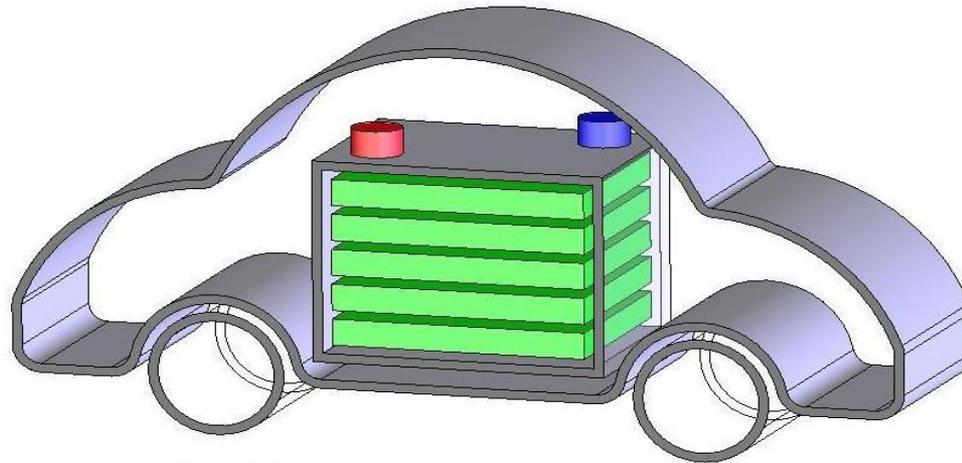


Instructions for accumulators set



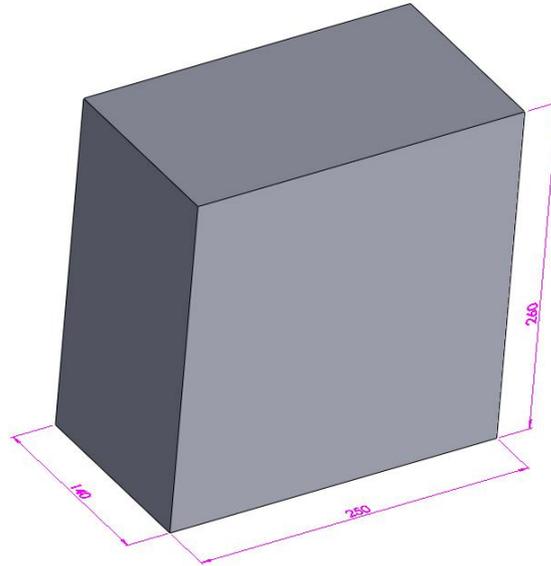
EV Battery

[http:// www. evbattery.eu](http://www.evbattery.eu) e-mail: evbattery@evbattery.cz

Content

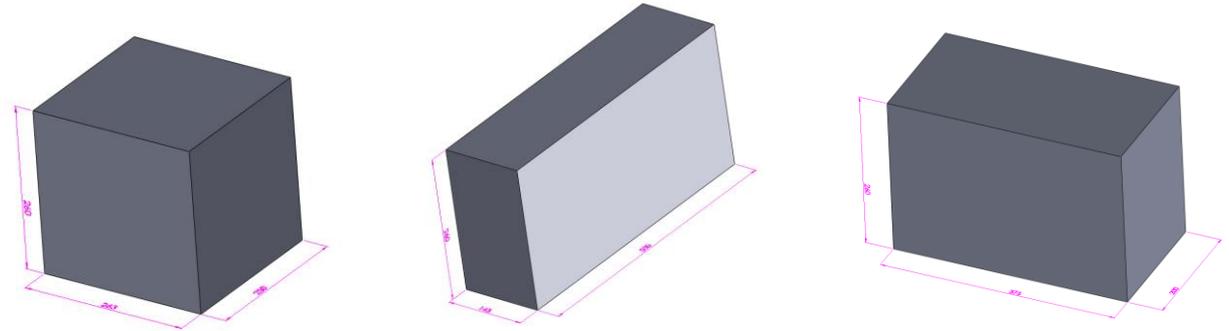
- Parameters
- Safety instructions
- Assembly instructions
- Function BMS
- Charging
- Circuit diagram
- Output relay
- Warranty

Parameters 12V 100Ah



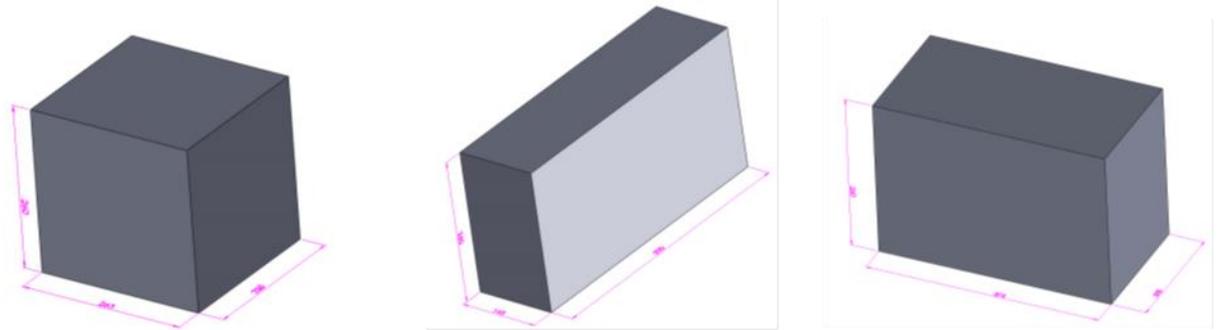
- Nominal voltage: 13,5V
- Charging voltage: 14,5V
- Minimal discharging voltage: 11V
- Capacity: 100 Ah
- Recommended charging current: to 30A
- Maximal discharging current: 60-120A
- Operating temperature: -20°C to 60°C
- Width: 250 mm
- Depth: 140 mm
- Height: lowered 250mm standard 260mm
- Weight: 15 kg
- Humidity: 25%-85% RH

Parameters 12V 200Ah



● Nominal voltage:	13,5 V	13,5 V	13,5 V
● Charging voltage:	14,5 V	14,5 V	14,5 V
● Minimal discharging voltage:	11 V	11 V	11 V
● Capacity:	100 Ah	100 Ah	100 Ah
● Recommended charging current:	max 60A	max 60A	max 60A
● Maximal discharging current:	60 - 120A	60 - 120A	60 - 120A
● Operating temperature:	- 20°C - 60°C	- 20°C - 60°C	- 20°C - 60°C
● Width:	250 mm	500 mm	375 mm
● Depth:	263 mm	143 mm	200 mm
● Height:	250 - 260 mm	250 - 260 mm	250 - 260 mm
● Weight:	29 kg	29 kg	29 kg
● Humidity:	25% - 85% RH	25% - 85% RH	25% - 85% RH

Parameters 24V 100Ah



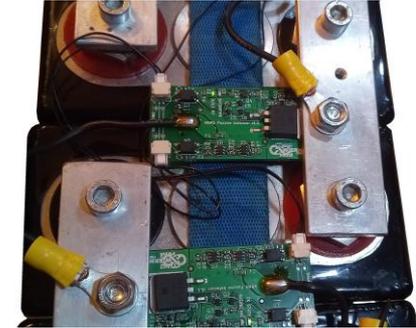
● Nominal voltage:	27V	27V	27V
● Charging voltage:	29V	29V	29V
● Minimal discharging voltage:	22V	22V	22V
● Capacity:	100 Ah	100 Ah	100 Ah
● Recommended charging current:	max 30A	max 30A	max 30A
● Maximal discharging current:	60 - 120A	60 - 120A	60 - 120A
● Operating temperature:	- 20°C - 60°C	- 20°C - 60°C	- 20°C - 60°C
● Width:	250 mm	500 mm	375 mm
● Depth:	263 mm	143 mm	200 mm
● Height:	250 - 260 mm	250 - 260 mm	250 - 260 mm
● Weight:	29 kg	29 kg	29 kg
● Humidity:	25% - 85% RH	25% - 85% RH	25% - 85% RH

Safety instructions

- Batteries LiFePO₄ are not themselves flammable, but fully charged cells have a big amount of energy, and if you short-circuit them, energy release, and that can cause fire. So never ever make short-circuit on them.
- When assembling the cells into larger units, make sure that the contacts are tightened sufficiently, otherwise there may be a large heat in point of bad connection in consequence of big transition resistance, which may cause fire.
- More cells connected together might mean a safe DC voltage being exceeded, and contact with body may cause electric shock. Therefore, do not touch the cells with your body.
- In the case of overload, short circuit, or mechanical damage, electrolyte may be released from the cell either in a liquid or gaseous state, so you must use protective equipment.
- Protect the eyes before chemicals.
- Protect the skin with gloves and protective clothing.
- Do not breathe fumes and place the cell in a well ventilated and place.
- Keep the cells dry.
- Recommended temperature for warehouse is 0°C - 30°C
- You need to check voltage minimally one time per month when warehousing them.
- Do not throw cells into fire.

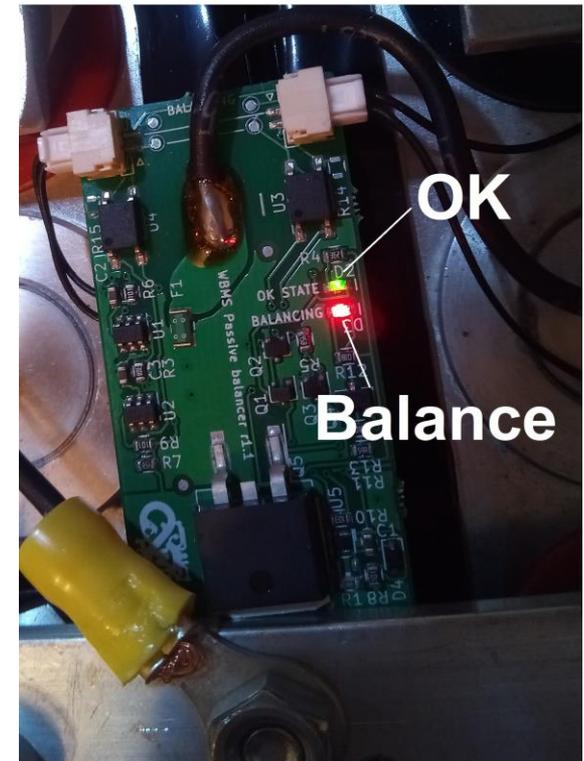
Mounting instructions

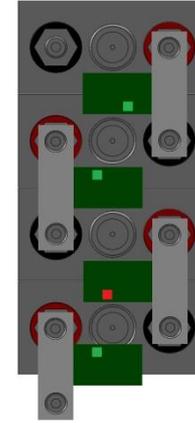
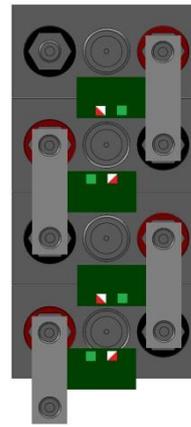
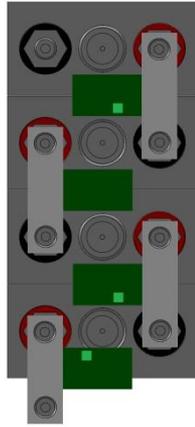
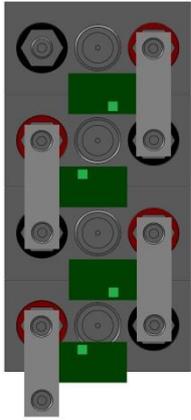
- For connecting to circuit use fuse which will be paired with current of output relay.
- When mounting, observe the polarity. When you accidentally change the poles, it may cause a short circuit.
 - + (red marked) positive pole connects to output of relay, using connector faston 9,5 mm.
 - (black marked) negative pole connects with cable eye 6mm.
- The set should be rotated with contacts up, it can be used in a lying position, but it may cause a faster loss of capacity.
- The battery must not be installed in the contact-down position. Short-time rotation in tens of seconds is possible.
- The optimal operating temperature is between 5 ° C and 30 ° C. At temperatures below 5 ° C, chemical processes slow down and capacity decreases. If it is necessary to have full capacity at these temperatures, we recommend the temperature of the cells. At temperatures above 30 ° C the capacity is slightly increased, but there is much faster aging, therefore it is not recommended to operate the batteries for longer at this temperature.
- For applications where the assembly needs to be hardly attached, we recommend using a strap. As you see on the photo.



Function of BMS

- BMS is used for cells protection against deep discharge, overcharging and exceeding the maximum operating temperature and secure ensures voltage comparisons of cells during charging.(balancing)
- BMS checks these parameters of cell, if they are alright, shines OK green LED and the output relay is connected.
- Maximal voltage: 3,7V
Minimal voltage: 2,65V - recovery after disconnection 2,9V
Temperature: 65°C
- After reaching end charging voltage on cell 3,6V lights up on BMS module starts flashing BALANCE red LED diode, which is signalization of starting balancing cells. Current slowly increases maximally to 1,5A. If it is still charged with bigger current than 1,5A Led BALANCE starts shining full time and temperature on transistor increases, when the temperature reaches 65°C disconnects status OK, and in this point charging is stopped.



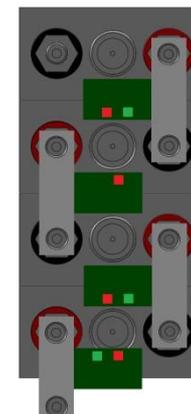
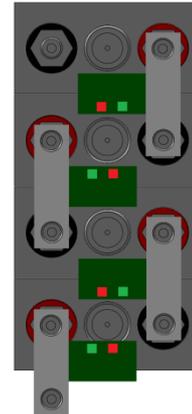
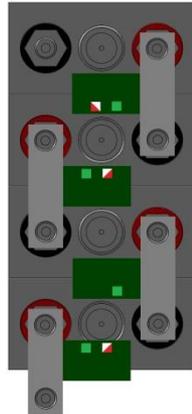
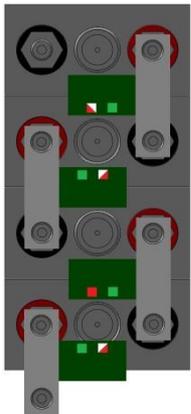


All parameters OK

Discharged acumulator

Fully charged,
right settings of
charging

Unbalanced



Fully charged, slightly
reduce charging

Increase charging
a little bit

Fully charged,
lower charging

Fully charged, lower charging
- disconnected output relay

Charging

- Phase of charging (bulk) should be going on voltage 14,5V.
- State of fully charged set When 4x Red LED diodes on balancers starts flashing, it means that the set is fully charged, and voltage is 3,6V.
- After reaching the ending voltage of charging (14,5V). Regulator, or charger must switch to absorption, when voltage is maintained on 14,5V and charging current decreases.

Some devices allows to set current of absorption end, for our sets is perfect 1,5A.

Other regulators, or chargers has adjustable time of absorption, our recommended time is 10minutes.

Some usages of sets allows to shorten time of charging, for example charging with fotovoltaic, when it is garanted that it would be charged every day to 100%.

Conversly, to sets, where is aplicated only occasional charging, is good to extend charging time.

Absorption time is judged according to state of LED diodes, if all 4 LED diodes starts flashing on cell, it is possible to shorten the time.

- The oposite situation, when it is necessary to extend charging time, means that cells in set are not completely balanced.

This situation happends if: 1. All cells are not burdened equally, 2. After a long time of warehousing, 3. After an insufficient charging, 4. If some cell in set, is not working correctly.

You can detect this problem, when you are charging batteries to 14,5V, and 3, 2 or 1 red LED on ballancers starts shining, and on remaining modules shines only green LED.

If cells are very unbalanced, on ballancer where all time shine red LED, after a some time, which depends on more factores, green LED will stop shining, which means that the temperaturje on ballancer was exceeded, or with big exceedance of maximal voltage on cell 3,7V and this cause that BMS disconnects main relay and stop charging.

After cooling, the relay switches back on and continues charging. This process is repeated periodically until the cells are balanced together, the red LED diode on the balancer stops shining, and starts flashing.

- Some voltage regulators do not accurately measure and charge below 14.5V.

In this case, only 3 red LEDs will flash

This state can also be considered a 100% charge because the last cell is at a voltage exceeding 3.5V.

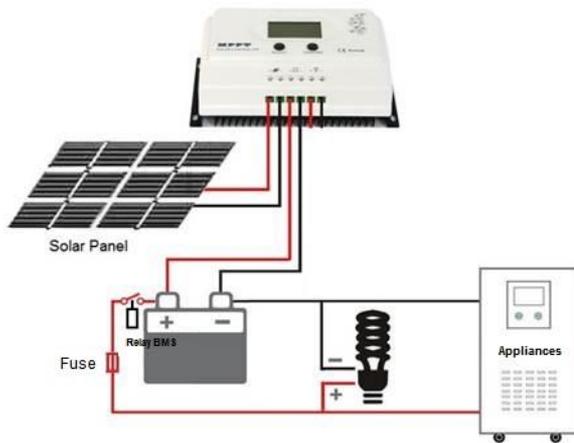
It is not necessary to increase the charging voltage, but it can be increased in steps, every 0.1V each time, until all four red LEDs on the modules start flashing.

- At high charging voltages, such as free-circuit transformer chargers 17V, all red LEDs on balances come on, after a while, depending on multiple factors, the green LED goes out, indicating that the 65 °C has been exceeded on the balancer, or exceeding the maximum voltage on the cell 3.7V and causes the BMS to open the main relay and shut down the charging.
- After cooling, the relay switches back on and continues charging. This process is repeated periodically and is necessary to turn off charging.

For charging, it is possible to use DC power sources that have a voltage at least 14.5V in the unloaded state. Doporučené jsou spínané zdroje u kterého je možno nastavit napětí na 14,5V a mají proudové omezení.

Connection scheme

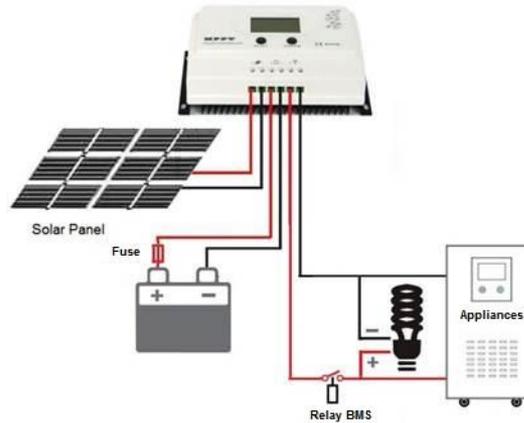
In these installations, when fotovoltaic regulator is connected directly to acumulator, it is necessary to check after commissioning that all four (three) red LEDs on balancing modules start blinking, and the set is not unbalanced. The de-balancing during this installation warns you to switch off the output, and it is necessary to turn off the battery charging to avoid damaging the wrong balanced cell.



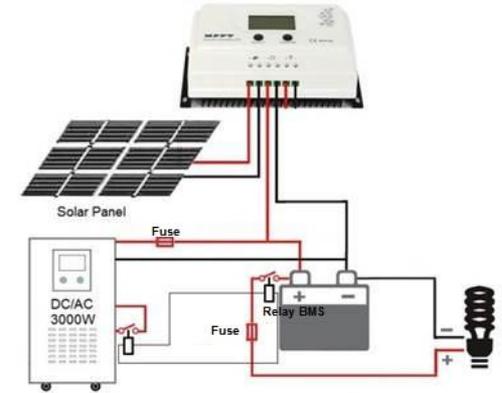
The most typical connection, for example in caravans, boats, and other.

The fuse value is based on the maximum current of the output relay.

For example relay 80, fuse 80A.



Connection via solar controller is suitable for lower output currents, but the output is controlled by the controller.



When using powerful appliances which has higher hodnotu of powerful relay, it is possible to connect appliance directly to acumulator and control only appliance with BMS.

Maximal current for the second relay is 5A.

Output relay

- Maximal current 80A, at resistance load 60A, power through coil 1,8W
- Maximal current 150A, at resistance load 100A, power through coil 2,9W
- If the battery is not used, it is better to turn off the power relay, this is reason why is on set placed switch, which turn off only power relay. By leaving the relay on, there is a risk of discharging to the minimum voltage on the cell when the BMS shuts down.
- The discharge time for the 80A relay version of the fully charged battery is approximately 26 days
- The discharging time for a 150A rechargeable battery rechargeable battery is approximately 17 days
- For caravans with a central off system, we supply the set with the outgoing control wire, where you can connect possitifrom 12v ignition battery, or current 12V from the optional traction battery.

Warranty

- Unless otherwise agreed, the standart warranty is 2 years.
- Warranty would not be agreed if:
 1. If minimum voltage on each cell would not be 2,5V
 2. If maximum voltage on each cell would exceed 3,8V
 3. If the cell will be overloaded during service
 4. If maximum operational temperature would be exceed.
 5. If cell will be mechanically damaged
 6. If cell will be damaged with water or other chemical substitution.
 7. If would be opened overpressure valve