

Protection against lightning and overvoltages

Surge Arrester range



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General points

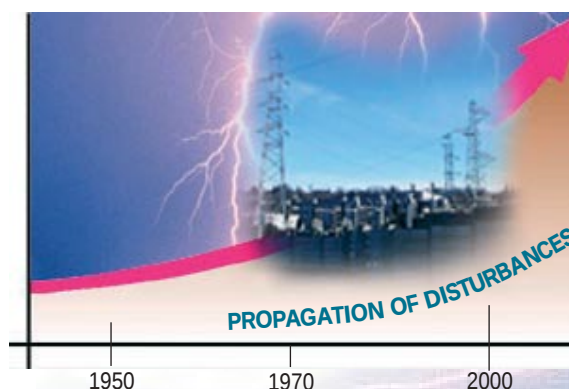
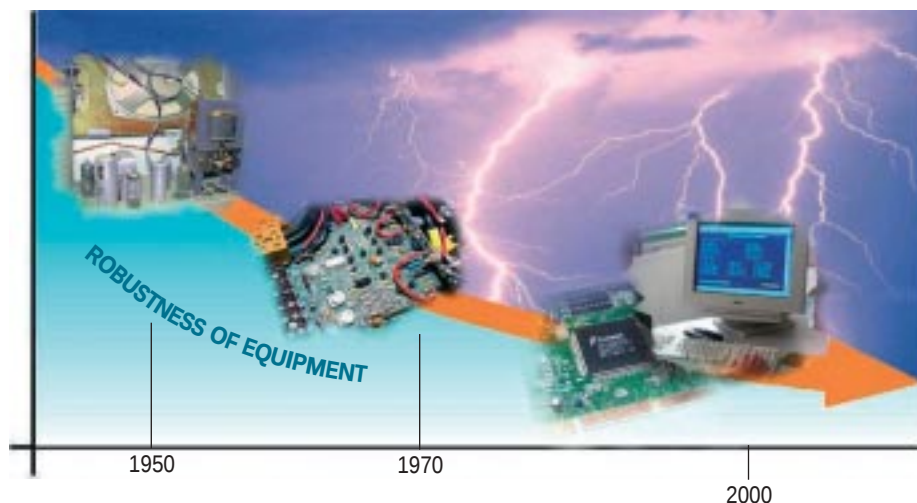
General points on lightning and its risks

The most serious consequences of lightning are the death of around twenty people and animals, and the destruction of equipment: telephone lines, transformers connected to the electrical distribution network, electrical meters, household appliances, etc.

At the same time, the growing amount of equipment incorporating very sensitive electronic devices increases the number of incidences linked to lightning.

Within companies, if office automation equipment or machines (in factories) are put out of action, it nearly always leads to operating losses, the cost of which is much more than that of the damaged equipment.

For example, if a bank's computers are no longer operational, it suffers large operating losses. For the general public, the damage is mainly material: computer, household appliances, home cinema, etc.



Causes of transient overvoltages

A transient overvoltage is a voltage peak with a maximum duration of less than one millisecond. There are two possible causes of overvoltages on electrical networks:

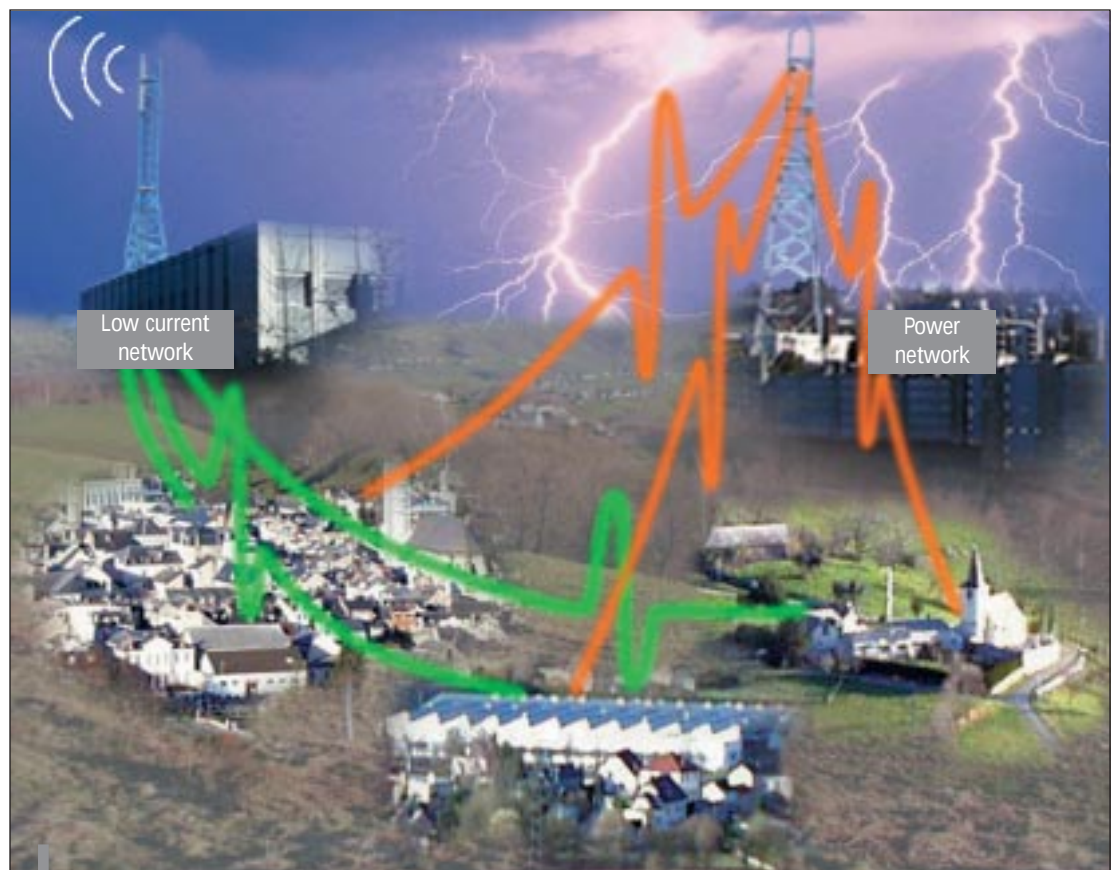
- natural causes (lightning),
- other causes due to equipment or switching devices.

Natural overvoltages on low voltage networks are caused by direct lightning strikes. The high level of energy contained in a direct lightning strike on a lightning conductor or an overhead low voltage line leads to considerable damage of the installation. The overvoltage can be over 20 times that of the nominal voltage.

Operating or switching overvoltages linked to a network's equipment create overvoltages of a lower level (3 to 5 times the nominal voltage) but occur much more frequently, thus causing premature ageing of the equipment.

Three categories of overvoltage propagate on low voltage networks:

- direct lightning strikes,
- indirect effects of lightning strikes,
- operating or switching overvoltages.



Propagation of overvoltages by electrical networks
(power and low current)

Overvoltages due to direct lightning strikes

These can take one of two forms:

- When lightning **strikes a lightning conductor or the roof of a building** which is earthed, the lightning current is dissipated into the ground. The impedance of the ground and the current flowing through it create large difference of potential : this is the overvoltage. This overvoltage then propagates throughout the building via the cables, damaging equipment along the way.

- When lightning **strikes an overhead low voltage line**, the latter conducts high currents which penetrate into the building creating large overvoltages. The damage caused by this type of overvoltage is usually spectacular (e.g. fire in the electrical switchboard causing the destruction of buildings and industrial equipment) and results in explosions.

Direct lightning strike on a lightning conductor or the roof of a building



Direct lightning strike on an overhead line



Overvoltages due to the indirect effects of lightning strikes

The overvoltages previously mentioned are also found when lightning strikes in the vicinity of a building, due to the increase in potential of the ground at the point of impact. The electromagnetic fields created by the lightning current generate inductive and capacitive coupling, leading to other overvoltages. Within a radius of several hundred metres

or even several kilometres, the electromagnetic field caused by lightning in clouds can also create sudden increases in voltage.

Although less spectacular than in the previous case, irreparable damage is also caused to so called sensitive equipment such as fax machines, computer power supplies and safety and communication systems.



Magnetic field



Increase in ground potential

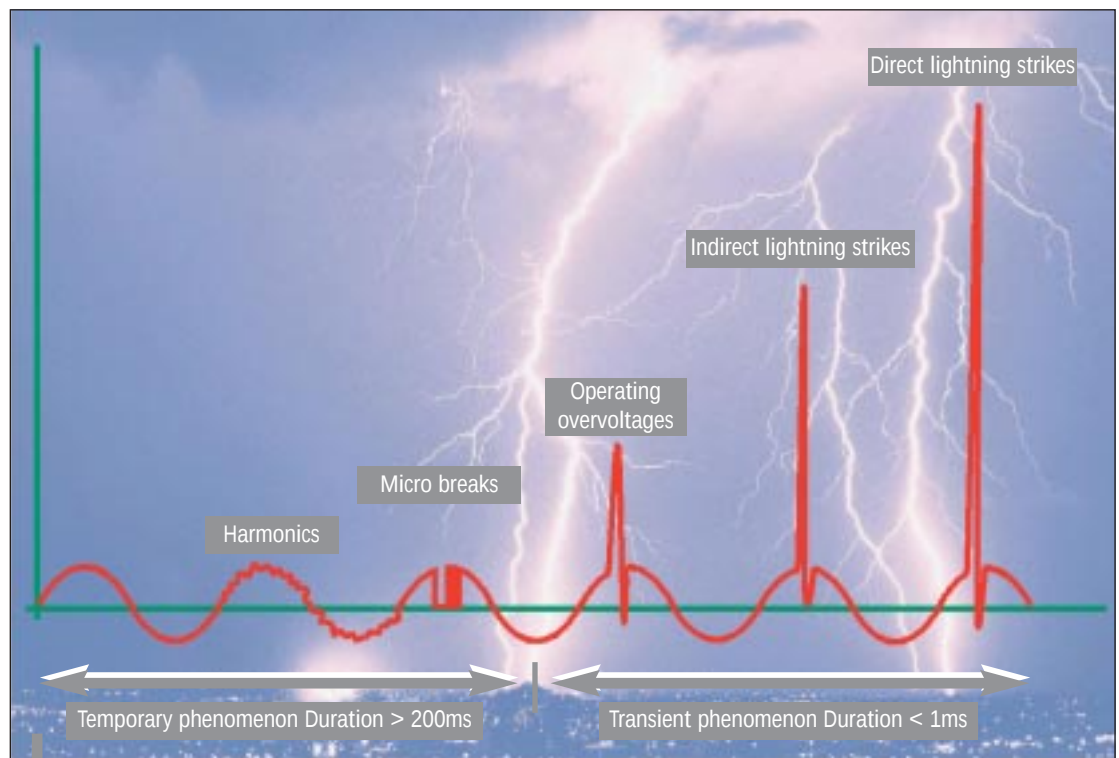


Electrostatic field

Overvoltages due to operating or switching actions

Equipment containing electronic switching components is also likely to generate electrical disturbances comparable to overvoltages. The consequences of which on sensitive equipment, albeit not visible, are no less detrimental: premature ageing and unpredictable or fleeting breakdowns. Operating overvoltages are produced when reactive or capacitive equipment is switched on and off.

Furthermore, interrupting factory production, lighting or transformers can generate overvoltages which will themselves cause greater damage to nearby electrical equipment.



Representation of the various disturbances on electrical networks

THE LABORATORY IN NUMBERS

Within its 450m² floor area, the Soulé laboratory is equipped for carrying out tests to IEC 61643-1 / EN 61643-11.

- High power generator

Standardised 8/20 and 10/350 impulse waves
Maximum shock current 100 kA for the two waves, superposed on the electrical network.
Stored energy 800 kJ.

- 200 kV generator

1.2/50 impulse wave
Maximum voltage 200 kV
Stored energy 10 kJ.

- Hybrid generator

Standardised 8/20 - 1.2/50 impulse wave
30 kV maximum
30 kA maximum
Stored energy 5 kJ.

- Electrical tests

440 V, 5000 A short circuit testing

- Mechanical tests

On-load operating test of sockets and strips.

Soulé: lightning and overvoltage protection solutions

With its experience gained over the last few decades, Soulé at Bagnères-de-Bigorre in the Hautes Pyrénées region (South West of France) is using its technological expertise for lightning and overvoltage protection.

In April 2003, Soulé acquired a new laboratory with several generators enabling the impact of a direct lightning strike (10/350 impulse wave) or an indirect lightning strike (8/20 impulse wave) to be tested in real conditions.

Through its wide product range, Soulé is able to offer solutions to protect power, telephone and low current networks, as well as equipment installed using coaxial links.

Seminars at Soulé's new training centre are suited to the needs of all professionals: design offices, architects, distributors, electricians, sales staff.

These training sessions combine practical and theoretical aspects and cover a varied range of topics such as direct impact protection, overvoltage protection and electromagnetic compatibility.

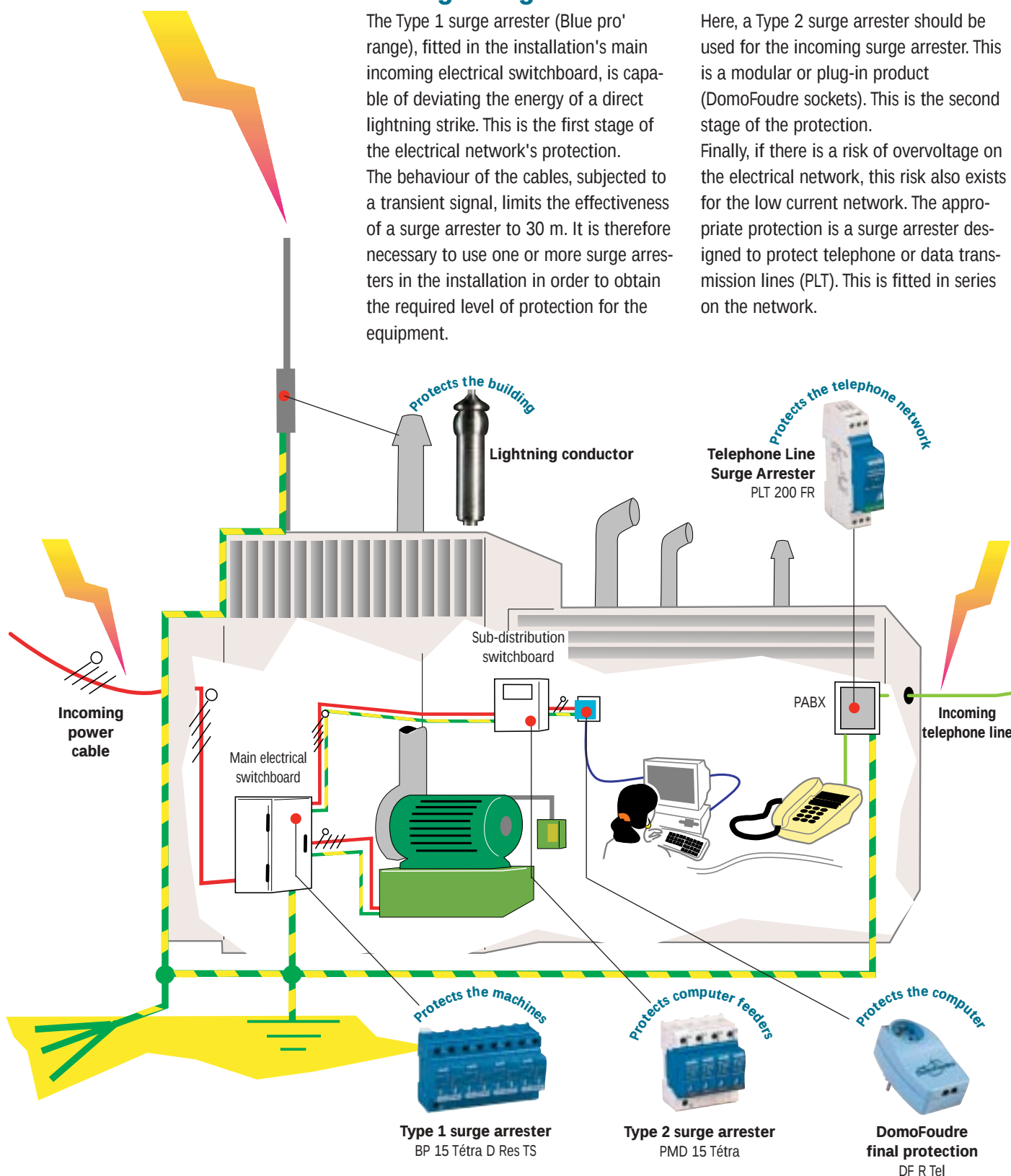


The Soulé Laboratory in the South West of France

Diagram of an installation protected against lightning and its indirect effects

The Type 1 surge arrester (Blue pro' range), fitted in the installation's main incoming electrical switchboard, is capable of deviating the energy of a direct lightning strike. This is the first stage of the electrical network's protection. The behaviour of the cables, subjected to a transient signal, limits the effectiveness of a surge arrester to 30 m. It is therefore necessary to use one or more surge arresters in the installation in order to obtain the required level of protection for the equipment.

Here, a Type 2 surge arrester should be used for the incoming surge arrester. This is a modular or plug-in product (DomoFoudre sockets). This is the second stage of the protection. Finally, if there is a risk of overvoltage on the electrical network, this risk also exists for the low current network. The appropriate protection is a surge arrester designed to protect telephone or data transmission lines (PLT). This is fitted in series on the network.



Terminology of electrical characteristics

Surge Arrester:

Device designed to limit transient overvoltages and run-off lightning currents. It consists of at least one non-linear component. It must comply with European standard EN 61643-11.

1.2/50 wave:

Standardised overvoltage waveform created on networks and which adds to the network's voltages.

8/20 wave:

Current waveform which passes through equipment when subjected to an overvoltage (low energy).

10/350 wave:

Current waveform which passes through equipment when subjected to an overvoltage due to a direct lightning strike.

Type 1 Surge Arrester:

Surge arrester designed to run-off energy caused by an overvoltage comparable to that of a direct lightning strike. It has successfully passed testing to the standard with the 10/350 wave (class I test).

Type 2 Surge Arrester:

Surge arrester designed to run-off energy caused by an overvoltage comparable to that of an indirect lightning strike or an operating overvoltage. It has successfully passed testing to the standard with the 8/20 wave (class II test).

Up :

Voltage protection level.

Parameter characterising surge arrester

operation by the level of voltage limitation between its terminals and which is selected from the list of preferred values in the standard. This value is greater than the highest value obtained during voltage limitation measurements (at I_n for class I and II tests).

I_n :

Nominal discharge current.

Peak current value of an 8/20 waveform flowing in the surge arrester. It is used to determine the U_p value of the surge arrester.

I_{max} :

Maximum discharge current for class II testing.

Peak current value of an 8/20 waveform flowing in the surge arrester with an amplitude complying with the class II operating test sequence. I_{max} is greater than I_n .

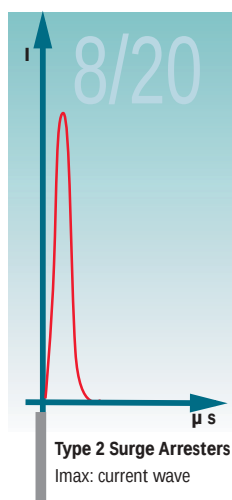
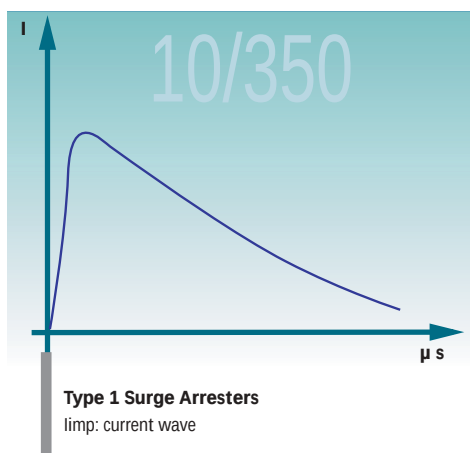
I_{imp} :

Impulse current for class I testing.

The impulse current I_{imp} is defined by a peak current I_{peak} and a charge Q , and tested in compliance with the operating test sequence. It is used to classify surge arresters for class I testing (the 10/350 wave corresponds to this definition).

U_n :

Nominal AC voltage of the network: nominal voltage between phase and neutral (AC rms value).



Uc :

Maximum voltage for continuous operation.

Maximum rms or dc voltage which can be continuously applied in surge arrester protection mode. It is equal to the rated voltage.

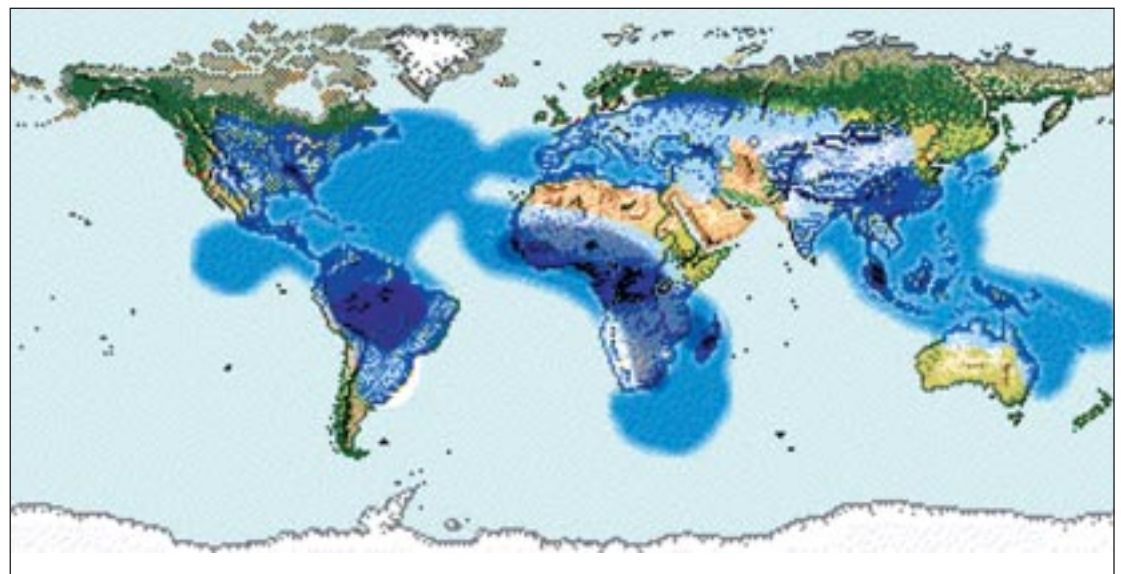
Ut :

Temporary overvoltage withstand.

Maximum rms or dc overvoltage that the surge arrester can be subjected to and which exceeds the maximum voltage for continuous operation U_c for a specified time.

Ng :

Lightning strike density expressed as the number of ground lightning strikes per km² and per year.



$2 < Ng \leq 8$



$8 < Ng < 18$

Protection mode

Common mode (MC): protection between live conductors and earth.

Differential mode (MD): protection between phase and neutral conductors.

Equipment withstand

Equipment tolerance levels are classified according to 4 categories (as indicated in the following table) according to IEC 60364-4-44, IEC 60664-1 and IEC 60730-1.

Categories	Un		Examples
	230 /400 V	400 /690 V	
I	1500 V	2500 V	Equipment containing particularly sensitive electronic circuits : - computer workstations, computers, TV, HiFi, Video, Alarms, etc; - household appliances with electronic programmers, etc.
II	2500V	4000 V	Domestic electrical equipment with mechanical programmers, portable tools, etc.
III	4000 V	6000 V	Distribution panels, switchgear (circuit-breakers, isolators, power socket bases, etc.), ducting and its accessories (cables, busbars, junction boxes, etc.).
IV	6000 V	8000 V	Equipment for industrial use and equipment such as fixed motors permanently connected to the fixed installation, electrical meters, principle overcurrent protection equipment, remote measurement devices, etc.

NOTE

In certain cases, protection components can be integrated into the equipment.
In this case, the manufacturer must communicate the type of protection that has been integrated.

Whatever the type of overvoltage protection used, the maximum voltage corresponds to category II.
Up max = 2500V if Un = 230V
However, it should be noted that some equipment requires a particularly low protection level.

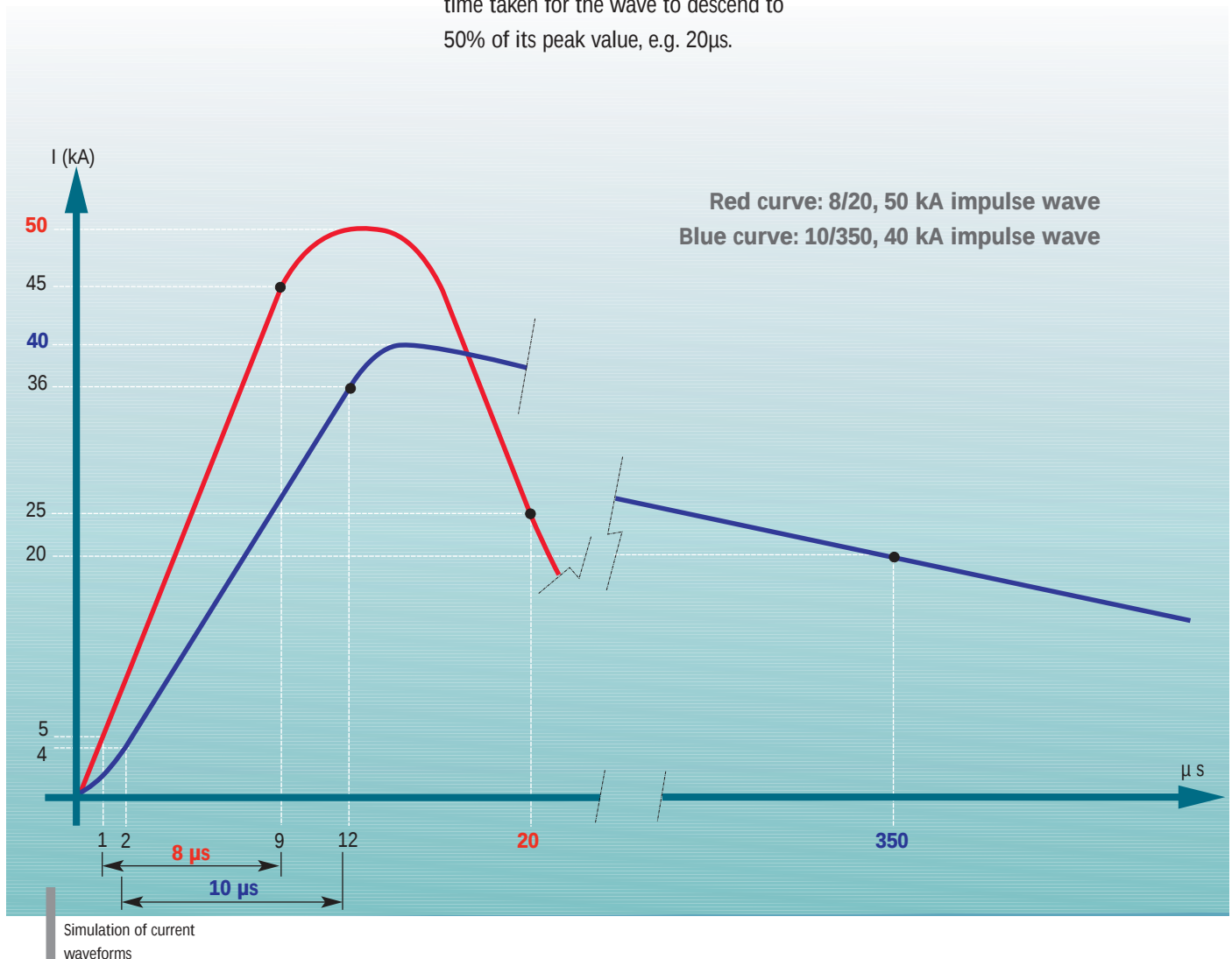
E.g. medical equipment, UPSs (with very sensitive electronics)
Up < 0.5 kV
The lightning protection Up is chosen according to the equipment to be protected.

8/20 and 10/350 impulse waves

The first number corresponds to the time taken for the wave to reach 90% of its peak value, e.g. 8 μ s.

The second number corresponds to the time taken for the wave to descend to 50% of its peak value, e.g. 20 μ s.

Hence 8/20 describes the form of the wave and 50 kA, for example, gives its peak value.



Earthing systems

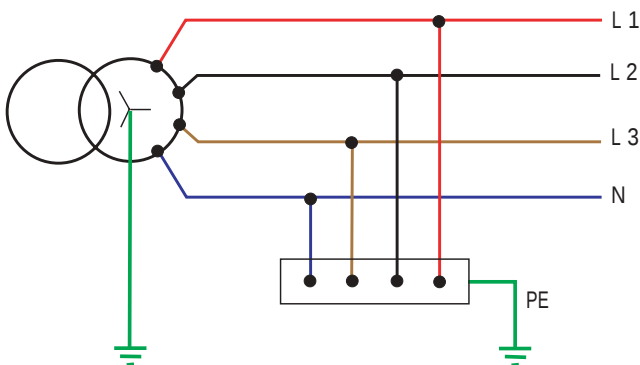
The earthing system indicates the position of the protective conductor with respect to the neutral conductor.

Installed devices must guarantee personnel protection and the protection of equipment.

There are 4 earthing systems differentiated by:

- the connection of the neutral with respect to earth;
- the connection of exposed conductive parts with respect to earth or the neutral.

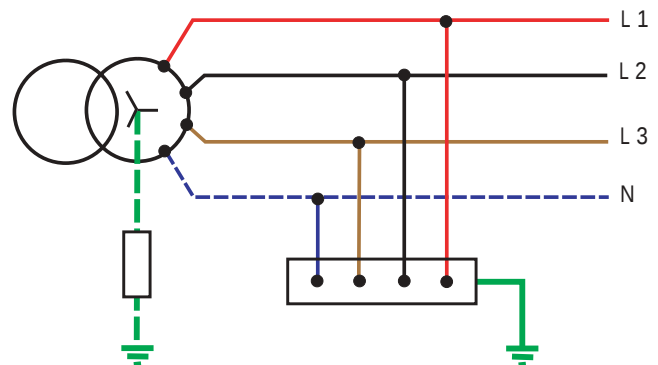
Earthing system	Connection of neutral	Connection of exposed conductive parts
TT	Neutral connected to earth	Exposed conductive parts connected to an earth rod
TN-C	Neutral connected to earth	Exposed conductive parts connected to the neutral
IT	Neutral isolated from earth or connected to earth via an impedance	Exposed conductive parts connected to an earth rod
TN-S	Neutral connected to earth	Exposed conductive parts connected to the protective conductor



TT (neutral connected to earth) wiring diagram:

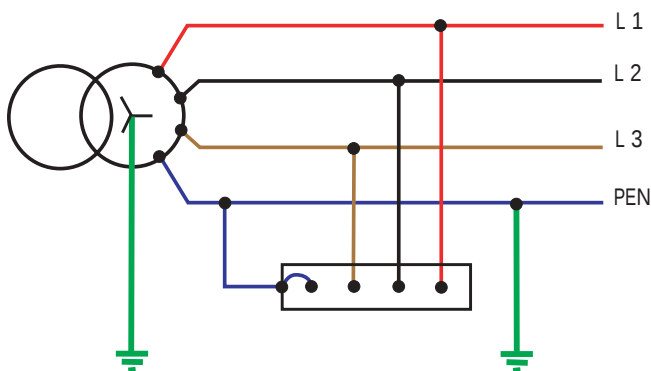
The neutral point of the supply is connected to earth.

The exposed conductive parts of the installation are connected to an earth rod; either a separate earth rod or to the neutral earth rod.



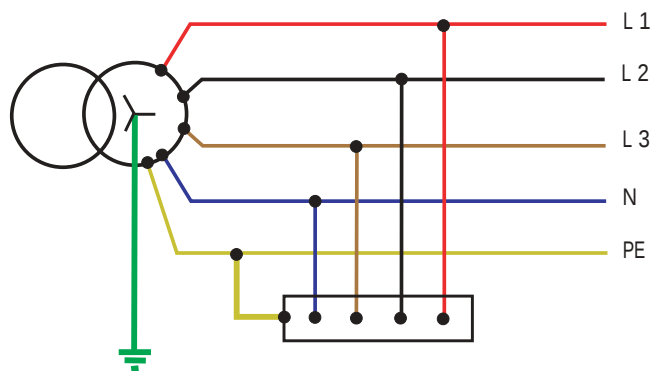
IT (neutral isolated or via impedance) wiring diagram:

The neutral point is either not connected to earth, or is so via an impedance (1000 to 2000 Ohms).



TN-C wiring diagram:

The neutral conductor and the protective conductor are the same conductor: PEN.



TN-S wiring diagram:

The neutral conductor and the protective conductor are separate.

Choice of earthing system

The choice of earthing system depends on:

- operating conditions,
- qualification of the maintenance team

workshops and small tertiary installations,

- IT if continuity of service is required: hospitals, buildings open to the public.

The earthing system may be imposed by the electricity supplier:

- TT for residential subscribers, small

Continuity of service is the priority

YES	NO
Isolated neutral (IT)	Isolated neutral (IT) Neutral connected to earth (TT) Distributed neutral (TN)
This is the surest way to avoid breaks in the supply. E.g. use of priority safety circuits: high-rise buildings, hospitals	Final choice after studying: - the installation's characteristics, - the complexity of implementing each type of earthing system, - the costs of each type of earthing system.

Earthing systems

Recommended	Also possible	Type of installation
TT	TNS	Widespread network with poor earthing of exposed conductive parts
TN	TT	Network located in a storm area
TT	TN	Distribution network fed by overhead lines
IT	TT	Emergency backup or peak period generator set
TN	TT	Low insulation loads (ovens, kitchens, welding sets)
TT or TNS		Portable single-phase loads (drills, grinders)
TN	TT	Handling machines, hoists, conveyer belts
TNS	TNC	Large number of auxiliaries, machine tools
IT or TT	TNS	Premises with fire risks
TT	TNS	Building sites (unreliable earth)
TNS	TT	Electronic equipment, computers

Common mode and/or differential mode protection

Common mode

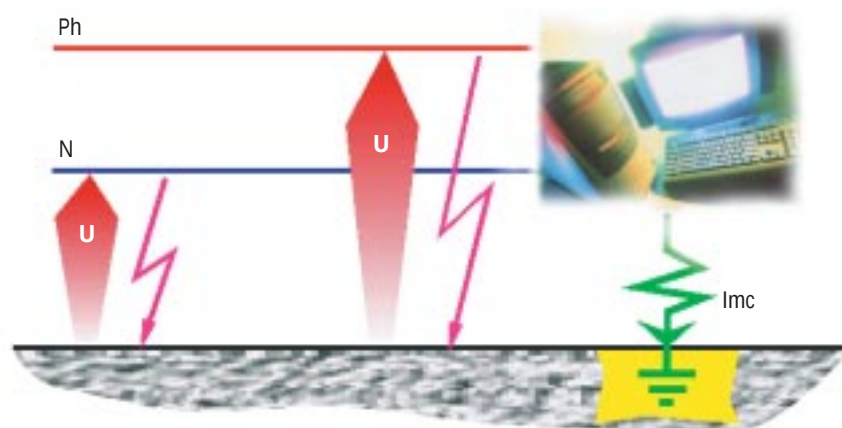
Common mode overvoltages appear between the live conductors and earth, e.g. phase/earth or neutral/earth.

A live conductor not only refers to the phase conductors but also to the neutral conductor.

This overvoltage mode destroys equipment connected to earth (class I equipment) and also equipment not connected

to earth (class II equipment) which is located near an earthed mass and which does not have sufficient electrical isolation (a few kilovolts).

Class II equipment not located near an earthed mass is theoretically protected from this type of attack.

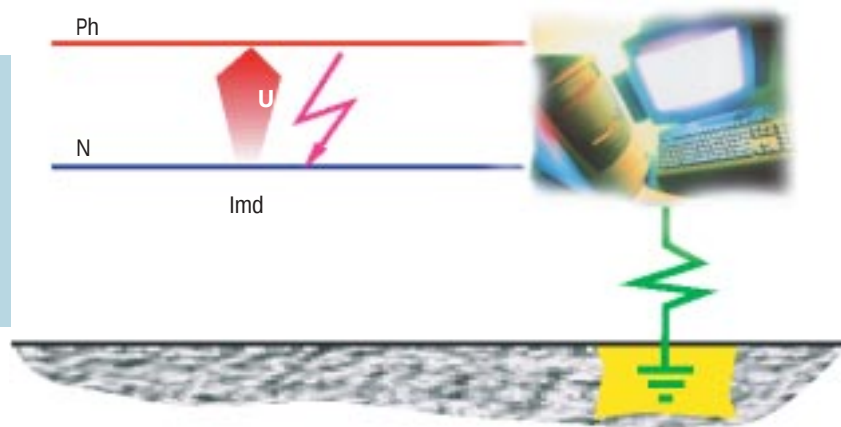


Differential mode

Differential mode overvoltages circulate between live conductors: phase/phase or phase/neutral.

These overvoltages have a potentially

high damaging effect for all equipment connected to the electrical network, especially sensitive equipment.



NOTE

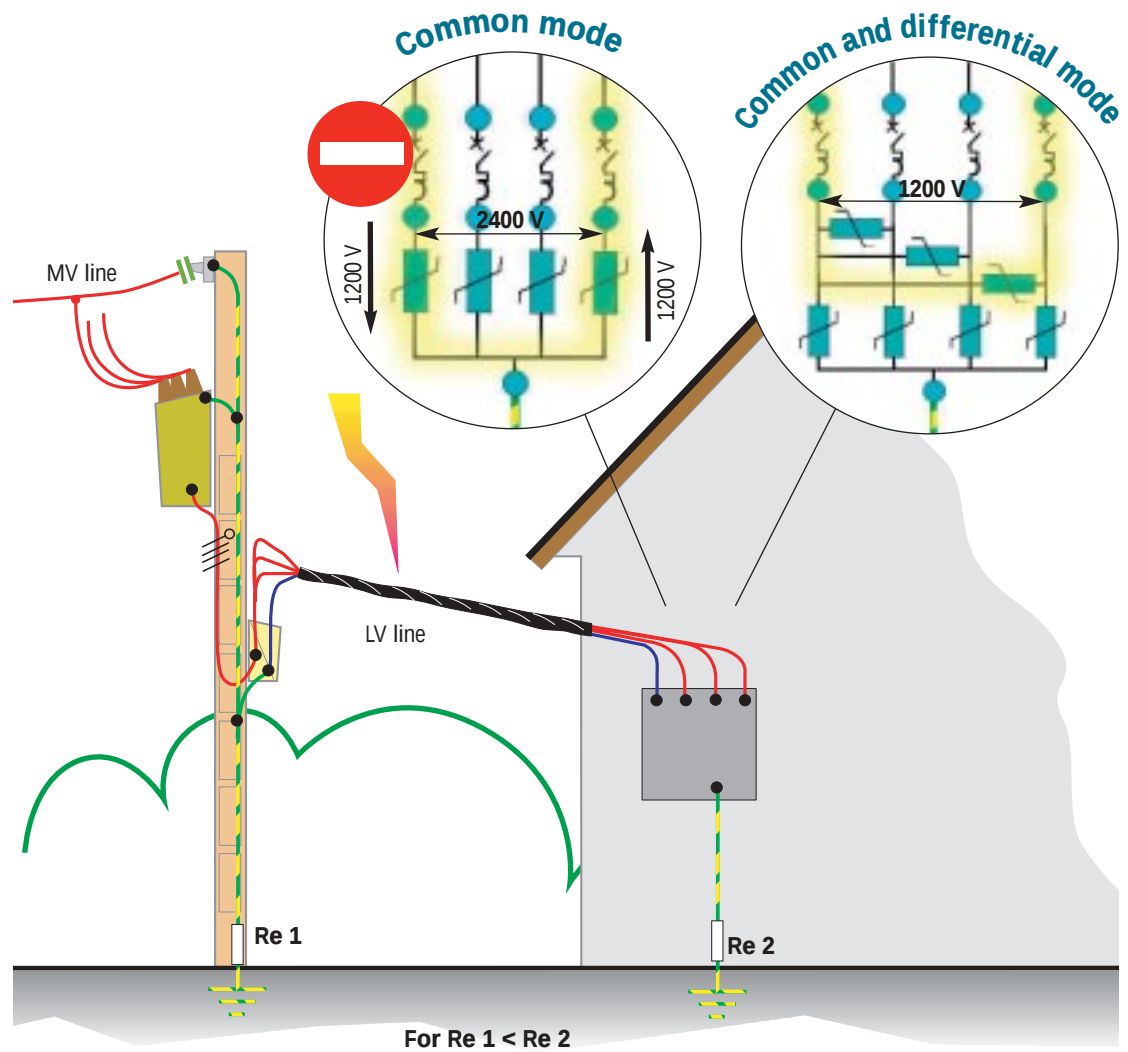
Common mode overvoltages affect all earthing systems.

NOTE

Differential mode overvoltages affect the TT earthing system.

These overvoltages also affect the TN-S earthing system if there is a considerable difference in the lengths of the neutral cable and the protective cable (PE)

The overvoltage caused by a lightning strike inevitably generates differences in potential in common mode and can generate differences in potential in differential mode. The solution consists of adopting combined "common" and "differential" modes; standard offer for Soulé surge arresters.



Protection mode

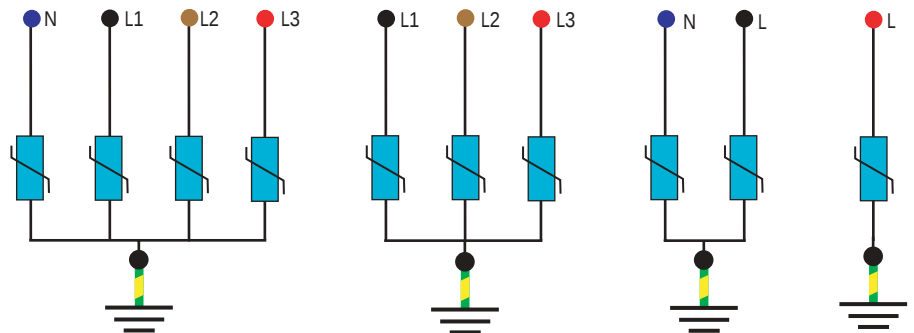
Non-linear components, amongst others, such as varistors and discharge tubes are used to stop overvoltages reaching equipment.

The combination of one or more of these components enables differential mode

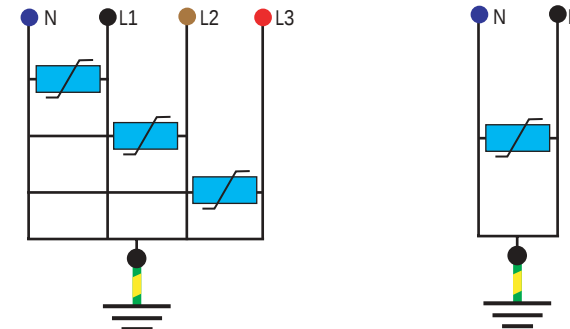
protection, common mode protection, or a combination of the two, depending on how they are wired.

Below are wiring diagrams or combinations according to the mode of protection.

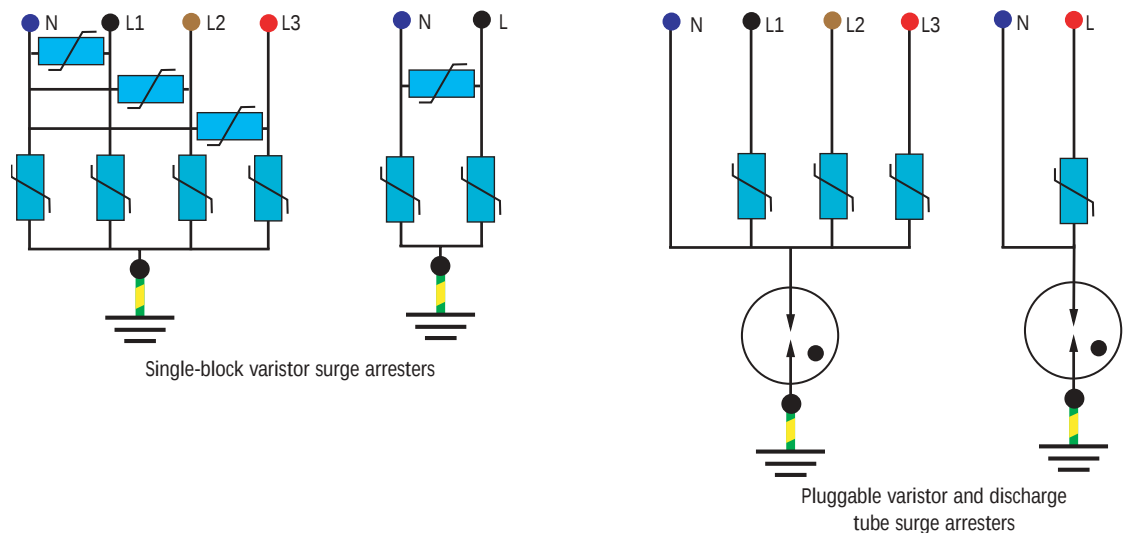
Overvoltage protection in common mode (MC)



Overvoltage protection in differential mode (MD)



Overvoltage protection in common and differential mode (MC / MD)



Selection



Choosing a surge arrester

The choice of surge arrester depends on a multitude of criteria defined when evaluating the lightning risk.

Evaluating the risk enables overvoltage protection requirements to be identified. When lightning protection is recommended, all that remains to be done is to select the appropriate product and install it.

All of the criteria that have to be taken into consideration make this risk analysis a laborious task which dissuades more than one.

Soulé's experience, expertise and precise study of standards related to this phenomenon have led us to develop a simplified procedure to optimise the choice and installation of overvoltage protection.

This work has resulted in a simplified and guided definition of surge arresters.

The choice of surge arrester is made according to several characteristics:

- **The protection level (Up)**
- **The run-off capacity: Iimp or I_{max} (10/350 or 8/20 impulse wave)**
- **The network's earthing system**
- **The operating voltages (U_c, U_t)**
- **The options (end of life indicator, pluggable, Res, TS, Optical Monitoring Block)**

These characteristics will be presented in the following pages:

- **When must we be protected ?,**
- **Choosing the type of protection according to the network,**
- **Choice of U_c and U_t according to the nominal voltage (Un) of the electrical network,**
- **Choice of I_n, I_{max}, I_{imp},**
- **The principle of coordination,**
- **Options: end of life indicator, pluggable, Res, TS, Optical Monitoring Block.**

If you would like a customised study with an analysis of a specific case, please contact our technical department.

When must we be protected ?

This aspect includes requirements of standards and recommendations based upon Soulé's expertise.

The criteria taken into consideration in this section are the evaluation of the risk of a direct lightning strike on or nearby the building, including the financial aspect

caused by destruction or operating losses. Even if protection is not indispensable, it should be noted that since zero risk does not exist, a means of protection may always be useful.

Environmental criteria



Context The building has a lightning conductor

According to basic protection rules

According to Soulé installation rules

Type of surge arrester

SURGE ARRESTER OBLIGATORY

TYPE 1



$N_g > 2.5$ and overhead electricity lines

SURGE ARRESTER OBLIGATORY

TYPE 1
or
TYPE 2



Building located on high land

SURGE ARRESTER RECOMMENDED

TYPE 1
or
TYPE 2 (65 kA)



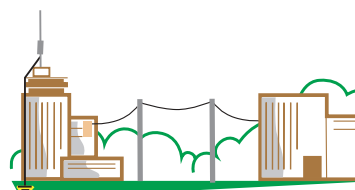
Context Element over 20m high at less than 50m from the building to be protected

According to Soulé installation rules

Type of surge arrester

SURGE ARRESTER RECOMMENDED

TYPE 1
or
TYPE 2



Less than 500m in a direct line separate the lightning conductor and main electrical switchboard from the building to be protected

SURGE ARRESTER RECOMMENDED

TYPE 1
or
TYPE 2



Less than 50m of ground separate the lightning conductor from the building to be protected

SURGE ARRESTER RECOMMENDED

TYPE 1
or
TYPE 2 (65 kA)

Operational criteria

Recommended	Highly recommended	Very highly recommended	Selection criteria
		●	Continuity of supply is the priority (for reasons of operating loss costs, safety, etc.) :
		●	- factories, offices, banks, airports, police stations, chemists, video surveillance systems, etc. ;
		●	- hospitals, retirement homes, dialysis centres.
●	●	●	Equipment protection is the priority :
			- high value > 150,000 Euros ;
			- medium value > 15,000 Euros ;
			- low value > 150 Euros.
	●	●	Risk of lightning strikes in the region :
		●	- $Ng \leq 2.5$;
		●	- $Ng > 2.5$;
		●	- isolated site.
●	●		Type of electrical supply network feeding the site :
			- overhead ;
			- underground.

NOTE

Repetitive overvoltages due to lightning strikes lead to economic losses that are much greater than the cost of installing surge arresters.

The installation of surge arresters is a professional reflex when protecting medical equipment, in-line with the state of the art technology that is used.

To be kept in mind: the cost of the protection is low compared to the cost of the equipment to be protected.

Choosing the type of protection according to the network

Overvoltages are either common and differential mode or common mode only depending on the type of earthing system.

	TT	TN - S	TN - C	IT with N	IT without N
Common mode	yes	yes	yes	yes	yes
Differential mode	yes	yes*	no	no	no

* : If there is a considerable difference in the lengths of the neutral cable and the protective (PE) cable.

NOTE

Suitable protection can be found for all network configurations in our PU, PM, PUD, PMD and Blue Pro' product ranges.

Choice of U_c and U_t according to the nominal voltage (U_n) of the electrical network

The choice of operating voltage is also vital when selecting a surge arrester.

There are two voltage characteristics U_c and U_t .

The surge arresters in combination with their breaking devices must resist a temporary 50 Hz overvoltage without incurring any modification to their characteristics or functionalities. For a 230 V (phase-neutral) electrical network, this overvoltage is defined as follows:

U_t for 5 secs (+0 / -5%)

U_t is given in the table below.

(e.g. $U_t = 400$ V with $U_o = 230$ V between phase and PE for a TT system).

It is imperative that these values are chosen in compliance with the table below according to the type of earthing system.

NOTE

The table also gives U_c values which correspond to the maximum continuous voltage that the surge arresters must be able to operate at.

Surge arrester connection	Network earthing system									
	TT		TN-C		TN-S		IT (Neutral distributed)		IT (Neutral not distributed)	
	U_c	U_t	U_c	U_t	U_c	U_t	U_c	U_t	U_c	U_t
Between Phase and Neutral	253 V	334 V	N.A.	N.A.	253 V	334 V	253 V	334 V	N.A.	N.A.
Between Phase and PE	253 V	400 V	N.A.	N.A.	253 V	334 V	400 V	N.A.	400 V	400 V
Between Neutral and PE	230 V	N.A.	N.A.	N.A.	230 V	N.A.	230 V	N.A.	N.A.	N.A.
Between Phase and PEN	N.A.	N.A.	253 V	334 V	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

Note: these voltages are minimum voltages.

N.A.: Not Applicable

Choice of Iimp and Imax of the upstream surge arrester

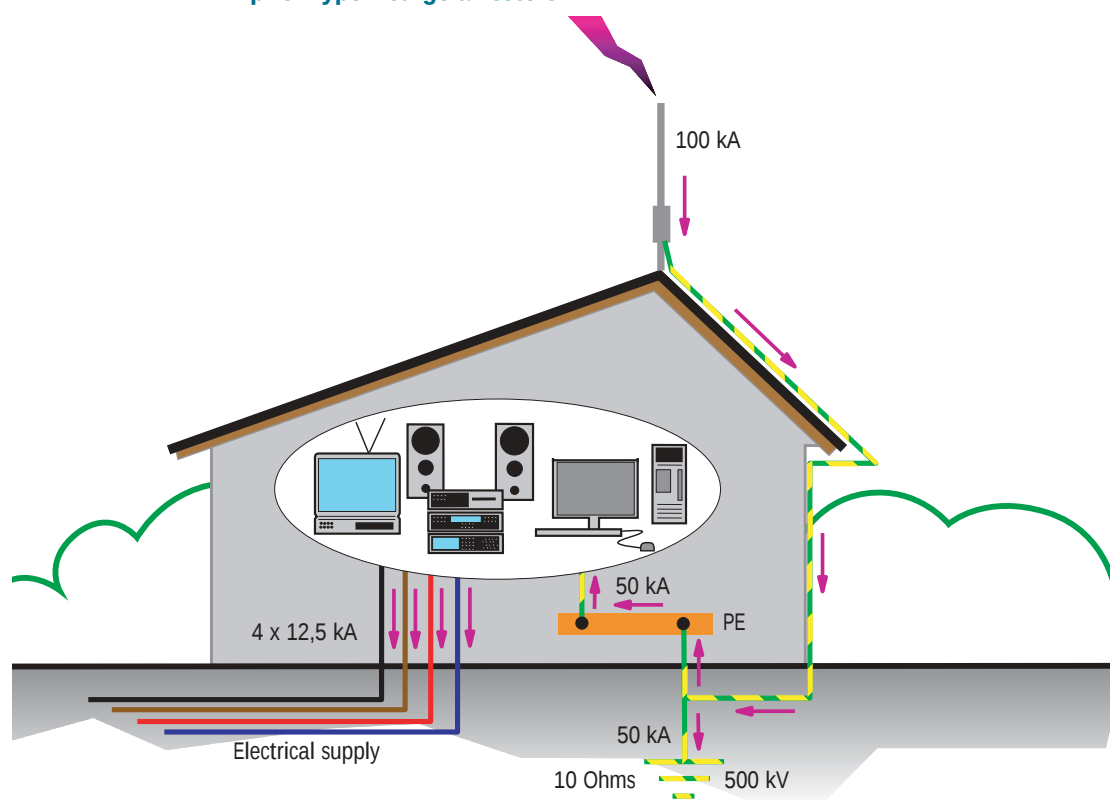
The run-off capacity of a surge arrester is determined by its electrical characteristics, and must be chosen according to the level of risk.

The choice of Iimp for Type 1 surge arrester in case of a 100 kA direct lightning strike (around

95% of strikes are less than 100 kA :

IEC 61 024-1-1 Annex A, Basic values of lightning current parameters), is 12.5 kA for each power line.

Iimp for Type 1 surge arresters



Soulé recommends a minimum Iimp of 12.5 kA for Type 1 surge arresters based on the following calculation :

- Prospective direct lightning strike current I: 100 kA (only 5% of discharges > 100 kA)
- Distribution of current within the building: 50 % to ground and 50 % to the electrical network
- Equal distribution of the current in each of the conductors (3 L + N):

$$I_{imp} = \frac{50 \text{ kA}}{4} = 12,5 \text{ kA}$$

NOTE

Soulé defines its Type 2 surge arresters according to their maximum current (Imax).

For a given Imax value, there is a corresponding nominal current value (In).

Imax for Type 2 surge arresters

Optimisation of Imax for Type 2 surge arresters				
Ng	< 2	2 ≤ Ng < 3	3 ≤ Ng < 4	4 < Ng
In (kA)	5	15	20	30
Imax (kA)	15	40	65	100

Principle of coordination

After having defined the characteristics of the incoming surge arrester, the protection must be completed with one or more additional surge arresters.

The incoming surge arrester does not provide effective protection for the whole installation by itself.

Certain electrical phenomena can double the protection's residual voltage if cable lengths exceed 10m.

Surge arresters must be coordinated when they are installed (refer to the tables below).

NOTE

The coordination of Type 2 surge arresters is analysed using their respective maximum discharge currents I_{max} (8/20) starting from the installation's incoming switchboard and working towards the equipment which is to be protected, taking into account the progressive reduction in I_{max} .

E.g. 65 kA followed by 15 kA

All Soulé Type 2 surge arresters coordinate between each other by respecting a minimum distance of 1m between them.

For DomoFoudre final protection in socket or strip format ($I_{max} = 8$ kA), the length of the electrical supply flex is enough to ensure correct coordination.

Coordination required

The incoming surge arrester does not reach the protection voltage (U_p) by itself

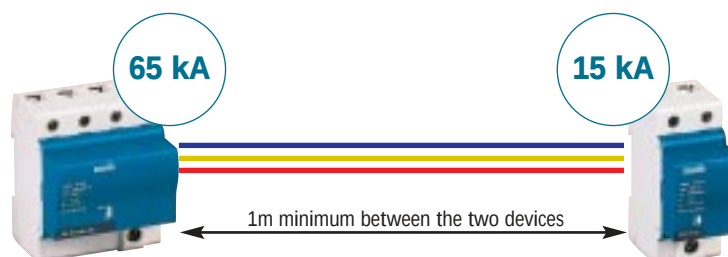
The incoming surge arrester is more than 10m away from the equipment to be protected

Recommended solutions

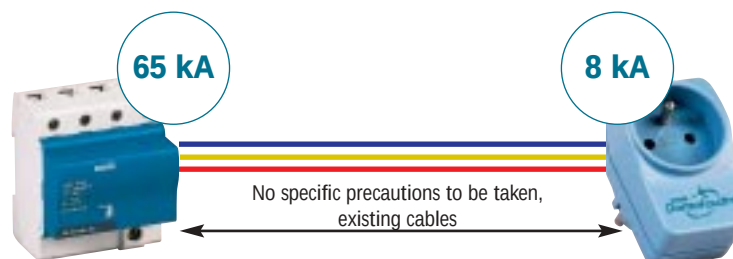
Use of modular Type 2 surge arresters (PU, PM)
or

Use of DomoFoudre final protection (sockets or strips)

Coordination between Type 2 surge arresters (example)



Coordination between Type 2 surge arresters and a DomoFoudre socket (example)



Choice of protection for non-power networks

Communication networks

24 V dedicated line

300 kHz switched analogue telephony

ISDN (Numéris) TO access

PCM line and T2 access

64 kbits/s dedicated modem line



PLT 200FR



48 V BOP box



24 V BAP box



16 V DL / PCM plug



DF-R-Tél

Modular PLTs	Reference	Choice
PLT 200 V	8148 04 00	☐
PLT 200 FR (low residual)	8148 05 00	☐
PLT M 48 V	8148 03 00	☐
PLT M 24 V	8148 02 00	☐
PLT M 12 V	8148 01 00	☐
PLT M 6 V	8148 06 00	☐
BOP surge arrester box	Reference	Choice
DF Tél 200 1 pair	8796 08 04	☐
BOP 200 FR 1 pair (low residual)	8796 07 02	☐
BOP 200 V 2 pairs	8796 08 03	☐
BOP 200 FR 2 pairs (low residual)	8796 07 03	☐
BOP 48 V 1 pair	8796 06 02	☐
BOP 48 V 2 pairs	8796 06 03	☐
BOP 24 V 2 pairs	8796 05 03	☐
BAP surge arrester strip	Reference	Choice
BAP 48 V 4 pairs	8796 06 04	☐
BAP 24 V 4 pairs	8796 05 04	☐
REP splitter	Reference	Choice
16 V DL / PCM plug	8798 36 07	☐
STN plug	8798 96 07	☐
DL / PCM module	8798 36 06	☐
48 V branch block DL module	8798 66 06	☐
STN module	8798 96 06	☐
Mounting plate for 8 modules	8860 08 02	☐
Final telephone socket	Reference	Choice
DF-R-Tél	8738 07 02	☐

High frequency networks

Local wireless networks

Army

Public microwave radio links

GSM

Civil aviation

Port and maritime navigation (lighthouses and beacons)

Ministry of the Interior

Space (CNES)

Met Office

BSC



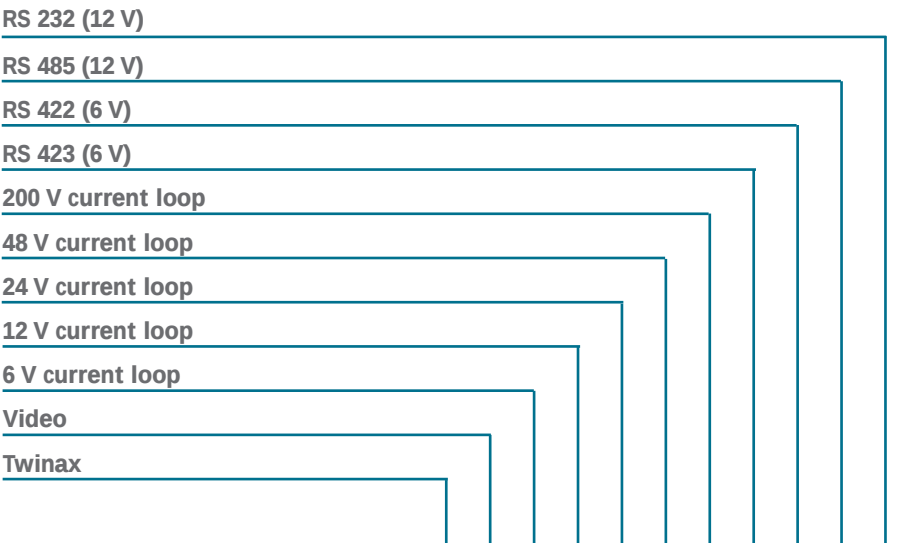
PHF HP 900 MHz



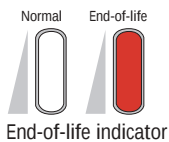
PHF AN 50 BNC m/f

Designation	Reference	Choice									
PHF HP 420 MHz	8150 01 13	●	●	●	●	●	●	●	●	●	●
PHF HP 900 MHz	8150 01 14								●	●	●
PHF HP 1800 MHz	8150 01 15								●	●	●
PHF HP 2300 MHz	8150 01 16										●
PHF AN 50 N m/f	8150 02 10	●	●	●	●	●	●		●	●	
PHF AN 50 BNC m/f	8150 02 12	●	●	●	●	●	●		●	●	●
PHF AN 50 N f/f	8150 02 14	●	●	●	●	●	●		●	●	
PHF AN 50 BNC f/f	8150 02 15	●	●	●	●	●	●		●	●	●
PHF AN 7/16 f/f	8150 02 16								●		
PHF AN 75 F f/f	8150 02 17	●									

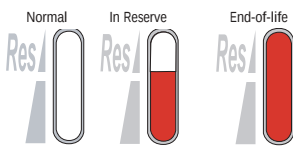
Computer, low current and video networks



Designation	Reference	Choice
Video Protection	8777 03 00	☒
Twinax Protection	8778 01 00	☒
PLT M 200 V	8148 04 00	☒
PLT M 200 FR (low residual)	8148 05 00	☒
PLT M 48 V	8148 03 00	☒
PLT M 24 V	8148 02 00	☒
PLT M 12V	8148 01 00	☒
PLT M 6 V	8148 06 00	☒



End-of-life indicator



Safety Reserve system

NOTE

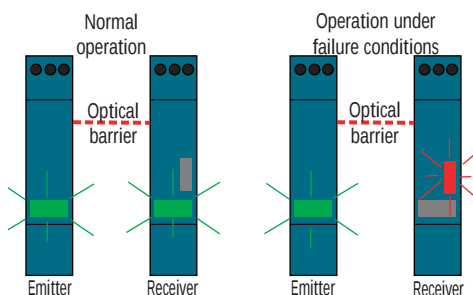
A faulty surge arrester does not interrupt continuity of service (if wired such that priority is given to continuity of service), it simply disconnects itself. But, the equipment is no longer protected.



Pluggable

NOTE

Pluggable surge arrester cartridges have a fool-proof system (Neutral cartridges different to Phase cartridges) preventing incorrect operations when replacing a cartridge.



Optical Monitoring Block (BOS)

Options and advantages

End of life indicator of the surge arrester

This option enables indication of the surge arrester's state via a mechanical indicator which changes from white to red as the surge

arrester fails. When this occurs, the surge arrester must be changed as protection is no longer guaranteed.

Safety Reserve (Res) system

In case of current surge exceeding the maximum capacity of the device, the surge arrester will switch to the Safety reserve position and the remote indicator (TS) will switch to defect. Consequently, the user is warned in advance and has more response time to replace

the cartridge, because in Safety reserve position the protection is still ensured due to the 2-stage disconnecting system.

Pluggable

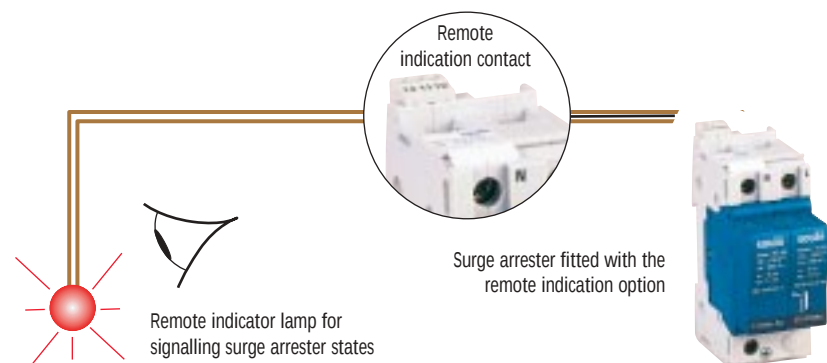
The pluggable feature of Soulé surge arresters facilitates maintenance. Should one or more worn cartridges need to be replaced,

the electrical circuit does not have to be isolated nor do the wires have to be removed.

Remote indication (TS)

This function, achieved by wiring a 3-point 1A volt-free contact, enables the operational state of the surge arrester to be checked remotely (maintenance premises).

This can be global (several surge arresters) when an Optical Monitoring Block (BOS) is used.



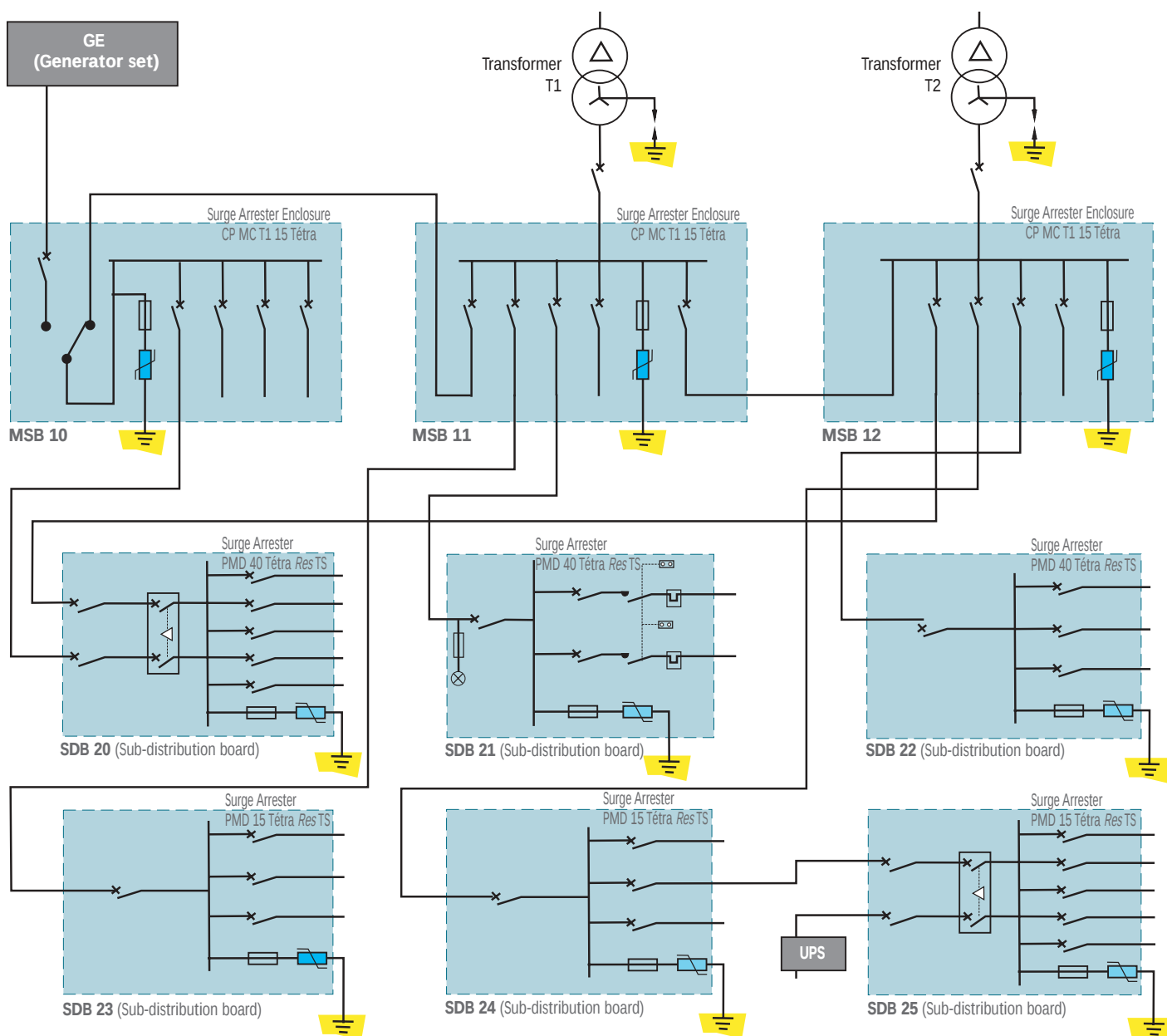
Optical Monitoring Block (BOS)

This is made up of two elements, an emitter and a receiver, positioned at the extremities of the surge arrester row to be monitored. Its optical barrier monitoring principle is compatible with all the "power" modular models (except PM8) and "low current" models (except PLT M 200V).

This unit allows the operation of several DIN rail mounted surge arresters to be monitored simultaneously (10 modules of 17.5 mm). In normal operation, the indicator lamps

on the emitter and receiver are green. In the event of surge arrester failure, the indicator lamp on the receiver turns red. In the event of an optical monitoring block fuse fault, all the indicator lamps go out. Global remote indication of the surge arrester row can be achieved by wiring the volt-free contact.

Example of a protected industrial installation



NOTE

Regardless of the geographical location and the immediate environment, the surge arrester enclosures used in this example would remain valid even if a lightning conductor was not installed. Note however that the site would not be protected against direct lightning strikes (structures and buildings).

The above diagram is an example of an industrial application located in an area where the lightning density (N_g) is 1.2 lightning strikes per km² and per year:

- the building is protected by a lightning conductor,
- the lightning conductor's earthing strip is connected to the installation's earth network,
- the earthing system is IT (with distributed neutral) and then TNS for the sub-distribution boards,

- MSBs 10, 11 and 12 are fitted with Type 1 surge arrester enclosures CP MC T1 15 Téra (ref. 2351 18 06),
- sub-distribution boards (SDB) 20, 21 and 22 are fitted with Type 2 surge arresters PMD 40 Téra Res TS (ref. 8149 01 03),
- sub-distribution boards (SDB) 23, 24 and 25 are fitted with Type 2 surge arresters PMD 15 Téra Res TS (ref. 8149 00 03).

Range



Soulé surge arrester range

- **Power surge arresters**

Modular
In enclosures
In panels

- **DomoFoudre range**

Final sockets

- **Low current surge arresters**

PLT
BOP / BAP
REP / CAD modules

- **Coaxial surge arresters**

Standard : PHF AN
High performance : PHF HP
Twinax / Video





Blue Pro' surge arresters

POWER Type 1

STANDARDS INFO

Blue pro' surge arresters comply with IEC 61 643-12 (Annex I.1.2.).

Type 1 Blue Pro' surge arresters provide incoming protection for an installation which has a lightning conductor or which is located in a high lightning strike density area.

The high run-off capacity of Blue Pro' surge arresters (15 kA impulse current for 10/350 μ s waveform) enables them to resist very high energy transient overvoltages appearing on the electrical network (mains).

The absence of follow or holding current (If = None) means there will be no tripping of main breakers or blowing of fuses during normal operation of Blue pro' surge arresters.

Blue pro' surge arresters, which are based on MOV technology, provide low let through voltages (Up) and allow easy coordination with Type 2 surge arresters (decoupling inductors not required when Types 1 & 2 surge arresters are installed together).



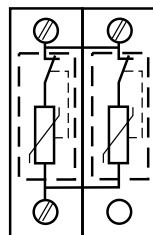
Blue' Pro pluggable surge arrester
BP 15 230 D Res TS



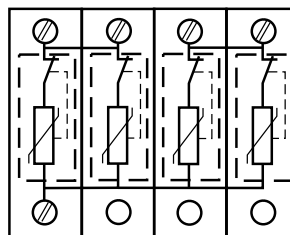
Blue' Pro pluggable surge arrester
BP 15 T  tra D Res TS

Dimensions (mm)	W	H	D
BP 15 400 D Res TS	35	85	63
BP 15 230 D Res TS	35	85	63
BP 15 Bi D Res TS	70	85	63
BP 15 Tri D Res TS	105	85	63
BP 15 T��tra D Res TS	140	85	63

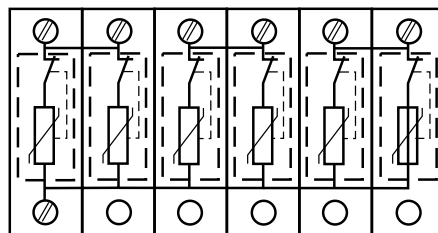
Schematic diagrams



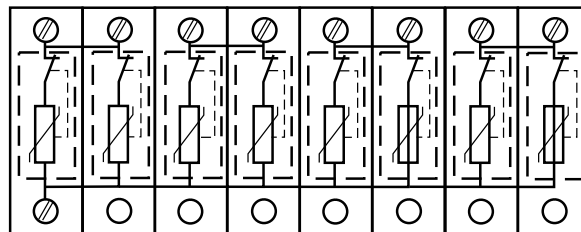
BP



BP Bi

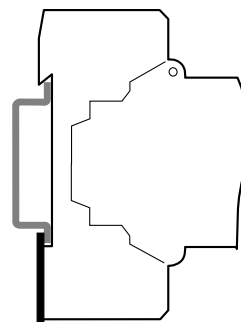


BP Tri



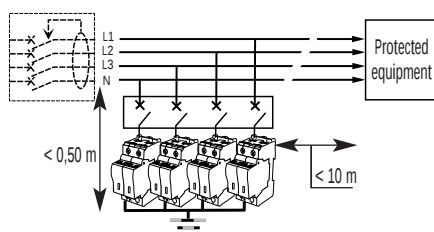
BP T  tra

Fixing

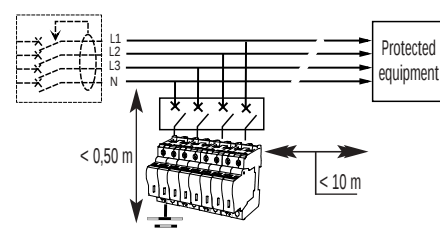


Simply clips onto DIN rail.

Connection

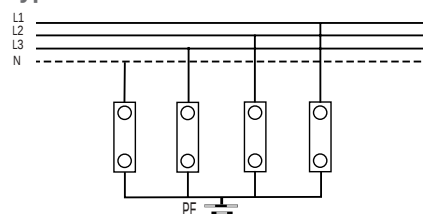


BP (15 230 / 15 400)

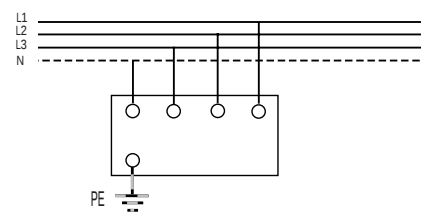


BP T  tra

Types of network



TT - TNS - IT networks



TT - TNS - IT networks

PRATICAL INFO

Blue pro' surge arresters are installed in main switchboards (MSBs) using DIN rail. They are used for common mode protection. Their pluggable cartridges allow optimised maintenance as they can be replaced without the need to isolate the circuit.

MORE INFO

Electrical characteristics

		15 kA (10/350)				
		BP 15 400 D Res TS Ref. 8152 01 06	BP 15 230 D Res TS Ref. 8152 01 07	BP 15 Bi D Res TS Ref. 8153 03 02	BP 15 Tri D Res TS Ref. 8154 01 03	BP 15 T��tra D Res TS Ref. 8155 03 02
Types of network	p. 16	TT - TNS - TNC - IT	TT - TNS - TNC	TT - TNS - IT	TNC - IT	TT - TNS - IT
Number of poles		1	1	2	3	4
Type of surge arrester		1	1	1	1	1
Type of current		A.C.	A.C.	A.C.	A.C.	A.C.
Nominal voltage: Un	p. 12	400 V	230 V	230 V/400 V	230 V/400 V	230 V/400 V
Max cont operating voltage: Uc	p. 13	440 V	275 V	440 V	440 V	440 V
Impulse current: Iimp (10/350)	p. 12	15 kA	15 kA	15 kA	15 kA	15 kA
Nominal discharge current: In (8/20)	p. 12	5 kA	5 kA	5 kA	5 kA	5 kA
Voltage protection level: Up (at 15 kA)	p. 12	1.4 kV	1.4 kV	1.4 kV	1.4 kV	1.4 kV
Residual voltage: Ures (at 5 kA)		1.2 kV	1.2 kV	1.2 kV	1.2 kV	1.2 kV
Maximal discharge current: Imax	p. 12	100 kA	100 kA	100 kA	100 kA	100 kA
Residual voltage: Ures (at 30 kA)		1.8 kV	1.8 kV	1.8 kV	1.8 kV	1.8 kV
Follow current : If		none	none	none	none	none
TOV withstand: Ut (5s)		440 V	440 V	440 V	440 V	440 V
Operating current: Ic		< 1 mA	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Short-circuit withstand: Icc		25 kA	25 kA	25 kA	25 kA	25 kA
Degree of protection		IP 203	IP 203	IP 203	IP 203	IP 203
Associated breaking device:	p. 68					
- gG - gL fuse		25 A	25 A	25 A	25 A	25 A
- curve C circuit-breaker		40 A	40 A	40 A	40 A	40 A

Mechanical characteristics

L/N connection terminals:		
- solid wire		2.5 ... 25 mm ²
- stranded wire		2.5 ...16 mm ²
L/N stripping length		12.5 mm
L/N tightening torque		2 Nm
PE connection terminal:		
- solid wire		2.5 ... 25 mm ²
- stranded wire		2.5 ... 16 mm ²
PE stripping length		12.5 mm
PE tightening torque		2 Nm
Integrated thermal disconnecter		Yes
End of life indicator	p. 31	Yes
Optical Monitoring Block (BOS) compatibility	p. 31	Yes
Safety reserve (Res)	p. 31	Yes
Remote indicator (TS)	p. 31	Yes

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C
Operating temperature		-40°C to + 80° C
Maximum altitude		2000 m
Case material		PC blue Pantone 315
Reference standards		IEC 61643-1 / EN 61643-11
Weight		250 g 250 g 500 g 750 g 1000 g

Maintenance

Replacement cartridges	p. 65	C BP 15 400 Res Ref. 8152 50 01	C BP 15 230 Res Ref. 8152 50 02	C BP 15 400 Res Ref. 8152 50 01	C BP 15 400 Res Ref. 8152 50 01	C BP 15 400 Res Ref. 8152 50 01
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Single-block single-pole surge arresters

The single-block single-pole modular power Type 2 surge arresters (PU) provide protection for equipment against transient overvoltages that occur on the electrical network (mains).

The maximum available discharge currents (I_{max}) range from 15 to 100 kA (8/20 μ s waveform).

POWER Type 2

STANDARDS INFO

The modular power Type 2 surge arresters comply with IEC 61643-1 and EN 61643-11. The relevant standard for the installation of this type of surge arrester is: IEC 61643-12.

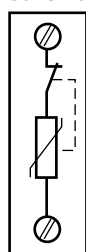


PU 15 400

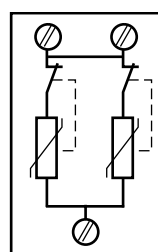


PU 100 400 Res

Schematic diagrams

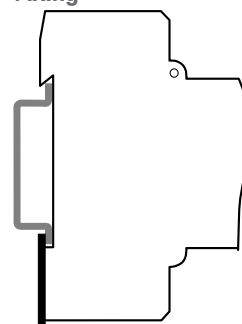


PU 15 / 40 / 65 kA



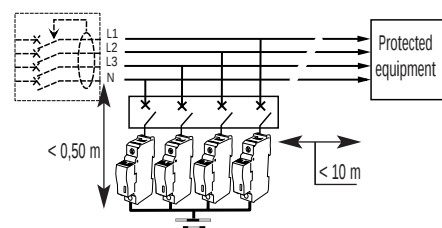
PU 100 kA

Fixing

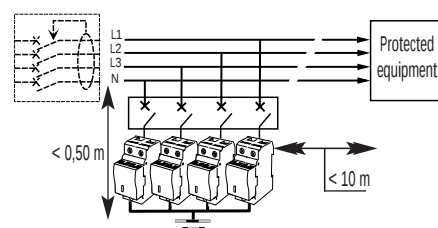


Simply clips onto DIN rail.

Connection

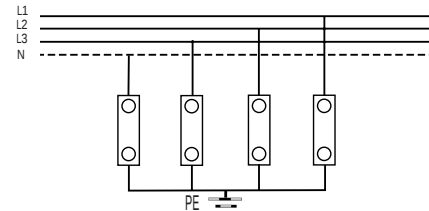


PU 15 / 40 / 65 kA (all models)

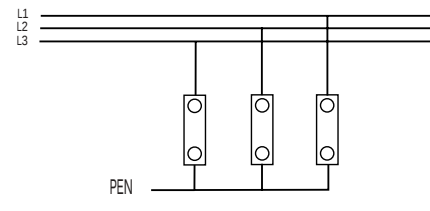


PU 100 kA

Types of network



TT - TNS - IT networks



TNC networks

Dimensions (mm)	W	H	D
PU 15 / 40 / 65 kA (all models)	17,5	85	63
PU 100 (all models)	35	85	63

PRATICAL INFO

Modular power Type 2 surge arresters are installed in main switchboards and in sub-distribution boards using DIN rail. They are used for common mode protection.

MORE INFO

Electrical characteristics

Types of network	p. 16	IT - TNC - TNS - TT	IT - TNC - TNS - TT	IT - TNC - TNS - TT	IT - TNC - TNS - TT	IT - TNC - TNS - TT
Number of poles		1	1	1	1	1
Type of surge arrester		2	2	2	2	2
Type of current		A.C.	A.C.	A.C.	A.C.	A.C.
Nominal voltage: Un	p. 12	400 V	400 V	400 V	400 V	400 V
Max cont operating voltage: Uc	p. 13	440 V	440 V	440 V	440 V	440 V
Voltage protection level: Up at In	p. 12	1.8 kV	1.8 kV	1.8 kV	1.8 kV	1.8 kV
Residual voltage : Ures (at 3 kA)	p. 12	1.5 kV	1.4 kV	1.4 kV	1.3 kV	1.2 kV
Nominal discharge current: In (8/20)	p. 12	5 kA	10 kA	10 kA	20 kA	30 kA
Maximum discharge current: Imax (8/20)	p. 12	15 kA	40 kA	40 kA	65 kA	100 kA
TOV withstand: Ut (5s)	p. 13	440 V	440 V	440 V	440 V	440 V
Operating current: Ic		< 1 mA	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Short-circuit withstand: Icc		10 kA	25 kA	25 kA	25 kA	25 kA
Degree of protection		IP 203	IP 203	IP 203	IP 203	IP 203
Associated breaking device:	p. 68					
- gG - gL fuse		16 A	16 A	16 A	20 A	25 A
- curve C circuit-breaker		10 A	25 A	25 A	32 A	40 A

Mechanical characteristics

L/N connection terminals:					
- solid wire		2.5 ... 25 mm ²	2.5 ... 25 mm ²	2.5 ... 25 mm ²	2.5 ... 25 mm ²
- stranded wire		2.5 ... 16 mm ²	2.5 ... 16 mm ²	2.5 ... 16 mm ²	2.5 ... 16 mm ²
L/N stripping length		12.5 mm	12.5 mm	12.5 mm	12.5 mm
L/N tightening torque		2 Nm	2 Nm	2 Nm	2 Nm
PE connection terminal:					
- solid wire		2.5 ... 25 mm ²	2.5 ... 25 mm ²	2.5 ... 25 mm ²	2.5 ... 50 mm ²
- stranded wire		2.5 ... 16 mm ²	2.5 ... 16 mm ²	2.5 ... 16 mm ²	2.5 ... 35 mm ²
PE stripping length		12.5 mm	12.5 mm	12.5 mm	15 mm
PE tightening torque		2 Nm	2 Nm	2 Nm	3.5 Nm
Integrated thermal disconnecter		Yes	Yes	Yes	Yes
End of life indicator	p. 31	Yes	Yes	Yes	Yes
Optical Monitoring Block (BOS) compatibility	p. 31	Yes	Yes	Yes	Yes
Safety reserve (Res)	p. 31	No	No	Yes	Yes
Remote indicator (TS)	p. 31	No	No	No	No

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C				
Operating temperature		-40°C to + 80° C				
Maximum altitude		2000 m				
Case material		PC blue Pantone 315				
Reference standards		IEC 61643-1 / EN 61643-11				
Weight		150 g	150 g	150 g	150 g	300 g

* : These surge arresters are also available in 230 V

Single-block multi-pole surge arresters

POWER Type 2 and Type 3

The single-block multi-pole modular power Type 2 surge arresters (PM) provide protection for equipment against transient overvoltages that occur on the electrical network (mains).

The maximum available discharge currents (I_{max}) range from 15 to 100 kA (8/20 μ s waveform).

The range consists of 2 and 4-pole models.

Modular power Type 3 surge arresters PM8 ($I_{max} = 8$ kA for 8/20 μ s waveform, nominal discharge current = 3 kA) are used for common and differential mode protection (series or parallel).

They are available in 2-pole models with remote indication (TS) and audible signal (B = Buzzer) options.

STANDARDS INFO

The modular power Type 2 and Type 3 surge arresters comply with IEC 61643-1 and EN 61643-11. The relevant standard for the installation of this type of surge arrester is: IEC 61643-12.



PM 8

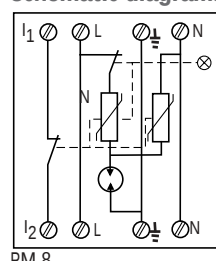


PM 15 Bi

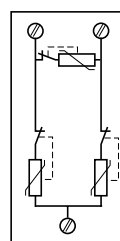


PM 65 Tétra Res

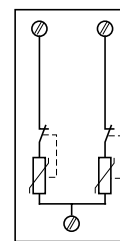
Schematic diagrams



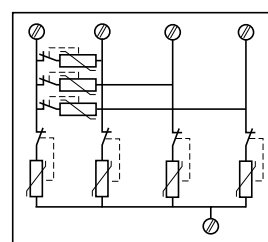
PM 8



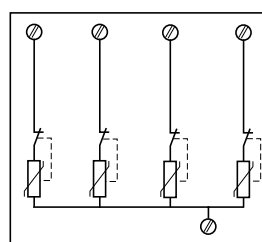
PM 15 / 40 Bi



PM 65 Bi

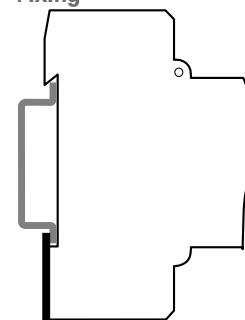


PM 15 / 40 Tétra



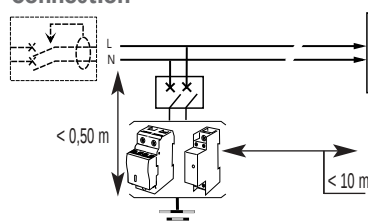
PM 65 Tétra

Fixing

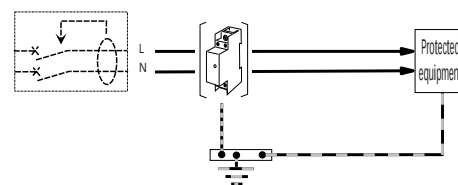


Simply clips onto DIN rail.

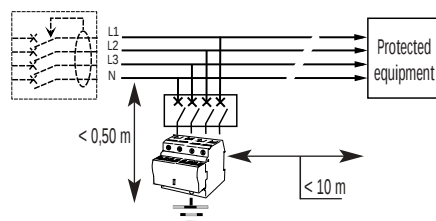
Connection



PM Bi (all models) and PM 8 in parallel (all models)



PM 8 in series (all models)



PM Tétra (all models)

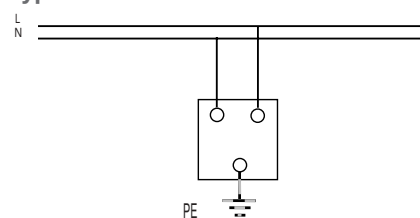
Dimensions (mm)	W	H	D
PM 8 (all models)	17,5	85	63
PM Bi (all models)	35	85	63
PM Tétra (all models)	70	85	63

PRATICAL INFO

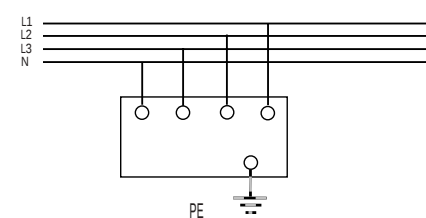
Modular power Type 2 and 3 surge arresters are installed in sub-distribution boards using DIN rail.

They provide common mode and differential mode protection (apart from PM65 models, common mode only).

Types of network



TT - TNS networks (2-pole models)



TT - TNS networks (4-pole models)

MORE INFO

Electrical characteristics

		8 kA				15 kA		40 kA		65 kA	
		PM 8 Ref. 8744 06 07	PM 8 TS Ref. 8744 06 08	PM 8 B Ref. 8744 06 09	PM 8 B TS Ref. 8744 06 10	PM 15 Bipolaire Ref. 8144 00 00	PM 15 Tétrapolaire Ref. 8146 00 00	PM 40 Bipolaire Ref. 8144 01 00	PM 40 Tétrapolaire Ref. 8146 01 00	PM 65 Bipolaire Res Ref. 8144 02 00	PM 65 Tétrapolaire Res Ref. 8146 02 00
Types of network	p. 16	TNS - TT				TNS - TT		TNS - TT		TNS - TT	
Number of poles		2				2	4	2	4	2	4
Type of surge arrester		3				2		2		2	
Type of current		A.C.				A.C.		A.C.		A.C.	
Nominal voltage: Un	p. 12	230 V				230 V		230 V		230 V	
Max cont operating voltage: Uc (L-N / L-PE - N-PE)	p. 13	260 V				275 / 440 V		275 / 440 V		N.A / 440 V	
Voltage protection level: Up at In (L-N / L-PE - N-PE)	p. 12	1.2 / 0.8 kV				1.2 / 1.8 kV		1.2 / 1.8 kV		N.A / 1.8 kV	
Residual voltage : Ures (at 3 kA)	p. 12	/				1 / 1.5 kV		0.9 / 1.4 kV		N.A / 1.3 kV	
Open circuit voltage: Uoc	p. 12	6 kA				/		/		/	
Nominal discharge current: In (8/20)	p. 13	3 kA				5 kA		10 kA		20 kA	
Maximum discharge current: Imax (8/20)		8 kA				15 kA		40 kA		65 kA	
Temporary overvoltages: Ut (5 s.) (L-N / L-PE)		334 V				340 / 440 V		340 / 440 V		N.A / 440 V	
Charging current: IL		16 A				/		/		/	
Operating current: Ic	p. 68	< 4 mA				< 1 mA		< 1 mA		< 1 mA	
Short-circuit withstand: Icc		6 kA				10 kA		25 kA		25 kA	
Degree of protection		IP 20				IP 203		IP 203		IP 203	
Associated breaking device:											
- gG - gL fuse		16 A				16 A		16 A		20 A	
- curve C circuit-breaker		16 A				10 A		25 A		32 A	

Mechanical characteristics

L/N connection terminals:											
- solid wire		2.5 mm ²				2.5 ... 25 mm ²		2.5 ... 25 mm ²		2.5 ... 25 mm ²	
- stranded wire		2.5 mm ²				2.5 ... 16 mm ²		2.5 ... 16 mm ²		2.5 ... 16 mm ²	
L/N stripping length		12.5 mm				12.5 mm		12.5 mm		12.5 mm	
L/N tightening torque		2 Nm				2 Nm		2 Nm		2 Nm	
PE connection terminal:											
- solid wire		2.5 mm ²				2.5 ... 50 mm ²		2.5 ... 50 mm ²		2.5 ... 50 mm ²	
- stranded wire		2.5 mm ²				2.5 ... 35 mm ²		2.5 ... 35 mm ²		2.5 ... 35 mm ²	
PE stripping length		12.5 mm				15 mm		15 mm		15 mm	
PE tightening torque		2 Nm				3.5 Nm		3.5 Nm		3.5 Nm	
Integrated thermal disconnecter		Yes				Yes		Yes		Yes	
End of life indicator	p. 31	Yes				Yes		Yes		Yes	
Optical Monitoring Block (BOS) compatibility	p. 31	No				Yes		Yes		Yes	
Safety reserve (Res)	p. 31	No				No		No		Yes	
Remote indicator (TS)	p. 31	No	Yes	No	Yes	No		No		No	

Miscellaneous characteristics

Storage temperature		-15°C to + 60° C				-40°C to + 80° C					
Operating temperature		-25°C to + 60° C				-40°C to + 80° C					
Maximum altitude		2000 m				2000 m					
Case material		PC grey blue				PC blue Pantone 315					
Reference standards		IEC 61643-1 / EN 61643-11				IEC 61643-1 / EN 61643-11					
Weight		25 g	25 g	25 g	25 g	200 g	400 g	200 g	400 g	200 g	400 g

Pluggable single-pole surge arresters

The pluggable single-pole modular power Type 2 surge arresters (PUD) provide protection for equipment against transient overvoltages that occur on the electrical network (mains).

The maximum available discharge currents (I_{max}) range from 15 to 100 kA (8/20 μ s waveform).

POWER Type 2

STANDARDS INFO

The pluggable single-pole power Type 2 surge arresters comply with IEC 61643-1 and EN 61643-11.

The relevant standard for the installation of this type of surge arrester is: IEC 61643-12.



PUD 15 400

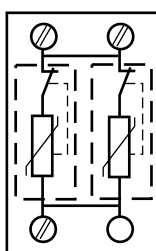


PUD 100 400 Res TS

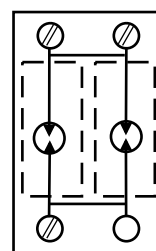
Schematic diagrams



PUD 15 / 40 / 65 kA

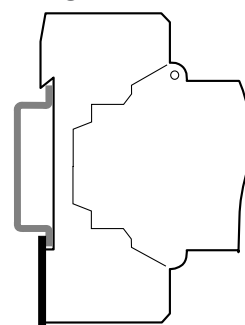


PUD 100 kA



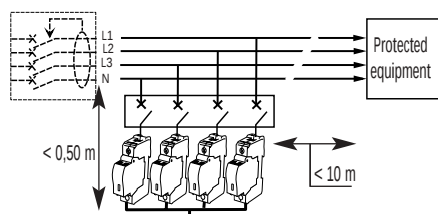
PUD 100 Neutre

Fixing

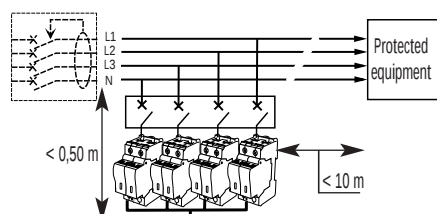


Simply clips onto DIN rail.

Connection



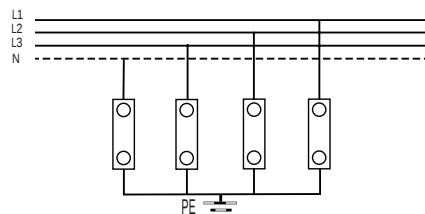
PUD 15 / 40 / 65 kA (all models)



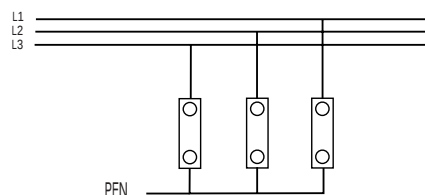
PUD 100 kA (all models)

Dimensions (mm)	W	H	D
PUD 15 / 40 / 65 kA (all models)	17,5	85	63
PUD 100 kA (all models)	35	85	63

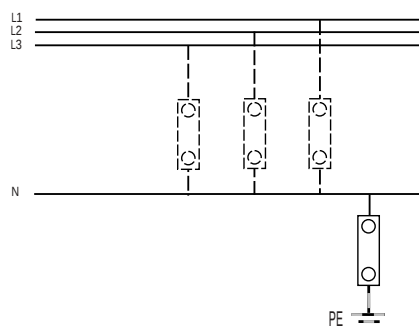
Types of network



TT - TNS - IT networks
(PUD all models)



TNC networks
(PUD all models)



TT network (PUD 100 Neutre)

PRATICAL INFO

Pluggable single-pole surge arresters (PUD) are installed in sub-distribution boards using DIN rail.

They are used for common mode protection. Maintenance is made easier with pluggable surge arresters as replacement cartridges can be simply plugged-in without the need to isolate the circuit.

MORE INFO

Electrical characteristics

		15 kA			40 kA			65 kA		100 kA		
		PUD 15 400 Ref. 8143 00 03	PUD 15 400 TS Ref. 8143 00 02	PUD 15 400 Res TS Ref. 8143 00 08	PUD 40 400 Ref. 8143 01 03	PUD 40 400 TS Ref. 8143 01 02	PUD 40 400 Res TS Ref. 8143 01 08	PUD 65 400 Res Ref. 8143 02 02	PUD 65 400 Res TS Ref. 8143 02 03	PUD 100 400 Res TS Ref. 8143 06 02	PUD 100 230 Res TS Ref. 8143 06 00	PUD 100 Neutre Ref. 8143 06 01
Types of network	p. 16	IT - TNC - TNS - TT			IT - TNC - TNS - TT			IT - TNC - TNS - TT		IT-TNC-TNS-TT	TNC-TNS-TT	TT
Number of poles		1			1			1		1	1	1
Type of surge arrester		2			2			2		2	2	2
Type of current		A.C.			A.C.			A.C.		A.C.	A.C.	A.C.
Nominal voltage: Un	p. 12	400 V			400 V			400 V		400 V	230 V	/
Max cont operating voltage: Uc	p. 13	440 V			440 V			440 V		440 V	275 V	255 V
Voltage protection level: Up at In	p. 12	1.8 kV			1.8 kV			1.8 kV		1.8 kV	1.2 kV	1.2 kV
Residual voltage : Ures (at 3 kA)	p. 12	1.5 kV			1.4 kV			1.3 kV		1.2 kV	700 V	1.2 kV
Nominal discharge current: In (8/20)	p. 12	5 kA			15 kA			20 kA		30 kA	30 kA	30 kA
Maximum discharge current: I _{max} (8/20)	p. 13	15 kA			40 kA			65 kA		100 kA	100 kA	100 kA
TOV withstand: Ut (5s)	p. 13	440 V			440 V			440 V		440 V	340 V	/
Operating current: Ic		< 1 mA			< 1 mA			< 1 mA		< 1 mA	< 1 mA	< 1 mA
Short-circuit withstand: I _{cc}		10 kA			25 kA			25 kA		25 kA	25 kA	25 kA
Degree of protection		IP 203			IP 203			IP 203		IP 203	IP 203	IP 203
Associated breaking device:	p. 68											
- gG - gL fuse		16 A			16 A			20 A		25 A	25 A	80 A
- curve C circuit-breaker		10 A			25 A			32 A		40 A	40 A	40 A

Mechanical characteristics

L/N connection terminals:												
- solid wire		2.5 ... 25 mm ²			2.5 ... 25 mm ²			2.5 ... 25 mm ²		2.5 ... 25 mm ²		
- stranded wire		2.5 ... 16 mm ²			2.5 ... 16 mm ²			2.5 ... 16 mm ²		2.5 ... 16 mm ²		
L/N stripping length		12.5 mm			12.5 mm			12.5 mm		12.5 mm		
L/N tightening torque		2 Nm			2 Nm			2 Nm		2 Nm		
PE connection terminal:												
- solid wire		2.5 ... 25 mm ²			2.5 ... 25 mm ²			2.5 ... 25 mm ²		2.5 ... 25 mm ²		
- stranded wire		2.5 ... 16 mm ²			2.5 ... 16 mm ²			2.5 ... 16 mm ²		2.5 ... 16 mm ²		
PE stripping length		12.5 mm			12.5 mm			12.5 mm		12.5 mm		
PE tightening torque		2 Nm			2 Nm			2 Nm		2 Nm		
Integrated thermal disconnector		Yes			Yes			Yes		Yes		
End of life indicator	p. 31	Yes			Yes			Yes		Yes		No
Optical Monitoring Block (BOS) compatibility	p. 31	Yes			Yes			Yes		Yes		No
Safety reserve (Res)	p. 31	No	No	Yes	No	No	Yes	Yes	Yes	Yes		No
Remote indicator (TS)	p. 31	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes		No

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C										
Operating temperature		-40°C to + 80° C										
Maximum altitude		2000 m										
Case material		PC blue Pantone 315										
Reference standards		IEC 61643-1 / EN 61643-11										
Weight		150 g	150 g	150 g	150 g	150 g	150 g	150 g	150 g	250 g	250 g	250 g

Maintenance

Replacement cartridges p. 65

C 15 400 Ref. 8143 03 03	C 15 400 Ref. 8143 03 03	C 15 400 Res Ref. 8143 03 02	C 40 400 Ref. 8143 04 03	C 40 400 Ref. 8143 04 03	C 40 400 Res Ref. 8143 04 02	C 65 400 Res Ref. 8143 05 02	C 65 400 Res Ref. 8143 05 02	2 x C 65 400 Res Ref. 8143 05 02	2 x C 65 230 Res Ref. 8143 05 00	2 x C Neutre Ref. 8143 05 10
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* : These surge arresters are also available in 230 V

Pluggable multi-pole surge arresters

POWER type 2

The pluggable multi-pole modular power Type 2 surge arresters (PMD) provide protection for equipment against transient overvoltages that occur on the electrical network (mains).

The maximum available discharge currents (I_{max}) range from 15 to 100 kA (8/20 μ s waveform).

The range consists of 2 and 4-pole models.

STANDARDS INFO

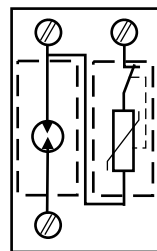
The pluggable multi-pole power Type 2 surge arresters comply with IEC 61643-1 and EN 61643-11.

The relevant standard for the installation of this type of surge arrester is: IEC 61643-12.



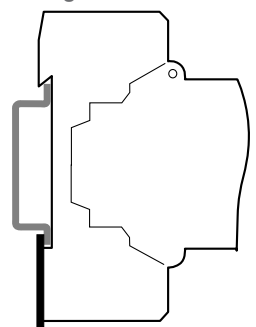
PMD 15 57 Bi Res TS

Schematic diagrams



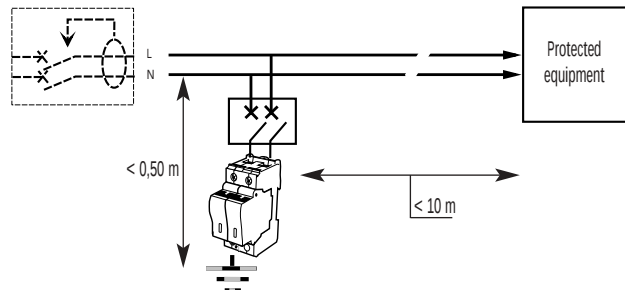
PMD Bi 15 / 40 / 65 kA

Fixing



Simply clips onto DIN rail.

Connection



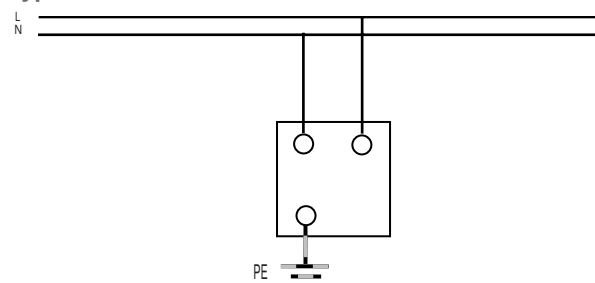
PMD Bi (all models)

No marking for connection of PMD 15 57 Bi Res TS (voltage Uno 70 V~ max.)



PMD 15 Bi Res TS

Types of network



TT - TNS networks

Dimensions (mm)	W	H	D
PM D Bi (all models)	35	85	63

PRATICAL INFO

Pluggable multi-pole surge arresters (PMD) are installed in sub-distribution boards using DIN rail.

They are used for common and differential mode protection.

Maintenance is made easier with pluggable surge arresters as replacement cartridges can be simply plugged-in without the need to isolate the circuit.

MORE INFO

Electrical characteristics

		15 kA				40 kA			65 kA	
		PMD 15 57 Bi Res TS Ref. 8147 00 10	PMD 15 Bi Ref. 8147 00 02	PMD 15 Bi TS Ref. 8147 00 04	PMD 15 Bi Res TS Ref. 8147 00 03	PMD 40 Bi Ref. 8147 01 02	PMD 40 Bi TS Ref. 8147 01 04	PMD 40 Bi Res TS Ref. 8147 01 03	PMD 65 Bi Res Ref. 8147 02 02	PMD 65 Bi Res TS Ref. 8147 02 03
Types of network	p. 16	TNC - TNS - TT	TNS - TT				TNS - TT			TNS - TT
Number of poles		2	2				2			2
Type of surge arrester		2	2				2			2
Type of current		A.C. / C.C.	A.C.				A.C.			A.C.
Nominal voltage: Un	p. 12	57 V	230 V				230 V			230 V
Max cont operating voltage: Uc (L-N / L-PE - N-PE)	p. 13	70 V	275 / 440 V				275 / 440 V			275 / 440 V
Voltage protection level: Up at In (L-N / L-PE - N-PE)	p. 12	0.3 / 0.6 kV	1.2 / 1.2 kV				1.2 / 1.2 kV			1.2 / 1.2 kV
Residual voltage : Ures (at 3 kA)	p. 12	/	1 / 1 kV				0.9 / 0.9 kV			0.85 / 0.85 kV
Nominal discharge current: In (8/20)	p. 12	5 kA	5 kA				15 kA			20 kA
Maximum discharge current: Imax (8/20)	p. 12	15 kA	15 kA				40 kA			65 kA
Temporary overvoltages: Ut (5 s.) (L-N / L-PE)	p. 13	N.A	340 / 440 V				340 / 440 V			340 / 440 V
Operating current: Ic		< 1 mA	< 1 mA				< 1 mA			< 1 mA
Short-circuit withstand: Icc		10 kA	10 kA				25 kA			25 kA
Degree of protection		IP 203	IP 203				IP 203			IP 203
Associated breaking device:	p. 68									
- gG - gL fuse		16 A	16 A				16 A			20 A
- curve C circuit-breaker		10 A	10 A				25 A			32 A

Mechanical characteristics

L/N connection terminals:										
- solid wire		2.5 ... 25 mm ²				2.5 ... 25 mm ²			2.5 ... 25 mm ²	
- stranded wire		2.5 ... 16 mm ²				2.5 ... 16 mm ²			2.5 ... 16 mm ²	
L/N stripping length		12.5 mm				12.5 mm			12.5 mm	
L/N tightening torque		2 Nm				2 Nm			2 Nm	
PE connection terminal:										
- solid wire		2.5 ... 25 mm ²				2.5 ... 25 mm ²			2.5 ... 25 mm ²	
- stranded wire		2.5 ... 16 mm ²				2.5 ... 16 mm ²			2.5 ... 16 mm ²	
PE stripping length		12.5 mm				12.5 mm			12.5 mm	
PE tightening torque		2 Nm				2 Nm			2 Nm	
Integrated thermal disconnecter		Yes				Yes			Yes	
End of life indicator	p. 31	Yes				Yes			Yes	
Optical Monitoring Block (BOS) compatibility	p. 31	Yes				Yes			Yes	
Safety reserve (Res)	p. 31	Yes	No	No	Yes	No	No	Yes	Yes	Yes
Remote indicator (TS)	p. 31	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C								
Operating temperature		-40°C to + 80° C								
Maximum altitude		2000 m								
Case material		PC blue Pantone 315								
Reference standards		IEC 61643-1 / EN 61643-11								
Weight		200 g								

Maintenance

Replacement cartridges	p. 65	2 x C 15 57 Res Ref. 8143 03 17	C Neutre Ref. 8143 05 10 C 15 230 Ref. 8143 03 01	C Neutre Ref. 8143 05 10 C 15 230 Res Ref. 8143 03 00	C Neutre Ref. 8143 05 10 C 40 230 Ref. 8143 04 01	C Neutre Ref. 8143 05 10 C 40 230 Res Ref. 8143 04 00	C Neutre Ref. 8143 05 10 C 65 230 Res Ref. 8143 05 00
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Pluggable multi-pole surge arresters

POWER Type 2

The pluggable multi-pole modular power Type 2 surge arresters (PMD) provide protection for equipment against transient overvoltages that occur on the electrical network (mains).

The maximum available discharge currents (I_{max}) range from 15 to 100 kA (8/20 μ s waveform).

The range consists of 2 and 4-pole models.

STANDARDS INFO

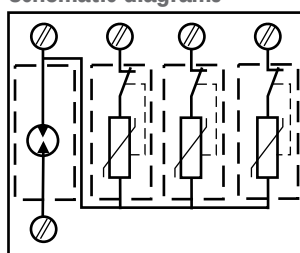
The pluggable multi-pole power Type 2 surge arresters comply with IEC 61643-1 and EN 61643-11.

The relevant standard for the installation of this type of surge arrester is: IEC 61643-12.



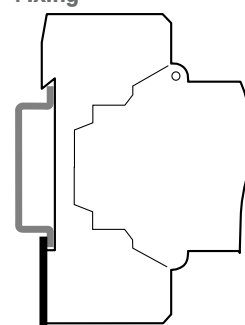
PMD 15 Tétra Res TS

Schematic diagrams



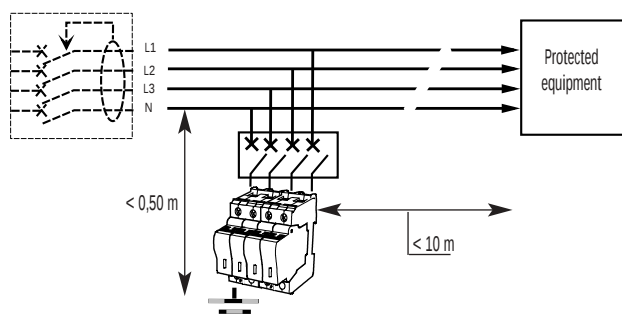
PMD Tétra 15 / 40 / 65 kA

Fixing



Simply clips onto DIN rail.

Connection

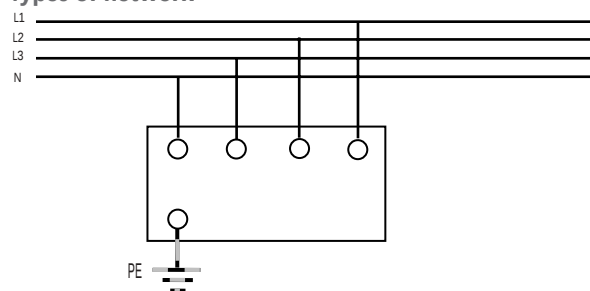


PMD Tétra (all models)



PMD 40 Tétra Res TS

Types of network



TT - TNS networks

Dimensions (mm)	W	H	D
PMD Tétra (all models)	70	85	63

PRATICAL INFO

Pluggable multi-pole surge arresters (PMD) are installed in sub-distribution boards using DIN rail.

They are used for common and differential mode protection.

Maintenance is made easier with pluggable surge arresters as replacement cartridges can be simply plugged-in without the need to isolate the circuit.

MORE INFO

Electrical characteristics

		15 kA			40 kA			65 kA	
		PMD 15 T�tra Ref. 8149 00 02	PMD 15 T�tra TS Ref. 8149 00 04	PMD 15 T�tra Res TS Ref. 8149 00 03	PMD 40 T�tra Ref. 8149 01 02	PMD 40 T�tra TS Ref. 8149 01 04	PMD 40 T�tra Res TS Ref. 8149 01 03	PMD 65 T�tra Res Ref. 8149 02 02	PMD 65 T�tra Res TS Ref. 8149 02 03
Types of network	p. 16	TNS - TT			TNS - TT			TNS - TT	
Number of poles		4			4			4	
Type of surge arrester		2			2			2	
Type of current		A.C.			A.C.			A.C.	
Nominal voltage: Un	p. 12	230 V			230 V			230 V	
Max cont operating voltage: Uc (L-N / L-PE - N-PE)	p. 13	275 / 440 V			275 / 440 V			275 / 440 V	
Voltage protection level: Up at In (L-N / L-PE - N-PE)	p. 12	1.2 / 1.2 kV			1.2 / 1.2 kV			1.2 / 1.2 kV	
Residual voltage : Ures (at 3 kA)	p. 12	1 / 1 kV			0.9 / 0.9 kV			0.85 / 0.85 kV	
Nominal discharge current: In (8/20)	p. 12	5 kA			15 kA			20 kA	
Maximum discharge current: Imax (8/20)	p. 12	15 kA			40 kA			65 kA	
Temporary overvoltages: Ut (5 s.) (L-N / L-PE)	p. 13	340 / 440 V			340 / 440 V			340 / 440 V	
Operating current: Ic		< 1 mA			< 1 mA			< 1 mA	
Short-circuit withstand: Icc		10 kA			25 kA			25 kA	
Degree of protection		IP 203			IP 203			IP 203	
Associated breaking device:	p. 68								
- gG - gL fuse		16 A			16 A			20 A	
- curve C circuit-breaker		10 A			25 A			32 A	

Mechanical characteristics

L/N connection terminals:									
- solid wire		2.5 ... 25 mm ²							
- stranded wire		2.5 ... 16 mm ²							
L/N stripping length		12.5 mm							
L/N tightening torque		2 Nm							
PE connection terminal:									
- solid wire		2.5 ... 25 mm ²							
- stranded wire		2.5 ... 16 mm ²							
PE stripping length		12.5 mm							
PE tightening torque		2 Nm							
Integrated thermal disconnecter		Yes							
End of life indicator	p. 31	Yes							
Optical Monitoring Block (BOS) compatibility	p. 31	Yes							
Safety reserve (Res)	p. 31	No	No	Yes	No	No	Yes	Yes	Yes
Remote indicator (TS)	p. 31	No	Yes	Yes	No	Yes	Yes	No	Yes

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C							
Operating temperature		-40°C to + 80° C							
Maximum altitude		2000 m							
Case material		PC blue Pantone 315							
Reference standards		IEC 61643-1 / EN 61643-11							
Weight		400 g							

Maintenance

Replacement cartridges

p. 65

1 x C Neutre
Ref. 8143 05 10
3 x C 15 230
Ref. 8143 03 01

1 x C Neutre
Ref. 8143 05 10
3 x C 15 230 Res
Ref. 8143 03 00

1 x C Neutre
Ref. 8143 05 10
3 x C 40 230
Ref. 8143 04 01

1 x C Neutre
Ref. 8143 05 10
3 x C 40 230 Res
Ref. 8143 04 00

1 x C Neutre
Ref. 8143 05 10
3 x C 65 230 Res
Ref. 8143 05 00

Surge Arrester Enclosures

The surge arrester enclosures are available with 5 discharge capacities: 15, 25, 40 and 65 kA (8/20 waveform) and 15 kA (10/350 waveform) for single-phase and three-phase networks; they provide protection against transient overvoltages that occur on the electrical network (mains). Enclosures fitted with power Type 1 surge arresters (CP T1) have been especially designed for sites protected by a lightning conductor or for high lightning strike density areas, and are able to stand a shock current of 15 kA (10/350 waveform).

POWER in common mode

STANDARDS INFO

The enclosure mounted surge arresters comply with IEC 61643-1 and EN 61643-11. The relevant standard for the installation of this type of enclosure is: IEC 61643-12.

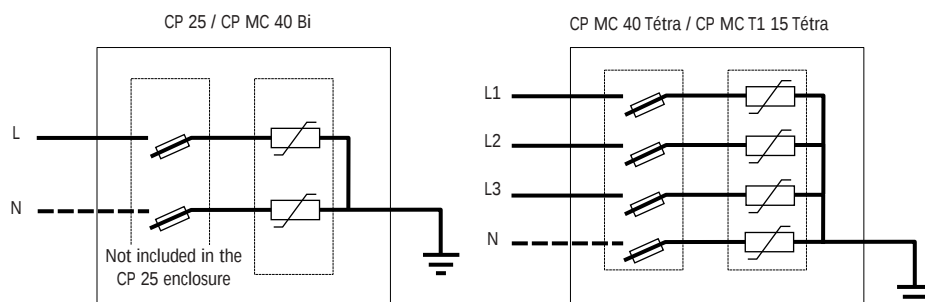
Schematic diagram (common mode)



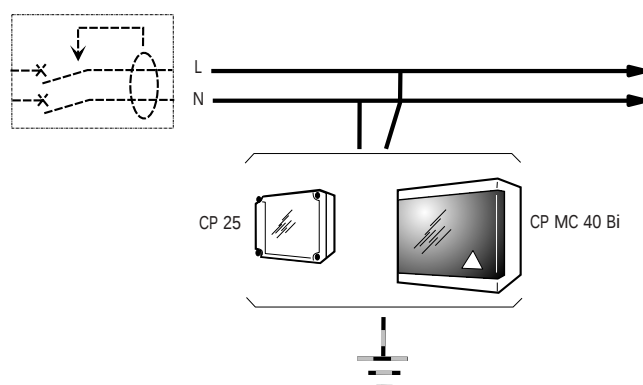
CP 25



CP MC 40 Bi



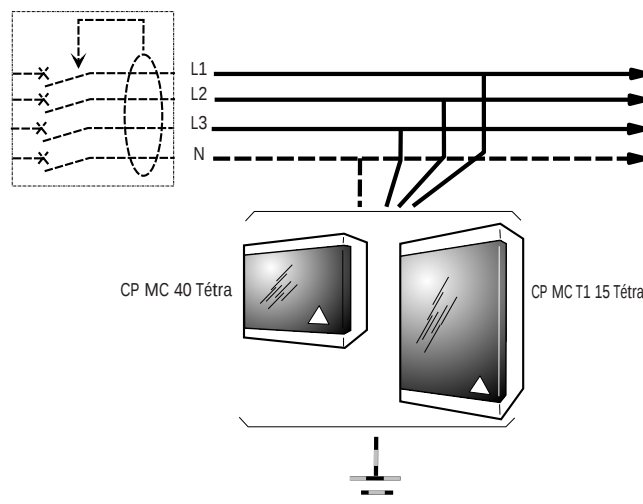
Connection of 2-pole enclosures



Fixings

CP 25 : 173 mm
 CP MC 40 Bi / Tétrà : 164 mm
 CP MC T1 15 Tétrà : 164 mm
 ø. 4,5 x 4
 CP 25 : 120 mm
 CP MC 40 Bi / Tétrà : 90 mm
 CP MC T1 15 Tétrà : 440 mm

Connection of 4-pole enclosures



Dimensions (mm)	W	H	D
CP 25	185	150	120
CP MC 40 Bi / Tétrà	275	250	140
CP MC T1 15 Tétrà	275	630	140

PRATICAL INFO

The surge arrester enclosures are to be fitted at the head of the electrical installation.

The surge arrester enclosures provide common mode (MC) protection or common mode and differential mode (MC/MD) protection, depending on the model.

PLUS' INFO

Electrical characteristics ***

		25 kA (Type 2)	40 kA (Type 2)	15 kA (Type 1)
		CP 25 Ref. 8802 04 02	CP MC 40 Bi Ref. 2351 18 00	CP MC 40 Tétra Ref. 2351 18 01
Types of network	p. 16	TNS - TT	TNS - TT- IT - TNC	TNC - IT
Number of poles		2	2	4
Type of surge arrester		2	2	1
Type of current		A.C.	A.C.	A.C.
Nominal voltage: Un	p. 12	230 V/400 V	230 V/400 V	230 V/400 V
Max cont operating voltage: Uc (L/Earth)	p. 13	440 V	440 V	440 V
Voltage protection level: Up (at In)	p. 12	1.8 kV	1.8 kV	1.2 kV
Nominal discharge current: In (8/20)	p. 12	5 kA	15 kA	5 kA
Maximum discharge current	p. 12	25 kA (8/20)	40 kA (8/20)	15 kA (10/350)
TOV withstand: Ut (5s)	p. 13	440 V	440 V	1500 V
Follow current : If		without	without	without
Operating current		< 1.2 mA	< 1 mA	< 2 mA
Short-circuit withstand : Icc		25 kA	25 kA	25 kA
Redundancy		/	/	with
Breaking device (associated*, included**):	p. 68			
- gG - gL fuse		25 A*	25 A**	63 A**
- curve C circuit-breaker		25 A*	/	/

Mechanical characteristics ***

Enclosure terminal capacity:		
- max. cross-section (solid and stranded wire)		25 ^{mm2}
- min. cross-section (solid and stranded wire)		16 ^{mm2}
PE connection terminal:		
- max. cross-section (solid and stranded wire)		50 ^{mm2}
- min. cross-section (solid and stranded wire)		35 ^{mm2}
Degree of protection		IP 65
Integrated thermal disconnecter		Yes
State indicator	p. 31	Yes
Optical Monitoring Block (BOS) compatibility	p. 31	Yes
Safety reserve (Res)	p. 31	No
Remote indicator (TS)	p. 31	No

Miscellaneous characteristics ***

Storage temperature		-40°C to + 80° C
Operating temperature		-40°C to + 80° C
Maximum altitude		2000 m
Fire withstand		UL 94 VO self-extinguishing
Reference standards	EN 61643-11	IEC 61643-1 / EN 61643-11
Case colour		Grey RAL 7035
Weight	< 2 kg	2.2 kg

Maintenance

Replacement cartridges	p. 65	2 x C 40 400 Ref. 8143 04 03	4 x C 40 400 Ref. 8143 04 03	4 x C BP 15 400 Res Ref. : B 8152 50 01
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Surge Arrester Enclosures

The surge arrester enclosures are available with 4 discharge capacities: 15, 40 and 65 kA (8/20 waveform) and 15 kA (10/350 waveform) for single-phase and three-phase networks; they provide protection against transient overvoltages that occur on the electrical network (mains). Enclosures fitted with power Type 1 surge arresters (CP T1) have been especially designed for sites protected by a lightning conductor or for high lightning strike density areas, and are able to stand a shock current of 15 kA (10/350 waveform).

POWER in common and differential mode

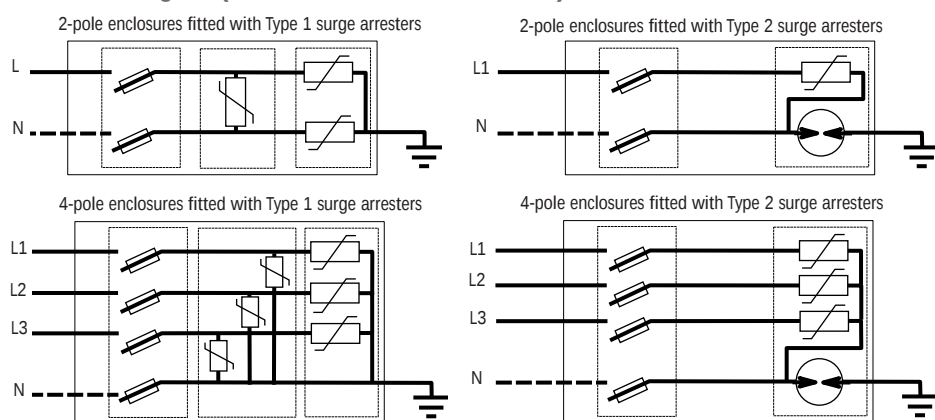
STANDARDS INFO

The enclosure mounted surge arresters comply with IEC 61643-1 and EN 61643-11. The relevant standard for the installation of this type of enclosure is: IEC 61643-12.

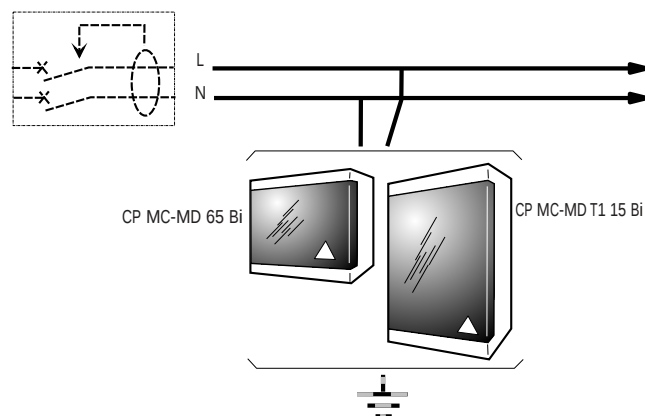


CP MC-MD T1 15 Tétrà

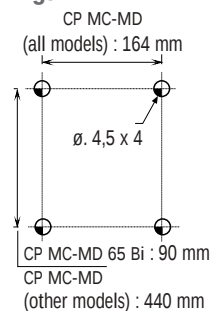
Schematic diagram (common and differential mode)



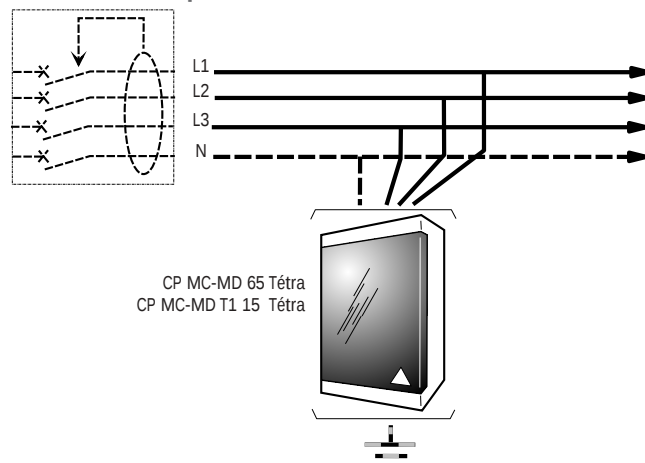
Connection of 2-pole enclosures



Fixings



Connection of 4-pole enclosures



Dimensions (mm)	W	H	D
CP MC-MD 65 Bi	275	250	140
CP MC-MD 65 Tétrà	275	630	140
CP MC-MD T1 (all models)	275	630	140

PRATICAL INFO

The surge arrester enclosures are to be fitted at the head of the electrical installation. The surge arrester enclosures provide common mode (MC) protection or common mode and differential mode (MC/MD) protection, depending on the model.

MORE INFO

Electrical characteristics ***

		65 kA (Type 2)		15 kA (Type 1)	
		CP MC-MD 65 Bi Ref. 2351 19 04	CP MC-MD 65 Tétra Ref. 2351 19 05	CP MC-MD T1 15 Bi Ref. 2351 19 06	CP MC-MD T1 15 Tétra Ref. 2351 19 07
Types of network	p. 16	TNS - TT	TNS - TT	TNS - TT	TNS - TT
Number of poles		2	4	2	4
Type of surge arrester		2	2	1	1
Type of current		A.C.	A.C.	A.C.	A.C.
Nominal voltage: Un	p. 12	230 V/400 V	230 V/400 V	230 V/400 V	230 V/400 V
Max cont operating voltage: Uc (L/N)	p. 13	275 V	275 V	440 V	440 V
Voltage protection level: Up (at In)	p. 12	1.2 kV	1.2 kV	1.2 kV	1.2 kV
Nominal discharge current: In (8/20)	p. 12	20 kA	20 kA	5 kA	5 kA
Maximum discharge current	p. 12	65 kA (8/20)	65 kA (8/20)	15 kA (10/350)	15 kA (10/350)
TOV withstand: Ut (5s)	p. 13	440 V	440 V	440 V	440 V
Follow current : If		without	without	without	without
Operating current		< 1 mA	< 1 mA	< 2 mA	< 2 mA
Short-circuit withstand : Icc		25 kA	25 kA	25 kA	25 kA
Redundancy		/	/	with	with
Included breaking device:	p. 68				
- gG - gL fuse		63 A	63 A	63 A	63 A
- curve C circuit-breaker		/	/	/	/

Mechanical characteristics ***

Enclosure terminal capacity:		
- max. cross-section (solid and stranded wire)		25 ^{mm2}
- min. cross-section (solid and stranded wire)		16 ^{mm2}
PE connection terminal:		
- max. cross-section (solid and stranded wire)		50 ^{mm2}
- min. cross-section (solid and stranded wire)		35 ^{mm2}
Degree of protection		IP 65
Integrated thermal disconnecter		Yes
State indicator	p. 31	Yes
Optical Monitoring Block (BOS) compatibility	p. 31	Yes
Safety reserve (Res)	p. 31	Yes
Remote indicator (TS)	p. 31	No

Miscellaneous characteristics ***

Storage temperature		-40°C to + 80° C
Operating temperature		-40°C to + 80° C
Maximum altitude		2000 m
Fire withstand		UL 94 VO self-extinguishing
Reference standards		IEC 61643-1 / EN 61643-11
Case colour		Grey RAL 7035
Weight		2.2 kg 2.4 kg 5.2 kg 6 kg

Maintenance

Replacement cartridges	p. 65	C Neutre Ref. 8143 05 10 C 65 230 Res Ref. 8143 0500	1 x C Neutre Ref. 8143 05 10 3 x C 65 230 Res Ref. 8143 0500	2 x C BP 15 400 Res Ref. : B 8152 50 01	4 x C BP 15 400 Res Ref. : B 8152 50 01
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*** : characteristics of surge arresters included in the enclosures

Protection Unit

POWER

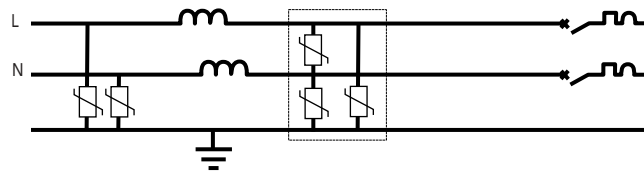
The protection units for electronic and electrical systems (PSEE) provide protection for sensitive equipment fed from the network against transient overvoltages that occur on the electrical network (mains). The PSEEs can supply equipment rated up to 100 kVA. They provide a high level of protection as they limit the voltage to 1 kV.

STANDARDS INFO

The Protection units for Electronic and Electrical Systems (PSEE) comply with IEC 61643-1 and EN 61643-11.
The relevant standard for the installation of this type of equipment is: IEC 61643-12.

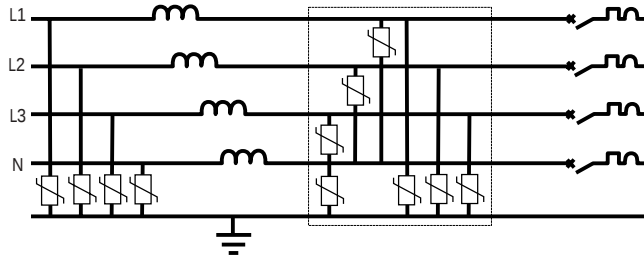
Schematic diagram

PSEE Mono (single-phase + neutral)



The 0.7 kVA single-phase PSEE does not have an incoming circuit-breaker. It has an optional 'operational' indicator lamp (between Phase and Neutral).

PSEE Tri (three-phase + neutral)



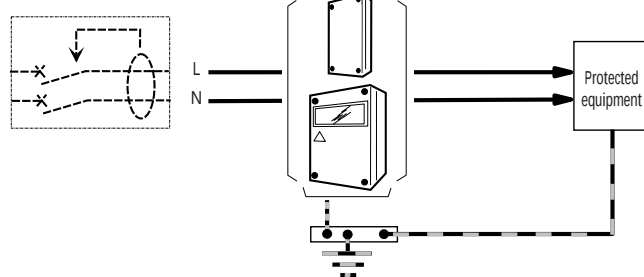
Certain part numbers incorporate the Safety + (S+) function achieved using the Optical Monitoring Block (BOS). This device provides global monitoring of the surge arresters' state, either locally or remotely by wiring the Remote Indicator contact (emitter module) to an external indicator lamp.



PSEE 1kVA mono S +

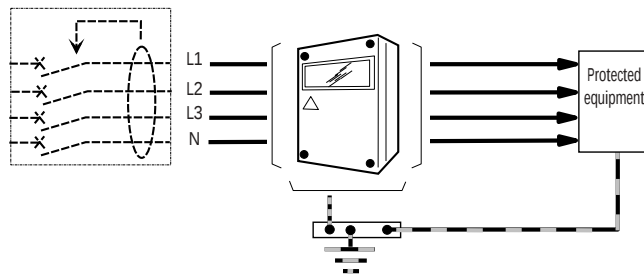
Connection

PSEE Mono (single-phase + neutral)



These models include an incoming circuit-breaker and an outgoing circuit-breaker.

PSEE Tri (three-phase + neutral)



Fixings

PSEE 0,7 kVA : 100 mm
PSEE Mono (all models) : 190 mm
PSEE Tri (all models) : 244 mm

ø. 4,5 x 4

PSEE 0,7 kVA : 250 mm
PSEE Mono (all models) : 240 mm
PSEE Tri (all models) : 314 mm

Dimensions (mm)	W	H	D
PSEE 0,7 kVA	130	262	105
PSEE Mono (all models)	220	270	120
PSEE Tri (all models)	270	340	120

PRATICAL INFO

The PSEEs are fitted in series with the electrical supply, nearby the equipment to be protected. The PSEEs provide common mode and differential mode (MC / MD) protection.

MORE INFO

Electrical characteristics

		40 kA (8/20 waveform)					
		PSEE 0.7 kVA Ref. 8805 07 00	PSEE 1 kVA Mono S+ Ref. 8805 01 01	PSEE 3 kVA Mono S+ Ref. 8805 03 01	PSEE 5 kVA Mono S+ Ref. 8805 05 01	PSEE 3 kVA Tri Ref. 8806 03 00	PSEE 5 kVA Tri Ref. 8806 05 00
Types of network	p. 16	Single-phase	Single-phase	Single-phase	Single-phase	Three-phase	Three-phase
Output power		0.7 kVA	1 kVA	3 kVA	5 kVA	3 kVA	5 kVA
Rated current		3 A	4 A	13 A	20 A	4 A	7 A
D1: incoming circuit-breaker I _{sc} curve C		No	25 A Cct-breaker	25 A Cct-breaker	25 A Cct-breaker	25 A Cct-breaker	25 A Cct-breaker
D2: outgoing circuit-breaker I _{sc} 6 kA		5 A fuse	6 A Cct-breaker	16 A Cct-breaker	20 A Cct-breaker	6 A Cct-breaker	10 A Cct-breaker
Max cont operating voltage: U _c	p. 13	250 / 440 V	250 / 440 V	250 / 440 V	250 / 440 V	250 / 440 V	250 / 440 V
Maximum discharge current: I _{max} (8/20)	p. 12	40 kA	40 kA	40 kA	40 kA	40 kA	40 kA
Nominal discharge current: I _n (8/20)	p. 12	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Voltage protection level: Up at I _n	p. 12	1 kV	1 kV	1 kV	1 kV	1 kV	1 kV
Continuous operating current		< 1 mA	< 2 mA	< 2 mA	< 2 mA	< 2 mA	< 2 mA
Allowable internal short-circuit current		10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Input-output voltage drop (50Hz)		0.5%	0.5%	0.5%	0.5%	0.5%	0.5%

Mechanical characteristics

		2.5 mm ²	10 mm ²	
Connection			Yes	
Integrated thermal disconnecter			Yes	
State indicator	p. 31		Yes	No
Integrated Optical Monitoring Block (BOS)	p. 31	No	Yes	No
Safety reserve (Res)	p. 31	No	Yes	No
Degree of protection (IP / IK)		44/7		

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C				
Operating temperature		-20°C to + 40° C				
Maximum altitude		2000 m				
Reference standards		IEC 61643-1 / EN 61643-11				
Weight		1.5 kg	3 kg	4 kg	4 kg	5 kg

Surge Absorbers

The AO surge absorbers provide protection against transient overvoltages for very sensitive or highly strategic equipment fed by the electrical network, and do so with a very low residual voltage (less than 500 V).

The AOs can protect equipment rated up to 100 kVA.

POWER

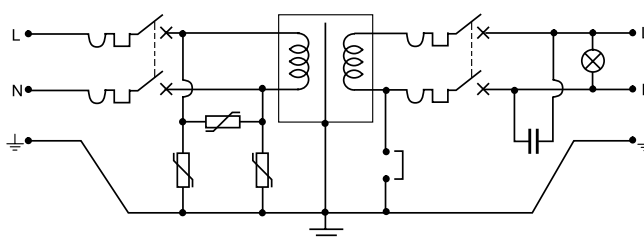


STANDARDS INFO

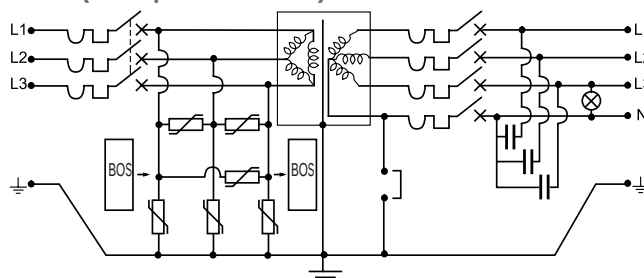
The Surge Absorbers (AO) comply with IEC 61643-1 and EN 61643-11.
The relevant standard for the installation of this type of equipment is: IEC 61643-12.

Schematic diagram

AO Mono (single-phase + neutral)



AO Tri (three-phase + neutral)



Certain part numbers incorporate the Safety + (S+) function achieved using the Optical Monitoring Block (BOS).

This device provides global monitoring of the surge arresters' state, either locally or remotely by wiring the Remote Indicator contact (emitter module) to an external indicator lamp.

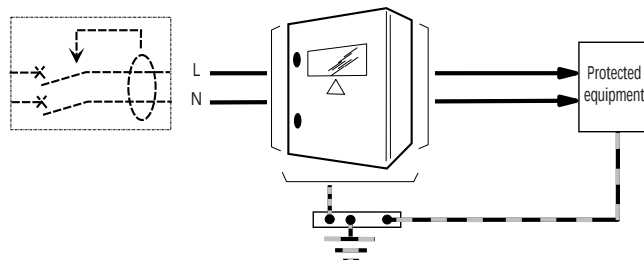
These models include an incoming circuit-breaker and an outgoing circuit-breaker.



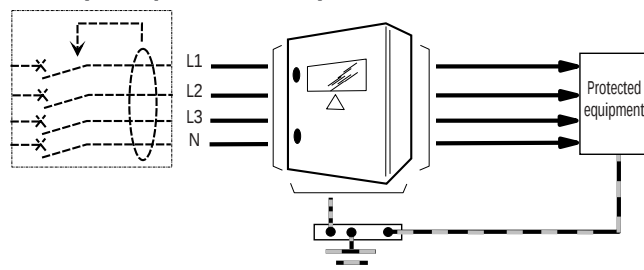
AO 3kVA mono S +

Connection

AO Mono (single-phase + neutral)

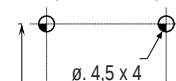


AO Tri (three-phase + neutral)



Fixings

AO 1 kVA Mono : 420 mm
AO 3 kVA Mono : 510 mm
AO 5 kVA Mono : 510 mm
AO 3 / 5 kVA Tri : 660 mm



AO 1 kVA Mono : 300 mm
AO 3 kVA Mono : 400 mm
AO 5 kVA Mono : 500 mm
AO 3 / 5 kVA Tri : 500 mm

Dimensions (mm)	W	H	D
AO 1 kVA Mono	350	400	250
AO 3 kVA Mono	400	500	250
AO 5 kVA Mono	600	600	300
AO 3 kVA Tri	600	600	300
AO 5 kVA Tri	600	600	300

PRATICAL INFO

The AOs are fitted in series with the electrical supply, nearby the equipment to be protected.
The AOs operate in common mode and differential mode (MC / MD).

MORE INFO

Electrical characteristics

		40 kA (8/20 waveform)				
		AO 1 kVA Mono S+ Ref. 8807 01 01	AO 3 kVA Mono S+ Ref. 8807 02 01	AOD 5 kVA Mono Ref. 8807 03 02	AO 3 kVA Tri S+ Ref. 8808 02 01	AO 5 kVA Tri S+ Ref. 8808 03 01
Types of network	p. 16	Single-phase	Single-phase	Single-phase	Three-phase	Three-phase
Output power		1 kVA	3 kVA	5 kVA	3 kVA	5 kVA
Rated current		4 A	12 A	20 A	4 A	10 A
D1: incoming circuit-breaker I _{sc} curve C		50 A Cct-breaker	50 A Cct-breaker	50 A Cct-breaker	50 A Cct-breaker	50 A Cct-breaker
D2: outgoing circuit-breaker I _{sc} 6 kA		6 A Cct-breaker	16 A Cct-breaker	20 A Cct-breaker	6 A Cct-breaker	10 A Cct-breaker
Max cont operating voltage: U _c	p. 13	250 / 440 V	250 / 440 V	250 / 440 V	250 / 440 V	250 / 440 V
Maximum discharge current: I _{max} (8/20)	p. 12	40 kA	40 kA	40 kA	40 kA	40 kA
Nominal discharge current: I _n (8/20)	p. 12	10 kA	10 kA	10 kA	10 kA	10 kA
Voltage protection level: Up at I _n	p. 12	0.5 kV	0.5 kV	0.5 kV	0.5 kV	0.5 kV
Continuous operating current		< 1mA	< 1mA	< 1mA	< 1mA	< 1mA
Allowable internal short-circuit current		10 kA	10 kA	10 kA	10 kA	10 kA
Input-output voltage drop (50Hz)		< 2 %	< 2 %	< 2 %	< 2 %	< 2 %

Mechanical characteristics

Connection					
- solid wire		10 mm ²			
- stranded wire		16 mm ²			
Integrated thermal disconnecter		Yes			
State indicator	p. 31	Yes	No	Yes	
Integrated Optical Monitoring Block (BOS)	p. 31	Yes	No	Yes	
Integrated remote indicator (TS)	p. 31	No	Yes	No	
Safety reserve (Res)	p. 31	Yes	No	Yes	
Degree of protection (IP / IK))		20/2			

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C			
Operating temperature		-20°C to + 40° C			
Maximum altitude		2000 m			
Reference standards		IEC 61643-1 / EN 61643-11			
Weight		< 30 kg	< 70 kg	< 90 kg	< 100 kg

Note: the integrated transformer complies with EN 60-742

Low current surge arresters

modular

Transmission line surge arresters (PLT) provide protection against transient overvoltages for equipment connected to telephone lines (digital or analogue), computer links or current loops.

STANDARDS INFO

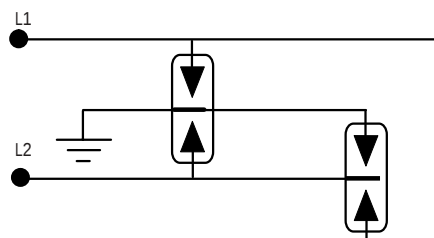
Modular low current surge arresters comply with IEC 61643-21.



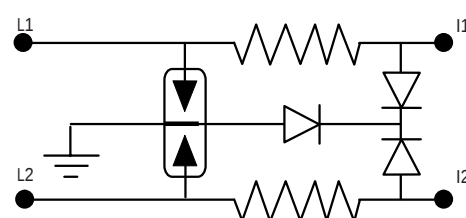
PLT M 06 V

Schematic diagrams

PLT M 200 V in parallel

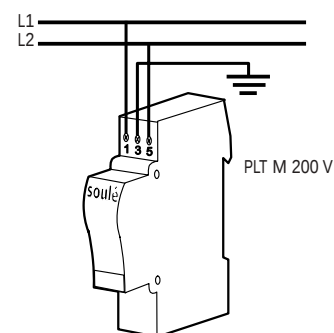


PLT M / xx V / 200 FR in series

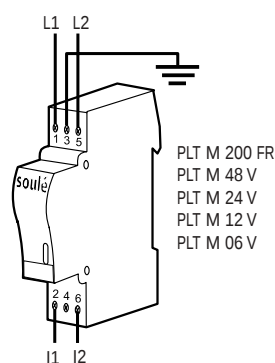


Connection

PLT M 200 V in parallel

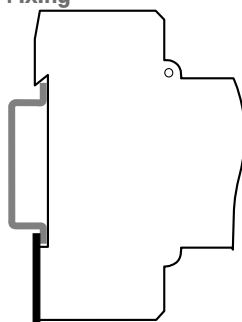


PLT M / xx V / 200 FR in series



PLT M 200 FR

Fixing



Simply clips onto DIN rail

Dimensions (mm)	W	H	D
PLT (all models)	17,5	85	63

PRATICAL INFO

PLT surge arresters are installed in electrical switchboards or enclosures using DIN rail.



Electrical characteristics

		PLT M 6V Ref. 8148 06 00	PLT M 12V Ref. 8148 01 00	PLT M 24V Ref. 8148 02 00	PLT M 48V Ref. 8148 03 00	PLT M 200V Ref. 8148 04 00	PLT M 200FR Ref. 8148 05 00
Types of network		Communication	Communication	Communication	Communication	Communication	Communication
Number of pairs		1	1	1	1	1	1
Type of protection		Serie	Serie	Serie	Serie	Serie	Serie
Type of current		Low current	Low current	Low current	Low current	Low current	Low current
Nominal voltage: Un	p. 12	6 V	12 V	24 V	48 V	200 V	200 V
Max cont operating voltage: Uc	p. 13	7 V	14 V	27 V	53 V	220 V	220 V
Voltage protection level: Up at In	p. 12	15 V	20 V	35 V	70 V	700 V	300 V
Nominal discharge current: In (8/20)	p. 12	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Maximum discharge current: I _{max} (8/20)	p. 12	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Bandwidth		10 MHz	2 MHz	4 MHz	6 MHz	100 MHz	3 MHz
Operating current: I _c		20 mA	20 mA	20 mA	20 mA	/	20 mA
Degree of protection		IP 203	IP 203	IP 203	IP 203	IP 203	IP 203
50Hz withstand (15 mins)		10 A	10 A	10 A	10 A	/	10 A

Mechanical characteristics

L/N connection:							
- solid wire		0.5 ... 2.5 mm ²					
- stranded wire		0.5 ... 2.5 mm ²					
PE connection:							
- solid wire		0.5 ... 2.5 mm ²					
- stranded wire		0.5 ... 2.5 mm ²					
Integrated thermal disconnecter	p. 31	Yes				No	Yes
End of life indicator	p. 31	Yes				No	Yes
Optical Monitoring Block (BOS) compatibility	p. 31	Yes				No	Yes

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C					
Operating temperature		-40°C to + 80° C					
Maximum altitude		2000 m					
Case material		PC blue Pantone 315					
Reference standard		IEC 61643-21					
Weight		150 g					

Low current surge arresters

in boxes / strips

The low current surge arresters in boxes and strips provide protection against transient overvoltages of equipment connected to telephone lines, computer links or current loops, whether in series or in parallel.

Low current surge arresters in boxes (BOP) can be fitted with 1 to 2 removable printed circuits from 6 to 200 V.

Low current surge arresters in strips (BAP) can be fitted with 1 to 4 removable printed circuits from 6 to 200 V.

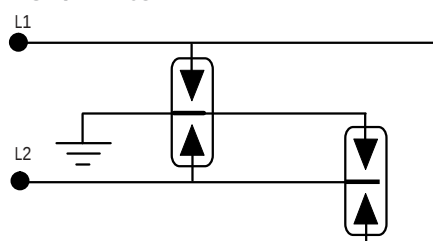


STANDARDS INFO

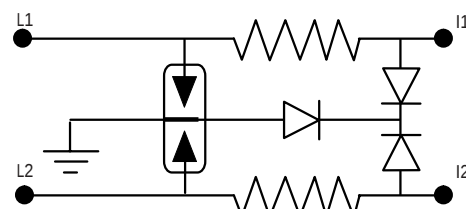
Low current surge arresters in boxes or strips comply with IEC 61643-21

Schematic diagram

BOP / BAP box



Parallel protection



Series protection



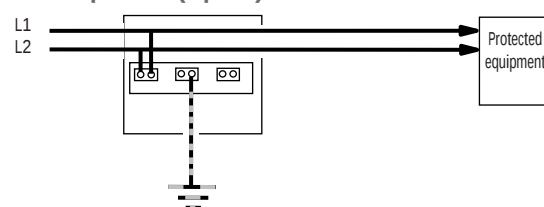
BOP 200V fr 2 pairs



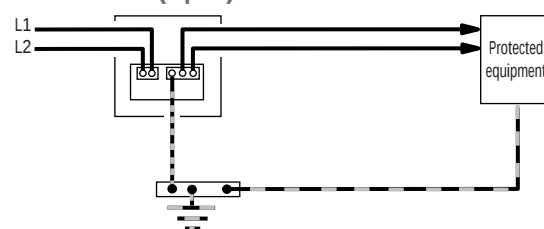
BAP 24V 4 pairs

Connection

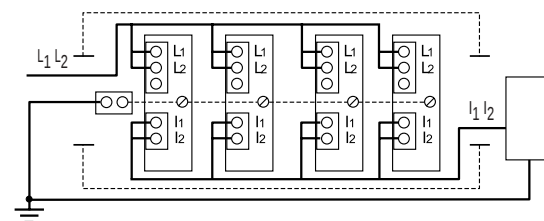
BOP in parallel (2 pairs)



BOP in series (1 pair)

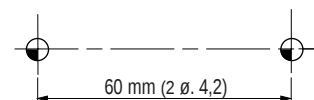


BAP

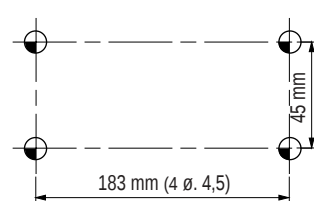


Fixings

BOP



BAP



Dimensions (mm)	W	H	D
BOP	83	65	26
BAP	200	73	42



PRATICAL INFO

The BOPs and BAPs are fitted to a smooth surface using screws.

MORE INFO

Electrical characteristics

		BOP 24V 2 pairs Ref. 8796 05 03	BOP 48V 1 pair Ref. 8796 06 02	BOP 48V 2 pairs Ref. 8796 06 03	BOP 200FR 1 pair Ref. 8796 07 02	BOP 200FR 2 pairs Ref. 8796 07 03	BOP 200V 2 pairs Ref. 8796 08 03	BAP 24V 4 pairs Ref. 8796 05 04	BAP 48V 4 pairs Ref. 8796 06 04
Types of network		Communication	Communication	Communication	Communication	Communication	Communication	Communication	Communication
Number of pairs		2	1	2	1	2	2	4	4
Type of protection		Series	Series	Series	Series	Series	Parallel	Series	Series
Type of current		Low currents	Low currents	Low currents	Low currents	Low currents	Low currents	Low currents	Low currents
Nominal voltage: Un	p. 12	24 V	48 V	48 V	200 V	200 V	200 V	24 V	48 V
Max cont operating voltage: Uc	p. 13	27 V	53 V	53 V	220 V	220 V	220 V	27 V	53 V
Voltage protection level: Up at In	p. 12	35 V	70 V	70 V	300 V	300 V	700 V	35 V	70 V
Nominal discharge current: In (8/20)	p. 12	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Maximum discharge current: I _{max} (8/20)	p. 12	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Bandwidth	p. 13	4 MHz	6 MHz	6 MHz	3 MHz	3 MHz	100 MHz	4 MHz	6 MHz
Operating current: I _c		20 mA	20 mA	20 mA	20 mA	20 mA	/	20 mA	20 mA
Degree of protection		IP 203	IP 203	IP 203	IP 203	IP 203	IP 203	IP 203	IP 203
50Hz withstand (15 mins)		25 A	25 A	25 A	25 A	25 A	25 A	25 A	25 A

Mechanical characteristics

Live wire connections:									
- solid wire		0.5 ... 2.5 mm ²							
- stranded wire		0.5 ... 2.5 mm ²							
PE connection:									
- solid wire		0.5 ... 2.5 mm ²							
- stranded wire		0.5 ... 2.5 mm ²							
Integrated thermal disconnecter	p. 31	Yes					Yes	No	
State indicator	p. 31	No					No	No	

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C							
Operating temperature		-20°C to + 40° C							
Maximum altitude		2000 m							
Case material		grey PC							
Weight		80 g						335 g	

Low current surge arresters

for splitters and pluggables

The plug low current surge arresters are pluggable and provide series protection for telephone lines against transient overvoltages that occur on the network.

They are made up of a pluggable two-stage series protection.

The mounting plate low current surge arresters (with DL or STN modules) provide protection against transient overvoltages on telephone lines, computer links or current loops, and are suited to the various types of splitter (plates or combs). They are made up of series protection; the plate can be fitted with 8 protection modules.

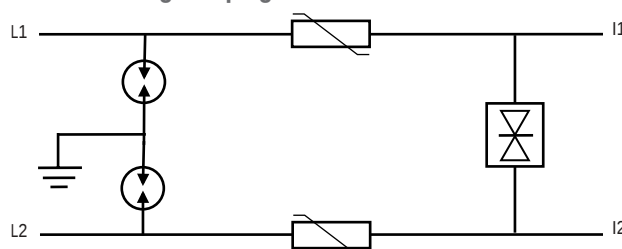


DL / PCM plug

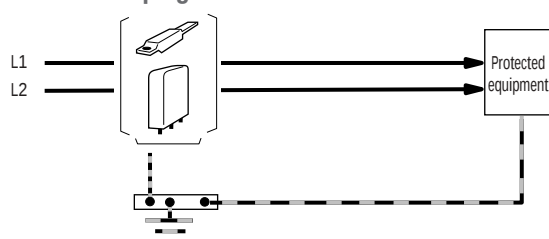


DL / PCM ISDN module

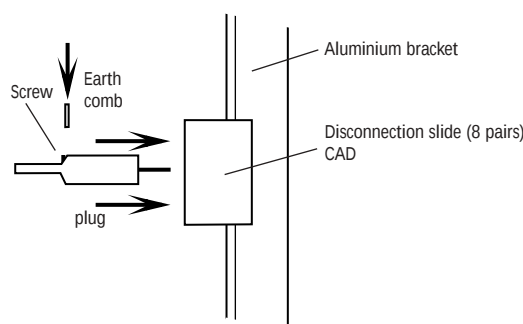
Schematic diagram: plugs and modules



Connection: plugs and modules

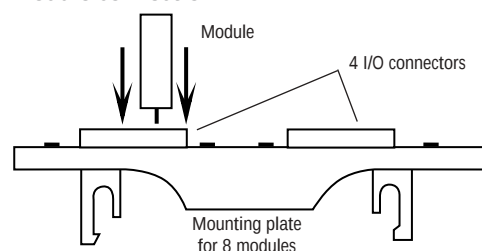


Plug connection



When the disconnection slide is not fitted with an earthing connection, the lollipops must be interconnected using the earth comb (8 plugs). There is a screw on each plug for this purpose.

Module connection



The Input / Output connections are made using 4, 8-terminal screw connectors with a pitch of 5.08 mm.

Dimensions (mm)	W	H	D
Plug (all models)	89	15	15
Module (all models)	75	75	15
Earth comb	130	8	1
Plate	170	75	30

PRATICAL INFO

These surge arresters are to be fitted to an aluminium bracket on the telephone splitter.



Electrical characteristics

		DL / PCM Plug Ref. 8798 36 07	STN Plug Ref. 8798 96 07	DL / PCM Module Ref. 8798 36 06	144 kbits / 48 V Module Ref. 8798 66 06	STN Module Ref. 8798 96 06
Maximum peak voltage		16 V	180 V	16 V	58 V	180 V
Maximum attenuation for 600 Ohms		0.35 db	0.35 db	0.30 db	0.35 db	0.30 db
Max. in-series resistance in each wire		12 Ohms	12 Ohms	12 Ohms	12 Ohms	12 Ohms
Voltage protection level:						
- common mode		950 V	950 V	950 V	950 V	950 V
- differential mode		33 V	400 V	33 V	105 V	400 V
Maximum discharge current: I _{max} (8/20)	p. 12	10 kA	10 kA	10 kA	10 kA	10 kA
Nominal discharge current: I _n (8/20)	p. 12	20 mA	20 mA	20 mA	20 mA	20 mA
Bandwidth		20 MHz	20 MHz	20 MHz	20 MHz	20 MHz
Accessory		Earth comb (for 8 protection units) Ref. : 8840 07 00		Protection plate (8 pairs) Ref. : 8860 08 02		

Miscellaneous characteristics

Conductor diameter		IP 643	IP 635
Degree of protection			0.4 ... 0.8 mm
Operating temperature		0°C to + 60°	
Maximum altitude		2000 m	
Case material		UL 94 VO	
Weight		70 g	90 g

Final protection

The DomoFoudre sockets and multi-sockets have integrated surge arresters to provide specific protection for equipment (telephone, television, computer, modem, etc.) against transient overvoltages that occur on the electrical, telephone or video networks.

In addition, when placed at the head of the installation, the DomoFoudre DF 40 modular surge arrester allows optimum mains protection.

The DomoFoudre DF Tel 200 box protects the telephone line (digital or analogue).

DOMOFOUDRE range

STANDARDS INFO

The sockets and multi-sockets comply with NF C 61-303 and have shutters to make them childproof.

Surge arresters integrated in the sockets and multi-sockets comply with NF C 61-740, 1995 version.

Domestic installation protection example

Mains incomer protection



DF 40 Bi

Telephone line protection



DF-R-Tel socket

Television protection



DF-R-TV socket

Computer protection



4 DF-F-Multimedia socket

Hi-Fi protection



6 DF-F-Hifi socket



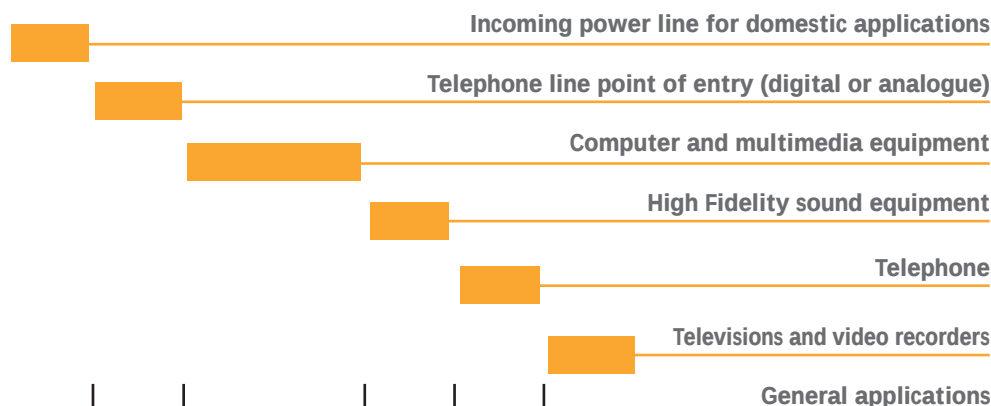
PRATICAL INFO

The DomoFoudre modular DF 40 surge arrester should be installed in the building downstream of the type S residual current circuit-breaker.

The DomoFoudre DF Tel 200 box surge arrester should be installed at the point where the telephone line enters the building.

All the other references are simply connected to the mains sockets, either directly or using the factory supplied lead.

Dimensions (mm)	W	H	D
DF40	35	87	64
DF Tel 200	65	83	26
4 DF socket (all models)	300	75	45
6 DF socket (all models)	400	75	45
DF-R socket (all models)	116	70	85
DF socket	57	50	75



MORE INFO

Power

		DF 40 Bi Ref. 8144 01 11	DF Tél 200 Ref. 8796 08 04	4 DF-F-Multimedia socket Ref. 8738 08 07	6 DF-F-Micro socket Ref. 8738 18 05	6 DF-F-Hifi socket Ref. 8738 18 04	DF-R-Tel socket Ref. 8738 07 02	DF-R-TV socket Ref. 8738 07 03	DF socket Ref. 8738 06 00	DF-R socket Ref. 8738 07 01	4 DF socket Ref. 8738 08 00	6 DF socket Ref. 8738 18 00
Voltage protection level: Up	p.12	1.8 kV				1.2 / 1.5 kV			1.2 kV	1.2 / 1.5 kV		1.2 kV
Nominal voltage: Un	p.12	230 V						230 V				
Maximum discharge current: I _{max} (8/20)	p.12	40 kA						8 kA				
Nominal discharge current: I _n (8/20)	p.12	10 kA						2 kA				
Response time		< 1ns						< 1ns				
Maximum power		/						3680 W / 230 V				
Maximum energy		/				510 J			280 J	510 J		280 J
Filtering: attenuation		/			40 dB to 10 MHz							
Allowable short-circuit current (I _{sc})		25 kA						3 kA				
Indication of state	p.31	Yes						Yes				

Telephone

Voltage protection level: Up	p.12	/	700 V	700 V	/	700 V	/
Nominal voltage: Un	p.12	/	200 V	200 V	/	200 V	/
Maximum discharge current: I _{max}	p.12	/	10 kA	5 kA	/	5 kA	/
Nominal discharge current: I _n	p.12	/	5 kA	2.5 kA	/	2.5 kA	/

Video

Voltage protection level: Up	p.12		700 V		700 V	/
Maximum discharge current: I _{max}	p.12		5 kA		5 kA	/
Insertion loss			< 1 dB		< 1dB	/

Mechanical characteristics

Degree of protection		IP 20					
Terminal capacity:							
- stranded wire		25 mm ²					
- solid wire		16 mm ²					

Miscellaneous characteristics

Storage temperature		-40°C to + 80° C									
Operating temperature		-20°C to + 40° C									
Maximum altitude		2000 m									
Case material		self-extinguishing									
Reference standards		NFC 61-740									
Weight		200 g	80 g	720 g	780 g	200 g	140 g	200 g	720 g	780 g	

Coaxial surge arresters

High Frequency (HF) surge arresters provide protection for equipment against transient overvoltages caused by lightning strikes on coaxial cables connected directly to outside aerials.

Soulé has two HF surge arrester ranges:

High Performance surge arresters (HP range) and Normal Application surge arresters (AN range).

They are available with N, BNC, F or 7/16 connectors.

They are designed for outdoor use (IP 65).



PHF HP 420 MHz

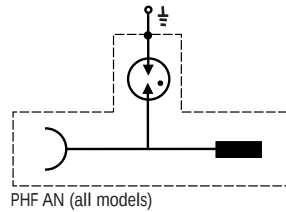
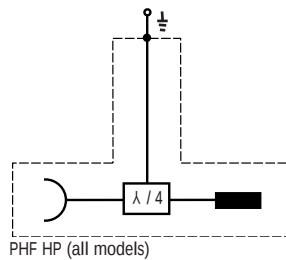


PHF HP 900 MHz

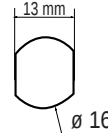


PHF AN 50 BNC m/f

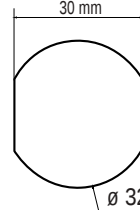
Schematic diagram



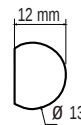
Fixings



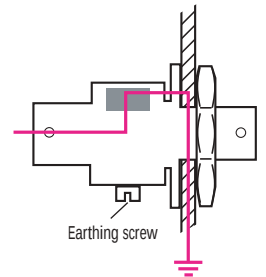
PHF HP 420 MHz
PHF HP 2300 MHz
PHF AN 50 N
PHF AN 50 N / F



PHF HP 900 MHz
PHF HP 1800 MHz
PHF AN 50 7/16 / F

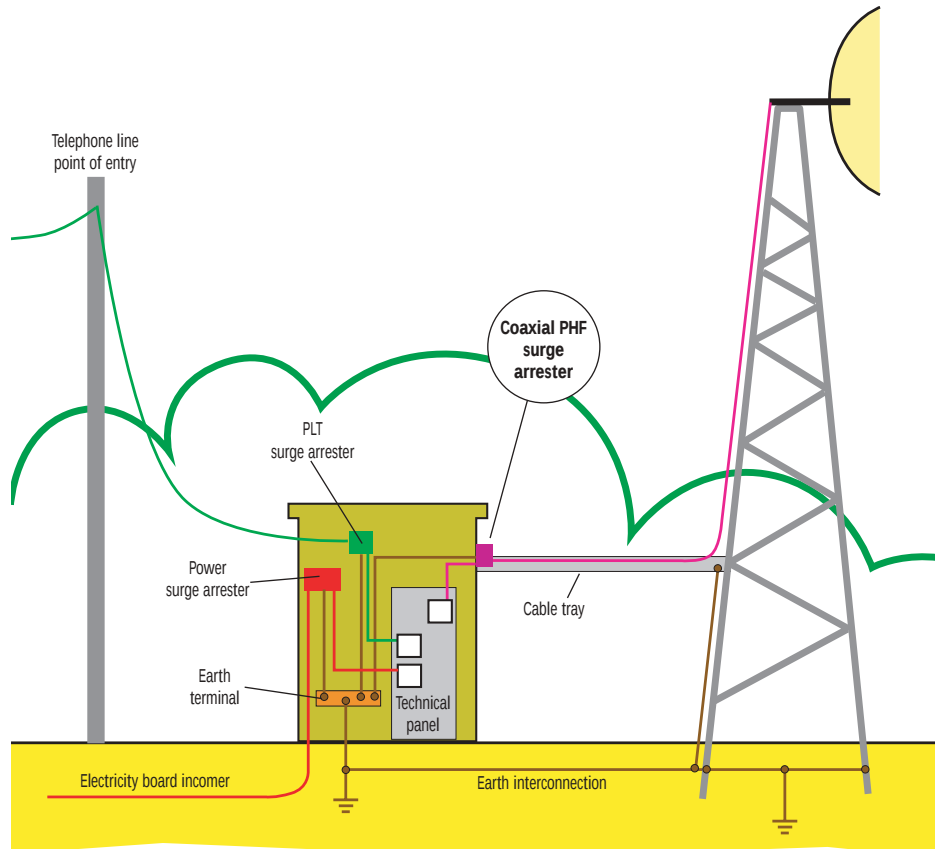


PHF AN 50 BNC
PHF AN 50 BNC / F
PHF AN 75 F / F



For a through-wall installation, the overvoltage is run-off over the wall. If this is not the case, an earthing screw is provided.

Installation protection example



Dimensions (mm)	W	H	D
PHF HP 420 MHz	95	75	64
PHF HP 900 MHz	100	100	26
PHF HP 1800 MHz	70	100	45
PHF HP 2300 MHz	56	90	45
PHF AN 50 N	75	Ø 25	85
PHF AN 50 BNC	65	Ø 25	75
PHF AN 50 N / F	60	Ø 25	/
PHF AN 50 BNC / F	55	Ø 25	/
PHF AN 50 7/16 / F	105	Ø 45	/
PHF AN 75 F / F	55	Ø 25	/
VIDEO protection	90	27	30
TWINAX protection	90	27	30
RS (all models)	105	15	50

PRATICAL' INFO

All of these surge arresters can be fitted either along the cable, in which case they must be connected to earth using a conductor with a minimum cross-section of ~10mm, or through-wall to optimise the earth return.

Characteristics

	PHF HP 420 MHz Ref. 8150 01 13	PHF HP 900 MHz Ref. 8150 01 14	PHF HP 1800 MHz Ref. 8150 01 15	PHF HP 2300 MHz Ref. 8150 01 16	PHF AN 50 N m/f Ref. 8150 02 10	PHF AN 50 BNC m/f Ref. 8150 02 12	PHF AN 50 N f/f Ref. 8150 02 14
Bandwidth	350 to 500 MHz	800 to 1000 MHz	1700 to 1900 MHz	2300 to 2500	0 to 2 GHz	0 to 2.5 GHz	0 to 2.5 GHz
Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Maximum allowable power	1000 W	3000 W	2000 W	400 W	300 W	300 W	300 W
Insertion loss	≤ 0.2 dB	≤ 0.1 dB	≤ 0.1 dB	≤ 0.1 dB	≤ 0.15 dB	≤ 0.15 dB	≤ 0.15 dB
8/20 run-off capacity (once only)	50 kA	100 kA	100 kA	50 kA	20 kA	20 kA	20 kA
8/20 residual voltage	< 10 V	< 10 V	< 10 V	< 10 V	< 600 V	< 600 V	< 600 V
Storage temperature	- 25 to + 85 °C	- 25 to + 85 °C	- 25 to + 85 °C	- 25 to + 85 °C	- 25 to + 85 °C	- 25 to + 85 °C	- 25 to + 85 °C
Operating temperature	- 25 to + 55 °C	- 25 to + 55 °C	- 25 to + 55 °C	- 25 to + 55 °C	- 25 to + 55 °C	- 25 to + 55 °C	- 25 to + 55 °C
Degree of protection	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65
Connectors	N male/female	7/16 females	7/16 females	N females	N male/female	BNC male/female	N females
Weight	150 g	170 g	190 g	250 g	100g	100 g	100 g

Characteristics

	PHF AN 50 BNC f/f Ref. 8150 02 15	PHF AN 50 7/16 f/f Ref. 8150 02 16	PHF AN 75F f/f Ref. 8150 02 17	VIDEO protection Ref. 8777 03 00	TWINAX protection Ref. 8778 01 00	RS 422 Ref. 8778 01 00	RS 232 Ref. 8778 02 00
Bandwidth	0 to 2.5 GHz	0 to 2.5 GHz	0 to 2 GHz				
Impedance	50 Ohms	50 Ohms	75 Ohms				
Insertion loss	≤ 0.15 dB	≤ 0.15 dB	≤ 0.5 dB	≤ 0.27 dB 3 dB typical	0.3 dB typical to 1MHz		
Attenuation at 10 MHz					0.6 dB typical to 5MHz		
112 Ohm attenuation (3V peak to peak)							
Maximum allowable power	300 W	300 W	300 W				
8/20 run-off capacity (once only)	20 kA	20 kA	20 kA	10 kA		10 kA	10 kA
8/20 residual voltage	< 600 V	< 600 V	< 600 V	20 V			
Peak voltage of signal to be transmitted				8 V	8 V		
Maximum residual voltage:							
- in common mode					750 V		
- in differential mode					20 V		
Maximum allowable 8/20 current					10 kA		
Operating voltage						+/- 16 V	+/- 16 V
Maximum on-line resistance						12 Ohms	12 Ohms
Residual voltage:							
- 0V connected to earth in the terminal						between live wires and earth: 33V	
- 0V not connected to earth						between live wires and 0V: 33V	
- in the terminal (floating earth)						between 0V and earth: 33V	
Maximum flow						≤ 10 Mb/s	≤ 20 Mb/s
1.2/50 run-off capacity						500 A	500 A
Nominal current						20 mA	10 mA
Storage temperature	- 25 to + 85°C	- 25 to + 85°C	- 25 to + 85°C	- 25 to + 85°C	- 25 to + 85°C	- 25 to + 85°C	- 25 to + 85°C
Operating temperature	- 25 to + 55°C	- 25 to + 55°C	- 25 to + 55°C	- 25 to + 55°C	- 25 to + 55°C	- 25 to + 55°C	- 25 to + 55°C
Degree of protection	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65
Connectors	BNC females	7/16 females	F females	BNC male/female	BNC male/female	Sub D 25 pts	Sub D 25 pts
Weight	100 g	100 g	120 g	110 g	175 g	115 g	115 g

Accessories

Maintenance

The Optical Monitoring Block (BOS) is installed on the DIN rail at each end of the surge arrester (power and low current) row in the electrical switchboard. It enables remote indication of the state of the modular surge arrester group (except for PLT M 200 V), up to 10 modules of 17.5 mm.



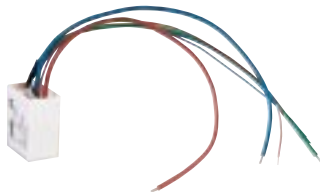
Optical Monitoring Block (BOS)

Dimensions (mm)	W	H	D
Optical Monitoring Block (emitter/receiver)	17,5	85	63

The integrable power surge arrester (TSP) provides protection for 230V single-phase electrical installations. This small module can be integrated into material such as: multi-socket trunking, technical strips, power supplies for motors or sensitive electronic equipment.

This surge arrester provides common mode and differential mode protection.

This power surge arrester is Type 2 and complies with the European standard: NF EN 61643-11.



Integrable surge arrester (TSP)

Dimensions (mm)	W	H	D
TSP	26	35	18

The pluggable nature of certain surge arresters makes the replacement of worn cartridges easy; the cartridges plug-in to the base of the surge arrester (with a foolproof system for phase and neutral and for the different voltages). This operation is carried out without the need to disconnect the wires or to isolate the circuit, and without any risk of using an incorrect cartridge.



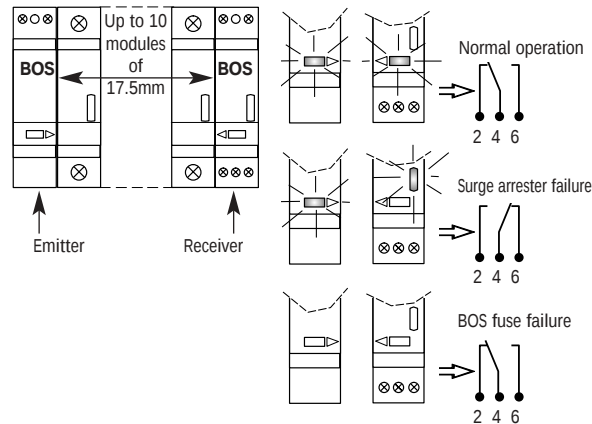
Cartridges for pluggable Type 1 surge arresters



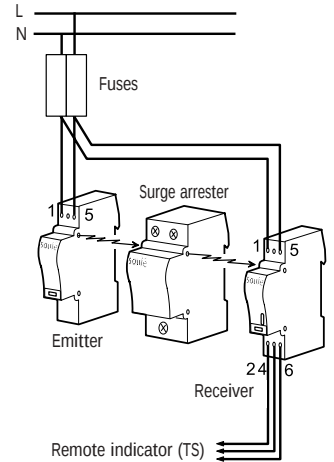
Cartridges for pluggable Type 2 surge arresters

Optical Monitoring Block (BOS)

Operation

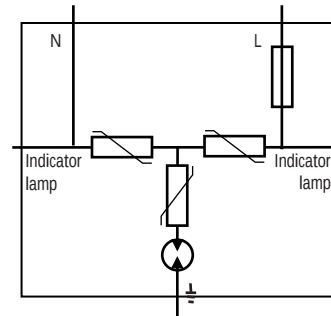


Connection

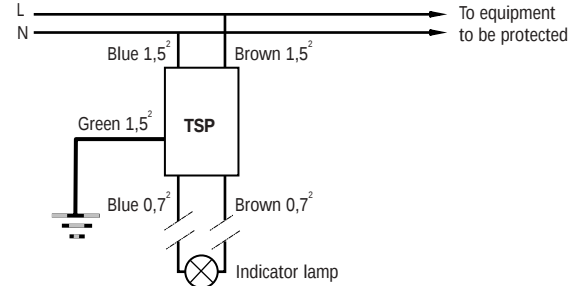


Integrable surge arrester (TSP)

Schematic diagrams

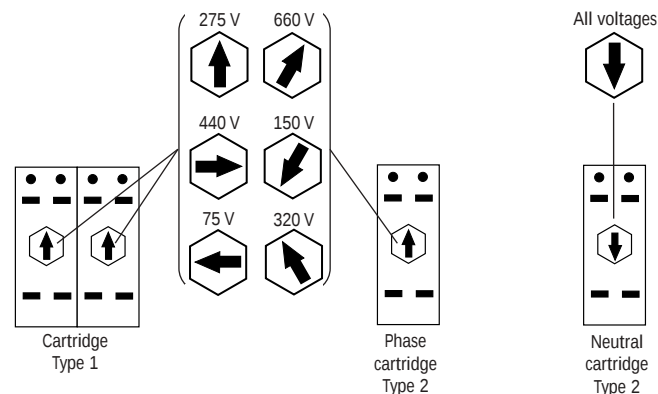


Connection



Pluggable surge arrester cartridges

Foolproof pin system





Characteristics

Use (230 / 400 V)	p. 31
Number of modules	
Emitter consumption in monitoring mode	
Receiver consumption in monitoring mode	
Remote indicator contact (TS) characteristics:	
- min. voltage	
- min. current	
- max. voltage (50Hz)	
- max. current (50Hz)	
Surge arresters monitored	
Number of surge arrester modules monitored	
Display of optical link	
Indication of surge arrester failure	
Connection terminal capacity	
Storage temperature	
Operating temperature	
Breaking device	

Optical Monitoring Block (BOS)

BOS / Ref. 8142 07 00

Single-phase
1 + 1
< 10 mA
< 10 mA
5 V CC
10 mA
250 V
5 A
BP / PU / PM / PUD / PMD / PLT
10 modules of 17.5 mm
By diode on emitter and receiver
By red indicator lamp on receiver
2.5mm ² (solid wire)
- 40 °C to + 70 °C
- 20 °C to + 40 °C
fuse 2 A

Characteristics

Voltage protection level (Up)	p. 12
Nominal voltage (Un)	p. 12
Maximum discharge current: I _{max} (8/20)	p. 12
Nominal discharge current: I _n (8/20)	p. 12
Operating temperature	
Connection	
Compliance with standards	
Associated breaking device	p. 68
Indication of state	p. 31

Integrable surge arrester (TSP)

TSP / Ref. 8744 04 03

1.2 / 1.5 kV
250 V (50Hz)
8 kA
2 kA
- 20 °C to + 65 °C
Parallel using 1.5mm ² wires
NF EN 61643-11
Yes
Yes (using 0.7mm ² wires)

Characteristics

Voltage	
Model with Safety Reserve (Res)	p. 12

Replacement cartridges for pluggable Type 1 surge arresters

15 kA (10/350)

230 V	400 V
C BP 15 230 Res Ref. 8152 50 02	C BP 15 400 Res Ref. 8152 50 01

Characteristics

Voltage	
Model with Safety Reserve (Res)	p. 12
Model without Safety Reserve (Res)	

Replacement cartridges for pluggable Type 2 surge arresters

15 kA (8/20)

40 kA (8/20)

65 kA (8/20)

Neutre

57 V	230 V	400 V	230 V	400 V	230 V	400 V	230 / 400 V
C 15 57 Res Ref. 8143 03 17	C 15 230 Res Ref. 8143 03 00	C 15 400 Res Ref. 8143 03 02	C 40 230 Res Ref. 8143 04 00	C 40 400 Res Ref. 8143 04 02	C 65 230 Res Ref. 8143 05 00	C 65 400 Res Ref. 8143 05 02	
	C 15 230 Ref. 8143 03 01	C 15 400 Ref. 8143 03 03	C 40 230 Ref. 8143 04 01	C 40 400 Ref. 8143 04 03			C Neutre Ref. 8143 05 10

Installation



Installation rules for surge arresters

Positioning

The incoming surge arrester is fitted immediately downstream of the installation's main isolating device.

The surge arrester must :

- be coherent with the allowable voltages of the equipment to be protected,

- be close by the equipment to be protected,

- be coordinated with the other surge arresters.

What measures are to be taken to limit overvoltages ?

Avoid rings over large surfaces, and use the same routing for the power and low current cables whilst respecting spacing and crossing rules for the two networks

Be aware of the equipment and installations (lifts, lightning rods) that generate overvoltages. Identify their position with respect to sensitive equipment and either ensure there is sufficient distance between them or that overvoltage protection is installed.

Favour the use of screening for equipment and cables, and carry out equipotential bonding using braiding of a shorter length as possible between all metallic parts entering, leaving or within the building.

Be aware of the different earthing systems in order to adapt the overvoltage protection and avoid the TN-C system if there is sensitive equipment in the installation.

Correctly select the thermal and short-circuit protection devices.

Favour type S circuit-breakers for protection against indirect contact in order to avoid nuisance tripping.

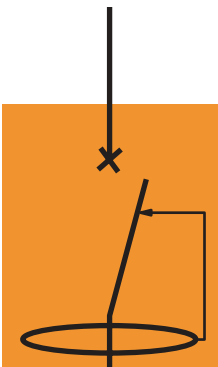
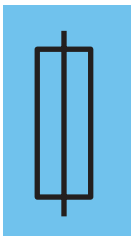


Choice of associated breaking device (fuse / circuit-breaker)

Choice of disconnecter

Surge arresters must be associated with upstream short-circuit protection and residual current protection against indirect contact (usually

already present in the installation).

	Function	Application
	Protection against indirect contact	- Residual current circuit-breaker compulsory for TT systems - Residual current circuit-breaker possible for TN-S, IT and TN-C-S systems - Residual current circuit-breaker forbidden for TN-C systems If a residual current circuit-breaker is used, it is preferable to use a type S. Otherwise there is a risk of nuisance tripping.
	Protection against fault currents	This does not affect the effectiveness of the surge arrester, but may cause the circuit to be broken. The breaking device associated with the surge arrester can be either a circuit breaker or a fuse. Its rating should take into consideration the surge arrester's characteristics.
	OR	
	Thermal protection	Thermal protection is integrated into the surge arrester.

NOTE

Priority is given to protection :

At the end of the surge arrester's service life, the rest of the installation can no longer be fed. The surge arrester that has failed must be replaced.

NOTE

Priority is given to continuity of service:

At the end of the surge arrester's service life, it can be isolated from the rest of the installation. The network can be re-established without the need to rewire the switchboard. In this configuration, the equipment is no longer protected.

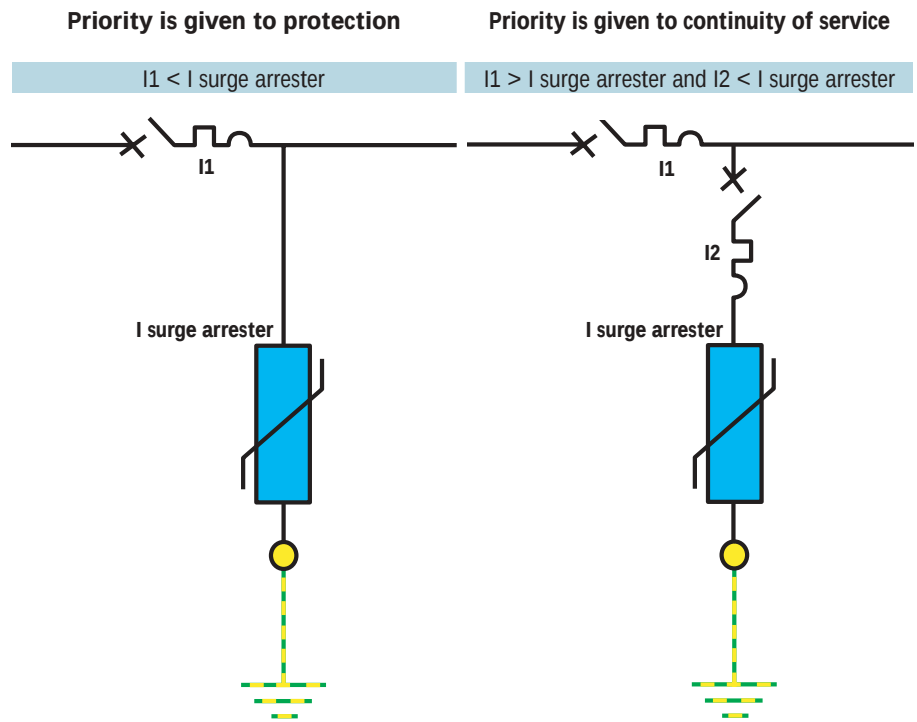
Replace the surge arrester as quickly as possible.

NOTE

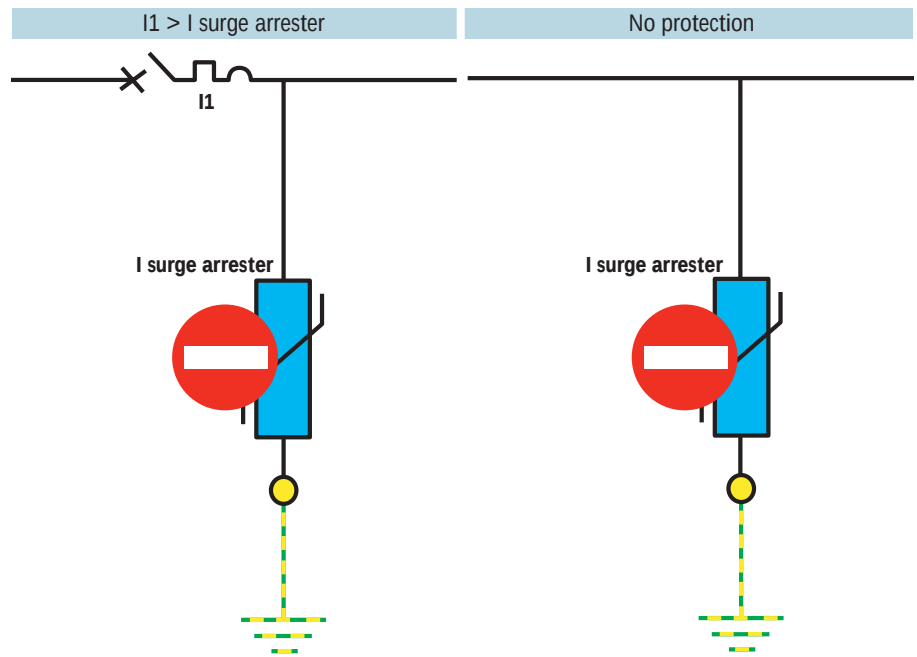
- I1 and I2: current ratings of the circuit-breaker(s) or fuse(s);
- I surge arrester: recommended current for surge arrester protection (see table on following page).

Wiring / connection

Possible

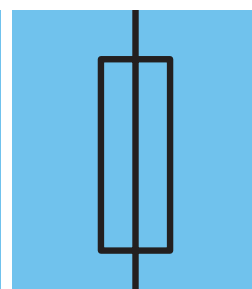
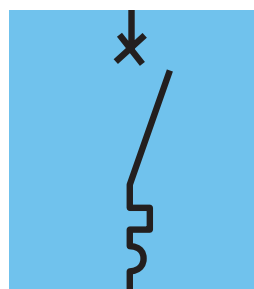


Forbidden



Choice of disconnecter

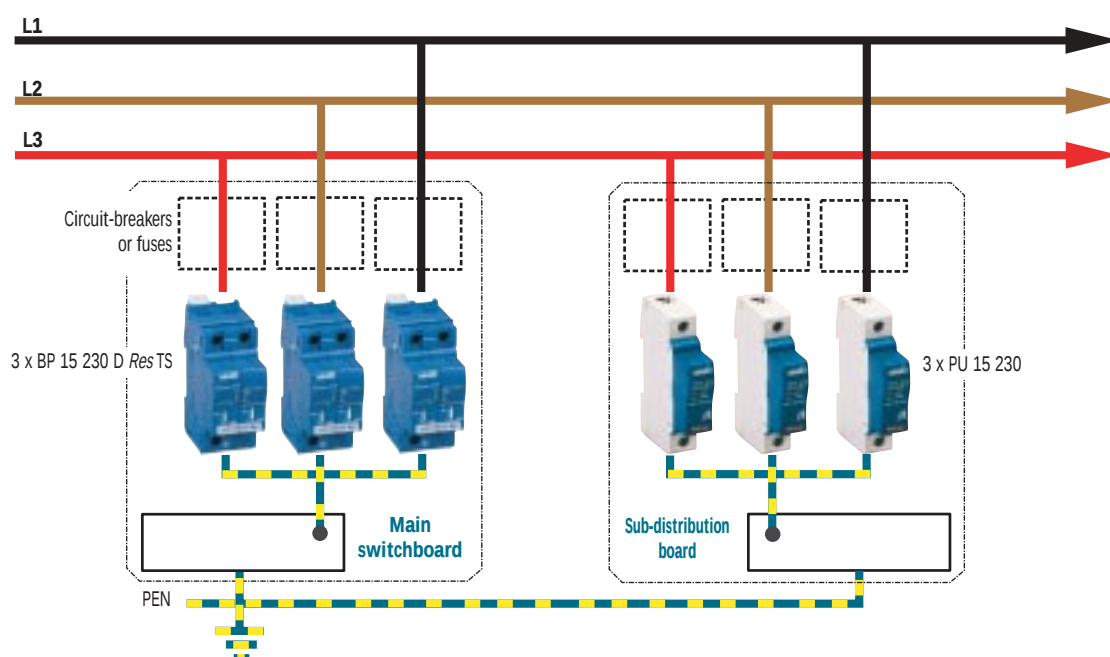
Maximum circuit-breaker
or fuse protection rating depend-
ing on I_{max} and I_{imp} of the
surge arrester



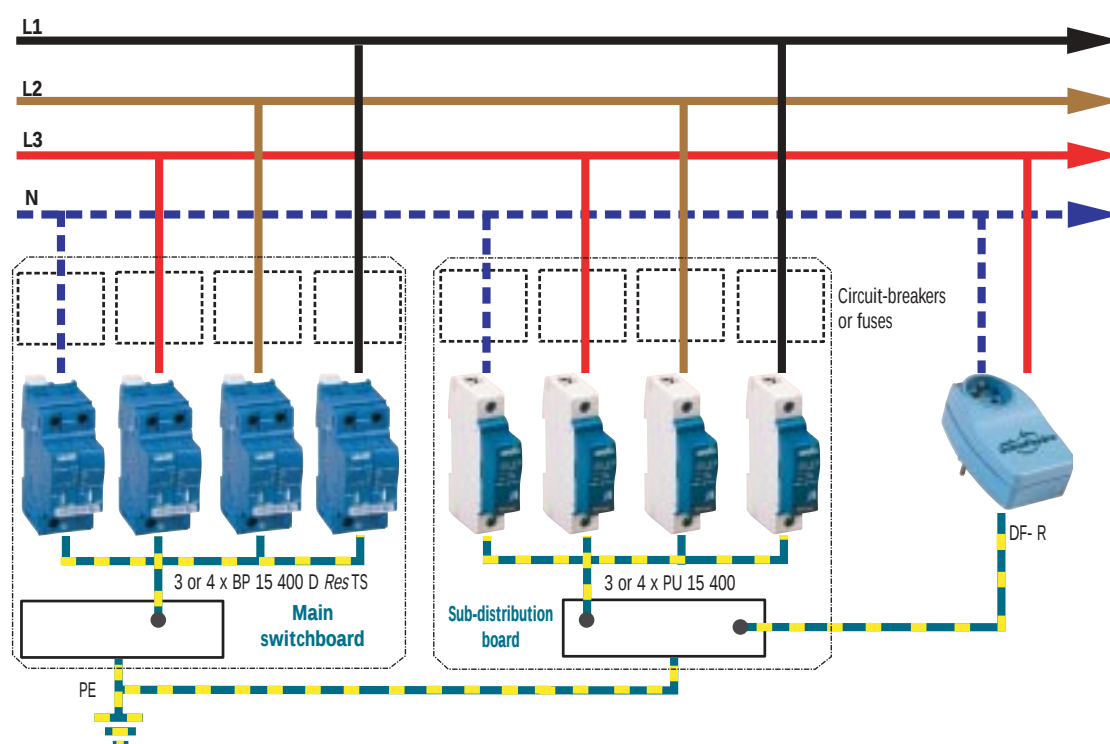
Type 1 surge arresters	Circuit-breaker	Fuse
BP 15 - XXX - From 300 A to 1 kA - From 1 kA to 7 kA - From 7 kA and above	40 A curve C 40 to 50 A curve C 40 to 63 A curve C	25 A gG 50 A gG 63 A gG
Type 2 surge arresters	Circuit-breaker	Fuse
XXX - 100 - From 300 A to 1 kA - From 1 kA to 7 kA - From 7 kA and above	40 A curve C 40 to 50 A curve C 40 to 63 A curve C	25 A gG 50 A gG 63 A gG
XXX - 65 - From 300 A to 1 kA - From 1 kA to 7 kA - From 7 kA and above	32 A curve C 32 to 40 A curve C 32 to 63 A curve C	20 A gG 40 A gG 63 A gG
XXX - 40 - From 300 A to 1 kA - From 1 kA to 7 kA - From 7 kA and above	25 A curve C 25 A curve C 25 to 50 A curve C	16 A gG 25 A gG 50 A gG
XXX - 15 - From 300 A to 1 kA - From 1 kA to 7 kA - From 7 kA and above	10 to 25 A curve C 10 to 32 A curve C 10 to 40 A curve C	16 A gG 16 A gG 25 to 40 A gG

Wiring diagrams according to the earthing system

Three-phase TNC system (for 230 V installations)



Three or four phase IT system

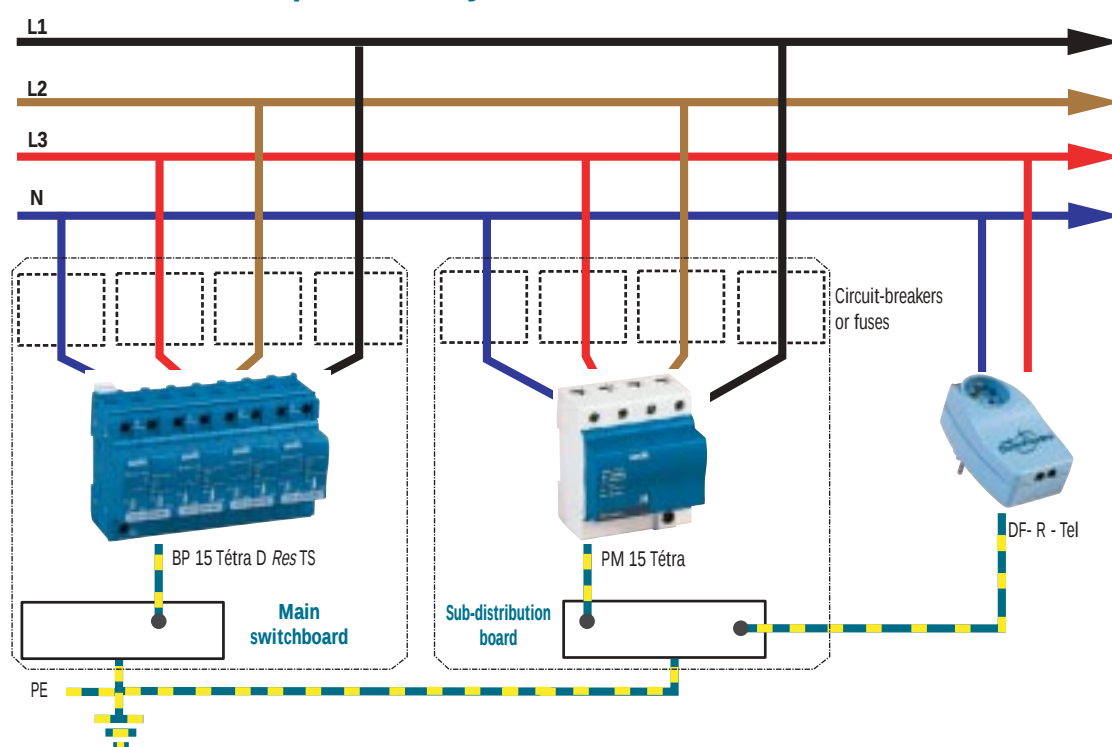


NOTE

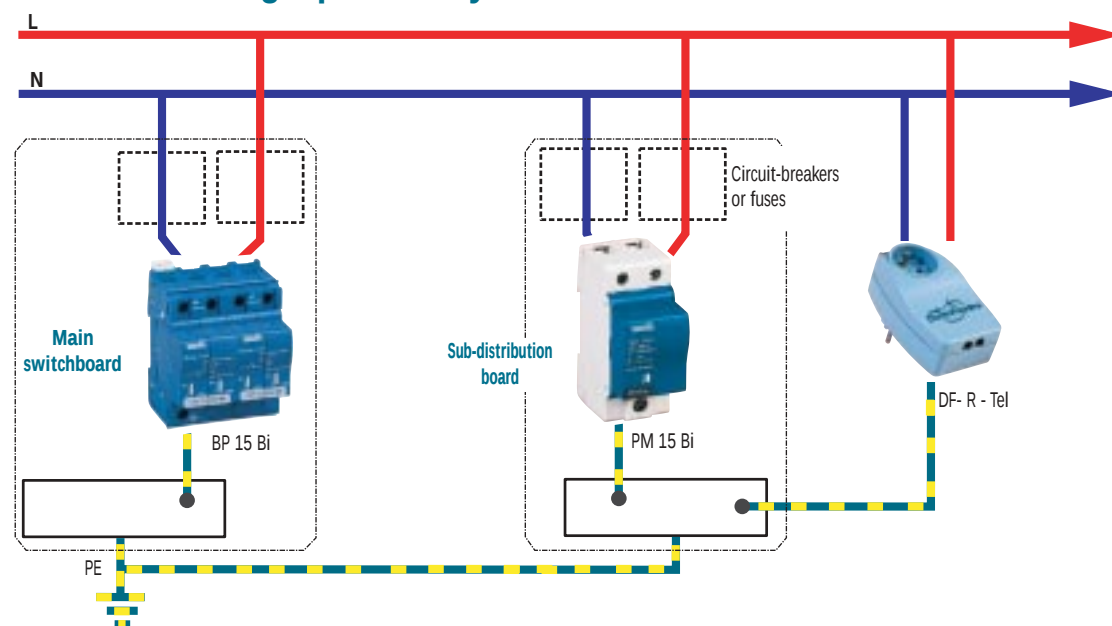
If continuity of service is essential, the "isolated neutral" (IT) configuration is the most reliable way of limiting breaks in the supply.

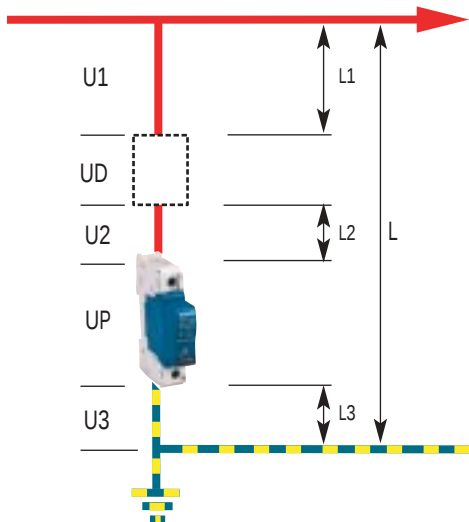
Wiring diagrams according to the earthing system

Four-phase TNS system



Single-phase TT system





Cabling and installation of surge arresters in an electrical panel

50 cm rule

Remember that a 10 kA lightning current passing through a 1 m length of cable generates 1000 Volts. Equipment protected by a surge arrester is subjected to a voltage equal to the sum of the Up voltage of the surge arrester, Ud of its disconnector and the sum of the inductive voltages of connecting cables ($U1+U2+U3$).

It is therefore essential that the total length ($L = L1+L2+L3$) of the connecting cables is as short as possible: limited to 0.50 m.

If this length ($L = L1 + L2+L3$) exceeds 0.50m, it is necessary to carry out one of the following:

- reduce this length by moving the connection terminals,
- choose a surge arrester with a lower Up value,
- install a second, coordinated surge arrester near the device to be protected so as to adapt the combined Up value to the impulse withstand of the equipment to be protected.

Wiring ring surfaces

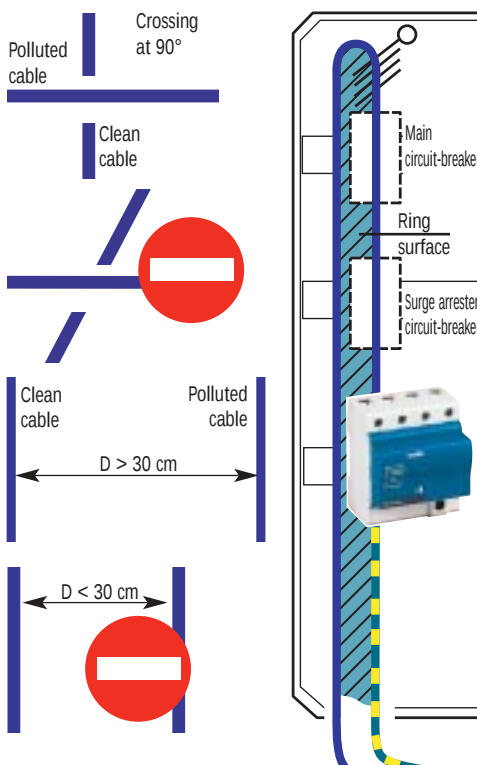
The wires must be arranged in such a way that they are as close to each other as possible (see adjacent diagram) to avoid overvoltages induced by a ring surface between phases, the neutral and the PE conductor.

Routing of clean cables and polluted cables

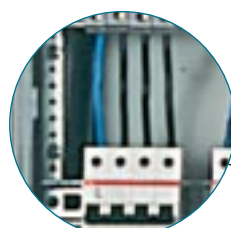
During installation, lay clean cables (protected) and polluted cables as shown in the adjacent diagrams.

To avoid magnetic coupling between the diffe-

rent cable types (clean and polluted), it is strongly advised that they are kept apart (>30 cm) and if a crossing cannot be avoided, it should be at right angles (90°).



Polluted cables | $D > 30 \text{ cm}$ | Clean cables



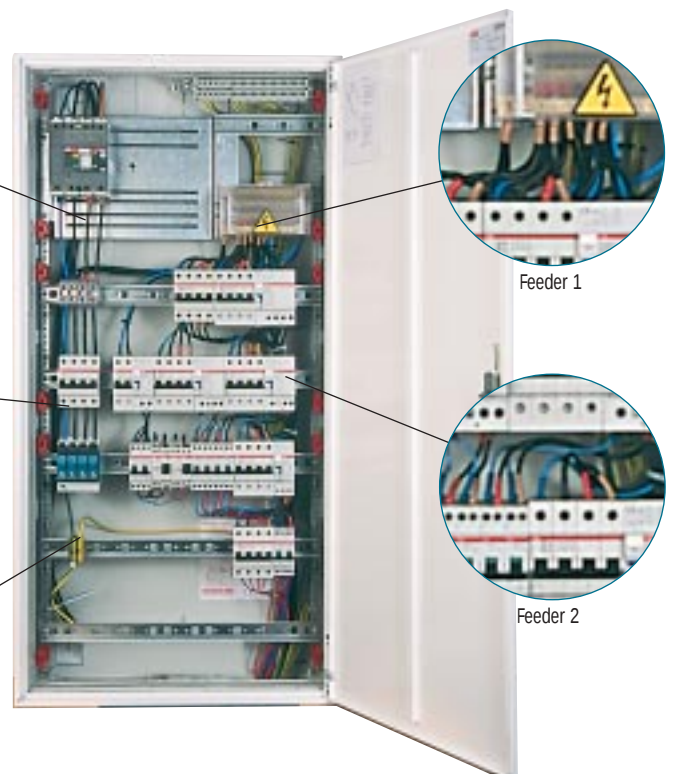
Terminal / Circuit breaker



Circuit breaker / Surge arrester



Surge arrester / Earth terminal



NOTE

The cross-section of the connecting cables is calculated according to the local short-circuit current level (where the surge arrester is installed). It must be equal to the cross-section of the installation's upstream cables. The minimum cross-section for the earth conductor is 4 mm² if there is not a lightning conductor and 10 mm² if there is a lightning conductor.



Notes

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