Testing Slots Specification

Number of testing slots	**16**
Load resistance per slot	**1.02 Ohms**
Current discharge range per slot	**0.1 – 3A** (MAX 2A recommended on the plastic case version with 2 fans)
Discharge Modes	Constant Current **(CC)**, Constant Voltage **(CV)**, Constant Resistance **(CR)**
Discharge range	**4.4V – 1V**
Charging voltage range	**3.5V – 4.4 V**
Current charge range per slot	**0.128 – 4.5A**
Current fall time	**<300 ms** in CR, **<15s** CC and CV
Current rise time	**<300 ms**
Current accuracy	**±1%**
Voltage accuracy	**±1%**
Cell protection	Over Current Protection **(OCP)** Over Voltage Protection **(OVP)** Over Temperature Protection **(OTP)** Reverse Polarity Protection **(RPP)**
Supported cells for on board slots **–** plastic case version	**18650**
Supported cells for onboard slots – metal case version	**18650, 21700, 26650, 32600, 32900,** and any 34mm to 90mm round cells with a diameter smaller than 35mm
Supported Testing accessories	- 1 x 25 cm 0.3mm2 wire XS12 6 pin – 3 A, with aligator connector and LMT85 temp sensor - 1 x 25 cm 0.3mm2 XS12 6 pin – 3A, aligator connector - 4 x 35 cm 0.3mm2 XS12 6 pin – 12A, aligator connector + 1 LMT85 temp sensor - 8 x 35 cm 0.3mm2 XS12 6 pin – 24A aligator connector + 2 LMT85 temp sensors - Expansion slot with temp sensor
Slot grouping (for increased charge/discharge current)	- **Yes**

Device Specifications

Power Input – Plastic case version	5 to 16V DC (5V x 80A PSU or 12V 40A)
Power Input – Metal case version (Commercial Version)	110V to 240V AC (It has a 12V 40A PSU inside)
Protection	Reverse Polarity Protection (RPP) at DC input side
Connectivity	- USB for accessory connection and Software Communication - WiFi for Software Communication - WiFi for updating firmware using OTA
16 x XS12 6 pin male connectors	Used for external accessories, see the slot specs for more details on available accessories
Active Cooling	2 x 5V 10 CFM fans for hobby (plastic case). 4 x 5V 12 CFM fans for commercial (metal case).
Display	Oled 0.96" I2C
Buttons	2 x push buttons for menu operation and commands
CPU	ESP8266
Plastic Case Version Weight	1 Kg (2.2 lbs)
Metal Case Version Weight	7.5 Kg (16.5 lbs)
Plastic Case Dimensions L, W, H	385 mm, 175 mm, 68 mm
Metal Case Dimensions L, W, H	480 mm, 322 mm, 82 mm

The Master Operation Manual of Megacell Charger PRO

LiCoO2, LiNiCoAlO2, LiMn2O4, LifePo4

CE and FCC Certified Cell Capacity Testing Equipment

Table of Contents

Introduction

Thank you for choosing the Megacell Charger Pro by DeepCycle-Power. This device is designed to remove the uncertainty that often comes with battery usage, providing valuable insights into battery cell performance. The Megacell Charger Pro is far more than just a basic voltage or load tester. It's compatible with multiple cell type, size, or chemistry, within reasonable limits on voltage and discharge current.

The Megacell Charger Pro is capable of tests up to a maximum of 48 amps at discharge and 72 amps for fast charging. With optional accessories, all slots can be combined together to test large cells. For details on per slot capabilities, check the table above.

Not only does this device measure the total amount of energy stored in a cell (expressed in mA-hours), it also offers graphical displays charting voltage over time under a constant current load. It saves the tested cells in a database along with testing data. For each tested cell it generates an unique ID and a lable containing the capacity, serial id, testing parameters and a QR code for fast cell processing.

The Megacell Charger Pro is durably constructed and it can be powered from a variety of power supplies from 5 to 16V DC. It's compact, features a high-performance cooling system, and operates quietly. LED indicators visible from across the room display test statuses.

The software included with the Megacell Charger Pro is user-friendly and intuitive. It automatically senses the battery cell count and provides the ability to fully control up to 80 devices from a single computer.

For those interested in additional capabilities, an optional Extended Software license is available. This adds several advanced features, including the ability to store more than 10 000 cells in the database.

Safety Information

While the Megacell Charger Pro by DeepCycle-Power is designed with safety in mind, it's important to remember that batteries themselves can be hazardous. All batteries have the potential to cause explosions or fires, making it crucial to consult the Battery Manufacturer's website for specific safety details.

Key Safety Guidelines:

- Only discharge batteries at their designed rate.
- Don't use batteries with damaged insulation, frayed wires, or exposed metal.
- Avoid reversing the battery's polarity when connecting it.
- Conduct all tests away from flammable materials.
- If a battery becomes excessively hot, discontinue the test.
- Always recharge batteries immediately after testing.
- Never leave a charging or testing battery unattended.
- Keep a fire extinguisher within reach.
- Connection Protocols:
- Connect the USB cable first before attaching the battery.
- Don't connect a battery to the Megacell Charger Pro if it's also connected to another device, unless you're using an isolated USB hub.
- If using a USB hub, ensure it's powered separately to adequately support the device.
- Working Environment:
- Always use the device in a cool, dry area.
- Avoid contact between fingers, battery wires, or metal objects and the device's metal heat sink.
- Ensure the cooling fan remains unblocked.

Software & Equipment:

Heed any warnings displayed by the software.

Be aware that the device can become hot; avoid touching the metal heat sink during or shortly after high-power tests.

Disclaimer!

! DeepCycle-Power is not responsible for any harm or damage that may occur through the use of the Megacell Charger Pro, whether to persons or equipment. This includes indirect losses like loss of revenue, data corruption, or damage to reputation.

Specific Battery Warnings:

Lead Acid Batteries: These can emit explosive hydrogen gas. Always operate them in a well-ventilated area.

NiCad, NiMh, and Alkaline Batteries: These can also pose a risk if short-circuited or charged/discharged too rapidly.

By using the Megacell Charger Pro, you acknowledge these safety guidelines and disclaimers. Always prioritize safety when working with batteries.

Lithium Battery Safety Guidelines

Lithium batteries have become increasingly popular for powering various systems due to their high energy-to-weight ratio. However, this high energy potential brings inherent risks,

primarily the risk of fire. Fires have resulted from mishandling lithium batteries, leading to loss of property and, in some cases, extensive damage to homes and workshops. A fire involving lithium batteries is extremely hot and can start other fires easily.

Safety Recommendations:

- Always store and charge the batteries in a fireproof container. Never keep them charged within devices.
- Conduct all charging and discharging activities in an area free from flammable materials. Monitor the process carefully; never leave it unattended.
- If a battery is damaged in any way—such as from a fall or collision—remove it to a safe location for at least 30 minutes. Damaged batteries can spontaneously ignite. Once confirmed safe, dispose of them according to the manufacturer's guidelines. Never try to charge or use damaged batteries.
- Use chargers specifically designed for lithium batteries. Using a charger designed for NiCad or other types of batteries can result in a fire. Make sure your charger settings are correct for your specific battery pack.
- Employ charging systems that can monitor the state of each individual cell in the battery pack. If a battery starts to swell, stop the charging process immediately and move the battery to a safe outdoor location.
- Do not leave batteries to charge or discharge unattended, especially overnight. This has been a common cause of severe fires.
- Do not assemble your own battery packs from individual cells. Mishandling during assembly can result in severe consequences, including fires and injury.
- By adhering to these guidelines, you reduce the risks associated with lithium battery use. Always put safety first.

Getting Started

To operate the Megacell Charger Professional **(MCC PRO)** you will need the following:

1. **The device**, which can be purchased from deepcyclepower.com
2. **A power supply** for the MCC PRO Hobby (plastic case version). The input voltage of **MCC PRO** is from 5 to 16V, giving you a wide range of power supplies you can choose from. To fully take advantage of the 4A per slot charging capabilities, you will need a power supply that can deliver 360 Watts or more. We recommend going with 12V 40A PSU for best results. The MCC PRO Commercial version comes with 12V 40A PSU already installed and you have the IEC C14 power connector.

3. **Wires**. We recommend keeping the wires short, especially if using 5V PSU, that will draw high current. The minimum voltage required for the device to run properly is 5.1V, make sure your wires are thick enough to not alow voltage drop under 5.1V during full charging process.

    MCC PRO Commercial comes with IEC C13 power cord included.
4.

Operating the MCC PRO Hobby version.

- Connect the power supply to megacell charger using proper wires. You can calculate your wire thickness required using this online tool: https://www.omnicalculator.com/physics/dc-wire-size

Source voltage	5.5 V ▾
Allowable voltage drop (V)	3 %
Conductor material	Copper ▾
Current (I)	60 A ▾
One-way distance (D)	0.5 m ▾
Maximum wire temperature	75 °C ▾

Recommended wire size per cable

Wire gauge	6 AWG
Wire cross-sectional area (A)	13.3 mm² ▾
Wire diameter (d)	4.115 mm ▾

These results are only a guide for informational purposes only. Always consult a qualified electrician before proceeding with any electrical installation.

Source voltage	12 V ▾
Allowable voltage drop (V)	3 %
Conductor material	Copper ▾
Current (I)	30 A ▾
One-way distance (D)	0.5 m ▾
Maximum wire temperature	75 °C ▾

Recommended wire size per cable

Wire gauge	10 AWG
Wire cross-sectional area (A)	5.26 mm² ▾
Wire diameter (d)	2.588 mm ▾

These results are only a guide for informational purposes only. Always consult a qualified electrician before proceeding with any electrical installation.

- **Power on the device.** The device will first try by default to a MCCRouter access point. If that AP is not present it will timeout and allow you to use the device.

- **Setting the wifi.** MCCRouter is the default access point set into the memory of MCC PRO. The default password if **MCCIsTheBest!** . An access point can be set on 2.4 Ghz WiFi network to match the **MCCRouter** name and the default password and megacell charger pro will automatically connect to that without any other settings.

- **Setting a custom wifi access point name and password.**
  If you wish to change the Access Point that Megacell Charger PRO connects to, you have to do the following steps:

  1. Long Press menu down button to enter the Main Menu
  2. Scroll to "Settings" tab and long press the "SEL" (Menu UP Button) to select the settings
  3. Go to Connectivity Menu > Start Config Portal
  4. Connect to the Acess Point the megacell charger created. The name of the AP should be: CellDoctor_XXXXXXX
  5. The default password of the AP is 1234567890
  6. After you connect to the AP, go the manage router page or type 192.168.4.1 in a web browser on the mobile phone or laptop you used to connect to the CellDoctor_ XXXXXXX AP.
  7. Go to Configure WiFi page and select the AP you want to connect Megacell Charger to
  8. Enter the SSID and Password of your router and make sure signal is above 70%. If signal is under 70%, you can have problems using the device and I recommend using a wired wifi repeater or bring your router closer to the megacell charger.

  For the entire procedure, you can watch the following video: https://youtu.be/x_J5dGbYa2w?t=44

- **Using the device in standalone mode.** If you don't want to connect the device to a wifi network and connect to a computer, you can disable the wifi from the Main Menu settings. You need to go to
  Main Menu > Settings > Connectivity > Wifi: Enabled and long press Menu Up button to change that option to "**Wifi: Disabled**". After this step is done, you must go to **Main Menu > Settings > Connectivity > Save** to make the setting permanent. Next time the device boots up, it will no longer try to connect to a wifi router and can use the device in standalone mode by pressing the menu buttons and triggering the wanted operations.

  For more details about stand-alone use, you can watch the following video:
  https://www.youtube.com/watch?v=0uIrQeyCPT4

Operating the device from the menu interface

While the most important feature of MCC PRO is the ability to connect to a computer network to gather data about cell testing and generate QR code labels for the cells, some users prefer using the device in standalone mode, without connecting it to a computer.

The following information can be used in both scenarios, connected to wifi or not. But if you are using Megacell Monitor software on a PC, I recommend setting the operations from the software.

MCC Pro Hobby and Commercial version uses a 2 button menu. They are called **"SEL" (Menu Up)** and **"Menu" (Menu down)** on the Commercial version of MCC. On hobby version, we will call those buttons, "Menu UP" and "Menu Down" buttons. The label on the plastic case for Menu UP is "Functions", Menu Down is the second button available on that device called "Reset" on some devices. The reset functionality of the button is no longer present and the misslabeling is due to the fact that cases were built and labeled already. In future versions, that will change to SEL and Menu.

The device has 1 main page that looks like Figure 1.

Figure 1

In the bottom left, you can find the graphic showin the status of slots. If no cell is detected, the icon for that slot will show like a broken link [icon]. When a cell is present, it will be represented by state of charge of a battery[icon].

From this main page, pressing „Menu down" button, will get you into main menu (Figure 2)

Figure 2

Inside main Menu, you can select "Operations", "Settings" and "<Exit" . The selection is done by Holding pressed "Menu Up" button. Short pressing either button, will allow you to navigate up and down to select the required option. Long pressing "Menu Down" button will exit from menu pages (exception on custom chemistry page).

Inside **Operations** you will find the available operation that can be performed on cells. These might change in the future, but the main operation that can be performed are the following:

- **Measure Capacity:** Selecting this option will enable the Mcap macro on the display which will perform a Charge, Discharge and store charge to each cell that's inserted.
- **Charge:** This operation will charge the cells to the required voltage set in Chemistry settings.
- **Discharge:** This operation will discharge the cells to the voltage set in Chemistry settings.
- **Store:** This operation will charge or discharge the cells to get them to the store voltage set in Chemistry settings.
- **Dispose:** This operation will discharge a cell until it reaches 1V.
- **Stop:** This operation will stop any process that's currently running on the device.
- <Back: This option is to exit the Operation menu

Inside **Settings** menu, you will find the following options:

- **Chemistry:** This is a sub-menu that contains entries with default chemistries and a Custom chemistry. Long pressing the "Menu Up" Button on either chemistry will apply that chemistry to all 16 slots.
- **Chemistry > Custom:** This option will allow you to change the following values:
  - Dchg Mode (Discharge Mode). This option allows you to change the method for discharging. CC (Constant Current), CV (Constant Voltage), CR (Constant Resistance). The default used is CC, but you can change this setting as you see fit for your testing procedure

  - Max V: This is the Max Voltage setting, this will set the max voltage for charging, has a range of 2.7V to 4.4V.

  - Min V: This is the Min Voltage setting, this sets the minim voltage for discharging, has a range of 1.5V to 4.2V.

  - Store V: This is the store voltage setting, has a range of 2V to 4.4V.

  - Max Cap: This option is for filtering bad cells. Set this value 20% larger than expected max capacity of cells you are testing. This will prevent infinitely charging a cell due to self discharging. Value is in mAh. 3Ah = 3000 mAh.

  - Chg Curr: This is Charging Current setting represented in mA. The range is 512 mA up to 4500 mA

  - PreChg curr: This is Pre-Charging Current setting. If a cell is under 2.8V, is declared as low voltage cell and it will perform pre-charging step with the set current, this has a range between 128 mA to 2048 mA.

  - TermChg Curr: This setting is Terminating Charging Current. If charging current goes under the set value, the charging will be considered as completed. The range of this setting is between 128 mA to 2048 mA. In case the charging completes but charging current was higher than set value + 35%, the status of charging will be set to **"Anormal Charged"**. If this happens frequent on the cells you are testing, you might want to change the charging voltage or termination current. A low value such as 128 mA for termination charging current can trigger Anormal Charged when charging with high current (**Chg Curr** above 1000 mA).

  - Dchg Curr: This setting is Discharging Current, the value goes between 100 mA up to 3000 mA. For MCC PRO Hobby, the recommended max Dchg Curr setting is 2000 mA due to limited cooling capabilities. If you are using a setting higher than 2000 on Hobby MCC PRO, device might be damaged and is no longer covered by warranty.

- **Dchg Res:** This setting is Discharging resistance. The range is between 1 to 10 ohms. The lower the resistance, the higher the discharge current is. This resistance is used when the discharge mode is set to CR (Constant Resistance).

- **Max Temp:** This setting is for setting the max temperature for charging / discharging cells. In case the cells go over this temperature, the process will stop and it will enter into a cool down state for 3 times. If the over temp happens more than 3 times, the cell will be marked as bad. The over temp can happen because the charging or discharging current is higher than what the cell is designed to handle or the cell is damaged and has a self-discharging flaw.

- **LV Max T:** This setting is Low Voltage Max Time in minutes. This is used to timeout a cell that's recovering from low voltage. This setting must be adjusted depending on the pre-charge current and cell capacity size.

- **Max Chg T:** This setting is Max Charging Time in minutes. It's used to timeout the charging process in case the charging process goes above this value. This must be adjusted depending on charging current setting and cell capacity.

- **Cycles:** During Measuring Capacity Operation, the cell can undergo multiple cycles if this setting is higher than the capacity of the cell displayed will be the one of the last cycle.

- **Apply:** This option will apply the custom chemistry to all the slots of Megacell Charger PRO. If you exit the menu without applying, the settings will not be saved.

- **<Back:** This will exit the custom chemistry menu.

Firmware Update Through OTA (Over the air)

From time to time we update the software running on the megacell charger device. For the PRO version, we have a new firmware that runs only on this device and firmwares should not be mixed from other versions as there was major changes made in the hardware.

To enable the OTA, you must go to:

Main Menu
Settings
Connectivity
OTA : Disabled
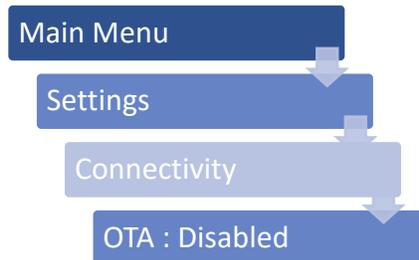
Default you will see that setting being **"Disabled".** Long pressing the Menu Up button will switch that to Enabled. After enabling this feature, scroll down and save the settings:

Main Menu
Settings
Connectivity
Save
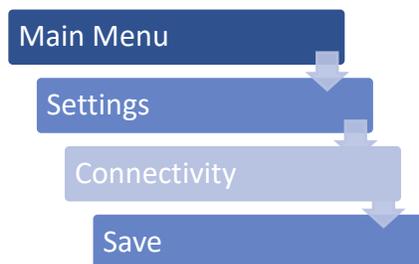
> **Note**
> • In order to use the OTA, previews wifi configuration step must be completed and you must know the IP address of the device

- Once OTA have been set to Enabled and settings were saved, you must reboot the device. You can do that from the **Main Menu > Settings > Hardware > Reboot** or by powering off the device then powering it back on.
- After device rebooted and is connected to wifi, go to **chargerip:8080/firmware** and use the **admin / admin** credentials.

  For example, if charger ip address is 192.168.1.40, you must type in your web browser **192.168.1.40:8080/firmware .** Double check your device ip and browser address if you encounter any issues.

  In case you get a page not found, check that your device is connected to wifi and IP address is aquired, also check that the OTA: Enabled was saved after reboot.

Megacell Charger Pro Warranty by DeepCycle-Power

The Megacell Charger Pro comes with a one-year warranty from the date of purchase, covering defects in materials and workmanship. This warranty does not apply to damage resulting from abuse, accidents, misuse, improper handling, failure to follow operating instructions, unauthorized alterations, or events like lightning and power surges.

If the product fails within the warranty period, you may return it to DeepCycle-Power at your expense for repair or replacement, at our discretion. The repaired or replaced unit will be covered for the remainder of the original warranty period and shipped back to you at our cost.

DeepCycle-Power will not be liable for any direct, indirect, incidental, or consequential damages, including but not limited to loss of time, data, property, revenue, or profit, even if we have been advised of the possibility of such damages.

This warranty provides you with specific legal rights. Any implied warranties, including those of merchantability or fitness for a particular purpose, are limited to the duration of this express warranty.

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