White Paper

Surge protection for gutter heating systems

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Solar radiation and waste heat from buildings may melt ice or snow even under frost conditions. Such melt water then refreezes, preventing water from draining away and causing it to back up. As a result, the roof drainage is blocked and there is an increased risk of icicle formation.

An even more serious problem is a heavy snow and ice build up that exceeds the maximum load capacity of the roof. Gutter heating systems prevent damage, however, only if their reliable function is ensured even under lightning and surge conditions.

Structure without external lightning protection system

If a structure has no external lightning protection system, it can be assumed that the operator assesses the probability of lightning striking his structure as low. In this case, type 2 surge arresters according to DIN VDE 0100-100/2009-06 must be used to protect the structure from inductive injection.

As both the heating bands as well as the temperature and moisture sensor are located outside the structure, their connecting cables are exposed to inductive injection, causing damage to the structure. To prevent this situation, type 2 surge arresters are connected to these cables directly at the entrance point into the building and to the supply cable upstream of the control unit (Figure 1).

Structure with external lightning protection system

IEC/EN 62305-1 to 4 (DIN EN 62305-1 to 4) must be observed when installing lightning protection systems in structures. In such systems, the gutters and/or downpipes are typically conductively connected to the air-termination systems and are therefore at a high potential in case of a lightning strike. Both the heating band and moisture sensor cables directly contact these lightning current carrying gutters and downpipes, meaning that lightning currents are automatically injected into the cables. For this reason, these cables must be connected to type 1 lightning current arresters directly at the entrance point into the building. It must be observed that lightning current splits both between the down conductors directly connected to the metallic gutter and the down conductors connected to the air-termination mesh. Even if the external lightning protection system only has four down conductors, lightning currents of less than 10 to 12 kA per core are to be expected in case of

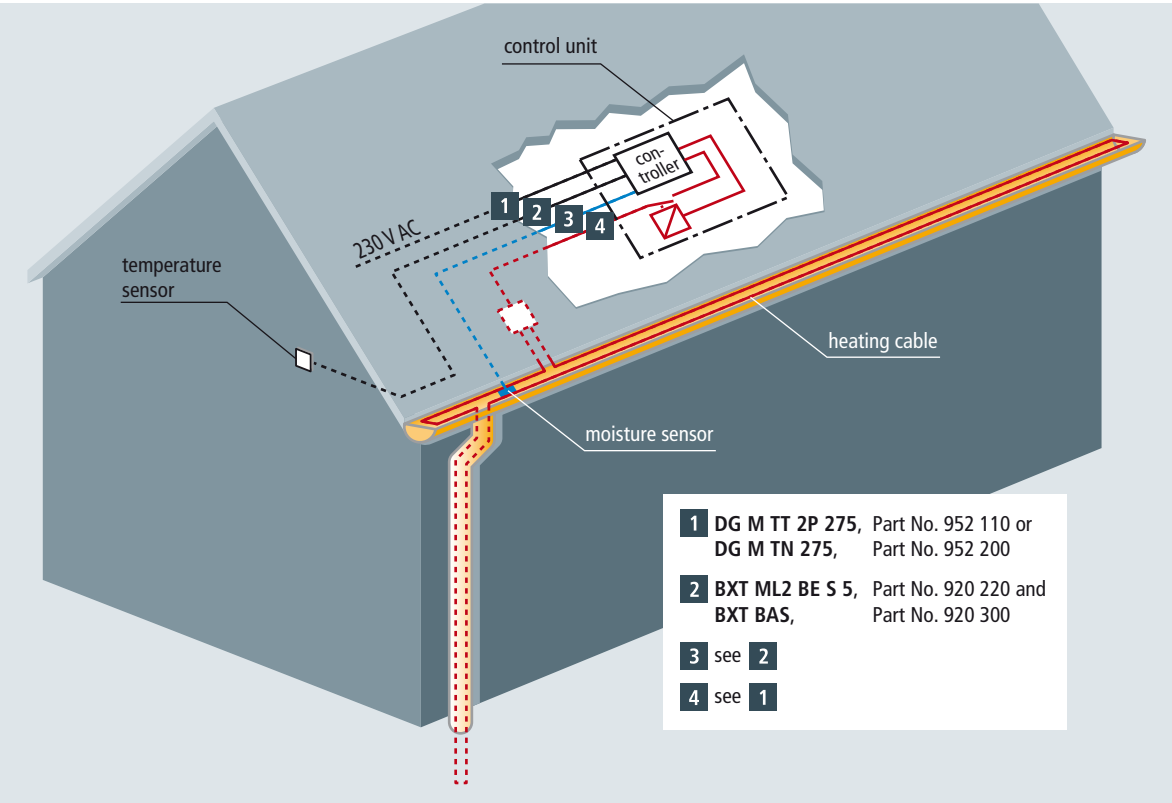

Figure 1 Control unit connected to surge arresters in a structure without external lightning protection system

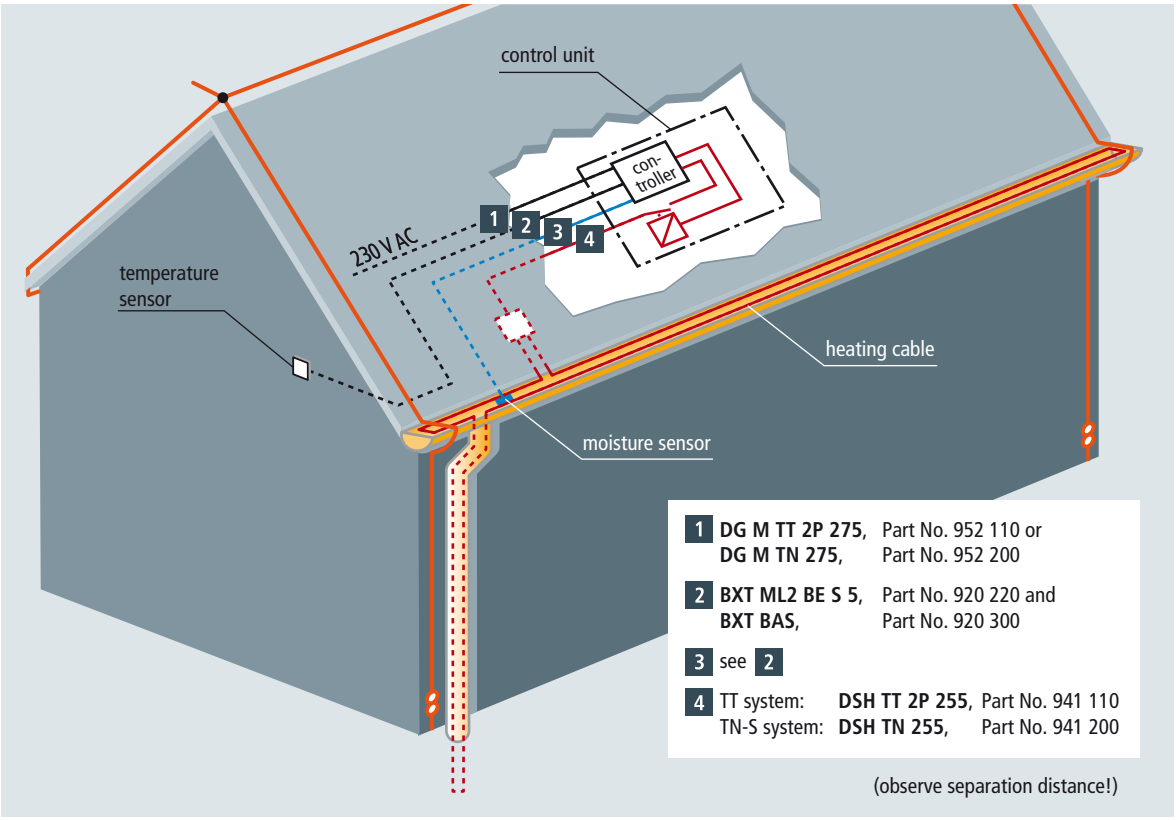

Figure 2 Installation of lightning current and surge arresters in case the control unit is not located near the entrance point into a structure with external lightning protection system

LPL III. A type 2 surge arrester must be installed in the supply cable upstream of the control unit (Figure 2).

Buildings with a continuously interconnected reinforced concrete or steel frame construction (IEC/EN 62305-4 (DIN EN 62305-4)) are an exception. If it is ensured by the air-termination system that the cables beyond the roof are not hit by a lightning strike, surge protective devices according to Figure 1 can be used.

If loss of the control unit is acceptable (the control unit and/or the incoming cables must not pose a risk of fire), the structure can be protected by installing combined lightning current and surge arresters directly where the cables enter the structure (Figure 3).

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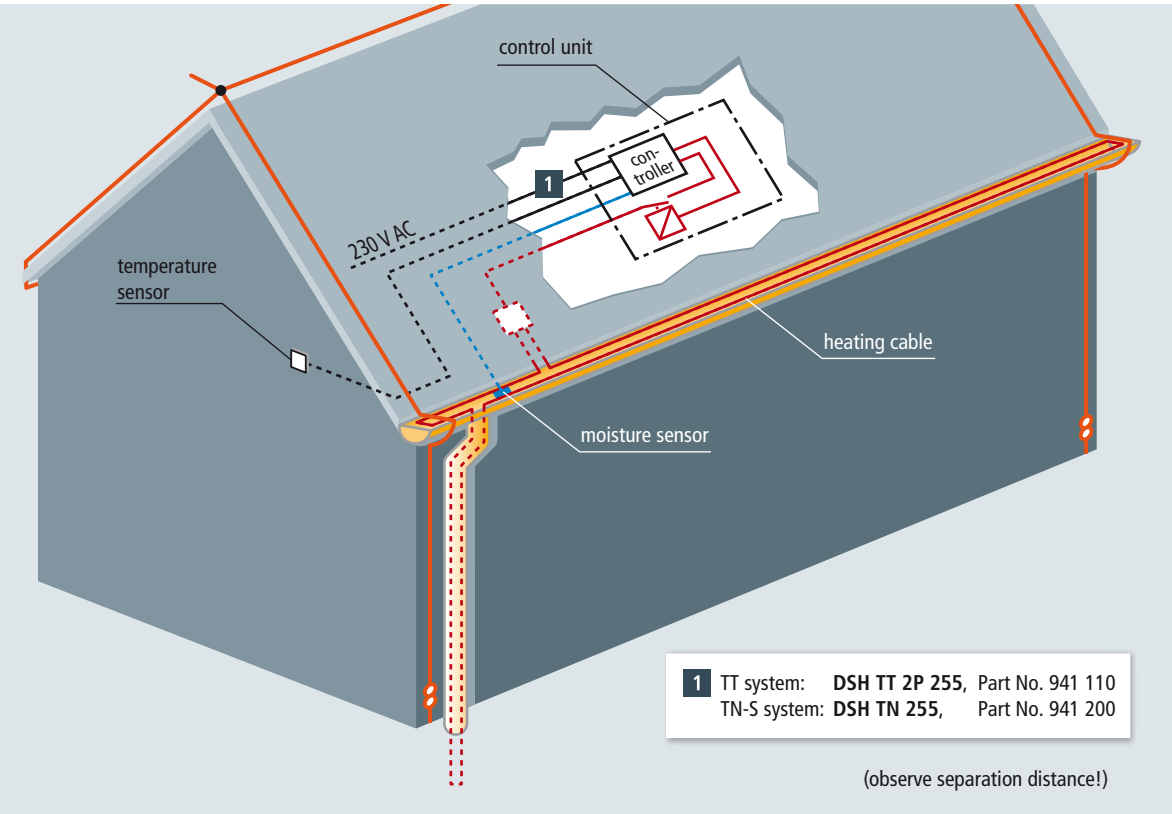

Figure 3 Installation of lightning current arresters in case the control unit (loss is accepted) is located near the entrance point into a structure with external lightning protection

Surge Protection
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Safety Equipment
DEHN protects.

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Hans-Dehn-Str. 1
Postfach 1640
92306 Neumarkt
Germany

Tel. +49 9181 906-0
Fax +49 9181 906-1100
info@dehn.de
www.dehn.de

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