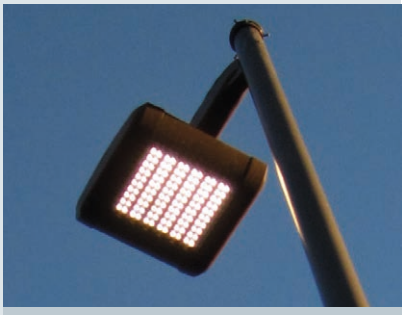
Surge protection for LED outdoor lighting

White Paper



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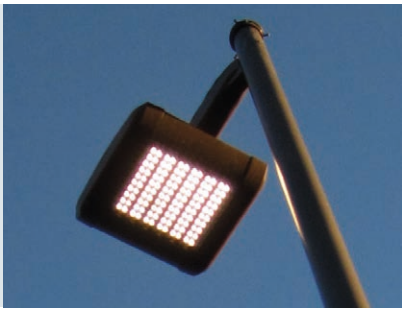

The scope of application for LED lights now covers the entire field of lighting systems which means that they are exposed to different surge loads depending on their point of use. Switching overvoltages and indirect or direct lightning current interference arising from atmospheric discharges are, therefore, always an issue. Whereas the load on protective devices resulting from surges or indirect lightning current interference (inductive / capacitive coupling) is quite low, direct lightning currents require surge protective devices which can carry much higher loads.

LED outdoor lighting for those areas of buildings with external lightning protection which are threatened by lightning currents (LPZ 0_B and LPZ 0_A)

Even if LED outdoor lighting is situated in lightning protection zone 0_B (LPZ 0_B) (outdoor area not threatened by lightning strikes) and the distance from installations with lightning potential has been kept, it may still be exposed to lightning currents. If, for example, LED mast lights are installed within the protected volume of a building with external lightning protection, there can be flashover from the conductors to the metal mast in case of a lightning strike. Using several type 2 surge arresters can reduce the damage to the subsequent lighting (**Figure 1**).

A combined type 1 lightning current and surge arrester would be required to protect an LED mast light within LPZ 0_A (area threatened by lightning strikes) against a lightning strike. In practice, however, there is a tendency to put up with the failure of the LED mast light, and perhaps those in the vicinity, and only install a type 1 combined arrester in the switchgear cabinet (**Figure 2**).

The afore-mentioned scenarios require type 1 surge protective devices only. Using an application-optimised spark-gap-based combined lightning current and surge arrester reduces mains follow currents to a minimum and ensures the required energy coordination.

LED outdoor lighting in those areas of buildings with external lightning protection which are not threatened by lightning currents (LPZ 0_B)

Outdoor lighting on or next to buildings with external lightning protection should be installed in LPZ 0_B (**Figure 3**). If this is not possible, this lightning protection zone must be created for the purpose (e.g., using air-termination rods).

If the outdoor lighting is installed on a metal façade of the building, this metal façade can be used as a natural down conductor, provided it encloses the building, has no impermissibly wide openings, the connections are capable of carrying lightning currents and it is connected with the earth-termination system every 5 m. Under these conditions, loads for surge protective devices can be assumed, which are comparable with those of LPZ 0_B (**Figure 4**).

The scenarios mentioned above require type 2 surge protective devices.

LED mast lights for street and path lighting (LPZ 0_A)

These LED mast lights are particularly susceptible to all the surge loads mentioned above. The corpus is generally metal – as is the mast. This holds advantages in terms of their mechanical strength, electrostatic discharge (ESD) and heat resistance, but also disadvantages in the event of a nearby lightning strike.

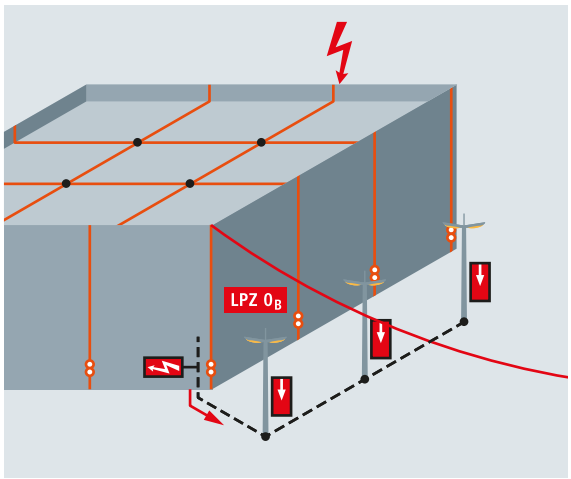

Figure 1 Risk for LED mast lights in LPZ 0_B due to the partial lightning currents conducted out of a building with external lightning protection in case of a lightning strike

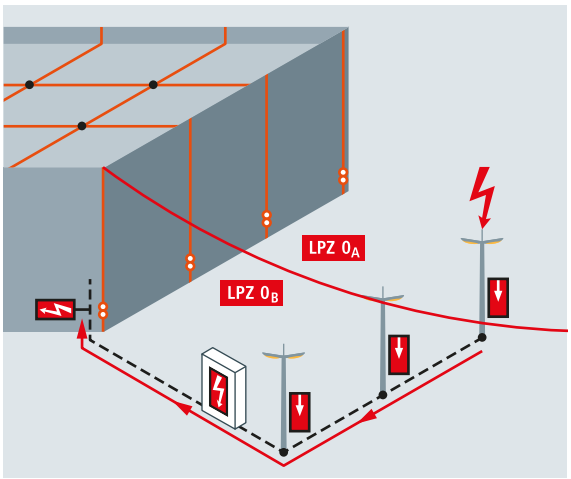

Figure 2 Discharge of partial lightning currents at the entrance point to the building via the lightning protection equipotential bonding when lightning strikes LED mast lights located in LPZ 0_A

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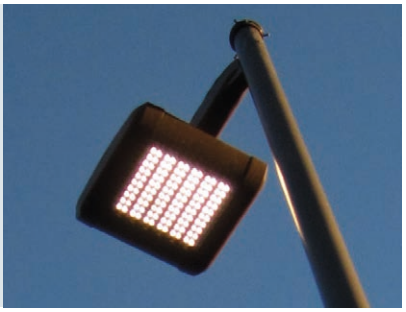

Regarding protection against electrical shock, they belong to protective class II (double / reinforced insulation) or sometimes protective class I (with protective conductor terminal).
With LED mast lights for public streets and paths, the impedances of the cable networks play a decisive role regarding the light protection class because normal final circuits up to 32 A have to be disconnected within 0.4 s in TN systems and 0.2 s in TT systems. In the case of TN systems, which are very common, a maximum loop impedance of 4.6 Ω is allowed for a 6 A gG fuse in the fully insulated fuse distribution board at the foot of the mast. If the fuse protection is higher, e. g. 10 A, the required switch-off time of 0.4 s can only be achieved at a loop impedance of 2.7 Ω. For this reason, fully insulated versions of both the conductors from the fully insulated fuse box to the lights and the lights themselves are installed.
Now, if lightning strikes near an LED mast light, a radial potential gradient is formed whose voltage, compared with the remote reference potential and without considering the conventional earthing impedance, depends on the electric current of the strike and the specific earth resistance (**Figure 5**).
Although the actual conventional earthing impedance is greater and the voltage higher, one can see that the mast / light potential significantly exceeds the withstand voltage of the upstream devices (approx. 8 kV) compared to the supply voltage. The consequence is a flashover from the housing via the protective insulation lining to the mains side of the upstream device (**Figure 6**).
When using surge protective devices with a gas discharge tube in the functional bonding conductor between the mast and N/PEN conductor, it is only in the event of a discharge that N/PEN is briefly connected to the metal mast. If a lightning current then flows via the gas discharge tube and spark gaps/varistors from the mast to the line conductor, it is the primary danger when touching the mast. After an overload, if both the line conductor circuit and gas discharge tube have been permanently set to a low resistance, this means that the lightning current was high enough to switch off the 6/10 A gG fuse (**Figure 7**).
The fuse blows to prevent the accidental energisation of the mast.
Another advantage of the gas discharge tube (indirect mast connection) is the prevention of corrosion currents.
The earth surface potential can be influenced in the area of the LED mast light by installing either an earth rod which is connected with the LED mast light, or an earthing conductor above the cable route. This considerably reduces the risk of dangerous electric shock.

Selection of surge protective devices

In extensive installations with LED mast lights, energy-coordinated combined type 1 spark-gap-based lightning current and surge arresters should be used as DIN rail mounted devices. If there is enough space, type 2 surge arresters can be used as DIN rail mounted devices for the lower part of the mast. The compact type 2 DEHNcord surge arrester recently developed to protect LED lights can always be used, regardless of how much space is available. This DEHNcord is manufactured in versions with protection type IP20 and IP65 and has a total impulse current discharge capacity of 20 kA. At the end of its service life, the light circuit is shut down for safety. Further DEHNcord versions have an additional protective circuit which can, e.g., be used for light circuits which are switched on for a shorter

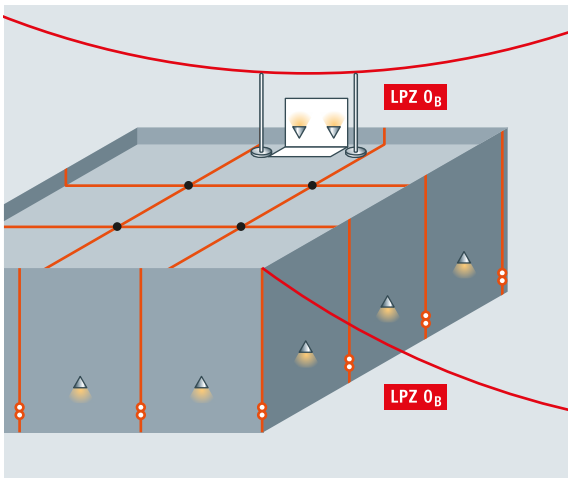

Figure 3 LED outdoor lights lightning protection zone 0_B

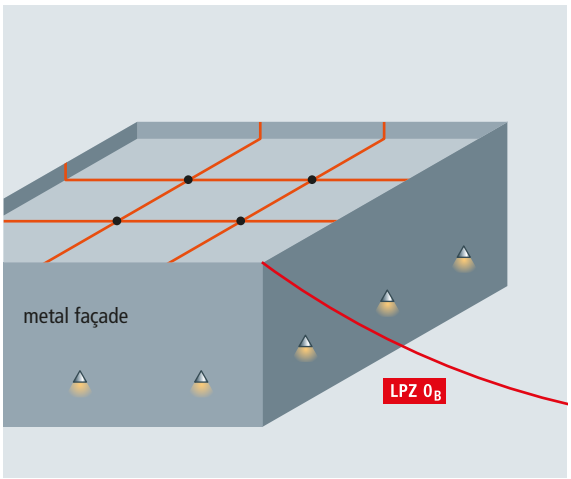

Figure 4 LED outdoor lights on the metal façade of a building with external lightning protection which fulfils the requirements for non-observance of the separation distance

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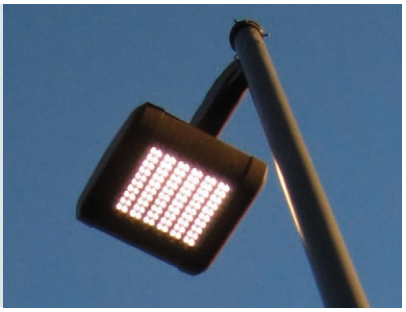

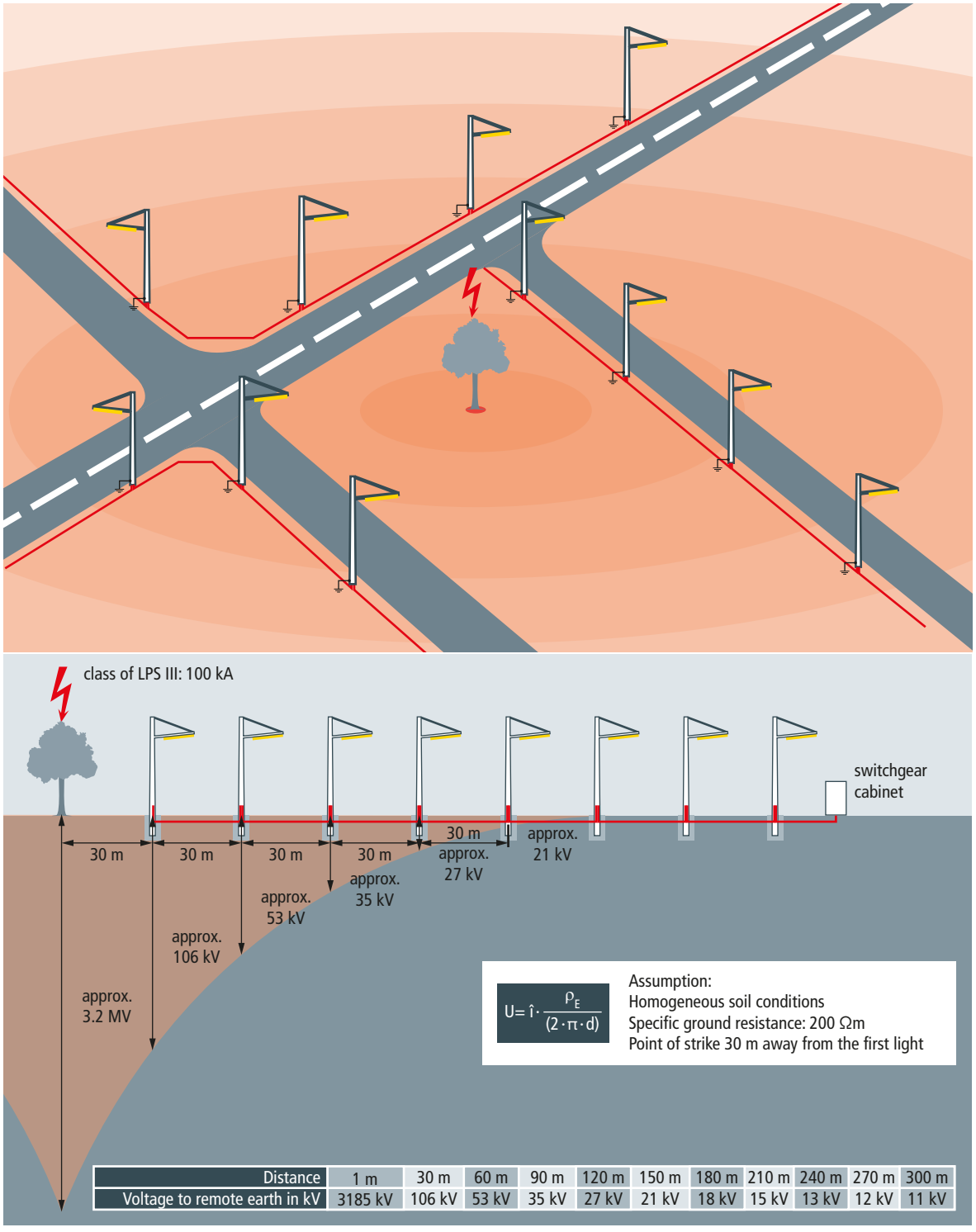

Distance	1 m	30 m	60 m	90 m	120 m	150 m	180 m	210 m	240 m	270 m	300 m
Voltage to remote earth in kV	3185 kV	106 kV	53 kV	35 kV	27 kV	21 kV	18 kV	15 kV	13 kV	12 kV	11 kV

Figure 5 Radial potential gradient for a lightning strike near an LED mast light

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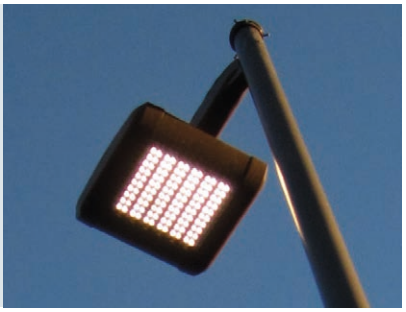


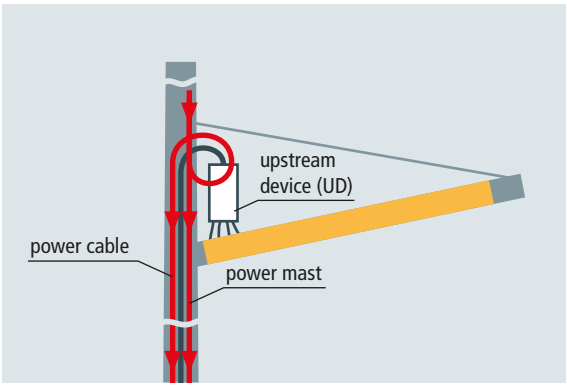


Figure 6 Lightning current flashover from the mast light housing to the mains voltage connection of the upstream device

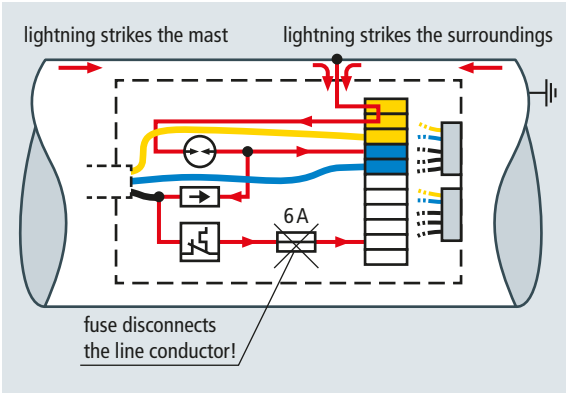
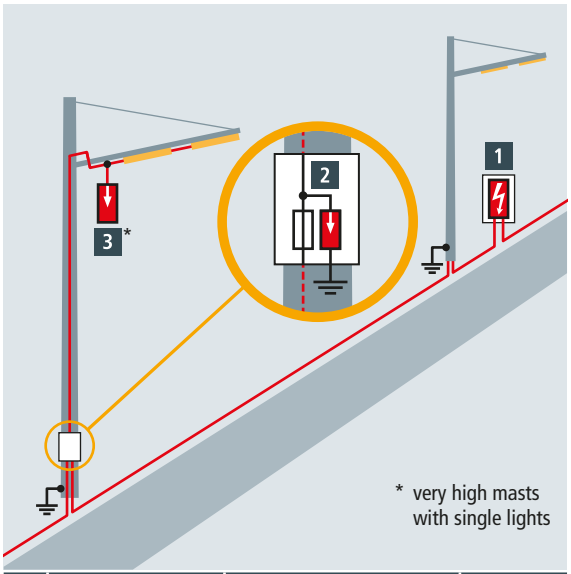


Figure 7 Blowing of a 6 A gG fuse and disconnection of the short circuit to the exposed conductive part caused by the lightning current

time. The DEHNcord series also includes surge-dependent fault indicators for each protective circuit (**Figure 8**).
In the case of new systems, where both the mast lights and cabling are installed from scratch, it is advisable to install a conductor which is in direct contact with the earth above the cable route.
If lightning strikes the LED light mast or the ground, this conductor, which is in direct contact with the earth, prevents flashover to the cables and equalizes the potential gradient (**Figure 9**).

LED light management with DALI

Aside from standard fields of application in lighting technology, DALI is also the ideal choice for special lighting creations as it can be integrated in superordinate management systems (e.g. LON and EIB) via interface modules. This makes it easy to implement lighting arrangements for outdoor LED advertising (**Figure 10**).
Surge protective devices are chosen on the basis of the aforementioned considerations. If lightning currents are expected,



	Type	Info	Part No.
Installation point: Distribution board			
1	DSH TNC 255	Earthing 16 mm² Cu	941 300
	DSH TT 255	Earthing 16 mm² Cu	941 310
Installation point: Cable junction box			
2	SK EK480 G2S-2d LM DCO	EK480 fuse box with integrated DEHNcord	900 443
	DCOR L 3P 275 SO LTG *	Two vector groups	900 445
	DCOR L 2P 275 SO LTG *	Two vector groups	900 446
	DCOR L 3P 275 SO IP *	Two vector groups, IP65	900 447
	DCOR L 2P 275 SO IP *	Two vector groups, IP65	900 448
Installation point: Lights with exposed cables			
3	DCOR L 1P 275	One light group PC-II	900 431
	DCOR L 2P SN1864 *	Two light groups PC-II	999 906

*Safety shutdown of a group

Figure 8 Coordinated surge protective devices in expansive LED mast light structures

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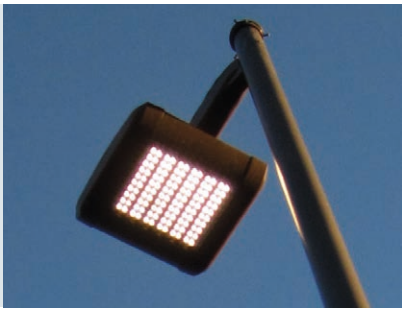


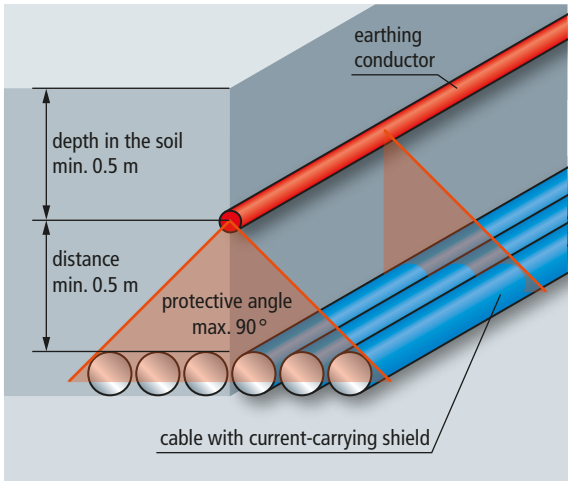
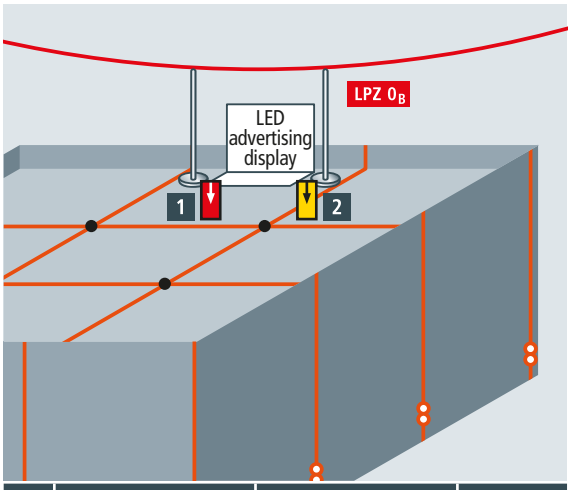


Figure 9 Earthing conductor protects the cables in the cable route and earths the mast

a type 1 surge arrester is used. If only small lightning current loads are anticipated (see previous example for an external metal façade) or there are inductive and/or capacitive couplings, a type 2 surge arrester is installed.



	Type	Info	Part No.
1	DGM TT 275		952 310
2	BXT ML2 BD S24 + BXT BAS	Earthing 6 mm² Cu	920 244 920 300

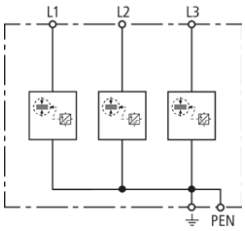
Figure 10 LED illuminated advertisement in LPZ 0_B with DALI control installed on a building with external lightning protection

DEHNshield

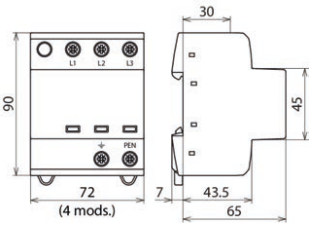
DSH TNC 255 (941 300)

- 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 TNC 255



Dimension drawing DSH TNC 255

Application-optimised and prewired combined lightning current and surge arrester for TN-C systems.

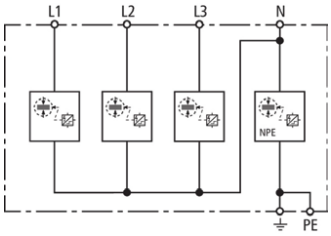
Type Part No.	DSH TNC 255 941 300
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 µs) [L1+L2+L3-PEN] (I_{total})	37.5 kA
Specific energy [L1+L2+L3-PEN] (W/R)	352.00 kJ/ohms
Lightning impulse current (10/350 µs) [L-PEN] (I_{imp})	12.5 kA
Specific energy [L-PEN] (W/R)	39.06 kJ/ohms
Nominal discharge current (8/20 µs) [L-PEN]/[L1+L2+L3-PEN] (I_n)	12.5 / 37.5 kA
Voltage protection level (U_P)	≤ 1.5 kV
Follow current extinguishing capability (a.c.) (I_{fi})	25 kA_{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
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, PEN) (min.)	1.5 mm^2 solid / flexible
Cross-sectional area (L1, L2, L3, PEN) (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
Weight	386 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364133556
PU	1 pc(s)

DEHNshield

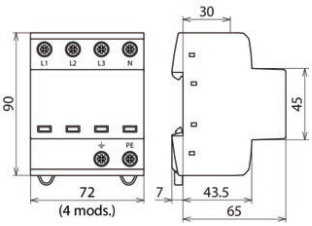
DSH TT 255 (941 310)

- 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



Dimension drawing DSH TT 255

Application-optimised and prewired combined lightning current and surge arrester for TT and TN-S systems (3+1 configuration).

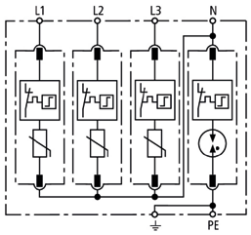
Type Part No.	DSH TT 255 941 310
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 µs) [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 µs) [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 µs) [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_{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. 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, ⏚) (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, VDE, UL
Extended technical data:	----------
Voltage protection level [L-PE] (U_P)	2.0 kV
Weight	480 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364131798
PU	1 pc(s)

DEHNguard

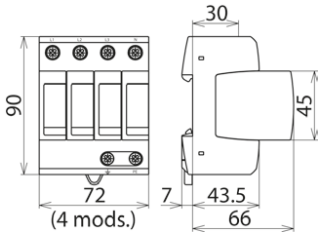
DG M TT 275 (952 310)

- 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



Dimension drawing DG M TT 275

Modular surge arrester for use in TT and TN-S systems (3+1 configuration).

Type Part No.	DG M TT 275 952 310
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
Extended technical data:	----------
Voltage protection level [L-PE] (U_P)	1.5 kV
Weight	405 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364108479
PU	1 pc(s)

Fuse box

SK EK480 G2S-2d LM DCOR (900 443)

The EK480 fuse box is a high-quality product from Langmatz which stands out for its excellent workmanship and tried and tested features. The EK480 series meets all mechanical and electrical requirements and standards. This ensures the effective protection of luminaires with high-quality electronics against surges resulting from switching operations or nearby lightning strikes.Flexibility

- Optimal installation thanks to large terminal compartment
- Spring clamp connection (innovative plug-in technology allows the toolless connection of wires to the luminaire)
- Easy replacement of the surge protective device

Stability and safety

- Contact protection, undetachable and transparent, for easy connection check
- Robust enclosure made of impact-resistant, solid-coloured polyamide IP54

Surge protection

- Dual visual fault indicator for the discharge path of the supply voltage and control phase
- Transparent cover for visually detecting SPD failure
- LED can be disconnected in case of a faulty surge protective device
- Protection of a second phase / control phase
- Multipole type 2 surge arrester with monitoring device and disconnector

Disconnector

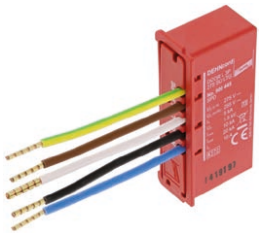
- Design optimised for integration into upper cable connection compartment

Fields of application

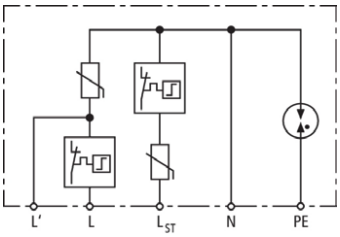
- Can be used for door sizes from 80 x 300 mm
- Can be installed in masts with an inside diameter from 89 mm

Figure without obligation

EK480 fuse box



DEHNcord surge protective device



Basic circuit diagram DEHNcord

Data of fuse box

Type Part No.	SK EK480 G2S-2d LM DCOR 900 443
Designation	EK480 with surge protective device
Dimensions	276 x 81 x 70 mm
For masts with an inside diameter from	89 mm
Enclosure material	polyamide
Enclosure colour	standard colour RAL 7035 light grey
Design	according to DIN 43 628 and VDE 0660 Part 505
Degree of protection	IP 54 according to DIN VDE 0470
Protection class	II
Cover	transparent or grey
Clamping technology	incoming: sliding clamp technology / outgoing: spring clamp technology
Max. cross-section of connectable cable	1 - 3 cables (4 or 5 x 16 mm^2)
Outgoing terminals	max. 2.5 mm^2

Fuse box

SK EK480 G2S-2d LM DCOR (900 443)

Data of DEHNcord L 3P 275 SO LTG surge protective device

Type Part No.	SK EK480 G2S-2d LM DCOR 900 443
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 V (50 / 60 Hz) V (50 / 60 Hz)
Max. continuous operating a.c. voltage [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous operating a.c. voltage [N-PE] (U_C)	255 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Total discharge current (8/20 µs) [L+N-PE] (I_{total})	20 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Voltage protection level [N-PE] (U_P)	≤ 1.5 kV
Follow current extinguishing capability [N-PE] (I_{fi})	100 A_{rms}
Response time [L-N] (t_A)	≤ 25 ns
Response time [L/N-PE] (t_A)	≤ 100 ns
Max. load current (a.c.) (I_L)	10 A
Max. mains-side overcurrent protection	B 16 A
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	1 kA_{rms}
Short-circuit withstand capability for mains-side overcurrent protection with 16 A gG (I_{SCCR})	6 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 – safe failure
Fault indication	red
Interruption of the load circuit in the event of a fault	yes
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Terminal wires	1.5 mm^2, 60 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Place of installation	indoor installation, fuse boxes for mast installation
Degree of protection of installed device	IP 20
Approvals	KEMA
Extended technical data:	----------
– Combination wave (U_{OC})	10 kV
Weight	785 g
Customs tariff number (Comb. Nomenclature EU)	85362010
GTIN	4013364394322
PU	20 pc(s)

DEHNcord

DCOR L 3P 275 SO LTG (900 445)

- Visual fault indication for both protective paths
- Interruption of the load circuit in the event of a fault
- Compact design

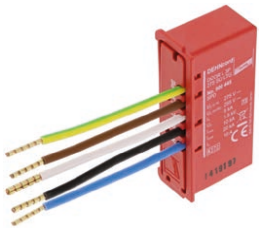
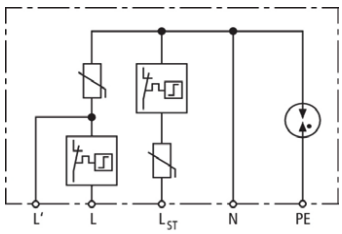
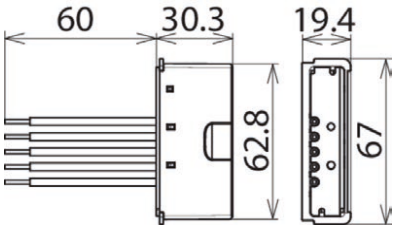


Figure without obligation



Basic circuit diagram DCOR L 3P 275 SO LTG



Dimension drawing DCOR L 3P 275 SO LTG

Three-pole arrester for all installation systems; compact design. With disconnection of the load circuit in the event of a fault and protection of the control phase

Technical data

Type Part No.	DCOR L 3P 275 SO LTG 900 445
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 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)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Total discharge current (8/20 µs) [L+N-PE] (I_{total})	20 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Voltage protection level [N-PE] (U_P)	≤ 1.5 kV
Follow current extinguishing capability [N-PE] (I_{fi})	100 A_{rms}
Response time [L-N] (t_A)	≤ 25 ns
Response time [L/N-PE] (t_A)	≤ 100 ns
Max. load current (I_L)	10 A
Max. mains-side overcurrent protection	B 16 A
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	1 kA_{rms}
Short-circuit withstand capability for mains-side overcurrent protection with 16 A gG (I_{SCCR})	6 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 – safe failure
Fault indication	red
Interruption of the load circuit in the event of a fault	yes
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Connecting wires	1.5 mm^2, 60 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Place of installation	indoor installation, fuse box for mast installation
Degree of protection of installed device	IP 20
Approvals	KEMA
Extended technical data:	----------
– Combination wave (U_{OC})	10 kV
Weight	58 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364280380
PU	1 pc(s)

DEHNcord

DCOR L 2P 275 SO LTG (900 446)

- Visual fault indication
- Interruption of the load circuit in the event of a fault
- Compact design

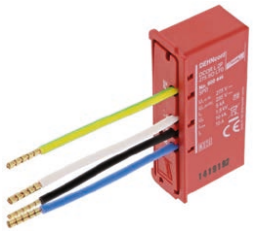
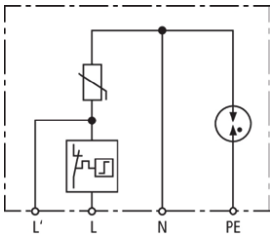
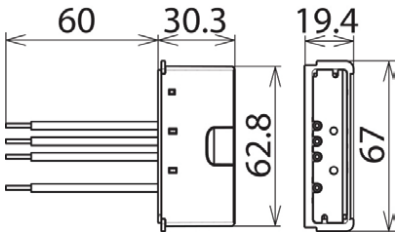


Figure without obligation



Basic circuit diagram DCOR L 2P 275 SO LTG



Dimension drawing DCOR L 2P 275 SO LTG

Surge arrester for all installation systems; compact design. With disconnection of the load circuit in the event of a fault.

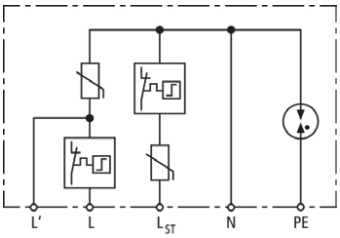
Type Part No.	DCOR L 2P 275 SO LTG 900 446
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [N-PE] (U_C)	255 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Voltage protection level [N-PE] (U_P)	≤ 1.5 kV
Follow current extinguishing capability [N-PE] (I_{fi})	100 A_{rms}
Response time [L-N] (t_A)	≤ 25 ns
Response time [L/N-PE] (t_A)	≤ 100 ns
Max. load current (I_L)	10 A
Max. mains-side overcurrent protection	B 16 A
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	1 kA_{rms}
Short-circuit withstand capability for mains-side overcurrent protection with 16 A gG (I_{SCCR})	6 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 – safe failure
Fault indication	red
Interruption of the load circuit in the event of a fault	yes
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Connecting wires	1.5 mm^2, 60 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Place of installation	indoor installation, fuse boxes for mast installation
Degree of protection of installed device	IP 20
Approvals	KEMA
Additional tests:	----------
– Total discharge current (I_{sum})	20 kA
Extended technical data:	----------
– Combination wave (U_{OC})	10 kV
Weight	49 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364292970
PU	1 pc(s)

DEHNcord

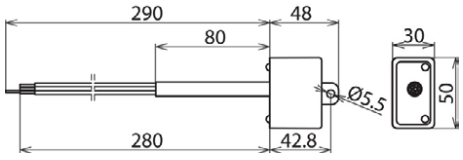
DCOR L 3P 275 SO IP (900 447)

- Visual fault indication for both protective paths
- Interruption of the load circuit in the event of a fault
- Compact design

Figure without obligation



Basic circuit diagram DCOR L 3P 275 SO IP



Dimension drawing DCOR L 3P 275 SO IP

Three-pole surge arrester for all installation systems; compact design. IP 65 degree of protection. With disconnection of the load circuit in the event of a fault and protection of the control phase

Technical data

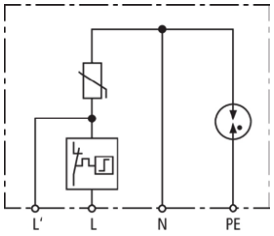
Type Part No.	DCOR L 3P 275 SO IP 900 447
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [N-PE] (U_C)	255 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Total discharge current (8/20 µs) [L+N-PE] (I_{total})	20 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Voltage protection level [N-PE] (U_P)	≤ 1.5 kV
Follow current extinguishing capability [N-PE] (I_{fi})	100 A_{rms}
Response time [L-N] (t_A)	≤ 25 ns
Response time [L/N-PE] (t_A)	≤ 100 ns
Max. load current (I_L)	10 A
Max. mains-side overcurrent protection	B 16 A
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	1 kA_{rms}
Short-circuit withstand capability for mains-side overcurrent protection with 16 A gG (I_{SCCR})	6 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 – safe failure
Fault indication	red
Interruption of the load circuit in the event of a fault	yes
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Connecting cable	1.5 mm^2, 230 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Degree of protection of installed device	IP 65
Extended technical data:	----------
– Combination wave (U_{OC})	10 kV
Weight	130 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364282216
PU	1 pc(s)

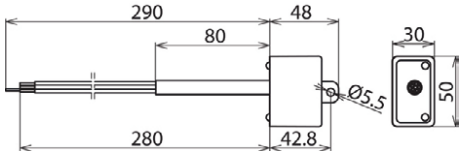
DEHNcord

DCOR L 2P 275 SO IP (900 448)

- Visual fault indication
- Interruption of the load circuit in the event of a fault
- Compact design

Figure without obligation





Dimension drawing DCOR L 2P 275 SO IP

Two-pole arrester for all installation systems; compact design. IP 65 degree of protection. With disconnection of the load circuit in the event of a fault.

Technical data

Type Part No.	DCOR L 2P 275 SO IP 900 448
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 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)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Voltage protection level [N-PE] (U_P)	≤ 1.5 kV
Follow current extinguishing capability [N-PE] (I_{fi})	100 A_{rms}
Response time [L-N] (t_A)	≤ 25 ns
Response time [L/N-PE] (t_A)	≤ 100 ns
Max. load current (I_L)	10 A
Max. mains-side overcurrent protection	B 16 A
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	1 kA_{rms}
Short-circuit withstand capability for mains-side overcurrent protection with 16 A gG (I_{SCCR})	6 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 – safe failure
Fault indication	red
Interruption of the load circuit in the event of a fault	yes
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Connecting cable	1.5 mm^2, 230 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Degree of protection of installed device	IP 65
Additional tests:	----------
– Total discharge current (I_{sum})	20 kA
Extended technical data:	----------
– Combination wave (U_{OC})	10 kV
Weight	113 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364293007
PU	1 pc(s)

DEHNcord

DCOR L 1P 275 (900 431)

- Visual fault indication
- Compact design
- For use in flush-mounted systems, cable ducts and flush-type boxes

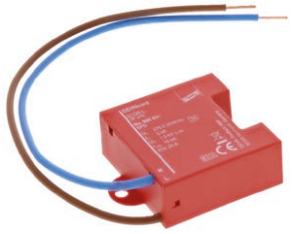
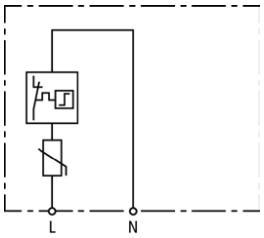
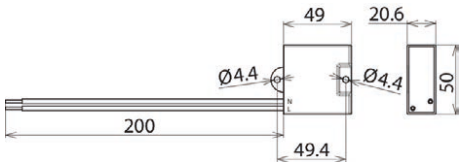


Figure without obligation



Basic circuit diagram DCOR L 1P 275



Dimension drawing DCOR L 1P 275

Single-pole surge arrester for lamps with protective class II; compact design.

Technical data

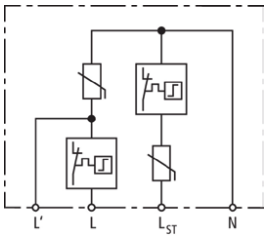
Type Part No.	DCOR L 1P 275 900 431
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Response time [L-N] (t_A)	≤ 25 ns
Max. mains-side overcurrent protection	25 A gG
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	25 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
Operating state / fault indication	green / red
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Connecting wires	1.5 mm^2, 200 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Place of installation	indoor installation
Degree of protection of installed device	IP 20
Approvals	KEMA
Weight	46 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364310827
PU	1 pc(s)

DEHNcord

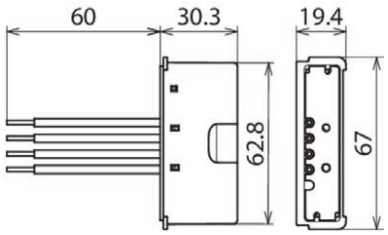
DCOR L 2P SN1864 (999 906)

- Visual fault indication for both protective paths
- Interruption of the load circuit in the event of a fault
- Compact design

Figure without obligation



Basic circuit diagram DCOR L 2P SN1864



Dimension drawing DCOR L 2P SN1864

Surge arrester for lamps with protective class II; compact design. With disconnection in the event of a fault.

Technical data

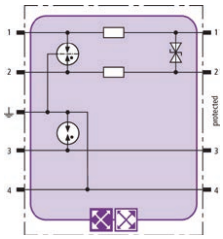
Type Part No.	DCOR L 2P SN1864 999 906
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Response time [L-N] (t_A)	≤ 25 ns
Max. load current (I_L)	10 A
Max. mains-side overcurrent protection	B 16 A
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	1 kA_{rms}
Short-circuit withstand capability for mains-side overcurrent protection with 16 A gG (I_{SCCR})	6 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
Fault indication	red
Interruption of the load circuit in the event of a fault	yes
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Connecting wires	1.5 mm^2, 60 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Place of installation	indoor installation, LED head / fuse box for mast installation
Degree of protection of installed device	IP 20
Additional tests:	----------
– Total discharge current (I_{sum})	20 kA
Weight	54 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364310926
PU	1 pc(s)

BLITZDUCTOR XT

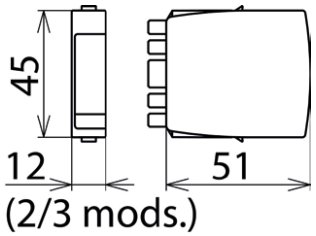
BXT ML2 BD S 24 (920 244)

- 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)

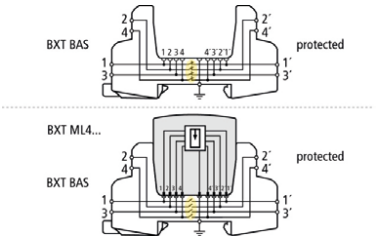
*) For more detailed information, please visit www.dehn-international.com.

BLITZDUCTOR XT

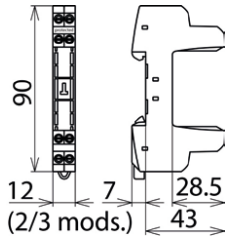
BXT BAS (920 300)

- 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

Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.

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