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 IEC 60364-4-44, clause 443 the evaluation of whether additional surge protective measures are necessary depends on the overvoltage category stated by the manufacturer.

Standards in the series IEC 60364 are installation standards and therefore apply to fixed installations. Charging posts

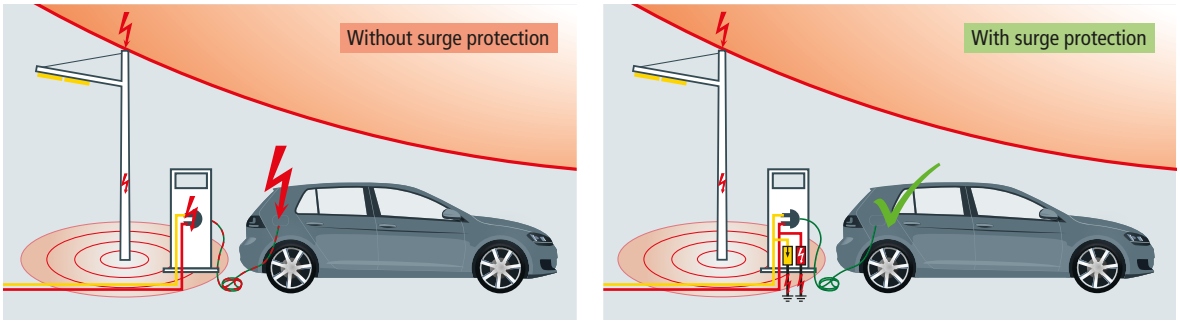

Figure 1 Lightning and surge coupling when charging

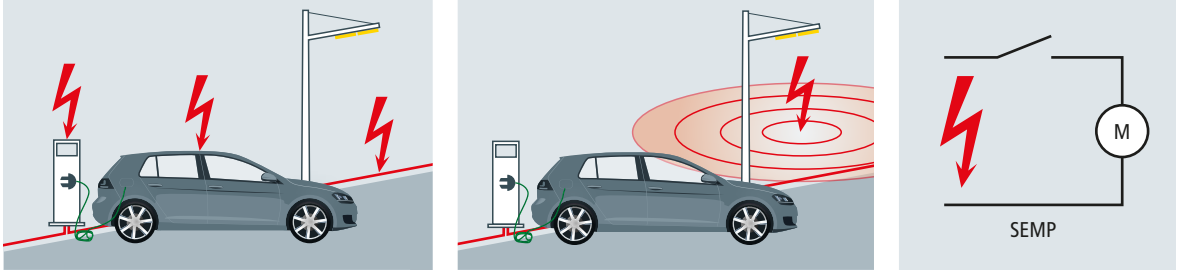

Figure 2 Causes of overvoltage

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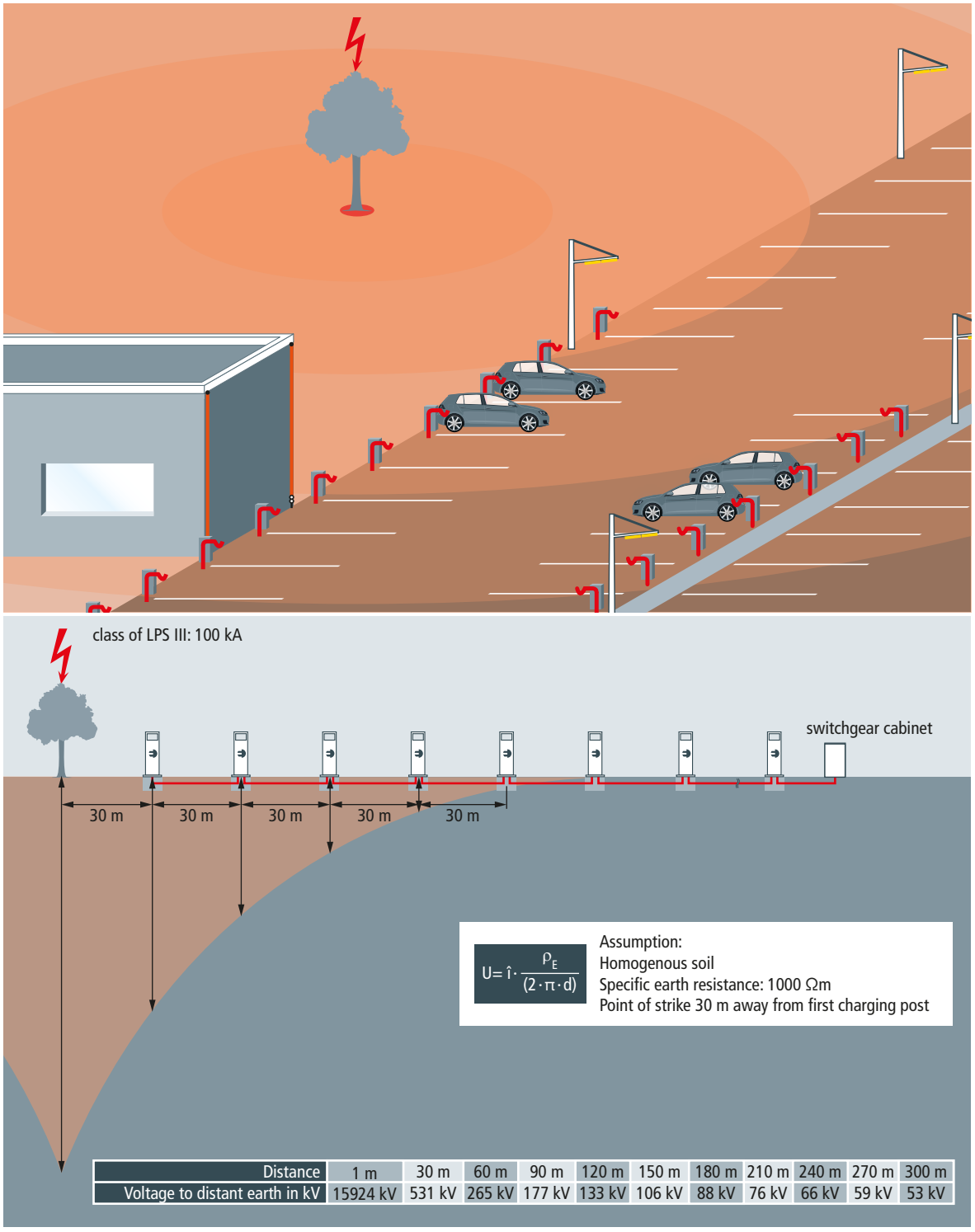


Distance	1 m	30 m	60 m	90 m	120 m	150 m	180 m	210 m	240 m	270 m	300 m
Voltage to distant earth in kV	15924 kV	531 kV	265 kV	177 kV	133 kV	106 kV	88 kV	76 kV	66 kV	59 kV	53 kV

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

which are not portable and are connected via fixed wiring fall under the scope of IEC 60364.

IEC 60364-4-44, clause 443 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 IEC 62305 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 IEC 60364-4-44, clause 443 and EN 62305, these should be installed according to IEC 60364-5-53, clause 534. Please note that a revised version of the standard IEC 60364-7-722 was published in June 2019. This stipulates the requirement for surge protection in publicly accessible charging facilities.

In Germany, VDE-AR-N-4100 must be additionally observed for charging posts which are directly connected to the low-voltage system.

VDE-AR-N-4100 describes, among other things, additional requirements on type 1 arresters used in the main power supply system, for example:

- Type 1 SPDs must comply with the IEC 61643-11 product standard
- Only voltage-switching type 1 SPDs (with spark gap) may be used. SPDs with one or more varistors or parallel connection of a spark gap and a varistor are prohibited.
- Type 1 SPDs must not cause operating current resulting from status displays, e.g. LEDs.

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 µs. Distant lightning strikes or so-called indirect lightning strikes lead to conducted partial lightning currents (impulse shape 10/350 µs) in the supply lines or also to inductive/capacitive coupling (impulse shape 8/20 µs) 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 IEC 60364-5-53, clause 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. DEHNvap EMOB, 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.

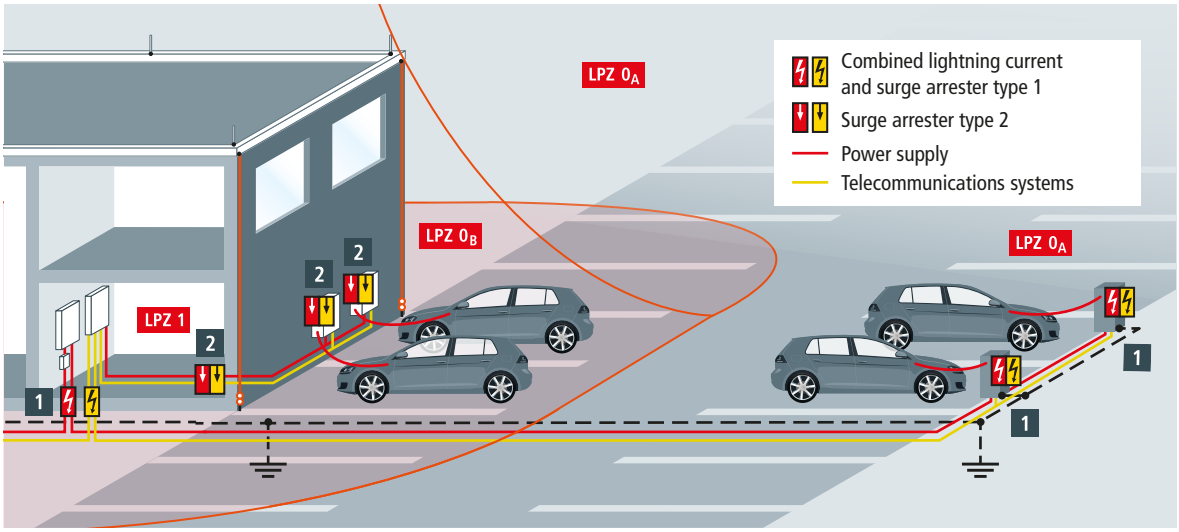


Figure 4 Application of lightning and surge protective devices depending on location

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)	DEHNvap EMOB	DVA EMOB 3P 255 FM	900 385	TT and TN system, DIN rail 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 ML2 BD S 24 + BXT BAS	920 244 + 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 M2 BD 24 + BXT BAS	926 244 + 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					

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

If it is not possible to reliably assess the potential threat, installing the compact and space-saving type 1 + 2 + 3 combined arrester DEHNvap EMOB is generally the best option. DEHNvap EMOB is based on RAC spark-gap technology and is specially designed for the requirements of power supply systems for the charging infrastructure. Its wave breaker function limits the residual energy to 0.5 J so that even the most sensitive electronic components are protected. What is more, this KEMA certified arrester can be used without a backup fuse up to a nominal current of 250 A, and thus truly does offer universal protection.

Selection of surge protective devices

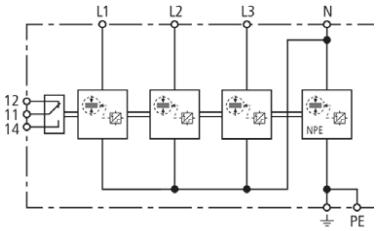
When selecting suitable lightning and surge protective devices, it is not only important to know about the installation location but also about the local system configuration, system voltage and nominal voltage of the charging facility. A possible selection is shown in **table 1**.

DEHNvap EMOB

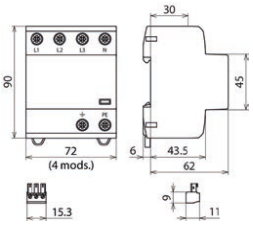
DVA EMOB 3P 255 FM (900 385)

- Universally applicable combined lightning current and surge arrester, particularly for use in power supply systems for the charging infrastructure
- Compact and space-saving installation thanks to spark gap technology with a width of only 1 module / pole
- Energy coordination with terminal equipment (type 1 + type 2 + type 3 protective effect)
- Residual energy in case of S20K275 < 0.5 J
- Maximum backup fuse up to 250 A gG

Figure without obligation



Basic circuit diagram DVA EMOB 3P 255 FM



Dimension drawing DVA EMOB 3P 255 FM

Prewired combined lightning current and surge arrester for use in three-phase TT and TN-S systems (3+1 configuration) with remote signalling contact.

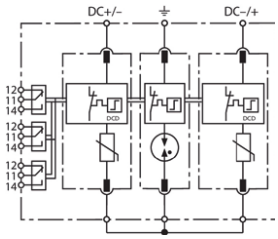
Type Part No.	DVA EMOB 3P 255 FM 900 385
SPD according to EN 61643-11 / ... IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.)[L-N]/[N-PE] (U_C)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 µs) [L-N]/[N-PE] (I_{imp})	12.5 / 50 kA
Specific energy [L-N]/[N-PE] (W/R)	39.06 kJ/ohms / 625.00 kJ/ohms
Nominal discharge current (8/20 µs) (I_n)	25 / 100 kA
Voltage protection level [L-N]/[N-PE] (U_P)	≤ 1.5 kV / ≤ 1.5 kV
Follow current extinguishing capability [L-N]/[N-PE] (I_{fi})	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. backup fuse (L) up to I_K > 25 kA_{rms}	250 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 [parallel]/[series] (T_U)	-40°C...+80°C
Operating state/fault indication	green / red
Number of ports	1
Cross-sectional area (L1, L2, L3, N, PE, ⏚) (min.)	1.5 mm^2 solid / flexible
Cross-sectional area (L1, L2, L3, N, PE, ⏚) (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
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:	----------
– Additional abnormal voltage test: 485 V AC / 50 Hz for 24 h	withstand
– Residual energy with a S20K275	< 0.5 J
– Characteristic at U = 320 V and I_{SCCR} = 13.5 kA in combination with a fuse 63 A gG	withstand
Weight	472 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364422186
PU	1 pc(s)

DEHNguard ME

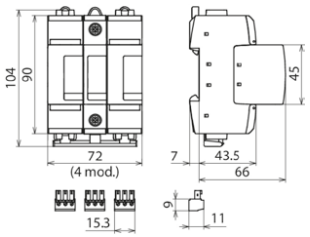
DG ME DC Y 950 FM (972 146)

- 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.

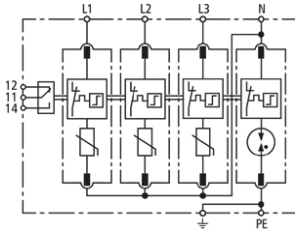
Type Part No.	DG ME DC Y 950 FM 972 146
SPD analogous to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Nominal voltage (d.c.) (U_N)	860 V
Max. continuous operating voltage (d.c.) (U_C)	950 V
Lightning impulse current (10/350 µs) (I_{imp})	5 kA
Nominal discharge current (8/20 µs) (I_n)	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 mm² solid / flexible
Cross-sectional area (max.)	35 mm² stranded / 25 mm² 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 mm² solid / flexible
Extended technical data:	----------
– Residual voltage (Ures) @ 1,2 kA	2,5 kV
Weight	497 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364347960
PU	1 pc(s)

DEHNguard

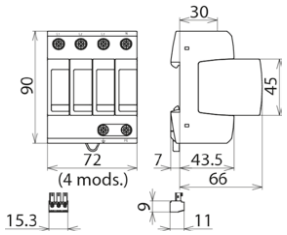
DG M TT 275 FM (952 315)

- 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.

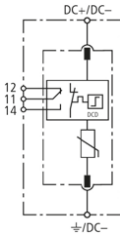
Type Part No.	DG M TT 275 FM 952 315
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [N-PE] (U_C)	255 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	20 kA
Max. discharge current (8/20 µs) (I_{max})	40 kA
Lightning impulse current (10/350 µs) [N-PE] (I_{imp})	12 kA
Voltage protection level [L-N]/[N-PE] (U_P)	≤ 1.5 / ≤ 1.5 kV
Voltage protection level [L-N] / [N-PE] at 5 kA (U_P)	≤ 1 / ≤ 1.5 kV
Follow current extinguishing capability [N-PE] (I_{fi})	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

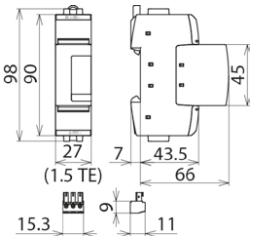
DG SE DC 900 FM (972 145)

- 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.

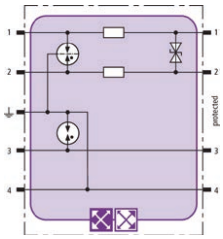
Type Part No.	DG SE DC 900 FM 972 145
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (d.c.) (U_N)	750 V
Max. continuous operating voltage (d.c.) (U_C)	900 V
Nominal discharge current (8/20 µs) (I_n)	12.5 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 gPV
Temporary overvoltage (TOV) d.c. (U_T) - Characteristic	1089 V / 5 sec. – withstand
Temporary overvoltage (TOV) d.c., 2x 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 mm² solid / flexible
Cross-sectional area (max.)	35 mm² stranded / 25 mm² 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 mm² 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

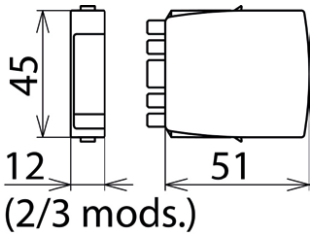
BXT ML2 BD S 24 (920 244)

- LifeCheck SPD monitoring function
- Optimal protection of one pair and the cable shield
- 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 ML2 BD S 24



Dimension drawing BXT ML2 BD S 24

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting one pair of unearthed balanced interfaces, with direct or indirect shield earthing. 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 Part No.	BXT ML2 BD S 24 920 244
SPD monitoring system	LifeCheck
SPD class	TYPE 1 P1
Nominal voltage (U_N)	24 V
Max. continuous operating voltage (d.c.) (U_C)	33 V
Max. continuous operating voltage (a.c.) (U_C)	23.3 V
Nominal current at 45 °C (I_L)	1.0 A
D1 Total lightning impulse current (10/350 µs) (I_{imp})	9 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)	≤ 52 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)	≤ 45 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_G)	7.8 MHz
Capacitance line-line (C)	≤ 1.0 nF
Capacitance line-PG (C)	≤ 25 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
Approvals	CSA, 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	21 g
Customs tariff number (Comb. Nomenclature EU)	85363010
GTIN	4013364117792
PU	1 pc(s)

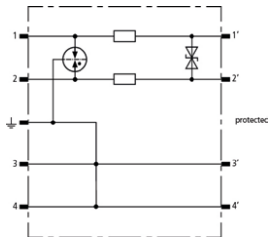
*) For more detailed information, please visit www.dehn-international.com.

BLITZDUCTOR SP

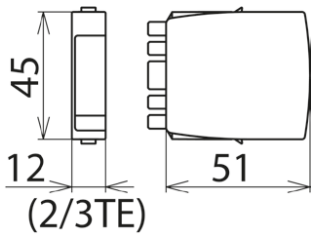
BSP M2 BD 24 (926 244)

- High degree of protection for one pair
- 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 M2 BD 24



Dimension drawing BSP M2 BD 24

Space-saving surge arrester module for protecting one pair of balanced interfaces with galvanic isolation.

Type Part No.	BSP M2 BD 24 926 244
SPD class	TYPE 2 P1
Nominal voltage (U_N)	24 V
Max. continuous operating voltage (d.c.) (U_C)	33 V
Max. continuous operating voltage (a.c.) (U_C)	23.3 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)	≤ 55 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)	≤ 45 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)	7.8 MHz
Capacitance line-line (C)	≤ 1.0 nF
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	21 g
Customs tariff number (Comb. Nomenclature EU)	85363010
GTIN	4013364127098
PU	1 pc(s)

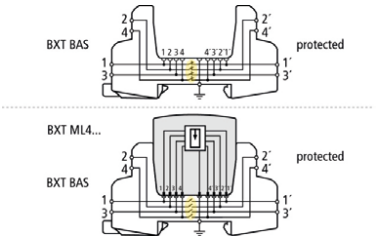
*) For more detailed information, please visit www.dehn-international.com.

BLITZDUCTOR

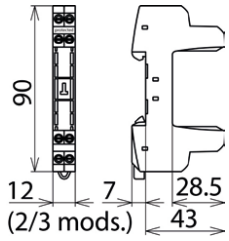
BXT BAS (920 300)

- 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)

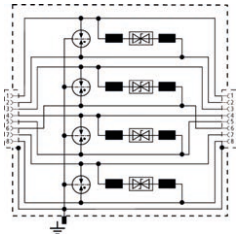
*) only in connection with an approved protection module

DEHNpatch

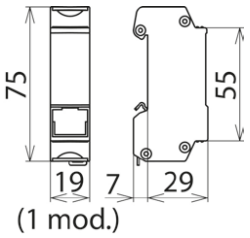
DPA M CLE RJ45B 48 (929 121)

- 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 Part No.	DPA M CLE RJ45B 48 929 121
SPD class	TYPE 2 P1
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_L)	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_G)	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)

www.dehn-international.com/partners

Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.

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