5 Lightning and Surge Arresters

Product overview

Overview

Lightning arresters – requirement category I (B)

Combination arresters – requirement category I (B) and II (C)

Surge arresters – requirement category II (C)

Surge arresters – requirement category III (D)

Accessories

Overview

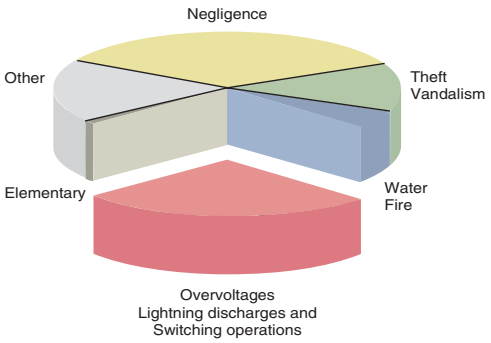
Introduction to lightning and overvoltage protection

Lightning and overvoltage protection – WHY?

Powerful information systems form the backbone of our modern industrial society. A fault or the failure of these types of systems can have far-reaching consequences. These can even cause service and industry companies to go bankrupt.

The cause of faults are many and electromagnetic influences play a major role. In a highly technical, electromagnetic environment, it is not advisable to simply wait for the mutual influencing of electrical and electronic devices and systems and then pay good money to eliminate the resulting problems. Rather it is essential to plan and take preventative measures that reduce the risk of influences, faults and destruction.

In spite of all this, the damage and loss statistics of electronic insurance companies are extremely worrying: more than a quarter of all claims are as a result of overvoltages due to electromagnetic influencing (see diagram, "Causes of damage to electronics").



The causes of damage to electronics in 2000, analysis of 8400 claims

Causes of overvoltages

Depending on their cause, overvoltages are divided into two categories:

- **LEMP** (**L**ightning **E**lectro**M**agnetic **P**ulse) – overvoltages caused by atmospheric influences (e.g. direct lightning strikes, electromagnetic lightning fields).
- **SEMP** (**S**witching **E**lectro**M**agnetic **P**ulse) – overvoltages caused by switching operations (e.g. disconnection of short-circuits, normal switching of loads).

Overvoltages that are the result of thunderstorms are caused by **direct/close-up** or **remote lightning** strikes (see diagram on page 5/4).

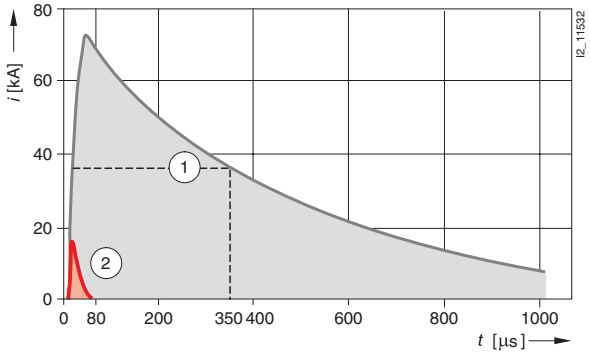
Direct or close-up strikes are lightning strikes to the lightning protection system of a building, its immediate proximity or to the electrical conductive systems of a building (e.g. l.v. power supply, TC and control lines). The resulting surge currents and voltages are a particular threat to the system to be protected due to their amplitude and power.

In the case of direct or close-up lightning strikes, the overvoltages (see diagram on page 5/4) are caused by the voltage drop at the surge grounding resistance and the resulting increase in potential of the building, compared to the distant environment. This represents the greatest possible loading of an electrical plant in buildings.

The characteristic parameters of the surge current (peak value, rate of current rise, charge content, specific energy) can be described using the surge current waveform 10/350 µs (see diagram examples for impulse test currents). These are defined in the international, European and national standards as test current for components and devices for protection in the event of direct strikes.

In addition to the voltage drop at the surge grounding resistance, overvoltages also occur in electrical building installations and the connected systems and devices, due to the induction effect of the electromagnetic lightning field (see diagram on page 5/4: case 1b). The energy of these induced overvoltages and the resulting pulse currents is considerably less than that of a direct lightning impulse current and is therefore only described with surge current wave 8/20 µs (see diagram examples for impulse test currents).

Components and devices that do not carry currents from direct lightning strikes are therefore checked using surge currents 8/20 µs.



		i_{max} [kA]	Waveform [µs]	Q [As]	W/R [J/Ω]
1	Test pulse current for lightning conductors	75	10/350	37,5	$1,5 \times 10^6$
2	Test pulse current for lightnung arresters	15	8/20	0,27	$2,75 \times 10^3$

Examples of impulse test currents

The protection concept

Remote strikes are lightning strikes at a greater distance from the objects to be protected, lightning strikes in the medium-voltage overhead system or the immediate proximity thereof, or lightning discharges from cloud to cloud (see diagram on page 5/4: cases 2a, 2b and 2c). At the same time as these induced overvoltages, the effects of remote strikes on the electrical system of a building are controlled through devices and components, the dimensions of which correspond to surge current wave 8/20 µs.

The causes of overvoltages **due to switching operations** include the following:

- Switching off of inductive loads (e.g. transformers, reactors, motors),
- Ignition and interruption of electric arcs (e.g. arc-welding device),
- Tripping of fuses.

The effects of switching operations in the electrical installation of a building are simulated for testing purposes with surge currents of waveform 8/20 µs.

To ensure the continuous availability of complex power and information systems, even in the event of direct lightning strikes, further measures for overvoltage protection of electrical and electronic systems are required as well as a building lightning protection system. It is important to take all the causes of overvoltages into account. For this purpose, the lightning protection zone concept is used as described in IEC 61312-1 (DIN VDE 0185 Part 103) (see diagram on page 5/5). The building is divided into zones of different danger levels. Using these zones, it is possible to determine the devices and components required for the lightning and overvoltage protection.

An EMC-oriented lightning protection zone concept should also include external lightning protection (with air terminals, arresters, grounding), equipotential bonding, room insulation and overvoltage protection for power and information systems.
For the definition of lightning protection zones, please use the specifications made in the table.

Introduction

Overview

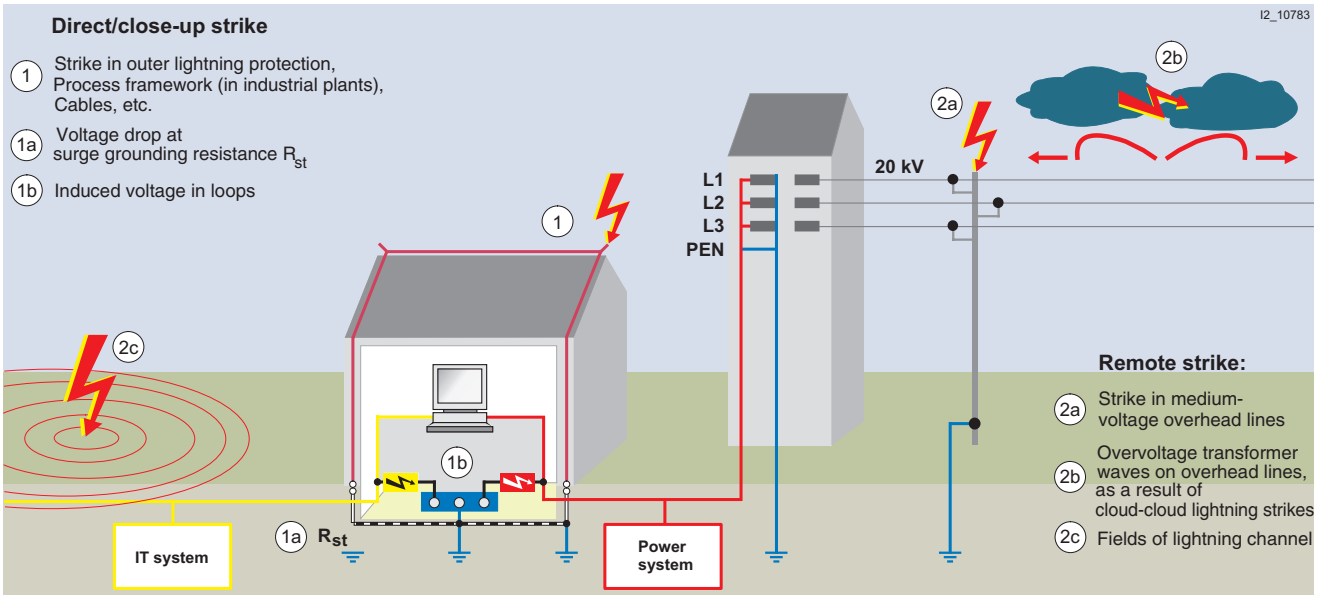
Definition of lightning protection zones

Lightning protection zone	Description
0_A	Zone where objects are exposed to direct lightning strikes and must therefore carry the whole lightning current. The undamped electromagnetic field occurs in this case.
0_B	Zone where objects are not exposed to direct lightning strikes but where the undamped electromagnetic field still occurs.
1	Zone where objects are not exposed to direct lightning strikes and in which the currents are reduced compared to Zone 0_A. In this zone, the electromagnetic field may be damped, depending on the insulation measures implemented.
2, 3	If a significant reduction in the conducted currents and/ or the electromagnetic field is required, subsequent zones must be set up. The demand on these zones must be geared towards the required environment zones of the system to be protected.

In accordance with the demands and loads made on overvoltage protection devices with regard to their installation site, these are divided into lightning arresters, surge arresters and combination arresters.

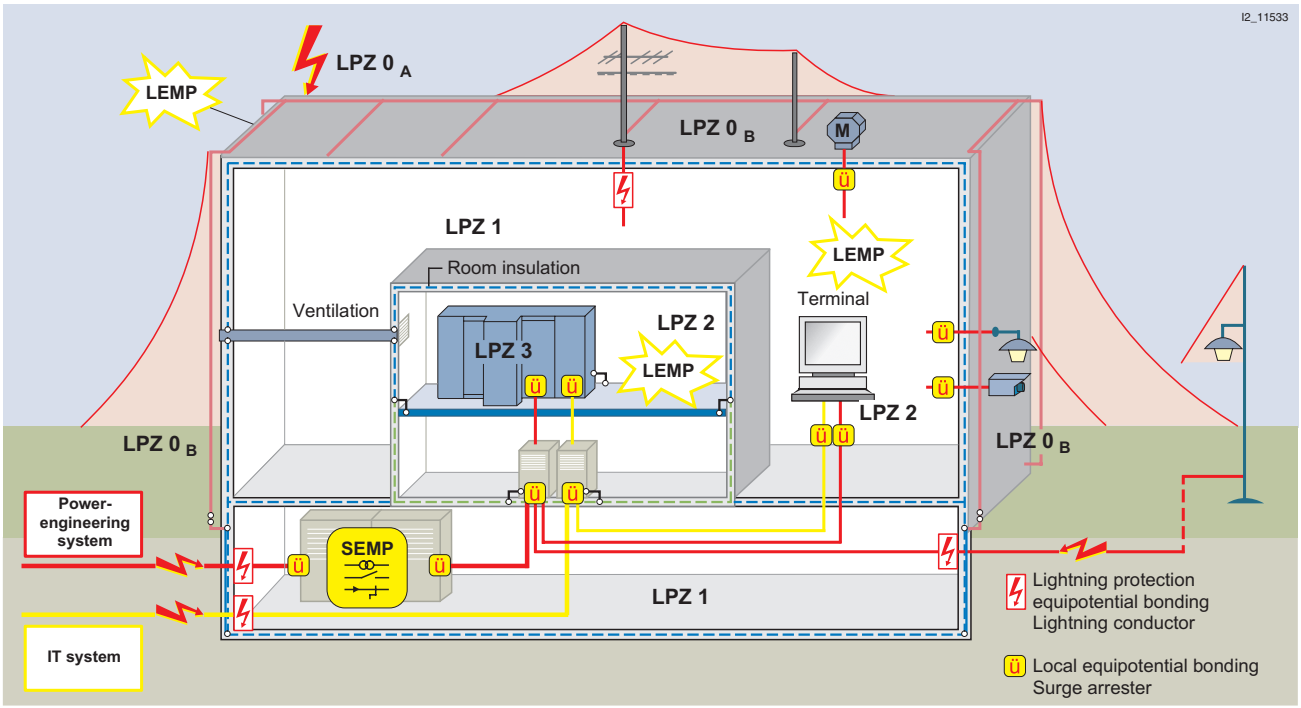
The highest demands with regard to discharge capacity are made on lightning current and combination arresters, which implement the transition from lightning protection zone 0_A to 1 or 0_A to 2. These surge arresters must be able to carry lightning partial currents of waveform 10/350 µs several times and thus prevent these destructive currents from penetrating the electrical systems of a building. At the transition area of lightning protection zones 0_B to 1 or at the downstream lightning arrester at the transition area of lightning protection zones 1 to 2 and higher, surge arresters are installed to protect against overvoltages. It is their task to further attenuate the remaining extent of the upstream protection level and restrict the overvoltages in the system, whether they are induced or self-generated.

The lightning and overvoltage protective measures at the borders of the lightning protection zones apply in equal measure to the energy and information system. The holistic approach of the measures described in the EMC-oriented lightning protection zone concept means it is possible to achieve permanent plant availability of a modern infrastructure.



Causes for overvoltages during lightning discharges

Overview



EMC-oriented lightning protection zone concept

Lightning arresters, requirement category I (B)

Overview

- Supports inclusion of power lines in the lightning protection equipotential bonding
- For protection of low-voltage load systems against overvoltage, even in the case of direct lightning strikes
- Max. permissible operational voltage 255 V AC, 50/60 Hz
- Lightning impulse current test, wave-shaped 10/350 µs
- The enclosed version can prevent ion emissions, as opposed to self-extinguishing measuring spark gaps: this facilitates the mounting of wiring next to other devices in the system.
- Supports energy coordination with surge arresters of requirement category II.
- 58 mm mounting depth

Technical specifications

		Lightning arresters					
		1-pole				3-pole	1-pole
Order No.		5SD7 311-0	5SD7 311-1	5SD7 318-0	5SD7 318-1	5SD7 313-1	5SD7 315-0
Reference to national regulations • SPD class I acc. to • Surge arrester requirement category B acc. to • SPD type 1 acc. to		IEC 61643-1: 1998-02; E DIN VDE 0675-6: 1989-11, -6/A1: 1996-03 and -6/A2: 1996-10; EN 61643: 2001-11					
Approval and marks		cULus, KEMA, VDE					
Requirement category		Class I (B)					
Rated voltage U_c (max. permissible operational voltage)	V AC	255/50 Hz					
Rated voltage U_n	V AC	230/50 Hz				400/50 Hz	230/50 Hz
Discharge of follow current I_f at voltage U_c	kA_{rms} A_{rms}	4	3	– 100		3	50
Discharge capacity							
• Lightning impulse current 1-pole (10/350 ms) I_{imp}	kA	75	50	100		–	50
• Lightning impulse current 3-pole (10/350 ms) I_{imp}	kA	–				100	100
Protection level at U_p							
Lightning operating current monitoring 1.2/50	kV	≤ 3.5	≤ 4				
Response time t_A	ns	≤ 100					
Max. back-up protection, if not already provided by the network	A	250 gL/gG	160 gL/gG	–		160 gL/gG	315 gL/gG
Short-circuit strength at max. back-up protection	kA	50		–		50	–
Min. conductor cross-section	mm^2	10 solid/finely stranded					
Max. conductor cross-section	mm^2	50 stranded, 35 finely stranded					
Temperature range	°C	-40 ... +80					
Degree of protection		IP20					
Installation		35 mm standard mounting rail acc. to EN 50022					
Mounting dimensions acc. to DIN 43880	MW	2				4	2

Selection and ordering data

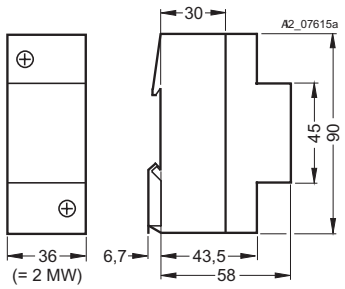
		Discharge capacity	MW	Order No.	Weight 1 item kg	PS*/ P. unit Items
Lightning arresters						
 5SD7 318-1	**Lightning arresters, 1-pole**					
	unenclosed	75 kA	2	**5SD7 311-0**	0.353	1
	N-PE unenclosed	100 kA	2	**5SD7 318-0**	0.295	1
	enclosed	50 kA	2	**5SD7 311-1**	0.262	1
	N-PE enclosed	100 kA	2	**5SD7 318-1**	0.261	1
	**Lightning arresters, 3-pole**					
	enclosed	100 kA	4	**5SD7 313-1**	0.620	1
	**Lightning arrester with increased follow current discharge capacity, 1-pole**					
	safe disconnection of line-follow currents up to 50 kA_{eff} without back-up fuse					
	unenclosed	50 kA	2	**5SD7 315-0**	0.305	1
	Accessories for 5SD7 311-0, 5SD7 318-0 and 5SD7 315-0 to ensure the required mounting dimensions:					
	8HP molded-plastic distribution system in box sizes 1 and 2, see catalog LV 30.					

Dimensional drawings

Lightning arresters

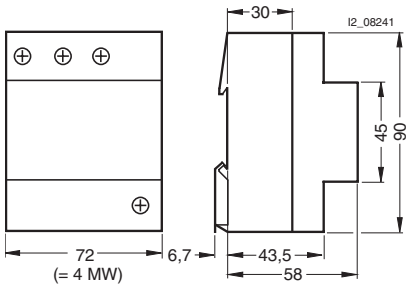
1-pole

5SD7 311-0
5SD7 311-1
5SD7 315-0
5SD7 318-0
5SD7 318-1

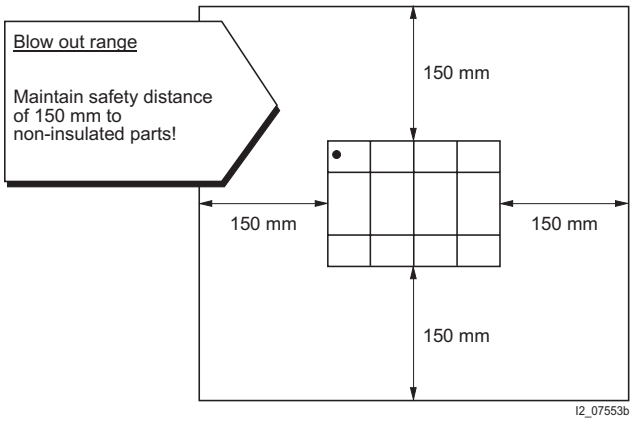


3-pole

5SD7 313-1



More information



- Recommended safety clearance for the installation of surge arresters in the switchgear cabinet.
- These setup instructions only apply to the unenclosed version (5SD7 311-0 and 5SD7 318-0).

*** You can order this quantity or a multiple thereof.**

Combination arresters, requirement category I (B) and II (C)

Overview

- Combination arresters are surge arresters that meet the basic requirement of requirement category I and II, i.e.:
  - have a lightning stroke current discharge capacity of 75 kA/100 kA (10/350 ms)
  - can be energy-coordinated with surge arresters of Class II and III, as well as directly with data terminal equipment of overvoltage category I (U_n = 230 V AC)
- Protection level <1.5 kV, corresponding to withstand impulse voltage of overvoltage category I
- Compact unit for all three-phase systems which is ready for connection
- Connection system: double terminal design supports "V wiring" option
- Multifunction terminal in the outgoing circuit
- Visual operational voltage display
- Remote signaling using separate, overvoltage-protected display and remote signaling module
- Overvoltage and atmospheric lightning arrester in a single device
- Perfect "all in one" solution
- Cabled complete device for any distribution system (TT, TN-C and TN-S)
- Easy-to-use device selection thanks to simple description
- Up to 70 % more space saving than conventional solutions
- Simple installation on standard mounting rail
- 58 mm mounting depth

Technical specifications

		Combination arrester			
		TN-C	**TN-S**	**TT**	**2P TT**
Order No.		5SD7 343-0	5SD7 344-0	5SD7 343-1	5SD7 341-1
Reference to national regulations • SPD class I acc. to • Surge arrester requirement category B acc. to • SPD type 1 acc. to		IEC 61643-1: 1998-02; E DIN VDE 0675-6: 1989-11, -6/A1: 1996-03 and -6/A2: 1996-10; EN 61643: 2001-11			
Approval and marks		VDE			
Requirement category		Class I (B)			
Rated voltage U_c (max. permissible operational voltage)	V AC	255/50 Hz			
Rated voltage U_n	V AC	400/50 Hz			
Discharge of follow current I_f at voltage U_c	kA_{rms}	50			
Discharge capacity • Lightning impulse current 1-pole (10/350 ms) I_{imp} • Lightning impulse current, multipole (10/350 µs) I_{imp}	kA kA	25 75	25 100	25 100	25 50
Protection level U_p at I_n Residual voltage at I_{imp} Lightning operating current monitoring 1.2/50	kV kV	≤ 1.5 ≤ 1.5			
Response time t_A	ns	≤ 100			
Max. back-up protection, if not already provided by the network	A	315 A gL/gG with spur terminal 125 A gL/gG with V terminal			
Short-circuit strength at max. back-up protection	kA	25/50 Hz			
Min. conductor cross-section	mm^2	10 solid/finely stranded			
Max. conductor cross-section	mm^2 mm^2	35 stranded, 35 finely stranded (L', N', PEN') 50 stranded, 35 finely stranded (L, N, PEN)			
Temperature range	°C	-40 ... +60			
Degree of protection		IP20			
Installation		35 mm standard mounting rail acc. to EN 50022			
Mounting dimensions acc. to DIN 43880	MW	6	8		6
Operating display for		L_1, L_2, L_3			
Remote display		yes, over remote signaling module 5SD7 398-3			5SD7 348-1

Design		**Remote signaling module**	
Order No.		**5SD7 348-3**	**5SD7 348-1**
Remote signaling module for combination arresters		5SD7 343-0, 5SD7 344-0 and 5SD7 343-1	5SD7 341-1
Connection of the module		connection only with the provided terminals of the combination arrester	
Contact type		floating changeover	
Switching capacity U_n/I_n	V AC V DC	250/0.5 A 250/0.1 A; 125/0.2 A; 75/0.5 A	
Power consumption	MW	500	400
Wavelength of the FOC diode	Nm	660	
Min. conductor cross-section	mm^2	0.5 solid/finely stranded	
Max. conductor cross-section	mm^2	4 solid/finely stranded	
Temperature range	°C	-40 ... + 80	
Degree of protection		IP20	
Installation		35 mm standard mounting rail acc. to EN 50022	
Mounting dimensions acc. to DIN 43880	MW	1.5	

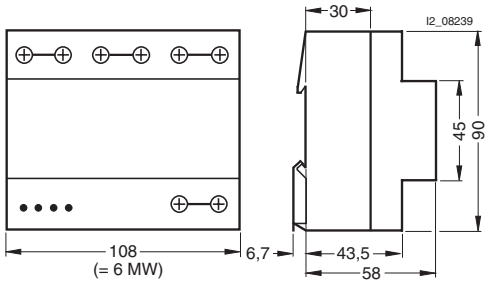
Selection and ordering data

		MW	Order No.	Weight 1 item kg	PS*/ P. unit Items
Combination arresters					
 5SD7 343-1	TN-C	6	**5SD7 343-0**	1.070	1
	TN-S	8	**5SD7 344-0**	1.388	1
	TT	8	**5SD7 343-1**	1.402	1
	2P TT	8	**5SD7 341-1**	0.832	1
	For technical specifications see page 5/8				
 5SD7 348-3	**Remote signaling modules** The remote signaling module is placed on left-hand side of combination arrester and linked to the existing connecting cables. contact: 1 changeover 250 V AC, 0.5 A 250 V DC, 0.1 A 125 V DC, 0.2 A 75 V DC, 0.5 A contact 11/12: operating status 11/14: fault scenario 				
	for 5SD7 343-0, 5SD7 343-1 and 5SD7 344-0 combination arrester with 4 connecting cables	1.5	**5SD7 348-3**	0.146	1
	for 5SD7 341-1 combination arrester with 2 connecting cables	1.5	**5SD7 348-1**	0.138	1
	For technical specifications see page 5/8.				

Dimensional drawings

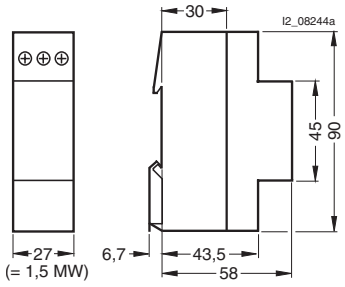
Combination arresters

5SD7 343-0

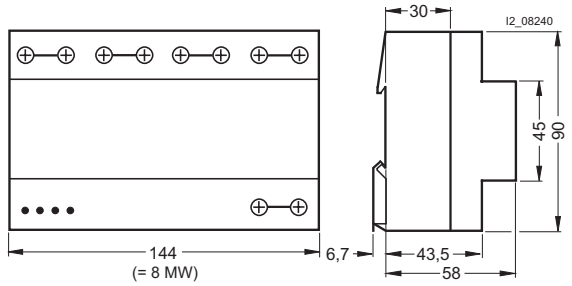


Remote signaling modules

5SD7 348-1
5SD7 348-3



5SD7 341-1
5SD7 343-1
5SD7 344-0



* You can order this quantity or a multiple thereof.

Single-pole surge arresters, Requirement category II (C)

Overview

- For the protection of low-voltage load system against overvoltage
- High discharge capacity through powerful zinc oxide varistors/ spark gaps (N-PE surge arresters)
- High monitoring reliability through isolating arrester disconnector, type "Thermo Dynamic Control" with double monitoring
- Fault indication through red marking in inspection window
- Multifunction terminals for conductor and busbar connection
- Simple replacement of surge arrester connectors
- Simple mounting on standard mounting rail with busbars
- Design as for multipole version
- Same connector as for multipole version
- No interaction limiting phase reactor with surge arresters Class III (formerly D)

Technical specifications

Order No.		5SD7 300-2	5SD7 301-2	5SD7 302-2	5SD7 302-4	5SD7 303-2	5SD7 303-4	5SD7 308-0
Reference to national regulations • SPD class II acc. to • Surge arrester requirement category C acc. to • SPD type 2 acc. to		IEC 61643-1: 1998-02; E DIN VDE 0675-6: 1989-11, -6/A1: 1996-03 and -6/A2: 1996/10; EN 61643: 2001-11						
Approval and marks		, KEMA, VDE						
Requirement category		Class II (C)						
Rated voltage U_c **(max. permissible operational voltage)**		275 V AC/50 Hz, 350 V DC			335 V AC/ 50 Hz, 420 V DC	275 V AC/ 50 Hz, 350 V DC	335 V AC/ 50 Hz, 420 V DC	255 V AC/ 50 Hz
Discharge of follow current I_f at voltage U_c	A_{rms}	–						100
Discharge capacity • Lightning impulse current 1-pole (10/350 mS) I_{imp} • Rated discharge current (8/20 mS) I_{sn} • Increased discharge current (8/20 µS) I_{snmax}	 kA kA kA	 – 20 40			 15	 20	 15	 12 20
Protection level U_p • Lightning operating current monitoring 1.2/50 • Residual voltage at 5 kA (8/20 µS) • Residual voltage at I_{sn}	 kV kV kV	 – ≤ 1 ≤ 1.5			 ≤1.1	 ≤1	 ≤1.1	 ≤ 1.5 – –
Response time t_A	ns	≤ 25						≤ 100
Max. back-up protection, if not already provided by the network	A	125 gL/gG						–
Short-circuit strength at max. back-up protection	kA	50/50 Hz			25/50 Hz	50/50 Hz	25/50 Hz	–
Min. conductor cross-section	mm^2	1.5 solid/finely stranded						
Max. conductor cross-section	mm^2	35 stranded, 25 finely stranded						
Temperature range	°C	-40 ... +80						
Degree of protection		IP20						
Installation		35 mm standard mounting rail acc. to EN 50022						
Mounting dimensions acc. to DIN 43880	MW	1						
Optical function/fault indication		yes						no
Remote display		no	yes	no		yes		no
Floating changeover contact		no	yes	no		yes		no
Switching capacity U_n/I_n		–	AC: 250 V/0.5 A DC: 250 V / 0.1 A; 125 V / 0.2 A; 75 V/0.5 Hz	–		AC: 250 V/0.5 A DC: 250 V / 0.1 A; 125 V / 0.2 A; 75 V/0.5 Hz		–

Single-pole surge arresters, Requirement category II (C)

Technical specifications

Order No.		5SD7 303-5	5SD7 300-5
Reference to national regulations • SPD class II acc. to • surge arrester requirement category C acc. to • SPD type 2 acc. to		IEC 61643-1: 1998-02; E DIN VDE 0675-6: 1989-11, -6/A1: 1996-03 and -6/A2: 1996/10; EN 61643-11	
Approval and marks		, KEMA, VDE	
Requirement category		Class II (C)	
Rated voltage U_c **(max. permissible operational voltage)**		385 V AC/50 Hz 500 V DC	
Discharge capacity • Rated discharge current (8/20 mS) I_{sn} • Increased discharge current (8/20 mS) I_{snmax}	 kA kA	 15 40	
Protection level U_p • Residual voltage at 5 kA (8/20 mS) • Residual voltage at I_{sn}	 kV kV	 ≤ 1.5 ≤ 2	
Response time t_A	ns	≤ 25	
Max. back-up protection, if not already provided by the network	A	125 gL/gG	
Short-circuit strength at max. back-up protection	kA	25/50 Hz	
Min. conductor cross-section	mm^2	1.5 solid/finely stranded	
Max. conductor cross-section	mm^2	35 stranded, 25 finely stranded	
Temperature range	°C	-40 ... +80	
Degree of protection		IP20	
Installation		35 mm standard mounting rail acc. to EN 50022	
Mounting dimensions acc. to DIN 43880	MW	1	
Optical function/fault indication		yes	
Remote display		no	yes
Floating changeover contact		no	yes
Switching capacity U_n/I_n		–	AC: 250 V/0.5 A DC: 250 V / 0.1 A; 125 V / 0.2 A; 75 V/0.5 Hz

Selection and ordering data

		MW	Order No.	Weight 1 item	PS*/ P. unit
				kg	Items
Surge arresters, 1-pole					
	• acc. to E DIN VDE 0675, Part 6/11.89 and Part 6/A1/03.96 and Part 6/A2/10.96				
	Surge arresters • High monitoring reliability through isolating arrester disconnector, type "Thermo Dynamic Control" with double monitoring function • Fault indication by red marking in the inspection window • Multifunction terminal for conductor and busbar connection • 1-pole				
	Surge arrester rated voltage U_c = 275 V	1	**5SD7 300-2**	0.125	1
	Surge arrester rated voltage U_c = 385 V	1	**5SD7 300-5**	0.133	1
	**Surge arrester with remote indication** [1] • Same design as 5SD7 300-2, but with additional 3-pole terminal for connection of remote indication • When the monitoring device responds (disconnection of the defective arrester from the line supply as a result of overload) the remote signaling connections are switched via a floating changeover contact. 14 12 11 • 1-pole				
	Surge arrester rated voltage U_c = 275 V	1	**5SD7 301-2**	0.132	1

1) The devices can be coupled to *instabus* KNX *EIB* and AS-i bus or PROFIBUS through potential-free changeover contacts.

*** You can order this quantity or a multiple thereof.**

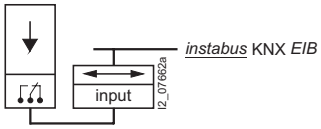
Single-pole surge arresters, Requirement category II (C)

Selection and ordering data

		MW	Order No.	Weight 1 item kg	PS*/ P. unit Items
Surge arresters, 1-pole, plug-in					
 5SD7 302-2	**Plug-in surge arresters** • Same design as 5SD7 300-2, but 2-piece, comprising basic element and plugged protective block • 1-pole				
	Surge arrester rated voltage U_C = 275 V	1	**5SD7 302-2**	0.134	1
	Surge arrester rated voltage U_C = 335 V	1	**5SD7 302-4**	0.134	1
 5SD7 303-2	**Plug-in surge arresters with remote indication** [1] • Same design as 5SD7 302-2, but with additional 3-pole terminal for connection of remote indication • When the monitoring device responds (disconnection of the defective arrester from the line supply as a result of overload) the remote signaling connections are switched via a floating changeover contact. 14 12 11				
	Surge arrester rated voltage U_C = 275 V	1	**5SD7 303-2**	0.138	1
	Surge arrester rated voltage U_C = 335 V	1	**5SD7 303-4**	0.138	1
	Surge arrester rated voltage U_C = 385 V	1	**5SD7 303-5**	0.137	1
	**N-PE surge arrester for 3+1 circuitry in the TT network** • Specially for use in TT system in "3+1 circuit" according to DIN V VDE V 0100-534: 1999-04 between neutral wire N and PE conductor PE/equipotential bonding with lightning impulse current (10/350 mS) 12 kA • Surge arrester on the basis of spark gaps • Multifunction terminal for conductor and busbar connection				
	Surge arrester rated voltage U_C = 275 V	1	**5SD7 308-0**	0.117	1

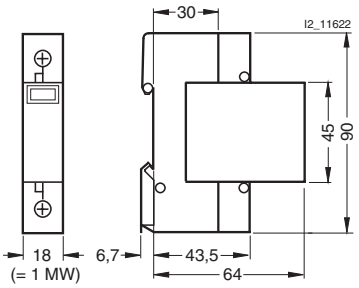
For technical specifications see page 5/10.

1) The devices can be coupled to *instabus* KNX *EIB* and AS-i bus or PROFIBUS through potential-free changeover contacts.

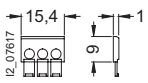


Dimensional drawings

5SD7 300-2, 5SD7 300-5
5SD7 301-2
5SD7 302-2, 5SD7 302-4
5SD7 303-2, 5SD7 303-4, 5SD7 303-5
5SD7 308-0



Remote indication



* You can order this quantity or a multiple thereof.

Multipole surge arresters, requirement category II (C)

Overview

Same design as surge arrester, but with additional 3-pole terminal for connecting remote indication.

When the monitoring device responds (disconnection of the defective arrester from the line supply as a result of overload), the remote signaling terminals are switched by means of a floating changeover contact.

Easy installation of the remote indication due to the plug-in terminal.

Designs:
- TN-C, plug-in
- TN-C, plug-in with remote indication
- TN-S, plug-in
- TN-S, plug-in with remote indication
- TT plug-in
- TT plug-in with remote indication

All device models are available for surge arrester rated voltages of 275 V, 335 V and 385 V (see page 5/14).

Accessories: connectors
Models suitable for multipole surge arresters TN-C/TN-S/TT and single-pole surge arresters.

The pluggable protective block can be replaced with no need to disconnect the supply voltage or remove the cover plate of the distribution board.

Benefits

- Pre-wired complete units for conventional system types (TN-C, TN-S, TT), comprising a basic part and plug-in protective blocks
- High discharge capacity through powerful zinc oxide varistors or spark gaps for TT surge arresters
- High monitoring reliability through isolating arrester disconnector, type "Thermo Dynamic Control" with double monitoring
- Fault indication by red marking in the inspection window
- Multifunction terminals for conductor and busbar connection
- Simple replacement of surge arrester connectors
- Up to 70 % more space saving than conventional solutions
- Simple mounting on standard mounting rail with busbars
- Design as for 1-pole version
- No interaction limiting phase reactor with surge arresters Class III (corresp. to D)
- Same male connectors as for 1-pole version

5

Technical specifications

		Multipole lightning arrester							
		without remote indication				with remote indication			
		TN-C	TN-S	TT		TN-C	TN-S	TT	
Order No.		5SD7 323-2	5SD7 325-2	5SD7 327-2		5SD7 324-2	5SD7 326-2	5SD7 328-2	
				L-N	N-PE			L-N	N-PE
Reference to national regulations • SPD class II acc. to • Surge arrester requirement category C acc. to • SPD type 2 acc. to		IEC 61643-1: 1998; E DIN VDE 0675-6: 1989-11, -6/A1: 1996-03 and -6/A2: 1996-10; EN 61643-11							
Requirement category		Class II (C)							
Rated arrester voltage U_c (max. permissible operating voltage)	V AC	275/50 Hz			225/50 Hz	275/50 Hz			255/50 Hz
Rated voltage U_n	V AC	230/400/50 Hz							
Discharge of follow current I_f at voltage U_c	A				100	–			200
Discharge capacity									
Rated discharge current (8/20 µs) I_{sn}	kA	20							
Increased discharge current (8/20 µs) I_{snmax}	kA	40			–	40			–
Protection level U_p									
Residual voltage at 5 kA (8/20 µs)	kV	≤ 1			–	≤ 1			–
Residual voltage at I_{sn}	kV	≤ 1.5			–	≤ 1.5			–
Response time t_A	ns	≤ 25			≤ 100	≤ 25			≤ 100
Max. back-up protection, if not already provided by the network	A	125 gL/gG			–	125 gL/gG			–
Short-circuit strength at max. back-up protection	kA	50/50 Hz			–	50/50 Hz			–
Min. conductor cross-section	mm^2	1.5 solid/finely stranded							
Max. conductor cross-section	mm^2	35 stranded, 25 finely stranded							
Temperature range	°C	-40 ... +80							
Degree of protection		IP20							
Installation		35 mm standard mounting rail acc. to EN 50022							
Mounting dimensions acc. to DIN 43880	MW	3	4			3	4		
Optical function/fault indication		yes							no
Remote display		no				yes			
Floating changeover contact		no				yes			
Switching capacity U_n/I_n		–				AC: 250 V/0.5 A DC: 250 V / 0.1 A; 125 V / 0.2 A; 75 V/0.5 Hz			

Multipole surge arresters, requirement category II (C)

Technical specifications

Order No.		Multipole surge arresters without remote indication				with remote indication			
		TN-C	TN-S	TT		TN-C	TN-S	TT	
		5SD7 323-4	5SD7 325-4	5SD7 327-4		5SD7 324-4	5SD7 326-4	5SD7 328-4	
				L-N	N-PE			L-N	N-PE
Rated arrester voltage U_c (max. permissible operating voltage)	V AC	335/50 Hz			225/50 Hz	335/50 Hz			255/50 Hz
Discharge capacity Rated discharge current (8/20 µs) I_{sn}	kA	15			20	15			20
Protection level U_p									
• Residual voltage at 5 kA (8/20 mS)	kV	≤ 1.1			–	≤ 1.1			–
• Residual voltage at I_{sn}	kV	≤ 1.5			–	≤ 1.5			–
Short-circuit strength at max. back-up protection	kA	25/50 Hz			–	25/50 Hz			–

Order No.		Multipole surge arresters without remote indication				with remote indication			
		TN-C	TN-S	TT		TN-C	TN-S	TT	
		5SD7 323-5	5SD7 325-5	5SD7 327-5		5SD7 324-5	5SD7 326-5	5SD7 328-5	
				L-N	N-PE			L-N	N-PE
Rated arrester voltage U_c (max. permissible operating voltage)	V AC	385/50 Hz			225/50 Hz	385/50 Hz			255/50 Hz
Discharge capacity Rated discharge current (8/20 µs) I_{sn}	kA	15			20	15			20
Protection level U_p									
• Residual voltage at 5 kA (8/20 mS)	kV	≤ 1.5			–	≤ 1.5			–
• Residual voltage at I_{sn}	kV	≤ 2			–	≤ 2			–
Short-circuit strength at max. back-up protection	kA	25/50 Hz			–	25/50 Hz			–

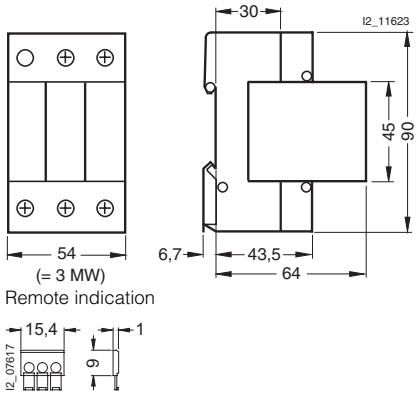
Selection and ordering data

		Surge arrester rated voltage U_c	MW	Order No.	Weight 1 item kg	PS*/ P. unit Items
Surge arresters, multipole, plug-in						
 5SD7 327-2	TN-C	275 V	3	**5SD7 323-2**	0.377	1
		335 V	3	**5SD7 323-4**	0.377	1
		385 V	3	**5SD7 323-5**	0.377	1
	TN-C with remote indication	275 V	3	**5SD7 324-2**	0.411	1
		335 V	3	**5SD7 324-4**	0.411	1
		385 V	3	**5SD7 324-5**	0.369	1
	TN-S	275 V	4	**5SD7 325-2**	0.458	1
		335 V	4	**5SD7 325-4**	0.458	1
		385 V	4	**5SD7 325-5**	0.438	1
	TN-S with remote indication	275 V	4	**5SD7 326-2**	0.468	1
		335 V	4	**5SD7 326-4**	0.468	1
		385 V	4	**5SD7 326-5**	0.468	1
 5SD7 328-2	TT	275 V	4	**5SD7 327-2**	0.482	1
		335 V	4	**5SD7 327-4**	0.482	1
		385 V	4	**5SD7 327-5**	0.482	1
	TT with remote indication	275 V	4	**5SD7 328-2**	0.508	1
		335 V	4	**5SD7 328-4**	0.508	1
		385 V	4	**5SD7 328-5**	0.508	1

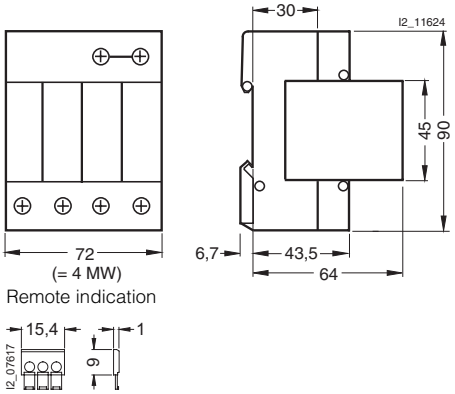
* You can order this quantity or a multiple thereof.

Dimensional drawings

5SD7 323-2, 5SD7 323-4, 5SD7 323-5
5SD7 324-2, 5SD7 324-4, 5SD7 324-5



5SD7 325-2, 5SD7 325-4, 5SD7 325-5
5SD7 326-2, 5SD7 326-4, 5SD7 326-5
5SD7 327-2, 5SD7 327-4, 5SD7 327-5
5SD7 328-2, 5SD7 328-4, 5SD7 328-5



5

Surge arresters, requirement category III (D)

Technical specifications

Design		Protective adapter, protective adapter with line filter	Surge arresters 2-pole	4-pole	Overvoltage safety socket outlet
Order No.		5SD7 335-0, 5SD7 335-1	5SD7 332-0	5SD7 334-0	5UB1 ..., 5UH1 ...
Tested acc. to		E DIN VDE 0675 Part 6/11: 89-11	E DIN VDE 0675, Part 6: 89-11, Part 6/A1: 96-03, EN 61643-11: 2001; IEC 61643-1: 1998-02		E DIN VDE 0675, Part 6: 89-11, Part 6/A1: 96-03 and Part 6/A2: 96-10
Requirement category		III (D)			
Rated arrester voltage U_c (max. permissible operating voltage)	V AC	255/50 Hz			
	V DC	–	255	440/50 Hz	–
Rated voltage U_n	V AC	230/50 Hz	230/50 Hz	500/50 Hz 400/50 Hz	230/50 Hz
Max. power requirements of load		920 W (4 A) ... 3680 W (16 A)	–		
Rated current	A	–	16		–
Rated discharge current (8/20 µs) I_{sn} in kA	kA	2.5 L(N) → PE, L → N 5 L+N → PE	3 L(N) → PE, 3 L → N 5 L+N → PE	3 L → L 3 L → N 5 N→PE	3 L(N) → PE, L → N 5 L+N → PE
Combined surge	kV	5 L(N) → PE, L → N 5 L+N → PE	6 L(N) → PE 6 L → N 10 L+N → PE	6 L → L 6 L → N 10 N→PE	–
Protection level U_p	kV	1.5	≤ 1.25 L → N ≤ 1.5 L(N) → PE	≤ 1.25 L → N ≤ 1.5 L(N) → PE ≤ 2.5 L → L	≤ 1.25/≤ 1.5
Response time t_A	ns	25 L → N 100 L(N) → PE	≤ 25 L → N ≤ 100 L(N) → PE		
Max. back-up protection, if not already provided by the network	A	4 (only for 5SD7 335-0)	16 gL/gG or LS C16		
Min. conductor cross-section	mm^2	10 solid/finely stranded	0.5 solid/finely stranded		0.75
Max. conductor cross-section		2.5	4 solid/finely stranded		2.5
Temperature range	°C	-25 ... +40	-40 ... +80		-25 ... +40
Degree of protection		IP20			
Installation		35 mm standard mounting rail acc. to EN 50022			flush mounting
Mounting dimensions acc. to DIN 43880	MW	–	1.5	3	–
Optical function/fault indication		–			•
Remote display		–	•		–
Contact type			NC		
Switching capacity U_n/I_n		–	AC: 250 V/0.5 A DC: 250 V / 0.1 A; 125 V / 0.2 A; 75 V/0.5 Hz		–

Surge arresters, requirement category III (D)

Benefits

- For the protection of electronic device against overvoltages (overvoltage category II according to DIN VDE 0110-1:1997-04)
- Surge arrester of requirement category D according to E DIN VDE 0675, Part 6/11.89 and –6/A1: 1996-03
- SPD Type 3 according to EN 61643-11: 2001 SPD class III according to IEC 61643-1: 1998-2
- Visual function indication (green)
- Visual fault indication (red)
- 58 mm mounting depth

Selection and ordering data

		MW	Order No.	Weight 1 item	PS*/ P. unit
				kg	Items
Surge arresters					
	• Complies with E DIN VDE 0675, Part 6: 1989-11 and -6/A1: 1996-03				
	**Surge arrester, 2-pole** • 2-pole overvoltage protection with monitoring equipment and isolating arrester disconnector • Floating remote indication contact (NC contact) for fault indication (no system shutdown) • Rated voltage U_N = 230 V • Surge arrester rated voltage U_C = 255 V	1.5	**5SD7 332-0**	0.301	1
	**Surge arrester, 4-pole** • 4-pole overvoltage protection with monitoring equipment and isolating arrester disconnector • Optical function indication for 3 outer conductors (glow lamp green) • Floating remote indication contact (NC contact) for fault indication (no system shutdown) • Rated voltage U_N = 230 V/400 V • Surge arrester rated voltage U_C = 255 V/440 V	3	**5SD7 334-0**	0.301	1
Surge arresters (socket outlet devices)					
	• Complies with E DIN VDE 0675, Part 6: 1989-11 and -6/A1: 1996-03				
	**Siemens (SCHUKO) socket outlet with overvoltage protection 5UB1.../5UH1...** [1] • with labeling field and function indicators • for the DELTA switch-socket outlet range				
	**Protective adapter, socket outlet adapter to protect electronic devices** • Can be plugged into (SCHUKO) socket outlets • With optical function indication/monitoring • Rated current: 16 A • Rated voltage: 230 V/50 Hz • Nominal discharge current 2.5 kA		**5SD7 335-0**	0.159	1
	**Protective adapter with line filter** • like 5SD7 335-0 protective adapter, but with additional line filter against high-frequency noise voltages • Rated current: 4 A		**5SD7 335-1**	0.210	1

For technical specifications see page 5/16.

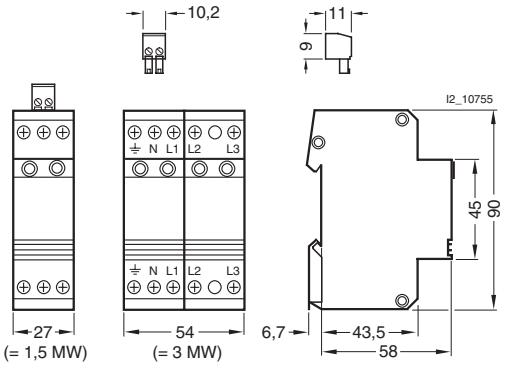
1) For prices and additional information, see the ET D1 catalog, "DELTA switches and outlets".

* You can order this quantity or a multiple thereof.

Surge arresters, requirement category III (D)

Dimensional drawings

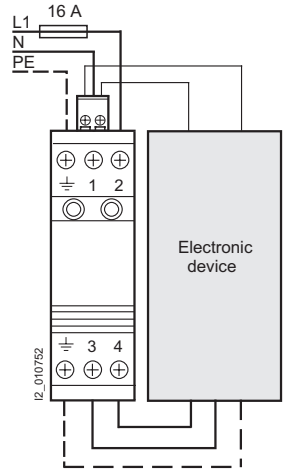
5SD7 332-0 5SD7 334-0



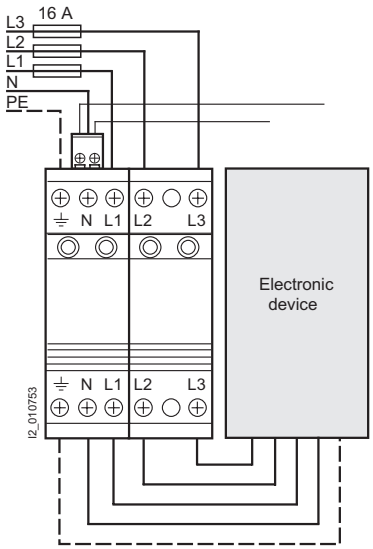
Circuit diagrams

Surge arresters – requirement category III (D)

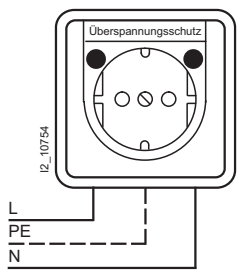
5SD7 332-0



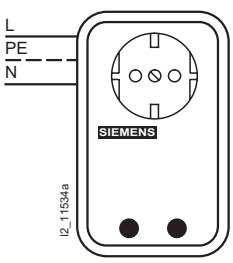
5SD7 334-0



5UB1 ...
5UH1 ...



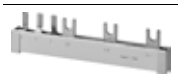
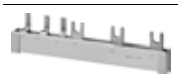
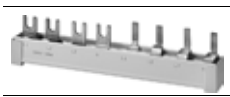
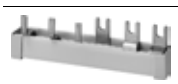
5SD7 335-0
5SD7 335-1



Technical specifications

Design		Decoupling reactors		Through-type terminal
Order No.		5SD7 390-0	5SD7 391-0	5SD7 360-0
Tested acc. to		E DIN VDE 0675, Part 6: 1989-11, Part 6/A1: 1996-03 and Part 6/A2: 1996-10		
Rated arrester voltage U_c (max. permissible operating voltage)	V AC	255/50 Hz		
Nominal voltage	V AC	500/50 Hz		
Rated current	A	35	63	100
Rated inductance	mH	15 ±20 %	15 ±20 %	–
Direct current resistance R_{cu}	MW	approx. 4	approx. 2	–
Max. back-up protection, if not already provided by the network	A	35 gL/gG	63 gL/gG	100 gL/gG 250 gL/gG
Short-circuit strength at max. back-up protection	kA	–		50/50 Hz
Min. conductor cross-section	mm^2	1.5 solid/finely stranded	10 solid/finely stranded	1.5 solid/finely stranded
Max. conductor cross-section	mm^2	35 stranded/ 25 finely stranded	50 stranded/ 35 finely stranded	35 stranded/ 25 finely stranded
Temperature range	°C	-40 ... +40		
Degree of protection		IP20		
Installation		35 mm standard mounting rail acc. to EN 50022		
Mounting dimensions acc. to DIN 43880	MW	2	4	1

Selection and ordering data

		MW	Order No.	Weight 1 item kg	PS*/ P. unit Items
	Through-type terminal				
	• For simple wiring in the different circuit versions (see section, "Configuring aid")				
	1-pole	1	**5SD7 360-0**	0.120	1
 5SD7 392-2	**Male connector for surge arresters**				
	• Male connectors can be used for both single-pole and multipole surge arresters				
	Male connector for L-N surge arrester Surge arrester rated voltage U_C = 275 V	1	**5SD7 392-2**	0.049	1
	Male connector for L-N surge arrester Surge arrester rated voltage U_C = 335 V	1	**5SD7 392-4**	0.049	1
	Male connector for L-N surge arrester Surge arrester rated voltage U_C = 385 V	1	**5SD7 392-5**	0.049	1
	Male connector for N-PE surge arrester (TT system)	1	**5SD7 398-0**	0.033	1
Busbars					
	**Busbar for lightning arrester** 8-pole, 1-phase		**5SD7 361-1**	0.039	1
	**Busbar for surge arrester** 4-pole, 1-phase		**5SD7 361-0**	0.020	1
	**Busbar for combination arrester** TN-S/TT and 4-pole residual current protective devices (5SM1 and 5SM3)		**5SD7 084**	0.133	1
	**Busbar for combination arrester** TN-S/TT and 4-pole miniature circuit-breaker (5SY)		**5SD7 085**	0.143	1
	**Busbar for combination arrester** TN-C and 3-pole residual current protective devices (5SM1 and 5SM3)		**5SD7 086**	0.079	1
	**Busbar for combination arrester** TN-C and 3-pole miniature circuit-breaker (5SY)		**5SD7 087**	0.084	1
	**Busbar for multipole surge arrester** TN-S/TT and 4-pole miniature circuit-breaker (5SY)		**5SD7 088**	0.104	1
	**Busbar for multipole surge arrester** TN-C and 3-pole miniature circuit-breaker (5SY)		**5SD7 090**	0.064	1

* You can order this quantity or a multiple thereof.

Accessories

Selection and ordering data

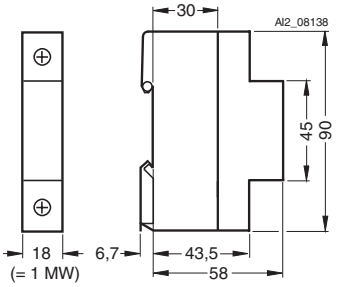
			MW	Order No.		Weight 1 item	PS*/ P. unit
						kg	Items
 5SD7 390-0	**Decoupling reactors**						
	• For the energetic coordination of lightning and surge arresters in the event of a lightning impulse current of 10/350 ms						
	• The concentrated inductance replaces the otherwise necessary cable length for decoupling lightning and surge arrester						
	• 58 mm mounting depth						
	• Rated voltage:	500 V, 50 Hz ... 60 Hz					
	• Inductance:	15 H 20 %					
	Rated current:	35 A	2	**5SD7 390-0**		0.355	1
	Rated current:	63 A	4	**5SD7 391-0**		0.710	1

Dimensional drawings

Through-type terminal

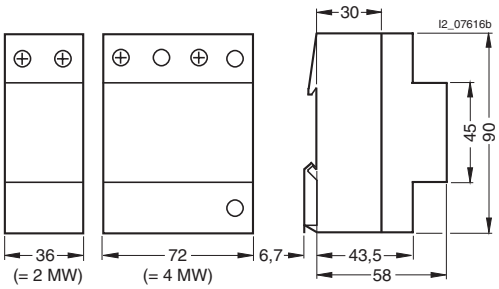
1-pole

5SD7 360-0



Decoupling reactors

5SD7 390-0 5SD7 391-0

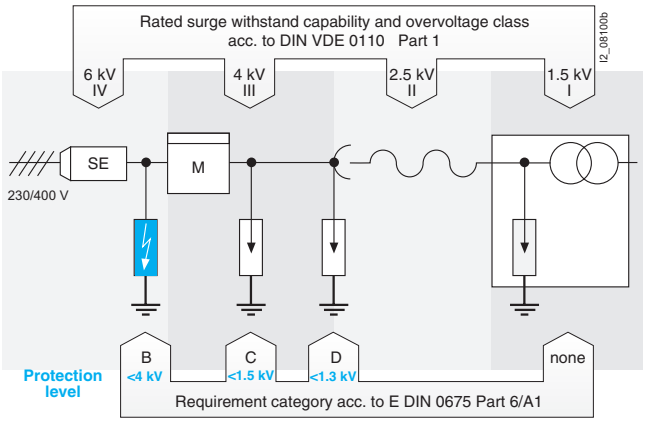


* You can order this quantity or a multiple thereof.

Overview

Requirement categories of surge arresters (SPDs)

Lightning current and overvoltage protection is only effective if the prescribed insulation resistance of system sections are taken into account. To do this, the impulse withstand voltage of the different overvoltage categories is coordinated with the protection level U_p of the different SPDs.



The international standard IEC 60664-1 (EN 60664-1) distinguishes between four impulse withstand voltage categories for l.v. devices. In particular, the following categories apply to l.v. systems with a nominal line voltage of 230/400 V.

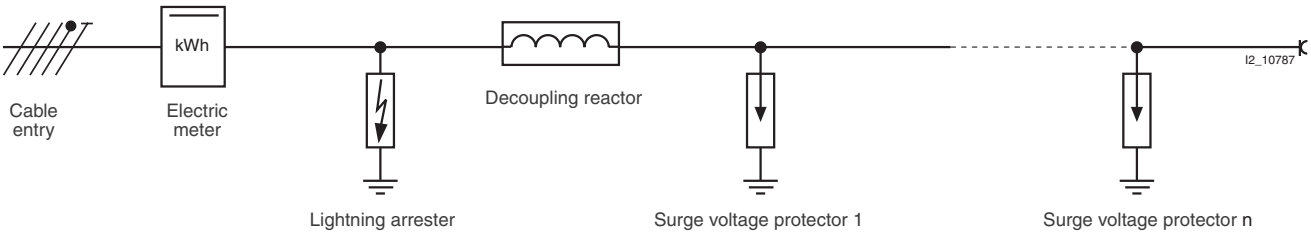
Impulse withstand voltage categories		
Category	**Impulse withstand voltage**	**Description**
IV	6 kV	for devices that are upstream of the distribution board
III	4 kV	for devices that are part of the fixed system (e.g. distribution boards)
II	2.5 kV	for normal impulse withstand voltage devices (e.g. household appliances)
I	1.5 kV	for very sensitive devices (e.g. electronic devices)

The adjacent circuit diagram and the above table show that lightning current and surge arresters are divided into requirement categories, depending on their location in the electrical system.

German draft standard VDE 0675-6	International standard IEC 61643-1	European standard EN 61643-11	Designation
Class B	Class I	Type 1	Lightning arresters
Class C	Class II	Type 2	Surge arresters for distribution
Class D	Class III	Type 3	Surge arresters for terminal device

Siemens SPDs correspond to the following product standards:
- Germany (VDE 0675-6, 1996),
- International (IEC 61643-1, 1998),
- Italy (CEI EN 61643-11),
- Austria ÖVE/ÖNORM E 8001.

Coordinated use of lightning current and surge arresters



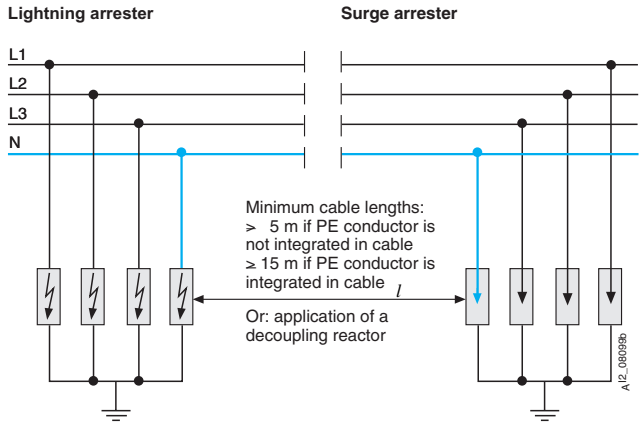
In practical use, surge arresters of different requirement categories are more or less connected in parallel. Due to their different response characteristics, discharge capacities and protective tasks, the different types of arrester must be installed in the system such that the ratings of the individual devices are not exceeded, thus ensuring system-wide protection. This requires energy considerations to ensure that a surge current always switches to the surge arrester connected next in series if there is a risk of the relevant surge arrester being overloaded by the surge current. This is called "energy coordination". It must be established between surge arresters of Class I (B) and II (C) and between surge arresters of Class II and III (D). In the latter case, the energy coordination is already present if there is a cable between the surge arrester of Class II and the surge arrester of Class III that is ≥ 5 m long. The coordination of SPDs of Class I and II is described in the following section.

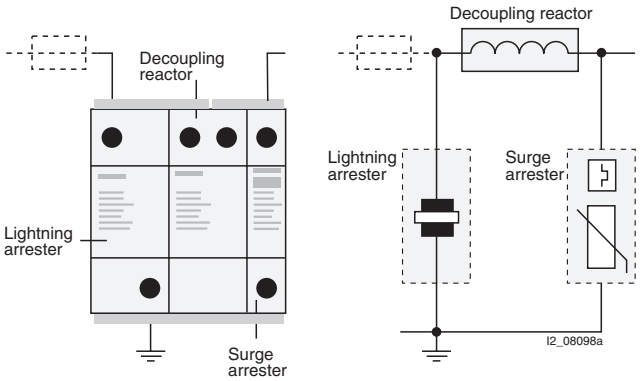
In the event of lightning strikes, the surge arresters of the requirement category II (C) will respond first due to the low protection level. These surge arresters have a protection level of < 1.5 kV. This voltage value is not sufficient to make the parallel-connected series gap of the lightning arrester Class I respond, as their response value is approx. 3.5 kV. In order not to overload the Class II surge arresters, an additional voltage drop of approx. 2 kV must be generated on the line between B and C surge arresters which, together with the protection level of the surge arrester, reaches the response value of the series gap of the lightning arrester.

The voltage drop is achieved in the power systems using the existing cable impedances or the concentrated inductances, the so-called decoupling reactors. The line inductance depends on the cable routing of the PE conductor. If it is routed in a shared cable with L1, L2, L3 and N, a cable length of at least ≥ 15 m is required in order to achieve sufficient inductance and the respective voltage drop. If the PE conductor runs separately from the other lines, at a distance of 1 m or more, a cable length of ≥ 5 m is sufficient. If these cable lengths are not possible, then additional decoupling reactors (5SD7 390-0/ -1) must be installed between the Class I and Class II arresters.

Configuring aids

Overview





Energy coordination of lightning and surge arresters

Line formation/ ground connection	Line distribution	Installation of decoupling reactor necessary if
L1 - L2 - L3 - N PE installed in separate line	L1 - L2 - L3 - N PE I2_10900	l < 5 m
L1 - L2 - L3 - N PE installed in same line	L1 - L2 - L3 - N - PE I2_10901	l < 15 m

The energy coordination of surge arresters of requirement category II and surge arresters of requirement category III is ensured by a cable length of at least 5 m.
The energy coordination of combination arresters and surge arresters of Class II is ensured without decoupling reactors.

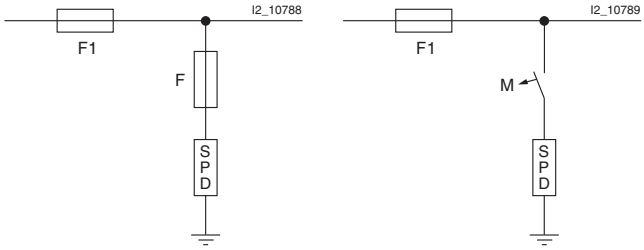
l is the cable length installed between the main switchgear cabinet and the auxiliary switchgear cabinet or between several auxiliary switchgear cabinets.
If the length exceeds ***l*** 30 m, we recommend that you use a second protection level, in which further surge arresters of requirement category II are installed in the input switchgear cabinet.

Follow current discharge capacity

The specification of the follow current discharge capability of lightning arresters identifies the level of the max. follow current that the surge arrester can still interrupt on its own without requiring the help of an upstream protective device, such as a fuse or a miniature circuit-breaker. The follow current is caused by a transient short-circuit generated by the lightning arrester when discharging the lightning current as required. The follow current is therefore a short-circuit current and has a frequency of 50 Hz.

If the max. possible short-circuit current of the system is smaller than the max. follow current that can be discharged by the SPD, no upstream protective device is required. Otherwise, a fuse or miniature circuit-breaker must be installed. The following sections provide data on the size of the protective device required.

The single-pole 5SD7 315-0 lightning arrester and the 5SD7 343-0, 5SD7 343-1 and 5SD7 344-0 combination arresters have a follow current discharge capability of 50 kA.



Overview

Coordination of SPDs with miniature circuit-breakers and fuses

The coordination between an SPD and overcurrent protective devices aims to:

- Protect the SPD against overload through overcurrent,
- Ensure plant availability,
- Help discharge line-follow currents, if necessary.

The coordination between SPDs and fuses/miniature circuit-breakers should ensure that the:

- max. permissible peak current $I_{p\,max}$ and
- max. permissible energy value I^2t_{max}

of the SPD is not exceeded. This prevents damage to the SPDs and thus, exposure of persons/materials to safety hazards.

Basically, there are 2 types of connection schemes:

- The protective device is in the connecting cable of the SPD. If the circuit-breaker or the fuse blows, this ensures that the power supply is maintained. We recommend the use of a signaling device to signal that the overvoltage protective function has disconnected from the system and is therefore no longer effective.
- The protection is carried out by the protective device (e.g. house connection fuse), which is located in the power distribution system as standard. In this case, the SPD is protected by the system fuse located in the network. When this fuse blows due to an SPD overload, the system is disconnected from the network. The fuse or miniature circuit-breaker to be used must be dimensioned to suit the conductor cross-sections in the installation.

Always take into account the max. permissible number of back-up fuses for the arrester.

Description	Requirement category	Product designation	Max. permissible energy value I^2t_{max}	Max. permissible peak current $i_{p\,max}$	Comments
Combination arrester	I and II	5SD7 343-0, 5SD7 344-0, 5SD7 343-1	600 kA^2s	18 kA	No protection necessary up to 50 kA short-circuit current
1-pole surge arrester for high potential	I	5SD7 315-0	600 kA^2s	18 kA	No protection necessary up to 50 kA short-circuit current
Enclosed surge arrester	I	5SD7 311-1, 5SD7 313-1	120 kA^2s	10 kA	
Unenclosed surge arrester	I	5SD7 311-0	280 kA^2s	13 kA	
Surge arresters	II	5SD7 300-2, 5SD7 301-2, 5SD7 302-2, 5SD7 303-2, 5SD7 323-2, 5SD7 325-2, 5SD7 327-2, 5SD7 324-2, 5SD7 326-2	100 kA^2s	10 kA	

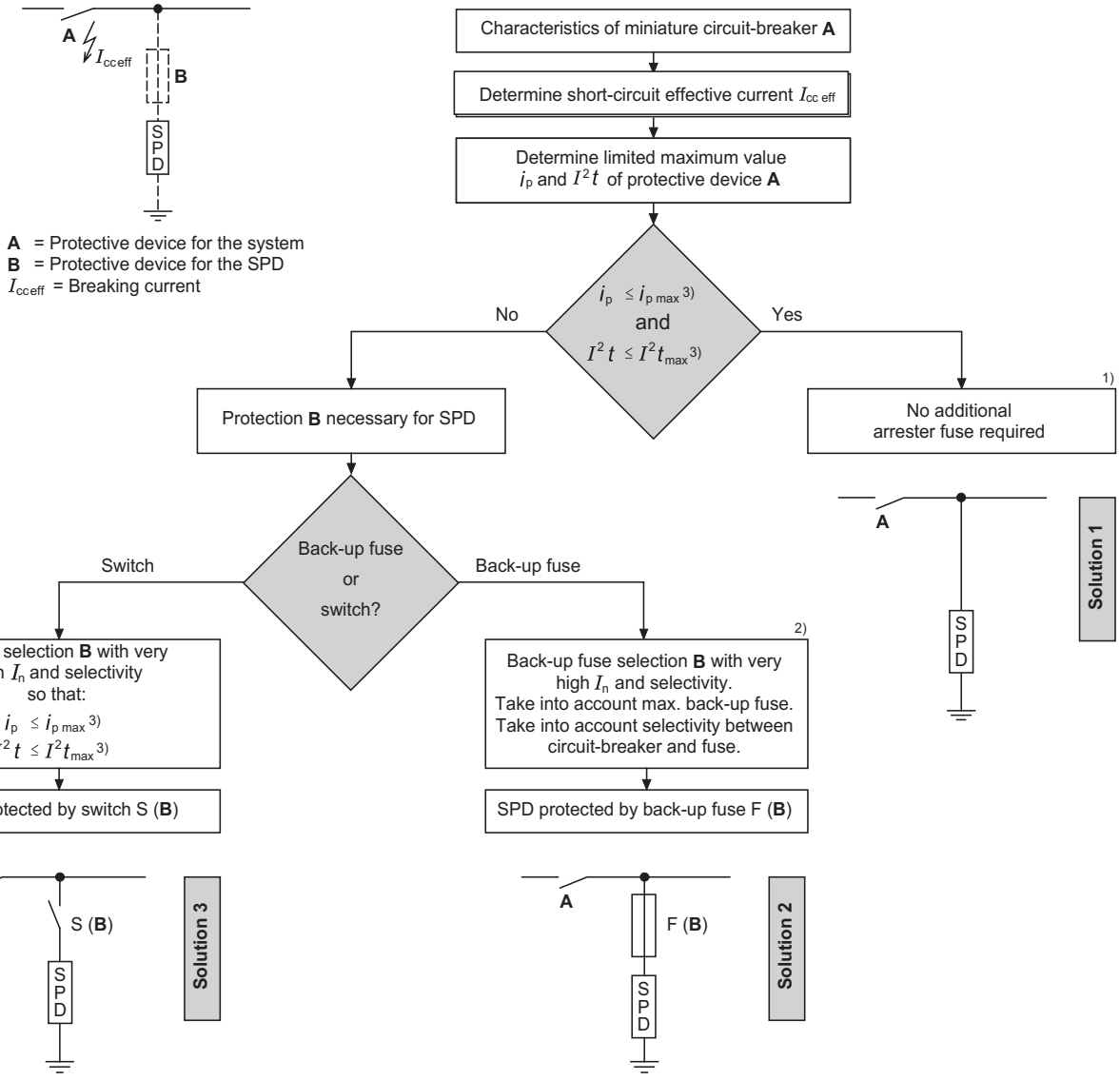
Configuring aids

Overview

Flow diagram for the coordination of SPD and overvoltage protection

The system distribution is implemented according to system standards with switches and fuses.
Where required, the lightning/surge arrester should ensure overvoltage protection through fuses or magneto-thermal switches.
The planner can use the plant protection located upstream of the SPD or provide a series connection for the surge arrester.

The following flow diagram describes the method of procedure when choosing between fuse and switch as overvoltage protection: when using a fuse (recommended), you can refer directly to the tables on pages 5/25 and 5/26, without using the flow diagram.



1) If the SPD needs to be replaced, an assigned cross-section element enables fast recovery of line operation once the SPD is replaced.
2) Recommended, because fuses have a lower voltage drop and ensure better protection.
3) For values, see table on page 5/23.

Overview

System protected by miniature circuit-breakers

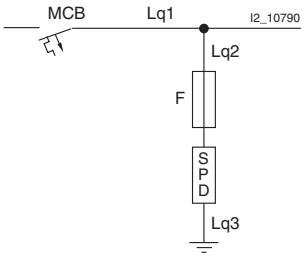
The following tables show the conditions under which it is necessary to protect the max. current, as well as the max. rated current of the fuse suitable for the SPD.

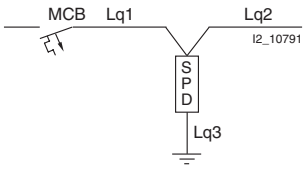
We recommend using fuses instead of magneto-thermal switches as they have a lower voltage drop and ensure better protection U_{prot}.

				Surge arresters	
				5SD7 315-0 [1]	5SD7 313-1, 5SD7 311-1
MCB upstream	Lq1	Lq2	Lq3	Fuse F	Fuse F [gL/gG]
[A]	[mm²]	[mm²]	[mm²]	[gL/gG]	[A]
16	2.5	2.5	16	/	/
25	6	6	16	/	/
32	10	10	16	/	/
50	16	16	16	/	up to 125
63	25	25	25	/	up to 160
80	35	35	35	/	up to 160
100	50	35	35	/	up to 160
125	50	35	35	/	up to 160
160	95	35	35	/	up to 160
200	120	35	35	/	up to 160
250	/	35	35	/	up to 160
> 250	/	35	35	/	up to 160

1) The 5SD7 315-0 surge arrester does not require a safety fuse up to 50 kA.

1-pole and multipole surge arresters				
5SD7 300-2, 5SD7 301-2, 5SD7 302-2, 5SD7 302-4, 5SD7 303-2, 5SD7 303-4, 5SD7 303-5, 5SD7 308-0, 5SD7 323-2, 5SD7 324-2, 5SD7 325-2, 5SD7 326-2, 5SD7 327-2, 5SD7 328-2				
MCB upstream	Lq1	Lq2	Lq3	Fuse F [gL/gG]
[A]	[mm²]	[mm²]	[mm²]	[A]
10	1.5	1.5	6	/
16	2.5	2.5	6	/
25	6	6	6	/
32	10	10	10	/
50	16	16	16	/
63	25	25	25	up to 125
80	35	25	25	up to 125
100	50	25	25	up to 125
125	50	25	25	up to 125
160	95	25	25	up to 125
200	120	25	25	up to 125
250	/	25	25	up to 125
> 250	/	25	25	up to 125





F Safety fuse
Lq1 Conductor cross-section of system
Lq2 Arrester cross-section to surge arrester
Lq3 Conductor cross-section with ground fault

Combination arrester 5SD7 343-0, 5SD7 343-1, 5SD7 344-0							
Feed-through connection			Arrester connection [2]				
MCB upstream	Lq1 = Lq2	Lq3	MCB upstream	Lq1	Lq2	Lq3	Fuse F
[gL/gG]	[mm²]	[mm²]	[gL/gG]	[mm²]	[mm²]	[mm²]	[gL/gG]
16	2.5	16	16	2.5	2.5	16	/
25	6	16	25	6	6	16	/
35	10	16*	32	10	10	16	/
50	16	16	50	16	16	16	/
63	25	25	63	25	25	25	/
80	35	35	80	35	25	35	/
100	50	50	100	50	25	35	/
125	50	50	125	50	25	35	/
–	–	–	160	95	25	35	/
–	–	–	200	120	25	35	/
–	–	–	250	/	25	35	/
–	–	–	> 250	/	25	35	/

2) Follow current discharge capacity 50 kA.

/ = No arrester protection necessary

Configuring aids

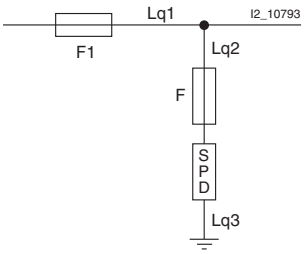
Overview

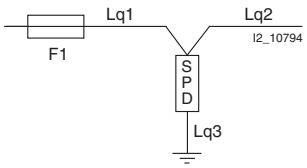
Fuse-protected system

Surge arresters					
				5SD7 315-0 [1]	5SD7 311-1, 5SD7 313-1
Fuse upstream	**Lq1**	**Lq2**	**Lq3**	**Fuse F**	**Fuse F**
[A]	[mm²]	[mm²]	[mm²]	[gL/gG]	[gL/gG] [A]
16	2.5	2.5	16	/	/
25	6	6	16	/	/
32	10	10	16	/	/
50	16	16	16	/	/
63	25	25	25	/	/
80	35	35	35	/	/
100	50	35	35	/	/
125	50	35	35	/	/
160	95	35	35	/	/
200	120	35	35	/	up to 160
250	/	35	35	/	up to 160
250	/	35	35	/	up to 160

1) The 5SD7 315-0 surge arrester does not require a safety fuse up to 50 kA.

1-pole and multipole surge arresters				
5SD7 300-2, 5SD7 301-2, 5SD7 302-2, 5SD7 302-4, 5SD7 303-2, 5SD7 303-4, 5SD7 303-5, 5SD7 308-0, 5SD7 323-2, 5SD7 324-2, 5SD7 325-2, 5SD7 326-2, 5SD7 327-2, 5SD7 328-2				
Fuse upstream	**Lq1**	**Lq2**	**Lq3**	**Fuse F**
[A]	[mm²]	[mm²]	[mm²]	[gL/gG] [A]
10	1.5	1.5	6	/
16	2.5	2.5	6	/
25	6	6	6	/
32	10	10	10	/
50	16	16	16	/
63	25	25	25	/
80	35	25	25	/
100	50	25	25	/
125	50	25	25	/
160	95	25	25	up to 125
200	120	25	25	up to 125
250	/	25	25	up to 125
> 250	/	25	25	up to 125





F Safety fuse
Lq1 Conductor cross-section of system
Lq2 Arrester cross-section to surge arrester
Lq3 Conductor cross-section with ground fault

Combination arrester							
5SD7 343-0, 5SD7 343-1, 5SD7 344-0							
Feed-through connection			Arrester connection [2]				
MCB upstream	**Lq1 = Lq2**	**Lq3**	**MCB upstream**	**Lq1**	**Lq2**	**Lq3**	**Fuse F**
[AgL]	[mm²]	[mm²]	[gL/gG]	[mm²]	[mm²]	[mm²]	[gL/gG]
16	2.5	16	16	2.5	2.5	16	/
25	6	16	25	6	6	16	/
35	10	16	32	10	10	16	/
50	16	16	50	16	16	16	/
63	25	25	63	25	25	25	/
80	35	35	80	35	25	35	/
100	50	50	100	50	25	35	/
125	50	50	125	50	25	35	/
–	–	–	160	95	25	35	/
–	–	–	200	120	25	35	/
–	–	–	250	/	25	35	/
–	–	–	> 250	/	25	50	/

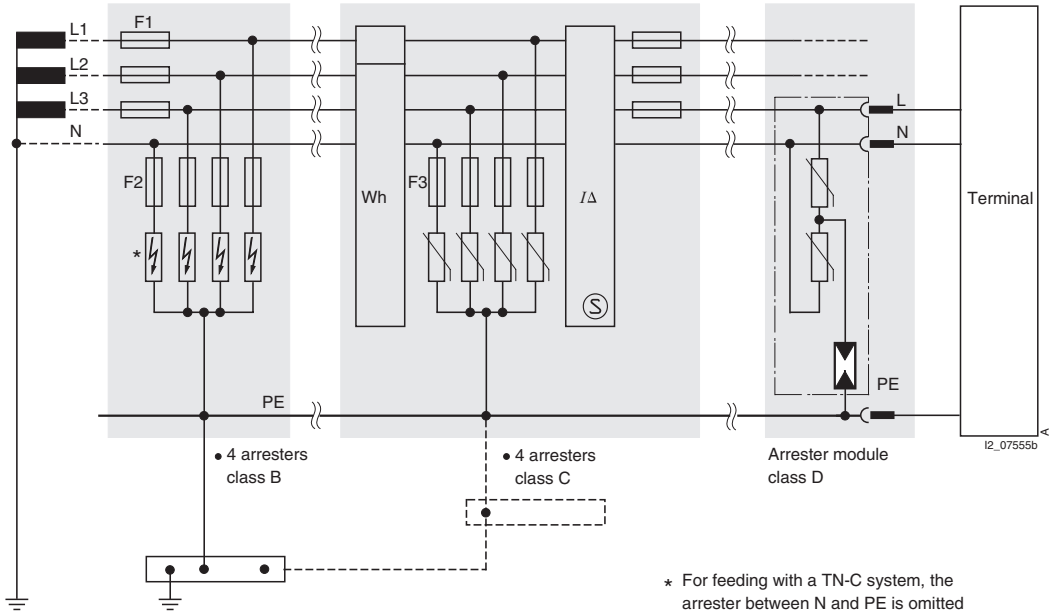
2) Follow current discharge capacity 50 kA.

/ = No arrester protection necessary

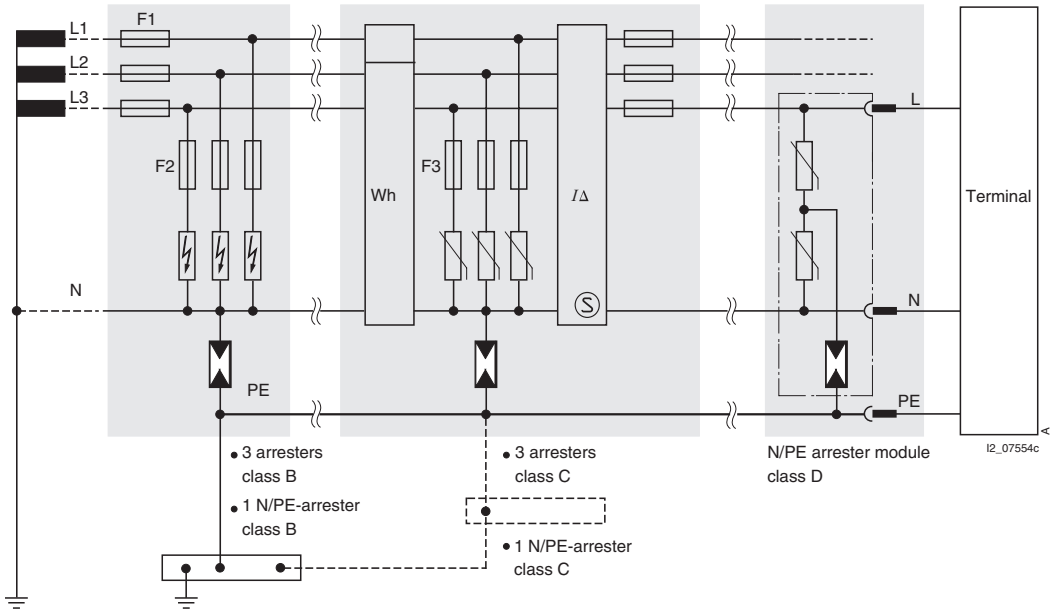
Circuit diagrams

Connection overview

TN-C system



TT system "wiring 3+1" [1)]



For protection rating F2 and F3, see pages 5/23 to 5/26.

An S-differential must be fitted if the lightning and surge arresters are to be installed upstream of the residual current operated circuit-breaker.

1) In the case of single-phase TT systems, the circuit diagram is called "Wiring1+1".

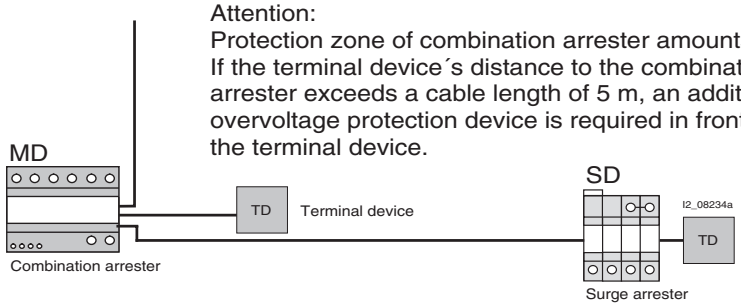
Configuring aids

Circuit diagrams

Combination arresters (installation instructions)

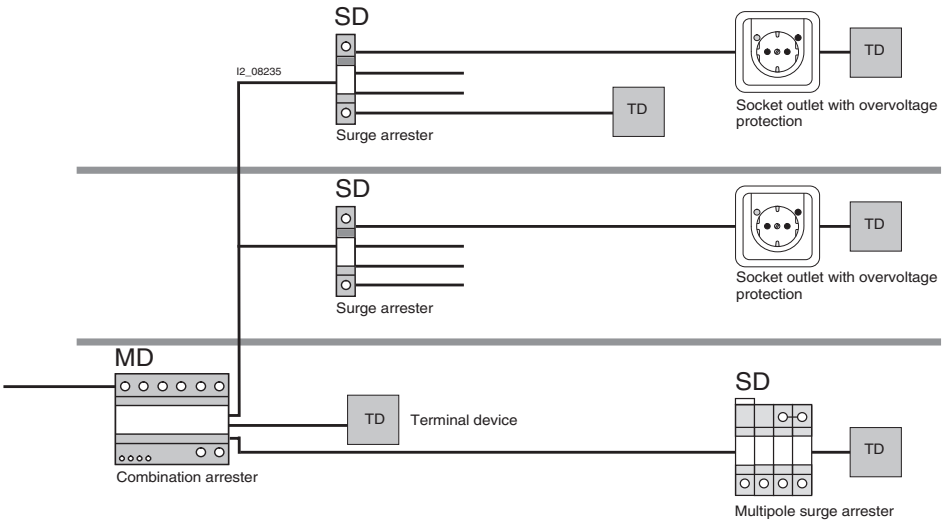
Combination arrester - protection zone

MD = Main distribution board
SD = Sub-distribution board



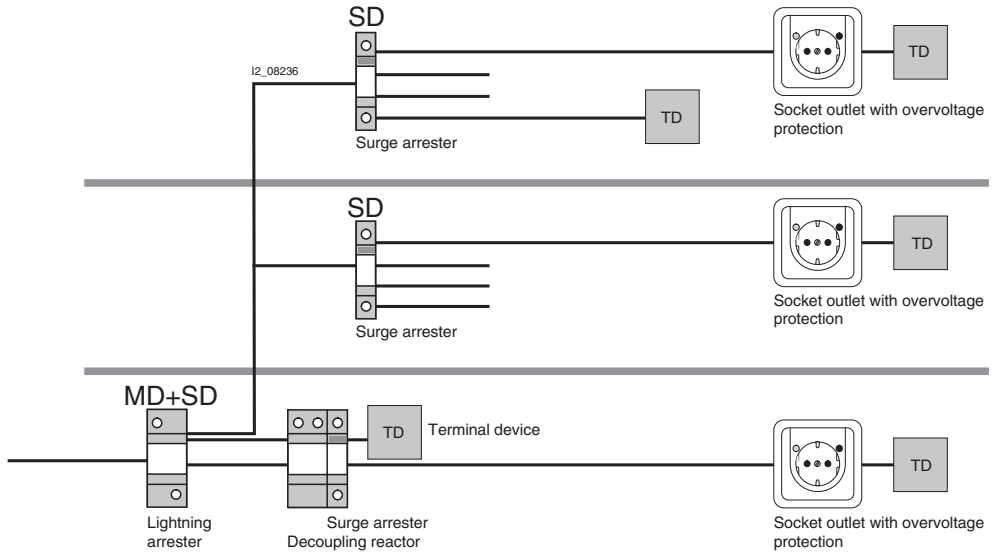
Combination arrester - use with combination main and sub-distribution boards

MD = Main distribution board
SD = Sub-distribution board



Conventional installation with decoupling reactor

MD = Main distribution board
SD = Sub-distribution board

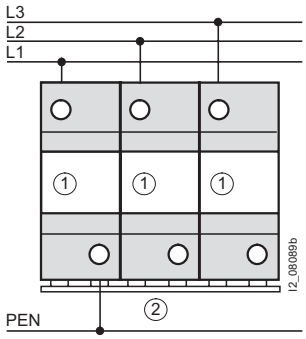


Circuit diagrams

Lightning arresters, requirement categories I (B)

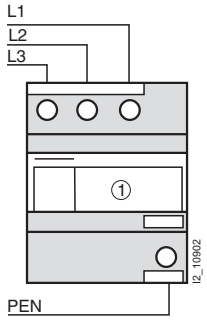
TN-C system

Version with 1-pole surge arresters



① 3 x 5SD7 311-1 surge arresters
② 5SD7 361-1 busbar (cut for 6-pole)

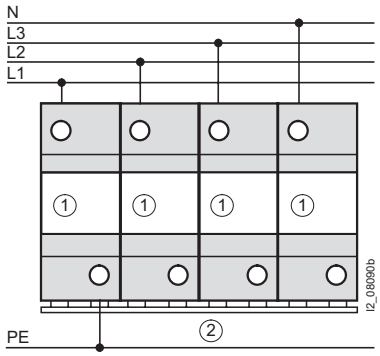
3-pole version



① 3x 5SD7 313-1 surge arresters

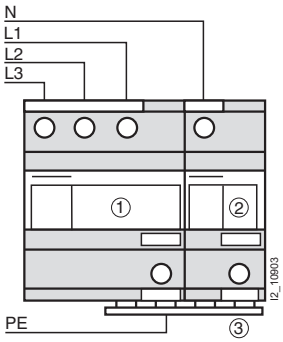
TN-S system

Version with 1-pole surge arresters



① 4x 5SD7 311-1 surge arresters
② 5SD7 361-1 busbar

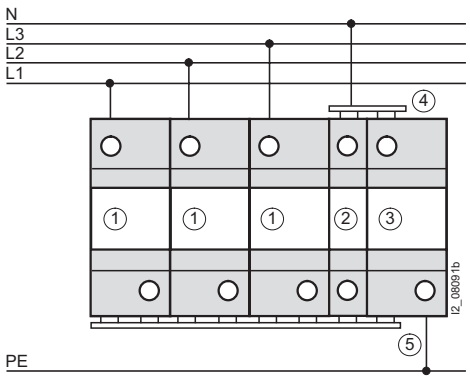
3-pole version



① 5SD7 313-1 surge arrester
② 5SD7 311-1 surge arrester
③ 5SD7 361-0 busbar

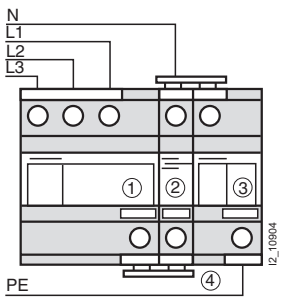
TT system

Version with 1-pole surge arresters



① 3x 5SD7 311-1 surge arresters
② 5SD7 360-0 through-type terminal
③ N-PE 5SD7 318-1 surge arrester
④ 5SD7 361-0 busbar (cut for 2-pole)
⑤ 5SD7 361-1 busbar

3-pole version



① 5SD7 313-1 surge arrester
② 5SD7 360-0 through-type terminal
③ N-PE 5SD7 318-1 surge arrester
④ 5SD7 361-0 busbar

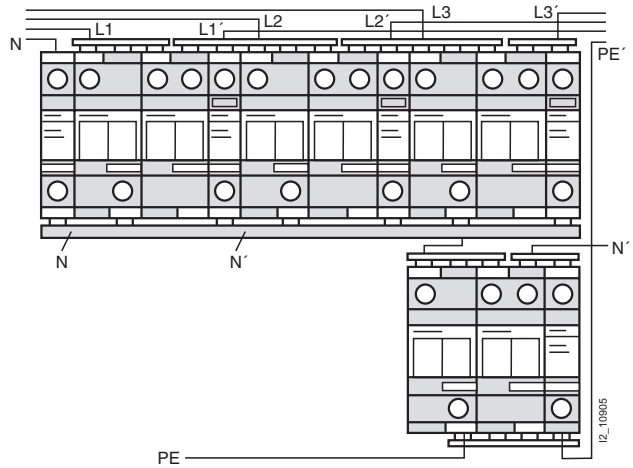
Configuring aids

Circuit diagrams

Lightning arresters, requirement categories I (B)

TT system

"Wiring 3+1" (with decoupling reactors)



3x 5SD7 311-1 surge arresters
1x 5SD7 318-1 surge arrester
4 decoupling reactors
3x 5SD7 300-2 surge arresters
1x 5SD7 308-0 surge arrester
1x 5SD7 360-0 through-type terminal
1x 5ST2 147 busbar
2x 5SD7 361-1 fanning strips
2x 5SD7 361-0 fanning strips

Caution!

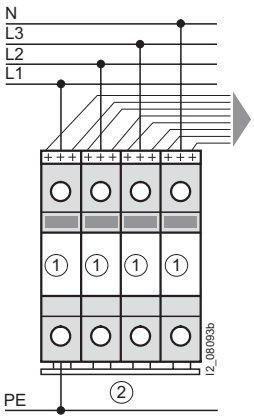
The configuration of the combination arrester is such that it ensures energy coordination with Class II limiters without the need for an decoupling reactor. See the solution on the next page.

Note: to simplify these circuit diagrams, the safety fuses and magneto-thermal protection of the surge arresters are not shown: for making operations and ratings, see the coordination tables on pages 5/25 and 5/26.

Surge arresters, requirement category II (C)

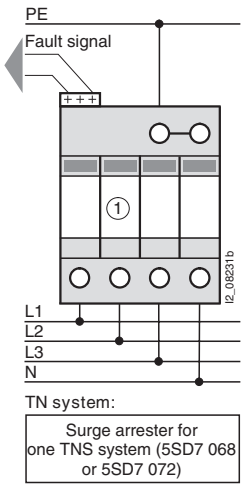
TN-S system

Version with 1-pole surge arrester



① 3 x 5SD7 303-2 surge arresters
② 5SD7 361-0 busbar
Austria:
① 3 x 5SD7 303-4 surge arresters
② 5SD7 361-0 busbar

Version with multipole surge arrester



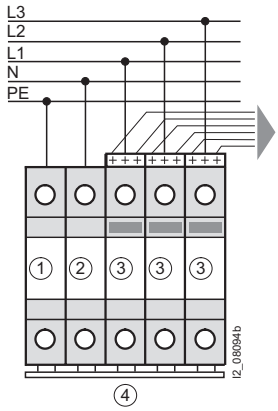
① 1x 5SD7 326-2 surge arrester
Austria:
① 1x 5SD7 326-4 surge arrester

Circuit diagrams

Surge arresters, requirement category II (C)

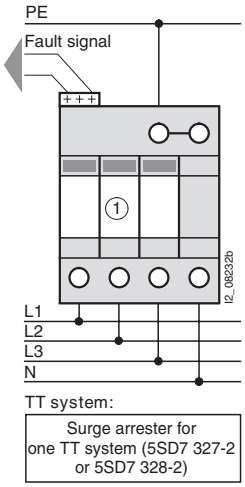
TT system

Version with 1-pole surge arrester



① 1x 5SD7 308-0 surge arrester
② 1x 5SD7 360-0 through-type terminal
③ 3 x 5SD7 302-2 surge arresters
④ 5SD7 361-1 busbar (cut for 5-pole)
Austria:
① 3 x 5SD7 308-0 surge arresters
② 1 5SD7 360-0 through-type terminal
③ 3 x 5SD7 303-4 surge arresters
④ 5SD7 361-0 busbar (cut for 5-pole)

Version with multipole surge arrester



① 1x 5SD7 328-2 surge arrester,
Austria:
① 1x 5SD7 328-4 surge arrester

1-pole and multipole surge arresters **5SD7 300-2, 5SD7 301-2, 5SD7 302-2, 5SD7 303-2, 5SD7 323-2, 5SD7 324-2, 5SD7 325-2, 5SD7 326-2, 5SD7 327-2, 5SD7 328-2**	
F1 Miniature circuit-breaker	F1 >125 A gL/gG ↓ F3 =125 A gL/gG
F3 On the line of the surge arrester	F1 >125 A gL/gG ↓ F3

Note:

To simplify these circuit diagrams, the safety fuses and magneto-thermal protection of the surge arresters is not shown: for rating the protective device, see the coordination tables on pages 5/25 and 5/26.

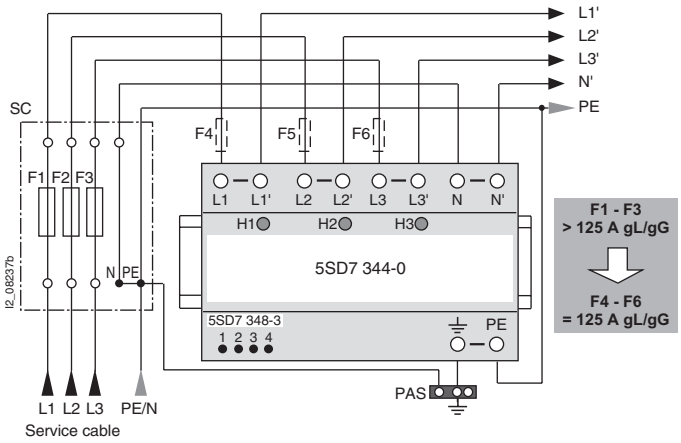
Configuring aids

Circuit diagrams

Combination arrester, requirement category I (B) and II (C)

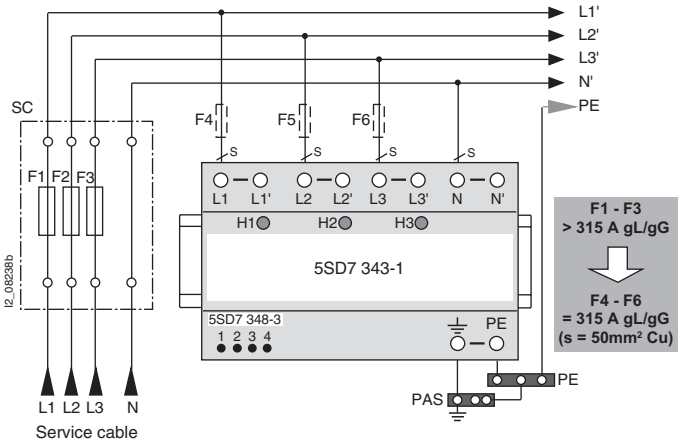
TN-S combination arrester

Sample application: V-wiring



TT combination arrester

Sample application: parallel wiring



Note: The 5SD7 343-0, 5SD7 344-0 and 5SD7 343-1 combination arresters can be linked using "V wiring" or through branching, see coordination tables on page 5/26.

More information

Glossary

Response time t_A

The response time indicates the general response behavior of the individual protective elements used with the surge arresters. The response time may fluctuate between certain limits due to the speed d*u*/d*t*, or the surge current d*i*/d*t* .

Versions for Austria

In Austria, the standard ÖVE/ÖNORM E 8001-1 with its respective supplements applies generally.
The key difference when using devices of requirement category C (II) is that they need to have a higher rated voltage (335 V AC, 440 V AC).

Area temperature δ

The area temperature specifies the area in which the devices can be used. In the case of devices without their own heating, the area temperature corresponds to the ambient temperature. Any increase in temperature of devices with their own heating must not exceed the specified maximum value.

Lightning impulse current I_{imp}

This is a standardized lightning impulse current, wave shaped 10/350 µs.
The lightning impulse current with its parameters (maximum value, charging and specific energy) serves to represent the loads through natural lightning current. (See CEI 81-8, CEI 81-1, E DIN VDE 0675-6/A1: 1996-03 and DIN VDE 0185-103).
The arresters designed to cope with the load of a lightning impulse current must be able to discharge lightning impulse currents several times without incurring any damage.

Damping the reverse current a_R

During use with high frequencies, the damping of the reverse current indicates how many parts of the "forward current" are reflected by the protective device ("interaction point").
The damping has a direct value, which can be used to adapt the protective device to the impedance system.

Follow current discharge capability I_f

This is the uninfluenced r.m.s. value (expected value) of the follow current, which can be interrupted independently of the surge suppressor by applying U_C .
This capability is proven in accordance with E DIN 0675-6/A1: 1996-03.

Cutoff frequency f_G

The cutoff frequency describes the behavior of a surge arrester. Cutoff frequency means the frequency that, under prescribed test conditions, causes a typical damping (a_E) of 3 dB (see DIN VDE 0845-2: 1993-10).
Unless specified otherwise, the cutoff frequency refers to a 50 Ohm system.

Holding short-circuit current

This is the uninfluenced short-circuit current with industrial frequency (50 Hz), which is supported by the surge suppressor and the upstream overvoltage back-up fuse.

Combined peak current U_{OC}

The combined peak current is generated by a hybrid generator (1.2/50 µs, 8/20 µs) with an ideal internal impedance of 2 Ω.
The open-circuit voltage of this generator is called U_{OC}. L'U_{OC}, as specified for Class D surge arresters.

Max. direct voltage (rated voltage) U_c

is the r.m.s. value of the max. voltage that can be used at the connection terminals of the surge suppressor. This is the max. voltage in a non-conducting area of a surge arrester. It ensures insulation recovery after a tripping operation.
The value U_c depends on the rated voltage U_O of the system to be protected and the regulations in accordance with CEI 81-8: 2002-03 and IEC 60634-5-534 (E DIN VDE 0100-534/A1: 1996-10).

Max. peak current I_{max}

This is the highest value of a peak current, wave shaped 8/20 µs, at which no damage should be incurred to the surge arrester. ($I_{sn\ max}$ according to draft standard E DIN VDE 0675-6).

Rated voltage U_n

refers to the rated voltage of the system to be protected. In the case of AC voltage, it is specified as the r.m.s. value.

Rated peak current I_n

This is the highest value of a surge current 8/20 µs to which the surge arrester can be exposed during a test program.
The surge arrester for **networks** should discharge the rated peak current and at the same time use the max. rated voltage U_c **20 times** without negatively influencing any of the other features.
(I_{sn} according to standard VDE 0375-6).

Rated peak current for discharging a lightning arrester

The respective value of the current carrying capacity of the rated peak current of multipole surge suppressors and single-pole combined protective devices.

N-PE surge arrester

Protective devices which are intended to be installed between N and PE conductors.

Degree of protection

The degree of protection, IP complies with the protective rating according to IEC 60529, EN 60529.

Protection level U_p

The protection level of a surge suppressor is the momentary maximum value of the terminal voltage of a surge arrester determined by standardized tests:
- Striking surge 1.2/50 µs (100%)
- Starting voltage with a speed of 1 kV/µs
- Residual voltage with rated discharge current

The protection level identifies the surge suppressor in which the residual overvoltages are limited.
In addition, the protection level helps determine the installation site of surge arresters, depending on applications for the power system with regard to the overvoltage category according to IEC 60439-1, EN 60439-1 and IEC 60664-1, DIN VDE 0110-1: 1997-04.

Protective circuits

The protective circuits are a protective device arranged in step form. The individual protection levels can be made up of discharge elements, varistors and semiconductor elements.
The energy coordination of the individual protection levels is implemented using decoupling elements.

Current on the protective conductor I_{PE}

This is the current flowing through the PE conductor when the protective device is connected to the max. direct voltage U_{OC} according to the mounting instructions and without downstream loads.

Technical specifications for surge arresters

The technical specifications for the surge arresters contain data that define their use according to:
- Application
  (e.g. mounting, system environment, temperature)
- Behavior during activities:
  (for example: discharge capacity of peak current, follow current discharge capacity of system, degree of protection, response time)
- Operational performance
  (e.g. rated current, damping, insulation resistance)
- Behavior in the event of a fault
  (e.g. series fuse, cross-section facility, failsafe).

The holding short-circuit current is tested up to 50 kA at 50 Hz.
To achieve higher values, such as the holding short-circuit current, the max. series fuse must be reduced according to the criterion for fuse selectivity, i.e. by the factor 1.6: In this case, the holding short-circuit current is that of the breaking capacity of the series fuse.

Configuring aids

More information

Thermal disconnecting device

All surge suppressors equipped with a varistor for use in power systems are equipped with a disconnecting device, which disconnects the protective device from the overvoltages in the event of a system overload.
This disconnection is subsequently signaled.
This device reacts to the heat influence of the current in the P-type varistor and switches off at a temperature specified by the surge suppressor.
The task of the disconnecting device is to disconnect the overloaded surge suppressor in time to prevent the risk of fire.
The device cannot ensure protection against indirect contact.
The function of the thermal disconnecting device is tested by simulating an overload/aging of the surge arrester.

Typical damping a_E

The typical damping of a surge suppressor shows the correlation of voltage values at the installation site before and after the surge suppressor has been switched on.
Unless specified otherwise, the typical damping refers to a 50 Ohm system.

Overvoltage protection on the line side/series fuse of the surge arrester

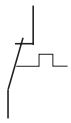
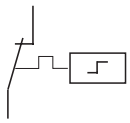
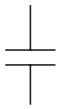
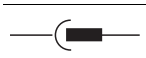
This is the surge suppressor (e.g. magneto-thermal fuse/switch). It is mounted on the supply side outside the surge arrester in order to interrupt the short-circuit current with line frequency (50 Hz) if the arc quenching capability of the surge suppressor is exceeded.

Surge suppressors

The surge suppressors largely comprise a linear resistance (varistors, diodes) and/or measuring spark gaps (discharge elements). The surge suppressors serve to protect other components and systems against non-permissible transient overvoltages and/or to achieve equipotentiality. The surge suppressors are divided into three groups according to the discharge capacity of the peak current:

- **Lightning arresters** for the protection of devices and loads against direct or close-up electrical discharges (use in lightning protection zones (LPZ) 0_A and 1).
  They must be able to withstand lightning partial currents due to their size according to CEI 81-8: 2002-03.
- **Surge arresters** for remote discharges, overvoltages of circuits and electrostatic discharges (application: follow-up transitions between impulse current protection (LPZ) and lightning protection zones (LPZ 0_B)). According to CEI 81-8, they must withstand a discharge current of ≥ 10 kA waveform 8/20 µs.
- **Combination arresters** for protection of installations, loads and data terminal equipment against direct or close-up electrical discharges (use in lightning protection zones (LPZ) 0_A and 1 e 0_A and 2).

Legend

Symbol	Description	Reference to national regulations
	Lightning current and surge arresters, general	
	Lightning current and surge arresters from atmospheric influences	
	Varistor	IEC 60617 Part 4 04-01-04
	Measuring spark gap	IEC 60617 Part 7 07-22-01
	Back-up fuse	IEC 60617 Part 7 07-21-01
	Thermal disconnecting device	IEC 60617 Part 7 07-09-03
	Thermodynamic disconnecting device	IEC 60617 Parts 7 + 11 07-09-03 111-07-02
	Capacitor	IEC 60617 Part 4 04-02-01
	Inductance	
	Socket connector	IEC 60617 Part 3 03-03-05
	NC	IEC 60617 Part 3 07-02-03
	CO	IEC 60617 Part 7 07-02-04
	NO	IEC 60617 Part 8 07-02-01

More information

Reference to national regulations

DIN standards

DIN V VDE V 0100-534
Electrical systems in buildings – Part 534: Selection and installation of equipment - overvoltage protective devices

DIN VDE 0185-103 (withdrawn)
Protection against lightning electromagnetic impulse - Part 1: General principles

E DIN VDE 0675-6 (withdrawn)
Surge arresters for use in AC systems with rated voltages between 100 V and 1000 V

DIN EN 60099-1 (VDE 0675 Part 1)
Surge arresters - Part 1: Non-linear resistor-type gapped surge arresters for AC systems

DIN EN 60439-1 (VDE 0660 Part 500)
Low-voltage switchgear and controlgear assemblies - Part 1: Type-tested and partially type-tested combinations

DIN EN 60664-1 (VDE 0110 Part 1)
Insulation coordination for electrical equipment in low-voltage systems – Part 1: Principles, requirements and tests

DIN EN 61643-11 (VDE 0675 Part 6-11)
Surge suppressors for low-voltage – Part 11: surge suppressors for use in l.v. systems – Requirements and tests

DIN EN 61643-21 (VDE 0845 Part 3-1)
Surge suppressors for low-voltage – Part 11: Surge suppressors for use in telecommunications and signaling networks – Performance requirements and testing methods

IEC standards

IEC 60099-1:1999-12
Surge arresters – Part 1: Non-linear resistor type gapped surge arresters for a.c. systems

IEC 60439-1:1999-09
Low-voltage switchgear and controlgear assemblies; Part 1: Type-tested and partially type-tested assemblies

IEC 60664-1:1992-10
Insulation coordination for equipment within low-voltage systems; Part 1: Principles, requirements and tests

IEC 61024-1:1990-04
Protection of structures against lightning; Part 1: General principles

IEC 61024-1-1:1993-09
Protection of structures against lightning; Part 1: General principles; Section 1: Guide A – Selection of protection levels for lightning protection systems

IEC 61024-1-2:1998-05
Protection of structures against lightning; Part 1-2: General principles – Guide B – Design, installation, maintenance and inspection of lightning protection systems

IEC 61312-1:1995-03
Protection against lightning electromagnetic impulse – Part 1: General principles

IEC 61643-1:1998-02
Surge protective devices connected to low-voltage power distribution systems – Part 1: Performance requirements and testing methods

IEC 61643-21:2000-09
Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signaling networks – Performance requirements and testing methods

Configuring aids

More information

Type	Description
Lightning arresters as a result of atmospheric influences Requirement category I (B)	
5SD7 311-0	Lightning arrester, 1-pole, unenclosed, 10/350 µs, I_{imp} = 75 kA
5SD7 311-1	Lightning arrester, 1-pole, enclosed, 10/350 µs, I_{imp} = 50 kA
5SD7 313-1	Lightning arrester, 3-pole, enclosed, 10/350 µs, I_{imp} = 100 kA
5SD7 315-0	Lightning arrester, 1-pole, unenclosed, 10/350 µs, I_{imp} = 50 kA
5SD7 318-0	Lightning arrester, 1-pole, N-PE, unenclosed, 10/350 µs, I_{imp} = 100 kA
5SD7 318-1	Lightning arrester, 1-pole, N-PE, enclosed, 10/350 µs, I_{imp} = 100 kA
Combination arresters – requirement category I (B) and II (C)	
5SD7 341-1	Combination arrester for 2P TT networks, 10/350 µs, I_{imp} = 25/50 kA, 1-pole/multipole
5SD7 343-0	Combination arrester for TN-C networks, 10/350 µs, I_{imp} = 25/75 kA, 1-pole/multipole
5SD7 343-1	Combination arrester for TT networks, 10/350 µs, I_{imp} = 25/100 kA, 1-pole/multipole
5SD7 344-0	Combination arrester for TN-S networks, 10/350 µs, I_{imp} = 25/100 kA, 1-pole/multipole
5SD7 348-1	Remote signaling module for 5SD7 341-1 combination arrester
5SD7 348-3	Remote signaling module for 5SD7 343-0, 5SD7 343-1, 5SD7 344-0 combination arresters
Surge arresters requirement category II (C), single-pole	
5SD7 300-2	Surge arrester, 8/20 µs, I_{sn} = 20 kA, $I_{sn\ max}$ = 40 kA, U_c = 275 V
5SD7 300-5	Surge arrester, 8/20 µs, I_{sn} = 15 kA, $I_{sn\ max}$ = 40 kA, U_c = 385 V
5SD7 301-2	Surge arrester, 8/20 µs, I_{sn} = 20 kA, $I_{sn\ max}$ = 40 kA, with remote indication, U_c = 275 V
5SD7 302-2	Surge arrester, 8/20 µs, I_{sn} = 20 kA, $I_{sn\ max}$ = 40 kA, plug-in, U_c = 275 V
5SD7 302-4	Surge arrester, 8/20 µs, I_{sn} = 15 kA, $I_{sn\ max}$ = 40 kA, plug-in, U_c = 335 V
5SD7 303-2	Surge arrester, 8/20 µs, I_{sn} = 20 kA, $I_{sn\ max}$ = 40 kA, plug-in, with remote indication, U_c = 275 V
5SD7 303-4	Surge arrester, 8/20 µs, I_{sn} = 15 kA, $I_{sn\ max}$ = 40 kA, plug-in, with remote indication, U_c = 335 V
5SD7 303-5	Surge arrester, 8/20 µs, I_{sn} = 15 kA, $I_{sn\ max}$ = 40 kA, plug-in, with remote indication, U_c = 385 V
5SD7 308-0	Surge arrester, 10/350 µs, I_{imp} = 12 kA, 8/20 µs, I_{sn} = 20 kA, $I_{sn\ max}$ = 40 kA, plug-in between N-PE, U_c = 275 V
Surge arrester requirement category II (C), multipole	
5SD7 323-2	Surge arrester for TN-C systems 3-pole, U_c = 275 V
5SD7 323-4	Surge arrester for TN-C systems 3-pole, U_c = 335 V
5SD7 323-5	Surge arrester for TN-C systems 3-pole, U_c = 385 V
5SD7 324-2	Surge arrester for TN-C systems 3-pole, with remote indication, U_c = 275 V
5SD7 324-4	Surge arrester for TN-C systems 3-pole, with remote indication, U_c = 335 V
5SD7 324-5	Surge arrester for TN-C systems 3-pole, with remote indication, U_c = 385 V
5SD7 325-2	Surge arrester for TN-S systems 3-pole, U_c = 275 V
5SD7 325-4	Surge arrester for TN-S systems 3-pole, U_c = 335 V
5SD7 325-5	Surge arrester for TN-S systems 3-pole, U_c = 385 V
5SD7 326-2	Surge arrester for TN-S systems 3-pole, with remote indication, U_c = 275 V
5SD7 326-4	Surge arrester for TN-S systems 3-pole, with remote indication, U_c = 335 V
5SD7 326-5	Surge arrester for TN-S systems 3-pole, with remote indication, U_c = 385 V
5SD7 327-2	Surge arrester for TT systems 3-pole, U_c = 275 V
5SD7 327-4	Surge arrester for TT systems 3-pole, U_c = 335 V
5SD7 327-5	Surge arrester for TT systems 3-pole, U_c = 385 V
5SD7 328-2	Surge arrester for TT systems 3-pole, with remote indication, U_c = 275 V
5SD7 328-4	Surge arrester for TT systems 3-pole, with remote indication, U_c = 335 V
5SD7 328-5	Surge arrester for TT systems 3-pole, with remote indication, U_c = 385 V
Surge arrester – requirement category III (D)	
5SD7 335-0	Surge arrester, socket outlet adapter, 8/20 µs, I_{sn} = 2.5 kA
5SD7 335-1	Surge arrester, socket outlet adapter with line filter, 8/20 µs, I_{sn} = 2.5 kA
5SD7 332-0	Surge arrester, 2-pole, 8/20 µs, I_{sn} = 3.0 kA
5SD7 334-0	Surge arrester, 4-pole, 8/20 µs, I_{sn} = 3.0 kA
Accessories	
5SD7 360-0	Through-type terminal, 1-pole
5SD7 361-0	Busbar for surge arrester Class II, 4-pole, 1-phase
5SD7 361-1	Busbar for surge arrester Class I, 8-pole, 1-phase
5SD7 390-0	Decoupling reactor, I_n = 35 A
5SD7 391-0	Decoupling reactor, I_n = 63 A
5SD7 392-2	Male connector for surge arrester, plug-in, Class II, U_c = 275 V
5SD7 392-4	Male connector for surge arrester, plug-in, Class II, U_c = 335 V
5SD7 392-5	Male connector for surge arrester, plug-in, Class II, U_c = 385 V
5SD7 398-0	Male connector for surge arrester, plug-in, Class II, TT system