



Main Catalogue

Valid as of August 1, 2019

Surge Protection **Lightning Protection / Earthing** **Safety Equipment**



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"We are a reliable partner for our customers and employees."

Dr. Philipp Dehn
Managing Partner / CEO

Our promise – DEHN protects.

Dear customers, friends, partners,

Every facet of life, whether business or private, is today highly complex. In order to cater to your ever increasing needs we provide innovations and manifold new products. We offer comprehensive protection solutions which, obviously, go hand in hand with the appropriate service. The key to the implementation of protection solutions for our and your own customers is in-depth and comprehensive consultation. Extended services and improved processes help both you and us to transform requirements into possibilities. We would like you, as our partner, to link up your protection requirements and needs with our services and expertise, in order for us both to reap the mutual advantages. Our new and constantly evolving protection concepts are designed to make your daily life and surroundings safer.

Of course, we also continue to provide all of DEHN's traditional, reliable products and safety solutions. We aim to be your safety partner worldwide for surge and lightning protection and safety equipment. Effective protection against the risks presented by lightning and surges for people and equipment is our business. A feel for the market, determination and ideas are the lifeblood for new safety products and concepts. This is the main focus of our family business and has, coupled with the pioneering spirit and innovation which have been our trademark for more than 100 years, made us a market leader with about 1800 employees.

The hub of our activities is in Neumarkt in Bavaria, Germany. It is here that developers work with project and product managers to further advance our protection technology. And it is here that we produce your safety products. Every day we endeavour to ensure that your business can continue to grow thanks to our innovative solutions and services. The DEHN brand name stands for innovation, consistent customer and market orientation and the highest possible quality. Now and in the future.

Take advantage of our range of surge and lightning protection and safety equipment and join us in providing a tad more safety.

I look forward to your interest and future cooperation with you.

Dr. Philipp Dehn

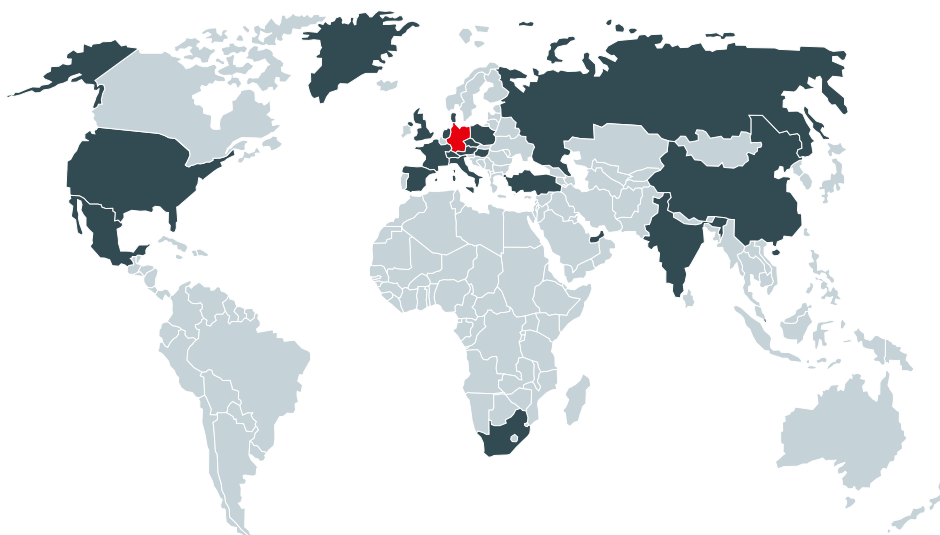


"Our customers are the focal point of our activities."

Helmut Pusch
Managing Director / CSO

Fair partnership for the best solution

Our goal is to be a reliable and fair partner for our industrial, commercial and technical customers all over the world. To this end, we always focus on the best protection solution. Our sales teams in our global network in Germany, in our 20 subsidiaries and offices as well as more than 70 international partners ensure the competent and customer-oriented marketing of our products. Proximity to and close contact with our customers is of great importance to us, be it on-site support by our experienced team, our telephone hotline or personal contact at trade fairs. In hundreds of seminars, workshops and conferences held every year throughout the world, we impart practical knowledge on our products and solutions based on specific sample applications, technical and physical correlations and standardisation.



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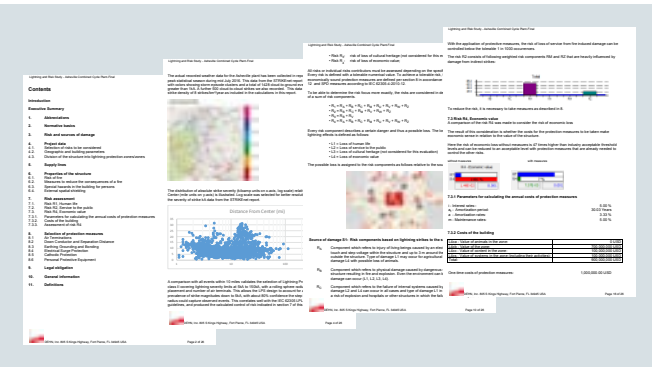
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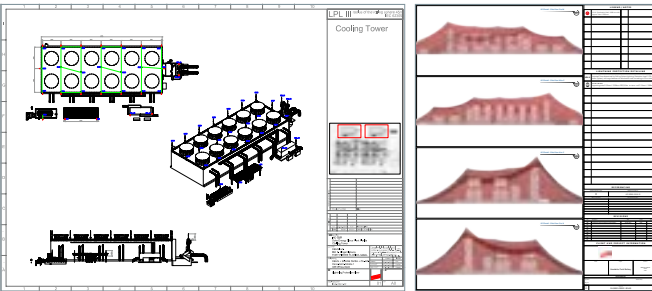
Sales activities in more than 70 countries worldwide

You can find your current local contact person on the Internet at:
<http://www.dehn-international.com/en/contact>



Site Survey and Risk Analysis

DEHN personnel will perform a site inspection, take earth measurements and make recommendations to improve your grounding and surge protection systems. A fully detailed site Risk Analysis is available to help make your calculated decision easier.



Lightning Protection System Design

DEHN will provide a detailed Rolling Sphere Coverage model calculation showing all necessary rod and down comer locations as well as technical drawings and instructions as required. DEHN will provide the necessary installation training and/or site supervision to ensure system compliance.



Supply all Lightning Protection and Surge Protection Components

All necessary items (Rods, wire and cabling, clamps, connectors and SPDs) are manufactured by DEHN. All products supplied are in accordance with and tested to stringent IEC 62305 and IEC 62561 lightning protection specifications. All designs and products meet or exceed the requirements of NFPA.



Install External LPS

A highly trained installation team can be deployed to finish your project on time and on budget. Using the most advanced products along with proven installation techniques ensure the end result is of the highest quality. Hurricane proven in the USA up to 150 MPH.



Certified System

All DEHN IEC 62305 systems can be certified under a UL Master Label or by an Independent IEC Inspection Auditor.

**WINNER 2019
SSB INNOVATION AWARD**

NEW: ACI Technology Equipped for the future!



Surge protection with ACI technology: The highest level of safety

The new ACI technology improves the safety of your electrical systems. The integrated switch/spark gap combination reduces complexity and has a firm grip on future requirements.

Your advantages with DEHNguard ACI:



Safe dimensioning:
eliminate mistakes



Connection cross-section of just 6 mm²:
easier to install



TOV withstand:
increase availability



Future energy structure:
fulfil requirements



Zero leakage current:
increase arrester lifetime



Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.

Find out more on
page 31 and:

www.de.hn/acie



Surge Protection



Failure of technical installations and systems in residential and functional buildings is very unpleasant and expensive. Therefore, faultless operation of devices must be ensured both during normal operation and thunderstorms. The number of annually registered lightning activities in Germany maintained at a constantly high level over many years. Damage statistics of insurance companies clearly show that there are deficits in terms of lightning and surge protection measures both in the private and commercial sector (Figure 1).

A professional solution allows to take adequate protection measures. The lightning protection zone concept, for example, enables designers, constructors and operators of buildings and installations to consider, implement and monitor different protection measures. All relevant devices, installations and systems are thus reliably protected at a reasonable expense.

Sources of interference

Surges occurring during a thunderstorm are caused by direct / nearby lightning strikes or remote lightning strikes (Figure 2 and Figure 3). Direct or nearby lightning strikes are lightning strikes to a building, its surroundings or electrically conductive systems entering the building (e.g. low-voltage supply, telecommunication and data lines). The resulting impulse currents and impulse voltages as well as the associated electromagnetic field (LEMP) are particularly dangerous for the devices and installations to be protected with regard to the amplitude and energy content involved. In case of a direct or nearby lightning strike, surges are caused by the voltage drop at the conventional earthing impedance R_{st} and the resulting potential rise of the building in relation to the remote earth (Figure 3, case 2). This means the highest load for electrical installations in buildings.

The characteristic parameters of the impulse current present (peak value, rate of current rise, charge, specific energy) can be described by means of the 10/350 μs impulse current wave form. They have been defined in international, European and national standards as test current for components and devices protecting against direct lightning strikes (Figure 4).

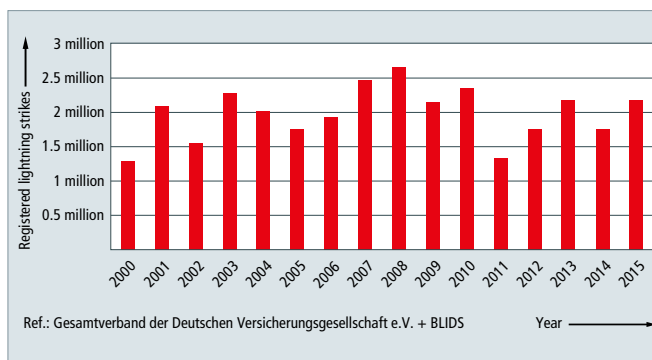


Figure 1: Lightning activity registered in Germany from 2000 to 2015.

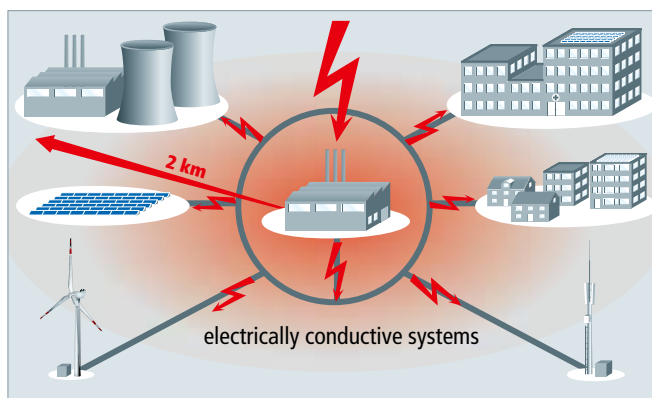


Figure 2: General risks for buildings and installations resulting from lightning strikes.

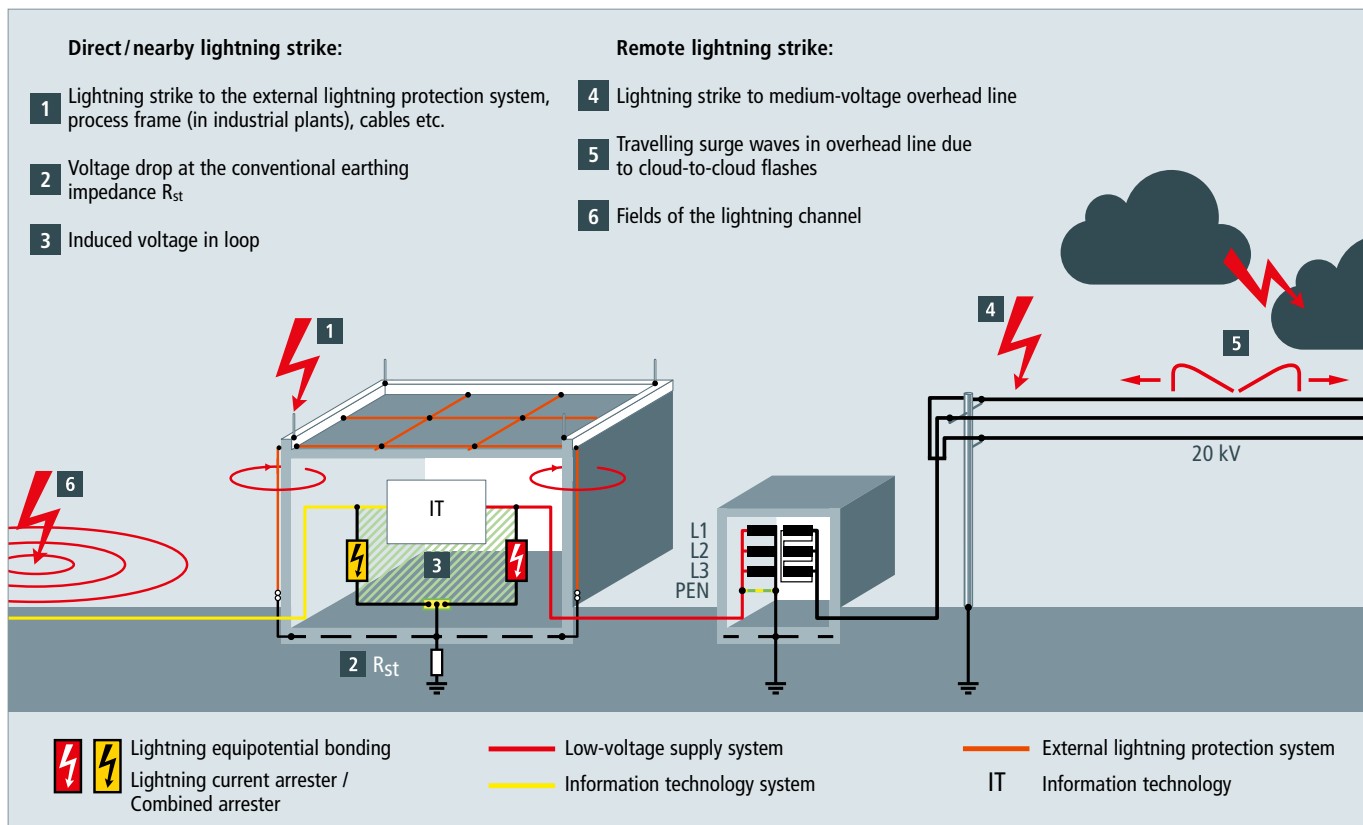


Figure 3: Causes of surges during lightning discharges.

In addition to the voltage drop at the conventional earthing impedance, surges are generated in the electric building installation and the systems and devices connected to it due to the inductive effect of the electromagnetic lightning field (Figure 3, case 3). The energy of these induced surges and of the resulting impulse currents is far lower than the energy of a direct lightning impulse current and is therefore described by a 8/20 μ s impulse current wave form (Figure 4). Components and devices that do not have to conduct currents resulting from direct lightning strikes are therefore tested with such 8/20 μ s impulse currents.

Protection scheme

Lightning strikes are called remote if they occur at a farer distance to the object to be protected, strike medium-voltage overhead lines or their surroundings or occur as cloud-to-cloud lightning discharges (Figure 3, cases 4, 5, 6). Similar to induced surges, the effects of remote lightning strikes on the electrical installation of a building are handled by devices and components which have been dimensioned according to 8/20 μ s impulse current waves. Surges caused by switching operations (SEMP) are, for example, generated by:

- Disconnection of inductive loads (e.g. transformers, reactors, motors)
- Arc ignition and interruption (e.g. arc welding equipment)
- Tripping of fuses

The effects of switching operations in the electrical installation of a building can also be simulated by impulse currents of 8/20 μ s wave form under test conditions. To ensure continuous availability of complex power supply and information technology systems even in case of direct lightning interference, further surge protection measures for electrical and electronic installations and devices based on a lightning protection

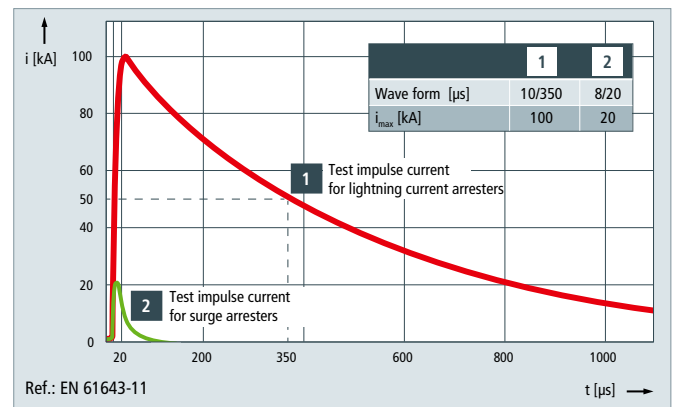


Figure 4: Test impulse currents for lightning current and surge arresters.

system for the building are required. It is important to take all causes of surges into account. To do so, the lightning protection zone concept as described in IEC 62305-4 is applied (Figure 5).

Lightning protection zone concept

The building is divided into different endangered zones. These zones help to define the necessary protection measures, in particular the lightning and surge protection devices and components. Part of an EMC compatible (Electromagnetic Compatibility) lightning protection zone concept is the external lightning protection system (including air-termination system, down-conductor system, earth-termination system), equipotential bonding, spatial shielding and surge protection for the power supply and information technology systems. Definitions apply as classified in Table 1.

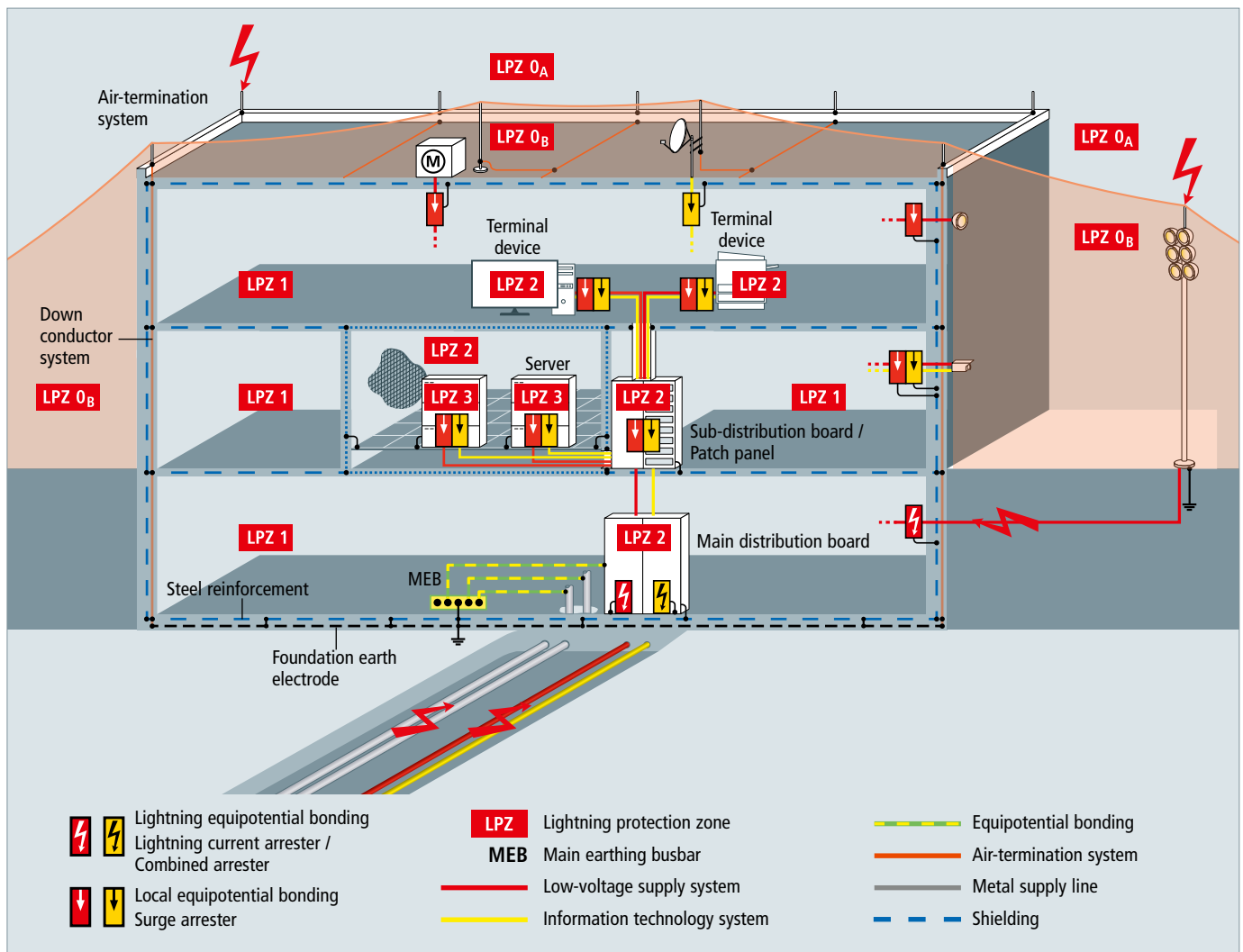
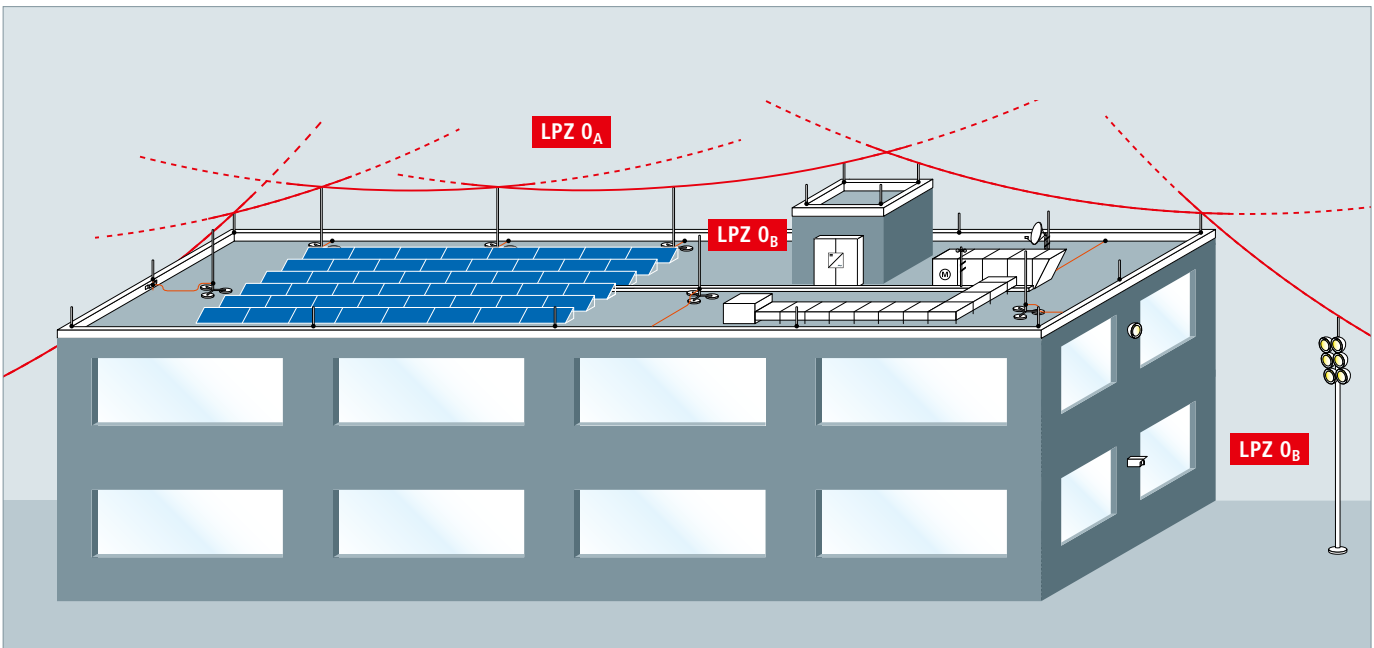
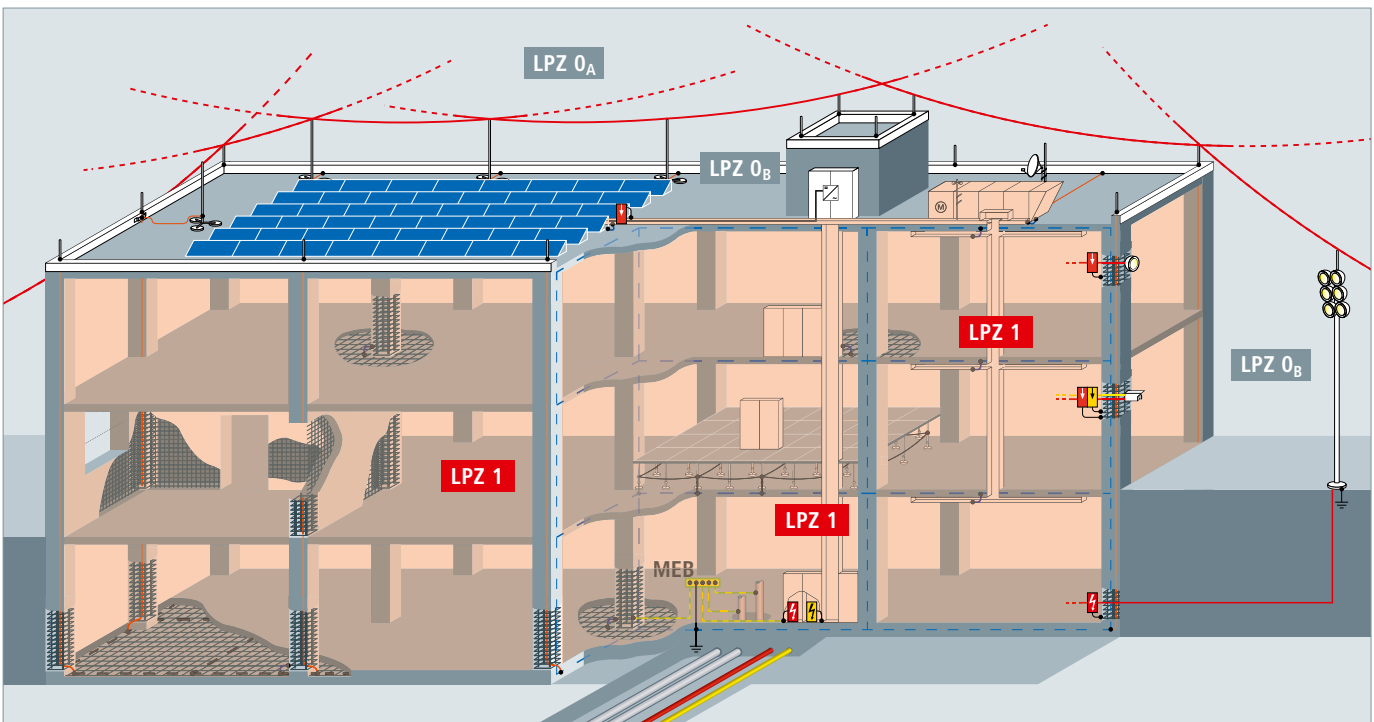


Figure 5: Overall view of a lightning protection zone concept.



▲ Figure 5.1: Transition from LPZ 0_A to LPZ 0_B (above)

▼ Figure 5.2: Transitions from LPZ 0_A to LPZ 1 and LPZ 0_B to LPZ 1 (below)



According to the requirements and loads placed on surge protective devices, they are categorised as lightning current arresters, surge arresters and combined arresters. The highest requirements are placed on the discharge capacity of lightning current arresters and combined arresters used at the transition from lightning protection zone 0_A to 1 or 0_A to 2. These arresters must be capable of conducting partial lightning currents of 10/350 μ s wave form without being destroyed in order to prevent the ingress of destructive partial lightning currents into the electrical installation of a building. At the transition point from LPZ 0_B to 1 or downstream of the lightning current arrester at the transition point from LPZ 1 to 2 and higher, surge arresters are used to protect against surges. Their task is both to reduce the residual energy of the upstream protection stages

even further and to limit the surges induced or generated in the installation itself.

The lightning and surge protective measures at the boundaries of the lightning protection zones described above equally apply to power supply and information technology systems. All measures described in the EMC compatible lightning protection zone concept help to achieve continuous availability of electrical and electronic devices and installations.

For more detailed technical information, DEHN offers a "Lightning Protection Guide" which can be downloaded at www.dehn-international.com/en/downloads.

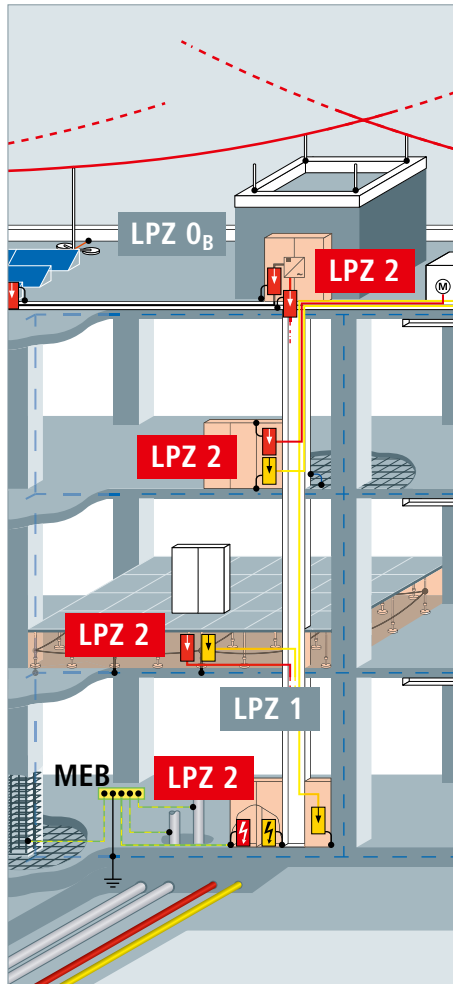
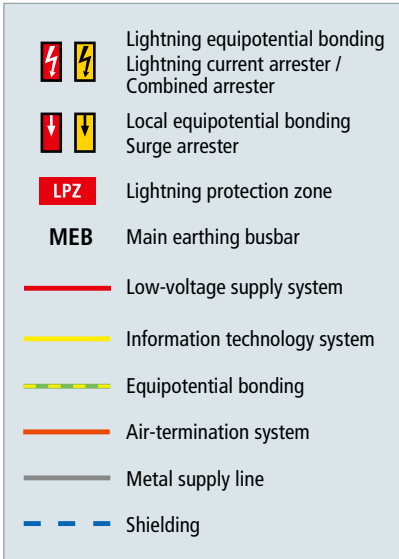


Figure 5.3: Transition from LPZ 1 to LPZ 2

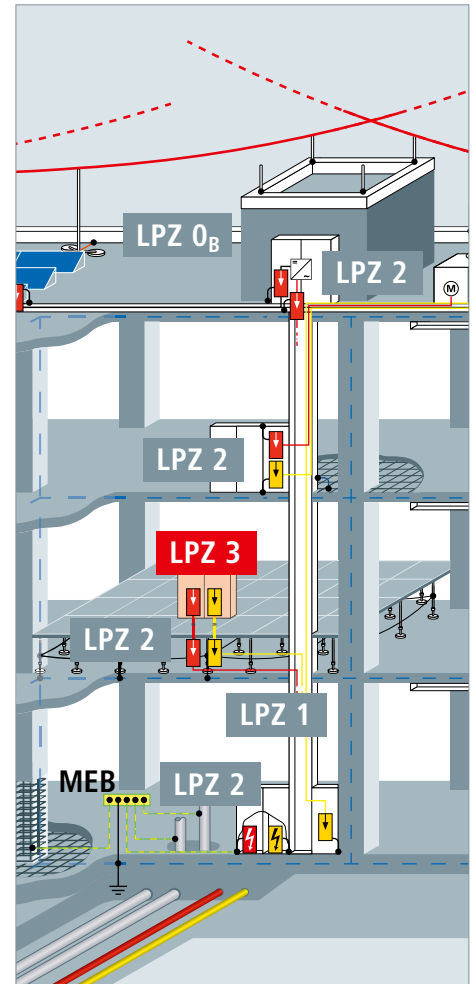


Figure 5.4: Transition from LPZ 2 to LPZ 3

IEC 62305-4:2010

Outer zones:

LPZ 0 Zone where the threat is due to the unattenuated lightning electromagnetic field and where the internal systems may be subjected to **full or partial lightning surge current**.

LPZ 0 is subdivided into:

LPZ 0A Zone where the threat is due to the direct lightning flash and the full lightning electromagnetic field. The **internal systems** may be subjected to **full lightning surge current**.

LPZ 0B Zone protected against direct lightning flashes but where the threat is the full lightning electromagnetic field. The **internal systems** may be subjected to **partial lightning surge currents**.

Inner zones (protected against direct lightning flashes):

LPZ 1 Zone where the surge current is limited by current sharing and **isolating interfaces and/or by SPDs** at the boundary. **Spatial shielding** may attenuate the lightning electromagnetic field.

LPZ 2 ... n Zone where the surge current may be further limited by current sharing and isolating interfaces and/or by **additional SPDs** at the boundary. **Additional spatial shielding** may be used to further attenuate the lightning electromagnetic field.

Table 1: Definition of lightning protection zones.

Surge Protective Devices (SPDs)

Surge protective devices are devices consisting mainly of voltage-controlled resistors (varistors, suppressor diodes) and / or spark gaps (discharge paths). Surge protective devices are used to protect other electrical equipment and installations against impermissibly high surges and / or to establish equipotential bonding.

Surge protective devices are classified:

- a) according to their use into:
- **Surge protective devices for power supply systems and equipment (Red/Line product family)**
for nominal voltage ranges up to 1000 V
– according to EN 61643-11:2012 in type 1 / 2 / 3 SPDs
– according to IEC 61643-11:2011 in class I/II/III SPDs
 - **Surge protective devices for IT systems and equipment (Yellow/Line product family)**
for protecting modern electronic systems in telecommunications and signal-processing networks with nominal voltages up to 1000V a.c. [root-mean-square value (rms)] and 1500 V d.c. against the indirect and direct effects of lightning strikes and other transients.
– according to IEC 61643-21:2012, EN 61643-21:2013 and DIN VDE 0845-3-1.
 - **Isolating spark gaps for earth-termination systems or equipotential bonding (Red/Line product family)**
 - **Surge protective devices for use in photovoltaic installations (Red/Line product family)**
for nominal voltage ranges up to 1500 V
– according to EN 50539-11:2013 as type 1 / 2 SPDs
- b) according to their impulse current discharge capacity and protective effect into:
- **Lightning current arresters / Coordinated lightning current arresters**
for interference resulting from direct or nearby lightning strikes for protecting installations and equipment [for use at the boundaries between lightning protection zones (LPZ) O_A and 1].
 - **Surge arresters**
for remote lightning strikes, switching overvoltages as well as electrostatic discharges for protecting installations, equipment and terminal devices (for use at the boundaries downstream of LPZ O_B).
 - **Combined lightning current and surge arresters**
for interference resulting from direct or nearby lightning strikes for protecting installations, equipment and terminal devices (for use at the boundaries between LPZ O_A and 1 as well as O_A and 2).

Technical data

The technical data of surge protective devices comprise information defining their conditions of use according to:

- use (e.g. installation, power supply conditions, temperature)
- performance in case of interference (e.g. impulse current discharge capacity, follow current extinguishing capability, voltage protection level, response time)
- performance during operation (e.g. nominal current, attenuation, insulation resistance)
- performance in case of failure (e.g. backup fuse, disconnection device, fail-safe, remote signalling option).

actiVsense

The actiVsense technology is integrated in universal combined arresters for protecting information technology installations and devices. The arrester automatically detects the signal voltage applied and optimally adapts the voltage protection level to it. Thus, the arrester can be universally used for different interfaces and provides maximum protection for the devices and system circuits connected to it in case of failure.

Breaking capacity, follow current extinguishing capability I_{fi}

The breaking capacity is the uninfluenced (prospective) r.m.s. value of the mains follow current which can automatically be extinguished by the surge protective device when connecting U_C . It can be proven in an operating duty test according to IEC / EN 61643-11.

Categories according to IEC 61643-21:2012

A number of impulse voltages and impulse currents are described in IEC 61643-21:2012 for testing the current carrying capability and voltage limitation of impulse interference. Table 3 of this standard lists these into categories and provides preferred values. In Table 2 of the IEC 61643-22 standard the sources of transients are assigned to the different impulse categories according to the decoupling mechanism. Category C2 includes inductive coupling (surges), category D1 galvanic coupling (lightning currents). The relevant category is specified in the technical data.

DEHN surge protective devices surpass the values in the specified categories. Therefore, the exact value for the impulse current carrying capability is indicated by the nominal discharge current (8/20 μ s) and the lightning impulse current (10/350 μ s).

Combination wave U_{OC}

A combination wave is generated by a hybrid generator (1.2/50 μ s, 8/20 μ s) with a fictitious impedance of 2 Ω . The open-circuit voltage of this generator is referred to as U_{OC} . U_{OC} is a preferred indicator for type 3 arresters since only these arresters may be tested with a combination wave (according to IEC / EN 61643-11).

Cut-off frequency f_G

The cut-off frequency defines the frequency-dependent behaviour of an arrester. The cut-off frequency is equivalent to the frequency which induces an insertion loss (a_E) of 3 dB under certain test conditions (see EN 61643-21:2013). Unless otherwise indicated, this value refers to a 50 Ω system.

Degree of protection

The IP degree of protection corresponds to the protection categories described in IEC / EN 60529.

Direct Current Disconnection

When using surge arresters in d.c. applications, disconnection must be reliably ensured even if there are no zero crossings. The specifically developed DC Disconnection (DCD) acts as a wedge similar to a blocking valve and interrupts the direct current. Consequently, the devices of the DEHNguard SE DC series are capable of safely interrupting direct currents, thus preventing fire damage caused by d.c. switching arcs.

Disconnecting time t_d

The disconnecting time is the time passing until the automatic disconnection from power supply in case of a failure of the circuit or equipment to be protected. The disconnecting time is an application-specific value resulting from the intensity of the fault current and the characteristics of the protective device.

Energy coordination of SPDs

Energy coordination is the selective and coordinated interaction of cascaded protection elements (= SPDs) of an overall lightning and surge protection concept. This means that the total load of the lightning impulse current is split between the SPDs according to their energy carrying capability. If energy coordination is not possible, downstream SPDs are insufficiently relieved by the upstream SPDs since the upstream SPDs operate too late, insufficiently or not at all. Consequently, downstream SPDs as well as terminal equipment to be protected may be destroyed.

DIN CLC/TS 61643-12:2010 describes how to verify energy coordination. Spark-gap-based type 1 SPDs offer considerable advantages due to their voltage-switching characteristic (see WAVE BREAKER FUNCTION).

Frequency range

The frequency range represents the transmission range or cut-off frequency of an arrester depending on the described attenuation characteristics.

Insertion loss

With a given frequency, the insertion loss of a surge protective device is defined by the relation of the voltage value at the place of installation before and after installing the surge protective device. Unless otherwise indicated, the value refers to a 50 Ω system.

Integrated backup fuse

According to the product standard for SPDs, overcurrent protective devices / backup fuses must be used. This, however, requires additional space in the distribution board, additional cable lengths, which should be as short as possible according to IEC 60364-5-53, additional installation time (and costs) and dimensioning of the fuse. A fuse integrated in the arrester ideally suited for the impulse currents involved eliminates all these disadvantages. The space gain, lower wiring effort, integrated fuse monitoring and the increased protective effect due to shorter connecting cables are clear advantages of this concept which is integrated in the DEHNvenCI, DEHNbloc Maxi S, DEHNguard ... CI and V(A) NH product families.

LifeCheck

Repeated discharge processes which exceed the specification of the device can overload arresters in information technology systems. In order to ensure high system availability, arresters should therefore be subjected to systematic tests. LifeCheck allows quick and easy testing of arresters (see page 54).

Lightning impulse current I_{imp}

The lightning impulse current is a standardised impulse current curve with a 10/350 μs wave form. Its parameters (peak value, charge, specific energy) simulate the load caused by natural lightning currents. Lightning current and combined arresters must be capable of discharging such lightning impulse currents several times without being destroyed.

Mains-side overcurrent protection / arrester backup fuse

Overcurrent protective device (e.g. fuse or circuit breaker) located outside of the arrester on the infeed side to interrupt the power-frequency follow current as soon as the breaking capacity of the surge protective device is exceeded. No additional backup fuse is required since the backup fuse is already integrated in the SPD (see relevant section).

Maximum continuous operating voltage U_C

The maximum continuous operating voltage (maximum permissible operating voltage) is the r.m.s. value of the maximum voltage which may be connected to the corresponding terminals of the surge protective device during operation. This is the maximum voltage on the arrester in the defined non-conducting state, which reverts the arrester back to this state after it has tripped and discharged. The value of U_C depends on the nominal voltage of the system to be protected and the installer's specifications (IEC 60364-5-534).

Maximum continuous operating voltage U_{CPV} for a photovoltaic (PV) system

Value of the maximum d.c. voltage that may be permanently applied to the terminals of the SPD. To ensure that U_{CPV} is higher than the maximum open-circuit voltage of the PV system in case of all external influences (e.g. ambient temperature, solar radiation intensity), U_{CPV} must be higher than this maximum open-circuit voltage by a factor of 1.2 (according to CLC/TS 50539-12). This factor of 1.2 ensures that the SPDs are not incorrectly dimensioned.

Maximum discharge current I_{max}

The maximum discharge current is the maximum peak value of the 8/20 μs impulse current which the device can safely discharge.

Maximum transmission capacity

The maximum transmission capacity defines the maximum high-frequency power which can be transmitted via a coaxial surge protective device without interfering with the protection component.

Nominal discharge current I_n

The nominal discharge current is the peak value of a 8/20 μs impulse current for which the surge protective device is rated in a certain test programme and which the surge protective device can discharge several times.

Nominal load current (nominal current) I_L

The nominal load current is the maximum permissible operating current which may permanently flow through the corresponding terminals.

Nominal voltage U_N

The nominal voltage stands for the nominal voltage of the system to be protected. The value of the nominal voltage often serves as type designation for surge protective devices for information technology systems. It is indicated as an r.m.s. value for a.c. systems.

N-PE arrester

Surge protective devices exclusively designed for installation between the N and PE conductor.

Operating temperature range T_U

The operating temperature range indicates the range in which the devices can be used. For non-self-heating devices, it is equal to the ambient temperature range. The temperature rise for self-heating devices must not exceed the maximum value indicated.

Protective circuit

Protective circuits are multi-stage, cascaded protective devices. The individual protection stages may consist of spark gaps, varistors, semiconductor elements and gas discharge tubes (see energy coordination).

Protective conductor current I_{PE}

The protective conductor current is the current which flows through the PE connection when the surge protective device is connected to the maximum continuous operating voltage U_C , according to the installation instructions and without load-side consumers.

Remote signalling contact

A remote signalling contact allows easy remote monitoring and indication of the operating state of the device. It features a three-pole terminal in the form of a floating changeover contact. This contact can be used as break and / or make contact and can thus be easily integrated in the building control system, controller of the switchgear cabinet, etc.

Response time t_A

Response times mainly characterise the response performance of individual protection elements used in arresters. Depending on the rate of rise du/dt of the impulse voltage or di/dt of the impulse current, the response times may vary within certain limits.

Return loss

In high-frequency applications, the return loss refers to how many parts of the "leading" wave are reflected at the protective device (surge point). This is a direct measure of how well a protective device is attuned to the characteristic impedance of the system.

SCI technology

Direct currents (d.c.) flow on the generator side of a PV system. The surge protective devices used on the generator side can be overloaded due to different scenarios (e.g. impulse load, insulation faults) and must not endanger the PV system. However, insufficient d.c. disconnection capability in a PV system may cause fire. Conventional surge arresters only feature a disconnecter in the form of a simple break contact mechanism which is typically used for a.c. devices. Due to the lacking zero crossing of the d.c. source, a d.c. arc may persist and cause fire. The SCI technology patented

by DEHN with active arc extinction is an ideal solution. In case of overload, a contact is opened and a short-circuit is generated (Short Circuit). Thus, a possible switching arc is actively, quickly and safely extinguished. The PV fuse integrated in the short-circuit path immediately trips after the arc has been extinguished and ensures safe electrical isolation (Interruption) (see also page 25 / 43-45). Thus, all PV arresters from DEHN combine surge protection, fire protection and personal protection in a single device.

Series resistance

Resistance in the direction of the signal flow between the input and output of an arrester. The series resistance is normally used to coordinate the protection stages in a multi-stage SPD.

Shield attenuation

Relation of the power fed into a coaxial cable to the power radiated by the cable through the phase conductor.

Short-circuit withstand capability

The short-circuit withstand capability is the value of the prospective power-frequency short-circuit current handled by the surge protective device when the relevant maximum backup fuse is connected upstream.

Short-circuit rating I_{SCPV} of an SPD in a photovoltaic (PV) system

Maximum uninfluenced short-circuit current which the SPD, alone or in conjunction with its disconnection devices, is able to withstand.

Temporary overvoltage (TOV)

Temporary overvoltage may be present at the surge protective device for a short period of time due to a fault in the high-voltage system. This must be clearly distinguished from a transient caused by a lightning strike or a switching operation, which last no longer than about 1 ms. The amplitude U_T and the duration of this temporary overvoltage are specified in EN 61643-11 (200 ms, 5 s or 120 min.) and are individually tested for the relevant SPDs according to the system configuration (TN, TT, etc.). The SPD can either a) reliably fail (TOV safety) or b) be TOV-resistant (TOV withstand), meaning that it is completely operational during and following temporary overvoltages.

Thermal disconnecter

Surge protective devices for use in power supply systems equipped with voltage-controlled resistors (varistors) mostly feature an integrated thermal disconnecter that disconnects the surge protective device in case of overload and indicates this operating state. The disconnecter responds to the "current heat" generated by an overloaded varistor and disconnects the surge protective device if a certain temperature is exceeded. The disconnecter is designed to disconnect the overloaded surge protective device in time to prevent a fire. It is not intended to ensure protection against indirect contact. The function of these thermal disconnecters can be tested by means of a simulated overload / ageing of the arresters.

Total discharge current I_{total}

Current which flows through the PE, PEN or earth connection of a multipole SPD during the total discharge current test. This test is used to determine the total load if current simultaneously flows through several protective paths of a multipole SPD. This parameter is decisive for the total discharge capacity which is reliably handled by the sum of the individual paths of an SPD.

Voltage protection level U_p

The voltage protection level of a surge protective device is the maximum instantaneous value of the voltage at the terminals of a surge protective device, determined from the standardised individual tests:

- Lightning impulse sparkover voltage 1,2/50 μ s (100%)
- Sparkover voltage with a rate of rise of 1 kV/ μ s
- Measured limit voltage at a nominal discharge current I_n

The voltage protection level characterises the capability of a surge protective device to limit surges to a residual level. The voltage protection level defines the installation location with regard to the overvoltage category according to IEC 60664-1 in power supply systems. For surge protective devices to be used in information technology systems, the voltage protection level must be adapted to the immunity level of the equipment to be protected (IEC 61000-4-5: 2015).

Wave breaker function



Due to the technical design of type 1 SPDs, energy coordination of SPDs considerably varies. Experience has shown that even small amplitudes of the 10/350 μ s lightning impulse current overload downstream SPDs or even destroy them if varistor-based type 1 lightning current arresters are used. In case of spark-gap-based type 1 arresters, in contrast, virtually the total current flows through the type 1 arrester. Similar to a wave breaker the energy is reduced to an acceptable level. The advantage is that the time to half value of the 10/350 μ s impulse current is reduced due to the reduction of the impulse time and the switching behaviour of type 1 SPDs. This considerably relieves downstream SPDs.






All devices of the DEHN Red/Line and Yellow/Line product family are energy-coordinated. Moreover, all type 1 arresters of the Red/Line family are based on spark gaps and thus feature this WAVE BREAKER FUNCTION.




Yellow/Line SPD class

All DEHN arresters for use in information technology systems are categorised into a Yellow/Line SPD class and are marked with the corresponding symbol in the data sheet and on the rating plate (see page 53).

Definition of Symbols

Symbol	Definition
	Installation instructions , see www.dehn-international.com
	Discontinued products

Symbol	Definition	Red Line®
	Integrated backup fuse Reduced space requirements, lower installation costs, faster wiring and shorter connecting cable lengths are clear advantages of this concept used for the DEHNvenCI, DEHNbloc Maxi S, DEHNguard ... CI and V(A) NH product series.	
	ACI technology ACI technology is a further development of CI technology and consists of a switch/spark gap combination connected in series with a high-performance varistor. This ensures easy dimensioning and safe operation of the surge protective device. Further advantages are safe dimensioning, TOV withstand, connection cross-section of only 6 mm ² Cu and zero leakage current. Thus, surge arresters with ACI technology ensure maximum safety and system availability.	
	SCI technology The patented SCI technology with active arc extinction allows to actively, quickly and safely extinguish a possible switching arc in case of overload. The PV fuse integrated in the short-circuit path trips immediately after the arc has been extinguished, thus ensuring safe electrical isolation (Interruption). Consequently, all PV arresters from DEHN combine surge protection, fire protection and personal protection in a single device.	
	Wave breaker function If a spark-gap-based type 1 arrester is used, the total current flows through the type 1 arrester during the discharge process. Similar to a wave breaker, the energy is mitigated to a sufficiently low level, thus considerably relieving downstream SPDs. The WAVE BREAKER function is integrated in all sparkgap-based type 1 arresters of the Red/Line series.	
	Direct Current Disconnection When using surge arresters in d.c. applications, disconnection must be reliably ensured even if there are no zero crossings. The specifically developed DC Disconnection (DCD) acts as a wedge similar to a blocking valve and interrupts the direct current. Consequently, the devices of the DEHNguard SE DC series are capable of safely interrupting direct currents, thus preventing fire damage caused by d.c. switching arcs.	

Symbol	Definition	Yellow Line
	Compact 3-in-1 protection This arrester allows 3 interfaces to be protected by means of a single device, resulting in reduced space requirements, faster wiring and lower installation costs.	
	LifeCheck LifeCheck allows to easily and quickly test arresters for information technology systems. It permanently monitors the condition of the arrester and detects electrical and thermal load on all protection components.	
	actiVsense Arrester technology for arresters for information technology systems. actiVsense automatically detects the signal voltage applied and optimally adapts the voltage protection level to it. Thus, the arrester can be universally used for different interfaces and always provides maximum protection for the connected devices and system circuits in case of failure.	
TYPE 1	Discharge capacity of an SPD (according to the categories from IEC 61643-21) Impulse D1 (10/350), lightning impulse current ≥ 2.5 kA / line or ≥ 5 kA / total • exceeds the discharge capacity of TYPE 2 – TYPE 4	
TYPE 2	Impulse C2 (8/20), increased impulse load ≥ 2.5 kA / line or ≥ 5 kA / total • exceeds the discharge capacity of TYPE 3 – TYPE 4	
TYPE 3	Impulse C1 (8/20), impulse load ≥ 0.25 kA / line or ≥ 0.5 kA / total • exceeds the discharge capacity of TYPE 4	
TYPE 4	Load < TYPE 3	
P1 P2 P3 P4	Protective effect of an SPD (limitation below the test levels according to EN 61000-4-5) Required test level of the terminal device: 1 or higher Required test level of the terminal device: 2 or higher Required test level of the terminal device: 3 or higher Required test level of the terminal device: 4	
+ ⌋	Energy coordination (with another Yellow/Line SPD) SPD with decoupling impedance, suitable for coordination with an SPD marked with ⌋ SPD is suitable for coordination with an SPD with decoupling impedance +	

Practice-oriented – Professional – User-friendly

Find the right product quickly and easily with the help of our surge protection assistants for power supply and information technology systems.



The new DEHNselect SPD software module allows to define and select all necessary internal lightning protection and surge protection products. It creates a structure plan with a bill of materials and allows fast online access to all documents for the products selected such as data sheets and installation instructions.

DEHNselect SPD can be easily used without special knowledge or training. The user-friendly surface facilitates operating the program.

This electronic planning and selection aid provides easy and practice-oriented support for e.g. designers, electricians and installers of lightning protection systems, thus making it considerably easier to professionally implement a surge protection concept.

For more detailed information, see brochure DS 709 E (DEHNSupport Toolbox) or visit www.dehn-international.com/en/selection-guides-and-configurators.



Filter function allows easy product selection

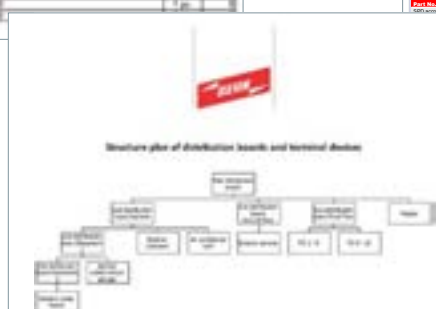


Product comparison

Bill of materials

Description	Part No.	Mount name	Unit	Quantity
Power supply system				
...

Bill of materials



Structure plan

Product Data Sheet: DEHNventil® modular

DV M TNS 255 FM (951 405)

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

Type	Part No.	Max. lightning current (I _{imp})	Max. surge current (I _{max})
1	951 405	100 kA	25 kA
2	951 406	100 kA	25 kA

Product data sheet

Product Data Sheet: BLITZDUCTOR® XT – Protection Modules with LifeCheck®

BXT ML4 B 180 (920 310)

- LifeCheck SPD monitoring function
- Four-pole lightning experimental lightning
- For installation in conformity with the lightning protection zone concept of the boundaries from Cl – 1 and higher

Parameter	Value
Max. lightning current (I _{imp})	100 kA
Max. surge current (I _{max})	25 kA
Max. continuous operating voltage (U _c)	180 V
Max. continuous operating voltage (U _c) (UL)	120 V
Rated current (I _n)	12.5 A
DI Total lightning impulse current (10/350 µs)	15 kA
DI Lightning impulse current (10/350 µs) per line (UL)	2.5 kA
CI Total nominal discharge current (8/20 µs) per line (UL)	25 kA
CI Nominal discharge current (8/20 µs) per line (UL)	5 kA
Voltage protection level line-to-line (U _{pl}) (UL)	4.850 V
Voltage protection level line-to-ground (U _{pl}) (UL)	3.550 V
Voltage protection level line-to-line at 1 kV/500 Hz (UL)	4.850 V
Voltage protection level line-to-ground at 1 kV/500 Hz (UL)	3.550 V
Series resistance per line	0.4 ohm
Capacitance line-to-line (C _{ll})	9 nF
Capacitance line-to-ground (C _{lg})	2 nF
Operating temperature (T _{op})	-40 °C ... +80 °C
Degree of protection (with plug-in protection module)	IP 20
Plug-in type	BXT ML4 BDP 840 4 base part
Surge type	BXT ML4 BDP 840 4 base part
Enclosure material	polycarbonate PA 6.6
Color	white
Test standards	IEC 61643-21 / EN 61643-21 / UL 487B
Approvals	CSA, VDE, IEC, ENEC, KEMA, CMA, USA, UL, Intertek, SIL
SIL classification	UL 95A
ATEX Approvals	EN 61643-21 / EN 61643-21 / EN 61643-21 / EN 61643-21
IECEx Approvals	IECEx 11.0002U, Ex, I, IIC, T4, Gc
CSA & USA Historic approvals (1)	251038B, Class I, Div 2, EPL A, C, C, T4
CSA & USA Historic approvals (2)	251038B, Class I, Div 2, EPL A, C, C, T4
Weight	250 g
Dimensions length (mm)	80
Dimensions width (mm)	80
Dimensions height (mm)	80
Part No.	920 310

Product data sheet

Surges – an underestimated risk

Surges are an often underestimated risk. These voltage pulses (transients) that only take a split second are caused by direct, nearby and remote lightning strikes or switching operations of a power utility.

Direct and nearby lightning strikes

Direct or nearby lightning strikes are lightning strikes into a building, in its close proximity or in lines entering the building (e.g. low-voltage power supply system, telecommunication and data lines). The amplitude and energy content of the resulting impulse currents and impulse voltages as well as the associated electromagnetic field (LEMP) considerably threaten the system to be protected.

The lightning current resulting from a direct lightning strike into a building causes a rise in potential of several 100,000 volts on all earthed devices. Surges are caused by the voltage drop at the conventional earthing impedance and the resulting potential rise of the building with respect to the environment. This is the highest stress on electrical systems in buildings.

In addition to the voltage drop at the conventional earthing impedance, surges occur in the electrical installation of the building and in the connected systems and devices due to the induction effect of the lightning electromagnetic field. The energy of these induced surges and the resulting impulse currents are lower than that of the direct lightning impulse current.

Remote lightning strikes

Remote lightning strikes are lightning strikes far away from the object to be protected, in the medium-voltage overhead line network or in its close proximity as well as cloud-to-cloud discharge.

Switching operations

Switching operations of power utilities cause surges (SEMP – Switching Electromagnetic Pulse) of some 1,000 volts in electrical systems. They occur, for example, when inductive loads (e.g. transformers, reactors, motors) are switched off, arcs are ignited or fuses trip. If power supply and data lines are installed in parallel, sensitive systems may be interfered with or destroyed.

Protection of power supply and data systems

Destructive transients in residential, office and administration buildings and industrial plants are likely to occur in, for example, the power supply system, information technology system and telephone system, control systems of production facilities via the fieldbus and controllers of air-conditioning or lighting systems. These sensitive systems can only be protected by a comprehensive protection concept. In this context, the coordinated use of surge protective devices (lightning current and surge arresters) is paramount.

The function of lightning current arresters is to discharge high energies without destruction. They are installed as close as possible to the point where the electrical system enters the building. Surge arresters, in turn, protect terminal equipment. They are installed as close as possible to the equipment to be protected.

With its Red/Line for power supply systems and its Yellow/Line for data systems, DEHN offers harmonised surge protective devices. The modular portfolio allows cost-optimised implementation of protection concepts for all building types and installation sizes.



Solutions for Industrial Plants

Automation systems are standard in most industrial companies. If the automation system fails, production comes to a halt. This can bring a company to the verge of ruin.



Office and Administration Buildings

Office and administration buildings are at least equipped with PCs, servers, networks and telecommunication systems. Failure of these systems would bring operation to a standstill since all work processes depend on these systems. Moreover, building automation systems linked via bus systems such as KNX and LON are used in these buildings.

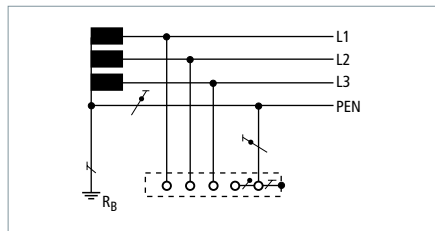


Residential Buildings

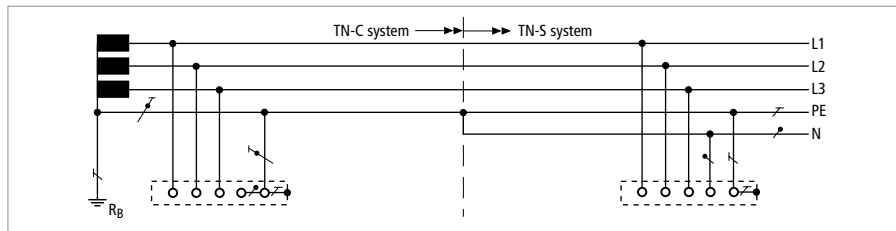
Our modern residential buildings are equipped with a variety of high-quality technical devices – with rising tendency. These devices are vulnerable to damage caused by overvoltage and may even fail completely. In this case the damage loss can easily amount to some thousand Euros.

International Power Supply Systems

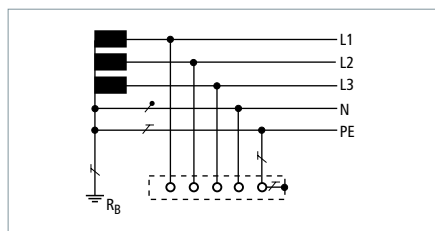
International system configurations* according to IEC 60364-1



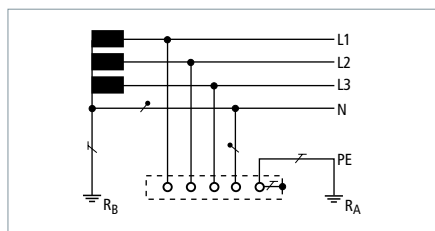
TN-C system 230 / 400 V



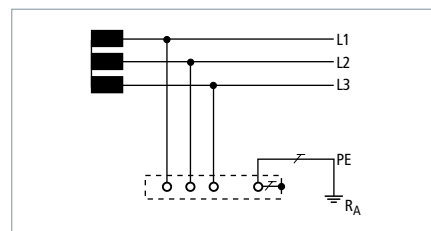
TN-C-S system 230 / 400 V



TN-S system 230 / 400 V

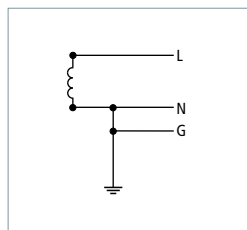


TT system 230 / 400 V



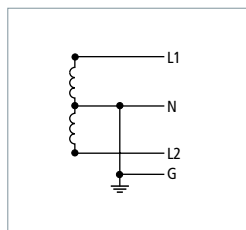
IT system 230 V

Further international system configurations*



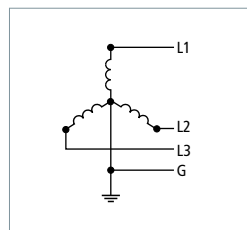
single-phase; 3 wire

(1 Ph, 2 W + G)
110 V
120 V
220 V
240 V



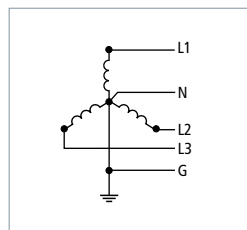
single-phase; 4 wire
Split Phase or Edison

(1 Ph, 3 W + G)
120 V / 240 V



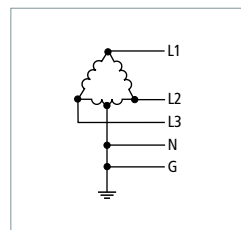
three-phase; 4 wire

(3 Ph Y, 3 W + G)
480 V



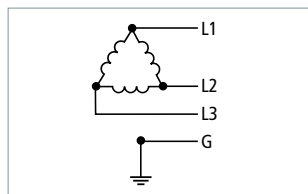
three-phase; 5 wire

(3 Ph Y, 4 W + G)
120 V / 208 V
277 V / 480 V



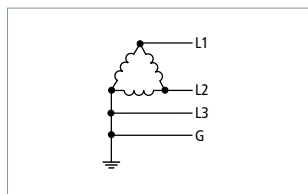
three-phase; 5 wire
Delta "Highleg"

(3 Ph Δ, 4 W + G)
120 V / 240 V



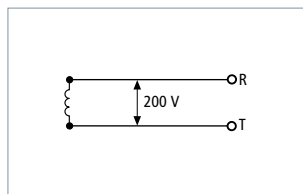
three-phase; 4 wire
Delta "Ungrounded"

(3 Ph Δ, 3 W + G)
240 V
480 V



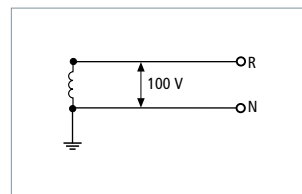
three-phase; 4 wire
Delta "Grounded Corner"

(3 Ph Δ, 3 W + G)
240 V
480 V



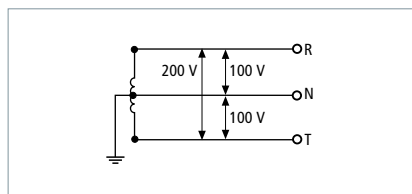
single-phase; 2 wire

(1 Ph, 2 W)
200 V



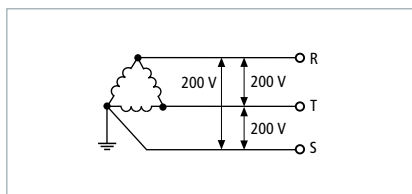
single-phase; 2 wire

(1 Ph, 2 W)
100 V



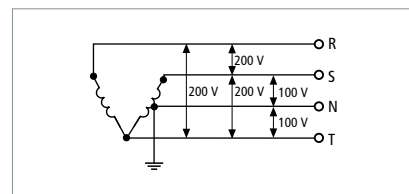
single-phase; 3 wire

(1 Ph, 3 W)
100 V / 200 V



three-phase; 3 wire

(3 Ph, 3 W)
200 V



three-phase + single-phase

100 V / 200 V; 200 V

* System according to the earth connection (according to IEC 60364-1)

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Lightning Current Arresters – Type 1	29
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DEHNventil modular


For protecting low-voltage consumer's installations against surges and even direct lightning strikes. For installation in conformity with the lightning protection zone concept at the boundaries from 0_A – 2.

- 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
- No tripping of 20 A gG fuses up to short-circuit currents of 50 kA_{rms}
- Discharge capacity up to 100 kA (10/350 μs)
- Capable of protecting terminal equipment
- Operating state/fault indication by green/red indicator flag in the inspection window
- Easy replacement of protection modules without tools due to module locking system with module release button
- Vibration and shock-tested according to EN 60068-2

- DEHNventil M TNC 255:** Modular combined lightning current and surge arrester for use in TN-C systems
DEHNventil M TNS 255: Modular combined lightning current and surge arrester for use in TN-S systems
DEHNventil M TT 255: Modular combined lightning current and surge arrester for use in TT and TN-S systems (3+1 configuration)
DEHNventil M TN 255: Modular combined lightning current and surge arrester for use in single-phase TN systems
DEHNventil M TT 2P 255: Modular combined lightning current and surge arrester for use in single-phase TT and TN systems (1+1 configuration)
DEHNventil M ... FM: With remote signalling contact for monitoring device (floating changeover contact)

With their functional Red/Line design, the devices of the modular DEHNventil family provide a combination of safety and innovation. Designed for "all-in-one installation", the arresters integrate lightning equipotential bonding and surge protection in a single device, making them ideal for use in compact electrical installations. The energy-coordinated arresters even allow to protect terminal equipment if the distance between DEHNventil and the loads is ≤ 10 m. With a lightning current discharge capacity up to 100,000 A, the arresters ensure a high degree of availability of the electrical installation to be protected. Even in large-scale electrical installations, the modular DEHNventil arresters provide various application benefits. The Red/Line surge arresters installed at the boundaries of the individual lightning protection zones, for example, are already energy-coordinated with the DEHNventil arresters. Encapsulated creepage discharge spark gaps and the small space requirements enable easy integration into switchgear installations or distribution boards. A special feature of the modular DEHNventil family is its functional design, in particular the module locking system. It fixes the protection module firmly in place so that it is safely connected to the base part even with maximum loads. If a protection module has to be replaced, it releases the module without tools and allows easy removal. By using the double terminals



suitable for all conductors, the arresters can be connected in series in a space-saving and cost-effective way up to nominal currents of 125 A as preferred by IEC 60364-5-53. Busbars of type MVS 3 8 6 and MVS 4 11 8 can be used for connecting further DIN rail mounted devices. The type designation of DEHNventil arresters allows to easily choose the right arrester for the relevant system configuration of the low-voltage consumer's installation.

The patented RADAX Flow technology for follow current limitation and extinction allows high availability of the electrical consumer's installation to be protected. Even in case of short-circuit currents as high as 100 kA_{rms}, mains follow currents are reduced in such a way that selectivity with respect to low-current-rated fuses is ensured. This means that upstream fuses will not trip due to upcoming mains follow currents.

The operating state/fault indicator of each protective path needs no power to operate and instantly shows the operating state of the surge arrester. Apart from the standard visual indicator with green and red indicator flags, DEHNventil M ... FM devices feature a three-pole remote signalling terminal. With its floating changeover contact, the remote signal can be used as a break or make contact according to the particular circuit concept.

Due to their parameters and design, the devices can be even installed upstream of meter panels in low-voltage consumer's installations.

DEHNventil M TNC (FM)

Modular combined lightning current and surge arrester for TN-C systems with a nominal voltage of 230/400 V (3+0 configuration); FM version with floating remote signalling contact.

Type DV M ...	TNC 255	TNC 255 FM
Part No.	951 300	951 305
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	264 V (50 / 60 Hz)	264 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3-PEN] (I_{total})	75 kA	75 kA
Lightning impulse current (10/350 μ s) [L-PEN] (I_{imp})	25 kA	25 kA
Voltage protection level (U_p)	≤ 1.5 kV	≤ 1.5 kV
Max. backup fuse (L) up to $I_K = 50$ kA _{rms}	315 A gG	315 A gG
Approvals	KEMA, VDE, UL	KEMA, VDE, UL
Type of remote signalling contact	—	changeover contact
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})	100 kA _{rms} (220 kA _{peak})



DEHNventil M TNS (FM)

Modular combined lightning current and surge arrester for TN-S systems with a nominal voltage of 230/400 V (4+0 configuration); FM version with floating remote signalling contact.

Type DV M ...	TNS 255	TNS 255 FM
Part No.	951 400	951 405
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	264 V (50 / 60 Hz)	264 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3+N-PE] (I_{total})	100 kA	100 kA
Lightning impulse current (10/350 μ s) [L, N-PE] (I_{imp})	25 kA	25 kA
Voltage protection level [L-PE]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV
Max. backup fuse (L) up to $I_K = 50$ kA _{rms}	315 A gG	315 A gG
Approvals	KEMA, VDE, UL	KEMA, VDE, UL
Type of remote signalling contact	—	changeover contact
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})	100 kA _{rms} (220 kA _{peak})



DEHNventil M TT (FM)

Modular combined lightning current and surge arrester for TT and TN-S systems with a nominal voltage of 230/400 V (3+1 configuration); FM version with floating remote signalling contact.

Type DV M ...	TT 255	TT 255 FM
Part No.	951 310	951 315
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) [L-N] (U_c)	264 V (50 / 60 Hz)	264 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3+N-PE] (I_{total})	100 kA	100 kA
Lightning impulse current (10/350 μ s) [L-N]/[N-PE] (I_{imp})	25 / 100 kA	25 / 100 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV
Max. backup fuse (L) up to $I_K = 50$ kA _{rms}	315 A gG	315 A gG
Approvals	KEMA, VDE, UL	KEMA, VDE, UL
Type of remote signalling contact	—	changeover contact
Extended technical data:	For use in switchgear installations with prospective short-circuit currents of more than 50 kA_{rms} (tested by the German VDE)	
Voltage protection level [L-PE] (U_p)	2.2 kV	2.2 kV
– Max. prospective short-circuit current	100 kA _{rms} (220 kA _{peak})	100 kA _{rms} (220 kA _{peak})



DEHNventil M TN (FM)

Modular combined lightning current and surge arrester for single-phase TN systems with a nominal voltage of 230 V (2+0 configuration); FM version with floating remote signalling contact.



Type DV M ...	TN 255	TN 255 FM
Part No.	951 200	951 205
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	264 V (50 / 60 Hz)	264 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L+N-PE] (I_{total})	50 kA	50 kA
Lightning impulse current (10/350 μ s) [L, N-PE] (I_{imp})	25 kA	25 kA
Voltage protection level [L-PE]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV
Max. backup fuse (L) up to $I_k = 50$ kA _{rms}	315 A gG	315 A gG
Approvals	KEMA, VDE, UL	KEMA, VDE, UL
Type of remote signalling contact	—	changeover contact
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})	100 kA _{rms} (220 kA _{peak})

DEHNventil M TT 2P (FM)

Modular combined lightning current and surge arrester for single-phase TT and TN-S systems with a nominal voltage of 230 V (1+1 configuration); FM version with floating remote signalling contact.



Type DV M ...	TT 2P 255	TT 2P 255 FM
Part No.	951 110	951 115
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) [L-N] (U_c)	264 V (50 / 60 Hz)	264 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L+N-PE] (I_{total})	50 kA	50 kA
Lightning impulse current (10/350 μ s) [L-N]/[N-PE] (I_{imp})	25 / 50 kA	25 / 50 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV
Max. backup fuse (L) up to $I_k = 50$ kA _{rms}	315 A gG	315 A gG
Approvals	KEMA, VDE, UL	KEMA, VDE, UL
Type of remote signalling contact	—	changeover contact
Extended technical data:	For use in switchgear installations with prospective short-circuit currents of more than 50 kA_{rms} (tested by the German VDE)	
Voltage protection level [L-PE] (U_p)	2.2 kV	2.2 kV
– Max. prospective short-circuit current	100 kA _{rms} (220 kA _{peak})	100 kA _{rms} (220 kA _{peak})

Protection Module for DEHNventil modular

- High discharge capacity due to powerful creepage discharge spark gap
- Maximum system availability due to RADAX Flow follow current limitation
- Easy replacement of protection modules without tools due to module locking system with module release button
- Operating state / fault indication by green / red indicator flag in the inspection window
- The plug-in protection module can be replaced without the need to de-energise and without removing the distribution board cover



For protecting low-voltage consumer's installations against surges and even direct lightning strikes. For installation in conformity with the lightning protection zone concept at the boundaries from 0_A–2.

- DV MOD 255: Spark-gap-based protection module
- DV MOD NPE 50: 50 kA N-PE spark-gap-based protection module
- DV MOD NPE 100: 100 kA N-PE spark-gap-based protection module

The spark-gap-based protection modules of the modular DEHNventil series combine safety and innovation in a single device. Apart from the encapsulated RADAX Flow spark gap technology, the compact protection modules incorporate the complete monitoring circuit for controlling the energy flow of the spark gap, the monitoring device and the operating state/fault indicator.

The mechanical coding of the protection module prevents that the N-PE protection modules are confused with the spark-gap-based module for the phase conductors.

The module locking mechanism fixes the protection modules to the base part. Protection modules can be easily removed without tools by simply pressing the module release button.

Avoid additional, short-notice and unplanned maintenance jobs. In multipole protective circuits, we recommend replacing the complete set of protection modules when one module fails.



Spark-Gap-Based Protection Module

Spark-gap-based protection module for DEHNventil M ...

Type DV MOD ...	255
Part No.	951 001
Max. continuous operating voltage (a.c.) (U _c)	264 V
Lightning impulse current (10/350 μs) (I _{imp})	25 kA



N-PE Spark-Gap-Based Protection Module

N-PE spark-gap-based protection module for DEHNventil M ... with ... + 1 configuration.

Type DV MOD ...	NPE 50	NPE 100
Part No.	951 050	951 100
Max. continuous operating voltage (a.c.) (U _c)	255 V	255 V
Lightning impulse current (10/350 μs) (I _{imp})	50 kA	100 kA





DEHNshield



- Application-optimised and prewired spark-gap-based type 1 + type 2 combined lightning current and surge arrester
- Compact design due to space-saving spark gap technology with a width of only one module / pole
- Fulfils the minimum requirements on the lightning current discharge capacity according to IEC 60364-5-53
- Allows compact lightning equipotential bonding including protection of terminal equipment
- Discharge capacity up to 50 kA (10/350 μ s)
- Operating state / fault indication by green / red indicator flag in the inspection window
- High follow current extinguishing capacity ($I_{fi} = 25 \text{ kA}_{rms}$)

For protecting compact low-voltage consumer's installations against surges and even direct lightning strikes. For installation in conformity with the lightning protection zone concept at the boundaries from $0_A - 2$.

- DEHNshield TNC 255:** Application-optimised combined lightning current and surge arrester for TN-C systems
- DEHNshield TNS 255:** Application-optimised combined lightning current and surge arrester for TN-S systems
- DEHNshield TT 255:** Application-optimised combined lightning current and surge arrester for TT and TN-S systems (3+1 configuration)
- DEHNshield TN 255:** Application-optimised combined lightning current and surge arrester for single-phase TN systems
- DEHNshield TT 2P 255:** Application-optimised combined lightning current and surge arrester for single-phase TT and TN systems (1+1 configuration)
- DEHNshield ... FM:** With remote signalling contact for monitoring device (floating changeover contact)

The space-saving and application-optimised DEHNshield family offers various benefits provided by type 1 + type 2 spark-gap-based arresters such as the "wave breaker function" (WBF). This function and the associated reduction of the pulse time mitigate the energy of the lightning impulse current to an acceptable level for downstream protection stages or terminal equipment. Moreover, DEHNshield arresters are directly energy coordinated with other arresters of the Red/Line product family.

Application-optimised DEHNshield combined lightning current and surge arresters combine lightning equipotential bonding up to lightning impulse currents of 50 kA (10/350 μ s) and surge protection in a single device.

This clearly distinguishes DEHNshield from varistor-based arresters of this application and performance class.

Due to their technical parameters and the very compact design as spark-gap-based arrester with only one module / pole, DEHNshield arresters are ideally suited for this application class. For this reason, they are a space-saving and application-optimised solution in particular for residential buildings.

DEHNshield arresters also provide optimal protection in existing buildings without external lightning protection system where roof superstructures or overhead line supplies are installed which require type 1 SPDs according to VdS 2031.

No additional backup fuse is required if an installation is protected by backup fuses up to 160 A.

The energy-coordinated arresters even allow to protect terminal equipment if the distance between DEHNshield and the loads is $\leq 10 \text{ m}$. The spark gap without venting means and the small space requirements of the application-optimised combined lightning current and surge arresters enable easy integration into distribution boards.

The follow-current-limiting spark gap technology ensures selectivity with regard to low-current-rated fuses (35 A gG). This means that upstream fuses will not trip due to mains follow currents.

Busbars and pin-shaped terminals from DEHN can be used for connecting DEHNshield to other DIN rail mounted devices. The type designation of DEHNshield allows to easily choose the right arrester for the relevant system configuration of the low-voltage consumer's installation.

The operating state / fault indicator of every protective path needs no power to operate and instantly shows the operating state of the arrester. Apart from the standard visual indicator with green and red indicator flags, the DEHNshield ... FM versions feature a three-pole remote signalling terminal. With its floating changeover contact, the remote signal can be used as a break or make contact according to the particular circuit concept.

Due to their parameters and design, the DEHNshield devices can be even installed upstream of meter panels in low-voltage consumer's installations.

DEHNshield TNC

Application-optimised and prewired combined lightning current and surge arrester for TN-C systems with a nominal voltage of 230/400 V (3+0 configuration).



Type DSH ...	TNC 255
Part No.	941 300
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3-PEN] (I_{total})	37.5 kA
Lightning impulse current (10/350 μ s) [L-PEN] (I_{imp})	12.5 kA
Voltage protection level (U_p)	$\leq 1.5 \text{ kV}$
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE, UL

DEHNshield TNC FM

Application-optimised and prewired combined lightning current and surge arrester for TN-C systems with a nominal voltage of 230/400 V (3+0 configuration); with floating remote signalling contact.

Type DSH ...	TNC 255 FM
Part No.	941 305
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3-PEN] (I_{total})	37.5 kA
Lightning impulse current (10/350 μ s) [L-PEN] (I_{imp})	12.5 kA
Voltage protection level (U_p)	≤ 1.5 kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE
Type of remote signalling contact	changeover contact



DEHNshield TNS

Application-optimised and prewired combined lightning current and surge arrester for TN-S systems with a nominal voltage of 230/400 V (4+0 configuration).

Type DSH ...	TNS 255
Part No.	941 400
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	255 (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3+N-PE] (I_{total})	50 kA
Lightning impulse current (10/350 μ s) [L, N-PE] (I_{imp})	12.5 kA
Voltage protection level [L-PE]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE, UL



DEHNshield TT

Application-optimised and prewired combined lightning current and surge arrester for TT and TN-S systems with a nominal voltage of 230/400 V (3+1 configuration).

Type DSH ...	TT 255
Part No.	941 310
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3+N-PE] (I_{total})	50 kA
Lightning impulse current (10/350 μ s) [L-N]/[N-PE] (I_{imp})	12.5 / 50 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE, UL
Extended technical data:	
Voltage protection level [L-PE] (U_p)	2.0 kV



DEHNshield TT FM

Application-optimised and prewired combined lightning current and surge arrester for TT and TN-S systems with a nominal voltage of 230/400 V (3+1 configuration); with floating signalling contact.

Type DSH ...	TT 255 FM
Part No.	941 315
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
Max. continuous operating voltage (a.c.) (U_c)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3+N-PE] (I_{total})	50 kA
Lightning impulse current (10/350 μ s) [L-N]/[N-PE] (I_{imp})	12.5 / 50 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE
Type of remote signalling contact	changeover contact
Extended technical data:	
Voltage protection level [L-PE] (U_p)	2.0 kV



DEHNshield TN

Application-optimised and prewired combined lightning current and surge arrester for single-phase TN systems with a nominal voltage of 230 V (2+0 configuration).



Type DSH ...	TN 255
Part No.	941 200
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
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
Lightning impulse current (10/350 μs) [L, N-PE] (I _{imp})	12.5 kA
Voltage protection level [L-PE]/[N-PE] (U _p)	≤ 1.5 / ≤ 1.5 kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE, UL

DEHNshield TN FM

Application-optimised and prewired combined lightning current and surge arrester for single-phase TN systems with a nominal voltage of 230 V (2+0 configuration); with floating remote signalling contact.



Type DSH ...	TN 255 FM
Part No.	941 205
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
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
Lightning impulse current (10/350 μs) [L, N-PE] (I _{imp})	12.5 kA
Voltage protection level [L-PE]/[N-PE] (U _p)	≤ 1.5 / ≤ 1.5 kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE
Type of remote signalling contact	changeover contact

DEHNshield TT 2P

Application-optimised and prewired combined lightning current and surge arrester for single-phase TT and TN systems with a nominal voltage of 230 V (1+1 configuration).



Type DSH ...	TT 2P 255
Part No.	941 110
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
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
Lightning impulse current (10/350 μs) [L-N]/[N-PE] (I _{imp})	12.5 / 25 kA
Voltage protection level [L-N]/[N-PE] (U _p)	≤ 1.5 / ≤ 1.5 kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE, UL
Extended technical data:	
Voltage protection level [L-PE] (U _p)	2.0 kV

DEHNshield TT 2P FM

Application-optimised and prewired combined lightning current and surge arrester for single-phase TT and TN systems with a nominal voltage of 230 V (1+1 configuration); with floating remote signalling contact.



Type DSH ...	TT 2P 255 FM
Part No.	941 115
SPD according to EN 61643-11 / IEC 61643-11	type 1 + type 2 / class I + class II
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
Lightning impulse current (10/350 μs) [L-N]/[N-PE] (I _{imp})	12.5 / 25 kA
Voltage protection level [L-N]/[N-PE] (U _p)	≤ 1.5 / ≤ 1.5 kV
Max. mains-side overcurrent protection	160 A gG
Approvals	KEMA, VDE
Type of remote signalling contact	changeover contact
Extended technical data:	
Voltage protection level [L-PE] (U _p)	2.0 kV

DEHNcombo

- Prewired type 1 + type 2 combined lightning current and surge arrester for use in photovoltaic generator circuits
- Combined disconnection and short-circuiting device with safe electrical isolation (patented SCI principle)
- Approved fault-resistant Y circuit prevents damage to the surge protective device in case of insulation faults in the generator circuit
- Space-saving enclosure with a width of only four modules for up to 1500 V d.c.
- Tested to EN 50539-11
- Suitable for use in all PV systems in accordance with IEC 60364-7-712
- Operating state/fault indication by green/red indicator flag in the inspection window



For protecting photovoltaic inverters against surges and even direct lightning strikes. For use in accordance with IEC 60364-7-712 (Installation of photovoltaic power supply systems).

- DEHNcombo YPV SCI 600:** Two-pole combined lightning current and surge arrester for use in photovoltaic power supply systems up to 600 V d.c.
- DEHNcombo YPV SCI 1000:** Two-pole combined lightning current and surge arrester for use in photovoltaic power supply systems up to 1000 V d.c.
- DEHNcombo YPV SCI 1500:** Two-pole combined lightning current and surge arrester for use in photovoltaic power supply systems up to 1500 V d.c.
- DEHNcombo YPV SCI ... FM:** With remote signalling contact for monitoring device (floating changeover contact)

The DEHNcombo YPV SCI ... combined arrester protects equipment in photovoltaic systems against lightning currents.

Thanks to its application-optimised discharge capacity of 6.25 kA (10/350 µs) per pole, DEHNcombo is tailored to meet the requirements of the latest version of the EN 50539-12 standard and Supplement 5 of the German DIN EN 62305-3 standard.

With a short-circuit current rating of 1000 A, DEHNcombo easily meets all requirements placed on surge arresters in small, medium and large photovoltaic systems and can be used without additional backup fuse in all photovoltaic systems up to 1000 A.

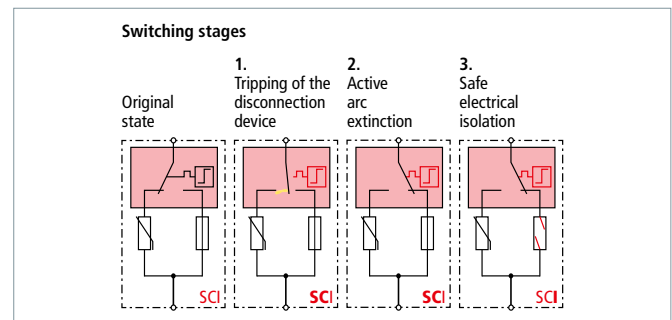
Due to its enclosure design which is specifically adapted to the system-specific requirements, even the version for voltages up to 1500 V can be used without taking special precautions (e.g. safety distances). The combined arrester has a width of only four modules, thus allowing space-saving installation.

The patented three-step d.c. switching device (SCI principle) provides an extremely high degree of safety which is required in modern photovoltaic systems. DEHNcombo YPV SCI is available for voltages of 600 V, 1000 V and 1500 V, covering the most common voltage levels of photovoltaic systems.

The fault-resistant Y circuit and the combined disconnection and short-circuiting device further reduce the probability of an arrester failure in case

of the operating and fault states which have to be considered in photovoltaic systems. This ensures reliable operation of the PV system at any time.

A low own consumption of the devices is also an important aspect in PV systems. The operating state/fault indication, which needs no power to operate and instantly provides information on the operating state of the arrester, also fulfils this requirement. With its optional floating changeover contact, the remote signal can be used as a break or make contact according to the particular circuit concept.



Three-step d.c. switching device (patented SCI principle)

DEHNcombo YPV SCI ... FM

Combined lightning current and surge arrester for use in photovoltaic power supply systems up to 1500 V d.c.; with floating remote signalling contact.

Type DCB YPV SCI ...	600	600 FM	1000	1000 FM	1500	1500 FM
Part No.	900 060	900 065	900 061	900 066	900 062	900 067
SPD according to EN 50539-11	type 1 + type 2	type 1 + type 2	type 1 + type 2	type 1 + type 2	type 1 + type 2	type 1 + type 2
Max. PV voltage [DC+ -> DC-] (U _{CPV})	≤ 600 V	≤ 600 V	≤ 1000 V	≤ 1000 V	≤ 1500 V	≤ 1500 V
Short-circuit current rating (I _{SCPV})	1000 A	1000 A	1000 A	1000 A	1000 A	1000 A
Total discharge current (10/350 µs) [DC+/DC- -> PE] (I _{total})	12.5 kA	12.5 kA	12.5 kA	12.5 kA	12.5 kA	12.5 kA
Lightning impulse current (10/350 µs) [DC+ -> PE/DC- -> PE] (I _{imp})	6.25 kA	6.25 kA	6.25 kA	6.25 kA	6.25 kA	6.25 kA
Voltage protection level [(DC+/DC-) -> PE] (U _p)	1.75 kV	1.75 kV	2.5 kV	2.5 kV	3.75 kV	3.75 kV
Approvals	KEMA, UL	KEMA, UL	KEMA, UL	KEMA, UL	KEMA	KEMA
Type of remote signalling contact	—	changeover contact	—	changeover contact	—	changeover contact



DEHnbloc modular



For protecting low-voltage consumer's installations against surges and even direct lightning strikes. For installation in conformity with the lightning protection zone concept at the boundaries from 0_A – 1.

- Coordinated spark-gap-based lightning current arrester consisting of a base part and a plug-in protection module
- Maximum system availability due to RADAX Flow follow current limitation
- No tripping of 32 A gG fuses up to short-circuit currents of 50 kA_{rms}
- Discharge capacity up to 50 kA (10/350 μs)
- Directly coordinated with DEHNguard surge protective devices without additional cable length
- Low voltage protection level
- Operating state/fault indication by green/red indicator flag in the inspection window
- Easy replacement of protection modules without tools due to module locking system with module release button

DEHnbloc M 1 ...: Coordinated and modular single-pole lightning current arrester with high follow current limitation
DEHnbloc M 1 ... FM: With remote signalling contact for monitoring device (floating changeover contact)

The modular devices of the DEHnbloc M product family are coordinated lightning current arresters with a functional design.

Energy coordination with type 2 surge arresters of the DEHNguard family is ensured without additional cable lengths or decoupling coils. This is one of the most important features of the Red/Line product families.

The DEHnbloc M arresters combine high performance and ease of use in a single device. Their electrical parameters are rated for the most stringent requirements within lightning and surge protection systems. DEHnbloc M is ideally suited for use in the main distribution board of the low-voltage consumer's installation of a building. Equipped with the latest RADAX Flow spark gap technology, the protection and availability of electrical installations is a top priority of DEHnbloc M.

Due to the unique follow current limitation and extinction, fuses are not tripped by follow currents even in case of low-current-rated fuses in the installation. The leakage-current-free protective circuit and the mechanical operating state indicator allow the device to be installed even in areas upstream of meter panels in low-voltage consumer's installations.

The modular design of the DEHnbloc M arresters makes them safe and easy to use. Their vibration-proof module locking system, for example, is unique. Shock or vibration during transport or operation or enormous mechanical impulse loads resulting from discharges do not affect the module locking system which ensures safe fixation both for the base part and protection module. Nevertheless, the protection modules can be eas-

ily replaced without tools by simply pressing the easy-to-use module release button. Both the base part and protection module are mechanically coded to ensure against installing an incorrect module.

DEHnbloc M devices incorporate double terminals, allowing series connection of the arresters in a space-saving and cost-effective way according to IEC 60364-5-53 requirements for nominal currents up to 125 A.

The operating state / fault indicator of DEHnbloc M needs no power to operate and instantly shows the operating state of the device. Apart from the standard visual indicator with red and green indicator flags, DEHnbloc M ... FM devices feature an additional remote signalling output. With its floating changeover contact, the remote signal can be used as a break or make contact according to the particular circuit concept.



DEHnbloc M 1 ...

Coordinated and modular single-pole lightning current arrester with a high discharge capacity.



Type DB M 1 ...	150	255	320
Part No.	961 110	961 120	961 130
SPD according to EN 61643-11 / IEC 61643-11	type 1 / class I	type 1 / class I	type 1 / class I
Max. continuous operating voltage (a.c.) (U _c)	150 V (50 / 60 Hz)	255 V (50 / 60 Hz)	320 V (50 / 60 Hz)
Lightning impulse current (10/350 μs) (I _{imp})	35 kA	50 kA	25 kA
Voltage protection level (U _p)	≤ 1.5 kV	≤ 2.5 kV	≤ 2.5 kV
Max. backup fuse (L) up to I _k = 50 kA _{rms} (t _a ≤ 0.2 s)	—	500 A gG	315 A gG
Max. backup fuse (L) up to I _k = 50 kA _{rms} (t _a ≤ 5 s)	—	315 A gG	315 A gG
Max. backup fuse (L) up to I _k = 35 kA _{rms} (t _a ≤ 0.2 s)	500 A gG	—	—
Max. backup fuse (L) up to I _k = 35 kA _{rms} (t _a ≤ 5 s)	315 A gG	—	—
Approvals	UL, CSA	VDE, KEMA, UL	UL

DEHNbloc M 1 ... FM

Coordinated and modular single-pole lightning current arrester with a high discharge capacity; with remote signalling contact for monitoring system (floating changeover contact).

Type DB M 1 ...	150 FM	255 FM	320 FM
Part No.	961 115	961 125	961 135
SPD according to EN 61643-11 / IEC 61643-11	type 1 / class I	type 1 / class I	type 1 / class I
Max. continuous operating voltage (a.c.) (U_c)	150 V (50 / 60 Hz)	255 V (50 / 60 Hz)	320 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) (I_{imp})	35 kA	50 kA	25 kA
Voltage protection level (U_p)	≤ 1.5 kV	≤ 2.5 kV	≤ 2.5 kV
Max. backup fuse (L) up to $I_K = 50$ kA _{rms} ($t_a \leq 0.2$ s)	—	500 A gG	315 A gG
Max. backup fuse (L) up to $I_K = 50$ kA _{rms} ($t_a \leq 5$ s)	—	315 A gG	315 A gG
Max. backup fuse (L) up to $I_K = 35$ kA _{rms} ($t_a \leq 0.2$ s)	500 A gG	—	—
Max. backup fuse (L) up to $I_K = 35$ kA _{rms} ($t_a \leq 5$ s)	315 A gG	—	—
Approvals	UL, CSA	VDE, KEMA, UL	UL



Protection Module for DEHNbloc modular

- High discharge capacity due to powerful creepage discharge spark gap
- Maximum system availability due to RADAX Flow follow current limitation
- Easy replacement of protection modules without tools due to module locking system with module release button
- Operating state / fault indication by green / red indicator flag in the inspection window
- The plug-in protection module can be replaced without the need to de-energise and removing the vertical cover



For protecting low-voltage consumer's installations against surges and even direct lightning strikes. For installation in conformity with the lightning protection zone concept at the boundaries from $0_A - 1$.

DB M MOD ...: Spark-gap-based protection module

The spark-gap-based protection modules for devices of the DEHNbloc M family incorporate the complete protective circuit including the RADAX Flow spark gap and the monitoring circuit for controlling the energy flow. The spark gap monitoring system and the operating state / fault indicator are also housed in the protection module.

Every protection module is mechanically coded to ensure against installing an incorrect replacement module.

As with all modular protective devices, protection modules can be easily replaced without tools by simply pressing the module release button.

Avoid additional, short-notice and unplanned maintenance jobs. In multi-pole protective circuits, we recommend replacing the complete set of protection modules when one module fails.

DB M Spark-Gap-Based Protection Module

Spark-gap-based protection module for DEHNbloc M ...

Type DB M MOD ...	150	255	320
Part No.	961 001	961 002	961 003
Max. continuous operating voltage (a.c.) (U_c)	150 V	255 V	320 V
Lightning impulse current (10/350 μ s) (I_{imp})	35 kA	50 kA	25 kA





DEHnbloc modular for North America



- High discharge current capacity due to powerful creepage discharge spark gap
- Directly coordinated with DEHNguard MU surge protective devices without additional cable length
- ANSI/UL 1449 – 4th Ed. open type 1 surge protection device (SPD)

DEHnbloc MU 3PY 208 3W+G R: Modular lightning current arrester for application in 3 phase Wye 208Y/120V electrical systems
 DEHnbloc MU 3PY 480 3W+G R: Modular lightning current arrester for application in 3 phase Wye 480Y/277V electrical systems
 DEHnbloc MU ... R: With remote status indicator for monitoring device (Form C / SPDT contact)

Power Supply Systems – Red/Line

DEHnbloc MU 3PY ... 3W+G

DIN rail mount, pluggable lightning current arrester consisting of a base part and plug-in protection modules for application in 3 Phase Wye electrical systems.



Type DB MU 3PY ...	208 3W+G R	480 3W+G R
Part No.	908 505	908 506
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Type 1 Component Assembly SPD	Type 1 Component Assembly
Max. continuous operating voltage [L-G] / [L-L] (MCOV)	150 V a.c. / 260 V a.c.	320 V a.c. / 555 V a.c.
Lightning impulse current (10x350 μs) (I _{imp})	35 kA	25 kA
Voltage protection rating [L-G] / [L-L] (VPR)	1500 V _{pk} / 2500 V _{pk}	1800 V _{pk} / 3000 V _{pk}
Approvals	UL	UL
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)

DEHNbloc

- Encapsulated creepage discharge spark gap without venting means
- RADAX Flow spark gap technology with high follow current limitation
- Energy coordination with other arresters of the Red/Line product family
- Can also be used upstream of meter panels due to its high insulation resistance
- Multifunctional terminal for connecting conductors and busbars
- Single-pole and three-pole version (lightning impulse currents up to 100 kA depending on the system configuration)
- Modular single-pole version also available



For protecting low-voltage consumer's installations against surges and even direct lightning strikes. For installation in conformity with the lightning protection zone concept at the boundaries from $0_A - 1$.

DEHNbloc H M 1 255: Modular single-pole lightning current arrester with high follow current limitation

DEHNbloc 1 255 H: Single-pole lightning current arrester with high follow current limitation

DEHNbloc 3 255 H: Three-pole lightning current arrester with high follow current limitation

The spark gaps of the DEHNbloc lightning current arresters allow compact configuration of low-voltage distribution boards. By using pressurised and encapsulated creepage discharge spark gaps, no safety distance from busbars and special flameproof enclosures are necessary.

With a lightning current discharge capacity up to 50 kA (10/350 μ s) per pole, DEHNbloc devices fulfil the highest national and international lightning protection and application standards.

The consistent improvement of the integration concept made the DEHNbloc devices even more efficient: With DEHNbloc H, the ground-breaking RADAX Flow spark gap technology for follow current extinction and limitation was integrated into the DEHNbloc family.

The RADAX Flow technology prevents that system operation is disrupted due to a tripped circuit breaker as soon as the arrester operates. In times where systems increasingly depend on a properly functioning electrical infrastructure, this is an indispensable product feature. Thanks to the patented RADAX Flow principle, even the amplitude of short-circuit currents in installations up to 50 kA_{rms} can be limited to approx. 500 A and extinguished after approximately 5 ms. This feature ensures selectivity even in case of low-current-rated fuses.

But the DEHNbloc H family concept also stands out due to other product features: With its double terminals on the phase and earth side, the single-pole DEHNbloc 1 255 H device offers various application options.

The DBH M 1 255 device with a new arrester design features the approved module release system that safely fixes the protection module to the base part even at maximum loads on the protection module. The module can be easily replaced without tools by simply pressing the module release button of the protection module.

By using the double terminals suitable for all conductors, even three-pole DEHNbloc 3 255 H arresters can be connected in series in a space-saving and cost-effective way up to nominal currents of 125 A as preferred by IEC 60364-5-53.

If DEHNbloc is to be used with other DIN rail mounted devices, the multifunctional terminals are ideally suited for providing connection for conductors and busbars.

DEHNbloc H

Modular single-pole lightning current arrester with a high discharge capacity for use in 230/400 V systems.

Type	DBH M 1 255
Part No.	961 122
SPD according to EN 61643-11 / IEC 61643-11	type 1 / class I
Max. continuous operating voltage (a.c.) (U_c)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) (I_{imp})	50 kA
Voltage protection level (U_p)	≤ 4 kV
Max. backup fuse (L) up to $I_k = 50$ kA _{rms} ($t_a \leq 0.2$ s)	500 A gG
Max. backup fuse (L) up to $I_k = 50$ kA _{rms} ($t_a \leq 5$ s)	315 A gG



Accessories for DEHNbloc

DB H Spark-Gap-Based Protection Module

Spark-gap-based protection module

Type	DBH MOD 255
Part No.	961 022
Max. continuous operating voltage (a.c.) (U_c)	255 V



DEHNbloc 1 255 H

Single-pole (3-0 configuration) lightning current arrester with a high discharge capacity for use in 230/400 V systems.



Type	DB 1 255 H
Part No.	900 222
SPD according to EN 61643-11 / IEC 61643-11	type 1 / class I
Max. continuous operating voltage (a.c.) (U_c)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) (I_{imp})	50 kA
Voltage protection level (U_p)	≤ 4 kV
Max. backup fuse up to $I_k = 50$ kA _{rms} ($t_a \leq 0.2$ s)	500 A gG
Max. backup fuse up to $I_k = 50$ kA _{rms} ($t_a \leq 5$ s)	315 A gG
Approvals	KEMA

DEHNbloc 3 255 H

Three-pole (3-0 configuration) lightning current arrester with a high discharge capacity for use in 230/400 V systems.



Type	DB 3 255 H
Part No.	900 120
SPD according to EN 61643-11 / IEC 61643-11	type 1 / class I
Max. continuous operating voltage (a.c.) (U_c)	255 V (50 / 60 Hz)
Lightning impulse current (10/350 μ s) [L1+L2+L3-N/PEN] (I_{total})	100 kA
Voltage protection level (U_p)	≤ 4 kV
Max. backup fuse up to $I_k = 50$ kA _{rms} ($t_a \leq 0.2$ s)	500 A gG
Max. backup fuse up to $I_k = 50$ kA _{rms} ($t_a \leq 5$ s)	315 A gG
Approvals	KEMA

DEHNguard modular with Advanced Circuit Interruption (safe dimensioning)

- New technology “Advanced Circuit Interruption” (ACI) integrated in the protection module, consists of a switch/spark gap combination
- Due to ACI technology no external backup fuse required
- Small connection cross-sections (6 mm²) absolutely sufficient*)
- TOV withstand also at 440 V (AC)
- High system reliability, no tripping of 32 A gG fuses
- Zero leakage current due to galvanic isolation by ACI switch unit
- Energy coordination with other arresters of the Red/Line product family

*) All live conductors should be wired so that they are inherently short-circuit and earth fault proof



For protecting low-voltage consumer's installations against surges. For installation in conformity with the lightning protection zone concept at the boundaries from $O_B - 1$ and higher.

- DEHNguard M TNC ACI 275 FM: Modular surge arrester with integrated ACI technology for TN-C systems
 DEHNguard M TNS ACI 275 FM: With integrated ACI technology for TN-S systems
 DEHNguard M TT ACI ... FM: With integrated ACI technology for TT and TN-S systems (3+1 configuration)
 DEHNguard M TN ACI 275 FM: With integrated ACI technology for 230 V TN systems
 DEHNguard M TT 2P ACI ... FM: With integrated ACI technology for 230 V TT and TN systems (1+1 configuration)
 DEHNguard S ACI ... FM: Single-pole, modular surge arrester with integrated ACI technology
 DEHNguard M/S ... ACI ... FM: With remote signalling contact for monitoring device (floating changeover contact)

The new modular surge arrester of the DEHNguard ACI product family provides safety at the highest level. This is down to ACI technology (Advanced Circuit Interruption) which replaces the backup fuse with a switch / spark-gap combination connected in series with a high capacity varistor.

At the end of the service life of the ACI surge arrester, the new technology reduces any fault current to such an extent that not even the smallest fuses in the system are tripped. This means much greater availability and operational safety for the system in comparison with standard type 2 arresters with external fuses.

The new internal arrester backup fuse has further advantages:

Safe dimensioning: eliminate mistakes

The new technology prevents designing errors which might occur when dimensioning or selecting overload protection; thus eliminating the need for a backup fuse. With ACI, protection is directly integrated in the arrester and, as a result, optimally adjusted to it. DEHNguard ACI automatically eliminates the possibility of faulty installation or dimensioning errors. The arrester also leaves you more space in the switchgear cabinet as there is no need for an additional upstream backup fuse. In addition to the condition of the varistor, that of the switch/spark-gap combination is also signalled and notified via the tried and tested mechanical function/fault indicator.

Connection cross-section of only 6 mm²: Easier to install

A conductor cross-section of just 6 mm² is always enough for the active conductors and PE. You save the valuable time you would, in the past, have spent dimensioning the cross-sections. 6 mm² Cu also makes installation easier because the bending radiuses are smaller. DEHNguard ACI therefore allows shorter wiring.

TOV withstand: Increase availability

Temporary overvoltages (e.g. caused by loss of neutral) can destroy conventional surge protective devices. The new DEHNguard ACI has a much better TOV withstand and provides protection without device failure even at 440 V (AC). This increases the availability of your system and avoids wasting time and money on troubleshooting and repairing unnecessary damage.

Zero leakage current: Increase service lifetime

The construction of DEHNguard ACI means that there are no leakage currents. This prevents premature ageing of the protective device and avoids wasting time and money on replacing them ahead of schedule. DEHNguard ACI arresters also contribute towards operational safety because they prevent the accidental tripping of the insulation monitoring.

Transition in the energy sector: Fulfil future requirements

With ACI arresters you are safely equipped for the future – even if network parameters change, e.g., as a result of renewable power generation. Isolated grids and storage systems are changing the short-circuiting conditions.

DEHNguard ACI – Maximum system availability

System downtimes caused by an upstream safety device tripping or being switched back on are a thing of the past. This means much greater availability and operational safety for the system in comparison with standard type 2 arresters with external fuses.

DEHNgard M TNC ACI 275 FM

Modular surge arrester with Advanced Circuit Interruption (ACI) for TN-C systems.



Type DG ...	M TNC ACI 275 FM
Part No.	952 330
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Max. continuous operating voltage (a.c.) (U _c)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 μs) (I _n)	20 kA
Voltage protection level (U _p)	≤ 1.5 kV
Additional external fuse	not required
Temporary overvoltage (TOV) (U _T) – Characteristic	440 V / 120 min. – withstand

DEHNgard M TNS ACI 275 FM

Modular surge arrester with Advanced Circuit Interruption (ACI) for TN-S systems.



Type DG ...	M TNS ACI 275 FM
Part No.	952 440
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Max. continuous operating voltage (a.c.) [L-PE] (U _c)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 μs) (I _n)	20 kA
Voltage protection level [L-PE] / [N-PE] (U _p)	≤ 1.5 / ≤ 1.5 kV
Additional external fuse	not required
Temporary overvoltage (TOV) (U _T) – Characteristic	440 V / 120 min. – withstand

DEHNgard M TT ACI ... FM

Modular surge arrester with Advanced Circuit Interruption (ACI) for TT and TN-S systems (3+1 configuration).



Type DG ...	M TT ACI 275 FM	M TT ACI 385 FM
Part No.	952 341	952 342
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) [L-N] (U _c)	275 V (50 / 60 Hz)	385 V (50 / 60 Hz)
Nominal discharge current (8/20 μs) [L-N] (I _n)	20 kA	20 kA
Voltage protection level [L-N] / [N-PE] (U _p)	≤ 1.5 / ≤ 1.5 kV	≤ 1.5 / ≤ 1.5 kV
Additional external fuse	not required	not required
Temporary overvoltage [L-N] (U _T) – Characteristic	440 V / 120 min. – withstand	440 V / 120 min. – withstand
Temporary overvoltage [N-PE] (U _T) – Characteristic	1200 V / 200 ms – withstand	1200 V / 200 ms – withstand

DEHNgard M TN ACI 275 FM

Modular surge arrester with Advanced Circuit Interruption (ACI) for single-phase 230 V-TN systems.



Type DG ...	M TN ACI 275 FM
Part No.	952 220
Max. continuous operating voltage (a.c.) [L-PE] (U _c)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 μs) (I _n)	20 kA
Voltage protection level [L-PE] / [N-PE] (U _p)	≤ 1.5 / ≤ 1.5 kV
Additional external fuse	not required
Temporary overvoltage (TOV) (U _T) – Characteristic	440 V / 120 min. – withstand

Surge Arresters – Type 2

DEHNgard M TT 2P ACI ... FM

Modular surge arrester with Advanced Circuit Interruption (ACI) for single-phase 230 V-TT and TN systems (1+1 configuration).

Type DG ...	M TT 2P ACI 275 FM	M TT 2P ACI 385 FM
Part No.	952 121	952 122
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) [L-N] (U_c)	275 V (50 / 60 Hz)	385 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) [L-N] (I_n)	20 kA	20 kA
Voltage protection level [L-N] / [N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV
Additional external fuse	not required	not required
Temporary overvoltage [L-N] (U_T) – Characteristic	440 V / 120 min. – withstand	440 V / 120 min. – withstand
Temporary overvoltage [N-PE] (U_T) – Characteristic	1200 V / 200 ms – withstand	1200 V / 200 ms – withstand



DEHNgard S ACI ... FM

Pluggable single-pole surge arrester consisting of a base part and plug-in protection module; with Advanced Circuit Interruption (ACI).

Type DG ...	S ACI 275 FM	S ACI 385 FM
Part No.	952 100	952 113
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) (U_c)	275 V (50 / 60 Hz)	385 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	20 kA	20 kA
Voltage protection level (U_p)	≤ 1.5 kV	≤ 1.5 kV
Additional external fuse	not required	not required
Temporary overvoltage (TOV) (UT) – Characteristic	440 V / 120 min. – withstand	440 V / 120 min. – withstand



Accessories for DEHNgard modular with Advanced Circuit Interruption (safe dimensioning)

Combined Switch / Spark Gap Protection Module for DEHNgard ACI

Type	DG MOD ACI 275	DG MOD ACI 385
Part No.	952 024	952 028
Max. continuous operating voltage (a.c.) (U_c)	275 V	385 V



Spark-Gap-Based Protection Module for DEHNgard M ACI

Type	DG MOD A NPE
Part No.	952 022
Max. continuous operating voltage (a.c.) (U_c)	275 V



N-PE Spark-Gap-Based Protection Module for DEHNgard M ACI

Type	DG MOD H A NPE
Part No.	952 083
Max. continuous operating voltage (a.c.) (U_c)	275 V





DEHNgard modular



For protecting low-voltage consumer's installations against surges. For installation in conformity with the lightning protection zone concept at the boundaries from $O_B - 1$ and higher.

- Prewired complete unit consisting of a base part and plug-in protection modules
- Energy coordination with other arresters of the Red/Line product family
- High discharge capacity due to heavy-duty zinc oxide varistors / spark gaps
- High reliability due to "Thermo Dynamic Control" SPD monitoring device
- Easy replacement of protection modules without tools due to module locking system with module release button
- Vibration and shock-tested according to EN 60068-2

- DEHNgard M TNC ... : Modular surge arrester for use in TN-C systems
- DEHNgard M TNS ... : Modular surge arrester for use in TN-S systems
- DEHNgard M TT ... : Modular surge arrester for use in TT and TN-S systems (3+1 configuration)
- DEHNgard M TN ... : Modular surge arrester for use in single-phase TN systems
- DEHNgard M TT 2P ... : Modular surge arrester for use in single-phase TT and TN systems (1+1 configuration)
- DEHNgard M ... FM: With remote signalling contact for monitoring device (floating changeover contact)

Featuring the functional Red/Line family design, the modular DEHNgard M ... surge arresters set new standards in terms of safety and ease of use. The proven protective circuit with heavy-duty zinc oxide varistors in combination with the dual "Thermo Dynamic Control" monitoring device are characteristic of the DEHNgard technology.

A variety of features shows that both reliable surge protection and equipment safety are key elements of the modular DEHNgard surge arresters. The application-based product designation, which makes it considerably easier to choose the correct device for the relevant application, as well as the unique module locking system stand for fulfilling the most stringent safety requirements. The module locking system firmly fixes the protection modules to the base part. Neither vibration during transport nor the enormous forces of discharge can loosen the protection modules. Nevertheless, they can be easily replaced without tools by simply pressing the easy-to-use module release button of the protection modules. Each protective circuit of the multipole surge arresters and each protection module are mechanically coded to ensure against installing an incorrect module.

The dual "Thermo Dynamic Control" monitoring device was not only developed on the basis of national and international product standards, but also stands for experience of decades in the world market of surge protective devices and considers many practical applications where arresters might be damaged. As with all DEHN surge arresters with "Thermo Dynamic Control", the surface temperature of the heavy-duty varistor and the intensity of the discharge current are used for evaluation. The visual indicator with green and red indicator flags shows the availability of every protective circuit. Apart from this standard visual indication, DEHNgard M ... FM devices feature a three-pole remote signalling terminal.

With its floating changeover contact, the remote signal can be used as a make or break contract according to the particular circuit concept. The surge arresters of the modular multipole DEHNgard M family feature multifunctional terminals on a standardised spacing of 1 module for the connection of conductors and busbars, allowing easy wiring with other DIN rail mounted devices. The STAK 25 pin-shaped terminal, which is compatible with all DEHNgard modules, allows optimal series connection according to IEC 60364-5-53.

DEHNgard M TNC ...

Modular surge arrester for use in TN-C systems (3+0 configuration).



Type DG M ...	TNC 150	TNC 275	TNC 385	TNC 440
Part No.	952 313	952 300	952 314	952 303
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	385 V (50 / 60 Hz)	440 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA	20 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA	40 kA	40 kA
Voltage protection level (U_p)	≤ 0.7 kV	≤ 1.5 kV	≤ 1.75 kV	≤ 2 kV
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG	125 A gG
Approvals	KEMA, UL	KEMA, VDE, UL	KEMA, UL	KEMA, UL

DEHNgard M TNC ... FM

Modular surge arrester for use in TN-C systems (3+0 configuration); with floating changeover contact.

Type DG M ...	TNC 150 FM	TNC 275 FM	TNC 385 FM	TNC 440 FM
Part No.	952 318	952 305	952 319	952 308
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	385 V (50 / 60 Hz)	440 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA	20 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA	40 kA	40 kA
Voltage protection level (U_p)	≤ 0.7 kV	≤ 1.5 kV	≤ 1.75 kV	≤ 2 kV
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG	125 A gG
Approvals	KEMA, UL	KEMA, VDE, UL	KEMA, UL	KEMA, UL
Type of remote signalling contact	changeover contact	changeover contact	changeover contact	changeover contact



DEHNgard M TNS ...

Modular surge arrester for use in TN-S systems (4+0 configuration).

Type DG M ...	TNS 150	TNS 275	TNS 385
Part No.	952 403	952 400	952 404
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	385 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA	40 kA
Voltage protection level [L-PE]/[N-PE] (U_p)	$\leq 0.7 / \leq 0.7$ kV	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.75 / \leq 1.75$ kV
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG
Approvals	KEMA, UL	KEMA, VDE, UL	KEMA, UL



DEHNgard M TNS ... FM

Modular surge arrester for use in TN-S systems (4+0 configuration); with floating changeover contact.

Type DG M ...	TNS 150 FM	TNS 275 FM	TNS 385 FM
Part No.	952 408	952 405	952 409
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	385 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA	40 kA
Voltage protection level [L-PE]/[N-PE] (U_p)	$\leq 0.7 / \leq 0.7$ kV	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.75 / \leq 1.75$ kV
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG
Approvals	KEMA, UL	KEMA, VDE, UL	KEMA, UL
Type of remote signalling contact	changeover contact	changeover contact	changeover contact



DEHNgard M TT ...

Modular surge arrester for use in TT and TN-S systems (3+1 configuration).

Type DG M ...	TT 150	TT 275	TT 320	TT 385
Part No.	952 323	952 310	952 320	952 311
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) [L-N] (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	320 V (50 / 60 Hz)	385 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA	20 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA	40 kA	40 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 0.7 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.75 / \leq 1.5$ kV
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG	125 A gG
Approvals	—	KEMA, VDE, UL	KEMA	KEMA, UL



DEHNgard M TT ... FM

Modular surge arrester for use in TT and TN-S systems (3+1 configuration); with floating remote signalling contact.

Type DG M ...	TT 150 FM	TT 275 FM	TT 320 FM	TT 385 FM
Part No.	952 328	952 315	952 325	952 316
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) [L-N] (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	320 V (50 / 60 Hz)	385 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA	20 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA	40 kA	40 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 0.7 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.5 / \leq 1.5$ kV	$\leq 1.75 / \leq 1.5$ kV
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG	125 A gG
Approvals	UL	KEMA, VDE, UL	KEMA	KEMA, UL
Type of remote signalling contact	changeover contact	changeover contact	changeover contact	changeover contact



DEHNgard M TN ...

Modular surge arrester for use in single-phase TN systems (2+0 configuration).



Type DG M ...	TN 150	TN 275
Part No.	952 201	952 200
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA
Voltage protection level [L-PE]/[N-PE] (U_p)	$\leq 0.7 / \leq 0.7$ kV	$\leq 1.5 / \leq 1.5$ kV
Max. mains-side overcurrent protection	125 A gG	125 A gG
Approvals	KEMA, UL	KEMA, VDE, UL

DEHNgard M TN ... FM

Modular surge arrester for use in single-phase TN systems (2+0 configuration); with floating remote signalling contact.



Type DG M ...	TN 150 FM	TN 275 FM
Part No.	952 206	952 205
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II	type 2 / class II
Max. continuous operating voltage (a.c.) (U_c)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	15 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA
Voltage protection level [L-PE]/[N-PE] (U_p)	$\leq 0.7 / \leq 0.7$ kV	$\leq 1.5 / \leq 1.5$ kV
Max. mains-side overcurrent protection	125 A gG	125 A gG
Approvals	KEMA, UL	KEMA, VDE, UL
Type of remote signalling contact	changeover contact	changeover contact

DEHNgard M TT 2P ...

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



Type DG M ...	TT 2P 275
Part No.	952 110
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Max. continuous operating voltage (a.c.) [L-N] (U_c)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV
Max. mains-side overcurrent protection	125 A gG
Approvals	KEMA, VDE, UL

DEHNgard M TT 2P ... FM

Modular surge arrester for use in single-phase TT and TN systems (1+1 configuration); with floating remote signalling contact.



Type DG M ...	TT 2P 275 FM
Part No.	952 115
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Max. continuous operating voltage (a.c.) [L-N] (U_c)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 μ s) (I_n)	20 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA
Voltage protection level [L-N]/[N-PE] (U_p)	$\leq 1.5 / \leq 1.5$ kV
Max. mains-side overcurrent protection	125 A gG
Approvals	KEMA, VDE, UL
Type of remote signalling contact	changeover contact

Accessories for DEHNgard modular**Varistor-based Protection Module for DEHNgard M**

Type	DG MOD 48	DG MOD 75	DG MOD 150	DG MOD 275
Part No.	952 018	952 011	952 012	952 010
Nominal discharge current (8/20 μ s) (I_n)	7.5 kA	10 kA	15 kA	20 kA
Max. discharge current (8/20 μ s) (I_{max})	25 kA	40 kA	40 kA	40 kA
Max. continuous operating voltage (a.c.) (U_c)	48 V	75 V	150 V	275 V

Type	DG MOD 320	DG MOD 385	DG MOD 440	DG MOD 600
Part No.	952 013	952 014	952 015	952 016
Nominal discharge current (8/20 μ s) (I_n)	20 kA	20 kA	20 kA	15 kA
Max. discharge current (8/20 μ s) (I_{max})	40 kA	40 kA	40 kA	30 kA
Max. continuous operating voltage (a.c.) (U_c)	320 V	385 V	440 V	600 V



DEHNgard S

- Multi-purpose surge arrester consisting of a base part and a plug-in protection module
- High discharge capacity due to heavy-duty zinc oxide varistor
- High reliability due to “Thermo Dynamic Control” SPD monitoring device
- Energy coordination with other arresters of the Red/Line product family
- Operating state/fault indication by green/red indicator flag in the inspection window
- Narrow (modular) design acc. to DIN 43880
- Multifunctional terminals for connecting conductors and busbars
- Easy replacement of protection modules due to module locking system with module release button
- Vibration and shock-tested according to EN 60068-2



For protecting low-voltage consumer's installations against surges. For installation in conformity with the lightning protection zone concept at the boundaries from $O_B - 1$ and higher.

DEHNgard S ...: Pluggable surge arrester consisting of a base part and a plug-in protection module
DEHNgard S ... FM: With remote signalling contact for monitoring device (floating changeover contact)

The universal features characterise the single-pole devices of the DEHNgard S product family. Whether as a single device or in combination with other devices – DEHNgard S surge arresters always provide adequate protection. The modern Red/Line family design and its universal features ensure safety and easy application for the user. The module release button and the approved “Thermo Dynamic Control” SPD monitoring device with dual tripping performance characterise the devices of the DEHNgard S series.

Experience of decades in the world market of surge arresters has further improved the latest DEHNgard generation compared to the previous devices.

The unique module locking system fixes the protection module to the base part. Neither vibration during transport nor the enormous forces of discharge can loosen this connection. Nevertheless, the modules can be easily replaced without tools by simply pressing the easy-to-use module release button of the protection modules.

Every base part and protection module is mechanically coded to ensure against installing an incorrect module.

As with all DEHNgard surge arresters, the user of DEHNgard S can rely on the dual “Thermo Dynamic Control” SPD monitoring device which ensures a maximum degree of safety, even under harsh environmental conditions. The green and red indicator flags show the operating state of DEHNgard S surge arresters. Apart from this standard visual indication, DEHNgard S ... FM features a three-pole remote signalling terminal. With its floating changeover contact, the remote signal can be used as a break or make contact according to the particular circuit concept. The multifunctional terminals of DEHNgard S surge arresters are suitable for connecting conductors and busbars, allowing easy wiring with other DIN rail mounted devices. Thus, a wide range of applications can be easily connected in series according to IEC 60364-5-53 for optimal protection.

DEHNgard S ... (FM)

Pluggable single-pole surge arrester consisting of a base part and a plug-in protection module; with floating remote signalling contact.

General Information:						
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II					
Type of remote signalling contact	changeover contact					
Type DG S ...	48	75	150	275	320	
Part No.	952 078	952 071	952 072	952 070	952 073	
Max. continuous operating voltage (a.c.) (U_C)	48 V (50 / 60 Hz)	75 V (50 / 60 Hz)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	320 V (50 / 60 Hz)	
Max. continuous operating voltage (d.c.) (U_C)	60 V	100 V	200 V	350 V	420 V	
Nominal discharge current (8/20 μ s) (I_n)	7.5 kA	10 kA	15 kA	20 kA	20 kA	
Max. discharge current (8/20 μ s) (I_{max})	25 kA	40 kA	40 kA	40 kA	40 kA	
Voltage protection level (U_p)	≤ 0.33 kV	≤ 0.4 kV	≤ 0.7 kV	≤ 1.5 kV	≤ 1.5 kV	
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG	125 A gG	125 A gG	
Approvals	— KEMA, VDE, UL, CSA					
Type DG S ...	48 FM	75 FM	150 FM	275 FM	320 FM	
Part No.	952 098	952 091	952 092	952 090	952 093	
Max. continuous operating voltage (a.c.) (U_C)	48 V (50 / 60 Hz)	75 V (50 / 60 Hz)	150 V (50 / 60 Hz)	275 V (50 / 60 Hz)	320 V (50 / 60 Hz)	
Max. continuous operating voltage (d.c.) (U_C)	60 V	100 V	200 V	350 V	420 V	
Nominal discharge current (8/20 μ s) (I_n)	7.5 kA	10 kA	15 kA	20 kA	20 kA	
Max. discharge current (8/20 μ s) (I_{max})	25 kA	40 kA	40 kA	40 kA	40 kA	
Voltage protection level (U_p)	≤ 0.33 kV	≤ 0.4 kV	≤ 0.7 kV	≤ 1.5 kV	≤ 1.5 kV	
Max. mains-side overcurrent protection	125 A gG	125 A gG	125 A gG	125 A gG	125 A gG	
Approvals	— KEMA, VDE, UL, CSA					



Varistor-Based Protection Module

Type	DG MOD 48	DG MOD 75	DG MOD 150	DG MOD 275	DG MOD 320
Part No.	952 018	952 011	952 012	952 010	952 013
Max. continuous operating voltage (a.c.) (U_C)	48 V	75 V	150 V	275 V	320 V





DEHNguard modular for North America



- **Prewired complete unit consisting of a base part and plug-in protection modules**
- **No need for additional overcurrent protection devices**
- **Short circuit current rating (SCCR) 200 kA**
- **ANSI/UL 1449 – 4th Ed. Open-Type 1 SPD**
- **High discharge capacity due to heavy-duty zinc oxide varistors (I_{max} 50 kA 8x 20 μ s)**
- **High reliability due to "Thermo Dynamic Control" SPD monitoring device**

- DEHNguard SU 1P ... : Modular single-pole surge arrester for application in Single Phase electrical systems
 DEHNguard MU SP ... : Modular surge arrester for application in Split Phase systems
 DEHNguard MU SPN ... : Modular surge arrester for application in Split Phase systems (with N protected)
 DEHNguard MU CGD ... : Modular surge arrester for application in Corner Grounded Delta systems
 DEHNguard MU 3PY ... : Modular surge arrester for application in 3 Phase Wye electrical systems
 DEHNguard MU 3PD ... : Modular surge arrester for application in 3 Phase Delta electrical systems
 DEHNguard MU 3PH ... : Modular surge arrester for application in 3 Phase High-leg Delta systems
 DEHNguard ... R: With remote status indicator for monitoring device (Form C / SPDT contact)

The DEHNguard SU/MU ... surge arresters are modular DIN rail mounted SPDs in the functional Red/Line family design and set new standards in terms of safety and user-friendliness. The SPDs are UL 1449 4th Edition certified as Type 1 Component Assemblies and are designed for all common electrical power systems. These Devices have optimised Voltage Protection Ratings and therefore provide ideal surge protection for the United States and Canadian electrical panel markets.

The enhanced maximum discharge capacity of 50 kA, the high short circuit current rating (SCCR) of 200 kA and the fact that there is no need for additional overcurrent protection devices make the DEHNguard SU/MU product family fulfil all requirements of nowadays electrical applications. Besides the variety of features shows that both reliable surge protection and equipment safety are key elements of the modular DEHNguard surge arresters. The application-based product designation, which makes it considerably easier to choose the correct device for the relevant application, as well as the module locking system firmly fixes the protection modules to the base part. Neither vibration during transport nor the enormous electromagnetic forces of discharge can loosen the protection modules. Nevertheless, they can be easily replaced without tools by simply pressing the user-friendly module release button of the protection modules. Each

protective circuit of the multipole surge arresters and each protection module are mechanically coded to ensure against installing an incorrect module.

The dual "Thermo Dynamic Control" monitoring device was not only developed on the basis of national and international product standards, but also stands for experience of decades in the world market of surge protective devices and considers practical applications where arresters might be damaged. As with all DEHN surge arresters with "Thermo Dynamic Control", the intensity of the discharge current and the surface temperature of the heavy-duty varistor are evaluated. The visual status indicator with green and red indicator flags shows the availability of every protective circuit. Apart from this standard visual indication, DEHNguard M SU/MU ... FM devices feature a Form C contact (SPDT).

With its floating changeover contact, the remote signal can be used as a make or break contract according to the particular circuit concept. The surge arresters of the multipole modular DEHNguard MU family feature multifunctional terminals on a standardised spacing of 1 module for the connection of wires and busbars, allowing easy wiring with other DIN rail mounted devices. Thus, a wide range of applications can be easily connected in series for optimal protection.

DEHNguard MU 3PY ... 3W+G

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase Wye electrical systems



Type DG MU ...	3PY 208 3W+G	3PY 480 3W+G	3PY 600 3W+G
Part No.	908 300	908 314	908 301
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	180 V a.c. / 360 V a.c.	385 V a.c. / 770 V a.c.	510 V a.c. / 1020 V a.c.
Nominal discharge current (8x 20 μ s) (I_n)	20 kA	20 kA	20 kA
Max. discharge current (8/20) (I_{max})	50 kA	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	600 V _{pk} / 1200 V _{pk}	1200 V _{pk} / 2500 V _{pk}	1500 V _{pk} / 3000 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed	Not needed
Approvals	UL, CSA	UL, CSA	UL, CSA

DEHNgard MU 3PY ... 3W+G R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase Wye electrical systems; has floating Form C (SPDT) remote status contacts

Type DG MU ...	3PY 208 3W+G R	3PY 480 3W+G R	3PY 600 3W+G R
Part No.	908 305	908 319	908 306
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	180 V a.c. / 360 V a.c.	385 V a.c. / 770 V a.c.	510 V a.c. / 1020 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	600 V _{pk} / 1200 V _{pk}	1200 V _{pk} / 2500 V _{pk}	1500 V _{pk} / 3000 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed	Not needed
Approvals	UL, CSA	UL, CSA	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)



DEHNgard MU 3PD ... 3W+G

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase Delta electrical systems

Type DG MU ...	3PD 480 3W+G	3PD 240 3W+G
Part No.	908 350	908 351
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	550 V a.c. / 1100 V a.c.	275 V a.c. / 550 V a.c.
Nominal discharge current (8x20μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	1800 V _{pk} / 3000 V _{pk}	800 V _{pk} / 1500 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA



DEHNgard MU 3PD ... 3W+G R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase Delta electrical systems; has floating Form C (SPDT) remote status contacts

Type DG MU ...	3PD 480 3W+G R	3PD 240 3W+G R
Part No.	908 355	908 356
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	550 V a.c. / 1100 V a.c.	275 V a.c. / 550 V a.c.
Nominal discharge current (8x20μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	1800 V _{pk} / 3000 V _{pk}	800 V _{pk} / 1500 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)



DEHNgard MU 3PY ... 4W+G

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase Wye Systems

Type DG MU ...	3PY 208 4W+G	3PY 480 4W+G	3PY 600 4W+G
Part No.	908 340	908 341	908 342
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-N] / [L-G] / [L-L] / [N-G] (MCOV)	180 V a.c. / 360 V a.c. / 360 V a.c. / 180 V a.c.	385 V a.c. / 565 V a.c. / 770 V a.c. / 180 V a.c.	510 V a.c. / 690 V a.c. / 1020 V a.c. / 180 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA	50 kA
Voltage Protection Rating [L-N] / [L-G] / [L-L] / [N-G] (VPR)	600 V _{pk} / 1200 V _{pk} / 1200 V _{pk} / 600 V _{pk}	1200 V _{pk} / 1800 V _{pk} / 2500 V _{pk} / 600 V _{pk}	1500 V _{pk} / 2000 V _{pk} / 3000 V _{pk} / 600 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed	Not needed
Approvals	UL, CSA	UL, CSA	UL, CSA



DEHNGuard MU 3PY ... 4W+ G R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase Wye Systems; has floating Form C (SPDT) remote status contacts



Type DG MU ...	3PY 208 4W+G R	3PY 480 4W+G R	3PY 600 4W+G R
Part No.	908 345	908 346	908 347
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-N] / [L-G] / [L-L] / [N-G] (MCOV)	180 V a.c. / 360 V a.c. / 360 V a.c. / 180 V a.c.	385 V a.c. / 565 V a.c. / 770 V a.c. / 180 V a.c.	510V a.c. / 690 V a.c. / 1020 V a.c. / 180 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA	50 kA
Voltage Protection Rating [L-N] / [L-G] / [L-L] / [N-G] (VPR)	600 V _{pk} / 1200 V _{pk} / 1200 V _{pk} / 600 V _{pk}	1200 V _{pk} / 1800 V _{pk} / 2500 V _{pk} / 600 V _{pk}	1500 V _{pk} / 2000 V _{pk} / 3000 V _{pk} / 600 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed	Not needed
Approvals	UL, CSA	UL, CSA	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)

DEHNGuard MU 3PH ... 4W+G

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase High-leg Delta Systems



Type DG MU ...	3PH 240 4W+G	3PH 480 4W+G
Part No.	908 343	908 344
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-N] / [H-N] / [L-G] / [H-G] / [L-L] / [L-H] / [N-G]	230 V a.c. / 275 V a.c. / 410 V a.c. / 455 V a.c. / 460 V a.c. / 505 V a.c. / 180 V a.c.	385V a.c. / 510 V a.c. / 565 V a.c. / 690 V a.c. / 770 V a.c. / 895 V a.c. / 180 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-N] / [H-N] / [L-G] / [H-G] / [L-L] / [L-H] / [N-G] (VPR)	700 V _{pk} / 800 V _{pk} / 1200 V _{pk} / 1500 V _{pk} / 1500 V _{pk} / 1500 V _{pk} / 600 V _{pk}	1200 V _{pk} / 1500 V _{pk} / 1800 V _{pk} / 2000 V _{pk} / 2500 V _{pk} / 2500 V _{pk} / 600 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA

DEHNGuard MU 3PH ... 4W+G R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Phase High-leg Delta Systems; has floating Form C (SPDT) remote status contacts



Type DG MU ...	3PH 240 4W+G R	3PH 480 4W+G R
Part No.	908 348	908 349
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-N] / [H-N] / [L-G] / [H-G] / [L-L] / [L-H] / [N-G]	230 V a.c. / 275 V a.c. / 410 V a.c. / 455 V a.c. / 460 V a.c. / 505 V a.c. / 180V a.c.	385 V a.c. / 510 V a.c. / 565 V a.c. / 690 V a.c. / 770 V a.c. / 895 V a.c. / 180 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-N] / [H-N] / [L-G] / [H-G] / [L-L] / [L-H] / [N-G] (VPR)	700 V _{pk} / 800 V _{pk} / 1200 V _{pk} / 1500 V _{pk} / 1500 V _{pk} / 1500 V _{pk} / 600 V _{pk}	1200 V _{pk} / 1500 V _{pk} / 1800 V _{pk} / 2000 V _{pk} / 2500 V _{pk} / 2500 V _{pk} / 600 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)

DEHNGuard MU SP ... 3W+G

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in Split Phase systems



Type DG MU ...	SP 240 3W+G	SP 480 3W+G
Part No.	908 190	908 192
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	230 V a.c. / 460 V a.c.	385 V a.c. / 770 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	700 V _{pk} / 1500 V _{pk}	1200 V _{pk} / 2500 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA

DEHNGuard MU SP ... 3W+G R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in Split Phase systems; has floating Form C (SPDT) remote status contacts

Type DG MU ...	SP 240 3W+G R	SP 480 3W+G R
Part No.	908 195	908 197
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	230 V a.c. / 460 V a.c.	385 V a.c. / 770 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	700 V _{pk} / 1500 V _{pk}	1200 V _{pk} / 2500 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)



DEHNGuard MU SPN ... 3W+G

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in Split Phase systems

Type DG MU ...	SPN 240 3W+G
Part No.	908 214
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-N] / [L-G] / [L-L] / [N-G] (MCOV)	180 V a.c. / 360 V a.c. / 360 V a.c. / 180 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA
Max. discharge current (8/20) (I _{max})	50 kA
Voltage Protection Rating [L-N] / [L-G] / [L-L] / [N-G] (VPR)	600 V _{pk} / 1200 V _{pk} / 1200 V _{pk} / 600 V _{pk}
Max. mains-side overcurrent protection	Not needed
Approvals	UL, CSA



DEHNGuard MU SPN ... 3W+G R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in 3 Split Phase systems; has floating Form C (SPDT) remote status contacts

Type DG MU ...	SPN 240 3W+G R
Part No.	908 219
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-N] / [L-G] / [L-L] / [N-G] (MCOV)	180 V a.c. / 360 V a.c. / 360 V a.c. / 180 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA
Max. discharge current (8/20) (I _{max})	50 kA
Voltage Protection Rating [L-N] / [L-G] / [L-L] / [N-G] (VPR)	600 V _{pk} / 1200 V _{pk} / 1200 V _{pk} / 600 V _{pk}
Max. mains-side overcurrent protection	Not needed
Approvals	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)



DEHNGuard MU CGD ... 3W+G

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in Corner Grounded Delta systems.

Type DG MU ...	CGD 240 3W+G	CGD 480 3W+G
Part No.	908 203	908 204
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	275 V a.c. / 550 V a.c.	550 V a.c. / 1100 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	800 V _{pk} / 1500 V _{pk}	1800 V _{pk} / 3000 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA



DEHNgard MU CGD ... 3W+G R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection modules for application in Corner Grounded Delta systems; has floating Form C (SPDT) remote status contacts



Type DG MU ...	CGD 240 3W+G R	CGD 480 3W+G R
Part No.	908 208	908 209
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-G] / [L-L] (MCOV)	275 V a.c. / 550 V a.c.	550 V a.c. / 1100 V a.c.
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA
Voltage Protection Rating [L-G] / [L-L] (VPR)	800 V _{pk} / 1500 V _{pk}	1800 V / 3000 V
Max. mains-side overcurrent protection	Not needed	Not needed
Approvals	UL, CSA	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)

DEHNgard SU 1P ...

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection module for application in Single Phase electrical systems.



Type DG SU ...	1P 120	1P 240	1P 347
Part No.	908 070	908 074	908 076
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-L] (MCOV)	230 Vac	385 Vac	510 Vac
Nominal discharge current (8x 20 μs) (I _n)	20 kA	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA	50 kA
Voltage Protection Rating [L-L] (VPR)	700 V _{pk}	1200 V _{pk}	1500 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed	Not needed
Approvals	UL, CSA	UL, CSA	UL, CSA

DEHNgard SU 1P ... R

DIN rail mount, pluggable surge arrester consisting of a base part and plug-in protection module for application in Single Phase electrical systems; has floating Form C (SPDT) remote status contacts



Type DG SU ...	1P 120 R	1P 240 R	1P 347 R
Part No.	908 090	908 094	908 096
SPD classification acc. to ANSI/UL 1449 4 th Ed.	Open-Type 1 SPD	Open-Type 1 SPD	Open-Type 1 SPD
SPD classification acc. to CSA - C22.2 No. 269.1-14	Type 4-1 Component Assembly	Type 4-1 Component Assembly	Type 4-1 Component Assembly
Max. continuous operating voltage AC [L-L] (MCOV)	230 Vac	385 Vac	510 Vac
Nominal discharge current (8x20μs) (I _n)	20 kA	20 kA	20 kA
Max. discharge current (8/20) (I _{max})	50 kA	50 kA	50 kA
Voltage Protection Rating [L-L] (VPR)	700 V _{pk}	1200 V _{pk}	1500 V _{pk}
Max. mains-side overcurrent protection	Not needed	Not needed	Not needed
Approvals	UL, CSA	UL, CSA	UL, CSA
Remote status contact	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)	Floating (dry), Form C (SPDT)

Protection module for DEHNgard M UL series

The varistor based protection modules of the DEHNgard SU/MU ... surge arresters distinguish themselves through their outstanding performance and sophistication.

The compact protection modules incorporate the complete protective circuit as well as the monitoring and disconnection device. The green flag in the inspection window indicates the availability of the protection modules. All protection modules are mechanically coded to ensure against installing an incorrect module. The protection modules can be easily replaced without tools by simply pressing the user-friendly module release button.

- **High discharge capacity due to heavy-duty zinc oxide varistors (I_{max} 50 kA 8x 20 μs)**
- **ANSI/UL 1449 – 4th Ed. Open-Type 1 SPD**
- **High reliability due to “Thermo Dynamic Control” SPD monitoring device**

DEHNgard PLU ... : Varistor-based protection module for DEHNgard SU/MU ... surge arresters

Varistor-Based Protection Module

Varistor-based protection module for DEHNgard MU ... and DEHNgard SU ... surge arresters.



Type DG PLU ...	180	230	275	385	510	550
Part No.	908 011	908 012	908 010	908 014	908 013	908 015
Nominal discharge current (8/20 μs) (I _n)	20 kA	20 kA	20 kA	20 kA	20 kA	20 kA
Max. discharge current (I _{max})	50 kA	50 kA	50 kA	50 kA	50 kA	50 kA



DEHNgard modular YPV ... FM

Multipole photovoltaic arresters

- Modular prewired complete unit for photovoltaic systems consisting of a base part and plug-in protection modules
- Fault-resistant Y circuit with three high-capacity varistors prevents damage to the surge protective device in case of insulation faults in the generator circuit
- Tested to EN 50539-11
- High monitoring safety due to "Thermo Dynamic Control" disconnecting device
- Fault indication by red indicator flag in the inspection window
- Suitable for use in accordance with IEC 60364-7-712 "Electrical installations of buildings – Solar voltaic (PV) power supply systems"



For protecting low-voltage consumer's installations against surges. For use in accordance with IEC 60364-7-712 (installation of photovoltaic power supply systems).

DEHNgard M YPV 1200 FM: For PV systems up to 1170 V, with remote signalling contact for monitoring device (floating changeover contact)
DEHNgard M YPV 1500 FM: For PV systems up to 1500 V, with remote signalling contact for monitoring device (floating changeover contact)

The modular DEHNgard modular YPV SCI ... FM surge arresters are specifically designed for protecting equipment in photovoltaic systems. The devices are available for 1200 V and 1500 V and cover the most common voltage levels.

The following application features characterise the modular arrester design of this Red/Line product series. The module locking system firmly fixes the protection modules to the base part. Neither shock nor vibration nor the enormous forces of discharge affect the safe connection to the protection module. Nevertheless, the protection modules can be easily replaced without tools by simply pressing the easy-to-use module release button of the protection modules. Every protective path of DEHNgard modular YPV SCI ... FM and every protection module is mechanically coded to ensure against installing the incorrect module.

The fault-resistant Y circuit with three high-capacity varistors prevents damage to surge protective devices in case of insulations faults in the generator circuit of the photovoltaic generator.

The green and red indicator flags show the availability of every protective circuit. Apart from this visual indication, DEHNgard YPV ... FM arresters also feature a three-pole remote signalling terminal. With its floating changeover contact, the remote signal can be used as make or break contact according to the particular circuit concept. As with all surge arresters of the modular DEHNgard modular family, DEHNgard modular YPV ... FM arresters incorporate multifunctional terminals on a standardised spacing of 1 module for connecting conductors and busbars, allowing easy wiring with other DIN rail mounted devices.

DEHNgard M YPV ... FM

Modular multipole surge arrester for PV systems with remote signalling contact for monitoring device (floating changeover contact).

Type DG M YPV ...	1200 FM	1500 FM
Part No.	952 565	952 567
SPD according to EN 50539-11	type 2	type 2
Max. PV voltage (U_{CPV})	1170 V	1500 V
Short-circuit current rating (I_{SCPV})	10 kA	10 kA
Nominal discharge current (8/20 μ s) [(DC+/DC-) --> PE] (I_n)	20 kA	15 kA
Max. discharge current (8/20 μ s) [(DC+/DC-) --> PE] (I_{max})	40 kA	40 kA
Voltage protection level (U_p)	≤ 4 kV	≤ 5 kV
Approvals	UL, KEMA	UL, KEMA
Type of remote signalling contact	changeover contact	changeover contact



Accessories for DEHNgard modular YPV ... FM

Varistor-Based Protection Module for DEHNgard M YPV

Type	DG MOD H PV 600	DG MOD H PV 750
Part No.	952 048 <small>NEW</small>	952 049 <small>NEW</small>
Max. continuous operating voltage (d.c.) (U_c)	600 V	750 V



DEHNgard modular (Y)PV SCI ...



For protecting low-voltage consumer's installations against surges. For use in accordance with IEC 60364-7-712 (installation of photovoltaic power supply systems).

Multipole / single-pole PV Arresters with three-step d.c. Switching Device

- Prewired modular complete unit for use in photovoltaic systems consisting of a base part and plug-in protection modules
- Combined disconnection and short-circuiting device with safe electrical isolation in the protection module (patented SCI principle)
- Tried and tested fault-resistant Y circuit of DEHNgard M YPV SCI ... (FM) prevents damage to the surge protective device in case of insulation faults in the generator circuit
- Integrated d.c. fuse allows safe replacement of protection modules without arc formation
- Tested to EN 50539-11
- Suitable for use in all PV systems according to IEC 60364-7-712

- DEHNgard M YPV SCI 150: Modular multipole surge arrester with three-step d.c. switching device; for photovoltaic systems up to 150 V
 DEHNgard M YPV SCI 600: For photovoltaic systems up to 600 V
 DEHNgard M YPV SCI 1000: For photovoltaic systems up to 1000 V
 DEHNgard M PV2 SCI 1000: For photovoltaic systems up to 1000 V; for protecting two MPP inputs
 DEHNgard M YPV SCI 1200: For photovoltaic systems up to 1200 V
 DEHNgard M YPV SCI ... FM: With remote signalling contact for monitoring device (floating changeover contact)

The modular DEHNgard modular (Y)PV SCI ... (FM) surge arresters are specifically designed for protecting equipment in photovoltaic systems. The patented three-step d.c. switching device (SCI principle) makes these arresters especially safe so that they fulfil the requirements in modern photovoltaic systems. The devices are available for 150 V, 600 V, 1000 V and 1200 V applications. DEHNgard ME YPV SCI 1500 (FM) – a 1500 V version – covers the most common voltage levels. DEHNgard M PV2 SCI ... also provides protection for 2 MPP inputs in a single device.

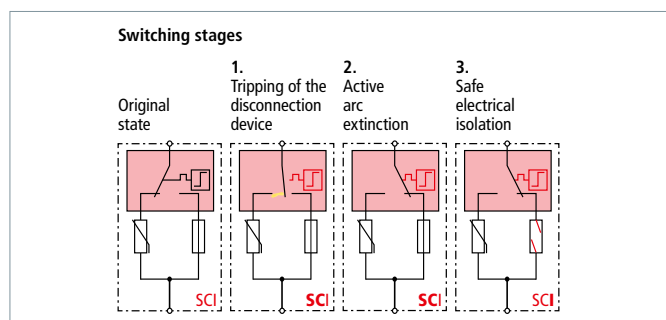
The application features of the modular Red/Line family design are similarly unique as the three-step d.c. switching device. The module locking system firmly fixes the protection modules to the base part. Neither shock nor vibration nor the enormous forces of discharge affect the safe connection to the protection module. Nevertheless, the protection modules can be easily replaced without tools by simply pressing the easy-to-use module release button of the protection modules. Every protective path of DEHNgard modular (Y)PV SCI ... (FM) and every protection module is mechanically coded to ensure against installing the incorrect module.

To fulfil the special requirements in photovoltaic systems, a fault-resistant Y circuit consisting of three protective paths of the varistor and a combined disconnection and short-circuiting device are integrated in a single device.

This synergy reduces the probability of an arrester failure in case of the operating and fault states which have to be considered in photovoltaic systems. This ensures that the arrester is protected in case of overload. Even in case of voltages up to 1200 V d.c., a switching arc, which is likely to occur in the surge protective device if a conventional disconnector (for a.c. application) is activated, is extinguished immediately without risk.

A fuse particularly developed for photovoltaic systems is integrated in the short-circuit path. This ensures safe electrical isolation in case of a faulty protection module, allowing de-energised replacement of the protection module without arc formation. This innovative and unique design, DEHNgard modular (Y)PV SCI ... (FM) can be used in all low, medium and high-performance photovoltaic systems with no need for an additional backup fuse.

The green and red indicator flags show the availability of every protective circuit. Apart from this visual indication, DEHNgard (Y)PV SCI ... (FM) arresters also feature a three-pole remote signalling terminal. With its floating changeover contact, the remote signal can be used as make or break contact according to the particular circuit concept. As with all surge arresters of the modular DEHNgard modular family, DEHNgard modular (Y)PV SCI ... (FM) arresters incorporate multifunctional terminals on a standardised spacing of 1 module for connecting conductors and busbars, allowing easy wiring with other DIN rail mounted devices.



Three-step d.c. switching device (patented SCI principle)

Surge Arresters – Type 2

DEHNgard M YPV SCI ...

Modular multipole surge arrester with three-step d.c. switching device for use in PV systems

Type DG ...	M YPV SCI 150	M YPV SCI 600	M YPV SCI 1000	M YPV SCI 1200
Part No.	952 513	952 511	952 510	952 512
SPD according to EN 50539-11	type 2	type 2	type 2	type 2
Max. PV voltage (U_{CPV})	150 V	600 V	1000 V	1200 V
Short-circuit current rating (I_{SCP})	10 kA	10 kA	10 kA	10 kA
Nominal discharge current (8/20 μ s) [(DC+/DC-) --> PE] (I_n)	10 kA	12.5 kA	12.5 kA	12.5 kA
Max. discharge current (8/20 μ s) [(DC+/DC-) --> PE] (I_{max})	20 kA	25 kA	25 kA	25 kA
Voltage protection level (U_p)	≤ 0.8 kV	≤ 2.5 kV	≤ 4 kV	≤ 4.5 kV
Approvals	KEMA, UL, CSA	KEMA, UL, CSA	KEMA, UL, CSA	KEMA, UL, CSA



DEHNgard M YPV SCI ... FM

Modular multipole surge arrester with three-step d.c. switching device for use in PV systems; with remote signalling contact for monitoring device (floating changeover contact).

Type DG ...	M YPV SCI 150 FM	M YPV SCI 600 FM	M YPV SCI 1000 FM	M YPV SCI 1200 FM
Part No.	952 518	952 516	952 515	952 517
SPD according to EN 50539-11	type 2	type 2	type 2	type 2
Max. PV voltage (U_{CPV})	150 V	600 V	1000 V	1200 V
Short-circuit current rating (I_{SCP})	10 kA	10 kA	10 kA	10 kA
Nominal discharge current (8/20 μ s) [(DC+/DC-) --> PE] (I_n)	10 kA	12.5 kA	12.5 kA	12.5 kA
Max. discharge current (8/20 μ s) [(DC+/DC-) --> PE] (I_{max})	20 kA	25 kA	25 kA	25 kA
Voltage protection level (U_p)	≤ 0.8 kV	≤ 2.5 kV	≤ 4 kV	≤ 4.5 kV
Approvals	KEMA, UL, CSA	KEMA, UL, CSA	KEMA, UL, CSA	KEMA, UL, CSA
Type of remote signalling contact	changeover contact	changeover contact	changeover contact	changeover contact



Accessories for DEHNgard modular (Y)PV SCI ...

Varistor-Based Protection Module for DEHNgard M (Y)PV SCI

Protection module with integrated back-up fuse for DEHNgard M (Y)PV SCI ... arresters comprising a varistor connected in parallel with a short-circuiting device.

Type DG MOD ...	PV SCI 75	PV SCI 300	PV SCI 500	PV SCI 600
Part No.	952 055	952 053	952 051	952 054
Max. continuous operating voltage (d.c.) (U_c)	75 V	300 V	500 V	600 V





EXFS L / EXFS KU



ATEX and IECEx-certified isolating spark gap for lightning equipotential bonding according to IEC 62305 with flexible cable connection.

- For indirect connection / earthing of functionally isolated parts of installations under lightning conditions
- For lightning equipotential bonding according to IEC 62305 in hazardous areas (zone 2)
- Corrosion-resistant zinc die-cast enclosure with plastic cover and flexible cable connection
- For bridging insulating joints, insulating flanges etc. in cathodically protected pipe sections
- Extremely heavy-duty device
- Approval according to ATEX directive 94/9/EC and IECEx

EXFS L ...: Isolating spark gap for use in hazardous areas with flexible connecting cable

EXFS KU: Isolating spark gap for use in hazardous areas with two 1.5 m long connecting cables for underground installation

Ex isolating spark gaps of the EXFS L / EXFS KU product line are used when electrically conductive parts of installations cannot be directly interconnected in hazardous areas, for example, in case of cathodically protected pipeline sections.

ATEX and IECEx-certified EXFS L and EXFS KU spark gaps provide approved safety in accordance with harmonised European standards.

The arc-resistant tungsten / copper electrodes ensure a long service life of the Ex spark gaps.

The approved EXFS L type with flexible cable connection quickly adapts to any application environment. The prewired spark gaps feature connecting cables of different lengths with cable lug, screw and M10 nut. The flat or angled connection brackets (IF), which are available as accessory, allow to easily connect the spark gap to pipeline flanges.

The EXFS KU type is enclosed by a water-proof PVC sheath and is thus ideally suited for underground installation on insulating couplings.

EXFS L

Ex isolating spark gap for aboveground installation.



Type EXFS ...	L100	L200	L300
Part No.	923 060	923 061	923 062
Isolating spark gap according to EN 62561-3 / IEC 62561-3	yes	yes	yes
Lightning impulse current (10/350 µs) (I _{imp})	50 kA	50 kA	50 kA
Class (lightning current carrying capability)	N	N	N
Rated impulse sparkover voltage (U _{r imp})	≤ 2.5 kV	≤ 2.5 kV	≤ 2.5 kV
Degree of protection	IP 54	IP 54	IP 54
ATEX approvals	DEKRA 11ATEX0146 X	DEKRA 11ATEX0146 X	DEKRA 11ATEX0146 X
Ex marking according to EN 60079-0 and EN 60079-15: gas	II 3 G Ex nC IIC T4 Gc	II 3 G Ex nC IIC T4 Gc	II 3 G Ex nC IIC T4 Gc
IECEx approvals	IECEx DEK 11.0063X	IECEx DEK 11.0063X	IECEx DEK 11.0063X
Ex marking according to EN 60079-0	Ex nC IIC T4 Gc	Ex nC IIC T4 Gc	Ex nC IIC T4 Gc
Cable length	100 mm	200 mm	300 mm

EXFS KU

Ex isolating spark gap with connecting cables for aboveground and underground installation; with water-proof sheath; can be shortened for short cable lengths.



Type EXFS ...	KU
Part No.	923 019
Isolating spark gap according to EN 62561-3 / IEC 62561-3	yes
Lightning impulse current (10/350 µs) (I _{imp})	50 kA
Class (lightning current carrying capability)	N
Rated impulse sparkover voltage (U _{r imp})	≤ 2.5 kV
Degree of protection	IP 67
ATEX approvals	DEKRA 11ATEX0146 X
Ex marking according to EN 60079-0 and EN 60079-15: gas	II 3 G Ex nC IIC T4 Gc
IECEx approvals	IECEx DEK 11.0063X
Ex marking according to EN 60079-0	Ex nC IIC T4 Gc
Cable length	2x approx. 1500 mm



EXFS 100 / EXFS 100 KU

- For indirect connection / earthing of functionally isolated parts of installations under lightning conditions
- Device for lightning equipotential bonding according to IEC 62305 in hazardous areas
- For bridging insulating joints, insulating flanges, etc. in cathodically protected pipe sections
- For safe installation in Ex zone 1 (gas) or 21 (dust)
- Extremely low sparkover voltage
- Extremely high alternating current withstand capability
- Approval according to ATEX directive 94/9/EC, IECEx, UL and Inmetro



ATEX and IECEx-certified isolating spark gap with a low sparkover voltage for lightning equipotential bonding according to IEC 62305.

EXFS 100: Isolating spark gap for use in hazardous areas with plastic sheath and M10 threaded bushings

EXFS 100 KU: Isolating spark gap for use in hazardous areas with two 2 m long connecting cables for underground installation

The Ex isolating spark gaps of the EXFS 100 / EXFS 100 KU product family are used when conductive installation parts situated in hazardous areas cannot be directly interconnected.

The spark gaps with low sparkover voltage are especially efficient for isolated parts of installations with low insulation strength.

No special requirements have to be observed for safe installation in zone 1 (gases) or zone 21 (dusts).

With a maximum lightning impulse current of 100 kA (10/350 μ s), EXFS 100 and EXFS 100 KU meet class H requirements (highest lightning current carrying capability class).

The ATEX and IECEx-certified EXFS 100 and EXFS 100 KU spark gaps provide approved safety according to harmonised European standards.

For connecting EXFS 100 spark gaps, prewired connecting cables of different lengths are available as accessory. Flat and angled connection brackets (IF) allow to easily connect the spark gaps to pipeline flanges.

EXFS 100 KU types are enclosed by a water-proof plastic sheath and are therefore ideally suited for underground installation on insulating couplings.

EXFS 100

Isolating spark gap for use in hazardous areas with plastic sheath and M10 threaded screws.

Type EXFS ...	100
Part No.	923 100
Isolating spark gap according to EN 62561-3 / IEC 62561-3	yes
Lightning impulse current (10/350 μ s) (I_{imp})	100 kA
Class (lightning current carrying capability)	H
Rated impulse sparkover voltage ($U_{r imp}$)	≤ 1.25 kV
Degree of protection	IP 67
Approvals	UL
ATEX approvals	DEKRA 11ATEX0178 X
Ex marking according to EN 60079-0 and EN 60079-1: gas	II 2 G Ex db IIC T6 Gb
Ex marking according to EN 60079-0 and EN 60079-31: dust	II 2 D Ex tb IIIC T80 °C Db IP 66/67
IECEx approvals	IECEx KEM 09.0051X
Ex marking according to EN 60079-0 and EN 60079-1: gas	Ex db IIC T6 Gb
Ex marking according to EN 60079-0 and EN 60079-31: dust	Ex tb IIIC T80 °C Db IP 66/67
Inmetro approvals	TÜV 17.0698 X
Ex marking according to EN 60079-0 and EN 60079-1: gas	Ex db IIC T6 Gb
Ex marking according to EN 60079-0 and EN 60079-31: dust	Ex tb IIIC T80 °C Db IP 66/67



EXFS 100 KU

Ex isolating spark gap with connecting cable for aboveground and underground installation; with water-proof sheath; can be shortened for short cable lengths.

Type EXFS ...	100 KU
Part No.	923 101
Isolating spark gap according to EN 62561-3 / IEC 62561-3	yes
Lightning impulse current (10/350 μ s) (I_{imp})	100 kA
Class (lightning current carrying capability)	H
Rated impulse sparkover voltage ($U_{r imp}$)	≤ 1.25 kV
Degree of protection	IP 67
Approvals	UL
ATEX approvals	DEKRA 11ATEX0178 X
Ex marking according to EN 60079-0 and EN 60079-1: gas	II 2 G Ex d IIC T6 Gb
Ex marking according to EN 60079-0 and EN 60079-31: dust	II 2 D Ex tb IIIC T80 °C Db IP 66/67
IECEX approvals	IECEX KEM 09.0051X
Ex marking according to EN 60079-0 and EN 60079-1: gas	Ex d IIC T6 Gb
Ex marking according to EN 60079-0 and EN 60079-31: dust	Ex tb IIIC T80 °C Db IP 66/67
Inmetro approvals	TÜV 17.0698 X
Ex marking according to EN 60079-0 and EN 60079-1: gas	Ex db IIC T6 Gb
Ex marking according to EN 60079-0 and EN 60079-31: dust	Ex tb IIIC T80 °C Db IP 66/67
Cable length	2x approx. 2000 mm



Accessories for EXFS 100 / EXFS 100 KU

Angled Connection Brackets – IF 1 –

Angled connection bracket for EXFS ...; diameter corresponds to the bolt diameter of the flange joint; material: St/tZn.

Type	AB EXFS IF1 W 11	AB EXFS IF1 W 14	AB EXFS IF1 W 18	AB EXFS IF1 W 22
Part No.	923 311	923 314	923 318	923 322
Borehole diameter d1	11 mm	14 mm	18 mm	22 mm

Type	AB EXFS IF1 W 26	AB EXFS IF1 W 30	AB EXFS IF1 W 33
Part No.	923 326	923 330	923 333
Borehole diameter d1	26 mm	30 mm	33 mm

Type	AB EXFS IF1 W 36	AB EXFS IF1 W 39	AB EXFS IF1 W 42
Part No.	923 336	923 339	923 342
Borehole diameter d1	36 mm	39 mm	42 mm

Type	AB EXFS IF1 W 48	AB EXFS IF1 W 56	AB EXFS IF1 W 62
Part No.	923 348	923 356	923 362
Borehole diameter d1	48 mm	56 mm	62 mm



Flat Connection Brackets – IF 3 –

Flat connection bracket for EXFS ...; diameter corresponds to the bolt diameter of the flange joint; material: St/tZn.

Type	AB EXFS IF3 G 11	AB EXFS IF3 G 14	AB EXFS IF3 G 18	AB EXFS IF3 G 22
Part No.	923 211	923 214	923 218	923 222
Borehole diameter d1	11 mm	14 mm	18 mm	22 mm

Type	AB EXFS IF3 G 26	AB EXFS IF3 G 30	AB EXFS IF3 G 33
Part No.	923 226	923 230	923 233
Borehole diameter d1	26 mm	30 mm	33 mm

Type	AB EXFS IF3 G 36	AB EXFS IF3 G 39	AB EXFS IF3 G 42
Part No.	923 236	923 239	923 242
Borehole diameter d1	36 mm	39 mm	42 mm



EXFS 100: Connecting Cable, Cu, 25 mm²

Connecting cable for EXFS 100; two cable lugs (Ø10.5 mm) made of Cu/gal Sn, screw, nut and spring washer.

Type	AL EXFS L100 KS	AL EXFS L200 KS	AL EXFS L300 KS
Part No.	923 025	923 035	923 045
Cable length	100 mm	200 mm	300 mm





Voltage-controlled smart decoupling device VCSD

- **VCSD: Voltage Controlled Smart Decoupling Device**
- Protection in case of transient, temporary and long-duration overvoltages
- Does not negatively affect cathodic protection equipment
- Adjustable response threshold for flexible use in a wide range of application and operating states



VCSD 40 IP65: Voltage-controlled smart decoupling device with adjustable response threshold

The smart decoupling device VCSD 40 IP65 is a short-circuiting switch which is controlled by overvoltage and limits long-duration, temporary and transient overvoltages. With the exception of direct currents, the VCSD is capable of discharging all interference voltages and limiting them to a preset value without negatively affecting the d.c. potential (cathodic protection potential). It limits the effects of dangerous high overvoltages in its immediate vicinity to a safe level.

Limiting behaviour of VCSD 40 IP65 in the time range

Transient overvoltages are limited to values < 1.25 kV (time range: up to 1 ms).

Temporary overvoltages are limited to values < 940 V depending on the duration (time range: 1 ms to 200 ms).

Long-duration overvoltages are limited to values between 3 and 50 V a.c. (adjustable) (time range: > 200 ms).

Functional description

Thanks to the coordinated and tested interaction of the functional units within the VCSD, the following overvoltage-related effects can be prevented:

Undefined, lightning-related puncture and flashover at insulating clearances

Lightning-related overvoltage is limited and the associated lightning currents are discharged to local earth.

Dangerous touch voltages at accessible places

Dangerous touch voltages are limited below the maximum permissible touch voltage for the duration of their occurrence.

Reduction of a.c. corrosion caused by a.c. interference

Technical alternating currents between 16.7 Hz and 60 Hz can be permanently discharged to low-impedance earth electrodes without negatively affecting the cathodic protection potential on long-distance pipelines.

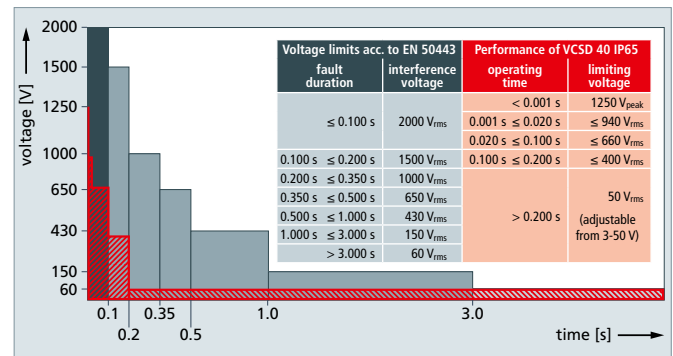
Monitoring / controlling

Due to the digital and analogue interfaces, the VCSD 40 IP65 can be externally controlled, device faults can be displayed and discharge currents can be signalled in the form of a 4 – 20 mA signal (scaled to 0 – 40 A).

Fields of application

The VCSD 40 IP65 is ideally suited for pipelines which are interfered by lightning strikes, electric railways or high-voltage lines. Typical fields of application are remote insulated pipeline sections, cathodically protected containers / storage tanks, open earthing of cable shields at accessible places or the corrosion-free interconnection of isolated earth-termination systems such as foundation earth electrodes of a building and an isolated signal ground or railway earth electrode.

Advantages of the VCSD 40 IP65 are the flexible and controllable use in different fields of application, the high discharge capacity as well as a tested, comprehensive, coordinated protection solution from the surge protection specialist DEHN.



Limiting behaviour of the VCSD



VCSD 40 IP65

Voltage-controlled smart decoupling device with adjustable response threshold for flexible use in a wide range of systems.



Type	VCSD 40 IP65
Part No.	923 401
Transient discharge current (10/350 µs)	100 kA
Transient discharge current (8/20 µs)	100 kA
Temporary discharge current (16.7 Hz, 50 Hz, 60 Hz)	1.1 kA _{rms} (up to 200 ms) * ¹⁾
Temporary discharge current (16.7 Hz, 50 Hz, 60 Hz)	500 A _{rms} (up to 1 s)
Long-duration discharge current (16.7 Hz, 50 Hz, 60 Hz)	40 A _{rms} (permanently) * ²⁾
Long-duration limiting voltage (a.c. _{rms}) (> 200 ms)	max. 50 V (adjustable from 3 to 50 V)
Degree of protection	IP 65
Dimensions	400 x 300 x 150 mm

*¹⁾ Derating depends on the „biasing current“ (long-duration discharge current) and on the ambient temperature

*²⁾ Derating depends on the ambient temperature
See instructions for use and installation instructions

Accessories for Voltage-controlled smart decoupling device VCSD

DGP M – 100 kA N-PE Spark-Gap-Based Protection Module

N-PE spark-gap-based protection module for all devices of the modular DEHNgap M family.



Type	DGP M MOD 255
Part No.	961 010
Max. continuous operating voltage (a.c.) (U _c)	255 V

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SPDs for Information Technology Systems



The surge protection components of arresters do not contain any radioactive isotopes and typically consist of at least one voltage-limiting or voltage-switching component and, in some cases, also of additional overcurrent-limiting components. The occurrence of blind spots in multistage arresters must be prevented. This means that it must be ensured that the different protection stages are fully coordinated with one another. Otherwise the protection stages will not reliably trip and cause faults in the protective device.

Arrester selection

The following must be observed when selecting arresters:

- Protective effect [Yellow/Line SPD class (discharge capacity and voltage protection level)]
- System parameters (system voltage, nominal current and transmission parameters)
- Installations environment (design, connection conditions and approvals)

Relevant product standard for arresters:

IEC/DIN EN 61643-21

Low-voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signalling networks – Performance requirements and testing methods.

Discharge capacity

According to IEC/DIN EN 61643-21 arresters must be tested with at least one impulse voltage and impulse current from the above table with the specified quantity of impulses. Further tests may be performed – even with different impulse values or quantities. The max. voltage level measured during the test(s) at the output of the device is specified as voltage protection level U_p . Category C represents particularly interference pulses with a steep rate of rise and low energy, while interference pulses of category D are supposed to simulate high energy loads caused by injected partial lightning currents. The relevant category is specified in the technical data of the arresters [see discharge capacity (I_n , I_{imp}) and voltage protection level (U_p)].

Category	Type of test	Impulse voltage	Impulse current	Minimum quantity of impulses	Test for
C1	fast rate of rise	0.5 kV to 2 kV, 1.2/50 μ s	0.25 kA to 1 kA, 8/20 μ s	300	Surge arrester
C2		2 kV to 10 kV, 1.2/50 μ s	1 kA to 5 kA, 8/20 μ s	10	
C3		≥ 1 kV, 1 kV/ μ s	10 A to 100 A, 10/1000 μ s	300	
D1	high energy	≥ 1 kV	0.5 kA to 2.5 kA, 10/350 μ s	2	*)

*) Lightning current arrester / Combined lightning current and surge arrester

Impulse voltages and currents (preferred values) for determining the voltage-limiting characteristics (excerpt from Table 3 of IEC / EN 61643-21)

Immunity of terminal equipment to be protected

During electromagnetic compatibility (EMC) tests, electrical and electronic equipment (devices) must have a certain immunity to conducted interferences (surges). The requirements on the immunity and the test set-up are described in IEC/EN 61000-4-5.

Since the devices are used in different electromagnetic environments, they must have different immunities. The immunity of a device depends on the test level. To classify the different immunities of terminal equipment, test levels are subdivided into four different levels (1 to 4). Test level 1 places the lowest requirement on the immunity of terminal equipment. The test level is specified in the arrester documentation or can be requested from the manufacturer of the arrester.

Test levels 1 – 4 according to EN 61000-4-5	Corresponds to the charging voltage of the test generator
1	0.5 kV
2	1 kV
3	2 kV
4	4 kV

Protective effect of arresters

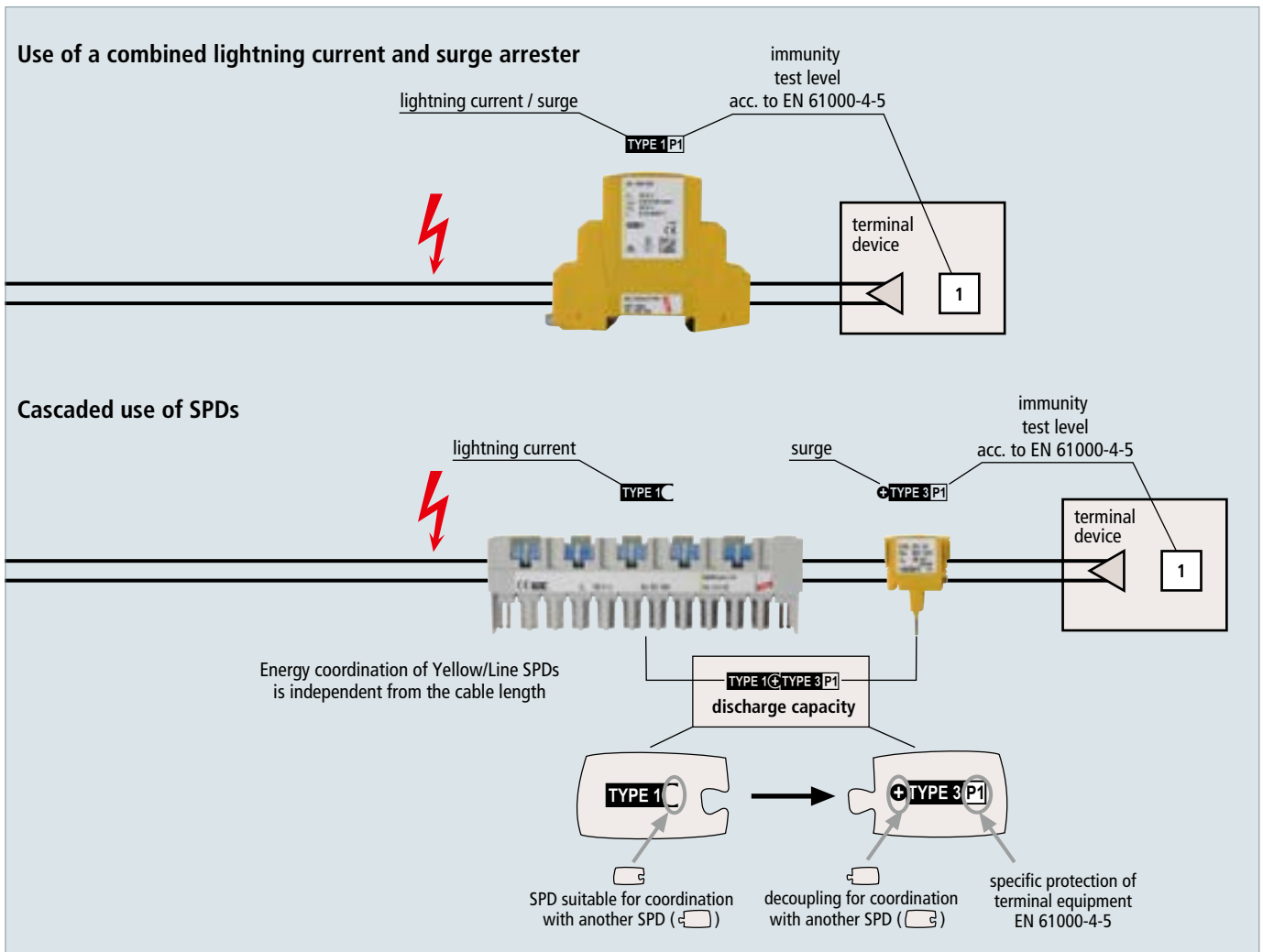
Yellow/Line arresters for use in information technology systems are capable of limiting conducted interference to a safe level so that the immunity of the terminal equipment is not exceeded. For example, an arrester with a let-through value below the EMC test values of the terminal device must be selected for a terminal device tested with test level 2: Impulse voltage < 1 kV in combination with an impulse current of some amperes (depending on the coupling network).

Yellow/Line SPD Classes – Symbols

All SPDs of the Yellow/Line family for use in information technology systems are assigned to a Yellow/Line SPD class and marked with a symbol in the technical data sheet and on their rating plates. The symbol for the Yellow/Line SPD class graphically combines three important characteristics of the SPD and can be a single symbol or a combination of individual symbols:

Characteristics	Single symbol	Definition
Discharge capacity of an SPD (according to the categories from IEC/EN 61643-21)	TYPE 1	Impulse D1 (10/350), lightning impulse current ≥ 2.5 kA/line or ≥ 5 kA/total • exceeds the discharge capacity of TYPE 2 – TYPE 4
	TYPE 2	Impulse C2 (8/20), increased impulse load ≥ 2.5 kA/line or ≥ 5 kA/total • exceeds the discharge capacity of TYPE 3 – TYPE 4
	TYPE 3	Impulse C1 (8/20), impulse load ≥ 0.25 kA/line or ≥ 0.5 kA/total • exceeds the discharge capacity of TYPE 4
	TYPE 4	Load $<$ TYPE 3
Protective effect of an SPD (limitation below the test levels according to EN 61000-4-5)	P1	Required test level of the terminal device: 1 or higher
	P2	Required test level of the terminal device: 2 or higher
	P3	Required test level of the terminal device: 3 or higher
	P4	Required test level of the terminal device: 4
Energy coordination (with another Yellow/Line SPD)	+	SPD with decoupling impedance, suitable for coordination with an SPD marked with ☐
	☐	SPD is suitable for coordination with an SPD with decoupling impedance +

Examples of energy-coordinated SPDs according to the Yellow/Line SPD class:



LifeCheck SPD Test



Testing a protection module via a hand-held device based on RFID technology (LifeCheck).

SPD
diagnostics with early warning function!

- Increased protection and availability of your installations and systems due to integrated LifeCheck monitoring system
 - Integrated three-stage monitoring of all protective circuit components
 - Quick diagnostics of surge protective devices
 - Easy testing of protection modules without downtime via contactless RFID technology
 - Even detects pre-damaged arresters

Regular testing of arresters installed

During operation, an arrester may be overloaded by discharge processes exceeding the arrester specification. In order to ensure high system availability, it is therefore essential to test arresters on a regular basis. DIN EN 62305-3, supplement 3 (see table excerpt), specifies the maximum intervals between tests of external and internal lightning protection systems.

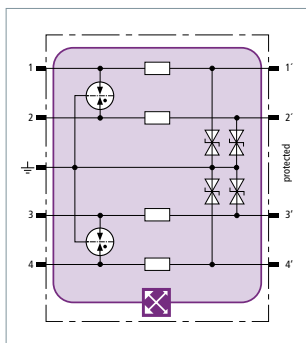
Class of LPS	Visual inspection	Complete inspection	Complete inspection of critical systems
I and II	1 year	2 years	1 year
III and IV	2 years	4 years	1 year

Easy testing with LifeCheck

Maintenance of LifeCheck-equipped BLITZDUCTOR XT arresters is particularly easy. LifeCheck uses modern RFID (Radio Frequency Identification) technology for monitoring the protective circuit and for communication. Irrespective of system downtimes, LifeCheck allows quick and easy testing of arresters by means of the hand-held DRC LC M1+ and DRC LC M3+ reader or a stationary DRC SCM XT and DRC MCM XT condition monitoring unit.

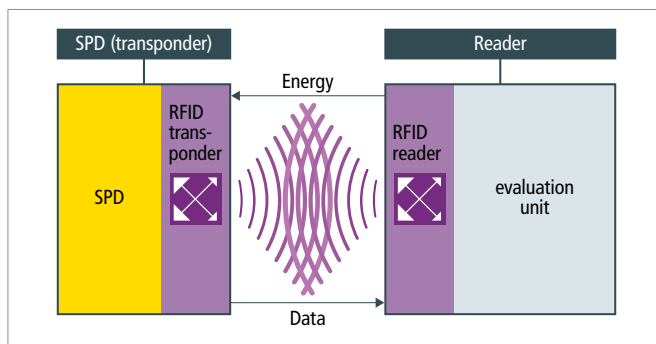
Indication of arrester failure

The three-stage LifeCheck monitoring circuit with early warning function detects extreme electrical or thermal stress on all protection elements of an arrester below their destruction limit. This can be contactlessly read out within a matter of seconds by means of an RFID reader. If the reader displays "LifeCheck OK", no extreme stress was detected. If the contrary is the case, the module should be replaced as soon as possible in order not to threaten the availability of the protected circuit.



The basic circuit diagram graphically shows whether LifeCheck is used to monitor the protective circuit of an arrester. In case of BXT arresters, the complete protective circuit is monitored.

Functional principle of the LifeCheck diagnostics systems



Principle of communication between an arrester and a test device

The diagnostics system consists of two functional units:

1. RFID reading and signalling unit (reader)

Combined with a visual or electric indicator, an electronic system contactlessly transmits energy to the RFID transponder in the arrester via an antenna. If the operating state of the arrester can be read out, an "OK" message is displayed.

2. Monitoring unit in the arrester:

It combines the diagnostics of the three-stage LifeCheck monitoring circuit with the communication of the RFID transponder:

- Diagnostics of electrical overload (impulse current)
Lightning strikes or overvoltage exceeding the specified discharge capacity of the arrester will damage or even destroy the protection elements. The LifeCheck monitoring device detects this electrical overload. When reading out the transponder, the "Replace SPD!" message appears.
- Diagnostics of thermal overload (overheating)
Active and passive protection elements in a critical temperature range will be pre-damaged or even destroyed depending on the type and duration of the overload. This pre-damage or overload is detected by the LifeCheck monitoring device. When reading out the transponder, the "Replace SPD!" message appears.



BLITZDUCTOR – Base Parts

BXT BAS – Without signal disconnection / BSP BAS 4 – With signal disconnection

- Universal base parts for protection modules of the BLITZDUCTOR XT/XTU/SP series
- Two base parts with or without signal disconnection if the protection module is removed
- Connection of up to four lines

BXT BAS

The BLITZDUCTOR XT base part is an extremely space-saving and universal four-pole **feed-through terminal** for the insertion of a protection module **without** signal disconnection if the protection module is removed. The snap-in mechanism at the supporting foot of the base part allows the protection module to be safely earthed via the DIN rail. Since no components of the protective circuit are situated in the base part, maintenance operation is only required for the protection modules.

Type	BXT BAS
Part No.	920 300
For mounting on	35 mm DIN rails acc. to EN 60715
Cross-sectional area, solid	0.08-4 mm ²
Cross-sectional area, flexible	0.08-2.5 mm ²
Tightening torque (terminals)	0.4 Nm
Earthing via	35 mm DIN rails acc. to EN 60715
Approvals	CSA, UL, EAC, ATEX, IECEx *)



*) only in connection with an approved protection module

BSP BAS 4

The BLITZDUCTOR SP base part is an extremely space-saving and universal four-pole **terminal** for the insertion of a protection module **with** signal disconnection if the protection module is removed. The snap-in mechanism at the supporting foot of the base part allows the protection module to be safely earthed via the DIN rail. Since no components of the protective circuit are situated in the base part, maintenance operation is only required for the protection modules.

Type	BSP BAS 4
Part No.	926 304
For mounting on	35 mm DIN rails acc. to EN 60715
Cross-sectional area, solid	0.08-4 mm ²
Cross-sectional area, flexible	0.08-2.5 mm ²
Tightening torque (terminals)	0.4 Nm
Earthing via	35 mm DIN rails acc. to EN 60715
Approvals	UL, CSA, EAC *)



*) only in connection with an approved protection module





BLITZDUCTOR XT



BLITZDUCTOR XT with an earthing module (grey). The lines can be tested by means of the measuring module (grey with lines) without disconnecting the terminals.

- **Combined lightning current and surge arrester**
 - Maximum discharge capacity for two-pole, three-pole or four-pole interfaces
 - Capable of carrying lightning currents up to 10 kA (10/350 μs)
 - Low voltage protection level, capable of protecting terminal equipment
- **With integrated LifeCheck monitoring**
 - Arrester testing during operation
 - Detection of pre-damaged arresters
 - High signal availability thanks to preventive replacement of arresters
- **SPD consists of a protection module and a base part**
 - Vibration and shock-tested for safe operation
 - All protection components integrated in the protection module
 - Two universal base parts with / without signal disconnection
 - Minimum space requirements, 4 single lines or 2 pairs over a width of 12 mm

BLITZDUCTOR XT combined arresters are pluggable and universal multi-pole DIN rail mounted lightning current and surge arresters for protecting measuring and control circuits, bus systems and telecommunication systems. They are particularly useful in installations and systems with high requirement on the availability. To ensure effective protection of terminal equipment under lightning and overvoltage conditions, BLITZDUCTOR XT arresters combine the permanently high impulse current discharge capacity of a lightning current arrester with the low voltage protection level of a surge arrester.

LifeCheck allows quick and easy testing of arresters without ever removing the module from the system. Integrated in the protection modules, LifeCheck permanently monitors the operating state of the arrester and acts like an early warning system, detecting imminent electrical or thermal overload of the protection components. The status of the arrester can be

read in a second by the portable DEHNrecord LC reader with non-contact RFID technology. LifeCheck also saves and indicates the date of the last test of the protection module. Stationary installed, a condition monitoring system permanently monitors the condition of up to 10 BXT arresters.

The module locking system ensures safe operation. Thus, the arrester provides protection against vibration effects and shock up to a 30-fold acceleration of gravity. The function-optimised design of the arrester ensures both fast and easy replacement of protection modules which house all relevant protection elements.

A wide range of accessories makes BLITZDUCTOR XT arresters particularly easy to use. Elements for earthing unused lines or easily testing signal circuits round off the product range.

The **protection module** and **base part** must be ordered separately!



Two-part design with universal base part and application-specific protection module.



The module locking mechanism ensures that the module is vibration-proof and protected against polarity reversal.



All protection elements are integrated in the plug-in module and are monitored by means of LifeCheck.



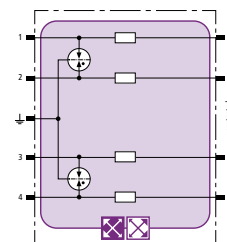
EMC spring terminal (accessory) for permanent low-impedance shield contact.

BLITZDUCTOR XT – Protection Modules with LifeCheck

BXT ML4 B 180

Space-saving four-pole lightning current arrester module with LifeCheck feature for almost all applications. For use in connection with downstream **TYPE2P1** surge arresters or combined lightning current and surge arresters with a lower or equal voltage level.

Type BXT ...	ML4 B 180
Part No.	920 310
SPD class	TYPE1P0
Max. continuous operating voltage (d.c.) (U _c)	180 V
Nominal current at 45 °C (I _n)	1.2 A
D1 Total lightning impulse current (10/350 µs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	20 kA
Series resistance per line	0.4 ohm(s)
Approvals	CSA, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL

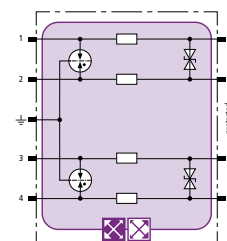


BXT ML4 BD 24 / BD 180

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting two pairs of unearthed balanced interfaces.

General Information:	
D1 Total lightning impulse current (10/350 µs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	20 kA
Approvals	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL

Type BXT ...	ML4 BD 24	ML4 BD 180
Part No.	920 344	920 347
SPD class	TYPE1P1	TYPE1P2
Max. continuous operating voltage (d.c.) (U _c)	33 V	180 V
Nominal current at 45 °C (I _n)	1.0 A	0.75 A
Series resistance per line	1.0 ohm(s)	1.8 ohm(s)
Cut-off frequency line-line (f _G)	7.8 MHz	25.0 MHz

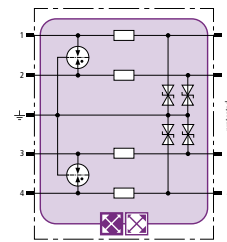


BXT ML4 BE 24 – BE 180

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting four single lines sharing a common reference potential as well as unbalanced interfaces.

General Information:	
D1 Total lightning impulse current (10/350 µs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	20 kA

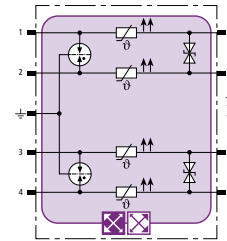
Type BXT ...	ML4 BE 24	ML4 BE 48	ML4 BE 180
Part No.	920 324	920 325	920 327
SPD class	TYPE1P1	TYPE1P1	TYPE1P2
Max. continuous operating voltage (d.c.) (U _c)	33 V	54 V	180 V
Nominal current at 45 °C (I _n)	0.75 A	0.75 A	1.0 A
Series resistance per line	1.8 ohm(s)	1.8 ohm(s)	1.0 ohm(s)
Cut-off frequency line-PG (f _G)	6.8 MHz	8.7 MHz	25.0 MHz
Approvals	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL



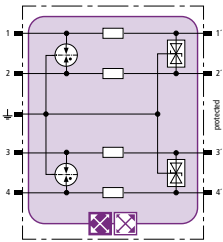
BXT ML4 BPD 24

Space-saving combined arrester module with LifeCheck feature for protecting two pairs in 24 V d.c. systems. Can also be used for systems with earthed negative poles. Integrated PTC resistors allow to reliably reset the arrester after the system circuit has been affected by short-circuit currents up to 40 A.

Type BXT ...	ML4 BPD 24
Part No.	920 314
SPD class	TYPE1P1
Max. continuous operating voltage (d.c.) (U _c)	33 V
Nominal current at 70 °C (I _n)	0.1 A
D1 Total lightning impulse current (10/350 µs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	20 kA
Series resistance per line	typ. 10 ohm(s)
Cut-off frequency line-line (f _G)	4 MHz
Approvals	EAC, SIL



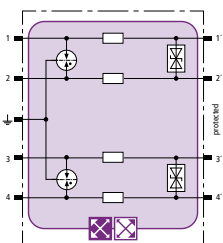
Information Technology Systems – Yellow / Line



BXT ML4 BE HF 5

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting four single lines sharing a common reference potential as well as high-frequency transmissions without galvanic isolation.

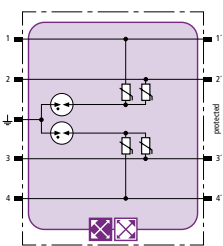
Type BXT ...	ML4 BE HF 5
Part No.	920 370
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	6.0 V
Nominal current at 45 °C (I _n)	1.0 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	1.0 ohm(s)
Cut-off frequency line-PG (f _c)	100.0 MHz
Approvals	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL



BXT ML4 BD HF 5

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting two pairs in unearthed high-frequency bus systems or two-wire video transmission systems.

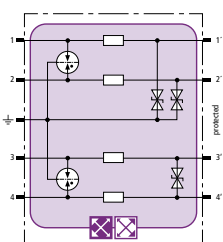
Type BXT ...	ML4 BD HF 5
Part No.	920 371
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	6.0 V
Nominal current at 45 °C (I _n)	1.0 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	1.0 ohm(s)
Cut-off frequency line-line (f _c)	100.0 MHz
Approvals	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL



BXT ML4 MY 110 / 250

Space-saving surge arrester module with LifeCheck feature for protecting four lines of stranded signal interfaces.

Type BXT ...	ML4 MY 110	ML4 MY 250
Part No.	920 388	920 389
SPD class	TYPE 2 P2	TYPE 2 P2
Max. continuous operating voltage (d.c.) line-line (U _c)	170 V	620 V
Max. continuous operating voltage (d.c.) line-PG (U _c)	85 V	320 V
Nominal current at 80 °C (I _n)	3.0 A	3.0 A
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA	10 kA
Cut-off frequency line-line (f _c)	4.5 MHz	20.0 MHz
Approvals	EAC, SIL	EAC, SIL



BXT ML4 BE BD 24

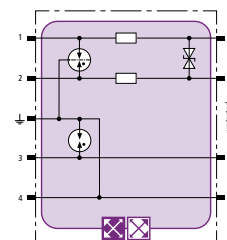
Space-saving LifeCheck-equipped surge arrester module for protecting two single lines with common reference potential as well as unbalanced interfaces and one pair of unearthed balanced interfaces.

Type BXT ...	ML4 BE BD 24
Part No.	920 334
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	33 V
Nominal current at 45 °C (I _n)	0.75 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA

BXT ML2 BD S 24 / BD S 48

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting one pair of unearthened balanced interfaces with direct or indirect shield earthing.

Type BXT ...	ML2 BD S 24	ML2 BD S 48
Part No.	920 244	920 245
SPD class	TYPE 1 P1	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	33 V	54 V
Nominal current at 45 °C (I _n)	1.0 A	1.0 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	9 kA	9 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA	20 kA
Series resistance per line	1.0 ohm(s)	1.0 ohm(s)
Cut-off frequency line-line (f _c)	7.8 MHz	8.7 MHz
Approvals	CSA, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL	

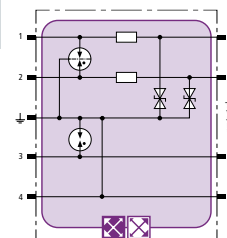


BXT ML2 BE S 12 / BE S 24

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting two single lines sharing a common reference potential as well as unbalanced interfaces, with direct or indirect shield earthing.

General Information:	
SPD class	TYPE 1 P1
D1 Total lightning impulse current (10/350 μs) (I _{imp})	9 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA

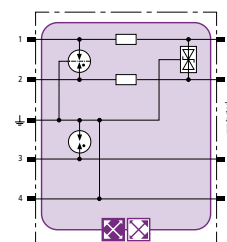
Type BXT ...	ML2 BE S 12	ML2 BE S 24
Part No.	920 222	920 224
Max. continuous operating voltage (d.c.) (U _c)	15 V	33 V
Nominal current at 45 °C (I _n)	0.75 A	0.75 A
Series resistance per line	1.8 ohm(s)	1.8 ohm(s)
Cut-off frequency line-PG (f _c)	2.7 MHz	6.8 MHz
Approvals	CSA, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL	



BXT ML2 BE HFS 5

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting one pair in high-frequency transmissions without galvanic isolation, with direct or indirect shield earthing.

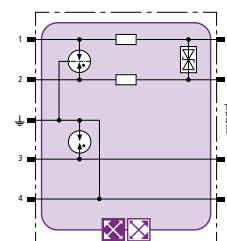
Type BXT ...	ML2 BE HFS 5
Part No.	920 270
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	6.0 V
Nominal current at 45 °C (I _n)	1.0 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	9 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	1.0 ohm(s)
Cut-off frequency line-PG (f _c)	100.0 MHz
Approvals	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL



BXT ML2 BD HFS 5

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting one pair in unearthened high-frequency bus systems or video transmission systems, with direct or indirect shield earthing.

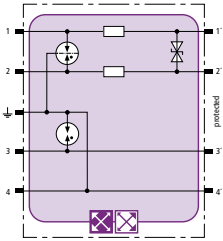
Type BXT ...	ML2 BD HFS 5
Part No.	920 271
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	6.0 V
Nominal current at 45 °C (I _n)	1.0 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	9 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	1.0 ohm(s)
Cut-off frequency line-line (f _c)	100.0 MHz
Approvals	CSA, UL, EAC, ATEX, IECEx, CSA & USA Hazloc, SIL





BXT ML2 BD DL S 15

Space-saving combined lightning current and surge arrester module with LifeCheck feature for protecting one pair of unearthed balanced interfaces, which specifically fulfils the requirements of Dupline buses, direct or indirect shield earthing.



Type BXT ...	ML2 BD DL S 15
Part No.	920 243
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	17 V
Nominal current at 70 °C (I _n)	0.4 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	9 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	2.2 ohm(s)
Cut-off frequency line-line (f _c)	2.7 MHz
Approvals	EAC, ATEX, IECEx, CSA & USA Hazloc, SIL

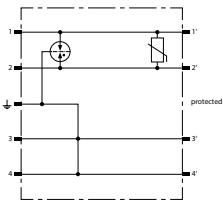
BLITZDUCTOR XT – Protection Module

Information Technology Systems – Yellow / Line



BXT M2 BD HC5A 24

Space-saving combined arrester module for protecting one pair of unearthed balanced interfaces. Module is adapted to interfaces with DC currents up to 5 A, e.g. for the controller of motor-driven actuators with high starting and operating currents.



Type BXT ...	M2 BD HC5A 24
Part No.	920 296
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	36 V
Nominal current (I _n)	5 A
D1 Total lightning impulse current (10/350 μs) (I _{imp})	5 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	0 ohm(s)
Approvals	SIL



BLITZDUCTOR XTU

- **Combined lightning current and surge arrester**
 - Max. discharge capacity for balanced data interfaces
 - Capable of carrying lightning currents up to 10 kA (10/350 μs)
 - For installation in conformity with the lightning protection zone concept at the boundaries from 0_A – 2 and higher
- **With actiVsense technology**
 - Automatically detects the signal voltage ranging from 0 to 180 V
 - Optimally adapts the voltage protection level to the currently applied signal
 - Capable of protecting terminal equipment due to adapted voltage protection level
 - One arrester type for two different data interfaces
- **Integrated LifeCheck monitoring function**
 - Arresters can be tested without downtime
 - Detection of pre-damaged arresters
 - High signal availability due to preventive replacement of arresters
- **Arrester consists of a protection module and a base part**
 - For DIN rail mounting with a standard base part
 - Easy replacement of protection modules
 - Vibration and shock-tested for safe operation
 - Two universal base parts with / without signal disconnection



BLITZDUCTOR XTU for protecting different balanced signal and data interfaces. Space-saving two-part design comprising a base part and a protection module for DIN rail mounting.

The compact BLITZDUCTOR XTU combined lightning current and surge arrester is designed for protecting information and automation equipment and systems and distinguishes itself through its unique actiVsense technology. The arrester does not have a specific nominal voltage and can thus be used for all voltages from 0 to 180 V with a superimposed signal voltage (± 5 V/50 MHz). The nominal current is limited to 100 mA which is innovatively sufficient for information technology systems.

Its innovative actiVsense technology allows the arrester to detect the signal voltage and to automatically adapt the voltage protection level to this voltage. This makes the arrester ideal for applications where changing or slowly fluctuating signal levels (≤ 400 Hz) are to be expected. In case of interference, BLITZDUCTOR XTU arresters always provide a minimal residual voltage for every signal voltage and therefore afford maximum protection for the devices and system circuits connected to them.

BLITZDUCTOR XTU is available in two versions. The four-pole version provides protection for two separate balanced interfaces, that is the arrester automatically detects the operating / signal voltage for every pair and optimally adapts the voltage protection level for every signal circuit. This allows to protect two different balanced interfaces by means of a single arrester, thus reducing installation time, saving costs and reducing the number of arresters to be used. If only one signal interface is to be protected, a two-pole version can be used for a balanced data interface (one pair). This version also allows to directly or indirectly connect cable shields to the equipotential bonding.

This DIN rail mounted arrester is ideally suited for use in information technology transmission systems such as telecommunication, bus or measuring and control systems.

The **protection module** and **base part** must be ordered separately!



Optimally adapted voltage protection level with integrated actiVsense technology ensures protection of terminal equipment.



The protection module of the pluggable arrester safely snaps into the base part, thus ensuring vibration and shock resistance.



To ensure high availability of the signal circuits, the integrated Life-Check feature allows to quickly check whether arresters are pre-damaged.



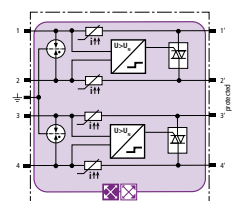
DIN rail mounting by means of integrated earthing contact.

BLITZDUCTOR XTU – Protection Modules with LifeCheck

BXTU ML4 BD 0-180

Space-saving combined lightning current and surge arrester module with actiVsense and LifeCheck technology for protecting two pairs (same or different operating voltage) of balanced interfaces with galvanic isolation.

Type BXTU ...	ML4 BD 0-180
Part No.	920 349
SPD class	TYPE 1 Pt
Max. continuous operating voltage (d.c.) (U _c)	180 V
Permissible superimposed signal voltage (U _{signal})	≤ +/- 5 V
Cut-off frequency line-line (U _{signal} , balanced 100 ohms) (f _c)	50 MHz
Nominal current at 80 °C (equal to max. short-circuit current) (I _n)	100 mA
D1 Total lightning impulse current (10/350 μs) (I _{imp})	10 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	≤ 10 ohms; typically 7.5 ohms
Approvals	CSA, UL, EAC, SIL





BLITZDUCTOR SP



Pluggable and universal multipole surge arrester for use in information technology systems.

- **Universal surge arrester**
 - Universal surge arrester for two-pole, three-pole or four-pole interfaces
 - High discharge capacity up to 20 kA (8/20 μ s)
 - Low voltage protection level, capable of protecting terminal equipment
- **Arrester consists of a protection module and a base part**
 - Easy replacement of protection modules
 - All protection components integrated in the protection module
 - Two universal base parts with or without signal disconnection
- **Functional and appealing design**
 - DIN rail mounted device with integrated earthing
 - Minimum space requirements, four single lines or two pairs over a width 12 mm
 - Vibration and shock-tested for safe operation

BLITZDUCTOR SP arresters are pluggable and universal multipole DIN rail mounted surge arresters for protecting measuring and control circuits, bus systems, emergency alarm systems or telecommunication systems. BLITZDUCTOR SP arresters combine a permanently high impulse current discharge capacity with an extremely low voltage protection level, thus ensuring effective protection of terminal equipment even in case of interference caused by impulse currents and surges resulting from switching operations.

The arresters provide protection against vibration effects and shock up to a 30-fold acceleration of gravity. The function-optimised arrester design ensures both fast and easy replacement of protection modules which house all relevant protection elements. A wide range of accessories e.g. for earthing unused lines or easily testing lines round off the product range. The **protection module** and **base part** must be ordered separately!



Two-part design comprising a base part and a protection module.



The module locking mechanism ensures that the module is vibration-proof and protected against polarity reversal.



All protection elements are integrated in the plug-in module.



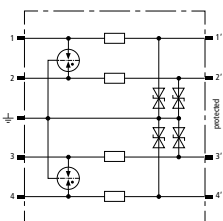
Two universal base parts with or without signal disconnection if the protection module is removed.

BLITZDUCTOR SP – Protection Modules



BSP M4 BE 12 – BE 180

Space-saving surge arrester module for protecting four single lines sharing a common reference potential and unbalanced interfaces.



General Information:			
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA		
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA		
Type BSP ...	M4 BE 12	M4 BE 24	M4 BE 180
Part No.	926 322	926 324	926 327
SPD class	TYPE 2 P1	TYPE 2 P1	TYPE 2 P2
Max. continuous operating voltage (d.c.) (U_c)	15 V	33 V	180 V
Nominal current at 45 °C (I_n)	0.75 A	0.75 A	1.0 A
Cut-off frequency line-PG (f_c)	2.7 MHz	6.8 MHz	25.0 MHz
Approvals	UL, CSA, SIL, EAC	UL, CSA, SIL, EAC	UL, CSA, SIL, EAC

BSP M4 BD 24

Space-saving surge arrester module for protecting two pairs of balanced interfaces with galvanic isolation.

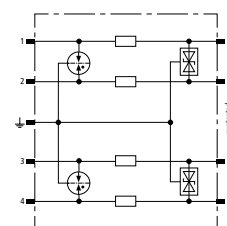
General Information:	
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA
Approvals	UL, CSA, SIL, EAC
Type BSP ...	M4 BD 24
Part No.	926 344
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U_c)	33 V
Nominal current at 45 °C (I_l)	1.0 A
Cut-off frequency line-line (f_G)	7.8 MHz



BSP M4 BE HF 5

Space-saving surge arrester module for protecting four single lines sharing a common reference potential and high-frequency transmissions without galvanic isolation.

Type BSP ...	M4 BE HF 5
Part No.	926 370
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U_c)	6.0 V
Nominal current at 45 °C (I_l)	1.0 A
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA
Cut-off frequency line-PG (f_G)	100.0 MHz
Approvals	UL, CSA, SIL, EAC



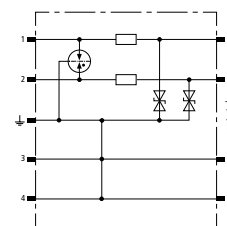
BSP M2 BE 5 – BE 180

Space-saving surge arrester module for protecting two single lines sharing a common reference potential and unbalanced interfaces.

General Information:	
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA
Approvals	UL, CSA, SIL, EAC

Type BSP ...	M2 BE 5	M2 BE 12	M2 BE 24
Part No.	926 220	926 222	926 224
SPD class	TYPE 2 P1	TYPE 2 P1	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U_c)	6.0 V	15 V	33 V
Nominal current at 45 °C (I_l)	1.0 A	0.75 A	0.75 A
Cut-off frequency line-PG (f_G)	1.0 MHz	2.7 MHz	6.8 MHz

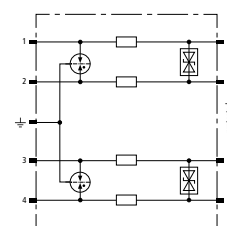
Type BSP ...	M2 BE 48	M2 BE 180
Part No.	926 225	926 227
SPD class	TYPE 2 P1	TYPE 2 P2
Max. continuous operating voltage (d.c.) (U_c)	54 V	180 V
Nominal current at 45 °C (I_l)	0.75 A	1.0 A
Cut-off frequency line-PG (f_G)	8.7 MHz	25 MHz



BSP M4 BD HF 5

Space-saving surge arrester module for protecting two pairs of high-frequency bus systems or video transmission systems with galvanic isolation.

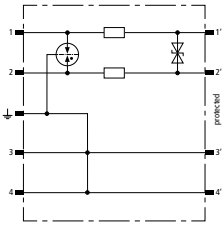
Type BSP ...	M4 BD HF 5
Part No.	926 371
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U_c)	6.0 V
Nominal current at 45 °C (I_l)	1.0 A
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA
Cut-off frequency line-line (f_G)	100.0 MHz
Approvals	UL, CSA, SIL, EAC





BSP M2 BD 5 – BD 24

Space-saving surge arrester module for protecting one pair of balanced interfaces with galvanic isolation.

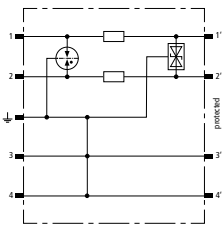


General Information:			
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA		
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA		
Approvals	UL, CSA, SIL, EAC		
Type BSP ...	M2 BD 5	M2 BD 12	M2 BD 24
Part No.	926 240	926 242	926 244
SPD class	TYPE 2 P1		
Max. continuous operating voltage (d.c.) (U_c)	6.0 V	15 V	33 V
Nominal current at 45 °C (I_L)	1.0 A	1.0 A	1.0 A
Cut-off frequency line-line (f_G)	1.0 MHz	2.8 MHz	7.8 MHz



BSP M2 BE HF 5

Space-saving surge arrester module for protecting two single lines sharing a common reference potential and high-frequency transmissions without galvanic isolation.

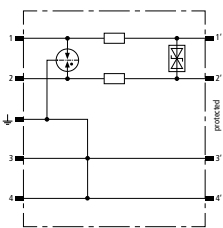


Type BSP ...	M2 BE HF 5
Part No.	926 270
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U_c)	6.0 V
Nominal current at 45 °C (I_L)	1.0 A
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA
Cut-off frequency line-PG (f_G)	100 MHz
Approvals	UL, CSA, SIL, EAC



BSP M2 BD HF 5

Space-saving surge arrester module for protecting one pair of high-frequency bus systems or video transmission systems with galvanic isolation.



Type BSP ...	M2 BD HF 5
Part No.	926 271
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U_c)	6.0 V
Nominal current at 45 °C (I_L)	1.0 A
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA
Cut-off frequency line-line (f_G)	100 MHz
Approvals	UL, CSA, SIL, EAC



BLITZDUCTOR XT Ex (i)

- Surge arrester for intrinsically safe measuring circuits and bus systems
 - Maximum discharge capacity for two-pole, three-pole or four-pole interfaces
 - Low voltage protection level, capable of protecting terminal equipment
 - Wide range of approvals: ATEX, IECEx, CSA Hazloc
- Arrester consists of a protection module and a base part
 - Easy replacement of protection modules without force
 - All protection components are integrated in the protection module
 - Arrester with integrated LifeCheck for preventive arrester monitoring
- Functional and appealing design
 - DIN rail mounted arrester with integrated earthing
 - Minimum space requirements, two pairs over a width of 12 mm
 - Vibration and shock-tested for safe operation



Pluggable and universal multipole surge arrester for use in intrinsically safe systems with integrated LifeCheck monitoring function.

BLITZDUCTOR XT EX is a pluggable and universal four-pole DIN rail mounted surge arrester designed for the most stringent requirements on the availability of intrinsically safe measuring and control circuits and bus systems.

Regarding intrinsic safety, the arrester is considered unearthed and its self-inductance and self-capacitance are negligibly small. The low-impedance arrester design ensures a high impulse current discharge capacity (at least 10x) and a low voltage protection level.

LifeCheck allows quick and easy arrester testing, however, the protection modules may only be read by the hand-held DRC LC reader in non-explosive atmospheres.

Integrated in the protection modules, LifeCheck permanently monitors the operating state of the arrester. Like an early warning system, LifeCheck

detects imminent electrical or thermal overload of the protection components. The LifeCheck status can be read in a second by the hand-held DEHNrecord LC reader via non-contact RFID technology. Moreover, the date of the last test of the protection module can be displayed and saved. Stationary installed, a condition monitoring system allows condition-based maintenance of 10 BXT arresters.

The arrester provides protection against vibration effects and shock up to a 30-fold acceleration of gravity. The function-optimised arrester design allows quick and easy replacement of protection modules which house all relevant protection elements.

The **protection module** and **base part** must be ordered separately!



Two-part design comprising a universal base part and an application-specific protection module.



The module locking mechanism ensures that the module is vibration-proof and protected against polarity reversal.



All protection elements are integrated in the plug-in module and are monitored by means of LifeCheck.



Prewired surge arrester unit ITAK EXI BXT 24.

Information Technology Systems – Yellow / Line

BLITZDUCTOR XT Ex (i) – Base Part



BXT BAS EX – Base part without signal disconnection

- Universal base part for protection modules of the BLITZDUCTOR XT Ex (i) series
- No signal disconnection if the protection module is removed
- Connection of up to four lines

BXT BAS EX

BLITZDUCTOR XT base part for use as an extremely space-saving and universal four-pole **feed-through terminal** for intrinsically safe circuits for the insertion of the protection module, no signal disconnection if the protection module is removed. The snap-in mechanism at the supporting foot of the base part allows the device to be safely earthed via the DIN rail. Since no components of the protective circuit are situated in the base part, only the protection modules must be maintained.

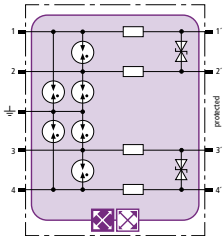
Type	BXT BAS EX
Part No.	920 301
For mounting on	35 mm DINs rails acc. to EN 60715
Cross-sectional area, solid	0.08-4 mm ²
Cross-sectional area, flexible	0.08-2.5 mm ²
Tightening torque (terminals)	0.4 Nm
Earthing via	35 mm DIN rails acc. to EN 60715
Approvals	UL, CSA, EACEx, ATEX, IECEx, Inmetro *)



*) only in connection with an approved protection module



BLITZDUCTOR XT Ex (i) – Protection Modules with LifeCheck

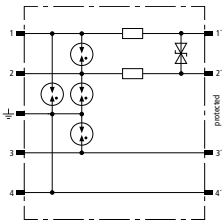


BXT ML4 BD EX 24

Space-saving LifeCheck-equipped surge arrester module for protecting two pairs in intrinsically safe measuring circuits and bus systems.

Type	BXT ML4 BD EX 24
Part No.	920 381
SPD class	TYPE 2 PI
Max. continuous operating voltage (d.c.) (U_c)	33 V
Max. input current acc. to EN 60079-11 (I_i)	0.5 A
D1 Total lightning impulse current (10/350 μ s) (I_{imp})	4 kA
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	20 kA
Cut-off frequency line-line (f_c)	7.7 MHz
Approvals *)	CSA, EACEx, ATEX, IECEx, CSA & USA Hazloc, SIL, Inmetro

BLITZDUCTOR XT Ex (i) – Protection Module



BXT M2 BD S EX 24

Space-saving surge arrester module for protecting one pair in intrinsically safe measuring circuits and bus systems, direct or indirect shield earthing.

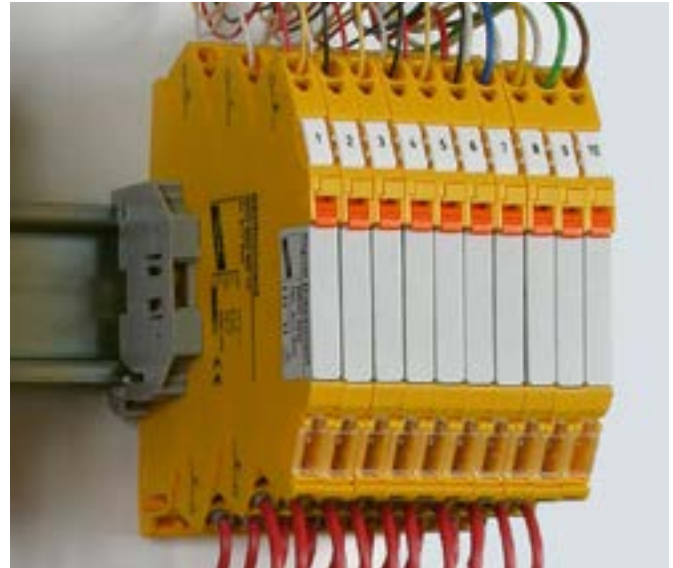
Type	BXT M2 BD S EX 24
Part No.	920 383
SPD class	TYPE 2 PI
Max. continuous operating voltage (d.c.) (U_c)	36 V
Max. input current acc. to EN 60079-11 (I_i)	0.5 A
D1 Total lightning impulse current (10/350 μ s) (I_{imp})	4 kA
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	1 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	10 kA
Cut-off frequency line-line (f_c)	7.7 MHz
Approvals *)	ATEX, IECEx, CSA & USA Hazloc, SIL

*) For details see: www.dehn-international.com



DEHNconnect SD2

- Terminal block with integrated surge protection
 - For protecting measuring and control circuits and bus systems
 - Maximum impulse current carrying capability I_{max} up to 20 kA (8/20 μ s)
 - Low voltage protection level, capable of protecting terminal equipment
 - No back up fuse up to 500 mA
- Modular disconnection function
 - Disconnection module for disconnecting the signal circuit for maintenance work
 - Module fixing and mechanical ejector
 - Module in “parked” position after disconnection
- Space-saving and function-optimised design
 - Terminal block with integrated surge protection (width of 6 mm)
 - Fast conductor connection without tools thanks to direct plug-in technology
 - Can be used with jumper bar (accessory)



Application example: DEHNconnect for protecting the I/O of PLC interfaces.

The surge arresters of the DEHNconnect SD2 series are designed as space-saving terminal blocks with a width of 6 mm. These terminal blocks with integrated surge protection have a modular disconnection function that allows them to interrupt the signal circuit for maintenance work. An integrated module ejector disconnects the signal circuit from the terminal equipment. The disconnection module does not have to be removed, but remains in a “parked” position in the module slot.

Different types of arresters are available and protect two single lines sharing a common reference potential (unbalanced interfaces) or an unearthed pair (balanced interface). Arresters with a high cut-off frequency (HF) can be used for balanced bus interfaces with high data rates (e.g. Profibus, RS485).

Conductors are connected via a vibration-proof spring-loaded connection system. Stripped solid conductors and flexible conductors with wire end ferrule can be easily and quickly inserted into the relevant conductor terminal without the use of tools. For rewiring, the conductor is removed from the clamping point and clamped into a new conductor terminal.

To reduce wiring, jumper bars can be inserted at the protected side of the surge arrester, thus quickly connecting signal circuits.

The arresters are ideally suited for use in industrial environments at information technology signal interfaces of automation, measuring and control as well as bus systems.



Disconnection module with ejector – for disconnecting the signal circuits.



Marking of the protected side – minimises wiring errors.

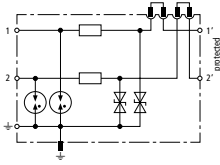


Terminals with direct-plug-in technology – fast and vibration-proof connection.



Slots for jumper bars – for quickly connecting signal circuits.

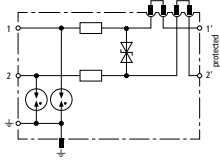




DCO SD2 ME

Energy-coordinated surge arrester with disconnection function for protecting two single lines sharing a common reference potential as well as unbalanced interfaces.

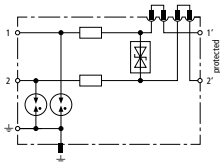
Type DCO SD2 ...	ME 12	ME 24
Part No.	917 920	917 921
SPD class	TYPE 2 P1	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	14 V	33 V
Nominal current at 80 °C (I _n)	0.5 A	0.5 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	1 kA	1 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA	10 kA
Cut-off frequency line-PG (f _c)	2.5 MHz	6 MHz
Approvals	UL, CSA, SIL, EAC, ATEX, IECEx	UL, CSA, SIL, EAC, ATEX, IECEx



DCO SD2 MD

Energy-coordinated surge arrester with disconnection function for protecting one unearthed pair as well as balanced interfaces.

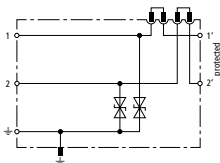
Type DCO SD2 ...	MD 24
Part No.	917 941
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	33 V
Nominal current at 80 °C (I _n)	0.5 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	1 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA
Cut-off frequency line-PG (f _c)	6 MHz
Approvals	UL, CSA, SIL, EAC, ATEX, IECEx



DCO SD2 MD HF

Energy-coordinated surge arrester with disconnection function for protecting balanced interfaces with extra-low voltages. Also suitable for high transmission rates.

Type DCO SD2 ...	MD HF 5
Part No.	917 970
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	8.5 V
Nominal current at 80 °C (I _n)	0.5 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	1 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA
Cut-off frequency line-line (f _c)	100 MHz
Approvals	UL, CSA, SIL, EAC, ATEX, IECEx



DCO SD2 E

Finely-limiting surge protective device with disconnection function for two single lines sharing a common reference potential and unbalanced interfaces.

Type DCO SD2 ...	E 12	E 24
Part No.	917 987	917 988
SPD class	TYPE 3 P1	TYPE 3 P1
Max. continuous operating voltage (d.c.) (U _c)	13 V	28 V
Nominal current at 60 °C (I _n)	10 A	10 A
C1 Total nominal discharge current (8/20 μs) (I _n)	0.8 kA	0.6 kA
Cut-off frequency line-PG (f _c)	2.3 MHz	5.5 MHz
Approvals	UL, CSA, SIL, EAC	UL, CSA, SIL, EAC



BLITZDUCTOR VT

- Cost-effective protection of multi-core signal lines
- Interface-specific versions, e.g. RS485, telecommunication systems
- Versions for d.c. power supply systems

BLITZDUCTOR VT is a family of compact DIN rail mounted arresters and consists of different types of enclosures with different connection methods. Both devices for protecting four-wire signal interfaces with screw connections, but also devices for protecting terminal equipment of telecommunication systems as well as telephone systems with RJ connection are for example available. All types can be mounted on DIN rails and are earthed via a screw terminal.

Different types of BLITZDUCTOR VT arresters are available depending on the application.



Compact DIN rail mounted surge protective device with screw terminals for multi-core lines.



BVT enclosure type with a width of 1.5 modules and screw terminals:
BVT AVD/ALD:
Two protected lines for d.c. power supply systems



BVT enclosure type with a width of 3 modules and screw terminals:
BVT RS485 specifically designed for protecting RS485 / RS422 interfaces.



BVT enclosure type with a width of 1.5 modules and RJ connection:
BVT TC1 and BVT ISDN for protecting telecommunication interfaces.

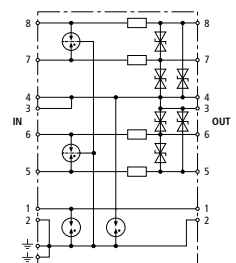


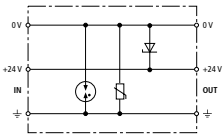
Separate earth connection on the unprotected side of the device. The second slot of the double terminal is intended for connecting the terminal equipment to the equipotential bonding.

BVT RS485

Protection for balanced four-wire RS485/422 interfaces, direct or indirect shield earthing, connection of a signal ground.

Type BVT ...	RS485 5
Part No.	918 401
SPD class	TYPE 2 Pt1
Max. continuous operating voltage (d.c.) (U_c)	6 V
Nominal current (I_n)	0.5 A
D1 Lightning impulse current (10/350 μ s) per line (I_{imp})	0.8 kA
C2 Total nominal discharge current (8/20 μ s) (I_n)	10 kA
Series resistance per line	1.8 ohms
Cut-off frequency line-line (f_c)	1.7 MHz
Approvals	CSA, EAC





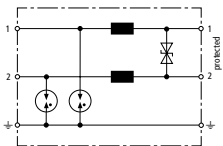
BVT AVD

Surge arrester with improved voltage protection levels for EMC protection of electronic components with d.c. voltage supply. Ideally suited for Siemens PLCs.

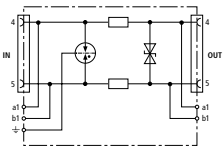
Type BVT ...	AVD 24
Part No.	918 422
SPD class	TYPE 3 P1
Max. continuous operating voltage (d.c.) (U _c)	35 V
Nominal current at 80 °C (I _N)	10 A
C2 Total nominal discharge current (8/20 μs) (I _n)	2 kA
Approvals	EAC

BVT ALD

Energy-coordinated, DIN rail mounted combined lightning current and surge arrester for protecting unearthed d.c. power supply systems.



Type BVT ...	ALD 60
Part No.	918 409
SPD class	TYPE 1 P1
Max. continuous operating voltage (d.c.) (U _c)	65 V
Nominal current at 80 °C (I _N)	4 A
Nominal current at 45 °C (I _N)	7 A
Backup fuse if	U _N ≥ 45 V and I _N ≥ 1 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	2.5 kA
D1 Total lightning impulse current (10/350 μs) (I _{imp})	5 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	20 kA
Series resistance per line	22 μH
Approvals	UL, EAC



BVT TC

Energy-coordinated leakage-current-free surge arrester for a/b lines, ISDN U_{k0} or ADSL with RJ45 connections and additional screw terminals. Compatible with RJ11/12.

Type BVT ...	TC 1
Part No.	918 411
SPD class	TYPE 2 P2
Max. continuous operating voltage (d.c.) (U _c)	170 V
Nominal current (I _N)	0.2 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	1 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	5 kA
Series resistance per line	4.7 ohms
Cut-off frequency line-line (f _G)	17 MHz
Approvals	EAC



DEHNpipe

- Surge arresters to be screwed onto field devices
 - Parallel or series connection
 - Made of corrosion-resistant stainless steel
 - Arrester for protecting a second interface (data or power side) available
- Types for Ex (i) and Ex (d) applications
 - For protecting intrinsically safe measuring circuits and bus systems Ex (i)
 - Type in a flameproof enclosure Ex (d)
- Variety of approvals
 - Approvals depending on the arrester: IECEx, ATEX, FISCO, CSA Hazloc



Surge arrester for outdoor use to be screwed onto two-wire field devices. Stainless steel, installation with cable gland up to IP 67.

The devices of the DEHNpipe family are made of corrosion-resistant stainless steel and can be directly screwed onto a field device. The permanently connected lines are connected to the terminals of the field device. Surge protective devices for series connection and parallel connection are available. Arresters for series connection are located directly in the cable run which ensures energy coordination with other arresters. These arresters can also be used for field devices with a single field device terminal or a single cable gland. Arresters for parallel connection are attached to the spare cable gland of the field devices or in the field bus distributor and are situated in parallel to the cable run. Due to their design, both versions have an IP 67 degree of protection.

Ex(i) und Ex(d) versions are available for field devices in potentially explosive atmospheres. Depending on the type, the arresters can thus be installed on field devices in intrinsically safe measuring circuits Ex(i) or on devices with flameproof enclosure and are suitable for use in Ex zone 1 or 2.

The surge arresters are ideally suited for installation in process environments, for example on transducers or field bus devices. 4-20 mA measuring circuits or bus systems up to 30 V are typical fields of application.



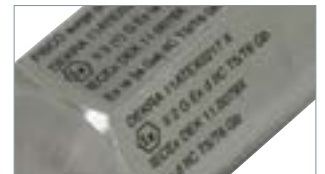
Types for series connection.



Robust type made of corrosion-resistant stainless steel.



Metric and NPT thread.

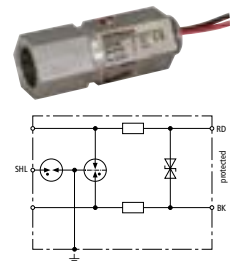


ATEX and IECEx approval.

DPI MD

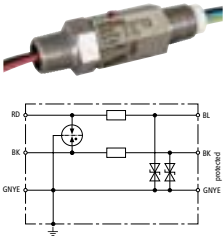
Energy-coordinated two-stage arrester, no leakage currents to earth, for 4-20 mA interfaces with M20 x 1.5 thread (female/male). Direct, indirect or no shield earthing. Cable gland available as accessory part.

Type DPI ...	MD 24 M 2S
Part No.	929 941
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	34.8 V
Nominal current (I _n)	0.5 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	1 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA
Cut-off frequency line-line (f _c)	14 MHz
For mounting on (field / device side)	M20 x 1.5 female thread / M20 x 1.5 male thread
Approvals	EAC, SIL



DPI ME

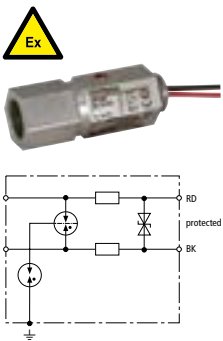
Energy-coordinated two-stage arrester for unbalanced interfaces with 1/2-14 NPT thread (male/male). The earthing conductor is led through the surge arrester.



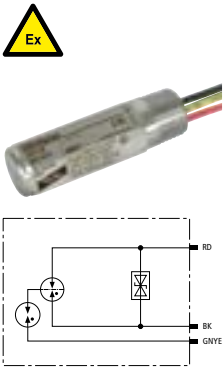
Type DPI ...	ME 24 N A2G	
Part No.	929 921	
SPD class	TYPE 2 P1	
Max. continuous operating voltage (d.c.) (U _c)	34.8 V	
Nominal current (I _n)	0.5 A	
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	1 kA	
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA	
For mounting on (field / device side)	1/2-14 NPT male thread / 1/2-14 NPT male thread	
Approvals	UL, EAC, SIL	

DPI MD EX

Energy-coordinated two-stage surge arrester for protecting intrinsically safe measuring circuits and bus systems according to FISCO. Cable glands are available as accessory.



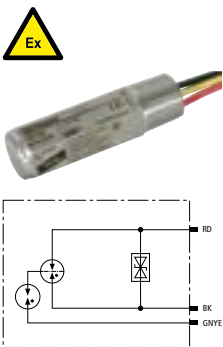
Type DPI ...	MD EX 24 M 2	MD EX 24 N 2
Part No.	929 960	929 965
SPD class	TYPE 2 P1	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	34.8 V	34.8 V
Nominal current (I _n)	0.5 A	0.5 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	1 kA	1 kA
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA	10 kA
Cut-off frequency line-line (f _G)	7 MHz	7 MHz
For mounting on (field / device side)	M20 x 1.5 female thread / M20 x 1.5 male thread	1/2-14 NPT female thread / 1/2-14 NPT male thread
Approvals	EACEx, ATEX, IECEx, SIL	ATEX, IECEx, SIL



DPI CD EXI

Surge arrester for protecting intrinsically safe measuring circuits and bus systems according to FISCO.

Type DPI ...	CD EXI 24 N	
Part No.	929 963	
SPD class	TYPE 2 P1	
Max. continuous operating voltage (d.c.) (U _c)	32 V	
Nominal current (I _n)	0.55 A	
D1 Lightning impulse current (10/350 μs) line-PG (I _{imp})	1 kA	
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA	
Cut-off frequency line-line (f _G)	67 MHz	
For mounting on (field / device side)	1/2-14 NPT male thread	
Approvals	EACEx, ATEX, IECEx, CSA & USA Hazloc, SIL	



DPI CD EXD

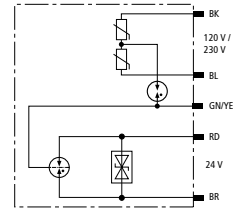
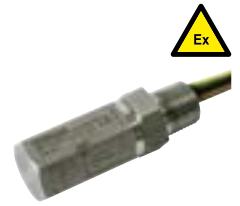
Surge arrester in a flameproof enclosure for protecting measuring circuits and bus systems in potentially explosive atmospheres.

Type DPI ...	CD EXD 24 N	
Part No.	929 964	
SPD class	TYPE 2 P1	
Max. continuous operating voltage (d.c.) (U _c)	32 V	
Nominal current (I _n)	0.55 A	
D1 Lightning impulse current (10/350 μs) line-PG (I _{imp})	1 kA	
C2 Total nominal discharge current (8/20 μs) (I _n)	10 kA	
Cut-off frequency line-line (f _G)	67 MHz	
For mounting on (field / device side)	1/2-14 NPT male thread	
Approvals	EACEx, ATEX, IECEx, CSA & USA Hazloc, SIL	

DPI CD EXD 230 24

Surge arrester in a flameproof enclosure for protecting 120/230 V terminal equipment and 0/4-20 mA interfaces in potentially explosive atmospheres.

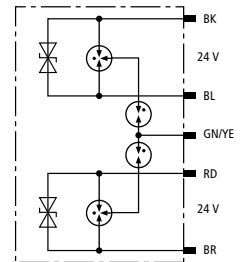
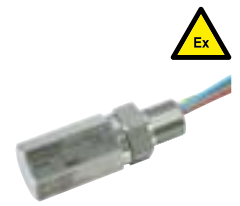
Type DPI ...	CD EXD 230 24 N
Part No.	929 970
Protection of the data side	
SPD class	TYPE 2 P2
Max. continuous operating voltage (d.c.) (U _c)	32 V
Nominal current at 80 °C (I _n)	0.55 A
D1 Lightning impulse current (10/350 µs) line-PG (I _{imp})	1 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	10 kA
For mounting on (field / device side)	1/2-14 npt male thread
Approvals	EACEx, ATEX, IECEx, CSA & USA Hazloc, SIL
Protection of the power side	
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Max. continuous operating voltage (a.c.) (U _c)	255 V
Total discharge current (8/20 µs) L+N-PE (I _{total})	5 kA
Voltage protection level L-N (U _p)	≤ 1.4 kV
Max. mains-side overcurrent protection	16 A gL/gG or B 16 A



DPI CD EXI+D 2X24

Surge arrester in a flameproof enclosure for protecting two 24 V interfaces in potentially explosive atmospheres according to FISCO.

Type DPI ...	CD EXI+D 2X24 N
Part No.	929 951
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	36 V
Nominal current (I _n)	0.55 A
D1 Lightning impulse current (10/350 µs) line-PG (I _{imp})	1.5 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	20 kA
For mounting on (field / device side)	1/2-14 NPT male thread
Approvals	EACEx, ATEX, IECEx, CSA & USA Hazloc, SIL



Information Technology Systems – Yellow / Line



DEHNpatch



DEHNpatch is the first Cat. 6A certified patch cable with surge protection that can be used according to IEEE 802.3at up to 57 V.

- Patch cable with surge protection
- Cat. 6 according to ISO / IEC 11801
- CAT 6A in the channel according to ANSI/TIA / EIA-568
- Power over Ethernet IEEE 802.3 compliant (up to PoE++ / 4PPoE)
- IP66 variant for outdoor applications
- Easy to retrofit

Surge arresters of the DEHNpatch family fulfill various requirements for a universal application for Ethernet, Industrial Ethernet, Power over Ethernet (IEEE 802.3 compliant up to PoE++ / 4PPoE) as well as general applications in structured cabling up to the Gbit range. Due to the different product designs the SPDs are suitable for indoor and outdoor installation in different environmental conditions.

The space-saving design of the DEHNpatch surge arrester as patch cable or as compact socket-socket design is especially easy to install. Thus, not only new systems can be equipped easily but also retrofitting is possible anytime without great effort. Due to its fully shielded design, DEHNpatch can be used in shielded and unshielded networks.

DEHNpatch is installed between patch panel and active component (e.g. switch). A safe equipotential bonding is provided by the surge current resistant DIN rail supporting foot with snap-in mechanism. Standard DEHNpatch will be supplied with integrated patch cable with a length of

3 m. Arresters with other, customised cable lengths are available upon request up to a total cable length of 10 m.

The width of the DIN rail mounting devices is similar to that of an RJ45 socket, allowing up to 24 devices to be installed next to one another in a 19" rack. For multiple application in 19" distribution boards a DEHNpatch mounting set is recommended which is available as accessory.

The IP66 version of DEHNpatch with its universal mounting device, especially developed for outdoor applications, can be installed on poles as well as on walls. The arrester is directly earthed via the metal enclosure. Screws in the enclosure cover are secured against falling out which facilitates installation also at great heights (e.g. on poles). Special cable seals enable an easy and low-effort installation of the arrester with pre-assembled patch cables. An additional effort of mounting RJ45 plugs on the building entry cable can be omitted.



With RJ45 sockets, fully shielded.



For DIN rail and wall mounting.



Patch cable version, fully shielded.

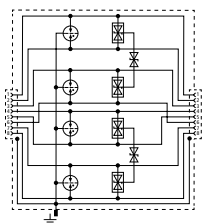


Mounting set (DIN rail, distance bolts) for 19" mounting sections available as accessory.

DPA CLE IP66

Universal surge arrester for GBit Ethernet applications, Power over Ethernet (IEEE 802.3 compliant up to PoE++ / 4PPoE) and similar applications in structured cabling systems in indoor and outdoor areas in an IP66 rated enclosure impervious to dust and water jets. Protection of all pairs with gas discharge tubes and one adapted filter matrix for each pair. Fully shielded surge protective solution with RJ 45 sockets. Universal mounting bracket for pole and wall mounting.

External accessories: Tensioning straps for pole mounting



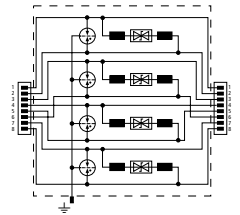
Type DPA ...	CLE IP66
Part No.	929 221
SPD class	TYPE 2P1
Max. continuous operating voltage (d.c.) pair-pair (PoE) (U _c)	60 V
Nominal current (I _n)	1 A
D1 Lightning impulse current (10/350 μs) per line (I _{imp})	0.8 kA
C2 Total nominal discharge current (8/20 μs) line-PG (I _n)	10 kA
Cut-off frequency (f _c)	250 MHz
Degree of protection (with installed cables)	IP 66
Connection (input / output)	RJ45 socket / RJ45 socket
Approvals	UL, CSA, EAC

DPA M CAT6

Universal arrester for Industrial Ethernet, Power over Ethernet (IEEE 802.3 compliant up to PoE++ / 4PPoE) and similar applications in structured cabling systems according to Cat. 6 and class E_A up to 500 MHz. Fully shielded type for DIN rail mounting, cable length of 3 m^{*)}.

Type DPA ...	M CAT6 RJ45S 48
Part No.	929 100
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	48 V
Max. continuous operating voltage (d.c.) pair-pair (PoE) (U _c)	57 V
Nominal current (I _n)	1 A
D1 Lightning impulse current (10/350 µs) per line (I _{imp})	1 kA
C2 Total nominal discharge current (8/20 µs) line-PG (I _n)	10 kA
Cut-off frequency (f _c)	250 MHz
Connection (input / output)	RJ45 connecting line / RJ45 connecting line
Approvals	GHMT, EAC

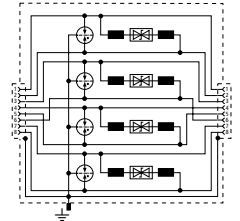
^{*)} Special lengths on request



DEHNpatch Class E

Universal arrester ideally suited for Industrial Ethernet, Power over Ethernet (IEEE 802.3 compliant up to PoE++ / 4PPoE) and similar applications in structured cabling systems according to class E up to 250 MHz. Fully shielded adapter with sockets for DIN rail mounting.

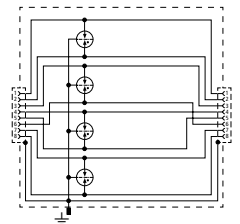
Type DPA ...	M CLE RJ45B 48
Part No.	929 121
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	48 V
Max. continuous operating voltage (d.c.) pair-pair (PoE) (U _c)	57 V
Nominal current (I _n)	1 A
D1 Lightning impulse current (10/350 µs) per line (I _{imp})	0.5 kA
C2 Total nominal discharge current (8/20 µs) line-PG (I _n)	10 kA
Cut-off frequency (f _c)	250 MHz
Connection (input / output)	RJ45 socket / RJ45 socket
Approvals	CSA, UL, GHMT, EAC



DEHNpatch Class D

Universal arrester according to class D up to 100 MHz for Ethernet and PoE applications. DIN rail mounted shielded adapter type with sockets.

Type DPA ...	M CLD RJ45B 48
Part No.	929 126
SPD class	TYPE 2 P2
Max. continuous operating voltage (d.c.) (U _c)	48 V
Max. continuous operating voltage (d.c.) pair-pair (PoE) (U _c)	57 V
Nominal current (I _n)	1 A
D1 Lightning impulse current (10/350 µs) per line (I _{imp})	0.5 kA
C2 Total nominal discharge current (8/20 µs) line-PG (I _n)	10 kA
Cut-off frequency (f _c)	100 MHz
Connection (input / output)	RJ45 socket / RJ45 socket
Approvals	UL, EAC



Information Technology Systems – Yellow / Line



DEHNgate



- Universal surge and combined arresters
- Maximum discharge capacity for coaxial systems
- Low voltage protection level allows to protect terminal equipment
- Contact materials with extremely long endurance

DEHNgate is a family of lightning current / surge arresters designed as a cable adapter for protecting coaxial systems such as cell sites and antenna systems from potential damage. The DEHNgate arrester family comes in different mechanical and electrical designs to suit a wide range of applications, with the various types and arrester technologies providing optimal solutions.

The space-saving DG A FF TV can be mounted onto a DIN rail to protect satellite systems with several outputs. For single applications such as broadband cable connections, the device can be simply snapped into a wall-mounted adapter. Two F connections are also included.

The quarter-wave surge arresters are bandpass filters. Only signals within a defined frequency band are transmitted. Since lightning interferences have a low frequency spectrum, the shorting stub acts as a short-circuit, conducting the lightning current to the ground. This makes the surge arresters mechanically very robust and almost maintenance-free. Due to their low voltage protection level and high discharge capacity, they can be used as combined lightning current and surge arresters. If additional remote supply is needed for the antenna, a combination of a gas discharge tube and quarter-wave technology (DGA LG) should be used. The arresters are made of top-quality materials and give outstanding endurance.

Information Technology Systems – Yellow / Line



Surge arrester for satellite and broadband cable systems.



F connection for 75-ohm systems.



Coaxial arrester with exchangeable gas capsule.



Maintenance-free quarter-wave surge arresters for protecting high-frequency applications (e.g. LTE).

DGA BNC VCD

The space-saving surge arrester with BNC socket can be mounted on DIN rails for protecting video and camera systems. With direct depending to avoid ground loops.



Type DGA ...	BNC VCD
Part No.	909 710
SPD class	TYPE 2 P1
Max. continuous operating voltage (d.c.) (U _c)	6.4 V
Nominal current (I _n)	0.1 A
D1 Lightning impulse current (10/350 μs) (I _{imp})	1 kA
C2 Nominal discharge current (8/20 μs) line-shield (I _n)	5 kA
Frequency range	0-300 MHz
Connection (input / output)	BNC socket / BNC socket
Approvals	CSA, UL

DGA TV

DGA ... TV arresters with F connection for remote supply protect 75-ohm satellite and broadband cable systems and fulfil the high shielding requirements of class A according to EN 50083-2. They allow space-saving installation in all common TV and satellite applications and are available as lightning current arresters, surge arresters as well as combined lightning current and surge arresters with integrated measuring output, allowing the system to be easily tested.

Type DGA ...	FF TV	GF TV	GFF TV
Part No.	909 703	909 704	909 705
SPD class	TYPE 3P1	TYPE 1	TYPE 1 + TYPE 3P1
Max. continuous operating voltage (d.c.) (U _c)	24 V	60 V	24 V
Nominal current (I _L)	2 A	2 A	2 A
D1 Lightning impulse current (10/350 µs) (I _{imp})	0.2 kA	2.5 kA	2.5 kA
C2 Nominal discharge current (8/20 µs) (I _n)	1.5 kA	10 kA	10 kA
Frequency range	d.c. / 5-3000 MHz	0-2400 MHz	d.c. / 5-2400 MHz
Connection (input / output)	F socket / F socket	F socket / F plug	F socket / F socket
Approvals	EAC	EAC	EAC



DGA FF5 TV

Five-channel surge arrester for 75 Ohm antenna systems. Special design for SAT antenna splitters and multi-switches. The arrester fulfills the shielding requirements of class A acc. to EN 50083-2. For use at the boundaries of zones 0_B – 2. Delivery includes fastening material, EB conductor and F-Connector adapter for mounting the arrester directly on a multi-switch.

Type DGA ...	FF5 TV
Part No.	909 706
SPD class	TYPE 2P1
Max. continuous operating voltage (d.c.) (U _c)	20 V
Nominal current (I _L)	0.4 A
D1 Lightning impulse current (10/350 µs) (I _{imp})	0.5 kA
D1 Total lightning impulse current (10/350 µs) (I _{imp})	2.5 kA
C2 Nominal discharge current (8/20 µs) (I _n)	2.5 kA
C2 Total nominal discharge current (8/20 µs) (I _n)	12.5 kA
Frequency range	47-2200 MHz
Connection (input / output)	F socket / F socket



DGA G

Surge arrester with integrated gas discharge tube. Remote supply possible. SMA connection.

Type DGA ...	G SMA
Part No.	929 039
SPD class	TYPE 2
Max. continuous operating voltage (d.c.) (U _c)	135 V
Nominal current (I _L)	2 A
Max. transmission capacity	60 W
D1 Lightning impulse current (10/350 µs) (I _{imp})	1 kA
C2 Nominal discharge current (8/20 µs) (I _n)	5 kA
Frequency range	0-5.8 GHz
Connection	SMA socket / SMA plug



DGA AG

Lightning current arrester with replaceable gas discharge tube. Remote supply possible. N connection.

Type DGA ...	AG N
Part No.	929 045
SPD class	TYPE 1
Max. continuous operating voltage (d.c.) (U _c)	180 V
Nominal current (I _L)	6 A
Max. transmission capacity	150 W
D1 Lightning impulse current (10/350 µs) (I _{imp})	5 kA
C2 Nominal discharge current (8/20 µs) (I _n)	20 kA
Frequency range	0-2.5 GHz
Connection	N socket / N plug





FS



Surge arrester with D-SUB connection (pin / socket version).

- Surge arrester with SUB-D connection for easy retrofitting
- 9-pole standard connection
- Standard Profibus-DP or V-24 interface



SUB-D connection for easy installation.



Direct connection to the device ensures optimal protection.

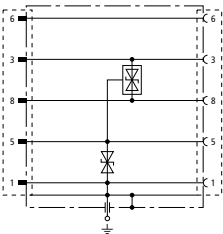
The surge arresters are available in a shielded enclosure with SUB-D connection (pin / socket version). The UNC threaded screws of the FS surge arresters for protecting terminal equipment can be exchanged as required. The thread is thus situated either on the pin or socket side, depending on the application.

Information Technology Systems – Yellow / Line



FS 9E PB

Surge arrester for Profibus-DP. 9-pin SUB-D version, pin 6 unprotected for the programming interface.



Type FS 9E ...	PB 6
Part No.	924 017
SPD class	TYPE 4 Pt1
Max. continuous operating voltage (d.c.) (U _c)	7 V
C1 Nominal discharge current (8/20 μs) line-line (I _n)	0.2 kA
C1 Nominal discharge current (8/20 μs) line-SG (I _n)	0.2 kA
C1 Nominal discharge current (8/20 μs) SG-PG (I _n)	0.4 kA
Cut-off frequency (f _c)	90 MHz
Connection (input / output)	SUB-D 9 plug / SUB-D 9 socket
Approvals	EAC

Shield Connection Systems

Protective Conductor Terminal

- High-quality accessories
- Suitable for DIN rail mounted arresters

Protective Conductor Terminal

For earthing DIN rails.



Type	SLK 16
Part No.	910 099
Cross-sectional area, flexible	6-16 mm ²
Cross-sectional area, solid	6-25 mm ²
For mounting on	DIN rails acc. to EN 60715
Enclosure material	polyamide 6.6



Condition Monitoring System with LifeCheck Sensor

- Permanent condition monitoring of LifeCheck-equipped arresters ensures a maximum degree of system protection and availability
- The early detection system already detects pre-damaged arresters and warns of imminent arrester failure
 - Visual indication of faulty or pre-damaged arresters
 - Compact dimensions and minimum wiring effort
 - Monitoring of up to ten arresters (40 signal cores)
 - Remote signalling contact
 - Remote monitoring also via RS485 interface and PC software (DRC MCM XT)



Installed DEHNrecord condition monitoring system

Condition monitoring

The DRC MCM XT and DRC SCM XT condition monitoring systems are compact DIN rail mounted devices designed for condition monitoring of up to 10 pre-programmed BXT/BXTU arresters with an integrated LifeCheck monitoring circuit.

Integrated into the protection modules, LifeCheck permanently monitors the condition of the arrester and acts like an early warning system, detecting imminent electrical or thermal overload of the protection components. The LifeCheck status can be read via non-contact RFID technology. Stationary installed, a single condition monitoring unit allows condition-based maintenance of 10 BXT/BXTU arresters.

The unit acts like an early warning system, generating a fault message already in case of imminent arrester overload. This fault message is indicated by an integrated three-coloured LED and transmitted via an integrated remote signalling contact. Failure of the monitoring unit, e.g. due to a voltage breakdown, is also indicated via the remote signalling contact.

The Show function integrated in the DRC MCM XT and DRC SCM XT system allows to detect pre-damaged arresters in the monitoring group.

The DRC SCM XT device is ideally suited for small-sized installations and allows to monitor up to 10 protection modules with integrated LifeCheck. In case of larger installations with more than 10 arresters, the DRC MCM XT device with integrated RS485 interface is used. The condition monitoring units are connected via the integrated RS485 interfaces to synchronise the monitoring cycles. Up to 15 DRC MCM systems can be connected to one another at the RS485 bus, allowing up to 150 BLITZDUCTOR modules or 300 pairs to be monitored simultaneously with minimum wiring effort.

The “Status Display and Service Console” PC software

is optionally available for the DRC MCM XT condition monitoring system. It indicates the status of the arresters and addresses the LifeCheck-equipped BLITZDUCTOR modules.

The software can be installed on a standard PC using an RS485/USB interface converter of type “USB-NANO 485” which is available as accessory.

The software can be downloaded free of charge at www.dehn-international.com (Service section) or is available as CD for a nominal fee.



Integrated visual operating state indication with three-colour LED.



Floating remote signalling contact
DRC MCM XT: break contact (21/22), make contact (13/14)
DRC SCM XT: break contact (21/22)



RS485 interface A/B (only for DRC MCM XT) for communication and control room solutions.



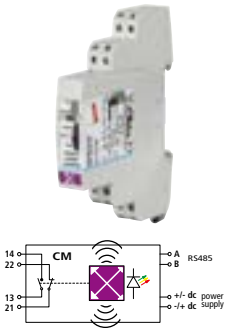
Online monitoring via free software (only for DRC MCM XT).



DRC MCM XT

DIN rail mounted device with integrated LifeCheck sensor for condition monitoring of max. ten LifeCheck-equipped BLITZDUCTOR XT/XTU arresters. Visual operating state indication via three-coloured LED in conjunction with remote signalling contact (break or make contact). The free "Status Display and Service Console" software can be optionally used via an RS485 interface converter. The software allows to remotely indicate the condition of all monitored arresters by means of a PC.

Download: www.dehn-international.com (Service section)



Type DRC ...	MCM XT
Part No.	910 695
Input voltage range (d.c.) (U_{IN})	18-48 V
Max. rated current consumption (I_{IN})	100 mA
RFID transmission frequency	125 kHz
Type of remote signalling contact	make (no) and break contact (nc)
Delivery includes	base part, monitoring module, quick guide and labelling system

DRC SCM XT

DIN rail mounted device with integrated LifeCheck sensor for condition monitoring of up to ten LifeCheck-equipped BLITZDUCTOR XT/XTU arresters. Visual operating state indication via three-colour LED combined with remote signalling function (break contact).



Type DRC ...	SCM XT
Part No.	910 696
Input voltage range (d.c.) (U_{IN})	18-48 V
Max. rated current consumption (I_{IN})	100 mA
RFID transmission frequency	125 kHz
Type of remote signalling contact	break contact (nc)
Delivery includes	base part, monitoring module, quick guide and labelling system

Information Technology Systems – Yellow / Line

Accessories for Condition Monitoring System with LifeCheck Sensor

USB Interface Converter of Type USB-NANO-485

USB-Nano-485 converts between USB and RS485 signals and is specifically designed for two-wire RS-485 buses. LEDs indicate the operating state (yellow), Rx (green) and Tx (red). Due to its compact dimensions, USB-Nano-485 is ideally suited for use with notebooks, however, stationary use is also possible.



Type	USB NANO 485
Part No.	910 486
Version	with LED indication



DEHNrecord Alert

- Modbus TCP/RTU communication module
- Integration of Red/Line and Yellow/Line SPDs into a monitoring system
- Monitoring of up to 4 surge arresters with remote signalling contacts and up to 150 BLITZDUCTOR XT arresters (RS 485)
- Integration of the remote signalling contacts of further user-defined functional modules in the monitoring system



Photo: fotolia.com

DEHNrecord Alert MODBUS

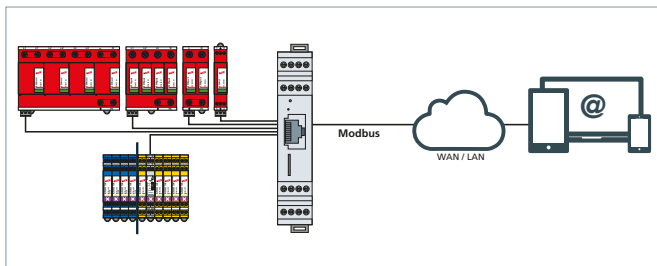
DEHNrecord Alert is a communication module which integrates Red/Line and Yellow/Line SPDs into a monitoring system. The systems can communicate via serial (Modbus RTU) as well as Ethernet based (Modbus TCP) interface. In case of the Red/Line SPDs the integrated floating remote signalling contacts are recorded. BLITZDUCTOR XT arrester modules are monitored via the DRC MCM AL XT, which transmits the collected information to the DRC AL via an RS 485 interface. In addition to the status of the SPDs also the part number of the complete device and the part numbers of the replacement modules of the Red/Line and Yellow/Line devices are relayed. Sending the relevant data to the customer's monitoring system maintenance of the system can be planned directly on workplace. This facilitates the efficient and cost-effective co-ordination of service and maintenance work, because on evaluation of the status reports the prod-

ucts to be replaced are shown. DEHNrecord Alert autonomously detects all integrated BLITZDUCTOR XT modules and their information. Integration of SPDs with remote signalling contact requires a start-up app. Intuitive to operate, this app relays device information of the connected SPDs per wireless communication to the DEHNrecord Alert. Optionally also the remote signalling contacts of any other function modules can be integrated. In this case only the status of the respective remote signalling contacts is relayed. The module is mounted on DIN rail in the switching cabinet. Versions with further bus protocols can be implemented upon request.

DEHNrecord DRC MCM AL XT

DRC MCM AL XT is a compact DIN rail mounted device for monitoring the status of up to 10 surge arresters of the BXT/BXTU series with integrated LifeCheck. In case of larger installations with more than 10 arresters, up to 15 DRC MCM AL XT can be interconnected by means of the integrated RS 485 interface. Thus, up to 150 protection modules can be monitored simultaneously and the device status can be transmitted to a recording system by a single DEHNrecord Alert.

DRC MCM AL XT is a special version of DRC MCM XT. In addition to the bus address of the BLITZDUCTOR XT the DRC MCM AL XT additionally can read and transmit its article number. Reading of the article number is only possible in connection with the DEHNrecord Alert. The protection modules are directly addressed with the monitoring module or the PC via the "Status Display and Service Console" software. Already installed DRC MCM XT can be adapted for the use of DEHNrecord Alert anytime by a software update.



Configuration of the whole DEHNrecord Alert system with Red/Line and Yellow/Line surge arresters.

DRC AL MODBUS

Compact DIN rail mounted device for the transmission of SPD status information, e.g. functional status, part number of SPD and part numbers of the replacement modules via Modbus RTU/TCP.

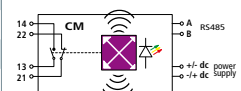
Type DRC ...	AL MODBUS
Part No.	910 694
Input voltage range (d.c.) (U _{IN})	11-28 V
Power max.	600 mW
Inputs	4 universally usable FM contacts and up to 150 BLITZDUCTOR XT via DRC MCM AL XT (910 698)
Communication	Modbus RTU/TCP



DRC MCM AL XT

DIN rail mounted device with integrated LifeCheck sensor for condition monitoring of max. ten LifeCheck-equipped BLITZDUCTOR XT/XTU arresters. Transmission of the status of the bus address and BXT part numbers to the DEHNrecord Alert communication unit.

Type DRC ...	MCM AL XT
Part No.	910 698
Input voltage range (d.c.) (U _{IN})	18-48 V
Max. rated current consumption (I _N)	100 mA
RFID transmission frequency	125 kHz
Physical interface	RS 485
Delivery includes	base part, monitoring module, quick guide and labelling system





LifeCheck SPD Test Devices



- **SPD test device for preventive maintenance**
 - The LifeCheck monitoring device detects thermal or electrical overload conditions of all components
 - To avoid imminent failure and thus system downtime, the protection module should be replaced as soon as possible
- **Benefits of this type of SPD testing:**
 - Extremely easy and within a matter of seconds
 - Detection of thermal or electrical pre-damage of all components

Maintenance tests and test intervals for lightning protection systems are specified in DIN EN 62305-3, supplement 3 (see table excerpt). However, these periods are only standard-based minimum requirements.

Class of SPD	Visual inspection	Complete inspection	Complete inspection of critical systems
I and II	1 year	2 years	1 year
III and IV	2 years	4 years	1 year

Visual inspections of arresters for information technology systems do not make sense since the status of the devices is not generally visible. For this purpose, another method has to be chosen as is the case with complete inspections. In the past, measurement equipment was used to test arresters. These measurements were very time consuming, required expertise and did not provide sufficient information.

Preventive maintenance:

With this maintenance strategy, arresters are tested and measured at regular intervals. They are assessed according to predetermined criteria and, if required, replaced.

In the past, this procedure was very time consuming, expensive and required disconnection of the system.

LifeCheck-equipped arresters have been available for some years now, allowing to determine the status of the arrester via RFID technology. A monitoring circuit with a transponder integrated the arrester permanently monitors the protective circuit for impermissible overload caused by overheating or impulse currents.

Information is read via a hand-held tester which houses the RFID reader. It contactlessly transmits electromagnetic energy to the transponder in the SPD, reads out its status and displays it. Information is simple: "SPD OK" or "Replace SPD!". A test can be conducted in a matter of seconds. When testing, the arrester must simply be pulled out of the base part by its mechanical length (approx. 50 mm). By using the BXT BAS, signal availability is also guaranteed while testing.

This type of monitoring reliably detects thermal and electrical overload of all components, typically before the arrester fails and the availability of the system to be protected is limited. In addition, no expertise is required for testing. The reader also facilitates documentation of the test results which is mandatory in compliance with the EN 62305-3 standard.

The test data (date, time, results) of all arresters are saved and can be transmitted to a PC via a USB interface for printing or storage. Consequently, a higher degree of protection and availability is achieved by means of LifeCheck-based preventive maintenance since overload of components is already detected before the protection of the system circuit fails.



Hand-held snap-on sensor



Interval testing with DRC LC M3+.

Test 01		
Status	Uhrzeit letzte Prüfung	Datum letzte Prüfung
Ja	11:41:34	25.08.15
Ja	11:41:54	25.08.15
Ja	11:42:12	25.08.15
Ja	11:42:30	25.08.15
Ja	11:42:54	25.08.15
Ja	11:43:10	25.08.15
Ja	11:43:29	25.08.15
Ja	11:43:50	25.08.15
Ja	11:44:06	25.08.15

Database function of DRC LC M3+.

DRC LC M3+

Portable device with LifeCheck sensor for flexible use. Fast and easy testing of LifeCheck-equipped arresters. Visual and acoustic indication. With additional USB connection and database software for PC-aided management of test samples and documentation of the test results. The DRC LC M3+ features a snap-on LifeCheck sensor. The hand-held device allows parameterisation for condition monitoring.



Type DRC LC ...	M3+
Part No.	910 653
Voltage supply (included in delivery)	lithium-ion battery
RFID transmission frequency	125 kHz
Measured value indication	beep and LCD
Delivery includes	hand-held device, BXT LifeCheck sensor, battery charger, USB cable, test module for reference, software CD, storage case
Dimensions of the storage case	340 x 275 x 83 mm



Lightning Protection / Earthing



Benjamin Franklin, inventor of the lightning rod, recognised lightning as an electrical phenomenon back in 1752. It is common knowledge today that lightning protection is more than a “cage” of air-termination system, down conductors and earth-termination system. A comprehensive protection system which is explained and specified in standards, is necessary. The current standard series IEC/EN 62305 is an internationally coordinated standard and provides a comprehensive overall concept for lightning protection. It is legally and technically binding and specifies a comprehensive overall concept for lightning protection.

DEHN offers components and devices for complete lightning protection systems. Components for the installation of the external lightning protection system have to meet the mechanical and electrical requirements as specified in the standard series EN 62561-x. Our products are of course manufactured and tested in accordance with these relevant standards.

It has been, and will always be our aim to be one step ahead of the current state of engineering and to continuously improve in the interest and benefit of our customers.

In our highly specialised laboratories lightning parameters are simulated in order to test installations/systems for lightning safety and to upgrade them if necessary.

Special solutions for lightning and surge protective systems can be tested and analysed in accordance with the current international and national standards. In addition, we have been working actively on international and national standardisation committees for decades. You can be assured that our devices and extensive knowledge are based on the current state of standardisation. Implementation of a functional lightning protection system requires the application of components and devices that are tested and conform to the latest standards. The installers of lightning protection systems have to choose the components in accordance with the installation requirements of individual sites and to install them correctly. Apart from the mechanical requirements, the electrical criteria also have to be considered and complied with in lightning protection engineering. DEHN provides tests and analyses of lightning and surge protection systems for your safety.



Test Reports, Test Certificates and Data Sheets

DEHN provides you with detailed installation instructions, data sheets and test reports in order to support you in the design of installations and systems. The necessary technical details are practice-orientated and documentation is continuously updated and always available at www.dehn-international.com. After the system installation we also assist you in the technical documentation, e.g. concerning a system inspection and the corresponding test certificates (e.g. a lightning protection system tested in accordance with IEC/EN 62305-3 or a documentation of the earth-termination system). These are also available under www.dehn-international.com.

Numerous brochures with practical information on our products as well as many application proposals complete the range of services available and can also be downloaded at www.dehn-international.com/en/downloads.

Planning Software for Lightning Protection Systems

The DEHNsupport Toolbox software program provides easy to use and practical programs for planners and installers, ranging from a complete risk assessment to the calculation of the air-termination rod length, the determination of the separation distance and the calculation of the length of the earth electrodes. Designing of a lightning protection system is thus considerably easier. See also page 15 for more details.

LIGHTNING PROTECTION GUIDE Textbook

The DEHN LIGHTNING PROTECTION GUIDE has been an indispensable aid for technical experts and is the benchmark for practice-orientated technical literature in the field of lightning and surge protection of buildings and structures. Whatever you need for the practical understanding of lightning and surge protection – the LIGHTNING PROTECTION GUIDE provides comprehensive and detailed expert knowledge about e.g. standards, regulations, project planning basics, installation examples and application proposals for special cases on more than 400 pages. The DEHN LIGHTNING PROTECTION GUIDE is available as printed book, as pdf file, on CD or at www.dehn-international.com/en/lightning-protection-guide.



DEHNacademy

DEHN offers a wide spectrum for practice-orientated education and training in the fields of surge protection, lightning protection / earthing and safety equipment. In seminars we give instructions and training for the practical application of components and devices in special structures and systems. You can also use our e-Learning service at www.dehn-international.com/en/dehnacademy-e-learning.

DVD

A picture is worth a thousand words. With DVD (DS708) we provide 3D-animated films to show the use of our products, and we invite you to meet DEHN on a tour through the company with the DEHNTour (DS707) DVD.

Tender Specifications

A current description of our products for tenders (delivery list texts) is available in the service download area at www.dehn-international.com.

DEHN – quick and direct

Proximity to our customers is important to us! We are at your disposal for any questions on special application topics concerning DEHN products under the service hotline +49 9181 906 1750. You can also contact our competent partners in your region. We shall be pleased to provide you with the name of the contact person of our subsidiaries or representatives. More details and information at www.dehn-international.com.

The lightning protection / earthing catalogue comprises components for lightning protection, earthing and equipotential bonding. More technical information is available at www.dehn-international.com. We also shall be pleased to send you brochures.

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Extreme weather conditions are on the rise all over the world as a result of global warming. Consequences such as high wind speeds, an increased number of storms and heavy rainfall cannot be ignored. Therefore, designers and installers will face new challenges particularly with regard to wind loads. This does not only affect building structures (statics of the structure), but also air-termination systems.

In the field of lightning protection, the DIN 1055-4:2005-03 and DIN 4131 standards have been used as dimensioning basis so far. In July 2012, these standards were replaced by the Eurocodes which provide Europe-wide standardised structural design rules (planning of structures).

The DIN 1055-4:2005-03 standard was integrated in Eurocode 1 (EN 1991-1-4: Actions on structures – Part 1-4: General actions - Wind actions) and DIN V 4131:2008-09 in Eurocode 3 (EN 1993-3-1: Part 3-1: Towers, masts and chimneys – Towers and masts). Thus, these two standards form the basis for dimensioning air-termination systems for lightning protection systems, however, Eurocode 1 is primarily relevant.

The following parameters are used to calculate the actual wind load to be expected:

- Wind zone (Germany is divided into four wind zones with different base wind speeds)
- Terrain category (the terrain categories define the surrounding of a structure)
- Height of the object above ground level
- Height of the location (above sea level, typically up to 800 m above sea level)

Other influencing factors such as:

- Icing
- Position on a ridge or top of a hill
- Object height above 300 m
- Terrain height above 800 m (sea level)

have to be considered for the specific installation environment and have to be calculated separately.

The combination of the different parameters results in the gust wind speed which is to be used as a basis for dimensioning air-termination systems and other installations such as elevated ring conductors. In our catalogue, the maximum gust wind speed is specified for our products to be able to determine the required number of concrete bases depending on the gust wind speed, for example in case of isolated air-termination systems. This does not only allow to determine the static stability, but also to reduce the necessary weight and thus the roof load.

Important note:

The “maximum gust wind speeds” specified in this catalogue for the individual components were determined according to the Germany-specific calculation requirements of Eurocode 1 (DIN EN 1991-1-4/NA:2010-12) which are based on the wind zone map for Germany and the associated country-specific topographic particularities.

When using products of this catalogue in other countries, the country-specific particularities and other locally applicable calculation methods, if any, described in Eurocode 1 (EN 1991-1-4) or in other locally applicable calculation regulations (outside Europe) must be observed. Consequently, the maximum gust wind speeds mentioned in this catalogue only apply to Germany and are only a rough orientation for other countries. The gust wind speeds have to be newly calculated according to the country-specific calculation methods!

Components used for installing the external lightning protection system shall meet the mechanical and electrical requirements, as specified in the EN 62561-x standard series. Lightning protection components are categorised according to their function, for example connection components (EN 62561-1), conductors and earth electrodes (EN 62561-2).

Testing of conventional lightning protection components

Metal lightning protection components (clamps, conductors, air-termination rods, earth electrodes) exposed to weathering have to be subjected to artificial ageing/conditioning prior to testing to verify their suitability for the intended application. In accordance with EN 60068-2-52 and EN ISO 6988 metal components are subjected to artificial ageing and tested in two steps.

Natural weathering and exposure to corrosion of lightning protection components

Step 1: Salt mist treatment

This test applies to components or devices for installation in saline atmosphere. The specimens are tested with severity level 2 in a salt mist chamber (Figure 1) for three days. Test level 2 provides three spraying phases of 2 h each, using a 5% sodium chloride solution (NaCl) at a temperature between 15 °C and 35 °C followed by a humidity storage at a relative humidity of 93 ± 2 % and a temperature of 40 ± 2 °C for 20 to 22 hours in accordance with EN 60068-2-52.

Step 2: Humid sulphurous atmosphere treatment

This test is to evaluate the resistance of materials or objects to condensed humidity containing sulphur dioxide in accordance with EN ISO 6988.

The test is carried out in a test chamber (Figure 2) in seven test cycles of 24 h each cycle in a sulphur dioxide concentration of 667×10^{-6} ($\pm 24 \times 10^{-6}$) of the volume. Each cycle has a heating period of 8 h at a temperature of 40 ± 3 °C in a humid, saturated atmosphere followed by a rest period of 16 h. After that, the humid sulphurous atmosphere is replaced. Both components for outdoor use and components buried in the ground are subjected to ageing / conditioning. For components buried in the ground additional requirements and measures have to be considered. No aluminium clamps or conductors may be buried in the ground. If stainless steel is to be buried in the ground, only high-alloy stainless steel may be used, e.g. StSt (V4A). In accordance with the German DIN VDE 0151 standard, StSt (V2A) is not allowed. Components for indoor use such as equipotential bonding bars do not have to be subjected to ageing / conditioning. The same applies to components which are embedded in concrete. These components are therefore often made of non-galvanised (black) steel.

Air-termination systems / air-termination rods

Air-termination rods are typically used as air-termination systems. They are available in many different designs, for example with a length of 1 m for installation with concrete base on flat roofs, up to the telescopic lightning protection masts with a length of 25 m for biogas plants.

EN 62561-2 specifies the minimum cross sections and the permissible materials with the corresponding electrical and mechanical properties for air-termination rods.

In case of air-termination rods with larger heights, the bending resistance of the air-termination rod and the stability of complete systems (air-termination rod in a tripod) have to be verified by means of a static calculation. The required cross sections and materials have to be selected based on this calculation. The wind speeds of the relevant wind load zone also have to be taken into account for this calculation.

Testing of connection components

Connection components, or often simply called clamps, are used as lightning protection components to connect conductors (down conductor, air-termination conductor, earth entry) to each other or to an installation. Depending on the type of clamp and clamp material, a lot of different clamp combinations are possible. The conductor routing and the possible



Figure 1:
Test in a salt mist chamber.



Figure 2:
Test in a Kesternich chamber.

material combinations are decisive in this respect. The kind of conductor routing describes how a clamp connects the conductors in cross or parallel arrangement.

In case of a lightning current load, clamps are subjected to electrodynamic and thermal forces which highly depend on the kind of conductor routing and the clamp connection. **Table 1** shows materials which may be combined without causing contact corrosion.

The combination of different materials with one another and their different mechanical strengths and thermal properties have different effects on the connection components when lightning current flows through them. This is particularly evident for stainless steel (StSt) connection components where high temperatures occur due to the low conductivity as soon as lightning currents flow through them. Therefore, a lightning current test in compliance with EN 62561-1 has to be carried out for all clamps. In order to test the worst case, not only the different conductor combinations, but also the material combinations specified by the manufacturer have to be tested.

Tests based on the example of an MV clamp

At first, the number of test combinations has to be determined. The MV clamp used is made of stainless steel (StSt) and hence can be combined with steel, aluminium, StSt and copper conductors as stated in Table 1. Moreover, it can be connected in cross and parallel arrangement which also has to be tested. This means that there are eight possible test combinations for the MV clamp used (Figures 3 and 4).

In accordance with EN 62561 each of these test combinations has to be tested on three suitable specimens / test set-ups. This means that 24 specimens of this single MV clamp have to be tested to cover the complete range. Every single specimen is mounted with the adequate tightening torque in compliance with normative requirements and is subjected to artificial ageing by means of salt mist and humid sulphurous atmosphere treatment as described above. For the subsequent

	Steel	Aluminium	Copper	StSt	Titanium	Tin
Steel (St/tZn)	yes	yes	no	yes	yes	yes
Aluminium	yes	yes	no	yes	yes	yes
Copper	no	no	yes	yes	no	yes
StSt	yes	yes	yes	yes	yes	yes
Titanium	yes	yes	no	yes	yes	yes
Tin	yes	yes	yes	yes	yes	yes

Table 1: Possible material combinations for air-termination systems and down conductors and for connection with structural parts.



Figure 3: New and aged components.



Figure 4: Test combinations for MV clamps (parallel and cross arrangement).



Figure 5: Specimen fixed on insulating plate (MV clamp) for a test in the impulse current laboratory.

electrical test the specimens have to be fixed on an insulating plate (Figure 5).

Three lightning current impulses of 10/350 μ s wave shape with 50 kA (normal duty) and 100 kA (heavy duty) are applied to every specimen. After being loaded with lightning current, the specimens must not show signs of damage.

In addition to the electrical tests where the specimen is subjected to electrodynamic forces in case of a lightning current load, a static-mechanical load was integrated in the EN 62561-1 standard. This static-mechanical test is particularly required for parallel connectors, longitudinal connectors, etc. and is carried out with different conductor materials and clamping ranges. Connection components made of stainless steel are tested under worst case conditions with a single stainless steel conductor only (extremely smooth surface). The connection components are prepared with a defined tightening torque and then loaded with a mechanical tensile force of 900 N (\pm 20 N) for one minute.

During this test period, the conductors must not move more than one millimetre and the connection components must not show signs of damage. This additional static-mechanical test is another test criterion for connection components and also has to be documented in the manufacturer's test report in addition to the electrical values.

The contact resistance (measured above the clamp) for a stainless steel clamp must not exceed 3 m Ω or 1 m Ω in case of other materials. The required loosening torque has to be ensured. A manufacturer's test report is prepared for every test combination. A detailed test report is available from the manufacturer upon request or a less detailed report can be downloaded from the internet (www.dehn-international.com => Products => Product data).



Consequently installers of lightning protection systems have to select the connection components for the duty (H or N) to be expected on site.

A clamp for duty H (100 kA), for example, has to be used for an air-termination rod (full lightning current) and a clamp for duty N (50 kA) has to be used in a mesh or at an earth entry (lightning current already distributed).

Conductors

EN 62561-2 also places special demands on conductors such as air-termination and down conductors or earth electrodes e.g. ring earth electrodes, for example:

- Mechanical properties (minimum tensile strength, minimum elongation),
- Electrical properties (max. resistivity) and
- Corrosion resistance properties (artificial ageing as described above).

The mechanical properties have to be tested and observed. The quality of coating (smooth, continuous) as well as the minimum thickness and adhesion to the base material are important and have to be tested particularly if coated materials such as galvanised steel (St/tZn) are used.

This is described in the standard in the form of a bending test. For this purpose, a specimen is bent through a radius equal to 5 times of its diameter to an angle of 90°. In doing so, the specimen may not show sharp edges, breakage or exfoliation. Moreover, the conductor materials shall be easy to process when installing lightning protection systems. Wires or strips (coils) are supposed to be easily straightened by means of a wire straightener (guide pulleys) or by means of torsion. Furthermore, it should be easy to install / bend the materials at structures or in the soil. These standard requirements are relevant product features which have to be documented in the corresponding product data sheets of the manufacturers.

Earth electrodes / earth rods

The separable DEHN earth rods are made of special steel and are completely hot-dip galvanised or consist of high-alloy stainless steel (StSt (V4A); material No. 1.4571). A coupling joint which allows connection of the rods without enlarging the diameter is a special feature of these earth rods. Every rod provides a bore and a pin end.

EN 62561-2 specifies the requirements for earth electrodes such as material, geometry, minimum dimensions as well as mechanical and electrical properties. The coupling joints linking the individual rods are weak points. For this reason EN 62561-2 requires that additional mechanical and electrical tests have to be performed to test the quality of these coupling joints.

For this test, the rod is put into a guide with a steel plate as impact area. The specimen consists of two joined rods with a length of 500 mm each. Three specimens of each type of earth electrode are to be tested. The top end of the specimen is impacted by means of a vibration hammer with an adequate hammer insert for a duration of two minutes. The blow rate of the hammer must be $2000 \pm 1000 \text{ min}^{-1}$ and the single stroke impact energy must be $50 \pm 10 \text{ [Nm]}$.

If the couplings have passed this test without visible defects, they are subjected to artificial ageing by means of salt mist and humid sulphurous atmosphere treatment. Then the couplings are loaded with three lightning current impulses of 10/350 μs wave shape of 50 kA and 100 kA each. The contact resistance (measured above the coupling) of stainless steel earth rods must not exceed 3 m Ω . To test whether the coupling joint is still firmly connected after being subjected to this lightning current load, the coupling force is tested by means of a tensile testing machine.

Testing of insulated conductors and spacers

In accordance with the new component standard IEC TS 62561-8 Edition 1.0 2018-01, in future also insulated conductors including system components as well as insulated spacers (GRP) must be tested mechanically as well as electrically. The tests are different according to the type of product.

Insulated conductors – HVI Conductors

A high-voltage-resistant insulated conductor (HVI Conductor) as well as the corresponding mounting material must, in compliance with IEC TS 62561-8 Edition 1.0 2018-01, be able to discharge lightning currents safely and insulated. Mechanical loadings and environmental influences are considered. Therefore, both, UV light tests and corrosion tests are required in the component standard.

Test scope for insulated conductors

- High voltage test for proving the electric strength of the insulated conductor (proof of flashover and dielectric strength) and as system test (see **Figure 6**)
- Test of lightning current carrying capability of the insulated conductor according to the specifications of IEC 62561-1 with a test impulse in accordance with the manufacturer's classification of IEC TS 62561-8 Edition 1.0 2018-01

Test scope for conductor holders

- Axial tensile force (mounted conductor, holder distance 250 mm, axial tensile load 50 N)
- Bending test (mounted conductor, holder distance 250 mm, vertical tensile load 200 N, time depends on type of holder)



Figure 6: High voltage test according to IEC TS 62561-8 Edition 1.0 2018-01 of a HVI system with four HVI Conductors.

Insulated spacers – DEHNiso spacers

When testing insulated spacers there is a difference, depending on how they are mounted, between self-supporting components (spacer in a concrete base) and horizontally mounted holders (air-termination rod with spacer). Before mechanical and electrical testing, the specimens must pass a UV light and a corrosion test.

Scope of mechanical test

- Bending test (length of specimen 500 mm, min. load 10 N, min. 60 min)
- Impact test centred (length of specimen 500 mm, force 2 J)
- Tensile force (length of specimen 500 mm, tensile force 200 N)

Scope of electrical test

For the electrical testing, high voltage is applied on the set-up. Insulated spacers must have a dielectric strength in accordance with standard requirements of IEC TS 62561-8 Edition 1.0 2018-01.

Test according to IEC TS 62561-8 Edition 1.0 2018-01 at DEHN

DEHN products for separated as well as insulated lightning protection are designed for the requirements according to IEC TS 62561-8 Edition 1.0 2018-01.

General note!

The application of components and devices which have been tested in compliance with the latest standards is a basic prerequisite for a functional lightning protection system. Installers of lightning protection systems must select components according to the requirements at the installation site and install them in accordance with the manufacturers' specifications. In state-of-the-art lightning protection technology, it is important to consider and comply with electrical criteria in addition to mechanical requirements.

Abbreviations

The following list shows and explains all abbreviations mentioned.

Conductor Types:

Abbreviation	Conductor Types
Fl	Flat conductor (strip)
Rd	Round conductor (round wire)

Materials:















Abbreviation	Description
Al	Aluminium
AlMgSi	Aluminium magnesium silicon wrought alloy
Cu	Copper, electrical copper
Cu/bronze	Copper / Bronze
Cu/gal Sn	Copper, tin-coated
EVA	Ethylene vinyl acetate copolymer
GRP	Glass-fibre reinforced plastic
GCI	Grey cast iron
K	Plastic material / Polyethylene / Polyamide / Polystyrene
Ms	Brass
Ms/gal Cu	Brass, copper coated
Ms/gal Sn	Brass, tin-coated
StSt	Stainless steel Material No.: 1.4301 (material No.: ASTM/AISI 304) Material No.: 1.4303 (material No.: ASTM/AISI 305) Material No.: 1.4307 (material No.: ASTM/AISI 304L)
StSt (V4A)	Stainless steel Material No.: 1.4401 (material No.: ASTM/AISI 316) Material No.: 1.4404 (material No.: ASTM/AISI 316L) Material No.: 1.4571 (material No.: ASTM/AISI 316Ti)
StSt / gal Cu	Stainless steel, copper coated
PA	Polyamide
PC	Polycarbonate
PE	Polyethylene
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl chloride
ABS	Acrylonitrile butadiene styrene
Sn	Tin
St/blank	Steel (black)
St/gal Zn	Steel, galvanised
St/tZn	Steel, hot dip galvanised
St / Cu	Steel, copper coated
MCI	Malleable cast iron
MCI/tZn	Malleable cast iron, hot dip galvanised
UP	Polyester (unsaturated)
XLPE	Cross-linked polyethylene
ZDC	Zinc die casting

Possible material combinations for air-termination systems, down conductors and other construction components.

Provided that no especially aggressive environmental influences have to be considered, the material combinations listed below have proved themselves. This is based on practical experience.

	Steel	Aluminium	Copper	StSt	Titanium	Tin
Steel (St/tZn)	yes	yes	no	yes	yes	yes
Aluminium	yes	yes	no	yes	yes	yes
Copper	no	no	yes	yes	no	yes
StSt	yes	yes	yes	yes	yes	yes
Titanium	yes	yes	no	yes	yes	yes
Tin	yes	yes	yes	yes	yes	yes





Symbols:

Screws		Screw heads	
	Half-round wood screw		Slot
	Countersunk head wood screw		Hexagon
	Wood screw with threaded head		Hexagon with slot
	Cheese head screw		Cross recessed
	Truss head screw		Star drive
	Knurled screw		Combined slot
	Countersunk screw		
	Raised head screw		

Recommended values:

Screw	Tightening torque
M5 / M6	≥ 4 Nm
M8	≥ 10 Nm
M10	≥ 20 Nm
M12	≥ 25 Nm
M16	≥ 25 Nm

Miscellaneous:

Symbols	
	Test according to EN 62561-1 Information online
	Installation instructions See dehn websites
	Discontinued products
	Product dimensioned according to Eurocode

Round Wires

According to EN 62561-2, for use in lightning protection and earth-termination systems.

DEHNalu wire

Part No.	840 008	840 108	840 018
Diameter Ø conductor	8 mm	8 mm	8 mm
Cross-section	50 mm ²	50 mm ²	50 mm ²
Material	AlMgSi	AlMgSi	AlMgSi
Characteristics	semi-rigid	semi-rigid	soft-torsionable
Standard	EN 62561-2	EN 62561-2	based on EN 62561-2
Coil weight	approx. 20 kg	approx. 3 kg	approx. 20 kg
PU	148 m	21 m	148 m

Part No.	840 028	840 010
Diameter Ø conductor	8 mm	10 mm
Cross-section	50 mm ²	78 mm ²
Material	AlMgSi	Al
Characteristics	soft-torsionable	soft-torsionable
Standard	based on EN 62561-2	EN 62561-2
Coil weight	approx. 3 kg	approx. 21 kg
PU	21 m	100 m

Note: Al and AlMgSi must not be installed directly (without distance) on, in, or under plaster, mortar or concrete, and not in soil.

DEHNalu wire with plastic sheath

Wire with plastic sheath (halogen-free, frost-resistant and UV stabilised) as additional mechanical protection / corrosion protection e.g. for installation behind facades.

Part No.	840 118	840 128
Diameter Ø conductor	8 mm	8 mm
Cross-section	50 mm ²	50 mm ²
Material	AlMgSi	Al
Characteristics	soft	soft
Standard	based on EN 62561-2	EN 62561-2
Diameter Ø outside	11 mm	11 mm
Material of sheath	plastic	plastic
Sheath thickness	1.5 mm	1.5 mm
Coil weight	approx. 20 kg	approx. 20 kg
PU	100 m	100 m

DEHNCupal wire

New composite material. Lighter than copper.

For use above ground as air-termination and down conductor, or for equipotential bonding.

Part No.	833 008
Diameter Ø conductor	8 mm
Cross-section	50 mm ²
Material	Al / Cu
Characteristics	soft-torsionable
Standard	based on EN 62561-2
Cu sheath	min. 0.26 mm
Coil weight	approx. 20 kg
PU	110 m

Note: DEHNCupal wire can be twisted or straightened with the wire straightening devices.

Copper wire

Part No.	830 008	830 108	830 038
Diameter Ø conductor	8 mm	8 mm	8 mm
Cross-section	50 mm ²	50 mm ²	50 mm ²
Material	Cu	Cu	Cu
Characteristics	soft F20	soft F20	semi-rigid F25
Standard	EN 62561-2	EN 62561-2	EN 62561-2
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	9.8 kA	9.8 kA	9.8 kA
Coil weight	approx. 45 kg	approx. 9 kg	approx. 45 kg
PU	100 m	20 m	100 m





Steel wire

With zinc coating $\geq 50 \mu\text{m}$ average (approx. 350 g/m²).

Part No.	800 008	800 010	800 310
Diameter \varnothing conductor	8 mm	10 mm	10 mm
Cross-section	50 mm ²	78 mm ²	78 mm ²
Material	St/tZn	St/tZn	St/tZn
Standard	based on EN 62561-2	based on EN 62561-2	based on EN 62561-2
Short-circuit current (50 Hz) (1 s; $\leq 300 \text{ }^\circ\text{C}$)	—	5.5 kA	5.5 kA
Coil weight	approx. 50 kg	approx. 50 kg	approx. 18.5 kg
PU	127 m	81 m	30 m

Steel wire straightened, cut to length, bars

With zinc coating $\geq 50 \mu\text{m}$ average (about 350 g/m²). Suitable for installation in reinforcements (e.g. concrete supports).

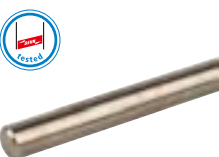


Part No.	800 910	800 911
Diameter \varnothing conductor	10 mm	10 mm
Cross-section	78 mm ²	78 mm ²
Material	St/tZn	St/tZn
Standard	based on EN 62561-2	based on EN 62561-2
Short-circuit current (50 Hz) (1 s; $\leq 300 \text{ }^\circ\text{C}$)	5.5 kA	5,5 kA
Length	3 m	6 m
PU	10 pc(s)	1 pc(s)

Stainless steel wire

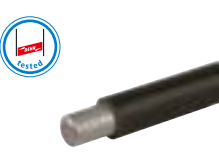
Stainless steel wire (Rd 10 mm) for use in soil has to be made of StSt (V4A) with a molybdenum proportion of $> 2 \%$, e.g. 1.4571 or 1.4404, in accordance with EN 62561-2 and IEC/EN 62305-3, DIN 18014 and DIN VDE 0151.

General technical data:				
Standard	based on EN 62561-2			
Part No.	860 908	860 920	860 950	860 910
Diameter \varnothing conductor	8 mm	10 mm	10 mm	10 mm
Cross-section	50 mm ²	78 mm ²	78 mm ²	78 mm ²
Material	StSt	StSt	StSt	StSt
Material No.	1.4301 / 1.4303	1.4301 / 1.4303	1.4301 / 1.4303	1.4301 / 1.4303
Short-circuit current (50 Hz) (1 s; $\leq 300 \text{ }^\circ\text{C}$)	—	—	—	—
Coil weight	approx. 50 kg	approx. 12 kg	approx. 31 kg	approx. 50 kg
PU	125 m	20 m	50 m	80 m
Part No.	860 008	860 010	860 020	860 050
Diameter \varnothing conductor	8 mm	10 mm	10 mm	10 mm
Cross-section	50 mm ²	78 mm ²	78 mm ²	78 mm ²
Material	StSt (V4A)	StSt (V4A)	StSt (V4A)	StSt (V4A)
Material No.	1.4571 / 1.4404	1.4571 / 1.4404	1.4571 / 1.4404	1.4571 / 1.4404
Short-circuit current (50 Hz) (1 s; $\leq 300 \text{ }^\circ\text{C}$)	—	2.9 kA	2.9 kA	2.9 kA
Coil weight	approx. 50 kg	approx. 50 kg	approx. 12 kg	approx. 31 kg
PU	125 m	80 m	20 m	50 m



Steel wire with plastic sheath

With plastic sheath as additional mechanical protection / corrosion protection e.g. at connections to the lightning protection system. Suitable for installation on, in and under plaster, mortar or concrete.



Part No.	800 108	800 110
Diameter \varnothing conductor	8 mm	10 mm
Cross-section	50 mm ²	78 mm ²
Material	St/tZn	St/tZn
Standard	based on EN 62561-2	based on EN 62561-2
Diameter \varnothing outside	11 mm	13 mm
Material of sheath	plastic	plastic
Sheath thickness	1.5 mm	1.5 mm
Coil weight	approx. 33 kg	approx. 34 kg
PU	75 m	50 m

Conductor materials will be delivered in original coil weights only.
More conductor materials and components as specified in the standard series EN 62561-2 upon request.

Tagging for Terminal Lugs

For attaching onto round wires or strips as striking marker (as required according to DIN 18014) during the construction phase.

Part No.	478 099
Material	PVC
Diameter Ø	70 mm
Attach on Fl	30 x 3.5 mm
Attach on Rd	10 mm
Colour	green ● / yellow ●
PU	20 pc(s)



Dripping Water Protective Collars

Prevent rain water draining down the round wire, thus less façade pollution.

Part No.	276 056	276 057
Material	plastic	plastic
Conductor Rd	8 mm	8 mm
Colour	grey ●	brown ●
Diameter Ø	37 mm	37 mm
PU	100 pc(s)	1 pc(s)



Strips

According to EN 62561-2, for use in earth-termination and lightning protection systems as well as for ring equipotential bonding.

Steel strip

Zinc coating $\geq 70 \mu\text{m}$ average (approx. 500 g/m²).

General technical data:			
Material	St/tZn		
Part No.	810 225	810 335	852 335
Width	20 mm	30 mm	30 mm
Thickness	2.5 mm	3.5 mm	3.5 mm
Cross-section	50 mm ²	105 mm ²	105 mm ²
Standard	based on EN 62561-2	EN 62561-2	EN 62561-2
Short-circuit current (50 Hz) (1 s; $\leq 300 \text{ }^\circ\text{C}$)	—	7.3 kA	7.3 kA
Coil weight	approx. 40 kg	approx. 42 kg	approx. 21 kg
PU	100 m	50 m	25 m
Part No.	810 304	810 404	810 405
Width	30 mm	40 mm	40 mm
Thickness	4 mm	4 mm	5 mm
Cross-section	120 mm ²	160 mm ²	200 mm ²
Standard	EN 62561-2	EN 62561-2	EN 62561-2
Short-circuit current (50 Hz) (1 s; $\leq 300 \text{ }^\circ\text{C}$)	8.4 kA	11.2 kA	14 kA
Coil weight	approx. 50 kg	approx. 50 kg	approx. 50 kg
PU	52 m	40 m	30 m



Copper strip

Part No.	831 225
Width	20 mm
Thickness	2.5 mm
Cross-section	50 mm ²
Material	Cu
Standard	EN 62561-2
Short-circuit current (50 Hz) (1 s; $\leq 300 \text{ }^\circ\text{C}$)	9.8 kA
Coil weight	approx. 45 kg
PU	100 m





Stainless steel strip, printed

Stainless steel strip with two-line ink print every one metre.
Stainless steel strip for use in soil has to be made of StSt (V4A) with a molybdenum content of > 2 % e.g. 1.4571, 1.4404 in accordance with EN 62561-2 and IEC/EN 62305-3, DIN 18014 and DIN VDE 0151.

Part No.	861 325	861 335
Width	30 mm	30 mm
Thickness	3.5 mm	3.5 mm
Cross-section	105 mm ²	105 mm ²
Material	StSt (V4A)	StSt (V4A)
Material No.	1.4404	1.4404
Type	with print	with print
Standard	based on EN 62561-2	based on EN 62561-2
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	3.9 kA	3.9 kA
Coil weight	approx. 21 kg	approx. 49 kg
PU	25 m	60 m

Stainless steel strip

General technical data:	
Standard	EN 62561-2

Part No.	860 925	860 900	860 325
Width	30 mm	30 mm	30 mm
Thickness	3.5 mm	3.5 mm	3.5 mm
Cross-section	105 mm ²	105 mm ²	105 mm ²
Material	StSt	StSt	StSt (V4A)
Material No.	1.4301 / 1.4303	1.4301 / 1.4303	1.4571 / 1.4404
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	—	—	3.9 kA
Coil weight	approx. 21 kg	approx. 49 kg	approx. 21 kg
PU	25 m	60 m	25 m



Part No.	860 335	860 404	860 405
Width	30 mm	40 mm	40 mm
Thickness	3.5 mm	4 mm	5 mm
Cross-section	105 mm ²	160 mm ²	200 mm ²
Material	StSt (V4A)	StSt (V4A)	StSt (V4A)
Material No.	1.4571 / 1.4404	1.4571 / 1.4404	1.4571 / 1.4404
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	3.9 kA	—	—
Coil weight	approx. 49 kg	approx. 50 kg	approx. 50 kg
PU	60 m	40 m	30 m

Other dimensions and materials upon request.

Cables

For use in lightning protection and earth-termination systems.

Aluminium cable

E.g. for spanning in case of isolated air-termination systems (DEHNiso Combi).

Part No.	840 050
Cross-section	50 mm ²
Cable structure qty x Ø wire	19 x 1.8 mm
Material	Al
Standard	EN 62561-2
Diameter Ø outside	9 mm
Coil weight	approx. 13.5 kg
PU	100 m

Note: Al must not be installed directly (without distance) on, in or under plaster, mortar or concrete, and not in soil.



Steel cable

E.g. for equipotential bonding.

Part No.	801 050
Cross-section	42 mm ²
Cable structure qty x Ø wire	[6x] 19 x 0.65 mm
Material	St/gal Zn
Diameter Ø outside	10 mm
Coil weight	approx. 33 kg
PU	100 m



Stainless steel cable

E.g. for equipotential bonding.

Part No.	850 008	850 010
Cross-section	27 mm ²	42 mm ²
Cable structure qty x Ø wire	[7x] 19 x ca. 0.59 mm	[7x] 19 x ca. 0.68 mm
Material	StSt (V4A)	StSt (V4A)
Material No.	1.4571 / 1.4404	1.4571 / 1.4404
Diameter Ø outside	8 mm	10 mm
Coil weight	approx. 23.5 kg	approx. 39.5 kg
PU	100 m	100 m



Copper cable

General technical data:			
Material	Cu		
Standard	EN 62561-2		
Part No.	832 739	832 740	832 192
Cross-section	50 mm ²	50 mm ²	70 mm ²
Cable structure qty x Ø wire	19 x 1.8 mm	19 x 1.8 mm	19 x 2.1 mm
Diameter Ø outside	9 mm	9 mm	10.5 mm
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	9.8 kA	9.8 kA	13.7 kA
Coil weight	approx. 22 kg	approx. 44 kg	approx. 30 kg
PU	50 m	100 m	50 m
Part No.	832 193	832 095	832 120
Cross-section	70 mm ²	95 mm ²	120 mm ²
Cable structure qty x Ø wire	19 x 2.1 mm	19 x 2.5 mm	19 x 2.8 mm
Diameter Ø outside	10.5 mm	12.5 mm	14.5 mm
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	13.7 kA	18.5 kA	23.4 kA
Coil weight	approx. 60 kg	approx. 42 kg	approx. 53 kg
PU	100 m	50 m	50 m



Copper cable tinned

General technical data:			
Material	Cu/gal Sn		
Part No.	832 838	832 839	832 202
Cross-section	35 mm ²	50 mm ²	70 mm ²
Cable structure qty x Ø wire	7 x 2.5 mm	19 x 1.8 mm	19 x 2.1 mm
Standard	—	EN 62561-2	EN 62561-2
Diameter Ø outside	7.5 mm	9 mm	10.5 mm
Short-circuit current (50 Hz) (1 s; ≤ 150 °C)	5 kA	7.2 kA	10.1 kA
Coil weight	approx. 33 kg	approx. 44 kg	approx. 30 kg
PU	100 m	100 m	50 m
Part No.	832 292	832 295	832 320
Cross-section	70 mm ²	95 mm ²	120 mm ²
Cable structure qty x Ø wire	19 x 2.1 mm	19 x 2.5 mm	19 x 2.8 mm
Standard	EN 62561-2	EN 62561-2	EN 62561-2
Diameter Ø outside	10.5 mm	12.5 mm	14.5 mm
Short-circuit current (50 Hz) (1 s; ≤ 150 °C)	10.1 kA	13.8 kA	17.3 kA
Coil weight	approx. 60 kg	approx. 42 kg	approx. 53 kg
PU	100 m	50 m	50 m



Other dimensions and materials upon request.

Flat Roof – Roof Conductor Holders, Bridging Braids

Roof Bushings

Down conductor bushing and sealing of roofs.

For tiled and corrugated plate roofing

Bore Ø16 mm.



Part No.	552 010
Bore	Ø16 mm
Material	plastic
Colour	black ●
Bushing Rd	8-10 mm
Diameter Ø	34 mm
PU	25 pc(s)

Roof Conductor Holders for Metal Roofs

For fixing additional air-termination systems on metal roofs.

Using two roof conductor holders (clamps / clamping frames) which are tested for the corresponding roof profile provides a lightning current carrying capability of 100 kA (10/350 µs).

For roofing with round standing seam, with clamping frame

Part No.	223 010
Material of roof conductor holder	StSt
Clamping range	Ø20-25 mm
Material of conductor holder	StSt
Conductor holder support Rd	6-10 mm
Conductor leading	fixed
Standard	EN 62561-1
PU	50 pc(s)



For roofing with clamping seam (e.g. RIB ROOF Speed 500 by Zambelli)

Part No.	223 070
Material of roof conductor holder	Al
Clamping range	approx. 18 / 22 mm
Material of conductor holder	Al
Conductor holder support Rd	6-10 mm
Conductor leading	fixed
Standard	EN 62561-1
PU	50 pc(s)



For roofs with trapezoidal sheeting, with clamping frame

For hooking into the fixing screws of the roof.

Part No.	223 020
Material of roof conductor holder	StSt
Material of conductor holder	StSt
Conductor holder support Rd	6-10 mm
Conductor leading	fixed
Standard	EN 62561-1
PU	50 pc(s)



For roofs with trapezoidal sheeting, with DEHNgrip

For hooking into the fixing screws of the roof.

Part No.	223 021
Material of roof conductor holder	StSt
Height of conductor holder	20 mm
Material of conductor holder	StSt
Conductor holder support Rd	8 mm
Conductor leading	loose
Standard	EN 62561-4
PU	50 pc(s)



Roof Conductor Holders with Adhesive Pad

For the installation of air-termination systems e.g. on trapezoidal sheet metal roofing.

The conductor holder may be used at plane (unstructured) surfaces such as metal roofs / metal surfaces. The conductor holders are adhesively fixed on the roof (remove the protective film from the pad).



With conductor holder DEHNgrip

Part No.	297 120
Material of roof conductor holder	plastic
Colour of roof conductor holder	grey ●
Material of conductor holder	StSt
Conductor holder support Rd	8 mm
Height of conductor holder	32 mm
Conductor leading	loose
Dimension	Ø67 mm
Standard	EN 62561-4
PU	50 pc(s)



Clamping Frame Variants

For example as connection with end piece for constructions or downpipe clamps.
Clamping frame with square hole 11 mm and truss head screw.



Part No.	390 159
Material of clamp	StSt
Clamping range Rd	6-10 mm
Screw	⬆ M10 x 35 mm
Material of screw / nut	StSt
Standard	EN 62561-1
PU	100 pc(s)

KS Connectors

Clamping screw connector (KlemmSchrauben-Verbinder) for lightning current carrying capable connection of round conductors e.g. to flat profiles, downpipe clamps or other parts of the lightning protection system.

One-piece, St/tZn

With screw and nut M10.



Part No.	301 000	301 010
Material of clamping screw	St/tZn	St/tZn
Material of clamp	ZDC	ZDC
Clamping range Rd	7-10 mm	7-10 mm
Type	—	+ spring washer
Standard	EN 62561-1	EN 62561-1
PU	100 pc(s)	100 pc(s)

One-piece, StSt

With screw and nut M10.



Part No.	301 019
Material of clamping screw	StSt
Material of clamp	StSt
Clamping range Rd	6-10 mm
Connection (single-wire / multi-wire)	25-70 mm ²
Type	+ spring washer
Standard	EN 62561-1
PU	100 pc(s)

Parallel Connectors

For connecting two conductors in parallel arrangement.

For equal diameters with one screw

Part No.	306 029
Material of clamp	StSt (V4A)
Material No.	1.4571 / 1.4404 / 1.4401
ASTM / AISI:	316Ti / 316L / 316
Clamping range Rd / Rd	7-10 mm
Standard	EN 62561-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	2.9 kA
PU	50 pc(s)



For different diameters with one screw

Part No.	306 121	306 122
Material of clamp	St/bare	St/tZn
Clamping range Rd / Rd	6-22 / 6-22 mm	6-22 / 6-22 mm
Standard	EN 62561-1	EN 62561-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	6.1 kA	6.1 kA
PU	50 pc(s)	50 pc(s)



For different diameters 4-10 mm with two screws

Part No.	305 000
Material of clamp	St/tZn
Clamping range Rd / Rd	4-10 mm
Standard	EN 62561-1
PU	50 pc(s)



For equal and different cable diameters, large

With thread in the base part and lock nut M10.
Specified short-circuit current applies to 70 mm² Cu cable.

Part No.	306 101
Material of clamp	Cu
Clamping range Rd / Rd	5-16 mm
Clamping range (stranded or cable)	16-150 mm ²
Standard	EN 62561-1
Short-circuit current (50 Hz) (1 s; ≤ 300 °C)	13.6 kA
PU	25 pc(s)



Connection Clamps

For connection to steel constructions and steel sheets.

Longitudinal or cross connection

Part No.	371 009
Clamping range	0.4-12 mm
Material of clamp	MCI/tZn
Clamping range Rd	7-10 mm
Standard	EN 62561-1
PU	20 pc(s)



Connection Clamps for Steel Girders

Heavy design, for connection to steel constructions.

Vertical design, with clamping frame

Lengthwise or crosswise connection with clamping frame.

Part No.	372 119	372 149
Clamping range	3-18 mm	18-35 mm
Material of clamp	StSt	StSt
Clamping range Rd	6-10 mm	6-10 mm
Standard	EN 62561-1	EN 62561-1
PU	25 pc(s)	25 pc(s)



Connection Lugs

For connecting metal claddings by blind rivets or screws.

With square hole

Dimension 11 x 11 mm (e.g. for KS connector M10), lengthwise or crosswise connection.



Part No.	377 009
Material of bracket	StSt
Fixing	[4x] Ø5.2 / [2x] Ø6.5 mm
Standard	EN 62561-1
PU	50 pc(s)

Connecting Components 200 kA (10/350 µs)



For use in protection class I and II of the lightning protection system (class of LPS I, II).
Clamps are tested with a 200 kA (10/350 µs) lightning impulse current, based on EN 62561-1.

UNI disconnecting clamp for two round conductors



Part No.	459 200
Material	StSt
Clamping range Rd / Rd	10 / 10 mm
Clamping range Rd / FI	10 / 30 mm
Lightning current carrying capability (10/350 µs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

UNI disconnecting clamp for earth entry rods



Part No.	459 219
Material	StSt
Clamping range Rd / Rd	8-10 / 16 mm
Lightning current carrying capability (10/350 µs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

Clamping piece



Part No.	380 209
Material	StSt
Clamping range FI	30 x 4 mm
Lightning current carrying capability (10/350 µs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

KS connector



Part No.	301 209
Material	StSt
Clamping range Rd	10 mm
Lightning current carrying capability (10/350 µs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

MV clamp for round conductors



Part No.	390 209
Material	StSt
Clamping range Rd / Rd	8-10 mm
Lightning current carrying capability (10/350 µs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

MV clamp for air-termination rods



Part No.	392 209
Material	StSt
Clamping range Rd / Rd	8-10 / 16 mm
Lightning current carrying capability (10/350 µs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

Air-termination Rods D40

For fixing e.g. on walls or other constructions.

The maximum free length relates to the distance between the rod tip and the upper support (fixing point).

For reasons of stability three supports shall be mounted. The distance between upper support and middle support must not exceed 15 cm. The lower rod holder has to be fixed in a height of ≤ 15 cm.

StSt

Part No.	105 190	105 192
Total length	4000 mm	6000 mm
Max. free length with air-termination rod	3500 mm	4500 mm
Clamping length	500 mm	1500 mm
Quantity of fixings	2	3
Max. gust wind speed	195 km/h	193 km/h
Material of air-termination rod	StSt	StSt
Standard	EN 62561-(1+2)	EN 62561-(1+2)
PU	1 pc(s)	1 pc(s)



Supports for Air-termination Rods D40 and DEHNcon-H



Wall mounting bracket for horizontal mounting

Part No.	105 140
Material	StSt
Fixing	[8x] Ø5.1 / [4x] 11 x 20 mm
Wall distance	80 mm
Clamping range of air-termination rod	40 mm
PU	1 pc(s)



Wall mounting bracket for vertical mounting

Part No.	105 342	105 348 ^{NEW}
Material	StSt	StSt
Fixing	[8x] Ø5.1 / [4x] 7 x 10 / [2x] 11 x 20 mm	[8x] Ø5.1 / [4x] 7 x 10 / [2x] 11 x 20 mm
Wall distance	46 mm	110 mm
Clamping range of air-termination rod	40-50 mm	40-50 mm
PU	1 pc(s)	1 pc(s)



Wall mounting bracket adjustable 150-200 mm

For fixing the supporting tubes or air-termination rods D40 / D50 with double cleat, for connecting 2x Rd 8-10 mm.

Part No.	105 344
Material	StSt
Fixing	[4x] 12 x 26 mm
Wall distance	150-200 mm
Clamping range Rd	8-10 mm
Clamping range of air-termination rod	40-50 mm
Standard	EN 62561-1
PU	1 pc(s)



Wall mounting bracket adjustable 400-700 mm

Part No.	105 347 ^{NEW}	105 343	105 349 ^{NEW}
Material	St/tZn / StSt	St/tZn / StSt	St/tZn / StSt
Fixing	[4x] 12 x 26 mm	[4x] 12 x 26 mm	[4x] 12 x 26 mm
Wall distance	230-400 mm	400-700 mm	700-1300 mm
Clamping range of air-termination rod	40-50 mm	40-50 mm	40-50 mm
PU	1 pc(s)	1 pc(s)	pc(s)



Accessory for Supports for Air-termination Rods D40 and DEHNcon-H

Railing Clamp

With spacer for adjusting e.g. the antenna fastener.

Part No.	105 162
Material	StSt
Clamping range of pipe Ø	45-65 mm (1 1/2-2")
Clamping range of supporting tube	40-50 mm
Length of spacer	95 mm
Standard	EN 62561-1
PU	1 pc(s)





Mounting Bracket for Installation on Metal Roofs

Mounting bracket, StSt, for installation on metal roofs for installing HVI air-termination systems or air-termination rods: Mounting bracket for vertical mounting of air-termination systems on metal roofs with an inclination of max. 53°. The bracket can be mounted on suitable, stable substructures. It is designed for up to 320 Nm torque. For fastening of air-termination rods D40 as well as attachment of DEHNcon-H systems with conductor installed on the inside.

Note: Mounting conditions on site must be clarified with the building constructor.
More information on max. gust wind speeds at www.dehn-international.com



Part No.	105 241
Material	StSt
Adjustment range	550-900 mm
Roof pitch	5-53°
Fastening by	holder HA M8 ... V2A
Standard	DIN EN 62561-1
PU	1 pc(s)

Accessory for Mounting Bracket for Installation on Metal Roofs

Holder for Metal Roof with Round Standing Seam

Screw with self-locking nut.



Part No.	123 040
Material (holder)	StSt
Clamping range	Ø20-25 mm
Screw	⬆ M8 x 25 mm
Material (screw / nut)	StSt
Standard	DIN EN 62561-1
PU	12 pc(s)

Holder for Metal Roof with Clamping Seam (e.g. RIB-ROOF Speed 500 Fa. Zambelli)

Screw with self-locking nut.



Part No.	123 041
Material (holder)	StSt
Clamping range	approx. 18 / 22 mm
Screw	⬆ M8 x 25 mm
Material (screw / nut)	StSt
Standard	DIN EN 62561-1
PU	12 pc(s)

Holder for Metal Roof with Standing Seam

Screw with self-locking nut.



Part No.	123 042
Material (holder)	StSt
Clamping range	0.7-8 mm
Screw	⬆ M8 x 25 mm
Material (screw / nut)	StSt
Standard	DIN EN 62561-1
PU	12 pc(s)

Holder for Metal Roof for Riveting or Screwing

Screw with self-locking nut.



Part No.	123 043
Material (holder)	StSt
Fixing	[4x] Ø5.2 / [2x] Ø6.5 mm
Screw	⬆ M8 x 25 mm
Material (screw / nut)	StSt
Standard	DIN EN 62561-1
PU	12 pc(s)

Isolated Lightning Protection

Accessory for DEHNiso Spacers

Separate Grip Head

For combination with endless tensioning strap (Part No. 540 901) in case of larger pipe diameters, e.g. for adapter with fixing bush.

Part No.	106 324
Material of head	StSt
For strap (w x d)	25 x 0.3 mm
Screw	☒ M8 x 20 mm
Material of screw	StSt
PU	20 pc(s)



Accessory for DEHNiso Combi Sets

Fixing Clamp with Tensioning Strap

With additional spacer for adjusting the fasteners of sector antennas at the mast.

Part No.	105 361
Material of clip	StSt
Clamping range of supporting tube	50 mm
Clamping range of pipe Ø	50-300 mm
Material of tensioning strap	StSt
Dimension of strap (w x d)	25 x 0.3 mm
Length of spacer	30 mm
PU	1 pc(s)



HVI-light Conductor

Conductor Holders

With thread.

Conductor holder for wall mounting with two-screw cleat (not for use in the sealing end range).

Part No.	275 250	275 251
Material of conductor holder	StSt	StSt
Conductor holder support Rd	20 / 23 mm	20 / 23 mm
Thread	M8	M6
Standard	DIN EN 62561-4	DIN EN 62561-4
PU	25 pc(s)	25 pc(s)



Conductor Holder

With slot hole.

For wall mounting with two-screw cleat (not for use in the sealing end range).

Part No.	275 252
Material of conductor holder	StSt
Conductor holder support Rd	20 / 23 mm
Fixing bore	5.5 x 10 mm
Standard	DIN EN 62561-4
PU	25 pc(s)



Spare Blades for HVI head 20

1 set = 4 blades

Part No.	597 101
Material	StSt
PU	1 Sa



Cable Shears for HVI Conductors

Cable shears for easily cutting of the HVI light Conductor, HVI Conductor (outer diameter 20/23 mm) and HVI power Conductor (outer diameter 27 mm) and of the CUI Conductor.

The special design of the cable shears also allows for a precise cutting of stranded conductors for attaching the connection elements easily.

HVI cutter

Part No.	597 032
Diameter Ø conductor	up to 32 mm
Material of blades	tool steel (CR-Moly (SCM440))
Material of handles	carbon steel (SS400)
Length	600 mm
PU	1 pc(s)



Fixing Clamp for DEHNcon-H

Clamp for fixing the supporting tube e.g. on the antenna pole. Design with spacer, length 30 mm for adjusting the antenna fastening.



Part No.	105 161
Material	StSt
Clamping range of pipe Ø	45-65 mm (1 1/2-2")
Clamping range of supporting tube	40-50 mm
Length of spacer	30 mm
PU	1 pc(s)

Connection Kit for HVI Conductor Ø20 mm for Installation Inside of Tube



Part No.	819 145
Material	StSt
Connection	bolt Ø10 mm, L 50 mm
Diameter Ø connection element	23 mm
Screw	threaded bolt M6 x 8 mm
PU	1 pc(s)

HVI long Conductor (on cable reel)

The HVI long Conductor for on-site assembly will be delivered in a length of 100 m on a disposable plywood reel (diameter approx. 800 mm, width approx. 485 mm) incl. one Allen key.



Part No.	819 135	819 136
Material of conductor	Cu	Cu
Material of insulation	PE	PE
Material of coating	PVC	PVC
Colour of conductor	black ●	grey ●
Diameter Ø conductor	20 mm	23 mm
PU	100 m	100 m

With air-termination rod

Supporting tube with interior sealing end and EB spring element. Air-termination rod StSt, Ø10 mm, length 1000 mm.



Part No.	105 314
Material of supporting tube	GRP / StSt
Length of supporting tube	3200 mm
Transport length	3200 mm
Diameter Ø outside	50 mm
Length of insulating clearance	1535 mm
Max. free length with air-termination rod (wall mounting)	3500 mm
Max. gust wind speed (wall mounting, 1x HVI inside)	234 km/h
Max. gust wind speed (wall mounting, 1x HVI outside)	229 km/h
Max. gust wind speed (wall mounting, 4x HVI outside)	200 km/h
PU	1 pc(s)

With air-termination rod

Supporting tube with interior sealing end and EB spring element. Air-termination rod Ø22/16/10 mm, length 2500 mm.



Part No.	105 331	105 317
Material of air-termination rod	Al	StSt
Material of supporting tube	GRP / Al	GRP / StSt
Length of supporting tube	3200 mm	4700 mm
Transport length	3200 mm	4700 mm
Diameter Ø outside	50 mm	50 mm
Length of insulating clearance	1535 mm	1535 mm
Max. free length with air-termination rod (wall mounting)	5000 mm	5000 mm
Max. gust wind speed (wall mounting, 1x HVI inside)	190 km/h	188 km/h
Max. gust wind speed (wall mounting, 1x HVI outside)	175 km/h	173 km/h
Max. gust wind speed (wall mounting, 4x HVI outside)	163 km/h	159 km/h
PU	1 pc(s)	1 pc(s)

EB Clamp

For connecting the special sheath of the HVI Conductor to the equipotential bonding.

Part No.	405 020
Material (cage clamp)	St/tZn
Clamping range Ø	20 mm
Terminal cross-section	4-95 mm ²
PU	1 pc(s)



Conductor Holder with Tensioning Strap

With metal conductor holder.

Part No.	275 320
Material of conductor holder	StSt
Conductor holder support Rd	20-23 mm
Tensioning range Ø pipe	50-300 mm
PU	1 pc(s)



Conductor Holder for Tensioning Strap Fixing

For fixing the HVI Conductor at pipes e.g. with pipe clamp (Part No. 106 323).

Part No.	275 319
Material of conductor holder	StSt
Conductor holder support Rd	20-23 mm
PU	10 pc(s)





Separate grip head

For combination with endless tensioning strap (Part No. 540 901).
 Connection for: 1 conductor Rd Ø10 mm or 1-2 conductors Rd Ø6-8 mm or 4-50 mm² (solid / stranded).

Part No.	540 110
Material	StSt
Screw	M8 x 20 mm
Material of screw	StSt
Standard	EN 62561-1
Military Name	VG 96953 T05 BA001
PU	50 pc(s)

Equipotential Bonding

Earthing Pipe Clamps Lightning Protection

Earthing pipe clamps for integrating pipes into the protective and functional equipotential bonding according to IEC 60364-4-41/60364-5-54 (DIN VDE 0100-410/540) and lightning equipotential bonding according to IEC/EN 62305-3.

The clamping range (specified in mm) refers to the outer diameter according to DIN EN ISO 228-1 of the pipes.

Type StSt with screws M8

StSt material thickness 2.5 mm.

Connection for FI with screws and nuts M10, for Rd 7-10 mm e.g. KS connector Part No. 301 000 or clamping frame, Part No. 390 150.



Part No.	410 349
Material	StSt
Clamping range pipe Ø	42 mm
Dimension (l x r)	132.5 x 21 mm
Standard	EN 62561-1
PU	1 pc(s)

Equipotential Bonding for Ex Areas

Pipe Clamp GSG for Hazardous Areas Zone 2/22

Pipe clamp for electrical contacting of pipes in explosion-hazardous areas zone 2/22. The pipe clamp is secured against self-loosening according to DIN/EN 62305-3 Supplement 2 (VDE 0185-305-3 Bbl 2).

Pipe clamps complete

Part No.	540 104
Material	StSt
Clamping range pipe Ø	27-89 mm (3/4-3")
Dimension of strap (l x w x d)	330 x 25 x 0.3 mm
Connection (solid / stranded)	4-50 mm ²
Standard	EN 62561-1
Tightening torque	≥ 15 Nm
PU	10 pc(s)



Endless tensioning strap

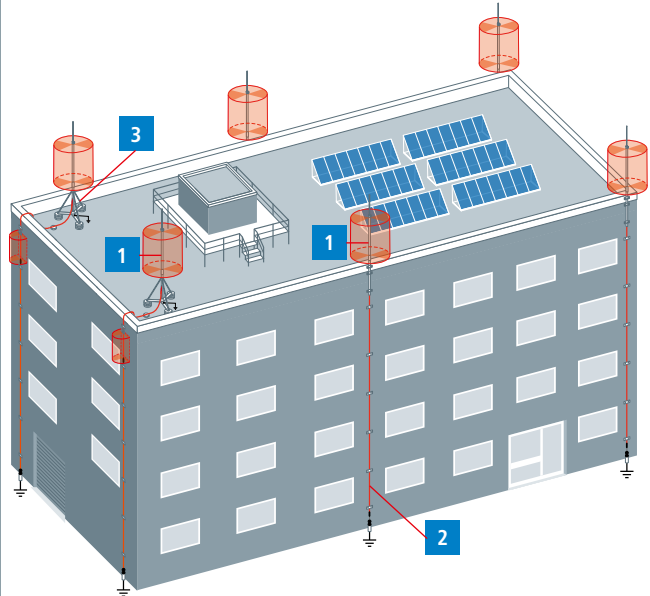
For cutting to length e.g. by means of tin snips.

Part No.	540 901
Material	StSt
Dimension of strap (w x d)	25 x 0.3 mm
Military Name	VG 96953 T05 BB001
PU	1 pc(s)

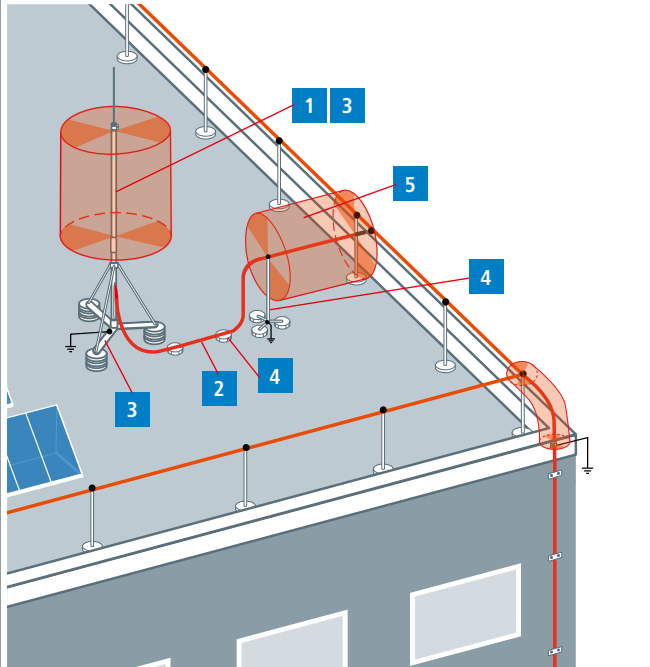


HVI power Conductor

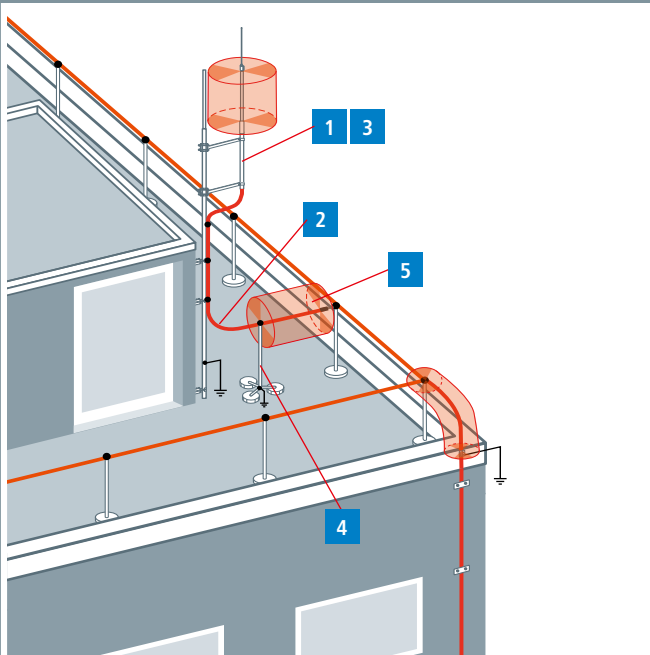
Partly Isolated Lightning Protection of an Industrial Building



Self-supporting HVI power System



HVI power Conductor Mounted on an Antenna Pole



Product	Product name
<p>1</p> 	Supporting Tubes with HVI power Conductor
<p>2</p> 	HVI power Conductor Connection Elements
<p>3</p> 	Supporting Tubes for HVI power Conductor Tripods Accessories for Tripods
<p>4</p> 	Fixing Elements for Tripods
<p>5</p> 	Sealing End Ranges



1 Supporting Tube with HVI power Conductor



Optically adapted installation of the HVI power Conductor inside of the supporting tube provides less wind exposed surface. Applicable up to an equivalent separation distance $s \leq 90$ cm (in air) or $s \leq 180$ cm (solid material). Conductor length to be indicated when ordering (in steps of 0.5 m).

HVI power Conductor inside of supporting tube with air-termination rod

Supporting tube with interior sealing end and EB spring element. Air-termination rod StSt, $\varnothing 10$ mm, length 1000 mm.



Part No.	819 430
Material of supporting tube	GRP / StSt
Length of supporting tube	3500 mm
Transport length	3500 mm
Diameter \varnothing conductor	27 mm
Colour of conductor	black ●
Material of conductor	Cu
Minimum order length	6 m
Maximum order length	35 m
Suitable for installation outside of tube	no
Max. free length with air-termination rod (wall mounting)	3500 mm
Max. gust wind speed (wall mounting, 1x HVI power inside)	235 km/h
PU	1 pc(s)

HVI power Conductor inside of supporting tube with air-termination rod

Supporting tube with interior sealing end and EB spring element. Air-termination rod StSt, $\varnothing 22 / 16 / 10$ mm, length 2500 mm.



Part No.	819 431	819 433
Material of supporting tube	GRP / StSt	GRP / StSt
Length of supporting tube	3500 mm	5000 mm
Transport length	3500 mm	5000 mm
Diameter \varnothing conductor	27 mm	27 mm
Colour of conductor	black ●	black ●
Material of conductor	Cu	Cu
Minimum order length	6 m	6 m
Maximum order length	35 m	35 m
Suitable for installation outside of tube	no	no
Max. free length with air-termination rod (wall mounting)	5000 mm	5000 mm
Max. gust wind speed (wall mounting, 1x HVI power inside)	169 km/h	169 km/h
PU	1 pc(s)	1 pc(s)

Due to the order related manufacturing (customised conductor length) the conductor can not be taken back.
Max. gust wind speed (supporting tube with tripod) see table on page 138.

Air-termination Mast with HVI power Conductor



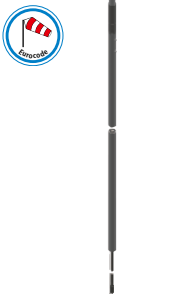
For a maximum free length of the whole air-termination system of 8.5 m. Fixing has to be implemented with three variable supports (Part No. 105 345). Transport length 6000 mm.

Design with 1x HVI power Conductor inside. Conductor length to be indicated when ordering (steps of 0.5 m).

Maximum total length of the HVI power Conductor 11.0 m at LPS class I.

Maximum total length of the HVI power Conductor 15.0 m at LPS class II.

Maximum total length of the HVI power Conductor 22.5 m at LPS class III.



Part No.	819 760
Total length of air-termination mast	11000 mm
Length of air-termination rod	3000 mm
Length of supporting tube	2300 mm
Length of mast pipe	6000 mm
Minimum order length	10 m
Maximum order length	35 m
Suitable for installation outside of tube	no
Max. gust wind speed	147 km/h
PU	1 pc(s)

Accessory for Air-termination Mast with HVI power Conductor

Variable Support for Air-termination Masts

Three supports per air-termination mast are to be mounted. Clamping range of air-termination mast $\varnothing 60$ mm.



Part No.	105 345
Material of support	St/tZn
Range of adjustment	250-350 mm
Fixing bores \varnothing	[4x] 12 x 25 mm
PU	1 pc(s)

2 HVI power Conductor



High-voltage-resistant, insulated down conductor for maintaining the separation distance to electrically conductive parts according to IEC/ EN 62305-3.

For use up to an equivalent separation distance $s \leq 90$ cm (in air) or $s \leq 180$ cm (solid material).

HVI power Conductor (pre-assembled, installation inside of tube)

With head piece and connection element (loosely enclosed).

Minimum order length 6 m, conductor length to be indicated when ordering (in steps of 0.5 m).

Part No.	819 160
Material of conductor	Cu
Material of insulation	PE
Material of sheath	PE
Colour of conductor	black ●
Diameter Ø conductor	27 mm
Minimum order length	6 m
Maximum order length	35 m
PU	1 pc(s)



HVI power Conductor (pre-assembled, installation outside of tube) für HVI power supporting tube GRP / Al

HVI power Conductor pre-assembled for installation outside of tube with head piece and connection element (loosely enclosed).

Connection kit for installation of the HVI power Conductor on HVI power supporting tubes GRP / Al consists of threaded pins, connection part, heat-shrinkable sleeve and fixing ring with slotted conductor holder (Ø27 mm) for the sealing end (including cable ties).

Minimum order length 6 m, conductor length to be indicated when ordering (in steps of 0.5 m).

Part No.	819 165
Material of conductor	Cu
Material of insulation	PE
Material of sheath	PE
Colour of conductor	black ●
Diameter Ø conductor	27 mm
Minimum order length	6 m
Maximum order length	35 m
PU	1 pc(s)



HVI power long Conductor (on reel)

The HVI power long Conductor for on-site assembly is delivered in a length of 100 m on a disposable plywood reel (diameter approx. 900 mm, width approx. 485 mm) including one Allen key.

Part No.	819 137
Material of conductor	Cu
Material of insulation	PE
Material of sheath	PE
Colour of conductor	black ●
Diameter Ø conductor	27 mm
PU	100 m



HVI power long Conductor (cut to length)

HVI power long Conductor cut to length for on-site assembly. The conductor is available in coil (Part No. 819 163) or on reel (Part No. 819 161). Conductor length to be indicated when ordering (in steps of 0.5 m).

Part No.	819 163	819 161
Material of conductor	Cu	Cu
Material of insulation	PE	PE
Material of sheath	PE	PE
Colour of conductor	black ●	black ●
Diameter Ø conductor	27 mm	27 mm
Minimum order length	6 m	36 m
Maximum order length	35 m	80 m
PU	1 pc(s)	1 pc(s)



2 Connection Elements for HVI power Conductor / HVI power long Conductor



Connection kit for HVI power long Conductor Ø27 mm for installation inside of tube

Connection elements for sealing the HVI power long Conductor at both ends, to implement the sealing end of the conductor in the supporting tube (head piece) and connection element for connection with other parts of the external lightning protection system or earth-termination system (including two heat-shrinkable sleeves).



Part No.	819 142
Material	StSt
Connection	bolt Ø10 mm, L 40 mm
Diameter Ø outside	30 mm
Screw	threaded bolt M6 x 8 mm
PU	1 pc(s)

Connection kit for HVI power long Conductor Ø27 mm for installation outside of tube

Connection kit for HVI power Conductor for installation on HVI power supporting tubes GRP / Al consisting of connection elements, threaded pins, connection part, heat-shrinkable sleeves, cable ties and fixing ring with a slotted conductor holder (Ø27 mm).



Part No.	819 149
Material	StSt
Connection	bolt Ø10 mm, L 40 mm
Diameter Ø outside	30 mm
Screw	threaded bolt M6 x 8 mm
PU	1 pc(s)

EB connection element for HVI power Conductor / HVI power long Conductor

For discharging the electric field of the HVI power Conductor (pre-assembled / on reel) in the sealing end range. Special slotted design for electrical contacting of the semi-conductive sheath.



Part No.	410 239
Material	StSt
Clamping range Ø	27 mm
Connection bore Ø	11 mm
Screw	● M10 x 20 mm
PU	1 pc(s)

3 Supporting Tubes for HVI power Conductor / HVI power long Conductor



With air-termination rod

Supporting tube with interior sealing end and EB spring element. Air-termination rod StSt, Ø10 mm, length 1000 mm.

Part No.	105 563	105 565	105 320	105 322
Material of supporting tube	GRP / Al	GRP / Al	GRP / StSt	GRP / StSt
Length of supporting tube	3500 mm	5000 mm	3500 mm	5000 mm
Diameter Ø outside	50 mm	50 mm	50 mm	50 mm
Transport length	3500 mm	5000 mm	3500 mm	5000 mm
Length of insulating clearance	1800 mm	1800 mm	1800 mm	1800 mm
Suitable for installation outside of tube	yes	yes	no	no
Max. free length with air-termination rod (wall mounting)	4000 mm	4000 mm	4000 mm	4000 mm
Max. gust wind speed (wall mounting, 1x HVI power inside)	203 km/h	203 km/h	235 km/h	235 km/h
Max. gust wind speed (wall mounting, 1x HVI power inside / outside)	181 km/h	181 km/h	—	—
PU	1 pc(s)	1 pc(s)	1 pc(s)	1 pc(s)

With air-termination rod

Supporting tube with interior sealing end and EB spring element. Air-termination rod StSt, Ø22 / 16 / 10 mm, length 2500 mm.

Part No.	105 573	105 575	105 321	105 323
Material of supporting tube	GRP / Al	GRP / Al	GRP / StSt	GRP / StSt
Length of supporting tube	3500 mm	5000 mm	3500 mm	5000 mm
Diameter Ø outside	50 mm	50 mm	50 mm	50 mm
Transport length	3500 mm	5000 mm	3500 mm	5000 mm
Length of insulating clearance	1800 mm	1800 mm	1800 mm	1800 mm
Suitable for installation outside of tube	yes	yes	no	no
Max. free length with air-termination rod (wall mounting)	5500 mm	5500 mm	5500 mm	5500 mm
Max. gust wind speed (wall mounting, 1x HVI power inside)	173 km/h	173 km/h	169 km/h	169 km/h
Max. gust wind speed (wall mounting, 1x HVI power inside / outside)	155 km/h	155 km/h	—	—
PU	1 pc(s)	1 pc(s)	1 pc(s)	1 pc(s)



With air-termination rod and lateral outlet

Supporting tube with interior sealing end and EB spring element. Air-termination rod StSt, Ø10 mm, length 1000 mm.

Part No.	105 513	105 515	105 392	105 394
Material of supporting tube	GRP / Al	GRP / Al	GRP / StSt	GRP / StSt
Length of supporting tube	3500 mm	5000 mm	3500 mm	5000 mm
Diameter Ø outside	50 mm	50 mm	50 mm	50 mm
Transport length	3500 mm	5000 mm	3500 mm	5000 mm
Length of insulating clearance	1800 mm	1800 mm	1800 mm	1800 mm
Suitable for installation outside of tube	yes	yes	no	no
PU	1 pc(s)	1 pc(s)	1 pc(s)	1 pc(s)

Max. gust wind speed (supporting tube with tripod) see table on page 138.

With air-termination rod and lateral outlet

Supporting tube with interior sealing end and EB spring element. Air-termination rod StSt, Ø22 / 16 / 10 mm, length 2500 mm.

Part No.	105 543	105 545	105 393	105 395
Material of supporting tube	GRP / Al	GRP / Al	GRP / StSt	GRP / StSt
Length of supporting tube	3500 mm	5000 mm	3500 mm	5000 mm
Diameter Ø outside	50 mm	50 mm	50 mm	50 mm
Transport length	3500 mm	5000 mm	3500 mm	5000 mm
Length of insulating clearance	1800 mm	1800 mm	1800 mm	1800 mm
Suitable for installation outside of tube	yes	yes	no	no
PU	1 pc(s)	1 pc(s)	1 pc(s)	1 pc(s)

Max. gust wind speed (supporting tube with tripod) see table on page 138.



Accessories for Supporting Tubes for HVI power Conductor / HVI power long Conductor

Lateral Air-termination Rods Al for Supporting Tubes

Fastening kit for mounting lateral/horizontal air-termination rods at HVI long supporting tubes and HVI power supporting tubes. Consisting of four air-termination rods and one fixing ring.

Note: The additional wind load on the air-termination system with the laterally mounted air-termination rods must be observed!

Part No.	819 183	819 185
Length of air-termination rod	530 mm	1030 mm
Material of air-termination rod	Al	Al
Material of fixing ring	Al	Al
PU	1 pc(s)	1 pc(s)

Lateral Air-termination Rods StSt for Supporting Tubes

Fastening kit for mounting lateral/horizontal air-termination rods on HVI long supporting tubes and HVI power supporting tubes. Consisting of four air-termination rods and one fixing ring.

Note: The additional wind load on the air-termination system with the laterally mounted air-termination rods must be observed!

Part No.	819 184	819 186
Length of air-termination rod	530 mm	1030 mm
Material of air-termination rod	StSt	StSt
Material of fixing ring	StSt	StSt
PU	1 pc(s)	1 pc(s)



3 Tripods for Supporting Tubes without Lateral Outlet

Special design for supporting tube with HVI power Conductor installed inside, with double cleat for the connection of 2x Rd 8-10 mm. The bending radius of the HVI power Conductor at the bottom of the tripod is maintained by positioning three concrete blocks under and one on the brace.

Adjustable to the roof inclination up to max. 10°.

The stackable **concrete base** (Part No. 102 010, 102 012) and the **support plate** (Part No. 102 050) have to be ordered separately.

Tripod small

To use for supporting tube with HVI power Conductor inside.

Part No.	105 351
Material of tripod	St/tZn
Support	50 mm
Radius	620 mm
Quantity of concrete bases	3-12 blocks 17 kg each
Space required for tripod	1300 x 1450 mm
PU	1 pc(s)



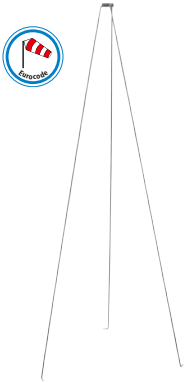
Tripod large

To use for supporting tube with HVI power Conductor outside.



Part No.	105 201
Material of tripod	St/tZn
Support	40 / 50 mm
Radius	1435 mm
Quantity of concrete bases	3-12 blocks 17 kg each
Space required for tripod	2520 x 2860 mm
PU	1 pc(s)

Accessories for Tripods for Supporting Tubes without Lateral Outlet



Bracing

Bracing, 3-fold with clamp for tubes D 50 mm for fastening at the tripod (Part No. 105 201). Bracing suitable for supporting tubes with a length of 4700 mm (e.g. Part No. 105 332, 105 316, 105 333, 105 317, 105 322, 105 323, 105 565, 105 575).

Part No.	105 601
Material	StSt
Brace length	2910 mm
Ø clamp	50 mm
PU	1 pc(s)

Concrete Base

For wedge mounting, stackable, for air-termination rods Ø16 mm, chamfered or tapered, DEHNiso spacers Ø16 mm or conductor holder (Part No. 253 279).



Part No.	102 010
Weight	17 kg
Support	wedge mounting Ø16 mm
Diameter Ø	337 mm
Material	concrete (C45/55)
Material of wedge / adapter	StSt
PU	54 pc(s)

Concrete Base

Concrete base without wedge, for the erection of tripods.



Part No.	102 012
Weight	17 kg
Support	Ø16 mm
Diameter Ø	337 mm
Material	concrete (C45/55)
PU	54 pc(s)

Support Plate

For protecting the roofing sheets under the concrete base.
For concrete bases (Part No. 102 010, 102 002).



Part No.	102 050
Diameter Ø outside	370 mm
Diameter Ø inside	360 mm
Material	EVA
Colour	black ●
PU	1 pc(s)

3 Tripods for Supporting Tubes with Lateral Outlet

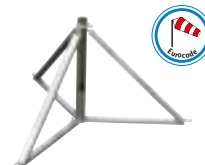


Special design for supporting tube with HVI Conductor installed inside, with lateral outlet and double cleat for connection of 2x Rd 8-10 mm. Adjustable to the roof inclination up to max. 5°

The stackable concrete base (Part No. 102 010) and the support plate (Part No. 102 050) as well as the threaded rod sets (Part No. 105 396-105 398 or Part No. 105 496-105 498) have to be ordered separately.

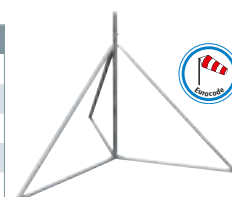
Tripod small

Part No.	105 390
Material	StSt
Support	50 mm
Radius	600 mm
Space required for tripod	1400 x 1200 mm
PU	1 pc(s)



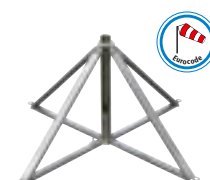
Tripod large

Part No.	105 391
Material	StSt
Support	50 mm
Radius	1450 mm
Space required for tripod	2900 x 2500 mm
PU	1 pc(s)



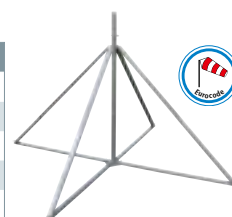
Four-legged stand small

Part No.	105 490
Material	StSt
Support	50 mm
Radius	600 mm
Space required for tripod	1200 x 1200 mm
PU	1 pc(s)



Four-legged stand large

Part No.	105 491
Material	StSt
Support	50 mm
Radius	1450 mm
Space required for tripod	2400 x 2400 mm
PU	1 pc(s)



Accessories for Tripods for Supporting Tubes with Lateral Outlet

Threaded Rod Kits for Tripod

Three threaded rods with base plate 44 x 4 mm and 3x nut with spring washer each.

Part No.	105 396	105 397	105 398
For tripod	Part No. 105 390	Part No. 105 390 / 105 391	Part No. 105 391
Quantity of concrete blocks	1 to 2	1 to 3	3 to 4
Material	StSt	StSt	StSt
Length	M16 x 340 mm	M16 x 520 mm	M16 x 650 mm
PU	1 pc(s)	1 pc(s)	1 pc(s)



Threaded Rod Kits for Four-legged Stand

Four threaded rods with base plate 44 x 4 mm and 3x nut with spring washer each.

Part No.	105 496	105 497	105 498
For four-legged stand	Part No. 105 490	Part No. 105 490 / 105 491	Part No. 105 491
Quantity of concrete blocks	1 to 2	1 to 3	3 to 4
Material	StSt	StSt	StSt
Length	M16 x 340 mm	M16 x 520 mm	M16 x 650 mm
PU	1 pc(s)	1 pc(s)	1 pc(s)



Concrete Base

Concrete base without wedge, for the erection of tripods.



Part No.	102 012
Weight	17 kg
Support	Ø16 mm
Diameter Ø	337 mm
Material	concrete (C45/55)
PU	54 pc(s)

Support Plate

For protecting the roofing sheets under the concrete base. For concrete bases (Part No. 102 010, 102 002).



Part No.	102 050
Diameter Ø outside	370 mm
Diameter Ø inside	360 mm
Material	EVA
Colour	black ●
PU	1 pc(s)

4 Fixing Elements for Supporting Tubes

Fixing Clamp with Tensioning Strap

For fixing the supporting tubes at construction elements e.g. antenna masts.



Part No.	105 360
Material of clip	StSt
Clamping range of supporting tube	50 mm
Clamping range of pipe Ø	50-300 mm
Material of tensioning strap	StSt
Dimension of strap (w x d)	25 x 0.3 mm
PU	1 pc(s)

Fixing Clamp with Tensioning Strap

With additional spacer for adjusting the fasteners of sector antennas at the mast.



Part No.	105 361
Material of clip	StSt
Clamping range of supporting tube	50 mm
Clamping range of pipe Ø	50-300 mm
Material of tensioning strap	StSt
Dimension of strap (w x d)	25 x 0.3 mm
Length of spacer	30 mm
PU	1 pc(s)

Fixing Clamp with Tensioning Strap

With additional long spacer for adjusting the fasteners of sector antennas at the mast.



Part No.	105 362
Material of clip	StSt
Clamping range of supporting tube	50 mm
Clamping range of pipe Ø	50-300 mm
Material of tensioning strap	StSt
Dimension of strap (w x d)	25 x 0.3 mm
Length of spacer	95 mm
PU	1 pc(s)

Fixing Bracket

For fixing the supporting tubes at the structure to be protected or on the wall.



Part No.	105 340
Material	StSt
Clamping range of supporting tube	50 mm
Wall / corner distance	80 mm
Dimension of fixing	320 mm
Fixing	[8x] Ø5.1 / [4x] 11 x 20 mm
PU	1 pc(s)

Fixing Bracket

For fixing the supporting tubes at the structure to be protected or on the wall.

Part No.	105 341
Material	StSt
Clamping range of supporting tube	50 mm
Wall / corner distance	80 mm
Dimension of fixing	152 mm
Fixing	[8x] Ø5.1 / [4x] 11 x 20 mm
PU	1 pc(s)



Fixing Bracket

Wall mounting bracket for vertical mounting.

For fastening of the supporting tubes or air-termination rods D40 / D50.

Part No.	105 342	105 348
Material	StSt	StSt
Fixing	[8x] Ø5.1 / [4x] 7 x 10 / [2x] 11 x 20 mm	[8x] Ø5.1 / [4x] 7 x 10 / [2x] 11 x 20 mm
Wall distance	46 mm	110 mm
Clamping range of air-termination rod	40-50 mm	40-50 mm
PU	1 pc(s)	1 pc(s)



Fixing Bracket

Wall mounting bracket with adjustment range between 150-200 mm.

For fastening of supporting tubes or air-termination rods D40 / D50 with double cleat for connection of 2x Rd 8-10 mm.

Part No.	105 344
Material of bracket	StSt
Clamping range of supporting tube	40-50 mm
Wall / corner distance	150-200 mm
Dimension of plate	120 x 120 x 4 mm
Fixing	[4x] 12 x 26 mm
Standard	EN 62561-1
PU	1 pc(s)



Fixing Bracket

Wall mounting bracket with adjustment range between 400-700 mm.

For fastening of the supporting tubes or air-termination rods D40 / D50.

Part No.	105 347 ^{NEW}	105 343	105 349 ^{NEW}
Material	St/tZn / StSt	St/tZn / StSt	St/tZn / StSt
Fixing	[4x] 12 x 26 mm	[4x] 12 x 26 mm	[4x] 12 x 26 mm
Wall distance	230-400 mm	400-700 mm	700-1300 mm
Clamping range of air-termination rod	40-50 mm	40-50 mm	40-50 mm
PU	1 pc(s)	1 pc(s)	pc(s)



Railing Clamp

For pipes.

Part No.	105 354	105 355
Material	StSt	StSt
Clamping range of pipe Ø	48-60 mm (1 1/2-2")	70-90 mm (2 1/4-3")
Clamping range of supporting tube	40-50 mm	40-50 mm
PU	5 pc(s)	5 pc(s)



Railing Clamps

For square hollow profiles.

Part No.	105 356	105 376
Material	StSt	StSt
Clamping range of square profile	20 x 20 bis 50 x 50 mm	60 x 120 mm
Clamping range of supporting tube	40-50 mm	40-50 mm
PU	5 pc(s)	5 pc(s)



Spacers for Omnidirectional Antennas



Spacer for DEHNiso Combi supporting tubes with inside and / or outside installed HVI Conductor mounted on the antenna mast.



Part No.	105 363	105 364	105 365
Material of support / square profile	St/tZn	St/tZn	St/tZn
Clamping range (Ø mast)	55-100 mm	100-150 mm	150-190 mm
Clamping range of supporting tube	50 mm	50 mm	50 mm
Length of spacer	1000 mm	1000 mm	1000 mm
Dimension (w x h x d)	140 x 120 x 55 mm	190 x 140 x 60 mm	230 x 180 x 70 mm
PU	1 pc(s)	1 pc(s)	1 pc(s)

Spacers for omnidirectional antennas in special lengths or any other diameters available upon request!

4 Accessories for HVI power Conductor / HVI power long Conductor

Fixing Bolt

Fixing bolt for spanning an aluminium cable 50 mm² Part No. 840 050 at an air-termination rod (Ø22 / Ø16 mm) or connection plate (e.g. Part No. 819 289 or 819 288).



Part No.	105 229
Bore	1x B 11 mm, 1x B 23 mm
Material of bolt	Al
Wire end ferrule	50 mm ²
Material of wire end ferrule	Cu/Sn
Standard	EN 62561-1
PU	10 pc(s)

Wire End Ferrule

Wire end ferrule for safely fixing an aluminium cable with a cross-section of 50 mm² (Part No. 840 050).
1 set = 10 pieces



Part No.	444 050
Material	Cu/Sn
Cross section	50 mm ²
PU	1 Sa

Roof Conductor Holder

For flat roofs, weight approx. 4.7 kg.
Conductor holder, concrete block and support plate for installing the HVI power Conductor on flat roofs.



Part No.	253 333
Material of conductor holder	StSt
Conductor holder support Rd	27 mm
Total weight	approx. 4.7 kg
PU	24 pc(s)

Roof Conductor Holder

For flat roofs, weight approx. 8.6 kg.
Conductor holder, concrete block and support plate for installing the HVI power Conductor on flat roofs.



Part No.	253 334
Material of conductor holder	StSt
Conductor holder support Rd	27 mm
Total weight	approx. 8.6 kg
PU	1 pc(s)

Conductor Holder

With slotted cleat for HVI power Conductor to be fixed in the concrete block (Part No. 253 301) and support plate (Part No. 253 300).

Part No.	253 330
Material	StSt
Conductor holder support Rd	27 mm
Height of conductor holder	approx. 87 mm
PU	24 pc(s)



Concrete Block

For stabilising the support plate.

Part No.	253 301
Material	concrete (C35/45)
Weight	4.6 kg
Dimension	180 x 180 x 70 mm
PU	24 pc(s)



Support Plate

Support plate with adapter (lock bush) for the spacer bar (Part No. 253 315, 253 325) as well as conductor holder (Part No. 253 289) and for protection of the roofing sheets under the concrete block (Part No. 253 301).

Part No.	253 300
Diameter Ø	300 mm
Diameter Ø of socket	10 mm
Height	60 mm
Material	plastic
Colour	grey ●
PU	24 pc(s)



Conductor Holder

With slotted cleat for HVI power Conductor to be fixed in the concrete block with wedge (Part No. 102 075).

Part No.	253 331
Material	StSt
Conductor holder support Rd	27 mm
Height of conductor holder	approx. 125 mm
PU	25 pc(s)



Concrete Base

For wedge mounting, for air-termination rods Ø10, length 1000 mm or DEHNiso spacers Ø16 mm, length up to 675 mm (distance 0.8 m) or conductor holder (Part No. 253 297).

Part No.	102 075
Total weight	8.5 kg
Diameter Ø	240 mm
Material	concrete (C45/55)
Material of wedge / adapter	StSt
PU	120 pc(s)



Support Plate

For protecting the roofing sheets under the concrete base. For concrete bases (Part No. 102 075, 102 003).

Part No.	102 060
Diameter Ø outside	280 mm
Diameter Ø inside	270 mm
Material	EVA
Colour	black ●
PU	1 pc(s)



NEW



Spacer with EB Element for HVI power Conductor (length of variable sealing end 350-900 mm)

Spacer for implementing the variable sealing end of the HVI power Conductor.

With MV clamp for connection to the equipotential bonding system (Rd 16 mm / Rd 8-10 mm).

The **concrete bases** (Part No. 102 010, weight 17 kg) and the **support plates** (Part No. 102 050) must be **ordered separately**.

Part No.	105 462 ^{NEW}
Material (spacer)	Al
Length (spacer)	1270 mm
Conductor holder support Rd	27 mm
Material (conductor holder)	StSt
Clamping range (MV Clamp Rd)	8-10 / 16
Material of clamp	Al
Length of variable sealing end (l)	350-900 mm
Max. gust wind speed (1 bases 17 kg each; l = 900 mm)	100 km/h
Max. gust wind speed (2 bases 17 kg each; l = 900 mm)	141 km/h
PU	1 pc(s)

Variable Tripod with EB Element for HVI power Conductor (length of variable sealing end 900-1800 mm)

Tripod (hinged) with variable spacer for implementing the variable sealing end of the HVI power Conductor.

With UNI earthing clamp for connecting 1x Rd 8-10 mm and 1x conductor 4-50 mm²

Adjustable to the roof inclination of max. 10°.

The **three concrete bases** (Part No. 102 075, weight 8.5 kg) and the **support plates** (Part No. 102 060) must be **ordered separately**.

NEW



Part No.	105 468 ^{NEW}	105 467 ^{NEW}
Material (tripod)	StSt	StSt
Radius	320 mm	320 mm
Quantity of concrete bases	3 (8.5 kg each)	3 (8.5 kg each)
Conductor holder support Rd	27 mm	27 mm
Adjustment range of spacer	600-1180 mm	750-1510 mm
Length of variable sealing end (l)	900-1500 mm	1500-1800 mm
Max. gust wind speed (3 bases 8.5 kg each; l = 900 mm)	170 km/h	—
Max. gust wind speed (3 bases 8.5 kg each; l = 1500 mm)	104 km/h	104 km/h
Max. gust wind speed (3 bases 8.5 kg each; l = 1800 mm)	—	93 km/h
PU	1 pc(s)	1 pc(s)

Spacer for HVI power Conductor

Spacer for additional mechanical fastening in the variable sealing end range.

The spacer is erected with **two concrete bases** (Part No. 102 010, weight 17 kg).

Concrete bases and support plate (Part No.Nr. 102 050) must be ordered separately.

NEW



Part No.	106 814 ^{NEW}
Material (spacer)	GRP
Material (conductor holder / adapter)	PA
Quantity of concrete bases	2 (17 kg each)
Length	1500 mm
Insulating clearance	1475 mm
Conductor holder support Rd	27 mm
Thread	M8
PU	1 pc(s)

Concrete Base

For wedge mounting, stackable, for air-termination rods Ø16 mm, chamfered or tapered, DEHNiso spacers Ø16 mm or conductor holder (Part No. 253 279).

Part No.	102 010
Weight	17 kg
Support	wedge mounting Ø16 mm
Diameter Ø	337 mm
Material	concrete (C45/55)
Material of wedge / adapter	StSt
PU	54 pc(s)



Support Plate

For protecting the roofing sheets under the concrete base. For concrete bases (Part No. 102 010, 102 002).

Part No.	102 050
Diameter Ø outside	370 mm
Diameter Ø inside	360 mm
Material	EVA
Colour	black ●
PU	1 pc(s)



Conductor Holder

With thread.

For wall mounting with two-screw cleat (not for use in the sealing end range).

Part No.	275 240	275 241
Material of conductor holder	StSt	StSt
Conductor holder support Rd	27 mm	27 mm
Thread	M8	M6
PU	25 pc(s)	25 pc(s)



Conductor Holder

With plastic base.

For wall mounting, with two-screw cleat (not for use in the sealing end range).

Part No.	275 249
Material of conductor holder	StSt
Conductor holder support Rd	27 mm
Thread	M8
PU	25 pc(s)



Conductor Holder

With slot hole. For wall mounting, with two-screw cleat (not for use in the sealing end range).

Part No.	275 242
Material of conductor holder	StSt
Conductor holder support Rd	27 mm
Fixing bore	5.5 x 10 mm
PU	25 pc(s)



Conductor Holder with Tensioning Strap

For fastening the HVI power Conductor e.g. at pipes.

Part No.	275 339
Material of conductor holder	StSt
Conductor holder support Rd	27 mm
Tensioning range Ø pipe	50-300 mm
PU	1 pc(s)



Conductor Holder for Tensioning Strap Fixing

For fixing the HVI power Conductor at pipes e.g. with pipe clamp (Part No. 106 323).

Part No.	275 359
Material of conductor holder	StSt
Conductor holder support Rd	27 mm
PU	1 pc(s)



Pipe Clamp

For fixing (tensioning) of conductor holders (e.g. 275 359) on different pipes.



Part No.	106 323
Material of head / strap	StSt
Clamping range Ø	50-300 mm
Dimension of strap	1100 x 25 x 0.3 mm
Material of screw	StSt
PU	10 pc(s)

Separate Grip Head

For combination with endless tensioning strap (Part No. 540 901) in case of larger pipe diameters, e.g. for adapter with fixing bush.



Part No.	106 324
Material of head	StSt
For strap (w x d)	25 x 0.3 mm
Screw	M8 x 20 mm
Material of screw	StSt
PU	20 pc(s)

Tensioning Strap



Part No.	540 901
Material	StSt
Strap dimension (w x d)	25 x 0.3 mm
Length	100 m
Military Name	VG 96953 T05 BB001
PU	1 pc(s)

Roof Conductor Holder

With preformed bending points for hooking at tiles and screwing at battens to install the HVI power Conductor on saddle roofs.



Part No.	202 857
Material of roof conductor holder	StSt
Material of conductor holder	StSt
Conductor holder support Rd	27 mm
Length of brace	205 mm
PU	25 pc(s)

Conductor Holders for HVI power Conductor in Ex Areas



The HVI power Conductor is suitable for installation in explosion hazardous areas Ex zone 1 (gases, vapours, mists) as well as Ex zone 21 (dusts). The special installation conditions safely prevent electric sparks to neighbouring metal parts when lightning current flows through the HVI power Conductor.

The HVI power Conductor has to be installed in accordance with the installation instructions.

HVI power Ex W85 holder

For fastening on metal construction parts (facades) in Ex zones 1 and 21.



Part No.	275 450
Material	StSt
Conductor holder support Rd	27 mm
Wall distance	85 mm
Fixing	[4x] Ø5.1 / [2x] 7 x 10 mm
PU	10 pc(s)

HVI power Ex W240 holder

For fixing on metal construction parts (facades) in Ex zones 1 and 21.



Part No.	275 451
Material	StSt
Conductor holder support Rd	27 mm
Wall distance	240 mm
Fixing	[4x] Ø5.1 / [2x] 7 x 10 mm
PU	10 pc(s)

HVI power Conductor

HVI power Ex busbar 500

For HVI power Conductor installation with conductor holder HVI Ex W85 holders (Part No. 275 450) on a non-conductive structure e.g. stone, wood.

Part No.	275 498
Fixing	[4x] Ø5.5 / [2x] 7 x 10 mm
PU	10 pc(s)



HVI power Ex P85 holder

For fixing on pipes e.g. with pipe clamp (Part No. 106 323) in Ex zones 1 und 21.

Part No.	275 454
Material	StSt
Conductor holder support Rd	27 mm
Wall distance	95 mm
Clamping range of tube	50-300 mm
PU	10 pc(s)



HVI power Ex P240 holder

For fixing on pipes e.g. with pipe clamp (Part No. 106 323) in Ex zones 1 and 21.

Part No.	275 455
Material	StSt
Conductor holder support Rd	27 mm
Wall distance	250 mm
Clamping range of tube	50-300 mm
PU	10 pc(s)



Accessories for Conductor Holders for HVI power Conductor in Ex Areas

Pipe Clamp

For fixing (tensioning) of conductor holders (e.g. 275 359) on different pipes.

Part No.	106 323
Material of head / strap	StSt
Clamping range Ø	50-300 mm
Dimension of strap	1100 x 25 x 0.3 mm
Material of screw	StSt
PU	10 pc(s)



Separate Grip Head

For combination with endless tensioning strap (Part No. 540 901) in case of larger pipe diameters, e.g. for adapter with fixing bush.

Part No.	106 324
Material of head	StSt
For strap (w x d)	25 x 0.3 mm
Screw	● M8 x 20 mm
Material of screw	StSt
PU	20 pc(s)



Tensioning Strap

Part No.	540 901
Material	StSt
Strap dimension (w x d)	25 x 0.3 mm
Length	100 m
Military Name	VG 96953 T05 BB001
PU	1 pc(s)



4 Connecting Components 200 kA (10/350 μs)



For use in protection class I and II of the lightning protection system (class of LPS I, II).
Clamps are tested with a 200 kA (10/350 μs) lightning impulse current, based on EN 62561-1.

UNI disconnecting clamp for two round conductors



Part No.	459 200
Material	StSt
Clamping range Rd / Rd	10 / 10 mm
Clamping range Rd / FI	10 / 30 mm
Lightning current carrying capability (10/350 μs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

UNI disconnecting clamp for earth entry rods



Part No.	459 219
Material	StSt
Clamping range Rd / Rd	8-10 / 16 mm
Lightning current carrying capability (10/350 μs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

Clamping piece



Part No.	380 209
Material	StSt
Clamping range FI	30 x 4 mm
Lightning current carrying capability (10/350 μs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

KS connector



Part No.	301 209
Material	StSt
Clamping range Rd	10 mm
Lightning current carrying capability (10/350 μs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

MV clamp for round conductors



Part No.	390 209
Material	StSt
Clamping range Rd / Rd	8-10 mm
Lightning current carrying capability (10/350 μs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

MV clamp for air-termination rods



Part No.	392 209
Material	StSt
Clamping range Rd / Rd	8-10 / 16 mm
Lightning current carrying capability (10/350 μs)	200 kA
Standard	based on EN 62561-1
PU	1 pc(s)

4 Stripping Tool for HVI power Conductors



Tool for stripping the semi-conductive sheath and the PE insulation of the HVI power Conductor (outer diameter 27 mm)

- Tool consisting of handle and various exchangeable cutting heads
- Stripping length of the HVI power Conductor is adjustable in steps of 0.2 mm (lock points) by the set screw in the handle and is shown on the handle scale

Handling

Apply the cutting head at the conductor end and turn clockwise with light pressure for cutting / stripping.
Exchange of the cutting head without tool due to the bayonet coupling.

HVI strip 27

For the HVI power Conductor.

Part No.	597 227
Diameter Ø conductor	27 mm
Material of moulded part	plastic / Al
Material of blade	StSt
PU	1 pc(s)



HVI head 27

For the HVI power Conductor.

Part No.	597 127
Diameter Ø conductor	27 mm
Material of moulded part	Al
Material of blade	StSt
PU	1 pc(s)



Accessories for Stripping Tool for HVI power Conductors

HVI head holder

Adapter with bayonet coupling for attaching the HVI head cutting head (pre-set stripping length 35 mm). Adapter may be used in usual three-jaw chuck (Ø10 mm) e.g. of cordless screwdrivers.

Part No.	597 139
Material	plastic / Ms
PU	1 pc(s)



Spare Blades for HVI head 27

1 set = 4 blades

Part No.	597 102
Material	StSt
PU	1 Sa



4 Cable Shears for HVI Conductors



Cable shears for easily cutting of the HVI light Conductor, HVI Conductor (outer diameter 20/23 mm) and HVI power Conductor (outer diameter 27 mm) and of the CUI Conductor.

The special design of the cable shears also allows for a precise cutting of stranded conductors for attaching the connection elements easily.

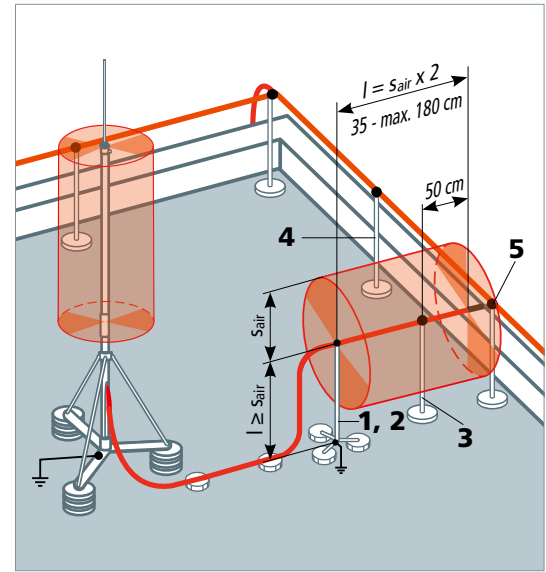
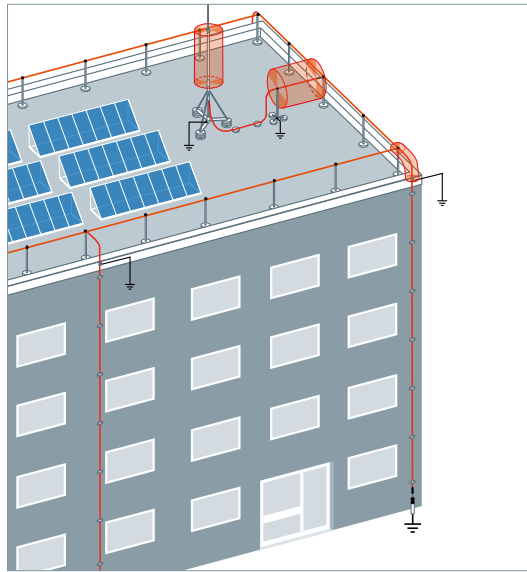
HVI cutter

Part No.	597 032
Diameter Ø conductor	up to 32 mm
Material of blades	tool steel (CR-Moly (SCM440))
Material of handles	carbon steel (S5400)
Length	600 mm
PU	1 pc(s)



5 Sealing End Range, Connection to "Isolated Ring Conductor"

If several installations are protected, it is not necessary to connect the HVI power Conductors of the individual air-termination systems directly with the earth-termination system. The HVI power Conductors can be connected to an "isolated ring conductor". From there several down conductors are routed to the earth-termination system. The „isolated ring conductor“ has to be installed on spacers and concrete bases e.g. on the roof level. The calculated separation distance "s" must be observed.



Accessories for Sealing End Range, Connection to "Isolated Ring Conductor"



- 1** **Spacer with EB Element for HVI power Conductor (length of variable sealing end 350-900 mm)**
 Spacer for implementing the variable sealing end of the HVI power Conductor.
 With MV clamp for connection to the equipotential bonding system (Rd 16 mm / Rd 8-10 mm).
 The **concrete bases** (Part No. 102 010, weight 17 kg) and the **support plates** (Part No. 102 050) must be **ordered separately**.

Part No.	105 462 <small>NEW</small>
PU	1 pc(s)



- 2** **Variable Tripod with EB Element for HVI power Conductor (length of variable sealing end 900-1800 mm)**
 Tripod (hinged) with variable spacer for implementing the variable sealing end of the HVI power Conductor.
 With UNI earthing clamp for connecting 1x Rd 8-10 mm and 1x conductor 4-50 mm²
 Adjustable to the roof inclination of max. 10°.
 The **three concrete bases** (Part No. 102 075, weight 8.5 kg) and the **support plates** (Part No. 102 060) must be **ordered separately**.

Part No.	105 468 <small>NEW</small>	105 467 <small>NEW</small>
PU	1 pc(s)	1 pc(s)



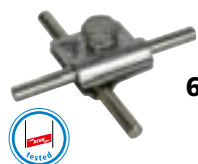
- 3** **Spacer for HVI power Conductor**
 Spacer for additional mechanical fastening in the variable sealing end range.
 The spacer is erected with two concrete bases (Part No. 102 010, weight 17 kg).
 Concrete bases and support plate (Part No.Nr. 102 050) must be ordered separately.

Part No.	106 814 <small>NEW</small>
PU	1 pc(s)



- 4** **DEHNiso Spacer**
 E.g. air-termination rod Part No. 101 001, air-termination rod with MV clamp Part No. 105 071 (for crossover points) or MV clamp for traversing Part No. 105 079.

Part No.	106 217	106 220
PU	10 pc(s)	10 pc(s)

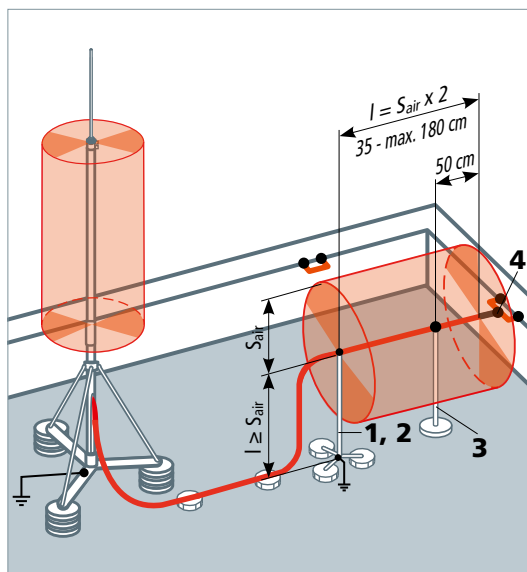
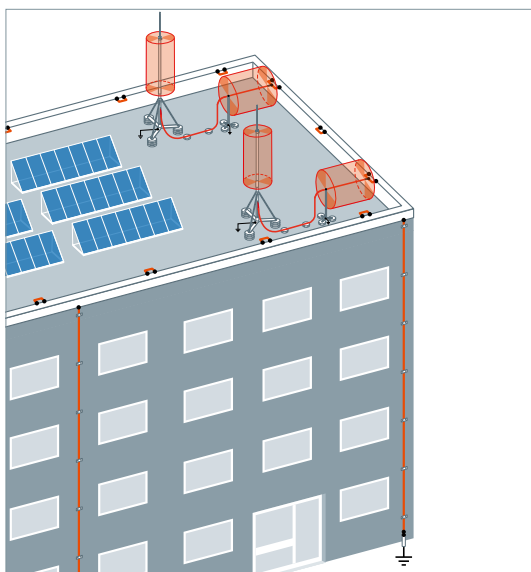


- 6** **MV Clamp**
 With hexagon screw, spring washer and thread in the base part.
 Lightning current carrying capability 200 kA (10/350 μs).

Part No.	390 209
PU	1 pc(s)

5 Sealing End Range, Connection to "Capping of Roof Parapet"

If several installations are protected, it is not necessary to connect the HVI power Conductors of the individual air-termination systems directly with the earth-termination system. The HVI power Conductors from the air-termination systems can be connected to the capping of the roof parapet. From there several down conductors are routed to the earth-termination system.



Accessories for Sealing End Range, Connection to "Capping of Roof Parapet"

Spacer with EB Element for HVI power Conductor (length of variable sealing end 350-900 mm)

Spacer for implementing the variable sealing end of the HVI power Conductor.
 With MV clamp for connection to the equipotential bonding system (Rd 16 mm / Rd 8-10 mm).
 The **concrete bases** (Part No. 102 010, weight 17 kg) and the **support plates** (Part No. 102 050) must be **ordered separately**.

Part No.	105 462 <small>NEW</small>
PU	1 pc(s)



Variable Tripod with EB Element for HVI power Conductor (length of variable sealing end 900-1800 mm)

Tripod (hinged) with variable spacer for implementing the variable sealing end of the HVI power Conductor.
 With UNI earthing clamp for connecting 1x Rd 8-10 mm and 1x conductor 4-50 mm²
 Adjustable to the roof inclination of max. 10°.
 The **three concrete bases** (Part No. 102 075, weight 8.5 kg) and the **support plates** (Part No. 102 060) must be **ordered separately**.

Part No.	105 468 <small>NEW</small>	105 467 <small>NEW</small>
PU	1 pc(s)	1 pc(s)



Spacer for HVI power Conductor

Spacer for additional mechanical fastening in the variable sealing end range.
 The spacer is erected with two concrete bases (Part No. 102 010, weight 17 kg).
 Concrete bases and support plate (Part No. 102 050) must be ordered separately.

Part No.	106 814 <small>NEW</small>
PU	1 pc(s)



KS Connector

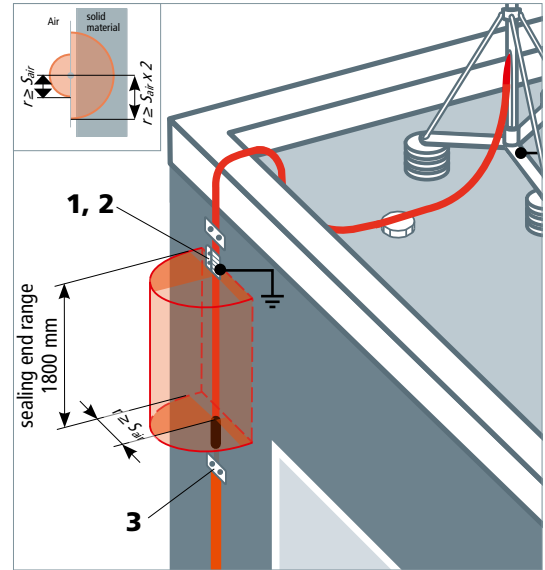
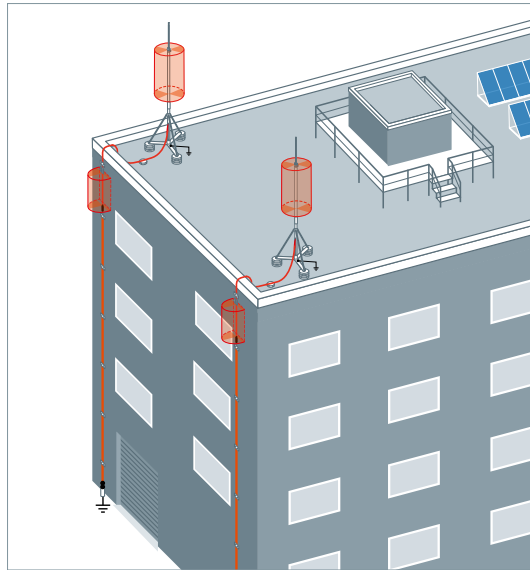
With screw and nut M10. For connecting the HVI power Conductor with the metal capping of the roof parapet.
 Lightning current carrying capability 200 kA (10/350 μs).

Part No.	301 209
PU	1 pc(s)



5 Sealing End Range on a Building

If HVI power Conductors are installed on a building, the calculated separation distance "s" in the sealing end range from metal parts on the building must be maintained. The sealing end range extends from the EB connection element to the earth-termination connection element. If the HVI power Conductor is directly connected with an earth entry rod / earth-termination system an EB element is not necessary. The sealing end range remains unconsidered.



Accessories for Sealing End Range on a Building



1

EB Connection Element for HVI power / HVI power long Conductor

EB connection element for discharging the electric field of the HVI power Conductor (pre-assembled / on reel) in the sealing end range. Special slotted design for electrical contacting of the semi-conductive sheath.

Part No.	410 239
PU	1 pc(s)



2

KS Connector

With screw and nut M10.

Part No.	301 019
PU	100 pc(s)



3

Disconnecting Clamp

Disconnecting clamp with spring washer to connect the HVI power Conductor with the earth entry rod. Lightning current carrying capability 200 kA (10/350 μs).

Part No.	459 200
PU	1 pc(s)



Safety Equipment



1. Abbreviations

1.1 Materials

Abbreviation	Material
Al	Aluminium
AlMgSi	Aluminium alloy
Cu	Electric copper, copper
Ms	Brass
StSt	Stainless steel
St	Steel
MCI	Malleable cast iron
ZDC	Zinc die casting
GRP	Glass-fibre reinforced plastic
PP	Polypropylene

2. Minimum lengths of insulating elements for

- 1) Operating sticks acc. to DIN VDE 0681
- 2) Voltage detectors acc. to IEC/EN 61243-1 (DIN VDE 0682-411)
- 2) Phase comparators acc. to IEC/EN 61481 (DIN VDE 0682-431)

Nominal voltage	Rated voltage	Minimum length of the insulating element $L_{I \min}$		
		1)	2)	3)
U_N *)	U_r			
up to 10 kV	12 kV	500 mm	520 mm	525 mm
20 kV	24 kV	500 mm	520 mm	525 mm
30 kV	36 kV	525 mm	520 mm	525 mm
45 kV	52 kV	720 mm	830 mm	—
60 kV	72.5 kV	900 mm	830 mm	—
110 kV	123 kV	1300 mm	1300 mm	—
150 kV	170 kV	1750 mm	1700 mm	—
220 kV	245 kV	2400 mm	2300 mm	—
380 kV	420 kV	3200 mm	3600 mm	—

*) For nominal voltages higher or lower than the nominal voltage indicated in the table above, a rated voltage closest to the required nominal voltage must be selected. In extreme cases, the nominal voltage is equal to the rated voltage.










1.2 Coating materials

Abbreviation	Coating material
gal Sn	Tin-plated
gal Zn	Galvanised
tZn	Hot-dip galvanised
Bronze gal Sn	Bronze, tin-plated

1.3 Types of conductors

Abbreviation	Type of conductor
Fl	Flat conductor
Rd	Round conductor

3. Application

Symbol	Application
	Installation instructions, see www.dehn-international.com
	Not suitable for use in wet weather conditions For indoor and outdoor installations For use in indoor and outdoor installations, but not in wet weather conditions.
	Suitable for use in wet weather conditions For indoor and outdoor installations For use in indoor and outdoor installations, in all weather conditions (even if the operating stick gets wet).
	For indoor installations only!
	Switchgear installations
	Overhead lines
	Components for railway applications
	Discontinued products
	see www.dehn-international.com Products / Selection guides and configurators / EaS configurator

Safety Equipment

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Wireless Inspection Camera



Live inspection of an insulator on its rear side.

Nominal Voltages up to 123 kV / 15 ... 60 Hz

- Wireless inspection camera for periodic inspection and documentation of electrical installations and equipment (also without special training)
- Brings the invisible to light
- Facilitates work
- Increases safety
- Saves time



General Information:	
Standard	based on EN 50508 (DIN VDE 0682-213)
Temperature range (TU)	0 °C ... +40 °C
Not for use in wet weather conditions	☀
Material (enclosure)	PUR
Material (camera)	Plastic

Digital Camera Kit



Kit includes:		
Item	Description	Type
1	Plastic case	KKL DIGIK
2	Digital camera enclosure	G DIGIK
3	Gear coupling adapter	AD M6 ZK 185
4	Digital camera	DIGIK QX10

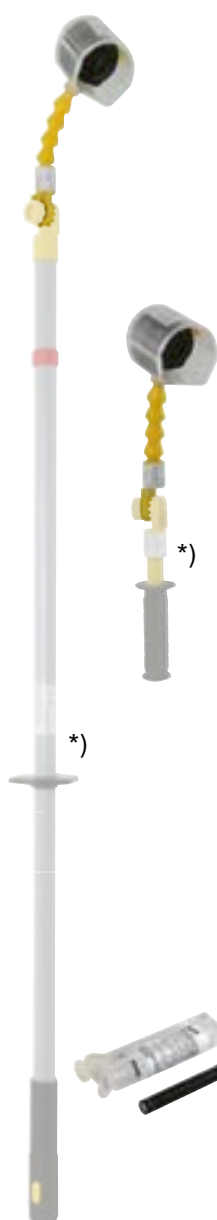
Type	SET DIGIK
Part No.	766 390
Nominal voltage (U _N)	up to 123 kV
Frequency	15-60 Hz
Resolution	18.2 megapixel
Objective	wide-angle lens (10x optical zoom)
Image stabiliser	optical image stabiliser
Focus	autofocus
Equipment	PlayMemories Mobile App, Wi-Fi integrated
Interfaces	micro-USB (USB 2.0) port
Dimensions (case)	395 x 290 x 105 mm

*) Handle and insulating rod are not included.

LED lighting


LED lighting to be attached to the G DIGIK L enclosure of the digital camera. For the visual inspection and documenting the state of electrical installations up to 123 kV, also in case of poor lighting conditions.

Type	LED DIGIK ISO
Part No.	766 395
Nominal voltage (U _N)	up to 123 kV
Lamp	mini LED torch
Luminous flux	37 lumen



PHE4 Voltage Detector Nominal Voltage 1 ... 36 kV

- Self-test of all live parts including test prod
- Unique plug-in coupling system
- Integrated visual and acoustic indication
- Also for use in wet weather conditions

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682-411)
Temperature range	-25 °C ... +70 °C, climatic category N and W
Design	Complete
For use in wet weather conditions	
For	Indoor and outdoor installations
Indication	Acoustic and visual
Self-testing element	Yes
Material (test electrode)	Cu alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube



PHE4 voltage detector with visual and acoustic indication.



Nominal Voltages up to 36 kV / 60 Hz, M12 Thread

Category "S" for switchgear installations and overhead lines.



General Information:					
Frequency	60 Hz				
Type PHE4 ...	3 10 S 60	6 20 S 60	10 30 S 60	20 36 S 60	U 3 36 S 60
Part No.	783 332	783 335	783 345	783 342	783 395
Nominal voltage (U _N)	3 ... 10 kV	6 ... 20 kV	10 ... 30 kV	20 ... 36 kV	3 ... 10 / 12 ... 36 kV
Total length (l _G)	1410 mm	1600 mm	1720 mm	1720 mm	1720 mm
Insertion depth (l ₀)	610 mm	800 mm	920 mm	920 mm	920 mm

Earth Connecting Plates



Earth connecting plate with fixed ball points and ball head cap with plastic handle

- Connecting plate with high short-circuit current carrying capacity
- Single-pole connection of the phase arms
- For connecting single-pole earthing and short-circuiting devices to transformers of overhead line masts or to fuse holders
- For fixed ball points (Ø20 mm, Ø25 mm) or ring groove pins (Ø16 mm)

General Information:

Standard	EN/IEC 61230 (DIN VDE 0683-100) and fixed points in accordance with DIN 48088-1
Material (plate)	Aluminium
Material (terminal lug)	4 mm: Cu / gal Sn; 6 mm: St / tZn
Material (fixed point)	E-Cu / brass (CuNi2Si) / gal Sn



With three Fixed Ball Points and Ball Head Cap

Type	EAPA 3 KFP 20 KKH	EAPA 3 KFP 25 KKH
Part No.	728 620	728 625
Fixed point Ø	20 mm	25 mm
Max. cable cross-section Cu	120 mm ²	150 mm ²
Max. short-circuit current I _k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I _k 1 s	23.7 kA	29.6 kA

Earthing Cable Cu in accordance with IEC 61138

The cable is delivered without crimped cable lugs and can be ordered by the metre.

General Information:

Minimum order quantity ^{*)}	1 m
--------------------------------------	-----

Type	ES YM2 16	ES YM2 25	ES YM2 35	ES YM2 50
Part No.	716 001	725 001	735 001	750 001
Cable cross-section	16 mm ²	25 mm ²	35 mm ²	50 mm ²

Type	ES YM2 70	ES YM2 95	ES YM2 120	ES YM2 150
Part No.	770 001	795 001	712 001	715 001
Cable cross-section	70 mm ²	95 mm ²	120 mm ²	150 mm ²

^{*)} Length of earthing cable to be specified when ordering (in whole metres).

Phase Connecting Elements for Switchgear Installations

- To be fitted to the phase cable end of single-pole to five-pole earthing and short-circuiting devices
- Anti-rotation element PK1
- Other earthing and short-circuiting devices can be configured online via the earthing and short-circuiting configurator

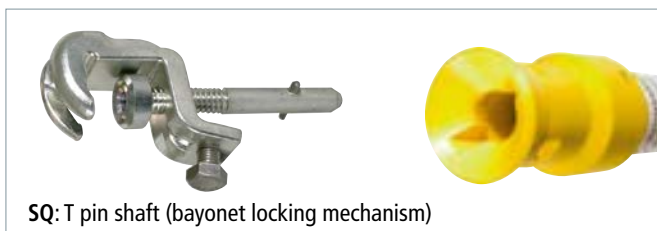


Connecting the phase cable end with universal clamp to a fixed ball point

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683-100), threaded T pin shaft DIN 48087
Temperature range	-25 °C ... +55 °C
Material (clamp body)	Cu alloy/gal Sn
Material (terminal lug)	Cu alloy/gal Sn
Material (shaft)	Cu alloy/gal Sn
Material (pressure plate)	Cu alloy/gal Sn / St/Zn



SK: Hexagon shaft



SQ: T pin shaft (bayonet locking mechanism)

Two types of ball head caps are available:

- Rigid ball head cap
- Adjustable ball head cap (4x 90°)
- The adjustable ball head cap allows the user to connect the earthing and short-circuiting device to fixed ball points that are installed in unfavourable positions. Thus, in the vast majority of cases, angled fixed ball points no longer have to be used.



Rigid ball head cap



Adjustable ball head cap (4x 90°)



Rigid Ball Head Cap, Hexagon Shaft

Type	KKH 20 SK	KKH 25 SK
Part No.	772 310	772 320
For fixed ball point Ø	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 120 mm ²	16 ... 150 mm ²
Max. short-circuit current I _k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I _k 1 s	23.7 kA	29.6 kA



Rigid Ball Head Cap, T Pin Shaft

Type	KKH 20 SQ	KKH 25 SQ
Part No.	772 311	772 321
For fixed ball point Ø	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 120 mm ²	16 ... 150 mm ²
Max. short-circuit current I _k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I _k 1 s	23.7 kA	29.6 kA



Adjustable Ball Head Cap (4x 90°), Hexagon Shaft



Type	KKH 20 D SK	KKH 25 D SK
Part No.	772 330	772 340
For fixed ball point Ø	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 120 mm ²	16 ... 150 mm ²
Max. short-circuit current I _k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I _k 1 s	23.7 kA	29.6 kA

Adjustable Ball Head Cap (4x 90°), T Pin Shaft



Type	KKH 20 D SQ	KKH 25 D SQ
Part No.	772 331	772 341
For fixed ball point Ø	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 120 mm ²	16 ... 150 mm ²
Max. short-circuit current I _k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I _k 1 s	23.7 kA	29.6 kA

Round Pin Clamp, T Pin Shaft

For round pins in switchgear installations.



Type	RBK 35 SQ
Part No.	715 312
For round pins Ø	35 mm
Anti-rotation element	PK1
For cable cross-section Cu	16 ... 150 mm ²
Max. short-circuit current I _k 0.5 s	42.0 kA
Max. short-circuit current I _k 1 s	29.6 kA

Universal Clamp, Hexagon



Type	UK 25 SK	UK 30 SK
Part No.	773 034	773 130
For fixed ball point Ø	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 120 ^{*)} mm ²	16 ... 120 ^{*)} mm ²
Max. short-circuit current I _k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I _k 1 s	23.7 kA	23.7 kA

Universal Clamp, T Pin Shaft



Type	UK 25 SQ	UK 30 SQ
Part No.	773 234	773 330
For fixed ball point Ø	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 120 ^{*)} mm ²	16 ... 120 ^{*)} mm ²
Max. short-circuit current I _k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I _k 1 s	23.7 kA	23.7 kA

^{*)} See table for „Clamping range and maximum cable cross-section of universal clamps used for“

Phase Connecting Element, T Pin Shaft

With M16 threaded pin for installation in switchgear installations.



Type	PAS EK SQ 16
Part No.	771 316
Dimensions	M16
Anti-rotation element	PK1
For cable cross-section Cu	16 ... 150 mm ²
Max. short-circuit current I _k 0.5 s	42.0 kA
Max. short-circuit current I _k 1 s	29.6 kA

^{*)} Clamping range and maximum cable cross-section of universal clamps used for:

Fixed ball point Ø	T Pin Collar width	Rd / Fl Clamping range	Max. cable cross-section
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	16 mm ²
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	25 mm ²
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	35 mm ²
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	50 mm ²
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm ²
20 / 25 / 30 mm	15 / 18 mm	—	95 mm ²
— / 25 / 30 mm	—	—	120 mm ²
—	—	—	150 mm ²

The clamps must have the same maximum short-circuit current as the earthing and short-circuiting cables!

Phase Connecting Elements for Overhead Lines

- For connecting the phase cables of single-pole and three-pole earthing and short-circuiting devices to overhead lines
- With coupling aid for safe attachment on conductor cables
- Easy coupling due to spring-loaded clamp
- Anti-rotation element PK1 or PK2 and long threaded T pin shaft
- Earthing and short-circuiting devices can be configured online via the earthing and short-circuiting configurator



Phase screw clamps used on an overhead line



EaS Configurator:
www.dehn.de/en/euk

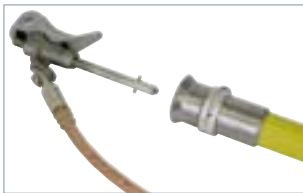
General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683-100), threaded T pin shaft DIN 48087
Temperature range	-25 °C ... +55 °C
Material (pressure plate)	Aluminium alloy
Material (clamp body)	Aluminium alloy
Material (shaft)	Copper alloy/gal Sn or StSt
Material (coupling aid)	St/gal Zn



Crimped cable lug, type PK1: Standard anti-rotation cable lug with cut-out.



Crimped cable lug, type PK2: Cable lugs without cut-out for connecting parts from other manufacturers are available on request.



Clamp with long shaft and earthing stick with aluminium cone coupling



Spring-loaded phase screw clamp



Phase screw clamp fitted with fixed coupling aid allows safe coupling

Standard Phase Screw Clamp

Short-circuit-proof, even if the conductor cables are corroded due to weathering.

Type	PSK 4 30 SQL	PSK 10 65 SQL
Part No.	784 201	784 301
Clamping range Ø	4 ... 30 mm	10 ... 65 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 70 mm ²	16 ... 120 mm ²
Max. short-circuit current I _k 0.5 s	19.5 kA	33.5 kA
Max. short-circuit current I _k 1 s	13.8 kA	23.7 kA



Phase Screw Clamp with Coupling Aid

Short-circuit-proof, even if the conductor cables are corroded due to weathering.

Type	PSK 4 30 SQL EH	PSK 10 65 SQL EH
Part No.	784 401	784 501
Clamping range Ø	4 ... 30 mm	10 ... 65 mm
Anti-rotation element	PK1	PK1
For cable cross-section Cu	16 ... 70 mm ²	16 ... 120 mm ²
Max. short-circuit current I _k 0.5 s	19.5 kA	33.5 kA
Max. short-circuit current I _k 1 s	13.8 kA	23.7 kA



Two-pole Phase Connecting Plate

Allows to connect two phase screw clamps with PK1 anti-rotation element.



Type	PAP 2 M12 SSM B13
Part No.	728 312
Anti-rotation cable lug	PK1
Borehole	Ø12.5 mm
Max. short-circuit current I_k 0.5 s	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA

Three-pole Phase Connecting Plate with Round Pin

Phase connecting plate for phase clamps.



Type	PAP 3 M12 SSM B13 RB
Part No.	728 313
Anti-rotation cable lug	PK1
Borehole	Ø12.5 mm
Max. short-circuit current I_k 0.5 s	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA

Phase Connecting Elements for Railway Applications

- Safe positive-locking earth clamps for railway applications



Coupling the earth clamp to the overhead contact line.

Earth Clamp for Overhead Contact Lines

With contact electrode and flexible threaded T pin shaft according to DIN 48087.
For AC-80 to AC-120 overhead contact lines.



Type	FEK 4 15 TS FSQL	FEK4 15 TS FSQL AB29
Part No.	784 755	784 756
Clamping range Ø	4 ... 15 mm	4 ... 15 mm
Anti-rotation cable lug	PK2 (Ø10.5 mm)	PK2 (Ø10.5 mm)
For cable material	Cu	Al
For cable cross-section	50 mm ²	70 mm ²
Max. short-circuit current I_k 0.06 s	34.0 kA	32.0 kA
DB drawing No.	3 Ebgw 01.54	Ebgw 01.85
DB material No.	157 536	—

Line Clamp

With contact electrode and threaded T pin shaft according to DIN 48087.
For supply and traction power lines.

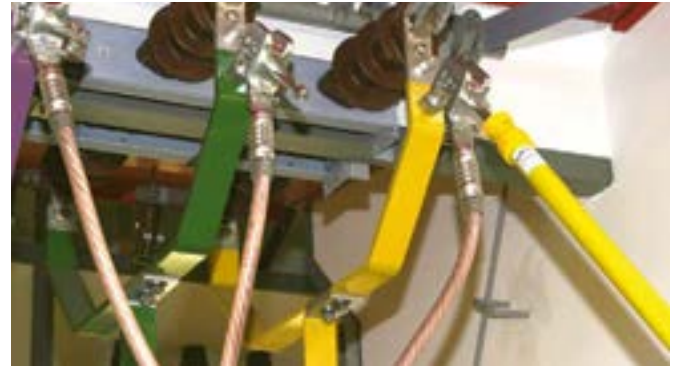


Type	LK 4 40 TS SQL
Part No.	784 352
Clamping range Ø	4 ... 40 mm
Anti-rotation cable lug	PK2 (Ø10.5 mm)
DB drawing No.	3 Ebgw 01.65
DB material No.	157 539

Earthing Sticks for Switchgear Installations

- For attaching earthing and short-circuiting devices
- Available in different lengths
- Modular for easy transport
- Light-weight construction
- Hexagon shaft (width across flats 19 mm) or T pin shaft

General Information:	
Standard	T pin shaft DIN 48087
Temperature range	-25 °C ... +55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap or plug-in coupling for extending the handle



Earthing stick used for attaching an earthing and short-circuiting device to an installation.

Earthing sticks are hand-held insulating sticks for approaching clamps of earthing and short-circuiting devices to parts of electrical installations for earthing and short-circuiting purposes.

They consist of an insulating element, black ring, handle and coupling for attaching clamps. Earthing sticks have to be selected according to the **weight** of the earthing and short-circuiting device (see also „max. load on the operating head in kg“).

The **insulating element** is the part of the earthing stick between the black ring and the end of the earthing stick in the direction of the clamp. It ensures that the user maintains the required safety distance and provides sufficient insulation. In installations exceeding 1 kV, the insulating element must have a minimum length of 500 mm.



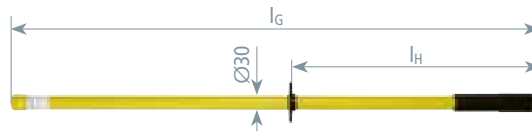
The plug-in coupling allows for easy handle extension of ES STK earthing sticks.



Earthing sticks with bayonet locking mechanism (T pin shaft) can also be used for clamps with hexagon shafts by attaching an AES SQ SK adapter.

For Hexagon Shafts, Plug-in Coupling

Handle termination with plastic plug-in coupling for extending the handle (spring locking mechanism)

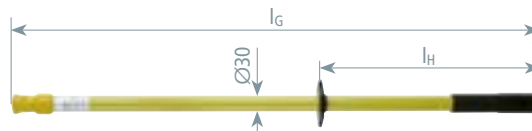


Type	ES SK STK 1000	ES SK STK 2000
Part No.	761 001	761 003
Total length (l_G)	1000 mm	2000 mm
Length (handle) (l_H)	430 mm	1430 mm
Max. load on the operating head	35 kg	14 kg



For T Pin Shafts, Plug-in Coupling

Handle termination with plastic plug-in coupling for extending the handle (bayonet locking mechanism)

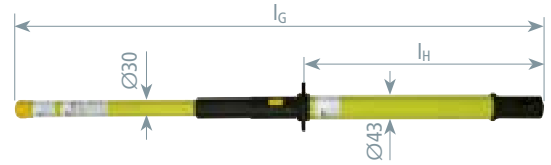


Type	ES SQ STK 1000	ES SQ STK 2000
Part No.	761 002	761 004
Total length (l_G)	1000 mm	2000 mm
Length (handle) (l_H)	430 mm	1430 mm
Max. load on the operating head	35 kg	14 kg



Two-part, for Hexagon Shafts

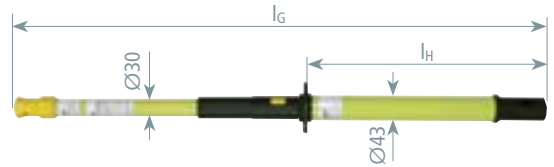
Handle termination with plastic plug-in coupling for extending the handle (spring locking mechanism)



Type	EST SK STK 920
Part No.	761 070
Total length (l _G)	920 mm
Length (handle) (l _H)	415 mm
Max. load on the operating head	35 kg

Two-part, for T Pin Shafts

Handle termination with plastic plug-in coupling for extending the handle (bayonet locking mechanism)



Type	EST SQ STK 920
Part No.	761 075
Total length (l _G)	920 mm
Length (handle) (l _H)	415 mm
Max. load on the operating head	35 kg

Accessories for Earthing Sticks for Switchgear Installations

Adapter (T Pin Shaft / Hexagon Shaft)

Suitable for insertion into earthing sticks with coupling for T pin shafts (bayonet locking mechanism) to accept clamps with hexagon shaft. The lock nut allows to fix the adapter on the earthing stick.



Type	AD ES SQ SK
Part No.	765 001
Length	130 mm

Earthing Sticks for Overhead Lines

- For outdoor use
- Robust aluminium cone coupling
- Total lengths up to 6000 mm
- Length of telescopic stick continuously adjustable via star knob
- For phase screw clamps and clamps with long T pin shaft

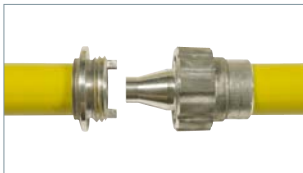


Telescopic earthing stick with aluminium cone coupling and phase screw clamp.

General Information:

Temperature range	-25 °C ... +55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (threaded coupling, star knob)	Aluminium alloy
End fitting	Aluminium/rubber eye / Plug-in coupling for extending the handle

A square tube (26 mm) can be pulled out of the round insulating tube and can be fixed in any position between l_{min} and l_{max} using the star knob.



Robust aluminium threaded coupling allows positive and non-positive connection due to the screw connection and gearing.



End fitting with eye (Al/rubber) or plug-in coupling with eye (Al/rubber) for extending the handle.

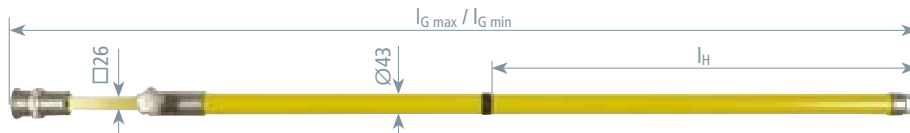


Lockable adjusting ring

The adjusting ring on the cone has the following functions:

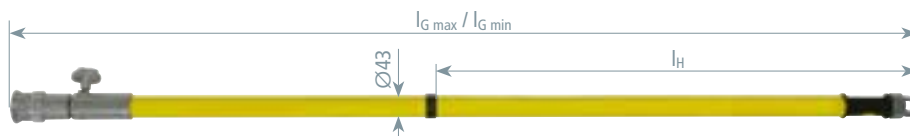
- Position „AUF“ (= OPEN): Stick can be removed after the clamp has been attached
- Position „ZU“ (= CLOSED): Stick and clamp remain coupled even after the earthing and short-circuiting device has been attached

Telescopic, for T Pin Shafts



Type	ESTC SQL 4000	ESTC SQL 5000
Part No.	769 400	769 500
Total length ($l_{G \max} / l_{G \min}$)	4015 / 2180 mm	5015 / 2680 mm
Length (handle) (l_H)	1400 mm	1900 mm
Max. load on the operating head ($l_{G \max} / l_{G \min}$)	12 / 35 kg	10 / 35 kg
Diameter	43 mm	43 mm

Telescopic, for T Pin Shafts, Plug-in Coupling



Type	ESTC SQL STK 3000
Part No.	769 300
Total length ($l_{G \max} / l_{G \min}$)	2945 / 1615 mm
Length (handle) (l_H)	900 mm
Max. load on the operating head ($l_{G \max} / l_{G \min}$)	18 / 35 kg
Diameter	43 mm

Earthing Sticks for Railway Applications



Attaching a railway earthing device.

For threaded T pin Shafts (Bayonet Locking Mechanism)

- For outdoor use
- Robust aluminium cone coupling
- Length of telescopic stick continuously adjustable via star knob
- Only suitable for phase screw clamps and clamps with long T pin shaft



General Information:

Standard	EN/IEC 61230 (DIN VDE 0683-100)
Temperature range	-25 °C ... +55 °C



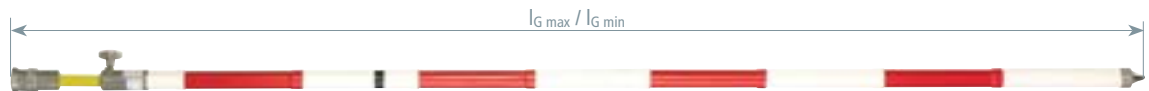
Lockable adjusting ring

The adjusting ring on the cone has the following functions:

- Position "AUF" (= OPEN): Stick can be removed after the clamp has been attached
- Position "ZU" (= CLOSED): Stick and clamp remain coupled even after the earthing and short-circuiting device has been attached

Telescopic Earthing Stick for T Pin Shafts

For threaded T pin shafts (bayonet locking mechanism).

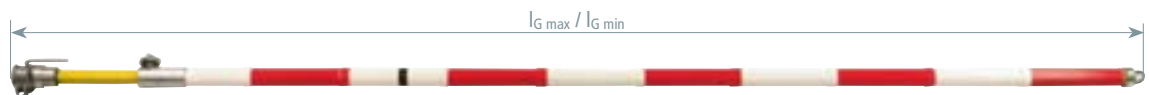


Type	ESTC SQL RW 3500	ESTC SQL RW 5000
Part No.	769 352	769 502
Total length (l _{G max} / l _{G min})	3515 / 1935 mm	5015 / 2685 mm
Max. load on the operating head (l _{G max} / l _{G min})	12 / 35 kg	10 / 35 kg
DB drawing No.	3 Ebgw 01.58	3 Ebgw 01.52
DB material No.	157 534	157 533

Telescopic Earthing Stick for T Pin Shafts with Cable Entry

For threaded T pin shafts (bayonet locking mechanism)

The coupling is additionally fitted with a cable entry and a hook for securing the earthing cable and earthing stick at the tower (without adjusting ring).



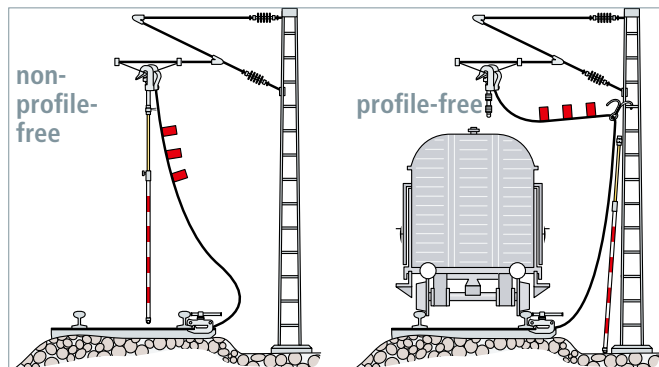
Type	ESTC SQL H RW 5000
Part No.	769 508
Total length (l _{G max} / l _{G min})	5015 / 2685 mm
Max. load on the operating head (l _{G max} / l _{G min})	10 / 35 kg
DB drawing No.	3 Ebgw 01.55
DB material No.	612 142

Kits for Railway Applications

Parts list:			
Pos.	Part No.	Pos.	Part No.
1	784 755	10	751 150
2	773 251	11	740 124
3	784 352	12	769 502
4	792 450	13	769 508
5	792 453	14	769 506
6	774 251	15	769 352
7	751 085	16	761 015
8	751 120	17	785 111
9	751 040	18	700 000

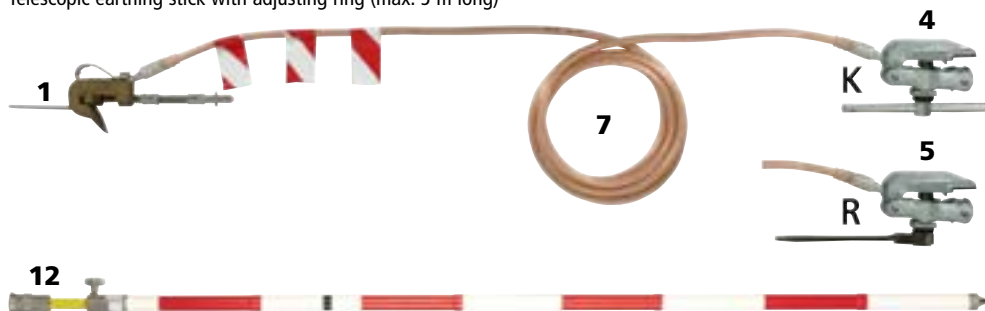


General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683-100)
Temperature range	-25 °C ... +55 °C



Kit for Overhead Contact Lines (non-profile-free)

Telescopic earthing stick with adjusting ring (max. 5 m long)



Kit includes:		
Type	Part No.	Pos. No.
Tommy bar (K) or ratchet (R)		
EKV K 50 8500	1x 751 086	1+4+7
EKV R 50 8500	1x 751 087	1+5+7
ESTC SQL RW 5000	1x 769 502	12

Type BEV ...	OL NPF K	OL NPF R
Part No.	750 210	750 218
Design	Tommy bar	Ratchet
Cable cross-section	50 mm ²	50 mm ²
Cable length	8500 mm	8500 mm
Max. short-circuit current I _k 0.06 s	34.0 kA	34.0 kA
DB drawing No.	3 Ebgw 01.51	—
DB material No.	237 117	—

Kit for Overhead Contact Lines for Transport in Motor Vehicles (non-profile-free)

For technical emergency service and emergency management

Telescopic earthing stick kit consisting of six elements, pluggable (max. 5 m long).



Kit includes:		
Type	Part No.	Pos. No.
Tommy bar (K) or ratchet (R)		
EKV K 50 8500	2x 751 086	1+4+7
EKV R 50 8500	2x 751 087	1+5+7
EST SQL RW 4915 TA	1x 769 506	14
STT 55 27 30	1x 785 111	17

Type BEV ...	OL NPF PKW K	OL NPF PKW R
Part No.	750 196	750 216
Design	Tommy bar	Ratchet
Cable cross-section	50 mm ²	50 mm ²
Cable length	8500 mm	8500 mm
Max. short-circuit current I _k 0.06 s	34.0 kA	34.0 kA
DB drawing No.	3 Ebgw 01.67	—
DB material No.	237 125	—

DEHNcare WJP



Protective overall against high-pressure water jets

- High-pressure resistant up to 1000 bar (tested with flat-jet nozzle according to the test principles GS-IFA-P15)
- Completely waterproof – including the seams
- Breathable, thus comfortable to wear
- Great freedom of movement due to especially light material
- Environmentally friendly – washable up to 60°

The first protective overall against high-pressure water jets to correspond to the test principles GS-IFA-P15 is breathable and a lightweight and thus especially comfortable to wear.



Attachable hood



Helmet, visor and earmuffs



Replaceable arm and leg protectors

Protective Overall against high-pressure Water Jets

Protective overall against high-pressure water jets, complete with arm and leg protectors.



General Information:			
High-pressure resistant	≤ 1000 bar		
Material	multilayer laminate		
Type	breathable and waterproof (class 3 according to EN 343)		
Standards / test principles	EN 343, EN 13034 (type 6), GS-IFA-P15		
Test parameters according to GS-IFA-P15	flat jet nozzle type B		
– Distance (nozzle – surface of test sample)	7.5 cm		
– Angle (high-pressure water jet)	15°		
– Speed (feed)	0.5 m/s		
– Quantity of water (high-pressure water jet)	22 l/min		
– Pressure (high-pressure water jet)	1200 bar*		
Type WJP OC ...	S	M	L
Part No.	786 741	786 742	786 743
Size	S	M	L
Type WJP OC ...	XL	XXL	3XL
Part No.	786 744	786 745	786 746
Size	XL	XXL	3XL

*) The test for protection against penetration of high-pressure water jets is performed with a safety factor of 1.2.

Accessories for DEHNcare WJP

Hood

Hood for protective overall against high-pressure water jets.



Type	WJP O H
Part No.	786 770
Fastening	by means of press buttons

Products for Protection against High-pressure Water Jet

Accessories for DEHNcare WJP

Overall

Overall without arm and leg protectors.

- Reflectors for better visibility
- Two-way zip
- Hood as accessory

General Information:	
High-pressure resistant	≤ 1000 bar
Material	multilayer laminate
Type	breathable and waterproof (class 3 according to EN 343)
Standards / test principles	EN 343, EN 13034 (type 6), GS-IFA-P15

Type	WJP O S	WJP O M	WJP O L
Part No.	786 751	786 752	786 753
Size	S	M	L

Type	WJP O XL	WJP O XXL	WJP O 3XL
Part No.	786 754	786 755	786 756
Size	XL	XXL	3XL

*) The test for protection against penetration of high-pressure water jets is performed with a safety factor of 1.2.



Arm Protectors

Arm protectors (set) for protective overall against high-pressure water jets.

- Increased protection against cuts and puncture wounds
- Reflectors for better visibility
- Silver popper – to start with buttoning

General Information:	
High-pressure resistant	≤ 1000 bar
Material	para-aramid fabric with polymer coating
Type	breathable and waterproof (class 3 according to EN 343)
Standards / test principles	EN 343, EN 13034 (Type 6), GS-IFA-P15

Type	WJP O AP S	WJP O AP M	WJP O AP L
Part No.	786 761	786 762	786 763
Size	S	M	L

Type	WJP O AP XL	WJP O AP XXL	WJP O AP 3XL
Part No.	786 764	786 765	786 766
Size	XL	XXL	3XL

*) The test for protection against penetration of high-pressure water jets is performed with a safety factor of 1.2.



Leg Protectors

Leg protectors (set) for protective overall against high-pressure water jets.

- Increased protection against cuts and puncture wounds
- Reflectors for better visibility
- Silver popper – to start with buttoning

General Information:	
High-pressure resistant	≤ 1000 bar
Material	para-aramid fabric with polymer coating
Type	breathable and waterproof (class 3 according to EN 343)
Standards / test principles	EN 343, EN 13034 (Type 6), GS-IFA-P15

Type	WJP O LP S	WJP O LP M	WJP O LP L
Part No.	786 781	786 782	786 783
Size	S	M	L

Type	WJP O LP XL	WJP O LP XXL	WJP O LP 3XL
Part No.	786 784	786 785	786 786
Size	XL	XXL	3XL

*) The test for protection against penetration of high-pressure water jets is performed with a safety factor of 1.2.



Accessories for DEHNcare WJP

ESH U Helmet



General Information:

Material	ABS plastics
Standard	EN 397 and EN 50365

Type	ESH U 1000 S SY	ESH U 1000 S SW	ESH U 1000 S SO
Part No.	785 705	785 706	785 707
Colour	Yellow	White	Orange

Type	ESH U 1000 S SB	ESH U 1000 S SR
Part No.	785 708	785 709
Colour	Blue	Red

Face Shield with Mechanical Lever Arm

Fits the slot of the ESH U S safety helmet for electricians.



Type	APS CL1 MEHA
Part No.	785 721
Colour	transparent
Material	polycarbonate

Earmuffs

For attaching to the face shield with mechanical lever arm according to EN 352-3.

- Pleasant to wear due to extra soft surface texture
- Comfortable protection in case of long-term application
- Turnable by 360°



Type	HKGH ESH MEHA
Part No.	786 799
SNR value	27 dB

Electrodes

- Safe contact with the part of an installation to be tested
- With M8 thread, to be screwed on the test prods of PHE4, PHE III, PHE voltage detectors as well as PHV I phase comparators

Onion-shaped Electrode

For contacting varnished busbars.

Type EL M8 ...	SZ PHE PHV
Part No.	766 913
Nominal voltage (U _N)	From 3 kV
Material	Brass/gal CuSn



Pin-shaped Electrode

For contacting varnished busbars.

Type EL M8 ...	S PHE PHV
Part No.	766 925
Nominal voltage (U _N)	From 3 kV
Material	StSt



Hook-shaped Electrode

For contacting overhead line conductors.

Type EL M8 ...	H PHE
Part No.	766 923
Application	For overhead lines only
Material	St/gal Zn



Adapters and End Fittings

End Fitting STK (Plug-in Coupling)

For use as termination and protection

Type	A STK
Part No.	766 888
Total length (l _G)	85 mm
Diameter	30 / 43 mm



End Fitting STK with Eye

For use as protection and transport eye when working on overhead lines.

Type	AR STK
Part No.	766 889
Total length (l _G)	150 mm
Diameter	30 / 43 mm



VDE standards for safety equipment and devices**DIN VDE 0680**

"Personal protective equipment, protective devices and apparatus for work on electrically energized systems up to 1000 V".

- Part 1 "Protective insulating devices"
- Part 3 "Operating rods and current collecting devices"
- Part 4 "Fuse handles for low-tension HRC-fuses"
- Part 6 "Single-pole voltage tester up to 250 V a.c."
- Part 7 "Socket spanner"

DIN VDE 0681

"Operating, testing and safe-guarding devices for work on electrically energized systems with rated voltages exceeding 1 kV".

- Part 1 "General requirements" for DIN VDE V 0681 Part 2 to Part 3 (DIN VDE V 0681-1)
- Part 2 "Switching sticks" (DIN VDE V 0681-1)
- Part 3 "Fuse tongs" (DIN VDE V 0681-1)
- Part 6 "Voltage detectors for overhead contact systems of electric railways"

DIN VDE 0682

"Apparatus and equipment for live working"

- Part 201 "Live working – Hand tools for use up to 1000 V a.c. and 1500 V d.c." (IEC/EN 60900)
- Part 211 "Live working – Insulating sticks and attachable devices – Part 1: Insulating sticks" (IEC 60832-1:2010)
- Part 212 "Live working – Insulating sticks and attachable devices – Part 2: Attachable devices" (IEC 60832-2:2010)
- Part 213 "Multi-purpose insulating sticks for electrical operations on high voltage installations" (EN 50508)
- Part 311 "Live working – Gloves of insulating material" (IEC/EN 60903)
- Part 312 "Sleeves of insulating material for live working" (IEC/EN 60984)
- Part 321 "Electrically insulating helmets for use on low voltage installations" (EN 50365)
- Part 401 "Two-pole low voltage type" (IEC/EN 61243-3)

- Part 411 "Capacitive type to be used for voltages exceeding 1 kV a.c." (IEC/EN 61243-1)
- Part 412 "Resistive type to be used for voltages of 1 kV to 36 kV" (IEC/EN 61243-2)
- Part 415 "Voltage detecting systems" (IEC/EN 61243-5)
- Part 417 "Voltage detectors – Distance voltage detectors" (preliminary standard DIN VDE V 0682-417/10.2013)
- Part 421 "Capacitive type to be used for voltages exceeding 1 kV a.c. and a frequency of 16.7 Hz" (draft 08.08)
- Part 431 Part 1: Live working – Phase comparators – Capacitive type to be used for voltages exceeding 1 kV a.c. (IEC/EN 61481-1)
- Part 431 Part 2: Live working – Phase comparators – Resistive type to be used for voltages from 1 kV to 36 kV a.c. (IEC/EN 61481-2)
- Part 511 "Electrical insulating blankets" (IEC/EN 61112)
- Part 512 "Electrical insulating matting" (IEC/EN 61111)
- Part 513 "Flexible conductor covers (line hoses) of insulating material" (IEC/EN 61479)
- Part 551 "Rigid protective covers for live working on a.c. installations" (IEC/EN 61229)
- Part 552 "Insulating protective barriers above 1 kV"
- Part 603 "Telescopic sticks and telescopic measuring sticks" (IEC/EN 62193)
- Part 621 "Suction device for the cleaning of live parts with rated voltages above 1 kV up to 36 kV"
- Part 651 "Saddles, pole clamps (stick clamps) and accessories for live working" (IEC/EN 61236)
- Part 741 "Aerial devices with insulating boom used for live working exceeding 1 kV a.c." (IEC/EN 61057)

DIN VDE 0683

"Portable equipment for earthing or earthing and short-circuiting"

- Part 100 "Portable equipment for earthing or earthing and short-circuiting" (IEC/EN 61230)
- Part 200 "Earthing or earthing and short-circuiting equipment using lances as a short-circuiting device – Lance earthing" (IEC/EN 61219)



Product documentation / construction and CAD drawings

Planning, design and implementation drawings of lightning and surge protection systems require a detailed product documentation. Computer Aided Engineering (CAE) is based on construction and CAD drawings.

DEHN provides you with the following documents and drawings for collective download:

- Installation instructions / instructions for use
- Test reports
- Certificates
- Data sheets
- Specifications
- CAD drawings (file formats: .stp, .igs, .jt, .dwg, .dxf)

Supported product ranges:

- **Surge Protection Red/Line** and **Yellow/Line** (complete)
- **Lightning Protection/Earthing** (partly; other in preparation)
- **Safety Equipment** (partly; other in preparation)

Proceed as follows:

1. Registration under <https://www.dehn-international.com/user/register> or
2. Login under <https://www.dehn-international.com/user>
3. Selected products into the shopping cart
4. Collective download of all components in the shopping cart

Collective download of certificates and test reports

Collective download of certificates and test reports from the notepad of our website is immediately possible. Procedure is the same as with the collective downloads of data sheets etc.

Please note:

A certificate and/or test report is not available for all products.

More information under

www.dehn-international.com/en/lightning-protection

Data sheets, test reports, 3D data and more also on the internet:

<http://de.hn/enpd>

DEHNacademy – E-Learning



Photo: fotolia.com

Easy-to-understand lightning and surge protection

What is the difference between a direct and an indirect lightning strike and how do they affect buildings? What are the causes for surges and how do they threaten electronic systems? What has to be observed when installing surge protective devices and how can installation errors be avoided? Are there special requirements for IT systems?

You will find the answers here. Become an expert "step-by-step" at your own pace. Start your learning program now. Directly on your computer – no download or installation required.

Notes

All information provided in this catalogue about the possible use of our products should be regarded as product information and for advisory purposes only. This information is based on experience and is specified to the best of our knowledge. We do not accept any liability in this respect. This particularly applies to the different conditions of use which are beyond our control. We recommend to check whether the respective DEHN product is suitable for the intended application. Application, use and processing of our products are beyond our control. Therefore, the product is completely subject to the user's responsibility. Illustrations are not binding.

We accept no liability for misprints, modifications and errors.

* GTIN (EAN-Code)

In this catalogue, you will find the GTIN (EAN code) next to the Part No. For reasons of clarity, only the individual GTIN part is specified. The country and DEHN code (40 13364) must be put in front of this number.

Abbreviations

PG	Product Group
PU	Packing Unit
SU	Sales Unit (Piece, Meter, Set or Pair)
pc(s)	Piece
m	Meter
Sa	Set
Pa	Pair
Weight	Weight per sales unit

Part No.	GTIN*	PG	Weight	PU	SU	Page
102 010	057814	01 01 01 01	17.62 kg	54	pc(s)	112
102 012	105089	01 01 01 01	17.60 kg	54	pc(s)	112
102 050	045996	01 01 01 01	217 g	1	pc(s)	112
102 060	094987	01 01 01 01	140 g	1	pc(s)	117
102 075	094215	01 01 01 01	8.46 kg	120	pc(s)	117
105 079	100183	01 01 01 05	96 g	1	pc(s)	123
105 140	112650	01 01 01 05	653 g	1	pc(s)	101
105 161	118324	01 01 01 05	667 g	1	pc(s)	104
105 162	146433	01 01 01 05	600 g	1	pc(s)	101
105 190	152045	01 01 01 01	9.20 kg	1	pc(s)	101
105 192	152069	01 01 01 01	16.20 kg	1	pc(s)	101
105 201	095915	01 01 01 01	17.23 kg	1	pc(s)	112
105 229	280625	01 07 01 01	89 g	10	pc(s)	116
105 241	361225	01 07 01 01	4.66 kg	1	pc(s)	102
105 314	157781	01 07 01 01	10 kg	1	pc(s)	104
105 317	157811	01 07 01 01	17 kg	1	pc(s)	104
105 320	152373	01 07 01 03	10.60 kg	1	pc(s)	110
105 321	152397	01 07 01 03	12.20 kg	1	pc(s)	110
105 322	152380	01 07 01 03	15.80 kg	1	pc(s)	110
105 323	152403	01 07 01 03	16.20 kg	1	pc(s)	110
105 331	152502	01 07 01 01	6 kg	1	pc(s)	104
105 340	098794	01 01 01 05	618 g	1	pc(s)	114
105 341	098800	01 01 01 05	607 g	1	pc(s)	115
105 342	111141	01 01 01 05	514 g	1	pc(s)	101
105 343	118515	01 01 01 05	3.60 kg	1	pc(s)	101
105 344	147300	01 01 01 05	1.52 kg	1	pc(s)	101
105 345	110489	01 01 01 05	3.60 kg	1	pc(s)	108
105 347	278554	01 01 01 05	2.42 kg	1	pc(s)	101
105 348	287013	01 01 01 05	540 g	1	pc(s)	101
105 349	288614	01 01 01 05	5.80 kg	1	pc(s)	101
105 351	238916	01 01 01 05	11.50 kg	1	pc(s)	111
105 354	098725	01 01 01 05	617 g	5	pc(s)	115
105 355	098732	01 01 01 05	690 g	1	pc(s)	115
105 356	098749	01 01 01 05	562 g	5	pc(s)	115
105 360	099777	01 01 01 05	358 g	1	pc(s)	114
105 361	102033	01 01 01 05	385 g	1	pc(s)	103
105 362	110496	01 01 01 05	467 g	1	pc(s)	114
105 363	106031	01 01 01 05	8.87 kg	1	pc(s)	116
105 364	106048	01 01 01 05	10.85 kg	1	pc(s)	116
105 365	106055	01 01 01 05	14.63 kg	1	pc(s)	116
105 376	115545	01 01 01 05	660 g	1	pc(s)	115
105 390	156944	01 07 01 01	6.30 kg	1	pc(s)	113
105 391	156951	01 07 01 01	22.90 kg	1	pc(s)	113
105 392	157903	01 07 01 03	10 kg	1	pc(s)	111
105 393	157927	01 07 01 03	12 kg	1	pc(s)	111
105 394	157910	01 07 01 03	15 kg	1	pc(s)	111
105 395	157934	01 07 01 03	17 kg	1	pc(s)	111
105 396	156487	01 07 01 01	1.80 kg	1	pc(s)	113
105 397	156494	01 07 01 01	2.50 kg	1	pc(s)	113
105 398	156500	01 07 01 01	3 kg	1	pc(s)	113
105 462	381537	01 07 01 03	830 g	1	pc(s)	118
105 467	381599	01 07 01 03	4.10 kg	1	pc(s)	118
105 468	381582	01 07 01 03	3.65 kg	1	pc(s)	118
105 490	156968	01 07 01 01	7.40 kg	1	pc(s)	113
105 491	156975	01 07 01 01	30 kg	1	pc(s)	113
105 496	156517	01 07 01 01	2.40 kg	1	pc(s)	113
105 497	156524	01 07 01 01	3.40 kg	1	pc(s)	113
105 498	156531	01 07 01 01	4 kg	1	pc(s)	113
105 513	270282	01 07 01 03	5 kg	1	pc(s)	111
105 515	271821	01 07 01 03	7.84 kg	1	pc(s)	111
105 543	271845	01 07 01 03	6.24 kg	1	pc(s)	111

Part No.	GTIN*	PG	Weight	PU	SU	Page
105 545	271876	01 07 01 03	8.72 kg	1	pc(s)	111
105 563	271937	01 07 01 03	5.54 kg	1	pc(s)	110
105 565	271944	01 07 01 03	7.92 kg	1	pc(s)	110
105 573	271975	01 07 01 03	6.40 kg	1	pc(s)	110
105 575	272026	01 07 01 03	8.74 kg	1	pc(s)	110
105 601	142336	01 01 01 01	6 kg	1	pc(s)	112
106 217	128811	01 01 01 06	280 g	10	pc(s)	123
106 220	128828	01 01 01 06	410 g	10	pc(s)	123
106 323	097315	01 01 01 06	110 g	10	pc(s)	121
106 324	099074	01 01 01 06	48 g	20	pc(s)	121
106 814	381483	01 07 01 03	673 g	1	pc(s)	118
123 040	353817	01 03 01 01	167 g	12	pc(s)	102
123 041	353787	01 03 01 01	180 g	12	pc(s)	102
123 042	353794	01 03 01 01	122 g	12	pc(s)	102
123 043	353824	01 03 01 01	75 g	12	pc(s)	102
202 857	153189	01 07 01 03	127 g	1	pc(s)	120
223 010	092778	01 03 01 01	184 g	50	pc(s)	97
223 020	092792	01 03 01 01	121 g	50	pc(s)	97
223 021	092808	01 03 01 01	103 g	50	pc(s)	97
223 070	108738	01 03 01 01	103 g	50	pc(s)	97
253 300	129771	01 03 01 01	165 g	24	pc(s)	117
253 301	129788	01 03 01 01	4.60 kg	24	pc(s)	117
253 330	153585	01 07 01 03	96 g	1	pc(s)	117
253 331	155206	01 07 01 03	180 g	25	pc(s)	117
253 333	153578	01 07 01 03	4.74 kg	24	pc(s)	116
253 334	154933	01 07 01 03	8.59 kg	1	pc(s)	116
275 240	152335	01 07 01 03	53 g	25	pc(s)	119
275 241	152342	01 07 01 03	53 g	25	pc(s)	119
275 242	152359	01 07 01 03	52 g	25	pc(s)	119
275 249	152366	01 07 01 03	56 g	25	pc(s)	103
275 250	155602	01 07 01 01	46 g	25	pc(s)	103
275 251	155619	01 07 01 01	46 g	25	pc(s)	103
275 252	155626	01 07 01 01	46 g	25	pc(s)	103
275 319	229952	01 07 01 01	124 g	10	pc(s)	105
275 320	099876	01 07 01 01	250 g	1	pc(s)	105
275 339	223332	01 07 01 01	247 g	1	pc(s)	119
275 359	223271	01 07 01 01	131 g	1	pc(s)	119
275 450	244436	01 07 01 01	168 g	10	pc(s)	120
275 451	244498	01 07 01 01	273 g	10	pc(s)	120
275 454	244504	01 07 01 01	173 g	10	pc(s)	121
275 455	244535	01 07 01 01	277 g	10	pc(s)	121
275 498	146945	01 07 01 01	320 g	10	pc(s)	121
276 056	104983	01 06 01 01	2 g	1	pc(s)	93
276 057	104990	01 06 01 01	2 g	1	pc(s)	93
297 120	100916	01 03 01 01	43 g	50	pc(s)	97
301 000	067035	01 04 01 02	61 g	100	pc(s)	98
301 010	067028	01 04 01 02	61 g	100	pc(s)	98
301 019	081277	01 04 01 02	63 g	100	pc(s)	98
301 209	158252	01 04 01 02	59 g	1	pc(s)	100
305 000	041936	01 04 01 01	146 g	50	pc(s)	99
306 029	129467	01 04 01 01	120 g	50	pc(s)	99
306 101	024120	01 04 01 01	412 g	25	pc(s)	99
306 121	284920	03 01 01 01	161 g	50	pc(s)	99
306 122	284937	03 01 01 01	165 g	50	pc(s)	99
371 009	024656	01 04 01 02	208 g	20	pc(s)	99
372 119	119178	01 04 01 02	277 g	25	pc(s)	99

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Part No.	GTIN*	PG	Weight	PU	SU	Page
372 149	119208	01 04 01 02	326 g	25	pc(s)	99
377 009	119284	01 04 01 02	52 g	50	pc(s)	100
380 209	158269	01 04 01 02	102 g	1	pc(s)	100
390 159	032200	01 04 01 02	61 g	100	pc(s)	98
390 209	158245	01 04 01 01	104 g	1	pc(s)	100
392 209	158238	01 04 01 01	28 g	1	pc(s)	100
405 020	098459	01 07 01 01	81 g	1	pc(s)	105
410 239	152465	01 07 01 01	80 g	1	pc(s)	110
410 349	081604	01 05 01 02	232 g	1	pc(s)	106
444 050	291218	03 07 01 01	24 g/Sa	1	Sa	116
459 200	155527	01 04 01 03	132 g	1	pc(s)	100
459 219	158221	01 04 01 03	126 g	1	pc(s)	100
478 099	120334	01 06 01 01	52 g	20	pc(s)	93
540 104	239685	01 05 01 05	127 g	10	pc(s)	106
540 110	094116	01 05 01 02	98 g	50	pc(s)	106
540 901	076525	01 05 01 02	6.28 kg	1	pc(s)	106
552 010	021150	01 01 01 03	33 g	25	pc(s)	96
597 032	155008	01 06 01 02	1.49 kg	1	pc(s)	103
597 101	143838	01 06 01 02	10 g/Sa	1	Sa	103
597 102	153127	01 06 01 02	3.30 g/Sa	1	Sa	123
597 127	153110	01 06 01 02	412 g	1	pc(s)	123
597 139	157941	01 06 01 02	172 g	1	pc(s)	123
597 227	153103	01 06 01 02	699 g	1	pc(s)	123
712 001	011823	05 00 04 02	1.23 kg/m	1	m	132
715 001	011830	05 00 04 02	1.52 kg/m	1	m	132
716 001	010406	05 00 04 02	184 g/m	1	m	132
725 001	011793	05 00 04 02	207 g/m	1	m	132
728 312	128712	05 00 04 06	270 g	1	pc(s)	136
728 313	157132	05 00 04 06	612 g	1	pc(s)	136
728 620	147843	05 00 04 09	985 g	1	pc(s)	132
728 625	147867	05 00 04 09	984 g	1	pc(s)	132
735 001	011847	05 00 04 02	366 g/m	1	m	132
750 001	011809	05 00 04 02	535 g/m	1	m	132
750 196	123823	05 00 04 06	26.58 kg	1	pc(s)	141
750 210	123793	05 00 04 06	13.44 kg	1	pc(s)	141
750 216	157255	05 00 04 06	26.58 kg	1	pc(s)	141
750 218	157224	05 00 04 06	14.73 kg	1	pc(s)	141
761 001	125179	05 00 04 11	400 g	1	pc(s)	137
761 002	125186	05 00 04 11	400 g	1	pc(s)	137
761 003	134348	05 00 04 11	840 g	1	pc(s)	137
761 004	134355	05 00 04 11	1.99 kg	1	pc(s)	137
761 070	136212	05 00 04 11	800 g	1	pc(s)	138
761 075	136229	05 00 04 11	800 g	1	pc(s)	138
765 001	051805	05 00 04 11	190 g	1	pc(s)	138
766 390	282810	05 00 01 05	1.55 kg	1	pc(s)	130
766 395	365988	05 00 01 05	67 g	1	pc(s)	130
766 888	125209	05 00 03 50	63 g	1	pc(s)	145
766 889	125193	05 00 03 50	172 g	1	pc(s)	145
766 913	051836	05 00 03 50	42 g	1	pc(s)	145
766 923	074590	05 00 03 50	71 g	1	pc(s)	145
766 925	091672	05 00 03 50	10 g	1	pc(s)	144

Part No.	GTIN*	PG	Weight	PU	SU	Page
769 300	080867	05 00 04 11	2.8 kg	1	pc(s)	139
769 352	007345	05 00 04 11	3.7 kg	1	pc(s)	140
769 400	080881	05 00 04 11	3.68 kg	1	pc(s)	139
769 500	080904	05 00 04 11	4.68 kg	1	pc(s)	139
769 502	004542	05 00 04 11	5.6 kg	1	pc(s)	140
769 508	052383	05 00 04 11	4.5 kg	1	pc(s)	140
770 001	011762	05 00 04 02	753 g/m	1	m	132
771 316	150393	05 00 04 08	418 g	1	pc(s)	134
772 310	057593	05 00 04 08	469 g	1	pc(s)	133
772 311	057586	05 00 04 08	482 g	1	pc(s)	133
772 312	054431	05 00 04 08	480 g	1	pc(s)	134
772 320	057432	05 00 04 08	785 g	1	pc(s)	133
772 321	057449	05 00 04 08	756 g	1	pc(s)	133
772 330	069220	05 00 04 08	560 g	1	pc(s)	134
772 331	066304	05 00 04 08	566 g	1	pc(s)	134
772 340	057456	05 00 04 08	878 g	1	pc(s)	134
772 341	057425	05 00 04 08	902 g	1	pc(s)	134
773 034	114562	05 00 04 08	634 g	1	pc(s)	134
773 130	057722	05 00 04 08	801 g	1	pc(s)	134
773 234	114555	05 00 04 08	661 g	1	pc(s)	134
773 330	057760	05 00 04 08	830 g	1	pc(s)	134
783 332	310070	05 00 03 03	1.46 kg	1	pc(s)	131
783 335	310001	05 00 03 03	1.55 kg	1	pc(s)	131
783 342	310025	05 00 03 03	1.61 kg	1	pc(s)	131
783 345	309975	05 00 03 03	1.61 kg	1	pc(s)	131
783 395	309951	05 00 03 03	1.61 kg	1	pc(s)	131
784 201	006591	05 00 04 08	880 g	1	pc(s)	135
784 301	006553	05 00 04 08	1.7 kg	1	pc(s)	135
784 352	006072	05 00 04 08	806 g	1	pc(s)	136
784 401	006614	05 00 04 08	1.3 kg	1	pc(s)	135
784 501	006560	05 00 04 08	1.95 kg	1	pc(s)	135
784 755	054202	05 00 04 08	1.54 kg	1	pc(s)	136
784 756	230118	05 00 04 08	1.6 kg	1	pc(s)	136
785 705	341449	05 02 01 03	400 g	1	pc(s)	144
785 706	341456	05 02 01 03	400 g	1	pc(s)	144
785 707	341487	05 02 01 03	400 g	1	pc(s)	144
785 708	341463	05 02 01 03	400 g	1	pc(s)	144
785 709	341470	05 02 01 03	400 g	1	pc(s)	144
785 721	360198	05 02 01 03	182 g	1	pc(s)	143
785 799	124950	05 02 01 01	196 g/Pa	1	Pa	143
786 741	4365438	05 08 01 01	2.16 kg	1	pc(s)	142
786 742	4365445	05 08 01 01	2.19 kg	1	pc(s)	142
786 743	4365452	05 08 01 01	2.45 kg	1	pc(s)	142
786 744	4365469	05 08 01 01	2.53 kg	1	pc(s)	142
786 745	4365476	05 08 01 01	2.66 kg	1	pc(s)	142
786 746	4365483	05 08 01 01	2.76 kg	1	pc(s)	142
786 751	4365247	05 08 01 01	1.58 kg	1	pc(s)	143
786 752	4365254	05 08 01 01	1.68 kg	1	pc(s)	143
786 753	4365261	05 08 01 01	1.78 kg	1	pc(s)	143
786 754	4365278	05 08 01 01	1.86 kg	1	pc(s)	143
786 755	4365285	05 08 01 01	1.94 kg	1	pc(s)	143
786 756	4365292	05 08 01 01	2.03 kg	1	pc(s)	143
786 761	4365308	05 08 01 01	207 g	1	pc(s)	143
786 762	4365315	05 08 01 01	226 g	1	pc(s)	143
786 763	4365322	05 08 01 01	245 g	1	pc(s)	143
786 764	4365339	05 08 01 01	251 g	1	pc(s)	143
786 765	4365346	05 08 01 01	276 g	1	pc(s)	143
786 766	4365360	05 08 01 01	300 g	1	pc(s)	143

Part No.	GTIN*	PG	Weight	PU	SU	Page
786 770	4365353	05 08 01 01	825 g	1	pc(s)	142
786 781	4365377	05 08 01 01	372 g	1	pc(s)	143
786 782	4365384	05 08 01 01	393 g	1	pc(s)	143
786 783	4365391	05 08 01 01	413 g	1	pc(s)	143
786 784	4365407	05 08 01 01	420 g	1	pc(s)	143
786 785	4365414	05 08 01 01	428 g	1	pc(s)	143
786 786	4365421	05 08 01 01	436 g	1	pc(s)	143
795 001	011816	05 00 04 02	1 kg/m	1	m	132
800 008	018716	02 01 01 01	394 g/m	127	m	92
800 010	018723	02 01 01 01	617 g/m	81	m	92
800 108	018754	02 01 01 01	440 g/m	75	m	92
800 110	018761	02 01 01 01	680 g/m	50	m	92
800 310	131064	02 01 01 01	617 g/m	30	m	92
800 910	253315	02 01 01 01	1.85 kg	10	pc(s)	92
800 911	273689	02 01 01 01	4.10 kg/Stk	1	pc(s)	92
801 050	018921	02 03 01 01	330 g/m	100	m	95
810 225	018815	02 02 01 01	400 g/m	100	m	93
810 304	019232	02 02 01 01	960 g/m	52	m	93
810 335	032880	02 02 01 01	840 g/m	50	m	93
810 404	048256	02 02 01 01	1.28 kg/m	40	m	93
810 405	032897	02 02 01 01	1.60 kg/m	30	m	93
819 135	141759	01 07 01 01	488 g/m	100	m	104
819 137	152625	01 07 01 03	854 g/m	100	m	104
819 142	152458	01 07 01 03	410 g	1	pc(s)	110
819 145	152533	01 07 01 01	377 g	1	pc(s)	104
819 149	272057	01 07 01 03	800 g	1	pc(s)	110
819 160	152298	01 07 01 03	4.80 kg	1	pc(s)	109
819 161	281646	01 07 01 03	25.97 kg	1	pc(s)	109
819 163	280199	01 07 01 03	4.36 kg	1	pc(s)	109
819 165	272224	01 07 01 03	4.48 kg	1	pc(s)	109
819 183	249325	01 07 01 01	737 g	1	pc(s)	111
819 184	249318	01 07 01 01	2 kg	1	pc(s)	111
819 185	249288	01 07 01 01	1.15 kg	1	pc(s)	111
819 186	249295	01 07 01 01	3.25 kg	1	pc(s)	111
819 430	152236	01 07 01 03	15.40 kg	1	pc(s)	108
819 431	155442	01 07 01 03	17 kg	1	pc(s)	108
819 433	155459	01 07 01 03	21 kg	1	pc(s)	108
819 760	240391	01 07 01 03	56.64 kg	1	pc(s)	108
830 008	018785	02 01 01 02	448 g/m	100	m	91
830 038	035690	02 01 01 02	448 g/m	100	m	91
830 108	080430	02 01 01 02	448 g/m	20	m	91
831 225	018891	02 02 01 02	450 g/m	100	m	93
832 095	048324	02 03 01 02	845 g/m	50	m	95
832 120	129610	02 03 01 02	1.06 kg/m	50	m	95
832 192	018914	02 03 01 02	597 g/m	50	m	95
832 193	093430	02 03 01 02	597 g/m	100	m	95
832 202	081048	02 03 01 02	597 g/m	50	m	96
832 292	093171	02 03 01 02	597 g/m	100	m	96
832 295	093447	02 03 01 02	845 g/m	50	m	96
832 320	129641	02 03 01 02	1.06 kg/m	50	m	96
832 739	018907	02 03 01 02	438 g/m	50	m	95
832 740	093454	02 03 01 02	438 g/m	100	m	95
832 838	335776	02 03 01 02	334 g/m	100	m	96
832 839	093164	02 03 01 02	438 g/m	100	m	96
833 008	151987	02 01 01 02	182 g/m	110	m	91
840 008	018730	02 01 01 04	135 g/m	148	m	91
840 010	018747	02 01 01 04	210 g/m	100	m	91

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840 018	035706	02 01 01 04	135 g/m	148	m	91
840 028	131163	02 01 01 04	135 g/m	21	m	91
840 050	070141	02 03 01 04	133 g/m	100	m	95
840 108	080423	02 01 01 04	135 g/m	21	m	91
840 118	071483	02 01 01 04	200 g/m	100	m	91
840 128	160002	02 01 01 04	200 g/m	100	m	91
850 008	129627	02 03 01 03	235 g/m	100	m	95
850 010	129634	02 03 01 03	395 g/m	100	m	95
852 335	031067	02 02 01 01	840 g/m	25	m	93
860 008	018808	02 01 01 03	395 g/m	125	m	92
860 010	019997	02 01 01 03	617 g/m	80	m	92
860 020	092662	02 01 01 03	617 g/m	20	m	92
860 050	139923	02 01 01 03	617 g/m	50	m	92
860 325	093157	02 02 01 03	825 g/m	25	m	94
860 335	143388	02 02 01 03	827 g/m	60	m	94
860 404	276482	02 02 01 03	1.28 kg/m	40	m	94
860 405	276499	02 02 01 03	1.45 kg/m	30	m	94
860 900	143395	02 02 01 03	824 g/m	60	m	94
860 908	019362	02 01 01 03	395 g/m	125	m	92
860 910	019300	02 01 01 03	617 g/m	80	m	92
860 920	092679	02 01 01 03	617 g/m	20	m	92
860 925	093140	02 02 01 03	825 g/m	25	m	94
860 950	155596	02 01 01 03	617 g/m	50	m	92
861 325	292611	02 02 01 03	825 g/m	25	m	94
861 335	292628	02 02 01 03	824 g/m	60	m	94
900 060	153707	04 01 01 05	374 g	1	pc(s)	25
900 061	153721	04 01 01 05	433 g	1	pc(s)	25
900 062	153745	04 01 01 05	524 g	1	pc(s)	25
900 065	153714	04 01 01 05	378 g	1	pc(s)	25
900 066	153738	04 01 01 05	437 g	1	pc(s)	25
900 067	153752	04 01 01 05	530 g	1	pc(s)	25
900 120	109377	04 01 01 13	873 g	1	pc(s)	30
900 222	102521	04 01 01 13	331 g	1	pc(s)	30
908 010	148512	04 01 02 17	42 g	1	pc(s)	42
908 011	148482	04 01 02 17	37 g	1	pc(s)	42
908 012	148505	04 01 02 17	40 g	1	pc(s)	42
908 013	148536	04 01 02 17	57 g	1	pc(s)	42
908 014	148529	04 01 02 17	49 g	1	pc(s)	42
908 015	148543	04 01 02 17	60 g	1	pc(s)	42
908 070	148499	04 01 02 17	113 g	1	pc(s)	42
908 074	148567	04 01 02 17	123 g	1	pc(s)	42
908 076	148581	04 01 02 17	130 g	1	pc(s)	42
908 090	148550	04 01 02 17	117 g	1	pc(s)	42
908 094	148574	04 01 02 17	126 g	1	pc(s)	42
908 096	148598	04 01 02 17	134 g	1	pc(s)	42
908 190	148604	04 01 02 17	219 g	1	pc(s)	40
908 192	148628	04 01 02 17	238 g	1	pc(s)	40
908 195	148611	04 01 02 17	225 g	1	pc(s)	41
908 197	148635	04 01 02 17	243 g	1	pc(s)	41
908 203	148642	04 01 02 17	225 g	1	pc(s)	41
908 204	148666	04 01 02 17	259 g	1	pc(s)	41
908 208	148659	04 01 02 17	230 g	1	pc(s)	42
908 209	148673	04 01 02 17	266 g	1	pc(s)	42
908 214	267961	04 01 02 17	304 g	1	pc(s)	41
908 219	267978	04 01 02 17	311 g	1	pc(s)	41
908 300	148680	04 01 02 17	303 g	1	pc(s)	38
908 301	148727	04 01 02 17	363 g	1	pc(s)	38
908 305	148697	04 01 02 17	310 g	1	pc(s)	39
908 306	148734	04 01 02 17	370 g	1	pc(s)	39

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908 314	148703	04 01 02 17	339 g	1	pc(s)	38
908 319	148710	04 01 02 17	347 g	1	pc(s)	39
908 340	148840	04 01 02 17	386 g	1	pc(s)	39
908 341	148864	04 01 02 17	423 g	1	pc(s)	39
908 342	148765	04 01 02 17	448 g	1	pc(s)	39
908 343	148789	04 01 02 17	399 g	1	pc(s)	40
908 344	148802	04 01 02 17	430 g	1	pc(s)	40
908 345	148857	04 01 02 17	394 g	1	pc(s)	40
908 346	148871	04 01 02 17	432 g	1	pc(s)	40
908 347	148772	04 01 02 17	456 g	1	pc(s)	40
908 348	148796	04 01 02 17	406 g	1	pc(s)	40
908 349	148819	04 01 02 17	438 g	1	pc(s)	40
908 350	148741	04 01 02 17	373 g	1	pc(s)	39
908 351	148826	04 01 02 17	319 g	1	pc(s)	39
908 355	148758	04 01 02 17	380 g	1	pc(s)	39
908 356	148833	04 01 02 17	325 g	1	pc(s)	39
908 505	228139	04 01 01 15	861 g	1	pc(s)	28
908 506	228146	04 01 01 15	882 g	1	pc(s)	28
909 703	085664	04 02 08 02	233 g	1	pc(s)	77
909 704	105690	04 02 08 02	86 g	1	pc(s)	77
909 705	105706	04 02 08 02	283 g	1	pc(s)	77
909 706	362437	04 02 08 02	222 g	1	pc(s)	77
909 710	118942	04 02 08 01	114 g	1	pc(s)	76
910 099	037298	04 02 10 02	38 g	1	pc(s)	78
910 486	124479	04 03 01 50	130 g	1	pc(s)	80
910 653	113008	04 03 01 02	1.06 kg	1	pc(s)	82
910 694	350212	04 03 01 03	67 g	1	pc(s)	81
910 695	118959	04 03 01 03	180 g	1	pc(s)	80
910 696	149359	04 03 01 03	54 g	1	pc(s)	80
910 698	337053	04 03 01 03	67 g	1	pc(s)	81
917 920	150560	04 02 02 02	32 g	1	pc(s)	68
917 921	150577	04 02 02 02	31 g	1	pc(s)	68
917 941	150607	04 02 02 02	31 g	1	pc(s)	68
917 970	150621	04 02 02 02	31 g	1	pc(s)	68
917 987	150645	04 02 02 02	30 g	1	pc(s)	68
917 988	150652	04 02 02 02	25 g	1	pc(s)	68
918 401	074224	04 02 03 01	182 g	1	pc(s)	69
918 409	146709	04 02 03 01	110 g	1	pc(s)	70
918 411	093133	04 02 03 01	99 g	1	pc(s)	70
918 422	149267	04 02 03 01	97 g	1	pc(s)	70
920 222	118355	04 02 01 02	21 g	1	pc(s)	59
920 224	117785	04 02 01 02	37 g	1	pc(s)	59
920 243	126732	04 02 01 02	21 g	1	pc(s)	60
920 244	117792	04 02 01 02	21 g	1	pc(s)	59
920 245	118386	04 02 01 02	36 g	1	pc(s)	59
920 270	117549	04 02 01 02	22 g	1	pc(s)	59
920 271	117556	04 02 01 02	22 g	1	pc(s)	59
920 296	340015	04 02 01 02	21 g	1	pc(s)	60
920 300	109179	04 02 01 01	34 g	1	pc(s)	55
920 301	109186	04 02 01 01	53 g	1	pc(s)	65
920 310	109124	04 02 01 02	25 g	1	pc(s)	57
920 314	261396	04 02 01 02	25 g	1	pc(s)	57
920 324	109056	04 02 01 02	38 g	1	pc(s)	57
920 325	109063	04 02 01 02	24 g	1	pc(s)	57
920 327	109087	04 02 01 02	24 g	1	pc(s)	57
920 334	152229	04 02 01 02	23 g	1	pc(s)	58
920 344	108981	04 02 01 02	37 g	1	pc(s)	57
920 347	109018	04 02 01 02	24 g	1	pc(s)	57
920 349	126404	04 02 01 03	25 g	1	pc(s)	61
920 370	109117	04 02 01 02	24 g	1	pc(s)	58

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920 371	109094	04 02 01 02	24 g	1	pc(s)	58
920 381	109025	04 02 01 05	23 g	1	pc(s)	66
920 383	126725	04 02 01 05	21 g	1	pc(s)	66
920 388	137370	04 02 01 02	28 g	1	pc(s)	58
920 389	118447	04 02 01 02	30 g	1	pc(s)	58
923 019	033177	04 01 05 02	1.7 kg	1	pc(s)	46
923 025	110397	04 01 05 03	137 g	1	pc(s)	48
923 035	110403	04 01 05 03	163 g	1	pc(s)	48
923 045	110410	04 01 05 03	190 g	1	pc(s)	48
923 060	038899	04 01 05 02	725 g	1	pc(s)	46
923 061	038905	04 01 05 02	750 g	1	pc(s)	46
923 062	038912	04 01 05 02	733 g	1	pc(s)	46
923 100	108325	04 01 05 02	289 g	1	pc(s)	47
923 101	108332	04 01 05 02	1.98 kg	1	pc(s)	48
923 211	150904	04 01 05 03	106 g	1	pc(s)	48
923 214	150911	04 01 05 03	107 g	1	pc(s)	48
923 218	150928	04 01 05 03	98 g	1	pc(s)	48
923 222	150935	04 01 05 03	98 g	1	pc(s)	48
923 226	150942	04 01 05 03	91 g	1	pc(s)	48
923 230	150959	04 01 05 03	180 g	1	pc(s)	48
923 233	150966	04 01 05 03	174 g	1	pc(s)	48
923 236	150973	04 01 05 03	170 g	1	pc(s)	48
923 239	150980	04 01 05 03	162 g	1	pc(s)	48
923 242	150997	04 01 05 03	158 g	1	pc(s)	48
923 311	150775	04 01 05 03	105 g	1	pc(s)	48
923 314	150782	04 01 05 03	106 g	1	pc(s)	48
923 318	150799	04 01 05 03	100 g	1	pc(s)	48
923 322	150805	04 01 05 03	96 g	1	pc(s)	48
923 326	150812	04 01 05 03	91 g	1	pc(s)	48
923 330	150829	04 01 05 03	178 g	1	pc(s)	48
923 333	150836	04 01 05 03	172 g	1	pc(s)	48
923 336	150843	04 01 05 03	168 g	1	pc(s)	48
923 339	150850	04 01 05 03	162 g	1	pc(s)	48
923 342	150867	04 01 05 03	158 g	1	pc(s)	48
923 348	150874	04 01 05 03	141 g	1	pc(s)	48
923 356	150881	04 01 05 03	262 g	1	pc(s)	48
923 362	150898	04 01 05 03	244 g	1	pc(s)	48
923 401	237766	04 01 06 04	12.2 kg	1	pc(s)	50
924 017	045934	04 02 09 01	30 g	1	pc(s)	78
926 220	127012	04 02 01 04	21 g	1	pc(s)	63
926 222	127029	04 02 01 04	21 g	1	pc(s)	63
926 224	127036	04 02 01 04	21 g	1	pc(s)	63
926 225	127043	04 02 01 04	21 g	1	pc(s)	63
926 227	127067	04 02 01 04	21 g	1	pc(s)	63
926 240	127074	04 02 01 04	21 g	1	pc(s)	64
926 242	127081	04 02 01 04	21 g	1	pc(s)	64
926 244	127098	04 02 01 04	21 g	1	pc(s)	64
926 270	127135	04 02 01 04	21 g	1	pc(s)	64
926 271	127142	04 02 01 04	21 g	1	pc(s)	64
926 304	157125	04 02 01 01	45 g	1	pc(s)	55
926 322	127166	04 02 01 04	23 g	1	pc(s)	62
926 324	127173	04 02 01 04	21 g	1	pc(s)	62
926 327	127203	04 02 01 04	22 g	1	pc(s)	62
926 344	127234	04 02 01 04	22 g	1	pc(s)	63
926 370	127272	04 02 01 04	22 g	1	pc(s)	63
926 371	127289	04 02 01 04	22 g	1	pc(s)	63
929 039	135185	04 02 08 03	24 g	1	pc(s)	77
929 045	091061	04 02 08 03	266 g	1	pc(s)	77
929 100	102170	04 02 06 01	244 g	1	pc(s)	75
929 121	118935	04 02 06 01	109 g	1	pc(s)	75

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929 126	242258	04 02 06 01	96 g	1	pc(s)	75
929 221	342866	04 02 06 01	606 g	1	pc(s)	74
929 921	098169	04 02 05 01	218 g	1	pc(s)	72
929 941	098152	04 02 05 01	173 g	1	pc(s)	71
929 951	137394	04 02 05 03	222 g	1	pc(s)	73
929 960	098145	04 02 05 01	172 g	1	pc(s)	72
929 963	101807	04 02 05 02	172 g	1	pc(s)	72
929 964	101814	04 02 05 02	169 g	1	pc(s)	72
929 965	360778	04 02 05 01	171 g	1	pc(s)	72
929 970	127425	04 02 05 03	248 g	1	pc(s)	73
941 110	137899	04 01 01 04	275 g	1	pc(s)	24
941 115	289208	04 01 01 04	285 g	1	pc(s)	24
941 200	138209	04 01 01 04	250 g	1	pc(s)	24
941 205	289185	04 01 01 04	260 g	1	pc(s)	24
941 300	133556	04 01 01 04	386 g	1	pc(s)	22
941 305	275317	04 01 01 04	361 g	1	pc(s)	23
941 310	131798	04 01 01 04	480 g	1	pc(s)	23
941 315	275324	04 01 01 04	448 g	1	pc(s)	23
941 400	133563	04 01 01 04	525 g	1	pc(s)	23
951 001	108066	04 01 01 01	192 g	1	pc(s)	21
951 050	108073	04 01 01 01	171 g	1	pc(s)	21
951 100	108080	04 01 01 01	171 g	1	pc(s)	21
951 110	108110	04 01 01 01	659 g	1	pc(s)	20
951 115	108127	04 01 01 01	664 g	1	pc(s)	20
951 200	108097	04 01 01 01	724 g	1	pc(s)	20
951 205	108103	04 01 01 01	669 g	1	pc(s)	20
951 300	108134	04 01 01 01	970 g	1	pc(s)	19
951 305	108141	04 01 01 01	962 g	1	pc(s)	19
951 310	108172	04 01 01 01	1.27 kg	1	pc(s)	19
951 315	108189	04 01 01 01	1.28 kg	1	pc(s)	19
951 400	108158	04 01 01 01	1.35 kg	1	pc(s)	19
951 405	108165	04 01 01 01	1.36 kg	1	pc(s)	19
952 010	108356	04 01 02 01	43 g	1	pc(s)	36
952 011	109773	04 01 02 01	32 g	1	pc(s)	36
952 012	109780	04 01 02 01	35 g	1	pc(s)	36
952 013	109797	04 01 02 01	46 g	1	pc(s)	36
952 014	108363	04 01 02 01	50 g	1	pc(s)	36
952 015	109803	04 01 02 01	53 g	1	pc(s)	36
952 016	109810	04 01 02 01	64 g	1	pc(s)	36
952 018	119482	04 01 02 01	37 g	1	pc(s)	36
952 022	376533	04 01 02 24	43 g	1	pc(s)	33
952 024	377356	04 01 02 24	52 g	1	pc(s)	33
952 028	387843	04 01 02 24	51 g	1	pc(s)	33
952 048	327733	04 01 02 22	51 g	1	pc(s)	43
952 049	327740	04 01 02 22	60 g	1	pc(s)	43
952 051	126442	04 01 02 07	49 g	1	pc(s)	45
952 053	127647	04 01 02 07	42 g	1	pc(s)	45
952 054	127975	04 01 02 07	52 g	1	pc(s)	45
952 055	136700	04 01 02 07	36 g	1	pc(s)	45
952 070	108493	04 01 02 02	130 g	1	pc(s)	37
952 071	109834	04 01 02 02	107 g	1	pc(s)	37
952 072	109858	04 01 02 02	109 g	1	pc(s)	37
952 073	109872	04 01 02 02	119 g	1	pc(s)	37
952 078	119468	04 01 02 02	109 g	1	pc(s)	37
952 083	376540	04 01 02 24	51 g	1	pc(s)	33
952 090	108509	04 01 02 02	119 g	1	pc(s)	37
952 091	109841	04 01 02 02	110 g	1	pc(s)	37
952 092	109865	04 01 02 02	113 g	1	pc(s)	37
952 093	109889	04 01 02 02	137 g	1	pc(s)	37

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952 098	119475	04 01 02 02	123 g	1	pc(s)	37
952 100	376526	04 01 02 24	128 g	1	pc(s)	33
952 110	108417	04 01 02 01	242 g	1	pc(s)	36
952 113	387874	04 01 02 24	128 g	1	pc(s)	33
952 115	108424	04 01 02 01	228 g	1	pc(s)	36
952 121	376663	04 01 02 24	250 g	1	pc(s)	33
952 122	387867	04 01 02 24	250 g	1	pc(s)	33
952 200	108394	04 01 02 01	229 g	1	pc(s)	36
952 201	123915	04 01 02 01	211 g	1	pc(s)	36
952 205	108400	04 01 02 01	232 g	1	pc(s)	36
952 206	123922	04 01 02 01	217 g	1	pc(s)	36
952 220	376656	04 01 02 24	241 g	1	pc(s)	32
952 300	108431	04 01 02 01	334 g	1	pc(s)	34
952 303	120709	04 01 02 01	355 g	1	pc(s)	34
952 305	108448	04 01 02 01	328 g	1	pc(s)	35
952 308	120716	04 01 02 01	362 g	1	pc(s)	35
952 310	108479	04 01 02 01	405 g	1	pc(s)	35
952 311	119390	04 01 02 01	432 g	1	pc(s)	35
952 313	123939	04 01 02 01	299 g	1	pc(s)	34
952 314	124028	04 01 02 01	342 g	1	pc(s)	34
952 315	108486	04 01 02 01	415 g	1	pc(s)	35
952 316	119406	04 01 02 01	436 g	1	pc(s)	35
952 318	124011	04 01 02 01	306 g	1	pc(s)	35
952 319	124035	04 01 02 01	350 g	1	pc(s)	35
952 320	126794	04 01 02 01	416 g	1	pc(s)	35
952 323	133235	04 01 02 01	381 g	1	pc(s)	35
952 325	126800	04 01 02 01	425 g	1	pc(s)	35
952 328	133242	04 01 02 01	390 g	1	pc(s)	35
952 330	376649	04 01 02 24	354 g	1	pc(s)	32
952 341	376632	04 01 02 24	452 g	1	pc(s)	32
952 342	387850	04 01 02 24	452 g	1	pc(s)	32
952 400	108455	04 01 02 01	414 g	1	pc(s)	35
952 403	128569	04 01 02 01	417 g	1	pc(s)	35
952 404	128545	04 01 02 01	474 g	1	pc(s)	35
952 405	108462	04 01 02 01	453 g	1	pc(s)	35
952 408	128576	04 01 02 01	426 g	1	pc(s)	35
952 409	128552	04 01 02 01	482 g	1	pc(s)	35
952 440	376625	04 01 02 24	449 g	1	pc(s)	32
952 510	126428	04 01 02 07	340 g	1	pc(s)	45
952 511	127494	04 01 02 07	291 g	1	pc(s)	45
952 512	127951	04 01 02 07	336 g	1	pc(s)	45
952 513	136663	04 01 02 07	269 g	1	pc(s)	45
952 515	126435	04 01 02 07	323 g	1	pc(s)	45
952 516	127500	04 01 02 07	298 g	1	pc(s)	45
952 517	127968	04 01 02 07	338 g	1	pc(s)	45
952 518	136670	04 01 02 07	276 g	1	pc(s)	45
952 565	327719	04 01 02 22	300 g	1	pc(s)	43
952 567	327726	04 01 02 22	329 g	1	pc(s)	43
961 001	118584	04 01 01 08	173 g	1	pc(s)	27
961 002	118591	04 01 01 08	195 g	1	pc(s)	27
961 003	118607	04 01 01 08	180 g	1	pc(s)	27
961 010	118744	04 01 01 14	170 g	1	pc(s)	50
961 022	118669	04 01 01 08	195 g	1	pc(s)	29
961 110	118560	04 01 01 08	317 g	1	pc(s)	26
961 115	118577	04 01 01 08	321 g	1	pc(s)	27
961 120	118614	04 01 01 08	340 g	1	pc(s)	29
961 122	118652	04 01 01 08	358 g	1	pc(s)	29
961 125	118621	04 01 01 08	343 g	1	pc(s)	27
961 130	118638	04 01 01 08	325 g	1	pc(s)	29
961 135	118645	04 01 01 08	330 g	1	pc(s)	27

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