



## USER GUIDE

Voltium Energy LiFePO<sub>4</sub> Battery

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# BATTERY INSTALLATION

## CHECK

Upon receipt of your product, please make sure that it is externally undamaged and that no parts are missing. If this should be the case, do not use the battery and contact the dealer.

## CONTENT

- ✓ Voltium Energy LiFePO<sub>4</sub> accu
- ✓ Screws and washers (these are fixed in the plus and minus terminals)

## INSTALLATION POSITION

The batteries can be installed vertically as well as horizontally.

*Please note!* Always check if the LiFePO<sub>4</sub> battery is properly secured after installation, to ensure it cannot move during use.

## BATTERY CONNECTION

The optional round terminals can be used to replace standard terminals, and terminal clamps can then be used.

## CHARGE THE BATTERY BEFORE USE

The battery is usually charged to about 20% at delivery. It is recommended to fully charge a new battery before using or installing it. Always use a suitable LiFePO<sub>4</sub> charger to charge the battery.

## INSTALLATION

- ✓ Do not disassemble the battery without the supplier's permission.
- ✓ The batteries are suitable for serial or parallel connection.
- ✓ Serial or parallel connection is possible for up to 4 batteries.
- ✓ If you install the batteries in a serial or parallel connection, make sure that all batteries have the same voltage level. The voltage difference must not exceed 0.2V. To make sure, we recommend to charge the batteries before measuring the voltage level.
- ✓ Make sure that the cabling can resist twice the battery capacity.
- ✓ Example: For a 100Ah battery, use a 200A cable.
- ✓ Do not reverse the positive and negative terminals. This will damage the batteries and/or connected equipment.
- ✓ The operating temperature must be below +60°C.

*Please note!* The batteries are not suitable for combined serial and parallel connection.

#### **SHORT CIRCUIT PROTECTION**

Installed batteries must be protected by a fuse.

#### **MAINTENANCE**

For proper maintenance of the battery, keep the terminals and the surface clean, tighten the clamps securely, and lightly grease them. The full battery cycle must be used at least once per year to maintain battery capacity and to calibrate the battery status. When used in serial connection, the batteries must be charged separately at least once a year.

#### **STORAGE**

To store the batteries correctly, disconnect and protect them from the possibility of a short circuit between the terminals. When the batteries are not used, they should be charged every 6 months to avoid deep discharging. Batteries must be stored in a dry and dark area at room temperature (15°C to 25°C). When stored, batteries must be charged to approximately 70-80% SOC.

# USING THE BATTERY

## BMS FUNCTIONS

Each 12.8V battery consists of four serially connected battery cells. Each 25.6V battery consists of eight serially connected battery cells. The internal BMS system is a security system with the following functions:

- ✓ Passive balancing: During “TOP” charging, the battery cells are balanced individually. This ensures that all battery cells remain at the same voltage level.
- ✓ Over-voltage protection: Charging stops when the maximum voltage of 3.75V per cell is reached.
- ✓ Under-voltage protection: Discharging stops when the minimum voltage of 2.8V per cell is reached.
- ✓ Temperature protection: As soon as a temperature of -20°C or +80°C is reached, temperature protection is activated and the battery switches off.
- ✓ Pre-charge function: This function allows the battery to deliver a very high current in a short time. This function is required, for example, for some inverters that use a high start-up current. This will prevent the battery’s safety mode from being activated.

## CHARGING

We It is recommended to charge a LiFePO<sub>4</sub> battery with a constant current of 0.2C until the battery has reached 14.6V. From that point the battery will charge at a constant voltage of 14.6V, while the charging current decreases. Charging will stop when the charging current has decreased from 0.2C to 0.05C. The battery must be charged at a temperature between 0°C and 45°C, and must then be allowed to rest for 30 minutes before discharging. Never exceed the maximum limits for charging current, voltage or temperature specified in this document or in the data sheets. Do not charge the battery with the terminals reversed.

- ✓ Do not exceed the maximum charging voltage.
- ✓ Use the battery only within the specified temperature range.
- ✓ Do not turn on the charger before it is connected to the battery. After charging, switch off the charger first, and then disconnect the battery from the charger.
- ✓ If the battery gets very hot during charging, interrupt charging and let the battery cool down before resuming charging.
- ✓ The Battery Management System (BMS) automatically balances the cells as needed.

## DISCHARGING

Ideally, the battery is discharged at a constant current of 0.2C to 10.0V at a temperature of 20°C (± 5°C). Allow the battery to rest for 30 minutes before recharging.

**SPECIFICATIONS FOR CHARGING AND DISCHARGING THE BATTERY**

**12.8V models**

CHARGING SPECIFICATIONS		DISCHARGING SPECIFICATIONS	
Charging voltage	<b>14.6V</b>	Output voltage discharged battery	<b>10.0V</b>
Recommended 'float' charge voltage in standby	<b>13.8V</b>	Recommended output voltage range	<b>12.8V – 10V</b>
Max. charging current	<b>Model-dependant</b>	Max. discharging current	<b>Model-dependant</b>
Recommended charging current	<b>0.2C</b>	Default discharge current	<b>Constant current 0.2C</b>
Cut-off voltage when charging	<b>15.2V</b>	Cut-out voltage when discharging	<b>10V</b>
Temperature range when charging	<b>0°C – 45°C</b>	Temperature range when discharging	<b>-20°C – 60°C</b>

**25.6V models**

CHARGING SPECIFICATIONS		DISCHARGING SPECIFICATIONS	
Charging voltage	<b>29.2V</b>	Output voltage discharged battery	<b>20.0V</b>
Recommended 'float' charge voltage in standby	<b>27.6V</b>	Recommended output voltage range	<b>25.6V – 20V</b>
Max. charging current	<b>Model-dependant</b>	Max. discharging current	<b>Model-dependant</b>
Recommended charging current	<b>0.2C</b>	Default discharge current	<b>Constant current 0.2C</b>
Cut-off voltage when charging	<b>30.4V</b>	Cut-out voltage when discharging	<b>20V</b>
Temperature range when charging	<b>0°C – 45°C</b>	Temperature range when discharging	<b>-20°C – 60°C</b>

# FREQUENTLY ASKED QUESTIONS

## **WHICH CHARGER IS SUITABLE?**

We recommend using a charger designed for charging LiFePO<sub>4</sub> batteries. The lithium charger must use a constant current (CC) and constant voltage (CV). The constant current depends on the capacity (Ah) of the lithium battery (0.2C to 0.5C is recommended). The constant voltage when charging a 12.8V battery should be 14.6V.

As an alternative, a standard lead-acid battery charger with a constant voltage can be used to charge Voltium Energy LiFePO<sub>4</sub> batteries, provided that the following standards are met. Failure to do so may result in damage to the battery when using such a charger.

- ✓ The charger must not have an equalisation setting.
- ✓ A maximum charging voltage of 14.6V (12.8V battery) or 29.2V (25.6V battery)
- ✓ A recommended float-charging voltage of 13.8V (12.8V battery) or 27.6V (25.6V battery)
- ✓ Some smart or multi-stage lead-acid battery chargers have an OCV (Open Circuit Voltage) function. This function will cause the charger to not charge LiFePO<sub>4</sub> batteries that have been discharged too far.

## **CAN I COMBINE LIFEPO<sub>4</sub> BATTERIES WITH A STARTER BATTERY?**

In principle, only batteries of the same type and model can be connected in parallel or serially. So, you should only use LiFePO<sub>4</sub> batteries. Never connect the battery directly to a lead-acid battery, because the difference in charging/discharging properties will inevitably cause problems.

For combined use with a lead-start battery, it is recommended to use a separation relay. This allows optimal charging of the batteries via the vehicle's dynamo, without direct connection between lead and lithium batteries.

## **THE BLUETOOTH FUNCTION DOES NOT WORK**

All you need to use the Bluetooth function is the Voltium Energy LiFePO<sub>4</sub> app. This app allows you to connect to the Voltium Energy LiFePO<sub>4</sub> battery. A direct connection via Bluetooth on your smartphone is not possible.

## **THE BATTERY DOES NOT SHOW UP IN THE LIST OF AVAILABLE BATTERIES IN THE APP**

A battery can only be connected to one smartphone at a time, and the app must be operated within a range of 5 meters from the battery. The range can be affected by obstacles such as walls, windows, etc. Check this when installing the battery. In some cases, it also helps to reinstall the app on your phone.

The Bluetooth function may have some communication limitations when enclosed in a thick or metal casing.

**MY NEW BATTERY ALREADY SHOWS CHARGE/DISCHARGE CYCLES IN THE APP.**

As part of the quality check and assurance process, the batteries and the installed components are checked before they are sold. These charge and discharge cycles may be shown. This is perfectly normal and no cause for concern.

**CAN THE BATTERIES BE CONNECTED IN SERIES OR IN PARALLEL?**

All Voltum Energy LiFePO<sub>4</sub> batteries can be used in parallel or in serial connection. All models support the use of 4 batteries in parallel or in series, without requiring additional engineering.

**CAN THE BATTERIES BE CONNECTED IN A COMBINED SERIAL AND PARALLEL CONFIGURATION?**

The Energy LiFePO<sub>4</sub> batteries cannot be installed in a combination of parallel and serial connection.

**SHOULD BATTERIES USED IN SERIES OR IN PARALLEL BE FROM THE SAME BATCH?**

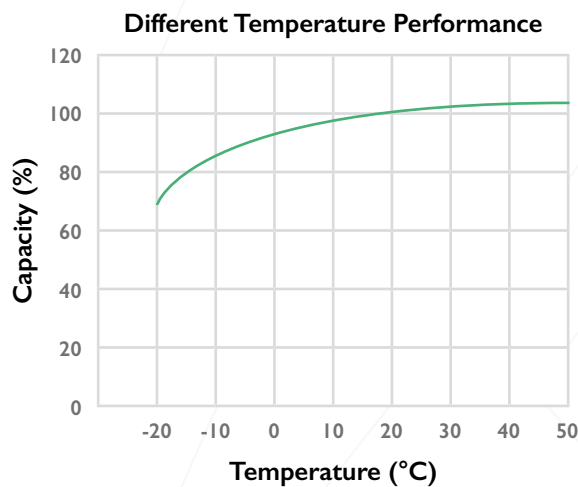
Yes, we recommend using batteries from the same batch for connection in series or in parallel.

**DOES TEMPERATURE AFFECT THE LIFESPAN OF A LIFEPO<sub>4</sub> BATTERY?**

As with all batteries, high temperatures will reduce the expected lifespan of the LiFePO<sub>4</sub> battery.

**DOES TEMPERATURE AFFECT THE CAPACITY OF A LIFEPO<sub>4</sub> BATTERY?**

Yes, temperature can have a major impact on the performance of a LiFePO<sub>4</sub> battery. The chart below shows a typical 'temperature vs. capacity curve' for lithium at a discharge rate of 0.5C.





# GLOSSARY

## IMPORTANT TERMS

This list contain explanations of some common terms and abbreviations.

TERM/AFKORTING	TOELICHTING
<b>LiFePO<sub>4</sub></b>	Lithium Iron Phosphate
<b>BMS</b>	Battery Management System
<b>SOC</b>	State Of Charge
<b>BCI</b>	Battery Communication Interface
<b>DOD</b>	Depth of Discharge
<b>CCCV</b>	Constant Current, Constant Voltage
<b>Cycle</b>	An operating period during which the battery is fully discharged and then recharged.
<b>Lifecycle</b>	The maximum battery life that can be achieved by following the guidelines in this user's manual.

## TECHNICAL SUPPORT

If you have any questions about your purchase or the operation of your battery after reading the user' guide or consulting the datasheet, you can contact the sales representative or contact our support department directly.

### Support department contact details

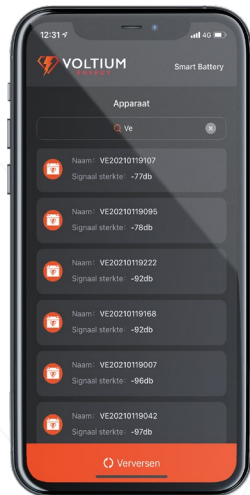
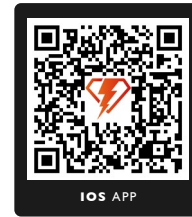
<b>OPENING HOURS</b>	MON - FRI 9 am to 5 pm
<b>E-MAILADDRESS</b>	support@voltiumenergy.com

# VOLTUM ENERGY LIFEPO4 APP



## INSTALLATION

By scanning the QR code with your smartphone you can download the version of the Voltum Energy LiFePO4 app for the operating system of your smartphone. You are automatically taken to the App store (Apple) or the Google Play store (Android).



## CONNECTION

After you have successfully downloaded and installed the app, you can open the app on your smartphone. When using the app for the first time Bluetooth must be turned on or activated. When the relevant message appears on your smartphone, press “Allow” or “OK”.

To connect to your battery, click on the battery in the battery list. If several batteries are shown, you can identify the battery by its serial number. This serial number can be found on the sticker on the side of the battery.

## MONITORING

Once connected to the battery, you have all the relevant information and values for your LiFePO4 battery at a glance.

As part of the quality check and assurance process, the batteries and the installed components are checked before they are sold. These charge may be discharge cycles are shown. This is perfectly normal and no cause for concern.



Back to the battery list

Pro information  
(password required)

Battery condition

State of Charge

Status  
(Discharging / Standby / Charging)

Battery information