PLUS POWER 80

#RC-CHA-212

WARNINGS AND SAFETY NOTES

These warnings and safety notes are particularly important. Please follow the instructions for maximum safety; otherwise the charger and the battery can be damaged or at worst it can cause a fire. Also read the chapter before you begin.

- Never leave the charger unsupervised when it is connected to its power supply. If any malfunction is found, **TERMINATE THE PROCESS IMMEDIATELY** and refer to the operation manual.
- Keep the charger well away from dust, damp, rain, heat, direct sunshine and vibration. Never drop it.
- The allowable DC input voltage is 11-18V DC.
- The allowable AC input voltage is 110V or 220V AC.
- This charger and the battery should be put on a heat-resistant, non-flammable and non-conductive surface.
  Never place them on a car seat, carpet or similar surface. Keep all flammable volatile materials away from the operating area.
- Make sure you know the specifications of the battery to be charged or discharged to ensure it meets the requirements of this charger. If the program is set up incorrectly, the battery and charger may be damaged.
  Fire or explosion can occur due to overcharging. This warranty is not valid for any damage or subsequent damage arising as a result of a misuse or failure to observe the procedures outlined in this manual.
- To avoid short circuiting between the charge lead, always connect the charge cable to the charger first, then connect the battery. Reverse the sequence when disconnecting.
- Never attempt to charge or discharge the following types of batteries:
  - A battery pack which consists of different types of cells (including different manufacturers)
  - A battery that is already fully charged or just slightly discharged
  - Non-rechargeable batteries (pose an explosion hazard)
  - A faulty or damaged battery
  - A 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 the following points before commencing charging

- Did you select the appropriate program suitable for the type of battery you are charging?
- Did you set up appropriate current for charging or discharging?

WARNINGS AND SAFETY NOTES

properly is that the charge lead should be of adequate conductor cross-section, and high quality connectors which are normally gold-plated should be fitted to both ends.

Always refer to the manual by the battery manufacturer pertaining to charging methods. Operate according to their recommended charging current and charging time. Lithium batteries, in particular, should be charged strictly according to the manufacturer's instruction.

Close attention should be paid to the connection of lithium batteries.

Do not attempt to disassemble the battery pack arbitrarily. Please get highlighted that lithium battery packs can be wired in parallel and in series. In the parallel connection, the battery's capacity is calculated by multiplying single the battery's capacity by the number of cells, bearing in mind that total voltage stays the same. If the voltage is imbalanced, it may cause a fire or explosion. Lithium batteries are recommended to charge in series.

Discharging

The main purpose of discharging is to clean the residual capacity of the battery, or to reduce the battery' voltage to a defined level. The same attention should be paid to the discharging process as the charging process. The final discharge voltage should be set up correctly to avoid deep discharging. Lithium batteries cannot be discharged to lower than the minimum voltage, or it will cause a rapid loss of capacity or a total failure. Generally, lithium batteries don't need to be discharged. Please pay attention to the minimum voltage of lithium batteries to protect them.

Some rechargeable batteries have a memory effect. If they are partly used and recharged before the whole charge is accomplished, they remember this and will only use that part of their capacity next time. This is a 'memory effect' It is said that NiMH and NiCD batteries are suffering from memory effect. NiCD has more 'memory effect' than NiMH.

Lithium batteries are recommended to be discharged partially rather than fully. Frequent full discharging should be avoided if possible. Instead, charge the battery more often or use a battery of larger capacity. Full capacity cannot be reached until it has been subjected to 10 or more charge cycles. The cyclic process of charge and discharge will optimize the capacity of battery pack.

WARNINGS AND SAFETY NOTES

- Have you checked the battery voltage? Lithium battery packs can be wired in parallel and in series, i.e. a 2-cell pack can be 3.7V (in parallel) or 7.4V (in series).
- Have you checked that all connections are firm and secure? Make sure there are no intermittent contacts at any point in the circuit.

Standard Battery Parameters
Be very careful to choose the correct voltage for different types of battery otherwise you may cause damage to the batteries. Incorrect settings could cause the cells to fire or explode.

Battery Type	Fast Charge Rate	Nominal Cell Voltage	Max. Charge Voltage Cell	Min. discharge Voltage Cell	Storage Voltage Cell
Ni-Cd	1 - 2C	1.2V	1.5V	0.85V	
Ni-MH	1 - 2C	1.2V	1.5V	0.85V	
Li-Ion	<= 1C	3.6V	4.1V	2.5V	3.7V
Li-Po	<= 1C	3.7V	4.2V	3.0V	3.8V
Li-Po HV	<= 1C	3.8V	4.35V	3.3V	3.9V
Li-Fe	<= 4C	3.3V	3.6V	2.0V	3.3V
PB	<= 0.4C	2V	2.46V	1.75V	

Charging
During charge process, a specific quantity of electrical energy is fed into the battery. The charge quantity is calculated by multiplying charge current by charge time. The maximum permissible charge current varies depending on the battery type or its performance, and can be found in the information by the battery manufacturer. Only batteries that are expressly stated to be capable of quick-charge are allowed to be charged at rates higher than the standard charge current.

Connect the battery to the terminal of the charger: red is positive and black is negative. Due to the difference between resistance of cable and connector, the charger can not detect resistance of the battery pack. The essential requirement for the charger to work

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SPECIFICATIONS

Operating voltage range:	10.0~18.0Volt
Circuit power:	max.80W for charging
	max.5W for discharging
Charge current range:	0.1~7.0A
Discharge current range:	0.1~1.0A
Current drain for balancing Li-po:	300mAh/cell
NiCd/ NiMH battery cell count:	1~15cells
Lithium battery cell count:	1~6Series
Pb battery voltage:	2 to 20V
Weight:	400g
Dimension:	136×127×56mm

ACCESSORIES

Multiple Charging Leads Included

Deans charge cable

Conversion lead Deans > Alligator clips

Conversion lead Deans > Receiver plug
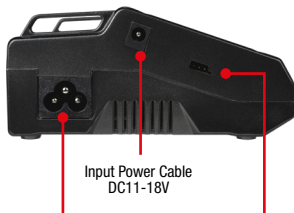

Conversion lead Deans > Bec

AC Input cable

CHARGER LAYOUT

BATT TYPE/STOP
To select main program
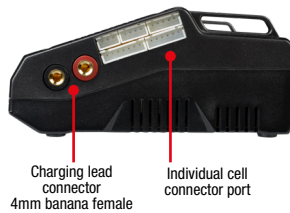To stop operation

DEC/INC
To select sub program
To alter the value

START/ENTER
To resume or start the
operation

Input Power Cable
DC11-18V

Input Power Cable
AC100-240V

3-pin port for tem-
perature sensor

Charging lead
connector
4mm banana female

Individual cell
connector port

FEATURES

Optimised operating software

When charging or discharging, it has an 'AUTO' function that sets the feeding current automatically. Especially for Lithium batteries, it can prevent the over-charging can lead to an explosion by users fault. Every program in the unit is controlled with mutual links and communication for every possible error so it introduces a maximum safety. These can be set at users option.

Special recharge plugs-port for receiver, transmitter and igniter charger. And for frequently used charger port such as multi purpose crocodile pin etc.

It provides most convenient balance charge port for Lithium batteries, with separated 3,4,5,6 charge port, and external reverse connector.

High-power and high-performance circuit

It employs the circuit that has maximum output power of 80W. As a result it can charge or discharge up to 15 cells of NiCd/NiMH and 6 series of Lithium batteries with maximum current of 7.0A. Furthermore the cooling system is so efficient that can hold such a power without any trouble of running the CPU or the operating program.

Individual voltage balancer for Lithium batteries inside

It has an individual-cell-voltage balancer inside. This does not require any extra balancer separately when charging Lithium batteries(Lilo/LiPO/LiFe) for cell voltage balancing.

Balance individual cells on discharge

It also can monitor and balance individual cells of the Lithium battery pack during the discharge process. If the voltage of any one cell varies abnormally, the process will be stopped with the error message.

Accept various types of Lithium battery

It can accept three types of Lithium batteries Lilo, LiPo and LiFe. They have different characteristics by their chemistry. You can select any one of them that you are going to process before the job. For their specifications, refer 'Warnings and safety notes' section.

Lithium battery 'Fast' and 'Storage' mode

You can charge Lithium battery for special purposes. 'Fast' charge reduces the charging time of Lithium battery and 'Storage' mode controls the final voltage of the battery to be suit for long time storage.

FEATURES

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 change current to avoid from high current charging. This is very useful when charging the low impedance and small capacity NiMH battery in 'AUTO' mode.

Capacity limit: The changing 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 will rise by its internal chemical reaction. If you set the limit of temperature the process will be expired forcibly when the limit has reached.

Processing time limit: you can also restrain the maximum process time to prevent from any possible defect.

Input power monitor: To protect the car battery using as input power from being damaged the voltage of it always monitored. If it drops below the lower limit the process will be ended automatically.

Automatic cooling fan: The electric cooling fan comes into action automatically only when the internal temperature of the unit is raised.

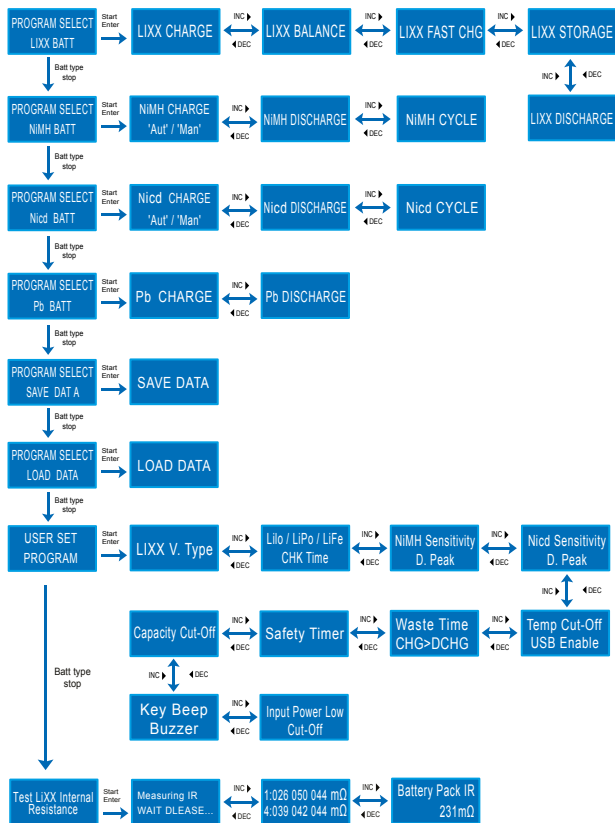**Data store/load**
For users convenience it can store maximum 5 data of different batteries. You can establish the data contains program setting of the battery to charge or discharge continually. These data can be called out at any time you need and the process can be executed without program setting.

Cyclic charging/discharging
Perform 1 to 5 cycles of charge>

PROGRAM FLOW CHART

```
PROGRAM SELECT     Start     LIXX CHARGE    INC►    LIXX BALANCE    INC►    LIXX FAST CHG    INC►    LIXX STORAGE
LIXX BATT          Enter                    ◄DEC                    ◄DEC                     ◄DEC

   │ Batt type stop                                                                                    INC►  ◄DEC

PROGRAM SELECT     Start     NiMH CHARGE    INC►    NiMH DISCHARGE    INC►    NiMH CYCLE              LIXX DISCHARGE
NiMH BATT          Enter     'Aut' / 'Man'  ◄DEC                      ◄DEC

   │ Batt type stop

PROGRAM SELECT     Start     Nicd CHARGE    INC►    Nicd DISCHARGE    INC►    Nicd CYCLE
Nicd BATT          Enter     'Aut' / 'Man'  ◄DEC                      ◄DEC

   │ Batt type stop

PROGRAM SELECT     Start     Pb CHARGE      INC►    Pb DISCHARGE
Pb BATT            Enter                    ◄DEC

   │ Batt type stop

PROGRAM SELECT     Start     SAVE DATA
SAVE DAT A         Enter

   │ Batt type stop

PROGRAM SELECT     Start     LOAD DATA
LOAD DATA          Enter

   │ Batt type stop

USER SET           Start     LIXX V. Type   INC►    Lilo / LiPo / LiFe    INC►    NiMH Sensitivity    INC►    Nicd Sensitivity
PROGRAM            Enter                    ◄DEC    CHK Time               ◄DEC    D. Peak              ◄DEC    D. Peak

                                                                                                               INC►  ◄DEC

                             Capacity Cut-Off   INC►   Safety Timer   INC►   Waste Time    INC►   Temp Cut-Off
                                                ◄DEC                   ◄DEC   CHG>DCHG       ◄DEC   USB Enable

   │ Batt type stop          INC►  ◄DEC

                             Key Beep       INC►   Input Power Low
                             Buzzer         ◄DEC    Cut-Off

Test LiXX Internal     Start     Measuring IR      1:026 050 044 mΩ    INC►    Battery Pack IR
Resistance             Enter     WAIT DLEASE...    4:039 042 044 mΩ    ◄DEC    231mΩ
```
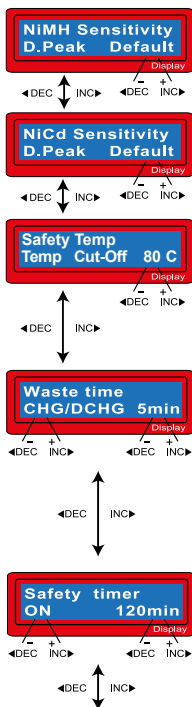
INITIAL PARAMETER SET UP

It will be operated with the default value of the essential user settings when it is connected to a 12V battery for the first time. The screen displays the following information in sequence and the user can change the value of parameter on each screen.

When you are willing to alter the parameter value in the program, press Start/Enter key to make it blink then change the value with INC or DEC key. The value will be stored by pressing Start/Enter key once.
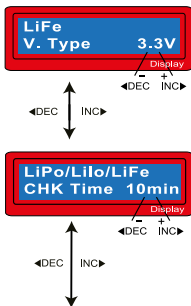
The screen displays the nominal voltage of Lithium battery. There are three kinds of Lithium battery; LiFe(3.3V),Lilo(3.6V) or LiPo(3.7V). This is very important so you have to check the battery carefully and set it up correctly. If it is different from correct value the battery can explode during charge process.

It recognise the cell count of Lithium battery automatically at the beginning of charge or discharge process to avoid from erroneous setting by user. But deeply discharged battery can be perceived incorrectly. To prevent the error, you can set the time term to verify the cell count by the processor. Normally, 10 minutes are enough to perceive the cell count correctly. For the battery of larger capacity, you may extend the time term. But if you set the time term too long for the battery of smaller capacity, the charge or discharge process can be finished within the time term with the erroneous cell count. This may cause the fatal result. If the processor recognises the cell count incorrectly at the beginning of charge or discharge process, you may extend the time. Otherwise, you had better use with the default value.

NiMH Sensitivity
D.Peak   Default
Display

◀DEC INC▶ ◀DEC INC▶
– +

NiCd Sensitivity
D.Peak   Default
Display

◀DEC INC▶ ◀DEC INC▶
– +

Safety Temp
Temp Cut-Off   80 C
Display

◀DEC INC▶
– +

◀DEC INC▶

Waste time
CHG/DCHG 5min
Display

◀DEC INC▶ ◀DEC INC▶
– +   – +

◀DEC INC▶

Safety timer
ON   120min
Display

◀DEC INC▶ ◀DEC INC▶
– +   – +

◀DEC INC▶

This shows the trigger voltage for automatic charge termination of NiMH and NiCd battery. The effective value ranges from 5 to 20mV per cell .if the trigger voltage is set higher, there is a danger of overcharging the battery; if it is set lower, there is a possibility of premature termination. Please refer the technical specification of the battery.(NiCd default:12mV, NiMH default:7mV)

The 3-pin port at left side is a temp. Port. You can use an optional temperature probe to contact the surface of battery. You can set the maximum temperature at which the charger allow battery to reach during charging. Once a battery reaches this temperature during charge, the process will be terminated to protect the battery.

The battery is on the cyclic process of charge and discharge can often become warm after charge or discharge period. The program can insert a time delay to occur after each charge and discharge process to allow the battery adequate time to cool down before being subjected to the next process. The value ranges from 1 to 60 minutes.

When you start a charge process, the integral safety timer automatically starts running at the same time. This is programmed to prevent overcharge the battery if it proves to be faulty, or if the termination circuit cannot detect the battery full. The value for the safety timer should be generous enough to allow a full charge of the battery .
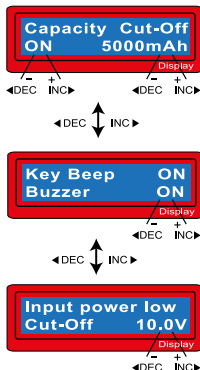
This program sets the maximum charge capacity that will be supplied to the battery during charge. If the delta-pack voltage is not detected nor the safety timer expired by any reason, this feature will automatically stop the process at the selected capacity value.

The beep sounds at every time pressing the buttons to confirm your action. The beep or melody sounded at various times during operation to alert different mode changes. These audible sounds can be on or off.

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.

LITHIUM BATTERY (LILO/LIPO/LIFE) PROGRAM

These programs are only suitable for charging and discharging Lithium batteries with a nominal voltage of 3.3V, 3.6V and 3.7V per cell. These batteries need to adopt different charge technique is termed a 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 precisely matched with the charade voltage of the battery. They are 4.2V for LiPo, 4.1V for Lilo, and 3.6 V for LiFe. The charge current and nominal voltage as for cell count set on the charge program must always be correct for the battery to be charged.
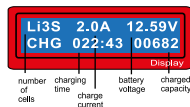
When you are willing to alter the parameter value in the program, press Start/Enter key to make it blink then change the value with INC or DEC key. The value will be stored by pressing Start/Enter key once.

CHARGING LITHIUM BATTERY
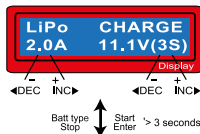
The left side of the first line shows the type of battery you select at the users setting. The value on the left side of second line sets a charge current and the value on the right side of second line sets the voltage of the battery pack.

After setting the current and voltage press Start/Enter key for more than 3 seconds to start the process.

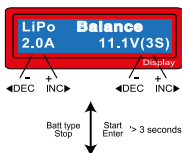(Charge current:0.1~7.0A,Voltage:1~6 series)

```
R: 3SER    S: 3SER
CONFIRM(ENTER)
                    Display
```

This shows the number of cells you set up and the processor detects. ' R: ' shows the number of cells found by the charger and ' S:' is the number of cells selected by you at the previous screen. If both numbers are identical you can start charging by press Start/Enter button. If not, press Batt Type/Stop button to go back to previous screen. Then carefully check the number of cells of the battery pack to charge again.

Start
Enter

```
Li3S  2.0A  12.59V
CHG 022:43  00682
                    Display
```

number   charging   battery   charged
of   time   voltage   capacity
cells   charge
            current

The screen shows the present situation during charge process. To stop charging press Batt Type/Stop key once.

CHARGING LITHIUM BATTERY AT BALANCE MODE

This is for balancing the voltages of Lithium batteries of the battery park to be charged. The battery pack to be charged should be connected to the suitable balance port at the right side of the charger. And also, you need 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 charging current that is feeding to each cell to normalise the voltage.

```
LiPo    Balance
2.0A        11.1V(3S)
                    Display
```
◄DEC INC►   ◄DEC INC►

The value on the left side of second line sets a charge current and the value on the right side of second line sets the voltage of the battery pack. After setting the current and voltage press Start/ Enter key for more than 3 seconds to start the process.
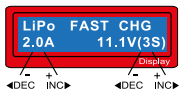(Charge current:0.1~7.0A, Voltage:1~6 series)

Batt type   Start '> 3 seconds'
Stop   Enter

```
R: 3SER   S: 3SER
CONFIRM(ENTER)
                    Display
```

This shows the number of cells you set up and the processor detects.' R: ' shows the number of cells found by the charger and ' S:' is the number of cells selected by you at the previous screen. If both numbers are identical you can start charging by press Start /Enter button. If not, press Batt type/ Stop button to go back to previous screen. Then carefully check the number of cells of the battery pack to charge again.

Start
Enter

```
Li3S  1.2A  12.59V
BAL 022:43  00682
                    Display
```

number   charging   battery   charged
of   time   voltage   capacity
cells   charge
            current

The screen shows the present situation during charge process. To stop charging press Batt type/Stop key once.
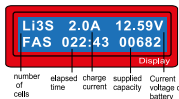
FAST CHARGING LITHIUM BATTERY

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 process time will be reduced.

```
LiPo  FAST CHG
2.0A      11.1V(3S)
```
Display

◄DEC INC►   ◄DEC INC►

Batt type   Start/
Stop   Enter   '>3 seconds'

```
Li3S  2.0A  12.59V
FAS 022:43 00682
```
Display

number   elapsed charge supplied Current
of   time   current capacity voltage of
cells   battery

You can set up the charging current and the voltage of the battery pack is being charged. As you press Start/ Enter button the voltage confirmation will be displayed. And then, if you confirm the voltage and current.

Press Start/ Enter button again to start charging.

This shows the present state of 'FAST' charging. To stop charging arbitrary, press Batt type/Stop key once.
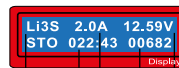
STORAGE LITHIUM BATTERY

This is for charging or discharging Lithium battery not to be used for the time being. The program will determine to charge or discharge the battery to the certain voltage depends on the voltage of the battery at its initial stage. They are different from the type of the battery, 3.75V for Lilo, 3.85V 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.
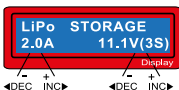
```
LiPo  STORAGE
2.0A      11.1V(3S)
```
Display

◄DEC INC►   ◄DEC INC►

Batt type   Start/
Stop   Enter   '>3 seconds'

```
Li3S  2.0A  12.59V
STO 022:43 00682
```
Display

number   elapsed charge or supplied Current
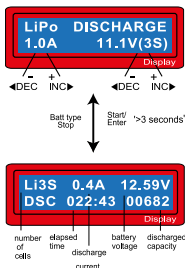of   time   discharge capacity voltage of
cells   current   battery

You can set up the current and the voltage of the battery pack to be charged. The current will be used for charge or discharge the battery to reach the 'storage' level of voltage.

The screen shows the present situation during charge process. To stop charging press Batt type/Stop key once.

DISCHARGING LITHIUM BATTERY

```
LiPo   DISCHARGE
1.0A      11.1V(3S)
                Display
```
‹DEC INC›   ‹DEC INC›
  −   +   −   +
Batt type   Start/   '>3 seconds'
  Stop   Enter

```
Li3S  0.4A  12.59V
DSC 022:43 00682
                Display
```
number   elapsed   battery   discharged
of   time   voltage   capacity
cells   discharge
            current

The value of discharge current on the left side of screen may not exceed 1C for a maximum safety and the final voltage on the right should not be under the voltage level that is recommended by the battery manufacturer to avoid deep discharging.

To start to discharge, press Start/ Enter key for more than 3 seconds.

This shows the present state of discharge.
To stop discharging Press Batt type/Stop key once.

VOLTAGE BALANCING AND MONITORING DURING THE DISCHARGE

The processor monitors the voltage of individual cells during 'storage-mode' and 'discharge' of Lithium battery pack. It tries to normalise the voltages to be equal. For this feature, the individual plug of the battery pack should be connected to the individual port of the charger.
If the voltage of any one or more cells varies abnormally during the procedure, It terminates the process forcibly with the error massage. If this happens, the battery pack contains the bad cell, or the bad connection of the cable plug. You can easily know which one cell is bad by pressing INC button at time of showing the error message.

```
BATTERY  VOL  ERR
 CELL  LOW  VOL
                Display
```

INC›

```
4.14  4.16  4.09
2.18  0.00  4.19
                Display
```
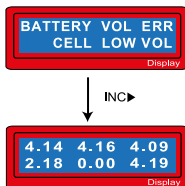
The processor found that the voltage of one of the cell in the Lithium battery pack is too low.

In this case, the 5th cell is bad. If there happens the connection-break of the cable or plug, the voltage value may show zero.

NIMH/NICD BATTERY PROGRAM

These programs are for charging or discharging NiMH (Nickel-Metal-Hydride) or NiCd (Nickel-Cadmium) battery commonly used for R/C model applications. To alter the value at the display, press Start/Enter key to make it blink then change the value using INC or DEC key. The value will be stored by pressing Start/Enter key once.
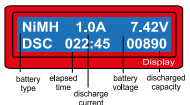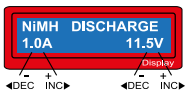To start the process, press Start/ Enter button for more than 3 seconds.

CHARGING NIMH/NICD BATTERY

NiMH CHARGE Aut
CUR LIMIT   5.0A
Display
◄DEC   INC►

Batt type / Stop   Start / Enter '> 3 seconds'
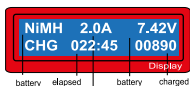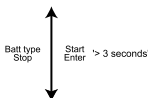
This program simply charge the battery using the current you set. In 'Aut' mode, you need to set the upper limit of charge current to avoid from higher feeding current that may damage the battery. Because some batteries of low impedance and small capacity can lead to the higher charge current by the processor at automatic charge mode. But in 'Man' mode, it will charge the battery with the charge current you set at the display. Each mode can be switched by pressing INC and DEC button simultaneously when the current field is blinking.

NiMH   2.0A   7.42V
CHG   022:45   00890
Display

battery   elapsed   battery   charged

The screen displays the current state of charging . To stop the process, press Batt type/Stop key once. The audible sound indicates you the end of process.
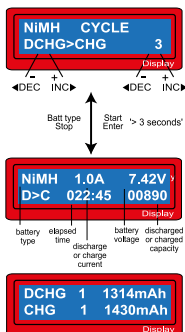
DISCHARGING NIMH/NICD BATTERY

NiMH   DISCHARGE
1.0A   11.5V
Display
◄DEC   INC►   ◄DEC   INC►

Batt type / Stop   Start / Enter '> 3 seconds'

Set discharge current on the left and final voltage on the right. The discharge current ranges from 0.1 to 1.0A and the final voltage ranges from 0.1 to 25.0V). To start the process, press Start /Enter key more than 3 seconds.

NiMH   1.0A   7.42V
DSC   022:45   00890
Display

battery type   elapsed time   discharge current   battery voltage   discharged capacity

The screen displays the current state of discharge. You can alter the discharge current by pressing Start/Enter key during the process. Once you change the current value, store it by pressing Start/Enter button again. To stop discharging press Batt type/Stop key once. The audible sound indicated you at the end of process.

RC PLUS

CHARGE/DISCHARGE - DISCHARGE/CHARGE CYCLE OF NIMH/NICD BATTERY

```
NiMH   CYCLE
DCHG>CHG        3
                    Display
◄DEC   INC►      ◄DEC   INC►

Batt type      Start      '> 3 seconds'
Stop          Enter
```

Set the sequence on the left and the number of cycle on the right. You can use this function for balancing, refreshing and break-in the battery. To avoid rising temperature of the battery, there will be a brief cool-off period that already fixed at 'User setting' after each charge and discharge process. The cycling number ranges from 1 to 5.

```
NiMH  1.0A    7.42V
D>C   022:45   00890
                      Display
battery  elapsed      battery  discharged
type     time         voltage  or charged
         discharge             capacity
         or charge
         current
```

To stop the process, press Batt type/Stop key once. You can change the discharge or charge current by pressing Start/Enter key once during the process. The audible sound indicates you the end of process.

```
DCHG  1   1314mAh
CHG   1   1430mAh
                    Display
```

At the end of the process, you can see charged or discharged electric capacities of the battery at each cyclic process.
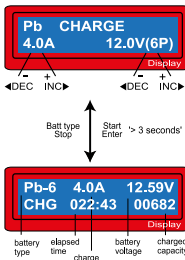By pressing INC or DEC button, the screen shows the result of each cycle in order.

PB (LEAD SULFURIC ACID) BATTERY PROGRAM

This is programmed for charging Pb(lead-sulphuric acid) battery with nominal voltage from 2 to 20V. Pb batteries are totally different from NiCd or NiMH batteries. They can only deliver relatively lower current compare to their capacity, and similar restrictions definitely apply to charge. So the optimal charge current will be 1/10 of the capacity. Pb batteries must not be charged rapidly. Always follow the instruction is supplied by the manufacturer of battery.
When you are willing to alter the parameter value in the program, press Start/Enter key to make it blink then change the value with INC or DEC key. The value will be stored by pressing Start/Enter key once.
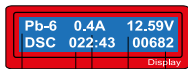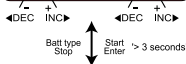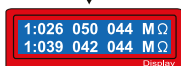
CHARGING PB BATTERY

```
Pb   CHARGE
4.0A        12.0V(6P)
                     Display
◄DEC   INC►      ◄DEC   INC►

Batt type      Start      '> 3 seconds'
Stop          Enter
```

Set up the charge current on the left and the nominal voltage of the battery on the right. The charge current ranges from 0.1 to 7.0A and the voltage should be matched with the battery being charged.
Start the charge process by pressing Start/Enter key for more than 3 seconds.

```
Pb-6  4.0A   12.59V
CHG   022:43   00682
                      Display
battery  elapsed      battery  charged
type     time         voltage  capacity
         charge
```

The screen displays the state of charging process. To stop charging forcibly, press Batt type/Stop key once. The audible sound indicates you at the end of process.

DISCHARGING PB BATTERY

```
Pb   DISCHARGE
1.0A        12.0V(6P)
```
Display

◄DEC INC►   ◄DEC INC►

Batt type   Start
Stop   Enter   '> 3 seconds'

```
Pb-6  0.4A   12.59V
DSC   022:43  00682
```
Display

battery   elapsed   battery   discharged
type   time   voltage   capacity
          discharge
          current

Set discharge current on the left and final voltage on the right. The discharge current ranges from 0.1 to 1.0A.

To start the process, press Start/Enter key for more than 3 seconds.

The screen displays the current state of discharge. You can alter the discharge current by pressing **Start/Enter** key during the process. Once you change the current value, store it by pressing Start/Enter button again. To stop discharging press Batt **Type/Stop** key once. The audible sound indicates you at the end of process.

BATTERY METER TESTING

Lithium battery internal resistance is one of the important index about battery discharge capacity and efficiency. We can know battery performance and the matching of each battery by getting the battery resistance value. The lithium battery internal resistance value tested by this charger is relative (not absolute), which is tested under the testing voltage. But it can also know the battery performance and matching through the relative value. If you want more battery performance comparison, you had better put them under the same voltage to detect. For example, to compare two 3-cells batteries, you should ensure that the total voltage is consistent. Testing in the single voltage of 4,20V, the test data is smaller the performance better and the data more close to the battery the better matching nature.

```
Test Lixx Internal
    Resistance
```
Display

Start
Enter

Interface of the internal Resistance Testing

Press ENTER to enter the menu

```
Measuring IR
    Wait Dlease
```
Display

Start
Enter

Show the data of battery pack IR

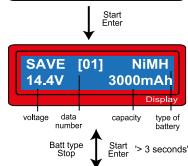```
1:026 050 044 MΩ
1:039 042 044 MΩ
```
Display

Press 'INC' to check the total data of the battery pack IR
(Press 'INC' again to back to show the data of the single cell IR)

## SAVE DATA PROGRAM

It has the data storage and load program for your convenience. This feature can store up to 5 battery data by number that represent the individual specification of the batteries you are using. They can be called back for the process of charging or discharging without setting up the program again. To set up the parameter value in the program, press START/ENTER key to make it blink then change the value with INC or DEC key.

PROGRAM SELECT
SAVE DATA
*Display*

Program select.

SAVE [01] NiMH
14.4V 3000mAh
*Display*

voltage, data number, capacity, type of battery
Batt type Stop — Start Enter '> 3 seconds'

The parameter value setting up in this screen does not affect charge or discharge process. They only represent the specification of the battery. The following screens will automatically be displayed exactly matched battery type you set up. The example shows the battery pack of NiMH, 12cells and 3000mAh of capacity.

NiMH CHARGE At*
CUR LIMIT 5.0A
*Display*
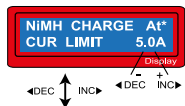
Set up the charge current for manual charge mode, or the current limit for automatic charge mode. Each mode can be switched by pressing INC and DEC button at the same time when the current field is blinking.

NiMH DISCHARGE *
1.0A 11.0V
*Display*
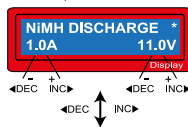
Setting up discharge current and final voltage.

NiMH CYCLE *)
DCHG>CHG 3
*Display*
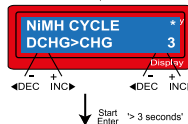
Setting up the sequence of charge and discharge, and the cycling number.

Save ...
*Display*

Saving the data.

# LOAD DATA PROGRAM

This program calls back the data that was stored at 'Save Data' program. To load the data, press Start/Enter key once to blink the data number field and select the number using INC or DEC key then press Start /Enter key for more than 3 seconds.
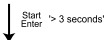
```
PROGRAM SELECT
        LOAD DATA
              Display
```
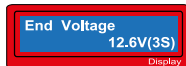Program select

Start
Enter
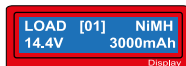
```
LOAD [01]   NiMH
14.4V   3000mAh
              Display
```
Select the data number you wish to load.
The data matched with the number will be displayed at this time.

Start
Enter   '> 3 seconds'

```
Load . . .

              Display
```
Loading the data.

# INFORMATION DURING THE PROCESS

You can inquire various information on LCD screen during charging or discharging process. When you press DEC button the charger shows the establishment of user settings. And also you can monitor the voltage of individual cell by pressing INC button when the individual connection cable is linked to the Lithium battery being processed.
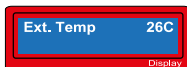
```
End Voltage
           12.6V(3S)
              Display
```
◄ DEC
Set-voltage protection

```
Capacity   Cut-Off
ON   5000mAh
              Display
```
◄ DEC
Set the charge-discharge capacity of the protection.

```
Safety   Timer
ON   200min
              Display
```
◄ DEC
Set the charge and discharge time protection.

| Ext. Temp        26C |
|---|
| Display |

◄DEC ↓

The external temperature only will be displayed when using the thermal probe.

| IN   Power    Voltage |
|---|
| 12.56V |
| Display |

The present voltage of input DC power.

| 4.14  4.16  4.09 |
|---|
| 0.00  0.00  0.00 |
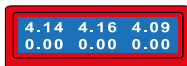
Using the individual connection cable to the battery, you can check the individual voltage of each cell in the battery pack. When connect the cable to the port on the right side of the charger the program shows the voltage of each cells for maximum 6 cells in sequence. To utilise this feature, the battery pack must have output connector that linked to each cells.

## WARNIG / ERROR MESSAGES

It 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.

| REVERSE POLARITY |
|---|
| Display |

The output is connected to a battery with incorrect polarity.

| CONNECTION BREAK |
|---|
| Display |

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.

| SHORT ERR |
|---|
| Display |

There was a short-circuit at OUTPUT. Please check the charging leads.

| INPUT VOL ERR |
|---|
| Display |

The voltage of input power drops below the limit.

| VOL SELECT ERR |
|---|
| Display |

The voltage of Lithium battery pack was selected incorrectly. Verify the voltage of battery pack carefully.

**BREAK DOWN**
*Display*

There happens the malfunction at the charger circuit by any reason.

**BATTERY CHECK LOW VOLTAGE**
*Display*

The processor detects the voltage is lower than you set at Lithium program. Please check the cell count of the battery pack.

**BATTERY CHECK HIGH VOLTAGE**
*Display*

The processor detects the voltage is higher than you set at Lithium program. Please check the cell count of the battery pack.

**BATTERY VOLTAGE CELL LOW VOL**
*Display*

The voltage of one of the cell in the Lithium battery pack is too low. Please check the voltage of the cell one by one.

**BATTERY VOLTAGE CELL HIGH VOL**
*Display*

The voltage of one of the cell in the Lithium battery pack is too high. Please check the voltage of the cell one by one.

**BATTERY VOL ERR CELL CONNECT**
*Display*

There are bad connection at the individual connector. Please check the connector and cables carefully.

**TEMP OVER ERR**
*Display*

The internal temperature of the unit goes too high. Cool down the unit.

**CONTROL FAILURE**
*Display*

The processor can not continue to control the feeding current by any reason. The unit needs to be repaired.

**Battery Pack IR 0mΩ**
*Display*

The battery balance port or the power line to connect incorrect.

**1: --- --- --- mΩ**
**4: --- --- --- mΩ**
*Display*

# WARRANTY CONDITIONS & LIABILITY DISCLAIMER

If material defects or manufacturing faults should arise in a product distributed or manufactured by RC-Plus, a division of JSP Group Intl BVBA, and purchased by a consumer, we RC-Plus acknowledge the obligation to correct those faults or defects within the limitations described below. This manufacturers warranty is in addition to, and does not affect, the legal or contractual rights of the consumer which arise from the purchase of such products. RC-Plus guarantees the consumer that its products are free from material, manufacturing, and construction faults, as determined by the general state of knowledge and technology valid at the time of manufacturing. The fault responsible for causing the damage must be proven to have been present in the product at this time. Claims for compensation arising from consequential damage or product liability will not be considered valid unless they fall under peremptory provisions of the law. If material defects or manufacturing faults should arise in a product distributed or manufactured by RC-Plus in the European community (EC) and purchased by a consumer, then RC-Plus undertakes to correct those defects within the limitations described below. This manufacturer's declaration does not affect the consumer's legal or contractual rights regarding defects arising from the purchase contract between the consumer and the dealer or reseller.

## Extend of the Warranty

If a claim is made under warranty, we take at our discretion to repair or replace the defective goods. We will not consider supplementary claims, especially for reimbursement of costs relating to the defect (e;g. installation / removal costs) and compensation for consequent damages unless they are allowed by statute. This does not affect claims on legal regulations, especially according to the product liability law.

## Provisions of the Warranty

The purchaser is required to make the warranty claim in writing, and must enclose original proof of purchase (e.g. invoice, receipt, delivery note) and the appropriate warranty card. He must send the defective goods to our **local representatives or directly to RC-PLUS, a division of JSP Group Intl BVBA, Geelseweg 80, 2250 Olen, Belgium at his own risk and cost.**
The purchaser should state the material defect or manufacturing fault, or symptoms of the fault, as accurate as possible, so that we can check if our warranty obligation is applicable. The goods are transported from the consumer to us, and from us to the consumer, entirely at the risk and cost of the consumer.

## Invalidation of the Warranty

The consumer cannot make a claim under warranty when the fault is affecting the use of the product arising from natural wear, competition use, or improper use (including installation) or external forces. The consumer's adherence to the building and operating instructions relevant to the model, including the installation, operation, use of, and maintenance of, model-related components cannot be supervised by RC-PLUS. Therefore RC-PLUS is in no way liable for loss, damage, or costs resulting from improper use, or behaviour in any way connected to the above described provisions. Unless otherwise required by law, RC-PLUS is in no way whatever liable to provide compensation for damages arising from the improper use of the model (including personal injury, death, damage to buildings, loss of turnover, loss of business, or interruption of business, or any other direct, or indirectly caused, consequential damage).

# WARRANTY CONDITIONS & LIABILITY DISCLAIMER

**Duration of Validity**

The claim period is 24 months from the date of purchase of the product by the consumer from a dealer in the European Community (EC) counted from the date of purchase. The claim period is 12 months from the date of purchase of the product by the consumer from a dealer outside the European Community (EC) counted from the date of purchase. If a defect arises after the end of the claim period, or if evidence or documents required according to this declaration in order to make the claim valid are not presented until after this period, then the consumer forfeits any rights or claims from this declaration. The guarantee period is not prolonged by the granting of any claims within the framework of this warranty, especially in the case of repair or replacement. The guarantee period also does not restart in such cases.

**Warranty Expiration**

If we do not acknowledge the validity of a claim based on this declaration within the claim period, all claims based on this declaration will expire after six months from the time of registering the claim; however this cannot occur prior to the end of the claim period.

**Applicable Law**

This declaration, and the claims, rights and obligations arising from it, are based exclusively on the pertinent Belgium Law, without the norms of international private law, and excluding UN retail law. Place of fulfilment for liabilities arising from this declaration is Olen, Belgium. Court of jurisdiction is Turnhout, Belgium.

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WEEE: At the end of this device's useful life, please remove all the batteries and dispose of them separately. Take electrical appliances to the local collection points for waste electrical and electronic equipment. Other components can be disposed of in domestic refuse.
Thank you for your co-operation!

# Declaration of Conformity

## RC-PLUS PLUS POWER 80 AC/DC

RC-PLUS, a division of JSP Group Intl BVBA declares under sole responsibility that the battery charger PLUS POWER 80 AC/DC to which this declaration relate, conforms with the following LVD standards;

EN 60335-1:2012 +A11:2014
EN 60335-2-29:2004 +A2:2010

The battery charger PLUS POWER 80 AC/DC also conforms with the following EMC standards;

EN 55014-1:2006 +A1:2009 +A2:2011
EN 55014-2:1997 +A1:2001 +A2:2008
EN 61000-3-2:2014
EN 61000-3-3:2008

Observing the provision of 2004/108/EG directive of 15 December 2014.
The battery charger also conforms with the requirements in;
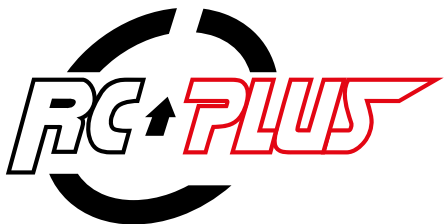
EN 62233:2008

Olen - Belgium
12 December 2016

Stefan Engelen
Ceo

C E