

USER'S MANUAL

BATTERY CHARGER

Model BC162

No. CAT.BC16211Ce

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1. Features

The Battery Charger model BC162 is a specially designed battery charger and conditioner for the rechargeable battery pack model BN122C that is used in the Blood Collection Mixer CM735(A). The unit has two features;

- charging six battery packs same time, one pack with fast charging speed and five packs with standard charging speed
- thoroughly discharging a pack for refreshment of used batteries.

Charging feature

Although the Blood Collection Mixer machine provides two ways of battery charging - one is charging a pack with an internal charging circuit in the machine and the other is using a separate external charger unit, each one charges only one pack at a time and it takes about 10 hours to recharge a pack from exhausted level to full charging.

BC162 has six battery bays. The first one gives fast charging so a pack is charged in 3 hours, and the other five bays give standard charging so packs are charged in 10 hours.

Discharging feature

The battery pack BN122C consists of Nickel-Cadmium (Ni-Cad) battery cells. Ni-Cad cell has lots of prominent features such that it is rechargeable, durable, inexpensive and of high energy density per volume, therefore the cell is most widely used as a secondary battery. But unfortunately Ni-Cad cell has an adverse feature called 'memory effect'.

When a cell has been used for long time - statistically saying after being exposed to a few hundred cycles of recharging, power capacity of the cell decreases gradually by 'chemical memory' built up in the cell, then the cell does not supply a proper level of power.

An efficient remedy for capacity degradation at Ni-Cad cells is discharging it thoroughly. It has been found that a thorough discharging process clears the memory significantly, but not perfectly. Technical reports say, with a cycle of thorough discharging, power capacity of a degraded Ni-Cad cell will be recovered up to 80-90 percents level of previous state.

Discharging feature of BC162 does the good job. The # 1 bay can be used for this feature by simply pressing the start button. Discharging process takes about 2 hours for one cell. Fast charging cycle starts automatically when discharging cycle ends.

With this feature, available life time of battery packs can be prolonged several times.

Another battery charger unit available for BN122C battery packs is the Battery Charger model BC142. It has four bays that give standard charging only, without fast charging or discharging features.

2. Specifications

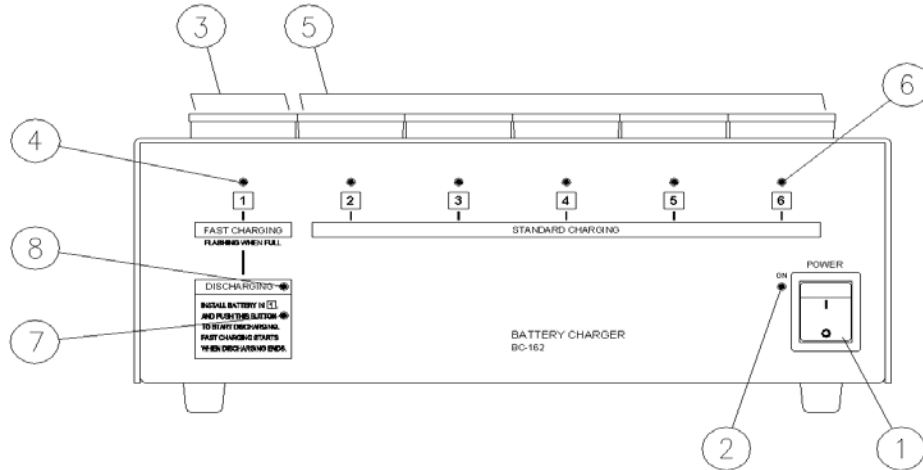
- a. Features :
- Fast charging of one BN122C battery pack
 - Standard charging of five BN122C battery packs
 - Discharging of one BN122C battery pack
- b. Bay configuration :
- Fast charging : at # 1 bay only
 - Standard charging : at # 2 - 6 bays
 - Discharging : at # 1 bay only
- (*) Discharging at # 1 and standard charging at # 2 - 6 bays can work same time.
- c. Initiation of operation :
- Fast charging : by inserting a pack in the bay
 - Standard charging : by inserting a pack in the bay
 - Discharging : by pressing a button after inserting a pack in the bay
- (*) Fast charging starts at # 1 bay automatically when discharging ends.
- d. Operating time :
- Fast charging : in approximately 3 hours
 - Standard charging : in approximately 10 hours
 - Discharging : in approximately 2 hours
- (*) Charging or discharging time varies depending on residual capacity in pack.
- e. Indication of LED lamps :

Function	Color	Location	Indication
Power	green	by switch	ON while power switch is turned on
Fast charging	green	on # 1 bay	ON during charging, flashing when ends
Standard charging	green	on # 2 - 6	ON while a pack is installed in the bay
Discharging	yellow	by button	ON during discharging, OFF when ends

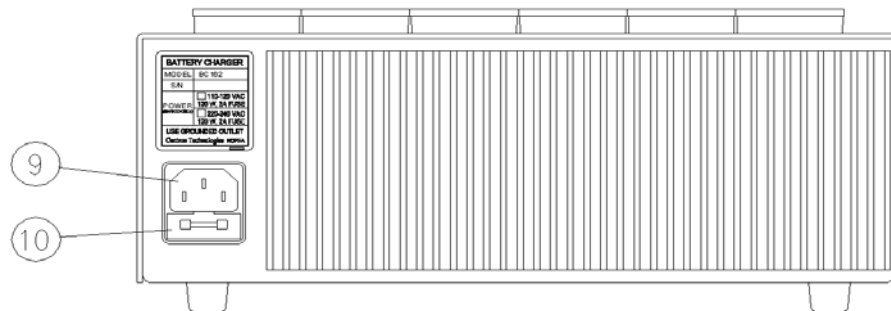
- d. Power source: 100-120 / 220-240 VAC, 50/60 Hz (automatic range selection)
- e. Maximum power consumption: 100 watts
- f. Dimensions: 275 mm W x 126 mm H x 200 mm L
(11.0" W x 5.0" H x 8.0" L)
- g. Weight: 6 Kg (13.2 lbs)
- h. Temperature characteristics:
- Operating 0 ~ 40 °C (32 ~ 104 °F)
 - Storage - 20 ~ 70 °C (- 4 ~ 158 °F)

3. Appearance and Functions

Front Panel



Rear Panel



- (1) Power switch
- (2) Power indication lamp
- (3) # 1 bay for fast charging & discharging
- (4) Fast charging indication lamp
- (5) # 2 - 6 bays for standard charging
- (6) Standard charging indication lamps
- (7) Discharging start button
- (8) Discharging indication lamp
- (9) AC power cord inlet
- (10) Fuse

Front Panel

- (1) Power switch : Power switch turns power on and off. Push '1' to turn it on.
- (2) Power indication lamp : The green LED turns on when power is on.
- (3) # 1 bay for fast charging & discharging : This bay is used for both fast charging and discharging. When a battery pack is installed in the bay, fast charging starts. After a pack being installed and then when the discharging start button is pushed, discharging starts. When discharging ends, fast charging starts automatically. When an empty pack is installed, fast charging ends after about three hours.
- (4) Fast charging indication lamp : The green LED turns on continuously during fast charging. When fast charging ends, the LED starts flashing.
- (5) # 2 - 6 bays for standard charging : These bays are used for standard charging. When a pack is installed in a bay, standard charging starts.
- (6) Standard charging indication lamps : The green LED at each bay turns on while a pack is installed in the bay. The lamp remains on every time and does not flash even when standard charging ends so the pack has got full charge. When an empty pack is installed, standard charging ends after about ten hours.
- (7) Discharging start button : This button switch is hidden in a hole on the front panel. After a pack being installed in # 1 bay and then when this button is pressed, discharging starts. When discharging ends, fast charging starts automatically. When a full charged pack is installed, discharging ends after about two hours.
- (8) Discharging indication lamp : The yellow LED turns on continuously during discharging, and turns off when discharging ends so the pack becomes empty.

Rear Panel

- (9) AC power cord inlet : A power cord is plugged in at this inlet.
- (10) Fuse : The fuse holder houses a 25-mm glass tube fuse in it.

4. Operating Procedures

Standard charging (at # 2 - 6 bays)

- (1) Turn on the power switch.
 - The green power indication lamp turns on.
- (2) Install battery packs in each bay. Every battery pack is symmetrical so that there is no direction of installation in each bay.
 - The green indication lamp at each bay turns on.
- (3) If an empty pack is installed, it takes about 10 hours to get full charge. Remove the pack in about 10 hours.
 - The lamp remains on always while a pack is in the bay. It does not flash even when standard charging ends so the pack has got full charge.
 - It will not damage the battery pack even if the pack keeps being charged over 10 hours.

Fast charging (at # 1 bay)

- (1) Turn on the power switch.
 - The green power indication lamp turns on.
- (2) Install a battery pack in # 1 bay.
 - The green indication lamp at # 1 bay turns on.
- (3) If an empty pack is installed, it takes about 3 hours to get full charge. When the pack gets full charge, fast charging cycle ends and the lamp starts flashing. When the green indication lamp flashes, remove the pack.
 - It will not damage the battery pack even if the pack remains in the bay for more hours.

Discharging (at # 1 bay)

- (1) Turn on the power switch.
 - The power indication lamp turns on.
- (2) Install a battery pack in # 1 bay.
 - The green lamp at # 1 bay turns on because fast charging has started.
- (3) Using a small rod, press the start button hidden in the hole. Discharging starts.
 - The green lamp at # 1 bay turns off, and the yellow lamp turns on.
 - If you want to stop discharging, just remove the pack out of the bay.
- (4) If a full charged pack is installed, it takes about 2 hours to get completely empty. When the pack becomes empty, the yellow lamp turns off. Remove the pack.
 - When discharging cycle ends, fast charging starts automatically. If you need to fast-charge the pack, leave the pack in bay for fast charging.

5. Making a decision on battery condition

Physics of thorough discharging

Although Ni-Cad battery, such as the battery pack BN122C, is rechargeable, the battery cannot be used forever but has a limited life. Battery manufacturers say that, under normal usage, expected life will be more or less a few hundred cycles of charging and discharging.

Current flow during charging and discharging gradually degrades electric characteristics of battery cell, and also 'chemical memory' is being accumulated in cell. Power capacity of a cell decreases gradually and 'effective terminal voltage' drops by memory.

'Effective terminal voltage' is the voltage at battery terminal with full loading. When the pack BN122C is new, effective terminal voltage should be not smaller than 12 volts. But the voltage of used pack decreases little by little by increasing amount of memory. A pack cannot be used anymore when the voltage drops to a certain level. This is the end of a battery pack.

Scientists have found that a thorough discharging process clears the memory significantly, so a degraded Ni-Cad cell will be recovered up to 80-90 percents level of previous state by a cycle of thorough discharging. The Battery Charger BC162 was designed with this principle. Discharging refreshes used battery hence prolongs overall battery life.

But level of each recovery is 80-90 percents. Therefore after the second discharging, power capacity level of the battery will be about 65-80 percents of a new one. It may depend on each battery, but after several discharging cycles, the battery will be finally too weak to be used in the Blood Collection Mixer machine. This is the end of a battery life.

How users can make a decision on battery pack

A new full charged BN122C pack can make the Blood Collection Mixer machine run for approximately 8 hours. When user feels that running time of a pack is obviously shorter than before, make the pack discharged in the Battery Charger BC162 to refresh it, and then fast charge it to full level. If running time of the pack is still too short to use, it means it is the real end of the pack. Discard the pack.

It will be seldom but sometimes a cell or a part of components in a battery pack can fail. If running time of a pack suddenly becomes short or unserviceable, it may mean the pack has got certain physical or chemical failure. Discharge it in the BC162 once and then fast charge it to full level again. If the pack is still bad, discard the pack.

If a pack has leakage of some fluid, discard the pack.

6. Maintenance

Keep all spring contacts in plastic bays clean. If rust is found, get the rust off.

When the fuse has to be replaced, remove the power cord and take fuse holder cover off. Use a proper fuse of same current rating.

Use a soft cloth and mild detergent to clean the equipment. DO NOT use paint thinner, benzene, solvent or strong detergent.

Other problems should be corrected by authorized service personnel. Contact your distributor or the manufacturer for service.