MH-C9000PRO

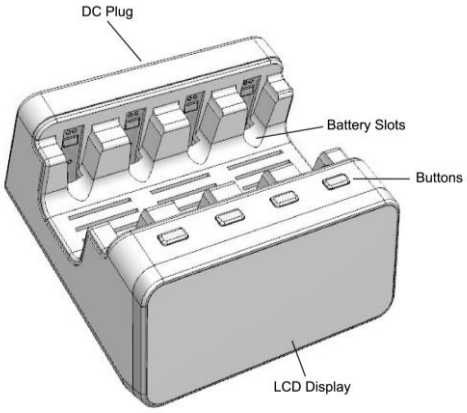
Professional Charger-Analyzer

Thank you for purchasing the Powerex MH-C9000PRO Professional Charger-Analyzer. Read these instructions carefully before operating this unit.

GENERAL PRECAUTIONS

- Do not charge battery cells other than NiMH or NiCD. Please check with the battery manufacturer to ensure it can accept the programmed charging and discharging rates.
- Do not expose the unit to rain or moisture due to the risk of fire.
- Do not operate the charger if it appears damaged in any way.
- Always place the battery cells with positive tip facing the top. Incorrect polarity may cause fire or explosion. Observe polarity diagrams located on the charger.
- Do not allow the unit to be exposed to direct sunlight. Operate in a well-ventilated area. Do not place unit on the carpet.
- Do not allow the battery terminals to become shorted.
- To reduce the risk of damage to the power cord, always pull by connector rather than the cord.
- Use only the supplied adapter or optional regional and car adapter offered by Maha Energy. Using third party accessories voids the product warranty.

FEATURES & SPECIFICATIONS



- Four independent slots for AA or AAA NiMH batteries.
- 4 Modes of Operation: *Charge*, *Break-In*, *Discharge*, and *Refresh & Analyze*.
- Memory Settings: Remembers the last settings that were used (Modes and Value) to make it easier to setup next time.
- Easy Setup: Set settings for 1 slot and apply same settings to all slots.
- Large Backlit LCD Display (with On/Off option).
- Digitally displays the Capacity, Voltage, Time, and Rate.
- 19 selectable charging rates from 0.2A to 2.0A.
- 10 selectable discharging rates from 0.1A to 1.0A.
- Worldwide power supply.
- Optional car adapter.

Charge Time:	1 Hour (2000mAh battery at 2000mA charge rate)
Charge Rate:	Programmable from 0.2A to 2.0A in increments of 0.1A
Discharge Rate:	Programmable from 0.1A to 1.0A in increments of 0.1A
Battery Conditioner:	Yes
Top-off Charging Rate:	100mA
Maintenance Charging Rate:	10mA
Discharge Termination:	Voltage 1.0V
Supported Capacity*:	100 to 4,000mAh
Charger Input Voltage:	DC: 12V 2.0A
Power Supply Input:	AC: 100-240V 50/60Hz
Charger Size:	4.25” x 4.25” x 2” (LWH)

** Always ensure that the batteries can accept the programmed rates.*

GENERAL BATTERY EDUCATION

Choosing the Right Charge & Discharge Rate

Charging at a rate below 30% of the battery capacity and above 100% of the battery capacity is not recommended.

Charging too slow may prevent the charger from terminating correctly. Charging too fast may overheat and damage the battery.

Typically speaking, a slower charge rate will yield better battery performance but requires longer time. A faster charge rate may not charge as fully and battery temperature can be higher.

As for the Discharge rate, do not exceed 100% of the battery capacity. Select a Discharge rate that is similar to your application.

AAA Batteries:

Battery Capacity (mAh)	Charge Rate (mA)	Discharge Rate (mA)
700	300	100
800	400	200
900	400	200
1000	500	200
1100	500	200
1200	600	300

AA Batteries:

Battery Capacity (mAh)	Charge Rate (mA)	Discharge Rate (mA)
1800	900	400
2200	1100	500
2400	1200	600
2600	1300	600
2700	1300	600

Battery Matching

In most devices, usually two or more batteries are used together. When batteries are used in a series, the performance is limited by the worst one. In other words, one poorly performing battery can significantly reduce the device runtime.

Battery matching refers to grouping batteries with similar “actual” capacity. To perform this, use the Refresh & Analyze mode to determine the battery capacity. Group the batteries with capacity within about +/- 5% of the rated capacity.

Battery “Forming”

New batteries and those stored for an extended period become chemically deactivated. Battery forming is a charge-discharge-charge cycle which forces a full charge into the battery at a very slow rate. This process activates the battery. In certain cases, it needs to be repeated two or three times.

Battery forming can be performed using the Break-In mode.

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4 MODES OF OPERATION

This section describes the various modes and when to use them. To enable each mode, refer to the "**Operation**" section.

MODE	WHEN TO USE
Charge	To charge or to add energy to batteries.
Break-In	To active batteries that have been in storage for an extended time (longer than 6 months).
Discharge	To discharge or remove all energy from batteries.
Refresh & Analyze	To analyze battery for its available capacity. Used to determine the health of the battery based on the actual amount of capacity it can hold. Also used for batteries not performing well.

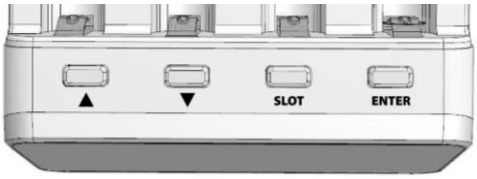
GETTING STARTED

1. Make sure there are no batteries inserted into the charger prior to connecting the power. Connect the power adapter DC connector to the charger.

   Plug the power adapter into a compatible outlet.

   TIP: When operating the charger outside of its intended region of use, simply use a plug-adapter. A voltage transformer is not required.

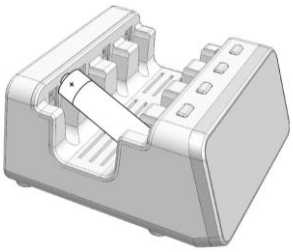
2. Use the buttons to make selections.



   - Use the **UP** and **DOWN** arrow buttons ▲▼ to choose the desired Mode.
   - Use the **SLOT** button to go to the desired battery slot.
   - Press the **ENTER** button to make a selection.

3. Insert a AA or AAA battery in Slot 1.

   Note: Insert the **Negative (-)** end first for AA and AAA batteries as shown below.

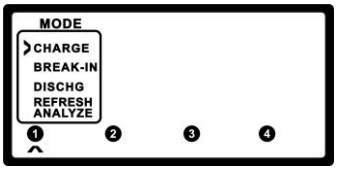


Inserting AA / AAA Batteries

   NOTE: It is normal for the batteries to become hot during charging and discharging. It is also normal for a faint noise to emanate from the charger during operation.

4. If no batteries are inserted during the startup, the charger will go into standby mode with the screen turned off.

5. When a battery is inserted, the LCD will display an arrow below the slot number and prompt for the mode by flashing "**MODE**."

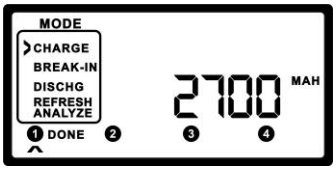


   Use the **UP** and **DOWN** arrow buttons to choose the desired mode. Press the "**ENTER**" button to make the selection.

   If no button is pressed within 10 seconds, the charger will proceed to the last used setting.

   If more than one battery is inserted at a time (without the button pressed), the charger will prompt for programming in the order in which the batteries were inserted.

6. When the programmed mode for a slot is completed, "**DONE**" will be displayed to the right of the slot number.



   The data will be stored as long as the battery is inserted in the charger. It will be lost upon removal of the battery.

Additional Selections:

- **To Turn On/Off Backlight Screen:**
  - **Default Light:** The screen will remain lit for 15 seconds from your last button press and then it will **Turn Off**. It will automatically turn back On once any button is pressed.
  - **Permanently Turn On Backlight:** Press the **UP** and **DOWN** Arrow Buttons ▲▼ at the same time for 2 seconds.
  - **To Go Back to Default Light:** Press the **UP** and **DOWN** Arrow Buttons ▲▼ at the same time for 2 seconds.

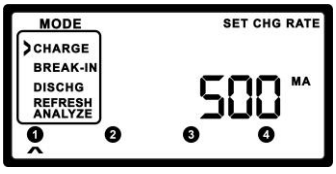
OPERATION

Charge Mode

- Charges the battery at the selected rate. Refer to the "**General Battery Education**" section (*page 1*) on choosing an appropriate rate.
- Useful when battery needs to be recharged without determining the capacity of the battery. It should be used on batteries known to be in good condition and have been in continuous use.

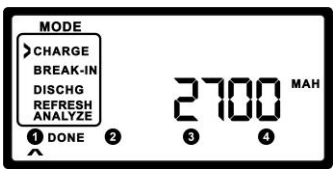
To use **CHARGE** Mode:

1. Insert a battery into Slot 1 of the charger.
2. Use the **UP** and **DOWN** arrow buttons to go to the '**Charge**' Mode and press the "**ENTER**" button to select the mode.
3. The charger will prompt for the charge rate by flashing "**SET CHG RATE**." Use the **UP** and **DOWN** arrow buttons to select the desired charge rate. Press **ENTER** to make the selection. (*Note*: If you would like to apply the same function and settings to the rest of the slots, **Press AND Hold** the **ENTER** button for 2 seconds instead of only pressing ENTER).



During the Charge Mode, the batteries are being charged.

Once the Charge Mode has finished charging the batteries, "**DONE**" will be displayed next to the slot number that is done. The charger will display the accumulated energy that is put into the battery, NOT the Available Capacity of the battery.

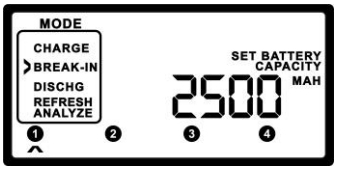


Break-In Mode (IEC Capacity Analysis)

- Applies a 16-hour 0.1C charge (0.1 times the capacity of the battery), rest of one hour, followed by a 0.2C discharge, rest again, and finally a 16-hour 0.1C recharge again.
- This process is also known as “Battery Forming.” Recommended with batteries that cannot be rescued by the Refresh & Analyze mode.
- Requires 39 to 45 hours to complete.
- The process follows the IEC standard for determining battery capacity.
- **The Discharge Mode must be done first before using the Break-In Mode.**

To use **BREAK-IN** Mode:

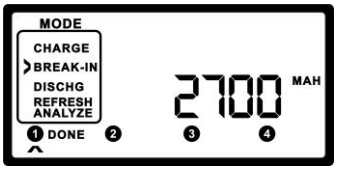
1. Insert a battery into Slot 1 of the charger.
2. Use the **UP** and **DOWN** arrow buttons to go to the ‘**Break-In**’ Mode and press the “**ENTER**” button to select the mode.
3. The charger will prompt for the battery capacity in order to calculate the charge and discharge rates automatically. The **“SET BATTERY CAPACITY**” will flash. Use the **UP** and **DOWN** arrow buttons to choose the capacity presented on the battery label. Press **ENTER** to make the selection. (*Note*: If you would like to apply the same function and settings to the rest of the slots, **Press AND Hold** the **ENTER** button for 2 seconds instead of only pressing ENTER).



The Break-In Mode will perform the following steps:

- Charge then Rest for 1 hour
- Discharge then Rest for 1 hour
- Charge until fully charged

Once the Break-In Mode has finished breaking in the batteries, “**DONE**” will be displayed next to the slot number that is done. The charger will display the Available Capacity of the battery.

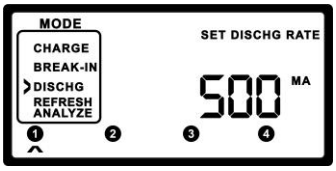


Discharge Mode

- Discharges the battery at the selected rate. Refer to the “**General Battery Education**” section *(page 1)* on choosing an appropriate rate.
- Useful for analyzing the amount of charge stored in the battery prior to using the Discharge mode. Battery not recharged at the end of the cycle.

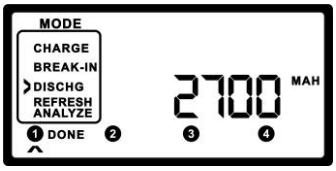
To use **DISCHARGE** Mode:

1. Insert a battery into Slot 1 of the charger.
2. Use the **UP** and **DOWN** arrow buttons to go to the ‘**Discharge**’ Mode and press the “**ENTER**” button to select the mode.
3. The charger will prompt for the discharge rate by flashing **“SET DISCHG RATE**.” Use the **UP** and **DOWN** arrow buttons to choose the desired discharge rate. Press **ENTER** to make the selection. (*Note*: If you would like to apply the same function and settings to the rest of the slots, **Press AND Hold** the **ENTER** button for 2 seconds instead of only pressing ENTER).



During the Discharge Mode, the energy is being removed from the batteries.

Once the Charge Mode has finished discharging the batteries, “**DONE**” will be displayed next to the slot number that is done. The charger will display the accumulated energy that is removed from the battery, NOT the Available Capacity of the battery.

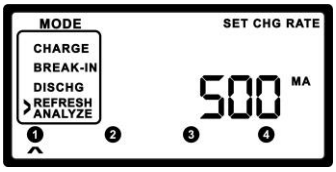


Refresh & Analyze Mode

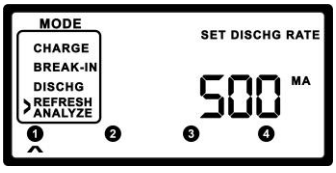
- Conditions and analyzes the batteries at the selected charge and discharge rates. Refer to the “**General Battery Education**” section *(page 1)* on choosing an appropriate rate.
- Reports the Available Capacity at the end of the cycle.
- Useful when the battery actual capacity needs to be determined. Also useful for battery with degraded performance.

To use **REFRESH & ANALYZE** Mode:

1. Insert a battery into Slot 1 of the charger.
2. Use the **UP** and **DOWN** arrow buttons to go to the ‘**Refresh & Analyze**’ Mode and press the “**ENTER**” button to select the mode.
3. The charger will prompt for the charge rate by flashing “**SET CHG RATE**.” Use the **UP** and **DOWN** arrow buttons to choose the desired charge rate. Press **ENTER** to make the selection.



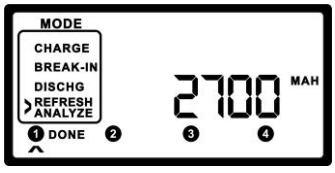
4. The charger will prompt for the discharge rate by flashing **“SET DISCHG RATE**.” Use the **UP** and **DOWN** arrow buttons to choose the desired discharge. Press **ENTER** to make the selection. (*Note*: If you would like to apply the same function and settings to the rest of the slots, **Press AND Hold** the **ENTER** button for 2 seconds instead of only pressing ENTER).



The process of the Refresh & Analyze Mode is as follows:

- Charge, then Rest for 1 hour
- Discharge, then Rest for 1 hour
- Charge until fully charged

Once the Refresh and Analyze Mode has finished analyzing and conditioning the batteries, “**DONE**” will be displayed next to the slot number that is done. The charger will display the available capacity of the battery.



TROUBLESHOOT

- = Caution! Batteries may be hot to touch.
  - Note which slot number has the flashing number and triangle (battery fault).
  - Unplug the charger.
  - Allow the batteries to cool down for 30 minutes before handling them.
  - Remove the faulty battery from the slot.

- To ensure safety, the charger performs a battery health "impedance check" at the beginning of the program. If the battery fails this test, "**HIGH**" would be displayed and program will be terminated.



Typically, alkaline and extremely aged batteries will fail this test. For a rechargeable battery, it is recommended for the battery to be discarded.

NOTE: This test is not performed for the discharge mode.

If this detection is believed to be incorrect, a discharge can be performed first.

Battery Rescue Steps

For batteries that do not perform favorably after using the mode recommended above, the following sequence can be applied.

1. Refresh & Analyze for one to three times.
2. If capacity is still low, use Break-In mode.
3. If steps 1 and 2 shows some capacity improvement (> 10%), repeat Break-In mode for one to three times. If no significant improvement is observed, the battery is probably at the end of useful life.
4. If the battery capacity is less than 60% of the rated capacity, it is recommended to recycle and replace the battery.

DISPLAYED INFORMATION

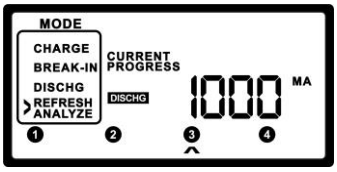
- When the programs are in-progress, the charger will display the battery status for each occupied slot consecutively. The screen will first show an arrow below the active slot and display the information. The next slot(s) occupied follows.

  Press the "**SLOT**" button at any time to jump to the next occupied slot. Press this button multiple times if necessary, to go to the desired slot.

  The following information is displayed on the screen:

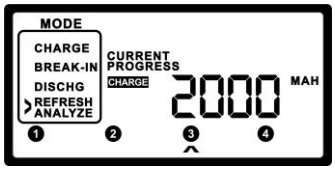
  Charge/Discharge Rate:

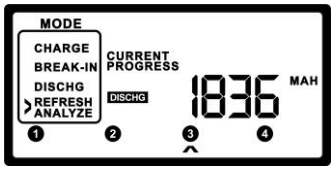
  This is the number followed by the unit "**MA**." This is the actual charging or discharging rate. Note that this number will go up and down slightly from selected rate due to the pulse charging.



Capacity:

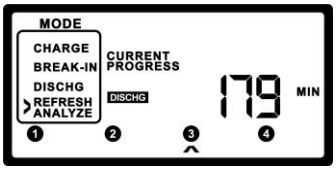
This is the number followed by the unit "**MAH**." This is the accumulated charging or discharging capacity. If it is accumulated charging capacity, "**CHARGE**" will be displayed in a black box. If it is discharging capacity, "**DISCHG**" will be displayed in a black box.





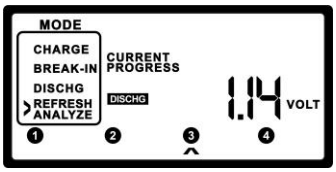
Time:

This is the number followed by the unit "**MIN**." This is the time elapsed for the particular routine such as charging, discharging, or rest in the program.



Voltage:

This is the number followed by the unit "**VOLT**." It represents the battery voltage. If you compare this with a voltmeter while charging, the values will not match as a voltmeter is unable to measure the battery voltage during charging or discharging.



At any given time during the program, the charger will either be charging, discharging or resting. The LCD displays the action in black boxes containing **CHARGE**, **DISCHG**, or **REST**.

WARRANTY

The MH-C9000PRO Professional Charger-Analyzer has a **3-Year Limited Warranty.**

See website, ***www.mahaenergy.com***, for more details. To obtain warranty service, contact Maha Energy Corporation Service Department at ***1-800-376-9992***. When returning the unit for warranty service, the product owner must obtain a return merchandise authorization number from a service representative.

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