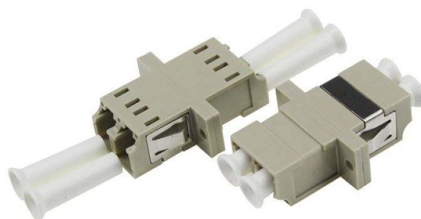


Photovoltaic panel lightning protection module



Overview

To avoid a direct lightning strike, all photovoltaic panels should be inside the protection zone (rolling sphere model).

Key Takeaways

A photovoltaic panel lightning protection module safeguards solar panels and inverters from direct and indirect lightning strikes by discharging surges and ensuring system grounding. Purpose and Importance

Lightning protection modules are essential for protecting PV systems from overvoltage and surges caused by direct strikes, nearby lightning, or switching operations. Without protection, solar modules, inverters, and other electronic components can suffer irreparable damage, leading to costly repairs or total system failure. Effective protection ensures system reliability, safety, and long-term profitability.

Key Components and Functions

- Surge Protective Devices (SPDs):
- DC-SPDs protect the direct current side, including solar modules and inverters, by detecting voltage spikes and safely discharging excess energy to the ground.
- AC-SPDs protect the alternating current side, particularly the inverter output, from surges entering the grid.

- Grounding and Earthing:
 - PV panels, metal frames, and mounting structures must be connected to a grounding system to safely dissipate lightning currents .
 - Lightning protection cables should maintain a distance of 0.5–1 meter from PV components to prevent direct conduction while ensuring effective dissipation.
- Lightning Arrestors and Shielding:
 - Strategically placed lightning arrestors redirect lightning currents away from sensitive components.
 - Shielded DC cables and metal housings in junction boxes help divert partial currents into the grounding system, minimizing damage .
- Type I and II Protection:
 - Type I SPDs handle direct lightning strikes, while Type II SPDs manage indirect surges. Modern modules often combine both types for flexible protection .

Installation Considerations

- Modules should be installed according to EN 61643-32 and EN 61643-11 standards, ensuring compliance with international safety requirements .
- For inverters with multiple MPP trackers, surge protection modules like the VARITECTOR VPU series can connect to two trackers and are designed for voltages from 600 V to 1,500 V .
- Proper installation includes connecting DC cables to Type I SPDs before the inverter and using Type II SPDs on the DC side for longer cable runs .

Benefits

- Protects system components from overvoltage and lightning-induced damage.
- Maintains system uptime and reduces repair costs.
- Enhances safety for personnel and property near the PV installation.
- Ensures compliance with international standards, supporting insurance and risk management strategies . In summary, a photovoltaic panel lightning protection module integrates SPDs, grounding, shielding, and arrestors to safeguard solar installations from both direct and indirect lightning effects, ensuring long-term reliability, safety, and efficiency of the PV system.

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