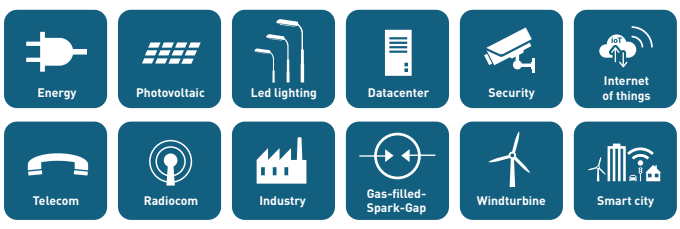
CITEL

SURGE PROTECTORS

Catalog 10-3



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General Catalog
10-3th edition


DIN RAIL AC POWER SURGE PROTECTORS


DIN RAIL DC POWER SURGE PROTECTORS


AC POWER SURGE PROTECTION PANELS


LED SYSTEM SURGE PROTECTORS


PHOTOVOLTAIC SURGE PROTECTORS


WINDTURBINES SURGE PROTECTORS


TELECOM & DATA LINE SURGE PROTECTORS


COMPUTER NETWORK SURGE PROTECTORS


HIGH FREQUENCY COAXIAL SURGE PROTECTORS


MISCELLANEOUS

THE SPECIALIST IN OVERVOLTAGE PROTECTION

With a thorough understanding of local standards and regulations, along with continuous investment in R&D, CITEL designs, manufactures and sells millions of SPD's each year.

CITEL develops many critical protection components internally. Our teams all over the world are proud to help bring to the market a comprehensive product range of surge protectors with our unique client-focused service & quality.

CITEL's business and expertise is to protect electrical networks and equipment from the effects of transient overvoltages, which are the result of electrical switching events or atmospheric disturbances from lightning. For this, CITEL manufactures two complementary products lines:

- **Gas discharge tubes** (or GDTs) are the basic passive components used in our own surge protective devices.

- **Surge Protective Devices** (or SPDs) are units combining several protection components. They may be used by the installer or by the end customer. They are designed to be incorporated in an installation to protect all electric, electronic, and data-processing equipment from transient overvoltages.

CITEL: best-in-class service quality

From the technical expertise to the operational deployment, we are passionate about all aspects and topics related to SPDs.

Our teams are composed of engineers and SPD specialists who can bring forward the best insights and solutions. Our technical and sales teams around the world are organized to share experience and knowledge.

Our teams place the user at the heart of their practise. Providing advice and training to their clients, they strive to bring the most appropriate product solution. Our local teams master both the language and the market specifics.

Our strategy: we are flexible, trustworthy and committed to supporting our customers. We provide high quality solutions that maximise the availability of equipment and processes that generate revenue for the customer

CITEL

IN-HOUSE ADVANCED TEST CAPABILITY

3 LABORATORIES...

CITEL constantly pioneers new technologies thanks to a bold innovation strategy, high-level R&D and in-house regional test labs around the world.

CITEL is recognized as an industry leader that is instrumental in the development of international codes and standards.

In order to test its products internally for standards compliance and to evolve toward greater reliability CITEL has several centers of expertise and research(France, USA, China) equipped with :

- Various transient surge current and surge voltage generators such as 8/20, 10/350,10/1000, 1.2/50...
- AC and DC Power Sources for short circuit and load current tests with possible superimposed and synchronized pulses for AC sources.
- Various equipment for environmental tests (impact, vibration, climate, damp, fire...)

The G100K test generator in Reims (France) can produce exceptionally high impulse current of 100 kA and is used for testing structural lightning protection systems as well as Type 1 surge protectors.

Tests capacities are dedicated to electrical equipment generally and specifically to surge protection. We are using the following standards :

- IEC / EN 61643-XXY
  -11, -21, -31 and -41*
  -311 and -331
- IEC / EN 610004-5
- NF C 17-100 and -102
- NF EN 50164-6 and IEC 62561-6 (as well as all the tests in surge currents pulses of these series of standards)
- UL1449, UL497B, UL497E
- ITU K12
- IEEE C62.31, C62.33, C62.35, C62.45
- ANSI C136.2
- etc...

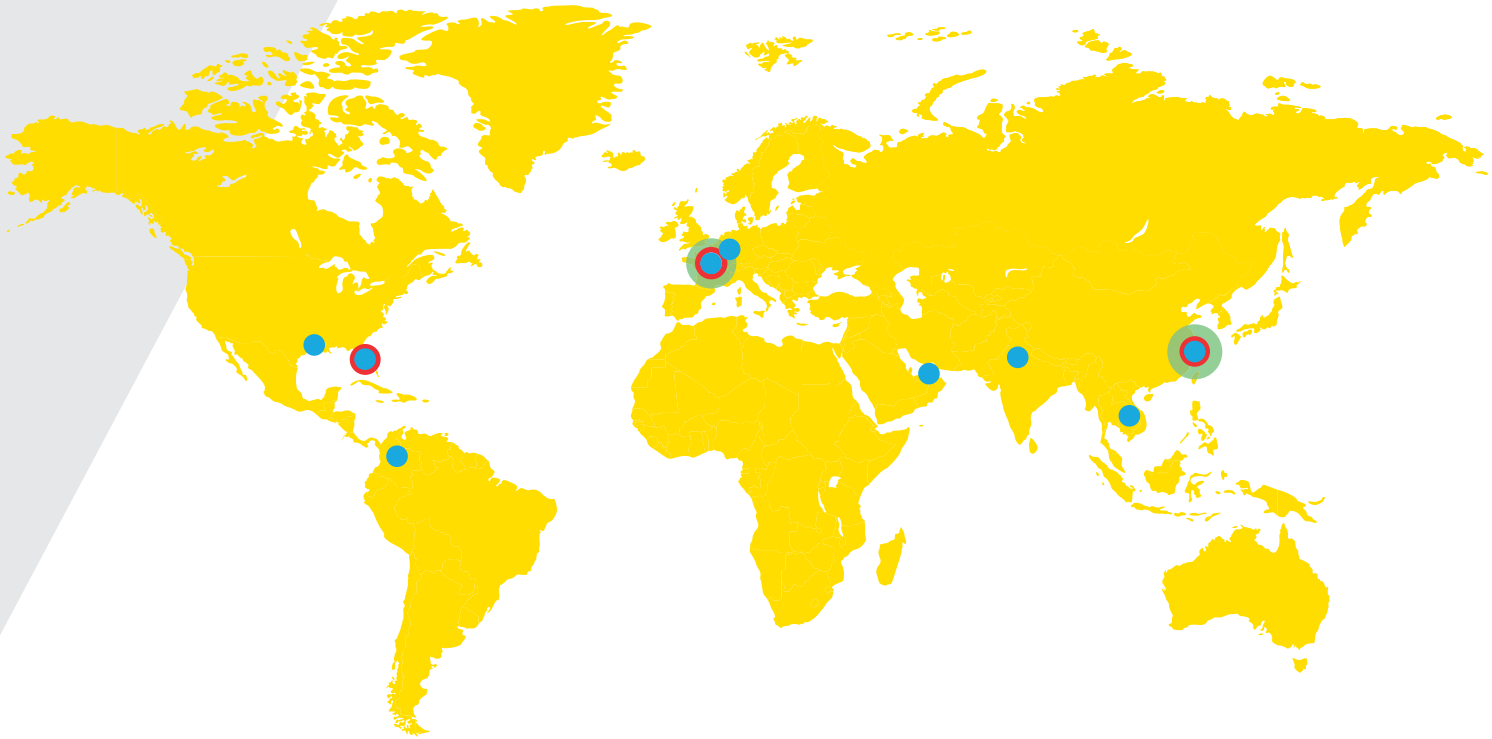
Test facilities and benches are made to be flexible and CITEL teams of experts can also realize custom-made tests (out of standards)

In 2017 the Shanghai lab has been equipped with a very high energy surge generator able to produce 240 kA in 8/20µs impulse.

Since 2019, our Shanghai Laboratory has received a CERTIFICATE OF APPROVAL for Customer's Testing Facility, for the testing of electrotechnical equipment and components under the IECEE System.

It has been approved by Dekra at Stage 2.

AN INTERNATIONAL NETWORK....



Production & Tests Laboratories

Factories

Subsidiaries

France - Paris
Headquarters
- General management
- Administrative and Financial Department
- Sales division : France and Export
- Marketing & Communication Department

France - Reims
Production and Shipment
Research and Development

SUBSIDIARIES

Citel Electronics GmbH
Bochum (Germany)

Citel Inc.
Miramar (USA)

Shanghai Citel Electronics Co., Ltd
Shanghai (China)

Citel India
New Delhi (India)

Citel Thailand
Bangkok (Thailand)

Citel Middle East
Dubai (United Arab Emirats)

Citel Colombia
Bogota (Colombia)

CITEL

....FOR OVER 80 YEARS

1937
CITEL founded

1944
Manufacture of the first surge arrester

1985
CITEL USA

1988
1st AC modular surge protector

1988
CITEL Germany

1992
Reims factory

1996
CITEL Shanghaï

1997
- AC surge protector new range «DS» series
- VG technology for AC surge protector

2012
Implementation of a test laboratory in Reims

2012
CITEL India

2017
New test laboratory 240 kA in CITEL Shanghai

2017
CITEL Thailand

2019
AC / DC new range

2021
CITEL Middle East

2023
PV new range with CTC Technology

2024
CITEL Colombia

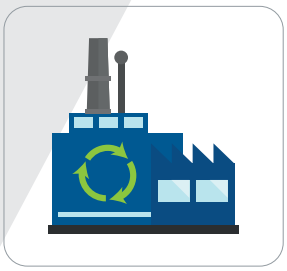
CITEL

CITEL PROTECTS OUR PLANET

Besides our constant work on the quality of our products, we take into account the ecological issues of our planet.

This is why CITEL is working to optimize its production equipment in order to reduce the impact on the environment. We have chosen for our new range high quality raw materials, and are always looking to increase our percentage of recyclable content.

Our products use **Halogen free** material and comply with **RoHS and REACH** regulations.
CITEL is **ISO 14001 and 9001** certified and meet the requirements of the **WEEE** directive.



PRODUCTION RESPECTING ENVIRONMENTAL STANDARDS

PURCHASE OF MATERIALS COMPLIANT WITH THE ENVIRONMENTAL REGULATIONS

COMMITMENT FOR RECYCLING

HSE POLICY

In accordance with its values and its Code of Ethics, and as part of a voluntary and ambitious approach, Citel is committed to:

- Ensuring a safe and healthy working environment for its employees at its various sites around the world and on external operations.
- Preserving the environment by limiting the impact (energy, natural resources, etc.) and preventing the risks of pollution.
- Design, purchase, produce and supply solutions, products or services that integrate health, safety and environmental requirements.
- Assessing health and safety risks in order to minimize, eliminate or mitigate risks to our employees and other stakeholders who may be exposed

This approach aims to:

- Characterise the current issues and anticipate the future as far as possible
- Identify, prevent and control the impacts and risks to health, safety and the environment, by adapting its practices according to the activities, products and the surrounding environment.
- Continuously promote a safety culture
- Refine our approach to reducing and sorting our waste
- Contribute to the development of environmentally friendly technologies
- Guarantee the physical and mental integrity of each employee, and preserve the environment as best we can

We therefore ask all our employees, production workers, employees, technicians, engineers and managers, to participate collectively in the success of our commitments.

TRANSIENT OVERVOLTAGES

Electrical networks are designed to operate around nominal values, and within acceptable tolerances. Transient overvoltages can be applied to such networks, either as a result of atmospheric disturbances (lightning) or electrical switching events. These transient overvoltages can cause disruption and degradation of sensitive electrical equipment, as well as outright damage.

WHAT IS THE ORIGIN OF A SURGE VOLAGE ?

Surge voltages differ in amplitude, duration and frequency. While protection against power surges caused by lightning or switching will require the use of surge protective devices (SPD), Electrostatic Discharge (ESD) and NEMP (Nuclear Electromagnetic Pulse) issues are far more specific and require other adapted solutions.

TRANSIENT OVERVOLTAGES DUE TO LIGHTNING STRIKES

Businesses rely upon the continuous availability of their electrical and electronic systems, in order to offer products and services that generate revenue. Therefore these systems must be protected against the effects of transient overvoltages by applying Surge Protection Measures (SPM) in the form of SPDs.
Lightning, investigated since Benjamin Franklin's first research in 1749, has paradoxically become a growing threat to our highly electronic society.

Lightning formation

A lightning flash is generated between two zones of opposite charge, typically between two storm clouds or between one cloud and the ground. The flash may travel several miles, advancing toward the ground in successive leaps: the leader creates a highly ionized channel. When it reaches the ground, the real flash or return stroke takes place.
A current in the tens of thousands of Amperes will then travel from ground to cloud or vice versa via the ionized channel.

We should consider that lightning strikes to the ground up to 1km away can induce transient overvoltages into the electrical systems of structures, so the likelihood of transient overvoltages from this source are much higher than that from a direct lightning strike, due to the much larger collection area

Direct effects of lightning

At the moment of the discharge, there is an impulse current flow that ranges from 5,000 to 200,000 Ampere peak, with a rise time of a few microseconds.

- Impact on buildings: Falling objects, property damages, fire,
- Impact on living beings: Lightning strike mortality of 10,000 people per year worldwide,
- Phenomenon of step tension: Lightning can indirectly kill by nearby strikes: at the point of impact a high electric potential exists that decreases rapidly with the distance away from the point of impact, so there is a chance for electrocution to humans and animals that are in contact with the ground. Large four-legged animals such as horses and cattle are particularly vulnerable; due to the larger distance between front and rear legs and thereby a large voltage potential difference, and thousands of cattle are killed each year by lightning after sheltering under trees that are struck by lightning during storms.

This direct effect may be considered as a small factor in damaging electric and electronic systems, because it is highly localized.

The best protection for a structure is still the classic lightning rod or Lightning Protection System (LPS), designed to capture the discharge current and conduct it to a particular point.

However, this does not protect people or electrical systems inside the structure, SPDs are needed to ensure this.

Indirect effects of lightning

Impact on overhead lines

Such lines are very exposed and may be struck directly by lightning, which will first partially or completely destroy the cables, then cause high surge voltages that travel naturally along the conductors to line-connected equipment. The extent of the damage depends on the distance between the strike and the equipment.

Rise in ground potential

The flow of lightning in the ground causes earth potential increases that vary according to the current intensity and the local earth impedance. In an installation that may be connected to several grounds (e.g. a link between buildings), a strike will cause a very large potential difference and equipment connected to the affected networks will be destroyed or severely disrupted.

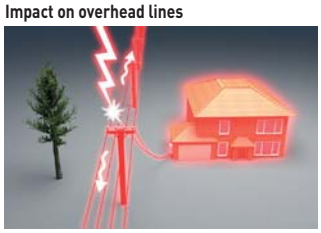
Electromagnetic radiation

The flash may be regarded as an antenna several miles high carrying an impulse current of several tens of kilo-amperes, radiating intense electromagnetic fields (several kV/m at more than 1 km).
These fields induce strong voltages and currents in lines near or on equipment. The values depend on the distance from the flash and the properties of the link.

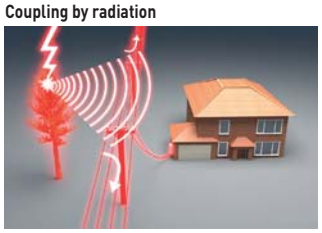
Direct impact

Rise in ground potential

Impact on overhead lines



Coupling by radiation



INDUSTRIAL AND SWITCHING SURGES

This term covers phenomena caused by switching electric power sources on or off.

Surges due to switching operations are caused by:

- Starting motors or transformers
- Neon and sodium light starters
- Switching power networks
- Switch «bounce» in an inductive circuit
- Operation of fuses and circuit-breakers
- Falling power lines...

These phenomena generate transients of several kV with rise times in the order of a few microseconds, disturbing equipment in networks to which the source of disturbance is connected.

ELECTROSTATIC OVERVOLTAGES (ESD)

Electrically, a human being has a capacitance ranging from 100 to 300 picofarads, and can pick up a charge of as much as 15kV by walking on a carpet, then touch some conducting object and be discharged in a few nanoseconds, with a current of about ten Amperes. All integrated circuits (CMOS, etc.) are quite vulnerable to this kind of disturbance, which is generally eliminated by shielding and grounding.

NEMP PHENOMENA

(Nuclear ElectroMagnetic Pulses)

A high-altitude nuclear explosion, above the atmosphere, creates an intense electromagnetic field (up to 50 kV/m in 10ns), radiated to a ground area up to 1200 kilometers in radius.

In the ground, the field induces very large transient overvoltages in power and transmission lines, antennas, etc., destroying the terminal equipment (power circuit, computer terminals, telephone equipment, etc.).

The field rise may reach several kV/ns. While it is difficult to eliminate all overvoltages induced by an electromagnetic pulse, there are ways to reduce them and strengthen the systems to be protected. In spite of the amplitude of the phenomenon, protection can be provided by shielding and filtering/surge protection adapted to NEMP.

CONSEQUENCES OF SURGE VOLTAGES

The lightning incident is relatively common. Statistically, the share of damage caused by lightning on computer equipment is far from negligible.
The consequences of a disturbance are not always visible and immediate. The degradation or weakening of a component by an overvoltage can lead to a reduction in the lifetime of the equipment, or a 'deferred' failure. The user can therefore not make the link between the failure and the real cause. He will hasten to establish a bad diagnosis, therefore a bad treatment of the problem.
Also, if equipment was damaged and replaced under insurance, later failures cannot be claimed as their is no certain link to the original disturbance.

Overvoltages have many types of effects on electronic equipment; in order of decreasing importance:

Destruction
- Voltage breakdown of semiconductor junctions
- Destruction of bonding of components
- Destruction of tracks of PCBs or contacts
- Destruction of triacs/thyristors by dV/dt.

Interference with operation (disruption)
- Random operation of contacts, thyristors, and triacs
- Erasure of memory
- Program errors or crashes
- Data and transmission errors

Premature ageing (degradation)
Components exposed to overvoltages have a shorter life.

The consequences of lightning strikes on installations are real since the standardization of electrical installations now makes the installation of SPDs compulsory in certain cases

SURGE PROTECTIVE DEVICES

The Surge Protective Devices (or SPD, generic name for any device to protect from voltage surges) is a recognized and effective solution for the overvoltage problem. For greatest effectiveness, however, it must be chosen according to the risk and installed in accordance with the applicable standards.
The SPDs are made of several types of components, like GDT (Gas Discharge Tube), GSG (Gas Spark Gap), MOV (Metal Oxide Varistor), SAD (Silicon Avalanche Diode), depending of the applications or the performances to reach.
As all types of networks could be stressed by surge voltages, SPDs are available for AC power, DC power, PV power, Telecom & Datalines, LAN and Radiocommunication lines.

STANDARDS

Because of the diversity and importance of transients, standards organizations have created specifications for testing the effects of overvoltages on equipment.
The phenomena were first characterized and a series of standardized waves created (1.2/50µs voltage wave and 8/20µs or 10/350µs current waveforms), then a number of standards defining SPD performance were issued, among them :

Surge Protectors for AC installations:
- NF EN 61643-11 (France)
- DIN EN 61643-11 (Germany)
- EN 61643-11 (Europe)
- UL 1449 (USA)
- IEC 61643-11 (International)

Surge Protectors for PV installations:
- EN 61643-31 (Europe)
- IEC 61643-31 (International)

Surge Protectors for Signalling and telecommunication lines:
- IEC 61643-21 (International)
- ITU-T recommendations K11, K12, K17, K20, K21, K36 (Int.)
- UL 497 A/B/E (USA)

DIN RAIL
AC POWER
SURGE PROTECTORS

DIN RAIL AC POWER SURGE PROTECTORS

CITEL AC power Surge Protective Devices (SPDs) are designed to meet all your surge protection needs for any low voltage installation.

These DIN rail mounted surge protectors are easy to install in any standardized distribution panel or control cabinets. The SPDs are equipped with a thermal disconnection device and provide real-time fault indicators thus allowing complete operational safety.

DS and DAC surge protectors are available with several protection circuits to comply with even the most demanding installations and standards compliance requirements.

CITEL AC power surge protectors offer three levels of surge protection capacity that correspond to the different IEC or EN classes, i.e. Type 1, Type 2 or Type 3.

STANDARDS

To ensure efficient and reliable performances, all CITEL's AC power surge protectors comply with the leading standards.
Relevant standards in the AC surge protection field could be split into 3 types of documents:

«Product» standards :
These documents address the type of tests the SPD manufacturer must apply on its devices :
- Europe : EN 61643-11
- Germany : DIN EN 61643-11
- International : IEC 61643-11
- USA : UL1449-5ed

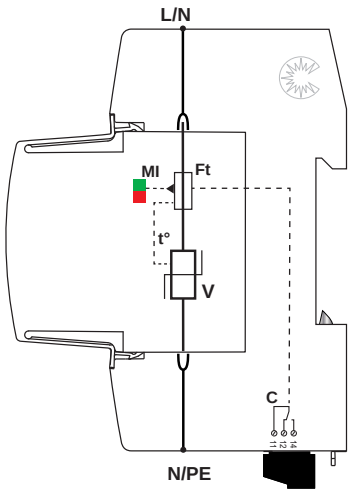
«Installation» standards :
These documents give the main information about AC power surge protectors and their proper installation:
- International : IEC 61643-12 guide
- Europe : CLC/TS 61643-12
- USA : IEEE C62-41

«Selection» standards :
They define the basic rules to select the surge protector in accordance with the general electrical code :
- International : IEC 60364-4-433 and 5-534
- Europe : HD 60364 -4-443 and 5-534
- USA : NEC art. 280 & 285

OPERATING PRINCIPLE

CITEL surge protectors for AC network are based on zinc metal-oxide varistors (MOV), the best compromise between a fast response time (<25 ns) and a high discharge current capacity, which are the main parameters to provide efficient protection.
Nevertheless the end of life of these MOVs must be absolutely monitored thus requiring the systematic use of built-in thermal disconnection devices (see «Disconnection devices»).

DAC50 surge protector diagram



V : Varistor
Ft : Thermal fuse
t° : Thermal disconnection
C : Remote signaling contact
MI : Disconnection indicator

VG TECHNOLOGY BY CITEL

In order to improve the surge protection efficiency, CITEL has developed a patented technology which combines a high energy varistor (MOV) network and a specific gas tube (GSG). This specialized circuit incorporated in the «VG» Type "1+2+3" surge protectors (DAC1-13VG, DS250VG, DUT250VG) or Type "2+3" (DAC50VG) can achieve better performance of:

- Protection level,
- Life duration (due to suppression of leakage current),
- Non-disturbing operation (no follow current)
- TOV behaviour.

For instance, these features allow it to reach, even with a single stage of surge protection, the same protection efficiency as a double stage association (Type 1, Type 2 and Type 3 SPDs) (see page 13).

SURGE PROTECTOR PARAMETERS

Surge protectors are defined by a series of electrical specifications which will help the user to select the right protection specific to their installation:

Operating voltage - Uc

The maximum continuous operating voltage (MCOV) Uc is the maximum AC voltage which may be applied continuously to the SPD, with safety margin.

Temporary overvoltage - U_T

The temporary overvoltage U_T (TOV) is the maximum AC voltage the surge protector applied during defined durations (5 seconds and 120 minutes), without failure or witht controlled disconnection. This parameter U_T is greater than Uc.
The intention of these tests is to simulate failures that could realistically occur within the low-voltage utility supply

An additional test is required for TT AC systems, to simulate a failure within the high-voltage utility supply, that can apply temporary overvoltages (TOV) between Neutral and PE (application of 1200 Vac, 300 A for 200 ms): the compliance with this test requires the use of the CT2 diagram (GSGt between N and PE).

Discharge current - In and Imax

The maximum discharge current (Imax), applicable to Type 2 SPD, is the maximum impulse current 8/20 µs a surge protector can withstand without destruction .

The nominal discharge current (In) is the level of 8/20 µs impulse current a surge protector Type 1 or Type 2 can withstand repeatedly (a minimum of 15 surges) without destruction.

Impulse current - Iimp

The impulse current (Iimp), used in Class I test applicable to Type 1 SPDs, is the maximum impulse 10/350 µs current a surge protector can withstand without destruction. This test simulates the effect, on AC power surge protectors, of a direct lightning strike on an installation.

Total discharge current - Itotal

Total discharge current flowing in the PE or PEN conductor of a multipole surge protector.

Specific energy - W/R

Energy discharged during the flow of the surge current Iimp, during the Class I test. Expressed in kJ/ohm.

Open circuit voltage - Uoc

This parameter is used only for Class III test, applicable to Type 3 SPD and consists of the injection of a combination wave (1.2/50 µs in open circuit voltage - 8/20 µs in short circuit current). This dual stress from voltage and current impulses is particularly useful when comparing SPD performance against other manufacturers SPDs.

Protection level - Up

Maximum voltages measured during specific protection level tests (Type 1, 2 or 3 SPD), to qualify the protection performance of the SPD. Combined products (such as T2+3) will declare more than one protection level, one for each type.

Residual voltage

Residual voltage of the surge protector during an 8/20µs current waveform injection at a determined rating (i.e 5 kA).

Short circuit current capability - Isccr

The surge protection and its associated disconnector (E.g., fuse or MCB) are a tested combination to disconnect safely on a maximal short circuit current value (i.e.: 50 kA) : This Isccr value needs to be higher than the short circuit current value of the network at the installation point.

Follow on current extinction capability - Ifi

This criteria is only devoted to surge protection using the "air gap" technology : once they have activated, these surge protectors conduct part of the network current (follow on current) and need to interrupt it. This behaviour does not concern AC power surge protector using Metal Oxide Varistor technology.

DIN RAIL AC POWER SURGE PROTECTORS

TYPE OF SURGE PROTECTORS

The AC power surge protectors are split into 3 categories by IEC 61643-11 and EN 61643-11 standards, following 3 classes of tests. These different tests depend on the location of the surge protector in the AC network and on the external conditions.

Type 1 surge protectors

Type 1 surge protectors are designed to be installed when a direct lightning strike risk is high, when the building is equipped with external lightning protection system (LPS or lightning rod) or where the installation is fed by overhead power lines. In this situation, EN 61643-11 and IEC 61643-11 standards require the Class I test to be applied to surge protectors : this test is characterized by the injection of 10/350 µs impulse current in order to simulate the direct lightning strike. Therefore these Type 1 surge protectors must be especially powerful to conduct this high energy impulse current.

Type 2 surge protectors

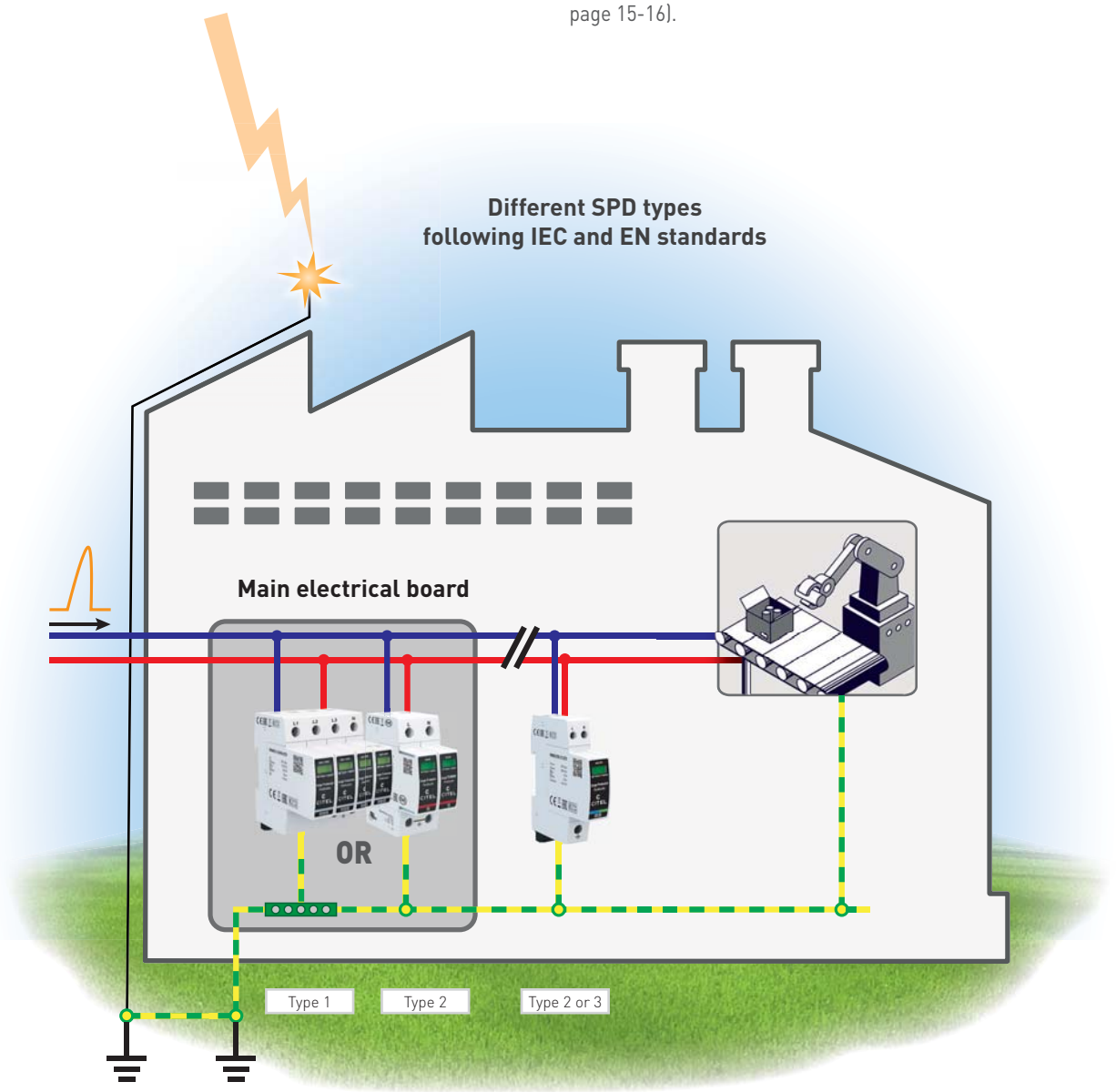
Type 2 surge protectors are designed to be installed at the entrance of the installation, in the main switchboard, or close to sensitive equipment, on installations without LPS (lightning rods). These protectors are tested following the Class II test from IEC61643-11 or EN61643-11 standards and based on 8/20 µs impulse current injection.

Type 3 surge protectors

For sensitive or remote equipment, further SPDs are required: these low energy SPDs could be Type 2 or Type 3 (see «Coordination of surge protector» page 20). Type 3 SPDs are tested with a combination waveform (1,2/50 µs - 8/20 µs) following Class III test.

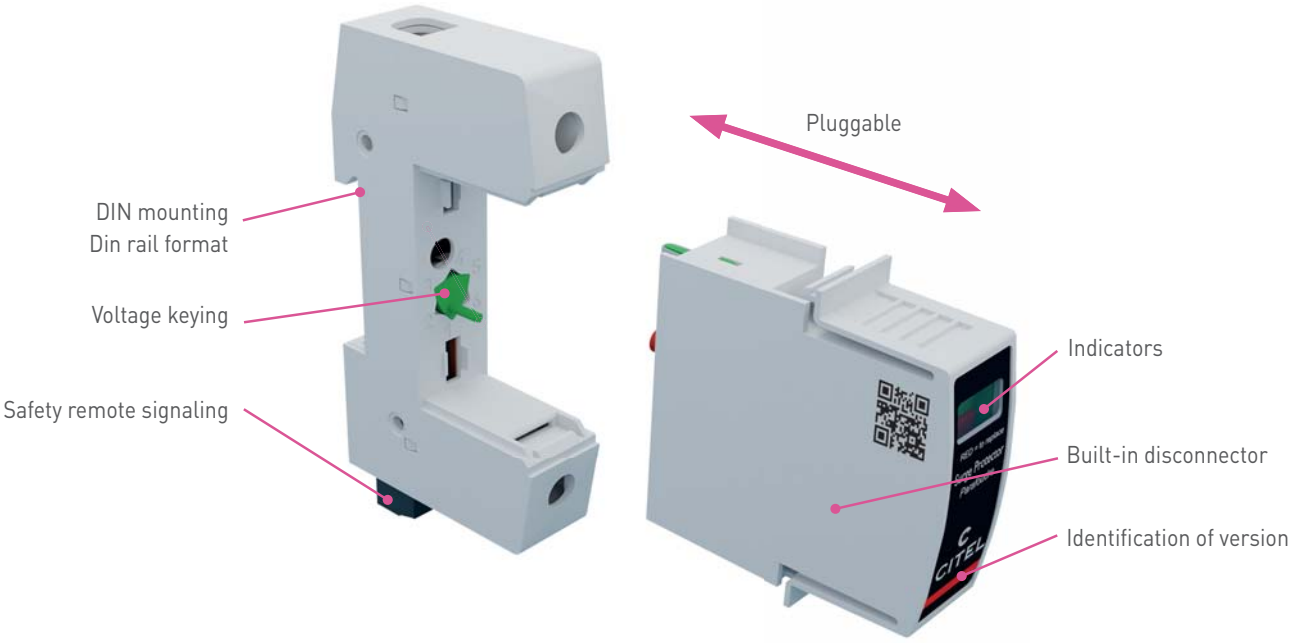
Surge protector combination

Surge Protectors incorporating VG technology provide protection equivalent to a coordination of a Type 1 + Type 2 + Type 3 surge protectors. Advantages: reduces the cost and time of installation. Simplifies selection (no calculation of coordination) (see page 15-16).



CITEL

AC power Surge Protector DAC50



DISCONNECTION DEVICES

In compliance with the standards, the AC power surge protectors are equipped with internal disconnection devices and associated to external devices, in order to provide total safety in case of failure.

2 types of devices are necessary :

• **Internal thermal security** which will disconnect the surge protector from the AC network in case of thermal runaway. In such a case, the user will be alerted to its safe disconnection by an indicator in front of the protector (or via the remote contact), and will carry out the replacement of the defective SPD.

• **External electrical disconnection** (fuses or breaker) to disconnect the surge protector from the AC network in case of internal short circuit, e.g. due to an excessive impulse current. The rating of the external fuses are specified to match with the discharge capability of the SPD and the prospective short-circuit current of the installation and must be tested together with the SPDT in order to ensure compliance of the short-circuit current withstand test (Isccr parameter). To ease the selection of these components, the rating and type of fuses are mentioned in the datasheet and in the installation instructions of each SPD (see «associated fuses» page 17).
Some specific versions, such tas DACF25/DACF15 series, are equipped with internal protection against short circuit currents and, by this way, can be installed without the need of external devices.

MAINTENANCE

DAC surge protectors are designed for repetitive operation and do not require specific maintenance. Nevertheless, in case of an extreme event, a controlled end of life could occur (see above) and a maintenance operation must be performed.

Pluggable design

The design of most of the CITEL AC power surge protectors is based on the use of a pluggable module that plugs into a matching receptacle. This makes replacement, and checking very easy without impairing the protection function. On multipolar surge protectors, the possibility of replacing a single pole makes rehabilitating a surge protector less expensive. The plug-in module is identified with a color label in relation with the type (Black/Grey = Type 1 ; Red = Type 2 ; Blue = Type 2 low power or Type 3) and are keyed for operating voltage, in order to avoid misapplications.

Signaling

DAC surge protectors are equipped with a mechanical failure indicator linked to the internal thermal disconnector: in case of safety disconnection, the indicator will switch on and the SPD must be replaced.

Remote Signaling

DAC surge protectors are available in «remote signaling» versions. This feature, which allows remote checking of the status of the surge protector, is especially important when the products are hard to reach or unsupervised. The system consists of an isolated auxiliary changeover contact that is activated if the surge protector module changes status. This lets the user monitors :
- the good operation of the SPD
- the presence of the plug-in modules (if any)
- the end of life (disconnection) of the surge protector.

The remote signaling version allows the choice of signaling system appropriate to the installation (light, buzzer, automation, modem transmission...) , and can be selected by the user.t

VG TECHNOLOGY FOR AC AND PHOTOVOLTAIC SURGE PROTECTORS

Several technologies exist on the market for surge protection of power network:

- **Metal Oxide Varistor (MOV)**
- **Air Gap + Trigger**
- **CITEL VG Technology → MOV + GSG**
  (Gas-filled Spark Gap)

VG TECHNOLOGY

This technology is the exclusive and patented technology of CITEL based on the use of specific types of Gas tubes: GSG. These components, the result of over 80 years of experience in the gas discharge tube field, have a behaviour adapted to the power network and provide robustness and working stability: their association with varistors combines the advantages of both technologies.

CITEL originally developed the "VG" technology for low voltage Type 1 SPDs and has then extended it to Type 2 and Type 3 SPDs and to Photovoltaic applications.

CITEL RANGE USING THE "VG" TECHNOLOGY:

- DAC50VGS : Type 2+3 AC power SPD, Imax = 50 kA
- DAC1-13VGS : Type 1+2+3 AC power SPD, Iimp = 12.5 kA
- DACN1-25CVGS : 3-phase Type 1+2+3 AC power SPD, Iimp =25 kA
- DS60VGPV : Type 1+2 PV power SPD, Iimp = 12.5 kA
- DPVN1 : Type1+2+3 PV power SPD, Iimp = 6.25 kA
- DPVN : Type 2+3 PV power SPD, Imax = 40 kA

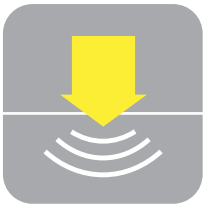
ADVANTAGES OF VG TECHNOLOGY

versus other technologies (specifically the triggered spark gap)

1. Gas-filled-Spark Gap (GSG)

CITEL VG surge protectors are using specific gas discharge tubes: GSG. These essential components are the result of over 80 years of experience in the gas discharge tube field, are meant for power network and ensure a perfect electrical stability.

→ Increase reliability



2. Very low clamping level and high surge current capability

GSG are able to conduct very high surge currents (Iimp, Imax) with a very low residual voltage (Up). Such characteristics could only previously be reached with the combination of a Type 1 and a Type 2 surge protector.

→ Equivalent to Type « 1+2+3 » or « 2+3 » solutions
→ Maximum efficiency
→ Compact design

3. Increased TOV withstand

VG surge protectors can handle very high TOV levels (Temporary over Voltage) up to 450 Vac without any failure or degradation to the level of protection.

→ Increased reliability for areas with unstable power networks.

4. No follow current

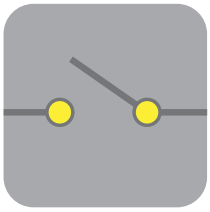
Unlike "Air Gap" technologies, "VG" Technology does not create any follow on current.
The VG solution increases service continuity by avoiding nuisance tripping of the upstream overcurrent protection device during surge events.

→ Improvement of the network quality (no power line disturbances)
→ Easy selection

5. Robustness and reliability

All the components of the VG surge protector are designed to handle high impulse discharge currents without any assistance from auxiliary systems. On the contrary, the "Triggered Air Gap" technology includes a control circuit, using very sensitive components, which could be stressed by a part of the surge current and will eventually fail.

→ Increase reliability
→ Better life expectancy



6. Safe disconnection and Device status signalization

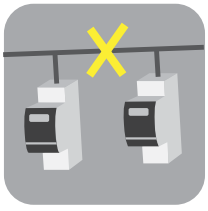
VG surge protectors use a safe disconnection system and provide real-time status indication of internal components. For a "Triggered Air Gap" technology, the disconnection and signalization only can provide the status of the control circuit and not the main protection circuit.

→ Safe and efficient maintenance

7. No ageing

During normal operation, in addition to transient events, varistors are always conducting a small amount of current. This leakage current can be stressful to the varistor over time, especially in DC power systems, and cause the varistor to age prematurely.

→ Maximum life expectancy



8. Easier surge protection coordination

In the case of coordinated SPD installations, the surge protector downstream of a VG SPD does not need any special consideration, such as a sufficient distance between locations, in order to ensure a working coordination between multiple SPDs. Note: due to its optimized protection level, the VG surge protector can be used without any additional surge protector

→ Easier to use

CONCLUSION :

CITEL Surge Protectors based on VG technology offer the best level of efficiency and reliability,
conditions essential for achieving the maximum performance of your surge protection measures (SPM).

DIN RAIL AC POWER SURGE PROTECTORS

SURGE PROTECTION INSTALLATION

Location

CITEL DAC or DS surge protectors are installed as follows, according to their types :

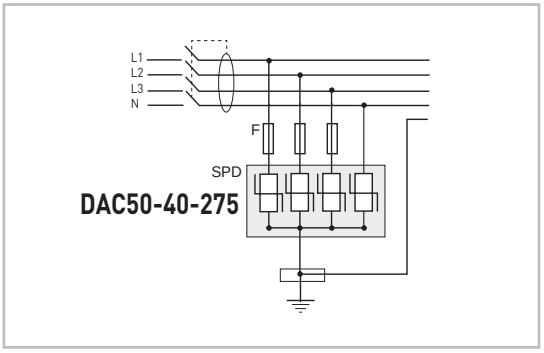
- **Type 1 or «Heavy duty»** : at the origin of the installation, in a separate box or on the main electrical panel, for efficient discharge of partial lightning currents.
- **Type 2 or «Primary»** : at the origin of the installation, on the main electrical panel, in order to eliminate impulses currents as fast as possible and thereby avoid coupling into other electrical services.
- **Type 2 (or Type 3) or «Secondary»** : on the secondary panel, near the sensitive equipment, to limit ringing voltages and improve the level of protection.

Wiring

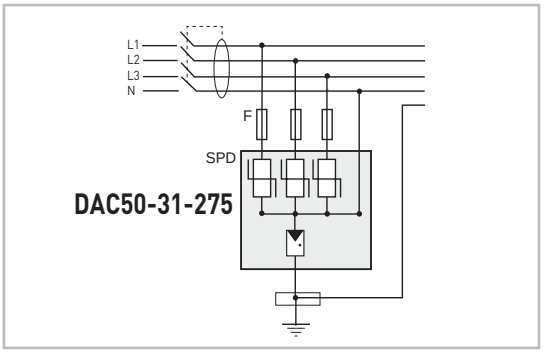
Since lightning surges are essentially common-mode phenomena, AC power SPDs at the origin of the installation are connected mainly in common mode (between the active conductors and PE).

Sensitive equipment requires additional differential-mode protection (between phase and neutral). For these applications, CITEL offers specific versions, using L/N protection branches (differential mode) and a specific gas tube branch for the Neutral to PE (common mode) protection: this type of installation is called a «CT2 connection» in IEC 60364 standard, is used in surge protectors such as DAC50-31-275.

Common mode protection :
CT1 Connection



Common and differential mode protection :
CT2 Connection

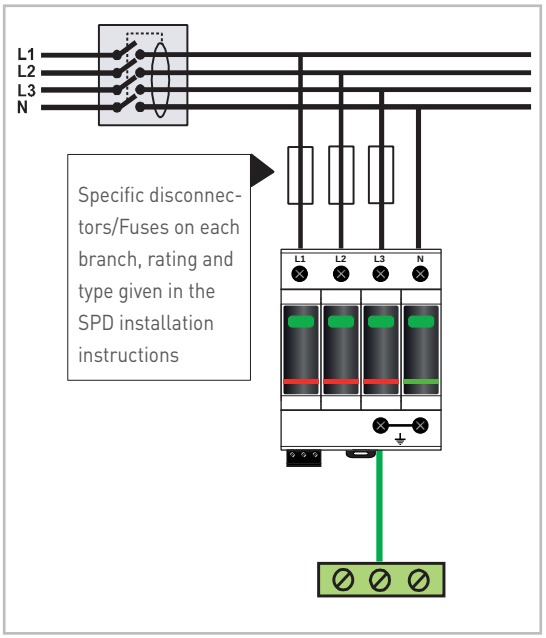


ASSOCIATED FUSES

To comply with standards and safety, the AC surge protectors must be protected against a possible end of life in short-circuit: the user must install on each SPD branch, a protection against short-circuit current (specific disconnectors, standard fuses or breaker).

The type and the rating of these devices are given by the SPD manufacturer in the product datasheet or installation instructions. The choice of this rating depends of 2 criteria:

- Withstand of the short-circuit current test in the IEC 61643-11 standard: the fuse must cut safety the short-circuit current before an harsh destruction of the SPD.
- Withstand of the discharge currents (In or Iimp): the fuse must be able to conduct the discharge current of the SPD without blowing.



SPECIFIC DISCONNECTORS

CITEL has designed a range of specific external disconnectors for SPD (SFD1 range) to replace the regular fuses :

- Optimized and tested in impulse current
- Compact
- Equipped with strikers to indicate their status and to monitor the remote signal feature of their holders (see page 70).

INTEGRATED DISCONNECTORS

Some specific versions, as DACF25/DACF15 series, are equipped with internal disconnector against short circuit currents, in addition of the internal thermal disconnectors, and, by this way, can be installed without the need of external devices. These SPDs are classified as "SPDI".

Installation

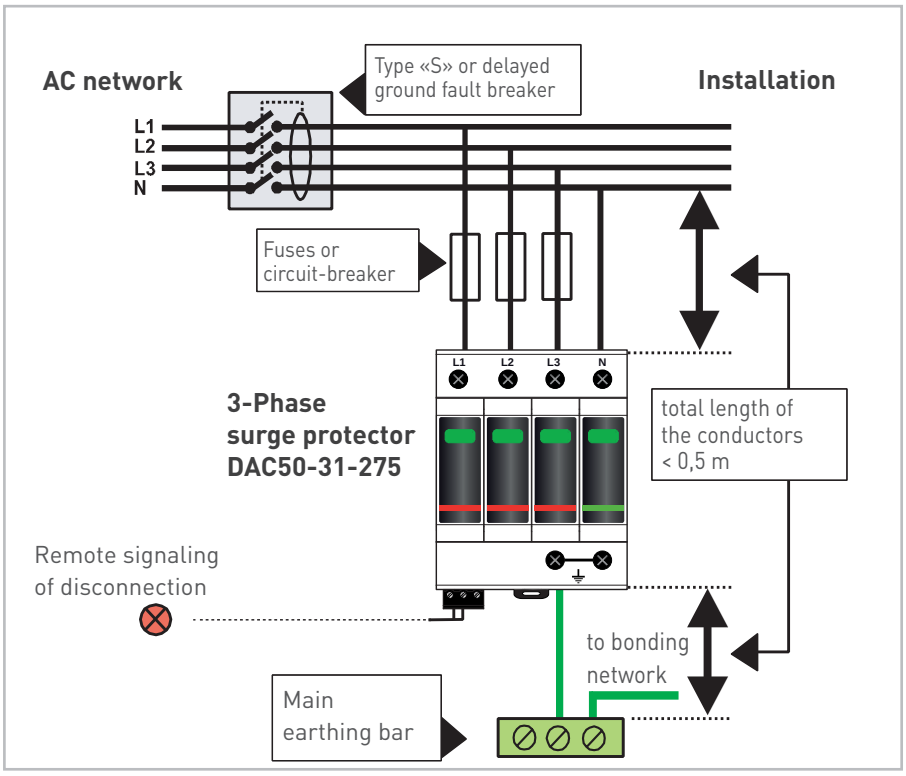
DAC surge protectors are connected in parallel on the AC network and must be equipped with external fuses for short-circuit current protection (see paragraph «Associated fuses»).

- The total length of parallel connection wires to AC network must be lower than 0.5 m in order not to significantly increase the protection level (Up + UL) provided by the SPD assembly (SPDA), see diagram.
- Wiring is made by screw connections. On some models, a distribution busbar can be used.
- The protection wire coming from the SPD must be connected to the bonding bar of the electrical panel.
- The cross sectional wire must be 6 mm² minimum for Type 2 SPD and 16 mm² for Type 1.
- Local earthing resistance must be in compliance with the electrical rules.

Further information can be found in IEC 61643-12 standard (selection and application principles for low voltage SPD).

Installation example

Type 2 surge protector DAC50S-31-275

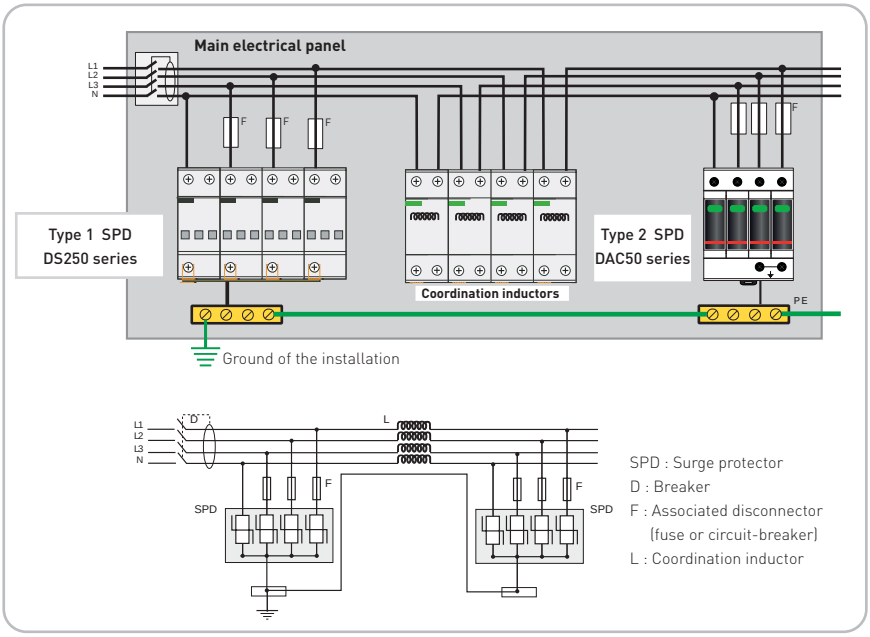


DAC AND DS SURGE PROTECTORS WIRING

COORDINATION OF SURGE PROTECTORS

In order to provide maximum protection efficiency, it is necessary to create a «coordination» diagram: that means installation of a «primary» SPD at the network entrance and a «secondary» close to sensitive equipment.
Efficient SPD coordination is performed by including, between primary and secondary SPDs:
- a minimum length of wire (> 10 m).
or
- coordination inductors (DSH range: see below).
Futher information is available in installation instruction sheet.

Example of coordination on 3-Phase network

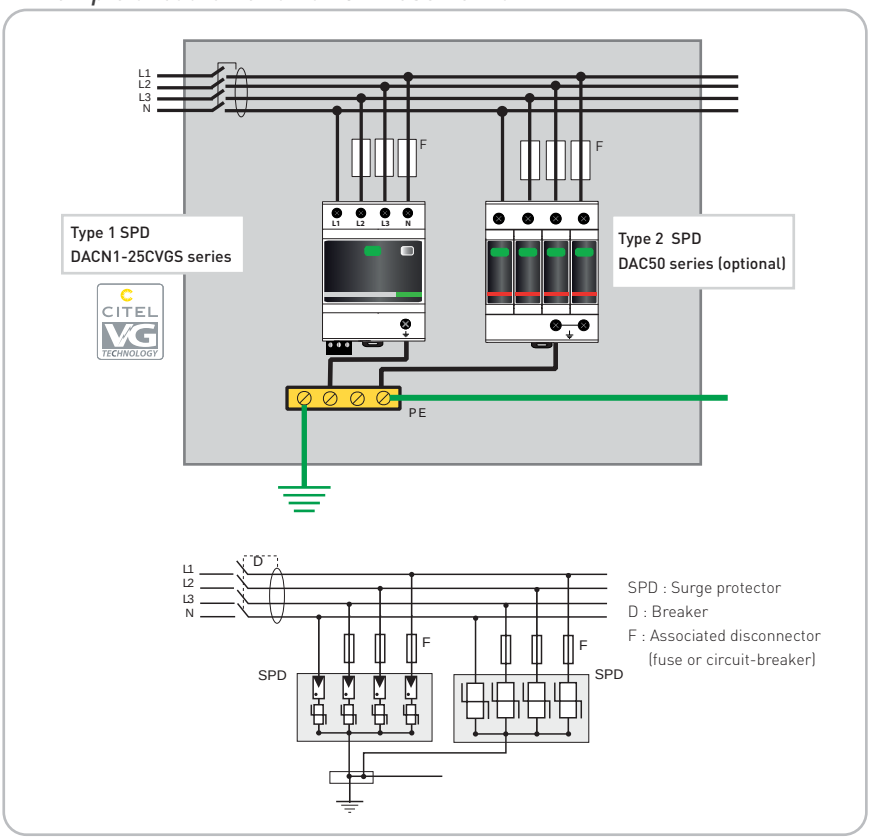


DIRECT COORDINATION WITH VG SURGE PROTECTOR

An additional benefit of the VG technology is to ensure effective coordination with secondary surge arrester without special precautions (no decoupling length required). It is therefore possible to directly connect the output of the surge arrester head VG secondary.

Note: However, because of the very high lightning discharge capacity and low residual clamping of the VG SPD, the addition of a secondary surge protector may not be necessary unless the protected equipment is >10m away..

Example of coordination on 3-Phase network



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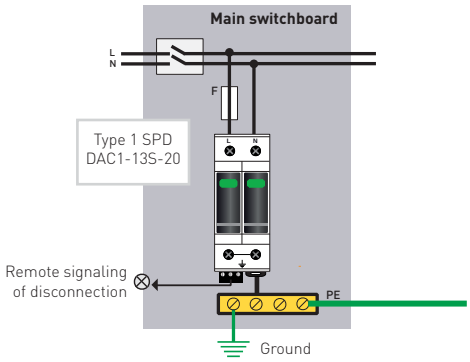
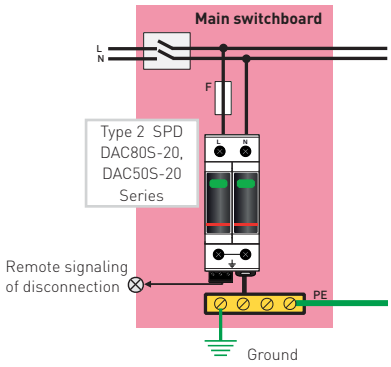
COMMON MODE PROTECTION (CT1 CONNECTION)

Common mode (L/PE or N/PE) protection provided by DAC/DS surge protectors in relation with the different types of AC network. Called CT1 connection type in IEC 60364 std.

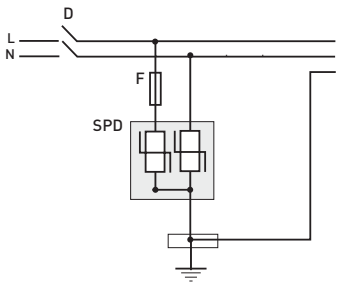
1 Type 1 Surge Protector Single-phase network



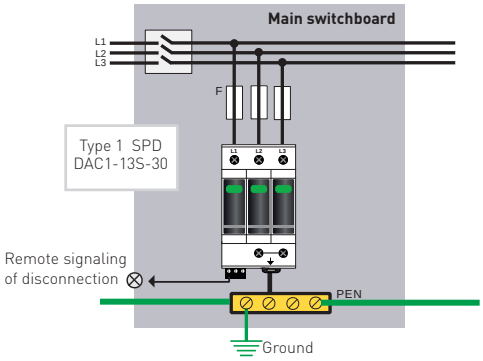
4 Type 2 Surge Protector Single-phase network



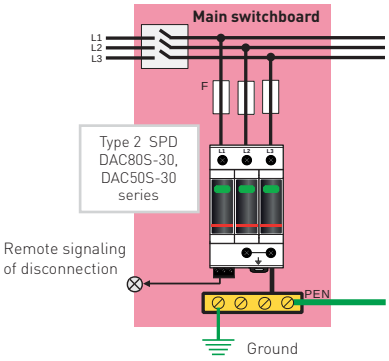
Diagram



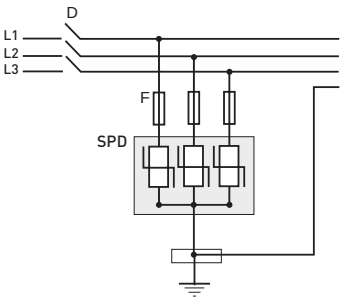
2 Type 1 Surge Protector 3-Phase network



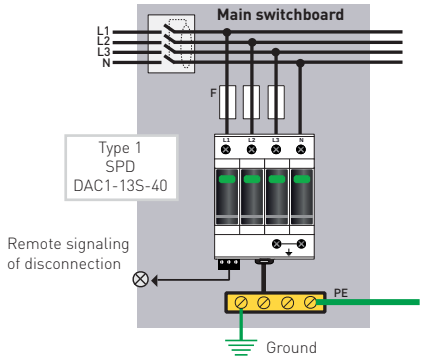
5 Type 2 Surge Protector 3-Phase network



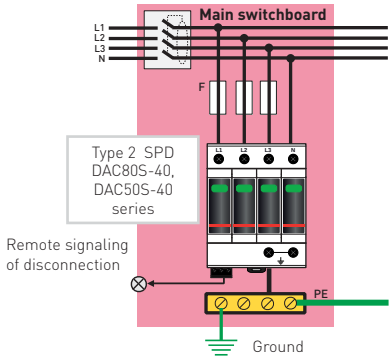
Diagram



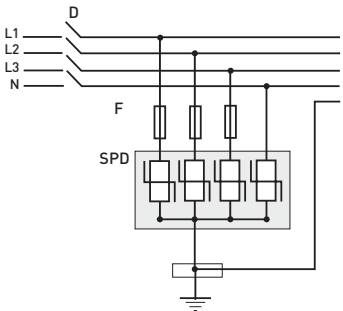
3 Type 1 Surge Protector 3-Phase network + neutral



6 Type 2 Surge Protector 3-Phase network + neutral



Diagram



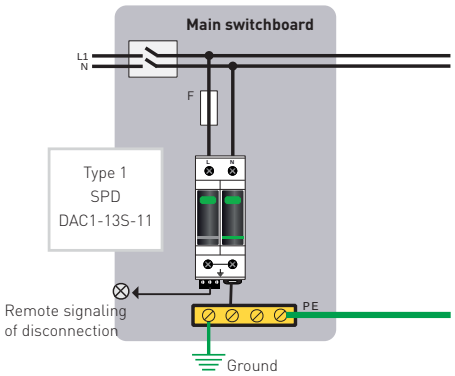
SPD : Surge protector
D : Circuit breaker
F : Associated disconnector
(fuse or circuit-breaker)

DAC AND DS SURGE PROTECTORS WIRING

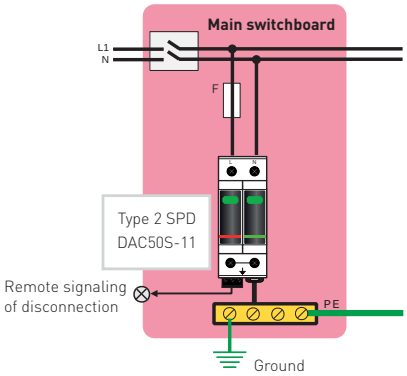
COMMON AND DIFFERENTIAL MODE PROTECTION (CT2 CONNECTION)

Common mode (N/PE) and differential mode (L/N) protection provided by DAC/DS surge protectors in relation to the different types of AC network. These configurations CT2 (following IEC 60364) are also called “1+1” and “3+1” mounting.

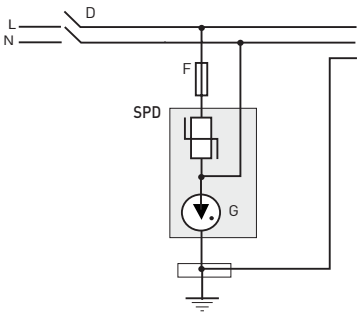
7 Type 1 Surge Protector Single-phase network



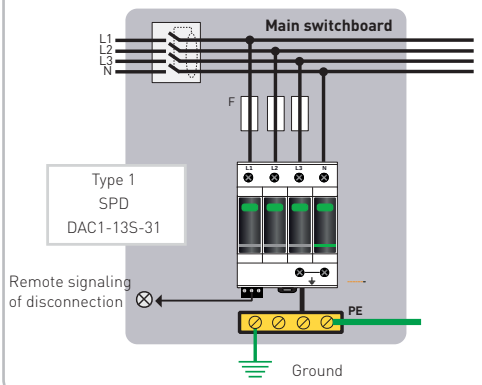
9 Type 2 Surge Protector Single-phase network



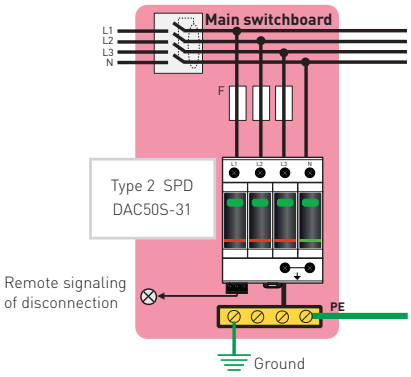
Diagram



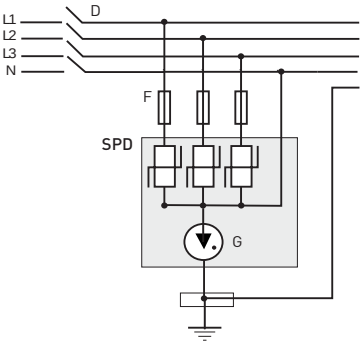
8 Type 1 Surge Protector 3-Phase network + neutral



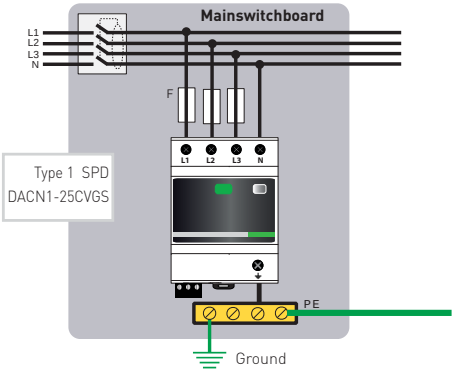
10 Type 2 Surge Protector 3-Phase network + neutral



Diagram

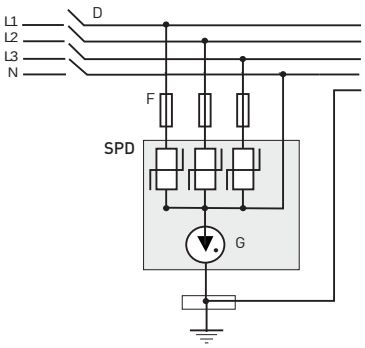


11 Type 1 Surge Protector 3-Phase network + neutral



SPD : Surge Protector
G : Surge protector with GDT
D : Circuit breaker
F : Associated disconnector
(fuse or circuit-breaker)

Diagram



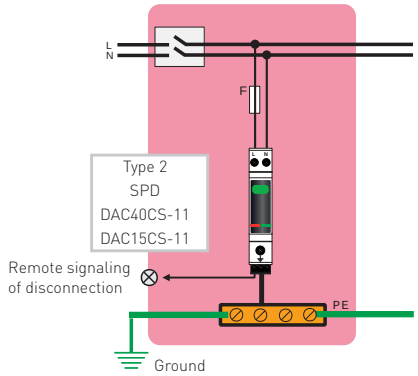
CITEL

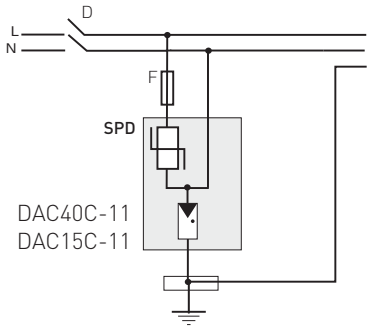
MULTIPOLE TYPE 2 SURGE PROTECTORS WIRING

Wiring instructions for DAC/DS multipolor and monobloc Type 2 surge protectors according to different types of networks.

12 Type 2 Surge protector Single-phase network

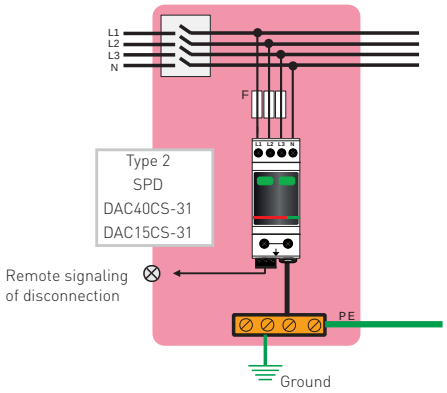
Diagram

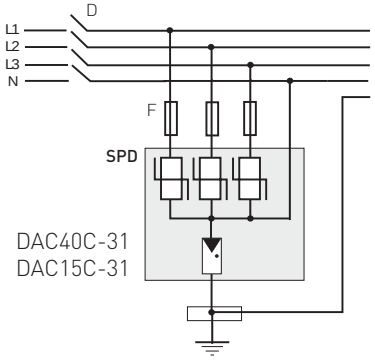




13 Type 2 Surge protector 3-Phase network + neutral

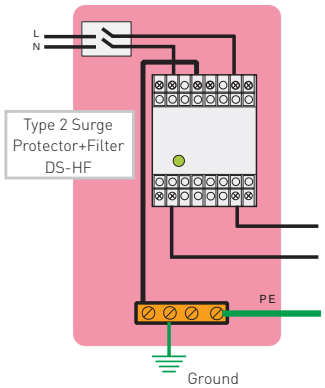
Diagram

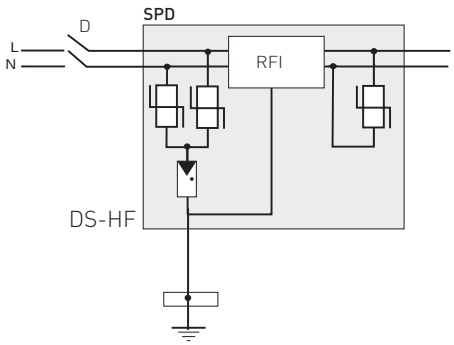




14 Type 2 surge protector + Filter Single phase network

Diagram





SPD: Surge protector
RFI: RFI filter
D: Breaker
F: Associated disconnector
(fuse or circuit-breaker)

INTERNATIONAL STANDARDS FOR AC SURGE PROTECTORS

The performance, selection and application of AC surge protectors are defined by standards, to ensure an efficient and secure use.
National standards are based on IEC international standards. In the field of AC surge protection, several documents must be taken into consideration.

STANDARDS IN AC SURGE PROTECTION

Related standards for test performance, selection and application of low voltage SPDs are :

General rules : IEC 60364 standard

- **Section 4-443** : «Protection against overvoltages of atmospheric origin or due to switching» :
This section of IEC 60364 is intended to describe the means by which transient overvoltages can be limited and describes the configurations where the surge protection is necessary.

- Section 5-534 : «Devices for protection against overvoltages» :
This section gives the basic requirements for the selection and installation of the SPDs for electrical installation of buildings to obtain a limitation of transient overvoltages.

Product test standard : IEC 61643-11 :

This document addresses performance tests for AC surge protective devices (SPDs) following different classes (Class I , II or III tests). It is mainly dedicated to surge protector manufacturers.

Selection and application guide : IEC 61643-12 :

This guide addresses in details the selection and application principles of SPDs in practical situations.

RECOMMENDATIONS FOR SPD INSTALLATION

Section 4-443 of IEC 60364 mandates SPD application depending of the type of installation :
Protection against transient overvoltage shall be provided where the consequence caused by an overvoltage due to indirect lightning strokes could result in:

a) Serious injury to, or loss of, human life.
b) Significant financial or data loss.

For all other cases, protection musty be applied unless the business owner specifically states that they can accept and tolerate any physical or consequential losses that could occur as a result of damage caused by an overvoltage.
For high-risk applications (such as nuclear or chemical sites); where the consequences of transient overvoltages could result in explosion or the harmful leakage of chemicals or radioactive emission, then the risk assessment within IEC 62305-2 must be applied.

SELECTION OF THE SPD

Section 5-534, among other, gives the minimum performance required for SPD installed at the entrance of installation :
1 - The installation equipped with lightning rod (LPS):
➡ Recommendation : Type 1 SPD, with Lightning impulse current limp of 12.5 kA minimum, connected at the origin of the installation.

2 - The installation is connected to an AC network, without LPS :
➡ Recommendation : Type 2 SPD, with nominal discharge current In ⩾ 5 kA, connected at the origin of the installation.

Application of the AC surge protectors following IEC 60364-4-443

Consequences caused by overvoltage, or Type of installations	SPD application
Serious injury to, or loss of human life, e.g. safety services, medical care facilities;	Mandatory
High-risk applications (E.g. nuclear or chemical sites); resulting in explosion or the harmful leakage of chemicals or radioactive emission	Risk analysis required
Significant financial or data loss, e.g. hotels, banks, industries, commercial markets, farms.	Mandatory
Dwellings or apartment buildings	Risk analysis required

CONCLUSION

Following international rules, AC surge protectors are required for most of the installations.
Risk assessment methods are also available to determine more accurately the need of surge protection.

NORTH-AMERICAN REGULATION ON LOW VOLTAGE SURGE PROTECTION DEVICES

STANDARD STATUS

In North America, the IEC international standard does not apply. Other national standards and guidelines exist, such as UL, NEC and ANSI/IEEE, which are used to determine your risk to transients in low voltage power networks as well as the use of appropriate protector for each application.

NEC (National Electrical Code):

The article 285 of NEC defines the use of standalone surge protectors and imposes their compliance with the product standard UL1449 Ed. 5.
The article 285 defines the selection and installation conditions of SPDs.

Product Standard: UL1449, 5th Ed.:

This document, devoted to surge protection manufacturers, defines the parameters as well as the test procedure to qualify an SPD: it is important to note that the UL Type designations of surge protective devices, while similar, is not exactly the same as SPD types in IEC61643-11.

SPD type according to UL 1449 5th Ed.:

Type 1 - Permanently connected surge protection devices to be installed both, on the supply side and the load side of the equipment main overcurrent protective device. The surge protection devices are supposed to be self-protected against short circuits and do not require external protection.
Type 2 - Permanently connected surge protection devices to be installed on the load side of the main equipment overcurrent protective device. This surge protection device requires an external short circuit protection device.
Type 3 - Surge protection devices installed at a conductor length of 10 meters or greater from the electrical panel. For example, the mobile surge protectors (that can be plugged into the outlet such as a multiple power outlet etc.). They can also be directly installed on the equipment to be protected.
Type 4 « Component Assemblies » - Component Assemblies consisting of one or more Type 5 components and a disconnect complying with the limited end-of-life short circuit current tests (0.5A, 2.5A, 5A and 10A).
Type 1, 2, 3 « Component Assemblies » - Type 4 Component Assemblies having, in addition to the limited end-of-life short circuit current tests, passed all the other end-of-life tests (under the short circuit current of 100A, 500A, 1000A and SCCR) and also with (2CA) or without (1CA) external short circuit protection
Type 5 - Discrete component surge suppressors, such as MOVs, Diode or GDT that may be mounted on a PCB, connected by its leads or provided within an enclosure with mounting means and wiring terminations.

ANSI/IEEE Guide:

ANSI/IEEE publishes different informative guides regarding the risk of transient overvoltages to low voltage networks (IEEE C62.41.1), the surge environment and types of transients (IEEE C62.41.2) as well as the method for testing equipment against transients that are connected to the low voltage network (IEEE C62.45). Another important guideline detailing the installation of SPDs is IEEE C62.72.

IEEE C62.41.2 Guide

IEEE C62.41.2 Guide provides the selection of performance surge arresters according to their location in the system.

Categories depending on the location following IEEE C62.41.2 Guide

Selection of surge protector following IEEE C62.41.2 Guide

Catégories of location		Minimum withstand of recommended arresters	
		Voltage 1,2/50 µs	Current 8/20 µs
A	Indoor installation	6 kV	0.5 kA
B	Entry installation	6 kV	3 kA
C	Outdoor installation, low exposure	6 kV	6 kA
C	Outdoor installation, high exposure	10 kV	10 kA

DIN RAIL AC POWER SURGE PROTECTORS

CHOOSING SURGE PROTECTORS

CITEL's line of AC power surge protectors is designed to cover all possible configurations within AC low voltage installations.
They are available in many versions, which differ in :

- Type (1 , 2 or 3) or Test Class (I , II or III)
- Operating voltage (Uc)
- AC network configuration (1-phase/3-Phase)
- Discharge currents (Iimp, Imax, In)
- Protection level (Up)
- Protection technology (varistors, VG technology, filter)
- Features (differential mode, plug-in, remote signaling, compact, integrated fuse..).

The surge protection selection must be done following the local electrical code requirements (e.g. : minimum rating for In) and specific conditions (e.g. : high lightning density).

Choosing the Type of surge protectors

The type of surge protector is based on its location and the constraints of the installation to be protected.

Configuration	SPD	Location	CITEL
Installation equipped with LPS or could be hit by lightning (overhead power lines)	Type 1+2 Type 1+2+3	Origin of the installation origin (Panel or main switchboard)	DAC1-13S DAC1-13VGS DACN1-25CVGS DS500E
Installation without LPS	Type 2 Type 2+3	Main switchboard	DAC80S DAC50S DAC50VGS DAC40CS DACF25S
Secondary protection (downstream primary SPD)	Type 2 (or Type 3)	Close to protected equipment	DAC15CS DACF15S DACN10S

Choosing the operating voltages Uc and U_T

The SPD Uc voltage (maximum continuous operating voltage) depends on:
- Nominal voltage of the AC network (Uo)
- Type of AC system (TN, TT, IT).

The level of withstand to temporary overvoltages (UT) is related to the Uc voltage. In addition, withstanding the "high voltage" TOV (1200 Vac, 300 A, 200 ms) between Neutral and PE is needed in TT AC system, which requires the CT2 diagram.

Operating voltage Uc (Line/Earth)

AC Network	230/400V		
AC system	TT	TN	IT
Uc Voltage (min)	255 V	255 V	440 V
U_T Voltage	335/440V	335/440V	-
TOV N/PE	1200 V	-	-
Example of CITEL products	DAC50-11-275	DAC50-20-275 DAC50-11-275	DAC50-30-440

Choosing the AC network configuration

DAC and DS surge protectors are available for single, 3-Phase and 3-Phase + neutral AC networks.

Choosing Iimp

The impulse current Iimp is defined for Type 1 SPD. The minimum rating for Iimp is 12.5 kA by pole, following IEC 60364-5-534 . This level is adapted to the real phenomenon. This value can, however, be increased according to the risk (calculation according to IEC 62305-1)
CITEL proposes, in its Type 1 SPD range, 3 levels of Iimp current by pole: 12.5, 25 and 50 kA.

Configuration	Iimp/pole	CITEL
Maximum risk	50 kA	DS500E
Very high lightning density	25 kA	DACN1-25CVGS
High, medium or low lightning density	12.5 kA	DAC1-13S, DAC1-13VGS

Choosing In

The minimum rating of In for a SPD connected at the installation entrance is 5 kA (8/20 µs waveform), required by standard.
Nevertheless higher ratings are advised in case of high lightning density. Moreover higher values of In current will increase the SPD lifetime.
Imax (maximum discharge current) rating is linked to In.

Conditions	In	CITEL
Very high lightning density	> 20 kA	DAC80
High or medium lightning density	10-20 kA	DAC50 DAC50VG DAC40C, DACF25
Low lightning density or secondary SPD	≤ 5 kA	DAC15C, DACF15,DACN10

Choosing the protection level Up

The user must select a surge protector with a protection level Up adapted to the withstand level of terminal equipment. In every case, the lower the protection level Up, the better the protection.
IEC 60364 standard calls for the minimum protection level of 2.5 kV for a SPD connected at the entrance of a 230/400 V network: this level is in compliance with the withstand of robust devices (electromechanical type).
Electronic-based equipment has lower impulse withstand and requires a better protection: so, surge protectors with 1.5 kV protection are necessary to provide efficient protection.

Conditions	Recommended Up	
	230/400 V AC network	120/208 V AC network
SPD at the installation entrance	2.5 kV max.	1.5 kV max.
Electromechanical protected equipment	2.5 kV	1.5 kV
Electronic-based protected equipment	1.5 kV	0.8 kV

Choosing the SPD technology

A relevant choice of the SPD technology, as well as the use of coordination diagram can help to improve the protection level.

DAC and DS surge protectors are based on Varistor (MOV) technology.
Some versions use different electrical diagrams in order to improve some of their characteristics :

➡ **«VG» technology** :
This GSG-MOV hybrid association, used in SPD: DAC1-13VG, DS250VG, DUT250VG, DAC50VG, improves the reliability and the efficiency (see page 15-16)..

➡ **Association with RFI filter** :
The Surge protection panel M series and secondary SPDs DS40HF and DS-HF combine surge protection stage and/or filter stage in order to improve the protection level.

Coordination of Surge Protectors

In order to provide maximum protection efficiency, it is necessary to create a «coordination» diagram, that means installation of a «primary» SPD at the network entrance and a «secondary» SPD close to sensitive equipment.

This association is required in the 2 following cases :

- **Long length** (greater than 10 m) of wire between equipment to be protected and primary SPD : Coordinated SPDs will reduce the ringing voltages created during the surge transmission.

- High sensitivity equipment : Coordinated SPDs will improve the overall protection level.

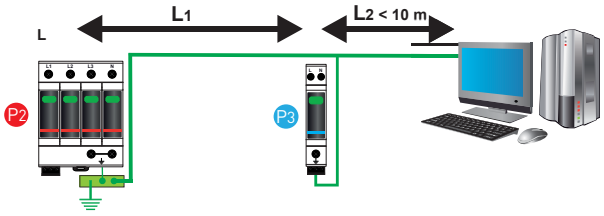
Efficient SPD coordination is performed by including between primary and secondary SPDs :
- a minimum length of wire (> 10 m)

or
- a coordination inductor (DSH range).

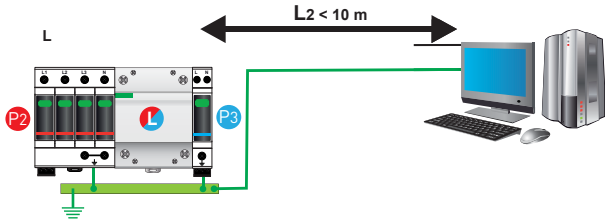
Coordination with VG Surge Protector

With VG technology, there is no consideration of the cable length or to use inductance (see page 21) : a secondary SPD can be connect directly downstream of the primary SPD.

Coordination by conductor



Coordination by inductor



P2 : Primary surge protector (ex. DAC50)
P3 : Secondary surge protector (ex. DAC15C)
L : Coordination inductors (ex. DSH35)
L1 : Length of conductor between surge protector
L2 : Length of conductor between surge protector and installation

PLUGGABLE DAC RANGE FROM CITEL

A PLUGGABLE DESIGN

The design of DAC surge protectors is based on the use of **a module to be plugged** into a matching base. This makes **replacement and checking very easy** without impairing your protection.
The plug-in module is identified with a color label in relation with the type (grey = Type 1 ; red = Type 2 ; blue = low power Type 2 or Type 3) and are keyed for operating voltage, in order **to avoid misapplications**.

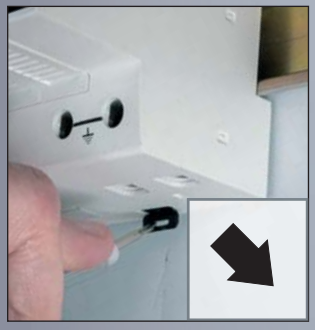
Application field

Application in standard electrical cabinets in compliance with international standard.

DIN Rail mounting

Slide the surge protector into the rail, and press until the unit fits and snaps.

Uninstall

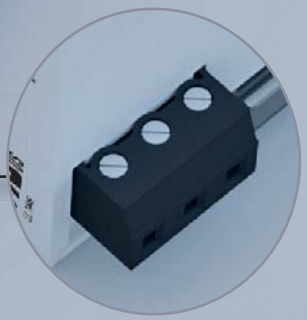


Pull the assembly clamp, and remove the device.

DDT16
Option for mounting in series
(see page 73)

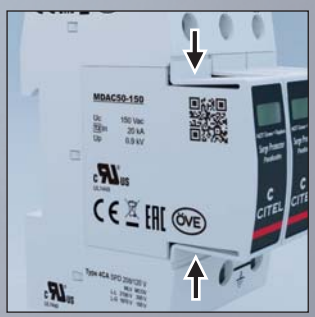
Plug-in module
Marked with technical characteristics.
QR code tag for installation instruction download

Identified connections
All connections are identified to avoid wiring mistakes.



Remote signaling
Less wiring thanks to a single remote signaling connector for all poles.

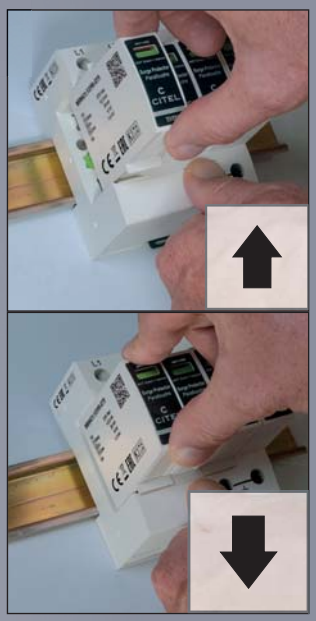
Locking feature
On some versions, the pluggable module is locked in position through dedicated clips.



Signaling

Defective modules are identified by red indicator in the front window. It is then necessary to replace them

Spare module



Easy module replacement, requiring no tools, thanks to the pluggable feature.

Module keying

Mistake-free replacement thanks to an explicit and mechanical codification for the different operating voltages.

TYPE 1+2 AND TYPE 1+2+3 SURGE PROTECTORS

Type 1+2 and Type 1+2+3 surge protectors are heavy duty devices, designed to be installed at the origin of the AC installations equipped with LPS (Lightning Protection System). They are necessary to protect sensitive equipment connected to AC network against indirect effects of lightning, and even in case of direct strike. Following the different national electrical codes, these SPDs can be recommended or mandatory, especially in case of LPS on the building . These surge protectors are tested following Class I tests from IEC 61643-11, characterized by 10/350 µs lightning current injections.

These surge protectors are available in a wide range of versions to be adaptable to all configurations :

- Iimp by pole : 12.5, 25 and 50 kA
- Total Iimp : up to 100 kA
- Single, 3 or 3-Phase+Neutral AC network
- 230/400 V, 120/208 V and 690 V AC network
- All AC system types
- Common mode protection (CT1 configuration) or Common and Differential mode protection (CT2 configuration)

Several mechanical formats are available to meet the needs of the user: assembled unipolar units, monobloc device or multipole equipped with pluggable modules.

These multipolar SPDs are using 2 different technologies:

- DS250VG, DAC1-13VGS, DUT250VG, DACN1-25CVGS: «VG» technology,
- DS500E, DS250E, DAC1-13S: «MultiMOV» technology.

PART NUMBER INFORMATION

DS254 VG-xxx/G

- " " = CT1 configuration (common mode)
  "G" = CT2 configuration (common and diff. modes)
- Operating voltage
- "VG" = «GSG/MOV» technology
  "E" or "R"= «MOV» technology
- Number of protected poles
- Iimp by pole : «13» =12.5 kA ; «25» = 25 kA, «50» = 50 kA
- "DS" = assembled or pluggable surge protector
  "DUT" = monobloc 3-phase unit

DAC1-13VGS-xx-xxx

- Maximum operating voltage
- Configuration: **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «**S**» = Remote signal
- VG Technology
- Iimp: 12.5 kA

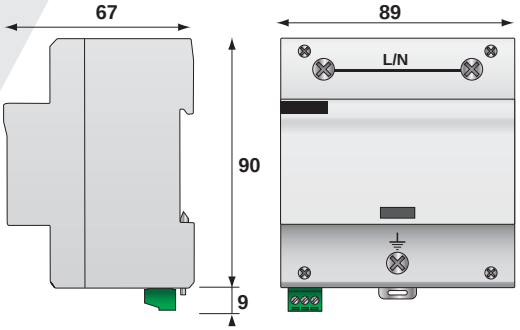
Range		Description	Iimp by pole (10/350 µs)	Characteristics	Page
DS500E		1-pole surge protector	50 kA	Very high energy	31
DACN1-35VGS **DACN1-25VGS**		1-pole surge protector VG Technology	35 kA 25 kA	Very high energy	33
DS250VG		1-pole reinforced surge protector - VG Technology	25 kA	Very high energy Very high efficiency	35
DS250E		1-pole reinforced surge protector	25 kA	Very high energy	37
DACN1-25CVGS		Single and 3-phase SPD VG Technology	25 kA	Compact Very high energy Surge counter	40
DAC1-13VGS		Pluggable surge protector VG Technology	12.5 kA	Compact, Pluggable, Very high efficiency	41
ZPAC1		3-phase SPD for busbar mounting	12.5 kA or 8 kA	Specfic mounting on 40 mm busbar system	43
DAC1-13S		Pluggable surge protector	12.5 kA	Compact Pluggable	45

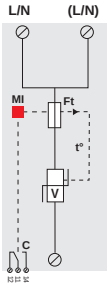
Iimp 50 kA

DS500E-400

DS500E SERIES

- **Type 1 + 2 surge protector**
- **Iimp: 50 kA on 10/350 µs impulse**
- **Imax: 200 kA on 8/20 µs impulse**
- **Internal disconnection with indicator**
- **Remote signaling**
- **EN 61643-11, IEC 61643-11 compliance**





V: High energy varistor network
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

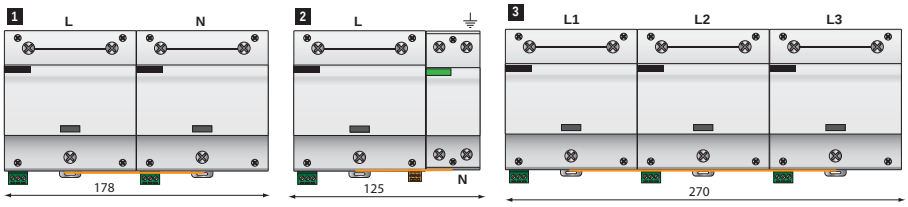
CITEL Model		DS500E-400	DS500E-320	DS500E-230
Description		Type 1+2 AC surge protector 1-pole		
Network		230/400 V	230/400 V	230/400 V
Max. AC operating voltage	Uc	440 Vac	320 Vac	255 Vac
Temporary Over Voltage (TOV) Characteristics - 5 sec.	UT	580 Vac withstand	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Characteristics - 120 mn	UT	770 Vac disconnection	440 Vac disconnection	440 Vac disconnection
Residual current *Leakage current at Uc*	Ipe	< 3 mA	< 3 mA	< 3 mA
Max. Load current *(if connection serie)*	IL	100 A	100 A	100 A
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	50 kA	50 kA	50 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	200 kA	200 kA	200 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	50 kA	50 kA	50 kA
Specific energy by pole	W/R	625 kJ/ohm	625 kJ/ohm	625 kJ/ohm
Protection level *@ In (8/20µs)*	Up	2.2 kV	1.8 kV	1.8 kV
Residual voltage *@ 5kA (8/20µs)*	Up-5kA	1.3 kV	0.9 kV	0.8 kV
Admissible short-circuit current	Isccr	50000 A	50000 A	50000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		Fuses Type gG - 500 A		
Installation ground fault breaker		Type «S» or delayed		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		By screw terminals : 6-35 mm²		
Disconnection indicator		1 mechanical indicator		
Remote signaling of disconnection		output on changeover contact		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-11 / EN 61643-11		
Part number				
		3964	63166	500230

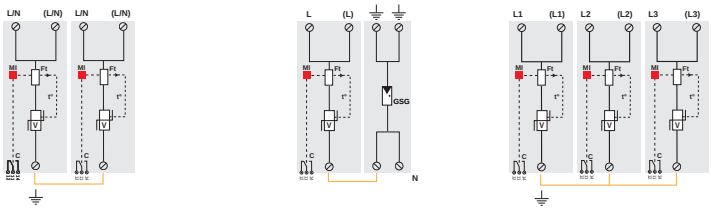
DS502E, DS503E, DS504E

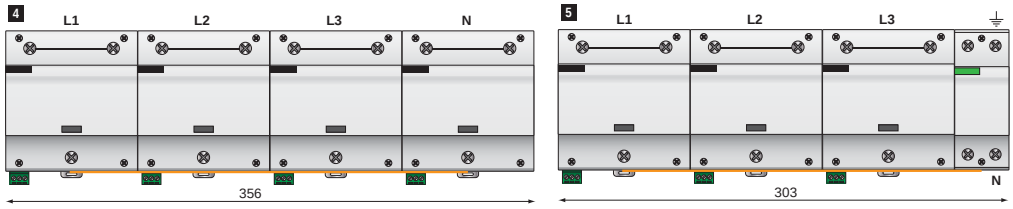
DS502E-230/G

DS50x E-xxx/G

- « » = Configuration CT1 (common mode)
- «G» = Configuration CT2 (common and differential mode)
- Operating/nominal voltage
- «E» = «Multi-Varistor» technology
- Number of protected poles (2, 3 or 4)







V: High energy varistor network
GSG : Specific gas Tube
Ft: Thermal fuse
C: Remote signaling contact
t°: Thermal disconnection system
MI: Disconnection indicator

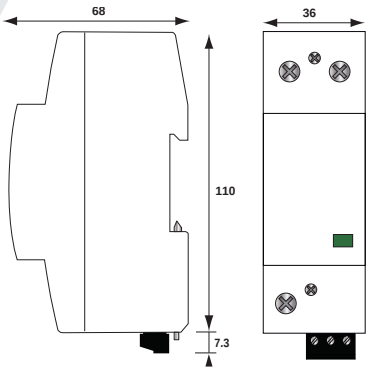
Model	P/N	Network	AC system	Protection Mode	Itotal	Up L/PE	Up L/N	Up N/PE	Diagram
DS504E-320/G	64017	230/400 V 3-phase+N	TT-TNS	L/N and N/PE	100 kA	-	1.8 kV	1.5 kV	5
DS504E-230/G	5042301	230/400 V 3-phase+N	TT-TNS	L/N and N/PE	100 kA	-	1.8 kV	1.5 kV	
DS504E-400	64020	230/400 V 3-phase+N	IT	L/PE and N/PE	200 kA	2.2 kV	-	2.2 kV	4
DS504E-320	504320	230/400 V 3-phase+N	TNS	L/PE and N/PE	200 kA	1.8 kV	-	1.8 kV	
DS504E-230	64021	230/400 V 3-phase+N	TNS	L/PE and N/PE	200 kA	1.8 kV	-	1.8 kV	
DS503E-400	3965	230/400 V 3-phase	IT	L/PE	150 kA	2.2 kV	-	-	3
DS503E-320	64023	230/400 V 3-phase	TNC	L/PE	150 kA	1.8 kV	-	-	
DS503E-230	64024	230/400 V 3-phase	TNC	L/PE	150 kA	1.8 kV	-	-	
DS502E-320/G	64026	230 V single phase	TT-TN	L/N and N/PE	100 kA	-	1.8 kV	1.5 kV	2
DS502E-230/G	5022301	230 V single phase	TT-TN	L/N and N/PE	100 kA	-	1.8 kV	1.5 kV	
DS502E-400	64028	230 V single phase	IT	L/PE and N/PE	100 kA	2.2 kV	-	2.2 kV	1
DS502E-320	64029	230 V single phase	TN	L/PE and N/PE	100 kA	1.8 kV	-	1.8 kV	
DS502E-230	64030	230 V single phase	TN	L/PE and N/PE	100 kA	1.8 kV	-	1.8 kV	

Iimp
35kA / 25 kA

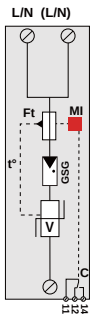
DACN1-25VGS-760

DACN1-xxVGS SERIES

- Type 1 + 2 + 3 Surge Protector
- for AC Network up to 690 VAC
- VG Technology
- In : 35 kA/25kA
- Iimp : 35 kA (DACN1-35VGS) and 25 kA (DACN1-25VGS)
- Remote signaling
- Optimized to TOV
- EN 61643-11, IEC 61643-11, UL1449 ed.5 and GB/T 18802.1 compliance



Electrical diagram for 1 pole



V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

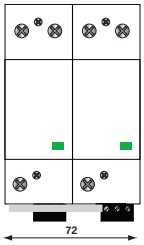
Characteristics

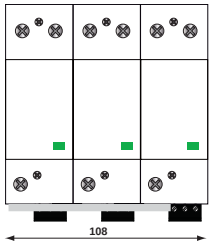
CITEL model		DACN1-25VGS-10-760	DACN1-25VGS-10-440	DACN1-35VGS-10-440
Description		Type 1+2+3 AC surge protector - 1-pole		
Max. AC operating voltage	Uc	760 Vac	440 Vac	440 VAC
Temporary Over Voltage (TOV) characteristics - 5 sec	UT	1000 Vac withstand	580 Vac withstand	580 Vac tenue
Temporary Over Voltage (TOV) characteristics - 20 mn	UT	1325 Vac disconnection	770 Vac disconnection	770 Vac déconnexion
Residuel current *- Leakage current at Uc*	Ipe	none	none	none
Max. Load current *(if connection serie)*	IL	100 A	100 A	100 A
Follow current	If	none	none	none
Nominal discharge current *15 x 8/20µs impulses*	In	35 kA	25 kA	35 kA
Maximal discharge current *max. withstand @ 8/20 µs*	Imax	70 kA	70 kA	70 kA
Impulse current by pole *max. withstand @ 10/350 µs by pole*	Iimp	25 kA	25 kA	35 kA
Specific energy by pole	W/R	156 kJ/ohm	156 kJ/ohm	306 kJ/ohm
Withstand on combination waveform *Class III test*	Uoc	6 kV	6 kV	6 kV
Protection level *@ In (8/20µs) et 6 kV (1.2/50µs)*	Up	2.5 kV	1,5 kV	1.8 kV
Residual voltage *@ 25kA (8/20µs)*	Up-25kA	2.5 kV	1.5 kV	1.8 kV
Residual voltage *@ 5kA (8/20µs)*	Up-5kA	1.6 kV	1.2 kV	1.4 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A	50 000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		Fuse type gG - 315 A		
Existing upstream ground breaker (if any)		Type «S» or delayed		
Mechanical characteristics				
Dimensions		see diagram, 2 TE (DIN43880)		
Connection to network		by screw terminals : 2.5-25 mm² (35mm² rigid)		
Disconnection indicator		1 mechanical indicator Green/Red		
Remote signaling of disconnection		output on changeover contact		
Failsafe mode		Disconnection from AC network		
Max. voltage/current for remote signaling		250 V/0.5 A (AC), 30 V/3 A (DC)		
Wiring for remote signaling		1.5 mm² max.		
Mounting		Symmetrical rail 35 mm² (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5 / GB/T 18802.1		
Certification		TUV Rheinland	-	-
Part number				
		29221012	29221022	29321022

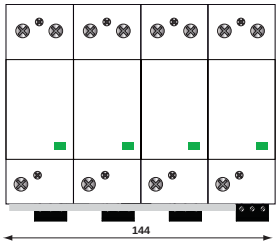
DACN1-xxVGS-20, DACN1-xxVGS-30, DACN1-xxVGS-40

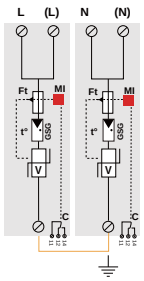
DACN1-xxGS-xx-xxx

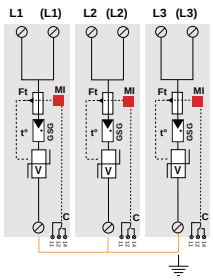
- Maximum operating voltage
- Configuration: **10** (single-pole 1+0), **20** (2+0), **30** (3+0), **40** (4+0)
- «**S**» = Remote signal
- VG Technology
- Iimp: 25 kA or 35 kA
- Non pluggable

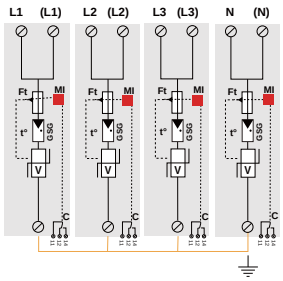












V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

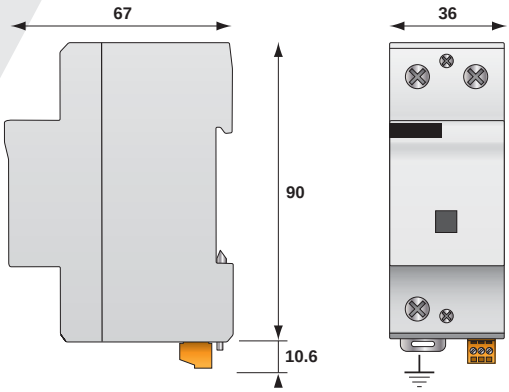
Model	P/N	Network	AC System	Protection Mode	Iimp total	Up L/PE	Up N/PE	Dimension DIN43880	Diagram
DACN1-25VGS-40-760	29224012	400/690 V 3-phase+N	TN System (4+0)	L/PE and N/PE	100 kA	2.5 kV	2.5 kV	8TE	3
DACN1-25VGS-40-440	29224022	230/400 V 3-phase+N	TNS System (4+0)	L/PE and N/PE	100 kA	1.5 kV	1.5 kV	8 TE	
DACN1-35VGS-40-440	29324022	230/400 V 3-phase+N	TNS System (4+0)	L/PE and N/PE	140 kA	1.8 kV	18 kV	8 TE	
DACN1-25VGS-30-760	29223012	400/690 V 3-phase	TNC System (3+0)	L/PE	75 kA	2.5 kV	-	6TE	2
DACN1-25VGS-30-440	29223022	400 V 3-phase	TNC System (3+0)	L/PE	75 kA	1.5 kV	-	6 TE	
DACN1-35VGS-30-440	29323022	400 V 3-phase	TNC System (3+0)	L/PE	105 kA	1.8 kV	-	6 TE	
DACN1-25VGS-20-760	29222012	400 V Single phase	IT System (2+0)	L/PE and N/PE	50 kA	2.5 kV	2.5 kV	4 TE	1
DACN1-25VGS-20-440	29222022	230 Single phase	IT System (2+0)	L/PE and N/PE	50 kA	1.5 kV	1.5 kV	4 TE	
DACN1-35VGS-20-440	29322022	230 Single phase	IT System (2+0)	L/PE and N/PE	70 kA	1.8 kV	1.8 kV	4 TE	

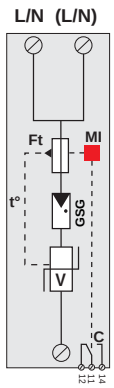
Iimp 25 kA

DS250VG-300

DS250VG SERIES

- **Type 1 + 2 + 3 Surge protector**
- **Iimp: 25 kA on 10/350 µs impulse**
- **Low Up level**
- **Internal disconnection, status indicator and remote signaling**
- **Optimized to TOV**
- **IEC 61643-11 and EN 61643-11 compliance**
- **UL 1449 ed. 5 recognized**





V: High energy varistor network
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

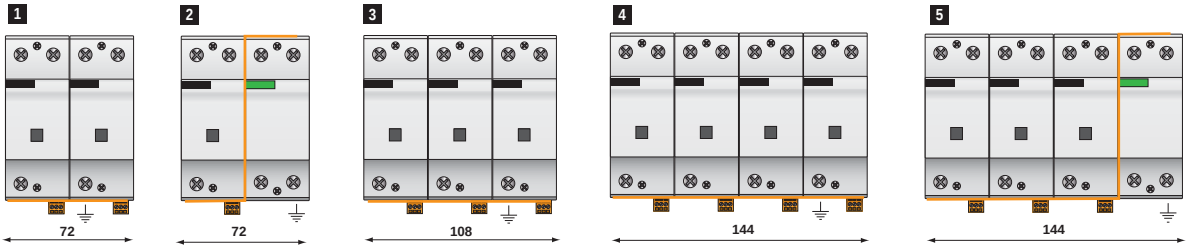
CITEL Model		DS250VG-400	DS250VG-300	DS250VG-120
Description		Type 1+2+3 AC surge protector 1-pole		
Network		230/400 V	230/400 V	120/208 V
Max. AC operating voltage	Uc	440 Vac	255 Vac	150 Vac
Temporary Over Voltage (TOV) Characteristics - 5 sec.	UT	580 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Characteristics - 120 mn	UT	770 Vac withstand	440 Vac withstand	230 Vac withstand
Residual current - *Leakage current at Uc*	Ipe	None	None	None
Max. Load current *(if connection serie)*	IL	100 A	100 A	100 A
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	30 kA	30 kA	30 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	70 kA	70 kA	70 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	25 kA	25 kA	25 kA
Specific energy by pole	W/R	156 kJ/ohm	156 kJ/ohm	156 kJ/ohm
Withstand on Combination waveform *Class III test*	Uoc	20 kV	20 kV	20 kV
Protection level *@ In (8/20µs) and 6 kV (1.2/50µs)*	Up	1.5 kV	1.5 kV	1 kV
Residual voltage *@ 5kA (8/20µs)*	Up-5kA	1 kV	0.6 kV	0.4 kV
Admissible short-circuit current	Isccr	50000 A	50000 A	50000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		Fuses type gG - 315 A / or CITEL SFD-25		
Installation ground fault breaker (if required)		Type «S» or delayed		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		By screw terminals : 6-35 mm² / by bus		
Disconnection indicator		1 mechanical indicator		
Remote signaling of disconnection		output on changeover contact		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Certification		-	UL / CSA	UL
Part number				
		2578	2577	2787

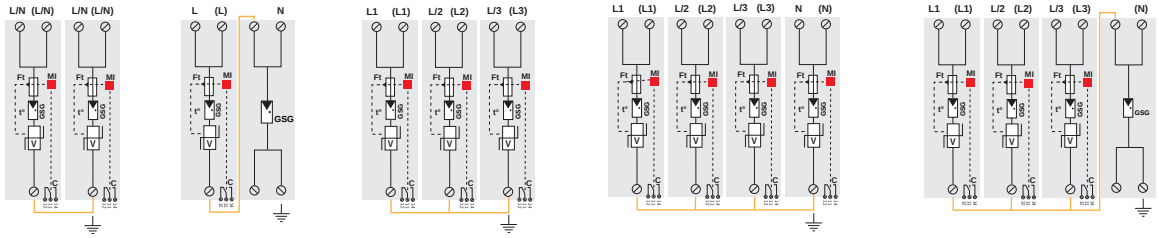
DS252VG, DS253VG, DS254VG

DS254VG-300/G

DS25x VG-xxx/G

- " " = CT1 configuration (common mode)
- "G" = CT2 configuration (common and diff. mode)
- Operating/nominal voltage
- "VG" = «GSG/MOV» technology
- Number of protected poles





V: High energy varistor network
GSG: Specific gas Tube
Ft: Thermal fuse
C: Remote signaling contact
t°: Thermal disconnection system
MI: Disconnection indicator

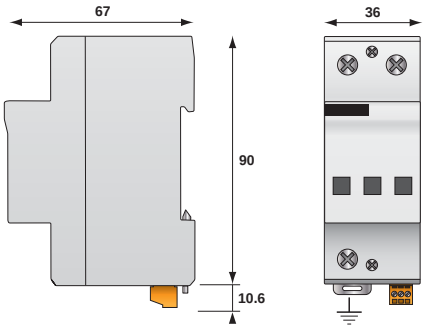
Model	P/N	Network	AC system	Protection Mode	Itotal	Up L/PE	Up L/N	Up N/PE	Diagram
DS254VG-300/G	2756	230/400 V 3-phase+N	TT-TNS	L/N and N/PE	100 kA	-	1.5 kV	1.5 kV	6
DS254VG-120/G	2757	120/208 V 3-phase+N	TT-TNS	L/N and N/PE	100 kA	-	1 kV	1.5 kV	
DS254VG-400	2581	230/400 V 3-phase+N	IT	L/PE and N/PE	100 kA	1.5 kV	-	1.5 kV	5
DS254VG-300	3713	230/400 V 3-phase+N	TNS	L/PE and N/PE	100 kA	1.5 kV	-	1.5 kV	
DS254VG-120	3722	120/208 V 3-phase+N	TNS	L/PE and N/PE	100 kA	1 kV	-	1 kV	
DS253VG-400	2580	230/400 V 3-phase	IT	L/PE	75 kA	1.5 kV	-	-	3
DS253VG-300	3896	230/400 V 3-phase	TNC	L/PE	75 kA	1.5 kV	-	-	
DS253VG-120	3959	120/208 V 3-phase	TNC	L/PE	75 kA	1 kV	-	-	
DS252VG-300/G	3403	230 V single phase	TT-TN	L/N and N/PE	50 kA	-	1.5 kV	1.5 kV	2
DS252VG-120/G	3960	120 V single phase	TT-TN	L/N and N/PE	50 kA	-	1 kV	1.5 kV	
DS252VG-400	2579	230 V single phase	IT	L/PE and N/PE	50 kA	1.5 kV	-	1.5 kV	1
DS252VG-300	3469	230 V single phase	TN	L/PE and N/PE	50 kA	1.5 kV	-	1.5 kV	
DS252VG-120	3950	120 V single phase	TN	L/PE and N/PE	50 kA	1 kV	-	1 kV	

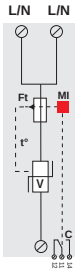
Iimp 25 kA

DS250E-300

DS250E SERIES

- **Type 1 + 2 Surge Protector**
- **Iimp : 25 kA on 10/350 µs impulse**
- **Imax : 140 kA on 8/20 µs impulse**
- **Internal disconnections, status indicators and remote signaling**
- **IEC 61643-11, EN 61643-11 and UL1449 ed.5 compliance**





V: High energy varistor network
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

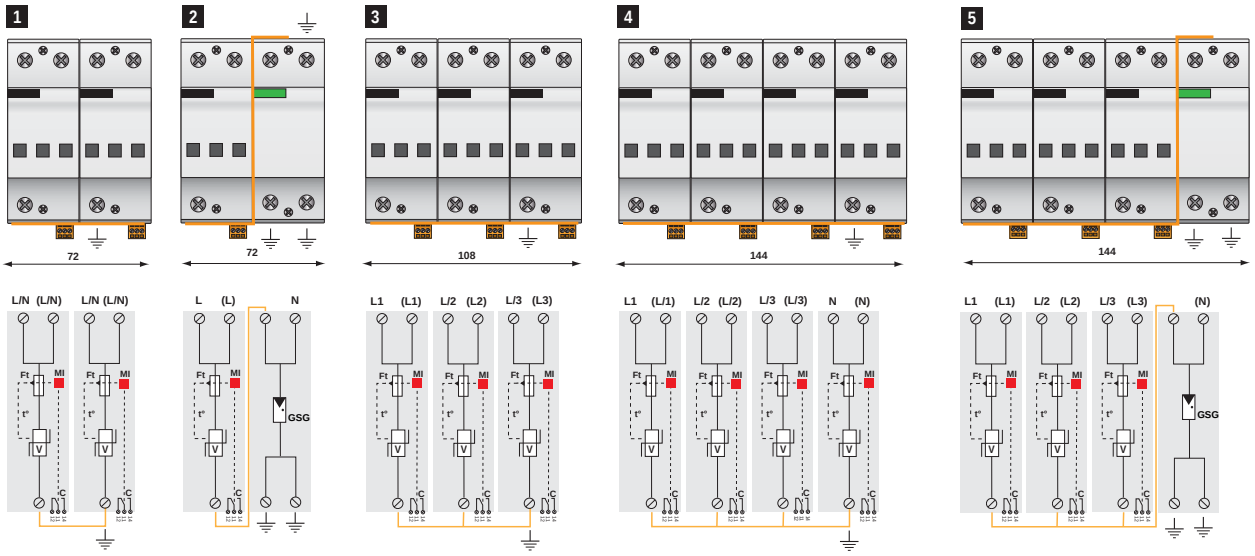
CITEL Model		DS250E-400	DS250E-300	DS250E-120
Description		Type 1+2 AC surge protector 1-pole		
Network		230/400 V	230/400 V	120/208 V
Max. AC operating voltage	Uc	440 Vac	330 Vac	150 Vac
Temporary Over Voltage (TOV) Characteristics - 5 sec.	UT	580 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Characteristics - 120 mn	UT	770 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Residual current *- Leakage current at Uc*	Ipe	< 3 mA	< 3 mA	< 3 mA
Max. Load current *(if connection serie)*	IL	100 A	100 A	100 A
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	50 kA	70 kA	70 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	140 kA	140 kA	140 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	25 kA	25 kA	25 kA
Specific energy by pole	W/R	156 kJ/ohm	156 kJ/ohm	156 kJ/ohm
Protection level *@ In (8/20µs)*	Up	2.5 kV	2.5 kV	1 kV
Residual voltage *@ 5 kA (8/20µs)*	Up-5kA	1.5 kV	1 kV	0.6 kV
Admissible short-circuit current	Isccr	50000 A	50000 A	50000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		Fuse type gG - 315 A / or CITEL SFD-25		
Installation ground fault breaker (if existing)		Type «S» or delayed		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		By screw terminals : 6-35 mm² / by bus		
Disconnection indicator		3 mechanical indicators		
Remote signaling of disconnection		output on changeover contact		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		3731	2730	3106

DS252E, DS253E, DS254E

DS254E-300/G

DS25x E-xxx/G

- « » = Configuration CT1 (common mode)
- «G» = Configuration CT2 (common and differential mode)
- Operating voltage
- «E» = «Multi-Varistor» technology
- Number of protected poles (2, 3 or 4)



V : High energy varistor network
GSG : Specific gas Tube
Ft : Thermal fuse
C : Remote signaling contact
t° : Thermal disconnection system
MI : Disconnection indicator

Model	P/N	Network	AC system	Protection Mode	Itotal	Up L/PE	Up L/N	Up N/PE	Diagram
DS254E-300/G	3411	230/400 V 3-phase+N	TT-TNS	L/N and N/PE	100 kA	-	2.5 kV	1.5 kV	5
DS254E-120/G	3831	120/208 V 3-phase+N	TT-TNS	L/N and N/PE	100 kA	-	1 kV	1.5 kV	
DS254E-400	3732	230/400 V 3-phase+N	IT	L/PE and N/PE	100 kA	2.5 kV	-	2.5 kV	4
DS254E-300	3371	230/400 V 3-phase+N	TNS	L/PE and N/PE	100 kA	2.5 kV	-	2.5 kV	
DS254E-120	3961	120/208 V 3-phase+N	TNS	L/PE and N/PE	100 kA	1 kV	-	1 kV	
DS253E-400	3939	230/400 V 3-phase	IT	L/PE	75 kA	2.5 kV	-	-	3
DS253E-300	3350	230/400 V 3-phase	TNC	L/PE	75 kA	2.5 kV	-	-	
DS253E-120	3887	120/208 V 3-phase	TNC	L/PE	75 kA	1 kV	-	-	
DS252E-300/G	3404	230 V 3-phase	TT-TN	L/N and N/PE	50 kA	-	2.5 kV	1.5 kV	2
DS252E-120/G	3904	120 V single phase	TT-TN	L/N and N/PE	50 kA	-	1 kV	1.5 kV	
DS252E-400	3952	230 V single phase	IT	L/PE and N/PE	50 kA	2.5 kV	-	2.5 kV	1
DS252E-300	3962	230 V single phase	TN	L/PE and N/PE	50 kA	2.5 kV	-	2.5 kV	
DS252E-120	3951	120 V single phase	TN	L/PE and N/PE	50 kA	1 kV	-	1 kV	

Iimp 25 kA

DACN1-25CVGS-31-275/SC

DACN1-25CVGS SERIES

- **With or without surge counter**
- **Iimp : 25 kA**
- **EN 61643-11, IEC 61643-11**
- **Compact**
- **Monobloc**
- **Optimized TOV**
- **Remote signaling**

Characteristics

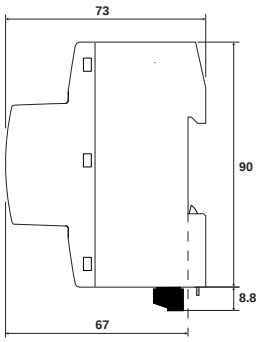
CITEL model		DACN1-25CVGS-31-320*	DACN1-25CVGS-11-320*	DACN1-25CVGS-31-275*	DACN1-25CVGS-11-275*	DACN1-25CVGS-31-150*	DACN1-25CVGS-11-150*
Description		3-Phase+N	Single-Phase	3-Phase+N	Single-Phase	3-Phase+N	Single-Phase
Network		230/400 V	230/400 V	230/400 V	230/400 V	120/208 V	120 V
Max. AC operating voltage	Uc	320 Vac	320 Vac	275 Vac	275 Vac	150 Vac	150 Vac
Temporary Over Voltage (TOV) characteristic - 5 sec.	UT	335 Vac withstand	335 Vac withstand	335 Vac withstand	335 Vac withstand	180 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) characteristic - 120 mn	UT	440 Vac withstand	440 Vac withstand	440 Vac withstand	440 Vac withstand	230 Vac withstand	230 Vac withstand
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/200 ms withstand					
Residual current *- Leakage current at Uc*	Ipe	none					
Follow current	If	none					
Nominal discharge current *15 x 8/20 µs impulses*	In	25 kA	25 kA	25 kA	25 kA	25 kA	25 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	25 kA	25 kA	25 kA	25 kA	25 kA	25 kA
Total lightning current *max. withstand 10/350 µs*	Itotal	100 kA	50 kA	100 kA	50 kA	100 kA	50 kA
Withstand on Combination waveform *Class III test*	Uoc	6 kV	6 kV	6 kV	6 kV	6 kV	6 kV
Protection level L/N *@ In (8/20µs) and @ 6 kV (1.2/50µs)*	Up L/N	1.5 kV	1.5 kV	1.5 kV	1.5 kV	1.5 kV	1.5 kV
Protection level N/PE *@ In (8/20µs)*	Up N/PE	1.5 kV	1.5 kV	1.5 kV	1.5 kV	1.5 kV	1.5 kV
Admis. short-circuit current	Isccr	50 000 A	50 000 A	50 000 A	50 000 A	50 000 A	50 000 A
Associated disconnectors							
Thermal disconnector		internal					
Fuses		Fuse type gG - 315 A / or CITEL SFD1-25S					
Installation ground fault breaker		Type «S» or delayed					
Mechnical characteristics							
Dimensions		see diagram					
Connection to Network		By screw terminals : 2.5-25 mm² (35 mm² rigid)					
Failsafe Mode		Disconnection from AC network					
Disconnection indicator		1 mechanical indicator Green/Red					
Max. voltage/current for remote signaling		250 V / 0.5 A (AC) / 30 V / 3 A (DC)					
Remote signaling		output on changeover contact					
Wiring for remote signaling		1.5 mm² max.					
Mounting		Symmetrical rail 35 mm (EN60715)					
Operating temperature		-40/+85°C					
Protection rating		IP20					
Housing materail		Thermoplastic UL94 V-0					
Standards							
Compliance		IEC 61643-11 / EN 61643-11					
Part number							
With counter DACN1-25CVGS-xx-xxx/**SC**		64170	64192	64136	64191	64169	64190
Without counter DACN1-25CVGS-xx-275		64157	64182	64135	64176	64152	64179

Iimp 25 kA

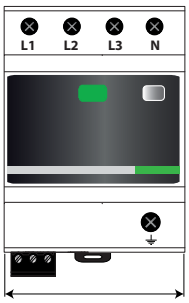
DACN1-25CVGS SERIES

DACN1-25CVGS-xx-xxx/xx

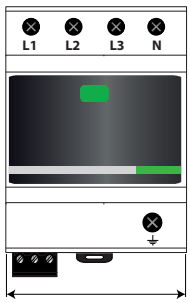
- «SC» with counter
- Maximum operating voltage
- Configuration: **11** (1+1), **31** (3+1)



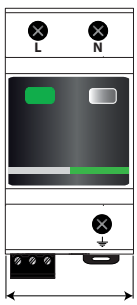
DACN1-25CVGS-31/SC



DACN1-25CVGS-31

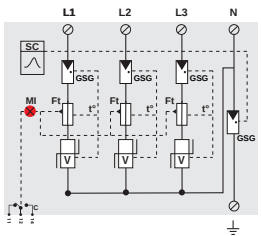


DACN1-25CVGS-11/SC



DACN1-25CVGS-11

DACN1-25CVGS-31/SC



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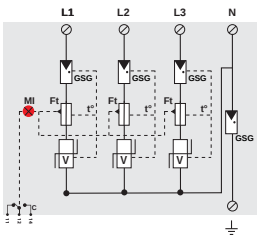

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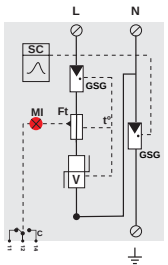

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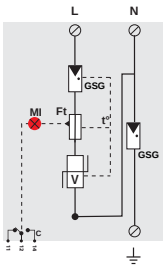


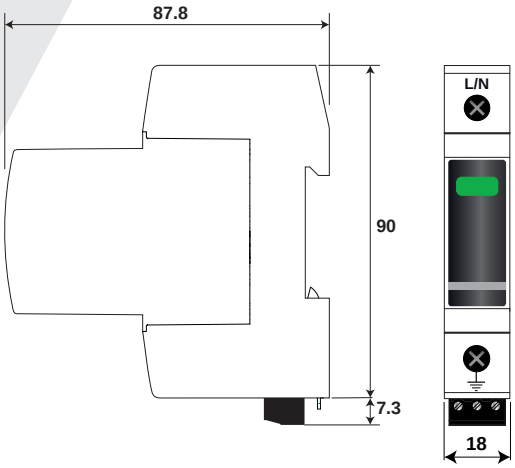
V: High-energy varistor network
GSG: Specific gas tube
Ft: Thermal fuse
DI: Disconnection indicator
t°: Thermal disconnection system

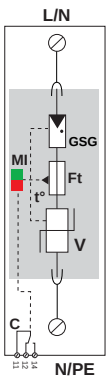
Iimp 12.5 kA

DAC1-13VGS-10

DAC1-13VGS SERIES

- VG Technology
- In: 20 kA
- Iimp: 12.5 kA
- No leakage current
- Pluggable module for each phase
- Remote signaling
- Optimized to TOV
- EN 61643-11, IEC 61643-11 certified
- UL1449 ed.5 compliance





V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

CITEL Model		DAC1-13VGS-10-320	DAC1-13VGS-10-275	DAC1-13VGS-10-150
Description		Type 1+2+3 AC surge protector - 1-pole - pluggable		
Max. AC operating voltage	Uc	320 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) characteristic - 5 sec.	UT	335 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) characteristic - 120 mn	UT	440 Vac withstand	440 Vac withstand	230 Vac withstand
Residual current *- Leakage current at Uc*	Ipe	None	None	None
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA	50 kA	50 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	12.5 kA	12.5 kA	12.5 kA
Specific energy by pole	W/R	40 kJ/ohm	40 kJ/ohm	40 kJ/ohm
Withstand on Combination waveform *Class III test*	Uoc	6 kV	6 kV	6 kV
Protection level *@ In (8/20µs) and 6 kV (1.2/50µs)*	Up	1.5 kV	1.5 kV	1.5 kV
Residual Voltage *@ 5 kA (8/20µs)*	Up-5kA	0.9 kV	0.7 kV	0.4 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A	50 000 A
Associated disconnectors				
Thermal disconnector		Internal		
Fuses		125 A min. - 315 A max. - gG type / or CITEL SFD-13		
Existing upstream ground fault breaker (if any)		Type «S» or delayed		
Mechanical characteristics				
Dimensions		see diagram - 1TE (DIN43880)		
Connection to Network		By screw terminals: 2.5-25 mm² (35mm² rigid)		
Failsafe Mode		Disconnection from AC network		
Disconnection indicator		1 mechanical indicator Green/Red		
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		
Wiring for remote signaling		1.5 mm² max.		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Spare unit		MDAC1-13VG-320	MDAC1-13VG-275	MDAC1-13VG-150
Standards				
Certification		KEMA		
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		821730321	821730221	821730121

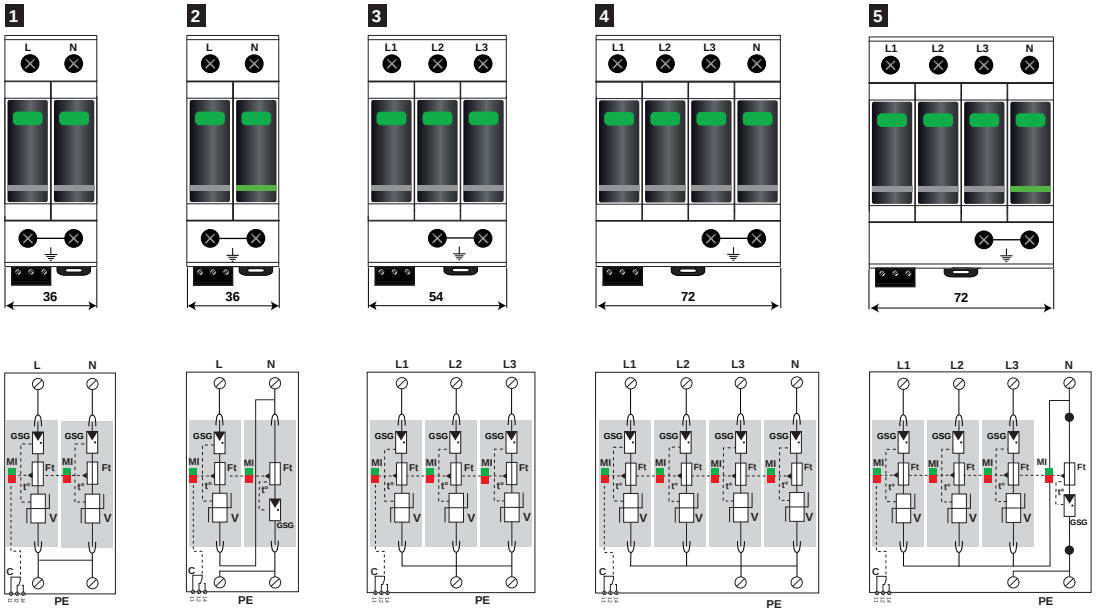
CITEL

DAC1-13VGS-11, DAC1-13VGS-20, DAC1-13VGS-30, DAC1-13VGS-31, DAC1-13VGS-40

DAC1-13VGS-31

DAC1-13VGS-xx-xxx

- Maximum operating voltage
- Configuration: **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «S» = Remote signal
- VG Technology
- Iimp: 12.5 kA



V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

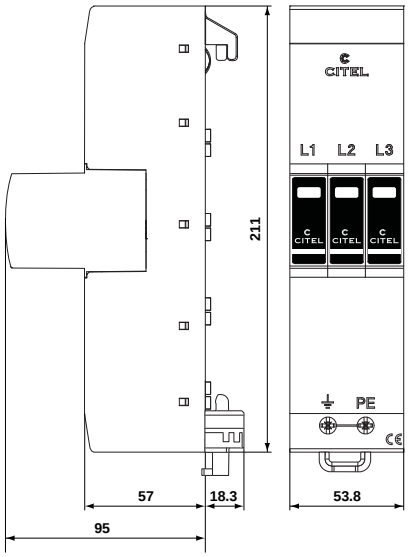
Model	P/N	Network	AC system	Protection Mode	Itotal	Up L/PE	Up L/N	Up N/PE	Dimension DIN43880	Diagram
DAC1-13VGS-31-320	821730344	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	50 kA	-	1.5 kV	1.5 kV	4 TE	5
DAC1-13VGS-31-275	821730244	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	50 kA	-	1.5 kV	1.5 kV	4 TE	
DAC1-13VGS-31-150	821730144	120/208 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	50 kA	-	1.5 kV	1.5 kV	4 TE	
DAC1-13VGS-40-320	821730324	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	50 kA	1.5 kV	-	1.5 kV	4 TE	4
DAC1-13VGS-40-275	871730224	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	50 kA	1.5 kV	-	1.5 kV	4 TE	
DAC1-13VGS-40-150	821730124	120/208 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	50 kA	1.5 kV	-	1.5 kV	4 TE	
DAC1-13VGS-30-320	821730323	230/400 V 3-Phase	TNC System (3+0)	L/PE	37.5 kA	1.5 kV	-	-	3 TE	3
DAC1-13VGS-30-275	821730223	230/400 V 3-Phase	TNC System (3+0)	L/PE	37.5 kA	1.5 kV	-	-	3 TE	
DAC1-13VGS-30-150	821730123	120/208 V 3-Phase	TNC System (3+0)	L/PE	37.5 kA	1.5 kV	-	-	3 TE	
DAC1-13VGS-11-320	821730342	230 V single phase	TT-TN System (1+1)	L/N and N/PE	25 kA	-	1.5 kV	1.5 kV	2 TE	2
DAC1-13VGS-11-275	821730242	230 V single phase	TT-TN System (1+1)	L/N and N/PE	25 kA	-	1.5 kV	1.5 kV	2 TE	
DAC1-13VGS-11-150	821730142	120 V single phase	TT-TN System (1+1)	L/N and N/PE	25 kA	-	1.5 kV	1.5 kV	2 TE	
DAC1-13VGS-20-320	821730322	230 V single phase	TN System (2+0)	L/PE and N/PE	25 kA	1.5 kV	-	1.5 kV	2 TE	1
DAC1-13VGS-20-275	821730222	230 V single phase	TN System (2+0)	L/PE and N/PE	25 kA	1.5 kV	-	1.5 kV	2 TE	
DAC1-13VGS-20-150	821730122	120 V single phase	TN System (2+0)	L/PE and N/PE	25 kA	1.5 kV	-	1.5 kV	2 TE	

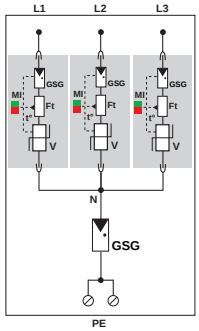
Iimp 12.5 kA/8 kA

ZPAC1 SERIES

- Type 1 + 2 + 3 AC SPD
- Mounting on 40 mm busbar system
- VG Technology
- Iimp: 12.5 kA or 8 kA
- Itotal: 50 kA or 32 kA
- No leakage current
- Optimized to TOV
- EN 61643-11, IEC 61643-11 certified
- VDE-AR-N 4100 compliance

CE
KEMA KEUR





V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system

Characteristics

CITEL Model		ZPAC1-13VG-31-275	ZPAC1-8VG-31-275
Network		230/400 V 3L+N	230/400 V 3L+N
Max. AC operating voltage	Uc	275 Vac	275 Vac
Temporary Over Voltage (TOV) characteristic - 5 sec.	UT	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) characteristic - 120 mn	UT	440 Vac withstand	440 Vac withstand
Temporary Over Voltage N/PE (TOV HT)	UT	1200V/300 V/200 ms withstand	1200V/300 V/200 ms withstand
Residual current *- Leakage current at Uc*	Ipe	None	None
Follow current	If	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA	50 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	12.5 kA	8 kA
Specific energy by pole	W/R	40 kJ/ohm	16 kJ/ohm
Total lightning current *- @ 10/350µs by pole*	Itotal	50 kA	32 kA
Withstand on Combination waveform *Class III test*	Uoc	6 kV	6 kV
Protection level *@ In (8/20µs) and 6 kV (1.2/50µs)*	Up L/N Up N/PE	1.5 kV 1.5 kV	1.5 kV 1.5 kV
Residual Voltage *@ 5 kA (8/20µs)*	Up-5kA	0.7 kV	0.7 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A
Associated disconnectors			
Thermal disconnector		Internal	
Fuses (existing upstream)		315 A max. - gG type	
Mechanical characteristics			
Dimensions		see diagram - 3TE (DIN43880)	
Connection to Network		Mounting on 40 mm busbar and wire for PE: 10-50 mm²	
Failsafe Mode		Disconnection from AC network	
Disconnection indicator		1 mechanical indicator by pole Green/Red	
Mounting		Symmetrical rail 35 mm (EN60715)	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Spare unit		ZMDAC1-13VG-275	ZMDAC1-8VG-275
Standards			
Certification		KEMA	
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5	
Part number			
		64004	64006

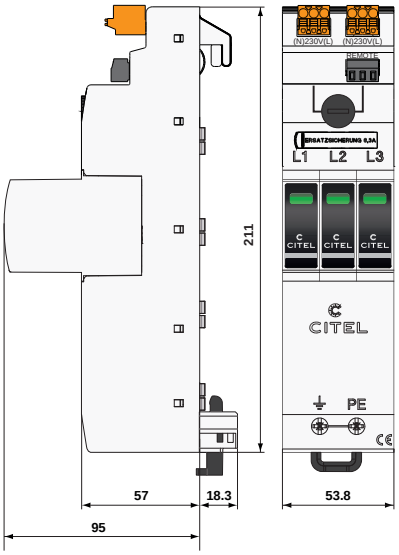
CITEL

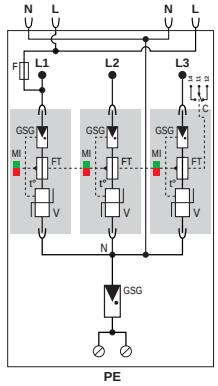
Iimp 12.5 kA/8 kA

ZPAC1 SERIES

- Type 1 + 2 + 3 multipolar surge protector
- For 40 mm Busbar system
- Gas Discharge Tube technology
- Iimp 12,5 kA (10/350 µs)
- Plug-in protection modules
- Integrated safety device
- RFZ and APZ Power Supply
- Tool-free installation
- With remote signaling
- Compliance IEC 61643-11 and EN 61643-11

CE
KEMA KEUR





V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system

Characteristics

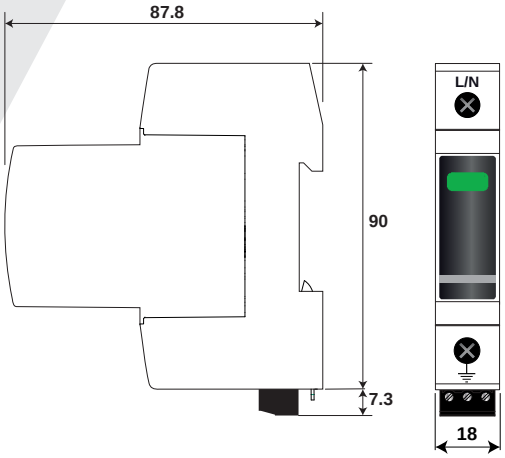
CITEL Model		ZPAC1-13VG-PRO-U	ZPAC1-8VG-PRO-U	ZPAC1-13VG-PRO-SU	ZPAC1-8VG-PRO-SU
Network		230/400 V 3L+N		230/400 V 3L+N	
Max. AC operating voltage	Uc	275 Vac	275 Vac	275 Vac	275 Vac
Temporary Over Voltage (TOV) characteristic - 5 sec.	UT	335 Vac withstand	335 Vac withstand	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) characteristic - 120 mn	UT	440 Vac withstand	440 Vac withstand	440 Vac withstand	440 Vac withstand
Temporary Over Voltage N/PE (TOV HT)	UT	1200V/300 V/200 ms withstand			
Residual current *- Leakage current at Uc*	Ipe	None	None	None	None
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA	50 kA	50 kA	50 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	12.5 kA	8 kA	12.5 kA	8 kA
Specific energy by pole	W/R	40 kJ/ohm	16 kJ/ohm	40 kJ/ohm	16 kJ/ohm
Total lightning current *@ 10/350µs by pole*	Itotal	50 kA	32 kA	50 kA	32 kA
Withstand on Combination waveform *Class III test*	Uoc	6 kV	6 kV	6 kV	6 kV
Protection level *@ In (8/20µs) and 6 kV (1.2/50µs)*	Up L/N Up N/PE	1.5 kV 1.5 kV	1.5 kV 1.5 kV	1.5 kV 1.5 kV	1.5 kV 1.5 kV
Residual Voltage *@ 5 kA (8/20µs)*	Up-5kA	0.7 kV	0.7 kV	0.7 kV	0.7 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A	50 000 A	50 000 A
Associated disconnectors					
Thermal disconnector		Internal			
Fuses (existing upstream)		315 A max. - gG type			
Mechanical characteristics					
Dimensions		see diagram - 3TE (DIN43880)			
Connection to Network		Mounting on 40 mm busbar and wire for PE: 10-50 mm²			
Failsafe Mode		Disconnection from AC network			
Disconnection indicator		1 mechanical indicator by pole Green/Red			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Spare unit		ZMDAC1-13VG-PRO-275	ZMDAC1-8VG-PRO-275	ZMDAC1-13VG-PRO-275	ZMDAC1-8VG-PRO-275
Standards					
Certification		KEMA			
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5			
Part number					
		64087	64079	64092	64085

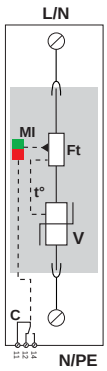
Iimp 12.5 kA

DAC1-13S-10

DAC1-13S SERIES

- **Type 1 + 2 AC power surge protector**
- **In: 20 kA**
- **Iimp: 12.5 kA**
- **Pluggable module for each phase**
- **Remote signaling**
- **EN 61643-11, IEC 61643-11 certified**
- **UL 1449 ed.5 compliance**





V: High energy varistor
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

CITEL Model		DAC1-13S-10-440	DAC1-13S-10-320	DAC1-13S-10-275	DAC1-13S-10-150
Description		1+2 AC surge protector - 1-pole - pluggable			
Max. AC operating voltage	Uc	440 Vac	320 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Characteristic - 5 sec.	UT	580 Vac withstand	335 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Characteristic -120 mn	UT	770 Vac disconnection	440 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Residual current *Leakage current at Uc*	Ipe	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA	50 kA	50 kA	50 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	12.5 kA	12.5 kA	12.5 kA	12.5 kA
Specific energy by pole	W/R	40 kJ/ohm	40 kJ/ohm	40 kJ/ohm	40 kJ/ohm
Protection level *@ In (8/20µs)*	Up	1.7 kV	1.6 kV	1.3 kV	0.9 kV
Residual voltage *@ 5kA (8/20µs)*	Up-5kA	1.5 kV	1.2 kV	1 kV	0.6 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A	50 000 A	50 000 A
Associated disconnectors					
Thermal disconnector		internal			
Fuses		125 A min. - 315 A max. - gG type / or CITEL SFD1-13			
Existing upstream ground fault breaker (if any)		Type "S" or delayed			
Mechanical characteristics					
Dimensions		see diagram, 1TE, DIN 43880			
Connection to Network		By screw terminals: 2.5-25 mm² (35mm² rigid)			
Failsafe mode		Disconnection from AC network			
Disconnection indicator		1 mechanical indicator Green/Red			
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)			
Wiring for remote signaling		max 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Spare unit		MDAC1-13-440	MDAC1-13-320	MDAC1-13-275	MDAC1-13-150
Standards					
Certification		-	KEMA	KEMA	KEMA
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5			
Part number					
		821710421	821710321	821710221	821710121

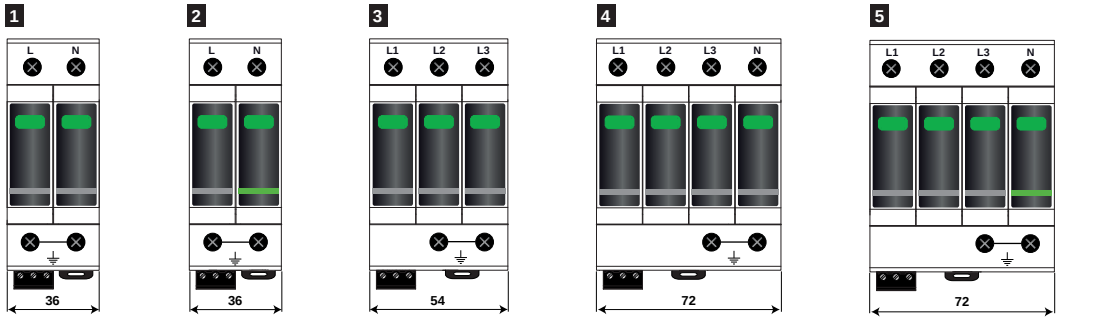
CITEL

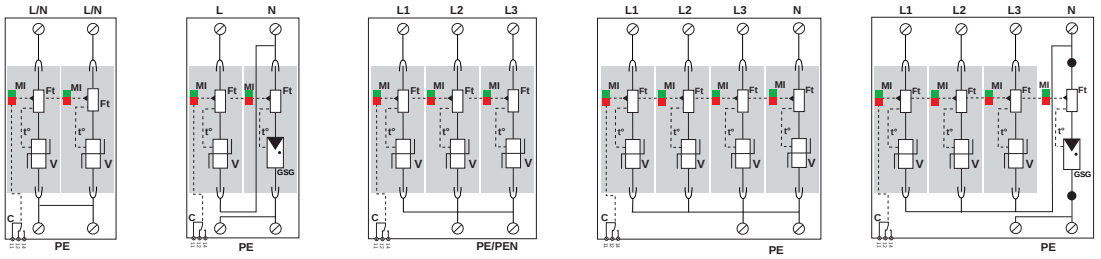
DAC1-13S-11, DAC1-13S-20, DAC1-13S-30, DAC1-13S-31, DAC1-13S-40

DAC1-13S-20

DAC1-13S-xx-xxx

- Maximum operating voltage
- Configuration: **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «**S**» = Remote signal
- Iimp: 12.5 kA





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

Model	P/N	Network	AC system	Protection Mode	Itotal	Up L/PE	Up L/N	Up N/PE	Dimension DIN43880	Diagram
DAC1-13S-31-320	821710344	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	50 kA	-	1.6 kV	1.5 kV	4 TE	5
DAC1-13S-31-275	821710244	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	50 kA	-	1.3 kV	1.5 kV	4 TE	
DAC1-13S-31-150	821710144	120/208 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	50 kA	-	0.9 kV	1.5 kV	4 TE	
DAC1-13S-40-440	821710424	230/400 V 3-Phase+N	IT System (4+0)	L/PE and N/PE	50 kA	1.7 kV	-	1.7 kV	4 TE	4
DAC1-13S-40-320	821710324	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	50 kA	1.6 kV		1.6 kV	4 TE	
DAC1-13S-40-275	821710224	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	50 kA	1.3 kV	-	1.3 kV	4 TE	
DAC1-13S-40-150	821710124	120/208 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	50 kA	1.2 kV	-	0.9 kV	4 TE	
DAC1-13S-30-440	821710423	230/400 V 3-Phase	IT System (3+0)	L/PE	37.5 kA	1.7 kV	-	-	3 TE	3
DAC1-13S-30-320	821710323	230/400 V 3-Phase	TNC System (3+0)	L/PE	37.5 kA	1.6 kV	-	-	3 TE	
DAC1-13S-30-275	821710223	230/400 V 3-Phase	TNC System (3+0)	L/PE	37.5 kA	1.3 kV	-	-	3 TE	
DAC1-13S-30-150	821710123	120/208 V 3-Phase	TNC System (3+0)	L/PE	37.5 kA	1.2 kV	-	-	3 TE	
DAC1-13S-11-320	821710342	230 V single phase	TT-TN System (1+1)	L/N and N/PE	25 kA	-	1.6 kV	1.5 kV	2 TE	2
DAC1-13S-11-275	821710242	230 V single phase	TT-TN System (1+1)	L/N and N/PE	25 kA	-	1.3 kV	1.5 kV	2 TE	
DAC1-13S-11-150	821710142	120 V single phase	TT-TN System (1+1)	L/N and N/PE	25 kA	-	0.9 kV	1.5 kV	2 TE	
DAC1-13S-20-440	821710422	230 V single phase	IT System (2+0)	L/PE and N/PE	25 kA	1.7 kV	-	1.7 kV	2 TE	1
DAC1-13S-20-320	821710322	230 V single phase	TN System(2+0)	L/PE and N/PE	25 kA	1.6 kV	-	1.6 kV	2 TE	
DAC1-13S-20-275	821710222	230 V single phase	TN System(2+0)	L/PE and N/PE	25 kA	1.3 kV	-	1.3 kV	2 TE	
DAC1-13S-20-150	821710122	120 V single phase	TN System (2+0)	L/PE and N/PE	25 kA	1.2 kV	-	0.9 kV	2 TE	

TYPE 2 AND TYPE 3 SURGE PROTECTORS

Type 2 (or Type 2+3) Surge Protectors are designed to be installed at the origin of the electrical installation or close to sensitive equipment to protect against transient voltages coupled into the Low Voltage network, if no LPS is used.
Regarding international standard, Type 2 AC Surge Protectors are required for most of the installations, linked with the consequences of possible losses due to the surge voltages. These Surge Protectors are testing following Class II tests from IEC 61643-11 , with 8/20 µs discharge currents.

Type 3 surge protectors are low power SPDs, intended to be installed near sensitive equipment, in coordination with Type 2 SPD installed upstream. Type 3 SPDs are especially required if the sensitive devices to protect are located farther than 10 m away from the Type 2 SPD.

CITEL Type 2 and Type 3 surge protectors are available in a wide range of versions to be adaptable to all configurations :

- Imax by pole : from 5 to 70 kA
- Single, 3 or 3-Phase+Neutral AC network
- Compact versions
- 230/400V or 120/208V AC networks
- All AC system types
- Remote signaling
- Integrated fuse option : SPDI (DACF25S / DACF15S)
- Common mode protection (CT1 configuration) or Common and Differential mode protection (CT2 configuration)

CITEL Type 2 and Type 3 surge protectors are offered mainly in pluggable version. Monobloc solutions are also available.

CITEL Type 2 are based on the use of varistors.
Type 2+3 «High efficiency» versions are based on VG technology (DAC50VGS)

STANDARD SURGE PROTECTORS

Range		Description	Imax/ pole	Characteristics	Page
DAC80S		Reinforced Type 2 SPD	80 kA	Type 2 High energy pluggable	49
DAC50VGS		Type 2+3 SPD VG Technology	50 kA	Type 2 + 3 Very high efficiency pluggable	51
DAC50S		Type 2 SPD	50 kA	Type 2 pluggable	53
DACF25S		Type 2 SPD + integrated fuse	25 kA	Type 2 Integrated fuse pluggable	57
DACF15S		Type 2 (or 3) SPD+ integrated fuse	15 KA	Type 2 (or 3) Integrated fuse pluggable	59

COMPACT SURGE PROTECTORS

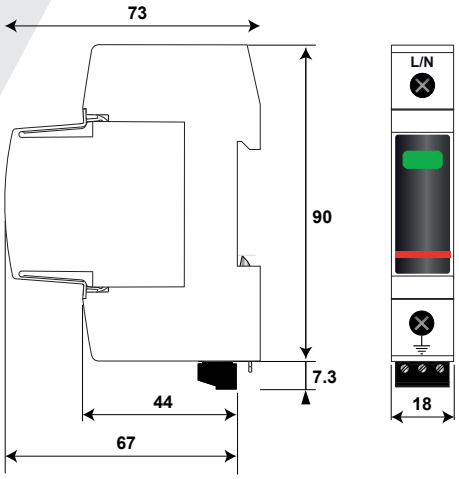
Range		Description	Imax /pole	Characteristics	Page
DAC40CS **DAC15CS**		Single phase SPD	40 kA 15 kA	Single phase Compact Pluggable	55 61
DAC40CS **DAC15CS**		3-phase+N SPD	40 kA 15 kA	3-phase Compact Pluggable	56 62
DACN10S		Single phase SPD	10 kA	Single phase Compact Monobloc	63
DS40HFS **DS-HF**		SPD + RFI filter	40 kA 10 kA	SPD with RFI filter stage	65 66
					

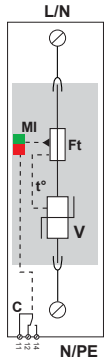
Imax 80 kA

DAC80S-10

DAC80S SERIES

- **Re-inforced Type 2 Surge Protector**
- **In: 40 kA**
- **Imax: 80 kA**
- **Pluggable module by phase**
- **Remote Signaling**
- **IEC 61643-11, EN 61643-11 certified**
- **UL1449 ed.5 compliance**





V: High energy varistor
Ft: Thermal Fuse
C: Remote signaling contact
t°: Thermal disconnection system
MI: Disconnection indicator

Characteristics

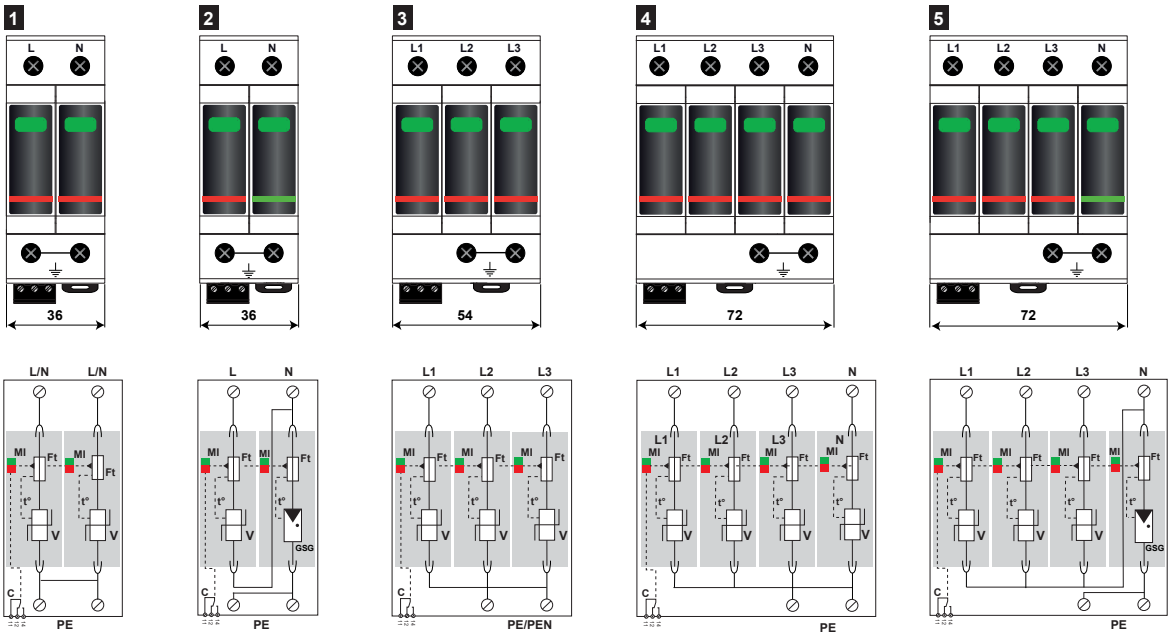
CITEL Model		DAC80S-10-440	DAC80S-10-320	DAC80S-10-275	DAC80S-10-150
Description		Type 2 AC surge protector - one-pole - pluggable			
Maximum AC operating voltage	Uc	440 Vac	320Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	580 Vac withstand	335 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Charasteristics -120mn	UT	770 Vac disconnection	440 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Residual current *Leakage current at Uc*	Ipe	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	40 kA	40 kA	40 kA	40 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	80 kA	80 kA	80 kA	80 kA
Protection level *@ In (8/20µs)*	Up	2 kV	1.6 kV	1.6 kV	1.2 kV
Residual voltage *@ 5 kA (8/20µs)*	Up-5kA	1.4 kV	1 kV	0.9 kV	0.7 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A	50 000 A	50 000 A
Associated disconnectors					
Thermal disconnector		internal			
Fuses		50 A min. - 125 A max. - gG Type			
Installation ground fault breaker (if any)		Type "S" or delayed			
Mechanical characteristics					
Dimensions		see diagram - 1TE (DIN43880)			
Connection to Network		By screw terminals: 2.5-25 mm² (35mm² rigid)			
Failsafe mode		Disconnection from network			
Disconnection indicator		1 mechanical indicator Green/Red			
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30V/3 A (DC)			
Wiring for remote signaling		max. 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Spare unit		MDAC80-440	MDAC80-320	MDAC80-275	MDAC80-150
Standards					
Certification		KEMA			
Compliance		EN 61643-11 / IEC 61643-11 / UL1449 ed.5			
Part number					
		821210421	821210321	821210221	821210121

DAC80S-11, DAC80S-20, DAC80S-30, DAC80S-31, DAC80S-40

DAC80S-31

DAC80S-xx-xxx

- Maximum operating voltage
- Configuration: **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «S» = Remote signal
- Imax



V: High-energy varistor
GSG: Specific gas tube
Ft: Thermal fuse
C: Contact remote signal
t°: Thermal disconnection system
Mi: Disconnection indicator

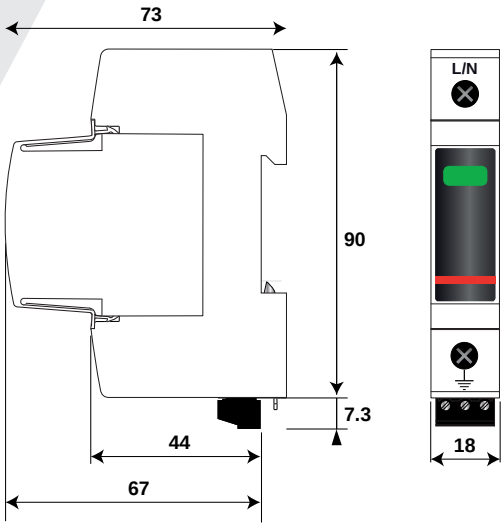
Model	Part number	Network	AC system	Protection Mode	Up L/PE	Up L/N	Up N/PE	Dimensions DIN43880	Diagram
DAC80S-31-320	821210344	230/400 V 3-phase+N	TT-TNS system (3+1	L/N and N/PE	-	1.6 kV	1.5 kV	4 TE	5
DAC80S-31-275	821210244	230/400 V 3-phase+N	TT-TNS system (3+1	L/N and N/PE	-	1.6 kV	1.5 kV	4 TE	
DAC80S-31-150	821210144	120/208 V 3-phase+N	TT-TNS system (3+1	L/N and N/PE	-	1.2 kV	1.5 kV	4 TE	
DAC80S-40-440	821210424	230/400 V 3-phase+N	IT system (4+0)	L/PE and N/PE	2 kV	-	2 kV	4 TE	4
DAC80S-40-320	821210324	230/400 V 3-phase+N	TNS system (4+0)	L/PE and N/PE	1.6 kV	-	1.6 kV	4 TE	
DAC80S-40-275	821210224	230/400 V 3-phase+N	TNS system (4+0)	L/PE and N/PE	1.6 kV	-	1.6 kV	4 TE	
DAC80S-40-150	821210124	120/208 V 3-phase+N	TNS system (4+0)	L/PE and N/PE	1.2 kV	-	1.2 kV	4 TE	
DAC80S-30-440	821210423	230/400 V 3-phase	IT system (3+0)	L/PE	2 kV	-	-	3 TE	3
DAC80S-30-320	821210323	230/400 V 3-phase	TNC system (3+0)	L/PE	1.6 kV	-	-	3 TE	
DAC80S-30-275	821210223	230/400 V 3-phase	TNC system (3+0)	L/PE	1.6 kV	-	-	3 TE	
DAC80S-30-150	821210123	120/208 V 3-phase	TNC system (3+0)	L/PE	1.2 kV	-	-	3 TE	
DAC80S-11-320	821210342	230 V single phase	TT-TN system(1+1)	L/N and N/PE	-	1.6 kV	1.5 kV	2 TE	2
DAC80S-11-275	821210242	230 V single phase	TT-TN system(1+1)	L/N and N/PE	-	1.6 kV	1.5 kV	2 TE	
DAC80S-11-150	821210142	120 V single phase	TT-TN system(1+1)	L/N and N/PE	-	1.2 kV	1.5 kV	2 TE	
DAC80S-20-440	821210422	230 V single phase	IT system (2+0)	L/PE and N/PE	2 kV	-	2 kV	2 TE	1
DAC80S-20-320	821210322	230 V single phase	TN system (2+0)	L/PE and N/PE	1.6 kV	-	1.6 kV	2 TE	
DAC80S-20-275	821210222	230 V single phase	TN system (2+0)	L/PE and N/PE	1.6 kV	-	1.6 kV	2 TE	
DAC80S-20-150	821210122	120 V single phase	TN system (2+0)	L/PE and N/PE	1.2 kV	-	1.2 kV	2 TE	

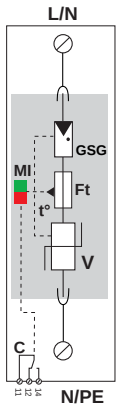
Imax 50 kA

DAC50VGS-10

DAC50VGS SERIES

- Type 2+3 AC Surge Protector
- VG Technology
- In: 20 kA
- No leakage current
- Remote signaling
- Optimized to TOV
- IEC 61643-11, EN 61643-11 certified
- UL1449 ed.5 compliance





V: High energy varistor
GSG: Specific Gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

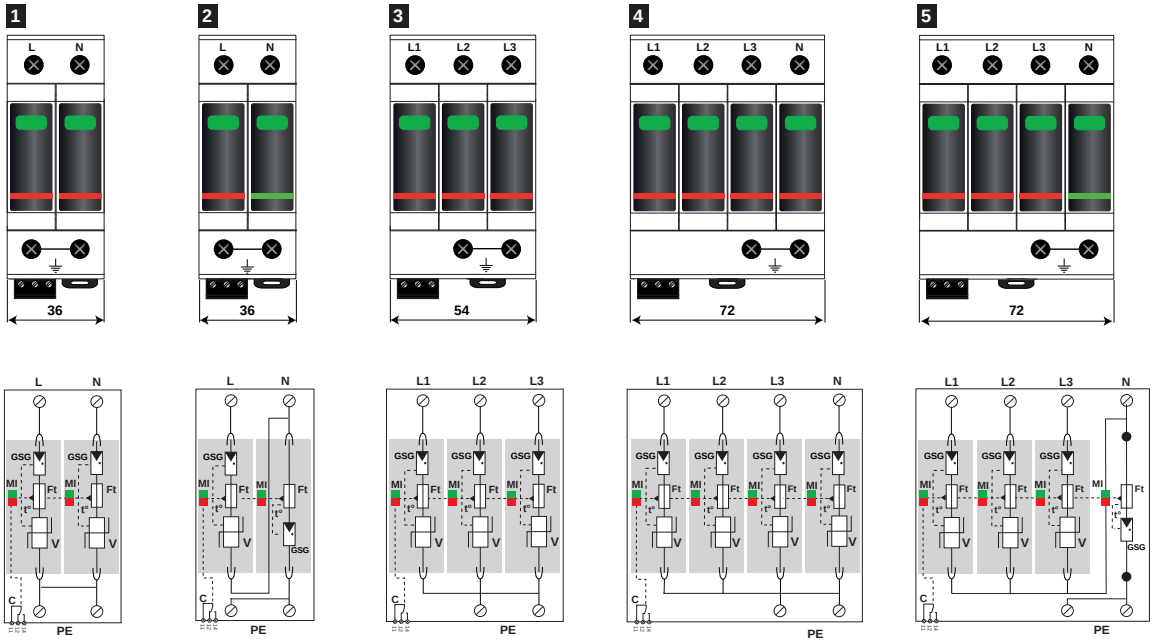
CITEL Model		DAC50VGS-10-320	DAC50VGS-10-275	DAC50VGS-10-150
Description		Type 2 AC surge protector - 1-pole - pluggable		
Maximum AC operating voltage	Uc	320 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Characteristic - 5 sec.	UT	335 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (N/PE TOV) Characteristic -120mn	UT	440 Vac withstand	440 Vac withstand	230 Vac withstand
Residual current *Leakage current at Uc*	Ipe	None	None	None
Follow current	If	None	None	None
Nominal discharge current *5 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Maximum discharge current *max. withstand 8/20µs by pole*	Imax	50 kA	50 kA	50 kA
Withstand on combination waveform *- Class III test*	Uoc	6 kV	6 kV	6 kV
Protection level *@ In (8/20µs) and 6 kV (1.2/50µs)*	Up	1.5 kV	1.5 kV	1.5 kV
Residual voltage *@ 5 kA (8/20µs)*	Up-5kA	0.9 kV	0.7 kV	0.4 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A	50 000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		50 A min. - 160 A max. - gG Type		
Existing upstream ground fault breaker (if any)		Type "S" or delayed		
Mechanical characteristics				
Dimensions		see diagram - 1 TE (DIN43880)		
Connection to Network		By screw terminals: 2.5-25 mm² (35mm² rigid)		
Failsafe mode		Disconnection from AC network		
Disconnection indicator		1 mechanical indicator Green/Red		
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		
Wiring for remote signaling		max. 1.5 mm²		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Spare unit		MDAC50VG-320	MDAC50VG-275	MDAC50VG-150
Standards				
Certification		KEMA		
Compliance		EN 61643-11 / IEC 61643-11 / UL1449 ed.5		
Part number				
		821130321	821130221	821130121

DAC50VGS-11, DAC50VGS-20, DAC50VGS-30, DAC50VGS-31, DAC50VGS-40

DAC50VGS-31

DAC50VGS-xx-xxx

- Maximum operating voltage
- Configuration: **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «**S**» = Remote signal
- VG Technology



V: High energy varistor
GSG: Specific Gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

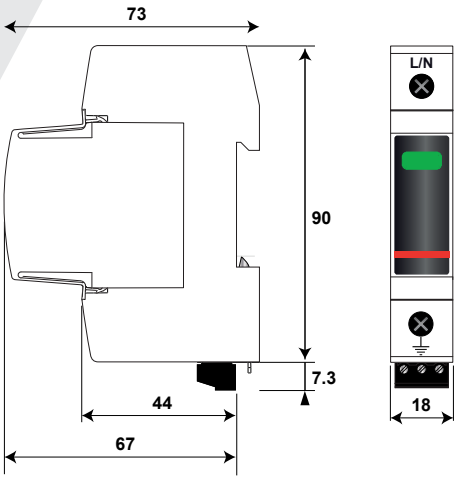
Model	P/N	Network	AC system	Protection mode	Up L/PE	Up L/N	Up N/PE	Dimension DIN43880	Diagram
DAC50VGS-31-320	821130344	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	1.5 kV	1.5 kV	4 TE	5
DAC50VGS-31-275	821130244	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	1.5 kV	1.5 kV	4 TE	
DAC50VGS-31-150	821130144	120/208 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	1.5 kV	1.5 kV	4 TE	
DAC50VGS-40-320	821130324	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1.5 kV		1.5 kV	4 TE	4
DAC50VGS-40-275	821130224	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1.5 kV	-	1.5 kV	4 TE	
DAC50VGS-40-150	821130124	120/208 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1.5 kV	-	1.5 kV	4 TE	
DAC50VGS-30-320	821130323	230/400 V 3-Phase	TNC System (3+0)	L/PE	1.5 kV	-	-	3 TE	3
DAC50VGS-30-275	821130223	230/400 V 3-Phase	TNC System (3+0)	L/PE	1.5 kV	-	-	3 TE	
DAC50VGS-30-150	821130123	120/208 V 3-Phase	TNC System (3+0)	L/PE	1.5 kV	-	-	3 TE	
DAC50VGS-11-320	821130342	230 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	1.5 kV	1.5 kV	2 TE	2
DAC50VGS-11-275	821130242	230 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	1.5 kV	1.5 kV	2 TE	
DAC50VGS-11-150	821130142	120 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	1.5 kV	1.5 kV	2 TE	
DAC50VGS-20-320	821130322	230 V Single Phase	TN System (2+0)	L/PE and N/PE	1.5 kV	-	1.5 kV	2 TE	1
DAC50VGS-20-275	821130222	230 V Single Phase	TN System (2+0)	L/PE and N/PE	1.5 kV	-	1.5 kV	2 TE	
DAC50VGS-20-150	821130122	120 V Single Phase	TN System (2+0)	L/PE and N/PE	1.5 kV	-	1.5 kV	2 TE	

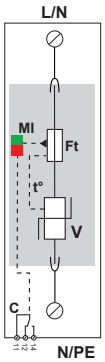
Imax 50 kA

DAC50S-10

DAC50S SERIES

- Type 2 AC Surge Protector
- In: 20 kA
- Imax: 50 kA
- Pluggable module for each phase
- Remote signaling
- IEC 61643-11, EN 61643-11 certified
- UL type 4CA certified





V: High-energy varistor
Ft: Thermal fuse
C: Contact for remote signal
t°: Thermal disconnection system
Mi : Disconnection indicator

Characteristics

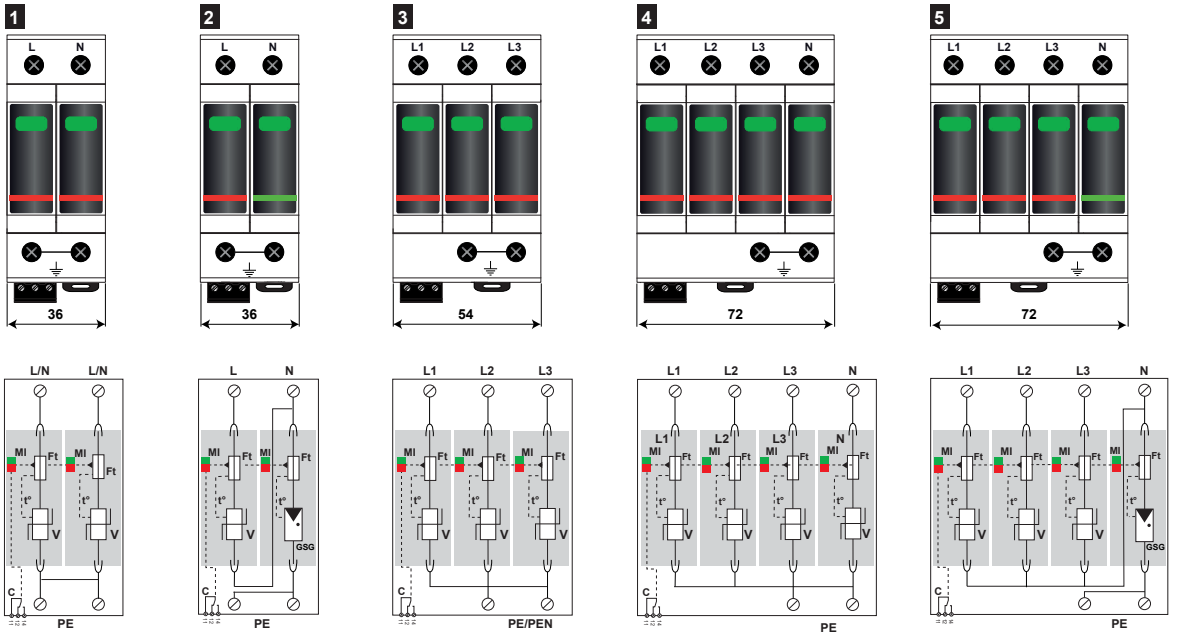
CITEL Model		DAC50S-10-760	DAC50S-10-440	DAC50S-10-275	DAC50S-10-150
Description		Type 2 AC surge protector - one-pole - pluggable			
Maximum AC operating voltage	Uc	760 Vac	440 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	1000 Vac withstand	580 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Charasteristics -120mn	UT	1325 Vac disconnection	770 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Residual current *Leakage current at Uc*	Ipe	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA	50 kA	50 kA	50 kA
Protection level *@ In (8/20µs)*	Up	2.9 kV	2 kV	1.25 kV	0.9 kV
Residual voltage *@ 5 kA (8/20µs)*	Up-5kA	2.6 kV	1.5 kV	1 kV	0.6 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A	50 000 A	50 000 A
Associated disconnectors					
Thermal disconnector		internal			
Fuses		50 A min. - 125 A max. - gG Type			
Installation ground fault breaker (if any)		Type "S" or delayed			
Mechanical characteristics					
Dimensions		see diagram - 1TE (DIN43880)			
Connection to Network		By screw terminals: 2.5-25 mm² (35mm² rigid)			
Failsafe mode		Disconnection from network			
Disconnection indicator		1 mechanical indicator Green/Red			
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30V/3 A (DC)			
Wiring for remote signaling		max. 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Spare unit		MDAC50-760	MDAC50-440	MDAC50-275	MDAC50-150
Standards					
Certification		OVE / UL			
Compliance		EN 61643-11 / IEC 61643-11 / UL1449 ed.5			
Part number					
		821110721	821110421	821110221	821110121

DAC50S-11, DAC50S-20, DAC50S-30, DAC50S-31, DAC50S-40

DAC50S-40

DAC50S-xx-xxx

- Maximum operating voltage
- Configuration: **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «S» = Remote signal
- Imax



V: High-energy varistor
GSG: Specific gas tube
Ft: Thermal fuse
C: Contact remote signal
t°: Thermal disconnection system
Mi: Disconnection indicator

Model	Part number	Network	AC system	Protection Mode	Up L/PE	Up L/N	Up N/PE	Dimensions DIN43880	Diagram
DAC50S-31-275	821110244	230/400 V 3-phase+N	TT-TNS system (3+1	L/N and N/PE	-	1.25 kV	1.5 kV	4 TE	5
DAC50S-31-150	821110144	120/208 V 3-phase+N	TT-TNS system (3+1	L/N and N/PE	-	0.9 kV	1.5 kV	4 TE	
DAC50S-40-440	821110424	230/400 V 3-phase+N	IT system (4+0)	L/PE and N/PE	2 kV	-	2 kV	4 TE	4
DAC50S-40-275	821110224	230/400 V 3-phase+N	TNS system (4+0)	L/PE and N/PE	1.25 kV	-	1.25 kV	4 TE	
DAC50S-40-150	821110124	120/208 V 3-phase+N	TNS system (4+0)	L/PE and N/PE	1.2 kV	-	0.9 kV	4 TE	
DAC50S-30-760	821110723	690 V 3-phase	TNC system (3+0)	L/PE	2.9 kV	-	-	3 TE	3
DAC50S-30-440	821110423	230/400 V 3-phase	IT system (3+0)	L/PE	2 kV	-	-	3 TE	
DAC50S-30-275	821110223	230/400 V 3-phase	TNC system (3+0)	L/PE	1.25 kV	-	-	3 TE	
DAC50S-30-150	821110123	120/208 V 3-phase	TNC system (3+0)	L/PE	1.2 kV	-	-	3 TE	
DAC50S-11-275	821110242	230 V single phase	TT-TN system(1+1)	L/N and N/PE	-	1.25 kV	1.5 kV	2 TE	2
DAC50S-11-150	821110142	120 V single phase	TT-TN system(1+1)	L/N and N/PE	-	0.9 kV	1.5 kV	2 TE	
DAC50S-20-440	821110422	230 V single phase	IT system (2+0)	L/PE and N/PE	2 kV	-	2 kV	2 TE	1
DAC50S-20-275	821110222	230 V single phase	TN system (2+0)	L/PE and N/PE	1.25 kV	-	1.25 kV	2 TE	
DAC50S-20-150	821110122	120 V single phase	TN system (2+0)	L/PE and N/PE	1.2 kV	-	0.9 kV	2 TE	

Imax 40 kA

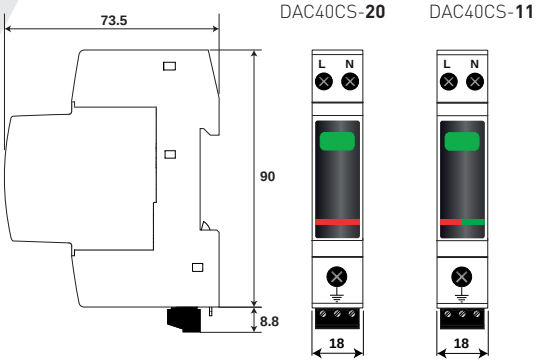
DAC40CS-11

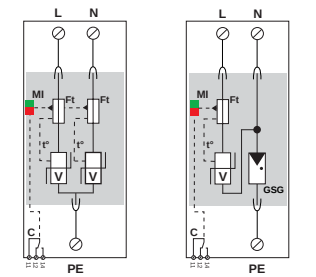
DAC40CS SERIES

- **Compact single phase Type 2 surge protector**
- **Common/Differential mode**
- **Remote signaling contact**
- **EN 61643-11, IEC 61643-11 certified**
- **UL1449 ed.5 compliance**

DAC40CS-xx-xxx

- Maximum operating voltage
- Configuration: **11** (1+1), **20** (2+0)
- «S» = Remote signal
- Imax: 40 kA





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

Characteristics

CITEL Model		DAC40CS-20-440	DAC40CS-11-275	DAC40CS-11-150
Description		Compact 1-phase Type 2 surge protector - Pluggable		
Network		230 V single-phase		
Protection mode		L/PE and N/PE	L/N and N/PE	L/N and N/PE
AC system		IT	TT-TN	TT-TN
Max. AC operating voltage	Uc	440 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Charasteristic - *5 sec.*	UT	580 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Charasteristic - *120mn*	UT	770 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	-	1200 V/300A/200 ms withstand	1200 V/300A/200 ms withstand
Residual current - *Leakage current at Uc*	Ipe	< 1 mA	None	None
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Total discharge current - *@8/20µs*	Itotal	80 kA	40 kA	40 kA
Protection level @In *(8/20µs)*	Up L/N Up N/PE Up L/PE	- 1.8 kV 1.8 kV	1.25 kV 1.5 kV -	0.9 kV 1.5 kV -
Admissible short-circuit current	Isccr	10 000 A	10 000 A	10 000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		50 A min. - 125 A max. - Type gG		
Existing upstream ground fault breaker (if any)		Type "S" or delayed		
Mechanical characteristics				
Dimensions		see diagram, 1TE (DIN43880)		
Connection to Network		by screw terminals: L/n =1.5-10mm² (16 mm²) / PE = 2.5-25mm² (35 mm² rigid)		
Failsafe mode		Disconnection from network		
Disconnection indicator		1 mechanical indicator Green/Red		
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		
Wiring for remote signaling		Max. 1.5 mm²		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Spare unit		MDAC40C-20-440	MDAC40C-11-275	MDAC40C-11-150
Standards				
Certification		KEMA		
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		821510421	821520221	821520121

Imax 40 kA

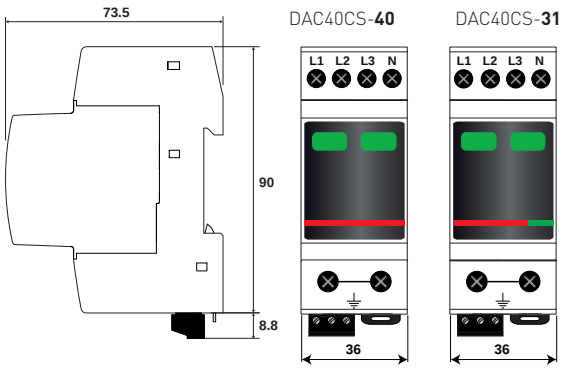
DAC40CS-31

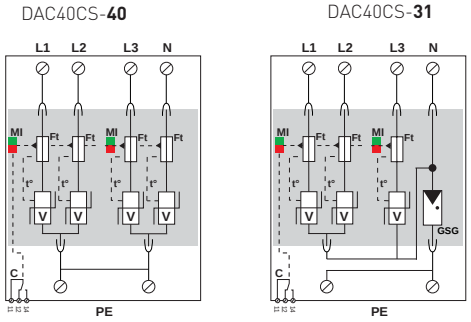
DAC40CS SERIES

- **Compact 3-phase Type 2**
- **Common/Differential mode**
- **Remote signaling contact**
- **EN 61643-11, IEC 61643-11 certified**
- **UL1449 ed.5 compliance**

DAC40CS-xx-xxx

- Maximum operating voltage
- Configuration: **40** (4+0), **31** (3+1)
- «**S**» = Remote signal
- Imax: 40 kA





V : High energy varistor
GSG : Specific GDT
Ft : Thermal fuse
C : Contact remote signaling
t° : Thermal disconnection system
MI : Disconnection indicator

Characteristics

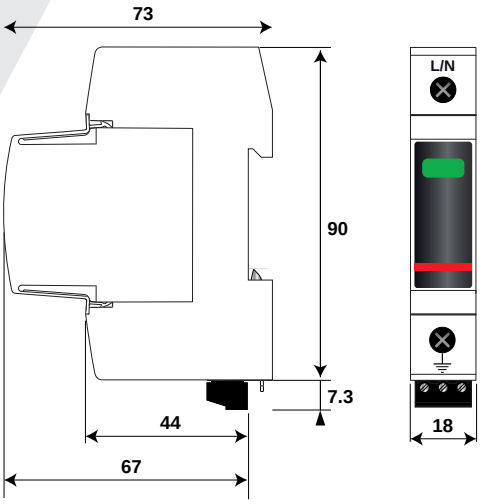
CITEL Model		DAC40CS-40-440	DAC40CS-31-275	DAC40CS-31-150
Description		Compact 3-phase Type 2 surge protector - Pluggable		
Network		230/400 V 3-phase	230/400 V 3-phase+N	120/208 V 3-phase + N
Protection mode		L/PE and N/PE	L/N and N/PE	L/N and N/PE
AC system		IT	TT-TN	TT-TN
Max. AC operating voltage	Uc	440 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Charasteristic - *5 sec.*	UT	580 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Charasteristic - *120mn*	UT	770 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	-	1200 V/300A/200 ms withstand	1200 V/300A/200 ms withstand
Residual current - *Leakage current at Uc*	Ipe	< 1 mA	None	None
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Total discharge current *@8/20µs*	Itotal	160 kA	40 kA	40 kA
Protection level @In *(8/20µs)*	Up L/N Up N/PE Up L/PE	- 1.8 kV 1.8 kV	1.25 kV 1.5 kV -	0.9 kV 1.5 kV -
Admissible short-circuit current	Isccr	10000 A	10000 A	10000 A
Associated disconnectors				
Thermal disconnector		internal		
Associated fuses		50 A min. - 125 A max. - Type gG		
Existing upstream ground fault breaker (if any)		Type "S" or delayed		
Mechanical characteristics				
Dimensions		see diagram, 2 TE (DIN43880)		
Connection to Network		by screw terminals: L/N = 1.5-10mm² (16 mm²) or PE = 2.5-25mm² (35 mm² rigid)		
Failsafe mode		Disconnection from network		
Disconnection indicator		2 mechanical indicators, Green/Red		
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		
Wiring for remote signaling		Max. 1.5 mm²		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Spare unit		MDAC40C-40-440	MDAC40C-31-275	MDAC40C-31-150
Standards				
Certification		KEMA		
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		821510422	821520222	821520122

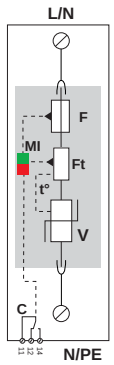
Imax 25 kA

DACF25S-10

DACF25S SERIES

- **Type 2 Surge Protector with integrated fuse (SPDI)**
- **No external fuse required**
- **In: 15 kA**
- **Imax: 25 kA**
- **Pluggable module for each phase**
- **Remote signaling**
- **IEC 61643-11 and EN 61643-11 certified**
- **UL1449 ed.5 compliance**





V : Varistor
F: Fuse
Ft : Thermal fuse
C : Contact for remote signal
t° : Thermal disconnection system
MI : Disconnection indicator

Characteristics

CITEL Model		DACF25S-10-440	DACF25S-10-320	DACF25S-10-275	DACF25S-10-150
Description		Type 2 AC SPD with integrated fuse (SPDI) - 1-pole - pluggable			
Max. AC operating voltage	Uc	440 Vac	320 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Characteristics - 5 sec.	UT	580 Vac withstand	335 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Characteristics -120 mn	UT	770 Vac disconnection	440 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Residual current *Leakage current at Uc*	Ipe	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	15 kA	15 kA	15 kA	15 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	25 kA	25 kA	25 kA	25 kA
Protection level *@ In (8/20µs)*	Up	2 kV	1.5 kV	1.25 kV	0.9 kV
Residual voltage *@ 5 kA (8/20µs)*	Up-5kA	1.5 kV	1.2 kV	1 kV	0.6 kV
Admissible short-circuit current	Isccr	100 000 A	100 000 A	100 000 A	100 000 A
Associated disconnectors					
Thermal disconnector		internal			
Fuses		internal (equivalent AC rating : 40 A, gG Type)			
Existing upstream ground fault breaker (if any)		Type "S" or delayed			
Mechanical characteristics					
Dimensions		see diagram, 1 TE (DIN43880)			
Connection to Network		By screw terminals: 2.5-25 mm² (35mm² rigid)			
Failsafe mode		Disconnection from network			
Disconnection indicator		1 mechanical indicator Green/Red			
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)			
Wiring for remote signaling		max. 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Spare unit		MDACF25-440	MDACF25-320	MDACF25-275	MDACF25-150
Standards					
Certification		-	-	KEMA	-
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5			
Part number					
		821410421	821410321	821410221	821410121

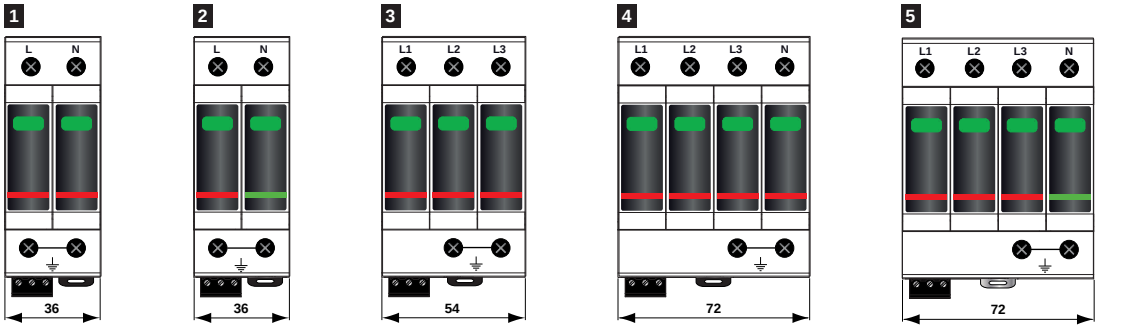
**) SPDI :SPD including all its safety devices : thermal disconnector AND electrical fuse against short circuit currents.*

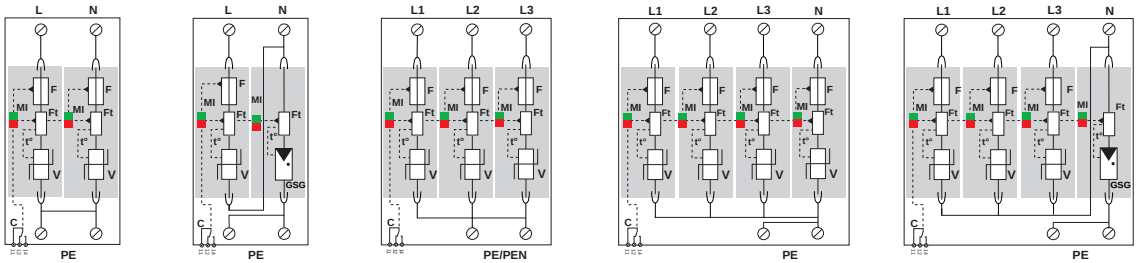
DACF25S-11, DACF25S-20, DACF25S-30
DACF25S-31, DACF25S-40

DACF25S-31

DACF25S-xx-xxx

- Maximum Operating voltage
- Configuration : **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «**S**» = Remote signal
- Imax : 25 kA
- Integrated overcurrent protectiont (fuse)





V : Varistor high energy
GSG: Specific gas tube
F: Fuse
Ft : Thermal fuse
C : Contact for remote signal
t° : Thermal disconnection system
MI : Disconnection indicator

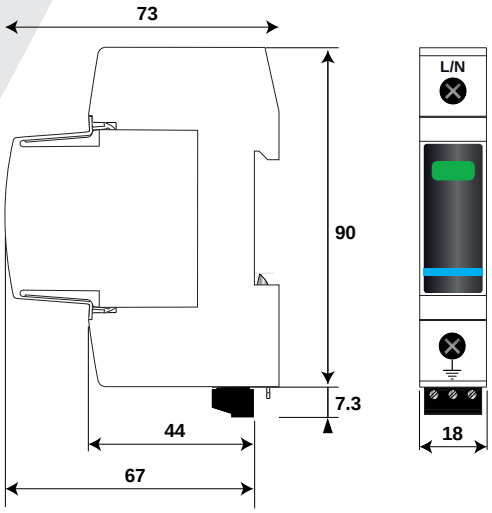
Model	P/N	Network	AC system	Protection mode	Up L/PE	Up L/N	Up N/PE	Dimension DIN43880	Diagram
DACF25S-31-320	821410344	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	1.5 kV	1.5 kV	4 TE	5
DACF25S-31-275	821410244	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	1.25 kV	1.5 kV	4 TE	
DACF25S-31-150	821410144	120/208 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	0.9 kV	1.5 kV	4 TE	
DACF25S-40-440	821410424	230/400 V 3-Phase+N	IT System (4+0)	L/PE and N/PE	2 kV	-	2 kV	4 TE	4
DACF25S-40-320	821410324	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1.5 kV	-	1.5 kV	4 TE	
DACF25S-40-275	821410224	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1.25 kV	-	1.25 kV	4 TE	
DACF25S-40-150	821410124	120/208 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1.2 kV	-	0.9 kV	4 TE	
DACF25S-30-440	821410423	230/400 V 3-Phase	IT System (3+0)	L/PE	2 kV	-	-	3 TE	3
DACF25S-30-320	821410323	230/400 V 3-Phase	TNC System (3+0)	L/PE	1.5 kV	-	-	3 TE	
DACF25S-30-275	821410223	230/400 V 3-Phase	TNC System (3+0)	L/PE	1.25 kV	-	-	3 TE	
DACF25S-30-150	821410123	120/208 V 3-Phase	TNC System (3+0)	L/PE	1.2 kV	-	-	3 TE	
DACF25S-11-320	821410342	230 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	1.5 kV	1.5 kV	2 TE	2
DACF25S-11-275	821410242	230 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	1.25 kV	1.5 kV	2 TE	
DACF25S-11-150	821410142	120 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	0.9 kV	1.5 kV	2 TE	
DACF25S-20-440	821410422	230 V Single Phase	IT System (2+0)	L/PE and N/PE	2 kV	-	2 kV	2 TE	1
DACF25S-20-320	821410322	230 V Single Phase	TN System (2+0)	L/PE and N/PE	1.5 kV	-	1.5 kV	2 TE	
DACF25S-20-275	821410222	230 V Single Phase	TN System (2+0)	L/PE and N/PE	1.25 kV	-	1.25 kV	2 TE	
DACF25S-20-150	821410122	120 V Single Phase	TN System (2+0)	L/PE and N/PE	1.2 kV	-	0.9 kV	2 TE	

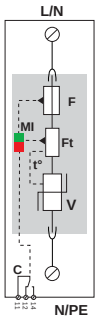
Imax 15 kA

DACF15S-10

DACF15S SERIES

- **Type 2 (or 3) surge Protector with integrated fuse (SPDI)**
- **No external fuse required**
- **In: 5 kA**
- **Imax: 15 kA**
- **Pluggable module for each phase**
- **Remote signaling**
- **IEC 61643-11, EN 61643-11 and UL1449 ed.5 compliance**





V: Varistor
F: Fuse
Ft: Thermal fuse
C: Contact for remote signal
t°: Thermal disconnection system
MI: Disconnection indicator

Characteristics

CITEL Model		DACF15S-10-440	DACF15S-10-320	DACF15S-10-275	DACF15S-10-150
Description		Type 2 (or 3) AC SPD with integrated fuse (SPDI*) - 1-pole - pluggable			
Max. AC operating voltage	Uc	440 Vac	320 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Characteristics - 5 sec.	UT	580 Vac withstand	335 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Characteristics -120 mn	UT	770 Vac disconnection	440 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Residual current *Leakage current at Uc*	Ipe	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA	5 kA
Max. discharge current *max. withstand (ã 8/20 µs by pole*	Imax	15 kA	15 kA	15 kA	15 kA
Withstand on combinaison waveform *Class III test*	Uoc	10 kV	10 kV	10 kV	10 kV
Protection level *(ã In (8/20µs)*	Up	1.5 kV	1.2 kV	1 kV	0.6 kV
Admissible short-circuit current	Isccr	100 000 A	100 000 A	100 000 A	100 000 A
Associated disconnectors					
Thermal disconnector		internal			
Fuses		internal (equivalent AC rating : 25 A, gG Type)			
Existing upstream ground fault breaker (if any)		Type "S" or delayed			
Mechanical characteristics					
Dimensions		see diagram, 1 TE (DIN43880)			
Connection to Network		By screw terminals: 2.5-25 mm² (35mm² rigid)			
Failsafe mode		Disconnection from network			
Disconnection indicator		1 mechanical indicator Green/Red			
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)			
Wiring for remote signaling		max. 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Spare unit		MDACF15-440	MDACF15-320	MDACF15-275	MDACF15-150
Standards					
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5			
Part number					
		821310421	821310321	821310221	821310121

**) SPDI :SPD including all its safety devices : thermal disconnector AND electrical fuse against short circuit currents.*

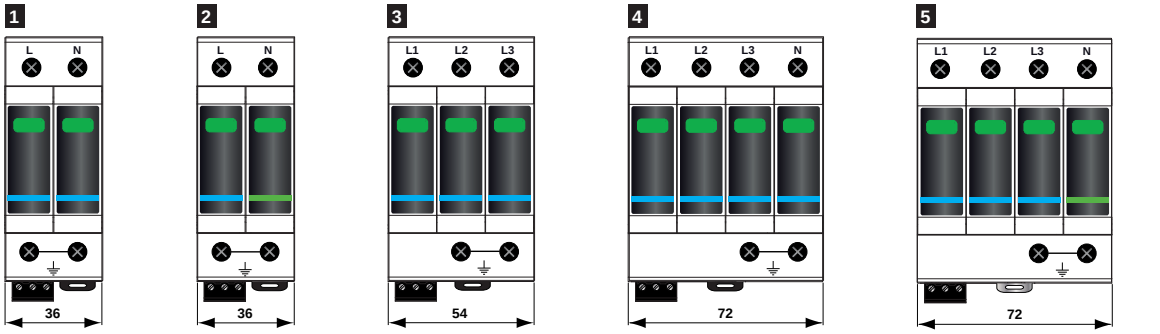
CITEL

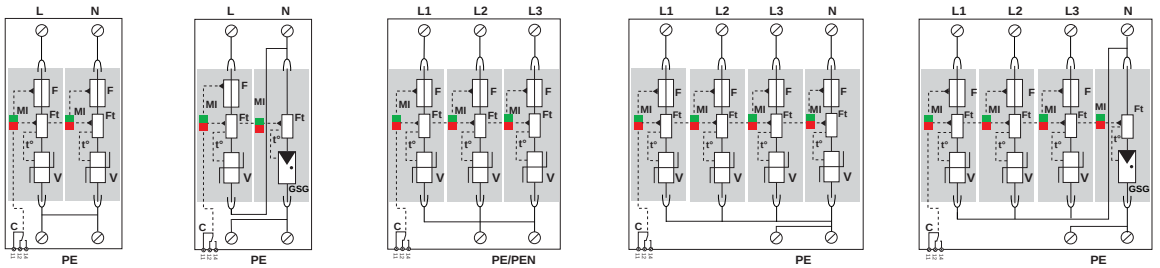
DACF15S-11, DACF15S-20, DACF15S-30, DACF15S-31, DACF15S-40

DACF15S-31

DACF15S-xx-xxx

- Maximum Operating voltage
- Configuration : **10** (single-pole 1+0), **11** (1+1), **20** (2+0), **30** (3+0), **40** (4+0), **31** (3+1)
- «**S**» = Remote signal
- Imax : 15 kA
- Integrated overcurrent protectiont (fuse)





V: Varistor high energy
GSG: Specific gas tube
F: Fuse
Ft: Thermal fuse
C: Contact for remote signal
t°: Thermal disconnection system
MI : Disconnection indicator

Model	P/N	Network	AC system	Protection mode	Up L/PE	Up L/N	Up N/PE	Dimension DIN43880	Diagram
DACF15S-31-320	821310344	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	1.2 kV	1.5 kV	4 TE	5
DACF15S-31-275	821310244	230/400 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	1 kV	1.5 kV	4 TE	
DACF15S-31-150	-	120/208 V 3-Phase+N	TT-TNS System (3+1)	L/N and N/PE	-	0.6 kV	1.5 kV	4 TE	
DACF15S-40-440	821310424	230/400 V 3-Phase+N	IT System (4+0)	L/PE and N/PE	1,5 kV	-	1,5 kV	4 TE	4
DACF15S-40-320	-	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1,2 kV	-	1 kV	4 TE	
DACF15S-40-275	-	230/400 V 3-Phase+N	TNS System (4+0)	L/PE and N/PE	1 kV	-	0.6 kV	4 TE	
DACF15S-40-150	-	120/208 V 3-Phase+N	TNS System (4+0)	L/PE et N/PE	0,6 kV	-	1 kV	4 TE	
DACF15S-30-440	821310423	230/400 V 3-Phase	IT System (3+0)	L/PE	1,5 kV	-	-	3 TE	3
DACF15S-30-320	-	230/400 V 3-Phase	TNC System (3+0)	L/PE	1,2 kV	-	-	3 TE	
DACF15S-30-275	821310223	230/400 V 3-Phase	TNC System (3+0)	L/PE	1 kV	-	-	3 TE	
DACF15S-30-150	-	120/208 V 3-Phase	TNC System (3+0)	L/PE	0,6 kV	-	-	3 TE	
DACF15S-11-320	821310342	230 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	1,2 kV	1,5 kV	2 TE	2
DACF15S-11-275	821310242	230 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	1 kV	1,5 kV	2 TE	
DACF15S-11-150	821310142	120 V Single Phase	TT-TN System (1+1)	L/N and N/PE	-	0,6 kV	1,5 kV	2 TE	
DACF15S-20-440	821310422	230 V Single Phase	IT System (2+0)	L/PE and N/PE	1,5 kV	-	1,5 kV	2 TE	1
DACF15S-20-320	-	230 V Single Phase	TN System (2+0)	L/PE and N/PE	1,2 kV	-	1 kV	2 TE	
DACF15S-20-275	-	230 V Single Phase	TN System (2+0)	L/PE and N/PE	1 kV	-	0.6 kV	2 TE	
DACF15S-20-150	-	120 V Single Phase	TN System (2+0)	L/PE and N/PE	1.2 kV	-	0,9 kV	2 TE	

Imax 15 kA

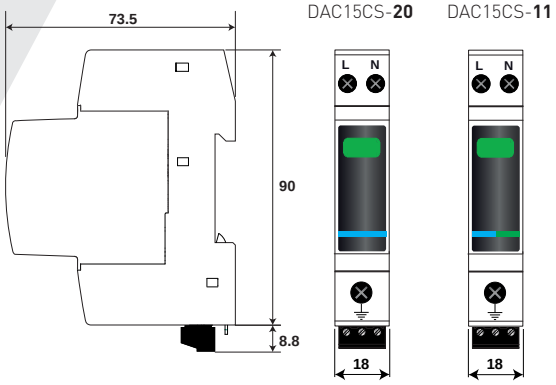
DAC15CS-11

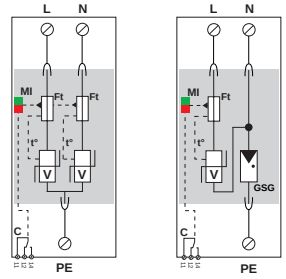
DAC15CS SERIES

- **Compact single phase Type 2 (or 3)**
- **Common/Differential mode**
- **Remote signaling contact**
- **IEC 61643-11, EN 61643-11 certified**
- **UL1449 ed.5 compliance**

DAC15CS-xx-xxx

- Maximum operating voltage
- Configuration: **20** (2+0), **11** (1+1)
- «**S**» = Remote signal
- Imax: 15 kA





V : High energy varistor
Ft : Thermal fuse
C : Contact remote signal
t° : Thermal disconnection system
GSG: Specific GDT
MI : Disconnection indicator

Characteristics

CITEL Model		DAC15CS-20-440	DAC15CS-11-275	DAC15CS-11-150
Description		Compact 1-phase Type 2 surge protector - Pluggable		
Network		230/400 V single-phase	230/400 V single-phase	120/208 V single-phase
Protection mode		L/PE and N/PE	L/N and N/PE	L/N and N/PE
AC system		IT	TT-TN	TT-TN
Max. AC operating voltage	Uc	440 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Charasteristic 5 sec.	UT	580 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Charasteristic 120 mn	UT	770 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	-	1200 V/300A/200 ms withstand	1200 V/300A/200 ms withstand
Residual current *- Leakage current at Uc*	Ipe	< 1 mA	None	None
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	15 kA	15 kA	15 kA
Total discharge current *@ 8/20µs*	Itotal	30 kA	30 kA	30 kA
Withstand on combinaison waveform *Class III test*	Uoc	10 kV	10 kV	10 kV
Protection level *@ In (8/20µs)*	Up L/N Up N/PE Up L/PE	- 1.5 kV 1.5 kV	0.9 kV 1.5 kV -	0.6 kV 1.5kV -
Admissible short-circuit current	Isccr	10000 A	10000 A	10000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		20 A min - 125 A max. - Type gG		
Existing upstream ground fault breaker (if any)		Type "S" or delayed		
Mechanical characteristics				
Dimensions		see diagram, 1 TE (DIN43880)		
Connection to Network		by screw terminals: L/N = 1.5-10 mm² (16mm²) or PE = 2.5-25 mm² (35 mm² rigid)		
Failsafe mode		Disconnection from network		
Disconnection indicator		1 mechanical indicators, Green/Red		
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		
Wiring for remote signaling		Max. 1.5 mm²		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Spare unit		MDAC15C-20-440	MDAC15C-11-275	MDAC15C-11-150
Standards				
Certification		KEMA		
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		821610421	821620221	821620121

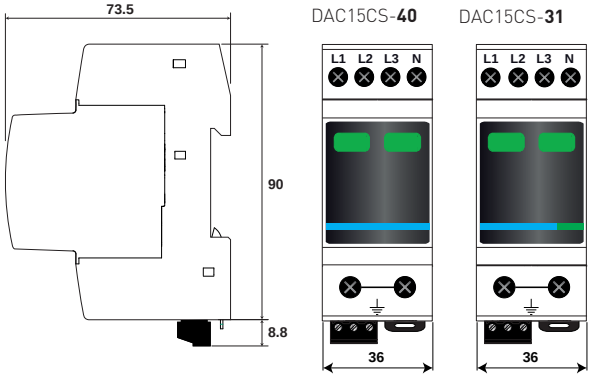
DAC15CS-40

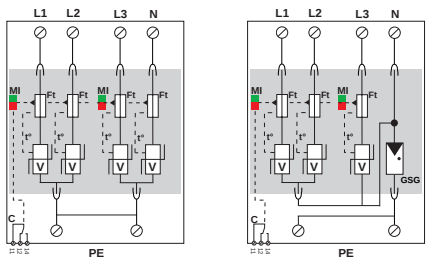
DAC15CS SERIES

- **Compact 3-phase Type 2 (or 3)**
- **Common/Differential mode**
- **Remote signaling contact**
- **IEC 61643-11, EN 61643-11 certified**
- **UL 1449 ed.4 compliance**

DAC15CS-xx-xxx

- Maximum operating voltage
- Configuration: **40** (4+0), **31** (3+1)
- «**S**» = Remote signal
- Imax: 15 kA





V : High energy varistor
Ft : Thermal fuse
C : Contact for remote signal
t° : Thermal disconnection system
GSG: Specific GDT
MI : Disconnection indicator

Characteristics

CITEL Model		DAC15CS-40-440	DAC15CS-31-275	DAC15CS-31-150
Description		Compact 3-phase+N Type 2 surge protector - Pluggable		
Network		230/400 V 3-phase	230/400 V 3-phase	120/208 V 3-phase
Protection mode		L/PE and N/PE	L/N and N/PE	L/N and N/PE
AC system		IT	TT-TN	TT-TN
Max. AC operating voltage	Uc	440 Vac	275 Vac	150 Vac
Temporary Over Voltage (TOV) Charasteristic *- 5 sec.*	UT	580 Vac withstand	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Charasteristic *-120 mn*	UT	770 Vac disconnection	440 Vac disconnection	230 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	-	1200 V/300A/200 ms withstand	1200 V/300A/200 ms withstand
Residual current *- Leakage current at Uc*	Ipe	< 1 mA	None	None
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	15 kA	15 kA	15 kA
Total discharge current *- @ 8/20 µs*	Itotal	60 kA	40 kA	40 kA
Withstand on combinaison waveform *Class III test*	Uoc	10 kV	10 kV	10 kV
Protection level *@ In (8/20µs)*	Up L/N Up N/PE Up L/PE	- 1.5 kV 1.5 kV	0.9 kV 1.5 kV -	0.6 kV 1.5kV -
Admissible short-circuit current	Isccr	10000 A	10000 A	10000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		20 A min. - 125 A max. - Type gG		
Existing upstream ground fault breaker (if any)		Type "S" or delayed		
Mechanical characteristics				
Dimensions		see diagram, 2 TE (DIN43880)		
Connection to Network		by screw terminals: L/N: 1.5-10mm² (16mm²) or PE: 2.5-25mm² (35mm² rigid)		
Failsafe mode		Disconnection from network		
Disconnection indicator		2 mechanical indicators, Green/Red		
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		
Wiring for remote signaling		Max. 1.5 mm²		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Spare unit		MDAC15C-40-440	MDAC15C-31-275	MDAC15C-31-150
Standards				
Certification		KEMA		
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		821610422	821620222	821620122

Imax 15 kA

DACN15S-P11-275

DACN15S-P SERIES

- **Cost effective Single phase Surge Protector**
- **Type 2 or Type 3**
- **Monobloc**
- **Bottom connection version (DACN15S-P/INV)**
- **In: 5 kA**
- **Imax: 5 kA**
- **Remote signaling**
- **IEC 61643-11 and UL1449 ed.5 compliance**

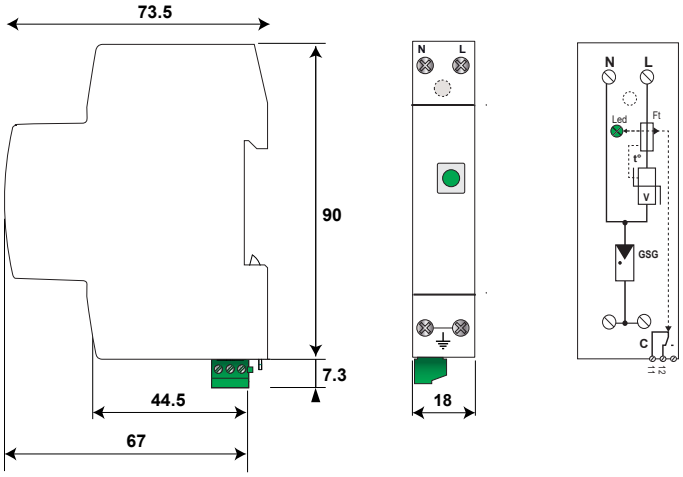
Characteristics

CITEL model		DACN15S-P11-275	DACN15S-P11-150	DACN15-P11-275/INV
Description		Type 2 (or 3), single-phase SPD, monobloc		
Network		230/400 Vac	120/208 Vac	230/400 Vac
Protection mode		L/N and N/PE	L/N and N/PE	L/N and N/PE
AC system		TT-TN	TT-TN	TT-TN
Max. AC operating voltage	Uc	275 Vac	150 Vac	275 Vac
Temporary Over Voltage (TOV) characteristics *- 5 sec.*	UT	335 Vac withstand	180 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) characteristics *- 120mn*	UT	440 Vac disconnection	230 Vac disconnection	440 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/200 ms withstand		
Residual current - *Leakage current at Uc*	Ipe	none		
Follow current	If	none		
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	15 kA	15 kA	15 kA
Withstand on Combination waveform *- Class III test*	Uoc	10 kV	10 kV	10 kV
Protection leveal @ In	Up L/N Up N/PE	1,1 kV 1,5 kV	0,7 kV 1,5 kV	1,1 kV 1,5 kV
Admissible short-circuit current	Isccr	10 000 A	10 000 A	10 000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		20 A mini - 125 A max - type gG		
Installation ground fault breaker (if any)		Type «S» or delayed		
Mechnical characteristics				
Dimensions		see diagram, 1 TE (DIN43880)		
Connection to Network		by screw terminal : 1.5-10 mm²	by screw terminal : 1.5-10 mm²	Bottom connection, by screw terminals: 1.5-10mm²
Failsafe behavior		Disconnection from AC network		
Disconnection indicator		LED green Off		
Remote signaling		Yes		No
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		-
Wiring for remote signaling		Max. 1.5 mm²		-
Mounting		Symmetrical rai 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		70146022	70146012	70146023

DACN15S-P 11-xxx/INV

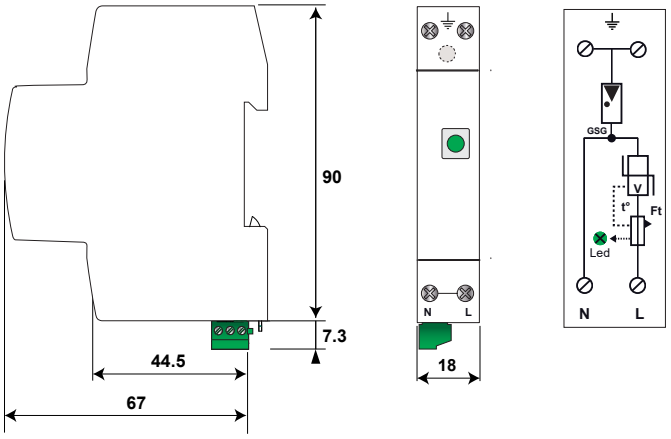
- "INV" : bottom connection
- Max operating voltage
- Configuration : **11** (1+1)
- «**P**» = parallel conexion
- «**S**» = Remote signal
- Imax : 15 kA
- Non pluggable

DACN15S-P11-xxx



V: MOV
GSG: Specific GDT
F : Thermal fuse
t°: Thermal disconnection mechanism
LED: Disconnector indicator
C: Remote signaling contact

DACN15S-P11-275/INV



Imax 10 kA

DACN10S SERIES

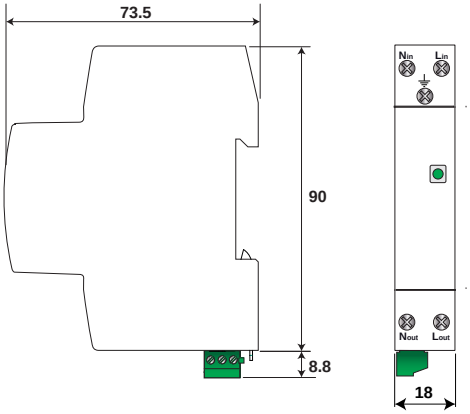
- **Cost effective Single phase Surge Protector**
- **Type 2 or Type 3, Monobloc**
- **2-port configuration (series mounting)**
- **In: 5 kA**
- **Imax: 10 kA**
- **Load current 25 A**
- **Remote signaling**
- **IEC 61643-11 compliance**

Characteristics

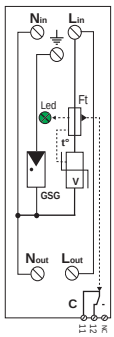
CITEL Model		DACN10S-11-150 DACN10S-L11-150	DACN10S-11-275 DACN10S-L11-275	DACN10S-21YG-275 DACN10S-L21YG-275	DACN10S-20-150	DACN10S-20-275	DACN10S-20-440
Description		Type 2 or Type 3, 2-port AC single phase surge protector					
Network		120 Vac	230 Vac	230 Vac	120 Vac	230 Vac	230 Vac
Protection mode		L/N and N/PE	L/N and N/PE	L/N and N/PE	L/PE and N/PE	L/PE and N/PE	L/PE and N/PE
AC system		TT-TN	TT-TN	TN	TN	TN	TN-IT
Max. AC operating voltage	Uc	150 Vac	275 Vac	275 Vac	150 Vac	275 Vac	440 Vac
Temporary Over Voltage (TOV) characteristics *- 5 sec.*	UT	180 Vac withstand	335 Vac withstand	335 Vac withstand	180 Vac withstand	335 Vac withstand	580 Vac withstand
Temporary Over Voltage (TOV) characteristics *- 120mn*	UT	230 Vac disconnection	440 Vac disconnection	440 Vac disconnection	230 Vac disconnection	440 Vac disconnection	770 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/ 200 ms withstand	1200 V/300A/ 200 ms withstand	-	1200 V/300A/ 200 ms withstand	1200 V/300A/ 200 ms withstand	-
Residual current *Leakage current at Uc*	Ipe	none	none	none	< 1 mA	< 1 mA	< 1 mA
Max. Load current	IL	25 A 16 A	25 A 16 A	25 A 16 A	25 A	25 A	25 A
Follow current	If	none	none	none	none	none	none
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Withstand on Combination waveform *- Class III test*	Uoc	10 kV	10 kV	10 kV	10 kV	10 kV	10 kV
Protection level *@In (8/20µs)*	Up L/N Up N/PE Up L/PE	0,7 kV 1,5 kV -	1,1 kV 1,5 kV -	1,3 kV 1,6 kV 1,6 kV	- 0,7 kV 0,7 kV	- 1,1 kV 1,1 kV	- 1,6 kV 1,6 kV
Admissible short-circuit current	Isccr	10 000 A	10 000 A	10 000 A	10 000 A	10 000 A	10 000 A
Associated disconnectors							
Thermal disconnector		internal					
Fuses		Fuses type gG - 25 A					
Installation ground fault breaker (if any)		Type «S» or delayed					
Mechnical characteristics							
Dimensions		see diagram, 1TE (DIN43880)					
Connection to Network		by screw terminals: 1.5-10 mm²					
Failsafe behavior		Disconnection SPD (DACN10) - Disconnection SPD + AC line cut off (DACN10L)					
Disconnection indicator		Green LED off					
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/2 A (DC)					
Wiring for remote signaling		Max. 1.5 mm²					
Mounting		Symmetrical rail 35 mm (EN60715)					
Operating temperature		-40/+85°C					
Protection rating		IP20					
Housing material		Thermoplastic UL94 V-0					
Standards							
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5					
Part number							
		70111012 70112012	70111022 70112022	70114022 -	70113012	70113022	70113032

DACN10S-L xx-xxx

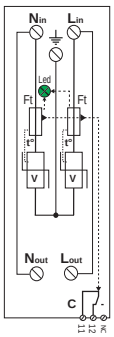
- Max operating voltage
- Configuration : **11** (1+1), **20** (2+0), or **21YG** (Y diagram)
- **« »** = parallel disconnection in case of failure
- «**L**» = In-line disconnection in case of failure
- «**S**» = Remote signal
- Imax : 10 kA
- Non pluggable



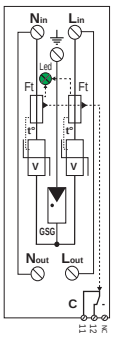
DACN10S-11-xxx



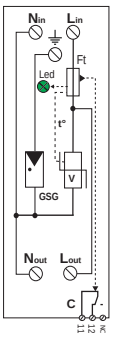
DACN10S-20-xxx



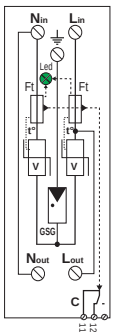
DACN10S-21YG-275



DACN10S-L11-xxx



DACN10S-L21YG-275



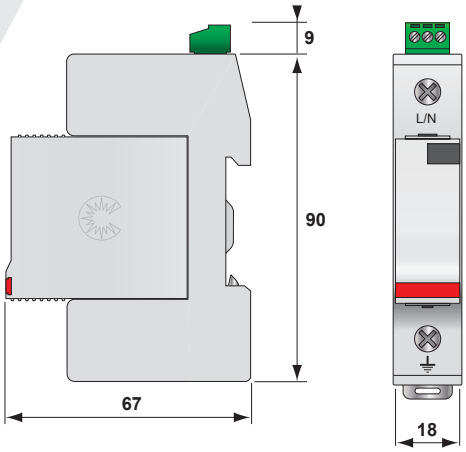
V: MOV
GSG: Specific GDT
F : Thermal fuse
t°: Thermal disconnection mechanism
LED: Disconnector indicator
C: Remote signaling contact

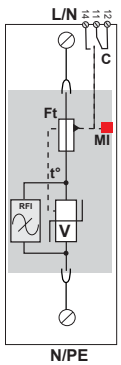
Imax 40 kA

DS41HFS-120

DS40HFS SERIES

- **Type 2 surge protector**
- **Integrated RFI Filtering**
- **In: 20 kA**
- **Imax: 40 kA**
- **Pluggable module**
- **Remote signaling**
- **IEC 61643-11, EN 61643-11, UL1449 ed.5 compliance**





V : MOV
Ft : Thermal fuse
t° : Thermal disconnection mechanism
RFI: RFI filtering
C: Contact for remote signal
MI: Disconnection indicator

Characteristics

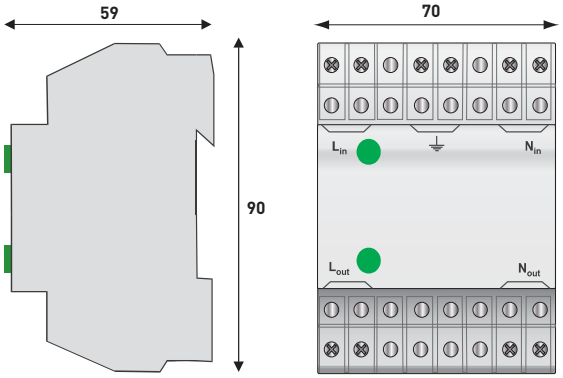
CITEL Model		DS41HFS-230	DS41HFS-120
Description		Type 2 AC surge protector + RFI filtering	
Network		230/400 V	120/208 V
Connection mode		L/N or N/PE	L/N or N/PE
Max. AC operating voltage	Uc	255 Vac	150 Vac
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) Charasteristics - 120 mn	UT	440 Vac disconnection	230 Vac disconnection
Residual current *- Leakage current at Uc*	Ipe	< 1 mA	< 1 mA
Follow current	If	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA
Protection level *@ In (8/20µs)*	Up	1.25 kV	0.9 kV
Residual voltage *@ 5kA (8/20µs)*	Up-5kA	1 kV	0.6 kV
Admissible short-circuit current	Isccr	25000 A	25000 A
RFI Filtering		0.1-30 Mhz	0.1-30 Mhz
Max. shunt capacitance		0,22 µF	0,22 µF
Associated disconnectors			
Thermal disconnector		internal	
Fuses		Fuses type gG - 50 A	
Installation ground fault breaker (if any)		Type "S" or delayed	
Mechnical characteristics			
Dimensions		see diagram	
Connection to Network		by screw terminals: 2.5-25 mm²	
Disconnection indicator		1 mechanical indicator	
Remote signaling of disconnection		output on changeover contact	
Mounting		Symmetrical rail 35 mm (EN60715)	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Spare unit		DSM40HF-230	DSM40HF-120
Standards			
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5	
Part number			
		461590	461690

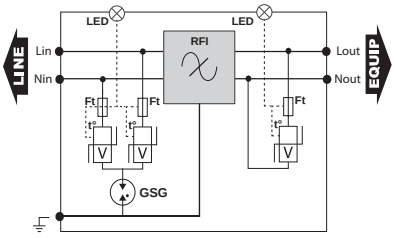
CITEL

DS-HF

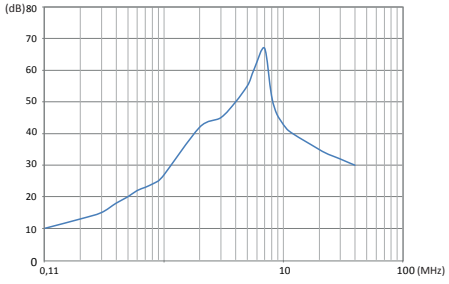
DS-HF SERIES

- **Single phase Surge protector with RFI filtering**
- **In: 3kA**
- **Imax: 10 kA**
- **Common and differential mode protection**
- **Low protection level**
- **Operating/disconnection indicators**
- **IEC 61643-11, EN 61643-11 and UL1449 ed.5 compliance**





V: Varistor
GSG: Specific GDT
Ft: Thermal fuse
t°: Thermal disconnection system
LED : Operating indicator
RFI: RFI filtering



Attenuation curve

Characteristics

CITEL Model		DS-HF	DS-HF-120
Description		Type 2+3 single-phase surge protector and filter	
Network		230 V single phase	120 V single phase
Connection mode		L/N/PE	L/N/PE
AC system		TT-TN	TT-TN
Max. AC operating voltage	Uc	255 Vac	150 Vac
Max. Load current	IL	16 A	16 A
Temporary Over Voltage (TOV) characteristics - 5 sec.	UT	335 Vac withstand	180 Vac withstand
Temporary Over Voltage (TOV) characteristics - 120 mn	UT	440 Vac disconnection	230 Vac disconnection
Residual current *- Leakage current at Uc*	Ipe	< 1 mA	< 1 mA
Follow current	If	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	3 kA	3 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA
Withstand on Combination waveform *- Class III test*	Uoc	10 kV	10 kV
Protection level *@In (8/20µs)*	Up	1 kV/ 0.8 kV	0.6 kV/0.5 kV
Admissible short-circuit current	Isccr	10000 A	10000 A
RFI Filtering		0.1 - 30 MHz	0.1 - 30 MHz
Associated disconnectors			
Thermal disconnector		internal	
Fuses		Fuses type gG - 20 A max. (if necessary)	
Installation ground fault breaker (if any)		Type "S" or delayed	
Mechnical characteristics			
Dimensions		see diagram	
Connection to Network		by screw terminals: 0.75 - 4 mm²	
Disconnection indicator		Green led(s) off	
Remote signaling of disconnection		none	
Mounting		Symmetrical rail 35 mm (EN60715)	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Standards compliance			
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5	
Part number			
		77945	77948

ACCESSORIES FOR AC SURGE PROTECTORS

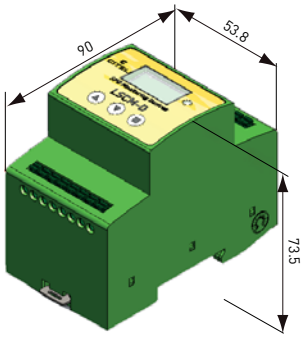
Model		Description	Page
LSCM-D		Surge Counter & SPD Monitoring	68
DSH		Coordination Inductors	69
SFD		Specific Fuses	70
PROTECTION KIT		AC SPD + Fuses + Busbar of connection	
DSDT16 **DDT16**		Screw terminal connection	71

LSCM-D RANGE

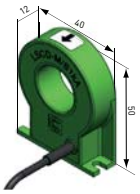
Complete unit LSCM-D/24/P1000

- **Lightning and Surge Current Counter & SPD monitoring device**
- **Wide surge current detection range :**
  - **0.3/25 kA or 1/50 kA ⍵ 10/350µs**
  - **0.3/50 kA or 1/100 kA ⍵ 8/20µs**
- **Front display for access to recorded events and device parameters**
- **Peak current and time stamping recording of the surge currents**
- **RS485 communication interface / MODBUS protocol**
- **Monitoring features : 2 inputs (SPD or disconnector status)/1 ouput**
- **IEC62561-6 compliance**

Characteristics



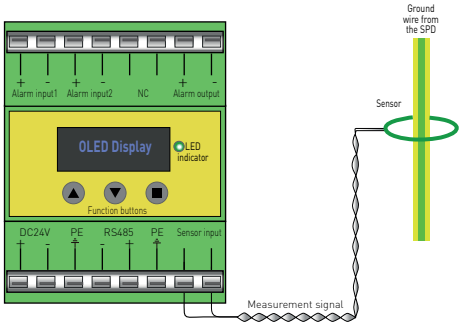
Monitoring unit LSCM-D/24



Sensor LSCM-P1000

CITEL Range	LSCM		
Application	Detect and record surge & lightning currents and monitor the SPD status		
Range of lightning current detection	P1000 version: 1-100 kA (8/20µs), 1-50 kA (10/350µs) P300 version: 0.3-50 kA (8/20µs), 0.3-25 kA (10/350µs)		
Input/output	Two channels of input switching signal and one channel of output switching signal		
Communication	RS485 bus (MODBUS protocol)		
Power supply	24 Vdc/ 24 Vac (LSCM-D/24) or 120/230 Vac (LSCM-D/230AC)		
Built-in battery (date saving) life	3-6 months, rechargeable		
Error and pricision (peak value)	0.1 kA ; +/- 5%		
Display module	128*64 lattice OLED display, green/red status LED display		
CITEL model	**LSCM-D/****	**LSCM-P1000**	**LSCM-P300**
Description	Monitoring unit	1 kA sensor	0.3 kA sensor
Dimensions	See diagram	See diagram	see diagram
Weight	130 g	40 g (with 1m wire)	40 g (with 1m wire)
Mounting	Symmetrical DIN rail 35 mm (EN60715)	2*M3 bolts	2*M3 bolts
Operating temperature	-25/+70°C	-25/70°C	-25/+70°C
Storage temperature	-20/+60°C	-20/+60°C	-20/+60°C
Protection rating	IP20	IP20	IP20
Housing material	Thermoplastic UL94 V-0	Thermoplastic UL94 V-0	Thermoplastic UL94 V-0
Connection wire	Not provided	Coaxial cable AWG26	Coaxial cable AWG26
Ground connection	Two connection PE ports	NA	NA
Terminal connection	Spring-cage terminals	Wire connection	Wire connection
Standards			
Compliance	EN 62561-6		
Part number			
LSCM-D/24/P1000	Complete set - 24V power - 1 kA mini detection		793532
LSCM-D/24/P300	Complete set - 24V power - 0.3 kA mini detection		793531
LSCM-D/230AC/P1000	Complete set - 230Vac power - 1 kA mini detection		793534
LSCM-D/230AC/P300	Complete set - 230Vac power - 0.3 kA mini detection		793533

***) 24 or 230AC*

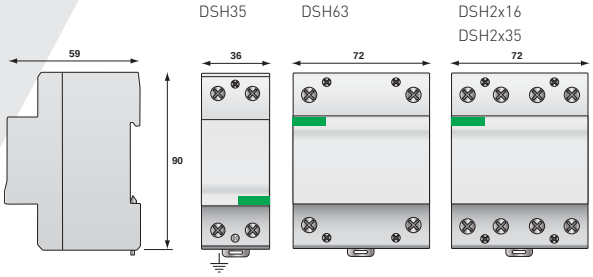


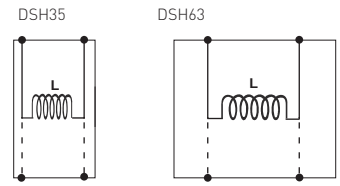
Application

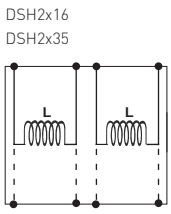
DSH 35

DSH SERIES

- **Coordination inductors for Surge Protectors**
- **For use with the DS series**
- **35 A and 63 A versions**
- **2x16 A and 2x35 A double inductor versions**
- **See «coordination» pages 20-21**







L : inductor

Characteristics

CITEL model		DSH63	DSH35	DSH2x35	DSH2x16
Description		Coordination inductor			
Max. operating voltage	Uc	500 Vac	500 Vac	500 Vac	500 Vac
Max. line current	IL	63 A	35 A	2 x 35 A	2 x 16 A
Line inductance		15 µH	15 µH	2 x 15 µH	2 x 15 µH
Mechanical characteristics					
Wiring		1 DSH in serie on each active wire		1 DSH in series on 2 active wires	
Dimensions		see diagram			
Connection		screw terminals : 6-35 mm²			
Mounting		Symmetrical DIN rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection class		IP20			
Housing material		Thermoplastic UL94 V-0			
Part number					
		360807	360806	360808	2690

SFD1-25 SFD1-13

SFD SERIES

- **Specific Fuses (SPD Fusing Disconnectors) for short circuit protection of Type 1 AC surge protectors**
- **Surge current withstand: 12.5 or 25 kA @ 10/350µs**
- **Very compact**
- **Activation signaling feature**
- **Remote signaling through fuse holder**

The SFD range has been especially designed to associated with Type 1 SPDs. These very specific fuses are able to conduct huge surge currents in rather small dimensions to protect Type 1 SPDs against harsh short circuit failures.

In order to comply IEC61643-11 standard, AC power SPD must be protected against short circuit failures : these specific fusing disconnectors must be installed in the SPD branches.
The SFD are equipped with fusing indicator to be used inside dedicated holder with remote signalling feature.

the SFD disconnectors must be used with specific fuse holders which provide :

- Relevant surge current capability
- Remote signaling feature
- Switching (useful for maintenance purpose)

Characteristics

CITEL Model		SFD1-25	SFD1-13
Description		Fusing disconnector for Type 1 AC surge protector	
Maximum AC operating voltage	Uc	500 Vac	500 Vac
Maximal discharge current *1 x 8/20 µs impulse*	Imax	100 kA	80 kA
Nominal discharge current *15 x 8/20 µs impulses*	In	80 kA	50 kA
Maximum discharge current *max. withstand 10/350µs by pole*	Iimp	25 kA	12.5 kA
Equivalent rated AC current		250 A	125 A
Residual voltage *@ Iimp*	Up	< 0.5 kV	< 0.4 kV
Breaking capacity		100 000 A	100 000 A
Safety			
Fusing indicator		yes	
Remote fusing indication		through dedicated fuse holder	
Mechanical characteristics			
Format		Cylindrical	Cylindrical
Dimensions		22x58 mm	14x51 mm
Mounting		on cylindrical fuse holder	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Standards			
Compliance		EN 61643-11 / IEC 61643-11 EN 60269-1/EN 60269-2/IEC60269-1/IEC60269-2	
Part number			
		39489	39466

ASSEMBLY OF FUSES SFD1-13 (14x51) + HOLDERS		
SFD1-13S-11*	64047	Assembly for single phase (L+N) + remote signal
SFD1-13S-20**	64051	Assembly for single phase (L+N) + remote signal
SFD1-13S-30	64052	Assembly for 3-phase + remote signal
SFD1-13S-31*	64048	Assembly for 3-phase+N + remote signal
SFD1-13S-40**	64053	Assembly for 3-phase+N + remote signal
ASSEMBLY OF FUSES SFD1-25 (22x58) + HOLDERS		
SFD1-25S-11*	64049	Assembly for single phase (L+N) + remote signal
SFD1-25S-20**	64055	Assembly for single phase (L+N) + remote signal
SFD1-25S-30	64056	Assembly for 3-phase + remote signal
SFD1-25S-31*	64058	Assembly for 3-phase+N + remote signal
SFD1-25S-40**	64057	Assembly for 3-phase+N + remote signal

** the Neutral position is equipped with a non-fusing element, for TT and TN system application*
** the Neutral position is equipped with a fusing element, for IT system application*

SFD1-25S-31 SFD1-13S-11

Protection Kit

ASSEMBLY AC SPD + FUSES + BUSBAR OF CONNECTION

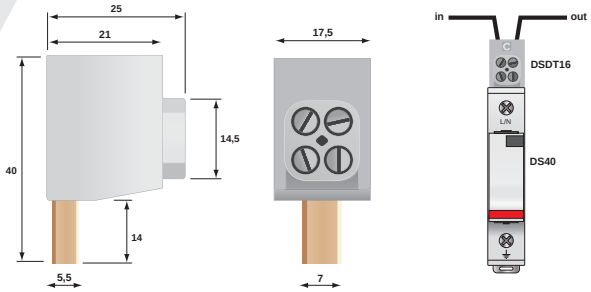
Protection KIT DAC1-13VGS-11-275	64195
Protection KIT DAC1-13VGS-30-275	64200
Protection KIT DAC1-13S-30-440	64201
Protection KIT DAC1-13VGS-31-275	64202
Protection KIT DAC1-13VGS-40-275	64204
Protection KIT DAC1-13S-40-440	64203

CITEL

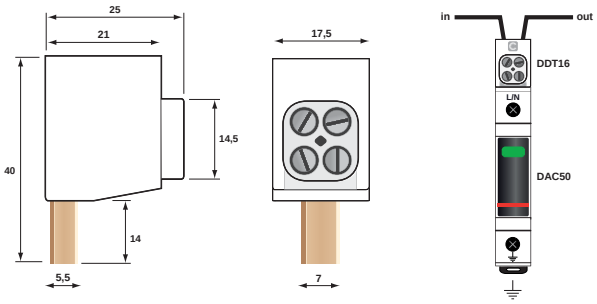
DSDT16 / DDT16

- «V» connection screw terminal for SPD
- Improved connection for better efficiency
- 2 x 35 mm² wire connection

DSDT16



DDT16



Characteristics

CITEL model	DSDT16	DDT16
Description	Screw terminal for «V» connection	
Mini-max. cross section	2.5 - 35 mm² (13-2 AWG)	
Torque	2-2,2 Nm (18-22 lb-in)	
Max Load Current (IL)	100 A	
Insulation material	Polycarbonate UL94 V-0	
Metal part	Brass	
Mounting	on DS range terminal	on DAC range terminal
Part number	400102	400132

CITEL

DC POWER SURGE PROTECTORS

DC POWER SURGE PROTECTORS

DC power networks are used in more and more applications and the threat of disturbances due to surge voltages must be taking in to account like for AC power lines.

The most common applications using DC power:

- 48 Vdc for Telecom installations
- 24 to 130 Vdc for off-grid PV sites
- 380/400 Vdc for Datacenters/Telecom centers
- 400 to 1000 Vdc for Electrical Vehicle Charging Stations
- 750 to 1500 Vdc for Railways electrification systems
- 800 to 1500 Vdc for Energy Storage Systems (ESS)

All these installations are critical and their possible disturbances or losses of operations are not acceptable: relevant surge protection will improve their proper operation and life duration.

CITEL has designed a wide range of surge protectors for all the DC power networks.
These surge protectors are available in a wide range of versions to be adaptable to all configurations :

- Type 1 or Type 2 Surge protectors
- DC voltage from 12 to 1500 Vdc
- Pluggable versions
- 1-pole or 2-pole configuration
- «Y» diagram for high voltage application
- Safety disconnectors and remote signaling feature

Selection of DC power Surge protectors

Depending of the type of DC power network, the choice of the relevant SPD must follow these processes

DC power line	Criteria	SPD Selection
Lightning stress	Direct or Indirect	Type 1 or Type 2
Maximum DC voltage	12 to 1500 Vdc	Uc parameter
Topology of the line	1-wire or 2-wire	1-pole or 2-pole configuration
Short circuit current	up to 100 kA	Isccr parameter

A particular attention must be paid to the short-circuit condition of the DC power line, which could varies from low rating (controlled DC power source) to very high rating (Battery storage). The related parameter of the SPD (Isccr) must be chosen greater or equal than the prospective short circuit current of the DC power line.

Test standard

As the dedicated test standard is not published yet (prIEC61643-41), these DC power SPDs are tested following the existing tests and declare parameters similar to AC power SPDs like Uc (Maximum operating voltage in DC voltage), In (Nominal discharge current), Up (Protection level).

TYPE 1 DC POWER SURGE PROTECTORS

Range		Iimp/pole	Description	Page
DS252E-420DC		25 kA	Type 1 for 400 Vdc High energy 2-pole	78
DS252C-48DC/G		25 kA	Type 1 for 48 Vdc High energy 2-pole	77
DS250E-48DC		25 kA	Type 1 for 48 Vdc High energy 1-pole	77
DS132RS-420DC		12.5 kA	Type 1 for 400 Vdc Pluggable 1 or 2-pole	78
DS72R-48DC		7 kA	Type 1 for 48 vdc Pluggable 1 or 2-pole	77

TYPE 2 DC POWER SURGE PROTECTORS

Range		Imax/ pole	Description	Page
DDC50-21Y		50 kA	Pluggable High DC voltage Y diagram	80
DDC30-20		30 kA	Pluggable 1 or 2-pole	79
DDC*C-20		20-30 kA	Pluggable Compact version	81
DS210-DC		2-6 kA	Pluggable Compact version Differential/common mode protection	83
DDCN		3-6 kA	2-port SPD Compact version Differential and common mode protection	85

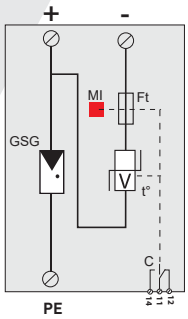
ACCESSORIES

Range		Uc	Description	Page
SFD50S-10-1500DC		1500 Vdc	DC fuse for energy storage system Base and remote signal	86
KIT ESS			DC SPD + Fuses for ESS system	86

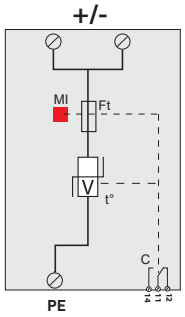
DS25x-48DC
DS7x-48DC

- **Surge protector for 48 Vdc supplies**
- **Type 1+2**
- **Imax up to 70 kA**
- **Iimp up to 25 kA/pole**
- **Remote signaling (option)**
- **prIEC 61643-41 and UL1449 ed.5 compliance**

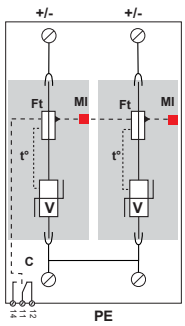
DS252C-48DC/G



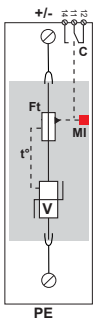
DS250E-48DC



DS72RS-48DC



DS71R-48DC



V: High energy varistor
GSG: Specific Gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

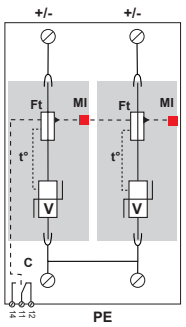
Characteristics

CITEL Model		DS252C-48DC/G	DS250E-48DC	DS72R-48DC	DS71R-48DC
Description		2-pole Type 1+2 SPD	1-pole Type 1+2 SPD	2-pole Type 1+2 SPD	1-pole Type 1+2 SPD
Network		48 Vdc	48 Vdc	48 Vdc	48 Vdc
Connection mode		+/- and +/PE	+/PE or -/PE	+/PE and -/PE	+/PE or -/PE
Protection mode(s)		CM/DM	CM	CM	CM
Max. PV operating voltage	Uc	75 Vdc	75 Vdc	65 Vdc	65 Vdc
Residual current *Leakage current at Uc*	Ipe	without	< 0.1 mA	< 0.1 mA	< 0.1 mA
Nominal discharge current *15 x 8/20 µs impulses*	In	25 kA	25 kA	30 kA	30 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	70 kA	70 kA	70 kA	70 kA
Max. lightning current by pole *max. withstand @ 10/350µs*	Iimp	25 kA	25 kA	7 kA	7 kA
Total lightning current *max. total withstand @ 8/20 µs*	Itotal	50 kA	-	14 kA	-
Protection level +/PE (-/PE) *@In (8/20µs)*	Up	0.5/1.5 kV	0.5 kV	0.3 kV	0.3 kV
Protection level +/- *@ In (8/20µs)*	Up	0.5 kV	-	-	-
Associated disconnectors					
Thermal disconnector		internal			
Fuses (if required)		Fuse type gG - 315 A		Fuses type gG - 100 A	
Mechnical characteristics					
Dimensions		see diagram			
Connection to Network		by screw : 6-35 mm² / by bus		by screw 4-25 mm²	
Disconnection indicator		1 mechanical indicator		1 mechanical indicator/pole	
Remote signaling of disconnection output on changeover contact		Yes	Yes	option DS72R**S**-48DC	option DS71R**S**-48DC
Mounting		Symmetrical rail 35 mm (EN60715)			
Spare unit		-	-	DSM70R-48DC	DSM70R-48DC
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94-V0			
Standards					
Compliance		prIEC61643-41 / UL1449 ed.5			
Part number					
		3415	63909	492101	322101

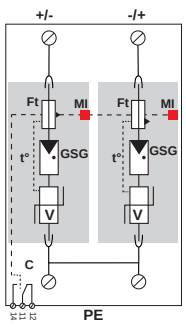
380-400 VDC POWER SURGE PROTECTORS TYPE 1+2 OR TYPE 2

- **Surge protectors for 380-400 Vdc power lines**
- **Type 1+2 or Type 2**
- **Imax up to 70 kA**
- **Iimp up to 25 kA/pole**
- **Remote signaling option**
- **prIEC 61643-41 compliance**

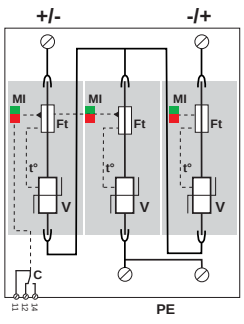
DS132RS-420DC



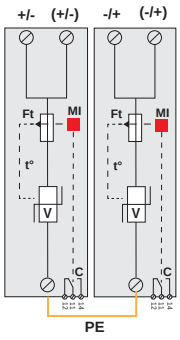
DS42VGS-450DC



DDC50S-21Y



DS252E-420DC



V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

CITEL Model		DS252E-420DC	DS132RS-420DC	DDC50S-21Y-440	DS42VGS-450DC
Description		Type 1+2 DC power SPD		Type 2 DC power SPD	
Nominal DC voltage	Un	400 Vdc	400 Vdc	400 Vdc	400 Vdc
Connection mode		+/PE and -/PE	+/PE and -/PE	+/PE and -/PE	+/PE and -/PE
Max. DC operating voltage	Uc	420 Vdc	420 Vdc	440 Vdc	450 Vdc
Residual current *Leakage current at Uc*	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA	None
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	15 kA	12.5 kA	20 kA	10 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	140 kA	50 kA	50 kA	40 kA
Max. lightning current by pole *max. withstand @ 10/350µs*	Iimp	25 kA	12.5 kA	-	-
Total lightning current *@ 10/350µs*	Itotal	50 kA	50 kA	-	-
Protection level +/PE (-/PE) *@ In (8/20µs)*	Up	1.5 kV	1.5 kV	1.8 kV	1.5 kV
Protection level +/- *@ In (8/20µs)*	Up	3 kV	3 kV	1.8 kV	2.5 kV
Associated disconnectors					
Thermal disconnector		internal	internal	internal	internal
Fuses (if requested)		315 A max	125 A max	50-125 A max	50-125 A max
Mechanical characteristics					
Dimensions		see diagram 4 TE (EN43880)	see diagram 2 TE (EN43880)	see diagram 3 TE (EN43880)	see diagram 2 TE (EN43880)
Connection to Network		Screw terminals: 2.5-25 mm²			
Failsafe mode		Disconnection from network			
Disconnection indicator		1 mechanical indicator/pole			
Remote signaling of disconnection		output on changeover contact			
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)			
Wiring for remote signaling		Max. 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94-V0			
Spare unit		-	DSM130R-420DC	MDDC50-Y-440	DSM40VG-450DC
Standards					
Compliance		prIEC 61643-41			
Part number					
		64005	573312	-	46287132

DDC30S-20

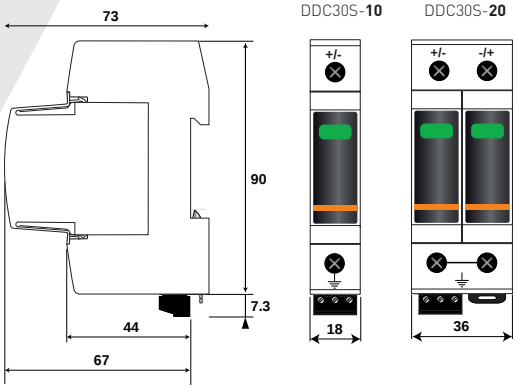
DDC30S-10

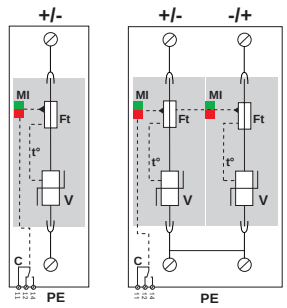
DDC30S SERIES

- 1-pole or 2-pole surge protector
- In: 15 kA / Imax: 30 kA
- Iimp: 4 kA
- Pluggable module
- Remote signaling
- prIEC 61643-41 compliance

DDC30S-x0-xx

- Max. DC operating voltage
- Number of protected pole (1 or 2)
- «**S**» = Remote signal
- Imax : 30 kA





V: High-energy varistor
Ft: Thermal fuse
C: Remote signaling contact
t°: Thermal disconnection system
Mi : Disconnection indicator

Characteristics

CITEL Model		DDC30S-10-65	DDC30S-10-85	DDC30S-20-65	DDC30S-20-85
Description		1-pole DC SPD Type 1+2		2-pole DC SPD Type 1+2	
Nominal DC voltage	Un	48 Vdc	75 Vdc	48 Vdc	75 Vdc
Connection mode		+/PE and -/PE	+/PE and -/PE	+/PE and -/PE	+/PE and -/PE
Max. DC operating voltage	Uc-DC	65 Vdc	85 Vdc	65 Vdc	85 Vdc
Max. AC operating voltage	Uc-AC	50 Vac	60 Vac	50 Vac	60 Vac
Residual current *Leakage current at Uc*	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
Follow current	If	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	15 kA	15 kA	15 kA	15 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	30 kA	30 kA	30 kA	30 kA
Total discharge current *@ 8/20µs*	Imax total	60 kA	60 kA	60 kA	60 kA
Max. lightning current by pole *max. withstand @ 10/350µs*	Iimp	4 kA	4 kA	4 kA	4 kA
Protection level +/PE (/-PE) *@ In (8/20µs)*	Up	300 V	390 V	300 V	390 V
Protection Level +/- *@In (8/20µs)*	Up	-	-	600 V	780 V
Associated disconnectors					
Thermal disconnector		internal			
Fuses (if requested)		50 A min. - 125 A max. -Fuses type gG			
Mechanical characteristics					
Dimensions		see diagram - 1 TE (EN43880)		see diagram - 2 TE (EN43880)	
Connection to Network		Screw terminals: 2.5-25 mm² +/- : 1.5-10 mm²			
Failsafe mode		Disconnection from network			
Disconnection indicator		1 mechanical indicator Green/Red		2 mechancial indicators, Green/Red	
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)			
Wiring for remote signaling		Max. 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94-V0			
Spare unit		MDDC30-65	MDDC30-85	MDDC30-65	MDDC30-85
Standards					
Compliance		prIEC 61643-41			
Part number					
		828110121	828110221	828110122	828110222

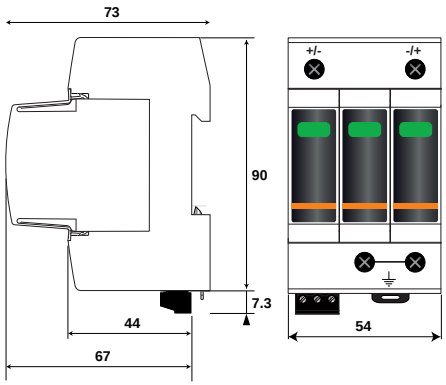
CITEL

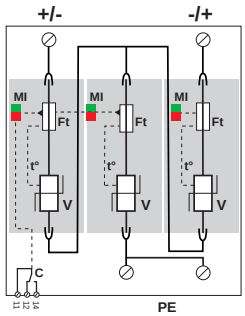
DDC50S-21Y SERIES

- DC power Type 2 SPD
- For Energy Storage System/EV Charging
- Up to 1500 V DC voltage
- In/Imax: 20/50 kA
- Pluggable modules
- Remote signaling
- prIEC 61643-41, UL1149 ed.5 compliance

DDC50S-21Y-xxxx

- Max. DC operating voltage
- Internal diagram
- «S» = Remote signa
- Imax : 50 kA





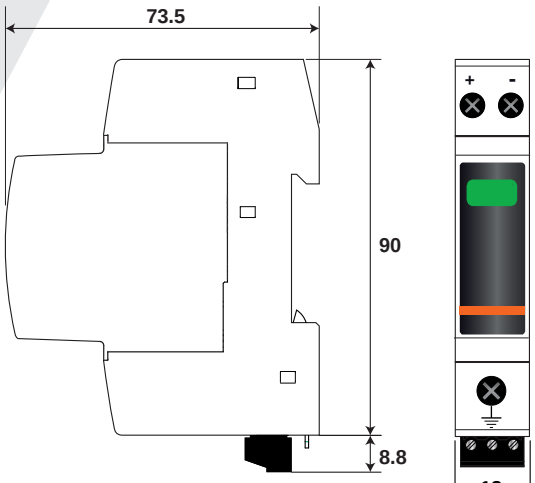
V: High-energy varistor
Ft: Thermal fuse
C: Remote signaling contact
t°: Thermal disconnection system
Mi : Disconnection indicator

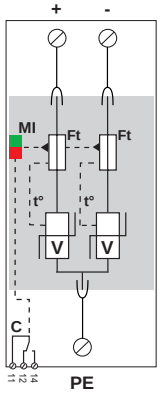
Characteristics

CITEL Model		DDC50S-21Y-500	DDC50S-21Y-800	DDC50S-21Y-1200	DDC50S-21Y-1500
Description		Type 2 DC power surge protector			
Nominal DC voltage	Un	450 Vdc	650 Vdc	1000 Vdc	1200 Vdc
Max. DC operating voltage	Uc	500 Vdc	800 Vdc	1200 Vdc	1500 Vdc
Residual current *Leakage current at Uc*	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA	50 kA	50 kA	50 kA
Max. lightning current by pole *max. withstand @ 10/350µs*	Iimp	4 kA	4 kA	4 kA	4 kA
Protection level +/PE (-/PE) *@ In (8/20µs)*	Up	2.1 kV	2.7 kV	3.6 kV	5.1 kV
Protection level *@ In (8/20µs) +/-*	Up	2.1 kV	2.7 kV	3.6 kV	5.1 kV
Admissible Short circuit current	Isccr	100 000 A	100 000 A	100 000A	100 000 A
Associated disconnectors					
Thermal disconnector		internal			
Fuses		50 A min. (Isccr 100 kA)- 125 A max. (Isccr 50 kA) - High voltage DC Fuses			
Mechanical characteristics					
Dimensions		see diagram - 3 TE (EN43880)			
Connection to Network		Screw terminals: 2.5-25 mm²			
Failsafe mode		Disconnection from network			
Disconnection indicator		3 mechanical indicators Green/Red			
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)			
Wiring for remote signaling		Max. 1.5 mm²			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94-V0			
Spare unit		MDDC50-500	MDDC50-800	MDDC50-1200	MDDC50-1500
Standards					
Compliance		prIEC 61643-41 - UL1449 ed.5			
Part number					
		828511263	828511363	828511563	828511663

DDCxxCS SERIES

- Surge protector for DC or PV powerlines
- From 12 to 350 Vdc
- Compact design
- Remote signaling
- prIEC 61643-41 and UL1449 ed.5 compliance

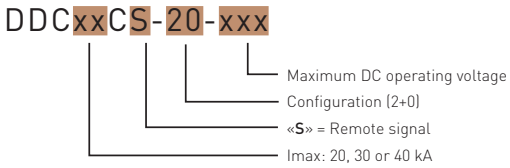




C: Remote signalling contact
V: Varistor
Ft: Thermal fuse
t°: Thermal disconnection system
MI : Disconnection indicators

Characteristics

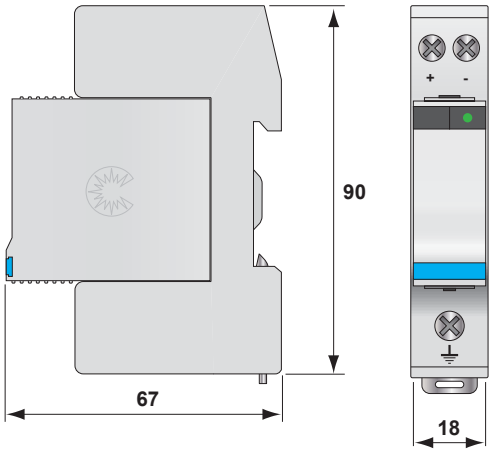
CITEL Model		DDC20CS-20-24	DDC20CS-20-38	DDC30CS-20-65
Network		12Vdc	24Vdc	48 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE
Max. DC operating voltage	Uc	24 Vdc	38 Vdc	65 Vdc
Max. AC operating voltage	Uc	20 Vac	30 Vac	50 Vac
Max. operating voltage PV-DC	Ucpv	24 Vdc	38 Vdc	65 Vdc
Permanent operating current *@ Ucpv*	Icpv	< 0.1 mA	< 0.1 mA	< 0.1 mA
Residual current *Leakage current at Uc*	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA
Follow current	If	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	10 kA	10 kA	15 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	30 kA
Total discharge current *@ 8/20µs*	Imax-total	40 kA	40 kA	60 kA
Protection level +/PE (-/PE) *@ In (8/20µs)*	Up	250 V	250 V	300 V
Protection level +/- *@((8/20µs)*	Up	500 V	500 V	600 V
Admissible short circuit current	Isccr	10 000 A	10 000 A	10 000 A
Current withstand short circuit PV	Iscpv	1000 A	1000 A	1000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses (if required)		20 A min - 125 A max - Type gG		
Mechanical characteristics				
Dimensions		see diagram, 1 TE (EN43880)		
Connection to Network		by screw terminals: 1.5-10mm² (actives wires) and 2.5-25mm² (ground)		
Disconnection indicator		1 mechanical indicator, Green/Red		
Failure mode		Disconnection from network		
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)		
Wiring for remote signaling		Max. 1.5 mm²		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94-V0		
Spare unit		MDDC20C-20-24	MDDC20C-20-38	MDDC30C-20-65
Standards				
Compliance		prIEC61643-41/ UL1449 ed.5		
Part number				
		828210321	828210421	828310121

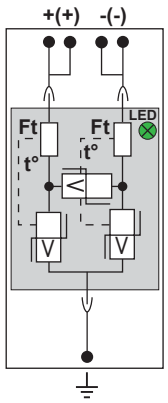


DDC40CS-20-100	DDC40CS-20-125	DDC40CS-20-150	DDC40CS-20-180	DDC40CS-20-275	DDC40CS-20-350	DDC40CS-20-460
75 Vdc	95 Vdc	110 Vdc	130 Vdc	220 Vdc	280 Vdc	350 Vdc
+/-/PE	+/-/PE	+/-/PE	+/-/PE	+/-/PE	+/-/PE	+/-/PE
100 Vdc	125 Vdc	150 Vdc	180 Vdc	275 Vdc	350 Vdc	460 Vdc
75 Vac	95 Vac	115 Vac	150 Vac	210 Vac	275 Vac	350 Vac
100 Vdc	125 Vdc	150 Vdc	180 Vdc	275 Vdc	350 Vdc	460 Vdc
< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
None	None	None	None	None	None	None
20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
40 kA	40 kA	40 kA	40 kA	40 kA	40 kA	40 kA
80 kA	80 kA	80 kA	80 kA	80 kA	80 kA	80 kA
390 V	450 V	500 V	620 V	900 V	1200 V	1400 V
780 V	900 V	1000 V	1200 V	1800 V	2400 V	2800 V
10 000 A	10 000 A	10 000 A	10 000 A	10 000 A	10 000 A	10 000 A
1000 A	1000 A	1000 A	1000 A	1000 A	1000 A	1000 A
50 A min. - 125 A max. - Type gG						
MDDC40C-20-100	MDDC40C-20-125	MDDC40C-20-150	MDDC40C-20-180	MDDC40C-20-275	MDDC40C-20-350	MDDC40C-20-460
828410521	828410621	828410721	828410821	828410921	828411021	828411121

DS210-xxDC SERIES

- Surge protector for DC or PV powerlines
- From 12 to 130Vdc
- Imax: 2 to 6 kA
- Operating indicator
- Pluggable module
- prIEC 61643-41 and UL1449 ed.5 compliance





V: Varistor
Ft: Thermal fuse
t°: Thermal disconnection system
LED : Disconnection indicator

Characteristics

CITEL Model		DS210-12DC	DS210-24DC	DS210-48DC
Description		DC or PV power surge protector		
Network		12 Vdc	24 Vdc	48 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. DC operating voltage	Uc	15 Vdc	30 Vdc	56 Vdc
Max. AC operating voltage	Uc	10 Vac	15 Vac	40 Vac
Max. PV-DC operating voltage	Ucpv	15 Vdc	30 Vdc	56 Vdc
Permanent operating current *@ Ucpv*	Icpv	< 0.1 mA	< 0.1 mA	< 0.1 mA
Residual current *Leakage current at Uc*	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA
Max. Load current *(if connection serie)*	IL	20 A	20 A	20 A
Nominal discharge current *15 x 8/20 µs impulses*	In	1 kA	1 kA	2 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	2 kA	2 kA	6 kA
Protection level +/PE (-/PE) *@ In (8/20µs)*	Up	85 V	105 V	180 V
Associated disconnectors				
Thermal disconnector		internal		
Fuses (if resqueted)		Fuses type gG- 10 A		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		by screw terminals: 1.5-10mm² (actives wires) and 2.5-25mm² (ground)		
Disconnection indicator		Green led off		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94-V0		
Spare unit		DSM210-12DC	DSM210-24DC	DSM210-48DC
Standards				
Compliance		prIEC 61643-41 / UL1449 ed.5		
Part number				
		440201	440301	440401

DS210-xxxDC

Nominal DC voltage

DS210-75DC	DS210-95DC	DS210-110DC	DS210-130DC
75 Vdc	95 Vdc	110 Vdc	130 Vdc
+/-/PE	+/-/PE	+/-/PE	+/-/PE
CM/DM	CM/DM	CM/DM	CM/DM
85 Vdc	100 Vdc	125 vdc	150 Vdc
60 Vac	75 Vac	95 Vac	115 Vac
85 Vdc	100 Vdc	125 Vdc	150 Vdc
< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
20 A	20 A	20 A	20 A
2 kA	2 kA	2 kA	2 kA
6 kA	6 kA	6 kA	6 kA
250 V	300 V	350 V	400 V

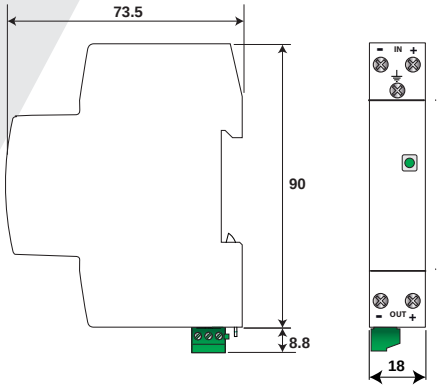
DSM210-75DC	DSM210-95DC	DSM210-110DC	DSM210-130DC
440601	441001	440901	440602

DDCN-DC SERIES

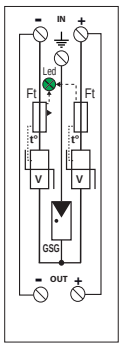
- SPD for 24 or 48 V DC
- Serial Connection (2-port)
- Type 2 (or Type 3)
- In : from 1.5 kA / Imax : up to 6 kA
- Monobloc
- Remote signaling (option)
- prIEC 61643-41 compliance

DDCNxxS-x21YG-xx

- Max operating DC voltage.
- " " : parallel disconnection / "**L**" : series disconnection
- «**S**» = Remote signaling option
- Imax



DDCN*-21YG-*



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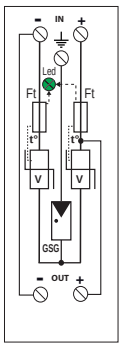

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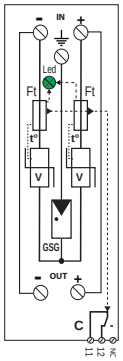

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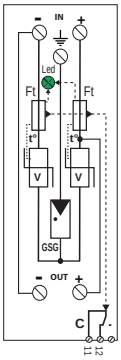


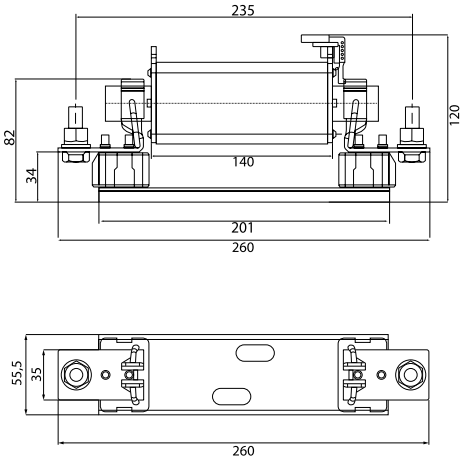
V: Varistor
GSG : Specific Gas Tube
Ft: Thermal fuse
t°: Thermal disconnection system
LED : Disconnection indicator
C : Remote signaling contact

Caracteristics

CITEL Model		DDCN03-21YG-30	DDCN06-21YG-65
Description		Type 2 (or 3) , 2-port DC powr SPD	
Nominal DC voltage	Un	24 Vdc	48 Vdc
Connection mode		+/-/PE	+/-/PE
Maximal operating voltage.	Uc	30 Vdc	65 Vdc
Max load current	IL	25 A	25 A
Residual current *Leakage current @ Uc*	Ipe	none	none
Nominal discharge current *15 x 8/20 µs impulses*	In	1.5 kA	2 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	3 kA	6 kA
Whithstand in combination waveform *Classe III Test*	Uoc	3 kV	4 kV
Protection level +/- *@ In (8/20µs)*	Up	0.2 kV	0.5 kV
Protection level +/PE (or -/PE) *@ In (8/20µs)*	Up	0.8 kV	0.8 kV
Associated disconnectors			
Thermal disconnector		internal	
Fuses (if resqueted)		25 A type gG	
Mechnical characteristics			
Dimensions		see diagram , 1 TE (EN43880)	
Connection to Network		by screw 1.5-10 mm²	
Failure mode		Disconnection	
Operation indication		Green indicator ON	
Disconnection indication		Green indicator OFF	
Parallel Disconnection Mode		DDCN03-21YG-30	DDCN06-21YG-65
Serial disconnection mode *AC network cut Off*		DDCN03-L21YG-30	DDCN06-L21YG-65
With remote signaling *output NC contact*		DDCN03S-21YG-30 DDCN03S-L21YG-30	DDCN06S-21YG-65 DDCN06S-L21YG-65
Max. Voltage/current for Remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)	
Remote signaling wiring		max. 1.5 mm²	
Mounting		Symmetrical rail 35 mm (EN60715)	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94-V0	
Standards			
Compliance		IEC 61643-11, prIEC 61643-41	
Part Number			
Standard Version		DDCN03-21YG-30 70124041	DDCN06-21YG-65 70134051
Series disconnection Version		DDCN03-L21YG-30 70125041	DDCN06-L21YG-65 70135051
Remote signaling Version		DDCN03S-21YG-30 70124042	DDCN06S-21YG-65 70134052
Remote signaling & Series disconnection Version		DDCN03S-L21YG-30 70125042	DDCN06S-L21YG-65 70135052

SFD50S-10-1500DC

- **Specific fuse for short circuit protection of Type 2 DC SPD**
- **For Energy Storage System (ESS) application**
- **To associate with CITEL SPD range: DDC50-21Y**
- **Status and remote signaling**
- **Supplied with mounting base**
- **IEC 60269-7 compliance**



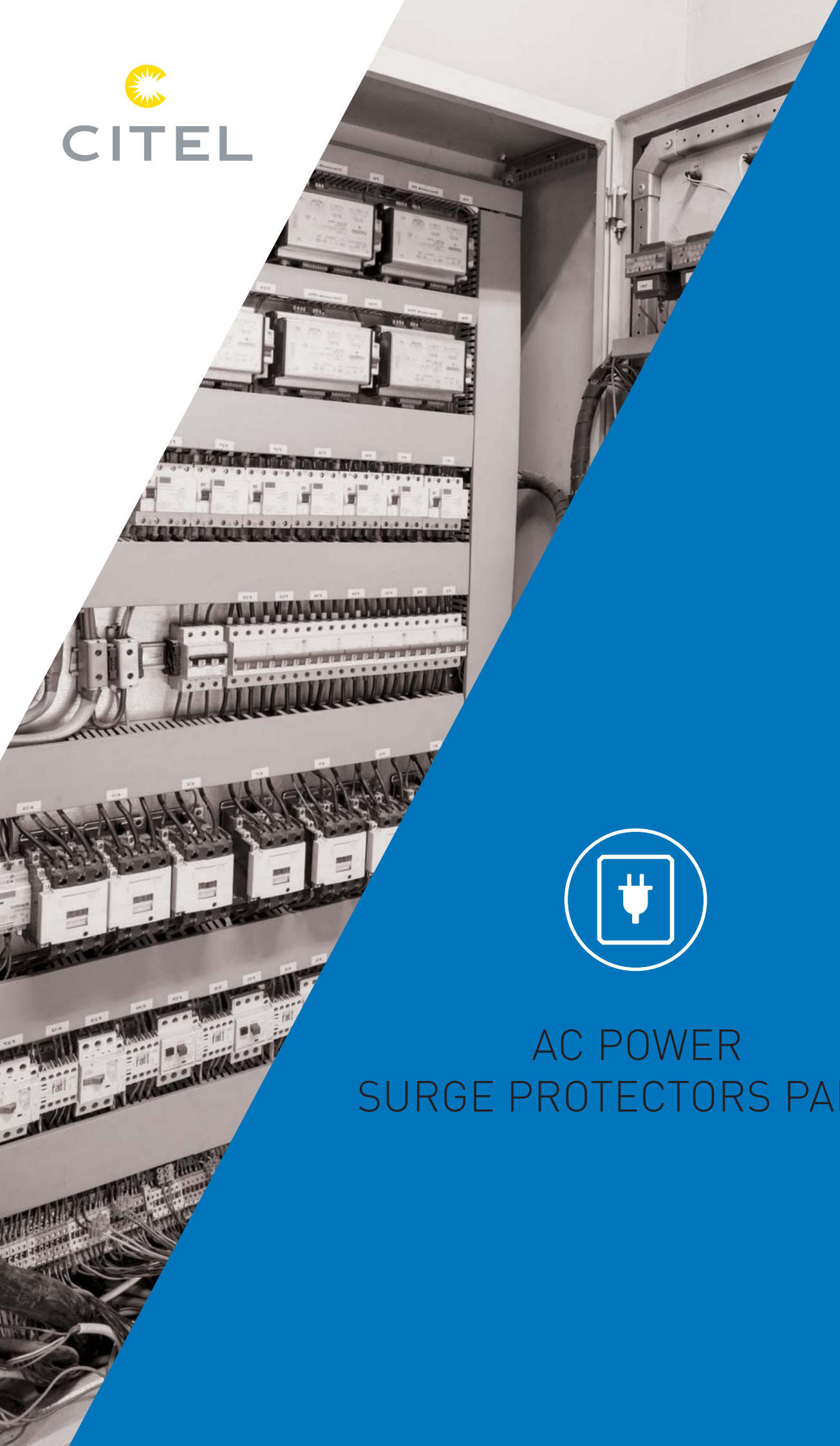
CITEL Model		SFD50-1500DC
Description		DC fuse with its base and remote signal
Max. DC operating voltage	Uc	1500 Vac
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA
Equivalent rated AC current		50 A gBat
Breaking capacity		100 000 A
Power dissipation		14 W / 6 W (0,7xIn)
Mechanical characteristics		
Dimensions		see diagram
Fuse configuration		1 pole
Format		NH1XL
Mounting		On CITEL base BSFD50-10 (PN:39602) or equivalent
Diconnection indicator		Top fuse status indicator
Weight		0,75 kg
Standards		
Standards compliance		IEC 60269-7
RoHS compliance		yes
Part number		
		3960239601

ESS KIT

DC SURGE PROTECTOR + ASSOCIATED FUSES FOR ESS

CITEL model	Part number
ESS KIT DDC50S-21Y-1200	64146
ESS KIT DDC50S-21Y-1500	64147

CITEL



AC POWER
SURGE PROTECTORS PANEL

AC SURGE PROTECTORS HARD-WIRED UNITS AND COMBINER BOXES

CITEL offers a line of surge protectors for the single and three phase AC networks connected to sensitive equipment.
These products, are available in various formats

- Hard-wired units single-phase (MSB, MLP)
- Hard-wired units and combiner box for US market (M series)

Series		Description	Characteristics	Page
MSB		Hard-wired SPD Type 2 or 3	compact	91 93
M50		Hard-wired SPD US market	Single-phase or 3-phase	95
MS MDS MP		SPD combiner boxes US market	Compliance UL1449 5th ed. 80 to 200 kA	94 97 99

HARD-WIRED SURGE PROTECTORS

MSB series

SPDs Type 2 or 3 for effective protection of sensitive equipment, in addition to the surge protector installation (coordination surge protector). Recommended installation near a sensitive equipment away from the surge protector (> 10 m). These surge protectors utilize a compact and economical varistor-based-scheme, to obtain a power flow relevant for secondary protection. They are more in accordance with IEC 61643-11, equipped with internal security which will disconnect the product of their networks for end of life. The operating condition of the arrester is signaled by light (or buzzer for version MSB6). Available in screw terminal connectors or pre-wired cabling.

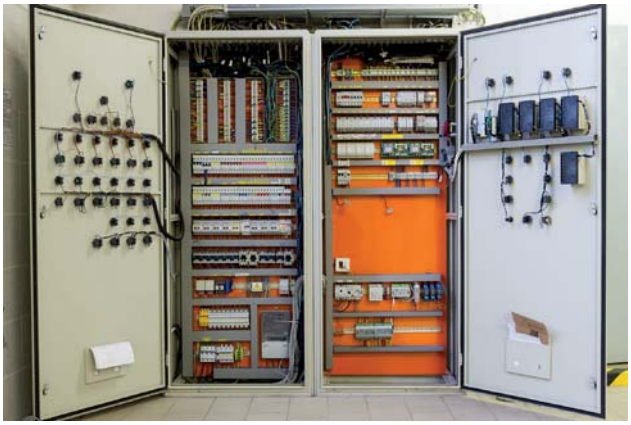
MLPC/MLPM series

Complete ranges of compact surge protectors specifically designed for the protection of outdoor lighting equipment with LED technology (see page 103).

STAND ALONE SPD ENCLOSURES

M series

M series surge protection devices (M50, MS and MDS) in metal enclosures belong to a complete family of surge protection devices specifically designed to meet the requirements of the North American surge protection standards: USA and Canada. Respectively, the UL1449 5th ed. standard and the C22.2 No.269.1–22.2 No.269.5 standards. These standards define different categories of surge protection devices (SPD) and unfortunately use very close or identical terms compared to the SPD classification used in International standards. It is therefore crucial not to confuse these terms and understand their meaning based on the reference standards.



UL STANDARDS

The north American standard applicable to AC power SPD (UL1449 5thedition) proposes a different approach and classification from the international standard (IEC61643-11)

Type 1 - Permanently connected surge protection devices to be installed both, on the supply side and the load side of the equipment main overcurrent protective device. The surge protection devices are supposed to be self-protected against short circuits and do not require external protection.

Type 2 - Permanently connected surge protection devices to be installed on the load side of the equipment main overcurrent protective device. This surge protection device requires an external short circuit protection device.

Type 3 - Surge protection devices installed at a conductor length of 10 meters or greater from the electrical panel. For example, the mobile surge protectors (that can be plugged into the outlet such as a multiple power outlet etc.). They can also be directly installed on the equipment to be protected.

Type 4 « Component Assemblies » - Component Assemblies consisting of one or more Type 5 components and a disconnect complying with the limited end-of-life short circuit current tests (0.5A, 2.5A, 5A and 10A).
Type 1, 2, 3 « Component Assemblies » - Type 4 Component Assemblies having, in addition to the limited end-of-life short circuit current tests, passed all the other end-of-life tests (under the short circuit current of 100A, 500A, 1000A and SCCR) and also with (2CA) or without (1CA) external short circuit protection

Type 5 - Discrete component surge suppressors, such as MOVs, Diode or GDT that may be mounted on a PCB, connected by its leads or provided within an enclosure with mounting means and wiring terminations.
It is therefore clear from these definitions that Type 1 and Type 2

surge protection devices (according to the US-accepted terminology) are not necessarily linked to potential surge hazard as it is in the International approach (IEC). In UL standard, Type 1 and Type 2 surge protection devices are determined by the fact whether or not they need a short circuit protection. However, depending on the impulse tests, the minimum levels required for a Type 1, Type 2 and Type 3 surge protection devices are as follows :
Type 1 – 10kA or 20kA 8/20
Type 2 – 3kA, 5kA, 10kA or 20kA 8/20
Type 3 – 6kV/3kA 1,2/50-8/20

It is also understood that the location of the surge protection device imposed by its type is related to a certain stress level naturally being such that: the closer the surge protection device is to the mains connection point the greater its ability to withstand the surge.
Note that the maximum nominal discharge current is set at 20 kA (equivalent to International nominal discharge current (In) but it has no limitation and much lower in energy than the maximum impulse current (Iimp) of International Type 1).

Also important to remember that even if it is very tempting to compare the American voltage protection rating (VPR) and the International voltage protection level (Up), they are not (yet) comparable. The VPR is determined for any type of American SPD by using by a 6 kV/3 kA combination waveform generator.

The concept of "Listed" or "Recognized"

is important to understand particularly regarding the installation according to the American installation rules. A listed product is a device that any electrician can install on an installation (on site) without compromising safety. A recognized device cannot be installed on an installation. It can only be installed on a piece of equipment or a system (e.g. electrical cabinet) by professionals, at the factory, following certain rules and may be a subject to additional tests.

Imax parameter

Another disconcerting and confusing aspect is the maximum discharge current (Imax) values indicated for American surge protection devices:
- For an International surge protection device, the Imax value is defined by standards and must be tested if declared.
- For an American surge protection device, Imax has no official definition and is completely open to various interpretations by users and manufacturers.

The easiest interpretation is that the Imax does not represent a maximum single shock that the surge protection device can withstand but reflects its durability. This Imax is the algebraic sum of the individual Imax values of possible multiple varistors connected in parallel for each declared protection mode.
For example, if the protection mode (common in the USA) phase with the neutral and the ground connected (usually called "per phase") consists of 5 varistors between the line and the neutral and 5 varistors between the line and the earth (each varistor having an individual Imax value of 40kA), the final declared Imax value will be 5x40+5x40=400kA...
This type of value totally escapes from the International logic but is useful information for American users as it gives an idea of the surge protection device capacity in terms of its service life.
Other example, a surge protection device with a In of 20kA and declared Imax of 40kA will not be able to withstand much more than 20 shocks of 20kA. On the other hand, a surge protection device having the same In of 20kA and declared Imax of 400kA will be able to withstand more than 2000 shocks of 20kA!
Conversely, the International Type 1 design with its characteristic of 10/350 wave maximum impulse current (Iimp) is completely unknown (and not accepted) in the USA.

5th Edition	**Line Side of Main Disconnect**	**Load Side of Main Disconnect**	**Local Equipment**	**Surge component + Thermal Disconnect (component assembly)**	**Surge Component Only**
	No upstream fuse requested	*Upstream fuse requested*	*Upstream fuse requested + distant 30ft from main panel*	*To be used in equipment/ panel. UL additional tests expected*	*To be used in equipment UL additonal test expected*
Listed	Type 1	Type 2	Type 3	-	-
Listed + condition (enclosure) (a)	Open- Type 1	Open- Type 2	Open- Type 3	-	-
Recognized (b)	Type 1CA	Type 2CA	Type 3CA	Type 4CA	Type 5
Required Tests	- SCCR - Intermediate - Limited (10, 5, 2.5 , 0.5 A) - VPR at 6kV/3kA - Nominal Discharge Current (15 x In: 10, 20 kA) - -	- SCCR - Intermediate - Limited (10, 5, 2.5 , 0.5 A) - VPR at 6kV/3kA - Nominal Discharge Current (15 x In: 3, 5, 10, 20 kA) - -	- - - Limited (10, 5, 2.5 , 0.5 A) - VPR at 6kV/3kA - - Operating Duty Cycle (15 x UOC: 6, 10, 20 kV) -	- - Limited (10, 5, 2.5 , 0.5 A) - - Nominal Discharge Current (15 x In: 0.01 to 20 kA) - - MLV at In	- - - - Nominal Discharge Current (15 x In: 0.01 to 20 kA) - - MLV at In
Optional Tests	-Field wiring (Not for CA)	-Field wiring (Not for CA)	-Field wiring (Not for CA) - Nominal Discharge Current (In x 15) -SCCR, Intermediate if permanently connected	- VPR at 6kV/3kA	

(a) field wiring. Can be installed by any electricien on site
(b) factory wiring/use. Cannot be installed on field. Must be installed in certified factory in products or cabinet.
Note 1: For component assembly (1CA and 2CA), Type 1 and Type 2 applications are considered in regards to nominal discharge current test. If Type3 application this is replaced by Operating Duty test.
Note 2: For reading simplification, thermal tests are not shown in this table but have to be considered.


MSB10-400(UL)

MSB10 SERIES

- **Compact Type 2+3 surge protectors**
- **Wall mounting and hard wired connection**
- **UL1449 5ed. and IP66 (MSB10-400)**
- **Status indicators**
- **EN 61643-11, IEC 61643-11 and UL1449 5th. compliance**

Characteristics

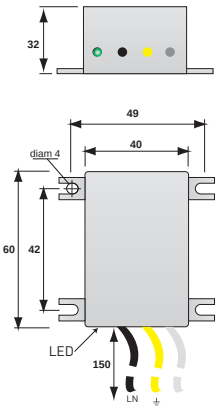
CITEL Model		MSB10-400(UL)	MSB10-480(UL)	MSB10-120(UL)	MSB10-400	MSB10V-400	MSB10V-120	MSB10C-400
Description		Compact Type 2+3 hard wired SPD						
Network		230 V single phase	347-480 Vac single phase	120 V single phase	230 V single phase	230 V single phase	120 V single phase	230 V single phase
AC system		TT-TN	TT/TN	TT/TN	TT-TN	TT-TN	TT/TN	TT-TN
Protection mode(s)		CM/DM	CM/DM	CM/DM	CM/DM	CM/DM	CM/DM	CM/DM
Max. AC operating voltage	Uc	300 Vac	550 Vac	150 Vac	255 Vac	255 Vac	150Vac	255 Vac
Max. Load current	IL	-	-	-	-	16 A	16 A	16 A
Residual current *Leakage current at Uc*	Ic	< 1 mA	< 1 mA	None	None	None	None	None
Temporary Over Voltage (TOV) *Charasteristics - 5 sec.*	UT	335 Vac withstand	700 Vac withstand	180 Vac withstand	335 Vac withstand	335 Vac withstand	180 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) *Charasteristics - 120 mn*	UT	440 Vac disconnection	915 Vac disconnection	230 Vac disconnection	440 Vac disconnection	440 Vac disconnection	230 Vac disconnection	440 Vac disconnection
Nominal discharge current	In	3 kA	3 kA	3 kA	3 kA	3 kA	3 kA	3 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Withstand on Combination waveform *Class III test*	Uoc	6 kV	6 kV	6 kV	6 kV	6 kV	6 kV	6 kV
Withstand on overvoltages *IEEE C62.41.1*		10 kV/10 kA	10 kV/10 kA	10 kV/10 kA	10 kV/10 kA	10 kV/10 kA	10 kV/10 kA	10 kV/10 kA
Protection level CM/DM *@In (8/20µs) and @ 6kV (1.2/50µs)*	Up	1.2 kV/1.2 kV	2 kV/2 kV	1 kV/1 kV	1.5 kV/1.5 kV	1.5 kV/1.5 kV	1 kV/1 kV	1.5 kV/1.5 kV
Admissible short-circuit current	Isccr	10 000 A	10 000 A	10 000 A	10 000 A	10 000 A	10 000 A	10 000 A
Associated disconnectors								
Thermal disconnector		internal						
Installation ground fault breaker		Type «S» or delayed						
Mechnical characteristics								
Dimensions		see diagram						
Connection to Network		wires	wires	wires	wires	screw terminal	screw terminal	screw terminal
Voltage/operating indicator		Green led ON						
Failsafe behavior		Disconnection	Disconnection	Disconnection	Disconnection	Disconnection and AC line cut-off	Disconnection and AC line cut-off	Disconnection and AC line cut-off
Disconnection indicator		Green led OFF						
Mounting		Wall or plate						
Operating temperature		-40/+85°C						
Protection rating		IP66	IP66	IP65	IP65	IP20	IP20	IP20
Housing material		Thermoplastic UL94 V-0						
Standards								
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5						
Certification		UL / TUV	UL	UL	-	-	-	-
Part number								
		561501	561801	561601	561201	561101	561602	561301

MSB10C

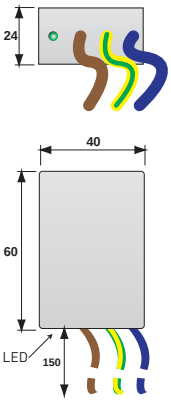
MSB10V

MSB10

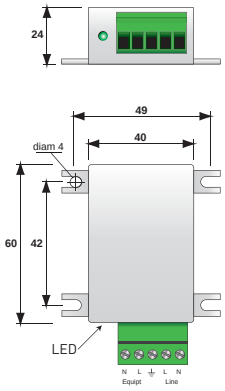
MSB10-UL



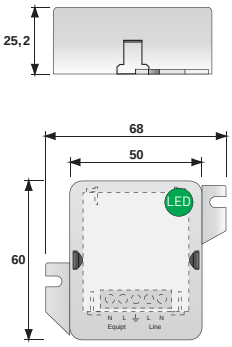
MSB10



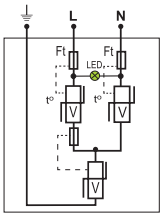
MSB10V



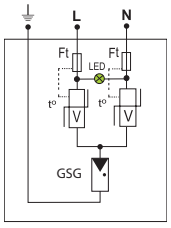
MSB10C



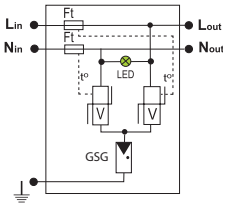
MSB10-xx(UL)



MSB10



MSB10V/MSB10C



V: Varistor
Ft: Thermal fuse
T°: Thermal system disconnection
GSG: Specific Gas Tube
LED: Disconnection indicator

MSB6-400

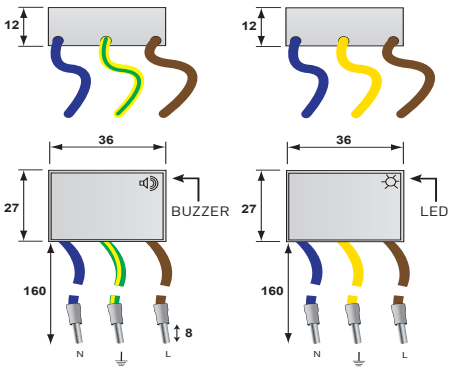
MSB6-24LD

MSB6 SERIES

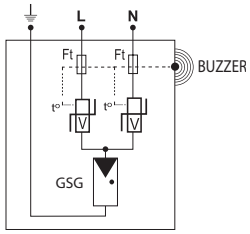
- **Ultra Compact Type 3 surge protectors for 230 Vac networks**
- **Mounting on plate or terminal**
- **Disconnection signaling by buzzer or Led system**
- **24 V AC or DC version available**
- **EN 61643-11, IEC 61643-11 and UL1449 5ed. compliance**

MSB6-400

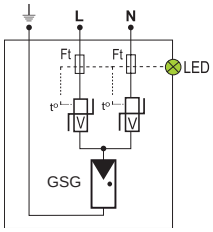
MSB6-400/LD
MSB6-24/LD



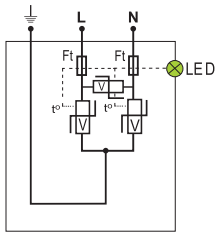
MSB6-400



MSB6-400/LD



MSB6-24/LD



V: Varistor
Ft: Thermal fuse
LED: Disconnection indicator
T°: Thermal system disconnection
GSG: Specific Gas Tube
Buzzer : Sound disconnection indicator

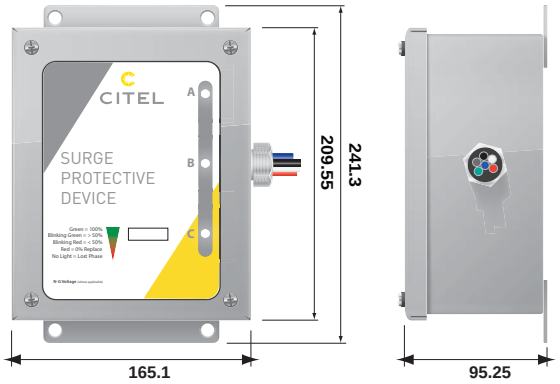
Characteristics

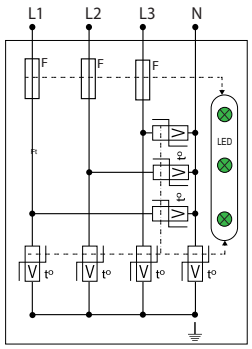
CITEL Model		MSB6-400	MSB6-24/LD	MSB6-400/LD
Description		Compact Type 3 hard wired SPD	Ultra Compact Type 3 hard wired SPD	Ultra Compact Type 3 hard wired SPD
Network		230 V single phase	24 Vac-30Vdc	230 V single phase
AC system		TT-TN	-	TT-TN
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. AC operating voltage	Uc	255 Vac	30 Vac-38 Vdc	255 Vac
Residual current *Leakage current at Uc*	Ic	None	None	None
Temporary Over Voltage (TOV) Characteristics - 5 sec.	UT	335 Vac withstand	36 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Characteristics - 120 mn	UT	440 Vac disconnection	42 Vac disconnection	440 Vac disconnection
Nominal discharge current *15 x 8/20 µs impulses*	In	3 kA	0.5 kA	3 kA
Max. discharge current *max. withstand ⍳ 8/20 µs by pole*	Imax	6 kA	2 kA	6 kA
Withstand on Combination waveform *- Class III test*	Uoc	6 kV	1 kV	6 kV
Withstand on overvoltages *IEEE C62.41.1*		6 kV/6 kA	-	6 kV/6 kA
Protection level CM/DM *(⍳In (8/20µs) and ⍳ 6kV (1.2/50µs)*	Up	1.5 kV/1.5 kV	0.18 kV/0.18 KV	1.5 kV/1.5 kV
Admissible short-circuit current	Isccr	3 000 A	3 000 A	3 000 A
Associated disconnectors				
Thermal disconnector		internal		
Installation ground fault breaker		Type «S» or delayed		
Mechanical characteristics				
Dimensions		see diagram		
Connection to Network		wires		
Voltage/operating indicator		without	Green Led ON	Green Led ON
Failsafe behavior		Disconnection		
Disconnection indicator		buzzer ON	Led OFF	Led OFF
Mounting		AC outlet or screw terminal	AC outlet or screw terminal	AC outlet or screw terminal
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5		
Part number				
		561302	561313	561312

CITEL

SERIES MS

- **Imax from 105 to 220 kA (8/20µs)**
- **All mode of protection**
- **200 kA short-circuit fault current rated**
- **Multi-redundant protection circuit per phase**
- **Full on-board diagnostics - LED indicators, remote and audible alarms**
- **EMI/RFI noise filtering (option)**
- **NEMA 4/4X/12 enclosure**
- **UL 1449 5th Ed. Type 1 listed**
- **Lightning counter (option)**





V: High energy varistor
t° : Thermal disconnector
F : Fuse
LED : Failure indicator

Characteristics

Series	MS80	MS100	MS160	MS200
Max. discharge current by phase Imax	88 kA	132 kA	176 kA	220 kA
Type of Network				
120/240 Vac Split Phase 3Ph+PE	MS80-120T	MS100-120T	MS160-120T	MS200-120T
120/208 Vac Wye 3Ph/N+PE	MS80-120Y	MS100-120Y	MS160-120Y	MS200-120Y
277/480 Vac Wye 3Ph/N+PE	MS80-277Y	MS100-277Y	MS160-277Y	MS200-277Y
240/415 Vac Wye 3Ph/N+PE	MS80-240Y	MS100-240Y	MS160-240Y	M2S00-240Y
120/120/240 Vac Hi-Leg Delta 3Ph/N PE	MS80-240DCT	MS100-240DCT	MS160-240DCT	MS200-240DCT
240 Vac Delta 3Ph+PE	MS80-240D	MS100-240D	MS160-240D	MS200-240D
347/600 Vac Wye 3Ph/N+PE	MS80-347Y	MS100-347Y	MS160-347Y	MS200-347Y
480 Vac Delta 3Ph+PE	MS80-480D	MS100-480D	MS160-480D	MS200-480D
Protection modes	L/N - L/PE - N/PE - L/L			
Admissible short-circuit current	200 kA			
RFI filtering	- 40 dB			
Standards compliance	UL1449 5th edition - IEC 61643-1			
Safety				
Thermal disconnector	internal to each component			
Electrical disconnector	internal to each surge protector			
Failure indicators	by Led			
Failure indicators	audible alarm and remote signaling			
Mechanical characteristics				
Housing material	Metal-NEMA 4, NEMA 12, Stainless steel-NEMA 4X			
Operating temperature	-40/+85 °C			
Mounting	Wall mounting by screws (not supplied)			
Connection to AC network	#10 AWG 36'' Leads			
Dimensions (H x L x D)	203 x 152 x 101 mm (8''x 6''x 4'')			
Specific features				
Disconnection switch	no			

Version	Network	Voltage max. (Uc)	Residual voltage (V) following UL1449@500A			
			L-N	L-PE	N-PE	L-L
MSxxx-120T	120/240 Vac Split Phase 3Ph+PE	150Vac	700	700	700	1000
MSxxx-120Y	120/208 Vac Wye 3Ph/N+PE	150Vac	700	700	700	1000
MSxxx-277Y	277/480 Vac Wye 3Ph/N+PE	320Vac	1000	1200	1000	1800
MSxxx-240Y	240/415 Vac Wye 3Ph/N+PE	320Vac	1000	1200	1000	1800
MSxxx-240DCT	120/120/240 Vac Hi-Leg Delta 3Ph/N PE	150/320Vac	1000	1200	1000	1800
MSxxx-240D	240 Vac Delta 3Ph+PE	320Vac	-	1200	-	1800
MSxxx-347Y	347/600 Vac Wye 3Ph/N+PE	550Vac	1800	1800	1800	3000
MSxxx-480D	480 Vac Delta 3Ph+PE	500Vac	-	1800	-	3000

M50 SERIES

M50-120Y-A

- **For AC Single Phase and 3-phase network (wye, delta, split phase)**
- **In: 20 kA**
- **Imax: 50 kA**
- **No leakage current**
- **Visual indicator and audible alarm**
- **Formats: side or back nipple**
- **UL 1449 5th Ed. certification**

Characteristics

Model		M50-120Y-*	M50-120T-*	M50-120S-*	M50-230S-*	M50-240T-*	M50-240D-*	M50-277Y-*	M50-347Y-*	M50-480D-*	M50-600D-*
System voltage		120-208 V	120-240 V	120 V	230 V	240-480V	240 V	277-480 V	347-600 V	480 V	600 V
AC System		4W+G Wye	3W+G Split Phase	2W+G Single Phase	2W+G Single Phase	3W+G Split Phase	3W+G Delta	4W+G Wye	4W+G Wye	3W+G Delta	3W+G Delta
Frequency		50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Residual current *-Leakage current at MCOV*	Ipe	None	None	None	None	None	None	None	None	None	None
Maximum Operating Voltage L- PE	MCOV	140 V	140 V	140 V	270 V	280 V	280 V	320 V	400 V	550 V	690 V
Maximum Operating Voltage L- N	MCOV	140 V	140 V	140 V	270 V	280 V	-	320 V	400 V	-	-
Maximum Operating Voltage N-PE	MCOV	120 V	120 V	120 V	230 V	240 V	-	280 V	350 V	-	-
Maximum Operating Voltage L-L	MCOV	240 V	280 V	-	-	480 V	280 V	560 V	560 V	560 V	690 V
Short Circuit Current Rating	SCCR	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA
Follow current	If	None	None	None	None	None	None	None	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Max. discharge current L-N *max. withstand Ø 8/20 µs*	Imax	50 kA	50 kA	50 kA	50 kA	50 kA	50 kA	50 kA	50 kA	50 kA	50 kA
Max. discharge current N-PE *max. withstand Ø 8/20 µs*	Imax	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA
Total lightning current *max. total withstand Ø 8/20 µs*	Itotal (8/20)	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA	100 kA
Total lightning current *max. total withstand Ø 10/350 µs*	Itotal (10/350)	15 kA	12 kA	8 kA	8 kA	12 kA	12 kA	15 kA	15 kA	12 kA	12 kA
Voltage Protection Rating L-PE	VPR	1400 V	1400 V	1400 V	1300 V	1300 V	1400 V	1300 V	2000 V	1300 V	2000 V
Voltage Protection Rating L-N	VPR	600 V	600 V	600 V	1200 V	1200 V	-	1200 V	2000 V	-	-
Voltage Protection Rating N-PE	VPR	1300 V	1300 V	1300 V	1300 V	1300 V	-	1300 V	1800 V	-	-
Voltage Protection Rating L-L	VPR	1100 V	1100 V	-	-	2100 V	1100 V	2100 V	3000 V	2100 V	2600 V
Associated disconnectors											
Maximum recommanded fuse		200 A, Class J									
Thermal disconnector		internal									
Mechnical characteristics											
Dimensions		see diagram									
Visual disconnection indicator		LED off									
Sound disconnection indicator		Continuous Buzzer									
Connection to Network		#12 AWG wires - 24 '' length									
Operating Temperature		-40/+85 C°									
Housing material		Aluminum cast									
Mounting type		Side or back nipple (Version A or B) T hreaded (M22) - NTP 1/2 adaptor available									
Environmental rating		IP66 / NEMA 6									
Location Installation		Indoor / outdoor									
Standards											
Compliance		IEC 61643-11									
Certification**		UL1449 5th Ed. - File E326289									
Part Number											
for A version (side nipple)		751101	751102	751103	751303	751402	751404	751501	751601	751704	751804
for B version (back niplle)		751111	751112	751113	751313	751412	751414	751511	751611	751714	751814

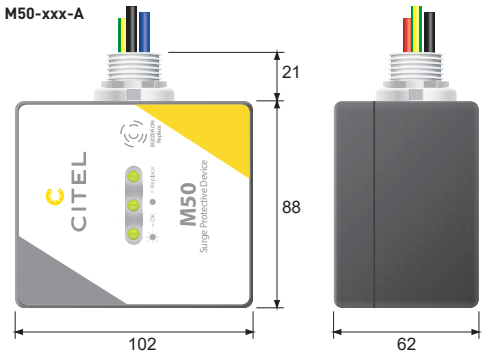
* = A or B
** M50-347Y = UL pending

M50x-120Y-B-YY

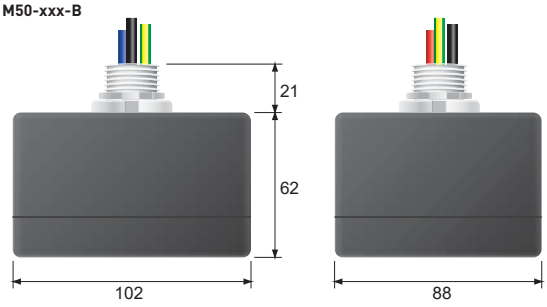
- yy-RA : Remote contacts
- Output type:
  A: side nipple
  B: back nipple
- AC network type
- AC voltage network
- F : RFI filter

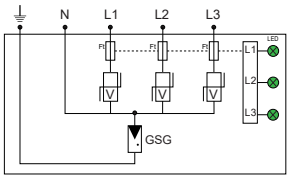
LISTED

M50-xxx-A



M50-xxx-B





LED : Disconnection indicator
Ft : Thermal fuse
GSG : Specific gas tube
V: High energy varistor

SERIES MDS

- **Type 1 surge protection panels**
- **Real time diagnostics**
- **Optional integrated disconnect**
- **Itotal : 300kA , 600 kA, 750 kA**
- **UL1449 5th Ed.**

Characteristics

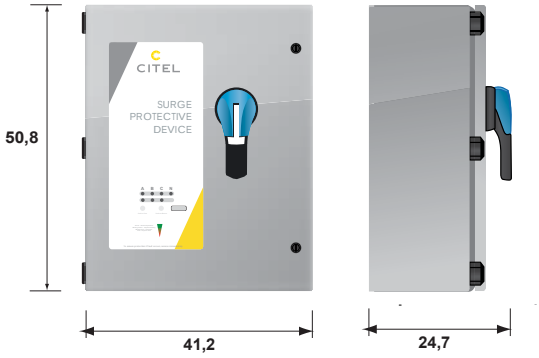
CITEL model		MDS300*				MDS600*				MDS750*			
Suffix		-120T -120Y	-240Y -240D	-277Y -347Y	-480D -600D	-120T -120Y	-240Y -240D	-277Y -347Y	-480D	-120T -120Y	-240Y -240D	-277Y -347Y	-480D -600D
Network		120/240 V 120/208 V	240/415 V 240 V	277/480 V 347/600 V	480 V 600 V	120/240 V 120/208 V	240/415 V 240 V	277/480 V 347/600 V	480 V 600 V	120/240 V 120/208 V	240/415 V 240 V	277/480 V 347/600 V	480 V 600 V
Max. operating voltage L-PE	MCOV	150-210 V	300-420 V	420-460 V	550 V	150-210 V	300-420 V	420-460 V	550 V	150-210 V	300-420 V	420-460 V	550 V
Temporary Over Voltage (TOV) Charasteristics	Ut	175 Vac	335 Vac	420 Vac	840 Vac	175 Vac	335 Vac	420 Vac	840 Vac	175 Vac	335 Vac	420 Vac	840 Vac
Nominal discharge current *15 impulses 8/20µs*	In	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Total lightning current *8/20µs*	Itotal	300 kA	300 kA	300 kA	300 kA	600 kA	600 kA	600 kA	600 kA	750 kA	750 kA	750 kA	750 kA
Max. lightning current *1 impulse 10/350µs*	Iimp	22 kA	22 kA	22 kA	22 kA	44 kA	44 kA	44 kA	44 kA	55 kA	55 kA	55 kA	55 kA
Follow current	If	none	none	none	none	none	none	none	none	none	none	none	none
Protection level* *at 3 kA + connection*	VPR	900	1200	1800	2000	900	1200	1800	2000	900	1200	1800	2000
Protection level * at In	Up	900	1200	1800	2000	900	1200	1800	2000	900	1200	1800	2000
Short-circuit current	SCCR	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA	200 kA
Associated disconnectors													
Max. recommended fuse		200 A - Classe J											
Thermal disconnector		Included											
Mechanical characteristics													
Dimensions		See diagram											
Connection		screw terminals, mini 4.5 mm²											
Remote signal indicator		250 Vac max, 2A											
Mounting		Wallmount by screws (not supplied)											
Operating temperature		-50°C/+85°C											
Protection class		NEMA 4 / IP56 / Outdoor											
Housing material		Metal, Stainless steel option											
Standards compliance		NF EN 61643-11 / UL1449 ed.5											
Part number													
		consult us											

* : depends on versions and modes

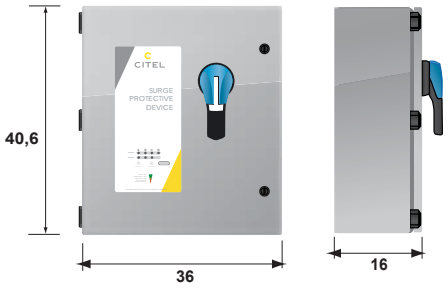
MDSXXX X-xxx x

- Configuration (T,Y,D)
- Voltage
- « » = Basic (Diagnostic by phase, audible alarm, remote alarm)
- «**S**» = Standard (Internal fuse, Diagnostic by phase, audible alarm, remote alarm)
- «**E**» = Enhanced (Internal fuse, external disconnect switch, Diagnostic by phase, audible alarm, remote alarm, surge counter)
- Imax

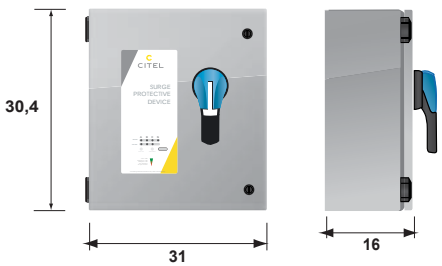
MDS750E series



MDS600E series



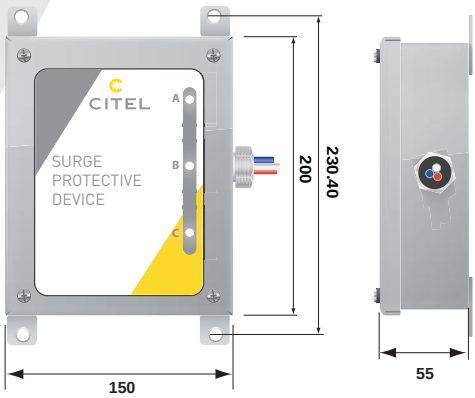
MDS300E series

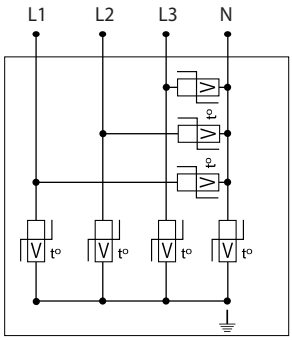


SERIES MP

UL LISTED

- Imax from 105 to 220 kA (8/20µs)
- All mode of protection
- 150 kA short-circuit fault current rated
- Multi-redundant protection circuit per phase
- LED indicators
- NEMA 4x enclosure
- UL 1449 5th Ed. Type 1 listed





V: High energy varistor
t° : Thermal disconnector

Characteristics

Series		MP80	MP100	MS200
Max. discharge current by phase	Imax	88 kA	132 kA	220 kA
Type of Network				
120/240 Vac Split Phase 3W+PE		MP80-120T	MP100-120T	MP200-120T
120/208 Vac Wye 3Ph/N+PE		MP80-120Y	MP100-120Y	MP200-120Y
277/480 Vac Wye 3Ph/N+PE		MP80-277Y	MP100-277Y	MP200-277Y
240/415 Vac Wye 3Ph/N+PE		MP80-240Y	MP100-240Y	MPS00-240Y
120/120/240 Vac Hi-Leg Delta 3Ph/N PE		MP80-240DCT	MP100-240DCT	MP200-240DCT
240 Vac Delta 3Ph+PE		MP80-240D	MP100-240D	MP200-240D
347/600 Vac Wye 3Ph/N+PE		MP80-347Y	MP100-347Y	MP200-347Y
480 Vac Delta 3Ph+PE		MP80-480D	MP100-480D	MP200-480D
Protection modes		L/N - L/PE - L/L		
Nominal discharge current	In	20 kA		
Admissible short-circuit current		150 kA		
Standards compliance		UL1449 5th edition - IEC 61643-1		
Safety				
Thermal disconnector		internal to each component		
Electrical disconnector		internal to each surge protector		
Failure indicators		LED status		
Mechanical characteristics				
Housing material		NEMA 4, Polycarbonate		
Enclosure		UL-94V0		
Operating temperature		-40/+85 °C		
Mounting		Wall mounting by screws (not supplied)		
Connection to AC network		#10 AWG 36'' Leads		
Dimensions (H x L x D)		230,4 x 150 x 55 mm		

	MCOV	VPR			
	L-G	L-L	L-G	L-N	N-G
MPxxx-120T	150Vac	1000	700	700	700
MPxxx-120Y	150Vac	1000	700	700	700
MPxxx-277Y	320Vac	1800	1200	1000	1000
MPxxx-240Y	320Vac	1800	100	1200	1000
MPxxx-240DCT	150/320Vac	1000	700	700	1000
MPxxx-240D	640Vac	1800	1200	-	-
MPxxx-347Y	550Vac	3000	1800	1800	1800
MPxxx-480D	550Vac	3000	1800	-	-

CITEL

CITEL

LED SYSTEMS
SURGE PROTECTORS

SURGE PROTECTORS FOR LED LIGHTING SYSTEM

LED street lighting is now widely used for its efficiency, its energy cost savings and its life expectancy.
Nevertheless this attractive technology has an important weakness: its sensitivity to transient voltages created by lightning or by power switch operations on AC network.

Due to its scattered and over-exposed location, LED lighting system will face induced surges which will create failure of its power supply, damage LED components or loss of the lighting efficiency. For these reasons, the use of relevant surge protectors located upstream the LED lighting systems is highly recommended.

CITEL offers a full range of surge protectors designed to be installed at different points on the lighting network such as streetlights, the base of poles and street cabinets.
CITEL offers solutions adapted to every type of outdoor LED lighting systems : urban, architectural, tunnels etc...

SURGE PROTECTORS FOR LED LIGHTING SYSTEMS

MLPM and MLPC series

The MLPM and MLPC ranges are compact surge protectors to be installed in small spaces. These devices have a same footprint and are equipped with mechanical (MLPM range) or light (MLPC range) disconnection indicator. MLPM provides spring contact connection whereas MLPC is available in 2 types of connectors (screw terminal or spring) and in two orientations wiring (input / output opposite or input / output on the same side) in order to adapt to the installation as much as possible.
In cases of extreme aggression, these SPDs will switch in failsafe mode : the indication of failure (disconnection) of the surge protector will be provided by an indicator and the switching off the AC power (extinction of the luminaire) will inform the user of the need for maintenance.

MLPX series

The MLPX range is an compact surge protection solution for installation in tight spaces.
These surge protectors are available with an output by wires and fixing bracket. In the end of life of security the MLPX indicates its failure (disconnection) by the extinction of an indicator and AC power supply switching off (extinction of the luminaire) inform the user of the need for maintenance.
Its IP67 rating makes the MLPX usable in harsh conditions.

MSB6 series

These very compact surge protectors can be integrated in the very small volumes of certain lights (e.g LED strips). The surge protection circuit is equipped with an end of life indicator buzzer in order to indicate the disconnection of the surge protector.

Series	Description	Characteristics	Page
MLPC **MLPC-VG** 	Compact Hard-wired surge protector Type 2 (or 3)	Compact. Many configurations	103
MLPC1-230L-V/2L 	Compact Hard-wired surge protector Type 2 (or 3)	Compact, 2-phase+N	106
MLPC1-230L-V/DL 	Combined Hard-wired surge protector Type 2 (or 3)	Compact AC/Data	107
MLPC2/ESP2 	Surge and electrostatic protector	Class II Electrostatic protector	108
MLPM 	Compact Hard-wired surge protector Type 2 (or 3)	Compact. Mechanical indicator	105
MLPX 	Ultra-compact hard-wired surge protector Type 2 (or 3)	Ultra compact IP67 VG Technology	112
MSB6 	Hard-wired surge protector Type 3	Very Compact. Buzzer indicator	93
DSLP **DLPM** 	DIN surge protector Type 2 (or 3)	Compact. Montage DIN	113 114
DACN10-L 	DIN surge protector Type 2 (or 3)	Double connector. DIN mounting	115
MLPVM2 	Combined protection for Surge, Temporary and Permanent overvoltages	Class II SPD and POP stages	116
DVM-230-16A 	Permanent & temporary overvoltages protector (POP)	IL 16 A	117

DSLP / DLPM series

This device is installed inside the bottom of the lighting pole : its very compact dimension allows a easy integration with the connection box, on DIN rail .
DSLP1 is based on a powerful association of MOV and GDT components, secured by thermal disconnector and disconnection light indicator. The DLPM version offers a mechanical indicator in order to inform about the status of the SPD without voltage supply.

DACN10-L series

The DACN10-L range is a series of AC surge protector for DIN assembly designed to be installed inside boxes at the bottom of poles: its high load current and double output connection allow several LED circuits to be protected. The DACN10-L is based on an efficient combination of a varistor and a gas discharge tube, secured by thermal disconnector and status indicator.

Street cabinet protection

In order to ensure the real security of the lighting network, the main AC cabinet must also be protected by surge protection devices: surge protectors on the AC network (e.g.: DAC50 range) and, if present, surge protectors on the dataline (e.g.: DLA range).

SURGE PROTECTORS INSTALLATION

MLPC1-230L-R

MLPC1-230L-V

MLPC SERIES

- **Type 2 (or 3) surge protectors for Led lighting**
- **Very compact**
- **Plate mounting**
- **VG technology version**
- **Screw terminal or spring terminal connection**
- **Status indicator**
- **End of life AC Disconnection**
- **IEC 61643-11 and EN 61643-11 certification**

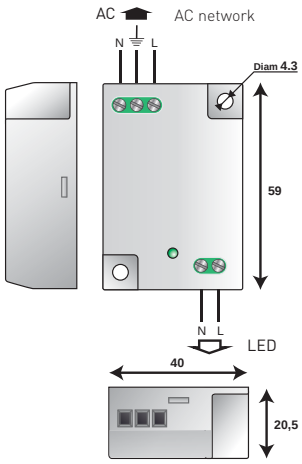
Characteristics

CITEL Model		MLPC1-230L-*	MLPC-VG1-230L-*	MLPC2-230L-R	MLPC-VG2-230L-*
Description		Surge protector Type2 (or 3) for LED lighting			
Application		Class I LED system	Class I LED system	Class II LED system	Class II LED system
Network		220-240 V single phase	220-240 V single phase	220-240 V single phase	220-240 V single phase
AC system		TT/TN	TT/TN	TT/TN	TT/TN
Protection mode(s)		CM/DM*	CM/DM*	DM*	DM*
Max. AC operating voltage	Uc	320 Vac	320 Vac	320 Vac	320 Vac
Max. Load current	IL	5 A	10 A	5 A	10 A
Residual current - *Leakage current at Uc*	Ipe	none	none	none	none
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	335 Vac withstand	335 Vac withstand	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Charasteristics - 120 mn	UT	440 Vac disconnection	440 Vac withstand	440 Vac disconnection	440 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/200 ms disconnection	1200 V/300A/200 ms disconnection	-	-
Nominal discharge current - *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA	5 kA
Max. discharge current -*max. withstand ⍵ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA	10 kA
Total discharge current - *max. total withstand ⍵ 8/20 µs*	Imax total	20 kA	20 kA	20 kA	20 kA
Withstand on Combination waveform - Class III test	Uoc	10 kV	10 kV	10 kV	10 kV
Protection level L/N *⍵In (8/20µs)*	Up	1.5 kV	1.5 kV	1.5 kV	1.5 kV
Protection level N/PE *⍵In (8/20µs)*	Up	1.5 kV	1.5 kV	-	-
Admissible short-circuit current	Isccr	10000 A	10000 A	10000 A	10000 A
Associated disconnectors					
Thermal disconnector		internal			
Installation ground fault breaker		Type "S" or delayed			
Mechnical characteristics					
Dimensions		see diagram			
Connection to Network		Screw (2.5 mm² max) or Spring (1.5 mm² max) contact terminal		2 spring terminals opposite side in/out - wire 1.5 mm² max.	Screw (2.5 mm² max) or Spring (1.5 mm² max) contact terminal
Voltage/operating indicator		Green Led ON			
Disconnection indicator		Led green OFF and AC network cut-off			
Failsafe behavior		Disconnection and AC network cut-off			
Mounting		on plate			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Standards					
Certification		IEC/IMQ/TUV	IEC	IEC/IMQ/TUV	IEC
Compliance		EN 61643-11 / IEC 61643-11			
Model/Part number					
version Spring contact / 2 opposed terminals		MLPC1-230L-R 831211	MLPC-VG1-230L-R 836211	MLPC2-230L-R 832211	MLPC-VG2-230L-R 837211
version Screw terminal / 2 opposed terminals		MLPC1-230L-V 831221	MLPC-VG1-230L-V 836221	-	MLPC-VG2-230L-V 837221
version Spring contact / 1 common terminal		MLPC1-230L-R/50 831212	-	-	-
version Screw terminal / 1 common terminal		MLPC1-230L-V/50 831222	-	-	-

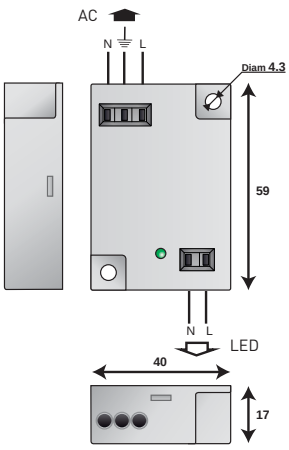
MLPC-VG1-230L-V/50

- _ : separated in/out terminals (3pts/2pts)
  50 : common in/out terminals (5pts)
- V : Screw terminal connection
  R : Spring terminal connection
- L : Line disconnection failure mode
- 230 : 220-240 Vac Voltage
- 1 : for Class I equipment
  2: for Class II equipment
- _ : Standard diagram
  VG : VG technology

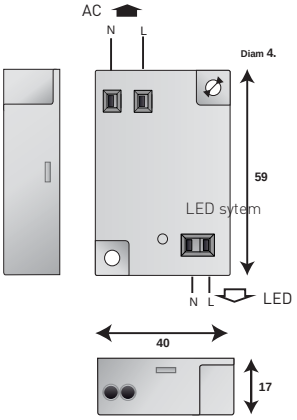
MLPC1-230L-V



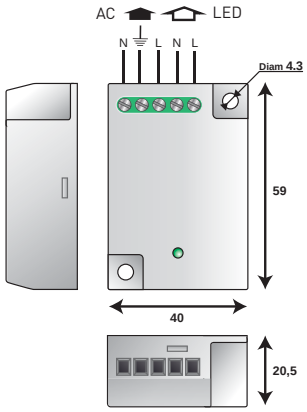
MLPC1-230L-R



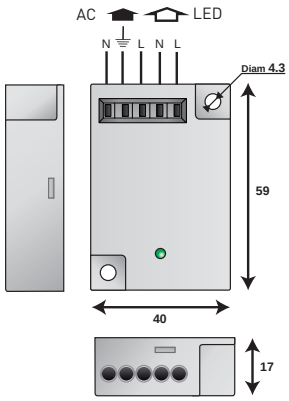
MLPC2-230L-R

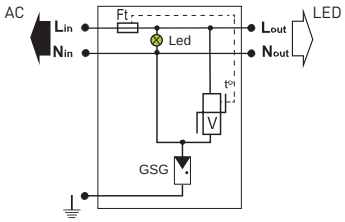


MLPC1-230L-V/50

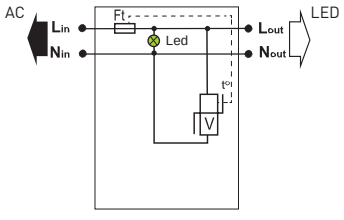


MLPC1-230L-R/50

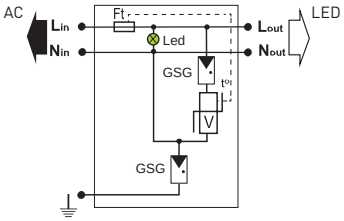




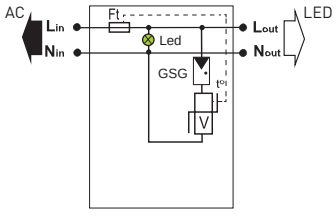
MLPC1



MLPC2



MLPC-VG1



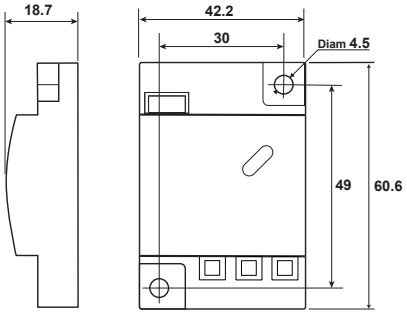
MLPC-VG2

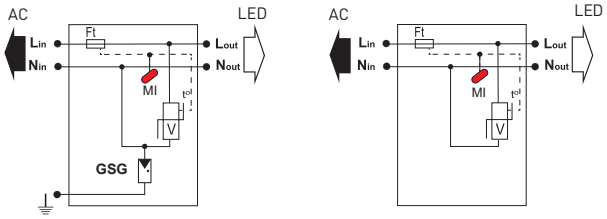
Ft: Thermal fuse
Led: Disconnection indicator
V: Varistor
GSG: Specific Gas Tube
t°: Thermal disconnection system

MLPM1-230L-R

MLPM SERIES

- **Compact Type 2 (or 3) surge protector for 230 Vac networks**
- **For Class I and Class II**
- **Spring contact terminal**
- **Disconnection signaling by mechanical indicator**
- **AC disconnection in case of end of life**
- **Imax : 10 kA**
- **EN 61643-11, IEC 61643-11 certified**





MLPM1-230L-R MLPM2-230L-R

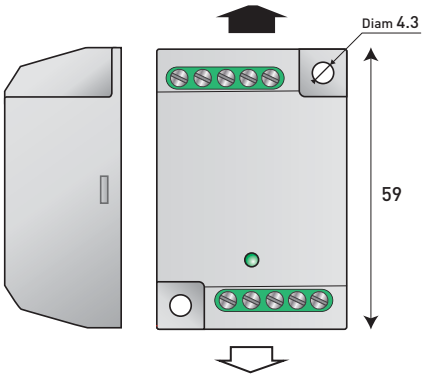
Ft : Thermal fuse
MI : Mechanical disconnection indicator
V : Varsitor
t°: Thermal disconnection system
GSG : specific Gas tube

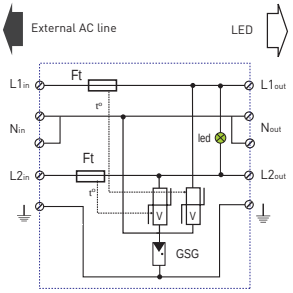
Characteristics

CITEL Model		MLPM1-230L-R	MLPM2-230L-R
Description		Compact Type 2 (or 3) hard-wired surge protector	
Application		Class I LED system	Class II LED system
Network		230-277 V single phase	230-277 V single phase
AC system		TT/TN	TT/TN
Protection mode(s)		CM/DM*	DM
Max. AC operating voltage	Uc	275 Vac	275 Vac
Max. Load current	IL	10 A	10 A
Residual current *- Leakage current at Uc*	Ipe	none	none
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Charasteristics - 120 mn	UT	440 Vac dIsconnection	440 Vac dIsconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/200 ms disconnection	NA
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA
Total max. discharge current *max. total withstand @ 8/20 µs*	Imax total	20 kA	NA
Withstand on Combination waveform *- Class III test*	Uoc	12 kV	12 kV
Protection level L/N *@In (8/20µs)*	Up	1.2 kV	1.2 kV
Protection level N/PE *@In (8/20µs)*	Up	1.5 kV	-
Admissible short-circuit current	Isccr	10000 A	10000 A
Associated disconnectors			
Thermal disconnector		internal	
Installation ground fault breaker		Type «S» or delayed	
Mechnical characteristics			
Dimensions		see diagram	
Connection to Network		Spring terminal - wires :1.5 mm² max	
Voltage/operating indicator		Mechanical red indicator OFF	
Disconnection indicator		Mechanical red indicator ON and AC network cut-off	
Failsafe behavior		Disconnection and AC network cut-off	
Mounting		wall or plate	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Standards			
Compliance		EN 61643-11 / IEC 61643-11	
Certification		KEMA	
Part number			
		841211	842211

MLPC1-230L-V/2L

- **Compact Type 2 (or 3) surge protector**
- **For Classe I**
- **2-phases+Neutral network**
- **Screw connection**
- **Imax : 10 kA**
- **EN 61643-11, IEC 61643-11 compliance**





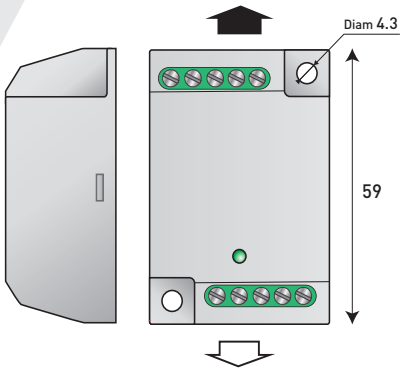
Ft: Thermal fuse
Led: Disconnection indicator
V: Varistor
GSG: Specific Gas Tube
t°: Thermal disconnection system

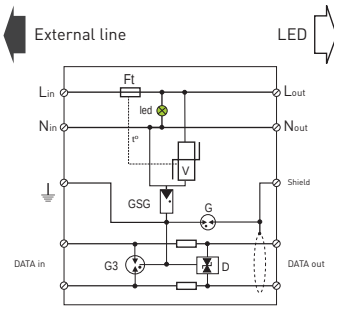
Characteristics

CITEL model		MLPC1-230L-V/2L
Description		AC surge protector for LED lighting
Application		LED Classe I
Network		230 V 2-phases+Neutral
AC system		TT-TN
Protection mode(s)		L1/N, L2/N and N/PE
Max. AC operating voltage	Uc	320 Vac
Max. load current	IL	5 A
Residual current - *leakage current at Uc*	Ipe	none
Temporary Over Voltage characteristics (TOV) 5sec.	UT	335 Vac withstand
Temporary Over Voltage characteristics (TOV) 120 mn.	UT	440 Vac disconnection
Nominal discharge current *15 x 8/20µs*	In	5 kA
Maximum discharge current *max. withstand 8/20 µs*	Imax	10 kA
Withstand on combination waveform *1,2/50µs-8/20µs*	Uoc	10 kV / 5 kA
Protection level L/N *@In (8/20µs)*	Up	1.5 kV
Protection level N/PE *@In (8/20µs)*	Up	1.5 kV
Admissible short-circuit current	Isccr	10 000 A
Associated disconnectors		
Thermal disconnector		internal
Mechanical characteristics		
Dimensions		see diagram
Connection to network		Screw connection: 1,5 mm² max
Voltage/operating indicator		Green Led ON
Failsafe behavior		Disconnection, Green Led OFF and AC line cut-off
Mounting		on plate
Operating temperature		-40/+85°C
Protection rating		IP20
Housing material		Thermoplastic UL94 V-0
Standards		
Certification		KEMA
Compliance		EN 61643-11 / IEC 61643-11
Part number		
		831225

MLPC1-230L-V/DL

- **Type 2 (or 3) surge protector for Class 1 LED lighting**
- **Combined AC/Dataline surge protection**
- **DALI, DMX, RS485, 0-10V dataline compliance**
- **Shield wire management**
- **Optimized coordination with driver (option: MLPCH1-230L-V/DL)**
- **Screw connection**
- **Imax : 10 kA**
- **EN 61643-11, IEC 61643-11 compliance**





V : Varistor
Ft : Thermal fuse
GSG : Specific gas tube
G : 2-electrode gas tube
G3 : 3-electrode gas tube
D : Clamping diode
L : Coordination inductor (option)
LED : Status indicator

Characteristics

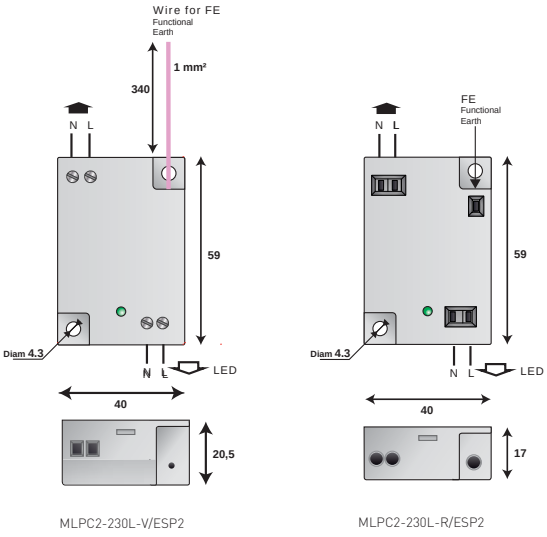
CITEL model		MLPC1-230L-V/DL
Description		AC/Dataline SPD for LED lighting system Class 1
AC power Characteristic		
Network		230 V single phase
AC system		TT-TN
Protection mode(s)		L/N and N/PE
Max. AC operating voltage	Uc	320 Vac
Max. Load current	IL	5 A (2,5 A)*
Residual current - *Leakage current at Uc*	Ipe	None
Temporary over voltage (TOV) characteristics 5sec.	UT	335 Vac withstand
Temporary over voltage (TOV) characteristics 120 mn.	UT	440 Vac disconnection
Nominal discharge current - *15 x 8/20µs impulses*	In	5 kA
Max. discharge current - *max. withstand @ 8/20 µs*	Imax	10 kA
Withstand on Combination waveform	Uoc	10 kV / 5 kA
Protection level L/N *@In (8/20µs)*	Up	1.5 kV
Protection level N/PE *@In (8/20µs)*	Up	1.5 kV
Admissible short-circuit current	Isccr	10 000 A
Thermal disconnectors		internal
Connection to network		Screw connection : 1,5 mm² max
Voltage/operating indicator		Green Led ON
Failsafe behavior		Disconnection, Green Led OFF and AC line cut-off
Specific version for optimized coordination with driver		MLPC**H**1-230L-V/DL*
Dataline Characteristics		
Network		DALI/DMX/RS485/0-10V
Dataline configuration		1-pair + shield
Nominal line voltage	Un	24 V
Max. DC operating voltage	Uc	28 V
Max. Load current	IL	300 mA
Max. frequency	f max	10 mHz
Insertion loss		< 1 dB
Nominal discharge current - *15 x 8/20µs impulses*	In	5 kA
Max. discharge current - *max withstand @ 8/20µs*	Imax	10 kA
Protection level L/L or L/PE	Up	50 V+
Protection level Shield/PE	Up	< 600V
Connection to network		Screw connection: 1,5 mm² max
Failure indication		Transmission cut-off
Mechanical Characteristics		
Dimensions		see diagram
Mounting		on plate
Operating temperature		-40/+85°C
Protection rating		IP20
Housing material		Thermoplastic UL94 V-0
Standards		
Compliance		EN 61643-11 / IEC 61643-11 / EN 61643-21 / IEC 61643-21
Part number		
		831223

CITEL

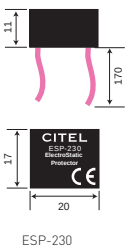
MLPC2/ESP2 & ESP-230

- **Type 2 (or 3) Surge & Electrostatic protectors**
- **For Class II Led lighting**
- **Version Electrostatic protector only: ESP-230**
- **Electrostatic protection included: MLPC2**
- **Plate mounting**
- **Screw terminal or spring terminal connection**
- **Status indicator**
- **End of life AC Disconnection**
- **IEC 61643-11 and EN 61643-11 compliance**

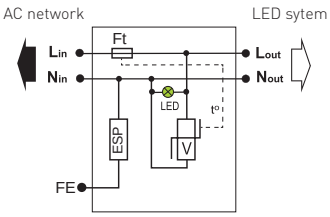
Characteristics



CITEL Model		MLPC2-230L-V/ESP2	MLPC2-230L-R/ESP2	ESP-230
Description		Surge & Electrostatic protectors for Class II LED lighting		Electrostatic protectors for Class II LED lighting
Network		220-240 V single phase	220-240 V single phase	220-240 V single phase
AC system		TT/TN	TT/TN	TT/TN
Surge Protection mode		L/N	L/N	-
Electrostatic protection mode		N/Functional Earth	N/Functional Earth	N/Functional Earth
Max. AC operating voltage	Uc	320 Vac	320 Vac	320 Vac
Max. Load current	IL	10 A	10 A	-
Residual current *leakage current at Uc*	Ipe	none	none	none
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	335 Vac withstand	335 Vac withstand	-
Temporary Over Voltage (TOV) Charasteristics - 120 mn	UT	440 Vac dIsconnection	440 Vac dIsconnection	-
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	-
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	-
Withstand on Combination waveform *- Class III test*	Uoc	10 kV	10 kV	10 kV
Protection level L/N *@In (8/20µs)*	Up	1.5 kV	1.5 kV	-
Electrostatic protection level	UESP	> 0.5 kV	> 0.5 kV	> 0.5 kV
Admi. short-circuit current	Isccr	10000 A	10000 A	-
Associated disconnectors				
Thermal disconnector		internal		
Installation ground fault breaker		Type «S» or delayed		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		2 screw terminals opposite side in/out - wire 2.5 mm² max.	2 spring terminals opposite side in/out Wire 1.5 mm² max.	2 wires 1 mm²
Voltage/operating indicator		Green Led ON		-
Failsafe behavior		Disconnection and AC network cut-off		-
Disconnection indicator		Led green OFF and AC network cut-off		-
Mounting		on plate		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		EN 61643-11 / IEC 61643-11		-
Part number				
		832227	832217	354913



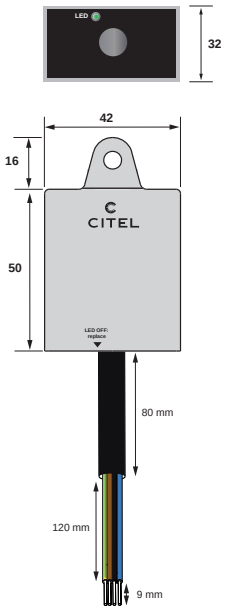
ESP-230

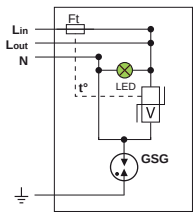


Ft : Thermal fuse
Led : Status indicator
V : MOV
t°: Thermal disconnection system
ESP: Electrostatic protection
FE: Functional Earth

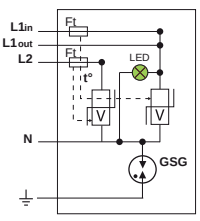
MLPCA SERIES

- **For protection class I applications**
- **Specially designed for mounting outside the cable junction box**
- **Simple assembly**
- **Single and two-phase (2L) version available**
- **Fully encapsulated housing and rubber conduit IP65**
- **Failure behaviour: disconnection from mains supply + circuit disconnection + error signalling: LED off**
- **Complies with EN 61643-11 / IEC 61643-11 and UL1449 5ed standards**





MLPCA1-230L



MLPCA1-230L-2L

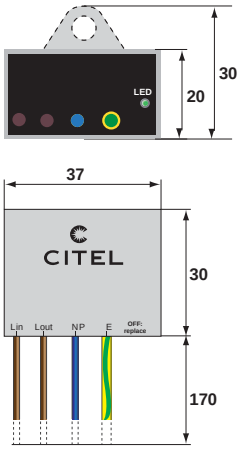
Characteristics

CITEL Model		MLPCA1-230L	MLPCA1-230L-2L
Description		Compact Type 2 +3 hard-wired surge protector	
Application		Class I	Class I
Network		220-240 V single phase	220-240 V 2-phase+N
AC system		TT/TN	TT/TN
Protection mode(s)		CM/DM	CM/DM
Nominal line voltage	Un	230 V	230 V
Max. AC operating voltage	Uc	320 Vac	320 Vac
Max. Load current	IL	10 A	10 A
Residual current - *Leakage current at Uc*	Ipe	none	none
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Charasteristics - 120 mn	UT	440 Vac dIsconnection	440 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/200 ms disconnection	1200 V/300A/200 ms disconnection
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA
Total max. discharge current *max. total withstand @ 8/20 µs*	Imax total	20 kA	30 kA
Withstand on Combination waveform - *Class III test*	Uoc	10 kV	10 kV
Protection level L/N *@In (8/20µs)*	Up	1.5 kV	1.5 kV
Protection level N/PE *@In (8/20µs)*	Up	1.5 kV	1.5 kV
Admissible short-circuit current	Isccr	10 000 A	10 000 A
Associated disconnectors			
Thermal disconnector		internal	
Installation ground fault breaker		Type «S» or delayed	
Mechnical characteristics			
Dimensions		see diagram	
Connection to Network		Cable with 4-wire of 1.5 mm²	Cable with 5-wire of 1.5 mm²
Voltage/operating indicator		Green Led ON	
Disconnection indicator		Led green OFF and AC network cut-off	
Failsafe behavior		Disconnection and AC network cut-off	
Mounting		wall or plate	
Operating temperature		-40/+85°C	
Protection rating		IP67	
Housing material		Thermoplastic UL94 V-0	
Standards			
Compliance		EN 61643-11 / IEC 61643-11/UL1449 ed.5	
Part Number			
		835261	835265

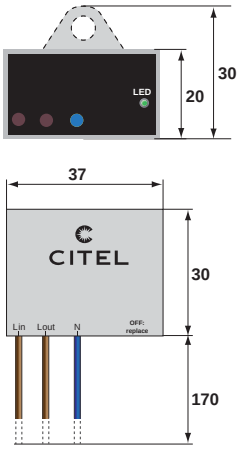
CITEL

MLPX SERIES

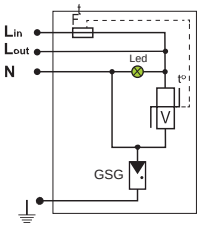
- For Class I and Class II
- Breakable mounting bracket
- Protection rating: IP67
- VG Technology (MLPX1VG and MLPX2VG)
- Improved coordination with driver (VG versions)
- Disconnection signaling by indicator
- AC disconnection in case of end of life
- EN 61643-11/IEC 61643-11 certification



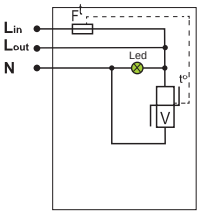
MLPX1-230L-W
MLPX1VG-230L-W



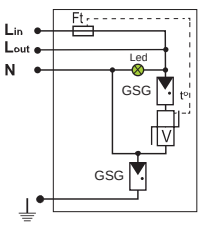
MLPX2-230L-W
MLPX2VG-230L-W



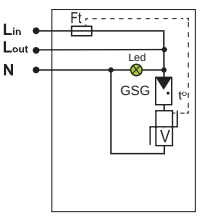
MLPX1



MLPX2



MLPX1VG



MLPX2VG

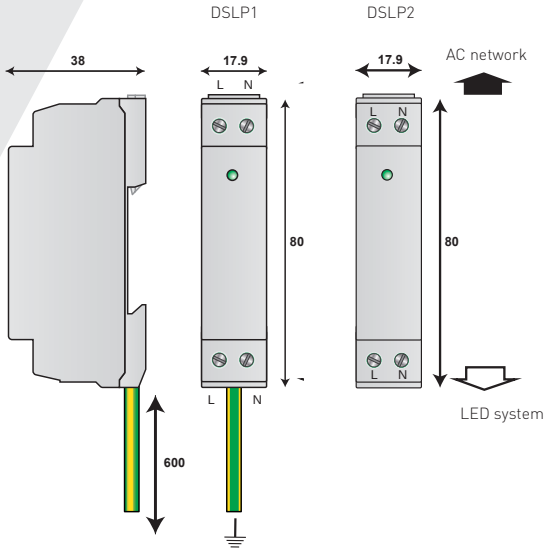
V : Varistor
GSG: Specific gas tube
Ft : Thermal fuse
LED : Disconnection indicator
t° : Thermal disconnection system

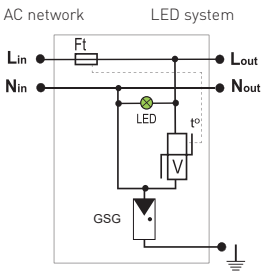
Characteristics

CITEL Model		MLPX1-230L-W	MLPX1VG-230L-W	MLPX2-230L-W	MLPX2VG-230L-W
Description		Compact Type 2 (or 3) hard-wired surge protector			
Application		Class I	Class I	Class II	Class II
Network		220-240 V single phase	220-240 V single phase	220-240 V single phase	220-240 V single phase
AC system		TT/TN	TT/TN	TT/TN	TT/TN
Protection mode(s)		CM/DM	CM/DM	DM	DM
Max. AC operating voltage	Uc	320 Vac	320 Vac	320 Vac	320 Vac
Max. Load current	IL	10 A	10 A	10 A	10 A
Residual current - *Leakage current at Uc*	Ipe	none	none	none	none
Temporary Over Voltage (TOV) Characteristics - 5 sec.	UT	335 Vac withstand	335 Vac withstand	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Characteristics - 120 mn	UT	440 Vac dIsconnection	440 Vac disconnection	440 Vac dIsconnection	440 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/200 ms disconnection		-	-
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA	10 kA
Total max. discharge current *max. total withstand @ 8/20 µs*	Imax total	20 kA	20 kA	-	-
Withstand on Combination waveform - *Class III test*	Uoc	10 kV	10 kV	10 kV	10 kV
Protection level L/N *@In (8/20µs)*	Up	1.5 kV	1.5 kV	1.5 kV	1.5 kV
Protection level N/PE *@In (8/20µs)*	Up	1.5 kV	1.5 kV	-	-
Admissible short-circuit current	Isccr	10000 A	10000 A	10000 A	10000 A
Associated disconnectors					
Thermal disconnector		internal			
Installation ground fault breaker		Type «S» or delayed			
Mechnical characteristics					
Dimensions		see diagram			
Connection to Network		by wires:1.5 mm² (L/N) and 2.5 mm² (PE) by wires:1.5 mm² (L/N)			
Voltage/operating indicator		Green Led ON			
Disconnection indicator		Led green OFF and AC network cut-off			
Failsafe behavior		Disconnection and AC network cut-off			
Mounting		wall or plate			
Operating temperature		-40/+85°C			
Protection rating		IP67			
Housing material		Thermoplastic UL94 V-0			
Standards					
Certification		EN 61643-11 / IEC 61643-11			
Part number					
		711214	711294	711217	711292

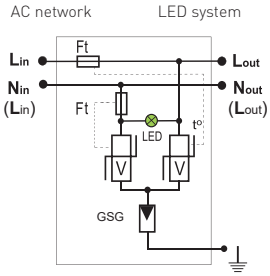
DSLP SERIES

- Type 2 (or 3) surge protectors for LED
- Very compact (low profile)
- DIN rail mounting
- Screw terminal connection
- Status indicator
- Disconnection AC end of life
- IEC 61643-11 and EN 61643-11 certified

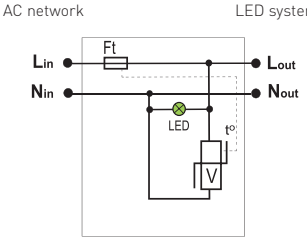




DSLP1



DSLP1/Y



DSLP2

V: Varistor
Ft: Thermal fuse
LED: Disconnection indicator
t°: Thermal disconnection system
GSG: Specific Gas Tube

Characteristics

CITEL Model		DSLP1-230L	DSLP1-230L/Y	DSLP2-230L
Description		Surge protectors for LED lighting system		
Application		Class I system	Class I system	Class II system
Network		220-240 V single phase	230-277 V single phase or 2-phase	220-240 V single phase
AC system		TT/TN	TN	TT/TN
Protection mode(s)		L/N and N/PE	L/N and N/PE	L/N
Max. AC operating voltage	Uc	320 Vac	320 Vac	320 Vac
Max. Load current	IL	10 A	10 A	10 A
Residual current *Leakage current at Uc*	Ipe	none	none	-
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	335 Vac withstand	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Charasteristics - 120 mn	UT	440 Vac disconnection	440 Vac disconnection	440 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/200 ms disconnection	-	-
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA
Total discharge current *max. total withstand @ 8/20 µs*	Imax total	20 kA	20 kA	-
Withstand on Combination waveform *- Class III test*	Uoc	10 kV	10kV	10 kV
Protection level L/N *@In (8/20µs)*	Up	1.5 kV	1.5 kV	1.5 kV
Protection level N/PE *@In (8/20µs)*	Up	1.5 kV	1.5 kV	-
Admissible short-circuit current	Isccr	10000 A	10000 A	10000 A
Associated disconnectors				
Thermal disconnector		internal		
Installation ground fault breaker (if any)		«S» type or delayed		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		Screw terminal 2.5 mm² max. Earthing conductor 2 mm² - 610 cm length		
Voltage/operating indicator		Led green ON		
Disconnection indication		Led green OFF and AC network cut-off		
Failsafe behavior		Disconnection and AC network cut-off		
Mounting		Symmetrical rail 35mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Certification		EN 61643-11 / IEC 61643-11		
Part number				
		352913	352923	352933

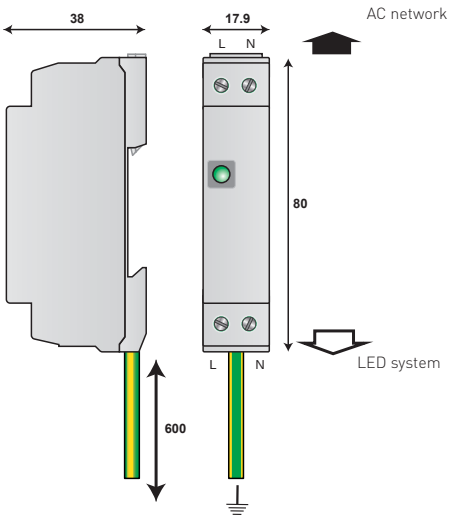
CITEL

DLPM1-230L

DLPM SERIES

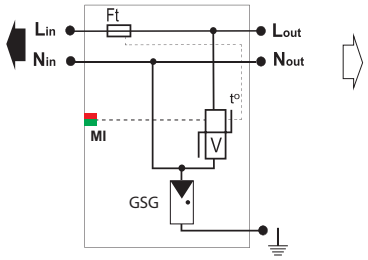
- Type 2 (or 3) surge protectors for LED
- Very compact (low profile)
- Mechanical status indicator
- 15 kA Imax version (DLPM1-230L/15K)
- DIN rail mounting
- Screw terminal connection
- Disconnection AC end of life
- IEC 61643-11 and EN 61643-11 certified

DLPM1

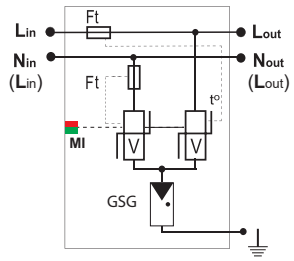


AC network LED system

DLPM1



DLPM1/Y



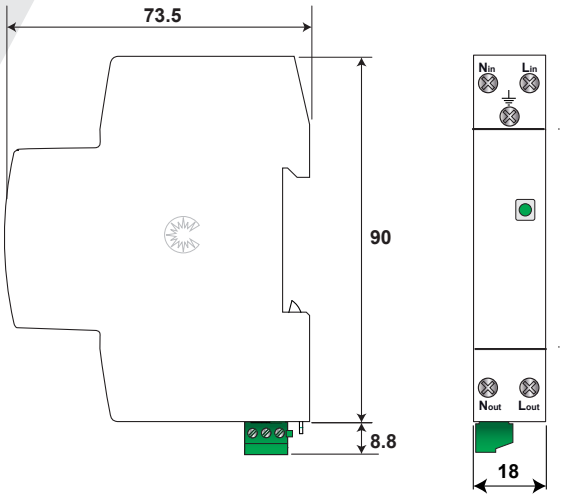
V: Varistor
Ft: Thermal fuse
MI: Mechanical disconnection indicator
t°: Thermal disconnection system
GSG: Specific Gas Tube

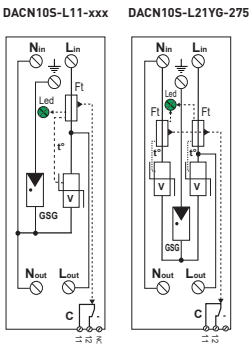
Characteristics

CITEL Model		DLPM1-230L	DLPM1-230L/Y	DLPM1-230L/15K	DLPM2-230L
Description		Surge protectors for LED lighting system			
Application		Class I system	Classe I	Class I system	Class II system
Network		220-240 V single phase	220-240 V single-phase or 2-phase	220-240 V single phase	220-240 V single phase
AC system		TT/TN	TT/TN	TT/TN	TT/TN
Protection mode(s)		L/N and N/PE	L/N and N/PE	L/N and N/PE	L/N
Max. AC operating voltage	Uc	320 Vac	320 Vac	320 Vac	320 Vac
Max. Load current	IL	10 A	10 A	10 A	10 A
Residual current *Leakage current at Uc*	Ipe	none	none	none	-
Temporary Over Voltage (TOV) Charasteristics - 5 sec.	UT	335 Vac withstand	335 Vac withstand	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) Charasteristics - 120 mn	UT	440 Vac disconnection	440 Vac disconnection	440 Vac disconnection	440 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200V /300A/200 ms disconnection			-
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	15 kA	10 kA
Total discharge current *max. total withstand @ 8/20 µs*	Imax total	20 kA	20 kA	30 kA	-
Withstand on Combination waveform *- Class III test*	Uoc	10 kV	10 kV	10 kV	10 kV
Protection level L/N *@In (8/20µs)*	Up	1.5 kV	1.5 kV	1 kV	1.5 kV
Protection level L/N *@In (8/20µs)*	Up	1.5 kV	1.5 kV	1.5 kV	-
Admissible short-circuit current	Isccr	10000 A	10000 A	10000 A	10000 A
Associated disconnectors					
Thermal disconnector		internal			
Installation ground fault breaker		Type «S» or delayed			
Mechnical characteristics					
Dimensions		see diagram			
Connection to Network		Screw terminal 2.5 mm² max. Earthing conductor 2 mm² length 60 cm			
Voltage/operating indicator		Mechanical indicator green			
Disconnection indicator		Red indicator and AC network cut-off			
Failsafe behavior		Disconnection and AC network cut-off			
Mounting		Symmetrical rail 35mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Standards					
Certification		EN 61643-11 / IEC 61643-11			
Part number					
		355913	355923	355973	355933

DACN10-L SERIES

- **Cost effective single-phase surge protector**
- **Type 2+3 monobloc compact**
- **In/Imax: 5 kA/10 kA**
- **Max. load current: 16A**
- **Disconnection + AC line cut**
- **2-port configuration (series mounting)**
- **Remote signaling (option)**
- **EN 61643-11, IEC 61643-11 compliance**





V : Varistor
GSG : Specific Gas tube
Ft : Thermal fuse
t° : Thermal disconnection mechanism
LED : Disconnector indicator

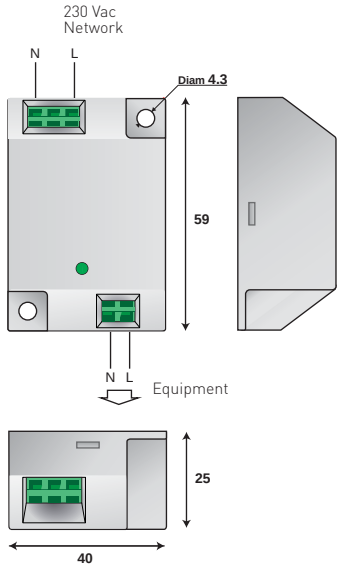
Characteristics

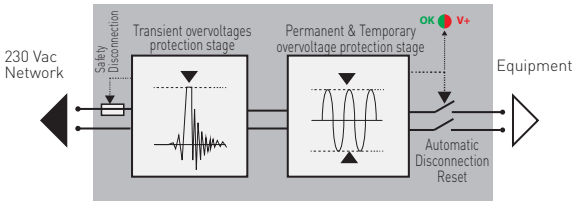
CITEL Model		DACN10-L11-150	DACN10-L11-275	DACN10-L21YG-275
Description		Type 2+3, 2-port AC single phase surge protector		
Network		120 Vac	230 Vac	230 Vac
Protection mode		L/N and N/PE	L/N and N/PE	L/N and N/PE
AC system		TT-TN	TT-TN	TN
Max. AC operating voltage	Uc	150 Vac	275 Vac	275 Vac
Temporary Over Voltage (TOV) characteristics *- 5 sec.*	UT	180 Vac withstand	335 Vac withstand	335 Vac withstand
Temporary Over Voltage (TOV) characteristics *- 120mn*	UT	230 Vac disconnection	440 Vac disconnection	440 Vac disconnection
Temporary Over Voltage N/PE (TOV HT)	UT	1200 V/300A/ 200 ms withstand	1200 V/300A/ 200 ms withstand	-
Residual current *Leakage current at Uc*	Ipe	none	none	< 1 mA
Max. Load current	IL	16 A	16 A	16 A
Follow current	If	none	none	none
Nominal discharge current *15 x 8/20 µs impulses*	In	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA
Withstand on Combination waveform *- Class III test*	Uoc	10 kV	10 kV	10 kV
Protection level *@In (8/20µs)*	Up L/N Up N/PE Up L/PE	0,7 kV 1,5 kV -	1,1 kV 1,5 kV -	1,3 kV 1,6 kV 1,6 kV
Admissible short-circuit current	Isccr	10 000 A	10 000 A	10 000 A
Associated disconnectors				
Thermal disconnector		internal		
Fuses		Fuses type gG - 25 A		
Installation ground fault breaker (if any)		Type «S» or delayed		
Mechnical characteristics				
Dimensions		see diagram, 1TE (DIN43880)		
Connection to Network		by screw terminals: 1.5-10 mm²		
Failsafe behavior		Disconnection SPD + AC line cut off		
Disconnection indicator		Green LED off		
Remote signaling of disconnection output on NC contact		option DACN10**S**-L11-150	option DACN10**S**-L11-275	-
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/2 A (DC)		
Wiring for remote signaling		Max. 1.5 mm²		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.4		
Part number				
		70112011	70112021	70115021

CITEL

MLPVM2-230L-5A

- **Protection against all types of overvoltages**
- **For Class II Led lighting**
- **230 V single-phase network / 5 A**
- **Function «Surge voltage protection» (SPD)**
  - **Nominal discharge current 8/20µs : 5 kA**
- **Function «Permanent or temporary Overvoltage Protection» (POP)**
  - **Overvoltages due to network quality, Neutral failures, wiring mistakes**
  - **AC overvoltage detection > 270 Vac**
  - **Automatic reset after defect disappears**



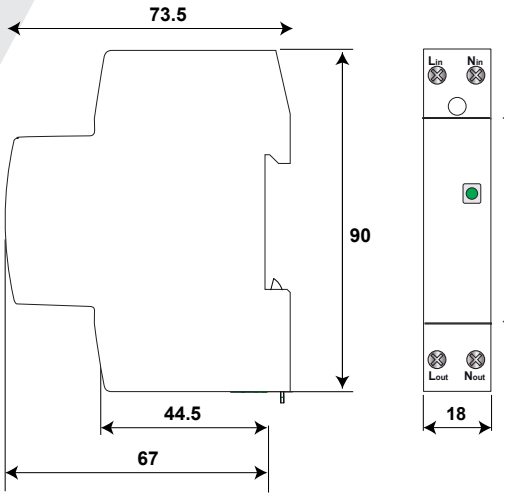


Characteristics

CITEL model		MLPVM2-230L-5A
Description		Protection against Surge, Temporary and Permanent overvoltages
Isolation class		Class II
Network	Un	230 V single-phase
Max Load current	IL	5 A
Function «Surge voltage protection»		
Protection mode		L/N
Max. AC operating voltage	Uc	255 Vac
Nominal discharge current	In	5 kA
Protection level L/N	Up	1.5 kV
Admissible short-circuit current	Isccr	10000 A
Function «Permanent or temporary overvoltage protection»		
AC overvoltage detection	Udisc	270 Vac
Disconnection time		0.1 ms typical
Reset time		10 s typical
Switching capability		L and N cut-off / 5 A @ 250 V
LED indicator		Green : voltage OK Red : overvoltage (disconnection)
Mechanical characteristics		
Dimensions		see diagram
Mounting		on plate
Connection to network		in series by conductors 1.5 mm² - spring terminal
Operating indicator		Led green ON
Surge protector Failsafe behavior		Disconnection and AC line cut-off
Surge protector Disconnection indicator		Led green OFF and AC network cut-off
Operating temperature		-40/+85°C
Protection rating		IP20
Housing material		Thermoplastic UL94 V-0
Part number		
		832278

DVM-xxx-16A

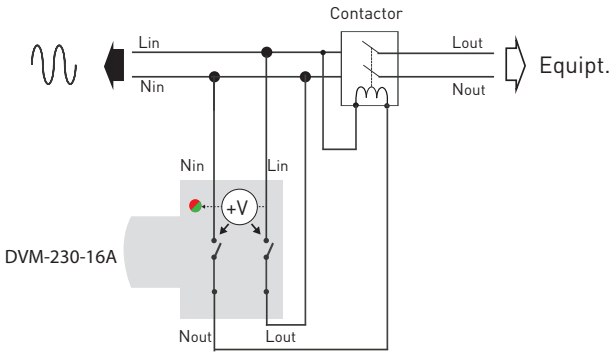
- **Protection against permanent/temporary overvoltages of AC network**
- **For 120, 230, 277 Vac AC single-phase powerline**
- **Load current: up to 16 A**
- **Automatic operation: disconnection/reconnection**
- **Operating indicator**
- **Easy installation on DIN rail**



Characteristics

CITEL model		DVM-277-16A	DVM-230-16A	DVM-120-16A
Network	Un	277 V single-phase	230 V single-phase	120 V single-phase
Max. load current	IL	16 A	16 A	16 A
Permanent and temporary overvol-tages protector		yes	yes	yes
Mechanical characteristics				
Dimensions		See diagram		
Minimum disconnection during on AC voltage		3s @ 275 Vac / 1s @ 300 Vac /0,25 s @ 350 / 0,07 @ 400 Vac		
Connection to network		by screw terminal : 1.5-10 mm²		
Failsafe behavior		LED green ON: voltage AC OK LED red ON : AC overvoltage		
Disconnection indicator		LED green OFF		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Material housing		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 63052		
Part number				
		358913	3589015	358912

In > 16 A



CITEL

PHOTOVOLTAIC SURGE PROTECTORS

SURGE PROTECTORS FOR PHOTOVOLTAIC SYSTEMS

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

Several points must be considered to analyze the risk of lightning and switching surges on PV installations:

- Due to the exposed nature of the PV array, the threat of «lightning» is more common.
- The risk is multiple: direct effect (lightning strike on the panels) and ndirect, through inductive coupling to cables feeding cells, solar chargers / inverters, and also on signalling lines.
- The operating loss (due to a lack of availability) must be taken into account, especially at sites of high power capacity.
- When the Photovoltaic system is located on industrial sites, the risk of switching overvoltages must also be taken into account.
- The level of risk is directly related to the lightning density and exposure of local lines

The IEC61643-32 international application guide gives the relevant information about the need of protection, the selection and the installation of the surge protective devices.

PROTECTION OF PV INSTALLATION

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

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

- **DC network**: surge protectors are required or mandatory on the input of the PV inverter and, in some conditions, the input of the PV modules.

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

AC SURGE PROTECTORS FOR PV INSTALLATION

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

Installations with lightning rods

A Type 1 surge protector, specifically dimensioned to handle direct lightning current is required at the service entrance of the installation (main switchboard).
SPDs like the DAC1-13 provide a high energy surge capacity in a compact size and are easily serviced with pluggable modules.

Standard installation

In the absence of a lightning rod, the implementation of a Type 2 SPD is generally preferred but, in some cases, it is compulsory depending on the level of lightning in the area (Ng> 2.5). The DAC50 Type 2 SPD range offers a modular solution adapted to these applications. For medium and small size facilities with limited space available, the DAC40C provides a high surge capacity in a reduced footprint.

Input protection of PV inverter

The IEC61643-32 application guide requires the implementation of an additional SPD on the AC input of the PV inverter, if it is more than 10 m from the primary surge protector. The DAC15C surge protectors provide this protection for these applications and can be installed either directly into the distribution panel or in a dedicated, standalone enclosure solution.

SURGE PROTECTORS FOR DATALINES

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

DC SURGE PROTECTORS FOR PV INSTALLATION

CITEL has designed a complete range of Type 1 and Type 2 surge protectors for these applications that are compliant with the IEC61643-31 (formerly EN50539-11) test standard.

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SELECTION OF SURGE PROTECTORS FOR PV POWERLINES

The IEC 61643-31 test standard defines the SPD parameters and the IEC 61643-32 application guide gives information regarding SPD installation on the DC side of the PV installation.

Main Parameters

Types of SPD

Similar to AC power SPDs, those used on DC power are qualified following types :

- Type 2 SPD: used when direct lightning strike is not taken into account (no LPS). Tested with the parameter In (Nominal discharge current 8/20µs).
- Type 1 SPD : must be used in case of possible direct strike (LPS on installation or free field PV plant). Tested with the parameters Iimp (10/350µs Impulse current by pole) and Itotal (10/350µs Total Impulse current).
- see «Selection and Location of SPD» table, below

Maximum DC voltage (Ucpv)

Maximum DC voltage applicable continuously to the SPD. Must be greater or equal than the maximum PV voltage of the installation (Uocstc).

Short-circuit current withstand (Iscpv).

The surge protector must safely withstand (failsafe disconnection) a end-of-life test on a declared short-circuit current. This Iscpv parameter must be greater or equal than the maximum short-circuit of the PV line (Iscstc).

Protection level (Up)

Must be lower than the impulse withstand (Uw) of the equipment of the PV installation (Inverter, PV modules).
The IEC61643-32 application guide provides some typical ratings.

Nominal discharge current (In)

The repetitive withstand in 8/20µs current impulse of the Type 2 SPDs must be equal or greater than 5 kA. Higher ratings (15 to 20 kA) gives a longer prospective life duration to the surge protectors.

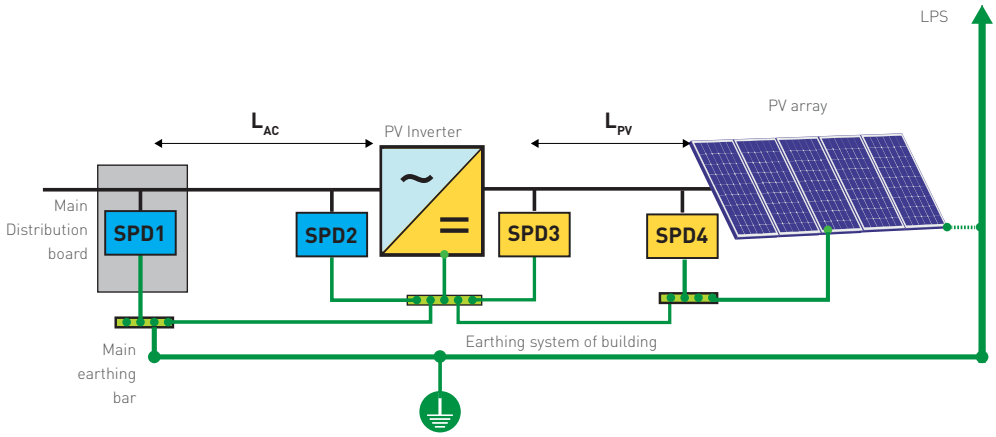
Impulse current (Iimp and Itotal)

The 10/350 impulse withstand on one pole (Iimp) or 2 poles together (Itotal) for Type SPD 1 are related to the installation configuration.
Typical values :

- Iimp 5 kA (Itotal 10 kA) for the installation equipped with LPL III or IV Lightning Protection System or free field PV.
- Iimp 10 kA (Itotal 20 kA) for a PV installation equipped with LPL I Lightning Protection System.

Selecting and locating SPDs on a PV system connected to the AC grid

According to IEC61643-32, the location and type of SPD to be installed on AC and DC networks depend on several criteria (PV on building/PV free field, presence of LPS, interconnection, length of lines).
The table opposite describes the main configurations.



	PV on building equipped with LPS				PV field	PV on building without LPS	
LPS	yes	yes	-	-	no	no	no
LPS isolated	-	-	yes	yes	-	no	no
PV field	-	-	-	-	yes	-	-
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 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

CTC TECHNOLOGY FOR PHOTOVOTAIC SURGE PROTECTORS

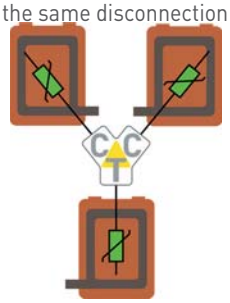
To improve the efficiency of SPD disconnection, CITEL has developed a technology which, unlike previous disconnection technologies, includes a single thermal disconnector. This monitors hottest point within the module to determine whether the SPD components have suffered any damage degrading its performance level.

Safer, faster, and more compact than previous disconnections. This cutting-edge technology counters the weaknesses of previous disconnection devices primarily through:

- Its thermo-sensitive solo disconnection point, which is placed in the centre of the SPD
- The additional insulating safety barrier integrated into the isolating device for more reliable separation of the poles in the event of safe disconnection.

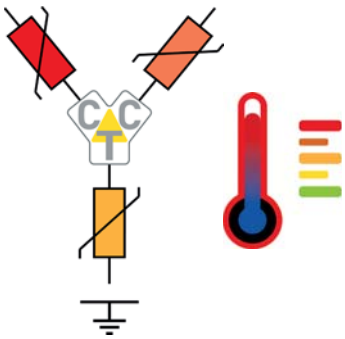
CTC TECHNOLOGY

Central: Compared with SPDs with multiple MOVs (Metal Oxide Varistor) designed previously, each MOV is no longer connected to a separate disconnection mechanism, but all MOVs in the SPD are connected to the same disconnection structure.



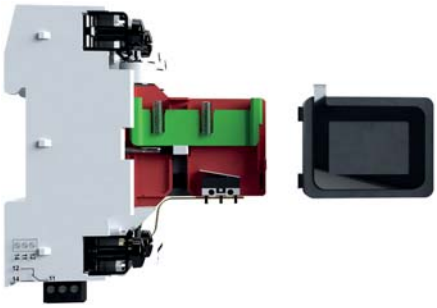
Thermal: The innovative disconnection device of the CTC technology is thermosensitive. Due to its identically short conductor lengths compared to conventional circuits, the heat generated in each MOV during a dissipation process (Joule heat) reaches the disconnector faster.

In addition, the connection of all MOVs to a single disconnection point allows the heat of all installed MOVs to act simultaneously on the single heat point of the disconnection device.



As a result, in the event of over-stress or end-of-life scenario, the external temperature of the SPD remains low during safety disconnection. The heat is concentrated in the CTC itself, allowing the SPD to disconnect from the mains much faster in the event of an overload. This means a significant increase in safety.

Control: As soon as the remaining protective capacity of a MOV is so low that safe operation can no longer be guaranteed, the CTC Technology disconnects the entire SPD from the network at all poles. This eliminates the risk of short-circuiting MOVs and guarantees safe system operation.



CITEL RANGE USING CTC TECHNOLOGY

CTC disconnection applies to Type 1 and Type 2+3 PV surge protections, and is compatible with the CITEL's VG technology, offering the added benefit of longer SPD life:

- **DPVN1-6CVGS**: Type 1 PV power SPD, VG technology, Iimp = 6.25 kA - Itotal = 12.5 kA
- **DPVN1-6CS**: Type 1 PV power SPD, Iimp = 6.25 kA Itotal = 12.5 kA
- **DPVN40CVGS**: Type 2 PV power SPD, VG technology, Imax = 40 kA - Itoal = 60 kA
- **DPVN40CS**: Type 2 PV power SPD, Imax = 40 kA - Itotal = 60 kA

ADVANTAGES OF THE TECHNOLOGY

- Space saving due to more compact design
- Short conductor lengths between MOV and cut-off device
- Fast triggering of the cut-off by cumulative heat impact of all MOVs on one heat point
- Additional insulation barrier for even safer pole separation
- All-pole disconnection in case of tripping
- No risk of varistor short-circuits
- Much lower temperature of the SPD enclosure during disconnection providing more safety to adjacent devices.

CITEL RANGE FOR PV SURGE PROTECTORS

DIN RAIL MOUNTING

Type 1 surge protectors

When the installation is equipped with lightning rods or for open free PV fields (following IEC61643-32), it is mandatory to install SPD rated for a direct lightning impulse (10/350µs).

- **DS60VGPV/51 series:**
  Type 1 SPDs withstand @10/350µs up to 12.5 kA by pole (Iimp) and 25 kA (Itotal).
  With CITEL's exclusive, patented «VG Technology». Comply with IEC61643-31 (and EN50539-12) product test.

- **DPVN1-6C(VG)S-21Y-xxsx series:**
  These Type 1 pluggable SPDs have a current total of 12.5 kA (Itotal) and are required when the likely direct current lightning is not maximal or for free PV field.

Type 2 surge protectors

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

- **DPVN40CVGS series** : This version is based on VG technology, insuring a total absence of leakage current and maximum reliability. Comply with IEC 61643-31 standard.

- **DPVN40 CS series** : based on the use of specific varistors, providing a protection in common mode and differential mode. Comply with IEC 61643-31 standard.

PCB MOUNTING

Surge protector requirements of PV inverter manufacturers have evolved. To save space in the cabinets, the manufacturers have decided to replace DIN rail surge protectors by PCB-mounted SPDs : these ones are designed to be mounted directly inside the inverters, soldered on the internal PCB.
Beyond PV applications, the AC version of these PCB-mounted SPDs could also be used for other applications, where high integration and lower cost are required (i.e charging station for electrical vehicles).
CITEL has developed two dedicated product ranges : PPV (PV power SPD) and PAC (AC power SPD)

PPV range

The PPV range (Type 2 or Type 1 + 2) is designed to protect the DC side of photovoltaic inverters.
The single pole module must be soldered on a PCB, in parallel to the DC network.
Every configuration (Y-diagram, V diagram-circuit, Delta diagram) can be realized, related to the application
The pin-out of the module is the same regardless of the version (T1 or T2) or Ucpv voltage, facilitating the
switching from one to the other.

- T1+2 : Iimp = 6,25 kA and Itotal 12.5 kA
- T2 : Imax 40 kA or 25 kA
- Remote signaling
- IEC 61643-31 compliance

PAC range

The PAC range (Type 2 or Type 1 + 2) is designed to protect the AC side of photovoltaic inverters.
The single pole module must be soldered directly on the PCB, in parallel to the AC network.
The pin-out is the same whatever the Uc voltage.

- Uc: 275, 420 or 680 Vac
- Imax: 25 kA or 40 kA
- T1+2 : Iimp = 6,25 kA
- Remote signaling
- IEC 61643-11 compliance

Application

In order to reach the relevant specifications, the PCB where the PPV or PAC SPDs will be used must be carefully designed by the customer.

PROTECTION OF ISOLATED (OFF-GRID) PV SYSTEMS

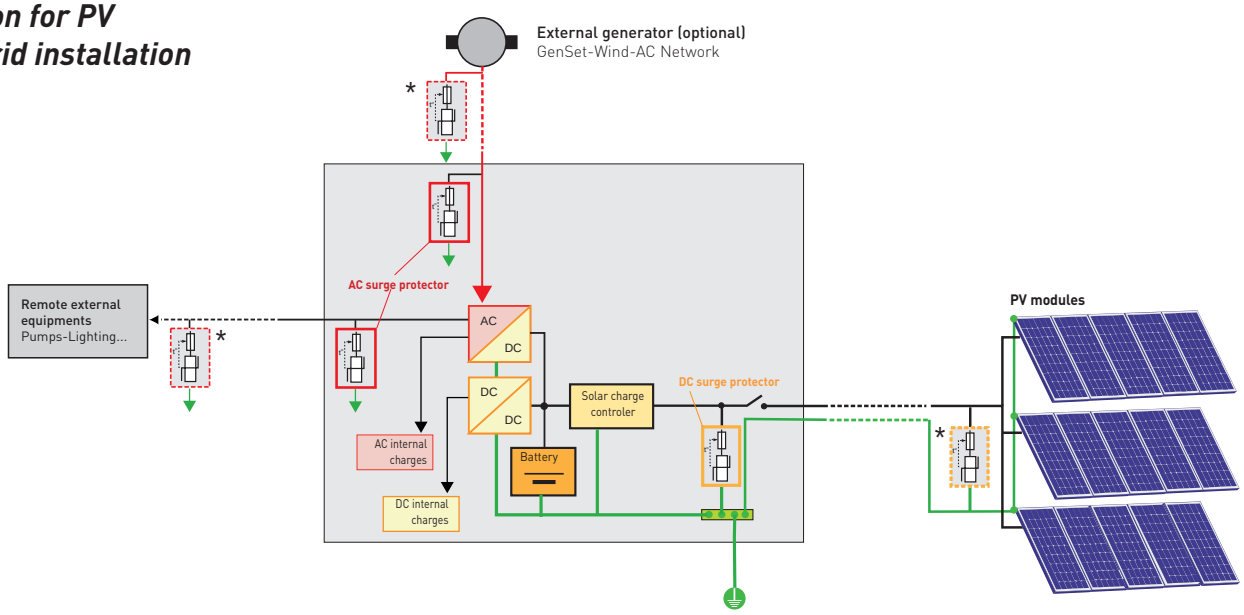
The exposure and location of remote sites powered by isolated PV systems not connected to the AC network are at a very high risk of failure due to transient surges.
Unlike the sites connected to the distribution network, PV equipment failure at a remote site will result in a total operating and economic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

PROTECTION OF ISOLATED (OFF-GRID) PV SYSTEMS

CITEL offers a wide range of SPDs dedicated to off-grid PV installations, with extended operating voltages from 12 to 350 Vdc.

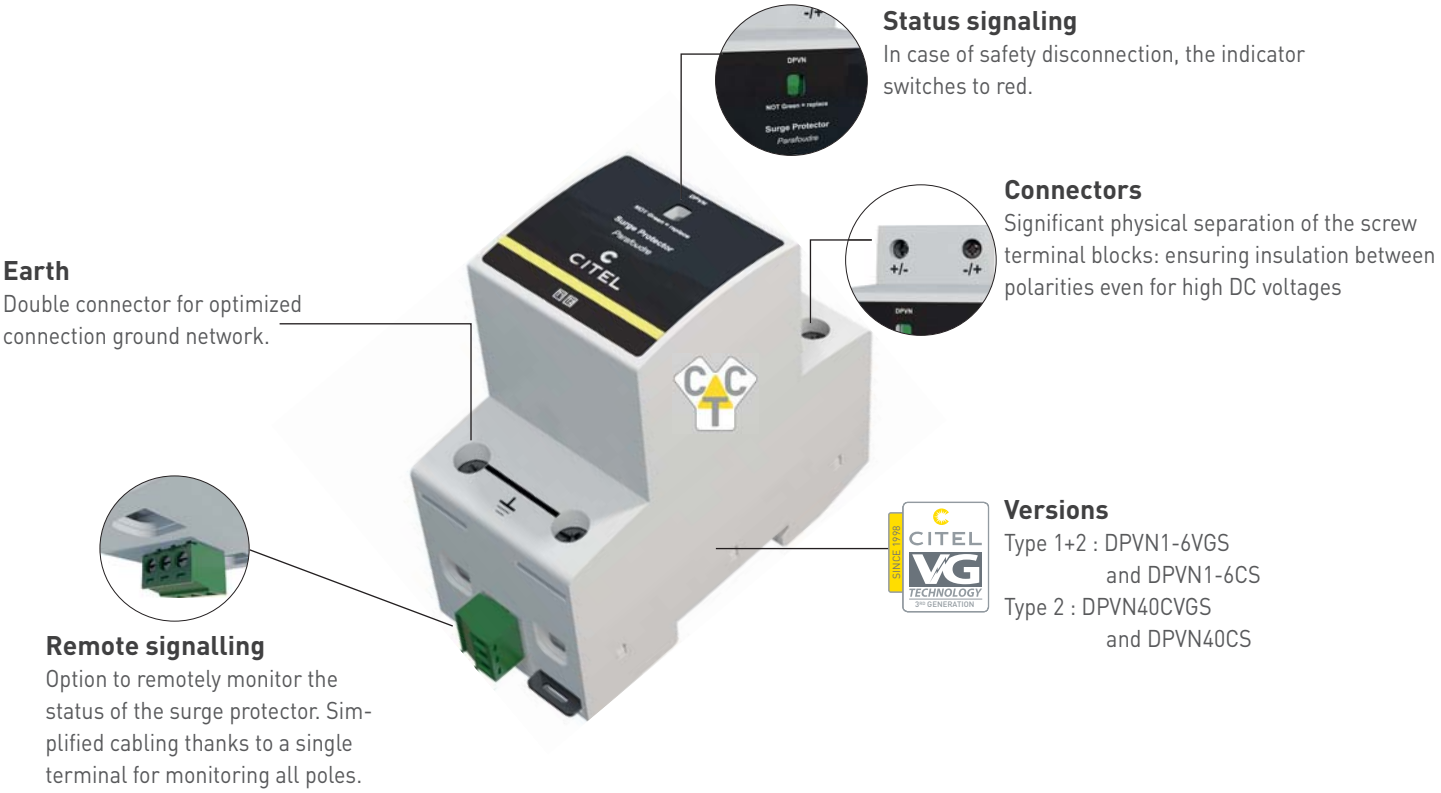
DDCxx and DDCxxC are pluggable surge protectors used for DC or PV powerlines. Especially compacts, they can easily be installed in off-grid installations.
If the off-grid installation is connected to outdoor equipment, SPDs must also be used on these networks in order to provide a global and efficient protection.

Surge protection for PV powered off-grid installation



**) Surge protectors at the terminals of the equipment more than 10m away from the facility*

DPVN series with CTC technology



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

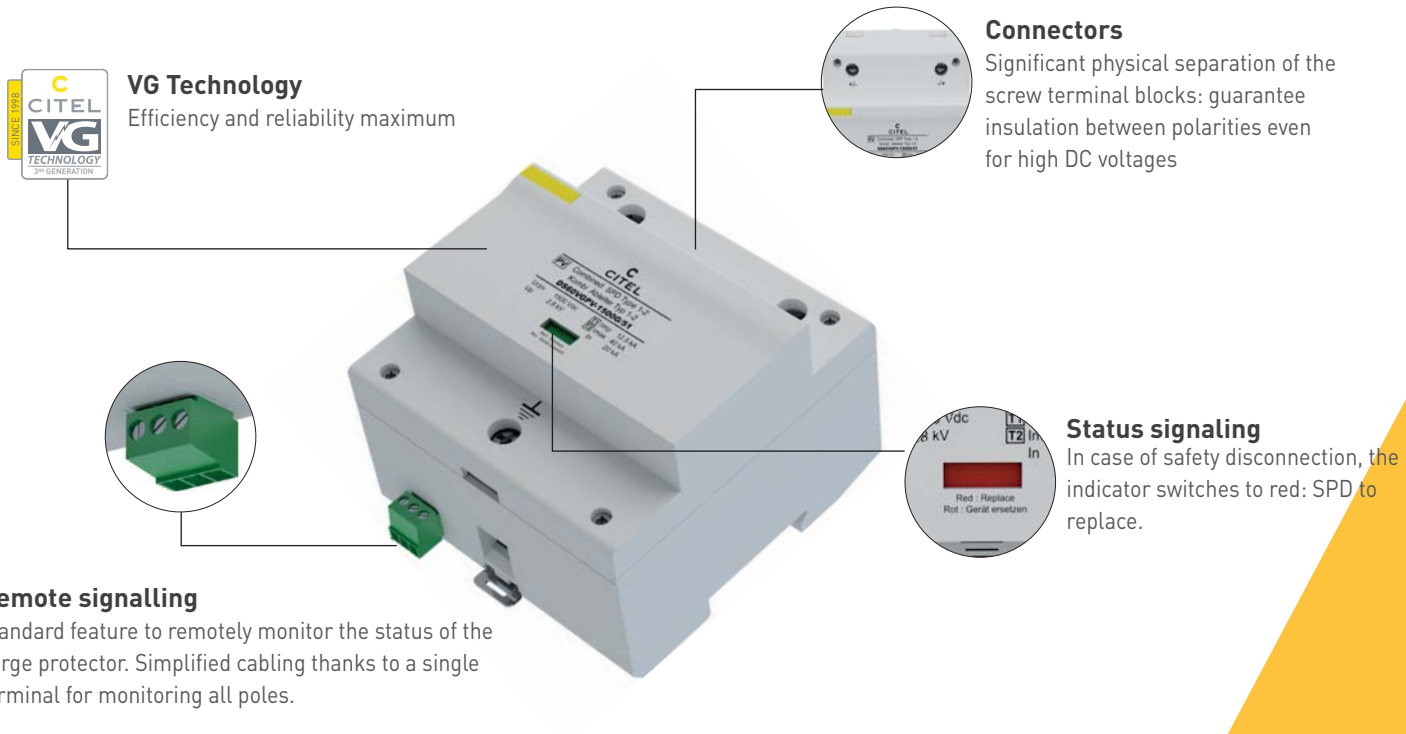
Connectors
Significant physical separation of the screw terminal blocks: ensuring insulation between polarities even for high DC voltages

Earth
Double connector for optimized connection ground network.

Versions
Type 1+2 : DPVN1-6VGS
and DPVN1-6CS
Type 2 : DPVN40CVGS
and DPVN40CS

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

DS60VGPV/51 series



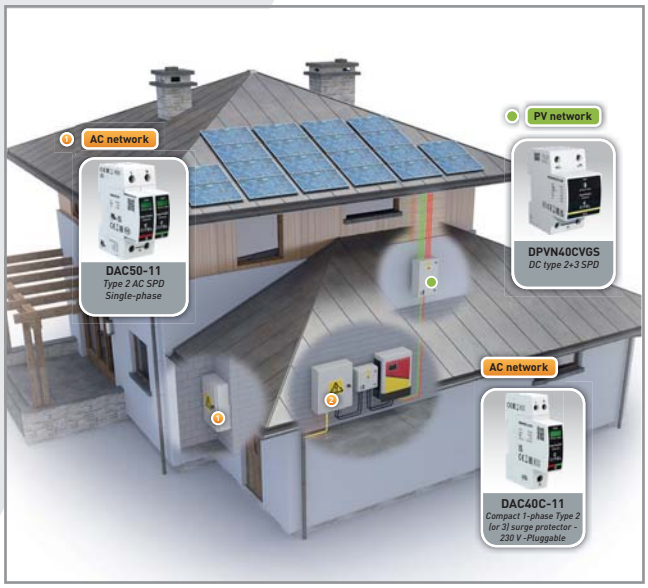
VG Technology
Efficiency and reliability maximum

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

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

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

PROTECTION OF PHOTOVOLTAIC INSTALLATIONS



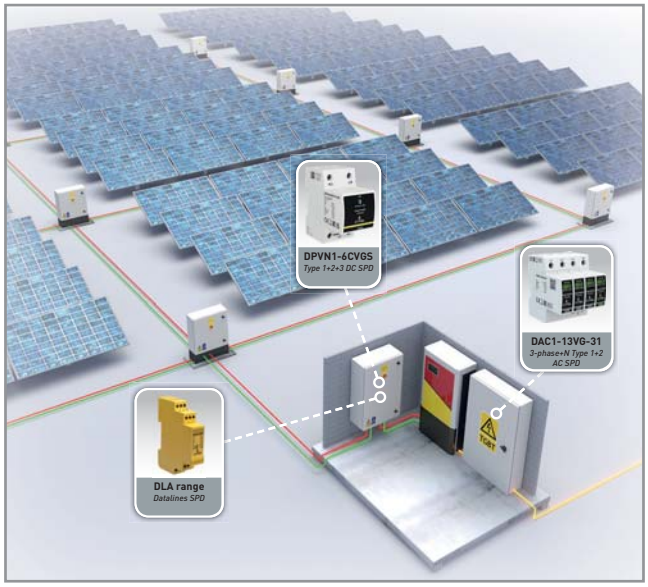
Residential Photovoltaic installation

The IEC61643-32 installation guide gives the relevant information to manage the safe operation of PV installation in case of surge due to lightning. For small power plants (residential and small commercial), AC input (connection to the grid) and DC output should be protected.

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

Business/Building Photovoltaic installation

Commercial or industrial sites can integrate very large photovoltaic systems into their power generation strategy. These applications are vulnerable to lightning and transient surges which can cause significant downtime and economic losses. The implementation of SPDs at key locations throughout the facility is necessary to ensure the reliable operation and high availability of the plant.
If the building is equipped with LPS, Type 1 SPDs are required on the AC and PV side of the inverter.



Photovoltaic Power Plant

Photovoltaic power plants have a high risk of lightning strikes due to their large surface area and exposed location. This expensive and sensitive equipment is vulnerable to lightning strikes. It may result in direct replacement costs and operation downtime and significant economic losses due to lack of availability. Thus implementation of SPDs on AC, DC and communication lines are highly recommended.
To comply with IEC 61643-32 guide, a free-field PV power plant is always considered to be a LPL III installation. Type 1 SPDs with a minimum limp rating of 5 kA on the DC side and Type 1 with minimum 12,5 kA on the AC side of the installation are mandatory

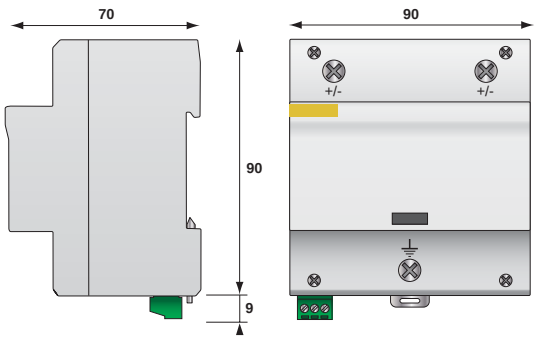
DS60VGPV-1500G/51

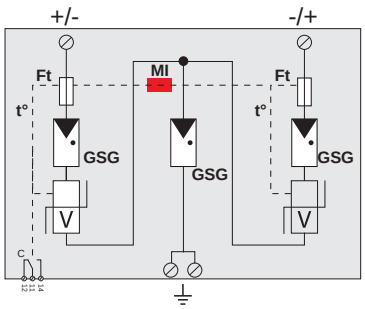
DS60VGPV/51 SERIES

- VG-Technology
- No leakage, no operating currents
- Improved life expectancy
- Iimp/Itotal 12.5 / 25 kA @ 10/350µs
- Common and Differential mode protection
- Remote Signaling

DS60VGPV-xxxG/51

Maximum PV voltage
«VG» = VG Technology





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

Characteristics

CITEL Model		DS60VGPV-600G/51	DS60VGPV-1000G/51	DS60VGPV-1500G/51
Description		Type 1+2 PV surge protector		
Network	Uocstc	600 Vdc	1000 Vdc	1250 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. PV operating voltage	Ucpv	720 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15 000 A	15 000 A	15 000 A
Permanent operating current *Leakage current at Ucpv*	Icpv	None	None	None
Residual current *Leakage current at Ucpv*	Ipe	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	12.5 kA	12.5 kA	12.5 kA
Total lightning current *max. total withstand @ 10/350 µs*	Itotal	25 kA	25 kA	25 kA
Protection level CM/DM *@In (8/20µs) and @ 6kV (1.2/50µs)*	Up	2.2/2.8 kV	4.7/5.4 kV	4.7/5.4 kV
Associated disconnectors				
Thermal disconnector		internal		
Fuses		without		
Mechanical characteristics				
Dimensions		see diagram		
Connection to Network		screw terminals: 6-35mm²		
Disconnection indicator		1 mechanical indicator		
Remote signaling of disconnection output on changeover contact		250 Vac/0.5 A (AC) - 30 Vdc/3 A (DC)		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		EN50539-11/EN IEC 61643-31		
Part number				
		3963	3958	3956

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

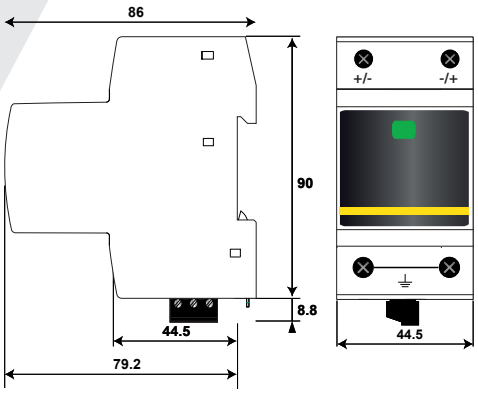
DPVN1-6CVGS-21Y-1500

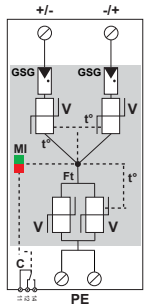
DPVN1-6CVGS SERIES

- For PV installations up to 1500 Vdc
- Impulse currents Iimp/Itotal : 6.25/12.5 kA @ 10/350µs
- VG-Technology and CTC Technology
- Common Mode and Differential mode protection
- Remote Signaling
- IEC 61643-31, EN 61643-31 and UL1449 ed.5 compliance

DPVN1-6CVGS-21Y-xxx

- xxx: Maximum PV voltage
- 21Y: Configuation 2+1 -»Y»diagram
- VG: «VG» = VG Technology





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

Characteristics

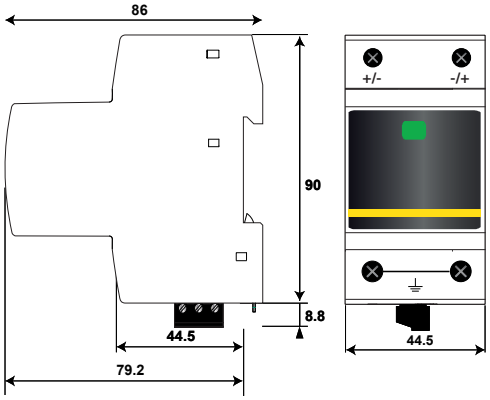
CITEL Model		DPVN1-6CVGS-21Y-600	DPVN1-6CVGS-21Y-1200	DPVN1-6CVGS-21Y-1500
Description		Type 1+2+3 PV surge protector		
PV Network	Uocstc	500 Vdc	1000 Vdc	1250 Vdc
Protection mode(s)		MC/MD	MC/MD	MC/MD
Max. PV operating voltage	Ucpv	600 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15 000 A	15 000 A	15 000 A
Permanent operating current *Leakage current at Ucpv*	Icpv	None	None	None
Residual current *Leakage current at Ucpv*	Ipe	None	None	None
Follow current	if	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	6.25 kA	6.25 kA	6.25 kA
Total lightning current *max. total withstand @ 10/350 µs*	Itotal	12.5 kA	12.5 kA	12.5 kA
Total max. discharge current *max. total withstand @ 8/20 µs*	Imax total	60 kA	60 kA	60 kA
Protection level CM/DM *@In (8/20µs) and @ 6kV (1.2/50µs)*	Up	2.3 kV	4.3 kV	4.8 kV
Associated disconnectors				
Thermal disconnector		Integrated CTC Technologie		
Fuses		without		
Mechanical characteristics				
Dimensions		see diagram - 2.5TE (EN43880)		
Connection to Network		Screw terminals: 2.5-25mm²		
Disconnection indicator		1 mechanical indicator - Green/Red		
Remote signaling of disconnection		Output on changeover contact		
Failsage mode		All pole disconnecion from PV network		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-31 / EN 61643-31 / EN 50539-11 / UL1449 ed.5		
Part number				
		65222101	65222102	65222103

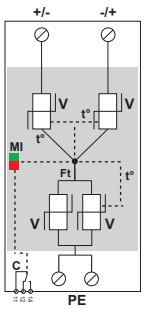
DPVN1-6CS-21Y-600

DPVN1-6CS SERIES

- **For PV installations up to 1500 Vdc**
- **Impulse currents Iimp/Itotal : 6.25/12.5 kA @ 10/350µs**
- **CTC Technology**
- **Common Mode and Differential mode protection**
- **Remote Signaling**
- **IEC 61643-31, EN 61643-31 and UL1449 ed.5 compliance**

DPVN1-6CS-21Y-xxx
- Maximum PV voltage
- Configuation 2+1 - «Y» diagram





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

Characteristics

CITEL Model		DPVN1-6CS-21Y-600	DPVN1-6CS-21Y-1200	DPVN1-6CS-21Y-1500
Description		Type 1+2+3 PV surge protector		
PV Network	Uocstc	500 Vdc	1000 Vdc	1250 Vdc
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. PV operating voltage	Ucpv	600 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15 000 A	15 000 A	15 000 A
Permanent operating current *Leakage current at Ucpv*	Icpv	< 0.1 mA	< 0.1 mA	< 0.1 mA
Residual current *Leakage current at Ucpv*	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA
Follow current	if	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	540 kA	40 kA
Impulse current by pole *max. withstand 10/350µs*	Iimp	6.25 kA	6.25 kA	6.25 kA
Total lightning current *max. total withstand @ 10/350 µs*	Itotal	12.5 kA	12.5 kA	12.5 kA
Total max. discharge current *max. total withstand @ 8/20 µs*	Imax total	60 kA	60 kA	60 kA
Protection level CM/DM *@In (8/20µs) and @ 6kV (1.2/50µs)*	Up	2.3 kV	4.3 kV	4.8 kV
Associated disconnectors				
Thermal disconnector		CTC Technology integrated		
Fuses		without		
Mechanical characteristics				
Dimensions		see diagram - 2.5TE (EN43880)		
Connection to Network		Screw terminals: 2.5-25mm²		
Disconnection indicator		1 mechanical indicator - Red/Green		
Remote signaling of disconnection		output on changeover contact		
Failsafe mode		All pole disconnection from PV network		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-31 / EN 61643-31 / EN 50539-11 / UL1449 ed.5		
Part number				
		65212101	65212102	65212103

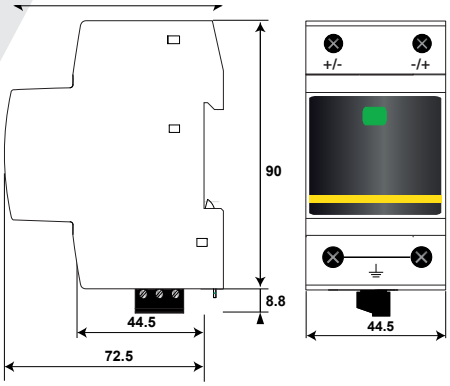
DPVN40CVGS-21Y-1200

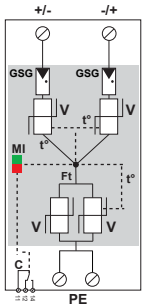
DPVN40CVGS SERIES

- For PV installations up to 1500Vdc
- In/Imax : 20/40 kA @8/20µs
- VG-Technology and CTC Technology
- Common Mode and Differential mode
- Remote Signaling
- IEC 61643-31, EN 61643-31 and UL1449 ed.5 compliance

DPVN40VGS-21Y-xxx

- xxx — Maximum PV voltage
- 21Y — Configuation 2+1 - «Y» diagram
- VGS — «VG» = VG Technology





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

Characteristics

CITEL Model		DPVN40CVGS-21Y-600	DPVN40CVGS-21Y-1200	DPVN40CVGS-21Y-1500
Description		Type 2+3 PV surge protector VG and CTC technology		
PV Network	Uocstc	500 Vdc	1000 Vdc	1250 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. PV operating voltage	Ucpv	600 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15 000 A	15 000 A	15 000 A
Permanent operating current *Leakage current at Ucpv*	Icpv	None	None	None
Residual current *Leakage current at Ucpv*	Ipe	None	None	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Total Maximal discharge current *- max. total withstand @ 8/20 µs*	Itotal	60 kA	60 kA	60 kA
Protection level *CM/DM @In*	Up	2.3 kV	4.3 kV	4.8 kV
Associated disconnectors				
Thermal disconnector		CTC Technology integrated		
Fuses		without		
Mechanical characteristics				
Dimensions		see diagram		
Connection to Network		Screw terminals: 2.5-25mm²		
Disconnection indicator		1 mechanical indicator - Red/Green		
Remote signaling of disconnection		Output on changeover contact		
Failsafe mode		All pole disconnection from PV network		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-31 / EN 61643-31 / EN 50539-11 / UL1449 ed.5		
Certification		KEMA		
Part number				
		65122101	65122102	65122103

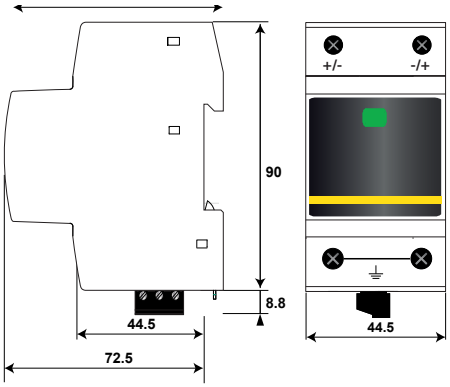
DPVN40CS-21Y-1500

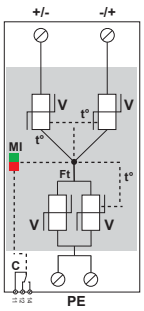
DPVN40CS SERIES

- For PV installations up to 1500Vdc
- In/Imax : 20/40 kA @8/20µs
- CTC Technology
- Common Mode and Differential mode
- Remote Signaling
- IEC 61643-31, EN 61643-31 and UL1449 ed.5 compliance

DPVN40CS-21Y-xxx

- Maximum PV voltage
- Configuration 2+1 - «Y» diagram
- «S» = remote signalling status





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

Characteristics

CITEL Model		DPVN40CS-21Y-600	DPVN40CS-21Y-1200	DPVN40CS-21Y1500
Description		Type 2+3 PV surge protector - CTC technology		
PV Network	Uocstc	500 Vdc	1000 Vdc	1250 Vdc
Connection mode		+/-/PE	+/-/PE	+/-/PE
Protection mode(s)		CM/MD	CM/MD	CM/DM
Max. PV operating voltage	Ucpv	600 Vdc	1200 Vdc	1500 Vdc
Current withstand short circuit PV	Iscpv	15 000 A	15 000 A	15 000 A
Permanent operating current *Leakage current at Ucpv*	Icpv	< 0.1 mA	< 0.1 mA	< 0.1 mA
Residual current *Leakage current at Ucpv*	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	40 kA	40 kA	40 kA
Total max discharge current *- max. total withstand @ 8/20 µs*	Itotal	60 kA	60 kA	60 kA
Protection level CM/DM *@In*	Up	2.3 kV	4.3 kV	4.8 kV
Associated disconnectors				
Thermal disconnector		CTC Technology integrated		
Fuses		without		
Mechanical characteristics				
Dimensions		see diagram		
Connection to Network		Screw terminals: 2.5-25mm²		
Disconnection indicator		1 mechanical indicator - Red/Green		
Remote signaling of disconnection		Output on changeover contact		
Failsafe mode		All pole disconnection from PV network		
Mounting		Symmetrical rail 35 mm (EN60715)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-31 / EN 61643-31 / EN 50539-11 / UL1449 ed.5		
Certification		KEMA		
Part number				
		65112101	65112102	65112103

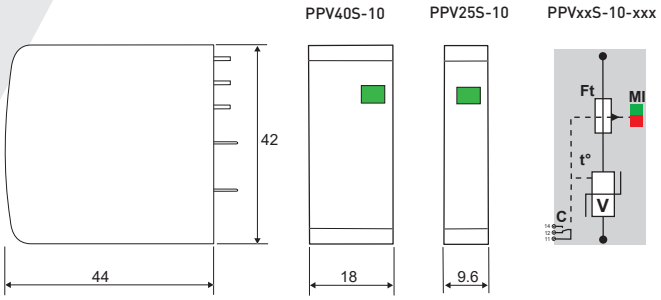
PPV25S-10-600 PPV40S-10-600 PPV40GS-10-1200

PPV SERIES

- PCB mounting
- Imax : 40 and 25 kA
- Application up to 1500 Vdc PV powerline
- Remote Signaling
- EN 61643-31 and IEC 61643-31 compliance*

PPV40S-10-xxxx

- Max. PV operating voltage
- 1-pole Configuration
- «S» : Remote signal
- Imax



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

Characteristics

CITEL Model PPV40S			-	-	PPV40S-10-500	PPV40S-10-600	PPV40S-10-750	PPV40S-10-900	PPV40GS-10-1200**
CITEL Model PPV25S			**PPV25S-10-75**	**PPV25S-10-300**	**PPV25S-10-500**	**PPV25S-10-600**	**PPV25S-10-750**	**PPV25S-10-900**	**-**
Description			Type 2 PV surge protector						
Technology			MOV	MOV	MOV	MOV	MOV	MOV	GDT
Max. PV operating voltage	Ucpv		75 Vdc	300 Vdc	500 Vdc	600 Vdc	750 Vdc	900 Vdc	1200 Vdc
Max. PV operating voltage *(star mounting)*	Ucpv		150 Vdc	600 Vdc	1000 Vdc	1200 Vdc	1500 Vdc	1800 Vdc	1200 Vdc
Continuous operating current	Icpv		< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	<0.1 mA	none
Nominal discharge current *15 x 8/20 µs impulses*	In	*PPV40S series* *PPV25S series*	- 10 kA	- 10 kA	20 kA 10 kA	20 kA 10 kA	20 kA 10 kA	20 kA 10 kA	20 kA -
Max. discharge current *max. withstand Ø 8/20 µs*	Imax	*PPV40S series* *PPV25S series*	- 25 kA	- 25 kA	40 kA 25 kA	40 kA 25 kA	40 kA 25 kA	40 kA 25 kA	40 kA -
Protection level	Up		0,5 kV	1,1 kV	1.8 kV	2 kV	2.6 kV	2.8 kV	2,8 kV
Protection level *(star mounting)*	Up		1 kV	2,2 kV	3.6 kV	4 kV	5.2 kV	5.6 kV	2,8 kV
Current withstand short circuit PV	Iscpv		15 000 A	15 000 A	15 000 A	15 000 A	15 000 A	15 000 A	15 000 A
Associated disconnectors									
Thermal disconnector			internal						
External Fuses			without						
Mechanical characteristics									
Dimensions			see diagrams						
Connection to Network			through soldering pins						
Disconnection indicator			1 mechanical indicator						
Remote signaling of disconnection			output on changeover contact						
Mounting			on Printed Circuit Board						
Operating temperature			-40/+85°C						
Protection rating			IP20						
Housing material			Thermoplastic UL94 V-0						
Standards									
Compliance*			EN 61643-31 / IEC 61643-31						
Part number									
		PPV40S series	-	-	8722202	8722203	8722205	8722206	8722608
		PPV25S series	8721207	8721210	8721202	8721203	8721205	8721206	-

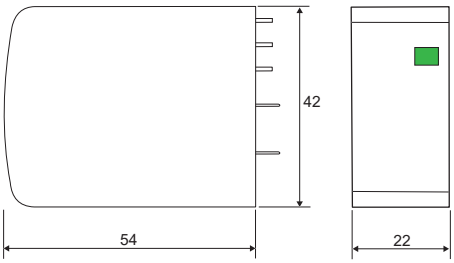
**) The standards cover devices. PPV/PAC series are components. Complient when combined is an assembly*
***) This module is used only for the ground connection of a "star" configuration for voltages Ucpv <1200Vdc*

PPV1 SERIES

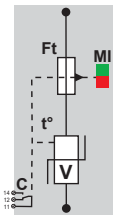
- **PCB mounting**
- **Iimp : 6.25 kA @ 10/350µs**
- **Application up to 1000 Vdc PV powerline**
- **Remote Signaling**
- **EN 61643-31 and IEC 61643-31 compliance***

PPV1-6VGS-10-xxx

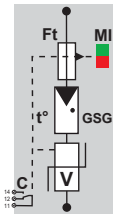
- Max. PV operating voltage
- 1-pole Configuration
- «S» : Remote signal
- VG Technology
- Iimp
- Type 1+2



PPV1-6S-10



PPV1-6VGS
PPV1-13VGS



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

Characteristics

CITEL Model		PPV1-6S-10-600	PPV1-6S-10-750	PPV1-6VGS-600	PPV1-13VGS-10-1200
Description		Type 1+2 PV surge protector			
Max. PV operating voltage	Ucpv	600 Vdc	750 Vdc	600 Vdc	1200 Vdc
Max. PV operating voltage (star mounting)	Ucpv	1200 Vdc	1500 Vdc	1200 Vdc	-
Continuous operating current	Icpv	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA	20 kA	20 kA
Max. lightning current *max. withstand @ 10/350 µs*	Iimp	6.25 kA	6.25 kA	6.25 kA	12.5 kA
Protection level	Up	2 kV	2 kV	2 kV	2 kV
Protection level (star mounting)	Up	4 kV	4 kV	4 kV	4 kV
Current withstand short circuit PV	Iscpv	15 000 A	15 000 A	15 000 A	15 000 A
Associated disconnectors					
Thermal disconnector		internal			
External Fuses		without			
Mechanical characteristics					
Dimensions		see diagrams			
Connection to Network		through soldering pins			
Disconnection indicator		1 mechanical indicator			
Remote signaling of disconnection		output on changeover contact			
Mounting		on Printed Circuit Board			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Standards					
Compliance*		EN 61643-31 / IEC 61643-31			
Part number					
		8723203	8723205	8723403	8724608

**) The standards cover devices. PPV/PAC series are components. Complient when combined is an assembly*

PAC SERIES

PAC25S-10-420 PAC40S-10-680 PAC40GS-10-275

- **PCB mounting**
- **Imax : 40 and 25 kA**
- **Remote Signaling**
- **EN 61643-11 and IEC 61643-11 compliance***

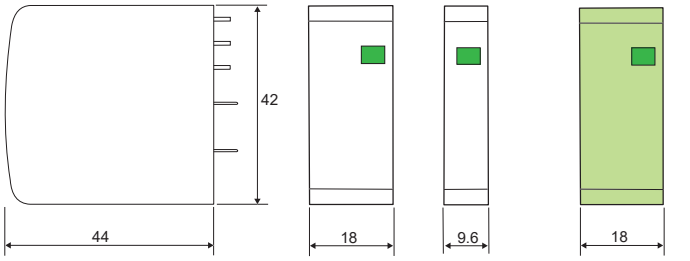
PAC40S-10-xxxx

- Max. operating voltage
- 1-pole Configuration
- «S» : Remote signal
- Imax

PAC25S-10-680
PAC40S-10-275
PAC40S-10-420
PAC40S-10-680

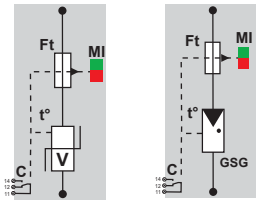
PAC25S-10-275
PAC25S-10-420

PAC40GS-10-275



PAC40S-10-xxx
PAC25-10-xxx

PAC40GS-10-275



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

Characteristics

CITEL Model		PAC25S-10-275	PAC25S-10-420	PAC25S-10-680	PAC40S-10-275	PAC40S-10-420	PAC40S-10-680	PAC40GS-10-275
Description		1-pole Type 2 AC surge protector						N/PE SPD
Max. operating voltage	Uc	275 Vac	420 Vac	680 Vac	275 Vac	420 Vac	680 Vac	275 Vac
Residual current	Ipe	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	<0.1 mA	none
Nominal discharge current *15 x 8/20 µs impulses*	In	10 kA	10 kA	10 kA	20 kA	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs*	Imax	25 kA	25 kA	25 kA	40 kA	40 kA	40 kA	40 kA
Protection level	Up	1.1 kV	1.8 kV	2.6 kV	1.1 kV	1.8 kV	2.6 kV	1.5 kV
Admissible short-circuit current	Isccr	25 000 A	25 000 A	25 000 A	25 000 A	25 000 A	25 000 A	25 000 A
Associated disconnectors								
Thermal disconnector		internal						
External Fuses (if necessary)		50 A gG			125 A gG			-
Mechanical characteristics								
Dimensions (see diagram)		9.6 mm		18 mm	9.6 mm	18 mm		18 mm
Connection to Network		through soldering pins						
Disconnection indicator		1 mechanical indicator						
Remote signaling of disconnection		output on changeover contact						
Mounting		on Printed Circuit Board						
Operating temperature		-40/+85°C						
Protection rating		IP20						
Housing material		Thermoplastic UL94 V-0						
Standards								
Compliance*		EN 61643-11 / IEC 61643-11						
Part number								
		8711207	8711201	8711204	8712207	8712201	8712204	8712607

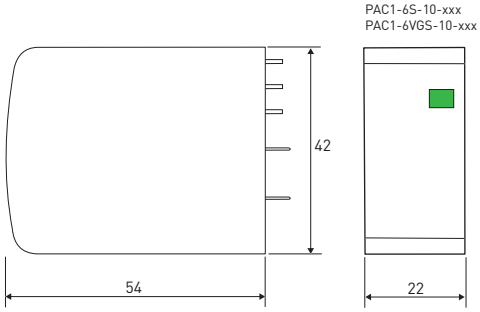
**) The standards cover devices. PPV/PAC series are components. Compliant when combined is an assembly*

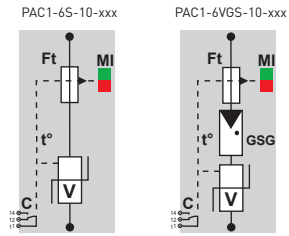
PAC1 SERIES

- PCB mounting
- Iimp : 6.25 kA @ 10/350µs
- VG or MOV Technology
- Remote Signaling
- EN 61643-11 and IEC 61643-11 compliance*

PAC1-6VGS-10-xxx

- Max. operating voltage
- 1-pole Configuration
- «S» : Remote signal
- VG Technology
- Iimp
- Type 1+2





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

Characteristics

CITEL Model		PAC1-6S-10-275	PAC1-6VGS-10-275
Description		Type 1+2 AC surge protector	
Technology		MOV	VG
Max. operating voltage	Uc	275 Vac	275 Vac
Residual current	Ipe	< 0.1 mA	none
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA	20 kA
Max. lightning current *max. withstand @ 10/350 µs*	Iimp	6.25 kA	6.25 kA
Protection level	Up	1.2 kV	1.5 kV
Admissible short circuit current	Isccr	25 000 A	25 000 A
Associated disconnectors			
Thermal disconnector		internal	
External Fuses (if necessary)		gG type 50 A min/125 A max	
Mechanical characteristics			
Dimensions		see diagram	
Connection to Network		through soldering pins	
Disconnection indicator		1 mechanical indicator	
Remote signaling of disconnection		output on changeover contact	
Mounting		on Printed Circuit Board	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Standards			
Compliance*		EN 61643-11 / IEC 61643-11	
Part number			
		8713207	8713407

**) The standards cover devices. PPV/PAC series are components. Compliant when combined is an assembly*

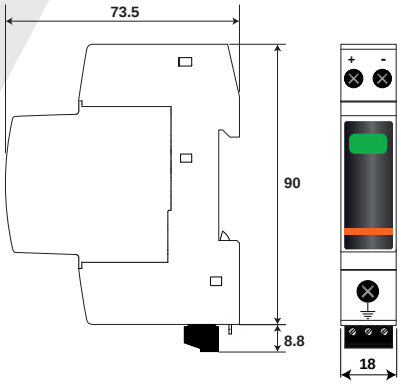
DDC20CS-20-24

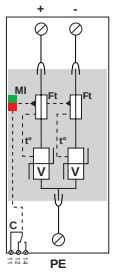
DDCxxCS SERIES

- **from 12 to 350 Vdc**
- **Compact design**
- **Imax: 20 to 40 kA**
- **Remote signalling**
- **prIEC 61643-41 and UL1449 ed.5 compliance**

DDCxxCS-20-xxxx

- Maximum DC operating voltage
- Configuration (2+0)
- «S» = Remote signal
- Imax: 20, 30 or 40 kA





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

Characteristics

CITEL Model		DDC20CS-20-24	DDC20CS-20-38	DDC30CS-20-65	DDC40CS-20-100	DDC40CS-20-125	DDC40CS-20-150	DDC40CS-20-180	DDC40CS-20-275	DDC40CS-20-350	DDC40CS-20-460
Network		12Vdc	24Vdc	48 Vdc	75 Vdc	95 Vdc	110 Vdc	130 Vdc	220 Vdc	280 Vdc	350 Vdc
Max. operating voltage PV-DC	Ucpv	24 Vdc	38 Vdc	65 Vdc	100 Vdc	125 Vdc	150 Vdc	180 Vdc	275 Vdc	350 Vdc	460 Vdc
Permanent operating current *@ Ucpv*	Icpv	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA	< 0.1 mA
Nominal discharge current *15 x 8/20 µs impulses*	In	10 kA	10 kA	15 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	30 kA	40 kA	40 kA	40 kA	40 kA	40 kA	40 kA	40 kA
Protection level +/PE (-/PE) *@ In (8/20µs)*	Up	250 V	250 V	300 V	390 V	450 V	500 V	620 V	900 V	1200 V	1400 V
Protection level +/- *@((8/20µs)*	Up	500 V	500 V	600 V	780 V	900 V	1000 V	1200 V	1800 V	2400 V	2800 V
Current withstand short circuit PV	Iscpv	1000 A	1000 A	1000 A	1000 A	1000 A	1000 A	1000 A	1000 A	1000 A	1000 A
Standards											
Compliance		prIEC61643-41/ UL1449 ed.5									
Part number											
		828210321	828210421	828310121	828410521	828410621	828410721	828410821	828410921	828411021	828411121

CITEL

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WIND TURBINE SURGE PROTECTORS

WIND TURBINE SURGE PROTECTORS

Wind turbines are usually located in exposed open areas, and are vulnerable to damage caused by lightning due to their height and complex internal electrical systems. To maximise the investment in Wind Turbines, protection against lightning is essential to ensure maximum availability.

High maintenance costs

Lightning strikes on a wind turbine may cause blade damage, a failure of an electrical and control system, and other phenomena. There are many such cases. The financial loss caused by wind turbine maintenance and downtime is very large. For an offshore wind turbine, the maintenance costs are particularly high, and the maintenance period is long. As a result, a big indirect loss can occur due to the lack of availability. The lost income from power generation can often dwarf the costs involved repairing the physical damage, and the cost of fitting suitable SPDs.

The threat caused by a lightning electromagnetic pulse is huge. Compared with direct lightning strikes, the indirect effect of lightning strikes, namely a lightning electromagnetic pulse (LEMP), is more risky to the electrical and control system of the wind turbine. The main reasons are as follows:

- the probability of lightning strikes on wind turbine blades is high, and the radiated electromagnetic field can cover the entire wind power plant;
- the operating systems of sensitive equipment, such as a main control and a pitch control system, have low immunity;
- the components and parts of the equipment have low capacity to endure LEMP and are prone to breakdown or insulation damage;
- the cable length of the interconnection between the wind turbines and the distance to the grid connection point is long in open areas. The inducted overvoltage can by very significant.

Reasonable installation of SPD is the most effective method.

LEMP is currently the main threat for breakdowns and failures of the electrical and electronic system. At present, the most cost-effective and reasonable main measures are taken: installing a coordinated set of SPDs, whose protection capability exceeds the withstand level of the protected equipment and the immunity of the system, at the boundaries of the lightning protection zones or at the front end of the protected equipment.

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STANDARDIZATION REQUIREMENTS

The basic protection method of wind power generation needs to meet the requirements of the basic protection standards of the lightning protection industry: the international standard IEC 62305-1 to 4 and national standards.

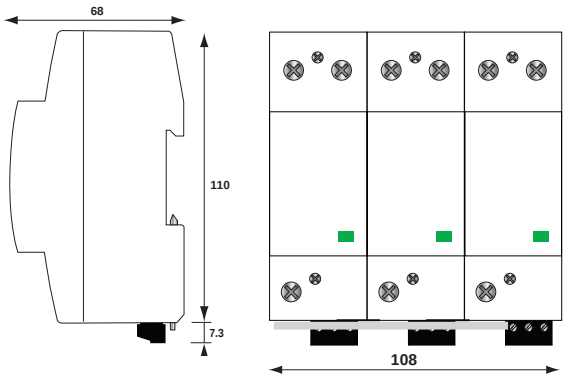
The general and special requirements for wind power industry applications need to meet the requirements of standards IEC 61400-24, which provide requirements for protection of blades, other structural components, and the effects of direct and indirect lightning strikes on the electrical and control system as well as detailing the typical environmental effect factors that the SPD should be able to withstand.

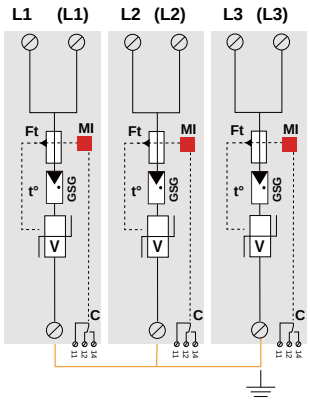
With regard to the performance and model selection requirements of the surge protection device, testing and model selection are required in accordance with SPD-related standards IEC 61643.

Range		Description	Page
DACN1-25VGS **DACN1-35VGS**		Type 1+2+3 3-phase 690 V network	136
DAC50S-31-760-2600DC		Type 2 3-phase	137
LMS-W		Lightning surge counter	138

DACN1-25VGS-30-760
DACN1-35VGS-30-440

- For 690 V AC Network
- VG Technology
- In : 35 kA/25kA
- Iimp : 35 kA (DACN1-35VGS) and 25 kA (DACN1-25VGS)
- Remote signaling
- Optimized to TOV
- EN 61643-11, IEC 61643-11, UL1449 ed.5 and GB/T 18802.1 compliance





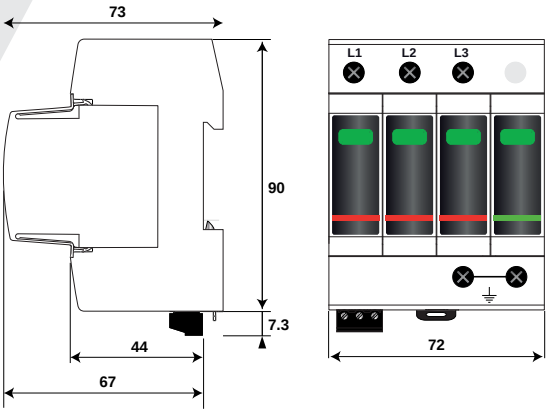
V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

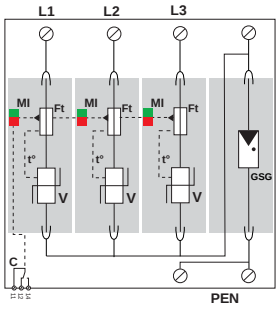
Characteristics

CITEL model		DACN1-25VGS-30-760	DACN1-35VGS-30-440
Description		Type 1+2+3 AC surge protector - 3-pole	
Max. AC operating voltage	Uc	760 Vac	440 VAC
Temporary Over Voltage (TOV) characteristics - 5 sec	UT	1000 Vac withstand	580 Vac tenue
Temporary Over Voltage (TOV) characteristics - 20 mn	UT	1325 Vac disconnection	770 Vac disconnection
Residuel current *- Leakage current at Uc*	Ipe	none	none
Max. Load current *(if connection serie)*	IL	100 A	100 A
Follow current	If	none	none
Nominal discharge current *15 x 8/20µs impulses*	In	35 kA	35 kA
Maximal discharge current *max. withstand @ 8/20 µs*	Imax	70 kA	70 kA
Impulse current by pole *max. withstand @ 10/350 µs by pole*	Iimp	25 kA	35 kA
Specific energy by pole	W/R	156 kJ/ohm	156 kJ/ohm
Withstand on combination waveform *Class III test*	Uoc	6 kV	6 kV
Protection level *@ In (8/20µs) et 6 kV (1.2/50µs)*	Up	2.5 kV	1.8 kV
Residual voltage *@ 25kA (8/20µs)*	Up-25kA	2.5 kV	1.8 kV
Residual voltage *@ 5kA (8/20µs)*	Up-5kA	1.6 kV	1.4 kV
Admissible short-circuit current	Isccr	50 000 A	50 000 A
Associated disconnectors			
Thermal disconnector		internal	
Fuses		Fuse type gG - 315 A	
Existing upstream ground breaker (if any)		Type «S» or delayed	
Mechanical characteristics			
Dimensions		see diagram, 2 TE (DIN43880)	
Connection to network		by screw terminals : 2.5-25 mm² (35mm² rigid)	
Disconnection indicator		1 mechanical indicator Green/Red	
Remote signaling of disconnection		output on changeover contact	
Failsafe mode		Disconnection from AC network	
Max. voltage/current for remote signaling		250 V/0.5 A (AC), 30 V/3 A (DC)	
Wiring for remote signaling		1.5 mm² max.	
Mounting		Symmetrical rail 35 mm² (EN60715)	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Standards			
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5 / GB/T 18802.1	
Certification		TUV Rheinland	-
Part number			
		29223012	29323022

DAC50S-31-760-2600DC

- **Type 2 surge protector 3-phase**
- **In : 20 kA**
- **Imax : 50 kA**
- **Pluggable module for each phase**
- **Remote signaling**
- **EN 61643-11, IEC 61643-11, UL1449 ed.5 compliance**





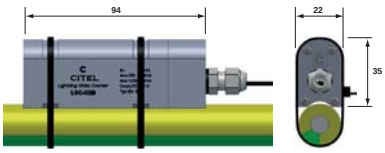
V: High energy varistor
GSG: Specific gas Tube
MI: Disconnection indicator
Ft: Thermal fuse
t°: Thermal disconnection system
C: Contact for remote signal

Characteristics

CITEL Model		DAC50S-31-760-2600DC
Description		Type 2 3-phase SPD
Network		400/690 Vac
Max. AC operating voltage	Uc	800 Vac
Temporary Over Voltage (TOV) characteristics - 5 sec	UT	2200 Vac withstand
Residual current *Leakage current at Uc*	Ipe	None
Follow current	If	None
Nominal discharge current *15 x 8/20 µs impulses*	In	20 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA
Protection level *@ In (8/20µs)*	Up	< 4 kV
Admissible short-circuit current	Isscr	50 000 A
Associated disconnectors		
Thermal disconnector		internal
Fuses (if requested)		50 A min. - 125 A max - Fuses Type gG
Installation ground fault breaker		Type «S» or delayed
Mechanical characteristics		
Dimensions		see diagram 4 TE (EN43880)
Connection to Network		Screw terminals: 2.5-25 mm²
Failsafe mode		Disconnection from network
Disconnection indicator		1 mechanical indicator/pole - Green/Red
Remote signaling of disconnection		output on changeover contact
Max. voltage/current for remote signaling		250 V/0.5 A (AC) / 30 V/3 A (DC)
Wiring for remote signaling		Max. 1.5 mm²
Mounting		Symmetrical rail 35 mm (EN60715)
Operating temperature		-40/+85°C
Protection rating		IP20
Housing material		Thermoplastic UL94-V0
Spare unit		MDAC50-320 + MDACG-320
Standards		
Compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.5
Part number		
		821115544

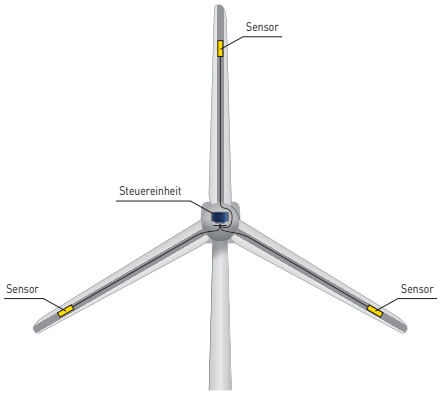
LMS-W

- **Smart lightning monitoring system for wind turbines.**
- **1 monitor + 3 sensors for the blades**
- **Monitoring, record the data for surge current, time of lightning strike, etc.**
- **Transmit the data by means of RS485.**
- **IEC 61400-24 and IEC 62561-6 compliant**



Characteristics

CITEL model		LMS-W
Description		Lightning current counters for windturbine
Power		24 Vdc
Minimum current sensibility	Itc	10 kA
Max. admissible impulse current	Imcw	200 kA
Mechanical characteristics		
Mounting		on plate
Operating temperature		-40°C bis + 70°C
Protection rating		IP67
Life expectancy		10 years
Standards		
Compliance		IEC 61400-24 / IEC 62561-6
Part Number		
		790623



TELECOM & DATA LINE SURGE PROTECTORS

TELECOM-DATA LINE SURGE PROTECTORS

Telecommunication and data transmission devices (PBX, modems, data terminals etc..) are becoming increasingly vulnerable to lightning-induced voltage surges.
These devices are becoming more complex, sensitive and often share a common grounding connection with other networks. This situation increases the risk for these sensitive devices to be stressed by destructive surge voltages, induced by lightning or by electrical switching operations.
Moreover, these devices are nowadays installed at every level of every installation (industrial, commercial and residential buildings), making these possible disturbances unacceptable and/or costly.
To make this telecom or data equipment sufficiently reliable, the installation of a dedicated surge protector, against transient overvoltages, is highly recommended.
Too often we only consider the cost of damage to hardware, which can be relatively low. What we should instead consider is the consequential losses to your business when that hardware is not available, which may take several weeks to replace and configure - the functional losses then become far more significant.

SURGE PROTECTORS FOR TELECOM AND DATA LINES

Surge protectors for telecom and data transmission equipment could be divided in 3 types:

- Surge protectors for telecom networks
- Surge protectors for datalines and industrial networks
- Surge protectors for Local Area Networks (LANs)

CITEL products differ by their electrical diagrams and their mechanical configurations, adapted to the need of each type of network.

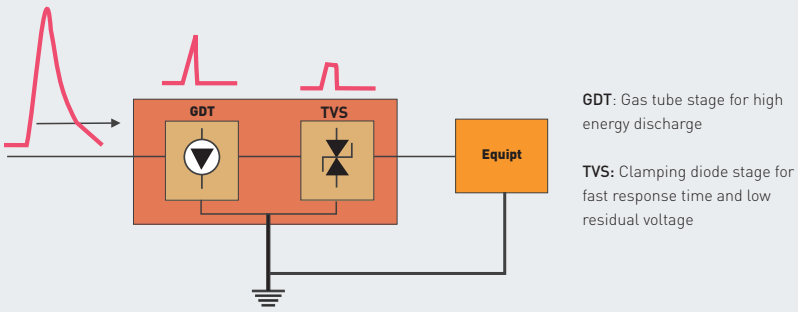
Reminder:
Devices connected to telecom or data networks, are also connected to the AC distribution network: in order to ensure a coordinated protection, surge protectors must be installed on each inter-connected networks.

TECHNOLOGY OF SURGE PROTECTORS

All CITEL telecom and data line surge protectors are based on reliable multistage hybrid design that combines a high discharge current capacity with fast response time.
All CITEL telephone and data line surge protectors use a combination of a 3-electrode gas discharge tube and fast clamping diodes, in order to provide:

- A nominal discharge current (repeated without destruction) greater than 5 kA @ 8/20 µs impulse
- An ultrafast response time < 1 ns
- Safety operation in end of life (Fail-safe behavior: end of life Mode 2 following EN 61643-21)
- Low insertion losses to not disturb the transmission signal.
- The systematic use of 3-electrode gas discharge tubes provides optimum protection through simultaneous activation.

2-stage diagram for Telecom/Dataline SPD



GDT: Gas tube stage for high energy discharge

TVS: Clamping diode stage for fast response time and low residual voltage

This set of characteristics is essential for optimum reliability of the protected equipment whatever the incident or disturbance.

Various protection circuits are available according to requirements and the type of network to be protected:

- Standard protection, used mainly for the analog telecom network
- Advanced protection, for high speed transmission lines.
- Line+Shield Protection: Transmission and protection for shield wire.
- «Low capacitance» surge protection for high bit rate links (> 1 Mbit/s)
- Indicator or remote signalling in case of end of life

STANDARDS

Tests procedures and installation recommendations for comunication line surge protectors must comply the following international standards:

- **IEC 61643-21**:
  Surge protective devices connected to telecommunications and signalling networks - Performance requirements and testing methods
- **IEC 61643-22**:
  Surge protective devices connected to telecommunications and signalling networks - Selection and application principles

Specific tests following EN/IEC 61643-21 standard

Surge protectors for communication lines are usually tested to several categories in order to declare their impulse durability

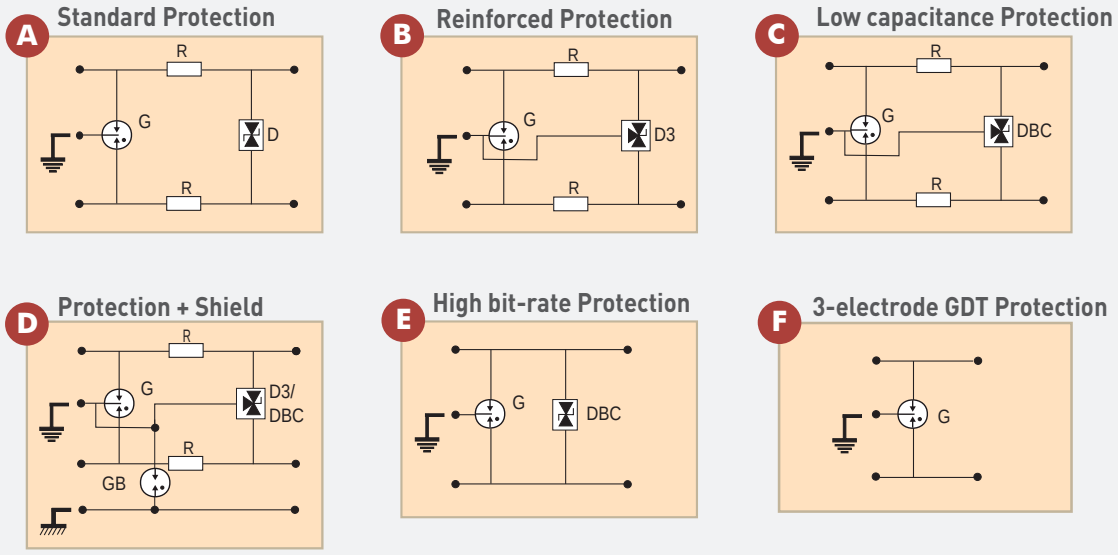
* **B2 Category**: 300 x 10/700µs voltage impulses from 1 to 4 kV
- **C2 Category**: combination wave impulses (1.2/50us & 8/20us) from 2kV/1kA to 10kV/5kA
- **C3 Category**: 300 x 10/1000µs current impulses from 10 to 100 A
- **D1 Category**: 2 x 10/350µs current impulses from 0.5 to 2.5 kA

As the surge current capabilities of CITEL Telecom/dataline SPDs are very high (typically Imax 20 kA, 8/20µs), their possible end of life is very unlikely.
Nevertheless, default modes on AC or impulse stress must be tested and declared. 3 default modes are defined by standard:

- **Mode 1**: disconnected SPD but line transmission still active
- **Mode 2**: short-circuited SPD, so line transmission off.
- **Mode 3**: Failed SPD and line transmission off (in-line cutoff).

For the majority of Citel telecom and dataline SPDs the fail-safe mode is Mode 2, as this ensures the customer equipment is protected under all failure conditions.

Typical diagrams for Telecom/Dataline SPD (for 1 pair)



G: 3-electrode gas tube
GB: 2-electrode gas tube
R: Line resistor
D: Fast Clamping Diode
D3: 3-pole Clamping Diode
DBC: Low capacitance clamping diode

TELECOM-DATA LINE SURGE PROTECTORS

USE OF SURGE PROTECTORS

In areas where standards are lacking or non-existent, the decision to use surge protectors on telecom and data lines can be taken by the following:

- The recommendation of the equipment manufacturer
- Corrective action following equipment damage due to transients
- Preventive action following risk assessment (IEC62305-2)
- Preventive action following a simplified risk assessment (below)

Simplified Risk assessment

In order to assess quickly the probability of the lightning impulses and their consequences, a simplified risk analysis could be performed following the table below.

Parameters	Low Risk	High Risk
Lightning density (Ng)	*< 2,5*	*> 2,5*
Site configuration	*Single building*	*Multiple buildings*
Transmission length	*Short*	*Long*
External lines distribution	*Underground*	*Overhead*
Electrical disturbances	*Low*	*High*
Existing lightning rod	*No*	*Yes*
Lightning events	*Infrequent*	*Already*
Equipment sensitivity	*Low*	*High*
Equipment costs	*Low*	*High*
Downtime costs	*Low or acceptable*	*Expensive or unacceptable*

The level of recommendation (from «no recommendation» to «highly recommended») of using surge protectors increase with the number of parameters classified as «high risk» on the table. More detailed risk analysis are available in the IEC 62305-2 and IEC61643-22 standards.

SURGE PROTECTION PARAMETERS

In choosing surge protection for your installation, bear the following in mind:

- The type of line: There is an appropriate level of protection and protection circuit for each type of line.
- The site configuration: Number of lines to be protected.
- The requested type of installation: The CITEL dataline range provides the following possibilities:
  - Installation in wall-mounted box, plug mounting, on distribution frame
  - various types of connection (screw, spring contact, connectors...)
- Maintenance features: Some surge protectors are:
  - equipped with pluggable modules (DLA).
  - equipped with failure indicators (DLAS1-DLATS1)

INSTALLATION

To be effective, surge protectors must be installed in accordance with the following principles:

- The earth point of the surge protector and of the protected equipment must be interconnected.
- The protection is installed on the network entrance, to divert impulse currents as fast as possible.
- The protected equipment must be nearby (protector/equipment distance less than 10 m long). If this rule cannot be followed, «secondary» protection must be installed near the equipment (coordinated surge protection).
- The grounding conductor (between the earth output of the SPD and the installation bonding circuit) must be as short as possible (less than 0.50 m) and have a minimum cross-section of 1 mm².
- The earth resistance must comply with the standards in force (no special earthing requested).
- Protected and unprotected cables must be kept well apart to limit coupling, which can they bypass the protection.

MAINTENANCE

CITEL data line surge protectors usually require no maintenance or replacement. They are designed to withstand repeated and heavy impulse currents without damage.
Nevertheless a controlled fail-safe mode (short circuit condition) is planned in case of surges exceeding the parameters of the surge protectors:

Protective short-circuit occurs in the following cases:

- Prolonged contact with a AC power line (AC overstress test in accordance with EN 61643-21)
- Exceptionally violent «lightning» strike (impulse overstress test in accordance with EN 61643-21).

In these cases, the surge protector definitively short-circuits, which indicates to the user the functional destruction through a transmission cut, while protecting the terminal equipment (Mode 2 default in accordance with EN 61643-21). The specific versions DLAS1 or DLATS1 provide a different failure mode: opening the line and switching an indicator in the front face of SPD or closing a switch for remote signalling (mode 1 default).
In all these cases, to reactive the line, the user must replace the surge protector or the removable module for pluggable versions.
The basic parameters of the surge protector for datalines could be checked with dedicated testers.

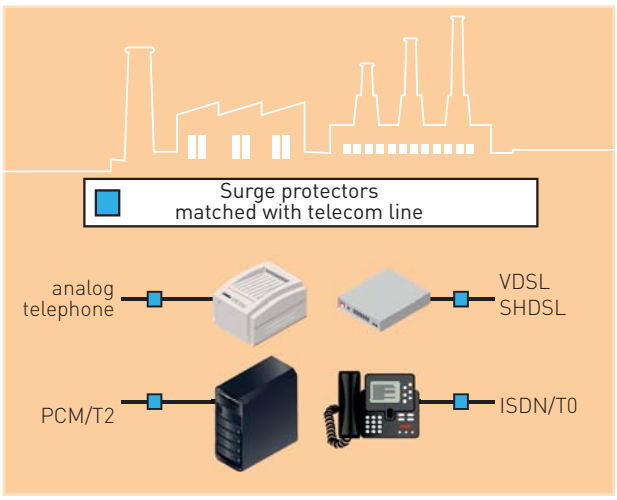
SPECIAL CONDITION: LIGHTNING ROD

If the installation to be protected is equipped with LPS (Lightning Protection System), the surge protectors for telecom or datalines, connected on external lines must be able to conduct 10/350 µs surge current with a rating of 2.5 kA minimum (D1 category test in IEC 61643-21 standard).

TELECOM SURGE PROTECTORS

PROTECTING TELECOMMUNICATION EQUIPMENT

Telecom devices (PBX, Modems, Terminals..) are especially exposed to lightning surges. CITEL offers a range of surge protectors dedicated to the protecting of these types of telecommunication networks:



For each type of telecom line, an adapted protection scheme must be used:

Lines	Voltage		Diagram
	Nominal	Residual	
Switched telephone /ADSL	170 V	210 V	Standard protection
ISDN, T0 primary access	48 V	70 V	Enhanced protection
ISDN, T2 primary access	6 V	25 V	Enhanced Protection Low capacitance
VDSL, SHDSL, G.FAST	170 V	210 V	Enhanced protection Low capacitance

The decision whether or not to use surge protection would be determined by taking a simplified risk assessment (see «Risk analysis» paragraph), or by detailed risk assessment (as the one included in IEC 61643-22 standard), or by specific installation conditions as:

Conditions	Recommendation
External telecom lines	Systematic protection
Lines downstream PBX	Protection in long or inter-building lines
Existing AC surge protector	Systematic protection

CITEL RANGE

Surge protectors for telecom networks are designed to fit into existing installations. So, CITEL surge protectors are available with several mechanical configurations and different mounting options:

- Connection boxes for Wall Mounting
- RJ11/RJ45 connection modules
- DIN rail mounting enclosure

CITEL model	*Description*	*Page*
B180 / B280 / B480 	Wall mounting Screw connection 1 to 4 pairs	153
MJ6 / MJ8 	RJ11 or RJ45 1 to 4 pairs	155
DLA / DLU / DLC 	DIN mounting Screw or spring connection 1 or 2 pairs Pluggable (option) Compact (option)	141 149 151
CL-DSL 	Wall mounting Spring connection 1 pair IP55 G.FAST	154

DATA LINE SURGE PROTECTORS

PROTECTING INDUSTRIAL NETWORKS

Industrial installations, businesses or smart buildings are packed with an increasing quantity of control equipment, measurement, control and supervisory equipment.
These systems are built with controller cards, probes, sensors and various sensitive electronic components: downtime on the operation on this equipment can be extremely costly.

Thus, it is increasingly vital to guarantee a relevant level of reliability to these systems: this can be obtained by installing data-line surge protection.

Equipment to be protected

Industrial or business installations are equipped with many different types of sensitive terminals, which must be protected against transient voltages, such as:

- Industrial process equipment
- SCADA systems (Supervisory Control And Data Acquisition)
- Transmission systems
- I/O cards
- Interfaces, converters
- Probes
- Actuators
- Access control system
- Fire detection system, Displays

Many data transmissions (or fieldbus) exist on the market. The table beside provides some examples of relevant CITEL surge protector model (DLA series: pluggable module, or DLC series: monobloc & compact module) in relation to the type of data transmission.

Network	Wiring	DLC	DLA*
4-20 mA	1 pair	DLC-24D3	DLA-24D3
Profibus-FMS	1 pair+Shield	DLC-12D3	DLA-12D3
Profibus-PA	1 pair+Shield	DLC-48D3	DLA-48D3
Profibus-DP	1 pair+Shield	DLC-12DBC	DLA-12DBC
Interbus	1 pair+Shield	DLC-12D3	DLA-12D3
Foundation Fieldbus-H1	1 pair+Shield	DLC-12D3	DLA-12D3
Foundation Fieldbus-H2	1 pair+Shield	DLC-48DBC	DLA-48DBC
WorldFIP	1 pair+Shield	DLC-48DBC	DLA-48DBC
Fipway	1 pair+Shield	DLC-48DBC	DLA-48DBC
LONworks	1 pair+Shield	DLC-48DBC	DLA-12DBC
Batibus	1 pair+Shield	DLC-12D3	DLA-12D3
RS485	1 pair+Shield	DLC-12D3	DLA-12D3
RS422	2 pairs	-	DLA2-06D3
RS232	4 wires	-	DLA2-12D3

DATA LINE SURGE PROTECTORS

CITEL RANGE

CITEL surge protectors for industrial data networks are designed to fit on symmetrical DIN rail.
Due to multiple possible configurations requested, CITEL offers a large range of solutions, the surge protectors are available in various configurations:

- Number of protected wires: 1 to 2 pairs.
- Screw or spring contact wiring (/R) connection
- Transmission and protection of the shield wire
- Compactness (DLC)
- Plug-in modules: Fixed version (DLU, DLU2) or pluggable version with removable module (DLA, DLA2) to ease the maintenance process.
- Signalling or remote signaling feature in case of end of life (DLAS1, DLATS1)
- Higher load current

The summary table below informs the different features related to the different models of dataline SPDs for DIN mounting.

CITEL model	*Description*	*Page*
DLA / DLA2 / DLAS1 / DLATS1 	Pluggable 1 or 2 pairs Screw/spring connection Imax 20 kA	141 143 145
DLU / DLU2 	Monobloc 1 or 2 pairs Screw connection Imax 20 kA	149
DLC 	Compact Monobloc 1 pair Spring connection Imax 10 kA	151

CITEL range	Line configuration	Pluggable Module	Line transmission when plug removed	Default mode (following IEC61643-21)	Shield management	Wire Connection	Default Signalling	Default Remote Signalling	Width	Imax	Max Load current
DLA	1 pair	Y	On	Mode 2	Y	screw	N	N	13 mm	20 kA	0.3 A
DLA/R	1 pair	Y	On	Mode 2	Y	spring	N	N	13 mm	20 kA	0.3 A
DLAW	1 pair	Y	Off	Mode 2	Y	screw	N	N	13 mm	20 kA	0.3 A
DLAW/R	1 pair	Y	Off	Mode 2	Y	spring	N	N	13 mm	20 kA	0.3 A
DLAHW/R	1 pair	Y	Off	Mode 2	Y	spring	N	N	13 mm	20 kA	2.4 A
DLAH	1 pair	Y	On	Mode 2	Y	screw	N	N	13 mm	20 kA	2.4 A
DLAH/R	1 pair	Y	On	Mode 2	Y	spring	N	N	13 mm	20 kA	2.4 A
DLA2	2 pairs	Y	On	Mode 2	Y	screw	N	N	18 mm	20 kA	0.3 A
DLA-IS	1 pair + 0V	Y	On	Mode 2	Y	screw	N	N	18 mm	20 kA	2.4 A
DLAS1	1 pair	Y	On	Mode 2	Y	screw	Y	N	13 mm	20 kA	0.3 A
DLAS1/R	1 pair	Y	On	Mode 2	Y	spring	Y	N	13 mm	20 kA	0.3 A
DLAWS1	1 pair	Y	Off	Mode 2	Y	screw	Y	N	13 mm	20 kA	0.3 A
DLAWS1/R	1 pair	Y	Off	Mode 2	Y	spring	Y	N	13 mm	20 kA	0.3 A
DLATS1	1 pair	Y	On	Mode 2	Y	screw	Y	Y	13 mm	20 kA	0.3 A
DLATS1/R	1 pair	Y	On	Mode 2	Y	spring	Y	Y	13 mm	20 kA	0.3 A
DLAWTS1	1 pair	Y	Off	Mode 2	Y	screw	Y	Y	13 mm	20 kA	0.3 A
DLAWTS1/R	1 pair	Y	Off	Mode 2	Y	spring	Y	Y	13 mm	20 kA	0.3 A
DLC	1 pair	N	NA	Mode 2	N	spring	N	N	6 mm	10 kA	0.3 A
DLU	1 pair	N	NA	Mode 2	Y	screw	N	N	18 mm	20 kA	0.3 A
DLU2	2 pairs	N	NA	Mode 2	N	screw	N	N	18 mm	20 kA	0.3 A
DLUH	1 pair	N	NA	Mode 2	Y	screw	N	N	18 mm	20 kA	2.4 A
DLUH2	2 pairs	N	NA	Mode 2	N	screw	N	N	18 mm	20 kA	2.4 A

DLA SERIES

- **Pluggable surge protection for «DIN» mounting**
- **All types of Telephone and Data lines**
- **Shield wire protection**
- **Screw (DLA) or spring contact (DLA/R) terminals**
- **Without line cut-off (DLA) or with (DLAW)**
- **IEC 61643-21 compliance**
- **UL497B approved**

Characteristics

CITEL Model		DLA-170G	DLA-170	DLA-48DBC	DLA-48D3	DLA-24D3	DLA-12D3	DLA-06DBC	DLA-06D3
Description		Telecom/Data SPD- 1-pair DIN mounting - Pluggable							
Network		Telephone line, ADSL2, VDSL2, SHDSL	Telephone line,ADSL2, VDSL	Fipway, WorldFIP, FieldBus-h2	ISDN-T0, 48 V line	4-20 mA	RS232, RS485	E1/T2 line 10BaseT	RS422
SPD configuration		1-pair+shield	1-pair+shield	1-pair+shield	1-pair+shield	1-pair+shield	1-pair+shield	1-pair+shield	1-pair+shield
Nominal line voltage	Un	150 V	150 V	48 V	48 V	24 V	12 V	6 V	6 V
Max. DC operating voltage	Uc	170 V	170 V	53 V	53 V	28 V	15 V	8 V	8 V
Max. Load current	IL	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA
Max. frequency	f max	> 100 MHz	> 10 MHz	> 20 MHz	> 3 MHz	> 3 MHz	> 3 MHz	> 20 MHz	> 3 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Protection level *following C3 Category test*	Up	750 V	220 V	75 V	70 V	40 V	30 V	25 V	20 V
Line resistance *(+/-10%)*		-	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics									
Dimensions		see diagram							
Format		Plug-in DIN box							
Connection to Network		DLA-xxx: screw terminal - cross section 0.5-2.5 mm² DLA-xxx/R: spring terminal - cross section 0.5-2.5 mm²							
Disconnection indicator		transmission interrupt - Default Mode 2							
Mounting		Symmetrical rail 35 mm (EN60715)							
Operating temperature		-40/+85°C							
Protection rating		IP20							
Housing material		Thermoplastic UL94 V-0							
Spare module		DLAM-170G	DLAM-170	DLAM-48DBC	DLAM-48D3	DLAM-24D3	DLAM-12D3	DLAM-06DBC	DLAM-06D3
Versions		DLA-xxx: standard version (line continuity in case of removal of plug-in module) - screw terminal DLA-xxx/R: standard version with spring contact terminal DLAW-xxx:specific version with line cut-off in case of removal plug-in module. DLAH-xxx: «remote supply» version with max. line current IL = 2,4 A - Line inductance: 10µH DLA-PE: grounding version							
Standards									
Compliance		IEC 61643-21 / EN 61643-21 / UL497B							
Part number									
DLA range		640165	6406011	640421	6403021	6403011	6402011	640121	6401011
DLA/R range		-	6401054	6404214	6403024	6401034	6402014	6401214	6401014
DLAH range		-	641005	641014	641004	641003	641002	641011	641001
DLAW range		-	640805	-	640804	640803	640802	640811	640801

DLA■-xxx■/■

- Wiring: « » (Screw) or «R» (Spring)
- Bit rate (D2, D3 or DBC)
- Nominal voltage
- « »: standard diagram
- «W»: line cut-off if removal plug-in module
- «H»: max. line current IL: 2.4 A

CE

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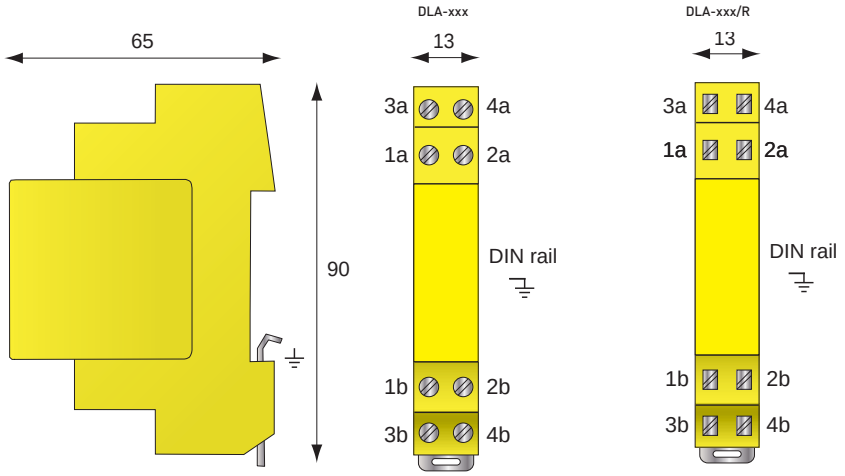
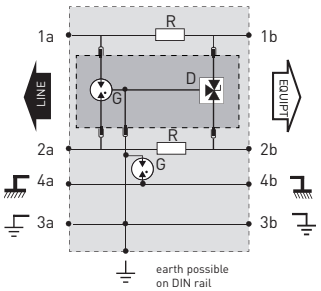
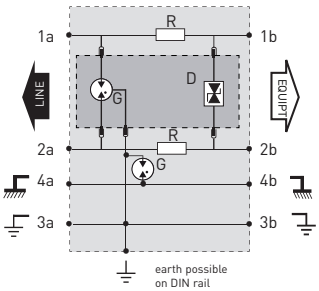


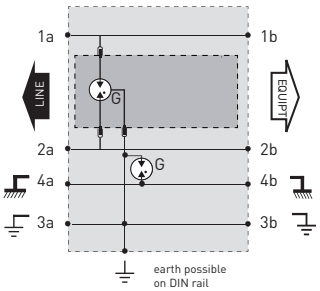
DLA-xxxD3
DLA-xxxDBC



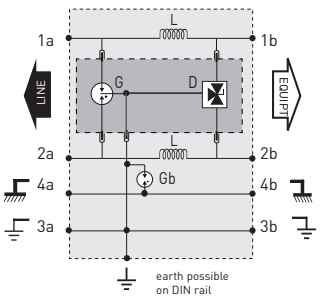
DLA-170
DLA-xxD2



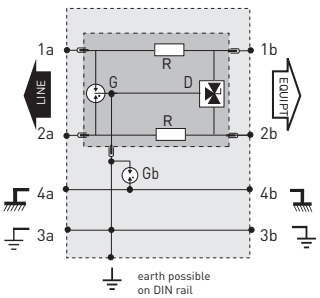
DLA-170G



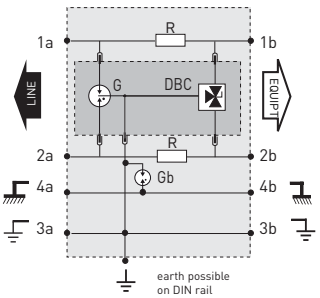
DLAH-xxxD3



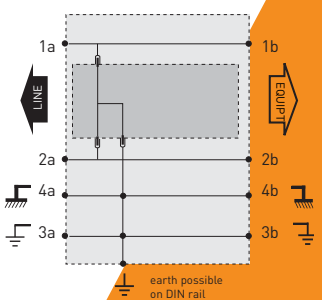
DLAW-xxxD3



DLA-xxxDBC



DLA-PE



G: 3-electrode gas tube
Gb: 2-electrode gas tube
R: Resistor
D: Clamping diode

DLA2-24D3

DLA2 SERIES

- **Pluggable surge protection for «DIN» mounting**
- **2-pair surge protection**
- **All type of telecom and data lines**
- **Shield wire protection**
- **IEC 61643-21 compliance**
- **UL497B approved**

Characteristics

CITEL Model		DLA2-170	DLA2-48DBC	DLA2-48D3	DLA2-24D3	DLA2-12D3	DLA2-06DBC	DLA2-06D3
Description		Telecom/Data SPD- 2-pair -DIN mounting - Pluggable						
Network		Telephone line, ADSL2, VDSL	Fipway, WorldFIP, FieldBus-h2	ISDN-T0, 48 V line	4-20 mA	RS232, RS485	MIC/T2, 10BaseT	RS422
SPD configuration		2-pair + shield	2-pair + shield	2-pair + shield	2-pair + shield	2-pair + shield	2-pair + shield	2-pair + shield
Nominal line voltage	Un	150 V	48 V	48 V	24 V	12 V	6 V	6 V
Max. DC operating voltage	Uc	170 V	53 V	53 V	28 V	15 V	8 V	8 V
Max. Load current	IL	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA
Max. frequency	f max	> 10 MHz	> 20 MHz	> 3 MHz	> 3 MHz	> 3 MHz	> 20 MHz	> 3 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. discharge current *-max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Protection level *following C3 Category test*	Up	220 V	75 V	70 V	40 V	30 V	25 V	20 V
Line resistance *(+/-10%)*		4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics								
Dimensions		see diagram						
Format		Plug-in DIN box						
Connection to Network		screw terminal - cross section 0.5-2.5 mm²						
Disconnection indicator		transmission interrupt - Default Mode 2						
Mounting		Symmetrical rail 35 mm (EN60715)						
Operating temperature		-40/+85°C						
Protection rating		IP20						
Housing material		Thermoplastic UL94 V-0						
Spare module		DLA2M-170	DLA2M-48DBC	DLA2M-48D3	DLA2M-24D3	DLA2M-12D3	DLA2M-06DBC	DLA2M-06D3
Standards								
Compliance		IEC 61643-21 / EN 61643-21 / UL497B						
Part number								
		640611	640314	640312	640311	640211	640131	640111

DLA2-xxx D3

- Bit rate (D3 or DBC)
- Nominal voltage

CE

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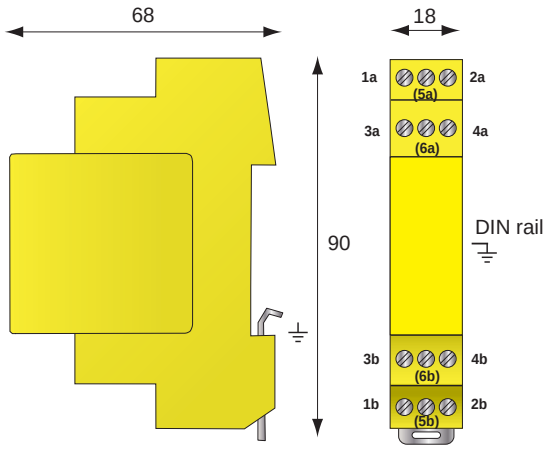
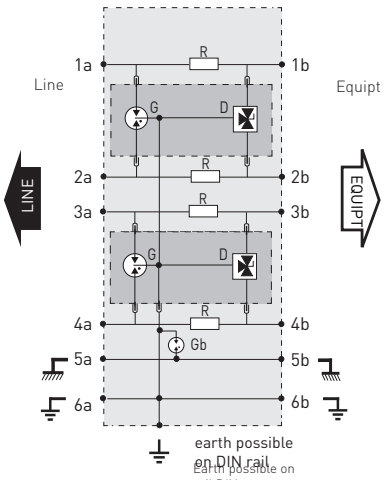
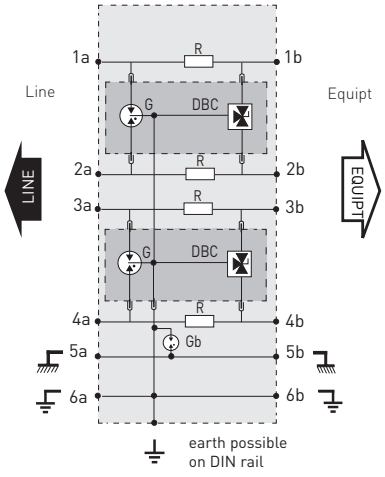


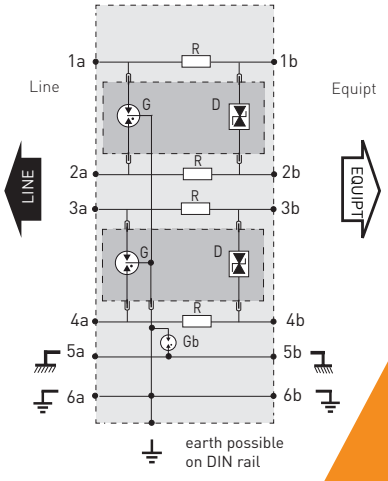
DLA2-xxxD3



DLA2-xxDBC



DLA2-170

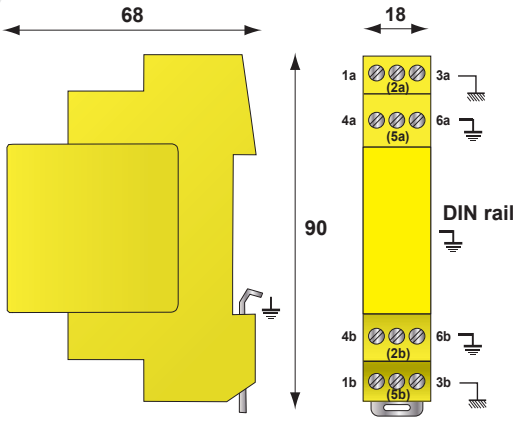


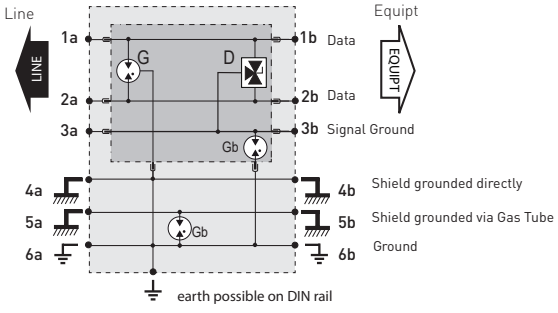
G: 3-electrode gas tube
Gb: 2-electrode gas tube
R: Resistor
D: Clamping diode

DLA-06-IS

DLA-IS

- **Pluggable surge protection for «DIN» mounting**
- **For RS422 or RS485 Datalines or fire-panels**
- **1-pair + Signal ground + Shield protection**
- **IEC 61643-21 / UL497B compliance**





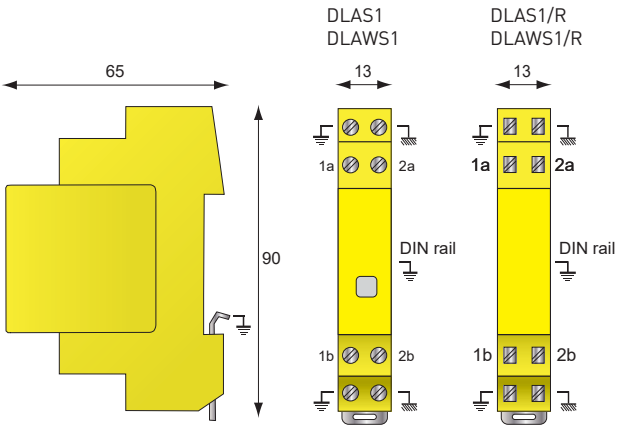
G: 3-electrode gas tube
Gb: 2-electrode gas tube
D: Clamping diode

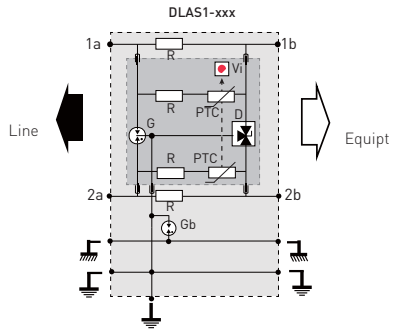
Characteristics

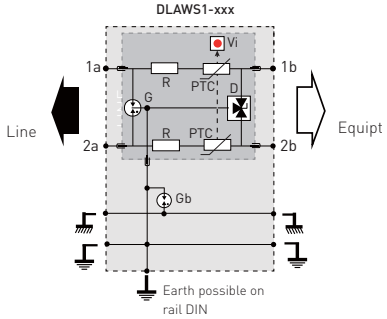
CITEL Model		DLA-06-IS	DLA-12-IS
Description		1-pair Data SPD - DIN mounting - Pluggable	
Network		RS422	RS232 / RS485
SPD configuration		1-pair + Signal Ground + shield	1-pair + Signal Ground + shield
Nominal line voltage	Un	6 V	12 V
Max. DC operating voltage	Uc	8 V	15 V
Max. Load current	IL	2.4 A	2.4 A
Max. frequency	f max	> 3 MHz	> 3 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	5 kA	5 kA
Protection level *following C3 Category test*	Up	20 V/650 V	30 V/650 V
Line resistance *(+/-10%)*		0 ohm	0 ohm
Failsafe behavior		Short-circuit	Short-circuit
Mechnical characteristics			
Dimensions		see diagram	
Format		Plug-in DIN box	
Connection to Network		screw terminal - cross section 0.5-2.5 mm²	
Disconnection indicator		transmission interrupt - Default Mode 2	
Mounting		Symmetrical rail 35 mm (EN60715)	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Spare module		DLAM-06-IS	DLAM-12-IS
Standards			
Compliance		IEC 61643-21 / EN 61643-21 / UL497B	
Part number			
		640151	640152

DLAS1 SERIES

- 1-pair Plugabble SPD for dataline
- Visual indicator in failsafe behaviour
- Line voltage from 6 to 48 Vdc
- Without line cut-off (DLAS1) or with (DLAWS1)
- DIN rail mounting ,Screw or spring contact terminals
- IEC/EN 61643-21 and UL497B compliance







G: 3-electrode gas tube
Gb: 2-electrode gas tube
PTC: Thermal resistor
T : Resistor
D: Clamping diode
Vi: Failure Indicator

Characteristics

CITEL Model		DLAS1-48D3	DLAS1-24D3	DLAS1-12D3	DLAS1-06D3
Description		Telecom/Data SPD- 1-pair -DIN mounting - Pluggable			
Network		ISDN-T0, 48 V line	4-20 mA	RS232, RS485	RS422
SPD configuration		1-pair + shield	1-pair + shield	1-pair + shield	1-pair + shield
Nominal line voltage	Un	48 V	24 V	12 V	6 V
Max. DC operating voltage	Uc	53 V	28 V	15 V	8 V
Max. Load current	IL	300 mA	300 mA	300 mA	300 mA
Max. frequency	f max	> 3 MHz	> 3 MHz	> 3 MHz	> 3 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB	< 1 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	20 kA	20 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	5 kA	5 kA	5 kA	5 kA
Protection level *following C3 Category test*	Up	70 V	40 V	30 V	20 V
Line resistance *(+/- 10%)*		4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms
Failsafe behavior		Opening line + indication			
Mechnical characteristics					
Dimensions		see diagram			
Format		Plug-in DIN box			
Connection to Network		screw terminal - cross section 0.5-2.5 mm²			
End of life		transmission interrupt - default mode 2			
Disconnection indicator		Red indicator			
Mounting		Symmetrical rail 35 mm (EN60715)			
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Thermoplastic UL94 V-0			
Spare module		DLAS1M-48D3	DLAS1M-24D3	DLAS1M-12D3	DLAS1M-06D3
Version		DLAS1-xxx: standard version - screw terminal DLAS1-xxx/R: spring contact terminal version DLAWS1-xxx: specific version with line cut-off in case of removal plug-in module DLAWS1-XXX/R: spring contact terminal version			
Standards					
Compliance		IEC 61643-21 / EN 61643-21 / UL497B			
Part number					
DLAS1-xxx version		6415041	6415031	6415021	6415011
DLAS1-xxx/R version		6415044	6415034	6415024	6415014
DLAWS1-xxx version		6419041	6419031	6419021	6419011
DLAWS1-xxx/R version		6419044	6419034	6419024	6419014

DLATS1 SERIES

- **1-pair dataline/telecom surge protection**
- **Local and Remote signaling of SPD status**
- **DIN rail mounting , Screw or Spring contact terminals**
- **Plug-in module**
- **1 monitoring module + SPD modules (up to 48) + bus**
- **Discharge current Imax/In: 20 kA / 5 kA**
- **Complies with IEC/EN 61643-21, UL497B**

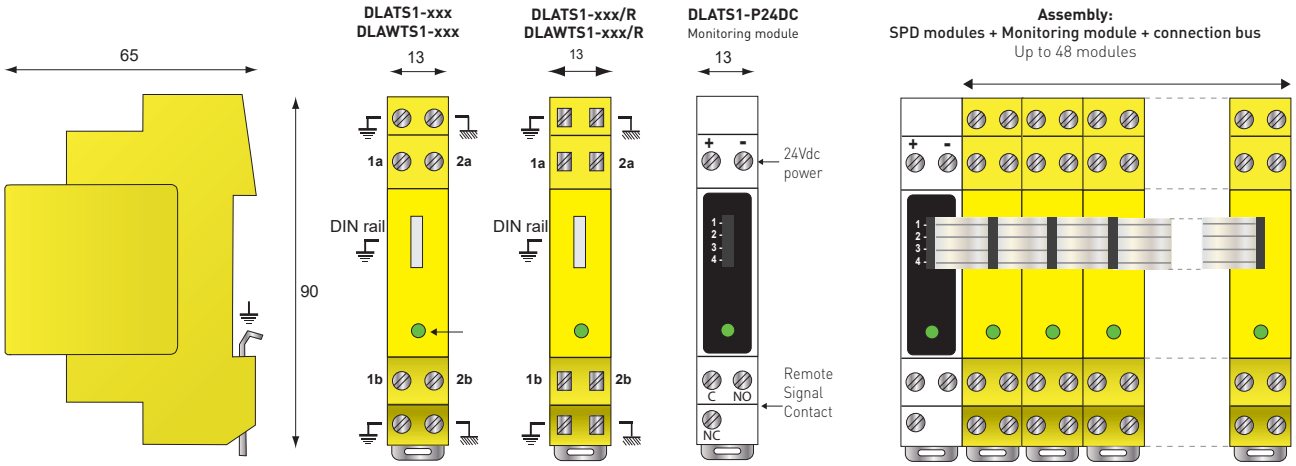
Characteristics

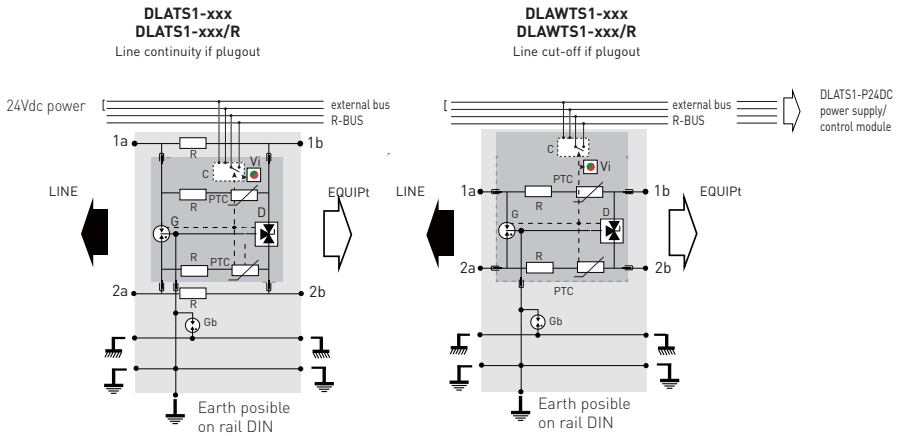
CITEL Model		DLATS1-170	DLATS1-48D3	DLATS1-24D3	DLATS1-12D3	DLATS1-06D3	DLATS1-P24DC
Description		Telecom/Data SPD- 1-pair + shield DIN mounting - Pluggable - Local & Remote signalling					Power supply/ Monitoring module
Network		Telephone line, ADSL2, VDSL	ISDN-T0, 48 V line	4-20 mA	RS232, RS485	RS422	
Configuration		1-pair + shield	1-pair + shield	1-pair + shield	1-pair + shield	1-pair + shield	24 Vdc powered
Nominal line voltage	Un	150 V	48 V	24 V	12 V	6 V	24 Vdc
Max. DC operating voltage	Uc	170 V	53 V	28 V	15 V	8 V	-
Max. Load current	IL	300 mA	300 mA	300 mA	300 mA	300 mA	-
Max. frequency	f max	10 MHz	3 MHz	3 MHz	3 MHz	3 MHz	-
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	-
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA	5 kA	-
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	20 kA	20 kA	20 kA	-
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	5 kA	5 kA	5 kA	5 kA	5 kA	-
Protection level *following C3 Category test*	Up	220 V	70 V	40 V	30 V	20 V	-
Line resistance *(+/- 10%)*		-	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	-
Failsafe behavior		Short circuit/ Line disconnection	Short circuit/ Line disconnection	Short circuit/ Line disconnection	Short circuit/ Line disconnection	Short circuit/ Line disconnection	-
Mechnical characteristics							
Dimensions		see diagram					
Format		Plug-in DIN box					
Connection to Network		Screw terminal (DLATS1-xxx) or spring terminal (DLATS1-xxx/R) : : wire cross section 0.5-2.5 mm²					
Overstressed default mode		transmission interrupt - default mode 2					-
Operating/fault indicator		Green/Red					Green
Remote Signaling		through control module					Output on changeover contact
Mounting		Symmetrical rail 35 mm (EN60715)					
Operating temperature		-40/+85°C					
Protection rating		IP20					
Housing material		Thermoplastic UL94 V-0					
Spare module		DLATS1M-170	DLATS1M-48D3	DLATS1M-24D3	DLATS1M-12D3	DLATS1M-06D3	DLATS1M-P24DC
Version		DLATS1-xxx: standard version - screw terminal DLATS1-xxx/R: spring contact terminal version DLAWTS1-xxx: specific version with line cut-off in case of removal plug-in module DLAWTS1-XXX/R: spring contact terminal version					
Connection bus		SPD/control module connection by bus: bus 1+4 (1 control module+4 SPD), bus 1+9, bus 1+24, bus 1+48					
Standards							
Compliance		IEC 61643-21 / EN 61643-21 / UL497B					
Part number							
DLATS1-xxx version		6417051	6417041	6417031	6417021	6417011	6417231
DLATS1-xxx/R version		6417054	6417044	6417034	6417024	6417014	
DLAWTS1-xxx version		6421051	6421041	6421031	6421021	6421011	
DLAWTS1-xxx/R version		6421054	6421044	6421034	6421024	6421014	

DIN RAIL PLUG-IN SURGE PROTECTOR FOR DATALINE/TELECOM WITH REMOTE FAILURE INDICATION

DLAW**TS**1-**xxx**D3/**R**

- Wiring: « » = Screw connection
  «R» = Spring connection
- Nominal voltage
- Remote Failure indication
- « » = Line continuity if plugout
  «W» = Line cut-off if plugout





G: 3-electrode gas tube
Gb: 2-electrode gas tube
R: Resistor
PTC : Thermal Resistor
D: Clamping diode
Vi : Operating/Failure indicator
C : Remote signaling contact

DLU2-48DBC

DLU-170

DLU, DLU2 SERIES

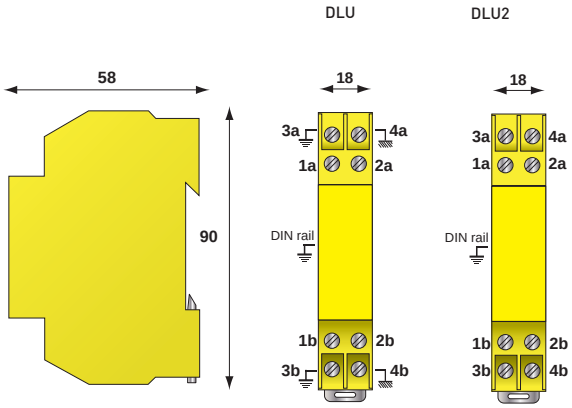
- **For «DIN» rail mounting, Monobloc housing**
- **All types of Telephone and Data lines**
- **1-pair (DLU) or 2-pair version (DLU2)**
- **Transmission and protection of shield wire (DLU)**
- **IEC 61643-21 compliance**
- **UL497 A approved**

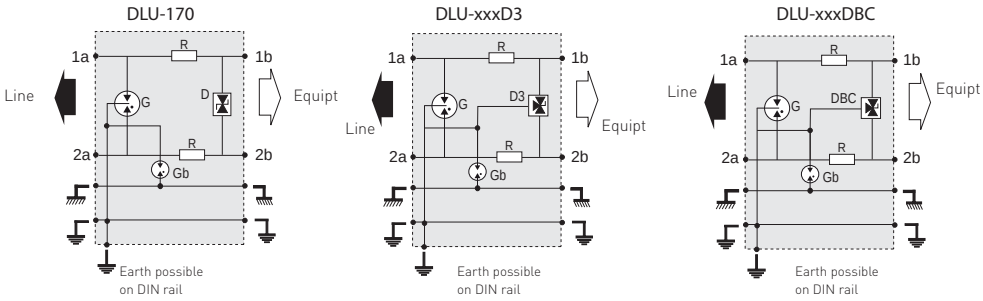
Characteristics

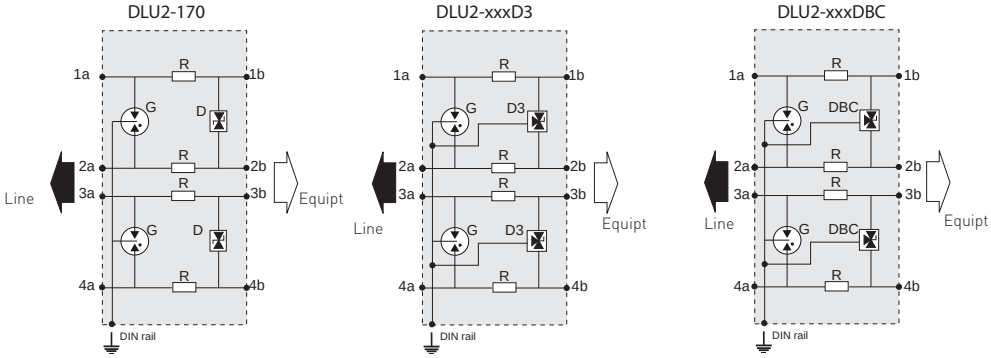
CITEL Model		DLU-170 DLU2-170	DLU-48DBC DLU2-48DBC	DLU-48D3 DLU2-48D3	DLU-24D3 DLU2-24D3	DLU-12D3 DLU2-12D3	DLU-06DBC DLU2-06DBC	DLU-06D3 DLU2-06D3
Description		Telecom/Data SPD- 1 or 2-pair -DIN mounting - Monobloc						
Network		Telephone line, ADSL2, VDSL	Fipway, World-FIP, FieldBus-H2,	48V line, ISDN-T0, Profibus-PA	4-20mA, 24V line	Profibus-FMS, Interbus, Fiel-dBus-H1, RS232, RS485	6V line, High bitrate, MIC/T2, 10BaseT	RS422
SPD configuration	DLU DLU2	1-pair + shield 2 pairs	1-pair + shield 2 pairs	1-pair + shielded 2 pairs	1-pair + shield 2 pairs	1-pair + shield 2 pairs	1-pair + shield 2 pairs	1-pair + shield 2 pairs
Nominal line voltage	Un	150 V	48 V	48 V	24 V	12 V	6 V	6 V
Max. DC operating voltage	Uc	170 V	53 V	53 V	28 V	15 V	10 V	10 V
Max. Load current	I_L	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA
Max. frequency	f max	> 10 MHz	> 20 MHz	> 3 MHz	> 3 MHz	> 3 MHz	> 20 MHz	> 3 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. discharge current -max. *withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Protection level *following C3 Category test*	Up	220 V	75 V	70 V	40 V	30 V	25 V	20 V
Line resistance *(+-/10%)*		4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics								
Dimensions		see diagram						
Format		DIN box						
Connection to Network		screw terminal - cross section 1.5-2.5 mm²						
Disconnection indicator		transmission interrupt - default mode 2						
Mounting		Symmetrical rail 35 mm (EN60715)						
Operating temperature		-40/+85°C						
Protection rating		IP20						
Housing material		Thermoplastic UL94 V-0						
Versions		DLU-xxx: version 1 pair DLU2-xxx: version 2 pairs DLUH-xxx: «remote supply» version 1-pair (max. line current IL = 2,4 A) DLUH2-xxx: «remote supply» version 2 pairs (max. line current IL = 2,4 A)						
Standards								
Compliance		IEC 61643-21 / EN 61643-21 / UL497B						
Part number								
DLU range		640505	640514	640504	640503	640502	640511	640501
DLUH range		640705	640714	640704	640703	640702	640711	640701
DLU2 range		640405	640434	640404	640401	640403	640431	640402
DLUH2 range		-	640744	640734	640733	640732	640741	640731

DLU■■-xxx■

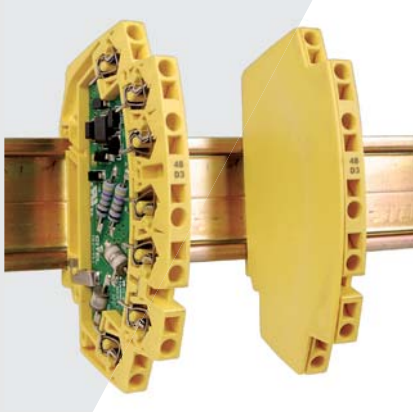
- Bit rate (D3 or DBC)
- Nominal voltage
- « »: 1 pair
- «2»: 2 pairs
- « »: standard version
- «H»: max. line current I_L: 2.4A







G: 3-electrode gas tube
Gb: 2-electrode gas tube
R: Resistor (or L: inductor for DLUH version)
D: Clamping diode



DLC SERIES

- **Compact SPD for Datalines**
- **For «DIN» rail mounting**
- **All types of Telephone and Data lines**
- **Spring contact terminal**
- **Protection of shield wire**
- **IEC 61643-21 compliance**
- **UL approved**

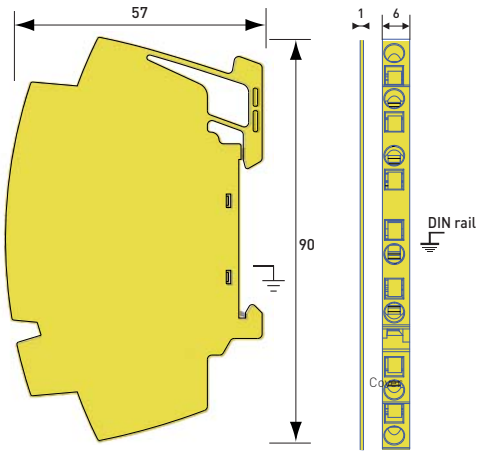
Characteristics

CITEL Model		DLC-170	DLC-48DBC	DLC-48D3	DLC-24D3	DLC-12D3	DLC-06DBC	DLC-06D3
Description		1-pair monobloc Telecom/data surge protector						
Network		Telephone line, ADSL2, VDSL	Fipway, World-FIP, FieldBus-H2	ISDN-T0, Line 48V	LS, 4-20mA	RS232, RS485	MIC/T2, 10BaseT	RS422
SPD configuration		1-pair + shielded	1-pair + shielded	1-pair + shielded	1-pair + shielded	1-pair + shielded	1-pair + shielded	1-pair + shielded
Nominal line voltage	Un	150 V	48 V	48 V	24 V	12 V	6 V	6 V
Max. DC operating voltage	Uc	170 V	53 V	53 V	28 V	15 V	8 V	8 V
Max. Load current	IL	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA	300 mA
Max. frequency	f max	> 10 MHz	> 20 MHz	> 3 MHz	> 3 MHz	> 3 MHz	> 20 MHz	> 3 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. discharge current -max. *withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	2.5 kA	2.5 kA	2.5 kA	2.5 kA	2.5 kA	2.5 kA	2.5 kA
Protection level *following C3 Category test*	Up	220 V	70 V	70 V	40 V	30 V	25 V	25 V
Line resistance *(+-/10%)*		4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms	4.7 ohms
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics								
Dimensions		see diagram						
Format		DIN box						
Connection to Network		by spring - max. cross section 1.5 mm²						
Disconnection indicator		transmission interrupt -default mode 2						
Mounting		Symmetrical rail DIN 35 mm (EN60715)						
Operating temperature		-40/+85°C						
Protection rating		IP20						
Housing material		Thermoplastic UL94 V-0						
Standards								
Compliance		IEC 61643-21 / EN 61643-21 / UL497B						
Part number								
		641105	641114	641104	641103	641102	641111	641101

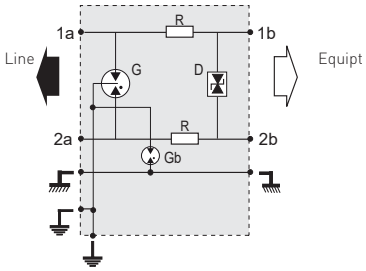
DLC-xxx

Bit rate (D3 or DBC)

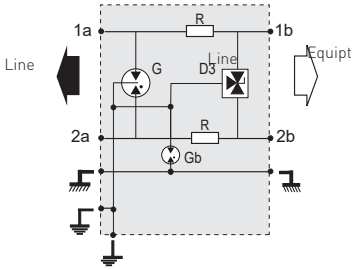
Nominal voltage



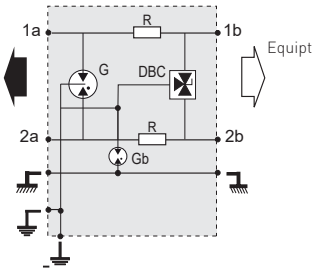
DLC-170



DLC-xxxD3



DLC-xxxDBC



G: 3-electrode gas tube
Gb: 2-electrode gas tube
PB: 2-electrode gas tube
R: Resistor
D: Clamping diode

B480

B180

B180, B280, B480 SERIES

- 1 to 4-pair surge protection units
- All types of telephone and data lines
- Removable protection circuit
- Wall mounting and screw connection
- IEC 61643-21 compliance
- UL497B approved

B 80-xx

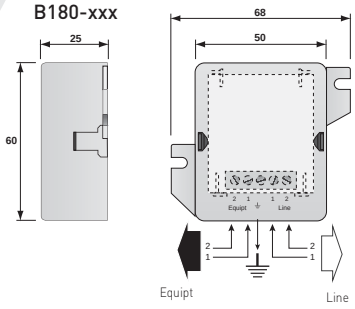
- Protection diagram
- Nominal voltage
  - «1 »: 1 pair
  - «2»: 2 pairs
  - «4»: 4 pairs

CE

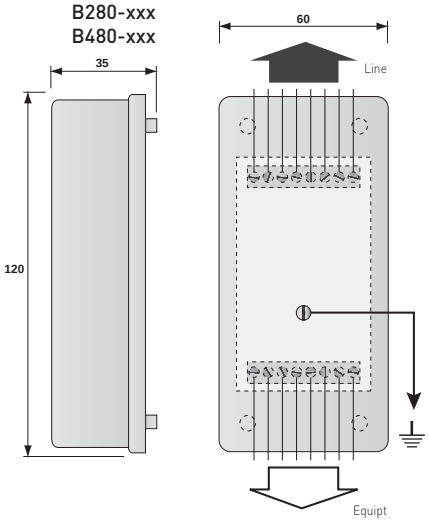
UL LISTED

Characteristics

B180-xxx



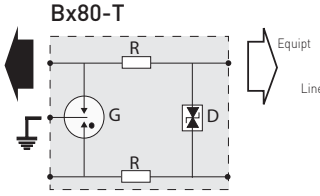
B280-xxx
B480-xxx



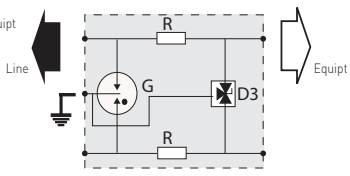
CITEL Model		B180-T B280-T B480-T	B180-48D3 B280-48D3 B480-48D3	B180-24D3 B280-24D3 B480-24D3	B180-12D3 B280-12D3 B280-12D3	B180-06D3 B280-06D3 B480-06D3
Description		Surge protector box - 1, 2 or 4 pairs				
Network		Tephone line, ADSL2, VDSL	ISDN-T0, 48 V line	4-20 mA	RS232, RS485	RS422 10 Base T
SPD configuration	B180 B280 B480	1 pair 2 pairs 4 pairs	1 pair 2 pairs 4 pairs	1 pair 2 pairs 4 pairs	1 pair 2 pairs 2 pairs	1 pair 2 pairs 4 pairs
Nominal line voltage	Un	150 V	48 V	24 V	12 V	6 V
Max. DC operating voltage	Uc	170 V	53 V	28 V	15 V	8 V
Max. Load current	IL	300 mA	300 mA	300 mA	300 mA	300 mA
Max. frequency	f max	10 MHz	20 MHz	20 MHz	20 MHz	20 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB	< 1 dB	< 1 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	20 kA	20 kA	20 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	2.5 kA	2.5 kA	2.5 kA	2.5 kA	2.5 kA
Protection level *following C3 Category test*	Up	220 V	70 V	40 V	30 V	20 V
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics						
Dimensions		see diagram				
Format		wall mounting box				
Disconnection indicator		transmission interrupt - default mode 2				
Mounting		wall (screws non included)				
Operating temperature		-40/+85°C				
Protection rating		IP20				
Housing material		Thermoplastic UL94 V-0				
Spare unit		S180-T	S180-48D3	S180-24D3	S180-12D3	S180-06D3
Spare unit		S280-T	S280-48D3	S280-24D3	S280-12D3	S280-06D3
Spare unit		S480-T	S480-48D3	S480-24D3	S280-12D3	S480-06D3
Standards						
		IEC 61643-21 / EN 61643-21 / UL497B				
Part number						
B180 range		510602	510402	510302	510202	510102
B280 range		72726	72774	72773	72772	72771
B480 range		72746	72794	72793	72772	72791

1-pair diagram

Bx80-T



Bx80-xxD3

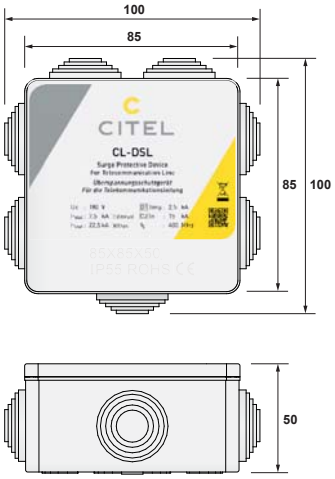


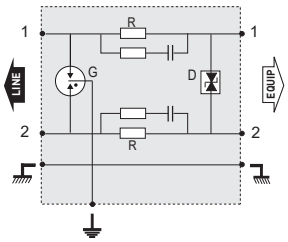
G: 3-electrode gas tube
R: Resistor
D: Clamping diode
D3: 3-pole clamping diode

CITEL

CL-DSL

- **Surge protection for telecommunication lines**
- **Protection for G.FAST, VDSL2, ADSL2, ISDN and analog lines**
- **Extended bandwidth up to 400 MHz**
- **Wall mounting and screwless terminals**
- **EN 61643-21 / IEC 61643-21 compliance**
- **UL497B approved**





G: 3-electrode gas tube
R: Resistor
D: Clamping diode

Characteristics

CITEL Model		CL-DSL
Description		Surge protector box - 1-pair
Network		G.FAST, VDSL2, ADSL2, ISDN, PSTN
Nominal line voltage	Un	150 V
Max. DC operating voltage	Uc	180 V
Max. Load current	IL	750 mA
Max. frequency	f max	400 MHz
Insertion loss *@ fmax*		< 3 dB
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	15 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	2.5 kA
Protection level *following C3 Category test*	Up	350 V
Failsafe behavior		Short-circuit
Mechnical characteristics		
Dimensions		see diagram
Format		wall mounting box
Connection to network		screwless terminal - cross section 0.4-1.5 mm²
Disconnection indicator		transmission interrupt - default mode 2
Mounting		wall (screws non included)
Operating temperature		-40/+85°C
Protection rating		IP55
Housing material		Thermoplastic UL94 V-0
Standards		
		IEC 61643-21 / EN 61643-21 / UL497B
Part number		
		6400066

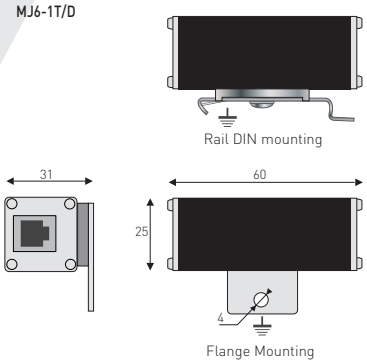
MJ6-1T/D

MJ8-170V

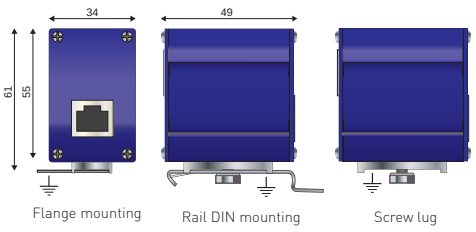
MJ8, MJ6-1T/D

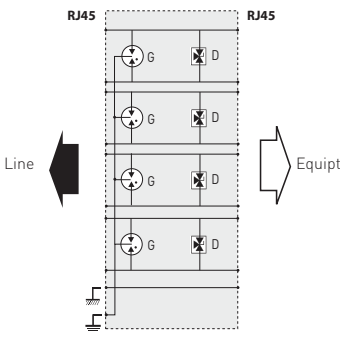
- Protection for one telephone line
- For PSTN, ISDN, ADSL lines
- Quick installation
- RJ11 or RJ45 connectors
- IEC 61643-21 compliance
- UL497B approved

MJ6-1T/D



MJ8





G: 3-pole gas tube
R: Resistor
D: Clamping Diode

Characteristics

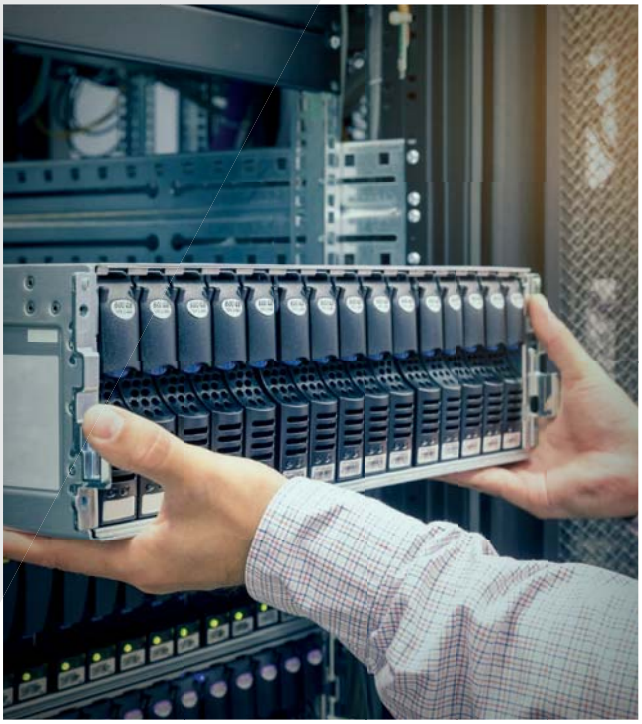
CITEL Model		MJ6-1T/D	MJ8-ISDN	MJ8-170V
Description		RJ11 surge protector for 1 telephone line	RJ45 surge protector for 1 ISDN line	Surge protector for telephone line 1 to 4-pairs
Network		PSTN, ADSL2, VDSL	ISDN, 48 V line	PSTN, ADSL2, VDSL-4 pairs
Max. data rate		30 Mbps	30 Mbps	30 Mbps
SPD configuration		1-pair + shielded	2 pairs + shielded	4 pairs + shielded
Pin outs		1-pair (3-4)	2-pairs (3-6)(4-5)	4-pairs (1-2)(3-6)(4-5)(7-8)
Nominal line voltage	Un	150 V	48 Vdc	150 Vdc
Max. DC operating voltage	Uc	170 Vdc	60 Vdc	170 Vdc
Max. Load current *(if connection serie)*	IL	300 mA	1000 mA	1000 mA
Max. frequency	f max	10 MHz	10 MHz	10 MHz
Insertion loss *@ fmax*		< 1 dB	< 1 dB	< 1 dB
Nominal discharge current Line/Ground *8/20µs Test x 10 - C2 category*	In	2500 A	2000 A	2000 A
Nominal discharge current Line/Line *8/20µs Test x 10 - C2 category*	In	2500 A	500 A	500 A
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	500 A	500 A	500 A
Protection level *following C3 Category test*	Up	220 V	70 V	220 V
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics				
Dimensions		see diagram		
Format		RJ11 Connector	RJ45 connector	
Connection to Network		RJ11 connector female input/output	RJ45 connector female input/output	
Disconnection indicator		transmission interrupt - default mode 2		
Mounting		Mounting flange or Screw lug or DIN Rail		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Aluminium		
Standards				
Compliance		IEC 61643-21 / EN 61643-21 / UL497B		
Part number				
		560412	560209	560203

CITEL

CITEL

COMPUTER NETWORK SURGE PROTECTORS

COMPUTER NETWORK SURGE PROTECTORS



PROTECTING DATA-PROCESSING NETWORKS

For industrial sites or business buildings integrating Local Area Networks (LANs), any single issue at one of these systems will create consequences, more or less, to the safety and productivity of the entire system.
It is now more and more crucial to reinforce the level of reliability for these systems: this can be achieved by using a proper surge protection strategy for these sensitive networks.
As is the case in telecom or industrial networks, the installation of surge protectors on data-processing networks is necessary, especially in the following cases:

- Inter-building networks
- Wide networks
- High Electromagnetic disturbance density
- Heavy Lightning exposure

As for the other types of transmission lines, CITEL surge protectors for LANs are based on a combination of 3-pole gas tubes and fast clamping diodes to ensure efficiency on lightning surges. In addition, two additional parameters need to be taken into account: if Power Over Ethernet (POE) is employed, and the very high data transmission speed. CITEL surge protectors for LANs are designed to satisfy both of these requirements.

Performances

Ethernet network surge protectors are designed for computer networks with very fast data transfer speed up to 10 Gbit/s for the Ethernet Category 6A cabled networks. In order to cover the many various types of networking applications, CITEL offers a complete range of surge protectors adapted to these Ethernet and PoE networks.

Standard

Surge protectors for LANs are in compliance with IEC 61643-21.

CITEL RANGE FOR ETHERNET @ POE

CITEL Surge protector for LANs can be adapted to the different configurations. They are equipped with the network connection (RJ45) and available either as a dingle product for the protection of an isolated terminal, or in a 19'' Rack version for multi-line protection at hub or server level.

Surge Protectors for terminal equipment

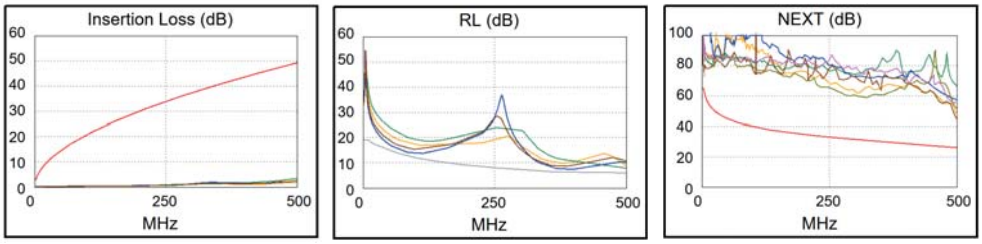
CITEL offers several configurations depending on the types of network and the performance protection required:

The MJ8-C6A are dedicated all STP (shielded cable) Ethernet networks up to 10 Gbit/s on Category 6A cabling. Their GDT/Diodes circuit gives them the discharge capacity necessary for the protection of inter-building connections.

The MJ8-POE-C6A are designed to protect indoor equipment connected to 90 W PoE++ networks, up to 10 Gbit/s on Category 6A cabling.

The CWMJ8-POE-C6A are designed to protect outdoor equipment connected to PoE++ networks, up to Category 6 A.

TRANSMISSION CURVES (MJ8-C6A)



CITEL

Multi-port surge protectors 19'' Rack format

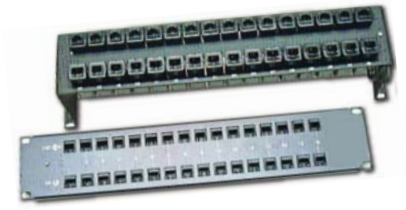
CITEL offers several configurations depending on the types of network and the protection performance required:

PL range

Available in 24 and 12 ports. Category 6 compatible. Shielded RJ45 input/output. STP cabling.

RAK range

Available in 32 and 16 ports. Category 6, PoE and coaxial BNC connection versions. Input/output by connectors on front. UTP cabling.



PCH range

Available in 48, 24 and 12 ports. Category 6, PoE and Telecom versions. Connection by self-stripping connectors/terminal. UTP cabling.

INSTALLATION

The surge protector for IT networks must be installed while respecting the following principles:

- SPDs must be installed on the both sides of the transmission line (e.g. server side and terminal equipment side)
- The surge protector and the protected equipment must be interconnected with the bonding network of the installation.
- The earthing conductor (between the earth output of the SPD and the bonding circuit of the installation) must be as short as possible (less than 0.50 m).
- The AC power supply of the equipment must also be surge protected.

PROTECTING VIDEO DATA TRANSMISSION

Video transmission lines (survey cameras) are regularly subjected to transient surges due to the nature of their distributed application. In order to insure the integrity of these installations, the application of dedicated SPDs at the equipment level (cameras) as well as at the server is absolutely necessary.

CITEL RANGE

The CITEL surge protectors for video-transmission are adapted to different configurations:

Video via coaxial cable: a surge protector is installed on the coaxial connection (CXP and CNP ranges).
The power supply as well as the control links must also be protected : The MSP-VM-2P surge protectors bring together all the protection devices in one single unit.

MSP-VM-2P

CNP

Video over IP: a MJ8-C6A surge protector must be installed on the IP connection.
The AC power supply of the terminal equipment must also be protected :The MSP-VM/R surge protector brings together all the protection devices in one single unit.

MSP-VM/R

MJ8-POE-C6A

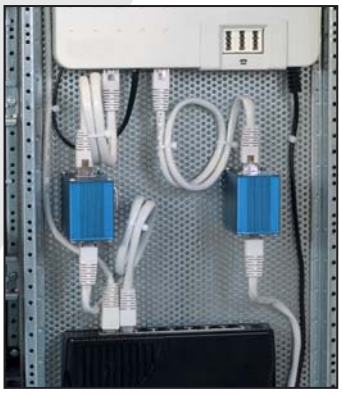
Video over PoE: a PoE compatible surge protector (MJ8-POE-C6A) must be installed on the terminal equipment. In the case of outdoor installation, the CWMJ8-POE-C6A is necessary.

MJ8-POE-C6A

CWMJ8-POE-C6A

CITEL MJ8 SERIES

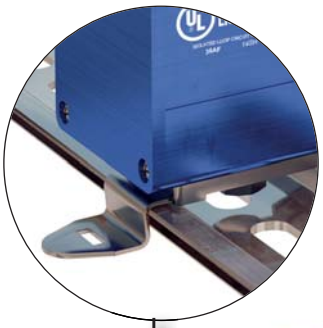
Installation

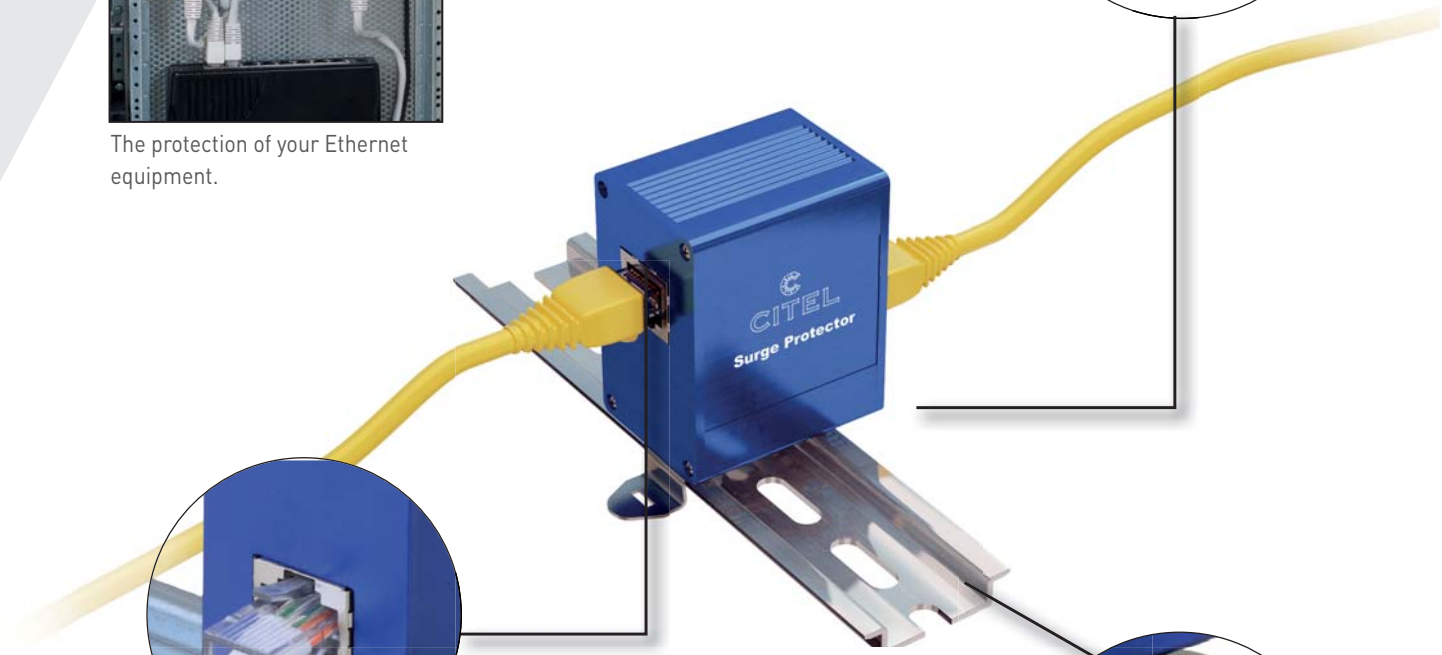


The protection of your Ethernet equipment.

Mounting

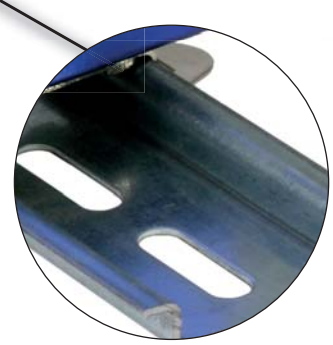
On Rail
or by flange





RJ45 connection

Immediate implementation by
connection of the RJ45 cables

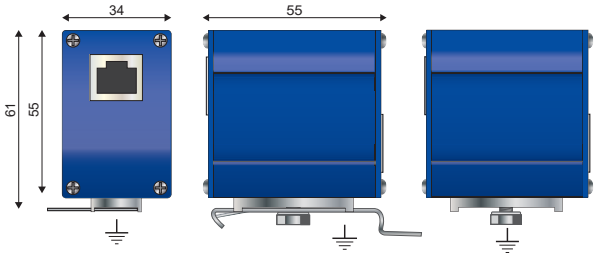


Ground connection

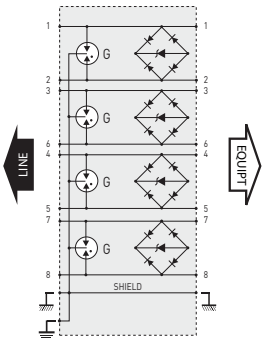
via DIN Rail

MJ8-C6A

- up to 10Gigabit Ethernet compatible
- Category 6A compatible
- RJ45 shielded connectors
- Mounted on frame or DIN rail
- IEC 61643-21, EN 61643-21 compliance
- UL497B certified



Mounting Flange | Rail DIN mounting | Screw lug



G : 3-electrode gas tube

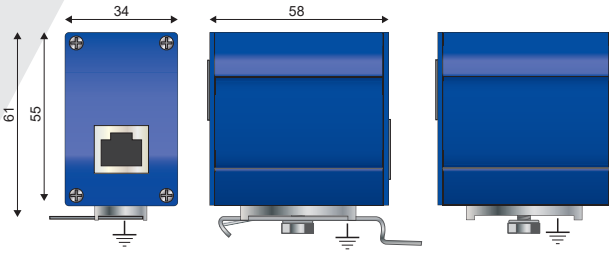
Characteristics

CITEL Model		MJ8-C6A
Description		RJ45 surge protector for Category 6A network
Network		10Gigabit Ethernet Category 6A
Max. data rate		10 Gbps
SPD configuration		4 pairs + shielded
Pin outs		(1-2)(3-6)(4-5)(7-8)
Nominal line voltage	Un	5 Vdc
Max. DC operating voltage	Uc	8 Vdc
Max. Load current	IL	1000 mA
Max. frequency	f max	> 500 MHz
Insertion loss		< 1 dB
Nominal discharge current Line/Ground *8/20µs Test x 10 - category C2*	In L/PE	2000 A
Nominal discharge current Line/Line *Category C2*	In L/L	500 A
Impulse current - *2 x 10/350µs Test - D1 Category*	limp	500 A
Protection level *@ In (8/20µs)-Line/Line*	Up L/L	20 V
Failsafe behavior		Short-circuit
Mechnical characteristics		
Dimensions		see diagram
Format		RJ45 connector
Connection to Network		RJ45 shielded connector female input/output
Disconnection indicator		transmission interrupt - default mode 2
Mounting		Mounting flange,Screw lug, DIN Rail
Operating temperature		-40/+85°C
Protection rating		IP20
Housing material		Aluminium
Accessories provided		DIN rail adapter, screw, screw nut, earthing plate, countersunk screw, cable crimp
Standards		
Compliance		IEC 61643-21 / EN 61643-21 / IEEE 802-3af/3at/3bt/ ANSI/TIA-568-C.1
Certification		UL497B
Part number		
		581540

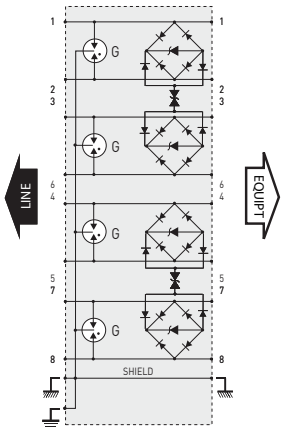
MJ8-POE SERIES

- PoE++ compatible (IEEE 802.3bt)
- 10Gb (5-100m) with Cat6A S/FTP cabling
- Shielded RJ45 connectors
- Indoor applications, IP20 (NEMA 2)
- Metal enclosure
- IEC/EN 61643-21 compliant
- SPD categories D1, C3, C2, C1

MJ8-POE-C6A



Mounting Flange | Rail DIN mounting | Screw lug



G : 3-electrode gas tube

Characteristics

CITEL Model		MJ8-POE-C6A	MJ8-POE-A
Description		RJ45 surge protector for POE++	
Network		10Gigabit Ethernet, Category 6A	Gigabit Ethernet, Category 5E
Protection modes (network)		CM/DM	CM/DM
Protection modes (POE)		CM/DM	CM
Transmission standard		IEEE 802.3bt	IEEE 802.3bt
Lightning Protection Zones (LPZ)		0-3	0-3
Max. data rate		10 Gbps	1 Gbps
SPD configuration		4 pairs + shielded	4 pairs + shielded
Pin outs		(1-2)(3-6)(4-5)(7-8)	(1-2)(3-6)(4-5)(7-8)
Max. DC operating voltage	Uc	8 Vdc	8 Vdc
Max. operating voltage (POE)	Uc	60 Vdc	60 Vdc
Max. Load current *@ 25°C*	IL	2 A	2 A
Max. frequency	f max	500 MHz	100 MHz
Max. POE power (4PPOE)		90 W	90 W
Capacitance *@1MHz, X-C (Line/Earth)*		< 5 pF	< 5 pF
Nominal discharge current Line/Line *C1 category (8/20µs), 300 applications X-X*	In L/L	1kV / 500 A	1 kV / 500 A
Nominal discharge current Line/Earth *C2 category (8/20µs), 10 applications X-C*	In L/PE	4 kV / 2kA	4 kV / 2kA
Max. discharge current *max. withstand @ 8/20 µs, X-C (Line/Earth)*	Imax	2 kA	2 kA
Impulse current - *2 x 10/350µs Test - D1 cat.*	Iimp	400 A	500 A
Protection level *following C3 Category test - Line/Line*	Up	70 V	70 V
Protection level *C3 category (10/1000µs), 300 applications@10 A, X-C (Line/Earth)*	Up	500 V	700 V
Protection Level *C3 Category (10/1000µs), 300 applications @ 10A, (Pair-Pair, POE)*	Up	80 V	700V
Failsafe behavior		Short-circuit	Short-circuit
Mechnical characteristics			
Dimensions		see diagram	
Format		Metallic box with connectors input/output	
Connection to Network		RJ45 shielded connector female input/output	
End of life		transmission interrupt - default mode 2	
Mounting		DIN rail, Wall, Plate	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Aluminium	
Accessories provided		Screw, washer, cable crimp, earthing plate, DIN rail adapter	
Standards			
Compliance		IEC 61643-21 / EN61643-21 / UL497B IEEE 802-3af/3at/3bt/ ANSI/TIA-568-C.1	
Certification		UL listed	
Part number			
		581541	581519

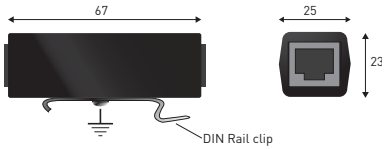
DIN-E-C6

SPDINRAK
*19'' rack for DIN surge protectors mounting (up to 16 DIN units)**

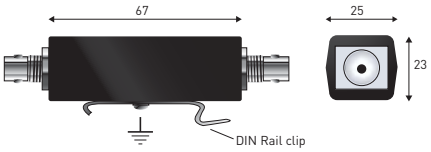
DIN SERIES

- **BNC or RJ45 Surge protector**
- **Various types: Ethernet, Dataline, Telecom, Video**
- **Mounting on DIN rail**
- **Secondary protection only**
- **UTP (US)**
- **Adaptable on specific rack 19" (SPDINRAK)**
- **IEC 61643-21, EN 61643-21 compliance**

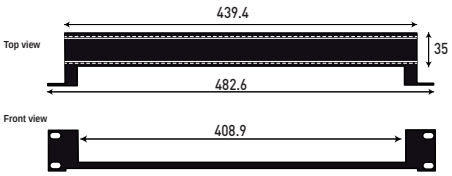
DIN-E-C6



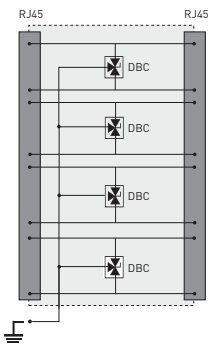
DIN-BNC-HD



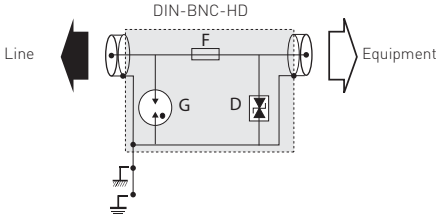
SPDINRAK



DIN-E-C6



DIN-BNC-HD



F : Fuse
G : 2-electrode gas tube
DBC : 3-pole low capacitance diode

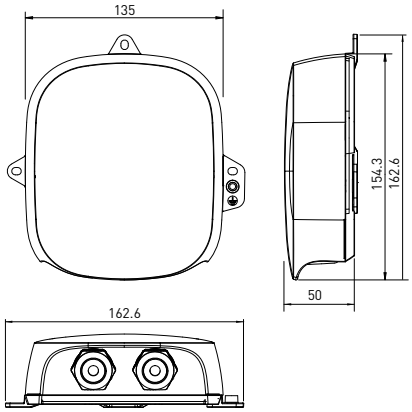
Characteristics

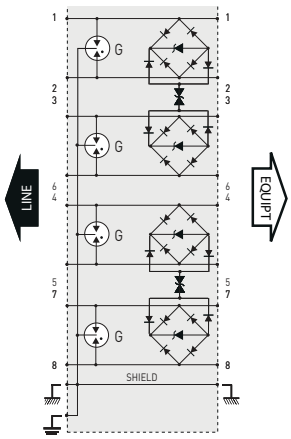
CITEL Model		DIN-E-C6	DIN-G	DIN-BNC-HD
Description		RJ45 surge protector for cat.6 network- UTP	Surge protector for telephone line	Surge protector for coaxial line
Network		Gigabit Ethernet Cat.6	RTC, ADSL2+, 4 pairs	Video line
Max. data rate		1 Gbps	40 Mbps	1000 Mbps
SPD configuration		8 wires	8 wires	1 coaxial line
Pin outs		(1-2)(3-6)(4-5)(7-8)	(1-2)(3-6)(4-5)(7-8)	-
Max. DC operating voltage	Uc	7.5 Vdc	240 Vdc	7.5 Vdc
Max. Load current	IL	750 mA	750 mA	750 mA
Max. frequency	f max	> 250 MHz	> 100 MHz	> 100 MHz
Insertion loss		< 1 dB	< 1 dB	< 1 dB
Nominal discharge current Line/Ground *8/20µs Test x 10 - C2 category*	In	500 A	400 A	5000 A
Nominal discharge current Line/Line *8/20µs Test x 10 - C2 category*	In	500 A	400 A	5000 A
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	-	-	500 A
Protection level *following C3 Category test - Line/Line*	Up	20 V	300 V	20 V
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics				
Dimensions		see diagram		
Format		RJ45 Connector - UTP		connector BNC
Connection to Network		female/female RJ45 connector - UTP		connector BNC female/female
End of life		transmission interrupt - default mode 2		
Mounting		DIN rail or specific 19'' rack model SPDINRAK (P/N 899001)*		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Thermoplastic UL94 V-0		
Standards				
Compliance		IEC 61643-21 / EN 61643-21 / IEEE 802-3ab	IEC 61643-21 / NF EN 61643-21	
Part number				
		6236	6374	6286

*) Possibility to mount 16 x DINxxx or 12 x MJ8xxx on SPDINRAK

CWMJ8-POE-C6A

- **POE++ and Category 6A compatible**
- **up to 10Gigabit Ethernet compatible**
- **Outdoor application**
- **IP66**
- **Plastic enclosure**
- **Shielded RJ45 connectors**
- **IEC 61643-21, EN 61643-21 compliance**





G : 3-electrode gas tube

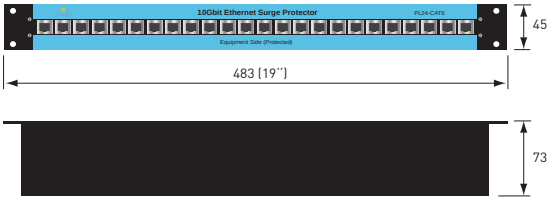
Characteristics

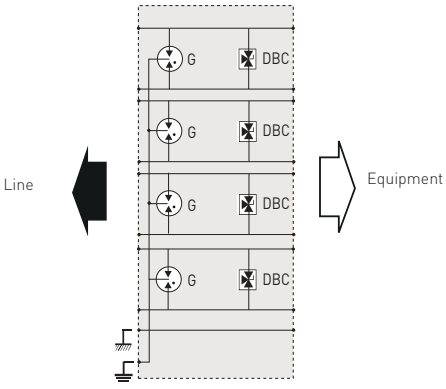
CITEL Model		CWMJ8-POE-C6A
Description		Outdoor RJ45 surge protector for POE++
Network		POE++ and 10Gigabit Ethernet - Category 6A
Max. data rate		10 Gbps
SPD configuration		8 wires + shielded
Pin outs		(1-2)(3-6)(4-5)(7-8)
Nominal line voltage	Un	48 Vdc
Max. DC operating voltage	Uc	60 Vdc
Max. Load current	IL	2000 mA
Max. frequency	f max	> 500 MHz
Insertion loss		< 1 dB
Nominal discharge current Line/ Ground *- 8/20µs Test x 10 - category C2*	In	2000 A
Nominal discharge current Line/Line *- 8/20µs Test x 10 - category C2*	In	500 A
Impulse current- *2 x 10/350µs Test - D1 cat*	Iimp	500 A
Protection level *following C3 Category test - Line/Line*	Up	70 V
Failsafe behavior		Short-circuit
Mechnical characteristics		
Dimensions		see diagram
Format		Plastic Box with connectors input/output Reinforced seal
Connection to Network		RJ45 shielded connectors female input/output
End of life		transmission interrupt - default mode 2
Mounting		on plate or pole
Operating temperature		-40/+85°C
Outdoor application		yes
Protection rating		IP66
Housing material		Thermoplastic UL94 V-0
Standards		
Compliance		IEC 61643-21 / EN 61643-21 IEEE 802-3af/3at/3bt/ ANSI/TIA-568-C.1
Certification		UL listed
Part number		
		581544

PL SERIES

PL24-CAT6

- Up to Gigabit Ethernet network
- 19” rack mounted
- 12 or 24 ports
- In/out: RJ45 shielded
- Gas tube/Diode circuit
- IEC 61643-21, EN 61643-21 compliance





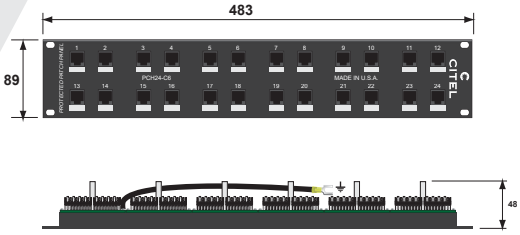
G: 3-electrode gas tube
DBC : 3-pole low capacitance diode

Characteristics

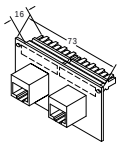
CITEL Model		PL12-CAT6	PL24-CAT6
Description		19'' patch panel surge protector for STP Ethernet	19'' patch panel surge protector for STP Ethernet
Network		Gigabit Ethernet Cat.6 cabling	Gigabit Ethernet Cat.6 cabling
Max. data rate		1 Gbps	1 Gbps
SPD configuration		12 ports of 8 wires	24 ports of 8 wires
Pin outs		(1-2)(3-6)(4-5)(7-8)	(1-2)(3-6)(4-5)(7-8)
Nominal line voltage	Un	5 Vdc	5 Vdc
Max. DC operating voltage	Uc	8 Vdc	8 Vdc
Max. Load current	IL	1000 mA	1000 mA
Max. frequency	f max	250 MHz	250 MHz
Insertion loss		< 1 dB	< 1 dB
Nominal discharge current Line/Ground *- 8/20µs Test x 10 - category C2*	In	2000 A	2000 A
Nominal discharge current Line/Line *- 8/20µs Test x 10 - category C2*	In	500 A	500 A
Protection level *following C3 Category test - Line/Line*	Up	20 V	20 V
Failsafe behavior		Short-circuit	Short-circuit
Mechnical characteristics			
Dimensions		see diagram	
Format		Rack 19''	
Connection to Network		RJ45 shielded female input/output	
End of life		transmission interrupt - default mode 2	
Spare unit		12-port PCB	
Mounting		19'' rack panel	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Aluminium	
Standards			
Standards		IEC 61643-21 / EN 61643-21 IEEE 802-3ab	
Part number			
		581534	581515

PCH SERIES

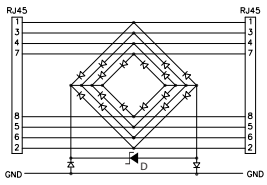
- 19” Rack mounted
- 12, 24 and 48 ports
- In/out: Connector type 110 / RJ45
- Available for Ethernet network and Telecom lines
- Possible maintenance per 2-line circuit
- Secondary protection
- IEC 61643-21 compliance



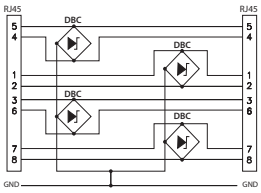
Surge protector circuit 2 lines



PCH-POE



PCH-C6



D : Clamping diode
DBC : 3-pole low capacitance clamping diode

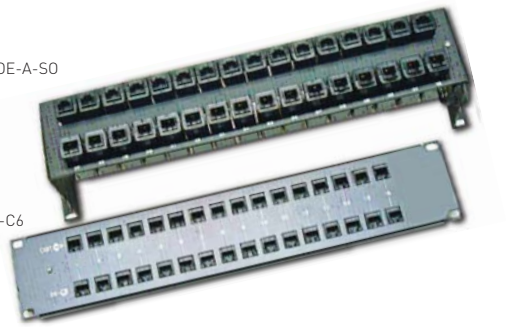
Characteristics

CITEL Model		PCH*-C6	PCH*-POE-A	PCH12-RJ45-G
Description		19'' patch panel surge protector for UTP lines high-speed network		
Network		Gigabit Ethernet, RS422, RS485, Cat. 6	POE+, Gigabit Ethernet, Cat. 5	Telephone line, ADSL
Max. data rate		1 Gbps	1 Gbps	40 Mbps
SPD configuration		12, 24 or 48 ports with 8 wires	12, 24 or 48 ports with 8 wires	12 ports of 8 wires
Pin outs		(1-2)(3-6)(4-5)(7-8)	(1-2)(3-6)(4-5)(7-8)	(1-2)(3-6)(4-5)(7-8)
Nominal line voltage	Un	5 Vdc	48 Vdc	200 Vdc
Max. DC operating voltage	Uc	7.5 Vdc	60 Vdc	240 Vdc
Max. Load current	IL	750 mA	750 mA	750 mA
Max. frequency	f max	250 MHz	> 100 MHz	> 100 MHz
Insertion loss		< 1 dB	< 1 dB	< 1 dB
Nominal discharge current Line/Ground *8/20µs Test x 10 - C2 category*	In	500 A	250 A	350 A
Nominal discharge current Line/Line *8/20µs Test x 10 - C2 category*	In	500 A	250 A	350 A
Protection level *C3 Category test - Line/Line*	Up	20 V	20 V	300 V
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics				
Dimensions		see diagram		
Format		Rack 19''		
Connection to Network		IDC connector 110 back/RJ45 female. front		
End of life		transmission interrupt - default mode 2		
Spare unit		removable circuit 2 ports		
Mounting		19'' rack panel		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Aluminium		
Standards				
Compliance		IEC/EN 61643-21 / IEEE 802-3ab	IEC/EN 61643-21 / IEEE 802-3ab/3at	IEC/EN 61643-21
Part number				
12-port version		PCH12-C6 6249	PCH12-POE-A 6273	PCH12-RJ45-G 6350
24-port version		PCH24-C6 6251	PCH24-POE-A 6274	on request -
48-port version		PCH48-C6 6252	PCH48-POE-A 6275	on request -

* : 12, 24 or 48-port

RAK-POE-A-SO

RAK-E-C6

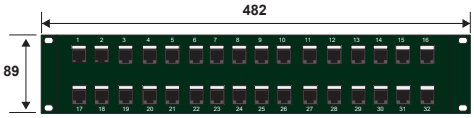


RAK16-BNC

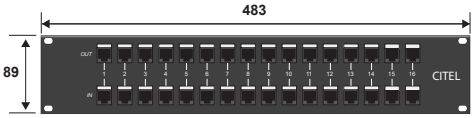
RAK SERIES

- 19" Rack mounted or Stand off (SO version)
- 16 or 32 ports
- In/out front: RJ45, BNC
- Available for Telecom and UTP Ethernet networks
- Possible maintenance per line
- Secondary protection
- IEC 61643-21 compliance

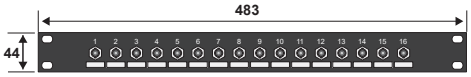
RAK-POE-A-SO



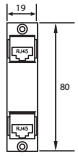
RAK-E-C6



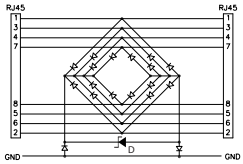
RAK16-BNC



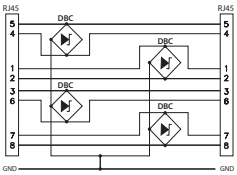
Surge protector circuit 1 line



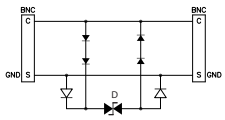
RAK-POE



RAK-E-C6



RAK-BNC



D : Clamping diode
DBC : 3-pole low capacitance clamping diode

Characteristics

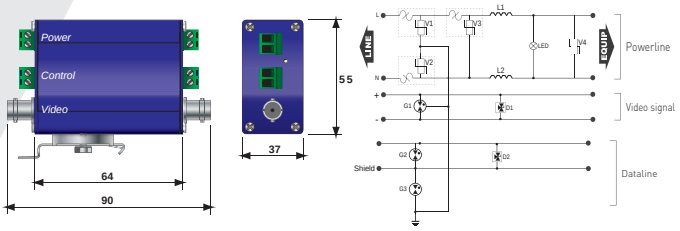
CITEL Model		RAK*-E-C6	RAK*-POE-A	RAK16-BNC
Description		19'' patch panel surge protector for UTP high-speed network		
Network		Gigabit Ethernet, RS422, RS485, Cat. 6	POE+, Gigabit Ethernet, Category 5	Video link
Max. data rate		1000 Mbps	1000 Mbps	1000 Mbps
SPD configuration		16 or 32 ports	16 or 32 ports	16 ports BNC
Pin outs		(1-2)(3-6)(4-5)(7-8)	(1-2)(3-6)(4-5)(7-8)	-
Nominal line voltage	Un	5 Vdc	48 Vdc	5 Vdc
Max. DC operating voltage	Uc	7.5 Vdc	60 Vdc	7.5 Vdc
Max. Load current	IL	750 mA	750 mA	750 mA
Max. frequency	fmax	250 MHz	> 100 MHz	> 100 MHz
Insertion loss		< 1 dB	< 1 dB	< 1 dB
Nominal discharge current Line/Ground *8/20µs Test x 10 - C2 category*	In	500 A	250 A	600 A
Nominal discharge current Line/Line *8/20µs Test x 10 - C2 category*	In	500 A	250 A	600 A
Protection level *C3 Category test - Line/Line*	Up	20 V	80 V	20 V
Failsafe behavior		Short-circuit	Short-circuit	Short-circuit
Mechnical characteristics				
Dimensions		see diagram		
Format		Rack 19''		
Connection to Network		RJ45 female intput/output		BNC female input/ output
End of life		transmission interrupt - default mode 2		
Spare unit		removable circuit 1 line		without
Mounting		19'' rack or wall mounted (version SO)		19'' rack
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		Aluminium		
Standards				
Compliance		IEC 61643-21 / EN 61643-21 / IEEE 802-3ab	IEC 61643-21/ EN 61643-21 / IEEE 802-3ab/3at	IEC 61643-21 / EN 61643-21
Part number				
16-port version		RAK16-E-C6 6254	RAK16-POE-A 6372	RAK16-BNC 6253
32-port version stand-off		RAK32-E-C6-SO 6257	RAK32-POE-A-SO 891104	- -

* : 16 or 32-port

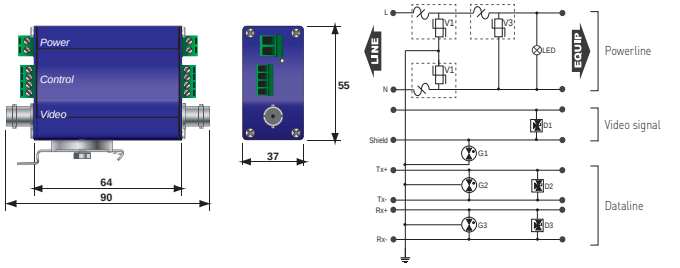
MSP-VM SERIES

MSP-VM120-2P MSP-VM24 MSP-VM120-R

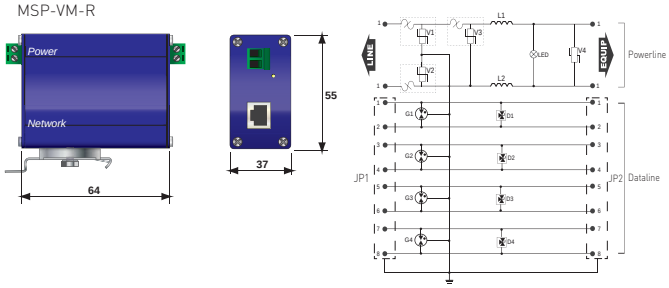
MSP-VM



MSP-VM-2P



MSP-VM-R



D : Clamping diode
G : Gas tube
V : Varistor
LED : Indicator
L : Inductor

Characteristics

		MSP-VM Range		
CITEL Model		**MSP-VM12**	**MSP-VM24**	**MSP-VM230**
Description		Surge protector for video survey camera Power/Data/Video		
AC power specifications				
Network		12 Vac/Vdc	24 Vac/Vdc	230 V single phase
AC system		-	-	TT-TN
Protection mode(s)		CM/DM	CM/DM	CM/DM
Max. operating voltage	Uc	15 Vac/Vdc	30 Vac/Vdc	255 Vac
Max. Load current	IL	5 A	5 A	5 A
Residual current *Leakage current at Uc*	Ic	None	None	None
Nominal discharge current	In	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA
Withstand on Combination waveform *Class III test*	Uoc	10 kV/5 kA	10 kV/5 kA	10 kV/5 kA
Protection level	Up	0.22 kV	0.22 kV	1.2 kV
End of life		Green LED OFF and line cut-off		
Connection to Network		screw terminal 2.5 mm² max		
Standards compliance		IEC 61643-11 / EN 61643-11 / UL1449 ed.4		
Dataline specifications				
Network		1 pair signal 0-5 V	1 pair signal 0-5 V	1 pair signal 0-5 V
Max. operating voltage	Uc	8 Vdc	8 Vdc	8 Vdc
Max. Load current	IL	300 mA	300 mA	300 mA
Max. frequency	f max	10 MHz	10 MHz	16 MHz
Insertion loss		< 1dB	< 1dB	< 1dB
Nominal discharge current	In	2.5 kA	2.5 kA	2.5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	5 kA	5 kA	5 kA
Protection level	Up	20 V	20 V	20 V
End of life		interruption of transmission - default mode 2		
Connection to Network		screw terminal 2.5 mm² max		
Standards compliance		IEC 61643-21 / EN 61643-21		
Videoline specifications				
Network		signal video	signal video	signal video
Max. operating voltage	Uc	6 Vdc	6 Vdc	6 Vdc
Max. Load current	IL	300 mA	300 mA	300 mA
Max. frequency	f max	100 MHz	100 MHz	100 MHz
Insertion loss		< 1dB	< 1dB	< 1dB
Nominal discharge current	In	5 kA	5 kA	5 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA	10 kA	10 kA
Protection level	Up	20 V	20 V	20 V
End of life		interruption of transmission - default mode 2		
Connection to Network		connector BNC female		
Standards compliance		IEC 61643-21 / EN 61643-21		
Mechnical characteristics				
Dimensions		see diagram		
Mounting		DIN rail or plate (flange)		
Operating temperature		-40/+85°C		
Protection rating		IP20		
Housing material		anodized aluminum		
Part number		420403	420402	420401

SURGE PROTECTOR FOR VIDEO SURVEY CAMERA

- **Security camera Surge Protectors**
- **AC, Data and Video in single unit**
- **Compact aluminium housing**
- **Rail DIN mounting or plate mounting**
- **3 versions :**
  - **AC + Coaxial Video + Data 1 pair : MSP-VMxx**
  - **AC + Coaxial Video + Data 2 pairs : MSP-VMxx-2P**
  - **AC + Cat.5 - RJ45 : MSP-VMxx/R**
- **IEC 61643-21, IEC 61643-11 and EN 61643-21, EN 61643-11 compliance**

MSP-VM-2P Range				
MSP-VM12-2P	**MSP-VM24-2P**	**MSP-VM48-2P**	**MSP-VM120-2P**	**MSP-VM230-2P**
Surge protector for video survey camera Power/Data/Video				
12 Vac/Vdc	24 Vac/Vdc	48 Vac/Vdc	120 V single phase	230 V single phase
-	-	-	TT-TN	TT-TN
CM/DM	CM/DM	CM/DM	CM/DM	CM/DM
15 Vac/Vdc	30 Vac/Vdc	65 Vac/Vdc	150 Vdc	255 Vac
5 A	5 A	5 A	5 A	5 A
None	None	None	None	None
5 kA	5 kA	5 kA	5 kA	5 kA
10 kA	10 kA	10 kA	10 kA	10 kA
10 kV/5 kA	10 kV/5 kA	10 kV/5 kA	10 kV/5 kA	10 kV/5 kA
0.22 kV	0.22 kV	0.40 kV	0.8 kV	1.2 kV
Green LED OFF and line cut-off				
screw terminal 2.5 mm² max				
IEC 61643-11 / EN 61643-11 / UL1449 ed.4				
2 pairs signal 0-5 V 8 Vdc	2 pairs signal 0-5 V 8 Vdc	2 pairs signal 0-5 V 8 Vdc	2 pairs signal 0-5 V 8 Vdc	2 pairs signal 0-5 V 8 Vdc
300 mA	300 mA	300 mA	300 mA	300 mA
16 MHz	16 MHz	16 MHz	16 MHz	16 MHz
< 1dB	< 1dB	< 1dB	< 1dB	< 1dB
2.5 kA	2.5 kA	2.5 kA	2.5 kA	2.5 kA
5 kA	5 kA	5 kA	5 kA	5 kA
20 V	20 V	20 V	20 V	20 V
interruption of transmission - default mode 2				
screw terminal 1.5 mm² max				
IEC 61643-21 / EN 61643-21				
signal video	signal video	signal video	signal video	signal video
6 Vdc	6 Vdc	6 Vdc	6 Vdc	6 Vdc
300 mA	300 mA	300 mA	300 mA	300 mA
100 MHz	100 MHz	100 MHz	100 MHz	100 MHz
< 1dB	< 1dB	< 1dB	< 1dB	< 1dB
5 kA	5 kA	5 kA	5 kA	5 kA
10 kA	10 kA	10 kA	10 kA	10 kA
20 V	20 V	20 V	20 V	20 V
interruption of transmission - default mode 2				
connector BNC female				
IEC 61643-21 / EN 61643-21				
see diagram				
DIN rail or plate (flange)				
-40/+85°C				
IP20				
anodized aluminum				
420433	420432	420435	420434	420431

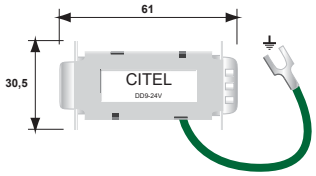
MSP-VM/R range		
MSP-VM12/R	**MSP-VM24/R**	**MSP-VM230/R**
Surge protector for video survey camera Power/data		
12 Vac/Vdc	24 Vac/Vdc	230 V single phase
-	-	TT-TN
CM/DM	CM/DM	CM/DM
15 Vac/Vdc	30 Vac/Vdc	255 Vac
5 A	5 A	5 A
None	None	None
5 kA	5 kA	5 kA
10 kA	10 kA	10 kA
10 kV/5 kA	10 kV/5 kA	10 kV/5 kA
0.22 kV	0.22 kV	1.2 kV
Green LED OFF and line cut-off		
screw terminal 2.5 mm² max		
IEC 61643-11 / EN 61643-11 / UL1449 ed.4		
4 pairs signal 0-5 V 8 Vdc	4 pairs signal 0-5 V 8 Vdc	4 pairs signal 0-5 V 8 Vdc
300 mA	300 mA	300 mA
16 MHz	16 MHz	16 MHz
< 1dB	< 1dB	< 1dB
2.5 kA	2.5 kA	2.5 kA
5 kA	5 kA	5 kA
20 V	20 V	20 V
interruption of transmission - default mode 2		
RJ45 shielded		
IEC 61643-21 / EN 61643-21		
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
see diagram		
DIN rail or plate (flange)		
-40/+85°C		
IP20		
anodized aluminum		
420413	420412	420411

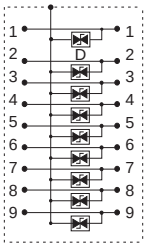
DD SERIES

DD9-24V

- "D-Sub" surge protectors
- For RS232, RS422, RS485 communication lines
- Fast and easy installation
- 9-pin connectors
- Secondary protection
- IEC 61643-21, EN 61643-21 compliance

DD9-24V





D : Clamping diode

Characteristics

CITEL Model		DD9-24V	DD9-6V
Description		D-sub dataline surge protector	
Network		RS232, RS485, 4-20mA	RS422, RS423
Max. data rate		< 40 Mbps	< 40 Mbps
SPD configuration		9-pin connector	9-pin connector
Pin outs		all wires transmitted and protected	all wires transmitted and protected
Nominal line voltage	Un	24 Vdc	5 Vdc
Max. DC operating voltage	Uc	40 Vdc	6 Vdc
Max. Load current	IL	750 mA	750 mA
Max. frequency	f max	> 10 MHz	> 10 MHz
Insertion loss		< 1 dB	< 1 dB
Nominal discharge current - Line/Ground *8/20µs Test x 10 - C2 cat.*	In	300 A	400 A
Nominal discharge current Line/ Line - *8/20µs Test x 10 - C2 category*	In	300 A	400 A
Protection level *following C3 Category test - Line/Line*	Up	18 V	7.5 V
Failsafe behavior		Short-circuit	Short-circuit
Mechnical characteristics			
Dimensions		see diagram	
Mounting		male/Female D-Sub connector unit	
End of life		transmission interrupt - default mode 2	
Mounting		on cable	
Operating temperature		-40/+85°C	
Protection rating		IP20	
Housing material		Thermoplastic UL94 V-0	
Standards			
Compliance		IEC 61643-21 / EN 61643-21	
Part number			
9-pin connector male/female		6147	6148

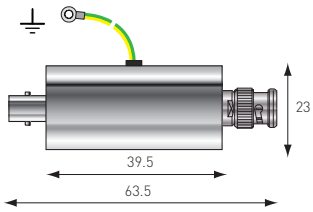
CXC06-B/MF

CNP06-B/FM

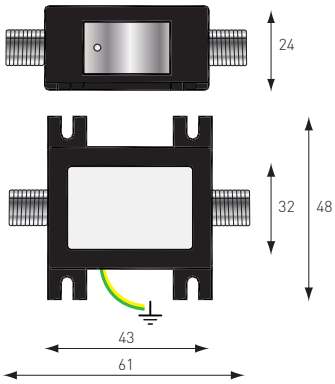
CXC - CNP

- **F or BNC connectors**
- **Low insertion loss**
- **Easy installation**
- **IEC 61643-21, EN 61643-21 compliance**

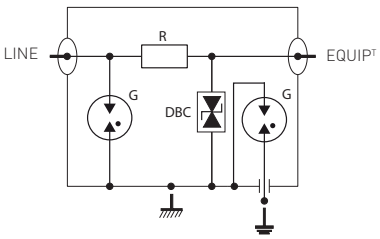
CXC06-B/MF



CNP06-F/FF



CXC06 / CNP06



G: 2-electrode gas tube
DBC : Low capacitance diode
R : Resistor

Characteristics

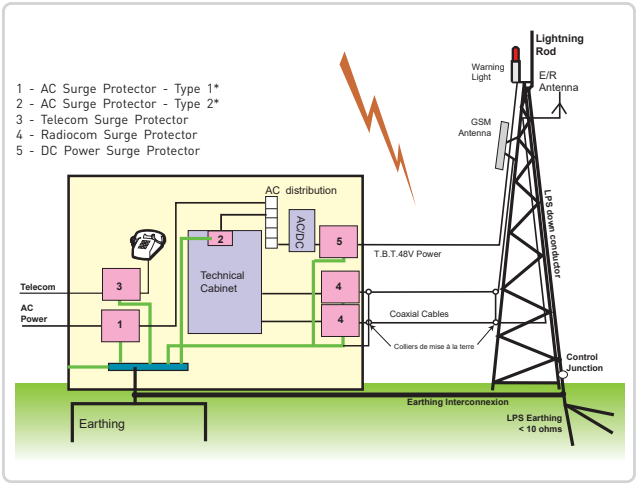
CITEL Model		CXC06*		CNP06*	
Description		Coaxial surge protector for video transmission networks			
Technology		GDT + Diode		GDT + Diode	
Max. frequency	f	DC - 70 MHz		DC - 100 MHz	
Max Power	P	6 W		4 W	
Impedance	Z	50/75 ohms		50/75 ohms	
Insertion loss		⩽ 0.6 dB		⩽ 0.5 dB	
Return loss		⩾ 20 dB		> 20 dB	
VSWR		< 1.3:1		< 1.3:1	
Max. Load current	IL	0.5 A		0.5 A	
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA		5 kA	
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	10 kA		20 kA	
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	2.5 kA		2.5 kA	
Protection level *following C3 Category test - Line/Line*	Up	25 V		20 V	
Failsafe behavior		short-circuit		short-circuit	
Mechnical characteristics					
Dimensions		see diagram			
Connection to Network		BNC or F connector			
End of life		transmission interrupt - default mode 2			
Mounting		on cable		on plate	
Operating temperature		-40/+85°C			
Protection rating		IP20			
Housing material		Brass		Metal+plastic	
Standards					
Compliance		IEC 61643-21 / EN 61643-21			
Part number					
BNC connector Female/Male		CXC06-B/FM	6301341	CNP06-B/FM	64270
BNC connector Male/Female		CXC06-B/MF	630134	CNP06-B/MF	632611
F connector Female/Female		-	-	CNP06-F/FF	632602
F connector Male/Female		-	-	CNP06-F/MF	632601

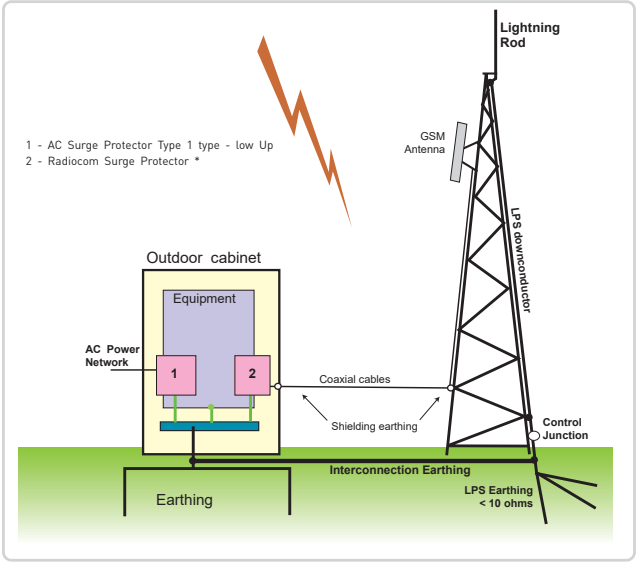
*) BNC or F, Male/Female or Female/Female connector

CITEL

COAXIAL RF SURGE PROTECTORS

RF SURGE PROTECTION OR RF COAXIAL SPD





* Type referring to IEC standards

PROTECTION OF RADIO COMMUNICATION EQUIPMENT

Radio communication equipment deployed in fixed, remote or mobile applications are especially vulnerable to lightning strikes because of their application in exposed areas. The most common disruption to service continuity results from transient surges originating from direct lightning strikes to the antenna pole, surrounding ground system or induced onto connections between these two areas.

Radio equipment utilized in CDMA, GSM/UMTS, WiMAX or TETRA base stations, must consider this risk in order to insure uninterrupted service. CITEL offers three specific surge protection technologies for Radio Frequency (RF) communication lines that are individually suited for the different operational requirements of each system (Filter, GDT and quarter wave).

RF SURGE PROTECTION TECHNOLOGY

P8AX series (Gas Discharge Tube Protection)

The gas discharge tube (GDT) is the only surge protection component usable on very high frequency transmission (several GHz) due to its very low capacitance. In a coaxial surge protector, the GDT is connected in parallel between the central conductor and the external shield. When its sparkover voltage is reached, during an overvoltage event, the line is briefly shorted (arc voltage). The sparkover voltage depends on the rate of rise of the overvoltage. Higher dV/dt surges result in higher sparkover voltages for the GDT.
When the overvoltage disappears, the GDT returns to its original condition of high isolation and is ready to operate again.
The gas tube is removable, making maintenance rapid in the end-of-life scenario (short-circuit).

The greatest advantage of this technology is its very wide bandwidth: from DC (so, compatible with DC voltage injection) to several GHz.

Main characteristics:

- Insertion losses < 0,2 dB
- VSWR < 1,2
- Imax : 20 kA (8/20µs)
- Frequency range from DC up to 7 GHz (depends on connector type)
- Connectors : 7/16, 4.3-10, N, TNC, BNC, SMA, F, UHF
- Waterproof IP65

Main benefits of VG option:

- Prevents the short-circuit of the transmitter (output) and the receiver (input) during a disturbance

CNP/CXP series (GDT protection) and CXP-DCB series (DC Blocked Protection)

CXP protectors are based on GDT to provide high discharge current capability without destruction. These type of products allows for installation in ungrounded systems. In these cases, the CXP isolates the shield from the earth ground and is typically found in applications including wireless radio terminals and TV monitors (antenna, cable or satellite).

CXP-DBC version is a relevant hybrid association between a filter stage and a GDT: this configuration has the advantage of reducing low frequency disturbances (DC and lightning voltages) while providing a high discharge current capability.

Main characteristics (CXP):

- isolated ground through secondary GDT
- Insertion losses < 0.5 dB
- VSWR < 1.3
- Imax : 20 kA (8/20µs)
- Frequency range from DC to 1000 MHz
- Connectors : N, BNC, F...

Main characteristics (CXP-DCB):

- "DC Block" feature
- Insertion losses < 1 dB
- VSWR < 1.2
- Imax : 20 kA (8/20µs)
- Frequency range from 125 MHz to 1000 MHz
- Connectors : N
- Filter blocks lightning frequencies

PRC series (Quarter Wave Protection)

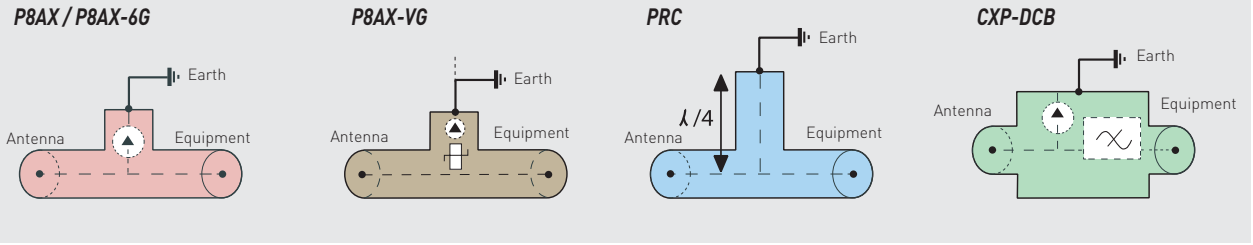
Quarter Wave DC Blocked Protection is an active band pass filter. It has no active components. Rather the body and corresponding stub are tuned to one quarter of the desired wave length. This allows only specific frequency bands to pass through the unit. Since lightning operates only on a very small spectrum, from a few hundred kHz to a few MHz, it and all other frequency's are short-circuited to ground.
The filter may be selective (narrow band or wide-band), according to the calculation of various mechanical elements.

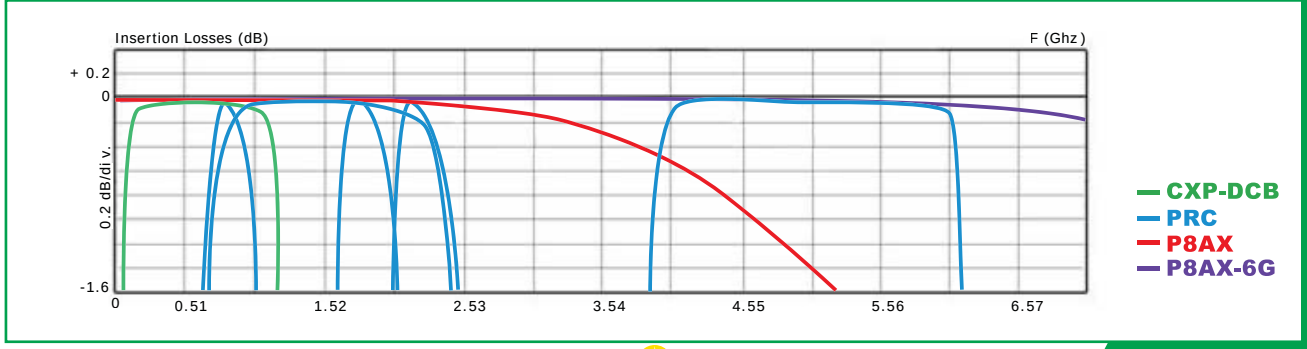
The PRC technology can be selected with very narrow band or wide band depending on the application. Surge current withstand is the depending on connector type. Typically, a 7/16 Din connector can handle 100kA 8/20µs while an N-type connector can handle up to 50kA 8/20µs.
AC/DC power injection is not possible with this technology. A typical application is the protection of radio lines that do not have a source voltage

Main characteristics :

- Insertion losses < 0.2 dB
- VSWR < 1.2
- Broadband and narrowband units available
- Frequency range:
  - 690-2700 MHz
  - 800-2200 MHz
  - 400-500 MHz
  - 870-950 MHz
  - 1700-1950 MHz
  - 1800-2400 MHz
  - 4800-6000 MHz
- Best PIM performance: less than 160 dBc with 4.3-10 connector
- Imax : up to 100 kA (8/20µs)
- Connectors : 7/16, N, BNC, TNC, 4.3/10

RF SURGE PROTECTORS DIAGRAMS





RF SURGE PROTECTION or RF COAXIAL SPD

COAXIAL SPD SPECIFIC PARAMETERS

RF transmission parameters

Coaxial protectors are intended to pass through a desired RF signal with minimum loss or disturbance. When RF energy enters a protector, the energy is, in some combination, passed through, reflected back, and dissipated within the device. The fundamental RF performance parameters of a coaxial protector are:

- Operation frequency range
- Insertion Loss : the loss in load power due to the insertion of the coaxial protector, measured in decibels (dB)
- Return Loss : part of signal which is lost due to reflection of power at a line discontinuity or mismatched coaxial protector, in decibels (dB)
- VSWR : Voltage standing Wave Ratio – ratio of Umax/Umin on a RF transmission line
- PIM (Passive Intermodulation) : non-linear characteristics of coaxial protectors cause undesirable signals by modulation effects in the case of several carriers being transmitted.

Surge current parameters

- General parameter from standard (In, Imax, Iimp refer to standards)
- Let-Through Energy :
  Energy through the surge protector when a standardized impulse is applied to the input. In most cases the input is a combination wave 4kV 1.2/50µs – 2kA 8/20µs. The output of the protector is burdened by 50 Ω, and the resulting waveform is measured. The let-through energy, in Joules, is calculated from the peak voltage/current and integrated pulse width across the load.

F_Female

F_Male

716_Female

716_Male

BNC_Female

BNC_Male

N_male_female

SMA

TNC_Female

TNC_Male

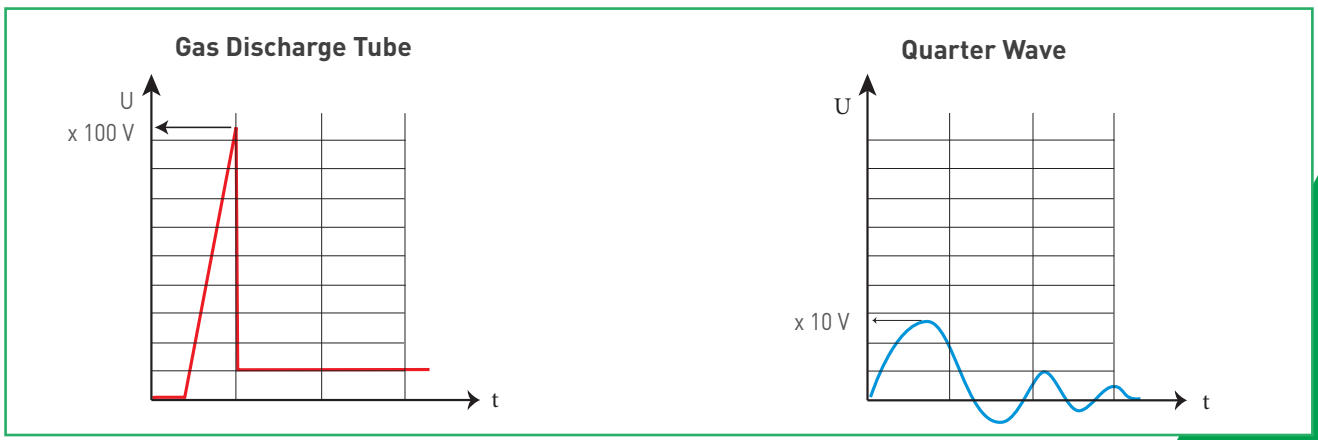
4.3-10_Female

4.3-10_Male

SPD TECHNOLOGIES COMPARISON

Table below allows comparison between the 3 technologies of RF coaxial surge protectors, in order to select the right solution regarding the application and the requirements.

Technology	Gas Discharge Tube (GDT)	DC Block	Quarter wave (1/4)
CITEL series	**P8AX**	**CXP-DCB**	**PRC**
			
Principle	Switching	Switching + Filter	1/4 wave filter
Residual voltage (under standardized test condition: 1kV/µs surge voltage and/or surge current (8/20µs))	Depending on version, it can be from 600V to 2400V for typically 200 ns and then 10V* during surge current flowing time. *(*VG version does not short-circuit the RF line)*	Less than 600V for typically 200 ns and then 0V during surge current flowing time.	< 20 V during all surge duration.
Frequency range	DC up to 7 GHz (dependent on the coaxial connector and the impedance)	125-1000 MHz	Broadband and narrow band (GSM, DCS1800, PCS, DECT, GPS....) up to 5800 MHz
DC/AC power injection	Possible	Blocked	Not compatible
Typical 8/20µs surge current capability	20 kA	20 kA	Depending on the connector: 100kA for the 7/16, 50kA for the N
Typical 10/350µs lightning current capability	2.5 kA	2.5 kA	Function of the connector : 25kA to 50kA
Typical let through energy (on 50 Ohms load for 4kV/2kA combined surge)	300µJ	300µJ	5µJ
Maintenance	Possible to replace the GDT (but not recommended)	None	None
End of life detection	RF line shorted (except VG versions)	RF shorted	No end of life expected due to environmental stress
Connectors	N, BNC, TNC, UHF, SMA, 7/16, 4.3-10 option VG : 4.3-10, N, F	N	7/16, N, TNC, 4.3-10....



RF SURGE PROTECTION or RF COAXIAL SPD

TYPICAL RADIO FREQUENCY BANDS

LF : Low Frequency	30-300 kHz
MF : Medium Frequency	300-3000 kHz
HF : High Frequency	3-30 MHz
VHF : Very High Frequency	30-300 MHz
UHF : Ultra High Frequency	300-3000 MHz
SHF : Super High Frequency	3-30 GHz

A FEW MICROWAVE APPLICATIONS

Tetra, Tetrapol	380-512 MHz
GSM 850	824-894 MHz
Tetra	870-925 MHz
GSM 900	880-960 MHz
GPS	1575 MHz
GSM 1800	1710-1785 MHz
GSM 1900	1850-1990 MHz
DECT	1880-1900 MHz
WCDMA/TD-SCDMA	1850-2025 MHz
UMTS (IMT-2000)	1885-2200 MHz
WLL (WiMax)	2400-5825 MHz

INSTALLATION, LOCATION OF THE SPD

The efficiency of coaxial protectors is highly dependent on proper installation, in particular their connection to the earthing network of the installation.
The following installations rules must be strictly observed to ensure the efficiency:

» Equipotential bonding network: all the bonding conductors of the installation must be interconnected and connected to the installation earthing network.

» Optimized connection of the protector to the bonding network: to reduce the residual voltages during lightning discharge currents, the connection of the protector to the bonding network must be as short as possible (less than 50 cm) and has a proper cross section (at least 4 mm²).

The «feedthrough/bulkhead mounting» versions perfectly meet all these requirements.

Warning: Carefully remove all paintings or insulating coatings to ensure good electrical contact.

» Location of the protectors: they should preferably be placed at the entrance of the installation (to limit the penetration of lightning currents) and also near sensitive equipment (to enhance protection).

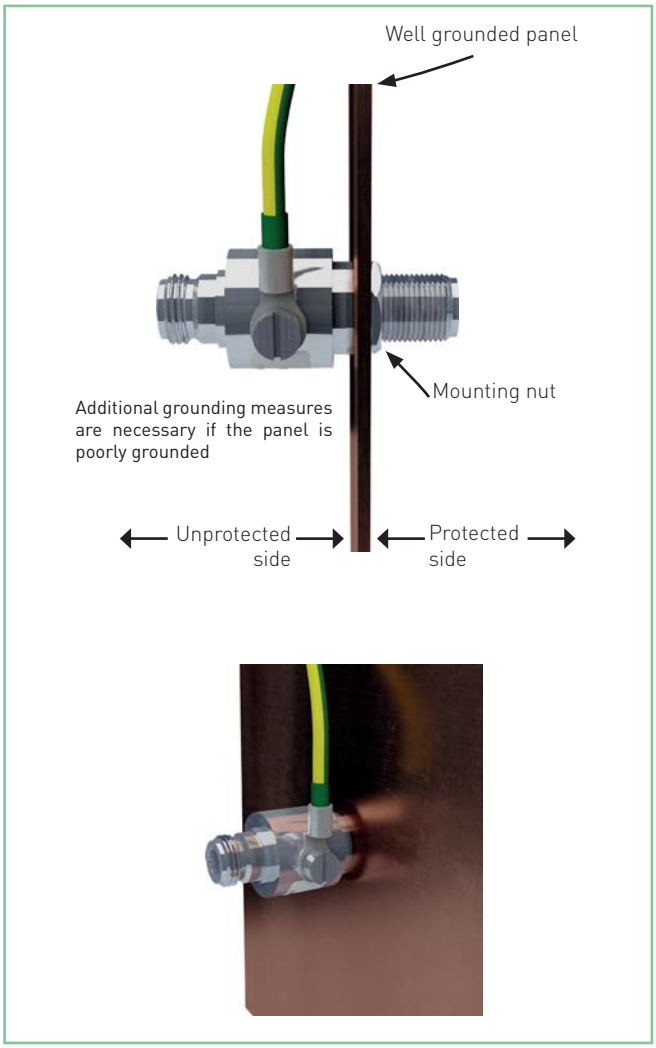
MOUNTING

The proper mounting of a coaxial surge protector is largely dependent on its connection to a low impedance grounding system. The following rules must be strictly observed:
Equipotential Grounding System: All the bonding conductors of the installation must be interconnected to each other and connected back to the grounding system.
Low Impedance Connection: The coaxial surge protector needs to have a low resistance connection to the Ground System.
Note: Depending on models, CITEL Coaxial SPD's family is suitable to be mounted outdoor and can be immersed as soon as the connection to the cable is realized to be immerse as well.

Feedthrough mounting

Direct mounting of the surge protector on the grounded frame at the installation entrance (or on specific bracket see p. 177) :

» Perfect connection to the bonding network
» Best location (conduction of the surge currents at the entrance of the installation)
» Good mechanical withstand.



Note: Unprotected side and Protected side concept is a recommendation to keep the box concept principle but surge protection is bidirectional

Alternative mounting

Connection to the bonding network by wire (4 mm² minimum and shortest length possible).

STANDARDS

Various standards address Coaxial surge protection . CITEL SPD are designed to be compliant with the following:

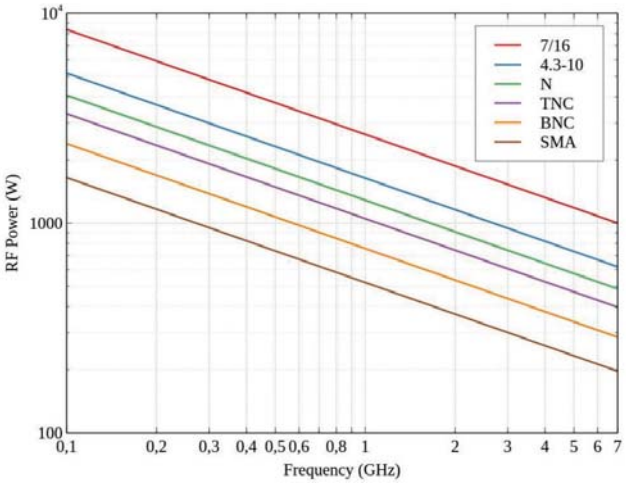
IEC 61643-21 : Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signaling networks – Performance requirements and testing methods
EN 61643-21: Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signaling networks – Performance requirements and testing methods
UL497E : Outline Of Investigation For Protectors For Antenna Lead-In Conductors

SPD SELECTION

Peak power and connectors

When selecting a coaxial surge arrester, it is necessary to ensure that the surge arrester can withstand the peak power of the installation without damage.The installation usually determines the connector used. The installation usually determines the connector used. The impedance of the arrester is mostly associated with a specific type of connector. However, it can happen that a type of connector is available in 2 different impedances (the BNC connector is available in 50 ohms and 75 ohms).

PRC range
The peak power of these products depends on: the voltage standing wave ratio (VSWR), the impedance and the type of connector. The following curve allows to find the peak power according to the frequency (50 ohms and VSWR 1.2:1), in relation to the connector of the chosen product.
Example: a PRC822S-N/MF product has an N connector, for a maximum frequency of 2200 MHz, the PRC will reach, according to the curve, a peak power of 867 W.



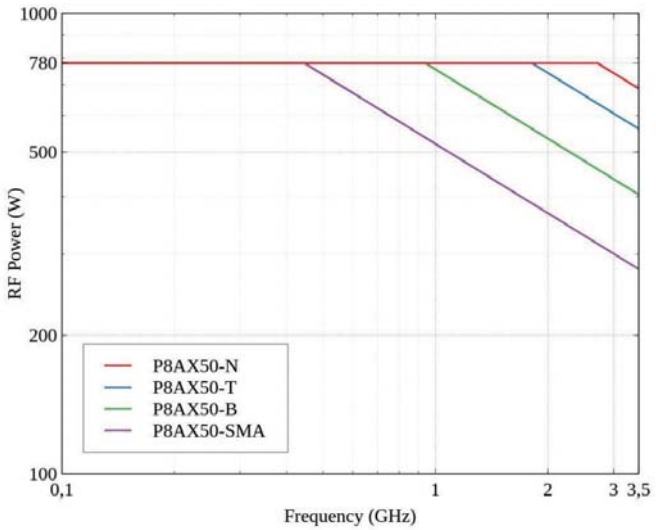
P8AX, CXC and CXP ranges

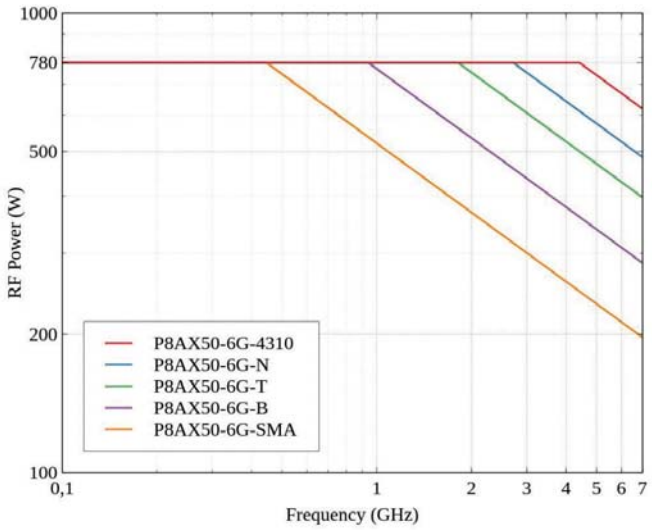
The allowable peak power of these ranges depends on:
the nominal firing voltage of the selected GDT, the voltage standing wave ratio, the AC/DC power that may be injected and the impedance and the connector type.

The following table shows the nominal firing voltage of the GDT and the type of connector at impedance (50 ohm and SWR 1.2:1).

CITEL model	Nominal sparkover voltage	Max. peak power with VSWR<1.2
P8AX09	90 V	25 W
P8AX15	150 V	70 W
P8AX25	250 V	190 W
P8AX50	500 V	780 W

Clarification on P8AX50 surge protectors: in order to determine the peak powers of P8AX50 protectors, which are not limited by the triggering voltage of their GDT component, it is necessary to refer to their curve illustrating the Frequencies (50 ohms and SWR 1.2:1) per connector.





RF SURGE PROTECTION

CITEL model	Connectors
P8AX-716	7/16
P8AX-4310	4.3-10
P8AX -N	N
P8AX - T	TNC
P8AX -B	BNC
P8AX -SMA	SMA
P8AX -F	F
P8AX -U	UHF

When ac/dc power is injected, special care must be applied. As an example, if 48V dc power is superimposed with RF signal a P8AX25 is limited to 114W for VSWR ⩽ 1,2. Consult our experts for further information.

REFERENCE SYSTEM

P8AX■-■/■

- Type of connection: F (Female), M (Male)
- Connector types : N, BNC, TNC, 7/16, SMA....
- Nominal sparkover voltage: 09, 15, 25, 50
- GDT series

PRC■-■(■)/■

- Type of connection: F (Female), M (Male)
- Type of connection: C (cable entry), W (bulkhead)
- Connector types : N, TNC, 7/16...
- Frequency (MHz): 450, 900, 1800, 822S (800-2200)...
- 1/4

CX■ ■-■/■

- Type of connection: F (Female), M (Male)
- Connector types : N, BNC, TNC, 7/16...
- Nominal sparkover voltage: 06, 36...
- Type of product: CXP, CXC, CXF...

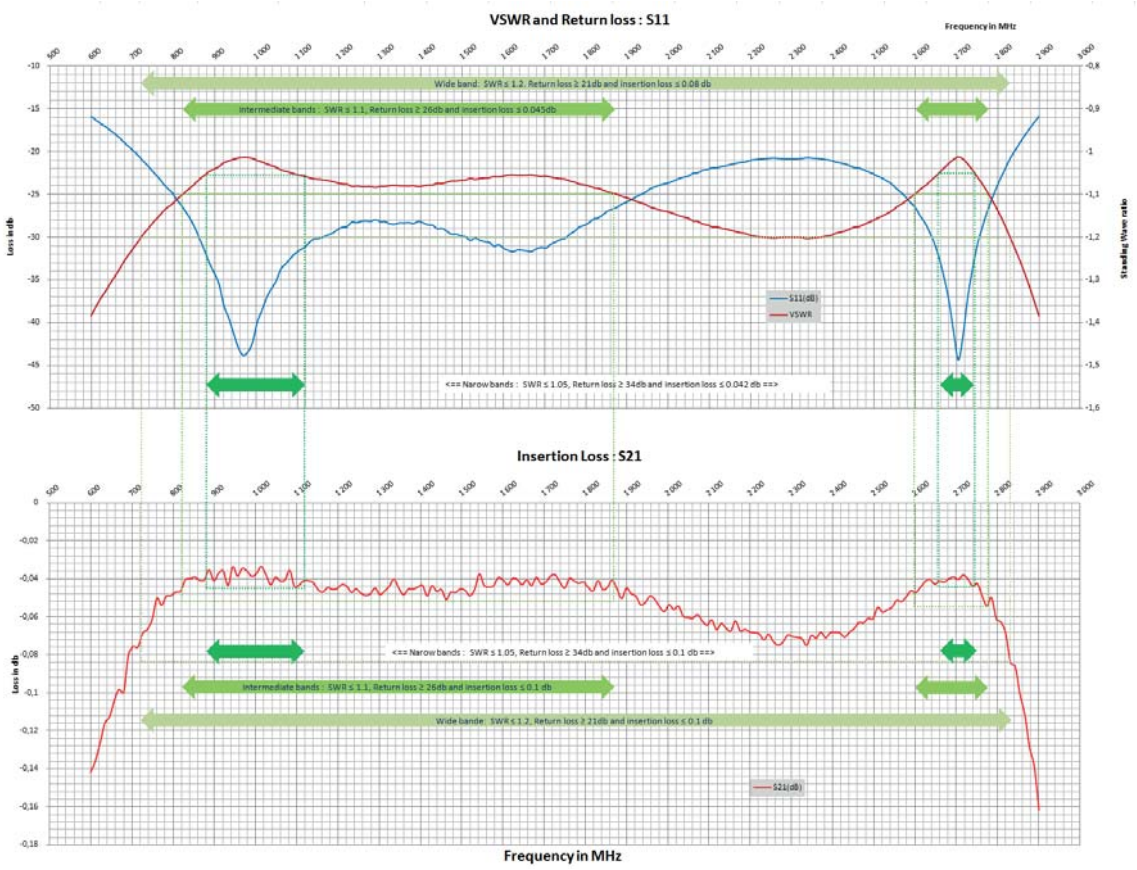
EXAMPLE FOR SPECIFIC REQUIREMENT USING A PRC827-N/MF

Main features description of the Quarter-Wave Surge Protector used for the example

- » Maintenance Free Design
- » Low Insertion Loss
- » Several Wide to Narrow Band Applications
- » Imax > 50kA, Peak power = 1,5kW, Z = 50Ω
- » IP66 Classification
- » DC Block (Short Circuit) (wide/narrow band-pass frequencies)

To select the proper RF protection, the main point is to know exactly what will be the frequency of use and the minimum transmission characteristic that the system is able to accept for proper communication. The full system must then be known as each single element of the system is able to disturb or attenuate the RF signal. Connectors, cable and any other components or equipment that is comprised in this system must be considered. In general a VSWR lower than 1.2 is more than acceptable for a system to work properly, which is why the wide band for single RF equipment is limited by the frequencies that are corresponding to this ratio. In extreme cases, the specific need is to get lower VSWR for the full system. It is mandatory to optimize each single equipment because each loss is simply cumulated along the transmission line (Coaxial cable equipped with various equipment such as SPDs). For this example, the plots made on our PRC827-N/MF, are showing transmission characteristics that are guaranteed levels and the SPD will exceed these performance levels.
In such specific needs, the Surge protection must be selected in regard to the working frequency band.
Note: in general all RF characteristics for a device are linked and vary in the same way depending on the frequency.

In our example, if the requested working frequency band is 2.7 GHz to 2.72 GHz, the selected SPD is presenting exceptional RF characteristics in this frequency range (VSWR<1,05) even if general features state that VSWR is between 1 and 1,2 from 0,8 GHz to 2,8GHz.



Another presentation format is shown in the following table.

Frequency band		Wide	Intermediate low	Intermediate high	Narrow low	Narrow high
	(MHz)	720-2830	820-1970	2600-2780	880-1120	2655-2745
VSWR	-	< 1.2	< 1.1		< 1.05	
Return loss	(dB)	> 21	> 26		> 34	
Insertion loss	(dB)	< 0.09	< 0.045		< 0.042	

In general wide band characteristics provided are sufficient for good selection of SPDs and for general application.
Specific characteristics are available on request for specific frequencies.

P8AX09-N/MF

P8AX SERIES

- **Low insertion losses**
- **Waterproof**
- **Removable GDT**
- **DC-pass**
- **Bi-directional protection**

P8AX■-■-■

- Type : MF = Male/Female
  FF = Female/Female
- Connectors
- Voltage

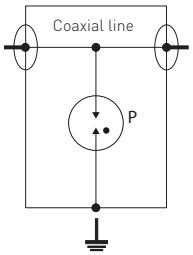
Characteristics

CITEL Model		P8AX09*		P8AX-15*		P8AX25*		P8AX50*	
Description		RF coaxial protector - 3.5 GHz							
Technology		Gas discharge tube		Gas discharge tube		Gas discharge tube		Gas discharge tube	
Max. DC operating voltage	Uc	72 Vdc		120 Vdc		200 Vdc		400 Vdc	
Frequency range	f	DC-3.5GHz		DC-3.5GHz		DC-3.5GHz		DC-3.5GHz	
Max Power	P	25 W		70 W		190 W		780 W**	
Impedance	Z	50/75 ohms		50/75 ohms		50/75 ohms		50/75 ohms	
Insertion loss		< 0.2dB		< 0.2dB		< 0.2dB		< 0.2dB	
Return loss		> 20 dB		> 20 dB		> 20 dB		> 20 dB	
VSWR		<1.2:1		<1.2:1		<1.2:1		<1.2:1	
Max. Load current	IL	10A		10A		10A		10A	
Nominal discharge current *- 8/20µs Test x 10 - C2 Category*	In	5 kA		5 kA		5 kA		5 kA	
Max. discharge current *-max. withstand @ 8/20 µs by pole*	Imax	20 kA		20 kA		20 kA		20 kA	
Impulse current *- 2 x 10/350µs Test - D1 Category*	Iimp	1 kA		1 kA		1 kA		1 kA	
Protection level *@ 1kV/µs - C3 Category*	Up	< 650 V		< 700 V		< 800 V		<1200 V	
Typical let through energy *(50 ohms) input 4kV 1.2/50µs - 2kA 8/20µs*		300 µJ		320 µJ		350 µJ		1100 µJ	
End of life behavior		Short-circuit (fault mode 2 - Transmission interruption)							
Mechnical characteristics									
Dimensions		see diagram							
Connection to Network		N . TNC. SMA. F. BNC. 7/16, 4.3-10							
Disconnection indicator		transmission interrupt							
Mounting		Feedthrough/ Bulkhead							
Operating temperature		-40/+85°C							
Protection rating		IP65							
Housing material		Brass/Surface plating: Cu Zn Sn							
Contacts		Bronze/Surface plating: Au or Ag							
Insulation material		PTFE							
RohS compliance		yes							
Spare unit		BBHF-90V		BBHF-150V		BBHF-250V		BBHF-500V	
Standards									
Compliance		IEC 61643-21 / EN 61643-21 / UL497E							
*** Part number**									
BNC connector Female/Female		P8AX09-B/FF	60111	P8AX15-B/FF	60112	P8AX25-B/FF	60114	P8AX50-B/FF	60117
BNC connector Male/Female		P8AX09-B/MF	60101	P8AX15-B/MF	60102	P8AX25-B/MF	60104	P8AX50-B/MF	60107
N connector Female/Female		P8AX09-N/FF	60011	P8AX15-N/FF	60012	P8AX25-N/FF	60014	P8AX50-N/FF	60017
N connector Male/Female		P8AX09-N/MF	60001	P8AX15-N/MF	60002	P8AX25-N/MF	60004	P8AX50-N/MF	60007
F connector Female/Female***		P8AX09-F/FF	60211	P8AX15-F/FF	60212	P8AX25-F/FF	60214	P8AX50-F/FF	60214
F connector Male/Female		P8AX09-F/MF	60201	P8AX15-F/MF	-	P8AX25-F/MF	60204	P8AX50-F/MF	60205
SMA connector Female/Female		P8AX09-SMA/FF	60511	P8AX15-SMA/FF	60512	P8AX25-SMA/FF	60514	P8AX50-SMA/FF	-
SMA connector Male/Female		P8AX09-SMA/MF	60501	P8AX15-SMA/MF	60502	P8AX25-SMA/MF	60504	P8AX50-SMA/MF	-
7/16 connector Male/Female		P8AX09-716/MF	60401	P8AX15-716/MF	-	P8AX25-716/MF	60404	P8AX50-716/MF**	60407
7/16 connector Female/Female		P8AX09-716/FF	60411	P8AX15-716/FF	-	P8AX25-716/FF	60414	P8AX50-716/FF**	60417
4.3-10 connector Male/Female		P8AX09-4310/MF	60901	P8AX15-4310/MF	-	P8AX25-4310/MF	60904	P8AX50-4310/MF**	60907
4.3-10 connector Female/Female		P8AX09-4310/FF	-	P8AX15-4310/FF	-	P8AX25-4310/FF	-	P8AX50-4310/FF**	-

Note: If no ordering code, please contact us for more information

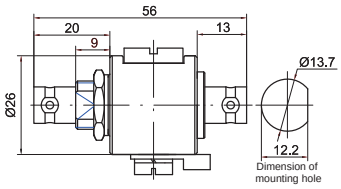
** Note: the maximum power varies according to the product's connector system. To obtain the maximum power per connector, please refer to the curves on page 184

***): products with an F connector have a limited bandwidth of 2 GHz

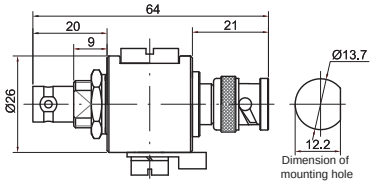


P: 2-electrode gas discharge tube

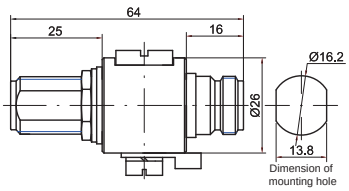
P8AX_-B/FF



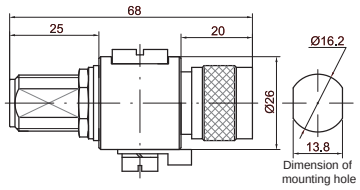
P8AX_-B/MF



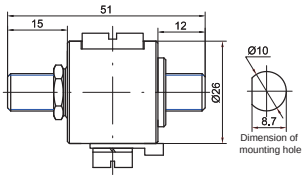
P8AX_-N/FF



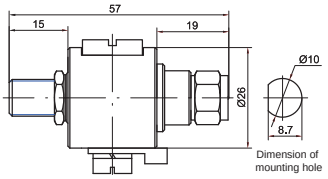
P8AX_-N/MF



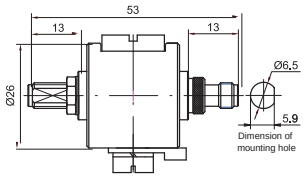
P8AX_-F/FF



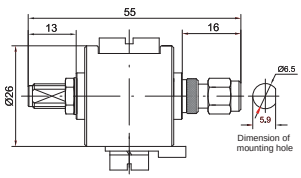
P8AX_-F/MF



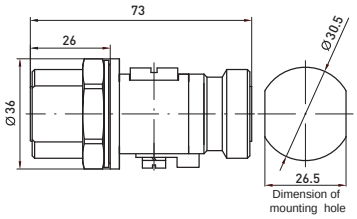
P8AX_-SMA/FF



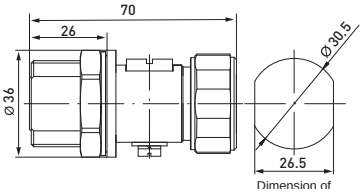
P8AX_-SMA/MF



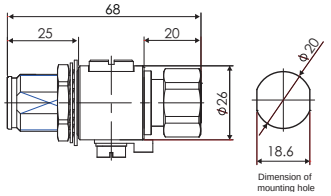
P8AX_-716/FF

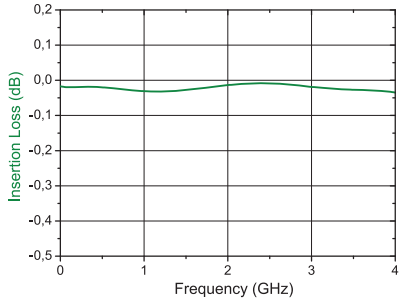


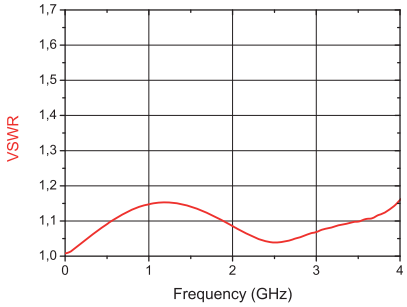
P8AX_-716/MF



P8AX_-4310/MF







P8AX09-6G-N/MF

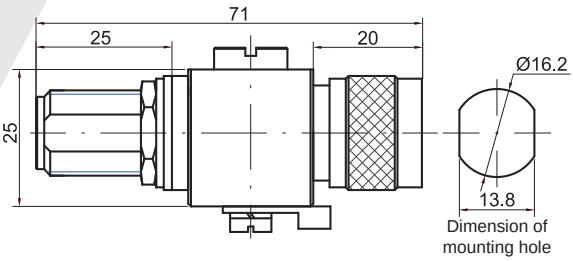
P8AX-6G SERIES

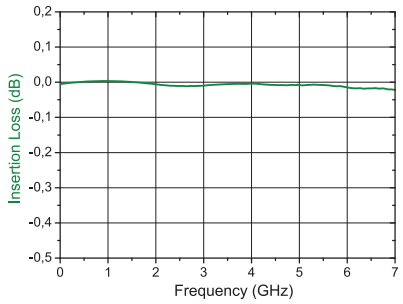
- **High frequency surge protector**
- **Low insertion losses**
- **Removable GDT**
- **DC-pass**
- **Bi-directional protection**

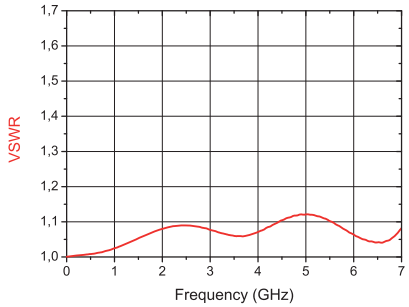
P8AX ■-6G-■-■■

- Type : MF = Male/Female
  FF = Female/Female
- Connectors (see reference system)
- Voltage (see reference system)

Example: P8AX-6G-N/MF







Characteristics

CITEL Model		P8AX09-6G*		P8AX25-6G*	
Description		RF coaxial protector - 7 GHz			
Technology		Gas discharge tube		Gas discharge tube	
Max. DC operating voltage	Uc	120 vdc		200 Vdc	
Frequency range	f	DC-7 GHz		DC-7 GHz	
Max Power	P	25 W		190 W	
Impedance	Z	50 ohms		50 ohms	
Insertion loss		< 0.2dB		< 0.2dB	
Return loss		> 20 dB		> 20 dB	
VSWR		<1.25:1		<1.25:1	
Max. Load current	IL	10A		10A	
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA		5 kA	
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	15 kA		15 kA	
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	1 kA		1 kA	
Protection level *@1 kV/µs - C3 Category*	Up	< 1100 V		< 1200 V	
Typical let through energy *(50 ohms) Input 4kV 1.2/50µs - 2kA 8/20µs*		2.2 mJ		2.2 mJ	
End of life behavior		Short-circuit (fault mode 2 - transmission interruption)			
Mechnical characteristics					
Dimensions		see diagram			
Connection to Network		N, TNC, SMA, 4.3-10			
Disconnection indicator		transmission interrupt			
Mounting		Feedthrough			
Operating temperature		-40/+85°C			
Protection rating		IP65			
Housing material		Brass/Surface plating: Cu Zn Sn			
Contacts		Bronze/Surface plating: Au or -Ag			
Insulation material		PTFE			
RohS compliance		yes			
Spare unit		1 x BA HF -90/20		1 x BA HF -150/20	
Standards					
Compliance		IEC 61643-21 / EN 61643-21 / UL497E			
*** Part number**					
TNC connector Female/Female		P8AX09-6G-T/FF	68311	P8AX25-6G-T/FF	68314
TNC connector Male/Female		P8AX09-6G-T/MF	68301	P8AX25-6G-T/MF	68304
N connector Female/Female		P8AX09-6G-N/FF	68011	P8AX25-6G-N/FF	68014
N connector Male/Female		P8AX09-6G-N/MF	68001	P8AX25-6G-N/MF	68004
SMA connector Female/Female		P8AX09-6G-SMA/FF	68511	P8AX25-6G-SMA/FF	68514
SMA connector Male/Female		P8AX09-6G-SMA/MF	68501	P8AX25-6G-SMA/MF	68504
4.3-10 connector Male/Female		P8AX09-6G-4310/MF	-	P8AX25-6G-4310/MF	68904
4.3-10 connector Female/Female		P8AX09-6G-4310/FF	-	P8AX25-6G-4310/FF	890202

* If no ordering code, please contact us for more information

CITEL

P8AX09-VG-N/MF

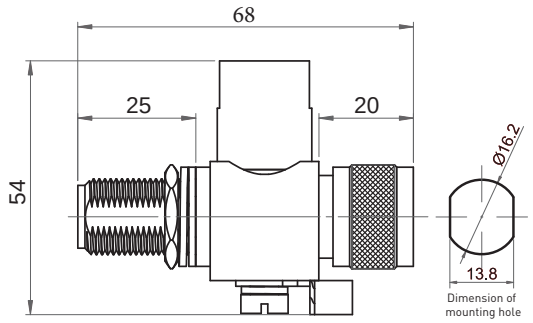
P8AX-VG SERIES

- Up to 7 Ghz
- VG technology
- Imax : 6 kA
- VSWR ⩽ 1.25
- Insertion Loss ⩽ 0.2 dB
- Feedthrough mounting
- Bi-Directional
- DC pass

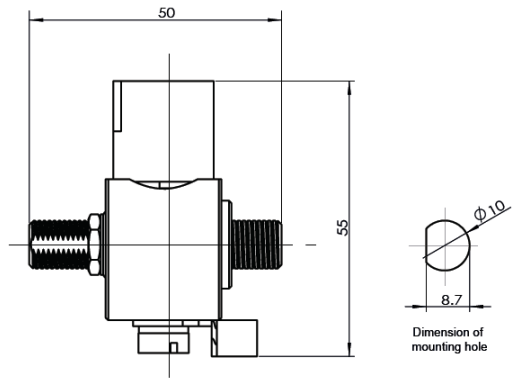
P8AX ■ -6VG- ■ / ■

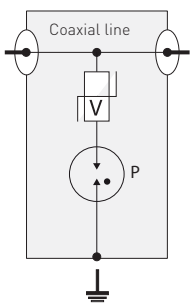
- Type : MF = Male/Female, FF = Female/Female
- Connectors (see reference system)
- Voltage (see reference system)

P8AX-VG-N/MF



P8AX-VG-F/FF





V: Varistor
P: 2-electrode gas tube

Characteristics

CITEL Model		P8AX09-6VG-N/MF	P8AX09-VG-N/MF	P8AX25-VG-F/FF
Description		RF coaxial protector 7 GHz	RF coaxial protector 3.5 GHz	RF coaxial protector 2 GHz
Technology		VG	VG	VG
Max DC operating voltage	Uc	120 Vdc	200 Vdc	200 Vdc
Frequency range	f	DC to 7 GHz	DC to 3.5 GHz	DC to 2 GHz
Max Power	P	25 W	25 W	190 W
Impedance	Z	50 ohms	50 ohms	75 ohms
Insertion loss		< 0.2dB	< 0.2dB	< 0.8dB
Return loss		> 20 dB	> 20 dB	> 13 dB
VSWR		⩽ 1.2:1	⩽ 1.2:1	⩽ 1.5:1
Max. Load current	IL	10A	10A	10A
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	3 kA	3 kA	3 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	6 kA	6 kA	6 kA
Impulse current *2 x 10/350µs Test - D1 Category*	limp	1 kA	1 kA	1 kA
Protection level *@ 1kV/µs - C3 Category*	Up	< 1100 V	< 650 V	< 800 V
End of life behavior		Short-circuit (fault mode 2 - transmission interruption)		
Mechnical characteristics				
Dimensions		see diagram		
Connection to Network		connector N Male/ Female	connector N Male/ Female	connector F Female/ Female
Disconnection indicator		transmission interrupt		
Mounting		Feedthrough		
Operating temperature		-40/+85°C		
Protection rating		IP65		
Housing material		Brass/Surface plating : Cu Zn Sn		
Contacts		Bronze/Surface plating: Au or -Ag		Bronze/Surface plating: Au
Insulation material		PTFE		
RohS compliance		yes		
Spare unit		-	-	-
Standards				
Compliance		IEC 61643-21 / EN 61643-21 / UL497E		
Part number				
		69001	60601	60701

PRC1800-716/MF

PRC SERIES

- **Low insertion losses**
- **Imax > 50 kA**
- **Available for wide-band application**
- **No maintenance**

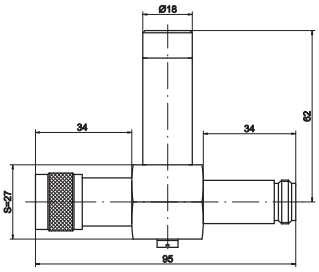
PRC■-■■-■

- Type : MF = Male/Female
  FF = Female/Female
- Mounting : " " = on connector
  W = on feedthrough
- Connectors (see reference system)
- Voltage (see reference system)

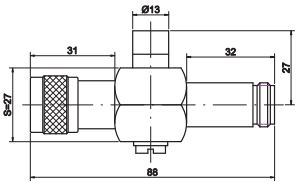
Characteristics

CITEL Model		PRC822S*	PRC900*	PRC1800*	PRC2100*	PRC5800*
Description		"Quarter wave" coaxial protector				
Technology		Quarter Wave	Quarter Wave	Quarter Wave	Quarter Wave	Quarter Wave
Frequency range	f	800-2200MHz	870-960MHz	1700-1950MHz	1800-2400MHz	4500-6000MHz
Max Power @ fmax		175 W**	855 W**	1895 W**	830 W	525 W
Max Power @ fmini		2959 W**	895 W**	2030 W**	958 W	606 W
Impedance	Z	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms
Insertion loss		< 0.2 dB	< 0.2 dB	< 0.2 dB	< 0.2 dB	< 0.2 dB
Return loss		> 20 dB	> 20 dB	> 20 dB	> 20 dB	> 20 dB
VSWR		<1.2:1	<1.2:1	<1.2:1	<1.2:1	<1.2:1
PIM 3rd order (2x20W)		<-160 dBc	<-160 dBc	<-160 dBc	<-160 dBc	<-160 dBc
Max. Load current	IL	10A	10A	10A	10A	10A
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	25 kA	50 kA	50 kA	25 kA	25 kA
Max. discharge current *max. withstand @ 8/20 µs by pole*	Imax	50 kA	100 kA	100 kA	50 kA	50 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	25 kA	50 kA	50 kA	25 kA	25 kA
Protection level *@ 1kV/µs- C3 Category*	Up	< 30 V	< 30 V	< 30 V	< 30 V	< 30 V
Failsafe behavior		without	without	without	without	without
Mechanical characteristics						
Dimensions		see diagram				
Connection to Network		N, 4.3-1 or 7/16 connector	N, 4.3-10, TNC or 7/16 connector	N, 4.3-10,TNC or 7/16 connector	N connector	N connector
Mounting		on connector or feedthrough (W version)				connector
Operating temperature		-40/+85°C				
Protection rating		IP67				
Housing material		Brass/Surface plating : Cu Zn Sn				
Contacts		Bronze/Surface plating: Au or -Ag				
Insulation material		PTFE				
Standards						
Compliance		IEC 61643-21 / EN 61643-21 / UL497E				
*** Part number**						
N connector Female/Female		PRC822S-N/FF 61013	PRC900-N/FF 621124	PRC1800-N/FF 621125	PRC2100-N/FF -	PRC5800-N/FF 621151
N connector Male/Female		PRC822S-N/MF 61003	PRC900-N/MF 621111	PRC1800-N/MF 621112	PRC2100-N/MF 621183	PRC5800-N/MF 621152
N connector Female/Female - Feedthrough mounting		- -	- -	- -	PRC2100-NW/FF 621172	PRC5800-NW/FF 621175
N connector Male/Female - Feedthrough mounting		- -	- -	PRC1800-NW/MF 61108	PRC2100-NW/MF -	- -
T connector Female/Female		- -	PRC900-T/FF 621126	PRC1800-T/FF 621127	- -	- -
T connector Male/Female		- -	PRC900-T/MF 621113	PRC1800-T/MF 621115	- -	- -
7/16 connector Male/Female		PRC822S-716/MF** 621139	PRC900-716/MF** 621110	PRC1800-716/MF** 621108	- -	- -
7/16 connector Female/Female		PRC822S-716/FF** 67413	PRC900-716/FF** 621109	PRC1800-716/FF** 621107	- -	- -
4.3-10 connector Male/Female		PRC822S-4310/MF -	PRC900-4310/MF -	PRC1800-4310/MF -	- -	- -
4.3-10 connector Female/Female		PRC822S-4310/FF -	PRC900-4310/FF -	PRC1800-4310/FF -	- -	- -

* If no ordering code, please contact us for more information



PRC822S-N/MF



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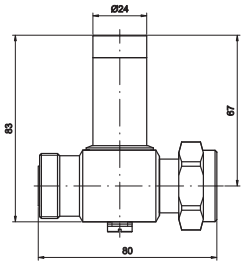

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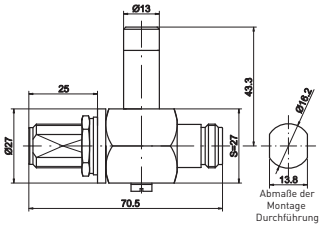
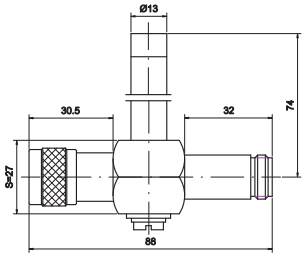


PRC2100-NW/FF



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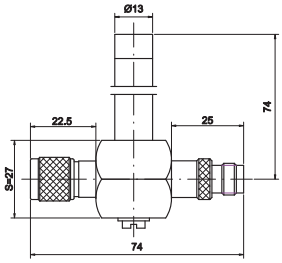

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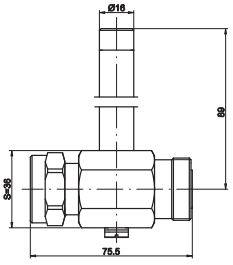

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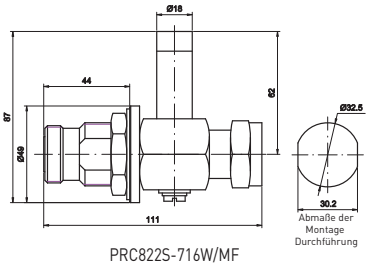

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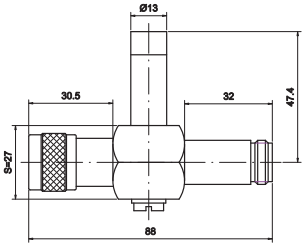

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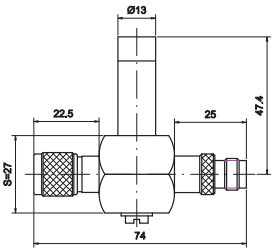

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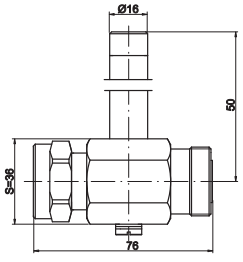

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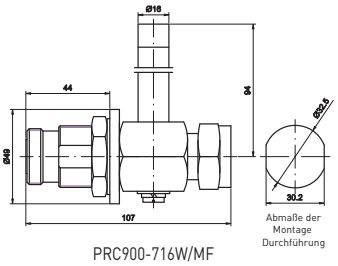

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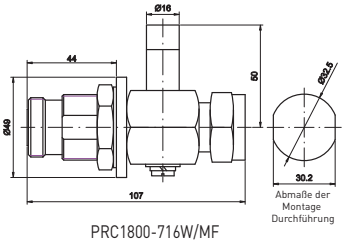

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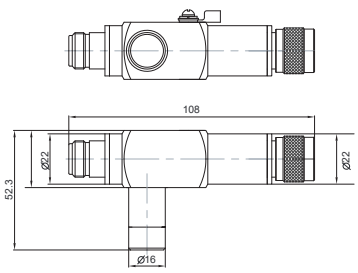


PRC350-N/MF

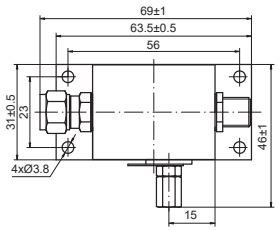
CNP AND CXP SERIES

- **Waterproof**
- **Mounting on plate**
- **Bi-directional**

Characteristics

CITEL Model		CNP90TV-F/*	CNP230TV-F/FF	CXP09*	CXP25*	CXP09*-DCB	CXP25*-DCB
Description		Coaxial SPD for video transmission networks	Coaxial SPD for video transmission networks	Coaxial SPD low frequency	Coaxial SPD low frequency	Coaxial SPD low frequency	Coaxial SPD low frequency
Technology		Gas discharge tube	Gas discharge tube	Gas discharge tube	Gas discharge tube	GDT+Filter	GDT+Filter
Frequency range	f	DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-1 GHz	125-1000 MHz	125-1000 MHz
Max Power	P	25 W	190 W	25 W	190 W	25 W	190 W
Impedance	Z	50/75 ohms	50/75 ohms	50/75 ohms	50/75 ohms	50/75 ohms	50/75 ohms
Insertion loss		< 0.6 dB	< 0.6 dB	< 0.5 dB	< 0.5 dB	< 1 dB	< 1 dB
Return loss		> 20 dB	> 20 dB	> 20 dB	> 20 dB	> 20 dB	> 20 dB
VSWR		< 1.35:1	< 1.35:1	< 1.3:1	< 1.3:1	<1.3:1	<1.3:1
Max. Load current	IL	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A	0.5 A
Nominal discharge current *8/20µs Test x 10 - C2 Category*	In	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. discharge current *-max. withstand @ 8/20 µs by pole*	Imax	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Impulse current *2 x 10/350µs Test - D1 Category*	Iimp	2.5 kA	2.5 kA	1 kA	1 kA	1 kA	1 kA
Protection level *@ 1kV/µs- C3 Category*	Up	600 V	650 V	600 V	800 V	600 V	800 V
End of life behavior		Short-circuit (fault mode 2 - transmission interruption)					
Mechnical characteristics							
Dimensions		see diagram					
Connection to Network		Connector F female/female		N or F connector		N or F connector	
Disconnection indicator		transmission interrupt					
Mounting		on plate					
Operating temperature		-40/+85°C					
Protection rating		IP20					
Housing material		Metal+plastic		Brass			
Standards							
Compliance		IEC 61643-21 / EN 61643-21 / UL497E					
***Part number**							
N connector Female/Female		- -	- -	CXP09-N/FF 631655	CXP25-N/FF -	CXP09-N/FF-DCB 631652	CXP25-N/FF-DCB 631752
N connector Male/Female		- -	- -	CXP09-N/MF -	CXP25-N/MF 631754	CXP09-N/MF-DCB 631653	CXP25-N/MF-DCB 631753
F connector Female/Female		CNP 90TV-F/FF 6329012	CNP230TV-F/FF 632302	CXP09-F/FF 631651	CXP25-F/FF 631757	- -	- -
F connector Male/Female		CNP 90TV-F/MF 6329011	- -	CXP09-F/MF 631611	CXP25-F/MF -	- -	- -

* If no ordering code, please contact us for more information



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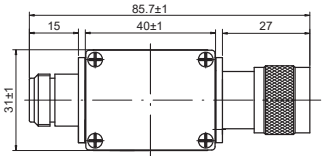

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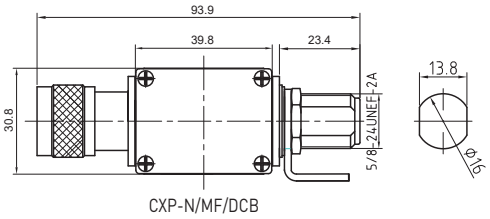
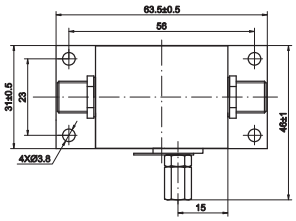


CXP-N/MF/DCB



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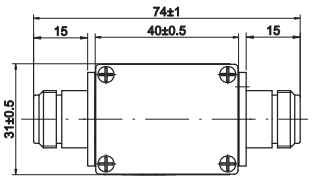

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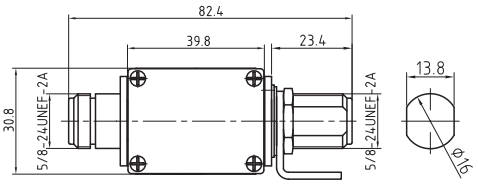

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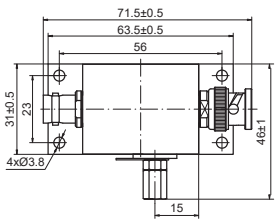

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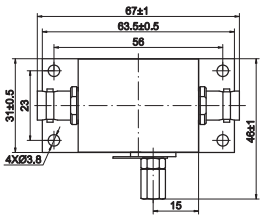

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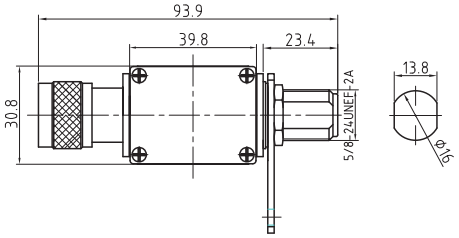

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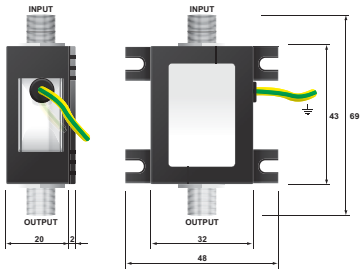
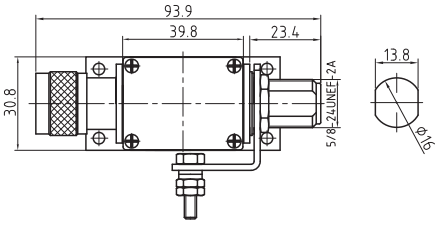
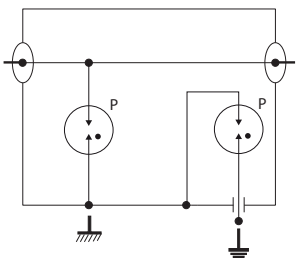


CNP

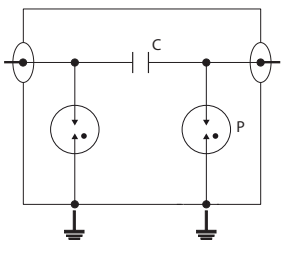


CXP-NW/MF/DCB Bulkhead

CNP
CXP



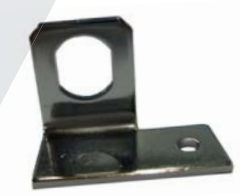
CXP-DCB



P : Gas discharge tube
C : Capacitance

BRACKET FOR COAXIAL SURGE PROTECTOR

BK-T
bracket for TNC connector

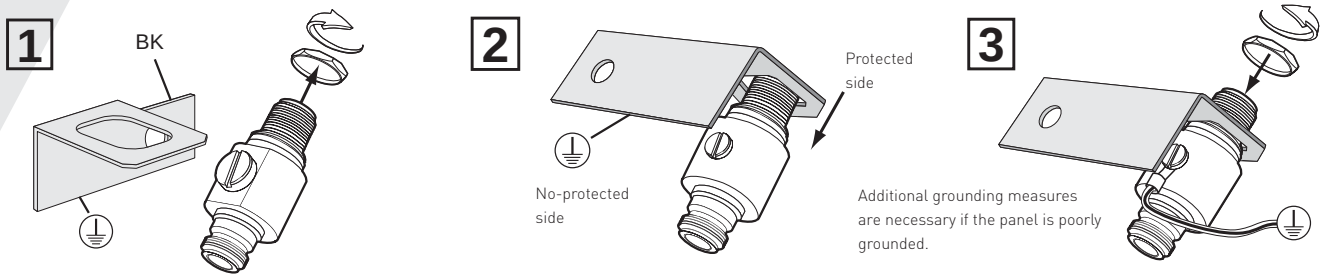


BK-N
bracket for N connector

BK-SMA
bracket for SMA connector

- **Screw fixing**
- **Grounding**
- **Requires a feedthrough connector**

Mounting bracket



Reference bracket

CITEL	Part number	Connection
BK-D	66001	7/16
BK-F*	66002	F
BK-N*	66003	N
BK-SMA	66006	SMA
BK-T/BK-B	66007	BNC and TNC
BK-U	66011	UHF
BK-43	-	4.3-10
BK-PRC-D	66012	7/16 PRC

** Mounting brackets are available with various dimensions (Screw hole distance). Contact us for further information.*

GAS DISCHARGE TUBE

- **GDT for maintenance of coaxial surge protectors P8AX**
- **Adapted for use in very high frequency**
- **Selection according to the RF signal power**

Reference	Part number*	for P8AX
BBHF 90/20	927000107	P8AX09-xxx
BBHF 150/20	927000207	P8AX15-xxx
BBHF 250/20	927005907	P8AX25-xxx
BBHF 500/20	927002207	P8AX50-xxx
BAHF 90/20	927100107	P8AX09-6G
BAHF 150/20	927100207	P8AX 25-6G

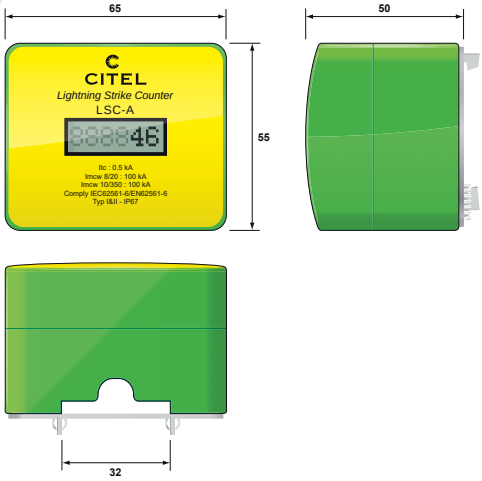
** P/N code is for 10 GDTs packaking*

CITEL

MISCELLANEOUS OBSTRUCTIONS LIGHTS

LSC-A

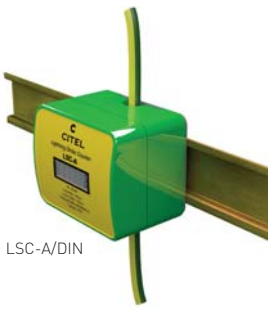
- Lightning current counter
- For LPS and SPD
- Outdoor or indoor application
- Mounting on conductor or DIN rail
- Compliance with EN 62561-6



Characteristics

CITEL model	LSC-A
Description	Lightning current counters outdoor or indoor
Minimum current sensibility	0.5 kA
Max. admissible impulse current	100 kA
Maximum numbers of events	999999
Type d'affichage	LCD
Dimensions	66 x 55 x 47 mm
Weight	0,14 kg
Enclosure	Thermoplastic UL94 V-0
Power supply	internal by battery
Life expectancy (before battery replacement)	> 10 years
Mounting	by flange on round (diam. 10-16mm) or flat (30 x2mm) conductor or DIN rail
Protection rating	IP67
Standards	
Compliance	EN 62561-6
Part Number	
LSC-A	790121
LSC-A/DIN	790122

Installation



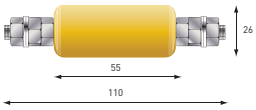
SGP70

BF P100C

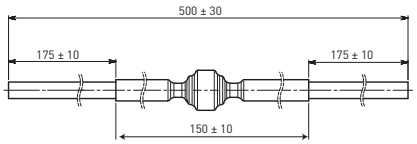
BF P AND SGP

- **Isolating Spark gaps**
- **Outdoor or indoor application**
- **Discharge currents up to 150 kA**
- **Compliance wiht EN 62561-3 / IEC 62561-3**

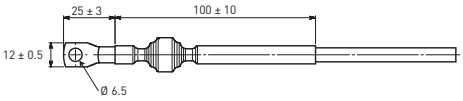
SGP

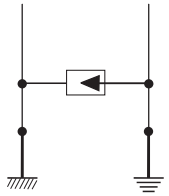


BF PS



BF PC



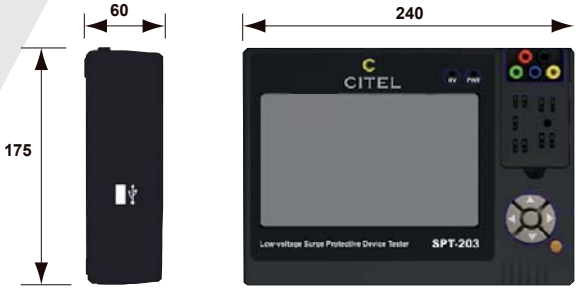


Characteristics

CITEL Model		BF P*	SGP70	SGP40
Description			Isolating spark gap	
Technology			Gas discharge tube	
Classification following EN 62561-3		N Class	1L Class	2L Class
Rated DC voltage withstand	Uw_{dc}	350 V	500 V	500 V
Rated AC voltage withstand	Uw_{ac}	250 Vac	350 Vac	350 Vac
Impulse Sparkover Voltage *(1 kV/µs)*	Ur_{imp}	< 1000 V	< 1500 V	< 1500 V
Max. discharge current *max. withstand Ø 8/20 µs impulse*	Imax	150 kA	70 kA	40 kA
Impulse current *max. withstand 10/350µs impulse*	Iimp	50 kA	25 kA	15 kA
Mechnical characteristics				
Dimensions		see diagrams		
* Connection to Network		wire (BF PS) wire terminal (BF PC)	threaded rod M10	threaded rod M10
Operating temperature		-40/+85°C		
Outdoor application		yes		
Protection rating		IP67	IP54	IP54
Standards				
Compliance		EN 62561-3 / IEC 62561-3		
Part number				
		BF PC 500/20 : 90231522 BF PS 500V : 90231622	690103	690102

SPT-203

- Surge Protectors Tester
- Testing the MOV, GDT and TVS components
- Automatically test and judge CITEL pluggable Surge Protectors
- Auto test mode and manual test mode
- Automatically save test data
- 7-inch TFT display with touch-screen
- Database management
- Portable and convenient



Characteristics

CITEL model	SPT-203
Charge voltage	AC 230 Vac single phase
Power	< 16 W
Voltage measurement error	+/- 2% (U < 200 V) +/- 1% (U > 200 V)
Leakage current measurement error	+/- 5%
MOV measurement	
1 mA voltage range	1 to 2000 V
Leakage current range	0 µA to 120 µA
GDT measurement	
DC spark voltage range	1 to 2000 V
TVS measurement	
Voltage range	0 to 500 V
Surge Protector measurement	
CITEL range : Automatic test of pluggable module	- AC Type 2/3 SPD: DAC50, DAC50VG, DS10, DS40, DS40VG, DS70R - AC compact Type 2/3 SPD : DAC15C, DAC40C, DS215, DS240, DS415,DS440 - AC Type 1/2 SPD: DAC1-13, DAC1-13VG, DS130R, DS130 VG - PV Type 2 SPD: DS50PV,DS50VGPV - Dataline SPD: DLA

OBSTRUCTION LIGHTS

- Low, Medium and High Intensity
- Led or Neon technology
- ICAO, FAA compliance
- Balisor and Spherical marker range

POWERLINE

TELECOM

CHIMNEY

AIRPORT

WINDTURBINE

CRANE

Company history

OBSTA, a subsidiary of CITEL group is part of an industrial group that engineers, manufactures and sells obstruction lights for transmission lines, telecom, broadcasting towers and all kind of obstacle to air navigation since more than 30 years. Our obstruction lights are manufactured by us compliant with ICAO annex 14 chapter 6 (International Civil Aviation Organization) recommendations and the FAA (Federal Aviation Administration).
OBSTA has manufacturing facilities in France and has sales offices located in France, Germany, USA, and China through Citel.

USA, Texas

FRANCE, Oil and Gas Chimney

PARIS, Eiffel Tower

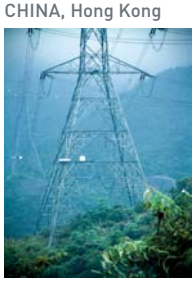
FRANCE, Millau

Paris Airport, FRANCE. Working since 1973!

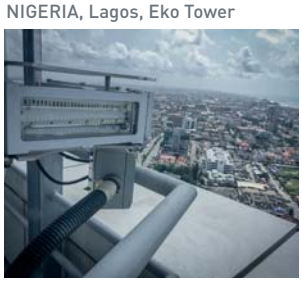
BELGIUM, Bruxelles airport

RUSSIA, Moscow

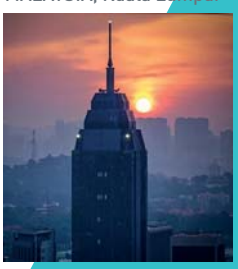
CHINA, Hong Kong



NIGERIA, Lagos, Eko Tower



MALAYSIA, Kuala Lumpur



CITEL

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CITEL

CITEL, Surge Protector for each appliction

CITEL

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