

URGESURGESURGE PROTECTIONPROT

8th EDITION

ELECTRICAL INSTALLATIONS



COMPUTER NETWORK



TELEPHONY



RADIOCOMMUNICATIONS



CITEL

2CP

General Catalog
8th edition

DIN RAIL AC POWER SURGE PROTECTORS



AC POWER SURGE PROTECTORS



TELEPHONE AND DATA LINE



HIGH FREQUENCY COAXIAL



GAS DISCHARGE TUBE



MISCELLANEOUS





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A long history.....

- 1937** CITEL founded.
Manufacture of tubular light bulbs.
- 1944** *Manufacture of the first Surge Arrester.*
- 1976** CITEL acquired by the present Management.
Light bulb manufacture discontinued.
- 1978** *CITEL gas tubes approved for ALCATEL electronic telecom exchanges.*
- 1985** *CITEL America founded in Miami.*
- 1988** *CITEL Electronics GmbH founded in Düsseldorf.*
- 1992** *Acquisition of the CLAUDE gas tube line from GTE Sylvania.*
- 1996** *Acquisition of SUPERSAFE in the Netherlands.*
- 1996** *Founding of Shanghai CITEL Electronics Co., Ltd.*
- 1998** *CITEL listed on the Paris Stock Exchange.*
- 1999** *New Headquarters in Issy les Moulineaux*
- 2000** *New technology for AC surge protectors (VG series).*
- 2005** *New JV for coaxial surge protectors production CITEL Tong Da).*
- 2007** *AC surge protectors become the best-selling range*
- 2008** *New Headquarters in Sèvres.*

The specialist in overvoltage protection

CITEL's only business is protecting networks and equipment from transient overvoltages, in particular those induced by lightning. For this, CITEL manufactures two complementary basic products:

- **Gas discharge tubes** (or GDTs) are the basic passive components used to protect telephone exchanges and equipment from voltage surges; they are generally installed on telephone networks by telecommunications operators.

- **Surge Protection 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.



Transient overvoltages

The users of electronic equipment and telephone and data-processing systems must face the problem of keeping this equipment in operation in spite of the transient overvoltages induced by lightning. There are several reasons:

- **Integration of electronic components makes the equipment more vulnerable.**
- **Interruptions of service are unacceptable.**
- **Data transmission networks cover large areas and are exposed to more disturbances.**

The origin of overvoltages

Transient overvoltages have four main causes :

- Lightning
- Industrial and switching surges
- Electrostatic discharges (ESD)
- Nuclear electromagnetic pulses (NEMP)

The overvoltages of different origins differ in amplitude, energy, waveform, and recurrence rate.

Lightning and industrial overvoltages have been with us for a long time, but ESD and NEMP disturbances are much more specific and arise from recent technological developments (massive use of semiconductors for the former, thermonuclear weapons for the latter).

Lightning

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.

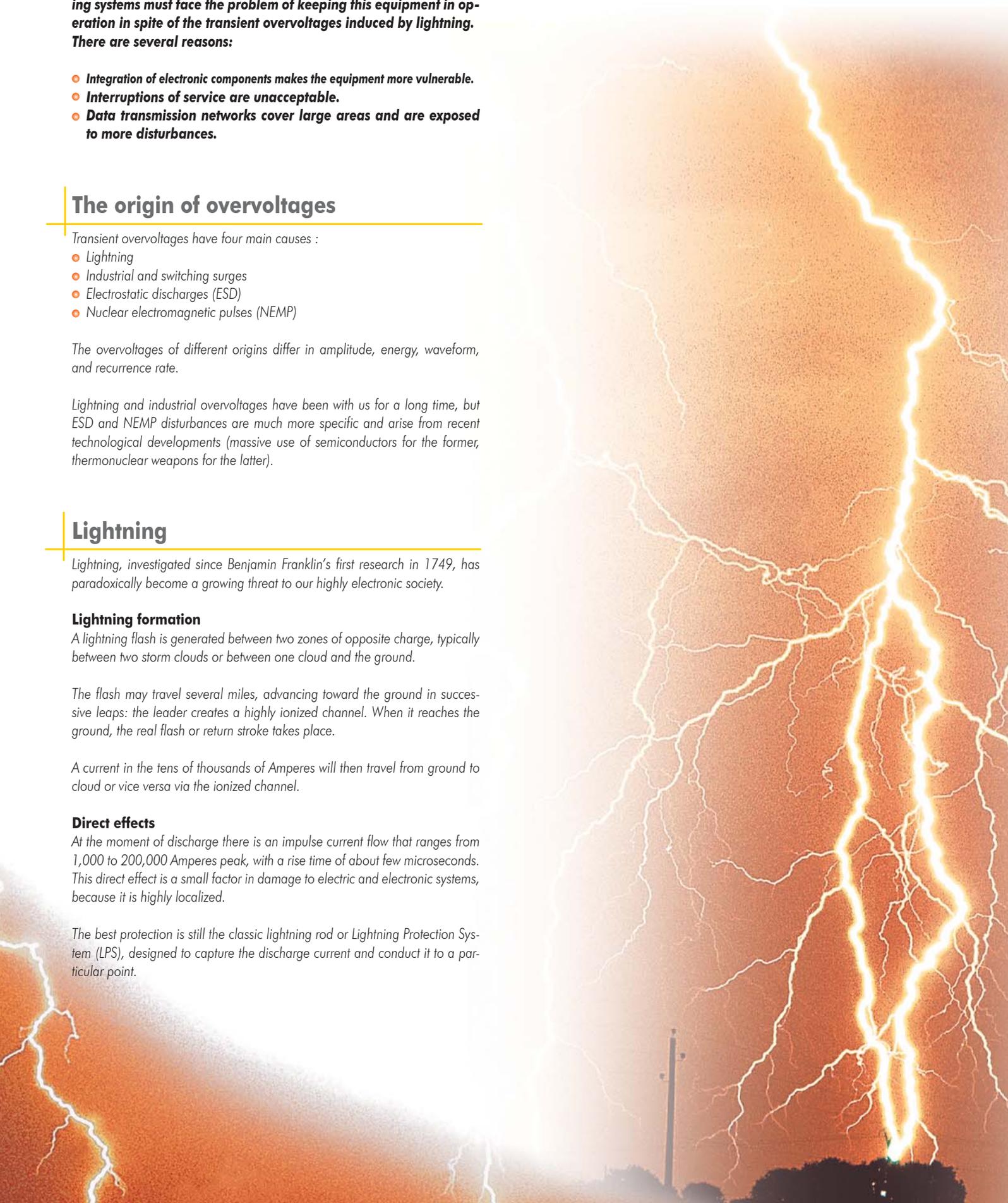
The flash may travel several miles, advancing toward the ground in successive leaps: the leader creates a highly ionized channel. When it reaches the ground, the real flash or return stroke takes place.

A current in the tens of thousands of Amperes will then travel from ground to cloud or vice versa via the ionized channel.

Direct effects

At the moment of discharge there is an impulse current flow that ranges from 1,000 to 200,000 Amperes peak, with a rise time of about few microseconds. This direct effect is a small factor in damage to electric and electronic systems, because it is highly localized.

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





Indirect effects

There are three types of indirect electrical effects :

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.

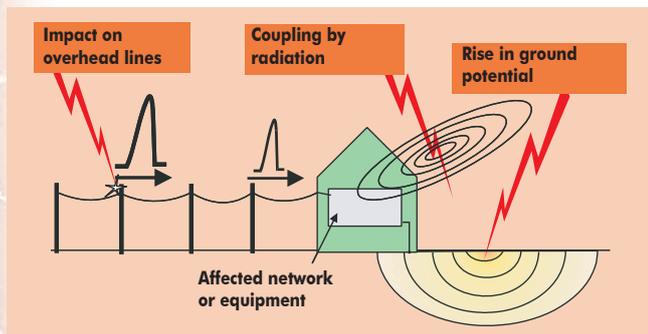
Rise in ground potential

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 tenths 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.



Industrial surges

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

Industrial surges 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.

Effects of overvoltages

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 traces of PCBs or contacts
- Destruction of triacs/thyristors by dV/dt.

Interference with operation

- Random operation of latches, thyristors, and triacs
- Erasure of memory
- Program errors or crashes
- Data and transmission errors

Premature ageing

Components exposed to overvoltages have a shorter life.

Surge Protection devices

The Surge Protection Devices (or SPD : this is a 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.

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 and 10/350µs current waveforms), then a number of standards defining surge arrester performance were issued, among them :

Surge Protectors for Low-Voltage installations :

- NF EN 61643-11 (France)
- EN 61643-11 (Europe)
- UL 1449 (USA)
- IEC 61643-1 (International)

Surge Protectors for Telecom equipment :

- IEC 61643-21 (International)
- ITU-T recommendations K11, K12, K17, K20, K21, K36 (International)
- UL 497 A/B (USA)

MODULAR AC POWER
SURGE PROTECTORS

MODULAR
AC POWER
SURGE PROTECTORS



Din Rail AC Power Surge Protectors

A2



DS Surge Protectors

CITEL DS AC power Surge Protective Devices (SPD) are designed to meet all surge protection needs for low voltage installations.

Designed for mounting on DIN rails, these protectors are easy to install in standardized panels and cabinets and are equipped with thermal disconnection devices and indicators allowing total operating safety.

DS surge protectors are available with several protection diagrams to comply with different installation needs and standard requirements.

CITEL AC power surge protectors offer three levels of surge protection corresponding to different IEC or EN classes.

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
- International : IEC 61643-1
- USA : UL1449-2ed
- France : NF EN 61643-11

«Installation» standards :

These documents give the main information about AC power surge protectors and its proper installation:

- International : IEC 61643-12 guide
- USA : IEEE C62-41
- France : UTE C15-443 guide

«Selection» standards :

They define the basic rules to select the surge protector in accordance with the general electrical code :

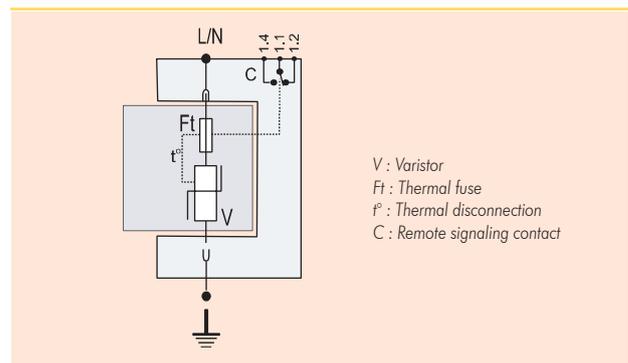
- Germany : DIN VDE 0100 part 443 and 534
- International : IEC 60364-4-433 and 5-534
- France : NF C 15-100 sect. 443 and 534

Operating principle

DS surge protectors 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 varistors must be absolutely monitored thus requiring the systematic use of built-in thermal disconnection devices (see «Disconnection devices»).

DS40 surge protector diagram





VG technology by CITEL

In order to improve the surge protection efficiency, CITEL has developed a patented technology which combines high energy varistor (MOV) network and specific gas tube (GDT) : by this way, the «VG» Type 1 surge protectors (DS150VG, DS250VG, DUT250VG) can get higher performances in :

- Protection level,
- Life duration (due to the suppression of leakage current),
- Continuous operation and power quality (no follow current)
- End of life 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 SPDs).

Surge protectors 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 - U_c

The maximum continuous operating voltage (MCOV) U_c is the maximum r.m.s voltage which may be applied continuously to the SPD.

Temporary overvoltage - U_T

The temporary overvoltage U_T (TOV) is the maximum r.m.s. value the surge protector can withstand during 5 seconds, without failure. In many cases , this parameter U_T is equal to U_c .

Discharge current - I_n and I_{max}

The maximum discharge current (I_{max}), applicable to Type 2 SPD, is the maximum impulse current $8/20 \mu s$ a surge protector can withstand without destruction .

The nominal discharge current (I_n) is the level of impulse current a surge protector Type 1 or Type 2 can withstand repeatedly (15 surges) without destruction.

Impulse current - I_{imp}

The impulse current (I_{imp}), used in Class I test applicable to Type 1 SPDs, is the maximum impulse $10/350 \mu s$ 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.

Open circuit voltage - U_{oc}

This parameter is used only for Class III test, applicable to Type 3 SPD and consists of the injection of a combination wave ($1.2/50 \mu s$ in open circuit - $8/20 \mu s$ in short circuit).

Protection level - U_p

This is the maximum voltage on the surge protector output when subjected to an impulse current equivalent to its nominal discharge current (I_n). Therefore this parameter characterizes the performance of the SPD in limiting the transient overvoltage across its terminal in order to protect the equipment.

Residual voltage - U_{res}

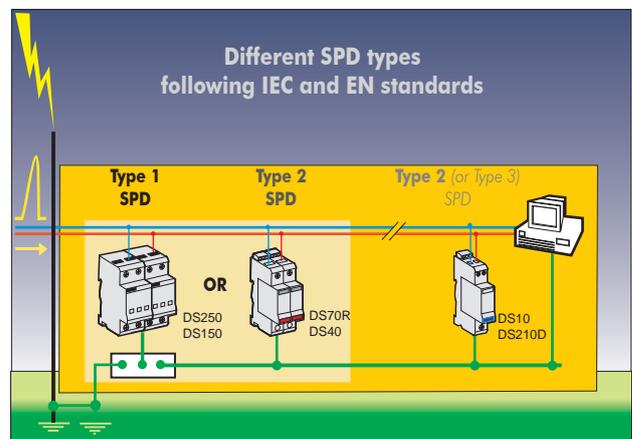
This parameter is the residual voltage across the SPD terminal during the injection of a selected impulse current. It may be lower than the protection level U_p , for surge protectors like «VG» series.

Type of surge protectors

The AC power surge protectors are split into 3 categories by IEC 61643-1 and EN 61643-11 standards, with the 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 where a direct lightning strike risk is high, especially when the building is equipped with external lightning protection system (LPS or lightning rod). In this situation, EN 61643-11 and IEC 61643-1 standards require the Class I test to be applied to surge protectors : this test is characterized by the injection of $10/350 \mu s$ impulse current in order to simulate the direct lightning strike consequence. Therefore these Type 1 surge protectors must be especially powerful to conduct this high energy impulse current.





Din Rail AC power Surge Protectors

Type 2 surge protectors

Type 2 surge protectors are designed to be installed at the beginning of the installation, in the main switchboard, or close to sensitive terminals, 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 μ s impulse current injection.

Type 3 surge protectors

In case of very sensitive or remote equipment, secondary stage of surge protectors is required : these low energy SPDs could be Type 2 or Type 3. Type 3 SPDs are tested with a combination waveform (1,2/50 μ s - 8/20 μ s) following Class III test.

Disconnection devices

In compliance with the standards, the AC power surge protectors are equipped with external and internal disconnection 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 warned about the trouble by an indicator (mechanical or light) in front of the protector 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 (or breaker) are in relation with the discharge capability of the SPD and the prospective short-circuit current of the installation. To ease the selection of these components, the rating and type of fuses (or breaker) is mentioned in the SPD instructions by the manufacturer.

Note : even if standards require safety devices, the risk of disconnection of the surge protectors is very low.

Maintenance

DS 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 .

Signaling

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

Remote Signaling

Most DS 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 auxiliary changeover contact that is activated if the surge protector module changes status.

This lets the user monitor :

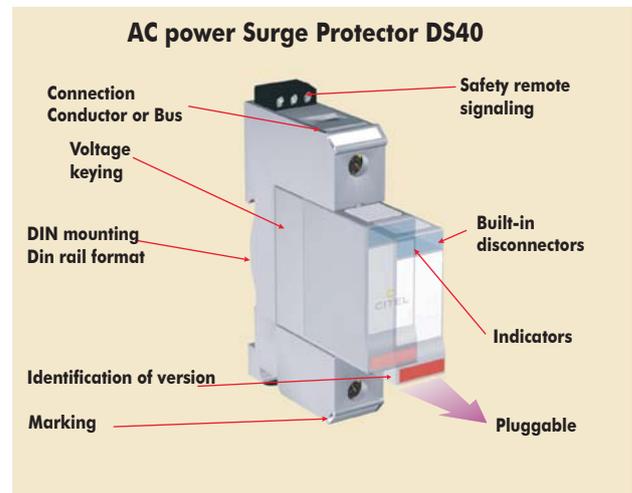
- the good operation of the SPD
- the presence of the plug-in modules (if any)
- the end of life (disconnection) of the surge protector.

The remote signaling version allows the choice of signaling system appropriate to the installation (light, buzzer, automation, modem transmission...).

Pluggable design

The design of some DS surge protectors (DS10, DS40, DS70R...) 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 = Type 1 ; Red = Type 2 ; Blue = Type 2 low power or Type 3) and are keying for operating voltage, in order to avoid misapplications.





Surge protection installation

Location

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 high lightning currents.
- Type 2 or «Primary» : at the origin of the installation, on the main electrical panel, so as to shunt lightning currents as directly as possible and thereby avoid coupling.
- Type 2 (or Type 3) or «Secondary» : on the secondary panel, near the sensitive equipment, to limit ringing and improve the level of protection.

Wiring

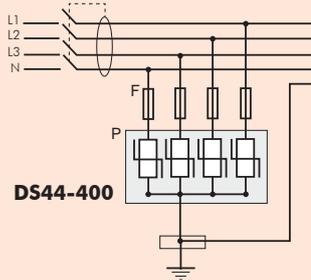
Since lightning surges are essentially common-mode phenomena, DS surge protectors are connected mainly in the common mode (between the active conductors and ground).

Some recommendations call for additional differential-mode protection (between phase and neutral). For this case, CITELE proposes special surge protectors (types DUT40, DS210D...) or, when the standards allow, combinations of surge protectors between phases and neutral (differential mode) with a special surge protector (DS100EG, DS40G) between neutral and ground (common mode) : this type of mounting, named «CT2 connection» in IEC 60364 standard, is used in surge protectors such as DS44-230/G.

Protection modes

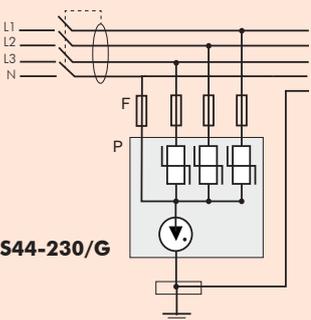
Common mode protection

CT1 Connection



Common and differential mode protection

CT2 Connection



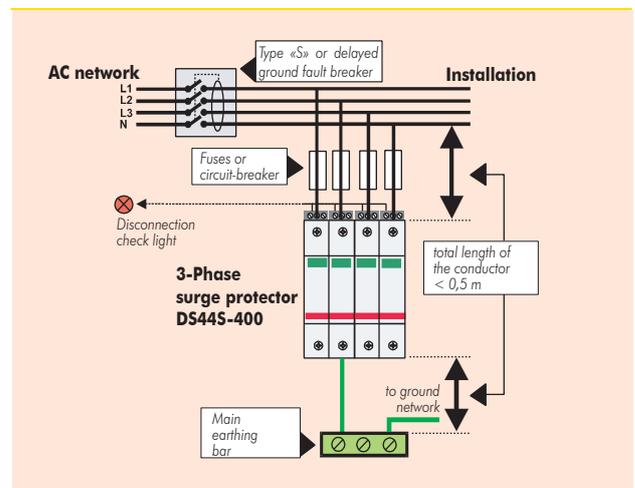
Installation

DS surge protectors are connected in parallel on the AC network and must be equipped with external fuses (or breakers) for short-circuit protection (see paragraph «Disconnection devices»).

- The total length of connection wires to AC network must be lower than 0.5 m in order not to increase the protection level (U_p) provided by the SPD.
- Wiring is made by screw connections. On some models, a distribution bus can be used.
- The protection wire coming from the SPD must be connected to the bonding bar of the electrical panel. Paralleling the protection wire with phases conductors must be avoided.
- The cross sectional wire must be 4 mm² minimum for Type 2 SPD's and 10 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 DS44S)





Din Rail Low Voltage Surge Protectors

Choosing Surge Protectors

CITEL's line of AC power surge protectors is designed to cover all possible configurations in low voltage installations.

They are available in many versions, which differ in :

- Type or test class (1, 2 or 3)
- Operating voltage (U_c)
- AC network configuration (Single/3-Phase)
- Discharge currents (I_{imp} , I_{max} , I_n)
- Protection level (U_p)
- Protection technology (varistors, gas tube-varistor, filter)
- Features (differential mode, plug-in, remote signaling...).

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

Choosing the Type of surge protectors

This choice is in relation to the LPS condition (Lightning Protection System) and the SPD location in the installation.

| Configuration | SPD | Location | CITEL |
|---|---------------------------|---|--------------------------------------|
| Installation equipped with LPS or could be hit by lightning | Type 1 | Origin of the installation origin (Panel or main switchboard) | DS150 DS250 DUT250VG DUM125 |
| Installation without LPS | Type 2 | main switchboard | DS70R, DS40 DS240, DUT40 |
| Secondary protection (downstream primary SPD) | Type 2 (or Type 3) | close to protected equipment | DS10 DS215 DUT10 |

Choosing of the operating voltage U_c

The SPD U_c voltage (maximum continuous operating voltage) depends on:

- Nominal voltage of the AC network (U_0)
- Level of possible temporary overvoltages (TOV) U_T
- Type of AC system (TN, TT, IT).

Operating voltage U_c (Line/Ground)

| AC Network | 230/400V | | | 120/208V |
|---------------------------------|--------------|----------------------|--------------|--------------|
| AC system | TT | TN | IT | TN |
| Voltage U_c | 255 V | 255 V | 400 V | 150 V |
| Voltage U_T | 400 V | 335 V | - | - |
| Example of CITEL product | DS42-400 | DS42-320 or DS42-400 | DS42-400 | DS42-120 |

AC network configuration

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

Choosing I_{imp}

The impulse current I_{imp} is defined for Type 1 SPD. The minimum rating for I_{imp} is 12.5 kA by pole, following IEC 60364-5-534. This level is adapted to the real phenomenon.

CITEL proposes, in its Type 1 SPD range, 2 levels of I_{imp} current : 15 and 25 kA.

| Configuration | I_{imp} | CITEL |
|---|--------------|-------------------------------|
| Very high lightning density Bad earthing | 25 kA | DS250E DS250VG DUT250VG |
| High, medium or low lightning density | 15 kA | DS150E DS150VG |

Choosing I_n and I_{max} currents

The relevant nominal discharge current I_n for the SPD is in relation with the lightning risk in the installation area.

The minimum rating of I_n for a SPD connected at the installation entrance is 5 kA (8/20 μ s waveform), required by standard.

Nevertheless higher ratings are advised in case of high lightning density. Moreover higher values of I_n current will increase the SPD lifetime.

I_{max} (max. discharge current) rating is linked to I_n .

| Conditions | I_n | CITEL |
|--|-------------------|---------------|
| Very high lightning density | > 20 kA | DS70R |
| High or medium lightning density | 10-20 kA | DS40 DS240 |
| Low lightning density or secondary SPD | 5 kA | DS10 DS215 |

Choosing the protection level U_p

The user must select a surge protector with a protection level U_p adapted to the withstand level of terminal equipment. In every case, the lower the protection level U_p , 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 terminals have lower impulse withstand and require a better protection : so, surge protectors with 1.5 kV protection are necessary to provide efficient protection.

| Conditions | Recommended U_p | |
|---------------------------------------|----------------------|----------------------|
| | 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 |

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



Choosing the SPD technology

DS surge protectors are based on Varistor (MOV) technology. Some versions use different electrical diagrams :

- «VG» technology : this Gas tube-Varistor hybrid association, used in Type 1 SPD (DS150VG, DS250VG, DUT250VG), improves the protection level U_p and the residual voltage U_{res} .
- Association with RFI filter : The Surge protection panel CBB and secondary SPD DS-HF combine surge protection stage and filter stage in order to improve the protection level.

Coordination of Surge Protectors

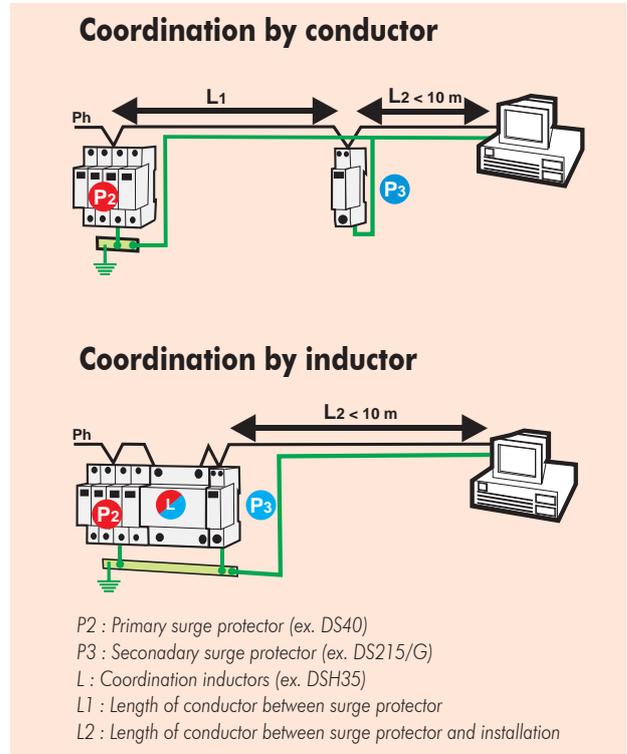
In order to provide maximum protection efficiency, it is necessary to create a «coordination» diagram, that means installation of a «primary» SPD at the network entrance and a «secondary» close to sensitive equipment.

This association is required in the 2 following cases :

- High sensitivity equipment :
 - ➔ Improvement of protection level.
- Long distance (greater than 30 m) of wire between equipment to be protected and primary SPD :
 - ➔ Reduction of ringing voltages created during the surge transmission.

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).





International Standards for AC Surge Protection

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

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Standards in 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 to reduce the risk of failures in the installation, and in electrical equipment connected to it, to an acceptable level.

- Section 5-534 : «Devices for protection against overvoltages» :

This section gives the basic requirements for the selection and implementation of the SPDs for electrical installation of buildings to obtain a limitation of transient overvoltages.

Product standard : IEC 61643-1 :

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

Selection and application guide : IEC 61643-12 :

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

The section 4-443 of IEC 60364 recommends SPDs on electrical installations if they are supplied by overhead lines (partially or totally) and if the local keraunic level is equal or greater than 25. Some national standards based on IEC make the SPD installation mandatory in these conditions.

Recommendations for SPD installation

Section 5-534 gives the minimum performance required for SPD installed at the entrance of installation, as nominal discharge current $I_n \geq 5$ kA for Type 2 SPD and Lightning current $I_{imp} \geq 12.5$ kA for Type 1 SPD.

1 - The installation equipped with lightning rod (LPS):

➔ **Recommendation : Type 1 SPD**, with Lightning impulse current I_{imp} of 12,5 kA minimum, connected at the origin of the installation.

2 - The installation is connected to an overhead AC network and the local keraunic level $N_k \geq 25$ (or the lightning density $N_g \geq 2.5$) :

➔ **Recommendation : Type 2 SPD**, with nominal discharge current $I_n \geq 5$ kA, connected at the origin of the installation.

3 - The installation is connected to an overhead AC network and the local keraunic level $N_k \leq 25$ (or the lightning density $N_g \leq 2.5$) :

➔ Surge Protector not required.

4 - The installation is connected to an underground AC network

➔ Surge Protector not required.

Nevertheless, in the two last cases, a more accurate analysis could be done, taking into account the type of equipment (sensitivity, cost..) or the consequences of a service interruption (downtime costs, human hazards...) : IEC 61662 international standard proposes a method for assessing the risk related to surges due to lightning.

5 - The unavailability of the electrical network could have consequences on human safety.

➔ Surge Protector mandatory or risk analysis required.

Application of the AC surge protectors following IEC 60364

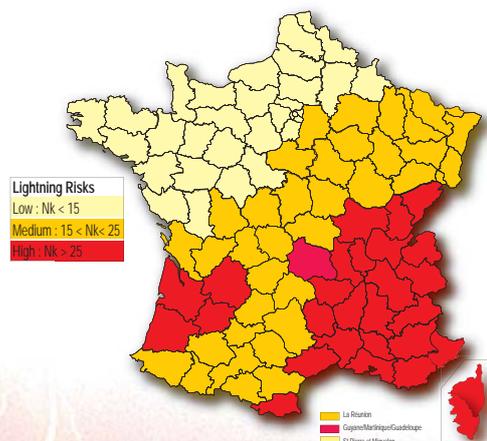
| Type of installation | $N_k < 25$ | $N_k > 25$ |
|--|---------------------------|---------------------------|
| Installation equipped with direct lightning protection system (LPS) | Mandatory (Type 1) | Mandatory (Type 1) |
| Connection to overhead AC line | No mandatory* | Mandatory (Type 2) |
| Connection to underground AC line | Non mandatory* | Non mandatory* |
| The unavailability of the electrical network could have consequences on human safety | Risk analysis required | Mandatory |

(*) Surge protectors are recommended in case of sensitive equipment or when a reinforced reliability is required.

Conclusion

Depending on the countries, AC surge protectors could be recommended or mandatory in relation with the external conditions (type of network and lightning threat). Risk assessment methods are also available to determine more accurately the need of surge protection. In any case, all the present electrical installations are crowded with sensitive devices, making the use of surge protectors more and more relevant.

Example of keraunic levels (France)





DS Series

DS surge protectors are available in single phase and 3-Phase versions. They can be chosen in several configurations : monobloc, multipole, pre-wired in panels....

| | Versions | Description | I_{max}^* (8/20 μ s) | I_{imp}^* (10/350 μ s) | Main Features | Comments |
|--|---|--|-------------------------------|---|---|--|
| Type 1 | DS250E  | 1-pole reinforced surge protector | 140 kA | 25 kA | Very high energy | Type 1 Surge protectors Designed to be installed where a direct lightning strike risk is high, especially when the building is equipped with external lightning protection system (LPS). In this situation, EN 61643-11 and IEC 61643-1 standards require the Class I test be applied to surge protectors : this test is characterized by the injection of 10/350 μ s impulse current in order to simulate the direct lightning strike consequence. Therefore these Type 1 surge protectors must be especially powerful to conduct this high energy impulse current. |
| | DS250VG  | 1-pole reinforced surge protector | 70 kA | 25 kA | Very high energy Low Up | |
| | DS150E  | 1-pole surge protector | 140 kA | 15 kA | Very high energy | |
| | DS150VG  | 1-pole reinforced surge protector | 40 kA | 15 kA | Very high energy Low Up | |
| | DS100EG  | N/PE surge protector | 100 kA | 50-100kA | Very high energy Low Up | |
| | DUT250VG  | 3-Phase surge protector | 100 kA | 25 kA | Compact Very high energy | |
| | DUM125  | 1 and 3-Phase surge protector | 100 kA | 12.5 kA | Compact, High energy, cost effective | |
| Type 2 | DS70R  | 1-pole and multipolar surge protectors | 70 kA | | Pluggable | Type 2 Surge protectors Designed to be installed at the beginning of the installation, in the main switchboard, or close to sensitive terminals, on installations without LPS. These protectors are tested following the Class II test from IEC61643-11 or EN61643-11 standards and based on 8/20 μ s impulse current injection. |
| | DS40  | 1-pole and multipolar surge protectors | 40 kA | | Pluggable | |
| | DS40/G  | Single and 3-Phase surge protector | 40 kA | | Pluggable Commun/diff. mode | |
| | DS240/G  | Single phase surge protector | 40 kA | | Pluggable, Compact, Common /diff. mode | |
| | DUT40  | 3-Phase surge protector | 40 kA | | Monobloc Common/diff. mode. | |
| Type 2 (or 3) | DS10  | 1-pole and multipolar surge protector | 10 kA | | Pluggable | Type 2 or Type 3 Surge protectors In case of very sensitive or remote equipment, secondary stage of surge protectors are required : these low energy SPDs could be Type 2 or Type 3. Type 3 SPDs are tested with combination waveform (1,2/50 μ s - 8/20 μ s) following Class III test. |
| | DS10/G  | Single and 3-Phase surge protectors | 10 kA | | Pluggable Common/Diff Mode. | |
| | DUT10  | 3-Phase surge protector | 10 kA | | Monobloc Common/Diff Mode. | |
| | DS215/G  | Single phase surge protector | 15 kA | | Pluggable Common/Diff Mode. | |
| | DS-HF  | Single phase surge protector + filter | 10 kA | | RFI filter Low Up | |
| | DS210DC  | 1-pole surge protector | 6 kA | | Pluggable | |
| CB..  | Single and 3-Phase surge protector panel | 40-140 kA | 15 kA | Several diagrams | Surge protection panels - Type 1 or Type 2 3 protection diagrams | |
| DS..PV  | Surge protectors for photovoltaic | 40 kA | 12,5 kA | from 500 to 1000 Vdc | Type 1 and 2 SPDs for photovoltaic installation | |
| DSH  | Coordination inductors | | | Nominal currents : 16 A, 35 A, 63 and 100 A | Components to connect in series between 2 SPDs in order to insure coordination. | |

* Discharge currents by pole.

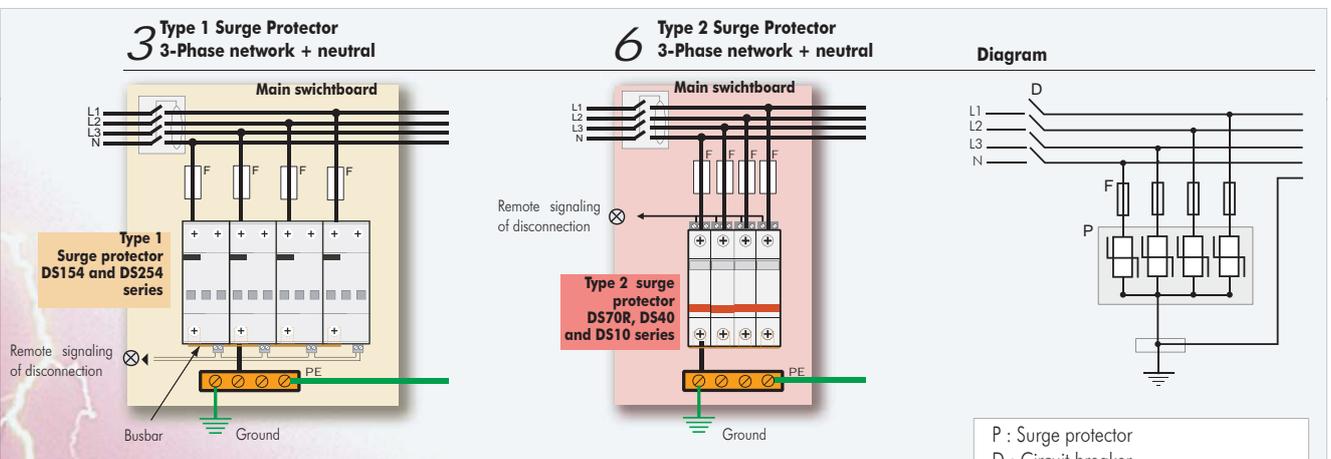
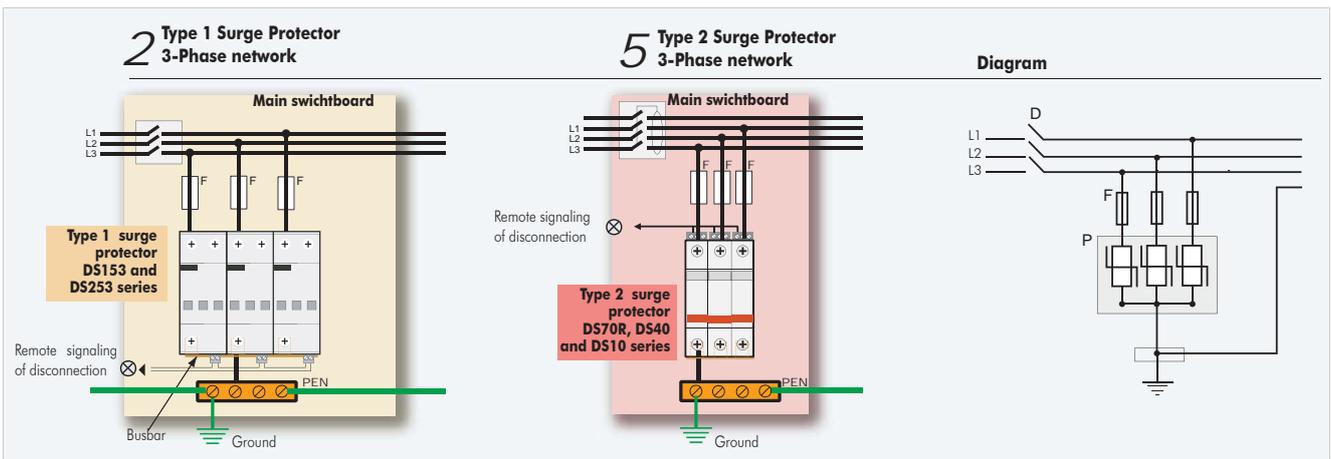
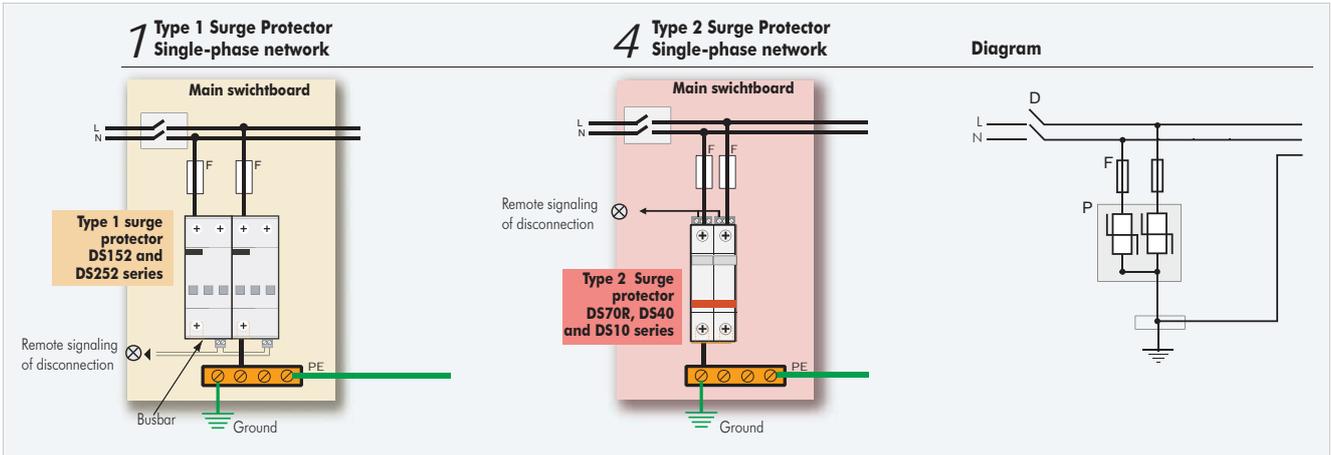


DS surge protectors wiring

Common mode protection (CT1 connection)

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

A10



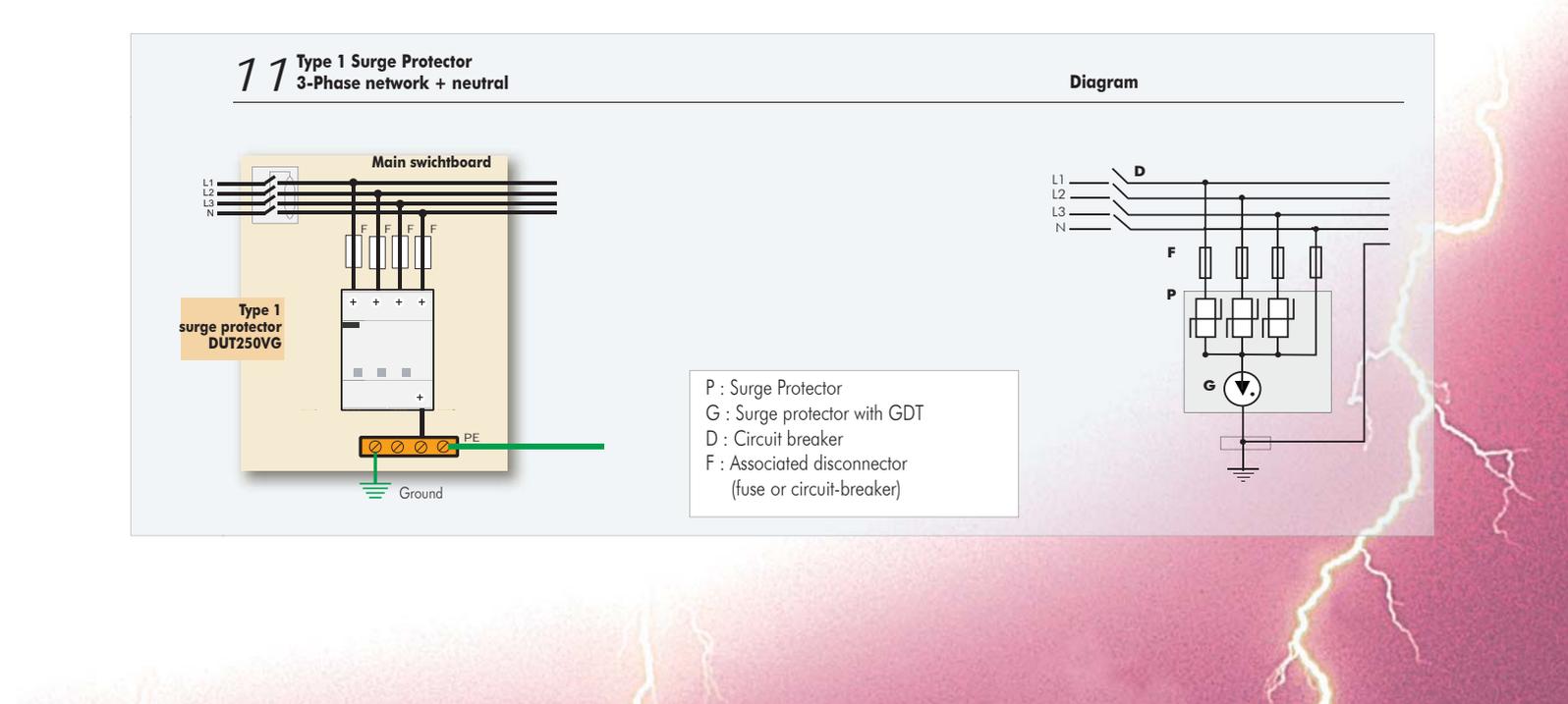
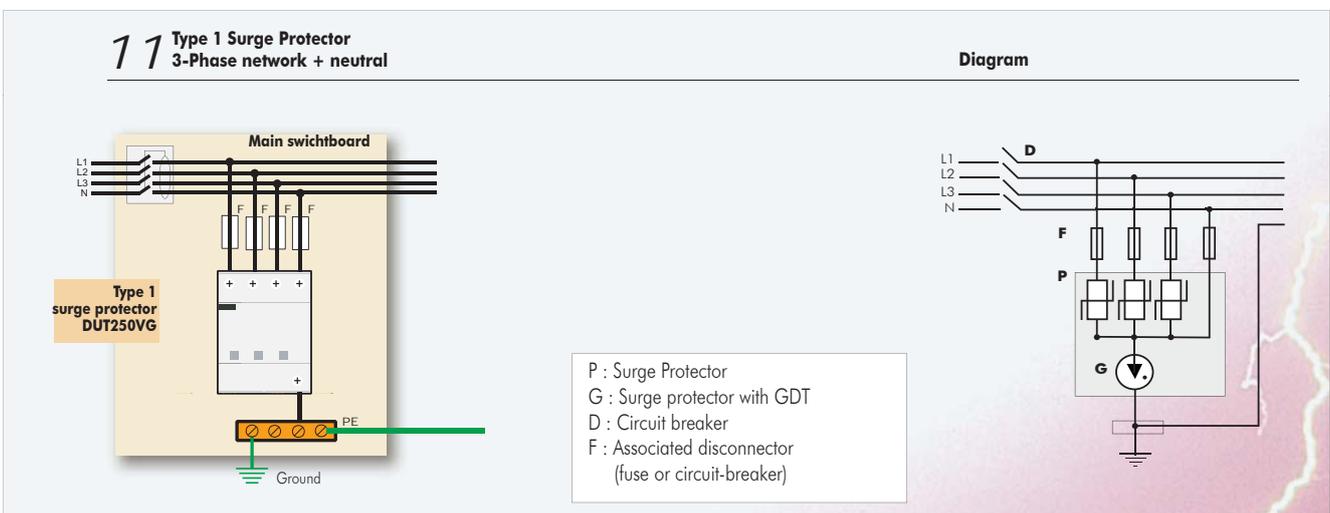
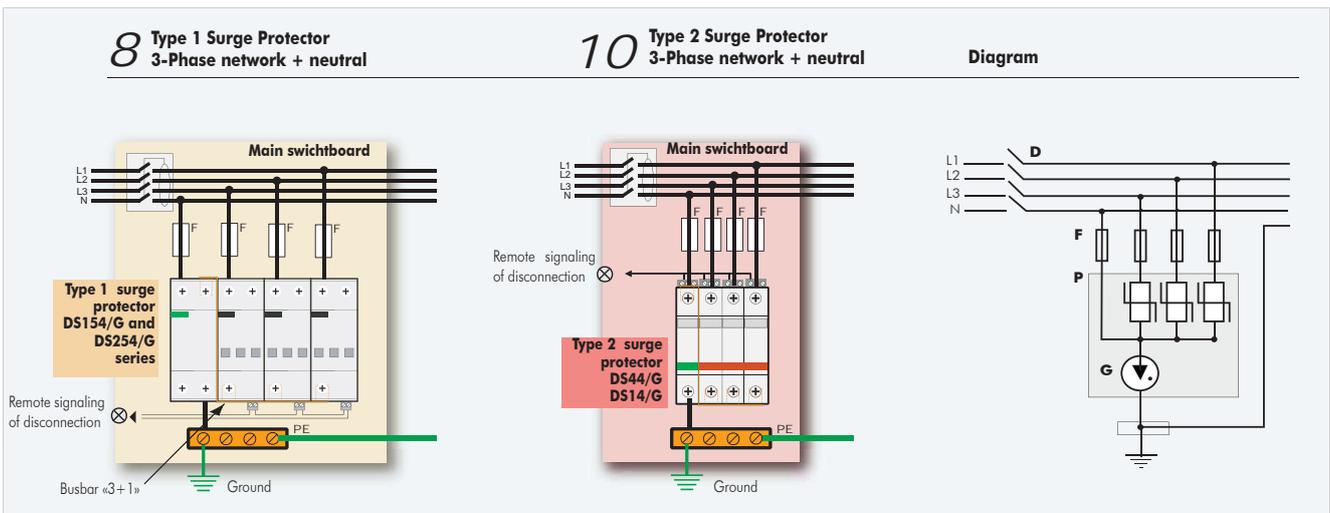
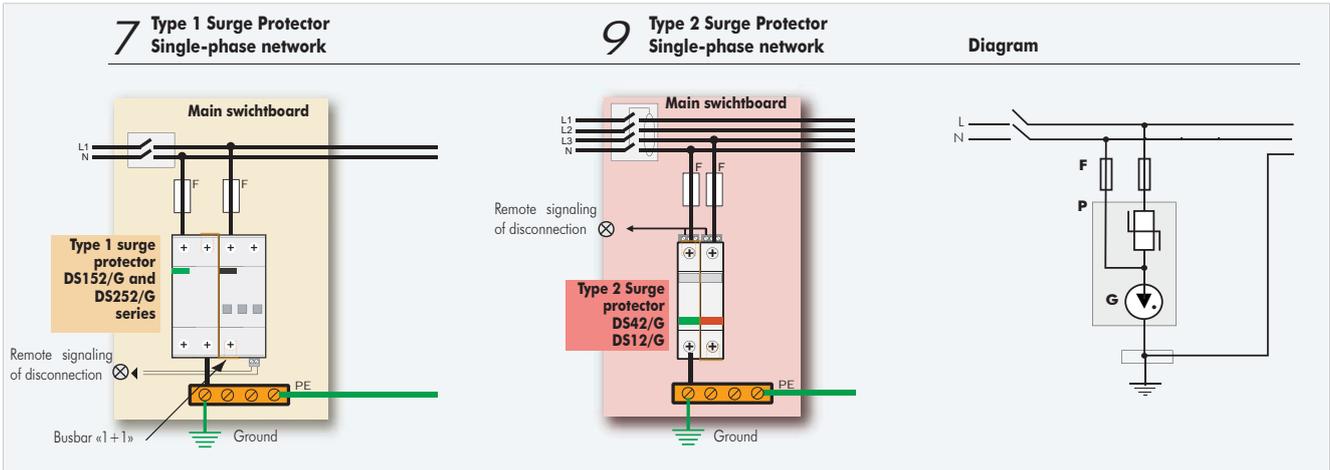
P : Surge protector
 D : Circuit breaker
 F : Associated disconnector (fuse or circuit-breaker)



DS surge protectors wiring

Common and Differential mode protection (CT2 connection)

Common mode (L/PE) and differential mode (L/N) protection provided by 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.





DS surge protectors wiring

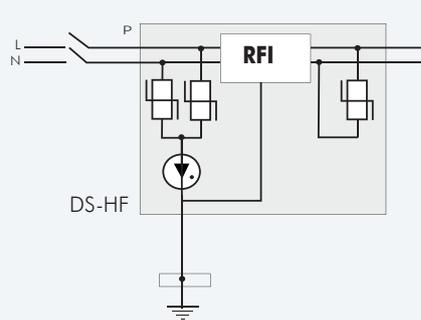
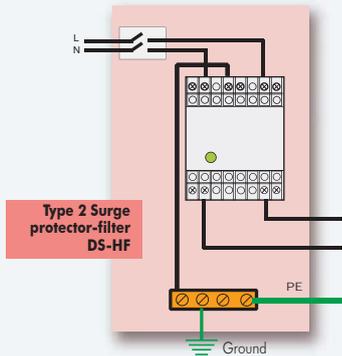
Multipole Type 2 surge protectors wiring

Wiring instructions for Multipole Type 2 surge protectors.

A12

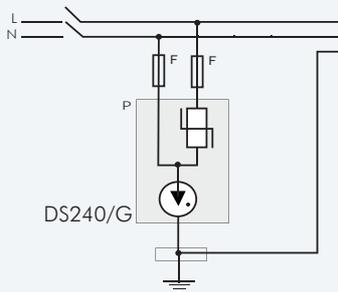
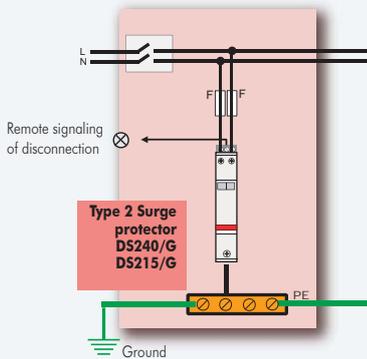
12 Type 2 surge protector + Filter Single phase network

Diagram



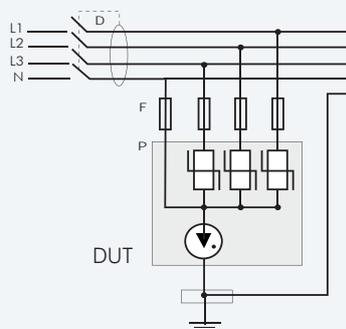
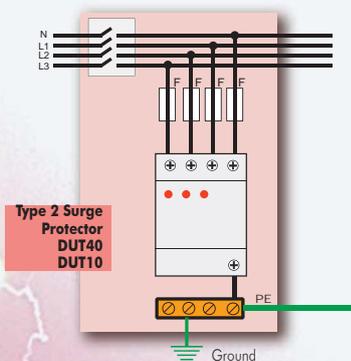
13 Type 2 Surge protector Single-phase network

Diagram



14 Type 2 Surge protector 3-Phase network + neutral

Diagram



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



DS surge protectors wiring

Coordination of Surge Protector

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 :

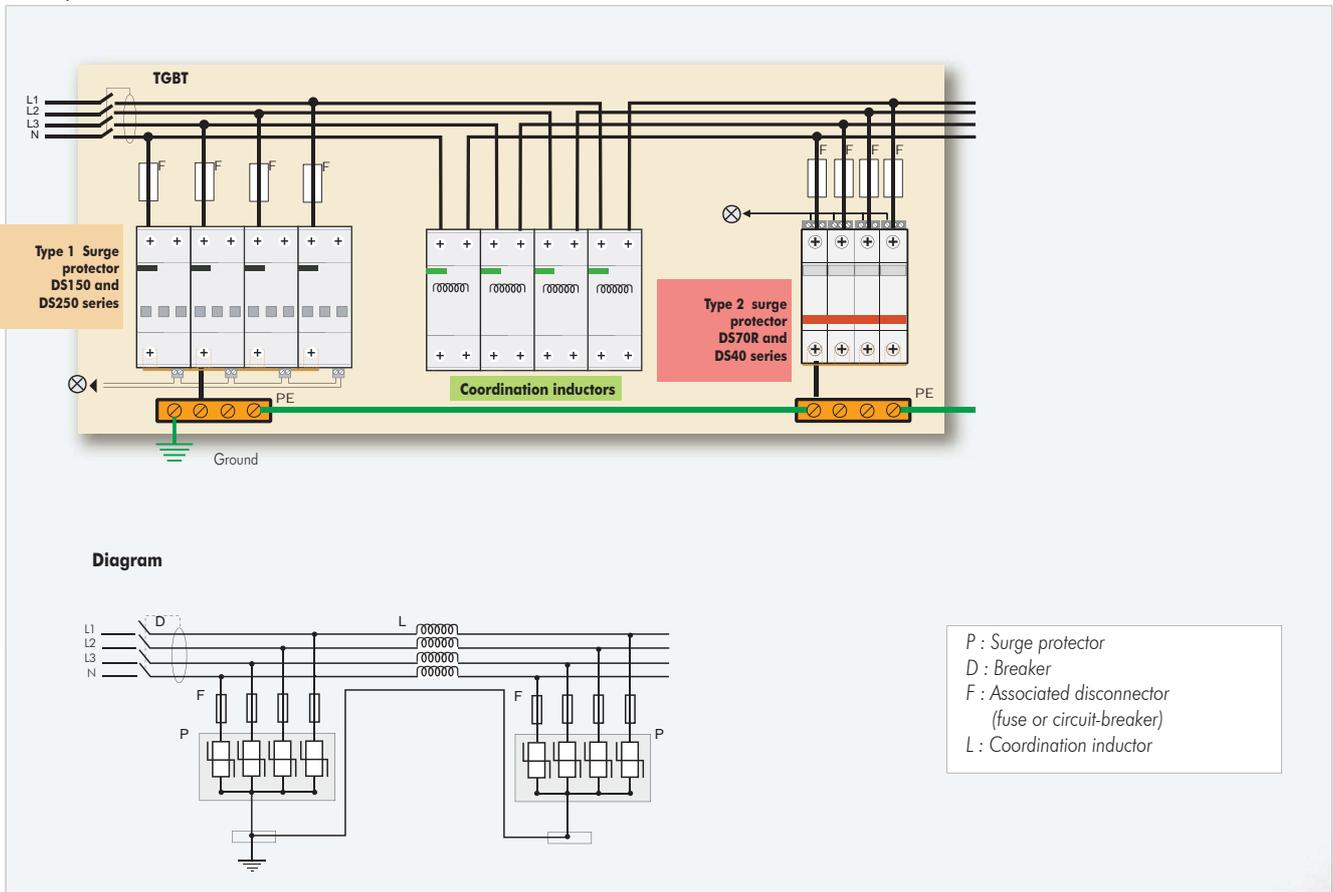
- a minimum length of wire (> 10 m).

or

- coordination inductors (DSH range: see below).

Futher information is available in installation instruction sheet.

Example of coordination on 3-Phase network.





DS surge protectors wiring

Associated fuses

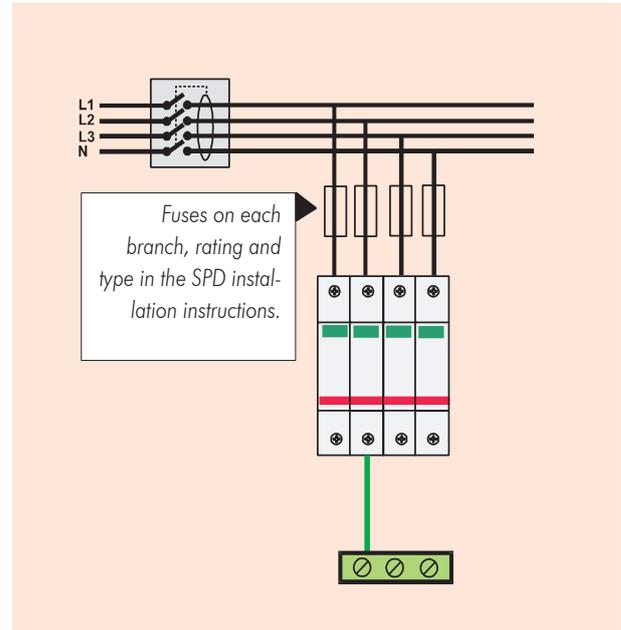
To comply with standards and safety, the AC surge protectors must be protected against a possible end of life in short-circuit : the user must install on each SPD branch, a protection against short circuit current (fuses or breaker).

The rating of this fuse is given by the SPD manufacturer in the product datasheet and installation instructions. The choice of this rating depends of 2 criteria:

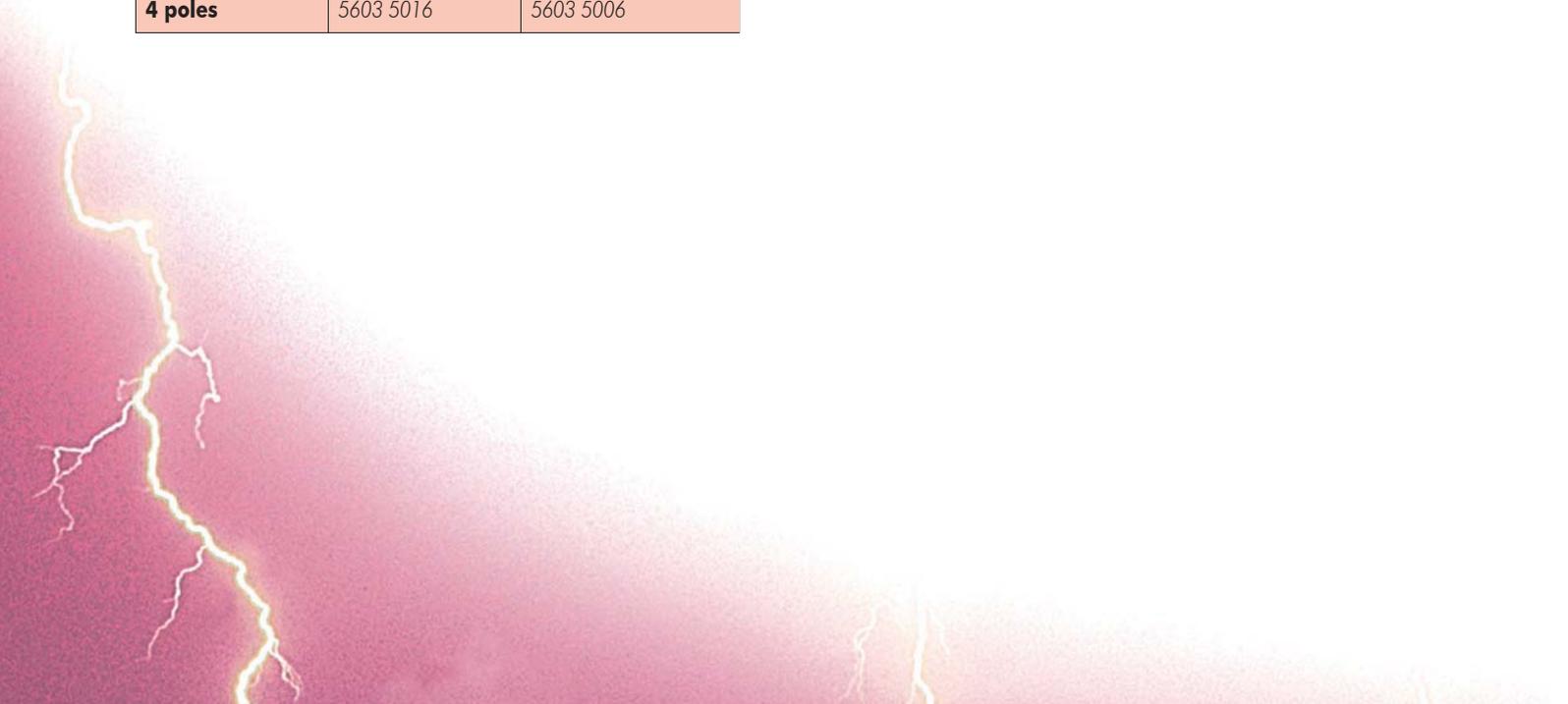
- Withstand of the short-circuit current test in the IEC 61643-1 standard : the fuse must cut safely the short-circuit current before an harsh destruction of the SPD.
- Withstand of the discharge currents (I_n or I_{max}) : the fuse must be able to conduct the discharge current of the SPD without blowing.

CITEL has selected some fuses and DIN rail holders to fit with his SPD range. The fuses are equipped with failure indicators to check easily their opening and the holders can be supplied with or without contact for remote signal of fuse status.

A14



| Fuses for SPD | | |
|-----------------|-------------------------------|---------------------------------|
| Rating | Dimensions | Fuse P/N |
| 125 A gG | 22x58 mm | 6062 0125 |
| 100 A gG | 22x58 mm | 6062 0100 |
| 50 A gG | 22x58 mm | 6062 0050 |
| 20 A gG | 22x58 mm | 6062 0020 |
| Fuse holders | | |
| Number of poles | with remote signaling contact | withou remote signaling contact |
| 1 pole | 5603 5011 | 5603 5001 |
| 2 poles | 5603 5012 | 5603 5002 |
| 3 poles | 5603 5013 | 5603 5003 |
| 4 poles | 5603 5016 | 5603 5006 |

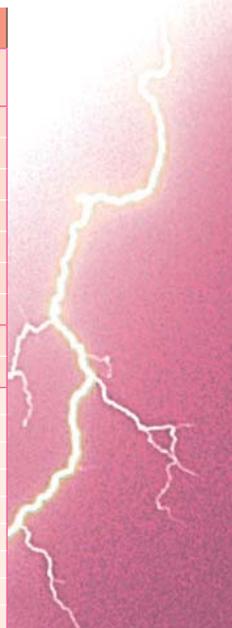


| Type 1 Surge Protector | | | | | | | | | | |
|------------------------|---------------|---------------|--------------|----------------|----------|------------------------------|------------------------------|-----------------|-----------------------|-------------------------|
| Network voltage | DS250VG | DS150VG | DS250E | DS150E | DUT250VG | DUM125 | Protection Mode | Type of Network | Neutral configuration | Diagram (pages A10-A12) |
| 230/400 V | DS250VG-300 | DS150VG-300 | DS250E-300 | DS150E-300 | - | - | Common Mode | Uniphase 230 V | - | - |
| | - | DS150VG-400 | DS250E-400 | DS150E-400 | - | - | Common Mode | Uniphase 400 V | - | - |
| | - | DS152VG-400 | DS252E-400 | DS152E-400 | - | DUM125-400 | Common Mode | Single phase | TT - TN - (IT) | 1 |
| | DS252VG-300 | DS152VG-300 | DS252E-300 | DS152E-300 | - | DUM125-400 | Common Mode | Single phase | TNS | 1 |
| | DS252VG-300/G | DS152VG-300/G | DS252E-300/G | DS152E-300/G | - | - | Common and Differential Mode | Single phase | TT - TNS | 7 |
| | DS253VG-300 | DS153VG-300 | DS253E-300 | DS153E-300 | - | - | Common Mode | 3-phase | TNC | 2 |
| | - | DS153VG-400 | DS253E-400 | DS153E-400 | - | - | Common Mode | 3-phase | TNC - IT | 2 |
| | - | DS154VG-400 | DS254E-400 | DS154E-400 | - | DUT125-400 | Common Mode | 3-phase + N | TT - TN - (IT) | 3 |
| | DS254VG-300 | DS154VG-300 | DS254E-300 | DS154E-300 | - | DUT125-400 | Common Mode | 3-phase + N | TNS | 3 |
| DS254VG-300/G | DS154VG-300/G | DS254E-300/G | DS154E-300/G | DUT250VG-300/G | - | Common and Differential Mode | 3-phase + N | TT - TNS | 8 | |
| 120/208 V | DS250VG-120 | DS150VG-120 | DS250E-120 | DS150E-120 | - | - | Common Mode | Uniphase 120 V | - | - |
| | DS252VG-120 | DS152VG-120 | DS252E-120 | DS152E-120 | - | - | Common Mode | Single phase | TNS | 1 |
| | DS252VG-120/G | DS152VG-120/G | DS252E-120/G | DS152E-120/G | - | - | Common and Differential Mode | Single phase | TT - TNS | 7 |
| | DS253VG-120 | DS153VG-120 | DS253E-120 | DS153E-120 | - | - | Common Mode | 3-phase | TNC | 2 |
| | DS254VG-120 | DS154VG-120 | DS254E-120 | DS154E-120 | - | - | Common Mode | 3-phase + N | TNS | 3 |
| | DS254VG-120/G | DS154VG-120/G | DS254E-120/G | DS154E-120/G | - | - | Common and Differential Mode | 3-phase + N | TNS | 8 |



| Type 2 Surge Protector | | | | | | | |
|------------------------|--------------|-------------|--|--|-----------------|-----------------------|--------------------------|
| Network voltage | DS70R | DS40 | DS10 | Protection Mode | Type of Network | Neutral configuration | Diagram (pages A10-A12)) |
| 230/400 V | DS71R-230 | DS41-230 | DS11-230 | Common Mode | Uniphase 230 V | - | - |
| | DS71R-400 | DS41-400 | DS11-400 | Common Mode | Uniphase 400 V | - | - |
| | DS72R-400 | DS42-400 | DS12-400 | Common Mode | Single phase | TT - TN - IT | 4 |
| | DS72R-230 | DS42-230 | DS12-230 | Common Mode | Single phase | TNS | 4 |
| | - | DS42-230/G | DS12-230/G | Common and Differential Mode | Single phase | TT - TN | 9 |
| | DS73R-230 | DS43-230 | DS13-230 | Common Mode | 3-phase | TNC | 5 |
| | DS73R-400 | DS43-400 | DS13-400 | Common Mode | 3-phase | TNC - IT | 5 |
| | DS74R-400 | DS44-400 | DS14-400 | Common Mode | 3-phase + N | TT - TN - IT | 6 |
| | DS74R-230 | DS44-230 | DS14-230 | Common Mode | 3-phase + N | TNS | 6 |
| | - | DS44-230/G | DS14-230/G | Common and Differential Mode | 3-phase + N | TT - TNS | 10 |
| 120/208 V | DS71R-120 | DS41-120 | DS11-120 | Common Mode | Uniphase 120 V | - | - |
| | DS72R-120 | DS42-120 | DS12-120 | Common Mode | Single phase | TNS | 4 |
| | - | DS42-120/G | DS12-120/G | Common and Differential Mode | Single phase | TT - TNS | 9 |
| | DS73R-120 | DS43-120 | DS13-120 | Common Mode | 3-phase | TNC | 5 |
| | DS74R-120 | DS44-120 | DS14-120 | Common Mode | 3-phase + N | TNS | 6 |
| | - | DS44-120/G | DS14-120/G | Common and Differential Mode | 3-phase + N | TNS | 10 |
| Accessories | DSM70R-400 | DSM40-400 | DSM10-400 | Plug-in 400 V module | - | - | - |
| | DSM70R-230 | DSM40-230 | DSM10-230 | Plug-in 230 V module | - | - | - |
| | DSM70R-120 | DSM40-120 | DSM10-120 | Plug-in 120 V module | - | - | - |
| | DSB12-400 | DSB1-400 | DSB1-400 | Base for 1 module 400 V | - | - | - |
| | DSB12-230 | DSB1-230 | DSB1-230 | Base for 1 module 230 V | - | - | - |
| | DSB12-120 | DSB1-120 | DSB1-120 | Base for 1 module 120 V | - | - | - |
| | DSB12-S2-400 | DSB1-S1-400 | DSB1-S1-400 | Base for 1 module 400V + remote signal | - | - | - |
| | DSB12-S2-230 | DSB1-S1-230 | DSB1-S1-230 | Base for 1 module 230V + remote signal | - | - | - |
| DSB12-S2-120 | DSB1-S1-120 | DSB1-S1-120 | Base for 1 module 120V + remote signal | - | - | - | |

| Type 2 (or Type 3) Surge Protector | | | | | | | | | |
|------------------------------------|-------------|---------------|-------------|---------------|--|--|-----------------|-----------------------|--------------------|
| Network voltage | DUT40 DUM40 | DS240 | DUT10 DUM10 | DS215 | DS-HF | Protection Mode | Type of Network | Neutral configuration | Diagram (page A12) |
| 230/400 V | - | DS240-400 | - | DS215-400 | - | Common Mode | Single phase | TT - TN - IT | 13 |
| | DUM40-230/G | DS240-230/G | DUM10-230/G | DS215-230/G | DS-HF | Common and Differential Mode | Single phase | TT - TN | 13/12 |
| | - | DS240-230 | - | DS215-400 | - | Common Mode | Single phase | TNS | 13 |
| | DUT40-230/G | DS240-230/G | DUM10-230/G | DS215-230/G | - | Common and Differential Mode | Single phase | TNS | 13 |
| | DUT40-230/G | - | DUT10-230/G | - | - | Common and Differential Mode | 3-phase | TT - TNS | 14 |
| | - | 2 x DS240-400 | - | 2 x DS215-400 | - | Common Mode | 3-phase + N | TT - TNS - IT | - |
| | DUT40-230/G | - | DUT10-230/G | - | - | Common and Differential Mode | 3-phase + N | TT - TNS | 14 |
| 120/208 V | DUM40-120/G | DS240-120 | DUM10-120/G | DS215-120 | DS-HF-120 | Common (and Differential) Mode | Single phase | TT - TNS | 13/12 |
| | DUT40-120/G | 2 x DS240-120 | DUT10-120/G | 2 x DS215-120 | - | Common (and Differential) Mode | 3-phase + N | TT - TNS | 13 |
| Accessories | - | DSM240-400 | - | DSM215-400 | - | Plug-in 400 V module | - | - | - |
| | - | DSM240-230 | - | DSM215-230 | - | Plug-in 230 V module | - | - | - |
| | - | DSM240-120 | - | DSM215-120 | - | Plug-in 120 V module | - | - | - |
| | - | DSB2-400 | - | DSB2-400 | - | Base for 1 module 400 V | - | - | - |
| | - | DSB2-230 | - | DSB2-230 | - | Base for 1 module 230 V | - | - | - |
| | - | DSB2-120 | - | DSB2-120 | - | Base for 1 module 120 V | - | - | - |
| | - | DSB2-S2-400 | - | DSB2-S2-400 | - | Base for 1 module 400V + remote signal | - | - | - |
| | - | DSB2-S2-230 | - | DSB2-S2-230 | - | Base for 1 module 230V + remote signal | - | - | - |
| - | DSB2-S2-120 | - | DSB2-S2-120 | - | Base for 1 module 120V + remote signal | - | - | - | |





**limp
25 kA**

Type 1 AC power Surge Protector DS250VG

A16



The DS250VG is a Extreme Duty Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the electrical installation. This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy surge current or even direct strike is high (e.g. : buildings equipped with lightning rods).

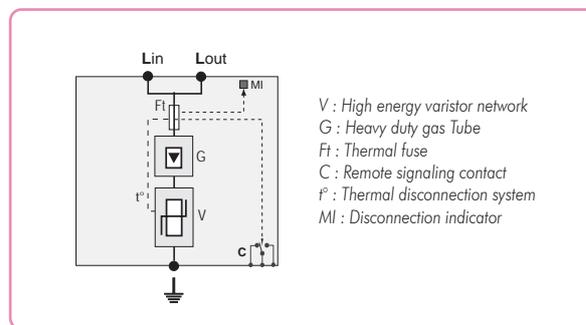
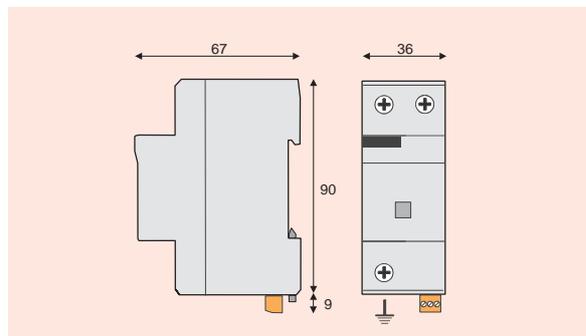
The DS250VG is a one-pole SPD and can be used in common mode (2, 3 or 4 DS250VGs connected between L/PE and N/PE = CT1 configuration) or common and differential mode (DS250VGs connected between L/N and 1 x DS100G between N/PE = CT2 configuration). See pages A20 and A21.

This SPD is designed to withstand a 25 kA lightning current (10/350 μ s impulse). It is based on specific heavy duty GDT and high energy MOV block : this technology allows the best behaviour possible on the AC network (no follow current and no leakage current) and a very low residual voltage.

The SPD is DIN rail compatible and is featured with a double terminal for line wire to allow improved connection to the AC network. To meet standards, the DS250VG includes a thermal disconnection mechanism, fault indicator and an internal microswitch for remote signaling.

- **Type 1 Surge protector**
- **25 kA on 10/350 μ s impulse**
- **Low voltage Up**
- **Internal disconnection, status indicator and remote signaling**
- **IEC 61643-1 and EN 61643-11 compliance**
- **UL 1449 ed. 2 recognition**

Dimensions and Diagram



V : High energy varistor network
 G : Heavy duty gas Tube
 Ft : Thermal fuse
 C : Remote signaling contact
 F : Thermal disconnection system
 MI : Disconnection indicator

Characteristics

| CITEL part number | DS250VG-300 | DS250VG-120 |
|---|--|--|
| AC Network | 230/400V | 120/208V |
| Connection mode | L/N, L/PE | L/N, L/PE |
| AC system | TT, TN | TT, TN |
| Max operating voltage | Uc 255 Vac | 150 Vac |
| TOV withstand | U _T 400 vac | 150 Vac |
| Operating current | Ic none | none |
| Leakage current at Uc | | |
| Follow current | If none | none |
| Nominal discharge current | In 30kA | 30 kA |
| 15 x 8/20 μ s impulses | | |
| Maximal discharge current | I _{max} 70 kA | 70 kA |
| max. withstand @ 8/20 μ s | | |
| Max. lightning current by pole | limp 25 kA | 25 kA |
| max. withstand @ 10/350 μ s | | |
| Residual voltage (at limp) | U _{res} 0.8 kV | 0.5 kV |
| Protection level (at In) | U _p 1.5 kV | 1 kV |
| Admissible short-circuit current | 25000 A | 25000 A |
| Associated disconnection devices | | |
| Thermal disconnector | internal | |
| Fuses | Fuse type gG - 125 A max. (see Note 1) | |
| Installation ground fault breaker | Type «S» or delayed | |
| Mechanical characteristics | | |
| Dimensions | see diagram | |
| Connection | by screw terminals : 6-35 mm ² / by bus | |
| Disconnection indicator | 1 mechanical indicator | |
| Remote signaling of disconnection | output on changeover contact | |
| Mounting | symmetrical rail 35 mm | |
| Operating temperature | -40/+85 °C | |
| Protection class | IP20 | |
| Housing material | Thermoplastic PEI UL94-5VA | |
| Standards compliance | | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class I and II |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class I and II |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I et II |
| UL1449 ed.2 | USA | Low Voltage TVSS |

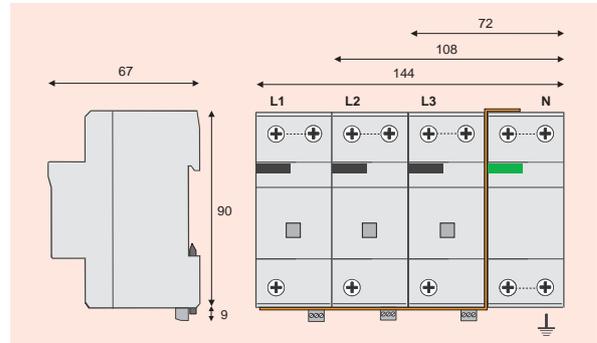
Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 250 A). For further information, please consult product instructions.



Type 1 AC power Multipolar Surge Protector

DS252VG
DS253VG
DS254VG

Dimensions and Diagram



A17

DS250VG AC surge protectors are designed to be connected in multi-pole configuration to protect single phase, 3-phase and 3-phase+Neutral AC networks. They are sometimes associated with a dedicated N/PE SPD (DS100G, «Gas tube» technology surge protector).

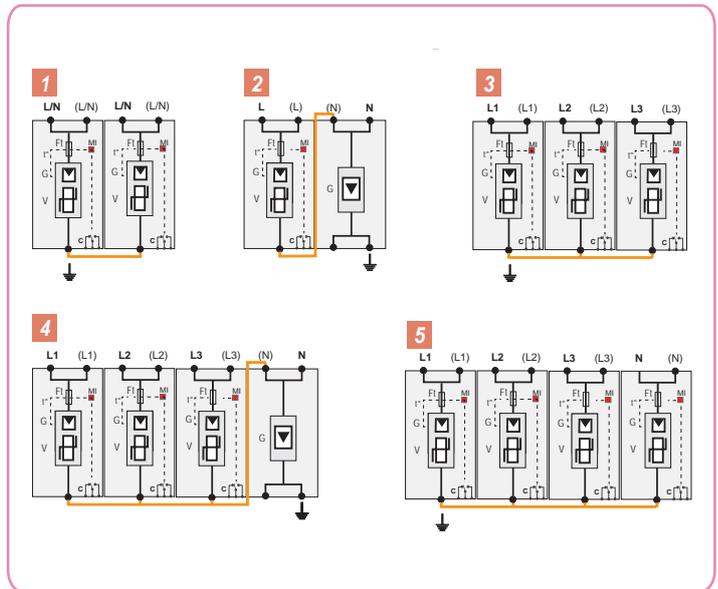
2 configurations are available:

Common mode : CT1 Configuration

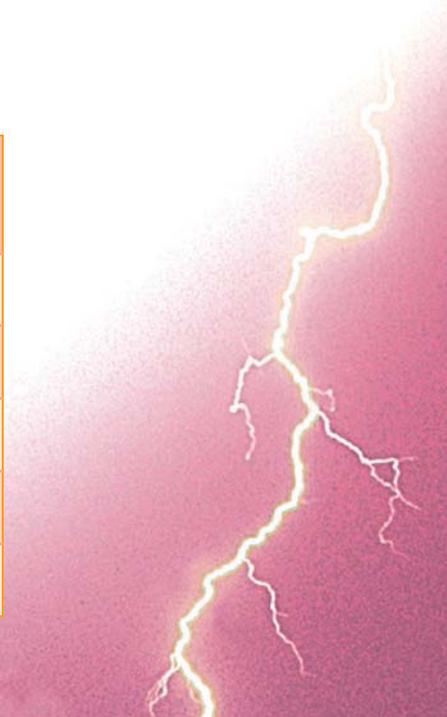
The DS250VG are connected between active wires (Phase(s) and Neutral) and earthing network (PE).

Common and differential mode : CT2 Configuration

The DS250VG are connected between Phase(s) and Neutral) for differential mode protection. A specific surge protector DS100G is connected between Neutral to PE for common mode protection. This CT2 version provides an enhanced protection efficiency.



| Part number | Network | AC system | Protection mode | | Iimp total | Up L/PE | Up L/N | Diagram |
|---------------|---------------------|-----------|-----------------|--------------|------------|---------|--------|---------|
| | | | common | differential | | | | |
| DS254VG-300/G | 230/400 V 3-phase+N | TT-TN | ● | ● | 100 kA | 1.5 kV | 1.5 kV | 4 |
| DS254VG-120/G | 120/208 V 3-phase+N | TT-TN | ● | ● | 100 kA | 1.5 kV | 1 kV | |
| DS254VG-300 | 230/400 V 3-phase+N | TT-TN | ● | | 100 kA | 1.5 kV | - | 5 |
| DS254VG-120 | 120/208 V 3-phase+N | TT-TN | ● | | 100 kA | 1 kV | - | |
| DS253VG-300 | 400 V 3-phase | TNC | ● | | 75 kA | 1.5 kV | - | 3 |
| DS253VG-120 | 208 V 3-phase | TNC | ● | | 75 kA | 1 kV | - | |
| DS252VG-300/G | 230 V single phase | TN | ● | ● | 50 kA | 1.5 kV | 1.5 kV | 2 |
| DS252VG-120/G | 120 V single phase | TN | ● | ● | 50 kA | 1.5 kV | 1 kV | |
| DS252VG-300 | 230 V single phase | TN | ● | | 50 kA | 1.5 kV | - | 1 |
| DS252VG-120 | 120V single phase | TN | ● | | 50 kA | 1 kV | - | |





limp
25 kA

Type 1 AC power Surge Protector DS250E

A18



The DS250E is a Extreme Duty Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the electrical installation. This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy surge current or even direct strike is high (e.g. : buildings equipped with lightning rods).

The DS250E is a one-pole SPD and can be used in common mode (DS250Es connected between L/PE and N/PE) or common and differential mode (DS250Es connected between L/N and 1 x DS100G between N/PE).

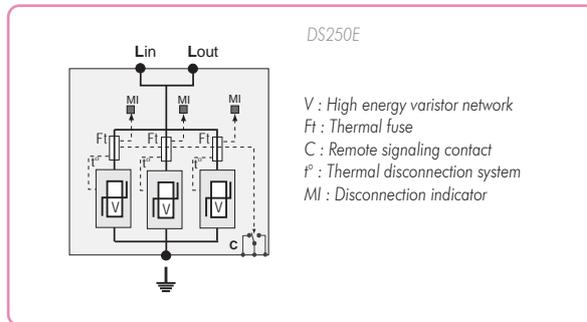
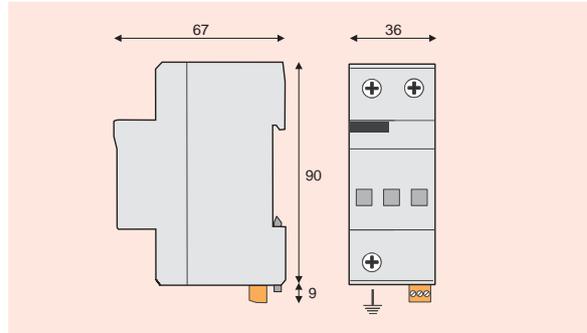
This SPD is designed to withstand a 25 kA lightning current (10/350 μ s impulse). It is based on «multi-MOV» diagram : this technology allows a very high discharge capability and the best behaviour possible on AC network (no follow current).

To meet standards, the DS250E includes a thermal disconnection mechanism, fault indicator and an internal microswitch for remote signaling.

This SPD is DIN rail compatible and is featured with a double terminal for line wire to allow improved connection to the AC network.

- Type 1 High-energy Surge Protector
- limp : 25 kA on 10/350 μ s impulse
- I_{max} : 140 kA on 8/20 μ s impulse
- Internal disconnections, status indicators and remote signaling
- IEC 61643-1, EN 61643-11 and UL1449 ed.2 compliance

Dimensions and Diagram



Characteristics

| CITEL part number | DS250E-400 | DS250E-300 | DS250E-120 |
|---------------------------------------|-------------------------|------------|------------|
| Network | 230/400V | 230/400V | 120/208V |
| Connection mode | L/PE | L/N | L/N, L/PE |
| AC system | IT, TT | TT, TN | TT, TN |
| Max. operating voltage | U _c 400 Vac | 330 Vac | 150 Vac |
| TOV withstand | U _T 400 Vac | 330 Vac | 150 Vac |
| Operating current | I _c < 2 mA | < 2 mA | < 2 mA |
| Leakage current at U _c | | | |
| Follow current | I _f none | none | none |
| Nominal discharge current | I _n 50 kA | 70 kA | 70 kA |
| 15 x 8/20 μ s impulses | | | |
| Maximal discharge current | I _{max} 140 kA | 140 kA | 140 kA |
| max. withstand @ 8/20 μ s | | | |
| Max. lightning current by pole | limp 25 kA | 25 kA | 25 kA |
| max. withstand @ 10/350 μ s | | | |
| Residual voltage (at limp) | U _{res} 2 kV | 1.5 kV | 0.6 kV |
| Protection level (at I _n) | U _p 2.5 kV | 2.5 kV | 1 kV |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A |

| Associated disconnection devices | |
|-----------------------------------|---|
| Thermal disconnecter | internal |
| Fuses | Fuses type gG - 125 A max. (see Note 1) |
| Installation ground fault breaker | Type «S» or delayed |

| Mechanical characteristics | |
|-----------------------------------|--|
| Dimensions | See diagram |
| Connection | by screw terminals : 6-35 mm ² / by bus |
| Disconnection indicator | 3 mechanical indicators |
| Remote signaling of disconnection | output on changeover contact |
| Mounting | symmetrical rail 35 mm |
| Operating temperature | -40/+85 °C |
| Protection class | IP20 |
| Housing material | Thermoplastic PEI UL94-5VA |

| Standards compliance | | |
|----------------------|---------------|--|
| IEC 61643-1 | International | Low Voltage SPD - Test Class I and II |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class I and II |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I et II |
| UL1449 ed.2 | USA | Low Voltage TVSS |

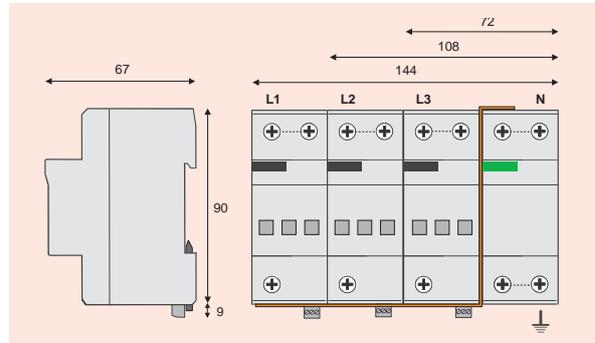
Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 250 A). For further information, please consult product instructions.



Type 1 AC power Multipolar Surge Protector

DS252E
DS253E
DS254E

Dimensions and Diagram



A19

DS250E AC surge protectors are designed to be connected in multi-pole configuration to protect single phase, 3-phase and 3-phase+Neutral AC networks. They are sometimes associated with a dedicated N/PE SPD (DS100G, «Gas tube» technology surge protector).

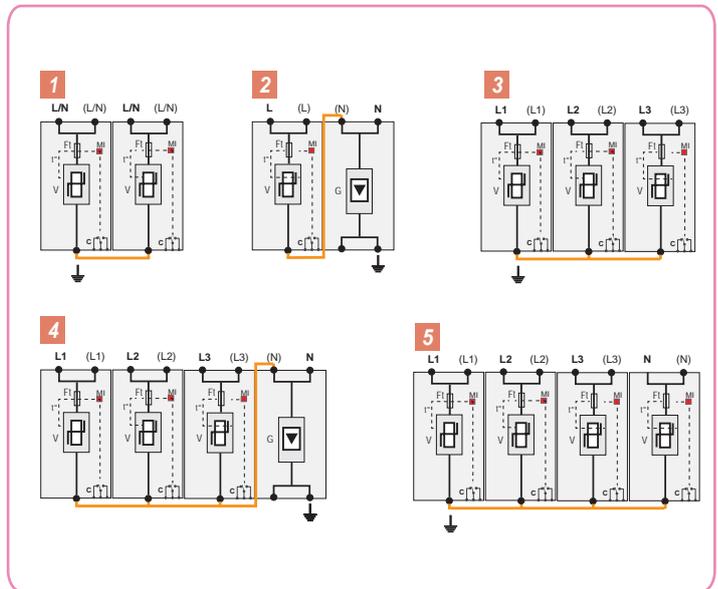
2 configurations are available:

Common mode : CT1 Configuration

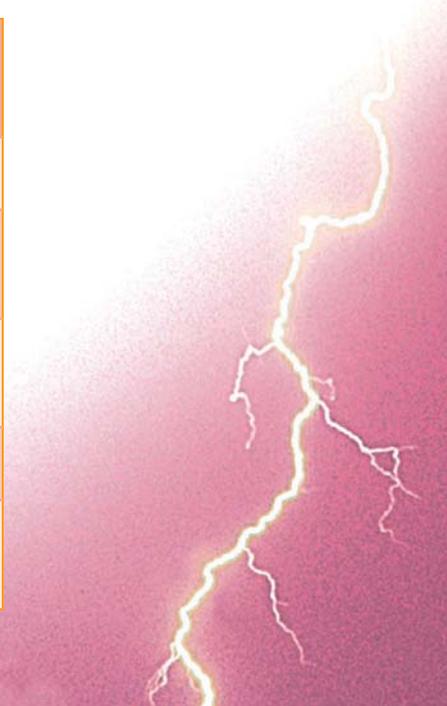
The DS250E are connected between active wires (Phase(s) and Neutral) and earthing network (PE).

Common and differential mode : CT2 Configuration

The DS250E are connected between Phase(s) and Neutral) for differential mode protection. A specific surge protector DS100G is connected between Neutral to PE for common mode protection. This CT2 version provides an enhanced protection efficiency.



| Part number | Network | AC system | Protection mode | | Iimp total | Up L/PE | Up L/N | Diagram |
|--------------|---------------------|-----------|-----------------|--------------|------------|---------|--------|---------|
| | | | common | differential | | | | |
| DS254E-300/G | 230/400 V 3-phase+N | TT-TN | ● | ● | 100 kA | 2.5 kV | 2.5 kV | 4 |
| DS254E-120/G | 120/208 V 3-phase+N | TT-TN | ● | ● | 100 kA | 1.5 kV | 1 kV | |
| DS254E-400 | 230/400 V 3-phase+N | IT | ● | | 100 kA | 2.5 kV | - | 5 |
| DS254E-300 | 230/400 V 3-phase+N | TT-TN | ● | | 100 kA | 2.5 kV | - | |
| DS254E-120 | 120/208 V 3-phase+N | TT-TN | ● | | 100 kA | 1 kV | - | 3 |
| DS253E-400 | 400 V 3-phase | IT-TT | ● | | 75 kA | 2.5 kV | - | |
| DS253E-300 | 400 V 3-phase | TNC | ● | | 75 kA | 2.5 kV | - | |
| DS253E-120 | 208 V 3-phase | TNC | ● | | 75 kA | 1 kV | - | 2 |
| DS252E-300/G | 230 V single phase | TN | ● | ● | 50 kA | 2.5 kV | 2.5 kV | |
| DS252E-120/G | 120 V single phase | TN | ● | ● | 50 kA | 1.5 kV | 1 kV | 1 |
| DS252E-400 | 230V single phase | TT-IT | ● | | 50 kA | 2.5 kV | - | |
| DS252E-300 | 230V single phase | TN | ● | | 50 kA | 2.5 kV | - | |
| DS252E-120 | 120 V single phase | TN | ● | | 50 kA | 1 kV | - | |





**limp
15 kA**

Type 1 AC power Surge Protector DS150VG

A20



The DS150VG is a Heavy Duty Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the electrical installation. This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy surge current or even direct strike is high (e.g. : buildings equipped with lightning rods)

The DS150VG is a one-pole SPD and can be used in common mode (2, 3 or 4 DS150VGs connected between L/PE and N/PE = CT1 configuration) or common and differential mode (DS150VGs connected between L/N and 1 x DS100EG between N/PE = CT2 configuration).

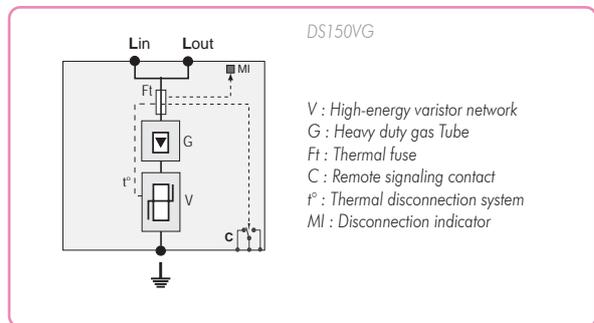
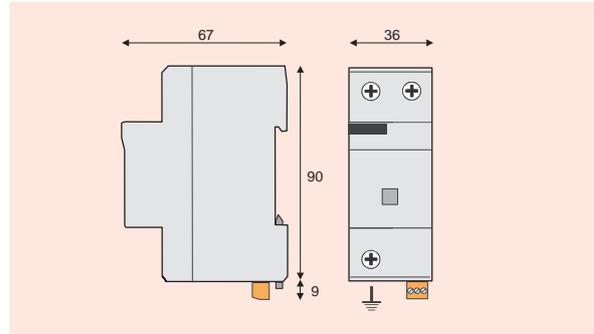
This SPD is designed to withstand a 15 kA lightning current (10/350 μ s impulse). It is based on specific heavy duty GDT and high energy MOV block : this technology allows the best behaviour possible on AC network (no follow current and no leakage current) and a very low residual voltage.

The SPD is DIN rail compatible and is featured with a double terminal for line wire to allow improved connection to the AC network.

To meet standards, the DS150VG includes a thermal disconnection mechanism, fault indicator and an internal microswitch for remote signaling.

- **Type 1 Surge protector**
- **limp : 15 kA on 10/350 μ s impulse**
- **Low voltage Up**
- **Internal disconnection, status indicator and remote signaling**
- **IEC 61643-1 and EN 61643-11 compliance**
- **UL 1449 ed. 2 recognition**

Dimensions and Diagram



Characteristics

| CITEL part number | DS150VG-400 | DS150VG-300 | DS150VG-120 |
|---|--|--|-------------|
| Network | 230/400V | 230/400V | 120/208V |
| Connection mode | L/PE | L/N | L/N, L/PE |
| AC system | IT, TT, TN | TT, TN | TT, TN |
| Max operating voltage | Uc 255 Vac | 255 Vac | 150 Vac |
| TOV withstand | U _T 400 Vac | 300 Vac | 150 Vac |
| Operating current | Ic none | none | none |
| Leakage current at Uc | | | |
| Follow current | If none | none | none |
| Nominal discharge current | In 20 kA | 20 kA | 20 kA |
| 15 x 8/20 μ s impulses | | | |
| Maximal discharge current | I _{max} 40 kA | 40 kA | 40 kA |
| max. withstand 8/20 μ s | | | |
| Max. lightning current by pole | limp 15 kA | 15 kA | 15 kA |
| max. withstand 10/350 μ s | | | |
| Residual voltage (at limp) | U _{res} 0.8 kV | 0.6 kV | 0.4 kV |
| Protection level (at In) | U _p 1.5 kV | 1.5 kV | 1 kV |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A |
| Associated disconnection devices | | | |
| Thermal disconnector | internal | | |
| Fuses | Fuses type gG - 100 A max. (see Note 1) | | |
| Installation ground fault breaker | Type «S» or delayed | | |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 6-35 mm ² / by bus | | |
| Disconnection indicator | 1 mechanical indicator | | |
| Remote signaling of disconnection | output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic PEI UL94-5VA | | |
| Standards compliance | | | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class I and II | |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class I and II | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I et II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 200 A). For further information, please consult product instructions.



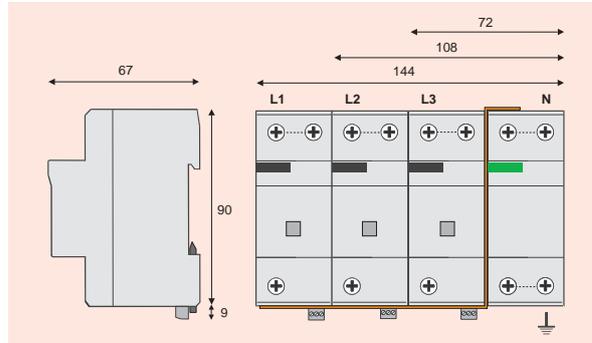
Type 1 AC power Multipolar Surge Protector

DS152VG
DS153VG
DS154VG

Dimensions and Diagram



DS154VG-300/G



A21

DS150VG AC surge protectors are designed to be connected in multi-pole configuration to protect single phase, 3-phase and 3-phase+Neutral AC networks. They are sometimes associated with a dedicated N/PE SPD (DS100EG, «Gas tube» technology surge protector).

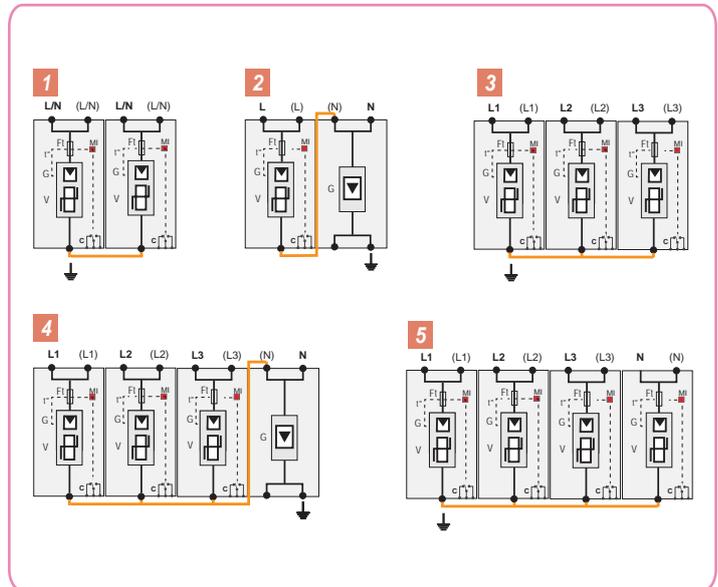
2 configurations are available:

Common mode : CT1 Configuration

The DS150VG are connected between active wires (Phase(s) and Neutral) and earthing network (PE).

Common and differential mode : CT2 Configuration

The DS150VG are connected between Phase(s) and Neutral) for differential mode protection. A specific surge protector DS100EG is connected between Neutral to PE for common mode protection. This CT2 version provides an enhanced protection efficiency.



| Part number | Network | AC system | Protection mode | | Iimp total | Up L/PE | Up L/N | Diagram |
|---------------|---------------------|-----------|-----------------|--------------|------------|---------|--------|---------|
| | | | common | differential | | | | |
| DS154VG-300/G | 230/400 V 3-phase+N | TT-TN | ● | ● | 50 kA | 1.5 kV | 1.5 kV | 4 |
| DS154VG-120/G | 120/208 V 3-phase+N | TT-TN | ● | ● | 50 kA | 1.5 kV | 1 kV | |
| DS154VG-300 | 230/400 V 3-phase+N | TT-TN | ● | | 60 kA | 1.5 kV | - | 5 |
| DS154VG-120 | 120/208 V 3-phase+N | TT-TN | ● | | 60 kA | 1 kV | - | |
| DS153VG-300 | 400 V 3-phase | TNC | ● | | 45 kA | 1.5 kV | - | 3 |
| DS153VG-120 | 208 V 3-phase | TNC | ● | | 45 kA | 1 kV | - | |
| DS152VG-300/G | 230 V single phase | TN | ● | ● | 30 kA | 1.5 kV | 1.5 kV | 2 |
| DS152VG-120/G | 120 V single phase | TN | ● | ● | 30 kA | 1.5 kV | 1 kV | |
| DS152VG-300 | 230 V single phase | TN | ● | | 30 kA | 1.5 kV | - | 1 |
| DS152VG-120 | 120V single phase | TN | ● | | 30 kA | 1 kV | - | |





**limp
15 kA**

Type 1 AC power Surge Protector DS150E

A22



The DS150E is a Heavy Duty Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the electrical installation. This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy surge current or even direct strike is high (e.g. : buildings equipped with lightning rods).

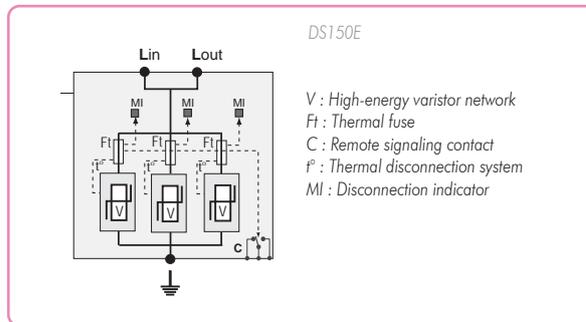
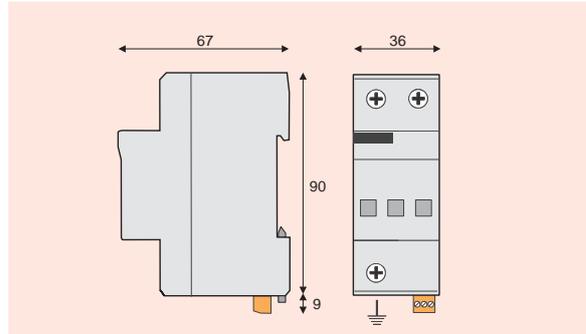
The DS150E is a one-pole SPD and can be used in common mode (DS150Es connected between L/PE and N/PE) or common and differential mode (DS150Es connected between L/N and 1 x DS100EG between N/PE).

This SPD is designed to withstand a 15 kA lightning current (10/350 μ s impulse). It is based on «multi-MOV» diagram : this technology allows a very discharge capability and the best behaviour possible on AC network (no follow current).

To meet standards, the DS150E includes a thermal disconnection mechanism, fault indicator and an internal microswitch for remote signaling.

The SPD is DIN rail compatible and is featured with a double terminal for line wire to allow improved connection to the AC network.

Dimensions and Diagram



Characteristics

| CITEL part number | DS150E-400 | DS150E-300 | DS150E-120 |
|---|--|--|------------|
| Network | 230/400V | 230/400V | 120/208V |
| Connection mode | L/PE | L/N | L/N, L/PE |
| AC system | IT, TT, TN | TT, TN | TT, TN |
| Max. operating voltage | Uc 400 Vac | 300 Vac | 150 Vac |
| TOV withstand | U _T 400 Vac | 300 Vac | 150 Vac |
| Operating current | Ic < 2 mA | < 2 mA | < 2 mA |
| Leakage current at Uc | | | |
| Follow current | If none | none | none |
| Nominal discharge current | In 60 kA | 70 kA | 70 kA |
| 15 x 8/20 μ s impulses | | | |
| Maximum discharge current | I _{max} 140 kA | 140 kA | 140 kA |
| max. withstand 8/20 μ s | | | |
| Max. lightning current by pole | limp 15 kA | 15 kA | 15 kA |
| max. withstand 10/350 μ s | | | |
| Residual voltage (at limp) | U _{res} 1.5 kV | 0.9 kV | 0.5 kV |
| Protection level (at In) | U _p 2.5 kV | 2 kV | 1 kV |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A |
| Associated disconnection devices | | | |
| Thermal disconnector | internal | | |
| Fuses | Fuses type gG - 125 A max. (see Note 1) | | |
| Installation ground fault breaker | Type «S» or delayed | | |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 6-35 mm ² / by bus | | |
| Disconnection indicator | 3 mechanical indicators | | |
| Remote signaling of disconnection | output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic PEI UL94-5VA | | |
| Standards compliance | | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I et II | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class I and II | |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class I and II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 200 A). For further information, please consult product instructions.

- Type 1 High-energy Surge Protector
- limp : 15 kA on 10/350 μ s impulse
- I_{max} : 140 kA on 8/20 μ s impulse
- Internal disconnections, status indicators and remote signaling
- IEC 61643-1, EN 61643-11 and UL 1449 ed.2

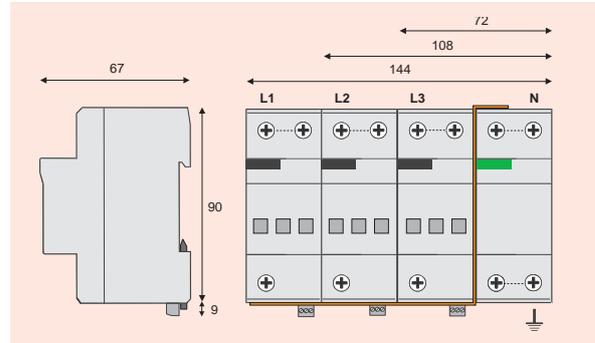


Type 1 AC power Multipolar Surge Protector

DS152E
DS153E
DS154E



Dimensions and Diagram



A23

DS150E AC surge protectors are designed to be connected in multi-pole configuration to protect single phase, 3-phase and 3-phase+Neutral AC networks. They are sometimes associated with a dedicated N/PE SPD (DS100EG, «Gas tube» technology surge protector).

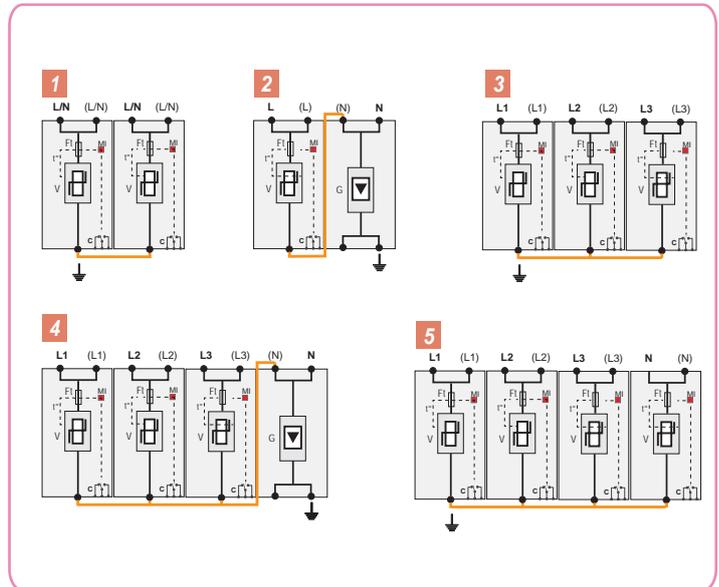
2 configurations are available:

Common mode : CT1 Configuration

The DS150E are connected between active wires (Phase(s) and Neutral) and earthing network (PE).

Common and differential mode : CT2 Configuration

The DS150E are connected between Phase(s) and Neutral) for differential mode protection. A specific surge protector DS100EG is connected between Neutral to PE for common mode protection. This CT2 version provides an enhanced protection efficiency.



| Part number | Network | AC system | Protection mode | | Iimp total | Up L/PE | Up L/N | Diagram |
|--------------|---------------------|-----------|-----------------|--------------|------------|---------|--------|---------|
| | | | common | differential | | | | |
| DS154E-300/G | 230/400 V 3-phase+N | TT-TN | ● | ● | 50 kA | 2 kV | 2 kV | 4 |
| DS154E-120/G | 120/208 V 3-phase+N | TT-TN | ● | ● | 50 kA | 1.5 kV | 1 kV | |
| DS154E-400 | 230/400 V 3-phase+N | IT | ● | | 60 kA | 2.5 kV | - | 5 |
| DS154E-300 | 230/400 V 3-phase+N | TT-TN | ● | | 60 kA | 2 kV | - | |
| DS154E-120 | 120/208 V 3-phase+N | TT-TN | ● | | 60 kA | 1 kV | - | 3 |
| DS153E-400 | 400 V 3-phase | IT-TT | ● | | 45 kA | 2.5 kV | - | |
| DS153E-300 | 400 V 3-phase | TNC | ● | | 45 kA | 2 kV | - | |
| DS153E-120 | 208 V 3-phase | TNC | ● | | 45 kA | 1 kV | - | 2 |
| DS152E-300/G | 230 V single phase | TN | ● | ● | 30 kA | 2 kV | 2 kV | |
| DS152E-120/G | 120 V single phase | TN | ● | ● | 30 kA | 1.5 kV | 1 kV | 1 |
| DS152E-400 | 230V single phase | TT-IT | ● | | 30 kA | 2.5 kV | - | |
| DS152E-300 | 230V single phase | TN | ● | | 30 kA | 2 kV | - | |
| DS152E-120 | 120 V single phase | TN | ● | | 30 kA | 1 kV | - | |





limp
50/100 kA

Type 1 N/PE AC power Surge Protector

DS100EG

DS100G

A24



This Type 1 Surge Protector is designed to be used in association with DS150 surge protectors to provide common and differential surge protection for AC networks, following the «CT2» configuration in IEC60364-5-534 standard. For the possible associations, refer to pages A20 and A21.

The DS100EG is connected between the Neutral (N) and Protective Earth (PE) wires.

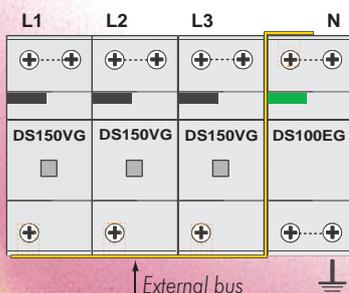
The DS100EG is based on CITEL P100 high energy gas tube, which provides much lower residual voltages than the air spark gap technology and a very high discharge current capability on a 10/350 μ s or 8/20 μ s impulses.

It is mechanically similar to the DS150 series, therefore making easy to use both products jointly.

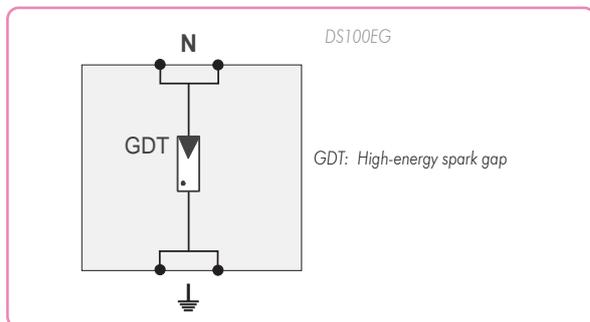
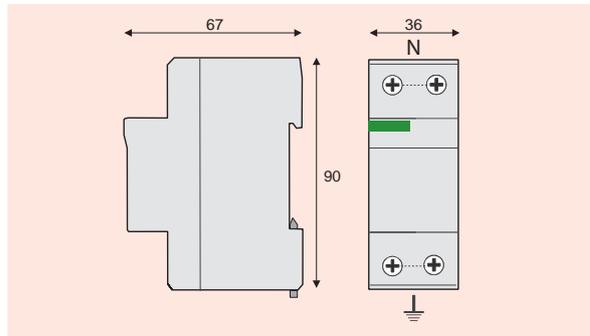
- N/PE Type 1 Surge Protector
- limp : 50 and 100 kA (10/350 μ s)
- I_{max} : 200 and 150 kA (8/20 μ s)
- Adapted to DS250/DS150 range
- EN 61643-11 and IEC 61643-1 compliance
- UL 1449 ed.2 Recognition

Association with DS150VG protectors

For example : DS154VG-300/G



Dimensions and Diagram



Characteristics

| CITEL part number | DS100G-600 | DS100EG-600 | DS100EG-350 |
|--|--|--|-------------|
| Network | 230/400V | 230/400V | 120/208V |
| Connexion mode | N/PE | N/PE | N/PE |
| AC system | TT, TNS | TT, TNS | TT, TNS |
| Max. operating voltage U _c | 255 Vac | 255 Vac | 150 Vac |
| Temporary overvoltage withstand U _T | 400 Vac | 400 Vac | 150 Vac |
| Operating current I _c | none | none | none |
| Leakage current at U _c | | | |
| Follow current I _f | yes | yes | yes |
| Nominal discharge current I _n | 50 kA | 50 kA | 50 kA |
| 15 x 8/20 μ s impulses | | | |
| Maximum discharge current I _{max} | 200 kA | 150 kA | 150 kA |
| max. withstand 8/20 μ s | | | |
| Max. lightning current by pole I _{imp} | 100 kA | 50 kA | 50 kA |
| max. withstand 10/350 μ s | | | |
| Protection level (at I _n) U _p | 1.5 kV | 1.5 kV | 1.5 kV |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 6-35 mm ² / by bus | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic PEI UL94-5VA | | |
| Standards compliance | | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I et II | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class I and II | |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class I and II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |



limp
50 kA

Type 1 AC power 3-Phase Surge Protector

DUT250VG-300/G



The DUT250VG-300/G is a Compact and Heavy Duty Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the electrical installation, on a 3-Phase 230/400V AC network.

This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy surge current or even direct strike is high (e.g.: buildings equipped with lightning rods or metallic poles, as radio base stations).

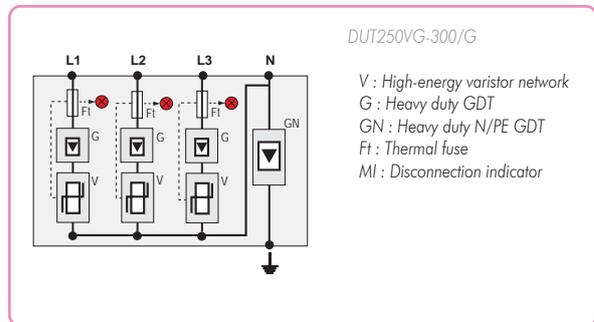
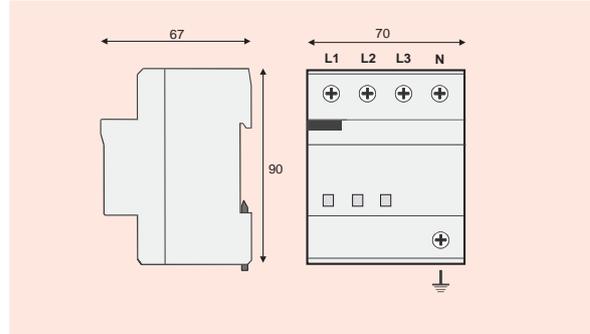
The DUT250VG-300/G is a 3-Phase+Neutral SPD and provides a common (L/G) and differential (L/N) mode protection. It complies to the Connection Type 2 configuration following IEC 60364-5-534.

This SPD is designed to withstand 25 kA lightning surge current (10/350 μ s impulse) by pole. It is based on specific heavy duty GDTs and high energy MOV blocks : this technology allows the best behaviour possible on AC network (no follow current and no leakage current) and a very low residual voltage.

This SPD is built in a compact enclosure for DIN rail mounting.

- **Type 1 3-Phase Surge protector**
- **Common and Differential mode**
- **Very compact monobloc enclosure**
- **limp by pole/total : 25 kA/50 kA**
- **Low voltage Up**
- **No Follow current**
- **EN 61643-11 and IEC 61643-1 compliance**

Dimensions and Diagram



A25

Characteristics

| CITEL part number | DUT250VG-300/G | |
|---|---|--|
| AC Network | 3-Phase 230/400V | |
| AC system | TT, TN | |
| Protection modes | L/N and N/PE | |
| Max. operating voltage | Uc | 255 Vac |
| Temporary overvoltage withstand | U _T | 400 Vac |
| Operating current | Ic | none |
| Leakage current at Uc | | |
| Discharge currents | In /Imax | 40 kA / 100 kA |
| 15 impulses and max. withstand 8/20 μ s | | |
| Max. lightning current by pole | limp | 25 kA |
| max. withstand 10/350 μ s | | |
| Total lightning current | Itotal | 50 kA (2) |
| max. withstand 10/350 μ s | | |
| Protection level (at In) | Up | 1.5 kV |
| Admissible short circuit current | 25000 A | |
| Associated disconnection devices | | |
| Thermal disconnector | internal | |
| Required external fuses | Fuses type gG - 125 A max. (see Note 1) | |
| Installation ground fault breaker | Type «S» or delayed | |
| Mechanical characteristics | | |
| Dimensions | see diagram | |
| Connection | by screw terminals : 6-35 mm ² | |
| Disconnection indicator | red light indicators | |
| Remote signaling of disconnection | none | |
| Mounting | symmetrical rail 35 mm | |
| Operating temperature | -40/+85 °C | |
| Protection class | IP20 | |
| Housing material | Thermoplastic UL94-V0 | |
| Standards compliance | | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class I |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class I |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 250 A). For further information, please consult product instructions.

Note 2: Specific version with limp total = 100 kA available.



limp
12.5 kA

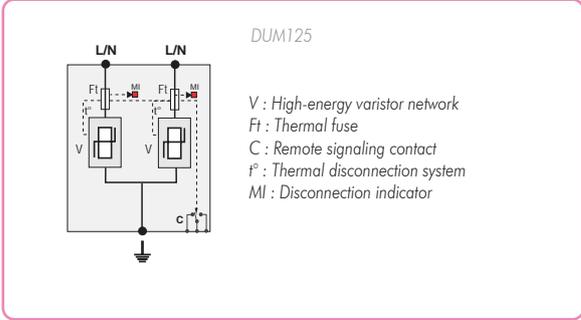
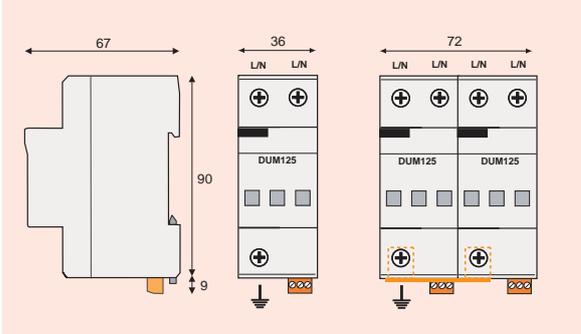
Type 1 Surge Protector Single and 3-phase

DUM125

DUT125

Dimensions and Diagram

A26



DUM125 is a single-phase Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the installation. This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy surge current or even direct strike is high (e.g.: buildings equipped with lightning rods).

The DUM125 provides a common mode protection (between L/PE and N/PE). The DUT125 version (made of 2 DUM125) is designed for 3-phase+N AC networks.

This SPD is designed to withstand a 12.5 kA lightning current (10/350 μ s impulse). It is based on «multi-MOV» diagram : this technology allows a very discharge capability and the best behaviour possible on AC network (no follow current).

The DUM125 fits on DIN rail and is connected in parallel on the AC network to be protected.

To meet standards, DUM125 includes a thermal disconnection mechanism, fault indicator and an internal microswitch for remote signaling.

Characteristics

| | Single phase network 3-phase + neutral network | DUM125-400 DUT125-400 | DUM125-120 DUT125-120 |
|---|---|---|----------------------------------|
| AC network | | 230/400V | 120/208V |
| Mode de connexion | | L/PE | L/N, L/PE |
| AC system | | IT, TT, TN | TT, TN |
| Max. operating voltage | Uc | 400 Vac | 150 Vac |
| Temporary overvoltage withstand | U _T | 400 Vac | 150 Vac |
| Operating current | Ic | < 2 mA | < 2 mA |
| Leakage current at Uc | | | |
| Follow current | I _f | none | none |
| Nominal discharge current | I _n | 40 kA | 40 kA |
| 15 x 8/20 μ s impulse | | | |
| Max. discharge current | I _{max} | 100 kA | 100 kA |
| max. withstand 8/20 μ s | | | |
| Max. lightning current by pole | limp | 12.5 kA | 12.5 kA |
| max. withstand 10/350 μ s | | | |
| Total lightning current | I _{total} | 25 kA (DUM125) 50 kA (DUT125) | 25 kA (DUM125) 50 kA (DUT125) |
| Residual voltage (at limp) | U _{res} | 1.5 kV | 0.5 kV |
| Protection level (at In) | U _p | 2 kV | 1 kV |
| Admissible short-circuit current | | 25000 A | 25000 A |
| Associated disconnection devices | | | |
| Thermal disconnector | | internal | |
| Fuses | | Fuses type gG - 125 A max. (see Note 1) | |
| Installation ground fault breaker | | Type «S» or delayed | |
| Mechanical characteristics | | | |
| Dimensions | | see diagram | |
| Connection | | by screw terminal : 6-35 mm ² / by bus | |
| Disconnection indicator | | 1 mechanical indicator by pole | |
| Remote signaling of disconnection | | output on changeover contact | |
| Mounting | | symmetrical rail 35 mm | |
| Operating temperature | | -40/+85 °C | |
| Protection class | | IP20 | |
| Housing material | | Thermoplastic PEI UL94-5VA | |
| Standards compliance | | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I et II | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class I and II | |
| EN 61643-11 | Europe | Parafoudre Basse Tension - Essais Classe I et II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

- Single and 3-phase Type 1 AC SPD
- limp : 12.5 kA (10/350 μ s)
- I_{max} : 100 kA (8/20 μ s)
- Internal disconnections, status indicators and remote signaling
- Complies EN 61643-11, IEC 61643-1 and UL1449 ed.2



Abstract

Type 1 Multipolar Surge Protectors

Type 1 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 direct and indirect effects of lightning. Following the different national electrical codes, these SPDs can be recommended or mandatory.

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

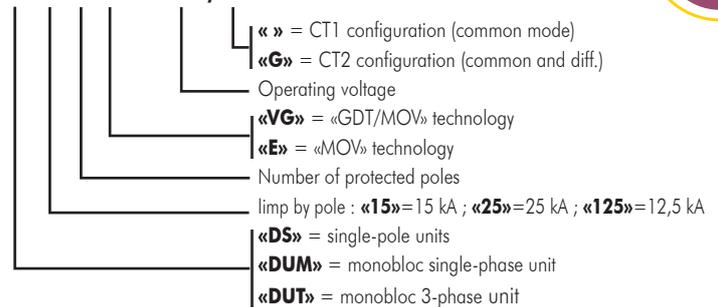
- limp by pole : 12.2, 15 and 25 kA (10/350 μ s)
- Total limp : up to 100 kA
- Single, 3 or 3-Phase+Neutral AC network
- 230/400V or 120/208V AC network
- All AC system types
- Common mode protection (CT1 configuration) or Common and Differential mode protection (CT2 configuration)
- Hard-wired single-pole units or monobloc unit.

These multipolar SPDs are using different technologies :

- DS250VG, DS150VG, DUT250VG : «Gas tube/MultiMOV» technology,
- DS250E, DS150E, DUM125 : «MultiMOV» technology,
- DS100EG, DS100G : N/PE SPD, «Gas tube» technology.

Part number information

DS154VG-300/G



| Network 230/400V | Network 120/208V | Protection Mode | | Type of network | Neutral configuration | limp total | Voltage Ures | | Voltage Up | | Width (mm) |
|---------------------|---------------------|-----------------|--------------|-----------------|-----------------------|------------|--------------|-----------|------------|-----------|------------|
| | | common | differential | | | | 230/400 V | 120/208 V | 230/400 V | 120/208 V | |
| DS252VG-300/G | DS252VG-120/G | ● | ● | Single phase | TT-TN | 50 kA | 0.8 kV | 0.5 kV | 1.5 kV | 1 kV | 72 |
| DS252E-300/G | DS252E-120/G | ● | ● | Single phase | TT-TN | 50 kA | 1.5 kV | 0.6 kV | 2.5 kV | 1 kV | 72 |
| DS152VG-300/G | DS152VG-120/G | ● | ● | Single phase | TT-TN | 30 kA | 0.6 kV | 0.4 kV | 1.5 kV | 1 kV | 72 |
| DS152E-300/G | DS152E-120/G | ● | ● | Single phase | TT-TN | 30 kA | 0.9 kV | 0.5 kV | 2 kV | 1 kV | 72 |
| DS152VG-400 | - | ● | | Single phase | TT-TN | 30 kA | 0.8 kV | - | 1.5 kV | - | 72 |
| DS152E-400 | - | ● | | Single phase | IT-TT-TN | 30 kA | 1.5 kV | - | 2.5 kV | - | 72 |
| DS252VG-400 | DS252VG-120 | ● | | Single phase | TN | 50 kA | 0.8 kV | 0.5 kV | 1.5 kV | 1 kV | 72 |
| DS252E-300 | DS252E-120 | ● | | Single phase | TN | 50 kA | 1.5 kV | 0.6 kV | 2.5 kV | 1 kV | 72 |
| DS152VG-300 | DS152VG-120 | ● | | Single phase | TN | 30 kA | 0.6 kV | 0.4 kV | 1.5 kV | 1 kV | 72 |
| DS152E-300 | DS152E-120 | ● | | Single phase | TN | 30 kA | 0.9 kV | 0.5 kV | 2 kV | 1 kV | 72 |
| DUM125-400 | DUM125-120 | ● | | Single phase | IT-TT-TN | 25 kA | 1.5 kV | 0.5 kV | 2 kV | 1 kV | 36 |
| DS253VG-300 | DS253VG-120 | ● | | 3-phase | TNC | 75 kA | 0.8 kV | 0.5 kV | 1.5 kV | 1 kV | 108 |
| DS253E-300 | DS253E-120 | ● | | 3-phase | TNC | 75 kA | 1.5 kV | 0.6 kV | 2.5 kV | 1 kV | 108 |
| DS153VG-300 | DS153VG-120 | ● | | 3-phase | TNC | 45 kA | 0.6 kV | 0.4 kV | 1.5 kV | 1 kV | 108 |
| DS153E-300 | DS153E-120 | ● | | 3-phase | TNC | 45 kA | 0.9 kV | 0.5 kV | 2 kV | 1 kV | 108 |
| DS153VG-400 | - | ● | | 3-phase | TNC | 45 kA | 0.8 kV | - | 1.5 kV | - | 108 |
| DS153E-400 | - | ● | | 3-phase | IT-TNC | 45 kA | 1.5 kV | - | 2.5 kV | - | 108 |
| DUT250VG-300/G | - | ● | ● | 3-phase + N | TT-TNS | 50 kA | 0.8 kV | 0.5 kV | 1.5 kV | 1 kV | 70 |
| DS254VG-300/G | DS254VG-120/G | ● | ● | 3-phase + N | TT-TNS | 100 kA | 0.8 kV | 0.5 kV | 1.5 kV | 1 kV | 144 |
| DS254E-300/G | DS254E-120/G | ● | ● | 3-phase + N | TT-TNS | 100 kA | 1.5 kV | 0.6 kV | 2.5 kV | 1 kV | 144 |
| DS154VG-300/G | DS154VG-120/G | ● | ● | 3-phase + N | TT-TNS | 50 kA | 0.6 kV | 0.4 kV | 1.5 kV | 1 kV | 144 |
| DS154E-300/G | DS154E-120/G | ● | ● | 3-phase + N | TT-TNS | 50 kA | 0.9 kV | 0.5 kV | 2 kV | 1 kV | 144 |
| DS154VG-400 | - | ● | | 3-phase + N | TT-TNS | 60 kA | 0.8 kV | - | 1.5 kV | - | 144 |
| DS154E-400 | - | ● | | 3-phase + N | IT-TT-TNS | 60 kA | 1.5 kV | - | 2.5 kV | - | 144 |
| DS254VG-400 | DS254VG-120 | ● | | 3-phase + N | TT-TNS | 100 kA | 0.8 kV | 0.5 kV | 1.5 kV | 1 kV | 144 |
| DS254E-300 | DS254E-120 | ● | | 3-phase + N | TNS | 100 kA | 1.5 kV | 0.6 kV | 2.5 kV | 1 kV | 144 |
| DS154VG-300 | DS154VG-120 | ● | | 3-phase + N | TNS | 60 kA | 0.6 kV | 0.4 kV | 1.5 kV | 1 kV | 144 |
| DS154E-300 | DS154E-120 | ● | | 3-phase + N | TNS | 60 kA | 0.9 kV | 0.5 kV | 2 kV | 1 kV | 144 |
| DUT125-400 | DUT125-120 | ● | | Single phase | IT-TT-TNS | 50 kA | 1.5 kV | 0.5 kV | 2 kV | 1 kV | 72 |

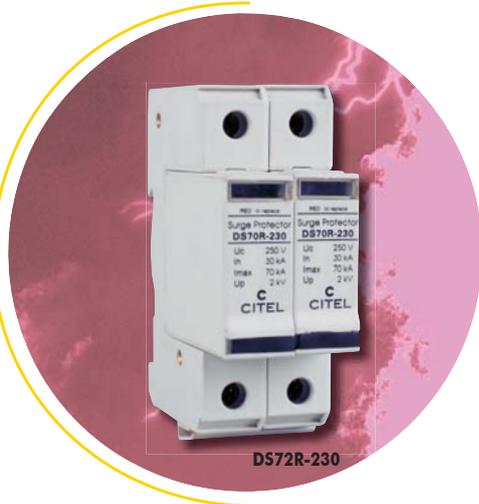




**Imax
70 kA**

Type 2 AC power Surge Protector DS70R

A28



DS72R-230

DS70R Type 2 AC Surge Protectors are used mainly for primary protection of single and three-phase networks at the main electrical panel. They provide common-mode protection (between the active conductors and protective wire) and are available in one-phase, single-phase, three-phase, and three-phase + neutral versions.

The DS70R high impulse discharge capability classifies this SPD as re-inforced Type 2, useful in case of high lightning density areas. IEC60364 standard requests Type 2 SPD at the entrance of installation if the keraunic level $N_k > 25$.

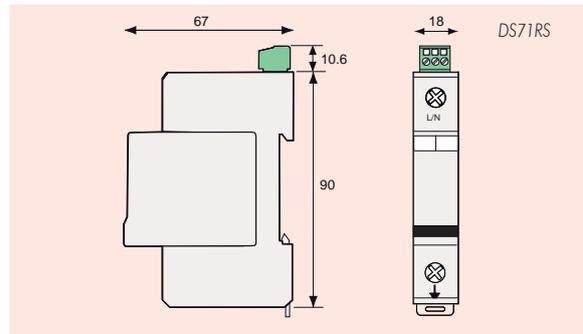
The SPD is based on association of high energy varistors equipped with thermal disconnecter and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS7*RS).

The DS70R is available for the main values of AC voltages.

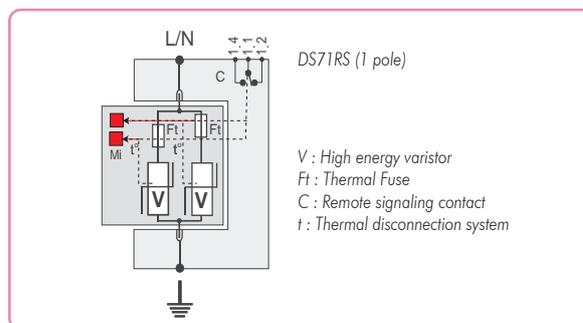
The DS70R is DIN rail compatible and is built with a plug-in module (DSM70R-xxx) and a fixed base, which allows an easy and fast maintenance.

- Re-inforced Type 2 Surge Protector
- Discharge currents : I_n : 30 kA/ I_{max} : 70 kA
- Pluggable module by phase
- Remote Signaling option
- IEC 61643-1 and EN 61643-11 compliance

Dimensions (in mm)



Electrical diagram



Characteristics

| CITEL part number | DS71R-400 | DS71R-230 | DS71R-120 |
|---|--|---|-----------|
| Network | 230/400V | 230/400V | 120/208V |
| Max. operating voltage | U_c 400 Vac | 255 Vac | 150 Vac |
| Temporary overvoltage withstand | U_T 400 Vac | 255 Vac | 150 Vac |
| Operating current | I_c < 1 mA | < 1 mA | < 1 mA |
| Leakage current at U_c | | | |
| Follow current | I_f none | none | none |
| Nominal discharge current | I_n 30 kA | 30 kA | 30 kA |
| 15 x 8/20 μ s impulses | | | |
| Maximum discharge current | I_{max} 70 kA | 70 kA | 70 kA |
| max. withstand 8/20 μ s | | | |
| Protection level (at I_n) | U_p 1.8 kV | 1.4 kV | 1 kV |
| Residual voltage at 10 kA | 1.4 kV | 1 kV | 0.7 kV |
| Residual voltage at 5 kA | 1.2 kV | 0.9 kV | 0.6 kV |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A |
| Associated disconnection devices | | | |
| Thermal disconnecter | internal | | |
| Fuses | Fuses type gG - 100 A max. (see Note 1) | | |
| Installation ground fault breaker | Type «S» or delayed | | |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 4-25 mm ² / by bus | | |
| Disconnection indicator | 2 mechanical indicators by pole | | |
| Remote signaling of disconnection | Option DS70RS - output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic UL94-V0 | | |
| Standards compliance | | | |
| EN 61643-11 | Europe | Low Voltage SPD - Class II Test | |
| IEC 61643-1 | International | Low Voltage SPD - Class II Test | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

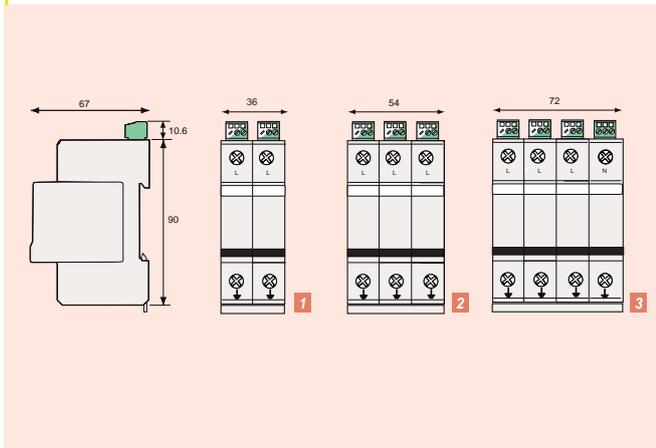
Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 160 A). For further information, please consult product instructions.



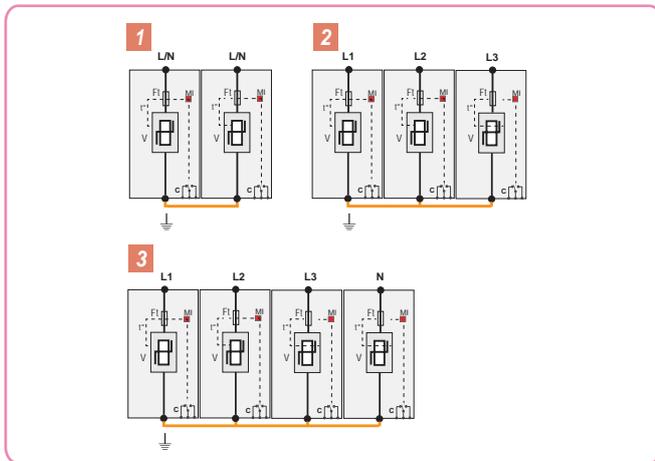
Type 2 AC power Multipolar Surge Protector

DS72R
DS73R
DS74R

Dimensions and Diagram



The DS70R surge protectors are designed to be used in a multipolar configuration to protect single-phase, 3-phase or 3-phase+neutral AC networks. Each pole of the SPD is connected between Line(s) and PE and Neutral and PE.



| Part number | Network | AC System | Protection mode | | I _{max} total | Up L/PE | Diagram |
|-------------|---------------------|-----------|-----------------|--------------|------------------------|---------|----------|
| | | | common | differential | | | |
| DS74R-400 | 230/400 V 3-phase+N | IT-TT | ● | | 280 kA | 1.8 kV | 3 |
| DS74R-230 | 230/400 V 3-phase+N | TT-TN | ● | | 280 kA | 1.4 kV | |
| DS74R-120 | 120/208 V 3-phase+N | TN | ● | | 280 kA | 1 kV | |
| DS73R-400 | 400 V 3-phase | IT | ● | | 210 kA | 1.8 kV | 2 |
| DS73R-230 | 400 V 3-phase | TNC | ● | | 210 kA | 1.4 kV | |
| DS73R-120 | 208 V 3-phase | TNC | ● | | 210 kA | 1 kV | |
| DS72R-400 | 230V Single phase | IT | ● | | 140 kA | 1.8 kV | 1 |
| DS72R-230 | 230V Single phase | TT-TN | ● | | 140 kA | 1.4 kV | |
| DS72R-120 | 120 V Single phase | TN | ● | | 140 kA | 1 kV | |





I_{max}
40 kA

Type 2 AC power Surge Protector

DS40

A30



DS40 Type 2 AC Surge Protectors are used mainly for primary protection of single and 3-Phase networks at the main electrical panel. They provide common-mode (between L and PE) or common and differential mode (L/PE and L/N) when associated with DS40G (DS4x-xxx/G version). They are available in one-phase, single-phase, three-phase, and three-phase+neutral versions.

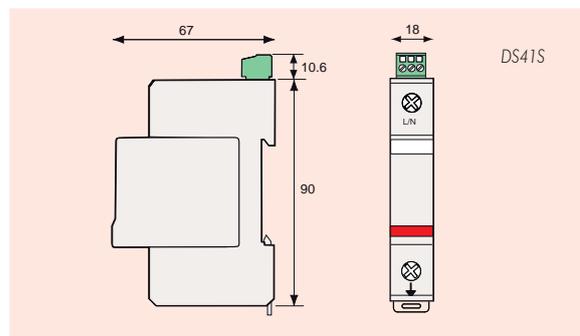
The DS40 impulse discharge capability classifies this SPD as regular Type 2, useful in case of medium lightning density areas. IEC60364 standard requests Type 2 SPD at the entrance of installation if the keraunic level $N_k > 25$.

This SPD is based on high energy varistor equipped with thermal disconnecter and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS4*S).

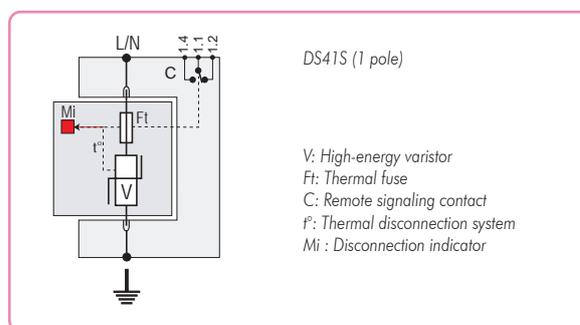
The DS40 is available for a large range of AC voltages. The DS40 is DIN rail compatible and is built with a plug-in module (DSM40-xxx) and a fixed base, which allows an easy and fast maintenance.

- Type 2 AC Surge Protector
- Discharge currents : I_n : 20 kA / I_{max} : 40 kA
- Pluggable module for each phase
- Remote signaling option
- IEC 61643-1 and EN 61643-11 compliance

Dimensions (in mm)



Electrical diagram



Characteristics

| CITEL part number | DS41-400 | DS41-230 | DS41-120 |
|---|--|---|----------|
| Network | 230/400V | 230/400V | 120/208V |
| Max. operating voltage | U_c 400 Vac | 255 Vac | 150 Vac |
| Temporary overvoltage withstand | U_T 400 Vac | 255 Vac | 150 Vac |
| Operating current | I_c < 1 mA | < 1 mA | < 1 mA |
| Leakage current at U_c | | | |
| Follow current | I_f none | none | none |
| Nominal discharge current | I_n 20 kA | 20 kA | 20 kA |
| 15 x 8/20 μ s impulse | | | |
| Maximum discharge current | I_{max} 40 kA | 40 kA | 40 kA |
| max. withstand 8/20 μ s | | | |
| Protection level (at I_n) | U_p 1.8 kV | 1.25 kV | 0.9 kV |
| Residual voltage at 10 kA | 1.5 kV | 1.1 kV | 0.7 kV |
| Residual voltage at 5 kA | 1.3 kV | 0.9 kV | 0.6 kV |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A |
| Associated disconnection devices | | | |
| Thermal disconnector | internal | | |
| Fuses | Fuses type gG - 50 A max. (see Note 1) | | |
| Installation ground fault breaker | Type «S» or delayed | | |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 4-25 mm ² / by bus | | |
| Disconnection indicator | 1 mechanical indicator | | |
| Remote signaling of disconnection | Option DS40S - output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic UL94-V0 | | |
| Standards compliance | | | |
| EN 61643-11 | Europe | Low Voltage SPD - Class II Test | |
| IEC 61643-1 | International | Low Voltage SPD - Class II Test | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 125 A). For further information, please consult product instructions..



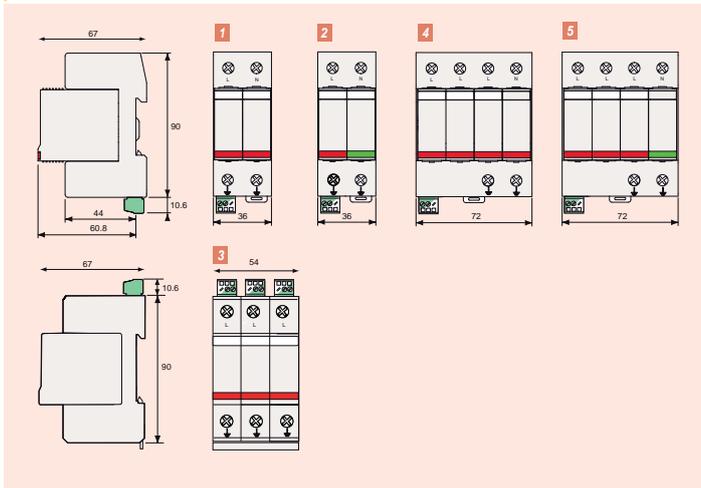
Type 2 AC power Multipolar Surge Protector

DS42

DS43

DS44

Dimensions and Diagram



A31

The DS40 surge protectors are designed to be used in a multipolar configuration to protect single-phase, 3-phase or 3-phase+neutral AC networks. They are sometimes associated with dedicated N/PE surge protector based on gas tube technology (DS40G).

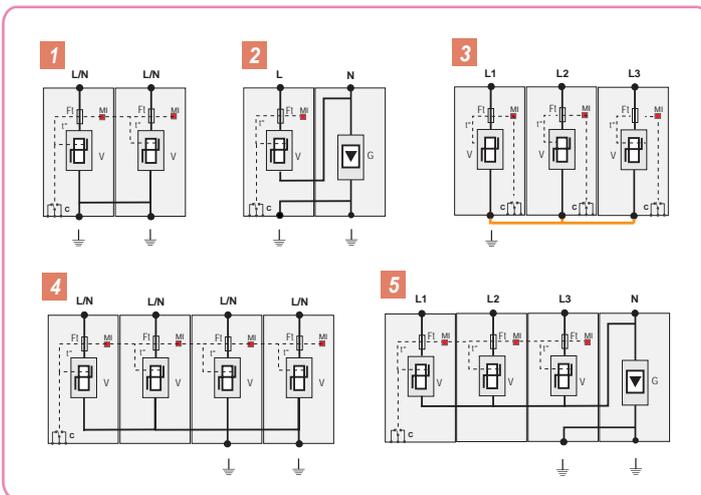
2 possible configurations :

Common mode : CT1 configuration

DS40 surge protectors are connected between line(s), Neutral and protective wire (PE).

Common and Differential mode : CT2 configuration

DS40 surge protectors are connected between line(s) and Neutral to provide differential mode protection. A specific surge protector DS40G is connected between Neutral and Protective wire (PE) for common mode protection. This configuration provides the highest efficiency.



| Part Number | Network | AC system | Protection mode | | Imax total | Up L/PE | Up L/N | Diagram |
|-------------|---------------------|-----------|-----------------|--------------|------------|---------|---------|---------|
| | | | common | differential | | | | |
| DS44-230/G | 230/400 V 3-phase+N | TT-TN | ● | ● | 40 kA | 1.5 kV | 1.25 kV | 5 |
| DS44-120/G | 120/208 V 3-phase+N | TT-TN | ● | ● | 40 kA | 1.5 kV | 0.9 kV | |
| DS44-400 | 230/400 V 3-phase+N | IT | ● | | 160 kA | 1.8 kV | - | 4 |
| DS44-230 | 230/400 V 3-phase+N | TN | ● | | 160 kA | 1.25 kV | - | |
| DS44-120 | 120/208 V 3-phase+N | TN | ● | | 160 kA | 0.9 kV | - | |
| DS43-400 | 400 V 3-phase | IT-TT-TNC | ● | | 120 kA | 1.8 kV | - | 3 |
| DS43-230 | 400 V 3-phase | TNC | ● | | 120 kA | 1.25 kV | - | |
| DS43-120 | 208 V 3-phase | TNC | ● | | 120 kA | 0.9 kV | - | |
| DS42-230/G | 230 V Single phase | TT-TN | ● | ● | 40 kA | 1.5 kV | 1.25 kV | 2 |
| DS42-120/G | 120 V Single phase | TN | ● | ● | 40 kA | 1.5 kV | 0.9 kV | |
| DS42-400 | 230V Single phase | IT | ● | | 80 kA | 1.8 kV | - | 1 |
| DS42-230 | 230V Single phase | TN | ● | | 80 kA | 1.25 kV | - | |
| DS42-120 | 120 V Single phase | TN | ● | | 80 kA | 0.9 kV | - | |

*) or DS4x-320x (e.g: DS44-320/G) in case of possible temporary voltages (bad quality AC voltage or supply by AC generator set).



**Imax
10 kA**

Type 2 AC power Surge Protector

DS10

A32



DS135-400

DS10 Type 2 AC Surge Protectors are used mainly for primary protection of single and 3-Phase networks at the main electrical panel. They provide common-mode (between L and PE) or common and differential mode (L/PE and L/N) when associated with DS40G. They are available in one-phase, single-phase, three-phase, and three-phase+neutral versions.

The DS10 impulse discharge capability classifies this SPD as secondary Type 2 or Type 3, useful downstream a Type 2 SPD (e.g. DS40) to protect a remote or sensitive equipment.

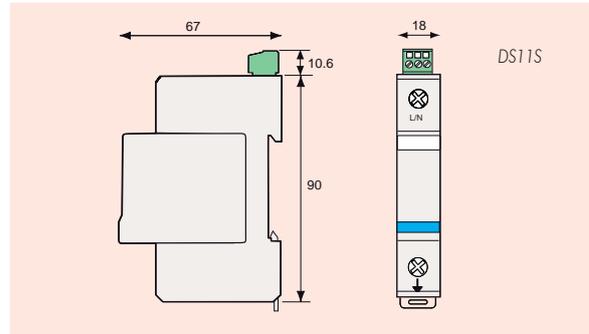
This SPD is based on high energy Varistor equipped with thermal disconnecter and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS1*S).

The DS10 is available for a large range of AC voltages.

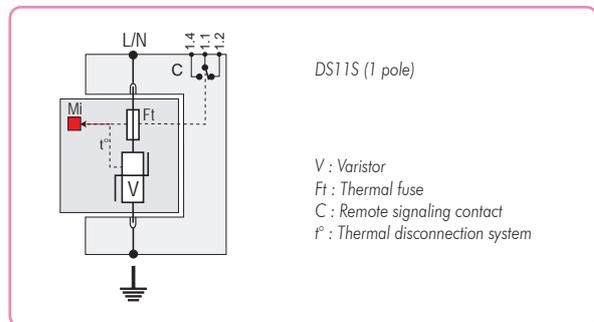
The DS10 is DIN rail compatible and is built with plug-in modules (DSM10-xxx) and a fixed base, which allows an easy and fast maintenance.

- **Type 2 (or 3) Surge Protector**
- **Discharge current : I_n : 5 kA/ I_{max} : 10 kA**
- **Pluggable module by phase**
- **Remote signaling option**
- **IEC 61643-1 and EN 61643-11 compliance**

Dimensions (in mm)



Electrical diagram



Characteristics

| CITEL part number | DS11-400 | DS11-230 | DS11-120 |
|--|--|--|----------|
| Single phase network | 230/400V | 230/400V | 120/208V |
| Neutral configuration | TT-IT | TN | TN |
| Max. operating voltage U_c | 400 Vac | 255 Vac | 150 Vac |
| Temporary overvoltage withstand U_T | 400 Vac | 255 Vac | 150 Vac |
| Operating current I_c | < 1 mA | < 1 mA | < 1 mA |
| <i>Leakage current at U_c</i> | | | |
| Follow current I_f | none | none | none |
| Nominal discharge current I_n | 5 kA | 5 kA | 5 kA |
| <i>15 x 8/20 μs impulses</i> | | | |
| Maximum discharge current I_{max} | 10 kA | 10 kA | 10 kA |
| <i>max. withstand 8/20 μs</i> | | | |
| Protection level (at I_n) U_p | 1.3 kV | 0.9 kV | 0.6 kV |
| Combination waveform test U_{oc} | 10 kV | 10 kV | 10 kV |
| <i>Class III test</i> | | | |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A |
| Associated disconnection devices | | | |
| Thermal disconnecter | internal | | |
| Fuses | Fuses type gG - 20 A max. (see Note 1) | | |
| Installation ground fault breaker | Type «S» or delayed | | |
| Mechanical characteristics | | | |
| Dimensions | See diagram | | |
| Connection | by screw terminals : 4-25 mm ² / by bus | | |
| Disconnection indicator | 1 mechanical indicator by pole | | |
| Remote signaling of disconnection | Option DS10S - output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic UL94-V0 | | |
| Standards compliance | | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II et III | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II and III | |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class II and III | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

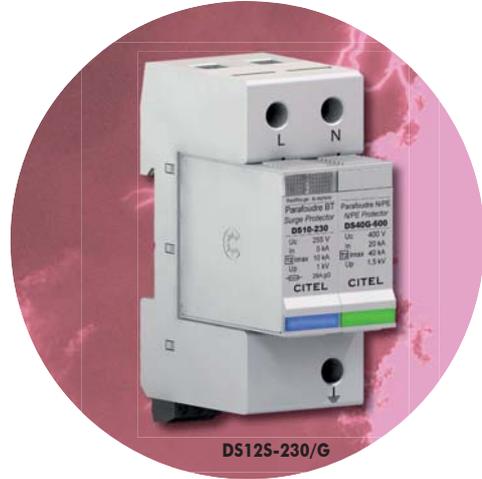
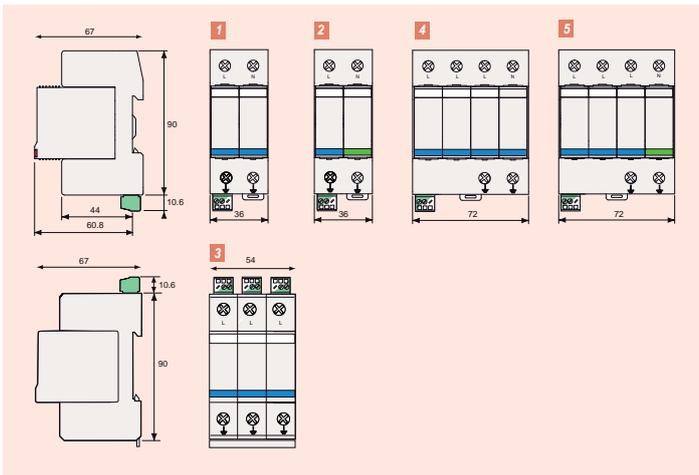
Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 40 A). For further information, please consult product instructions.



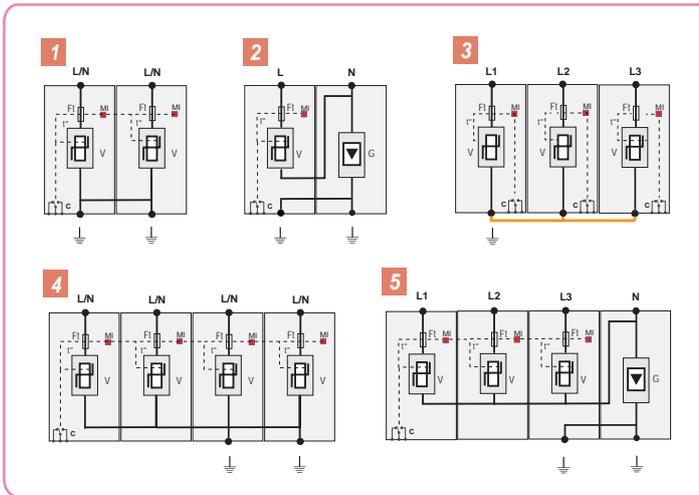
Type 2 AC power Multipolar Surge Protector

DS12
DS13
DS14

Dimensions and Diagram



A33



The DS10 surge protectors are designed to be used in a multipolar configuration to protect single-phase, 3-phase or 3-phase+neutral AC networks. They are sometimes associated with dedicated N/PE surge protector based on gas tube technology (DS40G).

2 possible configurations :

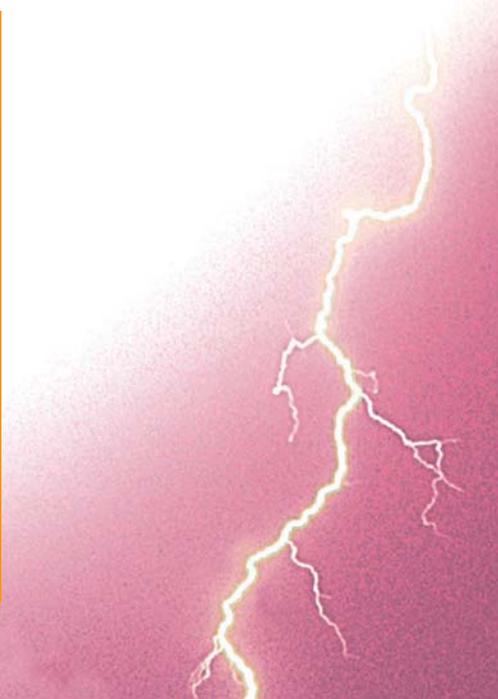
Common mode : CT1 configuration

DS10 surge protectors are connected between line(s), Neutral and protective wire (PE).

Common and Differential mode : CT2 configuration

DS10 surge protectors are connected between line(s) and Neutral to provide differential mode protection. A specific surge protector DS40G is connected between Neutral and Protective wire (PE) for common mode protection. This configuration provides the highest efficiency.

| Part number | Network | AC system | Protection mode | | Imax total | Up L/PE | Up L/N | Diagram |
|-------------|---------------------|-----------|-----------------|--------------|------------|---------|--------|---------|
| | | | common | differential | | | | |
| DS14-230/G | 230/400 V 3-phase+N | TT-TN | ● | ● | 40 kA | 1.5 kV | 0.9 kV | 5 |
| DS14-120/G | 120/208 V 3-phase+N | TT-TN | ● | ● | 40 kA | 1.5 kV | 0.6 kV | |
| DS14-400 | 230/400 V 3-phase+N | IT | ● | | 40 kA | 1.3 kV | - | 4 |
| DS14-230 | 230/400 V 3-phase+N | TN | ● | | 40 kA | 0.9 kV | - | |
| DS14-120 | 120/208 V 3-phase+N | TT-TN | ● | | 40 kA | 0.6 kV | - | |
| DS13-400 | 400 V 3-phase | IT-TT | ● | | 30 kA | 1.3 kV | - | 3 |
| DS13-230 | 400 V 3-phase | TNC | ● | | 30 kA | 0.9 kV | - | |
| DS13-120 | 208 V 3-phase | TNC | ● | | 30 kA | 0.6 kV | - | |
| DS12-230/G | 230 V Single phase | TT-TN | ● | ● | 20 kA | 1.5 kV | 0.9 kV | 2 |
| DS12-120/G | 120 V Single phase | TN | ● | ● | 20 kA | 1.5 kV | 0.6 kV | |
| DS12-400 | 230V Single phase | IT | ● | | 20 kA | 1.3 kV | - | 1 |
| DS12-230 | 230V Single phase | TN | ● | | 20 kA | 0.9 kV | - | |
| DS12-120 | 120 V Single phase | TN | ● | | 20 kA | 0.6 kV | - | |





**Imax
40 kA**

Type 2 N/PE Surge Protector DS40G

A34



This Type 2 AC surge protector is designed to be associated with a DS10 or DS40 surge protector to order to provide a common and differential mode protection, following the CT2 configuration (IEC 60364-5-534). refer pages A31 and A33.

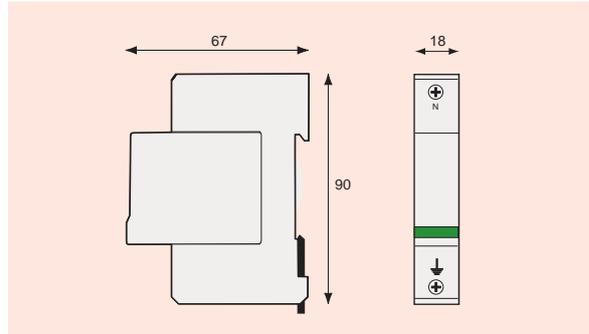
The DS40G is connected only between Neutral wire (N) and Protective Earth wire (PE).

The internal protection component is a specific gas tube which allows high discharge current in 8/20µs waveform and low residual voltages.

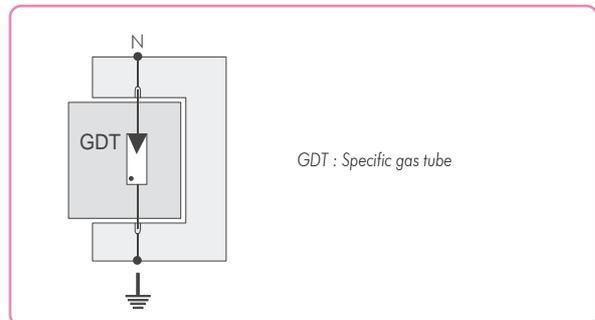
The DS40G is made with a fixed base and a plug-in module in order to comply mechanically with the DS10/DS40 range.

- Type 2 N/PE surge protectors
- DS40/DS10 series compliance
- Discharge currents : In : 20 kA/Imax : 40 kA
- Plug-in or non pluggable
- Comply IEC 61643-1 and EN 61643-11

Dimensions (in mm)



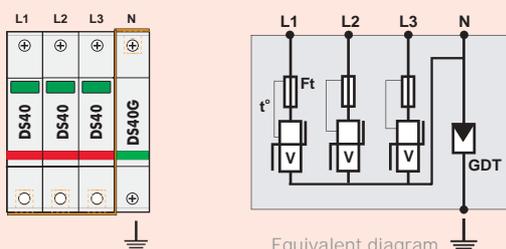
Electrical diagram



Characteristics

| CITEL part number | | DS40G-600 |
|----------------------------------|---------------|---|
| Network | | 230/400V or 120/208V |
| Maximum operating voltage | Uc | 255 Vac |
| Temporary overvoltage withstand | UT | 400 Vac |
| Operating current | Ic | none |
| <i>Leakage current at Uc</i> | | |
| Follow current interruption | Ifi | > 100 A |
| Nominal discharge current | In | 20 kA |
| <i>15 x 8/20 µs impulses</i> | | |
| Maximum discharge current | Imax | 40 kA |
| <i>max withstand 8/20 µs</i> | | |
| Protection level (at In) | Up | 1.5 kV |
| Admissible short-circuit current | | 25000 A |
| Mechanical characteristics | | |
| Configuration | | Pluggable |
| Dimensions | | See diagram |
| Connection | | by screw terminal : 4-25 mm ² / by bus |
| Mounting | | symmetrical rail 35 mm |
| Operating temperature | | -40/+85 °C |
| Protection class | | IP20 |
| Housing material | | Thermoplastic UL94-V0 |
| Standards compliance | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II |
| EN 61643-11 | Europe | Parafoudre Basse Tension - Essais Classe II |

DS40G+DS40 association (DS44-230/G)



Equivalent diagram



Abstract

Type 2 Multipolar Surge Protectors

Type 2 surge protectors are designed to be installed at the origin of the AC power installations. They are necessary to protect sensitive equipment connected to AC network against indirect effects of lightning. Following the different national electrical codes, these SPDs can be recommended practices or mandatory requirements.

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

- I_{max} by pole : 10 and 70 kA (8/20 μs)
- Total I_{max} : up to 240 kA
- Single, 3 or 3-Phase+Neutral AC network
- 230/400 V or 120/208 V AC network
- All AC system types
- Common mode protection (CT1 configuration) or Common and Differential mode protection (CT2 configuration).

These multipolare SPDs are based on single-pole surge protectors with internal MOVs, associated for CT2 configuration with N/PE gas tube surge protector.

These SPDs comply IEC 61643-1 standard, Class II test.

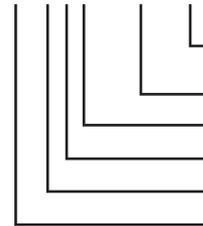
These Multipolar surge protectors fit on DIN rail.

To meet standards, they include thermal disconnection mechanisms, fault indicators and internal microswitches for remote signaling (option).

In case of failure indication, the multipolar configuration based on unipolar modules allows a cost effective maintenance by replacing only the defective element.

Part number information

DS44S-230/G



- « S » = CT1 configuration (common mode)
- « G » = CT2 configuration (common and differential mode)
- Operating voltage
- « S » = Remote signal option
- Number of protected poles
- I_{max} : « 1 » = 10 kA ; « 4 » = 40 kA ; « 7 » = 70 kA
- « DS » = Plug-in



| Red 230/400V | Red 120/208V | Protection mode | | Type of network | AC system | I _{max} by pole | Voltage Up network 230/400 V | | Voltage Up network 120/208 V | |
|-----------------|-----------------|-----------------|--------------|-----------------|-----------|--------------------------|------------------------------|----------|------------------------------|----------|
| | | common | differential | | | | at In | at 5 kA* | at In | at 5 kA* |
| | | | | | | | | | | |
| DS42-230/G | DS42-120/G | ● | ● | Single phase | TT-TN | 40 kA | 1.5 kV | 1 kV | 0.9 kV | 0.6 kV |
| DS12-230/G | DS12-120/G | ● | ● | Single phase | TT-TN | 10 kA | 1 kV | 1 kV | 0.6 kV | 0.6 kV |
| DS72R-400 | - | ● | | Single phase | IT-TT-TN | 70 kA | 2.5 kV | 1.3 kV | - | - |
| DS42-400 | - | ● | | Single phase | IT-TT-TN | 40 kA | 2 kV | 1.5 kV | - | - |
| DS12-400 | - | ● | | Single phase | IT-TT-TN | 10 kA | 1.5 kV | 1.5 kV | - | - |
| DS72R-230 | DS72R-120 | ● | | Single phase | TN | 70 kA | 2 kV | 0.8 kV | 1 kV | 0.5 kV |
| DS42-230 | DS42-120 | ● | | Single phase | TN | 40 kA | 1.5 kV | 1 kV | 0.9 kV | 0.6 kV |
| DS12-230 | DS12-120 | ● | | Single phase | TN | 10 kA | 1 kV | 1 kV | 0.6 kV | 0.6 kV |
| DS73R-400 | - | ● | | 3-phase | IT-TNC | 70 kA | 2.5 kV | 1.3 kV | - | - |
| DS43-400 | - | ● | | 3-phase | IT-TNC | 40 kA | 2 kV | 1.5 kV | - | - |
| DS13-400 | - | ● | | 3-phase | IT-TNC | 10 kA | 1.5 kV | 1.5 kV | - | - |
| DS73R-230 | DS73R-120 | ● | | 3-phase | TNC | 70 kA | 2 kV | 0.8 kV | 1 kV | 0.5 kV |
| DS43-230 | DS43-120 | ● | | 3-phase | TNC | 40 kA | 1.5 kV | 1 kV | 0.9 kV | 0.6 kV |
| DS13-230 | DS13-120 | ● | | 3-phase | TNC | 10 kA | 1 kV | 1 kV | 0.6 kV | 0.6 kV |
| DS44-230/G | DS44-120/G | ● | ● | 3-phase + N | TT-TNS | 40 kA | 1.5 kV | 1 kV | 0.9 kV | 0.6 kV |
| DS14-230/G | DS14-120/G | ● | ● | 3-phase + N | TT-TNS | 10 kA | 1 kV | 1 kV | 0.6 kV | 0.6 kV |
| DS74R-400 | - | ● | | 3-phase + N | IT-TT-TNS | 70 kA | 2.5 kV | 1.3 kV | - | - |
| DS44-400 | - | ● | | 3-phase + N | IT-TT-TNS | 40 kA | 2 kV | 1.5 kV | - | - |
| DS12-400 | - | ● | | 3-phase + N | IT-TT-TNS | 10 kA | 1.5 kV | 1.5 kV | - | - |
| DS74R-230 | DS74R-120 | ● | | 3-phase + N | TNS | 70 kA | 2 kV | 0.8 kV | 1 kV | 0.5 kV |
| DS44-230 | DS44-120 | ● | | 3-phase + N | TNS | 40 kA | 1.5 kV | 1 kV | 0.9 kV | 0.6 kV |
| DS14-230 | DS14-120 | ● | | 3-phase + N | TNS | 10 kA | 1 kV | 1 kV | 0.6 kV | 0.6 kV |





**Imax
40 kA**

Single and 3-Phase AC Surge Protectors

DUT40 - DUM40

A36



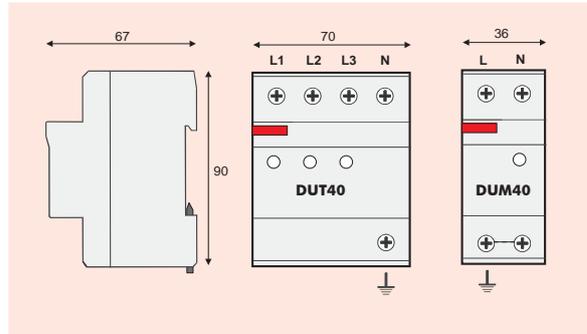
DUT40 (3-Phase) and DUM40 (Single Phase) Type 2 surge protectors are used to protect sensitive equipment, connected to AC network, against transient surge voltages due to lightning. The technology used is an association of gas tube and varistors equipped with thermal disconnectors and operating indicators.

DUT40 and DUM40 are installed at the entrance of the AC network, in the main electrical panel, and protect the whole electrical installation. Nevertheless they could be associated with a secondary stage of surge protectors (DUT10, DS210D..) close by the sensitive and remote equipment.

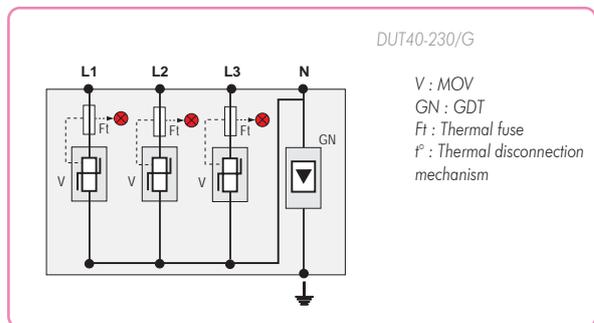
These surge protectors provide common and differential mode protection with a maximum discharge current of 40 kA.

- **3-Phase and Single phase Surge Protector**
- **Type 2 monobloc**
- **Discharge currents: In: 15 kA / Imax: 40 kA**
- **Common/Differential mode**
- **Protection levels Up: 2/1.5 kV**
- **Disconnection indicators**
- **IEC 61643-1 and EN 61643-11 compliance**

Dimensions (in mm)



Electrical diagram



Characteristics

| AC network | 230/400V | 120/208 V |
|---|---------------------------------------|---|
| 3-phase version | DUT40-230/G | DUT40-120/G |
| Single phase version | DUM40-230/G | DUM40-120/G |
| AC system | TN - TT | TN - TT |
| Max. operating voltage | Uc 255 Vac | 150 Vac |
| Temporary overvoltage withstand | U _T 400 Vac | 150 Vac |
| Operating current | Ic none | none |
| Leakage current at U _c | | |
| Follow current | I _f none | none |
| Nominal discharge current | I _n 15 kA | 15 kA |
| 15 x 8/20 μs impulses | | |
| Maximum discharge current | I _{max} 40 kA | 40 kA |
| max. withstand 8/20 μs | | |
| Protection level (at I _n) | U _p 2 kV/ 1.5 kV (MC/MD) | 1.5 kV/ 1 kV (MC/MD) |
| Admissible short-circuit current | 10000 A | 10000 A |
| Associated disconnection devices | | |
| Thermal disconnector | internal | |
| Fuses | gG type - 50 A max. (see Note 1) | |
| Installation ground fault breaker | «S» type or delayed | |
| Mechanical characteristics | | |
| Dimensions | Voir drawing | |
| Connection to AC network | screw terminal : 4-35 mm ² | |
| Disconnection indicators | Red light(s) on | |
| Remote signaling of disconnection | none | |
| Mounting | symmetrical rail 35 mm | |
| Operating temperature | -40/+85 °C | |
| Protection class | IP20 | |
| Housing material | Thermoplastic UL94-V0 | |
| Standards compliance | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class II |
| UL1449 ed.2 | USA | Low Voltage TVSS |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 125 A). For further information, please consult product instructions.



**I_{max}
40 kA**

1-phase Type 2 AC power Surge Protector DS240



The DS240 Type 2 surge protectors are compact devices designed to protect single phase networks at the main switchboard. They provide a common mode protection.

DS240 are available for 230V or 120V AC network and the different distribution systems (TN, TT, IT).

This SPD is based on high energy varistor equipped with thermal disconnectors and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS240S).

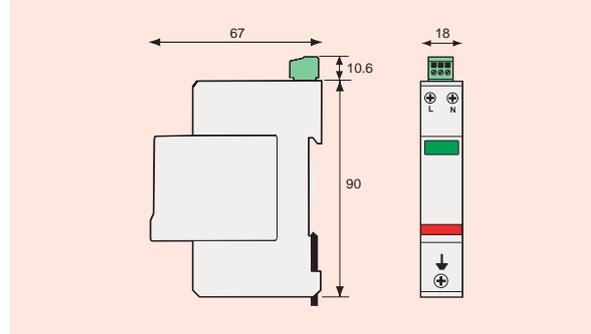
The DS240 is DIN rail compatible and is built with a plug-in module and a fixed base, which allows an easy and fast maintenance.

Surge protection of 3-Phase AC network is also possible by association of two DS240s (L1 and L2 connected on the first one, L3 and N connected on the second one, and earthing interconnection of both SPDs).

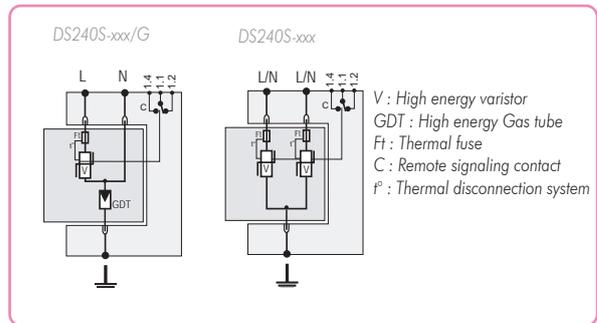
- Compact single-phase Type 2 SPD
- Discharge currents : I_n : 20 kA / I_{max} : 40 kA
- Common/Differential mode
- Pluggable module
- Remote signaling contact (option)
- Complies with EN 61643-11 and IEC 61643-1

| Part number available | Network | Neutral configuration | Protection mode | | Remote signaling |
|-----------------------|--------------------|-----------------------|-----------------|--------------|------------------|
| | | | common | differential | |
| DS240-230/G | 230 V Single phase | TT-TN | • | • | |
| DS240S-230/G | 230 V Single phase | TT-TN | • | • | • |
| DS240-400 | 230 V Single phase | IT | • | | |
| DS240S-400 | 230 V Single phase | IT | • | | • |
| DS240-230 | 230 V Single phase | TN | • | | |
| DS240S-230 | 230 V Single phase | TN | • | | • |
| DS240-120/G | 120 V Single phase | TT-TN | • | • | |
| DS240S-120/G | 120 V Single phase | TT-TN | • | • | • |
| DS240-120 | 120 V Single phase | TT-TN | • | | |
| DS240S-120 | 120 V Single phase | TT-TN | • | | • |

Dimensions (in mm)



Electrical diagram



Characteristics

| CITEL part number | DS240-400 | DS240-230/G | DS240-120/G |
|---|--|---|----------------|
| Single-phase network | 230 V | 230 V | 120 V |
| Neutral configuration | TT-TN-IT | TN | TN |
| Max. operating voltage | U _c 400 Vac | 255 Vac | 150 Vac |
| Temporary overvoltage withstand | U _T 400 Vac | 255 Vac | 150 Vac |
| Operating current | I _c < 1 mA | < 1 mA | < 1 mA |
| <i>Leakage current at U_c</i> | | | |
| Protection mode(s) | MC (2) | MC/MD (2) | MC/MD (2) |
| Nominal discharge current | I _n 20 kA | 20 kA | 20 kA |
| <i>15 x 8/20 μs impulses</i> | | | |
| Maximum discharge current | I _{max} 40 kA | 40 kA | 40 kA |
| <i>max. withstand 8/20 μs</i> | | | |
| Protection level (at I _n) | U _p 1.8 kV | 1.5/1.25 kV (2) | 1.5/0.9 kV (2) |
| Residual voltage at 5 kA | 1.3 kV | 0.9 kV | 0.6 kV |
| Admissible short-circuit current | 10000 A | 10000 A | 10000 A |
| Associated disconnection devices | | | |
| Thermal disconnector | internal | | |
| Fuses | Fuses type gG - 50 A max. (see Note 1) | | |
| Installation ground fault breaker | Type «S» or delayed | | |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 1,5-10 mm ² (L/N) or 2,5-25 mm ² (PE) | | |
| Disconnection indicator | 2 mechanical indicators | | |
| Remote signaling of disconnection | Option DS240S - output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic UL94-V0 | | |
| Standards compliance | | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II | |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

Note 1 : Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 125 A). For further information, please consult product instructions.

Note 2 : MC = Common mode (L/PE or N/PE) / MD = Differential mode (L/N)



**Imax
10 kA**

Single and 3-Phase AC Surge Protectors

DUT10 - DUM10

A38

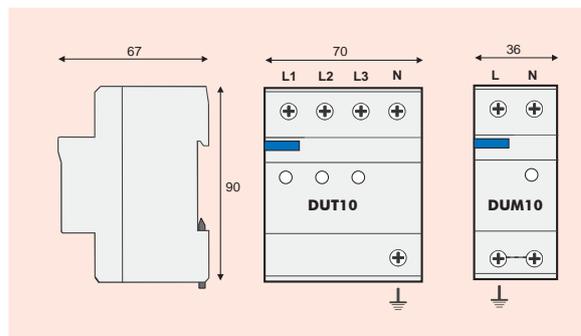


DUT10 (3-Phase) and DUM10 (Single Phase) Type 2 surge protectors are used to protect sensitive equipment, connected to AC network, against transient surge voltages due to lightning. The technology used is an association of gas tube and varistors equipped with thermal disconnectors and operating indicators.

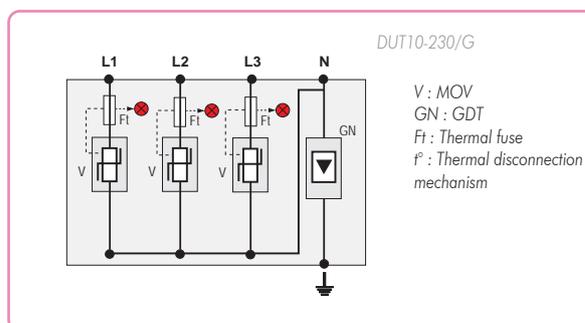
DUT10 and DUM10 are installed close by the sensitive equipment, in the distribution panel. They have to be used downstream a primary SPD (DS40, DUT40...) located in the main electrical panel. These surge protectors provide common and differential mode protection with a maximum discharge current of 40 kA. These SPDs could be also classified as Type 3 following IEC 61643-1

- 3-Phase and Single phase Surge Protector
- Type 2 (or 3) monobloc
- Discharge currents: In: 5 kA / I_{max}: 10 kA
- Common/Differential mode
- Protection levels Up: 1.5/1 kV
- Disconnection indicators
- IEC 61643-1 and EN 61643-11 compliance

Dimensions (in mm)



Electrical diagram



Characteristics

| AC network | 230/400V | 120/208 V |
|---|---------------------------------------|---|
| 3-phase version | DUT10-230/G | DUT10-120/G |
| Single phase version | DUM10-230/G | DUM10-120/G |
| AC system | TN - TT | TN - TT |
| Max. operating voltage | U _c 255 Vac | 150 Vac |
| Temporary overvoltage withstand | U _T 400 Vac | 150 Vac |
| Operating current | I _c none | none |
| Leakage current at U _c | | |
| Follow current | I _f none | none |
| Nominal discharge current | I _n 5 kA | 5 kA |
| 15 x 8/20 μs impulses | | |
| Maximum discharge current | I _{max} 10 kA | 10 kA |
| max. withstand 8/20 μs | | |
| Protection level (at I _n) | U _p 1.5 kV/ 1 kV (MC/MD) | 1.5 kV/0.6 kV (MC/MD) |
| Admissible short-circuit current | 10000 A | 10000 A |
| Associated disconnection devices | | |
| Thermal disconnector | internal | |
| Fuses | gG type - 20 A max. (see Note 1) | |
| Installation ground fault breaker | «S» type or delayed | |
| Mechanical characteristics | | |
| Dimensions | Voir drawing | |
| Connection to AC network | screw terminal : 4-35 mm ² | |
| Disconnection indicators | Red light(s) on | |
| Remote signaling of disconnection | none | |
| Mounting | symmetrical rail 35 mm | |
| Operating temperature | -40/+85 °C | |
| Protection class | IP20 | |
| Housing material | Thermoplastic UL94-V0 | |
| Standards compliance | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class II |
| UL1449 ed.2 | USA | Low Voltage TVSS |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 40 A). For further information, please consult product instructions.



**I_{max}
15 kA**

1-phase Type 2 AC power Surge Protector DS215

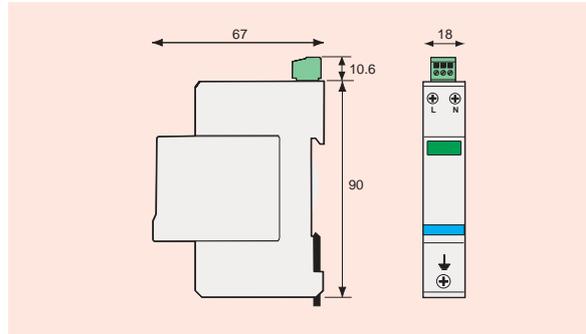


The DS215 Type 2 surge protectors are compact devices designed to protect single phase networks at the main switchboard. They provide a common mode protection. DS215 are available for 230V or 120V AC network and the different distribution systems (TN, TT, IT). This SPD is based on high energy varistor equipped with thermal disconnectors and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS215S). The DS215 is DIN rail compatible and is built with a plug-in module and a fixed base, which allows an easy and fast maintenance.

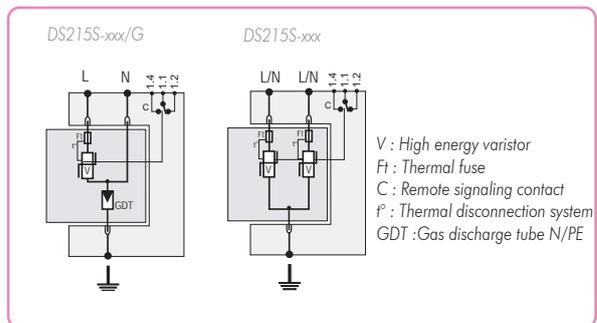
- Compact single-phase Type 2 SPD
- Discharge currents : I_n : 5 kA / I_{max} : 15 kA
- Common/Differential mode
- Pluggable module
- Remote signaling contact (option)
- IEC 61643-1 and EN 61643-11 compliance

| Part number available | Network | Neutral configuration | Protection mode | | Remote signaling |
|-----------------------|--------------------|-----------------------|-----------------|--------------|------------------|
| | | | common | differential | |
| DS215-230/G | 230 V Single phase | TT-TN | ● | ● | |
| DS215S-230/G | 230 V Single phase | TT-TN | ● | ● | ● |
| DS215-400 | 230 V Single phase | IT | ● | | |
| DS215S-400 | 230 V Single phase | IT | ● | | ● |
| DS215-230 | 230 V Single phase | TN | ● | | |
| DS215S-230 | 230 V Single phase | TN | ● | | ● |
| DS215-120/G | 120 V Single phase | TT-TN | ● | ● | |
| DS215S-120/G | 120 V Single phase | TT-TN | ● | ● | ● |
| DS215-120 | 120 V Single phase | TT-TN | ● | | |
| DS215S-120 | 120 V Single phase | TT-TN | ● | | ● |

Dimensions (in mm)



Electrical diagram



Characteristics

| CITEL part number | DS215-400 | DS215-230/G | DS215-120/G |
|---|--|---|----------------|
| Single-phase network | 230 V | 230 V | 120 V |
| Neutral configuration | TT-TN-IT | TN | TN |
| Max. operating voltage | U _c 400 Vac | 255 Vac | 150 Vac |
| Temporary overvoltage withstand | U _T 400 Vac | 255 Vac | 150 Vac |
| Operating current | I _c < 1 mA | << 1 mA | << 1 mA |
| Leakage current at U _c | | | |
| Protection Mode(s) | MC (2) | MC/MD (2) | MC/MD (2) |
| Nominal discharge current | I _n 5 kA | 5 kA | 5 kA |
| 15 x 8/20 μs impulses | | | |
| Maximum discharge current | I _{max} 15 kA | 15 kA | 15 kA |
| max. withstand 8/20 μs | | | |
| Protection level (at I _n) | U _p 1.3 kV | 1.5/0.9 kV (2) | 1.5/0.6 kV (2) |
| Residual voltage at 5 kA | 1.3 kV | 0.9 kV | 0.6 kV |
| Admissible short-circuit current | 10000 A | 10000 A | 10000 A |
| Associated disconnection devices | | | |
| Thermal disconnector | internal | | |
| Fuses | Fuses type gG - 20 A max. (see Note 1) | | |
| Installation ground fault breaker | Type «S» or delayed | | |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 1,5-10 mm ² (L/N) or 2,5-25 mm ² (PE) | | |
| Disconnection indicator | 2 mechanical indicators | | |
| Remote signaling of disconnection | Option DS215S - output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic UL94-V0 | | |
| Standards compliance | | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II | |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

Note 1 : Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 40 A). For further information, please consult product instructions.

Note 2 : MC = Common mode (L/PE or N/PE)/ MD = Differential mode (L/N)



**Imax
10 kA**

Single phase Type 2 AC Surge Protector

DS98

A40



DS98 AC surge protector is used for the 'secondary' protection of the single phase networks against the surge voltages created by lightning.

It is based on an association between a high energy gas tube and varistors. DS98 is equipped with an internal thermal safety which will disconnect the unit from the AC network in case of end of life. This disconnection will be indicated by the turn on of the red led in the front.

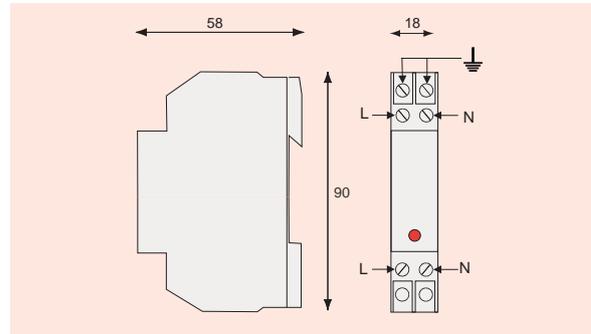
Very compact, the DS98 surge protector must be installed close by the equipment to protect, downstream a «primary» surge protector (e.g. DS40). DS98 provides both a common and differential mode protection.

These surge protectors can be classified as Type 2 or Type 3, following test class II or III from IEC 61643-1 standard.

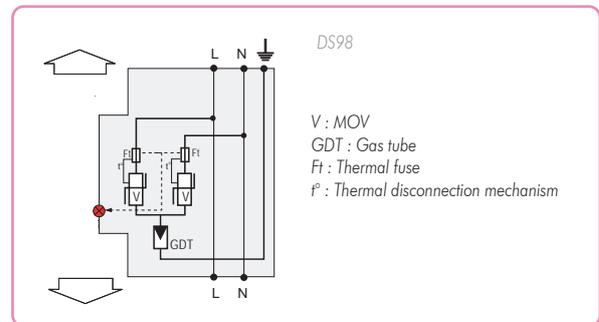
The electrical configuration of the DS98 allows a connection in parallel or series modes. In the last case, the maximum load current is 16 A.

- **Cost effective Single phase Surge Protector**
- **Type 2 (or 3) monobloc**
- **Discharge currents: In: 5 kA / Imax: 10 kA**
- **Common/Differential mode**
- **Series or parallel wiring**
- **IEC 61643-1 and EN 61643-11 compliance**

Dimensions (in mm)



Electrical diagram



Characterics

| CITEL part Number | DS98-400 | DS98-120 |
|---|---|--|
| Single Phase AC network | 230 V | 120 V |
| AC system | TN - TT - IT | TN - TT |
| Max. operating voltage | Uc 255 Vac | 150 Vac |
| TOV withstand | UT 400 Vac | 150 Vac |
| Max. load current <i>in case of series mounting</i> | IL 16 A | 16 A |
| Leakage current <i>Leakage current at Uc</i> | Ic without | without |
| Follow current | If without | without |
| Nominal discharge current <i>15 x 8/20 μs current impulse</i> | In 5 kA | 5 kA |
| Maximal discharge current <i>max. withstand in 8/20 μs impulse</i> | Imax 10 kA | 10 kA |
| Protection level (@ In) <i>Common mode/Differential mode</i> | Up 1.5 kV/ 1 kV | 0.7 kV/ 0.7 kV |
| Tenue en onde combinée <i>Test de classe III</i> | Uoc 10 kV | 10 kV |
| Admissible short circuit current | 10000 A | 10000 A |
| Associated disconnection devices | | |
| Thermal disconnector | internal | |
| Fuses | Fuse type gG - 20 A max. (see Note 1) | |
| RDC breaker (if any) | «S» Type or delayed | |
| Caractéristiques mécaniques | | |
| Dimensions | see diagram | |
| Connection to network | by screw terminal : 2,5 mm ² max | |
| Disconnection indicat | Red light on | |
| Mounting | symmetrical rail 35 mm | |
| Operating temperature | -40/+85 °C | |
| Protection class | IP20 | |
| housing material | Thermoplastic UL94-V0 | |
| Standard compliance | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II et III |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II et III |
| EN 61643-11 | Europe | Parafoudre Basse Tension - Essais Classe II et III |
| UL1449 ed.2 | USA | Low Voltage TVSS |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 40 A). For further information, please consult product instructions.

Note 2: MC = Common mode (L/PE or N/PE)/ MD = Differential mode (L/N)



**Imax
10 kA**

Single-Phase Surge Protector and Filter DS-HF



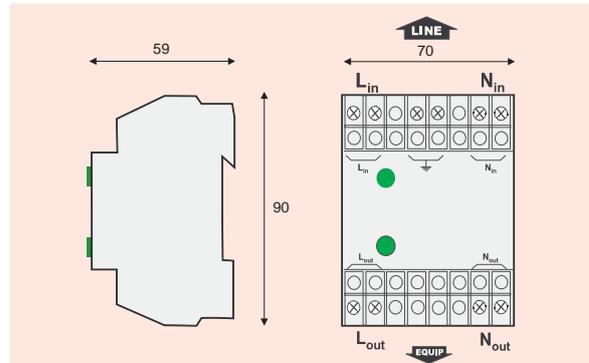
The DS-HF is a secondary Type 2 surge protector and RFI filter especially designed to protect sensitive equipment connected to single-phase networks.

The «surge protection» function is completed by RFI filtering : this combination of functions results in enhanced efficiency against transient overvoltages (improved protection level) and RF interferences.

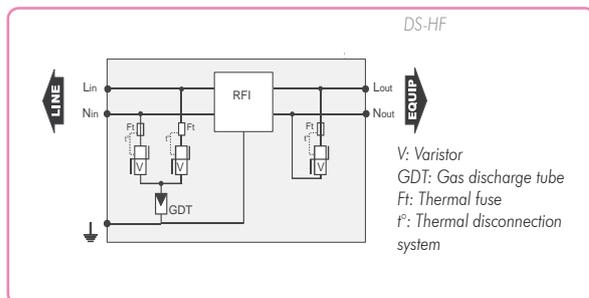
The DS-HF can be classified as secondary Type 2 or Type 3 SPD following IEC 61643-1. It is connected in series on AC network (maximum line current 16 A), downstream of a primary Type 2 SPD (e.g. DS40), installed in the main electrical switchboard, to protect a remote or sensitive equipment.

- **Surge protector with RFI filtering**
- **Discharge currents : In : 3kA / Imax : 10 kA**
- **Common and differential mode protection**
- **Low protection level**
- **Operating/disconnection indicators**
- **IEC 61643-1 and EN 61643-11 compliance**

Dimensions (in mm)



Electrical diagram



Characteristics

| CITEL part number | DS-HF | DS-HF-120 |
|---|---|--|
| Single-phase network | 230 V | 120 V |
| AC system | TN - TT - IT | TN - TT |
| Max. operating voltage | U _c 255 Vac | 150 Vac |
| Temporary overvoltage withstand | U _T 400 Vac | 150 Vac |
| Operating current | I _c < 1 mA | < 1 mA |
| leakage current at U _c | | |
| Max. line current | I _L 16 A | 16 A |
| Nominal discharge current | I _n 3 kA | 3 kA |
| 15 x 8/20 μs impulses | | |
| Maximum discharge current | I _{max} 10 kA | 10 kA |
| Max. withstand 8/20 μs | | |
| Protection level (CM/DM) | U _p 1 kV/ 0.8 kV | 0.6 kV/ 0.5 kV |
| Combination waveform test | U _{oc} 6 kV | 6 kV |
| Class III test | | |
| RFI filtering | 0.1 - 30 MHz | 0.1 - 30 MHz |
| Admissible short-circuit current | 10000 A | 10000 A |
| Associated disconnection devices | | |
| Thermal disconnecter | internal | |
| Fuses | Fuses type gG - 20 A max. (see Note 1) | |
| Installation ground fault breaker | Type «S» or delayed | |
| Mechanical characteristics | | |
| Dimensions | see diagram | |
| Connection | by screw terminals : 0,75 - 4 mm ² | |
| Voltage/operating indicator | Green led(s) on | |
| Disconnection indicator | Green led off | |
| Remote signaling of disconnection | none | |
| Mounting | symmetrical rail 35 mm | |
| Operating temperature | -40/+85 °C | |
| Protection class | IP20 | |
| Housing material | Thermoplastic UL94-V0 | |
| Standards compliance | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II et III |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II et III |
| EN 61643-11 | Europe | Low Voltage SPD - Test Class II and III |
| UL1449 ed.2 | USA | Low Voltage TVSS |

Note 1: Rating in compliance with nominal discharge current. In order to increase service continuity, higher rating can be used (up to 40 A). For further information, please consult product instructions.

A41



Coordination Inductors

DSH

A42



These coordination inductors are specially designed to control the implementation of the primary and secondary levels of DS surge protectors.

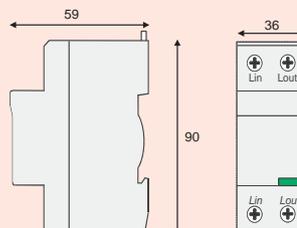
They are necessary where the coordination cannot be accomplished using the «natural» inductance of the active conductors (in particular in a small volume, where the length of line wire between primary SPD and secondary SPD is lower than 10 m).

DSH inductors are DIN rail compatible and are connected in series on the line to be protected and depend on the maximum line current.

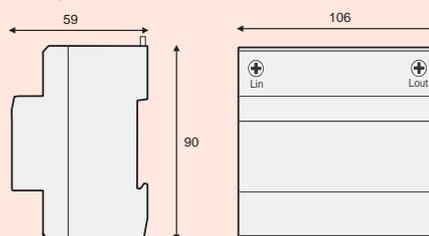
Several current values are available: 16A, 35A, 63A and 100 A.

Dimensions (in mm)

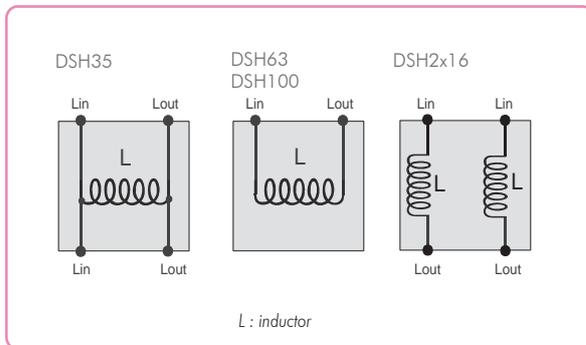
DSH35 - DSH2x16



DSH63 - DSH100



Electrical diagram



- Coordination inductors for Surge Protectors
- For use with the DS series
- 35A, 63A, 100A and 2 x 16A versions

Characteristics

| CITEL part number | DSH100 | DSH63 | DSH35 | DSH2x16 |
|-----------------------------------|---|-------------------------------------|-------------------------------------|-----------------------------------|
| Type | inductor | inductor | inductor | double inductor |
| Connexion mode | 1 DSH in series on each active wire | 1 DSH in series on each active wire | 1 DSH in series on each active wire | 1 DSH in series on 2 active wires |
| Max. operating voltage | Uc 500 Vac | 500 Vac | 500 Vac | 500 Vac |
| Max. line current | IL 100 A | 63 A | 35 A | 2 x 16 A |
| Line inductance | 15 μH | 15 μH | 15 μH | 2 x 15 μH |
| Mechanical characteristics | | | | |
| Dimensions | see diagram | | | |
| Connection | - by screw terminals : 6-35 mm ² (DSH2x16 and DSH35), 4-50 mm ² (DSH63 and DSH100) - by bus (DSH2x16 et DSH35) | | | |
| Mounting | symmetrical rail 35 mm | | | |
| Operating temperature | -40/+85 °C | | | |
| Protection class | IP20 | | | |
| Housing material | Thermoplastic UL94-V0 and UL94-5VA (DSH35-DSH2x16) | | | |



I_{max}
2-6 kA

DC power supply surge protector

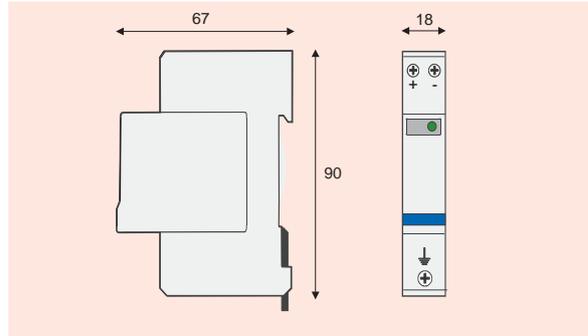
DS210..DC



The DS210..DC surge protector is designed to protect equipment connected to DC (and AC) power supplies from lightning surges. It is based on varistors matched to the network voltage (12, 24, 48, 75, 95, 110 and 130Vdc): the varistors have thermal disconnection devices to control any end-of-life case. A green LED that indicates «Power On» when lit and «Disconnection» when off, facilitates maintenance. In addition, the «surge protection» function is pluggable to make replacement simple and rapid (spare module : DSM210..DC).

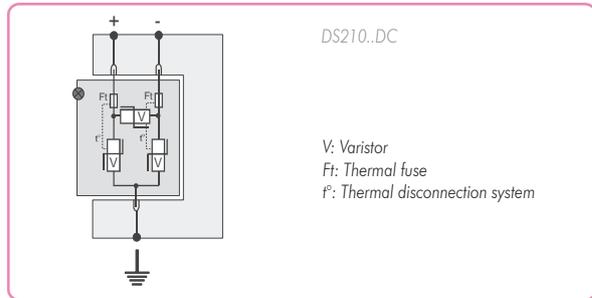
The DS210..DC is DIN rail compatible and is connected in parallel on the line to be protected.

Dimensions (in mm)



A43

Electrical diagram



- Surge protector for DC supplies
- From 12 to 130V
- Discharge currents : I_{max} : 2 to 6 kA
- Disconnection indicator
- Pluggable module

Characteristics

| CITEL part number | DS210-12DC | DS210-24DC | DS210-48DC | DS210-75DC | DS210-95DC | DS210-110DC | DS210-130DC |
|--|--|------------|------------|------------|------------|-------------|-------------|
| Nominal DC voltage | Un-dc 12 Vdc | 24 Vdc | 48 Vdc | 75 Vdc | 95 Vdc | 110 Vdc | 130 Vdc |
| Maximal AC voltage | Uc 10 Vac | 15 Vac | 40 Vac | 60 Vac | 75 Vac | 95 Vac | 115 Vac |
| Maximal DC voltage | Uc-dc 15 Vdc | 30 Vdc | 56 Vdc | 85 Vdc | 100 Vdc | 125 Vdc | 150 Vdc |
| Nominal discharge current <i>15 x 8/20 μs impulses</i> | In 1 kA | 1 kA | 1 kA | 2 kA | 2 kA | 2 kA | 2 kA |
| Maximum discharge current <i>Max. withstand 8/20 μs</i> | I _{max} 2 kA | 2 kA | 2 kA | 6 kA | 6 kA | 6 kA | 6 kA |
| Protection level (at In) | Up 85 V | 105 V | 180 V | 250 V | 300 V | 350 V | 400 V |
| Associated disconnection devices | | | | | | | |
| Thermal disconnector | internal | | | | | | |
| Fuses | Fuses type gG - 10 A | | | | | | |
| Mechanical characteristics | | | | | | | |
| Dimensions | see diagram | | | | | | |
| Connection | by screw terminals : 1.5-10 mm ² (active wires) - 2,5-25 mm ² (Ground) | | | | | | |
| Disconnection indicator | Green led off | | | | | | |
| Mounting | symmetrical rail 35 mm | | | | | | |
| Operating temperature | -40/+85 °C | | | | | | |
| Protection class | IP20 | | | | | | |
| Housing material | Thermoplastic UL94-V0 | | | | | | |

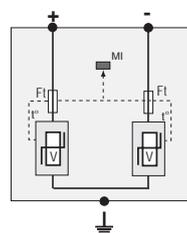
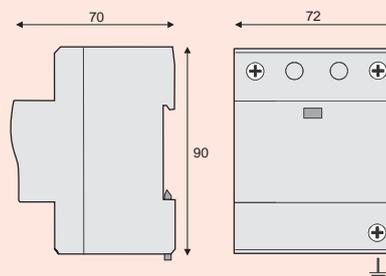


limp
12.5 kA

Type 1 Surge Protector for Photovoltaic

DS60PV

Dimensions and Diagram



V : High energy MOV
Ft : Thermal fuse
P : Thermal disconnection mechanism

DS60PV are Type 1 Heavy Duty Surge Protectors are designed to protect against lightning surge voltages in photovoltaic power supply networks. These units must be installed in parallel on the DC networks to be protected and provide common mode protection. These protectors are recommended when a direct lightning strike is possible on the installation.

The DS60PV is available for the main operating voltages in photovoltaic : 500 and 1000 Vdc.

The use of Type 1 surge protector is recommended at both ends of the DC power supply line (solar panel side and inverter/converter side) in case of risk of direct lightning strike on the installation.

The electrical diagram of the DS60PV is based on high energy MOVs equipped with specific thermal disconnectors, related failure indicators and contact for remote signaling (option). It is designed to conduct heavy lightning currents (10/350 μ s waveform) possible in case of direct strikes on installation.

The DS60PV is made with a monobloc enclosure and mounts on DIN rail.

Characteristics

| CITEL part number | DS60PV-500 | DS60PV-1000 |
|-----------------------------------|--|--|
| Nominal voltage network | 500 Vdc | 1000 Vdc |
| Max. operating voltage | Uc 550 Vdc | 1000 Vdc |
| Operating current | Ic < 1 mA | < 1 mA |
| Leakage current at Uc | | |
| Follow current | If none | none |
| Nominal discharge current | In 40 kA | 40 kA |
| 15 x 8/20 μ s impulses | | |
| Max. lightning current by pole | limp 12.5 kA | 12.5 kA |
| tenue max. 10/350 μ s | | |
| Residual voltage (at limp) | Ures 1.6 kV | 1.9 kV |
| Protection level (at In) | Up 1.7 kV | 2.4 kV |
| Associated disconnection | | |
| Thermal disconnector | internal | |
| Mechanical characteristics | | |
| Dimensions | See diagram | |
| Connection | by screw terminals : 6-35 mm ² / by bus | |
| Disconnection indicator | 1 mechanical indicator | |
| Remote signaling | output on changeover contact (option DS60PVS) | |
| Mounting | Symmetrical rail 35 mm | |
| Operating temperature | -40/+85 °C | |
| Protection class | IP20 | |
| Housing material | Thermoplastic PEI UL94-5VA | |
| Standards compliance | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe I et II |
| IEC 61643-1 | International | Low Voltage SPD - Test Class I and II |
| EN 61643-11 | Europe | Parafoudre Basse Tension - Essais Classe I et II |
| UL1449 ed.2 | USA | Low Voltage TVSS |

- **Type 1 SPD for Photovoltaic**
- **limp : 12,5 kA (10/350 μ s wave by pole)**
- **I_{total} : 25 kA (10/350 μ s wave)**
- **Internal disconnector, failure indicator**
- **Remote signal option**
- **Complies EN 61643-11, IEC 61643-1**

A44



**Imax
40 kA**

Type 2 Surge Protector for Photovoltaic DS50PV



DS50PV are Type 2 Surge Protectors are designed to protect against lightning surge voltages in photovoltaic power supply networks. These units must be installed in parallel on the DC networks to be protected and provide common and differential modes protection. The DS50PV is available for the main operating voltages in photovoltaic : 500, 800 and 1000 Vdc.

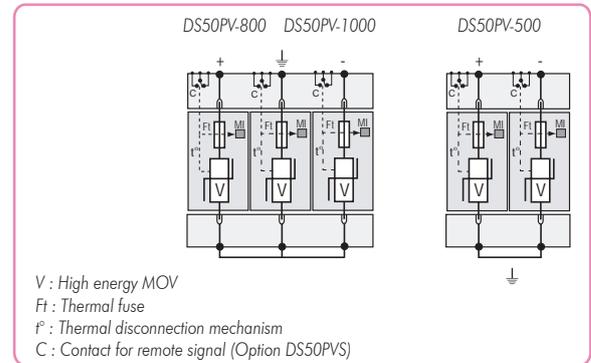
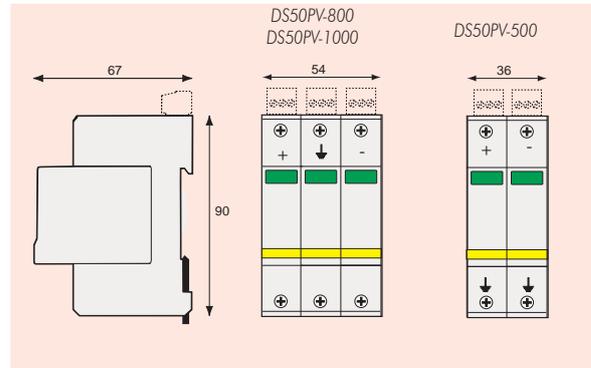
The use of Type 2 surge protector is recommended at both ends of the DC power supply line (solar panel side and inverter/converter side), especially if the line routing is external and long.

The electrical diagram of the DS50PV is based on high energy MOVs equipped with specific thermal disconnectors and related failure indicators. A remote signal feature is also available (DS50PVS-xxx)

The DS50PV is made with plug-in modules to allow a fast and easy maintenance in case of failure (disconnection from the DC network).

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

Dimensions and diagram



A45

Characteristics

| CITEL part number | DS50PV-500 | DS50PV-800 | DS50PV-1000 |
|-----------------------------------|--|---|-------------|
| Network voltage | 500 Vdc | 750-800 Vdc | 1000 Vdc |
| Protection mode | MC (1) | MC/MD | MC/MD |
| Max. operating voltage | Uc 530 Vdc | 840 Vdc | 1060 Vdc |
| Operating current | Ic < 1 mA | < 1 mA | < 1 mA |
| Leakage current at Uc | | | |
| Follow current | If none | none | none |
| Nominal discharge current | In 20 kA | 20 kA | 20 kA |
| 15 x 8/20 μs impulses | | | |
| Maximum discharge current | Imax 40 kA | 40 kA | 40 kA |
| tenuer max. 8/20 μs | | | |
| Protection level (at In) | Up 1.5 kV | 3.4 kV | 4 kV |
| Residual voltage at 10 kA | 1.2 kV | 2.8 kV | 3.4 kV |
| Residual voltage at 5 kA | 1 kV | 2.4 kV | 3 kV |
| Disconnecter | | | |
| Thermal Disconnecter | internal | | |
| Mechanical characteristics | | | |
| Dimensions | see diagram | | |
| Connection | by screw terminals : 4-25 mm ² / by bus | | |
| Disconnection indicator | 1 mechanical indicator by pole | | |
| Remote signaling | Option DS50PVS - output on changeover contact | | |
| Mounting | symmetrical rail 35 mm | | |
| Operating temperature | -40/+85 °C | | |
| Protection class | IP20 | | |
| Housing material | Thermoplastic UL94-V0 | | |
| Standards compliance | | | |
| NF EN 61643-11 | France | Parafoudre Basse Tension - Essais Classe II | |
| IEC 61643-1 | International | Low Voltage SPD - Test Class II | |
| EN 61643-11 | Europe | Parafoudre Basse Tension - Essais Classe II | |
| UL1449 ed.2 | USA | Low Voltage TVSS | |

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



AC power Surge Protector Panels

CBC - CBB - CBA

A46



The surge protector panels are intended to protect 230/400V or 120/208V (Single or 3-Phase) electrical installations from transient overvoltages generated by lightning or by the electrical environment.

These panels are based on the use of DIN rail AC power surge protectors (DS series) : these protections combine performance (very high discharge capacity, fast response time, common and differential mode protection) and safety (electrical and thermal disconnection, indication and remote signaling).

Installation of these surge protector panels do not require any external devices, these ones being already equipped with protective fuses in compliance with standards

3 types of panels are available :

CBC series :

«Single stage» surge protection panel, they are factory hardwired, including protective fuses. Their implementations are optimized and surge protection efficiency enhanced.

CBB series :

«Double stage» surge protection panel with coordination inductors to decrease dramatically the residual voltage at the output of the protection. RFI filtering feature integrated.

CBA series :

«Surge + isolation» protection panel designed for maximum efficiency ($U_p < 0,5$ kV) and with galvanic isolation from the upstream network (by high isolation transformer). RFI Filtering feature integrated

Versions

- Many versions are available to fit different needs :
- I_{max} (by pole) : 70 or 40 kA (Type 2 surge protector)
 - I_{limp} (by pole) : 15 or 25 kA (Type 1 surge protector)
 - Single and 3-Phase network
 - Network voltage : 230/400V or 120/208V
 - Signaling and remote signaling of disconnection
 - Fuses included
 - RFI filtering (CBB and CBA)

Options for specific versions :

- Breaker
- Resetting breaker system
- Lightning counter
- AC network monitoring
- Data or telecom line protection

Safety

According to standards, the surge protection panels are equipped with devices to monitor their end of life :

- Protective fuses for short-circuit currents
- Thermal disconnectors included in the surge protectors to prevent from thermal runaway.

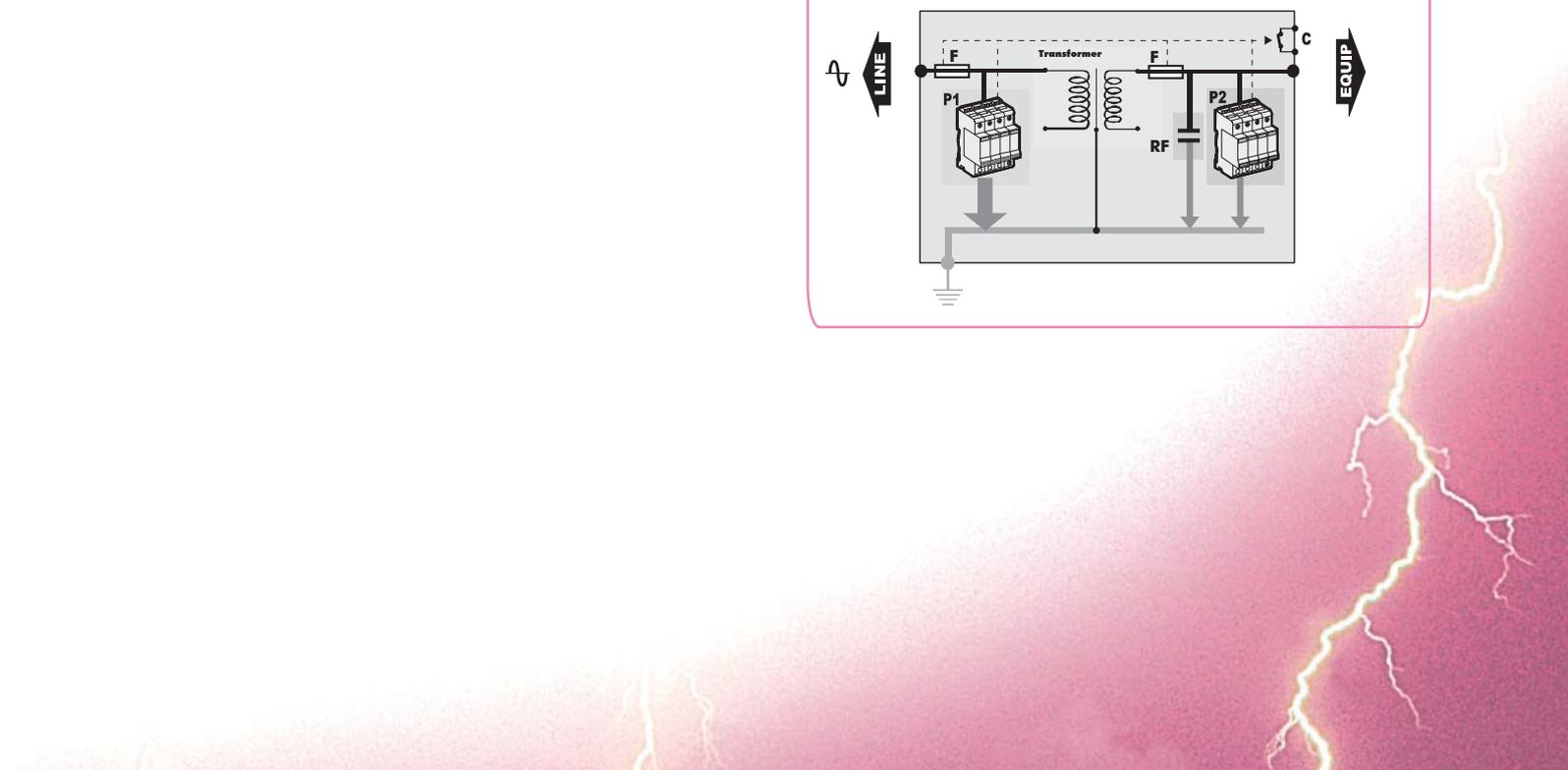
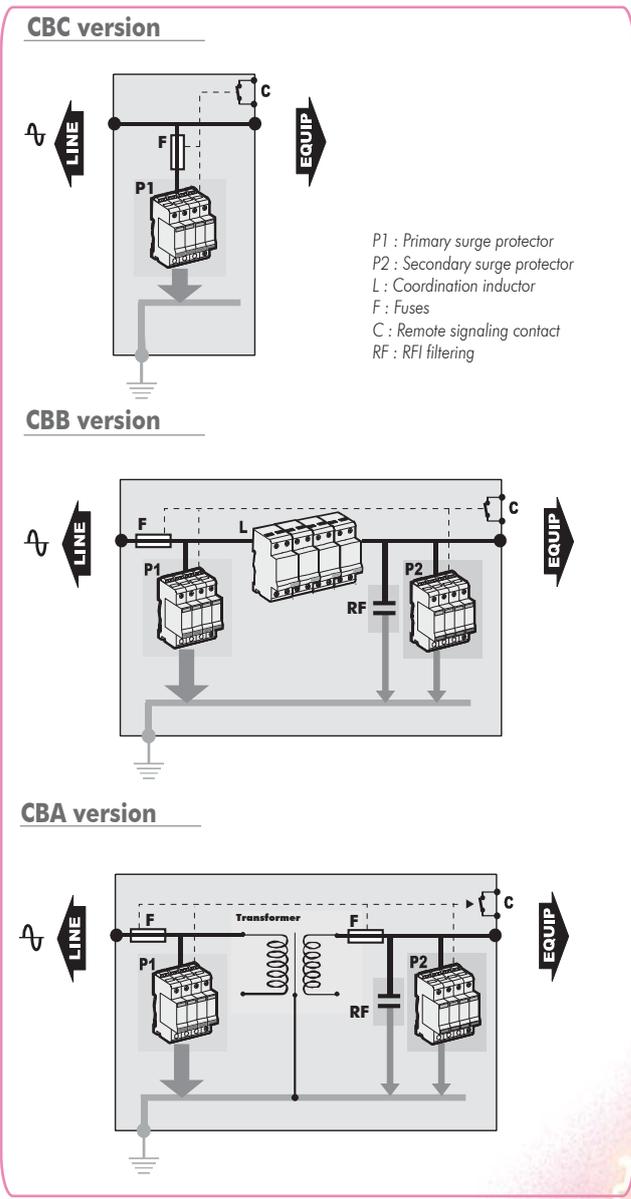
The status of these safety devices are monitored by indicators and auxiliary dry contacts : in case of one or more failure, these mechanisms will operate and any equipment connected will be activated (buzzer, external indicators, modem transmission...).



AC power Surge Protector Panels

CBC - CBB - CBA

- Single and 3-Phase surge protector panels
- Type 1 and Type 2
- Common mode and differential mode
- «Coordination» and «Isolation» versions
- Disconnection indicator and remote signaling of thermal and electrical disconnection
- Individual module for each phase
- Pluggable module (Type 2)
- IEC 61643-1 and EN 61643-11 compliance
- Specific versions on request





AC power Surge Protector Panels

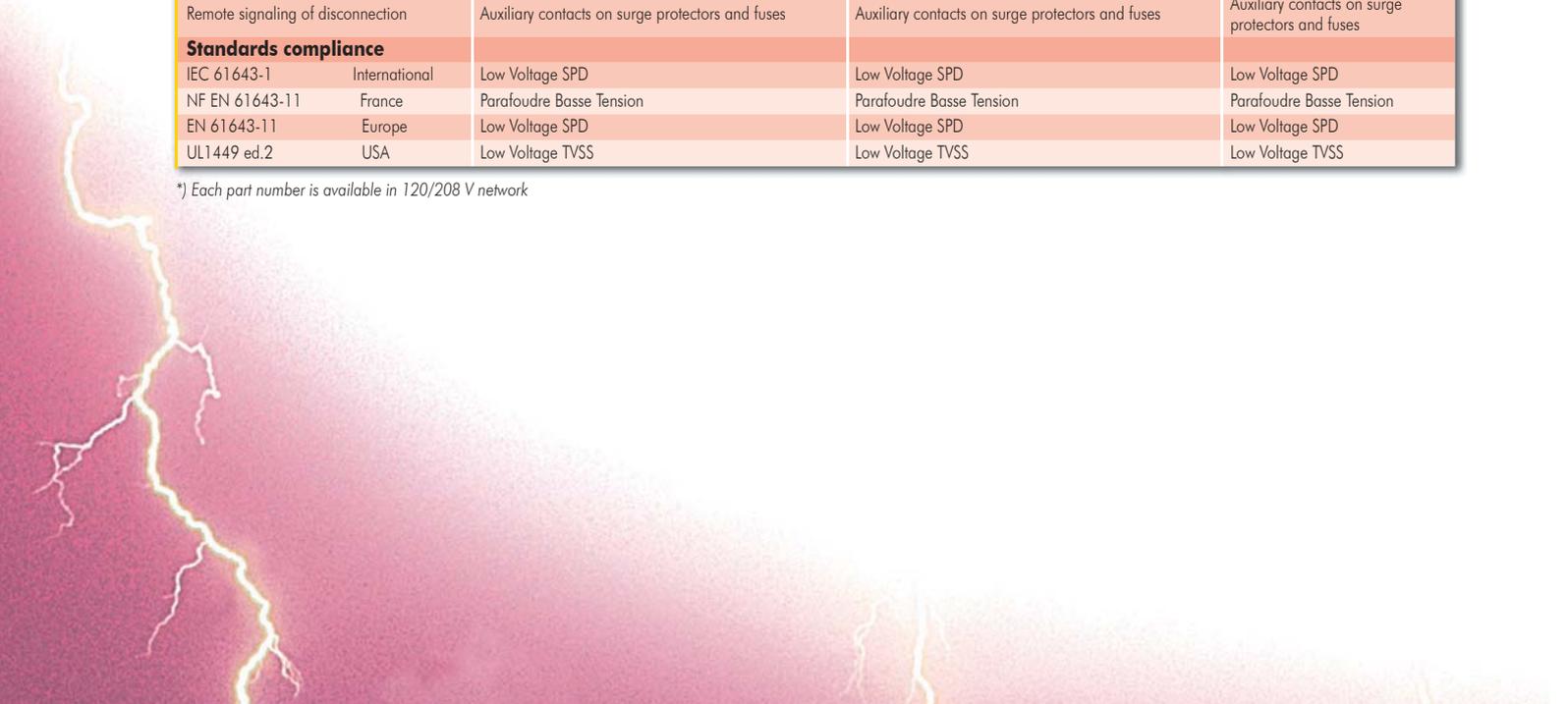
CBC - CBB - CBA

Characteristics

| CITEL part number | CBC | | | CBB | | | CBA |
|---|--|--------------------------|-----------|--|--------------|--------------|---|
| | Single stage | | | Coordination + Filtering | | | Coordination + Isolation |
| Configuration | Type 1 | Type 2 | Type 2 | Type 1 | Type 2 | Type 2 | Type 2 |
| Type of protection | Type 1 | Type 2 | Type 2 | Type 1 | Type 2 | Type 2 | Type 2 |
| Network voltage* | 230/400V | 230/400V | 230/400V | 230/400V | 230/400V | 230/400V | 230/400V |
| Max. operating voltage U_c | 400 Vac | 400 Vac | 400 Vac | 400 Vac | 400 Vac | 400 Vac | 400 Vac |
| Temporary overvoltage withstand U_T | 400 Vac | 400 Vac | 400 Vac | 400 Vac | 400 Vac | 400 Vac | 400 Vac |
| Single phase network (TT, TN) | CBC152-230 | CBC72-230 | CBC42-230 | CBB152-xx-230 | CBB72-xx-230 | CBB42-xx-230 | CBA42-xx-KVA-230 |
| 3-Phase network (TNC, IT) | CBC153-400 | CBC73-400 | CBC43-400 | CBB153-xx-400 | CBB73-xx-400 | CBB43-xx-400 | - |
| 3-Phase + neutral network (TT, TNS) | CBC154-230 | CBC74-230 | CBC44-230 | CBB154-xx-230 | CBB74-xx-230 | CBB44-xx-230 | CBA154-xx-KVA-230 |
| Common and differential mode protection | yes | yes | yes | yes | yes | yes | yes |
| RFI filtering | no | no | no | yes | yes | yes | yes |
| Max. line current I_L | - | - | - | 35 or 63 A | 35 or 63 A | 35 or 63 A | 4 at 44 A (single)/1,5 à 15 A (tri) |
| Maximum Power | - | - | - | 8 or 15 kVA (single phase)/24 or 44 kVA (tri) | | | 1 - 3 - 5 - 8 - 10 kVA |
| Operating current I_c <i>Leakage current at U_c</i> | none | none | none | < 1 mA | < 1 mA | < 1 mA | < 1 mA |
| Follow current I_f | none | none | none | none | none | none | none |
| Nominal discharge current I_n <i>15 x 8/20 μs impulses</i> | 20 kA | 30 kA | 15 kA | 20 kA | 30 kA | 15 kA | 15 kA |
| Maximum discharge current I_{max} <i>Max. withstand 8/20 μs</i> | - | 70 kA | 40 kA | - | 70 kA | 40 kA | 40 kA |
| Max. lightning current I_{imp} <i>Max. withstand. 10/350 μs</i> | 15 kA | - | - | 15 kA | - | - | 15 kA |
| Protection level (at I_n) U_p | 1,5 kV | 2 kV | 1,5 kV | 1 kV | 1,3 kV | 1,1 kV | 0,5 kV |
| Admissible short-circuit current | 25000 A | 25000 A | 25000 A | 25000 A | 25000 A | 25000 A | 25000 A |
| Safety | | | | | | | |
| Thermal disconnectors | internal to each surge protector | | | internal to each surge protector | | | internal to each surge protectors |
| Electrical disconnectors | internal to each panel | | | internal to each panel | | | internal to each panel |
| Installation ground fault breaker | Type «S» or delayed (if required) | | | Type «S» or delayed (if required) | | | Type «S» or delayed (if required) |
| Mechanical characteristics | | | | | | | |
| Dimensions | See table «Part number» | | | See table «Part number» | | | See table «Part number» |
| Weight | See table «Part number» | | | See table «Part number» | | | See table «Part number» |
| Protection class | IP65 | | | IP65 | | | IP45 |
| Housing material | ABS UL94-V0 | | | ABS UL94-V0 | | | Metal |
| Operating temperature | -40/+85 °C | | | -40/+85 °C | | | -40/+85 °C |
| Mounting | Wall mounted by screws (not supplied) | | | Wall mounted by screws (not supplied) | | | Wall mounted by screws or set down |
| Wiring access | Transparency hinged front door | | | Transparency hinged front door | | | Transparency hinged front door |
| Connection | by screws : 2,5-25 mm ² and 6-35 mm ² (CBC15x) | | | by screws : 2,5-25 mm ² and 6-35 mm ² (CBC15x) | | | by screw terminals : 6-25 mm ² |
| Disconnection indication | Mechanical indicators on surge protectors and fuses | | | Mechanical indicators on surge protectors and fuses | | | Mechanical indicators on surge protectors and fuses |
| Remote signaling of disconnection | Auxiliary contacts on surge protectors and fuses | | | Auxiliary contacts on surge protectors and fuses | | | Auxiliary contacts on surge protectors and fuses |
| Standards compliance | | | | | | | |
| IEC 61643-1 | International | Low Voltage SPD | | Low Voltage SPD | | | Low Voltage SPD |
| NF EN 61643-11 | France | Parafoudre Basse Tension | | Parafoudre Basse Tension | | | Parafoudre Basse Tension |
| EN 61643-11 | Europe | Low Voltage SPD | | Low Voltage SPD | | | Low Voltage SPD |
| UL1449 ed.2 | USA | Low Voltage TVSS | | Low Voltage TVSS | | | Low Voltage TVSS |

*) Each part number is available in 120/208 V network

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AC power Surge Protector Panels

CBC - CBB - CBA

Part number

| CBC series | | | | | | |
|-------------------------------------|-------------------------------------|---|----------------------|------------|----------------------------------|--------|
| Network 230V Single phase | Network 120V single phase | Discharge current by pole | Max. line current | Max. Power | Dimension (l x h x p - in mm) | Weight |
| CBC152-230 | CBC152-120 | $I_{imp} = 15 \text{ kA (10/350}\mu\text{s)}$ | - | - | 215 x 210 x 100 | 1.7 kg |
| CBC72-230 | CBC72-120 | $I_{max} = 70 \text{ kA}$ | - | - | | 1.5 kg |
| CBC42-230 | CBC42-120 | $I_{max} = 40 \text{ kA}$ | - | - | | 1.4 kg |
| Network 230/400V 3-Phase | Network 120/208V 3-Phase | | | | | |
| CBC153-400 | CBC153-120 | $I_{imp} = 15 \text{ kA (10/350}\mu\text{s)}$ | - | - | 410 x 285 x 140 | 3.8 kg |
| CBC73-400 | CBC73-120 | $I_{max} = 70 \text{ kA}$ | - | - | 298 x 260 x 140 | 2.6 kg |
| CBC43-400 | CBC43-120 | $I_{max} = 40 \text{ kA}$ | - | - | | 2.4 kg |
| Network 230/400V 3-Phase+neutral | Network 120/208V 3-Phase+neutral | | | | | |
| CBC154-230 | CBC154-120 | $I_{imp} = 15 \text{ kA (10/350}\mu\text{s)}$ | - | - | 410 x 285 x 140 | 4.2 kg |
| CBC74-230 | CBC74-120 | $I_{max} = 70 \text{ kA}$ | - | - | 298 x 260 x 140 | 3 kg |
| CBC44-230 | CBC44-120 | $I_{max} = 40 \text{ kA}$ | - | - | | 2.8 kg |



| CBB series | | | | | | |
|-------------------------------------|-------------------------------------|---|----------------------|------------|----------------------------------|--------|
| Network 230V single phase | Network 120V single phase | Discharge current by pole | Max. line current | Power max. | Dimension (l x h x p - in mm) | Weight |
| CBB152-35-230 | CBB152-35-120 | $I_{imp} = 15 \text{ kA (10/350}\mu\text{s)}$ | 35 A | 8 kVA | 410 x 285 x 140 | 4.1 kg |
| CBB152-63-230 | CBB152-63-120 | $I_{imp} = 15 \text{ kA (10/350}\mu\text{s)}$ | 63 A | 14.5 kVA | | 4.4 kg |
| CBB72-35-230 | CBB72-35-120 | $I_{max} = 70 \text{ kA}$ | 35 A | 8 kVA | | 4 kg |
| CBB72-63-230 | CBB72-63-120 | $I_{max} = 70 \text{ kA}$ | 63 A | 14.5 kVA | | 4.3 kg |
| CBB42-35-230 | CBB42-35-120 | $I_{max} = 40 \text{ kA}$ | 35 A | 8 kVA | | 3.7 kg |
| CBB42-63-230 | CBB42-63-120 | $I_{max} = 40 \text{ kA}$ | 63 A | 14.5 kVA | | 4 kg |
| Network 230/400V 3-Phase+neutral | Network 120/208V 3-Phase+neutral | | | | | |
| CBB154-35-230 | CBB154-35-120 | $I_{imp} = 15 \text{ kA (10/350}\mu\text{s)}$ | 35 A | 24 kVA | 410 x 463 x 140 | 7.5 kg |
| CBB14-63-230 | CBB154-63-120 | $I_{imp} = 15 \text{ kA (10/350}\mu\text{s)}$ | 63 A | 44 kVA | | 8.1 kg |
| CBB74-35-230 | CBB74-35-120 | $I_{max} = 70 \text{ kA}$ | 35 A | 24 kVA | | 7.5 kg |
| CBB74-63-230 | CBB74-63-120 | $I_{max} = 70 \text{ kA}$ | 63 A | 44 kVA | | 7.9 kg |
| CBB44-35-230 | CBB44-35-120 | $I_{max} = 40 \text{ kA}$ | 35 A | 24 kVA | | 6.9 kg |
| CBB44-63-230 | CBB44-63-120 | $I_{max} = 40 \text{ kA}$ | 63 A | 44 kVA | | 7.5 kg |

| CBA series | | | | | | |
|-------------------------------------|-------------------------------------|------------------------------|----------------------|------------|----------------------------------|--------|
| Network 230V single phase | Network 120V single phase | Discharge current by pole | Max. line current | Power max. | Dimension (l x h x p - in mm) | Weight |
| CBA42-1KVA-230 | CBA42-1KVA-120 | $I_{max} = 40 \text{ kA}$ | 5 A | 1 kVA | 600 x 400 x 250 | 34 kg |
| CBA42-3KVA-230 | CBA42-3KVA-120 | $I_{max} = 40 \text{ kA}$ | 13 A | 3 kVA | | 56 kg |
| CBA42-5KVA-230 | CBA42-5KVA-120 | $I_{max} = 40 \text{ kA}$ | 22 A | 5 kVA | | 75 kg |
| CBA42-8KVA-230 | CBA42-8KVA-120 | $I_{max} = 40 \text{ kA}$ | 35 A | 8 kVA | 600 x 400 x 400 | 76 kg |
| CBA42-10KVA-230 | CBA42-10KVA-120 | $I_{max} = 40 \text{ kA}$ | 44 A | 10 kVA | | 80 kg |
| Network 230/400V 3-Phase+neutral | Network 120/208V 3-Phase+neutral | | | | | |
| CBA44-1KVA-230 | CBA44-1KVA-120 | $I_{max} = 40 \text{ kA}$ | 1.5 A | 1 kVA | 700 x 500 x 250 | 35 kg |
| CBA44-3KVA-230 | CBA44-3KVA-120 | $I_{max} = 40 \text{ kA}$ | 4.5 A | 3 kVA | | 62 kg |
| CBA44-5KVA-230 | CBA44-5KVA-120 | $I_{max} = 40 \text{ kA}$ | 7.5 A | 5 kVA | | 76 kg |
| CBA44-8KVA-230 | CBA44-8KVA-120 | $I_{max} = 40 \text{ kA}$ | 11.5 A | 8 kVA | | 82 kg |
| CBA44-10KVA-230 | CBA44-10KVA-120 | $I_{max} = 40 \text{ kA}$ | 14.5 A | 10 kVA | | 87 kg |





Specific AC Surge Protection Panels

Series M

A50



The M Series AC surge protection panels have been especially designed for the standards, the AC networks and the installation conditions used in the USA

They are available for different types of AC configurations, in several discharge capabilities and are equipped with features (LED status indicators, audible alarm...). AC Surge protection panels, single or 3-Phase, available in several discharge capabilities ($I_{max} = 80, 100, 160$ and 200 kA) and built in NEMA 4 enclosures.

Surge protection diagram is based on high energy MOVs and filtering capacitors in order to provide very high discharge currents, low residual voltages and EMI/RFI filtering operation. In compliance with UL1449 standard, the operation safety, in case of end of life, is given by internal disconnectors linked to status indicators and a remote signaling circuit.

- AC Surge protection Panels
- RFI filter
- Comply US AC networks
- Common & differential mode protection
- Signaling and remote signaling
- UL1449 2ed. & IEC 61643-1 compliance

Characteristics

| Series | M80 | M100 | M160 | M200 |
|---------------------------------------|--|-------------|-------------|-------------|
| Max. discharge current by phase (1) | 80 kA | 100 kA | 160 kA | 200 kA |
| Type of Network | | | | |
| 120/240 Vac Split Phase 3Ph+PE | M80-120T | M100-120T | M160-120T | M200-120T |
| 120/208 Vac Wye 3Ph/N+PE | M80-120Y | M100-120Y | M160-120Y | M200-120Y |
| 220/380 Vac Wye 3Ph/N+PE | M80-220Y | M100-220Y | M160-220Y | M200-220Y |
| 277/480 Vac Wye 3Ph/N+PE | M80-277Y | M100-277Y | M160-277Y | M200-277Y |
| 240/415 Vac Wye 3Ph/N+PE | M80-240Y | M100-240Y | M160-240Y | M200-240Y |
| 120/120/240 Vac Hi-Leg Delta 3Ph/N PE | M80-240DCT | M100-240DCT | M160-240DCT | M200-240DCT |
| 240 Vac Delta 3Ph+PE | M80-240D | M100-240D | M160-2s40D | M200-240D |
| 347/600 Vac Wye 3Ph/N+PE | - | - | M160-347Y | M200-347Y |
| 480 Vac Delta 3Ph+PE | - | - | M160-480D | M200-480D |
| Protection modes | L/N - L/PE - N/PE - L/L | | | |
| Admissible short-circuit current | 200 kA | | | |
| RFI filtering | - 40 dB | | | |
| Standards compliance | UL1449 - IEC 61643-1 | | | |
| Safety | | | | |
| Thermal disconnector | internal to each surge protector | | | |
| Electrical disconnector | internal to each panel | | | |
| Failure indicators | by Led | | | |
| Failure indicators in option | audible alarm and remote signaling | | | |
| Mechanical characteristics | | | | |
| Housing material | Metal - NEMA 4 | | | |
| Operating temperature | -40/+85 °C | | | |
| Mounting | Wall mounting by screws (not supplied) | | | |
| Connection to AC network | on screw terminal | | | |
| Dimensions (H x L x D) | 203 x 152 x 89 mm (8" x 6" x 3.5") | | | |
| Specific features | | | | |
| Disconnection switch | no | | | |
| Replaceable internal surge protectors | no | | | |

1) The 8/20µs discharge current values are given following the north american process

Voltage specifications

| Version | Network | max Voltage (Uc) | Residual voltage (V) follow. UL1449@500 A | | | |
|-------------|---------------------------------------|------------------|---|------|------|------|
| | | | L-N | L-PE | N-PE | L-L |
| Mxxx-120T | 120/240 Vac Split Phase 3Ph+PE | 150Vac | 400 | 400 | 500 | 800 |
| Mxxx-120Y | 120/208 Vac Wye 3Ph/N+PE | 150Vac | 400 | 400 | 500 | 800 |
| Mxxx-220Y | 220/380 Vac Wye 3Ph/N+PE | 320Vac | 1000 | 1000 | 1000 | 1800 |
| Mxxx-277Y | 277/480 Vac Wye 3Ph/N+PE | 320Vac | 1000 | 1000 | 1000 | 1800 |
| Mxxx-240Y | 240/415 Vac Wye 3Ph/N+PE | 320Vac | 1000 | 1000 | 1000 | 1800 |
| Mxxx-240DCT | 120/120/240 Vac Hi-Leg Delta 3Ph/N PE | 150/320Vac | 1000 | 1000 | 1000 | 1000 |
| Mxxx-240D | 240 Vac Delta 3Ph+PE | 320Vac | - | 1000 | - | 1800 |
| Mxxx-347Y | 347/600 Vac Wye 3Ph/N+PE | 550Vac | 1500 | 1500 | 1500 | 3000 |
| Mxxx-480D | 480 Vac Delta 3Ph+PE | 500Vac | - | 1500 | - | 3000 |



AC Surge protection Panels - Modular

SP Series



A51

These AC surge protection panels have been especially adapted to US standards, AC networks and installation conditions. They are available in various configurations (single, 3-phase...), various types (Type 1, Type 2) and equipped with different features.

These panels are based on CITEL DS range modular surge protectors and are built with metallic housings (NEMA 4/12). They are in compliance with the relevant UL and IEC standards.

They are equipped with internal fuses to provide protection in case of short circuit currents and disconnection from AC network. Featuring failure indicators (Leds, buzzers) and remote signal.

- Single & 3-phase surge protection Panels
- Comply US AC networks
- Common & Differential mode protection
- Fault indicator & remote signal
- Comply UL1449 2ed. & IEC 61643-1

Characteristics

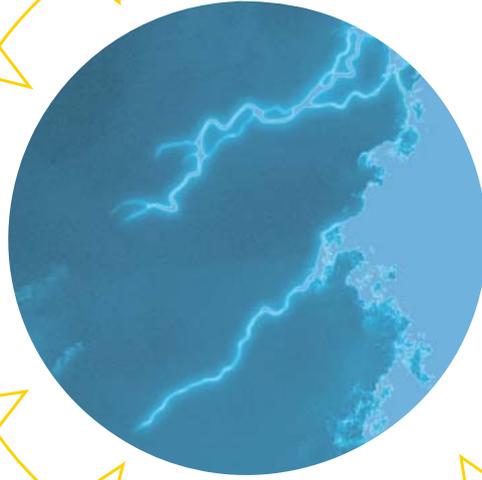
| Series | SP120 | SP165 | SP200 | SP330 | SP400 |
|--|---|-------------|-------------|-------------|-------------|
| Max. discharge current I _{max} (8/20μs) by phase (1) | 120 kA | 165 kA | 200 kA | 300 kA | 400 kA |
| Courant de choc limp (10/350μs) by phase (1) | 60 kA | 60 kA | 60 kA | 60 kA | 60 kA |
| Type of AC Network | | | | | |
| 120/240 Vac Split Phase 3Ph+PE | SP120-120T | SP165-120T | SP200-120T | SP330-120T | SP400-120T |
| 120/208 Vac Wye 3Ph/N+PE | SP120-120Y | SP165-120Y | SP200-120Y | SP330-120Y | SP400-120Y |
| 277/480 Vac Wye 3Ph/N+PE | SP120-277Y | SP165-277Y | SP200-277Y | SP330-277Y | SP400-277Y |
| 240/415 Vac Wye 3Ph/N+PE | SP120-240Y | SP165-240Y | SP200-240Y | SP330-240Y | SP400-240Y |
| 240 Vac Delta 3Ph+PE | SP120-240D | SP165-240D | SP200-240D | SP330-240D | SP400-240D |
| 347/600 Vac Wye 3Ph/N+PE | SP120-347Y | SP165-347Y | SP200-347Y | SP330-347Y | SP400-347Y |
| 480 Vac Delta 3Ph+PE | SP120-480D | SP165-480D | SP200-480D | SP330-480D | SP400-480D |
| Dimensions (H x L x D in mm) | 280x230x115 | 381x381x190 | 381x381x190 | 381x381x190 | 381x381x190 |
| Protection mode | L/N - L/PE - N/PE - L/L | | | | |
| Admissible short-circuit current | 200 kA | | | | |
| Standards compliance | UL1449 -IEC 61643-1 | | | | |
| Safety | | | | | |
| Thermal disconnecter | internal on each surge protector | | | | |
| Electrical disconnecter | internal on each panel | | | | |
| Failure indicators | Light indicator | | | | |
| Failure indicators in option | audible alarme and remote signal | | | | |
| Mechanical characteristics | | | | | |
| Housing material | Metal - NEMA 4/12 | | | | |
| Operating temperature | -40/+85 °C | | | | |
| Mounting | Wall mounting by screws (not supplied) | | | | |
| Connection to AC network | on screw terminal 35 mm ² max. | | | | |
| Specific features | | | | | |
| Disconnection switch | in option | | | | |
| Replaceable internal surge protectors | yes | | | | |

1) The 8/20μs discharge current values are given following the north american process

Voltage specifications

| Version | Network | max. Voltage (Uc) | Residual voltage (V) following UL1449@500 A | | | | | Residual voltage (V) following UL449@10 kA | | | | |
|------------|--------------------------------|-------------------|---|-------|-------|-------|-------|--|-------|-------|-------|-------|
| | | | SP120 | SP165 | SP200 | SP330 | SP400 | SP120 | SP165 | SP200 | SP330 | SP400 |
| SPxxx-120T | 120/240 Vac Split Phase 3Ph+PE | 150Vac | 385 | 435 | 435 | 415 | 415 | 605 | 585 | 585 | 575 | 575 |
| SPxxx-120Y | 120/208 Vac Wye 3Ph/N+PE | 150Vac | 385 | 435 | 435 | 415 | 415 | 605 | 585 | 585 | 575 | 575 |
| SPxxx-277Y | 277/480 Vac Wye 3Ph/N+PE | 330Vac | 735 | 850 | 850 | 820 | 820 | 975 | 955 | 955 | 925 | 925 |
| SPxxx-240Y | 240/415 Vac Wye 3Ph/N+PE | 330Vac | 645 | 745 | 745 | 710 | 710 | 865 | 840 | 840 | 820 | 820 |
| SPxxx-240D | 240 Vac Delta 3Ph+PE | 330Vac | 645 | 745 | 745 | 710 | 710 | 865 | 840 | 840 | 820 | 820 |
| SPxxx-347Y | 347/600 Vac Wye 3Ph/N+PE | 550Vac | 970 | 935 | 935 | 905 | 905 | 1350 | 1310 | 1310 | 1210 | 1210 |
| SPxxx-480D | 480 Vac Delta 3Ph+PE | 550Vac | 1415 | 1440 | 1440 | 1410 | 1410 | 1570 | 1500 | 1500 | 1480 | 1480 |

AC SURGE PROTECTORS
PLUG AND HARD-WIRED
UNITS



**AC SURGE PROTECTORS
PLUG AND HARD-WIRED
UNITS**



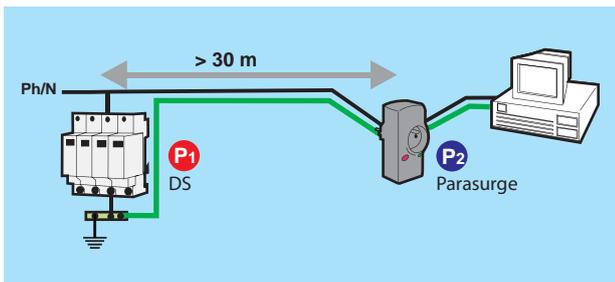
AC power Surge Protectors

CITEL proposes a line of surge protectors for the single-phase AC network access of sensitive terminal equipment. These products, named «Parasurge», are available in various formats :

- Plug-in outlet units (Parasurge, PBF)
- AC/telecom combined outlet units (Parasurge)
- Multi-outlet units (Parasurge Multi)
- Hard-wired units (MSB)

«Terminal» Surge Protectors

In order to ensure an efficient protection against surge voltages of terminals connected to AC network, it is recommended to install, close to sensitive equipment, an extra surge protector, in addition to the surge protector installed at the entrance of the installation. This approach is more necessary as the equipment to protect is further away of the primary surge protector (> 30 m).



These surge protectors are compact, easy to install and protect an equipment (Parasurge) or a set of equipment (Parasurge Multi). They provide an adapted protection level ($U_p = 1.5$ kV) and relevant discharge currents ($I_n = 2.5$ kA and $I_{max} = 5$ kA).

Choosing a secondary surge protector

A wide choice of formats are available to provide a solution for any configuration.

The choice will be based on installation constraints :

- | | |
|--------------------------------|------------------------------|
| ● Simple, rapid installation | Single/multiple outlet boxes |
| ● Telephone/Data equipment | Combined units |
| ● Fixed, built-in installation | Hard-wired units |

The outlet-based versions are generally available in French and German versions.

Installation

These surge protectors are used as secondary surge protection, in association with a primary surge protection (e.g. DS series) installed in the main electrical switch board. The Parasurge protectors are designed to operate in coordination with the primary surge protectors.

They are tested following Class II or Class III Test of the IEC 61643-1 standards.

These units are installed close by the sensitive equipment, providing a greater efficiency.

The «Outlet» or «Multi-outlet» configurations of the Parasurge series allow a fast and error-free installation by the end user.

Note: The wall outlet, receiving the Parasurge unit, must be connected to the earthing network by the dedicated wire.

Operation

These surge protectors are based on an hybrid association of gas tube and varistors in order to obtain a relevant discharge current, in a compact size, adapted to a secondary cost effective surge protection.

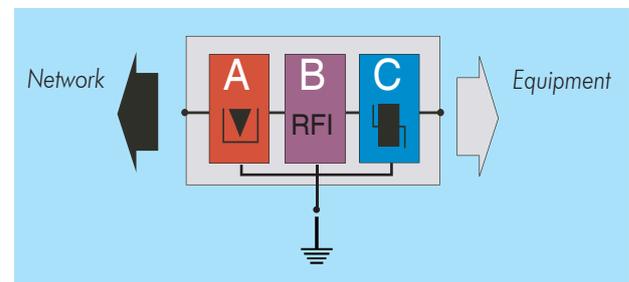
Moreover, they are equipped, in compliance with IEC 61643-1 standard, with internal thermal safety which will disconnect the unit from AC network in case of end of life. The operating status of the Parasurge is given by light indicator.

«3-stage» Diagram

The MSB-HF versions use a multi-stage diagram for enhanced efficiency. With these three protection stages, each having a distinct role, the surge protectors combine three functions normally provided by separate devices.

- A** - Input stage based on a gas discharge tube and varistors for a high discharge current capacity.
- B** - Intermediate stage consisting of an RFI filter to reject RF interference and coordinate the input and output stages.
- C** - Output stage based on varistors for a very short response time and low residual voltage.

This version is recommended for the protection of especially sensitive equipment.

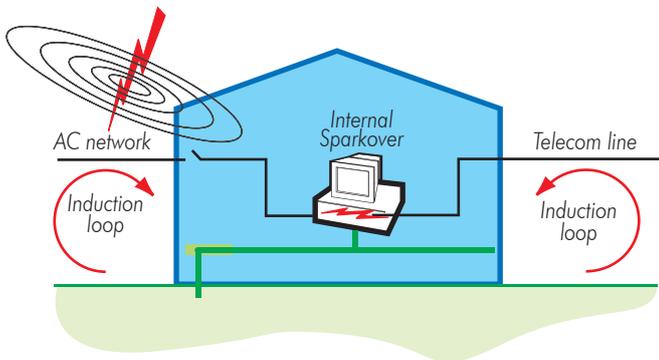




AC power Surge Protectors

The Combined Surge Protectors

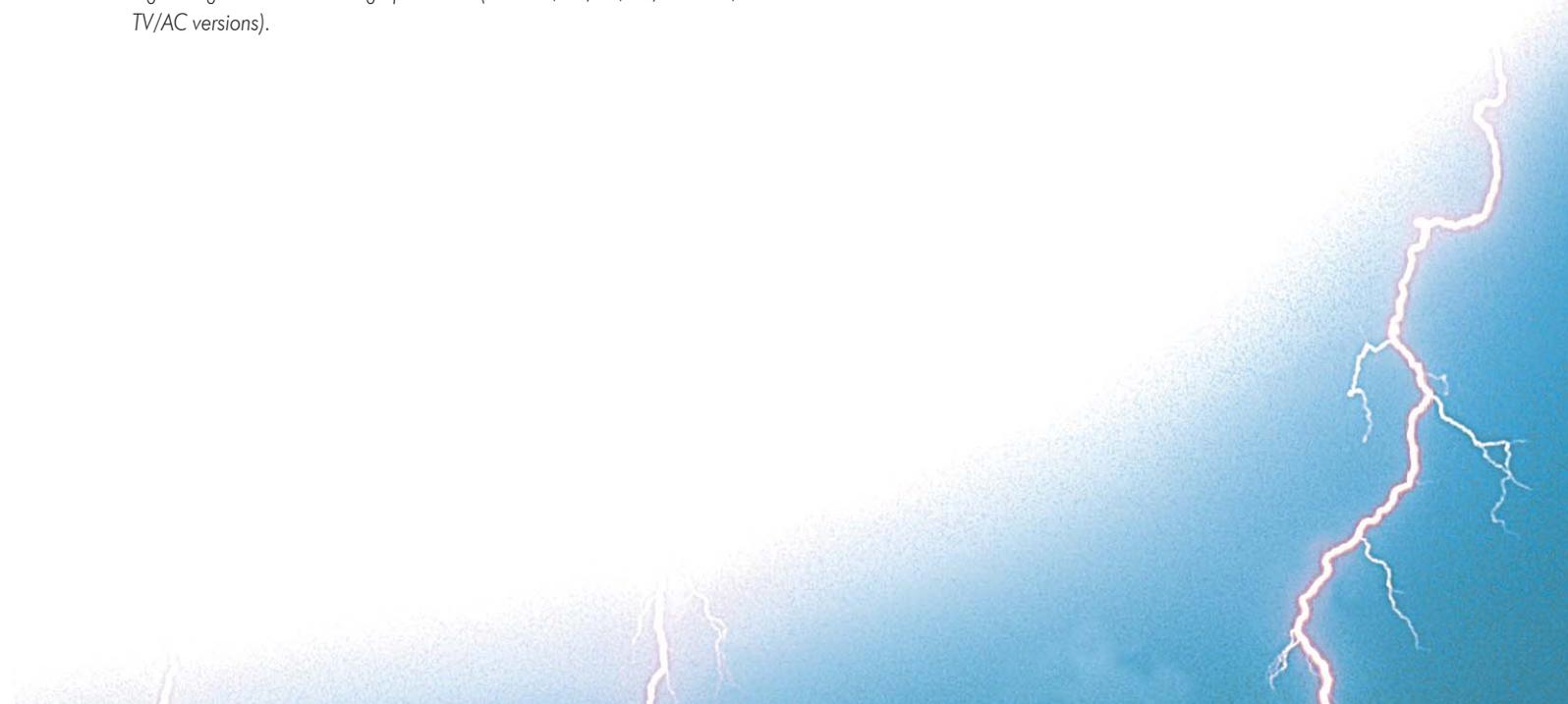
Terminals connected to several networks, as communication terminals connected to telecom line and AC power network, are especially sensitive to surge voltages : during a lightning event, surge voltages will occur, in common mode, on AC network and telecom network. But transient voltages will appear also between these networks themselves : this phenomena will create disturbances or destructions in the telecom equipment connected to these networks.



For this reason, it is important to improve the safety of equipment as :

- Modems (PSTN or ADSL)
- Fax machines
- TV set-top boxes
- Telephone sets
- Alarm transmitters
- TV set

The Parasurge series from CITEL is the perfect answer to this issue, by offering a range of combined surge protectors (Telecom/AC, TV/AC, Telecom/TV/AC versions).





Plug-in AC Surge Protection units

PARASURGE



CITEL offers a wide range of surge protectors in plug-in unit format. The various available versions allow the protection against lightning surge voltages of different types of sensitive equipment, such as personal computer or TV/Video systems.

This «plug-in» format, to fit in the wall AC outlet, allows a fast and error-free installation, directly on the wall outlet, by the end user.

This range of surge protectors is available with French, German or US plugs.

Parasurge D

Plug-in unit built in with surge protection circuit for AC network. It is based on gas tube and varistors hybrid association, with thermal safety to comply IEC 61643-1 standard.

It is equipped with light indicators for surge protection status (active or disconnected) and AC voltage status (voltage on/voltage off).

This Parasurge is available in French (Parasurge F), German (Parasurge D) or US (Parasurge US) plugs.

Parasurge D/TEL

Plug-in unit, similar to Parasurge D, but with an extra surge protec-

tion circuit for analog telecom line (PSTN or ADSL).

This unit is installed easily on the wall AC outlet and the telecom line is connected on the RJ11 connectors of the Parasurge.

Parasurge D/ISDN

Version for ISDN line. This Parasurge is equipped with adapted surge protection circuit and relevant RJ45 connectors.

Parasurge D/TV

Plug-in unit, similar to Parasurge D, but with an extra surge protection circuit for TV antenna or cable.

This unit is installed easily on the wall AC outlet and the coaxial line is connected on the coaxial TV connectors of the Parasurge.

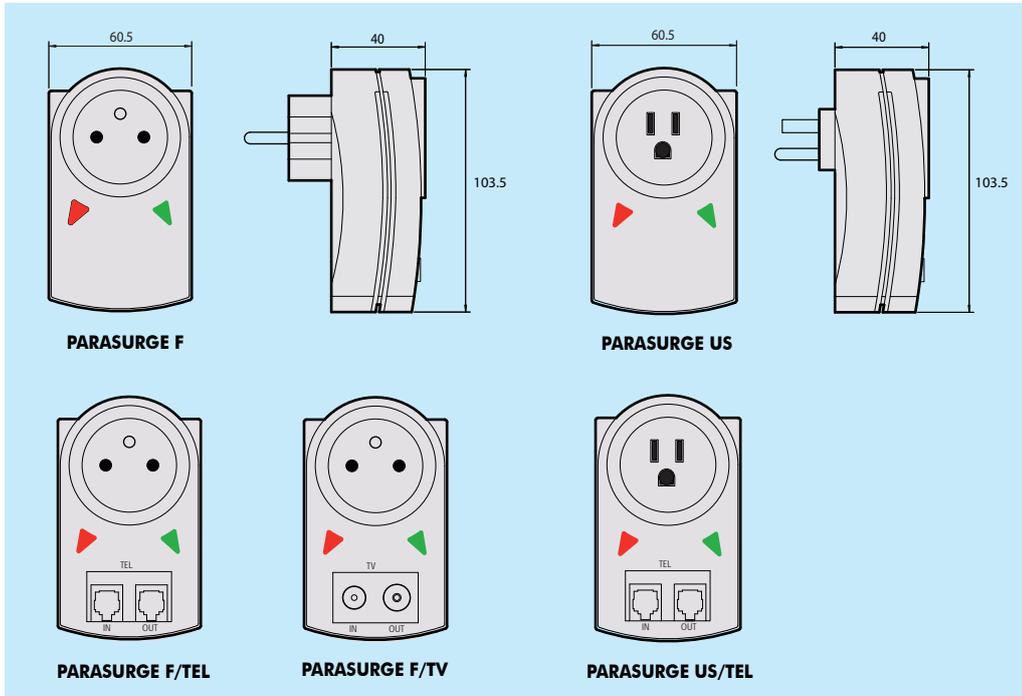
- **Type 2 (or 3) AC Surge Protectors**
- **«Plug-in» format**
 - Single AC plug version
 - Telecom/AC version (Fax, Modem...)
 - TV/AC version (antenna, satellite, cable)
- **French, German, US AC plugs**
- **Protection and AC voltage status indicators**
- **Instantaneous installation**
- **Complies with IEC 61643-1**



Plug-in AC Surge Protection units

PARASURGE

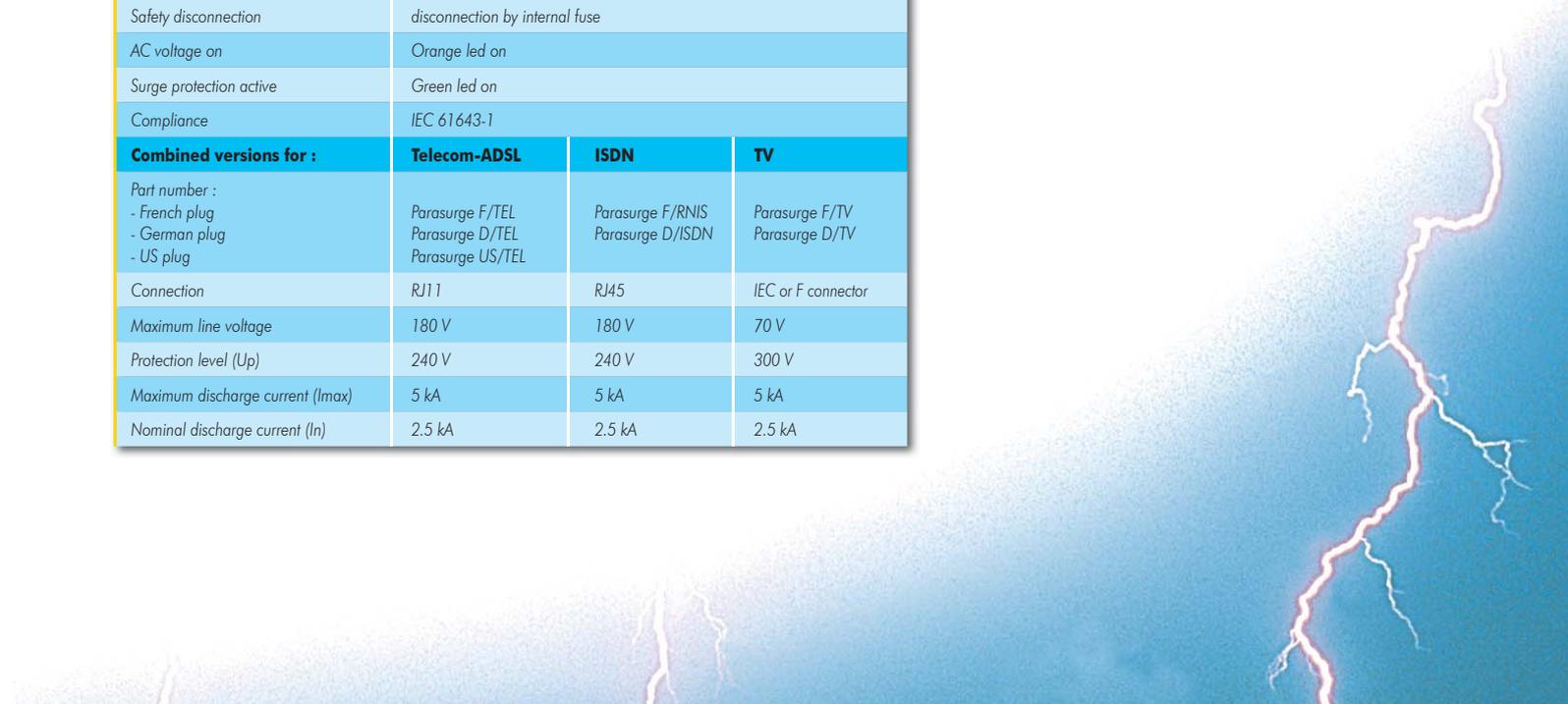
Dimensions (in mm)



B5

Characteristics

| Parasurge | Parasurge F. or D... | Parasurge US.. | |
|----------------------------------|--------------------------------|--------------------|--------------------|
| Nominal voltage | 230 V single phase | 120 V single phase | |
| Max. operating voltage (Uc) | 250 Vac | 150 Vac | |
| Maximum line current | 16 A | 15 A | |
| Protection level (Up) | 1.5 kV | 0.8 kV | |
| Max. discharge current (Imax) | 5 kA (1 x 8/20µs impulse) | | |
| Nominal discharge current (In) | 2.5 kA (15 x 8/20µs impulse) | | |
| Safety disconnection | disconnection by internal fuse | | |
| AC voltage on | Orange led on | | |
| Surge protection active | Green led on | | |
| Compliance | IEC 61643-1 | | |
| Combined versions for : | Telecom-ADSL | ISDN | TV |
| Part number : | | | |
| - French plug | Parasurge F/TEL | Parasurge F/RNIS | Parasurge F/TV |
| - German plug | Parasurge D/TEL | Parasurge D/ISDN | Parasurge D/TV |
| - US plug | Parasurge US/TEL | | |
| Connection | RJ11 | RJ45 | IEC or F connector |
| Maximum line voltage | 180 V | 180 V | 70 V |
| Protection level (Up) | 240 V | 240 V | 300 V |
| Maximum discharge current (Imax) | 5 kA | 5 kA | 5 kA |
| Nominal discharge current (In) | 2.5 kA | 2.5 kA | 2.5 kA |





Multi-outlet Strip Surge Protectors

PARASURGE MULTI



CITEL offers a wide range of surge protectors in multi-outlet strip format. The various available versions allow the protection against lightning surge voltages of different types of sensitive equipment, such as personal computer or TV/Video systems.

This «multi-outlet strip» format allows a convenient, fast and error-free installation by the end user and replace a standard multi-outlet strip. This range of surge protectors is available with French and German plugs/outlets.

The specific shape of the strip allows easy cord management.

Parasurge Multi D

6-outlet strip built in with surge protection circuit for AC network. It is based on gas tube and varistors hybrid association, with thermal safety to comply IEC 61643-1 standard.

It is equipped with switch and light indicators for surge protection status (active or disconnected) and AC voltage status (voltage on/voltage off).

Parasurge Multi D/TEL

5-outlet strip, similar to Parasurge Multi D, but with an extra surge protection circuit for telecom line (PSTN or ADSL). This unit is connected by its cord on the wall AC outlet and the telecom line is connected on the RJ11 connectors of the Parasurge Multi D/Tel.

This surge protector is especially dedicated to personal computer system equipped with modem.

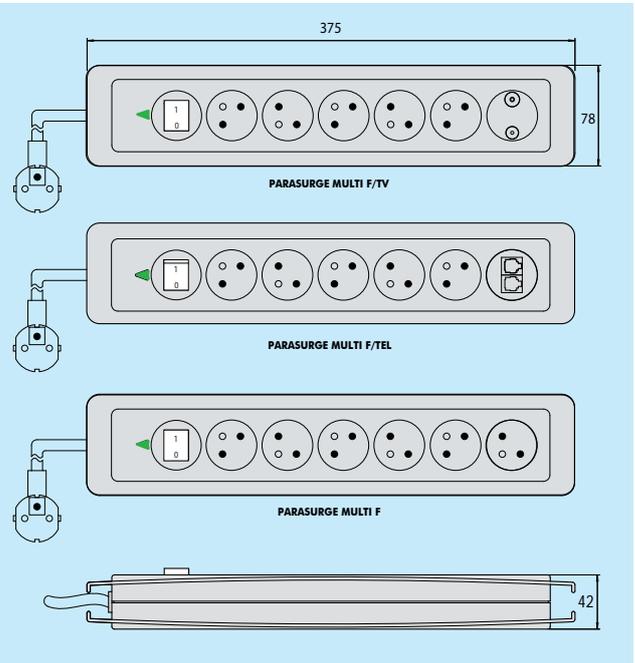
Parasurge Multi D/TV

5-outlet strip, similar to Parasurge D, but with an extra surge protection circuit for TV antenna or cable.

This unit is connected by its cord on the wall AC outlet and the TV line is connected on the TV connectors of the Parasurge Multi D/TV.

This surge protector is especially dedicated to Home Cinema installation with TV antenna or Cable TV connection.

Dimensions (in mm)



Characteristics

| Parasurge Multi (AC parameters for all the models) | | |
|--|--------------------------------|-----------------------|
| Nominal voltage | 230 V single phase | |
| Max. operating voltage (Uc) | 250 Vac | |
| Maximum line current | 16 A | |
| Protection level (Up) | 1.5 kV | |
| Max. discharge current (Imax) | 5 kA (1 x 8/20µs) | |
| Nominal discharge current (In) | 2.5 kA (15 x 8/20µs) | |
| Safety disconnection | Disconnection by internal fuse | |
| AC voltage on | Light switch on | |
| Surge protection active | Green light on | |
| Compliance | IEC 61643-1 | |
| Combined versions for : | Telecom-ADSL | TV antenna-sat.-cable |
| Models : | | |
| - French plug/outlets | Parasurge Multi F/TEL | Parasurge Multi F/TV |
| - German plug/outlets | Parasurge Multi D/TEL | Parasurge Multi D/TV |
| Connector | RJ11 | Coax. IEC et Coax. F |
| Max. line voltage | 180 V | 70 V |
| Protection level (Up) | 240 V | 300 V |
| Maximum discharge current (Imax) | 5 kA | 5 kA |
| Nominal discharge current (In) | 2.5 kA | 2.5 kA |

- «Multi-outlet strip» Surge Protectors
 - 6-outlet version
 - 5-outlet + Telecom/AC version (Fax, Modem...)
 - 5-outlet + TV/AC version (antenna, satellite, cable)
- French or German outlets
- Protection and AC voltage status indicators
- General switch
- Complies with IEC 61643-1



Multi-outlet Strip Surge/RFI Protectors

PARASURGE MULTIPRO and MULTIMEDIA



Parasurge MultiPro F

6-outlet strip built in with surge protection circuit for AC network. It is based on gas tube and varistors hybrid association, with thermal safety to comply IEC 61643-1 standard.

It is equipped with switch and light indicators for surge protection status (active or disconnected) and AC voltage status (voltage on/voltage off). Moreover, this unit is featured with a RFI filter to protect against HF disturbances.

The specific shape of the strip allows an easy cord management.

Parasurge MultiMedia F

6-outlet strip, similar to Parasurge MultiPro F, but with extra surge protection circuits for telecom line (PSTN or ADSL) and TV connection. This unit is connected by its cord on the wall AC outlet and the telecom line and TV is connected on the connectors of the Parasurge MultiMedia F.

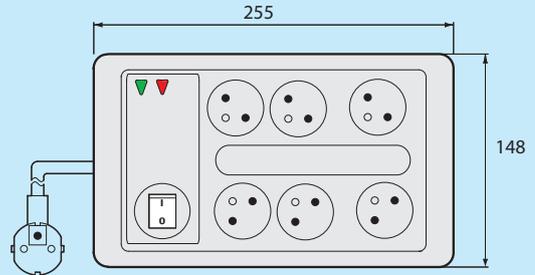
This surge protector is especially dedicated to computer/video system equipped with modem and TV connection.

Parasurge MultiMedia F/MS

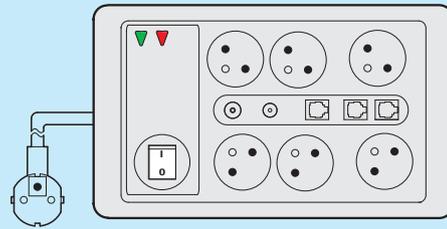
Version built-in with an «Master/Slave» feature : Automatic switch on/off of all the devices connected to the Parasurge in relation with the status of the device connected on the «Master» outlet. That allows an easy and safe control of the PC or Home Cinema system.

- «Multi-outlet strip» Surge Protectors
- «MultiMedia» version :
 - Telecom/TV protectors
 - Protection and AC voltage status indicators
 - General switch
 - Complies with IEC 61643-1
 - «Master/Slave» option

Dimensions (in mm)



PARASURGE MULTIPRO F



PARASURGE MULTIMEDIA F



Characteristics

| Product type | Surge/RFI protector 6-outlet strip | |
|------------------------------------|------------------------------------|------------------------|
| Nominal voltage | 230 V single phase | |
| Max. operating voltage (Uc) | 250 Vac | |
| Maximum line current | 16 A | |
| Protection level (Up) | 1.5 kV | |
| Max. discharge current (Imax) | 5 kA (1 x 8/20µs) | |
| Nominal discharge current (In) | 2.5 kA (15 x 8/20µs) | |
| Safety disconnection | Disconnection by internal fuse | |
| AC voltage on | Light switch on | |
| Surge protection active | Green light on | |
| Compliance | IEC 61643-1 | |
| Fonctionnalités | Parasurge MultiPro F | Parasurge MultiMedia F |
| 6 protected outlets | yes | yes |
| General switch | yes | yes |
| AC surge protection | yes | yes |
| RFI filter | yes | yes |
| Telecom (or ADSL) surge protection | no | yes |
| TV surge protection | no | yes |



Hard-wired AC Surge Protectors

MSB-HF, MSB, MSB10



MSB



MSB10C



MSB6

These surge protector units are designed to protect a single-phase input and are recommended for mounting on a board or in a utility box. This series lets you choose a product by housing (metal or plastic), dimensions, performance, connection mode (series or parallel), or type of connection (wires or screw terminal block). These surge protector comply with IEC 61643-1 or EN 61643-11, Class 2 or Class 3 Test.

MSB-HF :

Metal box with output by wires, with 3-stage protection:

- Gas discharge tube stage for a high discharge current capacity.
- RFI filtering stage to limit RF interference.
- Clamping stage for low residual voltage.

MSB :

Simplified version of the MSB-HF with a 1-stage surge protection, connected to the network in parallel.

MSB10 range :

This compact plastic housings include an electrical diagram based on thermally protected varistors and gas tube. The units are equipped with a led to indicate the right operation of the surge protection circuit.

When the led is switched off, it indicate, that the protector is disconnected following a major defect.

- **MSB10** : Parallel connection to AC line and mounting on wall or plate by self-adhesive tape.
- **MSB10C** : Enclosure with cap and removable protection circuit. Connection through screw terminal. Wall mounting.
- **MSB10V** : Connection through screw terminal. Wall mounting.
- **MSB6** : Ultra compact version to include inside AC outlet. End of life warning by buzzer.

Characteristics

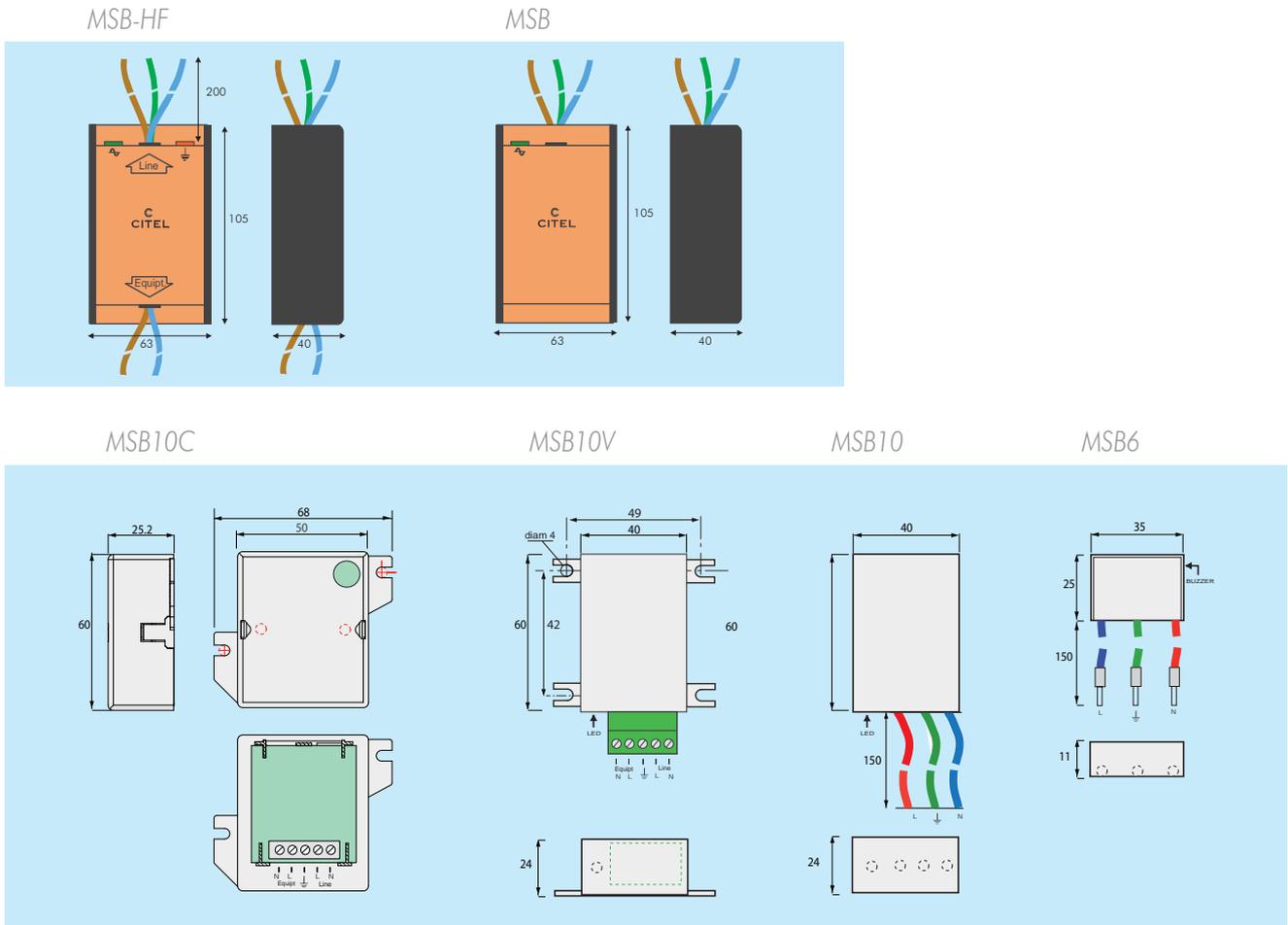
| Référence CITEL | MSB-HF | | MSB | | MSB10 | | MSB10C | MSB10V | MSB6 |
|--|-----------------------------------|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------------------------|-----------------------------------|---------------|
| | MSB-230HF | MSB-130HF | MSB-230 | MSB-130 | MSB10-400 | MSB10-120 | MSB10C-400 | MSB10V-400 | MSB6-400 |
| AC network | 230 Vac | 110-130 Vac | 230 Vac | 110-130 Vac | 230 Vac | 110-130 Vac | 230 Vac | 230 Vac | 230 Vac |
| Max. operating voltage - Uc | 255 V | 150 V | 255 V | 150 V | 255 V | 150 V | 255 V | 255 V | 255 V |
| Maximum line current | 16 A | 16 A | - | - | - | - | 16 A | 16 A | - |
| Protection level - Up | 0.9 kV | 0.6 kV | 1.5 kV | 1 kV | 1.5 kV | 1 kV | 1.5 kV | 1.5 kV | 1.5 kV |
| Maximum discharge current - I _{max} (1 impulse @ 8/20µs) | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA | 5 kA | 5 kA | 5 kA |
| Maximum discharge current - I _n (15 impulses @ 8/20µs) | 3 kA | 3 kA | 3 kA | 3 kA | 2.5 kA | 2.5 kA | 2.5 kA | 2.5 kA | 2.5 kA |
| RFI filter | 0,1 - 30 MHz | 0,1 - 30 MHz | none | none | none | none | none | none | none |
| - Attenuation @ 0,3 MHz | 25 dB | 25 dB | | | | | | | |
| - Attenuation @ 1 MHz | 30 dB | 30 dB | | | | | | | |
| - Attenuation @ 10 MHz | 40 dB | 40 dB | | | | | | | |
| Fail-safe | disconnection and AC line cut off | disconnection and AC line cut off | disconnection | disconnection | disconnection | disconnection | disconnection and AC line cut off | disconnection and AC line cut off | disconnection |
| Disconnection signalling | green light off | green light off | green light off | green light off | green light off | green light off | green light off | green light off | Buzzer |
| No-connection to earth signalling | orange light off | no | no | no | no | no | no | no | no |
| Wiring | wires | wires | wires | wires | wires | wires | screw terminal | screw terminal | wire |
| Mounting | wall | wall | wall | wall | wall | wall | wall | wall | AC outlet |



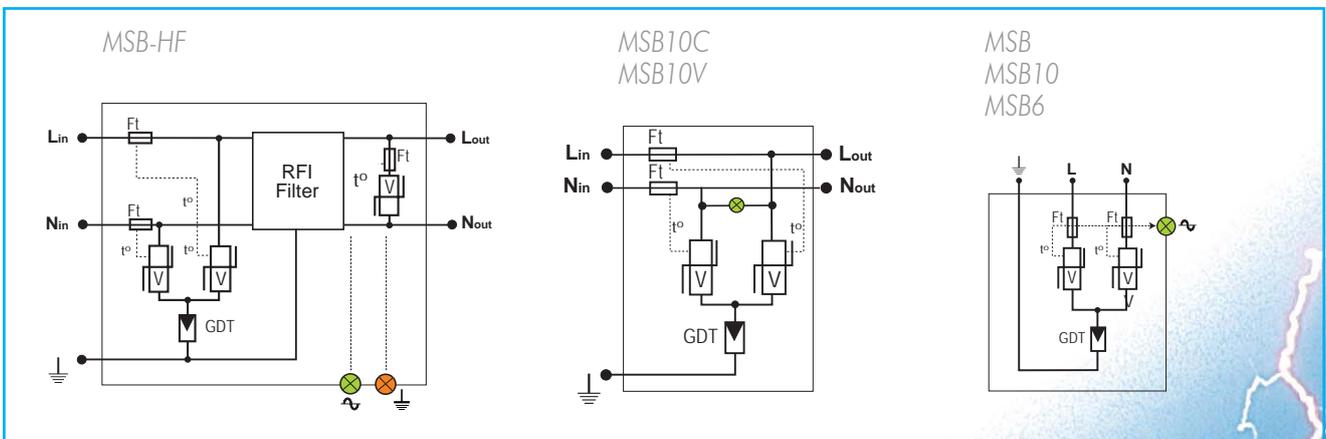
Hard-wired AC Surge Protectors

MSB-HF, MSB, MSB10

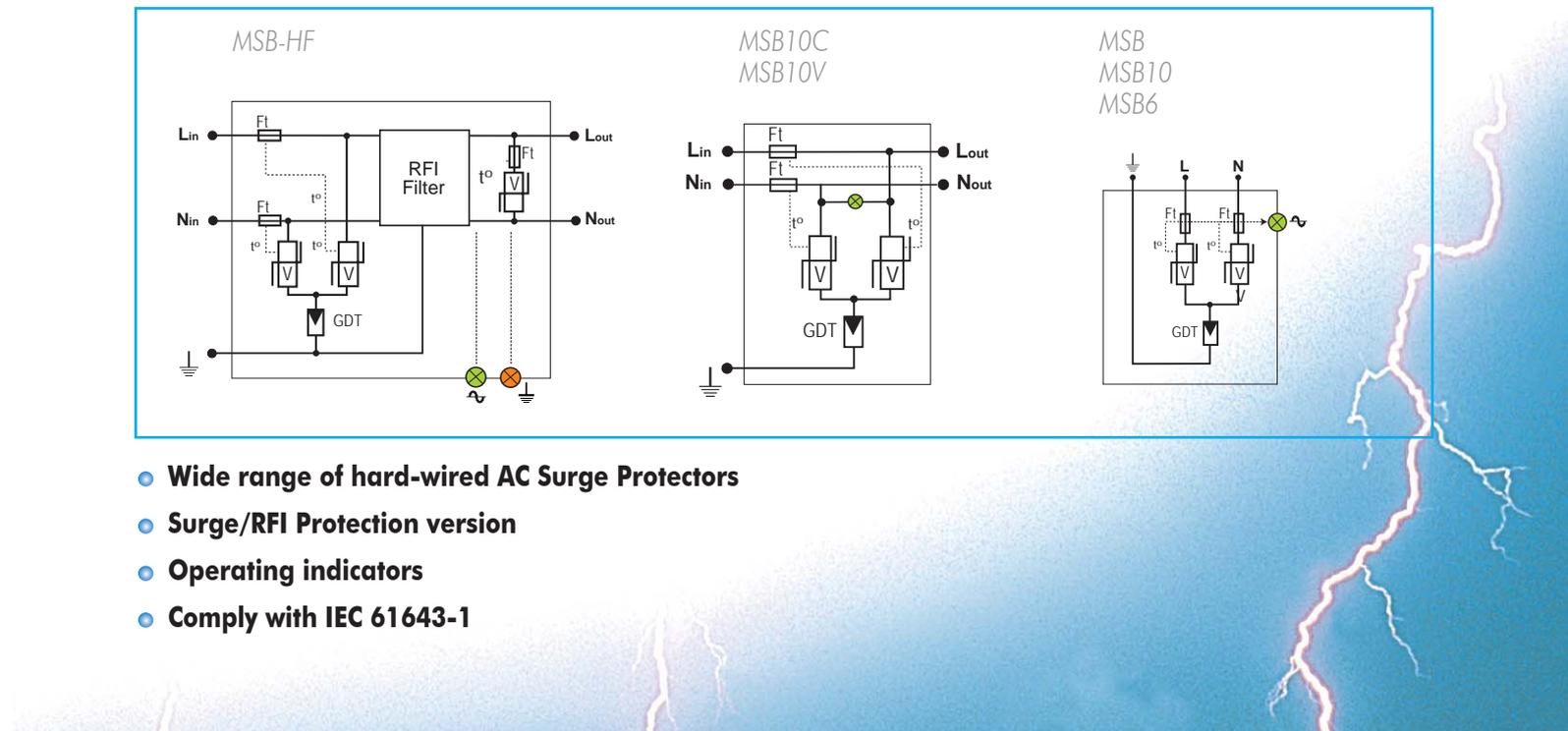
Dimensions (in mm)



Electrical diagrams



- Wide range of hard-wired AC Surge Protectors
- Surge/RFI Protection version
- Operating indicators
- Comply with IEC 61643-1



TELEPHONE
INDUSTRIAL NETWORK
DATA NETWORK



TELEPHONE
INDUSTRIAL NETWORK
DATA NETWORK



Telephone and data network surge protectors

Introduction

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 are currently connected to several 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.

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

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

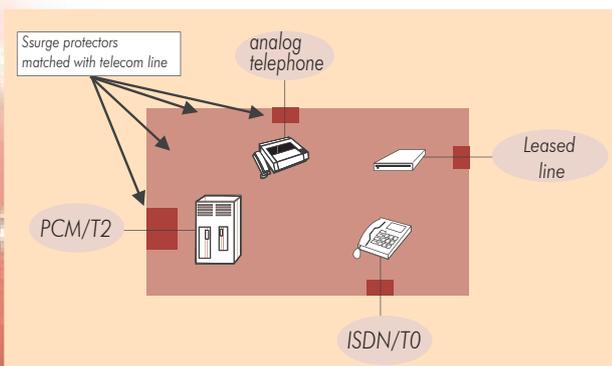
CITEL products differ by their electrical diagrams and their mechanical configurations, adapted to the need of each type of network.

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.

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 :



| Lines | Voltage | | Diagram |
|--------------------------|---------|----------|--|
| | Nominal | Residual | |
| Switched telephone /ADSL | 170 V | 210 V | Standard protection |
| Leased lines | 24 V | 35 V | Enhanced protection |
| ISDN, T2 primary access | 06 V | 15 V | Enhanced Protection Low capacitance |
| ISDN, T0 primary access | 48V | 62V | Enhanced protection |

Mechanical configurations

Surge protectors for telecom networks are designed to fit with existing installation. So, the CITEL surge protectors are available in different versions to allow :

- Mounting on telecom MDF
- Mounting on DIN rail
- Insertion in connection strips
- Wall mounting
- Plug-in on termination outlets

The decision whether or not to use surge protection would be taken by 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 |

Protecting industrial networks

Industrial installations, business or smart buildings are packed with an increasing quantity of measurement, control, 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 costly.

Thus, it is increasingly vital to guarantee a relevant level of reliability to these systems: this can be obtained by installing dataline 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, as:

- Industrial process equipment
- SCADA systems (Supervisory Control And Data Acquisition)
- Transmission systems
- I/O cards



Telephone and data network surge protectors

- Interfaces, converters
- Probes
- Actuators
- Access control system
- Fire detection system
- Displays
-

Many data transmissions (or fieldbus) exist on the market. The table below provides relevant CITELE surge protector model (DLA series : Din rail plug-gable module, and DLU series : Din rail monobloc module) in relation to the type of data transmission.

| Network | Wiring | DLU | DLA |
|------------------------|---------------|-----------|--------------|
| 4-20 mA | 1 pair | DLU-24D3 | DLA-24D3 |
| Profibus-FMS | 1 pair+Shield | DLU-12D3 | DLA-12D3 |
| Profibus-PA | 1 pair+Shield | DLU-48D3 | DLA-48D3 |
| Profibus-DP | 1 pair+Shield | DLU-12DBC | DLA-12DBC |
| Interbus | 1 pair+Shield | DLU-12D3 | DLA-12D3 |
| Foundation Fieldbus-H1 | 1 pair+Shield | DLU-12D3 | DLA-12D3 |
| Foundation Fieldbus-H2 | 1 pair+Shield | DLU-48DBC | DLA-48DBC |
| WorldFIP | 1 pair+Shield | DLU-48DBC | DLA-48DBC |
| Fipway | 1 pair+Shield | DLU-48DBC | DLA-48DBC |
| LONworks | 1 pair+Shield | DLU-48DBC | DLA-12DBC |
| Batibus | 1 pair+Shield | DLU-12D3 | DLA-12D3 |
| RS485 | 1 pair+Shield | DLU-12D3 | DLA-12D3 |
| RS422 | 2 pairs | DLU2-06D3 | 2 x DLA-06D3 |
| RS232 | 4 wires | DLU2-12D3 | 2 x DLA-12D3 |

Mechanical configuration

CITELE surge protectors for industrial data network are designed to fit on symmetrical DIN rail.

In order to offer a large range of solutions, the surge protectors are available in various configurations :

- Number of protected wires : from 1 wire to 2 pairs.
- Transmission and protection of the shield wire
- Plug-in modules : Version with removable module to ease the maintenance process.

Protecting data-processing 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

As for the other types of transmission lines, CITELE surge protectors for Local Area Networks (LANs) are based on association tripolar gas tubes and fast clamping diodes to ensure efficiency on lightning surges.

However, two additional parameters are to be taken into account: very low transmission voltage and high bitrate of the transmission. The CITELE surge protectors for data-processing networks are designed to fulfill these requirements.

Mechanical configuration

The surge protectors for data-processing networks are designed to fit with the existing installation. In consequence, the surge protectors are equipped with standard connectors (e.g. : RJ45) and are available in single enclosure to protect a terminal equipment, or in 19" rack unit format to protect at the hub level.

Technology of surge protectors

All Citel telephone and data line surge protectors are based on reliable multistage hybrid diagram 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 μ s impulse
- An ultrafast response time < 1 ns
- Safety operation in end of life (Fail-safe behaviour)
- Low insertion losses to not disturb the transmission signal.

The systematic use of 3-electrode discharge tubes provides optimum protection through simultaneous sparkover.

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

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

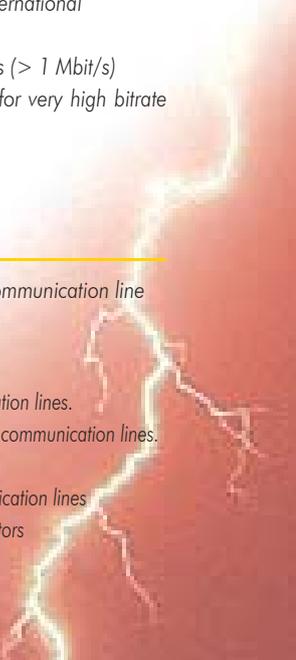
- Standard protection, used mainly for the analog telecom network (PSTN)
- Enhanced protection, for very low voltage transmission lines.
- Line+Shield Protection : Transmission and protection for the shield wire.
- «K20» protection complying with the ITU-T K20 International recommendation
- «Low capacitance» protection for high bit rate links (> 1 Mbit/s)
- «Cat 5» or «Cat 6» surge protection : designed for very high bitrate LAN (up to 1000 Mbit/s).

See list of diagrams, page C5.

Standards

Tests process and installation recommendations for communication line surge protectors must comply the following standards:

- International:
 - IEC 61643-21 : Tests of surge protectors for communication lines.
 - IEC 61643-22 : Choice/installation of surge protectors for communication lines.
- France:
 - NF EN 61643-21 : Tests of surge protectors for communication lines
 - Guide UTE C 15-443 : Choice/installation of surge protectors





Telephone and data network surge protectors

Use of surge protectors

In case of lack of recommendations or standard requirements, the decision of using surge protectors on telecom and datalines could be taken by following :

- the requirements of the terminal equipment manufacturer.
- a curative action following equipment failure.
- a risk analysis.

Risk analysis

In order to assess quickly the probability of the lightning surges and theirs 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 | Never | 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. A more detailed risk analysis is available on the IEC 61643-22 standard.

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 diagram for each type of line.
- The site configuration :
 - Number of lines to be protected.
- The requested type of installation :
 - The CITEL line provides the following possibilities :
 - Installation in wall-mounted box, plug mounting, on distribution frame
 - various types of connection (wrapping, IDC, screw terminals...)

● Features
Some surge protectors are equipped with pluggable modules (E280, DLA).

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 30 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 protector and the installation bonding circuit) must be as short as possible (less than 0.50 m) and have a cross-sectional area of at least 2.5 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.

Maintenance

CITEL dataline surge protectors 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 to earth) is planned in case of surges exceeding the parameters of the surge protectors:

Protective short-circuit occurs in the following cases :

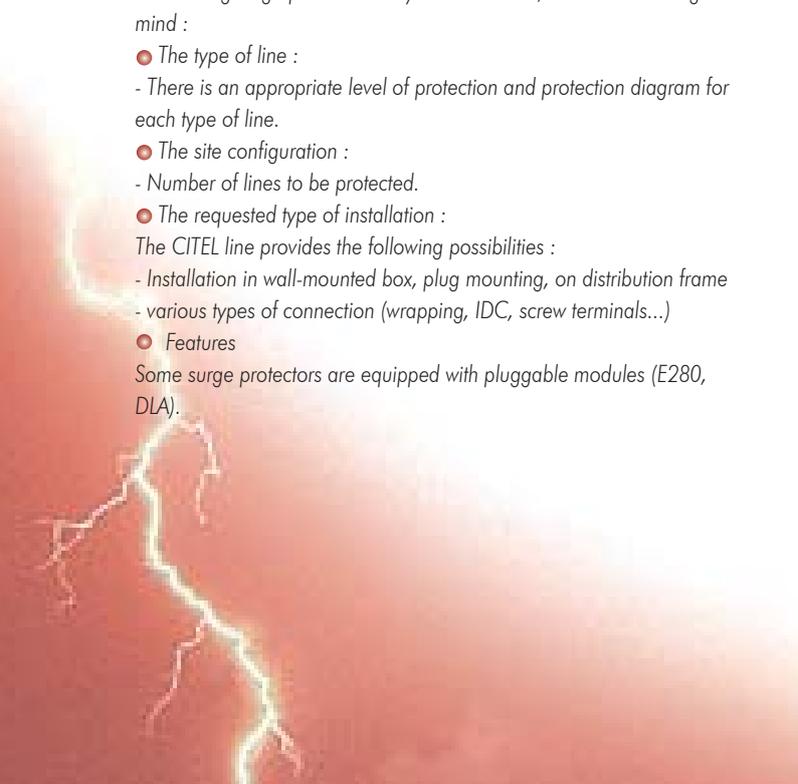
- sustained contact between the telecom line and a power line.
- exceptionally heavy lightning impulse current.

In these rare cases, the surge protectors will go definitively in short-circuit. By this way, it protects the terminal equipment and warns about its failure. To re-active the line, the surge protector must be replace.

The basic parameters of the surge protector for datalines could be controlled with dedicated testers (CITEL SPT1003).

Special conditions : Lightning rod

If the installation to be protected is equipped with LPS (lightning rod), 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).

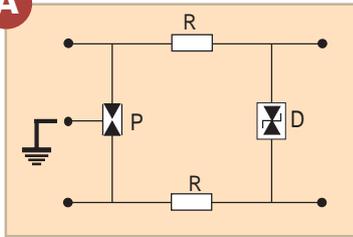




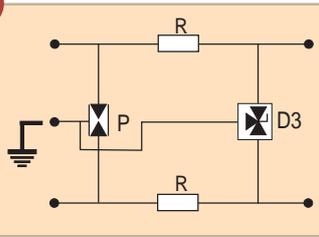
Telephone and data network surge protectors

Typical diagrams

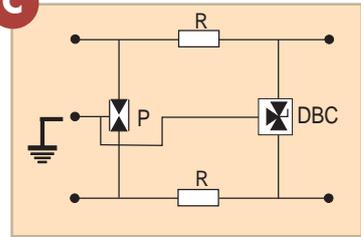
A Standard Protection



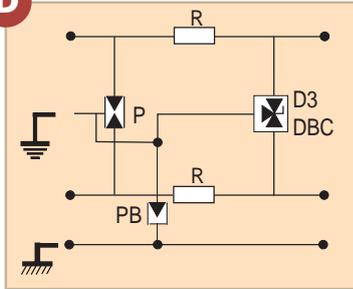
B Reinforced Protection



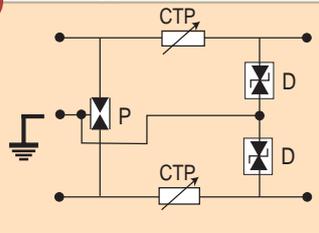
C Low capacitance Protection



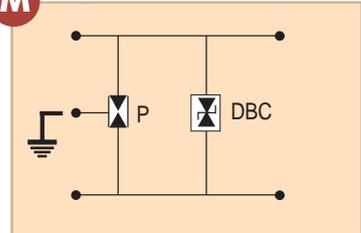
D Protection + Shield



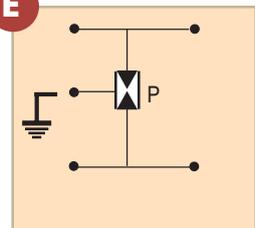
K1 «K20» type Protection



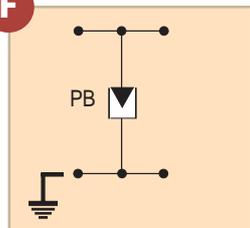
M High bitrate Protection



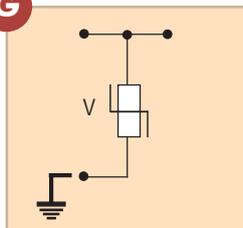
E 3-electrode GDT Protection



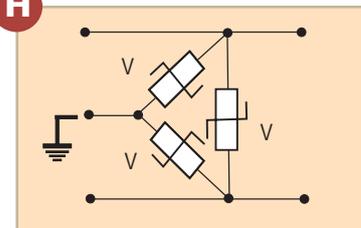
F 2-electrode GDT Protection



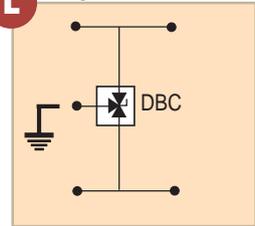
G 2-pole MOV Protection



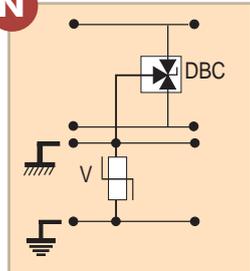
H 3-pole MOV Protection



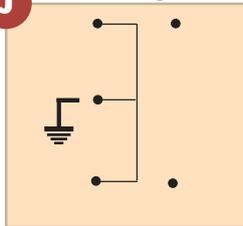
L Low capacitance 3- pole diode



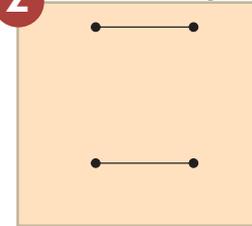
N «CAT6» Protection



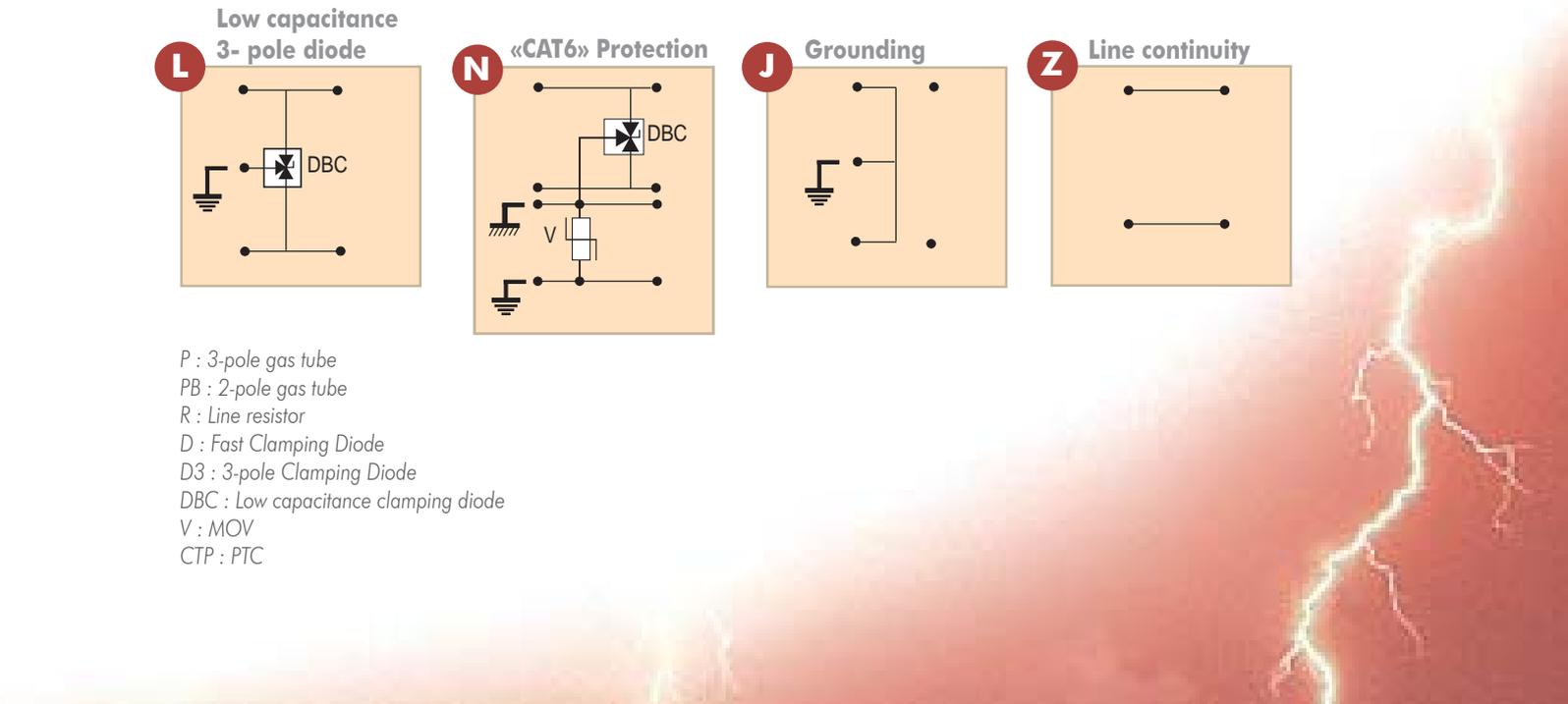
J Grounding



Z Line continuity



P : 3-pole gas tube
 PB : 2-pole gas tube
 R : Line resistor
 D : Fast Clamping Diode
 D3 : 3-pole Clamping Diode
 DBC : Low capacitance clamping diode
 V : MOV
 CTP : PTC



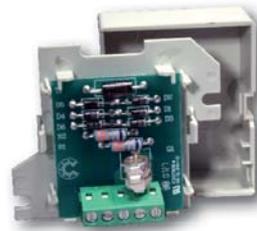


1, 2 and 4-pair Surge Protectors

B180, B280, B480



B480



B180

The B180, B280 and B480 units are designed to protect, against surge voltages, terminals connected to telephone or data networks. The electrical diagram is based on GDT and clamping diodes to guarantee a maximum efficiency.

These boxes are available for 1, 2 and 4 pairs : the protection printed circuit is removable for easy and fast maintenance (removable protection circuit S180.., S280.., S480..).

These compact boxes are designed for wall mounting and screw connection. Versions exist for most telephone and datalines.

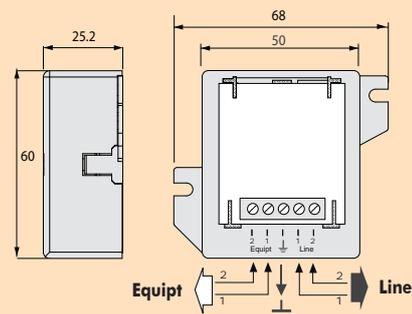
Special versions are also available for the combined protection of data transmission and remote power lines (e.g. B480-24D3/A12 : 3 x 24V transmission pairs + 1 x 12Vdc power supply). Contact us for more information.

C6

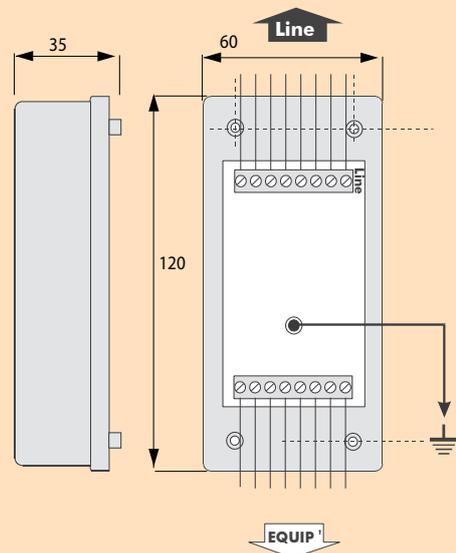
- 1 to 4-pair surge protection units
- All types of telephone and data lines
- Removable protection circuit
- Wall mounting and screw connection

Dimensions (in mm)

B180



B280-B480





1, 2 and 4-pair Surge Protectors

B180, B280, B480

Characteristics

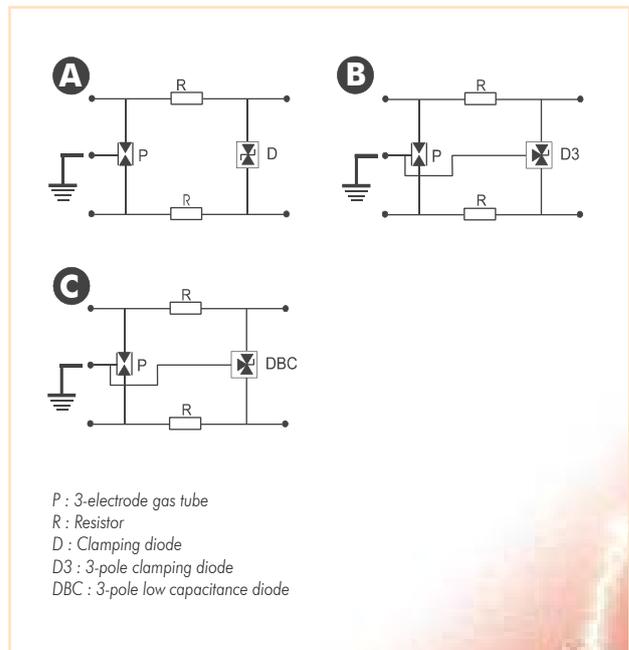
| Configuration | CITEL part number | | | | | |
|--|------------------------------|------------------------------|--|-------------------------------|---|------------------------------|
| | B180-T | - | B180-24D3 | B180-12D3 | B180-06D3 | - |
| 1-pair unit | B180-T | - | B180-24D3 | B180-12D3 | B180-06D3 | - |
| 2-pair unit | B280-T | B280-48D3 | B280-24D3 | B280-12D3 | B280-06D3 | B280-06DBC |
| 4-pairs unit | B480-T | B480-48D3 | B480-24D3 | B480-12D3 | B480-06D3 | B480-06DBC |
| Application | Telephone line ADSL | ISDN-T0 48 V line | Leased line 4-20 mA | RS232 | RS422 RS485 | T2 - T1 10BaseT |
| Configuration protected - B180... - B280... - B480... | 1 pair 2 pairs 4 pairs | - 1 channel 2 channels | LS 2 wires / 1 pair LS 4 wires / 2 pairs 2 LS 4 wires/2x2pairs | 2 wires 4 wires 8 wires | 1 pair 2 pairs 4 pairs/ 2x2 pairs | - 1 channel 2 channels |
| Nominal line voltage (Un) | 150 V | 48 V | 24 V | 12 V | 6 V | 6 V |
| Maximum line voltage (Uc) | 170 V | 53 V | 28 V | 15 V | 8 V | 8 V |
| Minimum clamping voltage | 190 V | 60 V | 35 V | 20 V | 10 V | 15 V |
| Protection level (Up) 8/20µs impulse - 5 kA | 220 V | 70 V | 40 V | 30 V | 20 V | 25 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Max. discharge current (Imax) 8/20µs impulse - 1 time | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA |
| Lightning current (Iimp) 10/350µs impulse - 2 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Type of diagram | A | B | B | B | B | C |
| End of life | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit |



Mechanical Characteristics

| | |
|------------------|---|
| Mounting | wall (screws non included) |
| Dimensions | see drawings schémas |
| Wiring | screw terminal - mini/maxi cross section : 0.4/1.5 mm ² |
| Housing material | Thermoplastic UL94-V0 |
| Spare circuit | for B180-xx = S180-xx for B280-xx = S280-xx for B480-xx = S480-xx |

Electrical diagram (for 1 pair)





DIN rail Surge Protector for dataline/telecom

DLU, DLU2



C8

DLU and DLU2 surge protectors are designed to protect, against surge voltages due to lightning, terminals equipment connected to industrial buses, telecom lines or datalines.

These surge protectors must be installed on symmetrical DIN rail and are available for most of the transmission lines : line voltage from 6 to 170 V, bitrate up to 10 Mbit/s.

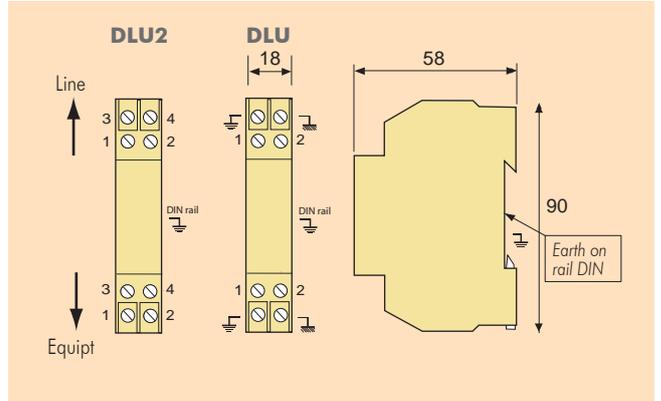
Electrical diagrams of DLU models are built with gas tubes and fast clamping diodes in order to provide high discharge current capability and fast operation.

The 2 versions are available:

1-pair (DLU) or 2-pair (DLU2) protection. These units are made with DIN rail monobloc enclosure. Transmission and protection of the shield wire by gas tube (DLU). Direct earthing through DIN rail.

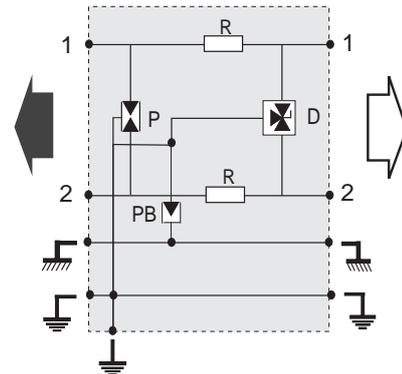
- For «DIN» rail mounting
- All types of Telephone and Data lines
- Monobloc housing
- 2-pair version (DLU2)
- Transmission and protection of shield wire (DLU)
- IEC 61643-21 compliance

Dimensions (in mm)

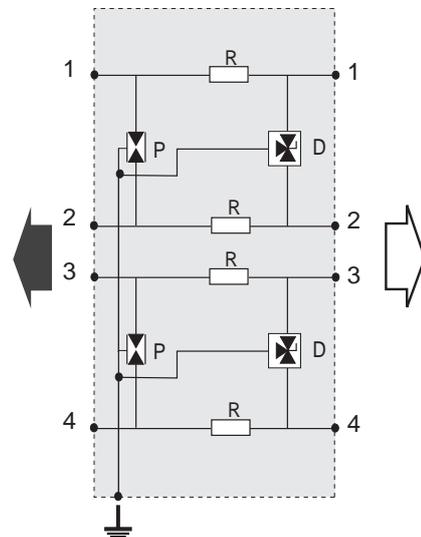


Electrical diagrams

DLU
1-pair version



DLU2
2-pair version



P : 3-electrode gas tube
Pb : 2-electrode gas tube
R : Resistor
D : Clamping diode



DIN rail surge protector for dataline/telecom

DLU, DLU2

Characteristics

1-pair version : DLU

| CITEL part number | DLU-170 | DLU-48D3 | DLU-48DBC | DLU-24D3 | DLU-12D3 | DLU-12DBC | DLU-06D3 | DLU-06DBC |
|---|---|--------------------|-----------------------------------|----------------------|--|------------------------|--------------------|--------------------------|
| Typical Application | Telephone line ADSL | 48 V line | Fipway WorldFIP Fieldbus-H2 | 4-20 mA 24 V line | Profibus-FMS Interbus Fieldbus-H1 Batibus | Profibus-DP LONwork | RS485 | 6 V line high bitrate |
| 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 | 48 V | 48 V | 24 V | 12 V | 12 V | 6 V | 6 V |
| Max. line voltage (Uc) | 170 V | 53 V | 53 V | 28 V | 15 V | 15 V | 10 V | 10 V |
| Max. line current | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA |
| Protection level (Up) 8/20µs impulse - 5 kA | 220 V | 70 V | 75 V | 40 V | 30 V | 35 V | 20 V | 25 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Max. discharge current (Imax) 8/20µs impulse - 1 time | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA |
| Impulse current (Iimp) 10/350µs impulse - 2 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Type of diagram | D | D | D | D | D | D | C | C |
| End of life | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit |
| Mechanical characteristics | Modular shape Symmetrical DIN rail mounting Dimensions : see drawing Connection by screw - max. cross section 1.5 mm ² Housing material : Thermoplastic UL94-V0 Earth connection via DIN rail (DLU, DLU2) and screw terminal (DLU). | | | | | | | |

2-pair version : DLU2

| CITEL part number | DLU2-170 | DLU2-48D3 | DLU2-24D3 | DLU2-12D3 | DLU2-06D3 | DLU2-06DBC |
|---|---|---------------|----------------------|---------------|---------------|--------------------|
| Typical Application | Telephone line ADSL | 48 V line | 4-20 mA 24 V line | RS232 | RS422 | T2 - T1 10BaseT |
| Configuration | 2 pairs | 2 pairs | 2 pairs | 4 wires | 2 pairs | 2 pairs |
| Nominal line voltage (Un) | 150 V | 48 V | 24 V | 12 V | 6 V | 6 V |
| Max. line voltage (Uc) | 170 V | 53 V | 28 V | 15 V | 10 V | 10 V |
| Max. line current | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA |
| Protection level (Up) 8/20µs impulse - 5 kA | 220 V | 70 V | 70 V | 30 V | 20 V | 25 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Max. discharge current (Imax) 8/20µs impulse - 1 time | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA |
| Impulse current (Iimp) 10/350µs impulse - 2 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Type of diagram | D | C | C | C | C | C |
| End of life | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit |
| Mechanical characteristics | Modular shape Symmetrical DIN rail mounting Dimensions : see drawing Connection by screw - max. cross section 1.5 mm ² Housing material : Thermoplastic UL94-V0 Earth connection via DIN rail (DLU, DLU2) and screw terminal (DLU). | | | | | |





DIN rail plug-in Surge Protector for dataline/telecom

DLA



DLA surge protectors are designed to protect, against surge voltages due to lightning, terminals equipment connected to industrial buses, telecom lines or datalines.

These surge protectors must be installed on symmetrical DIN rail and are available for most of the transmission lines : line voltage from 6 to 170 V, bitrate up to 10 Mbit/s.

Electrical diagrams are built with gas tubes and fast clamping diodes in order to provide high discharge current capability and fast operation.

These products are 1-pair surge protectors with removable module for easy maintenance (spare module : P/N DLAM...). Transmission and protection of the shield wire by gas tube. Direct earthing through DIN rail. Line continuity in case of plug-in module removal.

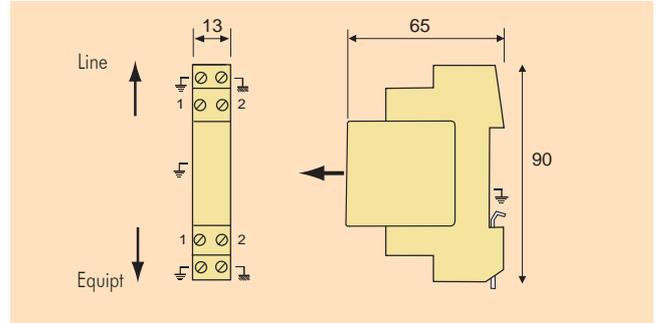
Specific versions :

DLAW : in this version, the removal of the plug-in module will cut the line transmission off.

DLAH : version designed for lines with higher line current (remote supply...) up to 2,4 A.

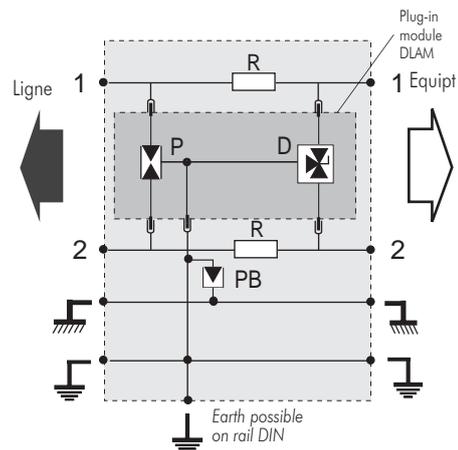
- Pluggable surge protection for «DIN» mounting
- All types of Telephone and Data lines
- Shield wire protection
- Without (DLA) or with (DLAW) line cut-off.
- IEC 61643-21 compliance

Dimensions (in mm)

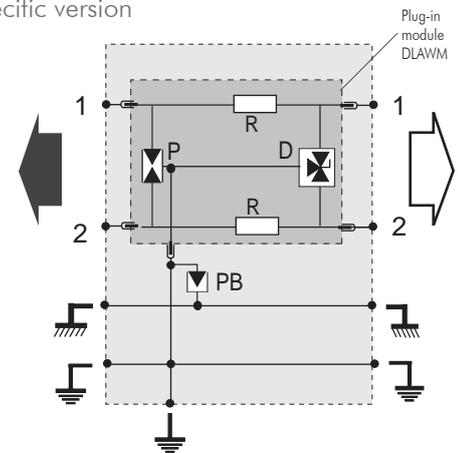


Electrical diagrams

DLA standard version



DLAW specific version



P : 3-electrode gas tube
 Pb : 2-electrode gas tube
 R : Resistor
 D : Clamping diode

C10



DIN rail surge protector for dataline/telecom

DLA

Characteristics

| Référence CITELE | DLA-170 | DLA-48D3 | DLA-24D3 | DLA-12D3 | DLA-06D3 | DLA-06DBC |
|---|--|----------------------|------------------------|---------------|----------------|-------------------|
| Utilisations type | Telephone line ADSL | ISDN-T0 48 V line | Leased line 4-20 mA | RS232 | RS422 RS485 | MIC/T2 10BaseT |
| Configuration | 1 pair+shield | 1 pair+shield | 1 pair+shield | 1 pair+shield | 1 pair+shield | 1 pair+shield |
| Nominal line voltage (Un) | 150 V | 48 V | 24 V | 12 V | 6 V | 6 V |
| Max. line voltage (Uc) | 170 V | 53 V | 28 V | 15 V | 8 V | 8 V |
| Max. line current | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA |
| Protection level (Up) 8/20µs impulse - 5 kA | 220 V | 70 V | 40 V | 30 V | 20 V | 25 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Max. discharge current (Imax) 8/20µs impulse - 1 time | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA |
| Impulse current (Iimp) 10/350µs impulse - 2 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Type of diagram | D | D | D | D | D | D |
| End of life | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit | Short-circuit |
| Spare module | DLAM-170 | DLAM-48D3 | DLAM-24D3 | DLAM-12D3 | DLAM-06D3 | DLAM-06DBC |
| Versions | DLA-xxx : standard version (line continuity in case of removal of plug-in module) DLAW-xxx : specific version (line cut-off in case of removal of plug-in module) DLAH-xxx : «remote supply» version (max. line current = 2,4 A) | | | | | |
| Mechanical specifications | Symmetrical DIN rail mounting Dimensions : see drawing Connection by screw - min/max. cross section 0.4/1.5 mm ² Housing material : Thermoplastic UL94-V0 Earth connection via DIN rail and screw terminal | | | | | |





DIN rail plug-in Surge Protector for dataline - ATEX

DLA-EX



DLA-EX surge protectors are designed to protect against surge voltages due to lightning, terminal equipments connected to intrinsic safe circuits.

In compliance with ATEX directives, they are classified as EEx ia and can operate in explosive areas by using the principle of energy limitation.

These surge protectors fit on DIN rail and are available for 12, 24 and 48 Vdc line voltages.

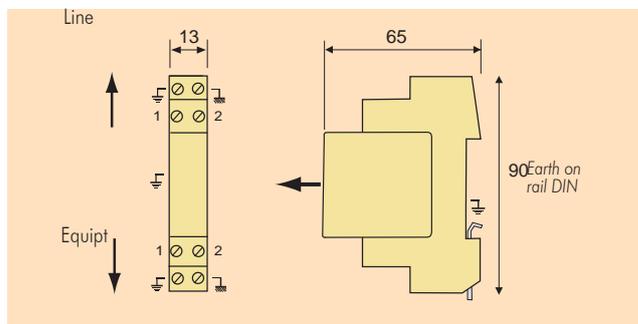
Electrical diagrams are built with gas tubes and fast clamping diodes in order to provide high discharge current capability and fast operation.

These products are 1-pair surge protectors with removable module for easy maintenance (spare module : P/N DLAM-EX...). Transmission and protection of the shield wire by gas tube. Direct earthing through DIN rail. Line continuity in case of plug-in module removal.

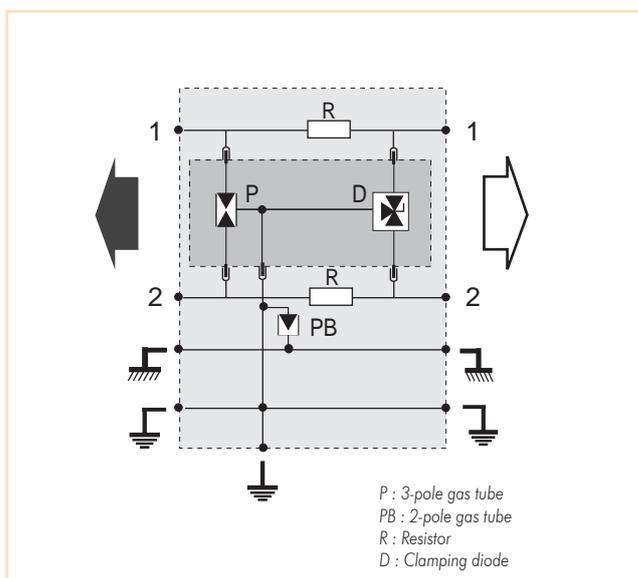
C12

- Pluggable surge protection for «DIN» mounting
- For datalines up to 48 Vdc
- Shield wire protection
- Comply with ATEX directive
- IEC 61643-21 compliance

Dimensions (in mm)



Electrical diagrams



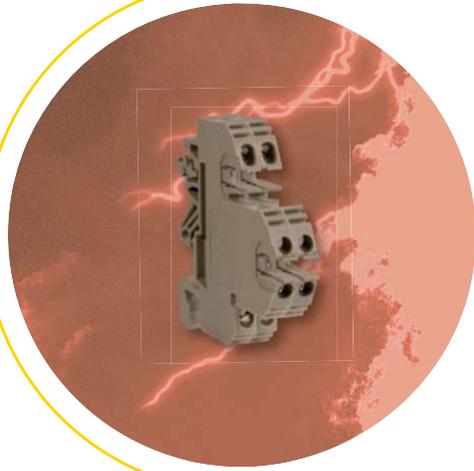
Characteristics

| CITEL part number | DLA-EX-48D3 | DLA-EX-24D3 | DLA-EX-12D3 |
|---|---|---------------|----------------|
| Typical use | 48 V line | 4-20 mA | RS232 RS485 |
| Configuration | 1 pair+shield | 1 pair+shield | 1 pair+shield |
| Nominal line voltage (Un) | 48 V | 24 V | 12 V |
| Max. line voltage (Uc) | 53 V | 28 V | 15 V |
| Max. line current | 300 mA | 300 mA | 300 mA |
| Protection level (Up) 8/20µs impulse - 5 kA | 70 V | 40 V | 30 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 5 kA | 5 kA | 5 kA |
| Max. discharge current (Imax) 8/20µs impulse - 1 time | 20 kA | 20 kA | 20 kA |
| Impulse current (Iimp) 10/350µs impulse - 2 times | 5 kA | 5 kA | 5 kA |
| Type of diagram | D | D | D |
| End of life | Short-circuit | Short-circuit | Short-circuit |
| Spare module | DLAM-EX-48D3 | DLAM-EX-24D3 | DLAM-EX-12D3 |
| Mechanical specifications | Symmetrical DIN rail mounting Connection by screw - min/max. cross section 0.4/1.5 mm ² Housing material : Thermoplastic UL94-V0 Earth connection via DIN rail and screw terminal | | |



1-wire compact DIN surge protector

DLR

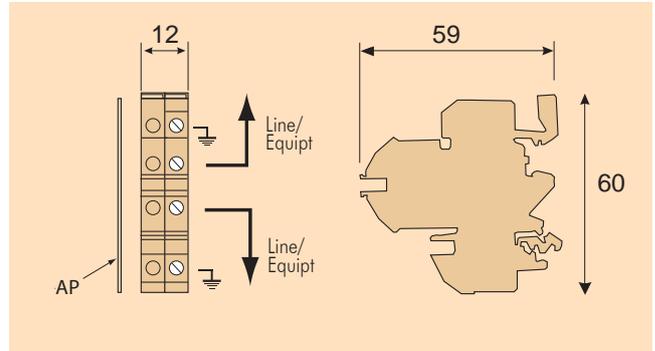


DLR surge protectors are designed to protect, against surge voltages due to lightning, terminals equipment connected to industrial buses, transmission and supply lines.

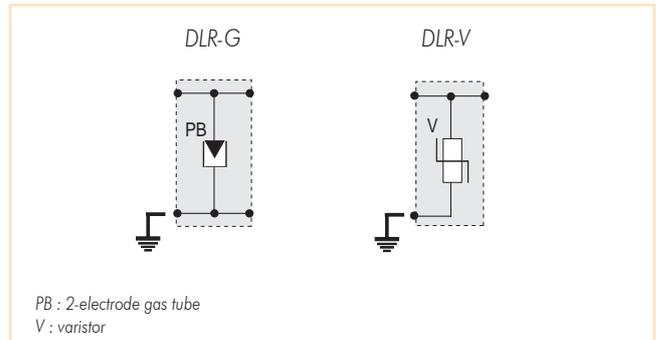
These surge protectors must be installed on symmetrical DIN rail and are designed to protect transmission lines (DLR-G with internal GDT) and power supply lines (DLR-V with internal whit MOV).

They protect and transmit 1 wire and are available in several volt-ages depending of the line to protect.

Dimensions (in mm)



Electrical diagrams



- Compact and cost effective
- For «DIN» rail mounting
- For transmission and power lines

Characteristics

| CITEL part number | DLR-G90 | DLR-G230 | DLR-G600 | DLR-V30 | DLR-V130 | DLR-V275 |
|---|--|--------------|----------------------------|------------------------------------|--------------------------------------|----------------------|
| Techonology | Gas tube | Gas tube | Gas tube | Varistor | Varistor | Varistor |
| Application | Dataline | Telecom line | Dataline with high voltage | Dataline or Power supply 12 - 24 V | Telecom line or Power supply 120 Vac | Power supply 230 Vac |
| Configuration | 1 wire | 1 wire | 1 wire | 1 wire | 1 wire | 1 wire |
| Max. line voltage (Uc) | 65 Vdc | 170 Vdc | 450 Vdc | 38 Vdc 30 Vac | 170 Vdc 130 Vac | 275 Vac |
| Max. line current | 300 mA | 300 mA | 300 mA | > 10 A | > 10 A | > 10 A |
| Protection level (Up) 8/20µs impulse (at In) | < 400 V | < 600 V | < 1000 V | 140 V | 480 V | 900 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 20 kA | 20 kA | 10 kA | 1 kA | 3 kA | 3 kA |
| Type of diagram | F | F | F | G | G | G |
| Mechanical characteristics | Symmetrical DIN rail mounting Dimensions : see drawing connection by screw - max. cross section 4 mm ² Housing material : Thermoplastic UL94-V0 Termination cap: DLR-AP | | | | | |



2-pair plug-in Surge Protector

E280 series



The E280 concept is based on the use of plug-in modules to protect telecom and data lines. The E280 line covers all multi-line telephone (PBX) and data installation configurations: there is an E280 module and a suitable support for every type.

E280 surge protectors use a high-speed 3-electrode gas discharge tube/clamping diode combination for a high discharge current capacity and a very short response time. Several diagrams are available to meet different line needs and standards.

Each module protects two pairs and is available for all types of line. The «plug-in» concept makes maintenance easy and lets you mix different types of line on the same support.

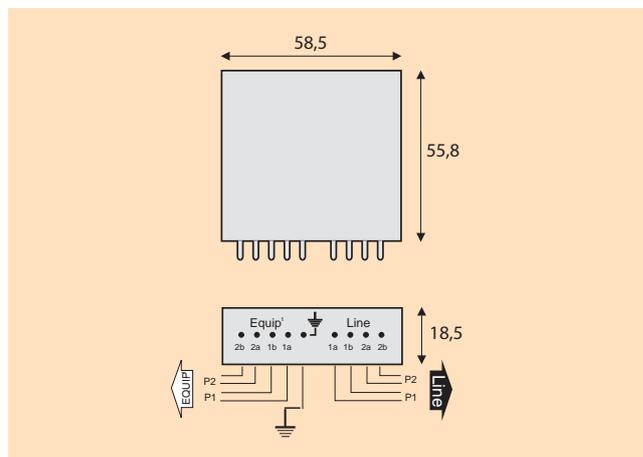
Specific versions for AC or DC powerline surge protection are also available :

- E280-A.. : Surge protector built with GDT and fast clamping diodes. Maximum line current : 0.5 A.
- E280-AV.. : Surge protector built with varistors. Maximum line current : 10 A.

E280 modules are compatible with a range of supports that includes multi-line boxes (ref. BNxx), «backplane» circuits for telephone distribution frames and DIN rails (ref. FPSUxx), and IDC modules for distribution frame mounting (ref. MMP).

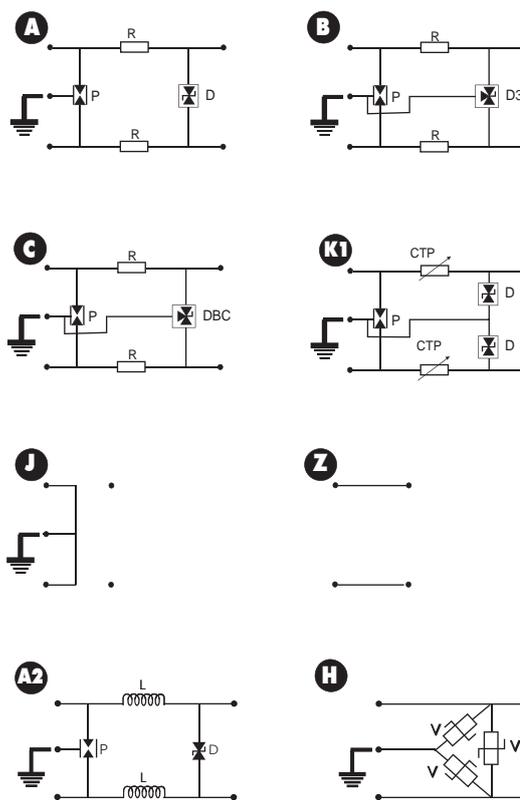
- 2 pairs plug-in module
- Optimized modularity and maintenance
- Can be adapted to all types of line
- Gas tube / diode combination
- For power supplies from 6 Vdc to 220 Vac (E280-A..)

Dimensions (in mm)



Electrical diagram

For 1 pair



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

DBC : 3-pole low capacitance diode
CTP : Thermistor
L : Inductor
V : Varistor



2-pair plug-in Surge Protector

E280 series

E280 series

Surge protectors for telecom and data lines

Characteristics

| CITEL part number | E280-TM | E280-K20 | E280-48D3M | E280-24D3M | E280-12D3M | E280-06D3M | E280-06DBC | E280G | ELM |
|---|--|--------------------------|---------------|---------------------|---------------|---------------|-----------------|----------|------------|
| Application | Telephone line - ADSL | Telephone line - K20 std | ISDN-T0 Telex | Leased line 4-20 mA | RS232 | RS422 RS485 | T2 - T1 10BaseT | Earthing | Continuity |
| Nominal line voltage (Un) | 150 V | 150 V | 48 V | 24 V | 12 V | 6 V | 6 V | - | - |
| Max. line voltage (Uc) | 170 V | 220 V | 53 V | 28 V | 15 V | 8 V | 8 V | - | - |
| Max. line current (Il) | 300 mA | 150 mA | 300 mA | 300 mA | 300 mA | 300 mA | 300 mA | - | > 1 A |
| Max. frequency | 3 MHz | 3 Mhz | 1 MHz | 0,5 MHz | 0,5 MHz | 0,5 MHz | 20 MHz | - | > 20 MHz |
| Protection level (Up) 8/20µs impulse - 5kA | 220 V | 260 V | 70 V | 40 V | 30 V | 20 V | 25 V | - | - |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA | > 5 kA | - |
| Max. discharge current (Imax) 8/20µs impulse - 1 time | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA | > 10 kA | - |
| Lightning current (Iimp) 10/350µs impulse - 2 times | 2.5 kA | 2.5 kA | 2.5 kA | 2.5 kA | 2.5 kA | 2.5 kA | 2.5 kA | > 2.5 kA | - |
| Type of diagram | A | K1 | B | B | B | B | C | J | Z |
| End of life | short-circuit | cut-off and reset | short-circuit | short-circuit | short-circuit | short-circuit | short-circuit | - | - |
| Mechanical characteristics | 2 pairs plug-in module Montage sur support type BN, FPSU, MMP Dimensions : see drawing Connectique : contact mâle laiton doré 0,5 µ Housing material : Thermoplastic UL94-V0 | | | | | | | | |



E280A series

Surge protectors for DC and AC power lines

Characteristics

| CITEL part number | E280-A06 | E280-A12 | E280-A24 | E280-A48 | E280-AV12 | E280-AV24 | E280-AV35 | E280-AV48 | E280-AV110 | E280-AV220 |
|---|----------|----------|----------|----------|-----------|-----------|-----------|-----------|------------|------------|
| Max. DC voltage (Uc-dc) | 8 V | 15 V | 28 V | 53 V | 18 V | 26 V | 35 V | 54 V | 125 V | 300 V |
| Max. AC voltage (Uc-ac) | 5 Vac | 10 Vac | 18 Vac | 38 Vac | 14 Vac | 20 Vac | 30 Vac | 40 Vac | 95 Vac | 250 Vac |
| Max. line current (Il) | 500 mA | 500 mA | 500 mA | 500 mA | 10 A | 10 A |
| Protection level (Up) at In | 20 V | 30 V | 50 V | 60 V | 40 V | 60 V | 90 V | 130 V | 250 V | 600 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 5 kA | 5 kA | 5 kA | 5 kA | 1.5 kA | 1.5 kA | 1.5 kA | 1.5 kA | 4.5 kA | 4.5 kA |
| Max. discharge current (Imax) 8/20µs impulse - 1 time | 10 kA | 10 kA | 10 kA | 10 kA | 3 kA | 3 kA | 3 kA | 3 kA | 6.5 kA | 6.5 kA |
| Type of diagram | A2 | A2 | A2 | A2 | H | H | H | H | H | H |

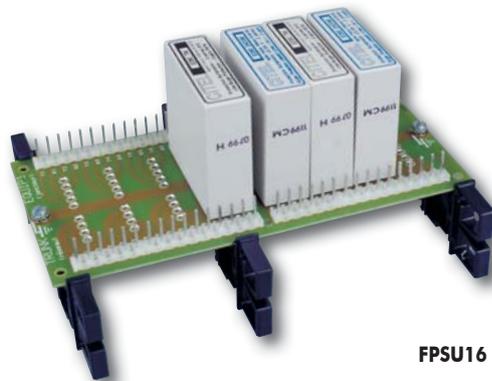


Support for E280 plug-in modules

BN , FPSU , MMP



MMP



FPSU16

Multi-pair boxes and supports are designed to be equipped with E280 plug-in surge protector, in order to propose solution to each kind of existing multilines installations.
3 configurations are available :

BN series : Metallic enclosures for wall mounting, when no existing panel is available on the network to install E280 surge protectors. Available in 8, 16 or 32 pairs.

FPSU series : System built with backplane, designed to receive E280 plug-in modules, featured with terminals for line connection and equipped with specific support for mounting on MDF profiles or symmetrical DIN rail. Available for 4,8, or 16 pairs. Version with wall mounting plate : FP series (10 or 25 pairs).

BN and FPSU are equipped with different type of connection terminal : Screw, Wrapping, IDC (France), IDC (USA : Quick Connect 66 and ATT110).

MMP module : this connector strip, designed to receive 2 E280 surge protectors (4 pairs), is installed on MDF in mechanical adaptation with the other connectors strips. Earthing is automatically performed through the pin in contact with the metallic frame.

- **BN series : 8, 16 or 32 pairs**
Metal enclosures for E280
- **FPSU series : 4, 8 or 16 pairs**
for MDF or DIN rail mounting
- **FP series : 10 or 25 pairs**
Wall mounting plate
- **MMP module : 4 pairs**
Connector strip for 2 E280
- **Connection : IDC, Screw, Wrapping, Punchdown**

Characteristics

| Format | Metal enclosures | | | Supports/boards | | | | | Strip |
|------------------------|-----------------------|---------|---------|-----------------------|------------------|------------------|----------|----------|-----------|
| | BN08 | BN16 | BN32 | FPSU04 | FPSU08 | FPSU16 | FP10 | FP25 | |
| CITEL part number | BN08 | BN16 | BN32 | FPSU04 | FPSU08 | FPSU16 | FP10 | FP25 | MMP |
| Max. number of pairs | 8 | 16 | 32 | 4 | 8 | 16 | 10 | 25 | 4 |
| Max. number of E280s | 4 | 8 | 16 | 2 | 4 | 8 | 5 | 13 | 2 |
| I/O connection : | | | | | | | | | |
| Screw terminals | BN08V | BN16V | BN32V | FPSU04V | FPSU08V | FPSU16V | - | - | - |
| Wrapping | BN08W | BN16W | BN32W | FPSU04W | FPSU08W | FPSU16W | - | - | - |
| IDC (France) | BN08CAD | BN16CAD | BN32CAD | FPSU04CAD | FPSU08CAD | FPSU16CAD | - | - | MMP |
| Quick connect 66 (USA) | - | - | - | - | - | - | FP10QC66 | FP25QC66 | - |
| ATT110 (USA) | - | - | - | - | - | - | FP10-110 | - | - |
| Mounting system | Wall | Wall | Wall | MDF* DIN rail | MDF* DIN rail | MDF* DIN rail | Wall | Wall | MDF* |
| Earth connection | 2 nuts with M4 screws | | | 2 nuts with M4 screws | | | | | Earth pin |

*) Compatible with MDF profile : PAO15001 (Infra+), HPU (3M-Pouyet), 09649 (Alcatel) and CITEL profile

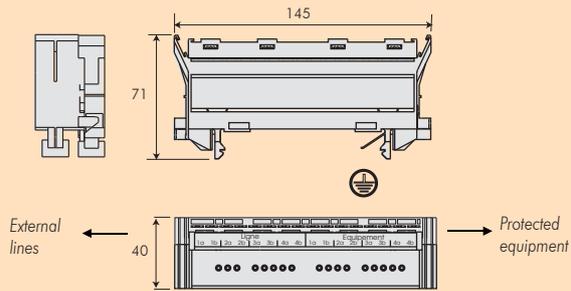


Support for E280 plug-in modules

BN, FPSU, MMP

Dimensions (in mm)

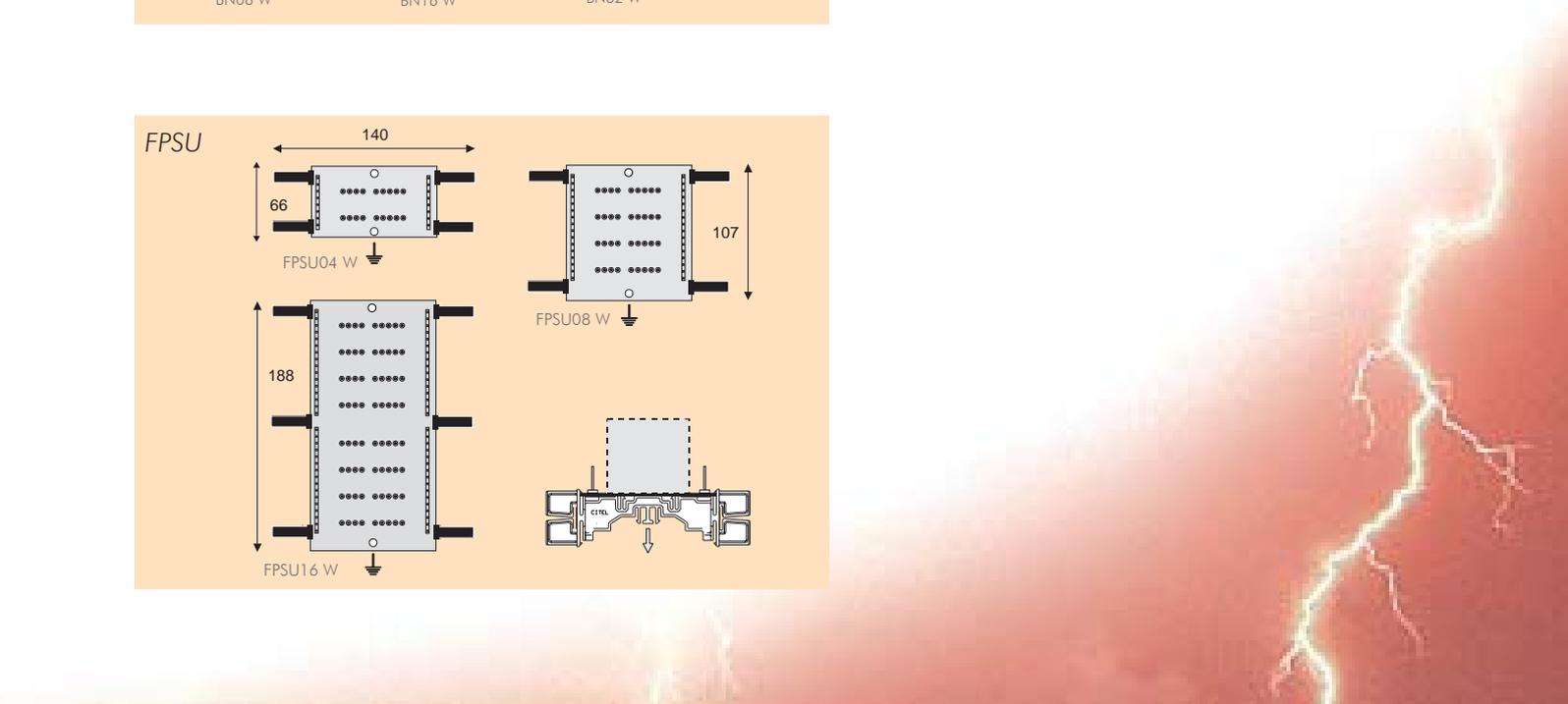
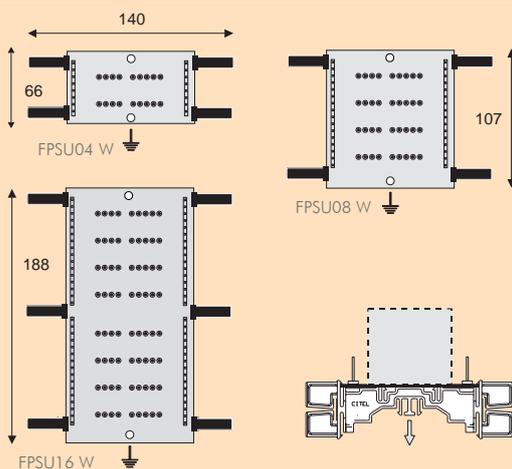
MMP



BN



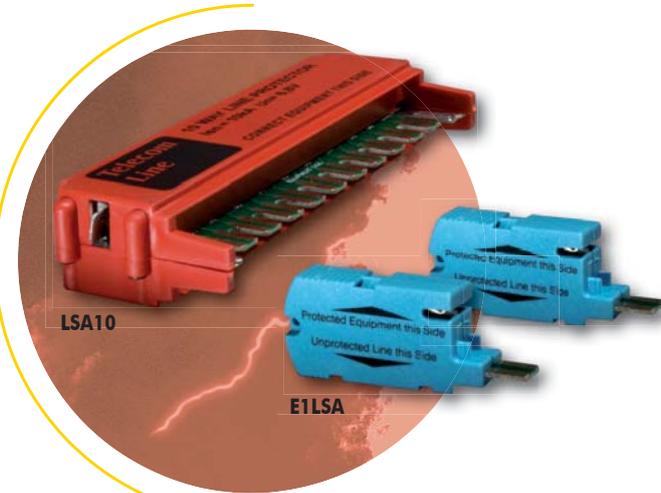
FPSU





1 and 10-pair Surge Protectors for LSA+*

E1LSA, LSA10



These surge protectors are designed to protect, from lightning surges, telephone equipment connected to the telecom network through a MDF equipped with connection strips.

They are compatible with LSA+ connection strip.

The mechanical design allows instantaneous installation, without wiring modification, on the connection system and fast maintenance. Nevertheless the connection strips, receiving the surge protectors, must be imperatively equipped a earthing contact connected to the bonding network of the installation (earthing frame in option).

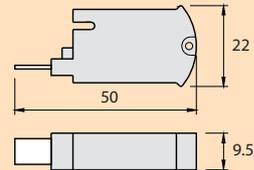
The electrical diagram combines a 3-electrode gas tube with clamping diode to provide a high discharge current capacity and a very fast response time.

2 versions : 1 pair (E1LSA) or 10 pairs (LSA10).

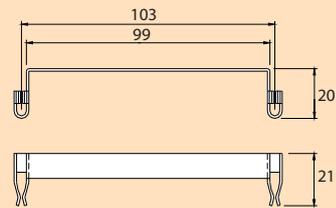
These products are in compliance with analog or high speed digital telecom networks.

Dimensions (in mm)

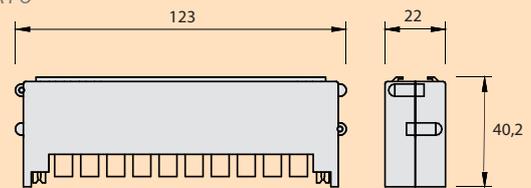
E1LSA



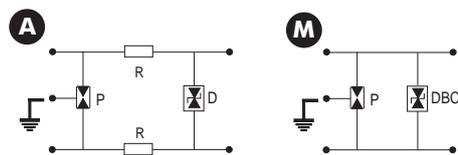
Earthing frame



LSA10



Electrical diagram



P : 3-pole gas tube
R : Resistor
D : Clamping Diode
DBC : Low capacitance Clamping Diode

- Surge protectors for LSA+ connection strip
- Fast installation with no wiring modification
- Fast Maintenance
- For analog or high speed telecom lines

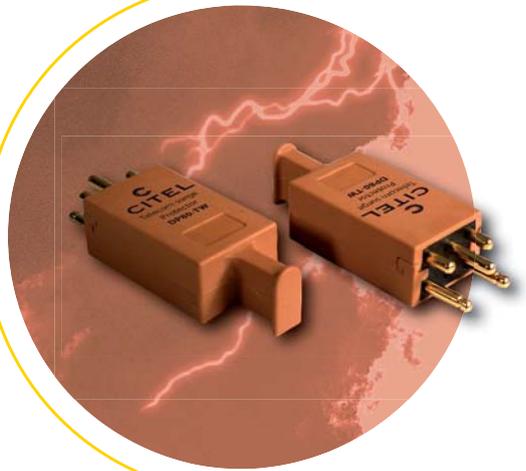
Characteristics

| CITEL part number | E1LSA-T | E1LSA-06DBC | LSA10-T | LSA10-06DBC |
|---|---|--------------------|---------------------|--------------------|
| Application | Analog line ADSL | T2 - T1 10BaseT | Analog line ADSL | T2 - T1 10BaseT |
| Configuration | 1 pair | 1 pair | 10 pairs | 10 pairs |
| Nominal line voltage (Un) | 150 V | 6 V | 150 V | 6 V |
| Max. line voltage (Uc) | 170 V | 8 V | 170 V | 8 V |
| Max. line current (I _l) | 300 mA | 300 mA | 300 mA | 300 mA |
| Max. frequency | 3 MHz | > 20 MHz | 3 MHz | > 20 MHz |
| Protection level (Up) 8/20µs impulse - 5kA | 230 V | 25 V | 230 V | 25 V |
| Max. discharge current (I _{max}) 8/20µs impulse - 1 time | 5 kA | 5 kA | 5 kA | 5 kA |
| End of life | short-circuit | short-circuit | short-circuit | short-circuit |
| Type of diagram | A | M | A | M |
| Mechanical characteristics | Mounting on LSA+ connection strip Dimensions : see drawing Housing material : Thermoplastic UL94-V0 | | | |



1-pair «5-pin» plug-in Surge Protector

DP80-TW



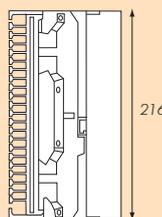
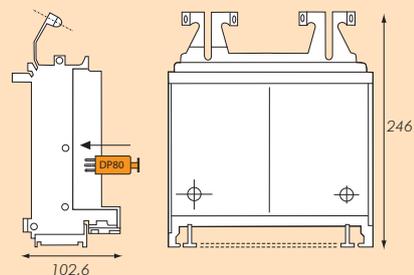
The DP80-TW series is designed to protect large telephone equipment (PBXs, central offices) against lightning surges. This protection is based in hybrid protection diagram (gas tube and diodes) and in K20 configuration (in compliance with ITU-T recommendation K20). The DP80-TW is a one-pair plug-in module that uses the 5-pin configuration, and so can be adapted to CITEL TC99 and similar 100-pair connector block.

TC99 100-pair MDF connector block allows the connection, protection, and disconnection of up to 100 pairs in a small volume, making it ideal for PBXs where space and effective protection are both critical. Connection is performed by Wrapping .

Dimensions (in mm)



TC99

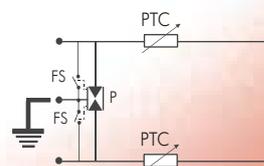


Characteristics

| CITEL part number | DP80-TW |
|---|--|
| Application | Analog line ADSL |
| Configuration | 1 pair |
| Nominal line voltage (Un) | 150 V |
| Max. line voltage (Uc) | 170 V |
| Max. line current (I _L) | 100 mA |
| Max. frequency | 3 MHz |
| Protection level (Up) 8/20µs impulse - 5kA | < 700 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 10 kA |
| End of life | Short-circuit on heavy surge and line cut-off + reset on overcurrent. |
| Mechanical characteristics | Mouting on «5-pin» connector block (type CITEL TC99 : 100 paires) Dimensions : see drawing Contact: brass gold plated 0,5 µ Housing material : Thermoplastic UL94-V0 |

- Discharge current 8/20µs : 5 kA
- «5-pin» configuration
- 100-pair MDF connector block : TC99

Electrical diagram



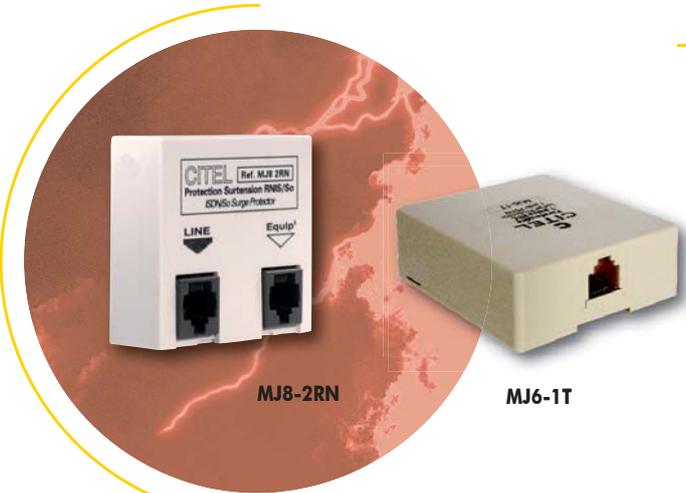
P : 3-electrode gas tube
PTC : Thermistance
FS : External short-circuit





Telecom Surge Protectors

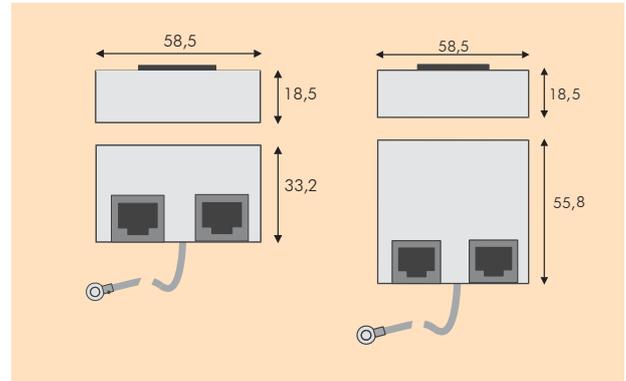
MJ8-2RN, B180T/MJ6, MJ6-1T



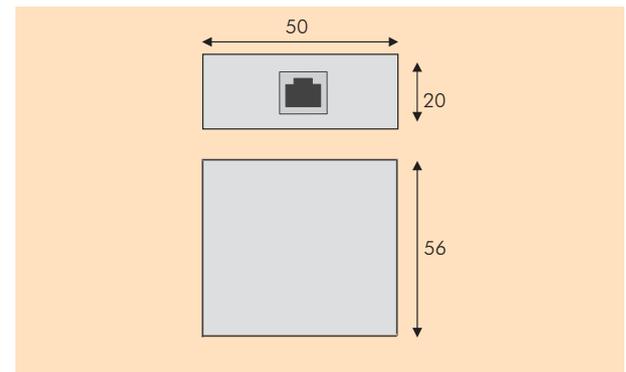
Dimensions (in mm)

B180T/MJ6

MJ8-2RN



MJ6-1T/MJ4-1T



These surge protectors are designed to protect sensitive telecom terminals (modems, fax machines, wireless telephone sets...) against lightning surges. They are equipped with standard telecom connection allowing easy and instantaneous installation.

The protection diagram combines a gas discharge tube with fast clamping diode, in order to provide maximum efficiency. These units need no special maintenance.

MJ8-2RN

Designed for ISDN terminal, the MJ8-2RN surge protector features in/out RJ45 connectors in compliance with T0/S0 ISDN requirements. Fast wall or frame mounting by self-gripping fasteners.

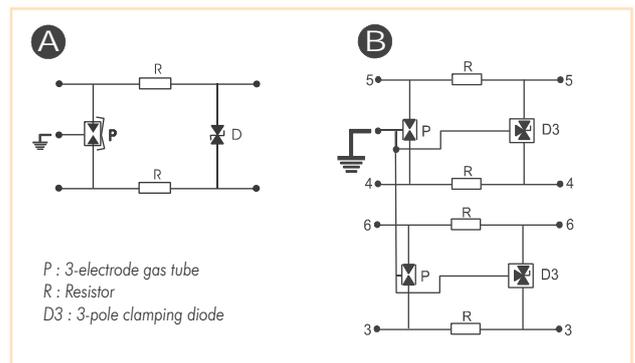
B180-T/MJ6

Compatible with RJ11 connector, it protects one PSTN or ADSL line. Instantaneous installation on between existing plugs. Fast wall or frame mounting by self-gripping fasteners.

MJ6-1T and MJ4-1T

Compatible with RJ11 or RJ9 connector, it protects one PSTN or ADSL line. Connection to line by screw terminal and connection toward protected equipment on RJ11 or RJ9 connectors. Wall mounting.

Electrical diagrams



P : 3-electrode gas tube
R : Resistor
D3 : 3-pole clamping diode

- Protection for one telephone line
- For PSTN, ISDN, ADSL lines
- Instantaneous installation
- RJ11 or RJ45 connectors

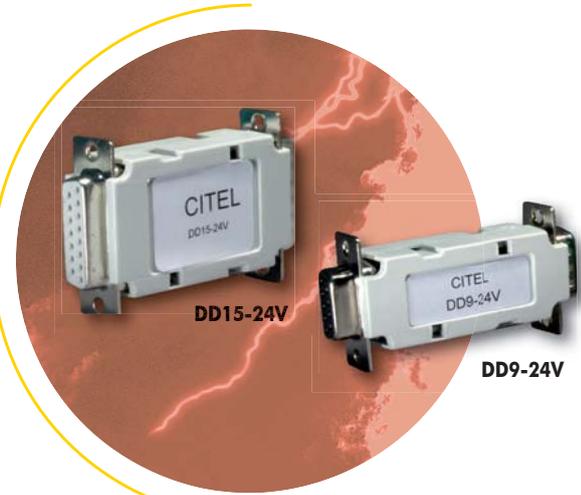
Characteristics

| CITEL part number | MJ8-2RN | B180-T/MJ6 | MJ6-1T | MJ4-1T |
|--------------------------------|--------------------|--------------------|----------------|----------------|
| Type of line | RNIS T0/S0 | RTC/ADSL | RTC/ADSL | RTC/ADSL |
| Max. line voltage (Uc) | 48 V | 170 V | 170 V | 170 V |
| Residual voltage (Up) | 70 V | 210 V | 210 V | 210 V |
| Nominal discharge current (In) | 2.5 kA | 2.5 kA | 5 kA | 5 kA |
| I/O connections | RJ45/RJ45 | RJ11/RJ11 | RJ11/screw | RJ9/screw |
| Connector wiring | 4-5/3-6 | 3-4 | 3-4 | 2-3 |
| Mounting | on equipment frame | on equipment frame | wall | wall |
| Earthing | by wire | by wire | screw terminal | screw terminal |
| Type of diagram | B | A | A | A |



Data «D-Sub» Surge Protectors

DD



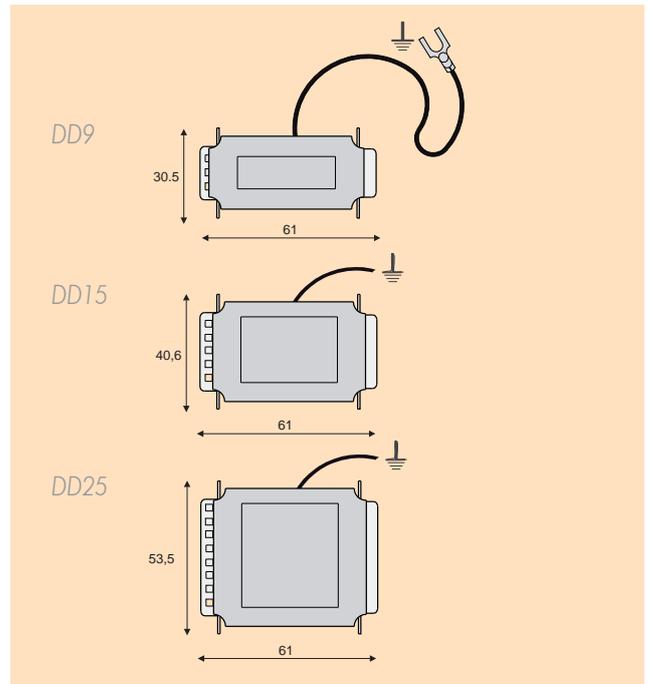
These surge protectors are designed to protect sensitive equipment linked to datalines equipped with D-Sub connectors, as RS232, RS422 and RS485 lines.

They protect against surge voltages due to lightning or switching operations. They are equipped with D-sub connectors for fast and easy maintenance. In order to comply with the line configuration, all the wires are transmitted and protected.

The surge protection diagram is based on ultra-fast clamping diodes in to reach an high level of efficiency. Nevertheless, their low discharge capability make them usable only to protect indoor transmission lines.

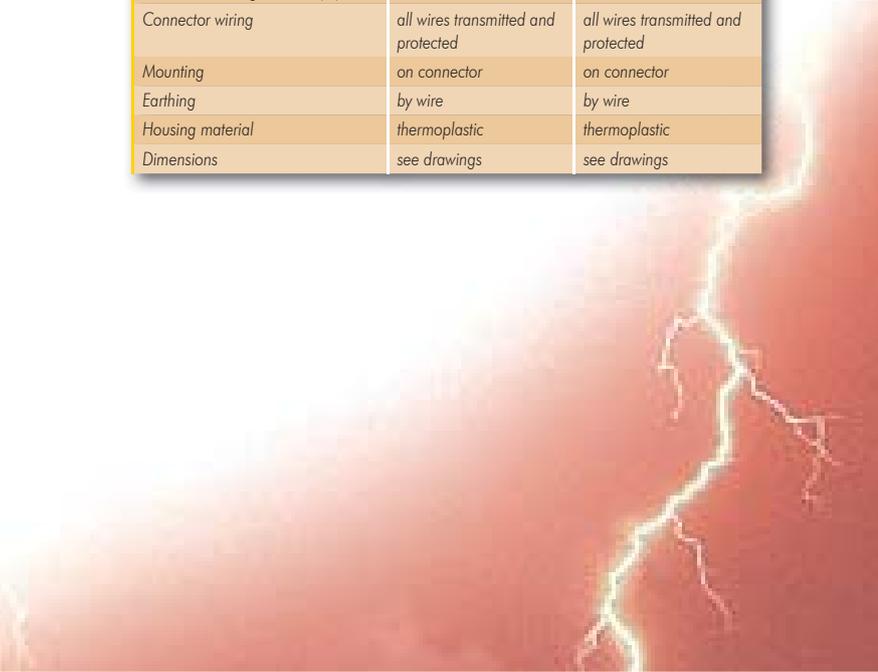
- «D-Sub» surge protectors
- For RS232, RS422, RS485 lines
- Instantaneous installation
- 9 pts, 15 pts ou 25 pts connectors

Dimensions (in mm)



Characteristics

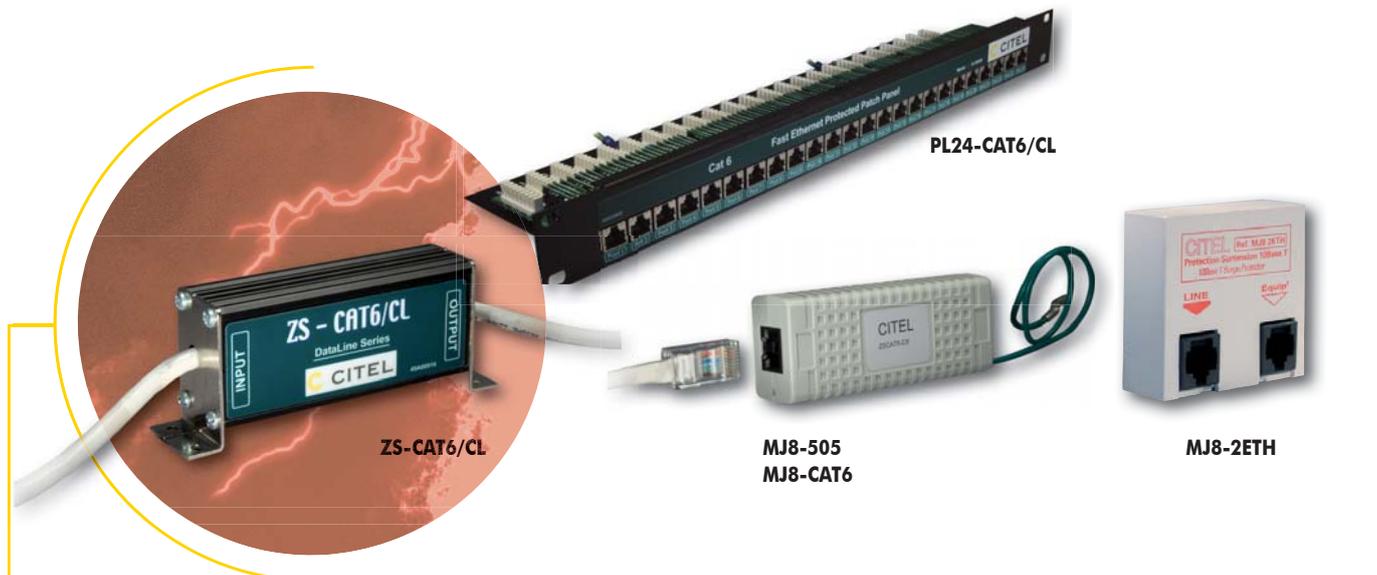
| CITEL part number | DDx-6V | DDx-24V |
|--------------------------------|-------------------------------------|-------------------------------------|
| Type of line | RS422/RS485 | RS232 |
| Connectique Sub-D 25 pts | DD25-6V | DD25-24V |
| Connectique Sub-D 15 pts | DD15-6V | DD15-24V |
| Connectique Sub-D 9 pts | DD9-6V | DD9-24V |
| Max. line voltage (Uc) | 6 V | 15 V |
| Capacitance | < 30 pF | < 30 pF |
| Maximum data rate | < 40 Mbps | < 40 Mbps |
| Clamping voltage (Up) | 7.5 V | 18 V |
| Nominal discharge current (In) | 400 A | 300 A |
| Connector wiring | all wires transmitted and protected | all wires transmitted and protected |
| Mounting | on connector | on connector |
| Earthing | by wire | by wire |
| Housing material | thermoplastic | thermoplastic |
| Dimensions | see drawings | see drawings |





10BaseT/100BaseT/1000BaseT surge protectors

MJ8-2ETH, MJ8-CAT6, ZS-CAT6/CL, PL-CAT6/CL, MJ8-505



C22

This range of surge protectors is designed to protect data processing equipment, connected to twisted pair Ethernet 10 to 1000 Mbit/s network (10BaseT or 100BaseT), against lightning or switching surges.

Electrical diagrams used are based on miniature GDT and clamping diode network in order to provide a maximum efficiency and a minimum low losses.

These surge protectors are equipped with standard RJ45 connector for easy installation.

Several versions are available :

MJ8-2ETH : Basic version to protect one terminal connected to an unshielded 10BaseT network (UTP). Featured with in/out RJ45 connectors. Fast wall or frame mounting by self-gripping fasteners.

MJ8-CAT6 : surge protector dedicated to protect terminals on 100/1000BaseT UTP networks. Compliance with «Cat5/6» standard. All of the 8 wires are protected. Featured with in/out RJ45 connectors. Easy mounting directly on cable.

ZS-CAT6/CL : Version designed to protect one terminal connected to a 1000BaseT «Category 6» network. Shielded enclosure equipped with in/out RJ45 connectors. All the 8 wires are protected. These surge protectors for remote terminals are used in association with a multiline rack surge protection (PL24-CAT5/CL), centralized protection at the hub level.

PL24-CAT6/CL : This 19" panel is designed for the surge protection of multi-line inputs of a Category 6 - 1000BaseT STP network at the hub level. The maximum capacity is 24 channels with the PL12-CAT5/CL panel (12 channels with the PL12-CAT6/CL panel). The 19" format, 1HE high (44 mm), allows installation in all standard cabinets. The product uses shielded RJ45 connectors. The circuit diagram and construction allow a bit rate of 1000 Mbps and ensure Category 5 conformity. All 8 wires of each RJ45 connector are protected

MJ8-505 : Designed for «PoE» network (Power over Ethernet , IEEE802-3af std), this surge protector is useful for the HotPoints used in WiFi networks or for the IPBX terminals . Protection of the 100BaseT transmission and up to 60 Vdc power supply. Equipped with in/out unshielded RJ45 connectors.

Characteristics

| CITEL part number | MJ8-2ETH | MJ8-CAT6 | ZS-CAT6/CL * | PL12-CAT6/CL * | PL24-CAT6/CL * | MJ8-505-24D3A60-12*** |
|------------------------------|------------------------|------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--|
| Protection | 1 line | 1 line | 1 line | 12 lines max | 24 lines max. | 1 line |
| Application | Ethernet 10baseT - UTP | Ethernet 100/1000baseT - UTP | Ethernet 1000baseT STP | Ethernet 1000BaseT STP | Ethernet 1000BaseT STP | PoE (Power over Ethernet) |
| Maximum data rate | 10 MHz | 250 MHz | 250 MHz | 250 MHz | 250 MHz | 100 MHz |
| EN50173 standard compliance | Category 3 | Category 5 | Category 6 * | Category 6 * | Category 6 * | Category 5 |
| Connections | | | | | | |
| - input | RJ45 | RJ45 | RJ45 shielded | IDC connector | RJ45 shielded | RJ45 shielded |
| - protected input | RJ45 | RJ45 | RJ45 shielded | RJ45 shielded | RJ45 shielded | RJ45 shielded |
| Wiring | 2 pairs (1-2/3-6) | 4 pairs (1-2/3-6/7-8/4-5) | 4 pairs + shielded (1-2/3-6/7-8/4-5) | 4 pairs + shielded (1-2/3-6/7-8/4-5) | 4 pairs + shielded (1-2/3-6/7-8/4-5) | 2 pairs Ethernet (1-2/3-6) + 1 DC supply 60 Vdc** (7-8 or 4-5) |
| Protection diagram | C | L | M | N | N | L |
| Nominal discharge currents : | | | | | | |
| - Line/Line | 2500 A | 300 A | 300 A | 300 A | 300 A | 300 A |
| - Line/Ground | 2500 A | 300 A | 10000 A | 2500 A | 2500 A | 300 A |
| Mounting | on cable/wall | on cable | wall | on rack 19" | on rack 19" | on cable |

*) available in «Category 5» version : ZS-CAT5/CL , PL12-CAT5/CL , PL24-CAT5/CL

**) others power supply voltages on request.

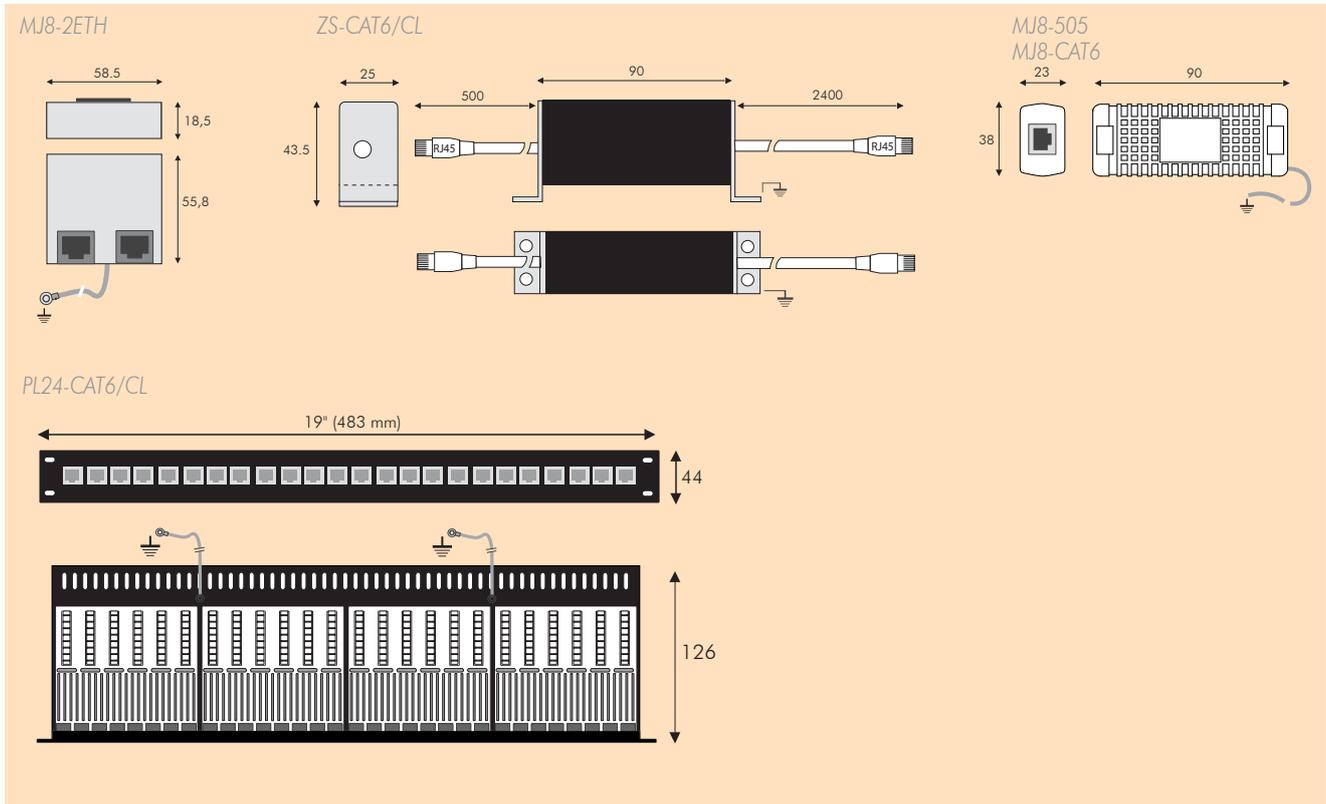
***) Outdoor versions on request



10BaseT/100BaseT/1000BaseT surge protectors

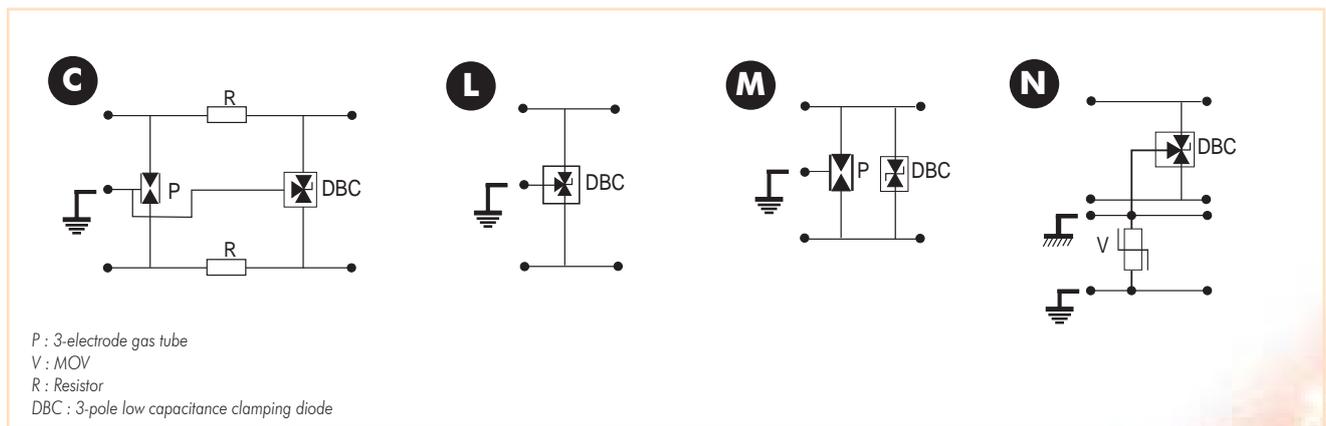
MJ8-2ETH, MJ8-CAT6, ZS-CAT6/CL, PL-CAT6/CL, MJ8-505

Dimensions (in mm)



C23

Electrical diagrams (for 1 pair)



- for 10BaseT/100BaseT/1000BaseT network
- Unshielded and shielded version
- Category 5 and 6 versions
- «PoE» version (indoor and outdoor)
- Multiline version for Rack 19"





Coaxial network and CATV Surge Protectors

CXC ,CXP , CNP



C24

CX surge protectors are designed to protect sensitive equipment, connected to coaxial lines as computer networks, video-transmission, against transient surge voltages and disturbances created by lightning. Several versions are available to fit the different networks :

CXC

Gas tube/Clamping diode hybrid association allowing heavy discharge current and low residual voltage.

These surge protectors are specially well adapted high frequency coaxial transmission as Ethernet 10Base5 or 10Base2, or video-transmissions.

CXP

Based on single Gas tube protection stage for heavy discharge current and very wide bandwidth (up to 1000 MHz).

Particularly adapted to TV or Radio receivers.

CNP-90TV

Cost effective version dedicated to TV receptors (Aerial, Cable or Satellite). Based on Gas Tube protection. F type connector in/out.

CXP-DCB

Version built with extra decoupling line circuit (DC block) to prevent DC or low frequency currents and to improve the residual voltage on surge voltages.

CX surge protectors are built with shielded metallic housings and are available with the main types of coaxial connectors.

Coaxial surge protectors

Multiples diagrams :

- GDT
- GDT/Diodes
- DC Block

Different connectors

Low insertion losses

Characteristics

| CITEL part number | CXC | CNP-90TV | CXP | CXP-DCB |
|---|--|---|---|--------------|
| Application | Ethernet 10Base2, Videotransmission | TV Aerial, Satellite or Câble | TV, Radiocom | TV, Radiocom |
| Bande passante (fmax) | 0-70 MHz | 0-1000 MHz | 0-1000 MHz | 125-1000 MHz |
| Insertion loss @ fmax | < 0.6 dB | < 0.3 dB | < 0.15 dB | < 0.15 dB |
| Max. line voltage (Uc) | 6 V* | 75 V | 60 V* | 60 V* |
| Protection level (Up) @ In (8/20 µs impulse) | 25 V / < 600 V (L-B / B-PE**) | < 600 V | < 600 V | < 200 V |
| Nominal discharge current (In) 8/20µs impulse - 10 times | 2.5 kA / 10 kA (L-B / B-PE**) | 2.5 kA / 10 kA (L-B / B-PE)** | 10 kA | 10 kA |
| Mechanical characteristics | Tinned Brass housing Cable mounting Dimensions : see diagram Earthing by wire | Plastic+metal housing Frame mounting Dimensions : see diagram Earthing by wire | Tinned Brass housing Frame mounting Dimensions : see diagram Earthing on screw | |
| Operating temperature | -40/+80°C | -40/+80°C | -40/+80°C | |

*) other voltages available on request

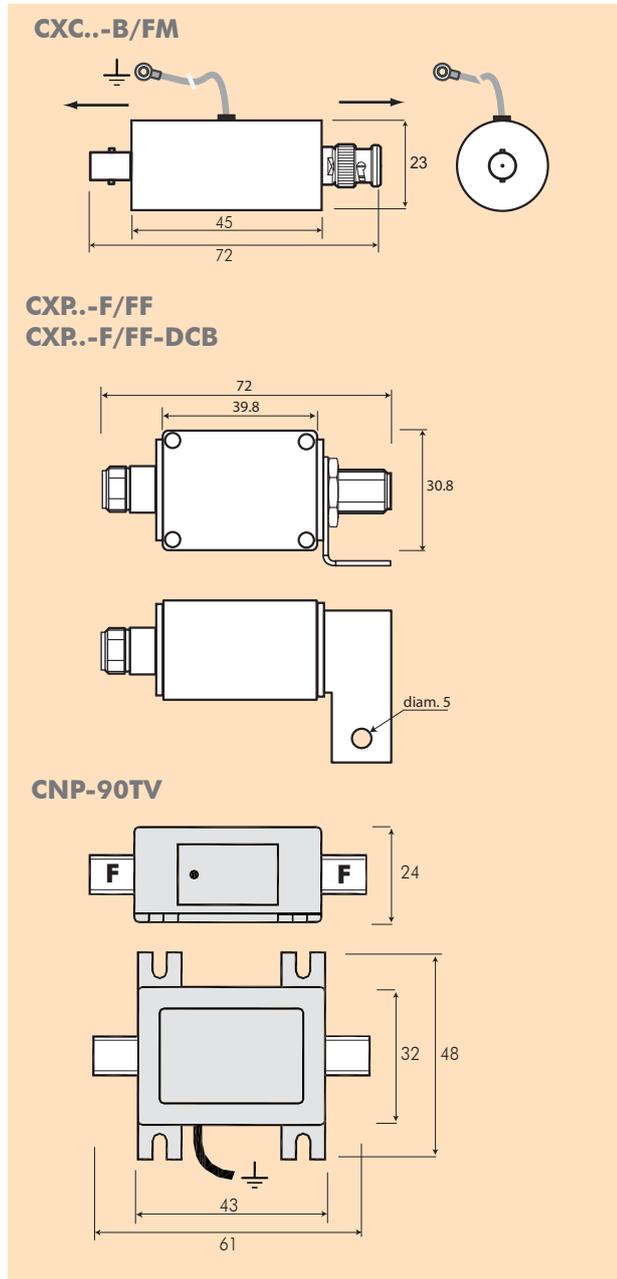
***) L-B : Line-Shield / B-PE : Shield-Ground



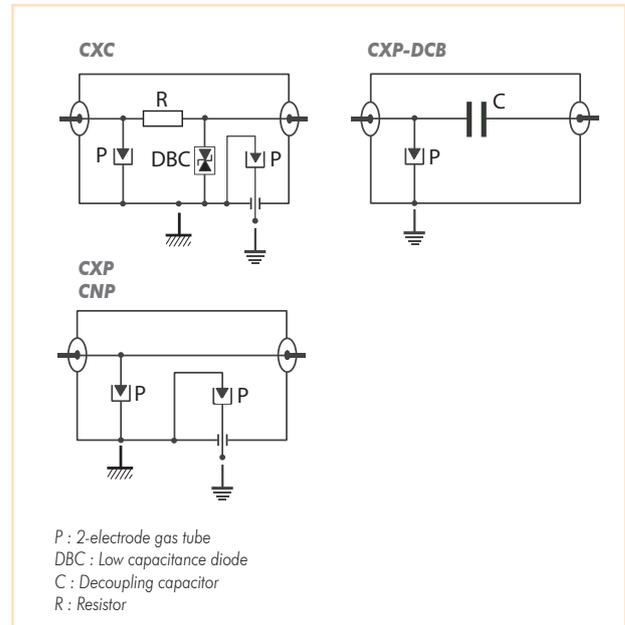
Coaxial network and CATV Surge Protectors

CXC, CXP, CXP-DCB, CXD

Dimensions (in mm)



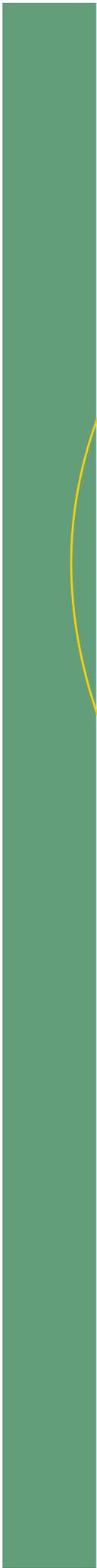
Electrical diagram



Part number

| CITEL part number | CXC06* | CXP* | CXP-DCB* | CNP* |
|-------------------|------------|------------|-----------------|---------------|
| F Connector | - | CXP09-F/MF | CXP09-F/MF-DCB | CNP-90TV F/MF |
| | - | - | CXP09-F/FM-DCB | - |
| | - | CXP09-F/FF | CXP09-F/FF-DCB | CNP-90TV F/FF |
| N Connector | - | - | CXP09-NW/MF-DCB | - |
| | - | - | CXP25-N/MF-DCB | - |
| | - | - | CXP09-NW/FF-DCB | - |
| BNC Connector | CXC06-B/MF | CXP09-B/MF | CXP09-B/MF-DCB | CNP-90TV B/MF |
| | CXC06-B/FM | - | CXP09-B/FM-DCB | - |
| | CXC06-B/FF | CXP09-B/FF | CXP09-B/FF-DCB | CNP-90TV B/FF |

MF : input Male/output Female
 FM : input Female/output Male
 FF : input Female/output Female
 W : Feedthrough mounting
 *) others configurations possible on request.



RF SURGE PROTECTORS



RF SURGE PROTECTORS

D1



RF Surge Protection

Protection of the radiocommunication equipment

Radiocommunication systems, connected to antennae, are especially exposed to lightning phenomena, the maximum risk being a direct strike on the antenna pole.

Equipment, as GSM/UMTS or TETRA base stations, must consider this risk in order to insure a relevant service continuity.

CITEL offers several surge protection technologies for RF lines to comply to the different operation requirements.

RF surge protection technology

Gas Tube Protection

P8AX series

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, the line is briefly practically shorted (arc voltage). The sparkover voltage depends on the rise front of the overvoltage. The higher the dV/dt of the overvoltage, the higher the sparkover voltage of the surge protector.

When the overvoltage disappears, the gas discharge tube returns to its original condition of high insulation and is ready to operate again.

The gas tube is removable, making maintenance rapid in the end-of-life case.

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

DC Blocked Protection

CXP-DCB series

This version is a relevant hybrid association between a filter stage and a gas tube : a such configuration allows a addition of the advantages of the both stages : Low frequency disturbances reduction (DC and lightning voltages) and high discharge current capability.

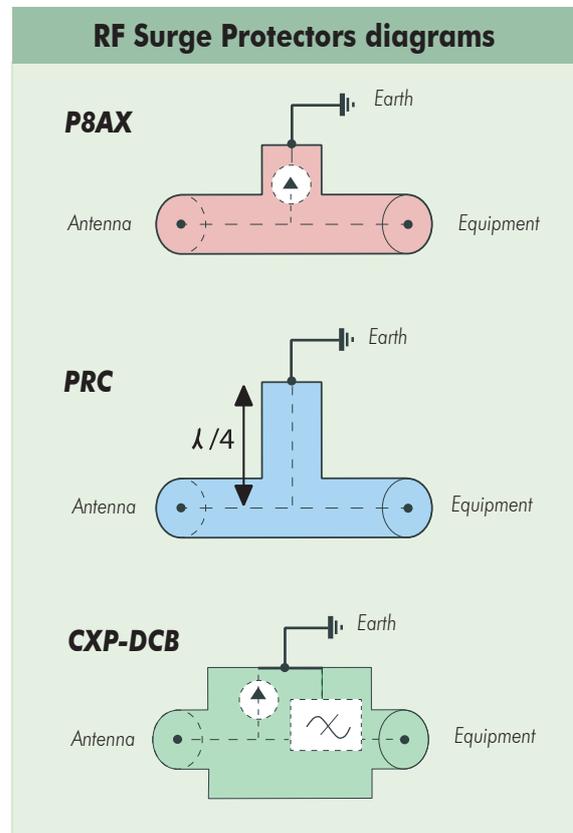
Quarter Wave Protection

PRC series

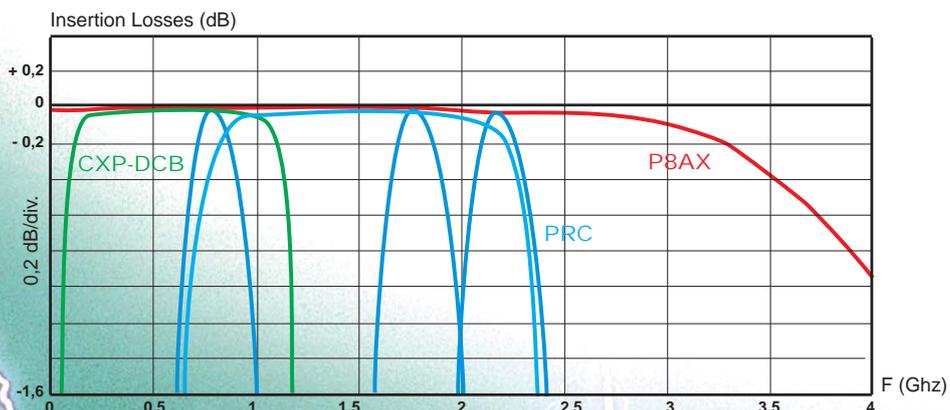
The other way to protect antenna lines is relevant replacement of the gas tube by a proper short-circuit chosen according to the operating frequency band. This short-circuit is tuned to one quarter of the wavelength, giving its name to «quarter-wave protection». This tuned short-circuit between the conducting core and the external ground acts as a band-pass filter.

The filter may be selective (narrow band) or wide-band, according to the calculation of the various mechanical elements.

Since lightning has a low-frequency spectrum (from a few hundred kHz to a few MHz), it will be filtered out from the operating frequencies.



D2





RF Surge Protection

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 tube | DC Block | Quarter wave |
|--|---|---|---|
| CITEL series | P8AX | CXP-DCB | PRC |
| |  |  |  |
| Principle | Sparkover | Sparkover + Filtering | Adapted short-circuit/selective band filter |
| Residual voltage | from 70V to 600 V in relation with the dV/dt, then arc regime (short-circuit of the line in the full bandwidth). RF signal disturbed during the protection operation. | < 100 V Short-circuit of the line in the full bandwidth : RF signal disturbed during the protection operation. | < 20 V RF signal not disturbed during the protection operation. |
| Bandwidth | DC to 3GHz (dependent of the coaxial connector and of the impedance) | 125-1000 MHz | Narrow band (GSM, DCS1800, PCS, DECT, GPS) |
| DC injection | Compatible | Not compatible | Not compatible |
| 8/20µs discharge current capability | 20 kA | 10 kA | Fonction de la connectique : 100 kA pour le 7/16, 50 kA pour le N |
| Life expectancy | Linked to the GDT stress | Linked to the GDT stress | Illimited |
| Connectors | N, BNC, TNC, UHF, SMA, 7/16 | N, BNC, TNC, F | 7/16, N, TNC.... |

Installation

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 insure 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 mounting» versions meet perfectly all these requirements.
Warning : for good contact, remove carefully all paintings or insulating coatings.
- **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).

2 types of mounting

● Feedthrough mounting

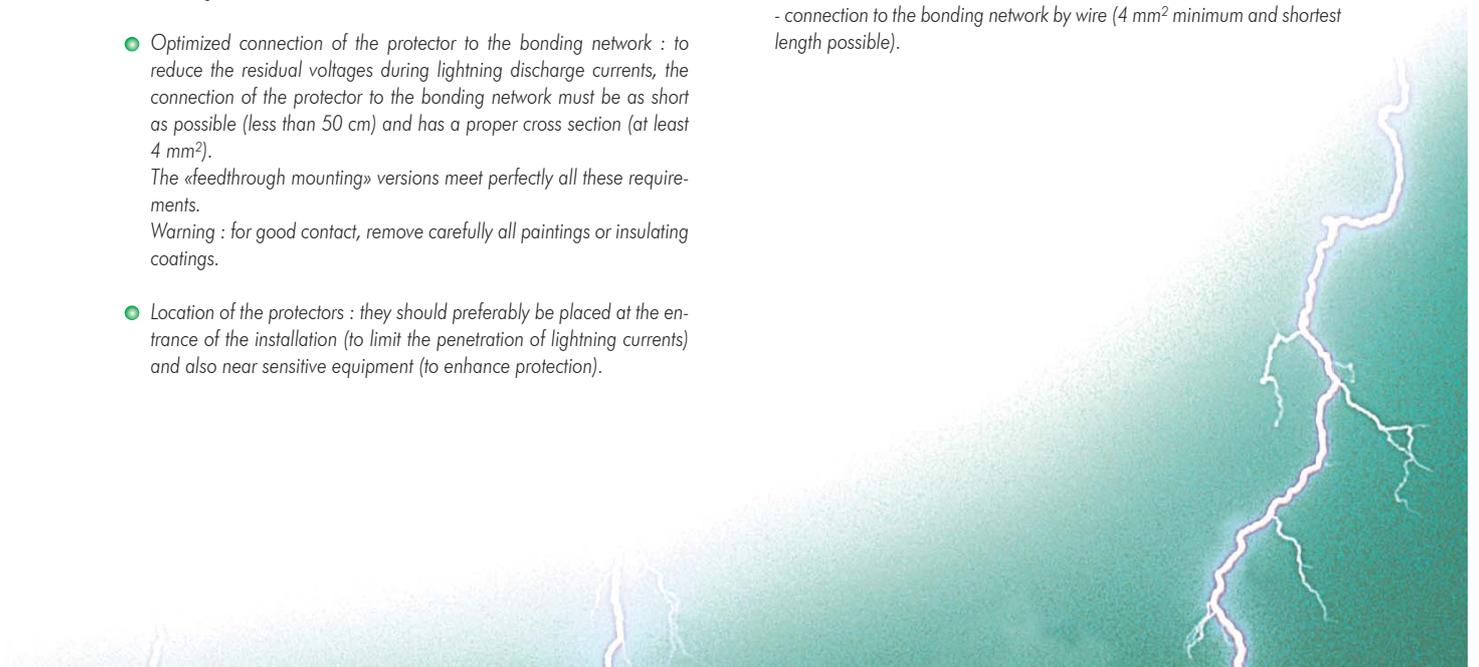
Direct mounting of the surge protector on the grounded frame at the installation entrance :

- perfect connection to the bonding network
- best location (conduction of the surge currents at the entrance of the installation)
- good mechanical withstand.

● Alternative mounting

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

D3





RF Coaxial Protectors

P8AX - PRC - CXP



PRC



P8AX



CXP

CITEL offers a comprehensive range of surge protectors designed for RF coaxial lines. Various technologies are available to comply the different uses and requirements.

P8AX series

The P8AX series is based on gas discharge tube (GDT) and designed for RF line surge protection. Available for different power and with coaxial connectors (N, BNC, TNC, UHF, SMA, 7/16, 7/8 cable), P8AX units could be provide in feedthrough mounting version and with various impedance (50 or 75 ohms).

Main characteristics :

- Insertion losses < 0,2 dB
- VSWR < 1,2
- I_{max} : 20 kA (8/20μs)
- Bandwidth : 0 to several GHz
- Connectors: N, BNC, TNC, 7/16, F, SMA, UHF, 7/8 cable.
- Waterproof

PRC series

PRC protectors are based on «Quarter-Wave» technology and are available in more than 30 versions : various connectors (7/16, N, TNC, 7/8 cable, BNC) and bandwidth (from 450 MHz to 6 GHz). These devices provide a very low residual voltage and are maintenance free.

Main characteristics :

- Insertion losses < 0,2 dB
- VSWR < 1,2
- Bandwidth :
 - 430-460 MHz
 - 870-950 MHz
 - 1700-1950 MHz
 - 1700-2200 MHz
- I_{max} : 100 kA (8/20μs)
- Connectors : 7/16, N, BNC, TNC, 7/8 cable.

CXP and CXP-DCB series

CXP protectors are based on GDT to provide high discharge current capability without destruction. Its particular mounting allows good adaptation to radio and TV system. Typical applications include radio terminals and TV sets (antenna, cable or satellite)

CXP-DCB version is built-in with an extra «DC block» stage in order to reduce low frequency disturbances (DC and lightning voltages) and decrease significantly the residual voltage.

Main characteristics (CXP) :

- Insertion losses < 0,5 dB
- VSWR < 1,3
- I_{max} : 20 kA (8/20μs)
- Bandwidth : DC - 1000 MHz
- Connectors : F, BNC, SE, N ..

Main characteristics (CXP-DCB) :

- «DC Block» feature
- Insertion losses < 0,15 dB
- VSWR < 1,2
- I_{max} : 10 kA (8/20μs)
- Bandwidth : 125 - 1000 MHz
- Connectors : N, BNC

Note: Comprehensive information about these ranges could be found in the dedicated CITEL catalog : «Surge Protective Protection for coaxial lines».

3 technologies of coaxial protectors :

- Gas tube : P8AX series
- Quarter wave : PRC series
- Gas tube + Filter : CXP-DCB series

Various types of coaxial connectors

Low insertion losses



RF Coaxial Protectors

P8AX - PRC - CXP

Characteristics*

| CITEL series | P8AX | PRC | CXP | CXP-DCB |
|---|--|--|---|---|
| Technology | Gas tube | Quarter wave | Gas tube | Gas tube + Filter |
| Typical application | RF transmission, DC supply | UMTS, GPS, GSM | TV, Satellite | RF transmission |
| Bandwidth (fmax) | 0 to several GHz | PRC450.. : 420-480 MHz PRC900.. : 870-960 MHz PRC1800 : 1700-1950 MHz PRC822 : 800-2200 MHz | 0-1000 MHz | 125-1000 MHz |
| Insertion losses @ fmax | < 0.2 dB | < 0.2 dB | < 0.5 dB | < 0.15 dB |
| VSWR @ fmax | < 1.2 | < 1.2 | < 1.3 | < 1.2 |
| Maximum peak power | 25 W : P8AX09.. 190 W : P8AX25.. | 1500 W (related to connector type) | 25 W : CXP09.. 190 W : CXP25.. | 25 W : CXP09..DCB 190 W : CXP25..DCB |
| Protection level (Up) @ In (8/20 μs) | < 600 V | < 20 V | < 600 V | < 100 V |
| Maximal discharge current (Imax) 8/20μs - 1 impulse | 20 kA | ~ 100 kA (related to connector type) | 20 kA | 10 kA |
| Mechanical specifications | - Material: brass CuZnSn - Amagnetic surface coating - Mounting : on cable or feedthrough («W» option) | - Material: brass CuZnSn - Amagnetic surface coating - Mounting : on cable or feedthrough («W» option) | - Material: brass - Amagnetic surface coating - Mounting : on frame | - Material: brass - Amagnetic surface coating - Mounting : on frame |
| Operating temperature | -40/+80°C | 40/+80°C | 80°C | 40/+80°C |

* For complete technical information, refer to the dedicated catalog : «Surge Protective Protection for coaxial lines».

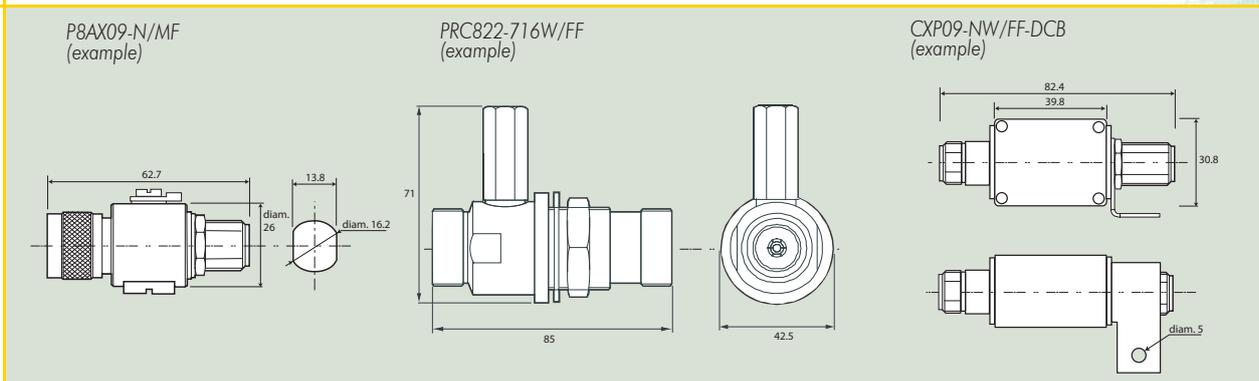
Part numbers*

| Référence CITEL | P8AX | PRC | CXP | CXP-DCB |
|-----------------|----------------------------------|--------------------------------|--------------------------|--|
| F connector | P8AX..-F/MF P8AX..-F/FF | - | CXP..-F/MF CXP..-F/FF | - |
| N connector | P8AX..-N/MF P8AX..-N/FF | PRC..-N/MF PRC..-N/FF | CXP..-N/MF CXP..-N/FF | CXP..-N/MF-DCB CXP..-N/FM-DCB CXP..-N/FF-DCB |
| BNC connector | P8AX..-B/MF P8AX..-B/FF | PRC..-B/MF PRC..-B/FF | CXP..-B/MF CXP..-B/FF | CXP..-B/MF-DCB CXP..-B/FM-DCB CXP..-B/FF-DCB |
| 7/16 connector | P8AX..-7-16/MF P8AX..-7-16/FF | PRC..-7-16/MF PRC..-7-16/FF | - | - |
| SMA connector | P8AX..-SMA/MF P8AX..-SMA/FF | - | - | - |
| TNC connector | P8AX..-T/MF P8AX..-T/FF | PRC..-T/MF PRC..-T/FF | - | - |
| UHF connector | P8AX..-U/MF P8AX..-U/FF | - | - | - |

* For complete list of part numbers, refer to the dedicated catalog : «Surge Protective Protection for coaxial lines».

Note: PRC series are available in «feedthrough» version : «W» option (e.g.: PRC822-716W/FF)

Dimensions*



* For complete information on mechanical dimensions, refer to the dedicated catalog : «Surge Protective Protection for coaxial lines».

D5

GAS DISCHARGE TUBES

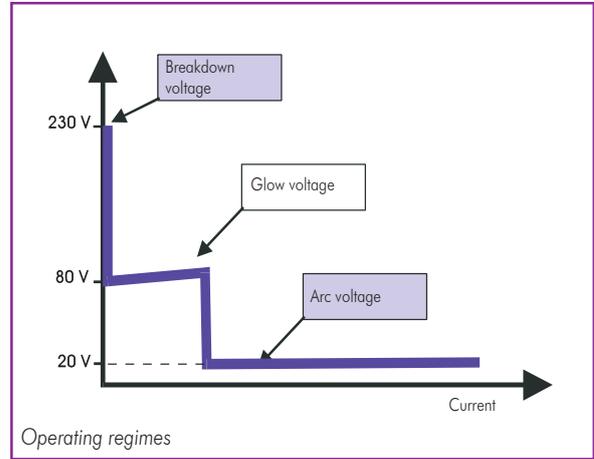
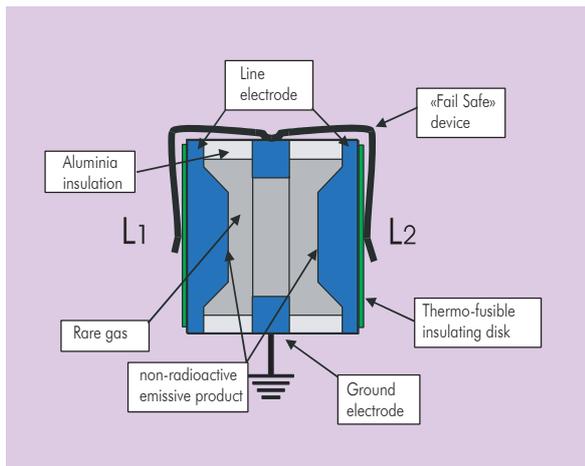
GAS DISCHARGE TUBES

E1



Gas Discharge Tubes

These components are made of two or three electrodes in an enclosure filled with a (non-radioactive) rare gas at a controlled pressure. The enclosure is a ceramic tube with its ends closed off by metal caps that also serve as electrodes. Their main use is to protect telecommunications lines, but other uses are possible.



Operation

The gas discharge tube may be regarded as a sort of very fast switch having conductance properties that change very rapidly, when breakdown occurs, from open-circuit to quasi-short circuit (arc voltage about 20V). There are accordingly four operating domains in the behavior of a gas discharge tube:

- **Non-operating domain**, characterized by practically infinite insulation resistance;
- **Glow domain** : At breakdown, the conductance increases suddenly; if the current drained off by the gas tube is less than about 0.5A (this is a rough value that differs according to the type of component), the glow voltage across the terminals will be in the 80-100V range;
- **Arc regime** : as the current increases, the gas discharge tube shifts from the glow voltage to the arc voltage (20V). It is in this domain that the gas discharge tube is most effective, because the current discharged can reach several thousand amperes without the arc voltage across its terminals increasing.
- **Extinction** : At a bias voltage roughly equal to the glow voltage, the gas tube recovers its initial insulating properties.

Electrical characteristics

The main electrical characteristics defining a gas discharge tube are:

- DC sparkover voltage (Volts)
- Impulse sparkover voltage (Volts)
- Discharge current capacity (kA)
- Insulation resistance (Gohms)
- Capacitance (pF).

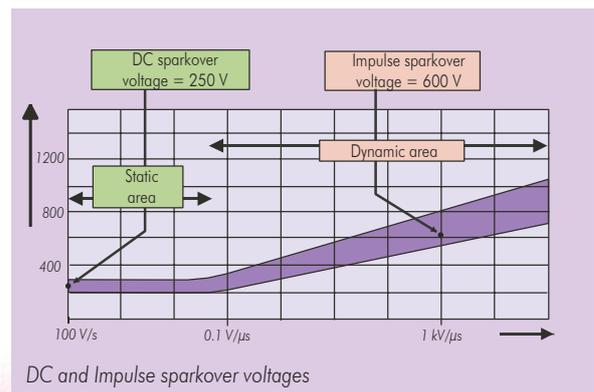
DC sparkover voltage

This is the main characteristic defining the gas discharge tube. It is the voltage at which breakdown will occur between the electrodes when a slowly increasing voltage ($dV/dt = 100 \text{ V/s}$) is applied to the component; it depends on the electrode spacing, the pressure, and the properties of the gas mixture and of the emissive substance.

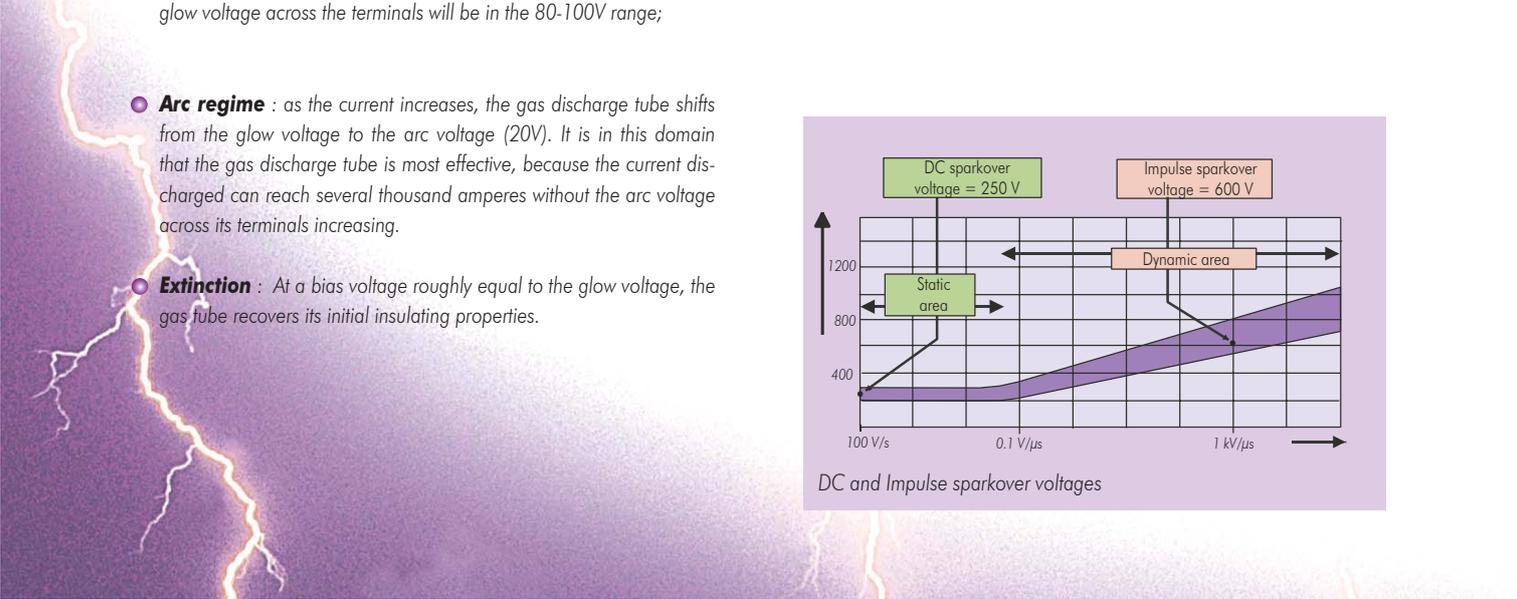
Range of DC sparkover voltages available:

- minimum 75V
- average 230V
- high voltage 500V
- very high voltage 1000 to 3000V

The tolerance on the breakdown voltage is generally $\pm 20\%$.



E2





Gas Discharge Tubes

Discharge current

This depends on the properties of the gas, the volume, and the material and treatment of the electrodes. It is the major characteristic of the GDT and the one that distinguishes it from other protection devices (Varistor, Zener diode, etc.): 5 to 20kA with an 8/20 μ s impulse for the standard components. This is the value the device can withstand repeatedly (say for ten impulses) without destruction or alteration of its basic specifications.

Impulse sparkover voltage

Sparkover voltage in the presence of a steep rise front ($dV/dt = 1\text{ kV}/\mu\text{s}$): the impulse sparkover voltage increases with increasing dV/dt .

Insulation resistance and capacitance

These characteristics make the gas discharge tube practically «invisible» in a line in a steady-state context: insulation resistance very high ($>10\text{ Gohm}$), capacitance very low ($<1\text{ pF}$).

3-electrode configuration

Protecting a two-wire line (for example a telephone pair) with two 2-electrode gas discharge tubes (connected between the wires and ground) may cause the following problem:

The line is subjected to an overvoltage in common mode; because of the dispersion of the sparkover voltages ($\pm 20\%$), one of the gas discharge tubes sparks over a very short time before the other (a few microseconds); the wire that has sparked over is therefore grounded (neglecting the arc voltages), turning the common-mode overvoltage into a differential-mode overvoltage, very dangerous for the terminal equipment. This risk disappears when the second gas discharge tube arcs over (a few microseconds later).

3-electrode geometry eliminates this drawback: the sparkover of one pole causes a «general» breakdown of the device almost instantaneously (a few nanoseconds) because there is only one gas-filled enclosure.

End of life

Gas discharge tubes are designed to withstand several impulses without destruction or loss of the initial characteristics (typical impulse tests: 10 times 5 kA impulses of each polarity).

On the other hand, a sustained strong current (e.g. 10 A rms for 15 seconds, simulating the fall of a AC power line onto a telecommunication line) will put the device out of service definitively.

If a fail-safe end of life is desired (i.e. a short-circuit that will report the fault to the user when the line fault is detected), gas discharge tubes with the fail-safe feature (external short-circuit) should be chosen.

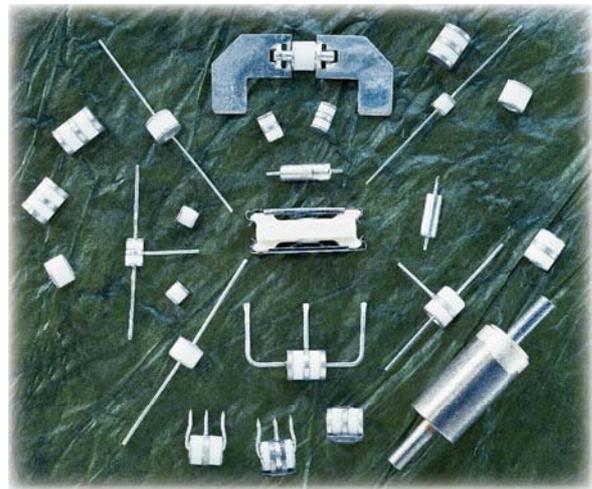
Standards

CITEL gas discharge tubes comply with the specifications of main telecom operators (France Telecom, British Telecom, etc.) and with the ITU-T K12 international recommendation.

The CITEL line

CITEL proposes a full line of gas discharge tubes to meet most configuration needs and specifications found on the market :

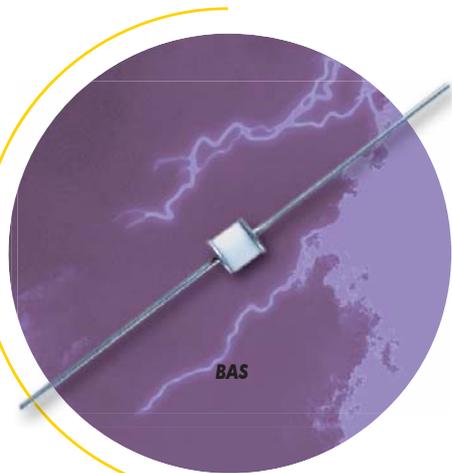
- 2- and 3-electrode gas discharge tubes
- Sparkover voltages from 75 to 3500 V
- Discharge capacities from 2.5 to 150 kA
- Optional external short-circuit device
- Installation on support, on printed circuit, or surface-mounted devices.





2-electrode Miniature Gas discharge tube

BA-BAS

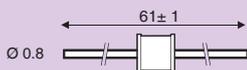


Dimensions (in mm)

BA

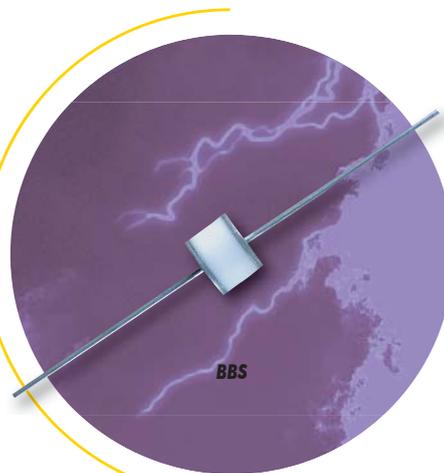


BAS



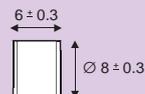
2-electrode Gas discharge Tube

BB-BBS

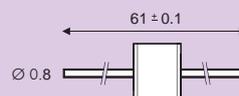


Dimensions (in mm)

BB



BBS



Characteristics

| CITEL part number | BA90* | BA150 | BA230 | BA300 | BA350 | BA550 |
|--|--|---------|---------|---------|---------|---------|
| DC sparkover voltage (100V/s) | 90 V | 150 V | 230 V | 300 V | 350 V | 550 V |
| Tolerance | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% |
| Impulse sparkover voltage (1kV/μs) | < 700 V | < 700 V | < 700 V | < 900 V | < 900 V | < 1200V |
| Holdover voltage (R = 330 Ω in serie RC = 150 Ω/100nF in //) | > 80V | > 80 V |
| Insulation resistance (at 100Vdc or 50Vdc for*) | >10GΩ | >10GΩ | >10GΩ | >10GΩ | >10GΩ | >10GΩ |
| Capacitance (at 1 MHz) | <0.3 pF | <0.3 pF | <0.3 pF | <0.3 pF | <0.3 pF | <0.3 pF |
| AC discharge current (50Hz, 1s, 5 times) | 10 A | 10 A | 10 A | 10 A | 10 A | 10 A |
| Nominal discharge current (8/20μs, 10 times) | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA |
| Options | Lead termination : BAS External fail-safe : BAC SMD version : BACMS in 90V/20, 230V/20 , 350V/20 Tape : BA en Bande | | | | | |

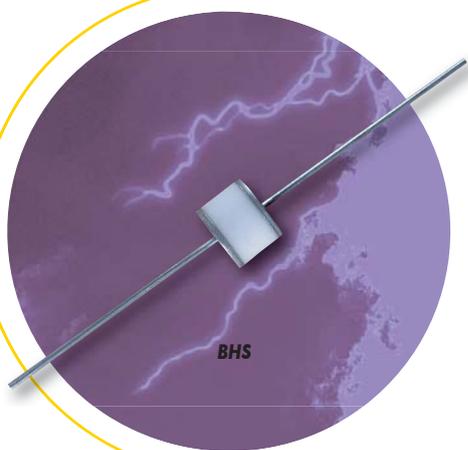
Characteristics

| CITEL part number | BB75* | BB90 | BB150 | BB230 | BB350 | BB500 |
|--|--|----------|----------|----------|----------|----------|
| DC sparkover voltage (100V/s) | 75 V | 90 V | 150 V | 230 V | 350 V | 500 V |
| Tolerance | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% |
| Impulse sparkover voltage (1kV/μs) | <700V | <700V | <700V | <750V | <850V | <2000V |
| Holdover voltage (R = 330 Ω in serie RC = 150 Ω/100nF in //) | > 60 V | > 80 V | > 80 V | > 80 V | > 80 V | > 80 V |
| Insulation resistance (at 100Vdc or 50Vdc for*) | >10 GΩ | >10 GΩ | >10 GΩ | >10 GΩ | >10 GΩ | >10 GΩ |
| Capacitance (at 1 MHz) | <0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF |
| AC discharge current (50Hz, 1s, 5 times) | 10 A | 10 A | 10 A | 10 A | 10 A | 10 A |
| Nominal discharge current (8/20μs, 10 times) | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA |
| Options | Lead termination : BBS External Fail-Safe : BBC | | | | | |



2-electrode Gas discharge tube

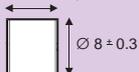
BH-BHS (High voltage series)



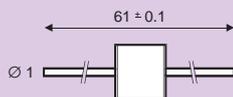
Dimensions (in mm)

BH

6 ± 0.3 (75-600V)
6.8 ± 0.3 (800-1500V)
8 ± 0.3 (2000-3500V)



BHS



Characteristics

| CITEL part number | BH75 | BH90 | BH230 | BH350 | BH470 | BH500 | BH600 | BH800 | BH1400 | BH2500 | BH3500 |
|--|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| DC sparkover voltage (100V/s) | 75 V | 90 V | 230 V | 350 V | 470 V | 500 V | 600 V | 800 V | 1400 V | 2500 V | 3500 V |
| Tolerance | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% | -15/+20% | +/-20% | +/-20% | +/-20% | +/-15% |
| Impulse sparkover voltage (1kV/μs) | < 700 V | < 700 V | < 700 V | < 850 V | < 1100 V | < 1200 V | < 1200 V | < 1400 V | < 2000 V | < 3800 V | < 4600 V |
| Holdover voltage (R = 330 ohms in serie RC = 150 ohms/100nF in //) | > 60 V | > 60 V | > 80 V |
| Insulation resistance (at 100Vdc) | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ |
| Capacitance (at 1 MHz) | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF | < 0.8 pF |
| AC discharge current (50Hz, 1s, 5 times) | 15 A | 15 A | 15 A | 15 A | 15 A | 15 A | 15 A | 10 A | 10 A | 10 A | 10 A |
| Nominal discharge current (8/20μs, 10 times) | 15 kA | 15 kA | 15 kA | 15 kA | 15 kA | 15 kA | 15 kA | 15 kA | 10 kA | 10 kA | 10 kA |
| Options | Lead termination (Ø 1 or Ø 0.8 mm) : BHS External short-circuit : BHC (from 90 to 600 V) | | | | | | | | | | |

E5



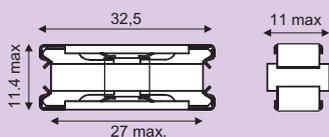
2-electrode Gas discharge tube

CA8B

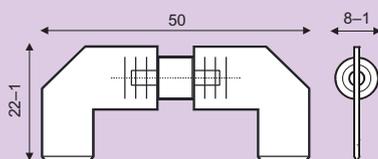


Dimensions (in mm)

CA8BB



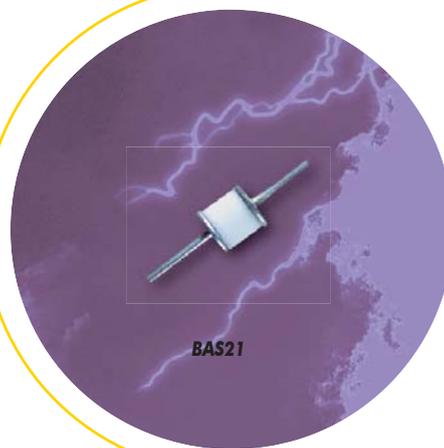
CA8BC



2-electrode glass-metal Gas discharge tube

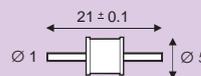
BAS21

(replacement P980 and CA5R)



Dimensions (in mm)

BAS21



E6

Characteristics

| CITEL part number | CA8B*230 | CA8B*250 | CA8BB350 | CA8BB-540 |
|--|--|----------|----------|-----------|
| DC sparkover voltage (100V/s) | 230 V | 250 V | 350 V | 540 V |
| Tolerance | +/-20% | +/-12% | +/-20% | +/-20% |
| Impulse sparkover voltage (1kV/μs) | < 750 V | < 750 V | < 900 V | < 1000 V |
| Arc voltage | < 20 V | < 20 V | < 20 V | < 20 V |
| Insulation resistance (at 100Vdc) | > 1GΩ | > 1 GΩ | > 1 GΩ | > 1 GΩ |
| Capacitance (at 1 MHz) | < 5 pF | < 5 pF | < 5 pF | > 5 pF |
| Holdover voltage (R = 330 Ω in serie RC = 150 Ω/100nF in //) | > 72 V | > 72 V | > 72 V | > 72 V |
| AC discharge current (50 Hz, 0.6s, 10 times) | 20 A | 20 A | 20 A | 10 A |
| Nominal discharge current (8/20μs, 10 times) | 10 kA | 10 kA | 10 kA | 10 kA |
| Options | Sliding version : CA8BB Blade termination : CA8BC 3-electrode with lead termination : CA8T31 | | | |

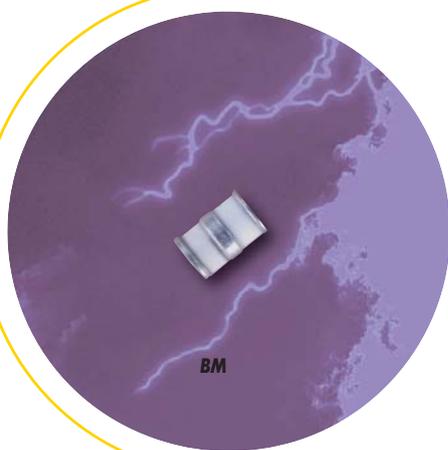
Characteristics

| CITEL part number | BAS21-230 | BAS21-250 | BAS21-350 |
|---|--|-----------|-----------|
| DC sparkover voltage (100V/s) | 230 V | 250 V | 350 V |
| Tolerance | +/-20% | +/-20% | +/-20% |
| Impulse Sparkover voltage (1kV/μs) | < 700 V | < 700 V | < 900 V |
| Arc voltage | < 20 V | < 20 V | < 20 V |
| Insulation resistance (at 100 Vdc) | > 10 GΩ | > 10 GΩ | > 10 GΩ |
| Capacitance (at 1 MHz) | < 0.3 pF | < 0.3 pF | < 0.3 pF |
| Holdover voltage (R = 330 Ω in serie RC = 150 Ω/100 nF in //) | > 72 V | > 72 V | > 72 V |
| AC discharge current (50 Hz, 1s, 10 times) | 5 A | 5 A | 5 A |
| Nominal discharge current (8/20μs, 10 times) | 5 kA | 5 kA | 5 kA |
| Options | External Fail-Safe : BAS21C (replacement P980) | | |



3-electrode Miniature Gas discharge tube

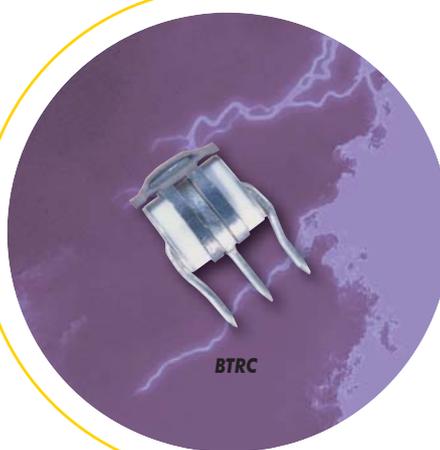
BM



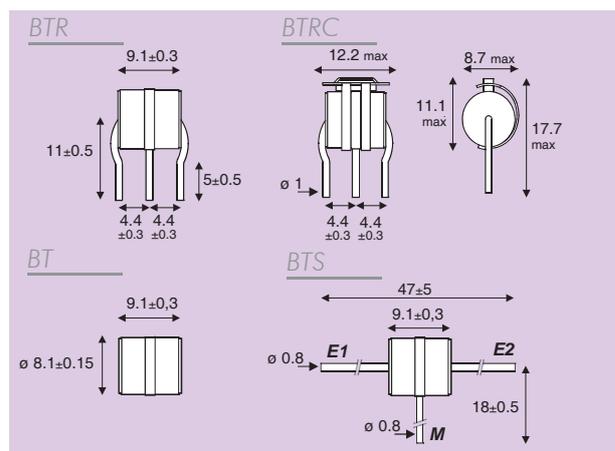
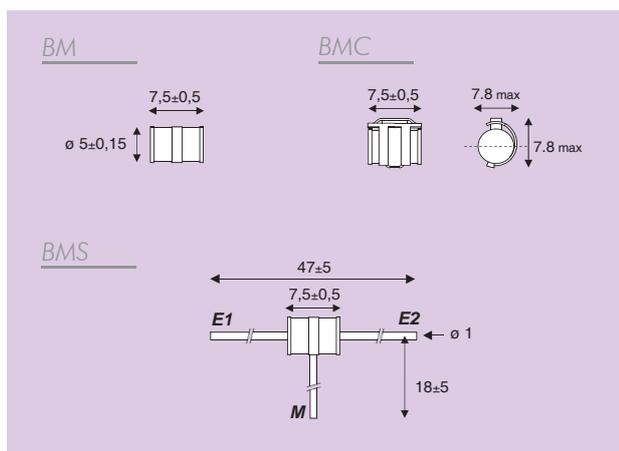
Dimensions (in mm)

3-electrode Gas discharge tube

BT



Dimensions (in mm)



Characteristics

| CITEL part number | BM90* | BM150 | BM230 | BM350 | BM500 |
|--|--|----------|----------|----------|----------|
| DC sparkover voltage (100V/s) E/M | 90 V | 150 V | 230 V | 350 V | 500 V |
| Tolerance | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% |
| Impulse sparkover voltage (1 kV/μs) E/M | < 700 V | < 700 V | < 800 V | < 1100 V | < 1200 V |
| Insulation resistance (at 100 Vdc or 50 Vdc for*) | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ |
| Capacitance (at 1 MHz) | < 0.5 pF | < 0.5 pF | < 0.5 pF | < 0.5 pF | < 0.5 pF |
| Holdover voltage (R = 330 Ω in serie RC = 150 Ω / 100nF in //) | > 60 V | > 80 V | > 80 V | > 80 V | > 80 V |
| AC discharge current (50 Hz, 1s, 10 times) E1 + E2/M | 5 A | 5 A | 5 A | 5 A | 5 A |
| Nominal discharge current (8/20μs, 10 times) E1 + E2/M | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Options | External Fail-Safe : BMC or BMFL Axial lead termination : BMS SMD version : BM CMS Tape : BM en Bande | | | | |

Characteristics

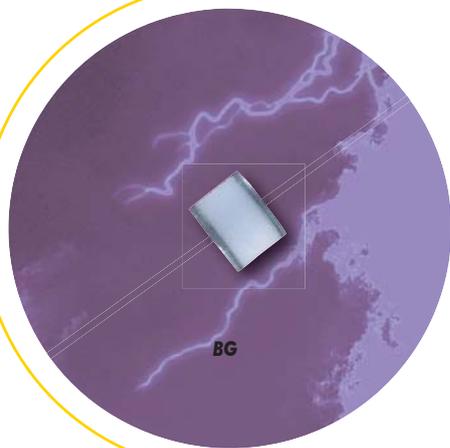
| CITEL part number | BT90* | BT150 | BT230 | BT350 | BT500 |
|---|--|----------|----------|----------|----------|
| DC sparkover voltage (100V/s) E/M | 90 V | 150 V | 230 V | 350 V | 500 V |
| Tolerance | +/-20% | +/-20% | +/-20% | +/-20% | +/-20% |
| Impulse sparkover voltage (100 V/s) E1/E2 | > 70 V | > 120 V | > 184 V | > 280 V | > 400 V |
| Impulse sparkover voltage (1kV/μs) E/M | < 700 V | < 700 V | < 800 V | < 900 V | < 1200 V |
| Insulation resistance (E/M, E1/E2 at 100V or 50V for*) | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ | > 10 GΩ |
| Capacitance (at 1 MHz) E/M, E1/E2 | < 0.9 pF | < 0.9 pF | < 0.9 pF | < 0.9 pF | < 0.9 pF |
| Holdover voltage (E/M, E1/E2 R = 330 Ω in serie RC = 150 Ω / 100nF in //) | > 70 V | > 70 V | > 70 V | > 70 V | > 70 V |
| AC discharge current (50 Hz, 1s, 10 times) | 10 A | 10 A | 10 A | 10 A | 10 A |
| Nominal discharge current (8/20μs, 10 times) | 10 kA | 10 kA | 10 kA | 10 kA | 10 kA |
| Options | External Fail-Safe : BTRC Axial lead termination : BTS (Ø 1 or Ø 0.8 mm wire) Radial lead termination : BTR (Ø 1 or Ø 0.8 mm wire) | | | | |

E7



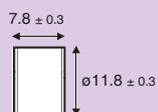
N/PE 2-electrode Gas discharge tube

BG



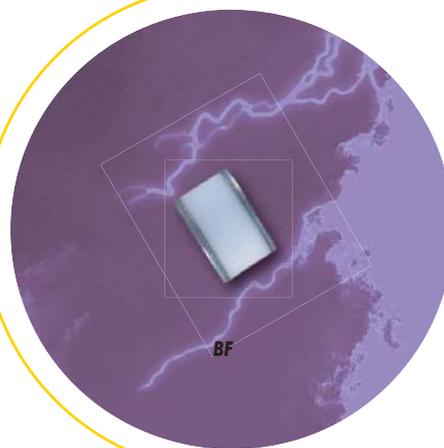
Dimensions (in mm)

BG



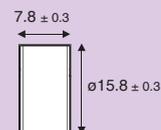
N/PE 2-electrode Gas discharge tube

BF



Dimensions (in mm)

BF



E8

Characteristics

| CITEL part number | BG-800 | BG-1000 | BG-1300 |
|--|------------|------------|-------------|
| DC sparkover voltage (100V/s) | 650-1000 V | 850-1200 V | 1100-1600 V |
| Impulse sparkover voltage (1.2/50µs - 6 kV) | < 1500 V | < 1800 V | < 2000 V |
| Tension extinction alternative (sous 100 A) | > 255 Vac | > 255 Vac | > 255 Vac |
| Insulation resistance (at 100Vdc) | > 1GΩ | > 1 GΩ | > 1 GΩ |
| Nominal discharge current (In) (test 8/20µs - NF EN 616473-11) | 20 kA | 20 kA | 20 kA |
| Maximum discharge current (Imax) (test 8/20µs - NF EN 616473-11) | 40 kA | 40 kA | 40 kA |
| Courant de choc (Iimp) (test 10/350µs suivant NF EN 616473-11) | > 15 kA | > 15 kA | > 15 kA |

Characteristics

| CITEL part number | BF-800 |
|--|------------|
| DC sparkover voltage (100V/s) | 650-1000 V |
| Impulse sparkover voltage (onde 1.2/50µs - 6 kV) | < 1500 V |
| Tension extinction alternative sous 100 A | > 255 Vac |
| Insulation resistance (at 100Vdc) | > 1GΩ |
| Nominal discharge current (In) (test 8/20µs suivant NF EN 616473-11) | 30 kA |
| Max. discharge current (Imax) (test 8/20µs suivant NF EN 616473-11) | 70 kA |
| Courant de choc (Iimp) (test 10/350µs suivant NF EN 616473-11) | > 25 kA |



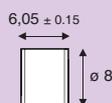
2-electrode Gas discharge tube

BB-HF

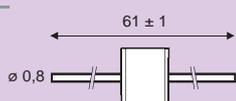


Dimensions (in mm)

BB-HF



BBS-HF



Characteristics

| CITEL part number | BB-HF80 | BB-HF90* | BB-HF250 | BB-HF350 | BB-HF500 |
|--|--|----------|-----------|-----------|-----------|
| DC sparkover voltage (100V/s) | 65-95 V | 72-108 V | 200-300 V | 300-400 V | 400-500 V |
| Impulse sparkover voltage (1 kV/μs) | ≤ 700 V | ≤ 700 V | ≤ 750 V | ≤ 900 V | ≤ 1200 V |
| Insulation resistance (at 100 Vdc or 50 Vdc for*) | ≥ 10 GΩ | ≥ 10 GΩ | ≥ 10 GΩ | ≥ 10 GΩ | ≥ 10 GΩ |
| Capacitance (at 1 MHz) | < 0.7 pF | < 0.7 pF | < 0.7 pF | < 0.7 pF | < 0.7 pF |
| Holdover voltage (R = 330 Ω in serie RC = 150 Ω / 100nF in //) | > 60 V | > 60 V | > 80 V | > 80 V | > 80 V |
| AC discharge current (50 Hz, 1s, 10 times) | 5 A | 5 A | 5 A | 5 A | 5 A |
| Nominal discharge current (8/20μs, 10 times) | 5 kA | 5 kA | 5 kA | 5 kA | 5 kA |
| Nominal discharge current (8/20μs, 1 time) | 20 kA | 20 kA | 20 kA | 20 kA | 20 kA |
| Options | *Sortie par fils axiaux : BBS-HF80 et BBS-HF90 | | | | |

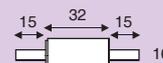
Heavy Duty Gas discharge tube

P100

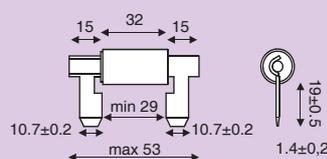


Dimensions (in mm)

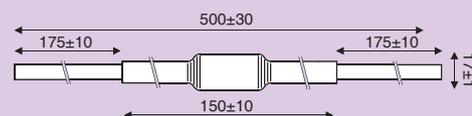
P100N



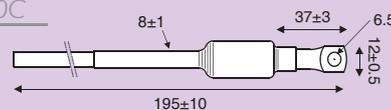
P100



P100S



P100C



Characteristics

| CITEL part number | P100-350 | P100-500 |
|--|---|----------|
| DC sparkover voltage (100V/s) | 350 V | 500 V |
| Tolerance | +/-20% | +/-20% |
| Impulse sparkover voltage (1 kV/μs) | < 1000 V | < 1500 V |
| Holdover voltage | 80 V | 80 V |
| Insulation resistance (at 100Vdc) | > 1 GΩ | > 1 GΩ |
| Capacitance (at 1 MHz) | 10 pF | 10 pF |
| AC discharge current (50Hz, 1s, 5 times) | 100 A | 100 A |
| Maximum discharge current (8/20μs, 1 time) | 150 kA | 150 kA |
| Maximum lightning current (10/350μs, 1 time) | 45 kA | 45 kA |
| Options | Bare version : P100N Blade termination : P100 Cable termination : P100S Cable/terminal termination : P100C | |

MISCELLANEOUS
ACCESSORIES
OBSTRUCTION LIGHTS



**MISCELLANEOUS
ACCESSORIES
OBSTRUCTION LIGHTS**

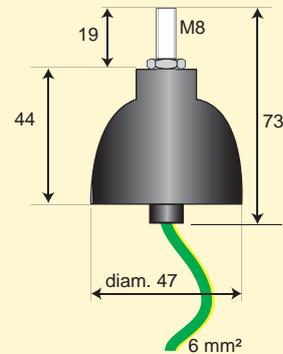


Outdoor Surge Protector for AC/Traction network

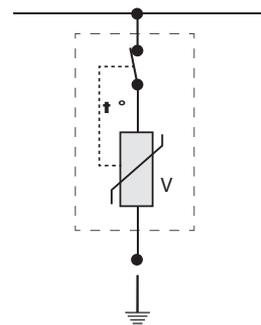
VP range



Dimensions (in mm)



Electrical diagram



V : High energy varistor
t° : Thermal disconnect

The VP is a surge protector designed to protect AC or DC power lines against lightning transient voltages.

It is mounted on outdoor carrier poles to protect overhead lines as AC lines or DC traction lines, and it is connected between one wire and earth.

The internal electrical diagram is based on high energy varistor (MOV). To take care of permanent overvoltage or component ageing, the surge protector device (SPD) is equipped with a thermal disconnecter mechanism: in case of overheating, the protective component disconnects itself from the line and the bottom part of the unit is ejected, indicating at distance the failure and the need of maintenance.

VP surge protectors are available in various operating voltages.

Characteristics

| CITEL part number | VP25/150 | VP25/275 | VP25/320 | VP25/440 | VP25/550 |
|---|---|------------------------|------------------------|------------------------|------------------------|
| Product type | 1-pole surge protector | 1-pole surge protector | 1-pole surge protector | 1-pole surge protector | 1-pole surge protector |
| Maximum operating voltage - U _c | 150 Vac 200 Vdc | 275 Vac 350 Vdc | 320 Vac 420 Vdc | 440 Vac 580 Vdc | 550 Vac 745 Vdc |
| Nominal discharge current - I _n 15 x 8/20 μs | 15 kA | 15 kA | 15 kA | 15 kA | 15 kA |
| Maximum discharge current - I _{max} 1 x 8/20 μs | 25 kA | 25 kA | 25 kA | 25 kA | 25 kA |
| Protection level - U _p @ 15 kA | 0.8 kV | 1.1 kV | 1.2 kV | 1.5 kV | 1.8 kV |
| Response time | < 25 ns | | | | |
| Mounting | Outdoor (IP66) or indoor | | | | |
| Connection | Phase connection on threaded rod (8 mm diameter) Earth connection through 6 mm ² wire | | | | |
| Operating Temperature | -40/+80°C | | | | |
| Enclosure | Thermoplastic UV resistant | | | | |
| Compliance | IEC 61643-1 Class II test, EN 61643-11 Class II test | | | | |

- 1-pole surge protector
- For AC distribution or Traction lines
- Outdoor installation
- Currents I_n/I_{max} : 15/25 kA



Isolating Spark Gaps

P100,SGP



These spark gaps are designed to protect metallic elements, like antennas, poles, pipes, roofing equipment... which are not connected to earth for operating reason, against the risk of flashover during a lightning strike on the installation.

When a large or exposed metallic element is not connected, for operating reasons, to the earthing system, it is better, in order to avoid destructive flashovers, to connect between the element and the grounded structure (or lightning conductor) a spark gap, which allows a punctual and a brief connection to earth during the lightning strike.

In stand-by situation, the spark gap insulates the element from the earth. During the lightning strike, the spark gap fires to create equipotentiality and to avoid destructive flashovers.

Several versions are available :

P100S - P100C

Specific version of the high energy gas tube P100, featured with isolated sleeve for outdoor application and connection cables (P100S-350) or (P100C-350) for easy wiring.

Very heavy discharge current : I_{max} 150 kA (@ 8/20 μ s) and I_{limp} 60 kA (@ 10/350 μ s).

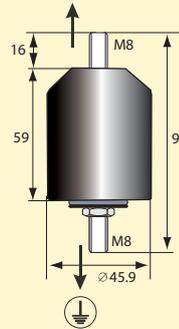
SGP

Air spark gap with high sparkover voltage (1000 and 2500 V) and heavy discharge current. Connection on threaded pin.

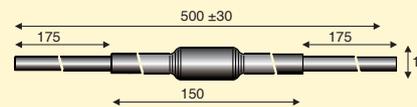
- Isolating Spark gaps
- Outdoor or indoor application
- Discharge currents up to 150 kA

Dimensions (in mm)

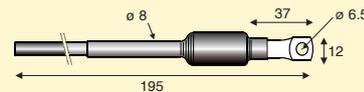
SGP



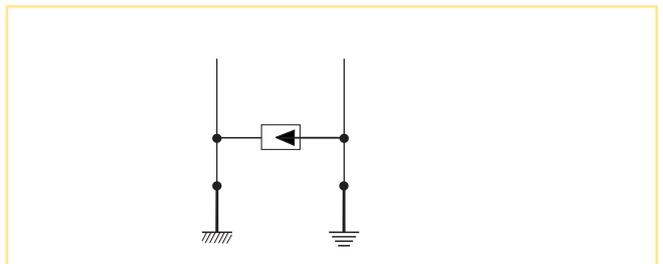
P100S



P100C



Electrical diagram



Characteristics

| CITEL part number | P100 | SGP |
|---|--|--|
| Technology | Gas tube | Air spark gap |
| DC sparkover | 280-420 V | 1000-1500 V (SGP1) 2500-4000 V (SGP2.5) |
| Impulse sparkover (1 kV/ μ s) | < 1 kV | < 2000 V (SGP1) < 5000 V (SGP2.5) |
| Insulation resistance | > 1 GOhm | > 1 GOhm |
| Max. discharge current (8/20 μ s) | 150 kA | 100 kA |
| Max. lightning current (10/350 μ s) | 60 kA | 30 kA |
| Dimensions | see drawing | see drawing |
| Connection | wires (P100S) wire terminal (P100C) | threaded rod M8 |
| Outdoor application | Yes | Yes |



Lightning counters

CF-01, P8011



P8011



CF-01

Lightning counters are designed to detect and record the impulse current conducted by the down conductor of the lightning protection system (LPS) or by the earthing wire of a protective surge protection (SPD).

These units are useful to assess the stress of the protection devices, in order to perform their efficient maintenance.

2 versions are available :

CF-01

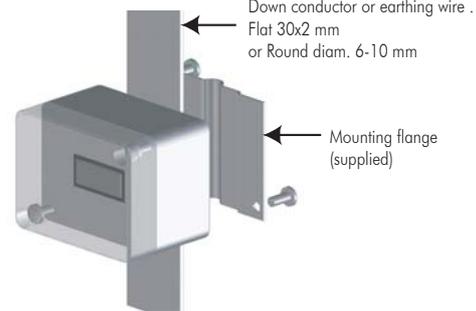
This device counts each impulse current greater than 0.3 kA. It is designed for outdoor or indoor application and is mounted directly on the down conductor with the supplied flange. A reset of the counter could be perform by returning the unit in factory.

This lightning counter is also available with solar supply (outdoor application).

P8011

This version is in compliance with NF C 17-106 guide and counts lightning and surge currents from 0.3 to 100 kA. The 6-digit LED display allows an easy reading whatever the conditions. P8011 counter can be itself controlled by an dedicated tester in case of maintenance cycle required.

Installation



Characteristics

| CITEL part number | CF-01 | P8011 |
|--|---|---|
| Description | Lightning counters outdoors or indoor | Lightning counters outdoor |
| Minimum current sensibility | 0.3 kA | 0.3 kA |
| Max. admissible impulse current | 100 kA | 100 kA |
| Maximum numbers of events | 999 | 999999 |
| Type d'affichage | LCD | LED |
| Dimensions | 65x50x45 mm | 146x95x42 mm |
| Weight | 0.15 kg | 0.5 kg |
| Enclosure | Polycarbonate IP54 | Polycarbonate IP67 |
| Power supply | internal by battery | internal by battery |
| Life expectancy (before battery replacement) | > 10 years | > 10 years |
| Mounting | by flange on round (Ø 6 to 10) or flat (30x2) conductor | by flange on round (Ø 6 to 10) or flat (30x2) conductor |
| Compliance | NFC 17-106 | NFC 17-106 |

- Lightning current counters
- For LPS and SPD
- Outdoor or indoor application
- Compliance with NF C17-106 std.



Surge protector Testers

T1000KE, SPT1003



T1000KE



SPT1003

These portable testers are designed to control the electrical parameters of the different types of surge protection components or devices, like gas tubes (GDT) , varistors (MOV) or voltage clamping diodes.

T1000KE tester

Designed for the DC sparkover test of the gas discharge tube, the T1000KE is a compact unit. Its digital display and single push-button for test make the measurement easy and accurate in all conditions. The tester T1000KE provides a wide range of voltage tests (from 0 to 999 Volts).

SPT1003 tester

This unit is designed to control all kinds of surge protective components (GDT, MOV, clamping diodes) or AC or data surge protective devices (SPD). It can test 2-pole (MOV, Diode, GDT), 3-pole (GDT) or 2-port (2 wires in, 2 wires out, earthing point = SPD). Extra feature of line continuity control (2-port SPD). Digital display.

- **Portable Testers**
- **Fast test process**
- **3-digit display**
- **For GDT, MOV, clamping Diodes and Surge Protectors.**

Characteristics

| CITEL part number | T1000KE | SPT1003 |
|--|----------------------------------|---|
| Description | GDT tester | GDT, MOV, Diode, SPD tester |
| Test | Sparkover voltage | Sparkover and clamping voltages - Line continuity (<50ohms) |
| Display | Led 3 digits | Led 3 digits |
| Voltage range | 0-999 V | 0-999 V |
| Rise time of the test voltage slope | 5000 V/s | 5000 V/s |
| Precision | +/- 2 % | +/- 2,5 % |
| Operating temperature | -20/+50°C | -20/+50°C |
| Dimensions | 150x93x29 mm | 65x118x188 mm |
| Weight | 0.36 kg | 0.5 kg |
| Test leads | 2 leads supplied (450 mm length) | 5 leads supplied (1000 mm length) |
| Power supply | internal by 4 AA batteries | by 230Vac/14Vdc adaptater (supplied) |
| Life expectancy (before battery replacement) | 20000 tests approx. | - |

OBSTA HI STI, OBSTA STI y OBSTA STIF obstruction lights



Any object that could present a hazard for low-flying aircraft, must be marked by beacon lights. The organizations involved (ICAO and FAA) have drawn up regulations defining how dangerous obstacles must be marked. These regulations lay down rules on the installation and characteristics of beacons. OBSTA has developed original lighting technics complying with regulations in force.

The basic objective was to develop high performance equipment. The use of filament lamps was therefore rejected, since they have major disadvantages (limited life and low reliability).

- Available in 12, 24 or 48 V DC ; 120 and 240 V AC
- Compliant with ICAO and FAA regulations
- Inherent generation of «aviation» red
- Neon is not sensitive to high temperature and EMC
- Perfect waterproofing
- Alarm indicator included
- Surge Protector included
- Very long lifetime expectancy

Characteristics

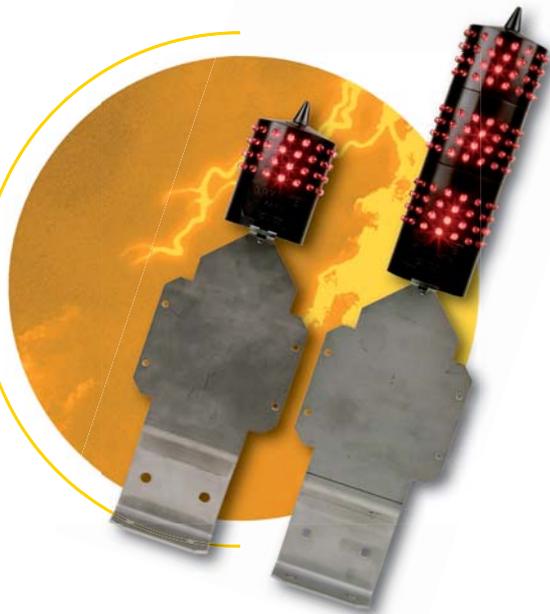
| OBSTA | HI STI | STI 48V | STI 24 V | STIF |
|--------------------|----------------------|---------------|---------------|---------------|
| Part number | 13110 | 13200 | 13300 | 13410 |
| Characteristics | | | | |
| Input voltage | 110 V AC to 240 V AC | 48 VDC | 24 VDC | 12 VDC |
| Surge protection | Yes | Yes | Yes | Yes |
| Alarm indicator | Yes | Yes | Yes | Yes |
| Luminous intensity | > 35 candélas | > 10 candelas | > 10 candelas | > 10 candelas |
| Current drawn | 370 up to 730 mA | 250 mA | 500 mA | 500 mA |
| Power consumption | 45 W | 12 W | 12 W | 6 W |
| Life time | 100 000 h.* | 100 000 h.* | 100 000 h.* | 100 000 h.* |
| Regulations | ICAO and FAA | ICAO | ICAO | ICAO and FAA |

(*): lifetime based on 50 years experience in this technology.

Options : Fixing brackets ; Junction box and monitoring box ; Shielded cable ; Photocell 24V CC, 48V CC or 240V AC ; Battery cabinet; Solar station.



NAVILITE with led technology



The NAVILITE is designed as beacon for obstruction lights. It falls into low intensity category.

The NAVILITE series have been designed to replace incandescent lights with LED technology and for mobile or fixed obstacles like crane. It is available in 12VDC, 24VDC, 48VDC, 120VAC or 240VAC in option. The NAVILITE series is one piece molded which integrates 4 or 12 levels of LED.

Advantages of this conception:

- Good heat dissipation for optimum led performance (led are sensitive to high temperature),
- Perfectly waterproof. No risk of corrosion,
- Redundancy mounting of diodes

Characteristics

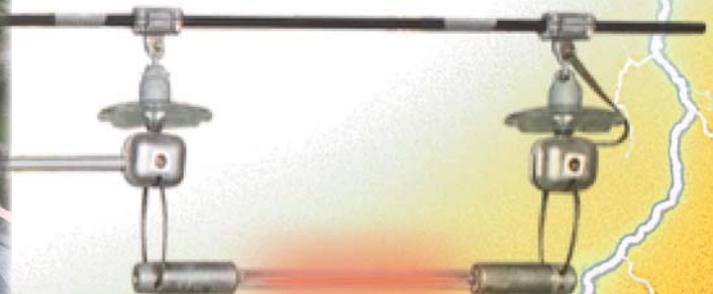
| | NAVILITE 48 VDC | NAVILITE 24 VDC | NAVILITE 12 VDC | NAVILITE 240 VAC |
|--------------------|-----------------|-----------------|-----------------|------------------|
| Part | 13900 | 13901 | 13902 | 13910 + 13900 |
| Input voltage | 48 VDC | 24 VDC | 12 VDC | 240 V AC |
| Luminous intensity | > 10 candelas | > 10 candelas | > 10 candelas | > 10 candelas |
| Current drawn | 125 mA | 250 mA | 500 mA | 70 mA |
| Power consumption | 6 W | 6 W | 6 W | 6 W |
| Lifetime | 100 000 h.* | 100 000 h.* | 100 000 h.* | 100 000 h.* |
| Regulations | ICAO | ICAO | ICAO | ICAO |

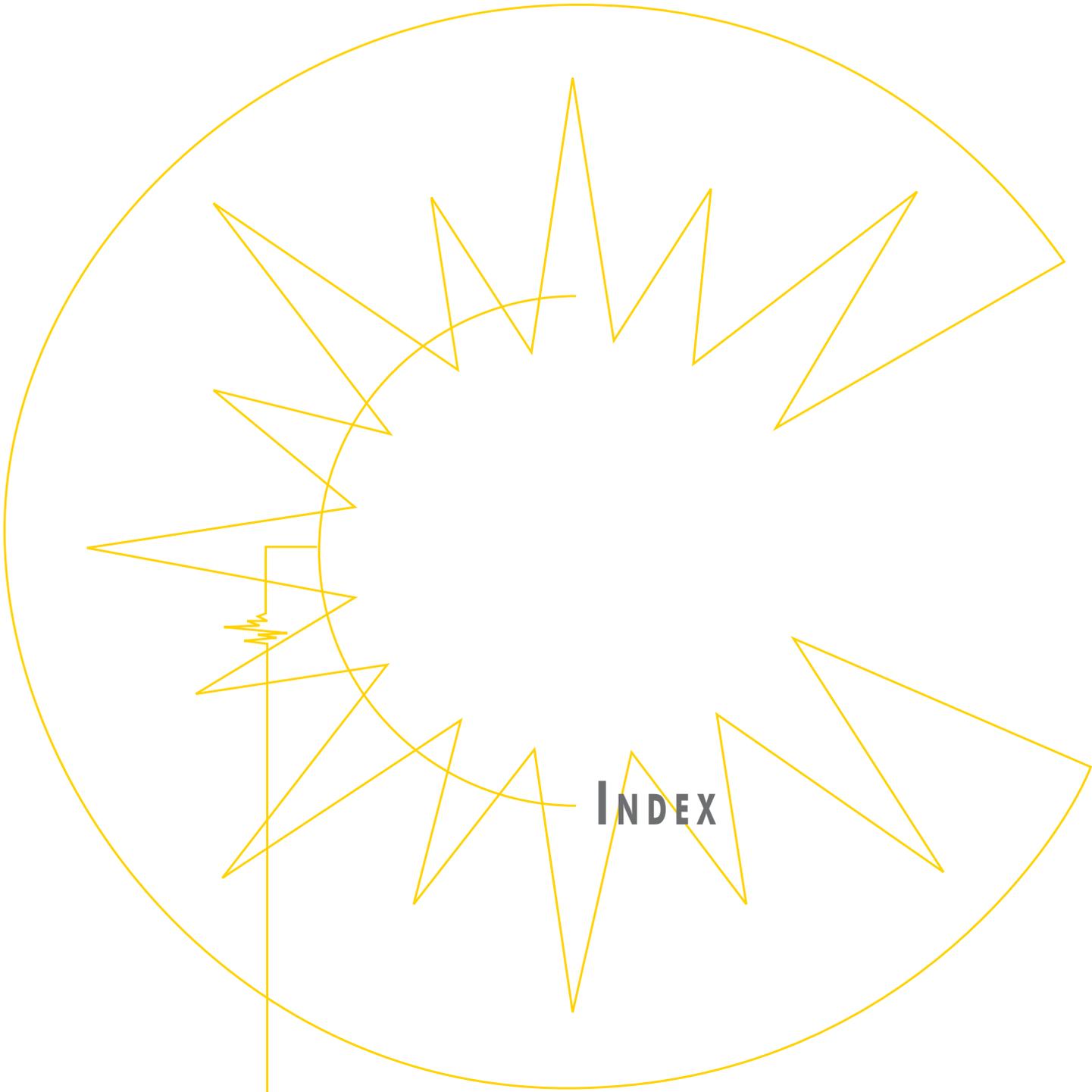
(*) : estimated lifetime (MTBF) given by LED manufacturer under certain conditions.

Options : Fixing bracket ; Box for one main and one back-up light with photocell and alarm indicator available in 48VDC and 240 VAC; Outdoor cable; Solar station.

Please consult OBSTA catalogue for further information.

- **Compliant with ICAO and FAA regulations**
- **Perfect waterproofing**
- **Good heat dissipation**
- **Resistant to shock and vibration**
- **Lasts years longer than an incandescent lamp**
- **Low power consumption**





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