OEL15&30&60 Series
Programmable DC Electronic Load
User Manual

For product support, visit:www.owon.com.hk/download

※:The illustrations, interface, icons and characters in the user manual may be slightly different from the actual product. Please refer to the actual product.

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General Warranty

We warrant that the product will be free from defects in materials and workmanship for a period of 2 years from the date of purchase of the product by the original purchaser from our company. The warranty period for accessories are 12 months. This warranty only applies to the original purchaser and is not transferable to a third party.

If the product proves defective during the warranty period, we will either repair the defective product without charge for parts and labour, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by our company for warranty work may be new or reconditioned like new. All replaced parts, modules and products become the property of our company.

To obtain service under this warranty, the customer must notify our company of the defect before the expiration of the warranty period. Customer shall be responsible for packaging and shipping the defective product to our designated service centre, a copy of the customer's proof of purchase is also required.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. We shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than our company representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of not our supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

Please contact the nearest sales and service offices for services.

Excepting the after-sales services provided in this summary or the applicable warranty statements, we will not offer any guarantee for maintenance definitely declared or hinted, including but not limited to the implied guarantee for marketability and special-purpose acceptability. We should not take any responsibilities for any indirect, special or consequent damages.

Table of Contents

1. General Safety Requirements 1
2. Safety Terms And Symbols 2
3. Quick Start 3
    3.1 Product Introduction 3
    3.2 Panel and User Interface 4
        3.2.1 Front Panel 4
        3.2.2 Rear Panel 6
        3.2.3 User Interface 7
    3.3 General Inspection 7
    3.4 Power-on Inspection 8
4. Functional features and Panel operation 9
    4.1 Turn On/Off the Channel Output 9
    4.2 Local/Remote mode Operation switch 9
    4.3 Constant Mode Operation 10
        4.3.1 Constant Current Mode(CC) 10
        4.3.2 Constant Voltage Mode(CV) 12
        4.3.3 Constant Resistance Mode (CR) 13
        4.3.4 Constant Power Mode (CP) 15
    4.4 Input Control function 17
    4.5 Keyboard Lock Function 17
    4.6 Short Circuit Simulation Function 17
    4.7 System Menu Function 18
        4.7.1 System Setting 18
        4.7.2 Parameter Setting 19
    4.8 Protection Functions and Fault Information 20
    4.9 Communication Port Introduction 23
    4.10 Dynamic Mode Function 24
    4.11 VON Function 25
    4.12 Compensation Function 26
    4.13 Test Function 27
        4.13.1 Battery discharge test function (Only available for T suffix version) 27

4.13.2 OCP test function (Only available for T suffix version) 30
4.13.3 OPP Test Function (Only available for T suffix version) 32
4.13.4 Ripple Test Function (Only available for V suffix version) 33
5. PC Software introduction 35
6. Troubleshooting 36
7. Technical Specification 37
8. Appendix 40
8.1 Appendix A: Accessories 40
8.2 Appendix B: General Care and Cleaning 40

1. General Safety Requirements

Before use, please read the following safety precautions to avoid any possible bodily injury and to prevent this product or any other connected products from damage. In order to avoid any contingent danger, ensure this product is only used within the range specified.

Only the qualified technicians can implement the maintenance.

To avoid Fire or Personal Injury:

- **Use Proper Power Cord.** Use only the power cord supplied with the product and certified to use in your country.
- **Connect the probe correctly. The grounding end of the probe corresponds to the grounding phase. Please don't connect the grounding end to the positive phase.**
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markers of this product. Refer to the user's manual for more information about ratings before connecting to the instrument.
- **Do not operate without covers**. Do not operate the instrument with covers or panels removed.
- **Use Proper Fuse.** Use only the specified type and rating fuse for this instrument.
- **Avoid exposed circuit**. Do not touch exposed junctions and components when the instrument is powered.
- **Do not operate if in any doubt.** If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations.
- **Use your instrument in a well-ventilated area.** Make sure the instrument installed with proper ventilation, refer to the user manual for more details.
- **Do not operate in wet conditions.T**o avoid the risk of internal circuit short circuits or electric shock, do not operate the instrument in a humid environment.
- **Do not operate in an explosive atmosphere.**To avoid damage to the instrument or personal injury, do not operate the instrument in flammable or explosive environments.
- **Keep product surfaces clean and dry.**To prevent dust or moisture in the air from affecting the instrument's performance, please keep the product's surface clean and dry.

2. Safety Terms And Symbols

Safety Terms

Terms in this manual. The following terms may appear in this manual:



Warning: Warning indicates the conditions or practices that could result in injury or loss of life.



Caution: Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the product. The following terms may appear on this product:

Danger: It indicates an injury or hazard may immediately happen.

Warning: It indicates an injury or hazard may be accessible potentially.

Caution: It indicates a potential damage to the instrument or other property might occur.

Safety Symbols

Symbols on the product. The following symbol may appear on the product:

	Hazardous Voltage		Caution, risk of danger (refer to this manual for specific Warning or Caution information)
	Protective Earth Terminal		Chassis Ground
	Test Ground		

3. Quick Start

This chapter will introduce the power-on inspection steps for the load, ensuring that the load can be properly turned on and used in its initialized state. It will also cover the front panel, rear panel, button functions, and display functions of the load, ensuring that before operating the load, users can quickly understand the load's appearance, structure, and button functionality, which will help you make better use of this series of loads.

3.1 Product Introduction

The single-channel programmable electronic load, it is primarily designed for applications such as fast chargers, battery discharge, and power supply testing, and other product performance validation tests. The series provides optimal solution for design R&D and production line testing.

Model Selection Table:

Model	Voltage	Current	Power	Communication interface
OEL1515	150V	15A	150W	USB, RS232, RS485
OEL1520	150V	20A	300W	USB, RS232, RS485
OEL1530	150V	30A	300W	USB, RS232, RS485
OEL3015	300V	15A	150W	USB, RS232, RS485
OEL3020	300V	20A	300W	USB, RS232, RS485
OEL3030	300V	30A	300W	USB, RS232, RS485
OEL6015	600V	15A	150W	USB, RS232, RS485
OEL6020	600V	20A	300W	USB, RS232, RS485
OEL6030	600V	30A	300W	USB, RS232, RS485

3.2 Panel and User Interface

3.2.1 Front Panel

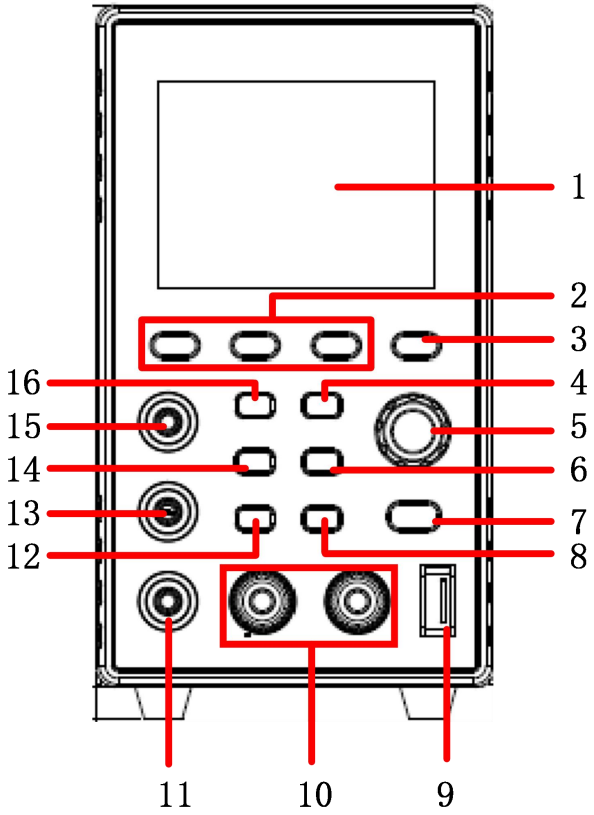


Figure 3- 1 Front Panel

1	**Display**	Displays the user interface.
2	**F1-F3**	Submenu option setting keys.
3	**SHIFT**	Multi-function key.
4	**CV/CP**	Constant voltage mode shortcut key: The user enters the constant voltage setting mode; SHIFT + this key: Constant power mode shortcut key, allowing the user to enter the constant power setting interface.

5	**Knob**	The user can rotate the knob to input programming information or select options.
6	**SHORT**	Short circuit mode.
7	**On/Off**	Controls the output state: ON or OFF. SHIFT + this key: Multi-function, LOCK function.
8	**ENTER**	Confirmation key.
9	**USB**	Type C USB data interface.
10	**Channel Output Terminal**	Output connection of the channel.
11	**PE**	Earth terminal on the machine chassis.
12	**ESC**	Cancel editing or go back to the previous menu.
13	**Vsense-**	Remote sensing, negative polarity terminal.
14	**TRIG/TRAN**	Trigger function key; SHIFT + this key: Multi-function, allows the user to enter dynamic mode.
15	**Vsense+**	Remote sensing, positive polarity terminal.
16	**CC/CR**	Constant current mode shortcut key: The user enters the constant current setting mode; SHIFT + this key: Constant resistance mode shortcut key, allowing the user to enter the constant resistance setting interface.

3.2.2 Rear Panel

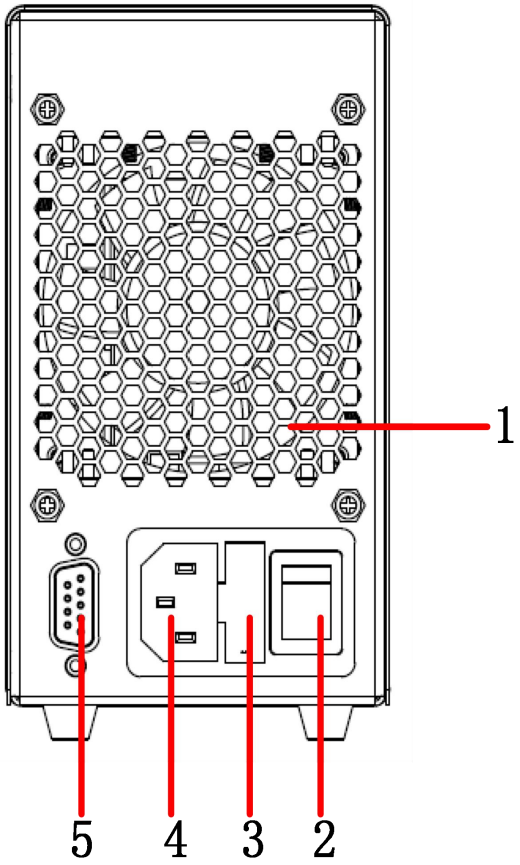


Figure 3-2 Rear Panel

1	**Air Vent**	Do not block the ventilation outlet, as it will prevent the machine from dissipating heat properly, which could lead to overheating inside the machine.
2	**Power Button**	Turn On/Off the instrument.
3	**Fuse**	Power fuse.
4	**AC Power Input Jack**	The power cable inputs AC power from this connection terminal to the input terminal.
5	**DB9 Terminal**	Includes: RS232, RS485, and Trig In/Out; communication control can be done via RS232 and RS485. (Note: Different models are equipped with different communication interfaces as options.)

3.2.3 User Interface



Figure 3-3 User Interface

Status Icon

Icon	Description
	The panel keys are locked
	Enable beeper
	A failure alarm

3.3 General Inspection

When you receive a new DC electronic load, it is recommended that you follow the steps below to inspect the instrument.

1. Check whether there is any damage caused by transportation.

If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away first till the complete device and its accessories succeed in the electrical and mechanical property tests.

2. Check the Accessories.

The supplied accessories have been already described in Appendix A:

Accessories of this manual. You can check whether there is any loss of accessories with reference to this description. If it is found that there is any accessory lost or damaged, please get in touch with our distributor responsible for this service or our local offices.

3. Check the Complete Instrument.

If it is found that there is damage on the first appearance of the instrument, or the instrument cannot work normally, or fails in the performance test, please get in touch with our distributor responsible for this business or our local offices. If there is damage to the instrument caused by the transportation, please keep the package. With the transportation department or our distributor responsible for this business informed about it, a repairing or replacement of the instrument will be arranged by us.

3.4 Power-on Inspection

(1) Connect the instrument to an AC power source using the power cord supplied with the accessory.



Warning:

To prevent electric shock, make sure the instrument is properly grounded.

(2) Press the **power button** on the front panel and the startup screen will be displayed on the screen.

4. Functional features and Panel operation

This chapter will provide a detailed description of the features and functions of the DC electronic load, as well as the panel menu operations. It will be divided into the following sections:

- Turn On/Off channel output
- Local/Remote mode operation switch
- Constant mode function
- Input control function
- Keyboard lock function
- Short circuit simulation function
- System menu function
- Multiple device parallel function
- Fault information
- Introduction to communication interfaces
- Test function

4.1 Turn On/Off the Channel Output

Press the **On/Off** key to turn On/Off the channel. When the **On/Off** key is bright, the output is turned ON; when the **On/Off** key light is off, the output is turned off. When the device is turned on, the panel defaults to the main interface to display the current state.

4.2 Local/Remote mode Operation switch

The instrument provides both local and remote operation mode, and the two modes can be switched by communication commands. In power initialization mode, the machine is operated locally by default.

- Local operation mode: Use the keys on the panel to perform relevant operations.
- Remote Operation Mode: The electronic load is connected to a PC, and the PC performs relevant operations on the electronic load. When the

electronic load is in remote mode, all panel keys are inactive except for the SHIFT + On/Off key. The mode can be switched to Local Operation Mode by long-pressing the SHIFT + On/Off key. Changing the constant mode operation will not affect the settings of the electronic load.

4.3 Constant Mode Operation

The electronic load can operate in the following four constant modes:

- Constant Current mode (CC)
- Constant Voltage mode (CV)
- Constant Resistance mode (CR)
- Constant Power mode(CP)

4.3.1 Constant Current Mode(CC)

When the user selects the **CC** function key, the load enters constant current mode. In constant current operation mode, regardless of changes in the input voltage, the electronic load consumes a constant current. The relationship between voltage and current is shown in the figure below.

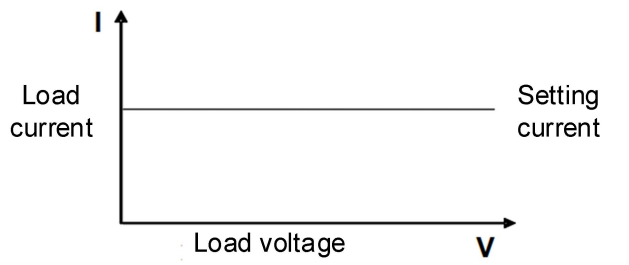


Figure 4.3.1-1 CC mode: The Voltage-Current Relationship Diagram



Figure 4.3.1-2 CC mode operation interface

There are two ways to set the output current (CC mode):

Mode one:

1. Press **MODE** and rotary the knob to select CC mode.
2. Press **ENTER** key to edit current setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob** will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.
3. Press **On/Off** key to output the setting current.

Mode two：

1. Press **CC** , at the same time, the user interface will switch into CC mode.
2. Press **ENTER** key to edit current setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob** will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.
3. Press **On/Off** key to output the setting current.
   In constant current mode, the user can also set the following parameters.

Operation steps:

1. Press **F1** to enter parameter setting interface
2. Set the maximum working current

3. Set voltage/current range
4. Set the rising slope of current
5. Set the falling slope of current
6. OCP, OVP, OPP setting

4.3.2 Constant Voltage Mode(CV)

When the user selects the **CV** function key, the load enters constant voltage mode. In constant voltage operation mode, the electronic load will draw sufficient current to maintain the input voltage at the set value. The relationship between voltage and current is shown in the figure below.

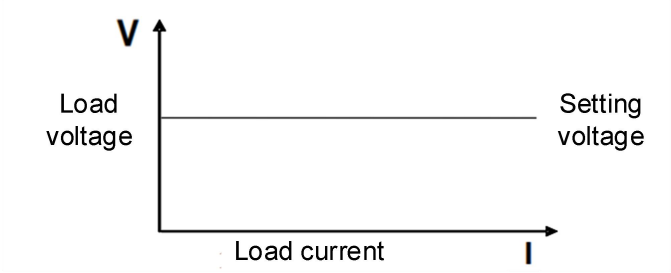


Figure 4.3.2-1 CV mode: The Voltage-Current Relationship Diagram



Figure 4.3.2-2 CV mode operation interface

There are two ways to set the output voltage (CV mode):

Mode one:

1. Press **MODE** and rotary the knob to select CV mode.
2. Press **Enter** key to edit voltage setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob**

will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.

3. Press **On/Off** key to output the setting voltage.

Mode two:

1. Press **CV** , at the same time, the user interface will switch into CV mode.
2. Press **Enter** key to edit voltage setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob** will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.
3. Press **On/Off** key to output the setting voltage.

In constant voltage mode, the user can also set the following parameters.

Operation steps:

1. Press **F1** to enter parameter setting interface
2. Set the maximum working current
3. Set the voltage range
4. Set the rising/falling slope of the voltage
   a) Fast b) Normal c) Slow
5. OCP, OVP, OPP setting

4.3.3 Constant Resistance Mode (CR)

When the user selects the SHIFT+ **CV** function key, the load enters constant resistance mode (CR). In constant resistance operation mode, the electronic load will behave as a constant resistor. The current will change linearly with the input voltage. The relationship between voltage and current is shown in the figure below.

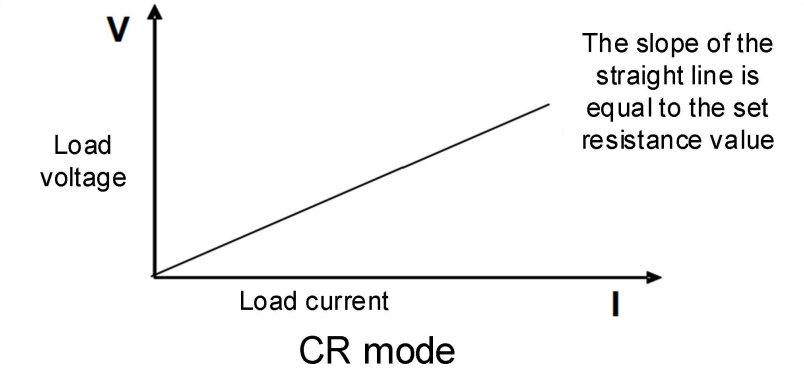


Figure 4.3.3-1 CR mode: The Voltage-Current Relationship Diagram



Figure 4.3.3-2 CR mode operation interface

There are two ways to set the output resistance (CR mode):

Mode one:

1. Press **MODE** and rotary the knob to select CR mode.
2. Press **Enter** key to edit resistance setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob** will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.
3. Press **On/Off** key to output the setting resistance.

Mode two:

1. Press SHIFT+**CV** , at the same time, the user interface will switch into CR mode.

2. Press **Enter** key to edit resistance setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob** will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.
3. Press **On/Off** key to output the setting resistance.

In constant resistance mode, the user can also set the following parameters.

Operation steps

1. Press **F1** to enter parameter setting interface
2. Set the maximum working current
3. Set voltage range
4. Set the rising/falling slope of resistance
   a) Fast b) Normal c) Slow
5. OCP, OVP, OPP setting

4.3.4 Constant Power Mode (CP)

When the user selects the SHIFT+ **CC** function key, the load enters constant power mode. The electronic load will consume a constant power, as shown in the figure below. If the input voltage increases, the input current will decrease. The relationship between voltage and current is shown in the figure below.

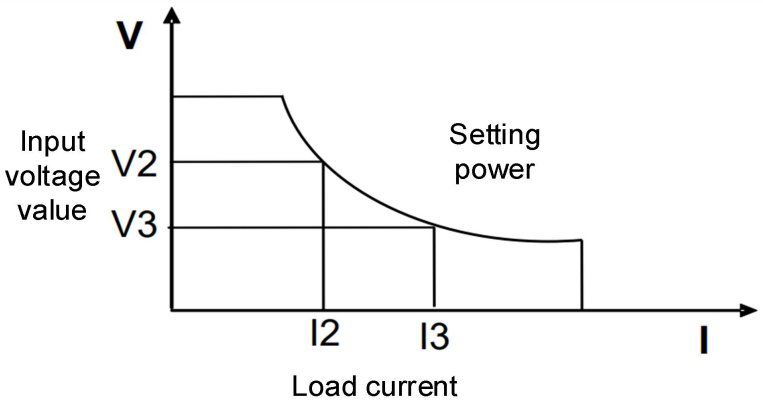


Figure 4.3.4-1 CP mode: The Voltage-Current Relationship Diagram



Figure 4.3.4-2 CP mode operation interface

There are two ways to set the output power (CP mode):

Mode one:

1. Press **MODE** and rotary the knob to select CP mode.
2. Press **Enter** key to edit power setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob** will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.
3. Press **On/Off** key to output the setting power.

Mode two:

1. Press SHIFT+**CC** , at the same time, the user interface will switch into CP mode.
2. Press **Enter** key to edit power setting, turn the **knob** to directly adjust to the set value. During the process of inputting a value, pressing the **knob** will increment the value to the right. Once it reaches the highest digit, pressing it again will return to the lowest digit, and this will cycle continuously.
3. Press **On/Off** key to output the setting power.

In constant power mode, the user can also set the following parameters.

Operation steps

1. Press **F1** to enter parameter setting interface
2. Set the maximum working current

3. Set voltage range
4. Set the rising/falling slope of power
   a) Fast b) Normal c) Slow
5. OCP, OVP, OPP setting

4.4 Input Control function

After the electronic load is turned on, it is in an unconnected (no load) state. The input switch of the electronic load can be controlled by pressing the **On/Off** button on the front panel of the electronic load.

- When the **On/Off** indicator light is on,it means the input is turned on, and the TFT screen displays the current real-time voltage and current information.
- When the **On/Off** indicator light is off, the screen will display OFF, indicating that the input is turned off.

4.5 Keyboard Lock Function

The front panel buttons of the electronic load can be locked by pressing the **SHIFT+On/Off** button. The screen will display the LOCK status. In this mode, all buttons are disabled except for unlocking the function by pressing and holding the **SHIFT+On/Off** button.

4.6 Short Circuit Simulation Function

The electronic load can simulate a short circuit at the input terminal to test whether the protection function of the device under test (DUT) operates correctly when a short circuit occurs at its output terminal.

To switch to the short circuit state, press (SHIFT) + 1 (SHORT) on the front panel of the electronic load. The short circuit operation does not affect the current settings, and pressing (SHIFT) + 1 (SHORT) or MODE again will return the electronic load to its original set state. The actual current consumed by the electronic load during a short circuit depends on the current operating mode and current range. In CC , CP, and CR modes, when the current is

within the maximum range, the short-circuit current will be equal to the current input value. If the current exceeds the maximum range, the maximum short-circuit current will be 110% of the current range. In CP mode, a short circuit is equivalent to setting the load's constant voltage value to 0V.



Figure 4.6-1 Short circuit simulation interface

4.7 System Menu Function

Press **F1** to enter system setting function.

Detail operation steps:

Press **F1** to enter "Function menu" item setting.

1. Rotary the **knob** to select the item you want to set.
2. Press **Enter** to confirm.
3. Press **Esc** or **F1** to return the function menu.

Description:

1. To cancel the setting, press the Esc key to return to the function menu page.

2. If you are on any setting page, pressing the CC key or CV key or On/Off will quickly return you to main page.

4.7.1 System Setting

The menu of the electronic load is as follows:

Menu	Settings	Description
SYSTEM	LANGUAGE	Chinese/ENGLISH

SETUP	COMM PRO	SCPI or modbus communication setting
	BUTTON VOICE	Enable or disable button sound
	ALARM VOICE	Enable or disable alarm sound
	BRIGHTNESS	Screen brightness adjustment from 10% to 100%, with a 10% adjustment each time.
	BAUD	The baud rate setting range of the communication device is from 115200 to 1200; 8 baud rates are available for selection.
	RESET	Restore the settings on the panel to factory defaults.
	ADDRESS	The parallel machine address can be selected from 1 to 10 to set the local machine's parallel address.

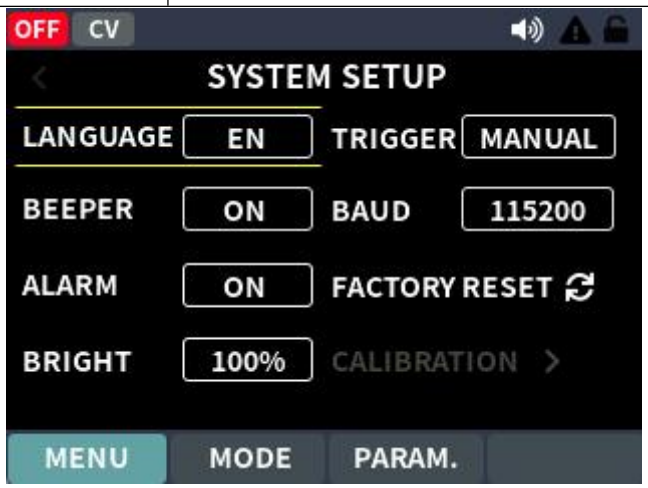


Figure 4-7-1 system setup page

4.7.2 Parameter Setting

Select System Settings, then choose Parameter Settings. Press the **Enter** key to enter the Parameter Settings options, as shown in the table below.

The parameter settings of the electronic load are as follows:

Menu	Settings	Description
Parameter setup	OVP	If the input voltage exceeds the set safety threshold (OVP point), the OVP protection will be triggered.
	OCP	If the input current exceeds the set safety threshold (OCP point), the OCP protection will be triggered.
	OPP	If the input power exceeds the set safety threshold (OPP point), the OPP protection will be triggered.
	RISE SLOPE	The setting value for the rise rate of input voltage or current during load operation.

	FALL SLOPE	The setting value for the fall rate of input voltage or current during load operation.
	CURRENT LIMIT	The maximum current value that can be set for normal load operation.
	REMOTE COMPENSATION	This option allows enabling the remote sensing function at the rear terminals, with the default setting for compensation at the front panel input terminals.
	VOLTAGE RANGE	The input voltage range supported by the electronic load is as follows: ● Low range: 0-15V ● High range: 0-150V
	LOAD VOLTAGE	After the load is connected, normal load operation can occur once the input voltage reaches the set load voltage.

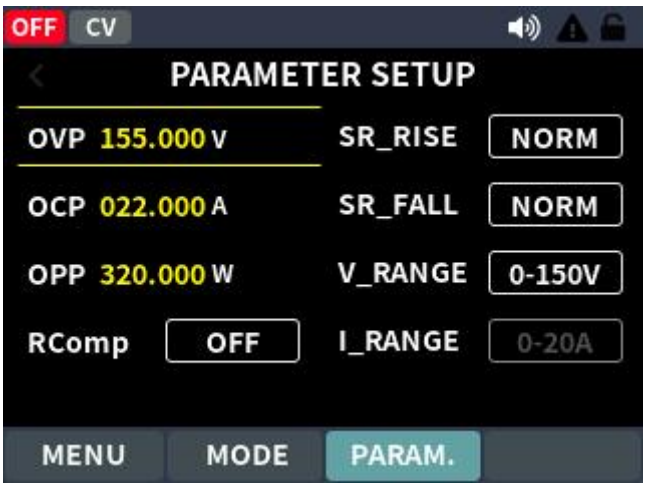


Figure 4-7-2 parameters setup page

4.8 Protection Functions and Fault Information

Products monitor the internal operation of the machine in real time, including system logic faults, external mains power faults, internal power stage faults such as OVP (Over Voltage Protection), OCP (Over Current Protection), OPP (Over Power Protection), OTP (Over Temperature Protection), as well as parallel operation faults, input reverse voltage protection, etc.

When any of the above protections are triggered, the electronic load enters the corresponding self-protection mode. For example, in the case of over-temperature protection, the load will trigger an alarm and automatically switch

to the OFF state, with the main unit displaying OTP.

Protection mode can be cleared by pressing the power button or the ENTER button on the front panel.

Over Voltage Protection (OVP)

If the over-voltage circuit is triggered, after a 100us delay, the electronic load will immediately turn OFF, and the buzzer will sound. The main unit will display OVP. Protection can be cleared by pressing the power button or the ENTER button.

Over Current Protection (OCP)

There are two types of over-current protection in the electronic load:

- **Hardware overcurrent protection:** The maximum load current of the instrument will be limited to the corresponding current value by the hardware maximum power (such as OEL1512: 400W). Once the hardware overcurrent protection is triggered, the machine is at the maximum power value and will not trigger the current On/Off state.
- **Software Over Current Protection:** When the software overcurrent protection function is turned on, if the load current exceeds the overcurrent protection setting value, after 100ms, the load will automatically turn off, and the panel will display OCP. In order to ensure the reliability of the machine, if the load current abnormally exceeds 2 times the rated maximum current of the machine for 40us or 1.1 times the rated current for 100us, the fast software overcurrent protection is triggered, the load will automatically turn off, and the panel will display OCP. Users can set the software overcurrent protection value of the product. For related configuration, please refer to F1 key to enter the parameter setting.

Over Power Protection (OPP)

There are two types of over-power protection in the electronic load:

- **Hardware Over Power Protection:** The maximum load power will be limited to the corresponding power value by the hardware maximum power (such as OEL1512: 400W). Once the hardware over-power protection is triggered, the machine is at the maximum power value and

will not trigger the current On/Off state.

- **Software Over Power Protection:** When the software over-power protection function is turned on, if the load power exceeds the over-power protection setting value and lasts for 100ms, the load will automatically turn off and the panel will display OPP. In order to ensure the reliability of the machine, if the load power abnormally exceeds 2 times the rated maximum current of the machine for 40us or 1.1 times the rated current for 100us, the fast software over-power protection is triggered, the load will automatically turn off and the panel will display OPP. Users can set the software over-power protection value of the load. For related configuration items, please refer to F1 to enter the parameter setting.

Over Temperature Protection (OTP)

When the internal devices' temperature of the electronic load exceeds about 85°C, the electronic load would trigger the temperature protection mode, and the electronic load automatically turns OFF and the panel displays OTP.

Local Reverse Voltage Protection (LRV)

When the electronic load detects a reverse voltage input on the front panel, it will trigger the Local Reverse Voltage (LRV) protection warning. In this case, please confirm that the front panel input terminals are correctly connected to the device under test. It can be released by pressing the power button or the ENTER button.

Fault Type	ERROR CODE	Fault cause Description
MAINS AC FAULT	0x0002	Abnormal mains undervoltage
INTERNAL FAULT	0x0004	Over temperature protection
	0x0010	Error in internal parameter storage
	0x0020	Model firmware match error
OUTPUT FAULTS	0x0002	Output over voltage protection
	0x0008	Output over current protection
	0x0010	Output over power protection
	0x0004	Local Reverse Voltage Protection
PARALLEL FAULTS	0x0001	Parallel address conflict
	0x0002	Multiple master fault
	0x0008	Communication drop
	0x0010	Mismatch in operable unit fault

4.9 Communication Port Introduction

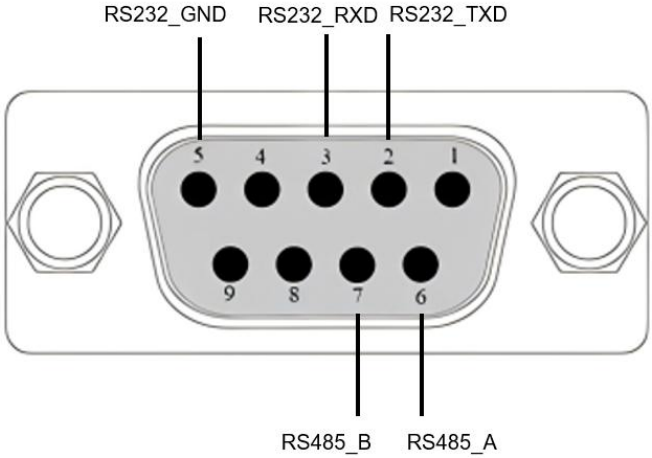
The rear panel of the load in this series is equipped with a USB serial port. After connecting to a PC, ensure that the serial port settings in the PC software interface match those of the load device (9600 baud rate, 8 data bits, no parity, 1 stop bit).

USB port

Use a USB cable with USB A-type on one end and USB B-type on the other end to connect the load to the computer. All electronic load functions can be controlled through USB programming. After connecting the load and PC via USB, the CH340 USB driver needs to be installed (available for download from the our website or by directly contacting our technical support), otherwise, communication will not be successful.

The electronic load supports RS232 and RS485 (for internal parallel use). The following table provides the corresponding pin definitions (output via DB9 terminal connector):

<table>
<tr><th>Pin</th><th>Function</th><th>Functions</th><th>Notes</th></tr>
<tr><td>Pin 2</td><td rowspan="3">RS232</td><td>TXD</td><td rowspan="3">Protocol supports: SCPI, Modbus RTU Typical 3.3V</td></tr>
<tr><td>Pin 3</td><td>RXD</td></tr>
<tr><td>Pin 5</td><td>GND</td></tr>
<tr><td>Pin 4</td><td rowspan="2">External trigger for transient command</td><td>TRIG IN+</td><td rowspan="2">3.3V TTL signal</td></tr>
<tr><td>Pin 9</td><td>TRIG IN-</td></tr>
<tr><td>Pin 1</td><td rowspan="2">External trigger out for power on/off signal indicator</td><td>TRIGOUT+</td><td rowspan="2">Floating, needed 1k resistor pull up to an external power rail 5V or 3.3V</td></tr>
<tr><td>Pin 8</td><td>TRIGOUT-</td></tr>
<tr><td>Pin 6</td><td rowspan="2">RS485</td><td>RS485_A</td><td rowspan="2">Optional; please make sure there is no signal in these pins when using RS232.</td></tr>
<tr><td>Pin 7</td><td>RS485_B</td></tr>
</table>



4.10 Dynamic Mode Function

In dynamic mode, the electronic load allows the user to set two load current parameters corresponding to the constant mode. By configuring the operation mode, the load current will switch back and forth between the two set values.



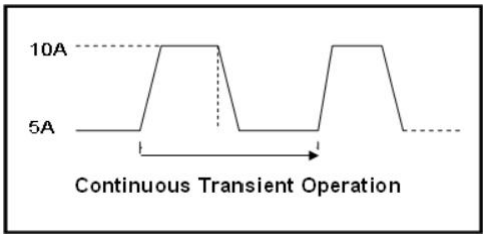
Dynamic Mode Setting Parameters:

Dynamic Test	Description
Operation Mode	Select the continuous operation mode: Continuous / Single
T1 Value	Set the T1 load current parameter
T1 Time	Set the T1 load current duration
T2 Value	Set the T2 load current parameter

T2 Time	Set the T2 load current duration
Rise Slope	Set the rise slope
Fall Slope	Set the fall slope

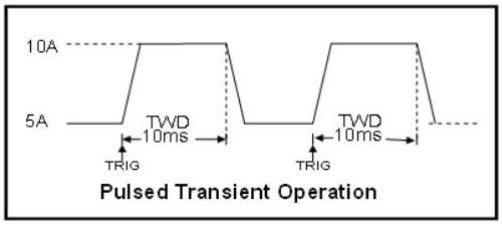
Continuous Mode

In continuous mode, when dynamic test operation is enabled, the load will continuously switch between the T1 value and T2 value.



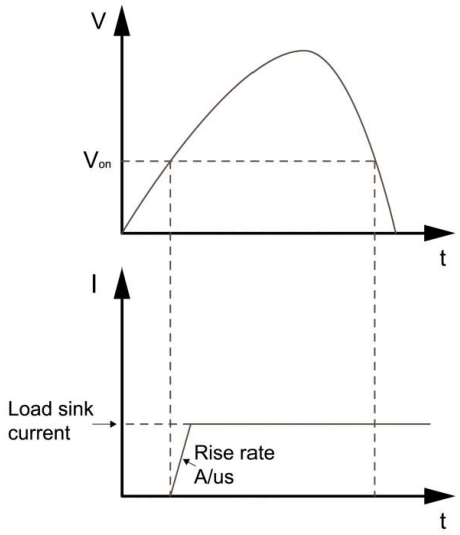
Single Pulse Mode (Pulse)

In single pulse mode, when dynamic test operation is enabled, the load will switch once between the T1 value and T2 value. Each time the load receives a “SHIF+” trigger command, it will perform a single switching action. The diagram below shows a schematic of the operation interface in this mode.



4.11 VON Function

When testing some power products with slow voltage rise speed, if you turn on the input of the electronic load first and then turn on the power supply, the power supply may be pulled to protect. To this end, the user can set the Von value. When the power supply voltage is higher than this value, the electronic load will start to pull the load. For this series of electronic load products, when the power supply voltage to be tested drops and is less than the Von Point unloading voltage, the load will not unload.



Note: Please confirm whether you need to set the load voltage. Setting the load voltage is to facilitate users to limit the working voltage value. If it does not need to be limited, please do not set it arbitrarily to avoid the trouble of not being able to load. If the instrument cannot load, please first check whether the VON function is set to a value other than 0. If it is set, please reset the Von value to the minimum value of 0.

4.12 Compensation Function

When the electronic load operates with high current, significant voltage drops can occur across the connection cables between the load and the device under test (DUT). To ensure measurement accuracy, the electronic load provides a pair of remote compensation terminals. Users can use these terminals to sample the precise output voltage of the DUT.

Operating Steps:

1. In the system parameter settings page, locate the remote compensation (RComp) option and select "Rear." Press confirm to enable the remote compensation function. At this point, the remote sampling voltage will be used as the actual detected voltage.
2. Return to the parameter settings page and select the remote compensation (RComp) option as "Front." This will disable the remote compensation function for the rear terminal, and the load will measure the voltage at the main front-panel binding posts as the actual voltage.

Note:

After enabling rear remote compensation, ensure correct polarity connections between the DUT and the terminals. Do not leave connections floating or reverse the polarity! Do not switch the sense mode while the system is running！

4.13 Test Function

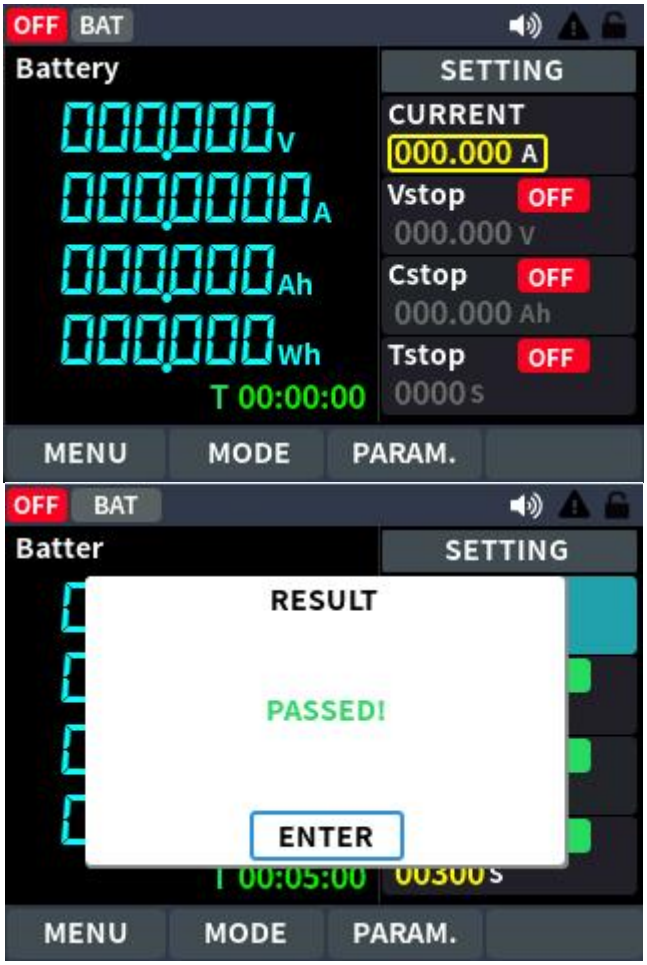
4.13.1 Battery discharge test function (Only available for T suffix version)

The electronic load can use the Battery mode to simulate the battery discharge test. After selecting the discharge test mode, you can set the test mode termination conditions: "cut-off voltage (Vstop)", "battery capacity (Cstop)" and "discharge time (Tstop)". When any of the three conditions is met, the discharge stops and the electronic load automatically switches to the OFF state.

When the discharge test uses only one or two of the conditions as the termination judgment conditions, the other unused conditions must be set to "OFF".

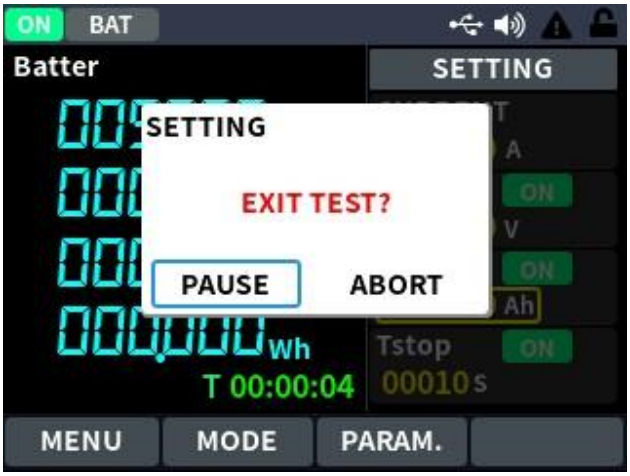
Press the On/Off button to turn on the channel. During the test, the main interface can display the actual current, battery discharge voltage, battery discharge time, and battery discharged capacity in real time. This test can reflect the reliability and remaining life of the battery, so it is very necessary to perform this test before replacing the battery.

If the battery discharge termination conditions are met, after the test is completed, the load interface pops up a "Battery discharge test completed!" prompt box, and the user presses the Enter key to exit the prompt box.



Tip: If the cut-off voltage is used as the termination condition, when the battery voltage is too low (lower than the cut-off voltage), the system determines that the battery has reached the set value, the machine will consider the test completed and automatically interrupt the test. If the cut-off voltage condition is OFF, when the port voltage is detected to be 0V, the electronic load will report a discharge abnormality, automatically terminate the discharge, and the machine will shut down.

During the discharge process, if you need to pause or terminate the battery discharge test, you can select the corresponding option through the On/Off key in the prompt box that appears on the load interface: Pause Discharge, Terminate Discharge. After confirming the selection, enter OFF, and the key indicator will turn off.



If the discharge is terminated, press the On/Off key again to power on, starting a new round of discharge recording.

To exit the battery test mode, select Programming Mode from the system menu and change the Battery Mode to General Mode.



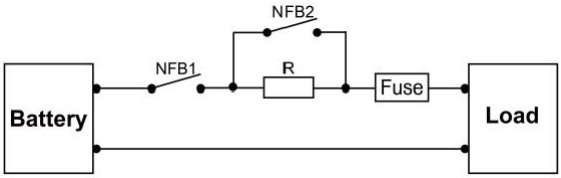
Note: To avoid electric shock, please ensure that the battery and electronic load terminals are properly connected before turning on the channel input.

Battery Testing Steps:

1. In Programming Mode, select Battery Mode, set the CC Current, and the charging stop conditions (Vstop, Cstop, Tstop).
2. Press the On/Off key to start the test. The panel will display the discharge voltage, current, discharge time, and capacity.
3. Press On/Off to pause or terminate the test. You can exit the battery capacity test mode by selecting Menu/Programming Mode/General Mode.

Battery Connection Precautions: When using a switch-type device to directly connect the device under test and the electronic load, voltage overshoot may occur at the moment the switch closes. Excessive voltage

overshoot can damage the electronic load. To avoid equipment damage, it is recommended to use the following wiring method in battery discharge testing to ensure the safe operation of the test equipment.



- **NFB:** Non-fuse breaker, used to immediately cut off the circuit in case of an internal aging short circuit in the load. The current rating of the non-fuse breaker must be less than the maximum current rating of the battery.
- **R:** Current-limiting resistor, used to prevent excessive surge current in the battery when the NFB1 is activated, due to the RC of the load port. This helps protect the battery under test from damage. Additionally, it can prevent resonance between the parasitic inductance on the test leads and the load port RC when the relay closes, which may cause excessive voltage at the load end, thus avoiding damage to the electronic load. It is recommended that the resistance value of the current-limiting resistor be greater than 100kΩ.
- **Fuse:** A fuse that melts and cuts off the current when the current increases to an abnormal level and the temperature becomes too high, thus protecting the circuit.
- **Starting the Discharge Test:** First, connect the electronic load and the battery as shown in the diagram. Then, close switch NFB1, wait for a 5-second delay, and then close switch NFB2 to begin the battery discharge test.
- **Stopping the Discharge Test:** First, press the [On/Off] button on the front panel of the load to turn off the load input. Then, open switch NFB2, and finally, open switch NFB1 to stop the battery discharge test.

4.13.2 OCP test function (Only available for T suffix version)

This series of electronic loads has an overcurrent protection (OCP) test

function. In the OCP test mode, when the input voltage reaches the Von value, a delay period is set, and the electronic load works. The current increases by the step value at regular intervals, and the load input voltage is detected at the same time to determine whether it is higher than the OCP voltage value. If it is higher, it indicates that OCP has not occurred, and the current step operation is repeated until it reaches the cut-off current; if it is lower, it indicates that OCP has occurred, and then check whether the current value is within the target range. If it is within the range, it is Pass, otherwise it is Fault.



OCP test steps:

1. Select OCP mode in programming mode, enter the OCP test function setting interface, and edit the OCP setting parameters.

2. Press the On/Off button to start the OCP test. If it is within the range, the test is PASS and the panel displays the corresponding display. If it is out of the range, the test fails and the panel displays the corresponding display.

3. After the test is completed, the user needs to return to the settings interface and reset it.





4.13.3 OPP Test Function (Only available for T suffix version)

This series of electronic loads has an over-power protection (OPP) test function. In the OPP test mode, when the input voltage reaches the Von value, the load starts to work after a delay. The current increases by the step value at regular intervals, and the load input voltage is detected at the same time to determine whether it is higher than the OPP voltage value. If it is higher, it means that OPP has not occurred, and the power step operation is repeated until it reaches the cut-off power; if it is lower, it means that OPP has occurred, and then check whether the current power value is within the target range. If it is within the range, it is Pass, otherwise it is Fault.



OPP test steps:

1. Select OPP test mode in programming mode, enter the OPP test function setting interface, and edit the OPP setting parameters.
2. Press the On/Off button to start the OPP test. If it is within the range, the

test is PASS and the panel displays the corresponding display. If it is out of the range, the test fails and the panel displays the corresponding display.

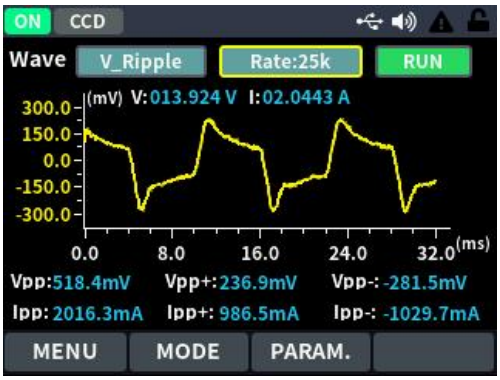
3. After the test is completed, the user needs to return to the settings interface and reset it.



4.13.4 Ripple Test Function (Only available for V suffix version)

This series of electronic loads is optionally equipped with a ripple test function, which can well meet the ripple measurement demands of switching power supplies and chargers. Users can directly connect the power supply to the load without using an additional oscilloscope, and read voltage ripple values (Vpp / Vpp+ / Vpp-) and current ripple values (Ipp / Ipp+ / Ipp-) directly. It greatly simplifies experimental wiring and operation. The system supports ripple display, screen capture and automatic statistical analysis. It is highly suitable for fast and batch ripple inspection scenarios, especially for R&D initial debugging and production line quality inspection.

The ripple sampling rate can be set to five options: 1kHz, 5kHz, 10kHz, 25kHz and 50kHz, with the display time ranging from 16ms to 800ms. When entering the ripple interface, if the user is unsure of the ripple frequency of the device under test, select the lowest sampling rate of 1kHz to display a complete AC cycle on the entire screen. Then adjust the sampling frequency to 10kHz or 25kHz according to the ripple density to view the actual ripple waveform in detail.

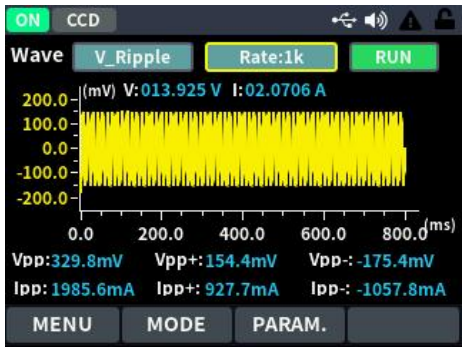


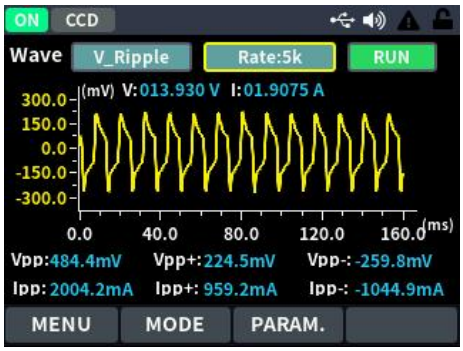
Ripple test operations:

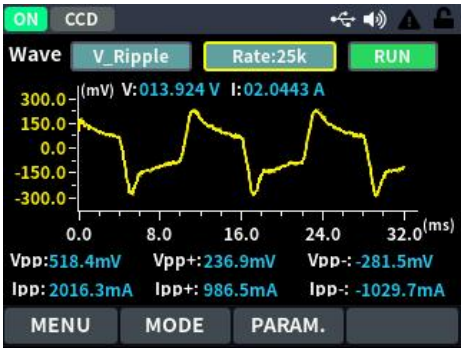
(1) On the main page, press **SHIFT**+**F2** to quickly enter the ripple test function interface.

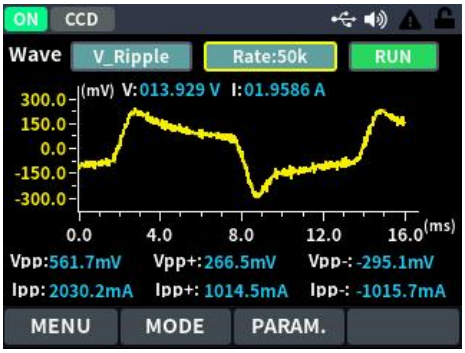
(2) Use the knob to select ripple voltage or ripple current to be tested. After confirmation, set the sampling rate. For unknown ripple signals, first select the lowest sampling rate to display a complete ripple cycle on the screen, then zoom in for detailed observation.

(3) After setting, press the RUN key on the interface to start the ripple test. The ripple waveform as well as voltage and current ripple values will be displayed during the test. To pause and check the ripple magnitude, press the **RUN** key again to enter the **HOLD** state, and the screen will stop refreshing.





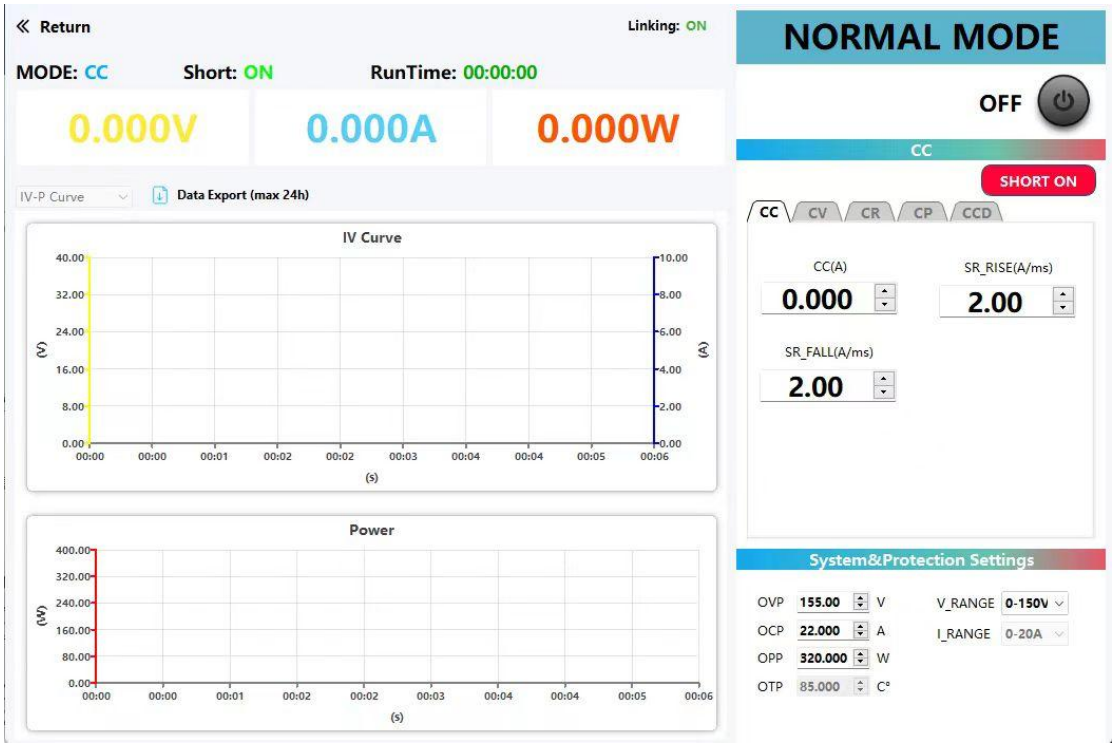




5. PC Software introduction

1. Please go to the our official website or contact your local dealer or our sales specialist to download or request the PC software.

2. Connect the USB CDC port on the back panel to the host computer. After the instrument is successfully connected, enter the mode setting to remotely operate the instrument.



6. Troubleshooting

1. **The instrument is powered on but no display. Please following the steps:**

- Check if the power is connected properly.
- Check if the fuse which is below the AC Power socket is used appropriately and in good condition (the cover can be pried open with a straight screwdriver).
- Restart the instrument after the steps above.
- If the problem still exists, please contact our customer service.

7. Technical Specification

The instrument must be operated continuously for more than 30 minutes at the specified operating temperature to achieve the following specifications:

Model		OEL 1530 (VT)	OEL 1520 (VT)	OEL 1515 (VT)	OEL 3030 (VT)	OEL 3020 (VT)	OEL 3015 (VT)	OEL 6030 (VT)	OEL 6020 (VT)	OEL 6015 (VT)
Input	Voltage	0-150V			0-300V			0-600V		
	Current	0-30A	0-20A	0-15A	0-30A	0-20A	0-15A	0-30A	0-20A	0-15A
	Power	300W		150W	300W		150W	300W		150W
Minimum Operation voltage		1.1V@ 30A	0.9V@ 20A	0.8V@ 15A	1.1V@ 30A	0.9V@ 20A	0.8V@ 15A	1.1V@ 30A	0.9V@ 20A	0.8V@ 15A
Constant voltage mode (CV)										
Range		0-150V			0-300V			0-600V		
Resolution		1mV								
Accuracy		0.05%+0.05%FS			0.05%+0.05%FS			0.05%+0.05%FS		
Constant current mode (CC)										
Range		0-30A	0-20A	0-15A	0-30A	0-20A	0-15A	0-30A	0-20A	0-15A
Resolution		1mA			1mA			1mA		
Accuracy		0.05%+0.05%IFS			0.05%+0.05%IFS			0.05%+0.05%IFS		
Constant resistance mode (CR)										
Range		0.05-7.5k Ω			0.05-7.5k Ω			0.05-7.5k Ω		
Accuracy*1		0.1%+0.01%R			0.1%+0.01%R			0.1%+0.01%R		
Constant power mode (CP)										
Range		300W		150W	300W		150W	300W		150W
Resolution		10mW			10mW			10mW		
Accuracy*1		0.1%+0.1%FS			0.1%+0.1%FS			0.1%+0.1%FS		
Dynamic mode (CCD)										
T1&T2		0.1ms-50s			0.1ms-50s			0.1ms-50s		
Rise/Fall slope		0.01A/ms-2000A/ms			0.01A/ms-2000A/ms			0.01A/ms-2000A/ms		

Min rise time	20us			20us			20us		
Voltage readback value									
Range	0-15V/ 0-150V			0-30V/ 0-300V			0-60V/ 0-600V		
Resolution	1mV			1mV			1mV		
Accuracy	0.05%+0.05%FS			0.05%+0.05%FS			0.05%+0.05%FS		
Current readback value									
Range	0-30A	0-20A	0-15A	0-30A	0-20A	0-15A	0-30A	0-20A	0-15A
Resolution	0.1mA			0.1mA			0.1mA		
Accuracy	0.05%+0.05%FS			0.05%+0.05%FS			0.05%+0.05%FS		
Power readback value									
Range	300W		150W	300W		150W	300W		150W
Resolution	10mW			10mW			10mW		
Accuracy	0.1%+0.1%FS			0.1%+0.1%FS			0.1%+0.1%FS		
Protection function									
OPP	>OPP value 10ms protection			>OPP value 10ms protection			>OPP value 10ms protection		
OVP	>OVP value 0.1ms protection			>OVP value 0.1ms protection			>OVP value 0.1ms protection		
OCP	>OCP value 0.1ms protection			>OCP value 0.1ms protection			>OCP value 0.1ms protection		
OTP	85℃			85℃			85℃		
Short circuit									
Current (CC)	>30A	>20A	>15A	>30A	>20A	>15A	>30A	>20A	>15A
Voltage (CV)	0			0			0		
Resistance (CR)	50mΩ			50mΩ			50mΩ		
Test Function									
Test Function	Battery test, OCP,OPP, Optional, only available for “T”version Ripple test function, Optional, only available for “V”version								
AC parameter									
Voltage range	100V-240Vac								
Frequency	50/60Hz								

range			
Interface			
RS-232 /RS458	**Support RS232, RS485, USB, Supported SCPI**		
General			
Heat dissipation	**Internal intelligent fan forced air cooling**		
Withstand voltage (Input to Ground)	**1.5KV/AC/5mA**		
Volume (L*W*H)	**282.9mm*84.3mm*151.15mm**		
Net weight	**Approx. 2.5kg**	**Approx. 2.5kg**	**Approx. 2.5kg**

* 1 Accuracy: The voltage and current input values should not be less than 10%FS

If there are any changes to parameters, no separate notice will be given. Please refer to the website update for the latest information.

Interval Period of Adjustment: One year is recommended for the calibration interval period.

8. Appendix

8.1 Appendix A: Accessories

(The accessories subject to final delivery.)

Standard



Power Cord



Quick Guide



Fuse

Optional



Remote Compensation Cable (Order No. 7CL3-10)



USB Cable (Type A to Type C) (Order No. 7ULC08)



RS232 (Order No. 7R232MFS)

8.2 Appendix B: General Care and Cleaning

General Care

Do not store or leave the instrument where the liquid crystal display could be exposed to direct sunlight for long periods of time.

Caution: To avoid any damage to the instrument, do not exposed it to any sprays, liquids, or solvents.

Cleaning

Inspect the instrument as often as operating conditions require. To clean the instrument exterior, perform the following steps:

1. Wipe the dust from the instrument surface with a soft cloth. Take care not to scratch the transparent LCD protection screen when cleaning.
2. Disconnect power before cleaning your instrument. Clean the instrument with a damp soft cloth (not dripping with water). It is recommended to clean with soft detergent or fresh water. To avoid damage to the instrument, do not use any corrosive chemical cleaning agents.



Warning:

Before re-applying power, ensure that the instrument is completely dry, avoiding any electric shock or electrical short circuit resulting from moisture.