Use of application-optimised type 1 combined arresters in low-voltage installations

White Paper

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- Outdoor socket outlets
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Use of application-optimised DEHNshield combined arresters in low-voltage installations

When lightning hits the external lightning protection system of a building, the lightning current is shared between the cables entering the building and the building's earth electrode. To prevent dangerous sparking in the structure to be protected, the IEC 62305 (EN 62305) lightning protection standard recommends taking internal lightning protection measures when installing an external lightning protection system. Under the term "lightning equipotential bonding", the standard describes the connection of all metal parts directly or, in the case of power supply and information technology systems, indirectly via surge protective devices in the structure. The surge protective devices specified in this standard are type 1 lightning current arresters with adequate voltage protection level. Application-optimised DEHNshield type 1 combined arresters combine lightning equipotential bonding up to 50 kA (10/350 µs) lightning impulse currents and surge protection in a single arrester stage. This clearly distinguishes DEHNshield from other varistor-based arresters currently on the market for this class of application and performance.

DEHNshield arresters also provide optimal protection for buildings without an external lightning protection system where power is supplied through an overhead line. DEHNshield combined arresters can be used without an additional backup fuse if the installation is already protected by backup fuses up to 160 A. The follow-current-limiting spark gap technology ensures selectivity even with respect to low-value fuses (35 A gL/gG), meaning that upstream fuses are not tripped by mains follow currents. If lightning hits external equipment (for example a camera mast), partial lightning current will flow through the earth electrode of the external equipment. A further partial lightning current will flow toward the building via the connection cable. One must ensure that this partial lightning current does overload the surge protective device (SPD) installed in the building.

Due to their technical parameters, which are configured for use in simple and compact electrical installations, DEHNshield arresters are a good solution for this field of application (**Figure 1**).

What is understood by application-optimised use?

A type 1 arrester installed at the entrance point into the building must be capable of carrying the partial lightning currents described above. Type 2 and / or type 3 arresters downstream of the entrance point into the building must be energy-coordinated with this type 1 arrester. The follow current limiting and application-optimised DEHNshield combined arrester with spark gap technology (type 1 SPD) fulfils all these requirements. Varistor-based type 1 SPDs cannot usually fulfil such criteria. Thanks to its wave breaker function, DEHNshield is

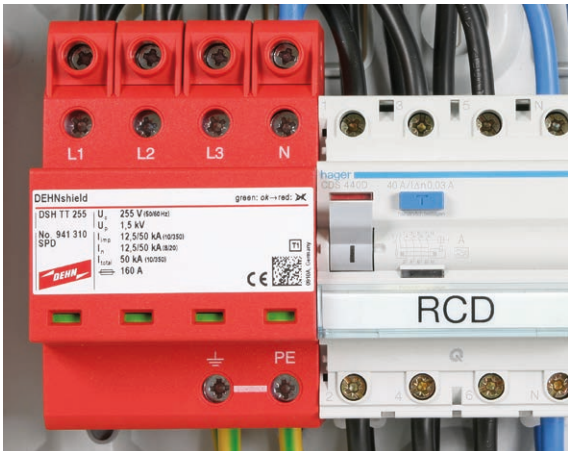

Figure 1 Prewired and application-optimised DEHNshield combined arrester with spark gap technology

capable of protecting terminal equipment and thus ensuring energy coordination with type 2 or type 3 arresters (**Figure 1**). DEHNshield combined arresters allow cost-optimised and application-specific design and configuration for a particular application in line with recognised standards. DEHNshield makes it possible to establish lightning equipotential bonding even in the, often limited, space available when retrofitting. It is, however, still important to check the parameters of the retrofit in the same way as for a new design to verify the suitability of DEHNshield. The following overviews of buildings and installations show some of the possible applications for DEHNshield.

Sample applications in Figure 2

In order to reduce lightning currents, equipment must be directly connected to earth electrodes at points where direct lightning strikes are likely to occur (LPZ 0_A) such as masts with video cameras, lamp posts and under-road heating. Cameras are frequently used for safety and security-related evaluation (monitoring systems) and lamp posts often have an important personal protection function (e.g., escape route lighting). This safety aspect makes it doubly important to implement the necessary lightning protection measures.

The situation is similar for under-road heating, except that here the area which is particularly susceptible to lightning strikes extends to in front of or next to the building. In the interest of personal safety, e.g. to prevent slipping on steep entrances and exits to underground car parks, measures should be taken to minimise the risk of lightning and surge-related disturbances of the heating system.

The earth electrodes of these pieces of equipment must be interconnected. If this connection is in contact with the ground (Supplement 1 of the German DIN EN 62305-3 (VDE 0185-305-3) standard) and extends over the entire cable route up to

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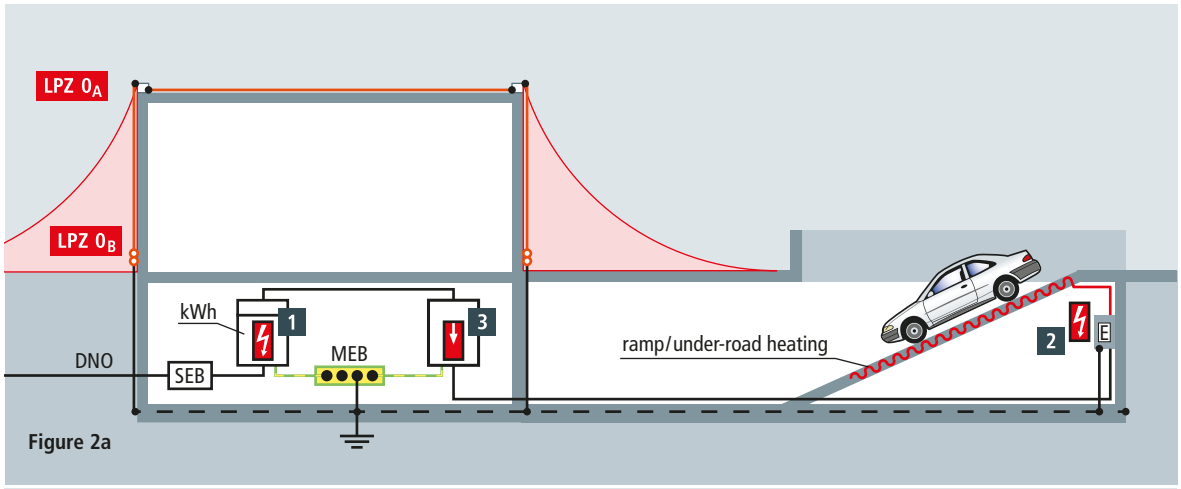

Figure 2a

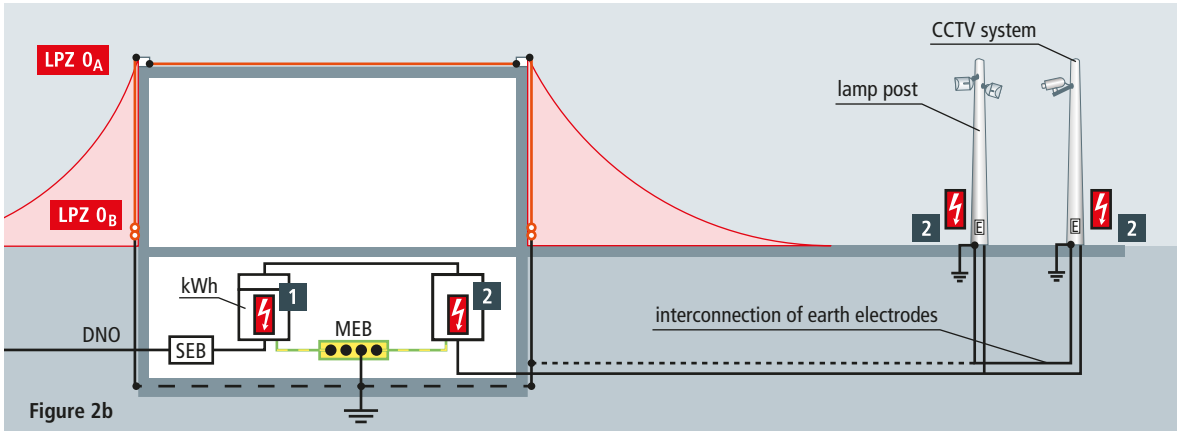

Figure 2b

SEB: Service Entrance Box
MEB: Main Earthing Busbar
LPZ: Lightning Protection Zone
DNO: Distribution Network Operator

— — — earth electrodes interconnected in a defined way (to ensure that they are capable of carrying lightning currents)

- - - - - - - - earth electrodes interconnected in an undefined way

	Surge protective device	Part No.
1	DEHNventil modular DV M TNS 255 (TN-S systems) or	951 400
	DEHNventil modular DV M TT 255 (TT systems)	951 310
2	DEHNshield DSH TNS 255 (TN-S systems) or	941 400
	DEHNshield DSH TT 255 (TT systems) or	941 310
	DEHNshield DSH TN 255 (single-phase TN systems) or	941 200
	DEHNshield DSH TT 2P 255 (single-phase TT and TN systems)	941 110
3	DEHNguard modular DG M TNS 275 (TN-S systems) or	952 400
	DEHNguard modular DG M TT 275 (TT systems) or	952 310
	DEHNguard modular DG M TN 275 (TN systems) or	952 200
	DEHNguard modular DG M TT 2P 275 (single-phase TT and TN systems)	952 110

Figure 2 Application-optimised use of DEHNshield with reference to an under-road radiator at the entrance to an underground car park (2a), a lamp post and a CCTV system (2b)

Use of application-optimised type 1 combined arresters in low-voltage installations

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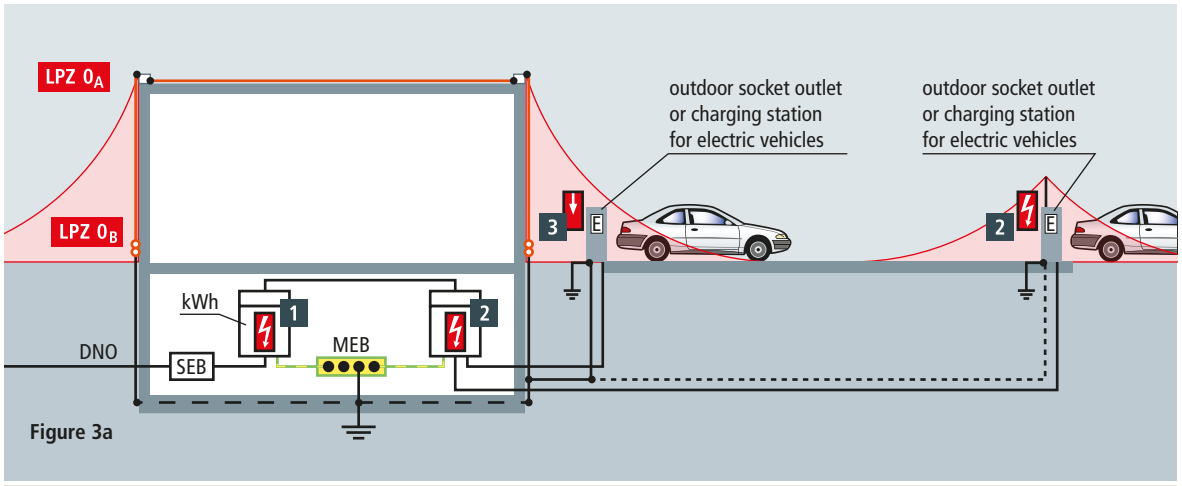


Figure 3a

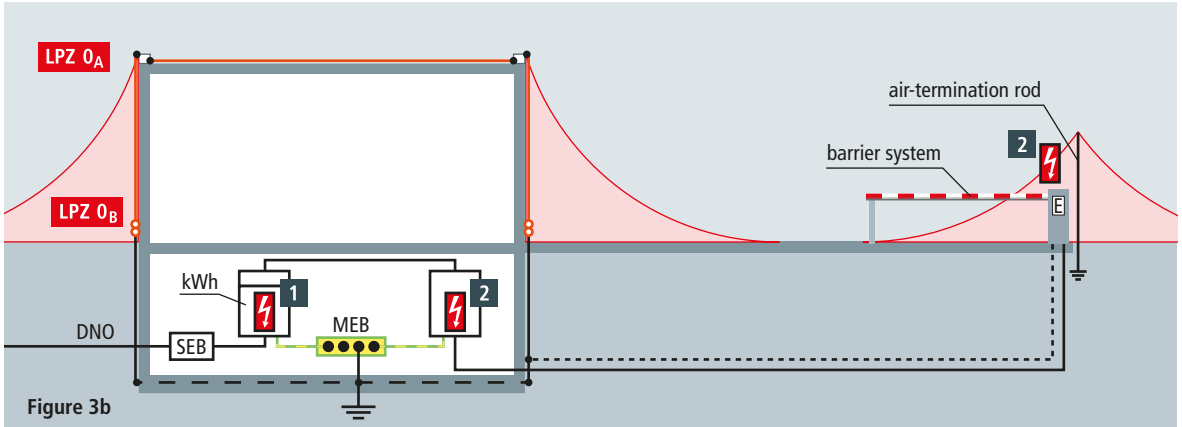


Figure 3b

SEB: Service Entrance Box
MEB: Main Earthing Busbar
LPZ: Lightning Protection Zone
DNO: Distribution Network Operator

— — — earth electrodes interconnected in a defined way (to ensure that they are capable of carrying lightning currents)

- - - - - - - - earth electrodes interconnected in an undefined way

	Surge protective device	Part No.
1	DEHNventil modular DV M TNS 255 (TN-S systems) or	951 400
	DEHNventil modular DV M TT 255 (TT systems)	951 310
2	DEHNshield DSH TNS 255 (TN-S systems) or	941 400
	DEHNshield DSH TT 255 (TT systems) or	941 310
	DEHNshield DSH TN 255 (single-phase TN systems) or	941 200
	DEHNshield DSH TT 2P 255 (single-phase TT and TN systems)	941 110
3	DEHNguard modular DG M TNS 275 (TN-S systems) or	952 400
	DEHNguard modular DG M TT 275 (TT systems) or	952 310
	DEHNguard modular DG M TN 275 (TN systems) or	952 200
	DEHNguard modular DG M TT 2P 275 (single-phase TT and TN systems)	952 110

Figure 3 Application-optimised use of DEHNshield with reference to a charging station for electric vehicles or an outdoor socket outlet (3a) and a barrier system (3b)

the building, it prevents damage to the cable should lightning strike the ground.

Sample applications in Figure 3

Even if the possibility of a lightning strike to external equipment can be ruled out (LPZ 0_B), partial lightning currents still pose a risk when lightning hits the external lightning protection system of the main building. In this case, partial lightning currents may travel through the cables to equipment with a remote earth potential (charging posts for electric vehicles, outdoor socket outlets and barrier systems protected by air-termination rods).

To ensure the safe flow of traffic, future concepts for charging stations for electric vehicles will require high availability, on a par with today's petrol stations. Since these charging stations are located outside buildings and are equipped with sensitive electrical systems, special attention should be paid to lightning protection in order to minimise those disturbances resulting from lightning strikes and surges.

For many years now, barrier systems have been protected against lightning strikes and surges to ensure their faultless operation. As far as outdoor socket outlets are concerned, lightning and surge protection measures may need to be taken at the design stage, depending on their intended use. An earth electrode is also required for such equipment to conduct the lightning currents flowing via DEHNshield from the building to earth. Here, the interconnection of earth electrodes is also recommended, but not mandatory. Equipment fitted directly on the building and connected to the earth-termination system of the building and the supply line, can be protected by type 2 arresters.

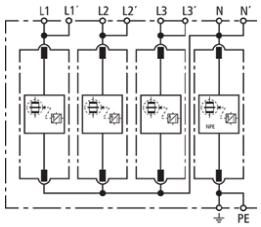
An application-optimised type 1 arrester such as DEHNshield is suitable for protecting specific applications. This, however, requires the consistent implementation of the measures described and consideration of the technical parameters of the installation to be protected. A properly functioning earth-termination system, for example, is one of the most important aspects for the overall system.

DEHNventil

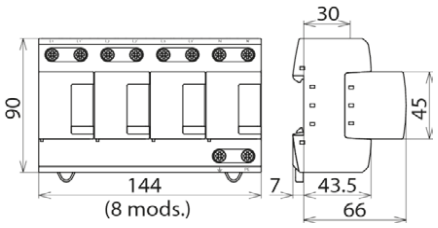
DV M TT 255 (951 310)

- Prewired spark-gap-based type 1 and type 2 combined lightning current and surge arrester consisting of a base part and plug-in protection modules
- Maximum system availability due to RADAX Flow follow current limitation
- Capable of protecting terminal equipment

Figure without obligation



Basic circuit diagram DV M TT 255



Dimension drawing DV M TT 255

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

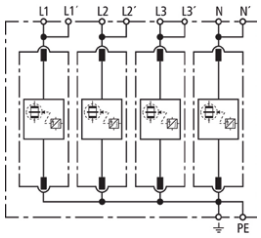
Type Part No.	DV M TT 255 951 310
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	264 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [N-PE] ($U_{C\ (N-PE)}$)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 µs) [L1+L2+L3+N-PE] (I_{total})	100 kA
Specific energy [L1+L2+L3+N-PE] (W/R)	2.50 MJ/ohms
Lightning impulse current (10/350 µs) [L-N]/[N-PE] (I_{imp})	25 / 100 kA
Specific energy [L-N]/[N-PE] (W/R)	156.25 kJ/ohms / 2.50 MJ/ohms
Nominal discharge current (8/20 µs) [L-N]/[N-PE] (I_n)	25 / 100 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})	50 kA_{rms} / 100 A_{rms}
Follow current limitation / Selectivity	no tripping of a 20 A gG fuse up to 50 kA_{rms} (prosp.)
Response time (t_A)	≤ 100 ns
Max. backup fuse (L) up to I_K = 50 kA_{rms}	315 A gG
Max. backup fuse (L-L')	125 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 / -40 °C ... +60 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (L1, L1', L2, L2', L3, L3', N, N', PE, ⏚) (min.)	10 mm^2 solid / flexible
Cross-sectional area (L1, L2, L3, N, PE) (max.)	50 mm^2 stranded / 35 mm^2 flexible
Cross-sectional area (L1', L2', L3', N', ⏚) (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	8 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Extended technical data:	----------
Voltage protection level [L-PE] (U_P)	2.2 kV
For use in switchgear installations with prospective short-circuit currents of more than 50 kA_{rms} (tested by the German VDE)	----------
– Max. prospective short-circuit current	100 kA_{rms} (220 kA_{peak})
– Limitation / Extinction of mains follow currents	up to 100 kA_{rms} (220 kA_{peak})
– Max. backup fuse (L) up to I_K = 100 kA_{rms}	315 A gG
Weight	1,27 kg
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364108172
PU	1 pc(s)

DEHNventil

DV M TNS 255 (951 400)

- Prewired spark-gap-based type 1 and type 2 combined lightning current and surge arrester consisting of a base part and plug-in protection modules
- Maximum system availability due to RADAX Flow follow current limitation
- Capable of protecting terminal equipment

Figure without obligation



Basic circuit diagram DV M TNS 255

Dimension drawing DV M TNS 255

Modular combined lightning current and surge arrester for TN-S systems.

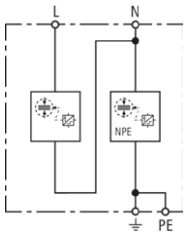
Type Part No.	DV M TNS 255 951 400
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	264 V (50 / 60 Hz)
Lightning impulse current (10/350 µs) [L1+L2+L3+N-PE] (I_{total})	100 kA
Specific energy [L1+L2+L3+N-PE] (W/R)	2.50 MJ/ohms
Lightning impulse current (10/350 µs) [L, N-PE] (I_{imp})	25 kA
Specific energy [L,N-PE] (W/R)	156.25 kJ/ohms
Nominal discharge current (8/20 µs) [L/N-PE]/[L1+L2+L3+N-PE] (I_n)	25 / 100 kA
Voltage protection level [L-PE]/[N-PE] (U_P)	≤ 1.5 / ≤ 1.5 kV
Follow current extinguishing capability (a.c.) (I_{fi})	50 kA_{rms}
Follow current limitation / Selectivity	no tripping of a 20 A gG fuse up to 50 kA_{rms} (prosp.)
Response time (t_A)	≤ 100 ns
Max. backup fuse (L) up to I_K = 50 kA_{rms}	315 A gG
Max. backup fuse (L-L')	125 A gG
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	440 V / 120 min. – withstand
Operating temperature range [parallel] / [series] (T_U)	-40 °C ... +80 °C / -40 °C ... +60 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (L1, L1', L2, L2', L3, L3', N, N', PE, ⏚) (min.)	10 mm^2 solid / flexible
Cross-sectional area (L1, L2, L3, N, PE) (max.)	50 mm^2 stranded / 35 mm^2 flexible
Cross-sectional area (L1', L2', L3', N', ⏚) (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	8 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Extended technical data:	For use in switchgear installations with prospective short-circuit currents of more than 50 kA_{rms} (tested by the German VDE)
– Max. prospective short-circuit current	100 kA_{rms} (220 kA_{peak})
– Limitation / Extinction of mains follow currents	up to 100 kA_{rms} (220 kA_{peak})
– Max. backup fuse (L) up to I_K = 100 kA_{rms}	315 A gG
Weight	1,35 kg
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364108158
PU	1 pc(s)

DEHNshield

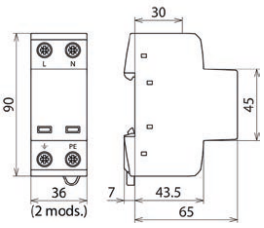
DSH TT 2P 255 (941 110)

- 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 2P 255



Dimension drawing DSH TT 2P 255

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

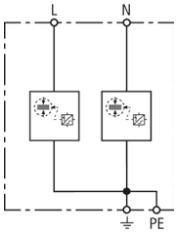
Type Part No.	DSH TT 2P 255 941 110
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 µs) [L+N-PE] (I_{total})	25 kA
Specific energy [L+N-PE] (W/R)	156.25 kJ/ohms
Lightning impulse current (10/350 µs) [L-N]/[N-PE] (I_{imp})	12.5 / 25 kA
Specific energy [L-N]/[N-PE] (W/R)	39.06 / 156.25 kJ/ohms
Nominal discharge current (8/20 µs) [L-N]/[N-PE] (I_n)	12.5 / 25 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 (L, N, PE, ⏚) (min.)	1.5 mm^2 solid / flexible
Cross-sectional area (L, 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	2 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Extended technical data:	----------
Voltage protection level [L-PE] (U_P)	2.0 kV
Weight	275 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364137899
PU	1 pc(s)

DEHNshield

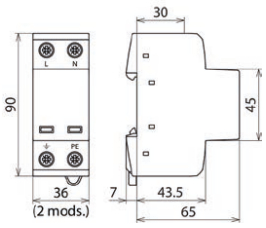
DSH TN 255 (941 200)

- 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 TN 255



Dimension drawing DSH TN 255

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

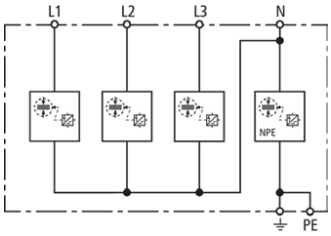
Type Part No.	DSH TN 255 941 200
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 µs) [L+N-PE] (I_{total})	25 kA
Specific energy [L+N-PE] (W/R)	156.25 kJ/ohms
Lightning impulse current (10/350 µs) [L, N-PE] (I_{imp})	12.5 kA
Specific energy [L,N-PE] (W/R)	39.06 kJ/ohms
Nominal discharge current (8/20 µs) [L/N-PE]/[L+N-PE] (I_n)	12.5 / 25 kA
Voltage protection level [L-PE]/[N-PE] (U_P)	≤ 1.5 /≤ 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 (L, N, PE, ⏚) (min.)	1.5 mm^2 solid / flexible
Cross-sectional area (L, 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	2 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Weight	250 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364138209
PU	1 pc(s)

DEHNshield

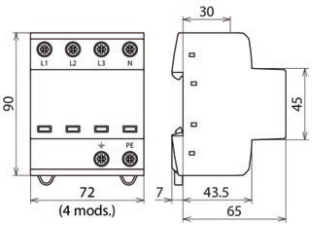
DSH TT 255 (941 310)

- 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).

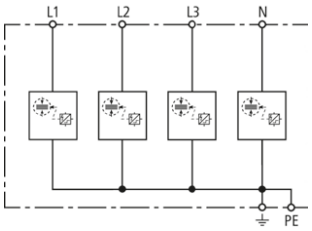
Type Part No.	DSH TT 255 941 310
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 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)

DEHNshield

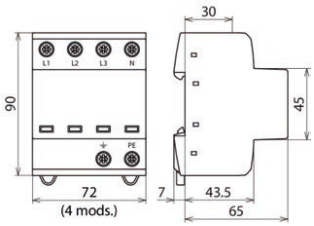
DSH TNS 255 (941 400)

- 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 TNS 255



Dimension drawing DSH TNS 255

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

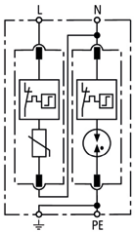
Type Part No.	DSH TNS 255 941 400
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Energy coordination with terminal equipment (≤ 10 m)	type 1 + type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 V (50 / 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-PE] (I_{imp})	12.5 kA
Specific energy [L,N-PE] (W/R)	39.06 kJ/ohms
Nominal discharge current (8/20 µs) [L/N-PE]/[L1+L2+L3+N-PE] (I_n)	12.5 / 50 kA
Voltage protection level [L-PE]/[N-PE] (U_P)	≤ 1.5 / ≤ 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, 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
Weight	525 g
Customs tariff number (Comb. Nomenclature EU)	85363090
GTIN	4013364133563
PU	1 pc(s)

DEHNguard

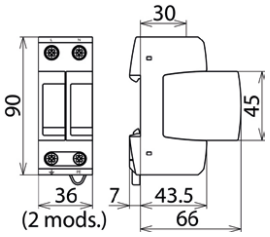
DG M TT 2P 275 (952 110)

- 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 2P 275



Dimension drawing DG M TT 2P 275

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

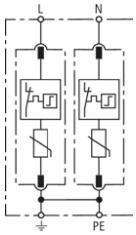
Type Part No.	DG M TT 2P 275 952 110
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [N-PE] (U_C)	255 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	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	2 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Extended technical data:	----------
Voltage protection level [L-PE] (U_P)	1.5 kV
Weight	242 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364108417
PU	1 pc(s)

DEHNguard

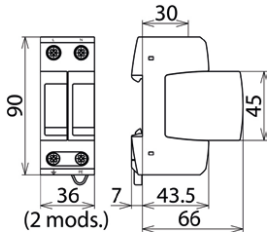
DG M TN 275 (952 200)

- 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 TN 275



Dimension drawing DG M TN 275

Modular surge arrester for use in single-phase TN systems.

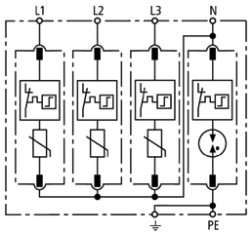
Type Part No.	DG M TN 275 952 200
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	20 kA
Max. discharge current (8/20 µs) (I_{max})	40 kA
Voltage protection level [L-PE]/[N-PE] (U_P)	≤ 1.5 / ≤ 1.5 kV
Voltage protection level [L-PE] / [N-PE] at 5 kA (U_P)	≤ 1 / ≤ 1 kV
Response time (t_A)	≤ 25 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) (U_T) – Characteristic	335 V / 5 sec. – withstand
Temporary overvoltage (TOV) (U_T) – Characteristic	440 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	IP 20
Capacity	2 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Weight	229 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364108394
PU	1 pc(s)

DEHNguard

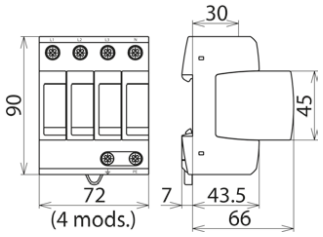
DG M TT 275 (952 310)

- 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).

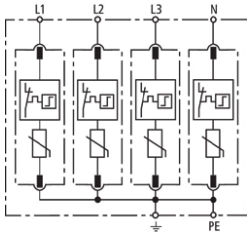
Type Part No.	DG M TT 275 952 310
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous 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)

DEHNguard

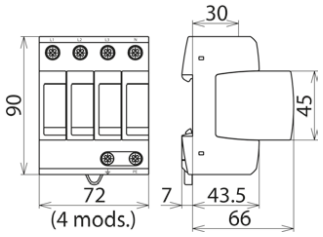
DG M TNS 275 (952 400)

- 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 TNS 275



Dimension drawing DG M TNS 275

Modular surge arrester for use in TN-S systems.

Type Part No.	DG M TNS 275 952 400
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.) (U_C)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	20 kA
Max. discharge current (8/20 µs) (I_{max})	40 kA
Voltage protection level [L-PE]/[N-PE] (U_P)	≤ 1.5 / ≤ 1.5 kV
Voltage protection level [L-PE] / [N-PE] at 5 kA (U_P)	≤ 1 / ≤ 1 kV
Response time (t_A)	≤ 25 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) (U_T) – Characteristic	335 V / 5 sec. – withstand
Temporary overvoltage (TOV) (U_T) – Characteristic	440 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	IP 20
Capacity	4 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Weight	414 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364108455
PU	1 pc(s)

Surge Protection
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Safety Equipment
DEHN protects.

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