

## M97XX

### Series Programmable DC Electronic Load

The new Maynuo M97XX programmable DC electronic load is a new generation product. Incorporating high-performance chips, the M97XX series delivers high speed and high accuracy with a resolution of 0.1 mV and 0.01 mA (basic accuracy is 0.03% and basic current rise speed is 2.5 A/ $\mu$ s).

M97XX series has wide application from production lines for cell phone chargers, cell phone batteries, electronic vehicle batteries, switching power supplies, linear power supplies, and LED drivers, to research institute, automotive electronic, aeronautic and astronautic, maritime, solar cells and fuel cells etc. test and measurement applications.

### Features

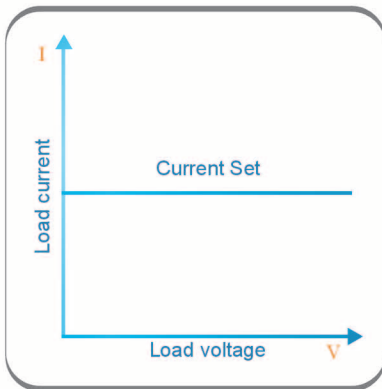
- Six high speed operation modes: CC,CR,CV,CW,CC+CV,CR+CV
- Over current, over voltage, over power, over heating and polarity reversal protection
- High-luminance vacuum fluorescent display (VFD) screen with two line, four channel display
- Intelligent fan system will automatically activate based on changing ambient temperatures
- Soft-start time setting, activating the power supply in accordance with the set voltage value
- Battery test and short-circuit test functions
- Capable of rising edge and falling edge dynamic testing
- Supporting external trigger on either input or output
- External current waveform monitor terminal output terminal
- Supports remote voltage compensation and multi-data storage
- Power-on-self-test, software calibration and standard rack mountable
- Edits arbitrary waveforms in list function
- Available with RS232/RS485/USB serial interfaces



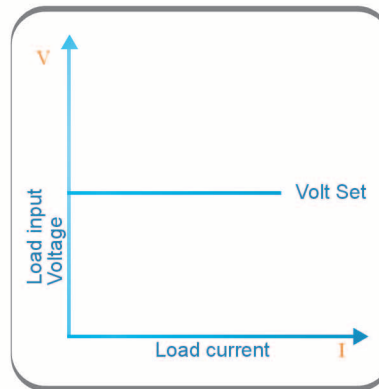
**Just Right For Your Power Electronics Test Solution**

**M97 Series Programmable DC Electronic Load Technical Specification Table**

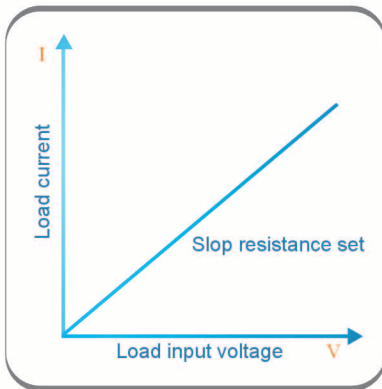
Model	M9713		M9713B		M9714		M9714B		
Input Rating	Power	600W		600W		1200W		1200W	
	Current	0-120A		0-30A		0-240A		0-60A	
	Voltage	0-150V		0-500V		0-150V		0-500V	
CC Mode	Range	0-12A	0-120A	0-3A	0-30A	0-24A	0-240A	0-6A	0-60A
	Resolution	1mA	10mA	0.1mA	1mA	1mA	10mA	0.1mA	1mA
	Accuracy	0.05%+0.05%FS	0.1%+0.05%FS	0.03%+0.05%FS	0.03%+0.05%FS	0.05%+0.05%FS	0.1%+0.05%FS	0.03%+0.05%FS	0.03%+0.05%FS
CV Mode	Range	0.1-19.999V	0.1-150V	0.1-19.999V	0.1-500V	0.1-19.999V	0.1-150V	0.1-19.999V	0.1-500V
	Resolution	1mV	10mV	1mV	10mV	1mV	10mV	1mV	10mV
	Accuracy	0.03%+0.02%FS	0.03%+0.02%FS	0.03%+0.02%FS	0.03%+0.05%FS	0.03%+0.02%FS	0.03%+0.02%FS	0.03%+0.02%FS	0.03%+0.05%FS
CR Mode(Voltage and current input value $\geq$ 10%full measurement)	Range	0.03 $\Omega$ -2K $\Omega$	0.03 $\Omega$ -5K $\Omega$	0.03 $\Omega$ -2K $\Omega$	0.03 $\Omega$ -5K $\Omega$	0.3 $\Omega$ -2K $\Omega$	0.3 $\Omega$ -5K $\Omega$	0.03 $\Omega$ -2K $\Omega$	0.03 $\Omega$ -5K $\Omega$
	Resolution	16 bit	16 bit	16 bit	16 bit	16 bit	16 bit	16 bit	16 bit
	Accuracy	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS
CW Mode(Voltage and current input value $\geq$ 10%full measurement)	Range	0-240W	0-600W	0-60W	0-600W	0-500W	0-1200W	0-120W	0-1200W
	Resolution	1mW	10mW	1mW	10mW	1mW	10mW	1mW	10mW
	Accuracy	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS
V Measurement	Voltage	0-19.999V	0-150V	0-19.999V	0-500V	0-19.999V	0-150V	0-19.999V	0-500V
	Resolution	1mV	10mV	1mV	10mV	1mV	10mV	1mV	10mV
	Accuracy	0.015%+0.03%FS	0.015%+0.03%FS	0.015%+0.03%FS	0.015%+0.05%FS	0.015%+0.03%FS	0.015%+0.03%FS	0.015%+0.03%FS	0.015%+0.05%FS
I Measurement	Current	0-12A	0-120A	0-3A	0-30A	0-24A	0-240A	0-6A	0-60A
	Resolution	0.1mA	1mA	0.01mA	0.1mA	0.1mA	1mA	0.01mA	0.1mA
	Accuracy	0.05%+0.05%FS	0.1%+0.1%FS	0.03%+0.05%FS	0.03%+0.08%FS	0.05%+0.05%FS	0.1%+0.2%FS	0.05%+0.05%FS	0.05%+0.1%FS
W measurement (Voltage and current input value $\geq$ 10%full measurement)	Watt	100W	600W	100W	600W	100W	1200W	100W	1200W
	Resolution	1mW	10mW	1mW	10mW	1mW	10mW	1mW	10mW
	Accuracy	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.1%FS	0.1%+0.2%FS	0.1%+0.1%FS	0.1%+0.1%FS
Battery Measurement Dynamic Measurement CC soft-startup Time		Battery Input: 0.1-150V; Max. Measurement: Capacity=999AH; Resolution=1mA; Time Range=1S-16H Transition List: 0-25KHZ; 5A $\mu$ S; T1&T2: 60 $\mu$ S-999S; Accuracy: $\pm$ 15% offset+10% FS 1 mS; 2 mS; 5mS; 10mS; 20 mS; 50 mS; 100 mS; 200 mS Accuracy: $\pm$ 15% offset+10% FS							
Short Circuit	Current(CC)	$\approx$ 13.2A	$\approx$ 132A	$\approx$ 3.3A	$\approx$ 33A	$\approx$ 26.4A	$\approx$ 264A	$\approx$ 6.6A	66A
	Voltage(CV)	0V		0V		0V		0V	
	Resistance(CR)	$\approx$ 13m $\Omega$		$\approx$ 100m $\Omega$		$\approx$ 7m $\Omega$		$\approx$ 50m $\Omega$	
Temperature	Operating	0 ~ 40°C		0 ~ 40°C		0 ~ 40°C		0 ~ 40°C	
	Nonoperating	-10°C ~ 70°C		-10°C ~ 70°C		-10°C ~ 70°C		-10°C ~ 70°C	
Dimension	W*H*D(mm)	103.5*428*453.5							
Weight	Kg	17.6							

**M97**
**Series Electronic Load Working Modes**

**Constant Current Mode**

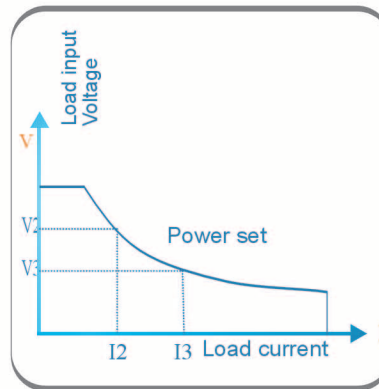
In CC mode, the electronic load will sink a current in accordance with the programmed value regardless of the input voltage. Please refer to the left graph.


**Constant Voltage Mode**

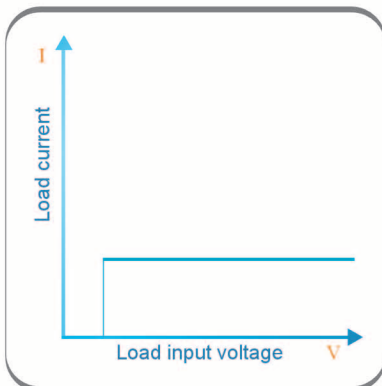
In CV mode, the electronic load will attempt to sink enough current to control the source voltage to the programmed value. Please refer to the left graph.


**Constant Resistance Mode**

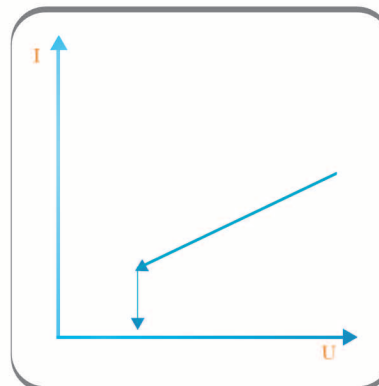
In CR mode, the module will sink a current linearly proportional to the input voltage in accordance with the programmed resistance. Please refer to the left graph.


**Constance Power Mode**

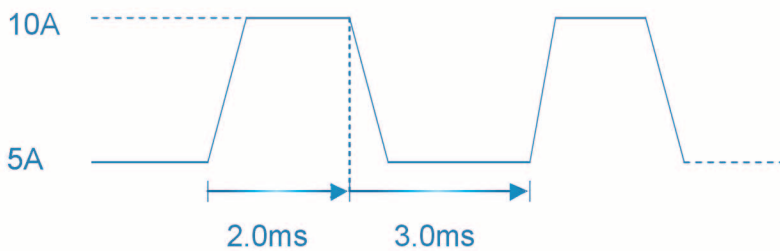
In CW mode, the electronic load will consume a constant power. Please refer to the left graph. If the load input voltage value increase, the load input current will decrease. Therefore the load power ( $=V \cdot I$ ) will remain in the power set.


**Constant Current Shifting into Constant Voltage Mode**

In CC+CV mode, the power supply under test can be avoided from the current strike damage.


**Constant Resistance Shifting into Constant Voltage Mode**

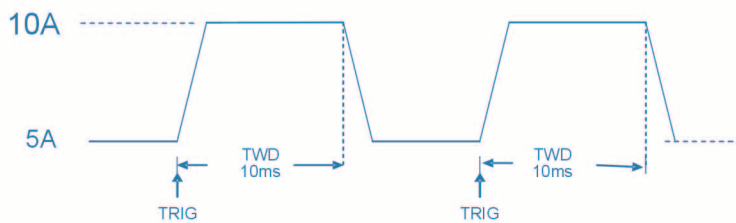
In CR+CV mode, the power supply under test can be avoided from the current strike damage.

**Dynamic Test** >>>


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**Continuous Operation Mode**

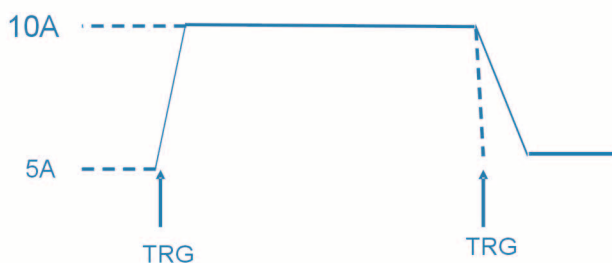
In continuous mode, the load will periodically switch between value A and value B when the dynamic test operation is turned on.



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**Pulse Operation Mode**

In pulse operation mode, when the dynamic test operation is turned on, the load will switch to value B as receiving one trigger signal, take the one pulse time (TWD) of value B, the load will return to value A.



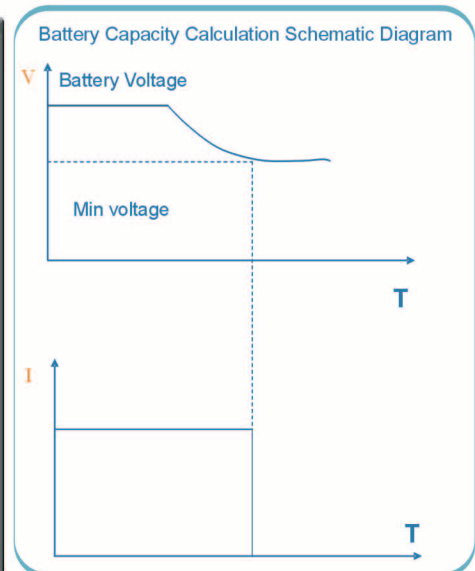
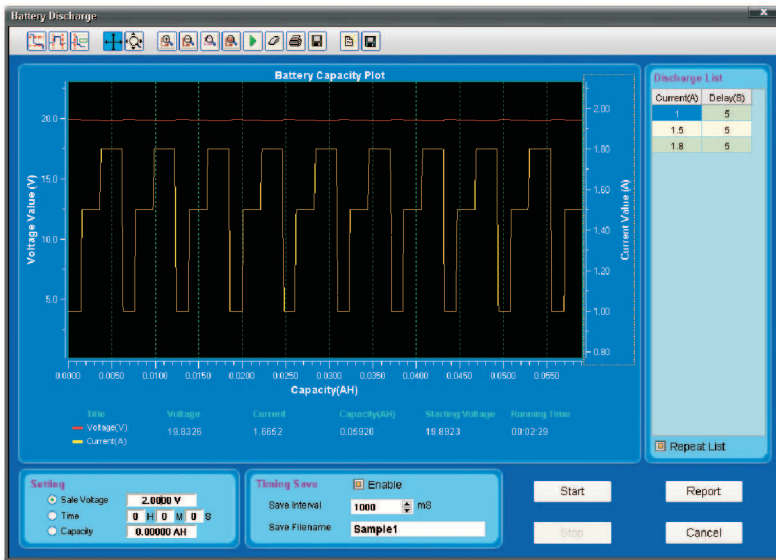
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**Trigger Operation Mode**

In trigger mode, when the dynamic test operation is turned on, the electronic load will switch the state between value A and value B once receiving a triggering signal.

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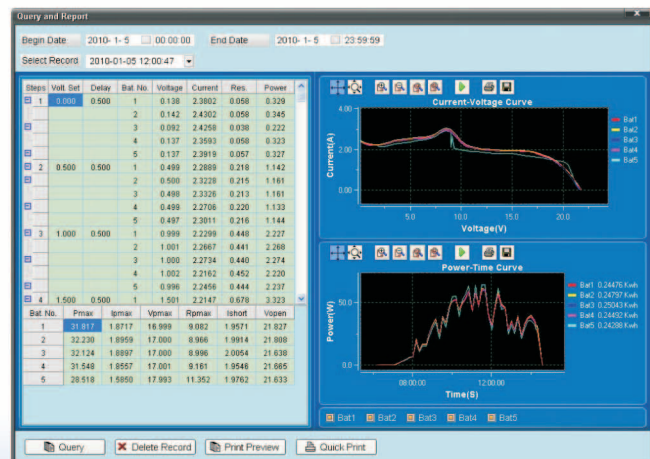
## Battery Test >>>



Constant current mode is applied in M97 series electronic load to test the battery capacity. A program is set to control voltage level. When the voltage of the battery is too low, the electronic load will identify the battery being on the threshold value set or at the margin of insecure state and will stop testing automatically. When the load is in testing procedure, you can see the battery voltage, battery discharge current, power and battery capability that has been spared. If the load is connected with PC software, then you can see the discharge curve of battery discharge. This test can set out the reliability and remaining life of battery.



M97 series programmable electronic load equipped with solar cell test software can test multi-channel solar cell parameters, query the test report according to the date, preview the test report that need to be printed and fast print the test report, etc by computer operation.



## Automatic Test >>>



The M97 series electronic load is available of automatic test function. 8 sets of data can be edited at most and 50 steps can be edited in each set of data. Each step can be edited in six working modes (load off mode, constant current mode, constant voltage mode, constant resistance mode, short circuit mode) and can be available of four types of parameters from current comparison, voltage comparison, power comparison and resistance comparison. Besides, the delay time of each step ranges can be also edited. The delay time of each step ranges from 0.1S ~25.5S, considering the quickness and accuracy. Moreover, M97 series electronic load equipped with PC monitoring software allows quick editing test steps, test report output to the EXCEL table by computer operation.

Begin Step	1			
End Step	10		Set	Clear
<input checked="" type="checkbox"/> Test Mode	CV			
<input checked="" type="checkbox"/> Set Value	11.000 V	~	20.000 V	
<input checked="" type="checkbox"/> Meas. Item	V	<input checked="" type="checkbox"/> Delay	1.000 S	
<input checked="" type="checkbox"/> Max Value	11.100 V	~	20.100 V	
<input checked="" type="checkbox"/> Min Value	10.900 V	~	19.900 V	

Query and Report

Select File: GONG.mdb

Begin Date: 2013-4-24 00:00:00 End Date: 2013-4-24 23:59:59

No.	DateTime	Test Mode	Set Value	Meas. Item	Actual Value	Max	Min	Delay(S)	Pass
1	2013-04-24 16:46:08	CV	11.000	V	10.9879	11.100	10.900	1.000	Pass
2	2013-04-24 16:46:08	CV	12.000	V	11.9892	12.100	11.900	1.000	Pass
3	2013-04-24 16:46:08	CV	13.000	V	13.0029	13.100	12.900	1.000	Pass
4	2013-04-24 16:46:08	CV	14.000	V	14.0038	14.100	13.900	1.000	Pass
5	2013-04-24 16:46:08	CV	15.000	V	15.0030	15.100	14.900	1.000	Pass
6	2013-04-24 16:46:08	CV	16.000	V	15.9870	16.100	15.900	1.000	Pass
7	2013-04-24 16:46:08	CV	17.000	V	16.9889	17.100	16.900	1.000	Pass
8	2013-04-24 16:46:08	CV	18.000	V	17.9877	18.100	17.900	1.000	Pass
9	2013-04-24 16:46:08	CV	19.000	V	19.0029	19.100	18.900	1.000	Pass
10	2013-04-24 16:46:08	CV	20.000	V	20.0018	20.100	19.900	1.000	Pass
11	2013-04-24 16:45:51	CV	11.000	V	10.9876	11.100	10.900	1.000	Pass
12	2013-04-24 16:45:51	CV	12.000	V	11.9894	12.100	11.900	1.000	Pass
13	2013-04-24 16:45:51	CV	13.000	V	13.0015	13.100	12.900	1.000	Pass
14	2013-04-24 16:45:51	CV	14.000	V	14.0038	14.100	13.900	1.000	Pass
15	2013-04-24 16:45:51	CV	15.000	V	15.0024	15.100	14.900	1.000	Pass
16	2013-04-24 16:45:51	CV	16.000	V	15.9867	16.100	15.900	1.000	Pass
17	2013-04-24 16:45:51	CV	17.000	V	16.9897	17.100	16.900	1.000	Pass
18	2013-04-24 16:45:51	CV	18.000	V	17.9875	18.100	17.900	1.000	Pass

Microsoft Excel - Load AutoTest.xls

No.	DateTime	Test Mode	Set Value	Meas. Item	Actual Value	Max	Min	Delay(S)	Pass
1	2013-04-24 16:46:08	CV	11.000	V	10.9879	11.100	10.900	1.000	Pass
2	2013-04-24 16:46:08	CV	12.000	V	11.9892	12.100	11.900	1.000	Pass
3	2013-04-24 16:46:08	CV	13.000	V	13.0029	13.100	12.900	1.000	Pass
4	2013-04-24 16:46:08	CV	14.000	V	14.0038	14.100	13.900	1.000	Pass
5	2013-04-24 16:46:08	CV	15.000	V	15.0030	15.100	14.900	1.000	Pass
6	2013-04-24 16:46:08	CV	16.000	V	15.9870	16.100	15.900	1.000	Pass
7	2013-04-24 16:46:08	CV	17.000	V	16.9889	17.100	16.900	1.000	Pass
8	2013-04-24 16:46:08	CV	18.000	V	17.9877	18.100	17.900	1.000	Pass
9	2013-04-24 16:46:08	CV	19.000	V	19.0029	19.100	18.900	1.000	Pass
10	2013-04-24 16:46:08	CV	20.000	V	20.0018	20.100	19.900	1.000	Pass
11	2013-04-24 16:45:51	CV	11.000	V	10.9876	11.100	10.900	1.000	Pass
12	2013-04-24 16:45:51	CV	12.000	V	11.9894	12.100	11.900	1.000	Pass
13	2013-04-24 16:45:51	CV	13.000	V	13.0015	13.100	12.900	1.000	Pass
14	2013-04-24 16:45:51	CV	14.000	V	14.0038	14.100	13.900	1.000	Pass
15	2013-04-24 16:45:51	CV	15.000	V	15.0024	15.100	14.900	1.000	Pass
16	2013-04-24 16:45:51	CV	16.000	V	15.9867	16.100	15.900	1.000	Pass
17	2013-04-24 16:45:51	CV	17.000	V	16.9897	17.100	16.900	1.000	Pass
18	2013-04-24 16:45:51	CV	18.000	V	17.9875	18.100	17.900	1.000	Pass