



## Charging the batteries in ROSbot

The ROSbot 2 kit contains the Redox Beta charger. It is an universal charger, suitable for charging NiCd, NiMH, Li-Po, Li-Fe, Li-Ion and Pb (AGM, VRLA) batteries.

Charger kit includes:

- Redox Beta charger
- AC/DC power adapter 100...240V to 12V 5A with 5.5/2.5mm plug on the 12V side
- cable to connect charger with ROSbot charging port



Due to the fact that ROSbot is powered from only one type of batteries (Li-Ion), this short manual will contain only the information needed to charge Li-Ion batteries.

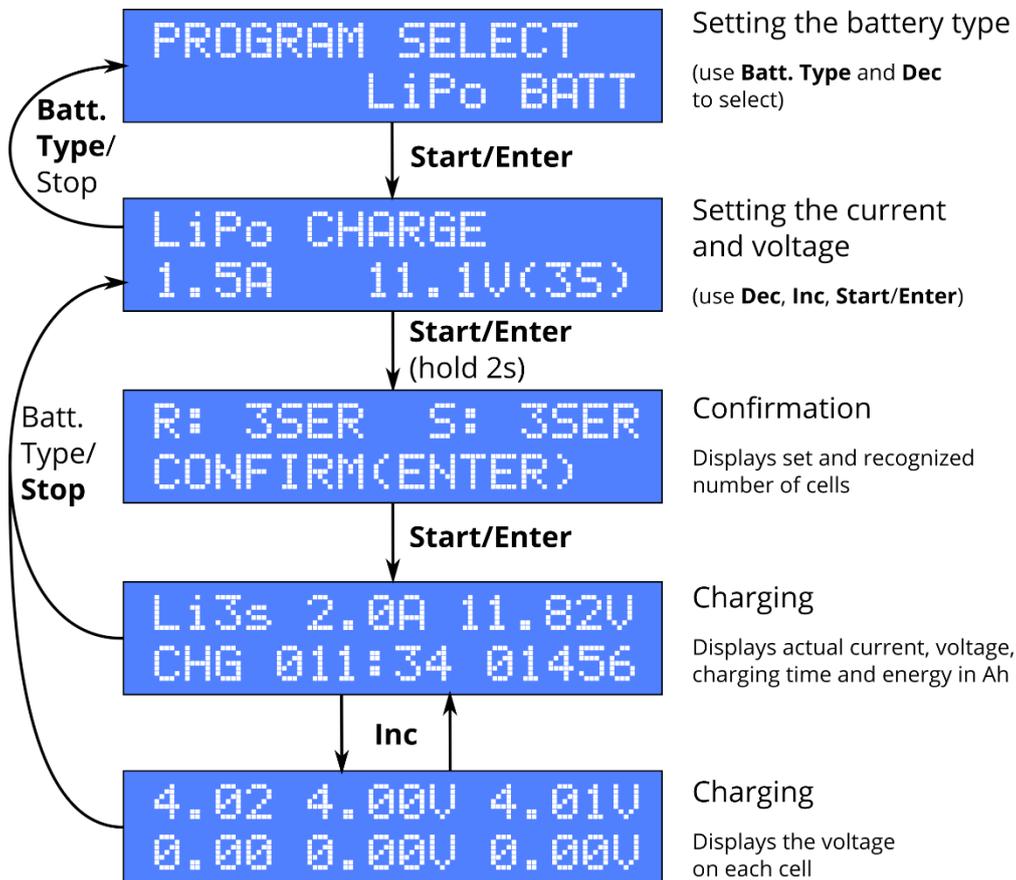




## Quick start charging guide

1. Connect the power adapter to the charger and the output cable between charger and ROSbot (2 connectors on charger side, 1 black connector to ROSbot charging port).
2. Use red and blue buttons to select "LiPo BATT" mode and press green [Start] button.
3. Use arrows to select "LiPo CHARGE" mode.
4. Press [Start] - the current value should start blinking. Use arrows to set the current to 1.5A.
5. Press [Start] again - the voltage value should start blinking. Select "11.1V(3S)" using arrows.
6. Press and hold [Start] for 2 seconds. The charger should now ask for confirmation. Press [Start] again. The charging process should begin now.
7. When the charging will be finished (after about 3 hours), the charger will generate a loud "beep" sound and will finish charging at the same time.

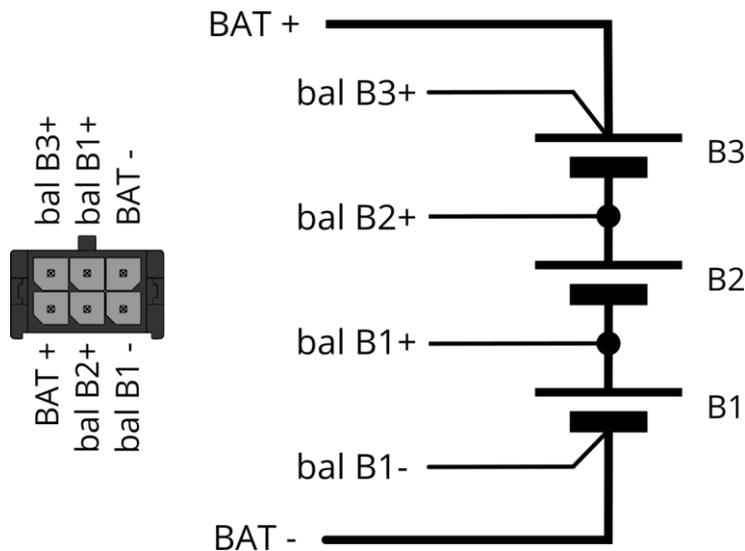
The picture below should help you to go through these steps.



Note: You can change charging current to maximum 3A. Please note that a regular charging with the maximum current can shorten the battery life.

## Charging Li-Ion batteries - basics

ROSbot is powered from 3 Li-Ion cells, connected in series. This type of connection is called "3S". The schematic below explains how the cells are wired together and with the charging connector (on ROSbot side).



The BAT+ and BAT- are the power connections and the “bal Bxx” wires are used to monitor the voltage on each cell. It is strongly recommended to keep equal voltages on each cell during the charging process. The charger included with ROSbot can charge batteries in the described way and, thanks to that, the long life of the battery set is possible.

The nominal voltage of each cell is 3.7V but the useful range is 3.2V to 4.2V, so the total voltage that supplies all ROSbot components is three times greater: 9.6V to 12.6V.

The connectors used for charging cable:

Connector	Manufacturer	Part Number	Comments
ROSbot side – housing	Molex	43025-0600	
ROSbot side – terminal	Molex	43030-0001	
charger side, balancer – housing	JST	XHP-7	
charger side, balancer – terminal	JST	SXH-001T-P0.6	
charger side, power	W.S. Deans	Ultra Plug #1300	known as T-Dean

### Important notes:

- Stationary use of ROSbot  
If you are going to use ROSbot stationary for a long time, you should use ROSbot with power supply connected all the time, using the barrel connector instead of the charger. The barrel DC connector has an internal switch which disconnects the batteries. Please remember that during connecting the barrel connector, the power can be interrupted and it is better to power off the system before you connect/disconnect the power supply.
- Using ROSbot in mixed mode  
If you see the above method of use inconvenient, because you work in mixed mode (stationary and remotely) and you need to avoid turning off the system, you can use the robot with a charger connected (6-pin connector) instead of the power supply. To make it working, it is best to align the charging current manually (0.5A – 3A) to ensure that the power consumption and charging current are compensated and the voltage is kept



at about 11.1V-12V. You should not keep charging for the prolonged time if the voltage is close to the maximum (12,4 - 12,6V) or close to the minimum (10 - 10,5V).

- Avoid deep discharging

Li-Ion batteries shall not be discharged below 3.0V per cell. The recommended lowest working voltage is 3.2V. User should use appropriate software functions to monitor the ROSbot battery voltage. This functionality is included in the default ROSbot firmware. Contact support in case of further questions.

- Unplug charging connectors carefully

You shall not unplug the charger connectors holding the wires. The balancer connection on ROSbot side has a latching tab (see photo below) that must be pressed before unplugging. On the charger side there is no latching tab but you should also unplug this connector holding the white plug.





## Redox BETA – short user manual

### Li-Po/Li-Ion charge/discharge modes

Use [Batt. Type/Stop] and [Dec] buttons to select “LiPo BATT” mode and press [Start]. Then use arrows to choose between charging/discharging modes for Li-Po or Li-Ion batteries.

#### LiPo CHARGE

In this mode batteries are charged in optimal way. The battery is charged to the maximum capacity. The voltage on each cell is monitored but they are not balanced – in case of unbalanced battery, the “strongest” cells are rather charged slower than discharged.

#### LiPo BALANCE

Used for charging the batteries to maximum capacity, but with the priority to have the same voltage in each cell. If the charger needs to discharge one cell a little to achieve exact voltages, it will do that. Use this mode if you observe that the difference between cell voltages is greater than 0,1V.

#### LiPo FAST CHG

Similar to CHARGE mode but doesn't charge batteries to the maximum capacity. In this mode, batteries are charged only in constant current stage, which provide the best charge/discharge time ratio.

#### LiPo STORAGE

The Li-Ion batteries have a specific voltage level, which is optimum to reduce the battery aging and self-discharging during the long-term storage. Use this mode if you are going to leave the batteries unused for more than one month.

#### LiPo DISCHARGE

You can use this mode to measure the capacity of the batteries. Probably you will never use this mode. It's mostly used for testing.

General rules for all modes:

- The charger needs to be configured in 3S mode to work with ROSbot, because it has 3 cells connected in series.
- When the charging will be finished (after about 3 hours), the charger will generate a loud “beep” sound and will finish charging at the same time.
- The recommended charging current for ROSbot is 1.5A. Current up to 3A can be used if the fast charging is more important for you than the battery lifespan.

### Redox BETA - specification

#### Characteristics:

- Dimensions: 113 x 65 x 23 mm
- Operating Voltage: DC 11.0 ~ 18.0 V 5A (AC/DC adapter is included)

#### Power output:

- Max. Charge power 50W
- Max. Discharge power 5W
- Charging current: 0.1 ~ 5.0A
- Discharging current: 0.1 ~ 1.0A



- Current balancing: 300 mAh / cell
- Number of supported cell NiCd / NiMH 1 ~ 15 cells
- Number of supported target Li-Po/Fe/Ion: 1 ~ 6 target
- Supported batteries Pb: 2 ~ 20V
- Weight (without cable and AC/DC adapter): 195 g
- Built-in charger memory: max. 5 packages
- Cycle feature packages
- Four programming buttons
- Built-in socket - T-deans

### Capabilities:

- Discharging function
- Support LiPo / LiFe
- Fast charge function and storage charge mode
- Auto limit current
- Programmable limits of capacity
- Charging time limits
- Continuous monitoring of current input voltage on built-in display
- Save and load your own settings

### **Warnings**

- Do not leave the charger unattended during operation.
- Do not connect charger or power adapter to power supply if you notice relevant mechanical damage or defect. If you are not sure if you can continue to use the charger kit, contact support.
- Avoid dust, moisture, excessive heating or direct sunlight and vibrations. These factors may affect the charging process and cause malfunction or even serious damage of charger or charged batteries.
- The allowed input voltage for the charger is 11...18V. Too high voltage can cause damage, too low voltage can cause malfunction or unpredictable behavior.
- Don't put the charger close to flammable items or material.

### **Support**

In case of any questions, please contact support at [support@husarion.com](mailto:support@husarion.com) or ask a question on our community forum: <https://community.husarion.com/>