

# SKYRC

## **S60** AC Balance Charger / Discharger



## Instruction Manual

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Congratulations on your choice of SKYRC S60 AC Input Professional Balance Charger/Discharger. This unit is simple to use, but the operation of a sophisticated automatic charger such as SKYRC S60 does require some knowledge on the part of the user. These operating instructions are designed to ensure that you quickly become familiar with its functions. It is therefore important that you read right through the Operating Instructions, Warning and Safety Notes before you attempt to use your new charger for the first time. We hope you have many years of pleasure and success with your new battery charger.

SkyRC S60 is an AC input charger/discharger with compact size (112x106x54mm). Like most SkyRC chargers, it supports TVC (Terminal Voltage Control), Battery Meter and can be connected to PC for PC control and firmware upgrade. And there are Automatic Charging Current Limit, Capacity Limit, Temperature Threshold and Processing Time Limit for maximum safety.

The maximum charging power of S60 is 60W with maximum charging current 6A and discharging current 2A. It is a high-performance micro processor control charge/discharge station with battery management suitable for use with all current battery types, LiPo, Lilon, LiFe, NiCd, NiHM, PB and also new generation LiHV with end voltage 4.35V.

Please BE SURE to read these INSTRUCTIONS, WARNING and SAFETY NOTES before you use the charger for the first time.

It can be dangerous to mis-handle batteries and battery chargers, as there is always a risk of batteries catching fire and exploding.

# INTRODUCTION

Please read this entire operating manual completely and attentively before using this product, as it covers a wide range of information on operating and safety. Or please do use this product in company with a specialist!



## ***Optimized Operating Software***

SkyRC S60 features the so-called AUTO function that set the feeding current during the process of charging or discharging. Especially for lithium batteries, it can prevent the overcharging which may lead to an explosion due to the user's fault. It can disconnect the circuit automatically and alarm once detecting any malfunction. All the programs of this product were controlled through two way linkage and communication, to achieve the maximum safety and minimize the trouble. All the settings can be configured by users!

## ***Battery Memory (Data Store/Load)***

The charger can store up to 10 different charge/discharge profiles for your convenience. You can keep the data pertaining to program setting of the battery of continuous charging or discharging. Users can call out these data at any time without any special program setting.

## ***Terminal Voltage Control(TVC)***

The charger allows user to change the end voltage. (for expert user only)

## ***PC Control Software "Charge Master"***

The free "Charge Master" software gives you unparalleled ability to operate the charger through the computer. You can monitor pack voltage, cell voltage and other data during the charging, view charge date in real-time graphs. And you can initiate, control charging and update firmware from "Charge Master".

## ***Internal Independent Lithium Battery Balancer***

SkyRC S60 employs an individual-cell-voltage balancer. It isn't necessary to connect an external balancer for balance charging.

## ***Balancing Individual Cells Battery Discharging***

During the process of discharging, SkyRC S60 can monitor and balance each cell of the battery individually. Error message will be indicated and the process will be ended automatically if the voltage of any single one cell is abnormal.

## ***Adaptable to Various Type of Lithium Battery***

SkyRC S60 is adaptable to various types of lithium batteries, such as LiPo, Lilon, LiFe and the new LiHV batteries.

## ***Fast and Storage Mode of Lithium Battery***

Purposes to charge lithium battery varies, 'fast' charge reduce the duration of charging, whereas 'store' state can control the final voltage of your battery, so as to store for a long time and protect useful time of the battery.

# SPECIAL FEATURES

## ***Re-Peak Mode of NiMH/NiCd Battery***

In re-peak charge mode, the charger can peak charge the battery once, twice or three times in a row automatically. This is good for making certain the battery is fully charged.

## ***Delta-peak Sensitivity for NiMH/NiCd***

Delta-peak sensitivity for NiMH/NiCd battery: The automatic charge termination program based on the principle of the Delta-peak voltage detection. When the battery's voltage exceeds the threshold, the process will be terminated automatically.

## ***Cyclic Charging/Discharging***

1 to 5 cyclic and continuous process of charge > discharge or discharge > charge is operable for battery refreshing and balancing to stimulate the battery's activity.

## ***Automatic Charging Current Limit***

You can set up the upper limit of the charging current when charging your NiMH or NiCd battery, it is useful for the NiMH battery of low impedance and capacity in the 'AUTO' charging mode.

## ***Battery Meter***

The user can check battery voltage and battery internal resistance.

## ***Capacity Limit***

The charging capacity is always calculated as the charging current multiplied by time. If the charging capacity exceeds the limit, the process will be terminated automatically when you set the maximum value.

## ***Temperature Threshold\****

The battery's internal chemical reaction will cause the temperature of the battery to rise. If the temperature limit is reached, the process will be terminated.

*\* This function is available by connecting optional temperature probe, which is not included in the package.*

## ***Processing Time Limit:***

You can also limit the maximum process time to avoid any possible defect.

# WARNING 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.**

- ⚠ Never leave the charger unattended when it is connected to its power supply. If any malfunction is found, **TERMINATE THE PROCESS AT ONCE** 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 AC input voltage is 100~240V AC
- ⚠ This charger and the battery should be put on a heat-resistant, nonflammable and nonconductive surface. Never place them on a car seat, carpet or similar. Keep all the inflammable volatile materials away from 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. It can cause fire or explosion due to overcharging.

## Standard Battery Parameters

|                        | LiPo          | Lilon         | LiFe          | LiHV          | NiCd          | MiMH          | Pb         |
|------------------------|---------------|---------------|---------------|---------------|---------------|---------------|------------|
| Nominal Voltage        | 3.7V/cell     | 3.6V/cell     | 3.3V/cell     | 3.7V/cell     | 1.2V/cell     | 1.2V/cell     | 2.0V/cell  |
| Max Charge Voltage     | 4.2V/cell     | 4.1V/cell     | 3.6V/cell     | 4.35V/cell    | 1.5V/cell     | 1.5V/cell     | 2.46V/cell |
| Storage Voltage        | 3.8V/cell     | 3.7V/cell     | 3.3V/cell     | 3.85V/cell    | n/a           | n/a           | n/a        |
| Allowable Fast Charge  | ≤1C           | ≤1C           | ≤4C           | ≤1C           | 1C-2C         | 1C-2C         | ≤0.4C      |
| Min. Discharge Voltage | 3.0-3.3V/cell | 2.9-3.2V/cell | 2.6-2.9V/cell | 3.1-3.4V/cell | 0.1-1.1V/cell | 0.1-1.1V/cell | 1.8V/cell  |

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.

# WARNING AND SAFETY NOTES

## ⚠ 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 (Explosion hazard).

Batteries that require a different charge technique from NiCd, NiMh, LiPo or Gel cell (Pb, Lead acid).

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 adequate current for charging or discharging?

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.

## ⚠ 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 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 battery manufacturer about charging methods, recommended charging current and charging time. Especially, the lithium battery should be charged according the charging instruction provided by the manufacturer strictly.



Attention should be paid to the connection of lithium battery especially.

Do not attempt to disassemble the battery pack arbitrarily.

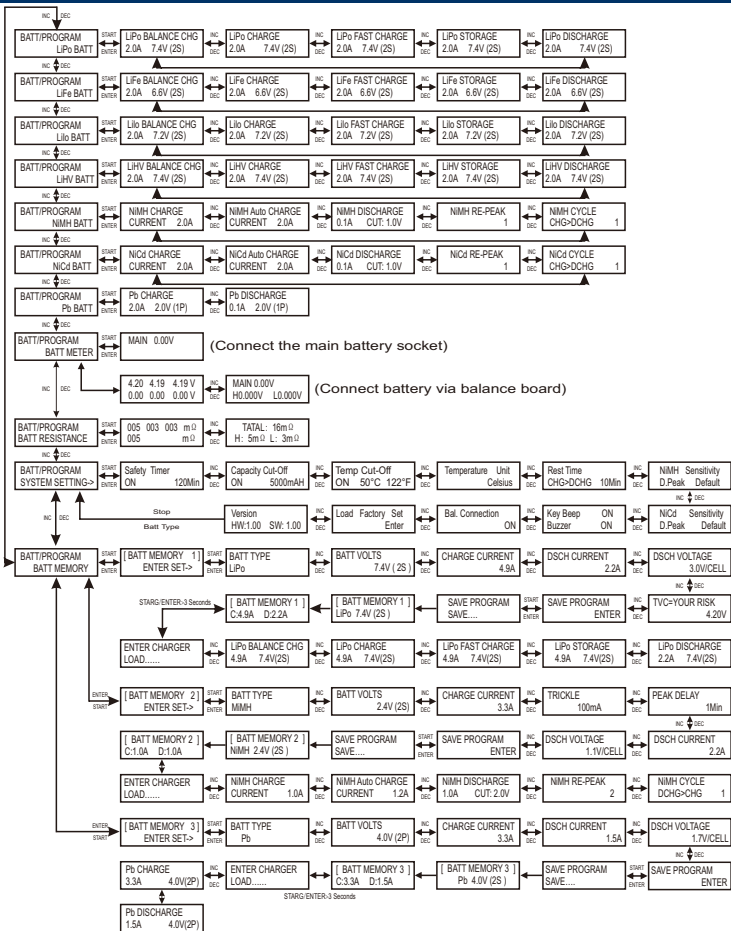
Please get highlighted that lithium battery packs can be wired in parallel and in series. In the parallel connection, the battery's capacity is calculated by multiplying single battery capacity by the number of cells with total voltage stay the same. The voltages imbalance may cause fire or explosion. Lithium battery is recommended to charge in series.

## ⚠ Discharging

The main purpose of discharging is to clean 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 charging. The final discharge voltage should be set up correctly to avoid deep-discharging. Lithium battery can not be discharged to lower than the minimum voltage, or it will cause a rapid loss of capacity or a total failure. Generally, lithium battery doesn't need to be discharged. Please pay attention to the minimum voltage of lithium battery to protect the battery.

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 NiCd and NiMH batteries are suffering from memory effect. NiCd has more memory effect than NiMH.

# PROGRAM FLOW CHART



**BATT PROG / STOP Button:**

It is used to stop the progress or go back to previous step/screen

**DEC Button:**

It is used to go through the menus and decrease the parameter value

**INC Button:**

It is used to go through the menus and increase the parameter value

**ENTER / START Button:**

It is used to enter parameter or store parameter on screen.

When you are willing to alter the parameter value in the program, press the START/ENTER button to make it blink then change the value by pressing DEC and INC button. The value will be stored by re-pressing the START/ENTER button. If there is another parameter can be altered in the same screen, when you confirm the first parameter value, the next parameter value will start to blink which means it is ready to alert.

When you are willing to start the progress, press and hold the START/ENTER button for 3 seconds. When you are willing to stop the progress or go back to previous step/screen, press the BATT PROG/STOP button once.

When you power on the charger, it will enter LiPo Battery balance program directly. You could change the mode (balance mode, normal charge mode, fast charge mode, store mode or discharge mode), enter the desired charging/discharging mode, set the referred parameter and start the progress.

If you have no request for LiPo Battery program, please press the BATT PROG/STOP button to enter BATT PROGRAM screen.

# OPERATING PROGRAM

Here is the detailed procedure to make the charger work. All the screens and operations will take Li-Po BALANCE CHARGE program for example,

## 1. Connection

### 1). Connecting to power source

It is an AC charger only.

Please insert the AC power cord to the wall socket (100-240V) directly to power it on.

### 2). Connecting the battery

Important!!! Before connecting a battery it is absolutely essential to check one last time that you have set the parameters correctly. If the settings are incorrect, the battery may be damaged, and could even burst into flames or explode. To avoid short circuits between the banana plugs, always connect the charge leads to the charger first, and only then to the battery. Reverse the sequence when disconnecting the pack.

### 3). Balance Socket

**In default setting, for safety issue, it requests to use balance charging wire with balance board to charge Lithium batteries in all modes. If the charging battery has no balance wire, please disable this function in system setting program as following,**



The balance wire attached to the battery must be connected to the charger with the black wire aligned with the negative marking. Take care to maintain correct polarity! (See the wiring diagram below.)

This diagram shows the correct way to connect your battery to the SKYRC S60 while charging in the balance charge program mode.



## WARNING:

Failure to connect as shown in this diagram will damage this charger. To avoid short circuit between the charge lead always connect the charge cable to the charger first, then connect the battery. Reverse the sequence when disconnecting.

## 2. Getting started

Locate the flowcharts show the entire programming menu. It is highly recommended to have these flowcharts handy while learning to operate this charger.

There are two main ways in which to set the charger.

- (1) A memory profile is available for setting and storing pertinent information for up to 10 different batteries. Once a battery's information is stored into a memory it will be retained until changed again manually. Recalling a battery's memory number makes the charger instantly ready to go!
- (2) If you do not wish to use the battery memories, this charger can be manually set before each use.

For following step, all are basing on manually set

BATT/PROGRAM  
LiPo BATT

START/ENTER

LiPo BALANCE CHG  
2.0A 11.1V (3S)

START/ENTER

LiPo BALANCE CHG  
2.0A 11.1V (3S)

START/ENTER

LiPo BALANCE CHG  
2.0A 11.1V (3S)

START/ENTER

LiPo BALANCE CHG  
2.0A 11.1V (3S)

START/ENTER  
> 3 Seconds

BATTERY CHECK  
WAIT...

R: 3SER S: 3SER  
CANCEL(STOP)

### 3. BATT/PROGRAM Select

Press INC and DEC to go through all the programs and press START/ENTER to enter LiPo BATT Program.

### 4. Mode Select

Press INC and DEC to go through all the modes and press START/ENTER to enter LiPo Balance Charge Mode.

### 5. Battery Setting

Press START/ENTER, the current value will start to blink, press INC and DEC to change the value and press START/ENTER to confirm your setting.

At the same time, the battery cells number will start to blink, press INC and DEC to change the value and press START/ENTER to confirm your setting.

### 6. Program Start

Press and hold START/ENTER for 3 seconds to start the program.

The charger is detecting the battery cell.

R shows the number of cells detected by the charger and S is the number of cells set by you at the previous screen. If both numbers are not identical, press STOP to go back to previous screen to recheck the number of cells of the battery pack before going ahead.

# OPERATING PROGRAM

R: 3SER S: 3SER  
CONFIRM(CENTER)

START/ENTER

LP4s 1.5A 12.14V  
BAL 000:50 00022

R shows the number of cells detected by the charger and S is the number of cells set by you at the previous screen. If both numbers are identical, press START/ENTER to start charging process.

## 7. Charging Status Monitor

During charge process, real-time status will be showed as left screen.

## VARIOUS INFORMATION DURING THE PROCESS

Press INC or DEC during charging or discharging process, you can inquire various information on LCD screen .

LP4s 1.5A 12.14V  
BAL 000:50 00022

Real-time status: battery type, battery cell, charge current, battery voltage, elapsed time and charged capacity

↕ INC ▶

4.07 4.06 4.11 U  
0.00 0.00 0.00 U

Voltage of each cell in the battery pack when the battery is connected with balance lead.

▶ ↕ INC

Fuel= 90%  
Cell= 4.10V

Charged capacity percentage and average cell voltage of the battery pack.

LP4s 1.5A 12.14V  
BAL 000:50 00022

◀ ↕ DEC

End Voltage  
12.60(3S)

Final voltage when the program ends.

◀ ↕ DEC

Ext. Temp ----  
Int. Temp 37°C

Internal temperature.  
Temperature probe is needed to show external temperature.

◀ ↕ DEC

Temp Cut-Off  
50°C

Cut off temperature

◀ ↕ DEC

Safety Time  
ON 200min

Safety timer ON and duration of time in minutes.

◀ ↕ DEC

Capacity Cut-Off  
ON 500mAh

Capacity cut-off ON and the setting value of capacity.

## 8. Program Stop

During the charging process, press STOP to stop the charging process.

## 9. Program Complete

When the charging process finishes, an audible sound will be heard.

### Charging Program

Depends on different battery type, the operation programs are different.

| Batt Type                     | Operation Program | Description  |
|-------------------------------|-------------------|--|
| LiPo<br>LiHV<br>Lilon<br>LiFe | CHARGE            | This charging mode is for charging LiPo/LiHV/LiFe/Lilon battery in normal mode.  |
|                               | DISCHARGE         | This mode is for discharging LiPo/LiHV/LiFe/Lilon battery.   |
|                               | STORAGE           | This program is for charging or discharging lithium battery which will not be used for long time.  |
|                               | FAST CHG          | The charging capacity may be a bit smaller than normal charging but the process time will be reduced.  |
|                               | BAL CHARGE        | This mode is for balancing the voltage of lithium-polymer battery cells while charging.  |
| NiMH<br>NiCd                  | CHARGE            | The charger will charge NiMH and NiCd batteries using the charge current set by the user.  |
|                               | AUTO CHG          | In this program the charger detects the condition of the battery which is connected to the output and automatically charges the battery.<br><b>Note: you should set up the upper limit of the charge current to avoid damage by excessive feeding current. Some batteries of low resistance and capacity can lead to higher current.</b> |
|                               | DISCHARGE         | This mode is for discharging NiMH/NiCd battery.  |
|                               | RE-PEAK           | In re-peak charge mode, the charger can peak charge the battery once, twice or three times in a row automatically. This is good for confirming the battery is fully charged, and for checking how well the battery receives fast charges.  |
|                               | CYCLE             | 1 to 5 cyclic and continuous process of charge>discharge or discharge>charge is operable for battery refreshing and balancing to stimulate the battery's activity.   |
| Pb                            | CHARGE            | This mode is for charging Pb battery.  |
|                               | DISCHARGE         | This mode is for discharging Pb battery.   |

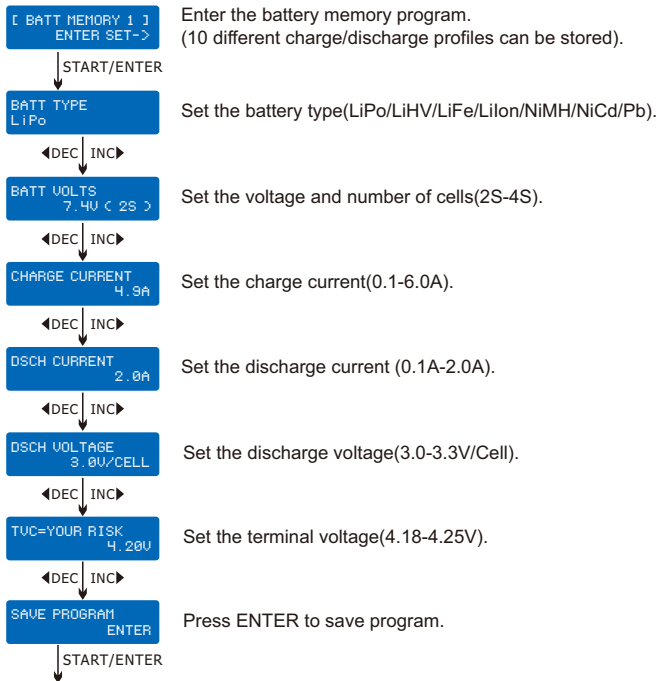
# BATTERY MEMORY SET AND CALL OUT

The charger can store up to 10 different charge/discharge profiles for your convenience, and the stored profiles can be recalled quickly without having to go through the setup process.

When you are willing to alter the parameter value in the program, press START/ENTER to make it blink then change the value with INC or DEC. The value will be stored by pressing START/ENTER once.

Note: All following screen are taking 2S(7.4V) LiPo battery for example.

## 1. Battery Memory Set





SAVE PROGRAM  
SAVE .



[ BATT MEMORY 1 ]  
LiPo 7.4V (2S)

Indicate the battery type and battery cell of the saved profile.



[ BATT MEMORY 1 ]  
C: 4.9A D: 2.2A

Indicate the charge and discharge current of the saved profile.  
Press the START/ENTER for 3 seconds to call out the memory.

START/ENTER  
>3 Seconds



ENTER CHARGER  
LOAD

Load the memory set



LiPo BALANCE CHG  
4.9A 7.4V(2S)

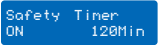
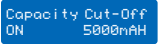
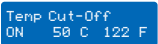
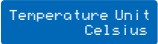
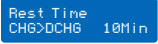
Press START/ENTER for 3 seconds to start the process.

## 2. Battery Memory Call Out

## SYSTEM SETTING

It will be operated with the default value of the essential user settings when it is powered on 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 to make it blink then change the value with INC or DEC. The value will be stored by pressing START/ENTER once.

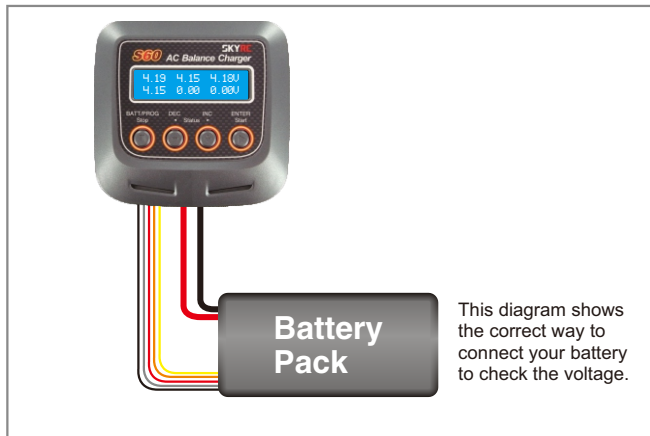
| ITEM   | SELECTION                                 | DESCRIPTION   |
|--|---|---|
|    | OFF/<br>ON<br>(1-720 Min)                 | When you start a charge process, the integral safety timer automatically starts running at the same time. This is programmed to prevent overcharge the battery if it proves 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. |
|    | OFF/<br>ON<br>(100-50000 mAh)             | This program sets the maximum charge capacity that will be supplied to the battery during charge. If the delta peak voltage is not detected nor the safety timer expired by any reason, this feature will automatically stop the process at the selected capacity value.  |
|    | OFF/<br>ON<br>(20°C/68°F -<br>80°C/176°F) | The battery's internal chemical reaction will cause the temperature of the battery to rise. If the temperature limit is reached, the process will be terminated.  |
|  | Celsius<br>Fahrenheit                     | You can choose the temperature displayed by Celsius or Fahrenheit as you like.  |
|  | 1-60Min                                   | A rest time allowing the battery to cool down between charging/discharging cycle.   |

| ITEM                               | SELECTION                        | DESCRIPTION  |
|------------------------------------|----------------------------------|--|
| NiMH Sensitivity<br>D.Peak Default | Default: 4mV/Cell<br>3-15mV/Cell | This program is for NiMH/NiCd battery only. When the charger detects the delta peak value reaches the value you set, the charger will say the battery is fully charged.  |
| NiCd Sensitivity<br>D.Peak Default |                                  |  |
| Key Beep ON<br>Buzzer ON           | OFF/ON                           | The beep sounds at every time touching the buttons to confirm your action. The beep or melody sounded at various times during operation to alert different mode changes.   |
| Bal. Connection<br>ON              | OFF/ON                           | For safety issue, when charging Lithium batteries, you are requested to connect the balance wire of the battery to balance sockets in any modes, such as Fast Charge, Storage Mode. This function can be disable here. |
| Load Factory Set<br>Enter          |                                  | Press ENTER to load factory default setting.   |
| Version<br>HW: 1.00 FH: 1.10       |                                  | It indicates the hardware and firmware version.  |

# BATTERY METER

The user can check battery's total voltage, the highest voltage, the lowest voltage and each cell's voltage.

Please connect the battery to the charger main battery lead to battery socket and balance wires to balance socket.



BATT/PROGRAM  
BATT METER

Press the START/ENTER to enter the Lithium Battery Meter program.

START  
ENTER

4.20 4.19 4.19 U  
4.18 0.00 0.00 U

The screen indicate each cell's voltage.

INC

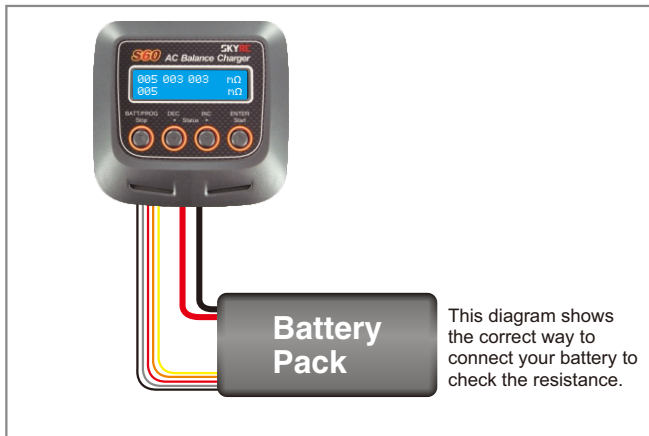
MAIN 16.76U  
H4.200U L4.182U

The screen indicate the total voltage, the highest voltage and the lowest voltage.

# BATTERY RESISTANCE METER

The user can check battery's total resistance, the highest resistance, the lowest resistance and each cell's resistance.

Please connect the battery to the charger main battery lead to battery socket and balance wires to balance socket.



BATT/PROGRAM  
BATT RESISTANCE

Press the START/ENTER to enter the Lithium Battery Resistance program.



012 005 005 nΩ  
006 nΩ

The screen indicate each cell's resistance.



TATAL: 28mΩ  
H: 12nΩ L: 5nΩ

The screen indicate the total resistance, the highest resistance and the lowest resistance.

## WARNING AND ERROR MESSAGE

In case of an error the screen will display the cause of error and emit an audible sound.

|                                  |   |
|----------------------------------|---|
| REVERSE POLARITY                 | Incorrect polarity connected.   |
| CONNECTION BREAK                 | The battery is interrupted.   |
| CONNECT ERROR<br>CHECK MAIN PORT | The battery connection is wrong.  |
| BALANCE CONNECT<br>ERROR         | The balance connect is wrong.   |
| CELL ERROR<br>LOH VOLTAGE        | Voltage of one cell in the battery pack is too low.   |
| CELL ERROR<br>HIGH VOLTAGE       | Voltage of one cell in the battery pack is too high.  |
| CELL ERROR<br>VOLTAGE- INVALID   | Voltage of one cell in the battery pack is invalid.   |
| CELL NUMBER<br>INCORRECT         | The cell number is wrong.   |
| INT . TEMP . TOO HI              | The internal temperature of the unit goes too high.   |
| EXT . TEMP . TOO HI              | The external temperature of the battery goes too high.  |
| OVER CHARGE<br>CAPACITY LIMIT    | The battery capacity is more than the maximum capacity which the user sets.                               |
| OVER TIME LIMIT                  | The charging time is longer than the maximum charging time which the user sets.                           |
| BATTERY HAS FULL                 | The battery voltage is higher than the maximum voltage which the user sets when charging in balance mode. |

## USING THE CHARGE CONTROL SOFTWARE “CHARGE MASTER”

The free “Charge Master” software gives you unparalleled ability to operate the charger through the computer. You can monitor pack voltage, cell voltage and other data during the charging, view charge date in real-time graphs. And you can initiate, control charging and update firmware from “Charge Master”.

In order to connect the charger to the computer and use the “Charge Master”, you are required to use a USB cable which is not included in this package. The cable must be terminated on one end with “A” plug and the opposite end is terminated with “micro-B” plug which can connect to charger directly.

The “Charge Master” can be download from [www.skyrc.com](http://www.skyrc.com).

### THE SET CONTAINS

1. SKYRC S60 Charger
2. Power Cord
3. 18AWG Charging Cable with XT60 Connector



# SPECIFICATION

- AC Input Voltage : 100-240V
- Display Type: 2x16 LCD
- Case Material: Plastic
- Case Size: 112x106x52mm
- PC Communications: USB Port for PC Control & Firmware Upgrade
- External Port: 2-4S Balance Socket-XH, Temperature Probe Socket, Battery Socket, Micro USB Port for PC.
- Delta Peak Detection for NiMH/NiCd: 3-15mV/cell / Default: 4mV/cell
- Battery Cutoff Temperature: 20°C/68°F-80°C/176°F(adjutable)
- Charge Voltage: NiMH/NiCd: Delta peak detection
  - LiPo: 4.18-4.25V/cell
  - LiHV:4.25-4.35V/cell
  - LiFe: 3.58-3.7V/cell
  - Lilon: 4.08-4.2V/cell
- Balance Current: 200mA/cell
- Reading Voltage Range: 0.1-26.1V/cell
- Battery Types/Cells: LiPo/LiHV/LiFe/Lilon: 2-4cells
  - NiMH/NiCd: 6-8cells
  - Pb: 3-6cells
- Battery Capacity Range: NiMH/NiCd: 100-50000mAh
  - LiPo/LiHV/LiFe/Lilon: 100-50000mAh
  - Pb: 100-50000mAh
- Charge Current: 0.1A-6.0A
- Safety Timer: 1-120minutes off
- Charge Wattage: 60W
- Discharge Current: 0.1A-2.0A
- Discharge Cut-off Voltage: NiMH/NiCd: 0.1-1.1V/cell
  - LiPo: 3.0-3.3V/cell      LiHV: 3.1-3.4V/Cell
  - LiFe: 2.6-2.9V/cell      Lilon: 2.9—3.2V/cell
  - Pb: 1.8V/cell
- Discharge Wattage: 10W
- Balance Cells: 2-4 cells
- Memory: 10 different charge/discharge profiles
- Charge Method: CC/CV for lithium types and lead (Pb) batteries
  - Delta-peak Sensitivity for NiMH/NiCd.



# CONFORMITY DECLARATION

SkyRC S60 satisfy all relevant and mandatory CE directives and FCC Part 15 Subpart B: 2012.

For EC directives:

The product has been tested to meet the following technical standards:

| Test Standards                      | Title  | Result  |
|-------------------------------------|--|---------|
| EN 55014-1:2006+<br>A1:2009+A2:2011 | EN 55014-1: Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus -a Part 1: Emission                        | Conform |
| EN 55014-2:1997+<br>A1:2001+A2:2008 | EN 55014-2: Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity product family standard | Conform |



This symbol means that you must dispose of electrical from the General household waste when it reaches the end of its useful life. Take your charger to your local waste collection point or recycling centre. This applies to all countries of the European Union, and to other European countries with a separate waste collection system.

# COMMONLY USED TERMS

## *Commonly used terms*

**Final charge voltage:** the voltage at which the battery's charge limit (capacity limit) is reached. The charge process switches from a high current to a low maintenance rate (trickle charge) at this point. From this point on further high current charging would cause overheating and eventual terminal damage to the pack.

**Final discharge voltage:** the voltage at which the battery's discharge limit is reached. The chemical composition of the batteries determines the level of this voltage. Below this voltage the battery enters the deep discharge zone. Individual cells within the pack may become reverse polarized in this condition, and this can cause permanent damage.

**A, mA:** unit of measurement relating to charge or discharge current.  $1000 \text{ mA} = 1 \text{ A}$  (A=Ampere, mA=Milliampere)

**Ah, mAh:** unit of measurement for the capacity of a battery (Amperes x time unit; h = hour). If a pack is charged for one hour at a current of 2 A, it has been fed 2 Ah of energy. It receives the same quantity of charge (2 Ah) if it is charged for 4 hours at 0.5 A, or 15 minutes (=1/4 h) at 8 A.

**'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).

**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.

### ***Liability exclusion***

This charger is designed and approved exclusively for use with the types of battery stated in this Instruction Manual. SkyRC accepts no liability of any kind if the charger is used for any purpose other than that stated.

We are unable to ensure that you follow the instructions supplied with the charger, and we have no control over the methods you employ for using, operating and maintaining the device. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect use and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by law, our obligation to pay compensation, regardless of the legal argument employed, is limited to the invoice value of those SkyRC products which were immediately and directly involved in the event in which the damage occurred.

### ***Warranty and service***

**THIS WARRANTY IS ONLY VALID IN THE COUNTRY OF PURCHASE AND THROUGH FORMAL DISTRIBUTOR.**

We guarantee this product to be free of manufacturing and assembly defects for a period of one year from the time of purchase. The warranty only applies to material or operational defects, which are present at the time of purchase. During that period, we will repair or replace free of service charge for products deemed defective due to those causes.

For any repair or replace service, please contact your dealer in the first instance, who is responsible for processing guarantee claims. This warranty is not valid for any damage or subsequent damage arising as a result of misuse, modification or as a result of failure to observe the procedures outlined in this manual.

# SKYRC

Manufactured by  
**SKYRC TECHNOLOGY CO., LTD.**  
[www.skyrc.com](http://www.skyrc.com)

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Printed in China ©2015.06 7504-0637-01

