



MH-C9000 Charger Analyzer FAQ

Basic Operations

- What are the recommended charging and discharging current for my battery?

The recommended charging current is 0.5C, or 0.5 times the battery capacity. The recommended discharging current is 0.25C, or 0.25C times the battery capacity. Here are some settings for common batteries:

2700mAh Charge: 1300mA Discharge: 700mA
2650mAh Charge: 1300mA Discharge: 700mA
2500mAh Charge: 1200mA Discharge: 600mA
2300mAh Charge: 1100mA Discharge: 600mA
2200mAh Charge: 1100mA Discharge: 600mA
2100mAh Charge: 1000mA Discharge: 500mA
2000mAh Charge: 1000mA Discharge: 500mA
1000mAh Charge: 500mA Discharge: 200mA
900mAh Charge: 400mA Discharge: 200mA
850mAh Charge: 400mA Discharge: 200mA

- Is there a way to charge batteries without pressing buttons?

Yes! The charger defaults to CHARGING mode at 1A if no button is pressed 10 seconds after inserting the batteries. This is the default auto charging mode and does not require you to program the charger.

- My brand new Powerex batteries are showing a lower capacity than the label in the MH-C9000? Should I return these batteries?

When tested using the REFRESH/ANALYZE mode, the capacity will be lower than the capacity indicated on the battery. To obtain a capacity that is closest to the rated capacity, use the BREAK-IN mode, which is similar to the process used by manufacturers to test and rate the batteries.

Furthermore, most batteries have a typical and minimum capacity. The Powerex 2700mAh batteries, for instance, has a 2700mAh typical capacity and a 2500mAh minimum capacity. Therefore, a Powerex 2700mAh that tests to be higher than 2500mAh using the BREAK-IN mode is considered within specification.

- The charger only allows capacity (in the BREAK-IN mode) to be entered in increments of 100 mAh. My battery is 2650 mAh. How do I enter that capacity?

Simply round up to the next capacity. For 2650 mAh battery, use 2700mAh capacity.

- Can I leave batteries in the charger? Does the charger keep the batteries topped off?

Upon completing the charge, the MH-C9000 goes to a very slow charge current (less than 10 mA) to keep the battery topped off. This "trickle charge" stops only when the batteries are removed. It is okay to keep the batteries in the charger as the batteries will always be ready for use. However, exercise common sense when keeping appliances constantly plugged in the wall.

- Using the BREAK-IN mode, I am seeing a charging capacity much higher than the capacity I programmed. Why is the battery overcharged?

When using the BREAK-IN mode, the charger puts in 1.6 times the capacity of the battery (entered at the start of the charge). This does not cause any harm to the battery as the charging rate is very low (only 10% of the battery capacity). The increased total charging capacity compensates for energy lost as heat. This is the charging scheme recommended by International Electrotechnical Commission (IEC).

- I am charging some older batteries and see that the charging capacity is much higher than the capacity I programmed. Why doesn't the charger terminate correctly?

The charger terminates by voltage and by temperature simultaneously. For certain older (and low quality) batteries, they do not produce the proper negative delta V signal (a small voltage drop at the conclusion of the charge) needed for the charger to stop. At the same time, the battery temperature failed to reach the termination limit as the charging rate was probably too low. To address this issue, you should attempt to perform a BREAK-IN mode on the batteries first. You should also use a higher charging rate.

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- When using higher charging current, the charging capacity seems to reduce. Is this normal?

When charging at higher current, the charge completeness reduces thereby lowering the charging capacity. This is to prevent battery overheating. This typically occurs at a rate greater than 1500mA. Generally speaking, 1000mA achieves nearly full charge completeness for AA batteries. Even after the charge ends (DONE appears on screen), the charger will apply a top-off charge and continuous maintenance charge. Despite that the capacity on the screen no longer increases, the batteries are being topped off. If you would like to achieve better charge completeness at higher currents, a small fan can be added to cool the batteries externally.

- Why is it not recommended to charge battery below 0.33C?

When charging below 0.33C (except in BREAK-IN) mode, the batteries may not produce a sufficient end-of-charge signal for the charger to terminate correctly. Although the temperature sensors will safeguard battery overheating, lower charging rate might not cause enough heating in the batteries to trip the sensors. If low charging rate is desired, you should use the BREAK-IN mode. Charging in that mode is terminated by only time (1.6 times battery capacity) and temperature.

- After the charge begins, why do I see an abnormally high voltage (~ 1.6V to 2.0V) on the screen?

In the first few seconds, the MH-C9000 performs a proprietary “high impedance” check to filter out batteries unsafe to charge including non-rechargeable batteries. During this time, a high current is applied and voltage measured to determine the impedance of the battery.

- Why doesn't the charging and discharging current reach the set values exactly? I thought the charger is supposed to be precise.

The charging and discharging current are pulsed, thereby causing the displayed current to go up and down. The capacity calculation is based on the actual current rather than the set current so capacity calculation remains accurate.

- I am using the CHARGE mode. Why is the capacity different than my battery capacity?

The capacity displayed in any charging process is called the “charging capacity.” This is the amount of energy put into the batteries. This number does not equal to the battery's capacity as it is dependent on the amount of charge already in the battery as well as the battery's internal resistance. For example, a half used 2000mAh battery may only show a charging capacity of 1000mAh since the battery is half full. It is normal for the charging capacity to exceed battery capacity by as much as 30% depending on battery brand and charging rate. To

determine the battery's useful capacity, you must look at a "discharge capacity." Such information is available in the REFRESH & ANALYZE, BREAK-IN, DISCHARGE, and CYCLE modes. Note that the battery is not recharged in the DISCHARGE mode.

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If charging or discharging is in-progress, a blackbox contain either CHARGE or DISCHG will be displayed on the screen. The capacity shown during charging is always the charging capacity. Similarly, the capacity shown during discharging is the discharging capacity. In the CHARGE mode, the final capacity displayed (after DONE appears) is the charging capacity. In the REFRESH & ANALYZE and BREAK-IN mode, the final capacity displayed is the discharging capacity. The battery have also been recharged after the discharge. In the DISCHARGE mode, the final capacity displayed is also the discharging capacity. However, the battery is not recharged. In the CYLCE mode, the capacities saved in memory always refer to the discharging capacity.

- There is an arrow that moves below the slot number. What does it mean?

The LCD screen displays information a slot at a time. The information (capacity, current, time, voltage) is displayed twice before moving on to the next slot. The arrow points to the slot reporting.

- Is it normal for the batteries to get warm during charging?

Yes, batteries do get warm during the charge due to both internal heat and heat produced by the charger. Lower charging rate can yield lower battery temperature, but it is not recommended to go below 0.33C or 0.33 times the battery capacity. Adding an external fan can also cool the battery.

- The manual makes recommendations for charging rates. How about discharging rate?

Most NiMH batteries can accept discharge rate up to 3 times its capacity. A higher discharge rate will yield lower capacity. For accurate capacity measurement, use the BREAK-IN mode which complies with IEC standards (0.2C discharge rate).

- Is the MH-C9000 compatible with the new "low self-discharge" batteries (e.g. Panasonic Eneloop)?

Yes. Follow the same charging rate recommendations for general NiMH batteries.

- What is the maximum capacity supported by the MH-C9000?

The maximum capacity supported (BREAK-IN mode) is 20,000mAh making it compatible with future technologies.

- The charger cannot detect my battery. What can be done?

Virtually all batteries can be detected by the charger. Therefore, if a battery cannot be detected, it is likely not making good contact with the charger. This can be caused by improper seating of the battery or battery not meeting the IEC dimension standard. Try rotating the battery or placing it in another slot.

- There is a faint noise emanating from the charger. Is this normal?

The charger can produce some high frequency hum, which is generated by the high frequency pulse charging and switchers.

- Why doesn't the charger show "DONE" instantly when I insert fully charged batteries?

The charger takes several minutes to detect whether or not a battery is fully charged. It is normal for the charger to put in a small amount of charge to fully charged batteries. Your unit may be faulty. Please contact Maha support for warranty services.

Advanced Operations

- I multiplied the charging time by the current. The resulting capacity is not the same as the capacity on the screen. Is the charger faulty?

No. The charging current displayed on the screen does not include a brief rest period (a fraction of a second every two seconds). Therefore, the actual charging current is about 90% of the displayed value. Discharging prior to BREAK-IN mode is optional. Overcharging during the BREAK-IN mode does not harm battery as the charging current is very slow.

- The MH-C9000 is showing "HIGH" error for my batteries, but it charges fine in other chargers. What can be done?

The MH-C9000 features a high impedance tester which can screen for defective/damaged battery. Most consumer chargers on the market does not have this feature, and therefore will allow charging batteries not may no longer

be suitable for use. Maha recommends that batteries triggering a "HIGH" error be disposed for safety reasons, as charging damaged batteries may result in overheating or explosions. However, if you feel the HIGH error is due to a false detection, try charging the battery first in another charger, or drain the battery first using the DISCHARGE mode on the MH-C9000. This is recommended only for advanced users.

- How does the MH-C9000 detect end-of-charge signals from the batteries?

The MH-C9000 uses a combination of Negative Delta V, Zero Delta V, Peak Voltage, time and temperature to determine the end-of-charge. In addition, proprietary algorithms are used.