LITHIUM BATTERY

POLINOVEL

LITHIUM IRON PHOSPHATE

LiFePO4

USER MANUAL

V1.1 2022.09

⚠ Important Safety Instructions

This user manual contains important installation, operation, and maintenance instructions for the Lithium Iron Phosphate Battery manufactured by Polinovel. Please read through the instructions in detail before installing and using the battery, and keep them located near the battery for further reference.

Should you have any questions concerning safety precautions, installation, or use of the lithium battery, please contact us at info@polinovel.com.

General Safety Information

Lithium iron phosphate (LiFePO4) batteries are inherently safe chemistry. However, as with any electronics, safety measures should always be taken. Please adhere to the instructions within this manual for safe installation and operation.

- DO NOT puncture, drop, crush, burn, penetrate, shake, or strike the battery.
- DO NOT open, dismantle, or modify the battery.
- DO NOT touch the exposed electrolyte or powder if the battery casing is damaged.
- DO NOT connect or disconnect terminals from the battery without disconnecting loads.
- DO NOT place any objects on top of the battery.
- DO NOT wear jewelry or other metal objects when working on or around the battery.
- DO NOT dispose of the battery as household waste, dispose of batteries at an authorized recycling facility in accordance with local, state, and federal regulations.

- Please keep the battery away from water, heat sources, sparks, and hazardous chemicals
- Please keep the battery out of the reach of young children.
- Please wear proper protective equipment and use insulated tools when working on the battery.
- Please ensure adequate and secure mounting of the battery.
- Please use suitable handling equipment for safe transportation of the battery.
- Uncovered electrolyte or powder that has contacted the skin or eyes MUST be flushed out with plenty of clean water immediately. Seek medical attention afterwards.
- Please make sure any battery charger or charge controller has been disconnected before working on the battery.

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Battery Basic Information

Polinovel Lithium Iron Phosphate Batteries are designed to replace deep-cycle lead-acid batteries. The battery features the highest safety standard and extended cycle life. Weighs one-third less than lead-acid batteries, but with greater energy and higher efficiency. The LiFePO4 Battery Pack includes two main components: The LiFePO4 Battery Pack includes two main components:

1. Individual cells assembled inside a plastic or steel case
2. An intelligent BMS (Battery Management System) built-in to protect the battery from abusive operation

Battery Cell And Pack Voltages

LiFePO4 Nominal Voltage	Lead-Acid Nominal Voltage
Cell 3.2V	Cell 2.0V
12.8V (4 cells in series)	12V
25.6V (8 cells in series)	24V
38.4V (12 cells in series)	36V
51.2V (16 cells in series)	48V

Battery Installation

- DO NOT short-circuit the battery terminals. Doing so can cause current bursts and lead to irreversible damage to the system and the battery.
- DO NOT place batteries on a metallic surface.
- Please verify the polarity before connecting the wiring. Reversing polarity can destroy the battery.
- Please use circuit breakers, fuses, or disconnect devices sized by a certified electrician, licensed installers, or regional code authorities.

Equipment

The following equipment or tools may be required to install the battery:

1. Proper protective equipment - gloves and eye protection
2. Insulated tools - wrench with insulated/rubber coated handle
3. Multimeter
4. Battery cable
5. Battery charger/charge controller

Inspection

Please check for visible damage including cracks, dents, deformation, and other visible abnormalities. The top of the battery and terminal connections should be clean, free of dirt and corrosion, and dry. If any problems are detected with the battery, please contact us for assistance within 7 days after receipt of batteries, otherwise, we deem customers have no objection to the batteries.

Cable Size

Battery cables (sold separately) should be appropriately sized to handle the expected load. Please refer to the below table for the ampacities of copper cables with different gauge sizes.

Copper Cable Gauge Size (AWG)	Ampacity (A)
14	20
12	25
10	35
8	50
6	65
4	85
2	115
1	130
1/0	150
2/0	175
4/0	230

* The above values are from the NEC Table 310.15 (B) (16) for copper cables rated at 75° C (167° F), operating at an ambient temperature of no more than 30° C (86° F). Lengths in excess of 6 feet (1829 mm) may require heavier gauge cable to avoid excess voltage drop in under sized wiring.

Series or Parallel Connections

The series or parallel connection is only applied to 12V lithium batteries. If need to connect 24V, 36V, or 48V batteries in series or parallel, please indicate the requirements before ordering.

- DO NOT connect batteries with different chemistries, brands, models, nominal voltages, or rated capacities.
- DO NOT connect batteries in series and parallel at the same time.
- DO NOT connect more than 4 batteries in series or parallel.

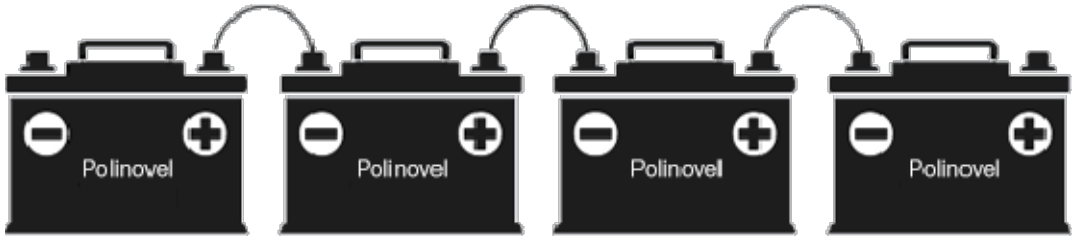
When connecting batteries in series or parallel, please follow these guidelines:

Please make sure the voltage difference between each battery is within 50mV (0.05V) before connection. This can minimize the chance of imbalance between batteries. If the voltage of any battery is >50mV from another battery in the group, charge each battery individually to rebalance.

The voltage or capacity of batteries when connected in series or parallel increased by the multiple of the batteries connected. However, the charge and discharge current will be the same as a single battery.

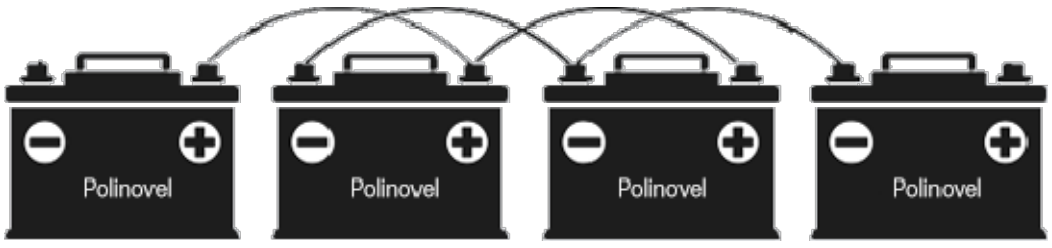
Series Connection Operation

To connect multiple batteries in series, first connect the Positive Terminals of the battery to the Negative Terminals of another until all batteries are connected. Then, connect the Negative Terminal of the first battery and the Positive Terminal of the last battery to the system. This type of arrangement is used to increase the overall battery voltage while keeping the battery capacity the same.



Parallel Connection Operation

To connect multiple batteries in parallel, first connect the Positive Terminals of the batteries to each other. Then, connect the Negative Terminals of the batteries to each other. Finally, connect the Positive Terminal of the first battery and the Negative Terminal of the last battery to the system. This type of arrangement is used to increase the overall battery capacity while keeping the battery voltage the same.



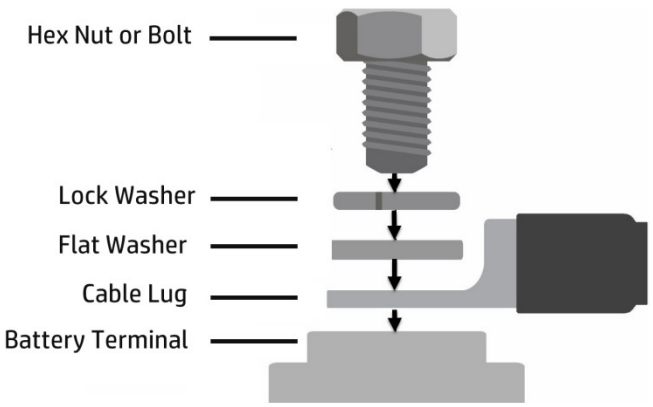
Securing Connection

- Please use a rubber-handled or insulated wrench when connecting batteries to avoid an external short circuit.

To maximize the performance and to ensure the safe operation of the battery, cable connections should adhere to the appropriate torque values for the specified terminal type to provide optimum electrical conductivity. Over or under-tightening the connections can result in terminal breakage, over-heating and/or terminal melting. See the table below for the recommended torque values:

Terminal Type	Torque Values
M8	21Nm
M6	8.2Nm

To ensure good contact between the cable lugs and the battery terminals, it is recommended to use washers to allow as much thread engagement as possible without bottoming out the terminal bolts. Place the washer between the cable lug and nut, not between the cable lug and battery terminal surface, as this can cause high resistance and excessive heat.



Installation Environment

The battery should be installed in a clean, cool, and dry place.

Keep any flammable/combustible material (e.g., oil, paper, cloth, plastic, etc that may be ignited by heat, sparks, or flames) away from the batteries.

Always leave space around all sides and on top of the battery to provide sufficient airflow to prevent excessive heat build-up.

Battery Operation

Battery Charge

- DO NOT charge the battery with any visible damage or frozen.
- DO NOT exceed the data sheet indicated maximum charge current of the battery.

Please charge the battery with a charger or charge controller compatible with the lifepo4 battery.

LiFePO4 battery can be safely charged at temperatures between 0℃ to 45℃.

The battery may be received in partial state of charge (SOC), please fully charge the battery prior to the initial use.

Battery Discharge

- DO NOT discharge the battery below the operating voltage.
- DO NOT exceed the data sheet indicated maximum continuous discharge current of the battery.

LiFePO4 battery can be safely operated at temperatures between -20℃~ 60℃.

LiFePO4 battery can be discharged up to 100% of its capacity. However, to optimize the performance of the battery, and avoid BMS disconnecting the battery, it is recommended to discharge to 80%.

High Discharge Current @ 200A

Discharging the battery at a high current will heat the battery quickly and may activate the high-temperature protection of BMS. See the table below for the recommended working time @200A for different battery capacities.

Battery Capacity	Working Time @ 200A Discharge
≤ 100Ah	< 20mins
> 150Ah	< 30mins

Battery Storage

- DO NOT expose to the battery to heat sources or extreme temperatures over 45℃.
- DO NOT expose the battery to direct sunlight, moisture, or precipitation.

Please follow below tips to ensure battery stored in good condition:

Charge the battery to 50%-60% stage of charge (SOC) before storage, and disconnect the battery from system.

Store the battery in an open, well ventilated, dry, clean area with temperatures between -20℃~45℃. For storage longer than 3 months, the recommended temperature range is 0℃~25℃.

Handle the battery carefully to avoid sharp impacts or heavy pressure on the battery casing.

If batteries are stored for a long time, charge the batteries at least every 3 months to prevent over-discharge, and cycle the batteries at least every 6 months.

Battery Recycling

Terminals must be covered with a protective cap or non-conductive tape before battery disposal to the lithium recycler. Dispose of LiFePO4 batteries at an authorized lithium recycling facility.

Polinovel reserves the right to change
the contents of this manual without notice.

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