Grounding information for photovoltaic modules

The grounding of photovoltaic modules is a technical operation regulated by specific standards, offering safety benefits but also potential critical issues if not carried out correctly.

Regulations

1. 1.European regulations: Directive 2014/35/EU sets the safety requirements for low-voltage electrical equipment. Photovoltaic modules must comply with EN 61730 standards, which cover PV module safety.
2. Italian regulations: In Italy, the main references are Ministerial Decree 37/2008, which regulates the installation and maintenance of electrical systems. In addition, CEI 0-21 defines the technical rules for connecting photovoltaic systems to the electrical grid.
3. Grounding system standards: It is essential to follow grounding requirements defined in CEI 64-8 (Technical standard for electrical systems). These standards specify how to design an effective grounding system and which materials must be used.

Pros (Advantages)

- **Protection against electric shock:** Protects people from the risk of electric shock caused by insulation faults that could energize metal frames.
- **Lightning protection:** Essential for integrating the system into a lightning protection system, safely dissipating excess energy into the ground.
- **System stability:** Reduces overvoltages that could damage the inverter or other sensitive electronic components.
- **Regulatory compliance:** In 2026, compliance with CEI standards remains a key requirement for safety and for access to incentives or tax benefits (such as the 50% tax deduction confirmed for primary residences).

Cons (Potential critical issues)

- **Galvanic corrosion:** If incompatible materials are used between the module frame and the grounding system, galvanic corrosion may occur, degrading components over time.
- **PID effect (Potential Induced Degradation):** In some module types, grounding the frame may promote leakage currents to ground, accelerating cell degradation and reducing long-term system efficiency.
- **Installation complexity:** Requires additional cabling and the use of specific clamps that penetrate the oxidation (anodized) layer of aluminum to ensure long-lasting electrical contact.

When is grounding mandatory?

Grounding is not always mandatory for modules if they are classified as Class II equipment (double insulation), unless required for lightning protection or explicitly requested by the module manufacturer to ensure performance.

However, metal support structures must always be grounded.

Grounding in Sun Ballast systems

Sun Ballast systems are made of concrete, therefore the structure itself does not require grounding. The module-to-ballast fixing systems we offer can be of two types, depending on customer requirements:

a. Aluminum clamps: No grounding through the clamp.

b. Steel clamp: patented PowerClamp system.

By biting through the anodization layer of the module frame, it allows the grounding cable lug to be connected directly to the clamp screw. Through the clamp, electrical continuity (equipotential bonding) is created between modules; therefore, it is only necessary to jumper one group of modules to the next. See the specifications in the PowerClamp fixing system technical datasheet.

Important notes for those who decide to ground the system

Earth resistance requirements for photovoltaic modules

1. Reference standards: Standards such as CEI 64-8 in Italy and international standards like IEC 61730 define specific requirements for grounding PV modules. These standards indicate that earth resistance must be low enough to ensure electrical safety.
2. Resistance limits: In general, it is recommended that earth resistance for PV systems be below 10 ohms for residential installations and 4 ohms for public or industrial installations, unless otherwise specified by local regulations. In some cases, recommended values may be even below 5 ohms, depending on the installation conditions.
3. International standards: Some international standards, such as NFPA 70 (NEC) in the United States, recommend maintaining sufficiently low earth resistance, typically below 5 ohms.
4. Testing and maintenance: It is essential to measure earth resistance during installation and during scheduled maintenance. In some cases, regular monitoring of earth resistance is recommended to ensure it remains below the limits set by regulations.