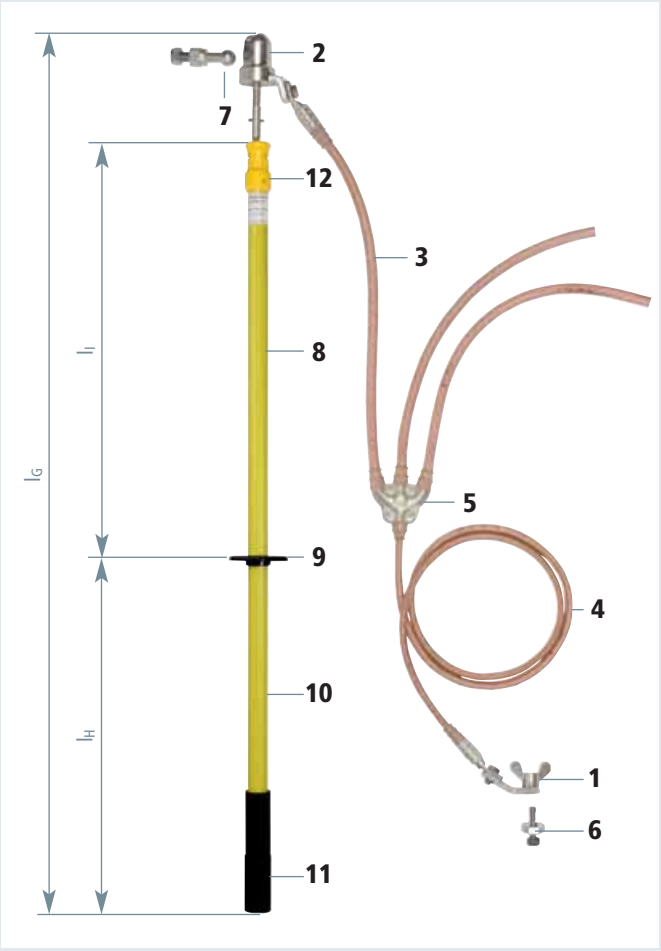
4. Carry out Earthing and Short-Circuiting – EaS Devices

Earthing and short-circuiting at the work location is a key element of the five safety rules. This measure ensures that the installation is de-energised when working on electrical equipment even in case of interference voltages, atmospheric surges or accidental reconnection.
Isolation from supply voltage must be verified at the point of installation immediately before portable earthing and short-circuiting equipment is installed.
When installing earthing and short-circuiting devices, the earthing cable always has to be connected to the earthing system first to ensure that residual or interference voltages are discharged.

Portable earthing and short-circuiting equipment according to IEC/EN 61230 (DIN VDE 0683-100) is a hand-held device used to approach fixed connection points of parts of an electrical installation for earthing and short-circuiting purposes (according to EN 50110-1 (DIN VDE 0105-100), section 6.2.4) and for connection with the fixed connection points without guide slots, bushings or guide rails. It consist of an earthing and short-circuiting device (EaS device) and an earthing stick.
The purpose of **earthing and short-circuiting devices** is to earth and short-circuit electrical conductors. They consist of an earthing and short-circuiting device. The **earthing device** connects the earthing system with a short-circuiting device or with the equipment to be earthed. It consists of an earth clamp (**1**) and an earthing cable (**4**).
The **short-circuiting device bar** connects the phase conductors that have to be short-circuited. It consists of clamps (**1**+**2**), short-circuiting cables or bars (**3**) and connecting clusters (**5**), if required.
The **short-circuiting** is a rigid short-circuiting device.
Connecting clusters connect the short-circuiting cables with each other and with the earthing cable or the short-circuiting bar with the earthing cable.
Clamps connect the earthing and short-circuiting cables or bars to the earthing system either directly or via connecting links such as cable lugs and to parts of the installation via fixed connection points, if required.
Fixed connection points are parts of the installation to which earthing and short-circuiting devices are connected (e.g. conductors, bars, fixed ball points, cylinder bolts, clamps etc.). Maximum short-circuit strength can be achieved by connecting the fixed ball point with the ball head cap of the earthing and short-circuiting device.
An **earthing stick** is a hand-held insulating stick for approaching clamps of earthing and short-circuiting devices to parts of electrical installations for earthing and short-circuiting purposes. It consists of an insulating element, black ring, handle and coupling for attaching clamps. Earthing sticks are selected according to the **weight** of the earthing and short-circuiting devices to be connected (see "max. load on 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 safe distance and provides sufficient insulation. The insulating element l_I must have a minimum length of 500 mm in installations exceeding 1 kV.



Portable earthing and short-circuiting equipment

1 Earth clamp	7 Line connection point
2 Line clamp	8 Insulating element with length l_I
3 Short-circuiting cable	9 Hand guard
4 Earthing cable	10 Handle with length l_H
5 Connecting cluster	11 End fitting with plug-in coupling
6 Earth connection point	12 Coupling

A complete earthing and short-circuiting device according to IEC/EN 61230 (DIN VDE 0683-100) includes, for example:

- Fixed point / Fixed ball point
- Single-pole or three-pole earthing and short-circuiting device or short-circuiting bar
- Fixed earthing point
- Earthing stick

Earthing and short-circuiting devices as well as the fixed ball and earthing points must be rated to withstand the **short-circuit current conditions** expected on site. The required cable cross-section depends on the maximum short-circuit current (I_k in A) and the maximum short-circuit time (T_k in s).

Earthing and Short-Circuiting Devices

Note:

In the event of a short-circuit, the short-circuit current will flow through the short-circuiting device. However, this is different for earthing devices as they do not conduct short-circuit currents and can therefore be rated for lower values.

Cable cross-section:

For short-circuiting cables of our three-pole earthing and short-circuiting devices with cross-sections of 50 mm² and higher, **the cross-section of the earthing cable** can be reduced according to the following table.

Cable Cross-Section	
Short-circuiting cable	**Earthing cable**
16 mm²	16 mm²
25 mm²	25 mm²
35 mm²	35 mm²
50 mm²	25 mm²
70 mm²	35 mm²
95 mm²	35 mm²
120 mm²	50 mm²
150 mm²	50 mm²

These earthing and short-circuiting devices with reduced earthing cable cross-sections can be used for all non-solidly earthed neutral systems (e.g. **compensated systems** with impedance neutral earthing). For **solidly earthed neutral systems**, the earthing and short-circuiting cables must have the same cross-sections.

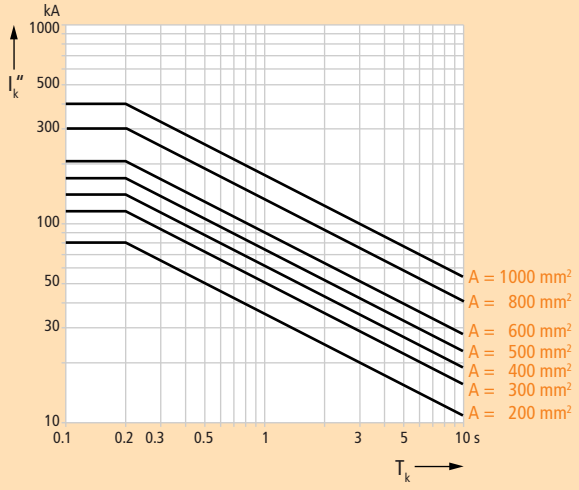
The **current carrying capacity** of the short-circuiting cable and the short-circuiting bar depends on the material, the cross-section (A) and the short-circuit time (T_k).

Calculations were based on the most critical case, i.e. an off-generator short circuit ($\mu = 1$) and a maximum d.c. components ($\chi = 1.8$) with I_k" being the maximum initial short-circuit alternating current, which, according to DIN VDE 0102, is equal to the permanent short-circuit current I_k and the breaking current I_a:

$$I_k" = I_k = I_a$$

The diagrams or the table help to determine the required cable or busbar cross-sections of short-circuiting devices according to the short-circuit current and the short-circuit time of an installation.

Current carrying capacity of E-Cu F20 short-circuiting bars



Initial cable temperature 20 °C

Final cable temperature 250 °C

$A = 5.54\ I_k" \sqrt{T_k}$ for $T_k \geq 0.2$ s

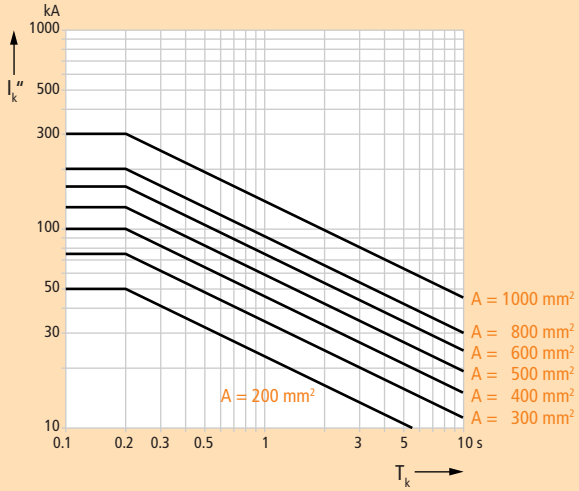
where:

A Busbars cross-section in mm²

I_k" Maximum initial short-circuit alternating current in kA according to DIN VDE 0102

T_k Short-circuit time in s

Current carrying capacity of E-AlMgSi 0.5 F17 short-circuiting bars



Initial cable temperature 20 °C

Final cable temperature 250 °C

$A = 8.79\ I_k" \sqrt{T_k}$ for $T_k \geq 0.2$ s

where:

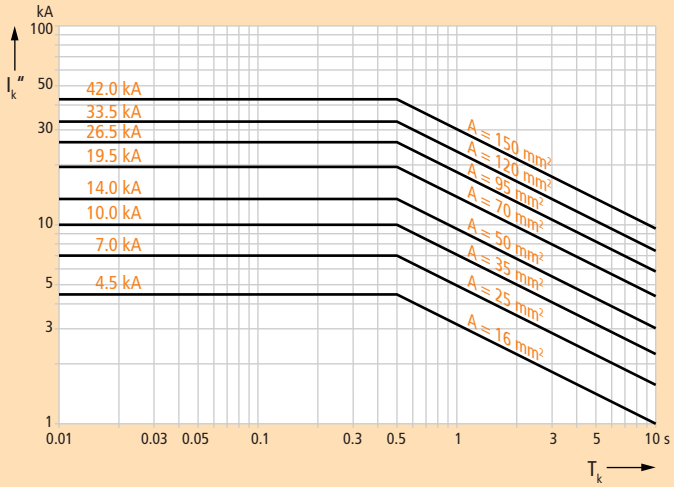
A Busbars cross-section in mm²

I_k" Maximum initial short-circuit alternating current in kA according to DIN VDE 0102

T_k Short-circuit time in s

Accessories, spare parts and kit parts from page 193

Current carrying capacity of copper short-circuiting cables for use in a.c. and three-phase installations



Initial cable temperature 20 °C

Final cable temperature 250 °C

$A = 5.07\ I_k'' \sqrt{T_k}$ for $T_k \geq 0.5$ s

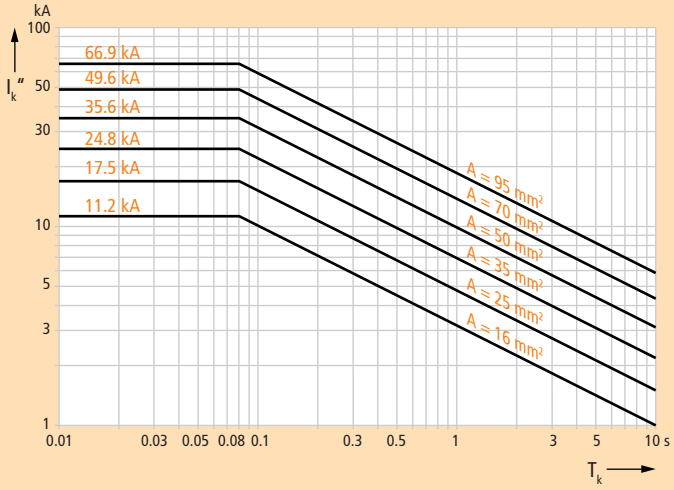
where:

A Cable cross-section in mm²

I_k'' Maximum initial short-circuit alternating current in kA according to DIN VDE 0102

T_k Short-circuit time in s

Current carrying capacity of copper short-circuiting cables for use in d.c. installations



Initial cable temperature 20 °C

Final cable temperature 250 °C

$A = 5.07\ I_k'' \sqrt{T_k}$ for $T_k \geq 0.08$ s

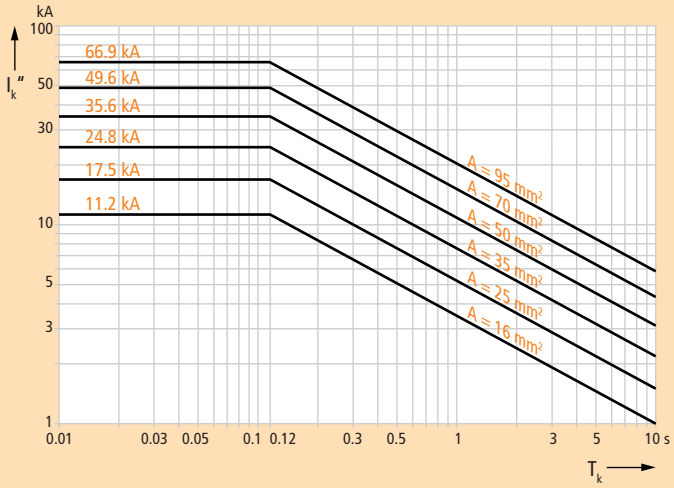
where:

A Cable cross-section in mm²

I_k'' Maximum initial short-circuit alternating current in kA according to DIN VDE 0102

T_k Short-circuit time in s

Current carrying capacity of copper short-circuiting cables for use on overhead contact lines of electric railways



Initial cable temperature 20 °C

Final cable temperature 400 °C

$A = 4.1\ I_k'' \sqrt{T_k}$ for $T_k \geq 0.12$ s

where:

A Cable cross-section in mm²

I_k'' Maximum initial short-circuit alternating current in kA according to DIN VDE 0102

T_k Short-circuit time in s

Calculation example:

Known: Mains breaking capacity S_a
Short-circuit time T_k

Unknown: Required cable or bar cross-section A.

The calculation is based on an off-generator short-circuit.

Three-phase current $I_k'' = I_k = I_a = \frac{S_a}{\sqrt{3} \bullet U_N}$

Single-phase alternating current $I_k'' = I_k = I_a = \frac{S_a}{U_N}$

The required cable or bar cross-section can now be calculated based on I_k'' of the above equations or can be taken from the diagrams. The permissible current carrying capacity of an earthing and short-circuiting device is based on the cross-section printed on the short-circuiting cables or bars.

Notes:

- Earthing and short-circuiting devices can only be loaded once with the permissible short-circuit currents depending on the short-circuit time.
- Short-circuiting cables of multi-pole earthing and short-circuiting devices must have the same cross-sections.
- Cable lengths of earthing and short-circuiting devices should be as short as possible as the cables move violently during a short-circuit. They should be at least 120% of the distance between two fixed connection points.
- When connecting earthing and short-circuiting devices in parallel with cables for achieving certain total cable cross-sections, the following conditions must be fulfilled:
  1. Identical cable lengths and cross-sections,
  2. Identical clamps and fixed connection points,
  3. Installing the devices directly next to each other, with parallel arrangement of cables,
  4. The current carrying capacity per cable must be reduced to 75% of the current carrying capacity of the cable cross-section.

Remark:
If it is ensured that earthing and short-circuiting devices connected in parallel are loaded with short-circuit currents only once (no interruption of the short circuit), the devices may be exposed to the full load. Generally, this applies to installations with nominal voltages above 110 kV.

Table:

Cable cross-section of the earthing and short-circuiting device depending on the maximum short-circuit I_k and maximum short-circuit time T_k

Cross-section of the copper cable	Max. short-circuit current I_k at a duration of				
	10 s	5 s	2 s	1 s *)	≤ 0.5 s *)
16 mm²	1 000 A	1 400 A	2 200 A	3 200 A	4 500 A
25 mm²	1 600 A	2 200 A	3 500 A	4 900 A	7 000 A
35 mm²	2 200 A	3 100 A	4 900 A	6 900 A	10 000 A
50 mm²	3 100 A	4 400 A	7 000 A	9 900 A	14 000 A
70 mm²	4 400 A	6 200 A	9 800 A	13 800 A	19 500 A
95 mm²	5 900 A	8 400 A	13 200 A	18 700 A	26 500 A
120 mm²	7 500 A	10 600 A	16 700 A	23 700 A	33 500 A
150 mm²	9 400 A	13 200 A	20 900 A	29 600 A	42 000 A

*) catalogue data

Accessories, spare parts and kit parts from page 193

Earthing and Short-Circuiting Cables, unequipped

4. Carry out Earthing and Short-Circuiting – EaS Devices

- To be equipped with connecting components
- Transparent sheath
- Waterproof and plastic-sheathed cable entries and node unit, additional anti-kink protection
- Standard anti-rotation crimped cable lugs (type PK1)
- Other cable lengths and crimped cable lugs can be selected online via the earthing and short-circuiting configurator
- Earthing and short-circuiting devices can be configured online via the earthing and short-circuiting configurator

Equipped three-pole earthing and short-circuiting device in a switchgear installation

EaS Configurator: www.dehn.de/en/euk

General Information:	
Standard	EN/IEC 61138 (DIN VDE 0283-3) and EN/IEC 61230 (DIN VDE 0683-100)
Temperature range	– 25 °C ... + 55 °C
Material (cable)	E-Cu, extra finely stranded and highly flexible
Material (sheath)	Thermoplastic polymer (flexible PVC compound YM2)
Hole (cable lug)	Ø12.5 mm

Crimped cable lugs, type **PK1:**
Standard anti-rotation cable lug with cut-out.

Crimped cable lugs, type **PK2:**
Cable lugs without cut-out for connecting parts from other manufacturers are available on request.

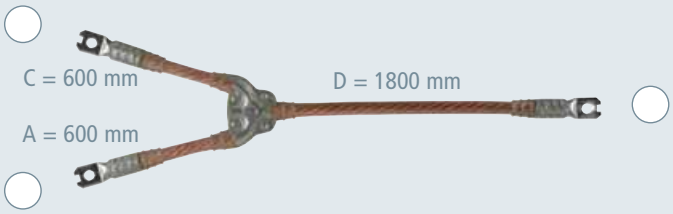
Crimped cable lugs, type **PK3:**
Hook-type cable lugs up to cable cross-sections of 35 mm² are available on request.

Earthing and Short-Circuiting Cables, unequipped

Single-pole Earthing and Short-Circuiting Cables

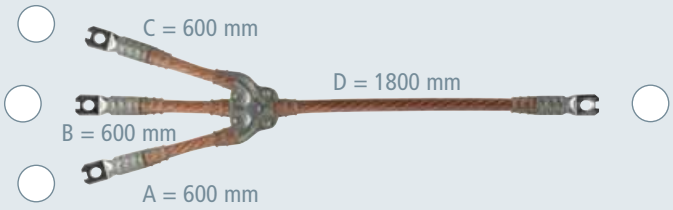
Type	EKV1+0 16	EKV1+0 25	EKV1+0 35	EKV1+0 50	EKV1+0 70	EKV1+0 95	EKV1+0 120	EKV1+0 150
Variant No.	V4YPRGE	VSY71K4	V9JF26K	VRJG23Y	VPZBBSL	VZC3FST	V797FE6	VB53TC9
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1

Two-pole Earthing and Short-Circuiting Cables



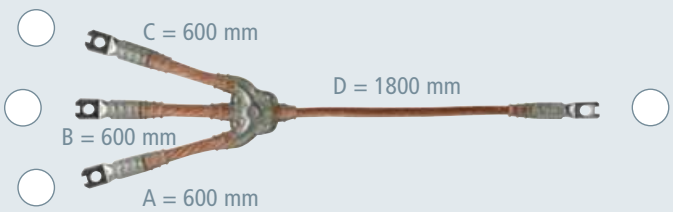
Type	EKV2+0 16 G	EKV2+0 25 G	EKV2+0 35 G	EKV2+0 50 G	EKV2+0 70 G	EKV2+0 95 G	EKV2+0 120 G	EKV2+0 150 G
Variant No.	V7265NS	VZL6TGH	VPHPZV2	VJ13VWW	VTJKEZU	VAM7M6H	VFV1Z7K	VLL6JWS
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1

Three-pole Earthing and Short-Circuiting Cables, same Cable Cross-Section



Type	EKV3+0 16 G	EKV3+0 25 G	EKV3+0 35 G	EKV3+0 50 G	EKV3+0 70 G	EKV3+0 95 G	EKV3+0 120 G	EKV3+0 150 G
Variant No.	VE5MT89	VNC1S9W	V18JQHQ	VJ7VGZD	VH95BZZ	VM2J7S3	V8D4AQ2	VG3V6T2
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1

Three-pole Earthing and Short-Circuiting Cables, reduced Cable Cross-Section

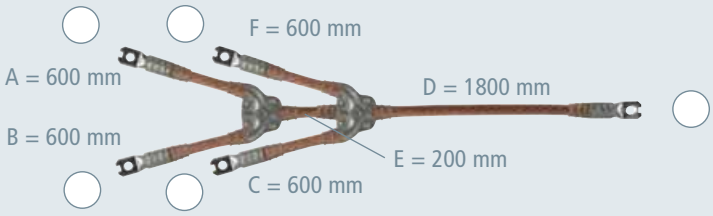


Type	EKV3+0 50 R	EKV3+0 70 R	EKV3+0 95 R	EKV3+0 120 R	EKV3+0 150 R
Variant No.	VN35H5D	VTCS2XV	VLB2F3G	V8115WA	V11E77B
Cable cross-section	50/25 mm²	70/35 mm²	95/35 mm²	120/50 mm²	150/50 mm²
Max. short-circuit current I_k 0.5 s	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA
Crimped cable lug	PK1	PK1	PK1	PK1	PK1

Accessories, spare parts and kit parts from page 193

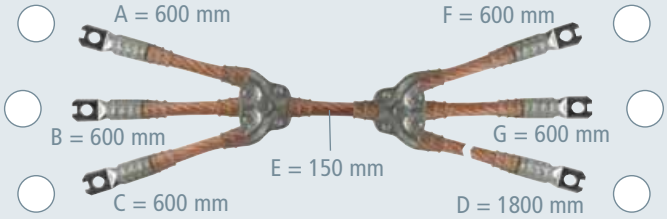
Earthing and Short-Circuiting Cables, unequipped

Four-pole Earthing and Short-Circuiting Cables



Type	EKV4u0 16 G	EKV4u0 25 G	EKV4u0 35 G	EKV4u0 50 G	EKV4u0 70 G	EKV4u0 95 G	EKV4u0 120 G	EKV4u0 150 G
Variant No.	VGUVRRG	VGM214B	V93UVAP	V3NCSHX	V7GN8WU	VABRSSE	V27E2GP	V291ZZT
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1

Five-pole Earthing and Short-Circuiting Cables



Type	EKV5+0 16 G	EKV5+0 25 G	EKV5+0 35 G	EKV5+0 50 G	EKV5+0 70 G	EKV5+0 95 G	EKV5+0 120 G	EKV5+0 150 G
Variant No.	VQ7PF5A	VZKQZB5	V76D5TH	V6VE249	VDXTBGF	VGCMAA5	VVL7AKP	VHV1NKR
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1

Note: When ordering, please specify a clear Variant No.

Earthing Cable in accordance with IEC 61138

The cable is delivered without crimped cable lugs and can be ordered by the metre.

Type	ES YM2 16	ES YM2 25	ES YM2 35	ES YM2 50	ES YM2 70	ES YM2 95	ES YM2 120	ES YM2 150
Part No.	716 001	725 001	735 001	750 001	770 001	795 001	712 001	715 001
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Minimum order quantity *)	1 m	1 m	1 m	1 m	1 m	1 m	1 m	1 m

*) Please specify the length of the earthing cable when ordering (in whole metres)

EaS Configurator: Easy online Configuration

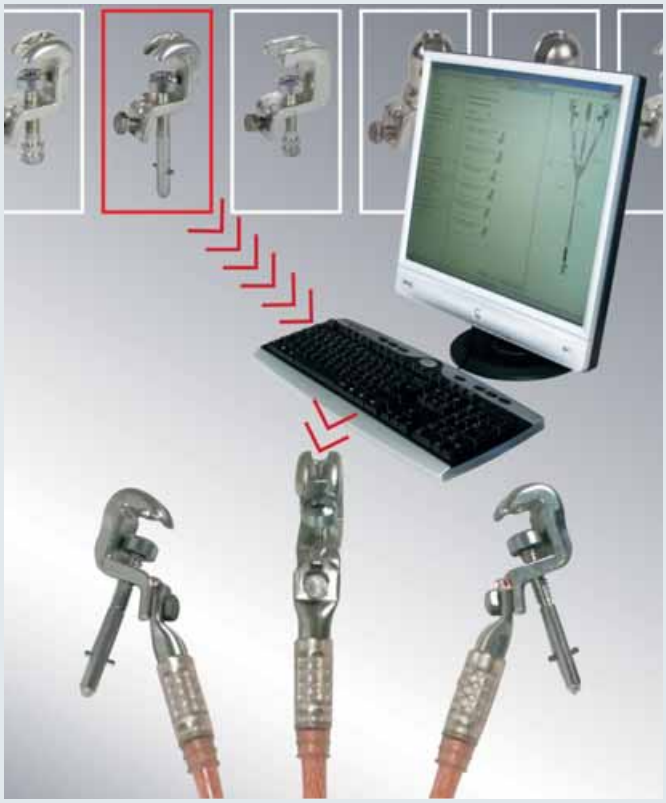
- **A suitable earthing and short-circuiting device can be easily selected online**
- **Unique laser printing on the earthing and short-circuiting device**
- **Individual configuration**
- **Permanent plausibility check in the background**
- **User-friendly interface**
- **To start the configuration, simply enter the Variant No., Part No. or product configuration**

With the help of the earthing and short-circuiting configurator, customised earthing and short-circuiting (EaS) devices for switchgear installations and overhead lines can be individually configured online at www.dehn.de/en/euk.
The configurator provides you with two options to start the configuration (product or system view).
The product view is ideally suited for users who know exactly what they need and already have a concrete idea of, for example, the cable cross-section and clamps to be used.
As an alternative, the system view can be selected. For this extended version of the product view, information on the installation must be provided.
The place of use (switchgear installation or overhead line) of the earthing and short-circuiting device is decisive for the selection of the clamps.

A permanent plausibility check ensures reliable selection of the right device. Further accessories such as earthing sticks are optionally displayed for the configured earthing and short-circuiting devices.
At the end of the configuration the result is graphically shown and a detailed description of the earthing and short-circuiting device is provided. Moreover, a unique Variant No. is assigned to the application-specific earthing and short-circuiting device, which will be lasered on the device later.

You will find the earthing and short-circuiting configurator and a demo version at **www.dehn.de/en/euk**

Note:
If you have no internet access, please fill in the template on page 105 and send it to us!

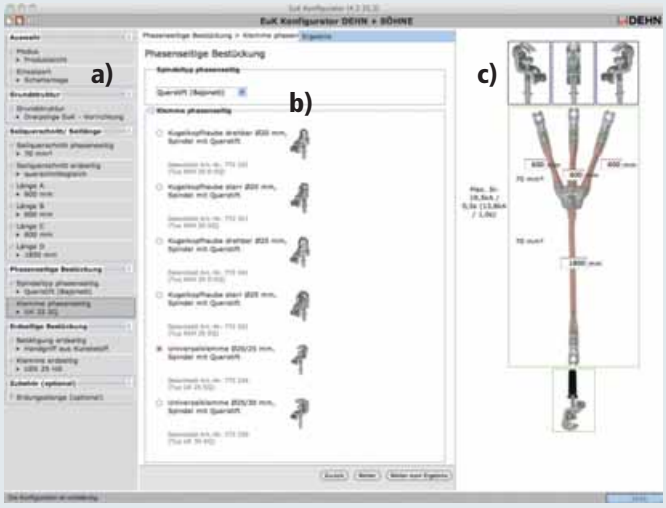


The earthing and short-circuiting configurator is graphically divided into three parts:

a) On the left side, a tree structure of the given information is displayed. You can return to the history and change already selected information at any time. The tree structure allows a clearly structured configuration.

b) In the centre you can select or change the required information via the keyboard or the mouse. This is done step by step meaning that a detail must be provided before the next detail is visible and selectable.

c) On the right side, the current state is graphically displayed to ensure and facilitate optimal selection. Moreover, data may be entered in the relevant field.

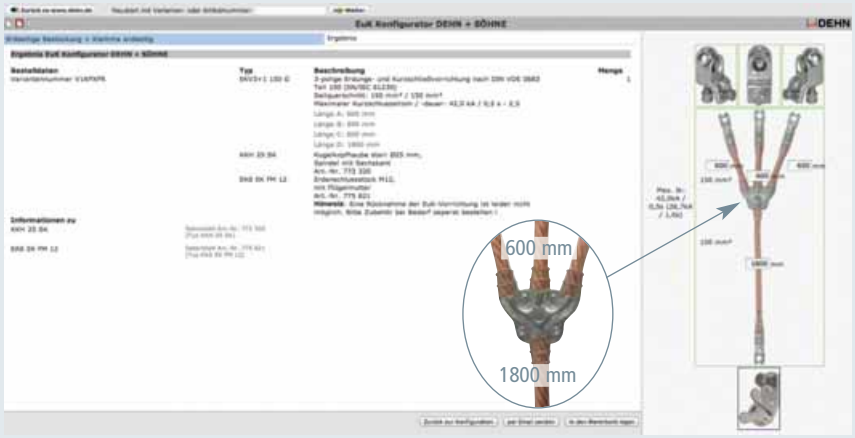


Examples of Possible Configurations

Three-pole, same Cable Cross-Section with Ball Head Caps

... easy configuration ...

EaS Configurator: www.dehn.de/en/euk

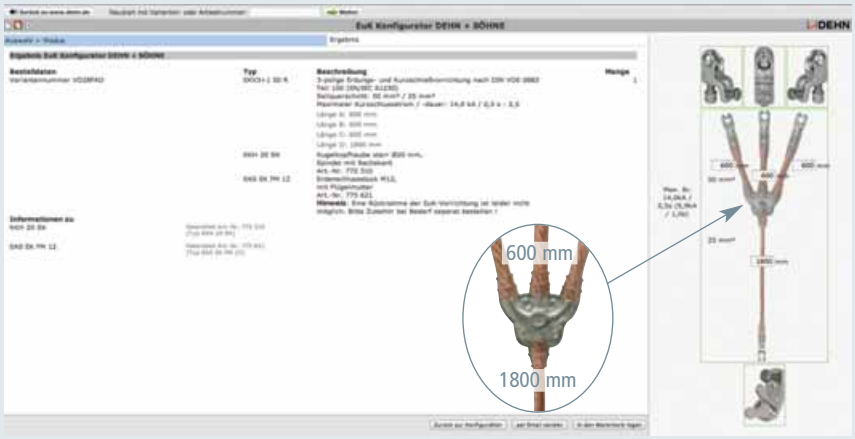


Type	EKV3+1 16 G	EKV3+1 25 G	EKV3+1 35 G	EKV3+1 50 G	EKV3+1 70 G	EKV3+1 95 G	EKV3+1 120 G	EKV3+1 150 G
Variant No.	VGJD2QX	VRDSN66	V3WJMYY	VU8P6LE	VCEY1U6	VA3926U	VAB3PJV	V1KPXFR
Phase cable end	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 25 SK
Earth cable end	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12
For fixed ball point ∅	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm	25 mm
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA

Three-pole, reduced Cable Cross-Section with Ball Head Caps

... easy configuration ...

EaS Configurator: www.dehn.de/en/euk



Type	EKV3+1 50 R	EKV3+1 70 R	EKV3+1 95 R	EKV3+1 120 R	EKV3+1 150 R
Variant No.	VD28FAD	VQYP8B2	V5SVXPH	VTSY9XH	VHBWUNH
Phase cable end	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 25 SK
Earth cable end	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12	EAS EK FM 12
For fixed ball point ∅	20 mm	20 mm	20 mm	20 mm	25 mm
Cable cross-section	50/25 mm²	70/35 mm²	95/35 mm²	120/50 mm²	150/50 mm²
Max. short-circuit current I_k 0.5 s	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	9.9 kA	13.8 kA	18.7 kA	23.7 kA	29.6 kA

Note: When ordering, please specify a clear Variant No.

Accessory for Earthing and Short-Circuiting Devices

SK Earthing Stick

Spring locking mechanism

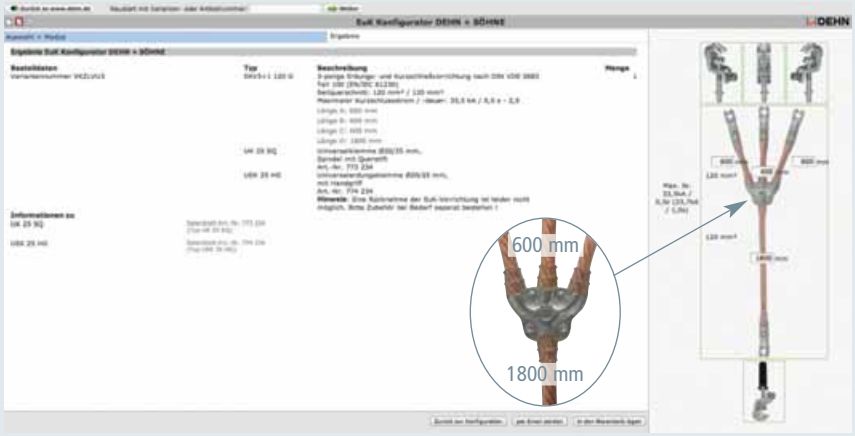
Type	ES SK 1000	ES SK 1500
Part No.	761 010	761 015
Length (l_G)	1000 mm	1500 mm

Examples of Possible Configurations

Three-pole, same Cable Cross-Section with Universal Clamp

... easy configuration ...

EaS Configurator: www.dehn.de/en/euk

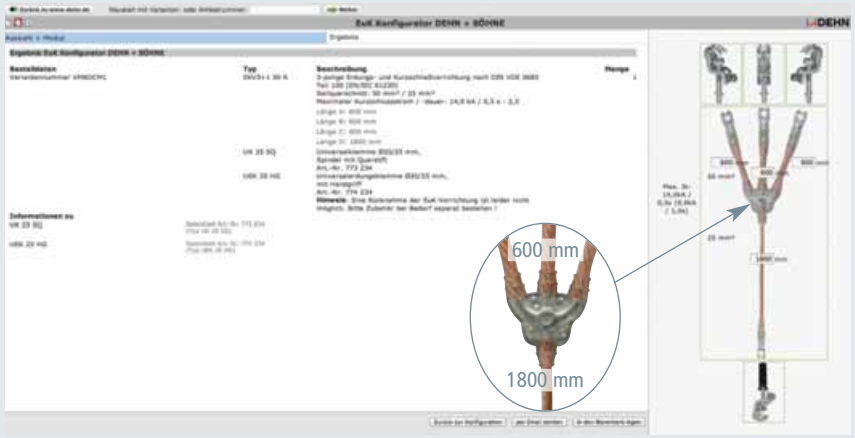


Type	EKV3+1 16 G	EKV3+1 25 G	EKV3+1 35 G	EKV3+1 50 G	EKV3+1 70 G	EKV3+1 95 G	EKV3+1 120 G
Variant No.	V8MCNWM	V8VF7CP	V5VN56Z	VPH98CT	VMLM2BZ	VE9HQHJ	VKZLVU3
Phase cable end	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ
Earth cable end	UEK 25 HG	UEK 25 HG	UEK 25 HG	UEK 25 HG	UEK 25 HG	UEK 25 HG	UEK 25 HG
For fixed ball point ∅	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm
For T pins with a collar width of	15 mm	15 mm	15 mm	15 mm	15 mm	15 mm	15 mm
Rd / Fl clamping range	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA

Three-pole, reduced Cable Cross-Section with Universal Clamp

... easy configuration ...

EaS Configurator: www.dehn.de/en/euk



Type	EKV3+1 50 R	EKV3+1 70 R	EKV3+1 95 R	EKV3+1 120 R
Variant No.	VMBDCM1	V4RJ7A2	VRAB9WB	VACNLP8
Phase cable end	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ
Earth cable end	UEK 25 HG	UEK 25 HG	UEK 25 HG	UEK 25 HG
For fixed ball point ∅	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm
For T pins with a collar width of	15 mm	15 mm	15 mm	15 mm
Rd / Fl clamping range	20 mm	20 mm	20 mm	20 mm
Cable cross-section	50/25 mm²	70/35 mm²	95/35 mm²	120/50 mm²
Max. short-circuit current I_k 0.5 s	14.0 kA	19.5 kA	26.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	9.9 kA	13.8 kA	18.7 kA	23.7 kA

Note: When ordering, please specify a clear Variant No.

Accessory for Earthing and Short-Circuiting Devices

SQ Earthing Stick

Bayonet locking mechanism

Type	ES SQ 1000	ES SQ 1500
Part No.	761 011	761 016
Length (l_G)	1000 mm	1500 mm

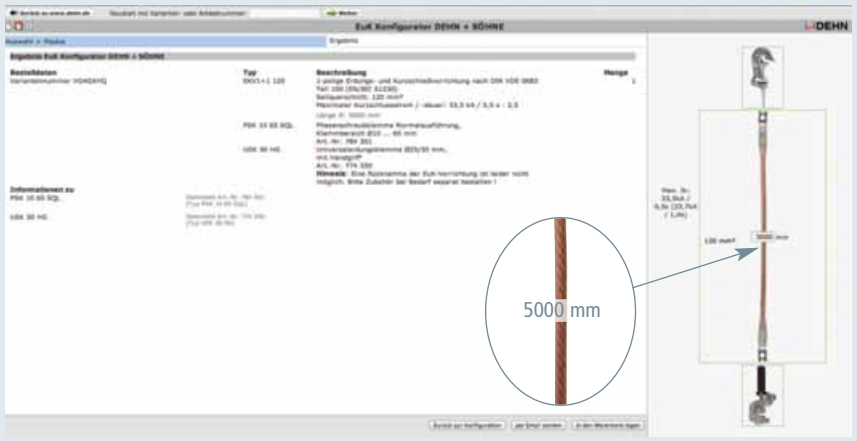
Accessories, spare parts and kit parts from page 193

Examples of Possible Configurations

Single-pole with Phase Screw Clamp

... easy configuration ...

EaS Configurator: www.dehn.de/en/euk

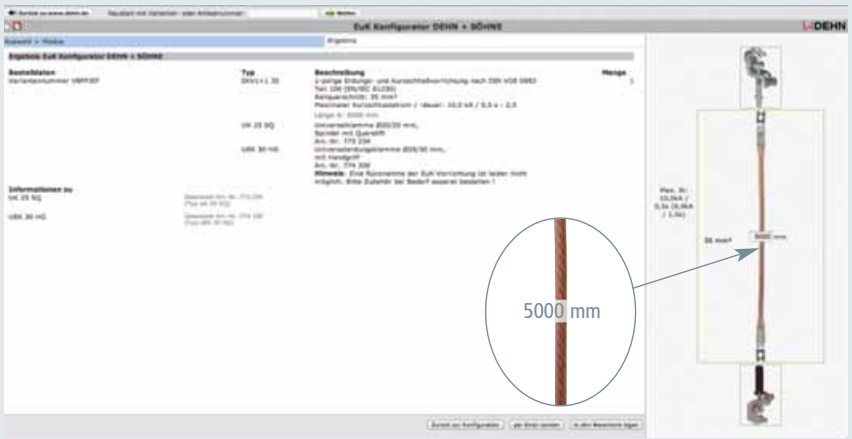


Type	EKV1+1 16	EKV1+1 25	EKV1+1 35	EKV1+1 50	EKV1+1 70	EKV1+1 95	EKV1+1 120
Variant No.	VE5E8FZ	VF33XR2	V43FCV8	V2KWXUL	VRP32FL	V2WPYVF	VG4GXHQ
Phase cable end	PSK 4 30 SQL	PSK 4 30 SQL	PSK 4 30 SQL	PSK 4 30 SQL	PSK 4 30 SQL	PSK 10 65 SQL	PSK 10 65 SQL
Earth cable end	EFK FL40 SKN	EFK FL40 SKN	EFK FL40 SKN	EFK FL40 SKN	EFK FL40 SKN	UEK 30 HG	UEK 30 HG
Clamping range ∅	4 ... 30 mm	4 ... 30 mm	4 ... 30 mm	4 ... 30 mm	4 ... 30 mm	10 ... 65 mm	10 ... 65 mm
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA

Single-pole with Universal Clamp

... easy configuration ...

EaS Configurator: www.dehn.de/en/euk



Type	EKV1+1 16	EKV1+1 25	EKV1+1 35	EKV1+1 50	EKV1+1 70	EKV1+1 95	EKV1+1 120
Variant No.	VMZDL8N	VB1DETL	V8PPJEF	VQY44GL	VFZ17TJ	VWBDMPS	V3CM9FR
Phase cable end	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ
Earth cable end	UEK 30 HG	UEK 30 HG	UEK 30 HG	UEK 30 HG	UEK 30 HG	UEK 30 HG	UEK 30 HG
For fixed ball point ∅	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm	20 / 25 mm
For T pins with a collar width of	15 mm	15 mm	15 mm	15 mm	15 mm	15 mm	15 mm
Rd / Fl clamping range	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0 kA	19.5 kA	26.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA	9.9 kA	13.8 kA	18.7 kA	23.7 kA

Note: When ordering, please specify a clear Variant No.

Telescopic Earthing Sticks

Type	ESTC SQL 5000	ESTC SQL STK 3000
Part No.	769 500	769 300
Total length ($l_{G\,max}$ / $l_{G\,min}$)	5015 / 2680 mm	2945 / 1615 mm
Length (handle) (l_H)	1900 mm	900 mm
Max. load on the operating head ($l_{G\,max}$ / $l_{G\,min}$)	10 / 35 kg	18 / 35 kg
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

Accessory for Earthing and Short-Circuiting Devices

Template for portable Earthing and Short-circuiting devices (EaS)

acc. to IEC/EN 61230 (DIN VDE 0683-100)

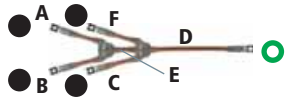
EaS Configurator: www.dehn.de/en/euk

Customer:			
Customer No.:			
Company:			
Address:			
Address, country:			
Contact:			
Phone / fax:		E-mail:	
☐ Enquiry	☐ Order	Quantity: pc(s).	Signature:

1 For use with:

☐ Switchgear Installations ☐ Overhead Lines

2 Earthing and short-circuiting device:

☐ 1-pole		☒ Same cable cross-section
☐ 2-pole		☒ Same cable cross-section
☐ 3-pole		☐ Same cable cross-section ☐ Reduced cable cross-section (≥ 50 mm²)
☐ 4-pole		☒ Same cable cross-section
☐ 5-pole		☒ Same cable cross-section

3 Cross-section of the copper cable:

	Max. short-circuit current I_k for a duration of	
	≤ 0.5 s	1 s
☐ 16 mm²	4.5 kA	3.2 kA
☐ 25 mm²	7.0 kA	4.9 kA
☐ 35 mm²	10.0 kA	6.9 kA
☐ 50 mm²	14.0 kA	9.9 kA
☐ 70 mm²	19.5 kA	13.8 kA
☐ 95 mm²	26.5 kA	18.7 kA
☐ 120 mm²	33.5 kA	23.7 kA
☐ 150 mm²	42.0 kA	29.6 kA

4 Cable lengths:

A	mm	From 200 up to 6000 mm at intervals of 50 mm
B	mm	From 200 up to 6000 mm at intervals of 50 mm
C	mm	From 200 up to 6000 mm at intervals of 50 mm
D	mm	From 300 up to 25000 mm at intervals of 50 mm
E	mm	From 150 up to 6000 mm at intervals of 50 mm
F	mm	From 200 up to 6000 mm at intervals of 50 mm
G	mm	From 200 up to 6000 mm at intervals of 50 mm

5 ● Phase connecting element (see easy choice):

Type or
Part No.

6 ○ Earth connecting element (see easy choice):

Type or
Part No.

7 Accessories (optional) (see easy choice):

☐ **Earthing stick**	Type or Part No.

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Easy Choice – Phase Connecting Elements and Earthing Sticks

Work according to the 5 Safety Rules

Phase Connecting Elements for Switchgear Installations:

Design SK	Design SQ	Type	Part No.	Clamping range Ø	Collar width Clamping range	Rd / Fl Clamping range	Max. cable cross-section	Max. short-circuit current I_k 0.5 s	Max. short-circuit current I_k 1 s
		KKH 20 D SK	772 330	Ø20 mm	–	–	16-120 mm²	33.5 kA	23.7 kA
		KKH 20 D SQ	772 331	Ø20 mm	–	–	16-120 mm²	33.5 kA	23.7 kA
		KKH 20 SK	772 310	Ø20 mm	–	–	16-120 mm²	33.5 kA	23.7 kA
		KKH 20 SQ	772 311	Ø20 mm	–	–	16-120 mm²	33.5 kA	23.7 kA
		KKH 25 D SK	772 340	Ø25 mm	–	–	16-150 mm²	42.0 kA	29.6 kA
		KKH 25 D SQ	772 341	Ø25 mm	–	–	16-150 mm²	42.0 kA	29.6 kA
		KKH 25 SK	772 320	Ø25 mm	–	–	16-150 mm²	42.0 kA	29.6 kA
		KKH 25 SQ	772 321	Ø25 mm	–	–	16-150 mm²	42.0 kA	29.6 kA
	*)	UK 25 SK	773 034	Ø20/25 mm	15 mm (-95 mm²)	20 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
		UK 25 SQ	773 234	Ø20/25 mm	15 mm (-95 mm²)	20 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
	*)	UK 30 SK	773 130	Ø25/30 mm	18 mm (-95 mm²)	30 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
		UK 30 SQ	773 330	Ø25/30 mm	18 mm (-95 mm²)	30 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA

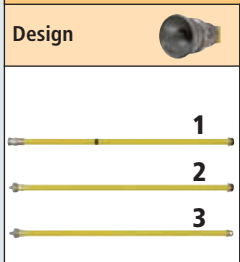
Earthing Sticks for Switchgear Installations:

Design	Type	Part No.	Length l_G	Max. load on operating head	Design	Type	Part No.	Length l_G	Max. load on operating head
	ES SK 1000	761 010	1000 mm	35 kg		ES SQ 1000	761 011	1000 mm	35 kg
	ES SK 1500	761 015	1500 mm	35 kg		ES SQ 1500	761 016	1500 mm	35 kg
	ES SK STK 1000	761 001	1000 mm	35 kg		ES SQ STK 1000	761 002	1000 mm	35 kg
	ES SK STK 2000	761 003	2000 mm	20 kg		ES SQ STK 2000	761 004	2000 mm	20 kg
	ES SK STK 920	761 070	920 mm	35 kg		ES SQ STK 920	761 075	920 mm	35 kg

Phase Connecting Elements for Overhead Lines:

Design SQL	Type	Part No.	Clamping range Ø	Collar width Clamping range	Rd / Fl Clamping range	Max. cable cross-section	Max. short-circuit current I_k 0.5 s	Max. short-circuit current I_k 1 s
	PSK 4 30 SQL	784 201	–	–	Ø4-30 mm	16-70 mm²	19.5 kA	13.8 kA
	PSK 10 65 SQL	784 301	–	–	Ø10-65 mm	16-120 mm²	33.5 kA	23.7 kA
	PSK 4 30 SQL EH	784 401	–	–	Ø4-30 mm	16-70 mm²	19.5 kA	13.8 kA
	PSK 10 65 SQL EH	784 501	–	–	Ø10-65 mm	16-120 mm²	33.5 kA	23.7 kA
	PSK FV 4 30 SQL	784 480	–	–	Ø4-30 mm	16-70 mm²	19.5 kA	13.8 kA
	PSK 10 85 SQL	784 085	–	–	Ø10-85 mm	16-150 mm²	29.6 kA	29.6 kA
	PSK 10 32 SQL	784 032	–	–	Ø10-32 mm	16-95 mm²	18.7 kA	18.7 kA
	PSK 10 32 SQL SB	784 038	–	–	Ø10-32 mm	16-95 mm²	18.7 kA	18.7 kA
	KKH 20 SQL	772 314	Ø20 mm	–	–	16-120 mm²	33.5 kA	23.7 kA
	KKH 25 SQL	772 324	Ø25 mm	–	–	16-150 mm²	42.0 kA	29.6 kA
	UK 25 SQL	773 236	Ø20/25 mm	15 mm (-95 mm²)	20 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
	UK 30 SQL	773 331	Ø25/30 mm	18 mm (-95 mm²)	30 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA

Earthing Sticks for Overhead Lines:

Design	Type	Part No.	Length l_G	Max. load on operating head	Design	Type	Part No.	Length $l_{G\,max}$ / $l_{G\,min}$	Max. load on operating head
	EST KS SQL 1500 Pos. No. **1**	1x 769 503	1500 mm	35 kg		ESTC SQL STK 3000	769 300	3000 mm / 1670 mm	18 / 35 kg
	Pos. No. **1** + **3**	1x 769 503 1x 769 504	3000 mm	30 kg					
	Pos. No. **1** + **2** + **3**	1x 769 503 1x 769 504 1x 769 505	4500 mm	15 kg		ESTC SQL 4000	769 400	4000 mm / 2170 mm	12 / 35 kg
	Pos. No. **1** + **2** + **2** + **3**	1x 769 503 2x 769 504 1x 769 505	6000 mm	8 kg		ESTC SQL 5000	769 500	5000 mm / 2670 mm	10 / 35 kg

Accessories, spare parts and kit parts from page 193

Work according to the 5 Safety Rules

Easy Choice – Earth Connecting Elements

Earth Connecting Elements:

Design	Type	Part No.	Clamping range Ø	Collar width Clamping range	Rd / Fl Clamping range	Max. cable cross-section	Max. short-circuit current I_k 0.5 s	Max. short-circuit current I_k 1 s
 *)	UEK 25 FS	774 034	Ø20/25 mm	15 mm (-95 mm²)	20 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
	UEK 30 FS	774 130	Ø25/30 mm	18 mm (-95 mm²)	30 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
 *)	UEK 25 HG	774 234	Ø20/25 mm	15 mm (-95 mm²)	20 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
	UEK 30 HG	774 330	Ø25/30 mm	18 mm (-95 mm²)	30 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
 *)	UEK 25 SKN	774 434	Ø20/25 mm	15 mm (-95 mm²)	20 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
	UEK 30 SKN	774 530	Ø30 mm	18 mm (-95 mm²)	30 mm (-70 mm²)	16-120 mm²	33.5 kA	23.7 kA
	KKH 20 FS	772 312	Ø20 mm	–	–	16-120 mm²	33.5 kA	23.7 kA
	KKH 25 FS	772 322	Ø25 mm	–	–	16-150 mm²	42.0 kA	29.6 kA
	KKH 20 HG	772 313	Ø20 mm	–	–	16-120 mm²	33.5 kA	23.7 kA
	KKH 25 HG	772 323	Ø25 mm	–	–	16-150 mm²	42.0 kA	29.6 kA

Design	Type	Part No.	Dimensions	Clamping range Fl	Max. cable cross-section	Max. short-circuit current I_k 0.5 s	Max. short-circuit current I_k 1 s
	EAS EK FM 12	775 621	M12	–	16-150 mm²	42.0 kA	29.6 kA
	EAS EK FM 16	775 631	M16	–	16-150 mm²	42.0 kA	29.6 kA
	EAS EK FS 12	775 626	M12 x 15 mm	–	16-150 mm²	42.0 kA	29.6 kA
	EAS EK FS 16	775 636	M16 x 15 mm	–	16-150 mm²	42.0 kA	29.6 kA
	EAB RN 16 FS	790 150	Ø16 mm	–	16-150 mm²	42.0 kA	29.6 kA
	EAB RN 16 SKN	790 160	Ø16 mm	–	16-150 mm²	29.6 kA	29.6 kA
	EFK FL40 SKN	792 190	–	40 mm	16-95 mm²	26.5 kA	18.7 kA
	EFK FL30 SKN	792 030	–	30 mm	16-50 mm²	14.0 kA	9.9 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	Max. short-circuit current I_k 0.5 s	Max. short-circuit current I_k 1 s
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	16 mm²	4.5 kA	3.2 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	25 mm²	7.0 kA	4.9 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	35 mm²	10.0 kA	6.9 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	50 mm²	14.0 kA	9.9 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm²	19.5 kA	13.8 kA
20 / 25 / 30 mm	15 / 18 mm	–	95 mm²	26.5 kA	18.7 kA
– / 25 / 30 mm	–	–	120 mm²	33.5 kA	23.7 kA
–	–	–	150 mm²	42.0 kA	29.6 kA