Usage & Maintenance Manual

Version V1.0, January 2026

Charging and storage instructions applicable to Super B energy and starter batteries

Usage & Maintenance Manual
Including charging and storage instructions applicable to Super B energy and starter batteries

We are pleased that you have chosen Super B Lithium Power B.V.

This manual provides instructions for charging and storage of Super B Lithium Iron Phosphate (LFP) energy and starter batteries. It is intended for use with chargers that can be configured with a charging profile compliant with the Super B battery charge specifications. This manual may also be used to verify whether a charger with a non-adjustable charge profile is suitable for charging Super B Lithium Iron Phosphate batteries.

This manual is intended for use by both installers and end users of the LFP battery. Installation and maintenance of the LFP battery must be performed only by qualified and certified personnel. Throughout the use of the product, user safety must always be ensured so that installers, users, service personnel, and third parties can safely work with and operate the LFP battery.

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1 General information

1.1 Safety guidelines

IMPORTANT!

- Read this manual carefully before use.
- Retain the original product documentation for future reference.
- The battery safety precautions as referred to in the Super B battery manual should always be observed. See our website www.super-b.com for more information.
- **Risk of battery degradation. If the system shuts down due to undervoltage, charge the LFP battery immediately to prevent permanent capacity loss.**
- **Use the latest firmware that can be found in the Be in Charge App or Be in Charge monitor kit**
- Always follow local regulations and guidelines for battery handling and disposal.
- Use appropriate personal protective equipment (PPE) when handling batteries.
- Never disassemble, puncture, or expose batteries to fire or heat.
- Ensure Super B Lithium Iron Phosphate (LFP) batteries are used in accordance with Super B's specifications and guidelines.
- Do not charge the LFP battery below 0 °C.
- Only use a class II charger for charging the LFP battery.
  Class II chargers are designed with double insulation, providing enhanced protection against electric shock. The charger must support the specific charging profile for LFP batteries. Using an unsuitable charger may lead to battery damage, overheating, or fire.
- Ensure that the charger is suitable for LFP chemistry.
- Observe the plus (+) and minus (–) marks on the LFP battery and equipment and ensure correct use. Refer to the battery manual for more information.
- Regularly inspect your LFP batteries and chargers for signs of damage, corrosion, or wear.

WARNING!

- Risk of battery damage or fire. Do not overcharge the LFP battery. Overcharging can cause permanent damage and may pose a fire risk. Always use a class II charger which automatically halts the charging process to prevent overcharging.
- Risk of electric shock or injury. Do not open or dismantle the LFP battery. The LFP battery contains no user- serviceable parts and may pose a hazard if tampered with.
- Risk of electric shock or injury. Always keep the battery and the charger out of reach of children. Children must not be allowed to play or handle the battery or charger. Risk of overheating and battery damage. Stop the charging process if the LFP battery temperature exceeds > 55-60°C. Continued charging at high temperatures can lead to battery failure or safety hazards. For more information, refer to Chapter 6, Thermal management.
- Risk of overheating and equipment damage. Do not place the charger directly on the LFP battery. This may cause overheating and lead to damage to both the charger and the LFP battery. Ensure that the charger and the LFP battery are positioned in well-ventilated areas, with sufficient space around them for proper heat dissipation.
- **Do not exceed the charging current as specified in the LFP battery manual.**

Overcurrent charging can cause permanent damage or reduce battery lifespan.

- **Degraded battery. Danger of overheating and gassing (thermal runaway) due to degraded battery. Do not charge. Charging a degraded LFP battery can lead to serious damage or fire hazard. Use the Be in Charge App to check the LFP battery status before charging. Replace the LFP battery if necessary**.

⚠ **CAUTION!**

- For optimal battery performance, keep the State of Charge (SoC) above 20%. Charging the LFP battery at lower levels may help maintain battery voltage and lifespan.
- In the event of an electrolyte leak, avoid direct contact with skin or eyes. If contact occurs, immediately rinse the affected area with water and seek medical advice.

Note: All LFP batteries will self discharge and should never be stored for prolonged periods of time without charging regularly.

1.2 Stay Informed

To get the most out of your Super B product, we recommend staying up to date with the latest information.
Join the Super B community and receive exclusive updates and insights, including:

- Product updates and improvements
- Important safety notifications
- Firmware releases and technical information
- News and developments from Super B

You can subscribe to the Super B newsletter via the link or QR code provided below.

Figure 1 https://www.super-b.com/newsletter-signup

1.3 Contacting Super B – Service & Support

If you have questions, experience issues, or require assistance, Super B offers several support options. Choosing the right contact method helps us support you as quickly and effectively as possible.

Telephone Support
Phone: +31 (0)88 007 6000

Use telephone support for:

- Urgent technical issues
- Immediate assistance during installation or commissioning
- Situations where the product cannot be operated safely

Email Support

- support@super-b.com – for technical questions, troubleshooting, and service-related issues
- sales@super-b.com – for product information, quotations, and commercial questions

Please include relevant product details (type, serial number, installation details) to help us assist you efficiently.

Support Ticket System
For structured support and service requests, you can open a **support ticket** via the Super B support portal.

Figure 2 Super B Support | Lithium Battery Help & Resources

Use the support ticket system for:

- Technical issues that require investigation
- Warranty claims
- Repair or return requests
- Tracking the status of ongoing cases

Using the ticket system ensures clear communication and proper documentation throughout the support process.

Warranty and Returns
Please note that **all warranty and return cases must be handled through a registered RMA (Return Material Authorization)**. Products returned without a valid RMA may not be processed.

1.4 Extended warranty

Super B offers an extended warranty. To be eligible, the battery must:

- Be registered with Super B.
- Be kept up to date with the latest software updates whenever new firmware is released for the specific model.

Failure to comply with these conditions may result in the forfeiture of extended warranty coverage.

1.5 Battery Registration

Battery registration is required to activate the extended warranty and allows Super B to provide better service and support.
To register your battery: Visit the Super B registration page via the link or QR code provided. Enter the required product information and submit the registration form.
After successful registration, the battery will be linked to your account in the Super B system.

Figure 3 *Super B Product Registration | Activate Your Lithium Battery Warranty*

1.6 Software Updates

To maintain eligibility for the extended warranty:

- Always install firmware updates released for your specific battery model
- Software updates may include safety improvements, performance optimizations, or functional enhancements

Information about available software updates is communicated via:

- The Super B newsletter
- The Super B website or support portal
- The Be In Charge App (Epsilon only)
- The Super B FTP server (registered users only) ftp://organization@downloads.super-b.com

If you are unsure whether your battery is running the latest software version, contact Super B support.

1.7 Deep discharged battery policy

Super B defines a deep discharged (DD) battery as a battery whose voltage has fallen below the minimum operational threshold. Deep discharge can negatively affect battery performance, lifespan, and safety. If deep discharge is a result of improper use, long-term storage without maintenance charging, or failure to follow the operating instructions it may not be covered under warranty.

When a battery is identified as deep discharged, Super B applies the following policy:

- The battery will be inspected and evaluated by Super B or an authorized service partner.
- Recovery attempts may be performed if the battery condition allows this and if it can be done safely.
- If recovery is successful, the battery will be tested to confirm proper functionality before being returned to service.
- If the battery cannot be safely recovered, it will be classified as irreparable and handled according to Super B's recycling and disposal procedures.

For prevention, users must ensure proper storage, periodic charging, and compliance with the guidelines described in this manual.

1.8 Disposal

Dispose the LFP batteries in accordance with local, state and federal laws and regulations.
Do not mix with other (industrial) waste.

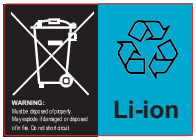


Figure 4. Battery dispose label

2 Introduction

2.1 General information

This manual applies to all Super B LFP batteries and provides guidance on charging, thermal management, and maintenance to ensure safe and long-lasting performance This information is supplementary to the battery manual. For specific details such as error codes, LED indicators, or troubleshooting, please refer to the battery manual.

2.2 Intended use

This manual applies to all Super B LFP battery products in automotive, marine, industrial, and renewable energy applications. It is intended for use with chargers that allow configurable charging profiles to match the battery's specified parameters, and can also help users determine whether a fixed (non-adjustable) charger is suitable for Super B LFP batteries.

2.3 Glossary of Terminology

AGM	Absorbing Glass Mat
Battery Bank	Within the context of this document, a (battery) bank is a collection of batteries connected by sub-strings. The entire system will be referred to as a battery.
Batteries in Parallel	A configuration where all positive terminals are connected, and all negative terminals are connected. This increases total capacity (Ah) while the voltage remains the same as a single battery.
Batteries in Series	A configuration where the positive terminal of one battery is connected to the negative terminal of the next. This increases the total system voltage while the capacity (Ah) stays the same.
Be in Charge Software	Software used for configuring and monitoring the battery system (desktop)
Be in Charge App	Mobile application available for Android and iOS devices; downloadable via the Google Play Store and Apple app store.
BMS	Battery Management System
CANopen communication bus	CAN Bus protocol
CCCV	Constant Current – Constant Voltage
Charge cycle	A period of use from fully charged, to fully discharged, and fully recharged again
Class II charger	A class II charger meets the necessary safety standards and provides protection against risks (fire hazard, battery damage) during charging.

DoD	Depth of Discharge
Endurance life cycle	The products' maximum life span, achieved by following the guidelines presented in this manual.
LFP	Lithium Iron Phosphate (LiFePO4)
Manual battery disconnect switch	Switch is used to safely disconnect power from the battery to consumers or chargers during installation, maintenance, or storage.
On/Off button	The battery can be switched on or off using either the button on the battery or an optional external On/Off switch.
SoC level	State of Charge level
U_{eoc}	End of Charge voltage

Table 1. Glossary of Terminology

2.4 Used symbols

The following icons will be used throughout the manual:

IMPORTANT! An important sign is used to emphasize how important something is. States precautions and restrictions that must be followed.

WARNING! A warning sign indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION! A caution sign indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

Note: A note is used to address practices not related to physical injury. It provides tips on correct use and supplementary information.

3 Installation

3.1 General information

IMPORTANT! Ensure that the installation is carried out in accordance with all applicable local regulations and standards for the application.

WARNING! Mixing different battery types (such as lithium or rechargeable batteries) in one system can cause batteries to leak, overheat, rupture, or even explode. This may result in product damage, fire, or personal injury. Always use batteries of the same type and brand in the system. Never mix different battery types.

WARNING! Never connect LiFePO4 batteries in series if it is not clearly stated that they are suitable for that.

WARNING! Never install or use a damaged LFP battery.

CAUTION! Do not reverse connect the power cables (polarity).

Note: Super B recommends using a manual battery disconnect device to fully disconnect loads and charger(s). Please refer to the LFP battery manual for complete installation instructions.

Note: It is advisable to keep terminals and communication terminals accessible for periodic inspection. Depending on the application, allow space for cooling airflow.

Note: When installing an LFP battery, ensure that you are using the latest revision of the relevant LFP battery manual. Updated specifications and information are available on our website www.super-b.com. Always refer to the most recent documentation to ensure proper installation and safe operation.

3.2 Installation Requirements

3.3 Manual Battery Disconnect Switch

CAUTION! BMS-controlled contactors or MOSFETs do not guarantee complete electrical isolation of the battery. Always use a manual battery disconnect switch to ensure the battery or batteries cannot be discharged or charged, especially during storage or maintenance.

Note: The manual disconnect switch can prevent sparks or arcs during installation, if it is disengaged.

A manual battery disconnect switch is useful for de-energizing the system, such as when storing a vehicle or vessel. The manual battery disconnect switch is an external device that helps to ensure that the electrical system is completely disconnected and no charging or discharging occurs when disengaged. An external BMS-controlled contactor or does not replace a manual battery disconnect switch. A manual disconnect switch should always be installed. When te battery is

stored or not used for a long period the manual battery disconnect switch must disconnect the battery to prevent deep discharge. Figure 5 and

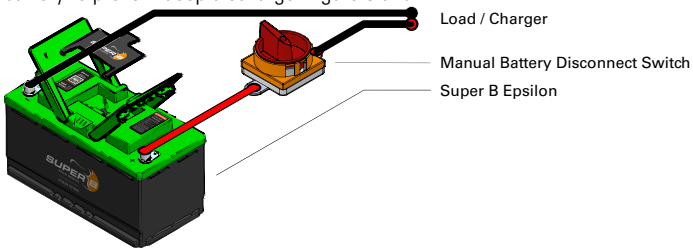


Figure 6 show batteries installed with a manual disconnect switch.

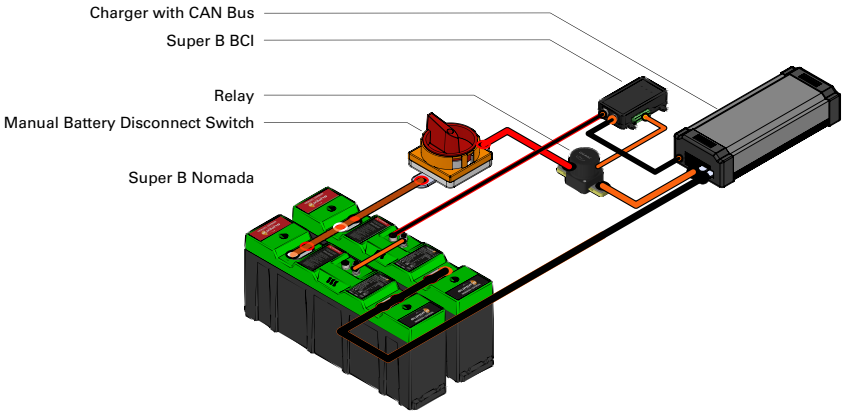


Figure 5

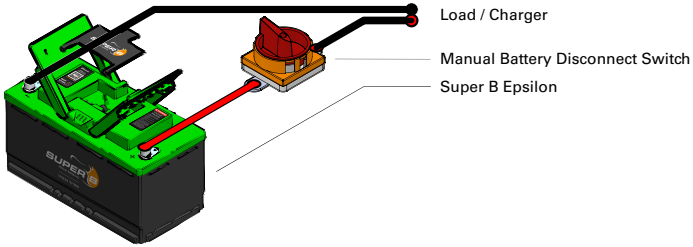


Figure 6

3.4 Connecting LFP batteries in series and/or parallel

⚠ **CAUTION! When connecting multiple LFP batteries in series or parallel make sure that the State of Charge (SoC) of all LFP batteries is 100% to avoid unbalance in the battery**

bank.

⚠ **CAUTION! Depending on the installation a pre-charge circuit might be needed. For further information consult Super B or your dealer.**

⚠ **WARNING! Local regulations may require that installation, maintenance, or service work be performed only by qualified personnel. This depends on system voltage and or system power.**

3.4.1 Wiring of LFP batteries in parallel

⚠ **WARNING! Before connecting two or more LFP batteries in parallel, the LFP batteries must be charged to 100% State of Charge (SoC).**

⚠ **CAUTION! For more than four LFP batteries in parallel connection consult Super B or your dealer.**

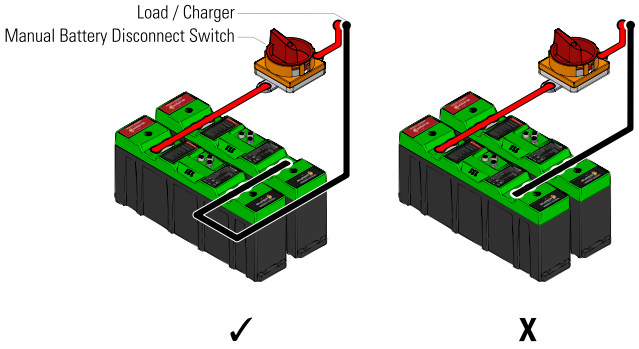


Figure 7. Two LFP batteries in parallel with external disconnect device

NOT OK: The current will not be equally divided. The Battery closest to load will have the highest current contribution, whereas batteries further away from load will have less current contribution.

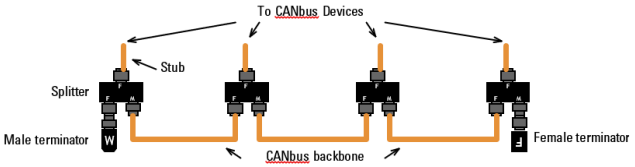
OK: The current will be equally divided. All batteries contribute equally to the current into the load.

3.5 CAN bus Topology and Termination

The typical CAN bus topology is illustrated in picture one. To ensure proper signal integrity, termination resistors must be installed at both ends of the CAN bus backbone. These resistors are essential to prevent signal reflections and ensure reliable communication.

Resistor Value: Each termination resistor should have a value of 120 ohms ± 5%.

Installation Locations: Place the termination resistors at the physical ends of the CAN bus backbone, directly at the connectors.
Stub Connections: Devices on the CAN Bus must be connected via stubs.



Picture 1. CAN Bus topology and termination

For detailed information, refer to CiA website: www.can-cia.org. The required information can be found in the following CiA documents (or in future versions of these documents):
CiA 301, CiA 303_1 V1.8.0, Chapter 5 (AC and DC parameters) and 7.2: (5-pin “micro” style connector).

For support related to interfacing and adapting to various protocols, refer to our website www.super-b.com, or send an e-mail to support@super-b.com.

4 Charging

4.1 General information

IMPORTANT! Ensure that the charger is suitable for LFP chemistry.

IMPORTANT! Only use a Class II charger for charging the LFP battery.
Class II chargers are designed with double insulation, providing enhanced protection against electric shock. The charger must support the specific charging profile for LFP batteries.
Using an unsuitable charger may lead to battery damage, overheating, or fire.

WARNING! Operating the LFP battery outside the charge specification defined in the Super B LFP battery manual may result in battery degradation. Refer to the Super B LFP battery manual and datasheet on our website: www.super-b.com.

WARNING! If any charge limit is exceeded, the LFP battery may be damaged and can even cause hazard.

WARNING! When used in a system, all Super B LFP batteries need to be charged 100% State of Charge (SoC) before installation.

WARNING! Do not use lead-acid chargers. A lead-acid charger is not suitable for LFP batteries and can damage your Super B LFP battery.

WARNING! Risk of overheating and battery damage. Stop the charging process if the LFP battery temperature exceeds > 55-60 °C. Continued charging at high temperatures can lead to battery failure or safety hazards.

4.2 Charger requirements

To charge a Super B LFP battery, it is required to use a charger with the appropriate charging profile specifically designed for LFP batteries to ensure safe and efficient charging. It is recommended to use a Class II charger. Class II chargers comply with safety standards to prevent fire hazards or electrical shock when used. Also, grounding is not required with Class II chargers.

WARNING! Do not use lead-acid chargers. A lead-acid charger is not suitable for LFP batteries and can damage your LFP battery.

WARNING! If any charge limit is exceeded, the LFP battery may be damaged and can even cause hazard.

Chargers are also categorized as:

- Profile-based chargers or
- Communication-controlled chargers.

Profile based chargers run a pre-programmed profile to LFP batteries. Some models can adjust the profile so it can be tailored to the battery it is used with. The following chapters provide detailed

information on how to configure this charger for use with Super B LFP batteries.

If the charger cannot be adjusted, the next chapters can be used to verify if your charger complies with the profile needed for Super B LFP batteries.

Communication-controlled chargers communicate with an LFP battery, allowing the battery's BMS to control the voltage and current of the charger. This is the safest and quickest way to charge an LFP battery. This does require compatibility between the LFP battery and charger and requires cables for communication.

Before using the charger, ensure the following:

- All the chargers connected to the LFP battery are configured with the correct settings. Refer to the Super B LFP battery manual and/or datasheet(s) for the charge specifications.
- If the battery chemistry type is selectable, verify that the charger is set to LFP chemistry.

Once these checks are complete, proceed with the steps outlined in the next Chapter.

4.3 Charging procedure

IMPORTANT! Follow the safety guidelines and measures of Chapter 1.

Before starting the charging process, it is important to ensure that both the LFP battery and the charging equipment are in proper condition. Follow the steps below to safely connect and operate the charger:

5 Inspect the LFP battery and charging equipment for any visible damage.

1. Power on the charger.
2. Connect the class II charger to the battery terminals ensuring correct polarity. Please refer to the applicable Super B LFP battery manual for more details.
3. If the class II charger has an on/off button, turn the charger on. Most chargers will start the moment they are connected to the LFP battery.
4. Monitor the charging process. Monitoring is important for safety purposes and to ensure the LFP battery is being charged correctly according to its specifications.
5. Depending on the application, the user has the option to disconnect the class II charger once the LFP battery reaches full charge to prevent overcharging.

5.1 Charging phases of LFP batteries

Note: Refer to the relevant Super B LFP datasheet for the recommended voltages.
Note: Refer to the relevant Super B LFP battery manual for the optimal charger settings.

Super B LFP batteries require the Constant Current Constant Voltage (CCCV) charging method, which is a widely used technique for charging LFP batteries.

The Constant Voltage phase consists of two voltage settings:

- The absorption voltage U_{abs}
- The Float Voltage U_{float}

In general, the charging profile of an LFP charger consists of three phases:

1. Bulk phase
2. Absorption phase
3. Float phase

Upon connection, chargers automatically detect the required phase based on the battery's voltage. They then adjust accordingly to ensure optimal charging performance. Figure 3 here below illustrates all the phases and shows how the charging profile progresses.

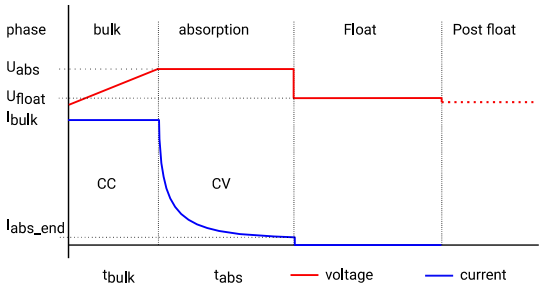


Figure 8. Charging profile Super B LFP batteries

Each charge phase is detailed in the following sections.

5.1.1 Bulk phase

In the bulk phase, this is the CC part of CCCV, the LFP batteries are charged with a constant current up to the absorption voltage (U_{abs}). When the absorption voltage (U_{abs}) is reached, the charger goes to the absorption phase, the CV part of the CCCV.
The duration of the bulk phase t_{bulk} is determined by the battery's state of charge (SoC), its capacity and the charging current.

$$t_{bulk} = \left(100 - SoC(\%)\right) \cdot \frac{Battery\ Capacity\ [Ah]}{Charge\ current\ [A]}\ [h]$$

5.1.2 Bulk phase charger settings

The charger settings for the bulk phase are specified in Table 2.

Parameter	Min.	Typical Range	Max.
I_{ch}(A)	-	C3*	-
t_{bulk}		See above formula.	

Table 2. Bulk phase charger settings

* C3 stands for one-third of the battery's capacity.

Note: Refer to the Super B LFP battery manual for the optimal charger settings.

Some chargers feature a time limit for the bulk phase. This is a safety precaution that stops the charger if the bulk phase is taking longer than the maximum expected bulk time. As a rule of thumb, the bulk time limit can be set to 1.2 times the maximum expected bulk time.

$$t_{bulk\_limit} = 1.2 \cdot \frac{Battery\ Capacity\ [Ah]}{Charge\ current\ [A]}\ [h]$$

The factor 1.2 also accounts for the LFP battery's actual capacity exceeding its rated value, as well as the charger's current measurement inaccuracies.
Consult your charging manual for the charger behavior if the bulk time limit is reached.

Note: To lower the bulk phase time, a charger with a higher charging current is necessary.
Note: If there is power consumption during charging, this should be considered, as it will reduce the effective charge current.

5.1.3 Absorption phase

In the absorption phase (CV part of CCCV) the charge voltage is kept constant at absorption voltage (U_{abs}) to fully charge the LFP battery and balance the battery cells. Sometimes this parameter is referred to as End of Charge voltage. In this phase the charge current drops due to the natural behavior of the cells/battery. When the charge current becomes lower than 1 to 10% of the capacity, the battery is considered full. This value is commonly referred to as the absorption end current (I_{abs_end}). When the charge current drops below the absorption end current (I_{abs_end}), the charger goes to float phase.

Most chargers have a time limit for the absorption phase. This is a safety precaution that stops the charger if the absorption phase is taking too long. It can also be that there is a load present which consumes current from the charger and therefore the current that the charger delivers will never drop below the absorption end current. In such a situation the charger would never go to float phase and the battery would be kept at the absorption voltage (U_{abs}) until the charger is turned off. The duration of the absorption phase should be limited to prevent potential damage to the battery. Once the absorption time (t_{abs}) is elapsed, the charger switches to the float phase.

The duration of the absorption phase may vary depending on the age and state of health of the LFP battery.

5.1.4 Absorption phase charger settings

Parameter	Min	Typical Range	Max
U_{abs} (12 V)	14.0 V (14.3 V)*	14.2 V (14.4 V)*	14.6 V
U_{abs} (24 V)	28.0 V (28.6 V)*	28.4 V (28.8 V)*	29.2 V
U_{abs} (48 V)	56.0 V (57.2 V)*	56.8 V (57.6 V)*	58.4 V
I_{abs_end}	0.01C	0.05C	0.1C
t_{abs}	10 minutes	30 minutes	1 hour

Table 3. Absorption phase charger settings

*The recommended lower voltage settings as specified above (excluding the bracketed values) can improve battery lifespan, depending on the software version of the battery.

5.1.5 Float phase

Note: Not all chargers feature a float phase.

The float phase is used to keep the LFP battery full without keeping the LFP battery at the absorption voltage (U_{abs}). Though charging an LFP battery to the absorption voltage (U_{abs}) is the proper way to charge it to 100%, it should not be kept longer than the absorption time (t_{abs}) at that voltage. This is because it will reduce cycle life and generate unnecessary heat.

In the float phase the charger makes sure the voltage will not drop below the float voltage (U_{float}). The float voltage is lower than the absorption voltage (U_{abs}). See table 4. Because in the previous phase the battery was charged to the absorption voltage (U_{abs}) it takes a while before the float voltage is reached. This depends on the BMS and if there are consumers present. For clarification, the charger itself does not force the battery to go to float voltage (U_{float}).
Commonly, chargers will provide energy to consumers in float phase if it is capable to deliver the current that is asked for.

Some chargers feature a time limit for the float phase. This is to lower the voltage even further or to turn off the charger completely to increase the cycle life of the LFP battery. Because the naming for this phase depends on the charger brand, it is referred to here as post float phase.

5.1.6 Float phase charger settings

Parameter	Min	Typical	Max
Ufloat (12 V)	13.6 V	13.8 V	13.9 V
Ufloat (24 V)	27.2 V	27.6 V	27.8 V
Ufloat (48 V)	54.4 V	55.2 V	55.6 V
t_{float}	1h		3h

Table 4. Float phase

5.1.7 Post float phase

Some chargers feature an additional phase after the float phase. This phase is intended to get the LFP battery voltage as low as possible but keeping the battery at 100% State of Charge (SoC) or very close to 100%. If this phase is supported by the charger, it is recommended to enable it.

Note: Implementation of this phase varies between manufacturers. Refer to the charger's user manual for specific configuration instructions and recommended settings.
Note: The post float phase only applies after a full charge.

Parameter	Min	Typical	Max
Upost float (12 V)	13.0V	13.2 V	13.4 V

Upost float (24 V)	26.0 V	26.4 V	26.8 V
Upost float (48 V)	52.0 V	V	V

Table 5. Post float phase settings

5.2 Communication-controlled charging

If communication-based charging control is required, a charger is needed that supports control via the CAN interface. The charger must be connected to the LFP battery or the BCI. The BCI is needed when more than one LFP battery is used in the application. These devices fetch information from the LFP batteries about their charge status and then send out data to the charger to control it.

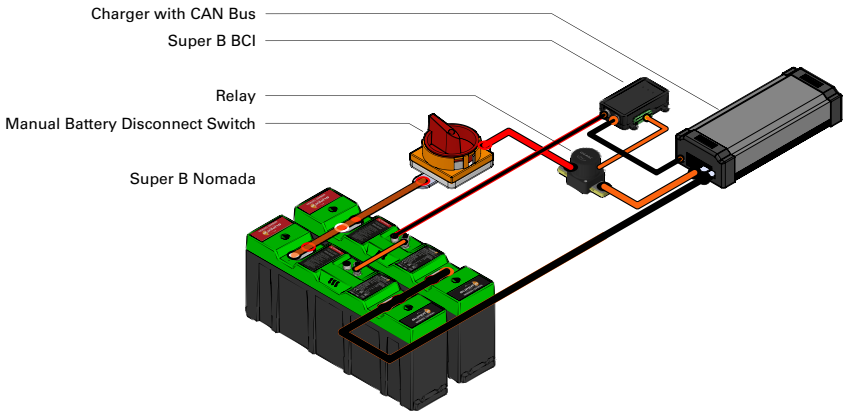


Figure 9 Example communication-controlled charging

CAN bus controlled chargers are available with different types of CAN protocols. Super B's BCI support different CAN protocols to communicate with chargers that do not use the CANopen protocol. The charger manual explains how to configure the BCI or to control a charger.

Refer to the Super B battery manual to verify whether your LFP battery supports communication-controlled charging.

5.3 Charging interval

5.3.1 Charging scheme for regular use

To maintain optimal battery performance, it is recommended to charge the LFP battery 100% after the following:

- 7 to 20 days of use, or
- 10 to 20 cycles.

For State of Charge (SoC) tracking, use the Be in Charge App or Be in Charge software.

5.3.2 Charging scheme for long-term storage

For LFP batteries the optimal SoC value for long time storage is 40 to 60 %. Super B batteries can be stored for well over six months **but only** if there is no comsumer or commuication with the battery. This applies for CAN, LIN and Bluetooth. If these conditions are met, Super B advice to use 50 % SoC for long -term storage. Refer to your battery manual for the optimal long-time storage SoC value and if any setting must be performed for long-term storage.

To make sure no consumers are connected to the battery, a manual disconnect switch is preferred/expected/should be used.

When a manual disconnect switch is not installed Super B recommends storing the battery at 95 % SoC.

When the LFP battery is not in use for an extended period, it should be charged 95% for proper storage. Follow these steps:

1. Fully charge the LFP battery to 100%.
2. Discharge 50 %(or 5 % in case a manual disconnect switch is not used) from the battery using any arbitrary consumer device.
3. Disconnect all devices from the battery to prevent drain from 'hidden' consumers. If available, the On/Off button function can also be used.
4. If applicable, disconnect the CAN bus from the battery. An LFP battery that uses communication channels (such as CAN/LIN/BLE), consumes considerable energy in the long term.
5. After the storage period, charge the battery to 100% before use.

For state of Charge (SoC) tracking, use the Be in Charge App or Be in Charge software.

6 Discharging

⚠ **WARNING! Ensure the LFP battery are used within the discharge specification as outlined in the battery's datasheet. If not, the LFP battery may degrade. For more information, refer to the Super B LFP battery manual and datasheet on our website: www.super-b.com.**

⚠ **CAUTION! Deep discharge can cause irreparable damage. Periodically checking the State of Charge (SoC) and ensuring proper SoC levels is crucial to maintain battery lifespan.**

⚠ **CAUTION! In case of an undervoltage shutdown, charge immediately.**

6.1 Self-discharge

LFP batteries will drain themselves slowly. The cause of this can be divided into 2 items, self-discharge of the cells and power consumption of the internal BMS.

Self discharge of the cells

Lithium iron phosphate cells exhibit a (low) natural self-discharge rate (maximum < 3% per month). Super B LFP batteries can be stored for a long time without recharging. Please refer to the Section 4.6.2 for long-term storage instructions. Self-discharge increases with respect to temperatures. Always store Super B LFP batteries in a cool, dry location to minimize discharging. Refer to the Super B battery manual and datasheet for detailed specifications. See our website: www.super-b.com.

Internal BMS consumption

Super B LFP batteries contain integrated electronics that consume a small amount of current. This current varies with the tasks that the user or system requests from the battery. E.g. communication interfaces (CAN, LIN) draw current when active. Disconnect or deactivate the network interfaces when not in use to prevent unnecessary energy loss.

If left unattended for an extended period, the battery may be discharged to a deeply discharged state because of self-discharge. Especially if a battery has a low SoC and is left unattended. The BMS or battery system includes a mechanism to shut down the battery at a configurable SoC threshold, preventing discharge below that level. This mechanism cannot avoid a deeply-discharged battery. The user **must** charge empty batteries before they get deeply discharged.

Note: A battery left at 10% SoC can sustain itself for approximately 90 days, considering the cells' self-discharge. BMS (communication) activity will further reduce this time.

6.1.1 Preventing deep discharge

Deep discharge can cause severe battery damage. To avoid this:

1. Turn off connected loads
   Always switch off all connected systems, loads, or devices when the LFP battery is not in use. Even small standby currents can slowly deplete the LFP battery. Refer to Section 8, Storage, for more details. The preferred way is to use a Manual disconnect switch for disconnecting.
2. Periodic monitoring
   Check the State of Charge (SoC) at least once every three months during storage. Recharge immediately if the State of Charge (SoC) drops below the recommended threshold. Refer to the Super B LFP battery manual for more information.
3. Follow the storage instructions
   When the battery is not intended to be used for a while (> 2 Month), follow the instructions in Section 8, Storage.

7 Thermal management

⚠ **WARNING! Ensure the LFP battery are used within their temperature specification as outlined in the battery's datasheet. If not, the LFP battery may degrade. For more information, refer to the Super B LFP battery manual and datasheet on our website: www.super-b.com.**

7.1 General information

LFP batteries or cells behave differently across temperature ranges, which affects their performance, available capacity, and overall lifespan. Effective thermal management of Super B LFP batteries is essential not only for extending battery lifespan and ensuring safety, but also for improving overall energy efficiency.
Batteries also generate heat during use, particularly in high-energy-demand applications. Therefore, users or installers should consider the operating environment and take measures to keep the battery within its recommended temperature range.

Effects at low temperatures:

- Reduced available capacity
- State of charge (SoC) readings may be inaccurate
- Higher impedance
- Protection against charging

Effects at high temperatures:

- Accelerated battery wear
- Excessive self-heating may occur

Some models include internal heating to maintain performance in cold environments. These models provide configurable settings to optimize the heating strategy for the environment.
If the environment and usage conditions permit, isolating the battery may be considered, especially when the heating power is supplied by the battery itself.

7.2 Temperature monitoring

Super B provides a Be in Charge software tool which can be used to read out the internal BMS system of the LFP battery. The software uses a CAN to USB converter to connect to the communication interface. The software can read out the actual status like battery cell voltages, current, temperature, but also statistical information and warning or alarms. The Be in Charge software can also be used to update the installed firmware of the LFP battery. For more details, see our website: www.super-b.com.

In case Super B LFP batteries are integrated in a system with CAN or LIN, for example displays on a camper van, you may also view the temperature readings.

8 Maintenance

8.1 General information

⚠ **WARNING! Never attempt to open or dismantle a Super B LFP battery! The inside of the LFP battery does not contain serviceable parts and may pose a hazard if tampered with.**

⚠ **WARNING! Disconnect the Super B LFP battery from all loads and charging devices before performing cleaning and maintenance activities.**

⚠ **WARNING! Not all battery models are equipped with M12 protective caps. Always verify that protective caps are present before performing any storage, cleaning, or maintenance activities to avoid the risk of short circuits.**

⚠ **WARNING! If maintenance is needed on the electrical system (cables and LFP battery), aways disconnect the LFP battery completely by removing the main connection to the terminals using the manual battery disconnect switch.**

8.2 Inspection

Before performing any maintenance on the LFP battery, a visual check should be performed. Inspect for loose and/or damaged wiring and contacts – there should be no corrosion on the contacts -, cracks, deformations (casing and cables must have the original format), leakage, or damage of any other kind. Ensure that fuses are well tightened.
If damage is detected, the battery must be replaced immediately. Do not attempt to charge or use a damaged Super B LFP battery.
In the event of an electrolyte leak, avoid direct contact with skin or eyes. If contact occurs, immediately rinse the affected area with water and seek medical advice.

State of Charge (SoC) monitoring

Super B advises checking the SoC (State of Charge) of your battery at least once per three months if the battery is not in regular use. This helps to maintain the battery's condition and prevents unwanted deep discharge.
The SoC (State of Charge) can be easily monitored using the Be in Charge App or the Be in Charge software.
If your application is equipped with a monitoring kit, such as a display, this can also be used to read the SoC (State of Charge). Such systems typically also provide warnings or alarm notifications, offering additional support in monitoring the battery status.

8.3 Cleaning

If necessary, clean the Super B LFP battery with a soft, dry cloth. Never use liquids, solvents, or abrasives to clean the Super B LFP battery.

8.4 Battery Performance Monitoring

Upon receiving a new Super B LFP battery, observe and record the run time it provides when fully charged and used to power your product. This baseline will serve as a reference for future comparisons with older batteries. Keep in mind that the run time may vary depending on your product's configuration and application.

9 Storage

9.1 General information

Proper storage of Super B LFP batteries is essential to ensure safety, maintain optimal performance, and extend battery lifespan. Follow the instructions provided in this section in addition to the information available in the battery's User Manual and Technical Data Sheet.

9.2 Storage preparation

When storing Super B LFP batteries, it is important to strictly adhere to the recommended environmental conditions outlined in the product documentation. Please refer to the applicable Super B LFP battery manual and technical data sheet that can be found on our website: www.super-b.com.

For extended storage periods, observe the following best practices:

- Refer to 4.6 for conditioning the battery for long-term storage
- Switch off the manual battery disconnect switch.
- Maintain the battery system within the environmental conditions for storage specified in the relevant datasheet or LFP battery manual.
- Store LFP batteries in a cool, dry, and well-ventilated area, protected from direct sunlight, heat sources, and moisture.
- If applicable, disconnect the CAN cable to prevent power drain. Or switch off all components which communicate over CAN or LIN, such as displays, chargers, inverters or communication hubs

Improper storage may lead to irreversible battery damage. If, upon inspection, a battery is found to be degraded (e.g. deep discharge), it should be considered damaged and no longer suitable for use.
For detailed environmental specifications, please refer to the relevant LFP battery manual and/or data sheet. Additional details and resources are also available on our website: www.super-b.com.

10 Battery replacement guidelines

10.1 Replacement criteria

Replace the LFP battery if either of the following conditions occurs:

- The LFP battery's runtime decreases to approximately 80% or less of its original capacity.
- The time required to fully charge the LFP battery increases significantly beyond normal levels.

11 Disposal and recycling

Always discharge a Super B LFP battery before disposal. Use electrical tape or other approved covering over the LFP battery connection points to prevent short circuits.
LFP battery recycling is encouraged. Dispose of the LFP battery in accordance with local, state, and federal laws and regulations.

12 Warranty and liability

No rights can be derived from this document. Any installation or use contrary to these instructions may void the warranty granted to you. Please refer to the sales agreement for warranty and other provisions applicable to your purchase. If the product is defective, please contact the dealer, reseller or retailer from whom you purchased the product. They will be able to guide you through the necessary steps for a return, exchange, or resolution of the issue. Super B's liability for any of its products is limited to the corresponding provisions under mandatory applicable law.

IMPORTANT!

Ensure that the installation is carried out in accordance with all applicable local regulations and standards for the application.

SUPER B
lithium batteries

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