

Programmable DC Electronic Load

User Manual

scientific

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Contents

	Preface	
	Important Symbols	
1	About this Manual	9
1.1	Scope	9
1.2	Targeted Audience	9
2	Unpacking	10
	2.1 Packing List	10
	2.2 Optional Components	11
	2.3 Checking for Shipping Damage	11
3	Products Introduction	12
	3.1 General Description	12
	3.2 Product Features	12
	3.3 Operating Instructions	13
	3.4 Operating Environments	13
	3.5 Protect Storage	13
	3.6 Maintenance and Cleaning	13
	3.7 Power Supply Voltage	14
	3.8 Fuse	14
	3.9 Warm-up Time	14
4	Panel Descriptions	15
	4.1 Front Panel Description	15
	4.2 Rear Panel Description	17
5	Menu Operation	18
	5.1.2 Introduction to Operation Modes	20
	5.1.3 Using the keys, Rotary knob and Touch Screen	20
5.2	Menu Operation	23
	5.2.1 Main Introduction	23
	5.2.2 Load Page	24
	5.2.2.1 Constant Current (CC) Mode	23
	5.2.2.2 Constant Voltage (CV) Mode	23
	5.2.2.3 Constant Resistance (CR) Mode	26
	5.2.2.4 Constant Power (CP) Mode	26
	5.2.2.5 Dynamic Current (DC) Mode	27
	5.2.2.6 Dynamic Voltage (DV) Mode	28
	5.2.2.7 Dynamic Resistance (DR) Mode	29

5.2.2.8	Dynamic Power (DP) Mode	30
5.2.3	Advanced Functions	31
5.2.3.1	Battery Mode (Battery Discharge Timer)	31
5.2.3.2	OCP/OPP	32
5.2.3.3	Program Mode	34
5.2.3.4	CV-CC Mode	36
5.2.3.5	CV-CR Mode	36
5.2.3.6	CR-CC Mode	37
5.2.3.7	Auto Mode	38
5.2.3.8	LED Mode	39
5.2.3.9	External Waveform Function	39
5.2.3.10	Fuse	39
5.2.3.11	RLC	40
5.2.3.12	Sweep	40
5.2.3.13	Sine	41
5.2.3.14	MPPT	41
5.2.4	Configure Page	42
5.2.4.1	Load Setup	42
5.2.4.2	Protection	44
5.2.4.3	Paral/Sync	44
5.2.4.4	SPEC Function	45
5.2.4.5	Digitizing	46
5.2.4.6	Timing	47
5.2.5	Save/Recall	47
5.2.6	Warning Log	48
5.2.7	System Setting	49
5.2.7.1	Settings	49
5.2.7.2	Date	49
5.2.7.3	RS232/485	50
5.2.7.4	TTL/Analog	50
5.2.7.5	LAN	51
5.2.7.6	GPIB	52
5.2.7.7	Info.	52
5.2.7.8	Factory	52
5.2.7.9	Calibrate	53
5.2.7.10	Upgrade	53

6	Parallel Operation	54
6.1	Paralleling Procedure	55
7	Installation.	56
7.1	Overview and Dimensions	56
7.1.1	Handle Installation	57
7.1.2	Casters Disassembly and Assembly	57
7.1.3	Locking and Unlocking of Casters	58
7.1.4	Installation of an Optional Intefrace Card	58
7.1.5	Installation Diagram of Electronic Load and Cabinet	59
7.2	AC Input Connection	60
7.3	Fuse Replacement	60
7.4	Load Connection	61
7.5	Remote Sensing Connection	62
7.6	External Control Interface	62
8	Troubleshooting	65
9.	SCPI Command Descriptions	66
9.1	IEEE - 488.2 Common Commands	66
9.2	System Subsystem	67
9.3	Setting Operation Mode of Electronic load	68
9.4	Load Subsystem	69
9.5	Config Subsystem	71
9.6	Measure Subsystem	79
9.7	Current Subsystem	80
9.8	Resistance Subsystem	83
9.9	Voltage Subsystem	86
9.10	Power Subsystem	89
9.11	LED (CR) Subsystem	92
9.12	Advance Subsystem	94
9.13	Specification Subsystem	107
9.14	Synchronous Subsystem	110
9.15	Program Subsystem	111
9.16	Status Subsystem	114
9.17	Fetch Subsystem	115
9.18	Time meas Subsystem	116
9.19	Digitizing Subsystem	117
9.20	Communication Subsystem	119
10	Dispatch procedure for service, E-Waste Management & Warranty	120
10.1	Dispatch procedure for service	120
10.2	E-Waste	120
10.3	Warranty	120

Important Symbols



This symbol highlights situations that are potentially dangerous, and highlights essential information that must be understood by the user.



This symbol highlights the precautions that users need to take to avoid potential injury while operating equipment.



This symbol highlights an important instruction that needs to be read before using the equipment.



This symbol indicates risk of exposure to high voltage and shock hazard.



This symbol indicates components of the supply that can be at high temperatures. Avoid touching these areas during or immediately after operation of the supply to prevent burns.



This symbol indicates that a grounded connection is required before operating the equipment. The input terminal with this label must be grounded to prevent possible electric shock.

In this manual, panel buttons are denoted by [], and software buttons / options are in bold type.

Dear Customer,

Thank you for using EL Series Programmable DC Electronic Load. We sincerely hope this product meets your needs.

This user manual is applicable to the following models:

Height	Power	200V	600V	1200V	Flippable Front Panel
2U	600W	60A	40A	*	NO
	1200W	130A	90A	45A	NO
	1800W	190A	130A	*	NO
	2400W	260A	180A	90A	NO
	3000W	320A	220A	*	NO
3U	3400W	370A	250A	125A	NO
	4400W	480A	320A	160A	NO
	5600W	610A	410A	205A	NO
4U	6600W	720A	480A	240A	YES
	8100W	720A	600A	300A	YES
7U	8800W	960A	640A	320A	YES
	10300W	960A	760A	380A	YES
	11000W	1200A	800A	400A	YES
	12500W	1200A	920A	460A	YES
	13200W	1440A	960A	480A	YES
10U	14700W	1440A	1080A	540A	YES
	15400W	1680A	1120A	560A	YES
	16900W	1680A	1240A	620A	YES
	17600W	1920A	1280A	640A	YES
	19100W	1920A	1400A	700A	YES
13U	19800W	2160A	1440A	720A	YES
	21300W	2160A	1560A	780A	YES
	22000W	2400A	1600A	800A	YES
	23500W	2400A	1720A	860A	YES
	24200W	2640A	1760A	880A	YES
	25700W	2640A	1880A	940A	YES
	26400W	2880A	1920A	960A	YES
27900W	2880A	2040A	1020A	YES	

* Custom master slave system could extend to 558KW(20 units 27.9KW E-load parallel connect).

This series of electronic load series is divided into Advanced Versions and Professional Version according to different applications. See the table below for a comparison of the two versions.

NO.	Description	Single unit (Advanced version)	Single unit (Professional version)
1	Dynamic frequency sweep	Not supported	Supported
2	Sine wave dynamic load	Not supported	Supported
3	High speed sampling rate	Supported	Supported
4	Non linear load	Not supported	Supported
5	User defined waveform	Not supported	Supported
6	MPPT	Not supported	Supported
7	External waveform function	Supported	Supported
8	Parallel capability	20pcs	20pcs

Safety Notices



Warning!

This symbol highlights operations that have the potential to endanger users. Operation procedures and instructions must be understood completely before use. Documentation



Caution!

Documentation must be consulted in all cases where this symbol is marked.



Note

This symbol highlights important instructions that need to be read before using the equipment.



This symbol indicates risk of exposure to high voltage and electrical shock.



This symbol indicates parts that may rise to a high temperature. Avoid touching these parts during or directly after operating the unit.



This symbol indicates that the equipment must have a grounded connection. The terminal with this label must be grounded to prevent electric shock.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Chapter 1 About this Manual

1.1 Scope

This manual provides the reader with detailed product information as well as installation, operation and maintenance instructions. This manual also provides our company contact information so that you can tell us your suggestions and comments about the performance of our products in order that we can continue to improve our product quality and our level of service.

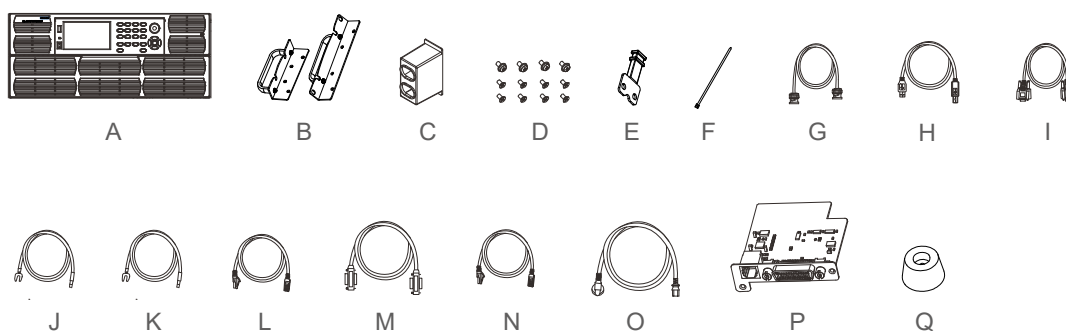
1.2 Targeted Audience

This manual is intended for product users and technical personnel that are involved with installing, operating and maintaining the product. Readers are required to have a certain degree of electrical and mechanical knowledge and be familiar with basic electrical and mechanical schematics.

Chapter 2 Unpacking

2.1 Packing List

Item	Description	Quantity	Remarks
A	EL Series High-density Programmable DC Electronic Load	1	As ordered
B	Rack Mount Brackets	2	Standard
C	DC Input Protective Cover	1	Standard
D	Screws	1set	Fasten item B and C
E	Strain relief bracket	2, 13U(4)	Support DC output cables
F	Cable ties	2, 13U(4)	Fix output cables
G	BNC Cable	2	Standard
H	USB Communication Cable	1	Standard
I	RS-232 Communication Cable	1	Standard
J	Sense Line (Red)	1	Standard
K	Sense Line (Black)	1	Standard
L	System Bus Cable	1	Standard
M	GPIB Communication Cable	1	Optional
N	LAN Communication Cable	1	Optional
O	AC Power Cable	1	Standard
P	GPIB & LAN Card	1	Optional
Q	Pads (applicable in 2U, 3U, 4U)	4	Standard



2.2 Checking for Shipping Damage

All products have undergone stringent testing before delivery, but inevitably damage can happen during transportation. Once you receive the product, please immediately check if there is any packaging damage that may indicate damage to the product. If you find damage related to product delivery, please immediately notify the transport company. Make sure to take photos documenting the damage to the product, and send them to us so that we can provide you with the best service.



Caution!

The load should not be carried by the front facing handles as they are not designed to carry the entire weight of the unit. The front facing handles are present to assist in sliding the unit in and out of cabinets.

Transporting the load by hand should be avoided when possible because it is very heavy. If it is unavoidable, then a minimum of two people should carry the unit by the housing, and should not grip exterior parts (handles, input/output terminals or rotary knobs).

2.3 Product Failure and Maintenance

In the unlikely event of product failure, please contact us in time to provide the serial number, detailed failure information and pictures of the faulty product to help us identify the cause of the failure. If the product need to be sent for repair, please pack it with the original packing material.

During the warranty period, the customer shall bear the freight and insurance costs for returning to the maintenance center, and we bear the return cost to customer. Please do not return the product without authorization from us.

Chapter 3 Products Introduction

3.1 Product Description

Electronic Loads (E-Loads) offer a variety of static load types in a single unit, including constant current (CC), constant voltage (CV), constant power (CP) and constant resistance (CR) modes. E-Loads also support Dynamic Load operations commonly used for performance and burn-in testing of power equipment. The loads offer a full set of protections including over-current protection (OCP), over-power protection (OPP), over-temperature protection (OTP), over voltage and reverse polarity alarm. The Loads can be fully controlled and monitored by external hardware through the External Control Interfaces. Standard RS232/RS485/USB communication interfaces, LAN & GPIB communication card is optional. Synchronized and parallel connection of a number of Loads is also supported, allowing the user to greatly increase total load capability.

3.2 Features

- Flippable front panel and color touch screen for convenient access and operation.
- CC, CV, CR, CP static load modes.
- CV+CC, CV+CR, CR+CC load modes.
- Adjustable voltage and current slew rates.
- Ultra-high precision of voltage & current measurements.
- Automated OCP/OPP testing function.
- 50kHz high-speed dynamic CC/CR mode.
- 500kHz high-speed voltage and current sampling rates.
- Automated Timing & Discharging tests for batteries.
- Auto mode function provides an easy way to do complicated test.
- Short circuit test mode.
- Auto mode for easily configured flexible test loads.
- ‡ Dynamic frequency sweep function for determining worst case voltage peaks.
- ‡ Non-linear load function for realistic load current.
- Fully controllable by external hardware through External Control Interface.
- Load voltage and current monitoring analog outputs.
- LED load mode.
- Full set of protections: OCP, OPP, OTP, over voltage and reverse polarity alarm.
- Supports paralleling of up to 20 units using master/slave control.
- Supports data upload and download through USB.
- SCPI language compatibility and standard rack size make it ideal for ATE System integration.
- Low noise smart fan control.
- Multiple versions and power levels to meet a variety of applications.

*Only included in Professional versions

3.3 Operating Instructions

This product is a precision instrument, please read this manual carefully before using an E-Load. In order to ensure measurement accuracy, it is recommended that all Loads be calibrated annually by a calibration laboratory. To ensure user safety, the input power cable, connector, and accessories of this product should be inspected annually.

3.4 Operating Environments

1. Scientific DCL Series Loads must be operated in a clean and dry environment with an ambient temperature between 0°C and 40°C, with a relative humidity between 5% and 95%.
2. Do not use DCL Series E-Loads in high ambient temperature environments. OTP protections may disrupt testing above 40°C ambient. Refer to the power derating curve in specification for details.
3. DCL Series Load should be spaced at least 1meter away from walls and other obstructions to ensure the efficient operation of forced air cooling.
4. Do not operate this product in an environment that contains large amounts of dust or corrosive gases. Please do not subject the unit shock and vibration or expose it to intense direct sunlight.

3.5 Product Storage

Please store this product in an area with an ambient temperature between -20°C and 85°C, and a relative humidity between 5% and 95% non-condensing. If the product will not be used for a long period of time, please pack it the original carton or similar packaging and store it in a cool and dry environment.

3.6 Maintenance and Cleaning

Before cleaning an E-Load, the AC input power cable and source power must be disconnected. Gently wipe off any dust from the unit's exterior using a brush, sponge, or cloth, together with a small amount of non-aqueous cleaning solution such as isopropyl alcohol. Do not use a corrosive or abrasive cleaning solution to clean this product. The display front panel can be cleaned with a cloth dampened in soft detergent. Removal of dust from the interior of this product must be carried out with a low-pressure air gun. To prevent damage to internal components, we suggest that such cleaning be performed by an authorized dealer on behalf of the user.

3.7 Power Supply Voltage

Ensure that the front panel which is in the OFF state and the AC input voltage is within the product's operating specification before connecting to the AC mains.



Caution!

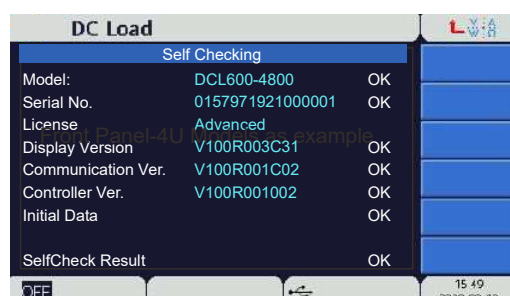
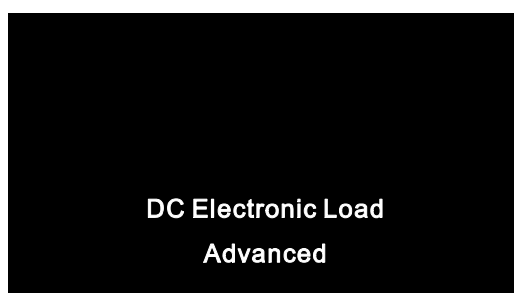
- To avoid burning out and electric shock, please only use the power cord supplied as a standard accessory.
- To prevent electric shock, be sure to take protective earthing. Please connect the power cable to the socket with the protective earth terminal.

3.8 Warm-up Time

In order to achieve the specified operating accuracy, the E-load should be powered on for a warm up of 30 minutes before use.

3.9 Starting Procedure

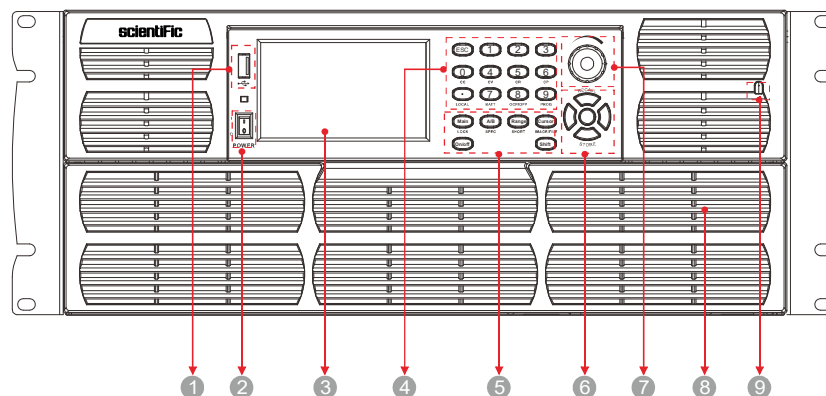
When the DCL Series Load is switched on, the unit will enter a start-up diagnostic routine to verify the integrity of the Load.



The diagnostic self-check will take several seconds to complete. If all check results are good, the unit will revert to the default screen. If any faults are detected during this test, please contact Customer Support

Chapter 4 Panel Description

4.1 Front Panel Description













Front Panel-4U Models as example






- ① USB host, for data import and export
- ② Power on/off switch
- ③ Color touch screen
- ④ Numeric and function keys

Keys	Name and the function	Manual Reference
① ~ ⑨	Numeric keys	[0]~[9]
⊙ / (LOCAL)	Decimal point key / Keypad unlock function key / Enter Local Control mode if in Remote Control.	[.] / ([LOCAL])
ESC	Esc key	[ESC]
CC (Shift + ①)	CC mode	[Shift]+[0]
CV (Shift + ④)	CV mode	[Shift]+[4]
CR (Shift + ⑤)	CR mode	[Shift]+[5]
CP (Shift + ⑥)	CP mode	[Shift]+[6]
BATT (Shift + ⑦)	Battery discharge timer	[Shift]+[7]
OCP/OPP (Shift + ⑧)	OCP or OPP test function.	[Shift]+[8]
PROG (Shift + ⑨)	Program function	[Shift]+[9]

5 Function keys and multifunction keys

Keys	Name and the function	Manual Reference
	Switches load from A setting to B setting	[A/B]
	Brings up cursor on screen	[Cursor]
	Press to return to the Main screen	[Main]
	On/Off control for load function	[On/off]
SHORT (Shift + )	Short circuit test function	[Shift]+[Range]
	Selects the alternate functions keys that have a secondary text label directly below	[Shift]
IMAGE/FILE (Shift + )	Screen snapshot/importing	[Shift]+[Cursor]
SPEC (Shift + )	Enables SPEC testing, displays GO/NG status when enabled.	[Shift]+[A/B]
LOCK (Shift + )	Locks the front panel keys and touch screen function	[Shift]+[Main]
	Selects Voltage/Current range of load	[Range]

6 Enter key and arrow keys

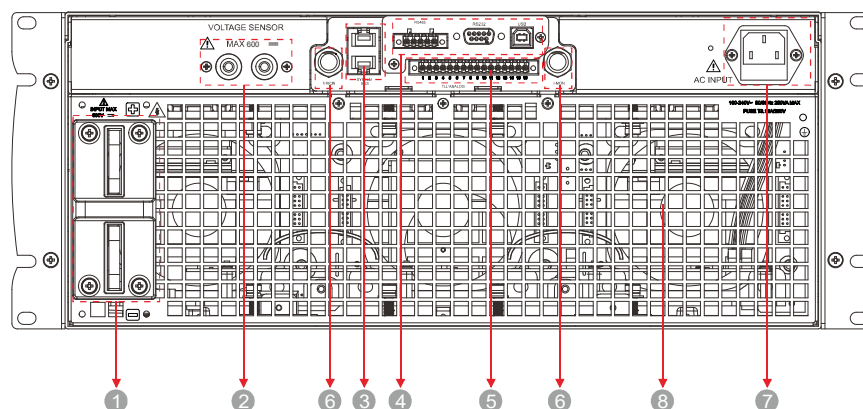
Keys	Name and the function	Manual Reference
RECALL (Shift + )	Recall configuration from memory	[Shift]+[▲]
STORE (Shift + )	Saves configuration to memory	[Shift]+[▼]
	Moves the cursor to the previous menu position	[◀]
	Used to move the cursor to the next menu position	[▶]
	Confirm key	[Enter]

7 Push-on knob, for editing parameter and moving the location of cursor

8 Ventilation holes

9 Stylus

4.2 Rear Panel Description



Rear Panel-4U Models as example

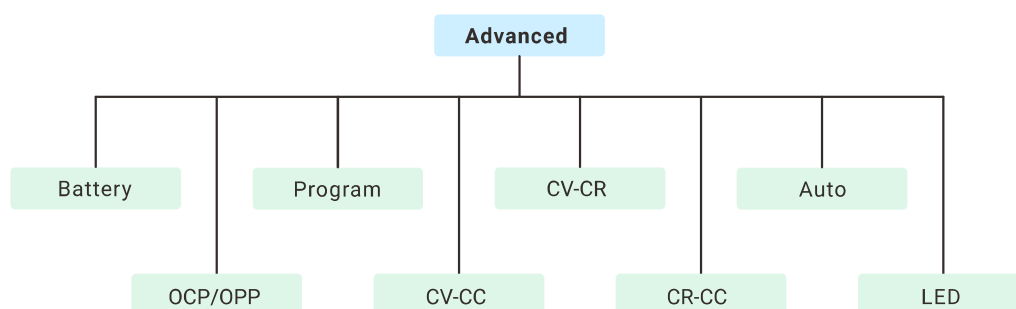
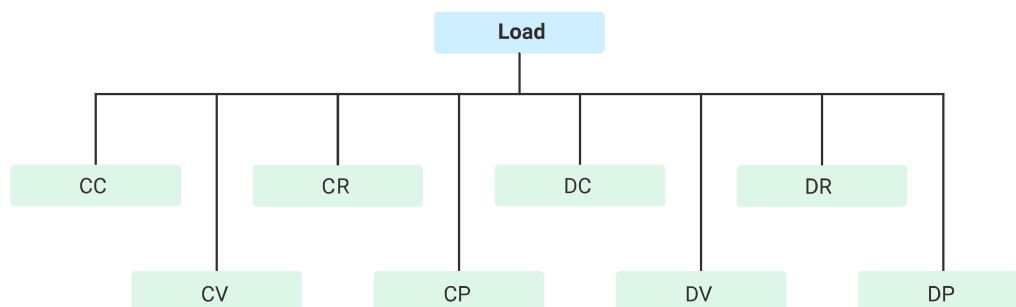
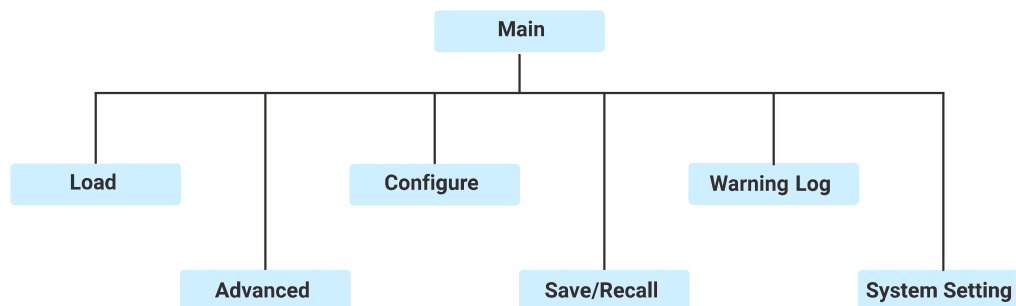
- ① Load positive/negative terminal
- ② Remote sense connections
- ③ System Bus connectors for master/slave connections
- ④ RS485/RS232/USB communication Interface (standard), LAN & GPIB communication Interface (optional) *
- ⑤ External TTL/Analog control interface
- ⑥ V-monitor/I-monitor
- ⑦ AC input connector
- ⑧ Fan Exhaust Grate

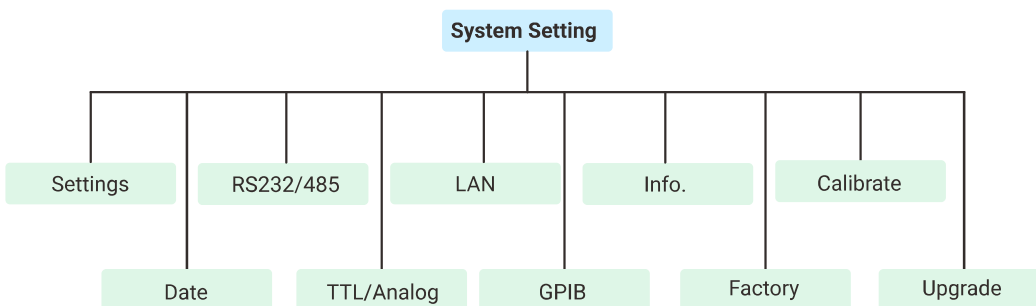
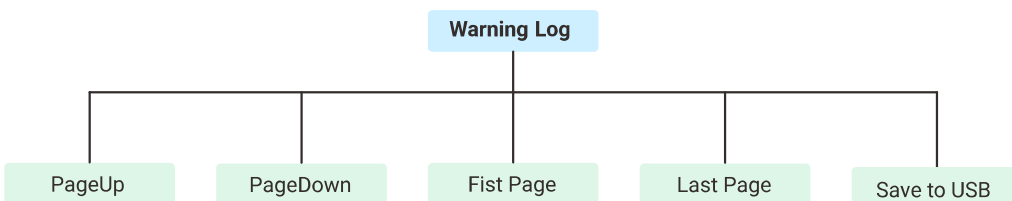
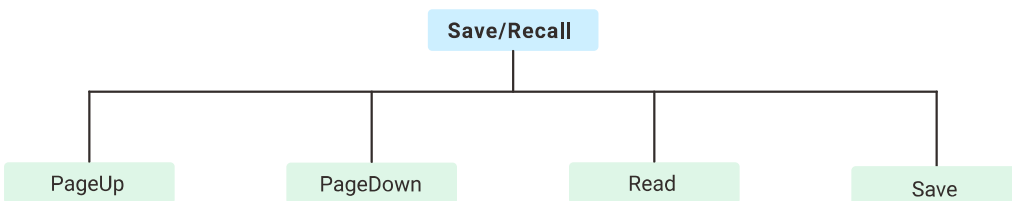
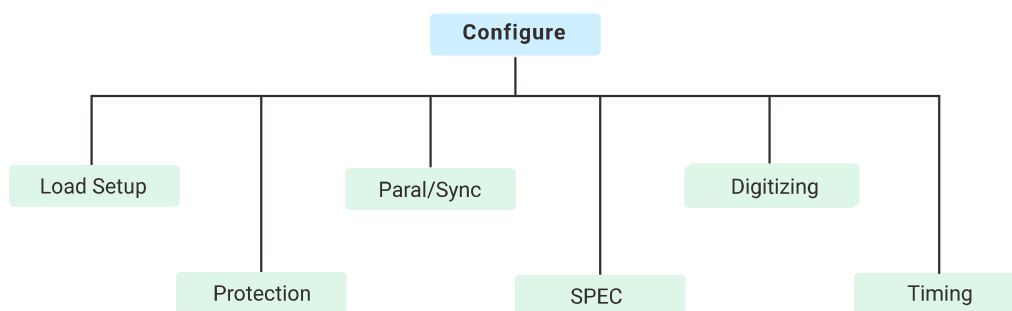
* If the LAN/GPIB interface card selected on order, it will be installed in place of the RS232/RS485 /USB interface card.

Chapter 5 Menu Operation

5.1 Menu Introduction

5.1.1 Menu Structure





5.1.2 Introduction to Operation Modes

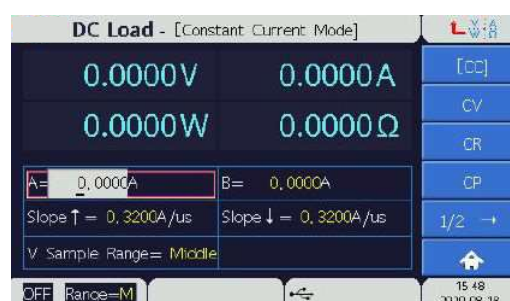
1. The Front panel [On/off] key is used engage and disengage the load.
2. When in Local Control mode, the load is controlled through the front panel interface. When operating in Remote Control or External Control, the Load is controlled by a remote computer, master load, or external control circuitry.
3. All front panel keys are functional when the load is in Local Control mode.
4. While under Remote Control, all front panel keys are locked except the [.]/[Local] key. Pressing the [.]/[Local] key while under remote control will revert the load to Local Control.

5.1.3 Using the Keys, Rotary Knobs, and Touch Screen

The following examples below will demonstrate how the front panel key switches, rotary knob, and touch screen can be used to interact with the Load. These examples include configuring a constant current load and navigating the main menu page.

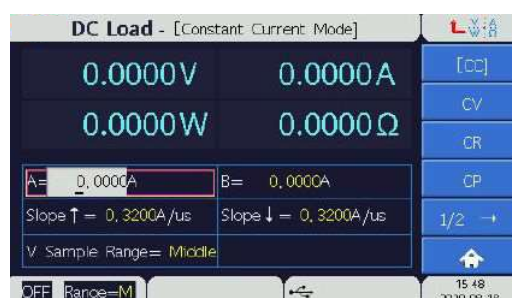
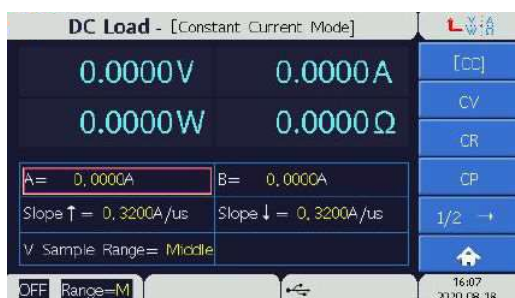
Using front panel keys to set a CC load:

1. Press the [Shift] key then the [0] key to select the load page and CC mode.
2. Press the [Cursor] key and use the two arrow keys on either side of the [Enter] key to move the cursor to the A parameter setting field.
3. Press the [Enter] key to select the A parameter, and use the [0]~[9] keys to enter the desired CC value. Press [Enter] again to confirm the value.



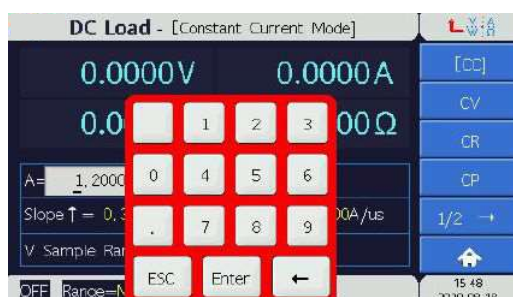
Using the Rotary Knob to set a CC load:

1. Press the [Shift] key then the [0] key to select the load page and CC mode.
2. Press the [Cursor] key and then use Rotary Knob to move the cursor to the A parameter setting field if not already highlighted.
3. Press the Rotary Knob to begin editing the A value. Set each digit by rotating the knob clockwise or counter clockwise, corresponding to an increment or decrement of the digit. Press the knob once to confirm the digit and the cursor will advance to the next digit. To conclude the entry, hold the knob down for 1.5 seconds.



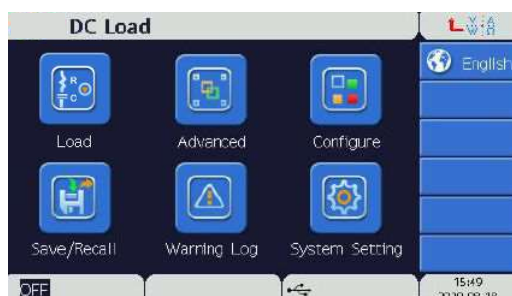
Using the Touch Screen to set a CC load:

1. In the Load page touch the $\begin{matrix} \uparrow & V & A \\ & W & \Omega \end{matrix}$ button in the top right hand corner of the page.
2. Touch the CC menu button on the right side of the touch screen page.
3. Touch the A parameter value field.
4. Use the numeric [0]~[9] keys on the pop-up red key panel to enter a CC value, then touch the [Enter] key on the red panel to finish the entry.



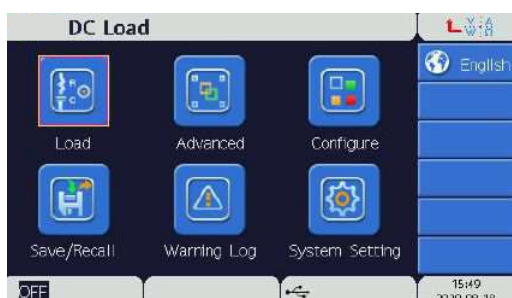
Navigating the Main Menu using the front panel keys:

1. Press the [Main] key.
2. Press the [Cursor] key.
3. Press the arrow keys to move the cursor between the menu options, and then press the [Enter] key to confirm a selection.



Navigating the Main Menu using the rotary knob:

1. Press the [Main] key.
2. Press the [Cursor] key.
3. Turn the knob to move the cursor to between the menu options, and then press the knob to confirm a selection.



Navigating the Main Menu using the touch screen :

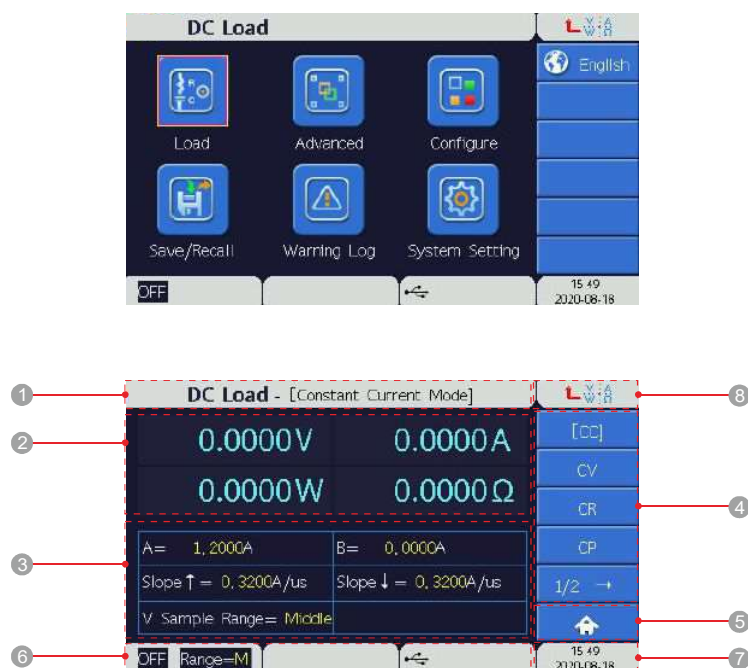
1. Press the [Main] key.
2. Touch the desired menu item on the Main page to enter a desired page.



5.2 Menu Operation

We will explain menu operation using the front panel keys as touch screen operation is self explanatory.

5.2.1 Menu Introduction

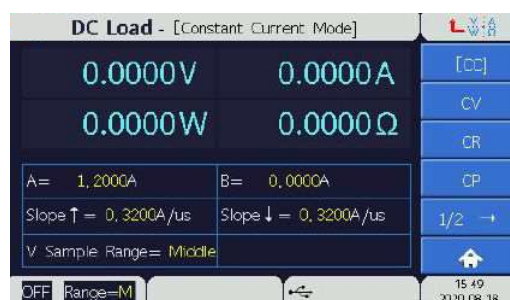


- ① Active menu page of the load
- ② Voltage, Current, Power, and Ohm meters
- ③ Parameters of load configuration
- ④ Sub-menus
- ⑤ Main page return button
- ⑥ Range, Output State and Mode icons
- ⑦ Date and time
- ⑧ Load page shortcut.

5.2.2 Load Page

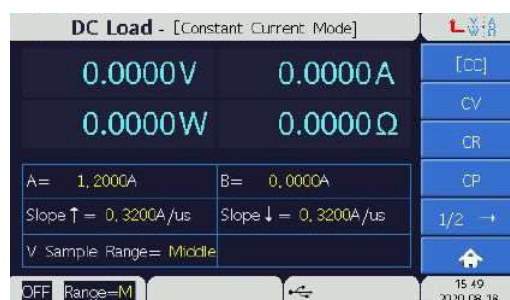
The Load page controls the type of load to be emulated. The different types of loads under the Load menu are:

- CC
- CV
- CR
- CP
- DC
- DV
- DR
- DP



5.2.2.1 Constant Current (CC) Mode

In CC mode, the Load will adjust to draw a programmed regulated constant current. To enter CC mode, press the [Main] key, select the Load menu, and then select CC mode.



CC Parameters:

A: Constant current value for load A setting (A).

B: Constant current value for load B setting (A).

Slope_↑: Current rise slew rate (A/μs).

Slope_↓: Current fall slew rate (A/μs).

Range (Low, Middle, High): Current could be programmed in each range, low range, middle range and high range. Choosing the lowest possible range yields the highest load accuracy. The limits of each range are specific to each model. Consult the product specification sheet for model specific range information.

V Sample Range: Voltage range of the CC load (Low, Middle, High) which overrides the voltage setting of Range, allowing the current and voltage to operate in different ranges simultaneously.

A/B State Switch: Each mode can save two current values in the A and B settings. The front panel [A/B] key can be used to manually switch between two programmed load current settings. The slew rate settings determine the rate at which the load will change from one current setting to another.



Note

- Never use CC mode for testing a constant current source. The regulation of the two units will fight for control of the current and an unstable oscillation will result.

5.2.2.2 Constant Voltage (CV) Mode

In CV mode the E-load will sink current such that the voltage at the load terminal will regulate to the programmed value. CV mode has 5 different response speeds: VerySlow, Slow, Normal, Fast and VeryFast. To enter CV mode, press the [Main] key, select the Load menu, and then select CV mode.



CV Parameters:

A: Constant voltage value for load A setting (V).

B: Constant voltage value for load B setting (V).

I Limit: Maximum CV mode Load current.

Response: Response speed (VerySlow, Slow, Normal, Fast and VeryFast).

Range (Low, Middle, High): Voltage could be programmed in each range, low range, middle range and high range. Choosing the lowest possible range yields the highest load accuracy. The limits of each range are specific to each model. Consult the product specification sheet for model specific range information.

I Sample Range: Current range of CV load (Low, Middle, High). Overrides the current setting of Range, allowing the current and voltage to operate in different ranges simultaneously.

A/B State Switch: Each mode can save two programmed parameter values in the A and B settings. The front panel [A/B] key can be used to manually switch between two programmed load settings. The response speed determines the rate at which the load will change from one voltage to another.

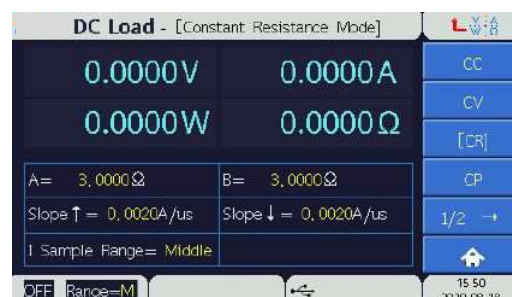


Note

- The remote sense should be connected so as to measure the output voltage of the unit under test while operating in this mode.
- Never use CV mode for testing a constant voltage source. The regulation of the two units will fight for control of the current and an unstable oscillation will result.
- Adjust the response time to a slow option if OPP alarm is triggered.

5.2.2.3 Constant Resistance (CR) Mode

In CR mode, the Load will adjust its resistance to the user programmed value. To enter CR mode, press the [Main] key, select the Load menu, and then select CR mode.



CR Parameters:

A: Constant resistance value for load A setting (Ω).

B: Constant resistance value for load B setting (Ω).

Slope_↑: Current rise slew rate ($A/\mu s$).

Slope_↓: Current fall slew rate ($A/\mu s$).

Range (Low, Middle, High): Resistance could be programmed in each range, low range, middle range and high range. Choosing the lowest possible range yields the highest load accuracy.

The limits of each range are specific to each model. Consult the product specification sheet for model specific range information.

I Sample Range: Current range of CR load (Low, Middle, High). Overrides the current setting of Range, allowing the current and voltage to operate in different ranges simultaneously.

A/B State Switch: Each mode can save two resistance values in the A and B settings. The front panel [A/B] key can be used to manually switch between two programmed load settings. The slew rate settings determine the rate at which the load will change from one resistance to another.

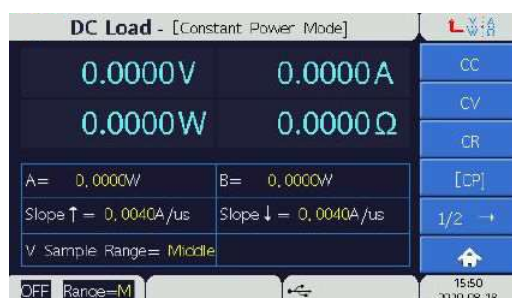


Note

- The remote sense should be connected so as to measure the output voltage of the unit under test while operating in this mode.
- Please check if the CR range setting is correct when an OV alarm is triggered.

5.2.2.4 Constant Power (CP) Mode

In CP mode, the E-load will adjust its resistance to sink a programmed constant power. To enter CP mode, press the [Main] key, select the Load menu, and then select CP mode.



CP Parameters:

A: Constant power value for load A setting (W).

B: Constant power value for load B setting (W).

Slope_↑: Current rise slew rate (A/μs).

Slope_↓: Current fall slew rate (A/μs).

Range (Low, Middle, High): Power range of the load that defines maximum permissible voltage and current. Choosing the lowest possible range yields the highest load accuracy.

The limits of each range are specific to each model. Consult the product specification sheet for model specific range information.

V Sample Range: Voltage range of CP load (Low, Middle, High) which overrides the normal voltage setting of Range, allowing the current and voltage to operate in different ranges simultaneously.

A/B State Switch: Each mode can save two power values in the A and B settings. The front panel [A/B] key is used to manually switch between two programmed load power states. The slew rate determines the rate at which the load will change from one power setting to another.

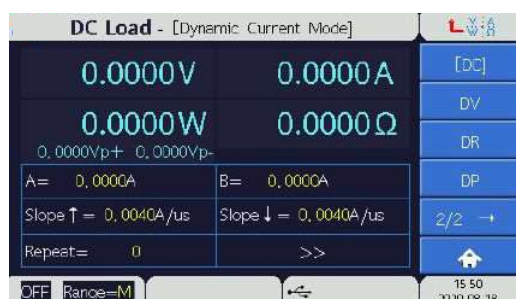


Note

When the source voltage decays to zero volts the load will attempt to draw max rated current. If the OCP limit of the Eload is greater than the current limit of the voltage source, the voltage source will be latched to the CC state. Otherwise the OCP will trip to shutdown the load.

5.2.2.5 Dynamic Current (DC) Mode

In DC mode, the E-Load will automatically cycle between the two CC settings, A and B. To enter DC mode, press the [Main] key, select the Load menu, and then select DC mode.



DC Parameters:

A: Constant current value for load A setting (A).

B: Constant current value for load B setting (A).

Slope_↑: Current rise slew rate (A/μs).

Slope_↓: Current fall slew rate (A/μs).

Repeat: The number of times to repeat the DC sequence (0 means infinite loop).

Time A: Setting A hold time (ms).

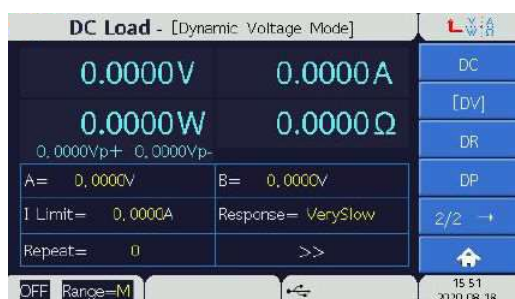
Time B: Setting B hold time (ms).

Range (Low , Middle, High): Current range of the load which defines maximum permissible voltage and current. Choosing the lowest possible range yields the highest load accuracy. The limits of each range are specific to each model. Consult the product specification sheet for model specific range information.

V Sample Range: Voltage range of DC load (Low, Middle, High) that overrides the normal voltage setting of voltage sampling Range, allowing the current and voltage to operate in different ranges simultaneously.

5.2.2.6 Dynamic Voltage (DV) Mode

In DV mode the DCL E-Load will cycle between CV settings A and B. DV mode has 5 different response speeds: Very Slow, Slow, Normal, Fast and Very fast. To enter DV mode, press the [Main] page key, select the Load menu, and then select DV mode.

**DV Parameters:**

A: Constant voltage value for load A setting (V).

B: Constant voltage value for load B setting (V).

I Limit: DV mode current limit (A).

Response: Response speed (VerySlow, Slow, Normal, Fast and VeryFast).

Repeat: The number of times to repeat the DV sequence (0 means infinite loop).

Time A: Setting A hold time (ms).

Time B: Setting B hold time (ms).

Range (Low , Middle, High): Voltage range of the load which defines maximum permissible voltage and current. Choosing the lowest possible range yields the highest load accuracy. The limits of each range are specific to each model. Consult the product specification sheet for model specific range information.

I Sample Range: Current range of DV load (Low, Middle, High) that overrides the normal Range of the current sampling thus allowing the current and voltage to operate in different ranges simultaneously.

5.2.2.7 Dynamic Resistance (DR) Mode

In DR mode, the DCL E-Load will cycle between CR settings A and B. To enter DR mode, press the [Main] key, select the Load menu, and then select DR mode.



DR Parameters:

A: Constant resistance value A (Ω).

B: Constant resistance value B (Ω).

Slope \uparrow : Current rise slew rate ($A/\mu s$).

Slope \downarrow : Current fall slew rate ($A/\mu s$).

Repeat: The number of times to repeat the DR sequence (0 means infinite loop).

Time A: Setting A hold time (ms).

Time B: Setting B hold time (ms).

Range (Low, Middle, High): The power Range of the load which defines the maximum permissible load voltage and current. Choosing the lowest possible range yields the highest load accuracy. The limits of each range are specific to each model. Consult the product specification sheet for model specific range information.

I Sample Range: Load current sampling Range in DR mode (Low, Middle, High) that overrides the normal Range of current sampling of the load, allowing the current and voltage to operate in different ranges simultaneously.

5.2.2.8 Dynamic Power (DP) Mode

In DP mode, the DCL E-Load will cycle between CP settings A and B. To enter DP mode, press the [Main] key, select the Load menu, and then select DP mode.



DP Parameters:

A: Constant power value A (W).

B: Constant power value B (W).

Slope_↑: Current rise slew rate (A/μs).

Slope_↓: Current fall slew rate (A/μs).

Repeat: The number of times to repeat the DP sequence (0 means infinite loop).

Time A: Setting A hold time (ms).

Time B: Setting B hold time (ms).

Range (Low, Middle, High): The Power Range of the load which defines the maximum permissible load voltage and current. Choosing the lowest possible range yields the highest load accuracy. The limits of each

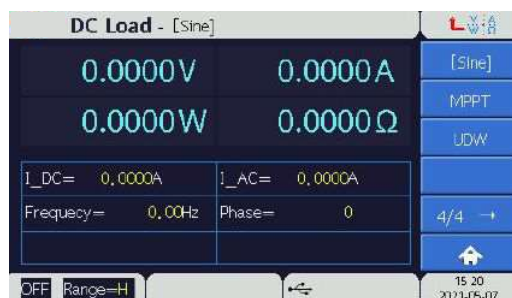
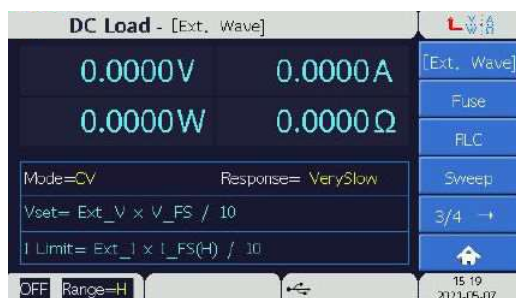
range are specific to each model. Consult the product specification sheet for model specific range information.

V Sample Range: Voltage range of the load in DP load (Low, Middle, High) that overrides the normal voltage setting of the Power Range, allowing the current and voltage to operate in different ranges simultaneously.

5.2.3 Advanced Functions

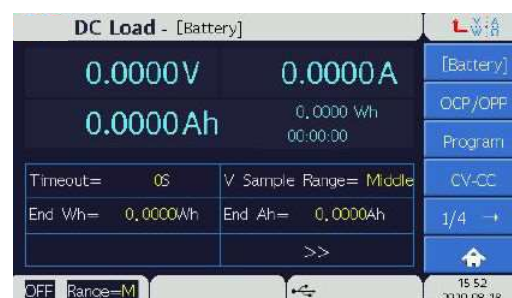
The following functions are available in the advanced menu:

- Battery
- OCP/OPP
- Program
- CV-CC
- CV-CR
- CR-CC
- Auto
- LED
- Ext. Wave
- Fuse
- RLC
- Sweep
- Sine
- MPPT
- UDW



5.2.3.1 Battery Mode (Battery Discharge Timer)

The Battery function serves to program the load as an automated battery discharge test, discharging the battery under test at a set rate until a test termination condition occurs. The load can perform a battery discharge test as a CC load, CR load, or CP load. Test termination conditions include End Voltage, End Watt Hours, End Ampere Hours, or test timeout.



Battery Parameters:

Mode: Load type (CC, CR, CP)

Set Value: Static load setting.

Slope \uparrow : Current rise slew rate (A/ μ s).

Slope \downarrow : Current fall slew rate (A/ μ s).

End Volt: Test termination voltage (V).

Timeout: Test timeout duration (s).

End Wh: Test termination Watt Hours (Wh).

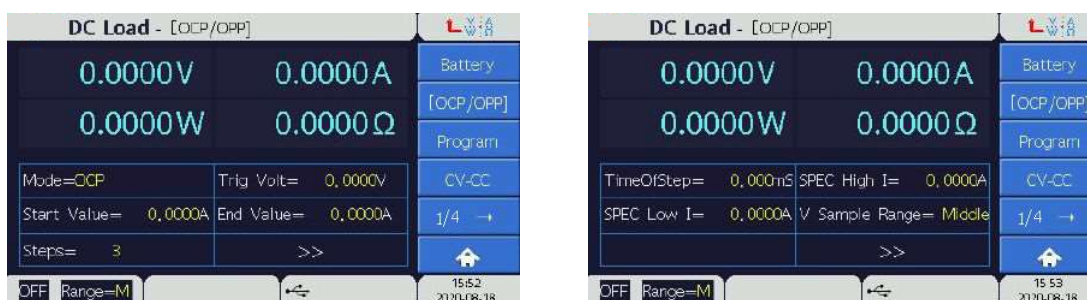
End Ah: Test termination Ampere Hours (Ah).

V Sample Range: Load voltage range for battery discharge test (Low, Middle, High). Overrides the normal voltage setting of the set the units selected Voltage Range.



Note

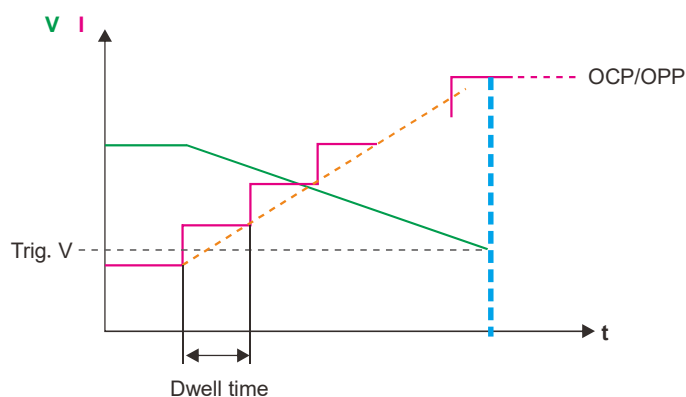
- When using End Volt, End Wh, End Ah as the cut-off condition, the Timeout must be set as long as possible.

5.2.3.2 OCP/OPP (Over-Current Protection/Over-Power Protection Test)

The OCP/OPP test function can be used to perform automated OCP and OPP testing of power supplies. In this mode the DCL E-Load will incrementally increase the load drawn from the supply until the supply voltage falls, or the maximum test load current is drawn.

The test is set up by choosing either OCP mode or OPP mode. The user then defines a start load current value, an end load current value, the number of load increment steps, and the time duration of each step. Finally, the user defines the supply voltage level that indicates a UUT OCP, OPP or test time out trigger. The test begins by loading the supply with the Start current Value, and the load current is then automatically increased after the set duration of each step has elapsed. The load current continues to increase after each step until the UUT voltage drops below the Test Termination Voltage or the load current has increased to the End Value.

While running this test, a specification function (SPEC) is defined to assist the user in supervising the test. The SPEC function checks if the Load current or power is within the range of the user defined SEPC high and SPEC low values. The SPEC status will be displayed at the bottom of the screen while the OCP/OPP test is running. If the Load is operating within the SPEC range, the text GO (Good) will be displayed at the bottom of the screen. If the Load is not operating within the SPEC range, NG (Not Good) will be displayed instead.



OCP/OPP Parameters:

Mode: Specifies OCP or OPP mode.

Trigger Volt: UUT OCP/OPP level.

Start Value: Starting load current value.

End Value: End load current value.

Steps: The number of load steps in the test.

Time Of Step: The time duration of each step.

SPEC High I/P: Specification of maximum current/power.

SPEC Low I/P: Specification of minimum current/power.

V Sample Range: Voltage range of load, that overrides the normal voltage setting of the selected Voltage Range.

5.2.3.3 Program Mode

The Program mode allows the user to program the load with a list of Load settings that can be executed sequentially. Up to 10 distinct programs can be saved in non-volatile memory so that they are remembered after power off, with space for a total of 300 program steps divided between the 10 programs. Users can link programs together in a program chain to produce more complex sequences and reuse saved programs. Programs can be triggered manually, remotely, or through the External Control Interface.



Program Mode Parameters:

Program No.: Program number (1-10).

Steps: The number of steps in the current program sequence.

Link: Program Link control which defines if another program should be appended to the current program. Enter the program number to link to, or set to 0 to indicate no linking.

Repeat: The number of times the program is to be repeated.

Remain Steps: The number of program steps remaining in the program chain.

Save: Saves a program to the selected program number.

Set Step: Sets a single step of a program.

Step No.: Chooses which step to edit (1-300).

Trigger: Sets the trigger type for the step (Skip, Auto, Manual, External).

Skip: The Load will skip the step and continue executing the program.

Auto: The Load executes the next step after the step time expires.

Manual: The Load executes the next step when the user presses the [Enter] key.

External: The Load will trigger the next step based on an External Control Interface signal.

Mode: Operation mode of the step (CC, CV, CR, CPoad off, Short mode).

Range: Sets the Load current Range of the step.

Value A: Sets the Load A value of the step.

Time: Sets the step time duration (0.1ms to 4000s). Click the check box to change time duration format to H:M:S, the maximum set value is 999 H 59 M 59 S.

Enable Value B: Enables the use of Load value B.

Slope[↑] : Rising current slew rate.

Slope[↓] : Falling current slew rate.

The Program mode includes a specification test (SPEC) to assist the user in supervising a program run. The user can define the voltage, current, and power that the load should see during the test. If the Load is operating within the specification, the text GO (Good) will be displayed at the bottom of the screen. If the Load is operating outside of this specification, it will display NG (Not Good) instead. The specification variables are:

SPEC High V: Voltage maximum specification.

SPEC Low V: Voltage minimum specification.

SPEC High I: Current maximum specification.

SPEC Low I: Current minimum specification.

SPEC High P: Power maximum specification.

SPEC Low P: Power minimum specification.

SPEC Delay: SPEC testing delay time. The SPEC test will begin after this delay time after the start of the program execution.

Prev Step: Return to the previous step.

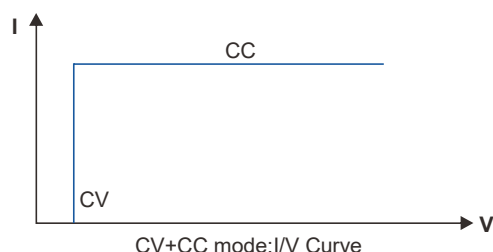
Next Step: Advances to the next step.

Exit: Exits the edit page.

>>: Advances the screen to next page.

5.2.3.4 CV-CC Mode

In CV-CC mode, the DCL E-Load behaves as a hybrid of CV and CC mode. The load will operate in CV Mode unless the load current would exceed the programmed CC value. If the CC value would be exceeded, the Load switches to CC mode.



CV- CC Parameters:

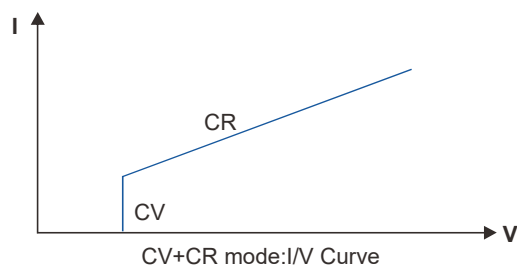
V_SET : CV mode voltage set value (V).

I_SET : CC mode current set value (A).

Response: Response speed (Very Slow, Slow, Normal, Fast, Very Fast).

5.2.3.5 CV-CR Mode

In CV-CR mode, the DCL E-Load behaves as a hybrid of CV and CR mode. The load will operate in CV mode unless the load resistance would fall below the programmed CR value. If the rise in source voltage would make the CV load resistance less the programmed CR value, the load will switch to CR mode.



CV- CR Parameters:

V_SET : CV mode voltage set value (V).

R_SET : CR mode resistance set value (Ω).

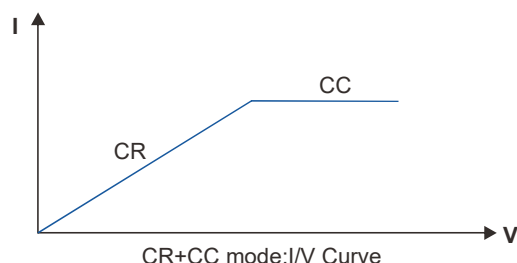


Note

- The unit under test should be configured for constant voltage output. The remote sense should be connected so as to measure the voltage at the terminal of the UUT.

5.2.3.6 CR-CC Mode

In CR-CC mode, the E-Load behaves as a hybrid of CR and CC mode. The load will operate in CR mode unless the Load current would exceed the programmed CC value. If the Load current would exceed the CC value, the Load switches to CC mode.



CR- CC Parameters:

R_SET : CR mode set value (Ω).

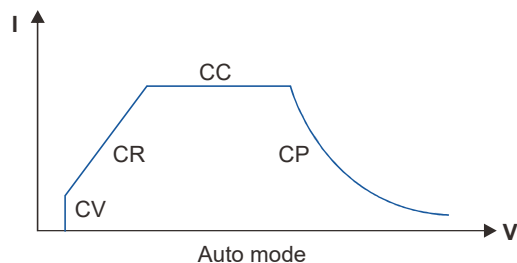
I_SET : CC mode set value (A).



- The unit under test should be configured for constant voltage output. The remote sense should be connected so as to measure the voltage at the terminal of the UUT.

5.2.3.7 Auto Mode

In Auto mode, the load will behave as a combination of CV, CR, CC, and CP modes as depicted in the Auto mode graph. When the UUT voltage begins to rise, the load will sink current as a CV load until the load resistance falls below the programmed CR value. As the UUT voltage then rises further, the load will remain in CR mode until the current exceeds the programmed constant current, where upon the load will transition to CC mode. If the UUT voltage rises further and the power dissipated by the load reaches the CP limit, the load will enter CP mode.



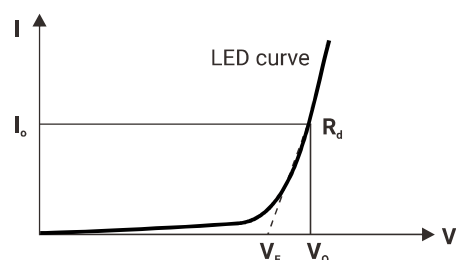
Auto Parameters:**V_SET** : CV set value (V).**R_SET** : CR mode set value (Ω).**I_SET** : CC mode set value (A).**P_SET** : CP mode set value (W).

Note

- The unit under test should be configured for constant voltage output. The remote sense should be connected so as to measure the voltage at the terminal of the UUT.

5.2.3.8 LED Mode

The I-V curve of LED is as shown below.

**LED V:** Working voltage of load LED.**LED I:** Output current of LED.**Parameter:** Includes Rd Default, Rd Coeff., Rd and Vf.

According to the I-V curve above we can get below formula:

$$V_o = V_f + I_o \times R_d$$

Assume $V_f = a \times V_o$, $a < 1$

$$\text{Then } V_o = a \times V_o + I_o \times R_d$$

$$\Rightarrow (1-a) V_o = I_o \times R_d \Rightarrow R_d = (1-a) \frac{V_o}{I_o} \Rightarrow R_d \text{ Coeff.} \times \frac{V_o}{I_o}$$

Or you can calculate the value of Rd Coeff. by the following formula.

$$R_d \text{ Coeff.} = \frac{V_o - V_f}{V_o}$$

So after setting any one parameter of Rd Default, Rd Coeff., Rd, Vf will give a real simulation of LED test.

5.2.3.9 External Waveform Function

This function refers to controlling the waveform by external. User can input 0V-10V voltage through control terminal on the rear panel. According to the chosen mode, setting parameters, controlling the waveform from output signal. In this mode, the external signal 0V to 10V can correspond to the full-scale of load condition.



Ext. Wave Parameters:

Mode: Can be set into CC(constant current), CR(constant resistance), CV(constant voltage) mode.

CC Mode: Setting parameters $I_{set} = Ext\ I \times I\ FS / 10$.

CR Mode: Setting parameters $R_{set} = R\ FS(\min) / Ext\ V \times 10$.

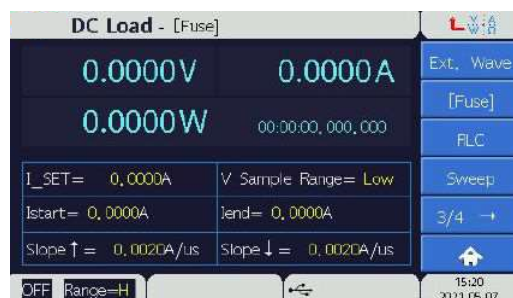
CV Mode: Setting parameters $V_{set} = Ext\ V \times V\ FS / 10$, $I\ Limit = Ext\ I \times I\ FS(H) / 10$.

Response: You can set the response speed. there are five response speeds: VerySlow, Slow, Normal, Fast and VeryFast.

5.2.3.10 Fuse

This function is mainly applied for fuse time counting test, when the current reaches the start counting current value, the timer starts to count, until the current value is equal to or lower than the end counting current value.

Current setting \uparrow start counting current \downarrow end counting current.



Fuse Parameters:

I_SET: Setting the current value.

V Sample Range: The voltage measurement range of the electronic load can be set, and there are three ranges: small/medium/large.

Istart: Setting the current value to trigger counting.

Iend: Setting the current value to stop counting.

Slope \uparrow : Setting the rise rate of the current.

Slope \downarrow : Setting the drop rate of the current.

5.2.3.11 RLC

This function can be set as RLC mode, which is mainly applied for simulating capacitive loads turn on and turn off test. In this mode, you need to set parallel resistance, parallel capacitance, series resistance, and series inductance to simulate a capacitive load. The function of the inductance is mainly to reduce the peak current when the machine is turned on and off.



RLC Parameters:

Rp: Setting the equivalent parallel load resistance, the gear is the same as the large range of the load under CR mode.

Cp: Setting the equivalent parallel load capacitance, the range that can be set is 30μF~50000μF.

Rs: Setting equivalent series resistance, the range that can be set is 30mΩ~20Ω.

Ls: Setting the equivalent series inductance, the range that can be set is 0.1μH~20μH.

5.2.3.12 Sweep

This function is a constant current dynamic frequency sweep function, which is mainly used to find the worst case voltage of the DUT. When using this function, the load will provide a specific dynamic frequency sweep, and use frequency conversion to find the worst-case voltage of the DUT. To use this function, you need to set the set the two current values of A and B, the rise and drop rates, the frequency of each step, the start frequency and the end frequency, the dwell time of each step, and the load rate. After setting, the load current will switch between two current values, and the frequency will be changed according to the step frequency.



Sweep Parameters:

A: Set A load current parameters.

B: Set B load current parameters

Slope↑ : Setting current rise rate.

Slope↓ : Setting current drop rate.

Step Freq: Setting step freq, range 0.01Hz~50KHz.

Start Freq: Setting start freq, range 0.01Hz~50KHz.

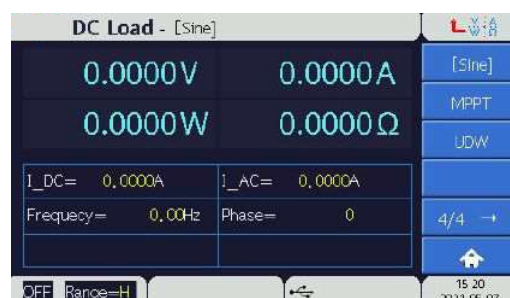
End Freq: Setting end freq, range 0.01Hz~50KHz.

Step Time: Setting step time, range 1ms~100s.

Duty: Setting the load rate, which can be set to 0%~100%, but it will be limited within the transient time of two load currents

5.2.3.13 Sine (Sine wave dynamic current load function)

This function is a sine wave dynamic current load function, which can provide a sine wave current for users. Setting the DC component of the load current, the AC peak-to-peak current value, the frequency of the sine wave and the times of repetitions, generates the sine wave Current.



Sine Parameters:

I DC: Setting the DC component of the load current.

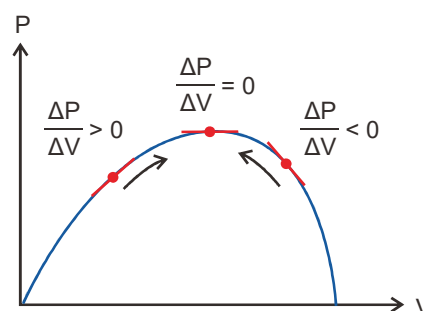
I AC: Setting the AC peak-to-peak current value.

Frequency: Setting the frequency of the sine wave, range 0~20kHz.

Phase: Setting phase angle of sine wave, range 0~359.

5.2.3.14 MPPT (Maximum power point tracking)

This function is the maximum power tracking function, which is mainly used to track the maximum power point of solar panels. The maximum output power of the solar panel always changes, due to the influence of the sun and the external environment. Through the maximum power tracking method, the maximum power point of the solar panel can be dynamically searched to maximize the efficiency of the solar panel. Based on the constant voltage mode, the electronic load will changes constantly and tracking the maximum power point of the solar panel in real time.



Mppt Parameters:

Uoc: Setting the voltage value of solar panel.

Isc: Setting the current value of solar panel.

Perror: Setting the power value of solar panel.

Time Interval: Set sampling interval time.

5.2.4 Configure Page

The configure page controls the following aspects of the load:

- Load Setup
- Protection
- Paral/Sync
- SPEC
- Digitizing
- Timing



5.2.4.1 Load Setup

Load On Voltage: The minimum voltage required at the load terminals before the load will turn on. If the voltage at the load terminals is less than this value, it will not turn on. The default setting is 0V.

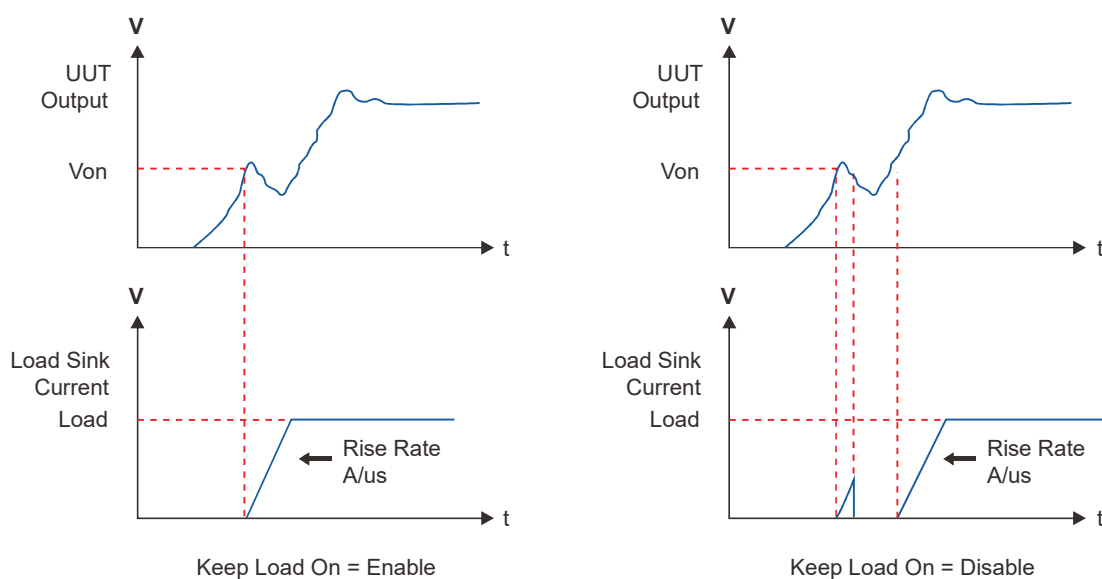
Load Off Voltage: The load terminal voltage at which the load will automatically turn off. The default setting is 0V.

Keep Load On: Lock the load on voltage.

Enable: Means load will continue loading current when the input voltage rises and is higher than Load On Voltage. When the input voltage drops and is lower than Load Off Voltage, the load will not unload.

Disable: Means load will continue loading current when the input voltage rises and is higher than Load On Voltage. When the input voltage drops and is lower than Load ON Voltage, the load will not unload.





Note

- To avoid an error in digital logic, the user should ensure that the Load On Voltage setting is higher than the Load Off Voltage setting. This does not apply if the Load On feature is disabled.
- If the Load On Voltage is set to be lower than the UUT's minimum output voltage, the UUT may be unable to start up, or could generate voltage or current overshoot. Always consider the UUT's minimum output voltage specification when choosing the Load On Voltage.

Vsense: Local Voltage sense or Remote Voltage Sense selection. Assure that the sense lines connection is made to the desired UUT measuring point with the correct polarity before enabling Remote Voltage Sense.

Auto Load On: When enabled, the load will apply the loading parameters and mode set last time before turned off for loading when power on next time. The default is Disable.

Measur Average: Sample averaging time of metered data such as load voltage and current.

Short Key: Short circuit function control (Disable, Hold, Toggle). When disabled, the Load Short function is disabled. When set to Hold, the load will behave as a short circuit as long as the Short key is pushed. When set to Toggle, pressing the Short key will toggle the Load short circuit mode on or off. Note that the user needs to first press the [Shift] key to be able to access the Short Key function, which serves as the secondary function of the [Range] key.



Note

- When operating in short circuit mode, the load simulates a short circuit but will not exceed the maximum rated current or power of the selected range.
- Engaging short mode will not affect the programmed settings of the load. When the short circuit disengages, the previous settings will return.

Sign of Volt: This function changes the voltage sign for display. The voltage shows a negative sign when Minus is selected and shows no sign if Plus is selected. The default is Plus.

5.2.4.2 Protection

OCP Check: OCP enable/disable.

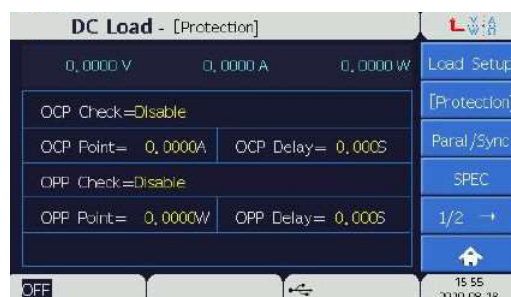
OCP Point: OCP trip level (A).

OCP Delay: OCP time delay (s).

OPP Check: OPP enable/disable.

OPP Point: OPP trip level (W).

OPP Delay: OPP time delay (s).



When the load detects an OCP or OPP condition an alarm will be displayed on the screen. Check that the settings of the UUT will not cause an OCP or OPP condition of the load before continuing. Also check that the load is set to the optimal range, as range limits can be exceeded without exceeding the load's rated power or current. Each range has limits on voltage and current, described in earlier sections. An OCP or OPP alarm can be cancelled by pressing [Enter] button on the front panel.

5.2.4.3 Paral/Sync

Several loads can be configured to operate in parallel connection or in a synchronous control mode.

Synchronous mode allows all connected loads to have unique settings, while the output enabling (ON/OFF) of slave units is controlled by the Master unit ON/OFF signal.

Always begin the programming of Loads by configuring the parameters of each Slave unit before turning on and setting the Master unit.



Mode: Connection mode (Disable, Sync, Parallel).

Master/Slave: Sets the load as a Master or a Slave.

Address: System bus address. Must be unique.

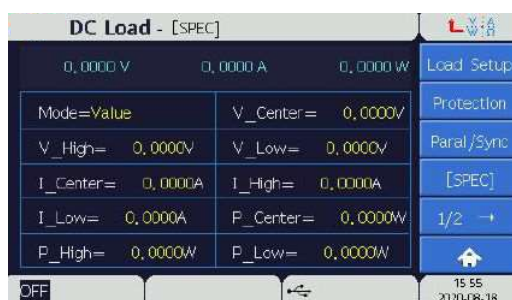
Parallel Number: Definition of the number of connected paralleled Loads. This number must be set identically on every connected unit.

Terminal Resistor: System bus termination resistor enable/disable.

Parallel Start: Initiates parallel connection.

5.2.4.4 SPEC Function

The SPEC function allows the user to program a supervisory test of the UUT specifications including UUT voltage, load current and power which can run while using other Load functions. When enabled, the UUT voltage, load current, and power will be compared to the SPEC parameters and the user will be informed if the UUT operates within this specification or not. If the UUT is operating within specification, GO (Good) will be displayed in the SPEC status zone at the bottom of the touch screen. If the specification is not met, NG (Not Good) will be displayed instead.



Parameters:

Mode: SPEC parameter type (Value, Percent).

V_Center: Load voltage reference value (V).

V_High: Upper bound of voltage SPEC test. Set in Volts while in Value mode. Set by the formula $V_High = V_Center + V_Center * Percent$ while in Percent mode.

V_Low: Lower bound of voltage SPEC test. Set in Volts while in Value mode. Set by the formula $V_Low = V_Center - V_Center * Percent$ while in Percent mode.

I_Center: Load current reference value (A).

I_High: Upper bound of current SPEC test. Set in Amps while in Value mode. Set by the formula $I_High = I_Center + I_Center * Percent$ while in Percent mode.

I_Low: Lower bound of current SPEC test. Set in Amps while in Value mode. Set by the formula $I_Low = I_Center - I_Center * Percent$ while in Percent mode.

P_Center: Load power reference value (W).

P_High: Upper bound of Power SPEC test. Set in Watts while in Value mode. Set by the formula $P_High = P_Center + P_Center * Percent$ while in Percent mode.

P_Low: Lower bound of Power SPEC test. Set in Watts while in Value mode. Set by the formula $P_Low = P_Center - P_Center * Percent$ while in Percent mode.



Note

- To enable the SPEC function while testing, use the [Shift] key to enable secondary key functions and then press the [SPEC] key. The SPEC status will then appear in the bottom bar of the touch screen, and will remain active until the SPEC is disabled by pressing the [SPEC] key again.

5.2.4.5 Digitizing

The load provides data capturing function for measured data to record waveform. It can record the measured data during loading via this function. Use command to return the voltage or current datas.



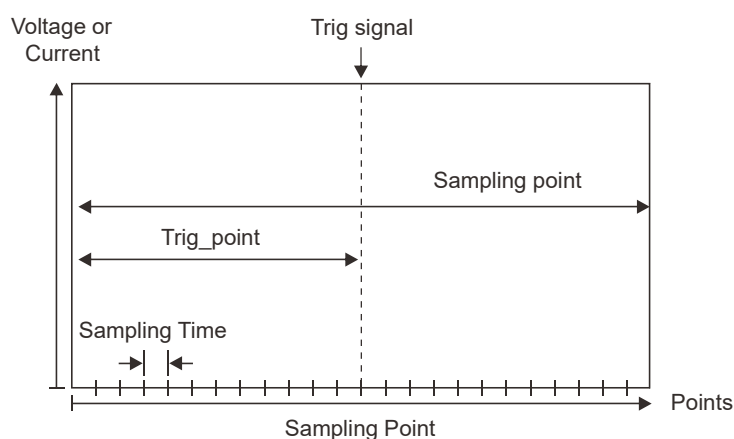
Sampling Time: The time between samples (ms).

Sampling Points: The total sampling point for measured data.

Trigger Source: Trigger condition options for data capture which include Load On, Load Off, Digital Port, Shift + Enter, BUS.

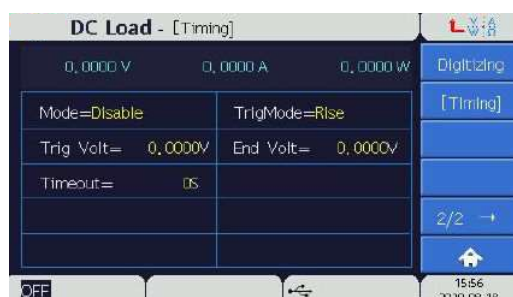
Trigger Point: Set the trigger point.

Digitizing Start: Arm the digitization mode.



5.2.4.6 Timing

The timing function can measure rise and fall times of the Load terminal voltage. The user decides whether a timing event triggers on a rising or falling voltage, and the levels at which the timer will start and stop.



Mode: Timing mode enable/disable.

TrigMode: Timing trigger type (Rise, Fall).

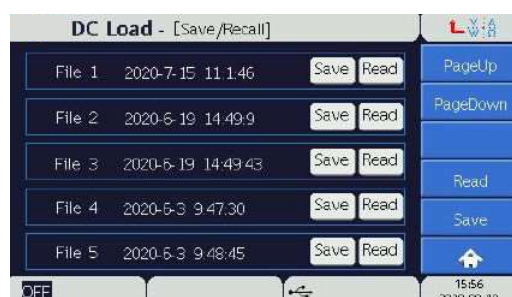
TrigVolt: Timer start trigger voltage level (V).

EndVolt: Timer stop trigger voltage level (V).

Timeout: Maximum time the timer will run before the timer function automatically terminates.

5.2.5 Save/Recall

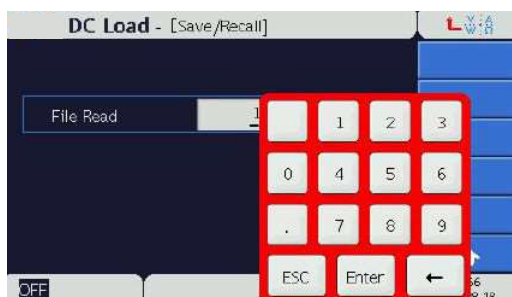
The Save/Recall function can be used to save unit configurations to non-volatile memory, and to recall previously saved configurations from memory. The Save/Recall files saved will include all Load data except for the items under the System Settings menu, and the Program Mode files.



1. To save the current load configuration to a particular file number, press the Save soft key and enter the file number (1-10) on the red pop-up keypad.



2. To load a saved configuration from memory, press the appropriate file number (1-10) on the the red pop-up keypad.

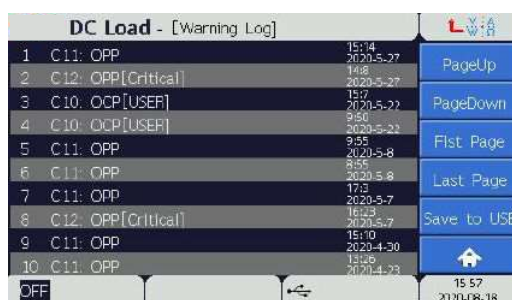


3. To delete a saved load configuration, touch the file's date and time displayed on the page to bring up the Delete file option pop-up. Select the Yes option to remove the file. The user can also overwrite files without first deleting them.



5.2.6 Warning Log

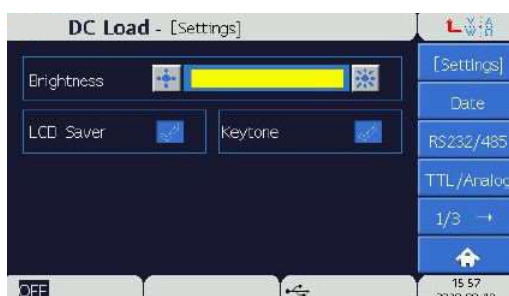
The Warning Log provides a history of all alarms the Load has encountered. The user may save this log to a USB memory drive inserted into the front panel.



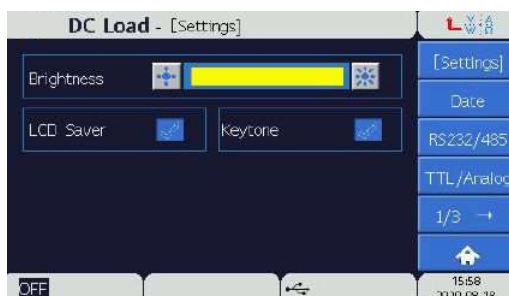
5.2.7 System Setting

The system settings page is used to configure the following parameter settings of the load:

- Settings
- Date
- RS232/485
- TTL/Analog
- LAN
- GPIB
- Info.
- Factory
- Calibrate
- Upgrade



5.2.7.1 Settings



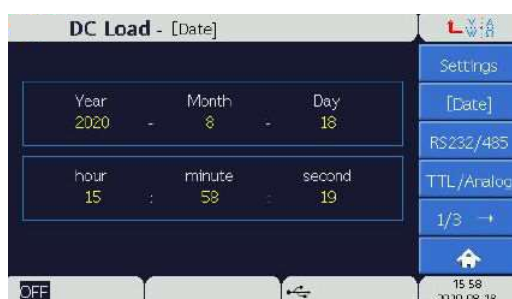
Brightness: LCD display brightness setting.

LCD Saver : Automatic LCD shutoff after 3 minutes of inactivity (enable, disable).

Keytone : Optional Beep audible tone upon key pressing (enable /disable)

5.2.7.2 Date

The user may use this menu to set the current date and time which is displayed in the bottom right corner of the screen on all pages.



5.2.7.3 RS232/485

The RS232 and RS485 communication ports can be used to connect a Load to a computer application. The user must set the serial communication parameters of the Load to match the computer's communication port settings.



RS232 Parameters:

Baud Rate: 9600, 19200, 38400, 57600 and 115200.

Parity: None, ODD, EVE.

Stop Bit: 1, 2.

RS485 Parameters:

Baud Rate: 9600, 19200, 38400, 57600 and 115200.

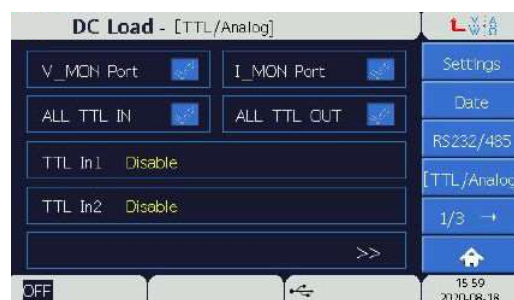
Parity: None, ODD, EVE.

Stop Bit: 1, 2.

Address: 1-254.

5.2.7.4 TTL/Analog

The TTL/Analog interface allows for remote control and monitoring of the Load using external hardware. The TTL/Analog interface consists of an analog voltage monitor output (V_MON), analog current monitor output (I_MON), two TTL control inputs, and three TTL monitor outputs. Each of these ports is disabled by default unless enabled.



The available selections TTLOut1, TTLOut2 and TTLOut3 are, where H indicated active high:

- Disable
- Batt Discharge Finish (H)
- OCP/OPP Test PASS (H)
- Program Finish (H)
- SPEC Test PASS (H)
- OCP, OPPOTP, OV, REV (H)
- BUS Control (H)
- 5V

The available options for TTL In1 and TTL In2:

- Disable
- Load On (H), Load Off (L)
- Remote Inhibit (H)
- Load OnOff (Toggle)

5.2.7.5 LAN

It sets the Ethernet address. The menu will be available only after installing the LAN & GPIB interface.



LAN Parameters:

Mode: IP address allocation mode, Static or Auto. Auto mode uses DHCP, Static mode uses a user defined IP.

IP Address: Local IP address of the unit.

Subnet Mask: 0~255.

Default Gateway: 1~254.

MAC Address: MAC address of the Load, cannot be edited.

Apply: Press this soft key to apply all the Ethernet settings.

Default: Press this soft key to restore default network settings.

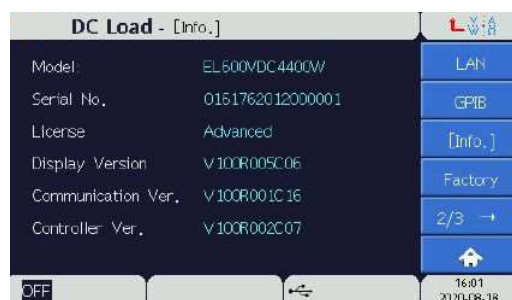
5.2.7.6 GPIB

It sets the GPIB address. The menu will be available only after installing the LAN & GPIB interface.



5.2.7.7 Info. (Information)

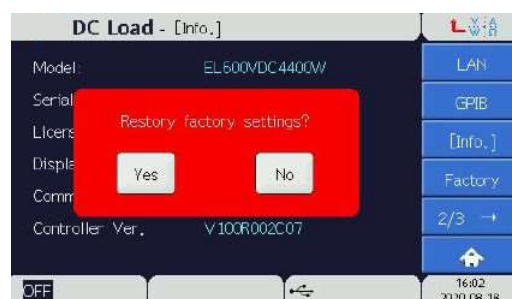
The information section displays the Model Number, Serial Number, License, and Software versions of the Load.



5.2.7.8 Factory

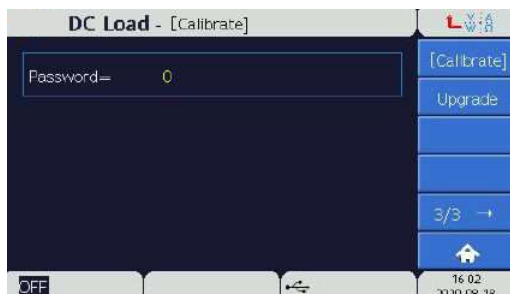
The Factory menu can be used to restore the Load to factory default settings. Selecting the Factory menu option will immediately open the factory reset dialog pop-up, which consists of a simple Yes or No decision.

Note: Resetting to factory defaults will not clear the 10 files Program file slots, the Warning Log, or the files saved in Save/Recall menu.



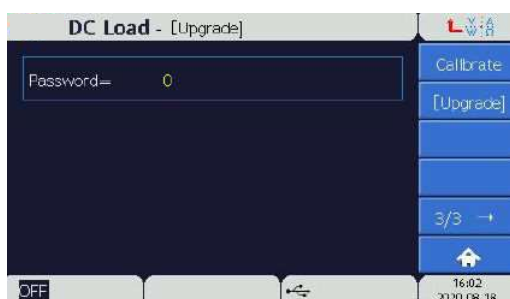
5.2.7.9 Calibrate

The Calibrate menu is used to calibrate the Load's voltage and current meters in each range. The menu is password protected. Please contact technical support for further information.



5.2.7.10 Upgrade

The Upgrade menu is used to perform firmware updates. Please contact technical support for further information.



Chapter 6 Parallel Operation

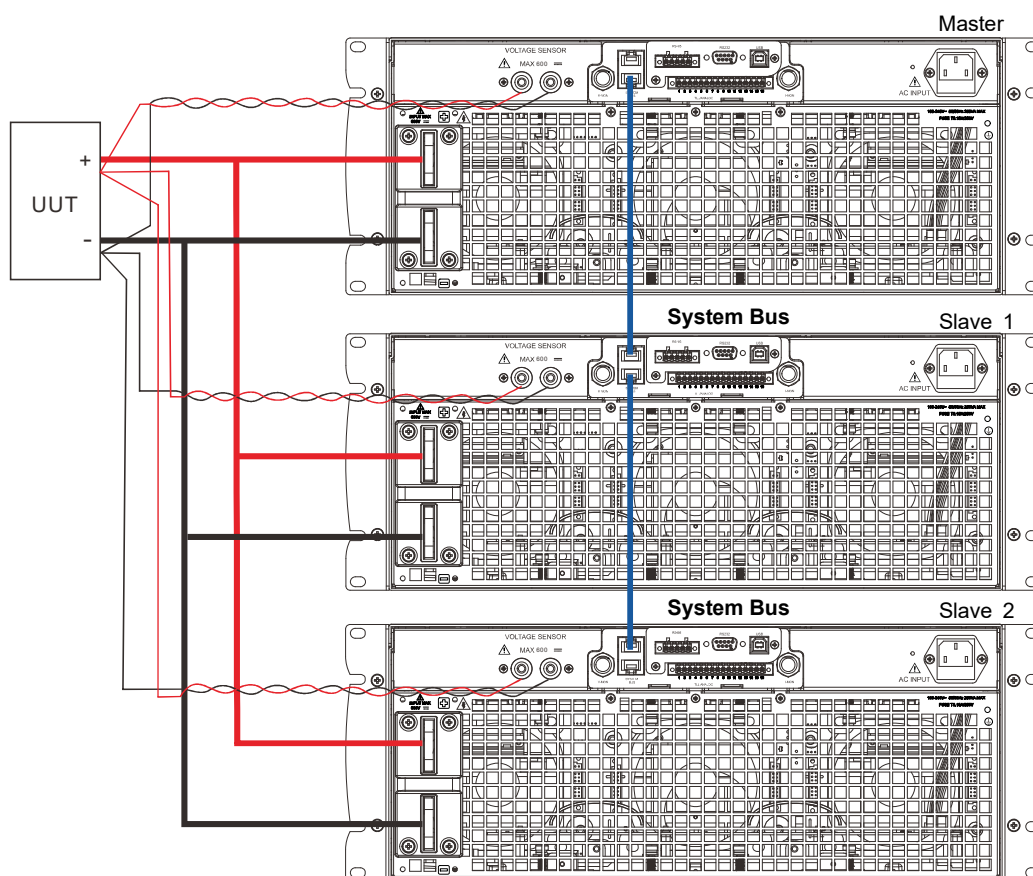
Electronic Loads can be connected in parallel to increase total loading capability. The paralleled Slave units are controlled by a single Master unit.



Note

- All Slave units must be configured before the Master unit is configured.
- There can only be one Master unit in any Master/Slave connection.
- Each Slave address must be unique.

Example wiring diagram of 3 paralleled units:



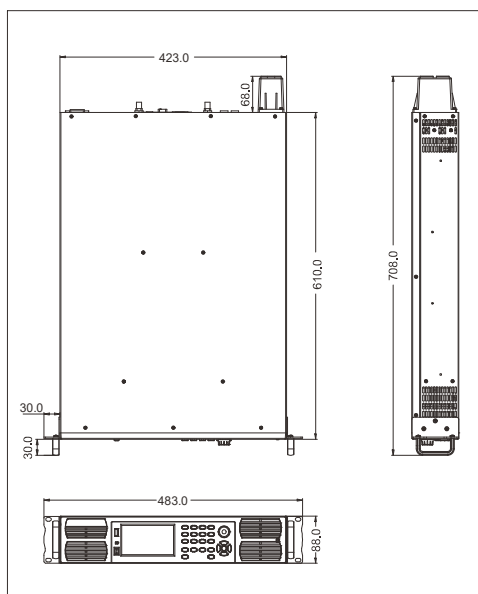
6.1 Paralleling Procedure

The procedure to connect 3 Loads in a Master/Slave Configuration is as follows:

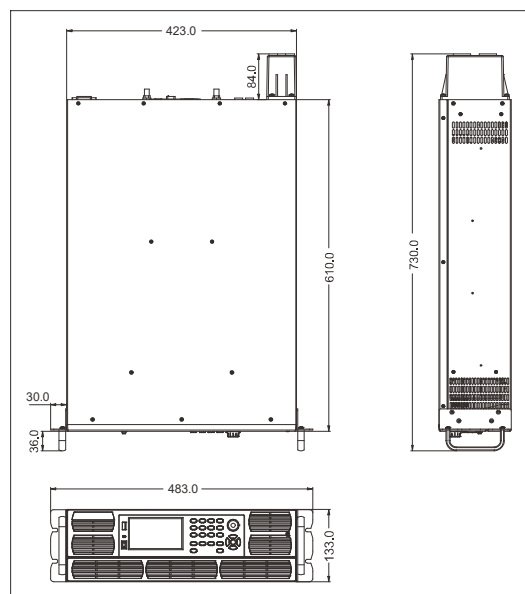
1. Assure all Loads are powered off the wire the 3 loads to the UUT as shown in the diagram above.
 - a. Connect each Load's power terminal to the UUT's output power terminals.
 - b. Connect the remote sense of each Load to the UUT's output power terminals.
 - c. Connect the system bus between each unit as shown.
2. Configure the Slave units, then configure the Master unit. For each unit:
 - a. Press the function key to enter the Paral/Sync menu.
 - b. Select "Parallel" and press [Enter] key to confirm the Parallel setting.
 - c. Select the unit as a Master unit or Slave unit as appropriate.
 - d. Turn on (enable) the Termination Resistor of the first and last units in the System Bus chain.
 - e. Press the Start button on the Master unit to search all the slave units. The loads should now be connected in parallel, with a Master unit which will display the sum of all load current and power.
3. After power-off, if you want to keep the previous setting, please power on all Slave units and allow them to complete their start-up checks. Then power on the Master unit. The Master will automatically search for the connected Slave units upon power on.
4. To disable a parallel connection, first disable the parallel setting by pressing the [Main] key, selecting the configure submenu, selecting the Parallel /Sync submenu, and set the parallel Mode to Disable. The System Bus cables can then be removed to complete the process.

Chapter 7 Installation

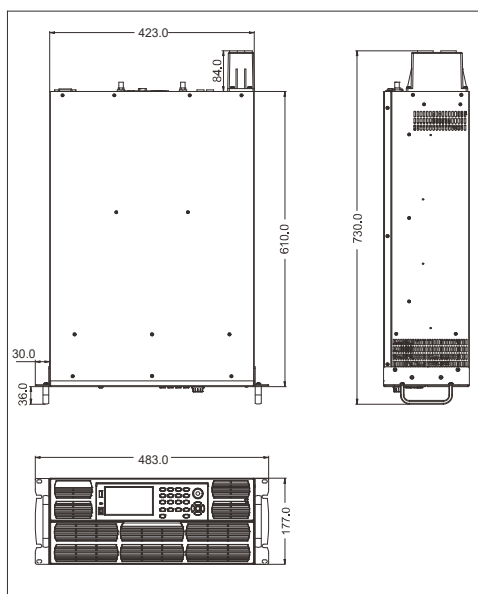
7.1 Overview and Dimensions



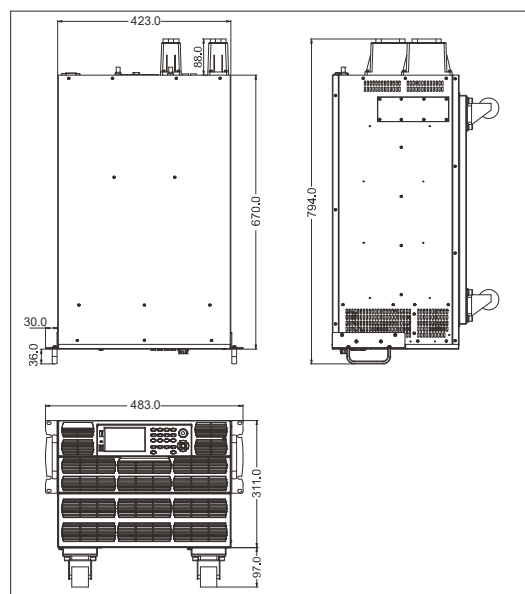
2U Height Models Unit: mm



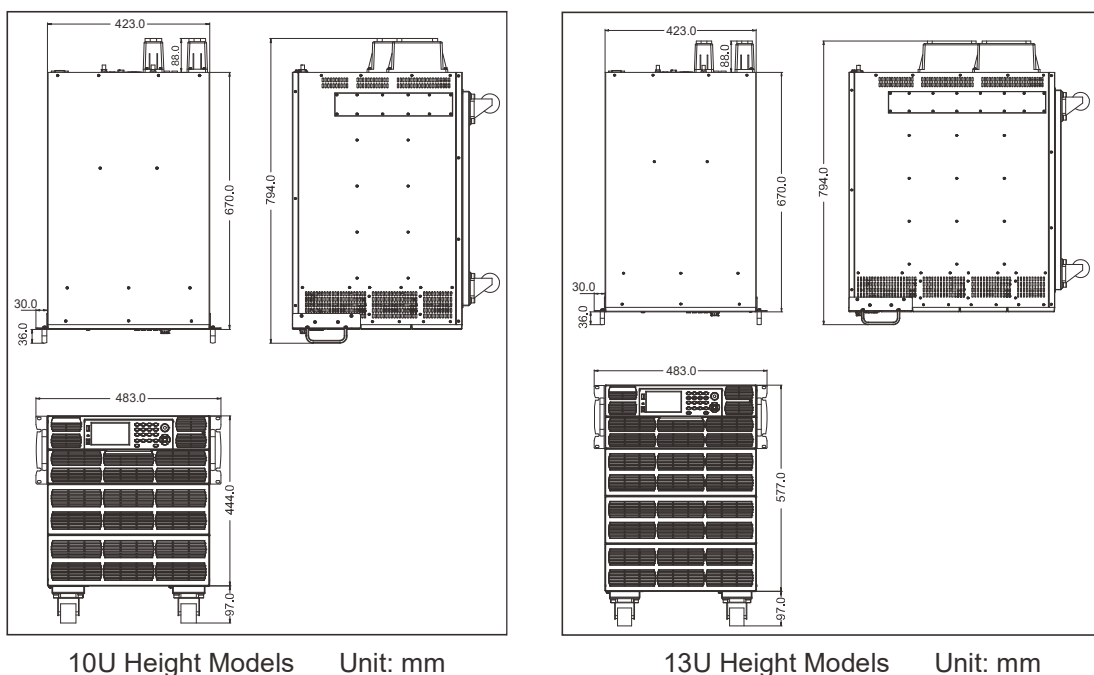
3U Height Models Unit: mm



4U Height Models Unit: mm



7U Height Models Unit: mm



10U Height Models Unit: mm

13U Height Models Unit: mm

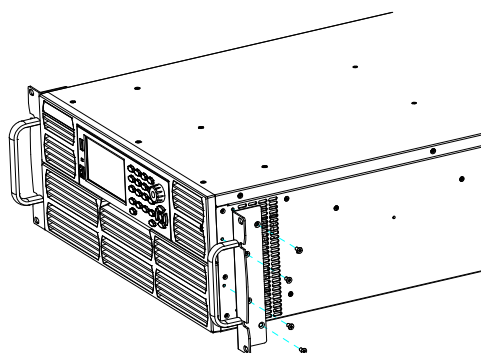
7.1.1 Handle Installation

Before mounting the unit in a rack, users can install the handles on the electronic load according to actual needs. The handles and screws are included in the accessories. Refer to the figure below to assemble the handles.



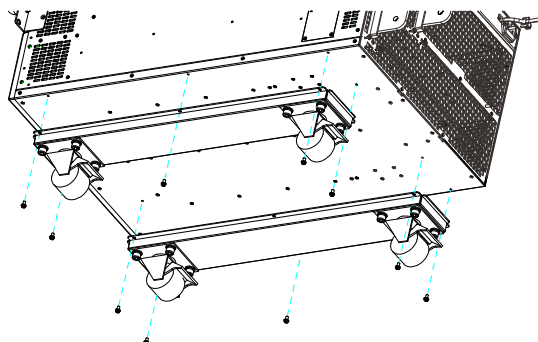
Caution!

- The handles on the front side of the device are for rack manipulations, but are not designed to carry the whole weight of the supply. The supply should not be carried by the handles.



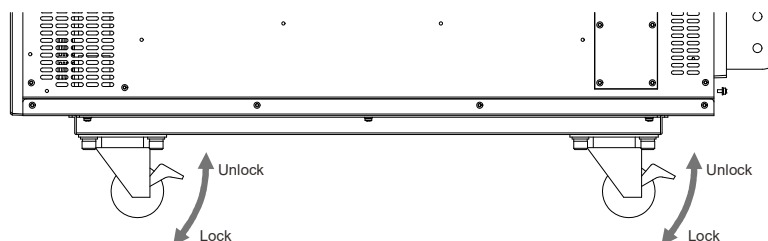
7.1.2 Casters Disassembly and Assembly

If necessary, refer to the figure below to install and remove the casters of the electronic load.



7.1.3 Locking and Unlocking of Casters

Please refer to the figure below to lock and unlock the casters. It is recommended to lock the casters to ensure that the electronic load stays safely in place when wiring.



7.1.4 Installation of an Optional Interface Card



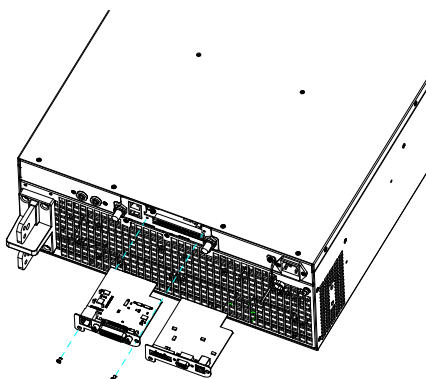
Caution!

- ESD protection procedures must be used when inserting or exchanging an interface card.
- The unit must be powered off before inserting or exchanging an interface card.
- Do not insert other hardware instead of the specified interface card.
- If an interface card is removed or not used, it is strongly recommended to install the card slot cover to avoid internal buildup of dust or particulate matter, increasing the risk of arc failure and shock hazards.

This series of electronic load provides optional interface cards. The interface slot is located on the rear panel, making it easy to install and swap interface cards.

Installation steps:

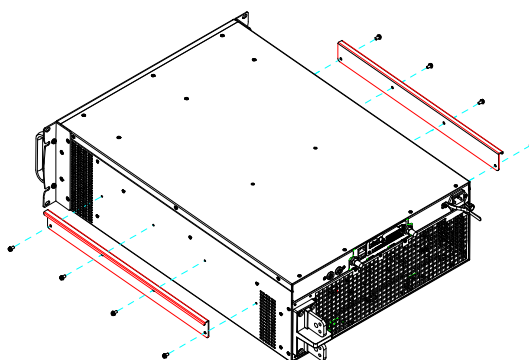
1. Use a suitable screw driver to remove the slot cover.
2. Insert the interface card into the slot and ensure that it is held at a 180° angle to the rear panel of the unit. Slide the card in assuring that the interface card is properly inserted into the connector inside of the unit.
3. Tighten the screws. After installation, the interface card is ready for use. The unit can now be controlled through the new interface



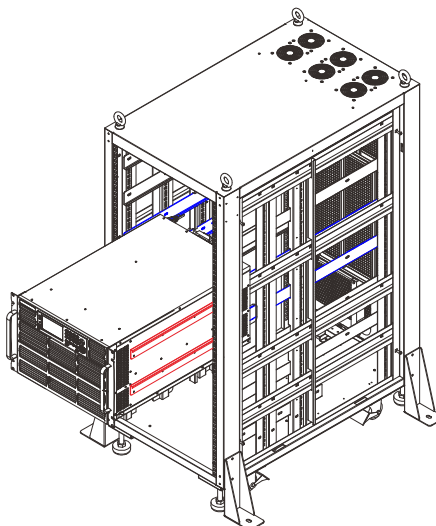
7.1.5 Installation Diagram of Electronic Load and Cabinet

This series of electronic load can be mounted in a standard rack panel or cabinet. It's easy to integrate into your test system. The user can select the optional rack-mount slide kit, which consists of two parts.

Part A is used to attach to each side of the source as shown below in red. To prevent internal damage please use the screws provided with the rack-mount kit.



Part B will be installed inside the cabinet as shown below in blue. Once part B is finished installing, the source can be inserted and slid to the end of the cabinet.



7.2 AC Input Connection

This series of Electronic Load supports the universal AC input range of 100VAC to 240VAC, 50Hz to 60Hz.



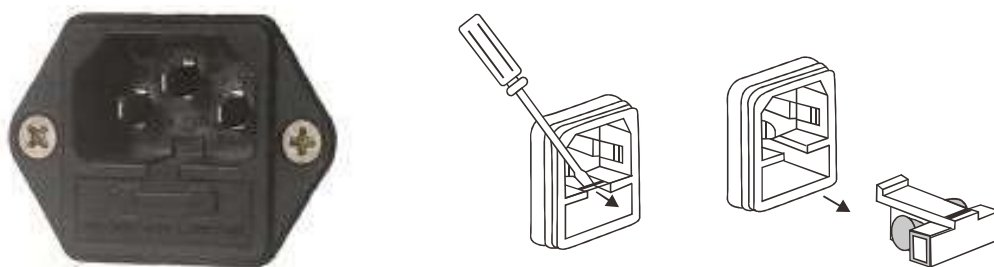
To prevent electric shock and damage to the instrument before connecting the power cord, please consider the following precautions.

- Before connecting the power cord, ensure that the AC input voltage is within the range of the of instruments input voltage specification.
- Ensure that the AC power is disconnected from the cable before attempting to install it.
- To prevent electric shock and fire, please use the power cord provided by us.
- To prevent electric shock, the earth ground must be connected to the Load. Connect the power cable to a three-pronged socket with an earth ground connection.

7.3 Fuse Replacement

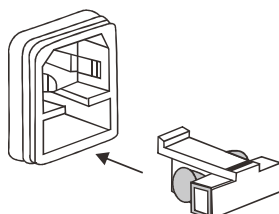
The power cord jack of the instrument includes the fuse. Please refer to the rear panel introduction of the corresponding instrument for the detailed position. The replacement steps for this type of the fuse are as follows.

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.



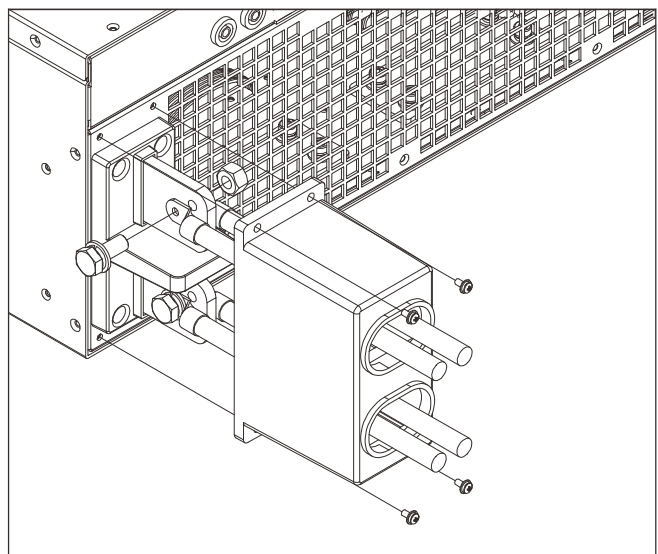
2. Have a visual inspection of the fuse to see whether it is burnt out; if yes, replace it with another fuse of the same specification. Refer to the corresponding technical specifications for fuse rating.

3. After replacement, mount the fuse block to the original position, as illustrated below.



7.4 Load Connection

Please make sure that the power switch is in the OFF position before making a load connection. Remove the screws for the protective cover and pull the cover away from the load far enough to fully expose the output terminal block. Assure that appropriate ring terminals are swaged on to the ends of the load wires and pass them through the protective cover's openings. Attach the load wire ring terminals to the terminal bars using the supplied bolts, nuts and washers and tighten the wire terminal hardware with appropriate tools. Replace the protective cover.



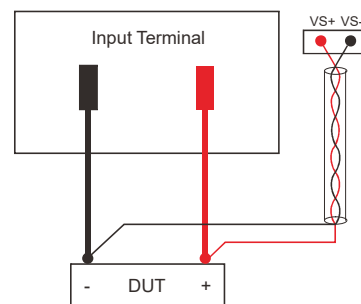
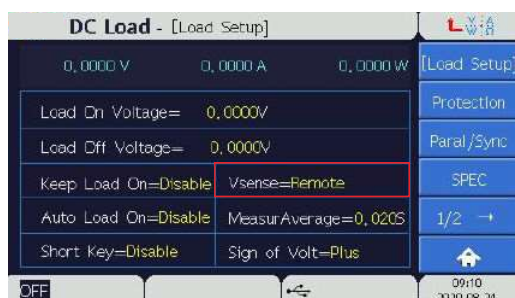
- To minimize voltage drop in the load wires, choose a sufficient wire gauge and make the Load wires as short as possible.
- If the load wires are crimped with terminals please make sure all the live parts are electrically insulated.

Please refer to the table below to select appropriate cable size. Also consider the temperature and voltage rating of the wires and voltage drop due to Load current when selecting the wire size:

Rated Current of equipment (A)	Minimum Conduct Sizes		Rated Current of equipment (A)	Minimum Conduct Sizes	
	Nominal Cross-sectional Area (mm ²)	AWG or kcmil		Nominal Cross-sectional Area (mm ²)	AWG or kcmil
13~16	1.5	14	125~160	50	0
16~25	2.5	12	160~190	70	000
25~32	4	10	190~230	95	0000
32~40	6	8	230~260	120	250 kcmil
40~63	10	6	260~300	150	300 kcmil
63~80	16	4	300~340	185	400 kcmil
80~100	25	2	340~400	240	500 kcmil
100~125	35	1	400~460	300	600 kcmil

7.5 Remote Sensing Connection

Under CC, CV, CR or CP mode, if the load sinks a large current, a significant voltage drop may be present between the UUT and the Load terminal. To ensure measurement accuracy, a remote sense connection can be used to compensate for the voltage drop in the connecting wires. The remote sense connection is available at the rear panel of the Load. For remote sense operation, connect VS+ to the UUT positive terminal and connect VS- to the UUT negative terminal. Select the remote option for VSense under the Load Setup menu.

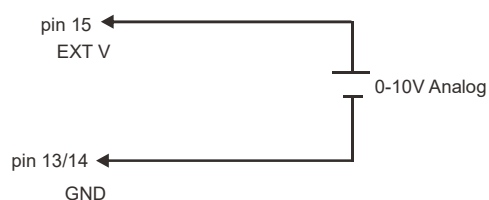


7.6 External Control Interface

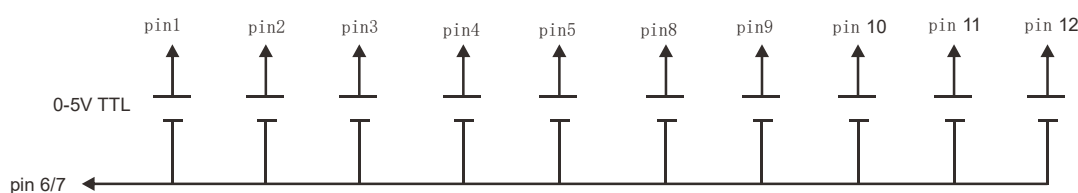
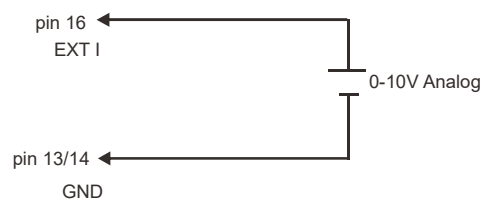
The External Control Interface located on the rear panel of the Load consists of a 16 pin terminal block, providing analog and digital TTL inputs and outputs, as well as two BNC connectors for analog voltage (V_{MON}) and current monitoring (I_{MON}). Two external waveform analog inputs are available to program the load voltage or load current. The bandwidth limit of this input waveform is 20kHz and any arbitrary waveform within this voltage and frequency specification are supported. When the programming signal frequency or amplitude exceeds the load input capacity, the load response will be automatically limited.

If several loads are operated in parallel mode, only the Master's External Control Interface will be active. All control interfaces of slave units are disabled if Parallel control is enabled. Logic signals of this interface include running state, short circuit state, sequence step state, trigger signal input and other state signals.

External analog input control voltage



External analog input control current



Pin 1: Load ON/OFF state output signal.

Load ON/OFF state, TTL level.

ON: High level, >4V.

OFF: Low level, <1V.

Pin 2: Short ON output signal.

Short ON output signal, TTL level.

SHORT: High level, >4V.

NORMAL: Low level, <1V.

Pin 3: TTLOut1 / Pin 4: TTLOut2 / Pin 5: TTLOut3

The range of the TTL outputs is 0~5VDC. Each of these pin functions must be defined in the TTL/Analog menu (Section 5.2.7.4) before use. 5VDC, define each pin in the 5.2.7.4 TTL/Analog menu first before using.

NO.	Option	Description
1	Disable	Disabled
2	Batt Discharge Finish (H)	Battery discharge test is completed.
3	OCP/OPP Test PASS (H)	OCP/OPP test is completed.
4	Program Finish (H)	Program test is completed.
5	SPEC Test PASS (H)	SPEC test result is GO.
6	OCP, OPPOTP, OV, REV (H)	OCP, OPPOTP, OVP or reverse connection alarm.
7	BUS Control (H)	System Bus control is enabled.
8	5V	5V

Pin 6: Digital Ground (TTL)**Pin 7: Digital Ground (TTL)****Pin 8: Program Function External Trigger**

TTL level input signal which triggers on a falling edge of a pulse width greater than 50 μ s.

Pin 9: Digitizing Function External Trigger

TTL level input signal which triggers on a falling edge of a pulse width greater than 50 μ s.

Pin 10/Pin 11: TTLIn1 / TTLIn2

The range of the TTL inputs is 0~5VDC. Each pin function must be defined in the TTL/Analog menu (Section 5.2.7.4) before use.

NO.	Option	Description
1	Disable	Disabled
2	Load On(H), Load Off(L)	Load on (high level), load off (low level)
3	Remote Inhibit(H)	Inhibits (turn off) of the load
4	Load OnOff (Toggle)	Toggle mode to enable/disable the input of load

Pin 12: I/O control input, reserved**Pin 13: Analog ground****Pin 14: Analog ground****Pin 15: The external waveform input signal for voltage**

The external waveform input signal with input range from 0 to 10V.

Pin 16: The external waveform input signal for current

The external waveform input signal with input range from 0 to 10V.

Chapter 8 Troubleshooting

Problem	Troubleshooting and solutions
Inner Communication fault	Contact us
Memory fault	Contact us
Aux Power fault	Contact us
Volt Reverse Fault	Please ensure the Load terminal voltage polarity is correct.
OTP	Please check and make sure the load is installed at well-ventilated and not obstructed. If the unit still does not work after checking, please ask your agent for help.
FAN fault	Please ensure the fan vents are unobstructed. If the unit still does not work after checking, please ask your agent for help.
OV	Please check whether voltage of the power supply is within the Load's specification, there is a risk of damage to the Load.
OV[Critical]	Please check whether voltage of the power supply is within the Load's specification, there is a risk of damage to the Load.
OCP	Clear the failure and check the configuration. Otherwise ask your agent for help.
OCP[Critical]	Clear the failure and check the configuration. Otherwise ask your agent for help.
OCP[USER]	Please check if user OCP level is reasonable. If not, please disable this setting.
OPP	Please check whether the Load test setup should be exceeding the Load's rated power. If not, ask your agent for help.
OPP[Critical]	Please check whether the Load test setup should be exceeding the Load's rated power. If not, ask your agent for help.
OPP[USER]	Please check if user OPP level is reasonable. If not, please disable this setting.
OPP [T Derating]	Please check the working environment temperature, and see the derating curve for ambient operating temperature.
OPP [V Derating]	This alarm information for 1200V model only. See the derating curve for 1200V models.
Parallel/Sync Fault	Please check and make sure that the termination resistor has been enabled, and that the address settings of the Master and Slave units are correct. Otherwise ask your agent for help.
Remote Vsense Fault	Check if the remote sense configuration is correct.
Range Fault	Contact us

Chapter 9 SCPI Command Description

SCPI is a programmable language standard designed especially for programmable instruments. It defines how to communicate with the instruments from an external computer. The APM programmable DC Electronic Load uses SCPI programming language with two categories of commands : basic commands (IEEE-488.2 common commands), and programmable DC Electronic Load.

Note: 1) Press the [Enter] key before sending each command.

2) There are two ways to send commands containing “[]” in the commands.

For example,

SYSTem:ERRor[:NEXT]? send : SYSTem:ERRor? or SYSTem:ERRor:NEXT?.

9.1 IEEE-488.2 Common Commands

These commands include common functions of IEEE-488.2. Common commands starting with *, regardless of hierarchy can be used.

***IDN?**

This command will request a download of information about the DC Electronic Load such as manufacturer, model number, series number and software version number.

***CLS**

This command clears the error queue and some state results.

***ESE<space><value>**

This command sets the condition of the standard event status enable register, which determines which events of the standard event status event register are allowed to set the ESB of the Status byte register. The setting range is 0~255.

***ESE?**

This command queries the standard event status register, which will be cleared after reading.

***RST**

This command enforces ABORt, *CLS and set parameter to manufacture preset value.

***OPC**

This command sets the OPC Bits of standard event status registers when the electronic load has completed all pending operations.

***OPC?**

This command queries causes the electronic load to place an ASCII “1” in the output queue when all pending operations are completed, returns ASCII “1” .

***RCL<space><value>**

This command restores the electronic load to a state that was previously stored in memory with a *SAV command to the specified location (see *SAV).

The setting range is 0~10, Factory default file (0), User defined file (1~10).

***SAV<space><value>**

This command sets the present state of the electronic load in a specified location in memory.

The setting range is 1~10.

***SRE<space><value>**

This command sets the condition of the service request enable register, which determines which events of the status byte register (see *STB) are allowed to set the MSS (Master Status Summary) bit. The setting range is 0~255.

***SRE?**

This command queries status of service request enable registers.

Returns current setting of service request enable.

***STB?**

This command queries the status byte register.

Returns content of status byte.

9.2 System Subsystem

SYSTem:ERRor[:NEXT]?

This command queries the error string of the command parser.

Return "No error", "Missing parameter", "Execution error", "Command error",
" Undefined header".

Query example : SYST:ERR?

SYSTem:ERRor:COUNT?

This command queries the quantity of the error command parser.

Return Integer.

Example : SYST:ERR:COUN?

SYSTem:REMOte

This command sets the electronic load in the remote state.

Example : SYST:REM

SYSTem:LOCal

This command sets the electronic load in the local state.

Example : SYST:LOC

SYSTem:COMMunication:PROTocol<space><value>

This command switches the protocol language between SCPI(1) and MODBUS(0).

Return OK/FAULT.

Example : SYST:COMM:PROT SCPI

9.3 Setting Operation Mode of Electronic-load

MODE<space><value>

This command sets operation mode of electronic-load.

ccl/CCL, ccm/CCM, cch/CCH, crl/CRL, crm/CRM, crh/CRH, cvl/CVL, cvm/CVM, cvh/CVH, cpl/CPL, cpm/CPM, cph/CPH, dcl/DCL, dcm/DCM, dch/DCH, drl/DRL, drm/DRM, drh/DRH, dvl/DVL, dvm/DVM, dvh/DVH, dpl/DPL, dpm/DPM, dph/DPH, ledl/LEDL, ledm/LEDM, ledh/LEDH, batl/BATL, batm/BATM, bath/BATH, sweepl/SWEEPL, sweepm/SWEEPm, sweepH/SWEEPH, ocpl/OCPL, ocpm/OCPM, ocph/OCPH, oppl/OPPL, oppm/OPPM, opph/OPPH, sinel/SINEL, sinem/SINEM, sineh/SINEH, rlcl/RLCL, rlcM/RLCM, rlch/RLCH, cvcc/CVCC, crcc/CRCC, cvcr/CVCR, auto/AUTO, list/LIST, userl/USERL, userm/USERM, userh/USERH, extwl/EXTWL, extwm/EXTWM, extwh/EXTWH, Return SET_OK\SET_TIME_OUT.

Example : MODE CCL It sets the low current range for CC mode.

MODE CCM It sets the middle current range for CC mode.

MODE CCH It sets the high current range for CC mode.

MODE?

This command queries operation mode of electronic-load.

Return : CCL,CCM,CCH,CRL,CRM,CRH,CVL,CVM,CVH,CPL,CPM,CPH,DCL,DCM,DCH,DRL,DRM,DRH,DVL,DVM,DVH,DPL,DPM,DPH,LEDL,LEDM,LEDH,BATL,BATM,BATH,SWEEPL,SWEEPm,SWEEPH,OCPL,OCPM,OCPH,OPPL,OPPM,OPPH,SINEL,SINEM,SINEH,RLCL,RLCM,RLCH,CVCC,CRCC,CVCR,AUTO,LIST,USERL,USERM,USERH,EXTWL,EXTWM,EXTWH,MPPTL,MPPTM,MPPTH.

Query example : MODE?

9.4 Subsystem of Load

LOAD[:STATe]<space><value>

This command sets the electronic load on or off. Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : LOAD ON

LOAD[:STATe]?

This command queries the status of electronic load. Return OFF or ON.

Query example : LOAD?

LOAD:SHORt[:STATe]<space><value>

This command activates or inactivates short-circuited simulation. Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : LOAD:SHOR ON

LOAD:SHORt[:STATe]?

This command returns the activate status of short-circuited simulation.

Return OFF or ON.

Query example : LOAD:SHOR?

LOAD:SHORt:KEY<space><value>

This command sets the mode of short key for electronic load.

Parameter : DISABLE(0), HOLD(1), TOGGLE(2), Return SET_OK/SET_TIME_OUT.

Example : LOAD:SHOR:KEY HOLD

LOAD:SHORt:KEY?

This command queries the mode of short key for electronic load.

Return DISABLE, HOLD, TOGGLE.

Query example : LOAD:SHOR:KEY?

LOAD:VALue<space><value>

This command sets the A/B value to switch.

Example : LOAD:VAL A

LOAD:VALue?

This command queries the current electronic load's A/B value.

Return A, B.

Query example : LOAD:VAL?

LOAD:SAMPlE:MODE<space><value>

This command sets the voltage sense mode for electronic load.

Parameter : LOCAL(0), REMOTE(1).

Example : LOAD:SAMP:MODE LOCAL

LOAD:SAMPlE:MODE?

This command queries the voltage sense mode for electronic load.

Return LOCAL, REMOTE.

Query example : LOAD:SAMP:MODE?

LOAD:PROGram:TRIGger<space><value>

This command used to trigger Program file in manual mode.

Parameter : DISABLE(0), ENABLE(1).

Query example : LOAD:PROG:TRIG ENABLE

LOAD:PROGram:TRIGger?

This command queries whether or not the trigger signal is enabled in manual mode for Program file.

Return DISABLE, ENABLE.

Query example : LOAD:PROG:TRIG?

LOAD:PROTection?

This command queries the status of the electronic load.

Query example : LOAD:PROT?

Bits position	31	30	29	28	27	26	25	24
Condition								
Bits weight	0	0	0	0	0	0	0	0

Bits position	23	22	21	20	19	18	17	16
Condition						Range Fault	OPP[V-Derating]	OPP[Critical]
Bits weight	0	0	0	0	0	262144	131072	65536

Bits position	15	14	13	12	11	10	9	8
Condition		SYNC	EEROM	COMM	AUXPWR	FAN	OTP	OPP3
Bits weight	0	16384	8192	4096	2048	1024	521	256

Bits position	7	6	5	4	3	2	1	0
Condition	OPP2	OPP1	OCP3	OCP2	OCP1	OV2	OV1	OUT
Bits weight	128	64	32	16	8	4	2	1

LOAD:PROTection:CLEar

This command resets the status of the electronic load.

Example : LOAD:PROT:CLE

9.5 Config Subsystem

CONFigure:VOLTage:ON<space><value>

This command sets the start loading voltage value. Return SET_OK/SET_TIME_OUT.

Example : CONF:VOLT:ON 1

CONFigure:VOLTage:ON?

This command queries the start loading voltage value.

Query example : CONF:VOLT:ON?

CONFigure:VOLTage:OFF<space><value>

This command sets the unload voltage value. Return SET_OK/SET_TIME_OUT.

Example : CONF:VOLT:OFF 1

CONFigure:VOLTage:OFF?

This command queries the unload voltage value.

Query example : CONF:VOLT:OFF?

CONFigure:VOLTage:LATCh<space><value>

This command sets the action type of Von. Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:VOLT:LATC ON

CONFigure:VOLTage:LATCh?

This command queries the action type of Von. Return OFF, ON.

Query example : CONF:VOLT:LATC?

CONFigure:AUTO:ON<space><value>

This command sets load to perform auto load on during power-on.

Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:AUTO:ON ON

CONFigure:AUTO:ON?

This command queries whether or not the load perform auto load on during power-on.

Returns OFF, ON.

Query example : CONF:AUTO:ON?

CONFigure:VOLTage:LATCh:RESEt

This command resets Von signal. Example : CONF:VOLT:LATC:RESE

CONFigure:VOLTage:SIGN<space><value>

This command sets symbol of voltage measurement. Parameter : PLUS(0), MINUS(1).
Return SET_OK/SET_TIME_OUT.

Example : CONF:VOLT:SIGN MINUS

CONFigure:VOLTage:SIGN?

This command queries symbol of voltage measurement. Return PLUS or MINUS.
Query example : CONF:VOLT:SIGN?

CONFigure:VOLTage:RANGe<space><value>

This command sets the voltage measurement range.
Parameter : LOW(0) , MIDDLE(1) , HIGH(2).

Example : CONF:VOLT:RANG MIDDLE

CONFigure:VOLTage:RANGe?

This command queries the voltage measurement range.
Return LOW, MIDDLE, HIGH .

Query example : CONF:VOLT:RANG?

CONFigure:WINDow<space><value>

This command sets window measure interval.

The setting range is preset value 20ms, max 10s. Return SET_OK/SET_TIME_OUT.

Example : CONF:WIND 20

CONFigure:WINDow?

This command queries window measure interval.

Query example : CONF:WIND?

CONFigure:SOUNd<space><value>

This command enables or disables the buzzer. Parameter : OFF(0), ON(1).
Return SET_OK/SET_TIME_OUT.

Example : CONF:SOUN ON

CONFigure:SOUNd?

This command queries the setting for the buzzer.

Return OFF, ON.

Example : CONF:SOUN?

CONFigure:ENTer:KEY<space><value>

This command sets the action type for ENTER key.

Parameter : NEXT(0), FIXED(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:ENT:KEY NEXT

CONFigure:ENTer:KEY?

This command queries the action type for ENTER key. Return NEXT, FIXED.

Query example : CONF:ENT:KEY?

CONFigure[:PROTection]:OCP<space><value>

This command sets the action enable or disable of user's define OCP function.

Parameter : DISABLE(0), ENABLE(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:OCP ENABLE

CONFigure[:PROTection]:OCP?

This command returns the action for OCP function.

Return DISABLE, ENABLE.

Query example : CONF:OCP?

CONFigure[:PROTection]:OCP:POINt<space><value>

This command sets the current limit for user's define OCP function.

Return SET_OK/SET_TIME_OUT.

Example : CONF:OCP:POIN 1

CONFigure[:PROTection]:OCP:POINt?

This command queries the current limit setting for OCP function.

Query example : CONF:OCP:POIN?

CONFigure[:PROTection]:OCP:DELay<space><value>

This command sets the delay time for user's define OCP function.

Return SET_OK/SET_TIME_OUT.

Example : CONF:OCP:DEL1

CONFigure[:PROTection]:OCP:DELay?

This command queries the delay time for user's define OCP function.

Query example : CONF:OCP:DEL?

CONFigure[:PROTection]:OPP<space><value>

This command sets the action enable or disable for user's define OPP function.

Parameter : DISABLE(0), ENABLE(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:OPP ENABLE

CONFigure[:PROTection]:OPP?

This command queries the action for OPP function.

Return DISABLE, ENABLE.

Query example : CONF:OPP?

CONFigure[:PROTection]:OPP:POINt<space><value>

This command sets the power limit for user's define OPP function.

Return SET_OK/SET_TIME_OUT.

Example : CONF:OPP:POIN 1

CONFigure[:PROTection]:OPP:POINt?

This command queries the power limit for user's define OPP function.

Query example : CONF:OPP:POIN?

CONFigure[:PROTection]:OPP:DELay<space><value>

This command sets the delay time for user's define OPP function.

Return SET_OK/SET_TIME_OUT.

Example : CONF:OPP:DEL 1

CONFigure[:PROTection]:OPP:DELay?

This command queries the delay time for user's define OPP function.

Query example : CONF:OPP:DEL?

CONFigure:DIO:VOLTage:OUT<space><value>

This command sets the action enable or disable of analog voltage signal.

Parameter : DISABLE(0), ENABLE(1).

Example : CONF:DIO:VOLT:OUT ENABLE

CONFigure:DIO:VOLTage:OUT?

This command queries the action of analog voltage signal.

Return DISABLE, ENABLE.

Query example : CONF:DIO:VOLT:OUT?

CONFigure:DIO:CURRent:OUT<space><value>

This command sets the action enable or disable of analog current signal.

Parameter : DISABLE(0) ENABLE(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:CURR:OUT ENABLE

CONFigure:DIO:CURRent:OUT?

This command queries the action of analog current signal. Return DISABLE, ENABLE.

Query example : CONF:DIO:CURR:OUT?

CONFigure:DIO:IN:ON<space><value>

This command enables or disables the TTL input function of the E-load.

Parameter : DISABLE(0), ENABLE(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:IN:ON ENABLE

CONFigure:DIO:IN:ON?

This command queries the setting of the TTL input function of the E-load.

Return DISABLE, ENABLE.

Query example : CONF:DIO:IN:ON?

CONFigure:DIO:OUT:ON<space><value>

This command enables or disables the TTL output function of the E-load.

Parameter : DISABLE (0), ENABLE (1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:OUT:ON ENABLE

CONFigure:DIO:OUT:ON?

This command queries the setting of the TTL output function of the E-load.

Return DISABLE, ENABLE.

Query example : CONF:DIO:OUT:ON?

CONFigure:DIO:IN1<space><value>

This command sets the DI1 type as TTL input signal.

The setting range is 0~2. NONE(0), EXTERNAL LOAD ON/OFF(1), REMOTE INHIBIT(2).

Return SET_OK/SET_TIME_OUT. Example : CONF:DIO:IN1 0

CONFigure:DIO:IN1?

This command queries the DI1 type as TTL input signal. Return 0~2.

Query example : CONF:DIO:IN1?

CONFigure:DIO:IN0<space><value>

This command sets the DIO type as TTL input signal.

The setting range is 0~2, NONE(0), EXTERNAL LOAD ON/OFF(1), REMOTE INHIBIT(2).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:IN0 0

CONFigure:DIO:IN0?

This command queries the DIO type as TTL input signal. Return 0~2.

Query example : CONF:DIO:IN0?

CONFigure:DIO:OUT2:LEVEL<space><value>

This command sets the level of DO2 as TTL output signal.

Parameter : LOW(0), HIGH(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:OUT2:LEVE LOW

CONFigure:DIO:OUT2:LEVEL?

This command queries the level setting of DO2 as TTL output signal. Return LOW, HIGH.

Query example : CONF:DIO:OUT2:LEVE?

CONFigure:DIO:OUT1:LEVEL<space><value>

This command sets the level setting of DO1 as TTL output signal.

Parameter : LOW(0), HIGH(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:OUT1:LEVE LOW

CONFigure:DIO:OUT1:LEVEL?

This command queries the level setting of DO1 as TTL output signal. Return LOW, HIGH.

Query example : CONF:DIO:OUT1:LEVE?

CONFigure:DIO:OUT0:LEVEL<space><value>

This command sets the level setting of DO0 as TTL output signal.

Parameter : LOW(0), HIGH(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:OUT0:LEVE LOW

CONFigure:DIO:OUT0:LEVEL?

This command queries the level setting of DO0 as TTL output signal. Return LOW, HIGH.

Query example : CONF:DIO:OUT0:LEVE?

CONFigure:DIO:OUT2<space><value>

This command sets the DO2 type as TTL output signal.

The setting range is 0~6.

NONE(0), Batt Discharge Test(1), OCP/OPP Test(2), Prog Test(3), Specification Test(4), OCP/OPP/OTP/OV Protection(5), Remote control status signal(6).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:OUT2 0

CONFigure:DIO:OUT2?

This command queries the DO2 type as TTL output signal. Return 0~6.

Query example : CONF:DIO:OUT2?

CONFigure:DIO:OUT1<space><value>

This command sets the DO1 type as TTL output signal.

The setting range is 0~6.

NONE(0), Batt Discharge Test(1), OCP/OPP Test(2), Prog Test(3), Specification Test(4), OCP/OPP/OTP/OV Protection(5), Remote control status signal(6).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:OUT1 0

CONFigure:DIO:OUT1?

This command queries the DO1 type as TTL output signal. Return 0~6.

Query example : CONF:DIO:OUT1?

CONFigure:DIO:OUT0<space><value>

This command sets the DO0 type as TTL output signal.

The setting range is 0~6.

NONE(0), Batt Discharge Test(1), OCP/OPP Test(2), Prog Test(3), Specification Test(4), OCP/OPP/OTP/OV Protection(5), Remote control status signal(6).

Return SET_OK/SET_TIME_OUT.

Example : CONF:DIO:OUT0 0

CONFigure:DIO:OUT0?

This command queries the DO0 type as TTL output signal. Return 0~6.

Query example : CONF:DIO:OUT0?

CONFigure:PARAllel:INITial<space><value>

This command sets load into/exit parallel mode. Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:PARA:INIT ON

CONFigure:PARAllel:INITial?

This command queries whether the unit is in parallel mode. Return OFF, ON.

Query example : CONF:PARA:INIT?

CONFigure:PARAllel:RESIstance:ON<space><value>

This command activates or inactivates the terminal resistance in parallel mode.

Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : CONF:PARA:RESI:ON ON

CONFigure:PARAllel:RESIstance:ON?

This command queries the terminal resistance setting in parallel mode. Return OFF, ON.

Query example : CONF:PARA:RESI:ON?

CONFigure:SYNChronous:MODE<space><value>

This command sets synchronous mode. Parameter : NONE(0), MASTER(1), SLAVE(2).

Return SET_OK/SET_TIME_OUT.

Example : CONF:SYNC:MODE NONE

CONFigure:SYNChronous:MODE?

This command queries synchronous mode. Return NONE, MASTER, SLAVE.

Query example : CONF:SYNC:MODE?

CONFigure:PARAllel:MODE<space><value>

This command sets parallel mode. Parameter : NONE(0), MASTER(1), SLAVE(2).

Return SET_OK/SET_TIME_OUT.

Example : CONF:PARA:MODE NONE

CONFigure:PARAllel:MODE?

This command queries parallel mode. Return NONE, MASTER, SLAVE.

Query example : CONF:PARA:MODE?

CONFigure:PARAllel:NUMber<space><value>

This command sets the parallel device number. The setting range is 2~20.

Return SET_OK/SET_TIME_OUT.

Example : CONF:PARA:NUM 2

CONFigure:PARAllel:NUMber?

This command queries the parallel device number. Return 2~20.

Query example : CONF:PARA:NUM?

CONFigure:PARAllel:ADDResS<space><value>

This command sets unit's address for parallel mode.

Return SET_OK/SET_TIME_OUT.

Example : CONF:PARA:ADDR 1

CONFigure:PARAllel:ADDResS?

This command queries unit's address for parallel mode.

Query example : CONF:PARA:ADDR?

CONFigure:PARAllel:STATe?

This command queries if the parallel communication is successfully or not.

Returns:

None;

Search failed,1. The number shows the address of the searched unit(s).

Connection successful,600,1200,4800. The values stand for maximum input voltage, maximum input current and power.

In search.

Query example: CONF:PARA:STAT?

9.6 Measure Subsystem

MEASure:CURRent?

This command queries real time current measurement.

Query example : MEAS:CURR?

MEASure:VOLTage?

This command queries real time voltage measurement.

Query example : MEAS:VOLT?

MEASure:POWer?

This command queries real time power measurement.

Query example : MEAS:POW?

MEASure:RESistance?

This command queries real time resistance measurement.

Query example : MEAS:RES?

MEASure:TEMPerature?

This command queries real time temperature measurement.

Query example : MEAS:TEMP?

MEASure:TEMPerature:MAX?

This command queries real time max. temperature measurement.

Query example : MEAS:TEMP:MAX?

9.7 Current Subsystem

CURRent:STATic:A<space><value>

This command sets static load current A for constant current static mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:STAT:A 1

CURRent:STATic:A?

This command queries static load current A for constant current static mode.

Query example : CURR:STAT:A?

CURRent:STATic:B<space><value>

This command sets static load current B for constant current static mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:STAT:B 1

CURRent:STATic:B?

This command queries static load current B for constant current static mode.

Query example : CURR:STAT:B?

CURRent:STATic:RISE<space><value>

This command sets the rising slew rate of current for constant current static mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:STAT:RISE 1

CURRent:STATic:RISE?

This command queries the rising slew rate of current for constant current static mode.

Query example : CURR:STAT:RISE?

CURRent:STATic:FALL<space><value>

This command sets the falling slew rate of current for constant current static mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:STAT:FALL 1

CURRent:STATic:FALL?

This command queries the falling slew rate of current for constant current static mode.

Query example : CURR:STAT:FALL?

CURRent:STATic:VRNG<space><value>

This command sets voltage measurement range for CC mode.

Parameter : LOW(0), MIDDLE(1), HIGH(2).

Return SET_OK/SET_TIME_OUT.

Example : CURR:STAT:VRNG LOW

CURRent:STATic:VRNG?

This command queries voltage measurement range for CC mode.

Return LOW, MIDDLE, HIGH.

Query example : CURR:STAT:VRNG?

CURRent:DYNamic:A<space><value>

This command sets load current A for DC mode. Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:A 1

CURRent:DYNamic:A?

This command queries load current A for DC mode.

Query example : CURR:DYN:A?

CURRent:DYNamic:B<space><value>

This command sets load current B for DC mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:B 1

CURRent:DYNamic:B?

This command queries load current B for DC mode.

Query example : CURR:DYN:B?

CURRent:DYNamic:T1<space><value>

This command sets duration parameter T1 for DC mode. Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:T1 1

CURRent:DYNamic:T1?

This command queries duration parameter T1 for DC mode.

Query example : CURR:DYN:T1?

CURRent:DYNamic:T2<space><value>

This command sets duration parameter T2 for DC mode. Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:T2 1

CURRent:DYNamic:T2?

This command queries duration parameter T2 for DC mode.

Query example : CURR:DYN:T2?

CURRent:DYNamic:REPeat<space><value>

This command sets repeat count for DC mode. Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:REP 1

CURRent:DYNamic:REPeat?

This command queries repeat count for DC mode.

Query example : CURR:DYN:REP?

CURRent:DYNamic:RISE<space><value>

This command sets rising slew rate of current for DC mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:RISE 1

CURRent:DYNamic:RISE?

This command queries rising slew rate of current for DC mode.

Query example : CURR:DYN:RISE?

CURRent:DYNamic:FALL<space><value>

This command sets falling slew rate of current for DC mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:FALL 1

CURRent:DYNamic:FALL?

This command queries falling slew rate of current for DC mode.

Query example : CURR:DYN:FALL?

CURRent:DYNamic:VRNG<space><value>

This command sets voltage measurement range for DC mode.

Parameter : LOW(0), MIDDLE(1), HIGH(2).

Return SET_OK/SET_TIME_OUT.

Example : CURR:DYN:VRNG LOW

CURRent:DYNamic:VRNG?

This command queries voltage measurement range for DC mode.

Return LOW, MIDDLE, HIGH.

Query example : CURR:DYN:VRNG

9.8 Resistance Subsystem

RESistance:STATic:A<space><value>

This command sets static resistance level A for CR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:STAT:A 1

RESistance:STATic:A?

This command queries the static resistance level A for CR mode.

Query example : RES:STAT:A?

RESistance:STATic:B<space><value>

This command sets static resistance level B for CR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:STAT:B 1

RESistance:STATic:B?

This command queries the static resistance level B for CR mode.

Query example : RES:STAT:B?

RESistance:STATic:RISE<space><value>

This command sets rising slew rate of current for CR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:STAT:RISE 1

RESistance:STATic:RISE?

This command queries rising slew rate of current for CR mode.

Query example : RES:STAT:RISE?

RESistance:STATic:FALL<space><value>

This command sets falling slew rate of current for CR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:STAT:FALL 1

RESistance:STATic:FALL?

This command queries falling slew rate of current for CR mode.

Query example : RES:STAT:FALL?

RESistance:STATic:IRNG<space><value>

This command sets the current measurement range for CR mode.

Parameter : LOW(0), MIDDLE(1), HIGH(2).

Return SET_OK/SET_TIME_OUT.

Example : RES:STAT:IRNG LOW

RESistance:STATic:IRNG?

This command queries the current measurement range for CR mode.

Return LOW, MIDDLE, HIGH.

Query example : RES:STAT:IRNG?

RESistance:DYNamic:A<space><value>

This command sets the load value A during T1 period for DR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:A 1

RESistance:DYNamic:A?

This command queries the load value A during T1 period for DR mode.

Query example : RES:DYN:A?

RESistance:DYNamic:B<space><value>

This command sets the load value B during T2 period for DR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:B 1

RESistance:DYNamic:B?

This command queries the load value B during T2 period for DR mode.

Query example : RES:DYN:B?

RESistance:DYNamic:T1<space><value>

This command sets duration parameter T1 for DR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:T1 1

RESistance:DYNamic:T1?

This command queries duration parameter T1 for DR mode.

Query example : RES:DYN:T1?

RESistance:DYNamic:T2<space><value>

This command sets duration parameter T2 for DR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:T2 1

RESistance:DYNamic:T2?

This command queries duration parameter T2 for DR mode.

Query example : RES:DYN:T2?

RESistance:DYNamic:REPeat<space><value>

This command sets the repeat count for DR mode.

The setting range is 0~65535. Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:REP 1

RESistance:DYNamic:REPeat?

This command queries the repeat count for DR mode.

Query example : RES:DYN:REP?

RESistance:DYNamic:RISE<space><value>

This command sets the rising slew rate of current for DR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:RISE 1

RESistance:DYNamic:RISE?

This command queries the rising slew rate of current for DR mode.

Query example : RES:DYN:RISE?

RESistance:DYNamic:FALL<space><value>

This command sets the falling slew rate of current for DR mode.

Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:FALL 1

RESistance:DYNamic:FALL?

This command queries the falling slew rate of current for DR.

Query example : RES:DYN:FALL?

RESistance:DYNamic:IRNG<space><value>

This command sets current measurement range for DR mode.

LOW(0), MIDDLE(1), HIGH(2). Return SET_OK/SET_TIME_OUT.

Example : RES:DYN:IRNG LOW

RESistance:DYNamic:IRNG?

This command queries current measurement range for DR mode.

Return LOW, MIDDLE, HIGH.

Query example : RES:DYN:IRNG?

9.9 Voltage Subsystem

VOLTage:STATic:A<space><value>

This command sets the static load voltage A for CV mode.

Return SET_OK/SET_TIME_OUT.

Example : VOLT:STAT:A 1

VOLTage:STATic:A?

This command queries the static load voltage A for CV mode.

Query example : VOLT:STAT:A?

VOLTage:STATic:B<space><value>

This command sets the static load voltage B for CV mode.

Return SET_OK/SET_TIME_OUT.

Example : VOLT:STAT:B 1

VOLTage:STATic:B?

This command queries the static load voltage B for CV mode.

Query example : VOLT:STAT:B?

VOLTage:STATic:ILIMit<space><value>

This command sets the current limit for CV mode.

Return SET_OK/SET_TIME_OUT.

Example : VOLT:STAT:ILIM 1

VOLTage:STATic:ILIMit?

This command queries the current limit for CV mode.

Query example : VOLT:STAT:ILIM?

VOLTage:STATic:RESponse<space><value>

This command sets the response speed for CV mode.

Paramter : VerySLOW|0, SLOW|1, NORMAL|2, FAST|3, VeryFAST|4.

Return SET_OK/SET_TIME_OUT.

Example : VOLT:STAT:RES SLOW

VOLTage:STATic:RESponse?

This command queries the response speed for CV mode.

Return VerySLOW, SLOW, NORMAL, FAST, VeryFAST.

Query example : VOLT:STAT:RES?

VOLTage:STATic:IRNG<space><value>

This command sets the current measurement range for CV mode.

Parameter : LOW(0), MIDDLE(1), HIGH(2).

Return SET_OK/SET_TIME_OUT.

Example : VOLT:STAT:IRNG LOW

VOLTage:STATic:IRNG?

This command queries the current measurement range for CV mode.

Return LOW, MIDDLE, HIGH.

Query example : VOLT:STAT:IRNG?

VOLTage:DYNamic:A<space><value>

This command sets the voltage value A during T1 period for DV mode.

Return SET_OK/SET_TIME_OUT.

Example : VOLT:DYN:A 1

VOLTage:DYNamic:A?

This command queries the voltage value A during T1 period for DV mode.

Query example : VOLT:DYN:A?

VOLTage:DYNamic:B<space><value>

This command sets the voltage value B during T2 period for DV mode.

Return SET_OK/SET_TIME_OUT.

Example : VOLT:DYN:B 1

VOLTage:DYNamic:B?

This command queries the voltage value B during T2 period for DV mode.

Query example : VOLT:DYN:B?

VOLTage:DYNamic:ILIMit<space><value>

This command sets the current limit for DV mode. Return SET_OK/SET_TIME_OUT.

Example : VOLT:DYN:ILIM 1

VOLTage:DYNamic:ILIMit?

This command queries current limit for DV mode.

Query example : VOLT:DYN:ILIM?

VOLTage:DYNamic:RESponse<space><value>

This command sets the response speed for DV mode.

Parameter : VerySLOW|0, SLOW|1, NORMAL|2, FAST|3, VeryFAST|4.

Return SET_OK/SET_TIME_OUT.

Query example : VOLT:DYN:RES SLOW

VOLTage:DYNamic:RESponse?

This command queries the response speed for DV mode.

Return VerySLOW, SLOW, NORMAL, FAST, VeryFAST.

Example : VOLT:DYN:RES?

VOLTage:DYNamic:IRNG<space><value>

This command sets the current measurement range for DV mode.

Parameter: LOW(0), MIDDLE(1), HIGH(2).

Return SET_OK/SET_TIME_OUT.

Query example : VOLT:DYN:IRNG LOW

VOLTage:DYNamic:IRNG?

This command queries current measurement range for DV mode.

Return LOW, MIDDLE, HIGH.

Example : VOLT:DYN:IRNG?

VOLTage:DYNamic:T1<space>< value>

This command sets duration parameter T1 for DV mode.

Return SET_OK/SET_TIME_OUT.

Query example : VOLT:DYN:T1 1

VOLTage:DYNamic:T1?

This command queries duration parameter T1 for DV mode.

Example : VOLT:DYN:T1?

VOLTage:DYNamic:T2<space><value>

This command sets duration parameter T2 for DV mode.

Return SET_OK/SET_TIME_OUT.

Query example : VOLT:DYN:T2 1

VOLTage:DYNamic:T2?

This command queries duration parameter T2 for DV mode.

Query example : VOLT:DYN:T2?

VOLTage:DYNamic:REPeat<space><value>

This command sets the repeat count for DV mode.

The setting range is 0~65535. Return SET_OK/SET_TIME_OUT.

Query example : VOLT:DYN:REP 1

VOLTage:DYNamic:REPeat?

This command queries the repeat count for DV mode.

Example : VOLT:DYN:REP?

9.10 Power Subsystem

POWER:STATic:A<space><value>

This command sets the static load power value A for CP mode.

Return SET_OK/SET_TIME_OUT.

Query example : POW:STAT:A 1

POWER:STATic:A?

This command queries the static load power value A for CP mode.

Example : POW:STAT:A?

POWER:STATic:B<space><value>

This command sets the static load power value B for CP mode.

Return SET_OK/SET_TIME_OUT.

Query example : POW:STAT:B 1

POWER:STATic:B?

This command queries the static load power value B for CP mode.

Example : POW:STAT:B?

POWER:STATic:RISE<space><value>

This command sets the rising slew rate of current for CP mode.

Return SET_OK/SET_TIME_OUT.

Query example : POW:STAT:RISE 1

POWER:STATic:RISE?

This command queries the rising slew rate of current for CP mode.

Example : POW:STAT:RISE?

POWer:STATic:FALL<space><value>

This command sets the falling slew rate of current for CP mode.

Return SET_OK/SET_TIME_OUT.

Query example : POW:STAT:FALL 1

POWer:STATic:FALL?

This command queries the falling slew rate of current for CP mode.

Example : POW:STAT:FALL?

POWer:STATic:VRNG<space><value>

This command sets the voltage measurement range for CP mode.

Parameter : LOW(0), MIDDLE(1), HIGH(2). Return SET_OK/SET_TIME_OUT.

Query example : POW:STAT:VRNG LOW

POWer:STATic:VRNG?

This command queries the voltage measurement range for CP mode.

Return LOW, MIDDLE, HIGH.

Example : POW:STAT:VRNG?

POWer:DYNamic:A<space><value>

This command sets the load power value A during T1 period for DP mode.

Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:A 1

POWer:DYNamic:A?

This command queries the load power value A during T1 period for DP mode.

Query example : POW:DYN:A?

POWer:DYNamic:B<space><value>

This command sets the load power value B during T2 period for DP mode.

Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:B 1

POWer:DYNamic:B?

This command queries the load power value B during T2 period in DP mode.

Query example : POW:DYN:B?

POWer:DYNamic:RISE<space><value>

This command sets the rising slew rate of current for DP mode.

Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:RISE 1

POWER:DYNamic:RISE?

This command queries the rising slew rate of current for DP mode.

Query example : POW:DYN:RISE?

POWER:DYNamic:FALL<space><value>

This command sets the falling slew rate of current for DP mode.

Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:FALL 1

POWER:DYNamic:FALL?

This command queries the falling slew rate of current for DP mode.

Query example : POW:DYN:FALL?

POWER:DYNamic:VRNG<space><value>

This command sets the voltage measurement range for DP mode.

Parameter : LOW(0), MIDDLE(1), HIGH(2). Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:VRNG LOW

POWER:DYNamic:VRNG?

This command queries the voltage measurement range for DP mode.

Return LOW, MIDDLE, HIGH.

Query example : POW:DYN:VRNG?

POWER:DYNamic:T1<space><value>

This command sets the duration parameter T1 for DP mode.

Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:T1 1

POWER:DYNamic:T1?

This command queries the duration parameter T1 for DP mode.

Query example : POW:DYN:T1?

POWER:DYNamic:T2<space><value>

This command sets the duration parameter T2 for DP mode.

Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:T2 1

POWER:DYNamic:T2?

This command queries the duration parameter T2 for DP mode.

Query example : POW:DYN:T2?

POWer:DYNamic:REPeat<space><value>

This command sets the repeat count for DP mode.

Return SET_OK/SET_TIME_OUT.

Example : POW:DYN:REP 1

POWer:DYNamic:REPeat?

This command queries the repeat count for DP mode.

Query example : POW:DYN:REP?

9.11 LED(CR) Subsystem

LED:VO<space><value>

This command sets the operating voltage in LED mode. Return SET_OK/SET_TIME_OUT.

Example : LED:VO 1

LED:VO?

This command queries the operating voltage in LED mode.

Query example : LED:VO?

LED:IO<space><value>

This command sets the operating current in LED mode. Return SET_OK/SET_TIME_OUT.

Example : LED:IO 1

LED:IO?

This command queries the operating current in LED mode.

Query example : LED:IO?

LED:RR:OHM<space><value>

This command sets the Rr high frequency resistance in LED mode.

Return SET_OK/SET_TIME_OUT.

Example : LED:RR:OHM 1

LED:RR:OHM?

This command queries the Rr high frequency resistance in LED mode.

Query example : LED:RR:OHM?

LED:VF<space><value>

This command sets the vf bias voltage in LED mode.

Return SET_OK/SET_TIME_OUT.

Example : LED:VF 1

LED:VF?

This command queries the vf bias voltage in LED mode.

Query example : LED:VF?

LED:RD:OHM<space><value>

This command sets the rd impedance resistance in LED mode.

Return SET_OK/SET_TIME_OUT.

Example : LED:RD:OHM 1

LED:RD:OHM?

This command queries the rd impedance resistance in LED mode.

Query example : LED:RD:OHM?

LED:RD:COEFF<space><value>

This command sets the rd in percent for LED mode.

The setting range is 0.001~1. Return SET_OK/SET_TIME_OUT.

Example : LED:RD:COEFF 1

LED:RD:COEFF?

This command queries the rd in percent for LED mode. Return 0.001~1.

Query example : LED:RD:COEFF?

LED:CONFigure:RR<space><value>

This command activates or inactivates Rr parameter for LED mode.

Parameter : DISABLE(0), ENABLE(1). Return SET_OK/SET_TIME_OUT.

Example : LED:CONF:RR ENABLE

LED:CONFigure:RR?

This command queries whether or not the Rr parameter is enabled for LED mode.

Return DISABLE(0), ENABLE(1).

Query example : LED:CONF:RR?

LED:CONFigure:VALue<space><value>

This command sets the parameter setting for LED mode.

Paramete : PRESet(0), COEFF(1), OHM(2), VF(3).

0 : Rd default, 1 : Rd Percent, 2 : Rd resistance, 3 : Vf bias voltage.

Return SET_OK/SET_TIME_OUT.

Example : LED:CONF:VAL OHM

LED:CONFigure:VALue?

This command queries the parameter setting for LED mode.

Return PRESet, COEFF, OHM, VF.

Query example : LED:CONF:VAL?

9.12 Advance Subsystem

[ADVance:]CVCC:VSET<space><value>

This command sets the voltage value for CVCC mode.

Return SET_OK/SET_TIME_OUT.

Example : CVCC:VSET 1

[ADVance:]CVCC:VSET?

This command queries the voltage setting for CVCC mode.

Query example : CVCC:VSET?

[ADVance:]CVCC:ISSET<space><value>

This command sets the current value for CVCC mode.

Return SET_OK/SET_TIME_OUT.

Example : CVCC:ISSET 1

[ADVance:]CVCC:ISSET?

This command queries the current setting for CVCC mode.

Query example : CVCC:ISSET?

[ADVance:]CVCC:RESponse<space><value>

This command sets the respond speed for CVCC mode.

Parameter : VerySLOW|0, SLOW|1, NORMAL|2, FAST|3, VeryFAST|4.

Return SET_OK/SET_TIME_OUT.

Example : CVCC:RES SLOW

[ADVance:]CVCC:RESponse?

This command queries the respond speed for CVCC mode.

Return VerySLOW, SLOW, NORMAL, FAST, VeryFAST.

Query example : CVCC:RES?

[ADVance:]CRCC:RSET<space><value>

This command sets the resistance value for CRCC mode.

Return SET_OK/SET_TIME_OUT.

Example : CRCC:RSET 1

[ADVance:]CRCC:RSET?

This command queries the resistance value for CRCC mode.

Query example : CRCC:RSET?

[ADVance:]CRCC:ISET<space><value>

This command sets the current value for CRCC mode.

Return SET_OK/SET_TIME_OUT.

Example : CRCC:ISET 1

[ADVance:]CRCC:ISET?

This command queries the current value for CRCC mode.

Query example : CRCC:ISET?

[ADVance:]CVCR:VSET<space><value>

This command sets the voltage value for CVCR mode. Return SET_OK/SET_TIME_OUT.

Example : CVCR:VSET 1

[ADVance:]CVCR:VSET?

This command queries the voltage setting for CVCR mode.

Query example : CVCR:VSET?

[ADVance:]CVCR:RSET<space><value>

This command sets the resistance value for CVCR mode.

Return SET_OK/SET_TIME_OUT.

Example : CVCR:RSET 1

[ADVance:]CVCR:RSET?

This command queries the resistance value for CVCR mode.

Query example : CVCR:RSET?

[ADVance:]AUTO:VSET<space><value>

This command sets the voltage value for AUTO mode.

Return SET_OK/SET_TIME_OUT.

Example : AUTO:VSET 1

[ADVance:]AUTO:VSET?

This command queries the voltage value for AUTO mode.

Query example : AUTO:VSET?

[ADVance:]AUTO:RSET<space><value>

This command sets the resistance value for AUTO mode.

Return SET_OK/SET_TIME_OUT.

Example : AUTO:RSET 1

[ADVance:]AUTO:RSET?

This command queries the resistance value for AUTO mode.

Query example : AUTO:RSET?

[ADVance:]AUTO:ISET<space><value>

This command sets the current value for AUTO mode.

Return SET_OK/SET_TIME_OUT.

Example : AUTO:ISET 1

[ADVance:]AUTO:ISET?

This command queries the current value for AUTO mode.

Query example : AUTO:ISET 1

[ADVance:]AUTO:PSET<space><value>

This command sets the power value for AUTO mode.

Return SET_OK/SET_TIME_OUT.

Example : AUTO:PSET 1

[ADVance:]AUTO:PSET?

This command queries the power value for AUTO mode.

Query example : AUTO:PSET?

[ADVance:]BATTery:MODE<space><value>

This command sets the execution mode in battery discharge mode.

Parameter : CC(0)/CR(1)/CP(2).

Return SET_OK/SET_TIME_OUT.

Example : BATT:MODE CC

[ADVance:] BATTery:MODE?

This command queries the execution mode in battery discharge mode.

Return CC, CR, CP.

Query example : BATT:MODE?

[ADVance:]BATTery:VALue<space><value>

This command sets load value according to the run mode in battery discharge mode.

Return SET_OK/SET_TIME_OUT.

Example : BATT:VAL 1

[ADVance:]BATTery:VALue?

This command queries the load setting in battery discharge mode.

Query example : BATT:VAL?

[ADVance:]BATTery:RISE<space><value>

This command sets the rising slew rate of current in battery discharge mode.

Return SET_OK/SET_TIME_OUT.

Example : BATT:RISE 1

[ADVance:] BATTery:RISE?

This command queries the rising slew rate of current in battery discharge mode.

Query example : BATT:RISE?

[ADVance:]BATTery:FALL<space><value>

This command sets the falling slew rate of current in battery discharge mode.

Return SET_OK/SET_TIME_OUT.

Example : BATT:FALL 1

[ADVance:] BATTery:FALL?

This command queries the falling slew rate of current in battery discharge mode.

Query example : BATT:FALL?

[ADVance:]BATTery:ENDVoltage<space><value>

This command sets the end voltage in battery discharge mode.

Return SET_OK/SET_TIME_OUT.

Example : BATT:ENDV 1

[ADVance:]BATTery:ENDVoltage?

This command queries the end voltage in battery discharge mode.

Query example : BATT:ENDV?

[ADVance:]BATTery:TOUT<space><value>

This command sets the timeout for battery discharge mode.

The setting range is 0s~48h. Return SET_OK/SET_TIME_OUT.

Example : BATT:TOUT 1

[ADVance:]BATTery:TOUT?

This command queries the timeout for battery discharge mode.

Query example : BATT:TOUT?

[ADVance:]BATTery:POUT<space><value>

This command sets the end Wh for battery discharge mode.

Return SET_OK/SET_TIME_OUT

Example : BATT:POUT 1

[ADVance:]BATTery:POUT?

This command queries the end Wh for battery discharge mode.

Query example : BATT:POUT?

[ADVance:]BATTery:IOUT<space><value>

This command sets the end Ah for battery discharge mode.

Return SET_OK/SET_TIME_OUT.

Example : BATT:IOUT 1

[ADVance:]BATTery:IOUT?

This command queries the end Ah for battery discharge mode.

Query example : BATT:IOUT?

[ADVance:]BATTery:STATus?

This command queries the operating status in battery discharge mode.

Return 0~5. 0 : Stop.

1 : Running.

2 : Completed, reached the timeout setting.

3 : Completed, input voltage is lower than the end voltage.

4 : Completed, reached the Wh setting.

5 : Completed, reached the Ah setting.

Query example : BATT:STAT?

[ADVance:]BATTery:CONSumption:TIME?

This command queries how long the battery discharge mode has been running.

Query example : BATT:CONS:TIME?

[ADVance:]BATTery:CONSumption:WH?

This command queries how much Wh has been consuming in battery discharge mode.

Query example : BATT:CONS:WH?

[ADVance:]BATTery:CONSumption:AH?

This command queries how much Ah has been consuming in battery discharge mode.

Query example : BATT:CONS:AH?

[ADVance:]OCP:START<space><value>

This command sets the start current for OCP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OCP:STAR 1

[ADVance:]OCP:START?

This command queries the start current for OCP test mode.

Query example : OCP:STAR?

[ADVance:]OCP:END<space><value>

This command sets the end current for OCP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OCP:END 1

[ADVance:]OCP:END?

This command queries the end current for OCP test mode.

Query example : OCP:END?

[ADVance:]OCP:TRIGger:VOLTage<space><value>

This command sets the trigger voltage for OCP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OCP:TRIG:VOLT 1

[ADVance:]OCP:TRIGger:VOLTage?

This command queries the trigger voltage for OCP test mode.

Query example : OCP:TRIG:VOLT?

[ADVance:]OCP:SPECification:L<space><value>

This command sets the low level current of specification for OCP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OCP:SPEC:L 1

[ADVance:]OCP:SPECification:L?

This command queries the low level current of specification for OCP test mode.

Query example : OCP:SPEC:L?

[ADVance:]OCP:SPECification:H<space><value>

This command sets the high level current of specification for OCP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OCP:SPEC:H 1

[ADVance:]OCP:SPECification:H?

This command queries the low level current of specification for OCP test mode.

Query example : OCP:SPEC:H?

[ADVance:]OCP:DWELI<space><value>

This command sets the step dwell time for OCP mode.

The setting range is 10us ~ 1s. Return SET_OK/SET_TIME_OUT.

Example : OCP:DWEL 1

[ADVance:]OCP:DWELI?

This command queries the step dwell time for OCP mode.

Example : OCP:DWEL?

[ADVance:]OCP:STEP<space><value>

This command sets the step count for OCP test mode.

The setting range is 1~1000. Return SET_OK/SET_TIME_OUT.

Example : OCP:STEP 1

[ADVance:]OCP:STEP?

This command queries the step count for OCP test mode.

Query example : OCP:STEP?

[ADVance:]OCP:RESult?

This command queries the result of OCP test function.

Return <value1> NONE(0), PASS(1), FAULT(2), (OCP test results).

<value2> 0, 1, 2, (0:Stop, 1 Runing, 2 Completed)

<value3> OCP value, unit A.

<value4> Max power, unit W.

Query example : OCP:RES?

[ADVance:]OPP:STARt<space><value>

This command sets the start power for OPP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OPP:STAR 1

[ADVance:]OPP:STARt?

This command queries the start power for OPP test mode.

Query example : OPP:STAR?

[ADVance:]OPP:END<space><value>

This command sets the end power for OPP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OPP:END 1

[ADVance:]OPP:END?

This command queries the the end power for OPP test mode.

Query example : OPP:END?

[ADVance:]OPP:TRIGger:VOLTage<space><value>

This command sets the trigger voltage for OPP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OPP:TRIG:VOLT 1

[ADVance:]OPP:TRIGger:VOLTage?

This command queries the trigger voltage for OPP test mode.

Query example : OPP:TRIG:VOLT?

[ADVance:]OPP:SPECification:L<space><value>

This command sets the low level power of specification for OPP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OPP:SPEC:L 1

[ADVance:]OPP:SPECification:L?

This command queries the low level power of specification for OPP test mode.

Query example : OPP:SPEC:L?

[ADVance:]OPP:SPECification:H<space><value>

This command sets the high level power of specification for OPP test mode.

Return SET_OK/SET_TIME_OUT.

Example : OPP:SPEC:H 1

[ADVance:]OPP:SPECification:H?

This command queries the high level power of specification for OPP test mode.

Query example : OPP:SPEC:H?

[ADVance:]OPP:DWELI<space><value>

This command sets the step dwell time for OPP test mode.

The setting range is 10us~1s. Return SET_OK/SET_TIME_OUT.

Example : OPP:DWEL 1

[ADVance:]OPP:DWELI?

This command queries the step dwell time for OPP test mode.

Query example : OPP:DWEL?

[ADVance:]OPP:STEP<space><value>

This command sets the step count for OPP test mode.

The setting range is 1~1000. Return SET_OK/SET_TIME_OUT.

Example : OPP:STEP 1

[ADVance:]OPP:STEP?

This command queries the step count for OPP test mode.

Query example : OPP:STEP?

[ADVance:]CURRent:SWEep:IMAXimum<space><value>

This command sets the maximum current for constant current frequency sweep mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:SWE:IMAX 1

[ADVance:]CURRent:SWEep:IMAXimum?

This command queries the maximum current for constant current frequency sweep mode.

Query example : CURR:SWE:IMAX?

[ADVance:]CURRent:SWEep:IMINimum<space><value>

This command sets the minimum current for constant current frequency sweep mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:SWE:IMIN 1

[ADVance:]CURRent:SWEep:IMINimum?

This command queries the minimum current for constant current frequency sweep mode.

Query example : CURR:SWE:IMIN?

[ADVance:]CURRent:SWEep:RISE<space><value>

This command sets the rising slew rate of current for constant current frequency sweep mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:SWE:RISE 1

[ADVance:]CURRent:SWEep:RISE?

This command queries the rising slew rate of current for constant current frequency sweep mode.

Query example : CURR:SWE:RISE?

[ADVance:]CURRent:SWEep:FALL<space><value>

This command sets the falling slew rate of current for constant current frequency sweep mode.

Return SET_OK/SET_TIME_OUT.

Example : CURR:SWE:FALL 1

[ADVance:]CURRent:SWEep:FALL?

This command queries the falling slew rate of current for constant current frequency sweep mode.

Query example : CURR:SWE:FALL?

[ADVance:]CURRent:SWEep:FSTArt<space><value>

This command sets the start frequency for constant current frequency sweep mode. The setting range is 0.01Hz~50KHz. Return SET_OK/SET_TIME_OUT.
Example : CURR:SWE:FSTA 1

[ADVance:]CURRent:SWEep:FSTArt?

This command queries the start frequency for constant current frequency sweep mode. Return 0.01Hz~50KHz.
Query example : CURR:SWE:FSTA?

[ADVance:]CURRent:SWEep:FEND<space><value>

This command sets the end frequency for constant current frequency sweep mode. The setting range is 0.01Hz~50KHz. Return SET_OK/SET_TIME_OUT.
Example : CURR:SWE:FEND 1

[ADVance:]CURRent:SWEep:FEND?

This command queries the end frequency for constant current frequency sweep mode. Return 0.01Hz~50KHz.
Query example : CURR:SWE:FEND?

[ADVance:]CURRent:SWEep:FSTEp<space><value>

This command sets the step frequency for constant current frequency sweep mode. The setting range is 0.01Hz~50KHz. Return SET_OK/SET_TIME_OUT.
Example : CURR:SWE:FSTE 1

[ADVance:]CURRent:SWEep:FSTEp?

This command queries the step frequency for constant current frequency sweep mode. Return 0.01Hz~50KHz.
Query example : CURR:SWE:FSTE?

[ADVance:]CURRent:SWEep:DWELI<space><value>

This command sets the dwell time for constant current frequency sweep mode. The setting range is 1ms~100s. Return SET_OK/SET_TIME_OUT.
Example : CURR:SWE:DWEL 1

[ADVance:]CURRent:SWEep:DWELI?

This command queries the dwell time for constant current frequency sweep mode. Return 1ms~100s.
Query example : CURR:SWE:DWEL?

[ADVance:]CURRent:SWEep:DUTY<space><value>

This command sets the duty cycle for constant current frequency sweep mode.

The setting range is 1%~99%. Return SET_OK/SET_TIME_OUT.

Example : CURR:SWE:DUTY 1

[ADVance:]CURRent:SWEep:DUTY?

This command queries the duty cycle for constant current frequency sweep mode.

Query example : CURR:SWE:DUTY?

[ADVance:]IMPedance:STATic:RL<space><value>

This command sets the equivalent parallel load resistance for nonlinear (RLC) load mode.

Return SET_OK/SET_TIME_OUT.

Example : IMP:STAT:RL 1

[ADVance:]IMPedance:STATic:RL?

This command queries the equivalent parallel load resistance for nonlinear (RLC) load mode.

Query example : IMP:STAT:RL?

[ADVance:]IMPedance:STATic:CL<space><value>

This command sets the equivalent parallel capacitance for nonlinear (RLC) load mode.

The setting range is 30 μ F~50000 μ F. Return SET_OK/SET_TIME_OUT.

Example : IMP:STAT:CL 30

[ADVance:]IMPedance:STATic:CL?

This command queries the equivalent parallel capacitance for nonlinear (RLC) load mode.

Query example : IMP:STAT:CL?

[ADVance:]IMPedance:STATic:RS<space><value>

This command sets the equivalent series resistance for nonlinear (RLC) load mode.

Return SET_OK/SET_TIME_OUT.

Example : IMP:STAT:RS 1

[ADVance:]IMPedance:STATic:RS?

This command queries the equivalent series resistance for nonlinear (RLC) load mode.

Query example : IMP:STAT:RS?

[ADVance:]IMPedance:STATic:LS<space><value>

This command sets the equivalent series inductance for nonlinear (RLC) load mode. The setting range is 0~20 μ H. Return SET_OK/SET_TIME_OUT.

Example : IMP:STAT:LS 1

[ADVance:]IMPedance:STATic:LS?

This command queries the equivalent series inductance for nonlinear (RLC) load mode. Query example : IMP:STAT:LS?

[ADVance:]SINE:IAC<space><value>

This command sets the AC current for sine wave dynamic mode. Return SET_OK/SET_TIME_OUT.

Example : SINE:IAC 1

[ADVance:]SINE:IAC?

This command queries the AC current for sine wave dynamic mode. Query example : SINE:IAC?

[ADVance:]SINE:IDC<space><value>

This command sets the DC current for sine wave dynamic mode. Return SET_OK/SET_TIME_OUT.

Example : SINE:IDC 1

[ADVance:]SINE:IDC?

This command queries the DC current for sine wave dynamic mode. Query example : SINE:IDC?

[ADVance:]SINE:FREQuency<space><value>

This command sets frequency for sine wave dynamic mode. The setting range is 0~20KHZ. Return SET_OK/SET_TIME_OUT.

Example : SINE:FREQ 1

[ADVance:]SINE:FREQuency?

This command queries the frequency for sine wave dynamic mode. Query example : SINE:FREQ?

[ADVance:]SINE:PHASe<space><value>

This command sets the start phase for sine wave dynamic mode.

The setting range is 0~359. Return SET_OK/SET_TIME_OUT.

Example : SINE:PHAS 1

[ADVance:]SINE:PHASe?

This command queries the start phase for sine wave dynamic mode.

Query example : SINE:PHAS?

9.13 Specification Subsystem

SPECification:TEST<space><value>

This command enables or disables the GO/NG function.

Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : SPEC:TEST ON

SPECification:TEST?

This command queries whether or not the GO/NG function is enabled.

Return OFF, ON.

Query example : SPEC:TEST?

SPECification:UNIT<space><value>

This command sets the specific entry mode.

Parameter : VALUE(1), PERCENT(0).

Return SET_OK/SET_TIME_OUT.

Example : SPEC:UNIT VALUE

SPECification:UNIT?

This command queries the specific entry mode.

Return VALUE, PERCENT.

Query example : SPEC:UNIT?

SPECification:CURREnt:C<space><value>

This command sets the center-level current specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:CURR:C 1

SPECification:CURRent:C?

This command queries the center-level current specification.

Query example : SPEC:CURR:C?

SPECification:CURRent:H<space><value>

This command sets the high-level current specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:CURR:H 1

SPECification:CURRent:H?

This command queries the high-level current specification.

Query example : SPEC:CURR:H?

SPECification:CURRent:L<space><value>

This command sets the low-level current specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:CURR:L 1

SPECification:CURRent:L?

This command queries the low-level current specification.

Query example : SPEC:CURR:L?

SPECification:POWer:C<space><value>

This command sets the center-level power specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:POW:C 1

SPECification:POWer:C?

This command queries the the center-level power specification.

Query example : SPEC:POW:C?

SPECification:POWer:H<space><value>

This command sets the high-level power specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:POW:H 1

SPECification:POWer:H?

This command queries the high-level power specification.

Query example : SPEC:POW:H?

SPECification:POWer:L<space><value>

This command sets the low-level power specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:POW:L 1

SPECification:POWer:L?

This command queries the low-level power specification.

Query example : SPEC:POW:L?

SPECification:VOLTage:C<space><value>

This command sets the center-level voltage specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:VOLT:C 1

SPECification:VOLTage:C?

This command queries the center-level voltage specification.

Query example : SPEC:VOLT:C?

SPECification:VOLTage:H<space><value>

This command sets the high-level voltage specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:VOLT:H 1

SPECification:VOLTage:H?

This command queries the high-level voltage specification.

Query example : SPEC:VOLT:H?

SPECification:VOLTage:L<space><value>

This command sets the low-level voltage specification.

Return SET_OK/SET_TIME_OUT.

Example : SPEC:VOLT:L 1

SPECification:VOLTage:L?

This command queries the low-level voltage specification.

Query example : SPEC:VOLT:L?

SPECification[:PASS]?

This command queries GO/NG function execution result.

Return GO, NG, IDLE.

Query example : SPEC?

SPECification[:PASS]:CURRent?

This command queries GO/NG result reference to current specification.

Return GO, NG, IDLE.

Query example : SPEC:CURR?

SPECification[:PASS]:POWer?

This command queries GO/NG result reference to power specification.

Return GO, NG, IDLE.

Query example : SPEC:POW?

SPECification[:PASS]:VOLTage?

This command queries GO/NG result reference to voltage specification.

Return GO, NG, IDLE.

Query example : SPEC:VOLT?

9.14 Synchronous Subsystem

SYNChronous:RUN<space><value>

This command sets all E-loads to 'ON' in synchronous mode.

Parameter: OFF(0), ON(1). Return SET_OK/SET_TIME_OUT.

Example : SYNC:RUN ON

SYNChronous:TYPE<space><value>

This command sets the unit to master or slave in synchronous mode.

Parameter : NONE(0), MASTER(1), SLAVE(2). Return SET_OK/SET_TIME_OUT.

Example : SYNC:TYPE NONE

PARAllel:DATA:LOAD:STARt<space><value>

This command starts to load the program data in parallel mode.

Parameter: ON|1, OFF|0

Return SET_OK/SET_TIME_OUT

Example : PARA:DATA:LOAD:STAR ON

PARAllel:DATA:LOAD:STATe?

This command queries the state of the data import in parallel mode.

Returns:

Began to transport, 1

In transmitting, 50

Transfer complete, 100

None

Query example: PARA:DATA:LOAD:STAT?

9.15 Program Subsystem

PROGram:DATA<space><value 1>,<value 2>,<value 3>,<value 4>

This command sets the basic parameters for program mode.

Return SET_OK/SET_TIME_OUT.

The setting parameter is 1~4.

Parameter1 : 1~10. To set Program NO..

Parameter2 : 0~10. To set the link parameter in program.

Parameter3 : 0~4000. To set repeat count for program.

Parameter4 : 0~300. To set sequence number for program.

Example : PROG:DATA 1,0,10,10

PROGram:DATA?<space><value>[,< MAX|MIN >]

This command queries the basic parameters for program mode.

Return 1,0,10,10.

Query example : PROGram:DATA? 1

PROGram:DATA:LIST<space><value 1>,<value 2>,<value 3>,<value 4>, <value 5>,<value 6>,<value 7>,<value 8>,<value 9>,<value 10>, <value 11>,<value 12>,<value 13>,<value 14>,<value 15>, <value 16>,<value 17>

Parameter 1 : 1~10. Select a program to be set.

Parameter 2 : 0~N. Select a step to be set.

Parameter 3 : SKIP|0, AUTO|1, MANUAL|2, EXTERNAL|3. Set the trigger mode of current step.

Parameter 4 : Set the run mode of step. General mode: CL|0, CCM|1, CCH|2, CRL|3, CRM|4, CRH|5, CVL|6, CVM|7, CVH|8, CPL|9, CPM|10, CPH|11. Special mode, OFF|12, SHORT|13.

Parameter 5 : Unit (A|Ohm|V|W), set the load value A according to run mode in step.

Parameter 6 : Unit (A|Ohm|V|W), set the load value B according to run mode in step.

Note : set parameter 6 a different value from parameter 5 means enable value B.

Parameter 7 : when parameter 4 set as CC/CR/CP, parameter 7 used to set the rising slew rate in step, the unit is A/us. Or when parameter 4 set as CV, parameter 7 used to set current limit, the unit is A.

Note : This setting is invalid when parameter 4 set as CV mode.

Parameter 8 : when parameter 4 set as CC/CR/CP, parameter 8 used to set the falling slew rate in step, the unit is A/us. Or when parameter 4 set as CV, parameter 8 used to set the response speed. SLOW|0, NORMAL|1, FAST|2.

Note : This setting is invalid when parameter 4 set as CV mode.

Parameter9 : unit=V, set the high-level of voltage specific in step.

Parameter10 : unit=V, set the low-level of voltage specific in step.
 Parameter11 : unit=A, set the high-level of current specific in step.
 Parameter12 : unit=A, set the low-level of current specific in step.
 Parameter13 : unit=W, set the high-level of power specific in step.
 Parameter14 : unit=W, set the low-level of power specific in step.
 Parameter15 : 1: s, 0: us, set the unit for Parameter 16 and Parameter 17.
 Parameter16 : set the dwell time.
 Parameter17 : set the spec delay time.
 Return SET_OK/SET_TIME_OUT
 Example : PROG:DATA:LIST 1,0,AUTO,CCL,1,1,1,1,1,1,1,1,1,1,1,1

Command1:PROG:DATA:LIST?<space><value 1>,<value 2>,<value 3>[,<MAX|MIN>]

Command2:PROG:DATA:LIST?<space><value 1>,<value 2>[,<MAX|MIN>]

The command 1 or 2 queries the step parameters in program mode.

Parameter1 : 1~10. To select a program.

Parameter2 : 1~N. To select a step.

Parameter3 : CCL|0, CCM|1, CCH|2, CRL|3, CRM|4, CRH|5, CVL|6, CVM|7, CVH|8, CPL|9,
 CPM|10, CPH|11, 400|OFF(SHORT OFF), 410|SHORT(SHORT ON).

Return 1,0,AUTO,CCL,1,1,1,1,1,1,1,1,1,s,1,1

Example : PROG:DATA:LIST? 1,0
 PROG:DATA:LIST? 1,0,MAX
 PROG:DATA:LIST? 1,0,0,MAX

PROG:SHORT<space><value 1>,<value 2>,<value 3>

The command enables or disables the short function for program mode.

Parameter1 : 1~10. Set a program.

Parameter2 : 0~N. Set a sequence.

Parameter3 : 0(OFF), 1(ON).

Return SET_OK/SET_TIME_OUT.

Example : PROG:SHOR 1,0,ON

PROG:SHORT?<space><value 1>,<value 2>

The command queries whether or not the short mode is enabled.

Parameter1 : 1~10. Set a program.

Parameter2 : 0~N. Set a sequence. Return 1,11,ON.

The program NO. is 1, the sequence NO. is 11, the short mode is ON.

Example : PROG:SHOR? 1,0

PROG:NSElect<space><value>

This command selects the program number which to be executed.

The setting range is 1~10. Return SET_OK/SET_TIME_OUT.

Example : PROG:NSEL 1

PROG:NSElect?

This command queries the program number which to be executed.

Return 1~10.

Query example : PROG:NSEL?

PROG:SAVe

This command save the program settings.

Example : PROG:SAV

PROG:STATe?

This command queries the information of program running.

Mode 1 : x1,x2,x3,x4,x5,x6,x7,x8,x9,x10

Mode 2 : No Run

Mode 3 : Run Done

x1 : Program number

x2 : Step number

x3 : Load mode (CCL,CCM,CCH,CRL,CRM,CRH,CVL,CVM,CVH,CPL,CPM,CPH)

x4 : The result of the previous step, return 1~7.

1 : PASS;

2 : FAIL, exceed the high-level of voltage specific;

3 : FAIL, below the low-level of voltage specific;

4 : FAIL, exceed the high-level of current specific;

5 : FAIL, below the low-level of current specific;

6 : FAIL, exceed the high-level of power specific;

7 : FAIL, below the low-level of power specific;

x5 : Execution state, 0 : Idle; 1 : Running;

x6 : Trigger mode of the current step, 2 : Wait manual trigger, 3 : Wait external trigger;

x7 : Current repeat count of program.

x8 : Dwell time of the current step.

x9 : Time unit of the current step, s or us.

x10 : Running state of this program file, return No Run, Running or Run Done.

Note : Only when the program is running, it will return all the parameters or return No Run or Run Done.

Return example : 1,2,CCL,1,1,2,1,1,s,Running

Query example : PROG:STAT?

PROG:SEQ:CLEAR<space><value>

This command clears all sequence in program file what specified.

The setting range is 1~10.

Example : PROG:SEQ:CLE 1

PROG:SEQ:REMAIN?

This command queries the remains sequence of unused.

Query example : PROG:SEQ:REM?

PROG:SEQ:FAIL?

This command queries the fail of sequence in specifications.

Return xx-xx, xx-xxx..., For example 1-2, 5-13, 10-8. Which front of '-' is the program number and rear of '-' is the sequence number.

Query example : PROG:SEQ:FAIL

PROG:STEP:RESULT?<space><value 1>,<value 2>

This command queries the result of a specified step.

Return:

PASS

SKIP

or the following causes of failure.

W_LOW

W_HIGH

V_LOW

V_HIGH

A_LOW

A_HIGH

PROG:STEP:CLEAR:STEP<space><value 1>,<value 2>

This command clears a specified sequence in the program file.

Parameter 1 : 1~10

Parameter 2 : 0~N

Return SET_OK/SET_TIME_OUT.

Example : PROG:SEQ:CLE:STEP 1,0

9.16 Status Subsystem

STAT:LOAD?

This command queries the running status of the E-load.

Query example : STAT:LOAD?

STATus:VALue?

This command queries the running value of the E-load.

Query example : STAT:VAL?

STATus:PROGram:TRIGger?

This command queries whether link to the next program ~~adly~~ in program mode.

Return DISABLE/ENABLE.

Query example : STAT:PROG:TRIG?

STATus:SHORT?

This command queries whether or not the short mode is enabled. Return OFF/ON.

Query example : STAT:SHOR?

STATus:SAMPlE?

This command queries the voltage sense mode. Return LOCAL/REMOTE.

Query example : STAT:SAMP?

STATus:VRNG?

This command queries the voltage measurement range.

Return LOW/MIDDLE/HIGH.

Query example : STAT:VRNG?

STATus:IRNG?

This command queries the current measurement range.

Return LOW/MIDDLE/HIGH.

Query example : STAT:IRNG?

STATus:MODE?

This command queries the current measurement range.

Return CCL,CCM,CCH,CRL,CRM,CRH,CVL,CVM,CVH,CPL,CPM,CPH.

Query example : STAT:MODE?

9.17 Fetch Subsystem

FETCh:CURRent:PEAK:MAX?

This command queries the measurement of the maximum peak current.

Query example : FETC:CURR:PEAK:MAX?

FETCh:CURRent:PEAK:MIN?

This command queries the measurement of the minimum peak current.

Query example : FETC:CURR:PEAK:MIN?

FETCh:VOLTage:PEAK:MAX?

This command queries the measurement of the maximum peak voltage.

Query example : FETC:VOLT:PEAK:MAX?

FETCh:VOLTage:PEAK:MIN?

This command queries the measurement of the minimum peak voltage.

Query example : FETC:VOLT:PEAK:MIN?

FETCh:TEMPerature:MAX?

This command queries the measurement of the maximum temperature.

Query example : FETC:TEMP:MAX?

9.18 TimeMeas Subsystem

TIMing[:STATe]<space><value>

This command enables or disables TIMING function.

Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : TIM ON

TIMing[:STATe]?

This command queries whether or not the Timing function is enabled.

Return OFF, ON.

Query example : TIM?

TIMing:TRIGger:MODE<space><value>

This command sets the trigger mode for starting measurement in Timing function.

Parameter : RISE(0), FALL(1).

Return SET_OK/SET_TIME_OUT.

Example : TIM:TRIG:MODE RISE

TIMing:TRIGger:MODE?

This command queries the trigger mode for starting measurement in Timing function.

Return RISE, FALL.

Query example : TIM:TRIG:MODE?

TIMing:TRIGger:VStArt<space><value>

This command sets the voltage at the start of measurement for Timing function.

Return SET_OK/SET_TIME_OUT.

Example : TIM:TRIG:VSTA 1

TIMing:TRIGger:VStArt?

This command queries the trigger voltage at the start of measurement for Timing function.

Query example : TIM:TRIG:VSTA?

TIMing:TRIGger:VEND<space><value>

This command sets the voltage at the end of measurement for Timing function.

Return SET_OK/SET_TIME_OUT.

Example : TIM:TRIG:VEND 1

TIMing:TRIGger:VEND?

This command queries the voltage at the end of measurement for Timing function.

Query example : TIM:TRIG:VEND?

TIMing:TRIGger:TOUT<space><value>

This command sets the measurement timeout for Timing function.

The setting range is 0~100000s. Return SET_OK/SET_TIME_OUT.

Example : TIM:TRIG:TOUT 1

TIMing:TRIGger:TOUT?

This command queries the measurement timeout for Timing function.

Return 0~100000.

Query example : TIM:TRIG:TOUT?

TIMing:RESult?

This command queries the results of Timming function.

Return 0~4. 0 : "UnderStart".

1 : "Wait for the trigger to start voltage".

2 : "Wait for the trigger to stop voltage".

3 : t = 5555ms. Reached trigger condition return the time.

4 : "TimeOut".

Query example : TIM:RES?

9.19 DIGITIZING Subsystem

DIGitizing:INITiate

This command starts digitizing function.

Return SET_OK/SET_TIME_OUT.

Example : DIG:INIT

DIGitizing:ABORt

This command aborts digitizing function.

Return SET_OK/SET_TIME_OUT.

Example : DIG:ABOR

DIGitizing:SAMPling:POINt <space><value>

This command sets the sampling points for digitizing function.

The setting range is 1~20000. Return SET_OK/SET_TIME_OUT.

Example : DIG:SAMP:POIN?

DIGitizing:SAMPling:POINt?

This command queries the sampling points for digitizing function.

Return 1~20000.

Query example : DIG:SAMP:POIN?

DIGitizing:SAMPling:TIME <space><value>

This command sets the sampling time for digitizing function.

The setting range is 2us~40ms. Return SET_OK/SET_TIME_OUT.

Example : DIG:SAMP:TIME 2

DIGitizing:SAMPling:TIME?

This command queries the sampling time for digitizing function.

Return 2us~40ms.

Query example : DIG:SAMP:TIME?

DIGitizing:TRIGger[:STATe]<space><value>

This command enables or disables the software trigger for digitizing function.

Parameter : OFF(0), ON(1).

Return SET_OK/SET_TIME_OUT.

Example : DIG:TRIG ON

DIGitizing:TRIGger[:STATe]?

This command queries whether or not the software trigger is enabled.

Return IDLE, PRE_TRIG, WAIT_TRIG, POST_TRIG.

Query example : DIG:TRIG?

DIGitizing:TRIGger:POINt<space><value>

This command sets the trigger point for digitizing function.

Parameter : Value, smaller than sampling point setting.

Return SET_OK/SET_TIME_OUT.

Example : DIG:TRIG:POIN 5

DIGitizing:TRIGger:POINt?

This command queries the trigger point for digitizing function.

Parameter : None

Return value setting.

Example : DIG:TRIG:POIN?

DIGitizing:TRIGger:SOURce<space><value>

This command sets the trigger source for digitizing function.

Parameter : LOADON(0), LOADOFF(1), TTL(2), BUS(3), MANUAL(4).

Return SET_OK/SET_TIME_OUT.

Example : DIG:TRIG:SOUR LOADON

DIGitizing:TRIGger:SOURce?

This command queries the trigger source for digitizing function.

Return LOADON, LOADOFF, TTL, BUS, MANUAL.

Query example : DIG:TRIG:SOUR?

DIGitizing:WAVEform:CAPture?

This command enables waveform data transmit from module to frame.

Return WALT, OK, ERROR.

Query example : DIG:WAV:CAP?

DIGitizing:WAVEform:DATA? <space><value>

This command queries the voltage or current waveform data from the E-load.

Parameter : V/I

Query example : DIG:WAV:DATA? V

9.20 Communication Subsystem

COMMunicate:ADDRess:GPIB<space><value>

This command sets the GPIB address.

The setting range is 1~31. Return SET_OK/SET_TIME_OUT.

Example : COMM:ADDR:GPIB 1

COMMunicate:ADDRess:GPIB?

This command queries the GPIB address. Return 1~31.

Query example : COMM:ADDR:GPIB?

Chapter 10 : Dispatch procedure for service, E-Waste Management & Warranty

10.1 Dispatch procedure for service

No user serviceable parts are inside the instrument, should it become necessary to send back the instrument to factory for service, please observe the following procedure:

Before dispatching the instrument please write to us giving full details of the fault noticed.

1. After receipt of your communication, our service department will advise you whether it is necessary to send the instrument back to us for repairs or the adjustment is possible in your premises.
2. Dispatch the instrument (only on the receipt of our advice) securely packed in original packing duly insured and freight paid along with accessories and a copy of the fault details noticed at our Service Center or factory.

10.2 E-Waste

We support environmentally sustainable measures and solicit your cooperation in this endeavour by way of sending the equipment to us at the end of the life of the product. The equipment will be sent for recycling through authorised recyclers as per E-Waste Management Rules

Please write to us at support@scientificindia.com for this purpose. Your support will go a long way as each and everybody's action can led to improve global environment.

10.3 Warranty

Scientific warrants all its Instruments to be free from defects in material and workmanship when used under normal operating conditions in accordance with the instructions given in the manual for a period of 12 (Twelve) months from date of purchase from Scientific or its authorized dealers. The service during the warranty period will be rendered on return to factory / service center basis.

1. Its obligation under this warranty is limited to repairing or replacing at its own discretion. This warranty shall not apply to any defect, failure or damage caused by accident, negligence, misapplication, alteration or attempt to repair, service or modify in any way.
2. This warranty does not include display, fuses, batteries or accessories. This warranty is only valid with the original purchaser who must have properly registered the product within 15 days from date of purchase. No other warranty is expressed or implied.
3. When it becomes necessary to return the instrument to our Factory facility, kindly pack it carefully in the original carton or equivalent and ship it duly insured, transportation charges prepaid.
4. Your Scientific instrument is a complex electronic device and deserves the best service available by technicians thoroughly familiar with its service and calibration procedures.