



EG4 Electronic Battery Balancing Methods

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SOC% De-Calibration:

The EG4 line of batteries could require a periodic SOC% recalibration if long durations of idle consumption with an inverter where to occur. Due to the parasitic draw of the idle consumption of an inverter with *multiple* batteries in parallel, this can lead to each battery module experiencing under 0.5A of discharging current which the BMS will not be able to detect. Due to this, the SOC% can become de-calibrated. This can lead to interruptions in power, when power is needed the most during a time of full backup.

SOC% Re-Calibration:

The SOC% re-calibration for EG4 batteries will have multiple reset points-

- Pack Undervoltage Protection
- Pack Overvoltage Protection
- Cell Undervoltage Protection
- Cell Overvoltage Protection
- AC or PV Charging to 100% SOC (Recommended reset point)

These recalibration points will only need to be used if a long duration of idle time is used with an inverter during the idle consumption of multiple batteries in parallel.

The most convenient method for installed batteries into a system will be the *top balancing method* by fully charging the battery or battery bank to 100% SOC in closed loop communication, or when top balancing in open loop communication, the individual battery or battery bank will need to have an applied 56V charging voltage with a Stop AC Charge Voltage and PV Charge Priority Stop Voltage of 57V.

Battery bank SOC% Imbalance:

When multiple batteries are in parallel, a SOC% imbalance can occur between the batteries. This is of no concern. Due to the internal impedance of each battery model being different, and the resistance of the conductors/wires that connect the batteries to the bank and the inverter. This will all lead to an occasional SOC% imbalance when each battery is charging/discharging at different rates of amperage.

Battery Bank SOC% Rebalance Method:

Balancing a battery bank in closed-loop communication will require setting the stop charging percentage to 100%. Or in open-loop communication fully charging the battery bank to 100% SOC. Based on using the applied charging voltage of 56V which is already set in closed loop communication.

Due to the SOC% being an average measurement of the battery bank, the inverter will be required to charge all batteries to 100% SOC to reach the stop charging percentage. This guarantees a fully top balanced battery bank.

Note: Although some BESS systems will not have enough solar power or AC utility to fully charge the entire battery bank at one time, isolating batteries into sections could be more convenient to fully charge.

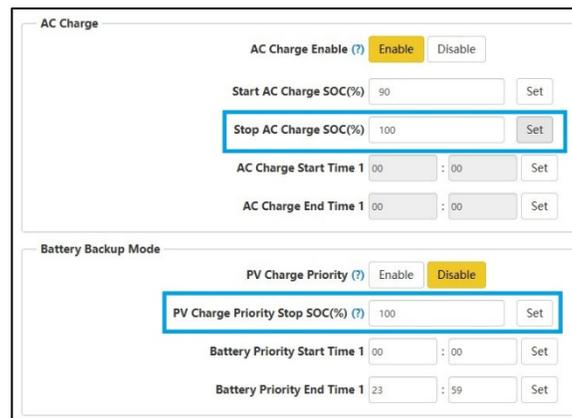
Recommended Settings for SOC Re-Calibration/Rebalancing:

The most common recalibration/balancing method when top balancing is setting PV Charge, AC charge, or Chargeverter charge to 100% SOC.

The newest firmware for EG4 batteries has included an improved SOC% charging logic to provide better accuracy of top balancing when fully charging the battery. These logics have added additional checks during top balancing to help improve accuracy between the SOC% and voltage.

Closed Loop Communication Settings for SOC Re-Calibration/Rebalancing:

When top balancing in closed loop communication, the individual battery or battery bank will be set to charge to Stop AC Charge SOC% and PV Charge Priority Stop SOC% to 100%.



The screenshot displays the settings for AC Charge and Battery Backup Mode. In the AC Charge section, the 'AC Charge Enable' is set to 'Enable'. The 'Start AC Charge SOC(%)' is set to 90, and the 'Stop AC Charge SOC(%)' is set to 100. The 'AC Charge Start Time 1' and 'AC Charge End Time 1' are both set to 00:00. In the Battery Backup Mode section, the 'PV Charge Priority' is set to 'Disable'. The 'PV Charge Priority Stop SOC(%)' is set to 100. The 'Battery Priority Start Time 1' is set to 00:00, and the 'Battery Priority End Time 1' is set to 23:59. The 'Stop AC Charge SOC(%)' and 'PV Charge Priority Stop SOC(%)' fields are highlighted with a blue border.

During the charge, when 95% SOC is reached, the charging current limiter will be enabled and reduce the amperage to 0.25C until 99% SOC is reached then the current limiter will be reduced to 0.05C. During this time, if there are multiple batteries charging, the amount of current seen between each battery could be very little.

Do not interrupt the charging during this time or the batteries may not be able to successfully charge to 100% and re-calibrate and re-balance.

Open Loop Communication Settings for SOC Re-Calibration/Rebalancing:

When top balancing in open loop communication, the individual battery or battery bank will need have an applied 56V Absorb Voltage within Lead-Acid mode.

The image shows two configuration panels. The top panel, titled "Model", contains the following settings: "Measurement" is set to "1: CT"; "CT Direction Reversed" has "Enable" selected and "Disable" is highlighted in yellow; "Battery Type" is set to "1: Lead-acid" and is highlighted with a blue box; "Lithium Brand" is set to "<Empty>"; and a "Set Model" button is highlighted with a blue box. The bottom panel, titled "Lead-acid Battery Setting", contains: "Absorb Voltage(V)" set to "56" and "On Grid Discharge Derate Vbatt(V)" set to "40", both highlighted with blue boxes. Each value has a "Set" button next to it.

Set the stop AC Charge Voltage and PV Charge Priority Stop Voltage of 57V.

The image shows two configuration panels. The top panel, titled "AC Charge", contains: "AC Charge Enable" with "Enable" selected and "Disable" highlighted in yellow; "Start AC Charge SOC(%)" set to "90"; "Stop AC Charge SOC(%)" set to "100"; "AC Charge Start Time 1" set to "00 : 00"; "AC Charge End Time 1" set to "00 : 00"; "AC Charge Based On" set to "SOC/Volt (Accordien)"; "Start AC Charge Volt(V)" set to "95"; "Stop AC Charge Volt(V)" set to "57" and highlighted with a blue box; "AC Charge Start Time 2" set to "00 : 00"; "AC Charge End Time 2" set to "00 : 00"; "AC Charge Power(kW)" set to "10"; "AC Charge Start Time 3" set to "00 : 00"; and "AC Charge End Time 3" set to "00 : 00". The bottom panel, titled "Battery Backup Mode", contains: "PV Charge Priority" with "Enable" selected and "Disable" highlighted in yellow; "PV Charge Priority Stop SOC(%)" set to "100"; "PV Charge Power(kW)" set to "12"; "PV Charge Priority Stop Volt(V)" set to "56" and highlighted with a blue box; "Battery Priority Start Time 1" set to "00 : 00"; "Battery Priority End Time 1" set to "23 : 59"; "Battery Priority Start Time 2" set to "00 : 00"; "Battery Priority End Time 2" set to "00 : 00"; "Battery Priority Start Time 3" set to "00 : 00"; and "Battery Priority End Time 3" set to "00 : 00".

Conclusion:

The above methods should be used as a preventative maintenance and performed regularly every 1-3 months for the most calibrated battery or battery bank. This prevents the individual battery or battery bank from falling into severe imbalance or decalibration and causing performance issues within the system.