



Advantages of Fronius inverters with optional DC overvoltage protection (SPD)

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Version 02 05/2024

Business Unit Solar Energy

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An SPD (Surge Protective Device) is a device for protection against transient voltages and pulse currents. Surges can be caused by lightning – direct strike or indirect strike into the electrical systems – or by switching operations in the public grid.

According to international and national standards, PV systems must be protected against overvoltages using SPDs (e.g., IEC 61643-32, IEC 60364-7-712)

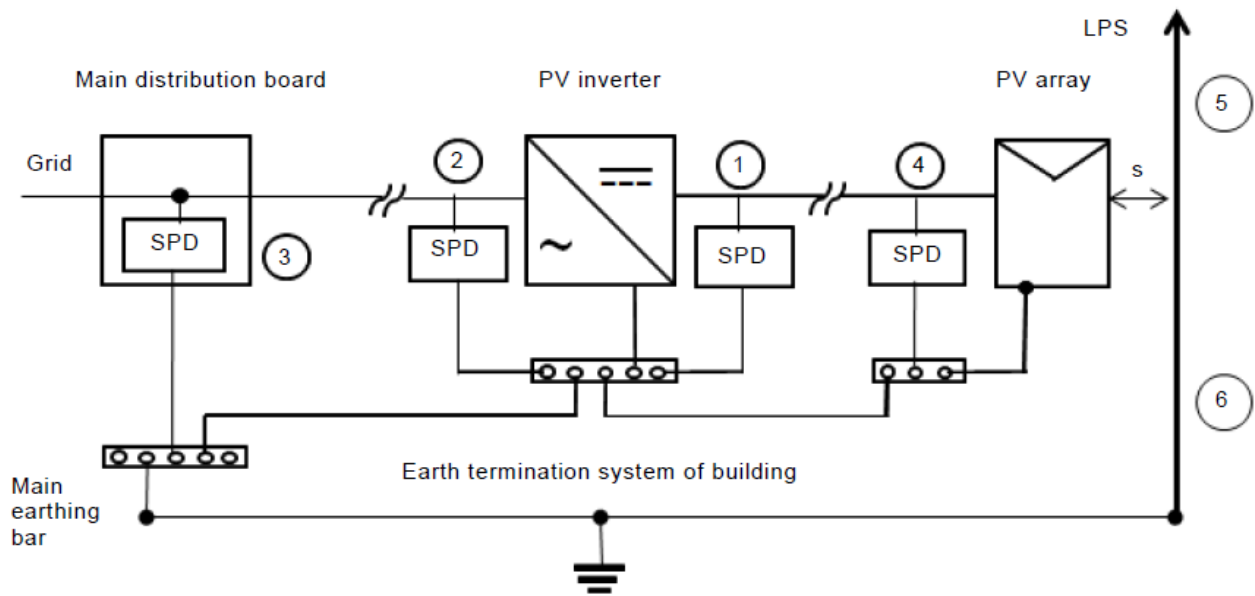


Figure 1: Example of an installation requirement for SPD in a PV System (source: IEC 61643-32)

- (1) as close as possible to the DC connection of the inverter
- (2) as close as possible to the AC connection of the inverter
- (3) in the main distribution board
- (4) As close as possible to the PV generator field (or immediately upon entering the structural system)
- (s) Separation distance between external lightning protection system (LPS) and PV generator field

Exceptions for shorter cable/line lengths ("10 m rule")

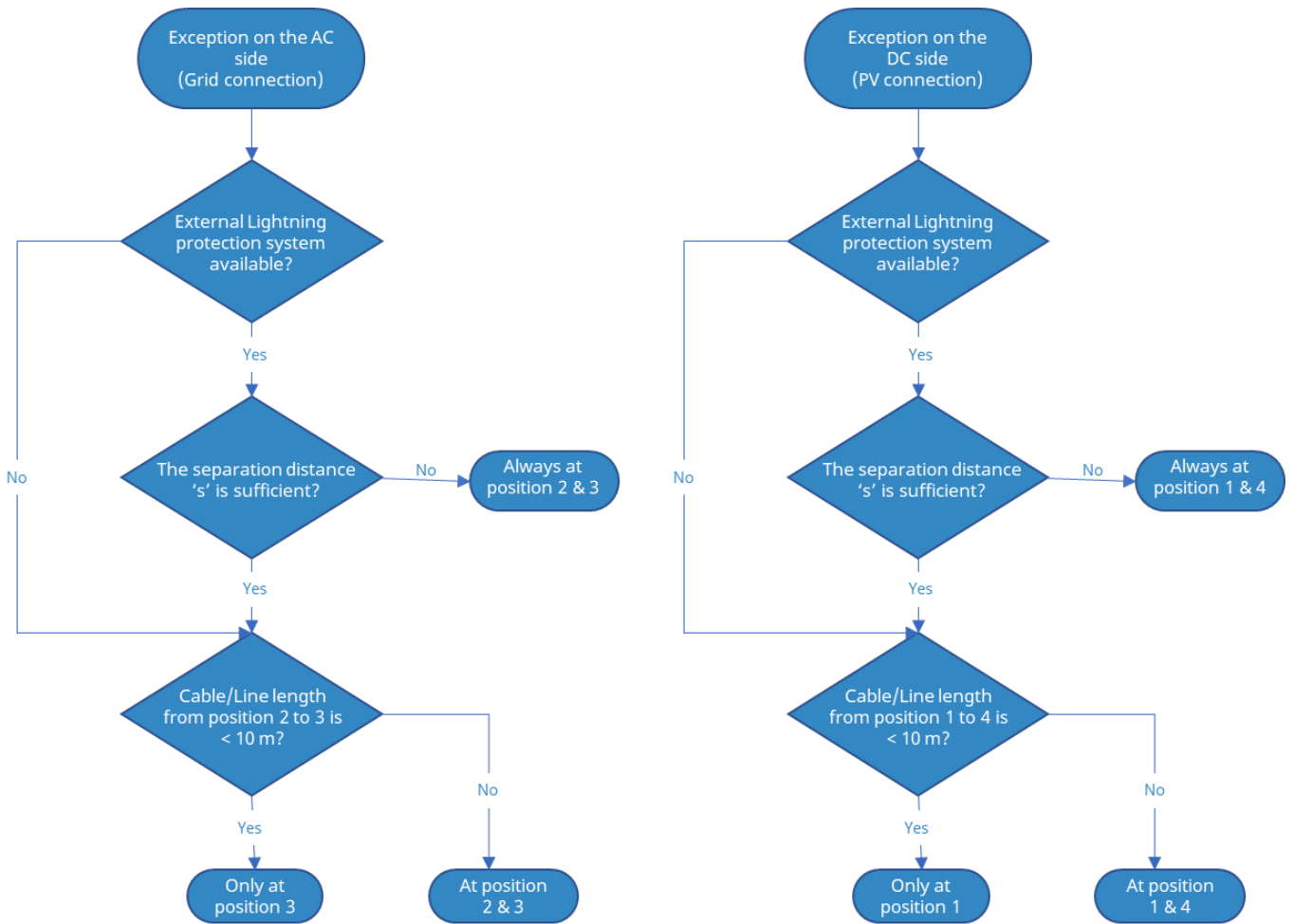


Figure 2: Exceptions for shorter cable/line lengths ("10 m rule")

With Fronius inverters, there is no need for SPDs in the PV generator array (4) regardless of the "10 m rule"!

This applies under the following conditions:

- The Fronius SPD option is used (Not all SPDs available on the market meet the requirements! For details, see "Fronius SPD solutions" in the appendix.)

and

- No external lightning protection system is available **or** there is an external lightning protection system installed and the separation distance 's' is maintained.

and

- Only new PV modules for a system voltage of at least 1000 V are used (existing systems or older PV modules would have to be checked individually to ensure whether all applicable standards are met)

and

- All lines from the PV generator to the inverter (e.g. several +/- string lines) including the equipotential bonding conductor are laid together (in parallel) by the substructure (= reduction of all loop areas!).

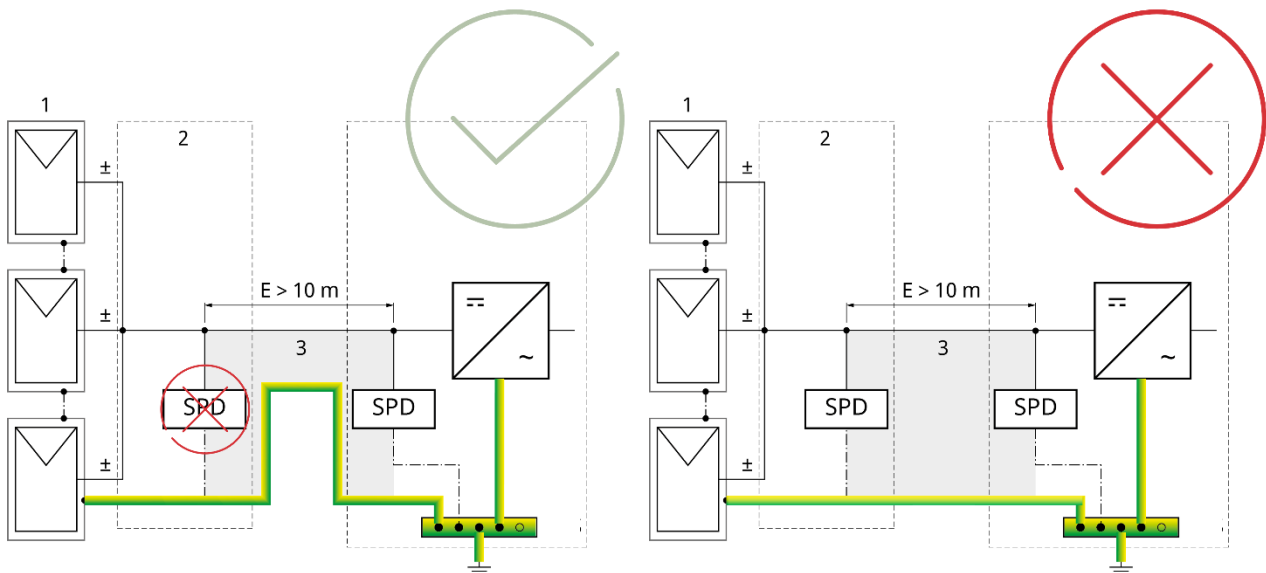


Figure 3: Avoidance of loops surfaces with equipotential bonding (source: IEC 61643-32 and Fronius)

Fronius can grant this exception under the conditions described because the SPDs used by Fronius in connection with its own inverters meet certain exception conditions of the standards and guidelines mentioned.

(Justification: The voltage protection level (U_p) of the integrated SPDs at the DC connection of the inverters, is with a maximum of 4000 V and is not greater than 0.5 times the rated surge voltage (U_w) of the connected PV generator arrays).

In these cases type 2 SPDs are usually sufficient for the inverter.

There are also other installation variants where not all SPDs (1, 2, 3, 4) are required.

Regional or country-specific rules and regulations may deviate from this.

The majority of inverter-integrated SPDs on the market do not automatically meet the requirements of installation and application standards (e.g. IEC 60364-7-712, IEC 61643-32), but they only meet inverter standards (IEC 62109, etc.).

The integrated Fronius SPD solutions are also very well designed for the installation and application standards and cover a large part of the use cases. Thanks to the adjustable, integrated remote signaling, the system operator receives an automatic message via the Fronius Solar.web online portal if the surge protection device is triggered.

Attention!

All SPDs must always be installed if an external lightning protection system exists/is installed and the separation distance 's' is NOT maintained (between all conductive installations and the lightning protection system!). In this case, partial lightning currents can be expected in the PV System.

In this case and for open spaces, type 1+2 SPDs are used. Most Fronius inverters are also available with this SPD option.

The type 1+2 SPD options also fulfill the exceptional conditions described above and naturally offer a higher level of protection, which is also recommended in the standards.

If you want to ensure the best protection and also want to be protected with regard to proximity to existing lightning protection systems, Fronius always recommends the 1+2 SPD option. This provides the inverters with the best possible protection in any case.

This means you can optimally protect not only the inverters but also the entire PV system, the building, the installations from the effects of overvoltages and lightning strikes.

Fronius SPD solutions

Fronius inverter	Overvoltage protection	Item number	Preassembled/ Retrofit Kit
Primo 3.0 – 8.2	DC SPD 8.2 Type 1+2 M	4,240,335,CK	Retrofit Kit
Symo 3.0 – 8.2			
Symo Advanced 10.0 – 20.0	Option DC SPD Typ 2 - S	4,251,019	Preassembled
	Option DC SPD Typ 2 - M	4,251,020	
	Option DC SPD Typ 1+2 - S	4,251,024	
	Option DC SPD Typ 1+2 - M	4,251,025	
Eco	Option DC SPD Typ 2 - S	4,251,019	Preassembled
	Option DC SPD Typ 1+2 - S	4,251,024	
	Option DC SPD Typ 1+2 - M	4,251,025	
Primo GEN24 (Plus)	DC SPD Type 1+2 GEN24	4,240,313,CK	Retrofit Kit
Symo GEN24 (Plus)			
Verto 25.0 -33.3	Variant AC & DC SPD Type 1+2	--	Product versions ex works
Verto 25.0-33.3	Variant AC & DC SPD Type 2	--	Product versions ex works
Tauro	SPD Type 1+2	4,240,334 4,240,334,CK	Available as Preassembled and Retrofit Kit (CK)
	SPD Type 2	4,240,332 4,240,332,CK	
Tauro ECO	SPD Type 1+2 ECO	4,240,333 4,240,333,CK	
		SPD Type 2 ECO	



Figure 4: Built-in SPD Fronius Symo 10-20 kW

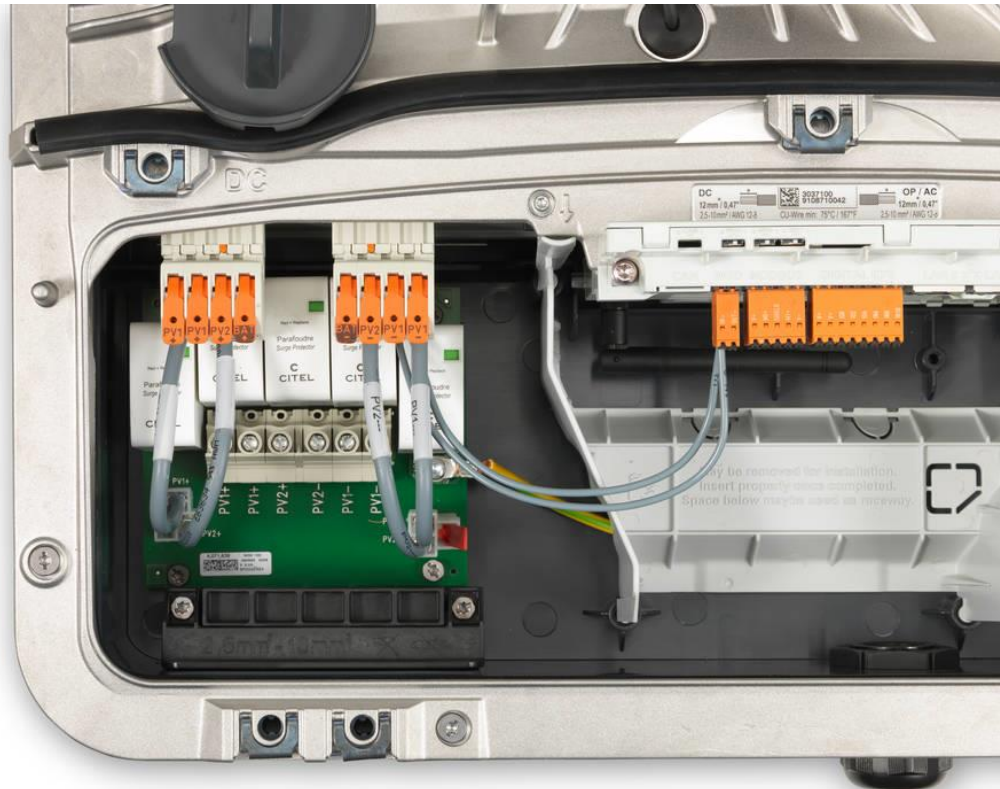


Figure 5: Built-in SPD Fronius Symo GEN24 Plus