

LUPINE®

LIGHTING SYSTEMS



CHARGER ONE

Technical Information
(Read before use!)



Caution!!

The Charger One can be used to charge all types of Lupine rechargeable batteries.

You must not use this charger with unchargeable batteries!!

They will explode!!

The Charger and AC/DC adaptor should not be opened by the user as this will invalidate the warranty.

General (V 40) :

The Charger One was developed for use with Lupine high current Li-Ion rechargeable batteries, but it is also fully compatible with all other Ni-MH Lupine rechargeables).

Out of the box, the Charger One is set to charge the specific battery type the lighting system is supplied with. Although the Charger One can easily be set to your individual settings, it is **not necessary**. Please do not attempt to program the charger until you are used to operating the Charger One and you have read and understood this Technical Information.

All pictures shown below demonstrate the charging of a Li-Ion rechargeable. For NiMH batteries ensure the display reads "NiMH" instead of Li-Ion when charging these battery types.

In the instructions below, "battery type" is used to represent the actual type of battery (Li-ion, NiMH).

Components:

The charging system "Charger One" consists of two components:

- AC/DC adaptor
- Charger One with microprocessor controlled charger

The AC/DC adaptor accepts 100V~ – 264V~ from the mains and delivers 12V= / 2A to the charger.

Connection:

Plug the AC/DC adaptor into the mains. Plug the adaptor into the socket of the Charger One. After a short initialisation the display will show: "*battery type* ready for charge".



The Charger One is set to default to the charge the type of battery the lighting system is supplied with. By **pressing** the select button you can toggle between the various charging programs (see chapter "Programming the Charger One"). The Charger will always start with the program that was last selected before the charger was removed from the power supply.

Charging:

The Charger One is now ready to charge. Just plug your rechargeable battery to the Charger One and charging starts automatically. The first line of the display shows: "*battery type* charge".

(Remember: *battery type* stands for the respective type of the rechargeable battery!)

The Charger One is now ready to charge. Plug the rechargeable battery into the Charger One and charging will start automatically. The first line of the display shows: "*battery type* charge".



From left to right, the second line of the display shows the following:

- Charging voltage in Volt (V)
- Charging current in Ampere (A)
- Capacity of battery charged in in Ampere hours (Ah)

Note: The actual capacity of a rechargeable battery can only be measured by fully discharging the battery. The given value displayed by the Charger One is the actual amount of capacity the battery has taken during that specific charge cycle. When the battery is full this value (capacity) will most likely be higher than the specified capacity of the battery and will not necessarily reflect the actual capacity available when the battery is discharged. Please keep this in mind if you want to calculate burn times.

The capacity charged is a guide as to how far through the charging cycle the battery is. For example, if an 8.2Ah battery shows a charged capacity of 4.1Ah, it is approximately 50% full.

During the charging procedure, the Charger One monitors the battery voltage and capacity. The charger will adjust the charging voltage and current based on these values and the charging program to ensure the battery is correctly charged and maintained.

The charging current will increase rapidly to 2.5 A when charging an almost empty rechargeable battery (battery voltage well below 8.2 V) and will continue to charge at 2.5A for most of the cycle.

When the battery reaches a certain level (or when charging a partly discharged battery), the battery voltage will reach 8 V and the charging current will be decreased to below 1.0A . At this time the battery will be almost full.

At this time it is possible to remove the battery from the charger and the capacity will almost be full. The final stages of charging are at a low current to ensure the battery is 100%.

Finally, when the battery has been fully charged with a low charging current (less than 1.0A), the charger switches to impulse preservation charge (Ni-MH) or off (Li-Ion). The display will show: "*battery type pulse*" or "*battery type full.*"



After charging the rechargeable battery can be used immediately. Due to the high discharging rate of Ni-MH batteries, Lupine recommends keeping these types of rechargeable batteries plugged to the charger for storing. This will prevent the battery from over discharging if stored for a long period of time (over 3 months).

Ni-MH batteries can become "lazy" after several weeks/months of being connected to the charger but this is easily overcome after two or three charge/ discharge cycles (also, see paragraph "pushing" below). It is far better to have a lazy battery which can be recovered than an over discharged battery which cannot be recovered and must be replaced.

Note: The discharging rate of Li-Ion batteries is very low. These batteries can be stored for a long period of time (up to 1 year) in a cool and dry place.

Display readings:

Charger ready:	<i>battery type</i> ready for charge
During charging:	<i>battery type</i> charge
When fully charged:	<i>battery type</i> full
During a puls in preservation charging:	<i>battery type</i> pulse
battery unplugged from charger during/after charging:	<i>battery type</i> disconnect
failure in power supply: (unplug power supply and wait for five seconds)	<i>battery type</i> error

Pushing:

When a fully charged Ni-MH rechargeable battery is connected to the charger, it is possible to top up the battery or "push" it by **pressing** the select button once. The Charger One tries to charge the battery with a current of 0.9A. The display flashes: "*battery type* push...*battery type* full"

A built-in delay of 30 Minutes after the end of the charging process prevents your battery from being over-charged. During this period, pressing the button will not start the pushing function.

This feature is only available with Ni-MH rechargeable batteries.

Changing the charging parameters:

It is **not** recommended to change any of the charging parameters if the battery is new and does not show any drop in performance.

However, old batteries that no longer give maximum capacity can be improved by changing the charging current and/or the maximum chargeable capacity. Older batteries often have an increased internal resistance that even increases with high charging currents. Reducing the maximum charging current to a lower level could result in a notably higher end capacity. Due to the unreliability of old batteries at charging currents below 0.8A, it is also necessary to adjust the maximum chargeable capacity. This prevents the battery from being overcharged by the charger which cannot recognise a weak, old battery.

Example: NiMH rechargeable battery from 1996 (3.6 Ah). Charge using NiMH program with charging current set to 0.6A and max. chargeable capacity set to 5.0 Ah.

To calculate the max.chargeable capacity use this calculation: nominal capacity x 1.3.

All settings are stored by the Charger One when disconnected from the power supply so it is not necessary to set the charging levels each time an old battery is charged.

Reset to factory defaults:

If you entered the programming mode by error or wish to go back to the factory settings, please carry out this procedure:

Unplug the Charger One from the AC/DC adaptor. Do not have the battery connected to the Charger One! Now plug the Charger One to the AC/DC adaptor while holding down the select button. The Charger One display will show its name and version number. Release the button. The Charger One has now been reset to the default setting.

Ensure the displays shows "*battery type* ready for...charge". If it does not, toggle to the correct battery mode by pressing the select button (repeatedly).

PROGRAMMING THE CHARGER ONE

1.) The Main Menu

The main menu is displayed on the LCD when it is not connected to a battery. From the main menu it is possible to toggle between modes by pressing the select button:

Charging programm Ni-MH

Charging and auto-switch off are set to the exact requirements of Lupine Ni-MH rechargeable batteries.

After charging, the Charger One automatically switches to impulse preservation charging (display: pulse...full, pulse...full). Keep the battery plugged to the charger for storage and remove from charge shortly before use.

Charging program Li-Ion

Charging and auto-switch off are set to the exact requirements of Lupine Li-Ion rechargeable batteries.

When the battery is fully charged, the charger switches off automatically (display: ..full,...full). The battery can be removed from the charger or kept attached.

forming programme

The forming programme does not switch off automatically and needs to be supervised! Only for Ni-MH batteries !

This programme can be used to re-activate rechargeable Ni-MH batteries which have been stored for a long time. The whole battery pack will slowly be overcharged to ensure that even the weakest cell will be fully charged according to its capacity. During this process, the strongest cells will transform the energy into heat. The battery will therefore become warm. Due to the low charging current, overcharging the battery up to 30 hrs does not cause problems.

However, to prevent your battery from damage, cautious pre-setting of the programme is essential:

The maximum charging **current must be set manually according to the size of your battery:**

NightMare 7.8/8.2 Ah : 0.9 A

Passubio XC 5.2 Ah : 0.5 A

If you are in doubt about the right setting, choose the lower current.

(See "Reducing Charging Current" below). We also advise you limit the maximum capacity of the battery.

Hint: You should use this charging programme only for batteries which have been stored for several months and which are fully discharged. Normal charging programmes will in those cases stop too early without the battery being fully charged.

Warning! When charging your bottle batteries, you need to open the bottle top to prevent overheating.

This programme is suitable only for Ni-MH rechargeable batteries.

Discharging programm

The "disc" programm is used to discharge rechargeable battery using a discharging current of 0.1 - 0.5 A. Discharging times are long due to the low discharging current.

Li 50% programm

The Li 50% program is very useful to prepare **Li-ion batteries** for long periods of storage.

It is recommended to store Li-Ion batteries at 50% charged level. This program firstly fully charges, then, fully discharges, then charges to 50% of the batteries capacity. When the battery is charged to 50% and ready for storage, the charger turns off automatically (display: storage) the battery can be removed from the charger or left connected where the charger will monitor and charge as appropriate (display: pulse) to keep the battery at 50%.

2.) The Sub Menu

To access the Sub Menu, press and hold the select button for **three seconds** until the display readings change. From here it is possible to change the parameters of the charging programs.

Each of the three options will be displayed for 5 seconds. If the select button is not pressed during this time the Charger One will revert back to the main menu.

THE PARAMETERS:

Select: press key ... first charge

charge

A quick press of the button ... will set the Charger One to 1-+ charge , second choice is 3-+ charge.

(Note: If choosen, the display will show "*battery type* first charge, 1-+charge or 3-+charge " when connected to the AC/DC adaptor.)

1 or 3 -+ charge is recommend for Ni-MH training.

After 5 seconds the display will change to the next parameter:

Select: press key ... I max: 2.5 A

Limiting the charging current

Each press of the select button reduces the charging current from 2.5A in steps of 0.4A. After the lowest possible setting is reached the cycle will return to 2.5A.

After 5 seconds the display changes to the next parameter:

Select: press key ... Ah max: 20 Ah

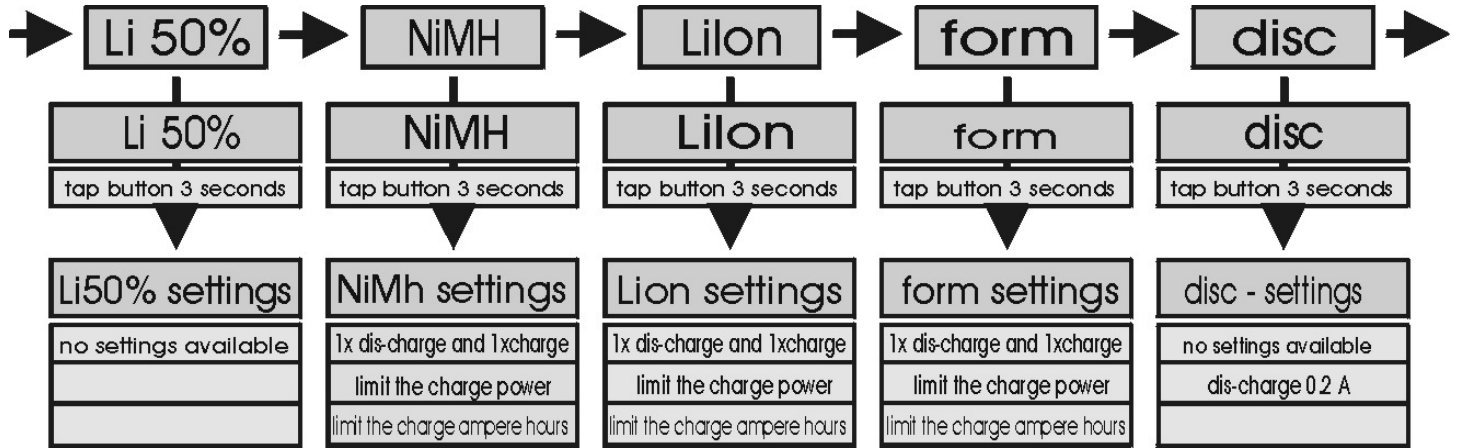
Limiting the chargeable capacity

Each press of the select button increases the chargeable capacity in steps of 0.5Ah up to 20.0 Ah.

Again, there is a delay of 5 seconds after pressing the button, but the programming mode is exited and the display returns to the main menu.

Note! If you do not want to change any settings in the sub menu, wait 3 x 5 seconds without pressing the button. Each paramter of the respective programm will then default to the factory settings (no discharging, max. charging current 2.5A, max.chargeable capacity 20.0Ah).

3. The Programming Chart



IMPORTANT NOTES:

Use of this lighting system might be limited differently from country to country depending on the purpose you use it for. Please do inform yourself about possible restrictions in your country.

The mounting device and the design of the Betty's as well as of the PCS are protected by worldwide patents.

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