

Active Load Balancers



Active load balancers (ALB) are the ultimate answer to power quality problems in installations caused by unbalanced load conditions for a range of segments and applications. They are a high performance, compact, flexible, modular and cost-effective type of active power filters (APF) that provide an instantaneous and effective response to power quality problems in low or high voltage electric power systems. They enable longer equipment lifetime, higher process reliability, improved power system capacity and stability, and reduced energy losses, complying with most demanding power quality standards and grid codes.

Using single-phase loads on a three-phase electric power system (connected phase-to-phase or phase-to-neutral) results in unbalanced load conditions in the system. Unbalanced load currents result in unbalanced voltages and affect other loads connected at the point of common coupling. Unbalanced load conditions also cause excessive neutral current, resulting in overheating motors and transformers, power losses and lower system efficiencies. Load balancing is necessary to improve the power quality and efficiency of the system.

Properly designed and rated ALBs can balance any unbalanced load from the supply system point of view. Any unbalanced load can be converted to a symmetrical three-phase active power load only.



Typical Applications

ALBs have few low and high voltage potential applications where their use offers many benefits.

- Arc welding machines: Shielded metal arc, gas tungsten arc, gas metal arc, flux-cored arc, submerged arc and electroslag welding.
- Resistance welding machines: Spot, seam, butt, flash, projection and upset welding.
- Single-phase loads not well distributed in a three-phase system: Computers, lighting, air conditioners, electric vehicles, etc.
- Railway electrification systems: Trains & trams
- Operation of single-phase arc furnace loads.
- Single-phase generators such as small wind turbines and photovoltaics connected to the distribution network via single-phase power electronic inverters.

Benefits

Main benefits of ALBs can be summarized as:

- Improve voltage unbalance on the phases and reduce neutral current which increases the safety of the installation and allows sensitive loads to operate.
- Avoid transformers' saturation & overloading.
- Reduce power losses and voltage drop in neutral conductors.
- Reduce the oscillating torque in the rotating machines that appears because of load variations in the system.
- Avoid electrical equipment overheating and efficiency loss that causes premature failures.