

POWERWIN®

BT10

User Manual



12.8V 10Ah LiFePO4 Battery

1. Technical Specification

Model Name	BT10
Battery Cell	3.2V/10Ah (LiFePO4)
Series-parallel	4S1P, 12.8V/ 10 Ah total.
Rated Power	128Wh
Cycle Life	4000+ (to 80% DoD.)
Charging Current	2-5A
Charging Voltage	14.2 - 14.6V
Charging Mode	Constant Current (CC) Constant Voltage (CV)
Discharge current	5A
Max. Discharge current	10A
Operating Temperature	Charge: 0-45°C Discharge:-20-60°C
Net Weight	2.2lbs / 1KG
Size	6"*2.6"*3.7" / 152*66*94 mm

2. Please Read Before Use

1. When using the battery for the first time, fully charge it before use.
2. Do not expose the battery to water or rain.
3. Do not charge the battery in the presence of fire or extreme heat.
4. Avoid using or storing the battery near heat sources such as a fire or heater. If the battery leaks or emits an odor, remove it from the vicinity of an open flame immediately.
5. Ensure that the positive and negative terminals are not reversed.
6. Avoid placing the battery in fire or subjecting it to heat.
7. Do not short-circuit the positive and negative electrodes of the battery using wires or other metal objects.
8. Do not puncture the battery housing with nails or other sharp objects, and avoid hammering or pedaling on the battery pack.
9. Disassembly of the battery and its components is strictly prohibited.
10. If you notice any unusual signs such as an odor, heat, deformation, discoloration, or any other abnormal behavior from the battery, stop using and disconnect immediately.
11. Avoid using the battery in a high-temperature environment, as it may overheat and affect its performance and shorten its service life.
12. If battery electrolyte contacts your eyes due to a leak, do not rub your eyes. Rinse your eyes with water right away and seek medical help. Immediate action is essential to prevent potential eye damage.

3. Charging Methods

A. Battery Characteristics & Charging Mode

The voltage measured during charging or discharging LiFePO₄ batteries may not accurately represent their actual voltage.

After charging or discharging and disconnecting the battery, the voltage may gradually settle to its true voltage over time.

Note

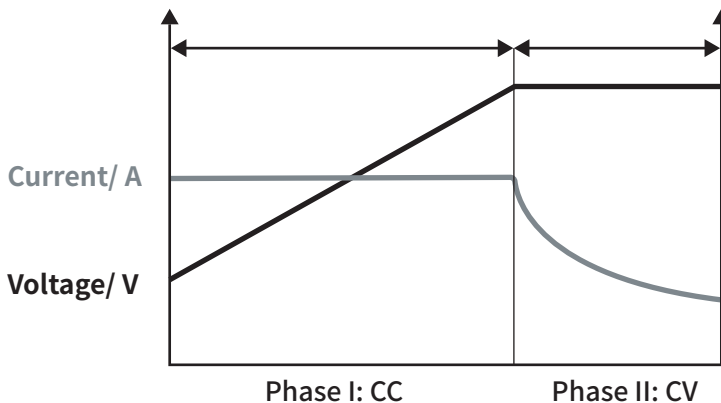
To accurately test the battery's real voltage, disconnect all connections and measure it after resting for over 30 minutes. The expected true voltage should be around 13.4V.

Phase I: CC (Constant current)

Initially, a discharged battery will be charged at a constant current, and the voltage will rise steadily until it reaches a constant voltage point, which varies with different charging method.

Phase II: CV (Constant Voltage)

In this phase, the battery maintains a constant voltage while the current rating drops to 2A (0.02 c), which is also known as constant current mode.



B. Charging Mode

Method 1: Battery charger

Use a dedicated 14.6V LiFePO₄ battery charger to maximize the battery's capacity.

Recommended charging voltage: **14.2V to 14.6V**

Recommended charging current:

The 2A (0.2C) battery will be fully charged to 100% capacity in about 5 hours.

The 5A (0.5C) battery will be charged in about 2 hours at 97% state of Charge.

Note

- Connect the charger to the battery before plugging it into the power outlet to prevent sparks and potential fire hazards.
- Disconnect the charger from the battery once it is fully charged.
- Avoid reversing the positive and negative terminals during connections.

Method 2: Solar Panel and Controller

Solar Panel

Recommended power : 30W

A 30W solar panel, fully charge in one day (effective power: 4 hours/ day)

It might take more than a day to fully charge, because the duration and intensity of light are important factors of charging efficiency.

Solar Charge Controller

Recommended charging mode: 12V (14.6V)

Recommended charging current:

The 2A (0.2C) battery will be fully charged to 100% capacity in about 5 hours.

The 5A (0.5C) battery will be charged in about 2 hours at 97% state of Charge.

Notes

If you need to manually configure the controller, please use the following parameters. It's important to note that these settings are specifically designed for LiFePO4 batteries, as different battery models have different charging requirements.

Charging Specs

Charging Voltage	14.6V
Overvoltage Protection	14.8V
Overvoltage Recovery	14.2V
Equalizing Current	0.2A

Discharging Specs

Undervoltage Alarm	11.6V
Undervoltage Recovery	12V
Low-voltage Protection	11V
Low-voltage Recovery	12.4V

Method 3: Alternator / Inverter

The battery can be charged via an alternator, or an inverter.

A. If your alternator or inverter provides DC output, consider incorporating a DC-DC charger between the battery and the generator.

B. If your alternator or inverter supports AC output, follow the charger's recommendations to add an appropriate battery charger between the battery and the generator.

Recommended charging voltage: **14.2V to 14.6V**

Recommended charging current:

The 2A (0.2C) battery will be fully charged to 100% capacity in about 5 hours.

The 5A (0.5C) battery will be charged in about 2 hours at 97% state of Charge.

4. How to Connect (series & parallel)

A. Definition

The battery is connected to the battery with a total input and output cable, and two copper bars are added to multiple connecting cables.

Step 1:

Connect batteries to batteries by referring to the wiring diagram.

Step 2:

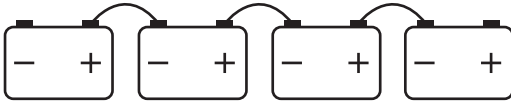
Connect the positive output cables of all batteries to a copper bar.

If you are connecting batteries in series (where the positive terminal of one battery connects to the negative terminal of another), do not connect the positive electrode to the copper bar to ensure a proper series connection for the battery system.

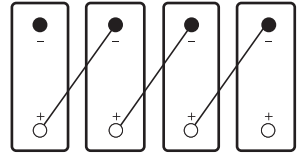
Step 3:

Connect the load to the copper bar. The cable table used in this step should be able to support the total input and output current of the entire battery system.

Connect in Series



48V(51.2V) 10Ah battery system

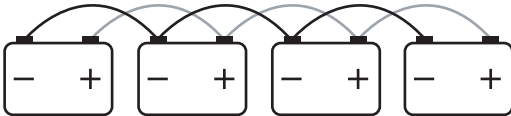


⚠ Note

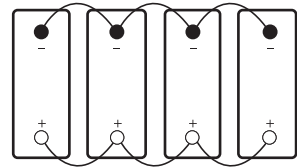
When you connect batteries in series, the voltage increases while the amperage (ampere) remains the same.

For example, if you connect two 12.8V 10Ah batteries in series, the battery system's voltage will be 25.6V, and the capacity remains at 10Ah.

Connect in Parallel



12V(12.8V) 40Ah battery system



⚠ Note

When you connect batteries in parallel, the ampere increases while the voltage remains the same.

For example, if you connect two 12.8V 10Ah batteries in parallel, the battery system's voltage remains at 12.8V, and the capacity will be 20Ah.

⚠ Restrictions

Up to 16 identical batteries connection: 4 in series for 48V (51.2V) & 4 parallel for 40Ah battery systems in total.

4. Before Connection

A. Safety Precautions for Battery Connection:

1. Always wear insulating gloves before making any connections.
2. Avoid reversing the battery's polarity or creating short circuits when connecting the positive and negative terminals.

B. Balancing Voltage in Parallel Battery Connections:

1. When connecting batteries in parallel, ensure the voltages are equal.
2. For systems with multiple batteries, consider performing voltage equalization every 6 months to address potential voltage differences that may occur after five months of use.

This helps maintain consistent voltage levels between battery packs and ensures optimal performance in series and parallel setups.

5. Equalization steps

1. Charge each battery individually to its full capacity.
2. Connect the batteries one at a time in parallel and allow them to sit together for 12-24 hours, but no more than 4 groups.
3. The battery pack can be connected in both series and parallel configurations.

Restrictions

When using batteries in series and/or parallel modes, please ensure that the following conditions are met:

- a. Use batteries with the same battery capacity (Ah) and BMS (A).
- b. Choose batteries from the same brand (different brands of lithium batteries may have unique BMS requirements).
- c. Purchase batteries from nearby sources (within 1 month).

6. Other Connection Modes

	2S2P	4S2P	2S4P
Battery voltage / capacity	25.6V / 20A	51.2V / 20A	25.6V / 40A
Energy	512Wh	1024Wh	1024Wh
Max. Discharge Current	20A	20A	40A
Max. Load Power	512W	1024W	1024W

7. For Extended Storage

1. When storing the battery pack for an extended period, ensure that the storage temperature remains within the range specified in the product specifications.
2. Long-term storage, defined as exceeding three months, should be conducted at a temperature of $25\pm5^{\circ}\text{C}$ and a relative humidity of $65\pm20\%\text{RH}$.
3. Prior to storage, it's advisable to charge the battery pack to approximately 50-70% of its capacity.
4. Store the battery pack in a dry, well-ventilated location.
5. If the battery is stored for more than six months, it should be periodically maintained by cycling through charging and discharging.
6. Avoid exposure to corrosive substances, open flames, and heat sources.

8. Transportation Precautions

1. During transportation, the battery pack must be adequately packaged to prevent severe vibration, impacts, and compression.
2. Protect the battery pack from exposure to direct sunlight and rain.
3. Transportation can be conducted using various means, including cars, trains, ships, planes, and other appropriate methods.

9. Battery Maintenance

- 1. When maintaining the battery pack, ensure that the battery's power level is between 40% and 70%.
- 2. Recommended maintenance for batteries not in regular use involves recharging every six months using the charger for 1 to 2 hours.
- 3. During maintenance, refrain from attempting to replace or remove individual batteries from the battery pack, as this may negatively impact battery performance.
- 4. Unauthorized disassembly or dissection of the battery core is strongly discouraged and should not be attempted.

10. Trouble Shooting

Phenomenon	Cause	How to solve
Battery has no output	The string of output cable is loose.	Properly connect the battery and output cable according to the specs.
	The battery pack is dead.	Charge the battery.
The charger indicator is off	The charger output voltage is incorrect or the AC input plug is incorrect.	Use the correct charger and plug the charger into the mains outlet according to the instructions.
The battery cannot be charged	The charger output plug is loose or the charger voltage is incorrect.	Check whether the charger output plug and battery set firm or change the correct charger.
	The battery is fully charged already.	The battery can be used normally.

If the problem still existed, because BMS, the protection system has been triggered, you can try the following steps to reactivate it.

Method 1

1. Disconnect the battery from any devices.
2. Wait for 30 minutes, and the battery should return to normal voltage (above 10 volts).

Method 2

If the battery doesn't recover with Method 1, you can:

1. Use a charger with a "0V" function and charge the battery as usual
2. Or charge the battery using an 18V-36V solar panel.

11. Packing List

1. POWERWIN 12.8V 10Ah
2. User Manual

12. Warranty

Our company provides customers with warranty of 12 months from the date of purchase.

13. Customer Service

service@iittechnology.com



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