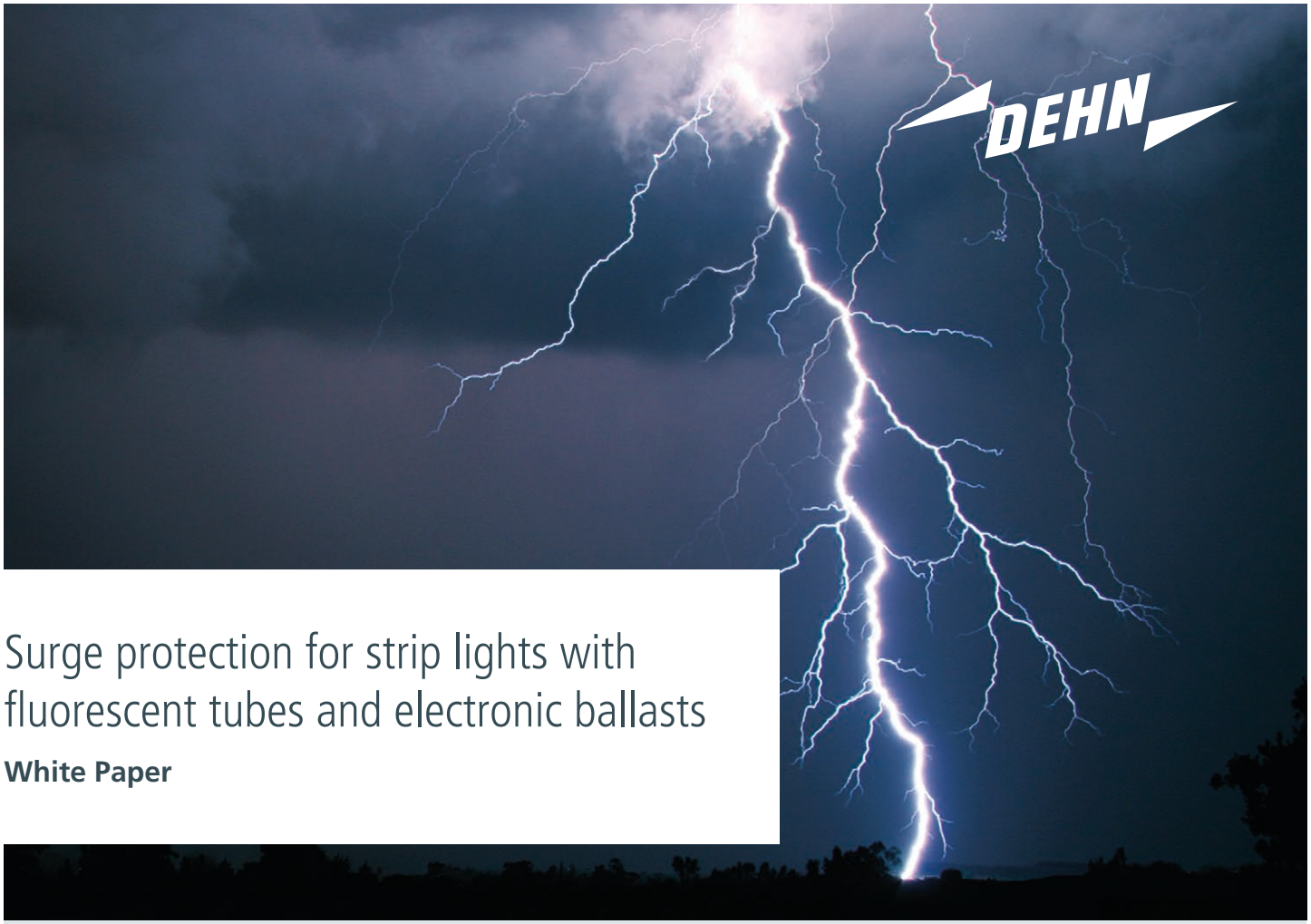
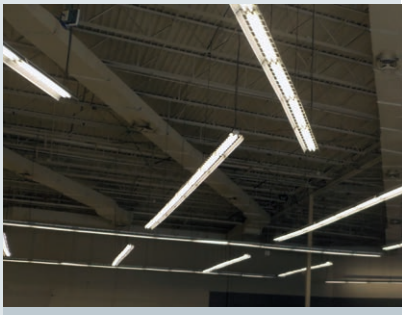


Surge protection for strip lights with fluorescent tubes and electronic ballasts

White Paper



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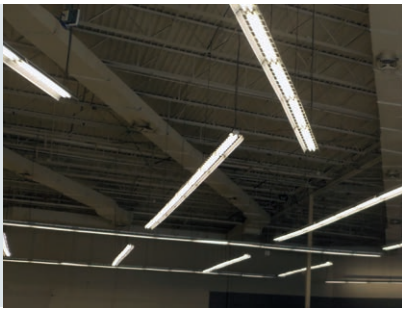
Surge protection for strip lights with fluorescent tubes and electronic ballasts

White Paper



Strip lights in industrial, commercial and agricultural buildings are frequently still equipped with fluorescent tubes (with a diameter of 26 mm or 16 mm) and electronic ballasts.

Strip lights with narrow-beam illumination are used in high halls. Here, the regular replacement of luminaires alone (after roughly 16,000 lighting hours for 26 mm tubes and 20,000 for 16 mm tubes) entails high costs because it requires cherry pickers and is usually done outside normal working hours.

If individual electronic ballasts are destroyed by surges or an entire strip light fails, immediate action is required since the necessary minimum illumination is frequently no longer ensured. This could potentially lead to a decrease in work performance and accidents.

The IEC 60364-4-44 (HD 60364-4-44) standard regulates protection against overvoltages of atmospheric origin or due to switching. The standard describes the use of surge protective devices (type 2 or type 3 arresters) as a solution for buildings and installations.

The often long supply lines for the strip lights are highly susceptible to coupling. Even a type 2 surge arrester or type 1 combined arrester in the power distribution board cannot prevent induced voltage peaks in the lamps. An additional surge arrester is required close to the strip light.

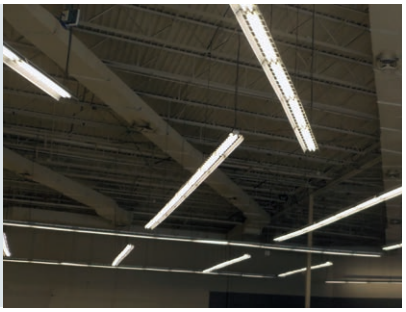
The risk of coupling in the strip lights themselves is considerably reduced in the, frequently installed, class I strip lights (PE connection). If strip lights feature luminaires with double or reinforced insulation, the strip light cables are often routed in a metal rail and are thus largely protected due to the shielded design of the metal rail.

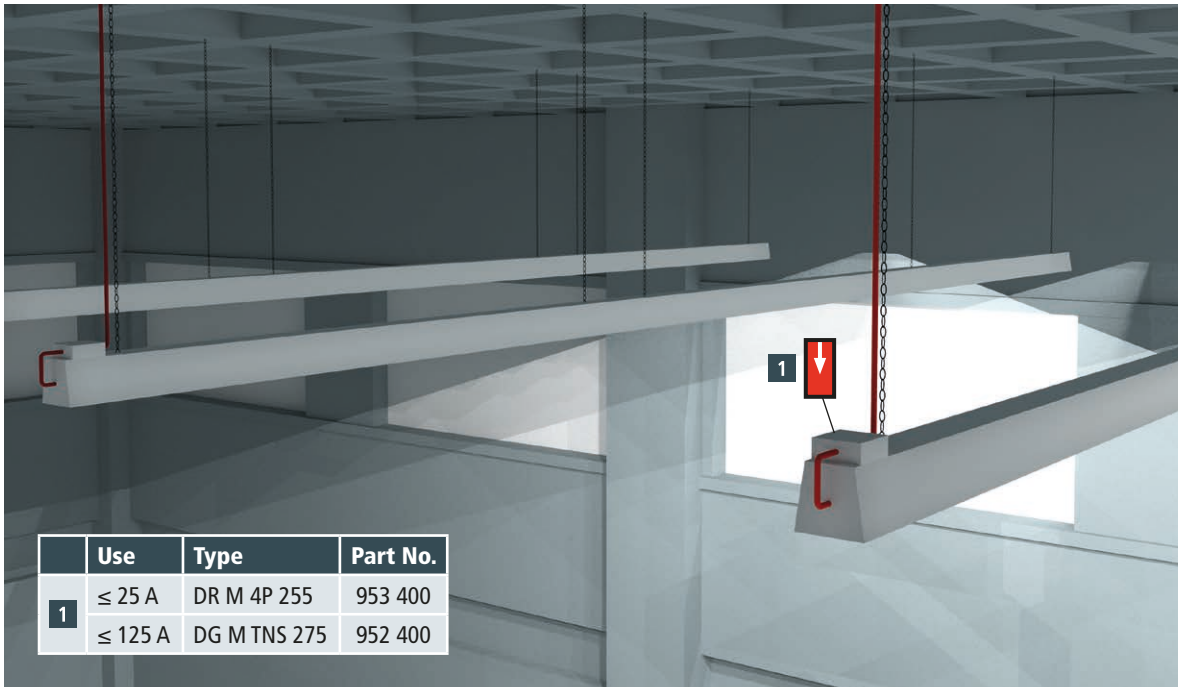
In practice, strip lights are operated with alternating current (230 V / 50 Hz) and three-phase current (3x 230/400 V / 50 Hz). For both types of supply, the maximum number of luminaires to be connected depends on the cross-section of the series connected cables. In order to take the starting current of the electronic ballasts into account for fuse protection, the luminaire manufacturer specifies the maximum number of the relevant luminaires depending on the rated currents of the overcurrent protective devices. This means, for example, that only 13 T26/58 W twin-lamp electronic ballasts may be connected to a 16 A circuit breaker with characteristic B although the operating current is 13 x 0.58 A = 7.54 A. Since luminaires do not cause overload, the line only needs to be protected against short-circuits. Also, the voltage drop is not determined according to the rated current of the overcurrent protective device, but according to the operating current of the luminaires. In practice, type 2/3 surge arresters are used to protect small-sized strip lights operated with alternating current (**Figure 1**). Thanks to their compact design, these surge arresters can be installed in the luminaire housing.

Figure 1 Type 3 surge arrester installed in an office luminaire

Surge protection for strip lights with fluorescent tubes and electronic ballasts

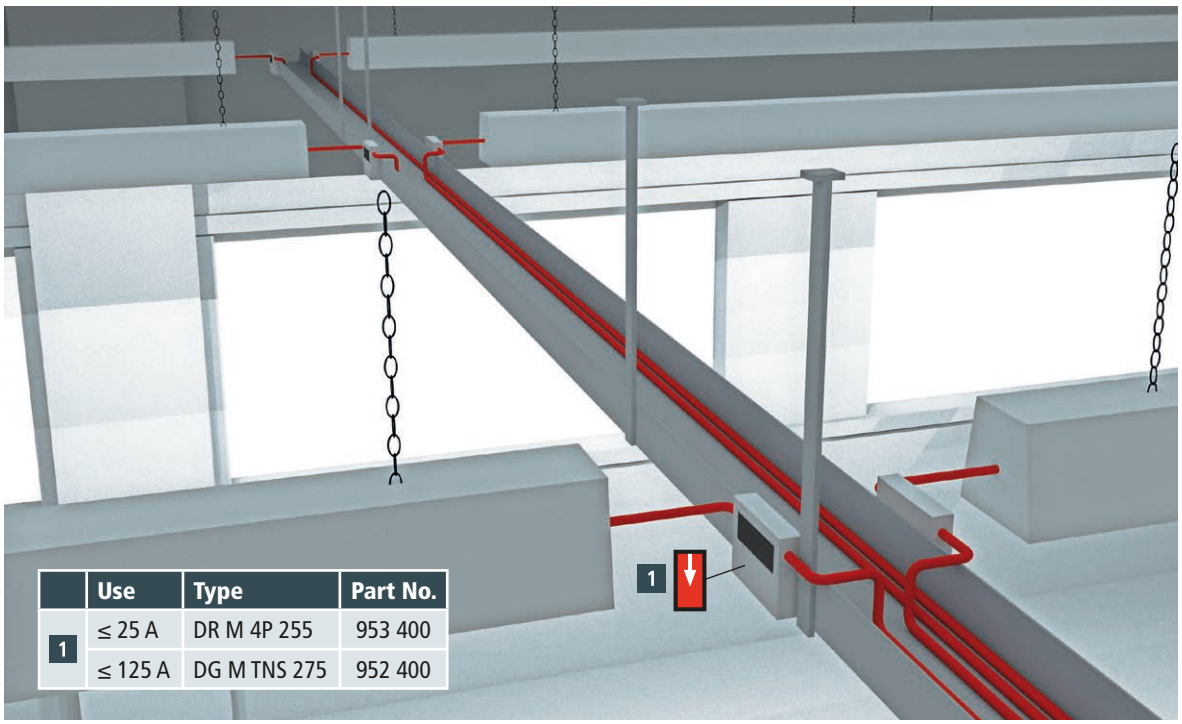
White Paper





	Use	Type	Part No.
1	≤ 25 A	DR M 4P 255	953 400
	≤ 125 A	DG M TNS 275	952 400

Figure 2 Type 2 / 3 surge arrester in a surface-mounted enclosure installed on the mounting rail of a light strip

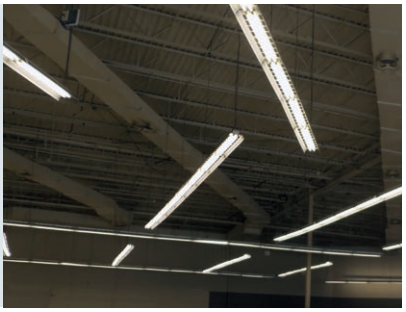


	Use	Type	Part No.
1	≤ 25 A	DR M 4P 255	953 400
	≤ 125 A	DG M TNS 275	952 400

Figure 3 Type 2 / 3 surge arrester in a surface-mounted enclosure installed on a cable tray

Surge protection for strip lights with fluorescent tubes and electronic ballasts

White Paper



For strip lights operated with three-phase current with backup fuses up to 25 A, it is advisable to use DIN rail mounted type 3 surge arresters in a surface-mounted enclosure with an adequate degree of protection which can be directly installed on the DIN rail (**Figure 2**). This type of installation is recommended for long supply lines of pendent luminaires (with a length of several metres).
If the afore-mentioned strip lights are mounted close to the ceiling, the surface-mounted enclosure mentioned above should be installed on the cable tray (**Figure 3**).

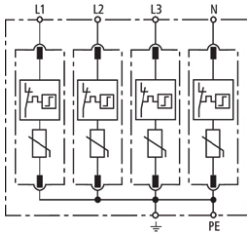
If the three-phase current cables supplying powerful strip lights (nominal current > 25 A) cover long distances, it is often necessary to install cables with larger cross-sections in order to maintain the voltage drop and loop impedance. In such cases, the cable cross-section is tapered via a junction box to the cross-section to be connected to the terminal (usually 2.5 mm^2) just in front of the connection point of the strip light. Here, it is advisable to install type 2 surge arresters which are available for TN-S and TT systems. These surge arresters may only be used for backup fuses up to max. 125 A which are not used anyway due to the short-circuit load on the strip light wiring.

DEHNguard

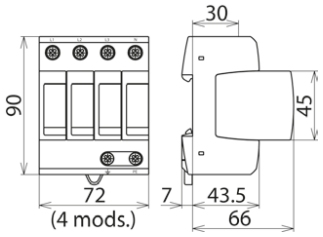
DG M TNS 275 (952 400)

- Prewired complete unit consisting of a base part and plug-in protection modules
- High discharge capacity due to heavy-duty zinc oxide varistors / spark gaps
- High reliability due to "Thermo Dynamic Control" SPD monitoring device

Figure without obligation



Basic circuit diagram DG M TNS 275



Dimension drawing DG M TNS 275

Modular surge arrester for use in TN-S systems.

Type Part No.	DG M TNS 275 952 400
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	275 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	20 kA
Max. discharge current (8/20 µs) (I_{max})	40 kA
Voltage protection level [L-PE]/[N-PE] (U_P)	≤ 1.5 / ≤ 1.5 kV
Voltage protection level [L-PE] / [N-PE] at 5 kA (U_P)	≤ 1 / ≤ 1 kV
Response time (t_A)	≤ 25 ns
Max. mains-side overcurrent protection	125 A gG
Short-circuit withstand capability for max. mains-side overcurrent protection (I_{SCCR})	50 kA_{rms}
Temporary overvoltage (TOV) (U_T) – Characteristic	335 V / 5 sec. – withstand
Temporary overvoltage (TOV) (U_T) – Characteristic	440 V / 120 min. – safe failure
Operating temperature range (T_U)	-40 °C ... +80 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (min.)	1.5 mm^2 solid / flexible
Cross-sectional area (max.)	35 mm^2 stranded / 25 mm^2 flexible
For mounting on	35 mm DIN rails acc. to EN 60715
Enclosure material	thermoplastic, red, UL 94 V-0
Place of installation	indoor installation
Degree of protection	IP 20
Capacity	4 module(s), DIN 43880
Approvals	KEMA, VDE, UL
Weight	414 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364108455
PU	1 pc(s)

DEHNcord

DCOR L 2P 275 (900 430)

- Visual fault indication
- Compact design
- For use in flush-mounted systems, cable ducts and flush-type boxes

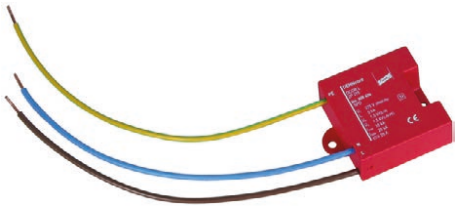
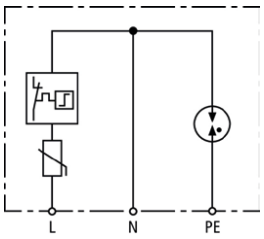
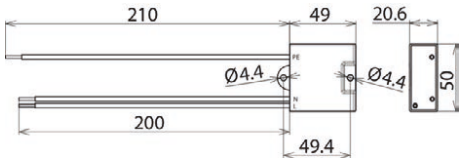


Figure without obligation



Basic circuit diagram DCOR L 2P 275



Dimension drawing DCOR L 2P 275

Two-pole surge arrester for all installation systems (1+1 configuration) and lamps of protective class I; compact design.

Technical data

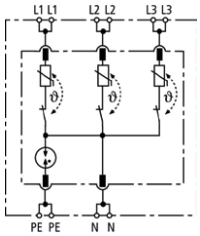
Type Part No.	DCOR L 2P 275 900 430
SPD according to EN 61643-11 / IEC 61643-11	type 2 / class II
Energy coordination with terminal equipment (≤ 10 m)	type 2 + type 3
Nominal voltage (a.c.) (U_N)	230 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [L-N] (U_C)	275 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) [N-PE] (U_C)	255 V (50 / 60 Hz)
Nominal discharge current (8/20 µs) (I_n)	5 kA
Max. discharge current (8/20 µs) (I_{max})	10 kA
Total discharge current (8/20 µs) [L+N-PE] (I_{total})	20 kA
Voltage protection level [L-N] (U_P)	≤ 1.5 kV
Voltage protection level [L-N] at 3 kA (U_P)	≤ 1 kV
Voltage protection level [L-N] at 1.5 kA (U_P)	≤ 0.85 kV
Voltage protection level [N-PE] (U_P)	≤ 1.5 kV
Follow current extinguishing capability [N-PE] (I_{fi})	100 A_{rms}
Response time [L-N] (t_A)	≤ 25 ns
Response time [L/N-PE] (t_A)	≤ 100 ns
Max. mains-side overcurrent protection	25 A gG
Short-circuit withstand capability for mains-side overcurrent protection (I_{SCCR})	25 kA_{rms}
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	335 V / 5 sec. – withstand
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	440 V / 120 min. – safe failure
Temporary overvoltage (TOV) [N-PE] (U_T) – Characteristic	1200 V / 200 ms – withstand
Operating state / fault indication	green / red
Number of ports	1
Operating temperature range (T_U)	-40 °C ... +80 °C
Connecting wires	1.5 mm^2, 200 mm long
Enclosure material	thermoplastic, red, UL 94 V-2
Place of installation	indoor installation
Degree of protection of installed device	IP 20
Approvals	KEMA
Weight	59 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364157286
PU	1 pc(s)

DEHNrail

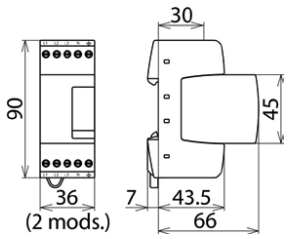
DR M 4P 255 (953 400)

- Four-pole surge arrester consisting of a base element and a plug-in protection module
- High discharge capacity due to heavy-duty zinc oxide varistor / spark gap combination
- Energy coordination with other arresters of the Red/Line product family

Figure without obligation



Basic circuit diagram DR M 4P 255



Dimension drawing DR M 4P 255

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

Type Part No.	DR M 4P 255 953 400
SPD according to EN 61643-11 / IEC 61643-11	type 3 / class III
Nominal voltage (a.c.) (U_N)	230 / 400 V (50 / 60 Hz)
Max. continuous operating voltage (a.c.) (U_C)	255 / 440 V (50 / 60 Hz)
Nominal load current (a.c.) (I_L)	25 A
Nominal discharge current (8/20 µs) (I_n)	3 kA
Total discharge current (8/20 µs) [L1+L2+L3+N-PE] (I_{total})	8 kA
Combination wave (U_{OC})	6 kV
Combination wave [L1+L2+L3+N-PE] ($U_{OC\ total}$)	16 kV
Voltage protection level [L-N] / [L/N-PE] (U_P)	≤ 1000 / ≤ 1500 V
Response time [L-N] (t_A)	≤ 25 ns
Response time [L/N-PE] (t_A)	≤ 100 ns
Max. mains-side overcurrent protection	25 A gG or B 25 A
Short-circuit withstand capability for mains-side overcurrent protection with 25 A gL/gG (I_{SCCR})	6 kA_{rms}
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	335 V / 5 sec. – withstand
Temporary overvoltage (TOV) [L-N] (U_T) – Characteristic	440 V / 120 min. – safe failure
Temporary overvoltage (TOV) [L/N-PE] (U_T) – Characteristic	335 V / 120 min. – withstand
Temporary overvoltage (TOV) [L/N-PE] (U_T) – Characteristic	440 V / 5 sec. – withstand
Temporary overvoltage (TOV) [N-PE] (U_T) – Characteristic	1200 V / 200 ms – safe failure
Operating temperature range (T_U)	-40 °C ... +80 °C
Operating state / fault indication	green / red
Number of ports	1
Cross-sectional area (min.)	0.5 mm^2 solid / flexible
Cross-sectional area (max.)	4 mm^2 stranded / 2.5 mm^2 flexible
For mounting on	35 mm DIN rails acc. to EN 60715
Enclosure material	thermoplastic, red, UL 94 V-0
Place of installation	indoor installation
Degree of protection	IP 20
Capacity	2 modules, DIN 43880
Approvals	KEMA, VDE
Weight	147 g
Customs tariff number (Comb. Nomenclature EU)	85363030
GTIN	4013364115767
PU	1 pc(s)

Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.

DEHN SE
Hans-Dehn-Str. 1
Postfach 1640
92306 Neumarkt, Germany

Tel. +49 9181 906-0
Fax +49 9181 906-1100
info@dehn.de
www.dehn-international.com

www.dehn-international.com/partners