



Simple and Reliable Solar Power Generation

DEHN Protects Photovoltaic (PV) systems.

Due to their exposed installation sites and very likely large collection areas, Photovoltaic (PV) installations are at a high risk of damage due to both direct and indirect lightning strikes. Since the PV system is connected directly to the building electrical system, the subsequent damage from these surges can cause serious damage to PV installations, expensive inverters and the building electrical system. Damage is not only limited to potentially high repair costs but also loss of service and important revenue for Solar Power plants.

External lightning protection for roof mounted systems.

A risk assessment according to BSEN 62305 will determine if a structure requires an external lightning protection system to be installed. The risk assessment can easily be undertaken using the DEHNsupport Toolbox / DEHN Risk tool software and from this the lightning protection level can be determined along with the appropriate protection measures required.

If however you are mounting the PV panel array onto a building that has a pre-existing lightning protection system (LPS), as would probably be the case on a modern commercial building, then we need to establish the separation distance from the LPS to the PV array. This is to allow for the flash over effect from array to grounded structures.

The installer of the LPS will be able to advise on this separation distance, but in any event if the array has been cross bonded to that LPS or a metal roof that is its own LPS then the separation distance cannot be maintained so surge protection shall be required.



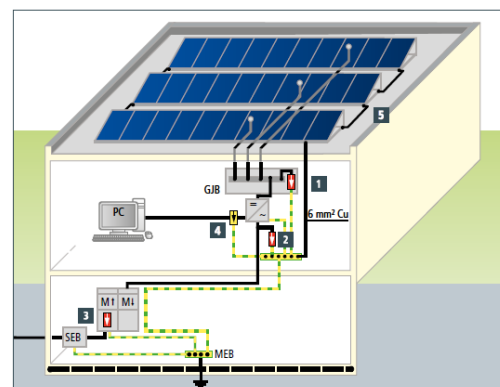
It is possible to fit slim line air termination rods to protect the PV panels and maintain the separation distance. They mount onto the back of the panel and extend approx. 300mm up lifting the threat of direct strike from the panel and onto those air termination tips. (See image below) This solution offer the benefit of an optimised slim design which minimise the effects of shadows being cast on the PV modules. The spacing between the PV panel rows may need to be adjusted slightly to allow for the extended tip, these tips and fixings are available from Segen. The installer will need to seek advice regarding the spacing of the tips from to another.

Surge protection for roof mounted systems.

When installing Surge protection on PV systems the distinction has to be made between buildings with external lightning protection and buildings without.

Buildings without external lightning protection.

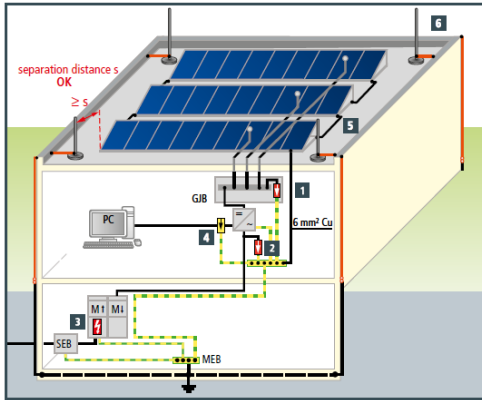
As only an external lightning protection system can protect PV installations and buildings from a direct strike, Type 2 Surge Protection Devices (SPD's) would typically be used to protect the inverters and AC electrical system from surges



induced by nearby indirect lightning strikes and also surges transmitted by the AC electrical grid. You may have seen these in some inverter models from Power One and SMA. It is also worth remembering that you look at the terms and conditions of the inverter many suppliers require that the surge device is fitted to cover aspects of the warranty.

Surge protection on DC and AC electrical supplies can be provided by the DEHNguard **RED/Line** Type 2 range of SPD's.

Buildings with external lightning protection and sufficient separation distance.



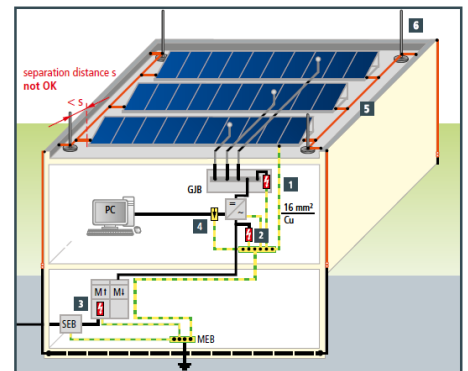
The PV system must be located within the protective zone of the isolated air termination system and the separation distance must also be maintained. If both these factors are met, the PV system is now protected from direct strikes and the possibility of flashover.

Surge protection on the inverter DC and AC electrical supplies can be provided by the DEHNguard **RED/Line** Type 2 range of SPD's. The main AC electrical incoming service into the building must now also be bonded with a Type 1 SPD such as the **RED/Line** DEHNshield.

Buildings with external lightning protection and insufficient separation distance.

If the separation distance cannot be maintained, for example in the case of a metal roof then lightning equipotential bonding must be carried out using Type 1 SPD's due to the risk of a flashover bringing lightning currents into the building.

The DC and AC electrical incoming services into the building must now be bonded with Type 1 SPD's such as the **RED/Line** DEHNshield for AC supplies and the DEHNlimit for DC supplies.



950530 type 2 DC SPD



900345 type 1 DC SPD

Protection for retrofit PV systems.

Caution must be taken when retrofitting PV systems and plant equipment onto buildings that already have an existing external lightning protection system in place.

On such buildings where an external lightning protection system has already been installed to BSEN 62305, care must be taken to ensure that the retro fit installation of a PV system does not render the existing lightning protection system non-compliant.

A PV system installed above the protective zone offered by the existing lightning protection system may now be at risk of receiving a direct lightning strike. Not only could this make the existing lightning protection system non-compliant it could also provide a path for lightning currents to enter the building and endanger life.

In order to avoid this, steps should be taken to ensure that the PV system is incorporated into protective zone of the existing air termination system and protected against direct lightning strikes. Additionally, the correct surge and lightning equipotential bonding SPD's should be installed where required on incoming services.

Co-ordination between PV designers, installers and lightning protection specialists is essential to ensure the continued integrity of the lightning protection system and so not compromise the installation.

DEHN have extensive experience in the design and development of Lightning Protection solutions for PV systems with a wide range of dedicated products aimed specifically at protecting PV installations.

For more information, a dedicated brochure (DS109) for protecting Photovoltaic systems is available. Please contact Segen/DEHN (UK) Ltd for more information.