



# Battery Management Systems

BMS MODULES  
BALANCERS  
SUITCASE BATTERY  
PACKS

# Instructions for connecting and using BMS 100Balance for Li-Ion (NMC) or LiFePO4 cell packs

The BMS purchased by you is a precise device protecting lithium batteries. The protection consists of measuring many parameters, specific to the given type and number of cells (charging voltage, discharge for a single cell and the entire pack, charge and discharge current, short-circuit protection, operating temperature range). If any parameter is exceeded, the BMS interrupts the battery operation process.

The 100Balance (Active) series BMSs provide active cell balancing. Energy is transferred from stronger to weaker cells. This ensures fast balancing with a current of up to 1A, sufficient even for large-capacity packs.

The 100Balance BMS is a fully configurable device. This means that it can be used to support Li-Ion, Li-FePO4, LTO cell packs. It is designed to work with a different number of cells (within the range described for a given BMS).

For the device to work correctly, its configuration in the mobile application is necessary. At least the type of battery and its capacity are required. Without the configuration, the BMS does not properly protect the package, which can lead to its damage or even fire.

The configuration is described in detail in the section "BMS configuration".

Under no circumstances should you solder the battery cables if the plug is connected to the BMS. This may result in damage to the BMS!

Please carefully check the connections made and the BMS settings in the application. Errors in connecting the cables or shorting any pins in the BMS sockets will result in the destruction of the system, which is not covered by the warranty.

Only use the cables and plugs supplied with the BMS. Using cables from other manufacturers may result in the destruction of the connection socket or incorrect connection (using different colors of cables).

## Step 1.

After welding or screwing the cell pack, please connect the wires according to the diagram. Before connecting, make sure that all cells in the pack are in a similar state of charge (the same voltage +/- 0.1V).

## Step 2.

To the first pin of the plug (black wire) we connect the negative pole of the entire pack. The black wire always means the minus of the pack.

## Step 3.

BMS supporting more than 17 cells are equipped with two connection sockets.

## Step 4.

We connect each subsequent cell to the next pin, starting with the minus of the pack and the black wire in the plug.

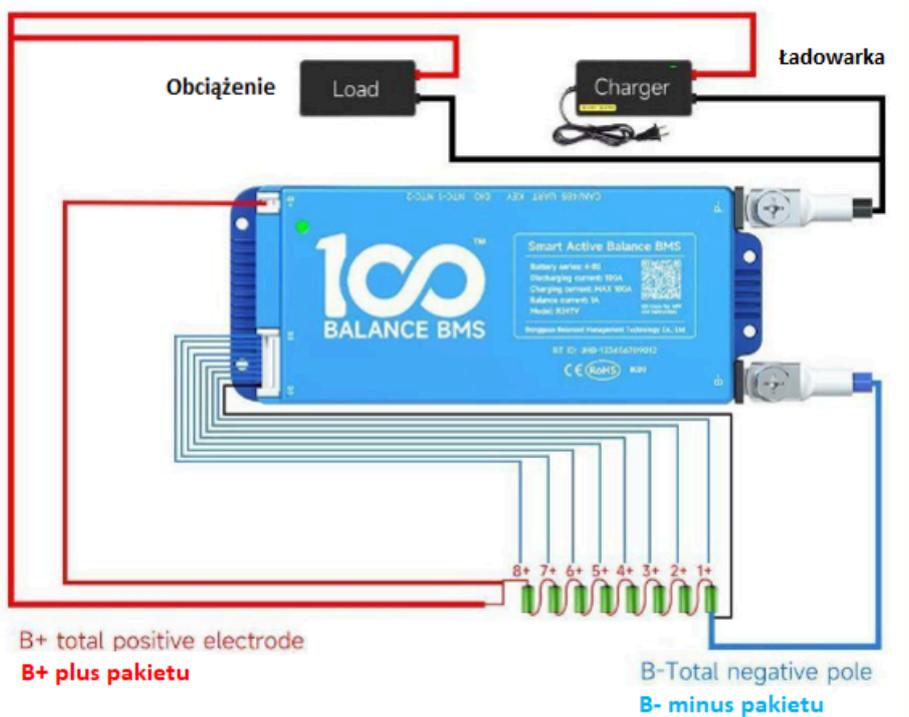
## Step 5.

If our pack has fewer cells than the maximum number supported by the BMS, we connect the wires from the next cells in turn, to the next wires of the plugs, including the plus of the last cell. Unconnected wires that have not been used should be cut or insulated so that they do not become a source of accidental short circuits.

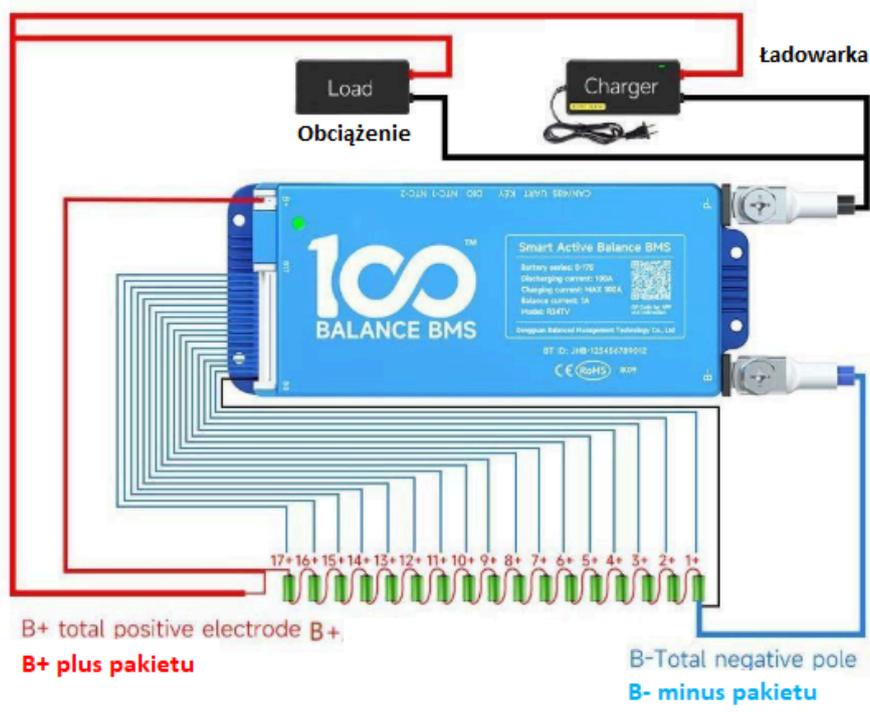
## Step 6.

The plus side of the pack is additionally connected to a separate, red wire marked B+.

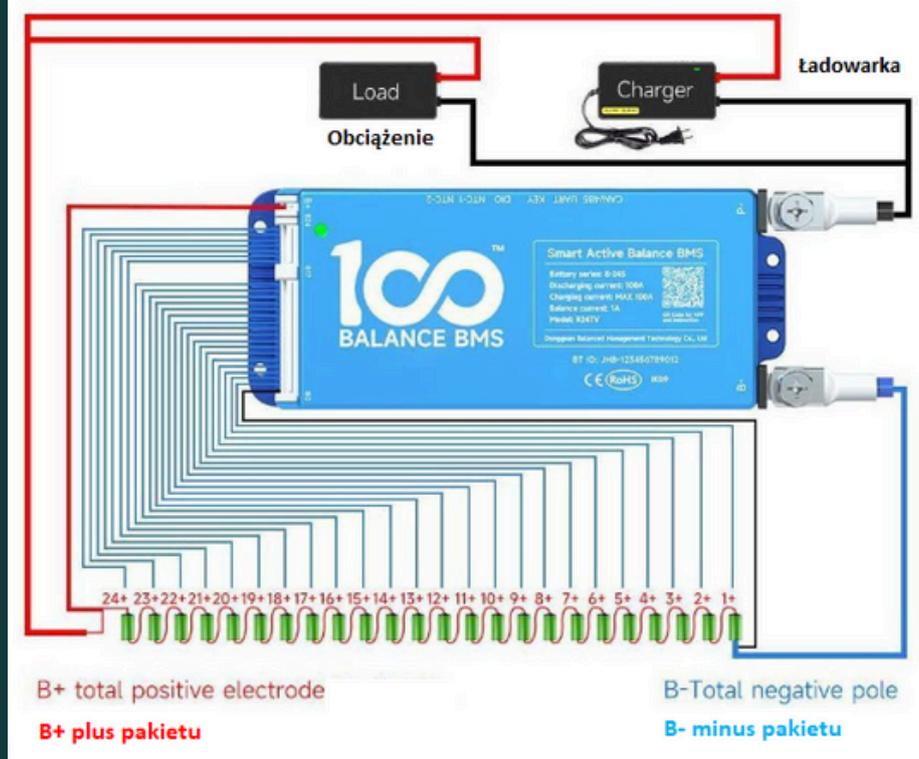
### 4S-8S BMS schemat połączeń ·4~8 strings BMS wiring diagram·



### 8S-17S BMS schemat połączeń ·8~17 strings BMS wiring diagram·



## 8S-24S BMS schemat połączeń · 8~24 strings BMS wiring diagram ·

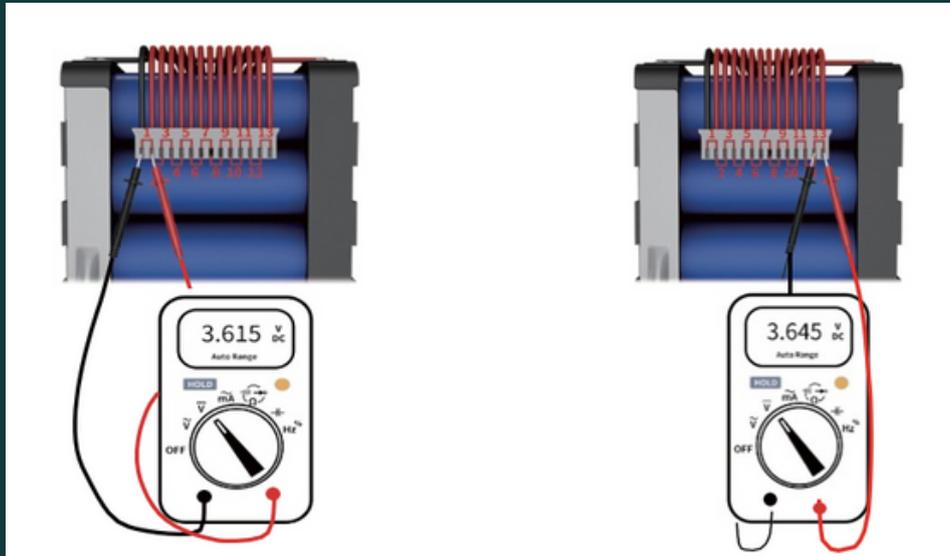


## Step 7.

After connecting the wires to the pack, before connecting the plug to the BMS, perform a connection test.

Use a multimeter to measure the voltages on the individual pins of the plug or plugs. Connect the minus of the meter to the first pin of the plug (black cable). On each subsequent pin, the voltage must increase by approx. 3.0-4.1V for Li-Ion cells or by approx. 2.5-3.6V for LiFePO4 cells, until the full voltage of the pack on the last pin. This test shows that there were no mistakes when soldering the cables to the pack. Incorrect connection of the cells results in damage to the BMS not covered by the warranty!

- Please do not connect the plug (plugs) to the BMS before performing steps 8-11.



## Step 8.

A temperature probe must be connected to the NTC-A socket. For correct operation of BMS SMART, the NTC temperature probe must be connected.

## Step 9.

The minus of the pack should be connected to the (B-) terminal, using a wire with a cross-section adapted to the planned current consumption. The maximum length of the wire is 40 cm.

## Step 10.

The P- wires and the positive wire of the pack should be connected to the plug used to power the device and charge the pack.

## Step 11.

Connect the BMS equipment (if used) to the appropriate sockets, e.g.:

- BMS switch - to the KEY socket
- communication cables, e.g. RS485-USB to the RS485/CAN socket
- LCD monitor to the UART socket
- WiFi module to the UART socket



## Step 12.

After connecting all devices to the BMS, please turn on the plug or plugs with the wires supplying voltage from the individual cells. Finally, connect the B+ power cable to the BMS.

## Step 13.

Checking the voltage on the plug (P- and B+), which should be equal to the pack voltage, completes the BMS connection process.

### **BMS activation.**

100Balance BMS does not require activation steps. Activation occurs automatically.

### **Installing software for mobile devices.**

For the BMS to function properly, it must be configured using the mobile application, available for Android and iOS systems.

The factory-set password is: 123456 for the mobile application and 20211115 for the PC program. This password can be changed in the application. In this case, however, it should be remembered well, as there is no way to recover or reset the password without contacting the manufacturer.

To download the application, you must:

- Scan the QR code on the BMS housing or
- Search for "BalanceBMS" in the iOS store or Google Play or
- Download the application from the manufacturer's website (<https://www.100balancebms.com/download.asp>)

After installing and starting the application, in some versions of the Android system you need to confirm access to the location. BMS does not use this information, but it is required by the Android system.

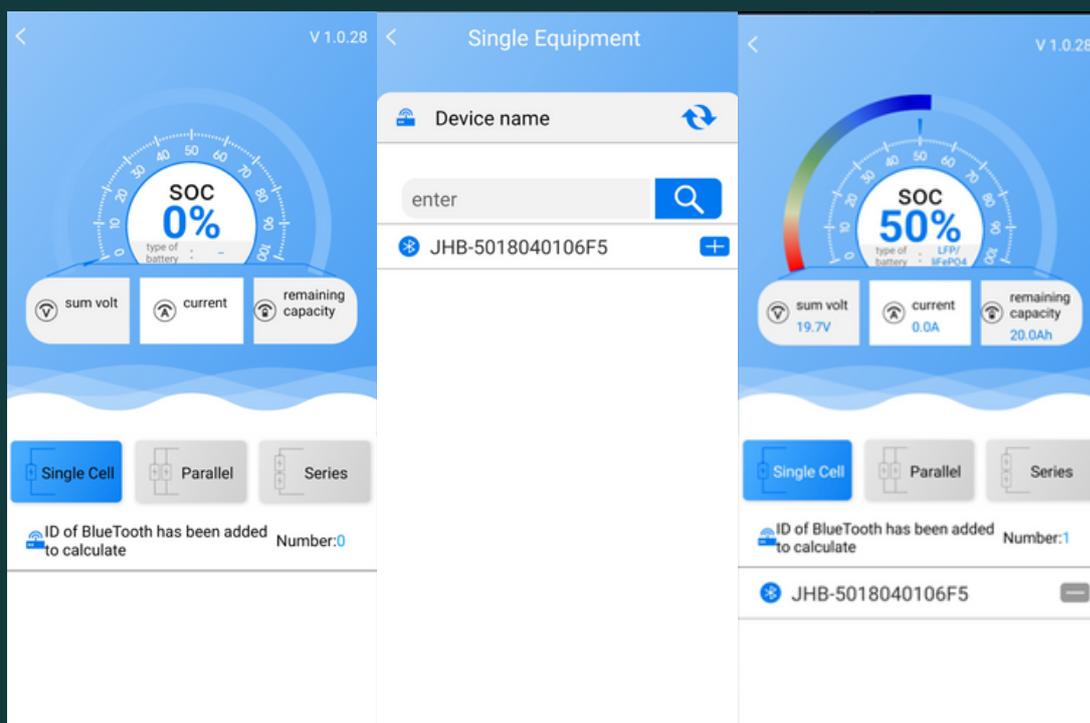
On the start screen, select "Local monitoring". The "Remote monitoring" option is used to operate the WiFi module and is described in its instructions.

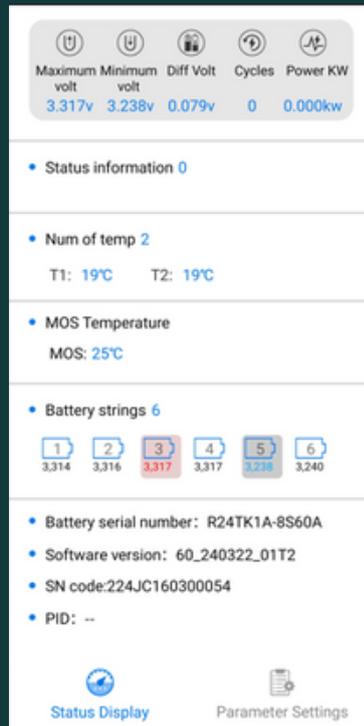
Select the "Single Cell" option for a single battery or "Parallel" for batteries connected in parallel. Do not select the "Series" option - it only applies to special BMS series adapted for series connection. Batteries with standard BMS must not be connected in series!

Then select the BT module built into the BMS from the list and click on its name.

If the Parallel option is selected, the first screen will show the data of the entire package, and after selecting the appropriate BT, data only from this battery. You can monitor up to 6 batteries in this way.

In the case of several batteries, a list of all available BTs will be visible. Select the module with which you want to communicate with the battery.





100Balance does not require complicated configuration, but for correct operation it is necessary:

1. Setting the cell type LFP/LiFePO4 or Li-Ion or LTO.
2. Specifying the pack capacity.
3. Checking whether the number of cells has been correctly detected. The lack of visibility of the voltage of a single cell usually indicates a problem with the quality of the measurement cable connection.

Parameter Settings

- Protection para...
- Cell charact...**
- control center
- Temp protection
- Parameter s...

Project ▼ | Machine ▼ | Setting ▼

type of battery **LFP/liFePO4** **Set**

rated capacity **40.0AH** enter **Set**

Real capacity **40.0AH** enter **Set**

cell reference volt **3.200V** enter **Set**

sleep waiting time **3600S** enter **Set**

SOC set **50.0%** enter **Set**

  
Status Display

  
Parameter Settings

Since the same BMS can handle packs of different capacities, to obtain the correct reading of the state of charge, the correct pack capacity must be entered and then the pack must be charged until the BMS turns it off. This will automatically calibrate the pack charge indicator. An alternative method is to start normal use of the pack. However, then the correct readings of the charge indicator will only appear after several cycles. If we know the actual state of charge of the pack, it can also be entered in the application.

Before starting to use the pack, it is advisable to perform a discharge and charge protection test, checking whether the BMS disconnects the battery at the desired voltage.

**NOTE:** Each BMS is designed for specific charging and discharging parameters.

They are given in the table below. In the case of BMS 100Balance, the currents given on the housing apply to:

Discharging current - continuous discharge current

Charging current MAX - maximum charging current. The continuous charging current is 0.5 times the charging current, i.e. for BMS 60A it will be 30A.

The values given as maximums refer to momentary current exceedances, e.g. during start-up of electrical devices.

Long-term operation of the BMS at currents exceeding the values given as continuous may lead to its damage not covered by the warranty.

Model	Compatible Strings	Continuous Discharge current	Max Discharge current	Continuous charge current	Max charge current
R24TK1A-8S 40A	4-8	40A	60A	20A	40A
R24TK1A-8S 60A	4-8	60A	90A	30A	60A
R24TK1A-8S 80A	4-8	80A	120A	40A	80A
R24TK1A-8S 100A	4-8	100A	150A	50A	100A
R24TK1A-17S 40A	8-17	40A	60A	20A	40A
R24TK1A-17S 60A	8-17	60A	90A	30A	60A
R24TK1A-17S 80A	8-17	80A	120A	40A	80A
R24TK1A-17S 100A	8-17	100A	150A	50A	100A
R24TK1A-24S 40A	8-24	40A	60A	20A	40A
R24TK1A-24S 60A	8-24	60A	90A	30A	60A
R24TK1A-24S 80A	8-24	80A	120A	40A	80A
R24TK1A-24S 100A	8-24	100A	150A	50A	100A

To reduce current consumption, the BMS automatically goes into sleep mode after 3600s if no charging or discharging is taking place. Reactivation occurs automatically if the charging or discharging process starts.

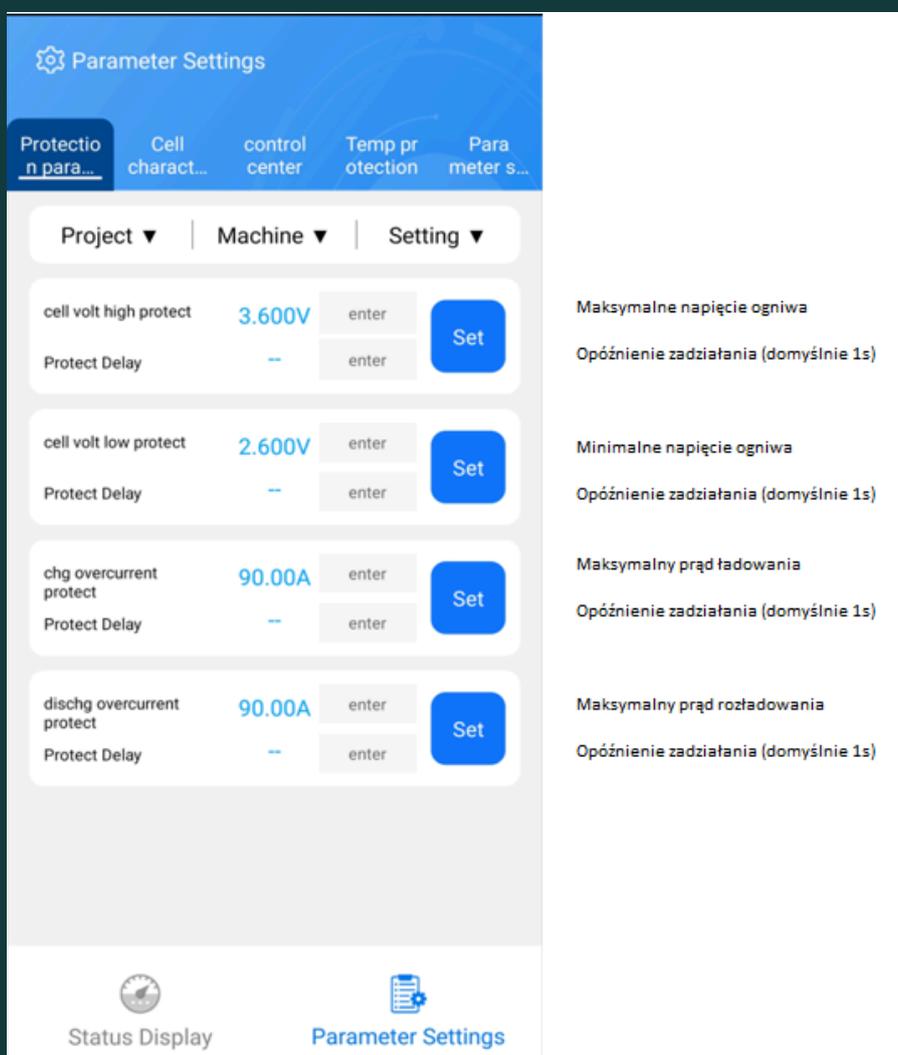
The time of transition to sleep mode can be changed in the application, if the value 65535 is entered. The BMS will then remain in the active state.

**NOTE:** BMS 100Balance in the state delivered to the customer cannot be used without the above-described process of matching parameters to the cell pack. Therefore, their installation requires appropriate knowledge and skills.

The manufacturer and distributor are not liable for damages resulting from the use of BMS without entered parameters, or with parameters entered contrary to this manual.

## Description of BMS parameters available in the application

Changing them is not required for the correct operation of the BMS and should be well thought out before use. All changes to the security parameters made by the user may be dangerous and result in the destruction of the package or BMS, or even fire. By entering them, the user assumes full responsibility for the consequences resulting from them.



The screenshot displays the 'Parameter Settings' interface of a BMS application. The interface is organized into a grid with four main sections, each containing a parameter name, its current value, an 'enter' button, and a 'Set' button. The parameters are:

- cell volt high protect:** 3.600V
- cell volt low protect:** 2.600V
- chg overcurrent protect:** 90.00A
- dischg overcurrent protect:** 90.00A

Each parameter section also includes a 'Protect Delay' field with a '--' value. To the right of the parameter grid, there are Polish descriptions for each parameter:

- Maksymalne napięcie ogniwa
- Opóźnienie zadziałania (domyślnie 1s)
- Minimalne napięcie ogniwa
- Opóźnienie zadziałania (domyślnie 1s)
- Maksymalny prąd ładowania
- Opóźnienie zadziałania (domyślnie 1s)
- Maksymalny prąd rozładowania
- Opóźnienie zadziałania (domyślnie 1s)

At the bottom of the interface, there are two navigation options: 'Status Display' and 'Parameter Settings' (which is currently selected).

⚙️ Parameter Settings

Protectio  
n para...
Cell  
charact...
control  
center
Temp pr  
otection
Para  
meter s...

Project ▼
Machine ▼
Setting ▼

Balance current

1.0A

enter

Set

Prąd balansowania

---

Balanced open start volt

3.000V

enter

Set

Minimalne napięcie najbliższej celi od którego rozpocznie się balansowanie

---

balanced open diff volt

0.010V

enter

Set

Różnica napięć pomiędzy najmocniejszą i najbliższą celą powyżej której rozpocznie się balansowanie

---

Balance switch

ON

Włącznik balansera

---

Chg switch

ON

Włącznik możliwości ładowania

---

Dischg switch

ON

Włącznik możliwości rozładowania

---

Heating switch

OFF

Włącznik podgrzewania wstępnego ogniów (nieaktywne)

Status Display

Parameter Settings

⚙️ Parameter Settings

Protection para...
Cell charact...
control center
Temp protection
Parameter s...

Project ▼
Machine ▼
Setting ▼

type of battery
LFP/LiFePO4
Set

rated capacity
40.0AH
enter
Set

Real capacity
40.0AH
enter
Set

cell reference volt
3.200V
enter
Set

sleep waiting time
3600S
enter
Set

SOC set
50.0%
enter
Set



Status Display



Parameter Settings

Rodzaj ogniw

Nominalna pojemność akumulatora

Faktyczna pojemność akumulatora

Nominalne napięcie celi (typowe 3,6V Li-Ion, 3,2V LiFePO4)

Czas do uśpienia BMS

SOC - stan naładowania akumulatora

[www.onvolt.pl](http://www.onvolt.pl)



⚙️ Parameter Settings

Protection para... | Cell charact... | control center | Temp protection | Parameter s...

Project ▼ | Machine ▼ | Setting ▼

chg high temp protect	65°C	enter	Set	Maksymalna temperatura przy ładowaniu
chg low temp protect	-20°C	enter	Set	Minimalna temperatura przy ładowaniu -dla ogniw LiFePO4 powinna być >0
disChg high temp protect	70°C	enter	Set	Maksymalna temperatura przy rozładowaniu
disChg low temp protect	-20°C	enter	Set	Minimalna temperatura przy rozładowaniu
diff Temp protect	15°C	enter	Set	Maksymalna różnica temperatury pomiędzy sondami
MOS temp protect	50°C	enter	Set	Maksymalna temperatura tranzystorów MOS



Status Display



Parameter Settings

⚙️ Parameter Settings

Protection para...
Cell charact...
control center
Temp protection
Parameter s...

---

Protocol Type NONE ◀

Communication Method RS485 ◀

Wybór protokołu inwertera (obecnie nieaktywne)

---

Device name JHB-501804 Set

Nazwa urządzenia

---

BMS software upgrade Upgrad

Aktualizacja oprogramowania

---

Data reporting Escalati

Eksport raportu błędów

---

Firmware Ver: 4.1.1

Wersja oprogramowania

Status Display

Parameter Settings