



Installation Manual

Bluevolt S-Type Battery



Manufactured in South Africa by Blue Volt Energy (Pty) Ltd

www.bluevolt.co.za

info@bluevolt.co.za

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Introduction

The Bluevolt S-Type lithium iron phosphate (LiFePO₄) battery, developed by Blue Volt Energy (Pty) Ltd, stands as a testament to our unwavering dedication to innovation, exceptional quality and the assurance of customer satisfaction. This guide serves to assist you through the installation and commissioning stages of the Bluevolt S-Type batteries. This manual is updated periodically; please ensure that you have the latest version.

 **Note:** For users well-versed in battery installations, this guide aims to offer straightforward and precise instructions. It is imperative to possess prior experience and relevant skills to ensure the installation is done safely.

Blue Volt Energy (Pty) Ltd T/A Bluevolt

Location: 245 Albert Amon Rd, Meadowdale, Johannesburg, 1614

Website: www.bluevolt.co.za

Support:

For queries regarding installation or technical issues, please liaise with your distributor or reseller.

Advanced Technical Support:

Should you require more specialised technical assistance, please contact

info@bluevolt.co.za

 **Warning:** Adhering closely to the steps provided is crucial to guaranteeing the optimal performance and durability of your Bluevolt S-Type batteries.

Product Codes

The Bluevolt S-Type is available in multiple versions, such as the S12-8. The first number represents the kWh energy storage capacity, while the second number indicates the battery's maximum continuous power delivery in kW. Please be aware that the latest Bluevolt S-Type batteries have the capability to surpass these power limits, delivering up to 1C for a duration of 5 seconds. For comprehensive details, refer to the Bluevolt S-Type Spec Sheet.

Depth of Discharge

Bluevolt batteries have a maximum depth of discharge (DoD) of 90%.

Battery Design and Positioning

The Bluevolt S-Type features a slim design, making it suitable for placement against walls. This battery is intended to stand on the adjustable feet in the base of the enclosure and positioned beneath wall-mounted inverters for a discreet appearance.

Transport and Handling

Each Bluevolt S-Type battery is securely packed on a pallet and wrapped in protective layers for transport. These pallets are designed for easy lifting with tools such as forklifts or pallet jacks. To safely unload the S-Type battery from a vehicle, either four individuals or appropriate machinery, such as a pallet stacker or forklift, are necessary. It is vital to ensure that the battery is either laid flat on its back panel or positioned upright on its adjustable feet. Placing the battery in any alternative orientation, or subjecting it to impacts or excessive vibration will void the warranty.

Installation

Installing the battery is straightforward. It can be set on its adjustable feet and then manoeuvred into the desired location without the need for complex wall mounting. The battery's design allows two individuals to shift it partially off its pallet, tilt it upright, and position it near the final installation spot. The remaining distance can be covered by gently sliding the battery into its final position on its feet. During installation, remember to:

- Ensure a gap of 10mm between the battery's back and the wall for ventilation, as the battery balancing system might occasionally emit heat.
- Provide space between multiple batteries for cable exit through the battery's side grommets.
- Place the battery on a solid and robust surface to prevent the adjustable feet from causing damage. Wood surfaces are not recommended due to potential long-term structural deterioration.

When handling the Bluevolt battery, it is advisable to wear personal protective equipment, including gloves and safety footwear.

Environmental Requirements

The Bluevolt battery has been exclusively designed for indoor usage. This ensures it is positioned away from direct sunlight, heat sources and moisture.

The battery has an IP20 ingress protection rating. For optimal performance, maintain the surrounding temperature between 0 and 30 degrees Celsius. Temperatures above this range can hasten the battery's degradation, while temperatures below zero degrees Celsius will

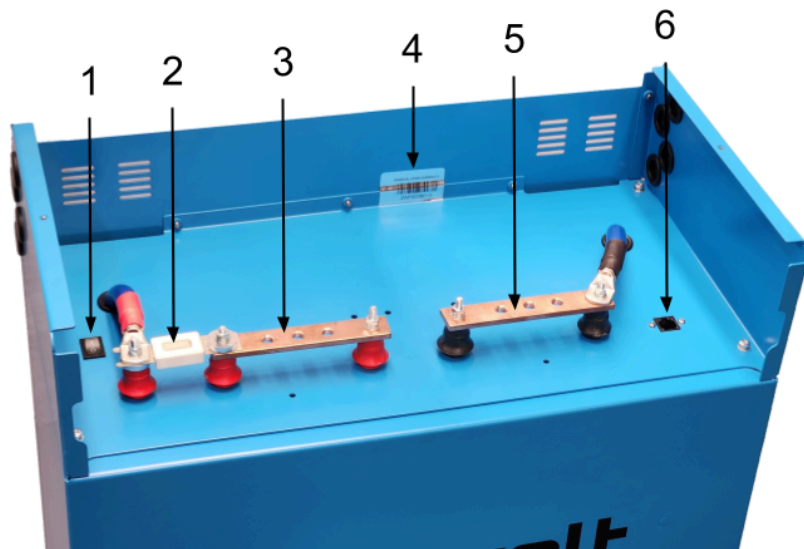
cause the battery BMS to block charging to prevent damage. It is essential to keep the battery at a safe distance from heat sources to prevent overheating.

Battery terminals

The Bluevolt S-Type battery is straightforward to connect. Refer to the image provided.

i Note:

The terminals are designed as bus bars, facilitating easy connection to the battery. Each bus bar offers multiple connection points, simplifying the paralleling process. The terminal holes can accommodate bolts up to 8mm in size.



Bluevolt S-Type battery DC terminals

1. Switch ON / OFF (Controls discharge. Charging is possible regardless of switch position.)
2. Fuse
3. Positive terminal busbar
4. Warranty seal and serial number
5. Negative terminal busbar
6. RJ45 socket for connection to Bluevolt Link or Bluevolt diagnostics equipment only

The polarity of these terminal bus bars can be identified by the colour of the insulators supporting them. As is standard, red indicates positive and black indicates negative. When connecting the battery to the DC bus or inverter, ensure the cables have an appropriate cross-sectional area. This is crucial, especially for extended cable lengths, to minimise voltage drop.

 **Warning:** The RJ45 socket is for connecting a Bluevolt Link CAN Bus controller or Bluevolt's diagnostic and programming tools. Avoid connecting any other devices, including CAN Bus or ethernet, to this socket as this may result in warranty voidance. If you have acquired the Bluevolt Link CAN Bus controller, refer to its dedicated manual. The Bluevolt Link provides CAN communication between Bluevolt batteries and inverters. This device is optional, but can enhance system performance through intelligent charging and balancing. Nonetheless, it is worth noting that Bluevolt batteries are capable of functioning effectively within a 'voltage-based' setup even without the need for CAN communication.

Overcurrent protection

The battery is equipped with an intelligent digital Battery Management System (BMS) and an electronically controlled MOSFET circuit breaker. Additionally, it features a fuse, which is clearly marked in the labelled image, serving as both a safety precaution and overcurrent protection. Should you require replacement fuses, please contact your reseller. Depending on regional regulations, the use of an external isolating device may be necessary.

Switching on and connecting to the DC bus

Your Bluevolt S-Type battery unit is designed with a sophisticated on-off switch mechanism. Follow the steps below to ensure safe connection to the DC bus and inverter:

Preparation: Verify that the DC fuse switch disconnecter or circuit breakers are in the open-circuit (disconnected) position before making the final electrical wire connections between the inverter and the battery.

Connection: Complete the final wire connections between inverter and battery, ensuring that the DC fuse switch disconnecter or circuit breaker remain in the open-circuit (disconnected) state.

Switching On: Maintain the DC fuse switch disconnecter or circuit breaker in the open-circuit (disconnected) state and turn the battery switches to the ON position. Use a multimeter to verify that the voltage at the battery terminals is normal - around 53V is typical. The DC bus and DC side of the inverters should register close to zero volts as the fuse switch disconnecter or circuit breaker is open.

Pre-Charging: Certain inverters can experience significant inrush current upon connection. To prevent damage to the battery, it is crucial to effectively manage and mitigate this. One can pre-charge the DC bus and the DC side of the inverters by either activating the DC-coupled PV (if present and in daytime) or turning on the AC input to the inverter charger (certain brands only). As an alternative, use a pre-charge resistor to transfer energy to the inverter capacitors in a controlled manner to avoid inrush current.

Final Connection: Before closing the fuse-switch-disconnectors or pushing up the DC circuit breakers, ensure the DC bus and DC terminals of the inverter have been pre-charged and measure a minimum of 40V.

Storage

The charged S-Type battery can be stored for up to three months. Switch off the output from the battery by placing the switch in the OFF position. It is essential to do this when the battery is not in use to prevent it from discharging.

Parallel Battery Configuration

Bluevolt S-Type batteries can be connected in parallel, even if the models differ. It is important to note that the continuous power output rating of the S-Type battery may vary depending on the model. When connecting batteries with varying power ratings, ensure that the system's maximum demand accounts for the power (or current) rating of the battery with the lowest output in the group. To determine the total output available from the connected batteries, multiply the lowest power or current rating by the number of batteries. It is advisable to de-rate the system power by an additional 10-20% to account for any load imbalances. For inverters, such as the Sunsynk, where the discharge current is adjustable, users have the flexibility to limit the output.

 **Note:** The latest Bluevolt S-Type batteries have been engineered to handle a 1C discharge for a duration of up to 5 seconds. This feature proves especially advantageous when considering surge loads in a system.

 **Warning:** Always ensure that system configurations are checked and tested to avoid overloading or potential damage.

Inverter-Charger Settings

Charge Current:

An average charge current of 70A or less, per battery, is recommended; this translates to a charging duration of 3-4 hours. Maintaining this charge current, and avoiding any higher values, will prolong battery life.

Voltage Parameters and Bluevolt Battery Setup:

For appropriate settings, please refer to the voltage parameters in the table provided.

	Backup	Off-grid
Absorption / bulk [1]	56 V	Up to 58 V
Float	54 V	54 V
Absorption time	1 hour	15min
Minimum (cut-off) [2]	49.5 V	49.5 V
Low Battery Voltage Warning	51 V	51 V
Restart	51.5 V	51.5 V

Notes

1. In the unlikely event that the cells have had too little time to balance and the battery trips before reaching 55.5V, start with a lower voltage initially (54.5V) and increase it **gradually** over several days or weeks.
2. For inverter-chargers with dynamic cut-off, set all the values to 49.5 V
3. Off-grid installations without utility power can benefit from a higher charging voltage as there may be less time for cell balancing.

If the system has a Bluevolt Link (see the following section), this device will manage the batteries automatically, adjusting the parameters as necessary. If the CAN connection were to be lost, the inverter-charger would default to the values in the table.

Set up with Deye Inverters

Bluevolt S-Type batteries have consistently delivered strong performance in installations with Deye inverters, whether operating with or without CAN bus communication.

Follow the instructions below for setup with Deye inverters in installations without CAN bus communication.

Inverter Menu Item	Recommended Setting
Batt Mode	Use Batt %
Batt Capacity (1x Bluevolt S12)	230 Ah
Batt Capacity (2x Bluevolt S12)	460 Ah
Batt Capacity (3x Bluevolt S12)	690 Ah
Batt Capacity (1x Bluevolt S11)	215 Ah
Batt Capacity (2x Bluevolt S11)	430 Ah
Batt Capacity (3x Bluevolt S11)	645 Ah
Max A Charge	70 A per battery (recommended)
Max A Discharge	150 A per battery (recommended)
Activate Battery	☒
Absorption / bulk	56 V
Float	54 V
Shutdown	20% (min 15% recommended)
Low Batt	30% (recommended)
Restart	40% (recommended)

CAN Bus Inverter Communication

While Bluevolt batteries are exceptionally well suited for a 'voltage-based' setup, they also provide the option for CAN communication through a Bluevolt Link device. This device facilitates seamless communication with inverters. Incorporating the Bluevolt Link or Bluevolt Link Mini into your system can further enhance its capabilities, providing intelligent charging and delivering battery information directly to your inverter.

For in-depth guidance on setting up CAN communication, please see the separate Bluevolt Link user manual.

The Bluevolt Link represents a cutting-edge solution that allows smooth CAN Bus communication between Bluevolt batteries and compatible inverter-chargers. This design innovation contributes to the following:

1. Simplified Architecture:

- a. Through the integration of a separate CAN Bus controller, the system requires only a single CAN Bus chip.
- b. This unique configuration is one of several Bluevolt innovations contributing to the affordability and efficiency of our systems.

2. Advanced Communication Capabilities:

- a. **Precise State of Charge (SoC):** Enables real-time access to the accurate state of charge of the batteries in the system.
- b. **Detailed Battery Information:** Offers insights at both the pack and cell levels as well as critical battery health information.
- c. **Bluevolt Charging Algorithm:** Controls the charging of your batteries, ensuring optimal performance and longevity.

To download the latest version of the manual, please visit our website www.bluevolt.co.za

Troubleshooting

Introduction

This guide provides instructions to troubleshoot the Bluevolt S-Type battery. If you have adhered to the steps provided and still face issues, please get in touch with Bluevolt or the authorised reseller from whom you bought the battery.

Key Features

The distinctive design of the Bluevolt S-Type battery sets it apart. In contrast to certain brands that utilise shunt trip breakers or contactors, the Bluevolt S-Type employs a MOSFET battery disconnect switch to independently manage discharge and charge separately through a MOSFET battery disconnect switch, capable of handling high currents. A notable advantage of this system is that it allows the battery to remain available for discharge during an over-voltage disconnect event, and vice versa for an under-voltage disconnect situation. This feature proves especially advantageous for setups situated far away from technical support.

Possible Problems and Remedial Action

No voltage at battery terminals

Problem/Description:

The battery displays incorrect voltage or zero volts at its main terminals.

 **Note:** Minor voltages might still be detected at the terminals even if the battery discharge switch is off. This is a normal occurrence due to the functioning of the BMS MOSFETs.

Cause/Solution:

 **Warning:** Confirm that there are no short circuits on the DC bus.

1. The battery might have been drained to an extremely low level.
 - a. **Remedial Action:** Try charging the battery by activating the AC input to the inverter charger (some models will charge the DC terminals), switching on the DC-coupled MPPTs (PV), or using an external DC power supply. Once the battery has sufficient charge and the Battery Management System (BMS) has released the battery from the low-voltage alarm state, you should be able to measure voltage at the main terminals.
2. The Battery Management System (BMS) might have detected a short circuit due to the absence of DC bus pre-charging.

Remedial Action: Consult the section titled “Switching on and connecting to the DC bus” and follow the steps for recovery.

 **Note:** If the BMS disconnects the battery due to a short circuit detection alarm, it will reset once it detects that the battery has been physically detached from the DC bus using the circuit breakers or the fuse switch disconnecter. Depending on the system wiring, you might need to disconnect all external links to the battery.

Should the voltage at the main terminals still appear incorrect, contact Bluevolt or your authorised battery reseller. A diagnostic test via the RJ45 socket may be necessary. Remote resetting by Bluevolt could be required. Ensure you have a Windows PC connected to the battery through an RS485 adaptor (available from Bluevolt) and have TeamViewer installed on the PC.

 **Warning:** Overloading the battery can cause the battery to disconnect and attempt to reset to an un-precharged DC bus. An inrush current to the capacitors in the inverter can trigger a short-circuit detection alarm within the battery. The system design and installation must be done in such a way as to avoid overloading of the battery. Battery damage due to overloading may result in warranty voiding.

Battery disconnects randomly

Problem/Description:

The battery pack voltage is within the normal range, but the battery seems to disconnect randomly.

Cause/Solution:

The battery might be overloaded, causing the battery protection mechanism to activate and to disconnect it from the DC bus. Use a DC clamp metre to measure the current. Other potential causes could be a weak cell or extreme ambient temperatures.

If the problem persists, please get in touch with Bluevolt.

Warranty & Repair

Please refer to the warranty document for the Bluevolt S-Type battery.

Expected Product Life

Based on daily usage and an average depth of discharge (DoD) of 70%, the Bluevolt S-Type battery has an anticipated lifespan of over 15 years

For attaining maximum battery longevity and obtaining the best value in terms of cost per kWh, maintaining an average Depth of Discharge (DoD) of between 50% and 60%, regulating the ambient temperature at around 20°C and refraining from imposing excessive loads on the battery are recommended practices

 **Note:** Depth of discharge (DoD) refers to the percentage of a battery's energy discharged relative to its overall capacity.