



LITHIUM

// 12.8V BATTERY RANGE

POWERFUL, RELIABLE, SAFE

Made from the highest quality LiFePO₄,
complete with cell and safety certifications



USER MANUAL



Distributed by: Supercharge Batteries
1300 288 888 // supercharge.com.au

READ FIRST

Please read through this User Manual to ensure proper use of your AmpTech Lithium Battery. Additional information such as the full product line up, Material Safety Data Sheet (SDS), and Technical Data Sheet are available on the Supercharge website.

Australia: supercharge.com.au/ranges/lithium

New Zealand: superchargebatteries.co.nz/ranges/lithium

For further questions about the battery, please contact Supercharge Batteries via the website. supercharge.com.au/contact-us (AU) or superchargebatteries.co.nz/contact-us (NZ)

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1. Introduction

1.1. Description

AmpTech Lithium is meant to be used for all types of deep cycle applications, with different sizes available for recreational, stationary, and industrial applications. This includes caravans, campers, 4WDs, solar, uninterruptible power supply (UPS), golf carts, lifting equipment and more.

Among all lithium-ion battery compositions, Lithium Ferrous Phosphate (LFP), the technology used in AmpTech Lithium, has one of the highest energy densities by weight and volume. In addition, LFP is the safest in the market due to its ionic level reactions. These batteries offer better performance, especially at higher temperatures and high vibration environments. They are also equipped with an internal Battery Management System (BMS) to monitor, protect, and maintain each cell module.

1.2. Terminologies

V – Voltage

A – Ampere

OCV – Open Circuit Voltage

Ah – Capacity, Ampere Hour

SOC – State of Charge

DOD – Depth of Discharge

BMS – Battery Management System

LFP– Lithium Ferrous Phosphate (LiFePO₄)

BT – Bluetooth

None-BT – None Bluetooth

1.3. Certifications

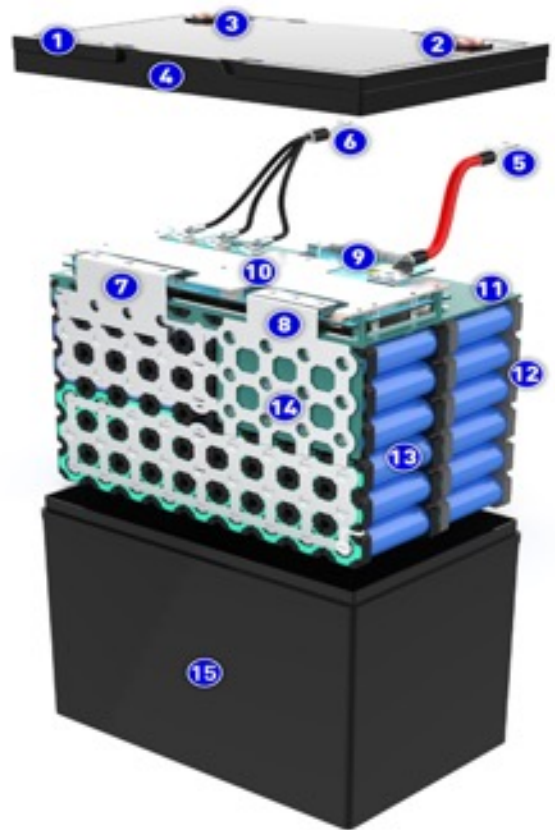
AmpTech Lithium batteries are of high quality and are certified to be safe for use on different applications.

Certifications	Description	Tests Covered
UN38.3	UN standard for safe transport of lithium batteries (reduced risk of explosion/fire during use & related injuries)	External Short, Abnormal Charging, Forced Discharging, Impact & Shock, Vibration, Thermal Cycling, Altitude Simulation
UL1642	UL standard for safety	Heating and Fire Exposure
IEC62133	Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications	Charging, Free Fall/Drop, Thermal abuse, Crush, Forced discharge, External short circuit, Forced internal short circuit
IEC62619	Safety requirements for secondary lithium cells and batteries, for use in industrial applications	External short circuit, Impact, Drop, Thermal abuse, Over-charge, Forced discharge, Internal short-circuit
ROHS	Restriction of Hazardous Substances	Safe battery chemistry - no Cobalt
ISO 9001, 14001, and 4500	Quality, Environmental, Occupational Health & Safety (OHS) Management System	Assurance of manufacturing factory for production of high-quality lithium batteries

Components & Construction

(Example of ATLS12-100BT shown)

1. Handle
2. Positive terminal
3. Negative terminal
4. ABS Top Cover
5. P+ SC25-8 positive
6. P- SC25-8 negative
7. B- Negative copper-nickel composite tape
8. B+ Positive copper-nickel composite tape
9. Bluetooth module
10. BMS
11. BMS fixed bracket
12. Molded plastic cell holder
13. Cylindrical cells
14. Positive ABS Insulator
15. ABS Battery case



1.4. Components & Construction

A single LFP battery has a nominal voltage of 12.8V, and it is composed of 4 sets of cells, each with 3.2V. For the given example above (ATLS12-100-BT) the nickel sheets are ultrasonically welded on each cell for a more secure connection. In addition, ABS Plastic is used for the case and cover for added reliability and protection against shock and vibrations. Moreover, the case used is IP65 rated, guaranteed to protect against ingress of dust and moisture.

Ex. for a 12.8V, 100Ah battery

- »»»» 4 sets of cells connected in series, and within each set of cells are 25 individual cylindrical cells connected in parallel, for a total of 100 cylindrical cells
- »»»» 4(S) @ 3.2V x 25(P) @100Ah = 12.8V, 100Ah

1.5 Battery Management System

All LFP batteries are equipped with a built-in Battery Management System (BMS). Its main purpose is to monitor, protect, and ensure the balance of each cell module. It provides circuit protection from over-charge, over discharge, over current, high temperatures, short circuits, and cell imbalances.

The BMS installed in AmpTech LFP batteries are tailored to the battery specifications and meet the industry standards, offering long term reliability for deep cycle applications. Each BMS monitors one battery only and cannot monitor other batteries connected to a system at the same time (ex. series/parallel).

1.6 Physical Reset Button

The Amp Tech Lithium 5-year line-up is equipped with a physical reset button. This provides a simple and safe method for reactivating or “waking up” batteries that have gone to sleep mode. Just press and hold the reset button for 5 seconds to reactivate the battery. This button is also IP67 waterproof rated to ensure that moisture won't seep through and damage the battery.

2. Caution/Safety

Please read and follow all the guidelines listed below. Failure to do so may result in battery capacity deterioration, electrical damage, fires, and injury. The supplier is not responsible for any damages and incidents caused by non-compliance with this user manual.

Do's

1. Use proper tools and personal protective equipment (PPE) when handling batteries.
2. Ensure all connections are secured. If working on the battery, remove any loads and/or electrical connections.
3. Store in a cool, dry place when not in use.
4. Store the battery in its original packaging until use.
5. Charge using the appropriate lithium compatible charger only and settings as provided in the individual battery data sheet.
6. Charge after installation.

Dont's

1. Do not interchange the positive and negative terminals.
2. Do not leave the batteries exposed to fires, hazards, and other high temperature sources. This can lead to overheating, performance degradation, and reduced life.
3. Avoid short-circuiting the battery to avoid serious damage.
4. Do not solder directly to the battery and keep away from sharp objects to avoid piercing/puncture.
5. Do not connect the battery electrodes to an electrical outlet.
6. Do not store the battery below 13V.
7. Do not throw, drop, strike, or shock the battery. Avoid mechanical impacts to the battery.
8. Do not immerse the battery in water.
9. Do not use the battery in a location with high static electricity or magnetic fields as it may damage the safety devices and cause safety issues.
10. Do not transport with metal objects such as hairpins, necklaces, etc.
11. Do not dispose in a regular landfill/waste bin.
12. Do not use for cranking/staring applications.
13. Do not leave the batteries on charge overnight.
14. Do not use charging profiles not intended for lithium (Lead acid, calcium, AGM).

Additional Information

- 1.If the battery leaks, and the chemical gets into your eyes, rinse with clean running water and seek medical attention immediately.
- 2.If the battery emits a strange odour, generates heat, changes colour or shape, or appears abnormal during use, stop, and immediately disconnect the battery.
- 3.Please avoid applying force to the product, as any damage to electronic components or lines may destabilise the product.
- 4.Pay attention to the terminals when connecting to avoid reversing the charging polarity which can damage the internal circuit board.
- 5.Do not use organic solvents to clean the battery exterior.
- 6.In case of fire, use dry powder fire extinguisher or sand.

3. Handling and Installation

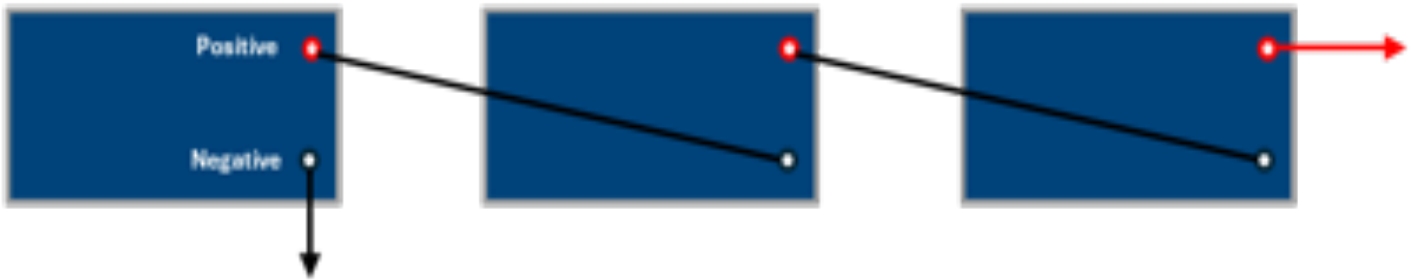
3.1. Battery Check & Precautions

- 1.Upon receipt of the battery, check the packaging carefully.
- 2.Handle the battery gently to avoid shock.
3. Check for any damage or leak on the battery box and accessories. If any are found, contact your supplier immediately.
- 4.Check if the output connector is correct and measure the voltage between the positive and negative terminals to ensure it's within the normal range.
- 5.Ensure battery voltage is good ($\geq 13V$).
- 6.The battery should be installed in a well-ventilated area away from direct sunlight and potential flooding.
- 7.Ensure that the battery and the terminals are clean before use to avoid poor connection.

3.2. Installation

- 1.Ensure that all connections, such as bolts, are correctly fastened according to the torque setting to avoid terminal damage or loosening during use.
- 2.Ensure the positive (+) and negative (-) polarity is correctly connected to avoid damage to the battery and load.
- 3.Test the equipment to ensure it works well with the battery.
- 4.Do not connect batteries of different brands, batches (old, new), sizes and types in either series or parallel.
- 5.The maximum number of batteries allowed in series or parallel connection can be seen on the product data sheet. See below example of proper connections for both series and parallel connections.

CONNECTING BATTERIES IN SERIES



CONNECTING BATTERIES IN PARALLEL



4. Operating Use

4.1. Battery Use

- 1.The charge current should be less than the maximum charge current specified in the Product Sheet. Exceeding the maximum charge current may damage the battery.
- 2.The discharge current should be less than the maximum discharge current specified in the Product Specification. Exceeding the maximum discharge current may damage the battery.
- 3.The discharge temperature should be between -20°C and $+60^{\circ}\text{C}$, with a relative humidity of $60 \pm 25\%$. If the temperature is higher than 45°C , ensure proper ventilation. If the environmental humidity is higher than 85%, ensure proper protection is in place.
- 4.The charging temperature should be between 0°C and $+55^{\circ}\text{C}$ with a relative humidity of $60 \pm 25\%$. If the environmental humidity is higher than 85%, ensure proper protection is in place.
- 5.The storage temperature should be between -5°C and 45°C (optimally between 15°C and 25°C in a dry environment), with a relative humidity of $60 \pm 25\%$. Higher temperatures increase battery capacity but reduces serviceable life.
- 6.When the battery power is low, ensure to charge the battery on time for a longer cycle life. If left at a low power for a long time, battery cycle life may be reduced.
- 7.To prevent cell function, battery function and performance deterioration, avoid over-discharging.
- 8.Periodic charging must be done to maintain the voltage at $13.32\text{V} \sim 13.6\text{V}$.
- 9.For improved cycle life, it is recommended to discharge at a nominal capacity of 80%.

4.2. Charging

Connect the terminals of the battery to a charger compatible with LFP batteries. Note that the recommended and maximum charge current are specific to each model and can be seen on the product data sheet.

- The charge voltage should be $14.4 \pm 0.2V$.
- Please ensure the polarity is correct.
- Ensure to not exceed the max charging current specific to each battery to prevent activation of circuit protection, which stops the charging process.
- When charging batteries connected in series, voltage setting should not exceed $14.4 \pm 0.2V$ multiplied by the number of batteries connected in series.

Ex. 4x batteries @ 14.4V each, charging voltage should be at 57.6V.

- For batteries in parallel, maximum charging voltage is $14.4 \pm 0.2V$.
- For batteries in parallel, the maximum charging current is the same as a single battery to prevent any damage due to overcurrent.

4.3. Discharging

Connect the terminals of the battery to the load using the appropriate connectors, then begin discharging.

Note that the recommended and maximum discharge current are specific to each model and can be seen on the product data sheet.

- Please ensure the polarity is correct.
- Ensure to not exceed the max discharging current to prevent activation of circuit protection.

4.4. Boost Charging

If the batteries are to be kept in storage, SOC must be at least 13V. It is also recommended to have the batteries boost charged periodically. Boost settings are the same as normal charging stated above.

4.5. Bluetooth Function

Some AmpTech LFP battery models have an integrated Bluetooth monitoring system for viewing real time information such as:

- Battery State of Charge (SOC)
- Remaining Battery Capacity (Ah)
- Battery Voltage (V)
- Individual Cell Voltage(mV)
- Incoming and Outgoing Current (A)
- Cell Balance Status
- Battery Temperature (o-C)
- Status Alerts
- Cycle Time
- Protection Record
- History Log

An additional feature that batteries equipped with both Bluetooth (BT) and BMS offers is the sleep mode. After 7 days of inactivity (no charge/discharge), it will automatically go to sleep mode to minimize loss.

4.5.1. App Installation and Pairing

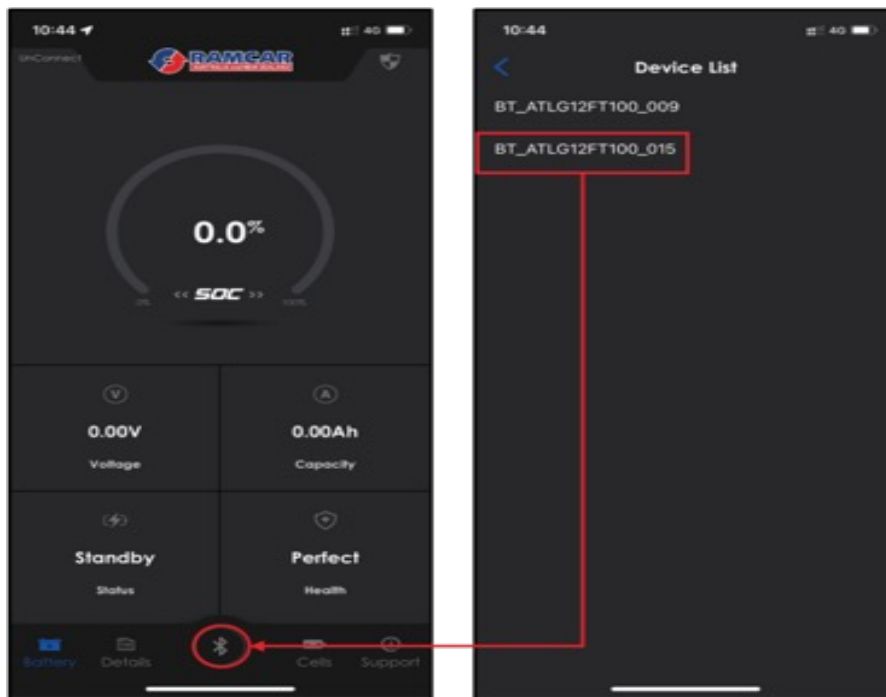
To start monitoring your battery, please download the app. The Ramcar BT Li App is available for both Android and iOS and can be downloaded via Google Play store and Apple App Store respectively.



Enable Bluetooth on your smartphone before pairing.

1. Open the app, make sure the Bluetooth connection of the device is enabled.
2. Click the Bluetooth icon to show all available batteries for monitoring.
3. Check the Bluetooth battery code on the actual battery for monitoring and select it on the app.

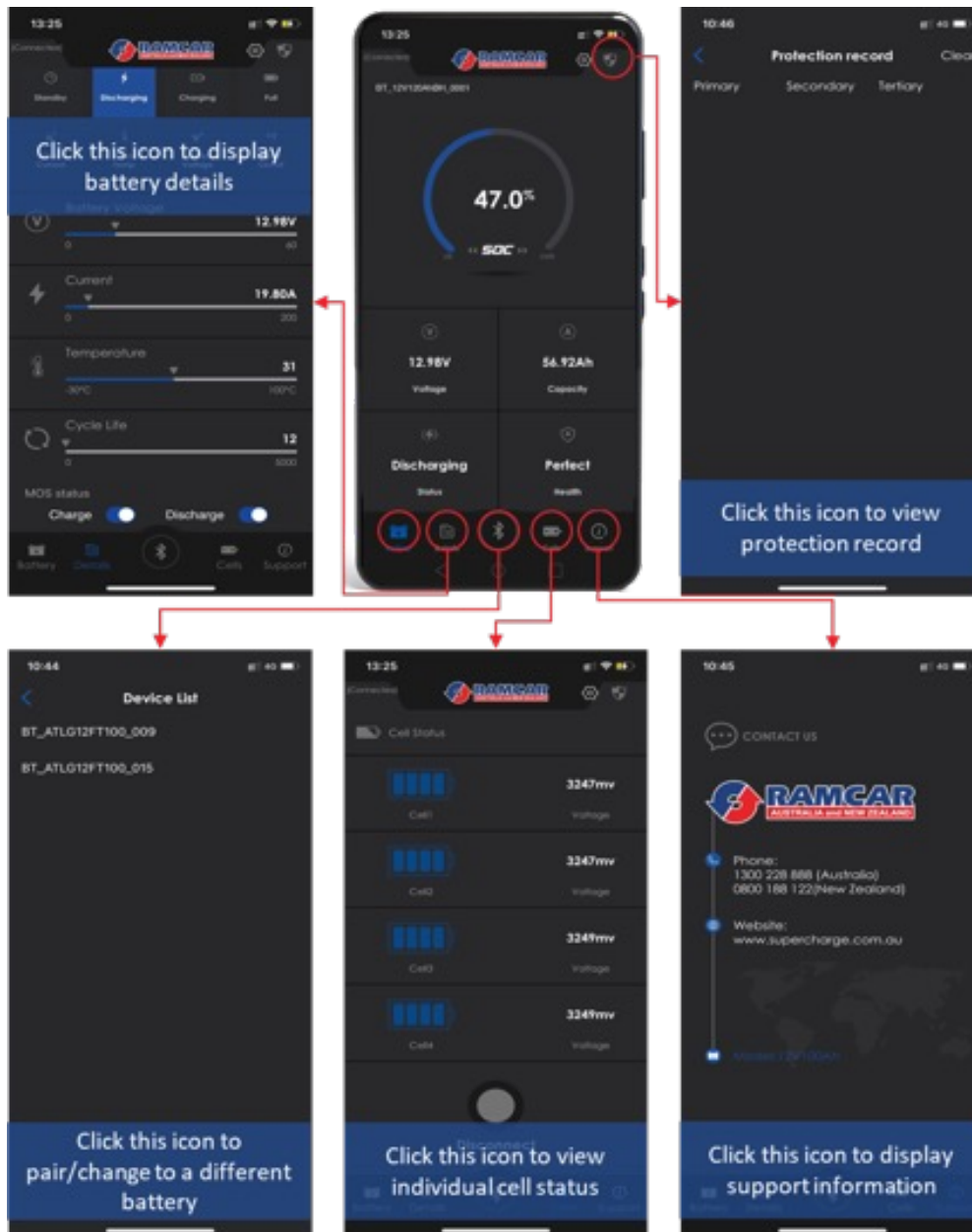
Note: The Bluetooth battery code can be seen on the side of the battery.
(Sample: BT_ATLG12FT100_0XX)



Note: When multiple batteries are connected, simply click on the Bluetooth icon, and select the specific battery you want to access.

4.5.2. Navigating the App

1. Once connected, the app will automatically show the basic information such as the State of Charge, Remaining Capacity, Battery Voltage, Battery Status, and Battery Health.
2. Below is a navigation guide for the app, and what each icon/button displays.



5. Troubleshooting

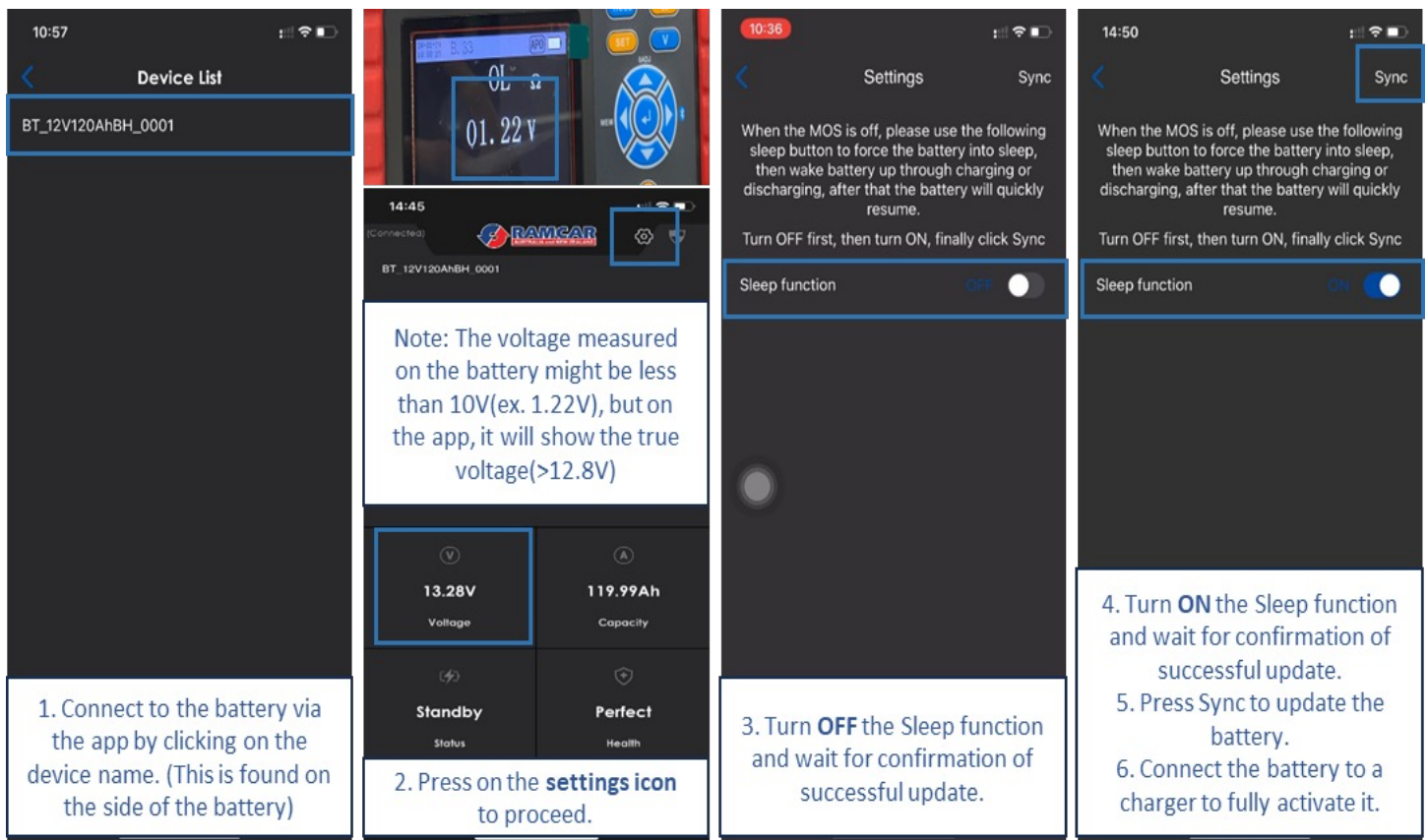
Below are some of the common problems, possible causes, and corrective actions for LFP Batteries and the Bluetooth App.

Problem/Concern	Possible Cause	Corrective Action
Battery in sleep mode - measured voltage is less than 10V. or at a low voltage.	Battery stored long term while not in use or at low voltage A battery on sleep will not be visible on the Bluetooth App.	Press and hold the physical reset button for at least 5 seconds to wake up/reactivate battery Note: This only works for models with physical reset button
		Charge activation: charge the battery (minimum current of 5A up to 20A)
		Discharge activation: connect to a load (Maximum load equal to the battery's declared capacity)
	Transistor off (MOS)	Discharge activation: connect to a load (Maximum load equal to the battery's declared capacity)
Battery voltage too low after fully charging	Battery stored long term while not in use	Charge the battery
Insufficient battery capacity		Charge and discharge 3-5 cycles
Battery voltage instability (not charging/discharging properly)	Poor connector/terminal condition	Clean/Replace connectors/terminals
Bluetooth battery ID not found	Battery is on sleep mode	Activate the battery by charging/discharging
	Battery and smart phone are more than 10/15meters apart	Move the smart phone close to the battery

5.1. MOS OFF Troubleshooting Guide

Battery with the MOS Relay turned off will be detectable on the Bluetooth App but is not able to charge or discharge. External voltage measured can appear to be below 10V, but on the app will show a different value. It is important to note that a sleeping battery is different from a battery with the MOS Relay off. First do the troubleshooting guide for a sleeping battery before proceeding with this one.

First, connect to the battery through the app. Once connected, on the homepage, click on the settings icon to access the sleep function button. Third, toggle the sleep function button and turn it off. Then, turn it back on and press sync, await confirmation of the activity. Lastly, after syncing, connect the battery to a charger to activate it. The battery is now ready for use. Follow the visual guide below for details.



6. Care & Maintenance

1. Batteries must be operated within the limits of product specifications. Ensure that it is used for the correct application based on technology, design, and capacity.
2. Always ensure that all cables and connections are securely fitted.
3. Regularly check the battery condition especially if not in use. All batteries partially self-discharge, monitor and charge accordingly.
4. The battery top and its terminals must be clean and corrosion free for good contact. Prior to cleaning the battery, disconnect it from the charger/load.
5. Only use a soft, dry, non-conductive cloth for cleaning the battery. Do not use solvents as these can remove the fire-retardant properties of the case.

7. Storage

1. Place plastic caps or insulating tape on the terminals when not in use.
2. Store the batteries in a cool, dry, place, away from hazardous/flammable elements. Do not store under direct sunlight.
3. For long term storage, it is not recommended to have the battery at full charge.
4. Maintenance cycling is recommended for cell balancing and BMS calibration.
(fully charge the battery › fully discharge the battery › charge › store)
5. Monitor and boost charge the battery every 2 months for both BT and non-BT models or when voltage drops below 13V.

8. Transportation

1. Uninstalled batteries must remain in their original packaging during transit.
2. It is highly recommended that the battery is transported at a voltage below 13.2V.
3. Make sure that the LFP battery packaging is properly labelled under the hazard classification UN3480, class 9, as shown below.



4. For transport of a damaged/defective LFP battery, consult/use a qualified shipping agent certified for such hazards.

9. Disposal & Recycling

1. Disposal of LFP batteries must be done in accordance with local and national government regulations. Do not place batteries into household waste bins or recycling bins as these pose a fire risk.
2. Lithium-ion batteries are recyclable, however, do not mix them with lead-acid batteries.
3. Tape/cover the terminals with insulative material such as sticky tape or electrical tape to prevent short circuit.
4. It is recommended to fully discharge the battery prior to disposal/recycling.
5. For batteries with signs of damage such as bulging, leaking, swelling, cracks, or other mechanical damage, follow local and national environmental protection guidelines for transport and disposal.

Further Information

This document may not be reproduced or transmitted in any form or by any means, without prior consent or approval of Supercharge Batteries Inc.

For more information related to battery safety precautions, installation, or use of AmpTech Lithium, please contact Supercharge Batteries.

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