

RGE SURGE SURGE PROTECTION PROTECTION

8th EDITION

ELECTRICAL INSTALLATIONS



COMPUTER NETWORK



TELEPHONY



RADIOCOMMUNICATIONS



CITEC

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



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Distributors

In more than 50 countries



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.

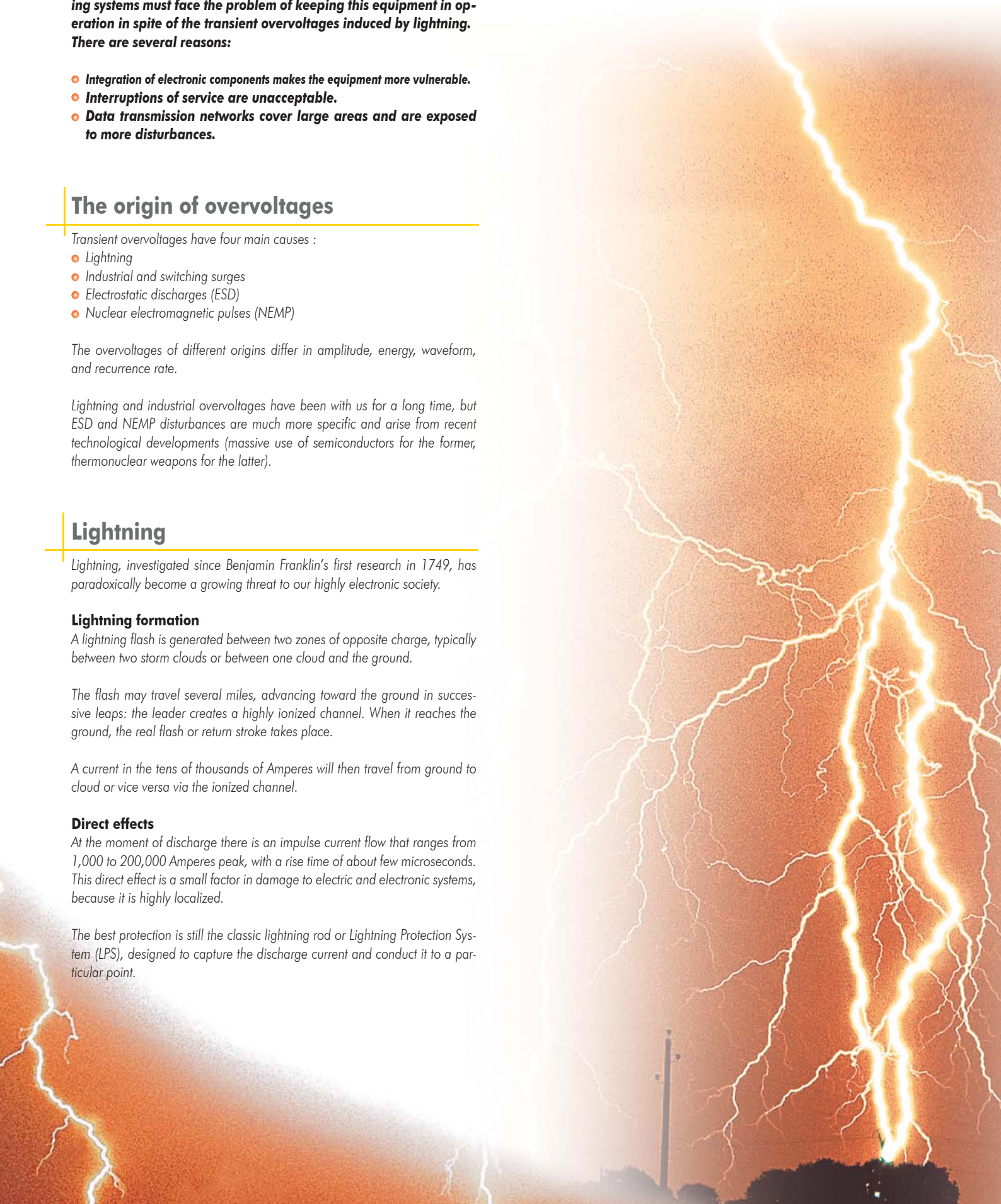
The flash may travel several miles, advancing toward the ground in successive leaps: the leader creates a highly ionized channel. When it reaches the ground, the real flash or return stroke takes place.

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.

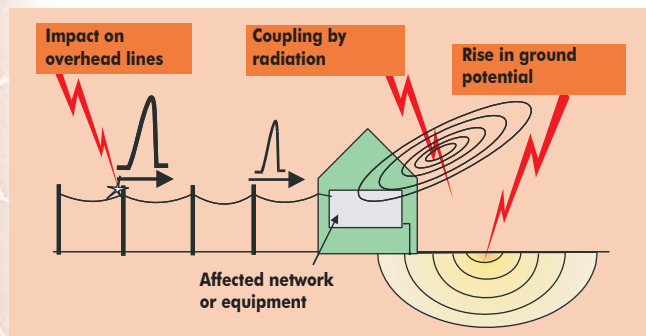
Rise in ground potential

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 tenth 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**

A1



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 :

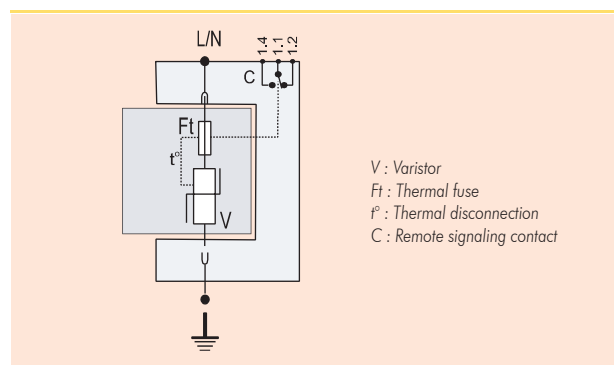
- Germany : DIN VDE 0100 part 443 and 534
- International : IEC 60364-4-433 and 5-534
- France : NF C 15-100 sect. 443 and 534

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 CITELE

In order to improve the surge protection efficiency, CITELE 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 μ 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 μ 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 μ s in open circuit - 8/20 μ 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}

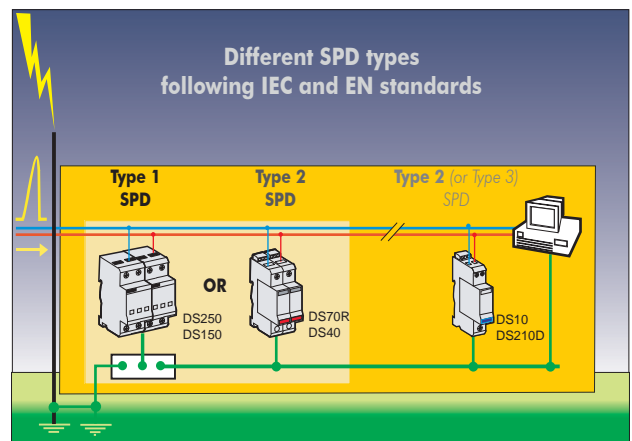
This parameter is the residual voltage across the SPD terminal during the injection of a selected impulse current. It may be lower than the protection level U_p , for surge protectors like «VG» series.

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 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.





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 :

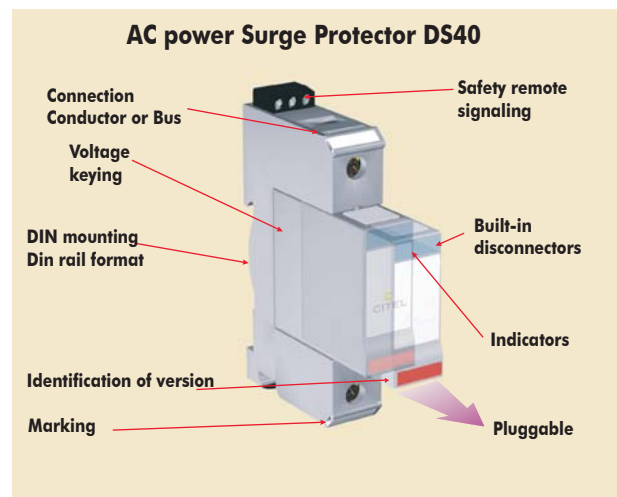
- the good operation of the SPD
- the presence of the plug-in modules (if any)
- the end of life (disconnection) of the surge protector.

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

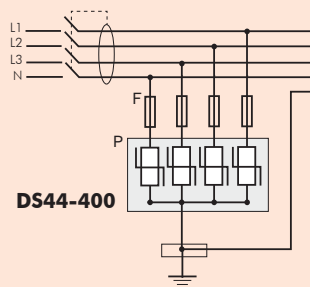
Since lightning surges are essentially common-mode phenomena, DS surge protectors are connected mainly in the common mode (between the active conductors and ground).

Some recommendations call for additional differential-mode protection (between phase and neutral). For this case, CITEC 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

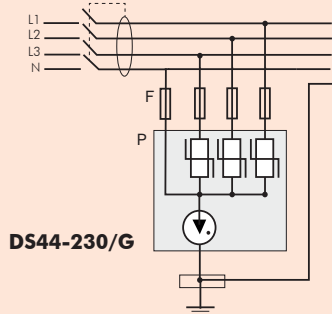
Common mode protection

CT1 Connection



Common and differential mode protection

CT2 Connection



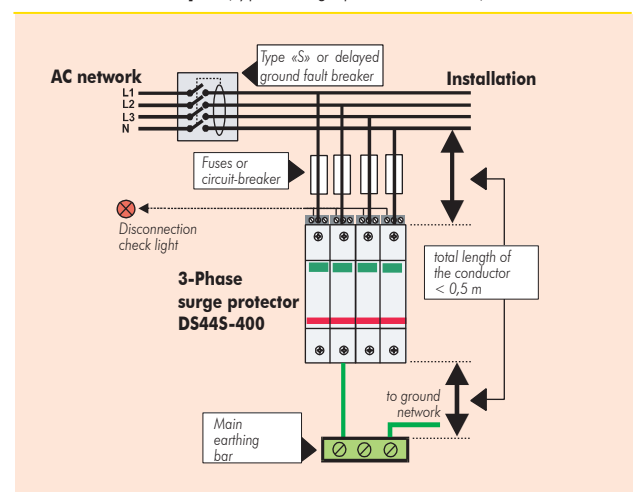
Installation

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 Up and the residual voltage Ures.
- 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.

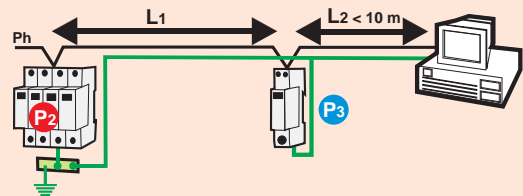
This association is required in the 2 following cases :

- 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.

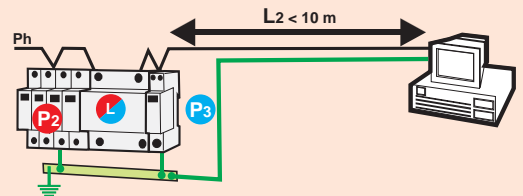
Efficient SPD coordination is performed by including between primary and secondary SPDs :

- a minimum length of wire (> 10 m).
- or
- a coordination inductor (DSH range).

Coordination by conductor



Coordination by inductor



P2 : Primary surge protector (ex. DS40)

P3 : Secondary surge protector (ex. DS215/G)

L : Coordination inductors (ex. DSH35)

L1 : Length of conductor between surge protector

L2 : Length of conductor between surge protector and installation



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.

A8

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

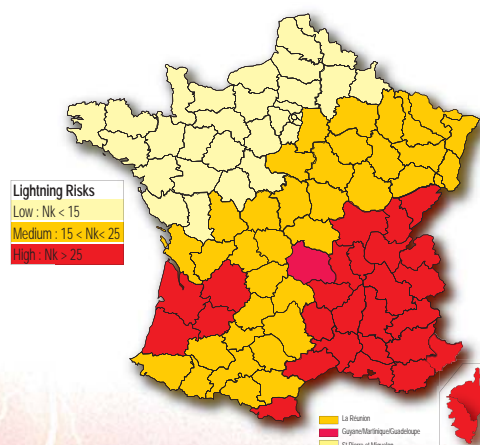
Type of installation	$N_k < 25$	$N_k > 25$
Installation equipped with direct lightning protection system (LPS)	Mandatory (Type 1)	Mandatory (Type 1)
Connection to overhead AC line	No mandatory*	Mandatory (Type 2)
Connection to underground AC line	Non mandatory*	Non mandatory*
The unavailability of the 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 μs)	I _{imp} * (10/350 μs)	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 μs 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 μs 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 μs - 8/20 μs) 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.



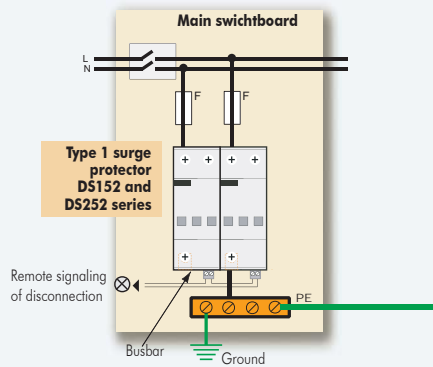
DS surge protectors wiring

Common mode protection (CT1 connection)

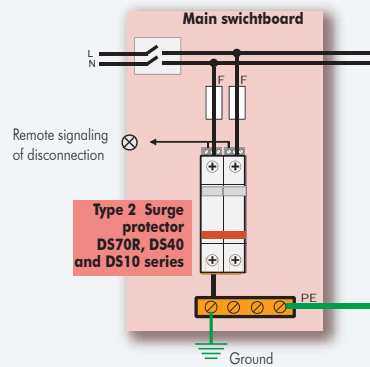
Common mode (L/PE) protection provided by DS surge protectors in relation with the different types of AC network. Called CT1 connection type in IEC 60364 std.

A10

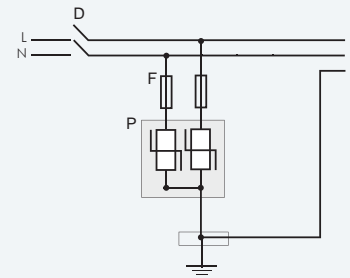
1 Type 1 Surge Protector Single-phase network



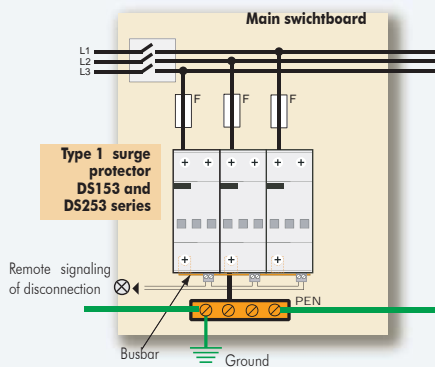
4 Type 2 Surge Protector Single-phase network



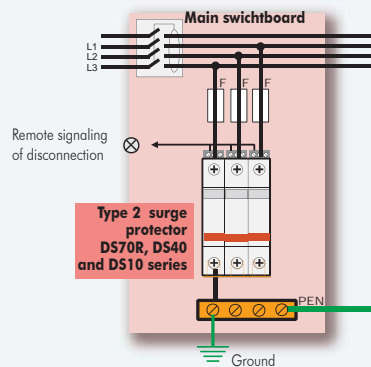
Diagram



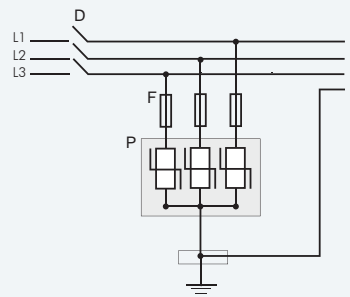
2 Type 1 Surge Protector 3-Phase network



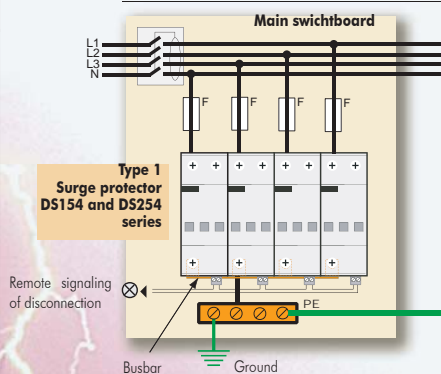
5 Type 2 Surge Protector 3-Phase network



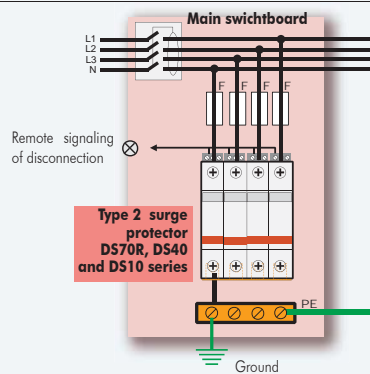
Diagram



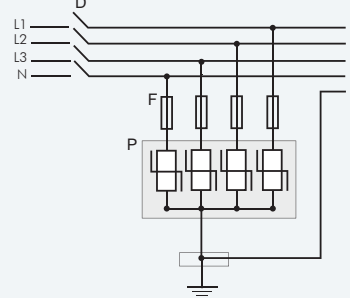
3 Type 1 Surge Protector 3-Phase network + neutral



6 Type 2 Surge Protector 3-Phase network + neutral



Diagram



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

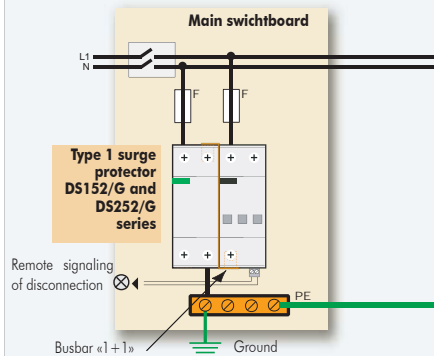


DS surge protectors wiring

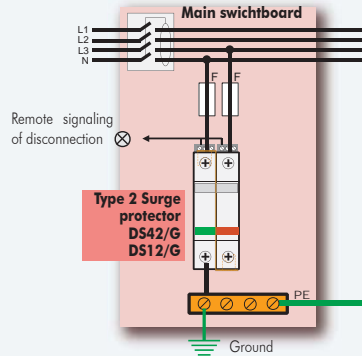
Common and Differential mode protection (CT2 connection)

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.

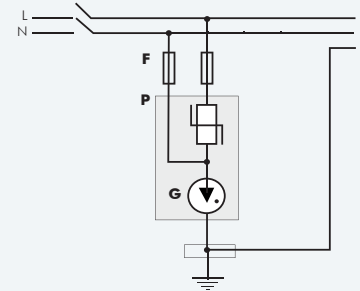
7 Type 1 Surge Protector Single-phase network



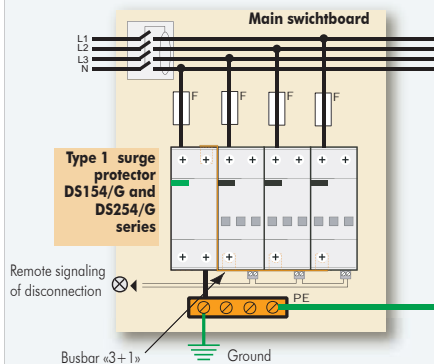
9 Type 2 Surge Protector Single-phase network



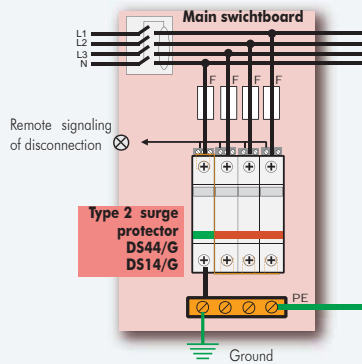
Diagram



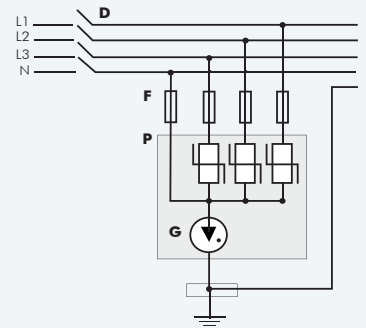
8 Type 1 Surge Protector 3-Phase network + neutral



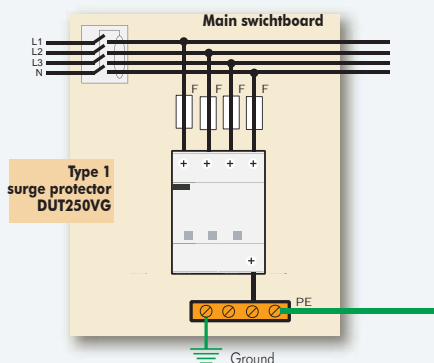
10 Type 2 Surge Protector 3-Phase network + neutral



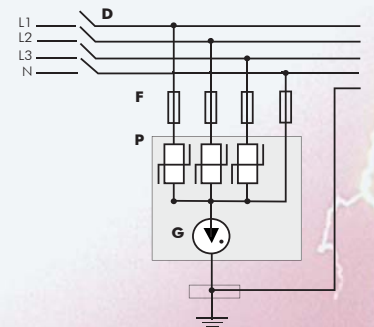
Diagram



11 Type 1 Surge Protector 3-Phase network + neutral



Diagram



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



DS surge protectors wiring

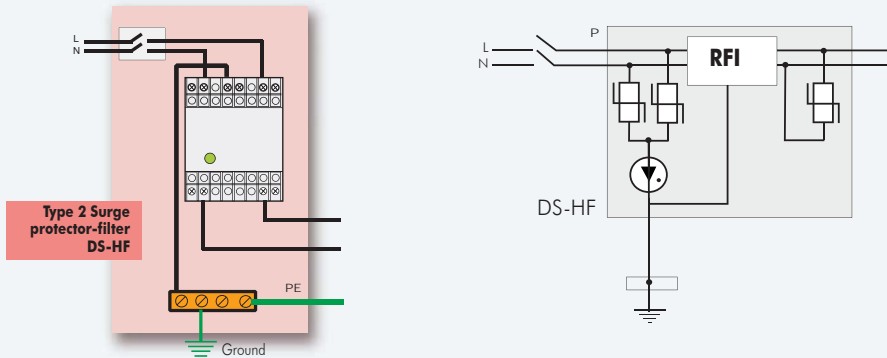
Multipole Type 2 surge protectors wiring

Wiring instructions for Multipole Type 2 surge protectors.

A12

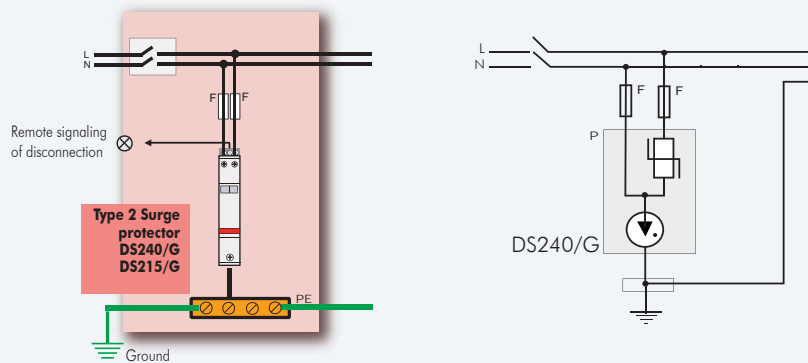
12 Type 2 surge protector + Filter Single phase network

Diagram



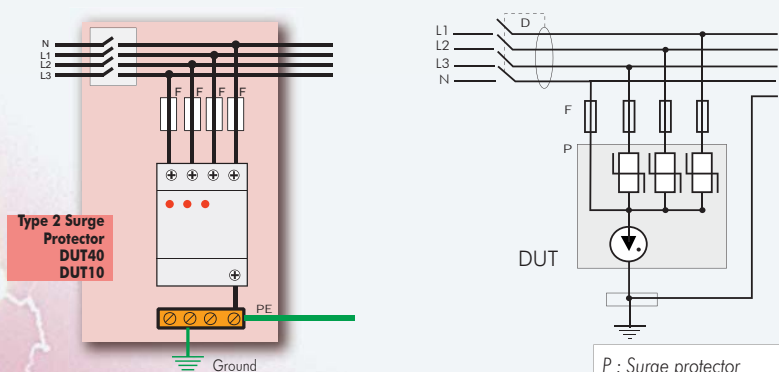
13 Type 2 Surge protector Single-phase network

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).

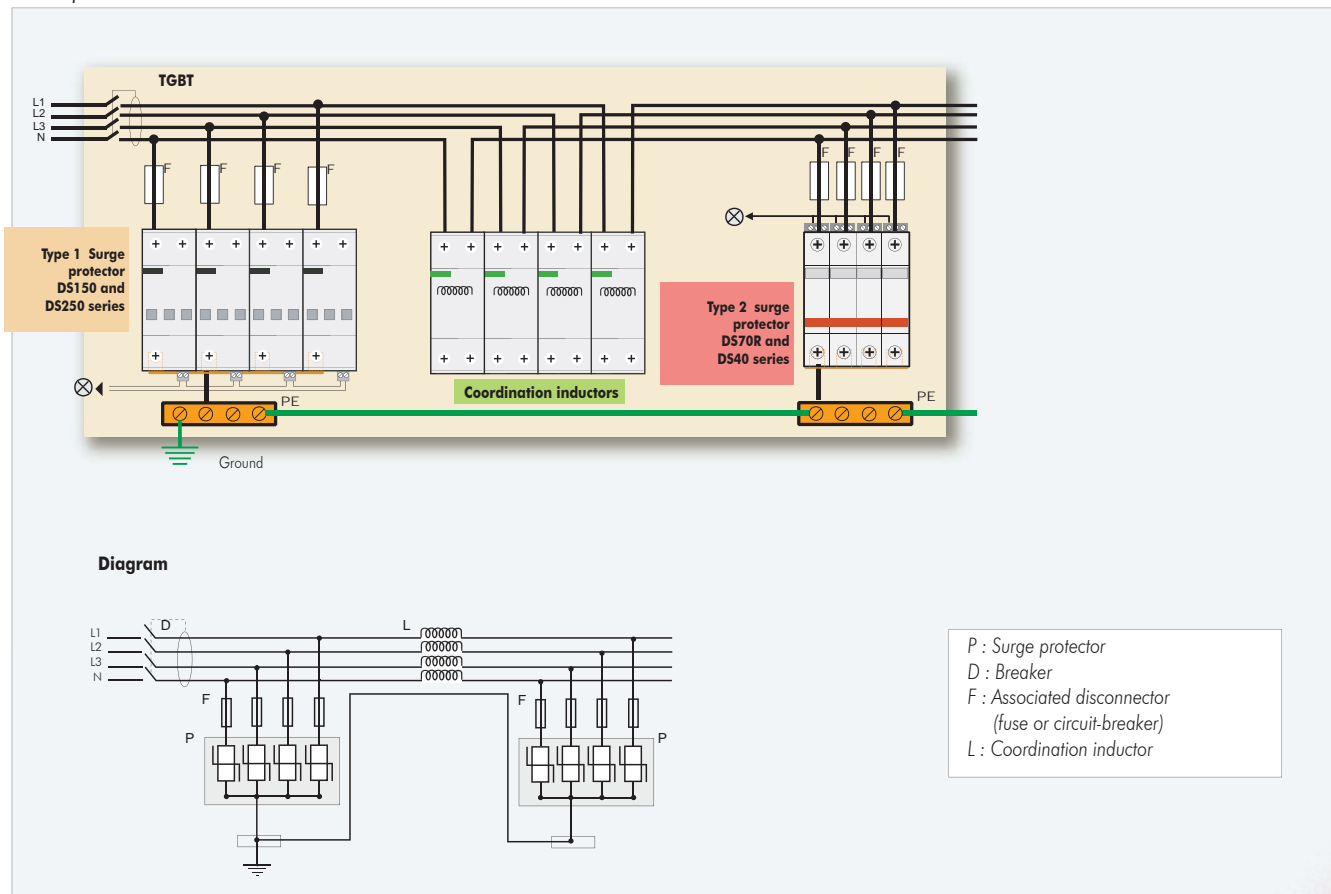
or

- coordination inductors (DSH range: see below).

Futher information is available in installation instruction sheet.

A13

Example of coordination on 3-Phase network.





DS surge protectors wiring

Associated fuses

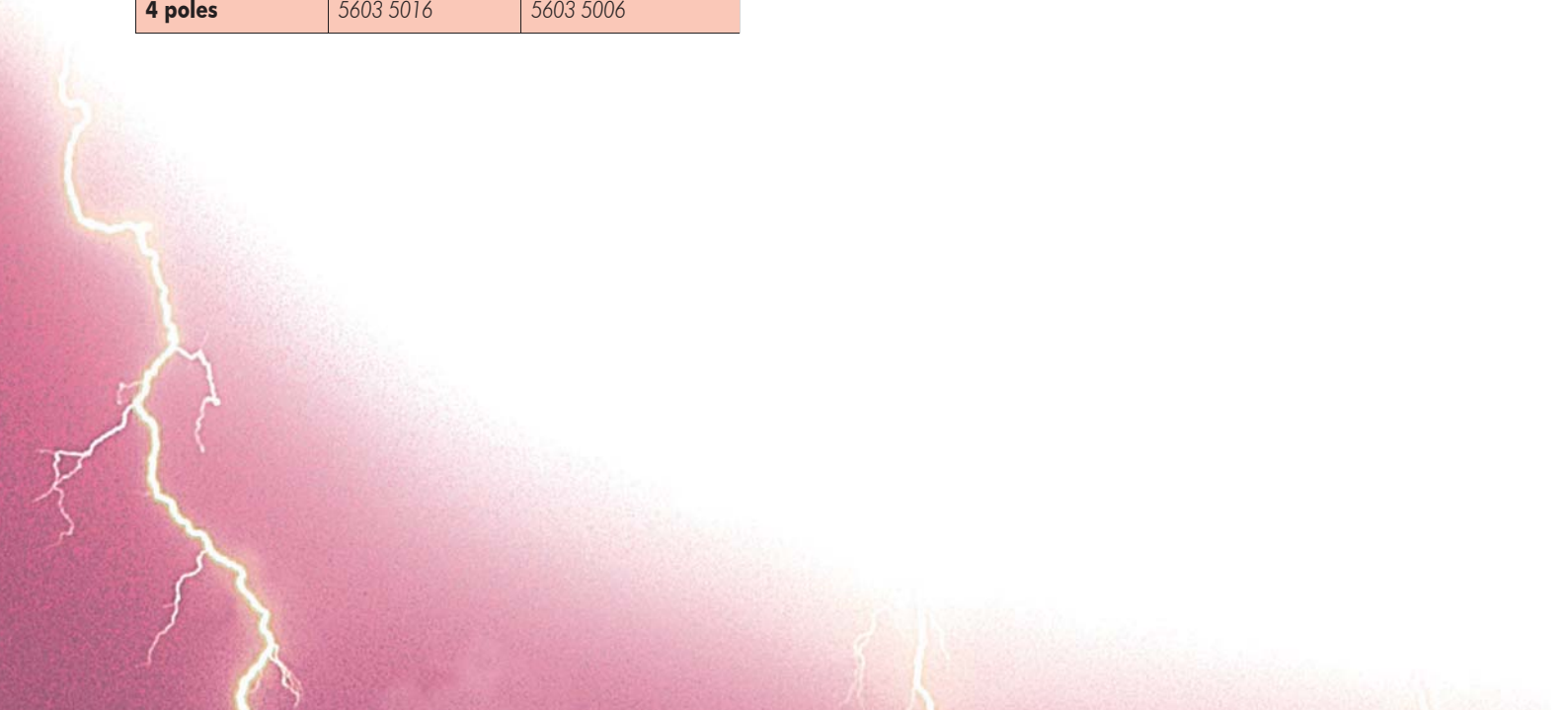
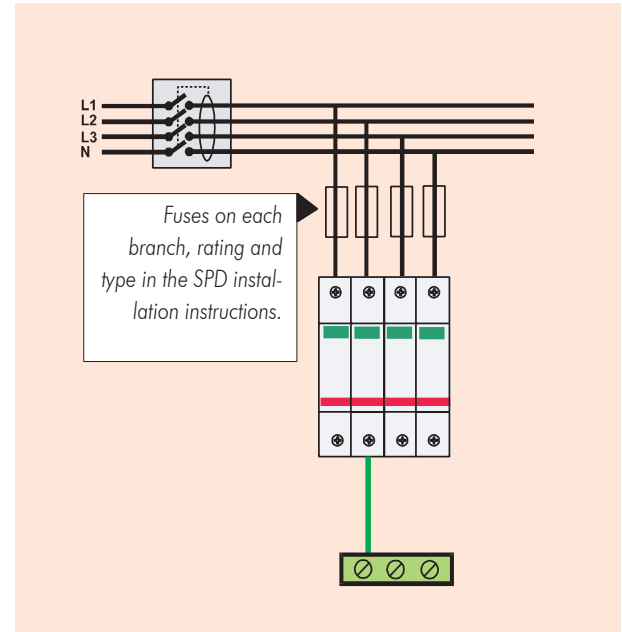
To comply with standards and safety, the AC surge protectors must be protected against a possible end of life in short-circuit : the user must install on each SPD branch, a protection against short circuit current (fuses or breaker).

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.

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

Dimensions and Diagram

A16

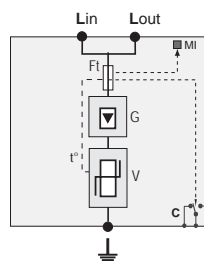
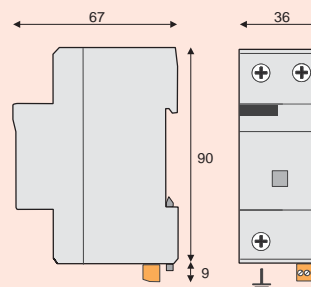


The DS250VG is a Extreme Duty Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the electrical installation. This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy 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.



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	U _c	255 Vac	150 Vac
TOV 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	30kA	30 kA
15 x 8/20 μs impulses			
Maximal discharge current	I _{max}	70 kA	70 kA
max. withstand @ 8/20 μs			
Max. lightning current by pole	I _{imp}	25 kA	25 kA
max. withstand @ 10/350 μs			
Residual voltage (at I _{imp})	U _{res}	0.8 kV	0.5 kV
Protection level (at I _n)	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 mm² / 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 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



Type 1 AC power Multipolar Surge Protector

DS252VG

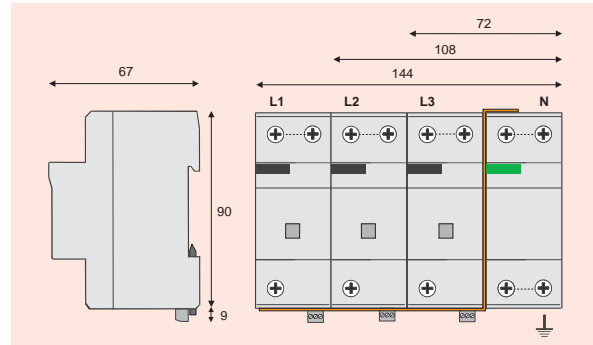
DS253VG

DS254VG



DS254VG-300/G

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).

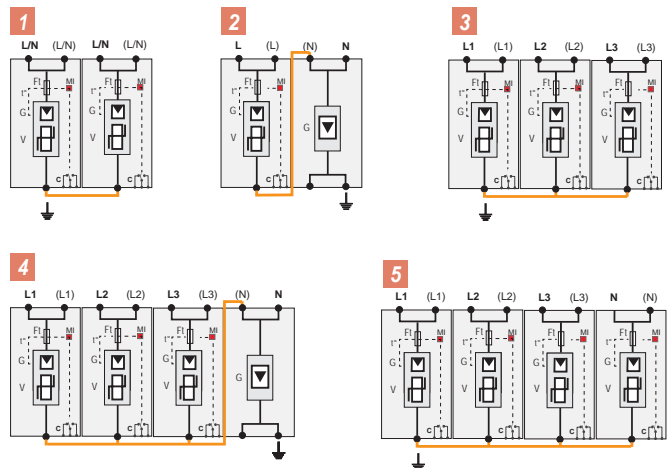
2 configurations are available:

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).

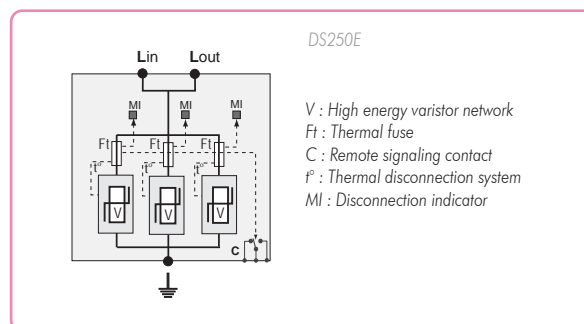
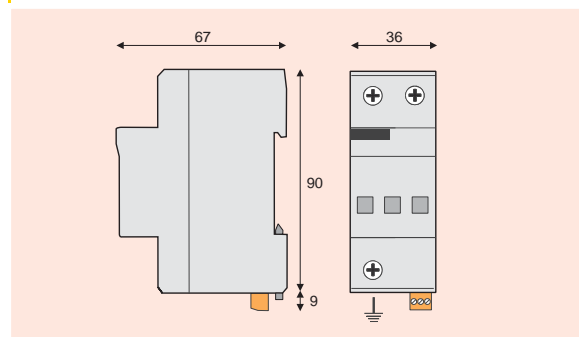
This SPD is designed to withstand a 25 kA lightning current (10/350 μ s impulse). It is based on «multi-MOV» diagram : this technology allows a very high discharge capability and the best behaviour possible on AC network (no follow current).

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
TOV withstand	U _T	400 Vac	330 Vac
Operating current	I _c	< 2 mA	< 2 mA
Leakage current at U _c			
Follow current	I _f	none	none
Nominal discharge current	I _n	50 kA	70 kA
15 x 8/20 μ s impulses			
Maximal discharge current	I _{max}	140 kA	140 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}	2 kV	1.5 kV
Protection level (at I _n)	U _p	2.5 kV	2.5 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 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.



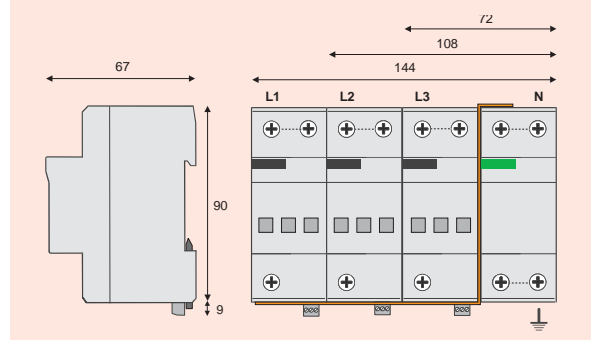
Type 1 AC power Multipolar Surge Protector

DS252E
DS253E
DS254E

Dimensions and Diagram



DS253E-400



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).

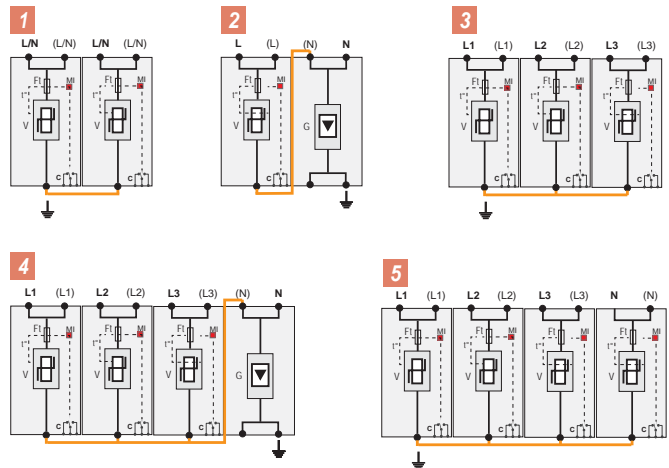
2 configurations are available:

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.



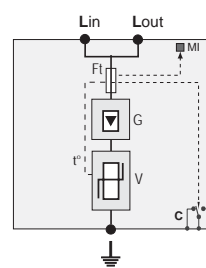
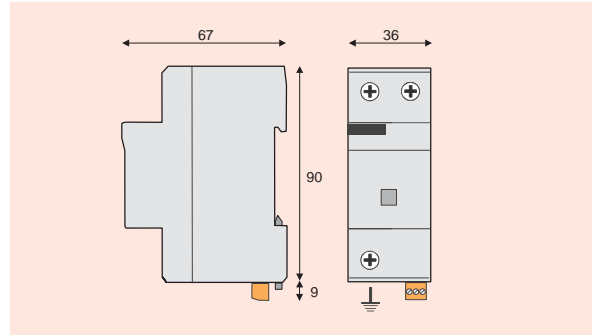
Part number	Network	AC system	Protection mode		Iimp total	Up L/PE	Up L/N	Diagram
			common	differential				
DS254E-300/G	230/400 V 3-phase+N	TT-TN	●	●	100 kA	2.5 kV	2.5 kV	4
DS254E-120/G	120/208 V 3-phase+N	TT-TN	●	●	100 kA	1.5 kV	1 kV	
DS254E-400	230/400 V 3-phase+N	IT	●		100 kA	2.5 kV	-	5
DS254E-300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

Dimensions and Diagram



DS150VG

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

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.

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	U _c	255 Vac	255 Vac	150 Vac
TOV withstand	U _T	400 Vac	300 Vac	150 Vac
Operating current	I _c	none	none	none
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 μs impulses				
Maximal discharge current	I _{max}	40 kA	40 kA	40 kA
max. withstand 8/20 μs				
Max. lightning current by pole	I _{imp}	15 kA	15 kA	15 kA
max. withstand 10/350 μs				
Residual voltage (at I _{imp})	U _{res}	0.8 kV	0.6 kV	0.4 kV
Protection level (at I _n)	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 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



Type 1 AC power Multipolar Surge Protector

DS152VG

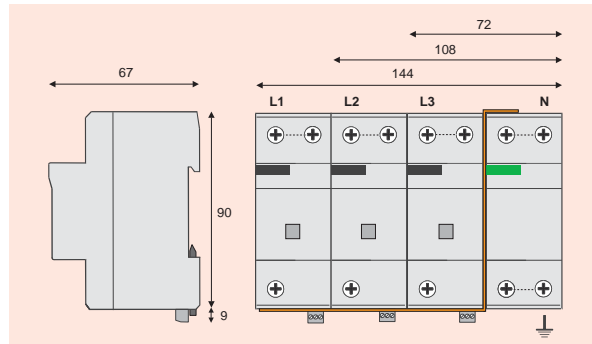
DS153VG

DS154VG



DS154VG-300/G

Dimensions and Diagram



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).

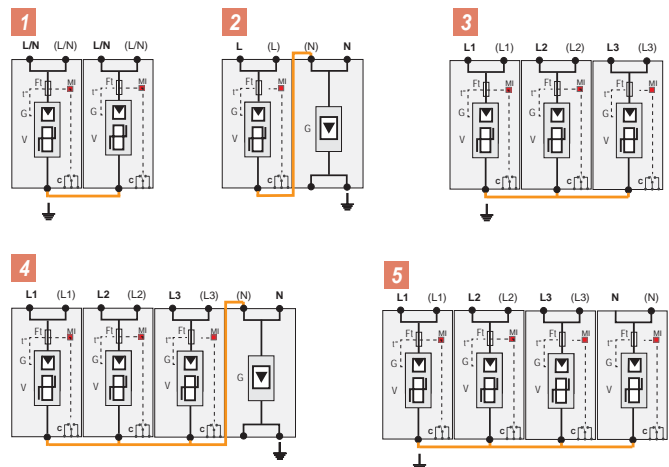
2 configurations are available:

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

Dimensions and Diagram

A22



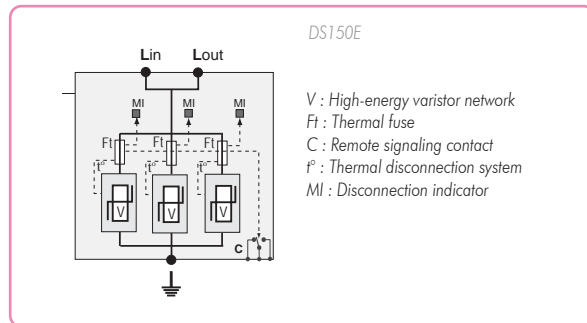
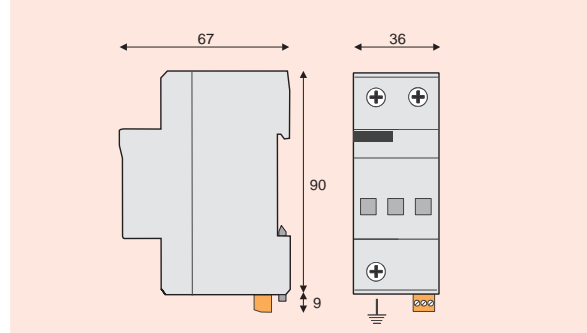
The DS150E is a Heavy Duty Type 1 AC Surge Protector Device (SPD) designed to be connected at the entrance of the electrical installation. This SPD provides an efficient protection against direct and indirect effects and is particularly useful in a high lightning density area where the risk of heavy 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.



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	U _c	400 Vac	300 Vac	150 Vac
TOV withstand	U _T	400 Vac	300 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	60 kA	70 kA	70 kA
15 x 8/20 μs impulses				
Maximum discharge current	I _{max}	140 kA	140 kA	140 kA
max. withstand 8/20 μs				
Max. lightning current by pole	I _{imp}	15 kA	15 kA	15 kA
max. withstand 10/350 μs				
Residual voltage (at I _{imp})	U _{res}	1.5 kV	0.9 kV	0.5 kV
Protection level (at I _n)	U _p	2.5 kV	2 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				
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



DS152E-300

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:

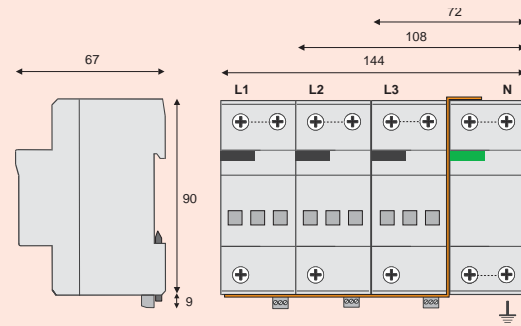
Common mode : CT1 Configuration

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

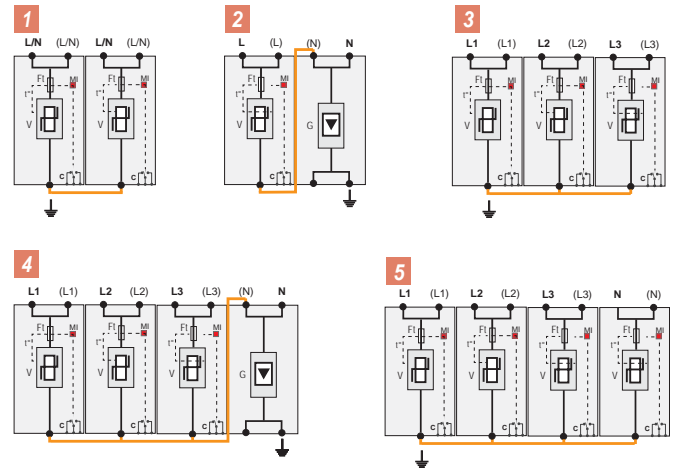
Common and differential mode : CT2 Configuration

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.

Dimensions and Diagram



A23



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	-	
DS153E-400	400 V 3-phase	IT-TT	●		45 kA	2.5 kV	-	3
DS153E-300	400 V 3-phase	TNC	●		45 kA	2 kV	-	
DS153E-120	208 V 3-phase	TNC	●		45 kA	1 kV	-	
DS152E-300/G	230 V single phase	TN	●	●	30 kA	2 kV	2 kV	2
DS152E-120/G	120 V single phase	TN	●	●	30 kA	1.5 kV	1 kV	
DS152E-400	230V single phase	TT-IT	●		30 kA	2.5 kV	-	1
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.

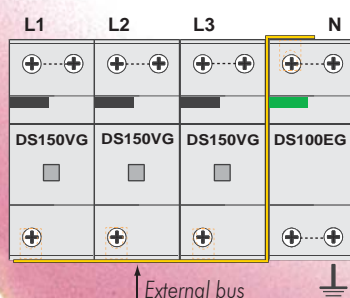
The DS100EG is based on CITEL P100 high energy gas tube, which provides much lower residual voltages than the air spark gap technology and a very high discharge current capability on a 10/350 μ s or 8/20 μ s impulses.

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

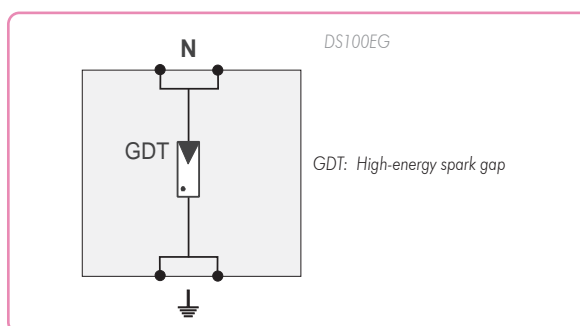
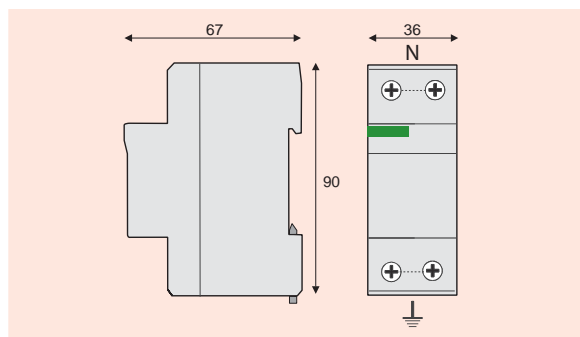
- **N/PE Type 1 Surge Protector**
- **limp : 50 and 100 kA (10/350 μ s)**
- **I_{max} : 200 and 150 kA (8/20 μ s)**
- **Adapted to DS250/DS150 range**
- **EN 61643-11 and IEC 61643-1 compliance**
- **UL 1449 ed.2 Recognition**

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 μs impulses				
Maximum discharge current	I _{max}	200 kA	150 kA	150 kA
max. withstand 8/20 μs				
Max. lightning current by pole	I _{imp}	100 kA	50 kA	50 kA
max. withstand 10/350 μs				
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).

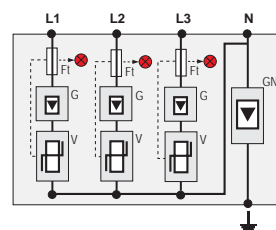
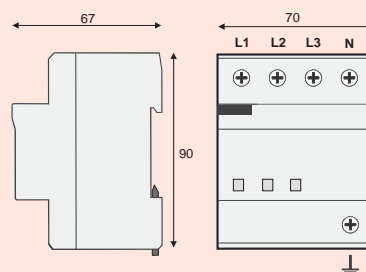
The DUT250VG-300/G is a 3-Phase+Neutral SPD and provides a common (L/G) and differential (L/N) mode protection. It complies to the Connection Type 2 configuration following IEC 60364-5-534.

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



DUT250VG-300/G

V : High-energy varistor network
G : Heavy duty GDT
GN : Heavy duty N/PE GDT
Ft : Thermal fuse
MI : Disconnection indicator

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	UT 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.



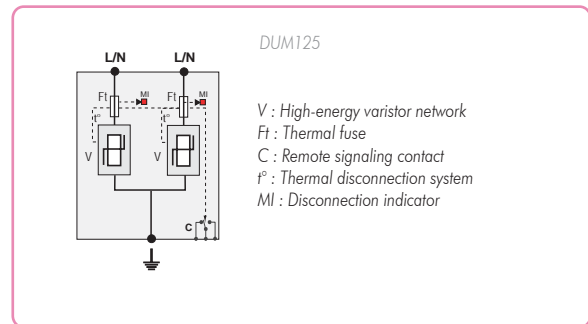
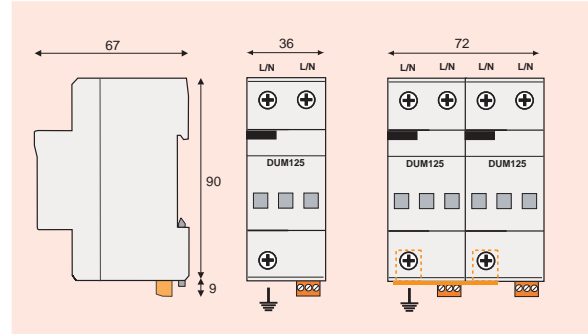
limp
12.5 kA

Type 1 Surge Protector Single and 3-phase

DUM125

DUT125

Dimensions and Diagram



DUM125 is a single-phase 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 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	If	none	none
Nominal discharge current 15 x 8/20 μs impulse	In	40 kA	40 kA
Max. discharge current max. withstand 8/20 μs	I _{max}	100 kA	100 kA
Max. lightning current by pole max. withstand 10/350 μs	I _{limp}	12.5 kA	12.5 kA
Total lightning current max. withstand 10/350 μs	I _{total}	25 kA (DUM125) 50 kA (DUT125)	25 kA (DUM125) 50 kA (DUT125)
Residual voltage (at I _{limp})	U _{res}	1.5 kV	0.5 kV
Protection level (at I _n)	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 :

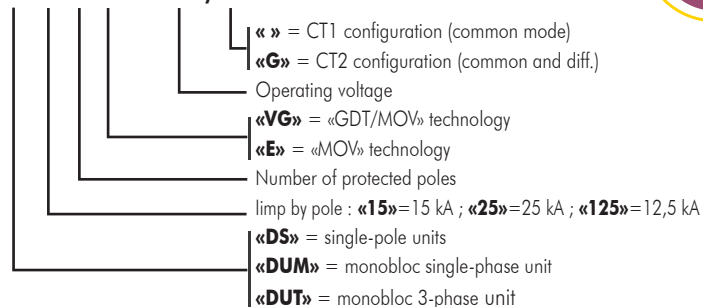
- limp by pole : 12.2, 15 and 25 kA (10/350 μ s)
- Total limp : up to 100 kA
- Single, 3 or 3-Phase+Neutral AC network
- 230/400V or 120/208V AC network
- All AC system types
- Common mode protection (CT1 configuration) or Common and Differential mode protection (CT2 configuration)
- Hard-wired single-pole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



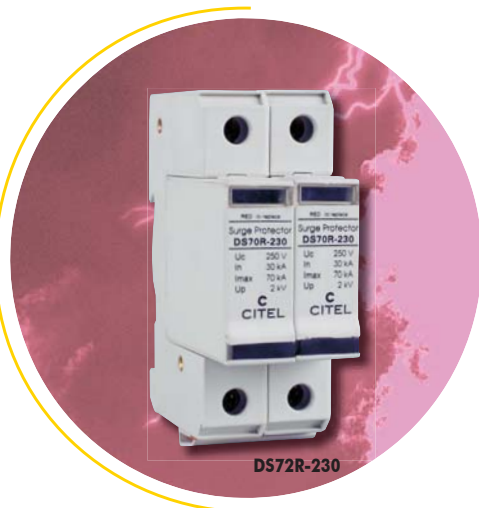


I_{max}
70 kA

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 $N_k > 25$.

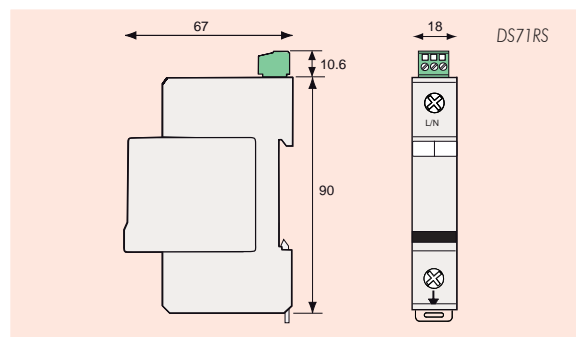
The SPD is based on association of high energy varistors equipped with thermal disconnector and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS7*RS).

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

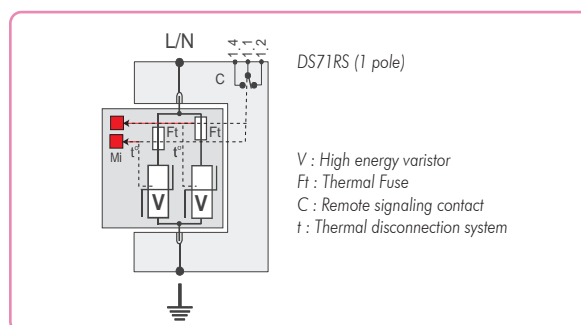
The DS70R is DIN rail compatible and is built with a plug-in module (DSM70R-xxx) and a fixed base, which allows an easy and fast maintenance.

- 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 μs impulses				
Maximum discharge current	I _{max}	70 kA	70 kA	70 kA
max. withstand 8/20 μs				
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 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 : 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.



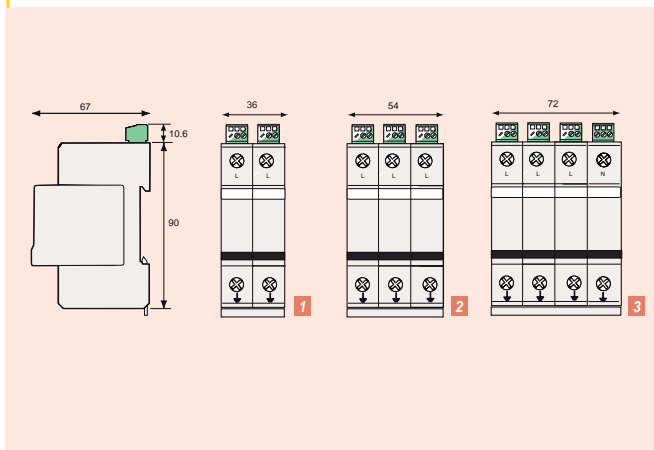
Type 2 AC power Multipolar Surge Protector

DS72R

DS73R

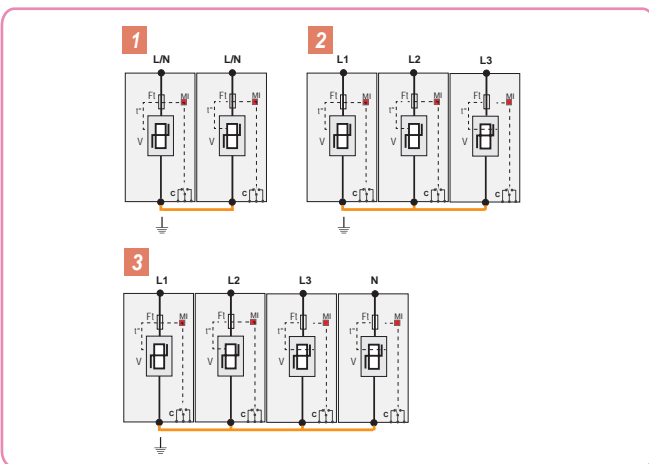
DS74R

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.

A29



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	



**Imax
40 kA**

Type 2 AC power Surge Protector DS40

A30



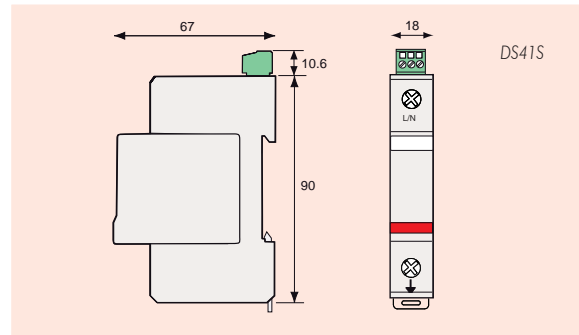
DS40 Type 2 AC Surge Protectors are used mainly for primary protection of single and 3-Phase networks at the main electrical panel. They provide common-mode (between L and PE) or common and differential mode (L/PE and L/N) when associated with DS40G (DS4x-xxx/G version). They are available in one-phase, 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 $N_k > 25$.

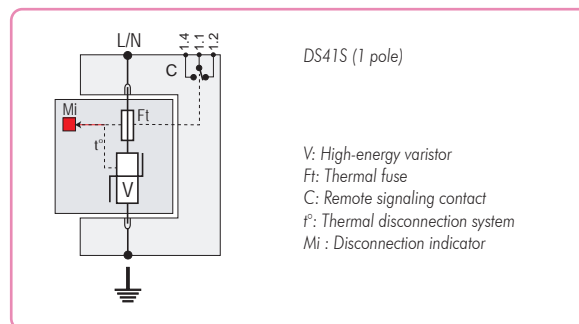
This SPD is based on high energy varistor equipped with thermal disconnecter and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS4*S).

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.

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	Uc	400 Vac	255 Vac	150 Vac
Temporary overvoltage withstand	U _T	400 Vac	255 Vac	150 Vac
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 impulse				
Maximum discharge current	I _{max}	40 kA	40 kA	40 kA
max. withstand 8/20 μs				
Protection level (at In)	Up	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 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**



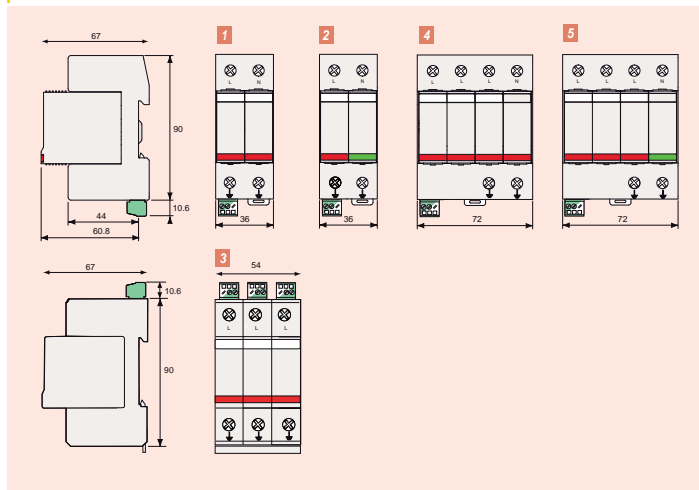
Type 2 AC power Multipolar Surge Protector

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).

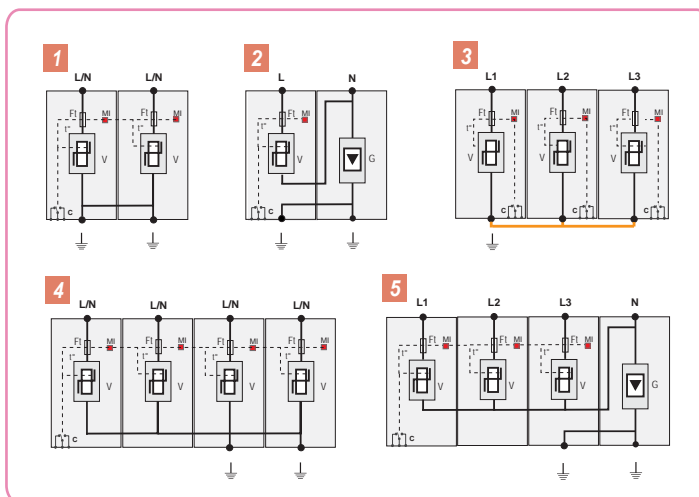
2 possible configurations :

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).



I_{max}
10 kA

Type 2 AC power Surge Protector

DS10

A32



DS13S-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.

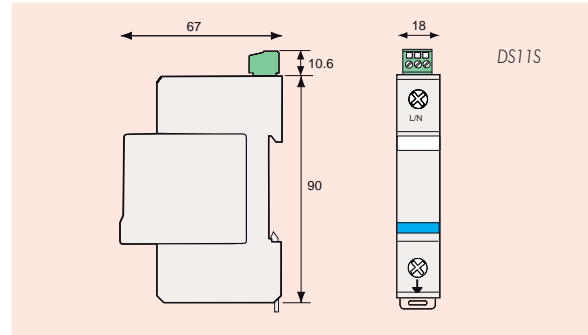
This SPD is based on high energy Varistor equipped with thermal disconnector and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS1*S).

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

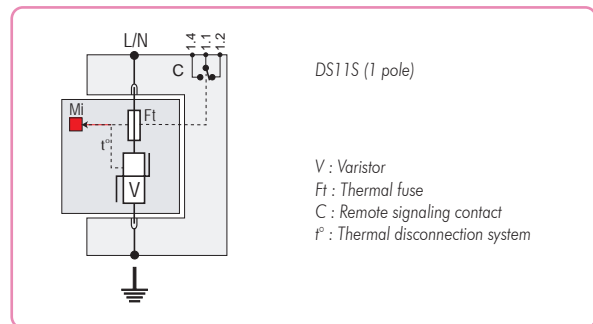
The DS10 is DIN rail compatible and is built with plug-in modules (DSM10-xxx) and a fixed base, which allows an easy and fast maintenance.

- **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
Leakage current at U _c				
Follow current	I _f	none	none	none
Nominal discharge current	I _n	5 kA	5 kA	5 kA
15 x 8/20 μs impulses				
Maximum discharge current	I _{max}	10 kA	10 kA	10 kA
max. withstand 8/20 μs				
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
Class III test				
Admissible short-circuit current		25000 A	25000 A	25000 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 : 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		
UL 1449 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.



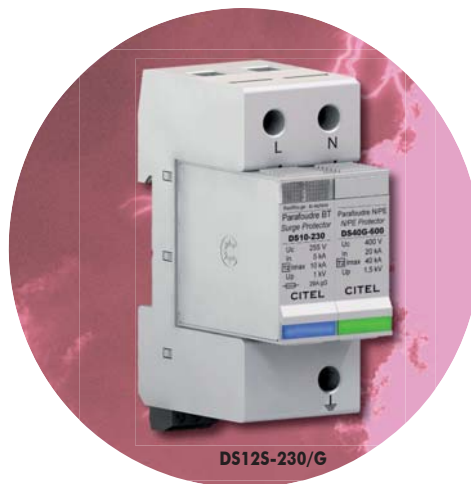
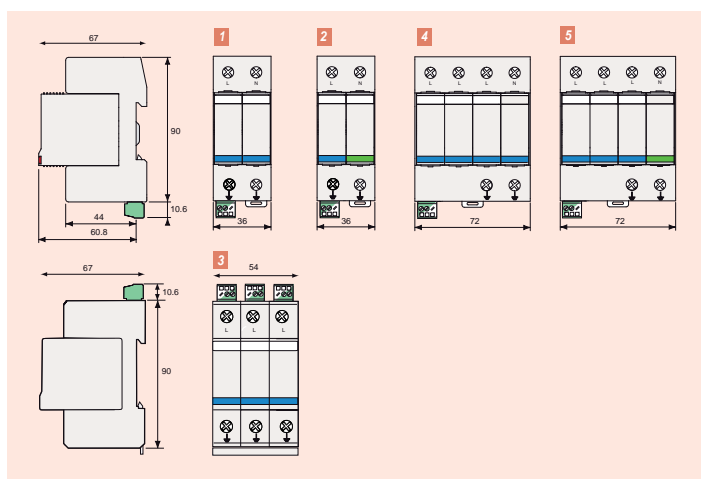
Type 2 AC power Multipolar Surge Protector

DS12

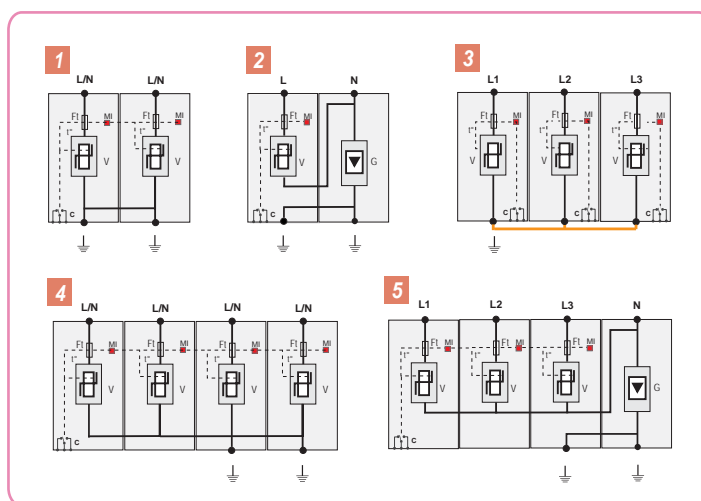
DS13

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	-	



I_{max}
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.

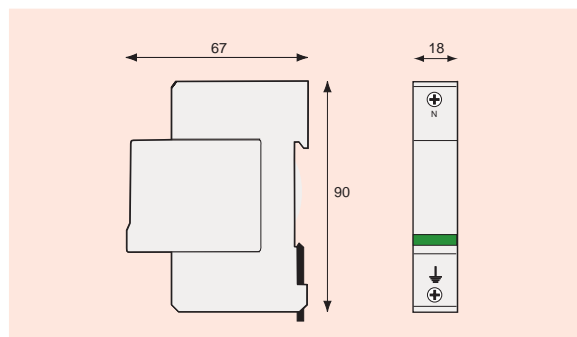
The DS40G is connected only between Neutral wire (N) and Protective Earth wire (PE).

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

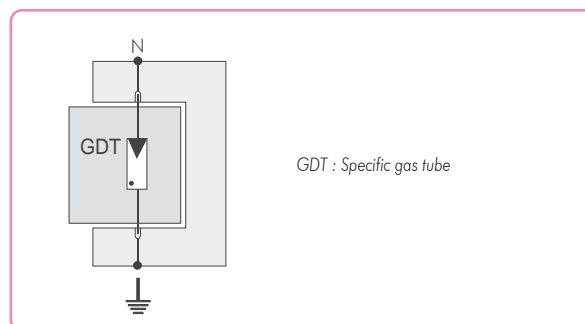
The DS40G is made with a fixed base and a plug-in module in order to comply mechanically with the DS10/DS40 range.

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

Dimensions (in mm)



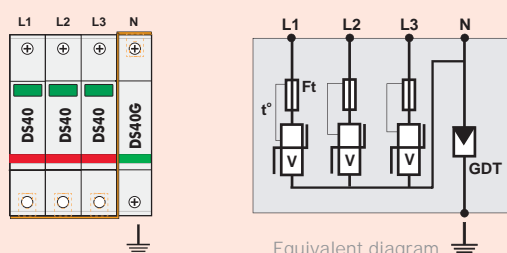
Electrical diagram



Characteristics

CITEL part number		DS40G-600
Network		230/400V or 120/208V
Maximum operating voltage	U _c	255 Vac
Temporary overvoltage withstand	U _T	400 Vac
Operating current	I _c	none
Leakage current at U _c		
Follow current interruption	I _{fi}	> 100 A
Nominal discharge current	I _n	20 kA
15 x 8/20 μ s impulses		
Maximum discharge current	I _{max}	40 kA
max withstand 8/20 μ s		
Protection level (at I _n)	U _p	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)





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 μ s)
- 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 multipolar 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.

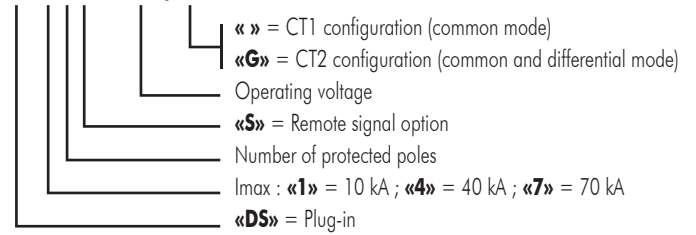
These Multipolar surge protectors fit on DIN rail.

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



A35

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



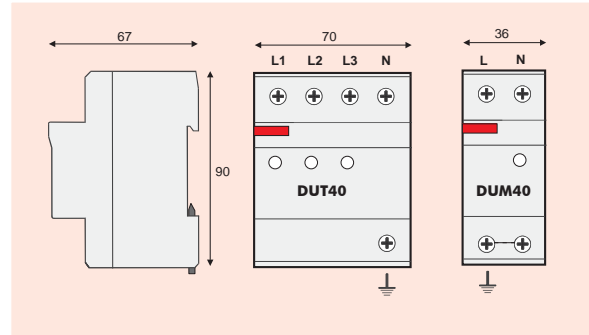


**Imax
40 kA**

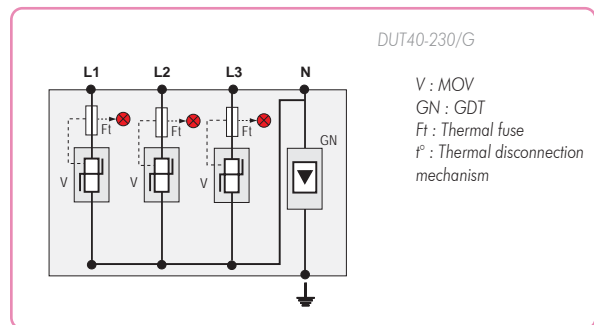
Single and 3-Phase AC Surge Protectors

DUT40 - DUM40

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	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	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.

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: I_n: 15 kA / I_{max}: 40 kA**
- **Common/Differential mode**
- **Protection levels U_p: 2/1.5 kV**
- **Disconnection indicators**
- **IEC 61643-1 and EN 61643-11 compliance**

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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).

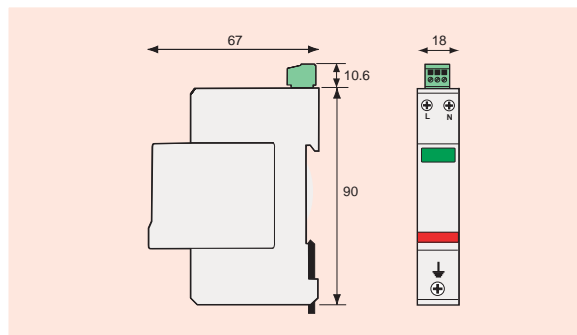
The DS240 is DIN rail compatible and is built with a plug-in module and a fixed base, which allows an easy and fast maintenance.

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).

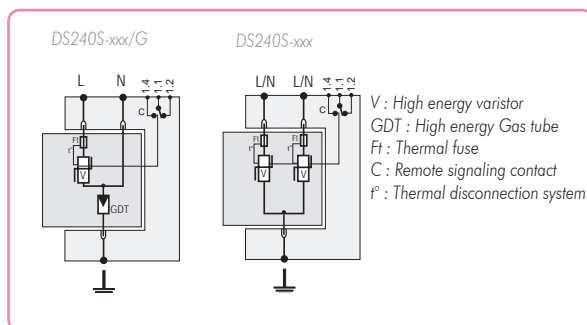
- **Compact single-phase Type 2 SPD**
- **Discharge currents : I_n : 20 kA / I_{max} : 40 kA**
- **Common/Differential mode**
- **Pluggable module**
- **Remote signaling contact (option)**
- **Complies with EN 61643-11 and IEC 61643-1**

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
Leakage current at U _c				
Protection mode(s)		MC (2)	MC/MD (2)	MC/MD (2)
Nominal discharge current	I _n	20 kA	20 kA	20 kA
15 x 8/20 μs impulses				
Maximum discharge current	I _{max}	40 kA	40 kA	40 kA
max. withstand 8/20 μs				
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)

A37



**Imax
10 kA**

Single and 3-Phase AC Surge Protectors

DUT10 - DUM10

A38

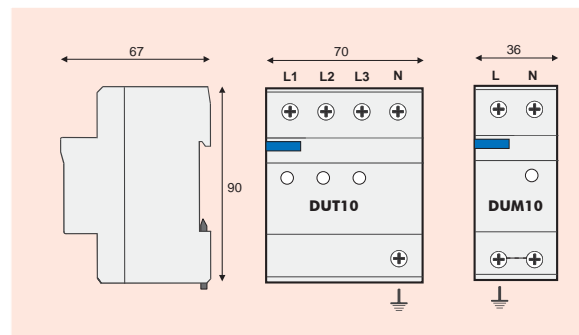


DUT10 (3-Phase) and DUM10 (Single Phase) Type 2 surge protectors are used to protect sensitive equipment, connected to AC network, against transient surge voltages due to lightning. The technology used is an association of gas tube and varistors equipped with thermal disconnectors and operating indicators.

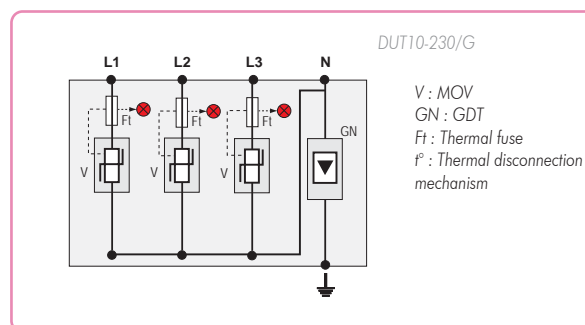
DUT10 and DUM10 are installed close by the sensitive equipment, in the distribution panel. They have to be used downstream a primary SPD (DS40, DUT40...) located in the main electrical panel. These surge protectors provide common and differential mode protection with a maximum discharge current of 40 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 / Imax: 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	Uc	255 Vac	150 Vac
Temporary overvoltage withstand	UT	400 Vac	150 Vac
Operating current	Ic	none	none
Leakage current at Uc			
Follow current	If	none	none
Nominal discharge current	In	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 In)	Up	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 mm²	
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.



**Imax
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).

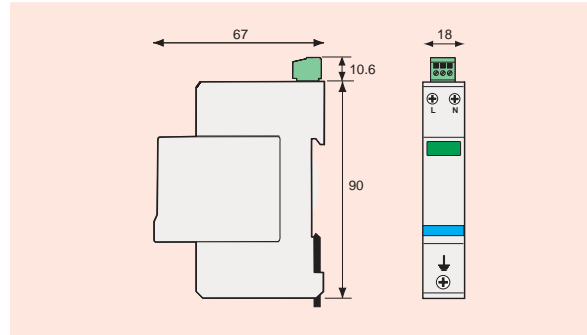
This SPD is based on high energy varistor equipped with thermal disconnectors and failure indicator, to comply with standards. Version with a remote signaling for disconnection indication is also available (DS215S).

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.

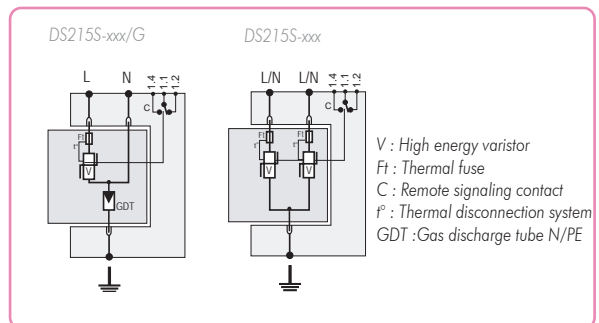
- **Compact single-phase Type 2 SPD**
- **Discharge currents : In : 5 kA / Imax : 15 kA**
- **Common/Differential mode**
- **Pluggable module**
- **Remote signaling contact (option)**
- **IEC 61643-1 and EN 61643-11 compliance**

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)	Up	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.

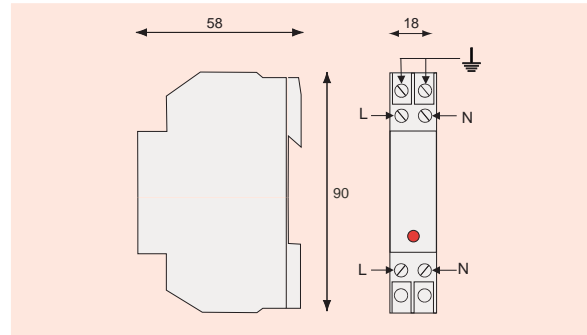
Note 2 : MC = Common mode (L/PE or N/PE)/ MD = Differential mode (L/N)



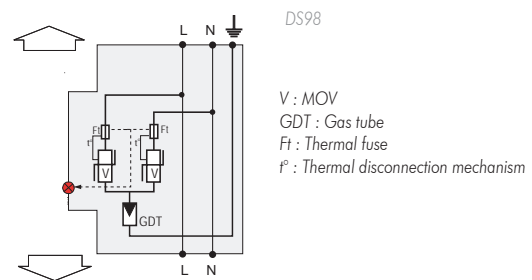
**Imax
10 kA**

Single phase Type 2 AC Surge Protector DS98

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	IL	16 A	16 A
in case of series mounting			
Leakage current	Ic	without	without
Leakage current at Uc			
Follow current	If	without	without
Nominal discharge current	In	5 kA	5 kA
15 x 8/20 µs current impulse			
Maximal discharge current	Imax	10 kA	10 kA
max. withstand in 8/20 µs impulse			
Protection level (@ In)	Up	1.5 kV/ 1 kV	0.7 kV/ 0.7 kV
Common mode/Differential mode			
Tenue en onde combinée	Uoc	10 kV	10 kV
Test de classe III			
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 mm² max	
Disconnection indicatior		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)

- **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**

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

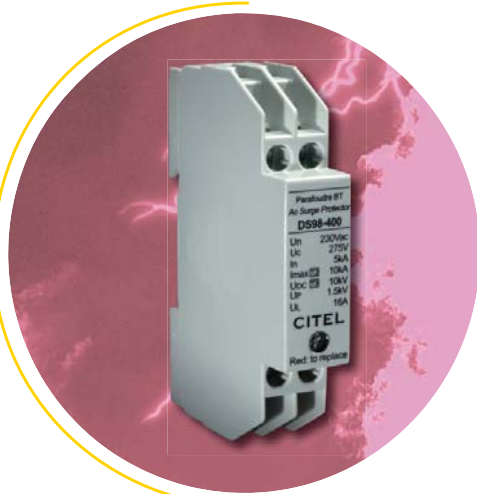
It is based on an association between a high energy gas tube and varistors. DS98 is equipped with an internal thermal safety which will disconnect the unit from the AC network in case of end of life. This disconnection will be indicated by the turn on of the red led in the front.

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.

A40





**Imax
10 kA**

Single-Phase Surge Protector and Filter DS-HF



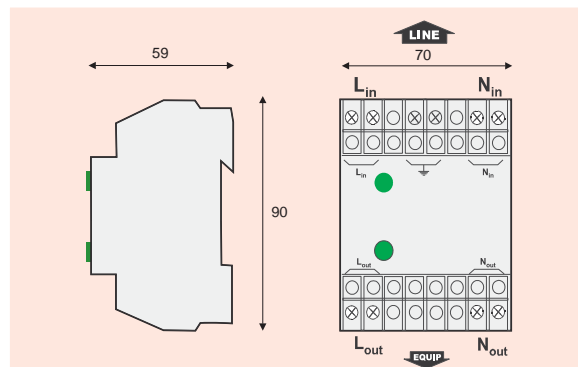
The DS-HF is a secondary Type 2 surge protector and RFI filter especially designed to protect sensitive equipment connected to single-phase networks.

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.

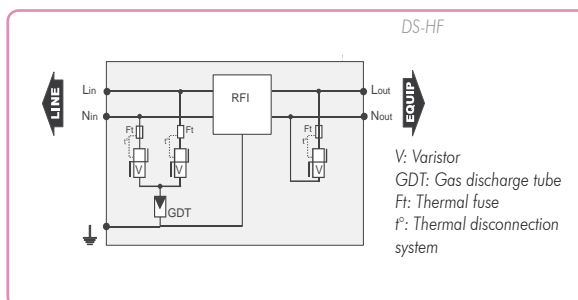
The DS-HF can be classified as secondary Type 2 or Type 3 SPD following IEC 61643-1. It is connected in series on AC network (maximum line current 16 A) , downstream of a primary Type 2 SPD (e.g. DS40), installed in the main electrical switchboard, to protect a remote or sensitive equipment.

- **Surge protector with RFI filtering**
- **Discharge currents : I_n : 3kA / I_{max} : 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 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 : 0,75 - 4 mm²	
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.

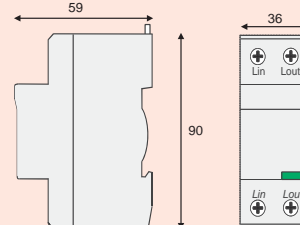
They are necessary where the coordination cannot be accomplished using the «natural» inductance of the active conductors (in particular in a small volume, where the length of line wire between primary SPD and secondary SPD is lower than 10 m).

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

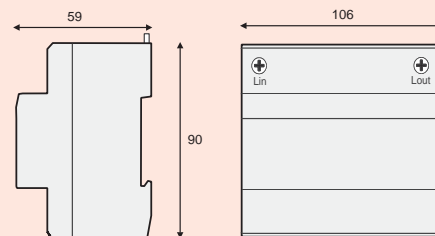
Several current values are available: 16A, 35A, 63A and 100 A.

Dimensions (in mm)

DSH35 - DSH2x16

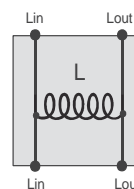


DSH63 - DSH100

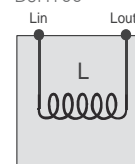


Electrical diagram

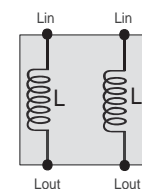
DSH35



DSH63
DSH100



DSH2x16



L : inductor

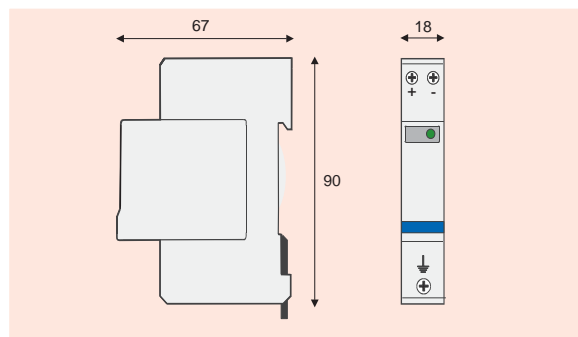
- Coordination inductors for Surge Protectors
- For use with the DS series
- 35A, 63A, 100A and 2 x 16A versions

Characteristics

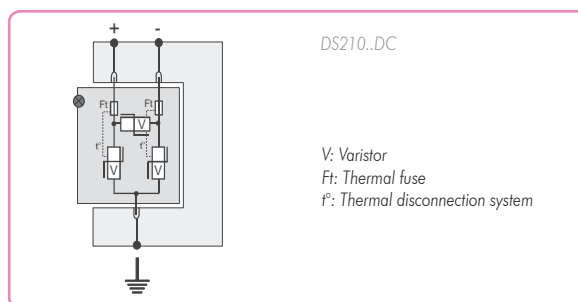
CITEL part number	DSH100	DSH63	DSH35	DSH2x16
Type	inductor	inductor	inductor	double inductor
Connexion mode	1 DSH in series on each active wire	1 DSH in series on each active wire	1 DSH in series on each active wire	1 DSH in series on 2 active wires
Max. operating voltage	Uc	500 Vac	500 Vac	500 Vac
Max. line current	IL	100 A	63 A	35 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)			



Dimensions (in mm)



Electrical diagram



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

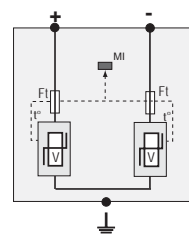
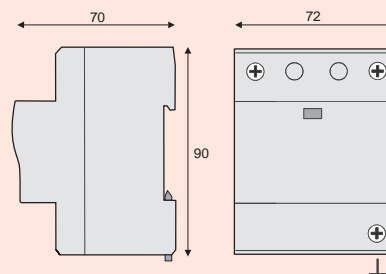
CITEL part number		DS210-12DC	DS210-24DC	DS210-48DC	DS210-75DC	DS210-95DC	DS210-110DC	DS210-130DC
Nominal DC voltage	Un-dc	12 Vdc	24 Vdc	48 Vdc	75 Vdc	95 Vdc	110 Vdc	130 Vdc
Maximal AC voltage	Uc	10 Vac	15 Vac	40 Vac	60 Vac	75 Vac	95 Vac	115 Vac
Maximal DC voltage	Uc-dc	15 Vdc	30 Vdc	56 Vdc	85 Vdc	100 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>	Imax	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
F° : 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 μs impulses			
Max. lightning current by pole	limp	12.5 kA	12.5 kA
tenue max. 10/350 μs			
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 mm² / 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 classe		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**



I_{max}
40 kA

Type 2 Surge Protector for Photovoltaic

DS50PV



DS50PV are Type 2 Surge Protectors 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.

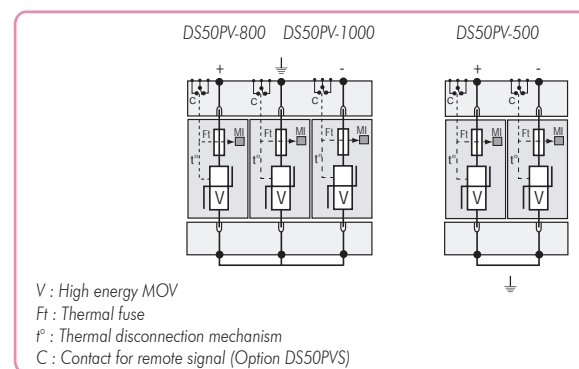
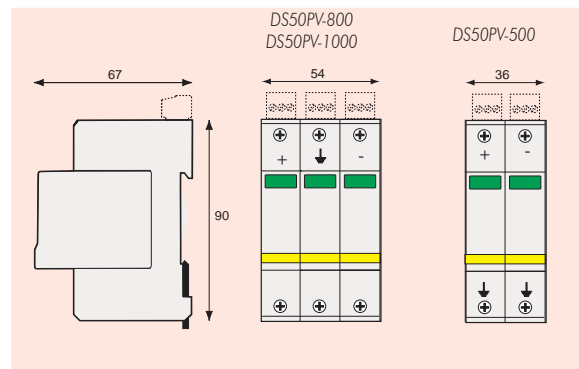
The use of Type 2 surge protector is recommended at both ends of the DC power supply line (solar panel side and inverter/converter side), especially if the line routing is external and long.

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 I_n: 20 kA / I_{max}: 40 kA**
- **Plug-in modules**
- **Remote signal option**
- **IEC 61643-1 compliance**

Dimensions and diagram



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
tenue 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 mm² / by bus		
Disconnection indicator		1 mechanical indicator by pole		
Remote signaling		Option DS50PVS - output on changeover contact		
Mounting		symmetrical rail 35 mm		
Operating temperature		-40/+85 °C		
Protection class		IP20		
Housing material		Thermoplastic UL94-V0		
Standards compliance				
NF EN 61643-11	France	Parafoudre Basse Tension - Essais Classe II		
IEC 61643-1	International	Low Voltage SPD - Test Class II		
EN 61643-11	Europe	Parafoudre Basse Tension - Essais Classe II		
UL1449 ed.2	USA	Low Voltage TVSS		

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

A45



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...).



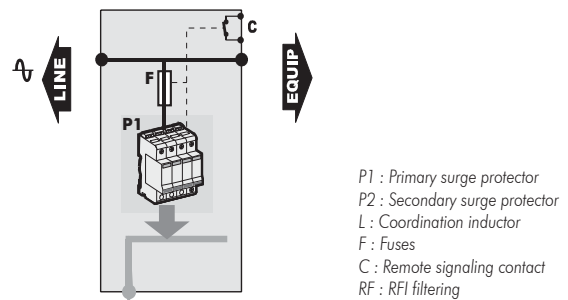
AC power Surge Protector Panels

CBC - CBB - CBA

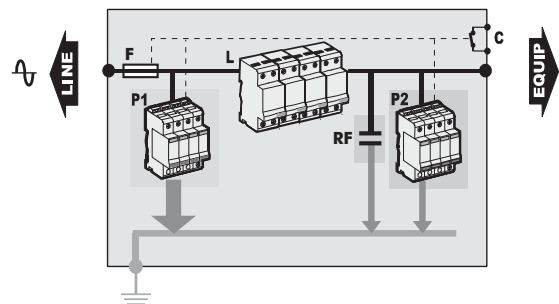
A47

- 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

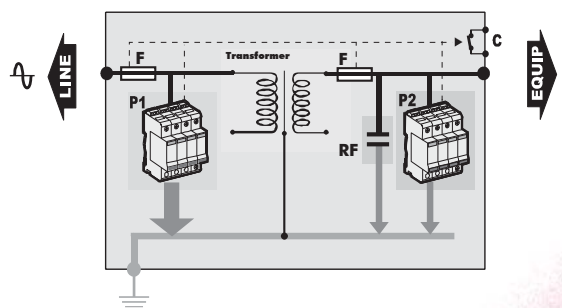
CBC version



CBB version



CBA version





AC power Surge Protector Panels

CBC - CBB - CBA

Characteristics

CITEL part number	CBC			CBB			CBA
Configuration	Single stage			Coordination + Filtering			Coordination + Isolation
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



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	limp = 15 kA (10/350 μ s)	-	-	215 x 210 x 100	1.7 kg
CBC72-230	CBC72-120	I _{max} = 70 kA	-	-		1.5 kg
CBC42-230	CBC42-120	I _{max} = 40 kA	-	-		1.4 kg
Network 230/400V 3-Phase	Network 120/208V 3-Phase					
CBC153-400	CBC153-120	limp = 15 kA (10/350 μ s)	-	-	410 x 285 x 140	3.8 kg
CBC73-400	CBC73-120	I _{max} = 70 kA	-	-	298 x 260 x 140	2.6 kg
CBC43-400	CBC43-120	I _{max} = 40 kA	-	-		2.4 kg
Network 230/400V 3-Phase+neutral	Network 120/208V 3-Phase+neutral					
CBC154-230	CBC154-120	limp = 15 kA (10/350 μ s)	-	-	410 x 285 x 140	4.2 kg
CBC74-230	CBC74-120	I _{max} = 70 kA	-	-	298 x 260 x 140	3 kg
CBC44-230	CBC44-120	I _{max} = 40 kA	-	-		2.8 kg

A49

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	limp = 15 kA (10/350 μ s)	35 A	8 kVA	410 x 285 x 140	4.1 kg
CBB152-63-230	CBB152-63-120	limp = 15 kA (10/350 μ s)	63 A	14.5 kVA		4.4 kg
CBB72-35-230	CBB72-35-120	I _{max} = 70 kA	35 A	8 kVA		4 kg
CBB72-63-230	CBB72-63-120	I _{max} = 70 kA	63 A	14.5 kVA		4.3 kg
CBB42-35-230	CBB42-35-120	I _{max} = 40 kA	35 A	8 kVA		3.7 kg
CBB42-63-230	CBB42-63-120	I _{max} = 40 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	limp = 15 kA (10/350 μ s)	35 A	24 kVA	410 x 463 x 140	7.5 kg
CBB14-63-230	CBB154-63-120	limp = 15 kA (10/350 μ s)	63 A	44 kVA		8.1 kg
CBB74-35-230	CBB74-35-120	I _{max} = 70 kA	35 A	24 kVA		7.5 kg
CBB74-63-230	CBB74-63-120	I _{max} = 70 kA	63 A	44 kVA		7.9 kg
CBB44-35-230	CBB44-35-120	I _{max} = 40 kA	35 A	24 kVA		6.9 kg
CBB44-63-230	CBB44-63-120	I _{max} = 40 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 kA	5 A	1 kVA	600 x 400 x 250	34 kg
CBA42-3KVA-230	CBA42-3KVA-120	I _{max} = 40 kA	13 A	3 kVA		56 kg
CBA42-5KVA-230	CBA42-5KVA-120	I _{max} = 40 kA	22 A	5 kVA	600 x 400 x 400	75 kg
CBA42-8KVA-230	CBA42-8KVA-120	I _{max} = 40 kA	35 A	8 kVA		76 kg
CBA42-10KVA-230	CBA42-10KVA-120	I _{max} = 40 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 kA	1.5 A	1 kVA	700 x 500 x 250	35 kg
CBA44-3KVA-230	CBA44-3KVA-120	I _{max} = 40 kA	4.5 A	3 kVA		62 kg
CBA44-5KVA-230	CBA44-5KVA-120	I _{max} = 40 kA	7.5 A	5 kVA		76 kg
CBA44-8KVA-230	CBA44-8KVA-120	I _{max} = 40 kA	11.5 A	8 kVA		82 kg
CBA44-10KVA-230	CBA44-10KVA-120	I _{max} = 40 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)	I _{max}	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

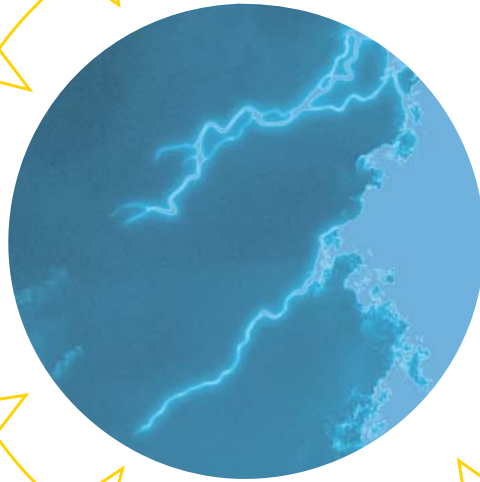
Series	SP120	SP165	SP200	SP330	SP400
Max. discharge current Imax (8/20μs) by phase (1)	120 kA	165 kA	200 kA	300 kA	400 kA
Courant de choc limp (10/350μs) by phase (1)	60 kA	60 kA	60 kA	60 kA	60 kA
Type of AC Network					
120/240 Vac Split Phase 3Ph+PE	SP120-120T	SP165-120T	SP200-120T	SP330-120T	SP400-120T
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 mm² 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**

B1



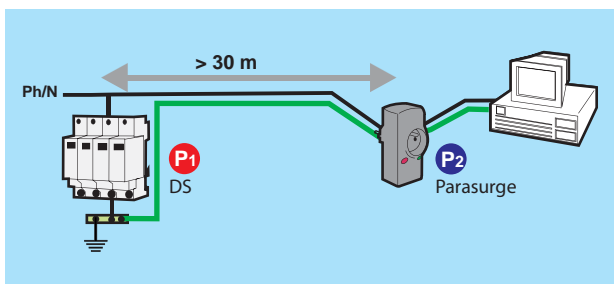
AC power Surge Protectors

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.

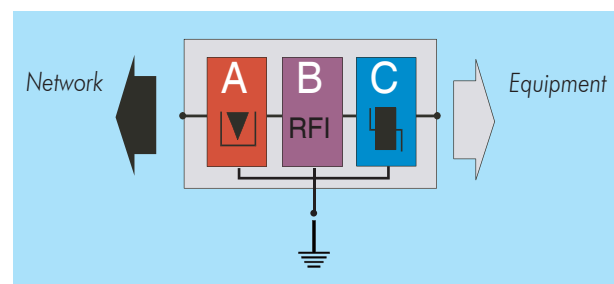
Moreover, they are equipped, in compliance with IEC 61643-1 standard, with internal thermal safety which will disconnect the unit from AC network in case of end of life. The operating status of the Parasurge is given by light indicator.

«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.

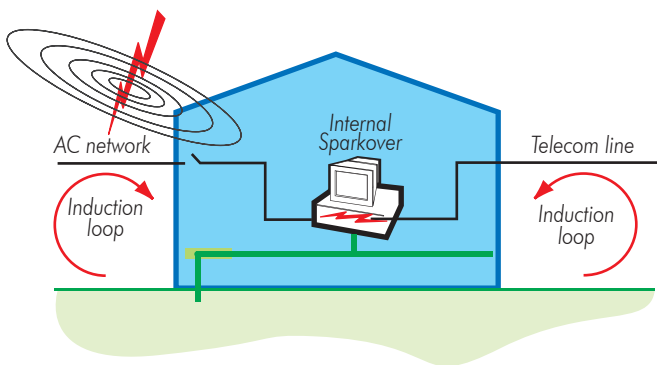




AC power Surge Protectors

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 CITELE 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



B4

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.

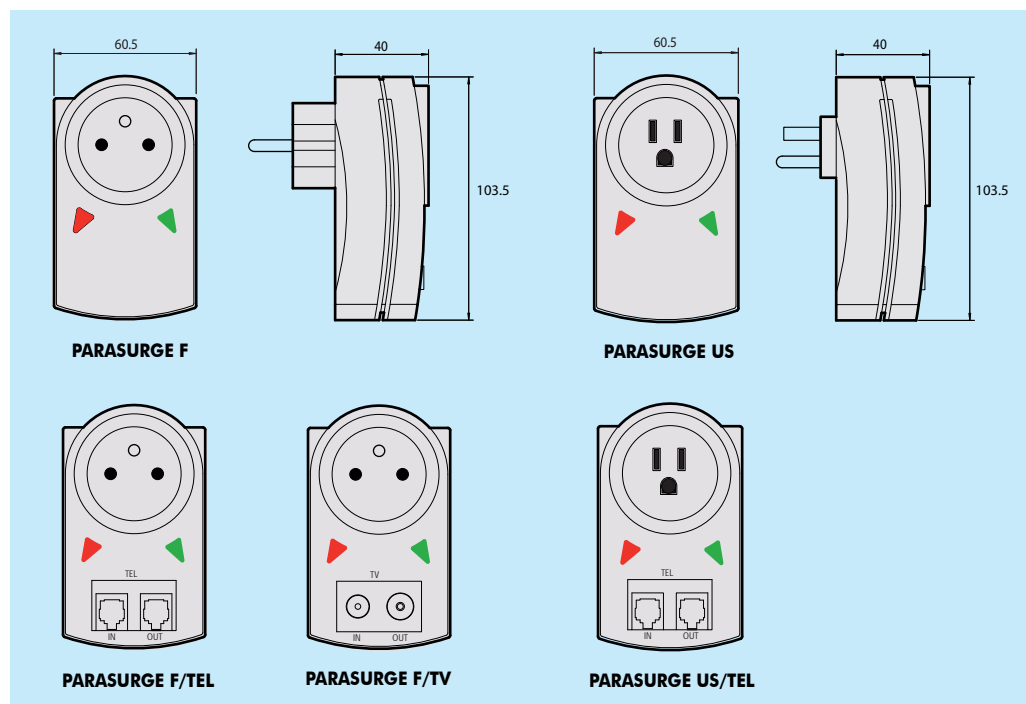
- **Type 2 (or 3) AC Surge Protectors**
- **«Plug-in» format**
 - Single AC plug version
 - Telecom/AC version (Fax, Modem...)
 - TV/AC version (antenna, satellite, cable)
- **French, German, US AC plugs**
- **Protection and AC voltage status indicators**
- **Instantaneous installation**
- **Complies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

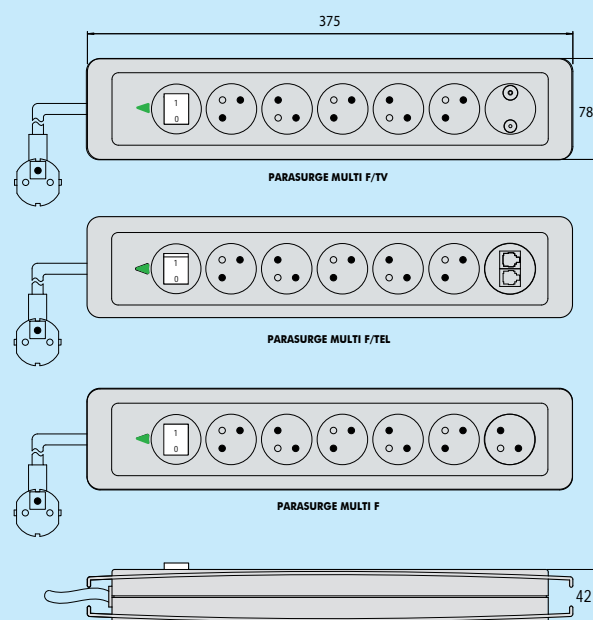
Parasurge Multi D/TV

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.

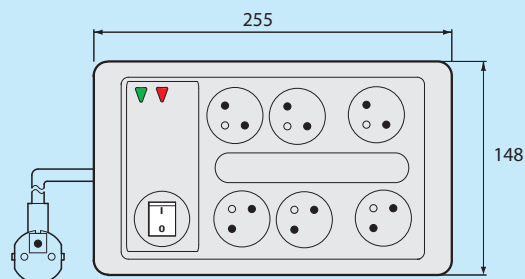
This surge protector is especially dedicated to computer/video system equipped with modem and TV connection.

Parasurge MultiMedia F/MS

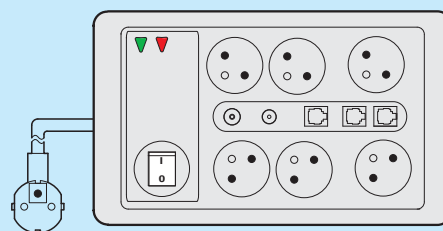
Version built-in with an «Master/Slave» feature : Automatic switch on/off of all the devices connected to the Parasurge in relation with the status of the device connected on the «Master» outlet. That allows an easy and safe control of the PC or Home Cinema system.

- «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

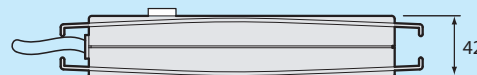
Dimensions (in mm)



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

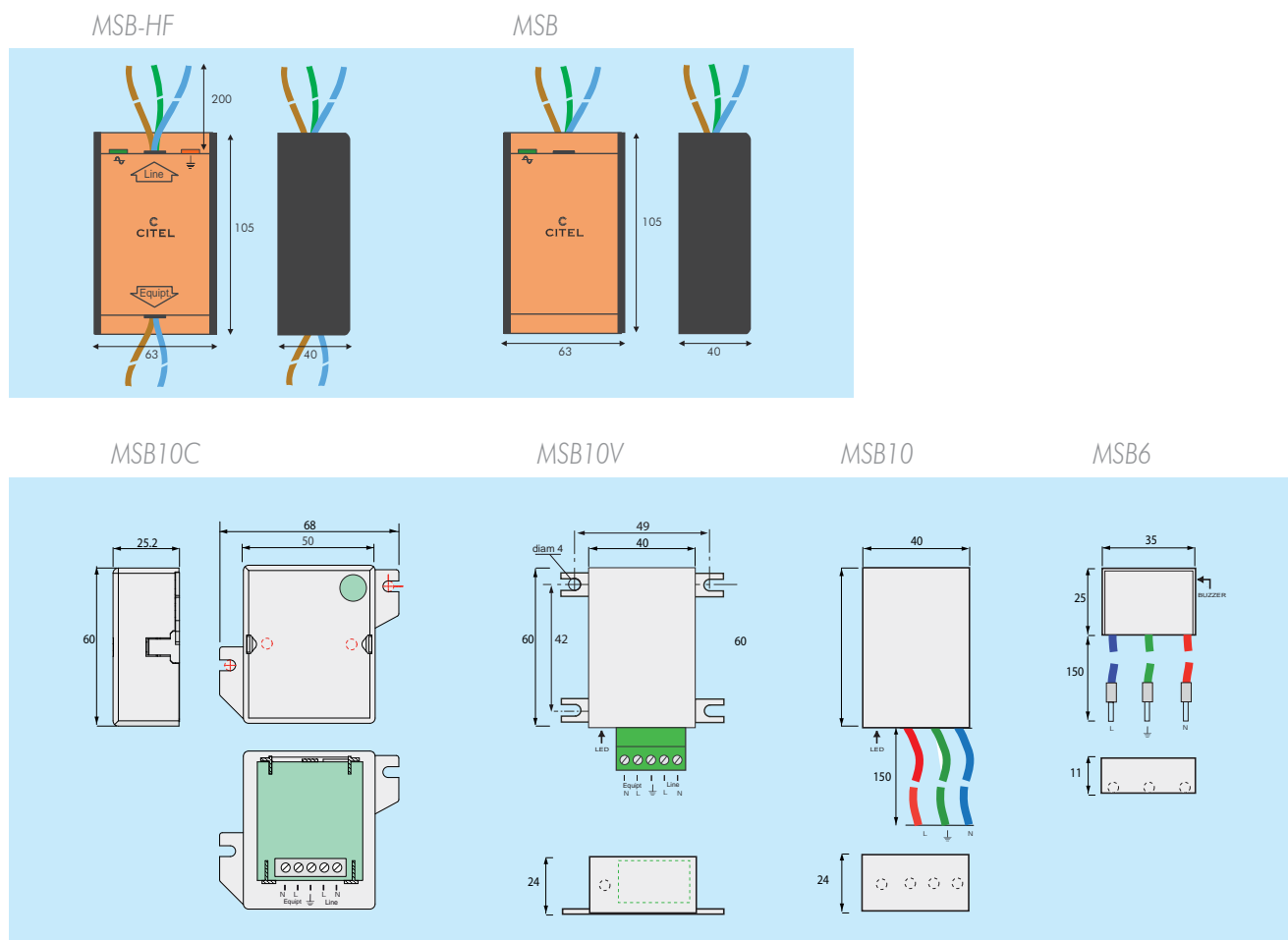
	MSB-HF		MSB		MSB10		MSB10C	MSB10V	MSB6
Référence CITEL	MSB-230HF	MSB-130HF	MSB-230	MSB-130	MSB10-400	MSB10-120	MSB10C-400	MSB10V-400	MSB6-400
AC network	230 Vac	110-130 Vac	230 Vac	110-130 Vac	230 Vac	110-130 Vac	230 Vac	230 Vac	230 Vac
Max. operating voltage - Uc	255 V	150 V	255 V	150 V	255 V	150 V	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 - Imax (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 - In (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									
- Attenuation @ 0,3 MHz	25 dB	25 dB	none	none	none	none	none	none	none
- 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

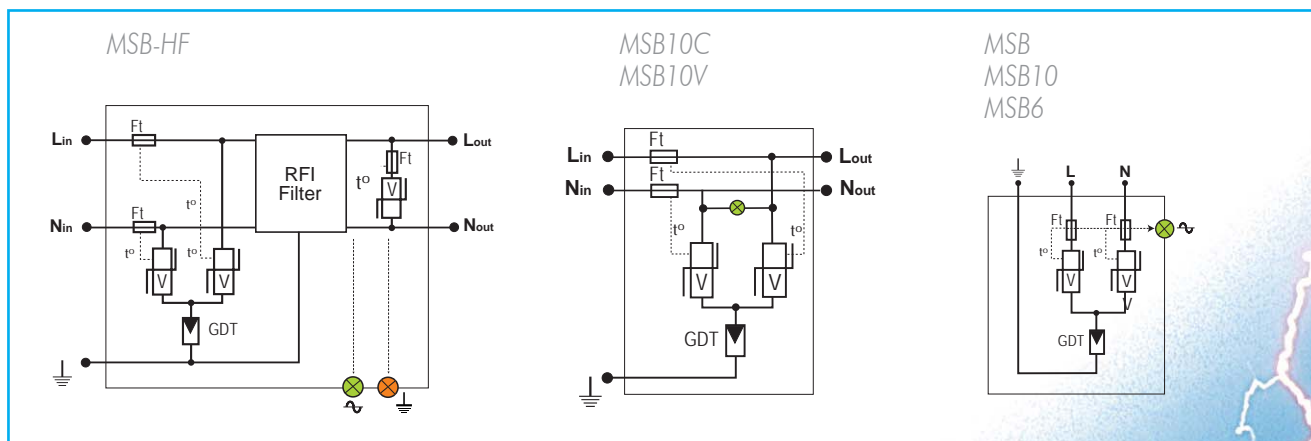
MSB-HF, MSB, MSB10

Dimensions (in mm)



B9

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.

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 :

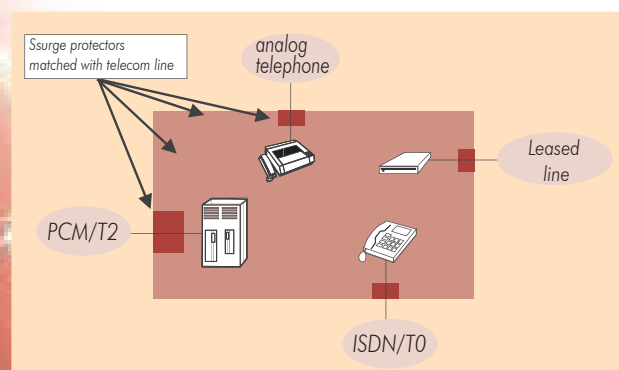
- Mounting on telecom MDF
- Mounting on DIN rail
- Insertion in connection strips
- Wall mounting
- Plug-in on termination outlets

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 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 :



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 CITEL 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

CITEL 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, CITEL 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 CITEL 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

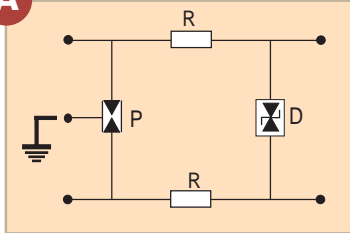
If the installation to be protected is equipped with LPS (lightning rod), the surge protectors for telecom or datalines, connected on external lines must be able to conduct 10/350 µs surge current with a rating of 2.5 kA minimum (D1 category test in IEC 61643-21 standard).



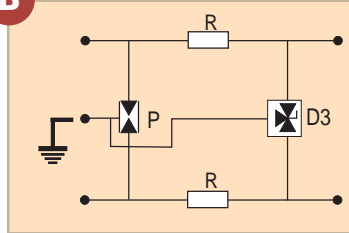
Telephone and data network surge protectors

Typical diagrams

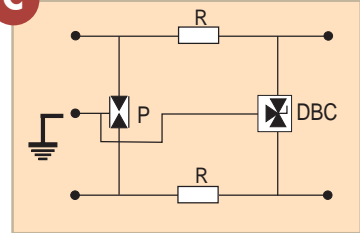
A Standard Protection



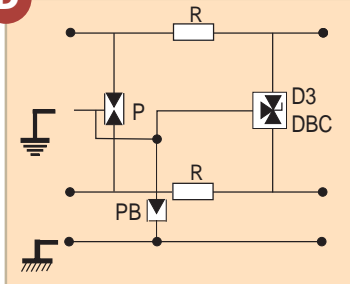
B Reinforced Protection



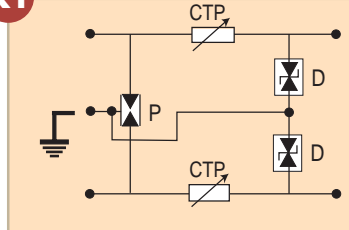
C Low capacitance Protection



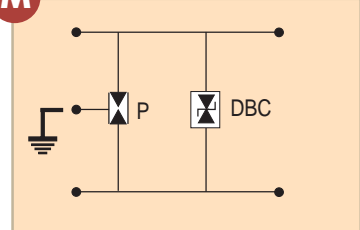
D Protection + Shield



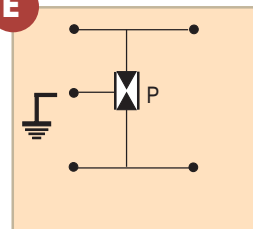
K1 «K20» type Protection



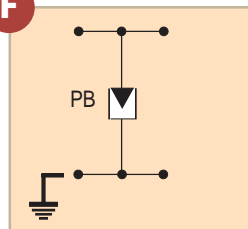
M High bitrate Protection



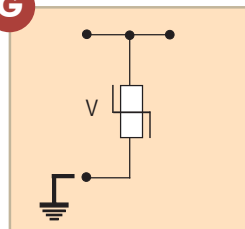
E 3-electrode GDT Protection



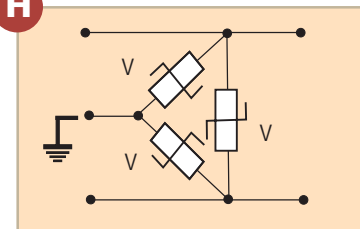
F 2-electrode GDT Protection



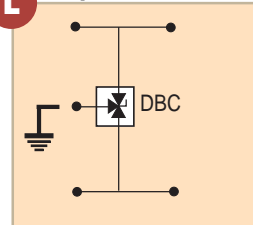
G 2-pole MOV Protection



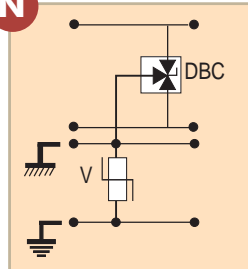
H 3-pole MOV Protection



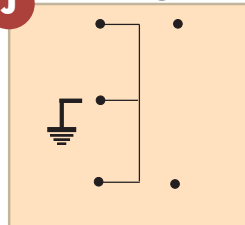
L Low capacitance 3- pole diode



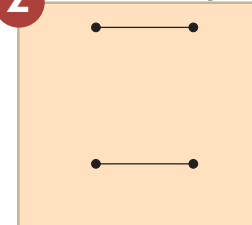
N «CAT6» Protection



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

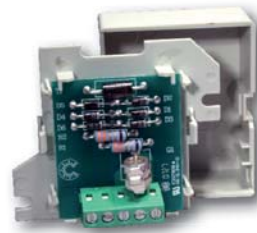


1, 2 and 4-pair Surge Protectors

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.

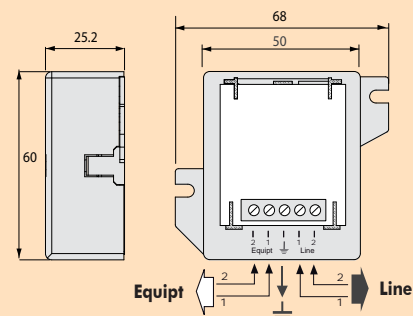
These boxes are available for 1, 2 and 4 pairs : the protection printed circuit is removable for easy and fast maintenance (removable protection circuit S180.., S280.., S480..).

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

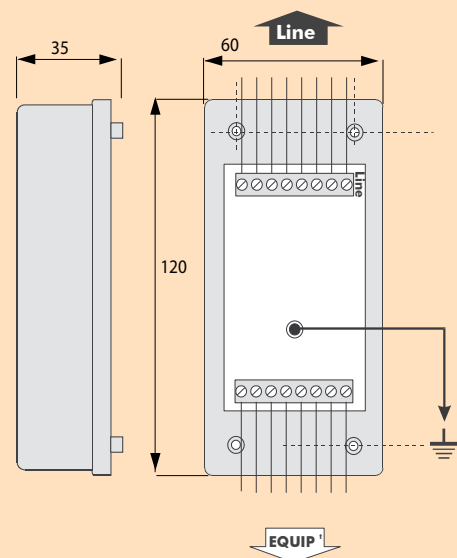
Special versions are also available for the combined protection of data transmission and remote power lines (e.g. B480-24D3/A12 : 3 x 24V transmission pairs + 1 x 12Vdc power supply).
Contact us for more information.

Dimensions (in mm)

B180



B280-B480



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



1, 2 and 4-pair Surge Protectors

B180, B280, B480

Characteristics

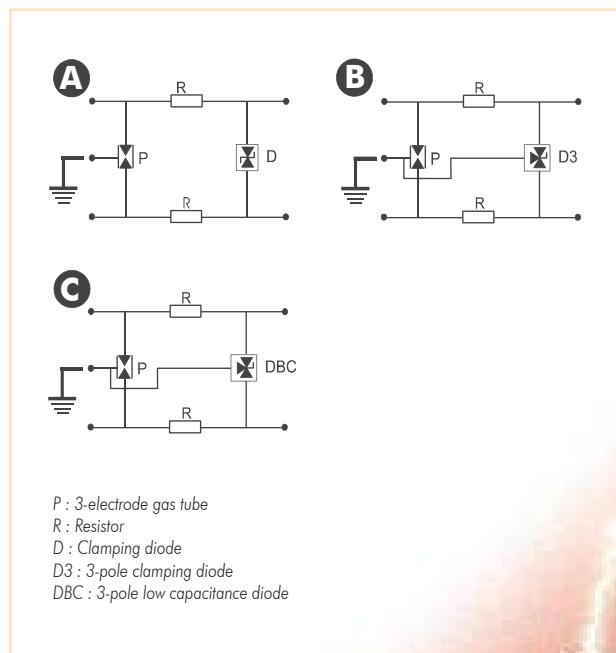
Configuration	CITEL part number					
1-pair unit	B180-T	-	B180-24D3	B180-12D3	B180-06D3	-
2-pair unit	B280-T	B280-48D3	B280-24D3	B280-12D3	B280-06D3	B280-06DBC
4-pairs unit	B480-T	B480-48D3	B480-24D3	B480-12D3	B480-06D3	B480-06DBC
Application	Telephone line ADSL	ISDN-T0 48 V line	Leased line 4-20 mA	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

C7

Mechanical Characteristics

Mounting	wall (screws non included)
Dimensions	see drawings schémas
Wiring	screw terminal - mini/maxi cross section : 0.4/1.5 mm ²
Huosing 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



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.

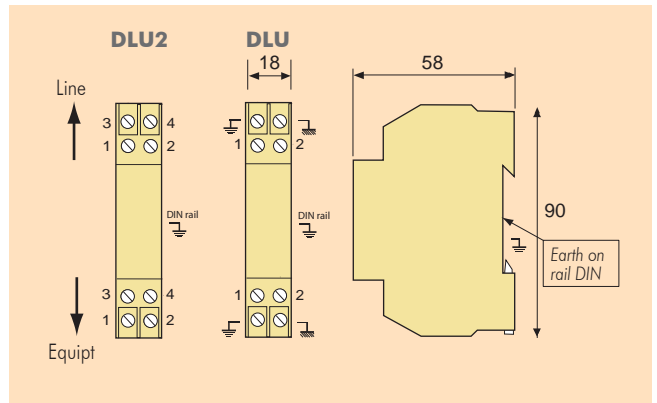
Electrical diagrams of DLU models are built with gas tubes and fast clamping diodes in order to provide high discharge current capability and fast operation.

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.

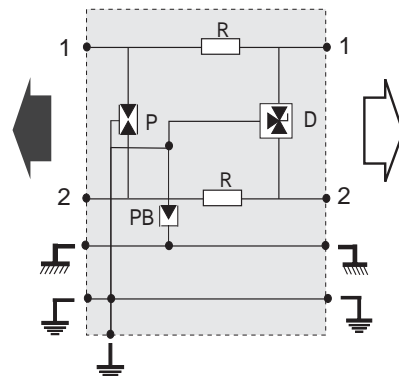
- For «DIN» rail mounting
- All types of Telephone and Data lines
- Monobloc housing
- 2-pair version (DLU2)
- Transmission and protection of shield wire (DLU)
- IEC 61643-21 compliance

Dimensions (in mm)

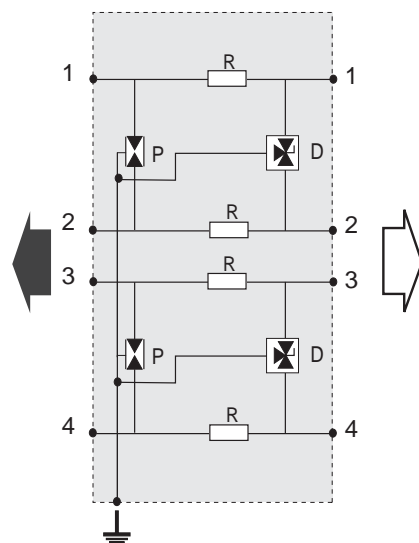


Electrical diagrams

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).							

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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.

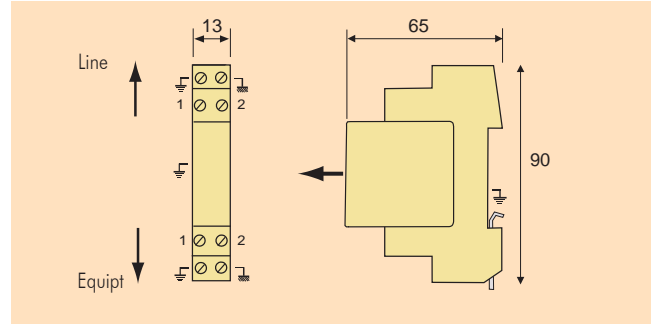
Specific versions :

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.

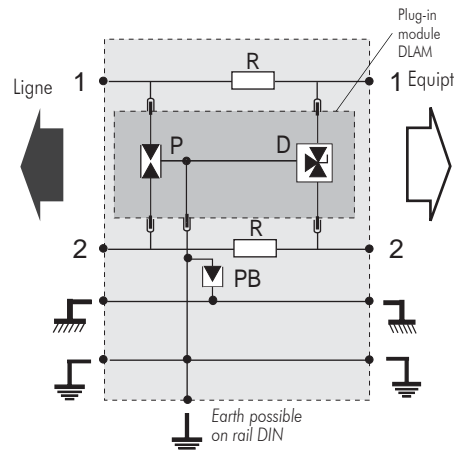
- Pluggable surge protection for «DIN» mounting
- All types of Telephone and Data lines
- Shield wire protection
- Without (DLA) or with (DLAW) line cut-off.
- IEC 61643-21 compliance

Dimensions (in mm)

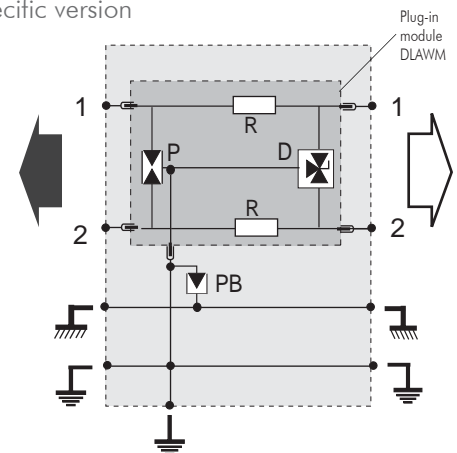


Electrical diagrams

DLA standard version



DLAW specific version



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



DIN rail surge protector for dataline/telecom

DLA

Characteristics

Référence CITEL	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					

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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.

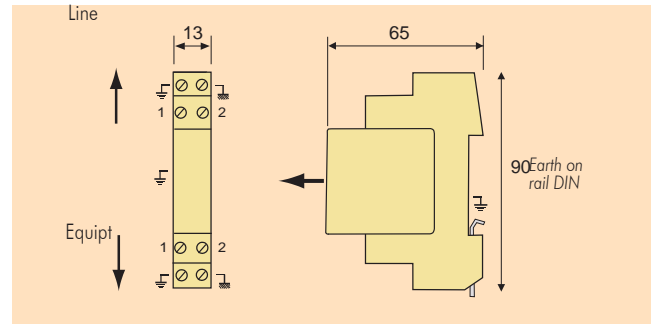
In compliance with ATEX directives, they are classified as EEx ia and can operate in explosive areas by using the principle of energy limitation.

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

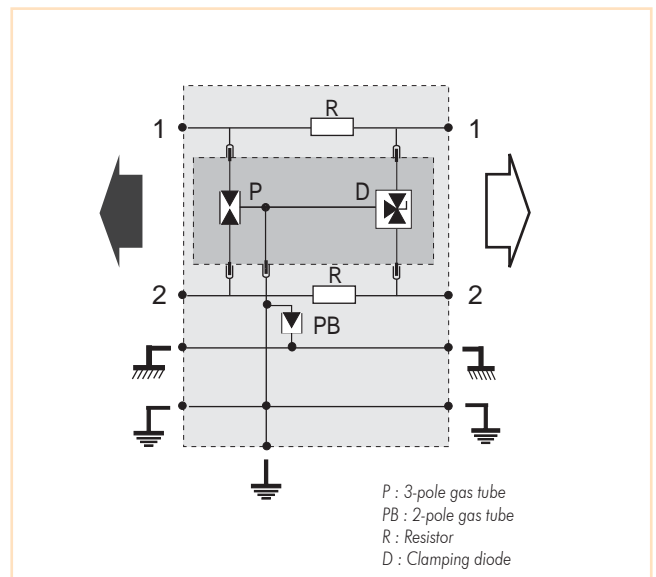
Electrical diagrams are built with gas tubes and fast clamping diodes in order to provide high discharge current capability and fast operation.

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.

Dimensions (in mm)



Electrical diagrams



Characteristics

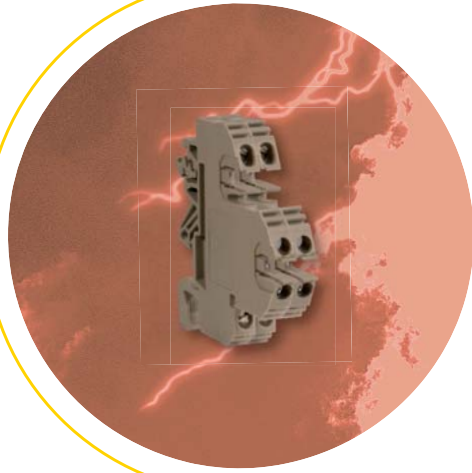
CITEL part number	DLA-EX-48D3	DLA-EX-24D3	DLA-EX-12D3
Typical use	48 V line	4-20 mA	RS232 RS485
Configuration	1 pair+shield	1 pair+shield	1 pair+shield
Nominal line voltage (Un)	48 V	24 V	12 V
Max. line voltage (Uc)	53 V	28 V	15 V
Max. line current	300 mA	300 mA	300 mA
Protection level (Up)	70 V	40 V	30 V
Nominal discharge current (In)	5 kA	5 kA	5 kA
Max. discharge current (Imax)	20 kA	20 kA	20 kA
Impulse current (Iimp)	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		

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



1-wire compact DIN surge protector

DLR

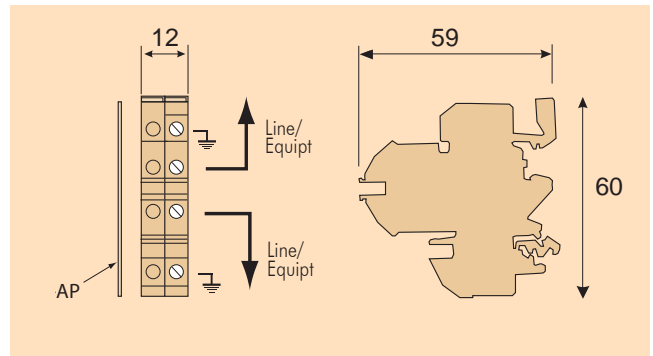


DLR surge protectors are designed to protect, against surge voltages due to lightning, terminals equipment connected to industrial buses, transmission and supply lines.

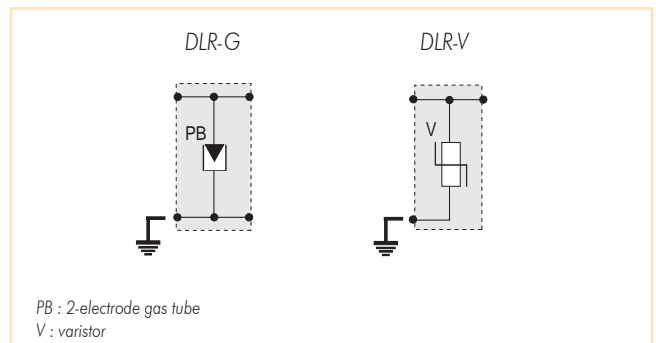
These surge protectors must be installed on symmetrical DIN rail and are designed to protect transmission lines (DLR-G with internal GDT) and power supply lines (DLR-V with internal whit MOV).

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.

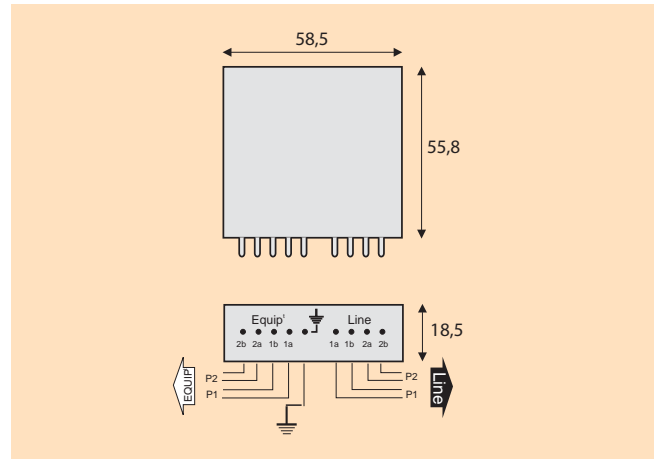
Specific versions for AC or DC powerline surge protection are also available :

- 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).

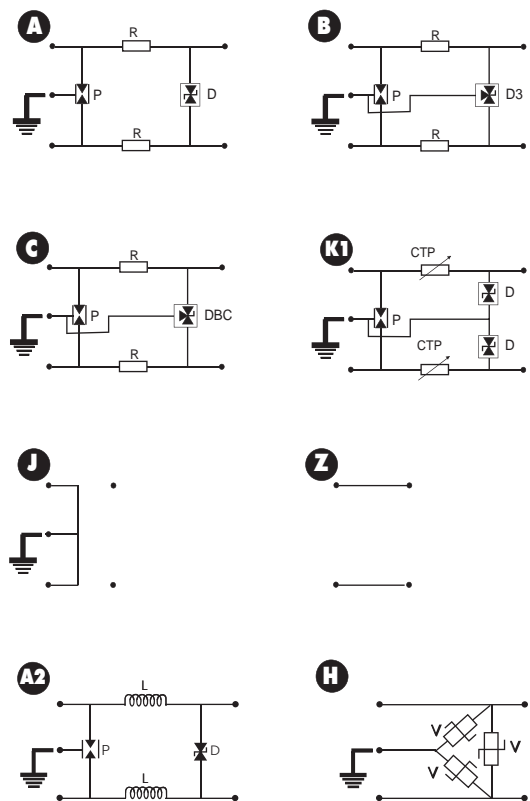
- **2 pairs plug-in module**
- **Optimized modularity and maintenance**
- **Can be adapted to all types of line**
- **Gas tube / diode combination**
- **For power supplies from 6 Vdc to 220 Vac (E280-A..)**

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								

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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	10 A	10 A	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

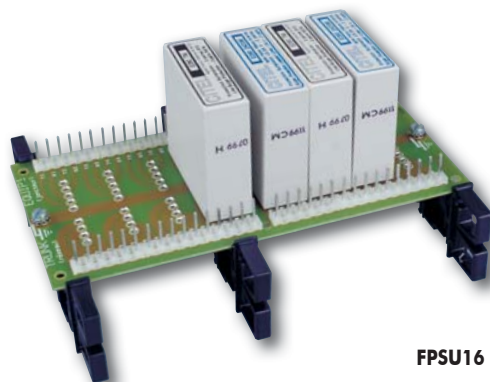


Support for E280 plug-in modules

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
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

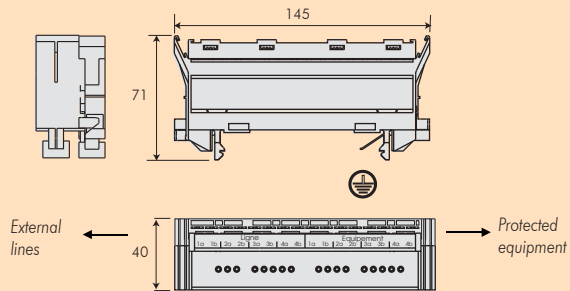


Support for E280 plug-in modules

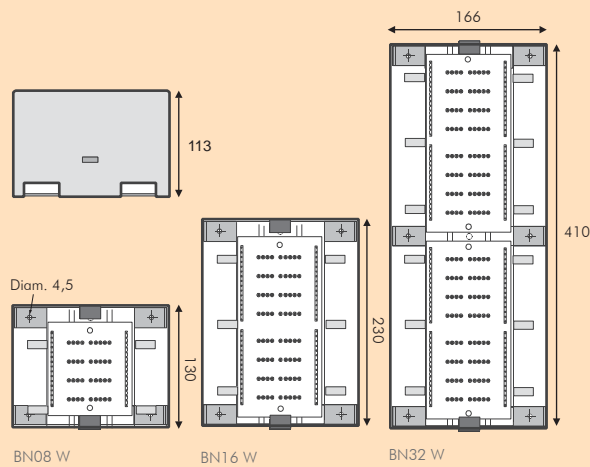
BN , FPSU , MMP

Dimensions (in mm)

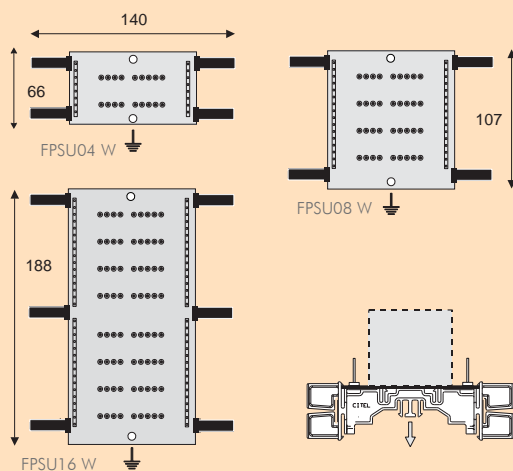
MMP



BN



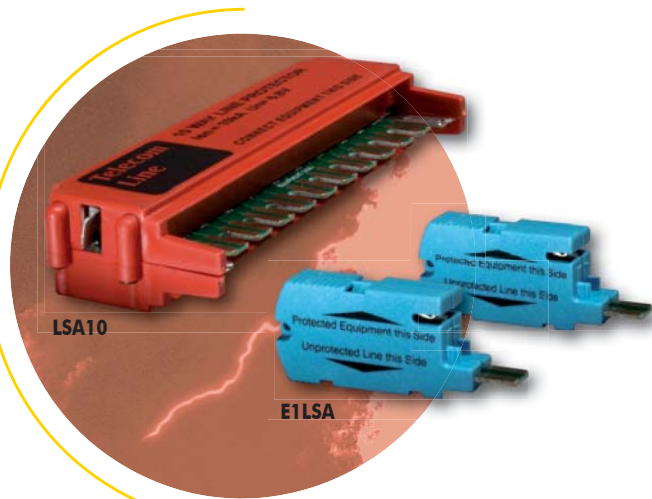
FPSU





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).

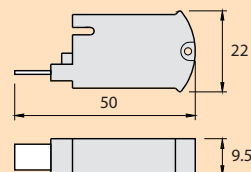
The electrical diagram combines a 3-electrode gas tube with clamping diode to provide a high discharge current capacity and a very fast response time.

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

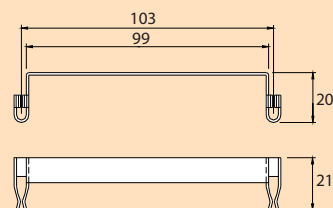
These products are in compliance with analog or high speed digital telecom networks.

Dimensions (in mm)

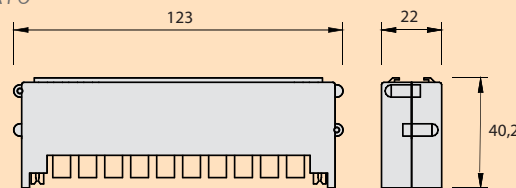
E1LSA



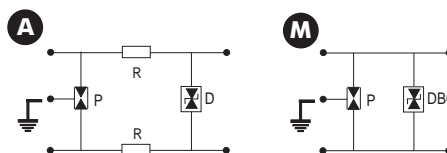
Earthing frame



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**

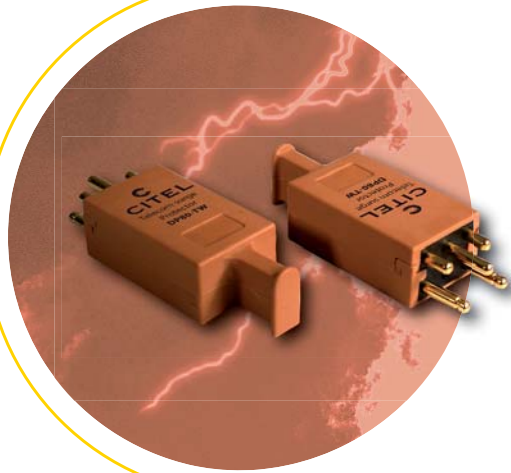
Characteristics

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 (Il)	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 (Imax) 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			



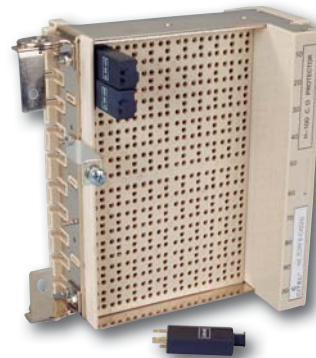
1-pair «5-pin» plug-in Surge Protector

DP80-TW



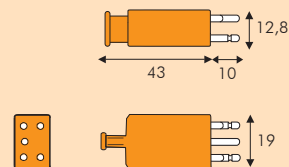
The DP80-TW series is designed to protect large telephone equipment (PBXs, central offices) against lightning surges. This protection is based in hybrid protection diagram (gas tube and diodes) and in K20 configuration (in compliance with ITU-T recommendation K20). The DP80-TW is a one-pair plug-in module 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 .

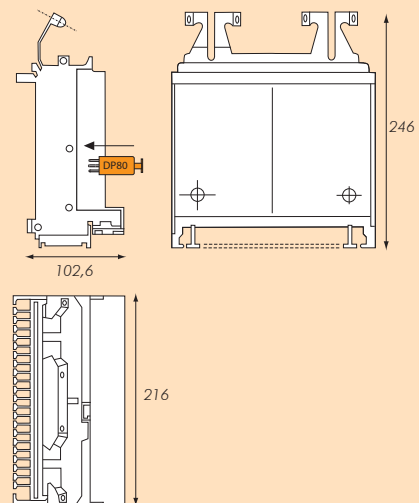


Dimensions (in mm)

DP80-TW



TC99

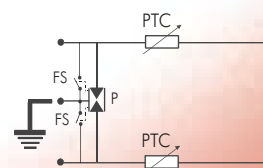


Characteristics

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

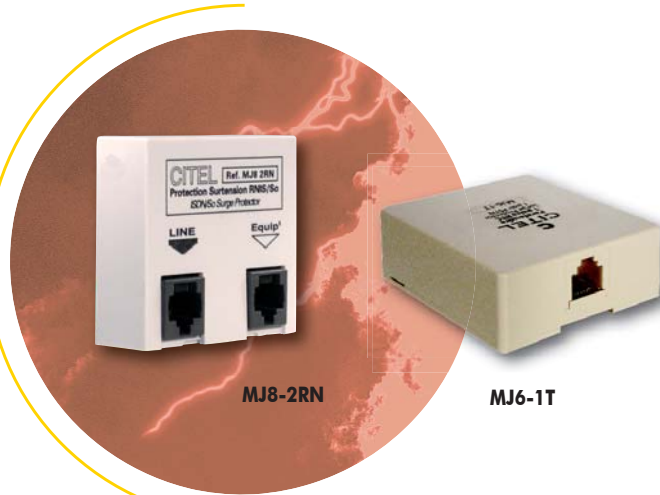


P : 3-electrode gas tube
PTC : Thermistance
FS : External short-circuit



Telecom Surge Protectors

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



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

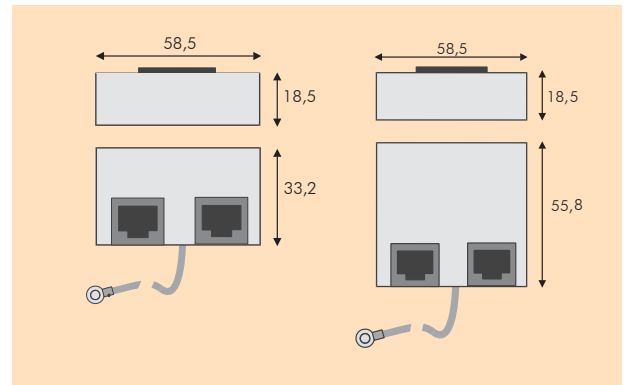
Compatible with RJ11 or RJ9 connector, it protects one PSTN or ADSL line. Connection to line by screw terminal and connection toward protected equipment on RJ11 or RJ9 connectors. Wall mounting.

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

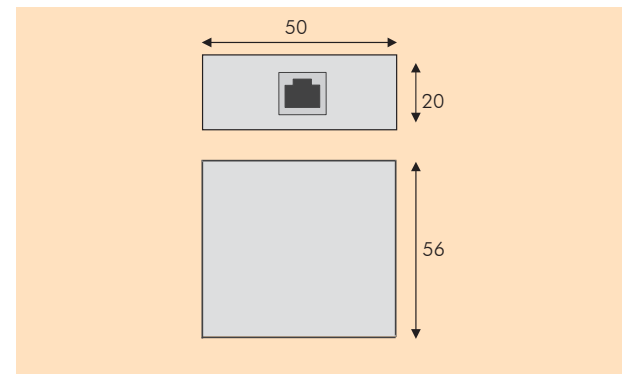
Dimensions (in mm)

B180T/MJ6

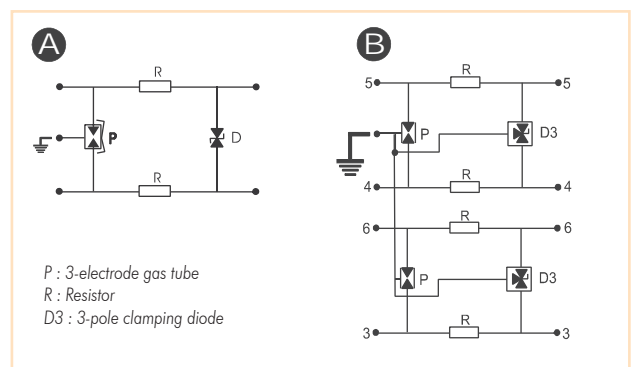
MJ8-2RN



MJ6-1T/MJ4-1T



Electrical diagrams



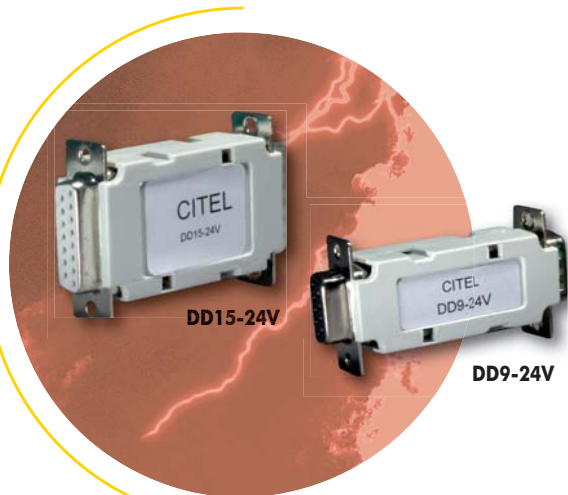
Characteristics

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



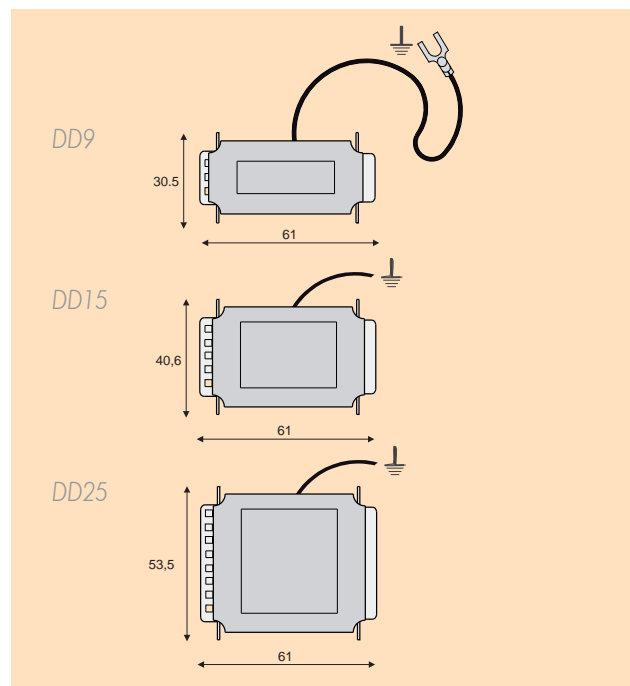
These surge protectors are designed to protect sensitive equipment linked to datalines equipped with D-Sub connectors, as RS232, RS422 and RS485 lines.

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

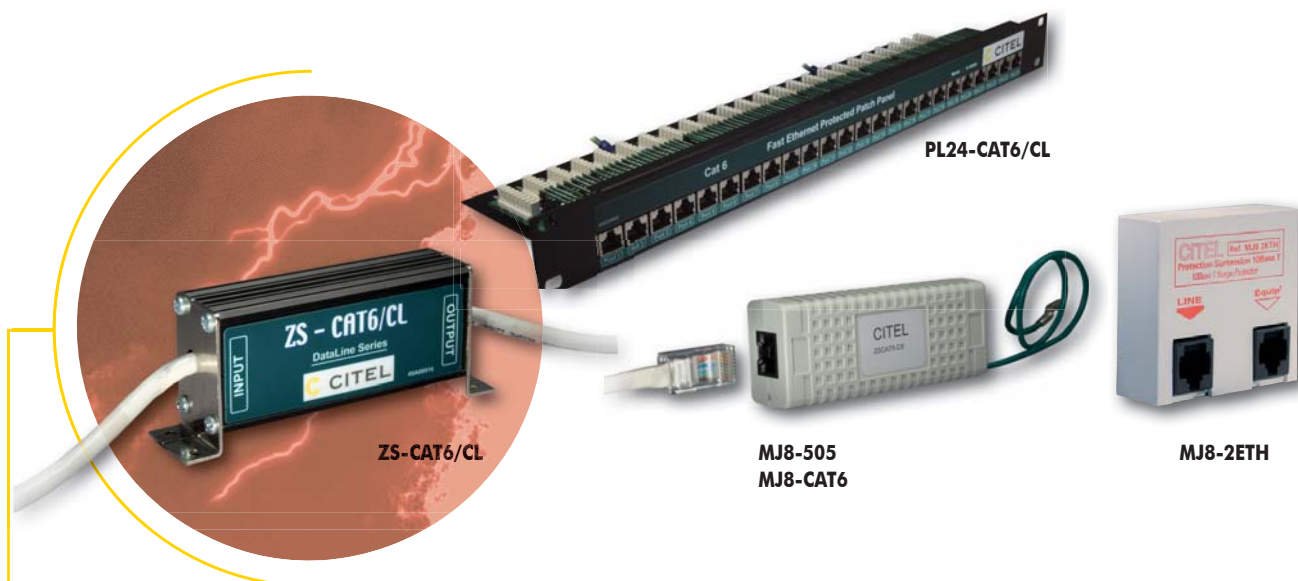
CITEL part number	DDx-6V	DDx-24V
Type of line	RS422/RS485	RS232
Connectique Sub-D 25 pts	DD25-6V	DD25-24V
Connectique Sub-D 15 pts	DD15-6V	DD15-24V
Connectique Sub-D 9 pts	DD9-6V	DD9-24V
Max. line voltage (Uc)	6 V	15 V
Capacitance	< 30 pF	< 30 pF
Maximum data rate	< 40 Mbps	< 40 Mbps
Clamping voltage (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

C21



10BaseT/100BaseT/1000BaseT surge protectors

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



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 PL24-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.

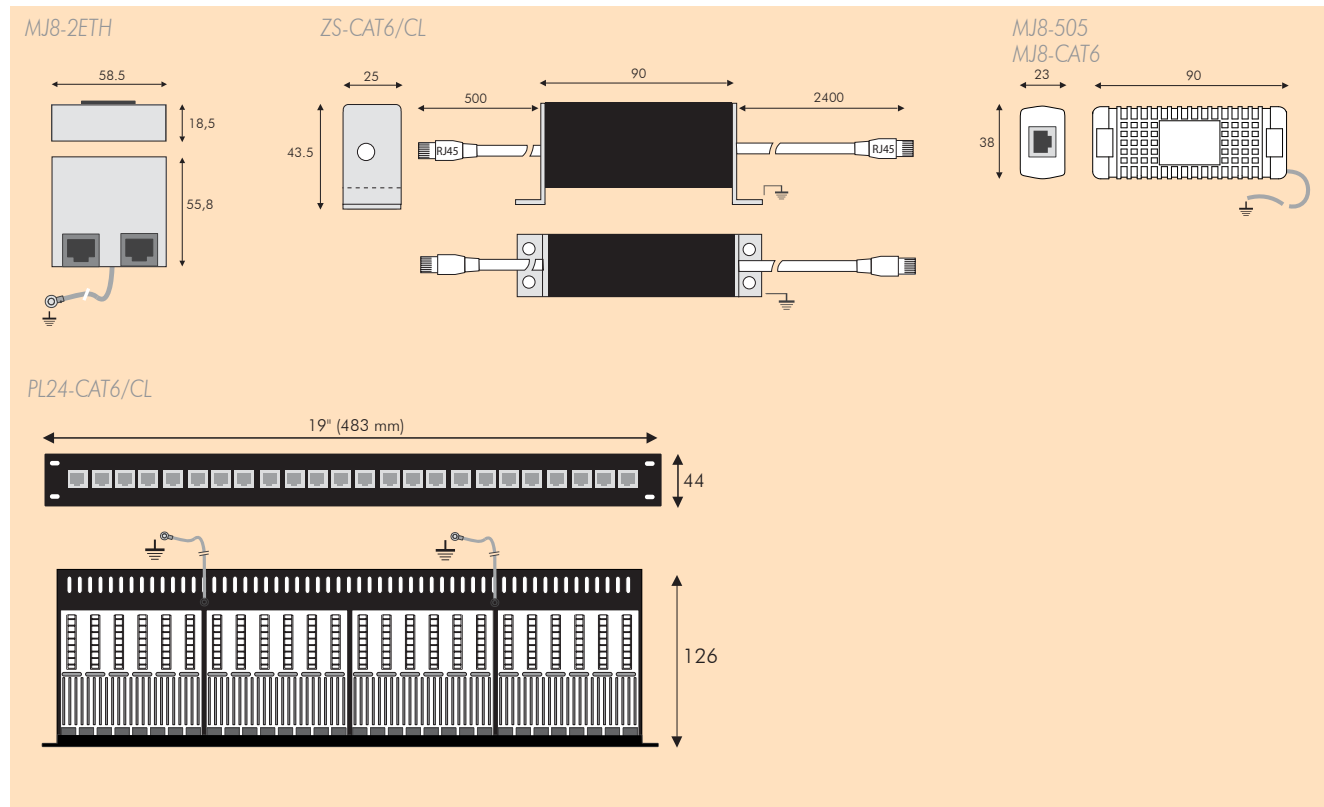
***) Outdoor versions on request



10BaseT/100BaseT/1000BaseT surge protectors

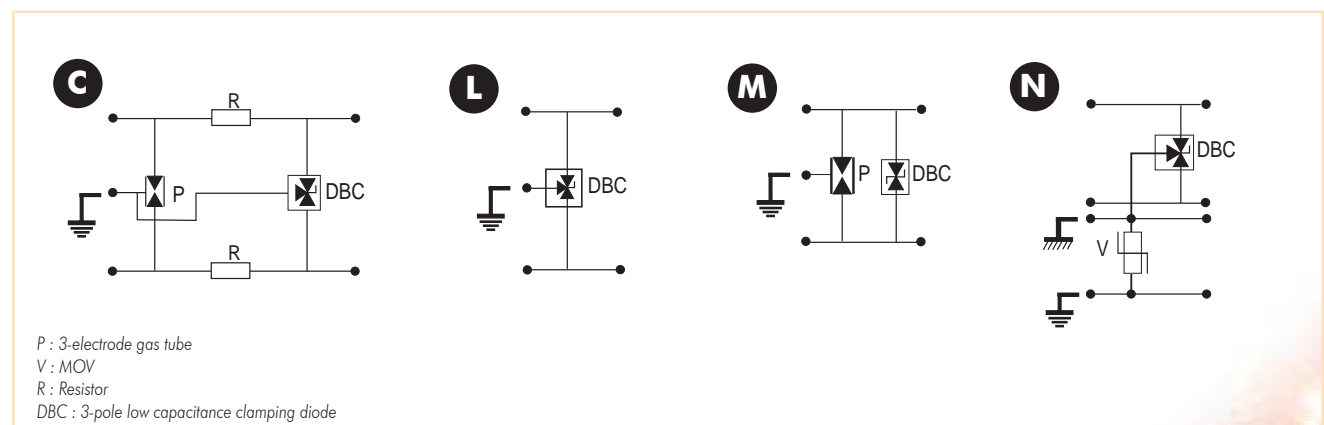
MJ8-2ETH, MJ8-CAT6, ZS-CAT6/CL, PL-CAT6/CL, MJ8-505

Dimensions (in mm)



C23

Electrical diagrams (for 1 pair)

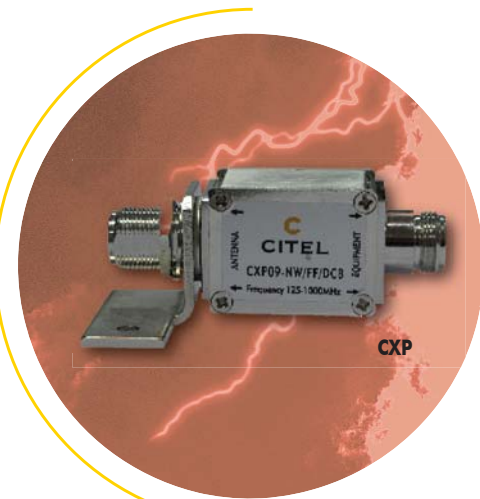


- for 10BaseT/100BaseT/1000BaseT network
- Unshielded and shielded version
- Category 5 and 6 versions
- «PoE» version (indoor and outdoor)
- Multiline version for Rack 19"



Coaxial network and CATV Surge Protectors

CXC ,CXP , CNP



CXP



CXC



CNP

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

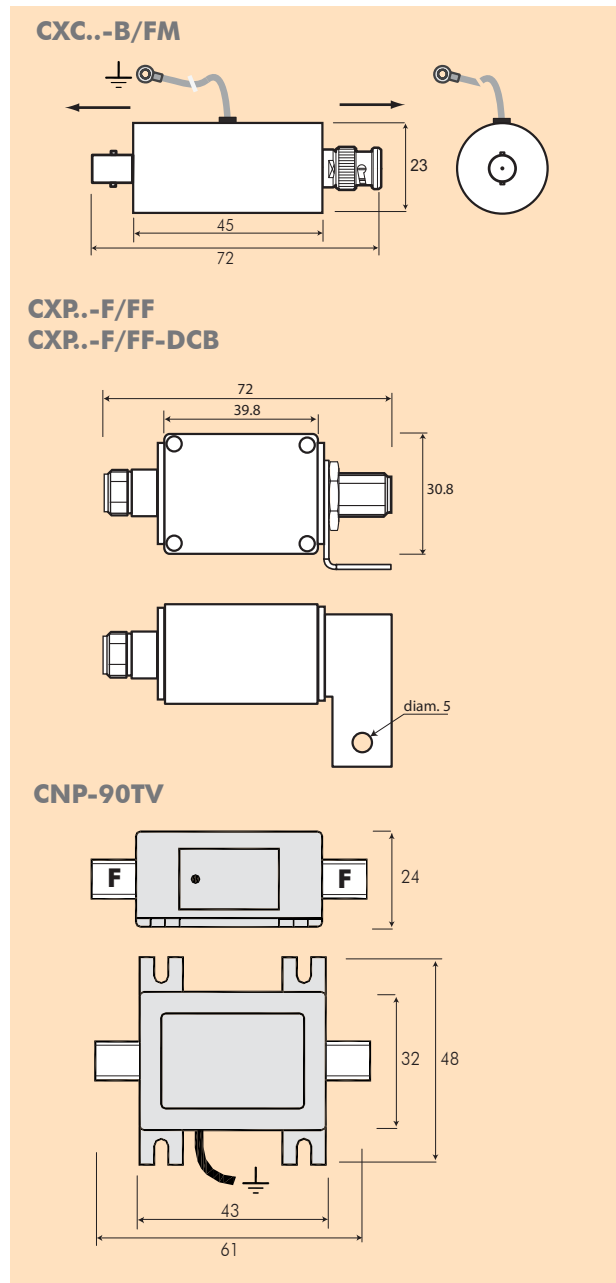
**) L-B : Line-Shield / B-PE : Shield-Ground



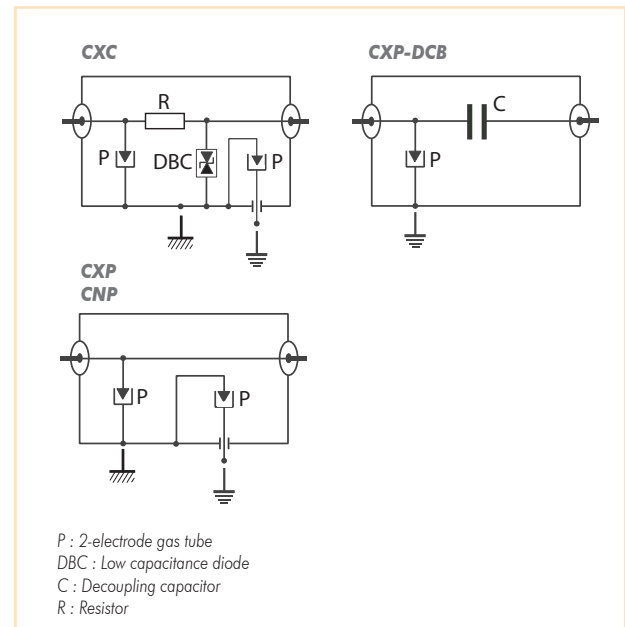
Coaxial network and CATV Surge Protectors

CXC , CXP , CXP-DCB , CXD

Dimensions (in mm)



Electrical diagram



C25

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

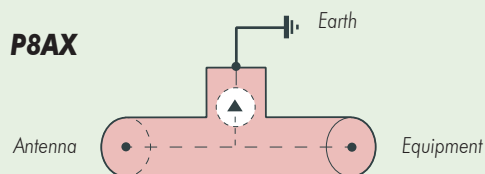
The other way to protect antenna lines is relevant replacement of the gas tube by a proper short-circuit chosen according to the operating frequency band. This short-circuit is tuned to one quarter of the wavelength, giving its name to «quarter-wave protection». This tuned short-circuit between the conducting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

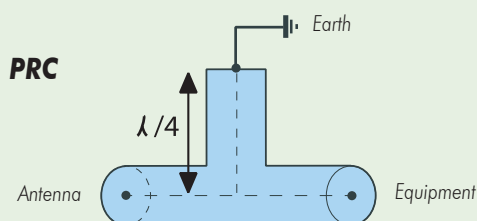
Since lightning has a low-frequency spectrum (from a few hundred kHz to a few MHz), it will be filtered out from the operating frequencies.

RF Surge Protectors diagrams

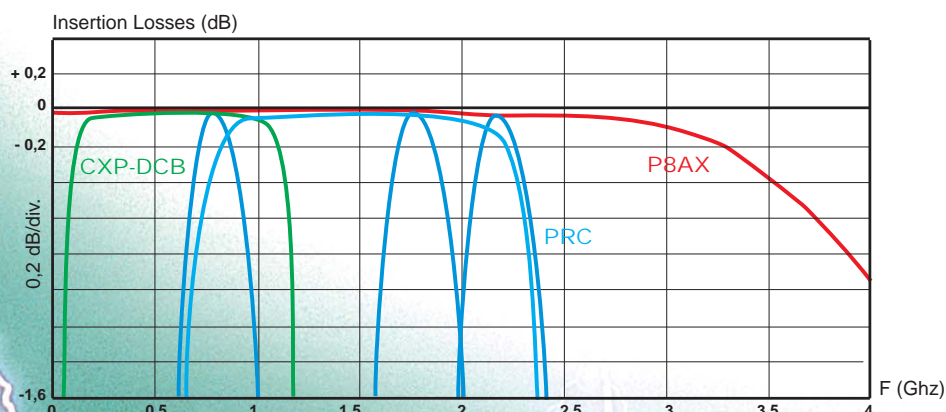
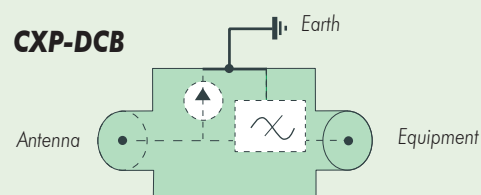
P8AX



PRC





CXP-DCB





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
8/20 μ s 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

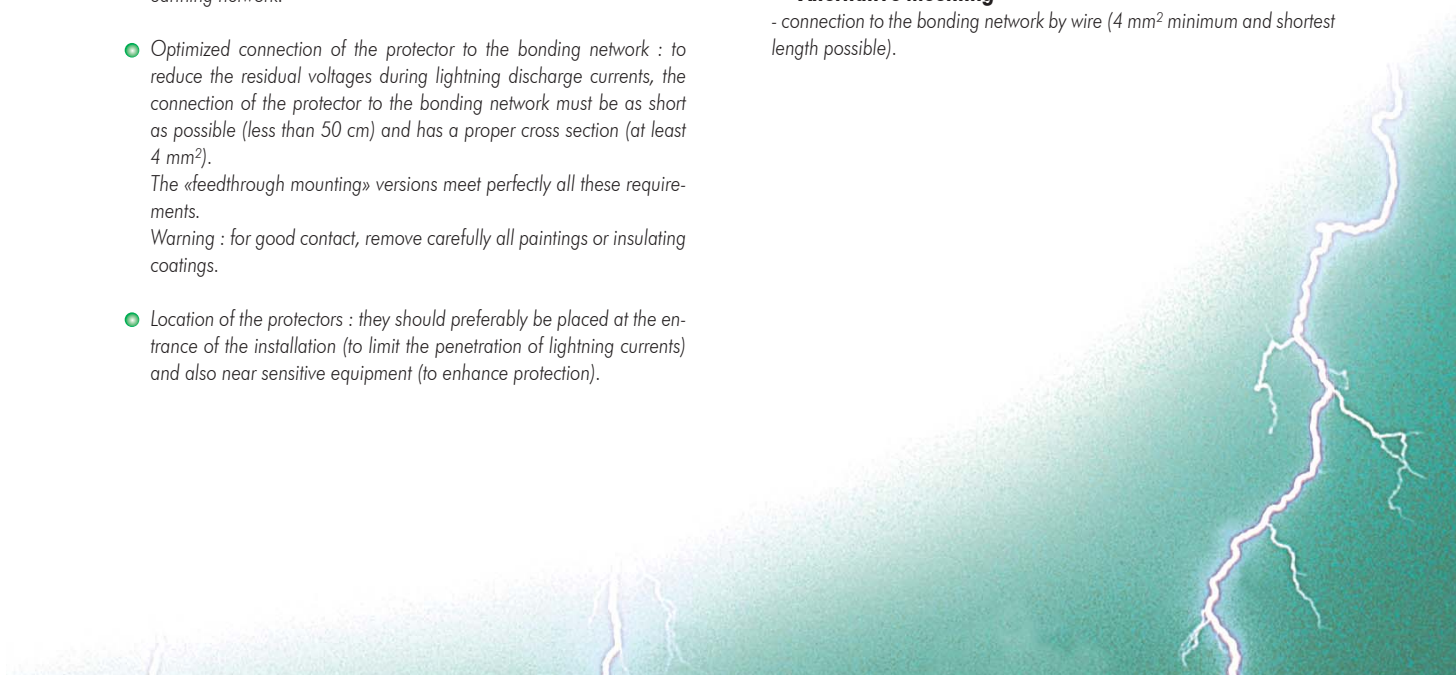
Direct mounting of the surge protector on the grounded frame at the installation entrance :

- 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».

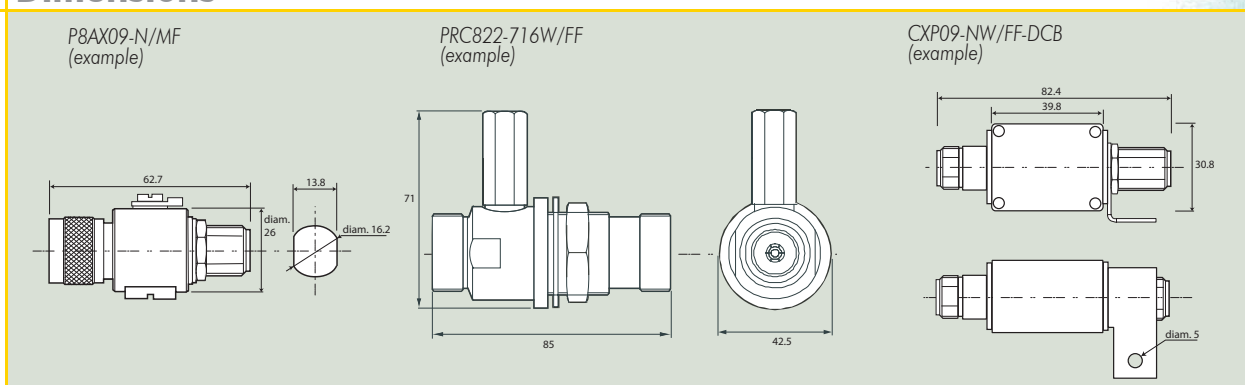
Part numbers*

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*



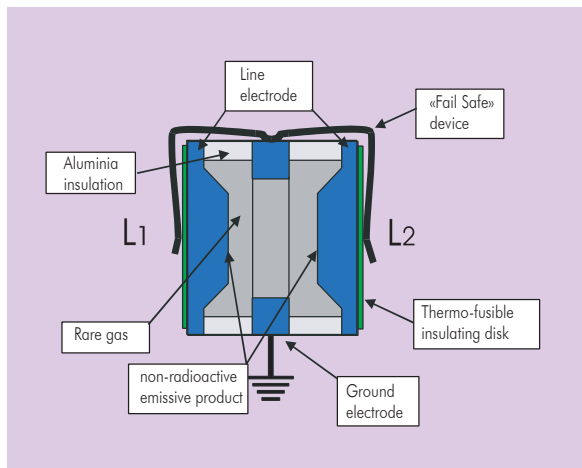
* For complete information on mechanical dimensions, refer to the dedicated catalog : «Surge Protective Protection for coaxial lines».

GAS DISCHARGE TUBES



Gas Discharge Tubes

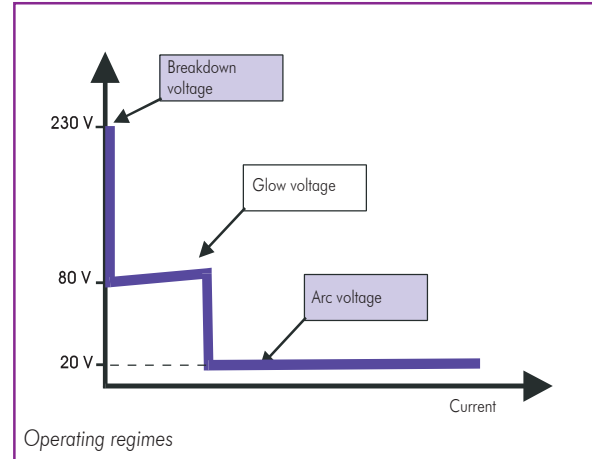
These components are made of two or three electrodes in an enclosure filled with a (non-radioactive) rare gas at a controlled pressure. The enclosure is a ceramic tube with its ends closed off by metal caps that also serve as electrodes. Their main use is to protect telecommunications lines, but other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

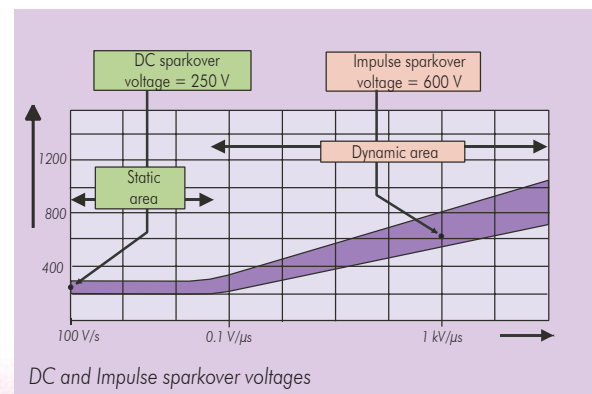
This is the main characteristic defining the gas discharge tube.

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 $\pm 20\%$.





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.

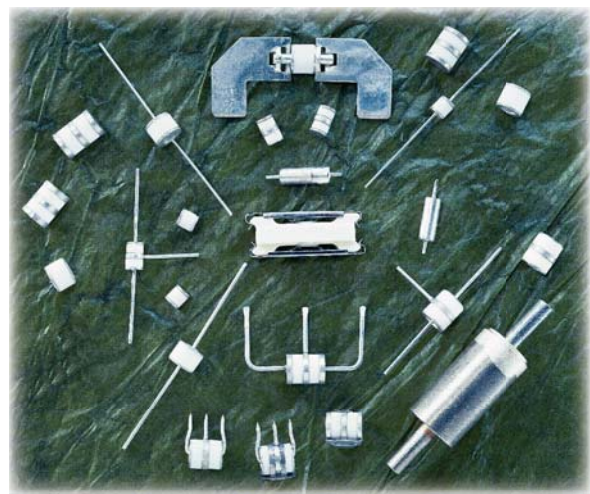
Standards

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 :

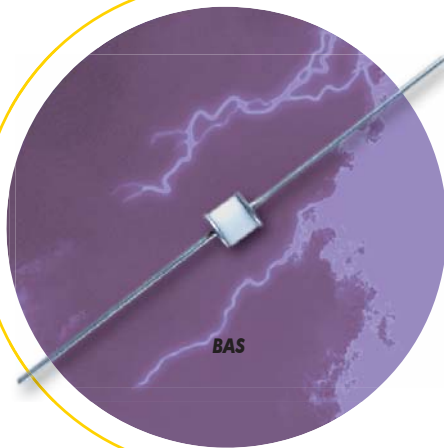
- 2- and 3-electrode gas discharge tubes
- Sparkover voltages from 75 to 3500 V
- Discharge capacities from 2.5 to 150 kA
- Optional external short-circuit device
- Installation on support, on printed circuit, or surface-mounted devices.





2-electrode Miniature Gas discharge tube

BA-BAS

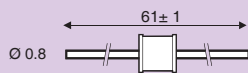


Dimensions (in mm)

BA

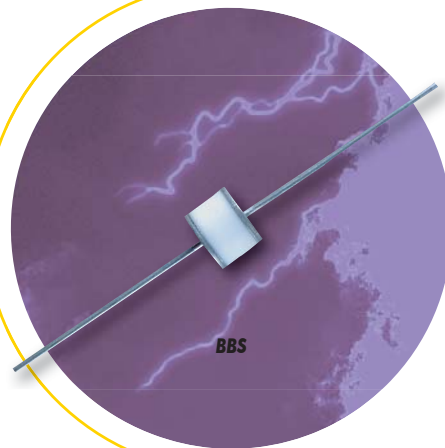


BAS



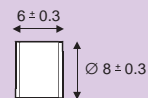
2-electrode Gas discharge Tube

BB-BBS

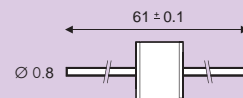


Dimensions (in mm)

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	> 80 V	> 80 V	> 80 V	> 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

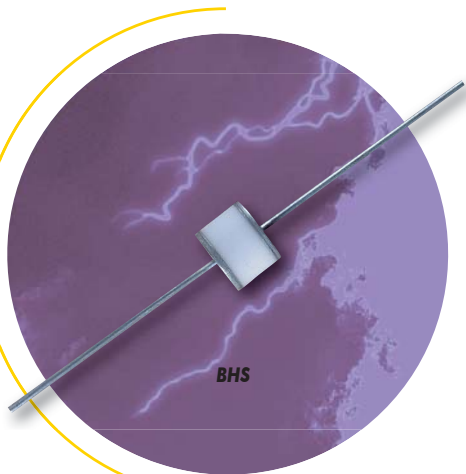
CITEL part number	BB75*	BB90	BB150	BB230	BB350	BB500
DC sparkover voltage (100V/s)	75 V	90 V	150 V	230 V	350 V	500 V
Tolerance	+/-20%	+/-20%	+/-20%	+/-20%	+/-20%	+/-20%
Impulse sparkover voltage (1kV/μs)	<700V	<700V	<700V	<750V	<850V	<2000V
Holdover voltage (R = 330 Ω in serie RC = 150 Ω/100nF in //)	> 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					

E4



2-electrode Gas discharge tube

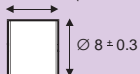
BH-BHS (High voltage series)



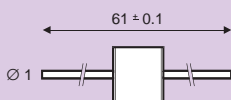
Dimensions (in mm)

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	> 80 V	> 80 V	> 80 V	> 80 V	> 80 V	> 80 V	> 80 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



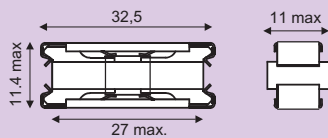
2-electrode Gas discharge tube

CA8B

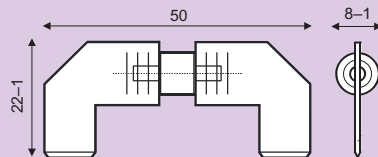


Dimensions (in mm)

CA8BB



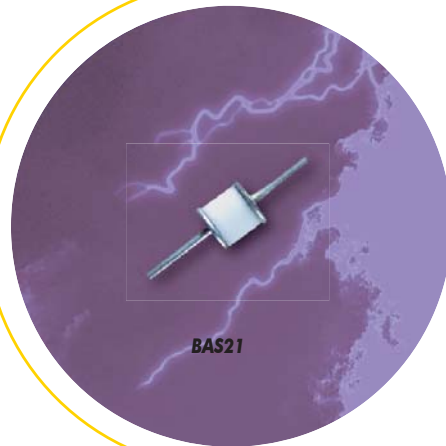
CA8BC



2-electrode glass-metal Gas discharge tube

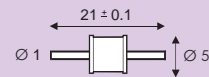
BAS21

(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			

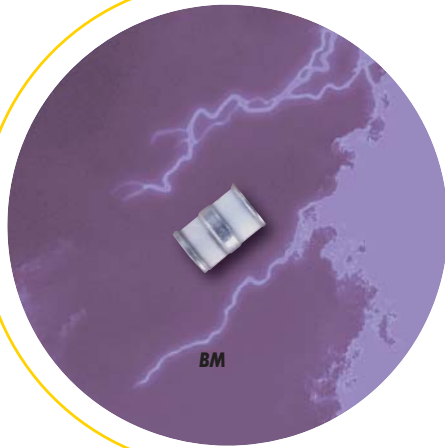
Characteristics

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)		

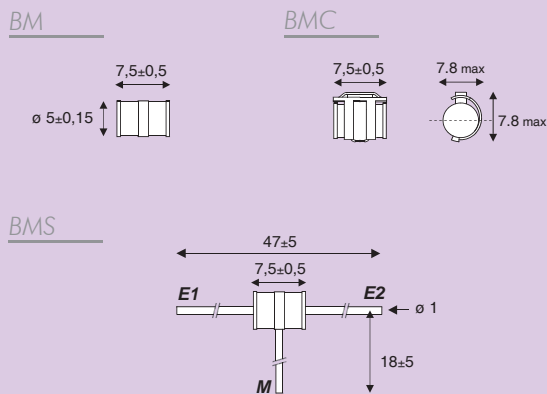


3-electrode Miniature Gas discharge tube

BM

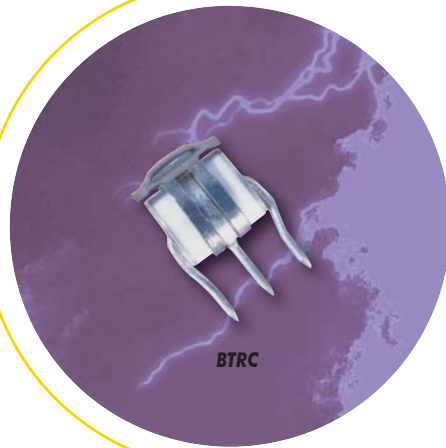


Dimensions (in mm)

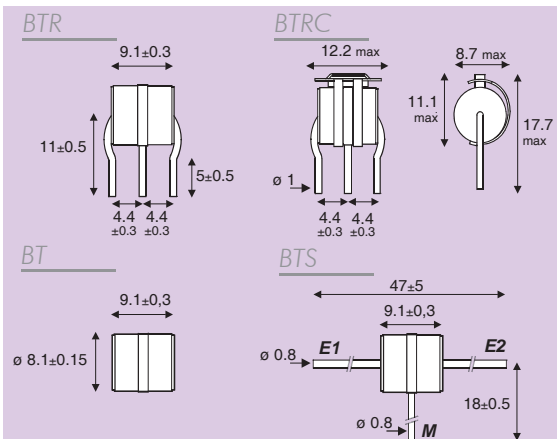


3-electrode Gas discharge tube

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/ μ s) E/M	< 700 V	< 700 V	< 800 V	< 1100 V	< 1200 V
Insulation resistance (at 100 Vdc or 50 Vdc for*)	> 10 G Ω	> 10 G Ω	> 10 G Ω	> 10 G Ω	> 10 G Ω
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 (8/20 μ s, 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

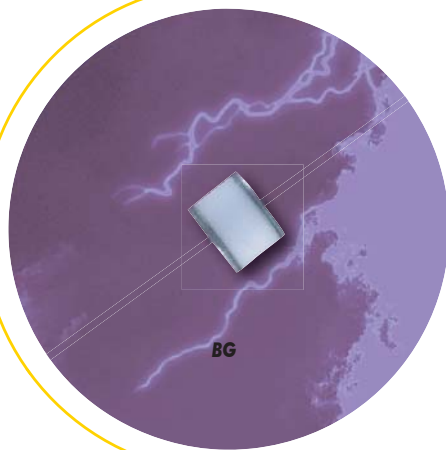
CITEL part number	BT90*	BT150	BT230	BT350	BT500
DC sparkover voltage (100V/s) E/M	90 V	150 V	230 V	350 V	500 V
Tolerance	+/-20%	+/-20%	+/-20%	+/-20%	+/-20%
Impulse sparkover voltage (100 V/s) E1/E2	> 70 V	> 120 V	> 184 V	> 280 V	> 400 V
Impulse sparkover voltage (1kV/ μ s) E/M	< 700 V	< 700 V	< 800 V	< 900 V	< 1200 V
Insulation resistance (E/M, E1/E2 (at 100V or 50V for*))	> 10 G Ω	> 10 G Ω	> 10 G Ω	> 10 G Ω	> 10 G Ω
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 (8/20 μ s, 10 times)	10 kA	10 kA	10 kA	10 kA	10 kA
Options	External Fail-Safe : BTRC Axial lead termination : BTS (ϕ 1 or ϕ 0.8 mm wire) Radial lead termination : BTR (ϕ 1 or ϕ 0.8 mm wire)				

E7



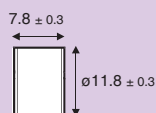
N/PE 2-electrode Gas discharge tube

BG



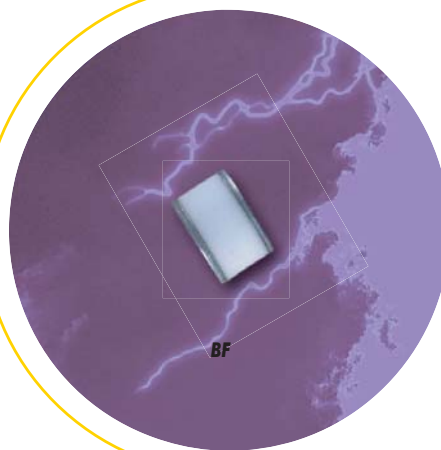
Dimensions (in mm)

BG



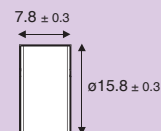
N/PE 2-electrode Gas discharge tube

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

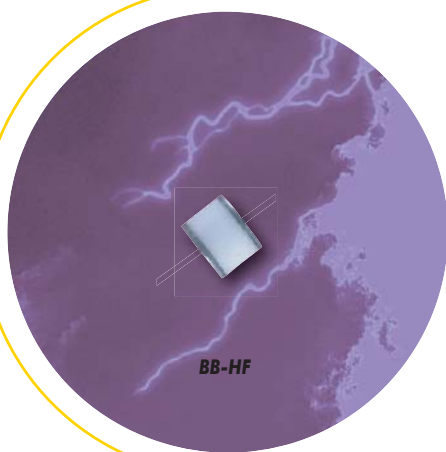
Characteristics

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



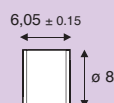
2-electrode Gas discharge tube

BB-HF

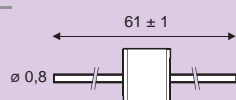


Dimensions (in mm)

BB-HF



BBS-HF



Characteristics

CITEL part number	BBS-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				

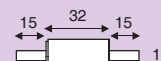
Heavy Duty Gas discharge tube

P100

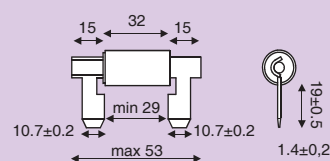


Dimensions (in mm)

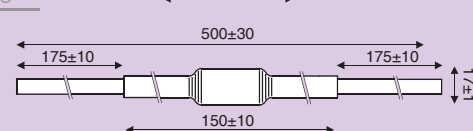
P100N



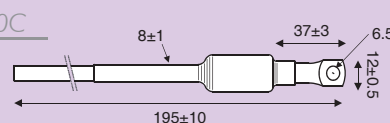
P100



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 (1kV/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	

E9

MISCELLANEOUS
ACCESSORIES
OBSTRUCTION LIGHTS

MISCELLANEOUS
ACCESSORIES
OBSTRUCTION LIGHTS



Outdoor Surge Protector for AC/Traction network

VP range



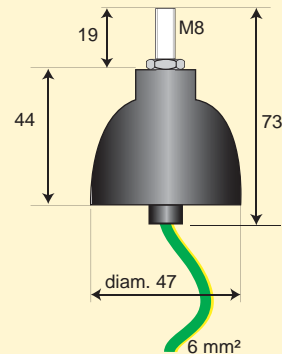
The VP is a surge protector designed to protect AC or DC power lines against lightning transient voltages.

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.

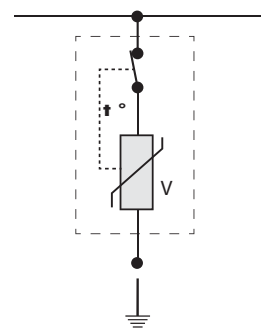
The internal electrical diagram is based on high energy varistor (MOV). To take care of permanent overvoltage or component ageing, the surge protector device (SPD) is equipped with a thermal disconnecter mechanism: in case of overheating, the protective component disconnects itself from the line and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

Dimensions (in mm)



Electrical diagram



V : High energy varistor
t° : Thermal disconnecter

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 - Uc	150 Vac 200 Vdc	275 Vac 350 Vdc	320 Vac 420 Vdc	440 Vac 580 Vdc	550 Vac 745 Vdc
Nominal discharge current - In 15 x 8/20 μ s	15 kA	15 kA	15 kA	15 kA	15 kA
Maximum discharge current - Imax 1 x 8/20 μ s	25 kA	25 kA	25 kA	25 kA	25 kA
Protection level - Up @ 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 In/Imax : 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 limp 60 kA (@ 10/350 μ s).

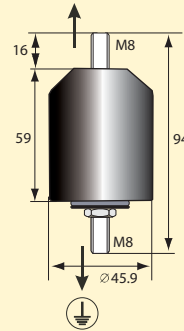
SGP

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

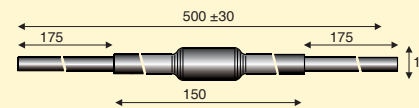
- Isolating Spark gaps
- Outdoor or indoor application
- Discharge currents up to 150 kA

Dimensions (in mm)

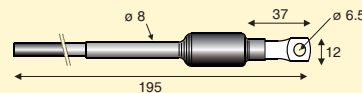
SGP



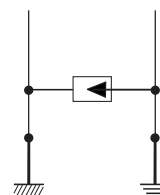
P100S



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

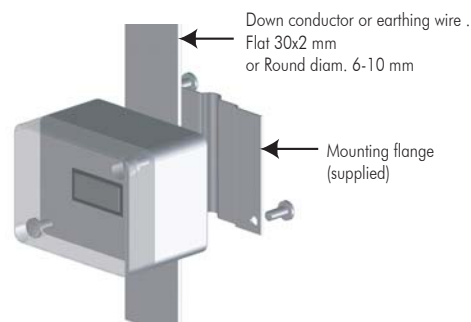
This device counts each impulse current greater than 0.3 kA. It is designed for outdoor or indoor application and is mounted directly on the down conductor with the supplied flange. A reset of the counter could be performed by returning the unit in factory.

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 a 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

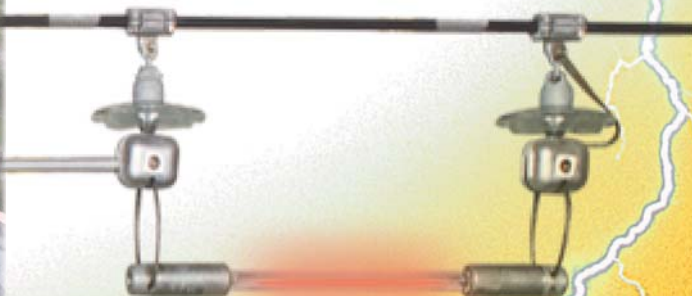
	NAVILITE 48 VDC	NAVILITE 24 VDC	NAVILITE 12 VDC	NAVILITE 240 VAC
Part	13900	13901	13902	13910 + 13900
Input voltage	48 VDC	24 VDC	12 VDC	240 V AC
Luminous intensity	> 10 candelas	> 10 candelas	> 10 candelas	> 10 candelas
Current drawn	125 mA	250 mA	500 mA	70 mA
Power consumption	6 W	6 W	6 W	6 W
Lifetime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

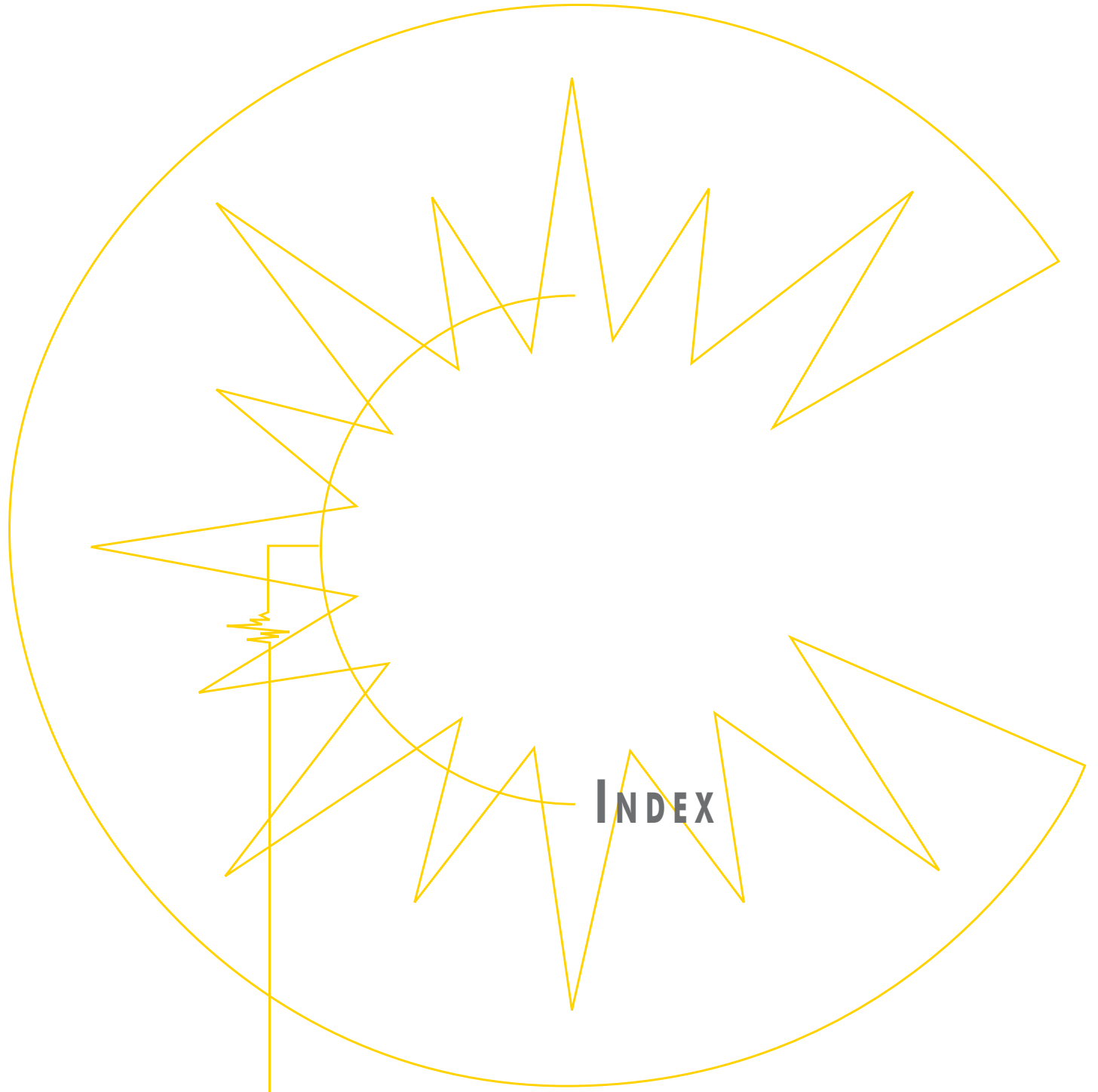
(*) : estimated lifetime (MTBF) given by LED manufacturer under certain conditions.

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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PRC...N/FF	D4-D5
PRC...N/MF	D4-D5
PRC...T/FF	D4-D5
PRC...T/MF	D4-D5

S

SGP	G3
SP120	A51
SP165	A51
SP200	A51
SP330	A51
SP400	A51

SPT1003	G5
STI 24V	G6
STI 48V	G6
STIF	G6

T

T1000KE	G5
TC99	C19

V

VP25/150	G2
VP25/275	G2
VP25/320	G2
VP25/440	G2
VP25/550	G2

Z

ZS-CAT6/CL	C22-C23
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