VOLTCRAFT®

GB Operating Instructions

Multifunctional charger “V-Charge 120 Touch Duo”

Item No. 1490909

CE

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GB

1. Introduction

Dear Customer,

thank you for making the excellent decision of purchasing this Voltcraft® product.

Voltcraft® - This name stands for above-average quality products in the areas of measuring, charging and grid technology, characterised by technical competence, extraordinary performance and permanent innovation.

Whether you are an ambitious hobby electronics technician or a professional user - a product of the Voltcraft® brand family will provide you with the best solution for even the most sophisticated of tasks. Special features: We offer the sophisticated technology and reliable quality of our Voltcraft® products at a near-unbeatable price/performance ratio. We lay the groundwork for long, good and successful cooperation.

Enjoy your new Voltcraft® product!

If there are any technical questions, please contact:

International: www.conrad.com/contact

United Kingdom: www.conrad-electronic.co.uk/contact

2. Explanation of Symbols

The symbol with a lightning bolt in a triangle is used where there is a health hazard, e.g. from electric shock.

The exclamation mark in a triangle indicates important notes in these operating instructions that must be observed strictly.

The arrow symbol indicates that special advice and notes on operation are provided.

The product is intended for use in dry indoor rooms only; it must not become damp or wet.

Observe the operating instructions.

3. Intended Use

The charger "V-Charge 120 Touch Duo" has two charge/discharge channels independent of each other.

The charger is operated via a contact-sensitive colour display on which all required displays and operating elements are shown.

The charger is used to charge and discharge rechargeable batteries of the type NiMH/NiCd (1 - 15 cells), LiPo/LiIon/LiFe (1 - 6 cells) and lead acid batteries (1 - 10 cells, 2 V - 20 V).

The charging current can be set between 0.1 A und 12.0 A for each of the two channels. The maximum charging output per channel is 120 W; the total charging output of the charger is 240 W.

The discharging current can be set between 0.1 A and 5.0 A for each of the two channels. The maximum discharging output per channel is 10 W; the total discharging output of the charger is 20 W.

For each of the two charge/discharge channels, there is a connection for a temperature sensor available for battery monitoring (not enclosed, can be ordered as an accessory).

For multi-cell lithium rechargeable batteries, each charge/discharge channel has a separate balancer. Two matching balancer boards (with XH-connections) are enclosed.

The charger has an integrated mains unit to permit operation on mains voltage (switchable between 115 and 230 V/AC, 50/60 Hz). The charger may, however, also be alternatively operated on a stabilised direct voltage of 11 - 18 V/DC (e.g. via an external vehicle lead battery or a suitable mains adapter).

The safety notes and all other information in these operating instructions always have to be observed!

Read the operating instructions carefully and attentively, and keep them for later reference. Only pass the product on to any third parties together with the operating instructions.

Use other than that described above can lead to damage to the product and may involve additional risks such as, for example, short circuits, fire, electrical shock etc. The entire product must not be modified or converted, and the casing must not be opened!

This product complies with the statutory national and European requirements.

4. Scope of Delivery

- Multifunctional charger
- 2x XH adapter (balancer board)
- Mains cable
- Software CD
- Operating instructions

Current operating instructions

Download the current operating instructions via the link www.conrad.com/downloads or scan the QR code displayed. Observe the instructions on the website.

5. Safety Notes

Read the operating instructions attentively and particularly observe the safety notes. If the safety notes and the information in these operating instructions regarding proper handling are not observed, we assume no liability for any resulting injury/property damage. In such cases, the warranty/guarantee will also lapse.

a) General

- The unauthorized conversion and/or modification of the product is inadmissible because of safety and approval reasons. Never dismantle the product!
- Maintenance, adjustment, or repair work must only be carried out by a specialist/a specialist workshop. The device contains no parts that require servicing or adjusting by you.
- The product is not a toy and must be kept out of reach of children!

  The product must only be set up, used or stored in places that are not accessible to children. The same applies for rechargeable batteries.

  Pay particular attention when children are present! Children may change the settings or short-circuit the rechargeable battery/batteries, which may lead to fire or explosion. Danger to life!
- In schools, training centres, hobby and self-help workshops, the use of the product must be supervised by responsible trained personnel.
- In commercial institutions, the accident prevention regulations of the Employer's Liability Insurance Association for Electrical Systems and Operating Materials are to be observed.
- Do not leave packaging material lying around carelessly. It may become a dangerous toy for children!
- Handle the product with care; impacts, shock or fall even from low heights will damage it.
- If you are not sure about the correct operation or if questions arise which are not covered by the operating instructions, please do not hesitate to contact us or another specialist.

b) Mains cable/mains voltage

- Before connecting the charger to the mains voltage, the right mains voltage must be set at the charger. For this, put the voltage selection switch into the correct position (115 V/AC or 230 V/AC). If this is not observed, the charger will be destroyed. Loss of warranty/guarantee!
- Product setup corresponds to protection class I. It must only be connected to a proper protective contact mains socket. Observe that the housing or mains line insulation is not damaged or destroyed.
- The mains socket to which the plug-in mains unit is connected must be easily accessible.
- Do not pull the mains plug from the mains socket by pulling the cable.
- If the mains cable or charger are damaged, do not touch it. Danger to life from electric shock!

  First switch off the mains voltage for the mains socket to which the mains cable is connected (switch off the corresponding circuit breaker or take out the fuse, then switch off the fault interrupter protection switch (FI circuit breaker) so that the mains socket is separated from the mains voltage on all poles).

  Only then unplug the mains unit from the mains socket.

If the charger is damaged, stop operating it. Take it to a specialised workshop or dispose of it in an environmentally friendly way.

If the mains cable is damaged, dispose of the damaged mains cable in an environmentally compatible way. Do not use it anymore. Replace it with a new mains cable of the same specifications.

c) Location for Installation

- The charger is intended for dry indoor use only. It must not become damp or wet. Never set it up near a bathtub, shower or similar!

  If the charger is operated via the mains cable, there is danger to life from electric shock in case of moisture/wetness on the charger/mains cable!

- Avoid direct sun irradiation, strong heat or cold. Keep the charger away from dust and dirt. The same applies to any rechargeable battery that may be connected.
- Do not operate the charger inside of rooms or in bad ambient conditions where flammable gases, vapours or explosive dust may be or are present! There is a danger of explosion!
- Choose a solid, flat, clean and sufficiently large surface for the charger. Never place the charger on a flammable surface (e.g. carpet, tablecloth). Always use a suitable, non-flammable, heatproof surface.
- Keep the charger away from flammable or easily inflammable materials (e.g. curtains).
- Never cover the ventilation slits. There is a danger of overheating or fire. Never push any objects into the ventilation slots of the charger; There is a danger to life from electric shock! Never impair the function of the integrated fan.
- Do not place the charger on any valuable furniture surfaces without using a suitable protection. Otherwise, scratches, pressure points or discolourations are possible. The same applies to the rechargeable battery.
- Do not use the charger inside a vehicle.
- The charger must only be set up, used or stored in places that are not accessible to children. Children may change the settings or short-circuit the rechargeable battery/battery pack, which can lead to an explosion. Danger to life!
- Avoid setup in direct proximity of strong magnetic or electromagnetic fields, transmitter aerials or HF generators. This can affect the control electronics.
- Ensure that the cables are not crushed or damaged by sharp edges. Never place any objects on the cables.
- Do not place any containers filled with liquid, vases or plants, on or next to the charger/mains cable.

  When these liquids get into the charger (or the plug connections of the mains cable), the charger will be destroyed and there is a most severe danger of potentially fatal electric shock or fire.

  If the charger is operated via the mains cable, first switch off the mains voltage for the mains socket to which the mains cable is connected (switch off the corresponding circuit breaker or take out the fuse, then switch off the fault interrupter protection switch (FI circuit breaker) so that the mains socket is separated from the mains voltage on all poles). Only then unplug the mains plug of the mains cable from the mains socket.

If the charger is operated via the DC input (11 - 18 V/DC), disconnect the charger from the voltage/power supply.

Then disconnect the connected rechargeable battery from the charger. Do not use the charger again - bring it to a specialist workshop.

d) Operation

- The charger may be operated either via the mains voltage (switchable 115 V/AC or 230 V/AC, 50/60 Hz) or via a stabilised direct voltage of 11 - 18 V/DC (e.g. via an external vehicle lead battery or a suitable mains adapter).

  Use only one of the two connection types, but never both at once. This may damage the charger.

- Do not wear any metal or conductive materials, such as jewellery (necklaces, bracelets, rings, etc.) while you are working with the charger or batteries. A short-circuit at the rechargeable battery or charging cable poses a danger of burns and explosion.

- Do not operate the product unattended. Despite a considerable number of protective circuits, it is impossible to exclude the possibility of malfunctions or problems during the charging process.

- Ensure that there is sufficient ventilation during operation. Never cover up the charger. Leave enough of a distance (at least 20 cm) between charger and other objects. Overheating causes a danger of fire!

- The charger must only be used to charge (or discharge) rechargeable batteries of types NiMH, NiCd, LiIon/LiPo/LiFe and lead batteries. Never charge any other rechargeable battery types or non-rechargeable batteries. There is great danger of fire or explosion!

- Always connect the charging cable to the charger first. Only then must the rechargeable battery be connected to the charging cable.

  When disconnecting, proceed in reverse order - first disconnect the rechargeable battery from the charging cable, then the charging cable from the charger.

  If the order is chosen incorrectly, there may be a short-circuit of the charger plugs; there is a danger of fire and explosion!

- Never connect several charges to each other.

- The charger has two charging channels that are independent of each other, so that up to two rechargeable batteries/rechargeable battery packs can be charged (or discharged) at once. However, only connect a single rechargeable battery/rechargeable battery pack to each of the two charging channels. Never connect the charging channels to each other!

- Only operate the product in moderate climate, never in tropical climate. For more information on acceptable environmental conditions, see the chapter "Technical Data".

- Never operate the device immediately after it was taken from a cold room to a warm room. The resulting condensation may lead to malfunctions or damage!

  Let the product reach room temperature before taking it into operation again. This may take several hours!

- Avoid operation in direct proximity of strong magnetic or electromagnetic fields, transmitter aerials or HF generators. This can affect the control electronics.

- If you have reason to believe that the device can no longer be operated safely, disconnect it immediately and make sure it is not operated unintentionally.

  Disconnect the charger from the voltage/current supply. Do not use the product any more after this, but take it to a specialised workshop or dispose of it in an environmentally compatible manner.
- It can be assumed that operation without danger is no longer possible if the device has any visible damage, the device no longer works, after extended storage under unsuitable conditions or after difficult transport conditions.
- Keep the entire product at a dry, cool, clean site that is not accessible to children.

6. Rechargeable Battery Notes

Although use of rechargeable batteries in everyday life is a matter of course today, there are many dangers and problems. In particular, with LiPo/LiIon/LiFe rechargeable batteries with their high energy content (in comparison with conventional NiCd or NiMH rechargeable batteries), various regulations must be observed in order to avoid the danger of explosion and fire.

For this reason, always ensure that you have read and understood the following information and safety information when handling rechargeable batteries.

If the manufacturer of the rechargeable battery has provided any other information, read it carefully and observe it!

a) General

- Rechargeable batteries are no toys. Always keep batteries/rechargeable batteries out of the reach of children.
- Do not leave rechargeable batteries lying around openly. Children or pets may swallow them. If swallowed, consult a doctor immediately!
- Rechargeable batteries must not be short-circuited, taken apart or thrown into fire. There is a risk of fire and explosion!
- Leaking or damaged batteries/rechargeable batteries can cause chemical burns to skin when touched without the use of adequate protective gloves.
- Never recharge normal (non-rechargeable) batteries. There is a risk of fire and explosion!

  Non-rechargeable batteries are meant to be used once only and must be disposed of properly when empty.

  Only charge rechargeable batteries intended for this purpose. Use a suitable battery charger.
- Batteries must not get damp or wet.
- Place the charger and battery on a non-flammable, heat-resistant surface (e.g. stone tiles). Maintain enough distance from flammable objects. Leave enough distance between the charger and the rechargeable battery - never place the rechargeable battery on the charger.
- As both the charger and the battery heat up during the charge/discharge procedure, it is necessary to ensure sufficient ventilation. Never cover the charger or the rechargeable battery!
- Never use battery packs made up of different cells.
- Never leave the charging/discharging batteries unattended.
- Never recharge a battery directly in the model. Always remove the rechargeable battery from the model for recharging.
- Always observe correct polarity (plus/+ and minus/-) when connecting the rechargeable battery to your model or charger. Connecting the battery incorrectly will not only damage the model but also the rechargeable battery. There is a risk of fire and explosion!

  This charger has a mechanism that protects against connecting the poles incorrectly. Nonetheless, it is possible that an incorrectly connected battery may lead to damage in certain situations.

- The charger has two charging channels that are independent of each other, so that up to two rechargeable batteries/rechargeable battery packs can be charged (or discharged) at once. However, only connect a single rechargeable battery/rechargeable battery pack to each of the two charging channels. Never connect the charging channels to each other!
- If the product is not to be used for an extended period of time (e.g. storage), disconnect any connected rechargeable battery from the charger and disconnect the charger from the voltage/current supply.

  The charger has no mains switch. If you operate the charger via the mains cable, pull the mains plug from the socket when you no longer need the charger.
- Do not charge/discharge any battery that is still hot (e.g. caused by high discharging current from the model). Allow the rechargeable battery to cool down to room temperature before attempting to charge or discharge it.
- Never damage the exterior cover of a battery. There is a risk of fire and explosion!
- Never charge/discharge damaged, leaking or deformed batteries. This can result in a fire or explosion! Dispose of any unusable rechargeable batteries in an environmentally compatible fashion. Do not continue to use them.
- Remove the battery from the charger when it is fully charged.
- Recharge the rechargeable batteries about every 3 months. Otherwise, so-called deep discharge may result, rendering the rechargeable batteries useless.
- Keep rechargeable batteries in a suitable location. Use a smoke detector in the room. The risk of fire (or the occurrence of toxic smoke) cannot be excluded. Special rechargeable batteries for the model construction area are subject to great stress (e.g. high charging and discharging currents, vibrations, etc.).

b) Additional Information about Lithium Batteries

Modern batteries with lithium technology do not only have a clearly higher capacity than NiMH or NiCd rechargeable battery packs but they also have a considerably lower weight. This makes this type of rechargeable battery very interesting for application in model construction; so-called LiPo batteries (lithium-polymer) are often used here.

Rechargeable lithium batteries require special care when charging/discharging, as well as during operation and handling.

For this reason, we would like to provide you with some information in the sections below about the dangers and how you can avoid them, thus helping such batteries to maintain their performance for an extended period of time to come.

Additionally observe chapter 6. a).

- The outer shell of many rechargeable lithium batteries is only made of a thick foil and therefore very sensitive.

  Never destroy or damage the battery, never let the battery fall and do not pierce the battery with any objects! Avoid any mechanical strain on the battery; never pull the connection cables of the battery! There is a risk of fire and explosion!

  These guidelines must also be observed when the battery is inserted into the model or when it is removed from the model.

- Ensure that the battery does not overheat during usage, recharging, discharging, transport or storage. Do not place the battery next to sources of heat (e.g. speed controller, motor), keep the battery away from direct sunlight. There is a risk of fire and explosion if the battery overheats!

  The battery must never heat up to more than +60 °C (observe any additional information from the manufacturer!).

- If the battery is damaged (e.g. after the crash of an aircraft or helicopter model) or the exterior cover is soaked/has expanded, do not use the battery. Do not charge it anymore. There is a risk of fire and explosion!

  Handle the battery with care, use suitable protective gloves. Dispose of the rechargeable battery environmentally compatibly.

  Never keep such rechargeable batteries in an apartment or a house/garage anymore. Damaged or bloated lithium rechargeable batteries may catch fire suddenly.

- Only use a suitable charger to charge lithium batteries or use the correct charging procedure. Due to a risk of fire and explosion, conventional chargers for NiCd, NiMH and lead batteries must not be used!

  Always choose the right charging procedure depending on rechargeable battery.

- When charging a lithium battery with more than one cell, always use a so-called balancer (one is already integrated into the supplied charger).

- Charge LiPo batteries with a max. charging current of 1C (if not indicated otherwise by the battery manufacturer!). This means that the charging current may not exceed the capacity value imprinted on the battery (e.g. battery capacity 1000 mAh, max. charging current 1000 mA = 1 A).

  With LiFe and LiIon batteries, you must observe the instructions of the battery manufacturer.

- The discharging current must not exceed the value printed on the battery.

  For example, if a value of "20C" is printed on a LiPo battery, the max. discharging current is 20 times the battery's capacity (e.g. battery capacity 1000 mAh, max. discharging current 20C = 20 x 1000 mA = 20 A).

  Otherwise, the battery will overheat, causing deformation/bloating of the battery or explosion and fire!

  The printed value (e.g "20C") does not generally refer to the constant current, but to the maximum current that the battery is capable of producing in the short-term. The constant current therefore should not be higher than one half of the given value.

- Observe that the individual cells of a lithium rechargeable battery must not be deep-discharged. A deep discharge of a lithium rechargeable battery will lead to permanent damage/destruction of the rechargeable battery.

  If the model does not provide protection against total discharge or possess a visual display indicating a low battery, remember to switch off the model in time.

7. Usable Rechargeable Battery Types

Rechargeable battery type	LiPo	LiIon	LiFe	NiCd	NiMH	Pb
Rated voltage (V/cell)	3.7	3.6	3.3	1.2	1.2	2.0
Max. charging voltage (V/cell)	4.2	4.1	3.6	1.5	1.5	2.46
Voltage for storage (V/cell)	3.8	3.7	3.3	-	-	-
Charging current for quick charge	<= 1C	<= 1C	<= 4C	1C - 2C	1C - 2C	<= 0.4C
Min. voltage after discharge (V/cell)	>= 3.0	>= 2.9	>= 2.6	>= 1.0	>= 1.0	>= 1.8

→ The voltages in the above table apply to a single cell. The data may deviate depending on manufacturer (observe manufacturer's information!).

The max. charging and discharging currents are indicated with the capacity value "C".

A charging current of 1C corresponds to the capacity value imprinted on the battery (e.g. indicated battery capacity 1000 mAh, max. charging current 1000 mA = 1 A).

Also observe the correct voltage setting for multi-cell battery packs. For example, the individual cells in a two-cell battery pack may be switched in parallel or in series.

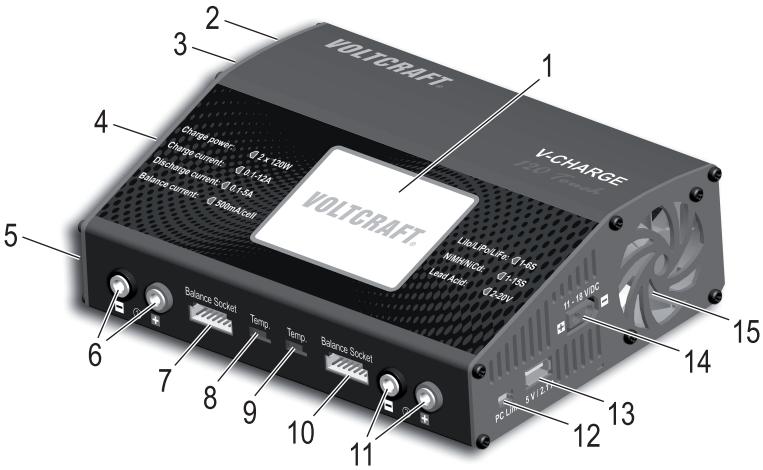
If the maximum permissible charging current for the rechargeable battery is exceeded or a wrong cell number/voltage setting is chosen, there is a danger of destroying the rechargeable battery. There also is a danger of fire and explosion from the rechargeable battery!

Further notes on the max. charging current and the cell number/voltage can be taken from the data sheets or the labels of the rechargeable batteries; these data take precedence over the information in the above table.

Important!

- Never charge battery packs made up of different cells (or cells from different manufacturers).
- Never charge non-rechargeable batteries.
- Never charge rechargeable batteries not listed in the above table.
- Never charge rechargeable batteries with integrated electronics.
- Never charge rechargeable batteries that are still connected to other devices (e.g. a speed controller).
- Never charge any damaged or bloated rechargeable batteries.

8. Operating Elements



1 Contact-sensitive colour display (touch screen)

2 Switch for mains voltage 115 V/AC or 230 V/AC

Before connecting the charger to the mains voltage, this switch must be inspected first and put into the corresponding position that corresponds to the mains voltage at the site of operation.

3 Mains socket for connecting the charger to the mains voltage

4 Fan

5 Channel 1: USB port to connect to a PC

6 Channel 1: Round sockets (4 mm) for rechargeable battery connection (red = plus/+, black = minus/-)

7 Channel 1: Balancer port for external balancer board

8 Channel 1: Socket for external temperature sensor (not enclosed, can be ordered separately)

9 Channel 2: Socket for external temperature sensor (not enclosed, can be ordered separately)

10 Channel 2: Balancer port for external balancer board

11 Channel 2: Round sockets (4 mm) for rechargeable battery connection (red = plus/+, black = minus/-)

12 Channel 2: USB port to connect to a PC

13 USB voltage/current output (5 V/DC max. 2.1 A)

14 Direct voltage input (11 - 18 V/DC, stabilised), e.g. to connect to an external vehicle lead battery

15 Fan

Either operate the charger via the mains voltage connection (3) or the direct voltage input (14). Never use both inputs at the same time. This may damage the charger.

9. Commissioning

a) Connection to a Voltage/Current Supply

The charger offers two different options for operation:

- Operation via the mains voltage (switchable 115 V/AC or 230 V/AC, 50/60 Hz)
- Operation via stabilised direct voltage (11 - 18 V/DC, e.g. via an external vehicle lead battery or a mains adapter)

Attention!

Before connecting the charger to the mains voltage, the right mains voltage must be set at the charger. For this, put the voltage selection switch into the correct position (115 V/AC or 230 V/AC). If this is not observed, the charger will be destroyed. Loss of warranty/guarantee!

Never use both operating modes at the same time. This may damage the charger. Loss of guarantee/warranty!

The charger has a maximum total charging output of 240 W. If the charger is to be operated via the direct voltage input, the power supply strength must be chosen depending on how high the actually used charging output is (depending on the rechargeable battery type, cell number and the charging current set).

→ When fully using the maximum total charging output of 240 W, the conversion loss increases power intake by about 20 - 30%.

If the charger is not to be operated at a 12 V vehicle lead battery, but via a fixed voltage mains unit, it must be able to supply a correspondingly high current.

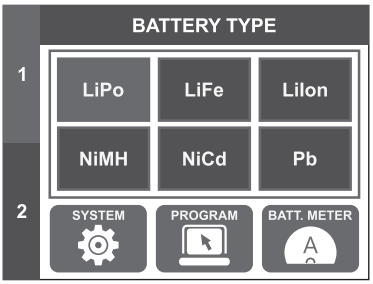
When using the direct current input, observe the correct polarity when connecting (plus/+ and minus/-).

Attention!

Always connect the charger to the voltage/current supply first; only then must a rechargeable battery be connected to the charger.

The charger will switch on automatically after connecting to the voltage/current supply. The display will light up; the start message will appear and the charger will emit a brief signal sound.

Then the main menu appears (see figure on the right) and the charger is ready.



b) Connection of a Rechargeable Battery to the Charger

Please observe the following points before connecting or charging/recharging the battery:

- If you have not done so already, please read chapters 5, 6 and 7 completely and ensure that you have understood the information there.
- Do you know all of the information you need to know about your battery? Unknown or unlabelled batteries, the necessary values of which you do not know, must not be connected/charged/discharged!
- Have you selected the correct charging/discharging program for the type of battery you are using? Incorrect settings will damage the charger and the battery; there is a danger of fire and explosion!
- Did you set the correct charging or discharging current?
- Have you selected the correct voltage (e.g. for multiple-cell LiPo batteries)? A two-cell LiPo battery may be switched in parallel (3.7 V) or series (7.4 V).
- Are all connector cables and plugs undamaged, do the plugs stay firmly in the sockets? Worn plugs and damaged cables should be replaced.
- Connect only one single rechargeable battery or rechargeable battery pack to each of the two charging/discharging channels of the charger, but never several at once per charging channel. Never connect the two channels to each other! Each of the two channels is independent of the other.
- When connecting a rechargeable battery to the charger, always connect the charging cable to the charger first. Only then must the charging cable be connected to the rechargeable battery. When disconnecting, proceed in reverse order (first disconnect the rechargeable battery from the charging cable, then the charging cable from the charger).

  Failure to do so presents the danger of a short circuit. This can result in a fire or explosion of the rechargeable batteries!
- If you wish to charge battery packs that you have manufactured yourself, the cells must be identical in their construction (same type, same capacity, same manufacturer).

  The cells must also be charged to the same level (lithium batteries can be balanced out using the balancer. This is, however, not possible with other battery packs such as NiMH or NiCd).
- Before connecting a rechargeable battery/battery pack to the charger, disconnect it completely, e.g. from a flight or speed controller.

Important when charging/discharging a lithium battery pack with balancer connection:

Multi-cell lithium battery packs usually always have a balancer connection. This permits the charger to monitor the voltage of every single cell separately at all times.

The charger adjusts the voltage of all cells to each other if there are deviations. The balancer prevents that one or several cells are over-charged or other cells not sufficiently fully charged by this. The balancer therefore protects both from over-charging (which may cause fire or explosion) and from deep discharge of a single cell, and thus ensures best performance of the battery pack in your model.

Procedure when connecting a battery pack to the charger:

1. Connect the charger to the voltage/current supply.
2. Select one of the two charging channels. First connect the charging cable to the two 4 mm round sockets of the corresponding charging output (1 or 2). Ensure correct polarity (red cable = plus/+, black cable = minus/-).

The charging cable must not be connected to the rechargeable battery yet! There may be a short-circuit of the charger plugs; there is a danger of fire and explosion!

3. If you want to connect a multiple-cell lithium rechargeable battery to the charger with a balancer cable, connect a balancer board to the respective socket of the charger.
4. Connect the charging cable to the rechargeable battery now. Ensure correct polarity (red cable = plus/+, black cable = minus/-).
5. Connect the balancer plug of a multiple-cell rechargeable lithium battery to the corresponding connection of the balancer board. Do not use any force for plugging in! Ensure correct polarity.

   If the balancer plug of the rechargeable battery does not match the shape of the socket on the balancer board, you need to use a matching connection cable (or another balancer board).

Proceed in the following steps when disconnecting a rechargeable battery:

1. If you have connected a lithium rechargeable battery with a balancer cable to the charger, disconnect it from the charger/balancer board.
2. Then disconnect the charging cable from the rechargeable battery.
3. Last disconnect the charging cable from the charger.

Always proceed in this order!

The rechargeable battery must always be disconnected from the charging cable (and from the balancer connection for lithium rechargeable batteries) first. Only then must the charging cable be disconnected from the charger.

Any other order poses danger of short circuit by the two round plugs of the charging cable connected to the rechargeable battery, as well as danger of fire and explosion!

4. If no rechargeable battery is connected to the charger anymore, you can disconnect the charger from the voltage/current supply.

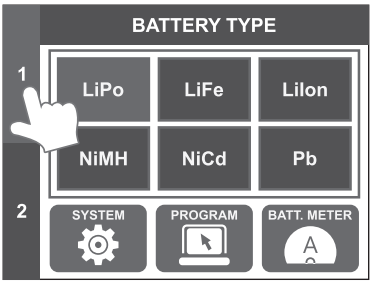
c) General Information on Operation of the Menus

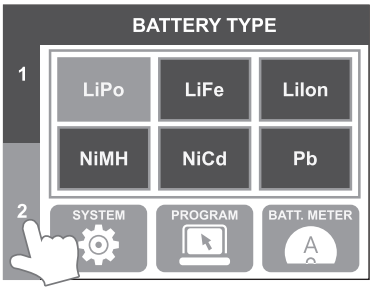
- After the charger has been connected to the voltage/power supply, the main menu will appear; see chapter 9. a).
- The display is pressure-sensitive; this way, you can select the individual functions and menus very easily by tapping.

Never press on the display with force.

Never touch the display with sharp/hard objects.

The display may be damaged at non-observance; loss of guarantee/warranty!





"1" Charging/discharging channel 1

"2" Charging/discharging channel 2

"LiPo" Rechargeable battery programme for LiPo rechargeable batteries

"LiFe" Rechargeable battery programme for LiFe rechargeable batteries

"LiIon" Rechargeable battery programme for LiIon rechargeable batteries

"NiMH" Rechargeable battery programme for NiMH rechargeable batteries

"NiCd" Rechargeable battery programme for NiCd rechargeable batteries

"Pb" Rechargeable battery programmes for lead batteries (Pb)

"SYSTEM" In this menu, the various basic settings for the charger can be modified.

"PROGRAM" Frequently used charging/discharging programmes can be saved here. A total of 6 mutually independent memories are available to you.

"BATT.METER" This function shows you the voltages of the rechargeable batteries.

The individual cell voltages can be controlled for Lithium rechargeable batteries that are connected to the charger by the balancer connection.

⟶ Both charge/discharge channels are independent from each other. Use the "1" or "2" buttons to switch between the two channels. The display shows in different colours which channel is currently active (red = channel 1, blue = channel 2).

10. Lithium Batteries (LiPo, LiIon, LiFe)

a) General

The rechargeable battery programmes for LiPo, LiIon and LiFe rechargeable batteries generally differ only in the voltages and the permitted charging current, see table in chapter 7.

When charging a lithium battery, there are two different phases. First, the rechargeable battery is charged with a consistent current. When the rechargeable battery reaches its maximum voltage (at a LiPo rechargeable battery, e.g., 4.2 V), charging continues at constant voltage (the charging current drops). When the charging current drops below a certain threshold, charging is ended and the rechargeable battery is fully charged.

If the rechargeable battery has a balancer connection (usually this is the case in almost every lithium battery with more than one cell), the balancer connection must be connected to the charger as well as the rechargeable battery's cable for charging/discharging.

There are different types of balancer plug. Therefore, do not apply any force if the plug does not fit! in the charger or the balancer board! The matching adapters for the balancer plugs are available as accessories.

There are also rare multi-cell rechargeable batteries where the cell connections are separately routed out and that strictly speaking are not a multiple-cell battery pack. Therefore, always observe the information of the rechargeable battery manufacturer on the build and rated voltage.

When using a balancer (integrated in the charger), all cells of a multi-cell battery pack have the same voltage after the charge process, which prevents the overcharging of individual cells (danger of fire and explosion) or a deep discharge of one of the cells (damage to the rechargeable battery).

The charger must be in the main menu.

Select the desired channel with the buttons "1" and "2" first.

Then use the buttons "LiPo", "LiFe" or "LiIon" to select the battery type matching the rechargeable battery used. The respective interface is marked in colour.

If you push the same button again, the charger will start setting mode for the selected rechargeable battery type.

In the figure on the right, a LiPo rechargeable battery has been chosen. The menus for LiFe and LiIon rechargeable batteries are identical apart from the adjustable voltage limits when charging and discharging.

"CELLS" = Cell number of the rechargeable battery

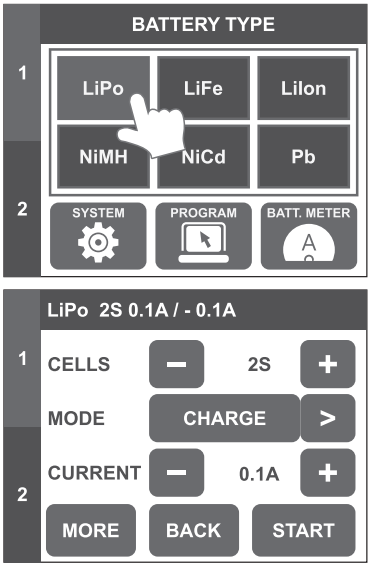
"MODE" = Charging/discharging mode

"CURRENT" = current

"MORE" = Display further settings

"BACK" = Return to the previous menu

"START" = Start the set charging/discharging mode
(keep the button pushed for 3 seconds)



There are the following charging/discharging modes:

- "CHARGE": Charge lithium battery without balancer connection
- "BALANCE": Charge lithium battery with balancer connection
- "FAST CHG": Fast battery charging
- "STORAGE": Charging/discharging batteries at a set voltage value (e.g. for storage)
- "DISCHARGE": Discharging the rechargeable battery

b) Charging Batteries without Balancer Connection ("CHARGE")

Of course, you can also charge multiple-cell lithium rechargeable batteries with a balancer connection with the rechargeable battery programme "CHARGE".

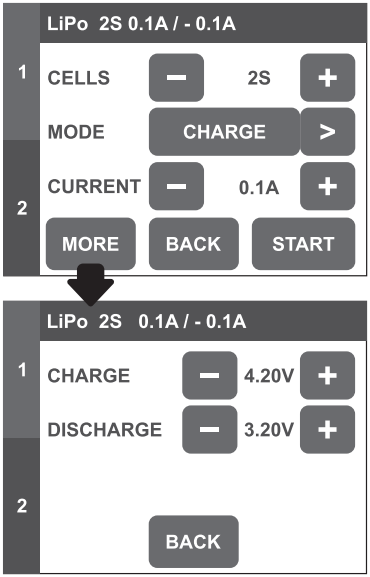
However, the individual cell voltages are not reconciled here, so that one or several cells may be over-charged. There is a risk of fire and explosion!

Therefore, always charge multiple-cell lithium rechargeable batteries with balancer connection with the rechargeable battery programme "BALANCE", but never with the rechargeable battery programme "CHARGE"!

- First, select the desired channel (1 or 2) as described in chapter 9. a) and the corresponding rechargeable battery type (LiPo, LiFe or Lilon).
- Set the cell number in "CELLS" with the buttons "-" and "+".
- Push the button ">" in "MODE" repeatedly until the mode "CHARGE" is displayed.
- For "CURRENT", use the buttons "-" and "+" to set the charge current. Keep the respective button pressed for quick adjustment.
- Another input window appears when you push the button "MORE".
- In the upper line at "CHARGE", the charge end voltage and at "DISCHARGE", the discharge end voltage can be set. Keep the respective button pressed for quick adjustment.
- "BACK" will take you back to the respective prior menu.
- If you push the button "START" for the duration of 3 seconds, the charger will review the connected rechargeable battery (the display will show "CHECK BATTERY.....").

  Charging starts when everything is OK.

  If errors are found (e.g. if no rechargeable battery is connected), the corresponding message will be displayed. The button "BACK" will return you to the previous menu in that case.

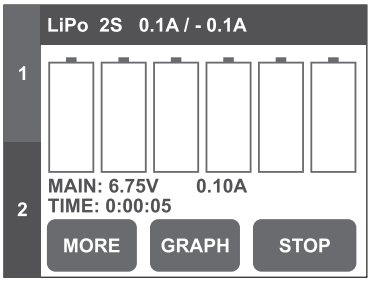


- When charging has commenced, a rechargeable battery display appears.

  The type of the rechargeable battery (LiPo), the cell number (2S) and the set charging current or discharging current are displayed here.

  Below the rechargeable battery symbols, you can see the rechargeable battery voltage, the actual charging current and the elapsed charging duration.

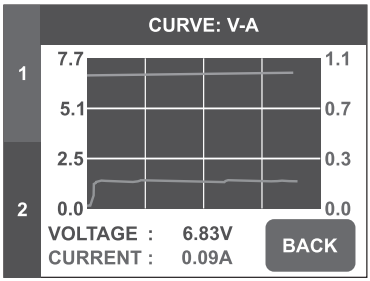
- Push the button "STOP" to manually interrupt or terminate charging.



- Use the button "GRAPH" to get to the graphical display of the voltage curve and charge current.

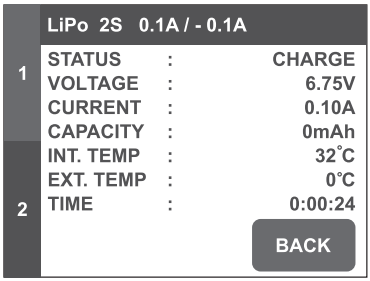
  The current overall voltage of the connected rechargeable battery and the current charge current are also displayed.

- Pushing the button "BACK" will take you back to the main view.



- The "MORE" button displays various further information and values, see figure on the right.

⟶ If no external temperature sensor is connected to the charger (not enclosed, can be ordered separately), the temperature "0 °C" appears.



- When charging is complete, the charger will emit a sound and a corresponding message will be displayed. The button "MORE" or "GRAPH" will display information on charging as described above. The button "STOP" will take you back to the setting menu.

c) Charging Batteries with Balancer Connection ("BALANCE")

In contrast to the simple rechargeable battery programme "CHARGE" (see chapter 10. b), the rechargeable battery programme "BALANCE" monitors the voltage of every single cell of a multiple-cell lithium rechargeable battery and corrects it accordingly if there are any deviations.

Besides the two normal rechargeable battery connections (plus/+ and minus/-), the balancer connector for the rechargeable battery must also be connected to the charger via the enclosed balancer board.

⟶ There are different types of balancer plug. Therefore, do not apply any force if the plug does not fit! in the charger or the balancer board! The matching adapters for the balancer plugs are available as accessories.

If you use self-customised rechargeable batteries, the balancer plug must be correctly assigned.

The black cable is the minus pole of the first cell. The next connection pin is the plus pole of the first cell; the respective next connection pin is the plus pole of the second, third, fourth, fifth and sixth cell (depending on cell number).

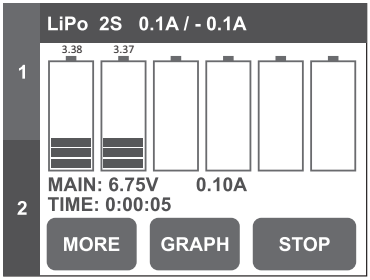
The last connection pin of the balancer plug of the rechargeable battery therefore is the plus pole of the last cell. Therefore, the same voltage can be measured between the two outer pins of the balancer plug as at the two rechargeable battery connections directly.

Some balancer cables only have the plus pole of the last cell marked with a red cable. All other cables are black. There is also a balancer cables, in which every cable has a different colour.

The remaining procedure for charging is described in chapter 10. b).

If a lithium rechargeable battery with balancer plug is connected to the charger, the display will show the individual cell voltages based on the cell number of the rechargeable battery; a graphical fill level display is displayed as well.

Below, the total voltage, the actual charging current and the expired charging duration is displayed.



Important!

Only a battery pack with exactly the same voltage for each cell provides the maximum performance and service life for a model airplane/vehicle.

Variations in the quality of the materials used and the internal structure of multiple-cell lithium battery packs mean that the cells may have different voltages once discharged.

Charging such a rechargeable lithium battery without balancer will quickly cause large differences of cell voltage. This not only shortens the operating life (as one cell may have a very low voltage), but also damages the rechargeable battery as a result of a total discharge.

When charging a rechargeable lithium battery with different cell voltages without a balancer, there is the risk of overcharging one cell.

Example:

A dual-cell LiPo battery pack charged without the use of a balancer appears to have a voltage of 8.4 V and thus appears to be fully charged. The individual cells, however, have a voltage of 4.5 V and 3.9 V (one cell is dangerously overcharged, the other half discharged).

A cell overcharged in this way may leak, expand or, in a worst case scenario, catch fire or explode!

If this LiPo rechargeable battery is inserted, e.g. in a model plane, the flying time will be very short, since the voltage of the half-charged cell will break down quickly and the rechargeable battery will not supply any current anymore.

If your rechargeable lithium battery has a balancer connection, it must be connected to the charger at all times in addition to the two regular rechargeable battery connections (plus/+ and minus/-) (via the balancer board); always use the charge programme "BALANCE" then rather than the "CHARGE" one.

d) Fast Charge ("FAST CHG")

When charging a lithium rechargeable battery, the charging current reduces continually due to the charging method used, the fuller the rechargeable battery becomes (when the rechargeable battery has reached its maximum charging current and the charger switches from continuous current to continuous voltage charging). This will, of course, also extend the charging time.

At quick charging, the continuous voltage charging method uses a higher charging current. However, this reduces the capacity, because the charge process is terminated earlier due to the safety cut-off in the charger.

This means, a LiPo battery, for example, cannot be fully charged using the fast charge function. Only approx. 90% of the capacity achievable with the normal charge process is available.

⟶ Therefore, fast charging is only wise if the battery has to be used again as quickly as possible.

The procedure when setting the charging current and voltage/cell number must be performed as for the rechargeable battery programme "CHARGE"; see chapter 10. b).

e) Storing Batteries ("STORAGE")

This rechargeable battery programme can be used if you want to store the rechargeable battery for an extended period. Depending on the rechargeable battery type set, the rechargeable battery is charged or discharged to a specific voltage.

⟶ Depending on the cell voltage, the battery is either charged or discharged. Of course, with a multi-cell battery pack, this is only wise if a balancer connection is available and connected to the charger.

At extended storage of a lithium rechargeable battery (e.g. when storing a flight battery over winter), the rechargeable battery should in any case be checked every 3 months and treated with the rechargeable battery programme "STORAGE" again to prevent harmful deep discharge.

The procedure when setting the charging current and voltage/cell number must be performed as for the rechargeable battery programme "CHARGE"; see chapter 10. b).

f) Discharging Battery ("DISCHARGE")

Normally, it is not necessary to discharge lithium batteries (contrary to NiCd batteries) before charging. The battery can be charged immediately, independent of its current status. If you want to discharge a rechargeable lithium battery anyway, you can set the discharge current.

→ The maximum possible discharging current depends on the battery type, battery capacity and number of cells. The max. discharge output of the charger is 10 W per channel. This limits the max. possible discharge current of rechargeable batteries with multiple cells.

Discharge a lithium rechargeable battery only to the minimum permitted discharge end voltage per cell (see table in chapter 7 or observe information of the rechargeable battery manufacturer). If the rechargeable battery is discharged any further, this deep discharge will permanently damage it and render it useless!

The procedure when setting the discharging current and voltage/cell number must be performed the same as when charging, see chapter 10. b), except that the rechargeable battery is not charged, but discharged after starting the rechargeable battery programme.

11. NiMH and NiCd Rechargeable Batteries

a) General

⟶ The rechargeable battery programmes for NiMH and NiCd rechargeable batteries generally differ only in the internally used charging procedures. The settings in the menus are the same.

The charger must be in the main menu.

Use the buttons "NiMH" or "NiCd" to select the battery type matching the rechargeable battery used. The respective interface is marked in colour.

If you push the same button again, the charger will start setting mode for the selected rechargeable battery type.

In the figure on the right, a NiMH rechargeable battery has been chosen. The menus for NiCd rechargeable batteries are the same, however.

"CELLS" = Cell number of the rechargeable battery

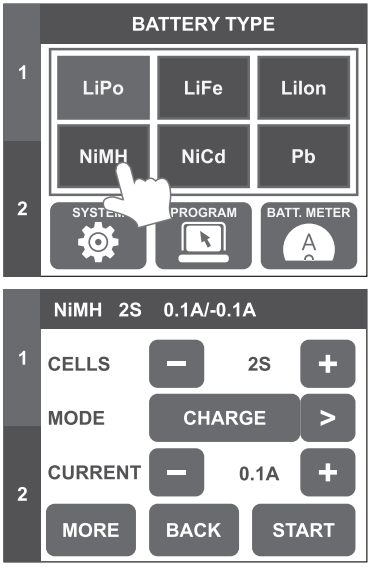
"MODE" = Charging/discharging mode

"CURRENT" = current

"MORE" = Display further settings

"BACK" = Return to the previous menu

"START" = Start the set charging/discharging mode
(keep the button pushed for 3 seconds)



The following charge/discharge modes exist for NiMH and NiCd rechargeable batteries:

- "CHARGE": Charge rechargeable battery
- "AUTO CHG.": Select the charge current according to the rechargeable battery
- "DISCHARGE": Discharging the rechargeable battery
- "RE-PEAK": Repeat the charge end recognition
- "CYCLE": Perform multiple discharge/charge cycles

b) Charging Batteries ("CHARGE")

The charging current to be set depends on the rechargeable battery's capacity and is usually 1C (also see chapter 7). High-quality rechargeable batteries also can stand a charging current up to 2C. However, you should always observe the battery manufacturer's instructions.

⟶ The value "1C" means that the charging current is equivalent to the battery's capacity. A charge current of 3 A therefore must be set for a 3000 mAh-NiMH battery at 1C.

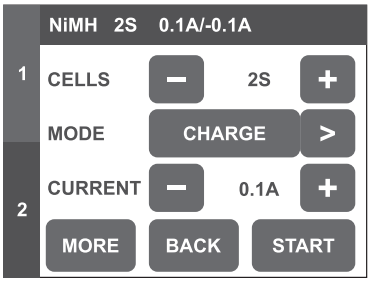
A value of 0.5C means that the charging current corresponds to half the capacity value. At a NiMH rechargeable battery with a capacity of 3000 mAh, 0.5C means that a charging current of 1.5 A must be set.

In general: The smaller the rechargeable battery (the individual cell), the lower the maximum charging current.

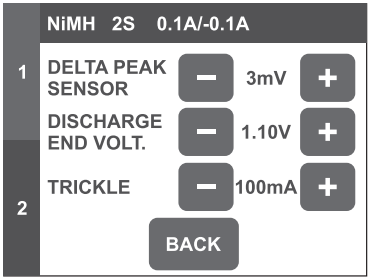
For example, conventional NiMH-mignon/AA-cells with a capacity of 2000 mAh permit a charging current of 1C (this corresponds to a charging current of 2 A). For quick charging of such cells (contained, e.g., in receiver batteries), never set more than 0.5C.

Charge a NiMH or NiCd battery as follows:

- First select the rechargeable battery type in the main menu, as described in chapter 11. a) (NiMH or NiCd).
- Set the cell number in "CELLS" with the buttons "-" and "+".
- Push the button ">" in "MODE" repeatedly until the mode "CHARGE" is displayed.
- For "CURRENT", use the buttons "-" and "+" to set the charge current. Keep the respective button pressed for quick adjustment.
- Another input window appears when you push the button "MORE".



- Set the voltage where the delta-U charging procedure recognises a fully charged rechargeable battery for "DELTA PEAK SENSOR".



⟶ If the value is set too high, the charger may not recognise that the rechargeable battery is fully charged. The protection circuit for the charge duration or the maximum capacity usually trips here (if set correctly).

If the value is set too low, the charge will switch off too early and the rechargeable battery will not be fully charged.

Change the voltage in steps and check the charging process. Due to the many different rechargeable batteries, it is not possible to suggest a perfect value.

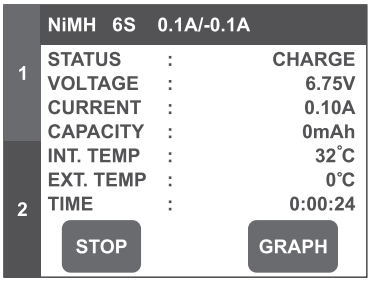
- In the setting "DISCHARGE END VOLT.", the cell voltage at which the discharge process is completed can be set.
- For "TRICKLE", you can set the maintenance charge current. When a NiMH or NiCd rechargeable battery is fully charged, it will lose part of its capacity again by self-discharge. The maintenance charging current (short charging impulses, no continuous charging current) ensures that the rechargeable battery remains fully charged. Thus also prevents crystal formation in the rechargeable battery.
- "BACK" will take you back to the respective prior menu.

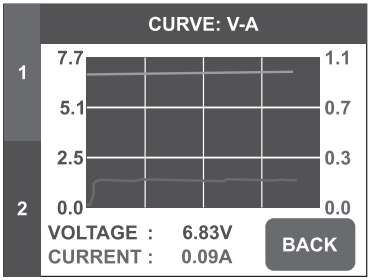
- If you push the button "START" for the duration of 3 seconds, the charger will review the connected rechargeable battery (the display will show "CHECK BATTERY.....").

  Charging starts when everything is OK.

  If errors are found (e.g. if no rechargeable battery is connected), the corresponding message will be displayed. The button "BACK" will return you to the previous menu in that case.

- After charging starts, various information is displayed.
- Use the button "GRAPH" to get to the graphical display of the voltage curve and charge current.
- Push the button "STOP" to manually interrupt or terminate charging.
- When charging is complete, the charger will emit a sound and a corresponding message will be displayed. The button "STOP" will take you back to the setting menu.





c) Automatic Charge Mode ("AUTO CHG.")

In automatic mode, the charger checks the rechargeable battery condition (e.g. the inner resistance) and calculates the charging current from this. You need to set an upper limit for the charging current so that the rechargeable battery is not damaged by a too-high charging current.

Depending on the rechargeable battery and its inner resistance, shorter charging times may be achieved in the rechargeable battery programme "AUTO CHG." than in the rechargeable battery programme "CHARGE" (chapter 11. b).

⟶ Proceed as in the rechargeable battery programme "CHARGE" for setting and operation (chapter 11. b).

The only difference is that you do not set the actual charging current, but the limit for the maximum charging current that the charger must not exceed.

d) Recharge Rechargeable Battery Again ("RE-PEAK")

The charger automatically ends charging of NiMH and NiCd rechargeable batteries when the rechargeable battery is fully charged. Recognition of when the rechargeable battery is fully charged is according to the delta-U procedure.

The rechargeable battery programme "RE-PEAK" performs this recognition again. This way, you can not only ensure that the rechargeable battery is truly fully charged, you can also check how well the rechargeable battery can take quick charging.

Proceed as follows:

- First, charge the rechargeable battery completely (see chapter 11. b) or chapter 11. c)). Then select the rechargeable battery programme "RE-PEAK".
- After you have set the rechargeable battery data and charge current, push the button "START" for 3 seconds.
- An input field will appear, indicating how often the recognition processes for the delta-U charging procedure are to be performed. Set the number with the "-" and "+" buttons.
- Keep the "START" button pushed again for 3 seconds to start the rechargeable battery programme "RE-PEAK".

⟶ The remaining operation corresponds to the rechargeable battery programme "CHARGE" (chapter 11. b).

e) Discharging Battery ("DISCHARGE")

To put partially charged NiMH/NiCd rechargeable batteries into a defined starting condition, they can be discharged with this rechargeable battery programme.

⟶ The maximum possible discharging current depends on the battery type, battery capacity and number of cells. The max. discharge output of the charger is 10 W per channel. This limits the max. possible discharge current of rechargeable batteries with multiple cells.

Specifically NiCd rechargeable batteries should not be recharged from a partially discharged condition, since the capacity may reduce by this (memory effect). This is usually not a problem in modern NiMH rechargeable batteries.

The rechargeable battery can also be used to measure the capacity of rechargeable batteries.

The procedure when setting the discharging current and voltage/cell number must be performed the same as when charging, see chapter 11. b), except that the rechargeable battery is not charged, but discharged after starting the rechargeable battery programme.

f) Cycle Programme ("CYCLE")

To test rechargeable batteries, form new rechargeable batteries or refresh older rechargeable batteries, you can perform up to 5 cycles in sequence automatically. The two possible combinations are "Charge/Discharge" and "Discharge/Charge".

⟶ The discharge current used will be the value you have set in the charge programme ("DISCHARGE").

Proceed as follows:

- Set the discharge current in the rechargeable battery programme "DISCHARGE" (see chapter 11. e).
- Switch to the rechargeable battery programme "CYCLE". Set the rechargeable battery data (cell number, charge current) here as usual.
- Keep the button "START" pressed for 3 seconds.
- A new input field appears.
- For "CYCLE COUNT", you can enter the cycle number (1....5), for how often the charging/discharging process is to be performed.
- In "MODE", you can set the sequence. "Chg>dChg" means "Charging/Discharging" and "dChg>Chg" means "Discharging/Charging".
- Keep the "START" button pushed again for 3 seconds to start the rechargeable battery programme.

⟶ The remaining operation corresponds to the rechargeable battery programme "CHARGE" (chapter 11. b).

12. Lead Batteries (Pb)

a) General

Lead batteries are completely different from lithium, NiMH or NiCd batteries. Despite their high capacity they can only provide low currents. The charging process is also different.

The charging current for modern lead batteries must not exceed 0.4C; 1/10C is perfect for lead batteries.

A higher charging current is not permitted; it would overload the rechargeable battery! This not only causes danger of explosion and fire, but also danger of injury from the contained acid.

Also always observe the information printed on the battery or the information provided by the battery manufacturer on the permitted charging current.

The charger must be in the main menu.

Push the button "Pb". The button is highlighted in colour.

If you push the same button again, the charger will start setting mode for the selected rechargeable battery type.

"CELLS" = Cell number of the rechargeable battery

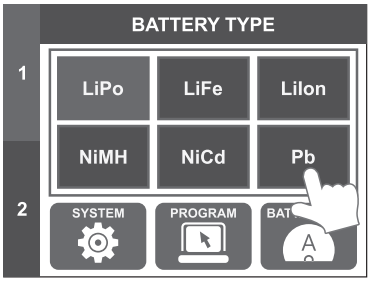
"MODE" = Charging/discharging mode

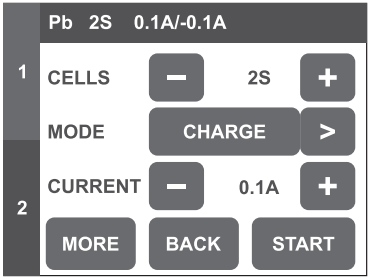
"CURRENT" = current

"MORE" = Display further settings

"BACK" = Return to the previous menu

"START" = Start the set charging/discharging mode
(keep the button pushed for 3 seconds)





There are the following charging/discharging modes:

- "CHARGE": Charge rechargeable battery
- "DISCHARGE": Discharging the rechargeable battery

b) Charging Batteries ("CHARGE")

The charging current to be set depends on the battery capacity and is usually 0.1C (also see chapter 7). High-quality lead batteries also can stand a charging current up to 0.4C. However, you should always observe the battery manufacturer's instructions.

⟶ The value "0.1C" means that the charging current is equivalent to one-tenth of the rechargeable battery's capacity. For a lead battery with a capacity of 5000 mAh (= 5 Ah) the charging current at 0.1C must be set to 0.5 A.

Proceed as follows to charge a lead battery:

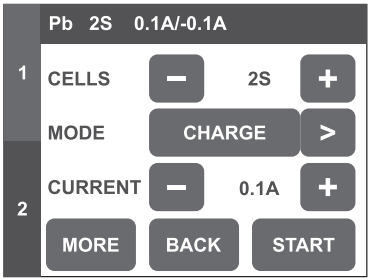
- First select the rechargeable battery type in the main menu, as described in chapter 12. a) ("Pb").
- Select the cell number in "CELLS" with the buttons "-" and "+".
- Push the button ">" in "MODE" repeatedly until the mode "CHARGE" is displayed.
- For "CURRENT", use the buttons "-" and "+" to set the charge current. Keep the respective button pressed for quick adjustment.
- Another input window appears when you push the button "MORE".

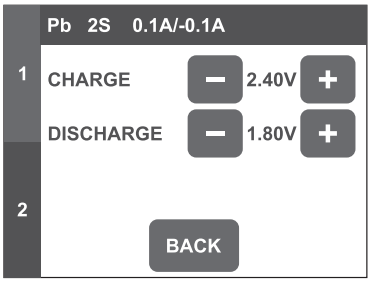
  For "CHARGE", a maximum cell voltage can be set when charging.

  For "DISCHARGE", you can set the minimum cell voltage when discharging.
- If you push the button "START" for the duration of 3 seconds, the charger will review the connected rechargeable battery (the display will show "CHECK BATTERY.....").

  Charging starts when everything is OK.

  If errors are found (e.g. if no rechargeable battery is connected), the corresponding message will be displayed. The button "BACK" will return you to the previous menu in that case.





- When charging is complete, the charger will emit a sound and a corresponding message will be displayed. The button "STOP" will take you back to the setting menu.

c) Discharging Battery ("DISCHARGE")

To put partially charged lead batteries into a defined starting condition, they can be discharged with this rechargeable battery programme.

⟶ The maximum possible discharging current depends on the battery type, battery capacity and number of cells. The max. discharge output of the charger is 10 W per channel. This limits the max. possible discharge current of rechargeable batteries with multiple cells.

The rechargeable battery can also be used to measure the capacity of rechargeable batteries.

The procedure when setting the discharging current and voltage/cell number must be performed the same as when charging, see chapter 12. b), except that the rechargeable battery is not charged, but discharged after starting the rechargeable battery programme.

13. Voltage indication

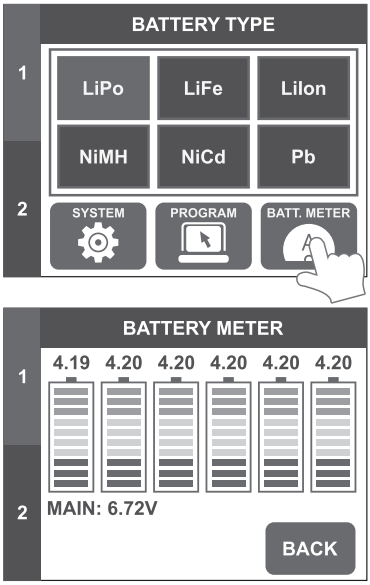
The charger can also display the current voltages of the cells of a lithium rechargeable battery.

⟶ For this, the rechargeable lithium battery must have a balancer connection that must be connected to the charger (via the balancer board).

For NiMH, NiCd and lead batteries, the overall voltage of the connected rechargeable battery is displayed. Display of individual cell voltages is not possible for construction principle reasons (these rechargeable batteries have no balancer connection).

Proceed as follows:

- Connect the rechargeable battery to the charger via the charging cable as usual. Connect Lithium rechargeable batteries with a balancer connection to the charger via the balancer board as well.
- Push the button "BATT.METER" in the main menu to call the voltage display.
- The display shows the total voltage ("MAIN") of the connected rechargeable battery.
- If a Lithium rechargeable battery is connected to the charger via the balancer connection, the individual cell voltages appear (depending on the cell number of the connected rechargeable battery; the figure on the right shows a 6-cell Lithium rechargeable battery).
- Use the button "BACK" to return to the main menu.

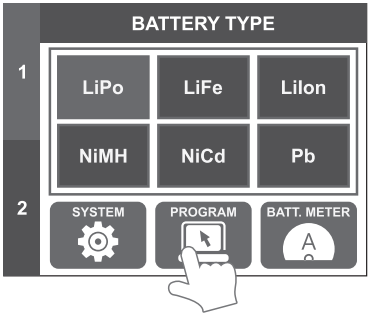


14. Loading/Changing/Saving Rechargeable Battery Data

⟶ The charger has a total of 6 memories in which you can save rechargeable battery data/settings. They can be loaded again on demand. This way, frequently used rechargeable battery programmes with the associated rechargeable battery data can be loaded without having to tediously set them again.

The charger must be in the main menu.

Push the "PROGRAM" button to set up the memories.



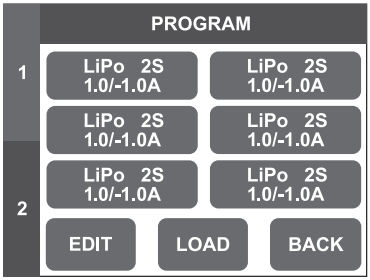
In the delivery condition and after a reset, all memories are preassigned (e.g. 2-cell LiPo battery), but can, of course, be changed according to your wishes.

Select one of the 6 memories by pushing the corresponding key/button as usual.

Use "EDIT" to change the data of your memory; see below.

Use the button "LOAD" to load the rechargeable battery data of the memory. The charger will then jump right to the respective rechargeable battery function where you can start the associated rechargeable battery programme.

Use the button "BACK" to return to the main menu.

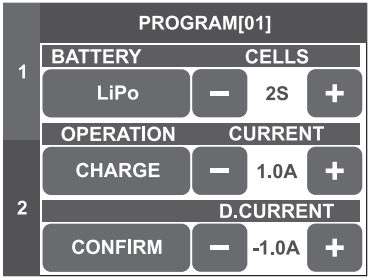


If you have selected "EDIT", you can now change the memory.

You can use the buttons to select the rechargeable battery type and the cell number, charging procedure (depending on the rechargeable battery type set), the charge current and discharge current.

Push the button "CONFIRM" to save the settings made.

⟶ The saved data are not lost if the charger is disconnected from the operating voltage.

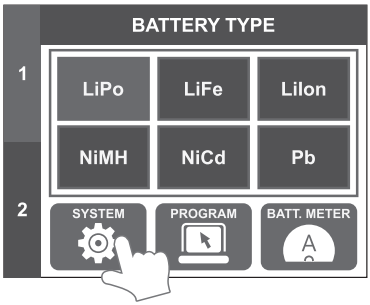


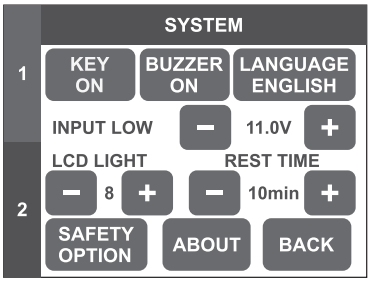
15. System Menu

Various basic settings are summarised in the system menu of the charger, pre-defined with the most common values.

The charger must be in the main menu.

Push the "SYSTEM" button to show the system menu.



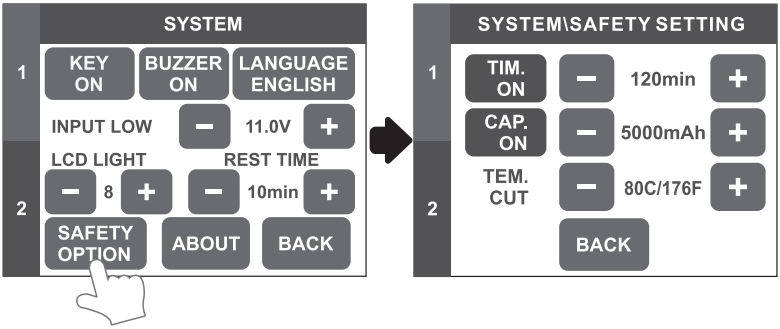


The following functions are available:

- "KEY": You can switch the confirmation sound for every push of a button on ("ON") or off ("OFF") here.
- "BUZZER": In this function, the signal sound for various functions/warning messages can be switched on ("ON") or off ("OFF").
- "LANGUAGE": Select the language for the menus and information in the display.
- "INPUT LOW": If the charger is connected to a car's lead battery (instead of via the mains cable), you can set the voltage limit here. If this is undercut, the charger terminates charging of the connected rechargeable battery and a warning sound is emitted.

  This setting protects the vehicle lead battery from deep discharge.
- "LCD LIGHT": Set the backlighting brightness of the display here.
- "REST TIME": For the cycle program at NiMH/NiCd rechargeable batteries, you can set the duration of the break that the charger is supposed to make before charging/discharging or discharging/charging here. This gives the rechargeable battery time to cool off sufficiently before the next cycle starts.
- "ABOUT": The charger displays the version number of the firmware. There also is a function here to restore all factory settings ("LOAD FACTORY"); all settings and memories will be deleted after a prompt.
- "SAFETY OPTION": The chager displays another setting menu; see next page.
- "BACK": Use this button to return to the main menu.

On the first page of the system menu, push the button "SAFETY OPTION", another setting menu appears.



"TIM.": If charging starts, the internal safety timer starts as well. If the charger cannot detect whether the battery is fully charged for whatever reason (e.g. with delta-U-recognition), the charging will be terminated automatically after the end of the time set here if the safety timer is on. This protects the battery from overloading. The safety timer can be switched on ("ON") or off ("OFF") by pushing the button "TIM"; the time for the safety timer can also be changed with the buttons "-" and "+".

⟶ Do not set the time too short, since the rechargeable battery cannot be fully charged then because the safety timer will cancel charging prematurely.

Calculate the time for the safety timer as follows (examples):

Battery capacity	Charging current	Timer time
2000 mAh	2.0 A	2000 / 2.0 = 1000 / 11.9 = 84 minutes
3300 mAh	3.0 A	3300 / 3.0 = 1100 / 11.9 = 92 minutes
1000 mAh	1.2 A	1000 / 1.2 = 833 / 11.9 = 70 minutes

⟶ The factor 11.9 is used to permit charging 140% of the rechargeable battery capacity (the rechargeable battery is guaranteed to be fully charged then), before the safety timer trips.

"CAP.": This safety function of the charger terminates charging automatically when a certain capacity has been "loaded" into the battery. The safety function can be switched on ("ON") or off ("OFF") by pushing the button "CAP"; the capacity can also be changed with the buttons "-" and "+".

⟶ However, do not set a capacity which is too low; otherwise the rechargeable battery cannot be fully charged.

"TEM. CUT": The charger can automatically cancel charging/discharging if the rechargeable battery exceeds the temperature set here. Set the temperature with the button "+" or "-".

⟶ To use this function, an external temperature sensor is required (not enclosed, can be ordered as an accessory). It must be connected to the respective socket of the respective charge/discharge channel of the charger.

- "BACK": This button returns you to the previous setting menu.

16. USB Output

If the charger is connected to the voltage/current supply, a voltage of 5 V/DC as common for USB and a current of up to 2.1 A are available at the USB-output.

⟶ You can use this output, e.g. to charge a mobile phone or a tablet computer.

17. PC Software

⟶ First install the software (at least Windows XP or higher required) and the drivers of the enclosed CD before connecting the charger to a computer.

For operation of the software observed, e.g., the corresponding information on the CD or in the software's help function.

Observe that the software cannot use both charging/discharging channels at the same time. If you want to control both channels at the same time by a computer, you need to use two computers (connect each computer to one channel of the charger). This limitation may no longer apply if you have a newer software version.

- Place the CD included in the delivery in the corresponding drive of your computer.
- If the installation programme does not start up automatically, open the table of contents of the CD, e.g. with the file manager of Windows and start the installation programme manually.
- Follow all instructions of the software or Windows.
- Now connect the USB socket of the charger of channel 1 or 2 to a free USB interface of your computer via a suitable USB cable (not included).

  Windows recognises the new hardware and completes the driver installation. Windows may then have to be re-started.
- Start the software. If any problems occur, try starting the software with Administrator rights.
- The charger can be controlled by software now.

⟶ If a new version of the software is available, you can find it on www.conrad.com in the download area on the respective product website.

18. Warning Messages on the Display

Warning Message on the Display	Description
"INT. TEMP TOO HIGH"	The temperature of the charger is too high. Check the fans if required.
"EXT. TEMP TOO HIGH"	The temperature measured at the rechargeable battery via the external sensor is too high.
"DC IN TOO LOW"	The input voltage (operating voltage) for the charger is too low (< 11.0 V).
"DC IN TOO HIGH"	The input voltage (operating voltage) for the charger is too high (> 18.0 V).
"OVER TIME LIMIT"	The set time limit for charging (see chapter 15) has been exceeded.
"OVER CAPACITY LIMIT"	The set capacity limit (see chapter 15) has been exceeded.
"REVERSE POLARITY"	The rechargeable battery was connected with reversed polarity.
"CONNECTION BREAK"	The connection to the rechargeable battery has been disrupted, e.g. if the battery has been disconnected during the charging process.
"CELL NUMBER ERROR"	The set cell number is wrong.
"BALANCE CONNECTOR ERROR"	The balancer connection of the rechargeable battery has been connected incorrectly or with reversed polarity.
"NO BATTERY"	No rechargeable battery is connected or the rechargeable battery has not been recognised (e.g. defective/deep discharged).
"CONNECTION ERROR"	The rechargeable battery has been connected incorrectly or the charger recognises doubtful values.
"BATTERY WAS FULL"	The connected rechargeable battery is fully charged. If required, check the cell number settings.

19. Maintenance and Cleaning

The product does not require any maintenance. You should never take it apart. The product should only be maintenanced/repaired by a specialist or specialist workshop or it may be damaged.

Any rechargeable battery connected must be disconnected from the charger before cleaning.

Then disconnect the charger from the voltage/current supply.

Never use any aggressive cleaning agents, cleaning alcohol or other chemical solutions, since these may damage the casing or even impair function.

Use a dry, lint-free cloth for cleaning the product.

Dust can be removed using a clean, soft brush and a vacuum cleaner.

20. Disposal

a) Product

Electronic devices are recyclable and should not be disposed of in household waste. Dispose of the product according to the applicable statutory provisions at the end of its service life.

b) Batteries/Rechargeable Batteries

You as the end user are required by law (Battery Ordinance) to return all used batteries/rechargeable batteries. Disposing of them in the household waste is prohibited.

Batteries/rechargeable batteries that contain hazardous substances are labelled with the adjacent icon to indicate that disposal in domestic waste is forbidden. The descriptions for the respective heavy metals are: Cd=cadmium, Hg=mercury, Pb=lead (the names are indicated on the battery/rechargeable battery e.g. below the rubbish bin symbol shown on the left).

You may return used batteries/rechargeable batteries free of charge at the official collection points in your community, in our stores, or wherever batteries/rechargeable batteries are sold.

You thus fulfil your statutory obligations and contribute to the protection of the environment.

21. Technical Data

Operating voltage	Mains voltage input: 115/230 V/AC (switchable), 50/60Hz
	Direct voltage input: 11 - 18 V/DC

If the mains voltage input is used, always select the mains voltage at the site of operation first with the voltage selection switch above the mains socket. If the wrong mains voltage is set, the charger will be destroyed. Loss of warranty/guarantee!

Never use both inputs at the same time. This may damage the charger. Loss of guarantee/warranty!

Charging/discharging channels	2
Charge current per channel	0.1 - 12.0 A (depending on the cell number and rechargeable battery type)
Charging output per channel	120 W (channel 1 + 2 total: 240 W)
Discharge current per channel	0.1 - 5.0 A (depending on the cell number and rechargeable battery type)
Discharge output per channel	10 W max. each (channel 1 + 2 total: 20 W)
Suitable rechargeable batteries	NiMH/NiCd, 1 - 15 cells
	LiPo/LiIon/LiFe, 1 - 6 cells
	Pb, 1 - 10 cells (rated voltage 2 - 20 V)
Discharge current for balancer	500 mA per cell
Delta-U-recognition	yes (for NiMH/NiCd, adjustable 3 - 15 mV/cell)
Maintenance charge current	yes (for NiMH/NiCd, adjustable 50 - 300 mA, can be switched off)
Safety timer	yes (10 - 720 minutes, can be switched off)
Rechargeable battery memory	6
Fan integrated	yes
Ambient conditions	Temperature 0 °C to +40 °C; humidity 0% to 90% relative, non-condensing
Weight	1.46 kg
Dimensions	180 x 139 x 60 mm (W x D x H)

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