Affect of Temperature on LiFePO4 Batteries

Key Advisory Points

Alpha ESS is dedicated to providing safe and efficient energy solutions. As part of our commitment to customer safety and product performance, we want to inform our customers about the charging restrictions for Lithium Iron Phosphate (LiFePO4) battery systems in cold weather conditions.



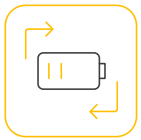
Automatic Charging Restriction Below 0°C (32°F): The Battery Management System (BMS) in Alpha ESS products is designed to automatically prevent charging when the temperature falls below 0°C. This feature ensures the safety and longevity of the battery by avoiding the risk of lithium plating on the anode, which can lead to battery damage. Additionally, as the system temperature approaches 0°C, the BMS gradually reduces the charging power to further protect the battery. Customers may notice a decrease in charging speed as temperatures drop close to freezing.



Industry-Wide Chemical Composition: It's important to note that this charging restriction is not specific to Alpha ESS products. Rather, it is an inherent characteristic of LiFePO4 battery chemistry across all manufacturers. The limitation is due to the chemical composition of these batteries and how they react at low temperatures. Some manufacturers may not implement these safety mechanisms to protect the health and lifespan of the battery.



Why Charging Below Freezing is Risky: Charging LiFePO4 batteries at sub-zero temperatures can cause irreversible damage due to metallic lithium plating. This can compromise battery integrity and increase the risk of failure under stress, regardless of the brand or manufacturer.



What can you do: Housing your battery inside a garage or outside cabinet will support keeping the temperature your battery is stored in above freezing. The battery needs to be kept ventilated so ensure you maintain the separation distances referenced in the installation manual for your specific system.

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