

Sustainable protection of power systems and installations

VARITECTOR PU PV for more safety

Lightning and surge protection

Photovoltaic power generation is one of the fastest growing renewable energy sources. Every year, roof systems and PV parks are installed, generating hundreds of megawatts. Best system availability and minimized operational expenses (OPEX) improve the profitability of systems of any size.

PV systems are directly exposed to environmental influences because they are always installed in exposed locations. Therefore the probability of lightning strikes and resulting overvoltage is high. The components of unprotected PV systems are again and again considerably damaged. This leads to high repair and replacement costs, system downtimes and loss of sales.

Automation systems, monitoring devices and PV inverters must be protected reliably and according to current standards. IEC and UL standards define the guidelines that must be followed when installing modern PV systems.

1,000 V
1,500 V

I_{scpv}
11 kA

Pluggable
inserts

up to
4,000 m



DC protection for 1,000 V applications

Type	Lightning surge current (I_{imp})	Leakage current (I_n/I_{max})	Order No.
VPU PV I+II 3 R 1000	6,25 kA	20/40 kA	2530620000
VPU PV I+II 3 1000	6,25 kA	20/40 kA	2530610000
VPU PV II 3 R 1000	-	20/40 kA	2530180000
VPU PV II 3 1000	-	20/40 kA	2530550000

DC protection for 1,500 V applications

Type	Lightning surge current (I_{imp})	Leakage current (I_n/I_{max})	Order No.
VPU PV I+II 3 R 1500	5 kA	20/30 kA	2530590000
VPU PV I+II 3 1500	5 kA	20/30 kA	2530580000
VPU PV II 3 R 1500	-	20/30 kA	2530650000
VPU PV II 3 1500	-	20/30 kA	2530640000



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Selection guide surge protection

PV systems with external lightning protection

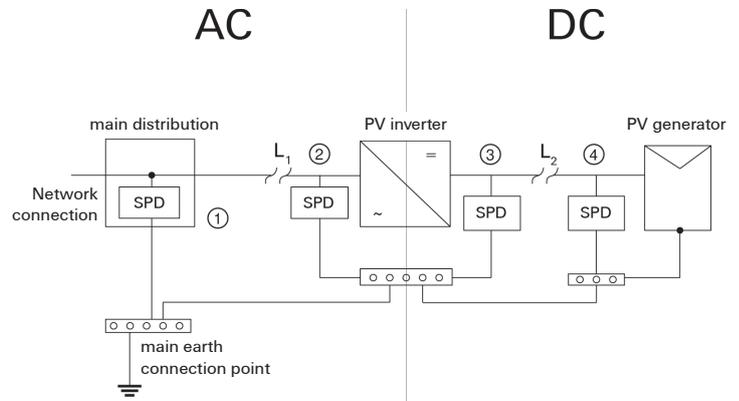
Type II surge protection can be used, provided the separation distance is maintained (usually > 0.7 m to 1 m). If the separation distance is not maintained, a surge protection Type I for DC cabling is required.

PV systems without external lightning protection

This is a common design for which surge protection Type II must be provided for DC cabling.

The figure on the right shows the general architecture of a PV system. The table below is intended to help you select the correct surge protection products according to the specifications of applicable standards in a PV system.

L_1 describes the cable length between the main distribution board and PV inverter (AC side) and L_2 describes the line length between PV inverter and PV generator (DC side). With a line length > 10 m, an SPD is required on both sides by the standard.



External lightning protection system	Observe separation distance	Line length $L_1 < 10$ m	Line length $L_2 < 10$ m	Place of installation ①	Place of installation ②	Place of installation ③	Place of installation ④
no	-	no	no	Type II AC	Type II AC	Type II DC	Type II DC
no	-	no	yes	Type II AC	Type II AC	Type II DC	-
no	-	yes	no	Type II AC	-	Type II DC	Type II DC
no	-	yes	yes	Type II AC	-	Type II DC	-
yes	yes	no	no	Type I AC	Type II AC	Type II DC	Type II DC
yes	yes	no	yes	Type I AC	Type II AC	Type II DC	-
yes	yes	yes	no	Type I AC	-	Type II DC	Type II DC
yes	yes	yes	yes	Type I AC	-	Type II DC	-
yes	no	no	no	Type I AC	Type I AC*	Type I DC	Type I DC
yes	no	no	yes	Type I AC	Type I AC*	Type I DC	-
yes	no	yes	no	Type I AC	-	Type I DC	Type I DC
yes	no	yes	yes	Type I AC	-	Type I DC	-

*If the inverter and the main distribution board are connected to the same earthing bar by an earthing cable not longer than 0.5 m, no SPD is required at installation location "2".



Recommendation

Since PV systems are usually installed in unprotected environments (danger from direct lightning strikes) it is always advisable to install type I+II surge protection. This increases also the service life of the protective components used.

