



Instruction Battery Charger

EXPERT CHARGER

50 060 6035

DUO



Dear Customer

Congratulations on buying the EXPERT charger, which is designed using state of the art technology. According to our policy of steady development and improvement of our products we reserve the right to make changes in specifications

concerning equipment, materials and design at any time without notice. Specifications or designs of the actual product may vary from those shown in this manual or on the box.

Manual

These instructions for completion and handling should be used for operation of your charger. Please read and understand this manual before starting any work on your EXPERT Charger or any accessories.

The warranty does not cover damage caused as a result of failure to follow the operating instructions. Normal wear and tear, damage by accidents and damage caused by incorrect operation are not covered by warranty.

Declaration of conformity

In accordance with guidelines 1999/5/EG (R&TTE)
Dickie-Tamiya GmbH&Co KG hereby declares that this charger is in accordance with the basic requirements and other relevant regulations of guideline 1999/5/EG.

The original declaration of conformity can be obtained from the following address:
Dickie-Tamiya GmbH&Co. KG
Werkstraße 1
D-90765 Fürth
Tel.: +49/(0)911/9765-03



Disposal

Please note and understand the symbols on this product, packaging or instructions. Electronic components are valuable materials and at the end of their useful life should not be disposed with household waste! Help us to protect the environment and safeguard our resources by

discarding this equipment at a dedicated recycling point. The authority responsible for waste disposal or your retailer will be able to answer any questions you may have in this respect.



Dual battery charger

This unit contains two battery chargers: charger 1 can be used for charging and discharging, charger 2 is only for charging. The main purpose of the unit is to charge two batteries of any type in

parallel at the same time. A further benefit of the first charger output is that it features all the maintenance and fine-tuning functions of a charger offered by the latest state-of-the-art technology.

We wish you good luck and a lot of fun using your CARSON EXPERT Charger!
Before using your EXPERT Charger carefully read this instruction!

Safety information

Never leave the charger unattended when connected to the power supply. If you notice any irregularities, stop the charging operation immediately and refer to the user manual.

Protect the charger from dust, dampness, rain, direct sunlight and vibrations. Do not drop the charger.

The power supply is provided via 230V 50/60Hz alternating current or 12V direct current (crocodile clips, red = positive terminal).

The charger and the battery for charging or discharging should be positioned on a heat-resistant, non-flammable and nonconductive surface.

Never place the charger or the battery on a car seat, carpet or similar surface. Keep all moving and flammable materials away from the area where the battery is being charged. First make sure you know exactly what needs to be done with the battery that is to be charged or discharged. If the programme is not set correctly, the battery may be completely ruined. When subject to excessive charge voltage, lithium batteries in particular may start to burn or explode.

NiCd/NiMH Voltage level 1.2V per cell

Allowable fast charge current 1C~2C depending on performance of cell

Discharge voltage cut-off level 0.85V (NiCd), 1.0V per cell (NiMH)

Lilo Voltage level 3.6V per cell

Maximum charge voltage 4.1V per cell

Allowable fast charge current 1C or less

Discharge voltage lowest cut-off level 3.0V per cell or higher

LiPo Voltage level 3.7V per cell

Maximum charge voltage 4.2V per cell

Allowable fast charge current 1C or less

Discharge voltage lowest cut-off level 3.0V per cell or higher

LiFe Voltage level 3.3V per cell

Maximum charge voltage 3.6V per cell

Allowable fast charge current 4C or less (for example A123M1)

Discharge voltage lowest cut-off level 2.5V per cell or higher

Pb (Lead-acid) voltage level 2.0V per cell

Maximum charge voltage 2.3V per cell

Allowable fast charge current 0.4C or less

Discharge voltage lowest cut-off level 1.7V per cell or higher

* To avoid short circuits in the power cable, always connect the power lead to the charger first, followed by the battery that is to be charged or discharged. Reverse the procedure when disconnecting.

* Two completely different power packs can be connected to the unit at the same time if required. Output 2 offers fewer functions, and this is alluded to in the description of the operation cycle.

- * Never attempt to charge or discharge the following kinds of batteries:
 - A battery pack that has been pieced together from various kinds of cells (including different manufacturers)
 - Non-rechargeable (dry) batteries because of the risk of explosion
 - Batteries that require a different charging process from NiCd, NiMH, Lilo, LiPo, LiFe or Pb.
 - Defective or damaged batteries
 - Batteries that have an integral charging circuit or protective circuit -Batteries inside a piece of equipment that are linked electrically to other components. -Batteries that are not specifically specified by the manufacturer as being suitable for the current delivered by the charger.
- * Do not try to continue charging a fully charged NiCd or NiMH battery or one which has been slightly discharged.
- * Please ensure that you always check the following before starting to charge a battery:
 - Have you selected the appropriate charging programme for the type of battery?- Have you set the correct strength of current for charging or discharging?
 - Lithium battery packs may have a mixed parallel and series connecting arrangement. Before charging, check the battery pack construction carefully.
 - Are all the connections secure; are there any loose connections?
- * The charging cable or connection should have an appropriate wire size. You should also check that quality plugs are used at both ends.
- Note the information supplied by the battery manufacturer as regards the charging operation, and adhere to the charge current and time. In the case of lithium batteries, it is particularly important that the manufacturer's charging instructions are followed very closely.
- Do not try to dismantle a battery pack yourself.
- Particular attention should be paid to the charge capacity and current of lithium battery packs. They may have a mixed parallel and series connecting arrangement. In the case of parallel connections, the capacity is multiplied by the number of cells, however the current remains the same. This type of construction without voltage equalisation can cause a fire or an explosion during charging. We therefore recommend that you only use lithium battery packs with series connections.
- * Never discharge to below the minimum voltage as this causes the battery capacity to drop off quickly or fail completely. As a general rule, lithium batteries do not need to be deliberately discharged.
- Some batteries are said to possess what is known as the "memory effect". If they are only partially discharged during use and are recharged before they are completely discharged, they "remember" this to a certain extent, and only this part of the charge can then be used. This is called the "memory effect" and is a characteristic of NiCd and NiMH batteries. They prefer a complete cycle whereby they are fully charged and then used until completely empty. Do not charge these batteries before storing – if they are to be stored for a long time, allow them to discharge by themselves. NiMH batteries have a lower memory effect than NiCd batteries.
- * This warning and safety information is important. To ensure the greatest possible safety, please observe these instructions carefully, as failure to do so may cause the charger and battery pack to be seriously damaged. Failure to follow these instructions may also cause a fire, resulting in injury and damage to property.

Explanation of terms and units of measurement

Ampere (A): The unit of measure of the rate of flow of electrical current. In most cases, the charger programme shows the current strength in amperes (A) on the LCD screen.

Milliampere (A): A milliampere (mA) is one thousandth of an ampere (A). For example, 2.0A is the same as 2000 mA. Conversely 200 mA is the same as 0.2A. If the strength of electric current lies below 1.0A, the charger's LCD screen will still show the current strength in amperes, not milliamperes. For example a current of 600mA will be shown as 0.6A.

Capacity, milliampere hours (mAh) and ampere hours (Ah): The energy stored in a battery is called the capacity; it indicates the continuous current that a battery can supply over a period of one hour. Most batteries used in model making give the capacity in "mAh" or milliampere hours. A 650 mAh battery can supply a current of 650mA for one hour. The capacity of very high-capacity batteries, such as lead-acid batteries (Pb), is generally given in "Ah" or ampere hours. A "12V 60 Ah" battery could supply 60A current for an hour ($60A \times 1hr = 60 Ah$) or a current of 6A over a period of 10 hours.

Nominal voltage (V): This is not the peak voltage of the whole battery pack. The battery data is given on the label on the battery.

- **LiPo:** The nominal voltage is obtained by multiplying the number of cells by 3.7V per cell. For example, a 3-celled LiPo battery pack with series connections has a nominal voltage of 11.1V ($= 3 \times 3,7V$)
- **Lilo:** Multiply the total number of cells in the battery pack by 3.6V per cell.
- **LiFe:** Multiply the total number of cells in the battery pack by 3.3V per cell.
- **NiCd or NiMH:** Multiply the total number of cells in the battery pack by 1.2V per cell. If in doubt consult the manufacturer or stockist. Do not guess the voltage of a battery pack – this can be dangerous.

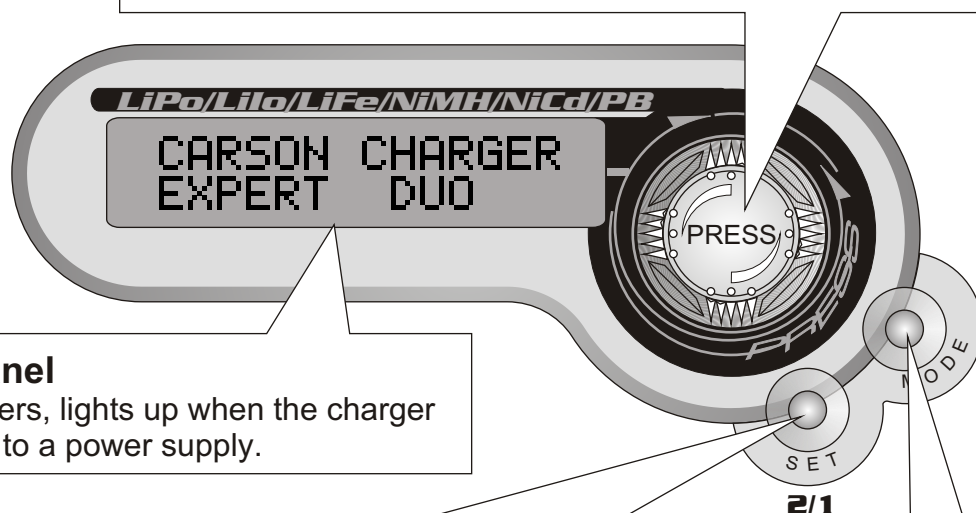
"C" value: The current strength for discharging or charging is given as a ratio. Many manufacturers recommend these values, e.g.: 1C for charging and 25C for discharging (current drain). The C value relates to the ratio of current to capacity. With a battery capacity of 2100mAh and a charge rate of 1C, the set current for charging should not exceed a maximum of 2.1A; during operation no more than $25 \times 2.1 = 52.5A$ peak voltage should be discharged. In the interests of a longer lifetime, it is recommended that these values are not fully exhausted.

Display and controls

Combined knob and push button

The knob can be turned clockwise or anti-clockwise. In normal programme execution, turning it by one notch displays the next current parameter in the menu, whilst turning in the opposite direction shows the previous parameter.

You can enter the input mode from the charging parameter display by pressing the knob. The parameters flash in sequence and can be changed by turning the knob. Press the knob to accept the newly set parameter, then the display jumps to the next parameter. The display cycles back to the initial display once all parameters have been set. If a charging/discharging cycle has already started, pressing the button will have no effect.



Display panel

2x16 characters, lights up when the charger is connected to a power supply.

SET button

The SET button is used to switch from display and input to charger outputs 1 or 2. Operation of the charger output is indicated by the relevant blue LED lights glowing. Settings applied to or processes started on the other output remain completely unaffected, even if the appropriate LED is not illuminated.

MODE button

This button is used to select and start one of the four/five possible charging and/or discharging operations on the connected battery. If the operation has been started after a few seconds, it can be stopped by pressing the MODE button again.

The display will show the word STOP and the charger will beep 10 times before reverting to the starting position.

Display of current settings

CARSON CHARGER
EXPERT DUO

If the charger is connected to the mains or 12V power supply, the display shown to the left will appear with the associated device designation EXPERT DUO. If a battery that is to be charged is already connected, the display will change to the next but one picture after several seconds.

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NB 0.000V 0.0A
MH06 0000 0000

If no battery for charging is connected, you will see the display shown to the left when you turn the knob. NB= no battery and the last battery used, in this instance NiMH with 6 cells.

RD 9.622V 0.1A
Cd06 0000 0000

When a battery is connected (with charging not yet initiated) a read-out similar to this one will be displayed. The parameters for voltage and current strength pulse; this is known as a trickle charge, meaning that a very small charge is being supplied to the battery at the voltage shown.

CHG 12.350V 4.0A
Cd08 0211 0218

If you select continuous read-out during a charging operation, the picture on the left shows the initial display. Description elsewhere.

CEL1V 2 3
4 5 6

The EXPERT DUO charger also has a Balancer for lithium batteries, which prevents one individual cell in a battery pack from reaching a higher than allowable voltage. The lithium battery pack is additionally connected (XHR connector) to the charger using the special balancer cable at the battery.

4.10 4.10 4.10
4.10 4.10 4.10

These read-outs are displayed one after the other; in this instance 6 cells are connected, for which a voltage of 4.1 volts is displayed for each cell.

For this charger, Lithium batteries (unless 1 cell battery) must be charged with the balancer.

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INPUT	OUTPUT
12.65	8.05V

The next read-out relates to the working voltage of the charger, which always adjusts to the requirements of the connected battery. OUTPUT is somewhat higher than the current voltage level of the battery being charged.

PEAK	AVERAGE
8.40V	7.40V

Peak and average voltage of the battery during the charging operation. For information only.

CAPACITY	TIME
258mAh	0237s

The adjacent diagram shows the power transferred to the battery during charging or from the battery during discharging in mAh. It also shows the elapsed time in seconds.

Entering battery parameters with the rotating button

The chargers in the EXPERT DUO range allow numerous battery specific data to be specified, ensuring optimum charging/discharging and maintenance of almost all the battery types used in model making. Various parameters (time and voltage difference) prevent a charging operation from being terminated prematurely. The operator must use the default parameter to make an approximation of the most favourable setting, which can vary depending on the quality and operating time of the battery.

However particular care should be exercised with lithium batteries, as setting the parameters too high (peak voltage) or too low can ruin the battery.

When the rotating button is pressed, the input screens appear in the following sequence; in the case of lithium batteries, the displays shown may vary slightly in some instances.

BATTERY:
NiMH08 C2.0 D1.1

SET BATTERY TYPE
NiCd 6 CELL

SET BATTERY CELL
NiCd 6 CELL

SET BATTERY TYPE
LiPo 3CELL 12.6V

First appear the values of your last charging: type, number of cells, charge- and discharge current. At this screen you can turn the knob to enter the battery type, in this instance: NiCd. Any types compatible with the charger can be entered and confirmed by pressing the button. The number of cells then flashes and you can enter the appropriate number. Confirm by pressing the button.

If you select a battery type other than NiCd or NiMH, the screen will display the voltage depending upon the number of cells, calculated from the number of cells multiplied by the cut-off voltage which has been set elsewhere.

SET CHARGING
2.5 AMPERE

The amperage required for charging the battery can be entered at this screen. This can be set to a maximum of 10 amps, but is also limited by the power output of the charger. If this is 95W (power supply), and you wish to charge a four-celled LiPo battery (16.8V), the maximum amperage is $95/16.8 = 5.6A$. The upper limit may also be limited by the charger's power input.

SET DISCHARGING
1.5 AMPERE

This function is not displayed if
charging input No.2 is selected.

Because of the so-called "memory effect", NiCd and NiMH batteries should be significantly discharged (down to a voltage lower limit), as the battery may otherwise suffer from a loss of capacity. The discharge current (ampere) depends upon the battery type (transmitter battery tends to be low, drive battery high). When discharging with a higher amperage, the operation finishes earlier, and there is a higher residual charge. Other battery types should only be discharged using the charger in exceptional cases. The lowest setting is 0.1A; the upper limit is dictated by the charger's performance.

If you are subsequently going to be selecting only "charge", the discharge setting that you enter here doesn't actually matter, as you will not have set the charger to discharge.

SET SENSITIVITY
05mV PER CELL

At the end of charging, the charge voltage drops by several millivolts depending upon the battery. In the case of NiCd and NiMH batteries, the charger uses this to terminate the charging operation. In certain cases, setting the threshold value can result in better battery performance. Based on the default parameter (7mV) you can experiment to ascertain the optimum setting by monitoring other criteria (absolute voltage).

SET DISCHG CUT V
2.95 V PER CELL

This function is not displayed if
charging input No.2 is selected.

As current is drained, the current of a battery decreases, particularly if the battery's charge is almost gone. At this point, at a certain voltage specific to the battery, the discharging operation must be terminated. Further current drain can damage the battery.

You should set the minimum voltage per cell.

SET CHARGE CUT V
4.20 V PER CELL

Only appears with Li batteries

As a battery is charged, the initial voltage increases to a battery-specific upper limit. Particularly in the case of lithium batteries, further charging is damaging to the battery, and there is also the danger of overheating and explosion. The limiting value of voltage per cell which should be entered here for lithium batteries ensures an automatic safety cut-out in the charging operation, and under normal circumstances the charger will automatically switch off in accordance with the parameters set for the battery type (Delta Peak).

SET CHARGING
MINIMUM 05min

Only appears with NiCd batteries

The setting options for charger output 2 finish here. It jumps back

With some batteries – particularly if they've not been used for some time – the automatic voltage monitoring can interrupt the charging process right at the beginning, and you might find that it takes several attempts to start charging normally. To overcome this problem you may find it useful to enter a minimum charge time for the charging operation, which may not however exceed 10 minutes. This bypasses the malfunction and full charging can then take place normally.

SET CYCLE REPEAT
TIME 03

New batteries, or batteries which have not been used for a long time do not reach their full capacity on first charge, so do not provide the maximum strength of current. You can improve the performance of a battery in this condition by carrying out several successive charging/discharging operations. The figures shown here refer to the number of cycles that should be carried out.

SET CYCLE MODE
DELAY 05minSTART

A battery that has been set on a charging and discharging cycle tends to get quite warm towards the end of the operation. The programme allows you to set a break at the end of every charging and discharging cycle, which gives the battery an appropriate time to cool down before starting the next cycle. This can be set between 1 and 10 minutes.

Precautions and error messages

The EXPERT chargers include a lot of functions for safety and control of the system which can show operation and condition of the electronic equipment.

If an error occurs a reference to the reason is displayed; additionally a sound is to be heard.

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INPUT VOLTAGE
TOO LOW

Input voltage too low.

The 12V (car) battery being used to power the charger is falling below the minimum level required for charging.

OUTPUT BATTERY
REVERSE OR SHORT

The battery being charged has been connected with incorrect polarity or there is a short circuit. The plus/minus plugs are the wrong way round or there is a short circuit in the charging cable.

OUTPUT BATTERY
BAD NOT BALANCED

If a wrong number of cells is set for a Lithium battery pack with balancer connection and this is identified by the charger, the error message shown on the left is automatically displayed and the charging process should be interrupted immediately by pressing the MODE-button

STOP

STOP indicates the end of a charging operation. If activated, an acoustic signal will also sound 10 times. The display will then revert to the start screen. The charging operation can also be interrupted manually by pressing the MODE button.

OUTPUT BATTERY
BAD CONNECTION

There is a faulty connection to the battery you are trying to charge. Check, repair or replace the charger cable if required.

SETUP BATTERY
PACK WRONG

The values set for the battery pack do not conform to those specified by the charger, for example: NiMH 4 cells set, charging voltage 9.8V. The number of cells is incorrect.

Setting up the charger

BUZZER
ON

If required, the charger has two functions that can be set by the user. To set these functions, hold down the SET and MODE buttons before connecting the charger to the power supply.

ALL PROGRAM LOAD
DEFAULT

Buzzer ON / OFF. Normally the buzzer is set to ON, but if you find it disturbing (e.g. at events), it can be switched off.

This restores the factory settings in all programmes. It is the equivalent of a RESET.

Charge / Discharge / MODE button

BATTERY:
NiMH08 C2.0 D1.1

If all of the parameters for the connected battery are set correctly (SET procedure concluded) and if the charger has reverted to its initial state (approx. 10 seconds after the last adjustment), the display shown to the left, or similar, will appear.

By pressing the MODE button, you can select what operation you would like the charger to perform. Pressing the button again selects and displays the next function. After approx. 10 seconds with no further activity the operation is initiated. If you subsequently realise that it isn't the operation that you wanted, the process can be stopped by pressing the MODE button again.

CHARGING 10min
NiCd06 C4.0 5mV

The setting options for charger output 2 finish here. It jumps back

The menu sequence starts with the normal charging procedure and displays the set parameters: 10min = minimum charging time/NiCd battery with 6 cells / C4.0 = charging at 4.0A / 5mV = switch-off sensitivity 5mV. If you leave it at this display, the charging process will start shortly thereafter, displaying a similar screen to the one on the left:

CHG 10.350V 4.0A
Cd06 0211 0218

CHG – charge / 10.350V = current voltage
4.0 A = set charging current / Cd06 = NiCd battery with 6 cells / + = charging operation / 0211 = mAh charged till now / 0218 = charge duration in seconds.

DISCHARGING CUT
NiCd06 D0.5 0.85

If you don't require normal charging, press the MODE button again: The next screen is just for discharging. In the case of NiCd and NiMH batteries, it is recommended that they are intentionally discharged prior to recharging. Some experts also recommend discharging them before being stored for a long period of time. The display to the left shows for example that a NiCd battery with 6 cells is being discharged at 0.5A with a voltage of 0.85V per cell (total battery therefore $0.85 \times 6 = 5.1V$).

DIS 7.958V 0.5A
Cd06 -0032 0218

During this operation the read-out on the left, or similar, will be displayed. DIS = Discharge.

Charge / Discharge / MODE button

CYCLE 03TIME D>C
NiCd06 D0.5 0.85

It is more common to discharge the battery after use immediately before recharging. This is what the process displayed as the next menu item (press the MODE button again) is for: Discharge / Charge. As this operation is also used to regenerate old batteries or batteries that have not been used for a long time, it can also be programmed to run automatically several times by setting a repeat cycle.

The read-out means: Carry out the cycle 3 times, discharge, then charge. The operation will also incorporate delay times that may have been set. When regenerating batteries the discharging and charging current must not be set very high (1/4 to 1/3 C).

During discharging and charging the displays as previously described will appear.

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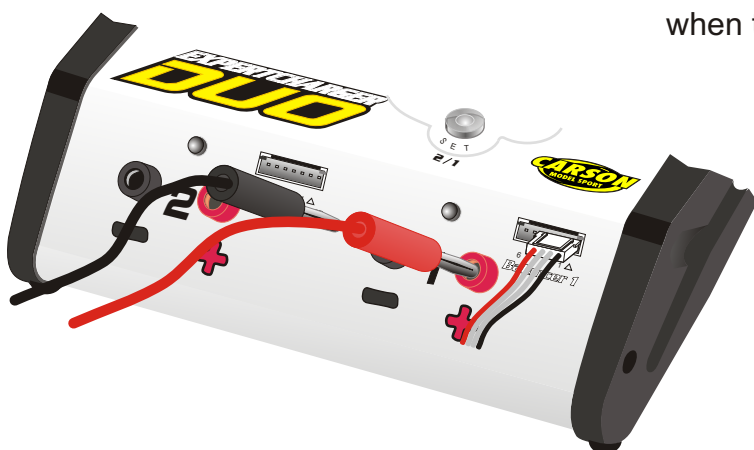
CYCLE 03TIME C>D
NiCd06 C2.4 05mV

The regeneration cycle can also be started and finished with an empty battery. To do this, select the next menu item with the display as shown on the left. C>D = Charge>Discharge (first charge then discharge). All the other operations are identical.

Connecting the charger cable and balancing cable

The type of charger cable depends on the battery pack that you want to charge. Charger cables are available for purchase from specialist retailers. They should have an adequate cable cross-section (min. 4mm² cross-section with 10A charging current). Connection on the charger is via a

quality banana plug, and on the battery via a matching (female) battery plug. To avoid short-circuits always connect the banana plug to the charger first before connecting the battery. Multi-celled lithium batteries always have what is known as a balancing cable, which balances any possible differences in the voltage of individual cells when the balancer built into the unit is fully charged. If the battery does not have the requisite XHR plug, an adapter cable can be purchased from specialist retailers. Always align the plug to the right when connecting (black cable fully to the right).



LIMITED WARRANTY

This product is warranted by CARSON against manufacturing defects in material and workmanship under normal use for 24 months from the date of purchase from authorized franchisees and dealers.

In the event of a product defect during the warranty period, take the product and the CARSON sales receipt as proof of purchase date to any CARSON store. CARSON will, at its option, unless otherwise provided by law:

- (a) correct the defect by product repair without charge for parts and labor;
 - (b) replace the product with one of the same or similar design; or
 - (c) refund the purchase price.
- All replaced parts and products, and products on which a refund is made, become the property of CARSON. New or reconditioned parts and products may be used in the performance of warranty service. Repaired or replaced parts and products are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the product made after the expiration of the warranty period.

This warranty does not cover:

- (a) damage or failure caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, lightning or other incidence of excess voltage or current;
- (b) any repairs other than those provided by a CARSON Authorized Service Facility;
- (c) consumables such as fuses or batteries;
- (d) cosmetic damage;
- (e) transportation, shipping or insurance costs; or
- (f) costs of product removal, installation, set-up service adjustment or reinstallation. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Specifications

Operating voltage	Direct Current 10.6 - 15.0V
Power pack	Alternating Current 230V 50/60Hz
Charging capacity	70W (only charging output 1 in use) 2x35W (both outputs 1+2 in use)
Discharging capacity	5W (only output 1 voltage higher than 2V) 18W (only output 1 voltage lower than 2V)
Operating voltage range	0,1 ~ 10.0A (output 1) 0.1A ~ 5A (output 2)
Discharge current range	0,1 ~ 10.0A
Balance current	about 150mA (XHR connector)
Conservation current	about 80mA NiCd or NiMH only
Weight	610 g
Dimensions	188 x163 x77mm

Suitable for	volt/cell	Number of cells	Discharge final voltage
NiCd/NiMH	1.2V	1 ~ 15 in series	0.8V
LiPo	3.7V	1 ~ 6 in series	3.0V
LiFe (A123)	3.3V	1 ~ 6 in series	2.5V
Lilo	3.6V	1 ~ 6 in series	3.0V
Lead battery	2.0V	1 ~ 12 in series	1.8V



For Germany:
Service-Hotline:
01805-73 33 00
14 ct/min

Mo-Do 8.00 - 17.00 Uhr
Fr 8.00 - 14.30 Uhr

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