OPERATING INSTRUCTIONS

Model: BT-C3400 V3.1

Universal Battery Charger CE

Intended Use

The BT-C3400 charger is intended to charge and discharge NiMH, NiCd and Lithium Ion (Li-ion 3.7v nominal 4.2V max) chemistry rechargeable batteries only. It provides four independent battery charging slots. The charger can also test and optimize the maximum capacity of the rechargeable batteries. Each charging slot has its own display to show various information such as, charging/discharging current, battery voltage, charged capacity, discharged capacity, battery internal resistance and time.

The BT-C3400 charger can charge, discharge or test batteries of different type, different size, and different capacity at the same time. Each charging slot may be programmed with a different working mode and current parameters if desired. When charging is complete FULL is shown in the display for that battery channel.

Battery sizes:
NiMH/NiCd cell sizes: AAAA, AAA, AA, A, C and SubC.
Li-ion cell sizes: 10340, 10440, 14500, 14650, RCR123A (17340), 17500, 17670, 18350, 18500, 18650, 19670 (protected 18650), 25500, 26500, 26650.

This product fulfills European and national requirements related to electromagnetic compatibility (EMC). CE conformity has been verified and the relevant statements are available upon request.

Unauthorized conversion or modification of the charger is prohibited and voids the manufacturer's warranty. Any usage other than described above is not permitted and can damage the product and lead to associated risks such as short-circuit, fire, electric shock, etc. Please read the operating instructions thoroughly and keep them for future reference.

Safety Instructions ⚠

The manufacturer assumes no liability for damages to property or personal injury if the product has been abused, modified or damaged by improper use or failure to observe these operating instructions.

Product Safety

- The product must not be exposed to substantial mechanical strain or strong vibrations.
- Do not operate the charger if it appears damaged in any way.
- **The product must be protected against strong electromagnetic fields, static electrical fields, extreme temperatures, direct sunlight and moisture.**
- The manufacturer's instructions for the respective batteries must be observed. Ensure the batteries can accept the programmed charge and discharge rates before attempting operation.
- The product should not be connected immediately after it has been brought from an area of cold temperature to an area of warm temperature. Condensed water might cause damage. Wait until the product adapts to the new ambient temperature before use.
- The product is to be used only in an indoor dry environment.
- Sufficient ventilation must be provided when operating the charger. Never cover the ventilating slots of the charger. Ensure adequate ventilation for the batteries under charge. Do not place the unit on the carpet as this can block ventilation slots on the charger body. Operate only in a well ventilated area.

Battery Safety

- Correct polarity must be observed while inserting the batteries. Always insert the battery cells with the positive tip facing the top of the charger.
- **Non-rechargeable batteries, rechargeable alkaline batteries (RAM), alkaline batteries, lead acid batteries, lithium iron phosphate or other than Lithium Ion batteries must not be charged with this product. There is danger of fire or explosion!**
- Batteries should be removed from the device if it is not used for a long period of time to avoid damage through leaking. Leaking or damaged batteries might cause chemical burns when in contact with skin; therefore use suitable protective gloves to handle corrupted batteries.
- Batteries must be kept out of reach of children and pets.
- Batteries must not be dismantled, short circuited or thrown into fire. Never allow battery contacts to become shorted.
- Use only NiMH, NiCd or Lithium Ion rechargeable batteries. Never recharge non-rechargeable batteries due to risk of fire or explosion of the batteries.

Delivery Contents

Battery Charger BT-C3400	1pc
Wall Power Adapter PS	1pc
Operation Instructions	1pc

Power Supply

The wall power adapter included is the main power supply for this charger. Only approved power supplies may be used to power the BT-C3400 charger. The included power supply provides +12Vdc at 3.0A. It has a coaxial DC power plug, which inserts into the power jack on the rear of the charger main unit, of 5mm OD, 2.1mm ID with center positive. The charger may be operated from approved portable power adapters that supply the correct voltage and minimum current requirements.

Operation

Upon initial power application the firmware revision level is displayed in the left most digits of the display. After approximately one second all display segments are displayed for approximately four seconds. The “null” icon will then be shown for all channels until batteries are inserted. This indicates that all internal self-tests passed and the charger is ready for use.

Once a rechargeable battery is inserted, the battery instantaneous voltage will be displayed for 3 seconds. Mode CHARGE and current value 500 mA will be displayed for another 3 seconds. If no button is pressed during these 6 seconds, the charging process will start at the default value of 500 mA. Any button press during this 6 second time will cause the charger to wait for another 10 seconds before entering the working mode.

If no particular slot is selected by pressing the SLOT button, the MODE, DISPLAY and CURRENT buttons refers to all 4 slots simultaneously. Flashing channel display indicates selection of that channel. All four channel displays flashing indicates that MODE, DISPLAY and CURRENT buttons refer to all four channels simultaneously. The charger display backlight turns on after each key press and remains on for 30 seconds after the last key press.

MODE Selection

At least one rechargeable battery must be inserted in a channel in order to program the charger.

Press and hold the “MODE” button for 2 seconds to start working mode selection for selected slots. Press the MODE button subsequently at least one time to toggle among the working modes. Press the MODE button until the desired working mode is shown in the selected channels.

The working mode may be changed any time while a battery is in the charger by pressing and holding the MODE button for 2 seconds.

Working Modes:

CHARGE

DISCHARGE

DISCHARGE - REFRESH

CHARGE - TEST

QUICK TEST

CHARGE Mode:

In the CHARGE mode the rechargeable battery is charged up to its maximum capacity at the selected current. Charge termination or full charge is determined with a modified -dV (minus delta voltage) algorithm for NiMH and NiCd cells. Lithium ion cells are charged with a CC/CV (constant current / constant voltage) algorithm to cell voltage of 4.2V. The proprietary modified charge algorithm ensures that full charge is reached by the charger. Once full charge is detected the charger enters a maintenance charge process for NiMH and NiCd cells supplying minimum charge to the cell so that it remains at full capacity until ready to use. Once full charge is detected for lithium ion cells charge is terminated.

Note: When attempting to charge cells with high impedance, the charger will not reject the cells as with some other chargers. Instead the cell will be charged at a reduced current from the programmed setting. This will allow charging of high resistance cells so that they may be cycled to improve their capacity and internal resistance.

Charge Example: Insert battery into a slot. CHARGE will flash in that channel display. Press CURRENT button to select 200, 300, 500, 700, 1000, (1500 or 2000) mA for the charge rate. If CURRENT button is not pressed the current will automatically default to 500 mA.

DISCHARGE Mode:

In the DISCHARGE mode the rechargeable battery is discharged to a preset battery voltage (0.9V NiMH/NiCd or 3.1V Li-ion) then discharged is terminated. At discharge termination 0 mA current is displayed in that channel display. Press the DISPLAY button until the mAh label is shown to view discharged capacity measurement.

Discharge Example: Insert battery into a slot. Press MODE button until DISCHARGE is displayed in that channel. Press CURRENT button to select 200, 300, 500, or 700 for NiMH/NiCd (1000 for Li-ion) mA discharge rate. If CURRENT button is not pressed the discharge current will automatically default to 500 mA.

DISCHARGE - REFRESH Mode:

In the DISCHARGE-REFRESH mode the rechargeable battery is discharged then charged repeatedly to optimize to its maximum capacity. Old rechargeable batteries or rechargeable batteries that have not been used for a long period of time can be restored with this mode. Depending on the selected discharge and charge current, it can take tens of hours for completion.

Discharge-Refresh mode will make 3 complete discharge-charge working cycles. When the three discharge-charge cycles are complete FULL will be displayed in the channel display. The discharged capacity is stored at the end of each discharge cycle and can be displayed by pressing the display button until the mAh label is displayed. At the completion of the 3 discharge-charge cycles FULL will be shown in the display. Pressing the display button until mAh label is show displays the last value from the last discharged capacity measurement.

Discharge - Refresh Example: Insert battery into a slot. Press the MODE button until DISCHARGE - REFRESH is displayed in that channel. Press the current button for 200, 300, 500, 700, (1000 Li-ion) mA discharge rate. If the CURRENT button is not pressed the discharge current will automatically default to 500 mA.

CHARGE - TEST Mode:

The CHARGE-TEST mode tests the present capacity of a rechargeable battery. The maximum capacity is determined by first fully charging the battery, then discharging the battery while measuring discharge current and time. The battery is then charged to full. After completion of the CHARGE-TEST mode, tested battery capacity is displayed in mAh or AH alternating with the FULL indication.

Charge - Test Example: Insert battery into a slot. Press the MODE button until CHARGE - TEST is displayed in that channel. Press the CURRENT button to select 200, 300, 500, 700, 1000, (1500 or 2000) charge rate. If CURRENT button is not pressed the current will automatically default to 500 mA.

QUICK TEST Mode:

The charger will analyze the dynamic internal battery resistance by applying a load current and this current reading is referred to the voltage drop detected on the battery. Within 10 seconds the tested battery resistance will be displayed in the unit of milliohms (thousandths of an ohm). Only fully charged batteries should be tested for internal resistance. Please note that the internal battery resistance can be very small, and contact resistance can be a major factor; thus with the same battery tested in a different slot or even in the same slot with different contact conditions, measurements can vary by 20% or more.

Quick Test Example: Insert battery into a slot. Press the MODE button until QUICK TEST is displayed in that channel. This symbol will appear in that channel -- --. Wait for a number or numbers to appear in place of the symbol -- --; this may take 30 seconds or longer. This will be the battery internal resistance in milliohms. A reading of 55 represents 55 milliohms or 0.055 ohms.

CURRENT Selection

After the Mode is selected press the CURRENT button to toggle between available charge/discharge current selections. Default charge current is 500 mA. Available selections are 200 mA, 300 mA, 500 mA, 700mA, 1000 mA. If batteries are inserted in only slots 1 and 4 the charging current can be further selected to 1500 mA or 2000 mA for channels 1 or 4. If charge current is selected to 1500 mA or 2000 mA for channels 1 or 4 and batteries are then inserted into slots 2 and 3, the charge current in slots 1 or 4 will be reduced to 1000 mA maximum.

Default discharge current is 500 mA. Available current selections are 200 mA, 300 mA, 500 mA and 700 mA for NiMH or NiCd cells. Further 1000 mA may be selected for Li-ion cells.

DISPLAY Selection

LCD Display Backlight Control. Press and hold the DISPLAY button for more than 5 seconds to toggle the backlight mode.

To turn on the LCD Display Backlight press and hold the DISPLAY button for more than 5 seconds. The backlight will remain on continuously.

To return the LCD Display Backlight control to auto-off (backlight turns off after 30 seconds of no button press) press and hold the DISPLAY button for more than 5 seconds.

Press the DISPLAY button to toggle among the display parameters Voltage, Current, Capacity and Time.

- Charge/Discharge Current: the instantaneous current is displayed.
- Time Elapsed: The charging/discharging time of the last cycle is displayed.
- Accumulated Capacity: The accumulated charge or discharge capacity is displayed in mAh or Ah.
- Voltage: The instantaneous battery voltage is displayed.
- Quick Test: displays the measured internal battery resistance in milliohms.
- Full: Battery full charge detected. FULL will flash in the display when full charge is detected. After the rechargeable battery is fully charged maintenance charging will be started automatically for NiMH/NiCd batteries. Maintenance charging prevents the rechargeable batteries from being overcharged when left in the charger and compensates for self-discharging of the batteries. After Li-ion rechargeable battery is fully charged then charge is terminated.

SLOT Selection.

Pressing the SLOT button will start the slot selection process in the sequence; Slot 1, Slot 2, Slot 3, Slot 4, All 4 Slots, Exit. Flashing display segment indicates slot selection. If all four display slot segments are flashing, this indicates all four slots selected. Mode and Current selection will then be for the selected slots.

Temperature Monitoring

Battery temperature and charger internal temperature are monitored during operation. Control board temperature is maintained within operational limits with cooling fan control. When control board temperature exceeds 40 degrees Celsius the cooling fan is activated. Battery temperature of 60 degrees Celsius will cause charge operation to be suspended. During suspended operation due to temperature limit "0 mA" will be displayed in the LCD digital display.

Maintenance

The device is maintenance free but should be cleaned occasionally**. When cleaning, the device must be removed from any power source**. Only use dry and soft cloth to clean the housing of the charger. Do not use abrasive or solvents.

Repairs may only be performed by authorized repair stations. Any repair or modification not performed by an authorized repair station voids the manufacturer's warranty.

Disposal

Disposal of waste electrical and electronic equipment. In order to preserve, protect and improve the quality of environment, protect human health and utilize natural resources prudently and rationally, the user should return unserviceable product to relevant facilities in accordance with statutory regulations. The crossed-out wheeled bin indicates the product needs to be disposed separately and not as municipal waste.

Never dispose of batteries in a fire. Explosion and personal injury may result.

Used batteries and rechargeable batteries disposal. Regulations require proper disposal of rechargeable batteries. Disposing used batteries in the household waste is prohibited. Batteries containing hazardous substances are marked with the crossed-out wheeled bin. The symbol indicates that the product is forbidden to be disposed via the domestic refuse. Return used batteries to authorized recycling stations or used battery collection center.

Technical Data

Operating Voltage	12V DC	
Power Adapter	Input:	100~240V～, 50/60Hz
	Output:	12V DC, 3.0A max
Charging Current range	200 ~ 2000 mA	
Discharge Current range	200 ~ 1000 mA	
Max. Charging Capacity	20,000 mAh (20 Ah)	
Operating Temperature	0 to 40 ℃	

One Year Limited Warranty

Manufactured by: Opus Instruments Co. LTD

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