



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 is available in combination with many reputable switchgear systems – integrated and tested according to IEC TS 63107:2020 or DIN VDE 0660-600-2-1:2021-05. This ensures that the function is verified and reliable. Following the integration tests, DEHN qualifies the employees of the switchgear manufacturer in terms of planning, assembly and functional testing.



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.



Photo of computer centre and railway station: fotolia.com



... 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:

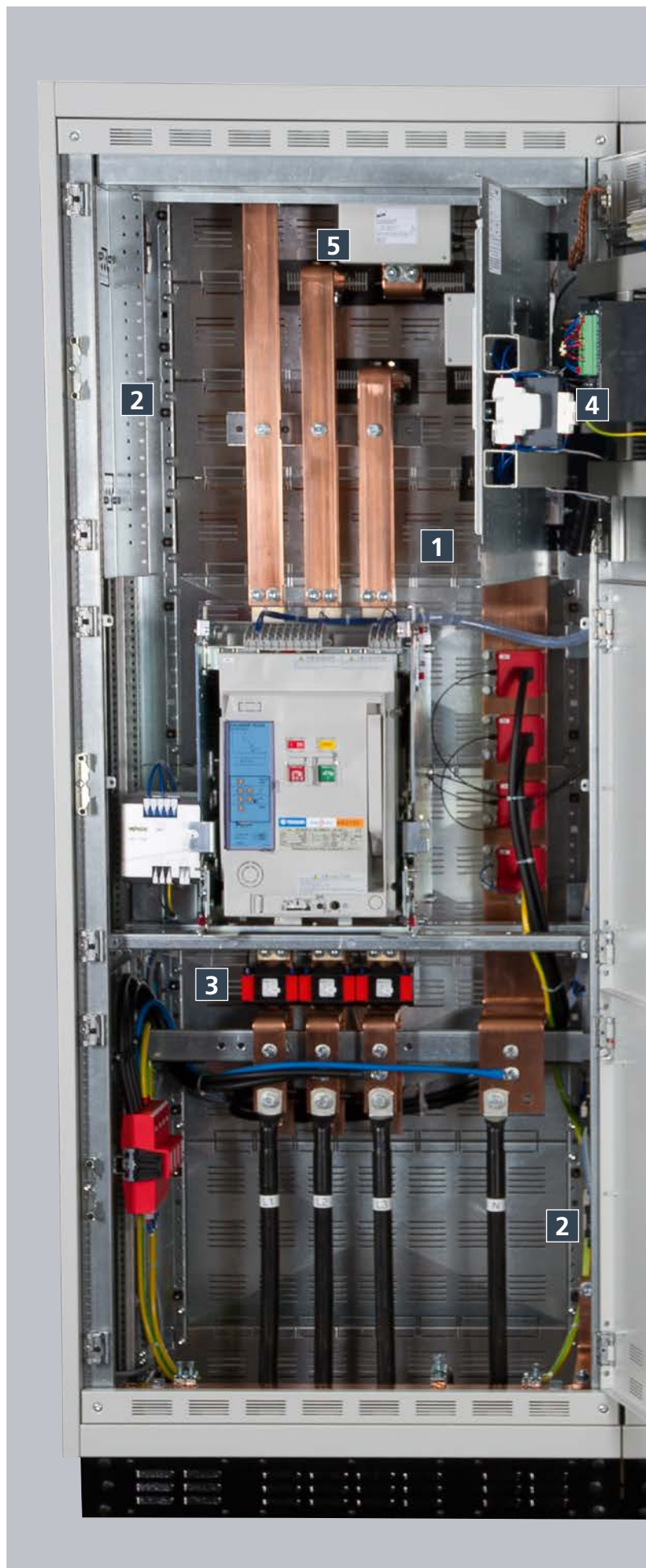
In order to quench the arc fault as quickly as possible, the detection device activates the relevant quenching devices. The current commutates from the arc fault to the low-impedance bolted short-circuit of the two quenching devices and the voltage drops, thus quenching the arc fault. Power thyristors 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 60364-5-5: 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 area and, like the fibre optic sensors, detect arc faults in the vicinity of the active parts.



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.

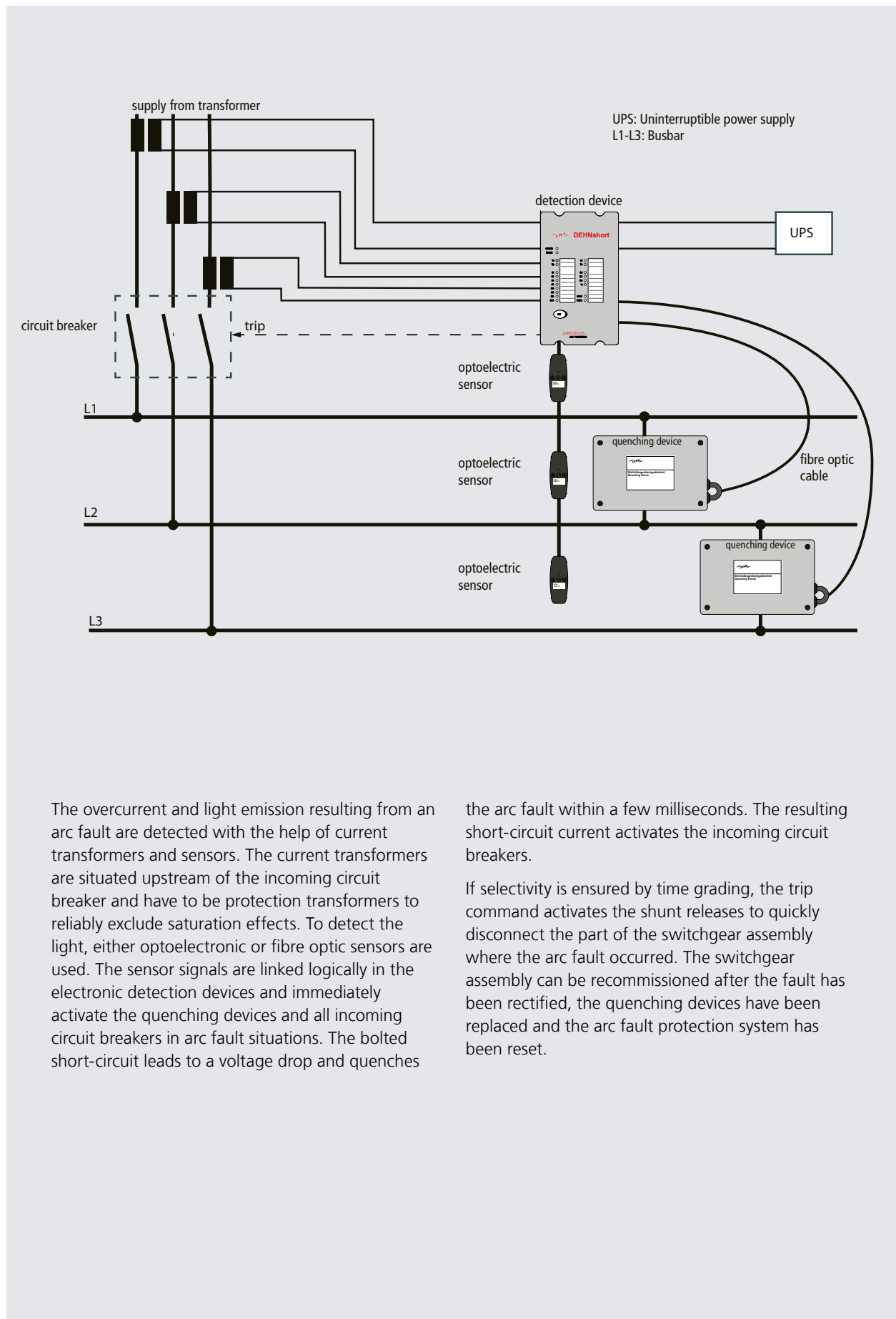


Quenching devices are preferably positioned in the vicinity of the supply switch.

Components of the arc fault protection system DEHNshort

Aktives Störlichtbogenschutzsystem DEHNshort		Typ	Art.-Nr.
DSRT DD CPS Detection Device (Current + Light)			
	<ul style="list-style-type: none"> • 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 	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)			
	<ul style="list-style-type: none"> • 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 	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)			
	<ul style="list-style-type: none"> • Connection of three fibre optic sensors • LEDs for status indication • Four tripping relays • Bidirectional exchange of sensor signals • One self-monitoring relay 	DSRT DD FS BAAA 24 V DC	782 050
		DSRT DD FS AAAA 230 V AC	782 051
DSRT PS optoelectronic sensor			
	<ul style="list-style-type: none"> • Continuous self-monitoring • Easy installation • Monitoring of one compartment • Max. three sensors per channel in series 	DSRT PS	782 060
	Accessories: Fixing clip for point sensors <ul style="list-style-type: none"> • Hole spacing 25 mm • Packing unit 5 pcs 	SPBCLPS	782 097
Faseroptischer Sensor DSRT FS			
	<ul style="list-style-type: none"> • For detecting arc faults • Connection of one sensor to each sensor input of the device • DSRT DD FS possible 	DSRT FS 8 1.5 DSRT FS 10 1.5 DSRT FS 12 1.5 DSRT FS 15 1.5 DSRT FS 17 1.5	782 077 782 081 782 085 782 091 782 092
	Foam rubber <ul style="list-style-type: none"> • Diameter 8 mm • Packing unit 50 pcs. 	DSRT SR DB L20	782 098
	Fixing clip <ul style="list-style-type: none"> • Diameter 8 mm • Packing unit 50 pcs. 	DSRT FC DB	782 099
DSRT QD II quenching device			
	<ul style="list-style-type: none"> • For direct connection to DSRT DD CPS and DSRT DD PS detection devices • Short-circuit current withstand up to 110 kA/300 ms 	DSRT QD II	782 002
DSRT LWL fibre optic cable			
	<ul style="list-style-type: none"> • Connection between detection devices and quenching device • Prewired cable lengths • Insensitive to EMC interference 	DSRT LWL 0.75 DSRT LWL 2.00 DSRT LWL 4.00 DSRT LWL 8.00	782 020 782 022 782 024 782 028

Functional principle of the arc fault protection system DEHNshort



The overcurrent and light emission resulting from an arc fault are detected with the help of current transformers and sensors. The current transformers are situated upstream of the incoming circuit breaker and have to be protection transformers to reliably exclude saturation effects. To detect the light, either optoelectronic or fibre optic sensors are used. The sensor signals are linked logically in the electronic detection devices and immediately activate the quenching devices and all incoming circuit breakers in arc fault situations. The bolted short-circuit leads to a voltage drop and quenches

the arc fault within a few milliseconds. The resulting short-circuit current activates the incoming circuit breakers.

If selectivity is ensured by time grading, the trip command activates the shunt releases to quickly disconnect the part of the switchgear assembly where the arc fault occurred. 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.



Hard-wearing, standard-compliant, indoors as outdoors

The new DEHNcare ArcFit multinorm protective clothing meets the requisite standards for working on electrical installations. It was developed to protect the wearer against the thermal effects of an arc fault – when worn in combination with the necessary accessories. In addition to an indoor collection, we also offer an outdoor collection. The ArcFit clothing protects against arc fault energies up to 320 kJ according to the box test.

Integrated arc fault protection concept – DEHNcare

Maximum protection and unique wearing comfort: DEHNcare personal protective equipment offers both. It is tested according to international standards and consists of a safety helmet for electricians, protective gloves, trousers, and jacket or coat.

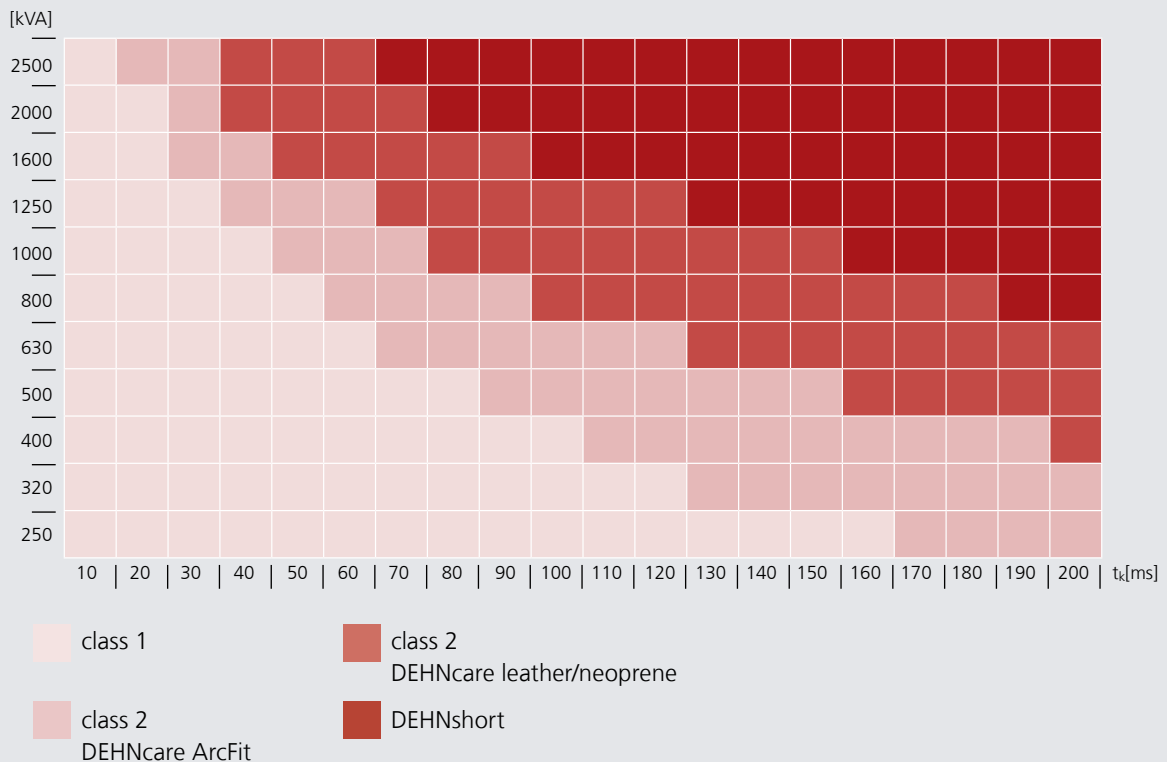
Our DEHNcare products are arc fault tested according to Class 2 (IEC 61482-1-2*) and certified according to PPE regulation (EU) 2016/425.

The leather/neoprene clothing protects against arc energies of up to 630 kJ based on the box test.

The safety helmet for electricians with an arc-fault-resistant face shield or protective hood prevents the face and head area from sustaining 2nd degree burns up to an arc fault energy of 318 kJ.



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**:

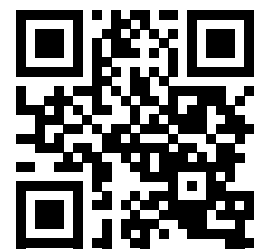
- $U_{Nn} = 400 \text{ V}$ U_{Nn} : nominal system voltage
- $u_k = 6 \%$ u_k : relative short-circuit voltage
- $k_p = 0,25$ k_p : Relationship between the arc fault power and the short-circuit power in the electrical system at the fault location
- $a = 300 \text{ mm}$ a : Distance between the arc fault and the upper part of the body
- $k_T = 1$ (small volume) 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 DGUV-I 203-077

Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.

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