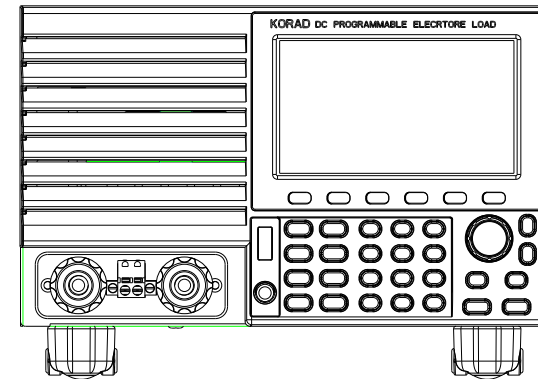


KORAD

Programmable DC Electronic Load KEL2000 Series



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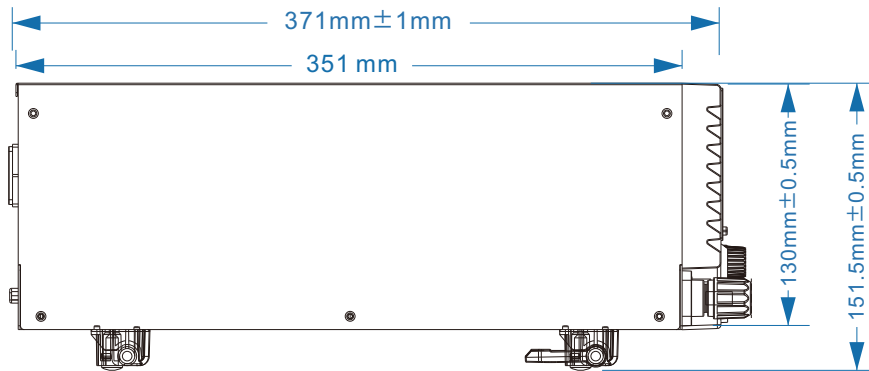
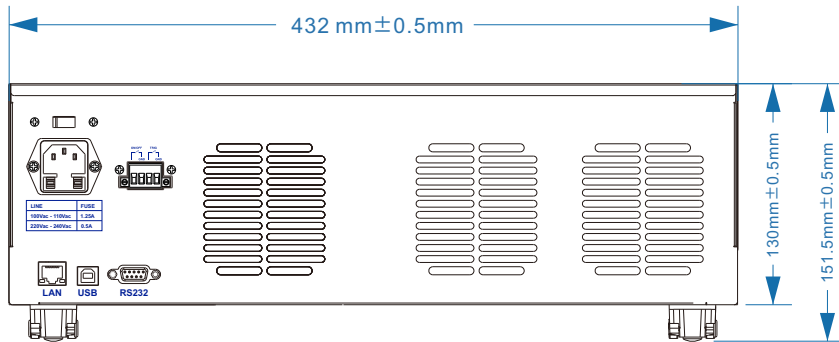
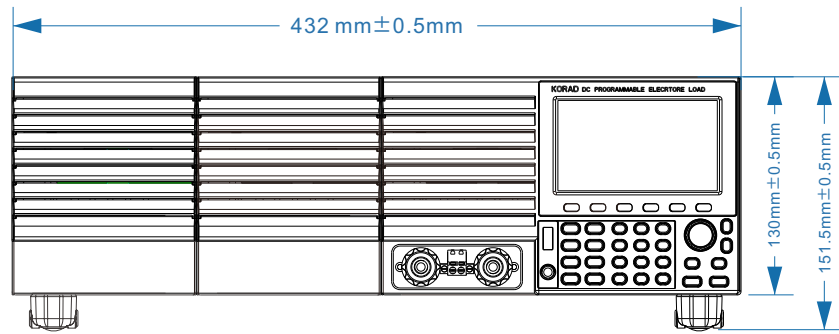
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USER MANUAL



KEL2030 & KEL2040

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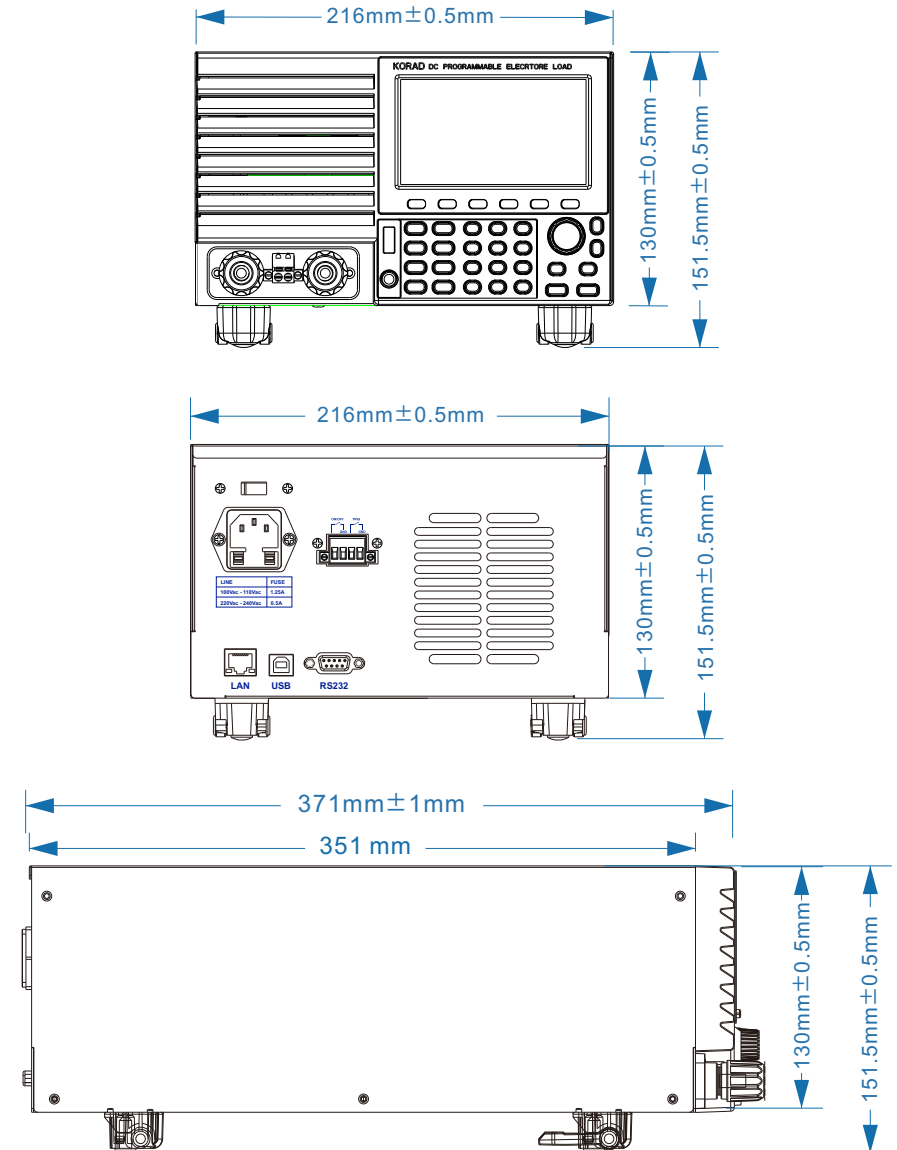
Introduction

KEL2000 series is an intelligent programmable DC single channel electronic load, including 300W, 500W, and 1000W stand-alone models and 50KW internal combination models. The voltage includes 150V popular series and 500V high voltage series. And it provides a variety of high-end test functions, such as the output of various dynamic waveforms, the oscilloscope waveform display function, the direct import of U disk editing data, the data U disk storage, the battery test record function, etc., and machine firmware can be upgraded via USB. Equipped with common interfaces such as USB, RS232, LAN and optional GPIB, it can meet the testing requirements of various occasions, for example, factory testing, automated application testing, new energy testing, laboratory testing, battery testing, etc..

Features:

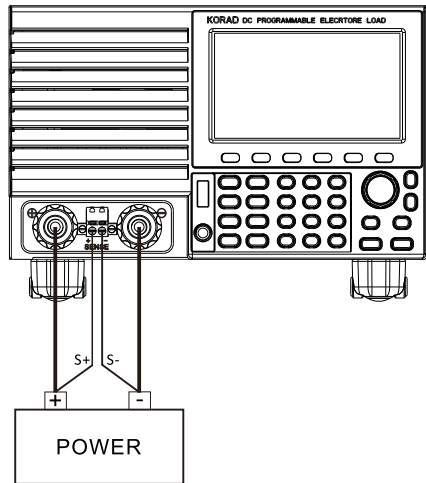
- Dynamic mode 40K
- Commonly used CV/CC/CW/VR mode
- Including 150V series and 500V high voltage series
- High voltage and current resolution and accuracy
- Intuitive display of dynamic voltage and current waveforms
- Dynamic data can be imported and exported via U disk
- Battery test function
- Multiple communication interfaces
- VI curve test function
- Machine firmware can be upgraded via USB

Dimensions

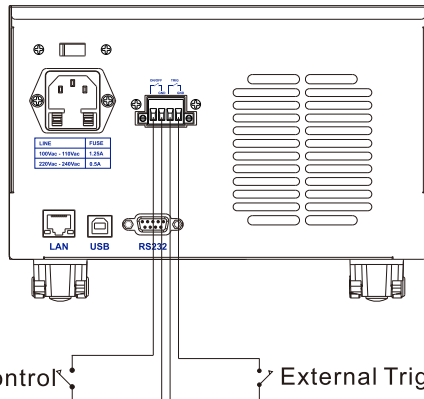


KEL2010 & KEL2020

Diagram of External Interfaces

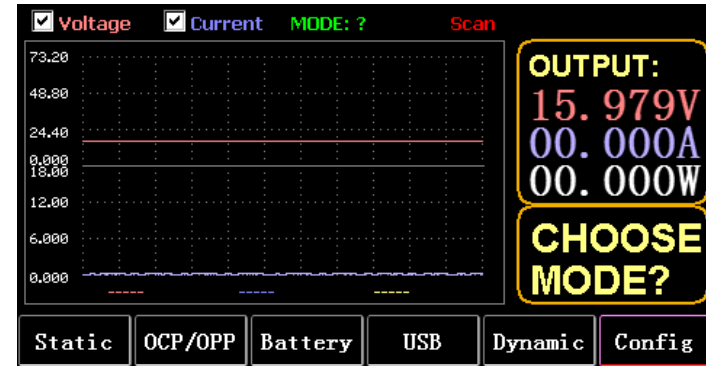


Output compensation



Trigger or external switch control will be controlled by the panel setting or communications.

1. Main Interface



1.1 Menu keys

STATIC(F1)	Enter static CC, CV, CW, CR, or SHORT
OCP/OPP(F2)	call tables OCP and OPP
BATTERY(F3)	Battery measurement mode: VI curve
USB(F4)	The panel will display the USB logo after inserting the U disk, and it will display blank when it is not inserted. Save data to U disk, import and export LIST to U disk.
DYNAMIC(F5)	Dynamic CC, CV, CW, CR, RL, or PL
CONFIG(F6)	Parameter settings

1.2 Keyboard function

ESC	key for escape and delete
F1 to F6	Function keys
TAB	Change focus
STOP	1. Pause during waveform display 2. Long press to take a screenshot

LOCK	Long press to lock the keyboard, and long press again to unlock it
CC	1. Short press to enter CC mode
	2. Long press SHORT
CV	Enter CV mode
CW	Enter CW mode
CR	Enter CR mode
0 to 9	1. Short press the number keys
	2. Long press numeric 1 to 6 to call static storage units 1 to 6
	3. Long press 7 to set RTC, and long press again to asave and exit
	4. Long press 8 set LCD backlight, and long press again to save and exit
	5. Long press 9 to enable the USB storage, and long press again to turn off the storage
	6. In the main interface, long press numeric 0 for more than 3s to calibrate 0
WAVE	Press TAB to select voltage or current, and press WAVE to display 4 measurement lines, among which 2 vertical lines measure time, and 2 horizontal lines measure voltage and current amplitude respectively.
	1. Short press ← (left key) to select the vertical line on the left
	2. Short press → (right key) to select the vertical line on the right, and long press after STOP to move the waveform to the right
	3. Short press ↑ (up key) to select the measured voltage amplitude, and long press to modify the voltage scale value
	4. Short press ↓ (down key) to select the measured current amplitude, and long press to modify the current scale value
	5. Enter to adjust the sampling time value
ON	Turn on and turn off
Enter	1. Short press to enter
	2. Long press to save
Note:	The long press time is about 1.5s

Models	KEL2030		KEL2040		
Input Rating	Power	1000W		1500W	
	Voltage	0-150V		0-150V	
	Current	0-40A		0-40A	
CC Mode	Range	0-3A	0-40A	0-3A	0-40A
	Resolution	0.1mA	1mA	0.1mA	1mA
	Accuracy	±(0.05%of set+0.045%off.s)		±(0.05%of set+0.045%off.s)	
CV Mode	Range	0-18V	0-150V	0-18V	0-150V
	Resolution	0.1mV	1mV	0.1mV	1mV
	Accuracy	±(0.05%of set+0.025%off.s)		±(0.05%of set+0.025%off.s)	
CR Mode	Range	0.2Ω-7.5KΩ		0.2Ω-7.5KΩ	
	Resolution	16 bit		16 bit	
	Accuracy	±(0.05%of set+0.025%off.s)		±(0.05%of set+0.025%off.s)	
CW Mode	Range	1000W		1500W	
	Resolution	0.01W		0.01W	
	Accuracy	±(0.1%of set+0.1%off.s)		±(0.1%of set+0.1%off.s)	
Slope	Range	0-3A	0-40A	0-3A	0-40A
	Rising	0.0001-0.3A/us	0.001-2A/us	0.0001-0.3A/us	0.001-2A/us
	Falling	0.0001-0.3A/us	0.001-2A/us	0.0001-0.3A/us	0.001-2A/us
Voltage measurement	Range	0-18V	0-150V	0-18V	0-150V
	Resolution	0.1mV	1mV	0.1mV	1mV
	Accuracy	±(0.03%of set+0.025%off.s)		±(0.03%of set+0.025%off.s)	
Current measurement	Range	0-3A	0-40A	0-3A	0-40A
	Resolution	0.1mA	1mA	0.1mA	1mA
	Accuracy	±(0.05%of set+0.045%off.s)		±(0.05%of set+0.045%off.s)	
Power measurement	Range	1000W		1500W	
	Resolution	0.1W		0.1W	
	Accuracy	±(0.1%of set+0.1%off.s)		±(0.1%of set+0.1%off.s)	
Over power protection	1050W		1575W		
Over current protection	42A		42A		
Over voltage protection	155V		155V		
Over temperature protection	85°C		85°C		
Input impedance	>150KΩ		150KΩ		
Werght	11.5kg		14.3kg		
Dimention(W*D*H)	430mm*388mm*150.5mm				

Note: Specifications are subject to change without notice.

Specifications

Note: The specifications below are tested under the conditions of temperature 25°C+-5°C and the warm-up for 20 minutes.

Models		KEL2010		KEL2020	
Input Rating	Power Voltage Current	300W 0-150V 0-40A		500W 0-150V 0-40A	
CC Mode	Range	0-3A	0-40A	0-3A	0-40A
	Resolution	0.1mA	1mA	0.1mA	1mA
	Accuracy	±(0.05%of set+0.045%off.s)			
CV Mode	Range	0-18V	0-150V	0-18V	0-150V
	Resolution	0.1mV	1mV	0.1mV	1mV
	Accuracy	±(0.05%of set+0.025%off.s)			
CR Mode	Range	0.2Ω-7.5KΩ		0.2Ω-7.5KΩ	
	Resolution	16 bit		16 bit	
	Accuracy	±(0.05%of set+0.025%off.s)			
CW Mode	Range	300W		500W	
	Resolution	0.01W		0.01W	
	Accuracy	±(0.1%of set+0.1%off.s)			
Slope	Range	0-3A	0-40A	0-3A	0-40A
	Rising	0.0001-0.3A/us	0.001-2A/us	0.0001-0.3A/us	0.001-2A/us
	Falling	0.0001-0.3A/us	0.001-2A/us	0.0001-0.3A/us	0.001-2A/us
Voltage measurement	Range	0-18V	0-150V	0-18V	0-150V
	Resolution	0.1mV	1mV	0.1mV	1mV
	Accuracy	±(0.03%of set+0.025%off.s)			
Current measurement	Range	0-3A	0-40A	0-3A	0-40A
	Resolution	0.1mA	1mA	0.1mA	1mA
	Accuracy	±(0.05%of set+0.045%off.s)			
Power measurement	Range	300W		500W	
	Resolution	0.01W		0.1W	
	Accuracy	±(0.1%of set+0.1%off.s)			
Over power protection		315W		525W	
Over current protection		42A		42A	
Over voltage protection		155V		155V	
Over temperature protection		85°C		85°C	
Input impedance		>150KΩ		>150KΩ	
Werght		6.3kg		6.5kg	
Dimention(W*D*H)		215mm*388mm*150.5mm			

Note: Specifications are subject to change without notice.

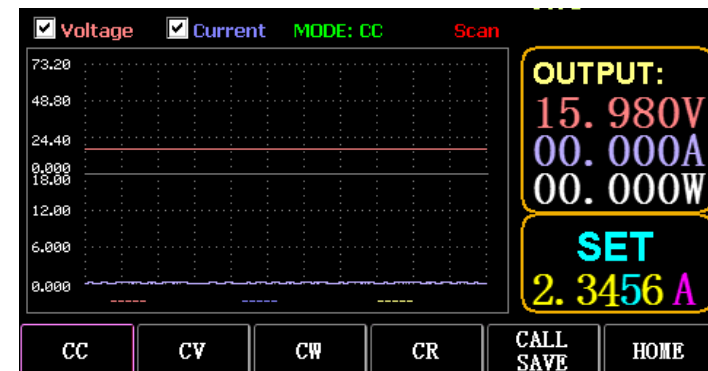
2. Static mode

2.1 Static CC

In constant current mode, the load consumes a constant current regardless of whether the input voltage is changed.

Operations:

- 1) Press CC or the soft key F1 on the keyboard.
- 2) Enter a value from 0 to 9 on the numeric keypad.
- 3) Press ← and → to move the cursor, and press ↑ ↓ and knob to adjust the corresponding value.
- 4) Press ENTER to turn ON/OFF.



2.2 Static CV

In constant voltage mode, the load keeps the device under test at the set voltage regardless of whether the input current is changed.

Operations: same as above

2.3 Static CW

In constant voltage mode, the load keeps the device under test at the set power regardless of whether the input voltage and current are changed.

Operations: same as above

2.4 Static CR

In constant resistance mode, the load keeps the device under test at the set resistance regardless of whether the input voltage and current are changed.

Operations: same as above

2.5 SHORT function

In SHORT mode, the load is output at the maximum current.

Operations:

Long press CC to displays MODE: SHORT on the interface and press CC, CV, CW or CR to exit.

2.6 Call static storage

The load can store and call 100 groups of static set values.

1) Storage operation

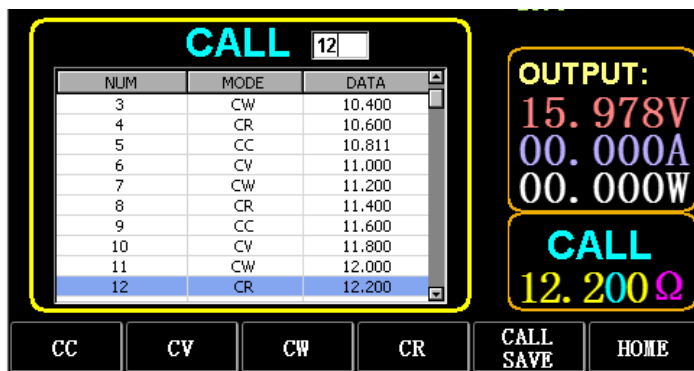
- (1) Press CAL/SAVE to switch the state to SAVE.
- (2) Enter a number key to index a line in the list, press TAB to select it, and press ENTER to enter the edit mode. Edit to display a red background, and press ← and → to select.
- (3) Edit MODE. Press CC, CV, CW, or CR on the keyboard to modify.
- (4) Edit data. Press 0 to 9 and ESC on the keyboard to modify.
- (5) After modification, press ENTER, and long press ENTER again to save the data.

2) Call operation

- (1) Press CALL/SAVE to switch to CALL.
- (2) Enter a number key to index a line or press TAB to switch the list, select it with the knob, and press ENTER.

3) M1 to M6 quick call

- (1) Long press numeric 1 to 6 to call M1 to M6.



11.2 U Flash Disk Storage of Real-time Data of Load Test

If the real-time test data is saved with a U flash disk, the data volume is to save the voltage and current data 5 times per second.

The operation procedures are as follows:

- 1) Press F6 (Config), use Tab to switch the focus on USB Store (Fig. 10.1 Parameter Setting).

Use ESC to delete, enter the number key 0.2, which means to save 5 times per second.

- 2) There are 2 ways to open the save data file.

<1> Turn on or off data saving in the menu interface: enter the U flash disk page (Fig. 11.1 Storage Interface of USB Flash Disk). Press (F1) “Start Save Data” to start, then the top status bar will have a down arrow flashing, indicating that the data is being saved right now.

To stop writing, re-enter the USB flash disk page, then press (F2) “Stop Save Data”. And the top arrow will disappear.

<2> Shortcut key to open or close the operation: in the state of inserting the U flash disk, long press the number key 9 to start the U flash disk saving, and long press the number key 9 again to stop saving.

Refer to Fig. 11.4 Data Write Icon



Fig. 11.4 Data Write Icon

Start SaveData(F1)	Create a CSV file with date as its name
Stop SaveData(F2)	Stop writing files
USB Disconnect(F3)	Disconnect USB
LoadCSV(F4)	Import files from USB flash disk
SaveCSV(F5)	Export CSV file
HomePage(F6)	Home page

Fig. 11.2

11.1 Import and save LIST

Take the table that data of BAT Group 1 is exported as an example.

- 1) After the USB flash disk is inserted, USB key is displayed on home page. Press (F4) USB.
- 2) Press TAB to switch to SAVE, turn the knob to select BAT mode, press ← or → to select Group, and turn the knob to Group 1.
- 3) After pressing (F5) SAVE CSV, a message will prompt that it has been exported. Import DYN_PL_Set.csv from USB flash disk to DYN PL.

	A	B	C	D	E
1	NO.	DATA (A)	UNITS	EXPLAIN	
2	1	1.132	A/uS	A SLOPE	
3	2	1.248	A/uS	B SLOPE	
4	3	1.51	A	LEVEL A	
5	4	3.201	A	LEVEL B	
6	5	6.813	S	TIME WIDTH	
7					

Fig. 11.3 DYN_PL_Set.csv

- 4) Press TAB to switch to LOAD, adjust to DYN mode and turn the knob to PL.
- 5) List a tree of files on the left and turn the knob to select the file DYN_PL Set.CSV to be imported.
- 6) After pressing (F4) LOAD CSV, successful import will be prompted.

3 Dynamic Test Mode

In dynamic mode, the load is constantly switching between 2 different values A and B.

3.1 Dynamic CC

For output using two different currents with different duty cycles at a certain frequency.

Take the current slope A of 0.001A/uS, the current change slope B of 0.002A/uS, the current value A of 1A, the current value B of 2A, the cycle frequency of 1HZ, and the duty cycle of 40% as an example.

Operations:

Select (F5) Dynamic to enter the interface as shown in Fig. 3.1.

- 1) Press (F1) DYN/CALL, press TAB to select CALLDYN's drop-down box, and turn the knob to CC.
- 2) Press (F2) DYN/SAVE to display SAVE on the screen.
- 3) Press TAB to switch the focus. The knob selects the first row.
- 4) Press ENTER to select the red background.
- 5) Enter numeric 0 to 9, and ESC.
- 6) After editing as 0.001, press ENTER. Then 0.0010 will be displayed on the screen, and the background will be switched to blue.
- 7) Repeat the above steps to set 0.002A/uS, 1A, 2A, 1HZ, and 40% respectively.
- 8) Long press ENTER to save the edited data.
- 9) Press the soft key (F1) DYN/CALL to display CALL.
- 10) Press ENTER to call.
- 11) Turn ON/OFF.

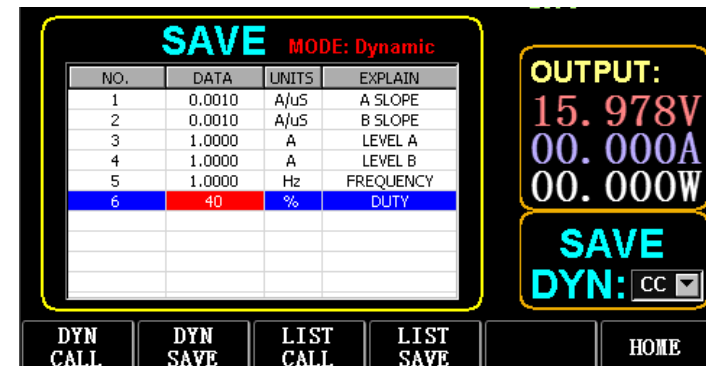


Fig. 3.1 DYN CC

Note:

Set the slope and current value to be range dependent. The maximum slope of the small range is 0.24A/uS, the maximum current can be set to 3A, the maximum slope of the large range is 3.2A/uS, and the maximum current can be set to 40A.

The maximum frequency can be set to 40,000Hz. When the frequency is set to 40,000Hz, the maximum duty cycle is 50%.

Refer to Section 10.7 "Load maximum setting" for the current maximum setting.

3.2 Dynamic CV

Used for output with different duty cycles at two different voltages at a certain frequency.

Take the A voltage of 1V, the B voltage of 2V, the cycle frequency of 1HZ, and the uty cycle of 40% as an example.

Operations:

- 1) Press (F1) DYN/CALL, TAB to select DYN/CALL, and turn the knob to CV.
- 2) Press (F2) DYN/SAVE to display SAVE on the screen.
- 3) Press TAB to switch the focus and turn the knob to select the first row.
- 4) Press ENTER to select the red background.
- 5) Enter numeric 0 to 9, and ESC.
- 6) After editing as 1.0001, press ENTER. Then 1.0000 will be displayed on the screen, and the background will be switched to blue.
- 7) Repeat the above steps to set 2V, 1HZ, and 40% respectively.
- 8) Long press ENTER to save the edited data.
- 9) Press (F1) DYN/CALL to display CALL.
- 10) Press ENTER to call DYN CV.
- 11) Turn ON/OFF.

3.3 Dynamic CW

The operation is the same as above.

3.4 Dynamic CR

The operation is the same as above.

3.5 Dynamic PL

It is set to the value A at the beginning. Each time a trigger signal is received, the load is switched to the value B, and switched to the value A again after the set time is maintained.

The following takes the current slope A of 0.001A/uS, the current slope B

Turn the knob to adjust the brightness, long press ENTER or numeric 8 to save, and press ESC to exit.

10.10 0 calibration function

If the device has not been calibrated for a long time or the temperature is high or low, the data will not return to zero, and the 0-calibration function can be performed.

After entering home page, close the load, unplug the external test line, and long press numeric 0 for over 3 seconds for the 0 calibration of voltage and current. And the 0-calibration function will disappear when the load restarts, and 0-calibrate again when needed.

11. U Flash Disk Import and Export Function

Save real-time voltage and current data and export data list through U flash disk. As shown in Fig. 11.1, the USB[0:] tree on the left shows that the file list is the acceptable format data loaded in the U flash disk. And the upper part on the right is the option of importing the load from the U flash disk, and the lower part is the data option of exporting the load to the U flash disk.

Press TAB to select the control. Press ◀ ▶ ▲ ▼ to move the focus left or right. Press F4 (Load CSV) to import the file from the USB flash disk, and save CSV (F5) to export the CSV file to the USB flash disk. And the function keys are shown in Fig. 11.2 below:

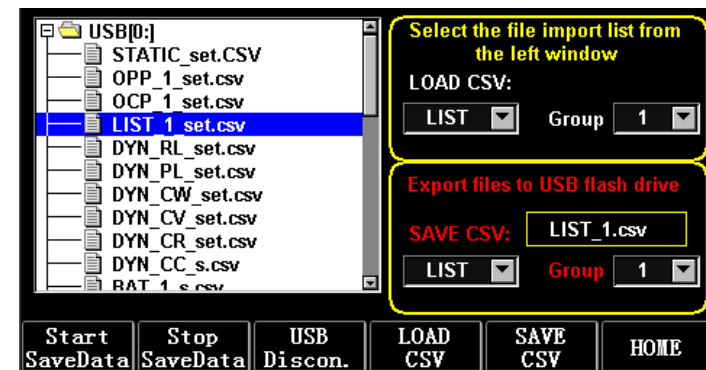


Fig. 11.1 Storage Interface of USB Flash Disk

set to be the high current range (0 to 40A).

OVP alarm value: it is (19.4V) at the low range and (155V) at the high range.

OCV alarm value: it is 105% of the set current value. For example, if the current is set to be 5A, the alarm value is 5.25A.

OPP alarm value: it is 105% of the set power value. For example, if the power value is set to be 100W, the alarm value is 105W.

OTP alarm value: if the temperature is higher than 85°C, an alarm will be given, and the load will be closed.

10.8 RTC setting

Long press numeric 7, and then date will be displayed on the screen as shown in Fig. 10.2.

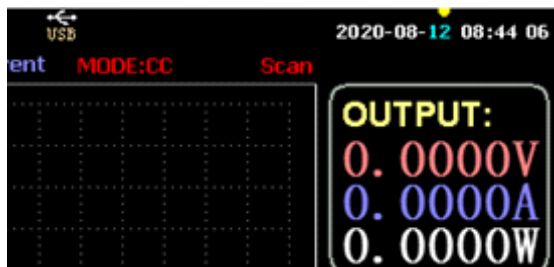


Fig. 10.2 RTC Date

Press ← or → to move the focus and turn the knob to make modification. After modification, long press ENTER or numeric 7 to save, and press ESC to exit.

10.9 Backlight setting

After long pressing numeric 8, the progress bar will be displayed on the screen as shown in Fig. 10.3.

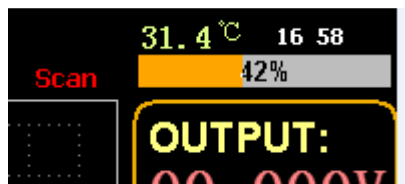


Fig. 10.3 Backlight

of 0.002A/uS, the current value A of 1A, the current value B of 2A, and the duration B of 1s as an example.

Operations:

- 1) Press (F1) DYN/CALL, press TAB to select CALLYN, and turn the knob to PL.
- 2) Press (F2) DYN/SAVE to display SAVE on the screen.
- 3) Press TAB to switch the focus and turn the knob to select the first row.
- 4) Press ENTER to select the red background.
- 5) Enter numeric 0 to 9, and ESC.
- 6) After editing as 0.001, press ENTER. Then 0.0010 will be displayed on the screen, and the background will be switched to blue.
- 7) Repeat the above steps to set 0.002A/uS, 1A, 2A, and 1S respectively.
- 8) Long press ENTER to save the edited data.
- 9) Press the soft key (F1) DYN/CALL to display CALL.
- 10) Press ENTER to call DYN RL.
- 11) Turn ON/OFF.
- 12) Trigger the value B every time you press ENTER.

3.6 Dynamic RL

Each time a trigger signal is received, the load is switched back and forth between the value A and the value B.

Take the current slope A of 0.001A/uS, the current slope B of 0.002A/uS, the current value A of 1A, and the current value B of 2A as an example.

Operations:

- 1) Press (F1) DYN/CALL, press TAB to select DYN/CALL, and turn the knob to RL.
- 2) Press (F2) DYN/SAVE to display SAVE on the screen.
- 3) Press TAB to switch the focus and turn the knob to select the first row.
- 4) Press ENTER to select the red background.
- 5) Enter numeric 0 to 9, and ESC.
- 6) After editing as 0.001, press ENTER. Then 0.0010 will be displayed on the screen, and the background will be switched to blue.
- 7) Repeat the above steps to set 0.002A/uS, 1A, and 2A respectively.
- 8) Long press ENTER to save the edited data.
- 9) Press the soft key (F1) DYN/CALL to display CALL.
- 10) Press ENTER to call DYN RL.
- 11) Turn ON/OFF.
- 12) Trigger the value B every time you press ENTER.

4. Sequential Operation Mode

A maximum of 7 groups can be stored, each group can set up to 84 dynamically changing currents, and then the set currents can be switched in sequence. Take the settings stored in Group 1, the maximum current of 3A, and the number of the dynamic change current of 3; the first dynamic current of 1A, the change rate of 0.001A/uS, and the duration of 1s; the second dynamic current of 2A, the change rate of 0.002A/uS, and the duration of 2S; the third dynamic current of 3A, the change rate of 0.003A/uS, and the duration of 3s; the number of repeated operations of 5 as an example. As shown in Fig. 4.1 List. Operations:

- 1) Press (F3) LIST/CALL press TAB to select GROUP, and turn the knob to Group 1.
 - 2) Press (F4) LIST/SAVE to display SAVE on LIST.
 - 3) Press TAB to switch the focus, select RANGE and edit the maximum value of 3A via numeric 0 to 9 and ESC.
 - 4) Press TAB to select CYCLE. The number of editing cycles is 5.
 - 5) Press TAB to the first row of LIST and press ENTER. At this time, the background turns red.
- Edit the first item DATA value of 1A. After editing, press ENTER, and the background will be switched to blue.
- Press left and right keys (← and →) to the second item SLOPE (A/uS), edit the value as 0.001A/uS, and press ENTER, and the background will be switched to blue. Press left and right keys (← and →) to the third item TIME (S), edit the value as 1s, and press ENTER.
- 6) Repeat the above steps to start setting the second and third rows of the table.
 - 7) Long press ENTER to save the edited data.
 - 8) Press the soft key (F3) LIST/CALL to display CALL.
 - 9) Press ENTER to call LIST1.
 - 10) Turn ON/OFF.

Note:

To delete data after Row 3, select Row 4 in LIST SAVE mode.

Press ENTER to enter the editing background and it turns red, and then press ESC to delete all data after Row 4. Long press ENTER to save the data.

number is 1000. The value 18191 cannot be set.

10.2 Setting of CC slope rate

Press TAB to switch to CC SLOPE and turn the knob to select LOW/HIGH.

10.3 Storage time setting of USB flash disk

Press TAB to switch to Sel UsbStore. ESC is the delete key, and numeric 0 to 9 is for entering numbers. The minimum storage time can only be 0.05S, and the maximum storage time is 9999S;

10.4 Buzzer setting

Press TAB to switch to BEEP and turn the knob to select ON/OFF.

10.5 Setting of remote compensation

Press TAB to switch to Remote Comp, select ON, and connect the output end of the object to be tested to the terminal sense (+) or sense (-) on the front panel (this function is not saved during the blackout, otherwise it is closed).

10.6 Setting of external triggering

Press TAB to switch to EXIP TRIG and turn the knob to select Trig On/Switch On/OFF.

Trig On: triggering switch (open load after triggering)

Switchon: remote switch (ON/OFF function on the front panel will not work when this function works)

10.7 Setting of maximum values

1) Maximum voltage

Press TAB to switch to Voltage. ESC is the delete key, and numeric 0 to 9 is for entering numbers. The maximum voltage is 150V.

2) Maximum current

Press TAB to switch to Current. ESC is the delete key, and numeric 0 to 9 is for entering numbers. The maximum current is 40A.

3) Maximum power

Press TAB to switch to Power. ESC is the delete key, and numeric 0 to 9 is for entering numbers. The maximum power depends on the model.

4) Maximum resistance

Press TAB to switch to Resistance. ESC is the delete key, and numeric 0 to 9 is for entering numbers. The maximum resistance is 7500R.

Note: 18V and below is set to be the low voltage range (0 to 18V), and above 18. 4V is set to be the high voltage range (0 to 150V).

3A and below is set to be the low current range (0 to 3A), and above 3. 1A is

10. Setting of Parameter Function

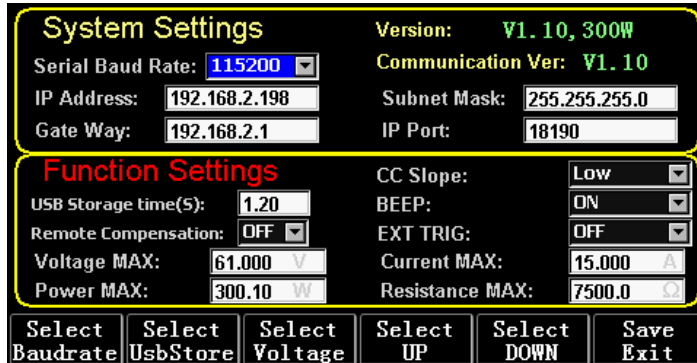


Fig. 10.1 Parameter Setting

Select Baudrate(F1)	Select the parameter of baud rate
Select UsbStore(F2)	Switch focus to select USB store
Select Voltage(F3)	Switch the Max setting of focus voltage
Select UP(F4)	Switch the focus up
Select DOWN(F5)	Switch the focus down
Save Exit(F6)	Save and exit

10.1 Setting of communication interface

1) Setting of serial baud rate

Select TAB or (F1) SelBaudrate to turn the knob

(1) Setting of IP address

ESC on the keyboard is the delete key, and numeric 0 to 9 is for entering numbers.

(2) Setting of port number

ESC on the keyboard is the delete key, and numeric 0 to 9 is for entering numbers. The maximum port number is 65535, and the minimum port

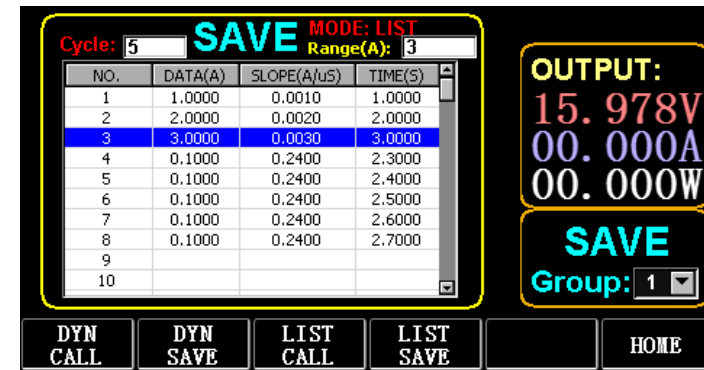


Fig. 4.1 LIST

5. Battery Test Mode

A maximum of 7 groups of battery test parameters can be set, the battery is tested according to the set current, voltage, capacity, time, and the test is automatically turned off if one of the conditions is met.

5.1 Battery test setup

Operation instructions: it takes the settings stored in Group 1, the current range of 10A, the discharge current of 1A, the discharge cut-off voltage of 2V, the discharge cut-off capacity of 0.5AH, and the discharge duration of 200m (battery time unit: m) as an example

- 1) Press (F3) Battery on the main interface to enter battery measurement.
- 2) Press (F1) BATT/CALL, and press TAB to select CALL GROUP 1.
- 3) Press (F2) BATT/SAVE to display SAVE on the table.
- 4) Press TAB to switch the focus and turn the knob to select the row position that needs to be modified.
- 5) Press ENTER to select the red background.
- 6) Enter numeric 0 to 9, and ESC.
- 7) After editing the range of 10A, press ENTER. Then 10.000 will be displayed on the screen, and the background will be switched to blue.

- 8) Repeat the above steps to set 1A, 2V, 0.5AH, and 200M respectively.
- 9) Long press ENTER to save the edited data.
- 10) Press (F1) BATT/CALL.
- 11) Press ENTER to call.
- 12) Turn ON/OFF.

6. VI Curve Mode

A maximum of 7 groups of VI test parameters can be set according to the set maximum current, minimum current, and step value.

Fig. 6.1 VI Curve

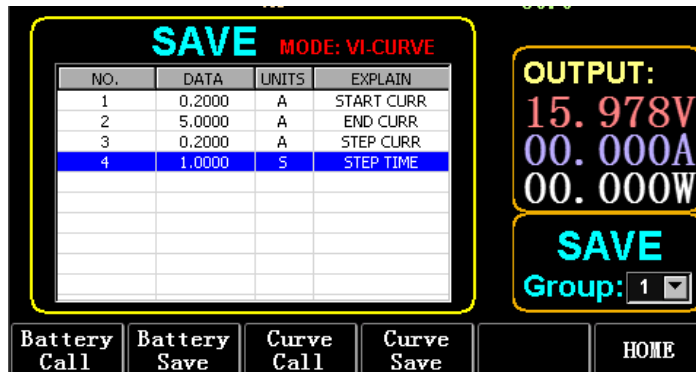


Fig. 6.1 VI Current Parameters

6.1 VI test setup

Operation instructions: it takes the settings stored in Group 1, the start current of 0.2A, the end current of 5A, the step current of 0.2A, and the step duration of 1s as an example.

- 1) Press (F3) Battery on the main interface to enter VI measurement.
- 2) Press (F3) Curve/CALL, and press TAB to select CALL GROUP 1
- 3) Press (F4) Curve/SAVE to display SAVE on the table.
- 4) Press TAB to switch to the table focus and turn the knob to select the row position to be modified.

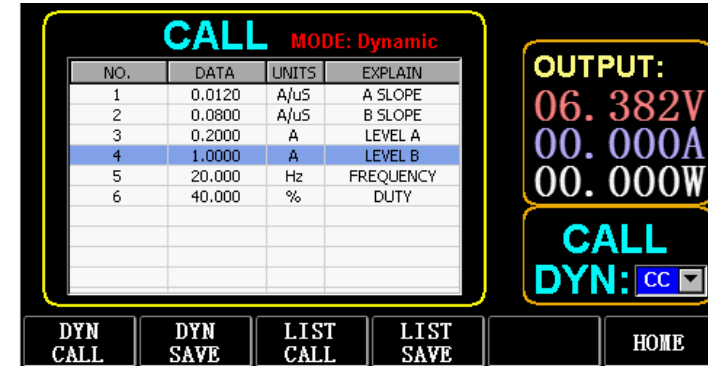


Fig. 9.1

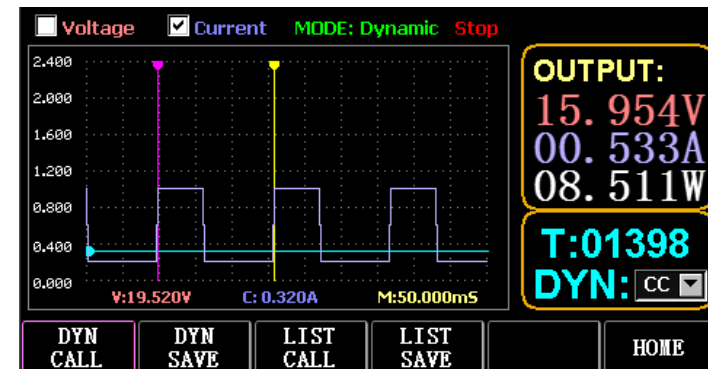


Fig. 9.2 Waveform Measurement

- 7) After editing VON as 10V, press ENTER. Then 10.000 will be displayed on the screen, and the background will be switched to blue.
- 8) Repeat the above steps to set 5S, 3A, 20W, 1W, 1S, 10W, 8V, 15W, and 10W respectively.
- 9) Long press ENTER to save the edited data.
- 10) Press (F3) OCP/CALL.
- 11) Press ENTER to call.
- 12) Turn ON/OFF.

9. WAVE Mode

9.1 WAVE measurement

- 1) Press TAB to display voltage, current and waveform.
- 2) Press WAVE to display the measuring column.
- 3) Measure the time scale. Press ← or → to select the left or right measuring column, and turn the knob to move left or right for the display of the difference between the two measuring lines.
- 4) Measure the negative value of voltage or current. Press ↑ or ↓ to select the upper or lower measuring column, and turn the knob to move up or down for the display of amplitude of the current measuring column.
- 5) Adjust the scale value of current. Long press ↓ and turn the knob to adjust the size.
- 6) Adjust the scale value of voltage. Long press ↑ and turn the knob to adjust the size.
- 7) Adjust the time value of sampling. Press ENTER and turn the knob to adjust the size.
- 8) When the wave pauses, press STOP.

Take the measurement of DYN CC mode as an example.

After editing the data of DYN CC, A SLOPE is 0.012 A/uS, B SLOPE is 0.08 A/uS, A is 0.2A, B is 1A, frequency is 20 HZ, duty cycle is 40%, as shown in Fig. 9.1. Please see Fig. 9.2 for the waveform measurement.

- 5) Press ENTER to select the red background.
- 6) Press ENTER to select the red background.
- 7) After editing as 0.2, press ENTER. Then 0.2000 will be displayed on the screen, and the background will be switched to blue.
- 8) Repeat the above steps to set 5A, 2A, and 1.000s respectively.
- 9) Long press ENTER to save the edited data.
- 10) Press (F3) Curve/CALL.
- 11) Press ENTER to call.
- 12) Turn ON/OFF.

The operation effect is shown in Fig. 6.2.

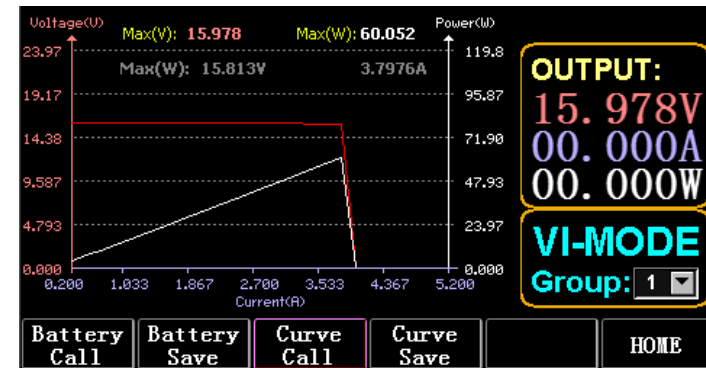


Fig. 6.2 VI Running Interface

7. OCP Mode

When the voltage reaches the VON value, the current output will be delayed for a period of time, and the step value will be decreased once every other period of time until the cut-off current or the voltage is higher than the OCP set voltage. If the stopped voltage is higher than the OCP voltage and the current is between the set maximum and minimum value, it is PASS, otherwise it is FAULT.

7.1 Setting function of OCP test

Note: 7 groups of OCP test parameters can be set at most.

Operation instructions: it takes the setting stored in Group 1, VON voltage of 10V, VON voltage delay of 5S, and current range of 3A; start current of 2A, each decrease of 0.1A, and each decreasing duration of 1s; end current of 1A, OCP voltage of 8V, maximum current of 1.9A, and minimum current of 1.1A as an example.

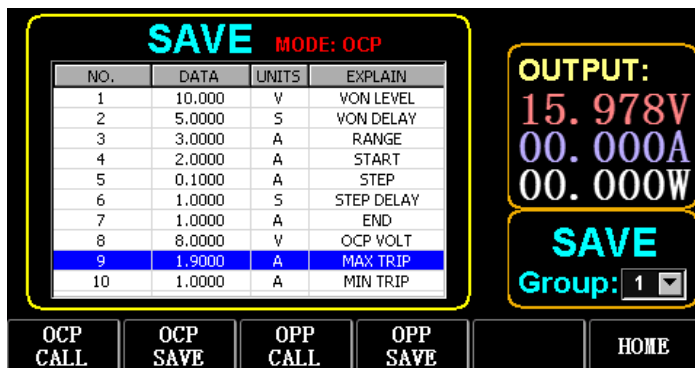


Fig. 7.1 OCP

- 1) Press (F2) OCP/OPP on home page.
- 2) Press (F1) OCP/CALL and TAB to select CALL GROUP 1.
- 3) Press (F2) OCP/SAVE to display SAVE on the table.
- 4) Press TAB to switch the focus and turn the knob to select the first row.
- 5) Press ENTER to select red background.
Enter numeric 0 to 9, and ESC.
- 6) After editing VON as 10V, press ENTER. Then 10.000 will be displayed on the screen, and the background will be switched to blue.
- 7) Repeat the above steps to set 5S, 3A, 2A, 0.1A, 1S, 1A, 8V, 1.9A, and 1.1A respectively.
- 8) Long press ENTER to save the edited data.
- 9) Press (F1) OCP/CALL.
- 10) Press ENTER to call.
- 11) Turn ON/OFF.

8. OPP Mode

When voltage reaches the VON value, the power output should be delayed for a period of time, and the step value should be decreased every once in a while until cut-off power or voltage is higher than the OPP set voltage. After the delay and decrease stop, if the voltage is higher than OPP voltage, the power between the set maximum and minimum values means PASS, or it means FAULT.

8.1 Setting function of OPP test

7 groups of OPP test parameters can be set at most.

Operation instructions: it takes the setting stored in Group 1, VON voltage of 10V, VON voltage delay of 5S, and current range of 3A; start power of 20W, each decrease of 1W, and each decreasing duration of 1s; end power of 10W, OPP voltage of 8V, maximum power of 15W, and minimum power of 10W as an example.

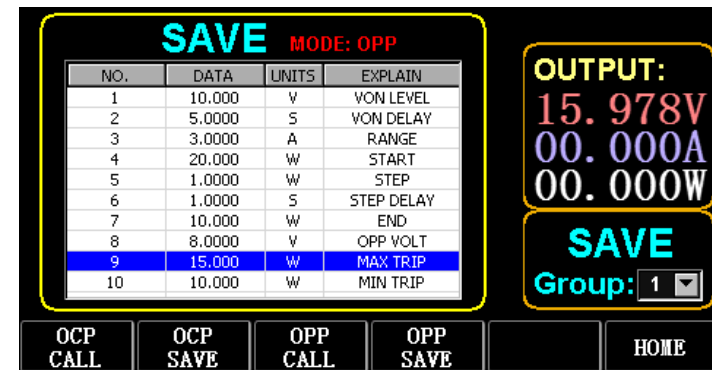


Fig. 8.1 OPP

- 1) Press (F2) OCP/OPP on home page.
- 2) Press (F3) OPP/CALL and TAB to select CALL GROUP 1.
- 3) Press (F4) OPP/SAVE to display SAVE on the table.
- 4) Press TAB to switch the focus and turn the knob to select the first row.
- 5) Press ENTER to select DATA in the first row and display the red background.
- 6) Enter numeric 0 to 9, and ESC.