

# Metal case LiFePO4 Battery Pack

Model: BPWFE51210BRD, 51.2V, 210Ah

## Overview

Bestgo Battery Co., Ltd. dedicated to offer advanced lithium-ion batteries which feature both high power and energy densities with a long lifespan and ultra safe performance. The cells made with unique manufacturing technology can help to build high quality li-ion batteries with high effective environmental friendly. Bestgo's unique technologies make sure cells have amazing consistency, with high precision quality control and auto matching system, Bestgo dedicated to help customer build the excellent battery packs as customer required.

## Scope

This specification describes the performance and detail technical requirements of the Li-ion Batteries that are supplied by BESTGO BATTERY COMPANY LIMITED, the products mentioned in the specification accord with GB/T18333.1-2001 Standard.

## Parameters

Item	Rating	Note
Battery Model	BPWFE51210BRD	For high power application
Battery pack description	51.2V 210Ah lithium ion battery pack	IP65, metal case with handles
Battery Chemistry	Lithium Iron Phosphate	LiFePO4
Cell Type and config	BCPFE27P	8 cells in parallel to reach 3.2V 210Ah unit, 16 units in series to reach 51.2V 210Ah.
BMS description	BMS which support 300A current	With CAN output
Battery Pack Dimension (L*W*H)	732*370*325 ± 2mm (metal case body)	
Battery Pack Weight	108 ± 3 kg	
Rated Capacity	≥ 210 Ah @ C/3, 23°C/73°F	Measured as 2.7V cut off at cell level
Operating Voltage	51.2 V (average) @ C/3, 23°C/73°F	Working voltage range is 58.4 ~ 46.4 V
Charging Voltage	≤ 58.4 V for CC/CV mode	Can be changed to 57.6V for longer cycle life
Discharge cut off Voltage	46.4 ~ 43.2 V (When any cell volt reaches 2.7V may trigger this protection)	Set device (like a controller) low volt protection much <b>higher</b> to avoid trigger cell protection.
Max Discharge Current	≤ 300 A @ 30min, 23°C, 30% ≤ SOC ≤ 100% ≤ 400 A @ 15s, 23°C, 30% ≤ SOC ≤ 100%	Please consider heat accumulation if long time discharging with a large continuous current.
Max Charge Current	≤ 210 A @ 60min, 23°C, 20% ≤ SOC ≤ 70% ≤ 300 A @ 5min, 23°C, 20% ≤ SOC ≤ 70%	Please consider heat accumulation if long time charging with a large continuous current.

Item	Rating	Note
Battery Cycle Life	≥ 2000 times @ 80% DOD, ± 1C, 23°C	After cycles can deliver ≥ 75% rated capacity
Internal Resistance	≤ 20 mΩ	DCIR test method, @10s, 50% SOC
Temperature protection For charging process	0 ~ 5 °C ≤ sensor for cell ≤ 52 ~ 58 °C	If internal sensor detects a temperature that is outside of range, BMS will shut the pack off.
Temperature protection For discharging process	sensor for cell ≤ 65 ~ 70 °C	If internal sensor detects a temperature that is outside of range, BMS will shut the pack off.
Surrounded working condition temperature	Charge: 5 ~ 50°C Discharge: -20 ~ 55°C	Suggested for charging: 10 ~ 40°C Suggested for discharging: -10 ~ 45°C
Storage Temperature	-10°C ~ 40°C ( for ≤ 3 months)	Keep SOC at 40~60% for long term storage

(60min means 60 minutes, 5min means 5 minutes, 15s means 15 seconds, 0.5s means 0.5 second.)

Inside the battery pack, the temperature sensors are attached to cells. However, the temperature measurements are not very accurate. As a result, the BMS may trigger protections in a specific temperature range. When the battery packs undergo large continuous charging or discharging, please consider the heat accumulation in the battery pack, as it may trigger BMS protection if inside temperature became very hot.

## EOL Test Standard

Unless specially specified, batteries will be tested based on below conditions,

SOC range: 30± 5 %;

Temperature range: From 15 to 35 degree Celsius.

### AC IR test

Use multimeter to test the ACIR value of the whole battery pack.

The value should be: ≤ 20 milliohms.

### Capacity test

Use the charging and discharging cabinet to test the whole battery pack, recording all testing data automatically in system. Then charge the battery pack with 95A till reach 57.6V, then keep this volt till current is less than 10.5A, let battery rest for 15 minutes, then discharge with 95A till battery pack has volt lower than 46.4V. During this discharge state, battery pack should be able to discharge capacity: ≥ 200Ah.

### Static cell volt delta value

After 2 hours of capacity test, when battery is not in charge or discharge, record the 16 series of cell volt values, the cell volt delta should be: ≤ 15mV.

### Dynamic cell volt delta value

To arrange 95A discharge current from battery pack, when battery pack is on load which current is 95A, and the lowest cell volt is 3.2V (±0.05V range), the cell volt delta should be: ≤ 100mV.

### Isolation test

Use the Isolation tester, set to 500V level, one probe is on the positive pole of battery pack, another probe is on the metal area of battery case, the resistance value tested should be: ≥1.25MΩ.

Repeat the test, but put one probe on the negative pole, the resistance value tested should be : ≥1.25MΩ.

If both value reached, we treat isolation test passed.

## Transportation & Storage of Li-ion Battery Pack

Here is the Notice in transportation and Storage of our Li-ion battery packs, please make sure they have been well executed.

- Can be transported via Truck, train, airplane and vessel, but to keep out of the sun & raining during transportation.
- To handle the battery pack with care during assembling or dis-assembling, do not arbitrarily throw to avoid collision.
- Do not place any heavy objects on the battery pack during transportation, to avoid crushing or damage caused.
- Do not mix Battery with flammable, explosive, and sharp metal objects in transportation.
- Make sure that the Packaging marked with moisture-proof & waterproof sticker, anti-fire stickers, to avoid dangerous in transportation.

## Battery care and maintenance

- We suggest charge up to 90% SOC and discharge no less than 20% SOC when using to prolong the cycle life. When the voltage of single cell drop down to 3.2V or the actual capacity is lower than 20%, please recharge the battery promptly.
- When battery pack is fully discharged and turned off automatically, please do not use it any more until it is recharged. Over discharge the battery pack means battery life will be shortened and the battery may become permanently damaged.
- When battery pack is fully discharged and turned off automatically, please recharge it in time (Within 12 hours), even charge 2~5% electricity to the pack will protect the cycle life well.
- If the battery pack will not be used for a long time (several days or weeks), please disconnect the battery pack from the load. (When battery pack connected to the load, the pack is always “waiting for” running, which will consume the electricity and may cause battery fully discharged and damaged.)
- Please discharge and recharge the battery timely after kept for more than 3 months so that the battery cycle life would be kept. The cycle life of li-ion battery would be shorted if the battery always be kept as fully charged state. For long time storage, keep the battery as 40 ~ 60% state of charge (SOC) and discharge and charge every 3 months.
- The battery pack can be used in cold and hot condition, but the maximum current should be modified to suit the temperature and SOC of battery pack.
- When the temperature of inside cell body is over than 70°C (Internal temperature of the cells in pack), the battery cycle life would be permanently shorted. So do not exposure the battery under the sun during summer.
- When the temperature is under -15°C or lower, the battery performance would be effect and the cycle life might be shorted.
- Battery should be kept under dry and ventilation condition. Do not put the battery close to fire and explosive products.
- Please carry the pack with care and gently to avoid severe vibration, throw or drop.

Unless otherwise specified, our LiFePO<sub>4</sub> batteries charge and discharge parameters are:

Charging state:

BMS would trigger the cut-off protection in charging process when any cell reach 3.85V, if usage condition is particularly harsh or customer do not require charge to absolutely full, it can be set to 3.75V.

When battery pack reaches the volt of 3.5\*N, BMS will treat SOC is full.

(PS: N is the number of 3.2V parallel units in series config of battery pack)

Discharge state:

If the SOC in screen is lower than 20%, please consider to get back for recharging.

If the SOC in screen is lower than 10%, please get back for recharging as soon as possible.

## After-sale Service

For the warranty and after-service we will follow the following principle.

Warranty year(s) for this model of battery pack is specified by supplier. In the period of warranty, there is any problem as the following description, we will take responsible for the replacement and repair.

- The whole battery pack can not be charged or discharged.
- Under the standard condition for testing, capacity is not same as nominal Ah. It is less than 80% in the first year, or 70% in last warranty year (if the last warranty year is provided as warranty period).
- There is liquid leakage.
- There is some damage on battery pack's case and accessory because it is caused by the battery.

There is any situation like the following description, we will not take responsible for the warranty and after-sale service.

Expired warranty period.

- Customer didn't follow the manual instruction, which is resulted in battery damage.
- Customer dismantles and convert the battery pack, which is not guided by the professional people.
- There is some apparent scratches and trace on the case of BMS and charger.
- Customer has right to choose the charger, while customer should get confirmation from supplier about technical details of Charger, to avoid mis-operation.

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