Hantek

Quick Guide

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Warranties and declarations

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Product certification

Hantek certifies that the HDL2500+ series of electronic loads meets China's national industry standards and industrial standards, and is CE marked and UKCA certified.

Contact Us

If you have any questions or uncertainties while using the products of Qingdao Hantek Electronics Co:
Email: service@hantek.com, support@hantek.com
Website: http://www.hantek.com

1. Safety requirement

1.1. Summary of routine security matters

Read the following safety precautions carefully to avoid injury and to prevent damage to this product or any product connected to this product. To avoid possible hazards, always use this product as specified.

- **Check the status of the electronic load's AC input changeover switch**

The electronic load supports 110V or 220V AC input, please be sure to check that the AC input switch state of the electronic load matches the supply voltage before switching on the power, otherwise the electronic load may be burnt.

- **Only authorised professionals should perform repairs.**
- **Use the correct power cord.**
- **Use only power cords approved for this product in your country.**
- **Ground the product.**

To avoid electric shock, this product is grounded through the grounding conductor of the power cord, which must be connected to ground Be sure to ground the product properly before connecting the inputs or outputs of the product.

- **View all terminal ratings.**

To avoid fire or excessive current shocks, check all ratings and labelling instructions on the product. Consult the product manual for detailed information on ratings before connecting the product.

- **Use cords with appropriate load ratings.**

All load wires must be of a capacity to carry the maximum short-circuit output current of the power supply without overheating. If there are multiple loads, each pair of load wires must be capable of safely carrying the full load rated short circuit output current of the power supply.

- **To reduce the risk of fire and electric shock, ensure that the voltage fluctuation of the mains supply does not exceed 10% of the operating voltage range.**

- **Do not operate with the lid open.**

Do not operate the product with the outer cover or panel open.

- **Avoid exposed circuits.**

Do not touch exposed connectors and components when the power is turned on.

- **Do not operate the product if you suspect it is malfunctioning.**

If you suspect this product has been damaged, disconnect the power cord and have it inspected by qualified service personnel.

- **Maintain proper ventilation.**
- **Do not operate in a humid environment.**
- **Do not operate in flammable or explosive environments.**
- **Please keep the surface of the product clean and dry.**
- **Do not install replacement parts on the instrument yourself or perform any unauthorised modifications.**

Warning:

Equipment that meets the requirements of Class A may not provide adequate protection for broadcast services in residential environments.

1.2. Safety terms and symbols

Safety terms in this manual:

Danger:

Indicates that you may be immediately harmed if you perform this action.

Warning:

Indicates that you may not be immediately harmed if you perform this action.

Note:

Indicates that you may cause damage to this product or other property if you do so.

Safety terminology on the product:

Warning:

Indicates that you may be potentially harmed if you do not perform this action.

Safety symbols on products:

warning

Environmentally Friendly End-of-Life Labelling

1.3. Measurement category

Measurement category

This instrument can perform measurements under measurement category I.

Warning:

This instrument is only permitted to be used in the specified measurement category.

Measurement category definitions

- **Measurement category I** refers to measurements on circuits that are not directly connected to the mains supply. For example, measurements are carried out on circuits that are not derived from the mains supply, in particular circuits that are protected (internally) from the mains supply. In the

latter case, the instantaneous stress changes. Therefore, the user should be aware of the instantaneous withstand capacity of the equipment.

- **Measurement category II** refers to measurements made on circuits directly connected to low-voltage equipment. Examples include measurements on household appliances, portable tools and similar equipment.
- **Measurement category III** refers to measurements made in construction equipment. For example, measurements are carried out in fixed installations on switchboards, circuit breakers, wiring (including cables, busbars, junction boxes, switches, sockets) as well as equipment for industrial use and certain other equipment (e.g. stationary motors permanently connected to fixtures).
- **Measurement category IV** refers to measurements on sources of low-voltage equipment. Examples are power meters, measurements at major overvoltage protection devices and measurements at pulse control units.

1.4. Ventilation requirements

To ensure adequate ventilation, when using the instrument in a bench or rack, make sure that there should be a clearance of at least 10 cm on the sides, above, and behind it.

Note:

Poor ventilation can cause the temperature of the instrument to rise, which in turn can cause damage to the instrument. Good ventilation should be maintained during use, and the air vents and fans should be checked regularly.

1.5. Working environment

The HDL2500+ series electronic loads are only permitted to be used indoors and in low condensation areas, the temperature and humidity described below show the general environmental requirements for this instrument.The fan speed of the HDL2500+ series electronic loads is intelligently adjusted in accordance with the operating status of the machine.

Operating temperature and humidity range

0°C - 40°C, 20% - 80% RH (no condensation)

Storage temperature range

-20°C ~ 70 °C

Warning:

To avoid the risk of short-circuiting the internal circuit of the instrument or electric shock, do not operate the instrument in a humid environment.

Atitude

Operating and non-operating: 2,000m or less.

Installation (overvoltage) category This product is supplied from a mains power supply that complies with installation (overvoltage) category II.

Warning:

Make sure that no overvoltage (e.g. caused by lightning) reaches the product. Otherwise the operator may be at risk of electric shock.

Installation (overvoltage) category definition

The installation (overvoltage) category I refers to the signal level, which applies to the measuring terminals of the device connected to the source circuit, where measures have been taken to limit the transient voltage to a correspondingly low level.

Installation (overvoltage) category II refers to the local distribution level, which applies to equipment connected to the mains (AC supply).

Degree of contamination

Class 2

Definition of level of contamination

Pollution Degree 1: No contamination, or only dry, non-conductive contamination occurs. This contamination level has no effect. Examples include clean rooms or office environments with air-conditioning controls.

Pollution Degree 2: Generally only dry, non-conducting contamination occurs. Temporary conduction due to condensation may sometimes occur. Example: general indoor environment.

Pollution Degree 3: Conductive contamination occurs, or dry, non-conductive contamination becomes conductive due to condensation. Example: outdoor environments with shelters.

Pollution Degree 4: Permanent conductive pollution through conductive dust, rain or snow. Example: outdoor sites.

Security level

Class 1 - Grounding Products

1.6. Maintenance and cleaning

Maintenance:

When storing or placing the electronic load, do not expose the LCD monitor to direct sunlight for a long time.

Clean:

Check the electronic load and test leads as often as required by the operating conditions, and clean the external surfaces of the instrument as described below:

1) Use a lint-free rag to remove dust from the outside of the electronic load and test leads. Be careful to avoid scratching the glossy display filter material.

2) Clean the electronic load with a soft cloth dampened with water.

Attention:

To avoid damaging the surface of the electronic load or test leads, do not use any corrosive reagents or chemical cleaning agents.

Warning:

Before re-energising, please make sure the instrument is dry to avoid electrical short circuit or even personal injury due to moisture.

1.7. Environmental Considerations

The following symbols indicate that this product complies with the requirements set out in WEEE Directive 2002/96/EC.

Equipment recycling:

The production of this equipment requires the extraction and use of natural resources. Some of the substances contained in this equipment may be harmful to the environment or human health if this product is not properly disposed of at end-of-life. To avoid the release of hazardous substances into the environment and to reduce the use of natural resources, it is recommended that this product be recycled using appropriate methods to ensure that the majority of the material can be reused correctly.

2. Overview of documentation

This document is used to guide users to quickly understand the front and rear panels, user interface and basic operation methods of HDL2500+ series electronic loads.

Tip:

The latest version of this manual can be downloaded at (http://www.hantek.com).

Document ID: 202405

Software Version:

Software upgrades may change or add features to the product, please check the Hantek website for the latest version.

Document formatting conventions:

Button

Use 'square brackets + text (bold)' to indicate the front panel keys, e.g. **[Utility]** for 'Utility' key.

Menu

Use 'menu text (bold) + blue' to indicate a menu option, such as **Sys. Info** indicates that clicking on the 'Sys Info' option on the current operation interface of the instrument enters the 'Sys Info' configuration menu.

Operating procedure

The hyphen and arrow -> indicate the next operation. For example, **[Utility]-> I/O Set** indicates that you click **[Utility]** and then click the **I/O Set** function key.

Button Identification Table

Mark	Button	Mark	Button
	Arrow key		Trigger key
	Enter key		Menu softkey

Document content conventions:

The HDL2500+ series of electronic loads contains the following models. If not otherwise specified, this manual uses the HDL2512A++ as an example to illustrate the HDL2500+ series and its basic operation.

Model	Voltage	Current	Power	Accuracy	Interface
HDL2512A+	150V	30A	300W	±(0.025%+0.025%FS)/ ±(0.05%+0.05%FS)	USB，RS232
HDL2512B+	500V	15A	300W	±(0.025%+0.025%FS)/ ±(0.05%+0.05%FS)	USB，RS232
HDL2512C+	120V	60A	300W	±(0.025%+0.025%FS)/ ±(0.05%+0.05%FS)	USB，RS232
HDL2512H+	800V	5A	300W	±(0.025%+0.025%FS)/ ±(0.05%+0.05%FS)	USB，RS232
HDL2512A++	150V	30A	300W	±(0.025%+0.025%FS)/ ±(0.05%+0.05%FS)	USB，RS232，LAN
HDL2512B++	500V	15A	300W	±(0.025%+0.025%FS)/ ±(0.05%+0.05%FS)	USB，RS232，LAN
HDL2512C++	120V	60A	300W	±(0.025%+0.025%FS)/ ±(0.05%+0.05%FS)	USB，RS232，LAN

Model	Voltage	Current	Power	Accuracy	Interface
HDL2512H++	800V	5A	300W	±(0.025%+0.025%FS)/±(0.05%+0.05%FS)	USB，RS232，LAN
HDL2513A+	150V	60A	600W	±(0.025%+0.025%FS)/±(0.05%+0.05%FS)	USB，RS232，LAN
HDL2513B+	500V	30A	600W	0.02%+0.025 %FS/0.1%+0.1%FS	USB，RS232，LAN
HDL2513C+	120V	120A	600W	±(0.025%+0.025%FS)/±(0.05%+0.05%FS)	USB，RS232，LAN

3. General inspection

Inspection of transport packaging

When the user receives the electronic load, please check the equipment according to the following steps: Check for any damage caused by transport: If you find that the packing carton or the foam protective pad is badly damaged, please keep it until the whole machine and the accessories have passed the electrical and mechanical tests.

Inspection Annexes

The details of the supplied accessories are described in 'Appendix A: Models and Accessories' at the end of this manual. If you find that an accessory is missing or damaged, please contact the dealer responsible for this service.

Check the whole machine

If you find that the appearance of the instrument is broken, the instrument does not work properly, or fails to pass the performance test, please contact the dealer responsible for this business.

4. Product presentation

HDL2500+ series DC electronic loads cover a wide range of voltage and current, with high accuracy and resolution, to accurately test the performance of the equipment, without missing any details. A variety of test functions, dynamic test and automatic test functions, fully meet the diversified needs of users. Provides convenient remote communication, supports SCPI protocol, realises seamless connection with design and development and production line test system, and makes the test process smoother. Whether it's testing various batteries, AC-DC/DC-DC modules, chargers, electronic components and other products, HDL2500+ series electronic loads can accurately and quickly complete the test.

4.1. Front Panel Overview

1. Power On/Off key

2. Menu softkey

Corresponding to the menu above it, press any softkey to activate the corresponding menu.

3. Channel terminals

Channel input terminals: for connection to the device under test, input voltage and current.

4. Function key

[CC]: Constant current mode button. Click **Shift->7 (CC)** in sequence to enter CC constant current mode.
[CV]: Constant Voltage Mode button. Click **Shift->8 (CV)** in sequence to enter CV constant voltage mode.
[CR]: Constant Resistance mode button. Click **Shift->9 (CR)** in sequence to enter

CR constant resistance mode.
[Utility (CP)]: auxiliary function key/constant resistance mode key. Press **[Utility]** to enter into the system auxiliary function menu; click **Shift-> Utility (CP)** in sequence to enter CP constant power mode.
[OCP]: OCP test function button. Click **Shift->4 (OCP)** in sequence to enter the overcurrent protection test interface.
[OPP]: OPP test function button. Click **Shift->5 (OPP)** in sequence to enter the over power protection test interface.
[CR-LED]: CR-LED test function button. Click **Shift->6 (CR-LED)** in sequence to enter the CR-LED test interface.
[Shift]: Shift composite key, used in conjunction with the number keys to achieve the function labelled above the number keys.
[Battery]: Battery test discharge function button. Click **Shift->1 (Battery)** to enter the battery test discharge function interface.
[Tran]: Dynamic test mode button. Click **Shift->2 (Tran)** in sequence to enter into the dynamic test mode interface.
[List]: List setting button. Click **Shift->1 (List)** in order to enter the list setting interface.
[Trig (Pause)]: In manual trigger mode, press this key to enable the trigger function; during dynamic testing, click **Shift->Trig (Pause)**, the machine stops reading data.
[Short]: Short circuit test function. Click **Shift->0 (Short)** in order to enter to the short circuit test function.
[Wave]: Waveform display function. **Click Shift->. (Wave)** to enter the waveform display function.
[Local]: Used to switch between local and remote operation. Click **Shift->(Local)** to switch from remote operation to local.
[ON/OFF (Lock)]: Switch on or off the input of the electronic load; click **Shift-> ON/OFF (Lock)** in sequence to enable the keyboard lock function.

5. Knob

Increases (clockwise) or decreases (counterclockwise) the value at the cursor; used to move the cursor position when setting the time.

6. Arrow keys (left/right) and confirmation keys

Left/Right Keys: Used to move the cursor position when setting parameters.
Enter key: Input confirmation after setting parameters.

7. TFT display

4.3-inch display for system status, input parameters, menu settings, and prompt messages.

8. Restore Default Settings Key

Used to restore the instrument state to factory defaults.

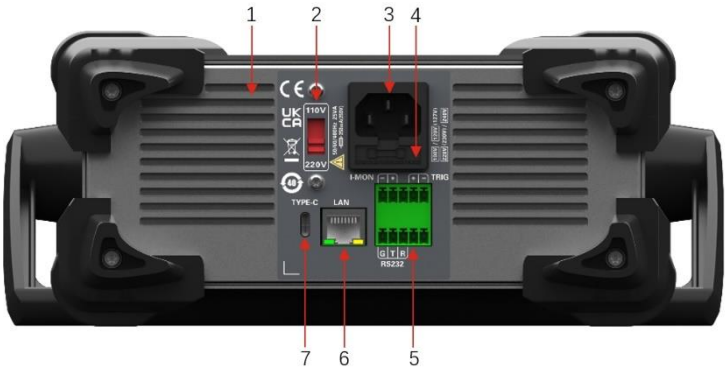
9. Help key

To get contextual help information for a front panel key or menu softkey, press the key and then the key whose help information you need.

10. USB HOST interface

External storage device (USB stick) can be accessed for saving or loading files, etc.

4.2. Rear Panel Introduction



1. Thermal window

Reduce the internal temperature of the instrument to ensure performance. When placing the instrument on a workbench or mounting it in a rack, make sure to leave at least 10 cm of space at the air vent to allow for air circulation.

2. AC Selector

Used to select the voltage specification that matches the actual AC input power. The electronic load supports two AC voltage specifications: 110 V and 220 V. Please select the correct voltage gear according to the AC power specification you are using. When the dip switch is in different positions, it indicates that different voltage specifications are selected. Toggle the switch upwards to select 110 V. Toggle the switch downwards to select 220 V.

3. Power Jack

AC power input connector, use the power cord provided with the accessory to connect AC power to the instrument through this connector.

4. Fuse holder

The instrument is shipped with a fuse that meets the standards of the country in which it is used.

5. Digital IO

Digital I/O interface supports I-MON, TRIG, and RS232 communication.

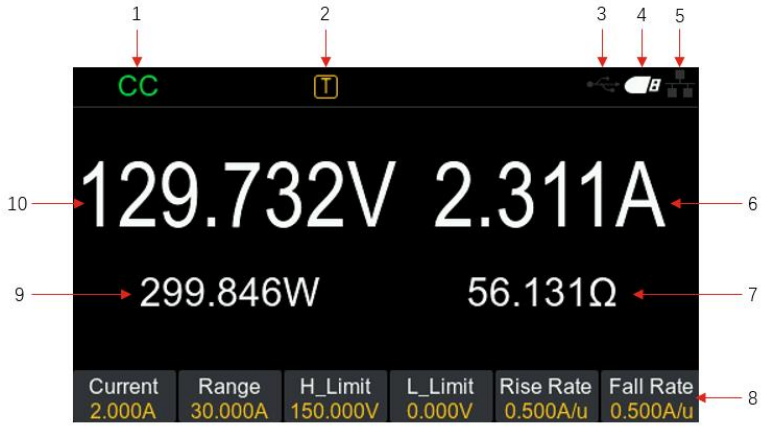
6. LAN Interface

This interface is used to connect the instrument to a LAN in order to control it remotely.

7. USB Interface

This interface is used to connect the machine to the computer and control it remotely.

4.3. User Interface Introduction



1. Functional Status Indicator

Real-time display of the current functional status of the electronic load.

2. Instrument working status

Real-time display of the current working status of the electronic load. S: electronic load off input; W: electronic load waiting for trigger signal; T: electronic load open input, has been triggered.

3. USB device icon display

The USB device icon lights up to allow remote control of the electronic load.

4. USB stick icon display

The USB device icon lights up to allow remote control of the electronic load.

5. Network icon display

The network icon lights up to indicate that the network is connected and the electronic load can be remotely controlled.

6. Current value

The actual amount of current flowing through the electronic load.

7. Resistance value

Measurement of the calculated value of the resistance characteristic presented by the actual load under specific operating conditions.

8. Menu bar

Displays the menu for the current function, corresponding to the menu key below it. Pressing the menu key activates the corresponding menu.

9. Power value

The power consumed by an electronic load during operation.

10. Voltage value

The actual voltage applied to the terminals of an electronic load.

5. Preparation for use

1. Connecting the power source

This series of electronic loads can be input into the AC power source with specifications of 110V and 220V. users should check the AC voltage selector on the rear panel of the power supply before starting to use the electronic loads. Connect the electronic load to the power supply using the power cord provided with the accessory. Turn on the instrument by pressing the power switch at the lower left corner of the front panel. If the instrument is not switched on, make sure that the power cord is securely connected and that the instrument is connected to an energised power source.

Warning:

1. **Before connecting the power cord, please check the 110V/220V changeover switch to ensure that the switching gear of the load matches the supply voltage, otherwise the instrument may be burnt.**
2. **Make sure the load's power switch is off before connecting the power cord.**
3. **To prevent electric shock, be sure to take protective grounding. Connect the power cord to a three-pronged socket with a protective earth terminal.**
4. **Do not use an extension power cord without a protective earth wire or the protection will fail.**
5. **Use an AC power outlet that matches the power cord supplied with the box and be sure to take protective grounding. Do not use this instrument if a suitable AC power cord cannot be used.**

2. Checking and replacing fuses

The instrument is shipped from the factory with a fuse of the specified size. Before use, check that the fuse type matches the AC voltage rating. If there is a mismatch or the fuse is blown, the fuse should be replaced according to specifications.

3. Adjustment of carrying handle

There is a bracket design on the side of the machine, hold the carrying handle on both sides of the instrument and pull it outward, rotate the handle and move the card lock to the corresponding position for fixing, which is easy to observe and operate.

6. Continuous reception measurements

Even before receiving the test

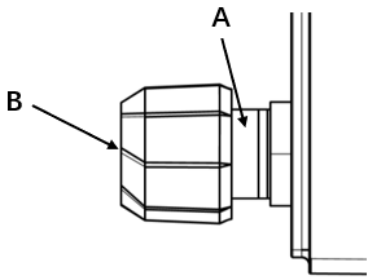
To prevent electric shock and damage to the instrument, please observe the following precautions.

Warning:

1. Before connecting the test object, please cut off the power supply of the test circuit to avoid the risk of electric shock during the connection.
2. In order to prevent electric shock, please confirm the rating of the test line before measurement and do not measure the current higher than the rating value.

Terminal description

The HDL2500+ Series load front panel contains the following terminals, and the maximum rated current of the terminal at position (A) is the maximum rated input current of the instrument. All cables are securely secured by manually tightening the terminal. It is also possible to insert the standard banana plug directly into the front of the connector, as shown in (B), with A maximum rated current of 10 A for the terminal at position (B).



Combined reception measurements (local measurements)

1. Before receiving the test object, please make sure that the power switch of the instrument is turned off.
2. Remove the load input terminal protection cover.
3. Unscrew the input terminal, connect the red and black test wire to the input terminal and tighten the screw; You can also insert the standard banana plug directly into the front of the connector.
When the maximum current that the test wire can withstand does not meet the current rated current, use multiple red and black test wires.
4. Install the load input terminal protection cover.
5. Connect the other end of the red and black test cable directly to the wiring

terminal of the object to be measured.

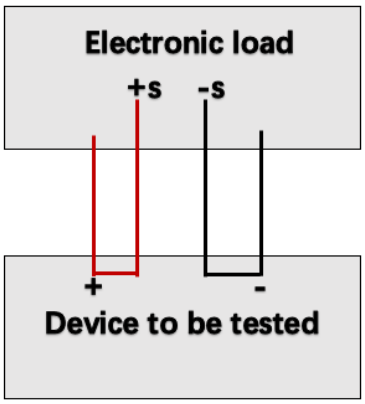
Remote measurement

In CC, CV, CR, CW mode, when the electronic load consumes a large current, there will be a large voltage drop in the connection line between the instrument under test and the load terminal. In order to ensure measurement accuracy, the electronic load provides a remote measuring terminal on the front panel, which the user can use to measure the output terminal voltage of the instrument under test.

SENSE (+) and SENSE (-) are remote input terminals. Before using the remote measurement function, you must first set the load to remote measurement mode.

The steps are as follows:

1. Remote measurement access. See the following figure for detailed cable connections.



2. Click **[Utility] ->Func. Set->Next->Sense->On** in order to turn on the remote measurement function.

Note: When the user does not use the remote measurement function, please disable this function.

Test and Sense wires should be as short as possible and Sense wires should be twisted together.

7. Parameter setting method

The parameter setting of this series of electronic loads supports numeric keypad input. Parameter setting can be done by numeric keypad and knob. Click the menu soft key corresponding to the parameter, and a box with white background will appear above the parameter. You can enter the desired value using the numeric keypad, or click the left arrow keys and the right arrow keys to move the cursor and change the value by rotating the knob. After setting the value, click **[enter]** to save and exit.

8. Remote control

Electronic loads can be controlled remotely in three ways.

1、 Custom programming:

The user can program control the instrument through the Standard Commands for Programmable Instruments (SCPI) commands. Please refer to the HDL2500+ Programming Manual for detailed instructions on commands and programming.

2、 Use IO software:

Users can use IO software to send commands for remote control of electronic loads. PC software IO provided by Keysight is recommended. You can log in to Keysight official website (www.keysight.com) to download the software.

Operation steps:

- Establishes communication between the electronic load and the computer.
- Run IO and search for electronic load resources.
- Open the Remote Command Control panel and send the command.

This electronic load can communicate with a PC through the following interfaces:

- Control via USB
- Control via LAN
- Controlled via RS232

Note: Before connecting the communication cable, switch off the instrument to avoid damaging the instrument's communication interface.

9. More product information

1、 Get system information about the product

Click [**Utility**]->**Sys. Info**, you can get the machine model, serial number, software version and hardware version.

2、 View option information and option installation

For more information on this product, please refer to the relevant brochure (which you can download from the Hantek website (www.hantek.com)).

- HDL2500+ User's Manual: Provides an introduction to the functions of the product and how to operate it, how to control it remotely, possible faults during use and how to deal with them, as well as ordering information.
- HDL2500+ Programming Manual: Provides the SCPI command set for this product

Address：No.780 Baoyuan Road, Gaoxin District, Qingdao, Shandong Province,

Building 35, Luandong U Valley

Switchboard: 400-036-7077

Email: service@hantek.com

Tel: 0532-55678770, 55678772, 55678773

Postcode: 266000

Official website: www.hantek.com

Qingdao Hantek Electronics Co.