

Earthing and Surge Protection of Solar (Photovoltaic) Systems and Inverter Systems.

Solar systems are installed for the following reasons:

- For continuity of energy supply in regions with unreliable energy supply.
- To cut the rising cost of energy supply.
- To eventually become independent of the energy supplier.
- To become more Green Energy compliant.

These Solar systems involve considerable investment and the expected lifetime of a system is currently > 20 years.

It is therefore of utmost importance that the system be correctly maintained and protected from the elements.

One of the most damaging of elements is lightning and surge transients and like all electrical devices, Solar systems are sensitive to over voltages.

Components such as Solar panels, Inverters, batteries, MPPTs and cables are all exposed to lightning and surge transients and therefore need to be protected against this phenomena.

Firstly it is imperative that structural earthing of all the equipment including the Solar panels and mounting systems is done according to SANS 62305.

These earthing systems (whether it be earth electrodes or earth mats or Crows Foot Earth) must be bonded back to the mains earth.

This is shown in figure1.

There is a choice of lightning / surge protection devices that may be fitted to an installation. Table 1 and the explanation below should make the choice of which products to select easier for the end user, although **Drensky Technology** as an installer would advise on the correct surge protection to be installed.

For protection of a solar system there is the choice of using Type 1 and Type 2 devices or Type 2 devices only.

Simplistically a Type 1 device is used to protect against lightning transients and a Type 2 device is used to protect against switching transients. A common example of switching transients would be load shedding.

These devices are available for both DC applications and AC applications (Three phase and Single phase)

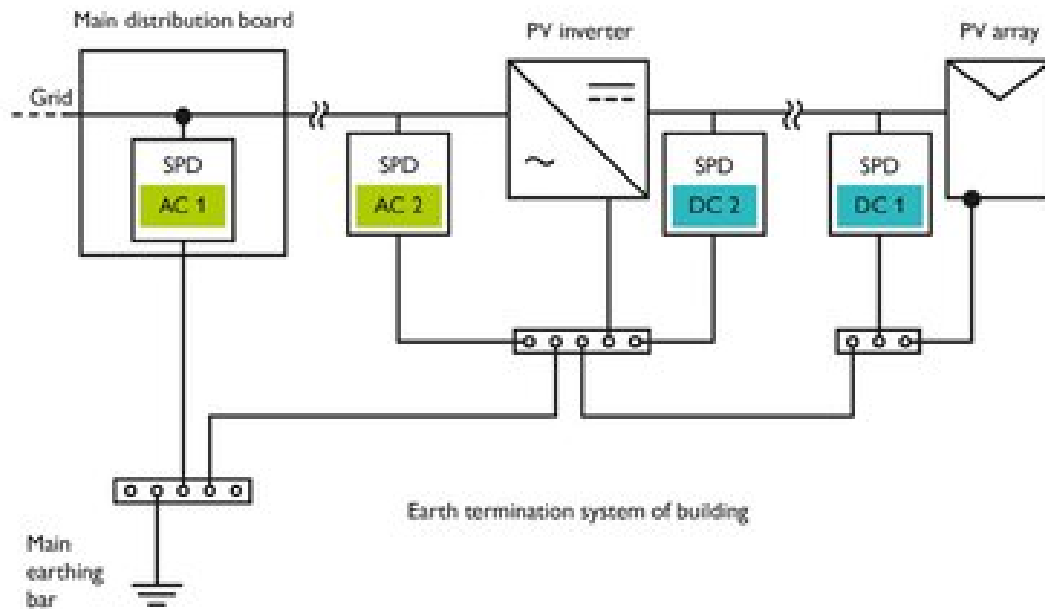


Figure 1 Courtesy of Phoenix Contact

	AC Voltage 1	AC Voltage 2	DC Voltage 1	DC Voltage 2
Installation Location	Main Distribution	AC Side of Inverter (Cable length to the main DB $\geq 10\text{m}$)	DC Side of Inverter (Cable length to the main DB $\geq 10\text{m}$)	Near the Solar panels or entrance to the building
Without external lightning protection	Type 2(1) SPD	Type 2 SPD	Type 2 SPD	Type 2 SPD
With external lightning protection, separation distance is observed	Type 1 SPD	Type 2 SPD	Type 2 SPD	Type 2 SPD
With external lightning protection, separation distance is not observed	Type 1 SPD	Type 1 SPD	Type 1 SPD	Type 1 SPD

Table 1

Images of some Lightning / Surge protection Devices



Type 1+2 (AC) Three Phase

Type 2 (AC) Three phase

Type 2 (DC)



In a nearby strike, the wiring in a building or photovoltaic system acts like an antenna, and if unprotected and/or ungrounded can feed thousands of volts back into your inverter and other equipment.

Surge and lightning protection should be an integral part of an installation and should not be excluded. Southern Africa has extreme lightning energy and many power supply issues therefore exposing all electronic equipment to high risk of damage and destruction.