Technaxx® * User Manual

TX-234 50Ah $LiFePO_4$ Battery

TX-235 100Ah $LiFePO_4$ Battery

Before using the appliance for the first time, please read the instructions for use and safety information carefully.

Keep this user manual for future reference or product sharing carefully. Do the same with the original accessories for this product. In case of warranty, please contact the dealer or the store where you bought this product.

Enjoy your product * Share your experience and opinion on one of the well-known internet portals.

Features

- Long life cycle up to 3000 cycles
- High end density
- Built in battery management system
- Low self-discharge rate
- Automatic protection
- Carry handle
- Light weight

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Service phone No. for technical support: 01805 012643* (14 cent/minute from German fixed-line and 42 cent/minute from mobile networks).
Free Email: **support@technaxx.de**
*The support hotline is available Mon-Fri from 9 am to 1 pm & 2 pm to 5 pm.

WARNINGS

Lithium-ion cells and battery packs may get hot, explode or ignite and cause serious injury if exposed to extreme conditions. Be sure to follow the safety warnings listed below:

- Do not connect the positive terminal and negative terminal of the battery to each other with any metal object (such as wire)
- Only use approved LiFePO4 battery chargers
- Do not carry battery while wearing necklaces, rings, bracelets, hairpins or other metal objects
- Do not pierce the battery with nails, strike the battery with a hammer, step on the battery or otherwise subject it to strong impacts or shocks
- Do not expose battery to water or salt water, or allow the battery to get wet
- Do not use LiFePO4 battery with any other types of batteries
- Do not use as starting battery of vehicle
- Do not connect to an alternator or non-smart charging system
- Do not smoke around or near the battery
- Be careful not to drop heavy tools on the battery
- Keep away from children.
- Charge the battery pack fully before you use it.
- Do not disassemble or repair the battery pack by yourselves.
- Do not expose the battery pack near fire, water, humidity place.
- Charge the battery pack every three months if no in use.
- Do not leave the battery unattended while it is charging or discharging.

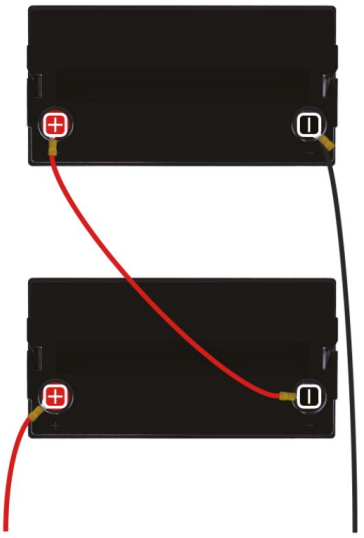
Cable Sizing

Battery cables should be appropriately sized to handle the expected load. Please refer to the following table for the ampacities of copper cables with different cross section sizes:

Ampere	Cable cross section (up to 10m)	AWG
10A	1,5 mm²	16
16A	2,5 mm²	14
20A	4 mm²	12
25A	6 mm²	10
40A	10 mm²	8
50A	16 mm²	6
63A	25 mm²	4
80A	35mm²	2
100A	50 mm²	1
125A	70 mm²	0
125A	95 mm²	-2
160A	120 mm²	-3

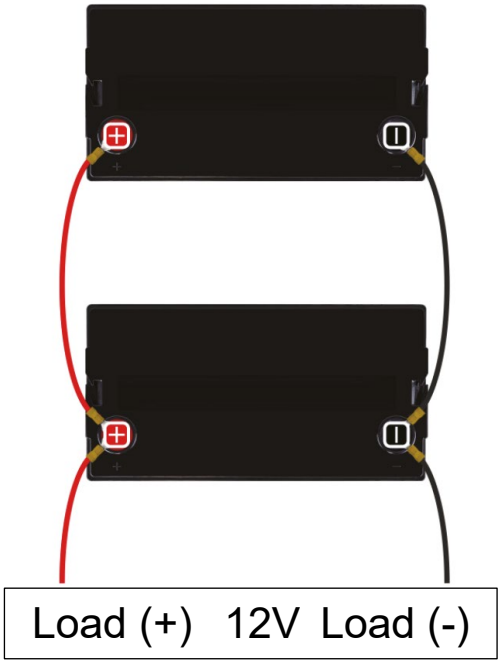
Connecting Batteries

Warning: DO NOT string batteries with different chemistries, brands, models, rated capacities, or nominal voltages in parallel. Please avoid a too high voltage difference between paralleled batteries, despite the auto-balancing function, to avoid triggering the over-current protection. In parallel battery banks, the cables between each battery should be of equal length to ensure that all batteries in the system can work equally together. It is not recommended to connect more than 4 batteries in parallel if taking advantages of the auto-balancing function.



Load (+) 24V Load (-)

The parallel mode means that the positive pole of the first lithium battery is connected to the positive pole of the second cell, and the negative pole is connected to the negative pole, and so on, to achieve the required capacity. The voltage in this comprehensive mode is unchanged or the voltage of a single cell, and the capacity is the sum of all battery capacities.



Cable Connections

Please use an insulated Philips screwdriver to tighten the cable connections.

Please secure all cable connections to the proper specification in order to ensure good contact between the cable lugs and the terminals.

Over-tightening cable connections can cause terminal breakage and loose cable connections can cause terminal meltdown or fire.

To ensure good contact between the cable lugs and the terminals, please use the appropriate number of washers to allow for as much thread engagement as possible without bottoming out the terminal bolt. The correct number of washers can be determined by hand-tightening the terminal bolt with just the cable lug in place and observing the gap that is present. Use the number of washers needed so that the washer stack is slightly larger than the observed gap.

It is important to ensure that the cable lug and the top surface of the terminal are in contact. The washer(s) must be placed on top of the lug. Do not place the washer(s) between the battery terminal and the cable lug as this can cause high resistance and excessive heating.

Charging Batteries

Charge your lithium iron phosphate batteries whenever you want. Unlike lead-acid batteries, lithium iron phosphate batteries do not get damaged if they are left in a partial state of charge, so you don’t have to stress about getting them charged immediately after use. They also don’t have a memory effect, so you don’t have to drain them completely before charging.

Battery Charger

The most ideal way to charge a LiFePO4 battery is with a lithium iron phosphate battery charger, as it will be programmed with the appropriate voltage limits. Most lead-acid battery chargers will do the job just fine.

AGM and GEL charge profiles typically fall within the voltage limits of a lithium iron phosphate battery. Wet lead-acid battery chargers tend to have a higher voltage limit, which may cause the Battery Management System (BMS) to go into protection mode. This won’t harm the battery; however, it may cause fault codes on the charger display.

Li-ion Battery cell level and pack level control variables are needed to be maintained accurately for safe operation. These control variables are monitored and protected by the battery management system (BMS).

BMS is an electronic device that acts as a brain of a battery pack, monitors the output, and protects the battery from critical damages. This incorporates monitoring of temperature, voltage and current, failure forecast or prevention, and data collection through communication protocol for battery parameter analysis. Battery state of charge (SOC) is the percentage of energy currently stored in the battery to the battery nominal capacity. One of the important key functions of BMS is the cell balancing.

Solar Charger

You can also use solar panel to charge your LiFePO4 battery, but please make sure to choose a proper controller, both PWM controller and MPPT controller are okay.

And as an SLA targeted 12V panel makes about 18V at full-sun full-load, such a 12v panel will provide more than enough voltage under all practical light conditions.

Lithium batteries are not like lead acid and not all battery chargers are the same. A 12v lithium battery fully charged to 100% will hold voltage around 13.3-13.4v. Its lead acid cousin will be approx. 12.6-12.7v.

Charger Selection

A lithium battery at 20% capacity will hold voltage around 13V, its lead acid cousin will be approx. 11.8v at the same capacity.

So, if you use lead acid charger to charge your lithium battery, it may not be fully charged.

You can use a mains-powered AC-DC lead-acid charger, as the charging efficiency and duration are less important. If this is the case, you should not use it, because the risk of damage to the cells or the battery is high. This can significantly shorten the life of the battery. If the device has a simple bulk / absorption / maintenance charging profile, it can be used to charge the battery, but it must be disconnected after charging and not remain in the maintenance charging/maintenance mode. It must also have a maximum output voltage of 13 V to 14.5 V. When it comes to DC-DC chargers and solar regulators, you must replace them with LiFePO4-specific models.

State of Charge

The table below shows the change in charging voltage of 12 V, 24 V and 48 V systems to determine the SOC based on voltage. Due to variations in measurement and voltage accuracy, it is difficult to determine SOC based on voltage alone.

SOC	12V setup	24V setup	48V setup
100.00%	14.60	29.20	58.40
99.50%	13.80	27.60	55.20
99.00%	13.50	27.00	54.00
90.00%	13.40	26.80	53.60
80.00%	13.30	26.60	53.20
70.00%	13.20	26.40	52.80
60.00%	13.10	26.20	52.40
50.00%	13.05	26.10	52.20
40.00%	13.00	26.00	52.00
30.00%	12.90	25.80	51.60
20.00%	12.80	25.60	51.20
14.00%	12.60	25.20	50.40
9.50%	12.00	24.00	48.00
5.00%	11.20	22.40	44.80
0.00%	10.00	20.00	40.00

BMS (Battery Management System)

A battery management system monitors and controls the individual cells of a battery and protects them from damage.
Important functions of a battery management system:

Overload Protection

The BMS shuts down the battery outputs in the event of an overload to protect the cells. The battery has no voltage at this time, after the consumer is finished the battery unlocks itself.

Deep Discharge Protection

Each cell is individually monitored for deep discharge. If this causes a disconnection of the battery outputs, this can only be released again by a charging process.
Attention: The BMS protects the cells against deep discharge in active use, but a switched off empty battery would damage itself over a longer period of time due to the small but existing self-

discharge of 3%/month! Tip: A battery that has been completely discharged should be charged as soon as possible!
Note: Even small consumers such as alarm systems, relays, standby systems or similar consume capacity discharge your battery. For longer periods of standstill, ensure that the battery is disconnected from the system by disconnecting the positive pole.

Overvoltage Protection

LiFePO4 battery cells must not be charged above 14.6V/battery, otherwise the cells will be destroyed by overvoltage. Therefore, only suitable chargers with a final charging voltage of 14.6V may be used to charge LiFEPO4 batteries. Although the BMS protects the cell from overcharging, it must itself absorb and burn the current. This is possible for a short time, but not a permanent condition. A permanently too high charge current above 14.6V will destroy the BMS!

Active Cell Balancing

The so-called balancing ensures that each individual cell is charged to the maximum end-of-charge voltage of 3.65V/cell. This is important for the maximum battery capacity. When the cells are completely empty, they can drift a little and become unequal. This condition cannot be compensated by normal charging. The result would be that the battery has less and less capacity over time. The remedy here is the active balancer, which always keeps the cells in balance. The active balancer ensures maximum efficiency regardless of the battery's state of charge.

Charge control

The BMS monitors and controls all parameters of a reliable and safe charge at any time. If problems occur, charging is inhibited by disconnecting the battery outputs, to protect the battery.

Cell Temperature Protection

All LiFePO4 cells in the battery are individually monitored by a temperature sensor at all times. If the battery shuts down because the cells have reached over 70°C, they must first cool down again until the BMS releases the output again. For this purpose, no current may be drawn and no charging may take place for 30 minutes!

Temperature Protection of the BMS

The BMS itself is also permanently monitored by a temperature sensor. If the BMS reaches a temperature of 95°C the battery outputs are switched off. Only after cooling down the output can be can be switched on again. For this purpose, no current may be drawn and no charging may take place for 30 minutes!

Short Circuit Protection

In the event of a short circuit, our BMS protects the battery from destruction and switches the battery outputs switched off. When the short-circuit is eliminated, the battery is automatically switched on again, unless the temperature protection is active. To do this, do not draw power or charge for 30 minutes!

Maintenance

To prevent possible leakage, heat generation, and explosion of the battery, please pay attention to the following precautions:

- It is strictly forbidden to immerse the battery in sea water or water.
- When it is not in use, it should be placed in a cool and dry environment.
- It is forbidden to use and leave the battery near a hot and high temperature source; such as fire, heater, etc.
- It is strictly forbidden to directly plug the positive and negative ends of the battery into a power socket.
- Do not throw the battery into a fire or heater.
- It is forbidden to use metal to directly connect the positive and negative electrodes of the battery to short-circuit.
- It is forbidden to transport or store the battery with conductive materials such as metal and carbon powder.
- Do not knock or throw, step on the battery, etc.
- It is forbidden to weld the battery directly and pierce the battery with nails or other sharp objects.

Storage / Hibernation

Extend the life of your LiFePO4 battery with the following instructions:

1. Charge your LiFePO4 battery to 60 - 80% of its capacity before storage.
2. Disconnect your LiFePO4 battery from all loads and consumers before storage!
3. Protect the pole contacts from short-circuit by covers!
4. In case of longer storage, the LiFePO4 battery must be recharged to 60 - 80% every 6 months!
5. Temperatures down to -20°C do not damage the battery cell, therefore it is not necessary to remove the battery in most cases. Make sure that very cold batteries are slowly adjusted to the ambient temperature! A fast heating up can lead to condensation inside the housing and damage the battery.

Caution: Never use a trickle charger for winter storage!

Troubleshooting:

If the battery or BMS is not functioning properly, please check the following:

- Is the battery charged?
- Is the battery being used within its rated voltage and current limits?
- Are the battery terminals clean and free of corrosion?
- Is the battery being stored in a safe and appropriate environment?

Possible solution: If the BMS protection has protected the battery in a safety case, do not draw power for about 30 minutes and do not charge the battery.

Technical Specifications

Article No.	TX-234	TX-235
Battery Cell Type	LiFePO4	LiFePO4
Battery Capacity	50Ah	100Ah
Battery Power	640Wh	1280Wh
Battery Voltage	12.8V	12.8V
Max. Continuous / Discharge Current	50A/50A	100A/100A
Max. Continuous Load Power	640W	1280W
Max. Peak Current (50mS)	200A	230A
Charge Voltage	14.4±0.2V	14.4±0.2V
Maximum Charge Voltage	14.5V	14.5V
Charge Method	CC/CV	CC/CV
Discharge Cut-Off Voltage	10V	10V
Recommend Charge Current	15A (0.3C)	30A (0.3C)
Battery Management System (BMS)	50A	100A
Charge Temperature Range	0-55°C	0-55°C
Internal Impedance	≤40mΩ	≤40mΩ
Discharge Temperature Range	-20 - 55°C	-20 - 55°C
Protections Class	IP65	IP65
Material Battery Case	ABS	ABS
Screw Size	M6	M8
Battery Size (mm)	22.3*13.5*17.8	26*16.8*20.9
Battery Weight	5kg	10kg

Declaration of Conformity

The EU Declaration of Conformity can be requested at the following address: www.technaxx.de/ (in the lower bar "Declaration of Conformity").

Disposal

Disposal of the packaging. Sort packaging materials by type upon disposal.

Dispose of cardboard and paperboard in the waste paper. Foils should be submitted for recyclables collection.

Batteries and rechargeable batteries must not be disposed of in household waste! As a consumer, you are required by law to dispose of all batteries and rechargeable batteries, whether they contain harmful substances* or not, at a collection point in your community/city or with a retailer, to ensure that the batteries can be disposed of in an environmentally friendly manner. * marked with: Cd = cadmium, Hg = mercury, Pb = lead. Return your product to your collection point with the fully discharged battery installed inside!

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