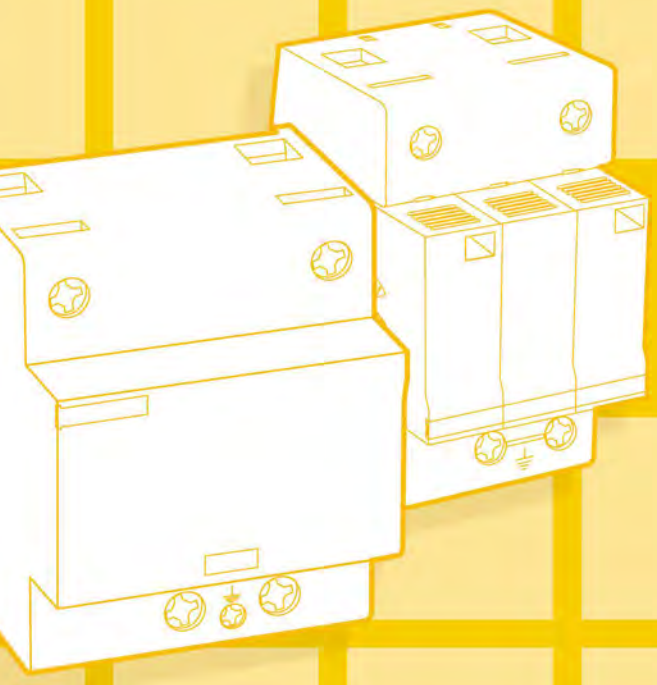
CITEL



PHOTOVOLTAIC

Surge Protectors

Surge Protectors for Photovoltaic systems

Most photovoltaic module manufacturers guarantee their materials for 20 years or more.The ROI of photovoltaic generation facilities connected to the low voltage network is therefore calculated over this long period of time. But these systems are often highly exposed to lightning and power surges, which can greatly reduce the required operating time. Implementation of appropriate protection solutions is strongly recommended.

Several points must be considered to analyze the risk «Lightning and Power Surges»:

- Due to the exposed nature of the PV array, the threat of «lightning» is more common.
- The risk is multiple: direct effect (lightning strike on the panels) and indirect (surge on cells, solar chargers / inverters), on other lines (data).
- The operating loss must be taken into account, especially at sites of high power capacity.
- When the PV system is located on industrial sites, the risk of switching overvoltages must also be taken into account.
- The level of risk is directly related to the lightning density and exposure of local lines

Protection of PV installation

The photovoltaic grid-connected low voltage power lines may be subject to overvoltages on different networks:

- ***AC network***: surge protectors are necessary, and in most cases, mandatory on the AC output of the PV inverter which is connected back to the AC power grid.

- ***DC network***: surge protectors are required or mandatory on the input of the PV inverter or the input of the PV modules.

- ***Communication network:*** if the PV inverter is connected to signal lines (probes, sensors, monitoring) then surge protectors are highly recommended on these networks.

AC surge protectors for PV installation

Depending on the type of networks, the presence of lightning rod or primary surge protectors existing, CITEL offers a complete range of solutions to protect the AC part of the PV system.

Installations with lightning rods

A Type 1 surge protector, specifically dimensioned to handle direct lightning current is required at the service entrance of the installation (main switchboard). Surge protectors like the DS130R provide a high energy surge capacity in a compact size and are easily serviced with pluggable modules.

Standard installation

In the absence of lightning rod, the implementation of a type 2 SPD is generally preferred,but, in some cases, it is compulsory depending on the level of lightning in the area (Ng> 2.5). The DS40 type 2 arrester range offers a modular solution adapted to these applications. For medium and small size facilities with limited space available, the DS240/DS440 provides a high surge capacity in a reduced footprint.

Input protection of PV inverter

CLC/TS 50539-12 guide requires the implementation of an additional SPD on the AC input of the PV inverter, if it is more than 10 m from the primary surge protector. The DS215/DS415 surge protectors provide this protection for these applications and can be installed either directly into the distribution panel or in a dedicated, standalone enclosure solution.

Surge protectors for datalines

The PV system can be interconnected to various datalines networks including probes, sensors, and monitoring equipment. In these cases, the implementation of suitable surge protectors is highly recommended: The DLA range performs this function and is available for any type of telecom or data line connections

DC surge protectors for PV installation

The DC input of the PV inverter has to be protected according to the recommendation of the CLC/TS 50539-12 Guide. CITEL has designed a complete range of Type 1 and Type 2 surge protectors for these applications that are compliant with the EN 50539-11 product standard.

Type 1 surge protectors

When the installation is equipped with lightning rods or for open free PV fields (see CLC/TS 50539-12), it is mandatory to install SPD dimensioned for a direct lightning impulse (10/350µs). In these cases, CITEL has developed a range of high energy Type 1 surge protectors:

- **DS60VGPV/51 series** : Type 1 SPDs may withstand @10/350µs up to 12.5 kA by pole (Iimp) and 25 kA (Itotal), it incorporates CITEL's exclusive, patented «VG Technology». Comply with EN50539-11 product test.

- **DS50PV/12KT1 and DS50VGPV/12KT1 series** :
  These Type 1 pluggable SPDs have a current total of 12.5 kA (Itotal) and are required when the likely direct current lightning is not maximal .

Type 2 surge protectors

In most installations, the SPD will be necessary or obligatory and will be of type 2. CITEL offers 3 ranges with pluggable module design:

- **DS50PV series** : based on the use of specific varistors, providing a protection in common mode or differential and common mode.

- **DS50PV/51 series** : based on the use of specific varistors, providing a protection in common mode or differential and common mode. Comply with EN50539-11 product test.

- **DS50VGPV/51 series** : This version is based on VG technology, insuring a total absence of leakage current and maximum reliability. Comply with EN50539-11 product test.

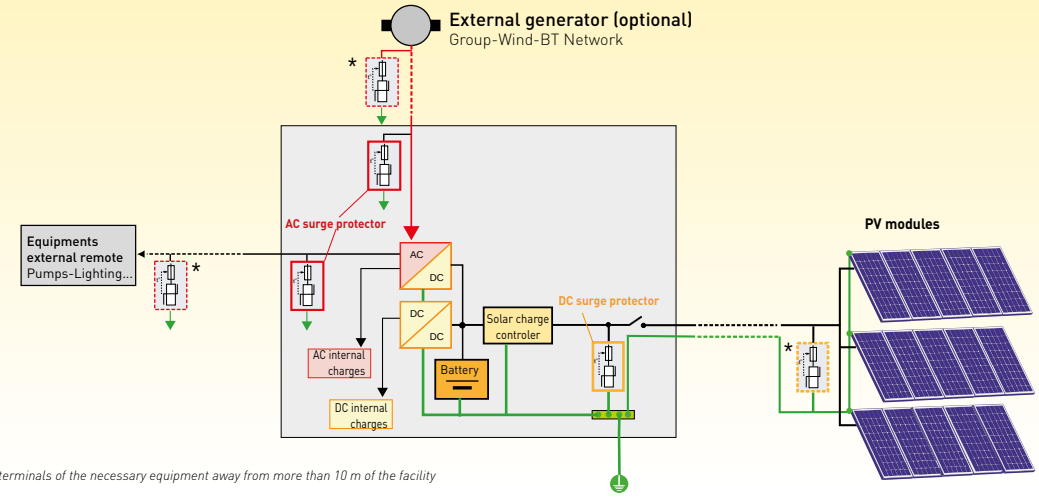
Series		*Description*	*Characteristics*	*Page*
DS60VGPV		Type 1+2 surge protector for PV	High energy VG Technology	69
DS50PV/12KT1 DS50VGPV/12KT1		Type 1+2 surge protector	Pluggable	**70**
DS50VGPV		Type 2 surge protector for PV	Pluggable VG Technology	71
DS50PV		Type 2 surge protector for PV	Pluggable	72

Protection of isolated (off-grid) PV systems

The exposure and location of remote sites powered by isolated PV systems not connected to the AC network are at a very high risk of failure due to transient surges.
Unlike the sites connected to the distribution network, PV equipment failure at a remote site will result in a total operating loss: thus, the implementation of appropriate surge protection is strongly recommended.
The selection and installation of surge protectors for off-grid sites will be defined in the UTE C15-712-2 guide.

CITEL surge protectors for remote sites are available in voltages from 12 to 350Vdc.

Surge protection for PV powered off-grid installation



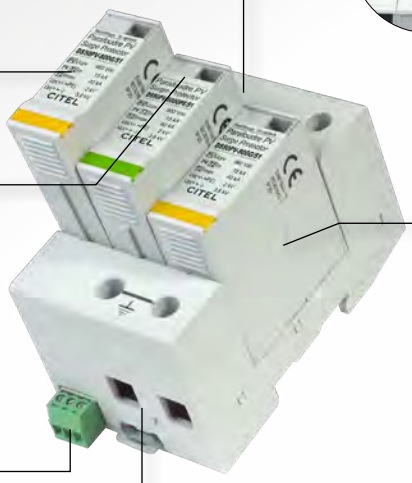
**) surge arrester at the terminals of the necessary equipment away from more than 10 m of the facility*

DS50PV/51, DS50VGPV/51 and DS5VP/12KT1 series

Pluggable module
Disconnection for simplified maintenance.
Standardized marking

Status signaling
In case of safety disconnection, the indicator switches to red: module to replace.

Remote signalling
Option to remotely monitor the status of the surge protector. Simplified cabling thanks to a single terminal for monitoring all poles.



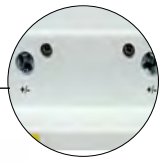
Connectors
Significant physical separation screw terminal blocks: ensuring insulation between polarities even for high DC voltages

Versions
several diagrams available
DS50PV/51 and DS50VGPV

Earth
Double connector for optimized connection ground network.

DS60VGPV/51 series

Connectors
Significant physical separation screw terminal blocks: guarantee insulation between polarities even for high DC voltages



VG Technology
Efficiency and reliability maximum

Remote signalling
Standard feature to remotely monitor the status of the surge protector. Simplified cabling thanks to a single terminal for monitoring all poles.

Status signaling
In case of safety disconnection, the indicator switches to red: SPD to replace.

Protection of Photovoltaic installations

Residential Photovoltaic installation

The CLC/TS 50539-12 installation guide gives the relevant information to manage the safe operation of PV installation in case of surge due to lightning. For small power plants (residential and small commercial), AC input (connection to the grid) and DC out should be protected.

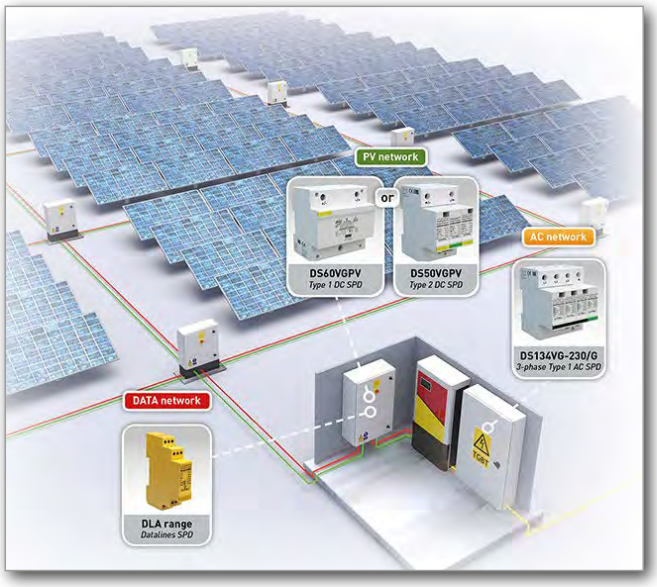
The implementation of the SPD may be mandatory for some cases. However, if the reliability and longevity of the PV system are the primary objective then the implementation of surge protectors is always recommended.

Business/Building Photovoltaic installation

Commercial or industrial sites can integrate very large photovoltaic systems into their power generation strategy. These applications are vulnerable to lightning and transient surges which can cause significant downtime and losses. The implementation of SPDs at key locations throughout the facility is necessary to ensure the reliable operation of the plant.

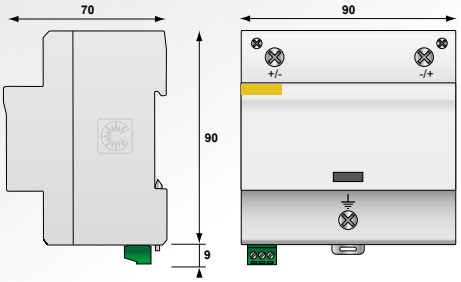
Photovoltaic Power Plant

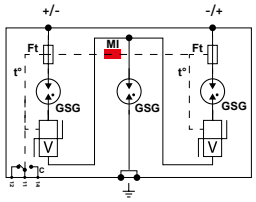
Photovoltaic power plants have a high risk of lightning strikes due to their large surface area and exposed location. This means expensive, sensitive equipment is vulnerable to lightning strikes resulting in direct replacement costs and operation downtime losses. Thus implementation of SPDs on AC, DC and communication lines are highly recommanded.



Type 1+2 PV Surge Protector
DS60VGPV/51 series

DS60VGPV-1500G/51





GSG: Specific gas tube
V : High energy MOV
Mi : Disconnection indicator
Ft : Thermal fuse
t° : Thermal disconnection mechanism
C : Contact for remote signal

- **Type 1+2 Surge Protector for Photovoltaic**
- **VG-Technology**
- **No leakage, no operating currents**
- **Improved life expectancy**
- **Impulse currents Iimp/Itotal 12.5 / 25 kA @ 10/350µs**
- **Common and Differential mode protection**
- **Remote Signaling**
- **EN 50539-11 compliance**
- **VDE and OVE approved**

DS60VGPV-xxxG/51

Maximum PV voltage
«VG» = VG Technology

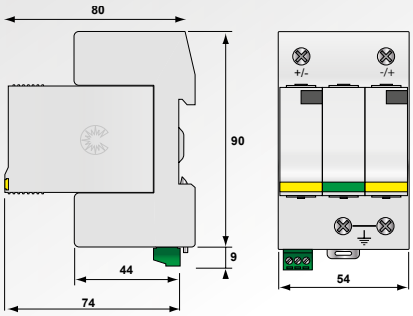
Characteristics

CITEL Model		DS60VGPV-600G/51	DS60VGPV-1000G/51	DS60VGPV-1500G/51
Description		Type 1+2 PV surge protector	Type 1+2 PV surge protector	Type 1+2 PV surge protector
Network	Uocstc	PV network 600 Vdc	PV network 1000 Vdc	PV network 1250 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. PV operating voltage	Ucpv	720 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15000 A	15000 A	15000 A
Permanente operating current - *Leakage current at Ucpv*	Icpv	None	None	None
Residual current - *Leakage current at Ucpv*	Ipe	None	None	None
Nominal discharge current - *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current -*max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Impulse current by pole - *max. withstand 10/350µs*	Iimp	12.5 kA	12.5 kA	12.5 kA
Total lightning current - *max. total withstand @ 10/350 µs*	Itotal	25 kA	25 kA	25 kA
Protection level CM/DM *@In (8/20µs) and @ 6kV (1.2/50µs)*	Up	2.2/2.8 kV	4.7/5.4 kV	4.7/5.4 kV
Associated disconnectors				
Thermal disconnector		internal		
Fuses		without		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		screw terminals: 6-35mm²		
Disconnection indicator		1 mechanical indicator		
Remote signaling of disconnection		Output on changeover contact - 250 Vac/0.5 A (AC) - 30 Vdc/3 A (DC)		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94-V0		
Standards compliance		EN50539-11 / UTE C61740-51		
Certification		EAC	VDE / OVE / EAC	EAC
Part number		3963	3958	3956

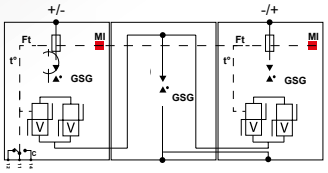
*) CM = Common mode (+/PE or -/PE) - DM = Differential mode (+/-)

Type 1+2 PV Surge Protector
D50xxPV-G/12KT1

DS50VGPV-1000G/12KT1



DS50VGPVS-1000G/12KT1



GSG: Gas-filled spark gap
V : High energy MOV
Ft : Thermal fuse
t° : Thermal disconnection mechanism
C : Contact for remote signal
MI : Disconnection indicator

- **Type 1+2 Surge Protector for Photovoltaic**
- **for 1000 and 1250 Vdc PV voltage**
- **Impulse currents Iimp/Itotal : 6.25/12.5 kA @ 10/350µs**
- **Common Mode and Differential protection**
- **Remote Signaling (option)**
- **Plug-in modules**
- **EN 50539-11 compliance**

DS50VGPVS-1000G/12KT1

- PV voltage
- «S» option remote signalling status
- «VG» : VG technology

Characteristics

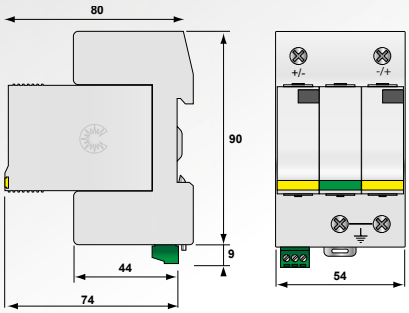
CITEL Model		DS50VGPV-1000G/12KT1	DS50PV-1000G/12KT1	DS50PV-1500/12KT1
Description		Type 1+2 PV surge protector		
Network	Uocstc	PV network 1000 Vdc	PV network 1000 Vdc	PV network 1250 Vdc
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. PV operating voltage	Ucpv	1200 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15000 A	15000 A	15000 A
Permanente operating current - *Leakage current at Ucpv*	Icpv	None	< 0.1 mA	< 0.1 mA
Residual current - *Leakage current at Ucpv*	Ipe	None	None	< 0.1 mA
Follow current	if	None	None	None
Nominal discharge current - *15 x 8/20 µs impulses*	In	15 kA	15 kA	15 kA
Max. discharge current -*max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Impulse current by pole - *max. withstand 10/350µs*	Iimp	6.25 kA	6.25 kA	6.25 kA
Total lightning current - *max. total withstand @ 10/350 µs*	Itotal	12.5 kA	12.5 kA	12.5 kA
Total Maximal discharge current - *max. total withstand @ 8/20 µs*	Imax total	60 kA	60 kA	60 kA
Protection level CM/DM *@In (8/20µs) and @ 6kV (1.2/50µs)*	Up	2.8/5.1 kV	2.6/4.6 kV	5.3/5.3 kV
Associated disconnectors				
Thermal disconnector		internal		
Fuses		without		
Mechanical characteristics				
Dimensions		see diagram		
Connection to Network		Screw terminals: 2.5-25mm²		
Disconnection indicator		2 mechanical indicators		
Remote signaling of disconnection		Option DS50VGPVS-1000G/12KT1 - output on changeover contact	Option DS50PVS-1000G/12KT1 - output on changeover contact	Option DS50PVS-1500/12KT1 - output on changeover contact
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94-V0		
Standards compliance		EN50539-11		
Part number		-	-	-

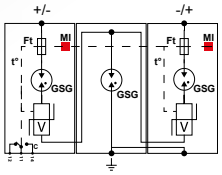
CE

CITEL VG TECHNOLOGY

Type 2 PV Surge Protector
DS50VGPV-G/51 series

DS50VGPV-1500G/51





GSG: Specific gas tube
V : High energy MOV
Ft : Thermal fuse
t° : Thermal disconnection mechanism
C : Contact for remote signal
MI: Disconnection indicator

- **Type 2 Surge Protector for Photovoltaic**
- **VG-Technology**
- **No leakage, no operating currents**
- **Improved life expectancy**
- **Impulse currents In/Imax : 15/40 kA**
- **Common Mode and Differential protection**
- **Remote Signaling (option)**
- **EN 50539-11 compliance**
- **UL, VDE and OVE approved**

DS50VGPVS-xxxG/51

- Maximum PV voltage
- «S» = remote signalling status option
- «VG» = VG Technology

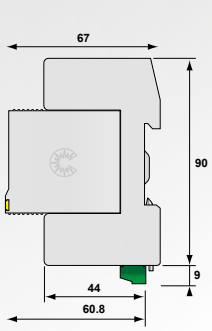
Characteristics

CITEL Model		DS50VGPV-600G/51	DS50VGPV-1000G/51	DS50VGPV-1500G/51
Description		Type 2 PV surge protector - 600 Vdc - VG technology	Type 2 PV surge protector - 1000 Vdc - VG technology	Type 2 PV surge protector - 1500 Vdc - VG technology
Network	Uocstc	PV network 600 Vdc	PV network 1000 Vdc	PV network 1250 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. PV operating voltage	Ucpv	720 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15000 A	15000 A	15000 A
Permanente operating current - *Leakage current at Ucpv*	Icpv	None	None	None
Residual current - *Leakage current at Ucpv*	Ipe	None	None	None
Nominal discharge current - *15 x 8/20 µs impulses*	In	15 kA	15 kA	15 kA
Max. discharge current -*max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Total Maximal discharge current - *max. total withstand @ 8/20 µs*	Itotal	60 kA	60 kA	60 kA
Protection level CM/DM @In *(8/20µs) and @ 6kV (1.2/50µs)*	Up	2.2/3.4 kV	2.8/5.1 kV	3.4/6.8 kV
Associated disconnectors				
Thermal disconnector		internal		
Fuses		without		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		Screw terminals: 2.5-25mm²		
Disconnection indicator		2 mechanical indicators		
Remote signaling of disconnection		Option DS50VGPVS-600G/51 - output on changeover contact	Option DS50VGPVS-1000G/51 - output on changeover contact	Option DS50VGPVS-1500G/51 - output on changeover contact
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94-V0		
Standards compliance		EN50539-11		
Certification		EAC	VDE / OVE / EAC	EAC
Part number		481401	481301	481501

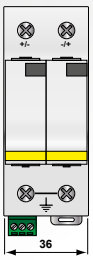
*) CM = Common mode (+/PE or -/PE) - DM = Differential mode (+/-)

Type 2 PV Surge Protector
DS50PV/51 series

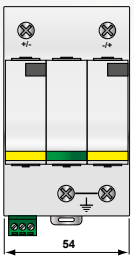
DS50PV-800G/51



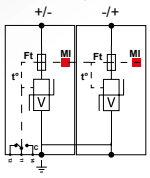
DS50PV-500/51
DS50PV-600/51



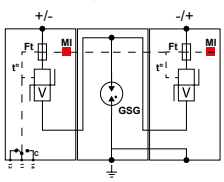
DS50PV-800G/51
DS50PV-1000G/51



DS50PV-500/51
DS50PV-600/51



DS50PV-800G/51
DS50PV-1000G/51



GSG: Specific gas tube
V : High energy MOV
Mi : Disconnection indicator
Ft : Thermal fuse
t° : Thermal disconnection mechanism
C : Contact for remote signal (option DS50PVS-xxx/51)

- **Type 2 Surge Protector for Photovoltaic**
- **In : 15 kA**
- **Imax : 40 kA**
- **Pluggable module**
- **Remote Signaling (option)**
- **EN 50539-11 compliance**
- **VDE and OVE approved**

DS50PVS-xxxG/51

- Maximum PV voltage
- «S» = remote signalling status option

Characteristics

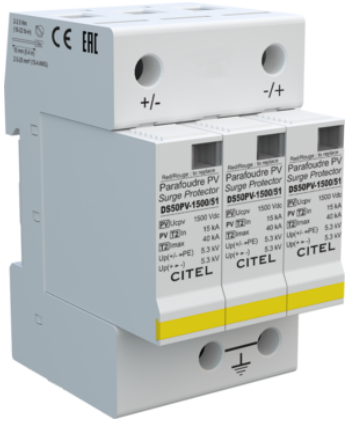
CITEL Model		DS50PV-500/51	DS50PV-600/51	DS50PV-800G/51	DS50PV-1000G/51
Description		Type 2 PV surge protector - 500 Vdc	Type 2 PV surge protector - 600 Vdc	Type 2 PV surge protector - 800 Vdc	Type 2 PV surge protector - 1000 Vdc
Network	Uocstc	PV network 500 Vdc	PV network 600 Vdc	PV network 800 Vdc	PV network 1000 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE	+/-/PE
Protection mode(s)		CM	CM	CM/DM	CM/DM
Max. PV operating voltage	Ucpv	600 Vdc	720 Vdc	960 Vdc	1200 Vdc
Current withstand short circuit PV	Iscpv	15000 A	15000 A	15000 A	15000 A
Permanente operating current - *Leakage current at Ucpv*	Icpv	< 0.1 mA	< 0.1 mA	< 0.1 mA	<0.1 mA
Residual current - *Leakage current at Ucpv*	Ipe	< 0.1 mA	< 0.1 mA	None	None
Nominal discharge current - *15 x 8/20 µs impulses*	In	15 kA	15 kA	15 kA	15 kA
Max. discharge current - *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA	40 kA
Total Maximal discharge current - *max. total withstand @ 8/20 µs*	Itotal	60 kA	60 kA	60 kA	60 kA
Protection level CM/DM *@In (8/20µs) and @ 6kV (1.2/50µs)*	Up	2.2 kV	2.8 kV	2 / 3.6 kV	2.6 / 4.6 kV
Associated disconnectors					
Thermal disconnector		internal			
Fuses		without			
Mechnical characteristics					
Dimensions		see diagram			
Connection to Network		Screw terminals: 2.5-25mm²			
Disconnection indicator		2 mechanical indicators			
Remote signaling of disconnection		Option DS50PVS-500/51 - output on changeover contact	Option DS50PVS-600/51 - output on changeover contact	Option DS50PVS-800G/51 - output on changeover contact	Option DS50PVS-1000G/51 - output on changeover contact
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94-V0			
Standards compliance		EN50539-11			
Certification		EAC	EAC	EAC	VDE / OVE / EAC
Part number		480121	480421	480281	480381

*) CM = Common mode (+/PE or -/PE) - DM = Differential mode (+/-)

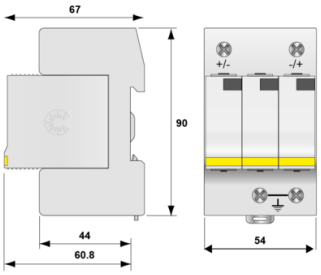
Type 2 PV surge protector

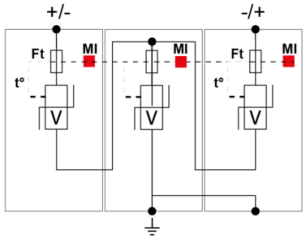
DS50PV-1500/51

PHOTOVOLTAIC



- Type 2 surge protector for PV
- In : 15kA / Imax : 40kA
- Pluggable
- Remote signaling (option)
- EN 61643-31 / NF EN 50539-11 compliant





V: High-energy varistor
Ft: Thermal fuse
t°: Thermal disconnection system
MI: Disconnection indicator

Caractéristiques Électriques		
SPD type		2
Network		PV network 1500 Vdc
Nominal PV voltage	Uocstc	1250 Vdc
Max. PV operating voltage	Ucpv	1500 Vdc
Residual Current(Leakage current to Ground)	Ipe	< 0.1 mA
PV Permanent Operating current (Current consumption at Ucpv)	Icpv	< 0.1 mA
Follow current	If	None
Nominal discharge current (15 x 8/20 µs impulses)	In	15 kA
Max. discharge current(max. withstand @ 8/20 µs by pole)	Imax	40 kA
Total Maximal discharge current (max. total withstand @ 8/20 µs)	Imax Total	60 kA
Current withstand short circuit PV	Iscpv	15000 A
Connection mode(s)		+/-/PE
Protection mode(s)		Common/Differential mode
Protection level +/PE (-/PE)(@ In (8/20µs))	Up	5.3 kV
Caractéristiques Mécaniques		
Technology		MOV
Connection to Network		Screw terminals: 2.5-25 mm²
Format		Plug-in modular box
Mounting		Symmetrical rail 35 mm (EN60715)
Housing material		Thermoplastic UL94-V0
Operating temperature		-40/+85°C
Protection rating		IP20
Failsafe mode		Disconnection SPD of the PV line
Disconnection indicator		3 mechanical indicators
Spare module(s)		DSM50PV-1500/51
Remote signaling of disconnection		Option DS50PVS-1500/51 output change over contact
Déconnecteurs associés		
Thermal disconnector		Internal
Fuses		Without
Normes		
Standards compliance		EN 61643-31 / NF EN 50539-11
Certification		UL / EAC / TUV
Code article		
480521		

Data Sheet

Type 2 PV Surge Protector
DS50PV-1000/51

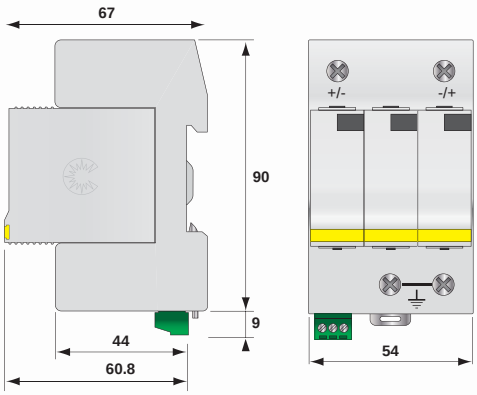
- **Type 2 Surge Protector for Photovoltaic**
- **In : 15 kA**
- **Imax : 40 kA**
- **Pluggable module**
- **Remote Signaling (option)**
- **EN 50539-11 compliant**

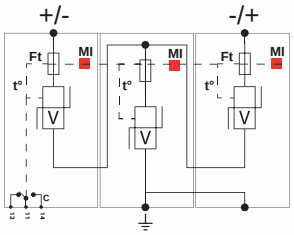
DS50PVS-1000/51

DC Network voltage
«S» option remote signalling status

Dimensions - Electrical diagram

(in mm)





V : High energy MOV
Ft : Thermal fuse
t° : Thermal disconnection mechanism
C : Contact for remote signal

Characteristics

CITEL part number		DS50PV-1000/51
Maximum PV voltage	Uocstc	1000 Vdc
Protection mode *		CM/DM
Max. operating voltage	Ucpv	1200 Vdc
Current withstand short-circuit	Iscpv	1000 A
Operating current to the voltage Ucpv	Icpv	< 0.1 mA
Leakage current to the voltage Ucpv	Ipe	< 0.1 mA
Nominal discharge current 15 x 8/20 µs impulses	In	15 kA
Max. discharge current max. withstand 8/20 µs	Imax	40 kA
Protection level CM/DM	Up	4.6 kV
Disconnector		
Thermal disconnector		internal
Mechanical characteristics		
Dimensions		see diagram
Connection		by screw terminal : 2,5-25 mm²
End of life mode		disconnection of the SPD from PV line
Disconnection indicator		by mechanical indicator
Remote signaling of disconnection		Option DS50PV**S**-1000/51 - output on changeover
Mounting		symmetrical rail 35 mm
Operating temperature		-40/+85 °C
Protection class		IP20
Housing material		Thermoplastic UL94-V0
Standards compliance		
EN50539- 11		DC SPD for PV - Class II test
Guide UTE C61-740-51		DC SPD for PV - Class II test
Part number		
DS50PV-1000/51		480321

*) CM = Common mode (+/PE or -/PE) - DM = Differential mode (+/-)

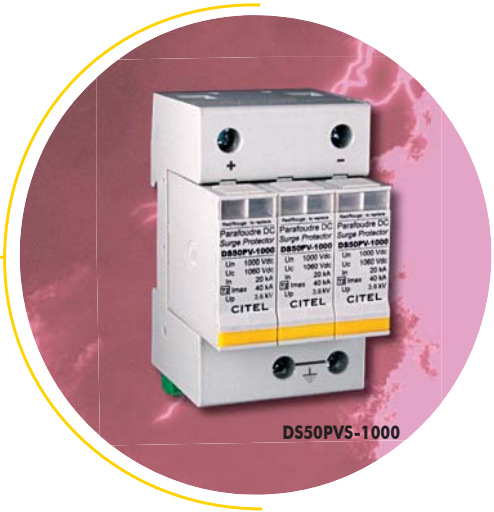
CITEL • 2 rue Troyon • 92316 Sèvres Cedex • France • Tel.: +33 1 41 23 50 23 • Fax: +33 1 41 23 50 09 • e-mail: contact@citel2cp.com • www.citel2cp.com
F131201 • Document could be modified without notice

CITEL 2CP

Imax 40 kA

Type 2 Surge Protector for Photovoltaic

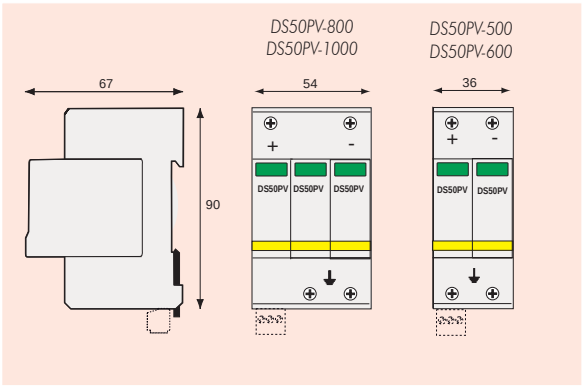
DS50PV

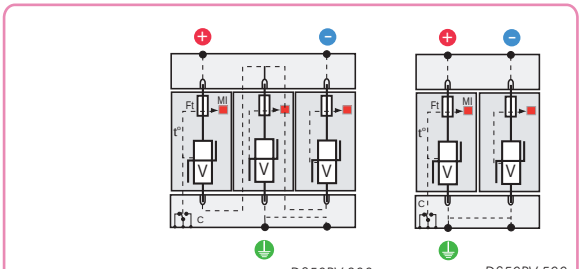


DS50PV are Type 2 Surge Protectors are designed to protect against lightning surge voltages in photovoltaic power supply networks. These units must be installed in parallel on the DC networks to be protected and provide common and differential modes protection.
The DS50PV is available for the main operating voltages in photovoltaic : 500, 600, 800 and 1000 Vdc.
The use of Type 2 surge protector is recommended at both ends of the DC power supply line (solar panel side and inverter/converter side), especially if the line routing is external and long.
The electrical diagram of the DS50PV is based on high energy MOVs equipped with specific thermal disconnectors and related failure indicators. A remote signal feature is also available (DS50PVS-xxx)
The DS50PV is made with plug-in modules to allow a fast and easy maintenance in case of failure (disconnection from the DC network).

- **Type 2 Surge Protector for Photovoltaic**
- **Discharge currents In: 20 kA / Imax: 40 kA**
- **Plug-in modules**
- **Remote signal option**
- **IEC 61643-1 compliance**

Dimensions and diagram





V : High energy MOV
Ft : Thermal fuse
t° : Thermal disconnection mechanism
C : Contact for remote signal (Option DS50PVS)

Characteristics

CITEL part number		DS50PV-500	DS50PV-600	DS50PV-800	DS50PV-1000
Network voltage		500 Vdc	600 Vdc	800 Vdc	1000 Vdc
Protection mode		MC (1)	MC	MC/MD	MC/MD
Max. operating voltage	Ucpv	530 Vdc	680 Vdc	840 Vdc	1060 Vdc
Operating current *Leakage current at Uc*	Ic	< 0.1 mA	<0. 1 mA	<0. 1 mA	< 0.1 mA
Follow current	If	none	aucun	aucun	aucun
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA	20 kA
Maximum discharge current *tenue max. 8/20 µs*	Imax	40 kA	40 kA	40 kA	40 kA
Protection level (at In)	Up	1.8 kV	2.5 kV	3 kV	3.6 kV
Residual voltage at 10 kA		1.5 kV	2.2 kV	2.5 kV	3 kV
Residual voltage at 5 kA		1.3 kV	1.8 kV	2.2 kV	2.6 kV
Disconnector					
Thermal Disconnector		internal			
Mechanical characteristics					
Dimensions		see diagram			
Connection		by screw terminals : 4-25 mm² / by bus			
Disconnection indicator		1 mechanical indicator by pole			
Remote signaling		Option DS50PVS - output on changeover contact			
Mounting		symmetrical rail 35 mm			
Operating temperature		-40/+85 °C			
Protection class		IP20			
Housing material		Thermoplastic UL94-V0			
Standards compliance					
NF EN 61643-11	France	Parafoudre Basse Tension - Essais Classe II			
IEC 61643-1	International	Low Voltage SPD - Test Class II			
EN 61643-11	Europe	Parafoudre Basse Tension - Essais Classe II			
UL1449 ed.2	USA	Low Voltage TVSS			

Note 1: MC = Common Mode (+/PE ou -/PE) et MC/MD = Common Mode and Differential Mode (+/-)

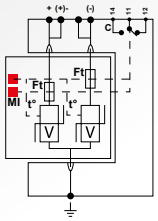
CITEL-2CP - 2 rue Troyon - 92316 Sèvres cedex - France Tel. +33-1 41 23 50 23 - Fax. +33-1 41 23 50 09 - Email : contact@citel2cp.com - Web : http://www.citel2cp.com

Surge protector for PV Off-grid site
DS2x0-xxDC series

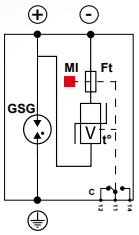
DS230-48DC

DS252C-48DC/G

DS230-DC



DS252C-48DC/G



GSG: Specific gas tube
V : High energy MOV
Mi : Disconnection indicator
Ft : Thermal fuse
t° : Thermal disconnection mechanism
C : Contact for remote signal

- **Surge protector for PV off-grid site**
- **from 12 to 350 Vdc**
- **Compact**
- **Imax: 20 to 40 kA**
- **Pluggable module**
- **Remote signalling (option)**
- **For additional information, see page 59**

Characteristics

CITEL Model		DS220-12DC	DS220-24DC	DS252C-48DC/G	DS230-48DC	DS240-75DC	DS240-95DC	DS240-110DC	DS240-130DC	DS240-220DC	DS240-280DC	DS240-350DC
SPD type		2	2	1 + 2	2	2	2	2	2	2	2	2
Network		12 Vdc	24 Vdc	48 Vdc	48 Vdc	75 Vdc	95 Vdc	110 Vdc	130 Vdc	220 Vdc	280 Vdc	350 Vdc
Max. DC operating voltage	Uc	24 Vdc	38 Vdc	75 Vdc	65 Vdc	100 Vdc	125 Vdc	150 Vdc	180 Vdc	275 Vdc	350 Vdc	460 Vdc
Nominal discharge current *- 15 x 8/20 µs impulses*	In	10 kA	10 kA	25 kA	15 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Impulse current by pole *- max. withstand 10/350µs*	Iimp	-	-	25 kA	-	-	-	-	-	-	-	-
Max. discharge current *-max. withstand Ø 8/20 µs by pole*	Imax	20 kA	20 kA	70 kA	20 kA	40 kA	40 kA	40 kA	40 kA	40 kA	40 kA	40 kA
Protection mode(s)		CM	CM	CM/DM	CM	CM	CM	CM	CM	CM	CM	CM
Protection level	Up	250 V	250 V	1.5/0.5 kV	300 V	390 V	450 V	500 V	620 V	900 V	1200 V	1400 V
Remote signaling of dis-connection		Option DS220S-12DC : output on changeover contact	Option DS220S-24DC : output on changeover contact	output on changeover contact	Option DS230S-48DC : output on changeover contact	Option DS240S-75DC : output on changeover contact	Option DS240S-95DC : output on changeover contact	Option DS240S-110DC : output on changeover contact	Option DS240S-130DC : output on changeover contact	Option DS240S-220DC : output on changeover contact	Option DS240S-280DC : output on changeover contact	Option DS240S-350DC : output on changeover contact
Part number		390101	390501	3415	390401	310601	310301	310701	310801	310201	310501	310901