

- 1) When real-time voltage jump is lower than 70% of the input voltage Vin, the device will display "OCP complete!", and display the end current value, and stop the test;
- 2) When the pull-in current is greater than or equal to the safety protection setting current, the device will display "Warning! Over Current!" and stop the test;
- 3) When pull-in current is greater than the hardware maximum current limit, the device will display "Warning! Over MAX Current!" and stop the test.

6.6 Internal Resistance Test (Internal Resis)

Internal resistance test can be used to test the internal resistance of the DUT. This function will automatically run in CC mode. During the internal resistance test, the device will first measure the voltage value Volt1 of the DUT when it is not under load, and then measure the voltage value Volt2 after the short pull-in time, so as to calculate the internal resistance of the device under test:

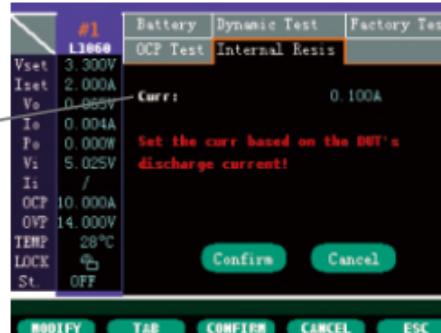
$$\text{Internal resistance} = (\text{Volt1} - \text{Volt2}) / (\text{Curr})$$

Operation method:

- 1) Set Safety Protection parameter values of MDP-L1060, and adjust the setting value to the protection function range;
- 2) Connect MDP-L1060 with MDP-M01 display control module to enter advanced function page (please refer to 6.1 for the method of entering advanced functions);
- 3) Press "TAB" to select internal resistance test interface (Internal Resis), and modify the discharge current setting value Curr of the DUT through MDP-M01 (as shown in the figure below);
- 4) Press "CONFIRM" to confirm and start the test.

Curr:

Set based on the battery discharge current, range 0.015A~10A.



6.7 Pull-In Threshold Voltage (Load Volt Threshold)

MDP-L1060 can set the load threshold voltage. After the device starts, when detecting the load input voltage is higher than the threshold voltage, the device starts to pull in the load; when detecting the load input voltage is lower than the threshold voltage, the device will automatically stop pulling. This feature can be used to avoid further damage that could result from continuing to pull the load if the DUT fails to work.

This function can also be used as a simple automatic test, first set MDP-L1060's pull-in load value (pull-in load voltage must be lower than the DUT's output voltage) and start pulling. When the DUT is connected to MDP-L1060 (with voltage input), MDP-L1060 will automatically starts to pull the load, and when the DUT is disconnected from MDP-L1060 (with no voltage input), the pulling will be automatically turned off. By this, it realize the simple pull-in test of the DUT and save the button operation on MDP-L1060 for each test.

The setting range of the load threshold voltage is 0V ~ 60V (the default value is 0.1V). Please refer to 3.5 for the setting method.

7/Safety Protections

MDP-L1060 provides a number of security protection functions to protect the device and the DUT.

If the device pops up a security protection warning during use, please pay attention to adjusting the corresponding protection parameters. If User need to adjust to the device's maximum power for testing, User can first turn on pulling load and gradually adjust the preset value to the maximum power to ensure that the device runs smoothly.

For the setting range of each safety protection function parameter, please refer to 3.5.

7.1 Over-Voltage Protection (OVP)

When the load voltage exceeds the set over-voltage value, the device will activate over-voltage protection. At this time, the device will turn off pulling, the buzzer will beep, the upper and lower indicators flicker, and "OVP" warning will appear on the screen.

7.2 Over-Current Protection (OCP)

In CC, CR and CP modes, when the input current exceeds the set over-current, the device will stop pulling with load, the buzzer will beep, the upper and lower indicators flicker, and "OCP" warning will appear on the screen.

7.3 Over-Power Protection (OPP)

In normal operation, when the consuming power exceeds the set over-power value, the device will stop pulling with load, the buzzer will beep, the upper and lower indicators flicker, and "OPP" warning will appear on the screen.

Note: In CP mode, the device will only start over power protection when the pull-in power exceeds 160W.

7.4 Over-Temperature Protection (OTP)

When the temperature of the internal power component exceeds the system protection temperature, the device will activate over-temperature protection. At this time, the device will automatically stop pulling, the buzzer will beep, the upper and lower indicators flicker, and "OVER TEMP" warning will appear on the screen.

7.5 Load Input Reverse Connection Protection (Anti-Reverse)

When the load input polarity is reversed, the device buzzer will beep, the upper and lower indicators flicker, and "INPUT REVERSE" warning will appear on the screen.

8/Firmware Upgrade

- 1) Visit www.miniware.com.cn to download the applicable electronic load firmware to PC;
- 2) Connect MDP-L1060 to PC with a USB TYPE-C data cable, press and hold both SET and RUN/LOCK Button to enter DFU mode, the computer will display a removable hard disk named "DFU VX.XX";
- 3) Copy the prepared .hex firmware to the root directory of that disk. When the firmware suffix changes from .hex to .RDY, restart the device to complete the firmware upgrade.

Questions	Reasons	Solutions
When using built-in battery, can the device run a loading test at a long time?	The running time of the device's battery depends on the loading tests.	It is recommended to connect a power source to the device if to perform a long time testing.
Can the built-in battery be charged when doing a loading test?	The built-in battery can not be charged with DUT, but should be charged independently.	Please connect a DC 5V 2A power input for charging via USB TYPE-C port.
There is an obvious deviation in display voltage.	When the device consumes a large current, there will be a voltage drop on the connection cable between the DUT and itself.	In order to ensure the test accuracy, please connect the XT30 remote compensation port for voltage compensation.

When MDP-L1060 displays warnings on the screen as below indicated, its upper and lower indicators will flicker in red light, and the buzzer will beep as warning.

Questions	Reasons	Solutions
INPUT REVERSE	The load input polarity is reversed.	Please input load in the right polarity.
OPP/OCP/OVP	Over-power / over-current / over-voltage protection	<ol style="list-style-type: none"> 1. Turn off the outer power source, adjust the power to a lower value and then turn on again; 2. Long press MDP-L1060's MENU Button, enter setting menu to adjust the corresponding setting values.
TEMP ERROR	NTC component error	Please contact after-sales service.

Questions	Reasons	Solutions
OVER TEMP	The temperature of processing component inside is higher than 80°C	<ol style="list-style-type: none"> 1. Please remove the thing near MDP-L1060 to make sure the air flow; 2. MDP-L1060's built-in fans will run at the highest speed to dissipate heat, when the temp drops to safety temp, the device will return to normal working state;
LOW BATTERY	Built-in battery is in low voltage	Please connect a DC 5V 2A power input for charging via USB TYPE-C port.
FAN1 ERROR	Fan 1 error	Please contact after-sales service.
FAN2 ERROR	Fan 2 error	
FAN1/2 ERROR	Fan 1 and Fan 2 error	
Display both "program output" and "parameter error"	In programmable loading mode, the file PRO_XX.CSV inside U disk error	Please refer to 3.5 for modification of programmable loading file, or contact after-sales service.
Flash Error	Flash chip error	Please contact after-sales service.
Wireless Error	Wireless chip error	
calibrate wait usb	Calibration file missing	

10/Legal Statements

 This device is complied with the regulation in the 15th part of FCC regulation. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference.
(2) This device must accept any interference received, including the interference that may cause undesired operation.

 The CE mark is a registered trademark of European Community.
This CE mark shows that the product complies with all the relevant European Legal Directives.

 UKCA (United Kingdom Conformity Assessed) mark is a certification mark for UK conformity.
This device complies with the standard testing and certification under British regulations required for electrical and electronic products to enter the British market.

 This product contains batteries and/or recyclable electronic parts. Please do not dispose of the product together with household garbage. Please handle it according to your local laws and regulations.



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