

## **Owner's Manual**



Enerdrive ePOWER LiFePO4, Lithium Iron Phosphate Battery with Smart Phone Monitoring

EPL-100BT-12V • EPL-125BT-12V • EPL-200BT-12V





For safe and optimum performance, the Enerdrive ePOWER LiFePO4, Lithium Iron Phosphate Battery with Smart Phone Monitoring must be used properly. Carefully read and follow all instructions and guidelines in this manual and give special attention to the CAUTION and WARNING statements.

## PLEASE KEEP THIS MANUAL FOR FUTURE REFERENCE

#### Disclaimer

While every precaution has been taken to ensure the accuracy of the contents of this guide, Enerdrive assumes no responsibility for errors or omissions. Note as well that specifications and product functionality may change without notice.

#### Important

Please be sure to read and save the entire manual before using your Enerdrive ePOWER LiFePO4, Lithium Iron Phosphate Battery with Smart Phone Monitoring. Misuse may result in damage to the battery and/or cause harm or serious injury. Read manual in its entirety before using the unit and save manual for future reference.

#### **Product Numbers**

EPL-100BT-12V EPL-125BT-12V EPL-200BT-12V

#### **Document Part Number**

ePOWER-BT-Rev 3.01

#### **Service Contact Information**

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## **1 GENERAL INFORMATION**

Thank you for purchasing the Enerdrive ePOWER **B-TEC** Lithium battery. Please read the following information carefully before installing your new battery.

This information defines the performance of the rechargable ePOWER LiFePO4 batteries distributed by Enerdrive Pty Ltd and describes the type, performance, technical characteristics and warning of the battery pack.

This battery is designed and intended only for use in deep cycle applications where a single battery is required.

- The EPL-100BT-12V is equivalent to a 160Ah lead acid AGM deep cycle in usable capacity (50%DOD).
- The EPL-125BT-12V is equivalent to a 200Ah lead acid AGM deep cycle in usable capacity (50%DOD)
- The EPL-200BT-12V is equivalent to a 360Ah lead acid AGM deep cycle in usable capacity (50%DOD)..

Suitable for Camper Trailers, 4WD's (AUX battery), Caravans, Small water craft, Low power communication sites or any application that requires the use of a deep cycle battery that meets the amp hour capacity.

The battery is equipped with a LiFePO4 Battery Management System (BMS) that can monitor and optimize each single prismatic cell during charge & discharge to protect the battery pack from over charge, over discharge & short circuit. The BMS helps to ensure safe and accurate operation of the battery.

Lithium batteries require specific charging algorithms. The charging source required must include the correct charging algorithms and voltage parameters listed in the specification table below. Using the incorrect charging source will damage the battery cells and void the warranty. Enerdrive can supply

AC mains, DC2DC chargers and solar controllers to suit all Lithium batteries available from Enerdrive. Please contact Enerdrive for more information.

## This Battery IS NOT designed for, nor should it be fitted into an engine bay or other area subject to high heat.

#### Damage WILL occur and not be covered by Enerdrive Warranty.



## **2 SMART PHONE MONITORING SYSTEM**

The Enerdrive ePOWER **B-TEC** battery incorporates a wireless Smart Phone Monitoring system. By downloading the Android<sup>™</sup> or Apple<sup>®</sup> app to your smart phone or tablet device, you can monitor the following information;

- Battery Capacity
- Battery Voltage
- Battery Current (Amps)
- Battery State of Charge (SOC)
- Battery State of Health (SOH)
- Battery Status

- Individual Cell Voltage
- Battery Temperature
- Battery Cycles
- Battery Alarms
- Battery Event Information





## **3 WARNINGS**

Please read and follow the cautions listed on the battery before installation. Improper use may cause heat, fire, rupture, damage or capacity deterioration of the battery. Enerdrive Pty Ltd is not responsible for any accidents caused by the usage without following our specification.

# WARNING!

# Failure to follow these instructions may result in early battery failure or possible personal injury.

- Do not use the battery for cranking/starting applications.
- Do not parallel or series connect the battery.
- Do not dispose of in fire.
- The battery must be installed far away from heat sources, high voltage, and avoid exposed sunlight for long periods of time.
- Do not throw the battery into water.
- Do not connect the positive and negative terminals of battery together.
- Do not ship or store battery together with metal.
- Do not disassemble the battery. Battery warranty will be voided if the case is opened.
- Do not drop, impact or puncture the battery.
- Do not allow the battery to sit in a discharged state≤11.50V
- When the battery capacity is low (≤15% SOC), please charge the battery.
- Please use the matched or suggested charger that contains a Lithium charge profile for this battery. Failure to install the correct battery charger will void all warranty.
- If the battery emits a peculiar smell, heating, distortion or appears to have any abnormality during operation or storage, please stop using the battery and take it out of service. Contact Enerdrive for further details
- If the battery leaks and gets into eyes or on skin, do not wipe. Rinse with clean water and seek medical attention immediately.

## Low Battery Voltage Disconnect

The battery has a low voltage disconnect incorporated for self-protection. If the battery is drawn down to the internal low voltage disconnect set point (2.8v per cell) or ( $\leq$ 11.2V) the battery will disconnect.

To reconnect, a charge voltage of  $\geq$ 12.8v must be applied to the battery before the over-discharge release will activate and allow charge current to flow into the battery.

Enerdrive strongly recommend keeping the battery charged to avoid activating the low battery voltage disconnect.



By continuously tripping the low voltage disconnect of the battery you may cause damage to sensitive electronic equipment that is attached to the battery. I.E battery chargers, solar controllers, inverters, stereo equipment etc, all of which are not covered under the battery warranty.

# **A** IMPORTANT NOTE

## **USE OF INVERTERS**

#### EPL-100BT-12V or the EPL-125BT-12V :

If a 230v inverter is to be installed on the battery, a maximum size of 1000w is allowed. Fitting an inverter larger than 1000w can damage the Battery Management System (BMS) and put undue stress on the cells and will void your warranty.

The EPL-200BT-12V 200Ah battery can accept an inverter size of up to 2000w



## **4** SPECIFICATIONS

Enerdrive B-TEC 12v Lithium Battery Technical Data							
Normal Specification	EPL-100BT-12V	EPL-125BT-12V	EPL-200BT-12V				
Nominal Voltage		12.8V					
Nominal Capacity	100Ah	125Ah	200Ah				
Cycle Life (DOD - 80% under controlled conditions)	≥2000 Cycles						
Standard Charge Specification (Lithium profile charger required)							
Battery Charge Temperature	0 - 45°C						
Normal Charge Voltage CV/CC*	14.40 - 14.60V						
Standby (Float) Voltage	13.50 - 13.80V						
Maximum Charge Current	50A @ 25°C for 30mins	60A @ 25°C for 30mins	150A @ 25°C for 30mins				
Recommended Charge Current for Maximum Life	≤33A	≤40A	≤60A				
Standard Discharge Specification							
Battery Discharge Temperature		-20 - 60°C					
Battery Output Voltage Range	11.00 - 14.60V						
Maximum Discharge Current	100A @ 25°C ±5°C for 30mins		200A @ 25°C ±5°C for 30mins				
Pulse Discharge Current	450A for 1.0s						
Discharge Cut-off Voltage ≤11.2		≤11.20V					
Circuit Protection							
The battery is supplied with a LiFePO4 Battery Management System (BMS) that can monitor and optimize each single prismatic cell during charge & discharge, to protect the battery pack from overcharge, over discharge & short circuit. Overall, the BMS helps to ensure safe and accurate operation of the battery.							
Over-Charge Protection							
Over-charge Protection Per Cell	$3.90V \pm 0.03V$						
Over-charge Release Per Cell	3.60V ± 0.05V						
Over-charge Release Method	Discharge below release voltage						



Over-Discharge Protection	EPL-100BT-12V	EPL-125BT-12V	EPL-200BT-12V			
Over-discharge Protection Per Cell	2.80V ± 0.05V					
Over-discharge Release Per Cell	3.20V ± 0.05V					
Over-discharge Release Method	Apply Charge/Voltage ≥12.8v					
Over Current Protection	^					
Discharge Over Current	110A for 30s – 450A for 1s	110A for 30s – 450A for 1s	220A for 30s – 450A for 1s			
Protection Reset Time	5s Auto Release					
Over Current Release Method	Disconnect Load					
Over Temperature Protection						
	Protection to $65^{\circ}C \pm 5^{\circ}C$					
Battery Discharge Over Temperature	Release at $50^{\circ}C \pm 5^{\circ}C$					
	Protection to $55^{\circ}C \pm 5^{\circ}C$					
Battery Charge Over Temperature	Release at 45°C ± 5°C					
Short Circuit Protection	Auto release after 5s					
Mechanical Characteristics						
	Length 318mm		485mm			
Dimensions	Width 165mm		170mm			
	Height 215mm		245mm			
Weight	Approx 12.6 Kg	Approx 15.0 Kg	Approx 25.0 Kg			
Storage Information						
	≤30 days -20°C to 35°C, 45 to 75% RH					
remperature & Humidity Range	≥30 days -10°C to 30°C, 45 to 75% RH					
Self-discharge Rate	≤3%Per Month					

\* CV/CC, Constant Voltage – Constant Current Lithium Charge Profile



## **5 DIMENSIONS**





## **6** STORAGE & TRANSPORTATION

Based on the character of the cells, proper environment for transportation of LiFePO4 battery packs need to be created to protect the battery.

- Battery should be stored where it's dry, clean, shaded and well-ventilated at a temperature between -20°C to  $35^\circ\text{C}$
- The battery should be stored at approx 50% SOC during transportation.
- The battery needs to be charged every 6 months if in an unused situation
- Keep the top of the battery and its terminals clean
- Protect the battery from being dropped, turning over and serious stacking during loading.

## 7 FREQUENTLY ASKED QUESTIONS:

#### Q: Can I parallel the ePOWER B-TEC batteries to increase the capacity?

**A:** The battery is not designed to parallel connect extra batteries to increase the overall capacity.

When manufactures of lithium cells build batteries, careful consideration is taken to choose matching cells to build the battery pack. The batteries are assembled by the manufacture that is experienced and certified to test and assemble battery packs. The individual cells are tested and sorted by machine so that each ePOWER B-TEC battery pack has matching cells with the same capacity and internal resistance.

Paralleling individual lithium batteries like the ePOWER B-TEC unit is like taking out a lottery ticket. There is a million to one chance that you would end up with two lithium batteries off the shelf at your local retailer with exactly the same capacity & resistance.



When assembling lithium-ion cells into functional battery packs, it is common to connect multiple cells in parallel. When lithium ion battery packs are connected in parallel and cycled, matching of internal resistance is important in ensuring long cycle life of the battery pack. Specifically, a 20% difference in cell internal resistance between two battery packs cycled in parallel can lead to approximately 40% reduction in cycle life when compared to two batteries parallel-connected with the same internal resistance.

Internal resistance mismatch becomes an important problem for applications where the lithium battery packs are paralleled and subjected to high C rates, (i.e. large inverter loads and moderate to high charge rates) and are also required to have a long cycle life.

The detrimental effect of internal resistance mismatch between parallel-connected batteries arises because differences in internal resistance lead to uneven current distribution and capacity between the batteries, resulting in a decrease in battery pack life and performance.

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The ePOWER B-TEC batteries internal management system (BMS) monitors and optimize each single prismatic cell within the battery during charge & discharge. However the BMS does not have the ability of making a physical connection to a second BMS system for balancing of the cells between each battery.

So bottom line;

Can I parallel connect the ePOWER B-TEC lithium batteries?

The short answer is yes. BUT as described above, overall performance of the battery pack and life expectancy will be reduced.

• EPL-100BT-12V: If you are requiring a battery system larger than 100Ah, please look at the Enerdrive ePOWER 125Ah Lithium battery or the Enerdrive Lithium Power Pack.

• EPL-125BT-12V: If you are requiring a battery system larger than 125Ah, please look at the Enerdrive Lithium Power Pack Systems which can offer this level of cell balancing protection.

#### **Q:** Can I series connect the ePOWER B-TEC batteries to increase the voltage?

**A:** The battery is not designed to series connect extra batteries to increase the overall voltage.

In series connected batteries, charging and discharging is inherently limited to the condition of the 'weakest' cell. This is particularly so with lithium-iron (LiFePO4) batteries.



A weaker cell would cause an imbalance. A weak cell may not fail immediately but will get exhausted more quickly than the strong ones when under load. On charge, the low cell fills up before the strong ones because there is less to fill and it remains in "over-charge" longer than the others. On discharge, the weak cell empties first and gets hammered by the stronger cells. Cells in multi-packs must be matched, especially when used under heavy loads.

Again, the chances of finding two ePOWER B-TEC batteries off the shelf, with exactly the same individual cell capacity in each battery would be near impossible.

So bottom line;

Can I series connect the ePOWER B-TEC lithium batteries?

The short answer is no. Early failure of the battery pack is virtually guaranteed due to the mismatch in cell capacities.

If you are requiring a battery system of 24v or higher, please look at the Enerdrive Lithium Power Pack Systems which can offer this level of cell balancing protection.



#### **Q:** Can I use an Inverter on the ePOWER B-TEC Lithium Battery?

**A:** Yes. You can use a small inverter with the ePOWER Lithium battery. A maximum 1000W inverter is allowed. If a larger inverter is used, then possible damage to the internal BMS system can occur and this will not be covered under warranty.

#### **Q:** What is the recommended charge rate for maximum lifespan for the ePOWER Lithium Battery?

**A:** Enerdrive recommends the following for maximum performance and lifespan for your ePOWER B-TEC Battery:

- EPL-100BT-12V: Use a charge rate of ≤0.33C (33A)
- EPL-125BT-12V: Use a charge rate of  $\leq$ 0.33C (40A)
- EPL-200BT-12V: Use a charge rate of ≤0.33C (66A).

#### Q: Why is the battery capacity that shows in the app reducing?

**A:** The amount of energy a battery can hold is measured in capacity. Capacity is the leading health indicator that determines runtime and predicts end of battery life when low. The battery capacity shown through the Smart Phone App is the overall maximum capacity available from the battery. As the battery ages overtime, this figure will slowly reduce.

- EPL-100BT-12V: When the battery indicates 60% of its capacity (100Ah battery = 60Ah) the battery is deemed "end of life"
- EPL-125BT-12V: When the battery indicates 60% of its capacity (125Ah battery = 75Ah) the battery is deemed "end of life"
- EPL-200BT-12V: When the battery indicates 60% of its capacity (120Ah battery = 75Ah) the battery is deemed "end of life"

Reaching end of life does not necessarily mean that a battery will no longer function; in fact, in many cases it will still be usable, albeit in a diminished capacity.

Cycling is not the only cause of capacity loss; keeping a battery at elevated temperatures also induces stress. A fully charged Li-ion kept at 40°C loses approximately 35% of its capacity in a year without being used. Ultra-fast chargers and harsh heavy discharging is also harmful. This cuts battery life to half, and Enerdrive can attest to this through our stringent testing regime.

#### Q: Can I install the ePOWER B-TEC battery in a wet area?

**A:** Not generally recommended, even though the battery does have an IP54 rating. Enerdrive recommend installing the battery in a dry, well ventilated, cool space. Below is a brief explanation of the IP rating.

IP 5# Dust Protected, Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact.

IP #4 Splashing water, Water splashing against the enclosure from any direction shall have no harmful effect.

#### **Q:** Can I install the ePOWER B-TEC battery laying on its side or end?



**A:** The ePOWER battery is designed to install in the upright position only. Installing it laying on its side or end will damage the lithium cells with the possibility of internal venting from the cell and early failure of the battery will occur, which is not covered under warranty.

#### **Q:** Can I install the ePOWER B-TEC battery under the bonnet of a car?

**A:** Enerdrive recommend the installation of the battery in a dry, well ventilated cool space. Installing the battery under a bonnet of a vehicle will reduce the performance and shorten the lifespan of the battery due to high temperatures usually found within an engine bay. **Battery NOT Warranted for Under bonnet use.** 

#### Q: How safe are the ePOWER B-TEC Lithium Batteries?

**A:** ePOWER LiFePo4 batteries are considered to be safe, non-flammable and non-hazardous by international and federally regulated standards.

#### **Q:** Can I use a lead-acid battery charger to charge the ePOWER B-TEC Lithium battery?

**A:** Yes. HOWEVER, you must NOT use a lead-acid charger if it has an automatic "equalisation mode", which cannot be permanently turned off. A lead-acid charger that can be set to charge no higher than 14.6v can be used for regular charging and then must be disconnected after the battery is fully charged. DO NOT leave the lead-acid charger connected to maintain or store the battery, because most will NOT maintain the proper voltage charge algorithm for lithium batteries and damage will occur to the battery and this is not covered under warranty.

Ultimately, using a battery charger with a specific Lithium charge algorithm is the best option for maximum performance and lifespan of the ePOWER battery.



## 8 WARRANTY

Enerdrive ePOWER B-TEC Lithium Battery Warranty.

### 1 to 2 Year Limited Warranty

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.

The limited warranty program is the only one that applies to this unit, and it sets forth all the responsibilities of Enerdrive. There is no other warranty, other than those described herein. Any implied warranty of merchantability of fitness for a particular purpose on this unit is limited in duration to the duration of this warranty.

Enerdrive Pty Ltd warrants its ePOWER B-TEC Lithium battery (hereafter referred to as "Battery") to be free of defects in material and workmanship for the following Applicable Warranty Period:

- 1 year for, commercial & industrial applications in cycling and non-cycling applications.
- 2 years for, pleasure marine and automotive applications in cycling and non-cycling applications.
- An additional 24 months Pro-Rata warranty is included in the battery for pleasure marine and automotive applications. The pro-rated price is calculated as a percentage of the current suggested retail price. Pro-Rata warranty applicable to original end user only.

The battery is warranted, to the original purchaser only, to be free of defects in materials and workmanship for the stated warranty period above from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users other than OEM applications.

Enerdrive does not warrant the battery for use in any residential system sold with the intent or purpose of a "Tariff Adjustment Program" of any type.

The warranty does not cover a battery reaching its normal end of life which may occur prior to the warranty period stated above. Depending on the application a battery can reach its normal end of life before the end of the warranty period.

A battery can deliver only a fixed number of usable cycles / amp-hours over its lifetime and is considered to have reached its normal end of life if the application uses up all of these cycles / amp-hours, regardless of the time the battery has been in service. Therefore Enerdrive reserves the right to deny a warranty claim if it determines the battery to be at its normal end of life, even if the claim is lodged within the applicable warranty period.

By continuously tripping the low voltage disconnect of the B-TEC battery you may cause damage to sensitive electronic equipment that is attached to the battery. I.E battery chargers, solar controllers, inverters, stereo equipment etc, all of which are not covered under the battery warranty.

The Applicable Warranty Period begins from the date of purchase with original receipt, or, if no receipt is available, from Enerdrives invoice / shipping date. Batteries determined to meet the conditions of

# POWER B-TEC

this warranty will be repaired/replaced free of charge if, at the sole discretion of Enerdrive, adjustment is necessary due to defect in material or workmanship. Batteries for warranty repair/replacement consideration are to be returned to the original supplying distributor/dealer.

Batteries replaced under the warranty provisions will be shipped with a replacement warranty sticker and carry only the remainder of the original Applicable Warranty Period.

The battery is not designed or warranted in the following areas:

- The battery is not designed to parallel connect extra batteries to increase the overall capacity
- The battery is not designed to series connect extra batteries to increase the overall voltage
- The battery in not designed for Under bonnet applications or areas of high temperature >45°c
- The battery is NOT to be used for cranking or starting applications.
- The 100Ah & 125Ah battery is NOT to be used with an inverter greater than 1000W
- The 200Ah battery is NOT to be used with an inverter greater than 2000W
- The Battery is NOT to be used in any Aviation aircraft application.
- The Battery is NOT to be used in any lifesaving applications
- The Battery is NOT to be exported to USA/Canada and their territories
- Any residential system sold with the intent or purpose of a "Tariff Adjustment Program" of any type.

**PLEASE NOTE:** The battery has a self-discharge rate of 3% per month @ 25°C. The battery should not be left for more than 30 days without checking its charge state. Enerdrive recommend that a battery left in a "storage state" should be checked and charged when the battery capacity is low ( $\leq$ 15% SOC), or the voltage measures  $\leq$ 11.50V to maintain maximum life expectancy of the battery. Failure to follow these requirements will see an early failure of the battery which is not covered under warranty.



#### **General Provisions:**

Enerdrives Pty Ltd has no obligation under the limited warranty herein in the event the battery is damaged or destroyed as a result of one or more of the following:

- Willful abuse, misuse, physical damage, neglect or if the decorative cover has been removed.
- Natural forces such as wind, lightning, hail; damage due to fire, collision, explosion, vandalism, theft, penetration or opening of the battery case in any manner.
- The battery MUST be installed in an upright position. Installing it upside down or laid on its side will void warranty.
- Overcharging, undercharging, charging or installing in reverse polarity, improper maintenance, allowing the battery to be deeply discharged via a parasitic load or mishandling of the battery such as but not limited to using the terminals for lifting or carrying the battery.
- Charging sources that do not meet the charging specifications of the ePOWER B-TEC battery. Charging sources that have an automatic de-sulfation mode that cannot be turned off manually. Use of such chargers may damages the B-TEC battery and may not be covered under the battery's warranty.
- For applications where an alternator is present, the battery must be charged via a "DC-DC" battery charger with a maximum charge voltage/amperage within the battery specifications listed in the manual. Once the battery is full the charger must go to a "power supply" stage of ≤13.8v.
- Repair or attempted repair of the battery by anyone other than an authorized Enerdrive representative shall void this warranty.
- Normal or accelerated deterioration in the electrical qualities due to operating or application conditions.
- If the battery is used for an application that requires high cranking power or a greater reserve rating than the battery is designed to deliver, or the battery capacity is less than the battery capacity specified by the manufacturer, or the battery is otherwise used in applications for which it was not designed.
- Prolonged storage of the battery with either no charge or a parasitic consumption load applied lowering battery voltage to ≤11.2v with no periodic charging or disconnecting the battery to prevent irreversible damage to the battery.
- A battery with an open circuit voltage (OCV) ≤10.50V will be deemed as over discharged and void warranty due to misuse and/or neglect.
- WARNING Do NOT use any type of oil, organic solvent, alcohol, detergent, strong acids, strong alkalies, petroleum-based solvent or ammonia solution to clean the battery covers and end plates. These materials may cause permanent damage to the battery covers and end plates and will void the warranty.



#### **Return and/or Repair Policy**

If you are experiencing any problems with your unit, please contact our customer service department at support@enerdrive.com.au or Phone 1300 851 535 before returning product to retail store. After speaking to a customer service representative, if products are deemed non-working or malfunctioning, the product may be returned to the purchasing store within 30 days of original purchase. Any defective unit that is returned to Enerdrive within 30 days of the date of purchase will be replaced free of charge.

If such a unit is returned more than 30 days but less than the states warranty period, Enerdrive will repair the unit or, at its option, replace it, free of charge. If the unit is repaired, new or reconditioned replacement parts may be used, at manufacturer's option. A unit may be replaced with a new or reconditioned unit of the same or comparable design. The repaired or replaced unit will then be warranted under these terms for the remainder of the warranty period. The customer is responsible for the shipping charges on all returned items back to Enerdrive.

### Limitations

This warranty does not cover damage or defects resulting from normal wear and tear (including chips, scratches, abrasions, discolouration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorized use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, acts of god, fire and flood.

If your problem is not covered by this warranty, contact our Support Team at support@enerdrive.com. au or phone 1300 851 535 for general information if applicable.



## **NOTES:**



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