The New Safety Baseline for Energy Storage：Neutral-Earth Bonding

Why "Dynamic Earthing" is Essential in Energy Storage Safety?

In the revolution of new energy, energy storage systems are emerging as the "power heart" for homes and businesses. However, system safety remains a core concern for users – including risks such as leakage, reverse power feeding, and islanding. How to mitigate these hazards? The innovative application of the NEB (Neutral-Earth Bonding) function is setting a new benchmark for energy storage safety. Particularly in markets with frequent grid fluctuations, such as African countries, this technology has become a safety imperative.

I. Safety Hazards in Traditional Energy Storage Systems

In systems not equipped with the NEB function, the following risks are hard to avoid:

Islanding and Reverse Power Feeding: When the grid is disconnected, if the energy storage system fails to completely sever its connection to the grid (including the neutral line N), it may feed power back, posing a life-threatening risk to maintenance personnel. In regions with unstable grids, this is particularly prone to triggering chain reactions.

Earthing Conflicts: In on-grid mode, if the neutral line (N) and protective earth (PE) on the load side are directly shorted, it can lead to multiple earthing points, causing circulating currents, nuisance tripping of residual current devices, and even ground wire overload and fire. In complex commercial and industrial environments, this potential risk significantly increases operational and maintenance costs, as well as safety hazards.

Off-Grid Floating Voltage: When operating off-grid, if the N line is not reliably connected to PE, the equipment casing may become live due to potential drift of the N line, posing an electric shock hazard. For C&I applications with extremely high demands for power continuity and safety, such as data centers, hospitals, or production lines, any form of voltage instability or electric shock risk is unacceptable.

II. Principle of NEB Function: Smart Dynamic Earthing

The NEB function utilizes intelligent relay control to achieve automatic switching between two modes, ensuring absolute safety for the energy storage system in any operational state:

On-Grid Mode:

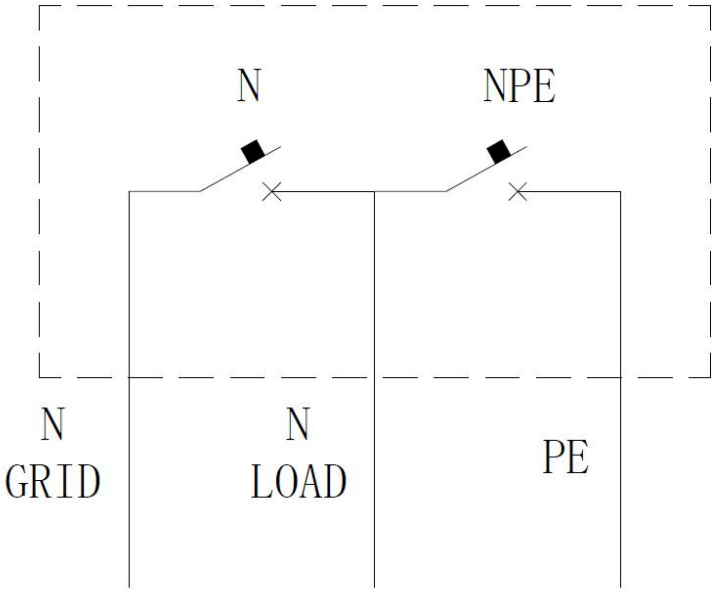
N-PE disconnect: Avoids conflict with the existing grid earthing system, eliminates the risk of circulating currents, and ensures stable operation on the grid side.

Synchronous disconnection of grid N line: Disconnects synchronously with the phase lines (L), ensuring complete isolation from the grid and eliminating the possibility of reverse power feeding from the source.

Off-Grid Mode:

N-PE connect: Establishes an independent neutral point, eliminates floating voltage on the N line, and safeguards personnel, providing a robust barrier for both people and equipment, especially in standalone operation without grid support.

Isolation of grid N line: Completely severs the electrical connection to the grid, preventing accidental reverse power feeding, achieving true physical isolation. The NEB function is not merely a simple switch operation; it actively monitors neutral point potential fluctuations and triggers protective actions in advance, nipping risks in the bud. This achieves more proactive and intelligent safety management.



Circuit diagram of NEB

III. International Standards and Market Imperatives

Energy storage system safety has become a global focal point, with countries and regions worldwide issuing stringent standards, incorporating NEB function or similar neutral point management requirements into mandatory regulations. ATESS's NEB function fully complies with these most rigorous global safety requirements:

South Africa: SANS 10142-1 and NRS 097-2 explicitly mandate that energy storage systems must enable the NEB function in off-grid mode, to address its unique grid characteristics and safety needs.

European Union: IEC 62109-2 clearly requires dynamic neutral point management during on-grid/off-grid switching, ensuring system compatibility and safety in complex grid environments.

North American Market: UL1741 and IEEE 1547-2018 standards mandate all-pole disconnection for islanding protection. The NEB function is one of the key technologies to achieve this requirement.

Australia/New Zealand: AS/NZS 4777.2 stipulates that energy storage systems must have automatic earthing switching functionality, a requirement perfectly met by ATESS's NEB design.

Southeast Asia: The latest amendments from Thailand's PEA and Malaysia's ST include new provisions for N-PE dynamic isolation, further highlighting the widespread adoption and importance of this technology globally. ATESS consistently adheres to mainstream global safety standards, ensuring product compliance and high safety across the globe, providing customers with a worry-free energy storage experience.

IV. ATESS Energy Storage Solutions' Integration with NEB Function

As a global provider of energy storage solutions, we always prioritize system safety. So we have integrated the NEB functions into the ATESS HPS15-50KTL, HPS100KTL, HPS100/150, HPS100/150HV , and PCS250/350S series energy storage inverters, delivering safe and reassuring products to global users.

Highly Integrated Design: The ATESS HPS and PCS250/350S series are compact solutions that support multiple connections, including battery, load, grid, and solar, flexibly adapting to various complex C&I application scenarios, significantly reducing transportation and installation costs.

Ultimate Seamless Transfer: The ATESS energy storage solutions boast an industry-leading 10-millisecond seamless transfer capability. In the event of an unexpected grid outage, the NEB function works with the system to achieve instantaneous on-grid to off-grid switching, ensuring uninterrupted power supply to critical loads and guaranteeing business continuity for users.

Conclusion

In the era of new energy, safety must not be compromised for cost but should instead serve as the foundation for technological innovation. The NEB function, featuring its innovative dynamic earthing design, redefines the safety boundary of energy storage systems. Even when confronted with mercurial grid conditions globally, this technology leaves no room for risk.