Installation and Operation Manual

Solar & Batteries Online

Solar & Batteries Online
ABN: 33 059 410 908
Jason Eldridge
0466 960 552
jason@solarbatteriesonline.com.au
www.solarbatteriesonline.com.au

Contents

Introduction 3

Safety 4

- Transportation 4
- Basic Safety 5
- Handling 5
- Damaged Battery 6
- Fire 6
- Qualified installation person (Installer) 6

Product Information 7

- Weight and Dimensions 7
- Specifications 8
- Charging and Discharging 9
- Location and Environment 9

Installation 10

- Battery Installation 10
  - *Power Cabinet* 11
  - *Wall Mount* 12
- Battery Connections 13
  - *Main DC Connections* 13
  - *Case Earthings* 14
  - *Alarm Contacts* 14

Operation 16

Troubleshooting 17

Maintenance 18

- Upgrading Battery Capacity 18

End of Life 19

Warranty 19

INTRODUCTION

The Eco Series Lithium Ferro Phosphate (LFP) battery by PowerPlus Energy was designed and manufactured in Australia for the worlds harshest conditions to be a simple, flexible and reliable energy storage solution. As a result the Eco Series batteries can be easily installed with most Inverter and charger combinations, UPS, Rectifiers, DC or AC coupled charging devices, on-grid and off-grid in single, Dual or three phase applications. There is almost no limitations in applications and suitable devices that can charge or discharge the Eco Series battery. Currently the Eco Series battery is available in a 48V model.

SAFETY

Installers and users are responsible for familiarising themselves with this manual.
The Eco Series batteries use a high grade Cylindrical Lithium Ferro Phosphate (LFP) cells which are robust and reliable in higher ambient temperatures, have a long service life and with no heavy metals are fully recyclable.

Each Eco Series battery has an internal Battery Management System (BMS) that provides protection against Over and Under Voltage, Over Current, Over Temperature and Short Circuit as well extended service life through managing cell string balancing.

Each battery has a 2 pole non polarised circuit breaker, status indicator light, volt free alarm contact and high quality Amphenol SurLok DC connections for safe and easy installation.

Installation should be by qualified and experienced installers who can specify the correct cables and DC bus arrangement, external circuit protection, polarity checking and suitability of the design for the installation.

Transportation

Lithium Ferro Phosphate Batteries are classed as Dangerous Goods (DG) Class 9 UN3480.
They are safe for road transport. The batteries are shipped in a partially discharged state with terminal protection and the circuit breaker off.

Basic Safety

The Following precautions should be observed:

- Battery should not be exposed to temperatures above or below the ambient temperature rating specified in this manual.
- Battery should not be installed in direct sunlight.
- Battery should not be exposed to strong impacts.
- Battery should not be crushed or punctured.
- Battery connectors should not touch conductive surfaces unless intended to do so.
- Battery should not be disassembled unless qualified to do so.
- Battery should not be touched if wet.
- Battery should be kept dry at all times.
- Battery should be kept away from animals and children.
- Battery pack should not be exposed to pressure or have objects stood on top of them.
- Battery pack is intended to be a 2 person lift when installing.

Handling

- Use Battery only as directed.
- The battery is non user serviceable and should not be opened for repair.
- Do not use the battery if it appears damaged or broken.
- Handle battery with care when installing or transporting.
- Do not use chemicals to clean the battery.

Damaged battery

A damaged battery should not be used and should be returned to PowerPlus Energy or disposed of via a recycling facility. Leaking electrolyte can cause skin irruption and chemical burns so contact should be avoided.

Eye Contact:	Rinse gently with running water. Seek medical attention if irritation develops.
Skin Contact:	Rinse gently with running water. Seek medical attention if irritation develops.
Ingestion:	If Ingested do not induce vomiting and contact you local poisons information centre or doctor.
Inhalation:	Evacuate area and seek professional medical attention immediately, however an inhalation hazard is not expected due to product form and nature of use

Fire

Should the battery pack catch on fire a dry agent fire extinguisher should be readily available and used. DO NOT use water. Evacuate the area and call emergency services. Toxic gas may be produced if the battery catches fire.

Note: Refer MSDS document for more details which is available from PowerPlus Energy's web page or upon request.

Qualified installation person (Installer)

This manual and task sets within regarding installation should be carried our by a suitable qualified and skilled person. The installer needs to be a person with adequate skills, qualifications and experience. They should:

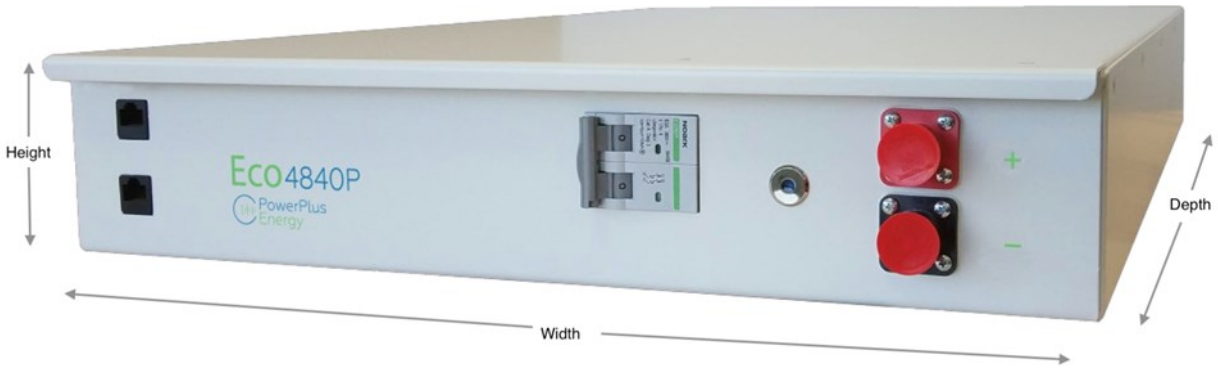
- Have a thorough understanding of operations, design and installation principles of On and Off Grid Electrical system.
- Have a thorough understanding of all dangers associated with installing and using electrical devices as well as all risks.
- Hold all local, state and country base qualifications to carry out such work.
- Adhere to all safety and installations requirements within this manual.

PRODUCT INFORMATION

The Technical information presented here within outlines the physical and electrical characteristics of the battery and what environment they should be installed in.

Weight and Dimensions

	Eco4840P
Depth	635mm
Width	434mm
Height	88mm
Weight	43kg



Specifications

	ECO4840P
Nominal DC Voltage	51.2V
Nominal Capacity	4.0kWh (3.994) / 78Ah
Continuous Charge / Discharge	0.5C (C2)
Continuous Charge / Discharge Current	39A
Maximum Current	63A (Limited by circuit breaker)
Charge / Discharge Cycles (80% Remaining Capacity)	2700@100% DoD / 5000@75% DoD / 10,000@50% DoD @25°C op. temp.
Operating Temperature Range	Charge: 0° to 55°C / Discharge -20° to 55°C
Operating Humidity (Non condensating)	85%
Altitude	Below 2000m
Battery Dimensions	635mm D x 434mm W x 88mm H
Battery Mounting Options	Standard 19" Rack Mounting / Horizontal or Vertical
Terminal Connections	Amphenol Surlok 100A Non Keyed
Module Weight	43kg
BMS Over-Volt cut off	58.4V
BMS Under-Volt cut off	40V
BMS Over-Temp cut off	65°C
BMS Under-Temp Cut off (Discharge	-20°C
BMS Under-Temp cut off (Charge)	0°C
BMS Fault Current	200A
Circuit Breaker	2-Pole 63A 360VDC (K Curve)
Self Discharge	14% Per Annum
Battery Fault Current (BMS plus Circuit breaker failure)	1000A
Lithium Composition	Lithium Ferro Phosphate (LiFePO4 or LFP)
IP Rating	IP40
Round Trip Efficiency	>96%
Expected Life @25°C	Greater than 10 years when used as per warranty terms
Cooling	Natural convection
Parallel Stacking	Infinitely stackable - Seek Manufacturers advice
Serial Stacking	Not designed for serial connection
Certifications	Pending IEC:62619:2017, UN38.3, EMC

Charging and Discharging

The battery should be charged and discharged within the operating temperature windows as outlined within the specifications and as indicated in the Charge Discharge table below. All currents are maximum global charging and currents and should be taken into consideration when multiple devices are charging the battery. SoC control should be used when maintaining charging and discharging of the battery for full warranty coverage.

	ECO4840P
Shut Down SoC (Per Warranty)	20%
DC Volts Shut Down 0% Load	48.0V
DC Volts Shut Down 100% Load	46.0V
Recovery / Restart Voltage	52V
Continuous Charge Voltage (Per Warranty)	56.0V
Float Voltage	55.2V
Peukert Exponent	1.02
100% recharge	7 to 14 days to keep External SoC counter accurate
Continuous Discharge Current	39A
Continuous Charge Current	39A
Cable Size	Refer relevant manual or cable sizing standard
Note	In our efforts towards constant product enhancement this specification is subject to change to at anytime without notice

Location and Environment

The Location of the battery should be in accordance with the IP rating and operating temperature range specified in the Specification section of this manual. Even though the batteries operate at a low temperature, it is preferred that adequate airflow around the batteries is provided.

The location of the batteries should meet the below conditions

- The Location if far way from the ocean/sea. If unavoidable appropriate air filtration is used to prevent salt air contacting the battery
- The Floor is level and free from obstructions
- There are no explosive or flammable materials nearby
- The optimal ambient temperature is between 0 and 45□C
- Operation of charge and discharge outside of the optimal ambient temperature should be limited to C5 and still remain between the max and min operation temperature range as specified in this manual.
- The temperature and humidity remains constant
- The area is of a clean environment with minimal dust
- The batteries and battery cabinets/housings are not exposed to direct sunlight

The Eco Series battery is designed to be installed in a 19inch data rack assembly or an electrical enclosure of your choice. If the battery is to be installed outdoors a suitable IP54 or above enclosure shall be used.

INSTALLATION

Installation should be carefully considered and all aspects of the specifications should be considered to determine a suitable location and way of installing the battery.

Battery Installation

The battery has been designed to fit into a standard 19inch rack enclosure. If you are building your own enclosure then it can be fitted with PowerPlus Energy's battery rails or similar to ensure stability and correct installation. Battery rails can be sourced from you normal PowerPlus Energy place of purchase.
If the battery is installed in to enclosures without rails, please ensure that they are securely seated to prevent accidental damage or tampering.

	Part number
Rack Mount battery rails (pair)	2149019

Power Cabinet

PowerPlus Energy provides a range of mounting options to make your installation easier. These come supplied with all battery mounting rails, battery cable interconnects and easy bus bar connection for to your main DC cable.

Note: M8 Nickel plated connection bolt for connecting Main DC cable to cabinet bus bar not included

	Part Number
IP21 Indoor 8 Battery Cabinet	PIR8C
IP21 Indoor 10 Battery Cabinet	PiR10C
IP21 Indoor 12 Battery Cabinet	PIR12C
IP21 Indoor 18 Battery Cabinet	PIR18C
IP21 Indoor 20 Battery Cabinet	PIR20C
IP55 Outdoor 16 Battery Cabinet	POR16C

Wall Mount

Other ways of mounting the battery is to stand then up right or on their edge in an electrical enclosure. This can be achieved by manufacturing your own solution or buying a PowerPlus Energy enclosure available from you normal place of purchase

Note: M8 Nickel plated connection bolt for connecting Main DC cable to cabinet bus bar not included

	Part number
3 battery IP66 Wall mount battery enclosure	PEW3

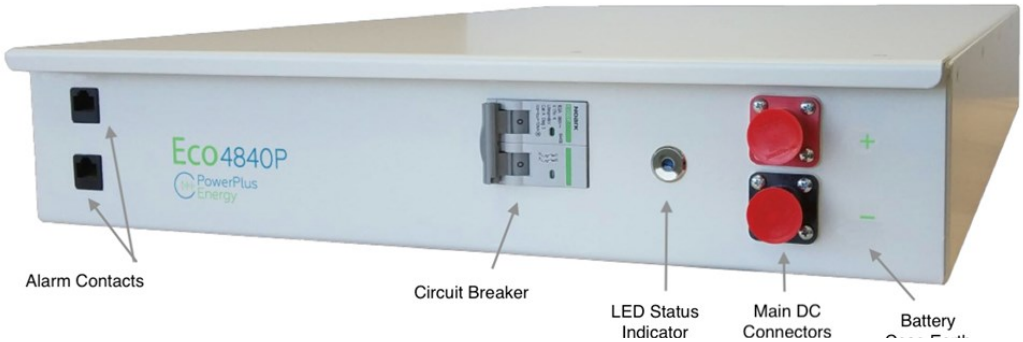
Note: The battery can be laid flat on its Bottom or on its side or end. The battery must not be laid upside down or on its face.

Battery Connections

Each battery has a positive and negative Amphenol SurLok non keyed male connector for easy snap on connection. A range of cable and mating connectors are available from you normal PowerPlus Energy place of purchase.

Main DC Connections

The battery comes fitted with Amphenol Surlok connectors (non Keyed) Male connectors. The table below outlines the battery connections and the mating cable connector required. Before connecting the DC cable you will need to remove the safety insulating cap on the connectors and dispose of appropriately .



	Battery	Cable
Positive connection	SLPRATPSR	SLPPA16BSR
Negative Connection	SLPRATPSB	SLPPA16BSB

Case Earthing

The Eco Series battery has an M6 nutsert to allow case earthing should your application require grounding of case to the same potential across the application.

Alarm Contacts

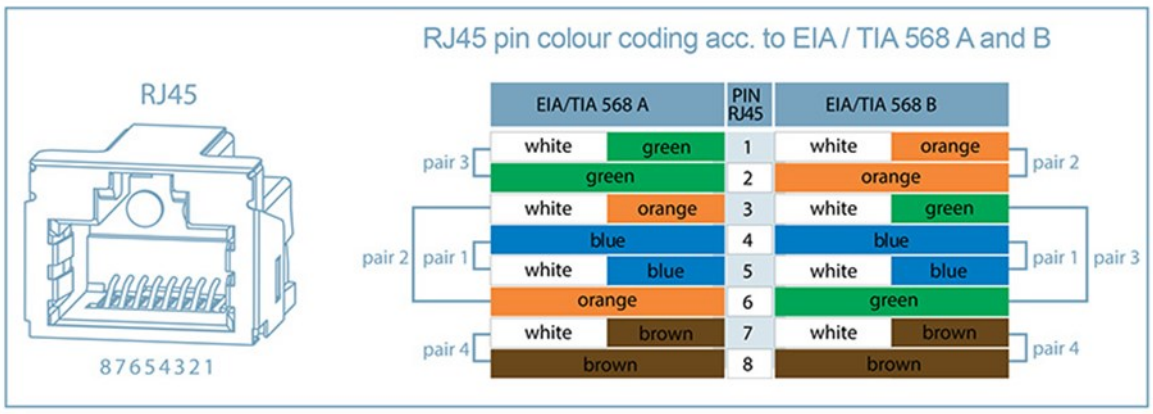
The battery provides the ability to alarm the system manager or user that there has been a loss of power to a battery or batteries. Loss of power to the battery or batteries could be either a circuit breaker or BMS trip. BMS trip will self rest, however a battery circuit breaker will need manual intervention.

The alarm contacts can be daisy chained to produce one alarm output or can be wired individually.

The connectors are an RJ45 style female connector. The alarm output uses pin 5 and 6 and provide and Volt free contact.

The Alarm output is normally closed when energised by the battery (battery is ON and LED illuminated). When or if the battery turns OFF (circuit breaker or BMS trip and LED off) the contact will open.

The Alarm outputs are designed to be daisy chained connecting the top RJ45 form one battery to the bottom RJ45 of the next and so on. The battery at the beginning of the chain will need to the have pins 5 and 6 bridged on the bottom RJ45 terminals, and battery at the end of the chain can be connected to an appropriate alarming circuit.



A range of cable and mating connectors are available from you normal PowerPlus Energy place of purchase.

	Cable
Battery daisy chain connector lead (30cm)	COM0030A
Battery Alarm Bridge connector	COMLBA
Battery to Alarming circuit cable (2 Metre)	COM020A
Battery to Alarming circuit cable (5 Metre)	COM050A
Battery to Alarming circuit cable (10 Metre)	COM100A
Battery to Alarming circuit cable (15Metre)	COM150A

OPERATION

Now that you have installed the batteries you are almost ready to turn the battery on. First you should check your installations to ensure the below:

- Check polarity of all battery connection to be correct
- Check that there is no damage to cables
- Check that all system breakers are in the off position
- Check for adequate air flow
- Check for local installation compliance

Starting up the battery system should be done in conjunction with the inverter manufactures recommendations as well any local or government, or safety requirements

Each battery in the system is powered up separately by turning the double pole breaker to the ON position. Once powered up voltage will be present at the DC terminals and the LED lights will glow blue

TROUBLESHOOTING

The Eco Series battery is designed as a lead acid replacement energy storage solution to work with most systems. Due to the higher energy density of Lithium batteries compared to lead acid batteries, as well as utilising the settings and protections built into the ancillary equipment, the Lithium batteries have a built in BMS. The BMS only activates when the operation of the battery is outside of the limits of the battery. During normal operation there will be a voltage across the terminals of the batteries. If the BMS activates its protection circuit, once the fault is cleared the battery should restart with out external assistance. The scenario where this may not occur is on low volt disconnect and the attached charging circuit requires a voltage on the battery to restart. In this instance the battery circuit breaker will need to be turned off and on again to wake the BMS up and in rare circumstances a battery charger applied to the terminals for a few moments to wake the battery up.

MAINTENANCE

The Battery system should be checked regularly as part of your system maintenance cycle. Some basic checks to carry out are:

- Check for any obstruction placed around the battery.
- Check for animals, insects or creatures nesting in or around the battery solution.
- Check for build up of any foreign objects in or around the cabinet.
- Check battery connections and cables for secure fitting or damage.
- Check breakers by turning them off then on again.
- Check LED indicators

Upgrading battery capacity

It is possible to add additional batteries to an existing Eco Series installation at a later date. If you are to add extra capacity the battery must be of the same type, part number, and specification.

Before adding the new battery the original battery bank and the new battery must be bought up to the same voltage. This is achieved by fully discharging and recharging both the new battery and the existing battery separately before combining them into the same battery system

END OF LIFE

The Eco Series batteries can be returned to Powerplus Energy for recycling or you nearest recycling centre. No heavy metals are used and it is approximately 96% recyclable.

WARRANTY

PowerPlus Energy will protect this product under warranty when it is installed as set out in this manual and used as set out in the warranty documents. Any product not being used or installed as outlined will be in violation of the terms and will render the product void of any warranty.

PowerPlus Energy does not cover warranty or any liability for damages or defects caused or from the following:

- Incorrect storage or transportation
- Incorrect installation and wiring
- Installed not according to this manual
- Incorrect operation
- Inappropriate environmental conditions when operating the battery
- Failure to follow safety requirements
- Tampering of the battery
- Unauthorised repairs or modifications
- External influences such as physical damage, over charging or electrical damage
- Used outside of warranty terms and conditions

PowerPlus Energy

+61 3 8797 5557
4, 21 Power Road, Bayswater Vic 3153
PO Box 4407, Knox City, VIC 3152
info@powerplus-energy.com.au