Powerhouse BATTERIES

LiFePO4

Next Generation Lithium Batteries.

FACT SHEET

This is a basic technical overview on our range of LiFePO4 lithium batteries.

• A LiFePO4 battery is made by combining multiple cells in series and parallel to provide the required voltage and charge capability. For a standard 12V battery this requires 4 cells in series (often expressed as 4S) with a nominal voltage of 12.8V.

• Within each battery housing exists a battery management system (BMS). This is used to oversee the well being of the overall battery pack and manages issues such as Over-voltage cut off, Low battery cut off and Over temperature shut down. It also balances the multiple single cells within the battery ensuring they are all correctly charged.

• Due to the BMS design, not all LiFePO4 batteries can be wired in series, and if they can be, there are limitations as to how many can be wired in a series string. Maximum for our range is 4 pieces. Generally there are no problems wiring the batteries in parallel. In theory, you could use unlimited batteries in parallel.

• It is important to note that prior to first use, all LiFePO4 batteries should be fully charged. Altronics LiFePO4 batteries are supplied 30% charged from the factory.

• If a LiFePO4 battery's BMS "low battery cut off" activates, it will disconnect the battery from the battery terminals. This will present a very low voltage across the battery terminals (potentially 0V) which may look like the battery is dead, but simply indicates that it is protecting itself. Chargers designed for LiFePO4 batteries will recognise this and bring the battery out of protect mode via various methods. For example our M8536A charger will pulse charging voltage into the BMS until it has charged the battery enough for the BMS to reconnect the battery (this can take up to 20 minutes). Once the battery has been reconnected, charging will proceed as normal.

• At a pinch a LiFePO4 can be charged with an SLA charger, however this will make poor use of the battery's capacity and we strongly recommend a LiFeP04 compatible charger such as M8536A.

Lithium's offer several advantages over traditional SLA batteries.

✔ Weight - up to half the weight of equivalent SLA models

✔ Low self discharge

✔ Longer service life up to 10 years

✔ Can't be damaged by over discharging

✔ Built in battery management system BMS to protect the battery

Revision Date: 11/06/2021

LiFePO4 Lithium Iron Phosphate Batteries

12V 120AH

Model: SL4578A

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The latest generation in maintenance free batteries is here! LiFePO4 batteries offer longer service life than traditional lead acid batteries, plus weigh less than HALF as much as SLA batteries. LiFePO4 also provide more usable life per cycle, allowing for longer run times by holding a higher voltage until capacity is almost exhausted. These batteries will also maintain 80-90% charge when in storage - far higher than their lead acid counterparts.

Each battery is fitted with an internal battery management system to provide safe charging and discharging at all times. This system provides internal short circuit, over temperature and under/over voltage cut off. Can be wired in series and/or parallel.

Battery Module Specification

Item		Specification	Conditions
Nominal	Voltage	12.8V	25C°,0.2C
	Capacity	120Ah	
Module weight		12.5kg	±0.1kg
Dimensions(W*D*H), mm		330*171*215*222	±2mm
Operating parameters	Charging Voltage	13.8-14.4V	
	Discharging Voltage	11.8V Recommended	9.2~15.4V
	Charging current	Max constant charge: 100A	Recommended 50A
	Discharging current	Max constant discharge:100A	
		Pulse discharge: 840A for 50mS	
Temperature	Charge range	0C°~45C°	
	Discharge range	-20C°~60C°	
	Storage range	-20C°~45C°	
BMS	Built-in BMS	Voltage, current, temperature management & cell balance	
Service life	Design life	>10years	0.2C, 25C°
	Cycle life (100%DOD to 80% end)	>2000 times	
	Cycle life (100%DOD to 50% end)	>4000 cycles	@0.5C, 25C°

LiFePO4 Lithium Iron Phosphate Batteries

12V 120AH

Model: SL4578A

Powerhouse BATTERIES

Battery Management System Specification

Item		Parameters		Condition
Charge	Cell voltage protection	3.9V	Delay 1~2S	Recover when discharge current >1A or Cell voltage<3.38V or module voltage<13.52V
	Module voltage protection	15.6V	Delay 1~2S	
	Over charging current 1	100A	Delay 20~30S	Turn to pre-charge mode and try to recover in every 3min
	Over charging current 2	--	--	
	Temperature protection	<-10C° or >70C°	Delay 1~2S	Recover when >0C°or <60C°
Discharge	Cell voltage protection	2.2V	Delay 500mS	Recover when charge current >1A or Cell voltage>2.6V or module voltage>10.4V
	Module voltage protection	8.8V	Delay 1~2S	
	Over discharging current 1	380~420A	Delay 500~1500mS	Recover when charging current>1A, or recover in every 60S
	Over discharging current 2	760~840A	Delay 50~150mS	
	Short circuit	-	200~700 us	
	Temperature protection	<-20C° or >75C°	Delay 1~2S	Recover when >-10C°or <65C°
BMS	PCB Temp protection	>115C°	Delay 1~2S	Recover when <80C°
	Cell balance	25~45mA	Passive balance	Cell voltage difference > 45mV
	Temperature accuracy	±2C°	Cycle measurement	Measuring range -40~100C°
	Voltage accuracy	±20mV	Cycle measurement	For cells and module
	Current accuracy	FSC±5%	Cycle measurement	Measuring range -200~+200
	SOC	5%		Integral calculation
	Power consumption with different condition	<300uA	Switch-off mode	Storage & transportation
		<100uA	Sleep mode	Protection & stand-by
		<15mA	Operating mode	Operating
		NA	Pre-charge mode	Low voltage to start Pre-charge
	Communication ports	NA		Can be customized to match the device

LiFePO4 Lithium Iron Phosphate Batteries

12V 120AH

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Powerhouse BATTERIES

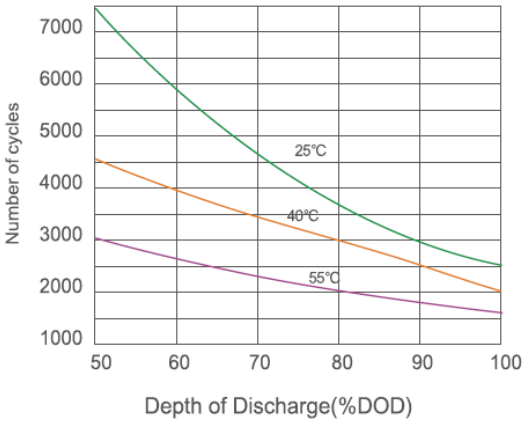
Battery Management System Properties

BMS provides complete management and protection for the battery.

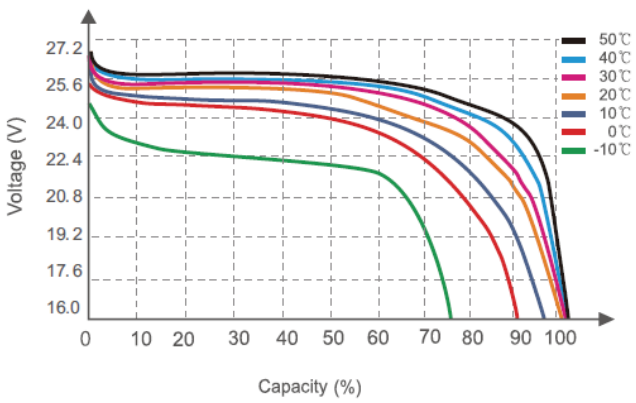
- Voltage warning and protection for module and each single cell.
- Current warning and protection, and the maximum operating current can be customized.
- Temperature warning and protection, 4 sensors for battery pack and 1 sensor for BMS.
- Battery module SOC and SOH calculation, display the accurate battery status.
- Communicate with the SMPS or monitor device, report the battery data.
- Pre-charge logic, make sure safety charge for the module if under low voltage condition.
- Switch-off mode, sleep mode, and operating mode, different mode for different condition.

Performance

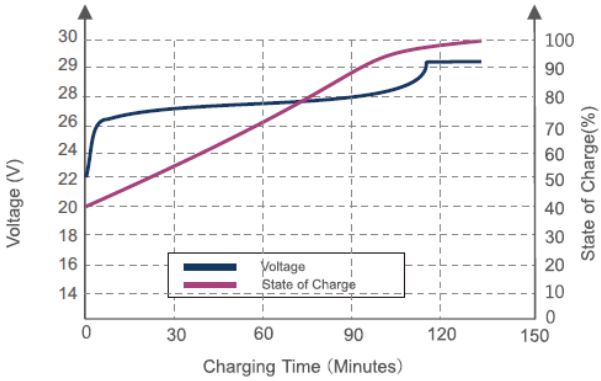
Different DOD Discharge Cycle Life Curve 1C 25C



Different Temperature Discharge Curve(0.2C)



State of Charge Curve(0.5C, 25℃)



Battery & Connection Specifications

Item	Specification
Dimensions:	330 x 172 x 220mm
Overall Weight:	13.5kg
Terminal Type:	M8 / F12
Terminal Torque:	12.4NM
Connection:	12-48V max 4 in series, no limit in parallel.
Case Material:	ABS
Case IP Rating:	IP56
Cell Type:	Cylinder
Certification:	CB/CE, UN38.3, UL1642 @ cell.
Shipping Class	UN3480, Class 9

Issued November 1st 2022.

Powerhouse BATTERIES

LiFePO4 Models

Important Information Regarding Your Lithium Battery.

The Powerhouse range of Lithium batteries have undergone two charge/discharge cycles at the factory during manufacture, and are only shipped with approximately 30% charge.

It is important to completely charge a new battery prior to first use. To obtain best performance and prolong battery life, you should use a battery charger suitable for Lithium batteries.

In an emergency you can use a traditional SLA charger, but you will not get optimum performance from the battery as it will never get to 100% charged.

Battery Management System (BMS) Overview

Every model Powerhouse Lithium battery has an inbuilt Battery Management System known as a BMS which is an elaborate electronic protection circuit. The purpose of the BMS is to protect the internal battery cells from numerous adverse conditions, including over temperature, over voltage, under voltage, over discharge as well as ensuring the internal cells making up the battery are properly charged and discharged and are overall well balanced.

SAFE/SLEEP mode.

During use, if the battery does encounter over temperature, over voltage, under voltage or over discharge situations, the BMS will place the battery into “SAFE/SLEEP” mode. When in this “SAFE/SLEEP” mode, there is no voltage present at the terminals. If you measured the battery with a DC volt meter the reading will be 0V. This could lead you to believe the battery is dead or faulty, but it is not. It is in protection “SAFE/SLEEP” mode and to continue using it, it has to be brought out of this state.

Reactivating Battery From “SAFE/SLEEP” mode.

With the battery completely disconnected, you will need to use a mains lithium battery charger with a “wake” circuit (suitable Powetran chargers include M8534A and M8536A). This will pulse the battery, eventually getting it to start charging. The time it takes varies depending on the charger used and the capacity of the battery. This can take from several minutes to more than an hour.

Do not use the battery until it has been 100% recharged.

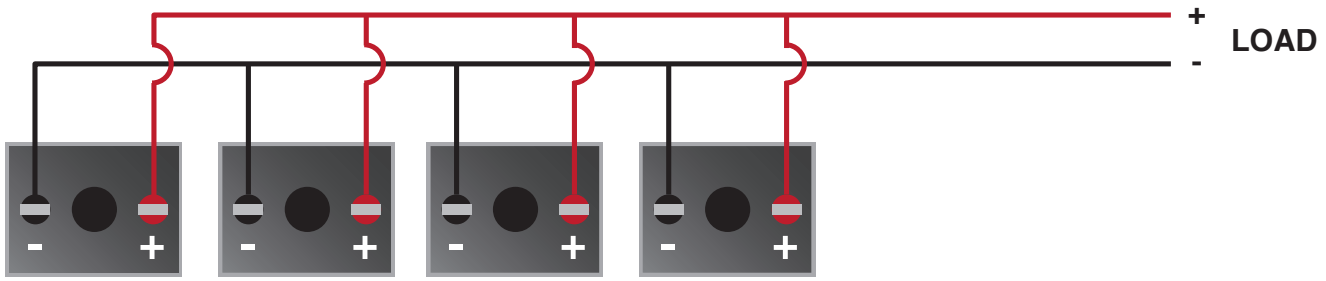
Powerhouse BATTERIES

LiFePO4 Models

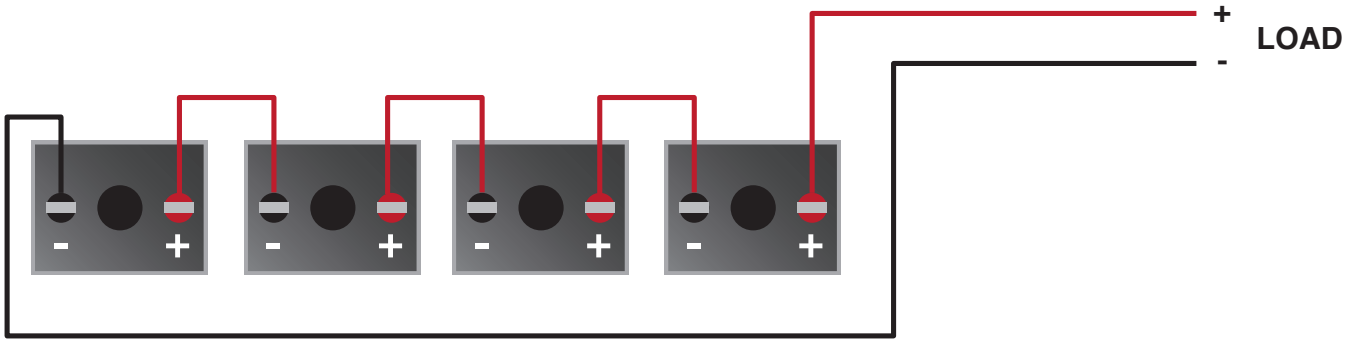
Battery Wiring Configurations

Regardless of your wiring configuration it is technically best to individually charge each battery to 100% capacity using the same charger before connecting them. This ensures all batteries are at the same terminal voltage and will charge/discharge evenly.

Parallel Batteries (no limit on number connected - always check battery datasheets to confirm).



Series Batteries (maximum 4 units - always check battery datasheets to confirm).



Note: When using LiFePO4 batteries in circuits, NEVER mix brands, capacities or voltages. Always use identical batteries in your circuit (ie: same brand/model, same amp hour (Ah) rating, same voltage).

Disclaimer

Information provided as a guide only. Please seek professional advice when installing battery circuits in your vehicle or trailer. Battery wiring can carry very high currents and if not fused correctly, could cause circuit failures and fires.

Warranty Statement

Altronic Distributors warrants Powerhouse LiFePO4 batteries for 5 years from date of purchase from Altronics or its resellers to the consumer. If this item is part of an installation or another product, please contact the installer or supplier for your warranty. During the warranty period, we undertake to repair or replace your product at no charge if found to be defective due to a manufacturing fault. The warranty excludes damage by misuse or incorrect installation (i.e. failure to install and operate device according to specifications in the supplied instruction manual), neglect, shipping accident, or no fault found, nor by use in a way or manner not intended by the supplier.

For repair or service please contact your PLACE OF PURCHASE.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. NOT FIELD SERVICEABLE.

Distributed by Altronic Distributors Pty. Ltd. Ph: 08 9428 2199 Internet: altronics.com.au

Issued: November 1st 2023

Powerhouse BATTERIES

LiFePO4

Installation Guide for Powerhouse LiFePO4 batteries.

IMPORTANT NOTICE: **As of November 2023 Australian Law states batteries installed in RVs, Caravans etc., CANNOT be installed in a habitable area unless placed in a sealed enclosure. The following outlines the specific requirements for installation.**

Overview

This guide is designed to provide information on installation of Powerhouse LiFePO4 batteries in accordance with AS/NZS 3001.2:2022. This guide is suitable for installation of batteries in recreational vehicles and covers the following battery series:

- Powerhouse Standard LiFePo4
- Powerhouse Slimline LiFePo4
- Powerhouse Bluetooth LiFePo4

Before commencing we advise that you read AS/NZS 3001.2:2022 to make sure that your installation complies to the requirements of this standard. The standard is available from Standards Australia.

All Powerhouse LiFePO4 batteries are fitted with an integral Battery Management System (BMS) that protects the following conditions as set out in clause 5.4.12.3.3:

A. Over and under voltage (at cell level).

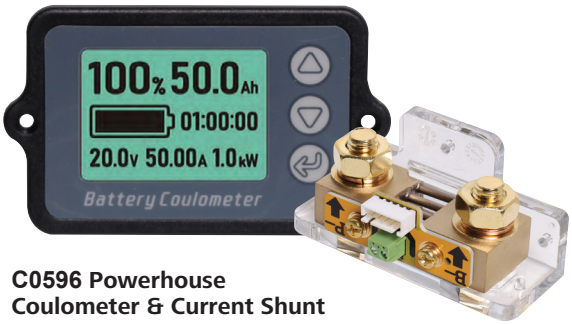
B. Over and under temperature.

C. Over current.

The lithium cells (batteries) inside the Powerhouse LiFePO4 batteries comply with AS IEC 62619 as required by clause 5.4.12.3.1 of the standard.

Battery State Of Charge (SOC)

The Powerhouse Bluetooth range of batteries are fitted with a Bluetooth module which allows monitoring of the state of charge (SOC) percentage as required by clause 5.4.12.3.4 along with current, temperature and voltage of the cells. If using multiple batteries in parallel we recommend a standalone battery monitor to be connected to the battery circuit such as the C0594 & C0596 coulometers.



C0596 Powerhouse Coulometer & Current Shunt

The Powerhouse Standard and Slimline ranges of batteries require external SOC monitoring. Using the C0594 & C0596 coulometers, essential battery parameters can be monitored including capacity as set out in clause 5.4.12.3.4.

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Installing your batteries.

To protect the battery from impact and moisture ingress the battery should be installed in a designated battery enclosure/compartment.

If the battery compartment is within a vehicle (car or caravan etc), the battery must be installed to share an outer wall or floor of the vehicle. The compartment must be sealed and made from material which prevents gases/vapour from entering the habitable space of the vehicle, directly or indirectly.

To meet clause 5.4.11.3.2 access to the battery compartment must be easy. It should be accessible by a door/hatch directly from the outside of the vehicle. As this cannot always be achieved in every installation type, an internal access panel is acceptable as long as it is securely fastened and fully sealed to prevent gas/vapour from entering the habitable space within the vehicle. If you choose this method of installation we recommend attaching a label to the hatch that warns of the dangers and legalities of leaving it unsecured.

Ventilation requirements.

Venting of the compartment is a requirement of the standard and must consist of a 20mm minimum hole size to the exterior of the vehicle either through the wall or floor of the structure. This venitilation allows the compartment to equalise pressure and temperature between the compartment and the outside environment. It also allows for venting of gas/vapour in the unlikely event of a battery/cell failure. The vent design should not compromise the battery compartment or force gas/vapour into the habitable space of the vehicle.

Mounting requirements.

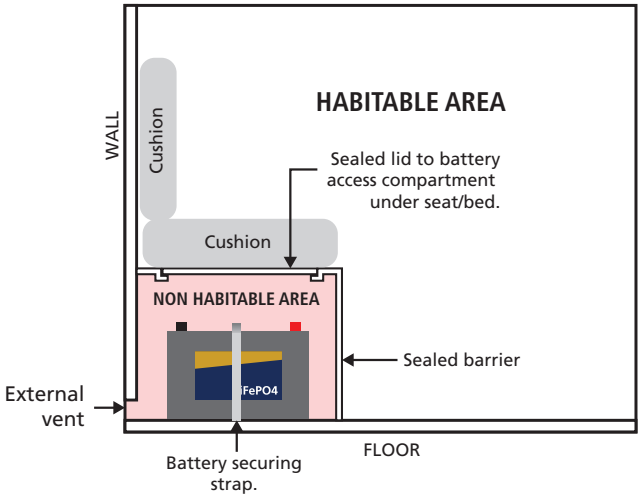
The Powerhouse Slimline batteries are provided with integral mounting points to comply with Clause 5.4.5.

For other Powerhouse LiFePO4 batteries, we recommend the use of a secure battery tray or straps to restrict the batteries movement as per the requirements of the standard.

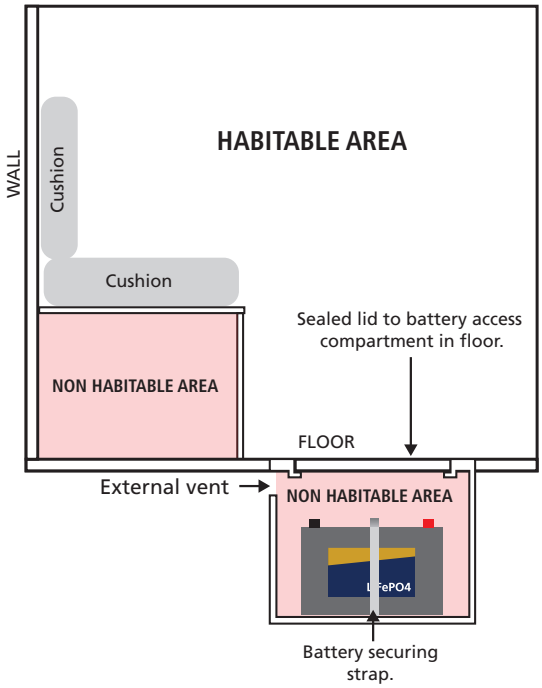
Spill trays are not required as part of the standard when using LiFePO4 batteries.

Example installations:

Caravan Seat / Bed Installation (Sealed Internal)



Under Floor Installation (External)



Powerhouse
BATTERIES

Steps before use:

Before commencing use of your vehicle power system you should ensure the following steps have been checked off.

1. All connections are secure and there is no interference from non-conductive materials.
2. Check that all batteries in the system are secure as per clause 5.4.5 (ie: no movement in any direction >25mm).
3. System has been charged to 100% capacity to allow all battery monitors to sync to 100% SOC.
4. Perform a discharge test with all intended loads, including any power inverters at their intended output. Check for hot connections which may indicate a poor quality connection or cable over its specified current carrying capacity.
5. Make any rectifications required.
6. Recharge the system to 100% SOC again.

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