



# Reliable Power for the Industry

## Arc Fault Protection System DEHNshort





# Arc faults – Total loss of switchgear assemblies!



The photo shows an arc fault test with  $I_{pc\ arc} = 65\text{ kA}$ ,  $U_p = 420\text{ V}$ ,  $t_b = 300\text{ ms}$ .

Photo: HAGER Group



## Minimising damage with DEHNshort

Every year, arc faults cause severe personal injury, heavy damage to installations and thus high production downtime costs. Even in the most modern switchgear assemblies, the risk of an arc fault cannot be completely ruled out. These arc faults can be caused by incorrect work on switchgear assemblies, contaminants, foreign objects or ingress of animals in the switchgear assembly. Within a few milliseconds, high amounts of energy are released, generating heat, a pressure wave and toxic gases similar to an explosion.

Persons in the vicinity of switchgear assemblies are severely injured or even killed. The switchgear assembly is heavily damaged and must often be completely replaced which can take several weeks. An unacceptable situation for processes that require a continuous power supply! Such damage can be reliably limited by using the arc fault protection system DEHNshort.

DEHNshort **quickly and reliably** quenches arc faults. Thanks to this quick arc fault quenching, only a small portion of the destructive energy is released. With proven arc fault quenching times of only a few milliseconds, DEHNshort is one of the quickest protection systems on the market, thus providing reliable protection for persons and switchgear assemblies.

DEHNshort is also **flexible** to use: The modular system can be exactly adapted to the existing installation.



## DEHNshort protects people and installations...

### ...in hospitals

A power failure in a hospital is immediately life-threatening. System availability is the top priority. A power cut in a hospital must be avoided at all costs. Just think of a patient in the operating theatre on artificial respiration or other life-preserving systems. The second priority is protecting those people who work on the electrical installations. The operator must eliminate the risk of accident and personal injury.

**In a hospital, system availability is synonymous with patient protection. DEHNshort can reliably protect this, in part, vital power supply.**

### ...in the chemical and petrochemical industry

Maximum availability is required wherever motor control centres are integrated in power distribution since power outages are unacceptable for critical production processes. Moreover, personal protection plays a central role in the chemical and petrochemical industry. This is ensured by the arc fault protection system DEHNshort.

**Thanks to its extremely short quenching times, not only thermal effects are reduced to a minimum.**



#### ...in data and computer centres

Availability is a top priority in modern computer centres to ensure customer satisfaction. Fire is one of the most prevalent threats to computer centres and is most frequently caused by electrical faults.

**The arc fault protection system DEHNshort considerably reduces the risk of fire.**



#### ...in railway stations

Large railway stations are neuralgic traffic nodes. If power supply is not continuously ensured, the sensitive railway network collapses. This results in reduced transportation capacities and thus considerable delays for passengers.

**The arc fault protection system DEHNshort ensures smooth railway operations.**



# Arc fault protection system DEHNshort

DEHNshort is a modular arc fault protection system which detects arc faults with the help of current and light sensors. Thanks to its short response time of a few milliseconds, the incident energy is reduced to a minimum. DEHNshort takes the protection of persons and systems to another level and by far exceeds the requirements of the currently applicable IEC TR 61641\* standard.

## Detection:

The current transformers at the infeed detect the overcurrent resulting from the arc fault and transmit this information to the relevant detection device. Sensors detect the light emitted by the arc fault and also transmit this information to the detection device. Depending on the application, fibre optic and optoelectronic sensors are available.

## Evaluation:

In the detection devices, the sensor signals are converted into digital information and are linked together logically. If all arc fault detection criteria are fulfilled, quenching and disconnection commands are issued. The quenching devices are immediately activated via fibre optic cables, the shunt releases via relay contacts. LEDs indicate the current status of the system. Since the detection devices are integrated in the assembly door, the system status can also be evaluated if the assembly door is closed.

## Arc fault quenching:

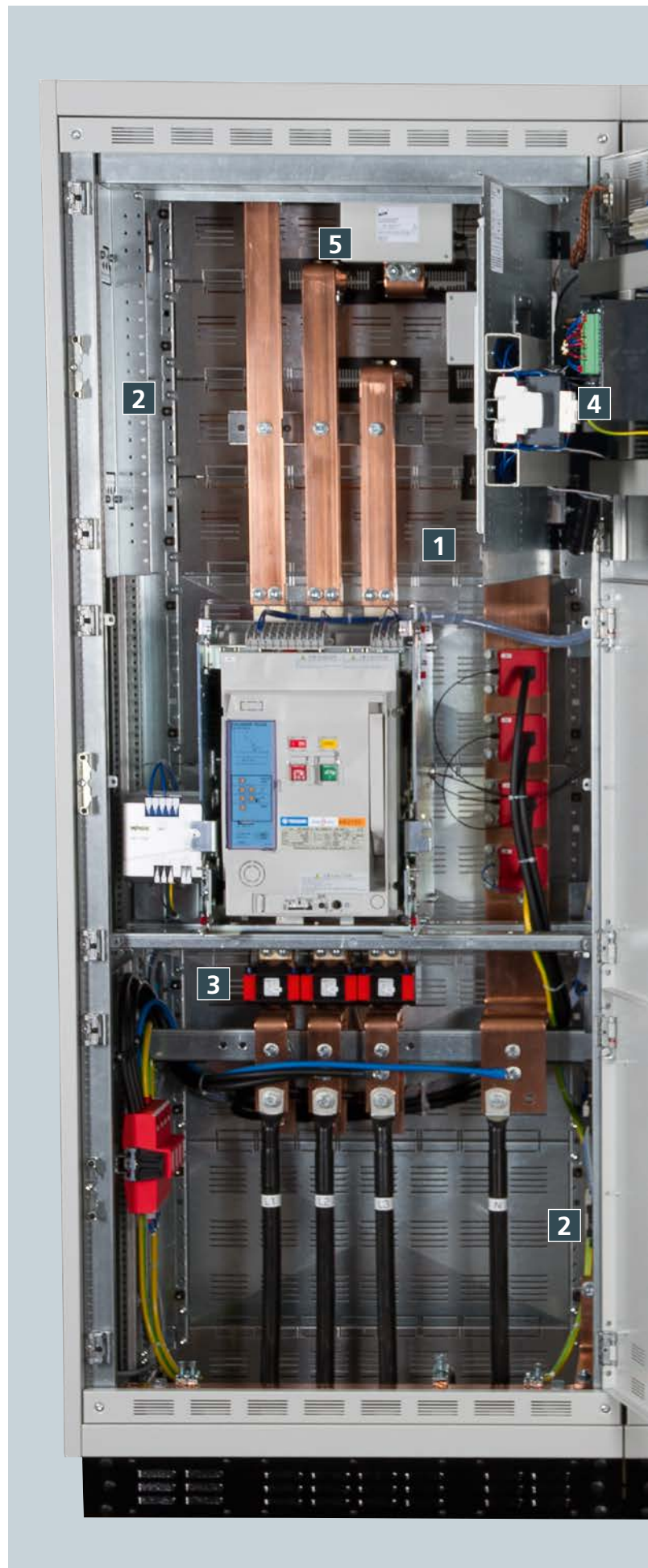
In order to quench the arc fault as quickly as possible, the detection device activates the relevant quenching devices. The current commutates from the arc fault to the low-impedance bolted short-circuit of the two quenching devices and the voltage drops, thus quenching the arc fault. Power thyristors ensure short commutation times which cannot be achieved by previous solutions.

## Disconnection:

At the same time as the quenching devices, the detection devices transmit a trip command to the shunt releases of all incoming circuit breakers via a floating relay contact and disconnect the part of the switchgear assembly where the arc fault occurred.

## Recommissioning:

The switchgear assembly can be recommissioned after the fault has been rectified, the quenching devices have been replaced and the arc fault protection system has been reset.



\* IEC TR 61641: Low-voltage switchgear and controlgear assemblies; Guide for testing under conditions of arcing due to internal fault

\*\* IEC 60364-4-42: Low-voltage electrical installations – Part 4-42: Protection for safety – Protection against thermal effects

\*\*\* IEC 60364-5-53: Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Switchgear and control gear



#### Product features:

- Arc fault quenching within a few milliseconds via power thyristors
- Detection devices at the front of the switchgear assembly
- Modular system
- Activation of the quenching devices via fibre optic cables
- Compact system components

#### IEC TR 61641\*

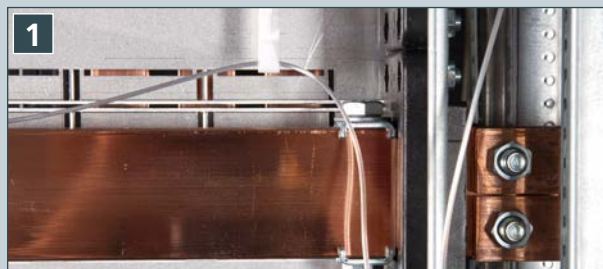
- Regulates the prerequisites for testing the arc fault resistance of low-voltage switchgear assembly with the aim of ensuring the protection of persons and systems

#### IEC 60364-4-42\*\*

- Regulates how to prevent arc faults in case of special fire protection requirements

#### IEC 60364-5-5\*\*\*

- Additionally applies if not only fire protection, but also availability requirements must be met



**Fibre optic sensors** are installed to detect the arc fault along all live parts of a switchgear assembly where ignition of an arc fault is to be expected.



**Optoelectronic sensors** monitor a large detection area and are positioned in every compartment of a switchgear assembly.



**Current transformers** detect the overcurrent resulting from an arc fault. They are positioned upstream of the incoming circuit breaker.



**Detection devices** are installed at the front of the switchgear assembly and LEDs indicate the current status of the system.



**Quenching devices** are preferably positioned in the vicinity of the supply switch.

## Components of the arc fault protection system DEHNshort

### DSRT DD CPS Detection Device (Current + Light)

- Connection of two quenching devices
- Connection of four sensor channels (including up to three optoelectronic sensors each)
- LEDs for status indication
- Four tripping relays
- Bidirectional exchange of sensor signals
- Connection of three current transformers
- One self-monitoring relay



Type		Part No.
DSRT DD CPS BACA	24 V DC	782 030
DSRT DD CPS AACA	230 V AC	782 031

### DSRT DD PS Detection Device (Point Sensor)

- Connection of two quenching devices
- Connection of four sensor channels (including up to three optoelectronic sensors each)
- LEDs for status indication
- Four tripping relays
- Bidirectional exchange of sensor signals
- One self-monitoring relay



Type		Part No.
DSRT DD PS BACA	24 V DC	782 040
DSRT DD PS AACA	230 V AC	782 041

### DSRT DD FS light detection device (detection via fibre optic sensors)

- Connection of three fibre optic sensors
- LEDs for status indication
- Four tripping relays
- Bidirectional exchange of sensor signals
- One self-monitoring relay



Type		Part No.
DSRT DD FS BAAA	24 V DC	782 050
DSRT DD FS AAAA	230 V AC	782 051

### DSRT PS optoelectronic sensor

- Continuous self-monitoring
- Easy installation
- Monitoring of one compartment
- Max. three sensors per channel in series



Type	Part No.
DSRT PS	782 060



### DSRT FS fibre optic sensor

- For detecting arc faults
- Connection of one sensor to each sensor input of the device
- DSRT DD FS possible



Type	Part No.
DSRT FS 8 1.5	782 077
DSRT FS 10 1.5	782 081
DSRT FS 12 1.5	782 085
DSRT FS 15 1.5	782 091

### DSRT QD quenching device

- For direct connection to DSRT DD CPS and DSRT DD PS detection devices
- Short-circuit current withstand up to 80 kA/50 ms



Type	Part No.
DSRT QD	782 000

### DSRT QD II quenching device

- For direct connection to DSRT DD CPS and DSRT DD PS detection devices
- Short-circuit current withstand up to 110 kA/50 ms



Type	Part No.
DSRT QD II	782 002

### DSRT LWL fibre optic cable

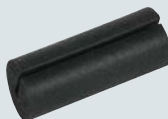
- Connection between detection devices and quenching device
- Prewired cable lengths
- Insensitive to EMC interference



Type	Part No.
DSRT LWL 0.75	782 020
DSRT LWL 2.00	782 022
DSRT LWL 4.00	782 024
DSRT LWL 8.00	782 028

### Foam rubber

- For fibre optic sensors DSRT FS
- Diameter 8 mm
- Packing unit 50 pcs.



Type	Part No.
DSRT SR D8 L20	782 098

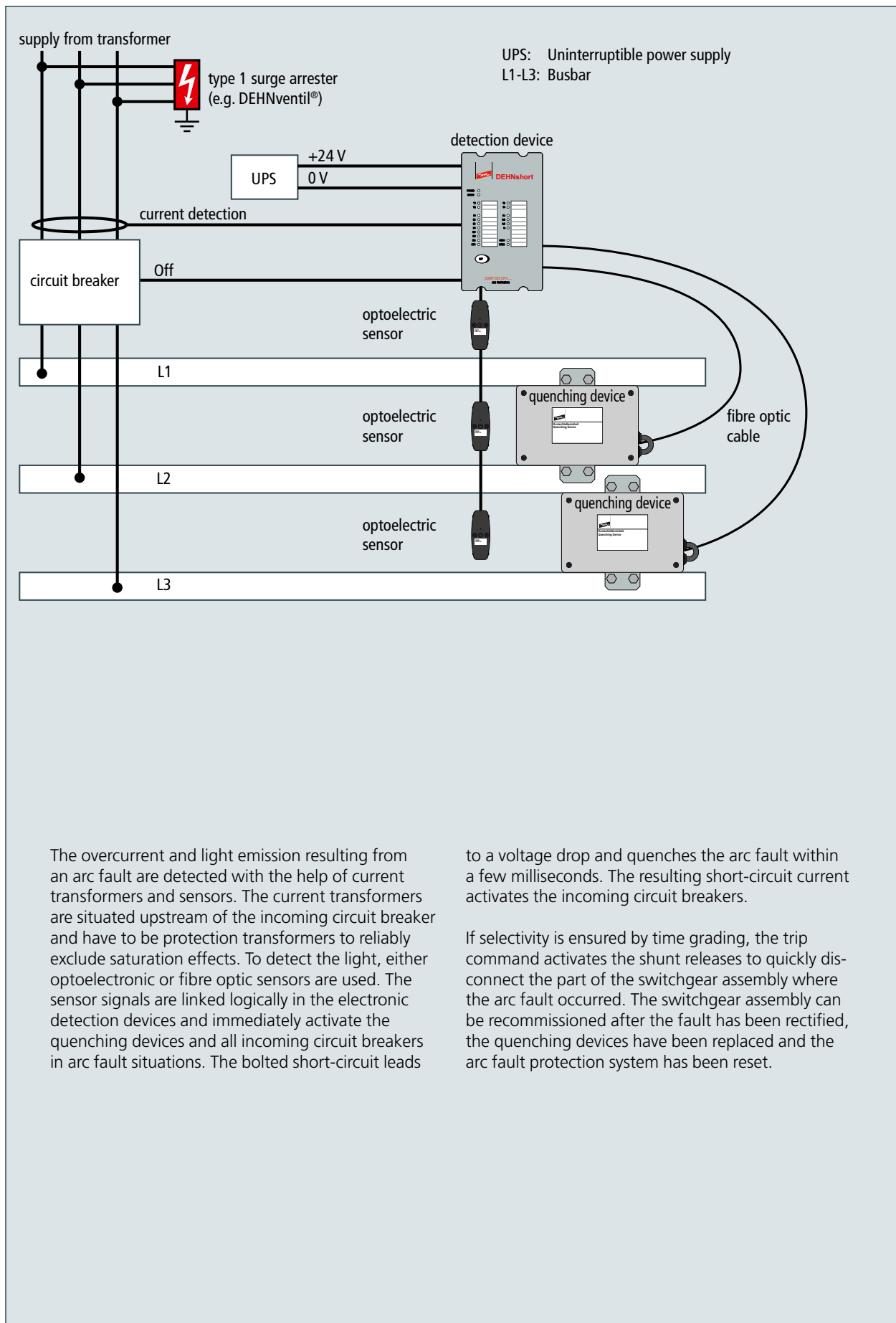
### Fixing clip

- For fibre optic sensors DSRT FS
- Diameter 8 mm
- Packing unit 50 pcs.



Type	Part No.
DSRT FC D8	782 099

## Functional principle of the arc fault protection system DEHNshort





## Integrated arc fault protection concept – DEHNcare®

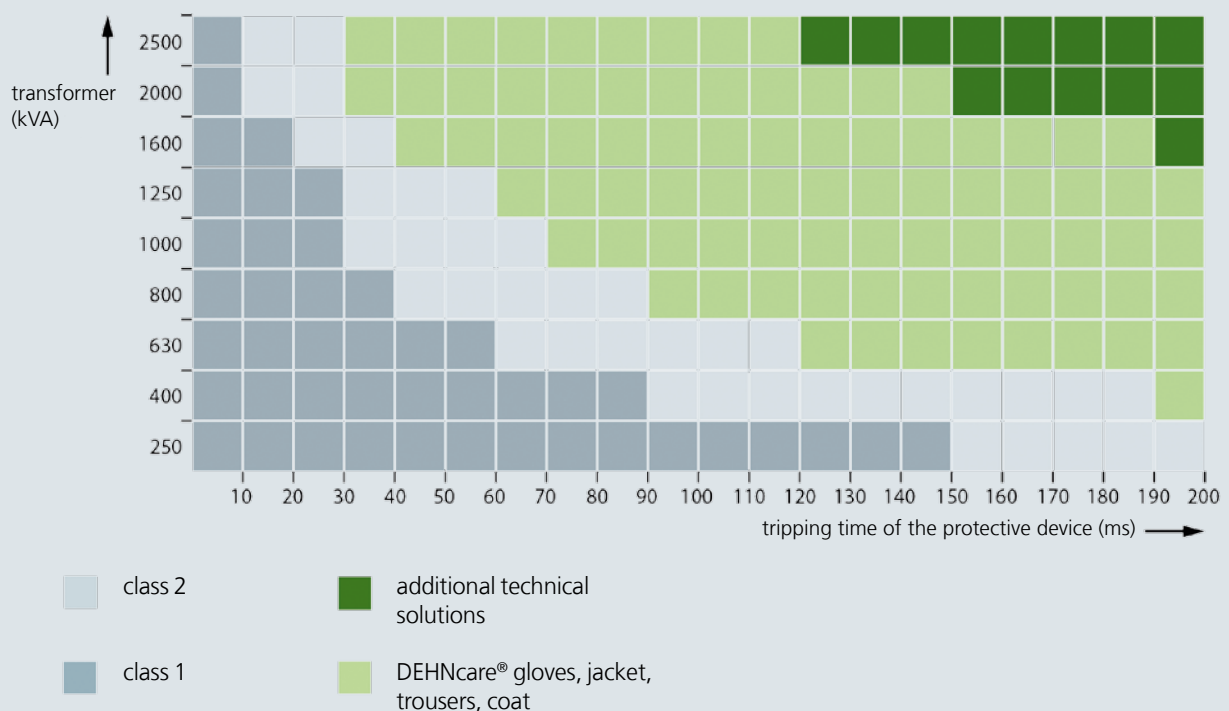
The personal protective equipment DEHNcare® combines maximum protection and unique wearing comfort and is tested to international standards. It consists of a safety helmet for electricians, protective gloves and a jacket or coat.

DEHNcare® protective gloves, trousers, jackets and coats are arc-fault-tested to class 2 (IEC 61482-1-2\*) and certified according to the EEC directive. The combination of leather and neoprene material and the high-quality workmanship ensure excellent fit. The safety helmet for electricians with arc-fault-resistant face shield or the protective hood protects the face and head region from second-degree burns up to arc fault energies of 315 kJ.



Type	Part No.
Safety helmet for electricians	785 705
Face shield	785 761
Protective hood	785 760
Protective gloves, long, size 10	785 810
APT trousers, size 52	785 782
APJ jacket, size 52	785 772
APC coat, size 52/54	785 756

### Requirements on arc fault protection systems with regard to thermal stress depending on the transformer and tripping time of the protective device



Exemplary selection with the following parameters\*\*:

$U_{Nn} = 400 \text{ V}$

$U_k = 6 \%$

$k_p = 0.25$

$a = 300 \text{ mm}$

$k_T = 1$  (small volume)

$U_{Nn}$ : nominal system voltage

$U_k$ : relative short-circuit voltage

$k_p$ : Relationship between the arc fault power and the short-circuit power in the electrical system at the fault location

$a$ : Distance between the arc fault and the upper part of the body

$k_T$ : The transmission factor describes the spatial propagation of the thermal impacts of an arc fault

\* IEC 61482: Live working – Protective clothing against the thermal hazards of an electric arc

\*\* This exemplary selection does not substitute a risk assessment according to the German BGI 5188

[www.dehn-international.com/partners](http://www.dehn-international.com/partners)



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