HiTEC RDX1 MiNi

AC BALANCE CHARGER/DISCHARGER

INSTRUCTION MANUAL

WARNING: THE CHARGING AND DISCHARGING OF RC HOBBY BATTERIES CAN BE DANGEROUS. FAILURE TO FOLLOW THE INSTRUCTIONS AND WARNINGS IN THIS MANUAL MAY RESULT IN PROPERTY DAMAGE AND/OR LOSS OF LIFE.

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Introduction

Congratulations on purchasing Hitec's RDX1 Mini AC Balance Charger/Discharger. Featuring a compact design, this sophisticated charger boasts 65 Watts of charge power with a 0.1 - 6 Amps charge current range. The RDX1 Mini's battery management capabilities are suitable for use with most popular battery types and it features integrated balancing for two-four cells Lithium-Polymer (LiPo), Lithium-Ferrite (LiFe) and Lithium-ion (LiIon) as well as the High Voltage Lithium-Polymer (LiHV) batteries. Although simple to operate, the RDX1 Mini does require some background knowledge for successful and safe operation.

Please read this entire operating manual before using the charger. If you are unsure of its proper operation after reading the manual, please seek advice from an experienced hobbyist or someone familiar with proper battery charging procedures.

Warning

THE CHARGING AND DISCHARGING OF RC HOBBY BATTERIES CAN BE DANGEROUS. FAILURE TO FOLLOW THESE EXPLICIT WARNINGS CAN RESULT IN PROPERTY DAMAGE AND/OR LOSS OF LIFE.

⚠ **NEVER LEAVE YOUR CHARGER UNATTENDED WHILE IN OPERATION.**

⚠ **NEVER CHARGE ON OR AROUND COMBUSTIBLE MATERIALS.**

⚠ **NEVER CHARGE A DAMAGED BATTERY PACK.**

⚠ **LOW COST, NO-NAME BATTERY PACKS POSE THE MOST DANGER. WE RECOMMEND YOU ONLY USE BATTERY PACKS THAT ARE SOLD AND WARRANTIED BY A REPUTABLE COMPANY.**

⚠ **IT IS HIGHLY RECOMMENDED THAT YOU UTILIZE A SAFETY DEVICE SUCH AS A STEEL CASE OR LIPO SACK™ WHILE CHARGING LITHIUM CHEMISTRY BATTERIES.**

⚠ **IT IS HIGHLY RECOMMENDED THAT YOU KEEP AN OPERABLE "CLASS A" FIRE EXTINGUISHER IN THE CHARGING AREA.**

FAILURE TO FOLLOW THESE WARNINGS CAN BE CONSIDERED NEGLIGENCE BY THE OPERATOR AND MAY NEGATE ANY CLAIMS FOR DAMAGES INCURRED.

Warning and Safety Notes

Hitec RCD will not be held responsible for any damages or injuries that may occur by persons who fail to follow these warnings or who fail to properly follow the instructions in this manual.


Warning


Tip

Warning: Be sure to read this section for your own safety.

Caution: Be sure to read this section to prevent accidents and damage to your charger.

Tip: This section will help you maximize the performance of your charger.


Note


Caution

Note: This section will provide more detailed explanations.

These warnings and safety notes are of the utmost importance. You must follow these instructions for maximum safety. Failure to do so can damage the charger and the battery and in the worst cases, may cause a fire.


Warning

NEVER LEAVE THE CHARGER UNATTENDED WHILE IT IS CONNECTED TO ITS POWER SOURCE. IF ANY MALFUNCTION IS FOUND, TERMINATE THE PROCESS AT ONCE AND REFER TO THE OPERATION MANUAL.

⚠ **The allowable AC input voltage is 100-240V AC.**

⚠ **Keep the charger away from dust, damp, rain, heat, direct sunlight and excessive vibration.**

⚠ **If the charger is dropped or suffers any type of impact, it should be inspected by an authorized service station before using it again.**

⚠ **This charger and the battery should be put on a heat-resistant, non-flammable and non-conductive surface.**

⚠ **Never place a charger 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 can be damaged.**

⚠ **Fire or explosion can occur due to overcharging.**

⚠ **To avoid a short circuit 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 fitted with an integral charge circuit or a protection circuit
- A battery pack which consists of different types of cells (including different manufacturer's cells)
- A battery that is already fully charged or just slightly discharged and non-rechargeable batteries (these pose an explosion hazard)
- A faulty or damaged battery
- 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 YOU COMMENCE CHARGING:

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

Standard Battery Parameters

	LiPo	LiPo HV	LiIon	LiFe	NiCd	NiMH	Pb
Nominal Voltage	3.7V/cell	3.8V/cell	3.6V/cell	3.3V/cell	1.2V/cell	1.2V/cell	2.0V/cell
Max. Charge Voltage	4.2V/cell	4.35V/cell	4.1V/cell	3.6V/cell	1.5V/cell	1.5V/cell	2.46V/cell
Storage Voltage	3.8V/cell	3.85V/cell	3.7V/cell	3.3V/cell	n/a	n/a	n/a
Allowable Fast Charge	≤ 1C	≤ 1C	≤ 1C	≤ 4C	≤ 1-2C	≤ 1-2C	≤ .04C
Min. Discharge Voltage	3.0-3.3V/cell	3.1-3.4V/cell	2.9-3.2V/cell	2.6-2.9V/cell	0.1-1.1V/cell	0.1-1.1V/cell	1.8V/cell

Warning

WHEN ADJUSTING YOUR RDX1 MINI CHARGING PARAMETERS, BE SURE YOU SELECT THE PROPER BATTERY TYPE AND CELL VOLTAGE FOR THE TYPE OF CELL YOU ARE CHARGING. CHARGING BATTERIES WITH THE WRONG SETTINGS MAY CAUSE THE CELLS TO BURST, CATCH FIRE OR EXPLODE.

Charging

Before charging your batteries, it is critical that you determine the maximum allowable charge rate for your batteries. The RDX1 Mini is capable of charging at high rates that may not be suitable or safe for your particular batteries. For example, Lithium cells are typically safe to charge at 1C, or the total mAh÷1000. A 1200mAh battery would have a 1C charge rate of 1.2 amps. A 4200mAh battery would have a 1C charge rate of 4.2 amps. Some manufacturers are offering Lithium cells that can be charged at greater than 1C but this should ALWAYS be verified before charging a Lithium battery at rates higher than 1C. Voltage is just as critical as the charging amperage rate and this is determined by the number of cells in series, or "S". For example, a 3S LiPo is rated at 11.1 volts ("S" multiplied by a single LiPo cell with a nominal voltage of 3.7 volts DC. 3 cells x 3.7 volts each equals 11.1 volts DC).

Connect the battery's main leads to the charger output: red is positive and black is negative. Keep in mind that the gauge or thickness of your charging leads from the RDX1 Mini to your battery must be of an acceptable current rating to handle the applied charge current. For maximum safety and charging effectiveness, always match or exceed the main battery lead rating when assembling or selecting your charging leads. If you charge a battery at a high current rate (amperage) with a charging lead not rated for the chosen amperage, the wire could get hot, catch fire, short out and/or potentially destroy your battery and the charger.

When in doubt, always use a higher gauge wire (lower AWG number). It is common to see charging leads constructed of 14AWG, 16AWG or 18AWG wire. Always refer to recommendations from your battery manufacturer for your specific battery type and size before initiating a charge or discharge process.

Do not attempt to disassemble or modify Lithium or Lead-Acid battery packs.

Discharging

The RDX1 Mini discharging functions are for two specific purposes:

- Refreshing the capacity of a Nickel-based battery that has lost capacity over time (NiMH or NiCd).
- Reducing the voltage of a Lithium battery for safe storage.

Warning

LITHIUM CHEMISTRY BATTERY PACKS SHOULD ONLY BE DISCHARGED TO THEIR MINIMUM SAFE VOLTAGE, NO LOWER. DEEP DISCHARGING A LITHIUM CELL WILL DO PERMANENT DAMAGE. REFER TO THE STANDARD BATTERY PARAMETERS TABLE ON PAGE 6 OF THIS MANUAL FOR MINIMUM DISCHARGE VOLTAGES.

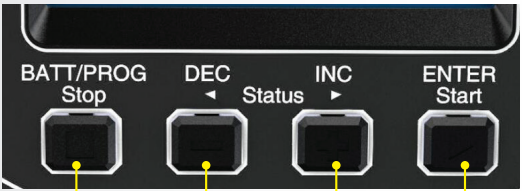
LiPo & LiHV Charge/Discharge Cycling

Lithium batteries are known to reach full capacity after a break-in period of about 10 charge/discharge cycles. We do not recommend you use the RDX1 Mini charger to do this; normal use and recharging will achieve the same results. If you wish to perform a Lithium break-in on the bench with the RDX1 Mini, discharging to minimum acceptable voltages and performing a balance charge at 1C maximum rate is recommended. If you choose to break in your Lithium batteries under normal use, charging at only 1C for the first ten cycles will help ensure full performance and service life from your Lithium cells.

Product Layout

1. **RDX1 Mini Charger**
2. **AC Cord**
3. **2 PIN T-TYPE Charge Connector**

Input Functions



BATT. Type/Stop Button
Stop the progress of the current action or cycle back to the previous step / screen.

DEC. Button
Scroll through available menus or decrease parameter values.

INC. Button
Scroll through available menus or increase parameter values.

Start/Enter Button
Stop the progress of the current action or cycle back to the previous step / screen.

BATT PROG / STOP Button: Stops a function in-progress or go back to the previous step or screen.

DEC Button: Scroll back through the menus or decrease the parameter value.

INC Button: Scroll forward through the menus or increase the parameter value.

ENTER / START Button: Enter parameters or store parameters on-screen. Start the charge/discharge process.

When changing a parameter value in the program, press the START/ENTER button to make it blink, then change the value by pressing the DEC and INC button. The value will be stored by repressing the START/ENTER button. If there is a second parameter to edit on the same screen, it will begin blinking after you confirm the first parameter value.

When you first power the charger on, it displays the last processes used. From here you can change the battery type or press enter to change the charge/discharge process, charge/discharge current rate and/or battery cell count. If you are charging a battery identical to the last one used and want to perform the same process, then simply press the start to begin that process.

Specifications | Features

AC Input Voltage	100 - 240V
Charge Power	65W
Charge Current Range	0.1-6.0A
MAX Discharge Power	10W
Discharge Current Range	0.1-2.0A
Balancing Port Current Drain	300mA/CELL
Trickling Charging Current	50mA-300mA & OFF
NiCd/NiMH Battery Cell Count	6-8 Cells
LiPo/LiHV/LiFe/LiIon Cell Count	2-4 Cells
Pb Battery Voltage	6-12V
Weight	315g
Dimensions	118 x 115 x 45mm

Optimized Operating Software:
The RDX1 Mini features an AUTO function that sets the feeding current during the process of charging or discharging in order to achieve maximum safety and minimize errors. This feature can prevent the overcharging of batteries, especially Lithium chemistry ones, which may result

Battery Memory (Data Store/Load):
The RDX1 Mini is capable of storing up to 10 different charge/discharge profiles for your convenience. Users can keep the data pertaining to any program setting for any battery to facilitate seamless charging or discharging. Saved profiles can be accessed and recalled as necessary.

Terminal Voltage Control(TVC):
For experienced users ONLY, the charger's end voltage can be reset.

Warning

Default setting is recommended. ONLY change in a controlled environment ALWAYS monitor the battery during charge process.

Feautures

Internal Independent Lithium Battery Balancer:
The RDX1 Mini employs an individual-cell-voltage balancer. It is not necessary to connect an external balancer for balance charging.

Individual Cell Balancing While Discharging:
During the discharge process, the RDX1 Mini can monitor and balance each cell of the battery individually. If the voltage of any single cell reads abnormally, an error message will display and end the process automatically.

Adaptable to Various Types of Lithium Battery:
The RDX1 Mini is adaptable to various types of lithium batteries, including LiPo, Lilon, LiFe and LiHV batteries.

Fast and Storage Mode of Lithium Battery:
Depending on your application requirements, you may choose fast charge or storage mode. Fast charge reduces the amount of time required for charging, whereas 'store' state controls the final voltage of your battery.

Multiple Lithium Battery Charge Modes
The RDX1 Mini features four methods of charging: Regular charge, Fast charge, Balance charge and Storage charge modes. We highly recommend using balance charge as it is the safest and best way to charge lithium chemistry batteries. If you plan on not using your Lithium chemistry batteries for an extended period of time, Storage charge mode is recommended to optimize your packs for long term storage and maximum lifespan

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 function is useful for ensuring a full battery charge.

Delta-Peak Sensitivity for NiMH/NiCd:
This automatic charge termination program is 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 charge > discharge or discharge > charge sessions are optimal for battery performance and balancing.

Specifications | Features Continued

Automatic Charging Current Limit:
You can set the upper limit of the charging current when charging your NiMH or NiCd battery. The 'AUTO' charging mode, however, is recommended when charging NiMH batteries with low impedance and capacity.

Battery Meter/Battery Resistance:
The user can check the battery's total voltage, the highest voltage, the lowest voltage and the voltage of each cell. The user can also check the battery's total internal resistance and the internal resistance of each cell.

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 automatically terminate according to the maximum value previously set.

Temperature Threshold*: (NiCd, NiMH ONLY)
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 an optional temperature probe which is available as a separate purchase.**

Processing Time Limit:
Protect your battery by setting a maximum time limit for charging and discharging.

Charger Connections

1.) Connecting to Power Source:

The RDX 1 Mini 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:

The safest way to set up the charger is to complete the program setup before connecting the battery, as it is absolutely essential to make sure that the parameters are setup correctly. Please refer to the propgramming section beginning on page 15 before attempting to use the charger.
Depending on the type of battery you have, you may have to use Connect your battery's connector to the XT60 output on the charger (use adapter as needed).

3.) Balance Socket:

For Lithium Batteries in all modes

The balance wire attached to the battery must be connected to the charger, with the black wire aligned with the negative marking on the right edge. Take care to maintain correct polarity. (See wiring diagram below) Depending on the type of battery you have you may have to use a balance adapter. Adapter are usually available wherever RC hobby products are sold.

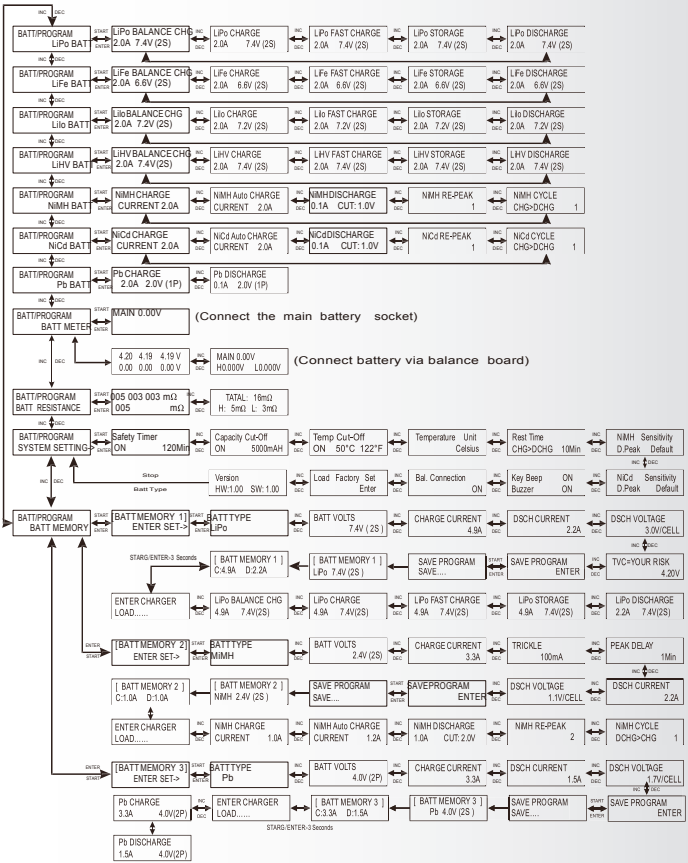
This diagram shows the correct way to connect your battery to the Hitec RDX1 Mini when charging in the balance charge program mode.

WARNING:

Failure to connect as shown in this diagram will damage your charger.

Note the polarity with the black (-) wire to the right side of each connection.

Program Flow Chart



Charger Operations

Initial Setup of the charger

After connecting the battery, you are now ready to setup the charger to charge your specific type of battery. When the charger is first powered on, you will enter the last program mode selected. The default mode of the charger is for a balance charge mode of a 2 Cell 2000 mAh Lithium Polymer battery. If this is not the battery you plan on working with, then you will need to make changes to the operation programming based on the following instruction.

Warning

BEFORE SELECTING AN OPERATION, IT IS CRITICAL THAT YOU KNOW THE TYPE OF BATTERY YOU ARE WORKING WITH AND WHAT THE MANUFACTURER RECOMMENDATIONS ARE FOR CHARGING OR DISCHARGING. FAILURE TO FOLLOW THE MANUFACTURERS RECOMMENDATIONS CAN RESULT IN DAMAGE TO THE BATTERY AND POSSIBLE EXPLOSION.

Depending on the battery type, different operations will be available. The chart below shows which operations are available for the different types of batteries the RDX1 Mini is capable of working with.

It is highly recommended that you have the flowchart handy while learning to operate this charger.

Batt Type	Operation Program	Description
LiPo LiIon LiFe LiHV	Charge	This mode is for charging LiPo/LiFe/LiIon/LiHV battery.
	Discharge	This mode is for discharging LiPo/LiFe/LiIon/LiHV battery.
	Storage	This program is for charging or discharging a Lithium battery to the storage level if it is not going to be used within 24 hours.
	Fast Chg	The charging capacity may be less 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 and is recommended the majority of the time.

Charger Operations Continued

NiMH NiCd	Charge	The charger will charge NiMH and NiCd batteries using the charge current set by the user.
	Auto Charge	In this program the user selects the maxium current and the charger will optimize the charge rate up to that current, depending on the internal resistance of the battery.
	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 confi rming the battery is fullly charged, and for topping off previously charged battery packs.
	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.

Warning

BEFORE YOU BEGIN CHARGING YOUR BATTERY, MAKE SURE YOU HAVE READ AND UNDERSTAND ALL OF THE WARNINGS AND SAFETY INFORMATION CONTAINED ON PAGES 3-7

Caution

DURING CHARGING/DISCHARGING, THE BATTERY SHOULD BE PLACED INSIDE A FIRE PROOF/RETARDANT BAG AND ON A FIRE PROOF SURFACE, AWAY FROM OTHER COMBUSTIBLE OBJECTS.

Charger Operations Continued

The following steps describe how to setup the RDX1 Mini: In this example we are setting up the charger to charge a 3 cell (11.1v) 2000mAh Lithium Polymer battery pack.

BATT/PROGRAM Select: Press the INC or DEC buttons to scroll through the battery programs, press START/ENTER to enter the Lithium Polymer Battery (LiPo BATT) Program.

MODE Select: Press the INC or DEC buttons to scroll through the battery programs, press START/ENTER to enter the Lithium Polymer Battery (LiPo BATT) Program.

BATTERY Setting: Press the INC or DEC buttons to scroll through the battery programs, press START/ENTER to enter the Lithium Polymer Battery (LiPo BATT) Program.

The battery cell number will start to blink. Press INC or DEC to change the value to the desired setting, press START/ENTER to confirm your setting.

Warning

BEFORE STARTING THE PROCESS MAKE SURE YOU HAVE SETUP THE CHARGER PROPERLY. NEVER LEAVE THE CHARGER UNATTENDED WHILE IT IS IN OPERATION.

Charger Operations Continued

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

The charger will perform a quick check to detect the number of cells. **R** shows the number of cells detected by the charger while **S** is the number of cells set by the user. If the numbers are not identical, press STOP to go back to the previous screen and recheck the number of cells in the battery pack before proceeding. If they are correct, the charger will begin the process

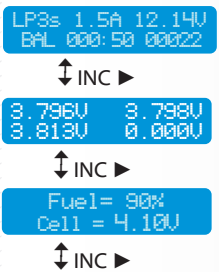
If both numbers are identical, press START/ENTER to begin the charging process.

Program Stop: You can press the STOP at anytime throughout the charge or discharge process to stop the process

Program Complete: The charger will indicate that the process is "FINISHED" and play an audible notification.

Information Displayed While Operating

Pressing INC or DEC during the charging or discharging process allows the user to scroll through a variety of information on the LCD screen.



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

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

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

Charger Operations Continued

Internal resistance of the individual cells when when the battery is connected with balance lead.

↕ INC ►

From the process screen pressing the DEC will display a variety of charger settings.

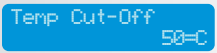
◄ ↕ DEC

Final voltage setting when the program ends.

◄ ↕ DEC

Internal and External temperature.
(Temperature probe required to show external temperature.)

◄ ↕ DEC



Cut off temperature.

Memory Preset - Data Save/Load

Safety timer ON and duration of time in minutes.

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

Memory Preset - Data Save/Load:
The Save Data and Load Data programs make it easy to store and load charge and discharge profiles for up to 10 batteries per channel. Data can be saved for each battery type and each charge mode available with the RDX1 Mini. This allows you to recall data for each battery when charging or discharging without having to set up the program over again. You can also edit settings for each saved battery.

Save Data:

From the BATT/PROGRAM menu use the + or - buttons to scroll to the BATT MEMORY program and press the ENTER/Start ▶ button to enter the battery memory program. In the corner of the screen you will see the number 1 flashing, use the + or - buttons to scroll through the memories. When you are ready to select a memory to program, press the ▶ button again to enter the memory setup menu.

Press the ▶ button again and the battery type will begin to flash. Use the + or - buttons to select the battery type (LiPo, LiFe, LiIon, LiHV, NiMH, NiCd or Pb, then press the ▶ button to confirm your selection.

Now you will use + or - buttons to scroll through the battery parameters, using the + you will make adjustments in the following order, using the - button will reverse this order.

Voltage and Number of Cells: Press the ▶ button and the number of cells will begin to flash. Use the + or - buttons to change the cell count then press the ▶ button to confirm your selection.

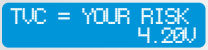
Charge Current: Press the ▶ button and the charge current value will begin to flash. Use the + or - buttons to change the charge current then press the ▶ button to confirm your selection.

Memory Preset - Data Save/Load Continued

Discharge Current: Press the ▶ button and the discharge current value will begin to flash. Use the + or - buttons to change the discharge current then press the ▶ button to confirm your selection.

Per Cell Discharge Voltage: Press the ▶ button and the per cell discharge voltage value will begin to flash. Use the + or ▶ buttons to change the per cell discharge voltage, then press the ▶ button to confirm your selection.

Warning **MAKE SURE TO FOLLOW YOUR BATTERY MANUFACTURERS RECOMMENDATIONS REGARDING DISCHARGING. FAILURE TO DO SO MAY DESTROY THE BATTERY OR RENDER IT UNSAFE FOR USE.**



Terminal Voltage: Press the ▶ button and the terminal voltage value will begin to flash. Use the + or - buttons to change the terminal voltage, and then press the ▶ button to confirm your selection.

Warning **CHANGING THE TERMINAL VOLTAGE IS ONLY INTENDED FOR EXPERT USERS, ANY CHANGES TO DEFAULT SETTINGS ARE COMPLETELY AT YOUR OWN RISK.**

Save Program: Press the ▶ button to save the program.

SAVE….. will appear momentarily while the program is written to the memory.

Once saved, the screen indicates the memory number, battery type, cell count, charge current and discharge current.

Memory Recall:

From the BATT/PROGRAM menu use the + or - buttons to scroll to the BATT MEMORY program and press ▶ button to enter the battery memory program . Use the + or - buttons to scroll through the memories. When you have found the memory you would like to use press and hold the ▶ button again to recall the memory.

Use the + or - buttons to scroll the available processes (charge, discharge, balance charge, etc.). Select the process you would like to execute for the battery, then press and hold the ▶ button for 3 seconds to begin the selected process.

Battery Meter

The user can check the battery's total voltage, the highest voltage, the lowest voltage and each cell's voltage. Connect the battery via the charger's main battery lead to the battery socket and balance wires to the balance socket as shown below.

The display indicates the current Main Voltage, Percentage of Charge, Individual Cell Voltage, and the Highest and Lowest voltages of the packs cells.

This diagram shows how to correctly connect your battery to check the voltage.

Press the START/ENTER button to access the Lithium Battery Meter program.

Indicates each cell's voltage.

Indicates the total voltage, the highest voltage and the lowest voltage.

Battery Resistance Measurement

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

Connect the battery to the charger by inserting the main battery lead to the battery socket and balance wires to the balance socket.

Press the START/ENTER button to access the Lithium Battery Resistance program.

The first screen indicates each cell's internal resistance.

Indicates the total resistance, the highest resistance and the lowest resistance.

This diagram shows how to correctly connect your battery to check internal resistance.

Advanced System Set Up

The system will be set to its default parameters when powered on for the first time. The screen displays the following information in sequence and the user can change any given value on each screen.

To change a parameter value in the program, press START/ENTER to make that value blink. Next, change the value by pressing INC or DEC. The value will be stored by pressing START/ENTER once.

Item	Selection	Description
	OFF/ON (1-720 Min) Default: 120 min	When you start a charge process, the integral safety timer automatically starts running at the same time. This is programmed to prevent overcharging of 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 battery.
	OFF/ON (100-50000mAh) Cut-off: 5000mAh	This program sets the maximum charge capacity that will be supplied to the battery during charge. If the delta peak voltage is not detected, the safety will automatically stop the process at the selected capacity value.
	OFF/ON (20°C/68°F - 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 Fahrenheit	You can choose the temperature displayed by Celsius or Farenheit as you like.
	1-60 Min	A rest time allows the battery to cool down between charging/ discharging cycle.

ITEM	SELECTION	DESCRIPTION
NiMH Sensitivity D.Peak 4mV NiCd Sensitivity D.Peak 4mV	Default: 4mV/Cell 3-15mV/Cell	This program is for NiMH/NiCd batteries only. When the charger detects that the delta peak value has reached the value set by the user, the battery will read fully charged.
Key Beep ON Buzzer ON	OFF/ON	A beep sounds with the press of each button to confirm your action. The beep or melody sounds at various times during operation to alert different mode changes.
Load Factory Set Enter		Press ENTER to load the factory default settings.
Version HW:1.00 SW:1.06		Indicates the hardware and firmware version.

Warning and Error Messages

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

REVERSE POLARITY	Reversed polarity is detected.
CONNECTION BREAK	The battery connection has been broken.
CONNECT ERROR CHECK MAIN PORT	The battery connection is incorrect.
BALANCE CONNECT ERROR	The balance connection is incorrect.
CELL ERROR LOW VOLTAGE	The Voltage of one cell in the battery pack is too low.
CELL ERROR HIGH VOLTAGE	The voltage of one cell in the battery pack is too high.
CELL ERROR VOLTAGE-INVALID	The voltage of one cell in the battery pack is invalid.
CELL NUMBER INCORRECT	The number of cells is wrong.
INT.TEMP.TOO HI	The internal temperature of the unit is too high.
EXT.TEMP.TOO HI	The external temperature of the battery is too high.
OVER CHARGE CAPACITY LIMIT	The battery capacity is more than the maximum capacity set by the user.
OVER TIME LIMIT	The charging time is longer than the maximum charging time set by the user.
BATTERY WAS FULL	The battery is already fully charged.
CONTROL FAIL	Battery pack voltage is lower than 5 volts. The RDX1 Mini cannot charge a pack with a voltage of less than 5v.

Commonly Used Terms

A, mA: Unit of measurement relating to a charge or discharge current. 1000 mA = 1A (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 2A, it has been fed 2Ah of energy. It receives the same quantity of charge (2Ah) if it is charged for 4 hours at 0.5A, or 15 minutes (=1/4 hour) at 8A.

'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).

Final Charge Voltage: The voltage at which the battery's charge limit (capacity limit) is reached after which the charge process switches from a high current to a low maintenance rate (trickle charge). From this point on, any 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 deep discharge zone. Individual cells within the pack may become reverse polarized under these conditions, resulting in permanent damage.

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. An 8-cell pack will have a nominal voltage of 9.6 volts (8 x 1.2).

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 (3 x 3.7). 4-cell LiHV wired in a series will have a nominal voltage of 14.8 volts. (4 x 3.7).

LiIon: Multiply the total number of cells in the pack by 3.6. A 2-cell LiIon wired in a series will have a nominal voltage of 7.2 volts (2 x 3.6).

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

LiHV: Multiply the total number of cells in the pack by 3.8. A 4-cell LiHV wired in a series will have a nominal voltage of 15.2 volts. (4 x 3.7).

Note

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

Hitec's RDX1 Mini satisfies all relevant and mandatory CE directives and complies with FCC Part 15 Subpart B: 2010.

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

Test Standards	Title	Result
EN 55014-1:2006+ 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+ A1:2001+A2:2008	EN 55014-2: Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparaturs - Part 2: Immunity product family standard	Conform
EN 61000-3-2:2006+ A1:2009+A2:2009	EN 61000-3-2: Electromagnetic Compatibility (EMS) Part 3-2: Limits for harmonic current emissions(Equipment input current up to and including 16A per phase)	Conform
EN 61000-3-3:2008	EN 61000-3-3: Electromagnetic Compatibility (EMS) Part 3-3: Limitation of voltage supply systems for equipment with rated current≤16A	Conform
EN 60335-1:2012	Part 1: General requirements	Conform
EN 60335-2-29:2004 +A2:2010	Part 2-29: Particular requirements for battery chargers Measurement methods for electromagnetic fields of household appliances and similar apparatus with regard to human exposure	Conform

This symbol indicates that when this type of electronic device reaches the end of its service life, it cannot be disposed of with normal household waste and must be recycled. To find a recycling center near you, refer to the internet or your local phone directory for electronic waste recycling centers.

STATE OF CALIFORNIA PROPOSITION 65 WARNING:

This product contains chemicals known to the State of California to cause cancer. Use caution when handling this product and avoid exposure to any electronic components or internal assemblies.

Warranty and Service

LIABILITY EXCLUSION:

This charger is designed and approved exclusively for use with the types of batteries stated in this Instruction Manual. Hitec RCD 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 any misuse or operation of our products. Unless otherwise prescribed by law, our obligation to pay compensation, regardless of the legal argument employed, is limited to the invoice value of Hitec RCD products which were immediately and directly involved in the event in which the damage occurred.

ONE YEAR LIMITED WARRANTY:

For a period of one year from the date of purchase from HITEC RCD shall REPAIR OR REPLACE, at our option, defective equipment covered by this warranty, otherwise the purchaser and/or consumer is responsible for any charges for the repair or replacement of the charger. This warranty does not cover cosmetic damages and damages due to acts of God, accident, misuse, abuse, negligence, improper installation, or damages caused by alterations by unauthorized persons or entities. This warranty only applies to the original purchaser of this product and for products purchased and used in the United States of America, Canada and Mexico. Plastic cases are not covered by this warranty.

Warranty and Service Continued

THIS WARRANTY IS IN LIEU OF ANY AND ALL OTHER WARRANTIES, WHETHER FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND WHETHER EXPRESS OR IMPLIED. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY. HITEC RCD SHALL NOT BE LIABLE FORANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY RELATING TO THIS PRODUCT. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED IN DURATION TO THE DURATION OF THIS WARRANTY. REPAIR AND SERVICE.

To have your Hitec charger serviced:

1. Visit the Hitec website at www.hitecrcd.com and download the service request form (under Support section).

2. Fill out the service request form completely and include a copy of your original receipt showing the purchase date.

3. Package your product in its original packaging or use a suspension-type packaging (foam peanuts or crumpled newspaper). Hitec RCD shall not be responsible for goods damaged in transit.

4. Ship prepaid (COD or postage-due returns will not be accepted) via a traceable common courier (UPS, insured parcel post, FedEx, etc.) to:

Hitec RCD, Customer Service Center,

9320 Hazard Way Suite D,

San Diego, CA 92123

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