

12V 314Ah Battery Product Manual

Introduction

The MPS-12V-314 is a robust, high power LFP energy storage solution that can be used in a wide range of applications from automotive to industrial.

Bluetooth connectivity enables quick checking of state of charge and adds the ability to monitor performance.

Flexible mounting solutions and a high strength 3mm seam welded aluminium case provide simple, strong options for permanently and temporarily situating the battery.

The battery has been designed and made in Australia to suit Australian conditions to ensure maximum performance over a long service life.

Simplicity of installation and maintenance was a priority in the design process.

Mictronix Power Systems (MPS) strives to manufacture as much of the battery module in Australia as possible, feeding money back into the local economy.



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Safety

Designers and installers must have a detailed understanding of this manual before undertaking any work involving the battery module. They must also be qualified to carry out the installation of the battery module(s) in the intended geographical region.

Battery charging, discharging and storage specifications must be followed at all times.

The battery has a high quality, calibrated Battery Management System (BMS) that protects from electrical fault conditions including cell imbalance, cell over voltage, cell under voltage, discharge over temperature, discharge under temperature, charge over temperature, charge under temperature, discharge over current, charge over current and short circuit protection. Protection values can be found in the specifications table of this manual. Any connected equipment (e.g. inverter, MPPT or PCE) must be capable of safely withstanding sudden disconnection of the battery – as the BMS may isolate the battery to prevent the above conditions causing damage. Correct installation and configuration of connected equipment will help to prevent this scenario.

Four 200A bolt on connectors (2 x red/positive and 2 x black/negative) are supplied for the purpose of attaching connected equipment. Attention must be paid to colour and polarity. To draw the maximum 300A from the battery, multiple connections of large gauge cable must be used across all available terminals. Excessive current draw through one connector may damage the terminal, cable and battery.

The battery uses AA grade LiFePO₄ prismatic cells that have been graded/grouped according to capacity and internal resistance. Each cell has a built-in safety over pressure release valve.

Key Safety Points

The battery module:

- Must be kept dry until installed
- Must not be pressure washed or hosed down
- Must not be exposed to salt spray
- Must not be installed in direct, sustained sunlight
- Must not be exposed to extreme vibration or ongoing movement
- Must not be installed if damaged in any way, including if crushed, punctured or if any defects are observed.
- Must be removed from service and placed in a safe area if damaged
- Must be installed and serviced by a qualified person following required precautions
- Must not be opened or disassembled
- Must not be connected with reverse or incorrect polarity
- Must not be exposed to temperatures beyond those described in the specifications section of this manual.
- Must not be overcharged, over-discharged or connected to equipment that may cause over current conditions.

Transportation

- LFP or LiFePO4 batteries are classified as Dangerous Goods (DG) Class 9 UN3480.
- Road and sea transport are the designated methods of transport.
- The battery modules are shipped and at approximately 50% state of charge.
- Local shipping labels and regulations must be met.
- Material Safety Data Sheet (MSDS) can be requested from Mictronix Power Systems.
- The battery modules should not be placed upside down at any time.

Storage

The battery modules are shipped at a reduced state of charge. It is recommended to charge the battery every 6 months to approximately 90% SOC if in storage.

The battery module should not be stored in a fully discharged state. Upon accidental full discharge, the battery must be recharged within 2 weeks.

Handling



- The battery weighs more than 30KG. Individuals should assess their ability and preparedness to move the battery module before attempting to do so.
- Suitably rated lifting and manual handling hardware must be used to assist in transport, movement and installation.
- Safe work practices should be followed during transportation, movement and installation.
- Ensure a clear path is available before moving the battery.
- The battery module's centre of gravity is not at the centre of the chassis.

Damaged Battery

Damaged battery modules must not be used. Please contact Mictronix Power Systems or a local recycling facility for disposal.

Contact with leaking battery electrolytes must be avoided as it can cause skin irritation and burns.

First Aid

Eyes

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical aid immediately.

Skin

Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Seek medical aid immediately.

Inhalation

Cease exposure and move to fresh air immediately. Use oxygen if available. Seek medical aid immediately.

Ingestion

Do not induce vomiting or give food or drink. Seek medical attention immediately.

Fire

- Call 000 or your local emergency service for assistance.
- For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.
- The internal cells may vent when subjected to excessive heat, exposing the battery contents.
- Toxic and flammable fumes may be released in the event of a fire. Fumes must be avoided. Keep people, pets and livestock clear of any substances released from the cells.
- Material Safety Data Sheet (MSDS) can be requested from Mictronix Power Systems.

What's In The Box

1 x MPS-12V-314Ah Battery with cover guards & M8 bolts



4 x angle mounting brackets and
4 x M10 bolts for fixing
bracket to battery



MPS-12V-314 Specifications

Weight And Dimensions

Depth	500mm
Width	238mm
Height	238mm
Weight	31kg



Model Number	MPS-12-314
Nominal Voltage	12.8 V
Nominal Capacity	314 Ah
Nominal Capacity watt hours	4.02 kWh
Cell type	Prismatic
Cell Configuration	1P 4S
Cycle Life 100% DOD @ 25 degrees C	8,000 Cycles
Cycle Life 90% DOD @ 25 degrees C	≥8,800 Cycles
Cycle Life 100% DOD @ 45 degrees C	≥4,000 Cycles
Capacity @ 0°C	282 Ah
Capacity @ 10°C	299 Ah
Capacity @ 55°C	314 Ah
Series connection	Not permitted
Parallel connection	Unlimited - Contact Mictronix
Depth of discharge	95%
Depth of discharge for maximum life	90%
Usable capacity	3.82 kWh
Battery Charging Temperature range. Protected via internal BMS	2 - 55°C
Battery output voltage range	11.6 V – 14.4 V
Maximum discharge current	400A @ 25°C for 10 seconds
Continuous discharge current	300A @ 25°C
Pulse discharge current	450A @ 25°C for 1 sec
Maximum discharge power	5.12 Kw @ 25°C for 10 seconds
Continuous discharge power	4.0 Kw @ 25°C
Pulse discharge power	5.76 Kw @ 25°C for 1 second
Charging Temperature range	2°C - 55°C
Discharging Temperature range	-20°C - 60°C
Short circuit protection	2000A for 300us
Balancing type	Active balancing >3.4V per cell
Electrical connection type	M8 Bolted connection (200A rated per connection)
Cooling method	Natural convection
Casing material	Aluminium
IP rating	IP54
Maximum altitude	2000M
Humidity Range	≤ 99% RH
Self-discharge Rate	≤ 3% Per Month

Warranty period	5 years, refer to MPS warranty statement
Certifications (cell level)	GB/UN38.3, IEC62619, UL9540A

Installation

This manual should be followed for correct installation of the battery.

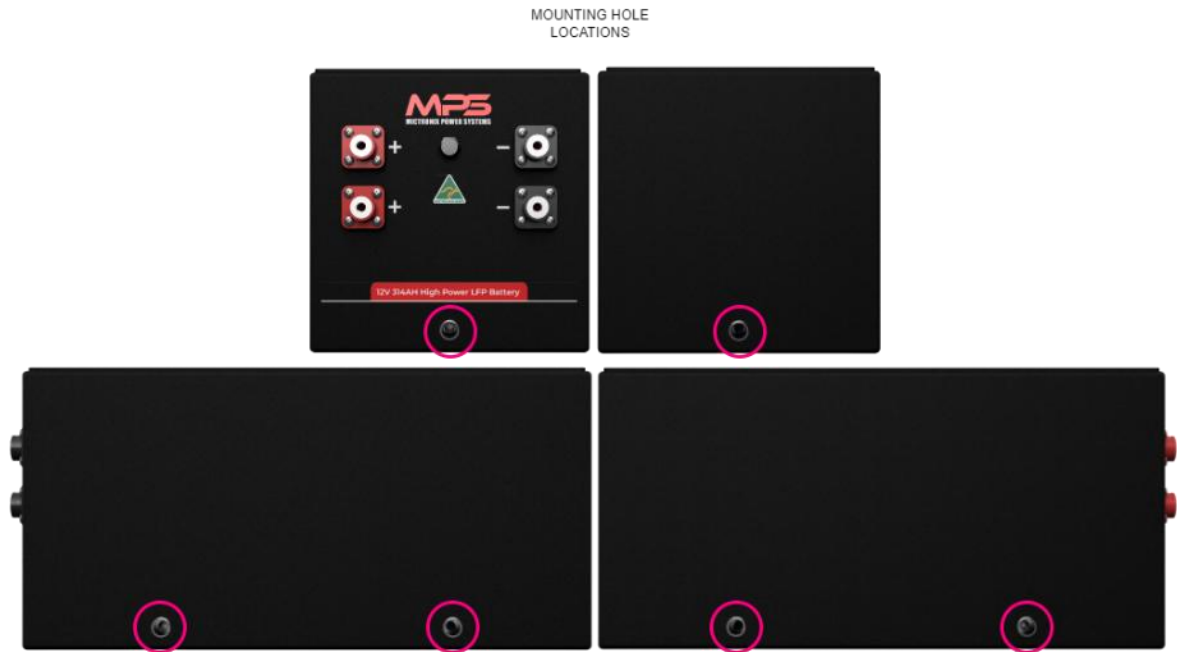
Bracket Mounting

The battery has 6 x M10 threaded inserts around the perimeter that can be used to mount the battery. It is recommended to bolt the battery to a solid surface to reduce the risk of the battery moving after installation. The thread is an M10 sealed nut insert with a depth of approximately 20mm. Care should be taken to avoid damaging the nut insert by bottoming out the bolt or by applying torque in excess of 25Nm.

Example mounting to a timber surface using supplied brackets



Mounting Threaded Insert Locations

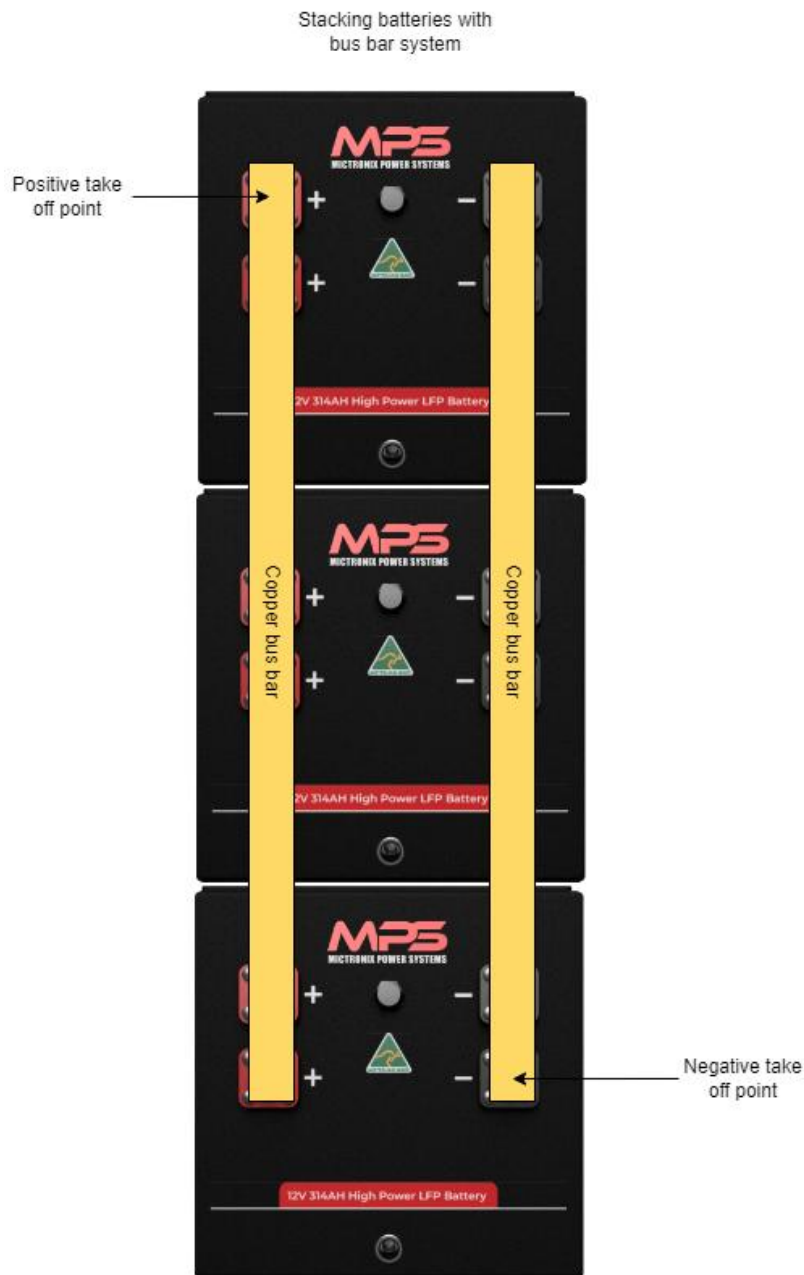


Parallel Stacking of Multiple Batteries

The battery modules are designed to mount in both the horizontal and vertical positions. The battery modules can be stacked on top of each other to a maximum of 3 high. It is recommended to place rubber between the modules to dampen vibrations, limit surface damage and to stop slippage.

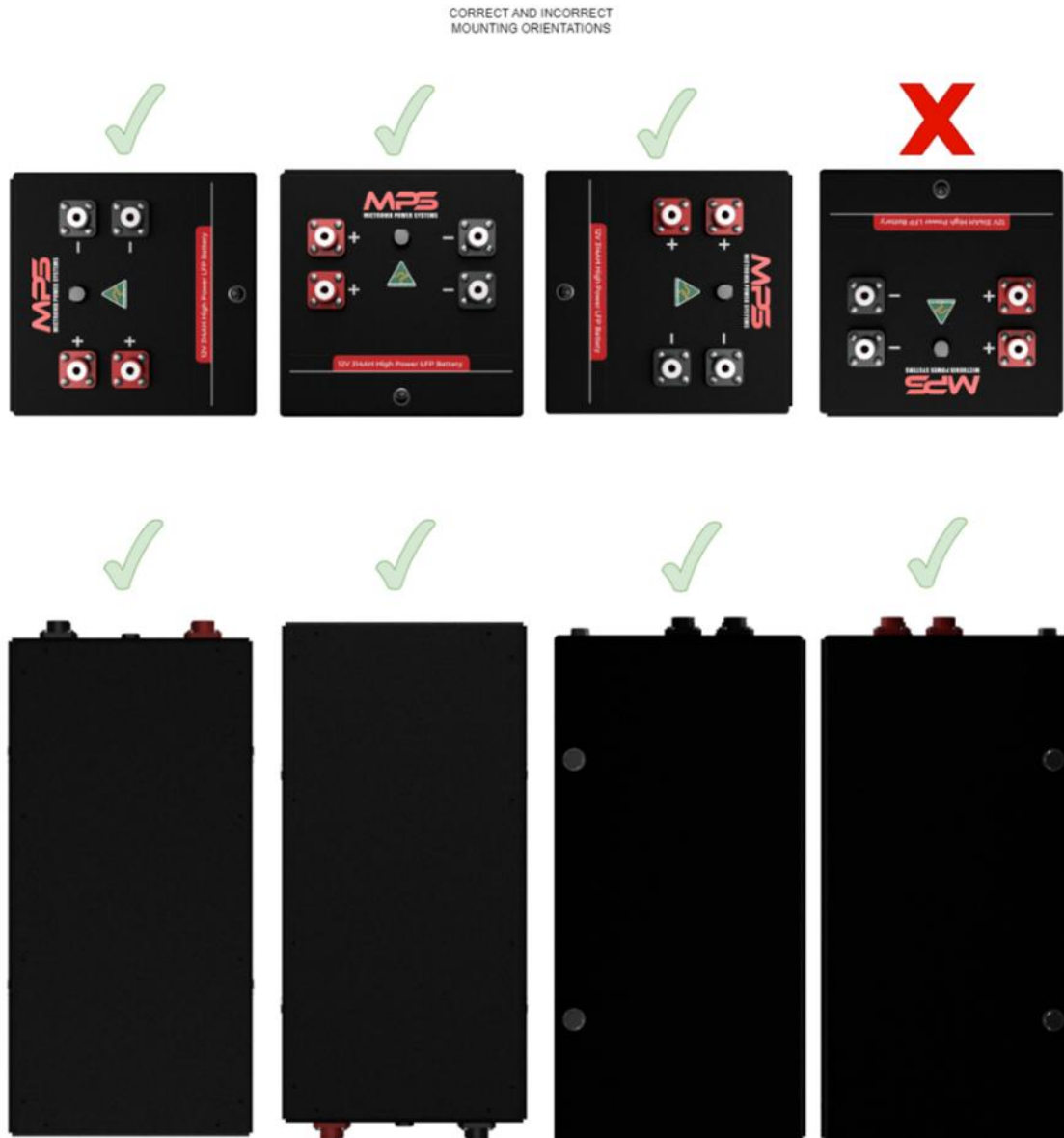
Electrical connections between each battery must be rated to carry the full combined current of the system, and must be insulated between connection points.

The positive and negative take off points must be located at opposite ends of the bus bars to closely match resistance and current across the parallel system (see below).



Permitted Mounting Orientation

The battery module may be mounted in many different positions. Please follow the below guidelines, noting incorrect orientations.



Temperature

Temperature has a dramatic effect on the life of LiFePO₄ batteries. Minimum and maximum temperatures are documented in the specifications section of this manual and must be adhered to.

Sustained high temperature operation (above 35°C) will significantly shorten the life span of the battery module.

High charge and discharge rates will increase the internal temperature of the battery.

Low temperatures limit the discharge power and storage capacity of the battery module. This effect is removed once nominal operating temperatures are achieved and is not permanent.

The internal battery management system continuously checks cell temperatures. If an over-temperature event is reached, the BMS will not allow discharging. If an under-temperature event is reached, the BMS will not allow charging. Charging and discharging will resume automatically when normal operating temperature is resumed. Temperature set points can be found in the specifications table of this manual.

When the temperature of the battery module is below 12 degrees Celsius, charging should be limited to less than 0.3C (94.2A).

Charge And Discharge Settings

The battery can be charged from a variety of sources including solar, DC-DC converters, inverter chargers, and regular 230V battery chargers. Lithium profile should be used where possible and temperature compensation disabled. Consult the manual of your charger for proper configuration when used with LiFePO₄ batteries.

When configuring the charger, ensure all voltage and current options are set within limits defined in the battery specifications table of this document. The built-in battery management system (BMS) helps to protect the cells from abnormal or unsafe charging conditions, however it should be considered a last resort, and should **not** be used to regulate or limit normal battery charge and discharge cycles.

The battery must regularly reach full state of charge and at least 13.8V to maintain proper balance between the built-in cells.

Consult www.mictronix.com.au for the latest charger settings guides

Location

The battery may be located indoors or outdoors.

Local regulations and standards should be followed when determining a suitable mounting location for the battery module. Direct, sustained sunlight should be avoided as the associated heat will degrade performance and lifespan of the battery module.

The battery module must **not** be located:

- In habitable or living areas.
- In areas subject to other environmental risks or extremes, such as excessive heat, humidity, high seismic activity, in the presence of hazardous chemicals, dust or flammable substances.

Salt spray in coastal locations should be avoided to prevent corrosion.

Suitable vermin and pest protection should be applied according to local conditions.

For maximum life in climate-controlled rooms, the cooling/heating system can be set at 25 degrees Celsius.

Under normal conditions and as part of regular cycling, the battery does not generate hazardous gases or fumes. In the event of a serious malfunction or cell failure, the cells are designed to vent excess gases and vapours generated by the fault. These emissions are toxic and flammable. If the battery is located inside a room, building or enclosed space:

- The room or enclosure must be capable of containing the fumes, gases or vapours until they are completely vented to the outside.
- Any emitted gasses or vapours must not be permitted to accumulate indefinitely – natural ventilation to the outside environment must allow dissipation of any substance vented from the battery module, including those heavier than air.
- Any emitted substances must not be permitted to dissipate or discharge directly into living or habitable areas.

Main DC Connections

The battery module is equipped with positive (red) and negative (black) bolted terminals. The connectors deliver and receive power to and from the connected equipment.

The connectors have clip on covers which should be attached to ensure no foreign objects can contact any live conductors.

M8 x 16mm bolts with spring washers and flat washers are used to connect power cables. These should be torqued to 19 Nm and not over tightened to avoid stripping. If bus bars or multiple lugs are used, longer bolts may need to be sourced.

Series connections i.e. positive to negative connections, are strictly prohibited.

Multiple take offs can be used and bridged to increase the discharge capability and capacity of batteries in parallel. Take offs should be connected on opposite ends, and be of matching length and cross-sectional area to allow the battery module to discharge evenly by reducing circulating currents.

Cable and connector sizes should be maximized to reduce voltage drop and DC ripple. Undersized or smaller cables can cause excess heating and ripple current, leading to inverter faults, and premature failure of capacitors in the inverter or power conversion equipment.

A minimum of 35MM² copper cabling from each terminal is required to operate an individual battery at its rated input and output current. Cable thickness should be increased when cable lengths are longer than 1 metre to minimise voltage drop.



All connections and disconnections must occur while DC circuits are isolated and de-energised. Never disconnect the battery module while charging or under load.

Earthing

When case earthing is required, any of the M10 fixing points can be used to fix an appropriately lugged bonding cable to the battery.

It is the installers responsibility to meet local regulations when determining earth size and placement.

Adding Batteries With Different States Of Charge

Care should be taken if batteries with differing states of charge are connected to each other. Each battery should be taken to approximately 50% state of charge when being connected in parallel for the first time. The battery is shipped at approximately 50% state of charge.

Commissioning

The following guide can be printed and checked off as part of installation:

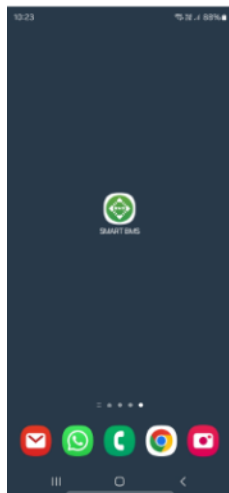
- Install batteries to final location complying with all requirements in this manual as determined by relevant local authorities.
- Ensure battery is mounted firmly in place and bolts meet torque specifications detailed in this manual.
- Ensure battery cabling and connections are rated and sized correctly.
- Ensure cable lugs are crimped according to manufacturer specifications.
- Ensure suitably rated fusing and or circuit breakers are installed.
- Check and test all circuit connections for polarity and tighten all terminals.
- Check connected power conversion equipment is set to manufacturer specifications and is ready for voltage to be applied.
- Engage circuit breakers and or fuses.
- Commission all power conversion equipment based on the requirements in this manual and charger settings guides.
- Using a DC clamp meter and or the Bluetooth app, measure the current flow into and out of each battery module, ensuring even current flow.
- Allow the system to reach the float charging state and test actual battery voltages vs setpoints programmed into the power conversion equipment.

Monitoring Using the Bluetooth Application

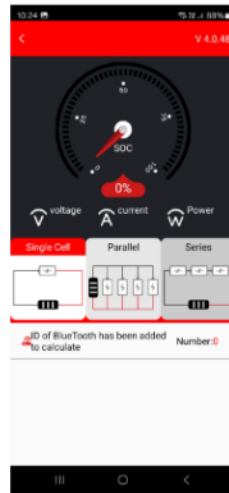
Connecting a Single Battery

Monitoring may not work if the **SMART BMS** application and phone operating system are not up to date. Permissions must be granted, and Bluetooth needs to be switched on for the application to work correctly.

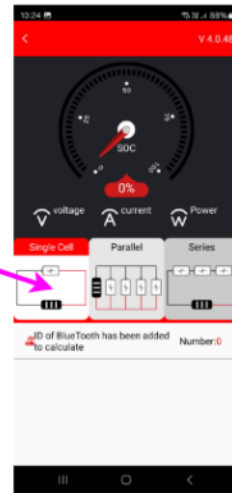
1. Download the smart BMS app from the app store or play store



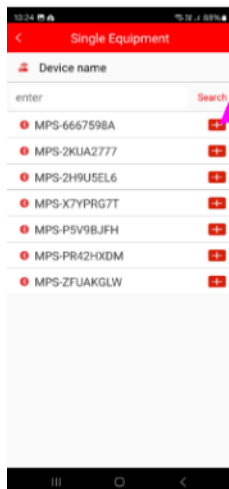
2. Open the app making sure bluetooth is on and permissions are granted



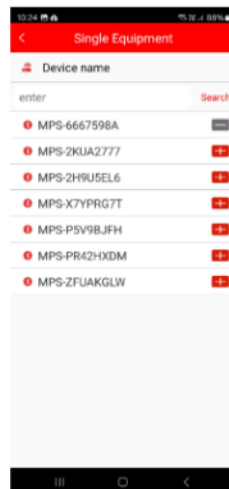
3. For a single battery, press the single cell option



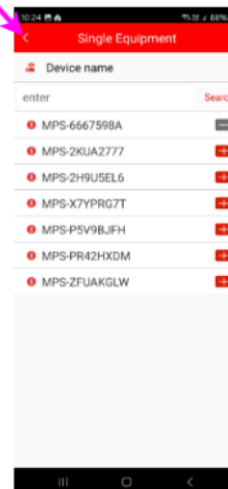
4. Select the serial number that matches your battery. The serial number is located on the side of the battery



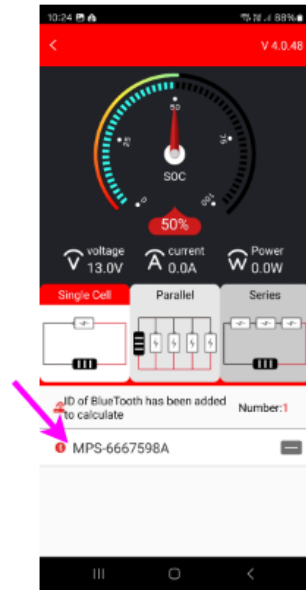
5. Once selected, the + will turn to a - This means you are connected to the battery



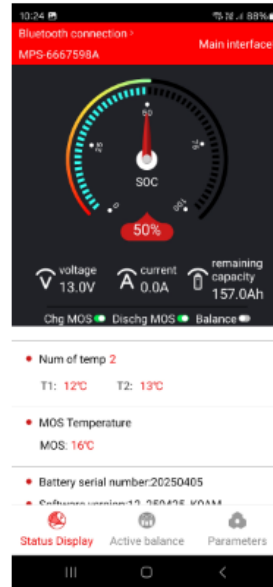
6. Press the < to return to the main screen



7. The screen will show a main overview of the battery. Press the battery serial number to see more detailed information

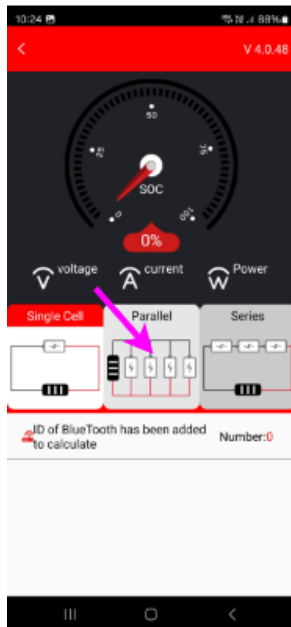


8. Screen showing more detailed information

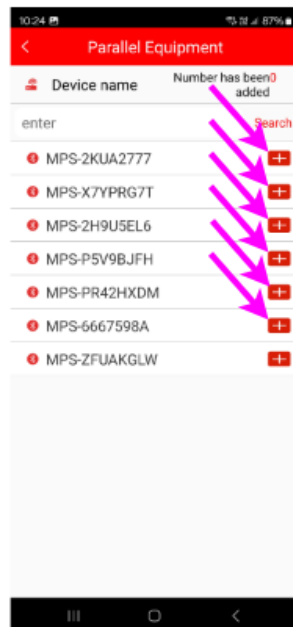


Connecting Multiple Batteries

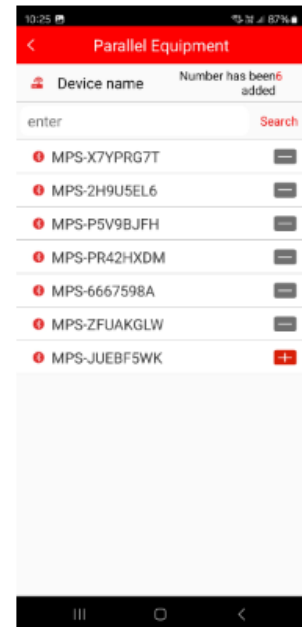
1. To add more than one battery press the parallel button. There is a 6 battery limit



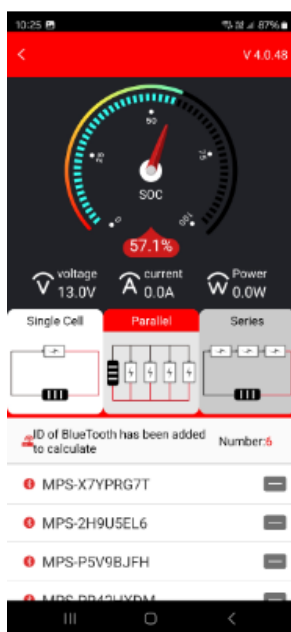
2. Select which batteries you would like to add by pressing the + button



3. Selected batteries will turn to a - Press the < arrow to return to the main menu



4. After adding all batteries. The total state of charge will be shown.



5. You can click on individual batteries to see more detailed information



Maintenance

The battery is designed with minimal maintenance requirements ensuring maximum reliability and trouble-free operation. The below items should be checked (and remediated, if required) at least annually as part of a regular maintenance program:

- If any alert or warning indicators are present in the Bluetooth monitoring app.
- If terminal bolts are torqued to specification and there are no signs of hot joints.
- If there are any signs of damaged or decaying cabling.
- The presence or indicators of any physical damage or deterioration including (but not limited to) cracks, leaks, dents, impact marks, fraying, tearing, warping, swelling, discolouration, corrosion or thermal indicators.
- If the battery and connected equipment is securely mounted and safely positioned.
- If connected equipment is configured to operate only within the battery module's specification, including maximum charge current, discharge current, upper voltage, lower voltage limits and state of charge limits.
- If any connected equipment has active alert or warning indicators.
- If electrical installation and safety standards have been met.
- Whether the battery has been, or appears to have been exposed to water, excessive dust, condensing humidity, extreme temperatures, vermin, power surge or lightning strike.
- Whether the battery BMS is active and in good working condition.

Monitoring using the Bluetooth app is recommended where possible to aid in preventative maintenance and ongoing reliability.

Disposal

The battery module has been designed for ease of recycling at its end of life. 98% of the battery by weight can be recycled and has been assembled in a way that the module can be easily broken down into its individual components. A suitable recycling facility should be used if disposal of the battery module is required.

Before disposal it is recommended the battery module be reused in low demand applications at reduced performance levels.

CAUTION: Do not dispose of batteries or cells in a fire. The batteries may explode.

Warranty

Please refer to the warranty statement at www.mictronix.com.au