DISCOVER ENERGY SYSTEMS

TECHNICAL SERVICE BULLETIN

Altitude Considerations for HELIOS ESS Installation Above 2,000m

CSB Number	855-0026 REV A
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URGENCY

- ○ **HIGH:** Action immediately
- ○ **MEDIUM:** Action when possible
- ○ **LOW:** Action if necessary
- ● **INFORMATION ONLY**

PRODUCTS AFFECTED

HELIOS ESS Lithium Battery 52-48-16000, all firmware versions.

SYMPTOMS OBSERVED

AHJ plan review comments citing the 2,000 m operating altitude in the Installation and Operation Manual and requesting a derating calculation before permit approval.

CAUSE

The 2,000 m value is the altitude at which the HELIOS was evaluated under UL 1973. The certification does not test operation at other altitudes, so the figure reflects the tested condition rather than a performance limit or a point requiring derating. It is commonly read as a maximum installation altitude.

FIELD CORRECTIVE ACTIONS

Technical position

- No capacity, energy, power or voltage derating applies to the HELIOS battery as a function of altitude.
- Altitude affects equipment two ways: reduced dielectric strength of air, and reduced convective cooling.
- Dielectric. Above 2,000 m, thinner air has lower dielectric strength, which is why creepage and clearance distances are corrected upward at altitude. These corrections scale with operating voltage. The HELIOS operates at 43.2 to 56.8 VDC, where the required distances are already small, so the correction has no practical effect on the battery.
- Thermal. Thinner air carries away less heat, so the battery has less cooling margin at altitude. The HELIOS operates at roughly 98% efficiency and generates little internal heat, so this reduced margin is minor and only becomes relevant when the battery is run near its continuous current limit at high ambient temperature. In most systems the primary heat sources are the inverter and power conversion equipment, not the battery.
- Where reduced cooling does raise cell temperatures, the BMS manages current, duration and thermal limits directly. It will reduce charge or discharge current and, if necessary, trigger over-temperature protection to stop or disconnect charging.

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- Charge voltage targets are BMS-managed in closed loop and are not user adjustable. Where thermal conditions warrant a reduced charge rate, limit maximum charge current or power at the inverter rather than modifying voltage setpoints.

BMS thermal current management

In closed-loop operation the BMS derates the charge and discharge current request based on cell temperature. As temperature approaches the high-temperature fault level, the current request ramps down to zero, reaching 0 mA at the fault level. The ramp begins 5 degC below the fault level and steps down by degree. If temperature still rises to or above the fault level, the battery faults after 5 seconds. Fault temperatures may differ between charge and discharge. This behaviour is inherent to the BMS and requires no installer configuration.

Recommended practice above 2,000 m

- Maintain all enclosure clearances and ventilation per the Installation and Operation Manual. Do not reduce spacing.
- Confirm ambient temperature at the install location stays within the manual's operating range.
- Apply humidity and temperature control appropriate to the site.
- Where continuous charge or discharge approaches the nameplate continuous rating, reduce the inverter current or power limit to restore thermal margin.
- Enable battery temperature trending through LYNK II, LYNK ACCESS or LYNK CLOUD and monitor through the first full seasonal cycle. Add current adjustment where the installer sees fit based on observed conditions.

Power conversion equipment

Altitude derating for inverters and other power conversion equipment is set by that manufacturer. Those devices run at higher voltages and dissipate more heat, and published derating tables commonly exist for them. Consult the inverter manufacturer's documentation for the applicable derating at the install elevation.

Limitations

The HELIOS ESS was evaluated under UL 1973 and UL 9540 at an operating altitude below 2,000 m. The listing does not test or approve operation above that altitude. This bulletin is Discover Energy Systems' engineering guidance for installations above 2,000 m. It is not an extension of the product listing and not a blanket authorization. Installations above 2,000 m remain subject to AHJ acceptance.

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