DEHN protects.

DEHN: A family-owned company with more than 100 years of experience

Since the foundation of our company in 1910, we have been operating our electro-technical company on a family basis. Our fourth-generation company is independent, innovative and globally active.

DEHN:
Headquarters in Neumarkt

DEHN:
Second facility in Muehlhausen (Neumarkt area)

DEHN protects.
International activities in more than 70 countries

- 18 sales offices in Germany
- 20 subsidiaries and own offices throughout the world
- Sales activities in more than 70 countries

Facts

>120 employees in our R&D, Construction and Quality Assurance Department

6 % of turnover invested in R&D

1,136 patents strong technology portfolio since 1910

Market leader in lightning and surge protection

110 years of experience, innovation and market success

DEHN presence in **>70** countries

> 4,000 active products

20 subsidiaries and representative offices

~ 1,900 employees worldwide

~300 million € turnover

Global Player family-owned, medium-sized company

History

1910
Foundation

1923
Production of compo-nents

1958
Earth rod

1977
Voltage detector

1984
DEHNventil®

1993–1998
“DEHN 2000“

2005
Subsidiary in China

2006
Red / Line®
Yellow / Line

2014 Site in Mühlhausen

1918
First patent

1954
Launch of J250

1954
Austria

2003
HVI®Conductor

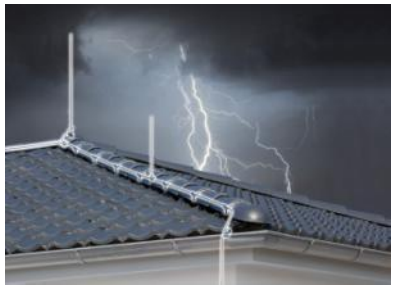
2012
DEHNcare®

1910 1920 1930 1940 1950 1960 1970 1980 1990 200 0 2010

DEHN protects.
Product ranges

DEHN stands for high-quality products and reliable solutions in the fields of:

Surge Protection



Lightning Protection/Earthing

Safety Equipment

DEHN protects.
Surge protection product range (examples)

DEHNprotector

DEHNrail

DEHNrapid® LSA

DEHNflex

DEHNguard® modular

DEHNbloc® Maxi S

DEHNventil® modular

BLITZDUCTOR®

DEHN protects.
Lightning protection/Earthing portfolio (examples)

earth rods

roof conductor holders with DEHNgrip

FB 2 roof conductor holders

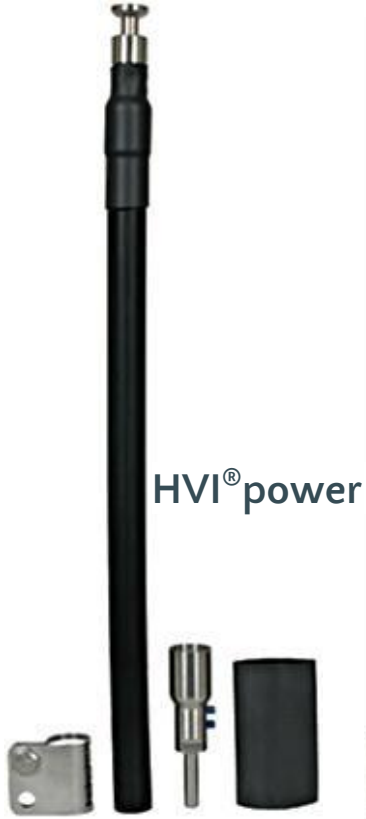
MV clamps

fixed earthing terminals

cross clamps

DEHNhold

DEHNiso spacers



HVI®power

HVI® Conductor III

equipotential bonding bars (industrial use)

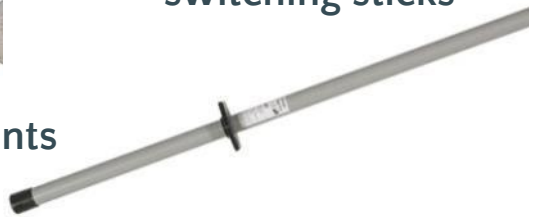
pipe clamps for hazardous areas

DEHN protects.
Safety equipment portfolio (examples)

earthing and
short-circuiting kits

fixed ball points

switching sticks



earthing and
short-circuiting
devices

dry cleaning
kits

PHE III voltage
detectors

fuse tongs

DEHNarc

personal protective
equipment (PPE)

DEHN protects.
Industries









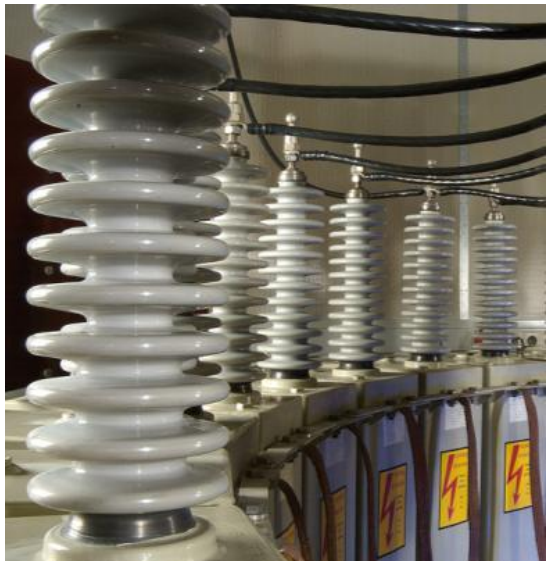

We offer customised solutions for residential and functional buildings, renewable energies as well as communication, transportation, process, gas- and safety systems.

Laboratory tests
System tests

Laboratories in Neumarkt

- 200 kA (10/350)
- 100 kA (8/20)
- Follow current transformer (50 kA_{rms})
- d.c. laboratory (up to 5000 A)
- PV laboratory (up to 300 A)

- In-house tests of products in compliance with the latest product standards
- In-house approval tests under supervision of official authorities
- Complete system tests

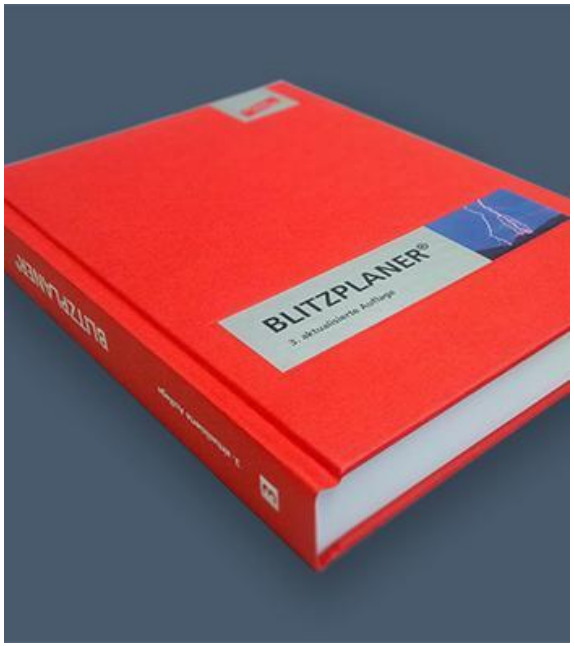


Lightning Protection/Earthing

Lightning Protection/Earthing product range

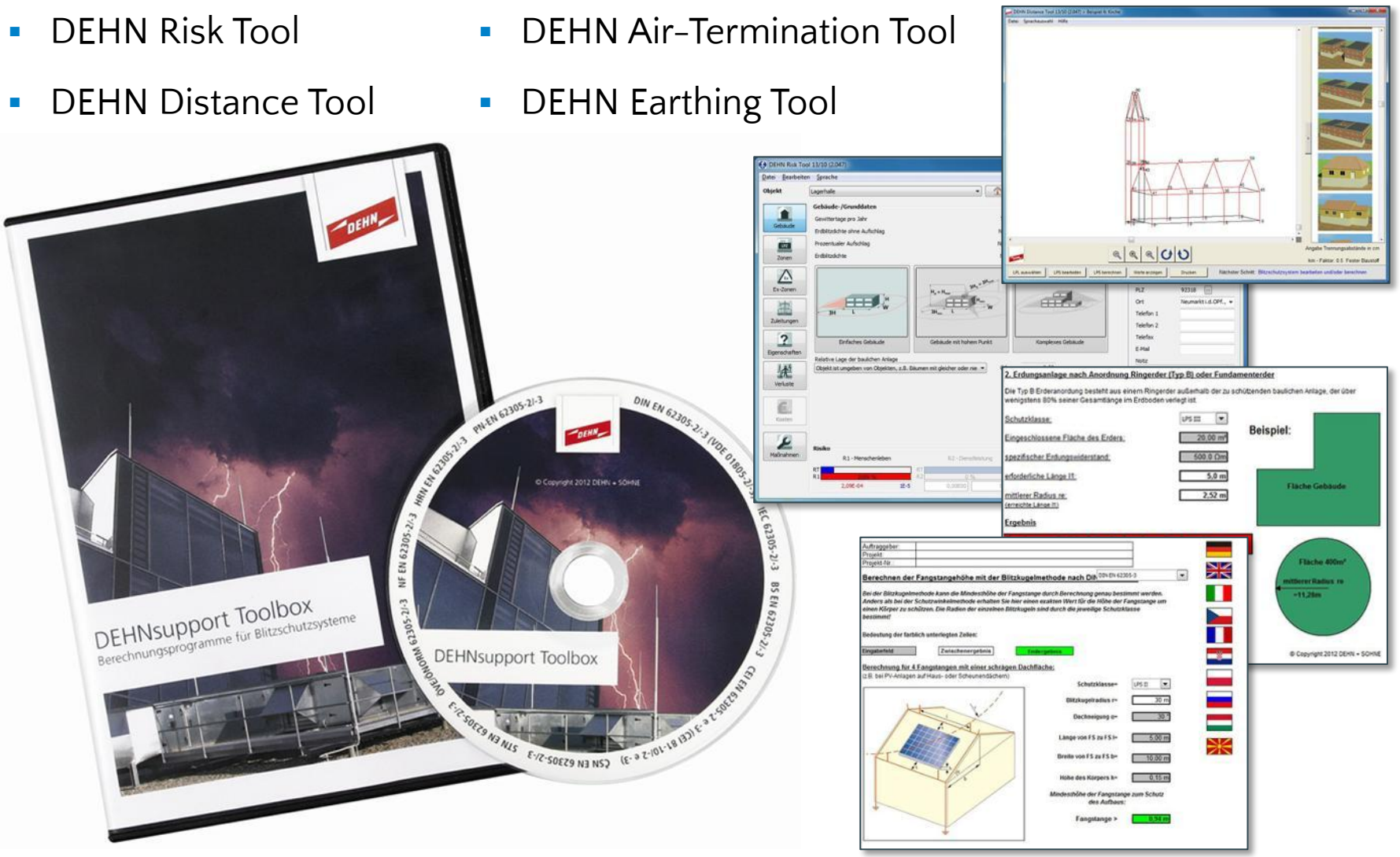
DEHN offers about 1,200 products for installing a lightning protection system, consulting and support as well as numerous publications.

The DEHNsupport Toolbox calculation program allows to specifically determine and implement lightning and surge protection measures.



DEHNsupport Toolbox

- DEHN Risk Tool
- DEHN Distance Tool
- DEHN Air-Termination Tool
- DEHN Earthing Tool



Lightning/Earthing
Product overview

Conductors
Air-termination systems, accessories

Isolated lightning protection

HVI lightning protection
Protection against touch voltage

Roof conductor holders
Conductor holders

Clamps
Expansion joints and bridging components

Test joints
Fixed earthing terminals

Earth electrodes
Components for foundation earth electrodes

Equipotential bonding
Components for ring equipotential bonding

Tools and accessories
Lightning protection for thatched roofs

Earthing material for telecommunication systems

Pipe clamps for use in hazardous areas

Spark gaps

Innovations in the Lightning Protection/Earthing area: HVI®Conductor

2010

2003: The invention of the patented HVI®Conductor (high-voltage-resistant insulated down conductor), which allows to keep the separation distance, stands as a milestone in external lightning protection.

HVI®power Conductor

HVI®light Conductor

HVI®long Conductor

HVI®power Conductor

Innovations in the Lightning Protection/Earthing area: Pipe clamp for hazardous areas, HVI®light Conductor

2010

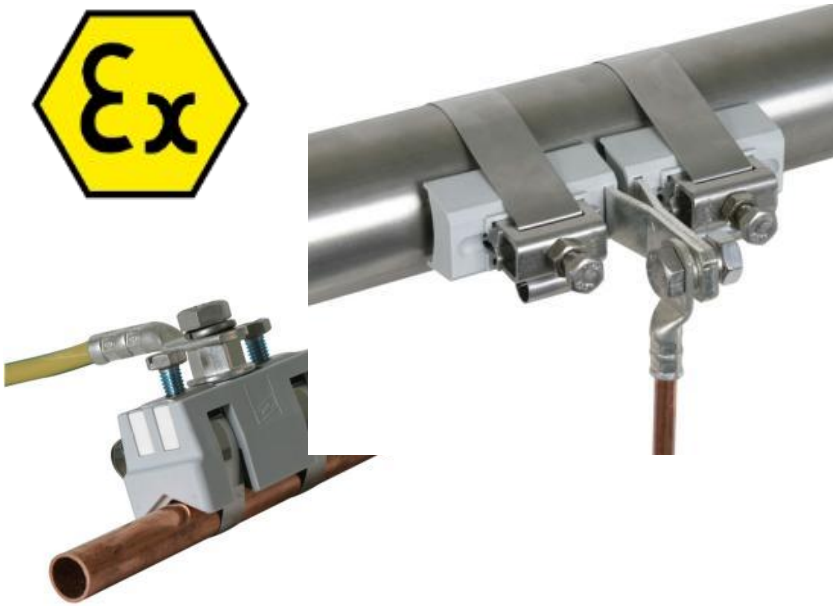
2007: Development of the pipe clamp for use in hazardous areas where no ignition sparks occur when lightning current flows through it.

2007: Development of HVI®light Conductor as supplement to the tried and tested HVI®Conductor.

Pipe clamps for use in hazardous areas

EX BRS …

- For electrically contacting pipes in hazardous areas
- For lightning equipotential bonding as per IEC 62305-3
- For use in potentially explosive atmospheres in Ex zones 1 and 2 (gas, vapour, mist) and Ex zones 21 and 22 (dust)
- Tested according to explosion group IIB
- Time-saving installation (no need to put the installation/areas out of service for welding or drilling)

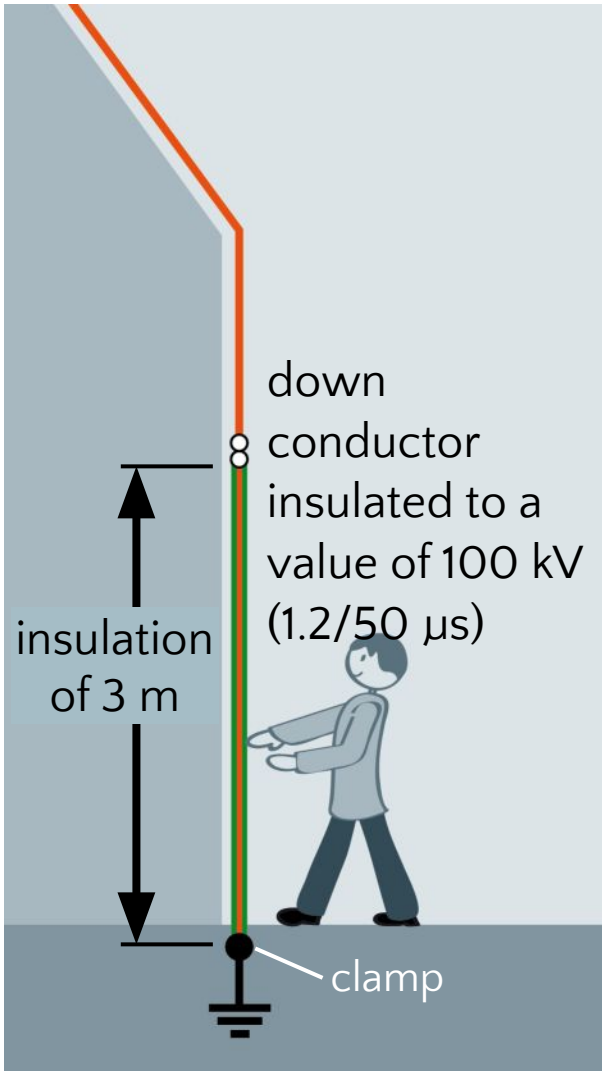


Innovations in the Lightning Protection/Earthing area: UNI earthing clamp

2010

2010: The newly developed DEHN UNI earthing clamp is an ideal solution integrating PV mounting systems in the equipotential bonding/earth-termination system.

Protection measures against touch voltage



If none of these conditions is fulfilled, protection measures shall be adopted against injury to living beings due to touch voltages as follows:

- insulation of the exposed down-conductor is provided giving a 100 kV, 1,2/50 µs impulse withstand voltage, e.g. at least 3 mm cross-linked polyethylene
- physical restrictions and/or warning notices to minimize the probability of down-conductors being touched

Ref: IEC 62305-3 :2010; 8.1

CUI Conductor
Protection against touch voltage at down conductors

Technical data	
Impulse withstand voltage	100 kV (1.2/50 µs)
Conductor material	copper
Insulation material	cross-linked PE
Outer diameter (conductor)	20 mm
Cross-section	50 mm² (Ø 8 mm)
Protective coating of the skin	PE, light grey
Length of 3.5 m Length of 5 m	Part No. 830 208 Part No. 830 218

- Eliminates the risk of touch voltage for living beings according to IEC 62305-3

CUI Conductor

Manufacturer's test reports for connecting components as per EN 50164-1

Symbol in the main catalogue:

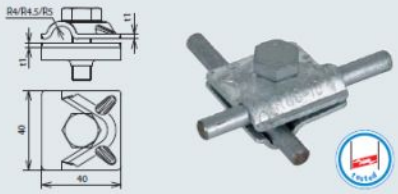
DEHN tested

Clamps

MV Clamps

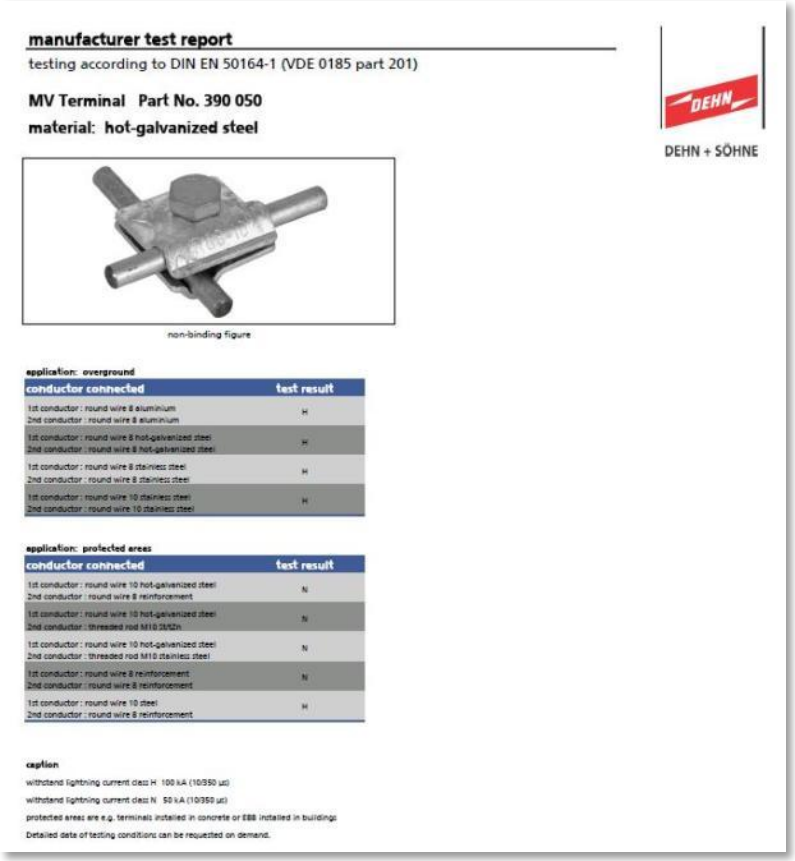
Multipurpose connecting clamp for universal use as a cross clamp, T clamp and parallel clamp; two-part

With hexagon screw



Thread in the base part

Part No.	390 050	390 051	390 059	390 057	391 050	391 059	390 079
Material of clamp	St/tZn	Al	StSt	Cu	St/tZn	StSt	StSt (V4A)
Clamping range Rd	8-10 mm	8-10 mm	8-10 mm	8 mm	10 mm	10 mm	8-10 mm
Material thickness (t1)	2.5 mm	3.0 mm	2.5 mm	3.0 mm	2.5 mm	2.5 mm	2.5 mm
Screw	M10x30 mm	M10x30 mm	M10x30 mm	M10x30 mm	M10x35 mm	M10x35 mm	M10x35 mm
Material of screw/nut	St/tZn	StSt	StSt	StSt	St/tZn	StSt	StSt (V4A)



manufacturer test report

testing according to DIN EN 50164-1 (VDE 0185 part 201)

MV Terminal Part No. 390 050

material: hot-galvanized steel

DEHN + SÖHNE

non-binding figure

application: overground

conductor connected	test result
1st conductor : round wire 8 aluminium 2nd conductor : round wire 8 aluminium	H
1st conductor : round wire 8 hot-galvanized steel 2nd conductor : round wire 8 hot-galvanized steel	H
1st conductor : round wire 8 stainless steel 2nd conductor : round wire 8 stainless steel	H
1st conductor : round wire 10 stainless steel 2nd conductor : round wire 10 stainless steel	H

application: protected areas

conductor connected	test result
1st conductor : round wire 10 hot-galvanized steel 2nd conductor : round wire 8 reinforcement	N
1st conductor : round wire 10 hot-galvanized steel 2nd conductor : threaded rod M10 St/tZn	N
1st conductor : round wire 10 hot-galvanized steel 2nd conductor : threaded rod M10 stainless steel	N
1st conductor : round wire 8 reinforcement 2nd conductor : round wire 8 reinforcement	N
1st conductor : round wire 10 steel 2nd conductor : round wire 8 reinforcement	H

caption

withstand lightning current class H 100 kA (10/350 µs)

withstand lightning current class N 50 kA (10/350 µs)

protected areas are e.g. terminals installed in concrete or EBB installed in buildings

Detailed data of testing conditions can be requested on demand.

Manufacturer's test reports can be downloaded at www.dehn-international.com

Surge Protection
Power Supply Systems

Type 1 arresters
Historical development

1984

DEHNventil®
of type VGA 280 4

creep. disch. spark gap in parallel to varistor
exhausting
untriggered
I_{imp} = 100kA (8/80)
$I_{fi} \approx 1.5$ kA
$U_p \leq 4$ kV

1996

DEHNbloc®
of type DB 1 255

creepage discharge spark gap
non-exhausting
untriggered
I_{imp} = 50 kA (10/350)
I_{fi} = 1.5 kA_{rms}
$U_p \leq 4$ kV

1998

DEHNport® Maxi
of type DPM 255

creepage discharge spark gap
exhausting
untriggered
I_{imp} = 50 kA (10/350)
I_{fi} = 50 kA_{rms}
$U_p \leq 4$ kV

today

DEHNventil®
of type DV modular

creepage discharge spark gap (RADAX Flow)
non-exhausting
triggered
I_{imp} = 100 kA (10/350)
I_{fi} = 50 kA_{rms}
$U_p \leq 1.5$ kV

Type 2 arresters
Historical development

1954 — **J 250**

Glass-collared spark gap; first arrester for indoor use
I_{sn} = 2 kA (10/20)
$U_p \leq 1.4$ kV
not pluggable

1976 — **VA 280**

SiC varistor + spark gap
I_{sn} = 5 kA (8/20)
$U_p \leq 1.9$ kV
not pluggable

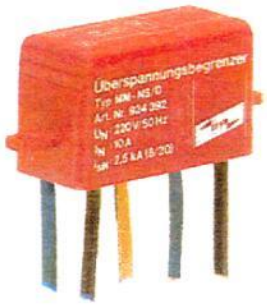
1986 — **VM 280**

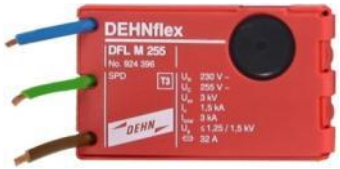
ZnO varistor
I_{sn} = 15 kA (8/20)
$U_p \leq 1.5$ kV
not pluggable

today — **DEHNguard® modular**

ZnO varistor, Thermo Dynamic Control
I_{sn} = 20 kA (8/20)
$U_p \leq 1.25$ kV
pluggable

Type 3 arresters
Historical development





1985 — 1988 — today

HE- / TV-Protector

intermediate adapter

i_s = 5 kA (8/80)

$U_p \leq$ 1.5 kV (1.2/50)

Minimodul of type MM-NS

Buried ducts, ...

i_{sn} = 2.5 kA (8/20)

$U_p \leq$ 1.5 kV

I_L = 10 A

DEHNflex

Cable ducts, flush-type boxes

I_n = 2.5 kA (8/20) (DFL A)

$U_p \leq$ 1.25 kV

DEHNrail modular

DIN rails, sub-distribution boards

I_n = 3 kA (8/20)

$U_p \leq$ 1.25 kV

I_L = 25 A

Type 1 arresters
Product overview






lightning current arresters

special designs

combined arresters

for TN-C, TN-S, TT systems

integrated backup fuse

wave breaker function

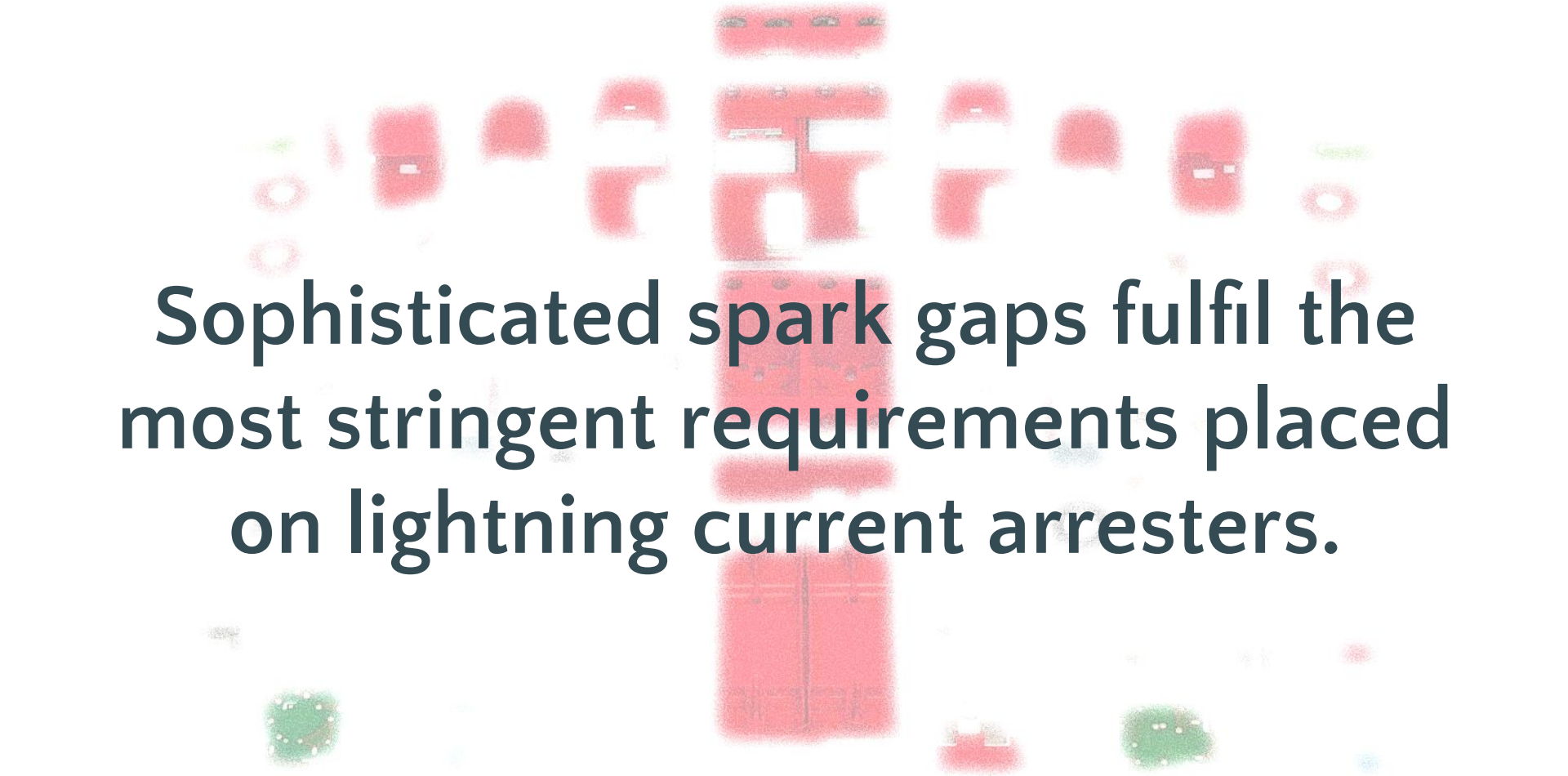
a.c., d.c., PV applications

variety of voltage levels







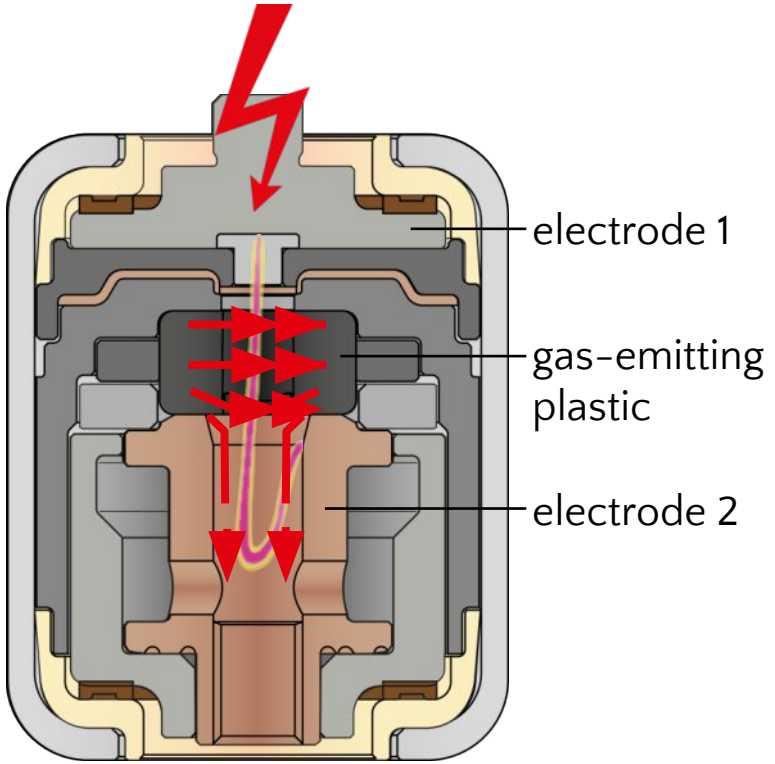


Sophisticated spark gaps fulfil the most stringent requirements placed on lightning current arresters.

Type 1 arresters – different spark gaps – Radax Flow technology

Features

- Extremely high lightning impulse currents
- Optimal arc cooling and extinction
- Extremely high follow current limitation
- Non-exhausting since it is encapsulated
- Extremely low voltage protection level
- Capable of protecting terminal equipment



For a.c. applications

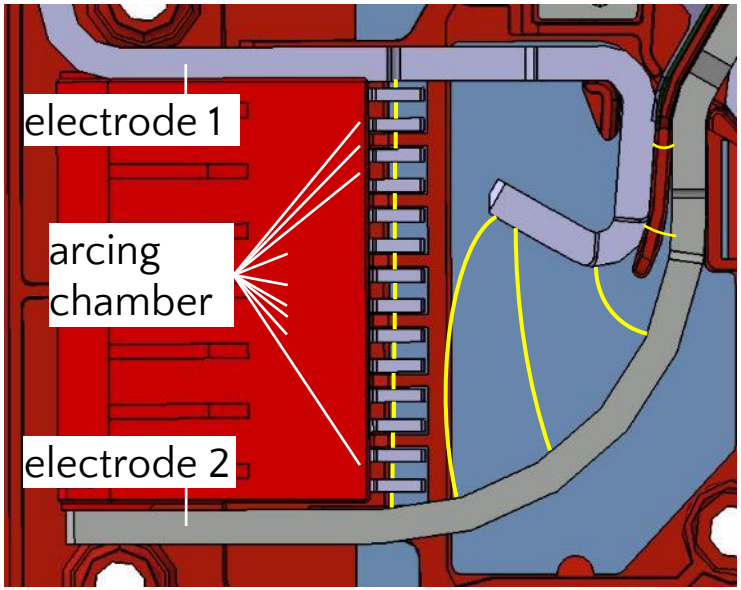
DEHNventil®
DEHNbloc® M
DEHNbloc® Maxi

Radial and axial gas flow stretches the arc.
 Arc extinction

Type 1 arresters – different spark gaps – Spark gap with arcing chamber

Features

- Medium lightning impulse currents
- Space-saving (only 1 module per pole)
- Application-optimised for electrical installations with reduced technical requirements
- Non-exhausting
- Extremely low voltage protection level
- Capable of protecting terminal equipment



for a.c. applications

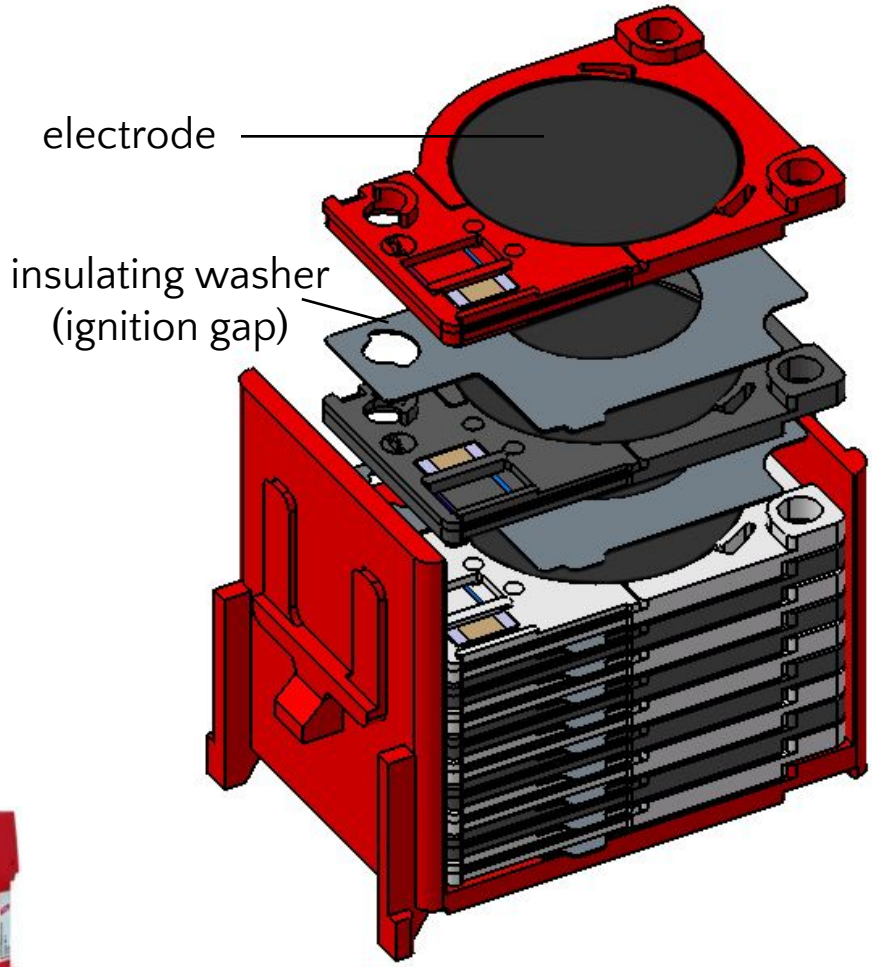
DEHNshield®

The arc is stretched due to the geometry of the electrodes, divided into small partial arcs in the arcing chambers and thus extinguished.

Type 1 arresters – different spark gaps – Spark gap with graphite stacks

Features

- Extremely high lightning impulse currents
- Division into partial arcs generates resulting arc voltage ≥ system voltage □ no leakage currents
- Directly coordinated with DEHNguard® surge protective devices without additional cable lengths
- Low voltage protection level



Ideally suited for d.c. applications

DEHNsecure

Protection of Remote Radio Head / Unit (RRH / RRU)
OVP & DC-Box – Solutions by DEHN

RRH/RRU – Surge Protection for 48 V D.C. and 230 V A.C. Application – combined Outdoor-Box

Source: ProCom Montage-Service GmbH, Gladbeck

DEHN PROTECTS CELL SITES WORLDWIDE

Various Products

DEHN PROTECTS CELL SITES WORLDWIDE

Power Supply-Application: DEHNvap CSP 3P 100 (900 360) DEHNvap CSP 1P 50 (900 361)

- T-Mobile D1 Germany
- Vodafone D2 Germany
- E-Plus Germany
- DB AG GSM-Railway Germany
- Orange United Kingdom
- Sonera Finland
- Nokia Finland
- Sonofon Denmark
- Orange Netherlands
- T-Moblile NL Netherlands
- Proximus Belgium
- Alcatel France
- Orange France
- SFR France
- Sunrise Switzerland
- Ericsson Sweden
- Telecom Italia Mobile (TIM) Italy
- Wind Italy
- Telefonica O2 Spain
- Vodafone Spain
- T-Mobile Austria Austria
- TMN Portugal
- Plus Poland
- ERA Poland
- T-Mobile Hungary
- Pannon Hungary
- Mobitel Slovenia
- MTN South Africa
- Telstra Australia
- Telesp Cellular Brazil
- France Telecom Mobile
- du Libanon (FTML) Lebanon
- Spacetel Syria
- Spacetel Yemen
- Orascom Telecom Algeria
- BSNL India
- Satelindo Indonesia
- China Mobile China
- China Telecom China
- China Unicom China

DEHN PROTECTS REMOTE RADIO HEAD'S WORLDWIDE

RRH/RRU-Application: DB M 1 SN1765 (961 115), DB M SN1762 (951 115), DSE M 1 60 (971 126), DSE M 2P 60 (971 226)

- Ericsson Germany
- Ericsson Sweden
- Huawei Germany
- Huawei China
- MTN South Africa
- Nokia Siemens Networks Germany
- Nokia Siemens Networks India
- Vodafone D2 Germany
- Vodafone D2 Czechia

Wave Breaker Function (WBF) due to spark gap technology

DEHNventil® M
DEHNventil® ZP
DEHNvenCI
DEHNshield®
DEHNlimit PV
DEHNbloc® M
DEHNbloc® Maxi
DEHNbloc®
DEHNsecure

Reduction of the pulse time allows energy coordination with downstream protective stages (and in case of combined arresters even with terminal devices)

Maximum system availability due to extremely high follow current limitation

Lightning impulse currents up to 50 kA/pole

Non-exhausting

Arresters with integrated backup fuse

SOLUTION

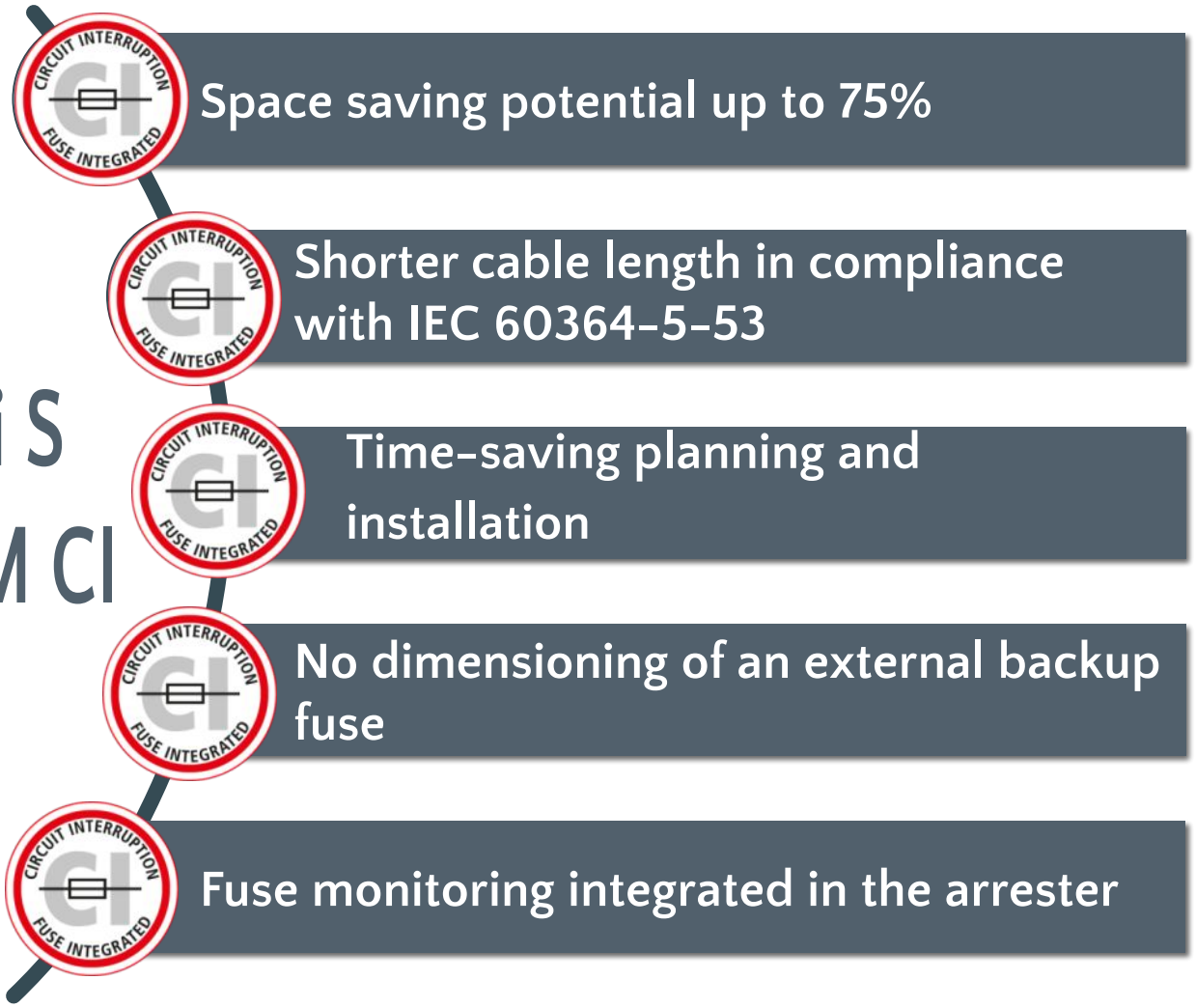
arrester with integrated backup fuse

Arresters with external backup fuse:

- Increased space requirements
- Increased installation time
- Additional cable length poor voltage protection level
- Time-consuming fuse monitoring

Arresters with integrated backup fuse (CI = Circuit Interruption)

DEHNvenCI
DEHNbloc® Maxi S
DEHNguard® S/M CI
V(A) NH



Type 2 arresters
Product overview






single-pole/multipole

for TNC, TNS, TT systems

with/without remote signalling contact

special designs (for LV HRC disconnectors)

integrated backup fuse

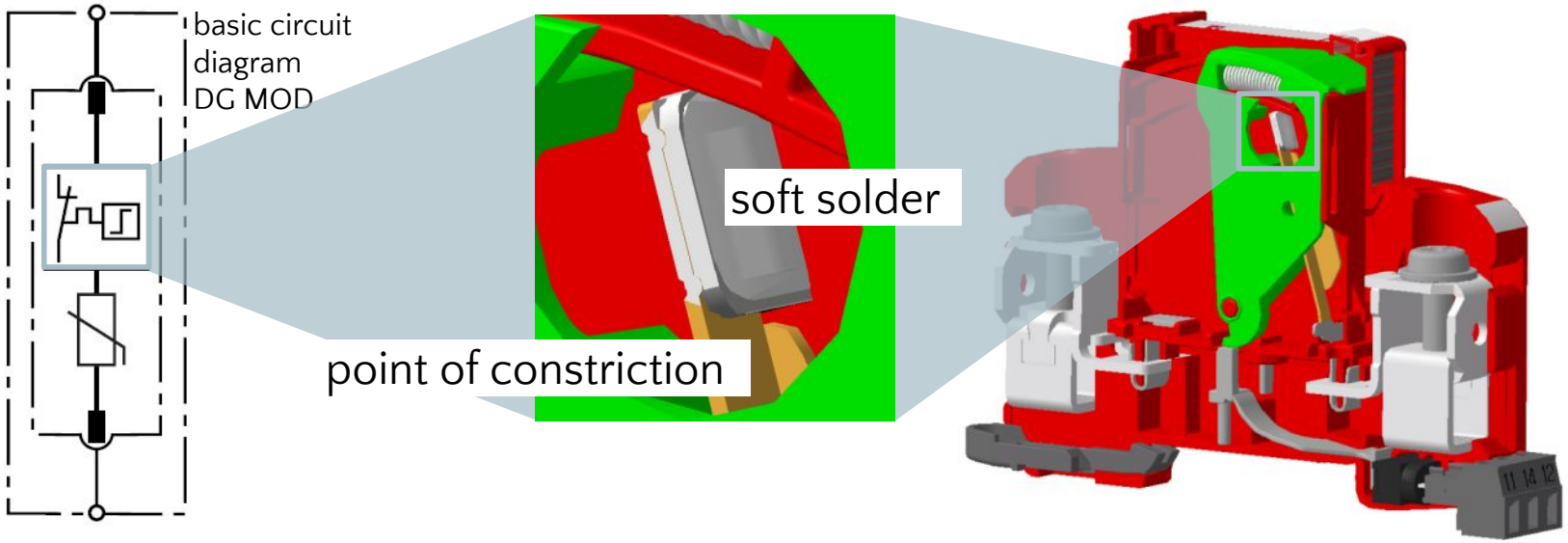
variety of voltage levels

surge protective devices for use in PV systems





Type 2 arresters – Technologies:
Thermo Dynamic Control disconnector



Protection element:
Varistor
 Limitation of surges

Thermal disconnection: Soft solder
 Disconnection in case of excessive **thermal stress Dynamic** disconnection: Point of constriction
 Disconnection in case of excessive **impulse current load**

- Both mechanisms disconnect independent of each other and activate the visual indication (+ remote signalling contact)
- Thermo Dynamic Control — “dual protection“

Evolutionary steps of type 2 surge arresters

Varistor

- Surge protection

1986

Varistor with thermal disconnector

- Surge protection
- Thermal disconnector

1993

Varistor with Thermo Dynamic Control

- Surge protection
- Thermal disconnector
- Dynamic disconnector

200 9

CI: Varistor with Thermo Dynamic Control and integrated backup fuse

- Surge protection
- Thermal disconnector
- Dynamic disconnector
- Integrated backup fuse

2018

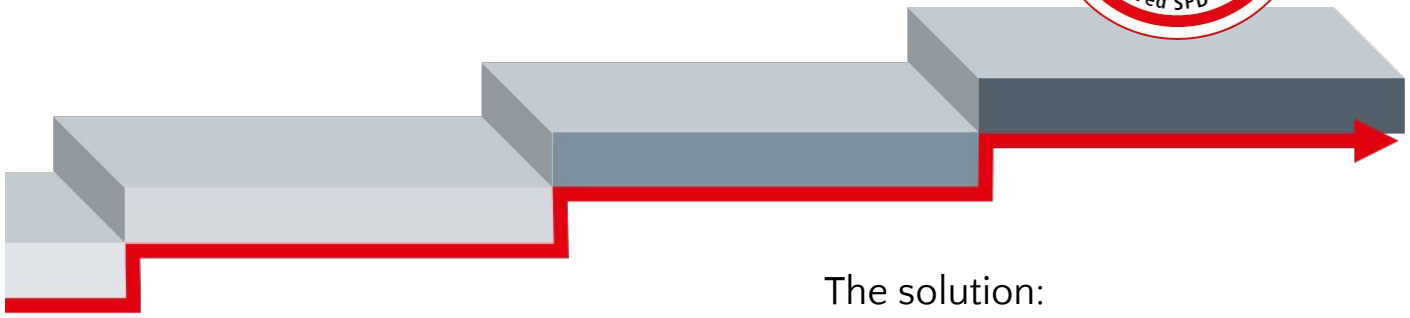
ACI: Advanced Circuit Interruption with switch / spark gap combination

- Surge protection
- Thermal disconnector
- Dynamic disconnector
- Integrated switch / spark gap combination to replace the backup fuse.
- Safe dimensioning

03.07.18 [20170315] / 10612_E_2

The consequences:

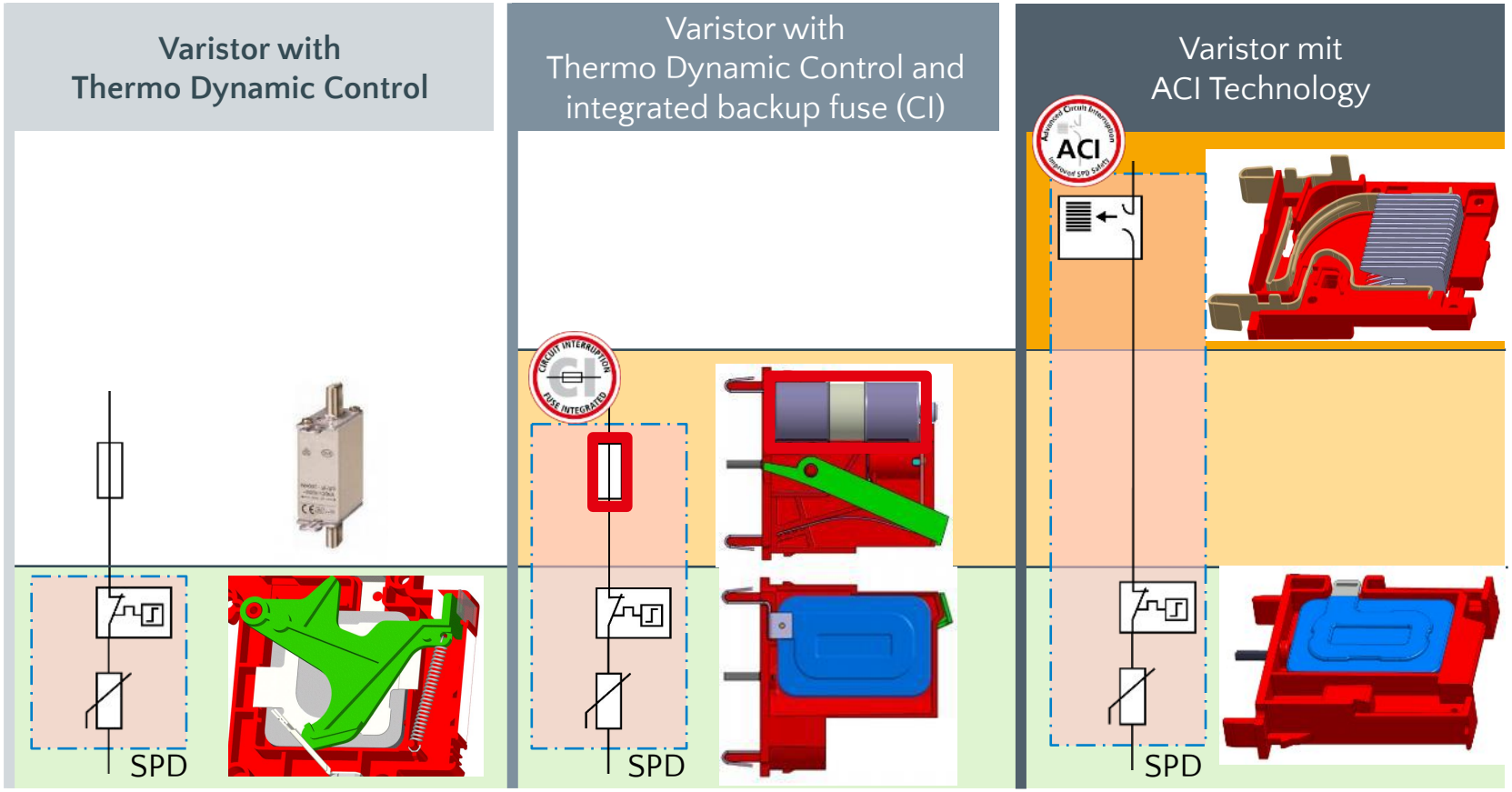
To be equipped for **future requirements,** a **new technological step** is needed!



The solution:

Advanced Circuit Interruption (ACI)
with integrated
switch / spark-gap combination

Basic design of different arrester technologies

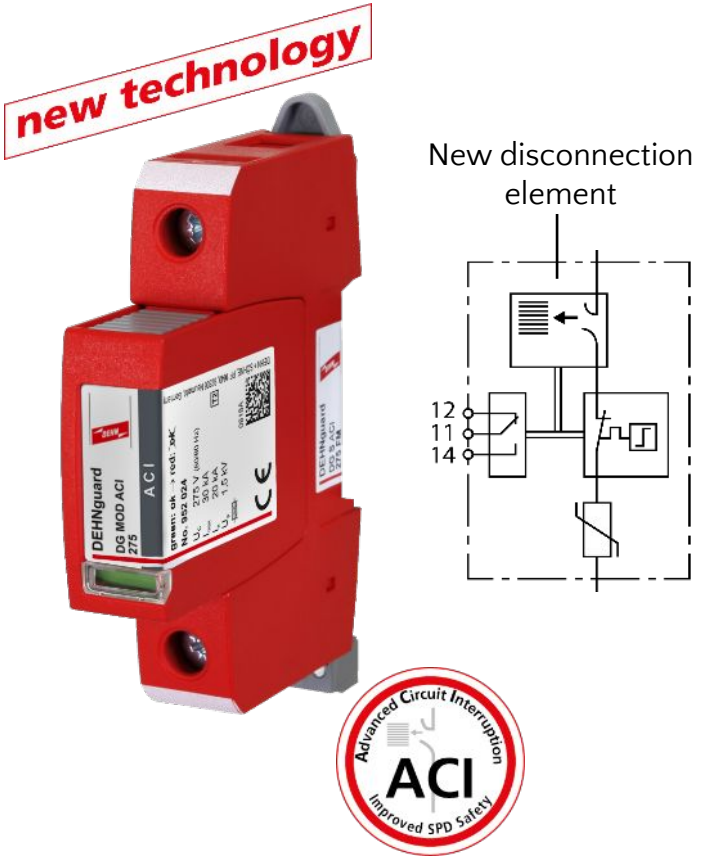


03.07.18 [20170315] / 10615_E_1

The new type 2 surge arrester for future requirements
DEHNguard S/M ACI 275

ACI switch/spark-gap combination offers:

1. Safe dimensioning
2. TOV withstand
3. Small disconnection integral / let-through energy
4. Zero leakage current
5. Insulation testing (up to 500V DC) without removing the protection module
6. No uncontrolled nuisance tripping



15.03.17 [20170315] / 10614_E_1

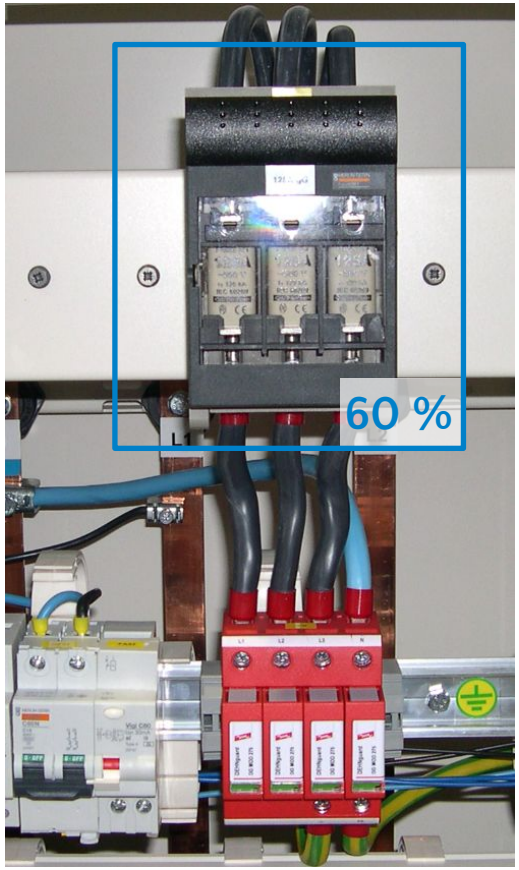
Benefit of ACI technology in type 2 surge arresters for the customer

Saves space

- More space in the switchgear cabinet – over 60 % additional space for DIN rail mounted devices because no external backup fuse is required

Saves costs

- Less material and installation time is required



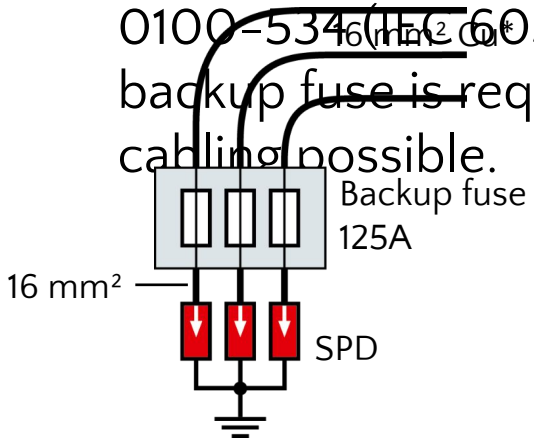
Advanced Circuit Interruption ACI Improved SPD Safety

20.03.17 [20170315] / 10614_E_4

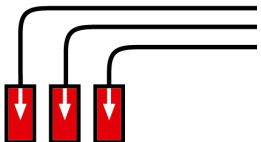
Benefits of ACI technology in type 2 surge arresters

Simple Installation

- No need to install an external backup fuse
- Small connection cross-section – the small disconnection integral of the ACI switching element allows the use of smaller connection cross-sections of ≥ 6 mm²
- Simple wiring – it is easier to f… the requirements of standard VDE 0100-534 (IEC 60364-5-53…) in the total cable length because no backup fuse is required a… ighter curves can be laid making shorter cabling possible.



* Short-circuit and earth-fault-proof installation of all live conductors



Type 3 arresters
Product overview

special designs (flush-mounted systems, socket outlets, ...)

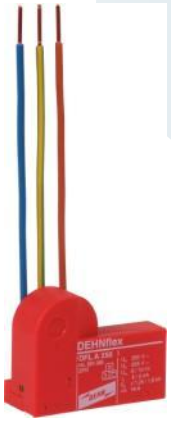
protection of terminal devices

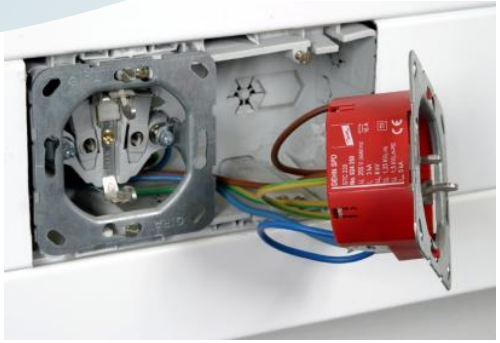
acoustic / visual indication

single-phase/ three-phase

variety of voltage levels

fault-proof Y circuit





Cathodic corrosion protection solutions

Connection to coaxial connection box
Example: Ethylene long-distance line

source: Evonik Industries

BLITZDUCTOR® VT KKS

Type BVT KKS ALD 75

- Energy-coordinated combined lightning current and surge arrester for protecting the rectifier in a protective circuit (red colour)
- Plug-in remote signalling contact (break contact) indicates overload (thermal monitoring of the varistors)
- **Installation into steel-sheet enclosure recommended**
- A low impulse sparkover voltage is achieved by capacitive control.
- For protective circuits
- High nominal current
- For installation in conformity with the lightning protection zone concept at the

ITAK, serial no. 4305

Approvals / certificates

A variety of approvals is available for the relevant products.

Surge Protection for Information Technology Systems

Yellow/Line
Product overview

Pluggable DIN rail mounted arresters

Compact DIN rail mounted arresters

Arresters for LSA technology

Arresters for data cabinets

Arresters for RJ connection

Surface-mounted arresters

Arresters for coaxial connection

Arresters for D-Sub connection

Arresters for terminal connection

Arresters for hazardous areas

Combined adapters

Accessory

Pluggable DIN rail mounted arresters BLITZDUCTOR® XT – Applications

- Combined arrester with a high discharge capacity and low voltage protection level
- Protection of measuring and control circuits, bus and telecommunication systems
- Great variety of types allows a wide range of applications
- Approvals (depending on the arrester): ATEX, IECEx, CSA Hazloc, UL, CSA, VdS, GOST

Pluggable DIN rail mounted arresters
BLITZDUCTOR® XT – SPD control

SPD control

LifeCheck®

- Monitoring of proper condition of an arrester
- Early detection of extreme thermal or electric load on the arrester as a result of lightning effects and surges
- Maintenance-free
- Integrated in the BLITZDUCTOR®XT protection module
- Contactless testing via RFID technology
- Measurement galvanically isolated from the signal circuit

Pluggable DIN rail mounted arresters
BLITZDUCTOR® XT – Arrester testing

Arrester test devices

M1+ / M3+

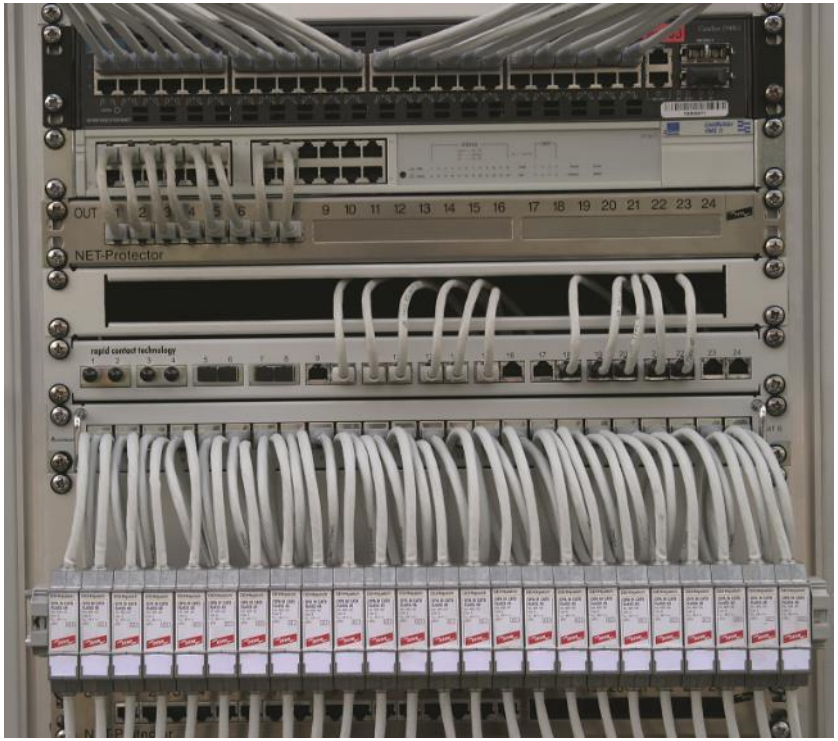
- Preventive maintenance
- Portable test device with result display
- LifeCheck® sensor is snapped onto protection modules
- Galvanically isolated measurement
- Measurement without removing the module
- Testing within a matter of seconds
- Test results can be evaluated and documented via PC software (M3+)

DEHNconnect SD2
Overview

- Terminal block with integrated surge protection
- Disconnection module for disconnecting the signal circuit for maintenance work
- Fast and easy wiring thanks to spring-loaded connection system
- Space-saving design: 6mm
- Protection of measuring and control circuits and bus systems, e.g. binary signals, 4-20mA interfaces, Modbus, Profibus, RS485/422 interfaces

Arrester for data cabinets and RJ connection
Applications

- Surge arrester for protecting Ethernet and telecommunication systems
- Easy to retrofit
- Installation in 19‘‘ data cabinets or on DIN rails
- Protection of switches, HUBs, telecommunication systems and IP camera systems
- Patch panel version with GHMT certificate
- Approvals (depending on the arrester): UL, CSA, GOST



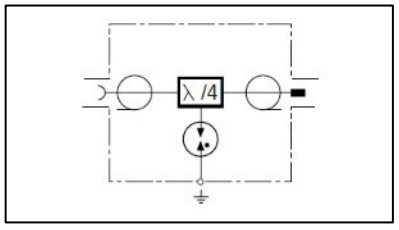
DEHNpatch

DPA M CLE RJ45B 48

DPA M CAT6 RJ45S 48

Arresters for coaxial connection
DEHNgate – G / AG / L...

- Lightning current and surge arrester for receiving and transmitting stations
- With SMA, BNC, N, or UHF interface
- Versions with exchangeable gas discharge tube
- DGA LG / L4 with maintenance-free quarterwave technology



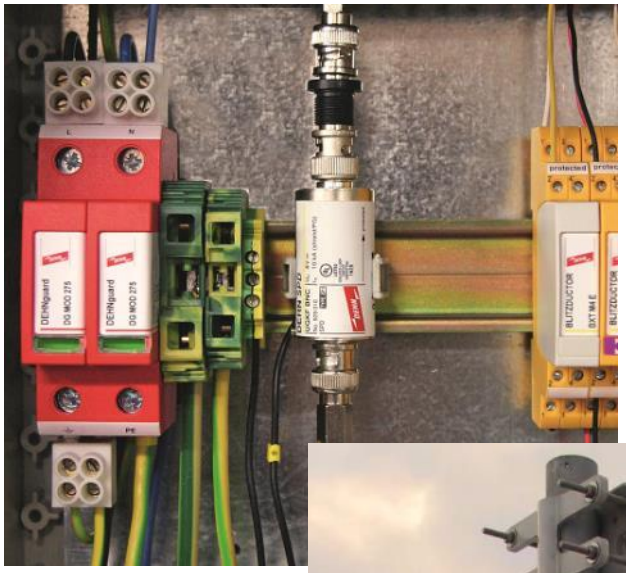
DGA G

DGA AG

DGA L4 / LG

Arresters for coaxial connection
DEHNgate – Applications

- Lightning current and surge arrester for coaxial systems
- Flexible use due to different plug types and arrester technologies
- Protection of CCTV systems, satellite and antenna systems, modems and large receiving and transmitting stations
- Approvals (depending on the arrester: GOST, CSA, UL



DEHNpipe

DPI MD Ex (i)

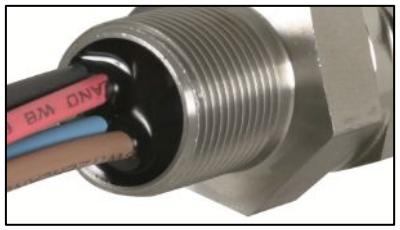
DPI CD Ex (d)

DPI CD Ex (i) + (d)

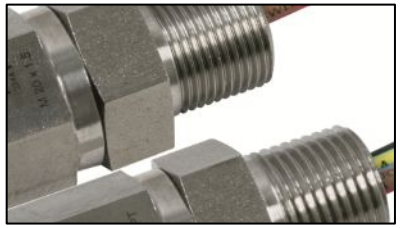
Arresters for use in hazardous areas
DEHNpipe

- Surge arrester to be screwed onto field devices in hazardous areas

- Versions for Ex (i) and Ex (d) applications



- With metric thread or NPT thread



- Made of corrosion-resistant stainless steel

Arresters for use in hazardous areas
DEHNpipe – Applications

- For installation on field devices in intrinsically safe measuring circuits Ex (i) or on flameproof devices Ex (d)
- Protection of 4–20mA measuring circuits or bus systems up to 32 V
- Easy installation on field devices with a spare cable gland
- Approvals (depending on the arrester): ATEX, IECEx, FISCO, CSA Hazloc, GOST, SIL

Arresters for use in hazardous areas
BLITZDUCTOR® XT Ex (i)

Approvals and certificates

Application-specific solutions for different industries

- Telecommunications / Mobil Communications
- Process industry
- Safety systems
- Transportation systems
- Wind power
- Photovoltaics

Telecommunications/ Mobile Communications

Coaxial transmitting and receiving stations	Data networks	Telecommunication interfaces	Communication electronics
			
DEHNgate	**DEHNpatch**	**DEHNrapid® LSA**	**DEHNprotector**

Process industry

Field devices Ex (i), Ex (d)	Intrinsically safe measuring circuits and bus systems	Measuring and control systems and bus signals	Condition monitoring
			
DEHNpipe	**BLITZDUCTOR® XT DEHNconnect Ex (i)**	**BLITZDUCTOR® XT DEHNconnect**	**DEHNrecord MCM XT**

Safety systems

Bus systems, CCTV systems	Data networks and IP cameras	Telecommunication interfaces	d.c. supply systems

BLITZDUCTOR® XT

DEHNpatch

DEHNrapid® LSA

BLITZDUCTOR® VT

Transportation systems

Signal interfaces	Video and camera systems	Equipotential bonding for cable shields	Condition monitoring

BLITZDUCTOR® XT

DEHNgate

shield connection

DEHNrecord MCM XT

Wind power

Signal lines and Bus systems	Ethernet cables	d.c. supply systems	Condition monitoring and testing at intervals

BLITZDUCTOR® XT

DEHNpatch

BLITZDUCTOR® VT

DEHNrecord SCM XT
DEHNrecord LC M1+

Photovoltaics

Data networks	RS 485 bus systems	Condition monitoring and testing at intervals

DEHNpatch

BLITZDUCTOR® XT

DEHNrecord SCM XT
DEHNrecord LC M1+