

Application Note: BYD LV Batteries Minimum SOE

Version History

- Version 1.0 – July 2020

Overview

A SolarEdge StorEdge® inverter discharges a battery until a minimum level of energy is reached (minimum State of Energy - minimum SOE). The battery SOE is estimated by the battery management system (BMS) and is not an accurate metric.

When the battery SOE is between the minimum SOE and 100% SOE, the StorEdge inverter and battery system operate in the predefined Energy Management mode.

When the battery SOE drops to 2% below the minimum SOE, the StorEdge inverter will stop operating in the Energy Management mode and will try to charge the battery up to its minimum SOE from PV power. If PV power is not available, the inverter will use power from the grid to charge the battery.

The minimum SOE is maintained by ensuring one of the following:

- Sufficient SOE estimation error margin
- Sufficient time to service the battery in case of a fault before the battery SOE drops to 0% (deep discharge)

Sufficient SOE Estimation Error Margin

The SOE is estimated by the battery BMS, and is not an accurate metric. Every battery type has a different SOE estimation accuracy and algorithm.

A deep discharge may result into irreparable damage to the battery. In the worst case, the battery must be replaced.

The minimum SOE level must be high enough to accommodate estimation errors and prevent the battery from a deep discharge.

Sufficient Time to Service the Battery

Even when the battery is not actively discharged by the inverter, it has a certain self-discharge (self-consumption) rate.

Self-discharge rates vary for different batteries and depend on the battery's chemistry and the power consumption of the BMS electronics.

In case of a fault that prevents the battery charge, a sufficient time must be allowed to service the inverter or battery before the battery reaches a deep discharge due to the self-discharge.

BYD Battery-Box LV

The minimum SOE value of the BYD Battery-Box LV batteries when paired with the StorEdge three phase inverter is set to 15%, mainly to allow a sufficient SOE estimation error margin.

The BYD Battery-Box LV battery SOE estimation is characterized by sharp corrections (up to 12%) at low and high SOE levels, as can be seen in the SolarEdge monitoring platform.

Note that such corrections to the SOE estimation do not mean you get less energy from your battery. The battery charge and discharge rates are determined by other measurements, ensuring full utilization of your battery.

To prevent the battery from reaching a deep discharge, SolarEdge and BYD have agreed on setting the minimum SOE of the BYD Battery-Box LV batteries to 15%.

BYD Battery-Box Premium LVS

SolarEdge is still in the process of integration testing of the StorEdge three phase inverter with the new BYD Battery-Box Premium LVS battery.

Currently, SolarEdge and BYD plan to support a minimum SOE of 10% with the BYD Battery-Box Premium LVS battery (subject to change without notice).