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Surge Protection Device

5SD7 Surge Protection Devices - Safe & Reliable

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Introduction

More than a million lightning strikes are registered in India each year. This is an enormous risk for buildings and plants, since lightning currents and line surges, left unchecked, can cause considerable damage. In the event of damage, however, it is often not recognized that the damage was caused by lightning currents or overvoltage's.

Despite the undisputed need in electrical installations, the use of lightning and overvoltage protection devices has so far played only a subordinate role. Various types of surge voltages can occur in electrical and electronic systems. They differ mainly with respect to their duration and amplitude. Depending on the cause, a surge voltage can last a few hundred microseconds, hours or even days. The amplitude can range from a few millivolts to some ten thousand volts. Lightning strikes are a special cause of surge voltages. Direct and indirect strikes can result not only in high surge voltage amplitudes, but also particularly high and sometimes long current flows, which then have very serious effects. Overvoltage endangers a considerable number of electronic and electrical installations. The damage profiles generally covers damaged cables, printed circuit boards and electronic switching devices. Such devices can be prevented by suitable overvoltage protection measures.

Causes of transient overvoltage's:

- Lightning discharges (waveform 10/350µs)
- Switching surges (waveform 8/20µs)
- Electrostatic discharges

Protection against lightning current and overvoltage's:

An SPD functions to similarly to switch that closes for short period in which an overvoltage is present. This results in "Short circuit" and the potential difference can be compensated. Surge currents are diverted by this "short circuits" in such a way that there as few restrictions as possible when operating electrical systems. The Short circuit only exists for short duration of the overvoltage.

The implementation of comprehensive protection, consisting of line, electric-shock and fire protection as well as lightning current and overvoltage protection, requires complete coordinated range of suitable measures and protection devices. SPD's from Siemens comply with national and international standards and state of art safety protection.

An important prerequisite for the effectiveness of external and internal lightning protection is a professionally designed equi potential bonding system. An essential component of internal lightning protection is the installation of a multi-level system of overvoltage protection devices.

The abbreviation "SPD" (Surge Protective Device) is used in German and in relevant standards for the term overvoltage protection device.

SPDs should ensure that transient overvoltages and currents do not cause damage to installations, equipment or terminals.

They must therefore fulfill two main tasks:

1. Limit the magnitude of the overvoltage so that the insulation strength of the units to be protected is not exceeded.
2. Safely discharge the surge currents connected to the overvoltage.

SPDs are installed in parallel to the equipment between the active conductors themselves and between the active conductors and the protective conductor or equipotential bonding conductor (see Fig. 1).

An SPD functions similarly to a switch that closes for the short period in which an overvoltage is present. This results in a "short circuit" and the potential difference

can be compensated. Surge currents are diverted by this "short circuit" in such a way that there are as few restrictions as possible when operating electrical systems. The "short circuit" only exists for the short duration of the overvoltage.

The implementation of comprehensive protection, consisting of line, electric-shock and fire protection as well as lightning current and overvoltage protection, requires a completely coordinated range of suitable measures and protective devices.

The SPDs from Siemens comply with national and international standards and offer state-of-the-art safety and protection.

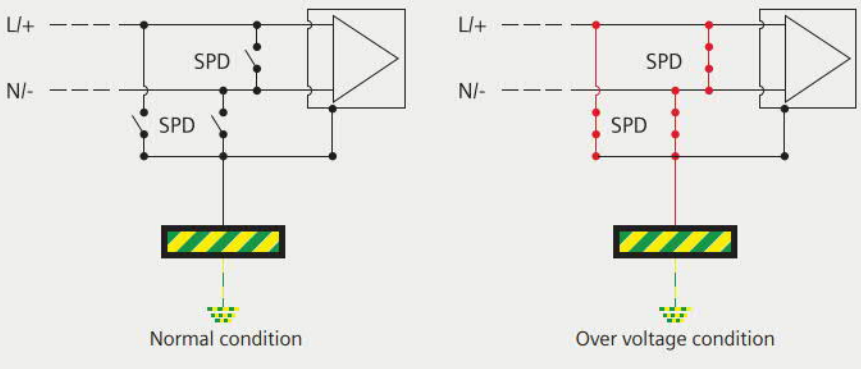

Fig. 1: Operation of Surge Protection devices

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Basics of Surge Protection

The transient currents and voltages to which SPDs are exposed in reality can be very diverse. Various typical transient current and voltage pulses are used to develop and professionally test powerful SPDs. These pulses are used in the laboratory to simulate the transient currents and voltages that occur in real electrical systems. Depending on the required discharge capacity, SPDs are tested with many different transients.

Some of these pulses are presented below to simulate lightning events and switching operations.

Lightning current pulse (10/350 µs)

The lightning current pulse (10/350 µs) is used for testing Type 1 SPDs (lightning arresters). This current pulse emulates the essential properties of lightning occurring in nature.

Depending on the lightning probability and the risk to be controlled, the standards require different levels of lightning current discharge capacity. Type 1 SPDs are divided into lightning protection classes I to IV, depending on the respective discharge capacity (see Fig. 2).

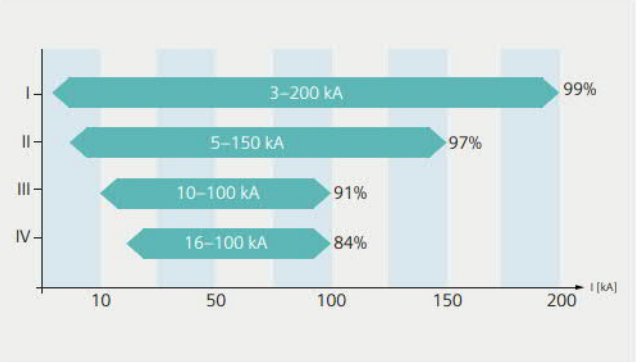

Fig. 2: Lightning protection classes

The rise time of the lightning current pulse is 10 µs; the virtual time to halfvalue on tail is 350 µs. The area below the curve of a lightning current pulse is equivalent to the charge of the respective current impulse and is explicitly indicated in data sheets. The peak value of the lightning impulse current (10/350 µs) is designated as I_{imp}.

For the performance capacity of a Type 1 SPD, not only the waveform and the peak value of the lightning current are important, but also the charge and the specific energy. Above all, the charge that is led through the Type 1 SPD is decisive.

A Type 1 SPD with a discharge capacity of 100 kA (10/350 µs) fulfills the requirements of lightning protection class I (according to EN 62305) and must be able to discharge a charge of 50 As.

A Type 1 SPD with a discharge capacity of 50 kA must be able to discharge a charge of 25 As.

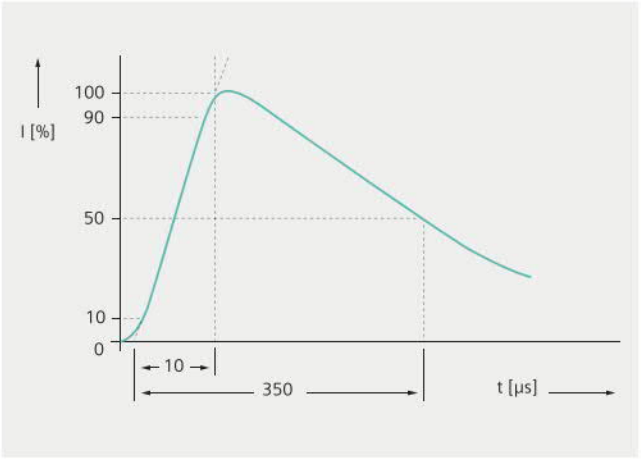

Fig. 3: Course of a (10/350 µs) lightning current pulse

Surge current impulse (8/20 µs)

The surge current impulse (8/20 µs) is used for testing Type 2 SPDs. The rise time of the surge current impulse is 8 µs; the virtual time to half-value on tail is 20 µs.

This pulse is used to simulate transient currents with a lower energy content, such as lightning-induced currents at a greater distance from the location of a lightning strike and surge currents resulting from switching operations.

The peak value of the surge current for this waveform, with which a Type 1 SPD or a Type 2 SPD is tested, is designated as In.

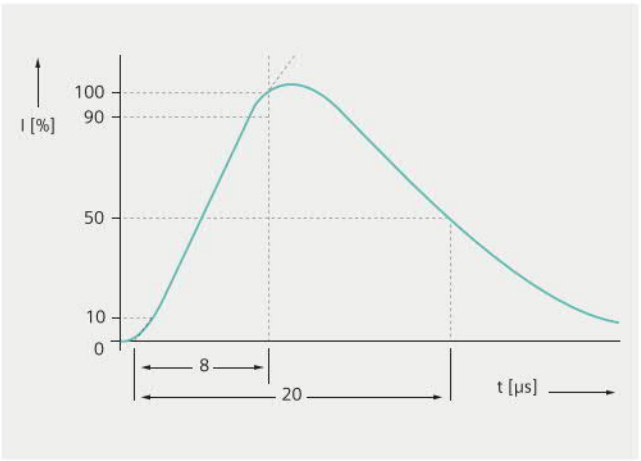

Fig. 4: Course of a (8/20 µs) lightning current pulse

Improved protection is achieved by combining spark gaps and varistors in one SPD. Type 1 spark gaps offer the most effective protection against high-energy and long-duration lightning currents, whereas type 2 varistors offer the best protection against short-duration switching overvoltages. A combination of Type 1 spark gaps and Type 2 varistors is the best choice for Building installation locations where both lightning currents and switching overvoltages must be expected.

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Basics of Surge Protection

The insulation coordination according to EN 60664-1 and IEC 60364-4-44 describes the minimum surge strength of a device to ground at the respective installation location.

Factors to consider here are:

- the expected overvoltages and the characteristics of the SPDs used, and
- the expected ambient conditions and the protective measures against contamination of the equipment.

The minimum surge strength to ground of equipment in 230/400 V AC networks is:

- 6 kV in the main power supply network (main distribution board)
- 4 kV in the area of electrical circuit distribution (sub-distribution) and in the area of permanent installation
- 2.5 kV at commercially available terminals
- 1.5 kV at particularly sensitive terminal equipment

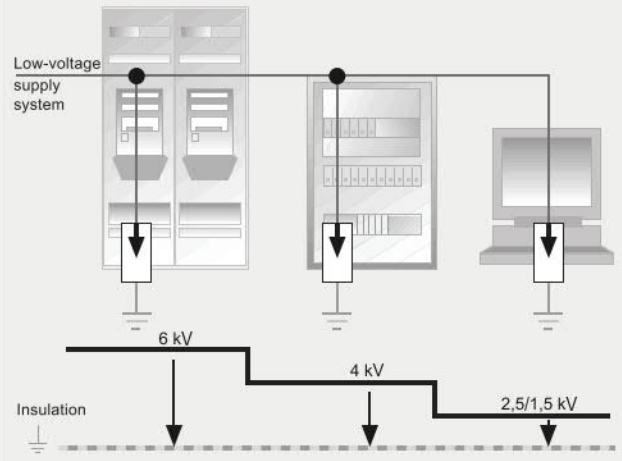

Fig. 5: Insulation coordination according to EN 60664-1

Overvoltage category IV

Equipment for use at the connection point of the installation.

Example: Equipment such as electricity meter and primary overcurrent protection modules.

Overvoltage category III

Equipment in fixed installations and for cases where special requirements for equipment reliability and availability are present.

Example: Equipment such as switches in fixed installations and equipment for industrial use with permanent connection to the fixed installation.

Overvoltage category II

Power consumers fed by the fixed installation.

Example: Equipment such as domestic appliances, portable tools and similar devices.

Overvoltage category I

Equipment for connection to electrical circuits in which measures have been taken to limit transient overvoltages to an acceptably low level.

Example: Sensitive equipment for special applications.

The SPD protection level U_p between active conductors and protective conductor must under no circumstances exceed the rated impulse voltage U_w of the equipment to be protected.

Recommendation

The protection level Up should not exceed 80% of the rated impulse voltage U_w.

For example, the rated impulse voltage U_w suffix according to overvoltage category II for 230/400V TN or TT systems is 2.5 kV and thus the recommended protection level Up of the SPD to be used is a maximum of 2.0 kV.

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SPD Types & Selection

Lightening arrester Type 1

Type 1 SPDs are the most effective surge protection devices. Therefore, they are used as the first protection level for the protection of power supply systems. From a technical perspective, the preferred location for installation location is at the feeding point of the electrical system – as close as possible to the main grounding bar. Depending on local conditions, it may therefore make sense to install these SPDs directly downstream of the incoming main feeder box or in the immediate vicinity of the main distribution board or within the main distribution board. When selecting suitable SPDs, the type of power supply system (TN-C, TNC-5, TN-5, TT or IT system) must also be considered.

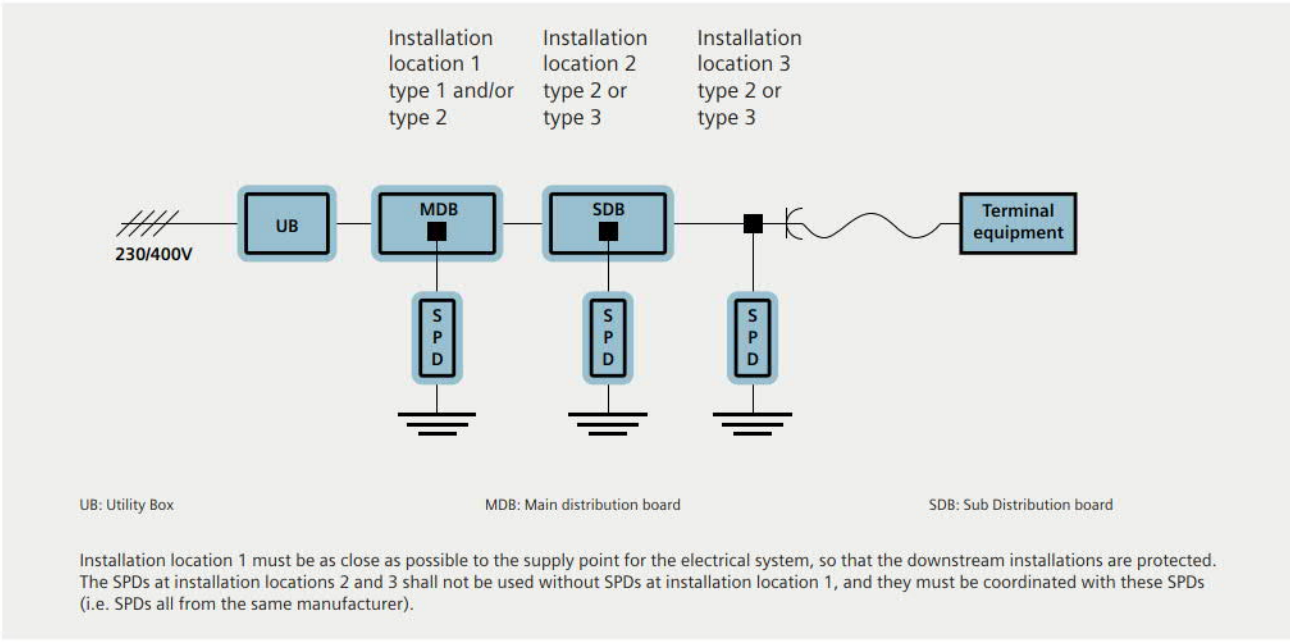
Leakage-current-free SPDs (e.g. with spark gaps) can also be installed upstream of the meter. This also protects the electricity meter against overvoltages. If SPDs are to be installed upstream of the meter, this must be approved by the responsible supply network operator. **e.g. Type 1 Surge protection Devices are installed in main power distribution board.**

Surge arrester Type 2

As a rule, a Type 1 SPD at the feeding point of the electrical system is not capable of effectively protecting all electrical equipment of the subsequent installation. Therefore, lightning protection standards and application standards require the installation of overvoltage protection systems with more than one protection level. Type 2 SPDs are generally used as the second protection level of the internal lightning protection system. The second protection level – closer to the sensitive terminal equipment – allows the voltage to which the terminal devices are exposed to be better limited than would be possible with just one protection level. A Type 2 SPD lowers the residual voltage transmitted by an upstream Type 1 SPD below the dielectric strength of the equipment and lines in the area of the permanent installation between circuit distribution and power connection. **e.g Type 2 Surge protection Devices are installed in sub distribution or secondary board.**

Surge arrester Type 3

The Type 3 SPD is the third protection level in the power supply. It reduces the transient voltage pulses caused by lightning events or switching operations to a voltage level that is lower than the proof voltage of the terminal equipment. For devices with an operational voltage of e.g. 230 V, that is max. 2.5 kV. **e.g Type 3 Surge protection Devices are installed at equipment level.**



Installation location 1 must be as close as possible to the supply point for the electrical system, so that the downstream installations are protected. The SPDs at installation locations 2 and 3 shall not be used without SPDs at installation location 1, and they must be coordinated with these SPDs (i.e. SPDs all from the same manufacturer).

Fig. 6: Installation location of SPD

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Technical Specification – Type 1

	For TN-C and IT systems	For TN-S and TT systems	For TN-C systems	For TN-S and TT systems
Protection paths	L-PE	L-N, L-PE and N-PE	L-PEN	L-N, L-PE and N-PE
Rated voltage U_n	690 V AC	240 V AC	240/415 V AC	240/415 V AC
Maximum continuous voltage U_c	800 V AC	350 V AC	350 V AC	350 V AC
				

Circuit	Mounting width				
With remote signaling					
1 + 0	–[1)]	5SD7411-2	–	–	–
1 + 1	4 MW	–	5SD7412-1RC	–	–
3 + 0	6 MW	–	–	5SD7413-1	–
3 + 1	8 MW	–	–	–	5SD7414-1RC

[1)] No modular installation device.

Further technical specifications

		5SD7411-2	5SD7412-1RC	5SD7413-1	5SD7414-1RC
Standards					
Standards		IEC 61643-11, EN 61643-11	IEC 61643-11, EN 61643-11	IEC 61643-11, EN 61643-11	IEC 61643-11, EN 61643-11
Approvals		–	KEMA, UL / cUL	KEMA, UL / cUL	KEMA, UL / cUL
Voltage					
Protection level U_p	L-N and L-PEN	≤4.50 kV	≤1.50 kV	≤1.50 kV	≤1.50 kV
	L-PE	–	≤2.50 kV	–	≤2.50 kV
	N-PE	–	≤1.50 kV	–	≤1.50 kV
Current					
Lightning impulse current I_{imp} (10 / 350 µs)	L-N and L-PEN, 1P / 3P	35 kA	25 kA	25 / 75 kA	25 / 75 kA
	N-PE	–	100 kA	–	100 kA
Rated discharge surge current I_n (8 / 20 µs)	L-N and L-PEN, 1P / 3P	35 kA	25 kA	25 / 75 kA	25 / 75 kA
	N-PE	–	100 kA	–	100 kA
Follow current discharge capacity I_{fi} (AC)	L-N and L-PEN for 264 / 350 V	–	50 / 25 kA	50 / 25 kA	50 / 25 kA
	N-PE	–	100 A	–	100 A
Function					
Response time t_A	L-N and L-PEN	≤100 ns	≤100 ns	≤100 ns	≤100 ns
	L-N and N-PE	–	≤100 ns	–	≤100 ns
Connections					
Conductor cross-section	Finely stranded	16 ... 50 mm²	2.5 ... 25 mm²	2.5 ... 25 mm²	2.5 ... 25 mm²
	Solid	16 ... 50 mm²	2.5 ... 35 mm²	2.5 ... 35 mm²	2.5 ... 35 mm²
Protection devices					
Max. back-up fuse acc. to IEC 61643-1	For stub wiring (gL / gG)	400 A	315 A	315 A	315 A
	For V wiring (gL / gG)	125 A	125 A	125 A	125 A
Short-circuit withstand current	With max. back-up fuse	50 kA	50 kA	50 kA	50 kA
Environmental conditions					
Degree of protection		IP20, with connected conductors			
Temperature range		–40 ... +80 °C			

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Technical Specification – Type 2

		For TN and TT systems		For TN-C and IT systems	For TN-C systems	For IT systems		For TN-S and TT systems
Protection paths		N-PE	L-PEN and L-N	L-PEN and L-N	L-PEN	L-PEN and L-PE	L-PEN and L-PE	L-N, L-PE and N-PE
Rated voltage U_n		240 / 415 V AC	240 / 415 V AC	400 / 690 V AC	240 / 415 V AC	400 / 690 V AC	–	240 / 415 V AC
Maximum continuous voltage U_c		260 V AC	350 V AC	800 V AC	350 V AC	580 V AC	1000 V DC	350 V AC (L-N, L-PE) 260 V AC (N-PE)
								
Circuit	**Mounting width**							
With remote signaling								
1 + 0	1 MW	–	5SD7461-1	–	–	–	–	–
	2 MW	–	–	5SD7481-1	–	–	–	–
3 + 0	3 MW	–	–	–	5SD7463-1	5SD7473-1	5SD7483-6RC	–
3 + 1	4 MW	–	–	–	–	–	–	5SD7464-1
Without remote signaling								
1 + 0	1 MW	5SD7481-0	5SD7461-0RC	–	–	–	–	–
3 + 0	3 MW	–	–	–	5SD7463-0	–	–	–
3 + 1	4 MW	–	–	–	–	–	–	5SD7464-0RC

Further technical specifications

		5SD7481-0	5SD7461-0RC	5SD7481-1	5SD7463-0 5SD7463-1	5SD7473-1	5SD7483-6RC	5SD7464-0RC
Standards								
Standards		IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11
Approvals		KEMA	KEMA	KEMA	KEMA	–	KEMA	KEMA
Voltage								
Protection level U_p	L-N and L-PEN	–	≤1.50 kV	≤5 kV	≤1.50 kV	≤2.50 kV	≤2.90 kV	≤1.60 kV
	L-PE	–	–	–	–	–	–	≤1.90 kV
	N-PE	≤1.50 kV	–	–	–	–	–	≤1.50 kV
Current								
Rated discharge surge current I_n (8 / 20 µs)	L-N and L-PEN	–	20 kA	15 kA	20 kA	15 kA	15 kA	20 kA
	N-PE	20 kA	–	–	–	–	–	20 kA
Max. discharge surge current $I_{max.}$ (8 / 20 µs)	L-N	–	40 kA	30 kA	40 kA	30 kA	40 kA	40 kA
	N-PE	40 kA	–	–	–	–	–	40 kA
Function								
Response time t_A	L-N and L-PEN	–	≤25 ns	≤100 ns	≤25 ns	≤25 ns	≤25 ns	≤25 ns
	L-N and N-PE	≤100 ns	–	–	–	–	–	≤100 ns
Connections								
Conductor cross-section	Finely stranded	1.5 ... 25 mm²						
	Solid	1.5 ... 35 mm²						
Protection devices								
Max. back-up fuse acc. to IEC 61643-1	For stub wiring (gL / gG)	–	125 A	100 A	125 A	125 A	100 A	125 A
	For V wiring (gL / gG)	–	–	80 A	80 A	80 A	80 A	80 A
Short-circuit withstand current	With max. back-up fuse	25 kA	25 kA	25 kA	25 kA	25 kA	25 kA	25 kA
Environmental conditions								
Degree of protection		IP20, with connected conductors						
Temperature range		–40 ... +80 °C						

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Technical Specification – Type 3

	For TN-S and TT systems		
Protection paths	L-N, L-PE, N-PE, (L+) – (L–) and (L+ / L–) – PE	L-N, L-PE, N-PE, (L+) – (L–) and (L+ / L–) – PE	L-N, L-PE, N-PE, (L+) – (L–) and (L+ / L–) – PE
Rated voltage U_n	24 V AC	120 V AC	230 V AC
Rated arrester voltage U_C	34 V AC	150 V AC	264 V AC
			
Circuit	**Mounting width**		
With remote signaling			
1 + 0	1 MW	5SD7432-5	5SD7432-6	5SD7432-7

Further technical specifications

		5SD7432-5	5SD7432-6	5SD7432-7
Standards				
Standards		IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11	IEC 61643-11; EN 61643-11
Approvals		KEMA / UL / cUL	KEMA / UL / cUL	KEMA / UL / cUL
Voltage				
Protection level U_p	L-N, L-PE and N-PE	≤250 / ≤650 V	≤850 / ≤950 V	≤1350 / ≤1500 V
Current				
Rated load current I_L (at 30 °C)		26 A	26 A	26 A
Rated discharge surge current I_n (8 / 20 µs)		1 kA	3 kA	3 kA
Combined surge $U_{open\ collector}$		2 kV	6 kV	6 kV
Function				
Response time t_A		≤100 ns		
Connections				
Conductor cross-section	Finely stranded	0.2 ... 2.5 mm²		
	Solid	0.2 ... 4 mm²		
Protection devices				
Required back-up fuse, max.	(gG / B / C)	25 A		
Environmental conditions				
Degree of protection		IP20, with connected conductors		
Temperature range		–40 ... +80 °C		
Display				
Visual function/fault indication		Yes		

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Technical Specification - Type 1 + Type 2

	For TN-C systems	For TN-S and TT systems	
Protection paths	L-PEN	L-N, L-PE and N-PE	L-N, L-PE and N-PE
Rated voltage U_n	240 / 415 V AC	240 V AC	240 V AC
Maximum continuous voltage U_C	350 V AC	350 V AC	350 V AC
			

Circuit	Mounting width			
With remote signaling				
1 + 1	4 MW	–	5SD7442-1	–
3 + 0	6 MW	5SD7443-1	–	–
3 + 1	8 MW	–	–	5SD7444-1

Further technical specifications

		5SD7443-1	5SD7442-1	5SD7444-1
Standards				
Standards		IEC 61643-11; EN 61643-11		
Approvals		KEMA, UL / cUL		
Voltage				
Protection level U_p	L-N and L-PEN	≤1.50 kV	≤1.50 kV	≤1.50 kV
	L-PE	–	≤2.20 kV	≤2.20 kV
	N-PE	–	≤1.50 kV	≤1.50 kV
Current				
Lightning impulse current I_{imp} (10 / 350 µs)	L-N and L-PEN	25 kA	25 kA	25 kA
	N-PE	–	100 kA	100 kA
Rated discharge surge current I_n (8 / 20 µs)	L-N and L-PEN	25 kA	25 kA	25 kA
	N-PE	–	100 kA	100 kA
Follow current discharge capacity I_{fi} (AC)	L-N and L-PEN	25 kA	25 kA	25 kA
	N-PE	–	100 A	100 A
Function				
Response time t_A	L-N and L-PEN	≤25 ns	≤25 ns	≤25 ns
	L-N and N-PE	–	≤100 ns	≤100 ns
Connections				
Conductor cross-section	Finely stranded	2.5 ... 25 mm²		
	Solid	2.5 ... 35 mm²		
Protection devices				
Max. back-up fuse acc. to IEC 61643-1	For stub wiring (gL / gG)	315 A		
	For V wiring (gL / gG)	125 A		
Short-circuit withstand current	With max. back-up fuse	25 kA		
Environmental conditions				
Degree of protection		IP20, with connected conductors		
Temperature range		–40 ... +80 °C		
Display				
Visual function/fault indication		Yes		

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Design & Operation of Surge Protection

SPDs have high impedance during normal operation of an electrical system. Only during the occurrence of an overvoltage (through lightning or switching action) do SPDs briefly become low-impedance, and then return to the high-impedance state autonomously.

By changing from the high-impedance to the low-impedance state, SPDs are able to limit the voltages occurring during overvoltage and lightning events in such a way that electrical equipment is effectively protected against damage. With professional planning and the installation of equipotential bonding as well as lightning and overvoltage protection, SPDs are also able to "divert" surge currents and lightning currents in such a way that the operation of electrical systems is affected as little as possible.

In order to meet the diverse requirements with regard to the required protective effect, various components are used in SPDs. Overvoltage protection components are used in SPDs both as individual components and in the form of complex protection circuits.

Depending on the application, the following components are used in SPDs:

- Spark gaps
- Gas-filled surge arresters (GFSAs)
- Varistors
- Suppressor diodes

These components chiefly differ in the following respects:

- Discharge capacity (ampacity)
- Response behavior (response time in the event of overvoltage)
- Voltage limitation (residual voltage/protection level for the device to be protected)
- Voltage curve during the discharge of overvoltage and surge current pulses
- Follow current discharge capacity (transition from low-impedance discharge state to high-impedance idle state after a discharge event)

Important features of the product range

All Siemens surge protection devices are constructed in two parts from a basic element and a plug. The basic element contains the terminal contacts and the remote signaling, while the plug contains the protective element. In order to prevent incorrect assembly, the basic element and plug are provided with a mechanical coding.

All protective plugs are equipped with a mechanical status display. This display indicates when a plug is no longer functional and must be replaced.

Many SPDs also have a remote signaling contact. This contact can be used to send a signal to a central signal receiver or controller. The operating state of an SPD can thus be permanently monitored.

When testing the insulation strength, it is not necessary to disassemble the entire SPD; only the protective plug has to be removed.

Multi-pole versions for all types of power supply guarantee easy installation of the SPDs.

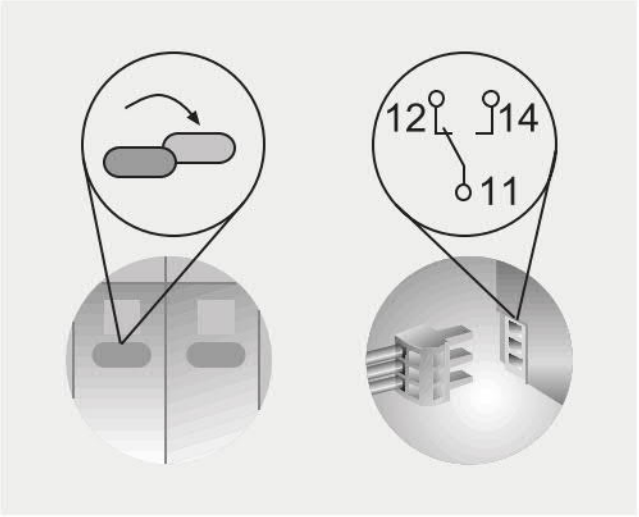

Fig. 7: Optical status display and plug-in remote signaling connection on the SPD

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Network systems

The selection of SPDs also depends on the type of power supply system. SPDs must be adapted to the respective network system to ensure effective protection.

Network systems differ primarily in whether and how one or more conductors of the network system are directly or indirectly earthed or whether the PE conductor is separated or carried along with the N conductor as the PEN conductor. Further differences result from the number of phases, the type of voltage and current as well as the frequency and the voltage level.

According to IEC 60364, a distinction is made between the following network systems:

- TN-S system
- TN-C system
- TT system
- IT system

The TN-S system

In a TN-S system, the neutral conductor (N) and protective conductor (PE) are each routed in a separate conductor. A three-phase power supply therefore consists of the five conductors L1, L2, L3, N and PE.

From the point of view of electromagnetic compatibility (EMC), systems in which N and PE are laid separately are considered more EMC-friendly than systems in which PEN conductors are used.

Depending on the requirements of the loads, systems are designed with 1 to 3 phases.

Fig. 8: The TN-S system

The TN-C system

In a TN-C system, the neutral conductor (N) and protective conductor (PE) are routed in a combined protective and neutral conductor (PEN). A three-phase power supply therefore consists of the four conductors L1, L2, L3 and PEN.

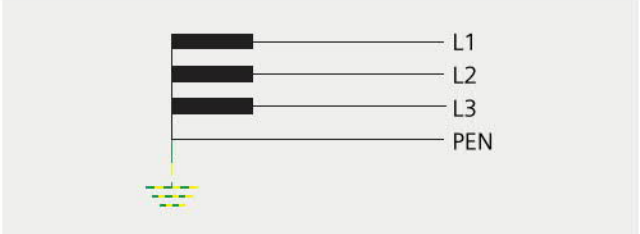


Fig. 9: The TN-C system

The TT system

In a TT system, one point – generally the neutral point of the transformer – is directly earthed (system ground). The grounded point is usually routed to the plant through an N conductor. The exposed conductive parts of the electrical system are connected to ground electrodes which have no direct connection to the system ground electrodes of the transformer. In other words, a local ground is set up directly at an installation or in a building. This local ground is connected to the local equipotential bonding system and the protective conductor of the local ground (PE), but not to the N conductor.

In a TT system, the neutral conductor (N) and protective conductor (PE) are routed in separate lines. A three-phase power supply therefore consists of the five conductors L1, L2, L3, N and PE from the local ground.

Depending on the requirements of the loads, systems are designed with 1 to 3 phases.

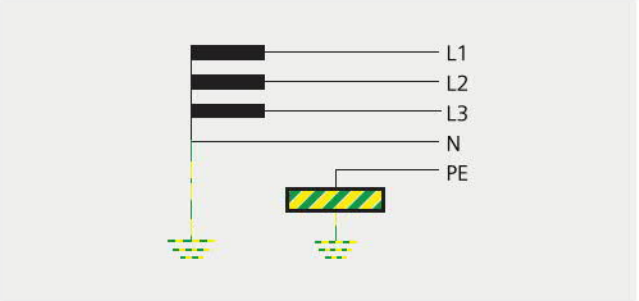


Fig. 10: The TT system

The IT system

In an IT system, the neutral point of the supplying transformer is not earthed or only earthed via a high impedance. If a neutral conductor is carried by the neutral point of the supplying transformer, it is led separately from the local protective conductor.

A 3-phase power supply consists of the 4 or 5 conductors L1, L2, L3, possibly N, and local PE.

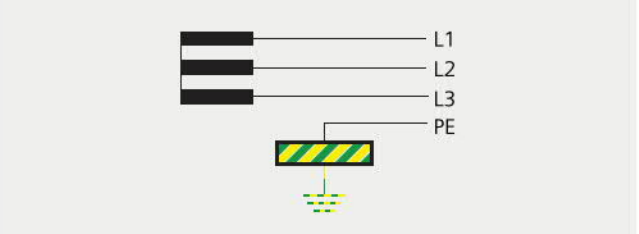


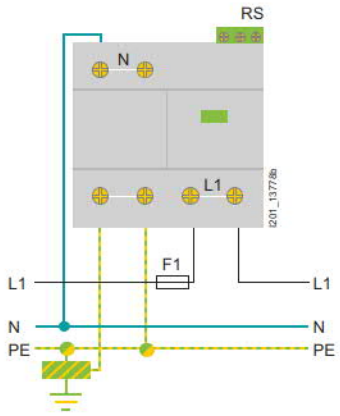
Fig. 11: The IT system

A special feature of the IT system is that an insulation fault against ground may occur for a limited period of time. The ground fault of a phase only has to be detected and reported by an insulation monitoring system so that it can be remedied promptly.

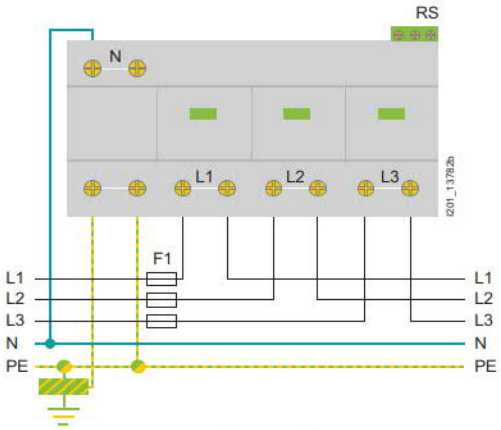
5SD7 Surge Protection Devices – Safe & Reliable

Circuit Connections

Type 1 - Lightning arrester

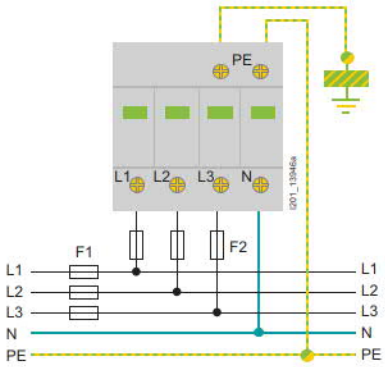


5SD7412-1RC for TN-S/TT systems

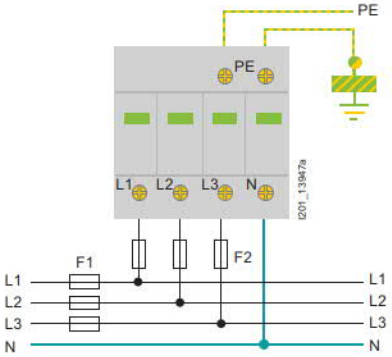


5SD7414-1RC for TN-S/TT systems

Type 2 - Surge arrester

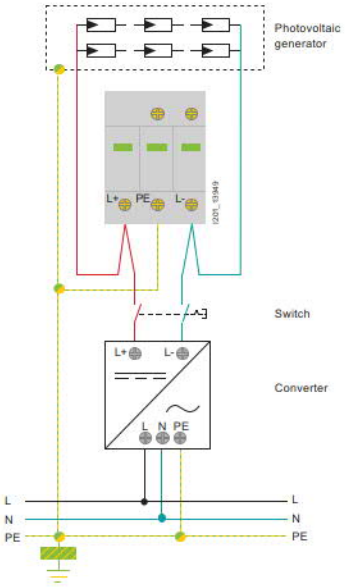


5SD7464-0RC for TN-S systems



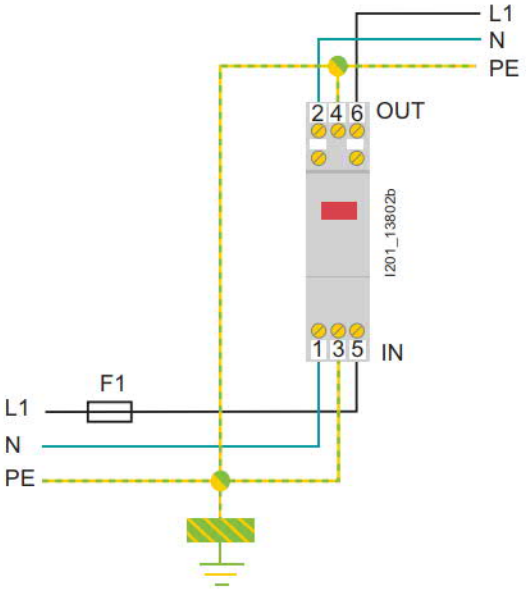
5SD7464-0RC for `TT systems

Type 2 - Photovoltaic arrester



5SD7483-6RC for D.C Side

Type 3 - Surge arrester



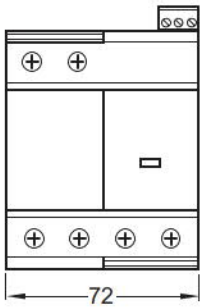
5SD7432-5 for 1P+N

5SD7 Surge Protection Devices – Safe & Reliable

Dimensions

Type 1 - Lightning arrester

5SD7412-1RC



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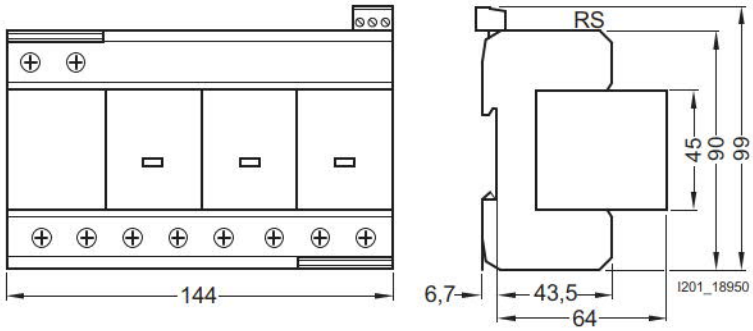
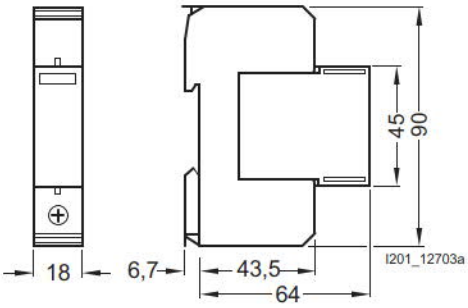
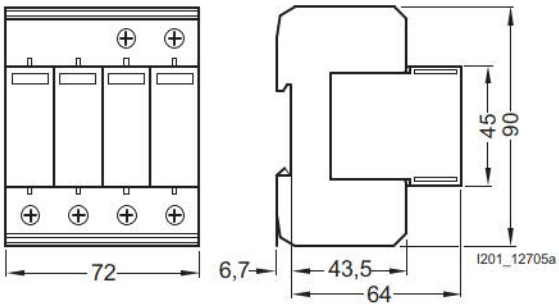


Type 2 - Surge arrester

5SD7461-0RC

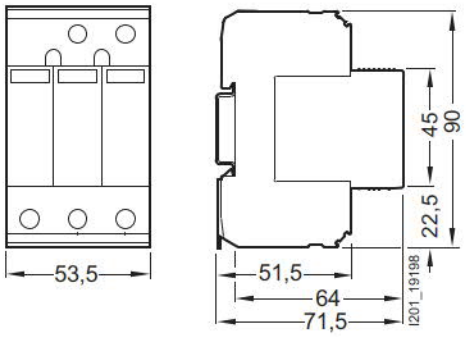


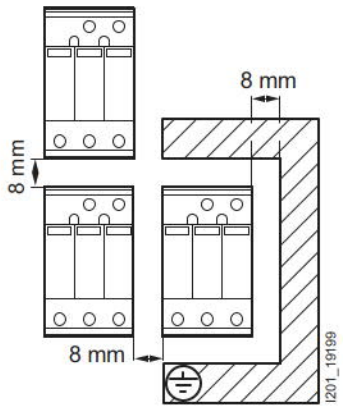
5SD7464-0RC



Type 2 - photovoltaic arrester

5SD7483-6RC





Note: Installation distance only valid for 5SD7483-6RC type

5SD7 Surge Protection Devices – Safe & Reliable

Application Guide

Energy Distribution

Protection of the energy distribution from failure due to surge voltage damages must be reliably ensured at distribution level. To avoid this, the SPDs of the Safe Energy Control portfolio fulfill this requirement with consistently pluggable protection modules.

Type 1 SPDs product range are designed to be pluggable. Thus, in addition to the space and cost savings from the integrated backup fuse, it is also possible to perform maintenance easily and make a replacement without interrupting the power supply.

Infrastructure

The variety of areas within public infrastructure results in different requirements for the respective surge protection, which have to be addressed through special properties of the SPDs. SPDs without leakage current, for example, are frequently required in rail transport to ensure that insulation monitoring systems in the installations are not impaired. The type 2 SPDs in this range feature and have a particularly narrow overall width.

Solar Systems

It is of the utmost importance to have high-performance type 1 SPDs at the cable inlet and outlet that protects against the effects of direct lightning strikes in order to effectively protect wind turbine generators from surge voltage damage.

Data Centers

To ensure the constant availability of data in today's information age, effective surge protection of data centers is indispensable.

Most systems supplied with DC voltage are optimally protected by the type 2 range in the respective distribution. Protection of sensitive end devices is ensured by the type 3 SPDs, which can also be used in DC voltage systems.

5SD7 Surge Protection Devices – Safe & Reliable

Application Guide

Wind Power

It is of the utmost importance to have high-performance type 1 SPDs at the cable inlet and outlet that protects against the effects of direct lightning strikes in order to effectively protect wind turbine generators from surge voltage damage.

Telecommunication Systems

Telecommunication systems are often greatly exposed to the elements and therefore at risk from the effects of direct lightning strikes. That is why most single-phase installations require a particularly high-performance type 1 with a high discharge capacity per position. Protection of sub-distributors and sensitive devices is achieved through additional type 2 SPDs or type 3 SPDs, even for devices supplied with DC voltage.

Building Installations

Protection of buildings with an external lightning protection system requires a type 1 SPD. To protect against the effects of direct lightning strikes, this is installed where the supply line enters the building in the unmetered area.

If there is no external lightning protection system, a high-performance type 2 SPD with increased discharge capacity in the N-PE path should be chosen for protection at the feed point of the installation.

Machine Building

Machines and associated electrical installations must be effectively protected against surge voltages, often without knowing the exact risk at the installation location.

The high-performance type 2 SPDs provide optimum protection in various designs with minimal installation space. Sensitive electronics are protected using the type 3 SPD, even for devices supplied with DC voltage.