

Operating Instructions

e-STATION BC6DX

Microprocessor controlled high-performance rapid charger/discharger for NiCd/NiMH/Lithium/Pb batteries.

Dual input power(AC/DC), USB PC link, temperature sensor and integrated Lithium battery balancer

Firmware upgrading by USB / PC program via USB

Charge current up to 6A, discharge current up to 1A, 1 to 6 series of Lilo/LiPo/LiFe, 1 to 15 cells of NiCd/NiMH, 2 to 22V of Lead-acid (Pb)



● Special features

- Operating software

The operating program in this charger is executed with mutual links and communications with every component to prevent any possible error, so it introduces the maximum safety. Especially, the charging algorithm is so multifarious that you can select the best program to suit your requirement. The operating software can be upgraded through SUB when it is necessary, by executing upgrade program at PC. And BC6DX has a large LCD for showing various information including charge/discharge graphs during the process.

- Dual input power

BC6DX employs the circuit that can be operated at AC(Alternating Current) or DC(Direct Current) input power. For AC input, the charger contains a AC-DC switching power supplier inside, which has maximum output power of 60watts for charging. As a result, it can charge up to 15 cells of NiCd/NiMH and 6 series of Lithium batteries. There may be the limit of feeding current to a higher voltage of battery. Please refer 'Maximum circuit power chart'.

- Individual voltage balancer for Lithium batteries inside

BC6DX has an individual-cell-voltage balancer inside. So it does not need any balancer separately when charging Lithium batteries (Lilo/LiPo/LiFe) for individual voltage balancing.

- Monitor the individual voltages on discharge

BC6DX will monitor the individual voltages of the Lithium battery pack during discharge process as well as 'FAST' and 'STORAGE' mode. If the voltage of any one cell varies abnormally, the process will be stopped with the error message.

- Maximum safety

Delta-peak sensitivity : The automatic charge termination program works on the principle of the Delta-peak voltage detection. (NiCd/NiMH)

Auto-charge current limit : When charging NiCd or NiMH at 'AUTO' current mode, you can set the upper limit of charge current to avoid from feeding high current to the battery. This is very useful when charging the low impedance and small capacity NiMH battery in 'AUTO' mode.

Capacity limit : The charging capacity always calculated by multiple of the charging current and time. If the charging capacity exceeds the limit the process will be terminated automatically when you set the maximum value.

Temperature limit : The temperature of the battery on charging or discharging will be raised by its internal chemical reaction. If you set the limit of temperature the process will be expired forcibly when the limit has been reached.

Processing time limit : You can also restrain the maximum processing time to prevent any possible defect.

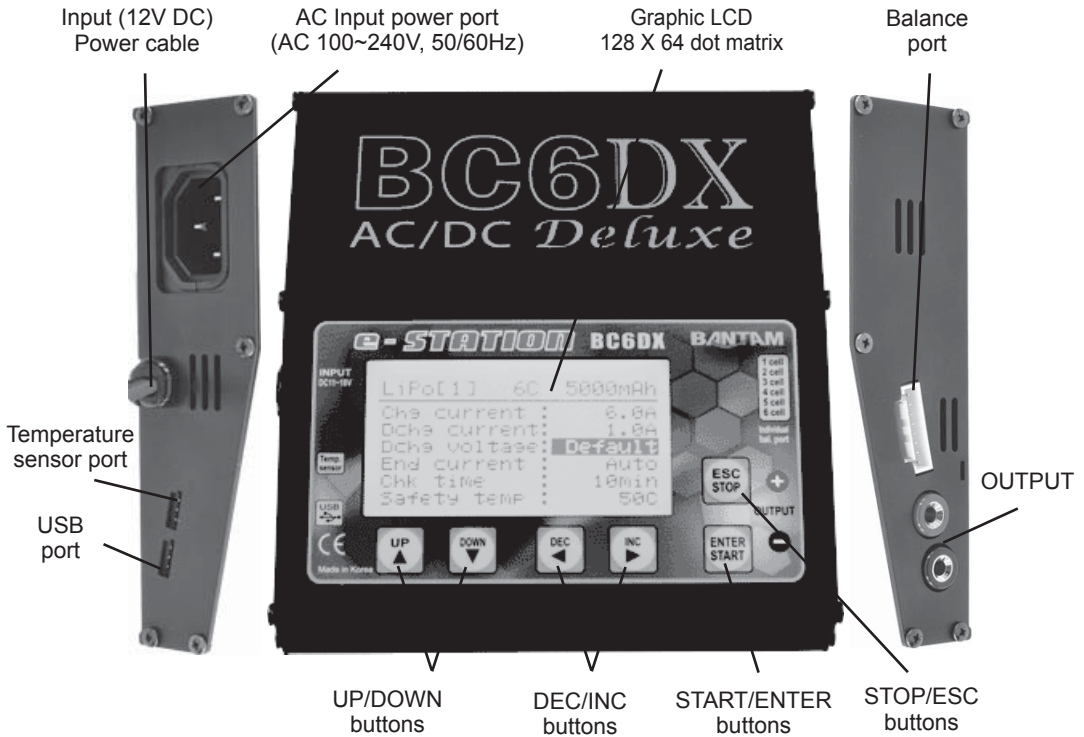
- Cyclic charging/discharging for NiMH/NiCd battery

Perform 1 to 10 cycles of charge>discharge or discharge>charge continually for battery refreshing and balancing.

- PC based analysis using USB communication/Firmware upgrading

For technical expert, BC6DX offers PC based program can analysis the characteristic of the battery via USB port. It shows a graph of voltage, current, capacity and temperature curves. It also shows the individual voltage of each cell in the Lithium battery pack. The firmware can be upgraded from internet download, when the newer version is released.

● Exterior of the charger



- 'UP' and 'DOWN' buttons

Navigate the cursor through the main menus vertically, and scroll the program set-up screen.

- 'DEC' and 'INC' buttons

Decrease or increase the parameter value or enter the program mode. And also, they navigate the cursor through the main menu horizontally. Switch the process data screen between graph, informations and individual cell voltages during charging or discharging.

- 'START/ENTER' button

Commence the program by pressing this button at the program set-up screen. Confirms the message.

- 'STOP/ESC' button

Suspend the program by pressing this button during the program is running. Deletes the error message. Returns to the previous screen.

- USB port*

Connect USB link cable to this port to link the charger to PC. It enables to activate the software to transfer the data to PC. And also, the firmware can be upgraded via USB from internet download.

- Temperature sensor port**

Connect the temperature sensor to this port to monitor the battery temperature.

* Optional USB cable set(part no. EAC400) is necessary to link the charger to PC. The software is free to download at our web page.

** The temperature sensor(part no. EAC110) is optional.

● Warnings and safety notes

- Never leave the charge unsupervised when it is connected to its power supply. If any malfunction is observed, terminate the process immediately and refer to the operating instructions.
- Keep away the unit from dust, damp, rain, heat direct sunshine and vibration. Do not drop it.
- The circuit of the unit is designed to be powered by a 12V DC like car battery or similar DC power supply, or 100~240V AC power selectively.
- The charger and the battery to charge or discharge should be set up on a head-resistant, non-inflammable and non-conductive surface. Never place them on a car seat, carpet or similar. Keep all the inflammable volatile materials well away from operating area.
- Be sure to understand the information of the battery to be charged or discharged accurately. If the program is set up incorrectly the battery can severely be damaged. Especially Lithium battery can cause a fire or an explosion by over-charging.

NiCd/NiMH voltage level: 1.2V/cell

allowable fast charge current: 1C ~ 2C depends on the performance of cell
discharge voltage cut off level: 0.85V/cell(NiCd), 1.0V/cell(NiMH)

Lilo

voltage level: 3.6V/cell

max. charge voltage: 4.1V/cell

allowable fast charge current: 1C or less

min. discharge voltage cut off level: 2.5V/cell or higher

LiPo

voltage level: 3.7V/cell

max. charge voltage: 4.2V/cell

allowable fast charge current: 1C or less

discharge voltage cut off level: 3.0V/cell or higher

LiFe

voltage level: 3.3V/cell

max. charge voltage: 3.6V/cell

allowable fast charge current: 4C or less (e.g. A123M1)

discharge voltage cut off level: 2.0V/cell or higher

Pb

voltage level: 2.0V/cell

(Lead-acid) max. charge voltage: 2.46V/cell

allowable fast charge current: 0.4C or less

discharge voltage cut off level: 1.75V/cell or higher

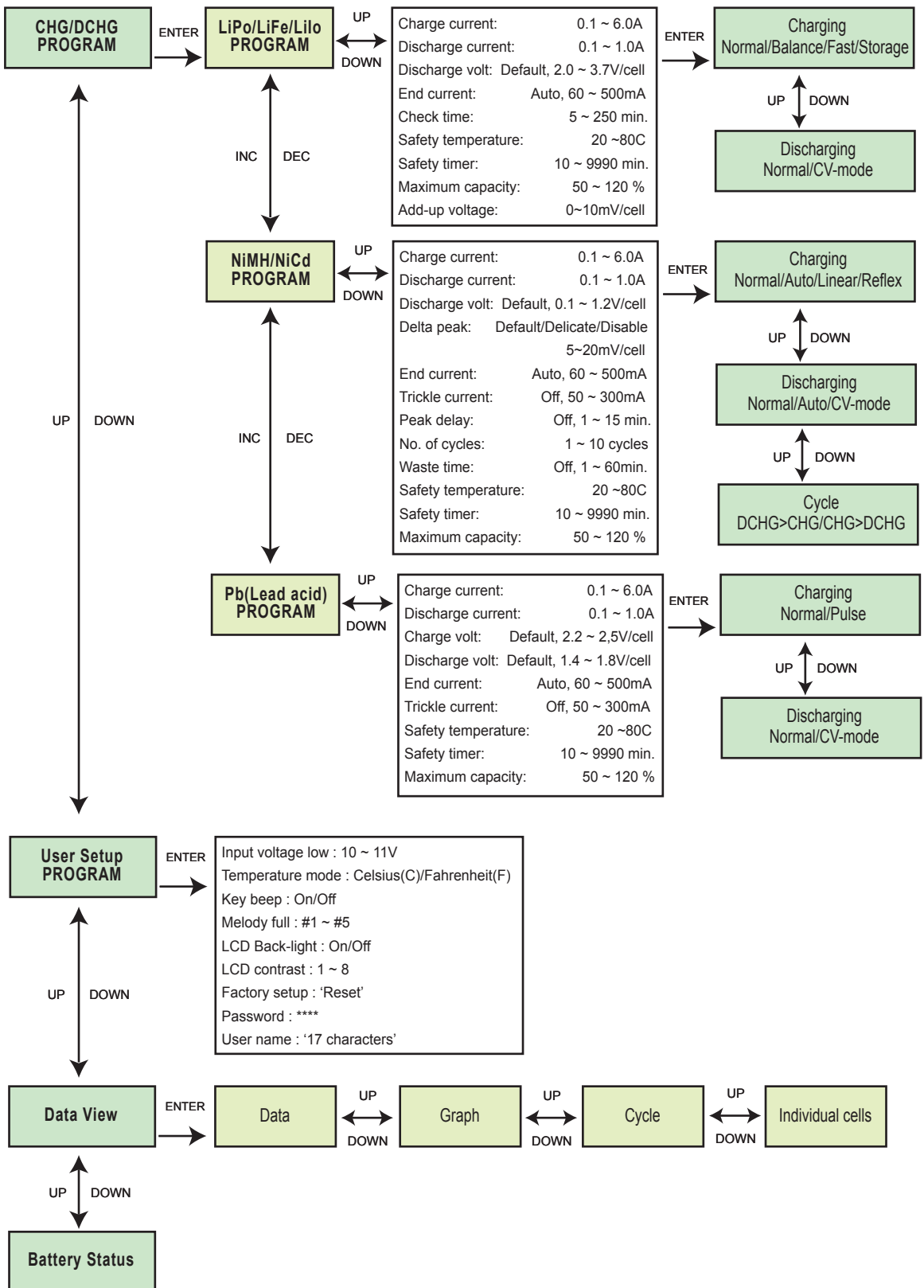
- To avoid short-circuits between the charge lead, always connect the charge cable to the unit first and only then to the battery to be charged or discharged. Reverse the sequence when disconnecting.

- Do not attempt to charge or discharge the following types of battery.
 - Battery pack, which consists of different types of cell (including different manufacturers).
 - Battery, which is already fully charged or just slightly discharged.
 - Non-rechargeable batteries (Explosion hazard).
 - Batteries that require a different charge technique from NiCd, NiMH, LiIo, LiPo, LiFe or Pb.
 - Faulty or damaged battery.
 - Battery fitted with an integral charge circuit or a protection circuit.
 - Batteries installed in a device, or which are electrically linked to other components.
 - Batteries that are not expressly stated by the manufacturer to be suitable for the currents the charger delivers during the charge process.

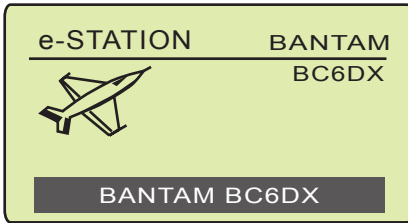
- Please bear in mind of checking the following point before charge operation.
 - Did you select the appropriate program, which are suitable for the type of battery?
 - Did you set up adequate current for charging or discharging?
 - Lithium battery pack can be composed with parallel and series circuits mixed. You have to check the composition of the battery pack carefully before charging.
 - Are all connections firm and safe, or is there an intermittent contact at any point in the circuit?

⚠ Those warnings and safety notes are particularly important. Please follow the instructions for a maximum safety; otherwise the charger and the battery can be damaged violently. And also it can cause a fire to injure a human body or to lose the property.

● Program flow chart



● The first display



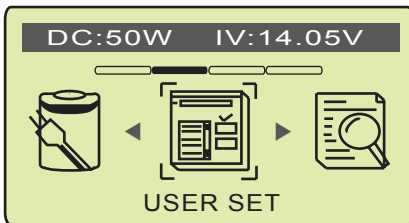
When you connect the crocodile clips which attached to the charger as an input power cable to a suitable 12V DC power source, or AC power cord to the wall socket, the start-up display appears. Thus the power-on process has been completed. The display shows the brand name and device name as well as user's name. The default display for user's name is 'BANTAM BC6DX', but you can revise it by your name at 'SETUP' program.

Press 'ENTER' to go for the main menu.

● Initial parameter set up

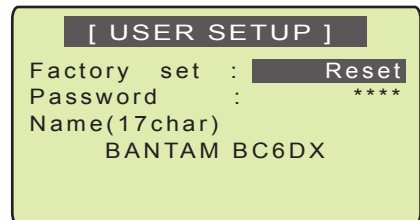
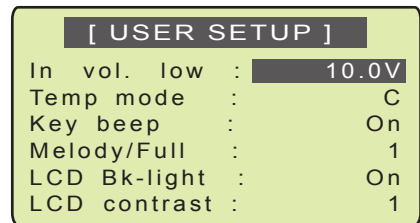
BC6DX will be operated with the default values of the initial settings which were done at the factory, when it is connected to a 12V DC battery or any similar input power source for the first time. The user can set these values at his/her own requirements. These setup data will be commonly applied through all programs.

Select 'USER SET' program by pressing 'UP' or 'DOWN' button, then press 'ENTER'.



START
ENTER

→



- **In vol. low** : This program monitors the voltage of input battery. If the voltage drops below the value you set the operation forcibly terminated to protect the input battery. (DC input power only, 10.0 ~ 11.0V DC)

- **Temp mode** : Choice of temperature mode. (C, Celsius or F, Fahrenheit)

- **Key beep** : The beep sounds at every time pressing the buttons to confirm your action.

- **Melody/Full** : Select the melody sound at the time when the process is finished. These audible sounds can be on or off.

- **LCD BK-Light** : LCD back-light can be on and off.

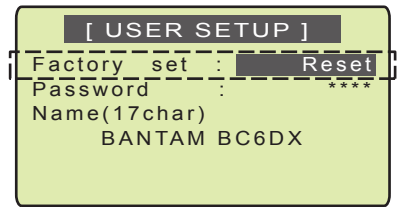
- **LCD contrast** : You can adjust the brightness of LCD screen, when 'LCD Light' is on.

- **Factory setup** : Restore all values to the default which was done at our factory. To do this, you need to enter the password. The way of entering the password is described on 'Password' mode at next step. When you perform this program successfully, all the data will return to their default values including the password('0000'). It will take several seconds to initialize the data.

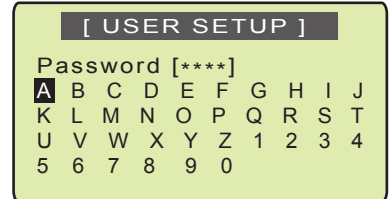
- **Password** : You can set your own 4-digit password. It has been set on '0000'-all zeros, at the factory. Or, you can change the password to new one. The password can be any combination of 4-digits within those alphanumeric characters. Locate the black mark to the desired character by pressing 'INC' or 'DEC' button then press 'DOWN' button for next digit input. For going back the digit, press 'UP' button.

First, input old password, then type new password.

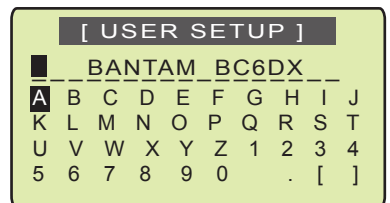
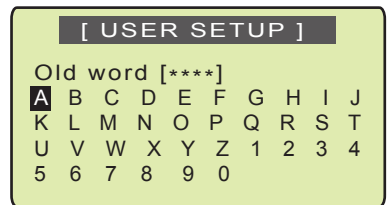
- **Name** : The charger shows the user name at the first screen at power-on. You can set your name of maximum 17 alpha-numeric characters. When you enter the mode, the charger will ask you the password. You need to input the password to change the name. The user name can be entered using exactly the same procedure as described on 'Password' program.



START
ENTER

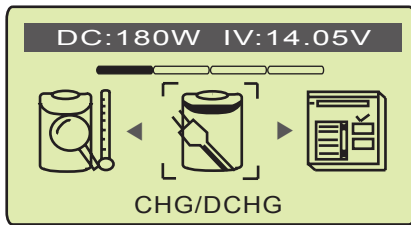


UP DOWN



! If you forgot the password, you can not reset the charger to factory default, and also you can not amend the user name again. The charger should be returned to our factory to revive the password.

● Lithium battery (Lilo/LiPo/LiFe) program



START
ENTER

| | | |
|----------------|---------|---------|
| LiPo [0] | 1C | 5000mAh |
| Chg current : | 0.1A | |
| Dchg current : | 0.1A | |
| Dchg voltage : | Default | |
| End current : | Auto | |
| Chk time : | 10min | |
| Safety temp : | 50C | |

These programs are only suitable for charging and discharging Lithium batteries with a nominal voltage of 3.3V, 3.6V or 3.7V per cell. These batteries need to adopt different charge technique is termed constant voltage(CV) and constant current (CC) method. The charge current varies according to the battery capacity and performance. The final voltage of charge process is also very important, it should be exactly matched with the charged voltage of the battery. They are 4.2V for LiPo, 4.1V for Lilo and 3.6V for LiFe. The charge current and nominal voltage as for cell-count set on the charge program must always be matched with the battery being charged.

Select 'CHG/DCHG' program at main menu by pressing 'UP' or 'DOWN' button, and press 'ENTER' to go for the program.

Parameter set-up for Lithium battery (Lilo/LiPo/LiFe)

| | | |
|------------|-----------|---------|
| LiPo [1] | 1C | 5000mAh |
| LiPo | current : | 0.1A |
| LiFe | current : | 0.1A |
| Lilo | voltage : | Default |
| NiMH | current : | Auto |
| NiCd | time : | 10min |
| Pb | temp : | 50C |

You can choose the type of battery to be charged or discharged at the first section. Select LiPo, LiFe or Lilo according to your battery. And then, select the data number which will newly set up, or load the data number already set up for re-use. If you have the set-up data which had been performed successfully before, you can just start the process after loading the data number. All setup data will be stored at charger's memory automatically after setting them all.

| | | |
|----------------|---------|---------|
| LiPo [1] | 1C | 5000mAh |
| Chg current : | 0.1A | |
| Dchg current : | 0.1A | |
| Dchg voltage : | Default | |
| End current : | Auto | |
| Chk time : | 10min | |
| Safety temp : | 50C | |

Input the cell-count and capacity of the battery will be charged at the top line of menu. The cell-count and capacity need to be matched with the battery.

Use 'UP' or 'DOWN' button to scroll up and down the menu, and change the value by using 'INC' or 'DEC' button.

To start the process, press and hold 'ENTER' button for more than 3 seconds regardless of cursor position.

- **Chg current:** Set the charge current. (0.1 ~ 6.0A)

- **Dchg current:** Set the discharge current. The value may not exceed 1C for a maximum safety. (0.1 ~ 1.0A)

- **Dchg voltage:** Set the final voltage per cell at the end of discharge. The final voltage should not be under the voltage level that is recommended by the battery manufacturer to avoid deep discharging. The default values are 3.00V/cell(LiPo/Lilo) and 2.00V/cell(LiFe).

- **End current:** Set the final charging current at termination. **The end current should be less than the initial charge current.** (Auto, 60~500mA)

Auto; The process will be terminated when the charging current go to 1/10 of its initial value. Otherwise, the charge current will be decreased until the designated value has been reached.

- **Chk time:** BC6DX recognizes the cell-count of Lithium battery automatically. But the battery which has been discharged deeply can be perceived the cell-count incorrectly. The charger will work on the cell-count anyway during the check time. But if the charger finds the wrong cell-count at the end of check time, the process will be terminated with an error message. To prevent the error, you can set the time term to verify the cell-count by the charger. Normally, 10 minutes are enough to perceive the cell-count correctly. For the battery of larger capacity, you may extend the time term. (5 ~ 250 min.)

- **Add-up voltage:** The voltage for CV term can be extended by 0 to 10mV per cell. If the cell is fully charged at lower than its full level of voltage, you can add some voltages to fill it up more.

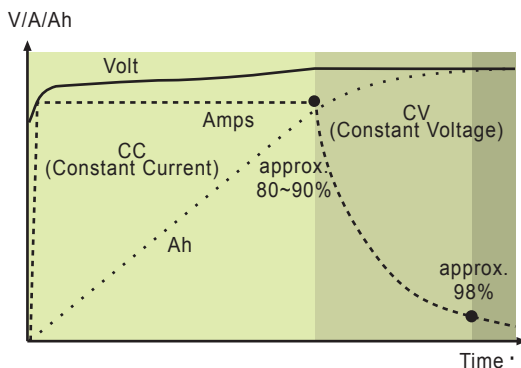
Safety programs for all types of battery

- **Safety temp:** This is a feature using temperature probe contacting the surface of battery. The charger can monitor the temperature of battery being charged or discharged. The recommended maximum values are 45~55C(113~130F) for NiCd, 43~52C(110~125F) for NiMH and 32~35C(90~95F) for Lixx. Once the battery reaches this temperature during the process, the program will be terminated to protect the battery. If the battery reaches the temperature during discharge, the discharge process will temporarily pause to allow the battery to cool down to a safe temperature. The discharge process will automatically resume when the battery's temperature drops about 4°C below the maximum temperature setting. Set the maximum temperature at which the charger should allow the battery to reach during charge or discharge process. (20 ~ 80C)

- **Safety timer:** When you start a charge process, the integral safety timer automatically starts running. This is programmed to prevent over-charging or deep-discharging the battery, if the charger or battery is proved to be fault, or if the termination circuit cannot detect the full-charging. The value for the safety timer should be generous enough to allow the full-charging. (10 ~ 1380 min.)

- **Max capacity:** You can define the maximum capacity which can be charged or discharged by the form of a percentage of battery capacity set in the top of display. If full-charge has not been detected for any reason, the charger limits the quantity of feeding energy by the value and terminates the process as on the value is reached. This is a safety feature programmed to protect the battery from over-charging or deep-discharging condition. (50 ~ 120%)

CC/CV charging process for Lixx and Pb(Lead-acid)



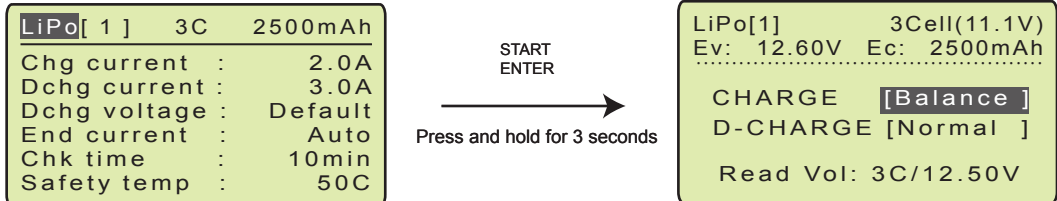
These batteries need to adopt different charge technique which is termed constant current(CC) and constant voltage(CV) method. As the process starts, the CC phase will be committed first, in which the charging current is maintained at a constant level until the battery reaches their final charge voltage. And then, the CV phase will be initiated, in which the voltage is maintained at a constant level. At this point the battery already has been charged about 80~90% full. The charging current will start to decrease until it reached its 1/10 of starting amount. When the charging current reaches 1/10 of initial amount, the charger will stop the charging process. The battery is virtually fully charged at this point.

Select program and start the process

After setting up all parameters, press and hold 'ENTER' button for more than three seconds to go for the next step. The display will show you the choice of options which are charge or discharge.

Press 'UP' or 'DOWN' button to select 'Charge' or 'Discharge', and press 'INC' or 'DEC' button to choose a sub-program to be performed.

To start the process, locate the cursor at the sub-program to be performed then press and hold 'ENTER' button for three seconds.



- **Charge 'Balance'**: This is for balancing the voltages of each individual cell of battery pack to be charged. To do this, the battery pack being charged should have the individual cell connector. And connect it to the individual port at the right side of charger with a suitable connection adaptor that fits with your battery. And also, you should to connect the battery output plug to the output of charger. In this mode, the charging process will be different from ordinary charging mode. The internal processor of the charger will monitor the voltages of each cell of the battery pack and controls the charging current that is feeding to each cell to normalize the voltage.

- **Charge 'Storage'**: This is for Lithium battery not to be used for long time. The program will determine to charge or discharge the battery to a certain voltage depending on the voltage of the battery at its initial stage. The final voltages are different from type of batteries, 3.6V for Lilo, 3.7V for LiPo and 3.3V for LiFe per cell. If the voltage of battery at its initial stage is over the voltage level to storage, the program will start to discharge.

- **Charge 'Fast'**: The charging current is getting smaller as the process goes to the near end term of Lithium battery charging. To finish charging process earlier, this program eliminate certain term of CV process. Actually, the charging current will goes to 1/5 from the initial value to end the process while the normal charging goes to 1/10 during CV term. The charging capacity may be a bit smaller than normal charging but the charging time will be reduced.

- **Discharge 'Normal'**: The charger will keep on discharging with the discharge current continuously until the discharge voltage has been reached.

- **Discharge 'CV-mode'**: The discharging current will be decreased gradually until the end current which has been set up at 'End current' has been reached, when the voltage has been dropped to the final discharge voltage. For maximum discharge, use this mode.

⚠ It is very important to know the exact type of battery to be charged, nominal voltage and capacity. Not to know these facts is the reason why batteries are damaged and improperly cared for. Read the battery's label and instruction sheet carefully, or consult the battery supplier to get those facts.

⚠ For balance mode charge, BANTAM supplies some balance adaptors for various brands of Lixx batteries in the market.

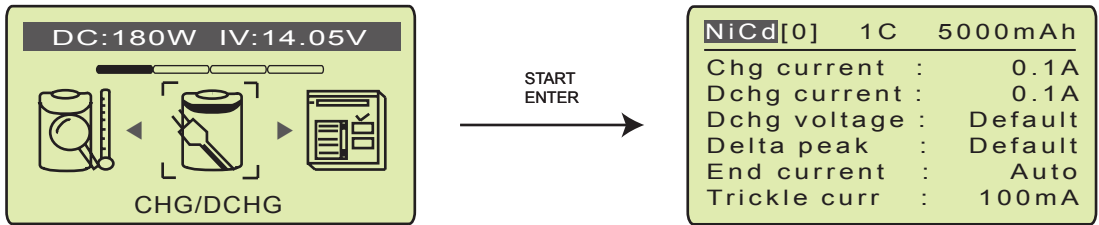
The suitable adaptors for single battery pack are;

Part no. EAC133: PolyQuest type, EAC134: Align type, EAC138: Kokam/Graupner type and EAC139: FlightPower/ThunderPower type.

The suitable adaptors for balancing multiple battery packs are;

Part no. EAC153: PolyQuest type, EAC154: Align type, EAC158: Kokam/Graupner type and EAC159: FlightPower/ThunderPower type.

● NiMH/NiCd battery program



These programs are for charging, discharging or cycle NiMH(Nickel-Metal-Hydride) or NiCd (Nickel-Cadmium) battery commonly used for R/C model applications. The charge current varies according to the battery capacity and performance. The type of battery which is either NiMH or NiCd must be correct for the battery being charged.

Select 'CHG/DCHG' program at main menu by pressing 'UP' or 'DOWN' button, and press 'ENTER' to go for the program.

Parameter set-up for NiCd/NiMH battery

| NiCd[0] 1C 5000mAh | | |
|--------------------|----------------|---------|
| LiPo | current : | 0.1A |
| LiFe | current : | 0.1A |
| LiIo | voltage : | Default |
| NiMH | peak : | Default |
| NiCd | current : | Auto |
| Pb | trickle curr : | 100mA |

| NiCd[0] 1C 5000mAh | | |
|--------------------|---------|--|
| Chg current : | 0.1A | |
| Dchg current : | 0.1A | |
| Dchg voltage : | Default | |
| Delta peak : | Default | |
| End current : | Auto | |
| Trickle curr : | 100mA | |

You can choose the type of battery to be charged or discharged at the first section. Select NiCd or NiMH according to your battery. And then, select the data number which will newly set up, or load the data number already set up for re-use. If you have the set-up data which had been performed successfully before, you can just start the process after loading the data number. All setup data will be stored at charger's memory automatically after setting them all.

Input the cell-count and capacity of the battery will be charged at the top line of menu. The cell-count and capacity need to be matched with the battery.

Use 'UP' or 'DOWN' button to scroll up and down the menu, and change the value by using 'INC' or 'DEC' button.

To start the process, press and hold 'ENTER' button for more than 3 seconds regardless of cursor position.

- **Chg current:** Set the charge current. (0.1 ~ 6.0A)

- **Dchg current:** Set the discharge current. The value may not exceed 1C for a maximum safety. (0.1 ~ 1.0A)

- **Dchg voltage:** Set the final voltage which the battery will reach at the end of discharge. The default value is 0.90V/cell. (0.1 ~ 1.2V/cell)

- **Delta-peak (Delta-peak voltage sensitivity) :** Set the Delta-peak voltage sensitivity at termination. (Disable, Delicate, Default, 5~20mV/cell)

Disable; The charger would not detect Delta-peak voltage for termination. To terminate charging process, the charger will check the parameters set up at other safety parameters like max. capacity, safety timer or safety temperature. If any one has been reached at its limit, the charging process will be terminated. (for NiMH only)

Delicate; The charger will detect a very small variation at delta-peak voltage. Some NiMH batteries which shows small voltage-drop at peak need to be use this option.

Default; If you do not know much about this function, or for ordinary batteries, select this mode. 15mV/cell for NiCd or 10mV/cell for NiMH will be used.

- **End current**: Set the final charging current at termination. **The end current should be less than the initial charge current.** (Auto, 60~500mA)

Auto; The process will be terminated when the charging current go to 1/10 of its initial value. Otherwise, the charge current will be decreased until the designated value has been reached.

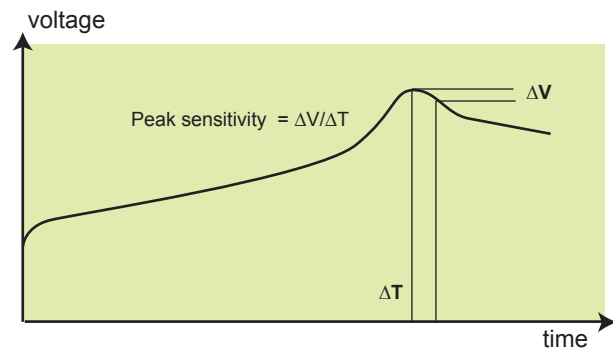
- **Trickle curr**: Activate or deactivate the trickle charge after the termination of process. (Off, 50 ~ 300mA)

- **Peak delay** : This restrains the delta-peak voltage detection until the time has reached. This prevents a premature cut-off from the battery of high internal resistance. The default value is one minute. (1 ~ 15 minutes)

- **No. cycles**: The number of cycles in the process. (1~10 times)

- **Waste time**: To avoid the battery from rising temperature caused by the internal chemical reactions, there should be a brief cool-off time between cycles. (0~60 minutes)

Delta-peak voltage for NiCd and NiMH batteries



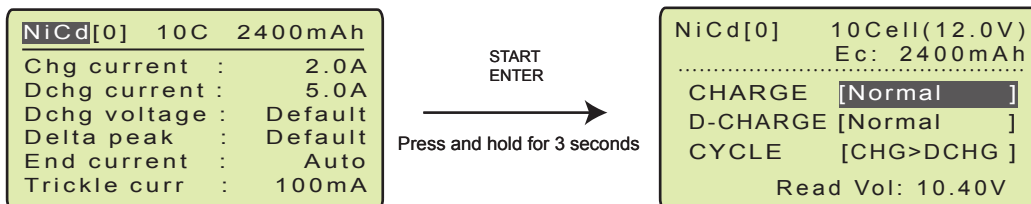
The most distinctive point on the voltage curve of a charging battery in response to a constant current is the voltage peak that occurs as the cell approaches full charge. The voltage will slightly drops after its maximum point. The charger works with proven 'Delta-peak voltage termination' to terminate charge process for NiCd and NiMH batteries. The actual termination point depends on the charging characteristics of the particular battery. Please refer the specification which is provided by the battery manufacturer.

Select program and start the process

After setting up all parameters, press and hold 'ENTER' button for more than three seconds to go for the next step. The display will show you the choice of options which are charge, discharge and cycle.

Press 'UP' or 'DOWN' button to select 'Charge', 'Discharge' or 'CYCLE', then chose a sub-program to be performed using 'INC' or 'DEC' button.

To start the process, locate the cursor at the sub-program to be performed then press and hold 'START/ENTER' button for three seconds.



- **Charge mode** : Set the charge mode which the charger will work with.

Normal; The charger will work with the parameters which were set at the screen. The feeding current will be zero at every 90 seconds to have 6 seconds of waste-time for higher charging efficiency.

Auto; The optimum charge current will be set by the charger automatically. The charge current set at 'Chg current' will be upper limit of charge current.

Linear; The charging current will be fed continuously without hesitating. The battery is charged with pure 'Direct-Current'.

- **Discharge mode** : Set the discharge mode which the charger will work with, on discharging.

Normal; The charger will finish discharging at the time when the voltage drops to the final voltage set at 'Dchg voltage'.

Auto; The charger will discharge the battery until the voltage drops to 0.90V per cell.

CV-mode; When the voltage has been dropped to the final discharge voltage, the discharge job will continue until the end current which has been set at 'End current' has been reached with decreasing discharge current gradually. For maximum discharge, use this mode.

- **Cycle mode** : You can use this function for balancing, refreshing and break-in the battery. All of charging and discharging parameters will be adopted from the values of 'CHARGE' and 'DISCHARGE' programs. Select the sequence of performing program.

CHG>DCHG; The charger starts with charging process, then the battery will be discharged.

DCHG>CHG; It starts with discharging process, then the battery will be charged.

⚠ Cautions for NiMH batteries

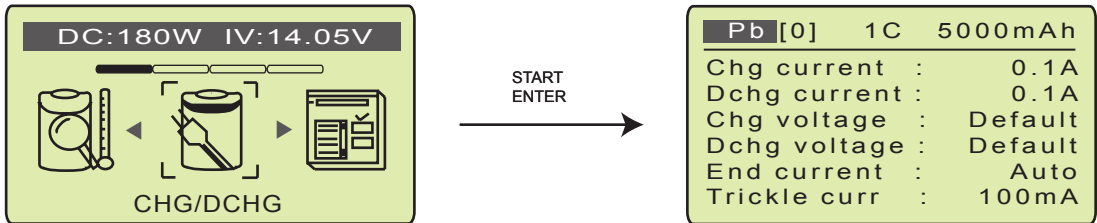
- Do not allow NiMH batteries to over-heat. Using the battery cooler will prevent over-heating at charge and discharge.

- Small size batteries like 'AAA', 'AA' and 'A' can safely be full charged at currents up to 1.0C. Higher charge current can easily over-heat batteries and thus damage batteries.

- NiMH batteries have higher self-discharge rate compare to NiCd, so it is necessary to recharge the battery immediately prior to use.

- Store NiMH batteries with some voltages remaining.

● Pb (Lead-acid) battery program



This is programmed for charging Pb (lead-acid) battery with nominal voltage from 2 to 28V. Pb batteries are totally different from NiCd or NiMH batteries, but very similar with Lithium batteries. They can only deliver relatively lower current compare to their capacity, and similar restrictions apply to charge. So the optimal charge current will be 1/10 of the capacity, and Pb batteries must not be charged rapidly. Always follow the instruction which was supplied by the battery manufacturer.

Select 'CHG/DCHG' program at main menu by pressing 'UP' or 'DOWN' button, and press 'ENTER' to go for the program.

Parameter set-up for Pb battery

| Pb[0] | 1C | 5000mAh |
|-------|---------|-----------|
| LiPo | current | : 0.1A |
| LiFe | current | : 0.1A |
| LiIo | voltage | : Default |
| NiMH | voltage | : Default |
| NiCd | current | : Auto |
| Pb | le curr | : 100mA |

Select 'Pb', then select the data number which will newly set up, or load the data number already set up for re-uses. If you have the set-up data which had been performed successfully before, you can just start the process after loading the data number. All setup data will be stored at charger's memory automatically after setting them all.

Input the cell-count and capacity of the battery will be charged at the top line of menu. The cell-count and capacity need to be matched with the battery.

Use 'UP' or 'DOWN' button to scroll up and down the menu, and change the value by using 'INC' or 'DEC' button.

To start the process, press and hold 'ENTER' button for more than 3 seconds regardless of cursor position.

| Pb[0] | 1C | 5000mAh |
|-------|--------------|-----------|
| | Chg current | : 0.1A |
| | Dchg current | : 0.1A |
| | Chg voltage | : Default |
| | Dchg voltage | : Default |
| | End current | : Auto |
| | Trickle curr | : 100mA |

- **Chg current:** Set the charge current. (0.1 ~ 6.0A)

- **Dchg current:** Set the discharge current. The value may not exceed 1C for a maximum safety. (0.1 ~ 1.0A)

- **Chg voltage:** Set the final charge voltage per cell. The charger will charge the battery until the voltage has been reached. The default values is 2.45V/cell. (2.20~2.50V/cell)

- **Dchg voltage:** Set the final voltage which the battery will reach at the end of discharge. The default value is 1.5V/cell. (1.4 ~ 1.8V/cell)

- **End current:** Set the final charging current at termination. **The end current should be less than the initial charge current.** (Auto, 60~500mA)

Auto; The process will be terminated when the charging current go to 1/10 of its initial value. Otherwise, the charge current will be decreased until the designated value has been reached.

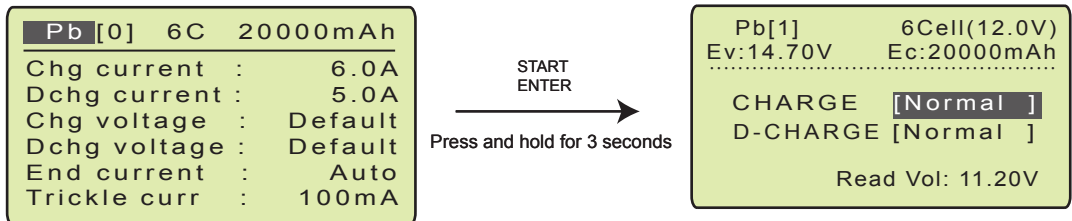
- **Trickle curr:** Activate or deactivate the trickle charge after the termination of process. (Off, 50 ~ 300mA)

Select program and start the process

After setting up all parameters, press and hold 'ENTER' button for more than three seconds to go for the next step. The display will show you the choice of options which are charge, discharge and cycle.

Press 'UP' or 'DOWN' button to select 'Charge' or 'Discharge' program, then chose a sub-program to be performed using 'INC' or 'DEC' button.

To start the process, locate the cursor at the sub-program to be performed then press and hold 'START/ENTER' button for three seconds.



- **Charge mode** : Set the charge mode which the charger will work with.

Normal; The charger will work with the parameters which were set at the screen. The feeding current will be zero at every 90 seconds to have 6 seconds of waste-time for higher charging efficiency.

Pulse; The charger will work with the parameters which were set at the screen. The feeding current will be zero at every 30 seconds to have 3 seconds of waste-time for higher charging efficiency.

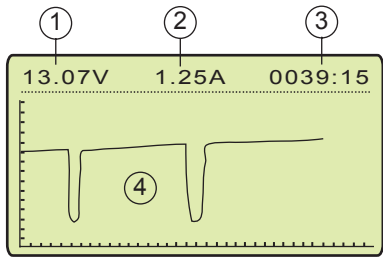
- **Discharge mode** : Set the discharge mode which the charger will work with, on discharging.

Normal; The charger will stop discharging at the time when the voltage drops to the final voltage set at next parameter-'Dchg volt'.

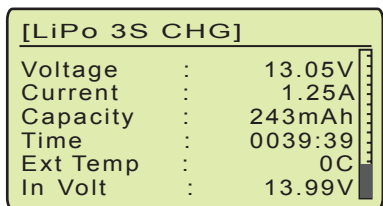
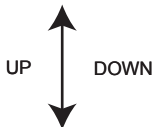
CV-mode: The discharging current will start to be decreased gradually until the end current which will be set up at next has been reached, when the voltage has been dropped to the final discharge voltage. For maximum discharge, use this mode.

● Screen displays during process

As the program starts by pressing 'START/ENTER' button, the LCD will be changed to show the charge or discharge graph, and also some other data. Those displays can be switched using 'UP' or 'DOWN' button. The display will go back to the graph screen automatically, after showing the data screen in three minutes.

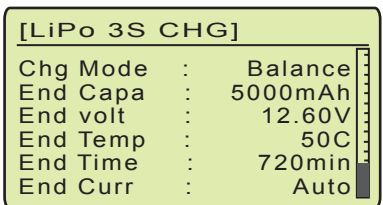
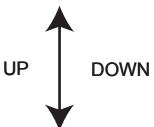


- (1) The voltage of battery is being processed, which will be updated as the process goes on in real time.
- (2) The feeding current at real time.
- (3) Elapsed time after the process started.
- (4) The graph shows the voltage curves in Y-axis along with the time in X-axis. The graph will automatically be scaled to fit in the screen.

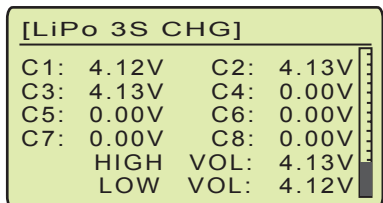
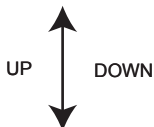


Ext temp: The temperature of battery is being process in real time. The temperature sensor should contact the surface of battery firmly to read out the data accurately.

In volt: The voltage of battery or DC power source, which is being used as an input power supply for the charger.

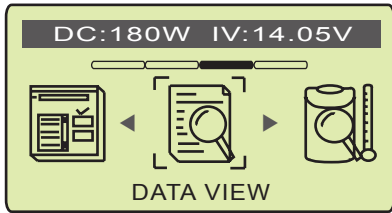


The other values show the data you already done at the program set-up to verify what you have done.



Individual cell voltages: The display shows the voltage of individual cells during charging Lixx battery. To show the voltages, the balance adaptor should be linked to the balance port of charger with connecting the balance tab of battery pack.

● Review the data after finishing the process



After finishing the program, you can review the data which had been pertained to the input and output of the charger by selecting 'DATA VIEW' menu at the main screen.

These data can not be shown while the program is being on process.

| DAT | GRP | CYE | CEL |
|-------------|-----|--------|-----|
| Input vol | : | 12.35V | |
| Battery vol | : | 10.54V | |
| Ext temp | : | 42C | |
| Chg time | : | 52min | |
| Dchg time | : | 0min | |
| Capacity | : | 898mAh | |

Input vol: DC voltage at the charger's input lead.

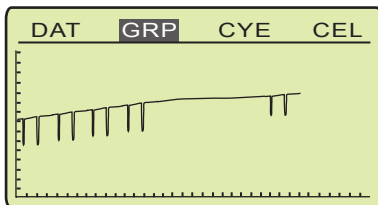
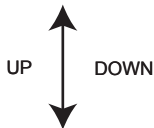
Battery vol: DC voltage of battery at the end of process.

Ext temp: The temperature of battery as measured with temperature sensor connected to temperature sensor port of charger at the end of process.

Chg time: The total elapsed of time needed to complete the charge process.

Dchg time: The total amount of time needed to complete the discharge process.

Capacity: The total amount of charged or discharged capacity during whole process.



The graph shows the voltage curves in Y-axis along with the time in X-axis, after the process has finished.



| DAT | GRP | CYE | CEL |
|-----|----------|----------|-------|
| No | Capacity | Voltage | |
| 1 | C | 00000mAh | 0.00V |
| | D | 00000mAh | 0.00V |
| 2 | C | 00000mAh | 0.00V |
| | D | 00000mAh | 0.00V |

This display shows the battery's capacity and peak voltage readings for each charge and discharge period for up to 10 cycles. The cycle number is show on the left side of the display.

Pressing 'INC' or 'DEC' button will scroll the display up and down.

Charge data is marked by 'C' and discharge data is marked by 'D'.



| DAT | GRP | CYE | CEL |
|-----|-----------|-----|-------|
| C1: | 4.12V | C2: | 4.13V |
| C3: | 4.13V | C4: | 0.00V |
| C5: | 0.00V | C6: | 0.00V |
| C7: | 0.00V | C8: | 0.00V |
| | HIGH VOL: | | 4.13V |
| | LOW VOL: | | 4.12V |

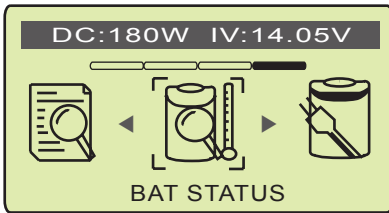
The display shows the final voltage of individual cells, when the balance tab was connected to the individual port of charger during the process of Lixx battery.

● Warning and error messages

BC6DX incorporates a various functions of protective and monitoring the system to verify functions and the state of its electronics. In any case of occurring error, the screen displays the cause of error that is self-explanatory with audible sound.

| | |
|--|--|
| Check connection ... Reversed polarity STOP/ESC | The output is connected to a battery with incorrect polarity. |
| Check connection ... Connection break STOP/ESC | This will be displayed in case of detecting an interruption of the connection between battery and output or voluntarily disconnecting the charge lead during the operation of charge or discharge on output. |
| Check cell-count ... Incorrect cell-count STOP/ESC | The cell-count of Lithium battery pack was selected incorrectly. Verify the cell-count carefully. |
| Check charger ... Break-down STOP/ESC | There happens the malfunction at the charger circuit by any reason. The charger should be repaired at the factory. |
| Check connection ... Short-circuit STOP/ESC | There is a short-circuit at output. Please check the charging leads or output cable of battery pack. |
| Check battery ... Low voltage STOP/ESC | The charger detects the voltage is lower than you set at Lithium program. Please check the cell-count of the battery pack. |
| Check battery ... High voltage STOP/ESC | The charger detects the voltage is higher than you set at Lithium program. Please check the cell-count of the battery pack. |
| Check balancer ... Comm. error STOP/ESC | The balancing circuit had been damaged. The balance function can not be used, and the charger needs to be repaired at our factory. |
| Balance error ... Low cell vol. STOP/ESC | The voltage of one of the cell in the Lithium battery pack is too low. Please check the voltage of cells one by one. |
| Balance error ... High cell vol. STOP/ESC | The voltage of one of the cell in the Lithium battery pack is too high. Please check the voltage of cells one by one. |
| Balance error ... Bad connection STOP/ESC | There are bad connection at the individual connector. Please check the connector and cables carefully. |
| Balance error ... Ref. data fail STOP/ESC | The charger can not read out the individual voltages correctly because of malfunction of main processor. The charger needs to be repaired. |
| Check power ... Low input volt STOP/ESC | The voltage of input power drops below the limit. |

● Battery status view



You can check the battery status simply by connecting it to charger. After connecting the battery to charger, select 'BAT STATUS' program at main menu. You can see the data which has been read from the output of charger.

| Status View | |
|---------------------|-----------|
| InV:14.26V | Temp: 0C |
| Bttery vol : 11.88V | |
| C1: 3.99V | C2: 3.99V |
| C3: 3.99V | C4: 0.00V |
| C5: 0.00V | C6: 0.00V |
| C7: 0.00V | C8: 0.00V |

Input vol : DC voltage at the charger's input lead.

Temp : The temperature is read out from the temperature sensor.

If it is not linked, the value will be zero.

Battery vol : The output voltage of battery.

C1~C8 : The individual voltages of battery pack. The balance tab should be connected to the balance port of charger.

● Glossary of terms

Amps(A): The unit of measure for charge or discharge electric current. The program of the charger will show most of the current in amps(A) at its LCD screen.

Milliampere(mA): The electric current, being amps(A) multiplied by 1000 and noted as 'mA'. So 2.0A is the same as 2000mA (2.0x1000). Or, to convert mA to amps, divide the mA number by 1000. So 200mA is the same as 0.2A. If a current value is below 1.0A, the LCD screen of the charger will still show the current in amps, not milliampere. For example, a current of 600mA will be displayed as 0.6A, and a current of 100mA will actually be shown as 0.1A.

Capacity, milliampere hours (mAh), and amp-hours (Ah): Charge energy stored by a battery is called capacity, which is defined as how much current a battery can supply constantly over one hour of time. Most hobby batteries are rated for capacity in 'mAh' or milliampere hours. A 650mAh battery can deliver 650mA of current for one hour (650mA x 1hr = 650mAh). The batteries of very large capacity, such as lead-acid(Pb) batteries, are usually rated in 'Ah' or amp-hours. A '12V 60Ah' car battery can deliver 60 amps of current for one hour (60A x 1hr = 60Ah).

Nominal voltage(V): The nominal voltage of the battery pack can be determined as follows;

-NiCd or NiMH: multiply the total number of cells in the pack by 1.2. A 8-cell pack will have a nominal voltage of 9.6 volts (8x1.2).

-LiPo: multiply the total number of cells in the pack by 3.7. A 3-cell LiPo wired in series will have a nominal voltage of 11.1 volts (3x3.7).

-Lilo: multiply the total number of cells in the pack by 3.6. A 2-cell Lilo wired in series will have a nominal voltage of 7.2 volts (2x3.6).

-LiFe: multiply the total number of cells in the pack by 3.3. A 4-cell Lilo wired in series will have a nominal voltage of 13.2 volts (4x3.3).

If the nominal voltage of the battery is not printed on the battery's label, consult your battery manufacturer or supplier. Do not guess the rated voltage of battery.

'C'-rating: Capacity is also referred to as the 'C' rating. Some battery suppliers recommend charge and discharge currents based on the battery 'C' rating. A battery's '1C' current is the same number as the battery's rated capacity number, but noted in mA or amps. A 600mAh battery has a 1C current value of 600mA, and a 3C current value of (3 x 600mA) 1800mA or 1.8A. The 1C current value for a 3200mAh battery would be 3200mA (3.2A).

● Maximum circuit power chart

For the higher voltage of battery, the actual amount of charge or discharge current feeding to the battery might automatically be limited, so not to exceed the charger's maximum rated charging power(50Watts) at an output channel. And also, the discharge current delivered to the battery might be limited by the maximum rated discharge power of 5 watts at output.

| Maximum charge/discharge current at 12V DC input | | | | |
|---|---------------------|-------------------------|--------------------------|-----------------------------|
| | No. of cells | Rated voltage(V) | Charge current(A) | Discharge current(A) |
| NiCd/NiMH | 1 | 1.2 | 6.0 | 1.0 |
| | 2 | 2.4 | 6.0 | 1.0 |
| | 3 | 3.6 | 6.0 | 1.0 |
| | 4 | 4.8 | 6.0 | 1.0 |
| | 5 | 6.0 | 6.0 | 0.8 |
| | 6 | 7.2 | 6.0 | 0.7 |
| | 7 | 8.4 | 6.0 | 0.6 |
| | 8 | 9.6 | 5.2 | 0.5 |
| | 9 | 10.8 | 4.6 | 0.5 |
| | 10 | 12.0 | 4.2 | 0.4 |
| | 11 | 13.2 | 3.8 | 0.4 |
| | 12 | 14.4 | 3.5 | 0.3 |
| | 13 | 15.6 | 3.2 | 0.3 |
| | 14 | 16.8 | 3.0 | 0.3 |
| | 15 | 18.0 | 2.8 | 0.3 |
| LiPo | 1S | 3.7 | 6.0 | 1.0 |
| | 2S | 7.4 | 6.0 | 0.7 |
| | 3S | 11.1 | 4.5 | 0.5 |
| | 4S | 14.8 | 3.4 | 0.3 |
| | 5S | 18.5 | 2.7 | 0.3 |
| | 6S | 22.2 | 2.3 | 0.2 |
| Lilo | 1S | 3.6 | 6.0 | 1.0 |
| | 2S | 7.2 | 6.0 | 0.7 |
| | 3S | 10.8 | 4.6 | 0.5 |
| | 4S | 14.4 | 3.5 | 0.3 |
| | 5S | 18.0 | 2.8 | 0.3 |
| | 6S | 21.6 | 2.3 | 0.2 |
| LiFe | 1S | 3.3 | 6.0 | 1.0 |
| | 2S | 6.6 | 6.0 | 0.8 |
| | 3S | 9.9 | 5.0 | 0.5 |
| | 4S | 13.2 | 3.8 | 0.4 |
| | 5S | 16.5 | 3.0 | 0.3 |
| | 6S | 19.8 | 2.5 | 0.3 |
| Pb | | 6.0 | 6.0 | 0.8 |
| | | 8.0 | 6.0 | 0.6 |
| | | 10.0 | 5.0 | 0.5 |
| | | 12.0 | 4.2 | 0.4 |
| | | 14.0 | 3.6 | 0.4 |
| | | 16.0 | 3.1 | 0.3 |
| | | 18.0 | 2.8 | 0.3 |
| | | 20.0 | 2.5 | 0.3 |
| | 22.0 | 2.3 | 0.2 | |

● Specifications

| | |
|---|--|
| Operating voltage range : | 11.0 ~ 15.0V DC 12V Lead-acid battery or equivalent high power PSU AC 100~240V (50/60Hz) |
| Circuit power : | Charge max. 50W at AC/DC input Discharge max. 5W at AC/DC input |
| Charge current : | 0.1 ~ 6.0A |
| Discharge current : | 0.1 ~ 1.0A |
| NiCd/NiMH battery cell count : | 1 ~ 15 cells |
| Lithium battery cell count : | 1 ~ 6 series |
| Pb battery voltage : | 2 ~ 22V |
| Battery data memory : | 10 memories per program |
| Battery capacity range : | 100 ~ 65000mAh |
| Delta-peak sensitivity : | Disable/Delicate/5 ~ 20mV adjustable |
| Temperature cut-off range : | 20 ~ 80C/68 ~ 176F |
| Trickle charge current : | Off, 50 ~ 300mA adjustable (N/A for Lixx) |
| Cycle count : | 1 ~ 10 times (N/A for Lixx) |
| Current drain for balancing Lixx : | 200mAh/cell |
| Weight : | 650 g |
| Dimensions : | 140 X 130 X 45 mm |

● Warranty and service

We warrant this product for a period of one year (12 months) from the date of purchase. The guarantee applies only to such material or operational defects, which are present at the time of purchasing the product. During that period, we will repair or replace without service charge any product deemed defective due to those causes. Any repairs carried out under warranty do not extend the original warranty period. You will be required to present proof of purchase (invoice or receipt). The defective unit has to be sent to us by pre-paid delivery; we will pay for return shipping cost. This warranty does not cover the damage due to wear, overloading, incompetent handling or using of incorrect accessories.

BANTAM Inc.

#623 Unitech Ville 1141-2
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Web: www.bantamtek.com



Electrical equipment marked with the cancelled waste bin symbol must not be discarded in the standard household waste; instead it should be taken to a suitable specialist disposal system.

Date of purchase/delivery :

Dealer :