

# SPD

Surge Protective Device

## Overvoltage

Electricity is an essential part of modern human production and life. But power facilities are threatened by internal and external overvoltages. Power system overvoltage mainly includes:

**Transient overvoltage of atmospheric origin:** Lightning strikes instantly generate high energy, generating surge currents up to hundreds of kA, and lightning wave can invade along power lines, causing damage to power facilities and electrical equipment

**Transient overvoltage due to switching:** Switching operations of a power utility may cause overvoltage.

**Temporary overvoltage:** A long duration (second level) temporary overvoltage (asymmetric ground fault) or harmonious overvoltage.

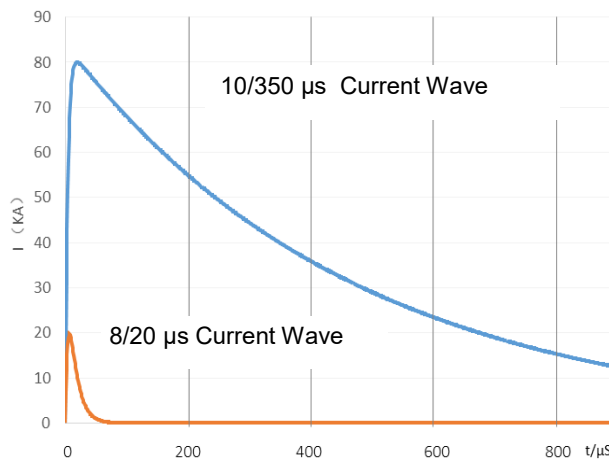
## Surge Voltage Caused by Lightning

Electrical and electronic system are subject to damage from a lightning electromagnetic impulse (LEMP). Therefore SPD need to be provided avoid failure of internal system. LEMP may caused by direct, near and far lightning strikes. According to the relevant research, lightning strikes within a certain distance may cause dangerous overvoltage on the cable, endangering the equipment connected to it.

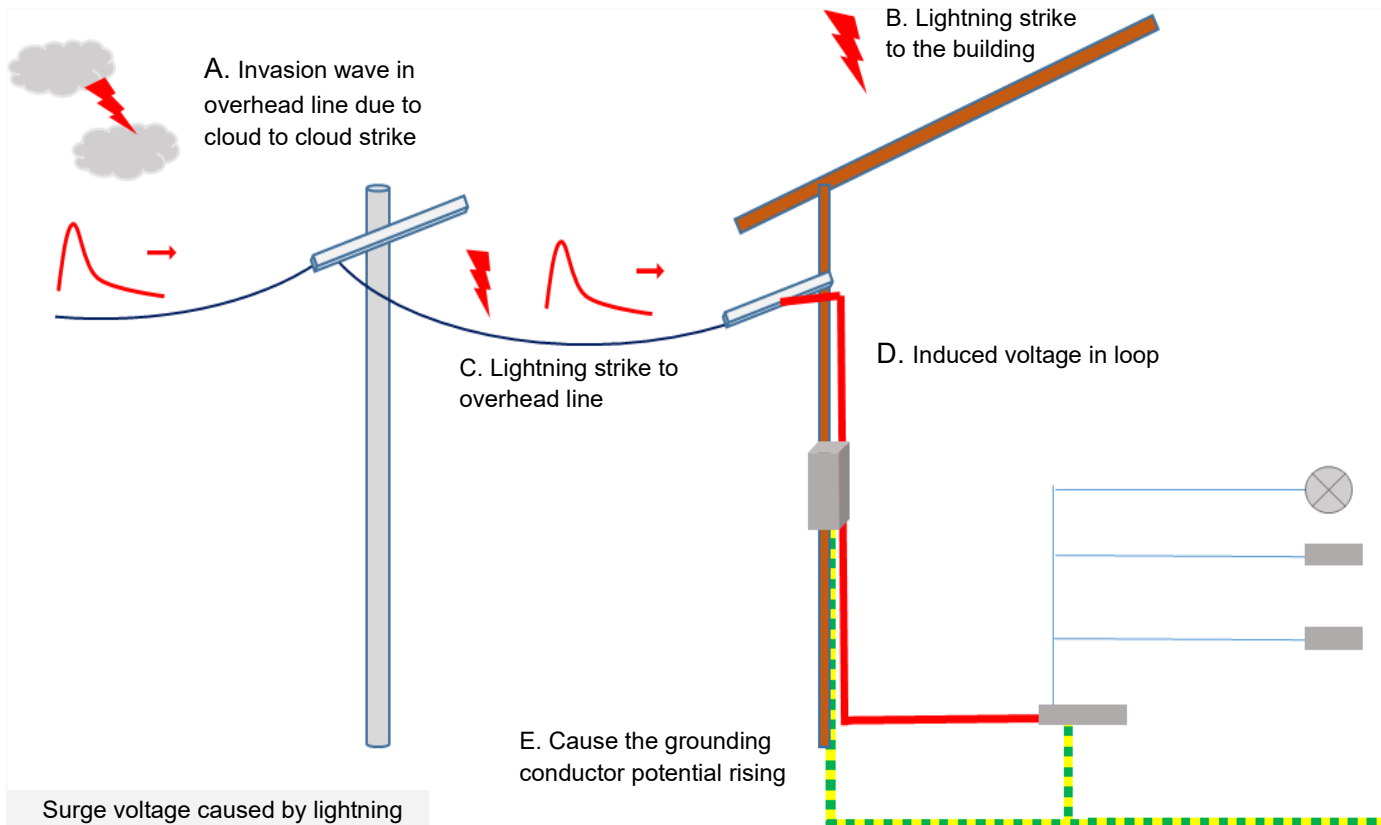
## Damage Due to Lighting

The lighting can cause three basic type of damage:

- D1: injury to living beings by electric shock;
- D2: physical damage (fire, explosion, mechanical destruction, chemical release) due to lighting current effects, including sparking;
- D3: failure of internal systems due to LEMP



Standard lightning test wave



Surge voltage caused by lightning

SPD

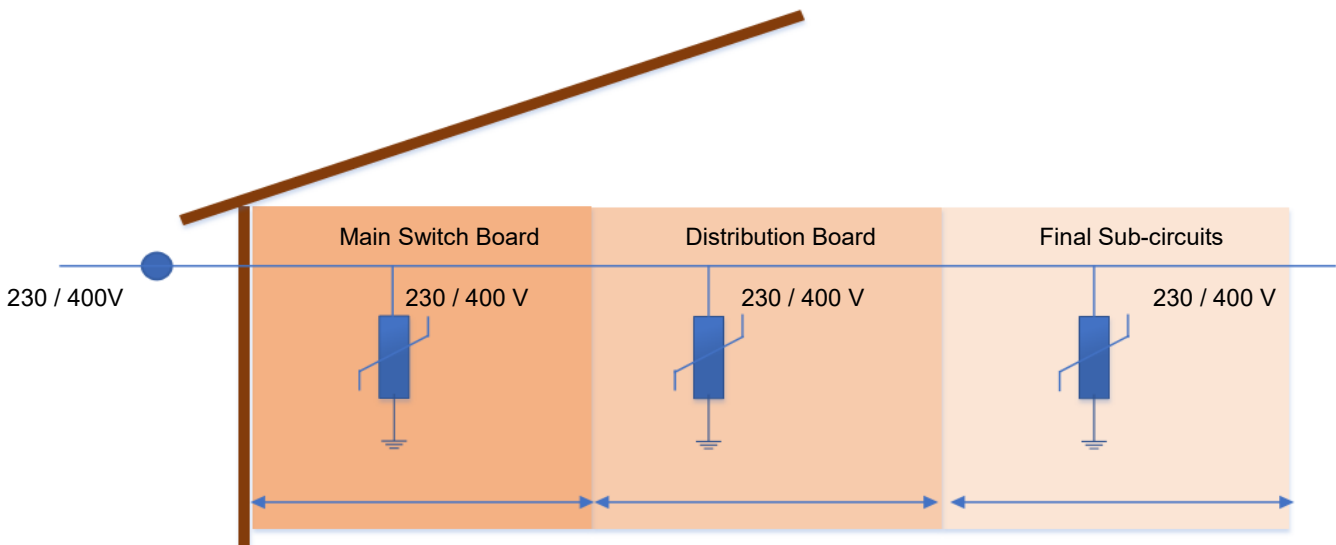
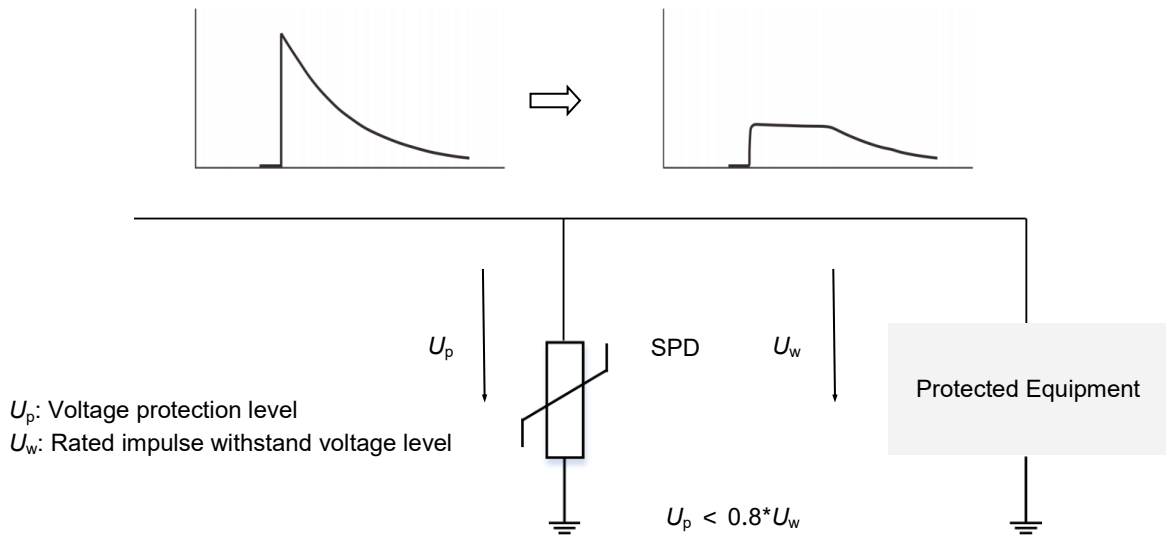
SPD

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## Impulse Withstand Voltage and Surge Protection

As the primary equipment of internal lightning-proof, SPD needs to be able to withstand surge stress and provides the level of voltage protection required for the equipment. This involves the selection and coordination of SPD in different locations to form a complete protection system.

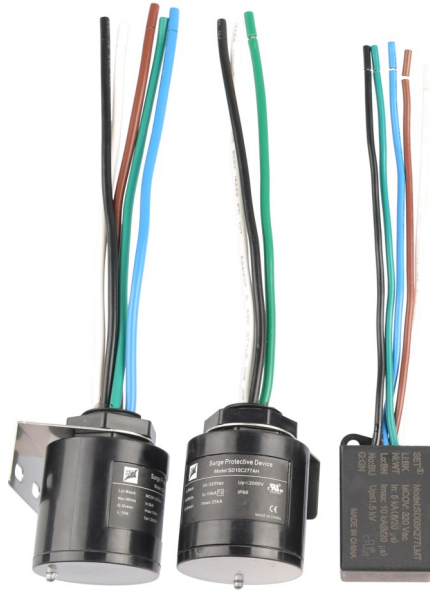


Overvoltage Category	IV	III	II	I
$U_w$ (kV) Impulse Withstand Voltage	6	4	2.5	1.5
Lightning Protection Zone LPZ	LPZ1	LPZ2	LPZn	
SPD Type	Class I or Class II	Class II	Class II or Class III	

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## LED Surge Protective Device



### Description

As LEDs are more susceptible to surges, the impact of the surge will cause the partial or complete failure of the LED module or driver. To ensure the service life and reliability and to avoid unnecessary maintenance, a well-conceived and effective surge protection for LED street lightings should be adopted.

SETsafe | SETfuse LED Surge Protective Devices (SPDs) are specifically designed for outdoor lighting. The products facilitate surge immunity compliant with IEEE C62.41.2 Location Category C high exposure and protect LED street lighting from lightning surge damage. With built-in thermal protection, the products could fail safely when suffering sustained overvoltage or its internal varistor degradation. The products with small size, could be easily mounted in narrow space.

### Features

- Sealed Enclosure, IP66
- Differential and Common Mode Protections
- One-port or Two-port Surge Protective Device (SPD)
- Thermal Protection and Failure Indication

### Applications

- Outdoor Street Lighting
- Parking Lighting
- Highway Lighting
- Landscape Lighting
- Traffic and Signal Lighting

## Glossary

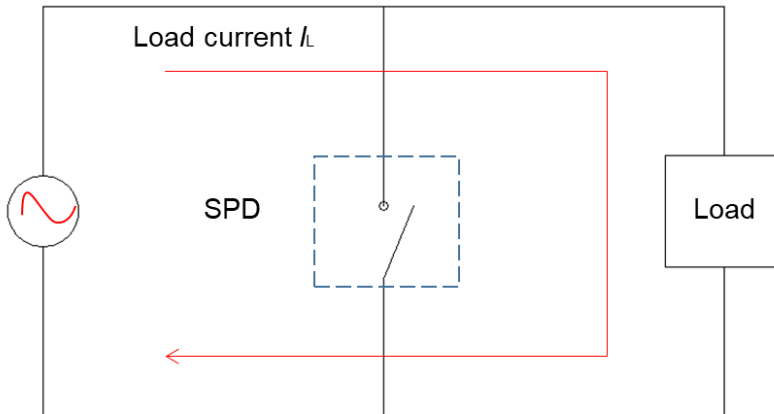
Item	Description
$U_p$	<p><b>Voltage Protection Level</b> Maximum voltage to be expected at the SPD terminals due to an impulse stress with defined voltage steepness and an impulse stress with a discharge current with given amplitude and waveshape. — (IEC 61643-11)</p>
8/20 $\mu$ s	<p><b>8/20 Current Impulse</b> Current impulse with a nominal virtual front time of 8 <math>\mu</math>s and a nominal time to half-value of 20 <math>\mu</math>s. — (IEC 61643-11)</p>
1.2/50 $\mu$ s	<p><b>1.2/50 Voltage Impulse</b> Voltage impulse with a nominal virtual front time of 1.2 <math>\mu</math>s and a nominal time to half-value of 50 <math>\mu</math>s. — (IEC 61643-11)</p>
$U_c$	<p><b>Maximum Continuous Operating Voltage</b> Maximum r.m.s. voltage, which may be continuously applied to the SPD's mode of protection. — (IEC 61643-11)</p>
$I_n$	<p><b>Nominal Discharge Current</b> Crest value of the current through the SPD having a current waveshape of 8/20. — (IEC 61643-11)</p>
$I_{imp}$	<p><b>Impulse Discharge Current for Class I Test</b> Crest value of a discharge current through the SPD with specified charge transfer Q and specified energy W/R in the specified time. — (IEC 61643-11)</p>
$I_{max}$	<p><b>Maximum Discharge Current</b> Crest value of a current through the SPD having an 8/20 waveshape and magnitude according to the manufacturers specification. <math>I_{max}</math> is equal to or greater than <math>I_n</math>. — (IEC 61643-11)</p>
<b>Modes of Protection</b>	<p><b>Modes of Protection</b> An intended current path, between terminals that contains protective components, e.g. line-to-line, line-to-earth, line-to-neutral, neutral-to-earth. — (IEC 61643-11)</p>
<b>IP</b>	<p><b>Degrees of Protection Provided by Enclosure (IP Code)</b> Classification preceded by the symbol IP indicating the extent of protection provided by an enclosure against access to hazardous parts, against ingress of solid foreign objects and possibly harmful ingress of water.</p>

# SPD

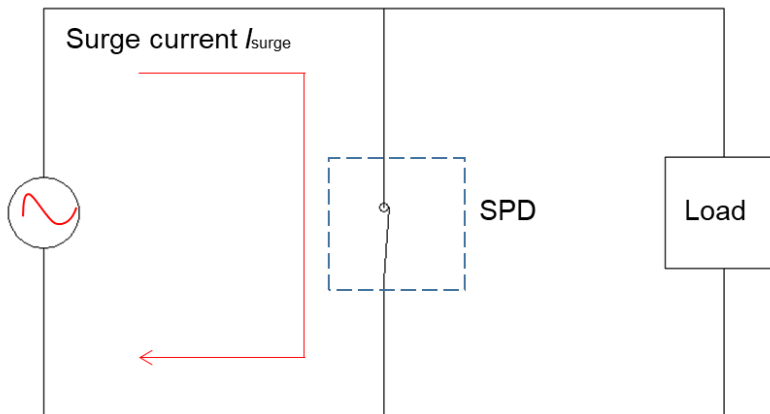
Surge Protective Device

## Operation Principle

SPD is equivalent to open circuit when the circuit without surge (Impedance > 100 MΩ).



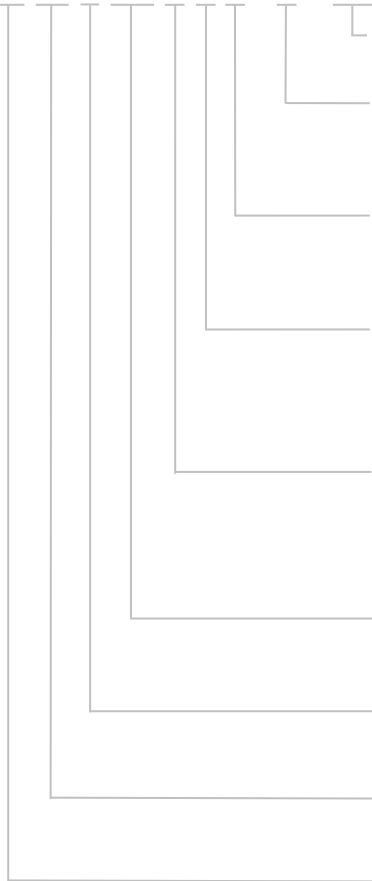
When a surge invades the circuit, the SPD circuit mutates to a low impedance, releasing the surge current into the ground.



**SPD**  
Surge Protective Device

**Part Numbering System**

SD 10 K 277 L M T - D - 001









- Other Options**
- Protection Mode**  
Default: All-mode  
D: Differential Mode
- Wire Connection**  
Default: One-port  
T: Two-port
- Surge Capacity**  
H: High  
M: Medium
- Circuit Characteristic**  
A: With GDT and Failure Indicator  
G: With GDT  
L: With Failure Indicator  
N: Without GDT or Failure Indicator
- Nominal System Voltage**  
120 V, 277 V, 347 V, 480 V
- Design Sequence**
- Nominal Discharge Current**  
05: 5 kA, 10: 10 kA
- Product Category**

SPD

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**Agency Information**

Agency Information		Standards	NO.	Category
	UL	UL 1449 4th Edition	E322662	VZCA2
	cUL	CSA C22.2 NO.269, CSA ECN 516	E322662	VZCA8
	TUV	IEC/EN 61643-11, IEC/EN 61643-31	See the different models for details	
	CE	IEC/EN 61643-11, IEC/EN 61643-31	See the different models for details	
	CB	IEC/EN 61643-11	See the different models for details	
	CQC	GB/T 18802.1-2011	See the different models for details	

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## ATTENTION

### Usage

1. Frequency range is from 47 Hz to 63 Hz.
2. The voltage applied continuously to the SPD must not exceed its maximum continuous operating voltage  $U_c$ .
3. When atmosphere press is from 80 kPa to 106 kPa, the related altitude shall be from 2000 m to - 500 m.
4. Do not touch the product body or wires directly when power is on, to avoid electric shock.

### Replacement

As SPD is a non-repairable product, for safety sake, please use the same type of SPD for replacement.

### Storage

Do not store SPD at high temperature, high humidity or corrosive gas environment, to avoid oxidation of the wires. Use them up within 2 years after receiving the goods.

### Installation

1. Installation and startup may only be carried out by qualified personnel. The relevant country-specific regulations must be observed.
2. Check the device for external damage before installation. If the device is defective, it must not be used.
3. Pay attention to risk of electric shock. Please cutoff all electrical power before installation or service.
4. Lay the output cables to the surge protective devices (SPDs) as short as possible, without loops.
5. Do not apply mechanical stress to the SPD body during or after the installation.

### Maintenance

1. Check SPD status according to instructions before and after the thunderstorm season each year.
2. If the indicator of "failure state" appears, the SPD is damaged. Replace the SPD with same type.
3. Ensure electrical connections and mountings are correct before energizing the circuit.
4. SPD`s quality is well controlled and strictly inspected before delivery. If non-functional ones are found during operation, please contact us early enough.

# SPD

Surge Protective Device

## SPD for Outdoor Lights



- Outdoor Street Lighting
- Parking Lighting
- Highway Lighting
- Landscape Lighting
- Traffic and Signal Lighting





## Description

SD10K series is specifically designed for outdoor lighting. The products facilitate surge immunity compliant with IEEE C62.41.2 Location Category C high exposure and protect LED street lighting from lightning surge damage. With built-in mechanical trip thermal protection, tripping current up to 100 A, SD10K series could fail safely when suffering sustained overvoltage or its internal varistor degradation. SD10K series is designed with 1+1 protection mode and the GDT applied between the neutral line and the ground, that improves the safety of the product. SD10K series is two-port Surge Protective Device (SPD), which is convenient for wiring and installing



## Features

- Sealed Enclosure, IP66
- 1+1 Protections Mode, High Protection Performance
- Two-port Surge Protective Device (SPD), Convenient for Wiring
- Fast Tripping Thermally Protected MOV and Thermally Protected GDT Technology, Tripping Current up to 100 A, High Safety
- GDT Follow Current Interrupt Rating  $I_{fi}$ : 100 A

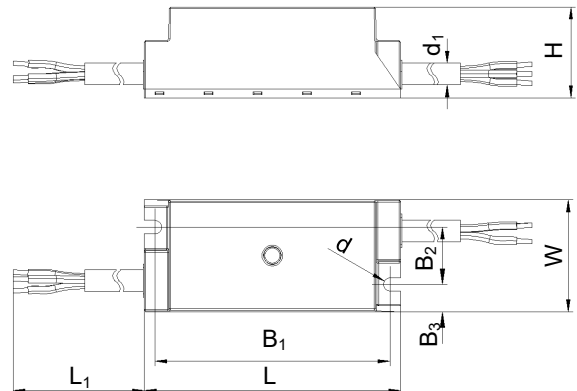
## Applications

- Outdoor Street Lighting
- Parking Lighting
- Highway Lighting
- Landscape Lighting
- Traffic and Signal Lighting

## Agency Approvals

Agency	Standards	No.
	EN 61643-11	AN 50518873
	EN 61643-11	R 50507075
Environment	RoHS 2.0 & REACH	Compliant

## Dimensions (mm)

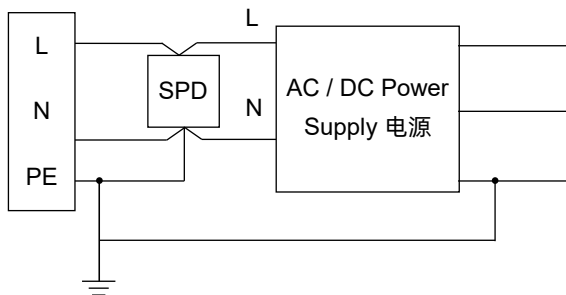


L	L <sub>1</sub>	W	H
85.0 ± 0.5	200.0 ± 10.0	37.0 ± 0.5	30.0 ± 0.5
d	d <sub>1</sub>	B <sub>1</sub>	B <sub>2</sub>
4.5 ± 0.5	7.2 ± 0.5	78.0 ± 0.5	19.0 ± 0.5
B <sub>3</sub>			
9.0 ± 0.5			

Note:

The wire length "L<sub>1</sub>" can be customized as required.

Wiring Diagram

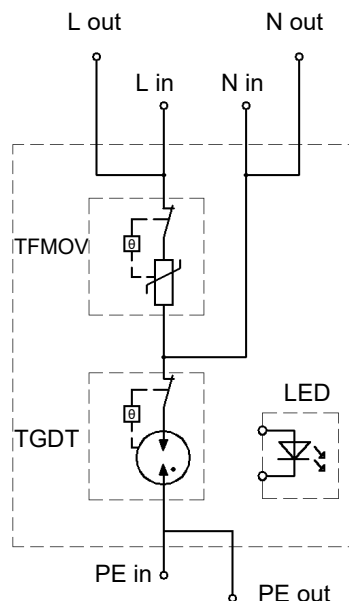


“ Kelvin ” Connection (Two-port)

Notes:

- Internal thermal protection.
- Two-port “ Kelvin ” connection SPD can reduce the effect of inductance and achieve optimum overvoltage protection.

Schematics



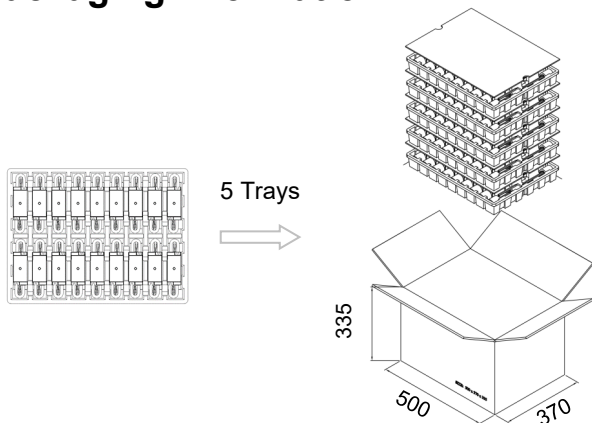
Specifications

Model	System Voltage	Max. Continuous Operating Voltage		Nominal Discharge Current (8/20 μs)	Max. Discharge Current (8/20 μs)	Voltage Protection Level		Response Time (ns)	External Overcurrent Protection <sup>a</sup> (A)
	$U_n$	$U_c$ (VAC)		$I_n$	$I_{max}$	$U_p$ (V)			
	(VAC)	L-N	N-PE	(kA)	(kA)	L-N	N-PE		
SD10K230AHT-300	230	300	255	10	20	1200	1200	<100	16
SD10K230AHT-320	230	320	255	10	20	1500	1200	<100	16
SD10K230AHT-385	230	385	255	10	20	1800	1200	<100	16
SD10K277AHT-320	277	320	255	10	20	1500	1200	<100	16
SD10K277AHT-385	277	385	255	10	20	1800	1200	<100	16

Note:

a: Recommended External Circuit Breaker Model C 16 A, Curve C.

Packaging Information



Item	Tray	Carton
Dimensions (mm)	470 × 350 × 57	500 × 370 × 335
Quantity (PCS)	18	90

- Unit: mm
- Please contact us if you have special packaging requirement.