CITEL

SURGE PROTECTION

FOR

Photovoltaic Systems

Version 6.2.4

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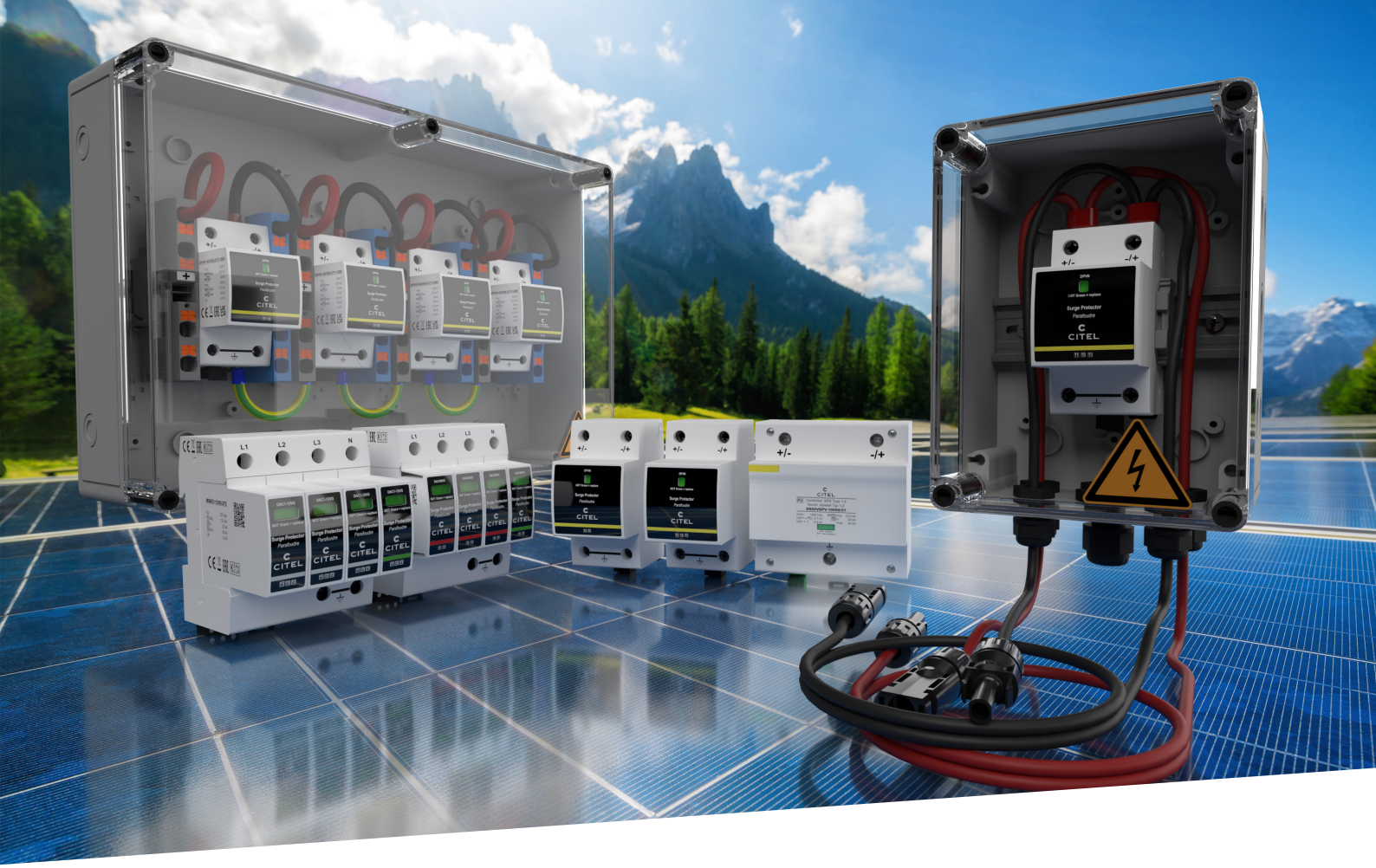


SURGE PROTECTION FOR PHOTOVOLTAIC SYSTEMS

As specialists for lightning and surge protection, the safety of people and systems is our top priority. For more than 80 years, we have been thinking about how we can improve the safety and durability of your systems and thus increase their cost-effectiveness. Our team has many years of experience and extensive knowledge of the special challenges posed by photovoltaic systems.

CITEL has developed patented VG technology on the basis of continuous research and expertise as well as in response to ever-increasing regulatory requirements for protective measures. This unique hybrid technology consisting of a high-performance varistor (MOV) and gas-filled spark gap (GSG) stands for optimal robustness and reliability while guaranteeing the highest possible level of protection.

Our state-of-the-art technology in the field of surge protection for photovoltaic applications is also based on our research and development into "CTC technology". This completely new and patented disconnection technology corrects the weaknesses of previous disconnecting devices by implementing two important features:

- A thermosensitive, all-pole disconnection point, which is located in the centre of the SPD
- An additional, electrically insulating safety barrier to prevent arcing

These technologies can also be found in lightning and surge protection devices (SPDs) for the protection of your photovoltaic system.

To provide planners, installers and operators of photovoltaic systems with a comprehensive protection concept, we offer special protective devices for sensor, data and communication cables in addition to SPDs for PV systems. These solutions are available for any kind of system, whether it's for your family home, a commercial property or a PV generation system, and to round off our range we supply a comprehensive portfolio of generator junction boxes.

CITEL can provide generator junction boxes (GAK) in a wide variety of configurations, meeting requirements for inverters with 1-MPPT up to 10-MPPT, with line fuses and/or load-break switches as well as our CiPlug series with MC4 plugs/sockets. In addition to our standard series, we also develop customised solutions for specific projects.

CITEL PRODUCTS ARE EASY TO PLAN, QUICK TO INSTALL AND HELP YOU SAVE MONEY.

The advantages for the planner and installer

- ✓ Comprehensive portfolio for all common applications
- ✓ Innovative system through continuous further development
- ✓ Easy to coordinate with existing protective devices

Quite apart from planning and installation, the protection devices from CITEL have many other advantages for investors and system operators.

The advantages for the operator

- ✓ Optimal protection thanks to the latest technology, low let-through voltage and high discharge capacity
- ✓ Long service life thanks to high-quality devices manufactured in-house and strict quality assurance
- ✓ Perfectly coordinated devices that form a complete surge protection system.

Above all, this means trouble-free operation of the system and thus a high level of economic efficiency. We have summarised the regulations and requirements for the most common applications below. If you have any questions, please do not hesitate to contact us.

THE MARKET REQUIREMENTS

Due to the steady growth in the use of photovoltaic systems for energy generation in Germany, Europe and worldwide, the issue of system and yield reliability is becoming increasingly important. During the planning phase of a PV system, the required lightning and surge protection concept should be carefully considered. This avoids unnecessary costs for retrofitting.

Particular attention should be paid to the sensors and communication lines as voltage surges can also be coupled in this way, which can cause serious damage to the system, especially to the inverter. The requirements to be met should be clarified with the insurer. Particularly relevant in this regard is the DIN VDE 0100-712 standard, which deals specifically with the installation of photovoltaic power supply systems. Supplement 5 of DIN EN 62305-3 (VDE 0185-305-3 Supplement 5) provides a good overview of special structural installations, which also include PV systems. Lightning and surge protection of lightning protection class III is recommended for PV systems.

If a photovoltaic system is installed on a public building,national or local building regulations must also be taken into account in addition to the relevant standards DIN VDE 0100-443, DIN VDE 0100-534 and DIN EN 62305-3 (VDE 0185-305-3).

Many critical public buildings, such as hospitals, must therefore be equipped with a lightning protection system and protected with an external and internal lightning protection system in accordance with DIN EN 62305-3. The photovoltaic system is part of the electrical installation and must therefore also be integrated into the lightning protection concept. Even for systems without external lightning protection, VDE 0100-443 generally requires surge protection. This also applies in particular to individuals, for example in residential buildings and offices, if equipment of voltage surge category I or II is installed, which in practice is almost always the case.

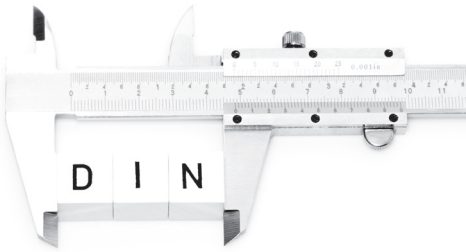
DIN VDE 0100-712 provides the following description (quote from section 4.5 of VDE V 0675-39-12):

"As long as the risk calculation according to VDE 0185-305-2 does not provide any other information, the installation of SPDs on the DC and AC side of PV systems is mandatory."

DIN VDE 0100-712 goes on to state in the normative annex ZB to section 712.534:

"The selection and installation of surge protection devices (SPDs) in PV systems must be carried out in accordance with DIN EN 62305-3 Supplement 5 (VDE 0185-305-3 Supplement 5)."

INNOVATIONS:
STATE OF THE ART / STANDARDS



For the professional installation of a lightning and surge protection concept for PV systems, in addition to supplement 5 of the lightning protection standard DIN EN 62305-3 (VDE 0185-305-3), the following are available:

Since September 2017, the IEC 61643-32 ED1 application standard has been published at international level; this has been implemented nationally in VDE V 0675-5-32 (as a replacement for VDE V 0675-39-12). The new DIN VDE 0100-712 now also contains additional requirements for protecting systems against voltage surges.

The new IEC 61643-32 is essentially based on the familiar VDE V 0675-5-32.

This standard deals with the selection and application principles of surge protection devices for use in photovoltaic installations. This involves measures against surge damage to increase the safety and availability of the system, buildings with and without external lightning protection, the handling of the separation distance and the use of surge protection devices in ground-mounted systems. Specifications are also provided for the selection and installation of surge protection devices on the DC and AC sides. The new IEC 61643-32 also requires the use of SPDs for the data and communication lines.

IEC 61643-32 states:

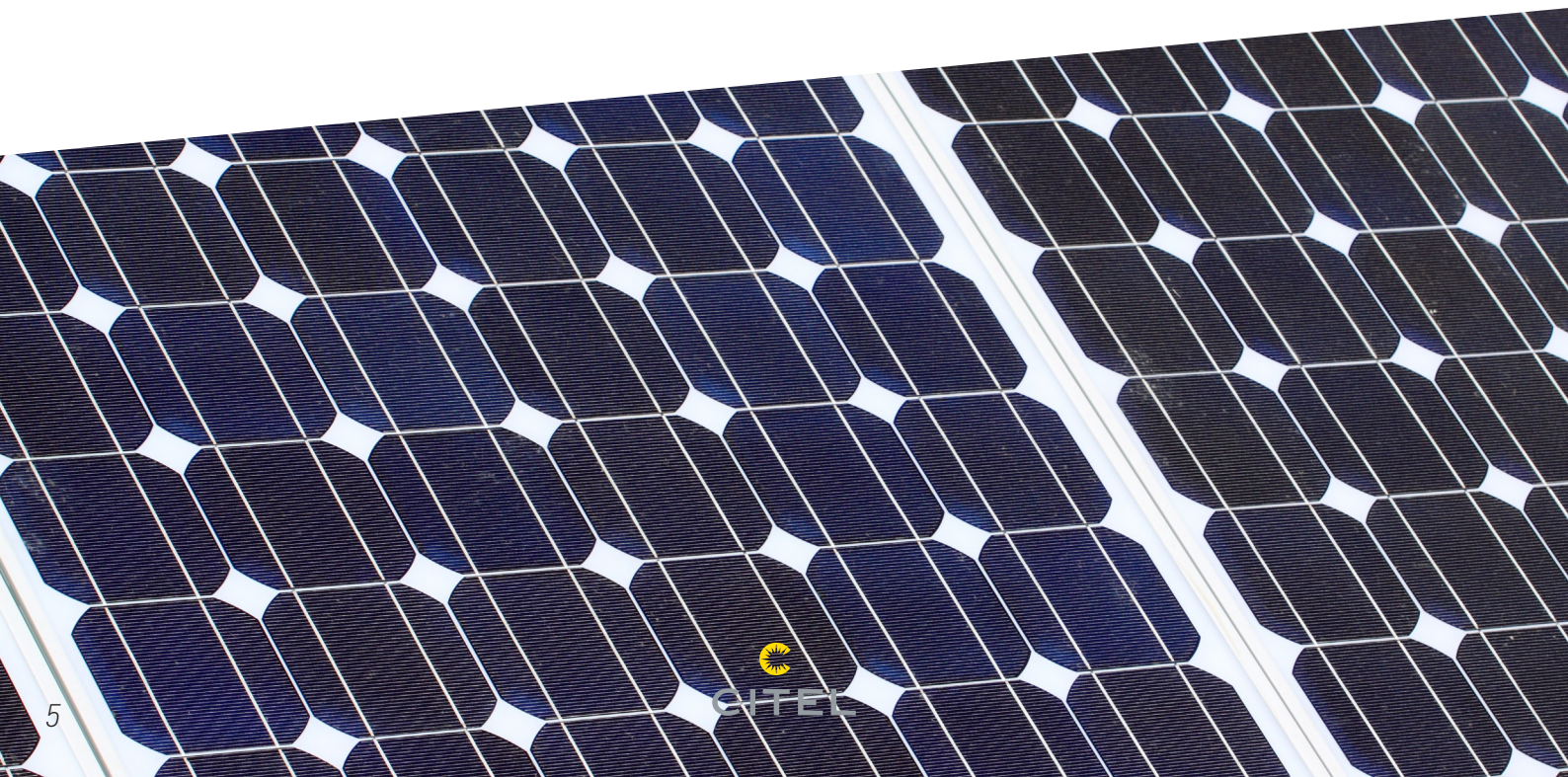
"The installation of SPDs on the DC and AC sides of a PV installation is mandatory unless indicated otherwise by a risk assessment."

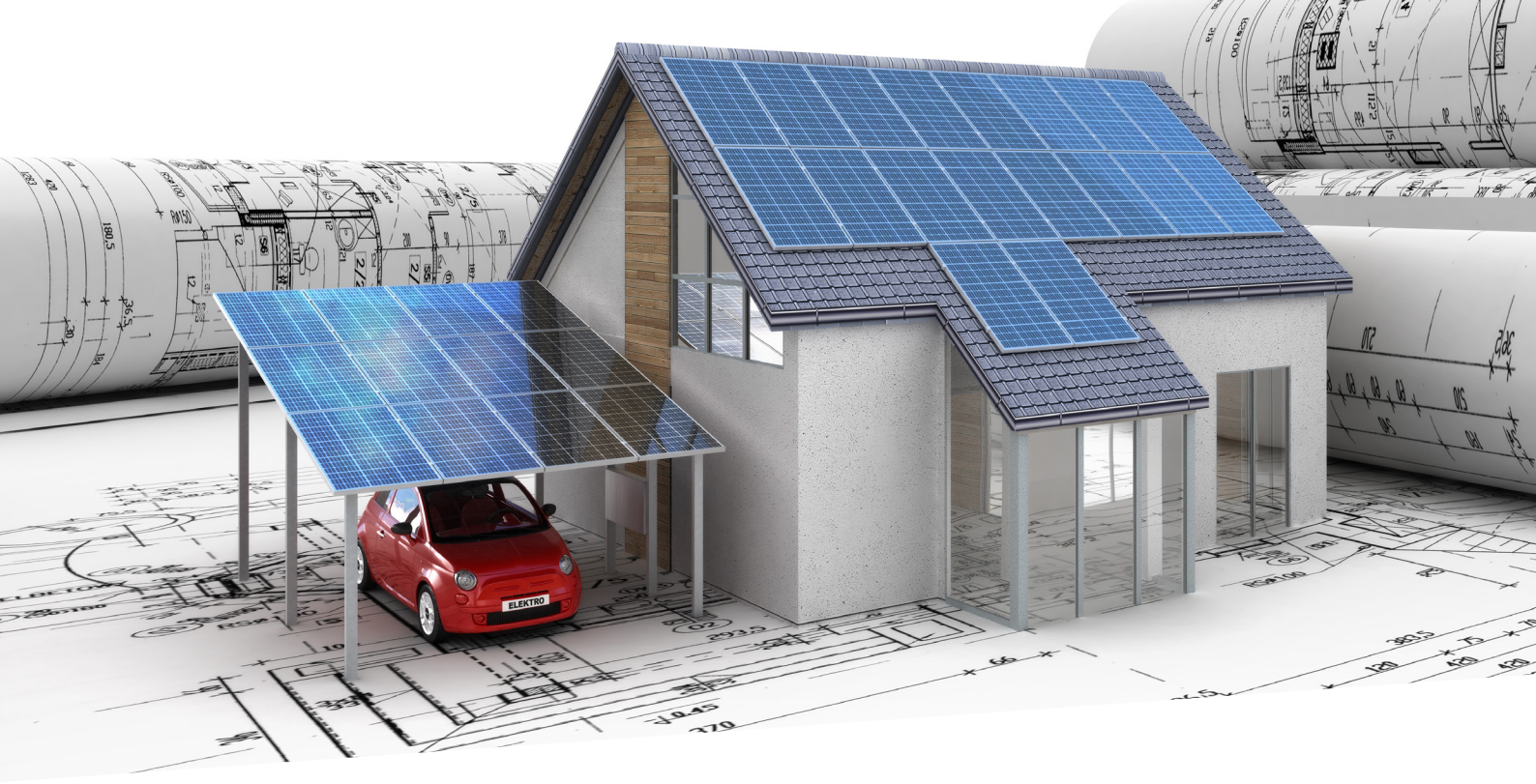
It goes on to add: "When SPDs are installed to protect the PV-installation, it is necessary also to protect any telecommunication and signalling circuits which are part of the PV system."

The obligation to protect photovoltaic systems against voltage surges is also set out in DIN VDE 0100-712.

This standard begins by referencing Supplement 5 of the lightning protection standard DIN EN 62305-3 (VDE 0185-305-3): "The selection and installation of surge protection devices (SPDs) in PV systems must be carried out in accordance with DIN EN 62305-3 Supplement 5 (VDE 0185-305-3 Supplement 5)." This supplement 5 in turn contains the requirement: "The need for surge protection measures on the AC side of the PV power supply system is determined in accordance with DIN VDE 0100-443." This in turn prescribes the mandatory use of SPDs in every installation. DIN VDE 0100-712 also states: "If protection against transient voltage surges is required by DIN VDE 0100-443, Section 443, such protection must also be used on the DC side of the PV system."

For PV systems on or near buildings, DIN VDE 0100-712 also provides guidance on the correct selection of protective devices (minimum requirement) in informative Annex C:





MINIMUM REQUIREMENTS OF STANDARDS

Cross-sections:

- Equipotential bonding conductors not exposed to lightning:

  → At least 6 mm² copper or equivalent.

- Equipotential bonding conductors exposed to lightning:

  → At least 16 mm² copper or equivalent.

Selection of Uc and Up:

- Uc > 1.2*Uocstc
- Up < (5*Uocstc)*0.8 or

Up < Uw*0.8 (Uw: Dielectric strength of the equipment)

Discharge values according to:
A) DIN VDE 0100-712 and IEC 61643-32

- **Type 1 SPD: min. Iimp: 12.5 kA/pole (10/350 µs)**

  Deviating Iimp for type 1 SPDs according to the risk is determined

  - for DC SPDs in accordance with IEC 61643-32 Annex A,
  - for AC SPDs according to lightning protection class and lightning current distribution according to EN 61643-12

- **Type 2 SPD (AC and DC): min. 5 kA/pole (8/20 µs)**

B) VDE 0185-305-3 Supplement 5:

- **Type 1 SPD:**

  - for DC SPDs in accordance with section 5.6.2, tables 2 and 3: 12.5 kA/pole (10/350 µs) to 25 kA/pole (10/350 µs) depending on the earthing concept, system structure or system type and SPD technology

  For AC SPDs in the vicinity of the:

  - Inverter: min. 12.5 kA/pole (10/350 µs).
  - Feed-in point or lightning protection zone transition according to lightning protection class and lightning current distribution according to EN 61643-12, if required values up to 25 kA/pole (10/350 µs).

- **Type 2 SPD (AC and DC): min. 5 kA/pole (8/20 µs)**

Summary for DC side:

If a DC type 1 SPD is required, an Iimp= 12.5 kA/pole (10/350 µs) is sufficient for almost all systems, satisfying the requirements of the various standards. The DS60VG series therefore offers the user a standard-compliant product that does not require complicated calculations during planning and can be used in almost any system. If smaller values are determined by a detailed calculation or when using Supplement 5, the DPVN1-6CVG-21Y series as a type 1+2+3 SPD with an Iimp= 6.25 kA/pole (10/350 µs) is a cost- and space-optimised variant. The DPVN40C-21Y series is used in this case as a DC type 2+3 SPD.

Summary for AC side:

On the AC side, the DS250VG series with 25 kA/pole for maximum loads and the DAC1-13VG or ZPAC series with 12.5 kA/pole for average loads are available as type 1+2+3 SPDs. The SPDs of the DAC50VG series round off the AC side for type 2+3.

SURGE PROTECTION FOR PV SYSTEMS

When analysing the risk of "lightning strikes and voltage peaks", several aspects must be taken into account:

- Due to the exposed position of the PV modules, the risk of lightning strikes is the predominant concern.
- There are several risks involved, namely the danger of a direct lightning strike (to the modules), the risk of indirect effects (the effect of voltage peaks on solar cells, solar chargers or inverters) and the danger to other lines (data).
- The risk of operational breakdown must also be taken into account, especially at locations with a high installed capacity.
- If the PV system is located on an industrial site, the risk of voltage surges due to switching operations must also be included in the analysis.
- The level of risk is directly related to the frequency of lightning and the exposure of the lines on site.

PROTECTION OF PV SYSTEMS

The low-voltage lines of the photovoltaic system connected to the public electricity grid can be exposed to voltage surges in various networks:

- **AC voltage network:** Surge protection devices are required and in most cases also mandatory on the AC voltage output of the PV inverter, which is connected to the public grid.

- **DC voltage network:** Surge protection devices are required or mandatory at the input of the PV inverter or on the PV modules.

- **Data line network:** If SPDs are installed to protect the PV system, it is also necessary to protect all telecommunication and signalling circuits that form part of the PV system.

Most manufacturers of photovoltaic modules guarantee the performance of their products for 20 years or more. The return on investment for photovoltaic power generation systems connected to the low-voltage grid is therefore calculated over this long period. However, these systems are also often exposed to a high risk of lightning strikes and voltage peaks, which can drastically reduce the operating time on which the RoI calculation is based. The implementation of suitable protection solutions is therefore strongly recommended.

AC SURGE PROTECTION FOR PV SYSTEMS

Depending on the type of network and the presence of lightning SPDs or primary surge protection devices, CITEL also offers a complete range of solutions for protecting the AC part of PV systems.

Installations with lightning protection system

A type 1 lightning current SPD, which is especially rated for the discharge of direct lightning currents, is required in the building junction box of the system (in the main distribution board). SPDs such as the DAC1-13VGS offer a high impulse current discharge capability in a compact size and are easy to maintain thanks to their modular design.

Standard installation

If no lightning protection system is available, the installation of a type 2 surge protection device is generally sufficient. In some cases, however, this is mandatory, depending on the amount of lightning in the area concerned (Ng > 2.5). The DAC50S type 2 SPD series enables the creation of modular solutions that are customised for these applications. In medium-sized and small systems with little available space, the DAC15CS/DAC40CS offers a high surge current discharge capacity with compact design.

Input protection of PV inverters

VDE0100-712 requires the installation of additional surge protection at the AC voltage input of the PV inverter if this is more than 10 metres away from the original surge protection device installation location. The DAC15CS/DAC40CS surge protection devices provide the aforementioned protection in these applications and can be installed either directly in the distribution board or in a dedicated separate housing.

SURGE PROTECTION FOR SIGNALLING CABLES

The PV system can be integrated into various data line networks to which elements such as measuring probes, sensors or monitoring systems are connected. In these cases, the installation of a suitable surge protection device is strongly recommended. The DLA product line fulfils this function, and surge protection devices are available for all types of telecommunication or data lines.

DC SURGE PROTECTION FOR PV SYSTEMS

According to VDE0100-712, the DC voltage input of the PV inverter must also be protected. For these applications, CITEL has developed a complete series of type 1+2+3 or type 1+2 and type 2+3 combined SPDs that fulfil the EN61643-31 standard.

Type 1 lightning current SPD

If the system is equipped with non-insulated lightning conductors (see VDE0100-712), the installation of a surge protection device rated for a direct lightning current waveform (10/350 µs) is mandatory. CITEL has developed two series of type 1+2+3 (type 1+2) lightning current SPDs for these cases:

- **DS60VGPV series:** These type 1+2 SPDs withstand impulse currents of 12.5 kA/pole (10/350 µs). They are built using the patented "VG technology" developed by CITEL.
- **Series DPVN1-6CVG-21Y:** Combined SPD type 1+2+3 in "VG and CTC Technology" with an Iimp (10/350 µs) of 6.25 kA/pole.
- **DPVN1-6C-21Y series:** Type 1+2+3 combined SPD based on special varistors and "CTC technology".

Type 2 surge protection devices

In most installations, a type 2+3 SPD will be required or even mandatory. CITEL offers two suitable product lines:

- **Series DPVN40CVG-21Y:** This version is based on the "VG" and "CTC" technologies, is free of operating and leakage currents and ensures maximum reliability.
- **DPVN40C-21Y series:** This series is based on the use of special varistors and "CTC technology".

Highest continuous voltage (Ucpv)

Highest continuous voltage that may be continuously applied to the SPD. It must be higher than the maximum PV voltage of the system (Uocstc).

Short-circuit resistance (Iscpv)

The voltage surge protection must reliably withstand an end-of-life test with a specified short-circuit current (fail-safe shutdown). This parameter Iscpv must be higher than the maximum short-circuit current of the PV line (Iscstc).

Let-through voltage (Up)

Must be lower than the impulse strength (Uw) of the PV system devices (inverters, PV modules).

IEC61643-32 specifies some typical values.

Rated leakage surge current (In)

The repetition stability of the type 2 SPDs at a current impulse of 8/20 µs must be at least 5 kA. Higher values (15 to 20 kA) extend the expected service life of the surge protection devices.

Lightning impulse current (Iimp and Itotal)

The 10/350 impulse load capacity on one pole (Iimp) or on 2 poles together (Itotal) for type SPD 1 depends on the installation configuration.

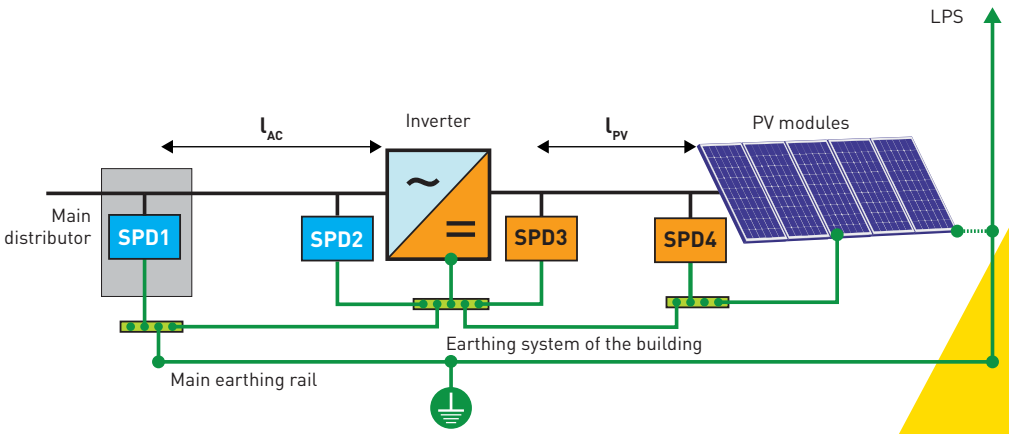
Typical values are:

- Iimp 5 kA (Itotal 10 kA) for installation with the LPL III or IV lightning protection system or a freestanding PV array.
- Iimp 10 kA (Itotal 20 kA) for a PV system equipped with the LPL I lightning protection system.

Selection and placement of SPDs in a PV system connected to the AC grid

According to IEC61643-32, the location and type of SPD to be installed in AC and DC grids depends on several criteria (PV on the building/ PV array, presence of LPS, interconnection, length of lines).

The table opposite describes the most important configurations.



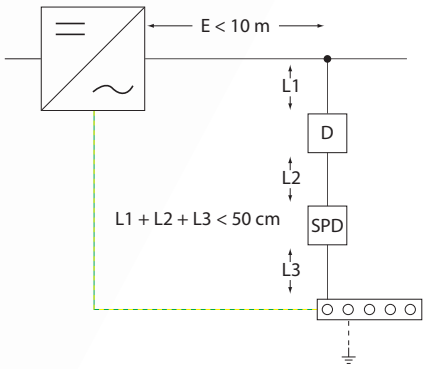
	PV on buildings with external lightning protection system (LPS)				PV field	PV on buildings without LPS	
LPS	Yes	Yes	-	-	No	No	No
LPS isolated*	-	-	Yes	Yes	-	No	No
lAC	> 10 m	< 10 m	> 10 m	< 10 m	> 10 m	> 10 m	< 10 m
lPV	> 10 m	< 10 m	> 10 m	< 10 m	> 10 m	> 10 m	< 10 m
SPD1	AC type 1+2	AC type 1+2	AC type 1+2	AC type 1+2	AC type 1+2	AC type 2**	AC type 2**
SPD2	AC type 1+2	without	AC type 2	without	AC type 2	AC type 2	without
SPD3	PV type 1	PV type 1	PV type 2	PV type 2	PV type 1	PV type 2	PV type 2
SPD4	PV type 1	without	PV type 2	without	PV type 1	PV type 2	without

* Separation distance (s) is maintained

** In Germany, type 1(+2) in the pre-meter area

CABLE LENGTHS (AS PER IEC 61643-32)

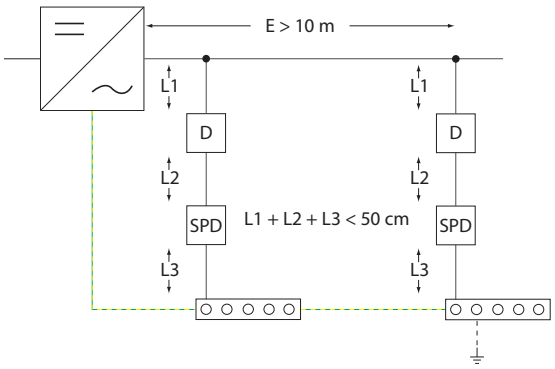
Protection of the AC-side



E : Distance between the feed-in point of the installation and the inverter
L1 + L2 + L3 : Connection cable
D : SPD disconnecting device (if not integrated in the SPD)

Diagram: Installation of SPDs on the AC-side with a short distance between the feed-in point of the installation and the PV inverter (E < 10 m)

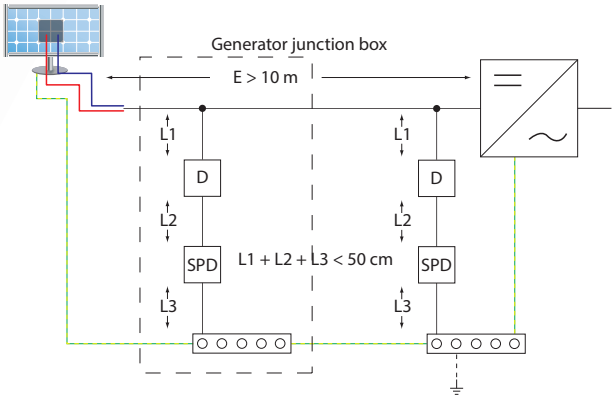
Protection of the AC-side



E : Distance between the feed-in point of the installation and the inverter
L1 + L2 + L3 : Connection cable
D : SPD disconnecting device (if not integrated in the SPD)

Diagram: Installation of SPDs on the AC-side with a large distance between the feed-in point of the installation and the PV inverter (E > 10 m)

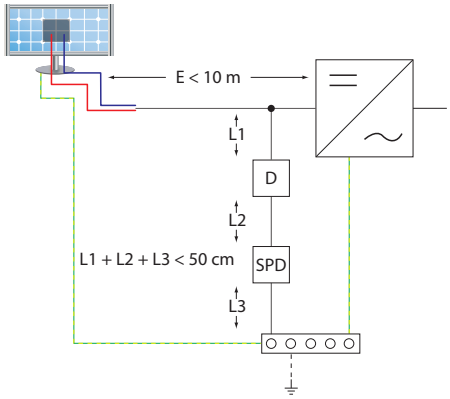
Protection of the DC-side



E : Distance between the feed-in point of the installation and the inverter
L1 + L2 + L3 : Connection cable
D : SPD disconnecting device (if not integrated in the SPD)

Diagram: Installation of SPDs on the DC-side with large distance between PV generator and PV inverter (E > 10 m)

Protection of the DC-side



E : Distance between the feed-in point of the installation and the inverter
L1 + L2 + L3 : Connection cable
D : SPD disconnecting device (if not integrated in the SPD)

Diagram: Installation of SPDs on the DC-side with a short distance between the PV array and PV inverter (E < 10 m)

If cable lengths on both the AC and DC sides are > 10 m, two surge protection devices are required.

SURGE PROTECTION FOR PV SYSTEMS

CITEL SURGE PROTECTION DEVICES FOR PHOTOVOLTAIC APPLICATIONS

- **DPVN1-6CVG-21Y and DPVN1-6C-21Y series:**

  SPD of type 1+2+3 - Optimised for use in systems with > 4 down conductors in accordance with VDE 0185-305-3 Supplement 5, table 2. Available in "VG technology" and as a varistor-based version.

DPVN1-6CVG-21Y-1200

DPVN1-6C-21Y-1200

- **DPVN40CVG-21Y and DPVN40C-21Y series:**

  SPD type 2+3. Like the DPVN1 series, the devices are available in "VG technology" and as a varistor-based version.

DPVN40CVG-21Y-1200

DPVN40C-21Y-1200

- **DS60VGPV-1000G/51 series:**

  The devices in the DS60VGPV/51 series are leakage and operating current-free SPDs of type 1+2 based on "VG technology".

  They have a leakage capacity of 12.5 kA per pole (10/350 µs) and a total leakage capacity of 25 kA. The SPDs therefore offer very high performance and can be used for all lightning protection classes.

DS60VGPVS-1000G/51

DS60VGPVS-1500G/51

All SPD series fulfil the requirements of the currently applicable standards and guidelines for use in photovoltaic systems!

PHOTOVOLTAIC SYSTEM ON YOUR FAMILY HOME

CITEL offers complete protection for all areas

In practice, a distinction is made between houses with or without external lightning protection. If no external lightning protection is required for a building, it can be assumed that there is no increased risk of a direct lightning strike. The voltage surge protection on the DC side of the photovoltaic system therefore only needs to be reactive against indirectly coupled surges. In this case, a type 2+3 SPD (DPVN40CVG) must be provided on both the PV generator and the inverter. If the cable lengths between the generator and inverter are negligible (< 10 m), then one of the two surge protection devices can be dispensed with. The string cables for connecting the generator may form a large induction loop in the event of inductively coupled voltage surge events such as nearby lightning strikes within a radius of around 2 km. In order to obtain increased safety beyond the normative requirements, CITEL recommends using a type 1+2+3 combined SPD (DPVN1-6CVG) even in buildings without external lightning protection. On the AC side, type 1+2+3 combined SPDs (ZPAC or DAC1-13VGS) in the meter cabinet provide optimal protection. This protects both the AC input of the inverter and the building's electrical installation. For houses with external lightning protection, which is generally not mandatory, further regulations apply and we will be happy to inform you about these in detail if required.

Lightning equipotential bonding (AC)

Type 1+2+3 combined SPDs should ideally be installed at the building entrance and protect against lightning currents and switching voltage surges.

Lightning equipotential bonding (DC)

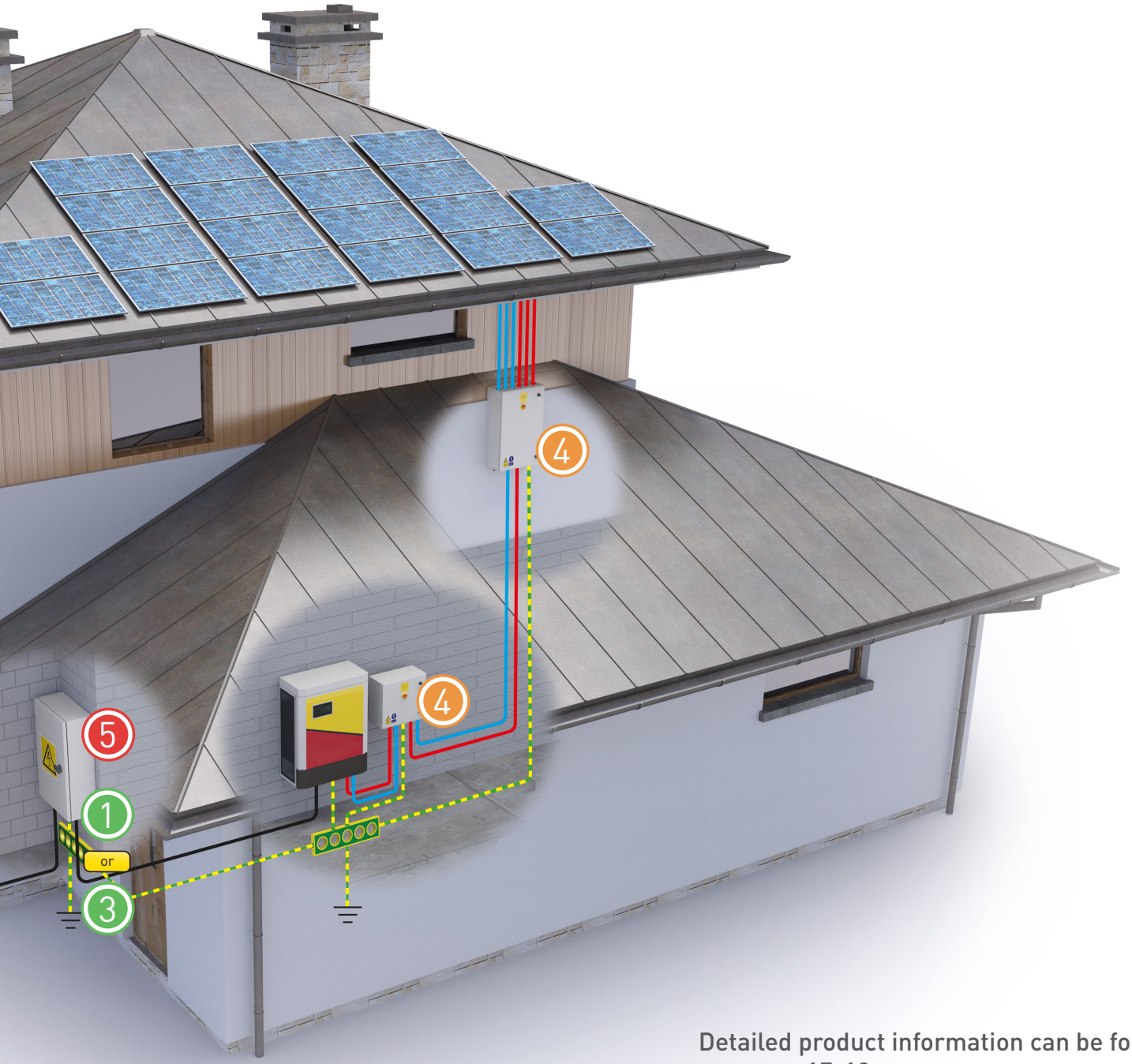
Type 1+2+3 or type 1+2 combined SPDs protect against voltage surges and against (partial) lightning currents, and safely discharge these. Complete protection can only be achieved in conjunction with external lightning protection.

Overvoltage protection (DC)

Type 2+3 surge protective devices protect against voltage surges caused by field couplings or switching operations.

1 AC type 1+2+3

3 AC type 2+3



Detailed product information can be found on pages 17-19.

4

Generator junction box *

DC type 2+3

DC type 1+2

5

Data SPD

* Depending on requirements with DC SPD type 1+2+3 (type 1+2) or type 2+3

CITEL

INDUSTRIAL, COMMERCIAL AND PUBLIC BUILDINGS

CITEL solutions in compliance with the separation distance

CITEL also offers very good lightning and surge solutions for systems with external lightning protection. Firstly, the necessary separation distance "s" between the PV system and the external lightning protection system must be calculated in accordance with VDE 0185-305-3 (EN 62305-3) and ideally maintained. The necessary separation distance is not limited to the modules and their substructure; it also includes the laying of the string cables.

Protection by maintaining the separation distance

If an external lightning protection system is available, the PV system should be as insulated as possible and be installed completely within the protected area of the lightning protection system. If the calculated separation distances are observed, only indirect coupling voltage surges are to be expected. A type 2 SPD is sufficient for protecting the generator and inverter.

Protection if the separation distance is less than the recommended value

If the separation distance falls below the minimum required, the PV system must be integrated into the external lightning protection system by means of direct connections capable of carrying lightning currents. This prevents dangerous flashovers and the associated fire hazard in the event of direct lightning strikes. As partial lightning currents can now be expected on the DC lines, the generator and inverter must be protected with type 1 SPDs or type 1+2+3 (DPVN1) or type 1+2 (DS60VGPV) combined SPDs. In this case too, one of the two SPDs may be dispensed with for cable lengths < 10 m.

AC side

As commercial and industrial buildings usually contain valuable plant and materials, and sensitive information and data is held in many public buildings, complete protection is particularly important in these cases. A combined SPD T1+2+3, such as the DS250VG or the DACN1, guarantees the best possible protection of the AC side with a low let-through voltage < 1500V, combined with a total lightning current discharge capacity of 100 kA (25 kA/pole).

Separation distance "s"

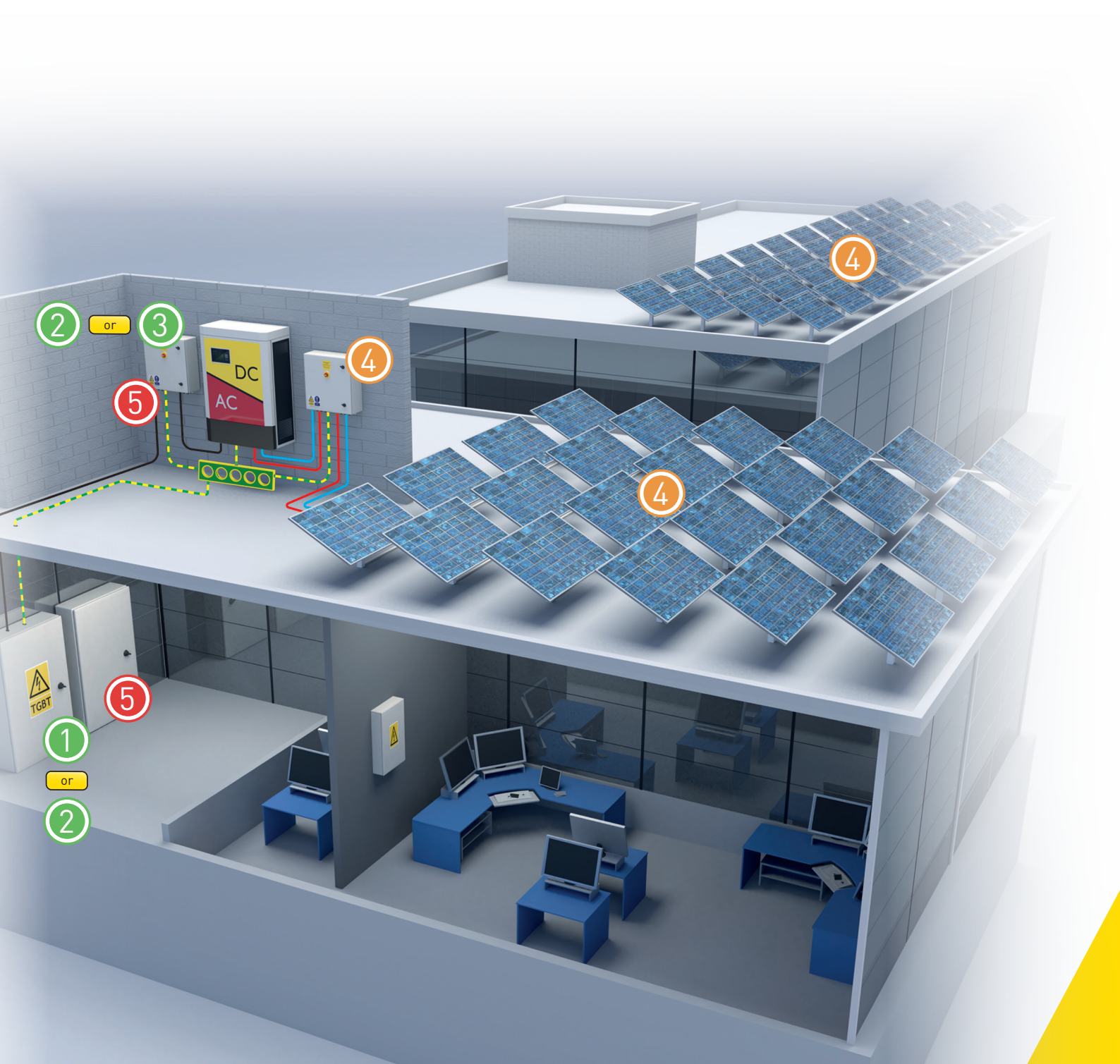
- Calculation of separation distance "s" according to VDE 0185-305-3 (EN 62305-3)
- Compliance with "s"
  → SPD type 2 (DC)
- Non-compliance with "s"
  → SPD type 1+2 (DC)

Detailed product information can be found on pages 17-19.

1 Type 1+2+3

2 Type 1+2+3

3 Type 2+3



4

Generator junction box *

DC type 2+3

DC type 1+2

5

Data SPD

* Depending on requirements with DC SPD type 1+2+3 (type 1+2) or type 2+3

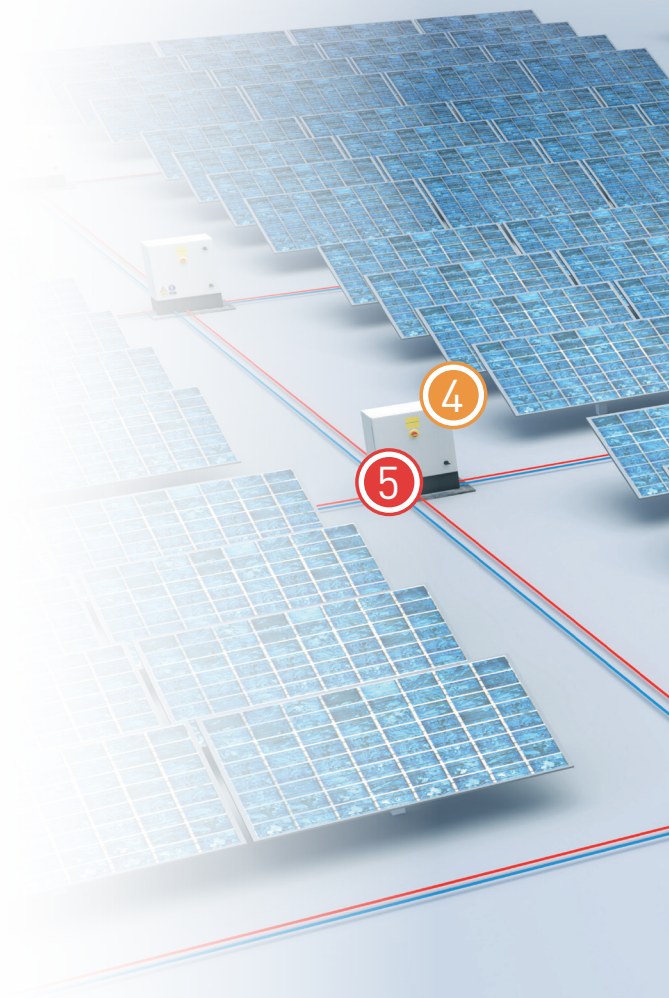
CITEL

EFFICIENT PROTECTION OF GROUND-MOUNTED PV POWER PLANTS

How do I properly protect my PV power plant against surges?

PV power plants are equipped with more and more technology these days. In addition to monitoring systems for pure performance monitoring, this includes sensor technology for recording and analysing ambient conditions such as ambient temperature, module temperature, irradiation and wind speed. The currents of the individual strings are also often monitored precisely. In addition, in some cases tracking systems are used so the modules can automatically track the position of the sun. The protection of all these systems is particularly important. These data and control lines should therefore be consistently taken into account when creating the protection concept.

Ground-mounted systems have a larger spatial area and are thus exposed to a greater lightning hazard during thunderstorms than compact systems on the roof. EN 61643-32 takes this into account by making the use of type 1 surge SPDs mandatory on the DC side of ground-mounted systems.



CITEL recommends:

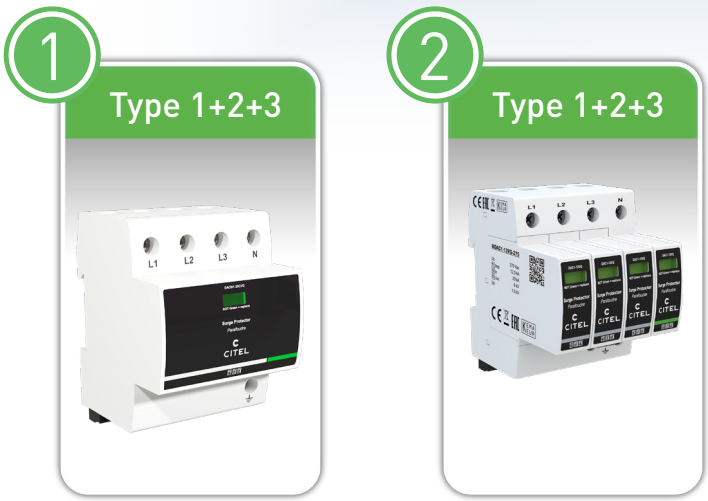
Combined SPDs with VG technology of type 1+2+3 (DPVN1) or type 1+2 (DS60VGPV) on the DC side and type 1+2+3 on the AC side offer the best possible protection for your investment against all types of voltage surge events.

Earthing and potential equalisation

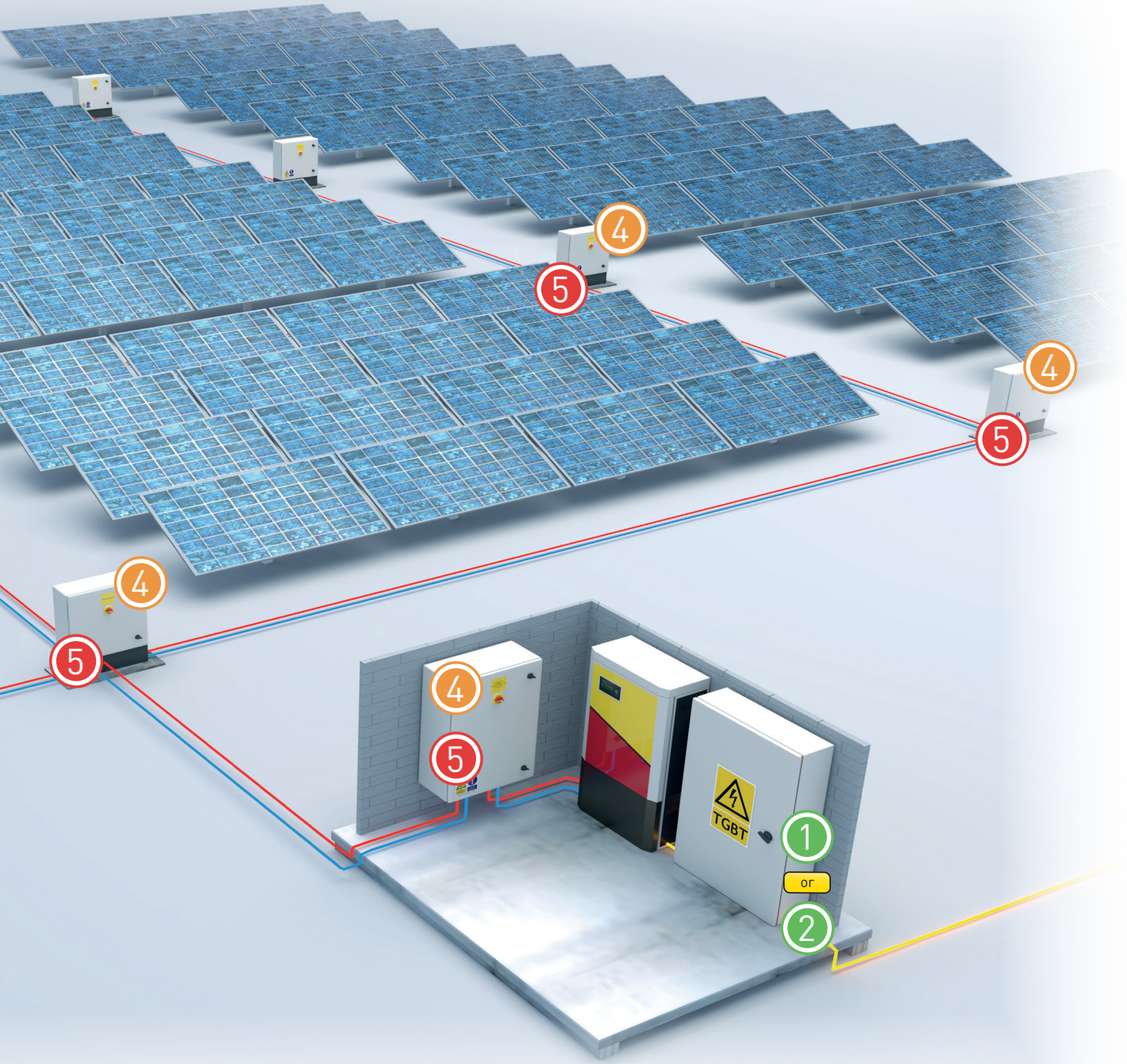
All metallic elements must be electrically connected to each other so that potential differences are avoided.

Correct cable routing

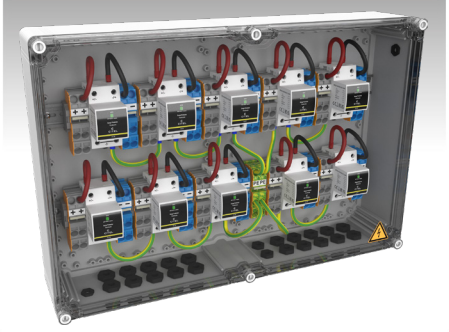
- Prevent the formation of conductor loops
- Short cable runs
- Twisting of string cables



Detailed product information can be found on pages 17-19.



4 Generator junction box*



5 Data SPD

*With DC SPD type 1+2+3

CITEL

PRODUCT SELECTION (example)
AC SIDE

1

DS252VG-300

AC combined SPD type 1+2+3 based on a gas-filled spark gap

- 10-year guarantee
- Secure disconnecting device
- Generates no (grid) follow currents
- No operating and leakage current
- Remote signalling standard
- Fulfils requirements of standards IEC 61643-11 and EN 61643-11
- VDE-AR-N 4100 compliant

Art. code	DACN1-25VGS-11-275	DACN1-25VGS-31-275	DS253VG-300	DS254VG-300/G
Network form	TN TT (1+1), TN	TT (3+1)	TNC (3+0)	TT (3+1), TNS
Iimp / pole	25 kA	25 kA	25 kA	25 kA
Iimp total	50 kA	100 kA	75 kA	100 kA
In / pole	30 kA	30 kA	30 kA	30 kA
Up	< 1.5 kV	< 1.5 kV	< 1.5 kV	< 1.5 kV
Ipe	None	None	None	None
If	None	None	None	None
Art. no.	64176	64135	3896	2756

1

ZPAC1-13VG-PRO-U
ZPAC1-13VG-31-275

AC combined SPD type 1+2+3 based on a gas-filled spark gap

- 10-year guarantee
- Secure disconnecting device
- Generates no (grid) follow currents
- No operating and leakage current
- Plug-in protective modules
- Remote signalling (only PRO-SU)
- Fulfils requirements of standards IEC 61643-11 and EN 61643-11
- VDE-AR-N 4100 compliant
- Standard-compliant fused double voltage tap

Art. code	ZPAC1-13VG-PRO-U	ZPAC1-8VG-PRO-U	ZPAC1-13VG-31-275	ZPAC1-8VG-31-275
Network form	TT, TNS	TT, TNS	TT, TNS	TT, TNS
Iimp / pole	12.5 kA	8 kA	12.5 kA	8 kA
Iimp total	50 kA	32 kA	50 kA	32 kA
In / pole	20 kA	20 kA	20 kA	20 kA
Up	< 1.5 kV	< 1.5 kV	< 1.5 kV	< 1.5 kV
Ipe	None	None	None	None
If	None	None	None	None
Art. no.	64087	64079	64004	64006

2

DAC13VGS-31-275

AC combined SPD type 1+2+3 based on a gas-filled spark gap

- 10-year guarantee
- Secure disconnecting device
- Generates no (grid) follow currents
- No operating and leakage current
- Plug-in protective modules
- Remote signalling standard
- Fulfils requirements of standards IEC 61643-11 and EN 61643-11
- VDE-AR-N 4100 compliant

Art. code	DAC1-13VGS-20-275	DAC1-13VGS-30-275	DAC1-13VGS-40-275	DAC1-13VGS-31-275
Network form	TN (2+0)	TNC (3+0)	TNS (4+0)	TT (3+1), TNS
Iimp / pole	12.5 kA	12.5 kA	12.5 kA	12.5 kA
Iimp total	25 kA	37.5 kA	50 kA	50 kA
In / pole	20 kA	20 kA	20 kA	20 kA
Up	< 1.5 kV	< 1.5 kV	< 1.5 kV	< 1.5 kV
Ipe	None	None	None	None
If	None	None	None	None
Art. no.	821730222	821730223	821730224	821730244

3

DAC50VGS-31-275

AC combined SPD type 2+3 based on a gas-filled spark gap

- 10-year guarantee
- Secure disconnecting device
- Generates no (grid) follow currents
- No operating and leakage current
- Plug-in protective modules
- Remote signalling standard
- Fulfils requirements of standards IEC 61643-11 and EN 61643-11

Art. code	DAC50VGS-20-275	DAC50VGS-30-275	DAC50VGS-40-275	DAC50VGS-31-275
Network form	TN (2+0)	TNC (3+0)	TNS (4+0)	TT (3+1), TNS
In / pole	20 kA	20 kA	20 kA	20 kA
Imax / pole	50 kA	50 kA	50 kA	50 kA
Up	< 1.5 kV	< 1.5 kV	< 1.5 kV	< 1.5 kV
Ipe	None	None	None	None
If	None	None	None	None
Art. no.	821130222	821130223	821130224	821130244

PRODUCT SELECTION (example) DC SIDE

CiPlug1-XS

Generator junction box (GAK) CiPlug1-XS with 1 string

- Generator junction box for 1 MPP tracker
- Voltage surge protection integrated
- IP 65, SK II and IK 8 housing
- Housing material: UV and ozone resistant, glass fibre reinforced polycarbonate with pressure equalisation element
- Connection cables pre-fitted with MC4 connectors
- Further solutions available on request

Article code		CiPlug1-DP6VG-1-XS	CiPlug1-DP6-1-XS	CiPlug1-DP40VG-1-XS
Rated voltage	Un	1000 Vdc		
Rated current	InA	52 A		
Rated line current	InC	26 A		
Input / per MPPT		MC4 plug 1x6 mm² with 15 cm connection		
Output / per MPPT		MC4 plug 1x6 mm² with 120 cm connection		
Earth terminal		Screw clamp 2.5-25 mm² (35 mm²)		
Dimensions		WxHxD (mm): 130 x 180 x 111		
Surge protection				
Compliant with standard		DIN EN 61643-31		
Technology		**VG technology**		
Voltage surge protection type		Combined SPD type 1+2+3		SPD type 2+3
Surge protection device		DPVN1-6CVG-21Y-1200	DPVN1-6C-21Y-1200	DPVN40CVG-21Y-1200
Article number		156955	156954	156953

DS60VGPV-1000G/51

DC combined SPD type 1+2 based on a gas-filled spark gap

- 10-year guarantee
- Redundant secure disconnecting device
- Galvanic isolation
- No ageing due to operating and leakage currents
- Fault-resistant, reverse polarity protected Y-circuit
- Remote signalling standard
- Fulfils requirements of standard EN 50539-11

Art. code	DS60VGPV-600G/51	DS60VGPV-1000G/51	DS60VGPV-1500G/51
Uocstc	600 Vdc	1000 Vdc	1250 Vdc
Ucpv	720 Vdc	1200 Vdc	1500 Vdc
Iimp / pole	12.5 kA	12.5 kA	12.5 kA
Imax / pole	40 kA	40 kA	40 kA
Up (In)	< 1.7 kV	< 2.8 kV	< 3.4 kV
Ipe	None	None	None
If	None	None	None
Art. no.	3963	3958	3956

DPVN1-6CVG-21Y-1200
DPVN1-6C-21Y-1200

DC combined SPD type 1+2+3 based on a gas-filled spark gap

- "CTC-Technology"
- 10-year warranty (only VG)
- Galvanic isolation
- No ageing due to operating and leakage currents (only VG)
- Fault-resistant, reverse polarity protected Y-circuit
- Remote signalling standard
- According to VDE 0185-305-3 Supplement 5, especially suitable for buildings with > 4 down conductors (see Table 2)
- Fulfils requirements of standards IEC 61643-31 and EN 61643-31

Art. code	DPVN1-6CVG-21Y-1200	DPVN1-6C-21Y-1200
Uocstc	1000 Vdc	1000 Vdc
Ucpv	1200 Vdc	1200 Vdc
Iimp / pole	6.25 kA	6.25 kA
Imax / pole	40 kA	40 kA
Up (In)	< 4.3 kV	< 4.3 kV
Ipe	None	None
Comb. impulse	6 kV	6 kV
If	None	None
Art. no.	65222102	65212102

10-year warranty only for SPD based on VG technology

DPVN40CVG-21Y-1200
DPVN40C-21Y-1200

DC combined SPD type 2+3 based on a gas-filled spark gap

- "CTC-Technology"
- 10-year warranty (only VG)
- Galvanic isolation
- No ageing due to operating and leakage currents (only VG)
- Fault-resistant, reverse polarity protected Y-circuit
- Plug-in protective modules
- Remote signalling standard
- Fulfils requirements of standards IEC 61643-31 and EN 61643-31

Art. code	DPVN40CVG-21Y-1200	DPVN40C-21Y-1200
Uocstc	1000 Vdc	1000 Vdc
Ucpv	1200 Vdc	1200 Vdc
In / pole	20 kA	20 kA
Imax / pole	40 kA	40 kA
Up (In)	< 4.3 kV	< 4.3 kV
Comb. impulse	6 kV	6 kV
Ipe	None	None
If	None	None
Art. no.	65122102	65112102

10-year warranty only for SPD based on VG technology

PRODUCT SELECTION (example)
SPD FOR USE IN PV SYSTEMS

DDC40CS-20-275

SPD type 2 for DC applications

- Compact 2-pole DC surge protector type 2
- Secure disconnecting device
- Transverse / longitudinal surge protection
- The narrowest type 2 SPD on the market
- Plug-in protective modules
- Remote signalling standard
- Fulfils requirements of standards IEC 61643-11 and EN 61643-11

Art. code	DDC20CS-20-24	DDC40CS-20-100	DDC40CS-20-275	DDC40CS-20-460
Uc DC	24 Vdc	100 Vdc	275 Vdc	460 Vdc
In / pole	10 kA	20 kA	20 kA	20 kA
Imax / pole	20 kA	40 kA	40 kA	40 kA
Up	< 250 V	< 390 V	< 900 V	< 1400 V
Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
If	None	None	None	None
Art. no.	828210321	828410521	828410921	828411121

5 years WARRANTY

DLA-06D3 DLA-12IS

SPD for data applications

- Only 13 mm (DLA) or 18 mm (DLA-IS)
- For all instrumentation and control, telecommunications and data technology applications
- Protected shield connection
- Plug-in protective module
- Earthing via top hat rail
- Fulfils requirements of standards IEC 61643-21 and VDE 0845-3-1
- Other variants are available on request

Art. code	DLA-06D3	DLA-12D3	DLA-24D3	DLA-48D3	DLA-12-IS
Applica-tions	RS422 / RS485	RS232	Current loop 4-20 mA	48 V Applica-tions	RS485 RS232
Config.	2 cores + shield	2 cores + shield	2 cores + shield	2 cores + shield	2 cores + shield + signal-ground
Un	6 V	12 V	24 V	48 V	12 V
UC AC / DC	8 V / 6 V	15 V / 10 V	28 V / 20 V	53 V / 37 V	15 V / 10 V
Up	< 20 V	< 30 V	< 40 V	< 70 V	< 30 V
Iimp	5 kA	5 kA	5 kA	5 kA	5 kA
Imax	20 kA	20 kA	20 kA	20 kA	20 kA
Art. no.	6401011	6402011	6403011	6403021	640152

MJ8-C6A

Surge protection SPD for Ethernet, POE, data and telecommunications technology

- High-quality, fully shielded housing with 2 RJ45 sockets
- 2-stage protection circuit
- Shielded
- Optimal let-through voltage for network applications
- Simple installation
- Fulfils requirements of standards IEC 61643-21 and EN 61643-21

Art. code	MJ8-C6A	MJ8-POE-C6A	MJ8-170V
Application	Ethernet 10GB Base T	Power over Ethernet ++	DSL
Connection	RJ45	RJ45	RJ45
UC	8 V	60 V	170 V
Up	< 20 V	< 70 V	< 220 V
In	2 kA	2 kA	2 kA
Iimp	500 A	500 A	500 A
Art. no.	581540	581541	560203

DC selection of surge protection devices

Lightning protection system present?

NO

Is an LPS necessary according to VDE 0185-305?

NO

Retrofit at least class III LPS

Continue

YES

Is the PV system in the protected zone, and is the separation distance maintained?

NO

YES

YES

Lightning current carrying connection of the PV rack to the LPS. Use of combined arrester type 1+2 on the inverter.

Use of SPD type 2 directly on the device to be protected (inverter)

Continue

For cable lengths > 10 m between generator and inverter, additional SPDs of the same class must be used on the generator.

Continue

Additionally in the electrical installation of the building: Possibly SPD type 2 (possibly type 1) at the mains entry point and for cable lengths > 10 m additionally before the inverter. Protect the data line if necessary. Use the AC selection aid.

Standardised according to EN 61643-32

DS60VGPV-1000G/51

- Combined arrester
- Type 1+2
- VG technology
- 10-year guarantee

DS60VGPV-1000G/51 3958

or

DPVN40C(VG)S-21Y-1200

- Combined arrester
- Type 2+3
- CTC technology
- Only 2.5 TE
- Optionally with VG technology

DPVN40CS-21Y-1200 65112102
DPVN40CVGS-21Y-1200 65122102

or

DS50VGPVS-1000G/51

- SPD
- Type 2
- VG technology
- 10-year guarantee
- Pluggable

DS50VGPVS-1000G/51 481311

Opt. according to Annex A, Table A1

DPVN1-6C(VG)S-21Y-1200

- Combined arrester
- Type 1+2+3
- CTC technology
- Only 2.5 TE
- Optionally with VG technology

DPVN1-6CS-21Y-1200 65212102
DPVN1-6CVGS-21Y-1200 65222102

or

DS50(VG)PVS-1000G/12KT1

- Combined arrester
- Type 1+2
- Pluggable
- Optionally with VG technology

DS50PVS-1000G/12KT1 482393
DS50VGPVS-1000G/12KT1 482313

or

DS50PVS-1000G/51

- SPD
- Type 2
- Pluggable

DS50PVS-1000G/51 480391

Generator junction box

GAK1 ... GAK10

- Generator junction box for 1 to 10 MPP trackers
- SPD type 2 (+3) or combined arrester type 1+2 (+3)
- Optionally with line fuses

CiPlug1 ... CiPlug4

- Generator junction box for 1 to 4 MPP trackers
- With MC4 connectors
- SPD type 2 (+3) or combined arrester type 1+2 (+3)

AC selection lightning and surge protection (SPD)

DAC40CS • DAC50VGS • DAC1-13VGS • DS254VG • ZPAC1-13VG-(PRO)

SPD type 2 | SPD type 2+3 | Combined arrester type 1+2+3

Data/communication technology (SPD)

DLA-12-IS

- For the protection of data lines
- 2-stage protection
- 2 cores + shield
- Pluggable

DLA-12-IS 640152

MJ8-C6A / MJ8-POE-C6A

- Cat6A (10GbE)
- PoE++ capable
- Shielded RJ45 connection
- Two-stage, high performance protective circuit

MJ8-C6A 581540
MJ8-POE-C6A 581541

DLATS1-06D3

- For the protection of data lines
- 2-stage protection
- 2 cores + shield
- Optical display
- Remote signalling
- Pluggable

DLATS1-06D3 6417011

CL-DSL

- Protection of VDSL, VDSL2, DSL, ISDN and analogue devices
- Frequency range up to 400 MHz
- Surface mounting

CL-DSL 6400066

Energy technology: Flow chart based on VDE 0185-305-3, Supplement 5 and VDE 0100-712 as well as EN 61643-32

You can find other voltage variants on our homepage!

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WE PROTECT
YOU RELAX!
+/-
-/+
DPVN1-6CVGS-21Y-1200
Ucpv 1200 V
PV T1 Iimp 6.25 kA
PV T2 In 20 kA
Imax 40 kA
PV T1 Itotal 12.5 kA
PV T2 Itotal 60 kA
Up 4.3 kV
DPVN
NOT Green = replace
Surge Protector
Parafoudre
CITEL
T1 T2 T3
+/-
-/+
CITEL
PV Combined SPD Type 1-2
Kombi Ableiter Typ 1-2
DS60VGPV-1000G/51
Ucpv 1200 Vdc
Up(+/-→PE) 4.7 kV
Up(+→-) 5.4 kV
PV T1 Iimp 12.5 kA
T2 In 20 kA
Imax 40 kA
RED : Replace
ROT : Gerät ersetzen
YOUR EXPERTS FOR
SURGE PROTECTION

CITEL

GENERATOR JUNCTION BOXES

COMPACT GAK-XS SERIES FOR 1 MPP-TRACKER

SPD TYPE 1+2+3 or SPD TYPE 2+3

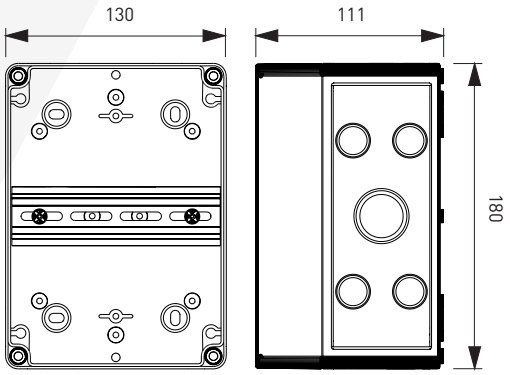
- Generator junction box for 1 MPP tracker / 2 strings
- Voltage surge protection integrated
- Connection via spring terminals (6-10 mm²)

GAK 1. K2x10. K1x10. DP6VG-1-XS

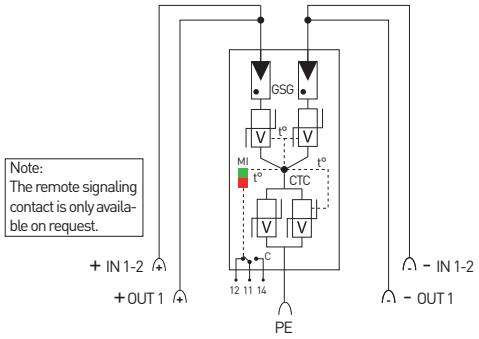
- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200

- **"K1x10"** Number of output strings x conductor cross-section, 1 pc. x 10 mm²
- **"K2x10"** Number of input strings x conductor cross-section, 2 pc. x 10 mm²
- **"1"** Number of SPDs

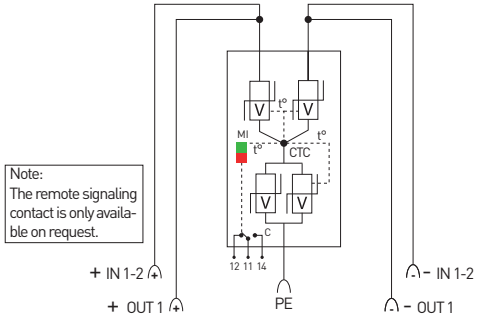
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker

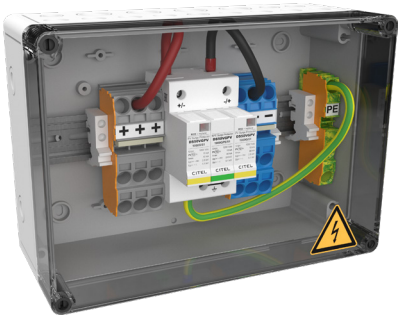


Electrical characteristics		GAK1.K2x10.K1x10-XS series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	32 A
Rated line current	InC	16 A
Connection options		
Input / per MPPT		Spring clamps max. 10 mm²
Output / per MPPT		Spring clamps max. 10 mm²
Earth terminal		Screw terminal 2.5 - 25 mm² (35 mm²)
Cable entry		7x M16 (Ø 4.5-10 mm) - Screw connections supplied
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 130 x 180 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK1.K2x10.K1x10.DP40-1-XS	157106	Combined SPD 2+3	MOV
GAK1.K2x10.K1x10.DP40VG-1-XS	157107	Combined SPD 2+3	VG technology
GAK1.K2x10.K1x10.DP6-1-XS	157108	Combined SPD type 1+2+3	MOV
GAK1.K2x10.K1x10.DP6VG-1-XS	157109	Combined SPD type 1+2+3	VG technology

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

GENERATOR JUNCTION BOX (GAK) FOR 1 MPP TRACKER



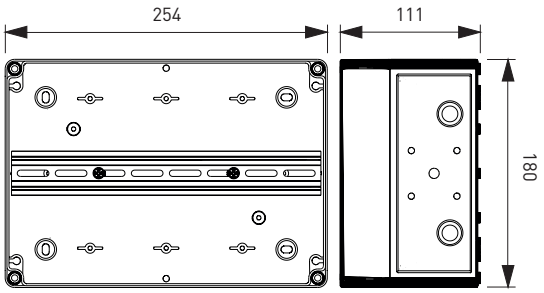
SPD TYPE 1+2 or SPD TYPE 2

- Generator junction box for 1 MPP tracker / 6 strings
- Voltage surge protection integrated
- Connection via spring terminals (6-16 mm²)

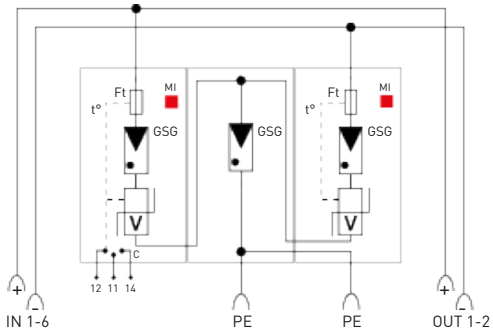
GAK 1. K6x16. K2x16. 51VG-12

- **"61VG-1"** DS60VGPV-1000G/51
- **"51VG-12"** DS50VGPVS-1000G/12KT1
- **"51VG-1"** DS50VGPVS-1000G/51
- **"51-12"** DS50PVS-1000G/12KT1
- **"51-1"** DS50PVS-1000G/51
- **"K2x16"** Number of output strings x conductor cross-section, e.g. 2 pcs. x 16 mm²
- **"K6x16"** Number of input strings x conductor cross-section, e.g. 6 pcs. x 16 mm²
- **"1"** Number of SPDs

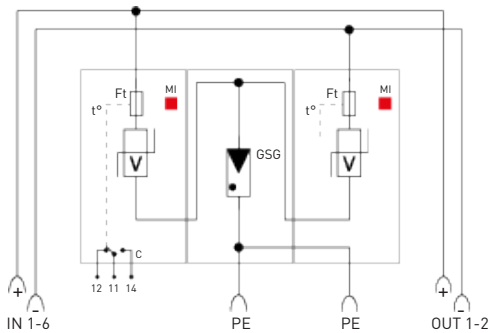
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



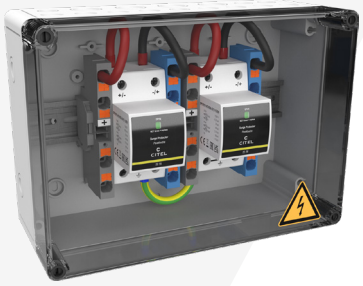
Electrical characteristics		GAK1.K6x16.K2x16 series
Description		Generator junction box type 1+2 or type 2 PV SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	10 A
Rated line current	InC	10 A
Connection options		
Input / per MPPT		Spring clamps max. 16 mm²
Output / per MPPT		Spring clamps max. 16 mm²
Earth terminal		Spring clamps max. 16 mm²
Cable entry		18x M16 (Ø 4.5-10 mm) - Screw connections supplied
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 254 x 180 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK1.K6x16.K2x16.61VG-1	158103	Combined SPD type 1+2	VG technology
GAK1.K6x16.K2x16.51VG-12	158109	Combined SPD type 1+2	VG technology
GAK1.K6x16.K2x16.51VG-1	158107	SPD type 2	VG technology
GAK1.K6x16.K2x16.51-12	158110	Combined SPD type 1+2	MOV
GAK1.K6x16.K2x16.51-1	158106	SPD type 2	MOV

* Other surge protection devices on request (DPVN series)

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
Ft: Thermal fuse
C: Remote signalling
MI: Error display

COMPACT GAK-XS SERIES FOR 2 MPP-TRACKER



SPD TYPE 1+2+3 or SPD TYPE 2+3

- Generator junction box for 2 MPP tracker / 2 strings each
- Voltage surge protection integrated
- Connection via spring terminals (6-10 mm²)

GAK 2. K2x10. K1x10. DP6VG-1-XS

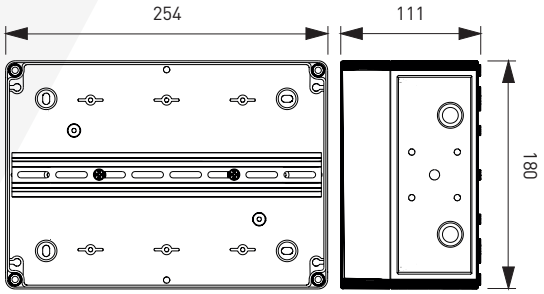
- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200

"K1x10" Number of output strings x conductor cross-section, 1 pc. x 10 mm²

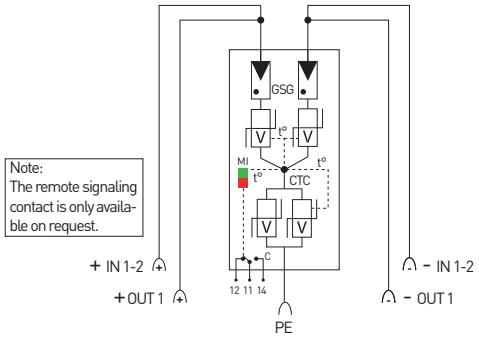
"K2x10" Number of input strings x conductor cross-section, 2 pc. x 10 mm²

"2" Number of SPDs

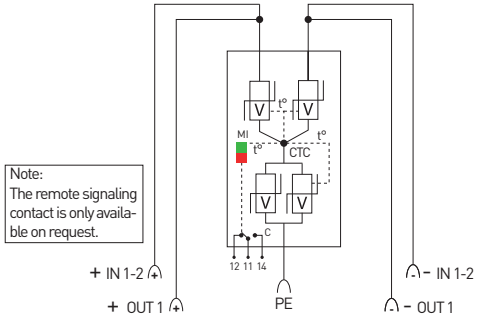
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



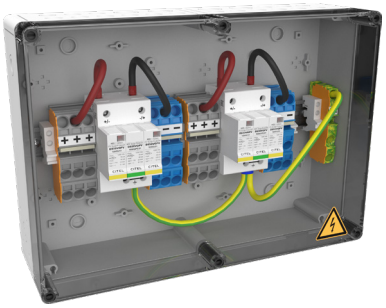
Electrical characteristics		GAK2.K2x10.K1x10-XS series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	32 A
Rated line current	InC	16 A
Connection options		
Input / per MPPT		Spring clamps max. 10 mm²
Output / per MPPT		Spring clamps max. 10 mm²
Earth terminal		Screw terminal 2.5 - 25 mm² (35 mm²)
Cable entry		14x M16 (Ø 4.5-10 mm) - Screw connections supplied
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 254 x 180 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK2.K2x10.K1x10.DP40-1-XS	157206	Combined SPD type 2+3	MOV
GAK2.K2x10.K1x10.DP40VG-1-XS	157207	Combined SPD type 2+3	VG technology
GAK2.K2x10.K1x10.DP6-1-XS	157208	Combined SPD type 1+2+3	MOV
GAK2.K2x10.K1x10.DP6VG-1-XS	157209	Combined SPD type 1+2+3	VG technology

CE

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

GENERATOR JUNCTION BOX (GAK) FOR 2 MPP TRACKER



SINCE 1998 CITEL VG TECHNOLOGY

IP65

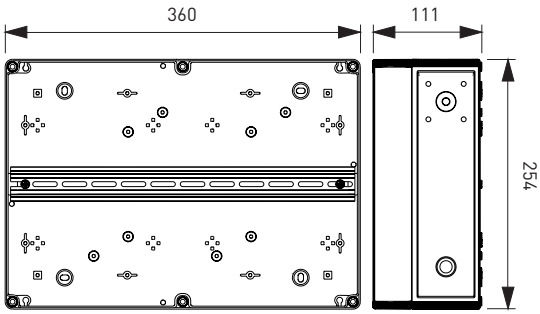
SPD TYPE 1+2 or SPD TYPE 2

- Generator junction box for 2 MPP tracker / 6 strings each
- Voltage surge protection integrated
- Connection via spring terminals (6-16 mm²)

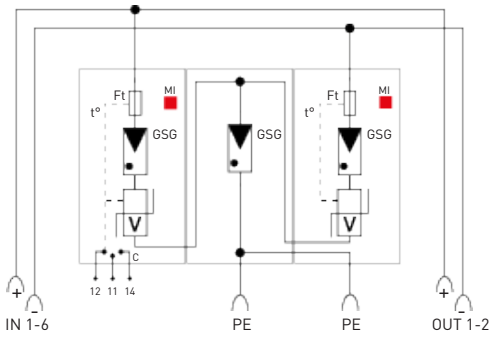
GAK 2. K6x16. K2x16. 51VG-12

- **"61VG-1"** DS60VGPV-1000G/51
- **"51VG-12"** DS50VGPVS-1000G/12KT1
- **"51VG-1"** DS50VGPVS-1000G/51
- **"51-12"** DS50PVS-1000G/12KT1
- **"51-1"** DS50PVS-1000G/51
- **"K2x16"** Number of output strings x conductor cross-section, e.g. 2 pcs. x 16 mm²
- **"K6x16"** Number of input strings x conductor cross-section, e.g. 6 pcs. x 16 mm²
- **"1"** Number of SPDs

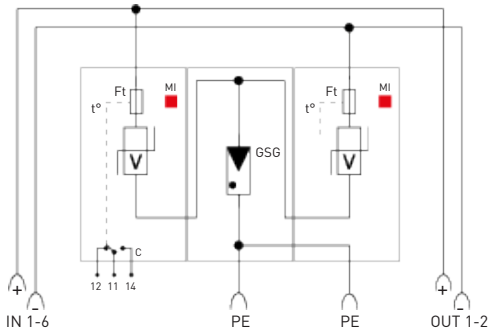
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
Ft: Thermal fuse
C: Remote signalling
MI: Error display

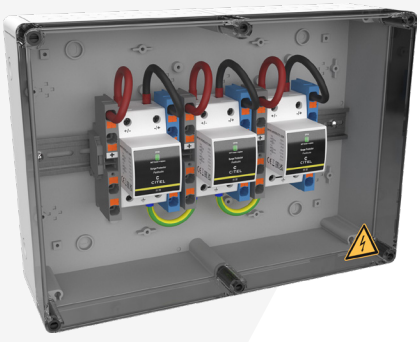
Electrical characteristics		GAK2.K6x16.K2x16 series
Description		Generator junction box type 1+2 or type 2 PV SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	10 A
Rated line current	InC	10 A
Connection options		
Input / per MPPT		Spring clamps max. 16 mm²
Output / per MPPT		Spring clamps max. 16 mm²
Earth terminal		Spring clamps max. 16 mm²
Cable entry		30x M16 (Ø 4.5-10 mm) - Screw connections supplied
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 360 x 254 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK2.K6x16.K2x16.61VG-1	158203	Combined SPD type 1+2	VG technology
GAK2.K6x16.K2x16.51VG-12	158209	Combined SPD type 1+2	VG technology
GAK2.K6x16.K2x16.51VG-1	158207	SPD type 2	VG technology
GAK2.K6x16.K2x16.51-12	158210	Combined SPD type 1+2	MOV
GAK2.K6x16.K2x16.51-1	158206	SPD type 2	MOV

CE

* Other surge protection devices on request (DPVN series)

COMPACT GAK-XS SERIES FOR 3 MPP-TRACKER



SPD TYPE 1+2+3 or SPD TYPE 2+3

- Generator junction box for 3 MPP tracker / 2 strings each
- Voltage surge protection integrated
- Connection via spring terminals (6-10 mm²)

GAK 3. K2x10. K1x10. DP6VG-1-XS

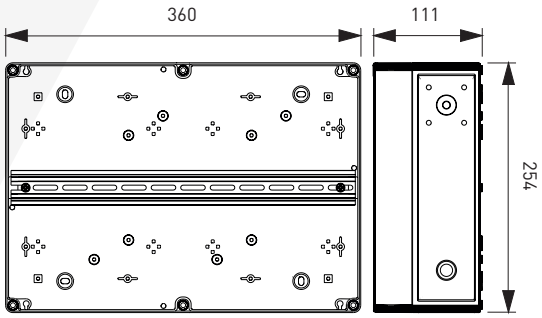
- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200

"K1x10" Number of output strings x conductor cross-section, 1 pc. x 10 mm²

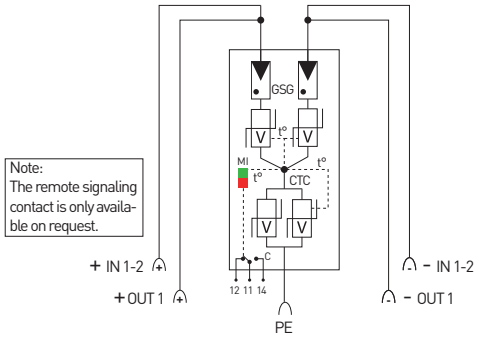
"K2x10" Number of input strings x conductor cross-section, 2 pc. x 10 mm²

"3" Number of SPDs

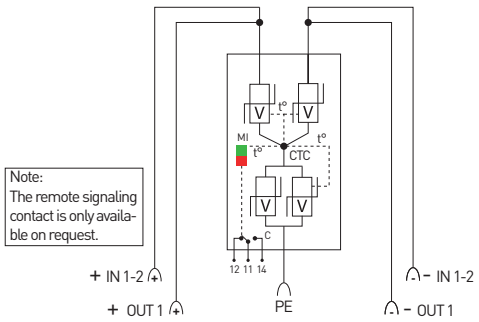
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



Electrical characteristics		GAK3.K2x10.K1x10-XS series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	32 A
Rated line current	InC	16 A
Connection options		
Input / per MPPT		Spring clamps max. 10 mm²
Output / per MPPT		Spring clamps max. 10 mm²
Earth terminal		Screw terminal 2.5 - 25 mm² (35 mm²)
Cable entry		20x M16 (Ø 4.5-10 mm) - Screw connections supplied
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 360 x 254 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK3.K2x10.K1x10.DP40-1-XS	157306	Combined SPD type 2+3	MOV
GAK3.K2x10.K1x10.DP40VG-1-XS	157307	Combined SPD type 2+3	VG technology
GAK3.K2x10.K1x10.DP6-1-XS	157308	Combined SPD type 1+2+3	MOV
GAK3.K2x10.K1x10.DP6VG-1-XS	157309	Combined SPD type 1+2+3	VG technology

CE

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

COMPACT GAK-XS SERIES FOR 4 MPP-TRACKER

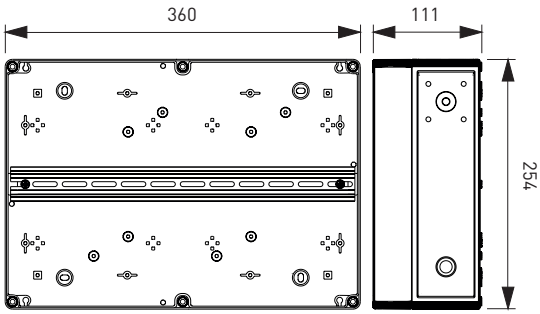
SPD TYPE 1+2+3 or SPD TYPE 2+3

- Generator junction box for 4 MPP tracker / 2 strings each
- Voltage surge protection integrated
- Connection via spring terminals (6-10 mm²)

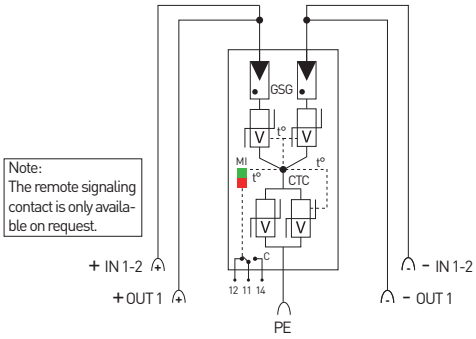
GAK 4. K2x10. K1x10. DP6VG-1-XS

- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200
- **"K1x10"** Number of output strings x conductor cross-section, 1 pc. x 10 mm²
- **"K2x10"** Number of input strings x conductor cross-section, 2 pc. x 10 mm²
- **"4"** Number of SPDs

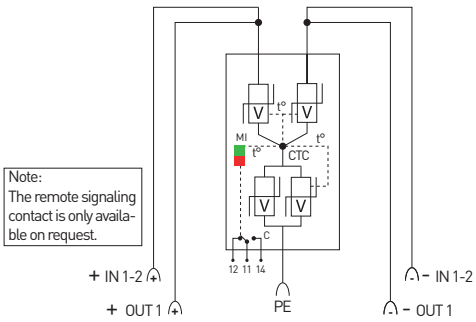
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



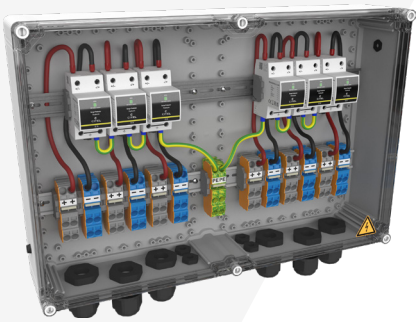
GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		GAK4.K2x10.K1x10-XS series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	32 A
Rated line current	InC	16 A
Connection options		
Input / per MPPT		Spring clamps max. 10 mm²
Output / per MPPT		Spring clamps max. 10 mm²
Earth terminal		Screw terminal 2.5 - 25 mm² (35 mm²)
Cable entry		20x M16 (Ø 4.5-10 mm) - Screw connections supplied
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 360 x 254 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK4.K2x10.K1x10.DP40-1-XS	157406	Combined SPD type 2+3	MOV
GAK4.K2x10.K1x10.DP40VG-1-XS	157407	Combined SPD type 2+3	VG technology
GAK4.K2x10.K1x10.DP6-1-XS	157408	Combined SPD type 1+2+3	MOV
GAK4.K2x10.K1x10.DP6VG-1-XS	157409	Combined SPD type 1+2+3	VG technology

CE

COMPACT GAK-XS SERIES FOR 6 (GAK6) OR 10 (GAK10) MPP-TRACKER



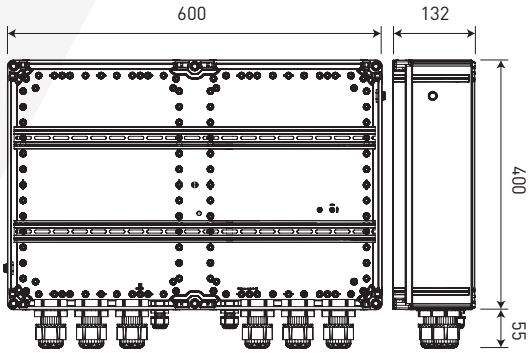
SPD TYPE 1+2+3 or SPD TYPE 2+3

- Generator junction box for 6 or 10 MPP tracker / 4 strings each
- Voltage surge protection integrated
- Connection via spring terminals (6-16 mm²)

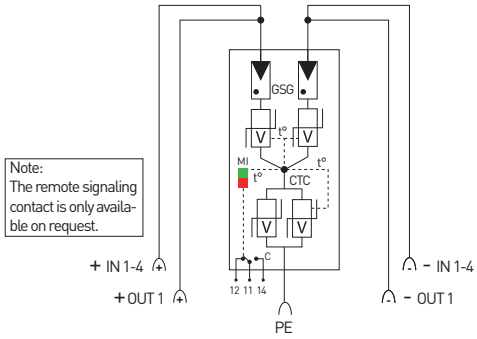
GAK 6. K4x16. K1x16. DP6VG-1-XS

- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200
- **"K1x16"** Number of output strings x conductor cross-section, 1 pc. x 16 mm²
- **"K4x16"** Number of input strings x conductor cross-section, 4 pc. x 16 mm²
- **"6"** Number of SPDs

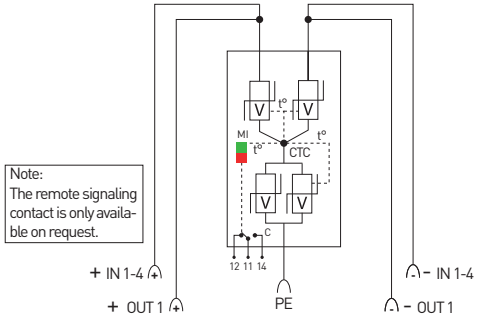
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker

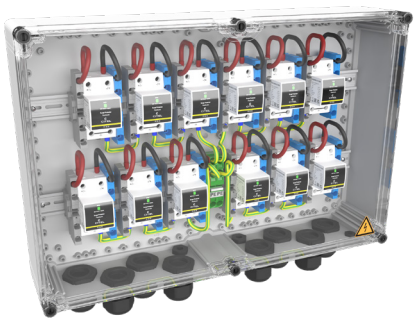


Electrical characteristics		GAK6.K4x16.K1x16-XS series GAK10.K4x16.K1x16-XS - Serie
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	50 A
Rated line current	InC	25 A
Connection options		
Input / per MPPT		Spring clamps max. 16 mm²
Output / per MPPT		Spring clamps max. 16 mm²
Earth terminal		Spring clamps max. 16 mm²
Cable entry		Pre-fitted
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 600 x 400 x 132
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK6.K4x16.K1x16.DP40-1-XS	157606	Combined SPD type 2+3	MOV
GAK6.K4x16.K1x16.DP40VG-1-XS	157607	Combined SPD type 2+3	VG technology
GAK6.K4x16.K1x16.DP6-1-XS	157608	Combined SPD type 1+2+3	MOV
GAK6.K4x16.K1x16.DP6VG-1-XS	157609	Combined SPD type 1+2+3	VG technology
GAK10.K4x16.K1x16.DP40-1-XS	157616	Combined SPD type 2+3	MOV
GAK10.K4x16.K1x16.DP40VG-1-XS	157617	Combined SPD type 2+3	VG technology
GAK10.K4x16.K1x16.DP6-1-XS	157618	Combined SPD type 1+2+3	MOV
GAK10.K4x16.K1x16.DP6VG-1-XS	157619	Combined SPD type 1+2+3	VG technology

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

COMPACT GAK-XS SERIES FOR 12 MPP-TRACKER



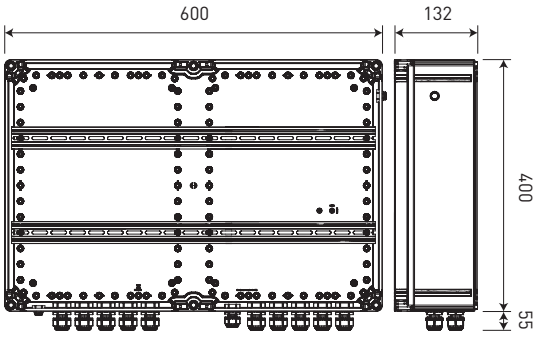
SPD TYPE 1+2+3 or SPD TYPE 2+3

- Generator junction box for 12 MPP tracker / 2 strings each
- Voltage surge protection integrated
- Connection via spring terminals (6-10 mm²)
- Max. Outer diameter of the stranded cable: 6.9 mm

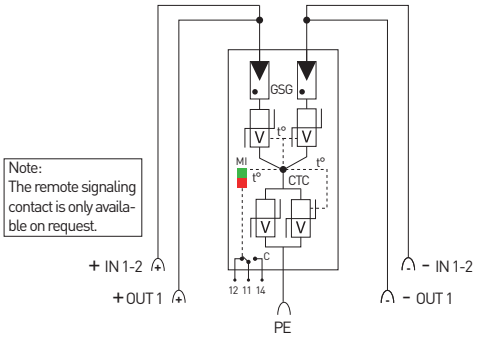
GAK 12. K2x10. K1x10. DP6VG-1-XS

- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200
- **"K1x10"** Number of output strings x conductor cross-section, 1 pc. x 10 mm²
- **"K2x10"** Number of input strings x conductor cross-section, 4 pc. x 10 mm²
- **"12"** Number of SPDs

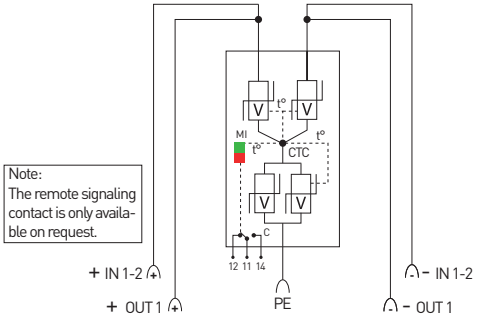
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
Ft: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		GAK10.K4x16.K1x16-XS series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	50 A
Rated line current	InC	25 A
Connection options		
Input / per MPPT		Spring clamps max. 10 mm²
Output / per MPPT		Spring clamps max. 10 mm²
Earth terminal		Spring clamps max. 16 mm²
Cable entry		Pre-fitted
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 600 x 400 x 132
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
GAK12.K2x10.K1x10.DP40-1-XS	157626	Combined SPD type 2+3	MOV
GAK12.K2x10.K1x10.DP40VG-1-XS	157627	Combined SPD type 2+3	VG technology
GAK12.K2x10.K1x10.DP6-1-XS	157628	Combined SPD type 1+2+3	MOV
GAK12.K2x10.K1x10.DP6VG-1-XS	157629	Combined SPD type 1+2+3	VG technology

CE

COMPACT CIPLUG-XS SERIES FOR 1 MPP-TRACKER
WITH MC4 CONNECTORS

SPD TYPE 1+2+3 or SPD TYPE 2+3

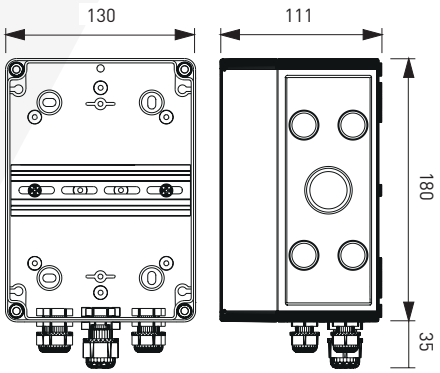
- Generator junction box for 1 MPP tracker / 1 string
- Voltage surge protection integrated
- Connection cables pre-fitted with MC4 plug-in connectors

CiPlug 1- DP6VG-1-XS

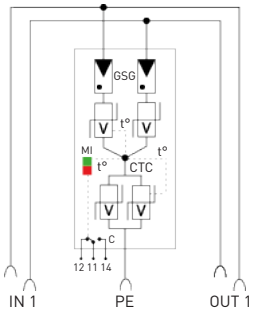
"DP6VG"	DPVN1-6CVG-21Y-1200
"DP40VG"	DPVN40CVG-21Y-1200
"DP6"	DPVN1-6C-21Y-1200
"DP40"	DPVN40C-21Y-1200

"1" Number of SPDs

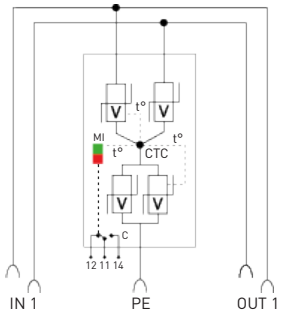
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



Electrical characteristics		CiPlug1-XS series	
Description		Generator junction box type 1+2+3 or type 2+3 SPD	
Rated voltage	Un	1000 Vdc	
Rated insulation voltage	Ui	1000 Vdc	
Rated current	InA	30 A	
Rated line current	InC	30 A	
Connection options			
Input / per MPPT		MC4 plug 1x 6 mm² with 15 cm cable	
Output / per MPPT		MC4 plug 1x 6 mm² with 120 cm cable	
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)	
Cable entry		2x M16 (Ø 4.5-10 mm)	
Other characteristics			
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover	
Dimensions		WxHxD (mm): 125 x 175 x 111	
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)	
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)	
Protection type		IP 65	
Protection class		SK II	
Impact resistance		IK 8	
Pressure compensation element		Provided	
Components			
DC disconnection point		None	
Fuse holder / per MPPT		None	
Surge protection			
Surge protection device as per		EN 61643-31	
Article code	**Article number**	**SPD type**	**Technology**
CiPlug1-DP40-1-XS	156952	Combined SPD type 2+3	MOV
CiPlug1-DP40VG-1-XS	156953	Combined SPD type 2+3	VG technology
CiPlug1-DP6-1-XS	156954	Combined SPD type 1+2+3	MOV
CiPlug1-DP6VG-1-XS	156955	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

CIPLUG1 SERIES FOR 1 MPP TRACKER
with MC4 plugs

CITEL VG TECHNOLOGY SINCE 1968

IP65

SPD TYPE 1+2 or SPD TYPE 2

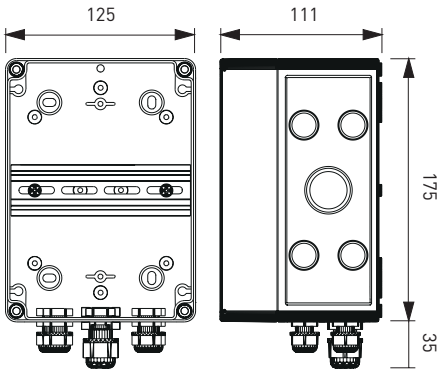
- Generator junction box for 1 MPP tracker / 1 string
- Voltage surge protection integrated
- Connection cables pre-fitted with MC4 plug-in connectors

CiPlug 1- 51VG-12

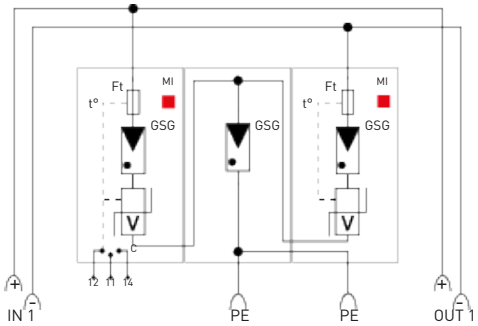
- **"61VG-1"** DS60VGPV-1000G/51
- **"51VG-12"** DS50VGPVS-1000G/12KT1
- **"51VG-1"** DS50VGPVS-1000G/51
- **"51-1"** DS50PVS-1000G/51

"1" Number of SPDs

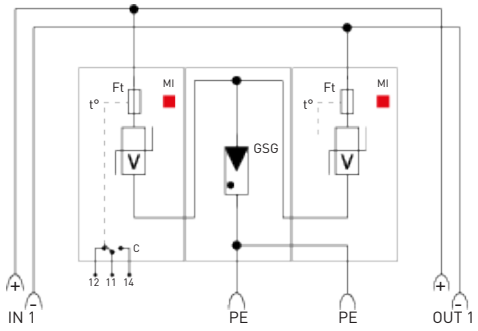
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
Ft: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		CiPlug1 series	
Description		Generator junction box type 1+2 or type 2 PV SPD	
Rated voltage	Un	1000 Vdc	
Rated insulation voltage	Ui	1000 Vdc	
Rated current	InA	20 A	
Rated line current	InC	20 A	
Connection options			
Input / per MPPT		MC4 plug 1x 6 mm² with 15 cm cable	
Output / per MPPT		MC4 plug 1x 6 mm² with 120 cm cable	
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)	
Cable entry		1x M20 (Ø 6-13 mm) PE	
Other characteristics			
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover	
Dimensions		WxHxD (mm): 125 x 175 x 111	
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)	
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)	
Protection type		IP 65	
Protection class		SK II	
Impact resistance		IK 8	
Pressure compensation element		Provided	
Components			
DC disconnection point		None	
Fuse holder / per MPPT		None	
Surge protection			
Surge protection device as per		EN 61643-31	
Article code	**Article number**	**SPD type**	**Technology**
CiPlug1-61VG-1	158551	Combined SPD type 1+2	VG technology
CiPlug1-51VG-12	158552	Combined SPD type 1+2	VG technology
CiPlug1-51VG-1	158553	SPD type 2	VG technology
CiPlug1-51-12	158555	Combined SPD type 1+2	MOV
CiPlug1-51-1	158554	SPD type 2	MOV
Accessories			
MC4-Y connectors	158596		

CE

* Other surge protection devices on request (DPVN series)

COMPACT CIPLUG-XS SERIES FOR 2 MPP-TRACKER
WITH MC4 CONNECTORS

SPD TYPE 1+2+3 or SPD TYPE 2+3

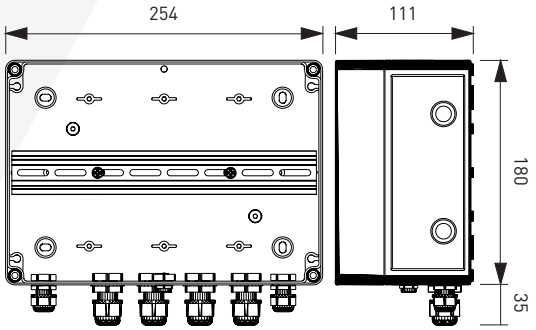
- Generator junction box for 2 MPP tracker / 1 string each
- Voltage surge protection integrated
- Connection cables pre-fitted with MC4 plug-in connectors

CiPlug 2- DP6VG-1-XS

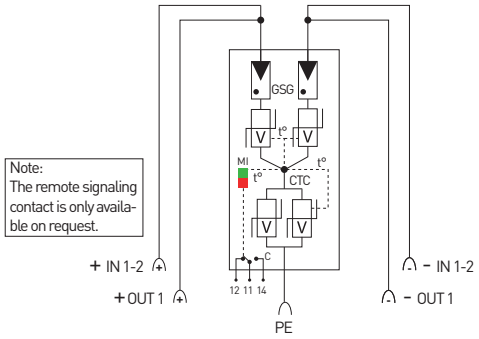
"DP6VG"	DPVN1-6CVG-21Y-1200
"DP40VG"	DPVN40CVG-21Y-1200
"DP6"	DPVN1-6C-21Y-1200
"DP40"	DPVN40C-21Y-1200

"2" Number of SPDs

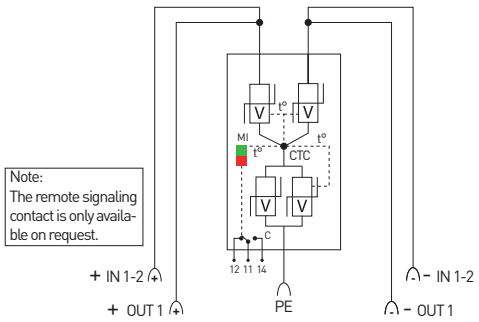
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker

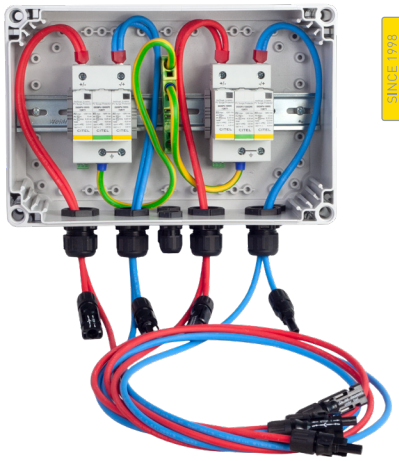


Electrical characteristics		CiPlug2-XS series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	30 A
Rated line current	InC	30 A
Connection options		
Input / per MPPT		MC4 plug 1x 6 mm² with 15 cm cable
Output / per MPPT		MC4 plug 1x 6 mm² with 120 cm cable
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)
Cable entry		2x M16 (Ø 4.5-10 mm)
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 254 x 180 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
CiPlug2-DP40-1-XS	156962	Combined SPD type 2+3	MOV
CiPlug2-DP40VG-1-XS	156963	Combined SPD type 2+3	VG technology
CiPlug2-DP6-1-XS	156964	Combined SPD type 1+2+3	MOV
CiPlug2-DP6VG-1-XS	156965	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

CIPLUG2 SERIES FOR 2 MPP TRACKERS
with MC4 plugs



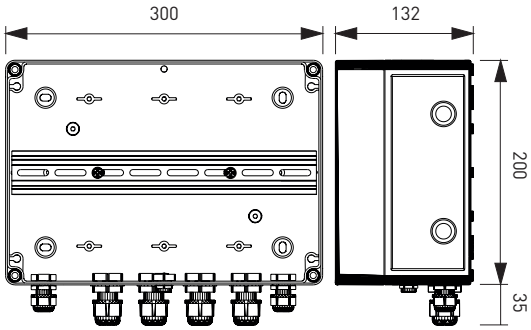
SPD TYPE 1+2 or SPD TYPE 2

- Generator junction box for 2 MPP tracker / 1 string each
- Voltage surge protection integrated
- Connection cables pre-fitted with MC4 plugs

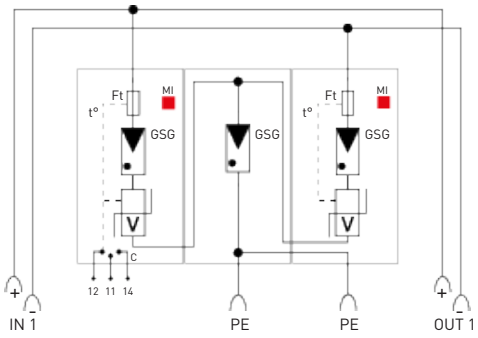
CiPlug 2- 51VG-12

- **"61VG-1"** DS60VGPV-1000G/51
- **"51VG-12"** DS50VGPVS-1000G/12KT1
- **"51VG-1"** DS50VGPVS-1000G/51
- **"51-1"** DS50PVS-1000G/51
- **"2"** Number of SPDs

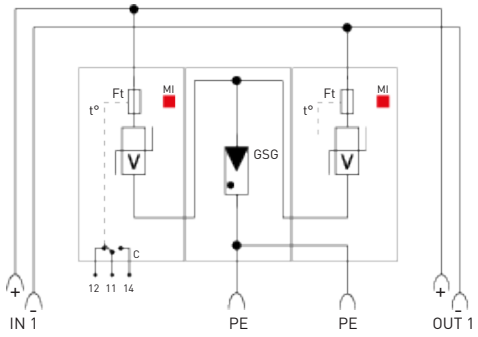
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



Electrical characteristics		CiPlug2 series	
Description		Generator junction box type 1+2 or type 2 PV SPD	
Rated voltage	Un	1000 Vdc	
Rated insulation voltage	Ui	1000 Vdc	
Rated current	InA	20 A	
Rated line current	InC	20 A	
Connection options			
Input / per MPPT		MC4 plug 1x 6 mm² with 15 cm cable	
Output / per MPPT		MC4 plug 1x 6 mm² with 120 cm cable	
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)	
Cable entry		2x M16 (Ø 4.5-10 mm) PE	
Other characteristics			
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover	
Dimensions		WxHxD (mm): 300 x 200 x 132	
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)	
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)	
Protection type		IP 65	
Protection class		SK II	
Impact resistance		IK 8	
Pressure compensation element		Provided	
Components			
DC disconnection point		None	
Fuse holder / per MPPT		None	
Surge protection			
Surge protection device as per		EN 61643-31	
Article code	**Article number**	**SPD type**	**Technology**
CiPlug2-61VG-1	158571	Combined SPD type 1+2	VG technology
CiPlug2-51VG-12	158572	Combined SPD type 1+2	VG technology
CiPlug2-51VG-1	158573	SPD type 2	VG technology
CiPlug2-51-12	158575	Combined SPD type 1+2	MOV
CiPlug2-51-1	158574	SPD type 2	MOV
Accessories			
MC4-Y connectors	158596		

CE

* Other surge protection devices on request (DPVN series)

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
Ft: Thermal fuse
C: Remote signalling
MI: Error display

COMPACT CIPLUG-XS SERIES FOR 3 MPP-TRACKER
WITH MC4 CONNECTORS

SPD TYPE 1+2+3 or SPD TYPE 2+3

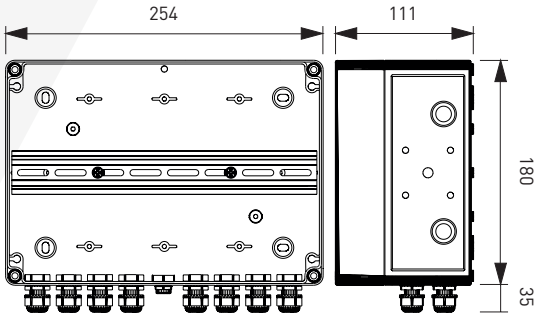
- Generator junction box for 3 MPP tracker / 1 string each
- Voltage surge protection integrated
- Connection cables pre-fitted with MC4 plug-in connectors

CiPlug 3- DP6VG-1-XS

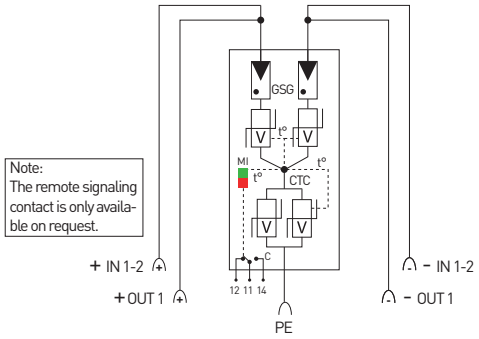
"DP6VG"	DPVN1-6CVG-21Y-1200
"DP40VG"	DPVN40CVG-21Y-1200
"DP6"	DPVN1-6C-21Y-1200
"DP40"	DPVN40C-21Y-1200

"3" Number of SPDs

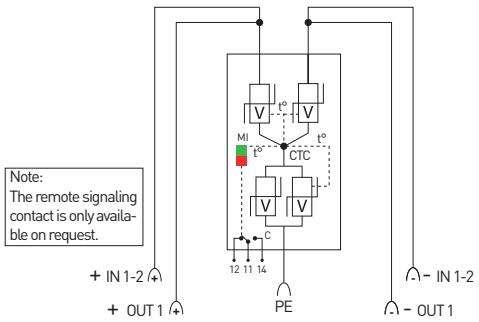
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker

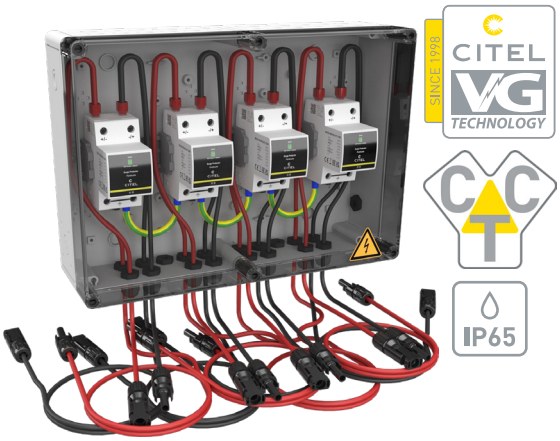


GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		CiPlug3-XS series	
Description		Generator junction box type 1+2+3 or type 2+3 SPD	
Rated voltage	Un	1000 Vdc	
Rated insulation voltage	Ui	1000 Vdc	
Rated current	InA	30 A	
Rated line current	InC	30 A	
Connection options			
Input / per MPPT		MC4 plug 1x 6 mm² with 15 cm cable	
Output / per MPPT		MC4 plug 1x 6 mm² with 120 cm cable	
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)	
Cable entry		2x M16 (Ø 4.5-10 mm)	
Other characteristics			
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover	
Dimensions		WxHxD (mm): 254 x 180 x 111	
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)	
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)	
Protection type		IP 65	
Protection class		SK II	
Impact resistance		IK 8	
Pressure compensation element		Provided	
Components			
DC disconnection point		None	
Fuse holder / per MPPT		None	
Surge protection			
Surge protection device as per		EN 61643-31	
Article code	**Article number**	**SPD type**	**Technology**
CiPlug3-DP40-1-XS	156972	Combined SPD type 2+3	MOV
CiPlug3-DP40VG-1-XS	156973	Combined SPD type 2+3	VG technology
CiPlug3-DP6-1-XS	156974	Combined SPD type 1+2+3	MOV
CiPlug3-DP6VG-1-XS	156975	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

CE

COMPACT CIPLUG-XS SERIES FOR 4 MPP-TRACKER
WITH MC4 CONNECTORS



SPD TYPE 1+2+3 or SPD TYPE 2+3

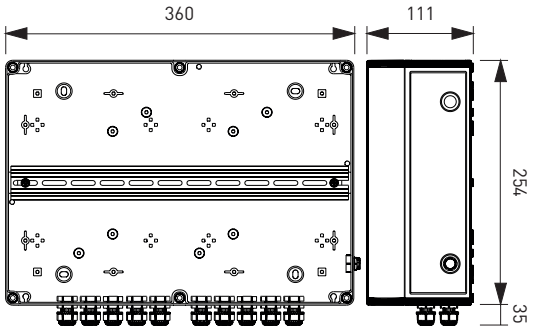
- Generator junction box for 4 MPP tracker / 1 string each
- Voltage surge protection integrated
- Connection cables pre-fitted with MC4 plug-in connectors

CiPlug 4- DP6VG-1-XS

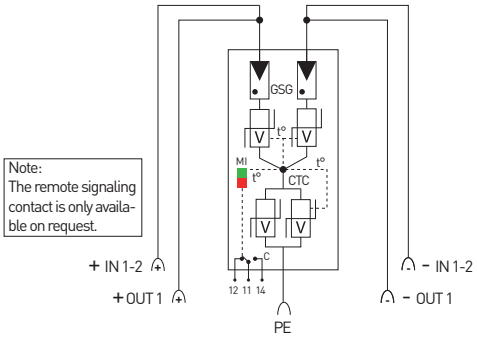
"DP6VG" DPVN1-6CVG-21Y-1200
"DP40VG" DPVN40CVG-21Y-1200
"DP6" DPVN1-6C-21Y-1200
"DP40" DPVN40C-21Y-1200

"4" Number of SPDs

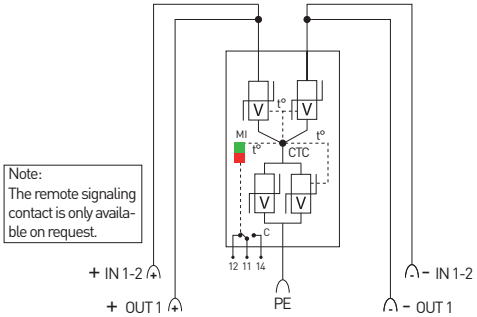
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		CiPlug4-XS series	
Description		Generator junction box type 1+2+3 or type 2+3 SPD	
Rated voltage	Un	1000 Vdc	
Rated insulation voltage	Ui	1000 Vdc	
Rated current	InA	30 A	
Rated line current	InC	30 A	
Connection options			
Input / per MPPT		MC4 plug 1x 6 mm² with 15 cm cable	
Output / per MPPT		MC4 plug 1x 6 mm² with 120 cm cable	
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)	
Cable entry		2x M16 (Ø 4.5-10 mm)	
Other characteristics			
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover	
Dimensions		WxHxD (mm): 360 x 254 x 111	
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)	
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)	
Protection type		IP 65	
Protection class		SK II	
Impact resistance		IK 8	
Pressure compensation element		Provided	
Components			
DC disconnection point		None	
Fuse holder / per MPPT		None	
Surge protection			
Surge protection device as per		EN 61643-31	
Article code	**Article number**	**SPD type**	**Technology**
CiPlug4-DP40-1-XS	156982	Combined SPD type 2+3	MOV
CiPlug4-DP40VG-1-XS	156983	Combined SPD type 2+3	VG technology
CiPlug4-DP6-1-XS	156984	Combined SPD type 1+2+3	MOV
CiPlug4-DP6VG-1-XS	156985	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

CE

COMPACT CIPLUG-XS-MC4 SERIES FOR 1 MPP TRACKER
with MC4 connectors

SPD TYPE 1+2+3 or SPD TYPE 2+3

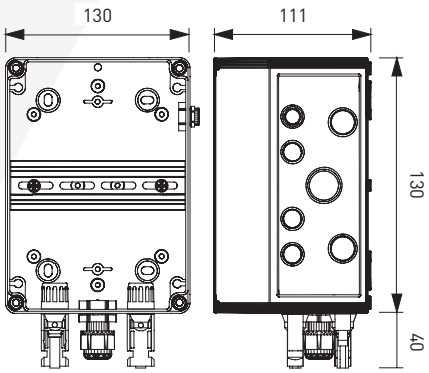
- Generator junction box for 1 MPP tracker / 1 string
- Voltage surge protection integrated
- MC4 connector attached to the bottom of the housing

CiPlug1. MCx1. MCx1. DP6VG-1-XS

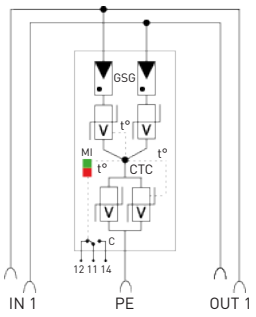
- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200

- **"MCx1"** Number of output strings x conductor cross-section, 1 pc. x 6 mm²
- **"MCx1"** Number of input strings x conductor cross-section, 1 pc. x 6 mm²
- **"1"** Number of SPDs

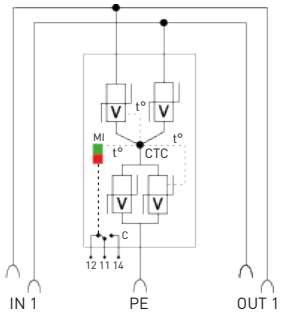
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker

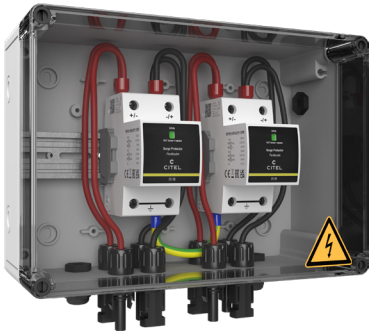


GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		CiPlug1-XS-MC series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	30 A
Rated line current	InC	30 A
Connection options		
Input / per MPPT		MC4 plug 1x 6 mm²
Output / per MPPT		MC4 plug 1x 6 mm²
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)
Cable entry		2x M16 (Ø 4.5-10 mm)
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 125 x 175 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
CiPlug1-MCx1.MCx1-DP40-1-XS	156612	Combined SPD type 2+3	MOV
CiPlug1-MCx1.MCx1-DP40VG-1-XS	156613	Combined SPD type 2+3	VG technology
CiPlug1-MCx1.MCx1-DP6-1-XS	156614	Combined SPD type 1+2+3	MOV
CiPlug1-MCx1.MCx1-DP6VG-1-XS	156615	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

COMPACT CIPLUG-XS-MC4 SERIES FOR 2 MPP TRACKER
with MC4 connectors



SPD TYPE 1+2+3 or SPD TYPE 2+3

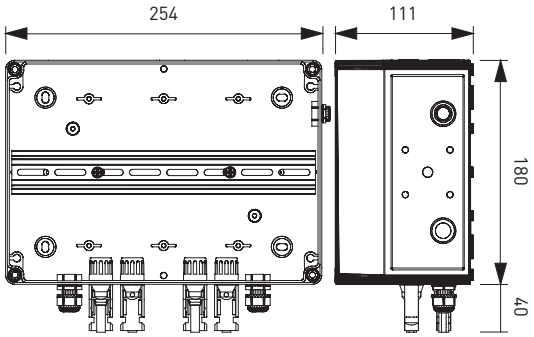
- Generator junction box for 2 MPP tracker / 1 string each
- Voltage surge protection integrated
- MC4 connector attached to the bottom of the housing

CiPlug2. MCx1. MCx1. DP6VG-1-XS

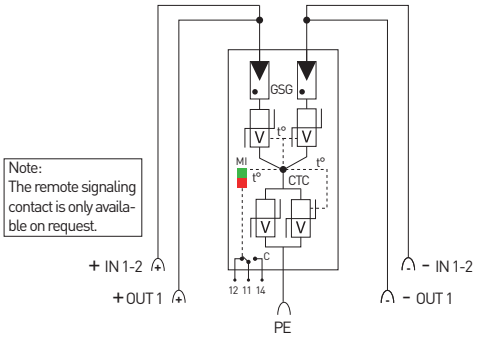
- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200

- **"MCx1"** Number of output strings x conductor cross-section, 1 pc. x 6 mm²
- **"MCx1"** Number of input strings x conductor cross-section, 1 pc. x 6 mm²
- **"2"** Number of SPDs

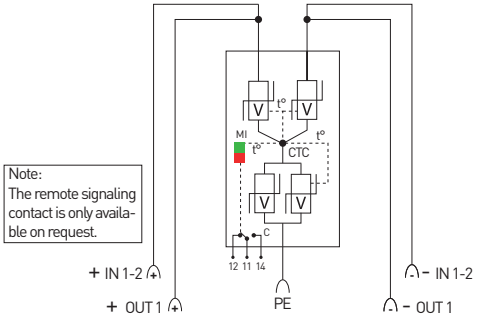
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



Electrical characteristics		CiPlug2-XS-MC series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	30 A
Rated line current	InC	30 A
Connection options		
Input / per MPPT		MC4 plug 1x 6 mm²
Output / per MPPT		MC4 plug 1x 6 mm²
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)
Cable entry		2x M16 (Ø 4.5-10 mm)
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 254 x 180 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
CiPlug2-MCx1.MCx1-DP40-1-XS	156622	Combined SPD type 2+3	MOV
CiPlug2-MCx1.MCx1-DP40VG-1-XS	156623	Combined SPD type 2+3	VG technology
CiPlug2-MCx1.MCx1-DP6-1-XS	156624	Combined SPD type 1+2+3	MOV
CiPlug2-MCx1.MCx1-DP6VG-1-XS	156625	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

COMPACT CIPLUG-XS-MC4 SERIES FOR 3 MPP TRACKER
with MC4 connectors

SPD TYPE 1+2+3 or SPD TYPE 2+3

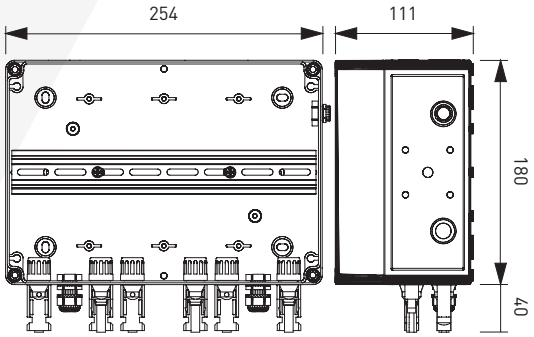
- Generator junction box for 3 MPP tracker / 1 string each
- Voltage surge protection integrated
- MC4 connector attached to the bottom of the housing

CiPlug3. MCx1. MCx1. DP6VG-1-XS

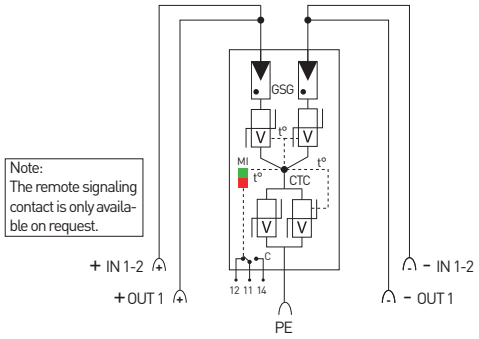
- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200

- **"MCx1"** Number of output strings x conductor cross-section, 1 pc. x 6 mm²
- **"MCx1"** Number of input strings x conductor cross-section, 1 pc. x 6 mm²
- **"3"** Number of SPDs

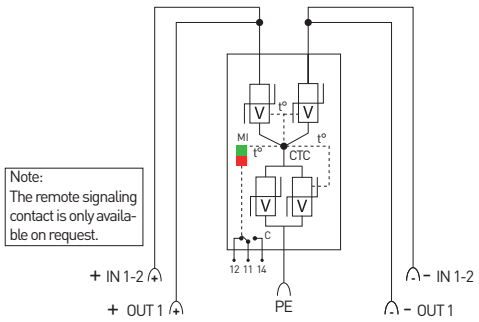
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker



GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		CiPlug3-XS-MC series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	30 A
Rated line current	InC	30 A
Connection options		
Input / per MPPT		MC4 plug 1x 6 mm²
Output / per MPPT		MC4 plug 1x 6 mm²
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)
Cable entry		2x M16 (Ø 4.5-10 mm)
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 254 x 180 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
CiPlug3-MCx1.MCx1-DP40-1-XS	156632	Combined SPD type 2+3	MOV
CiPlug3-MCx1.MCx1-DP40VG-1-XS	156633	Combined SPD type 2+3	VG technology
CiPlug3-MCx1.MCx1-DP6-1-XS	156634	Combined SPD type 1+2+3	MOV
CiPlug3-MCx1.MCx1-DP6VG-1-XS	156635	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

COMPACT CIPLUG-XS-MC4 SERIES FOR 4 MPP TRACKER
with MC4 connectors

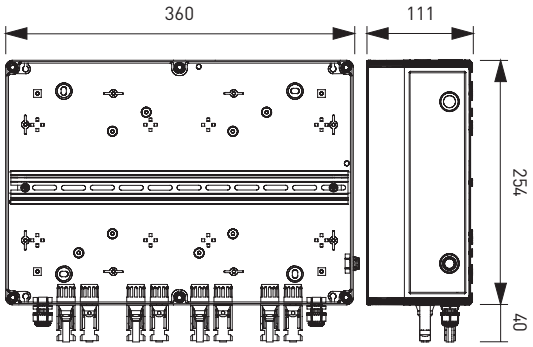
SPD TYPE 1+2+3 or SPD TYPE 2+3

- Generator junction box for 4 MPP tracker / 1 string each
- Voltage surge protection integrated
- MC4 connector attached to the bottom of the housing

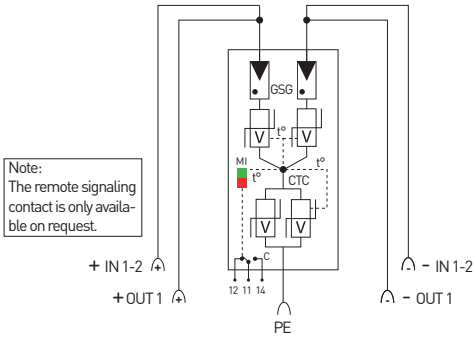
CiPlug4. MCx1. MCx1. DP6VG-1-XS

- **"DP6VG"** DPVN1-6CVG-21Y-1200
- **"DP40VG"** DPVN40CVG-21Y-1200
- **"DP6"** DPVN1-6C-21Y-1200
- **"DP40"** DPVN40C-21Y-1200
- **"MCx1"** Number of output strings x conductor cross-section, 1 pc. x 6 mm²
- **"MCx1"** Number of input strings x conductor cross-section, 1 pc. x 6 mm²
- **"4"** Number of SPDs

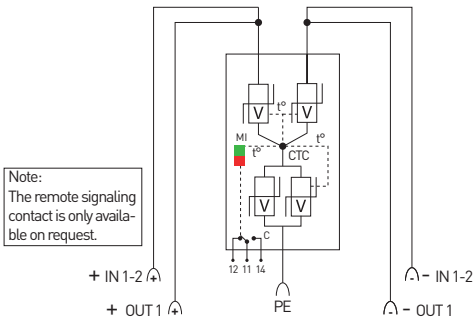
Dimensional drawing (in mm)



"VG technology" circuit per MPP tracker



"MOV" circuit for each MPP tracker

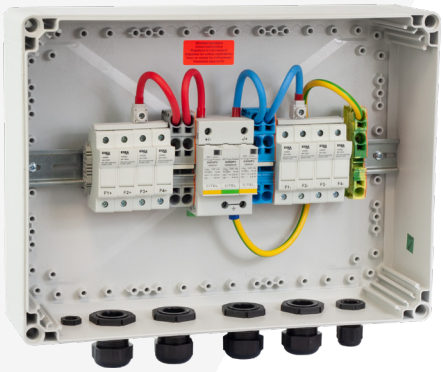


GSG: Gas-filled spark gap
V: High performance varistor block
t°: Thermal disconnecting device
CTC: Thermal fuse
C: Remote signalling
MI: Error display

Electrical characteristics		CiPlug4-XS-MC series
Description		Generator junction box type 1+2+3 or type 2+3 SPD
Rated voltage	Un	1000 Vdc
Rated insulation voltage	Ui	1000 Vdc
Rated current	InA	30 A
Rated line current	InC	30 A
Connection options		
Input / per MPPT		MC4 plug 1x 6 mm²
Output / per MPPT		MC4 plug 1x 6 mm²
Earth terminal		Screw clamp2.5-25 mm² (35 mm²)
Cable entry		2x M16 (Ø 4.5-10 mm)
Other characteristics		
Housing material		UV and ozone resistant, glass fibre reinforced polycarbonate with semi-transparent cover
Dimensions		WxHxD (mm): 360 x 254 x 111
Ambient temperatures		Indoor: -5°C to max. +40°C (+35°C 24h mean value) Outdoor: -25°C to max. +40°C (+35°C 24h mean value)
Air humidity		Indoor: max. 50% at +40°C, max. 90% at 20°C (non-condensing) Outdoor: transiently 95% at +25°C (non-condensing)
Protection type		IP 65
Protection class		SK II
Impact resistance		IK 8
Pressure compensation element		Provided
Components		
DC disconnection point		None
Fuse holder / per MPPT		None
Surge protection		
Surge protection device as per		EN 61643-31

Article code	Article number	SPD type	Technology
CiPlug4-MCx1.MCx1-DP40-1-XS	156642	Combined SPD type 2+3	MOV
CiPlug4-MCx1.MCx1-DP40VG-1-XS	156643	Combined SPD type 2+3	VG technology
CiPlug4-MCx1.MCx1-DP6-1-XS	156644	Combined SPD type 1+2+3	MOV
CiPlug4-MCx1.MCx1-DP6VG-1-XS	156645	Combined SPD type 1+2+3	VG technology
Accessories			
MC4-Y connectors	158596		

CE



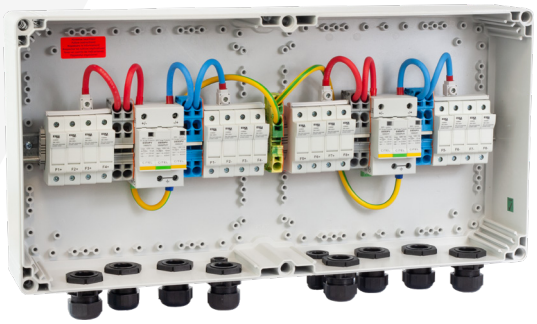
SPD TYPE 1+2 or SPD TYPE 2

- Generator junction box for 1 MPP tracker / 4 strings
- Voltage surge protection integrated
- IP65 housing
- With PV fuses 10x38 up to 20 A

Article code	Article number	SPD type	Technology
GAK1.K4x16.K2x16.S.61VG-1	158403	Combined SPD type 1+2	VG technology
GAK1.K4x16.K2x16.S.51VG-12	158409	Combined SPD type 1+2	VG technology
GAK1.K4x16.K2x16.S.51VG-1	158407	SPD type 2	VG technology
GAK1.K4x16.K2x16.S.51-12	158408	Combined SPD type 1+2	MOV
GAK1.K4x16.K2x16.S.51-1	158406	SPD type 2	MOV

CE

* Other surge protection devices on request (DPVN series)



SPD TYPE 1+2 or SPD TYPE 2

- Generator junction box for 2 MPP tracker / 4 strings each
- Voltage surge protection integrated
- IP65 housing
- With PV fuses 10x38 up to 20 A

Article code	Article number	SPD type	Technology
GAK2.K4x16.K2x16.S.61VG-1	158703	Combined SPD type 1+2	VG technology
GAK2.K4x16.K2x16.S.51VG-12	158709	Combined SPD type 1+2	VG technology
GAK2.K4x16.K2x16.S.51VG-1	158707	SPD type 2	VG technology
GAK2.K4x16.K2x16.S.51-12	158708	Combined SPD type 1+2	MOV
GAK2.K4x16.K2x16.S.51-1	158706	SPD type 2	MOV

CE

* Other surge protection devices on request (DPVN series)

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