



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

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 encourages to take internal lightning protection measures when installing an external lightning protection system. The standard also requires to establish lightning equipotential bonding by connecting all metal parts directly or, in case of power supply and information technology systems, indirectly via surge protective devices in the structure. The surge protective devices referred to in this standard are type 1 lightning current arresters with an adequate voltage protection level.

Application-optimised DEHNshield type 1 combined arresters combine lightning equipotential bonding up to 50 kA (10/350 μ s) lightning impulse currents and surge protection in a single arrester stage. This clearly distinguishes DEHNshield from the currently available varistor-based arresters of this application and performance class.

DEHNshield arresters also provide optimal protection for buildings without external lightning protection system where power is supplied through an overhead line and type 1 arresters are to be installed in the service entrance box according to the German VdS 2031 guideline. DEHNshield combined arresters can be used without additional backup fuse if the installation is 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 currents will flow into the building via the earth electrode of the external equipment and the connecting cables. In this context, it must be observed that these lightning currents flowing into the building will not overload the surge protective device (SPD) installed in the building.

Due to their technical parameters which are suited for use in simple and compact electrical installations, DEHNshield arresters are an ideal solution for this field of application (**Figure 9.30.1**).

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. Thanks to its wave breaker function, DEHNshield is capable of protecting

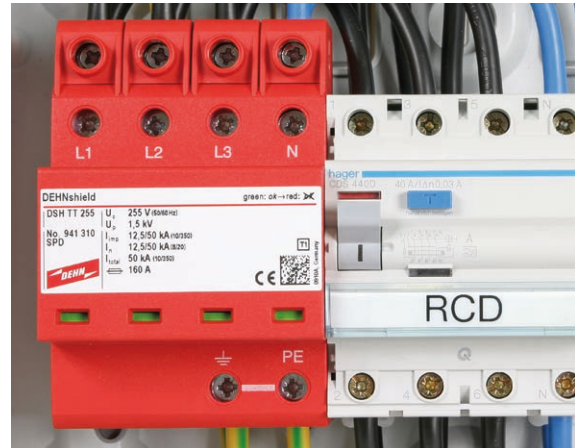


Figure 9.30.1 Prewired and application-optimised DEHNshield combined arrester with spark gap technology

terminal equipment and thus ensures energy coordination with type 2 or type 3 arresters (**Figure 9.30.1**). Varistor-based type 1 arresters are typically not suited for energy coordination.

DEHNshield combined arresters allow cost-optimised and application-specific design and configuration matched to a particular application in line with recognised standards. As space for retrofitting is confined, DEHNshield allows to establish lightning equipotential bonding wherever space is restricted. To this end, however, the parameters of the installation must be observed as is the case when planning new installations and it must be checked whether DEHNshield can be used.

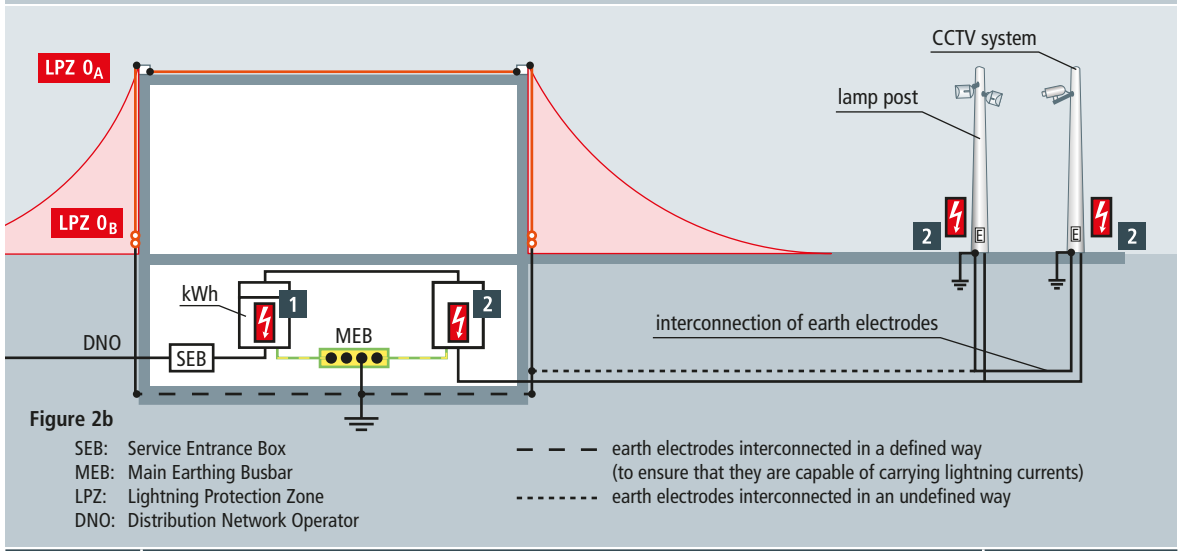
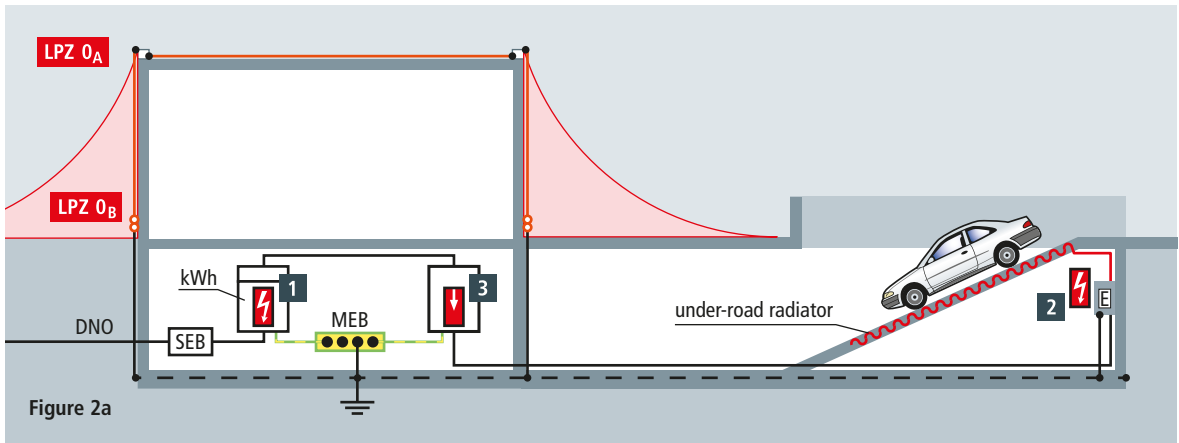
To make the field of application of DEHNshield more transparent, some sample applications are given in the following figures.

Sample applications in Figure 9.30.2

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 radiators. Cameras are frequently used for safety-related evaluation (monitoring systems) and lamp posts are in many cases essential to ensure personal protection (e.g. escape route lighting).

Therefore, the required lightning protection measures must be taken in both cases to ensure full protection. The situation is similar for under-road radiators, except that the area in front of or next to the building is particularly prone to lightning strikes. To ensure personal protection (slip hazard in case of steep entrances and exits of e.g. underground car parks), failure of the heating system as a result of lightning strikes or surges must be minimised.

The earth electrodes of these pieces of equipment must be interconnected. If this connection is performed in contact with



No. in Fig.	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) or	951 310
	DEHNventil DV ZP TT 255 (TT systems)	900 391
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 9.30.2 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)

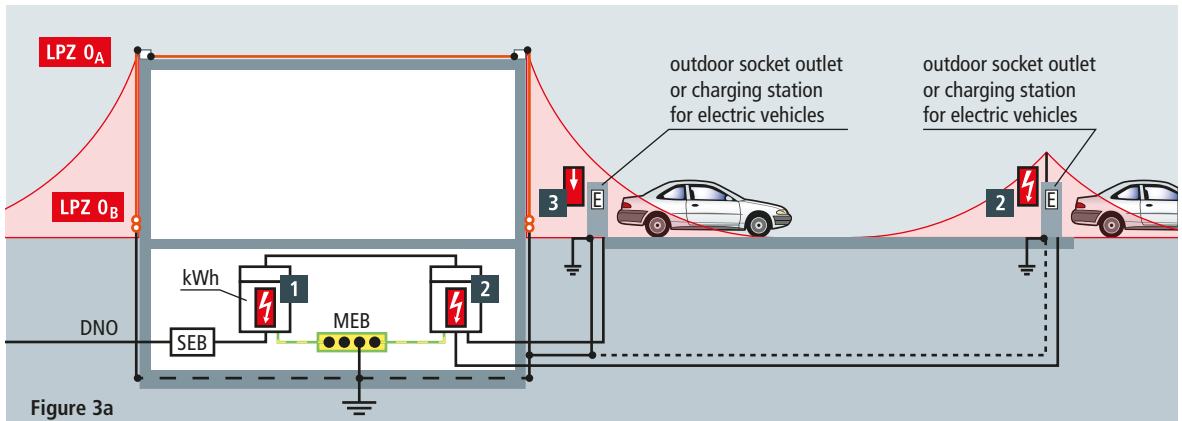


Figure 3a

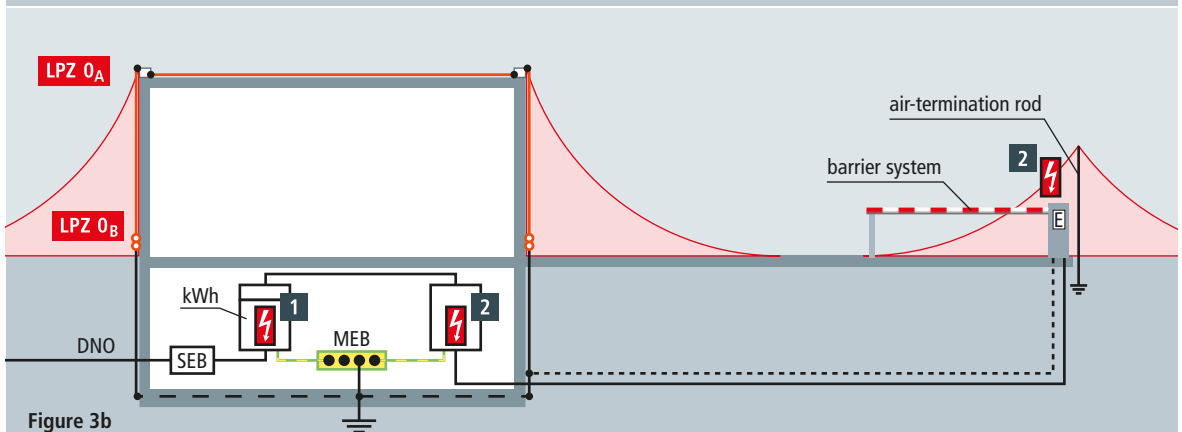


Figure 3b

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

No. in Fig.	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) or	951 310
	DEHNventil DV ZP TT 255 (TT systems)	900 391
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	DEHNgard modular DG M TNS 275 (TN-S systems) or	952 400
	DEHNgard modular DG M TT 275 (TT systems) or	952 310
	DEHNgard modular DG M TN 275 (TN systems) or	952 200
	DEHNgard modular DG M TT 2P 275 (single-phase TT and TN systems)	952 110

Figure 9.30.3 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 ground (Supplement 1 of the German DIN EN 62305-3 (VDE 0185-305-3) standard) and possibly extends over the entire cable route up to the building, damage to the cable is prevented if lightning strikes the ground.

Sample applications in Figure 9.30.3

If lightning strikes 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 stations for electric vehicles, outdoor socket outlets and barrier systems protected by air-termination rods).

To ensure safe traffic flow, future concepts of charging stations for electric vehicles require high availability as is the case with petrol stations. Since these charging stations are located outside buildings and are equipped with sensitive electrical systems, lightning protection is vital to minimise interference with the installation as a result of lightning strikes and surges.

Barrier systems have been protected against lightning strikes and surges over decades to ensure faultless operation. As far as outdoor socket outlets are concerned, lightning and surge protection measures may have to be taken at the design stage, depending on their intended use. An earth electrode is also required for these pieces of equipment to conduct the lightning currents flowing via DEHNshield from the building to earth. Also in this case, the interconnection of earth electrodes is recommended, but not mandatory. Equipment attached to the building, which is directly 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 that the described measures are implemented consistently and that the technical parameters of the installation to be protected are observed. A properly functioning earth-termination system, for example, is one of the most important aspects for the overall system.

