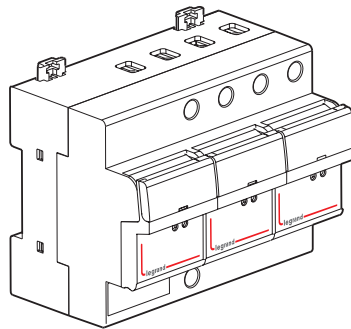


0 039 51/71



0 039 53/73

SOMMAIRE

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1. GENERAL CHARACTERISTICS

1.1 Overview

Self-protected SPDs for single-phase 230 V~ networks (Cat. Nos 0 039 51/71) and three-phase + neutral 230/400 V~ networks (Cat. Nos 0 039 53/73).

0 039 51/53 : consumer unit protection for installations whose local prospective short-circuit current (I_{cc}) is limited to 6 kA.

0 039 71/73 : line distribution panel protection for installations whose local prospective short-circuit current (I_{cc}) is limited to 10 kA.

Type 2/Type 3 protectors in common mode and residual current mode, for residential and small commercial installations (small trades, offices, etc...)

Neutral point connection systems: TT, TN-S.

Type 2 : I_n = 10 kA, U_p = 1,2 kV (protection level),

0 039 51/71 : I_{max} = 12 kA (8/20 μs).

0 039 53/73 : I_{max} (L-N/N-PE) = 12/20 kA (8/20 μs).

Type 3 : U_{oc} = 20 kV (combined wave 1.2/50 μs - 8/20 μs).

SPDs protected by internal disconnector against overload currents and short-circuit currents.

Fitted with thermal protection.

Equipped with plug-in replacement modules and indicator lights:

- Green: SPD operational.

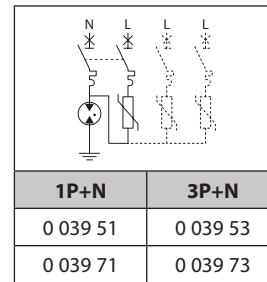
- Red: module needs replacing.

SPDs must not be installed in facilities that carry either fire or explosion risks without taking specific measures.

1.2 Protection modes

SPDs 1P+N/3P+N

TT, TNS systems



Surge protective devices with L-N and N-PE protection modes (common and differential protection modes), the neutral (N) being protected by encapsulated spark gaps with higher power capacities than the phase protection. Also called mode "1+1" or "connection type 2" (CT2) according to standards HD/IEC 60364 clause 534.

Two-phase mains supplies

Use SPDs 1P or 2P.

IT earthing systems

Use SPDs 1P/3P/4P with U_c 440 V~

■ 1.3 Applications

1.3.1 Installation standards

1.3.1.1 NF C 15-100

According to this standard, SPDs are compulsory at the source of any new (or refurbishment) installation that is:

- equipped with an LPS (lightning protection system) or lightning conductor (also see section 1.2.3)
- supplied with overhead power lines when located in a geographical area classified AQ2 (Nk > 25)

In the latter case, a lack of SPDs can however be justified by a risk analysis according to the UTE C 15-443 guide, standard IEC 60364-4-443 or any other recognised equivalent method.

An SPD may also be required in geographical areas classified AQ2 for certain installations:

- with home-based medical services
- equipped with security systems for people and property (fire alarm, technical or social alarms, etc).

Note:

SPDs are usually recommended anywhere where the safety of people may depend directly or indirectly on the continuity of service of this equipment.

The use of SPDs is also strongly recommended in mountainous areas, near large bodies of water or dominant structures (tall buildings, trees, etc), for installations at the end of a line or located less than 50 m from buildings equipped with a lightning conductor.

Nk = keraunic level (number of days a year when lightning strikes occur in a given area)

Ng = Nk/10 where Ng: number of strikes a year per km².

Installations with a lightning conductor or a LPS (or equipped with something that can act as a lightning conductor, such as a metal structure higher than the surrounding buildings, aerials, etc):

- Type 1 SPD (Iimp ≥ 12.5 kA) compulsory at the installation source (main distribution board in secondary buildings)
- Installations more than 10 m high (apartment buildings, office buildings, hotels, etc): type 2 SPD recommended for protecting private areas and floor distributors (communal areas) in addition to a type 1 SPD
- Installations with numerous private areas (apartment buildings, office buildings, etc): type 2 SPD where In ≥ 5 kA compulsory at the source of each private area if the type 1 SPD cannot be installed at the installation source.

1.3.1.2 HD 60364, IEC 60364

According to articles 443 and 534 of standards HD/IEC 60364 and guides TS/IEC 61643-12, the use of SPDs in new or renovated buildings is compulsory at the supply end of the installation in the following cases:

- Buildings with lightning conductors or a LPS (T1 SPD, Iimp ≥ 12.5 kA)
- Buildings with totally or partially overhead power supplies in AQ2 geographical areas (article 443.3.2.1 - AQ2: Nk > 25) and based on a risk assessment taking into account the type of power supply to the building (article 443.3.2.2)

According to article 443.3.2.2, SPDs (type 2) are also required in the following cases:

- Commercial/industrial buildings, public services, religious buildings, schools, large residential complexes, etc.
- Hospitals and buildings containing medical equipment and/or security systems for people and property (fire alarms, technical alarms, etc)

1.3.2 Legrand recommendations

To ensure correct protection, an SPD is recommended:

- at the origin of each installation (compulsory depending on the type and location of the installation to be protected)
- at secondary distribution board feeding sensitive equipment
- on all outdoor electrical circuit outgoing lines (power supply for secondary buildings, outdoor lighting or outdoor distribution boards, etc).

It is advisable to install an SPD when the safety of people may depend on the continuity of service of equipment (even if this is not required by national standards). Although not compulsory according to the installation standards, an SPD should always be installed for communication networks to protect the communication equipment when there is an SPD on the low voltage power network.

To define the type of SPD needed according to the installation level of risk, use the selection chart (see catalogue) or our XL PRO³ and XL PRO³ Calcul software.

1.3.3 EN 62305 (IEC 62305)

An external lightning protection system (LPS) protects buildings against direct lightning strikes. It is generally based on the use of lightning conductors (single rods, with ESE, meshed cage, etc.) and/or the metal structure of the building.

If there is an LPS or a lightning risk assessment has been carried out in accordance with standards EN/IEC 62305, SPDs are generally required in the main distribution board (T1 SPDs) and distribution boards (T2 SPDs).

Determination of SPDs in the main distribution board according to EN/IEC 62305 and TS/IEC 61643-12 (if there is insufficient information available):

Buildings with an external LPS

LPL ⁽¹⁾ : Lightning protection level	LPS total lightning current	Min. value of the SPD Iimp current (T1)	Usage practices
I	200 kA	25 kA/pole (IT: 35 kA min.)	Power installations
II	150 kA	18.5 kA/pole	Rarely used
III/IV	100 kA	12.5 kA/pole	Small installations

(1): LPL (Lightning Protection Level)

Note:

According to standards EN/IEC 62305, T1 SPDs may also be required if there is a risk of direct impact on power lines (EN/IEC 62305-1 table E.2). However, according to standard EN 62305-4 (appendix C.2.2), this is only the case if a risk of direct impact on the last 50 m of the line really exists and if this risk really has to be taken into account.

Risk assessment according to EN/IEC 62305

The risk assessment aims to evaluate if protective measures are needed. It defines their type and the level of needs to protect a building against lightning impacts (lightning protection of the building with an external LPS) and to protect equipment against impacts on the power or data lines, and against transient overvoltages due to lightning impacts on the LPS or close to the building.

To evaluate if protective measures are needed, it takes into account the following criteria :

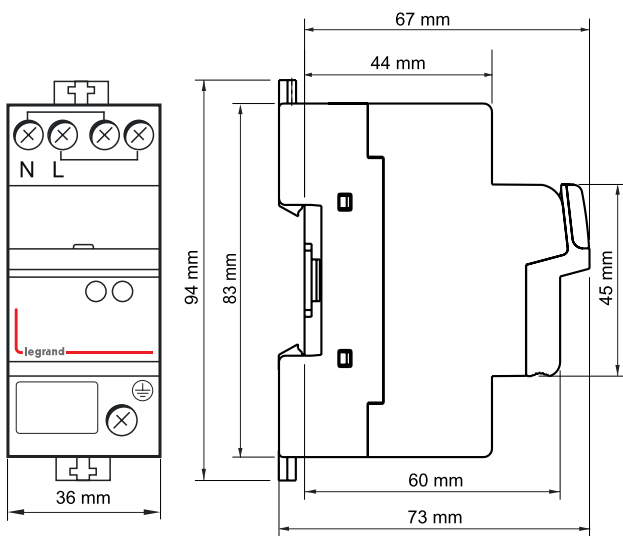
- dimensions and type of construction of the building, type and level of use, type and number of lines entering the building, surrounding environment and local lightning density, number of persons usually present, etc...
- possible origins of the threats (S1: impacts on the building, S2: impacts close to the building, S3: impacts on the lines, S4: impacts close to the lines)
- possible losses or damages (L1: human safety, L2: public services, L3: cultural heritage and L4: economic value)
- and the level of acceptable risks depending on the type of building and its final use.

When the calculated risk is too high (higher than the acceptable level), protective measures must be implemented (LPS, SPDs, earthings, ...) and adapted to the level of needs. This level of needs is expressed in terms of LPL (Lightning Protection Level) with values ranging from I to IV, a LPL of I being the highest level of needs corresponding to a lightning current discharge of 200kA on the SPF and to SPDs of 100kA (25kA/pole for 4P SPDs) to be installed at the main board. LPL : see table above.

2. OVERALL DIMENSIONS

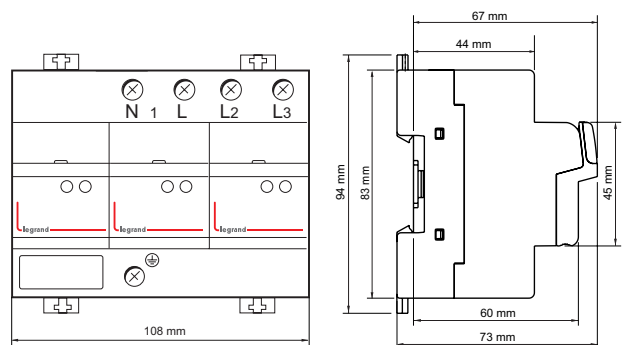
2.1 SPD for single-phase network

Cat. Nos. 0039 51/71



2.2 SPD for three-phase plus neutral network

Cat. Nos. 0039 53/73



3. TECHNICAL CHARACTERISTICS

Cat. Nos.	0 039 51/71	0 039 53/73
Number of poles	2	4
Mains network	230 V~	230/400 V~
Earthing system	TT, TNS	
Protection modes	L-N, L/N-PE	
Max. continuous operating voltage (Uc)	L-N, L-PE : 275 V~ N-PE : 255 V~	L-N, L-PE : 275 V~ N-PE : 255 V~
Frequency	50/60 Hz	
Type	Type 2 (T2) - Type 3 (T3)	
Nominal current In (L-N/N-PE)	10/10 kA	10/20 kA
Maximum discharge current (Imax)	L-N : 12 kA N-PE : 12 kA	L-N : 12 kA N-PE : 20 kA
Protection level (Up ; In)	1,2 kV ; 10 kA L-N : 1 kV ; 5 kA	
Combined wave resistance (Uoc)	20 kV	
Temporary overvoltages (LV supply faults)	L-N : 336 V / 5s (withstand mode) L-PE : 440 V / 5s (withstand mode) L-N : 440 V / 2h (failure mode)	
Temporary overvoltages (HV supply faults)	1200 V (failure mode in security)	
Associated disconnecter	Built-in	
Short-circuit current withstand (Icc)	0 039 51 : 6 kA 0 039 71 : 10 kA	0 039 53 : 6 kA 0 039 73 : 10 kA
Follow current suppression capacity Ifi (N-PE)	100 A	
Residual current (Ipe)	zero	
Max. line current (Il)	63 A	-
Voltage drop under Il	< 1 %	-
Response time	L-N : 25 ns N-PE : 100 ns	
Number of port	1	
Location category	Internal	
Installation method	Permanent fixture	
Pollution level	IP 20 (installed in enclosure)	
Number of modules	2	6
Operating temperature	-10°C à +40°C	
Storage temperature	-20°C à +70°C	

4. CONFORMITY

Conforming to standards EN 61643-11:2012 and IEC 61643-11 edition 1: 2011. These SPDs ensure compliance with the installation obligations and recommendations of standards NF C 15-100 (HD/IEC 60364) part 534, standards IEC/EN 62305 and guide UTE C 15-443 (TS/IEC 61643-12).

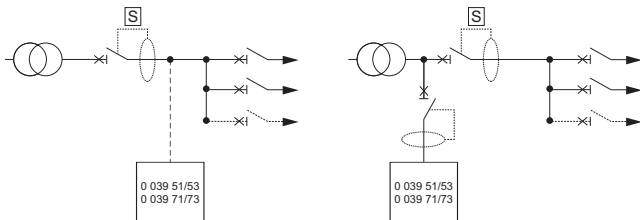
Conforming to directives 73/23/EC + 93/68/EC.

5. INSTALLATION

Surge protective devices must not be installed in locations where there is a risk of fire or explosion without special provisions. They must be disconnected before checking the insulation resistance of the installation.

5.1 Basic principle

TT neutral earthing systems: compulsory installation downstream of a residual current device.



Residual current devices and service continuity : if the panel general protection located upstream of the SPD features a residual current device, this residual current device must be either type S or delayed at installation head (residual current device immune from overvoltages up to 3 kA according to standard IEC 60364). Also recommended for line distribution panels.

5.2 Connections

Check that the ground system to which the installation's exposed conductive parts are linked complies with standard NF C 15-100 (IEC 60364, section 54).

SPD connected to the mains supply and to the protective conductor (PE) using as short a connection as possible, X+Z ≤ 50 cm recommended.

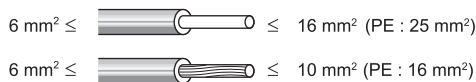
Compulsory connection of the earth terminal on the surge protective device to the protective conductor (PE) on the distribution board.

Equipotentiality rules: interconnection of the exposed conductive parts of the equipment and the protective conductor (PE) on the distribution board, which is itself connected to the earth terminal of the surge protective device.

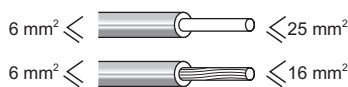
Electromagnetic compatibility rules: avoid loops, fix the cables firmly against the exposed metal conductive parts.

Recommended connection cross-sections and lengths to be stripped :

Cat. Nos. 0 039 51/71



Cat. Nos. 0 039 53/73



Tightening torques

0 039 51/71	Recommended	Max
L-N	1,5 Nm	2 Nm
PE	2,5 Nm	3 Nm

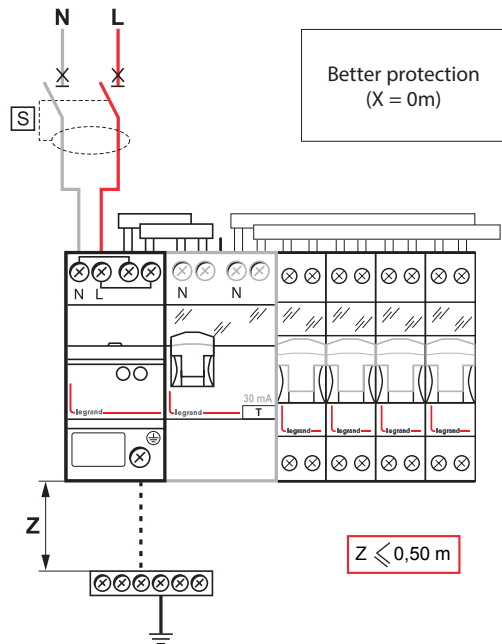
0 039 53/73	Recommended	Max
L-N/PE	2,5 Nm	3 Nm

5.2.1 SPD for single-phase network Cat. Nos. 0 039 51/71

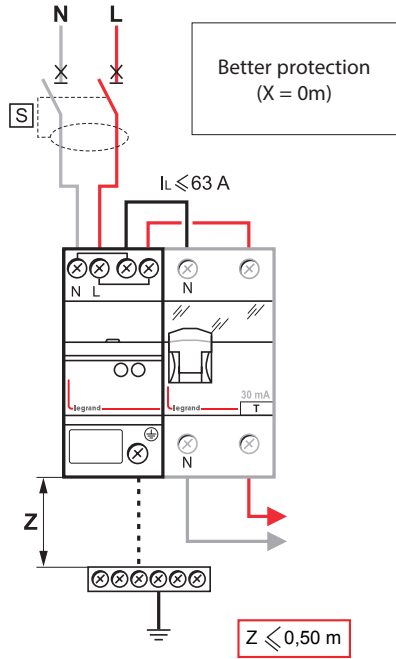
Serial connections

2 connection methods depending on the type of residual current device connected downstream of the SPD.

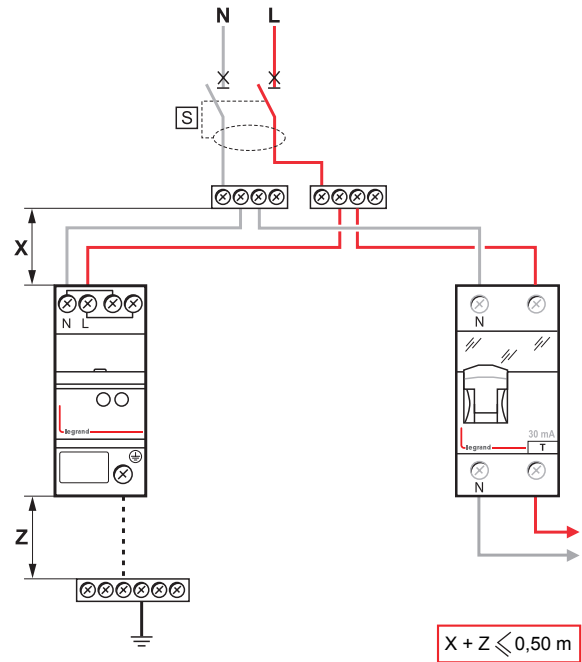
- Downstream busbar-based connection up to 63 A



- Downstream cable-based connection up to 63 A

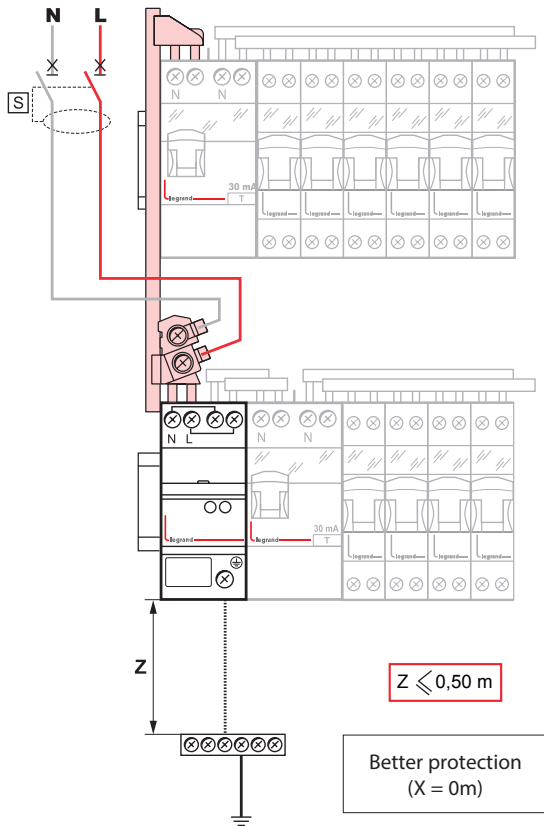


- cable-based connection with currents superior to 63 A



Parallel connection

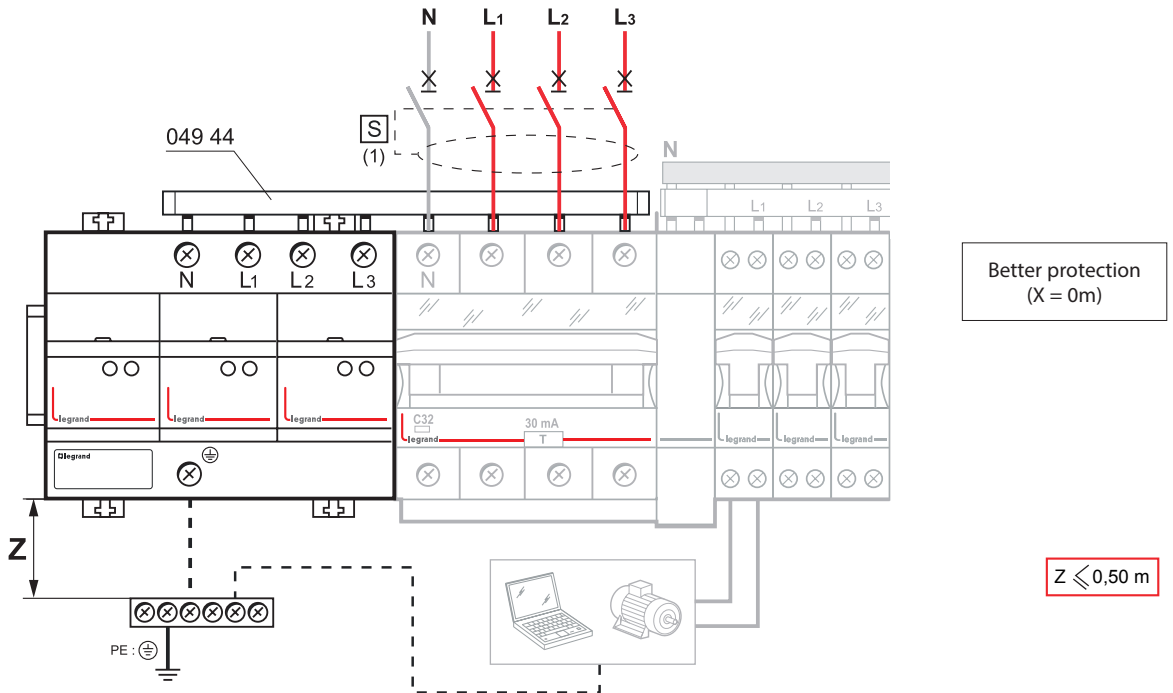
- Connection via vertical supply busbar up to 63 A



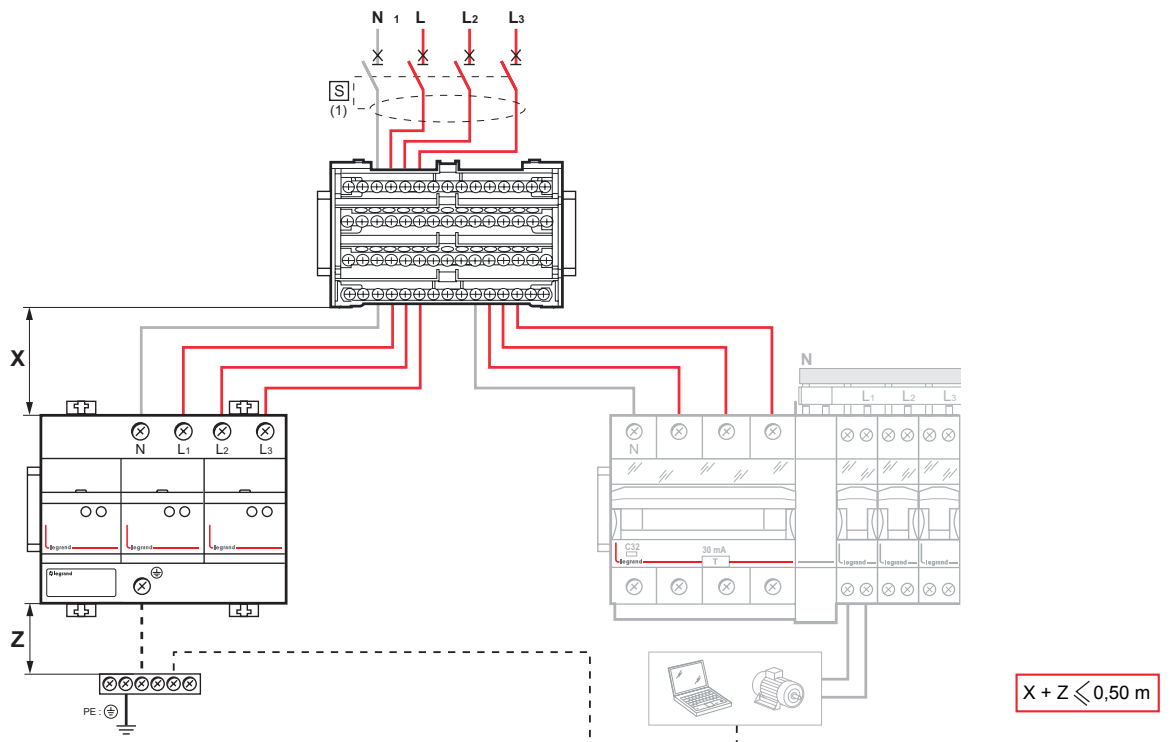
5.2.2 SPDs for three-phase plus neutral network Cat. Nos. 0 039 53/73

Cat. Nos.	Max. Icc
0 039 53	6 kA
0 039 73	10 kA

- Busbar-based connection

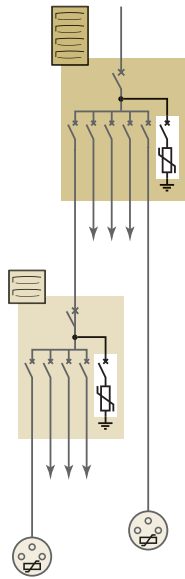


- Cable-based connection



■ 5.3 Cascaded SPDs

Effective protection against overvoltages cannot generally be assured with a single SPD if its protection level (U_p) is greater than 1.2 kV (EN/IEC 62305 and TS/IEC 61643-12).



When there are overvoltages, an SPD protects equipment by limiting these overvoltages to values that can be tolerated by the equipment. Thus, depending on its discharge capacity (discharge current I_n , I_{max} , etc.) and its protection level (U_p), an SPD will limit these overvoltages to varying values depending on the energy levels involved. The overvoltage values likely to be transmitted downstream of the SPD can double over distances of more than 10 m due to resonances associated with the type of electrical installation and the type of equipment. Overvoltages greater than 2.5 kV can then occur and damage equipment if the residual energy is high enough (2.5 kV being the insulation level of most electrical and electronic equipment, or even 1.5 kV for electrical domestic appliances). SPDs should be installed in the distribution boards supplying equipment that is sensitive or critical for the activity being carried out (and/or near to equipment with proximity SPDs).

■ 5.4 Coordinating upstream/downstream SPDs

Consists of ensuring that any downstream SPD (in distribution enclosures or proximity SPDs) is correctly coordinated in energy terms with any SPD located upstream (TS 61643-12).

Minimum distances between SPDs

Upstream SPD	Downstream SPD	Min. distance (m)
T1/50 and T1/25	T2/40	10
T1/12.5 and T1/8	T2/40	6
	T2/20, T2/12	8
T2/40	T2/20	4
	T2/12	6
T2/20 and T2/12	Proximity SPD	2

6. ACCESSORIES

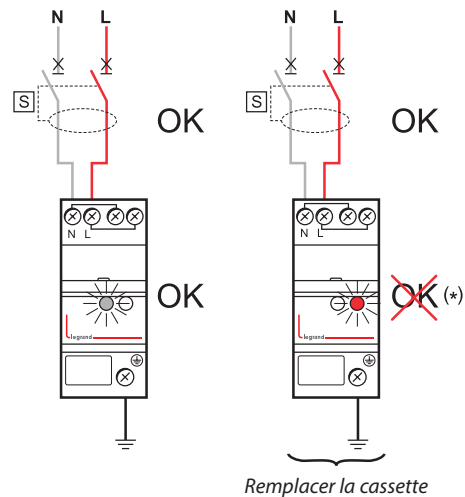
Plug-in replacement modules

With indicator lights :

- Green : SPD operational
- Red : module needs replacing (*)

Cat. Nos.	I_{max} (kA)	U_p (kV)	For SPD
0 039 54	12	1,2	0 039 51/71
0 039 74	12	1,2	0 039 53/73

■ 6.1 SPD for single-phase network Cat. Nos. 0 039 51/71

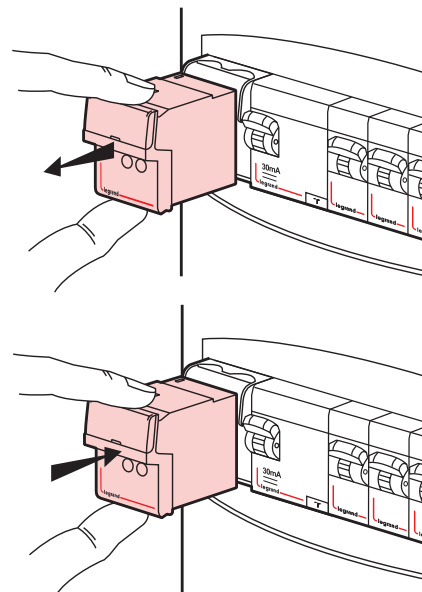


Remplacer la cassette

(*) Special situations requiring the SPD module to be changed :

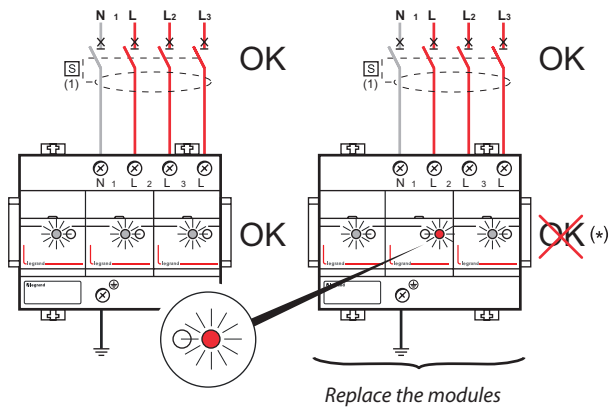
- Voltage present, but module's indicator lights are off
- The circuit-breaker located upstream can only be reset when the module has been removed.

Replacing the module



0 039 51	0 039 71
↓	↓
0 039 54	0 039 74

■ 6.2 SPDs for three-phase plus neutral network Cat. Nos. 0 039 53/73



(*) Special situations requiring the SPD module to be changed :

- Voltage present, but module's indicator lights are off
- The circuit-breaker located upstream can only be reset when the module has been removed.

Replacing the modules

