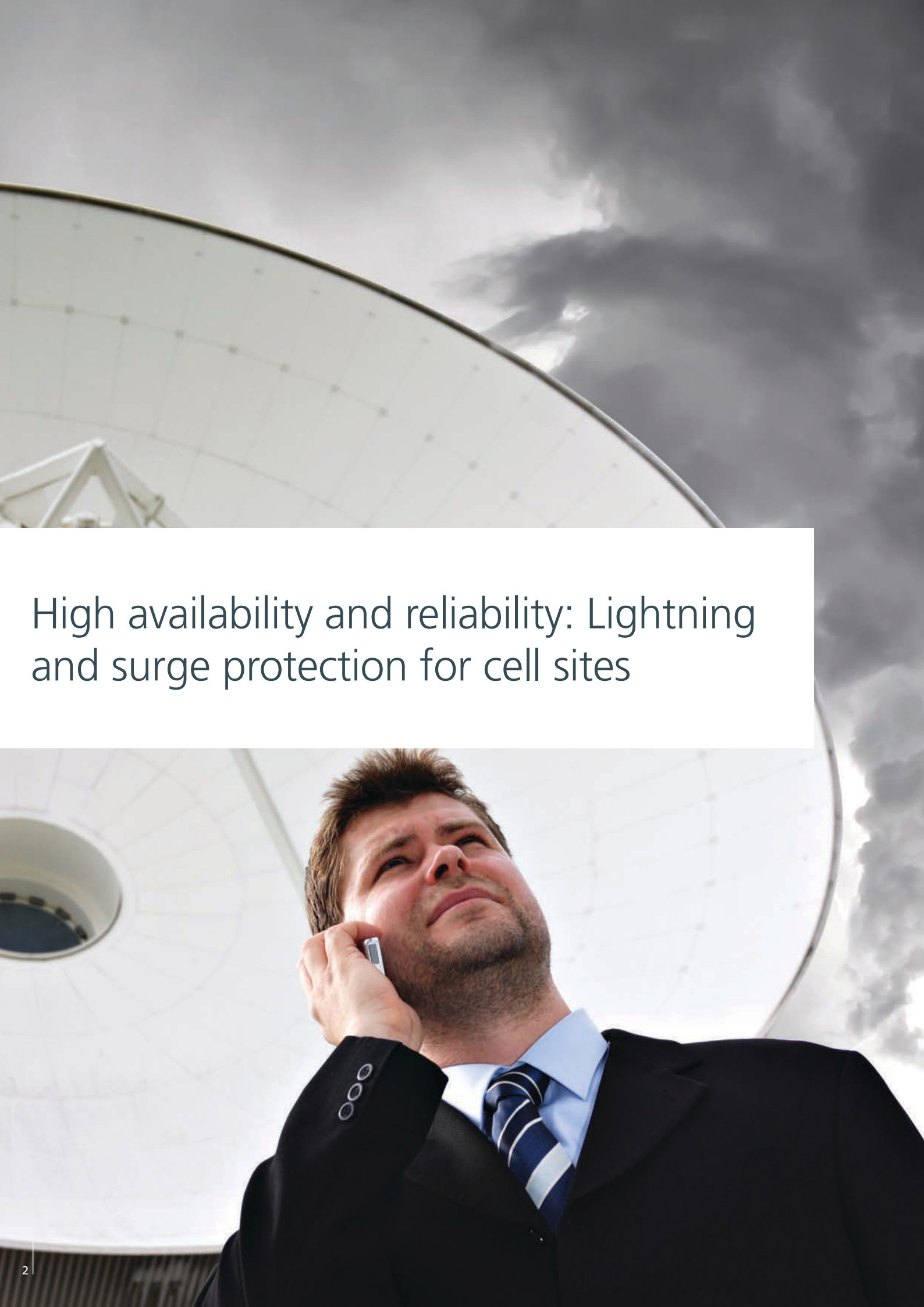
DEHN protects Cell Sites

www.dehn-international.com

High availability and reliability: Lightning and surge protection for cell sites



High availability and reliability

With the explosive growth in mobile terminal devices the utilisation of mobile networks and the global demand for bandwidth is increasing. The transfer from the UMTS to the LTE standard, the fourth generation of mobile communications, is globally promoted. This will allow providers to offer data services, thus making the mobile Internet a mass market.

In mobile communications, high availability and reliability of equipment and system technology is paramount; not only in the private but also in the public sector, for example in digital radio systems of security authorities. Therefore, lightning protection systems for cell sites are indispensable. When configuring the network infrastructure and planning new sites, planners, installers and operators must take lightning and surge protection measures. This is also required by insurance companies and experts.

Lightning and surge protection measures are selected and arranged according to the lightning protection zone concept as per IEC 62305. This standard defines protection zones. At the edges of that zones, different coordinated protection elements are used.

A lightning protection system provides optimal protection by coordinating the

- External lightning protection system consisting of air-termination system, down conductor, earth-termination system and the
- Internal lightning protection system consisting of lightning equipotential bonding and surge protective devices.

A protection concept consisting of an external and internal lightning protection system ensures the availability of cell sites.

DEHN protects cell sites

For more than 25 years, we have been successfully developing customised products and protection solutions for cell sites. Our long-standing experience makes us a leading provider of earthing and equipotential bonding as well as lightning and surge protection products for the mobile communication market. As an all-in-one supplier, we support network operators, power supply manufacturers and system technology suppliers as well as their general contractors and service partners.

Our protection solutions include planning and selection of components for earth-termination systems and external lightning protection systems as well as the use of lightning current and surge arresters in mobile radio stations. Combined lightning current and surge arresters, also referred to as combined arresters, are used to protect the infrastructure in power supply systems.

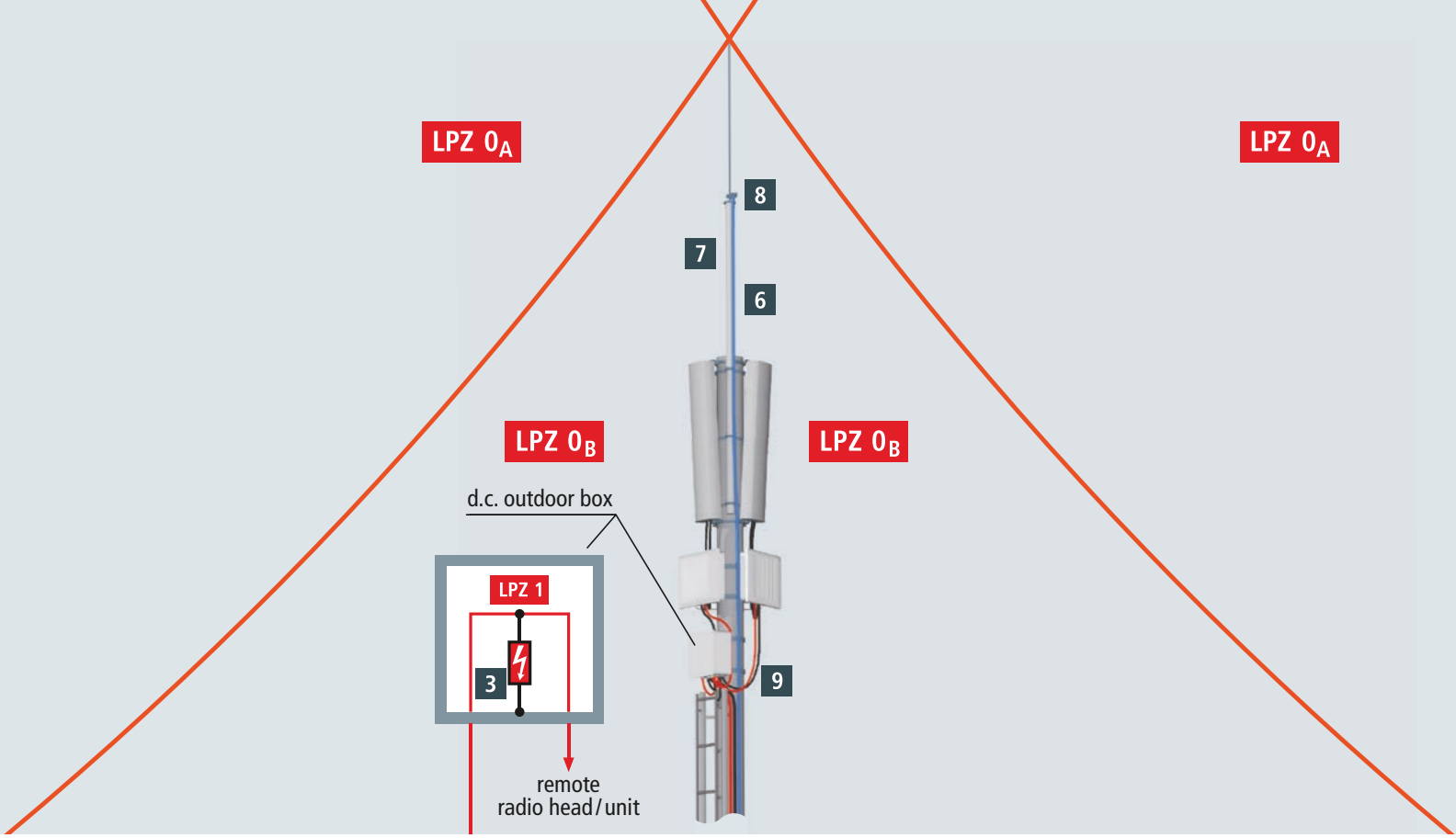
DEHNvap CSP* combined arresters
DEHNvap CSP* combined arresters, which can be universally used for TN-C, TN-S and TT systems, are specifically designed for mobile communication applications. When using combined arresters, energy coordination with system and equipment technology is an important criterion. For this reason, we have extensively tested DEHNvap CSP* in our test laboratory to ensure its coordination with the integrated input circuits of power supply units.

*CSP: Cell Site Protection

DEHNsecure surge arresters
Innovative mobile radio systems rely on remote radio heads: the high-frequency signal is directly generated at the antenna and is then transmitted. Optical fibre cables, which have significantly higher transmission ranges than conventional coaxial cables, transmit data between the remote radio heads and the base station. The remote radio heads are supplied by a separate 48 V dc line. Operators as well as power supply manufacturers rely on DEHNsecure dc lightning current arresters.

DEHNgate high-frequency arresters
High-frequency arresters such as DEHNgate are used to protect radio transmission technology based on conventional coaxial high-frequency cables, for example in GSM railway systems or digital radio systems of security authorities.

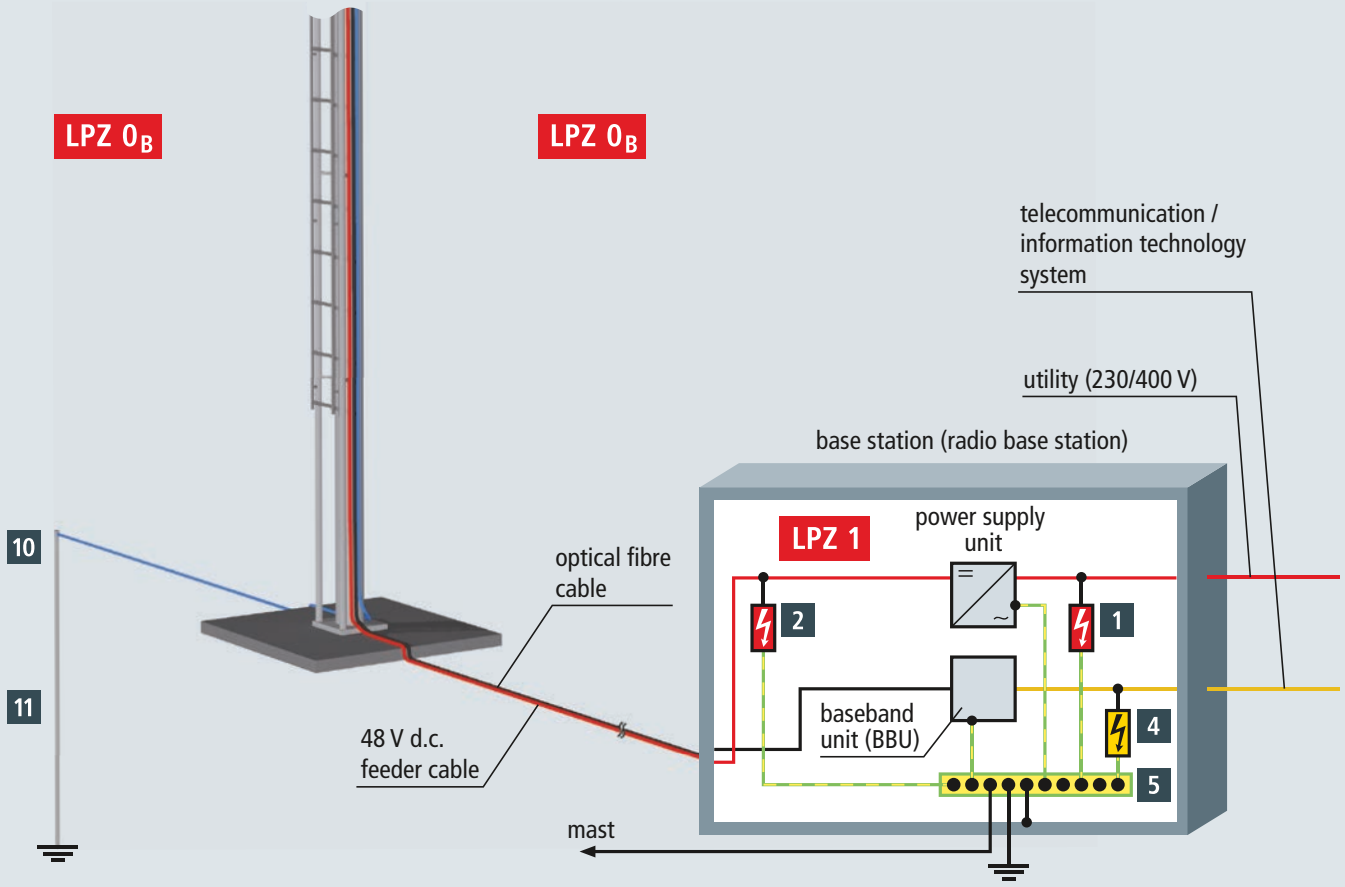
DEHNrapid® LSA arresters
DEHNrapid LSA lightning current and surge arresters are used in service area interfaces for land-line connections or the transmission of the sending signal of microwave links over the last mile.



Profit from our expertise in developing lightning protection zone concepts

Our decades of know-how in lightning protection and intensive research activities are key factors for designing lightning protection systems for cell sites. The primary aim is to prevent lightning damage to antennas, remote radio heads, base stations and power supply systems.

Lightning protection zone concepts for mobile radio stations (or transceiver systems) are based on IEC 62305. This international standard defines the selection and arrangement of lightning and surge protection measures. It also requires system operators to perform a risk analysis when installing a new mobile radio system.
Most of the ground-mounted and roof-mounted mobile radio stations are designed according to class of LPS III, depending on the risk potential and the acceptable risk of damage. Stations with an increased risk potential are designed according to class of LPS II or higher.



The lightning protection system of a mobile communication system comprises

- An external lightning protection system and
- An internal lightning protection system consisting of surge protective devices.

In order to plan protection measures, the mobile communication system is divided into lightning protection zones. The rolling sphere method is used to determine LPZ 0_A** and LPZ 0_B**.

LPZ 0** is the outer zone where the threat is due to the full lightning electromagnetic field and where the internal systems may be subjected to the full or partial lightning current. LPZ 0** is subdivided into:

- **LPZ 0_A****: Parts of the mobile communication system which may be subjected to direct lightning strikes and the full lightning electromagnetic field.
- **LPZ 0_B****:** Parts of the mobile communication system which are protected against direct lightning strikes, but where the full lightning electromagnetic field is present.

LPZ 1** is the inner zone that is protected against direct lightning strikes. However, impulse currents must be limited by current distribution, isolating interfaces and SPDs*** on the zone boundaries.

* Lightning Protection System
** Lightning Protection Zone
*** Surge Protective Device

1 **DEHNvap CSP:**
Protection of the base station 230/400 V a.c.

Type	Part No.
DVA CSP 3P 100 FM	900 360

2 **DEHNsecure M:**
Protection of the power supply unit 48 V d.c.

Type	Part No.
DSE M 1 60 FM	971 126

3 **DEHNsecure M:**
Protection of remote radio heads 48 V d.c.

Type	Part No.
DSE M 2P 60 FM	971 226

4 **BLITZDUCTOR® XT:**
Protection of telecommunication lines

Type	Part No.
BXT BAS	920 300
BXT ML 4 B 180	920 310

5 **Equipotential bonding bar for industrial use, 10 terminals**

Type	Part No.
Equipotential bonding bar	472 219

6 **HVI®Conductor III**

Type	Part No.
HVI®Conductor III	819 025

7 **Supporting tube (GRP/Al)**

Type	Part No.
Supporting tube (GRP/Al)	105 306

8 **Connecting plate (stainless steel)**

Type	Part No.
Connecting plate (StSt)	301 339

9 **Antenna pipe clamp**

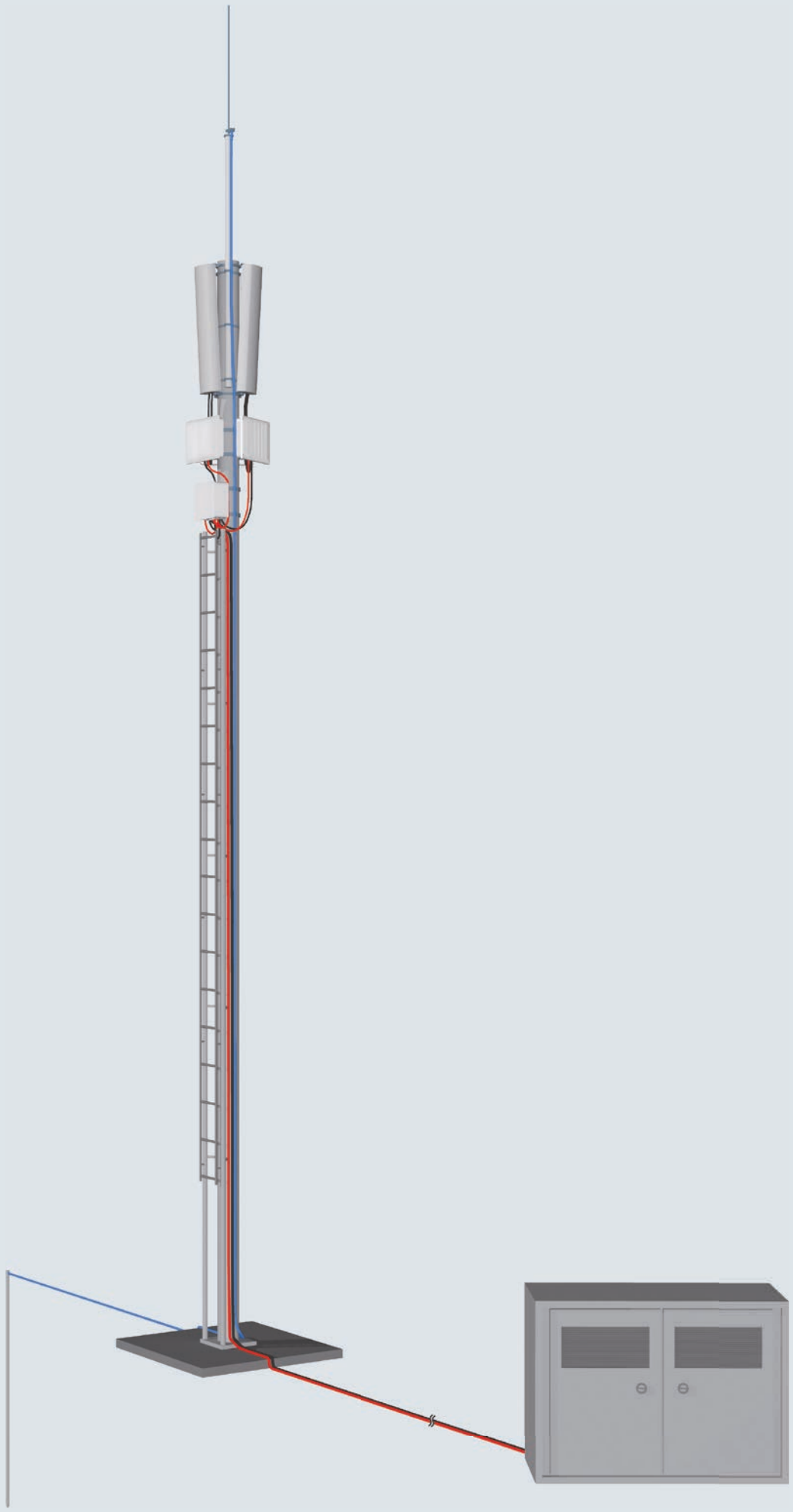
Type	Part No.
Antenna pipe clamp	540 100

10 **Connecting clamp (stainless steel)**

Type	Part No.
Connecting clamp (StSt)	620 915

11 **Earth rod (stainless steel)**

Type	Part No.
Earth rod (StSt)	620 902



Equipotential bonding and earthing

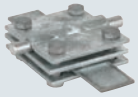
Our earthing and equipotential bonding components meet the most stringent quality requirements, are user-friendly and can be flexibly used.

Equipotential bonding bar

For protective and functional equipotential bonding according to IEC 60364-4-41/ 60364-5-54 and lightning equipotential bonding according to IEC/EN 62305-3

Type	Part No.
UV-stabilised	563 201
For industrial use	472 229

Accessories



Type	Part No.
Earth rod	620 150
Stainless steel strip	860 325
Cross unit	321 045

Air-termination systems for external lightning protection

In case of newly installed, modified or extended mobile radio stations, the external lightning protection system (LPS) is designed in the form of an isolated lightning protection system to prevent partial lightning currents from entering the building. Our external lightning protection solutions withstand maximum stress and take into account the architectural design.

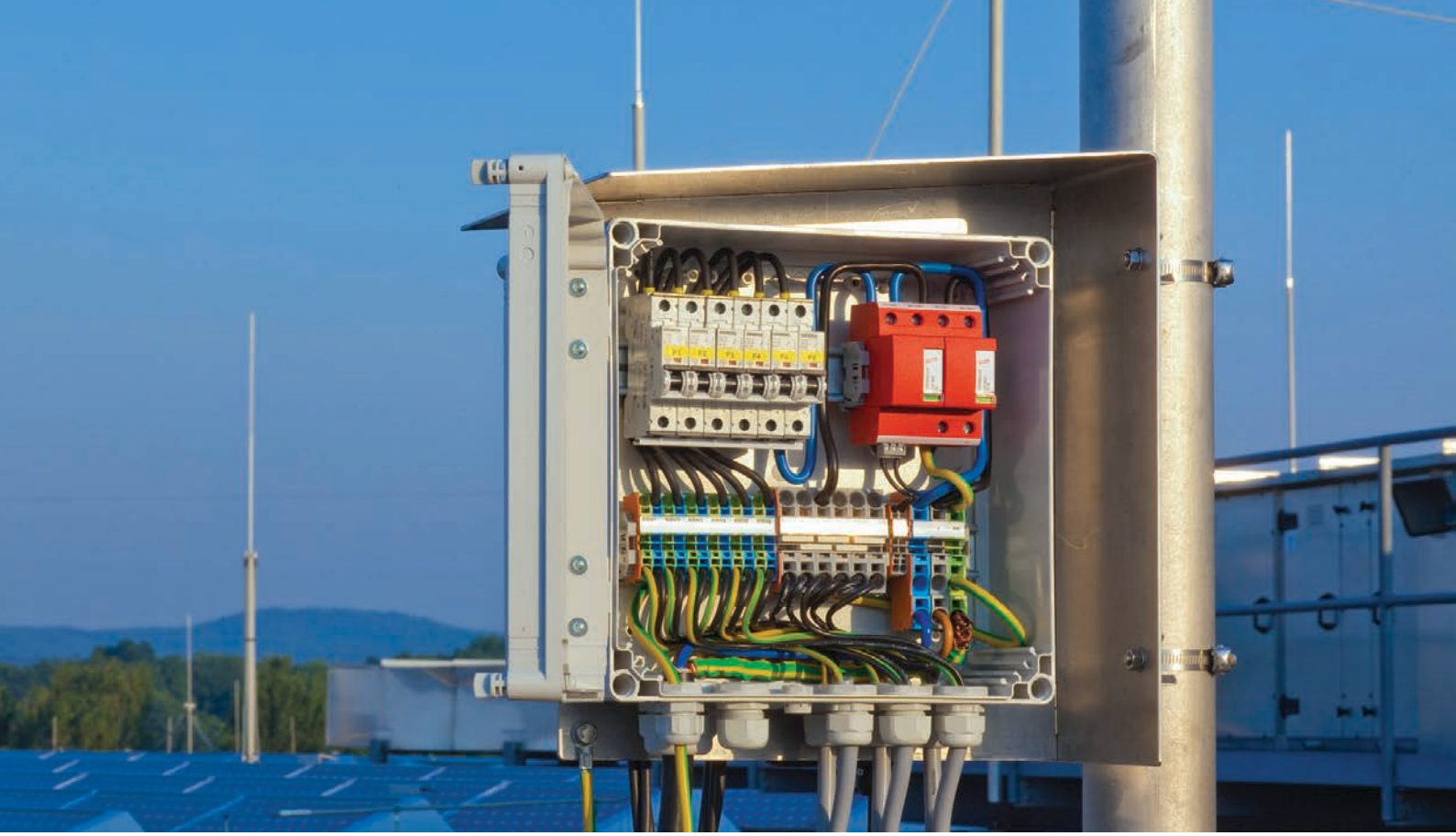
HVI®Conductor

High-voltage-resistant insulated down conductor allows to keep the separation distance from conductive parts according to IEC 62305-3.

Type	Part No.
HVI®Conductor I	819 020
HVI®Conductor III	819 022

Accessories

Type	Part No.
Antenna pipe clamp	540 100
Conductor holder (with tensioning strap)	275 320
Concrete base (with wedge)	102 010
Spacer	106 852



Surge protection for d.c. applications

The DEHNsecure product family is specifically designed for the d.c. requirements of remote radio head applications. Designed for possible high load currents, it leaves sufficient margin for future extensions in the field of mobile communication. Thanks to the design of the DEHNsecure spark gap and the device concept, mains follow currents are prevented at the early stages of development.

DEHNsecure M

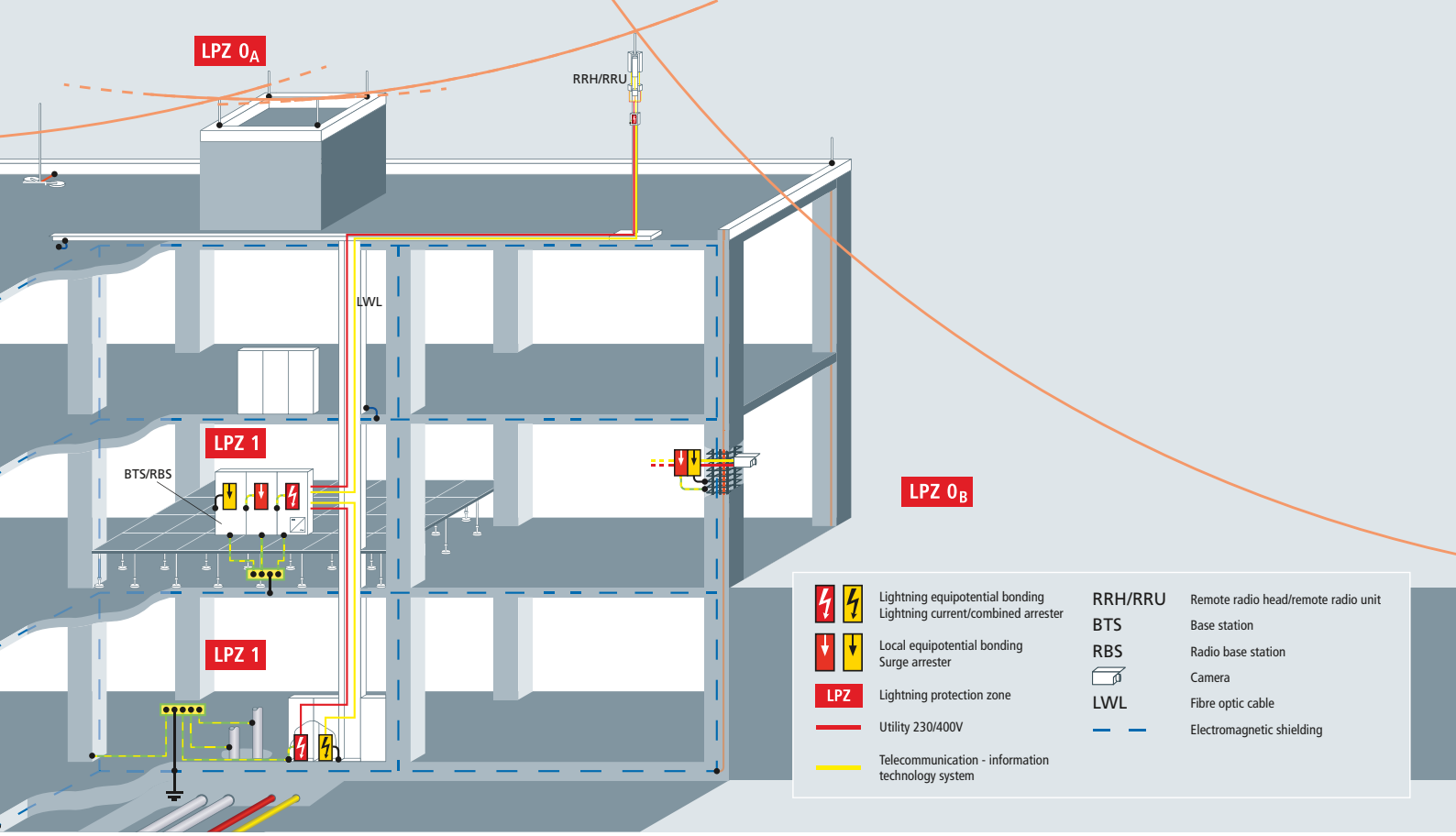
Modular, coordinated and spark-gap based single-pole lightning current arrester with floating changeover contact

Type	Part No.
DSE M 1 60 FM	971 126

DEHNsecure M

Modular, coordinated and spark-gap-based two-pole lightning current arrester with floating changeover contact

Type	Part No.
DSE M 2P 60 FM	971 226



Surge protection for a.c. applications

The power supply unit of a cell site has a separate feeder cable that is independent from the power supply unit of the building. DEHN combined arresters feature sufficient follow current extinction. This is the only way to prevent false tripping of system fuses and disconnection of the cell site, thus increasing system availability.

DEHNvap CSP*

Modular prewired combined arrester for mobile radio stations that is energy-coordinated with power supply units

*CSP = Cell Site Protection

Type	Part No.
DVA CSP 3P 100 FM	900 360

DEHNguard® modular

Modular, coordinated surge arrester; prewired complete unit consisting of a base part and plug-in protection modules

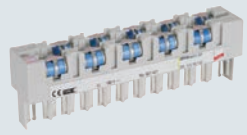
Type	Part No.
DG M TT 275 FM	952 315

Surge protection for land-line technology

Land-line connections by means of copper cables or microwave links are used to connect base stations to higher-level switching technology. In case of land-line connections, partial lightning currents can flow through the telecommunication lines in case of a direct lightning strike in the antenna system. BLITZDUCTOR® XT combined arresters provide reliable protection.

DEHNrapid® LSA

Lightning current carrying DRL plug-in SPD block (10 pairs) for almost all applications, can be extended to a combined arrester using a DRL protective plug. With visual fault indication



Type	Part No.
DRL 10 B 180 FSD	907 401
DRL PD 180	907 430
EF 10 DRL	907 498

BLITZDUCTOR® XT

LifeCheck®-equipped combined arrester module for protecting two pairs of unearthed balanced interfaces.
BXT BAS base part: Space-saving and universal four-pole feed-through terminal that accommodates a protection module without signal interruption.

Type	Part No.
BXT BAS	920 300
BXT ML4 BD 180	920 347

Surge protection for radio transmission technology

Adequate high-frequency surge protective devices must be chosen for radio transmission technology according to the frequency band and the relevant connection system. A sufficiently high discharge capacity and remote supply voltages of directional radio stations must be observed.
The DEHNgate product family can handle high lightning currents,supports multi-carrier systems and stands out thanks to its ease of maintenance and service.

DEHNgate

Arrester for remote power supply with exchangeable gas discharge tube

Type	Part No.
DGA AG BNC	929 043
DGA AG N	929 045

Combined arrester with maintenance-free quarterwave technology

Type	Part No.
DGA L4 7 16 S	929 047
DGA L4 7 16 B	929 048

Accessories

Type	Part No.
Fixing angle (DEHNgate)	106 310
Fixing angle (High-frequenzy arrester)	106 329

DEHN protects Europoles' power supply

Europoles* is a global manufacturer of masts, poles, towers and carrier systems made of steel, concrete and glass-fibre reinforced plastics (GRP). Europoles has developed a self-sufficient power supply that generates energy in an environmentally friendly way. This self-sufficient system is protected by DEHN products.

The power supply system from Europoles is not connected to the grid, but powered by electricity generated by photovoltaic systems, wind turbines and fuel cells. With its modular design, the power generation components can be individually combined. The distributed stand-alone solution was developed for cell sites, however, it can be universally used.

The core element of the power supply system is the control unit that controls all energy sources and allows remote maintenance of the site. A wind generator with a rotor diameter of 3.2 metres generates electricity up to 2.5 kW**.

* www.europoles.com
** in case of a wind speed of 10 metres per second

The solar cells mounted on a spun concrete mast and technical equipment container generate another 1.9 kW. In case of an undersupply with wind and solar energy, a fuel cell is used. The electrical energy produced is stored in lithium ion batteries and is transferred to the consumers.

Europoles relies on the following DEHN lightning and surge protection products for the CO2-neutral power supply system:

- Earth-termination system
- Equipotential bonding
- DEHNlimit: Surge protection for the generator of the phovoltaic system on the d.c. side
- DEHNventil®: Modular and prewired combined arrester for the a.c. side
- BLITZDUCTOR®: Combined arrester for information technology lines

DEHN protects cell sites from Vodafone

Since 2012, Vodafone Germany has been gradually equipping its mobile communications network with new LTE* technology from Ericsson. Vodafone Germany relies on lightning and surge protection products from DEHN.

Vodafone Germany, part of the Vodafone Group*, plans, installs and operates cell sites. The company operates a comprehensive mobile radio network which is continuously further developed. The installation of a new cell site requires professional planning for its safe and reliable operation in the future. However, planning must be individually adapted to the relevant site. Lightning and surge protection plays a vital role in the early stages of planning. For roof-mounted systems, for example, it is decisive whether the building is fitted with a lightning protection system.

With DEHN protection concepts, general contractors and service partners can provide a complete safety package including external and internal lightning protection and earth-termination systems for Vodafone and Ericsson. They rely on the following DEHN products which have been specifically designed for cell sites:

- High-voltage-resistant insulated HVI® Conductors
- DEHNvap CSP*** modular combined arresters
- DEHNsecure modular surge arresters

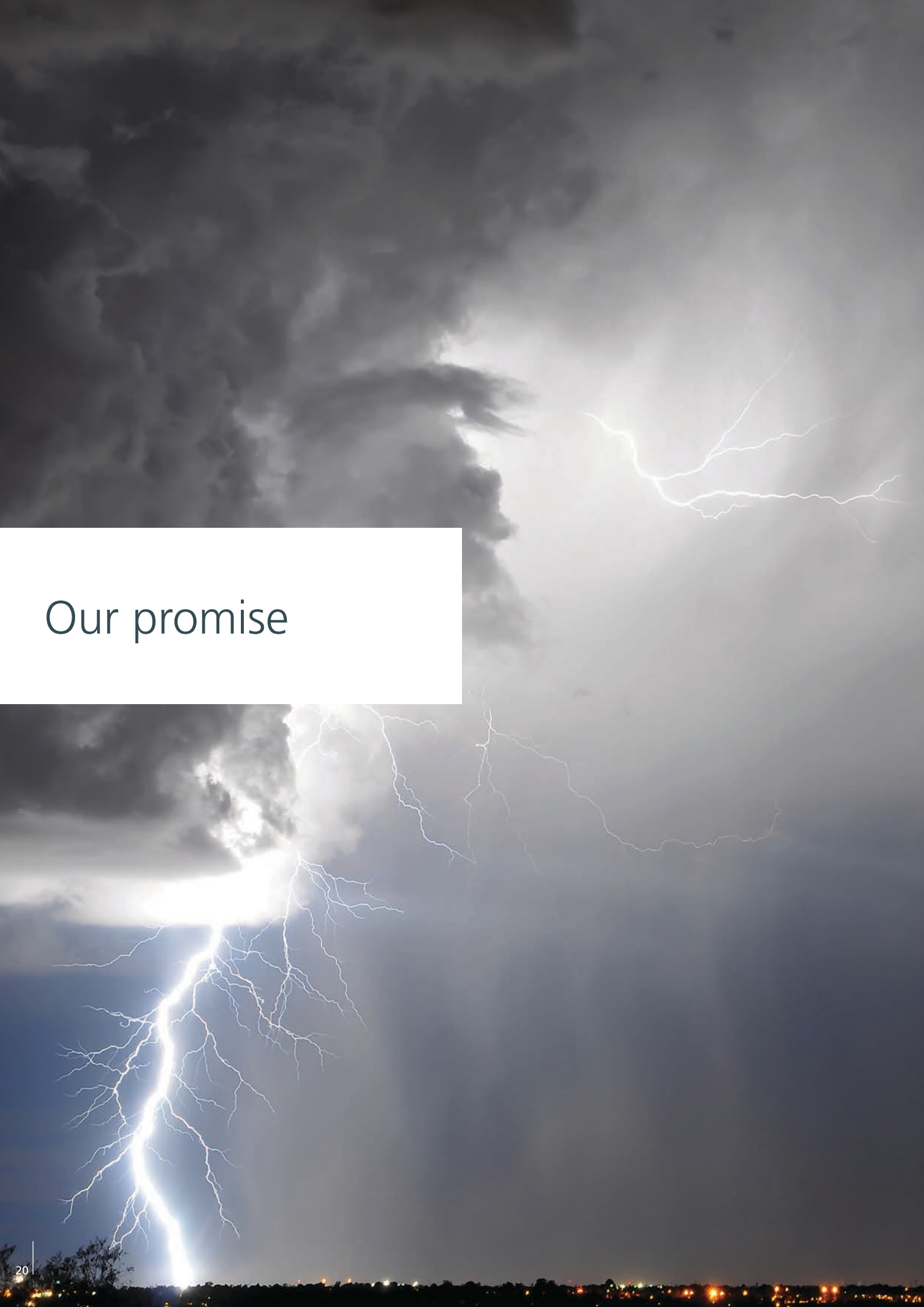
Field tests in the DEHN test laboratory

In the DEHN test laboratory, the lightning current carrying capability of components used in mobile communication systems is tested. Moreover, the coordination of DEHN products with downstream mobile communication equipment is checked. DEHN carries out these tests on behalf of its customers. Tests in the impulse current laboratory show whether the selected protection measures are effective.

We offer operators, system integrators and manufacturers the following engineering and test services:

- Lightning current tests on passive and active antennas
- Lightning current tests on high-frequency and installation lines
- Coordination tests with downstream protective circuits of the inputs of ac/dc power supply units
- Tests of customised and prewired connection units and assembly systems for protecting the electrical installation

Our laboratory is equipped with high-performance devices. Tests are carried our in line with the latest national and inter national standards. Thanks to our representation in standard-isation committees, our employees are always familiar with the latest standards and have an in-depth knowledge of technological basics. We use this knowledge to carry out our engineering and test services, thus making our protection concepts feasible for mobile communication applications.



Our promise

DEHN protects.

Our key objective is to protect workers and material assets. It was our pioneering spirit and innovative ideas that have defined our company for more than 100 years and made us a market leader with over 1,500 employees. New products and safety concepts reflect our market feasibility, commitment and ideas.

In 1923, our founder Hans Dehn started production of external lightning protection and earthing components to optimise the protection of buildings and installations. In 1954, we launched the world's first series of surge protective devices. Continuous development of these devices ensures safe operation and permanent availability of electrical and electronic installations. Also in the 1950s, our third sector, safety equipment, was added to our portfolio.

Neumarkt is the heart of our activities where product managers and developers advance our protection technologies. Here we manufacture our high-quality safety products.

We offer the best solution.

Our focus is to be a reliable and fair partner for our industrial, commercial and technical customers all over the world. To this end, we always concentrate on the best solution to protection problems. Our global network of 17 subsidiaries and offices as well as more than 70 partners are committed to competent and customer-oriented distribution of our products. Proximity and close contact with our customers is of utmost importance to us, be it on-site support by our experienced field staff, our telephone hotline or personal contact at trade fairs. In hundreds of seminar, workshops and conferences held every year throughout the world we impart practical knowledge on our products and solutions. Our specialised book "Lightning Protection Guide" and our brochures will broaden your practical knowledge.

Visit us at www.dehn-international.com

Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.

DEHN + SÖHNE
GmbH + Co.KG.

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