DEHN protects technical building equipment
Good reasons for protection measures

An effective lightning protection concept eliminates risks for intelligent building systems and closes security gaps in the power and data supply. This is a must, especially in case of sensitive, networked technology.

Lightning and surge protection measures ensure that the basic supply structures of buildings are stable and reliable in case of atmospheric lightning effects. Heating, sanitary engineering, air-conditioning or electrical engineering, all fall under the heading of technical building equipment. The lifelines of the building. If central devices fail, the entire „organism of the building“ may be at risk.

Avoiding danger

Failure to take proper lightning and surge protection precautions can, in the worst case, result in serious injury or even loss of life. Fires, malfunctions or loss of availability of important technical building equipment also have serious consequences – especially for intelligent building systems. The malfunction of individual networked components, e.g. due to surge damage, may lead to total system failure and paralyse entire buildings.

Closing safety gaps

All technical building equipment falls back on the central power and data system. This also means that operators often rely on the upstream protection measures for the electric devices in these systems. But what happens if there are gaps in the lightning protection concept? Central components of the technical building equipment then face surges without any protection whatsoever. As a result, nothing works anymore after a thunderstorm. An unnecessary risk!

Take precautions in the form of an effective protection concept!
This consists of:
- Earthing
- Equipotential bonding / surge protection
- External lightning protection

Protection of vital technology

In hospitals, maximum availability of building technology and medical equipment is an absolute must since human lives directly depend on reliably functioning technology. This means that preventive lightning and surge protection measures are vital. These protection measures are based on legal and normative regulations.

Another important aspect is that the requirements for hospitals are becoming more and more complex. This also applies to technical equipment and the necessary interaction of the individual components. An effective and complete lightning protection concept is therefore particularly important for hospitals.
Risk assessment

A lightning protection risk analysis allows you to assess and determine the risk potential for structures. This risk analysis forms the basis for minimising risks and defining economically optimal protection measures – Tailored to the existing structures and their use.

Predictive risk management involves calculating risks for the company. It provides the basis for decisions to limit these risks and shows which risks should reasonably be covered by insurance.

The following is a summary of the damage, the potential for structures and the use.

Source of damage S1: Lightning strike to a structure
Source of damage S2: Lightning strike to an incoming supply line
Source of damage S3: Lightning strike to an incoming supply line
Source of damage S4: Lightning strike near an incoming supply line

Lightning protection zone concept

In case of the lightning protection zone concept, the building is divided into zones with different risk potential. Inner and outer lightning protection zones are defined depending on the lightning threat. Based on these zones, it is determined where which measures are required.

Modern structures and buildings are becoming smart. They are based on a variety of networked technical components: Building management, telecommunication, control and security systems. Failure of individual technical equipment can have far-reaching consequences and even bring the entire building to a standstill.

Although external lightning protection protects people and material assets in buildings from the risk of fire, it does not protect the electrical and electronic systems from failure due to surges caused by lightning discharge. The principle of lightning protection zones (LPZ) according to IEC 62305-4 describes effective protection against surges caused by lightning electromagnetic impulse (LEMP).

According to this principle, the structure to be protected should be divided into inner lightning protection zones of different LEMP threat values. Suitable LPZ can be defined depending on the number, type and sensitivity of the electronic devices / systems.

Inner zones:

Inner zones are protected against direct lightning strikes. They are divided into:

LPZ 1: Zone where impulse currents are limited by current sharing and surge protective devices at the zone boundaries. Spatial shielding may attenuate the lightning electromagnetic field. Ring lines with detectors are often installed in LPZ 1.

LPZ 2 nc: Zone which, compared to LPZ 1, is additionally protected against impulse currents and the lightning electromagnetic field and is therefore subject to less interference.

Outer zones:

LPZ 0: Zone where the threat is due to direct lightning strikes and the unattenuated lightning electromagnetic field. The systems affected, such as lines extending beyond buildings, may be subjected to the full lightning current.

LPZ 2: Zone protected against direct lightning strikes, but where the threat is the unattenuated lightning electromagnetic field. The systems affected, such as alarm lights or sirens, may be subjected to partial lightning currents.

Lightning protection zone concept

In the simplified diagram the lightning protection zones are shown. The lightning protection concept can be drawn up that is comprehensible to all parties involved and technically and economically optimised, i.e. can ensure the protection required at the lowest possible cost. The protection measures resulting from the risk analysis are described in detail in parts 3 and 4 of the IEC 62305 series.

Definition of protection measures

The protection measures are defined based on the determined risk. These include, for example various equipotential bonding measures or definition of a class of LPZ (Lightning Protection Level) and thus external lightning protection measures. The aim is to reduce the risk to an acceptable level. After that, internal lightning protection measures (surge protection) are then taken. These are based on the so-called lightning protection zone concept.

Experience has shown that hospitals are designed according to class of LPZ 2. This includes a defined risk as well as the necessary external lightning protection, equipotential bonding and surge protection measures. In addition to risk management, statutory and normative regulations such as the relevant building regulations, IEC (or EN) specifications or fire protection requirements must also be observed for hospitals.

Source of damage S1: Lightning strike to a structure
Source of damage S2: Lightning strike to an incoming supply line
Source of damage S3: Lightning strike to an incoming supply line
Source of damage S4: Lightning strike near an incoming supply line

Simplified diagram
Components of a lightning protection system

A complete lightning protection system (LPS) consists of the elements shown in the adjacent figure:

External lightning protection: E.g. with HVI system

A lightning protection system consists of an air-termination system installed on the roof, which is connected to the earth-termination system via down conductors. To avoid dangerous flashover and thus sparking, separation distances must be kept to conductive metal parts. It is often not possible to maintain these separation distances consistently. Using a high-voltage-resistant insulated down conductor (HVI Conductor), however, allows you to forget about separation distances while still safely discharging lightning currents to the earth-termination system. An HVI system thus offers optimum safety and maximum flexibility as compared to conventional lightning protection.

Earthing

The design and implementation of the earth-termination system are of central importance. After the concrete has set, it is no longer possible to retrofit this vital component, e.g. in the form of a foundation earth electrode. Omissions or errors during the construction phase cannot be corrected later or, at least, not without a great deal of effort and expense.

Foundation and/or ring earth electrode

Combined equipotential bonding systems are a safe and cost-effective earth-termination system – for as long as the building stands. Installation of a foundation earth electrode in new buildings is required by IEC 61364-5-54 and DIN 18015-1 (German standard). The German DIN 18014 deals with the technical implementation. The foundation earth electrode is installed into the concrete foundations and covered by at least 5 cm of concrete to ensure corrosion protection. However, in some cases this conductive earth connection may no longer be ensured (foundations with increased earth contact resistance) due to various building construction measures (e.g. when constructing a building made of waterproof concrete). A corrosion-resistant ring earth electrode must then be installed in the ground outside the building foundations and connected to the functional bonding conductor in the foundations. For buildings with external lightning protection systems, additional connection lugs must be positioned at intervals corresponding to the relevant class of LPS in line with IEC 62305 and connected to the ring earth electrodes. The connection lugs should protrude at least 1.5 m above ground level.
Lightning equipotential protection bonding / surge protection

Consistent lightning equipotential bonding is an important basis for the safe functioning of the entire lightning protection system. For an effective surge protection concept, it is important to ensure that the three-stage protection principle is observed.

The consequences of a lightning strike are particularly serious in buildings designed in accordance with Industry 4.0, in systems for renewable energy generation or in systems with a modern building infrastructure. It is not only a matter of destroying valuable system technology, but also of damage resulting from the interruption of operations such as failure of work processes, IT systems and manufacturing systems. An important basis for the necessary system availability of such modern building equipment as well as for the safe functioning of the entire lightning protection system is a consistent lightning equipotential bonding for all electrical cables entering the building from outside.

Lightning equipotential bonding (according to IEC 62305-3) is an extension of protective equipotential bonding according to IEC 60364-4-41. In addition to all those extraneous conductive parts which are directly connected to the equipotential bonding, the lightning equipotential bonding must also encompass the supply lines of the network operator, communication lines and other electrical interfaces and systems which inject lightning currents into the building. The connection must be made as closely as possible to the entrance point into the building by way of type 1 lightning current arresters.

Three-stage protection principle

In addition to taking the different lightning protection zones into account, an effective surge protection concept is also based on three protection stages, in which the incoming energy is gradually reduced to a low level that is safe for terminal devices:

- **Stage 1**: Type 1 lightning current arresters / combined arresters at the entrance point into the building (lightning equipotential bonding).
- **Stage 2**: Type 2 surge arresters usually installed in the downstream sub-distribution boards.
- **Stage 3**: Type 3 surge arresters, which can be installed directly at the terminal device or in socket outlets.

Interaction of the individual protection stages ensures the best possible protective effect. To this end, the relevant arresters must be energy coordinated according to IEC 60364-5-53 clause 534.

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### Lightning equipotential bonding / surge protection

<table>
<thead>
<tr>
<th>Application / Interface</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply line</td>
<td>DEHNvenCI 1 255 FM</td>
<td>DVCI 1 255 FM</td>
</tr>
<tr>
<td>Telecommunication line</td>
<td>LSA-plus technology</td>
<td>DRL 10 B 180 FSD</td>
</tr>
<tr>
<td>Gas network</td>
<td>DEHNgate</td>
<td>DGA GFF TV</td>
</tr>
<tr>
<td>Gas network</td>
<td>High-performance isolating spark gap</td>
<td>TFS</td>
</tr>
<tr>
<td>AC-supplied charging post or outdoor lighting system</td>
<td>DEHNshield TNS</td>
<td>DSH TNS 255</td>
</tr>
<tr>
<td>Power supply toll barrier</td>
<td>DEHNshield TN</td>
<td>DSH TN 255</td>
</tr>
<tr>
<td>Data and communication line</td>
<td>BLITZDUCTORconnect</td>
<td>BCO ML2 BD 24</td>
</tr>
</tbody>
</table>

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Use our online configurators for easy and fast selection.
Technical equipment and server rooms

Servers, fire alarm systems, fire extinguishing systems, UPS, air-conditioning and cooling systems

Effective room shielding and a coherent surge protection concept based on the lightning protection zone concept for power supply and communication lines prevent the loss of sensitive data and ensure safe operation of online systems in case of lightning strikes and surges.

Today, digitally networked technologies are increasingly determining the quality of life and social participation in all sections of the population and will continue to do so in the future. In this context, a needs-based data infrastructure is the basic prerequisite for modern buildings. But at the same time, networking also means that the failure of individual, central components can bring the entire system to a standstill.

In addition to server equipment, the infrastructure of server rooms includes other systems designed to ensure safety and continuous operation such as UPS, fire extinguishing and alarm systems, as well as air-conditioning and cooling systems. To ensure safe and uninterrupted operation, all components must be protected against surges and their consequences. Possible protection measures to reduce the failure of electrical and electronic systems in a building are described, for example, in IEC 62305-4.

A combination of earthing, equipotential bonding, spatial shielding, cable routing/shielding, and installation of coordinated surge arresters provides reliable protection against failures.

Due to its central importance, we recommend treating the server room as lightning protection zone 2 and designing it as a Faraday cage. In addition, all incoming and outgoing electrical lines should be protected by installing surge arresters.

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**Surge protection**

<table>
<thead>
<tr>
<th>Application / interface</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEHNguard M ACI FM</td>
<td>Modular surge arrester for TN systems with integrated ACI technology. Power supply UPS system 230/400 V</td>
<td>DG M TNS ACI 275 FM 952 440</td>
</tr>
<tr>
<td>DEHNcond 3P TT 275 FM</td>
<td>Protection of terminal devices 2.30/400 V (measuring and control systems)</td>
<td>DCDR 3P TT 275 FM 900 439</td>
</tr>
<tr>
<td>DEHNpatch Class E</td>
<td>Universal arrester for Industrial Ethernet, PoE+.</td>
<td>DPA M CLE RJ45B 48 929 121</td>
</tr>
<tr>
<td>DEHNpatch</td>
<td>For mounting DEHNpatch in 19&quot; data cabinets.</td>
<td>MS DPA 929 199</td>
</tr>
<tr>
<td>SFL Protector</td>
<td>Multiple socket outlet with integrated surge protection and mains filter for data cabinets. Protection of terminal devices 2.30 V (server racks)</td>
<td>SFL PRO 6X 19&quot; 909 251</td>
</tr>
<tr>
<td>BLITZDUCTORconnect</td>
<td>Space-saving, modular combined arrester with a width of 6 mm and push-in connection technology. Measuring and control data lines</td>
<td>BCO ML2 BD HF 5 927 271</td>
</tr>
<tr>
<td>BUSector BT 24</td>
<td>Surge arrester with minimal space requirements, can be easily plugged onto, e.g., a bus coupler instead of a standard bus terminal. KNX bus systems</td>
<td>BT 24 925 001</td>
</tr>
</tbody>
</table>

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**Equipotential bonding / shielding**

<table>
<thead>
<tr>
<th>Application / interface</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesh mat</td>
<td>EMC shielding measures possible, mounted in ceilings and walls.</td>
<td>618 214</td>
</tr>
<tr>
<td>Connecting clamp for mesh mats</td>
<td>For interconnecting mesh mats / connecting mesh mats to equipotential bonding systems.</td>
<td>540 271</td>
</tr>
</tbody>
</table>
Basic elements according to IEC 62305-3:
- Earthing
- External lightning protection
- Lightning equipotential bonding

Protection of technical building equipment
- Protection components at a glance

Key applications for surge protection devices:
- Building automation / measuring and control systems
- Emergency and alarm system
- Arc fault protection
- PV
- E-mobility
- Security technology: Cameras, access control
- Technical equipment / server room
- Heating / air-conditioning / ventilation systems
- Fire alarm system / voice alarm system
- Security technology: Cameras, access control
Measuring and control systems / building automation – Heating / air-conditioning / ventilation

Surge protective devices ensure that the basic supply structures of technical building equipment are stable and reliable.

Closing security gaps

Technical building equipment (TBE) encompasses heating, ventilation, sanitary engineering, air-conditioning, but also fire prevention and electrical installations, or measuring and control systems. Whatever its type, all technical building equipment falls back on the central power and data systems of the building. However, this frequently also means that one relies on the protection measures for the electric devices in these systems. But what happens if there are gaps? Central components of the technical building equipment then face lightning currents and surges without any protection whatsoever. With the consequence that in the aftermath of a thunderstorm the heating and ventilation no longer function, and important measuring equipment is destroyed.

Observing framework conditions

IEC 60364-5-53, clause 534 calls for separate surge arresters directly at the consumer (e.g. air-conditioning container or heating sensor) if the cable to the last upstream protective device is longer than 10 m. This is an important aspect which is often neglected in technical building facilities. Technical building equipment in modern buildings is interconnected and interdependent. Many interfaces interconnect to optimise consumption and save resources. Specified temperatures or solar radiation control shading, heating, air-conditioning and ventilation processes. If just a single component fails, it impairs the function of the entire system.

IEC 60364-5-53, clause 534 calls for separate surge arresters directly at the consumer (e.g. air-conditioning container or heating sensor) if the cable to the last upstream protective device is longer than 10 m. This is an important aspect which is often neglected in technical building facilities. Technical building equipment in modern buildings is interconnected and interdependent. Many interfaces interconnect to optimise consumption and save resources. Specified temperatures or solar radiation control shading, heating, air-conditioning and ventilation processes. If just a single component fails, it impairs the function of the entire system.
Smoke / heat extraction systems, fire alarm systems, voice alarm systems

Technical fire protection equipment and especially fire alarm systems are of vital importance. They enable modern buildings with elaborate architecture and both a complex infrastructure and purpose to easily meet today’s fire protection and safety requirements.

The systems are used for fire detection, alarming and evacuation and thus serve the protection of people and material assets. A further critical task as a superordinate system element is to take over the central function of the control systems of other safety-related systems and equipment - in the event of a fire.

Lightning strikes and voltage surges can cause irreparable damage to electrical and electronic equipment that is not adequately protected. In addition to electrical consumers, this applies to safety protection and safety requirements.

Technical fire protection equipment and especially fire alarm systems should be taken in accordance with the VdS 2833 guideline (see also DIN VDE 0845 - appendix 1). Moreover, it should be checked whether additional surge arresters are required due to the indicators listed in the VdS 2833 guidelines. If this is the case, the operator of the hazard alarm system must be informed of the necessity for protection measures.

Surge protection

<table>
<thead>
<tr>
<th>Application / Interface</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke / Heat extraction system</td>
<td>DEHNpatch Class E</td>
<td>LAN connection to building services management system</td>
</tr>
<tr>
<td>DEHNguard M TT 2P</td>
<td>Modular surge arrester for single-phase TT and TN systems.</td>
<td>Power supply smoke extraction system</td>
</tr>
<tr>
<td>DEHNguard S</td>
<td>Universal surge arrester</td>
<td>Actuator, air intake dampers, alarms</td>
</tr>
</tbody>
</table>

Fire alarm system

<table>
<thead>
<tr>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEHNguard M TN</td>
<td>Modular surge arrester for single-phase TN systems.</td>
</tr>
<tr>
<td>DEHN XT</td>
<td>Combined arrester with RFID LifeCheck for protecting 4 single lines sharing a common reference potential.</td>
</tr>
<tr>
<td>DEHNrail</td>
<td>Two-pole surge arrester consisting of a base part and plug-in protection module.</td>
</tr>
<tr>
<td>DEHN XT or -VT</td>
<td>Space-saving, modular combined arrester with a width of 6 mm and push-in connection technology.</td>
</tr>
<tr>
<td>or</td>
<td>Actuator air intake dampers (24 V DC/AC; 5 W)</td>
</tr>
</tbody>
</table>

Public address systems - voice alarm

<table>
<thead>
<tr>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEHNvario</td>
<td>Combined arrester for protecting electro-acoustic systems.</td>
</tr>
</tbody>
</table>
Security systems: Access control, burglary protection, video surveillance, perimeter protection, emergency / safety lighting

Electrical security systems are only truly reliable if they do not fail during thunderstorms. A lightning protection concept prevents damage and failure.

### Ensuring availability

Whether fire and burglary protection or emergency exit and escape route lighting – Security and safety systems must always be functional. If lightning strikes and surges destroy security systems or safety-relevant equipment no longer functions, human lives are at risk. An important economic aspect: Surges can cause false alarms, resulting in high follow-up costs. Therefore, be sure to integrate all security systems in your lightning and surge protection concept and make sure that sensitive security and safety technology always functions reliably.

### Meeting requirements

Meeting legal and normative requirements is a must for manufacturers, planners and installers. The specifications for the protection of safety-related equipment are often complex. For example, the legal duty to maintain safety, normative requirements, technical regulations, particularly building law and construction product law of the federal states, as well as the generally acknowledged rules of technology or insurance requirements have to be considered. The ZVEI leaflet (82025:2017-02) “Rechtliche Bedeutung technischer Standards und technischer Regelwerke” (legal significance of technical standards and technical regulations) provides a good overview.

### Surge protection

<table>
<thead>
<tr>
<th>Surge protection</th>
<th>Application / interface</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burglar alarm systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEHNguard</td>
<td>Two-pole surge arrester consisting of a base part and plug-in protection module.</td>
<td>Power supply burglar alarm panel</td>
<td>DR M 2P 255 953 200</td>
</tr>
<tr>
<td>BLITZDUCTOR XT</td>
<td>Combined arrester with RFID LifeCheck for protecting 4 single lines sharing a common reference potential.</td>
<td>Detector group lines</td>
<td>BXT ML2 BD 512 BXT BAS 920 242 920 300</td>
</tr>
<tr>
<td>DEHNignite G</td>
<td>Surge arrester with integrated gas discharge tube.</td>
<td>Transmission device, GSM antenna</td>
<td>DGA G SMA 929 039</td>
</tr>
<tr>
<td>BLITZDUCTORconnect</td>
<td>Space-saving, modular combined arrester with a width of 6 mm and push-in connection technology.</td>
<td>Transmission device, VDSL, DSL</td>
<td>BCO ML2 B 180 927 210</td>
</tr>
</tbody>
</table>

### IP video surveillance

<table>
<thead>
<tr>
<th></th>
<th>Application / interface</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEHNvario</td>
<td>Compact 3-in-1 surge arrester for protecting analogue camera systems.</td>
<td>Access control including video surveillance</td>
<td>DVR BNC RS485 230 928 440</td>
</tr>
<tr>
<td>DEHNipatch outdoor</td>
<td>Surge arrester for indoor and outdoor use.</td>
<td>IP camera surveillance systems</td>
<td>DPA CLE IP66 929 221</td>
</tr>
</tbody>
</table>

### Emergency / safety lighting

<table>
<thead>
<tr>
<th></th>
<th>Application / interface</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEHNsecure</td>
<td>Modular and coordinated single-pole lightning current arrester for DC applications.</td>
<td>Lighting, rescue routes (outdoor)</td>
<td>DSE M 1 242 FM 971 127</td>
</tr>
<tr>
<td>DEHNguard SE</td>
<td>Modular single-pole surge arrester for DC applications.</td>
<td>Lighting, rescue routes (indoor) DC supply (Battery) Safety lighting</td>
<td>DG SE DC 242 FM 972 125</td>
</tr>
<tr>
<td>DEHNguard M TN</td>
<td>Modular surge arrester for single-phase TN systems.</td>
<td>AC supply 3+N (DB) Safety lighting</td>
<td>DG M TN 275 952 200</td>
</tr>
<tr>
<td>BLITZDUCTOR XT</td>
<td>Combined arrester with RFID LifeCheck for protecting 2 pairs.</td>
<td>Sensor and signal line</td>
<td>BXT ML4 BD HF 24 BKT BAS 920 375 920 300</td>
</tr>
</tbody>
</table>

More information at: de.hn/configurators

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Personal and system protection –
Arc fault protection system DEHNshort

Active arc fault protection - This means protection of employees working on electrotechnical systems and maximum system availability.

In a hospital, a power failure is immediately life-threatening. The top priority is system availability. A power failure must never happen in a hospital. Think of patients in the operating theatre, on artificial respiration or other life-supporting measures. The active arc fault protection system DEHNshort supports your system concept and reduces downtime resulting from arc faults to a minimum.

In addition, people working in and on electrical installations must be protected. The operator must eliminate all accident risks and prevent personal injury. To prevent electrical accidents, the five safety rules defined in the EN 50110-1 standard apply. DEHN offers suitable products for applying the five safety rules as well as the personal protective equipment necessary to protect people from arc faults.

<table>
<thead>
<tr>
<th>Safety equipment</th>
<th>Application</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arc fault protection system DEHNshort - components:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quenching device QD II</td>
<td>Quenching of the arc fault &lt; 5 ms</td>
<td>DSRT QD II</td>
<td>782 002</td>
</tr>
<tr>
<td>Fibre optical cable Connecting cable 4 m</td>
<td>Connection between the central and quenching device</td>
<td>DSRT LWL 4.00</td>
<td>782 024</td>
</tr>
<tr>
<td>Detection device (current and light)</td>
<td>Connection of the current transformers and activation of the quenching devices</td>
<td>DSRT DD CPS BACA</td>
<td>782 030</td>
</tr>
<tr>
<td>Detection device For light detection</td>
<td>Connection of the fibre optical sensors</td>
<td>DSRT DD FS BAAA</td>
<td>782 050</td>
</tr>
<tr>
<td>Fibre optic sensor Sensor length 12 m</td>
<td>Monitoring of a panel (example)</td>
<td>DSRT FS 12 1.5</td>
<td>782 085</td>
</tr>
</tbody>
</table>

Safety equipment according to the 5 safety rules in line with EN 50110-1

1. Disconnect completely
   - Switching stick up to 36 kV
   - Switching stick up to 36 kV
   - Switching stick up to 36 kV
   - SCS 36 2000
   - SCS 36 2000
   - SCS 36 2000
   - 763 612
   - 763 612
   - 763 612

2. Secure against re-connection
   - Insulating blade for NH2 and NH3 for distribution blocks
   - Insulating blade for NH2 and NH3 for distribution blocks
   - Insulating blade for NH2 and NH3 for distribution blocks
   - SE NH2 3
   - SE NH2 3
   - SE NH2 3
   - 785 644
   - 785 644
   - 785 644

3. Verify that the installation is dead
   - Voltage detector for medium-voltage installations 6-20 kV
   - Voltage detector for medium-voltage installations 6-20 kV
   - Voltage detector for medium-voltage installations 6-20 kV
   - PHE4 6 20 S
   - PHE4 6 20 S
   - PHE4 6 20 S
   - 783 235
   - 783 235
   - 783 235

4. Carry out earthing and short-circuiting
   - Earthing and short-circuiting device with earthing stick for transformer substations
   - Earthing and short-circuiting device with earthing stick for transformer substations
   - Earthing and short-circuiting device with earthing stick for transformer substations
   - EKV3+1 120 G
   - EKV3+1 120 G
   - EKV3+1 120 G
   - 761 001
   - 761 001
   - 761 001

Personal protective equipment DEHNcare (PPE against the thermal effects of an arc fault)

<table>
<thead>
<tr>
<th>Safety equipment</th>
<th>Application</th>
<th>Type</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety helmet for electricians</td>
<td>white</td>
<td>ESM U 1000 S SW</td>
<td>785 706</td>
</tr>
<tr>
<td>Face shield</td>
<td>With active protection, arc-fault-tested</td>
<td>APS T AS CL2 SC</td>
<td>785 821</td>
</tr>
<tr>
<td>Protective gloves</td>
<td>With long gauntlet, arc-fault-tested</td>
<td>APG 10 L</td>
<td>785 810</td>
</tr>
<tr>
<td>Protective coat</td>
<td>Arc-fault-tested</td>
<td>APC S2 S4</td>
<td>785 756</td>
</tr>
</tbody>
</table>
Securing power generation: Surge damage due to thunderstorms is one of the most frequent causes of damage to PV systems. Protection measures increase the availability of your system and secure the yield in the long term.

Protect rooftop systems
One of the most common forms of PV systems is the rooftop system. Due to its exposed position, it is particularly prone to damage caused by direct and indirect lightning effects.

Comprehensive protection is therefore necessary and consists of:

- External lightning protection including an air-termination and down conductor system
- Internal lightning protection for lightning equipotential bonding using type 1 arrester for electrical systems

Tip: For economic reasons, lightning and surge protection should be incorporated at the design stage of PV systems – subsequent installation is much more expensive and time consuming.

Preventing surge damage
Surges resulting from thunderstorms frequently destroy system parts such as modules, inverters and the monitoring system. The resulting financial loss and costs are considerable, e.g. replacement of a faulty inverter, new installation or loss of revenue during downtime. This can easily be prevented by a lightning protection concept.

By the way: With the publication of the amended IEC 60364-4-44 clause 443, IEC 60364-5-53 clause 534 and IEC 60364-7-712, the installation of surge protection measures becomes mandatory - even if there is no external lightning protection system!

Protecting charging posts and vehicles
Charging posts are required wherever electric vehicles are parked for a prolonged period of time, e.g. in car parks for residents, customers, patients or employees. Lightning effects and surges pose a risk for the sensitive electronics of the charging post and the vehicle itself.

In case of a thunderstorm, the sensitive electronic circuitry for the controller, meter and communication system is particularly at risk. Satellite systems with interconnected charging points can be completely destroyed by a single lightning strike. Surges during the charging process frequently not only damage the charging post, but also the electric vehicle connected to it.

Electric vehicles generally have an electric strength protection level of up to 2,500 V. However, the voltage occurring during a lightning strike may be 20 times higher. Therefore, prevent damage and meet the normative requirements according to IEC 60364-4-44 clause 443, IEC 60364-5-53 clause 534 and IEC 60364-7-722.

Protect charging systems and electric vehicles from costly damage:

- To the charge controller and battery.
- To the control, meter and communication electronics of the charging system

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Specific concepts can be found in numerous white papers alongside industry and practical solutions. Or, in our LIGHTNING PROTECTION GUIDE, a lightning and surge protection planning manual. This means that you quickly have all relevant information and solutions at your fingertips.

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Answering questions
If you have commercial or specific technical questions, please contact our commercial customer services or our experts for lightning protection, earthing, surge protection, safety equipment and arc fault protection:

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