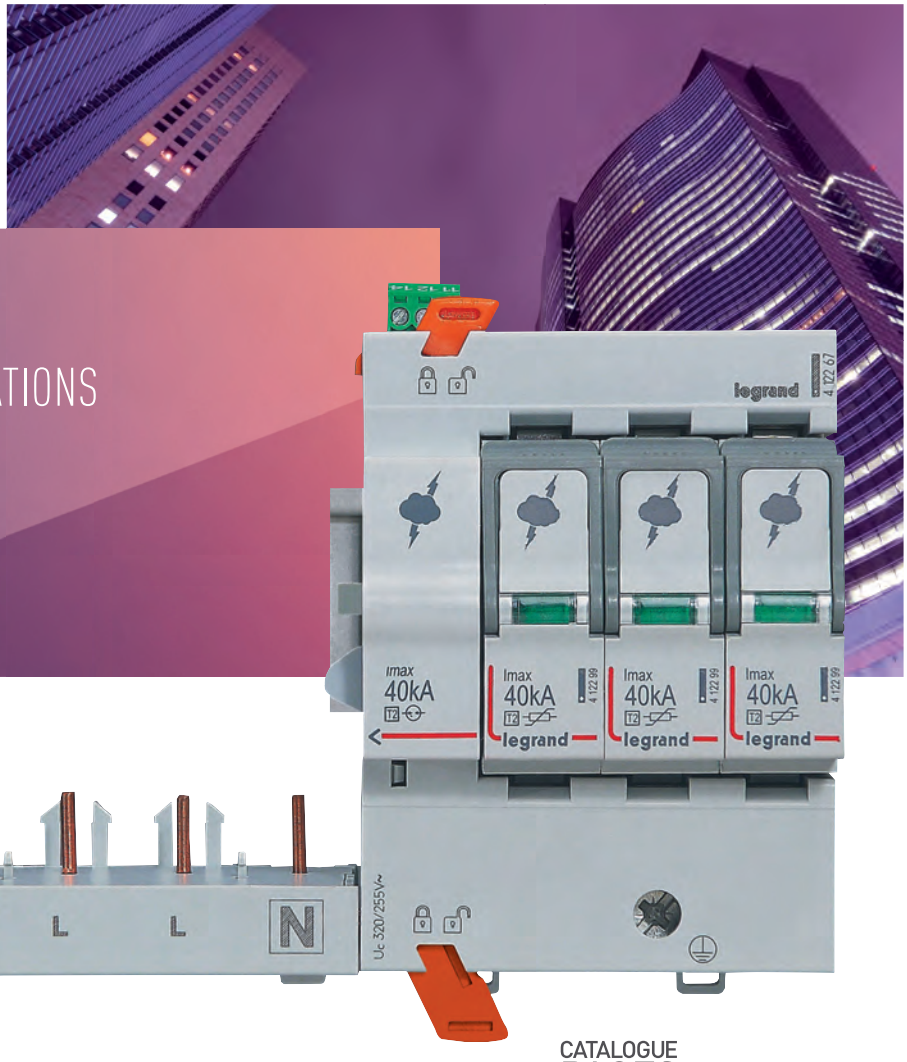
New surge protective devices

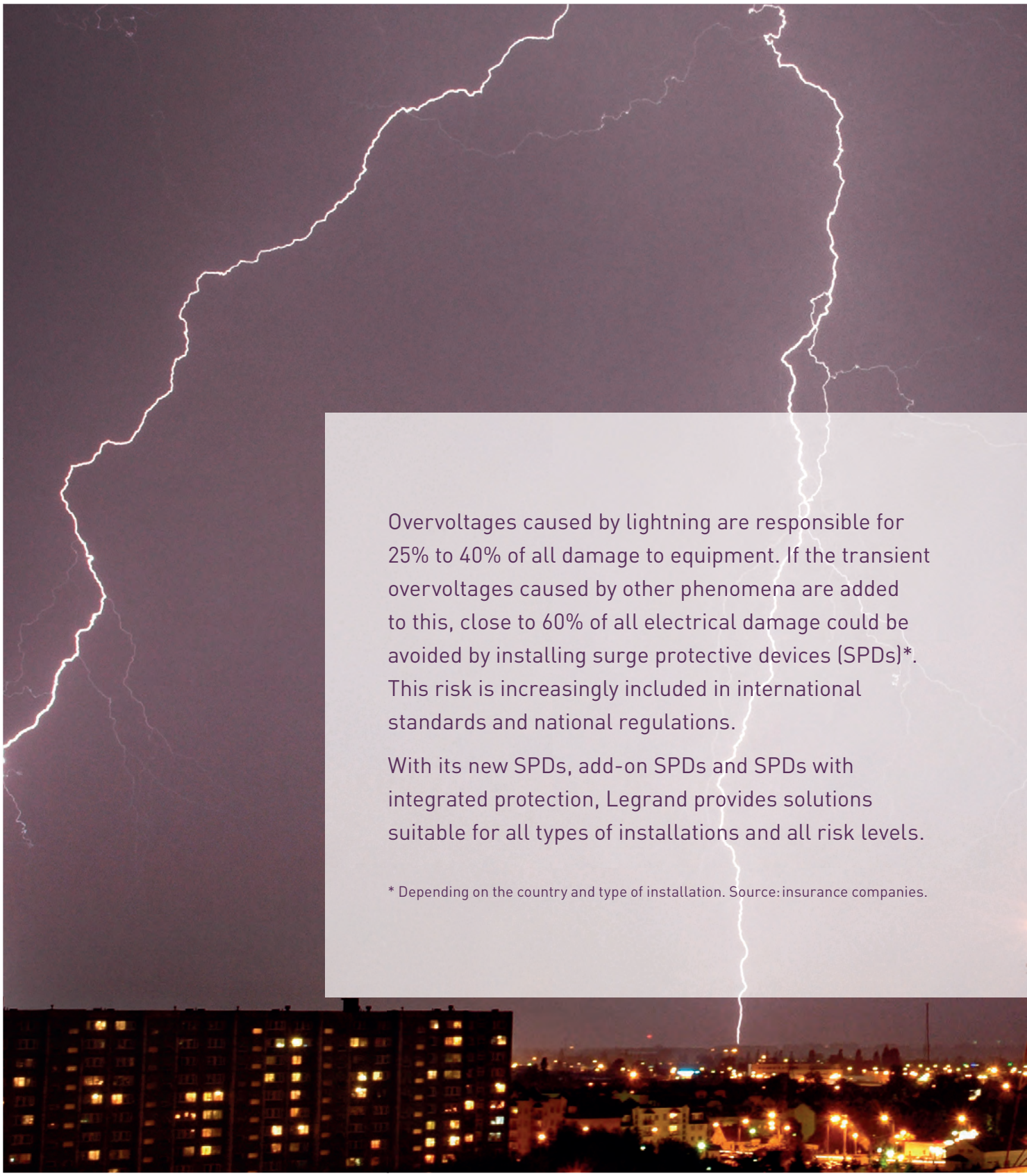


SUITABLE SOLUTIONS
FOR ALL TYPES OF INSTALLATIONS
AND ALL RISK LEVELS

CATALOGUE
PAGES
INSIDE

THE GLOBAL SPECIALIST
IN ELECTRICAL AND DIGITAL BUILDING INFRASTRUCTURES

legrand®



Overvoltages caused by lightning are responsible for 25% to 40% of all damage to equipment. If the transient overvoltages caused by other phenomena are added to this, close to 60% of all electrical damage could be avoided by installing surge protective devices (SPDs)*. This risk is increasingly included in international standards and national regulations.

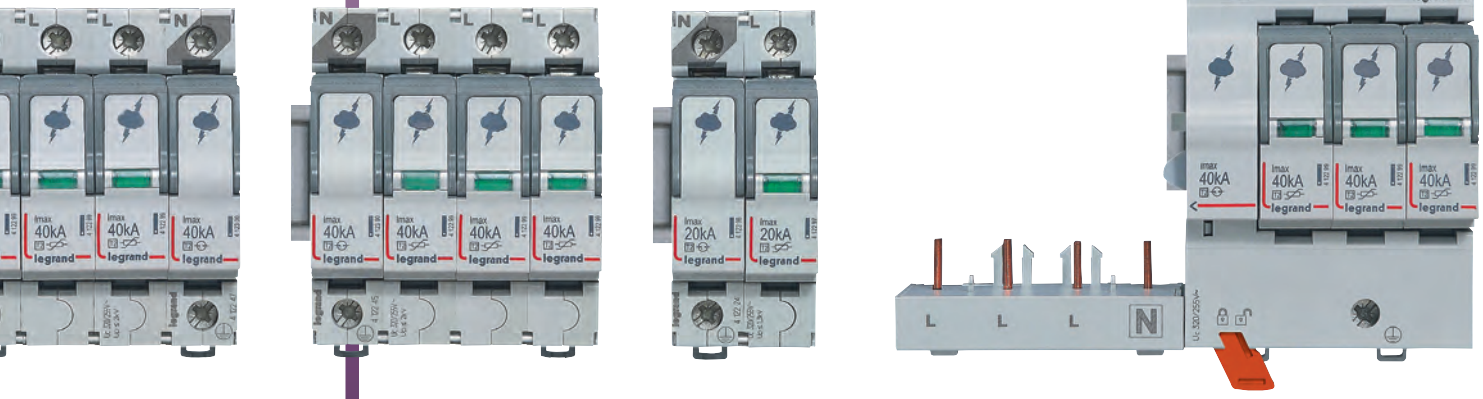
With its new SPDs, add-on SPDs and SPDs with integrated protection, Legrand provides solutions suitable for all types of installations and all risk levels.

* Depending on the country and type of installation. Source: insurance companies.

New Surge Protective Devices (SPDs)

New SPDs, a complete range for all risk levels

For protection against transient overvoltages to be effective, the position of the SPD in the installation and the type of SPD must be appropriate for the level of risk. Conforming fully to international standards, Legrand's range of type 1 (T1+T2) and 2 (T2) SPDs meet all the requirements of low voltage installations.

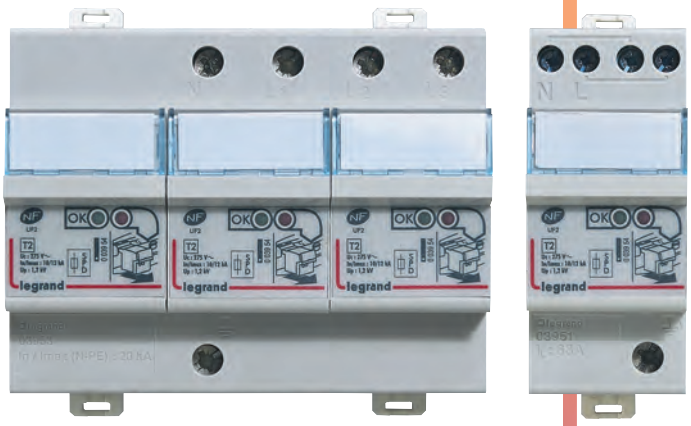


SPDs WITHOUT INTEGRATED PROTECTION (T1+T2 AND T2)

These SPDs require associated protection by means of a circuit breaker or fuse. They are designed to protect commercial and industrial installations.

ADD-ON SPDs (T2)

The protective circuit breaker is connected directly to the SPD with no wiring (see page 13). These SPDs are designed to protect commercial and industrial installations in their secondary distribution boards.



SPDs WITH INTEGRATED PROTECTION (T2)

Protection against overloads and short-circuits is incorporated in the SPD. This is the most straightforward choice for small commercial or residential installations. It also provides the warranty of having the ideal match between the SPD and its associated protection, for maximum safety.

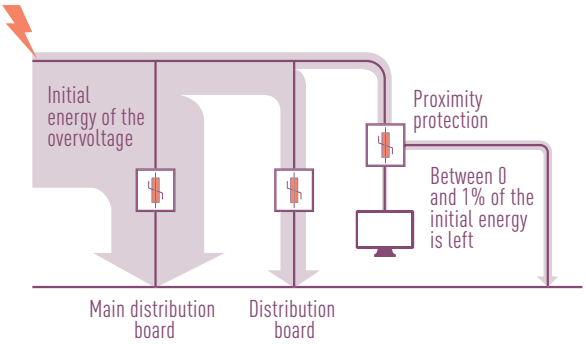
STANDARDS EN 61643-11 AND IEC 61643-11

The entire range of Legrand SPDs conforms to standards EN and IEC 61643-11. The standards distinguish two types of SPD for distribution boards: T1 and T2.

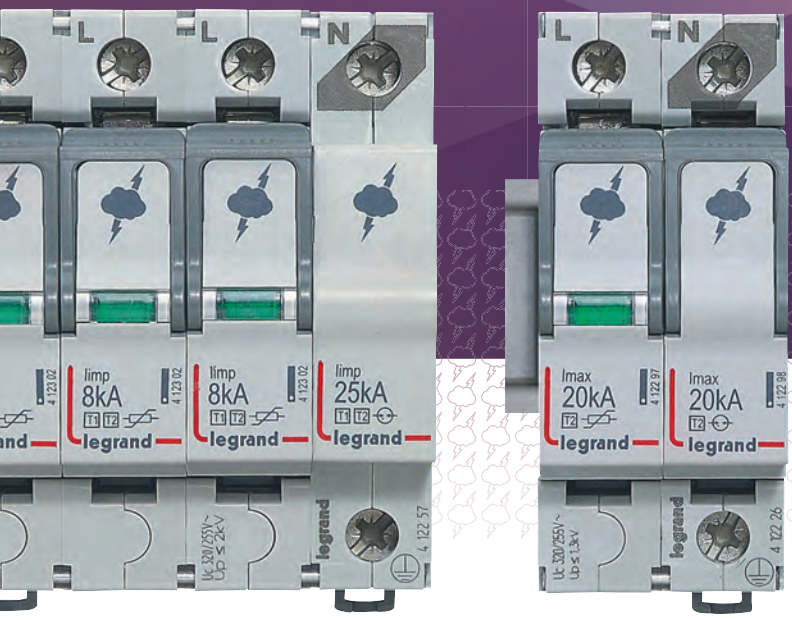
T1 SPDs are designed to provide protection in the main distribution boards and T2 SPDs mostly provide protection in secondary distribution boards or consumer units. T1+T2 SPDs, which are increasingly used at the supply end of installations, comply with the specifications of both T1 and T2 SPDs.

CASCADED PROTECTION

The only way to discharge all the initial energy is to install SPDs at every level of the installation.



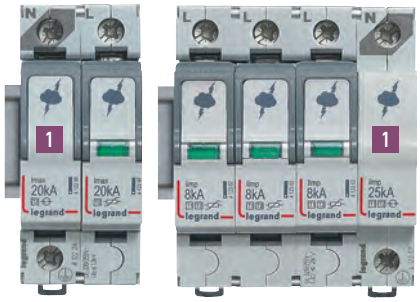
Optimum protection and adaptability to suit local habits



The new Legrand 1P+N and 3P+N SPDs ensure optimum protection for electronic equipment, while providing a universal solution suited to the installation practices of all markets. Available with all levels of discharge current.

OPTIMUM PROTECTION

The 1P+N and 3P+N SPDs with dedicated protection of the neutral pole discharge the common and differential mode overvoltages that may occur in installations with TT and TNS systems, when there is a lightning strike.



1 Dedicated protection of the neutral

ADAPTABILITY

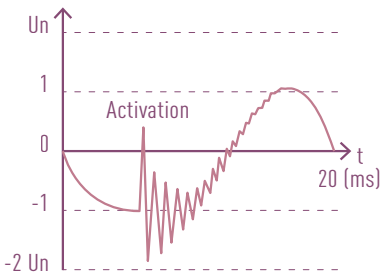
To adapt to the installation practices of different countries, the 1P+N and 3P+N SPDs are available with the neutral on the right or on the left side.

Neutral on the right

Neutral on the left

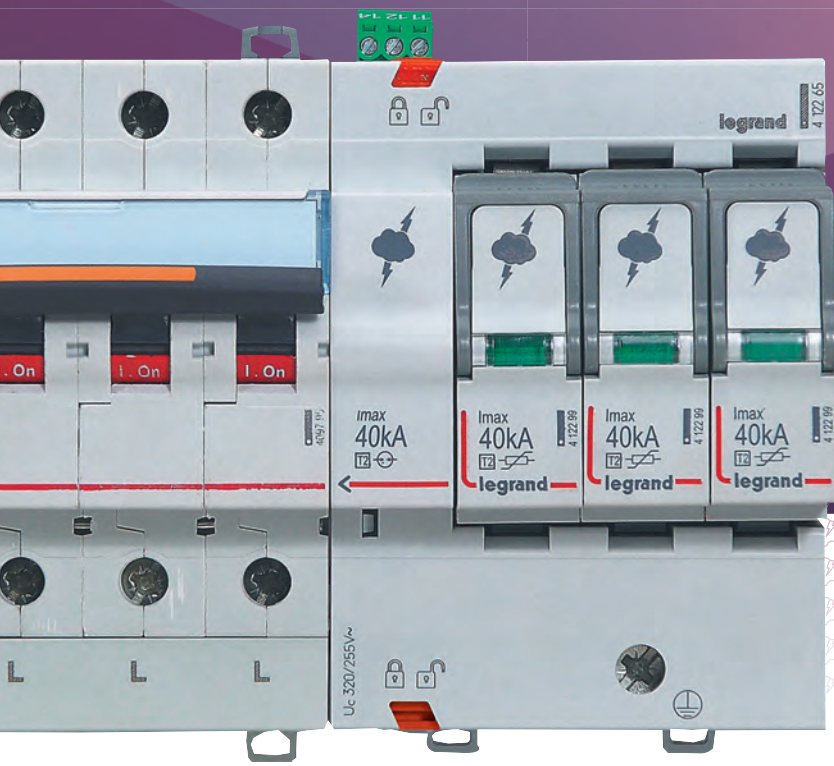
SPDS... NOT JUST PROTECTION AGAINST THE EFFECTS OF LIGHTNING

The operation of distribution networks, installations and equipment can cause very harmful transient overvoltages. As well as providing protection against the effects of lightning, installing SPDs also protects sensitive equipment against this type of disturbance.



Typical switching overvoltage

Add-on SPDs, increased reliability and safety



Exclusive to Legrand, the add-on SPDs make installation and maintenance simpler and safer and enable the associated circuit breaker to be chosen according to the back-up or discrimination requirements of the installation.

SAVE INSTALLATION TIME

The add-on SPD and its protective circuit breaker are joined together without any wiring, guaranteeing speed of installation and safety.

SIMPLER MAINTENANCE AND INCREASED SAFETY

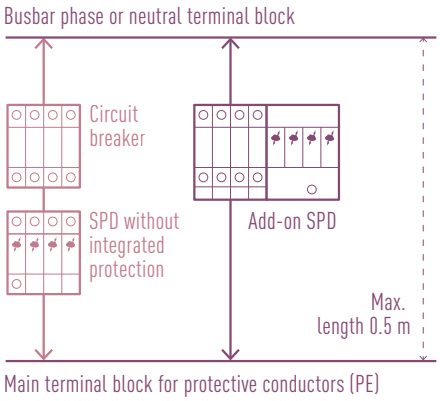
- The circuit breaker + add-on SPD assembly is joined together by a locking system.
- A single auxiliary to ascertain the status of the SPD (operational or plug-in modules out of service) and its associated circuit breaker.
- It is not possible to reset the circuit breaker if a plug-in module is missing or out of service.
- If a plug-in module is out of service, the circuit breaker remains ON and the SPD can still protect the other poles.

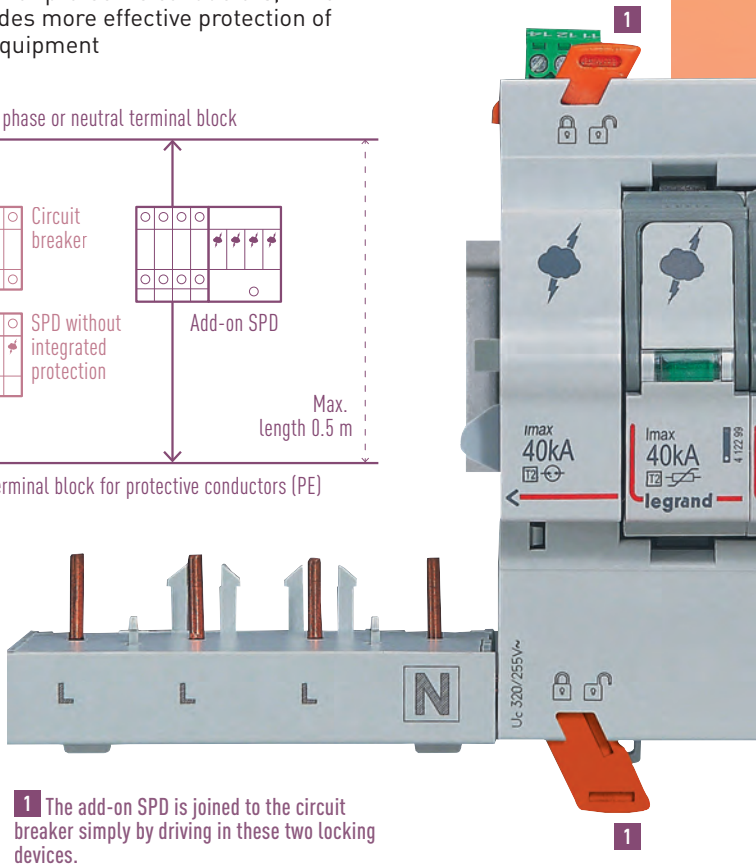
MORE FLEXIBILITY DUE TO THE CHOICE OF CIRCUIT BREAKERS

The add-on SPD can be used with all DX³ 1 module per pole circuit breakers, thus enabling users to choose the characteristics of the protective device, which is not possible with SPDs with integrated protection.

INCREASED RELIABILITY AND MORE EFFECTIVE PROTECTION

With no intermediate wiring between the SPD and the circuit breaker, it is easier to create the shortest possible connection between the supply terminal block and the main terminal block for protective conductors, which provides more effective protection of the equipment

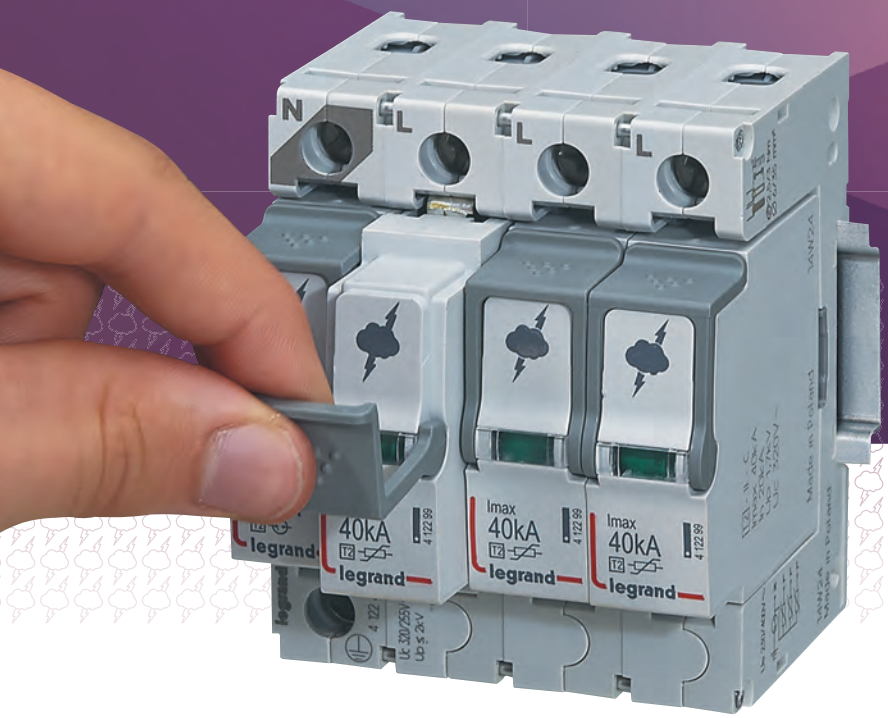




1 The add-on SPD is joined to the circuit breaker simply by driving in these two locking devices.

Design and functionality, perfect integration in distribution boards

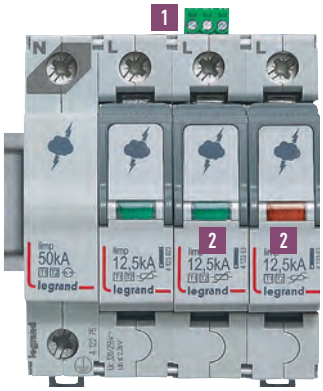
Clear, easily identifiable marking for easier maintenance, design in line with other Legrand modular equipment, well tought features: the new SPDs integrate perfectly in the modular rows of Legrand distribution boards.



Easier to handle: the plug-in modules are easy to replace thanks to the extraction handles.

STATUS INDICATOR AND REMOTE MONITORING OF INFORMATION

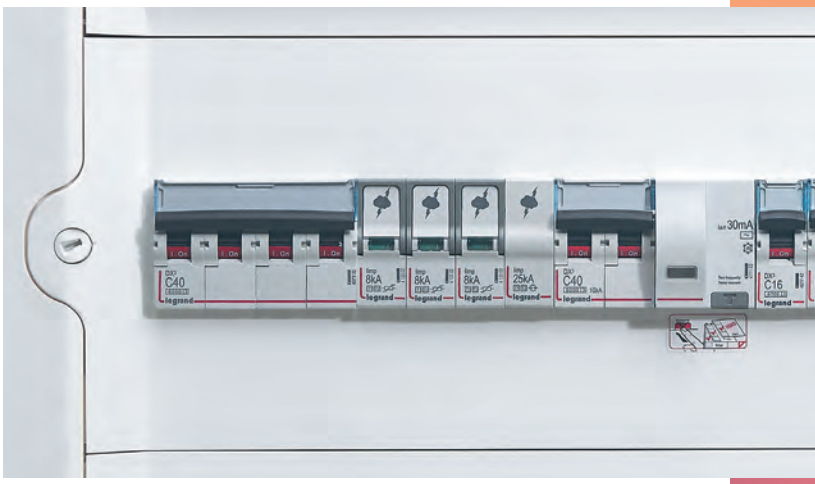
A plug-in module status indicator indicates whether the SPD is operational (green) or out of service (orange). The fault signal contact integrated in all add-on SPDs and available for all protection levels of conventional SPDs provides remote monitoring of this information. The fault signal contact on the add-on SPDs also indicates the status of the circuit breaker (ON/OFF).



1 Fault signal contact
2 Status indicator

DESIGN AND MARKING

New design in line with the DX³ range of circuit breakers, but with dedicated marking for easy identification of the product once installed in the distribution board.

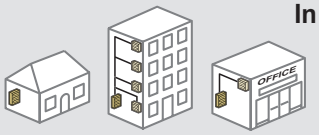


3 Dedicated marking for easier identification and maintenance of the SPDs.

Selecting Surge Protective Devices (SPDs) and their associated protection

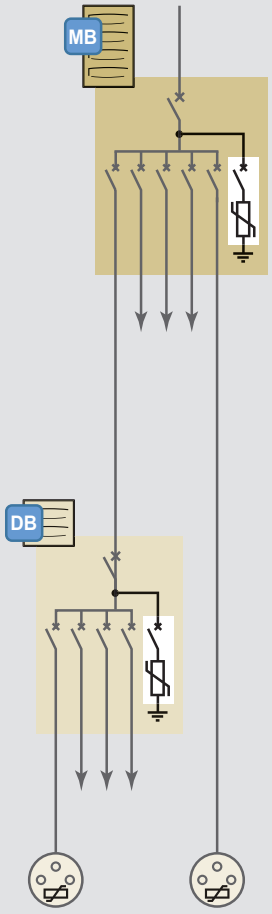
SPDs are mandatory[1] for buildings:
- With risks for the persons: buildings with safety services or medical care facilities, hospitals, …
- Dedicated to public services, cultural heritage, religious buildings,…
- With professional activities: commercial buildings, hotels, banks, industries, farms,…
- Equipped with a LPS (Lightning Protection System: protection of buildings against direct lightning strikes) and/or designed according to IEC/EN 62035 standard
- With large number of persons: large residential, offices, schools, (Mandatory in Europe according to HD 60364)
- Small buildings: small commercial buildings, houses, small multi-family buildings, according to a risk analysis[1]

Group or individual houses, small commercial buildings



In ≤ 125 A

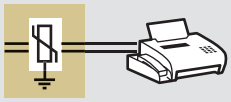
Low voltage installation



MB: Main Distribution Board
DB: Distribution Board

Main distribution board	Power network	Isc	SPD type	SPD (N left/right) + recommended overcurrent protection[2]
Very high risk All areas	1P+N	≤ 10 kA	 T1+T2 / 12.5 kA	4 122 74/76 + 4 078 06
	3P			4 122 72 + 4 078 65
	3P+N			4 122 75/77 + 4 079 34
High risk Non-urban areas, mountains, etc.	1P+N		 T1+T2 / 8 kA	4 122 54/56 + 4 078 04
	3P			4 122 52 + 4 078 63
	3P+N			4 122 55/57 + 4 079 32
Low risk Urban areas, excluding mountains, etc.	1P+N		 T2 / 40 kA	4 122 44/46 + 4 078 02
	3P			4 122 42 + 4 078 61
	3P+N			4 122 45/47 + 4 079 30
Distribution board **All risks**	1P+N	≤ 6 kA	 T2 /12 kA	0 039 51 (integrated protection)
	3P			-
	3P+N			0 039 53 (integrated protection)
	1P+N		 T2 / 20 kA	4 122 24/26 + 4 078 01
	3P			-
	3P+N			4 122 25/27 + 4 079 29
Proximity protection of sensitive equipment		Multi-outlet extensions		6 946 14/48/51/56/64/66/70/71
		Mosaic		0 775 40

Communication lines



(See p. 70)

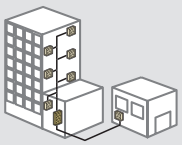
1: According to installation standards IEC/HD 60364 parts 443 and 534
2: Recommended protective device to be used according to the type of SPD and requirements of the installation (see opposite table and technical pages)
3: Standard modular SPD

SPDs Cat.Nos	T1+T2 / 25 kA and 35 kA 4 122 80/81/82/83		T1+T2 / 12.5 kA 4 122 70/71/72/73/74/75/76/77			T1+T2 / 8 kA 4 122 50/51/52/53/54/55/56/57			T2 / 40 kA 4 122 30/32/33/40/41/42/43/44/45/46/ 47/64/65/66/67		
Network	3P	3P+N	1P+N	3P	3P+N	1P+N	3P	3P+N	1P+N	3P	3P+N
Circuit breaker	DPX³160 - 80 A		DX³ 63 A C curve			DX³ 40 A C curve			DX³ 25 A C curve		
	3P	4P	2P	3P	4P	2P	3P	4P	2P	3P	4P
Isc ≤ 10 kA	-	-	4 078 06	4 078 65	4 079 34	4 078 04	4 078 63	4 079 32	4 078 02	4 078 61	4 079 30
Isc ≤ 16 kA	4 200 04	4 200 14	4 092 08	4 092 60	4 093 42	4 092 06	4 092 58	4 093 40	4 092 04	4 092 56	4 093 38
Isc ≤ 25 kA	4 200 44	4 200 54	4 097 74	4 097 87	4 098 00	4 097 72	4 097 85	4 097 98	4 097 70	4 097 83	4 097 96
Isc ≤ 50 kA	4 201 24	4 201 34	4 101 54	4 101 67	4 101 80	4 101 52	4 101 65	4 101 78	4 101 50	4 101 63	4 101 76

Risk levels:

- **Very high risk:** EN/IEC 62305 standards, installations with a LPS or metal structure (acting as a lightning conductor), installations that are isolated, or on a high mountain, or have a history of lightning strikes, etc.
- **High risk:** installations outside of urban areas, in mountainous areas, isolated, at the end of a line, near a body of water, trees or near installations equipped with lightning conductors, etc.
- **Low risk:** installations in urban areas (or grouped buildings), flat areas, or low and medium height mountains

Commercial buildings

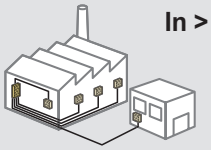


In ≤ 400 A

Isc	SPD type	SPD (N left/right) + recommended overcurrent protection(2)
≤ 25 kA	 T1+T2/25 kA	-
		4 122 82 + 4 200 44
		4 122 83 + 4 200 54
	 T1+T2/12.5 kA	-
		4 122 72 + 4 097 87
		4 122 75/77 + 4 098 00
	 T1+T2/12.5 kA	-
		4 122 72 + 4 097 87
		4 122 75/77 + 4 098 00
≤ 10 kA	 T2 / 12 kA	0 039 71 (integrated protection)
		-
		0 039 73 (integrated protection)
≤ 16 kA	 T2/20 kA	4 122 60/62 + 4 092 03
		4 122 42(3) + 4 092 55
		4 122 61/63 + 4 093 37
Mosaic		0 775 40

Large commercial/ Industrial buildings

(IT earthing system: see below)



In > 400 A

Isc	SPD type	SPD (N left/right) + recommended overcurrent protection(2)
≤ 50 kA	 T1+T2/25 kA	-
		4 122 82 + 4 201 24
		4 122 83 + 4 201 34
	 T1+T2/25 kA	-
		4 122 82 + 4 201 24
		4 122 83 + 4 201 34
	 T1+T2/12.5 kA	-
		4 122 72 + 4 101 67
		4 122 75/77 + 4 101 80
≤ 25 kA	-	-
		-
		-
	 T2/40 kA	4 122 64/66 + 4 097 70
		4 122 42(3) + 4 097 83
		4 122 65/67 + 4 097 96
Mosaic		0 775 40

When low voltage SPDs are present, protection of all lines entering the building is recommended

	T2 / 20 kA 4 122 20/21/23/24/25/26/27/60/61/62/63		
	1P+N	3P	3P+N
	DX³ 20 A C curve		
	2P	3P	4P
	4 078 01	4 078 60	4 079 29
	4 092 03	4 092 55	4 093 37
	4 097 69	4 097 82	4 097 95
	-	-	-

IT earthing system (all risks)

SPD type		Network	Icc	SPD + protective device(2)
MB	T1+T2 35 kA/440 V	3P	50 kA	4 122 80 (x 3) + 4 201 24
		3P+N		4 122 80 (x 4) + 4 201 34
DB	T2 40 kA/440 V	1P+N	25 kA	4 122 30 (x 2) + 4 097 70
		3P		4 122 32 + 4 097 83
		3P+N		4 122 33 + 4 097 96

Class I + II (T1+T2) low voltage SPDs


4 122 75


4 122 57


4 122 83


4 123 03


4 122 84

Technical characteristics **p. 15-17**

Protection against transient overvoltagess for 230/400 V~ power networks (50/60 Hz). SPDs compliant with EN/IEC 61643-11 standards
Recommended for main distribution boards
Class I+II (T1+T2) : SPDs tested and specified according to both T1 and T2 test classes

SPDs for general protection of main distribution board

SPDs with plug-in modules and status indicators:
- Green: SPD operational
- Orange: plug-in modules to be replaced

Earthing systems: TT, TNC, TNS

T1+T2 - Iimp 12,5 kA/pole

For general protection of big installations and protection of small installations with external lightning protection (LPS).
Up: 1.5 kV - Imax: 60 kA/pole - Uc: 320 V~
Recommended MCB: DX³ 63 A - C curve

Pack	Cat.Nos	Number of poles	Neutral position	Itotal (10/350)	Remote status monitoring (FS contact)	Number of modules
1	4 122 70	1P	-	12.5 kA	No	1
1	4 122 74[1]	1P+N	Left	25 kA	Yes	2
1	4 122 76[1]	1P+N	Right	25 kA	Yes	2
1	4 122 71	2P	-	25 kA	No	2
1	4 122 72	3P	-	37.5 kA	Yes	3
1	4 122 75[1]	3P+N	Left	50 kA	Yes	4
1	4 122 77[1]	3P+N	Right	50 kA	Yes	4
1	4 122 73	4P	-	50 kA	No	4

T1+T2 - Iimp 8 kA/pole

SPDs for small installations without external lightning protection (LPS)
Up: 1.3 kV - Imax: 50 kA/pole - Uc: 320 V~
Recommended MCB: DX³ 40 A - C curve

Pack	Cat.Nos	Number of poles	Neutral position	Itotal (10/350)	Remote status monitoring (FS contact)	Number of modules
1	4 122 50	1P	-	8 kA	No	1
1	4 122 54[1]	1P+N	Left	16 kA	No	2
1	4 122 56[1]	1P+N	Right	16 kA	No	2
1	4 122 51	2P	-	16 kA	No	2
1	4 122 52	3P	-	25 kA	No	3
1	4 122 55[1]	3P+N	Left	25 kA	No	4
1	4 122 57[1]	3P+N	Right	25 kA	No	4
1	4 122 53	4P	-	32 kA	No	4

SPDs for high risk level installations

SPDs for big installations with external lightning protection (LPS) and for high risk level installations according to EN/IEC 62305 standards
SPDs with plug-in modules and status indicators:
- Green: SPD operational
- Red: plug-in modules to be replaced

T1 + T2 - Iimp 35 kA/pole - 440V~ (IT) - Plug-in

Up: 2.5 kV - Uc: 440 V~
Earthing systems: TT, TNC, TNS, IT
Recommended MCCB: DPX³160 - 80 A

Pack	Cat.Nos	Number of poles	Neutral position	Itotal (10/350)	Remote status monitoring (FS contact)	Number of modules
1	4 122 80	1P	-	35 kA	Yes	2

SPDs for high risk level installations (continued)

T1 + T2 - Iimp 25 kA/pole

Up: 1.5 kV - Uc: 350 V~
Earthing systems: TT, TNC, TNS.
Recommended MCCB: DPX³160 - 80 A

Pack	Cat.Nos					
1	4 122 81[1]	1P+N	Right	50 kA	Yes	4
1	4 122 82	3P	-	75 kA	Yes	6
1	4 122 83[1]	3P+N	Right	100 kA	Yes	8

Replacement plug-in modules

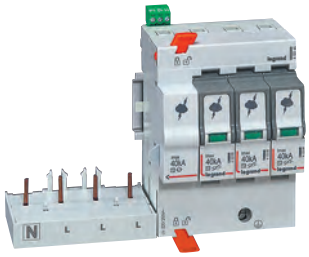
Pack	Cat.Nos	
1	4 123 02	For SPDs T1+T2 - 8 kA Cat.Nos 4 122 50/51/52/53/54/55/56/57
1	4 123 03	For SPDs T1+T2 - 12.5 kA Cat.Nos 4 122 70/71/72/73/74/75/76/77
1	4 122 84	For SPDs T1+T2 - 25 kA Cat.Nos 4 122 81/82/83 and 0 030 20/22/23/27
1	4 122 85	N-PE module for SPDs T1+T2 - 25 kA Cat.Nos 4 122 81/83 and 0 030 23
1	4 122 86	For SPDs T1+T2 - 35 kA Cat.No 4 122 80

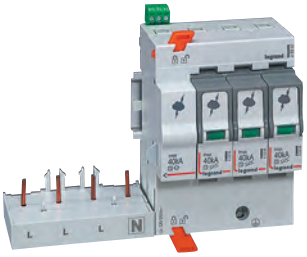
Cabling accessories

Pack	Cat.Nos	
1	4 123 10	Ready to use cabling kit consisting of 5 conductors (including the earth conductor) Cross section :16mm² Lenght : 40cm For cabling SPDs in industrial enclosures (for EN/IEC 61439 compliance).

1: 1P+N and 3P+N: L-N and N-PE protection modes (common and differential modes), the N pole being protected by encapsulated spark gaps. Also called 1+1 and 3+1

Class II (T2) low voltage SPDs


4 122 65


4 122 67


4 122 45


4 122 99

Technical characteristics **p. 15-17**

Protection against transient overvoltagess for 230/400 V~ power networks (50/60 Hz). SPDs compliant with EN/IEC 61643-11 standards
Recommended for distribution boards

T2 add-on SPDs

SPDs with plug-in modules and status indicators:
- Green: SPD operational
- Orange: plug-in modules to be replaced

SPDs providing increased safety during their lifetime and maintenance cycles. Prewired MCB connexions for increased reliability and for quick and easy Installation.
To be equipped with DX³ MCBs (1 module/pole)
Earthing systems: TT, TNS

T2 - Imax 40 kA/pole

SPDs recommended for power installations
Up: 1.7 kV - In: 20 kA/pole - Uc: 320 V~
Recommended MCB: DX³ 25 A - C curve

Pack	Cat.Nos	Number of poles	Neutral position	Remote status monitoring (FS contact)	Number of modules
1	4 122 64[1]	1P+N	Left	Yes	4
1	4 122 66[1]	1P+N	Right	Yes	4
1	4 122 65[1]	3P+N	Left	Yes	8
1	4 122 67[1]	3P+N	Right	Yes	8

T2 - Imax 20 kA/pole

SPDs recommended for small installations
Up: 1.2 kV - In: 5 kA/pole - Uc: 320 V~
Recommended MCB: DX³ 20A - C curve

Pack	Cat.Nos				
1	4 122 60[1]	1P+N	Left	Yes	4
1	4 122 62[1]	1P+N	Right	Yes	4
1	4 122 61[1]	3P+N	Left	Yes	8
1	4 122 63[1]	3P+N	Right	Yes	8

T2 SPDs

SPDs with plug-in modules and status indicators:
- Green: SPD operational
- Orange: plug-in modules to be replaced

T2 - Imax 40 kA/pole

SPDs recommended for power installations
Up: 1.7 kV - In: 20 kA/pole - Uc: 320 V~
Earthing systems : TT, TNC, TNS
Recommended MCB: DX³ 25 A - C curve

Pack	Cat.Nos	Number of poles	Neutral position	Remote status monitoring (FS contact)	Number of modules
1	4 122 40	1P	-	No	1
1	4 122 44[1]	1P+N	Left	No	2
1	4 122 46[1]	1P+N	Right	No	2
1	4 122 41	2P	-	No	2
1	4 122 42	3P	-	Yes	3
1	4 122 45[1]	3P+N	Left	No	4
1	4 122 47[1]	3P+N	Right	No	4
1	4 122 43	4P	-	No	4

T2 - Imax 40 kA/pole - 440V~ (IT)

SPDs recommended for big installations
Up: 2.1 kV - In: 20 kA/pole - Uc: 440 V~
Earthing systems : TT, TNC, TNS, IT
Recommended MCB: DX³ 25 A - C curve

Pack	Cat.Nos				
1	4 122 30	1P	-	No	1
1	4 122 32	3P	-	Yes	3
1	4 122 33	4P	-	Yes	4

T2 - Imax 20 kA/pole

SPDs recommended for small installations
Up: 1.2 kV - In: 5 kA/pole - Uc: 320 V~
Earthing systems : TT, TNC, TNS
Recommended MCB: DX³ 20 A - C curve

Pack	Cat.Nos				
1	4 122 20	1P	-	No	1
1	4 122 24[1]	1P+N	Left	No	2
1	4 122 26[1]	1P+N	Right	No	2
1	4 122 21	2P	-	No	2
1	4 122 25[1]	3P+N	Left	No	4
1	4 122 27[1]	3P+N	Right	No	4
1	4 122 23	4P	-	No	4

Replacement plug-in modules

1	4 122 99	For SPDs T2 - 40 kA Cat.Nos 4 122 40/41/42/43/44/45/46/47/64/65/66/67
1	4 123 00	N-PE module for SPDs T2 - 40 kA Cat.Nos 4 122 44/45/46/47
1	4 123 01	For SPDs T2 - 440 V Cat.Nos 4 122 30/32/33
1	4 122 97	For SPDs T2 - 20 kA Cat.Nos 4 122 20/21/23/24/25/26/27/60/61/62/63
1	4 122 98	N-PE module for SPDs T2 - 20 kA Cat.Nos 4 122 24/25/26/27

1: 1P+N and 3P+N: L-N and N-PE protection modes (common and differential modes), the N pole being protected by encapsulated spark gaps. Also called 1+1 and 3+1

Class II (T2) low voltage SPDs with integrated protection

0 039 51

0 039 53

0 039 54

Technical characteristics **p. 15-17**

SPDs with integrated protection against overload currents and short-circuit currents
SPDs compliant with EN/IEC 61643-11 standards
For 230/400 V~ power networks (50/60 Hz)

Protection for consumer units

For residential and small commercial installations
With plug-in modules and status indicators:
- Green: SPD operational
- Red: plug-in module need to be replaced

T2 self protected SPDs - Imax 12 kA/pole

For installations with low risk level (in urban areas, underground power supplies, etc.)
In: 10 kA/pole - Uc: 275 V~
Earthing systems: TT, TNS
Cat. No. 0 039 51: SPD with Y connection (both incoming and outgoing terminals at the top of the SPD) providing better protection against overvoltages

Pack	Cat.Nos	Number of poles	Neutral position	Integrated protection	Number of modules
1	0 039 51[1]	1P+N	Left	Isc ≤ 6 kA	2
1	0 039 53[1]	3P+N	Left	Isc ≤ 6 kA	6

Protection for secondary distribution boards

Protection of sensitive equipment.
With plug-in modules and status indicators:
- Green: SPD operational
- Red: plug-in module need to be replaced
In: 10 kA/pole - Uc: 275 V~
Earthing systems: TT, TNS.
Cat. No. 0 039 71: SPD with Y connection both incoming and outgoing terminals at the top of the SPD, providing better protection against overvoltages

T2 self protected SPDs - Imax 12 kA/pole

Pack	Cat.Nos	Number of poles	Neutral position	Integrated protection	Number of modules
1	0 039 71[1]	1P+N	Left	Isc ≤ 10 kA	2
1	0 039 73[1]	3P+N	Left	Isc ≤ 10 kA	6

Replacement plug-in modules

For self protected SPDs

Pack	Cat.Nos	
1	0 039 54	Cat.Nos 0 039 51/53
1	0 039 74	Cat.Nos 0 039 71/73

For old SPDs

Pack	Cat.Nos	
5	0 039 28	Cat.Nos 0 039 20/21/22/23
5	0 039 34	Cat.Nos 0 039 30/31/32/33
5	0 039 39	Cat.Nos 0 039 35/36/38
5	0 039 44	Cat.Nos 0 039 40/41/43

1: 1P+N and 3P+N: L-N and N-PE protection modes (common and differential modes), the N pole being protected by encapsulated spark gaps. Also called 1+1 and 3+1.

SPDs for telephone lines

0 038 28

0 038 29

Technical characteristics **p. 15-17**

SPDs for telephone and data lines

Overvoltage protection of equipment such as telephones, modems, video door entry phones, RS485 networks, measurement loops, etc.
Not compatible with VDSLs
SPDs needed to provide complete protection of the installation when low voltage SPDs are present (TS/IEC 61643-12).
SPDs with status indicators:
- Green: SPD operational
- Orange: plug-in module need to be replaced
Compliant with EN/IEC 61643-21 standards

"Analogue" SPD (STN, non-unbundled ADSL, etc.)

Pack	Cat.Nos	In/Imax	Max. voltage(Uc)	Level of protection (Up)	No. of modules
1	0 038 28	5/10 kA	170 V	260 V	1

"Digital" SPD (unbundled ADSL, SDSL, ISDN, etc.)

1	0 038 29	5/10 kA	48 V	100 V	1

Surge Protective Devices (SPDs)

protection against transient overvoltages

Protection against lightning and overvoltages

Protection against the effects of lightning is essentially based on:
• Protecting buildings using a lightning protection system (LPS or lightning conductors) to catch lightning strikes and to drive the lightning current to earth.
• The use of surge protective devices (SPDs) to protect equipment.
• The design of the earthing system (passive protection of the installation).
Throughout the world, there are millions of lightning strikes each day in the summer (up to 1000 lightning strikes/second). Lightning is responsible for 25% to 40% of all damage to equipment. When added to industrial overvoltages (switching overvoltages due to the operation of internal equipment), they account for more than 60% of all electrical damages, which can be prevented by installing SPDs (according to the country and type of installation - source: insurance companies).
In some countries, and depending on the end use of the building, national regulations may always stipulate the installation of SPDs (for example, Germany, Austria, Norway, etc.). If there are no specific national regulations, SPDs are usually specified by national installation standards (based on HD/IEC 60364 international installation standards) and EN/IEC 62305 standards.

External lightning protection system (LPS) or lightning conductors: protection of buildings (EN/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 rod, with sparkover device, meshed cage, etc.) and/or the metallic structure of the building.
If there is an LPS or if a lightning risk assessment has been carried out in accordance with EN/IEC 62305 standards, SPDs are generally required in the main distribution board (T1 or T1+T2 SPDs) and distribution boards (T2 SPDs).
Determination of the SPDs in the main distribution board in accordance with EN/IEC 62305 and TS/IEC 61643-12 (if there is insufficient information available):

LPL[1]: Lightning protection level	Total lightning current of the LPS	Min. value of Imp current of the SPD (T1 or T1+T2)	Usage practices
I	200 kA	25 kA/pole (IT: 35kA 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)

Surge protective device (SPD) (internal protection)

The SPD
• Protects sensitive devices against overvoltages caused by lightning and industrial overvoltages, by limiting the overvoltages to values that are tolerated by the equipment
• Limits the possible harmful consequences in terms of the safety of people (medical equipment installed in the home, security systems, environmental systems, etc.)
• Maximises the continuity of operation of equipment and limits production losses

SPDs and standards

Standards EN/IEC 61643-11

Type of SPD		Test waves
EN 61643-11	IEC 61643-11	
Type 1 (T1)	Class I (T1)	Iimp: 10/350 µs (discharge current) In: 8/20 µs (nominal current, 15 shocks)
Type 2 (T2)	Class II (T2)	Imax: 8/20 µs (discharge current) In: 8/20 µs (nominal current, 15 shocks)

T1+T2 SPDs: tested in accordance with both methods.
T1 or T1+T2 SPDs are increasingly used at the supply origin of installations, even when there is no lightning conductor, as they enable higher energies to be discharged and increase the service life the SPD.

HD/IEC 60364 electrical installation standards

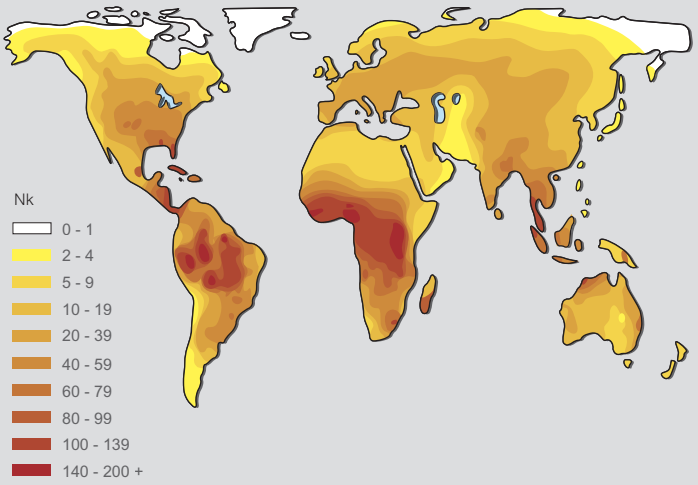
According to articles 443 and 534 of HD/IEC 60364 standards from year 2015 and the TS/IEC 61643-12 guides, the use of SPDs in new or renovated buildings is compulsory for buildings with:
• Risks for human life, e.g. safety services, medical care facilities, hospitals...
• Public services and cultural heritage, e.g. loss of public services, data centres, museums, religious buildings, ...
• Commercial or industrial activities, e.g. hotels, banks, industries, commercial markets, farms, …
• With direct lightning protection and/or designed according to EN/IEC 62305-2 (with LPS: T1 or T1+T2 SPDs, Iimp ≥ 12.5 kA)
• Receiving large number of persons, e.g. large residential, offices, schools, … (Europe)

In the case of small buildings, e.g. small commercial buildings, houses, small multi-family buildings, ..., a risk analysis shall be realized (article 443.5). If this is not done, SPDs are made mandatory by HD/IEC 60364 installation standards.

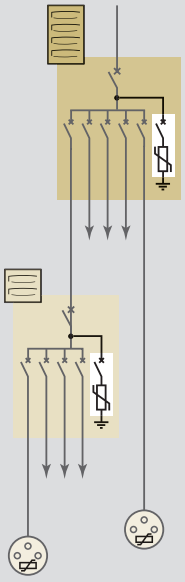
Countries still following earlier versions of HD/IEC installation standards:

According to articles 443 and 534 of HD/IEC 60364 standards and the TS/IEC 61643-12 guides, the use of SPDs in new or renovated buildings is compulsory at the supply origin of the installation in the following cases:
• Buildings with lightning conductors or LPS (T1 or T1+T2 SPDs, Iimp ≥ 12.5 kA)
• Buildings with totally or partially overhead power supplies in AQ2 geographical areas (article 443.3.2.1 - AQ2: Nk > 25, see map below) 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 buildings and services, religious buildings, schools and large residential complexes, etc.
• Hospitals and buildings containing medical equipment and/or safety services for people and property (fire alarm, technical alarms, etc.)

Important: 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 national installation standards, an SPD should always be installed to protect the communication equipment when there is an SPD on the low voltage power network.



Protection of distribution boards and sensitive equipment (cascaded protection)



Effective protection against overvoltages cannot generally be assured with a single SPD if its protection level (Up) 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 In, Imax, etc.) and its protection level (Up), an SPD will limit these overvoltages to varying values depending on the energy levels involved. The overvoltage values that may be transmitted downstream of the SPD may 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 may 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 typically 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).

Surge Protective Devices (SPDs)

technical characteristics

Modular SPDs

230/400 V~ power network (50/60 Hz) - Degree of protection IP 20
1P+N (3P+N) SPDs: L-N and N-PE protection, also called 1+1 (3+1 resp.) or CT2 type protection depending on installation standards.

Cat.Nos	Type	Poles	Earthing system	Max. voltage (Uc)	Protection mode	Nominal current In/pole (8/20)	Max. discharge current			Protection level		Max. short-circuit current Isc (Isccr)	Protective device to be used [1]	FS auxiliary (remote status monitoring)
							Imax/ pole (8/20)	Iimp/pole (10/350)	I total (10/350)	Up (L-N/L-PE/N-PE)	Up at 5 kA			
4 122 80	T1+T2/35 kA	1P	TT, TNC, TNS, IT	440 V~	CT1	35 kA	50 kA	35 kA	35 kA	2.5 kV		50 kA	DPX³160 80 A	yes
4 122 81	T1+T2/25 kA	1P+N	TT, TNS	350 V~	CT2	25/50 kA	50/100 kA	25/50 kA	50 kA	1.5/2.5/1.5 kV				yes
4 122 82	T1+T2/25 kA	3P	TNC	350 V~	CT1	25 kA	50 kA	25 kA	75 kA	1.5 kV				yes
4 122 83	T1+T2/25 kA	3P+N	TT, TNS	350 V~	CT2	25/100 kA	50/100 kA	25/100 kA	100 kA	1.5/2.5/1.5 kV				yes
4 122 70	T1+T2/12.5 kA	1P	TT, TNC, TNS	320 V~	CT1	25 kA	60 kA	12.5 kA	12.5 kA	1.5 kV at 12.5 kA 1.9 kV at 25 kA	1 kV	50 kA	DX³ 63 A C curve	no
4 122 71	T1+T2/12.5 kA	2P	TT, TNS	320 V~	CT1	25 kA	60 kA	12.5 kA	25 kA					no
4 122 72	T1+T2/12.5 kA	3P	TNC	320 V~	CT1	25 kA	60 kA	12.5 kA	37.5 kA					yes
4 122 73	T1+T2/12.5 kA	4P	TT, TNS	320 V~	CT1	25 kA	60 kA	12.5 kA	50 kA					no
4 122 74/76	T1+T2/12.5 kA	1P+N	TT, TNS	320 V~	CT2	25/25 kA	60 kA	12.5/25 kA	25 kA	1.5/1.6/1.5 kV at 12.5 kA 1.9/2.1/1.5 kV at 25 kA	1 kV			yes
4 122 75/77	T1+T2/12.5 kA	3P+N	TT, TNS	320 V~	CT2	25/50 kA	60 kA	12.5/50 kA	50 kA					yes
4 122 50	T1+T2/8 kA	1P	TT, TNC, TNS	320 V~	CT1	20 kA	50 kA	8 kA	8 kA	1.2 kV at 8 kA 1.7 kV at 20 kA	1 kV	50 kA	DX³ 40 A C curve	no
4 122 51	T1+T2/8 kA	2P	TT, TNS	320 V~	CT1	20 kA	50 kA	8 kA	16 kA					no
4 122 52	T1+T2/8 kA	3P	TNC	320 V~	CT1	20 kA	50 kA	8 kA	25 kA					no
4 122 53	T1+T2/8 kA	4P	TT, TNS	320 V~	CT1	20 kA	50 kA	8 kA	32 kA					no
4 122 54/56	T1+T2/8 kA	1P+N	TT, TNS	320 V~	CT2	20 kA	50 kA	8 kA	16 kA	1.2/1.5/1.5 kV at 8 kA 1.7/2/1.5 kV at 20 kA	1 kV			no
4 122 55/57	T1+T2/8 kA	3P+N	TT, TNS	320 V~	CT2	20 kA	50 kA	8 kA	25 kA					no
4 122 40	T2/40 kA	1P	TT, TNC, TNS	320 V~	CT1	20 kA	40 kA			1.5 kV at 15 kA 1.7 kV at 20 kA	1 kV	50 kA	DX³ 25 A C curve	no
4 122 41	T2/40 kA	2P	TT, TNS	320 V~	CT1	20 kA	40 kA					50 kA		no
4 122 42	T2/40 kA	3P	TNC	320 V~	CT1	20 kA	40 kA					50 kA		yes
4 122 43	T2/40 kA	4P	TT, TNS	320 V~	CT1	20 kA	40 kA					50 kA		no
4 122 44/46 4 122 64/66	T2/40 kA	1P+N	TT, TNS	320 V~	CT2	20 kA	40 kA			1.5/1.6/1.4 kV at 15 kA 1.7/2/1.4 kV at 20 kA	1 kV	50 kA 25 kA		no yes
4 122 45/47 4 122 65/67	T2/40 kA	3P+N	TT, TNS	320 V~	CT2	20 kA	40 kA					50 kA 25 kA		no yes
4 122 30	T2/40 kA	1P	TT, TNC, TNS, IT	440 V~	CT1	20 kA	40 kA			1.8 kV at 15 kA 2.1 kV at 20 kA	1.3 kV	50 kA	DX³ 25 A C curve	no
4 122 32	T2/40 kA	3P	TNC, IT	440 V~	CT1	20 kA	40 kA							yes
4 122 33	T2/40 kA	4P	TT, TNS, IT	440 V~	CT1	20 kA	40 kA							yes
4 122 20	T2/20 kA	1P	TT, TNS	320 V~	CT1	10 kA	20 kA			1.2 kV at 5 kA 1.4 kV at 10 kA	1.2 kV	25 kA	DX³ 20 A C curve	no
4 122 21	T2/20 kA	2P	TT, TNS	320 V~	CT1	10 kA	20 kA							no
4 122 23	T2/20 kA	4P	TT, TNS	320 V~	CT1	10 kA	20 kA							no
4 122 24/26 4 122 60/62	T2/20 kA	1P+N	TT, TNS	320 V~	CT2	10/20 kA	20 kA			1.2/1.4/1.4 kV at 5 kA 1.4/1.4/1.4 kV at 10 kA	1.2 kV			no yes
4 122 25/27 4 122 61/63	T2/20 kA	3P+N	TT, TNS	320 V~	CT2	10/20 kA	20 kA							no yes
0 039 51 0 039 71	T2+T3/12 kA	1P+N	TT, TNS	275 V~	CT2	10/10 kA	12 kA			1.1/1.2/1.2 kV at 10 kA	1 kV	6 kA 10 kA	integrated protection	no
0 039 53 0 039 73	T2+T3/12 kA	3P+N	TT, TNS	275 V~	CT2	10/20 kA	20 kA					6 kA 10 kA		

CT1: L(N)-PE protection modes.
CT2: L-N and N-PE protection modes.
1: DPX³ (only T1 + T2 SPDs Cat.Nos 4 122 80/81/82/83), DX³ or similar type circuit breakers (with T2 and other T1+T2 SPDs). For fuse protection or values other than those indicated in the table: please consult Legrand.

Characteristics of proximity SPDs

230 V~ protection: Type 3 (T3) SPDs

Cat.Nos	0 775 40	6 946 64/66/70	6 946 14/48/51/56/71
Protection mode	LN/NPE	LN/LPE/NPE	LN
Up	1/1.2 kV	1 kV	1 kV
Imax	6 kA	-	-
In	1.5 kA	2 kA	2 kA
Uoc	3 kV	4 kV	4 kV

TT earthing system: Installation downstream of a residual current device (HPI type recommended).

RJ 45/RJ 11 protection

Cat. No.	6 946 64	6 946 70
Uc	200 V	
Up	600 V	
Imax	1.5 kA	
In	1 kA	
Uoc	3 kV	

TV protection (9.5 mm coax.)

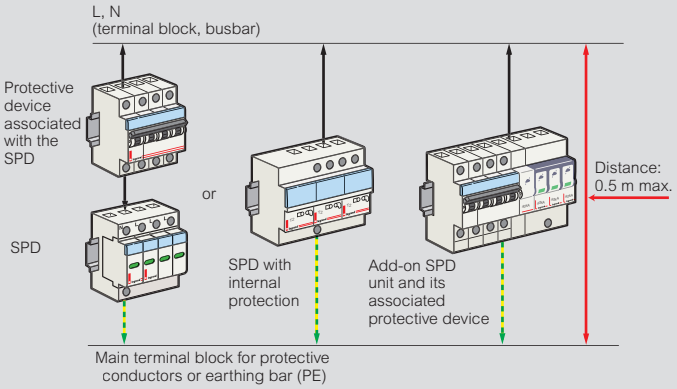
Cat. No.	6 946 66
Uc	50 V
Up	900 V
Imax	5 kA
In	1 kA
Uoc	3 kV

Installation

Associated overcurrent protection

SPDs must be protected by a circuit breaker (or fuses), to provide protection in the event of an overload, which may make the SPD reach its end of life (see selection table p. 10-11). This protective device will be defined to be coordinated or discriminating with regard to upstream protective devices.

Connection principles



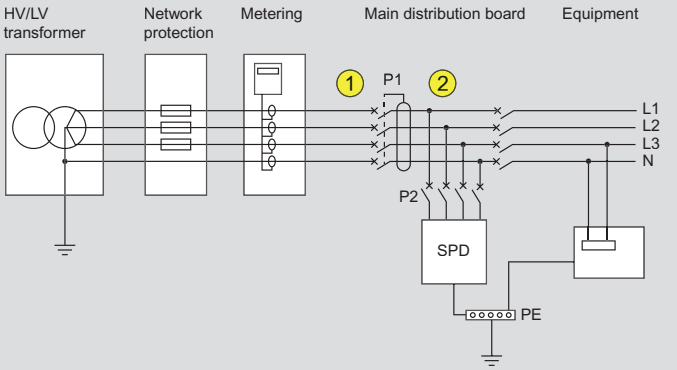
Connection lengths: as short as possible (< 50 cm if possible).

EMC (Electromagnetic Compatibility) rules: avoid loops, fix the cables firmly against the exposed metal conductive parts of the enlcosure.

SPD types and earthing systems

When possible (according to local rules), the SPD and its associated overcurrent protection (P2) should be installed upstream of the main protection (P1) as shown below (according to standards HD/IEC 60364).

SPDs and TT earthing system

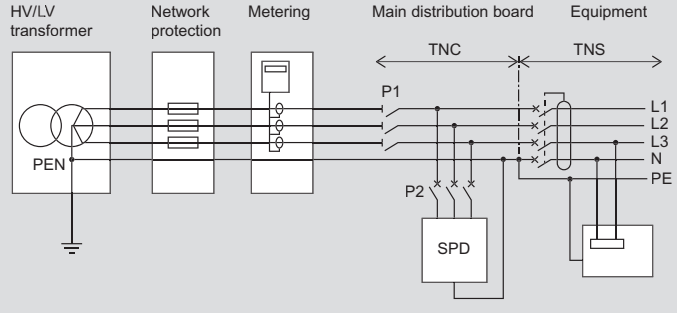


P1: main protection of the installation
SPD: surge protective device with Uc 275 or 320 V recommended

(1) (upstream of P1): 1P+N/3P+N SPDs only (except for Cat.Nos 0 039 51/53/71/73).
1P/2P/3P/4P SPDs and Cat.Nos 0 039 51/53/71/73 must always be installed downstream of a residual current device (discriminating or delayed, at the supply end of the installation).

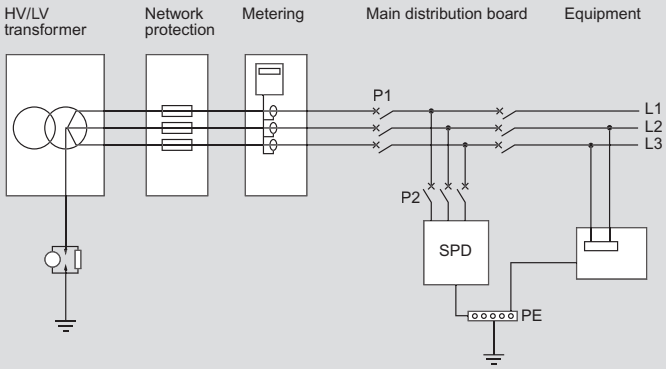
(2) (downstream of P1): any SPD.

SPDs and TN (TNC, TNS and TNC-S) earthing systems



P1: main protection of the installation
SPD: surge protective device with Uc 275 or 320 V recommended

SPDs and IT earthing system



P1: main protection of the installation
SPD: surge protective device with Uc 440 V (Uc < 440 V prohibited)

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).

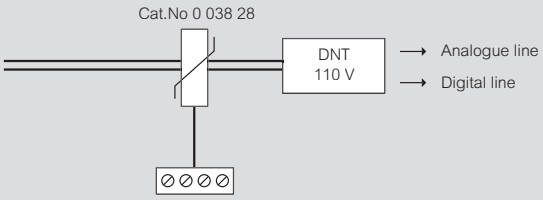
Minimum distances between SPDs

Upstream SPD	Downstream SPD	Minimum distance between SPDs (m)	
		With LPS	Without LPS
T1+T2/35 and T1+T2/25	T2/40 (Uc 440V)	0	0
	T2/40 (Uc 320V)	1	0
T1+T2/12.5 and T1+T2/8	T2/40	5	0
	T2/20 or T2/12	8	0
T2/40	T2/20 or T2/12	-	1
T2/20	T2/12	-	0.5
T2/20 and T2/12	Proximity SPDs	-	2

Installation for telephone lines

Protection of a telephone line

• Upstream the communication distribution box



• Downstream the communication distribution box

- Analogue or digital

- Digital

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