



Lightning and surge protection for electromobility

White Paper



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Danger during thunderstorms

Several billion flashes of lightning come down in the world every year. In Germany alone, an average of 1.5 million lightning events are counted each year and the tendency is rising. If lightning strikes nearby, buildings and the infrastructure often suffer damage: lightning strikes can cause fires and/or surge damage to electrical devices and systems. The latter may occur even if the actual strike was up to 2 km away. In addition, switching electrical power, e.g. on the charging post, and switching operations in transformer stations generate switching overvoltages which can also have negative effects. It frequently only takes a small amount of energy to cause significant damage.

Damage caused during charging

Constant availability of electrical power is a decisive factor for the charging process. The fact that charging stations are primarily erected outside means that they are especially susceptible to the effects of lightning discharge and the resulting surges which might exceed the dielectric strength of the electrical components within the charging post many times over. Furthermore, voltage peaks in the power grid from, e.g. switching operations or earth faults and short-circuits, should be regarded as a possible threat. The consequences are defective electronic components and a charging post which is out of order. Should the surge occur during the charging process

itself, it can even damage the actual vehicle (e.g. the charge controller or battery). It is therefore advisable to consider a reliable lightning and surge protection concept in order to avoid such financially damaging consequences and minimise repairs and maintenance.

What happens if lightning strikes when charging?

In case of a direct lightning strike, e.g. in a street lamp, a partial lightning current can flow to the charging post. This can be conducted directly into the vehicle via the attached charging cable where it may destroy the charging electronics or even the battery.

If a surge protective device has been installed, the lightning current and the overvoltage is discharged directly via the protective device and the charging equipment and vehicle remain intact (**Figure 1**).

What do the standards have to say?

Publication VdS 3471, issued by the VdS (German insurer for damage prevention), on 'Charging stations for electrical vehicles' states on the topic of surge protection that according to DIN VDE 0100-443 the evaluation of whether additional surge protective measures are necessary depends on the overvoltage category stated by the manufacturer.

Standards in the series DIN VDE 0100 are installation standards and therefore apply to fixed installations. Charging posts

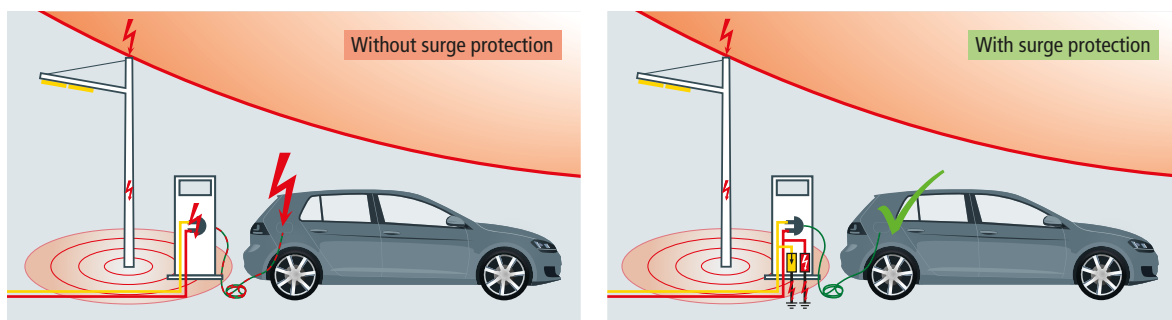


Figure 1 Lightning and surge coupling when charging

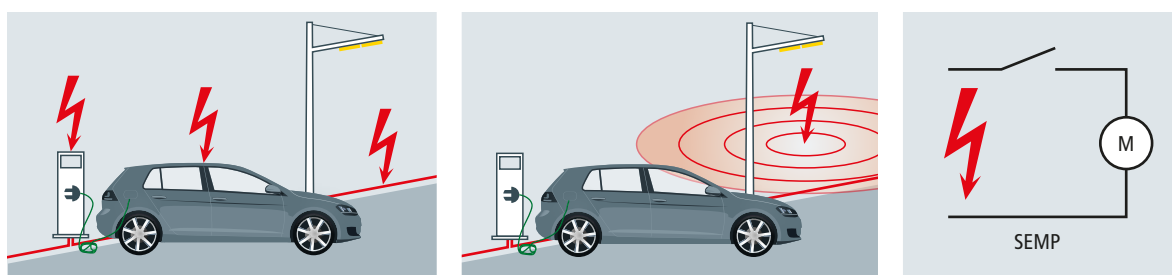


Figure 2 Causes of overvoltage

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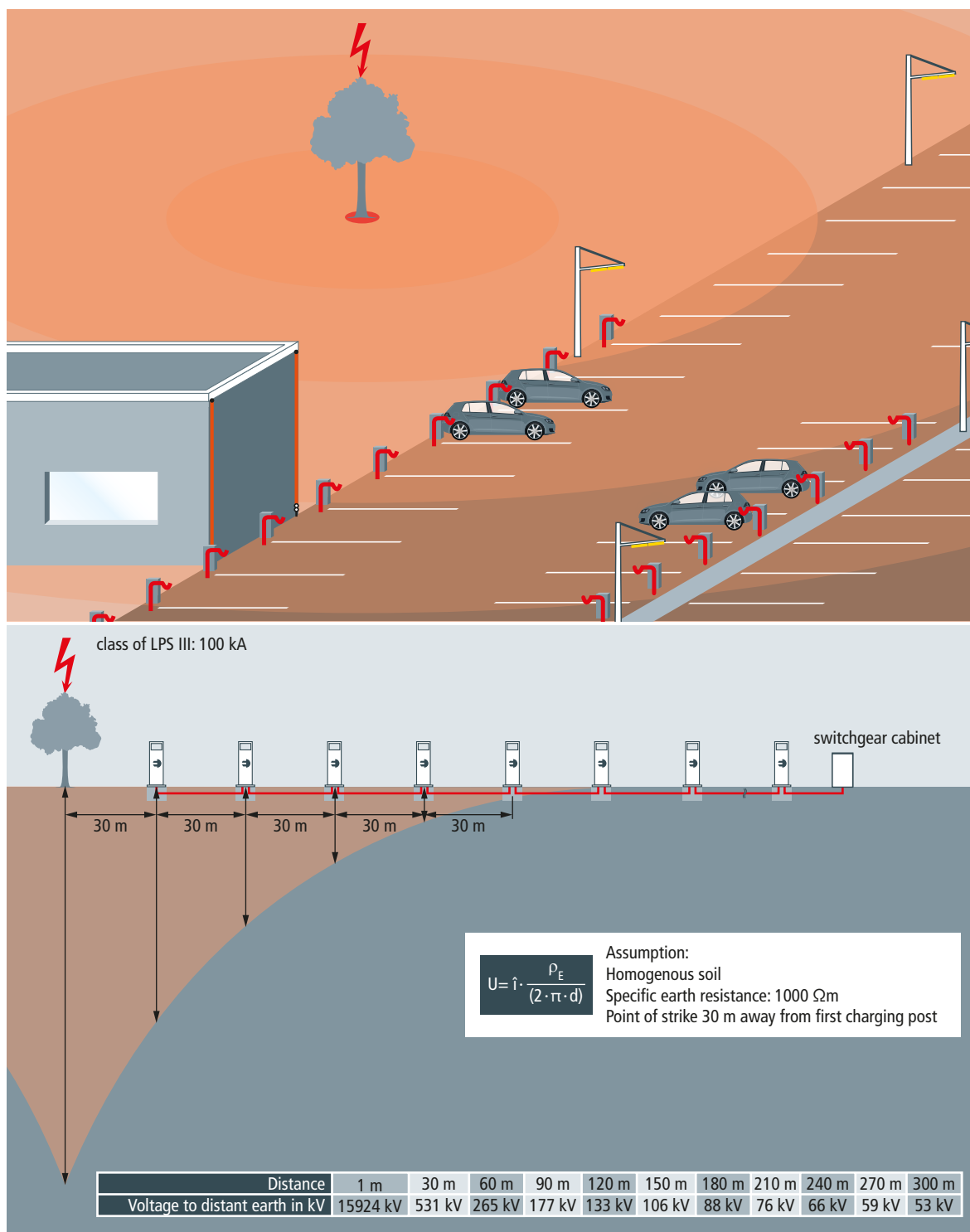


Figure 3 Potential gradient area for a lightning strike in the immediate vicinity of a charging station

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which are not portable and are connected via fixed wiring fall under the scope of DIN VDE 0100.

DIN VDE 0100-443:2016-10 deals with the protection of electrical installations against transient overvoltages of atmospheric origin which are transmitted through the power grid, including direct lightning strikes in power lines and transient overvoltages due to switching operations. It explains whether surge protective measures are necessary, assesses the risk of the location, defines overvoltage categories and the correspondingly required rated impulse withstand voltage level for the equipment and defines whether additional surge protective devices are necessary. Furthermore, it expands on the required availability of the system. If the risk of direct lightning strikes needs to be considered, lightning protection standard DIN EN 62305 (VDE 0185-305) should also be applied.

The technical guidance document "Charging infrastructure/electromobility" by the DKE/AK EMOBILITY.60 (a working group of the German commission for electrotechnology) also refers to the fact that, in the interest of preventing damage and injury, these standards should be assessed and considered. Should lightning and surge protective measures be applied in compliance with DIN VDE 0100-443 and EN 62305, these should be installed according to DIN VDE 0100-534. Please note that a revised version of the standard IEC 60364-7-722 will be published in 2019. This will stipulate the requirement for surge protection in publicly accessible charging facilities.

Causes of transient overvoltage

A direct strike to the charging post or the supply line produces lightning current which is simulated under test conditions with the impulse shape 10/350 μ s. Distant lightning strikes or

so-called indirect lightning strikes lead to conducted partial lightning currents (impulse shape 10/350 μ s) in the supply lines or also to inductive/capacitive coupling (impulse shape 8/20 μ s) in the charging stations themselves. In addition, overvoltage can be caused by switching operations, earth faults and short circuits or when fuses trip (SEMP – switching electromagnetic pulse) (Figure 2 and 3). Surge protection should be selected according to DIN VDE 0100-534 depending on the location of the charging post or wall box (Figure 4). If the charging post or its wiring are in zone 0_A, both galvanic coupling and coupling of partial lightning currents must be expected in case of a nearby or distant lightning strike. Type 1 + 2 + 3 combined arresters, e.g. DEHNshield, should be installed in the charging posts to control these interference impulses. If the charging posts or wall boxes and their wiring are in zone 0_B, i.e. in an area protected against strikes, one only needs to reckon with inductive and capacitive coupling from lightning discharge. In this case, type 2 surge arresters like, for example, DEHNguard suffice. If it is not possible to reliably assess the potential threat, installing the compact and space-saving type 1 + 2 + 3 combined arrester DEHNshield is generally the best option. DEHNshield is based on spark-gap technology, has VDE and UL certification, is maintenance free, offers protection against both the direct and indirect effects of lightning and is, therefore, a flexible and universal solution. As this arrester is purely based on spark gap technology, the wave breaker function is assured. This has the effect of reducing the energy of the lightning impulse current to such an extent that even the most sensitive electronics installed downstream remain intact. This constitutes real protection of terminal devices!

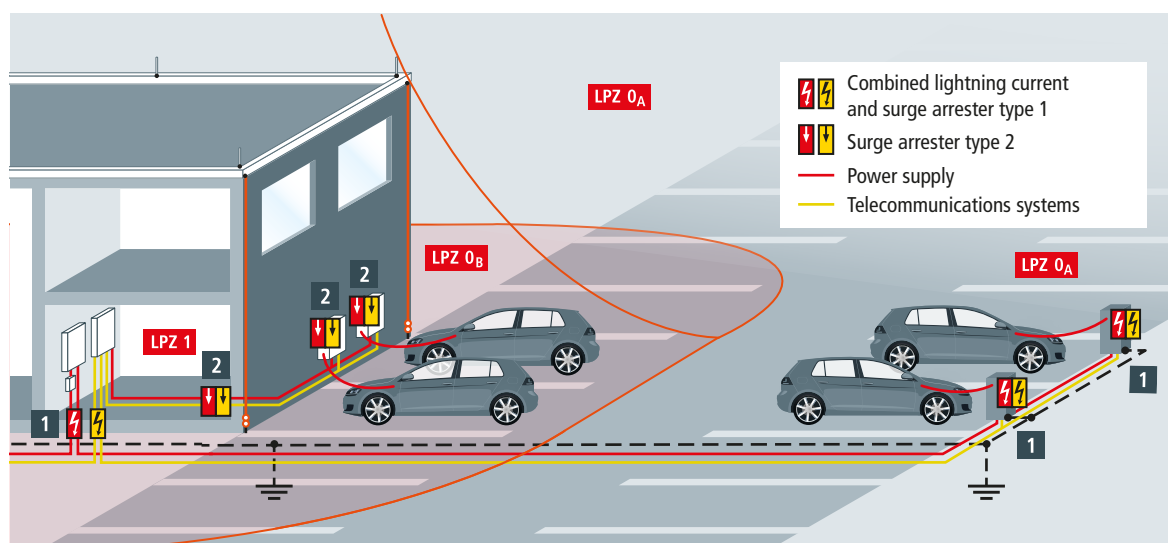


Figure 4 Application of lightning and surge protective devices depending on location

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No.		Type	Part No.	Other	
Protection against the direct and indirect effects of lightning					
1	Combined arrester type 1 + 2 + 3 230/400V (50/60 Hz)	DEHNshield	DSH TT 255 FM	941 315	TT and TN system, DIN rail mounting
		DEHNshield ZP	DSH ZP TT 255	900 397	TT and TN system, 40 mm busbar mounting
	DC applications	DEHNguard ME DC	DG ME DC Y 950 FM	972 146	max. continuous operating voltage DC 950 V
	Data and communication lines*	BLITZDUCTOR XT	BXT ML4 BD HF 5 + BXT BAS	920 371 + 920 300	Module and base part, e.g. for RS485
Protection against the indirect effects of lightning					
2	Combined arrester type 2 + 3	DEHNguard modular	DG M TT 275 FM	952 315	TT and TN system, DIN rail mounting
	DC applications	DEHNguard SE DC	DG SE DC 900 FM	972 145	e.g. highest continuous operating voltage DC 900 V
	Data and communication lines*	BLITZDUCTOR SP	BSP M4 BD HF 5 + BXT BAS	926 371 + 920 300	Module and base part, e.g. for RS485
		DEHNpatch	DPA M CLE RJ45B 48	929 121	e.g. Power over Ethernet
* Selection depending on the interface					

* Selection depending on the interface

Table 1 Selection aid for protecting electromobility – charging infrastructure (Figure 4)

Selection of surge protective devices

When selecting suitable lightning and surge protective devices, it is not only important to know about the installation location

but also about the local system configuration, system voltage and nominal voltage of the charging facility. A possible selection is shown in **table 1**.

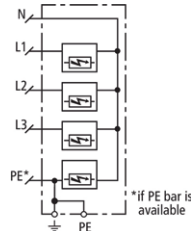
DEHNshield ZP

DSH ZP TT 255 (900 397)

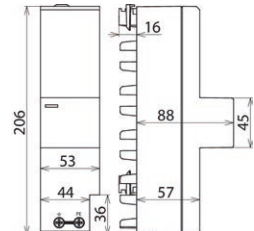
- Type 1 + type 2 combined spark-gap-based lightning current and surge arrester meets the requirements of class of LPS III + IV in residential buildings
- Quick and easy installation by snapping the arrester onto 40 mm busbar systems
- Capable of protecting terminal equipment



Figure without obligation



Basic circuit diagram DSH ZP TT 255



Dimensions DSH ZP TT 255

Combined arrester for TT and TN-S systems for use in the primary power supply system (3+1 configuration) of buildings with external lightning protection system (class of LPS III/IV).

Type Part No.	DSH ZP TT 255 900 397
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3+N-PE] (I_{total})	50 kA
Lightning impulse current (10/350 μ s) [L-N] (I_{imp})	12.5 kA
Specific energy [L-N] (W/R)	39.06 kJ/ohms
Lightning impulse current (10/350 μ s) [N-PE] (I_{imp})	50 kA
Specific energy [N-PE] (W/R)	625 kJ/Ohm
Nominal discharge current (8/20 μ s) [L-N]/[N-PE] (I_n)	20 / 80 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [N-PE] (U_P)	≤ 1.5 kV
Follow current extinguishing capability [L-N] (a.c.) (I_n)	25 kA _{rms}
Follow current extinguishing capability [N-PE] (a.c.) (I_n)	100 A _{rms}
Follow current limitation / Selectivity	no tripping of a 32 A gG fuse up to 50 kA _{rms} (prosp.)
Max. mains-side overcurrent protection	160 A gG
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	440 V / 120 min. – withstand
Temporary overvoltage (TOV) [N-PE] (U_T) – Characteristic	1200 V / 200 ms – withstand
Operating temperature range (T_U)	-40 °C ... +80 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (PEN, $\frac{1}{2}$)	10-35 mm ² flexible / 50 mm ² stranded
For mounting on	40 mm busbar systems
Enclosure material	thermoplastic, red, UL 94 V-0
Place of installation	indoor installation
Degree of protection	IP 30 (in combination with cover)
Capacity	3 module(s), DIN 43880
Approvals	VDE
Extended technical data:	-----
Voltage protection level [L-PE] (U_P)	1.6 kV
Weight	643 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364306721
PU	1 pc(s)

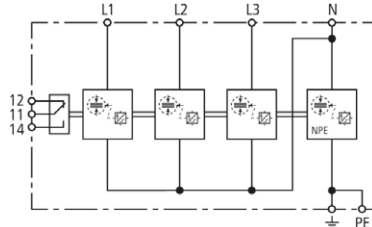
DEHNshield

DSH TT 255 FM (941 315)

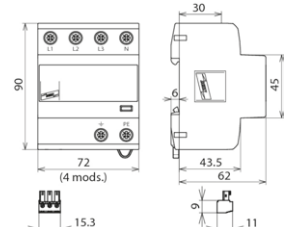
- Application-optimised and prewired spark-gap-based type 1 and type 2 combined lightning current and surge arrester
- Compact design due to space-saving spark gap technology with a width of only 1 module / pole
- Allows compact lightning equipotential bonding including protection of terminal equipment



Figure without obligation



Basic circuit diagram DSH TT 255 FM



Dimension drawing DSH TT 255 FM

Application-optimised and prewired combined lightning current and surge arrester for TT and TN-S systems (3+1 configuration); with floating remote signalling contact.

Type	DSH TT 255 FM
Part No.	941 315
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3+N-PE] (I_{total})	50 kA
Specific energy [L1+L2+L3+N-PE] (W/R)	625.00 kJ/ohms
Lightning impulse current (10/350 μ s) [L-N]/[N-PE] (I_{imp})	12.5 / 50 kA
Specific energy [L-N]/[N-PE] (W/R)	39.06 / 625.00 kJ/ohms
Nominal discharge current (8/20 μ s) [L-N]/[N-PE] (I_n)	12.5 / 50 kA
Voltage protection level [L-N]/[N-PE] (U_p)	≤ 1.5 / ≤ 1.5 kV
Follow current extinguishing capability [L-N]/[N-PE] (I_n)	25 kA _{rms} / 100 A _{rms}
Follow current limitation / Selectivity	no tripping of a 32 A gG fuse up to 25 kA _{rms} (prosp.)
Response time (t_A)	≤ 100 ns
Max. mains-side overcurrent protection	160 A gG
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	440 V / 120 min. – withstand
Temporary overvoltage (TOV) [N-PE] (U_T) – Characteristic	1200 V / 200 ms – withstand
Operating temperature range (T_U)	-40 °C ... +80 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (L1, L2, L3, N, PE, $\pm$) (min.)	1.5 mm ² solid / flexible
Cross-sectional area (L1, L2, L3, N, PE, $\pm$) (max.)	35 mm ² stranded / 25 mm ² flexible
For mounting on	35 mm DIN rails acc. to EN 60715
Enclosure material	thermoplastic, red, UL 94 V-0
Place of installation	indoor installation
Degree of protection	IP 20
Capacity	4 module(s), DIN 43880
Approvals	KEMA, VDE
Type of remote signalling contact	changeover contact
Switching capacity (a.c.)	250 V / 0.5 A
Switching capacity (d.c.)	250 V / 0.1 A; 125 V / 0.2 A; 75 V / 0.5 A
Cross-sectional area for remote signalling terminals	max. 1.5 mm ² solid / flexible
Extended technical data:	
Voltage protection level [L-PE] (U_p)	2.0 kV
Weight	448 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364275324
PU	1 pc(s)

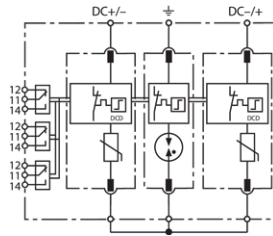
DEHNGuard ME

DG ME DC Y 950 FM (972 146)

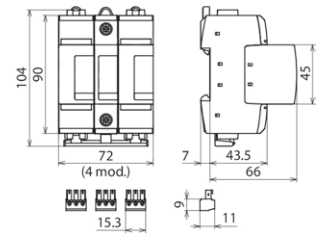
- Powerful d.c. switching device DCD



Figure without obligation



Basic circuit diagram DG ME DC Y 950 FM



Dimension drawing DG ME DC Y 950 FM

Modular combined lightning current and surge arrester for d.c. applications; with floating remote signalling contact.

Type Part No.	DG ME DC Y 950 FM 972 146
SPD analogous to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Nominal voltage (d.c.) (U_N)	860 V
Max. continuous operating voltage (d.c.) (U_C)	950 V
Lightning impulse current (10/350 μ s) (I_{imp})	5 kA
Nominal discharge current (8/20 μ s) (I_n)	12.5 kA
Voltage protection level [DC+ -> DC-] (U_P)	≤ 4 kV
Voltage protection level [(DC+/DC-) --> PE] (U_P)	≤ 3.2 kV
Max. short circuit withstand capability (I_{SCCR})	500 A / 170 ms
Temporary overvoltage (TOV) [DC+ -> DC-] (U_T) – Characteristic	950 V ($U_{TOV} = U_C$)
Temporary overvoltage (TOV) [DC+/- -> PE] (U_T) – Characteristic	950 V / 10 sec. – withstand
Operating temperature range (T_U)	-40 °C ... +80 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (min.)	1.5 mm ² solid / flexible
Cross-sectional area (max.)	35 mm ² stranded / 25 mm ² flexible
For mounting on	35 mm DIN rails acc. to EN 60715
Enclosure material	thermoplastic, red, UL 94 V-0
Place of installation	indoor installation
Degree of protection	IP20
Capacity	4 module(s), DIN 43880
Approvals	UL
Type of remote signalling contact	changeover contact
Switching capacity (a.c.)	250 V / 0.5 A
Switching capacity (d.c.)	250 V / 0.1 A; 125 V / 0.2 A; 75 V / 0.5 A
Cross-sectional area for remote signalling terminals	max. 1.5 mm ² solid / flexible
Extended technical data:	-----
– Residual voltage (U_{res}) @ 1,2 kA	2,5 kV
Weight	497 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364347960
PU	1 pc(s)

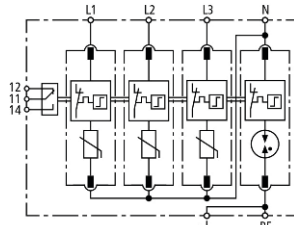
DEHNGuard

DG M TT 275 FM (952 315)

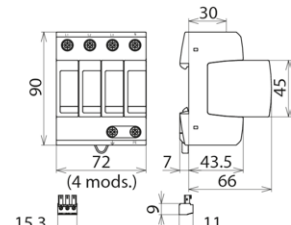
- Prewired complete unit consisting of a base part and plug-in protection modules
- High discharge capacity due to heavy-duty zinc oxide varistors / spark gaps
- High reliability due to "Thermo Dynamic Control" SPD monitoring device



Figure without obligation



Basic circuit diagram DG M TT 275 FM



Dimension drawing DG M TT 275 FM

Modular surge arrester for use in TT and TN-S systems (3+1 configuration); with floating remote signalling contact.

Type	DG M TT 275 FM
Part No.	952 315
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [N-PE] (U_C)	255 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA
Lightning impulse current (10/350 μ s) [N-PE] (I_{imp})	12 kA
Voltage protection level [L-N]/[N-PE] (U_P)	$\leq 1.5 / \leq 1.5$ kV
Voltage protection level [L-N] / [N-PE] at 5 kA (U_P)	$\leq 1 / \leq 1.5$ kV
Follow current extinguishing capability [N-PE] (I_R)	100 A _{rms}
Response time [L-N] (t_A)	≤ 25 ns
Response time [N-PE] (t_A)	≤ 100 ns
Max. mains-side overcurrent protection	125 A gG
Short-circuit withstand capability for max. mains-side overcurrent protection (I_{SCCR})	50 kA _{rms}
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	335 V / 5 sec. – withstand
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	440 V / 120 min. – safe failure
Temporary overvoltage (TOV) [N-PE] (U_T) – Characteristic	1200 V / 200 ms – withstand
Operating temperature range (T_U)	-40 °C ... +80 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (min.)	1.5 mm ² solid / flexible
Cross-sectional area (max.)	35 mm ² stranded / 25 mm ² flexible
For mounting on	35 mm DIN rails acc. to EN 60715
Enclosure material	thermoplastic, red, UL 94 V-0
Place of installation	indoor installation
Degree of protection	IP 20
Capacity	4 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Type of remote signalling contact	changeover contact
Switching capacity (a.c.)	250 V / 0.5 A
Switching capacity (d.c.)	250 V / 0.1 A; 125 V / 0.2 A; 75 V / 0.5 A
Cross-sectional area for remote signalling terminals	max. 1.5 mm ² solid / flexible
Extended technical data:	
Voltage protection level [L-PE] (U_P)	1.5 kV
Weight	415 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364108486
PU	1 pc(s)

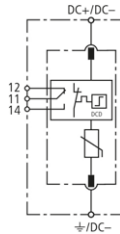
DEHNguard SE

DG SE DC 900 FM (972 145)

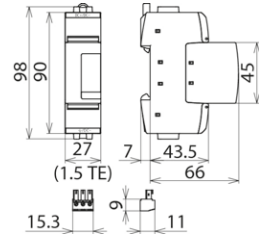
- Universal single-pole surge arrester consisting of a base part and a plug-in protection module
- Powerful d.c. switching device DCD
- Can be used without additional backup fuse



Figure without obligation



Basic circuit diagram DG SE DC 900 FM



Dimension drawing DG SE DC 900 FM

Modular single-pole surge arrester for d.c. applications; with floating remote signalling contact.

Type	DG SE DC 900 FM
Part No.	972 145
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Nominal voltage (d.c.) (U_N)	750 V
Max. continuous operating voltage (d.c.) (U_C)	900 V
Nominal discharge current (8/20 μ s) (I_n)	12.5 kA
Voltage protection level (U_P)	≤ 3.0 kV
Response time (t_A)	≤ 25 ns
Short-circuit withstand capability without backup fuse (d.c.) (I_{SCCR})	100 A
Short-circuit withstand capability for max. mains-side overcurrent protection (d.c.) (I_{SCCR})	25 kA
Max. mains-side overcurrent protection	80 A gG
Temporary overvoltage (TOV) d.c. (U_T) - Characteristic	1089 V / 5 sec. – withstand
Temporary overvoltage (TOV) d.c., $2 \times U_C$ (U_T) - Characteristic	1800 V / 120 min. – safe failure
Operating temperature range (T_U)	-40 °C ... +80 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (min.)	1.5 mm ² solid / flexible
Cross-sectional area (max.)	35 mm ² stranded / 25 mm ² flexible
For mounting on	35 mm DIN rails acc. to EN 60715
Enclosure material	thermoplastic, red, UL 94 V-0
Place of installation	indoor installation
Degree of protection	IP20
Capacity	1.5 module(s), DIN 43880
Type of remote signalling contact	changeover contact
Switching capacity (a.c.)	250 V / 0.5 A
Switching capacity (d.c.)	250 V / 0.1 A; 125 V / 0.2 A; 75 V / 0.5 A
Cross-sectional area for remote signalling terminals	max. 1.5 mm ² solid / flexible
Extended technical data:	use for safety lighting systems
– d.c. and a.c. operation	no
Weight	172 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364158658
PU	1 pc(s)

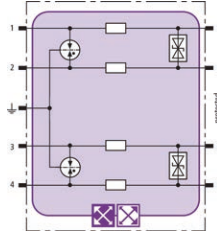
BLITZDUCTOR XT

BXT ML4 BD HF 5 (920 371)

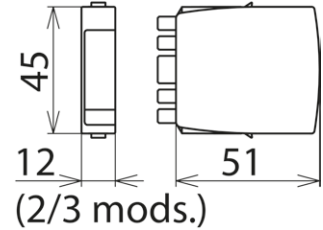
- LifeCheck SPD monitoring function
- Minimal signal interference
- For installation in conformity with the lightning protection zone concept at the boundaries from 0_A –2 and higher



Figure without obligation



Basic circuit diagram BXT ML4 BD HF 5



Dimension drawing BXT ML4 BD HF 5

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting two pairs of high-frequency bus systems or video transmission systems. If LifeCheck detects thermal or electrical overload, the arrester has to be replaced. This status is indicated contactlessly by the DEHNrecord LC / SCM / MCM reader.

Type	BXT ML4 BD HF 5
Part No.	920 371
SPD monitoring system	LifeCheck
SPD class	TYPE 1P
Nominal voltage (U _N)	5 V
Max. continuous operating voltage (d.c.) (U _C)	6.0 V
Max. continuous operating voltage (a.c.) (U _C)	4.2 V
Nominal current at 45 °C (I _N)	1.0 A
D1 Total lightning impulse current (10/350 µs) (I _{imp})	10 kA
D1 Lightning impulse current (10/350 µs) per line (I _{imp})	2.5 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	20 kA
C2 Nominal discharge current (8/20 µs) per line (I _n)	10 kA
Voltage protection level line-line for I _{imp} D1 (U _p)	≤ 25 V
Voltage protection level line-PG for I _{imp} D1 (U _p)	≤ 550 V
Voltage protection level line-line at 1 kV/µs C3 (U _p)	≤ 11 V
Voltage protection level line-PG at 1 kV/µs C3 (U _p)	≤ 550 V
Series resistance per line	1.0 ohm(s)
Cut-off frequency line-line (f _c)	100.0 MHz
Capacitance line-line (C)	≤ 25 pF
Capacitance line-PG (C)	≤ 16 pF
Operating temperature range (T _U)	-40 °C ... +80 °C
Degree of protection (with plugged-in protection module)	IP 20
Pluggable into	BXT BAS / BSP BAS 4 base part
Earthing via	BXT BAS / BSP BAS 4 base part
Enclosure material	polyamide PA 6.6
Colour	yellow
Test standards	IEC 61643-21 / EN 61643-21, UL 497B
Approvals	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL
SIL classification	up to SIL3 ^{*)}
ATEX approvals	DEKRA 11ATEX0089 X: II 3 G Ex nA IIC T4 Gc
IECEx approvals	DEK 11.0032X: Ex nA IIC T4 Gc
CSA & USA Hazloc approvals (1)	2516389: Class I Div. 2 GP A, B, C, D T4
CSA & USA Hazloc approvals (2)	2516389: Class I Zone 2, AEx nA IIC T4
Weight	24 g
Customs tariff number (Comb. Nomenclature EU)	85363010
GTIN	4013364109094
PU	1 pc(s)

^{*)}For more detailed information, please visit www.dehn-international.com.

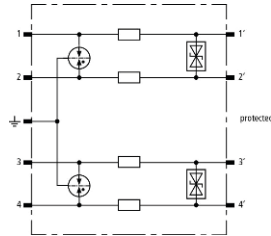
BLITZDUCTOR SP

BSP M4 BD HF 5 (926 371)

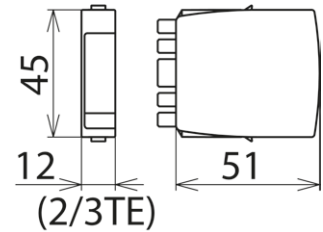
- Minimum signal interference
- For installation in conformity with the lightning protection zone concept at the boundaries from $0_B - 2$ and higher



Figure without obligation



Basic circuit diagram BSP M4 BD HF 5



Dimension drawing BSP M4 BD HF 5

Space-saving surge arrester module for protecting two pairs of high-frequency bus systems or video transmission systems with galvanic isolation.

Type	BSP M4 BD HF 5
Part No.	926 371
SPD class	TYPE 2 P1
Nominal voltage (U_N)	5 V
Max. continuous operating voltage (d.c.) (U_C)	6.0 V
Max. continuous operating voltage (a.c.) (U_C)	4.2 V
Nominal current at 45 °C (I_L)	1.0 A
D1 Lightning impulse current (10/350 µs) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 µs) (I_n)	20 kA
C2 Nominal discharge current (8/20 µs) per line (I_n)	10 kA
Voltage protection level line-line for I_n C2 (U_p)	≤ 35 V
Voltage protection level line-PG for I_n C2 (U_p)	≤ 600 V
Voltage protection level line-line at 1 kV/µs C3 (U_p)	≤ 11 V
Voltage protection level line-PG at 1 kV/µs C3 (U_p)	≤ 550 V
Series impedance per line	1.0 ohm(s)
Cut-off frequency line-line (f_G)	100.0 MHz
Capacitance line-line (C)	≤ 25 pF
Capacitance line-PG (C)	≤ 16 pF
Operating temperature range (T_U)	-40 °C ... +80 °C
Degree of protection (with plugged-in protection module)	IP 20
Pluggable into	BXT BAS / BSP BAS 4 base part
Earthing via	BXT BAS / BSP BAS 4 base part
Enclosure material	polyamide PA 6.6
Colour	yellow
Test standards	IEC 61643-21, UL 497B
Approvals	UL, CSA, SIL, EAC
SIL classification	up to SIL3 ^{*)}
Weight	22 g
Customs tariff number (Comb. Nomenclature EU)	85363010
GTIN	4013364127289
PU	1 pc(s)

^{*)} For more detailed information, please visit www.dehn-international.com.

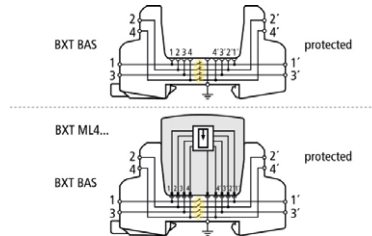
BLITZDUCTOR

BXT BAS (920 300)

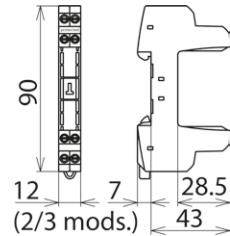
- Four-pole version for universal use with all types of BSP and BXT / BXTU protection modules
- No signal interruption if the protection module is removed
- Universal design without protection elements



Figure without obligation



Basic circuit diagram with and without plugged-in module



Dimension drawing BXT BAS

The BLITZDUCTOR XT base part is an extremely space-saving and universal four-pole feed-through terminal for the insertion of a protection module without signal disconnection if the protection module is removed. The snap-in mechanism at the supporting foot of the base part allows the protection module to be safely earthed via the DIN rail. Since no components of the protective circuit are situated in the base part, maintenance is only required for the protection modules.

Type Part No.	BXT BAS 920 300
Operating temperature range (T _U)	-40 °C ... +80 °C
Degree of protection	IP 20
For mounting on	35 mm DIN rails acc. to EN 60715
Connection (input / output)	screw / screw
Signal disconnection	no
Cross-sectional area, solid	0.08-4 mm ²
Cross-sectional area, flexible	0.08-2.5 mm ²
Tightening torque (terminals)	0.4 Nm
Earthing via	35 mm DIN rails acc. to EN 60715
Enclosure material	polyamide PA 6.6
Colour	yellow
ATEX approvals	DEKRA 11ATEX0089 X: II 3 G Ex nA IIC T4 Gc ^{*)}
IECEX approvals	DEK 11.0032X: Ex nA IIC T4 Gc ^{*)}
Approvals	CSA, UL, EAC, ATEX, IECEX ^{*)}
Weight	34 g
Customs tariff number (Comb. Nomenclature EU)	85369010
GTIN	4013364109179
PU	1 pc(s)

^{*)} only in connection with an approved protection module

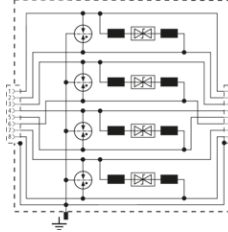
DEHNpatch

DPA M CLE RJ45B 48 (929 121)

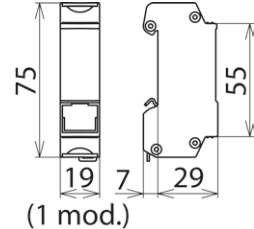
- Ideally suited for retrofitting, protection of all lines
- Cat. 6 in the channel (class E)
- Power over Ethernet IEEE 802.3 compliant (up to PoE++ / 4PPoE)
- For installation in conformity with the lightning protection zone concept at the boundaries from 0_B -2 and higher



Figure without obligation



Basic circuit diagram DPA M CLE RJ45B 48



Dimension drawing DPA M CLE RJ45B 48

Universal arrester for Industrial Ethernet, Power over Ethernet (IEEE 802.3 compliant up to PoE++ / 4PPoE) and similar applications in structured cabling systems according to class E up to 250 MHz. Protection of all pairs by means of powerful gas discharge tubes and one adapted filter matrix per pair. Fully shielded type with sockets for DIN rail mounting (up to 1 Gbit Ethernet).

Type	DPA M CLE RJ45B 48
Part No.	929 121
SPD class	TYPE 2 Pt
Nominal voltage (U _N)	48 V
Max. continuous operating voltage (d.c.) (U _c)	48 V
Max. continuous operating voltage (a.c.) (U _c)	34 V
Max. continuous operating voltage (d.c.) pair-pair (PoE) (U _c)	57 V
Nominal current (I _N)	1 A
D1 Lightning impulse current (10/350 µs) per line (I _{imp})	0.5 kA
C2 Nominal discharge current (8/20 µs) line-line (I _n)	150 A
C2 Nominal discharge current (8/20 µs) line-PG (I _n)	2.5 kA
C2 Nominal discharge current (8/20 µs) total (I _n)	10 kA
C2 Nominal discharge current (8/20 µs) pair-pair (PoE) (I _n)	150 A
Voltage protection level line-line for I _n C2 (U _p)	≤ 180 V
Voltage protection level line-PG for I _n C2 (U _p)	≤ 500 V
Voltage protection level line-line for I _n C2 (PoE) (U _p)	≤ 600 V
Voltage protection level line-line at 1 kV/µs C3 (U _p)	≤ 180 V
Voltage protection level line-PG at 1 kV/µs C3 (U _p)	≤ 500 V
Voltage protection level pair-pair at 1 kV/µs C3 (PoE) (U _p)	≤ 600 V
Cut-off frequency (f _c)	250 MHz
Insertion loss at 250 MHz	≤ 3 dB
Capacitance line-line (C)	≤ 30 pF
Capacitance line-PG (C)	≤ 25 pF
Operating temperature range (T _U)	-40 °C ... +80 °C
Degree of protection	IP 10
For mounting on	35 mm DIN rails acc. to EN 60715
Connection (input / output)	RJ45 socket / RJ45 socket
Pinning	1/2, 3/6, 4/5, 7/8
Earthing via	35 mm DIN rail acc. to EN 60715
Enclosure material	zinc die-casting
Colour	bare surface
Test standards	IEC 61643-21 / EN 61643-21 / UL 497B
Approvals	CSA, UL, GHMT, EAC
External accessories	fixing material
Weight	109 g
Customs tariff number (Comb. Nomenclature EU)	85363010
GTIN	4013364118935
PU	1 pc(s)

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**Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.**

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GmbH + Co.KG.

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