PV Fact Sheet
09 | Earthing of PV installations

Earthing of the surge protection in a PV installation

This fact sheet focuses on photovoltaic installations on top of buildings within the European Union. One essential part of such an installation is the PV combiner box. These boxes are used to combine several strings and to protect against overvoltage and feature many more functions.

In the event of a lightning strike, the overvoltage occurs within a radius of approx. 2 km, which can affect and destroy all electrical equipment - including a PV system. For this reason, the following rules must be considered within the EU for the commissioning of a PV system. These requirements are defined in the EN 51643-32:2020.

Which advantages does surge protection offer?

Surge protection products are used to shield devices against the high voltages created, for instance, by lightning strikes. This achieved by means of varistors, which lower their resistance with rising voltage. If a sudden surge occurs, the varistors lose almost all resistance and thereby redirect the overload into the earth connector.

In order to reliably discharge this overload, it must be ensured that each surge device is connected to an equipotential bonding rail. In the PV system shown below, the DC SPD **(1)** is connected to the equipotential bonding rail **(A)** and the DC SPD **(2)** to the equipotential bonding rail **(B)**. The PV modules are also connected to the equipotential bonding rail **(A)**. Looping the earth line of the PV modules through e. g. the DC SPD, which is usually a combiner box, is not permitted for safety reasons.

The reason for this is the distinction between functional earth and protective earth. The **functional earth** is the earth wire that is connected to an SPD. Its function is to discharge the overvoltage. The **protective earth** is the earthing of the modules to protect against electric shock. Separating the protective earth and functional earth ensures that protection is still provided when the combiner box is removed. The individual equipotential bonding bars are finally brought together at the main earthing connection point.

The cable **diameter of the earthing cable** is clearly defined in the EN 51643-32:2020 and is always linked to the installation environment. If an SPD Type II must be used a min. 6mm² earthing cable must be installed. And if an SPD Type I or I+II must be used a min. 16mm² earthing cable must be installed.

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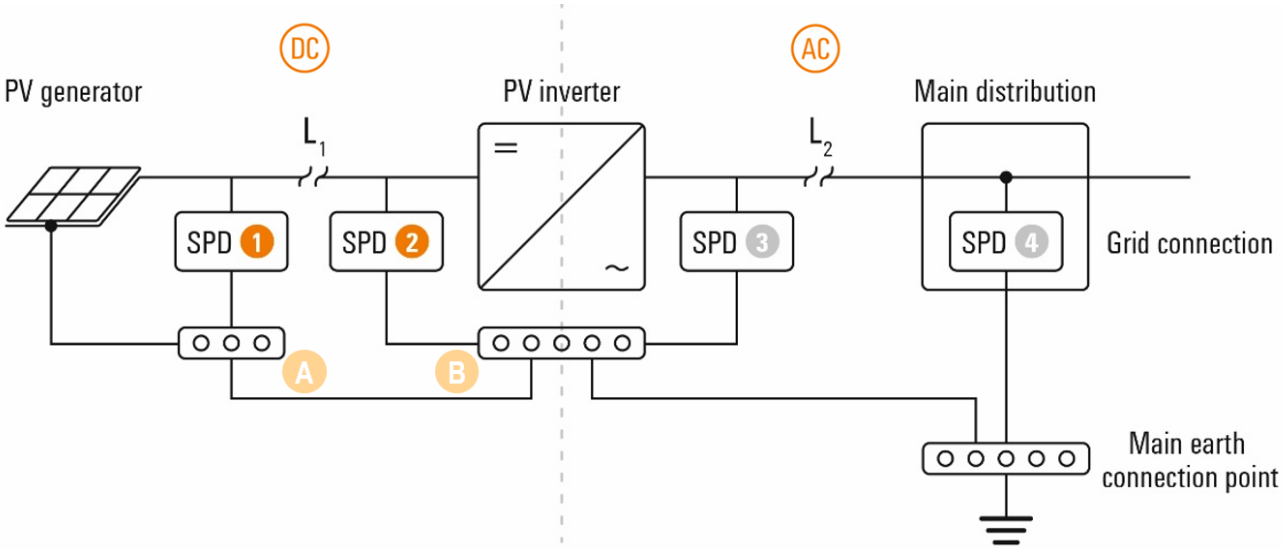

Figure 1: Source: EN 51643-32:2020 - Installation of SPDs in a building without external lightning protection

Advantages of Weidmüller products

PV Next combiner boxes and overvoltage protection boxes (OVP Boxes) are small enough to be placed close to the PV modules. This means that they can safeguard against thermal damages to the building/house in the event of a lightning strike. The voltage protection units (VPUs) can be replaced very easily and quickly thanks to their design as plug-in elements. In addition, the failure of a VPU can be easily detected using the remote contact or the signal fields.

Figure 1: Weidmüller PV Next combiner box

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