CITEL

SURGE PROTECTORS

FOR

Photovoltaic systems

www.citel.us

EFFICIENT SURGE PROTECTION OF YOUR SOLAR INSTALLATIONS

A professional approach to lightning and surge protection
will guarantee your photovoltaic systems a long life

ROOF TOP INSTALLATIONS

For low power PV applications, i.e. residences and small offices, it is necessary to consider surge protecting the AC output of the Inverter that connects directly into the electric power grid as well as the DC input side of the Inverter fed by the PV modules.

SPD location
The diagram below shows the pertinent locations for surge protectors as described in the CLC/TS61643-12 guide.

Additional Surge Protectors
If the equipment to be protected (inverter or PV modules) is located more than 10 meters away from the initial surge protector, the guide imposes the insertion of a complimentary surge protector to improve the level of protection.

● **PV network**

Type 2 surge protector
Depending on the lightning rating of the installation area, a Type 2 surge protector on the DC network may be required.

① **AC network**

AC Surge Protector
to protect all loads connected to the facility's main distribution panel against transients originating from the AC utility grid.

② **AC network**

Additional AC Surge protector
If the length of conductor between the PV inverter and the primary SPD in the main board exceeds 10 m, an additional SPD is necessary at the input of the inverter.

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INDUSTRIAL AND PUBLIC BUILDINGS

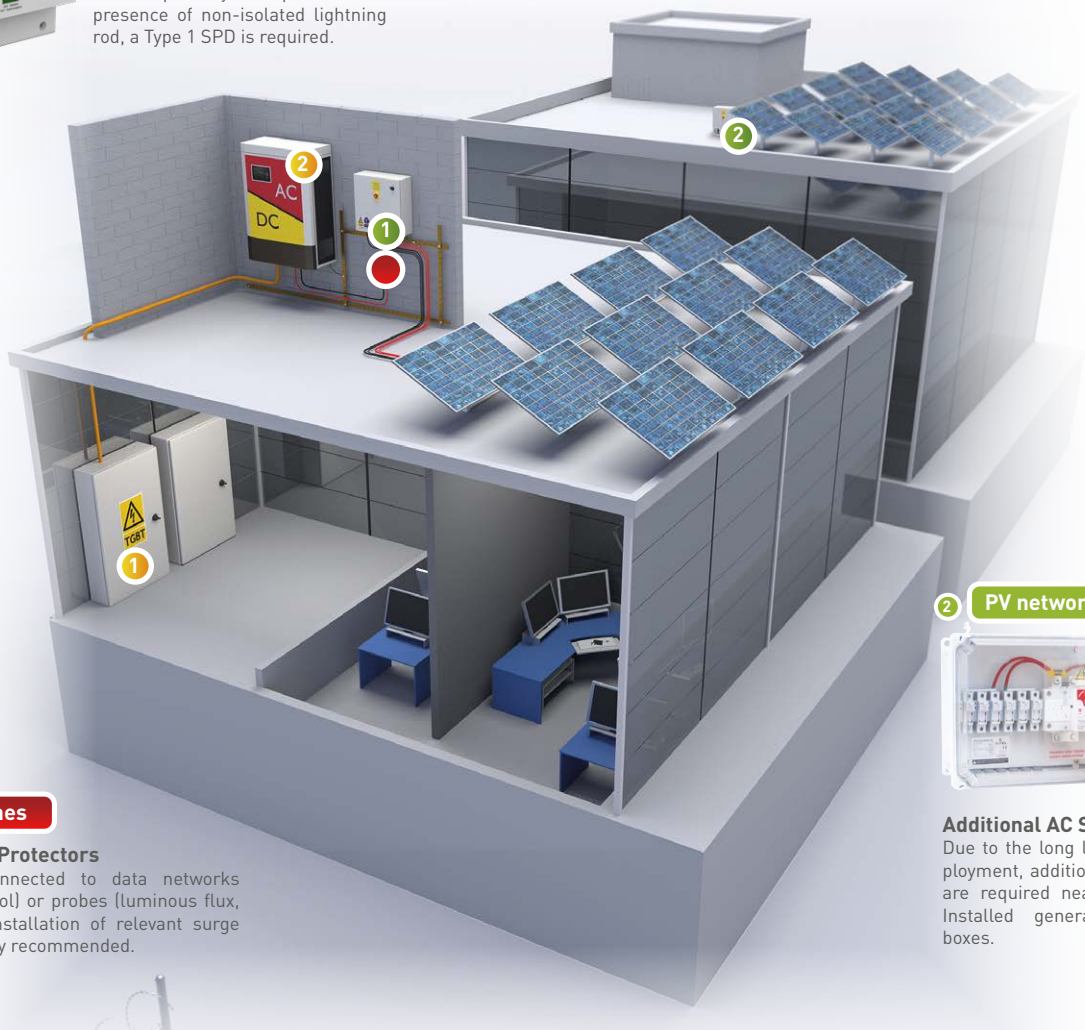
Medium to large power PV systems can be installed on industrial and service facilities.
In order to avoid very costly downtime and lost productivity resulting from a direct or indirect lightning strike, it is critical, and in some cases mandatory, to install surge protection at key points within your facility and its vital power and communication networks.

Type 2 surge protector
If the building is not equipped with a lightning rod system then a Type 2 surge protector is necessary or compulsory on the AC and DC inputs of the inverter. On the PV side, for cable lengths greater than 10 meters it is mandatory to install additional surge protectors at each end of the cable run.

Type 1 surge protector
If the installation is equipped with lightning rod systems, Type 1 surge protectors are compulsory at the AC input.
The same on the DC side, Type 1 surge protectors are compulsory in case of not isolated ligtning rod installation. Depending on the level of protection of the lightning rod, the total discharge current (Itotal) required can reach 20 kA.
(See guide CLC / TS50539-12).

1 **PV network**

Type 2 surge protector
Depending on the level of lightning strike in the installation area, a Type 2 SPD on the DC network at the inverter input may be required. In the presence of non-isolated lightning rod, a Type 1 SPD is required.



● **Datalines**

Dataline Surge Protectors
For inverters connected to data networks (monitoring, control) or probes (luminous flux, temperature...), installation of relevant surge protectors is highly recommended.

2 **PV network**

Additional AC Surge Protector
Due to the long length of strings deployment, additional surge protectors are required near the PV modules. Installed generally in connection boxes.

1 **AC network**

Type 2 AC surge protector
When the local lightning density is Ng > 2.5, by standard, it is mandatory to install an AC surge protector at the incoming service of the three phase network. In areas with a lower lightning density, while it is not mandatory, it is certainly good practice to install a surge protector for protection against switching transients originating from the external power grid not associated with lightning.

2 **AC network**

Additional Surge protector
If the length of conductor between the PV inverter and the arrester in the MLVS exceeds 10 m, an additional SPD is necessary at the input of the inverter.

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PV POWER PLANTS

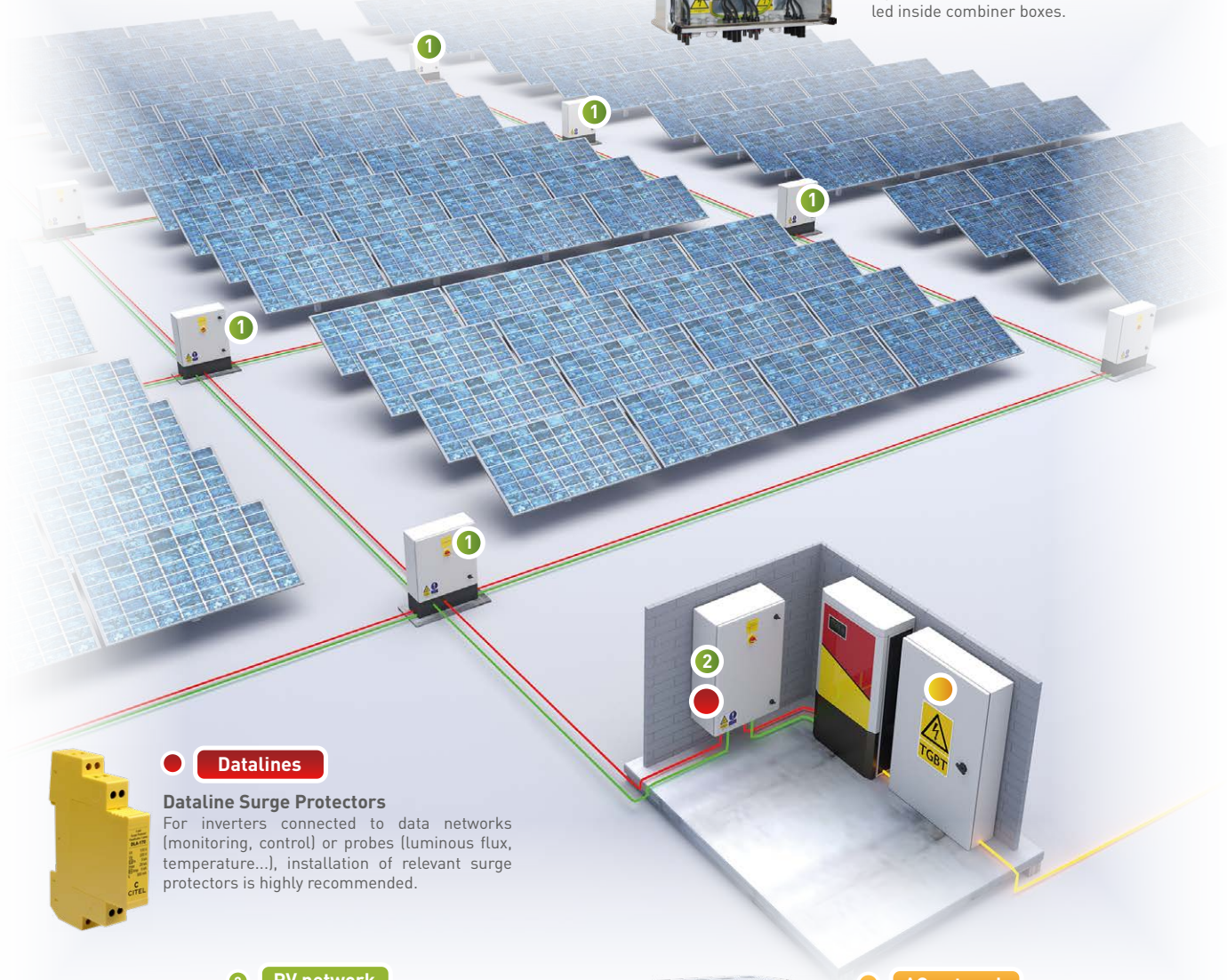
PV power plants present a high risk of direct lightning impact and surges due to the large exposed area and the long lengths of the electric conductors.In order to avoid problems leading to costly damage and downtime, it is compulsory to install surge protectors at key points in the PV system.

Type 1 surge protector
If the PV field is equipped with lightning rod systems (rods, open air wiring...) Type 1 surge protectors are compulsory at the AC input.

On the DC side, Type 1 surge protectors are compulsory at the inverters DC output as defined by CLC/TS 50539-12. Due to the long lengths of cabling required to connect numerous strings running throughout the PV farm, additional surge protectors are required at the input of the PV modules as well.

1 **PV network**

Type 1 DC Surge Protector panel
Due to the long length of wires (>> 10 m), additional Type 1 SPDs are required at the input of PV modules. They are usually installed inside combiner boxes.



Datalines

Dataline Surge Protectors
For inverters connected to data networks (monitoring, control) or probes (luminous flux, temperature...), installation of relevant surge protectors is highly recommended.

2 **PV network**

Type 1 DC Surge Protector
Due to the risk of direct lightning strikes, Type 1 surge protector must be applied.

AC network

AC Surge Protector
Type 1 surge protector is required at the AC network entrance whenever a lightning rod is installed on the premises.

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DC SURGE PROTECTORS FOR CONNECTED PV SITES

DS60VGPV | *Type 1 Surge Protector «Itotal 25 kA» for PV power supply*

EN 50539-11 compliance

DS60VGPV-1500G/51

CITEL model		DS60VGPV-600G/51	DS60VGPV-1000G/51	DS60VGPV-1500G/51
Maximum DC operating voltage	Ucpv	720 Vdc	1200 Vdc	1500 Vdc
Nom. discharge current (8/20µs)	In	40 kA	40 kA	40 kA
Lightning current (10/350µs)	Iimp	12.5 kA	12.5 kA	12.5 kA
Total Lightning current (10/350µs)	Itotal	25 kA	25 kA	25 kA
Protection level	Up	2.2/2.8 kV*	4.7/5.4 kV*	4.7/5.4 kV*
Remote signalling		Yes	Yes	Yes

- *) Common Mode (+/PE or -/PE)/Differential Mode (+/-)

DS50PV/12KT1 | *Type 1 Pluggable Surge Protector «Itotal 12.5 kA» for PV power supply* - EN50539-11 compliance

DS50VGPV-1000G/12KT1

CITEL model		DS50PV-1000G/12KT1	DS50VGPV-1000G/12KT1	DS50VGPV-1500G/12KT1
Maximum DC operating voltage	Ucpv	1200 Vdc	1200 Vdc	1500 Vdc
Nom. discharger current (8/20µs)	In	15 kA	15 kA	15 kA
Lightning current (10/350µs)	Iimp	6.25 kA	6.25 kA	6.25 kA
Total lightning current (10/350µs)	Itotal	12.5 kA	12.5 kA	12.5 kA
Protection level	Up	2.6/4.6 kV*	2.8/5.1 kV*	3.4 kV
Remote signalling		Option DS50PV**S**-1000G/12KT1	Option DS50VGPV**S**-1000G/12KT1	Option DS50VGPV**S**-1500G/12KT1

- *) Common mode (+/PE or -/PE)/Differential mode (+/-)

DS50PV and DS50VGPV | *Type 2 pluggable Surge Protector for PV power supply*

EN50539-11 compliance

DS50VGPV-1500G/51

DS50PV-800G/51

CITEL model		DS50PV-500/51	DS50PV-600/51	DS50PV-800G/51	DS50PV-1000G/51	DS50VGPV-1500/51
Maximum DC operating voltage	Ucpv	600 Vdc	720 Vdc	960 Vdc	1200 Vdc	1500 Vdc
Nom. discharge current (8/20µs)	In	15 kA	15 kA	15 kA	15 kA	15 kA
Protection level	Up	2.2 kV*	2.8 kV*	2/3.6 kV*	2.6/4.6 kV*	5.3/5.3 kV*
Remote signalling		Option DS50PV**S**-500/51	Option DS50PV**S**-600/51	Option DS50PV**S**-800G/51	Option DS50PV**S**-1000G/51	Option DS50VGPV**S**-1500/51

- *) Common mode (+/PE or -/PE)/Differential mode (+/-)
- Specific version DS50VGPV available : total suppression of operating and leakage currents.

SURGE PROTECTORS FOR DATA LINES

DLA | *Pluggable Surge Protectors for Data lines* - IEC 61643-21 compliance

DLA-24D3

Citel model		DLA-48D3	DLA-24D3	DLA-06D3
Type of line		PT100	4-20 mA	RS485
DC nominal operating voltage	Un	48 Vdc	24 Vdc	06 Vdc
Nom. discharge current (8/20µs)	In	5 kA	5 kA	5 kA
Max. discharge current (8/20µs)	Imax	20 kA	20 kA	20 kA
Protection level	Up	70 V	40 V	20 V

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DC SURGE PROTECTORS FOR PV OFF-GRID SITE

DDC30C
DDC40C

Type 2 Pluggable Surge Protector for PV Off-grid site

DDC30C-20-65

CITEL model		DDC30C-20-65	DDC40C-20-100	DDC40C-20-180	DDC40C-20-275	DDC40C-20-460
Network		48 Vdc	75 Vdc	130 Vdc	220 Vdc	350 Vdc
Max.operating voltage	Uc	65 Vdc	100 Vdc	180 Vdc	275 Vdc	460 Vdc
Nominal discharge current (8/20µs)	In	15 kA	20 kA	20 kA	20 kA	20 kA
Protection level	Up	300 V	390 V	620 V	900 V	1400 v
Remote signalling		Option DDC30CS-20-65	Option DDC40CS-20-100	Option DDC40CS-20-180	Option DDC40CS-20-275	Option DDC40CS-20-460

SURGE PROTECTORS FOR AC NETWORK

DAC1-13-31-275

DAC50-11-275

DAC40C-31-275

DAC40C-11-275

DAC1-13
DAC50
DAC40C

Type 1 and Type 2 Surge Protectors for AC power supply

IEC61643-11 compliance

CITEL range		DAC1-13	DAC50	DAC40C 3-phase	DAC40C 1-phase
Surge protector		Type 1+2	Type 2	Type 2	Type 2
AC network	Un	230 Vac	230 Vac	230 Vac	230 Vac
Max. AC operating voltage	Uc	255 Vac	255 Vac	255 Vac	255 Vac
Nom. discharge current (8/20µs)	In	20 kA	20 kA	20 kA	20 kA
Max. discharge current (8/20µs)	Imax	50 kA	50 kA	40 kA	40 kA
Max. lightning current (10/350µs)	Iimp	12.5 kA	-	-	-
Protection level	Up	1.5/1.3 kV*	1.5/1.25 kV*	1.5/1.25 kV*	1.5/1.25 kV*
P/N for single phase network		DAC1-13-11-275	DAC50-11-275	-	DAC40C-11-275
P/N for 3L+N network		DAC1-13-31-275	DAC50-31-275	DAC40C-31-275	-
Télésignalisation de déconnexion		Option DAC1-13S-xx-xxx	Option DAC50S-xx-xxx	Option DAC40CS-xx-xxx	Option DAC40CS-xx-xxx

- *) Common mode (L/PE or N/PE)/Differential mode (L/N)
- **Specific version DAC1-13VG and DAC50VG available**: suppression of operating and leakage currents.

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