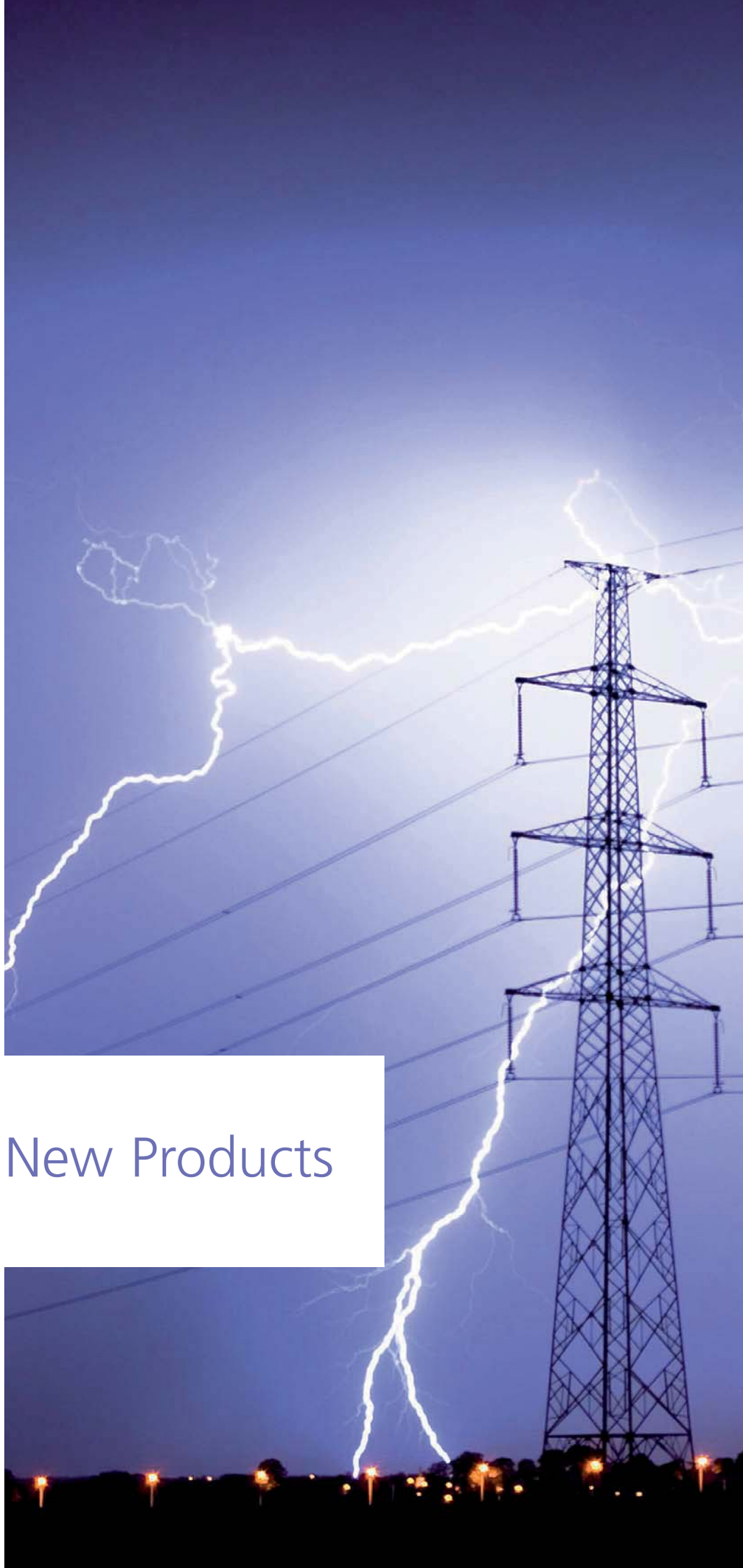
Safety Equipment

Main Catalogue 2012 / 2013

www.dehn.de



New Products

Safety Equipment

PHE III M12 / ZK Voltage Detector Kit

- Safe verification of isolation from supply voltage
- 30 to 60 kV / 50 Hz
- Wide nominal voltage range
  10 to 30 kV / 50 Hz and 60 to 110 kV / 50 Hz

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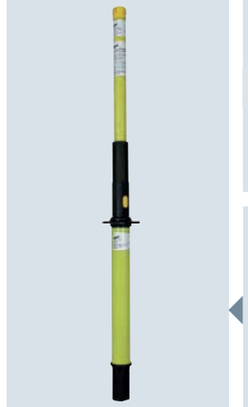


Earthing Sticks

- Two-part design allows easy transport
- With plug-in coupling for extending the handle

See page 104

PHE/G I d.c. Voltage Detector for Switchgear Installations

- Modular versions **up to 24 kV d.c.**
- Great insertion depth
- Earth clamp with adjustable handle and **magnet**

See page 30 / 171

PHE/G I d.c. Voltage Detector for Switchgear Installations

- Modular versions **up to 24 kV d.c.**
- Great insertion depth
- Earth clamp with adjustable handle and **magnet**

See page 30 / 171

PHE/G II d.c. Voltage Detector for Switchgear Installations and d.c. Links

- Modular versions **up to 24 kV d.c.**
- Great insertion depth

See page 31 / 172

Earthing and Short-circuiting Configurator

- Easy online selection of the adequate earthing and short-circuiting device
- Clear laser printing of the earthing and short-circuiting device
- Individual configuration
- Permanent plausibility check in the background

See page 73

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

See page 89

Safety Helmet for Electricians

- For nominal voltages up to 1000 V
- Adjustable to head sizes from 51 to 62 cm via knob

See page 151

Face Shield

- Arc-fault-tested in accordance with GS-ET-29 (class 2, 423 kJ/m²) and ASTM F2178 (6 cal/cm² and 12 cal/cm²)
- Energy absorbing nanoparticles homogeneously dispersed in the material ensure a high degree of protection and wear resistance

See page 151

Safety Equipment
for electric Railways

PHE III Voltage detector Kit

- With 110 to 132 kV / 50 Hz and 16.7 Hz
- Voltage detector for 50 Hz three-phase systems and 16.7 Hz centre-earthed monophase traction current lines
- Range does not have to be switched

See page 167

PHE III Voltage Detector

- For overhead lines of electric railways
- For single-ended monophase systems

See page 164

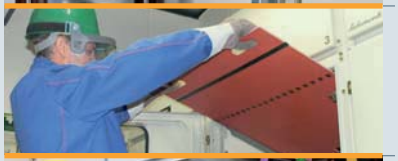
Syfety Equipment
Main Catalogue 2012/2013

Valid as of 1st April 2012

This catalogue replaces the Safety Equipment main catalogue published in 2009/2010.

DS396/E/0412

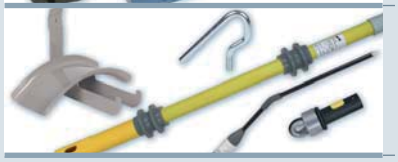
Safety Equipment



Live Working

Railways

Accessory



Our promise

DEHN protects

Our family-owned company has been specialising in surge protection, lightning protection and safety equipment for many decades. With the key objective of protecting material assets and workers, we have made a name for ourselves in the market.

It was our pioneering spirit and innovative ideas that have defined our company for more than 100 years and made us a market leader with more than 1,400 employees. Our products and developments reflect our market feasability, commitment and ideas.

As early as in 1923 our founder Hans Dehn started production of external lightning protection and earthing components to optimise the protection of buildings and installations. In 1954, we launched the first series of surge protective devices. Constant further development of these devices ensures safe operation and permanent availability of electrical and electronic installations. Also in the 1950s, our third sector, safety equipment, was added to our portfolio.

The Bavarian town of Neumarkt is the heart of our activities where product managers and developers advance our protection technologies. Here we manufacture our high-quality safety products.

We offer the best solution

Our concern is to be a reliable and fair partner for our industrial, commercial and technical customers all over the world. To this end, we always focus on the best solution to protection problems. Our sales teams in Germany and our global network of 11 subsidiaries as well as more than 70 international sales partners are committed to competent and customer-oriented distribution of our products. Proximity and close contact with our customers is of utmost importance to us, be it on-site support by our experienced field staff team, our telephone hotline or personal contact at trade fairs.

In hundreds of seminar, workshops and conferences held every year throughout the world we impart practical knowledge on products and solutions.
Our specialised book "Lightning Protection Guide" and our brochures will broaden your practical knowledge. Or visit us at www.dehn.de for more information.

DEHN stands for innovation, highest quality and consistent customer and market orientation – also in the future.

Thomas Dehn Dr. Peter Zahlmann Dr. Philipp Dehn

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We shall be pleased to name you the right contact person of our subsidiaries or representatives.

Export Department
Tel. +49 9181 906 1462
Fax +49 9181 906 1444
export@dehn.de

1. VDE Regulations for safety equipment and devices

DIN VDE 0680

"Personal protective equipment, protective devices and apparatus for work on electrically energized systems up to 1000 V".

Part 1 "Personal protective equipment and protective insulating devices"

Part 3 "Operating rods and current collecting devices"

Part 4 "Fuse handles for low-tension HRC-fuses"

Part 6 "Single-pole voltage tester up to 250 V a.c."

Part 7 "Socket spanner"

DIN VDE 0681

"Operating, testing and safe-guarding devices for work on electrically energized systems with rated voltages exceeding 1 kV"

Part 1 "General requirements" for DIN VDE 0681 Parts 2 to 4

Part 2 "Operating rods"

Part 3 "Fuse tongs"

Part 6 "Voltage detectors to be used for overhead contact systems 15 kV, 16 2/3 Hz"

DIN VDE 0682

"Apparatus and equipment for live working"

Part 201 "Live working – Hand tools for use up to 1000 V a.c. and 1500 V d.c." (IEC/EN 60900)

Part 211 "Live working – Insulating sticks and attachable devices – Part 1: Insulating sticks" (IEC/EN 60832-1:2010)

Part 212 "Live working – Insulating sticks and attachable devices – Part 2: Attachable devices" (IEC 60832-2:2010)

Part 213 "Multi-purpose insulating sticks for electrical operations on high voltage installations"; German version" EN 50508:2009

Part 311 "Live working – Gloves of insulating material" (IEC/EN 60903)

Part 312 "Sleeves of insulating material for live working" (IEC/EN 60984)

Part 321 Electrically insulating helmets for use on low voltage installations

Part 401 "Live working – Voltage detectors – Part 3: Two-pole low voltage type" (IEC/EN 61243-3)

Part 411 "Live working – Voltage detectors – Part 1: Capacitive type to be used for voltages exceeding 1 kV a.c." (IEC/EN 61243-1)

Part 412 "Live working – Voltage detectors – Part 2: Resistive type to be used for voltages of 1 kV to 36 kV" (IEC/EN 61243-2)

Part 415 "Live working – Voltage detectors – Part 5: Voltage detective systems (VDS)" (IEC/EN 61243-5)

Part 417 "Voltage detectors – Distance voltage detectors" (draft 08.08)

Part 421 "Capacitive type to be used for voltages exceeding 1 kV a.c. and a frequency of 16.7 Hz" (draft 08.08)

Part 431 "Live working – Portable phase comparators for voltages of 1 kV to 36 kV a.c." (IEC/EN 61481)

Part 511 "Electrical insulating blankets" (IEC/EN 61112)

Part 512 "Electrical insulating matting" (IEC/EN 61111)

Part 513 "Live working – Flexible conductor covers (line hoses) of insulating material" (IEC/EN 61479)

Part 551 "Rigid protective covers for live working on a.c. installations" (IEC/EN 61229)

Part 552 "Live working – Insulating protective barriers above 1 kV"

Part 603 "Live working – Telescopic sticks and telescopic measuring sticks" (IEC/EN 62193)

Part 621 "Live working – Suction device for the cleaning of live parts with rated voltages above 1 kV up to 36 kV"

Part 651 "Saddles, pole clamps (stick clamps) and accessories for live working" (IEC/EN 61236)

Part 741 "Aerial devices with insulating boom used for life working exceeding 1 kV a.c." (IEC/EN 61057)

DIN VDE 0683

"Portable equipment for earthing or earthing and short-circuiting"

Part 100 "Live working – Portable equipment for earthing or earthing and short-circuiting" (IEC/EN 61230)

Part 200 "Live working – Earthing or earthing and short-circuiting equipment using lances as a short-circuiting device – Lance earthing" (IEC/EN 61230)

1.1 Further reference:

"Arbeitsschutz in elektrischen Anlagen"
["Occupational safety in electrical installations"]
Explanations on DIN VDE 0105, 0680, 0681, 0682 and 0683
VDE Series, Volume 48
Dr. P. Hasse, W. Kathrein and H. Kehne
VDE-Verlag GmbH, Berlin-Offenbach, Germany

"Arbeiten unter Spannung (AuS)"
["Live working"]
Practical Examples
Dr. P. Hasse, W. Kathrein
WEKA MEDIA GmbH & Co. KG, Kissing, Germany.

2. Abbreviations

2.1 Materials

Abbreviation used in our catalogue	Material
Al	Aluminium
Cu	Electric copper, copper
St	Steel
StSt	Stainless steel
MCI	Malleable cast iron
ZDC	Zinc die casting
AlMgSi	Aluminium alloy
GRP	Glass-fibre reinforced plastic

2.2 Coating materials

Abbreviation used in our catalogue	Coasting material
gal Sn	Tin-plated
gal Zn	Galvanised
tZn	Hot-dip galvanised
Bronze gal Sn	Bronze, tin-plated

2.2 Types of conductors

Abbreviation used in our catalogue	Type of conductor
Fl	Flat conductor
Rd	Round conductor

3. Minimum lengths of insulating elements for

1) Operating sticks acc. to DIN VDE 0681
2) Voltage detectors acc. to IEC/EN 61243-1 (DIN VDE 0682 Part 411)
3) Phase comparators acc. to IEC/EN 61481 (DIN VDE 0682 Part 431)

Nominal voltage	Rated voltage	Minimum length of the insulating element $L_{I\ min}$		
U_N *)	U_r	1)	2)	3)
up to 10 kV	12 kV	500 mm	520 mm	525 mm
20 kV	24 kV	500 mm	520 mm	525 mm
30 kV	36 kV	525 mm	520 mm	525 mm
45 kV	52 kV	720 mm	830 mm	—
60 kV	72.5 kV	900 mm	830 mm	—
110 kV	123 kV	1300 mm	1300 mm	—
150 kV	170 kV	1750 mm	1700 mm	—
220 kV	245 kV	2400 mm	2300 mm	—
380 kV	420 kV	3200 mm	3600 mm	—

*) For nominal voltages higher or lower than the nominal voltage indicated in the table above, a rated voltage closest to the required nominal voltage must be selected.
In extreme cases, the nominal voltage is equal to the rated voltage.

4. Designs

Operating sticks and equipment are basically subdivided into the following types:

Not suitable for use in wet weather conditions

For indoor and outdoor installations

For use in indoor and outdoor installations, but not in wet weather conditions.

Suitable for use in wet weather conditions

For indoor and outdoor installations

For use in indoor and outdoor installation, in all weather conditions (even if the operating stick gets wet).

For indoor installations only!

5. Maintenance tests

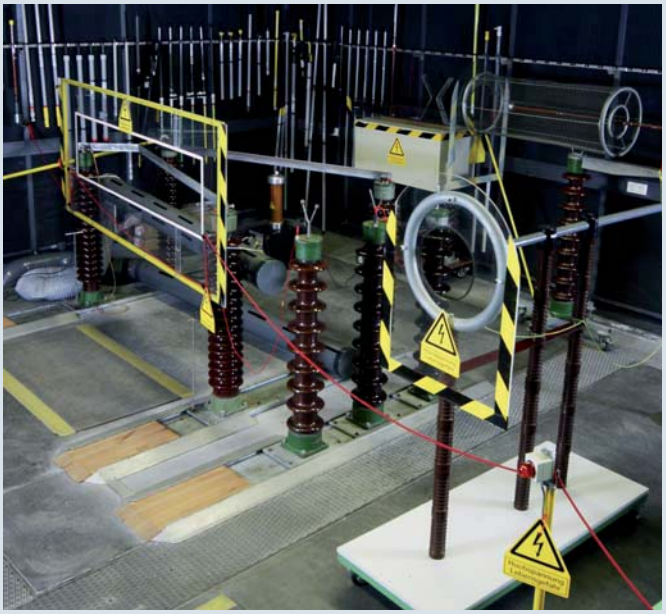
Maintenance test criteria for safety equipment			
	BGV A3 (German regulation)	**VDE 0105 Part 100 and EN 50110-1*)**	**Equipment standard**
Earthing and short-circuiting devices	§ 5 (1) [… It shall be checked whether equipment is in good order and condition…] (2) [… at certain intervals. The intervals must be chosen so that the defects to be expected are detected in due time.]	5.3.101 Periodic inspections, general information	IEC/EN 61230, Annex C (informative), C 3.2.2 [It is recommended to perform a cut test and visual inspection at least every five years in case of outdoor use and every ten years in case of indoor use.]
Voltage detectors, phase comparators and voltage detecting systems	§ 5: according to table 1C [Tests for compliance with the limit values specified in the electrotechnical rules must be carried out at least every six years]	*) 6.2.3 [Inspection at least before and, if possible, after each use], 5.3.101 Periodic inspections, general information	IEC/EN 61243-1, Annex G (informative): Tests for capacitive voltage detectors > 1 kV [Voltage detectors that have not been subjected to a maintenance test within six years should not be used.] IEC/EN 61243-5: Tests for voltage detecting systems (VDS) IEC/EN 61481, Annex G (informative): Tests for phase comparators 1 to 36 kV a.c. [The maximum interval between maintenance tests is six years.]
Operating and earthing sticks	§ 5: according to table 1C [A visual inspection for signs of damage or defect must be carried out prior to each use.]	5.3.101 Periodic inspections, general information	VDE 0681 Part 1 to 3: Tests for operating sticks Note: Operating sticks also have to be subjected to electrotechnical tests. DEHN + SÖHNE recommends to use the test intervals of voltage detectors.

Tests for our Safety Equipment

Our tried and tested safety equipment allows safe working in electrical installations. It is state of the art, complies with the German accident prevention regulations (UVV) and exceeds the requirements of national and international standards.

Numerous process inspections ensure the high quality and reliability of our safety equipment.

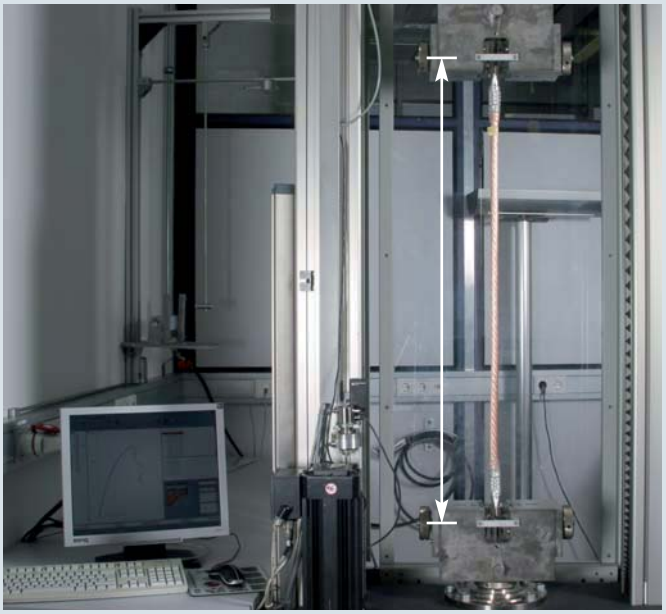
The following pictures show type tests performed on our safety equipment.



One of our high-voltage test laboratories

Testing a PHE III voltage detector for immunity to interference fields

Testing a switchgear installation for protection against bridging



Pull test carried out on an earthing and short-circuiting device

Design of Voltage Detectors

Voltage Detectors

Voltage detectors according to IEC/EN 61243-1 (DIN VDE 0682 Part 411) are designed to verify safe isolation from supply voltage on all poles at the work location according to EN 50110-1 (DIN VDE 0105 Part 100).

Safe isolation from supply voltage must be verified on all poles at the work location or as close as possible to the work location by electrotechnically skilled or instructed persons only.

Voltage detectors must be tested for correct operation immediately before and after use. Correct operation of voltage detectors without self-testing element must be verified by contacting a part of the installation connected to operating voltage.

Verifying safe isolation from supply voltage using a voltage detector is considered live working.

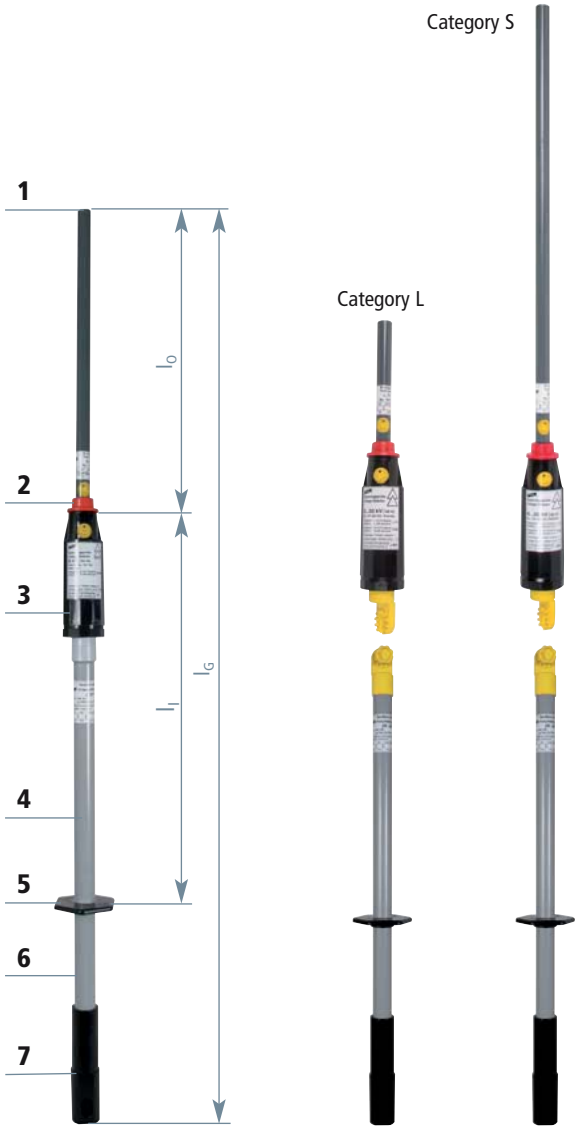
Voltage detectors may only be used for the nominal voltages / nominal voltage ranges as indicated on the rating plate. The user may be at risk if they are used for voltages other than indicated on the rating plate (incorrect indication, electric shock, arcing).

Voltage detectors labelled with "For indoor use only" may only be used in indoor installations.

Voltage detectors labelled with "For use in wet weather conditions" may be used in all weather conditions (rain, snow, fog and dew).
Voltage detectors according to IEC/EN 61243-1 (DIN VDE 0682 Part 411) are only suitable to a limited extent for use in **factory assembled (type-tested) installations**. If space in installations is confined, flashover may occur when inserting the test prod into the installation. The user of the voltage detector or the operator of the switchgear installation must contact the manufacturer of the type-tested installation to find out whether the voltage detector may be used (please refer to the table on the next page: Application of voltage detectors in type-tested, factory assembled switchgear installations).

Design of voltage detectors
Voltage detectors according to IEC/EN 61243-1 (DIN VDE 0682 Part 411) are **single-pole** devices designed to make contact with the part of the installation to be tested.
There are two **mechanically different designs** of voltage detectors: Complete and separate voltage detectors.
Complete voltage detectors (PHE III, PHE and PHG II) consist of an insulating stick, indicator and test prod and are tested as a complete unit.
Separate voltage detectors (PHE III indicator with test prod) must be attached to a suitably rated insulating stick.
Single-pole **voltage detectors** typically consist of a **handle**, **insulating element**, **indicator** and **test prod** with **contact electrode**.
The **insulating element** is the section of a voltage detector between the hand guard and the red ring. It ensures that the user maintains an adequate safety distance for safe operation.
The **test prod** (contact electrode extension) with contact electrode **above the red ring** allows to reach remote parts of the installation and to **eliminate** the influences of **interference fields**.
Voltage detectors are classified into two categories based on their behaviour in case of interference fields or their field of application.
Voltage detectors of **category "L"** (line) with a short test prod (without contact electrode extension) are designed for use on overhead lines.
Voltage detector of **category "S"** (switchgear) with a long test prod (with contact electrode extension) are resistant to interference fields and are therefore used in switchgear installations. They are also suitable for overhead lines.

The **hand guard** provides a visible barrier between the handle and the insulating element and prevents the user from making contact with the insulating element.
The **red ring** indicates the end of the insulating element in the direction of the test electrode. This provides the user with a visible limit for contact with live parts in the installation. The **insulating element** between the red ring and the hand guard must not contact live parts, however, it may contact earthed parts.
The **test electrode** is the part of the voltage detector that is used to make contact with the part of the installation to be tested.



1 Test electrode
2 Red ring
3 Operating head
4 Insulating element
5 Hand guard
6 Handle
7 Plug-in coupling for handle extension

l_G Total length of the voltage detector
l_o Length of the top section
l_I Length of the insulating element

Accessory, kit parts and spare parts from page 195

Application of Voltage Detectors

in type-tested, factory assembled switchgear installations

Tests carried out in cooperation with switchgear manufacturers have proven the suitability of PHE, PHE III and PHG II voltage detectors (Category "S") for use in factory assembled switchgear installations (e.g. in accordance with EN/IEC 62271-200 (DIN VDE 0670 or DIN VDE 0671 Part 200)).

Switchgear manufacturer	Type	Nominal voltages U_N	Suitable voltage detectors
ABB	BA/BB systems, BAX systems, BD systems	10 ... 30 kV	PHE, PHE III and PHG II
	BC systems		PHE, PHE III and PHG II
ABB Calor Emag	ZE3/4, ZE7/8, ZK4/5, ZK8 L7.6, ZS1, ZS8	10 ... 30 kV	PHE, PHE III and PHG II
	ZW1		PHE and PHE III
	Isopond	10 kV	PHE, PHE III with test probe, Part No. 766 916
AREVA T&D			
AEG	GS, GSD, GSH, H, K, L	10 ... 20 kV	PHE, PHE III and PHG II
Concordia Sprecher + Schuh	PI, PIC, PID, PN 300, PN 500, PN 600, PU, PUADC, PUB, PUD, PUDC, SC, SCC, SCD, SCDC, RMB[1]	10 ... 30 kV	PHE, PHE III and PHG II
Sachsenwerk	A (HA, MA, SM), FK (A, B, C, E, F), PIX, R (D[1], L, LI, M[1], MI[1]), W (AK,BA, BB, BD, DS), WK (A, B, C, D, E, F, M, T), WZ (K, R, RV)	6 ... 30 kV	PHE, PHE III and PHG II
Starkstromanlagen Dresden	D, WKC-D	10 kV	PHE, PHE III and PHG II
VEB Otto Buchwitz	BSIG, CSIM	20 kV	PHE, PHE III and PHG II
BELUK	BET2308, BET231, BK219, BK216,	20 kV	PHE, PHE III and PHG II
	BMB2, BRS; Compact load-break switchgear installations		PHE, PHE III
Driescher Moosburg	W12, W24, W36, WEL, F24	12 ... 36 kV	PHE, PHE III und PHG II
	E2K, E3K, D12, D24; Compact load-break switchgear installations	12 ... 24 kV	PHE, PHE III with great insertion depth (e.g. Part No. 767 731)
Driescher Wegberg	Mipak, Minor, Minex, RKL, ZLDT, TSL, TSLG, FL, SK400, BS600, HS24, LDTC	10 ... 20 kV	PHE, PHE III and PHG II or PHE III with test prod, Part No. 767 767 for type Mipak
Eaton Holec	HC, Unitole	3 ... 24 kV	PHE and PHE III with electrode, Part No. 766 927
	Magnefix	3 ... 15 kV	PHE and PHE III with electrode, Part No. 766 915
	MMS, SVS, Xiria	3 ... 24 kV	PHE and PHE III with electrode, Part No. 766 913 or 766 925
Eimers	EKS 10 N, ES 20 N, ES 10 N, EMS 12.190	10 ... 20 kV	PHE, PHE III and PHG II
ORMAZABAL (F & G)	HGKN, EA, MA, KE, EF, WA, K-HGK	10 ... 20 kV	PHE, PHE III and PHG II
Pfisterer	MAG	10 kV	PHE with test prod P2/10
Klöpper	KMG	10 ... 20 kV	PHE, PHE III and PHG II
Krone	KH10, KHS10d, KHS10dp, KHS17I, KHS17II, KHS20, KHS30	10 ... 30 kV	PHE, PHE III and PHG II
	KES10		PHE, PHE III with test probe, Part No. 766 916
Miebach	AS, HUK, TE, TSE, DSS, ASR	10 ... 20 kV	PHE, PHE III and PHG II
NATUS	NES, NESCON, NFwZ	3 ... 20 kV	PHE, PHE III and PHG II
Ritter	GT1, GT3	6 ... 30 kV	PHE, PHE III and PHG II
Senteg	AMS12	3 ... 10 kV	PHE, PHE III and PHG II
Siemens The circuit breaker must be tripped before testing systems containing a circuit breaker	8 BD, 8 CK	6 ... 30 kV	PHE, PHE III with modified contact electrode (on request)
	8 BK 20, 8 BJ 20, 8 BK 30, 8 AA 10	6 ... 20 kV	PHE, PHE III and PHG II
Wickmann	DZ switchgear cabinet	20 kV	PHE, PHE III and PHG II
Ziegler	AZ cells	10 ... 20 kV	PHE, PHE III and PHG II

[1] Switchgear panels with integrated division into busbar or cable compartments require special guide adapters for the fixed isolating contacts.

Accessory, kit parts and spare parts from page 195

Voltage Detectors

Device	Nominal Voltage U_N / Frequency f_N	Application, Indication	Page
PHE III and **PHE III indicator with test prod**	3 / 6 / 10 / 20 / 30 kV / 50 Hz 3...10 / 6...20 / 10...30 kV / 50 Hz 3...10 / 10...30 kV / 50 Hz, switchable 6...20 / 10...30 kV / 50 Hz, test set	For use in wet weather conditions For indoor and outdoor installations With self-testing element Visual and acoustic indicator	12 16
PHE III (Kit)	20 kV / 50 Hz 60...110 und 60...132 kV / 50 Hz	Easy transport Fast battery replacement without additional tools	18
PHE	3 / 6 / 10 / 20 / 30 kV / 50 Hz 3...10 / 6...20 / 15...30 kV / 50 Hz 3...10 / 6...20 / 15...30 kV / 50 Hz switchable	For use in wet weather conditions For indoor and outdoor installations With self-testing element Visual indicator Easy transport	24
ASP **HSA 205**	110...420 kV / 50 Hz 1...30 / 30...220 / 110...420 kV	For use in wet weather conditions Non-contact voltage detector For overhead lines and outdoor switching stations With self-testing element Visual and acoustic indicator	26
PHG II	6 / 10 / 20 kV / 50 Hz	For indoor installations only Three LED indicator lights LEDs staggered at 120° allow for better visibility of the indication Passive voltage detector without batteries	28
PHE/G	1...24 kV / d.c. voltage	For use in wet weather conditions For indoor and outdoor installations With self-testing element Visual indicator Easy transport Two-pole unit (one stick/two sticks)	29
Storage Bags and Transport Cases		Sheet metal or plastic case Artificial leather or canvas bag	187

Maintenance tests

According to German regulations (BGV A3), voltage detectors have to be tested for compliance with the prescribed limits as stated in the Electrical Safety Rules. This test is performed in the high voltage test laboratory of DEHN + SÖHNE and includes

- measurement of the leakage current,
- test for clear indication,
- test for protection against bridging,
- visual inspection, manual tests and measurements.

This maintenance test is documented in a test report and on the device.

The test intervals depend on the operating conditions of the voltage detector, e.g. frequency of use, environmental conditions and transport. According to German regulations, however, it is advisable to carry out a maintenance test **at least** every **6 years**.

PHE III M12 Voltage Detector

Nominal voltages up to 30 kV / 50 Hz

PHE III voltage detector with visual and acoustic indicator used for an indoor switchgear installation

Safe verification of isolation from supply voltage

- **Reliable indication**
- **Easy to use**
- **Cost-effective/space-saving transport**

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Indication	Visual and acoustic
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Testing with integrated electrode

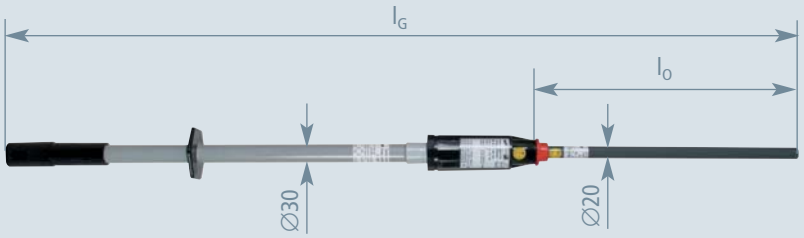
Testing with screwed-on V-shaped electrode

Plugging a HV STK extension handle into an IS PHE STK insulating stick

Accessory, kit parts and spare parts from page 195

PHE III M12 Voltage Detector

Nominal Voltages up to 30 kV / 50 Hz



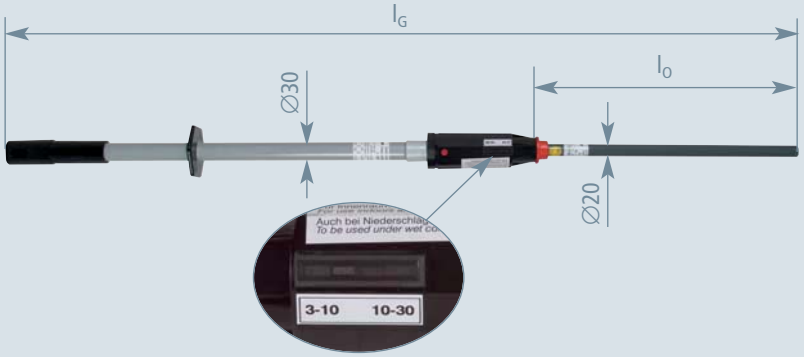
Category "S"

Type	PHE3 3 S	PHE3 6 S	PHE3 10 S	PHE3 20 S	PHE3 30 S
Part No.	767 703	767 706	767 710	767 720	767 730
Nominal voltage (U_N)	3 kV	6 kV	10 kV	20 kV	30 kV
Total length (l_G)	1080 mm	1080 mm	1080 mm	1230 mm	1415 mm
Insertion depth (l_O)	285 mm	285 mm	285 mm	435 mm	620 mm

Type	PHE3 3 10 S	PHE3 6 20 S	PHE3 10 30 S
Part No.	767 711	767 721	767 731
Nominal voltage (U_N)	3 ... 10 kV	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	1415 mm	1575 mm	1675 mm
Insertion depth (l_O)	620 mm	780 mm	880 mm

Nominal Voltage Ranges up to 30 kV / 50 Hz, switchable

The nominal voltage selector switch allows to switch between two nominal voltage ranges. For safety reasons, the voltage detector can only be switched on if the selector switch is switched to the most sensitive range of 3 kV to 10 kV. The switch snaps into the relevant position, thus providing protection against inadvertent switching. A magnetically operated, wear-resistant reed switch changes the switching position.

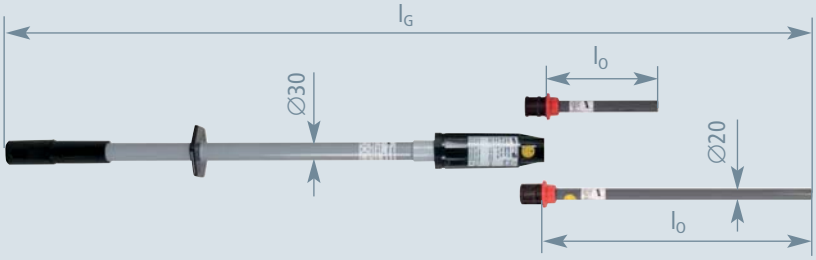


Category "S"

Type	PHE3 U 3 30 S
Part No.	767 733
Nominal voltage (U_N)	3 ... 10 / 10 ... 30 kV
Total length (l_G)	1675 mm
Insertion depth (l_O)	880 mm

Nominal Voltage Ranges up to 30 kV / 50 Hz, Test Set

The test set includes two test prods of different lengths which are labelled "S" (long test prod) and "L" (short test prod) on the rating plate.



Category "S" and "L"

Type	PHE3 6 20 SL	PHE3 10 30 SL
Part No.	767 740	767 750
Nominal voltage (U_N)	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	1575 / 990 mm	1675 / 990 mm
Insertion depth (l_O)	780 / 185 mm	880 / 185 mm

Voltage detectors for other nominal voltages and frequencies are available on request.

PHE III ZK Voltage Detector

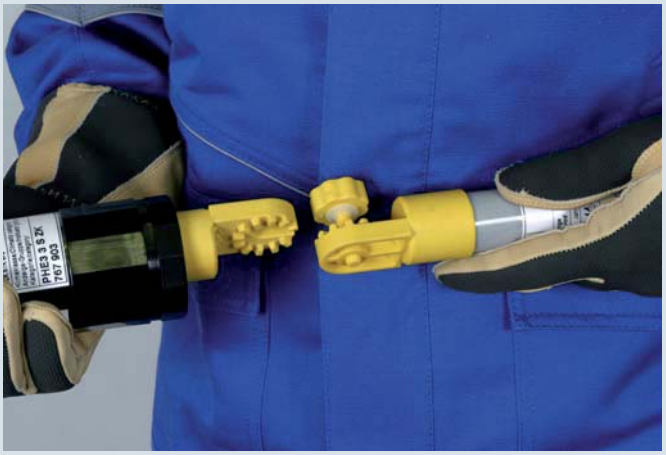
Nominal voltages up to 30 kV / 50 Hz

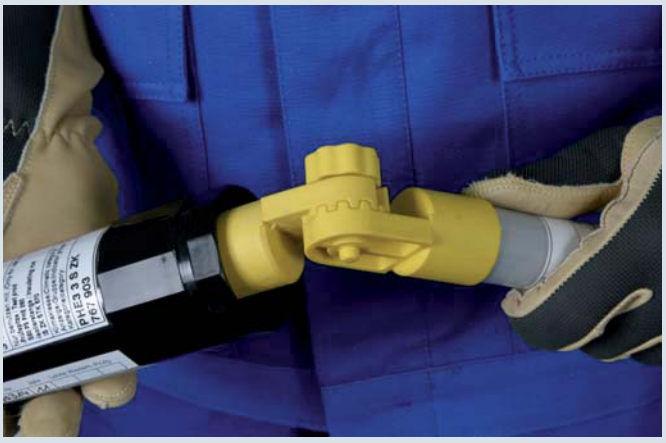
PHE III ZK voltage detector used in an indoor switchgear installation

Safe verification of isolation from supply voltage

- **Reliable indication**
- **Easy to use**
- **Cost-effective/space-saving transport**

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Indication	Visual and acoustic
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube



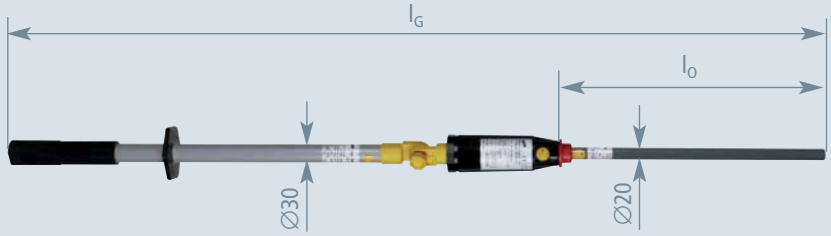


Universal gear coupling allows to adjust the angle of the voltage detector

Accessory, kit parts and spare parts from page 195

PHE III ZK Voltage Detector

Nominal Voltages up to 30 kV / 50 Hz



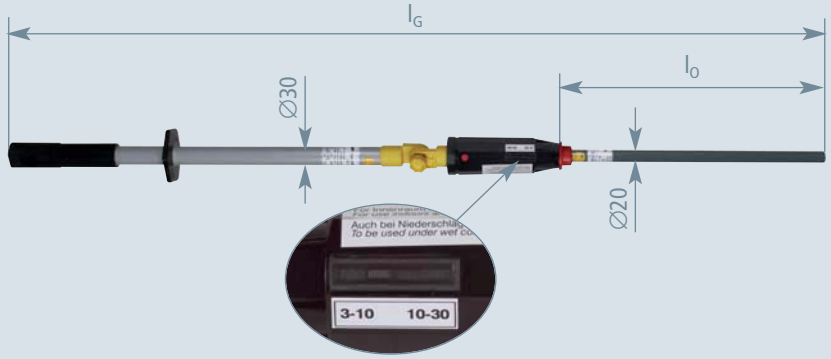
Category "S"

Type	PHE3 3 S ZK	PHE3 6 S ZK	PHE3 10 S ZK	PHE3 20 S ZK	PHE3 30 S ZK
Part No.	**767 903**	**767 906**	**767 910**	**767 920**	**767 930**
Nominal voltage (U_N)	3 kV	6 kV	10 kV	20 kV	30 kV
Total length (l_G)	1150 mm	1150 mm	1150 mm	1300 mm	1485 mm
Insertion depth (l_O)	285 mm	285 mm	285 mm	435 mm	620 mm

Type	PHE3 3 10 S ZK	PHE3 6 20 S ZK	PHE3 10 30 S ZK
Part No.	**767 941**	**767 951**	**767 961**
Nominal voltage (U_N)	3 ... 10 kV	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	1485 mm	1645 mm	1745 mm
Insertion depth (l_O)	620 mm	780 mm	880 mm

Nominal Voltage Ranges up to 30 kV / 50 Hz, switchable

The nominal voltage selector switch allows to switch between two nominal voltage ranges. For safety reasons, the voltage detector can only be switched on if the selector switch is switched to the most sensitive range of 3 kV to 10 kV. The switch snaps into the relevant position and provides protection against inadvertent switching. A magnetically operated, wear-resistant reed switch changes the switching position.

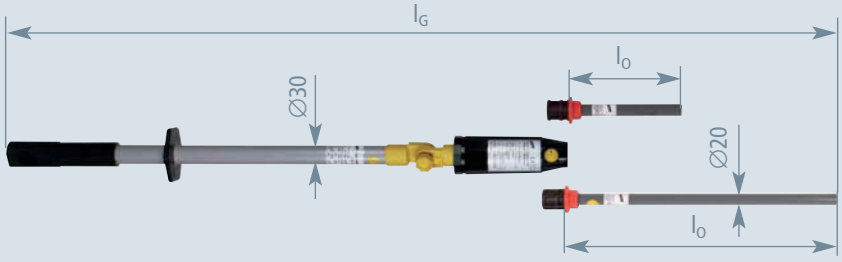


Category "S"

Type	PHE3 U 3 30 S ZK
Part No.	**767 960**
Nominal voltage (U_N)	3 ... 10 / 10 ... 30 kV
Total length (l_G)	1745 mm
Insertion depth (l_O)	880 mm

Nominal Voltage Ranges up to 30 kV / 50 Hz, Test Set

The test set includes two test prods of different lengths which are marked "S" (long test prod) and "L" (short test prod) on the rating plate.



Category "S" and "L"

Type	PHE3 6 20 SL ZK	PHE3 10 30 SL ZK
Part No.	**767 940**	**767 950**
Nominal voltage (U_N)	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	1650 / 1050 mm	1750 / 1050 mm
Insertion depth (l_O)	780 / 185 mm	880 / 185 mm

Voltage detectors for other nominal voltages and frequencies are available on request.

PHE III ZK Indicator with Test Prod

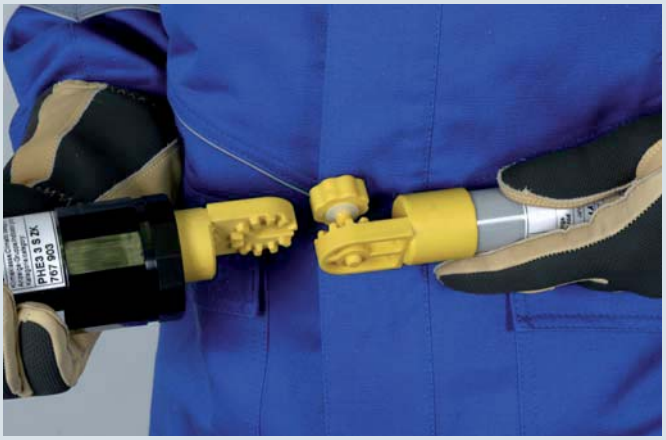
Nominal voltages up to 30 kV / 50 Hz

PHE III indicator with test prod, universal gear coupling and insulating stick

Safe verification of isolation from supply voltage

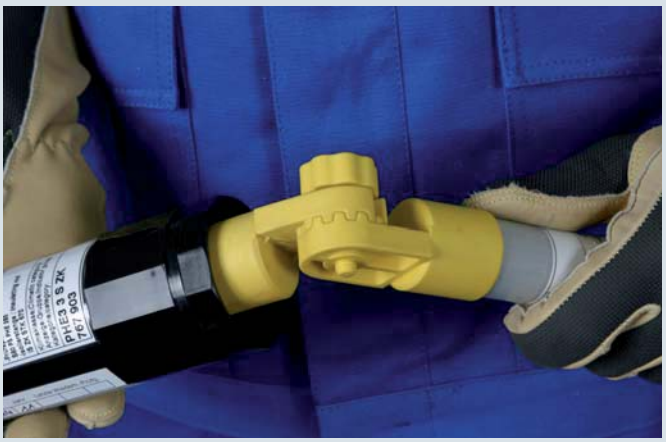
- **Reliable indication with standby function**
- **Easy to use**
- **Cost-effective/space-saving transport**

General Information:	
Standard (indicator with test prod)	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Standard (universal gear coupling)	EN/IEC 60832 (DIN VDE 0682 Part 211)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Separate
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Indication	Visual and acoustic
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated



Standby function
The PHE III indicator with test prod has a standby function that automatically activates the device as soon as contact with energised equipment is made (without previous self-test) and visually and acoustically indicates "voltage present". When making contact with de-energised equipment, the indicator is not activated.

Attention
The PHE III indicator with test prod may only be used in combination with a suitably rated insulating stick from the same equipment range.



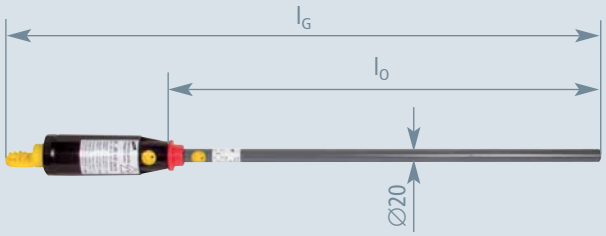
Universal gear coupling allows to adjust the angle of the voltage detector

Accessory, kit parts and spare parts from page 195

PHE III ZK Indicator with Test Prod

Nominal Voltage Ranges up to 30 kV / 50 Hz, Category "S"

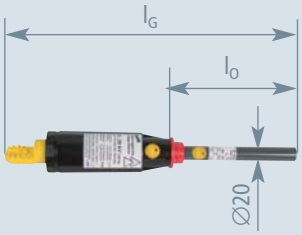
Category "S"



Type	PHE3 PK6 20 S SB ZK	PHE3 PK10 30 S SB ZK
Part No.	**767 921**	**767 931**
Nominal voltage (U_N)	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	1010 mm	1110 mm
Insertion depth (l_O)	780 mm	880 mm

Nominal Voltage Ranges up to 30 kV / 50 Hz, Category "L"

Category "L"

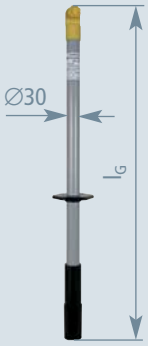


Type	PHE3 PK6 20 L SB ZK	PHE3 PK10 30 L SB ZK
Part No.	**767 922**	**767 932**
Nominal voltage (U_N)	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	415 mm	415 mm
Insertion depth (l_O)	185 mm	185 mm

Voltage detectors for other nominal voltages and frequencies as well as indicators with permanent light and acoustic signal instead of flashing light and intermittent acoustic signal are available on request.

Accessory for PHE III ZK Indicator with Test Prod

Insulating Stick with universal Gear Coupling

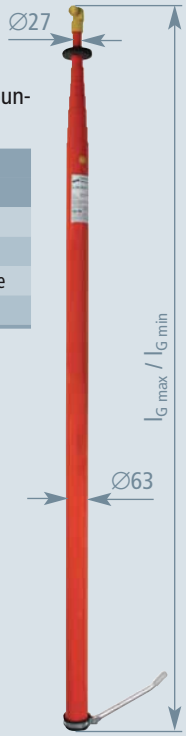


Type	IS ZK STK 670
Part No.	**766 368**
Nominal voltage (U_N)	Up to 36 kV
Total length (l_G)	670 mm
Material	Glass-fibre reinforced polyester tube

Accessory for PHE III ZK Indicator with Test Prod

Telescopic Insulating Stick

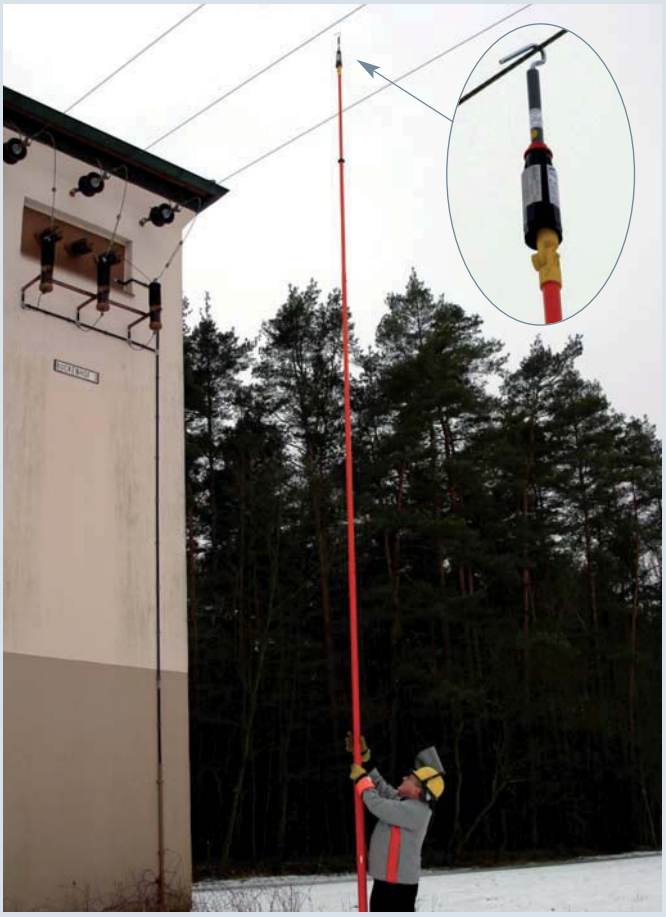
With scale for measuring the ground clearance, mounted support included



Type	ISMTC N 36 ZK 10600
Part No.	**766 037**
Nominal voltage (U_N)	Up to 36 kV
Total length ($l_{G\,max}$ / $l_{G\,min}$)	10,600 / 1750 mm
Material	Glass-fibre reinforced epoxy resin tube
End fitting	Non-slip plastic cap

PHE III ZK Voltage Detector Kit

Nominal voltage 20 kV / 50 Hz



PHE III voltage detector with telescopic insulating stick

Safe verification of isolation from supply voltage

- **Reliable indication**
- **Easy to use**
- **Multi-purpose kit**
- **Cost-effective/space-saving transport**

General Information:	
Standard (indicator with test prod)	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Standard (universal gear coupling)	EN/IEC 60832 (DIN VDE 0682 Part 211)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Type	Telescopic insulating stick (10.6 m)
Indication	Visual and acoustic
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube
Material (telescopic insulating stick)	Glass-fibre reinforced epoxy resin tube
End fitting (insulating stick)	Plug-in coupling for extending the handle
End fitting (telescopic insulating stick)	Non-slip plastic cap

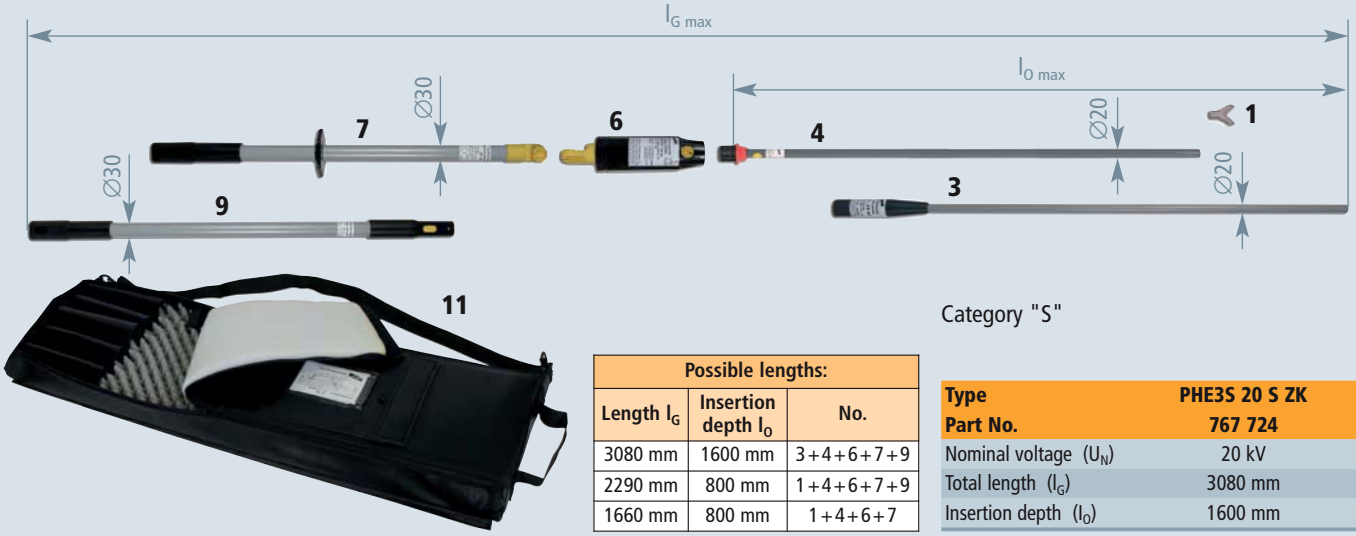
Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 927	**8**	766 037
2	766 923	**9**	766 335
3	766 960	**10**	766 049
4	767 763	**11**	767 996
5	767 766	**12**	766 036
6	767 722	**13**	766 039
7	766 368		

For more detailed information on these products, see Accessory chapter

Accessory, kit parts and spare parts from page 195

PHE III ZK Voltage Detector Kit

Nominal Voltage 20 kV / 50 Hz, Category "S"

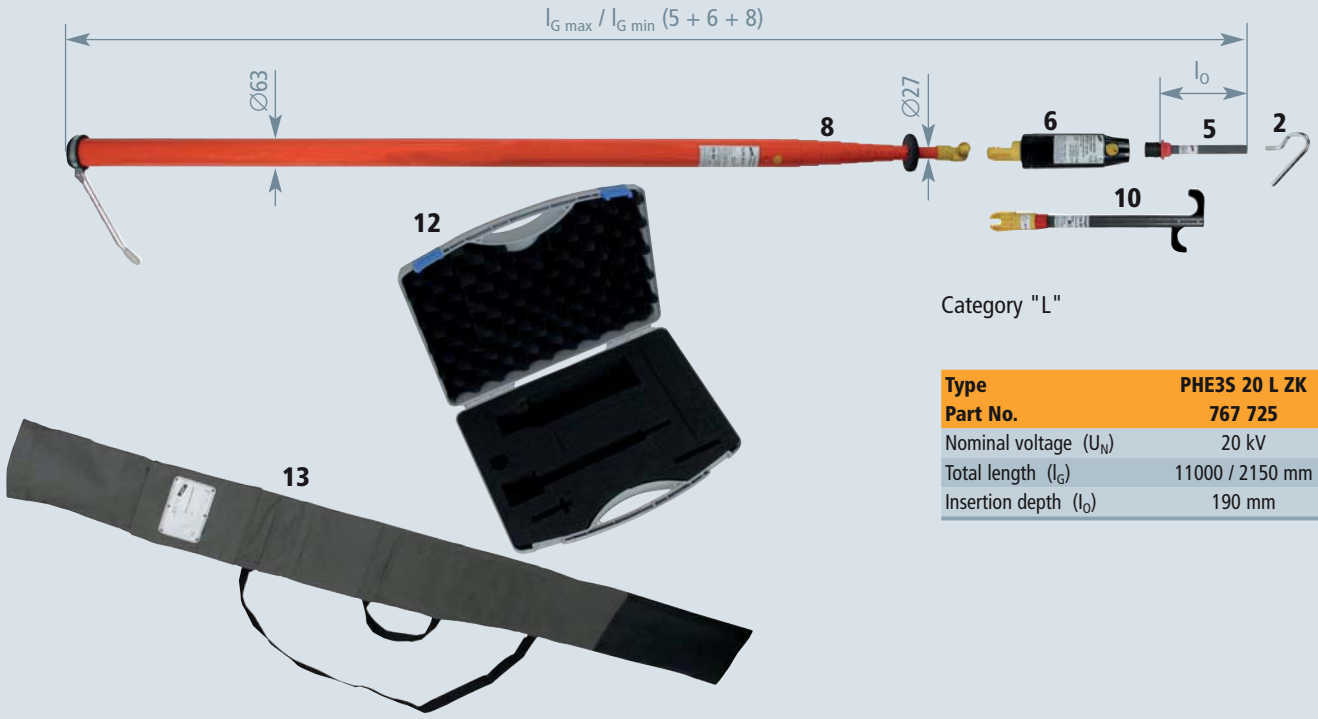


Category "S"

Possible lengths:		
Length l_G	Insertion depth l_O	No.
3080 mm	1600 mm	3+4+6+7+9
2290 mm	800 mm	1+4+6+7+9
1660 mm	800 mm	1+4+6+7

Type	PHE3S 20 S ZK
Part No.	767 724
Nominal voltage (U_N)	20 kV
Total length (l_G)	3080 mm
Insertion depth (l_O)	1600 mm

Nominal Voltage 20 kV / 50 Hz, Category "L"



Category "L"

Type	PHE3S 20 L ZK
Part No.	767 725
Nominal voltage (U_N)	20 kV
Total length (l_G)	11000 / 2150 mm
Insertion depth (l_O)	190 mm

Voltage detectors for other nominal voltages and frequencies as well as indicators with permanent light and acoustic signal instead of flashing light and intermittent acoustic signal are available on request.

PHE III M12 / ZK Voltage Detector Kit

Nominal voltage 10 ... 132 kV / 50 Hz

PHE III voltage detector used on a 110 kV outdoor station

Safe verification of isolation from supply voltage

- **Reliable indication**
- **Easy to use**
- **Multi-purpose kit**
- **Cost-effective/space-saving transport**

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Indication	Visual and acoustic
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

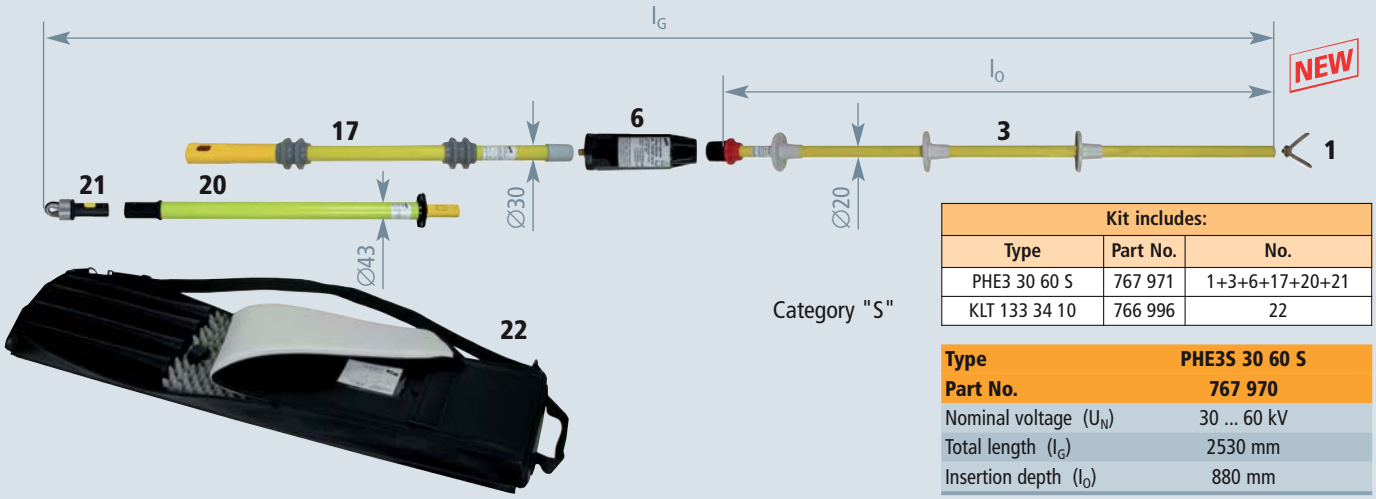
Kit includes:			
Pos. No.	**Part No.**	**Pos. No.**	**Part No.**
1	766 924	**13**	767 965
2	766 923	**14**	766 352
3	767 771	**15**	766 359
4	767 772	**16**	766 358
5	767 764	**17**	766 114
6	767 972	**18**	766 115
7	767 974	**19**	766 128
8	767 734	**20**	766 120
9	767 726	**21**	766 889
10	767 732	**22**	766 996
11	767 735	**23**	766 998
12	767 963		

For more detailed information on these products, see Accessory chapter

Accessory, kit parts and spare parts from page 195

PHE III M12 / ZK Voltage Detector Kit

Nominal Voltage Range 30 ... 60 kV / 50 Hz, Category "S"

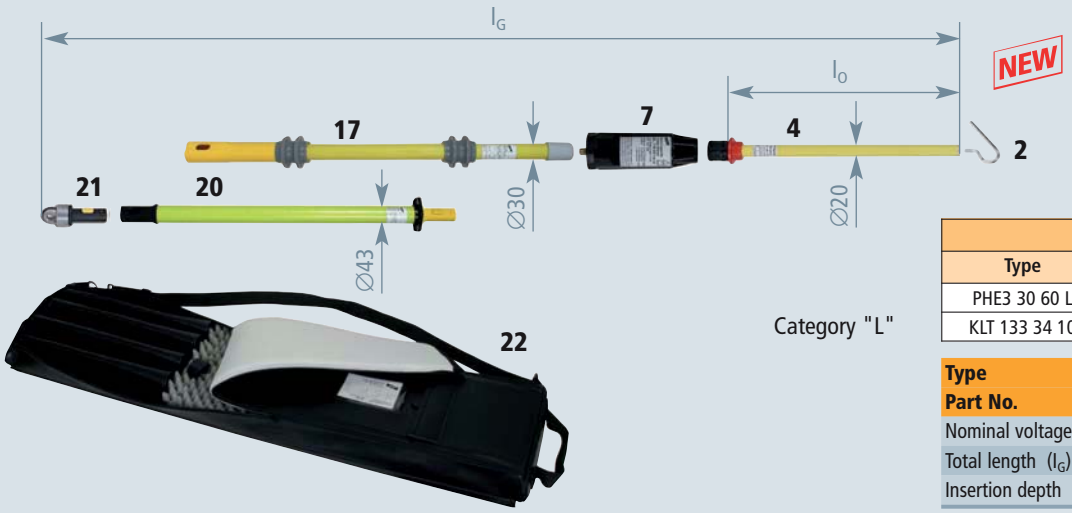


Category "S"

Kit includes:		
Type	Part No.	No.
PHE3 30 60 S	767 971	1+3+6+17+20+21
KLT 133 34 10	766 996	22

Type	PHE3S 30 60 S
Part No.	767 970
Nominal voltage (U_N)	30 ... 60 kV
Total length (l_G)	2530 mm
Insertion depth (l_O)	880 mm

Nominal Voltage Range 30 ... 60 kV / 50 Hz, Category "L"

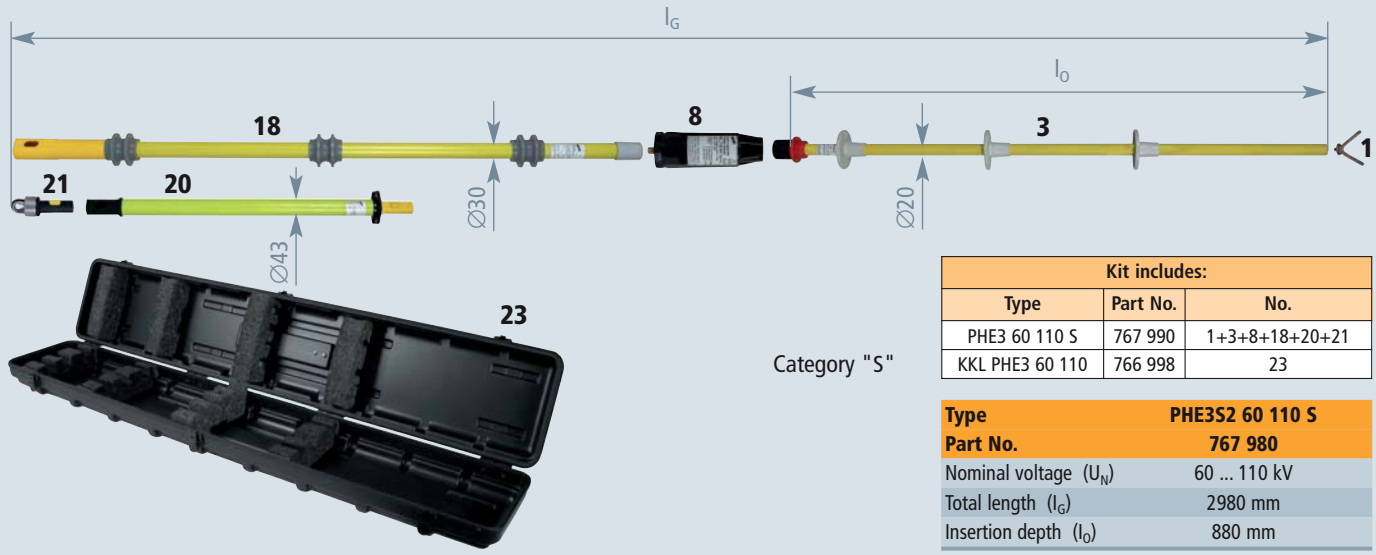


Category "L"

Kit includes:		
Type	Part No.	No.
PHE3 30 60 L	767 973	2+4+7+17+20+21
KLT 133 34 10	766 996	22

Type	PHE3S 30 60 L
Part No.	767 975
Nominal voltage (U_N)	30 ... 60 kV
Total length (l_G)	2030 mm
Insertion depth (l_O)	380 mm

Nominal Voltage Range 60 ... 110 kV / 50 Hz, Category "S"



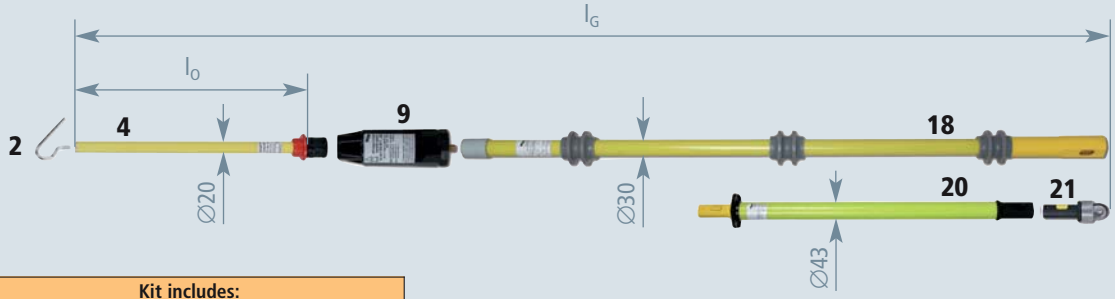
Category "S"

Kit includes:		
Type	Part No.	No.
PHE3 60 110 S	767 990	1+3+8+18+20+21
KKL PHE3 60 110	766 998	23

Type	PHE3S2 60 110 S
Part No.	767 980
Nominal voltage (U_N)	60 ... 110 kV
Total length (l_G)	2980 mm
Insertion depth (l_O)	880 mm

PHE III M12 / ZK Voltage Detector Kit

Nominal Voltage Range 60 ... 110 kV / 50 Hz, Category "L"

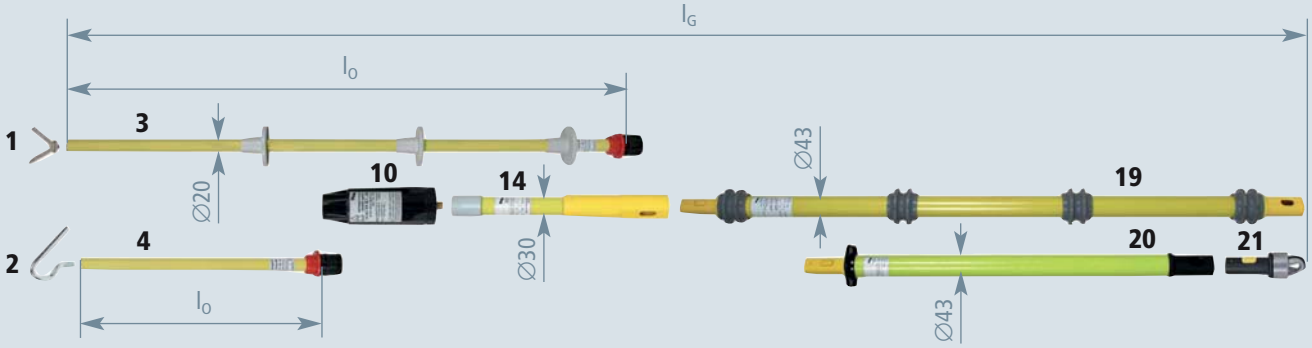


Kit includes:		
Type	**Part No.**	**No.**
PHE3 60 110 L	767 991	2+4+9+18+20+21
KKL PHE3 60 110	766 998	23

Type	**PHE3S2 60 110 L**
Part No.	**767 981**
Nominal voltage (U_N)	60 ... 110 kV
Total length (l_G)	2540 mm
Insertion depth (l_O)	380 mm

Category "L"

Nominal Voltage Range 60 ... 132 kV / 50 Hz, Category "S / L"



Kit includes:		
Type	**Part No.**	**No.**
PHE3 60 132 SL	767 992	1+3+2+4+10+14+ 19+20+21
KLT 133 34 10	766 996	22

Type	**PHE3S2 60 132 SL**
Part No.	**767 982**
Nominal voltage (U_N)	60 ... 132 kV
Total length (l_G)	3440 / 2950 mm
Insertion depth (l_O)	880 / 380 mm

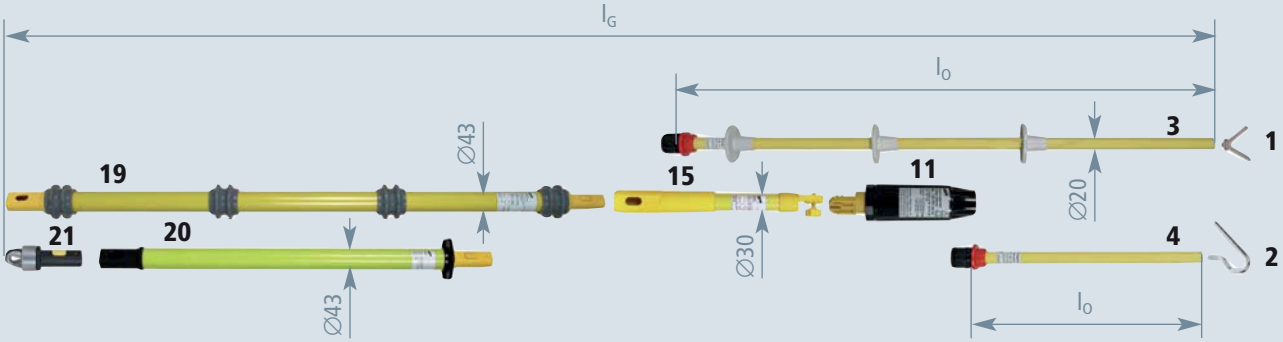
The test set includes two test prods of different lengths which are labelled "S" (long test prod) and "L" (short test prod) on the rating plate.

Category "S" and "L"

Accessory, kit parts and spare parts from page 195

PHE III M12 / ZK Voltage Detector Kit

Nominal Voltage Range 60 ... 132 kV / 50 Hz with Gear Coupling, Category "S / L"



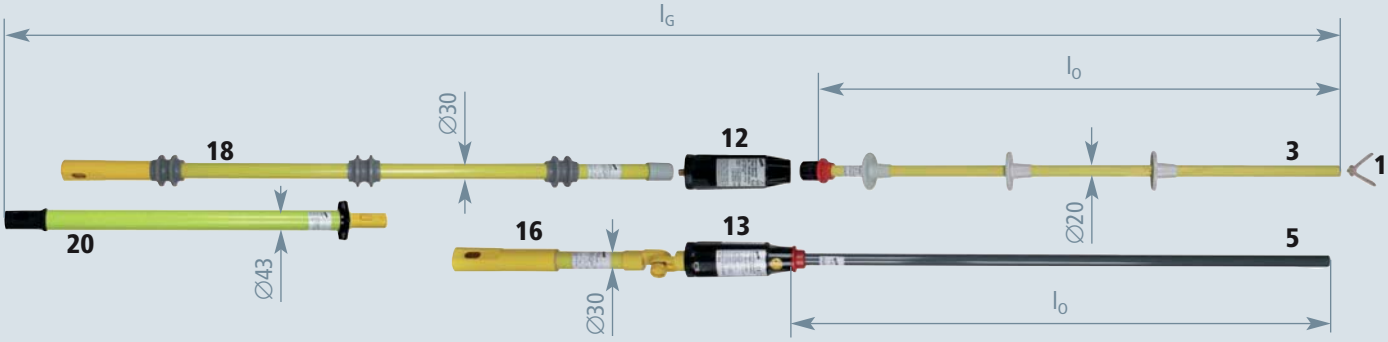
The test set includes two test prods of different lengths which are labelled "S" (long test prod) and "L" (short test prod) on the rating plate.

Category "S" and "L"

Kit includes:		
Type	**Part No.**	**No.**
PHE3 60 132 SL ZK	767 993	1+3+2+4+11+15+19+20+21
KLT 133 34 10	766 996	22

Type	**PHE3S2 60 132 SL ZK**
Part No.	**767 983**
Nominal voltage (U_N)	60 ... 132 kV
Total length (l_G)	3490 / 3000 mm
Insertion depth (l_O)	880 / 380 mm

Nominal Voltage Range 10 ... 30 kV / 50 Hz and 60 ... 110 kV / 50 Hz, Category "S"



Category "S"

Kit includes:		
Type	**Part No.**	**No.**
PHE3 60 110 S IT	767 962	1+3+12+18
PHE3 10 30 S ZK30	767 964	5+13+16
H STK 43 800	766 120	20
KLT 133 34 10	766 996	22

Type	**PHE3S 10 110 S**
Part No.	**767 984**
Nominal voltage (U_N)	10 ... 30 / 60 ... 110 kV
Total length (l_G)	2160 / 2910 mm
Insertion depth (l_O)	880 / 880 mm

Voltage detectors for other nominal voltages and frequencies as well as indicators with permanent light and continuous acoustic signal instead of flashing light and intermittent acoustic signal are available on request.

PHE Voltage Detector

Nominal voltages up to 30 kV / 50 Hz

PHE voltage detector with visual indication

Easy and safe testing

- Reliable indication
- Easy to use

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Indication	Visual
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Before testing the installation for safe isolation from supply voltage, the voltage detector must be tested for correct operation. When pressing the "TEST" button, the red indicator light flashes.

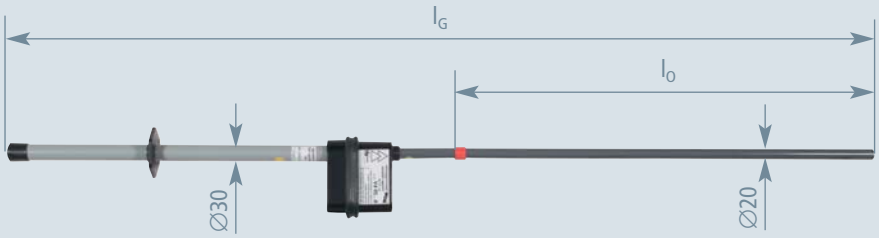
As soon as the button is released, the green indicator light lights up. The test for correct operation was successful and the voltage detector is operational.

Accessory, kit parts and spare parts from page 195

PHE Voltage Detector

Nominal Voltages up to 30 kV / 50 Hz

Category "S"



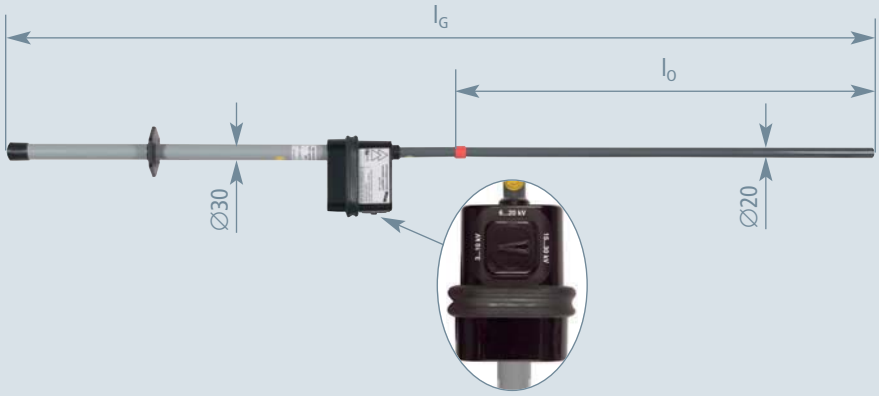
Type	PHE 3 S	PHE 6 S	PHE 10 S	PHE 20 S	PHE 30 S
Part No.	**767 403**	**767 406**	**767 418**	**767 428**	**767 438**
Nominal voltage (U_N)	3 kV	6 kV	10 kV	20 kV	30 kV
Total length (l_G)	1115 mm	1115 mm	1115 mm	1300 mm	1460 mm
Insertion depth (l_O)	320 mm	320 mm	320 mm	505 mm	670 mm

Type	PHE 3 10 S	PHE 6 20 S	PHE 15 30 S
Part No.	**767 410**	**767 420**	**767 430**
Nominal voltage (U_N)	3 ... 10 kV	6 ... 20 kV	15 ... 30 kV
Total length (l_G)	1375 mm	1565 mm	1565 mm
Insertion depth (l_O)	580 mm	770 mm	770 mm

Nominal Voltage Ranges up to 30 kV / 50 Hz, switchable

The nominal voltage selector switch allows to switch between three voltage ranges. For safety reasons, the voltage detector can only be switched on if the selector switch is switched to the most sensitive range of 3 kV to 10 kV. The switch snaps into the relevant position and provides protection against inadvertent switching. A magnetically operated, wear-resistant reed switch changes the switching position.

Kategorie "S"



Type	PHE U 3 30 S
Part No.	**767 433**
Nominal voltage (U_N)	3 ... 10 / 6 ... 20 / 15 ... 30 kV
Total length (l_G)	1565 mm
Insertion depth (l_O)	770 mm

Voltage detectors for other nominal voltages and frequencies are available on request.

ASP Non-Contact Voltage Detector

Nominal voltage range 110 ... 420 kV / 50 Hz

ASP non-contact voltage detector used in an outdoor switching station

Easy and safe testing

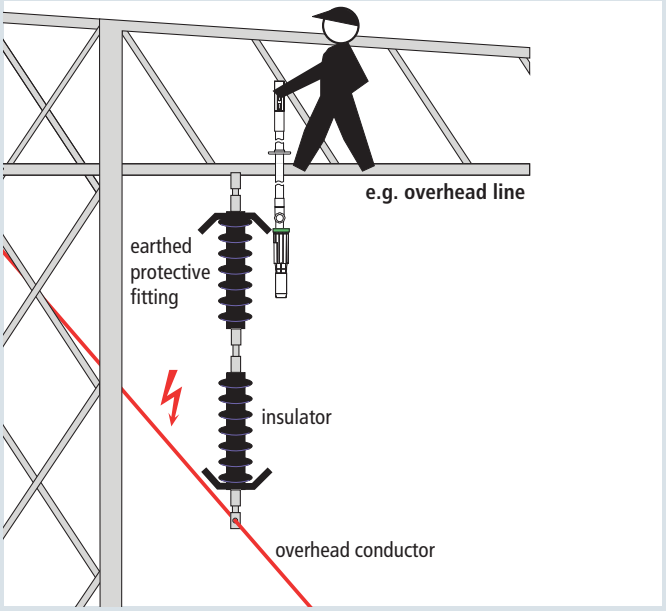
- Easy-to-use due to compact design
- Cost-effective/space-saving transport

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	767 576	5	767 593
2	767 577	6	766 369
3	767 591	7	767 574
4	767 592	8	767 996

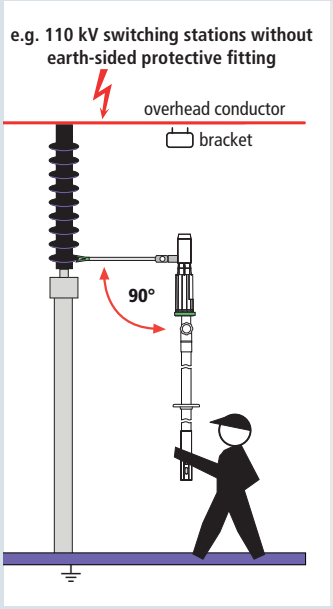
For more detailed information on these products, see Accessory chapter

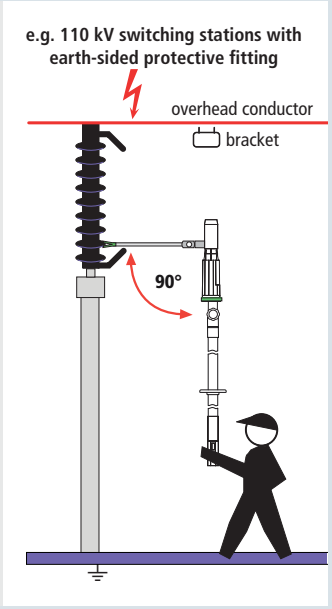
General Information:	
Temperature range	– 25 °C ... + 55 °C
Use	Suitable for use in wet weather conditions
For	Overhead lines and outdoor switching stations
Indication	Visual and acoustic
Self-testing element	Yes
Design	With universal gear coupling for adjusting the angle of the indicator with test prod
Material (indicator)	Plastic, fully insulated (black)
Material (electric field sensor)	Plastic (black)
Material (insulating stick)	Glass-fibre reinforced polyester tube

Category "S" and "L"
Devices of category "S" may only be used in outdoor switching stations, devices of category "L" for overhead lines only. Devices of category "S" / "L" may be used both for outdoor switching stations and overhead lines.



Use for overhead lines
The green ring on the ASP non-contact voltage detector with category "L" electric field sensor is used to make contact with the last earthed protective fitting in such a way that the electric field sensor points in the direction of the overhead conductor fixed at the other end of the insulator.



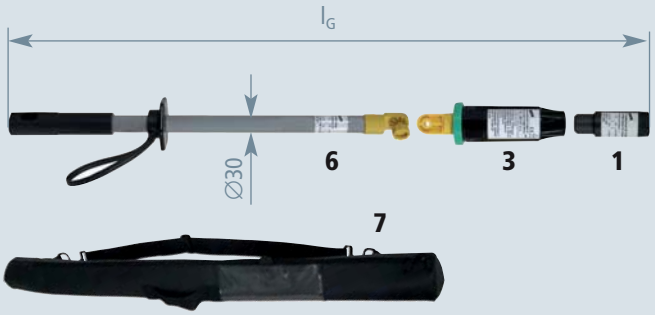


Use in outdoor switching stations
The green marking on the arm of the ASP non-contact voltage detector with category "S" electric field sensor is used to make contact with the lowest insulator plate at a right angle.
If a protective fitting is located on the earth side, contact is made at the next possible insulator plate above the protective fitting.

Accessory, kit parts and spare parts from page 195

ASP Non-Contact Voltage Detector

ASP Non-Contact Voltage Detector Kit, Category "L"

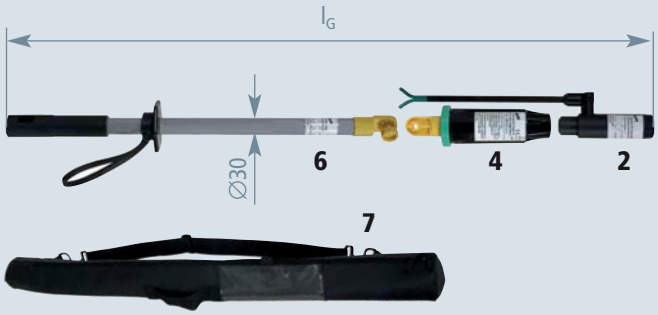


For overhead lines in accordance with E DIN VDE 0682-417 Category "L"

Kit includes:		
Type	Part No.	No.
ASP 110 420 L	767 581	1+3+6
KLT 104 9	767 574	7

Type	ASP 110 420 L
Part No.	767 571
Nominal voltage (U_N)	110 ... 420 kV
Total length (l_G)	960 mm

ASP Non-Contact Voltage Detector Kit, Category "S"



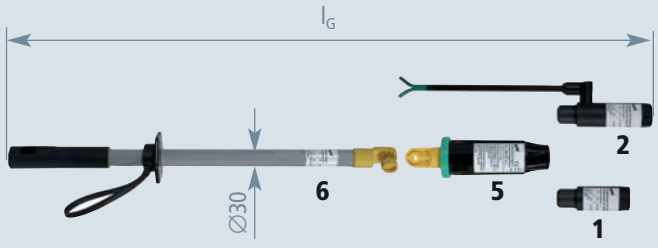
For outdoor switching stations Category "S"

Kit includes:		
Type	Part No.	No.
ASP 110 420 S	767 582	2+4+6
KLT 104 9	767 574	7

Type	ASP 110 420 S
Part No.	767 572
Nominal voltage (U_N)	110 ... 420 kV
Total length (l_G)	1000 mm

ASP Non-Contact Voltage Detector

ASP Non-Contact Voltage Detector Kit, Category "S / L"



For overhead lines and outdoor switching stations Category "L" and "S"

Kit includes:		
Type	Part No.	No.
ASP 110 420 S L	767 583	1+2+5+6
KLT 101 30 10	767 996	8

Type	ASP 110 420 S L
Part No.	767 573
Nominal voltage (U_N)	110 ... 420 kV
Total length (l_G)	1000 mm

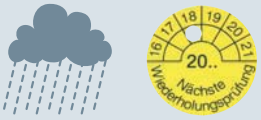
Voltage detectors for other nominal voltages and frequencies as well as indicators with permanent light and continuous acoustic signal instead of flashing light and intermittent acoustic signal are available on request.

HSA 205 High-Voltage Indicator

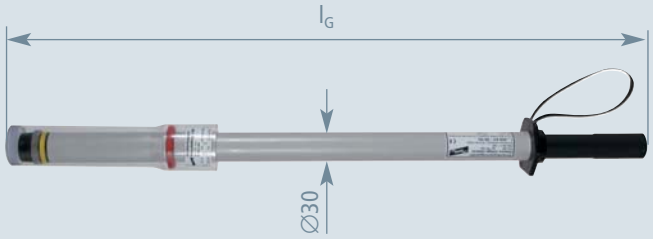
Nominal voltage range 1 ... 420 kV / 50 Hz

HSA 205 non-contact voltage detector with insulating cap used on a switchgear installation

- For contactless verification of safe isolation from supply voltage on switchgear installations and high-voltage overhead lines
- Wide nominal voltage range
- Storage bag included



General Information:	
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
Indication	Visual and acoustic
Self-testing element	Yes
Material (insulating stick)	Glass-fibre reinforced polyester tube

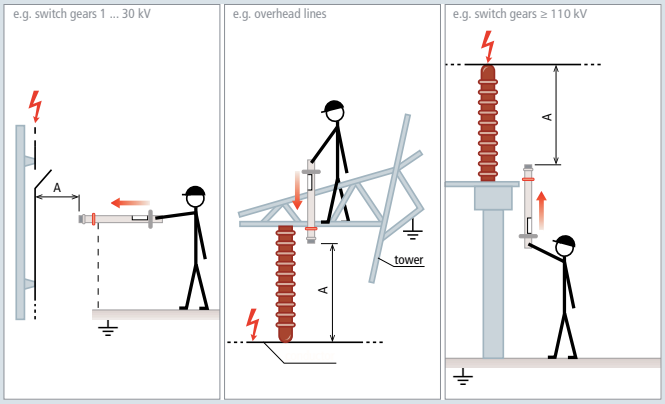


With insulating cap and plug-in coupling as end fitting for extending the handle

Type	HSA205 U 1 420 STK
Part No.	767 552
Nominal voltage range (U_N)	1 ... 30 / 30 ... 220 / 110 ... 420 V
Frequency	50 Hz
Total length (l_G)	950 mm

HSA 205 non-contact voltage detectors with Lithium batteries for other nominal voltages and frequencies are available on request.
ATTENTION: These HSA 205 non-contact voltage detectors may not be sold in Germany!

Minimum distances A according to nominal voltage:		
Selected voltage range	Nominal voltage acc. to DIN VDE 0105 Part 1	Min. safety distance A
Red 1 ... 30 kV	1 up to 6 kV	90 mm indoor installations
	6 up to 10 kV	120 mm indoor installations
	1 up to 10 kV	150 mm outdoor installations
	10 up to 20 kV	220 mm indoor and outdoor installations
	20 up to 30 kV	320 mm indoor and outdoor installations
White 30 ... 220 kV	30 up to 45 kV	480 mm indoor and outdoor installations
	45 up to 60 kV	630 mm indoor and outdoor installations
	60 up to 110 kV	1100 mm indoor and outdoor installations
Yellow 110 ... 420 kV	110 up to 220 kV	2100 mm indoor and outdoor installations
	220 up to 420 kV	2900/3400 mm indoor and outdoor installations



Application notes

The operating head of HSA 205 non-contact voltage detectors is fitted with a yellow switching ring, which is used to set the required nominal voltage range, either 1 to 30 kV, 30 to 220 kV or 110 to 420 kV.
Provided that the insulating tube and cap of the non-contact voltage detector is in a dry and clean condition, the minimum distance A can be reduced for nominal voltages up to 30 kV.
If these conditions cannot be ensured, the minimum distance A must be maintained!

Accessory, kit parts and spare parts from page 195

PHG II Voltage Detector

Nominal voltages up to 20 kV / 50 Hz

Easy and safe testing
- **Cost-effective**
- **Reliable indication**

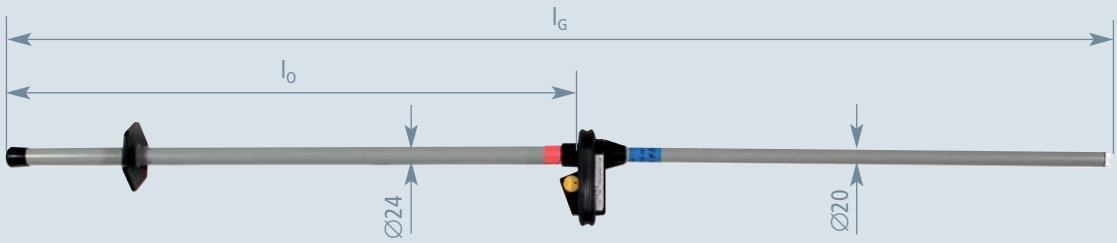
PHG II voltage detector used in a type-tested switchgear installation

Test for correct operation
EN 50110-1 (DIN VDE 0105 Part 100) requires that voltage detectors are tested for correct operation directly before and after they are used. Voltage detectors without self-testing element must tested for correct operation by attaching them to parts of the installation connected to operating voltage.

A fork-shaped electrode is situated on the test prod of the voltage detector.

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
Use	Not suitable for use in wet weather conditions
For	Indoor installations
Indication	Visual, 3 LEDs
Type	Passive voltage detector without batteries
Material (test electrode)	Cu/gal Sn
Material (test prod)	Glass-fibre reinforced polyester tube
Material (indicator)	Plastic
Material (insulating stick)	Glass-fibre reinforced polyester tube

Nominal voltages up to 20 kV / 50 Hz



Category "S"

Type	PHG2 6	PHG2 10	PHG2 20
Part No.	766 706	766 710	766 720
Nominal voltage (U_N)	6 kV	10 kV	20 kV
Total length (l_G)	1425 mm	1425 mm	1425 mm
Insertion depth (l_O)	720 mm	720 mm	720 mm

Voltage detectors for special switchgear installations are available on request.

PHE/G d.c. Voltage Detector

Nominal voltage up to 24 kV d.c.

PHE/G II d.c. voltage detector for d.c. links (ICE power car)

Safe verification of isolation from supply voltage

- For use in direct voltage systems (electrified rail networks, d.c. links)
- Reliable indication
- Easy to use due to compact design
- User-friendly

General Information:	
Standard	Based on EN/IEC 61243-2 (DIN VDE 0682 Part 412)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations, for example d.c. voltage systems (electrified rail networks, d.c. links)
Indication	Visual
Self-testing element	Yes
Material (test prod)	Glass-fibre reinforced polyester tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube
Material (earthing/ connecting cable)	Copper cable, highly flexible

The two-pole PHE/G II d.c. voltage detector is specifically designed for d.c. links in electric locomotives. Due to the confined space in electric locomotives, it has a total length of only 800 mm. The voltage detector is supplied with a nominal voltage U_N = 3 kV and a response voltage U_t = 120 V (Part No. 767 602 / SN7216).

Voltage detectors for other nominal voltages are available on request.

The test prod of d.c. voltage detectors is colour-coded according to the polarity of the test prod:

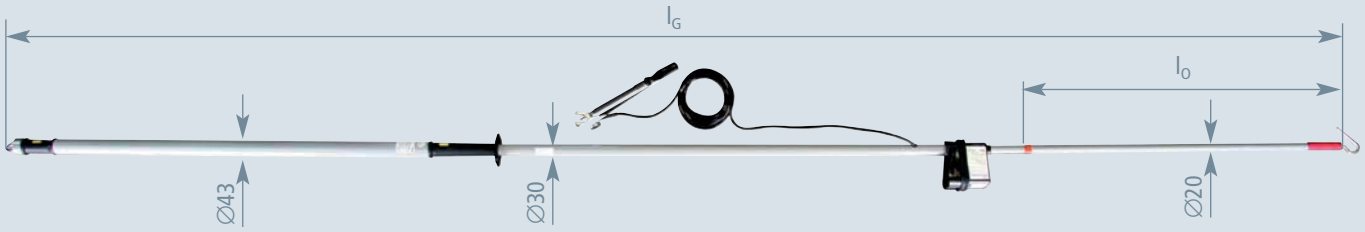
positive pole – red;

negative pole – blue.

Earth clamp with adjustable handle and **magnet**

Accessory, kit parts and spare parts from page 195

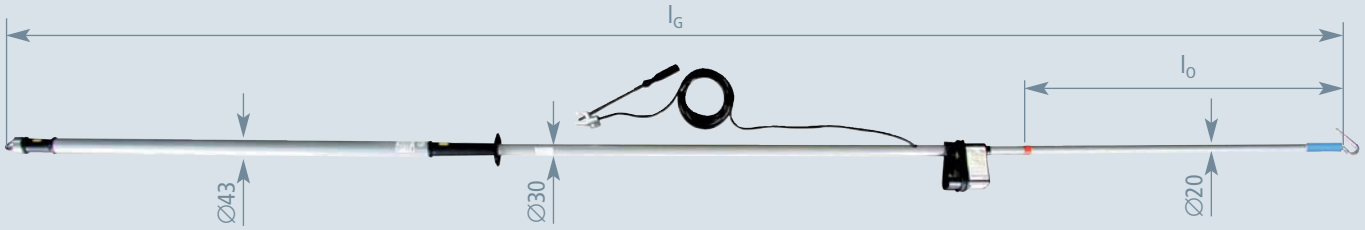
PHE/G I for Overhead Contact Lines, positive Pole



One stick (four elements)
- For direct voltage systems with earthed negative pole
- For nominal voltages up to **24 kV d.c.**
- Positive pole: Indicator with test prod
- Negative pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.FD P SN7...
Part No.	**767 650**
Length (earthing cable)	6000 mm
Total length (l_G)	4120 mm
Insertion depth (l_O)	1020 mm

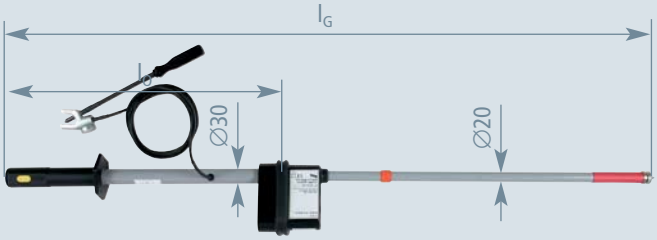
PHE/G I for Overhead Contact Lines, negative Pole



One stick (four elements)
- For direct voltage systems with earthed positive pole
- For nominal voltages up to **24 kV d.c.**
- Negative pole: Indicator with test prod
- Positive pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.FD M SN7...
Part No.	**767 655**
Length (earthing cable)	6000 mm
Total length (l_G)	4120 mm
Insertion depth (l_O)	1020 mm

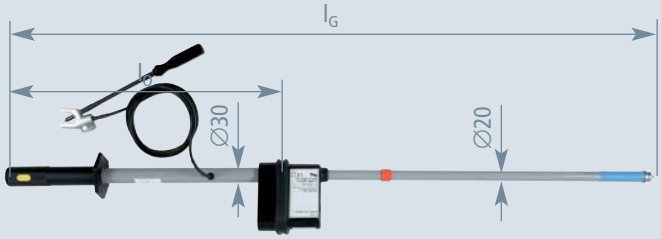
PHE/G I for Switchgear Installations, positive Pole



One stick
- For direct voltage systems with earthed negative pole
- For nominal voltages up to **24 kV d.c.**
- Positive pole: Indicator with test prod
- Negative pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.S P SN7...
Part No.	**767 660**
Length (earthing cable)	2000 mm
Total length (l_G)	1260 mm
Insertion depth (l_O)	530 mm

PHE/G I for Switchgear Installations, negative Pole

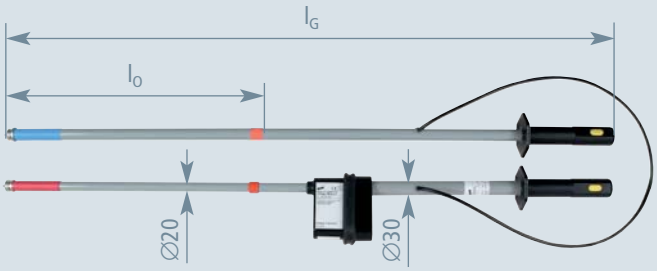


One stick
- For direct voltage systems with earthed positive pole
- For nominal voltages up to **24 kV d.c.**
- Negative pole: Indicator with test prod
- Positive pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.S M SN7...
Part No.	**767 665**
Length (earthing cable)	2000 mm
Total length (l_G)	1260 mm
Insertion depth (l_O)	530 mm

PHE/G d.c. Voltage Detector

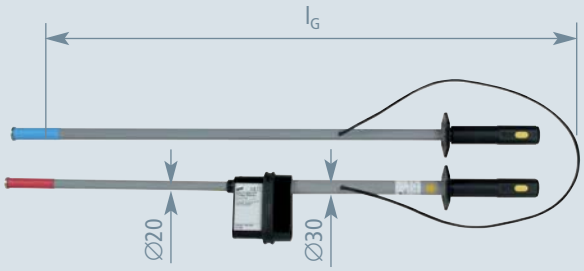
PHE/G II for Switchgear Installations and d.c. Links up to 24 kV d.c.



Two sticks
- For unearthed direct voltage systems
- For nominal voltages up to **24 kV d.c.**
- For d.c. links
- Positive pole: Indicator with test prod
- Negative pole: Insulating stick
- Response voltage U_t = 0.5 x U_N
- Nominal voltage (U_N) to be specified at order!

Type	PHEG2.P SN7...
Part No.	767 670
Length (connecting cable)	1250 mm
Total length (l_G)	1250 mm
Insertion depth (l_O)	540 mm

PHE/G II for Switchgear Installations and d.c. Links up to 7.5 kV d.c.



Two sticks
- For unearthed direct voltage systems
- For nominal voltages up to **7.5 kV d.c.**
- For d.c. links (e.g. electric locomotive; $U_A \leq 120$ V, l_G = 800 mm)
- Positive pole: Indicator with test prod
- Negative pole: Insulating stick
- Response voltage U_t = 0.5 x U_N
- Nominal voltage (U_N) to be specified at order!

Type	PHEG2 P SN7...
Part No.	767 602
Length (connecting cable)	1200 mm
Total length (l_G)	1075 mm

Other lengths and response values (U_t) are available on request.

Design of Phase Comparators

Phase comparators in accordance with EN/IEC 61481 (DIN VDE 0682 Part 431) are designed for testing in-phase conditions of three-phase systems.

Only electrically skilled or instructed persons are allowed to test in-phase conditions.
Phase comparators have to be tested for correct operation immediately before and after use.

Phase comparators without self-testing element have to be tested for correct operation by making contact with a part of the installation connected to operating voltage.

Testing in-phase conditions by means of a phase comparator is considered live working.

Phase comparators may only be used for the nominal voltage / nominal voltage range as indicated on the rating plate. The user may be at risk if the phase comparator is used for voltages other than indicated on the rating plate (incorrect indication, electric shock, arcing).

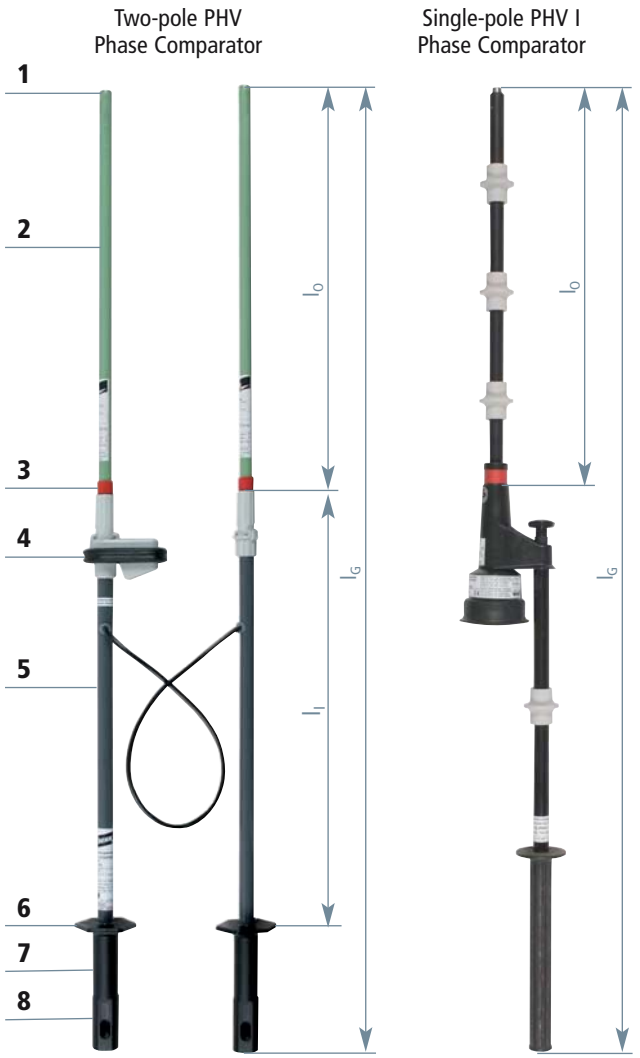
Phase comparators labelled "For indoor and outdoor installations" must not be used in wet weather conditions.

Phase comparators labelled "Also suitable for use in wet weather conditions" may be used in all weather conditions such as rain, snow, fog and dew.

Phase comparators in accordance with IEC/EN 61481 (VDE 0682 Part 431) are only suitable to a limited extent for use in factory assembled (type tested) installations.
Due to the restricted space in these installations, flashover may occur when inserting the test prod into the installation. The user of the phase comparator or the operator of the switchgear installation must contact the manufacturer of the type-tested installation to find out whether the phase comparator may be used in the installation.

Design of phase comparators
Phase comparators in accordance with IEC/EN 61481 (VDE 0682 Part 431) can be designed as **two-pole devices** (resistive phase comparators) or as **single-pole devices** (capacitive phase comparators).
The design of single-pole phase comparators is similar to that of capacitive voltage detectors. The functional principle of single-pole phase comparators is based on a microprocessor controlled electronic storage system.
Classified as complete devices, PHV and PHV I phase comparators are tested as a complete unit.
Single-pole phase comparators consist of a handle with hand guard, insulating element, indicator and test prod with test electrode. Two-pole phase comparators additionally have a connecting cable.
The **insulating element** is the section of a phase comparator between the hand guard and the red ring. It ensures that the user maintains an adequate safety distance for safe operation.
The **test prod** with contact electrode above the red ring allows to reach remote parts of the installation and to eliminate the influence of interference fields.

The **hand guard** provides a visible barrier between the handle and the insulating element and prevents the user from making contact with the insulating element.
The **red ring** indicates the end of the insulating element in the direction of the test electrode. This provides the user with a visible limit of contact with live parts in the installation. The insulating element situated between the red ring and the hand guard must not contact live parts, however, it may contact earthed parts.
The **test electrode** is the part of the phase comparator that is used to make contact with the part of the installation to be tested.



1 Test electrode
2 Test prod
3 Red ring
4 Indicator
5 Insulating element
6 Hand guard
7 Handle
8 Plug-in coupling for handle extension

l_G Total length of the phase comparator
l_O Length of the top section
l_I Length of the insulating element

Storage Bags and Transport Cases — Sheet metal or plastic case; Artificial leather or canvas bag — 187

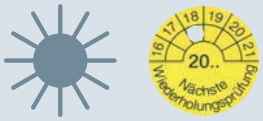
Two-pole PHV Phase Comparator

Nominal voltages up to 36 kV / 50 Hz

Two-pole PHV phase comparator with a pair of green test prods (15 ... 24 kV) used in a 20 kV switchgear installation

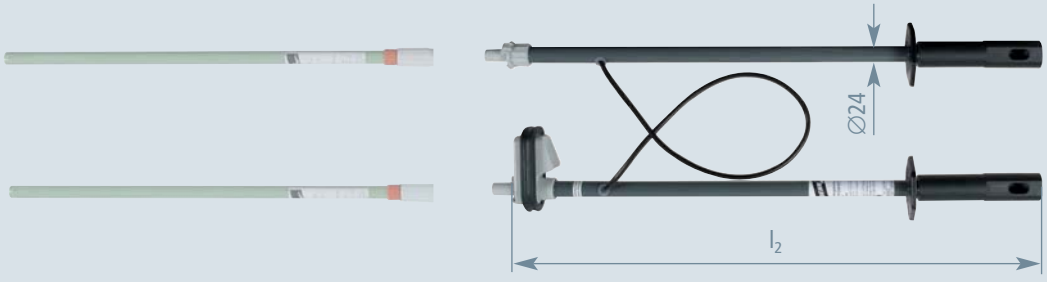
Easy and safe testing

- Easy to use
- User-friendly
- Cost-effective/space-saving transport



General Information:	
Standard	EN/IEC 61481 (DIN VDE 0682 Part 431)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Not suitable for use in wet weather conditions
Material (test electrode)	Copper alloy/gal Sn
For	Indoor and outdoor installations
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced epoxy resin tube
Connecting cable	Flexible copper cable, plastic-insulated

PHV Test Unit



The two-pole PHV phase comparator consists of a test unit and two test prods which are attached to the test unit (to be ordered separately). To avoid confusion, the test prods have different colours according to the nominal voltage.

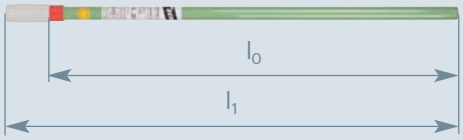
Type	PHV 3 36 STK
Part No.	759 300
Nominal voltage (U_N)	3 ... 36 kV
Colour	Grey
Length (test unit) (l_2)	750 mm
Length (connecting cable)	800 mm

Other connecting cable lengths as well as versions for other nominal voltages and for special switchgear installations are available on request.

Accessory, kit parts and spare parts from page 195

Two-pole PHV Phase Comparator

Straight Test Prods

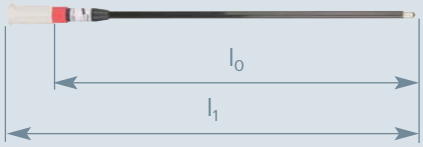


Note: Two tests prods are required for a test unit.

Type	PS 3 3.6 PHV	PS 5 7.2 PHV	PS 10 12 PHV	PS 10 17.5 PHV	PS 15 24 PHV	PS 25 36 PHV
Part No.	759 603	759 605	759 610	759 615	759 620	759 630
Nominal voltage (U_N)	3 ... 3.6 kV	5 ... 7.2 kV	10 ... 12 kV	10 ... 17.5 kV	15 ... 24 kV	25 ... 36 kV
Colour	Grey	White	Yellow	Grey	Green	Grey
Length (test prod) (l_1)	381 mm	681 mm	681 mm	681 mm	681 mm	681 mm
Insertion depth (l_0)	316 mm	616 mm	616 mm	616 mm	616 mm	616 mm
Diameter	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm

Test Prods (Ø11 mm)

For type-tested, factory assembled switchgear installations with limited access (e.g. Mipak)

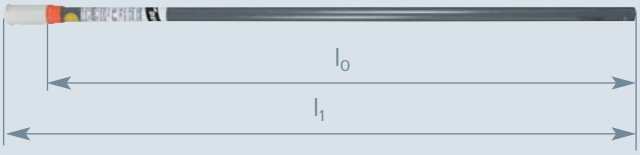


Note: Two tests prods are required for a test unit.

Type	PS 10 12 PHV D11	PS 20 24 PHV D11
Part No.	759 111	759 121
Nominal voltage (U_N)	10 ... 12 kV	20 ... 24 kV
Colour	Black	Black
Length (test prod) (l_1)	415 mm	585 mm
Insertion depth (l_0)	330 mm	520 mm
Diameter	11 mm	11 mm

Long Test Prods

For type-tested, factory assembled switchgear installations with remotely situated series-connected contacts (e.g. Driescher D600)

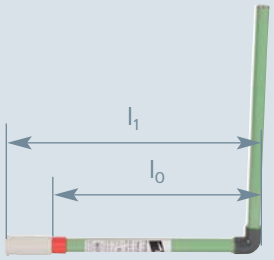


Note: Two tests prods are required for a test unit.

Type	PS 15 24 PHV L880
Part No.	759 621
Nominal voltage (U_N)	15 ... 24 kV
Colour	Grey
Length (test prod) (l_1)	880 mm
Insertion depth (l_0)	820 mm
Diameter	20 mm

90° angled Test Prods

For type-tested, factory assembled switchgear installations with limited access and contacts situated in a vertical plane (e.g. Alstom)



Note: Two tests prods are required for a test unit.

Type	PS 3 3.6 PHV W90	PS 5 7.2 PHV W90	PS 10 12 PHV W90	PS 15 24 PHV W90	PS 25 36 PHV W90
Part No.	759 604	759 608	759 611	759 622	759 633
Nominal voltage (U_N)	3 ... 3.6 kV	5 ... 7.2 kV	10 ... 12 kV	15 ... 24 kV	25 ... 36 kV
Colour	Grey	White	Yellow	Green	Grey
Length (test prod) (l_1)	359 mm	359 mm	359 mm	359 mm	359 mm
Insertion depth (l_0)	274 mm	274 mm	274 mm	274 mm	274 mm
Diameter	20 mm	20 mm	20 mm	20 mm	20 mm

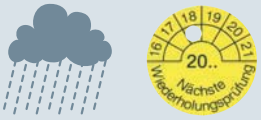
Single-pole PHV I Phase Comparator

Nominal voltages up to 36 kV / 50 Hz

Single-pole PHV I phase comparator used in a switchgear installation

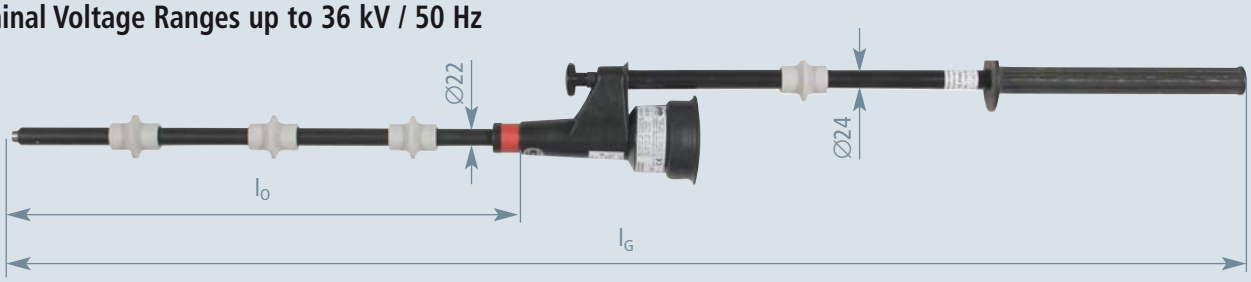
Safe testing

- Reliable indication



General Information:	
Standard	EN/IEC 61481 (DIN VDE 0682 Part 431)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Material (test prod)	Plastic
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Nominal Voltage Ranges up to 36 kV / 50 Hz



Type	PHV1 6 12	PHV1 12 24	PHV1 24 36
Part No.	759 606	759 612	759 624
Nominal voltage (U_N)	6 ... 12 kV	12 ... 24 kV	24 ... 36 kV
Total length (l_G)	1400 mm	1600 mm	1600 mm
Insertion depth (l_O)	575 mm	775 mm	775 mm

Nominal Voltage Ranges up to 36 kV / 50 Hz, switchable via Selector Ring

Type	PHV1 U 6 36
Part No.	759 616
Nominal voltage (U_N)	6 ... 12 / 12 ... 24 / 24 ... 36 kV
Total length (l_G)	1600 mm
Insertion depth (l_O)	775 mm

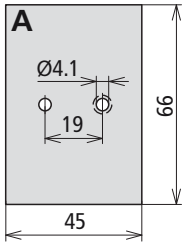
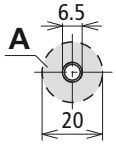
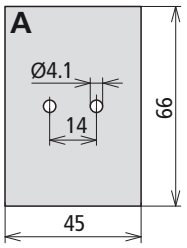
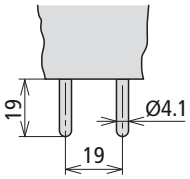
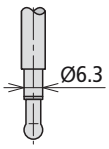
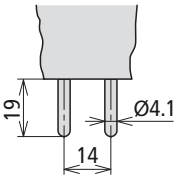
Accessory, kit parts and spare parts from page 195

Voltage Detecting Systems

Metal-encapsulated switchgear installations, typically SF6 gas-insulated, have become widely accepted in the field of switchgear construction.
In these types of installation, conventional voltage detectors can often not be used for verifying safe isolation from supply voltage in accordance with EN/IEC 61243-1 (DIN VDE 0682 Part 411).
For this reason, capacitive voltage detecting systems in accordance with IEC/EN 61243-5 (DIN VDE 0682 Part 415) have been developed for verifying safe isolation from supply voltage on all poles at the work location in accordance with EN 50110-1 (DIN VDE 0105 Part 100).

Only electrically skilled or instructed persons are allowed to verify safe isolation from supply voltage.

Electrical and mechanical interface requirements for separable HR, LR and LRM voltage detecting systems

System description		HR High resistance	LR low resistance	LRM low resistance, modified
Input impedance of the indicator	X_C	36 MΩ	2 MΩ	2 MΩ
Electrical response conditions of the interface	I	2.5 µA	2.5 µA	2.5 µA
Electrical response conditions of the interface	U	90 V	5 V	5 V
Socket arrangement and minimum spare area A for indicator or plug				
Plug arrangement				

Accessory, kit parts and spare parts from page 195

Voltage Detecting Systems

Device	Nominal voltage U_N / Frequency f_N	Application, Indication	Page	
DEHNcap/P Voltage Indicator	up to 45 kV / 50 Hz	Passive indicator without batteries LED indication Can also be used as permanent voltage indicator	40	
DEHNcap/P Test Unit	230 V / 50 Hz	For testing for correct operation Plugs into 230 V socket outlets For HR and LRM indicators	41	
DEHNcap/A Voltage Indicator	up to 45 kV / 50 Hz	Active voltage indicator Indication by two separate LEDs With self-testing element and battery monitoring device Automatic deactivation after use	42	
DEHNcap/IT Interface Test Unit	up to 45 kV / 50 Hz	Active indicator for maintenance tests Indication by two separate LEDs With self-testing element and battery monitoring device Automatic deactivation after use	43	
DEHNcap/PC-LRM Phase Comparator	up to 45 kV / 50 Hz	Active indicator for testing in-phase conditions Indication by three separate LEDs Can be used for HR test sockets with two HR-LRM test adapters Comparator detects zero crossings of the installations to be compared With battery monitoring device	44	
DEHNcap HR – LRM Test Set	up to 45 kV / 50 Hz	Fully equipped test set	45	
Storage Bags and Transport Cases		Sheet metal or plastic case Artificial leather or canvas bag	187	

Maintenance tests

According to German regulations (BGV A3), voltage detecting systems have to be tested to compliance with the prescribed limits as stated in the Electrical Safety Rules. This test is performed in the high voltage test laboratory of DEHN + SÖHNE and includes

- measurement of for leakage current,
- test for clear indication,
- test for protection against bridging,
- visual inspection, manual tests and measurements.

This maintenance test is documented in a test report and on the device.

The test intervals depend on the operating conditions of the voltage detecting systems, e.g. frequency of use, environmental conditions and transport. According to German regulations, however, it is advisable to carry out a maintenance test **at least** every **6 years**.

DEHNcap/P Voltage Indicator

Nominal voltages up to 45 kV / 50 Hz

DEHNcap/P passive voltage indicator used for an encapsulated switchgear installation

- **Easy verification of isolation from supply voltage**
- **Cost-effective**

General Information:	
Standard	EN/IEC 61243-5 (DIN VDE 0682 Part 415)
Temperature range	– 25 °C ... + 55 °C
Degree of protection	IP 66
Design	Passive indicator without batteries
Field of application	Can also be used as permanent voltage indicator

Test for correct operation

EN 50110-1 (DIN VDE 0105 Part 100) requires that voltage indicators are tested for correct operation shortly before and after use.
Passive indicators without self-testing element must be tested for correct operation by plugging them into test sockets connected to operating voltage or into a test unit (DEHNcap/P test unit).

DEHNcap/P – HR

Type	SAG DCA P HR
Part No.	767 101
Dimensions	40 x 48 x 35 mm
Plug spacing	19 mm
Indication threshold (HR system)	90 V
Input impedance (HR system)	36 Mohms

DEHNcap/P – LRM

Type	SAG DCA P LRM
Part No.	767 102
Dimensions	40 x 48 x 35 mm
Plug spacing	14 mm
Indication threshold (LRM system)	5 V
Input impedance (LRM system)	2 Mohms

Accessory, kit parts and spare parts from page 195

DEHNcap/P Test Unit

Nominal voltages up to 230 V / 50 Hz

- **Test unit for testing DEHNcap/P voltage indicators for correct operation**
- **Plugs into 230 V socket outlets**

Test unit for testing a DEHNcap/P passive voltage indicator plugged into a 230 V socket outlet for correct operation

Test unit for testing DEHNcap/P voltage indicators or other HR (HO) or LRM indicators for correct operation. Both HR and LRM devices can be used for testing.
The test unit is plugged into the mains socket outlet and generates both test voltages for HR and LRM systems.

General Information:	
Temperature range	– 25 °C ... + 55 °C
Field of application	For HR and LRM indicators

Nominal voltages up to 230 V / 50 Hz

Type	TG DCA
Part No.	767 110
Dimensions	43 x 75 x 35 mm
Test voltage (HR system)	90 V a.c.
Socket spacing (HR system)	19 mm
Test voltage (LRM system)	5 V a.c.
Socket spacing (LRM system)	14 mm
Nominal capacity	500 mW
Max. short-circuit current at the test socket	approximately 20 µA

DEHNcap/A Voltage Indicator

Nominal voltages up to 45 kV / 50 Hz

Self-test of a DEHNcap/A voltage indicator

Safe verification of isolation from supply voltage

- User-friendly
- Easy to use

General Information:	
Standard	EN/IEC 61243-5 (DIN VDE 0682 Part 415)
Temperature range	– 25 °C ... + 55 °C
Field of application	Active voltage indicator for testing
Self-testing element and battery monitoring	Yes

Self-testing element
DEHNcap/A electronic voltage indicators have an integrated self-testing element. By simply pressing the test button, the electronic circuit is tested for correct operation. The self-test is automatically performed as soon as the indicator is switched on. The voltage indicator is only operational if the test button is pressed, i.e. the function test was performed successfully.

DEHNcap/A – HR

Type	SAG DCA A HR
Part No.	767 111
Dimensions	120 x 60 x 25 mm
Plug spacing	19 mm
Type of plug	2 multilam plugs (∅4 mm)
Indication threshold (HR system)	90 V
Input impedance (HR system)	36 Mohms

DEHNcap/A – LRM

Type	SAG DCA A LRM
Part No.	767 112
Dimensions	120 x 60 x 25 mm
Plug spacing	14 mm
Type of plug	2 multilam plugs (∅4 mm)
Indication threshold (LRM system)	5 V
Input impedance (LRM system)	2 Mohms

Accessory, kit parts and spare parts from page 195

DEHNcap/IT Interface Test Unit

Nominal voltages up to 45 kV / 50 Hz

Easy and safe testing

DEHNcap/IT interface test unit allows to carry out maintenance tests on coupling systems of switchgear installations according to IEC/EN 61243-5 (DIN VDE 0682 Part 415).

Self-testing element

The DEHNcap/IT interface test unit has an integrated self-testing element. By simply pressing the test button, the electronic circuit is tested for correct operation. The self-test is automatically performed as soon as the indicator is switched on. The interface test unit is only operational if the test button is pressed i.e. the function test was performed successfully.

General Information:	
Standard	EN/IEC 61243-5 (DIN VDE 0682 Part 415)
Temperature range	– 25 °C ... + 55 °C
Field of application	Active indicator for maintenance test of coupling systems
Self-testing element and battery monitoring	Yes

DEHNcap/IT – HR

Type	SPG DCA IT HR
Part No.	767 121
Dimensions	120 x 60 x 25 mm
Plug spacing	19 mm
Type of plug	2 multilam plugs (∅4 mm)
Input impedance (HR system)	36 Mohms
Test threshold	3.2 µA

DEHNcap/IT – LRM

Type	SPG DCA IT LRM
Part No.	767 122
Dimensions	120 x 60 x 25 mm
Plug spacing	14 mm
Type of plug	2 multilam plugs (∅4 mm)
Input impedance (LRM system)	2 Mohms
Test threshold	3.2 µA

DEHNcap/PC-LRM Phase Comparator

Nominal voltages up to 45 kV / 50 Hz

DEHNcap/PC-LRM phase comparator with two HR-LRM test adapters used for an HR switchgear installation

Easy and safe testing

- User-friendly
- Easy to use

General Information:	
Standard	EN/IEC 61243-5 (DIN VDE 0682 Part 415)
Temperature range	– 25 °C ... + 55 °C
Design	Active indicator for verifying in-phase conditions on LRM test sockets
Field of application	For HR test sockets with two HR-LRM test adapters
Self-testing element and battery monitoring	Yes

By attaching two optional HR-LRM adapters (Part No. 767 133), the DEHNcap/PC-LRM phase comparator can also be used for phase comparison in HR systems. DEHNcap/PC-LRM is designed as a universal phase comparator in accordance with EN/IEC 61243-5 (DIN VDE 0682 Part 415) and detects zero crossings, but no voltage values.

DEHNcap/PC – LRM

Type	PV DCA PC LRM
Part No.	767 132
Dimensions	145 x 85 x 32 mm
Measuring cables	3 measuring cables with multilam plug (∅4 mm)
Length (measuring cable)	2000 mm
Indication threshold (LRM system)	5 V
Input impedance (LRM system)	2 Mohms

DEHNcap/PC – LRM Phase Comparator Kit

Phase comparator in an artificial leather bag, Part No. 767 500

Type	PV DCA PC LRM T
Part No.	767 139
Dimensions	145 x 85 x 32 mm
Measuring cables	3 measuring cables with multilam plug (∅4 mm)
Length (measuring cable)	2000 mm
Indication threshold (LRM system)	5 V
Input impedance (LRM system)	2 Mohms

Accessory, kit parts and spare parts from page 195

DEHNcap HR – LRM Test Set

Nominal voltages up to 45 kV / 50 Hz

Easy and safe testing

- Complete test set for universal use
- Easy to use

Set in a plastic case for verifying safe isolation from supply voltage and in-phase conditions in HR and LRM systems

General Information:	
Standard	EN/IEC 61243-5 (DIN VDE 0682 Part 415)
Temperature range	– 25 °C ... + 55 °C

Nominal voltages up to 45 kV / 50 Hz

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	1x 767 112	4	2x 767 133
2	1x 767 122	5	1x 767 107
3	1x 767 132		
For more detailed information on these products, see Accessory chapter			

Set in a plastic case for verifying safe isolation from supply voltage and in-phase conditions in HR and LRM systems

Type	PS DCA HR LRM
Part No.	767 150
Dimensions	395 x 295 x 105 mm

DEHNcap Test Adapter /Measuring Impedance

The HR-LRM test adapter allows to plug an LRM indicator into a HR test socket

- Easy and safe testing
- Easy mechanical and electrical adaptation to HR, LR or XC test sockets
- Measuring impedance for maintenance tests on coupling systems with suitable µA meter
- 4 mm safety plugs or sockets
- Energised HR plug, insulated

General Information:	
Standard	EN/IEC 61243-5 (DIN VDE 0682 Part 415)
Temperature range	– 25 °C ... + 55 °C

HR-LRM Test Adapter

For electrical and mechanical adaptation of HR (HO) to LRM systems. Used as a measuring impedance with X_C = 36 Mohms for maintenance tests on HR coupling systems (with suitable µA meter).

Type	MA DCA HR LRM
Part No.	767 133
Dimensions	90 x 50 x 30 mm
Plug spacing	19 mm
Socket spacing	14 mm
Type of plug	2 multilam plugs (∅4 mm)
Type of test socket	2 sockets (∅4 mm)

LR-LRM Test Adapter

For mechanical adaptation of LR (NO) to LRM systems

Type	MA DCA LR LRM
Part No.	767 136
Dimensions	100 x 50 x 30 mm
Plug spacing	jack, 6.3 mm
Socket spacing	14 mm
Type of plug	1 jack
Type of test socket	2 sockets (∅4 mm)

XC-LRM Measuring Impedance

Used as a measuring impedance with X_C = 2 Mohms for maintenance tests on LRM coupling systems (with suitable µA meter).

Type	MA DCA XC LRM
Part No.	767 135
Dimensions	90 x 50 x 30 mm
Plug spacing	14 mm
Socket spacing	16 mm
Type of plug	2 multilam plugs (∅4 mm)
Type of test socket	2 sockets (∅4 mm)

Operating Sticks

Device	Nominal Voltage U_N / Frequency f_N	Application	Page
IS STK Insulating Stick Kit	up to 36 kV / 50 Hz	Suitable for use in wet weather conditions For use in indoor and outdoor installations Plug-in coupling protected against twisting and bridging Easy transport due to detachable sticks Kits for a variety of applications For use as switching stick, earthing stick or operating stick	48 50
IS Insulating Sticks	up to 123 kV / 50 Hz	For use in wet weather conditions For use in indoor and outdoor installations Attachable switching stick head allows for use as switching stick Supporting head for hexagon shaft or T pin shaft For use as earthing stick For use as operating stick for insulating protective shutters	52 54
SCS Switching Sticks	up to 123 kV / 50 Hz	For use in wet weather conditions For indoor and outdoor installations Fully insulated, massive switching stick head Allows deep access into the installation For use as operating stick for insulating protective shutters	56 57
SZ Fuse Tongs	up to 36 kV	Not suitable for use in wet weather conditions Operating head with two adjustable jaws Straight or 20° angled operating head Secure clamping Wide clamping range ∅30 ... 90 mm	58
RST Rescue Rods	up to 36 kV / 50 Hz	Not suitable for use in wet weather conditions For use in indoor and outdoor installations Fully insulated and fixed rescue hook For rescuing persons weighing up to approximately 100 kg from the live working zone in the event of an electrical accident	60
Storage Bags and Transport Cases		Sheet metal or plastic case Artificial leather or canvas bag	187

Maintenance tests

According to German regulations (BGV A3), operating sticks have to be tested for compliance with the prescribed limits as stated in the Electrical Safety Rules. This test is performed in the high voltage test laboratory of DEHN + SÖHNE and includes

- measurement of the leakage current,
- test for protection against bridging,
- visual inspection, manual tests and measurements.

This maintenance test is documented in a test report and on the device.

Prior to each use, operating sticks must be visually inspected for signs of damage or any other defect.

IS STK Insulating Stick Kit with Silicon Rubber Insulator

Nominal voltages up to 36 kV / 50 Hz

IS STK insulating stick fitted with STK switching stick head used as switching stick

Easy and safe working

- Cost-effective due to universal use
- Space-saving transport

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 164	6	766 468
2	766 365	7	766 456
3	766 465	8	766 466
4	766 356	9	766 996
5	766 367		

For more detailed information on these products, see Accessory chapter

General Information:	
Standard (switching stick head)	DIN VDE 0681 Part 2
Standard (insulating stick)	EN/IEC 61243-1 (DIN VDE 0682 Part 411) test for protection against bridging (section 6.3.2) after wet test and leakage current measurement (section 7.1.2)
Standard (switching stick)	DIN VDE 0681 Part 1 and 2
Standard (operating stick)	DIN VDE 0682 Part 552
Standard (earthing stick)	Based on EN/IEC 61230 (DIN VDE 0683 Part 100)
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations

The artificial leather bag with reinforced back panel allows for safe transport and easy storage of the single components.

Dirt-repellent end fittings with plug-in coupling

Anti-rotation plastic plug-in coupling used as insulating stick extension (yellow coupling)

Accessory for IS STK Insulating Stick Kit

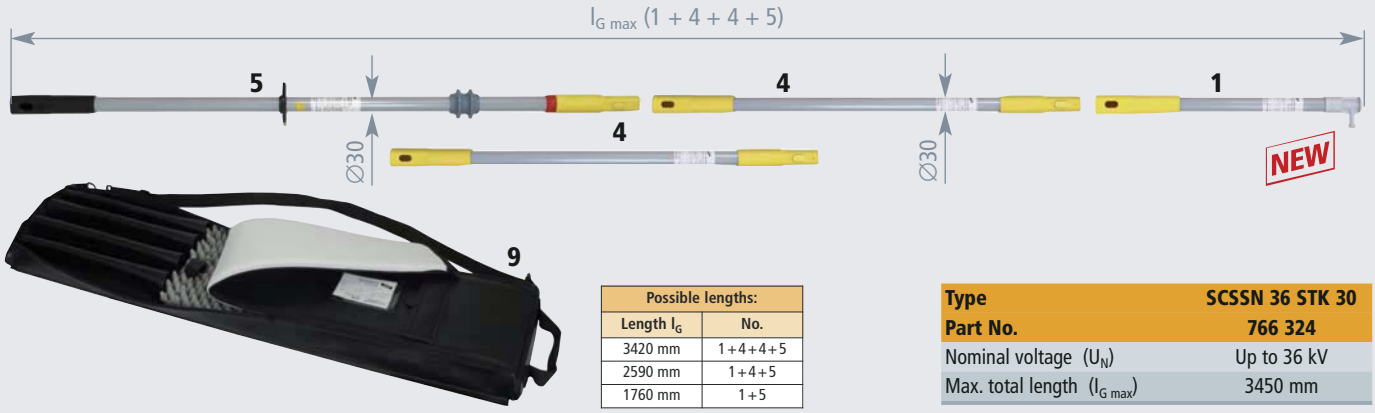
Operating Head with plug-in Coupling / hexagon Shaft

For indoor use

Type	AK 36 SK STK 330
Part No.	766 364
Diameter	30 mm
Total length (l_G)	330 mm
Material	Plastic
Colour	Yellow

Accessory, kit parts and spare parts from page 195

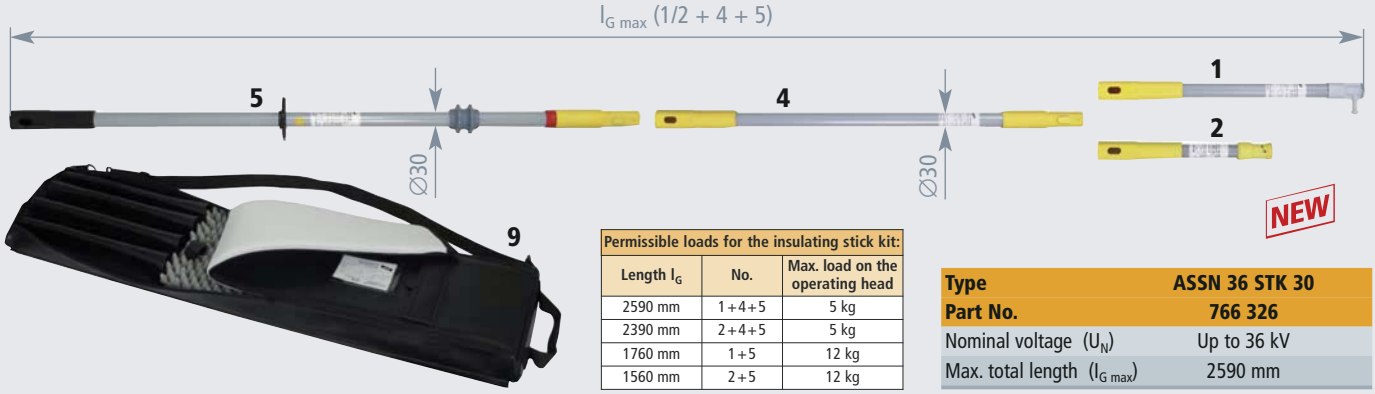
Switching Stick Kit (Ø30 mm)



Possible lengths:	
Length l_G	No.
3420 mm	1+4+4+5
2590 mm	1+4+5
1760 mm	1+5

Type	SCSSN 36 STK 30
Part No.	766 324
Nominal voltage (U_N)	Up to 36 kV
Max. total length ($l_{G\ max}$)	3450 mm

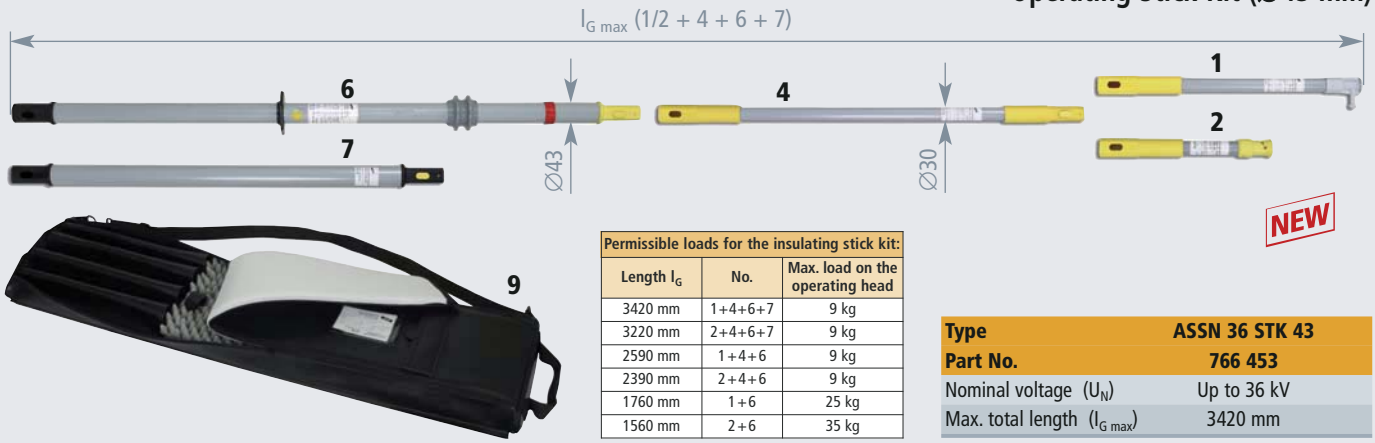
Operating Stick Kit (Ø30 mm)



Permissible loads for the insulating stick kit:		
Length l_G	No.	Max. load on the operating head
2590 mm	1+4+5	5 kg
2390 mm	2+4+5	5 kg
1760 mm	1+5	12 kg
1560 mm	2+5	12 kg

Type	ASSN 36 STK 30
Part No.	766 326
Nominal voltage (U_N)	Up to 36 kV
Max. total length ($l_{G\ max}$)	2590 mm

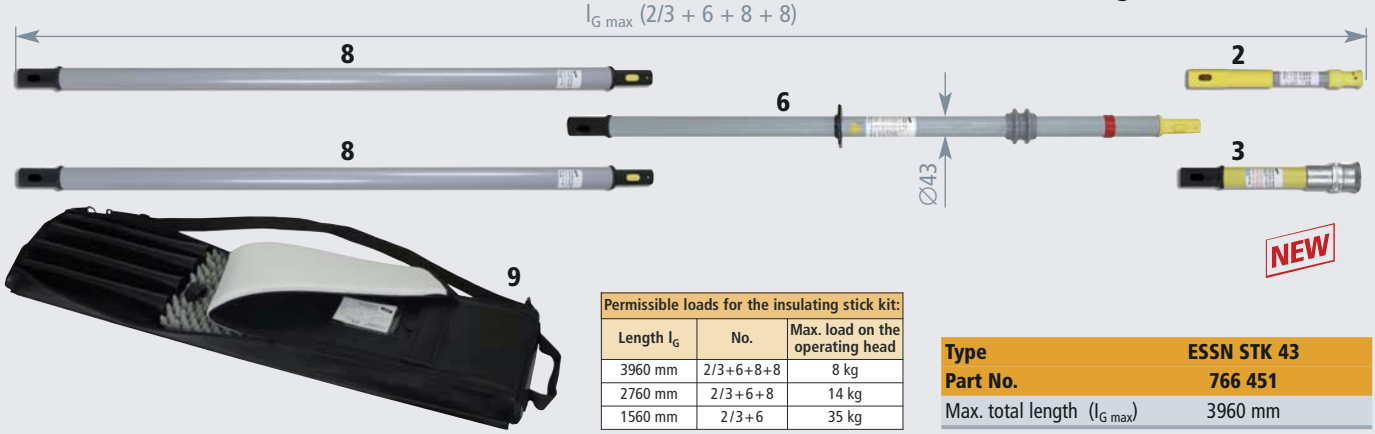
Operating Stick Kit (Ø43 mm)



Permissible loads for the insulating stick kit:		
Length l_G	No.	Max. load on the operating head
3420 mm	1+4+6+7	9 kg
3220 mm	2+4+6+7	9 kg
2590 mm	1+4+6	9 kg
2390 mm	2+4+6	9 kg
1760 mm	1+6	25 kg
1560 mm	2+6	35 kg

Type	ASSN 36 STK 43
Part No.	766 453
Nominal voltage (U_N)	Up to 36 kV
Max. total length ($l_{G\ max}$)	3420 mm

Earthing Stick Kit (Ø43 mm)



Permissible loads for the insulating stick kit:		
Length l_G	No.	Max. load on the operating head
3960 mm	2/3+6+8+8	8 kg
2760 mm	2/3+6+8	14 kg
1560 mm	2/3+6	35 kg

Type	ESSN STK 43
Part No.	766 451
Max. total length ($l_{G\ max}$)	3960 mm

IS STK Insulating Stick Kit

Nominal voltages up to 36 kV / 50 Hz

IS STK insulating stick fitted with STK switching stick head used as switching stick

- Easy and safe working
- Cost-effective due to universal use
- Space-saving transport

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 164	6	766 463
2	766 365	7	766 456
3	766 465	8	766 466
4	766 356	9	766 996
5	766 363		
For more detailed information on these products, see Accessory chapter			

General Information:	
Standard (switching stick head)	DIN VDE 0681 Part 2
Standard (insulating stick)	DIN VDE 0681 Part 1
Standard (switching stick)	DIN VDE 0681 Part 1 and 2
Standard (operating stick)	DIN VDE 0682 Part 552
Standard (earthing stick)	Based on EN/IEC 61230 (DIN VDE 0683 Part 100)
Use	Not suitable for use in wet weather conditions
For	Indoor and outdoor installations

Anti-rotation plastic plug-in coupling used as insulating stick extension (yellow coupling)

The artificial leather bag with reinforced back panel allows for safe transport and easy storage of the single components.

Dirt-repellent end fittings with plug-in coupling

Accessory for IS STK Insulating Stick Kit

Operating Head with plug-in Coupling / hexagon Shaft

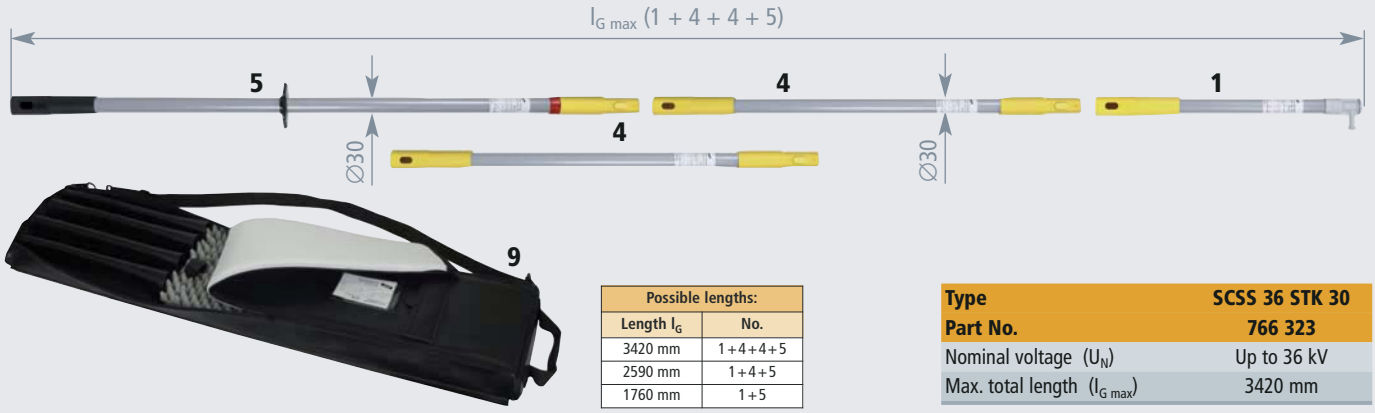
For indoor use

Type	AK 36 SK STK 330
Part No.	766 364
Diameter	30 mm
Total length (l_G)	330 mm
Material	Plastic
Colour	Yellow

Accessory, kit parts and spare parts from page 195

IS STK Insulating Stick Kit

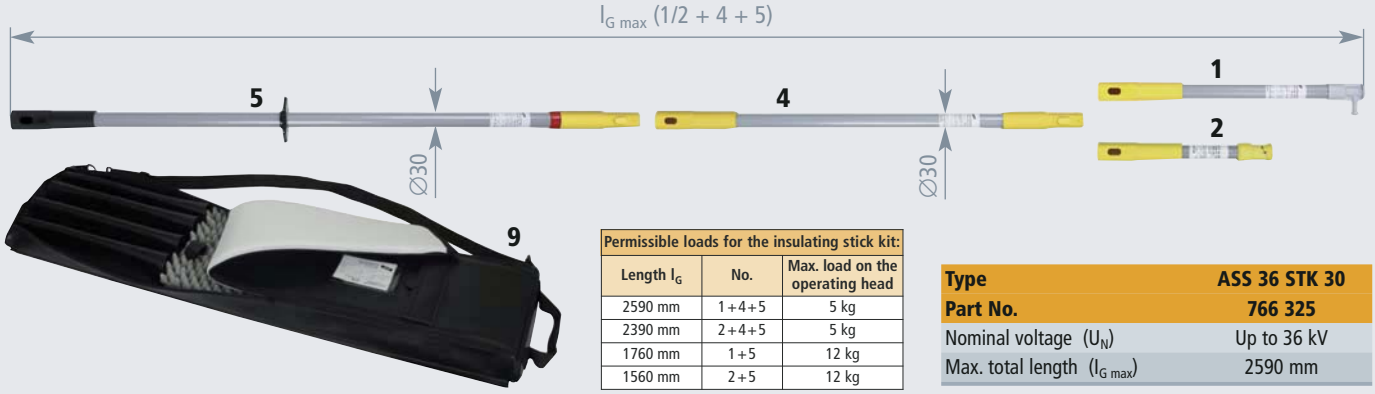
Switching Stick Kit (Ø30 mm)



Possible lengths:	
Length l_G	No.
3420 mm	1+4+4+5
2590 mm	1+4+5
1760 mm	1+5

Type	SCSS 36 STK 30
Part No.	766 323
Nominal voltage (U_N)	Up to 36 kV
Max. total length ($l_{G\,max}$)	3420 mm

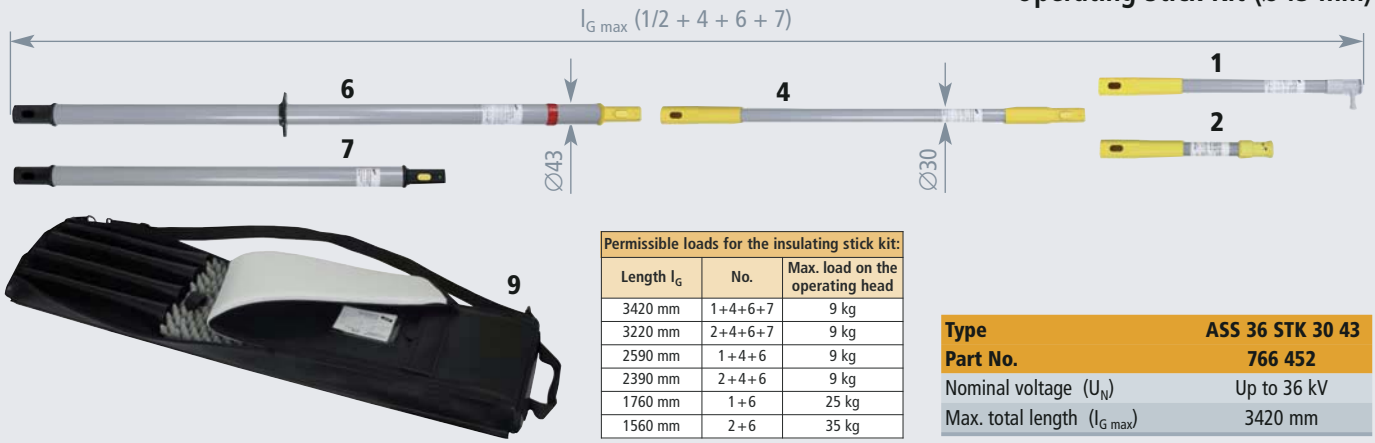
Operating Stick Kit (Ø30 mm)



Permissible loads for the insulating stick kit:		
Length l_G	No.	Max. load on the operating head
2590 mm	1+4+5	5 kg
2390 mm	2+4+5	5 kg
1760 mm	1+5	12 kg
1560 mm	2+5	12 kg

Type	ASS 36 STK 30
Part No.	766 325
Nominal voltage (U_N)	Up to 36 kV
Max. total length ($l_{G\,max}$)	2590 mm

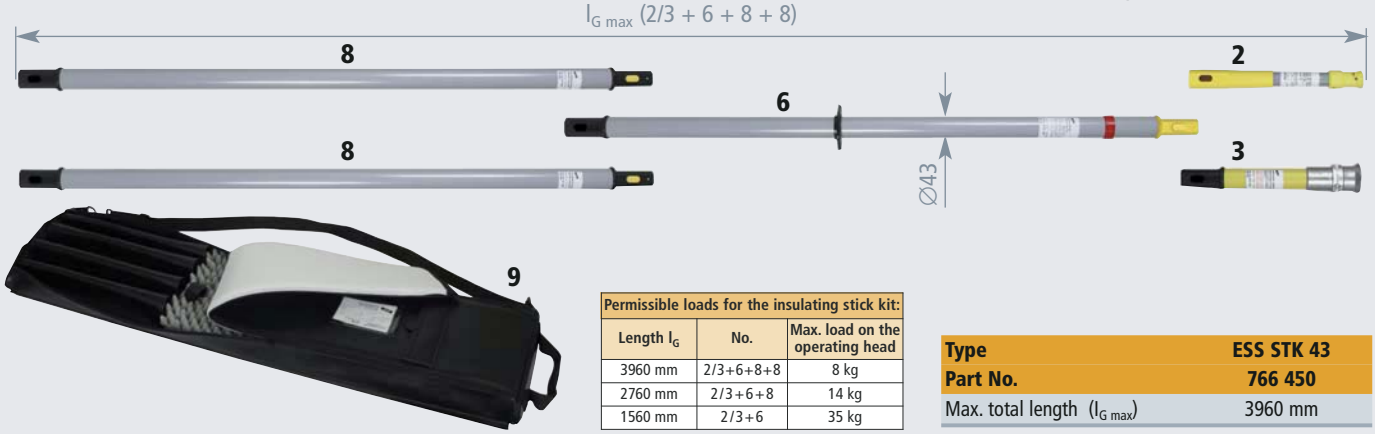
Operating Stick Kit (Ø43 mm)



Permissible loads for the insulating stick kit:		
Length l_G	No.	Max. load on the operating head
3420 mm	1+4+6+7	9 kg
3220 mm	2+4+6+7	9 kg
2590 mm	1+4+6	9 kg
2390 mm	2+4+6	9 kg
1760 mm	1+6	25 kg
1560 mm	2+6	35 kg

Type	ASS 36 STK 30 43
Part No.	766 452
Nominal voltage (U_N)	Up to 36 kV
Max. total length ($l_{G\,max}$)	3420 mm

Earthing Stick Kit (Ø43 mm)



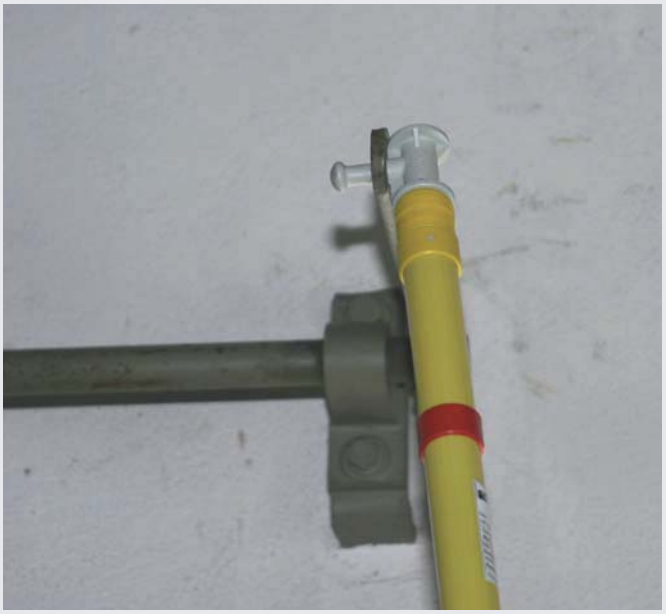
Permissible loads for the insulating stick kit:		
Length l_G	No.	Max. load on the operating head
3960 mm	2/3+6+8+8	8 kg
2760 mm	2/3+6+8	14 kg
1560 mm	2/3+6	35 kg

Type	ESS STK 43
Part No.	766 450
Max. total length ($l_{G\,max}$)	3960 mm

Accessory, kit parts and spare parts from page 195

IS Insulating Sticks with Silicon Rubber Insulator

Nominal voltages up to 123 kV / 50 Hz



Switching stick head screwed on an IS SK insulating stick for switching a switch disconnector

General Information:	
Standard (switching stick head)	DIN VDE 0681 Part 2
Standard (insulating stick)	EN/IEC 61243-1 (DIN VDE 0682 Part 411) test for protection against bridging (section 6.3.2) after wet test and leakage current measurement (section 7.1.2)
Standard (operating stick)	DIN VDE 0682 Part 552
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Material	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap / plug-in coupling for extending the handle

ISN SK insulating stick used for clamps with hexagon shaft of earthing and short-circuiting devices

Easy and safe working

- **Cost-effective since the installation of different supporting heads allows universal use**
- **Easy to use**

SSK M12 switching stick head screwed on ISN SK insulating stick

ISN SQ insulating stick fitted with SSK SQ switching stick head. The insulating stick can be additionally locked by means of the black knurled nut.

The handle of ISN STK insulating sticks can be easily extended via the plug-in coupling

Accessory for IS Insulating Sticks, rain-proof

Screw-on Switching Stick Head for IS SK Insulating Sticks

With M12 thread

In accordance with DIN VDE 0681 Part 2

Type	SSK M12
Part No.	765 005
Material	Steel, plastic-sheathed

Switching Stick Head for IS SQ Insulating Sticks

With T pin shaft (bayonet locking mechanism)

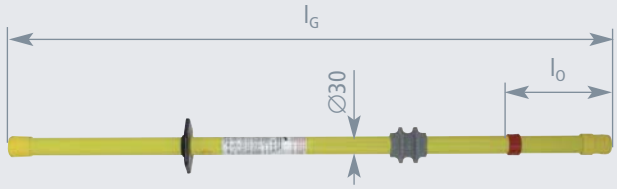
In accordance with DIN VDE 0681 Part 2

T pin shaft in accordance with DIN 48087

Switching stick head is fixed on the insulating stick via the knurled nut

Type	SSK SQ
Part No.	765 009
Material	Polyamide

Insulating stick, hexagon Shaft



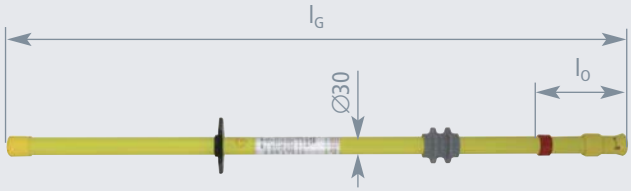
With M12 thread and spring locking mechanism

- Can be used as switching stick by attaching a switching stick head (Part No. 765 005)
- Can be used as earthing stick

NEW

Type	ISN 36 SK 1000	ISN 36 SK 1500
Part No.	766 210	766 215
Nominal voltage (U_N)	36 kV	36 kV
Total length (l_G)	1000 mm	1500 mm
Insertion depth (l_O)	175 mm	475 mm

Insulating stick, T Pin Shaft



Bayonet locking mechanism

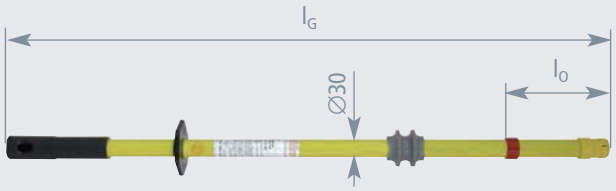
- Can be used as switching stick by a attaching switching stick head (Part No. 765 009)
- Can be used as earthing stick
- Can be used as operating stick for inserting insulating protective shutters

NEW

Type	ISN 36 SQ 1000	ISN 36 SQ 1500
Part No.	766 211	766 216
Nominal voltage (U_N)	36 kV	36 kV
Max. load on the operating head	17*) kg	17*) kg
Total length (l_G)	1028 mm	1528 mm
Insertion depth (l_O)	150 mm	500 mm

*) Max. Shutter weight when used for inserting insulating protective shutters

Insulating stick, hexagon Shaft, plug-in Coupling



With M12 thread, spring locking mechanism and plug-in coupling for extending the handle

- For use as switching stick with a switching stick head (Part No. 765 005)
- For use as earthing stick

NEW

Type	ISN 36 SK STK 1000
Part No.	766 111
Nominal voltage (U_N)	36 kV
Total length (l_G)	1000 mm
Insertion depth (l_O)	175 mm

Insulating stick, T Pin Shaft, plug-in Coupling

Bayonet locking mechanism and plug-in coupling for extending the handle

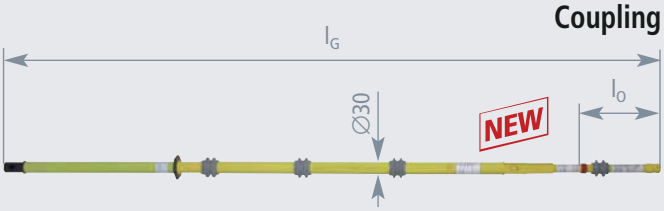
- Can be used as switching stick by attaching a switching stick head (Part No. 765 009)
- Can be used as earthing stick
- Can be used as operating stick for inserting insulating protective shutters

NEW

Type	ISN 36 SQ STK 1000
Part No.	766 310
Nominal voltage (U_N)	36 kV
Max. load on the operating head	17*) kg
Total length (l_G)	1025 mm
Insertion depth (l_O)	150 mm

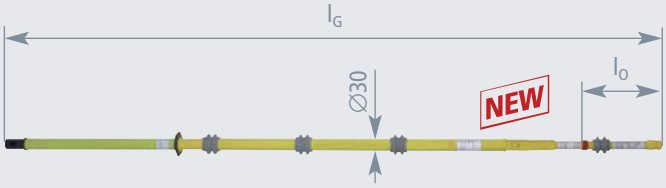
*) Max. Shutter weight when used for inserting insulating protective shutters

Modular Insulating stick, hexagon Shaft, plug-in Coupling



Type	ISN 123 SK STK 2500
Part No.	766 222
Nominal voltage (U_N)	123 kV
Total length (l_G)	2500 mm
Insertion depth (l_O)	287 mm

Modular Insulating stick, T Pin Shaft, plug-in Coupling



Type	ISN 123 SQ STK 2500
Part No.	766 332
Nominal voltage (U_N)	123 kV
Total length (l_G)	2500 mm
Insertion depth (l_O)	287 mm

Accessory, kit parts and spare parts from page 195

IS Insulating Sticks

Nominal voltages up to 123 kV / 50 Hz

Switching a disconnector by means of an IS SK insulating stick fitted with switching stick head

General Information:	
Standard (switching stick head)	DIN VDE 0681 Part 2
Standard (insulating stick)	DIN VDE 0681 Part 1
Standard (operating stick)	DIN VDE 0682 Part 552
Use	Not suitable for use in wet weather conditions
For	Indoor and outdoor switchgear installations
Material	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap / plug-in coupling for handle extension

IS SK insulating stick used for clamps with hexagon shaft of earthing and short-circuiting devices

Easy and safe working

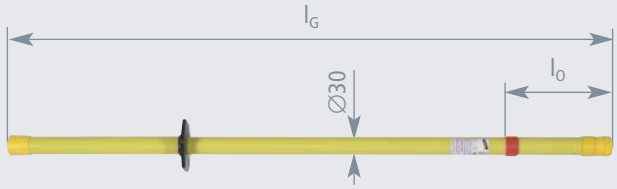
- **Cost-effective since the installation of different supporting heads allows universal use**
- **Easy to use**

IS SK insulating stick fitted with SSK M12 switching stick head

IS SQ insulating stick fitted with SSK SQ switching stick head. The black knurled nut is locked into position using the insulating stick.

The handle of IS STK insulating sticks can be easily extended via the plug-in coupling.

Insulating stick, hexagon Shaft

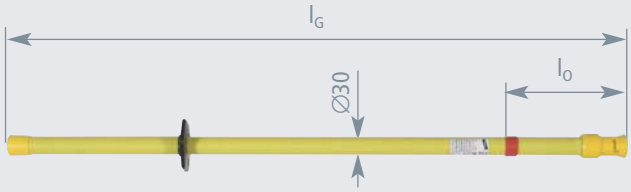


With M12 thread and spring locking mechanism

- Can be used as switching stick by attaching a switching stick head (Part No. 765 005)
- Can be used as earthing stick

Type	IS 36 SK 1000	IS 36 SK 1500
Part No.	766 001	766 002
Nominal voltage (U_N)	36 kV	36 kV
Total length (l_G)	1000 mm	1500 mm
Insertion depth (l_O)	175 mm	475 mm

Insulating stick, T Pin Shaft



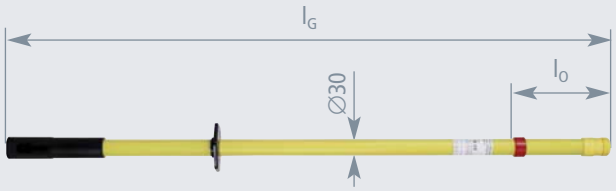
Bayonet locking mechanism

- Can be used as switching stick by attaching a switching stick head (Part No. 765 009)
- Can be used as earthing stick
- Can be used as operating stick for inserting insulating protective shutters

Type	IS 36 SQ 1000	IS 36 SQ 1500
Part No.	766 311	766 315
Nominal voltage (U_N)	36 kV	36 kV
Max. load on the operating head *)	17 kg	17 kg
Total length (l_G)	1028 mm	1528 mm
Insertion depth (l_O)	150 mm	500 mm

*) Max. shutter weight when inserting insulating protective shutters

Insulating stick, hexagon Shaft, plug-in Coupling

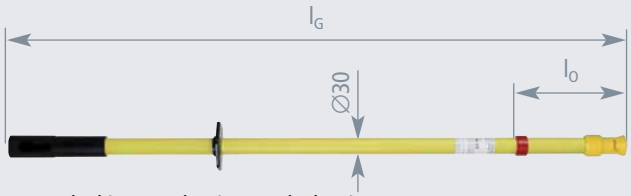


With M12 thread, spring locking mechanism and plug-in coupling for handle extension

- Can be used as switching stick by attaching a switching stick head (Part No. 765 005)
- Can be used as earthing stick

Type	IS 36 SK STK 1000	IS 123 SK STK 2000
Part No.	766 100	766 122
Nominal voltage (U_N)	36 kV	123 kV
Total length (l_G)	1000 mm	2000 mm
Insertion depth (l_O)	175 mm	200 mm

Insulating stick, T Pin Shaft, plug-in Coupling



Bayonet locking mechanism and plug-in coupling for extending the handle

- Can be used as switching stick by attaching a switching stick head (Part No. 765 009)
- Can be used as earthing stick
- Can be used as operating stick for inserting insulating protective shutters

Type	IS 36 SQ STK 1000	IS 123 SQ STK 2000
Part No.	766 301	766 322
Nominal voltage (U_N)	36 kV	123 kV
Max. load on the operating head *)	17 kg	8 kg
Total length (l_G)	1025 mm	2000 mm
Insertion depth (l_O)	150 mm	200 mm

*) Max. shutter weight if used for inserting insulating protective shutters

Accessory for IS Insulating Sticks

Screw-on Switching Stick Head for IS SK Insulating Sticks

With M12 thread

In accordance with DIN VDE 0681 Part 2

Type	SSK M12
Part No.	765 005
Material	Steel, plastic-sheathed

Accessory for IS Insulating Sticks

Switching Stick Head for IS SQ Insulating Sticks

With T pin shaft (bayonet locking mechanism)

In accordance with DIN VDE 0681 Part 2

T pin shaft in accordance with DIN 48087

Switching stick head is fixed on the insulating stick via the knurled nut

Type	SSK SQ
Part No.	765 009
Material	Polyamide

Accessory, kit parts and spare parts from page 195

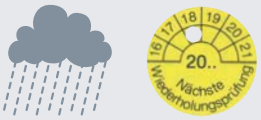
SCS Switching Sticks with Silicon Rubber Insulator

Nominal voltages up to 123 kV / 50 Hz

Switching a disconnector by means of an SCS switching stick

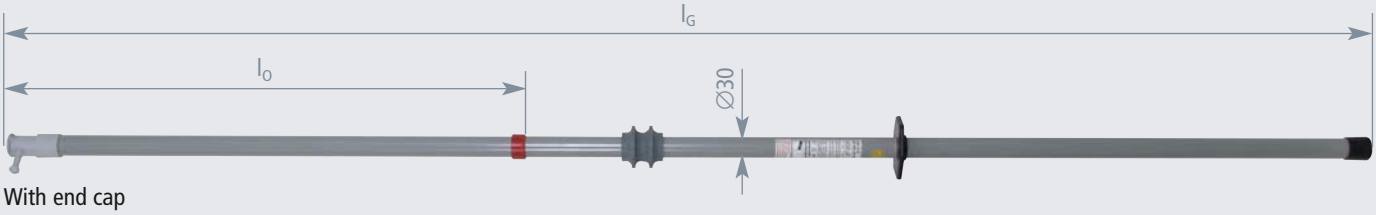
Easy and safe working

- Cost-effective
- Easy to use



General Information:	
Standard (switching stick head)	DIN VDE 0681 Part 2
Standard (switching stick)	DIN VDE 0681 Part 1 and Part 2
Standard (insulating stick)	EN/IEC 61243-1 (DIN VDE 0682 Part 411) test for protection against bridging (section 6.3.2) after wet test and leakage current measurement (section 7.1.2)
Standard (operating stick)	DIN VDE 0682 Part 552
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Design	Fully insualted, massive switching stick head
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (switching pin)	Steel, sheathed overall in plastic
End fitting	Non-slip plastic cap / plug-in coupling for extending the handle

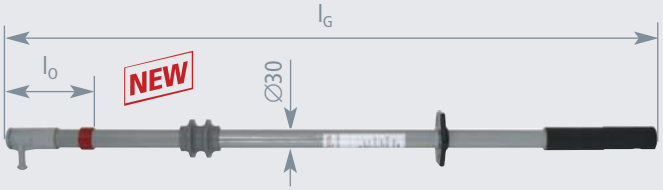
Nominal Voltages up to 36 kV



With end cap

Type	SCSN 36 1000	SCSN 36 1500	SCSN 36 2000
Part No.	763 510	763 511	763 512
Nominal voltage (U_N)	36 kV	36 kV	36 kV
Max. shutter weight	17 kg	17 kg	9 kg
Total length (l_G)	1030 mm	1500 mm	2000 mm
Insertion depth (l_O)	135 mm	415 mm	765 mm

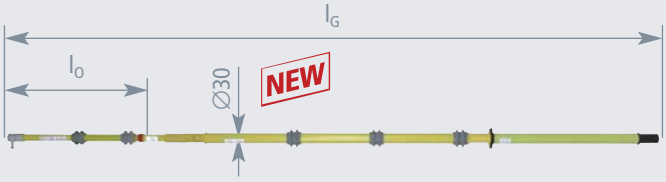
Nominal Voltages up to 36 kV, plug-in Coupling



Handle termination with plastic plug-in coupling for extending the handle

Type	SCSN 36 STK 1000
Part No.	763 111
Nominal voltage (U_N)	36 kV
Max. shutter weight	17 kg
Total length (l_G)	1000 mm
Insertion depth (l_O)	135 mm

Nominal Voltages up to 123 kV, modular



Handle termination with plastic plug-in coupling for extending the handle

Type	SCSN 123 STK 2800
Part No.	763 181
Nominal voltage (U_N)	123 kV
Total length (l_G)	2800 mm
Insertion depth (l_O)	637 mm

Accessory, kit parts and spare parts from page 195

Nominal voltages up to 123 kV / 50 Hz

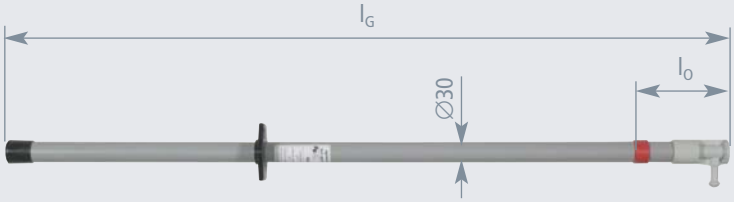
Easy and safe working
- Cost-effective
- User-friendly

General Information:	
Standard (switching stick head)	DIN VDE 0681 Part 2
Standard (switching stick)	DIN VDE 0681 Part 1 and Part 2
Standard (insulating stick)	DIN VDE 0681 Part 1
Standard (operating stick)	DIN VDE 0682 Part 552
Use	Not suitable for use in wet weather conditions
For	For indoor and outdoor switchgear installations
Design	Fully insulated, massive switching stick head
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (switching pin)	Steel, sheathed overall in plastic
End fitting	Non-slip plastic cap / plug-in coupling for extending the handle

Switching a disconnector by means of an SCS switching stick

Nominal Voltages up to 72.5 kV

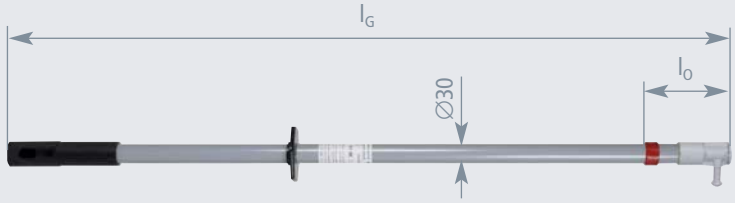
With end cap



Type	SCS 36 1000	SCS 36 1500	SCS 36 2000	SCS 72 1500	SCS 72 2000
Part No.	763 610	763 611	763 612	763 615	763 620
Nominal voltage (U_N)	36 kV	36 kV	36 kV	72.5 kV	72.5 kV
Max. shutter weight	17 kg	17 kg	9 kg	—	—
Total length (l_G)	1030 mm	1500 mm	2000 mm	1500 mm	2000 mm
Insertion depth (l_O)	135 mm	415 mm	765 mm	290 mm	690 mm

Nominal Voltages up to 123 kV

Handle termination with plastic plug-in coupling for extending the handle



Type	SCS 36 STK 1000	SCS 72 STK 1500	SCS 123 STK 2000
Part No.	763 100	763 150	763 180
Nominal voltage (U_N)	36 kV	72.5 kV	123 kV
Max. shutter weight	17 kg	—	—
Total length (l_G)	1000 mm	1500 mm	2000 mm
Insertion depth (l_O)	135 mm	290 mm	200 mm

Other lengths are available on request.

SZ Fuse Tongs

Nominal voltages up to 36 kV

SZ fuse tongs for inserting and removing HH fuses

Easy and safe working

- User-friendly

General Information:	
Standard	DIN VDE 0681 Part 3
Use	Not suitable for use in wet weather conditions
Design	Straight and 20° angled operating head
Clamping range	Wide clamping range ∅30 ... 90 mm
Material (insulating stick)	Glass-fibre reinforced polyester tube
Material (operating head)	Glass-fibre reinforced polyamide
Material (adjustable handle)	Polyamide
Material (reducing insert)	Polyamide
Colour	Grey

A fuse tong is an operating stick used for working on live parts of an installation with voltages exceeding 1 kV a.c. The operating head is used to remove and insert high-voltage high-breaking-capacity fuses (HH fuses). The clamping jaws are opened and closed by simply turning the adjustable handle.

In practice, the 20° angled operating head allows safe and easy actuation of HH fuses that are not easily accessible.

The reducing insert allows low clamping ranges from ∅30 to 50 mm.
Without reducing insert, HH fuses from ∅50 to 90 mm can be actuated.

Accessory, kit parts and spare parts from page 195

SZ Fuse Tongs

Straight SZ Fuse Tong

Type	SZ HH 1060	SZ HH 1250	SZ HH 1500
Part No.	765 040	765 041	765 042
Clamping range	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm
Total length (l_G)	1060 mm	1250 mm	1500 mm
Insertion depth (l_O)	185 mm	185 mm	185 mm

*) Only if used with reducing insert

20° angled SZ Fuse Tong

Type	SZ HH W20 1070	SZ HH W20 1250	SZ HH W20 1500
Part No.	765 050	765 051	765 052
Clamping range	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm
Total length (l_G)	1070 mm	1250 mm	1500 mm
Insertion depth (l_O)	195 mm	195 mm	195 mm

*) Only if used with reducing insert

Other lengths are available on request.

Accessory for SZ Fuse tongs

Storage Devices for HH Fuses

Wall-mounted

Type	HV 3HH ET
Part No.	700 005
For	HH fuses

Accessory for SZ Fuse tongs

Storage Devices for HH Fuses and Fuse Tong

Wall-mounted

Type	HV 3HH SZ ET
Part No.	700 004
For	HH fuses and fuse tong

Storage Device Kit for HH Fuses or HH fuses and Fuse Tong

Wall-mounted

Type	HV 3HH	HV 3HH SZ
Part No.	700 015	700 014
Consisting of	2x HV 3HH ET	1x HV 3HH ET and 1x HV 3HH ZS ET

RST Rescue Rods

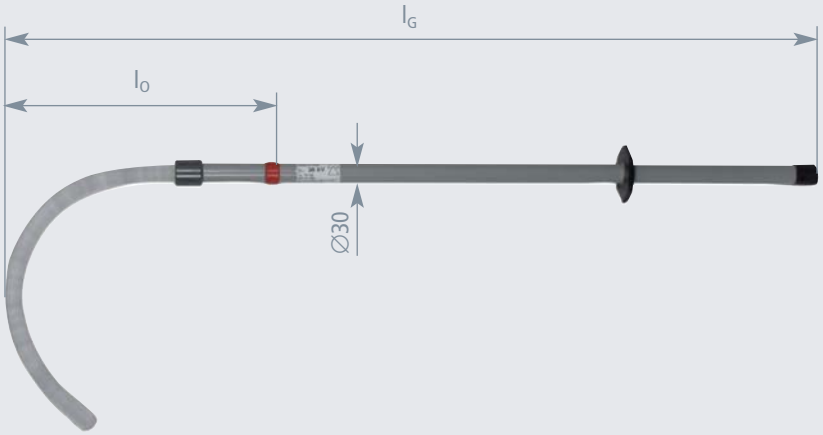
Nominal voltages up to 36 kV / 50 Hz

Insulated RST rescue rod used to rescue an electrified victim from the live working zone

- For use in indoor and outdoor installations
- Fixed rescue hook (protected against bridging)
- For rescuing persons weighing up to approximately 100 kg from the live working zone in the event of an electrical accident

General Information:	
Standard	Based on DIN VDE 0681 Part 1
Use	Not suitable for use in wet weather conditions
Material (hook)	PVC-HI solid stick
Material (insulating tube)	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap

Nominal voltages up to 36 kV / 50 Hz



Type	RST 36 1000	RST 36 1500	RST 36 2000
Part No.	766 040	766 041	766 042
Total length (l_G)	1000 mm	1500 mm	2000 mm
Insertion depth (l_O)	175 mm	425 mm	775 mm

Accessory, kit parts and spare parts from page 195

Insulating Protective Shutters

Rated voltages from 1 kV to 36 kV

- **Protection against accidental contact with live parts of installations with rated voltages from 1 kV to 36 kV**
- **Four different designs for use in almost all types of switchgear installations**

Inserting an insulating protective shutter (type A1) by hand

General Information:	
Standard	DIN VDE 0682 Part 552
For	Use in indoor installations only

According to the five safety rules, adjacent parts are parts situated in the vicinity zone. If parts of an installation near the work location cannot be isolated, additional safety measures must be taken before beginning work as is the case with work near live parts.

Insulating protective shutters according to DIN VDE 0682 Part 522 are used to provide protection against accidental contact with live parts of an installation. They are portable and are inserted by hand or by using an operating stick under live conditions.
Insulating protective shutters are designed for short-term use in indoor electrical installations according to DIN VDE 0101 with voltages exceeding 1 kV to 36 kV a.c. at nominal frequencies below 100 Hz to provide protection against direct contact according to DIN VDE 0105 Part 100 when working near live parts.

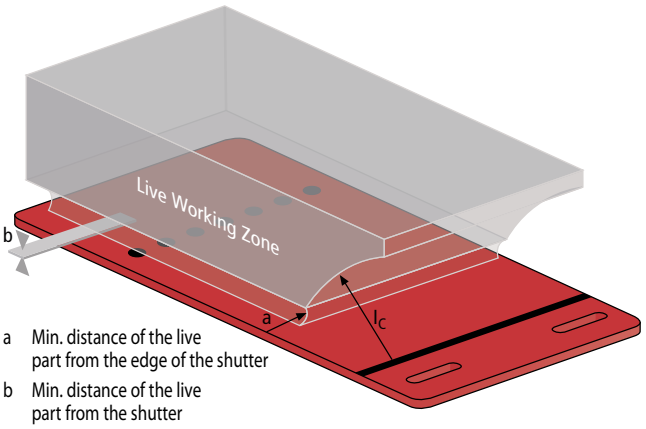
When used in medium-voltage systems, insulating protective shutters might have to be adapted, for example if it is not possible to insert shutters in the live working zone without risk due to unfavourably located drives, switch components or isolating plates. In such cases, a standard-compliant solution can be found by cutting out parts of the insulating protective shutter or cutting it to size. For that purpose, technical details must be provided. We have developed a special template for insulating protective shutters which can be used, for example, to mark the exact location of the cut-outs.

For enquiries and orders, please fill in the template on pages 66 to 68 or visit our website www.dehn.de.

Accessory, kit parts and spare parts from page 195

Example of a Live Working Zone

Rated voltages from 1 kV to 36 kV



a Min. distance of the live part from the edge of the shutter
b Min. distance of the live part from the shutter
l_C Safety distance (min. 525 mm)

Example of a live working zone with an insulating protective shutter of type A1

Rated voltage	Minimum distance of the live part	
U_r	from shutter edge a	from shutter b
3.6 kV	60 mm	0 mm
7.2 kV	90 mm	0 mm
12.0 kV	120 mm	20 mm
24.0 kV	220 mm	60 mm
36.0 kV	320 mm	100 mm

Note

Insulating protective shutters do not protect against reconnection. The protected area is the area which is separated from the area containing live parts by the insulating protective shutter. The minimum distances shown in the above table between shutters / shutter edges and live parts must be observed.

The protective part (with length l_S and, if required, height h_S) of insulating protective shutters is the part that provides protection against accidental contact with live parts. It is fitted with either a handle or a coupling for attaching an operating stick.

Outside the live working zone, the following gaps are permissible between shutter edge and cell wall:

- Up to 10 mm without restriction
- Up to 40 mm, if the distance between the shutter edge and the live working zone is at least 100 mm
- Up to 100 mm near a switch subconstruction

Accessory, kit parts and spare parts from page 195

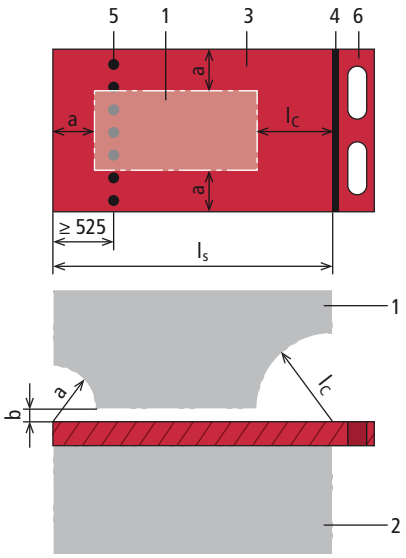
Due to the various designs of switchgear installations, DIN VDE 0682 Part 552 defines four different basic types of protective shutters:

A1, safety distance provides protection during inserting and removing insulating protective shutters

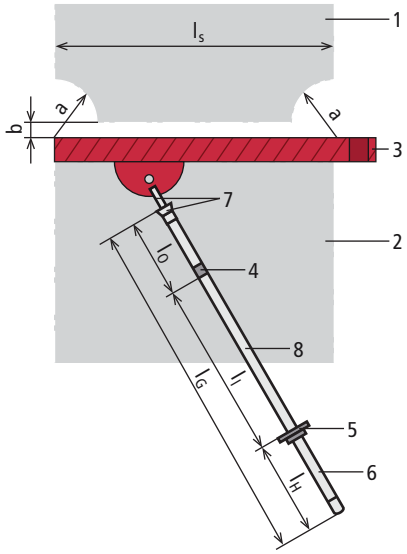
A2, protective section provides protection during inserting and removing insulating protective shutters

A3, operating stick provides protection during inserting and removing insulating protective shutters

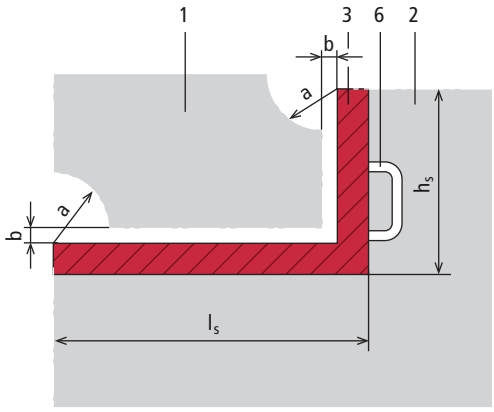
A4, protective device installed on the installation provides protection during inserting and removing insulating protective shutters



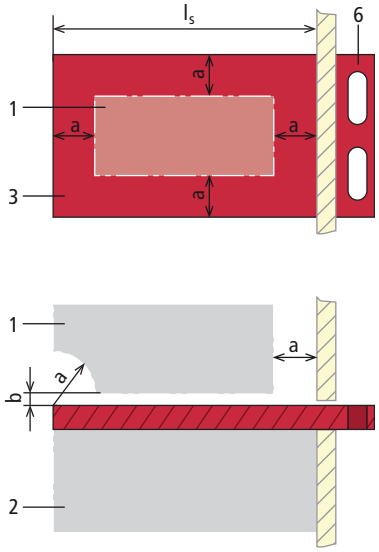
Protective shutter of type **A1** – Operation by hand



Protective shutter of type **A3** – Operation by means pf an operating stick



Protective shutter of type **A2** – Operation by hand



Protective shutter of type **A4** – Operation by hand

1 Live working zone
2 Protected area
3 Protective section with length l_S (and height h_S)
4 Limit mark or red ring
5 Guide mark / hand guard
6 Handle
7 Coupling
8 Insulating element of the operating stick with length l_I

l_G Total length of the operating stick
l_O Length of the top section of the operating stick
l_H Length of the handle of the operating stick
l_I Length of the insulating element of the operating stick
l_S Length of the protective section
l_C Protection distance

a Minimum distance of live parts from the edge of the insulating shutter
b Minimum distance of live parts from the insulating shutter

Insulating Protective Shutters

Type A1

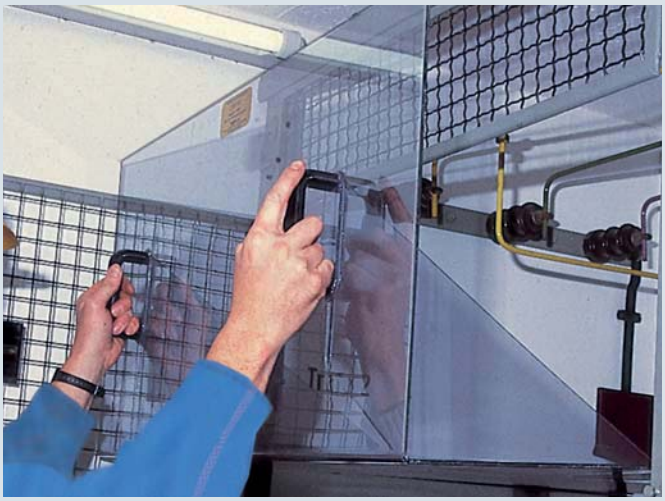
Inserting an insulating protective shutter of type A1

With finger holes, guide and limit mark for inserting and removing insulating protective shutters into / from guide rails by hand.

The guide mark is a dotted line with a minimum distance of 525 mm from the rear shutter edge. The section beyond this mark must not be contacted when inserting the insulating protective shutter.
The limit mark is a continuous line and separates the handle from the protective section. The section beyond this mark must not be contacted when inserting the insulating protective shutter and must be at least 525 mm away from live parts when the shutter has been inserted.

Type	**ISP 36 PVC A1...**
Part No.	**763 211**
Rated voltage (U_r)	Up to 36 kV
Material	Rigid PVC

Type A2



Inserting a transparent insulating protective shutter of type A2

With 90° angled handle and hand grips for inserting or removing insulating protective shutters into / from guide rails by hand. Other angled handles (70° to 270°) are available on request.

The height of the handle has to be selected in such a way that live parts of the installation above the shutter are completely covered.

Type	**ISP 36 PVC A2...**
Part No.	**763 221**
Rated voltage (U_r)	Up to 36 kV
Material	Rigid PVC

Guide rails and other accessories are listed in our template.

Accessory, kit parts and spare parts from page 195

Insulating Protective Shutters

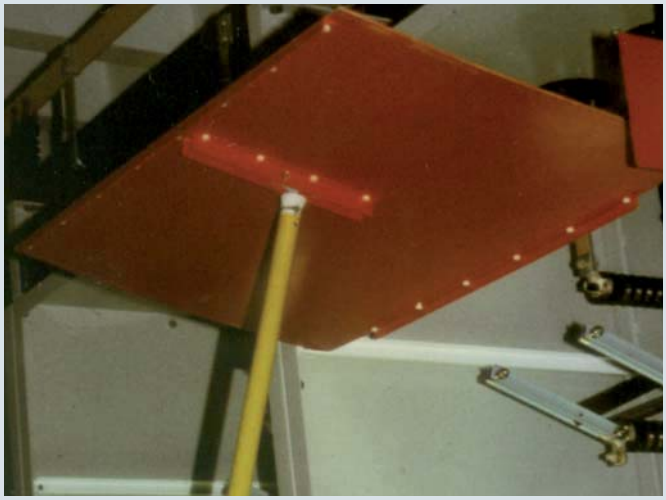
Insulating Protective Shutters

Type A3

With retaining device with bayonet pin for inserting and removing insulating protective shutters into / from guide rails using an operating stick.

This shutter type is also available with a longitudinal slot and a retaining device (rotable shutter). In this case, the shutter is operated using an operating stick with switching stick head.
Two persons are required to insert/remove shutter sizes exceeding 1 m^2. For this purpose, two retaining devices for attaching operating sticks are required.
Moreover, insulating protective shutters are also available with rolls.

Type	ISP 36 PVC A3...
Part No.	763 231
Rated voltage (U_r)	Up to 36 kV
Material	Rigid PVC



Inserting an insulating protective shutter of type A3

Operating stick with bayonet coupling and insulating protective shutter with bayonet pin

Type A4

With finger holes (without additional marks) for use in factory assembled switchgear panels. Instead of finger holes, the shutters are also available with a grip (minimum height: 35 mm).

The shutter is inserted through a slot into the closed installation.
The protective device of the installation must ensure full protection when inserting and removing the shutter.
In type-tested switchgear installations in accordance with DIN VDE 0670 Parts 6 and 7 or EN/IEC 62271-200 (DIN VDE 0671 Part 200), insulating protective shutters may only be used in consultation with the manufacturer of the switchgear installation.

Type	ISP 36 PVC A4...
Part No.	763 241
Rated voltage (U_r)	Up to 36 kV
Material	Rigid PVC

Inserting an insulating protective shutter of type A4

Guide rails and other accessories are listed in our template.

Accessory, kit parts and spare parts from page 195

Template

DEHN form No. 2090/E/0112

Template for Insulating Protective Shutters used in Switchgear Installation with Voltages up to 36 kV

acc. to DIN VDE 0682, Part 552

Material: Rigid PVC

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

1 Switchgear installation:	
Type:	Rated voltage:

ISP	/
for internal use only, please do not fill in	

2 Remark:	
Created / released by:	Signature:
	Date:

3 Recorded by:			
for internal use only, please do not fill in		Name:	
		Date:	
Person in charge:			
Dept.	**Name**	**Date**	**Remark**
Sales			
Purchasing			

4 Confirmation of delivery:	
The protective shutter(s) has/have been delivered to the above mentioned customer according to the information stated in the template on _____ (date). This delivery has been subject to random tests in accordance with DIN VDE 0682, Part 552.	
Place, Date	Stamp / Signature

DEHN + SÖHNE
GmbH + Co.KG.

Hans-Dehn-Str. 1
Postfach 1640
92306 Neumarkt
Germany

Tel. +49 9181 906-0
Fax +49 9181 906-1444
info@dehn.de
www.dehn.de

Technical Support:
Tel. +49 9181 906-1510

Accessory, kit parts and spare parts from page 195

Template for Insulating Protective Shutters used in Switchgear Installation with Voltages up to 36 kV

acc. to DIN VDE 0682, Part 552

Material: Rigid PVC

ISP	/

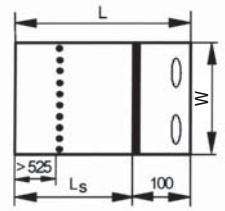
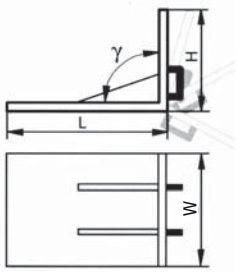
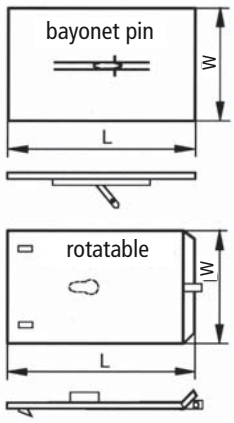
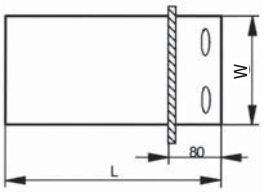
for internal use only, please do not fill in

1 Type of insulating protective shutter:

Thickness:	Type/Application	* Note:
☐ 5 mm	☐ with finger holes for operation by hand (A1)	Type A4 – when inserting and removing the shutter, the front of the switchgear installation protects the operator from electrical shocks!
☐ 6 mm	☐ with finger holes for operation by hand (A4*)	
☐ _____ mm	☐ with 1 bayonet pin for use with an operating stick (A3)	
	☐ with 2 bayonet pins for use with an operating stick (A3)	
	☐ rotatable shutter for use with an operating stick (A3)	
	☐ with handle (A2)	

Colour:	Type / Insertion	Note:
☐ red	☐ Standard type (can be inserted into guide rails, Part No. 9030)	Two persons are required to insert / remove shutter sizes exceeding 1 m² !
☐ transparent	☐ Rotable shutters (by bearing pin guide)	

2 Dimensions of the insulating protective shutter:

Dimensions:	A1: 763 211	A2: 763 221	A3: 763 231	A4: 763 241
W mm				
L mm				
L_S mm				
H mm				
γ mm				
The angle of the handle can be selected from 70° to 290°.				

Additional sketch for other types

Template

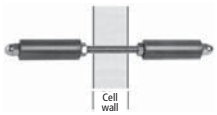
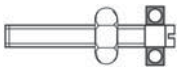
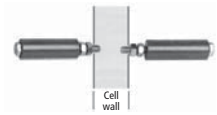
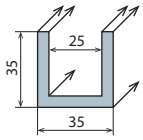
DEHN form No. 2090/E/0112

Template for Insulating Protective Shutters used in Switchgear Installation with Voltages up to 36 kV

acc. to DIN VDE 0682, Part 552

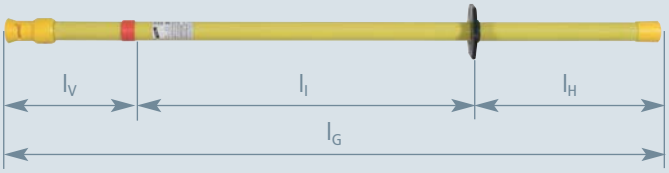
Material: Rigid PVC

Accessories:

☐ **Bayonet pin** Part No.: 9040 Quantity: _____ pc(s).		☐ **Bearing pins** Part No.: 9010 Quantity: _____ pc(s).	
☐ **Ball bearing** Part No.: 9041 Quantity: _____ pc(s).		☐ **Bearing pins** Part No.: 9020 Quantity: _____ pc(s).	
☐ **Handle** Part No.: 9050 Quantity: _____ pc(s).		☐ **Guide rails** Part No.: 9030 Quantity: _____ mm	
☐ **Keyhole** Part No.: 9070 Quantity: _____ pc(s).		☐ **Magnet holder** Part No.: 9060 Quantity: _____ pc(s).	
☐ **45° angled swivelling eye** Part No.: 9080 Quantity: _____ pc(s).			

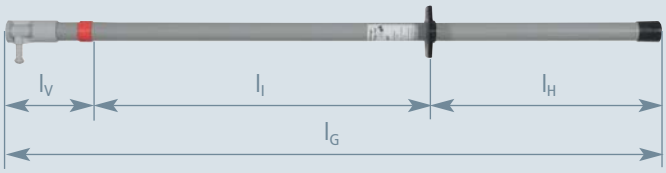
IS insulating stick – T pin shaft

For rotable shutters with bayonet pin.
For use as operating stick.



SCS switching stick

For rotable shutters with longitudinal hole.
For use as operating stick.



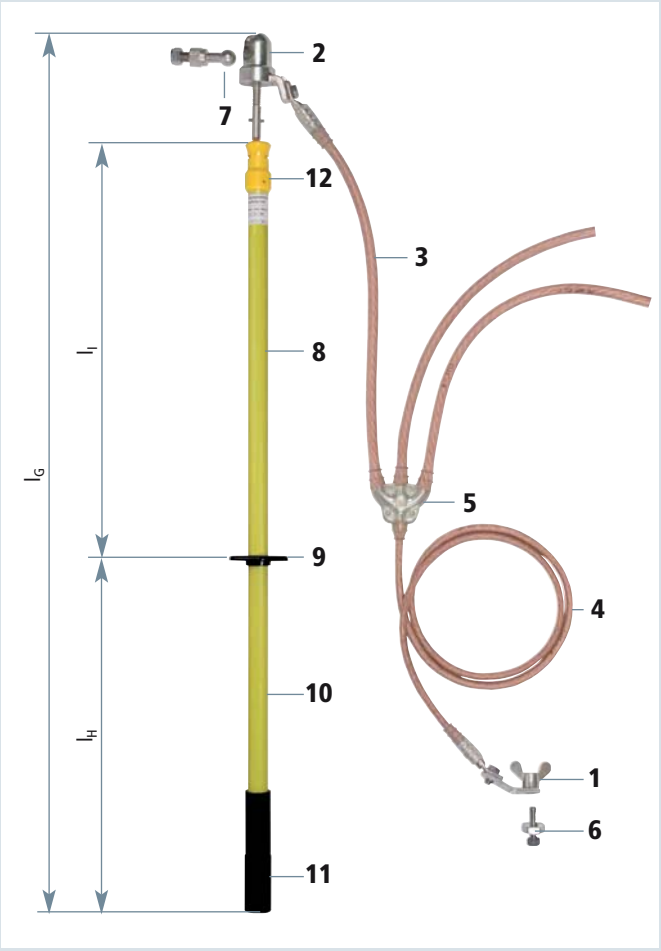
Nominal voltage	l_G	l_I	l_H	l_V	Part No. of insulating stick	Part No. of switching stick	Part No. of operating stick kit
up to 36 kV	1028 mm	525 mm	350 mm	140 mm	☐ **766 311**		
up to 36 kV	1528 mm	525 mm	500 mm	490 mm	☐ **766 315**		
up to 36 kV	1030 mm	525 mm	370 mm	115 mm		☐ **763 610**	
up to 36 kV	1500 mm	525 mm	550 mm	395 mm		☐ **763 611**	
up to 36 kV	2000 mm	525 mm	700 mm	745 mm		☐ **763 612**	
up to 36 kV		525 mm	560 mm				☐ **766 452**

Accessory, kit parts and spare parts from page 195

Earthing and Short-Circuiting 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 Part 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 IEN 50110-1 (DIN VDE 0105 Part 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 sticks.
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 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 bar** 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 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, bows 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 ll 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 Part 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**, earthing and short-circuiting cables must have the same cross-sections.

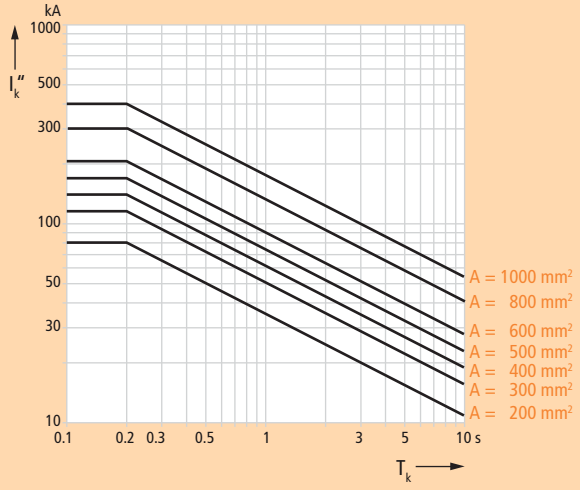
The **current carrying capacity** of the short-circuiting cable and the short-circuiting bar depends on the material, the cross-section (A) and the short-circuit time (T_k).

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

$$A = 5.54\ I_k''\ \sqrt{T_k} \quad \text{for } T_k \geq 0.2 \text{ s}$$

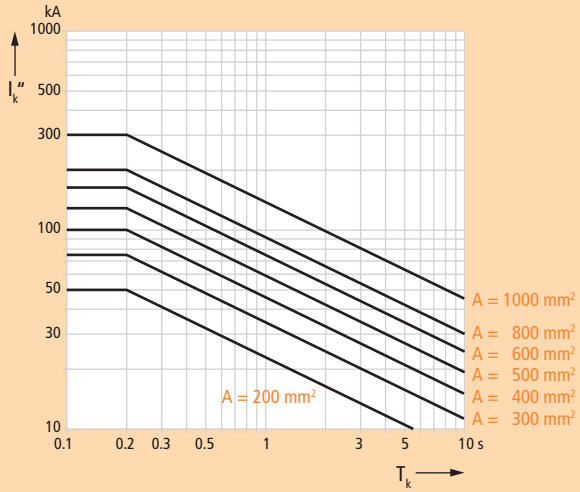
where:

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

$$A = 8.79\ I_k''\ \sqrt{T_k} \quad \text{for } T_k \geq 0.2 \text{ s}$$

where:

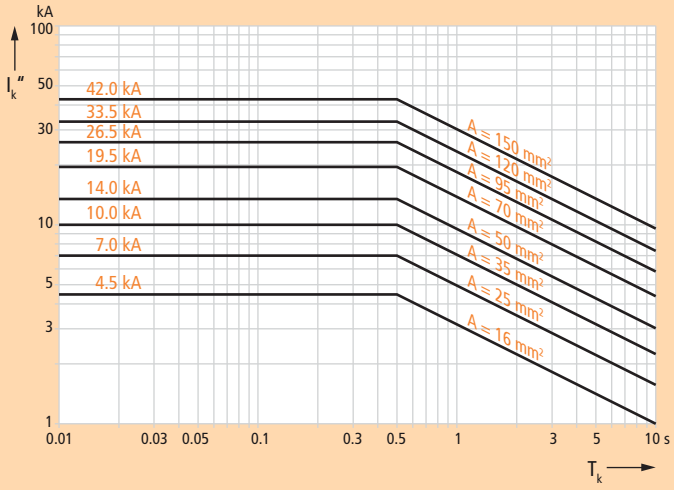
A Busbars cross-section in mm²

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

T_k Short-circuit time in s

Accessory, kit parts and spare parts from page 195

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

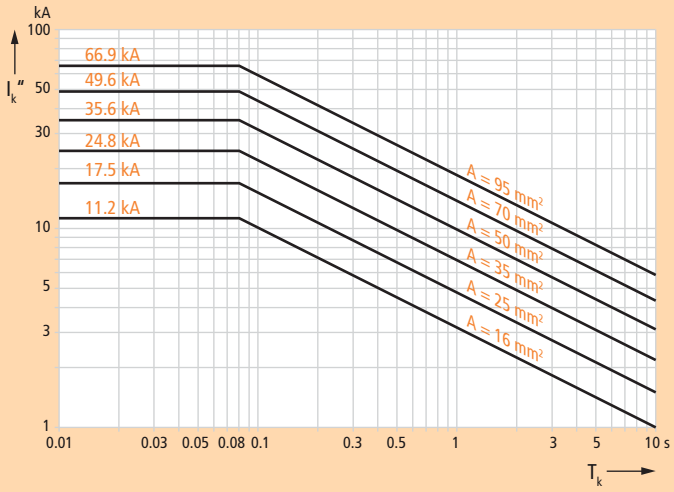
where:

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

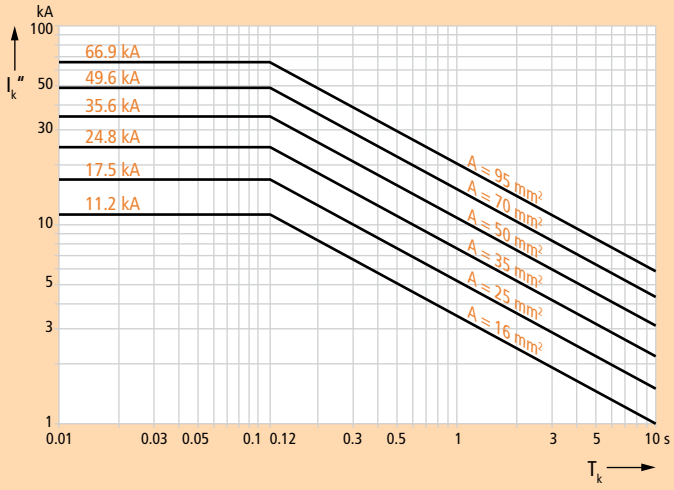
where:

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

Earthing and Short-Circuiting Devices

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 a.c. 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

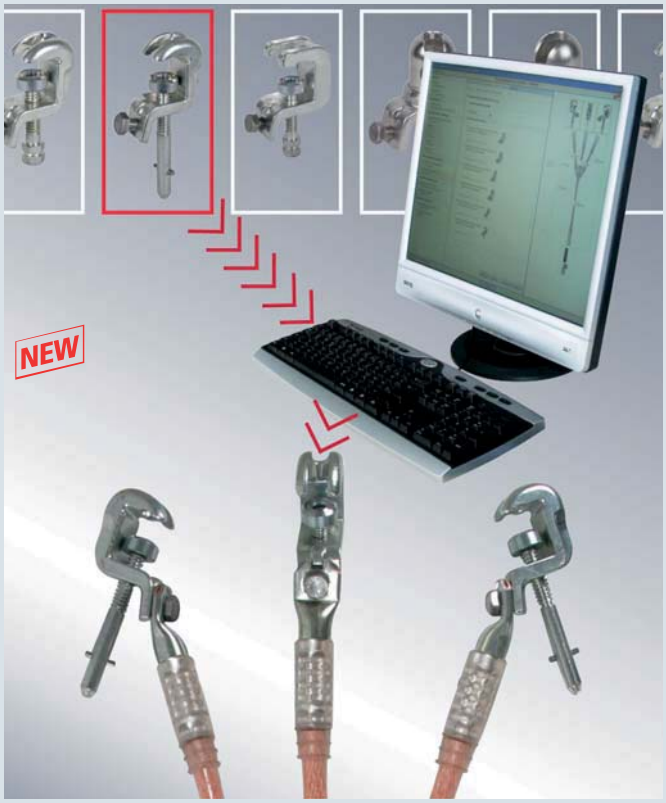
*) catalogue data

Accessory, kit parts and spare parts from page 195

Earthing and Short-Circuiting Configurator: Easy online Configuration

Earthing and Short-Circuiting Devices

- **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**



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

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 begin with 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 accessory such as earthing sticks is 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**

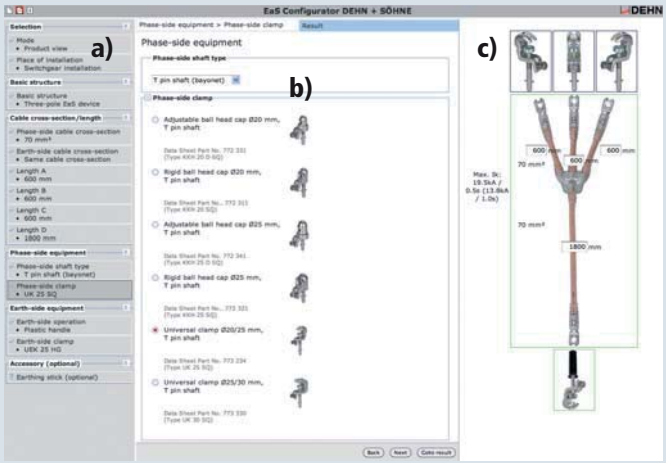
Note:
If you have no internet access, please fill in the template on page 109 and send it to us!

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 may select or change the reuired 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.



Earthing and Short-Circuiting Device in eight Steps with the Earthing and Short-Circuiting Configurator

1. Selection mode

First select

a. **Product view** or

b. **System view**.

If you already know which cable cross-section and clamps are to be used, select the product view.

In the system view the parameters of the switchgear installation are entered, for example the maximum short-circuit current and the type of earthing. Whether product or system view – both solutions lead to a technically sound earthing and short-circuiting device.

2. Basic structure

Define the basic **structure** of the earthing and short-circuiting device.

3. Phase cable end cross-section

Select the **phase cable end cross-section** of the short-circuiting cables.

4. Earth cable end cross-section

Decide whether the **earth cable end** should have the same cable cross-section or a reduced cable cross-section.

5. Phase cable end equipment

Select the **shaft type** and **connection element** to be used for the phase cable end.

6. Earth cable end equipment

Select the **type of operation** and **connection element** to be used for the earth cable end.

7. Earthing stick

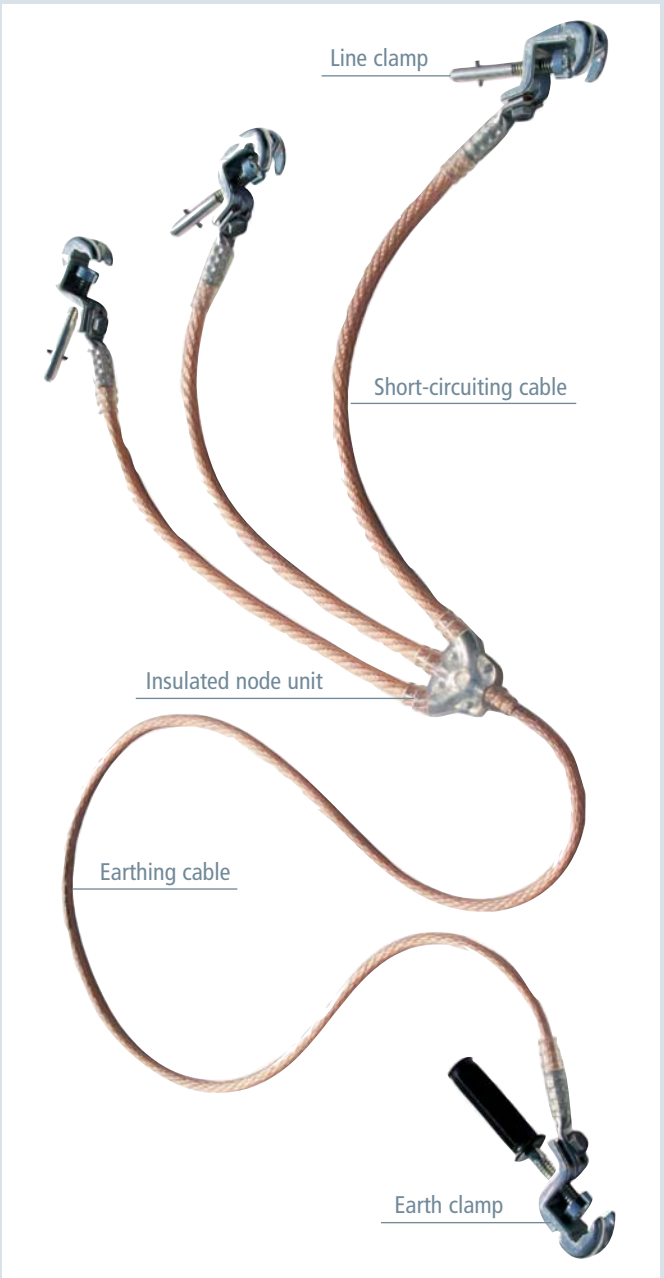
Optional earthing sticks are available as **accessory** in different lengths and versions.

8. PDF of your selection

You can send the configured **result** via e-mail, add it to the DEHN + SÖHNE shopping cart or created a pdf file of the result.

Note:
If you have no internet access, please fill in the template on page 109 and send it to us!

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



Selection Guide

Earthing and Short-Circuiting Devices

Accessory, kit parts and spare parts from page 195

Fixed Ball Points

∅20 or 25 mm

Straight fixed ball point mounted on a busbar

- Suitable for fixing cable lugs or connecting busbars in accordance with DIN 43673 Part 1
- Self-locking nut
- M12 or M16 female thread (not cut)
- M12 or M16 threaded pin

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 1
Material (fixed ball point)	E-Cu/gal Sn
Material (threaded pin)	StSt A2-70
Hexagon nut	DIN 985-M12-8 / gal Zn; DIN 985-M16-8 / gal Zn
Tightening torque	M12: 80 Nm; M16: 150 Nm

Angled fixed ball point

Angled with Terminal Lug

Type	KFP 20 S AL 12	KFP 25 S AL 12
Part No.	706 300	756 300
Fixed ball point ∅	20 mm	25 mm
Dimensions	45 x 30 x 9 mm	50 x 30 x 9 mm
Max. cable cross-section	50 mm²	95 mm²
Max. short-circuit current I_k 0.5 s	14 kA	26.5 kA
Max. short-circuit current I_k 1 s	9.9 kA	18.7 kA

Accessory, kit parts and spare parts from page 195

Straight with threaded Pin and Nut

Type	KFP 20 M12 35 SSM	KFP 20 M16 45 SSM	KFP 25 M12 25 SSM	KFP 25 M12 45 SSM	KFP 25 M16 45 SSM
Part No.	754 235	754 645	755 225	755 245	755 645
Fixed ball point ∅	20 mm	20 mm	25 mm	25 mm	25 mm
Dimensions	M12 x 35 mm	M16 x 45 mm	M12 x 25 mm	M12 x 45 mm	M16 x 45 mm
Width A/F	24 mm	24 mm	27 mm	27 mm	27 mm
Max. cable cross-section	120 mm²	120 mm²	150 mm²	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA	42.0 kA	42.0 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA	29.6 kA	29.6 kA	29.6 kA

Straight with female Thread

Type	KFP 20 M12	KFP 20 M16	KFP 25 M12	KFP 25 M16
Part No.	754 200	754 600	755 200	755 600
Fixed ball point ∅	20 mm	20 mm	25 mm	25 mm
Dimensions	M12 mm	M16 mm	M12 mm	M16 mm
Width A/F	24 mm	24 mm	27 mm	27 mm
Max. cable cross-section	120 mm²	120 mm²	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA	42.0 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA	29.6 kA	29.6 kA

45° angled with threaded Pin and Nut

Type	KFP 20 W45 M12 35SSM	KFP 20 W45 M16 45SSM	KFP 25 W45 M12 45SSM	KFP 25 W45 M16 45SSM
Part No.	706 235	706 645	756 245	756 645
Fixed ball point ∅	20 mm	20 mm	25 mm	25 mm
Dimensions	M12 x 35 mm	M16 x 45 mm	M12 x 45 mm	M16 x 45 mm
Width A/F	24 mm	24 mm	27 mm	27 mm
Max. cable cross-section	70 mm²	70 mm²	95 mm²	95 mm²
Max. short-circuit current I_k 0.5 s	19.5 kA	19.5 kA	26.5 kA	26.5 kA
Max. short-circuit current I_k 1 s	13.8 kA	13.8 kA	18.7 kA	18.7 kA

Other threaded pin lengths are available on request.

Fixed Ball Points

45° angled with female Thread

Type	KFP 20 W45 M12	KFP 20 W45 M16	KFP 25 W45 M12	KFP 25 W45 M16
Part No.	706 200	706 600	756 200	756 600
Fixed ball point ∅	20 mm	20 mm	25 mm	25 mm
Dimensions	M12 mm	M16 mm	M12 mm	M16 mm
Width A/F	24 mm	24 mm	27 mm	27 mm
Max. cable cross-section	70 mm²	70 mm²	95 mm²	95 mm²
Max. short-circuit current I_k 0.5 s	19.5 kA	19.5 kA	26.5 kA	26.5 kA
Max. short-circuit current I_k 1 s	13.8 kA	13.8 kA	18.7 kA	18.7 kA

90° angled with threaded Pin and Nut

Type	KFP 20 W90 M12 35SSM	KFP 20 W90 M16 45SSM	KFP 25 W90 M12 45SSM	KFP 25 W90 M16 45SSM
Part No.	707 235	707 645	757 245	757 645
Fixed ball point ∅	20 mm	20 mm	25 mm	25 mm
Dimensions	M12 x 35 mm	M16 x 45 mm	M12 x 45 mm	M16 x 45 mm
Width A/F	24 mm	24 mm	27 mm	27 mm
Max. cable cross-section	70 mm²	70 mm²	95 mm²	95 mm²
Max. short-circuit current I_k 0.5 s	19.5 kA	19.5 kA	26.5 kA	26.5 kA
Max. short-circuit current I_k 1 s	13.8 kA	13.8 kA	18.7 kA	18.7 kA

90° angled with female Thread

Type	KFP 20 W90 M12	KFP 20 W90 M16	KFP 25 W90 M12	KFP 25 W90 M16
Part No.	707 200	707 600	757 200	757 600
Fixed ball point ∅	20 mm	20 mm	25 mm	25 mm
Dimensions	M12 mm	M16 mm	M12 mm	M16 mm
Width A/F	24 mm	24 mm	27 mm	27 mm
Max. cable cross-section	70 mm²	70 mm²	95 mm²	95 mm²
Max. short-circuit current I_k 0.5 s	19.5 kA	19.5 kA	26.5 kA	26.5 kA
Max. short-circuit current I_k 1 s	13.8 kA	13.8 kA	18.7 kA	18.7 kA

Other threaded pin lengths are available on request.

Accessory, kit parts and spare parts from page 195

Fixed Ball Points for round Conductors

∅20 or 25 mm

- To be mounted on round copper conductors
- Stainless steel fixing bolts

Fixed ball point attached to the round copper conductor of a switchgear installation

General Information:

Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)

Ball (∅20 mm) for round Conductors (∅10 – 20 mm)

Type	KFP 20 RL 10	KFP 20 RL 12	KFP 20 RL 14	KFP 20 RL 16	KFP 20 RL 18	KFP 20 RL 20
Part No.	720 010	720 012	720 014	720 016	720 018	720 020
Fixed ball point ∅	20 mm	20 mm	20 mm	20 mm	20 mm	20 mm
For round conductor ∅ d	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm
Max. cable cross-section	50 mm²	50 mm²	50 mm²	50 mm²	50 mm²	50 mm²
Max. short-circuit current I_k 0.5 s	14 kA	14 kA	14 kA	14 kA	14 kA	14 kA
Max. short-circuit current I_k 1 s	9.9 kA	9.9 kA	9.9 kA	9.9 kA	9.9 kA	9.9 kA

Ball (∅25 mm) for round Conductors (∅10 – 20 mm)

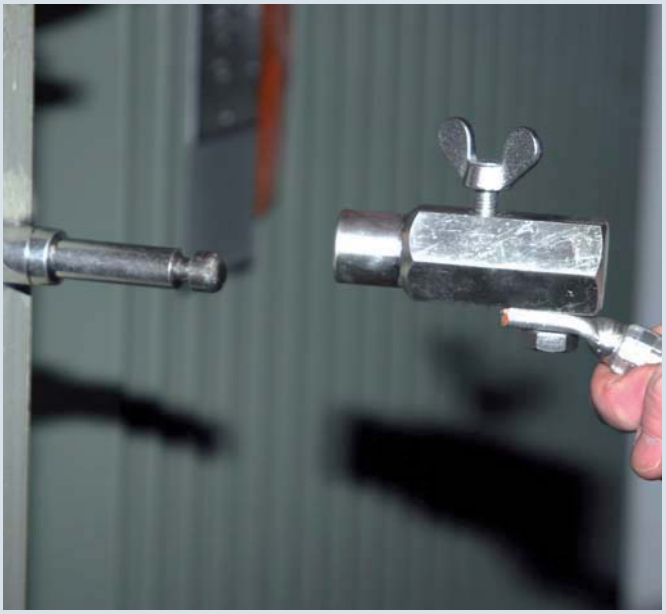
Type	KFP 25 RL 10	KFP 25 RL 12	KFP 25 RL 14	KFP 25 RL 16	KFP 25 RL 18	KFP 25 RL 20
Part No.	725 010	725 012	725 014	725 016	725 018	725 020
Fixed ball point ∅	25 mm	25 mm	25 mm	25 mm	25 mm	25 mm
For round conductor ∅ d	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm
Max. cable cross-section	95 mm²	95 mm²	95 mm²	95 mm²	95 mm²	95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA	26.5 kA	26.5 kA	26.5 kA	26.5 kA	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA	18.7 kA	18.7 kA	18.7 kA	18.7 kA	18.7 kA

Fixed ball points for round conductors with other diameters are available on request.

Note: Conductor diameter d to be specified at order!

Fixed Earthing Points with Ring Groove

Ring groove (∅16 mm)



Fixed earthing point with ring groove and earth bushing

- For connecting earth bushings or earth connecting plates in accordance with DIN 48088 Part 2
- Self-locking nut
- M12 or M16 female thread (not cut)
- M12 or M16 threaded pin

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 2
Material (fixed point)	Brass (CuNi2Si) / gal Sn
Material (threaded pin)	StSt A2-70
Hexagon nut	DIN 985-M12-8 / gal Zn; DIN 985-M16-8 / gal Zn
Tightening torque	M12: 80 Nm; M16: 150 Nm

Ring Groove (∅16 mm) with threaded Pin and Nut

Type	EFP 16 RN M12 35 SSM	EFP 16 RN M16 45 SSM
Part No.	790 251	790 261
Dimensions	M12 x 35 mm	M16 x 45 mm
Width A/F	22 mm	22 mm
Max. cable cross-section	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	42*) kA	42*) kA
Max. short-circuit current I_k 1 s	29.6*) kA	29.6*) kA

Ring Groove (∅16 mm) with female Thread

Type	EFP 16 RN M12	EFP 16 RN M16
Part No.	790 250	790 260
Dimensions	M12 mm	M16 mm
Width A/F	22 mm	22 mm
Max. cable cross-section	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	42*) kA	42*) kA
Max. short-circuit current I_k 1 s	29.6*) kA	29.6*) kA

*) *For earthing and short-circuiting devices with cable lengths > 4000 mm: 26.5 kA / 0.5 s (18.7 kA / 1 s)*

Accessory, kit parts and spare parts from page 195

- For welding or screwing earth connectors with wing nut or wing bolt
- Connectors with M12 or M16 threaded pin
- M12 or M16 female thread

Earth connector with M12 threaded pin screwed to an earthed part of an installation

General Information:

Standard	EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 5

Welding-type Connector with threaded Pin

Type	AS SCHW M12 25	AS SCHW M16 30
Part No.	705 501	755 501
Dimensions	M12 x 25 mm	M16 x 30 mm
Material	St/gal Zn	St/gal Zn
Max. cable cross-section	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	42 kA	42 kA
Max. short-circuit current I_k 1 s	29.6 kA	29.6 kA

Welding-type Connector with female Thread

Type	AS SCHW M12	AS SCHW M16
Part No.	336 020	336 025
Dimensions	M12 mm	M16 mm
Material	St/gal Zn	St/gal Zn
Max. cable cross-section	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	42 kA	42 kA
Max. short-circuit current I_k 1 s	29.6 kA	29.6 kA

Bolted-type Connector with female Thread

Type	AS SCHR M12 M12 40
Part No.	705 504
Dimensions	M12 / M12 x 40 mm
Width A/F	27 mm
Material	Copper alloy/gal Sn
Max. cable cross-section	150 mm²
Max. short-circuit current I_k 0.5 s	42 kA
Max. short-circuit current I_k 1 s	29.6 kA

Bolted-type Connector with threaded Pin and separate hexagon Nut

Type	AS SCHR M12 55	AS SCHR M16 65
Part No.	705 500	750 500
Dimensions	M12 x 55 mm	M16 x 65 mm
Width A/F	32 mm	41 mm
Material (threaded pin)	StSt	StSt
Material (nut)	Copper alloy/gal Sn / St/tZn	Copper alloy/gal Sn / St/tZn
Max. cable cross-section	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	42 kA	42 kA
Max. short-circuit current I_k 1 s	29.6 kA	29.6 kA

Bolted-type Connector for converting from M12 to M16 threaded Pin

Type	AS SCHR M16 55 M12
Part No.	705 510
Dimensions	M12 x 20 / M16 x 55 mm
Width A/F	41 mm
Material (threaded pin)	StSt
Material (nut)	Copper alloy/gal Sn
Max. cable cross-section	150 mm²
Max. short-circuit current I_k 0.5 s	42 kA
Max. short-circuit current I_k 1 s	29.6 kA

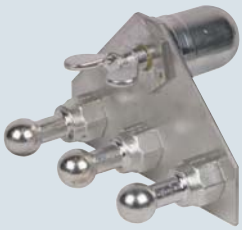
Earth Connecting Plates

Earth connecting plate with fixed ball points and ball head cap with plastic handle

- For indoor and outdoor installations
- Connecting plate with high short-circuit carrying capacity
- Allows for connection of the short-circuiting cables (single-pole)
- For fixed ball points ∅20 mm, ∅25 mm or ring groove bolts ∅16 mm

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100) and fixed points in accordance with DIN 48088 Part 1
Material (fixed point)	E-Cu / brass (CuNi2Si) / gal Sn
Material (threaded pin)	StSt A2-70
Hexagon nut	DIN 985-M12-8 / gal Zn; DIN 985-M16-8 / gal Zn

With Ball Head Cap and three fixed Ball Points



Type	EAP 3 KFP 20 KKH	EAP 3 KFP 25 KKH
Part No.	728 300	728 500
Fixed point ∅	20 mm	25 mm
Max. cable cross-section	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

With three fixed Ball Points

To be mounted on earth connecting clamps with protection against twisting (PK1)

Type	EAP 3 KFP 20 B13	EAP 3 KFP 25 B13
Part No.	728 320	728 325
Fixed point ∅	20 mm	25 mm
Max. cable cross-section	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

With Earth Bushing and three fixed Earthing Points with Ring Groove

Type	EAP 3 RN 16 EAB
Part No.	728 520
Fixed point ∅	16 mm
Max. cable cross-section	95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA

With three fixed Earthing Points with Ring Groove

To be mounted on earth connecting clamps with protection against twisting (PK1)

Type	EAP 3 RN 16 B13
Part No.	728 316
Fixed point ∅	16 mm
Max. cable cross-section	95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA

Accessory, kit parts and spare parts from page 195

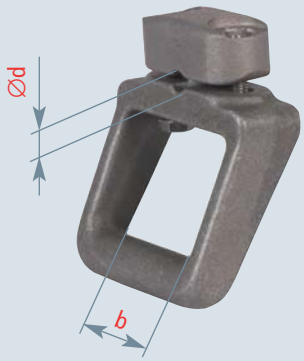
Fixed Phase and Earthing Points

- Coupling aid (clamp) for phase screw clamps
- For high-voltage installations up to 220 kV
- Other types of clamps, e.g. for twin conductors or greater clamp widths available on request

Fixed phase point mounted on an overhead line conductor

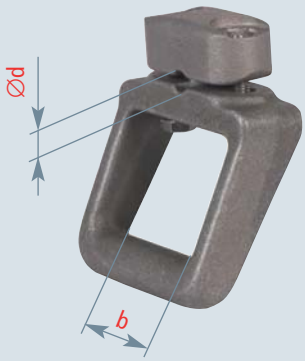
General Information:	
Standard	Clamp in accordance with DIN 48088 Part 3
Clamp material	Aluminium / copper alloy
Bolt material	StSt

Fixed Phase Points for Al and Al/St Overhead Line Conductors



Type PFP ...	11 33 AL 60 82	34 48 AL 60 98	49 70 AL 60 126
Part No.	731 011	731 013	731 015
Clamp width b	82 mm	98 mm	126 mm
For conductors ∅ d	11.0 ... 33 mm	33.1 ... 48 mm	48.1 ... 70 mm
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA	23.7 kA

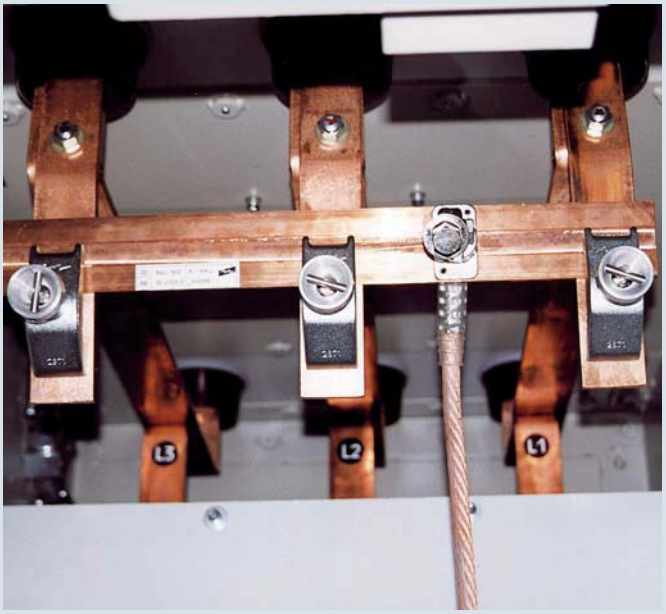
Fixed Phase Points for round Copper Conductors



Type PFP ...	11 33 CU 60 82	PFP 34 48 CU 60 98
Part No.	731 027	731 037
Clamp width b	82 mm	98 mm
For conductors ∅ d	11.0 ... 33 mm	33.1 ... 48 mm
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

Note: Conductor diameter d to be specified at order!

Short-Circuiting Bar



Short-circuiting bar with earthing cable on a switchgear installation

- With longitudinal slot for reliable contact
- For copper or aluminium busbars up to a thickness of 25 mm
- For use with earthing sticks for hexagon or T pin shafts
- Other bar and earthing cable lengths can be selected online via the earthing and short-circuiting configurator

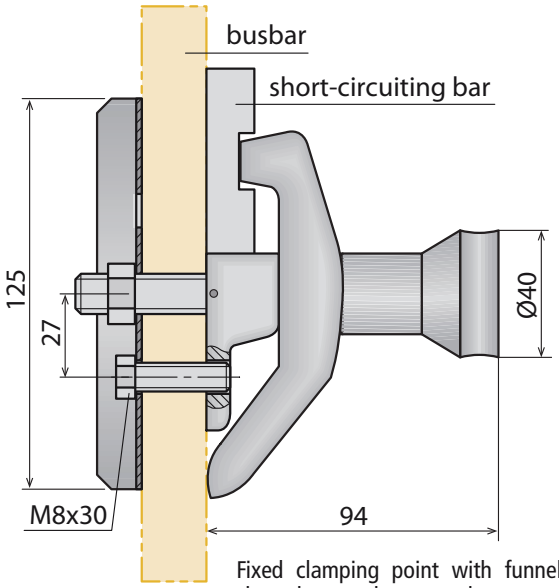
EaS Configurator: www.dehn.de/en/euk

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (earthing cable)	Highly flexible copper
Cable cross-section	50 mm²

The short-circuiting bar with longitudinal slot can be used for installations without direct neutral point earthing.
For connecting the earthing cable to the earthing system it is fitted with a rigid ball head cap with a wing bolt for fixed ball points (∅20 mm) (Part No. 772 312 (type KKH 20 FS)). Other equipment or cable lengths can be selected online via the earthing and short-circuiting configurator. Short-circuiting bars are available with two different coupling mechanisms for earthing sticks:

SK: Hexagon shaft

SQ: T pin shaft (bayonet locking mechanism)



Fixed clamping point with funnel-shaped nut and contact claw

Accessory for Short-Circuiting Bar

Fixed Clamping Point for Busbars

Clamping point with fixing elements for a busbar thickness up to 25 mm and contact claw for short-circuiting bars with longitudinal slot

Type	KLFP M12 KSS
Part No.	795 040
Type	Screw-on shaft with aluminium funnel-shaped nut

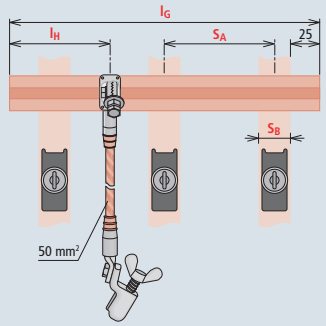
Accessory, kit parts and spare parts from page 195

Safety Equipment

Short-Circuiting Bar

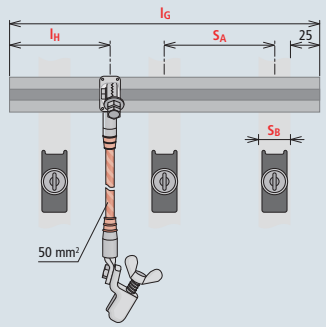
Earthing and Short-Circuiting Devices

Short-Circuiting Bar made of Copper (E-Cu F20)



Type	KS60 8SK C	KS60 12SK C	KS60 8SQ C	KS60 12SQ C
Part No.	795 138	795 139	795 141	795 145
Variant No.	V96QGHR	VRECHFQ	VWRQLGM	VGCXPNC
Coupling mechanism	SK	SK	SQ	SQ
Position of the coupling mechanism (L_H)	200 mm	200 mm	200 mm	200 mm
Profile	60 x 8 mm	60 x 12 mm	60 x 8 mm	60 x 12 mm
Total length (l_G)	550 mm	550 mm	550 mm	550 mm
Bar spacing (S_A)	150 mm	150 mm	150 mm	150 mm
Max. short-circuit current I_k 0.5 s	100 kA	130 kA	100 kA	130 kA
Max. short-circuit current I_k 1 s	70 kA	90 kA	70 kA	90 kA

Short-Circuiting Bar made of Aluminium (AlMgSi 0.5)



Type	KS60 8SK A	KS60 12SK A	KS60 8SQ A	KS60 12SQ A
Part No.	795 142	795 143	795 148	795 149
Variant No.	VF6L7FP	VLPGVCB	VVW4QY2	VZS98VH
Coupling mechanism	SK	SK	SQ	SQ
Position of the coupling mechanism (L_H)	200 mm	200 mm	200 mm	200 mm
Profile	60 x 8 mm	60 x 12 mm	60 x 8 mm	60 x 12 mm
Total length (l_G)	550 mm	550 mm	550 mm	550 mm
Bar spacing (S_A)	150 mm	150 mm	150 mm	150 mm
Max. short-circuit current I_k 0.5 s	60 kA	100 kA	60 kA	100 kA
Max. short-circuit current I_k 1 s	45 kA	70 kA	45 kA	70 kA

Two coupling mechanisms are required for a total length > 1000 mm.

Note: When ordering, please specify the variant No. generated online via the earthing and short-circuiting configurator or fill in the template on page 86 and send it to us.

Accessory for Short-Circuiting Bar

SQ Screw-Type Adapter

Screw-type adapter for plugging into earthing sticks for tightening/loosening the funnel-shaped nut of the fixed clamping point

T pin shaft (bayonet coupling mechanism)

Type	SA KLFP SQ
Part No.	795 213
Total length (l_G)	100 mm

Accessory for Short-Circuiting Bar

SK Screw-Type Adapter

Screw-type adapter for plugging into earthing sticks for tightening/loosening the funnel-shaped nut of the fixed clamping point

Hexagon shaft (width across flats 19)

Type	SA KLFP SK
Part No.	795 214
Total length (l_G)	60 mm
Width A/F	19 mm

Accessory, kit parts and spare parts from page 195

Template

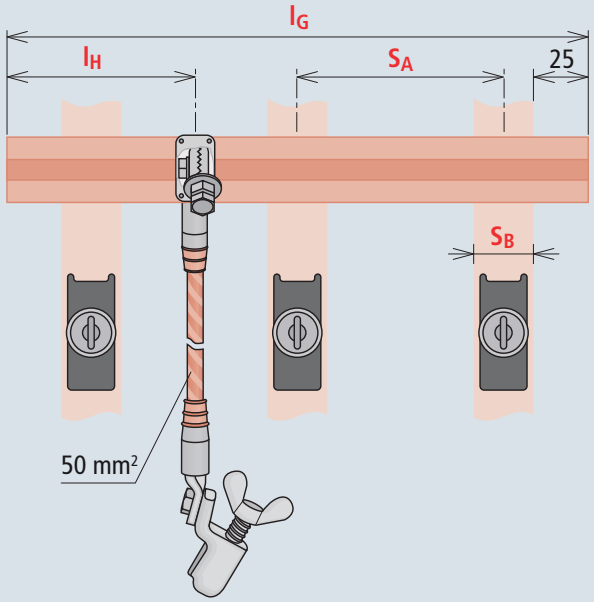
DEHN Form No. 2150/E/0412

Template for Short-circuiting Bars

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 Material and short-circuit current:

Material	Short-circuit current 0.5 s	Short-circuit current 1 s	Bar profile
☐ Copper (E-Cu F20)	100 kA	70 kA	60 x 8 mm
☐ Copper (E-Cu F20)	130 kA	90 kA	60 x 12 mm
☐ Aluminium (AlMgSi 0.5)	60 kA	45 kA	60 x 8 mm
☐ Aluminium (AlMgSi 0.5)	100 kA	70 kA	60 x 12 mm

2 Coupling mechanism:

☐ T pin shaft (bayonet) 

☐ Hexagon shaft 

3 Dimensions:

Bar spacing S_A (in the installation):	Bar width S_B (in the installation):	OR	Total length l_G:	Bar spacing S_A (in the installation):
mm	mm		mm	mm
From 30 up to 500 mm at intervals of 5 mm	From 40 up to 150 mm at intervals of 5 mm		From 200 up to 2000 mm at intervals of 50 mm	From 30 up to 500 mm at intervals of 5 mm

4 Cable length D (50 mm²):

Standard: D = 2500 mm	mm
	From 250 up to 25000 mm at intervals of 100 mm

5 Equipment of the earth cable end:

Standard:
Type or KKH 20 FD
Part No. 772 312

see easy choice:
☐ Type
or Part No.

6 Accessory (optional):

☐ **Fixed clamping points for busbars**
3x Part No. 795 040

☐ **SQ screw-type adapter**
Part No. 795 213

☐ **SK screw-type adapter**
Part No. 795 214

☐ see easy choice
Earthing Stick

Type or
Part No.

DEHN + SÖHNE GmbH + Co.KG.
Hans-Dehn-Str. 1
Postfach 1640
92306 Neumarkt
Germany
Tel. +49 9181 906-0
Fax +49 9181 906-1444
info@dehn.de
www.dehn.de
Technical Support:
Tel. +49 9181 906-1510

Earthing and Short-Circuiting Cables, unequipped

- To be equipped with connecting components
- Transparent sheath
- Waterproof 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

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

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

General Information:	
Standard	EN/IEC 61138 (DIN VDE 0283 Part 3) and EN/IEC 61230 (DIN VDE 0683 Part 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)	∅12.5 mm

Crimped cable lugs, type **PK1:**

Standard anti-rotation cable lug with cut-out.

Crimped cable lugs, type **PK2:**

Cable lug 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.

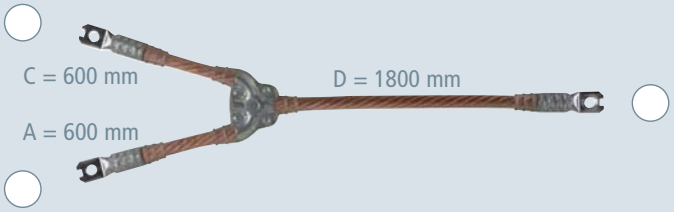
Accessory, kit parts and spare parts from page 195

Earthing and Short-Circuiting Cables, unequipped

Single-pole Earthing and Short-Circuiting Cables

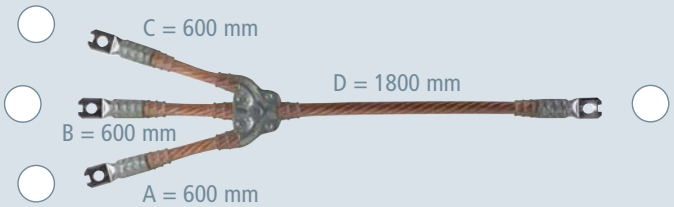
Type	EKV1+0 16	EKV1+0 25	EKV1+0 35	EKV1+0 50	EKV1+0 70	EKV1+0 95	EKV1+0 120	EKV1+0 150
Part No.	716 100	725 100	735 100	750 100	770 100	795 100	712 100	715 100
Variant No.	V4YPRGE	VSY71K4	V9JF26K	VRJG23Y	VPZBBSL	VZC3FST	V797FE6	VB53TC9
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1
Cable cross-section	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

Two-pole Earthing and Short-Circuiting Cables



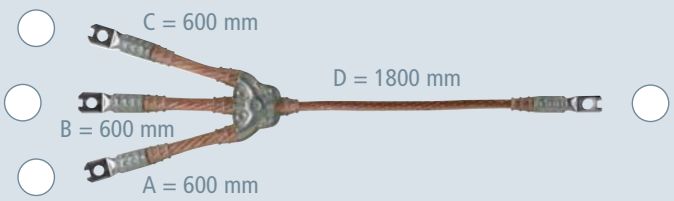
Type	EKV2+0 16 G	EKV2+0 25 G	EKV2+0 35 G	EKV2+0 50 G	EKV2+0 70 G	EKV2+0 95 G	EKV2+0 120 G	EKV2+0 150 G
Part No.	716 200	725 200	735 200	750 202	770 200	795 200	712 200	715 200
Variant No.	V7265NS	VZL6TGH	VPHPZV2	VJ13VWW	VTJKEZU	VAM7M6H	VFV1Z7K	VLL6JWS
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1
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 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
Part No.	716 300	725 300	735 300	750 300	770 300	795 300	712 300	715 300
Variant No.	VE5MT89	VNC1S9W	V18JQHQ	VJ7VGZD	VH95BZZ	VM2J7S3	V8D4AQ2	VG3V6T2
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1
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 Earthing and Short-Circuiting Cables, reduced Cable Cross-Section

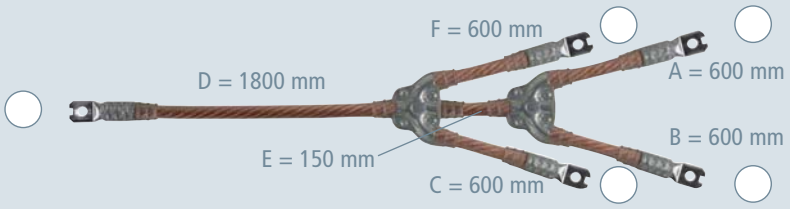


Type	EKV3+0 50 R	EKV3+0 70 R	EKV3+0 95 R	EKV3+0 120 R	EKV3+0 150 R
Part No.	750 301	770 301	795 301	712 301	715 301
Variant No.	VN35H5D	VTCS2XV	VLB2F3G	V8115WA	V11E77B
Crimped cable lug	PK1	PK1	PK1	PK1	PK1
Cable cross-section	50/25 mm²	70/35 mm²	95/35 mm²	120/50 mm²	150/50 mm²
Max. short-circuit current 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

Accessory, kit parts and spare parts from page 195

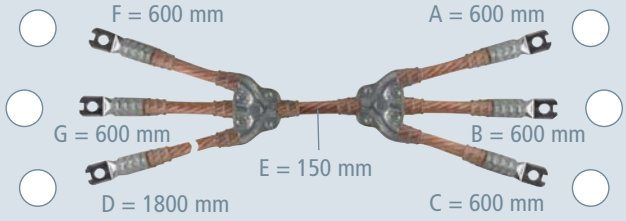
Earthing and Short-Circuiting Cables, unequipped

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
Part No.	**716 401**	**725 401**	**735 401**	**750 401**	**770 401**	**795 401**	**712 401**	**715 401**
Variant No.	VGUVRRG	VGM214B	V93UVAP	V3NCSHX	V7GN8WU	VABRSSE	V27E2GP	V291ZZT
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1
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

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
Part No.	**716 500**	**725 500**	**735 500**	**750 510**	**770 500**	**795 500**	**712 500**	**715 500**
Variant No.	VQ7PF5A	VZKQZB5	V76D5TH	V6VE249	VDXTBGF	VGCMAA5	VVL7AKP	VHV1NKR
Crimped cable lug	PK1	PK1	PK1	PK1	PK1	PK1	PK1	PK1
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

Note: When ordering please specify the 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)

Phase Connecting Elements for Switchgear Installations

Ball head caps and universal clamps

Connecting the phase cable end with universal clamp to a fixed ball point

- To be fitted to the phase cable end of single-pole to five-pole earthing and short-circuiting devices
- Anti-rotation cable lug of type PK1
- Other cable lengths can be configured online via the earthing and short-circuiting configurator

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

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100), threaded T pin shaft DIN 48087
Temperature range	– 25 °C ... + 55 °C
Material (clamp body)	Copper alloy/gal Sn
Material (shaft)	Copper alloy/gal Sn
Material (pressure plate)	Copper alloy/gal Sn / St/Zn

SK: Hexagon shaft

Two types of ball head caps are available:

– Rigid ball head cap

– Adjustable ball head cap (4x 90°)

The adjustable ball head cap allows the user to connect the earthing and short-circuiting device to fixed points that are installed in unfavourable positions. Thus, in the vast majority of cases, angled fixed ball points no longer have to be used.

Rigid ball head cap

Adjustable ball head cap (4 x 90°)

SQ: T pin shaft (bayonet locking mechanism)

*) Clamping range and maximum cable cross-section of universal clamps used for:			
Fixed ball point ∅	Phase T pin collar width	Rd / Fl clamping range	Cable cross-section
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm²
20 / 25 / 30 mm	15 / 18 mm	–	95 mm²
– / 25 / 30 mm	–	–	120 mm²

The clamps must have the same maximum short-circuit current as the earthing and short-circuiting cables!

Accessory, kit parts and spare parts from page 195

Phase Connecting Elements for Switchgear Installations

Phase Connecting Elements

Rigid Ball Head Cap, hexagon Shaft

Type	KKH 20 SK	KKH 25 SK
Part No.	772 310	772 320
For fixed ball point ∅	20 mm	25 mm
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Rigid Ball Head Cap, T Pin Shaft

Type	KKH 20 SQ	KKH 25 SQ
Part No.	772 311	772 321
For fixed ball point ∅	20 mm	25 mm
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Adjustable Ball Head Cap (4 x 90°), hexagon Shaft

Type	KKH 20 D SK	KKH 25 D SK
Part No.	772 330	772 340
For fixed ball point ∅	20 mm	25 mm
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Adjustable Ball Head Cap (4 x 90°), T Pin Shaft

Type	KKH 20 D SQ	KKH 25 D SQ
Part No.	772 331	772 341
For fixed ball point ∅	20 mm	25 mm
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Universal Clamp, hexagon Shaft

Type	UK 25 SK	UK 30 SK
Part No.	773 034	773 130
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

*) see table for clamping ranges and maximum cable cross-sections for universal clamps

Universal Clamp, T Pin Shaft

Type	UK 25 SQ	UK 30 SQ
Part No.	773 234	773 330
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

*) see table for clamping range and maximum cable cross-section for universal clamps

Accessory, kit parts and spare parts from page 195

Phase Connecting Elements for Overhead Lines up to ∅85 mm

Phase screw clamps for overhead line conductors ∅4 to 85 mm

Phase screw clamps used on an overhead line

- To be fitted to the phase cable end of single-pole and three-pole earthing and short-circuiting devices used for overhead lines
- Coupling aid for safe installation of the phase screw clamps on overhead line conductors
- Easy coupling due to spring-loaded clamp
- Anti-rotation cable lugs of type PK1 or PK2 and long threaded T pin shaft
- Earthing and short-circuiting devices can be configured online via the earthing and short-circuiting configurator

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

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100), threaded T pin shaft DIN 48087
Temperature range	– 25 °C ... + 55 °C
Material (pressure plate)	Aluminium alloy
Material (clamp body)	Aluminium alloy
Material (shaft)	Copper alloy/gal Sn or StSt
Material (coupling aid)	St/gal Zn

Phase screw clamp fitted with fixed coupling aid allows safe coupling

Spring-loaded phase screw clamp

Clamp with long shaft and earthing stick with aluminium cone coupling

Crimped cable lugs, type **PK1:**

Standard anti-rotation cable lug with cut-out.

Crimped cable lugs, type **PK2:**

Cable lug without cut-out for connecting parts from other manufacturers are available on request.

Accessory for Phase Connecting Elements

Two-pole Phase Connecting Plate

Two screw connections for phase screw clamps with anti-rotation cable lug of type PK1

Type	PAP 2 M12 SSM B13
Part No.	728 312
Anti-rotation cable lug	PK1
Max. short-circuit current I_k 0.5 s	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA

Accessory, kit parts and spare parts from page 195

Phase Connecting Elements for Overhead Lines up to ∅85 mm

Phase Connecting Elements

Standard Phase Screw Clamp

Short-circuit-proof, even in case of corroded overhead conductors due to weathering

Type	PSK 4 30 SQL	PSK 10 65 SQL
Part No.	784 201	784 301
Clamping range ∅	4 ... 30 mm	10 ... 65 mm
Anti-rotation cable lug	PK1	PK1
For cable cross-sections	16 ... 70 mm²	16 ... 120 mm²
Max. short-circuit current I_k 0.5 s	19.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	13.8 kA	23.7 kA

Phase Screw Clamp with Coupling Aid

Short-circuit-proof, even in case of corroded overhead conductors due to weathering

Type	PSK 4 30 SQL EH	PSK 10 65 SQL EH
Part No.	784 401	784 501
Clamping range ∅	4 ... 30 mm	10 ... 65 mm
Anti-rotation cable lug	PK1	PK1
For cable cross-sections	16 ... 70 mm²	16 ... 120 mm²
Max. short-circuit current I_k 0.5 s	19.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	13.8 kA	23.7 kA

Spring-loaded Phase Screw Clamp

Easy coupling due to spring-loaded clamp

Type	PSK FV 4 30 SQL
Part No.	784 480
Clamping range ∅	4 ... 30 mm
Anti-rotation cable lug	PK1
For cable cross-sections	16 ... 70 mm²
Max. short-circuit current I_k 0.5 s	19.5 kA
Max. short-circuit current I_k 1 s	13.8 kA

Phase Screw Clamp with wide Clamping Range

Ideally suited for use with Al and Al/St overhead conductors, pipes and fixed phase points

Type	PSK 10 85 SQL
Part No.	784 085
Clamping range ∅	10 ... 85 mm
Anti-rotation cable lug	PK2
For cable cross-sections	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	29.6 kA
Max. short-circuit current I_k 1 s	29.6 kA

Phase Screw Clamp

Ideally suited for angled positions

Type	PSK 10 32 SQL
Part No.	784 032
Clamping range ∅	10 ... 32 mm
Anti-rotation cable lug	PK2
For cable cross-sections	16 ... 95 mm²
Max. short-circuit current I_k 0.5 s	18.7 kA
Max. short-circuit current I_k 1 s	18.7 kA

Phase Screw Clamp with Safety Bow

Ideally suited for use in inclined positions

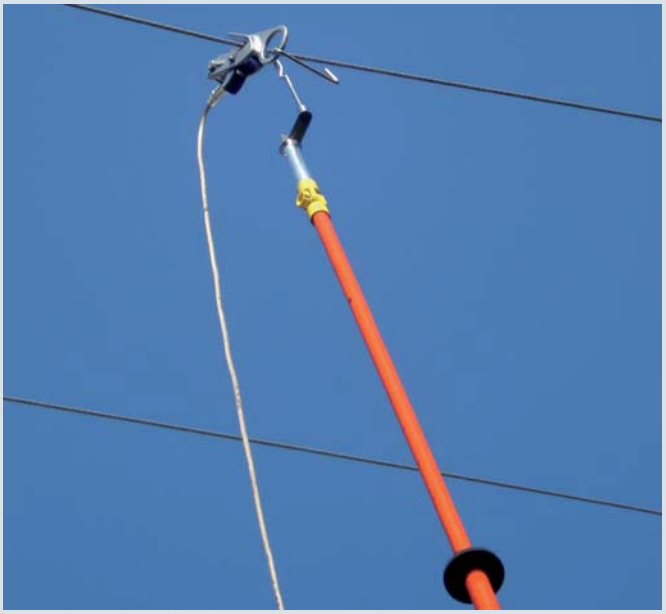
Type	PSK 10 32 SQL SB
Part No.	784 038
Clamping range ∅	10 ... 32 mm
Anti-rotation cable lug	PK2
For cable cross-sections	16 ... 95 mm²
Max. short-circuit current I_k 0.5 s	18.7 kA
Max. short-circuit current I_k 1 s	18.7 kA

The clamps must have the same maximum short-circuit current as the earthing and short-circuiting cables!

Accessory, kit parts and spare parts from page 195

Phase Connecting Elements for Overhead Lines up to ∅25 mm

Phase clamp for overhead line conductors ∅4 to 25 mm



Removal of a phase clamp using a single-pole coupling aid

- **Spring-loaded clamp for overhead lines without shaft**
- **Single-pole or three-pole coupling aid for easy coupling and removal of the clamp**
- **Light-weight construction**
- **With two screw connections for type PK1 cable lugs**
- **To be fitted to the phase cable end of single-pole to three-pole earthing and short-circuiting cables**

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (pressure plate)	Aluminium alloy
Material (clamp body)	Aluminium alloy
Material (tension spring)	St
Material (bolt)	StSt A2-70

Crimped cable lugs of type **PK1:**
Cable lug with cut-out mounted to the phase clamp

Crimped cable lugs of type **PK3:**
Anti-rotation hook-type cable lug mounted to a three-pole earthing busbar

Single-pole coupling aid:
with telescopic insulating stick. Recommended earthing cable cross-section between 16 mm² and max. 25 mm².

Three-pole coupling aid:
with earthing stick (T pin shafts) and lock nut for positioning the coupling aid in the cone coupling.

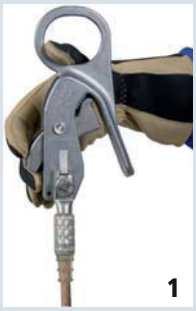
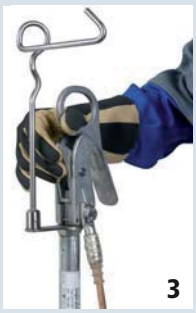


Figure **1** and **2**:
Biasing the clamp via the pressure plate



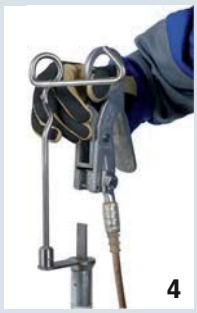


Figure **3** and **4**:
Attaching the clamp to the coupling aid

Accessory, kit parts and spare parts from page 195

Phase Connecting Elements for Overhead Lines up to ∅25 mm

Phase Connecting Elements

The pre-loaded clamp is connected by simply removing the coupling aid

Type	PK FV 4 25
Part No.	784 490
Clamping range ∅	4 ... 25 mm
Anti-rotation cable lug	PK1 / PK1
For cable cross-sections	16 ... 70 mm²
Max. short-circuit current I_k 0.5 s	13.8 kA
Max. short-circuit current I_k 1 s	13.8 kA

Accessory for Phase Connecting Elements

Single-pole Coupling Aid with Gear Coupling

For ISMTC N 36 ZK 10600 telescopic sticks for use from the ground

Type	EH1 PK FV ZK
Part No.	784 461
Total length	520 mm

Accessory for Phase Connecting Elements

Three-pole Coupling Aid with T Pin Shaft

For earthing sticks with bayonet locking mechanism for use from towers or aerial working platforms

Type	EH3 PK FV SQL
Part No.	784 463
Total length	500 mm

Earthing Kit

Type	ES 3P FL ER
Part No.	799 009
Length (drill)	1000 mm

Accessory, kit parts and spare parts from page 195

Phase Connecting Elements for Overhead Lines

Clamps with long shaft

Rigid ball head cap with long shaft and earthing stick

- To be fitted to the phase cable end of single-pole and three-pole earthing and short-circuiting devices used for overhead lines
- Long threaded T pin shaft for earthing sticks with robust aluminium cone coupling
- Anti-rotation cable lug of type PK1
- Other cable lengths can be configured online via the earthing and short-circuiting configurator

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

Clamp with long shaft and earthing stick with aluminium cone coupling

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100), threaded T pin shaft DIN 48087
Temperature range	– 25 °C ... + 55 °C
Material (clamp body)	Copper alloy/gal Sn
Material (shaft)	Copper alloy/gal Sn
Material (pressure plate)	Copper alloy/gal Sn / St/Zn

*) Clamping range and maximum cable cross-section of universal clamps used for:			
Fixed ball point ∅	Phase T pin collar width	Rd / Fl clamping range	Cable cross-section
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm²
20 / 25 / 30 mm	15 / 18 mm	–	95 mm²
– / 25 / 30 mm	–	–	120 mm²

Rigid Ball Head Cap, long T Pin Shaft

Type	KKH 20 SQL	KKH 25 SQL
Part No.	772 314	772 324
For fixed ball point ∅	20 mm	25 mm
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	3.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Universal Clamp, long T Pin Shaft

Type	UK 25 SQL	UK 30 SQL
Part No.	773 236	773 331
Clamping range	20 mm	30 mm
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

*) See table for the clamping range and max. cable cross-section of universal clamps

The clamps must have the same maximum short-circuit current as the earthing and short-circuiting cables!

Accessory, kit parts and spare parts from page 195

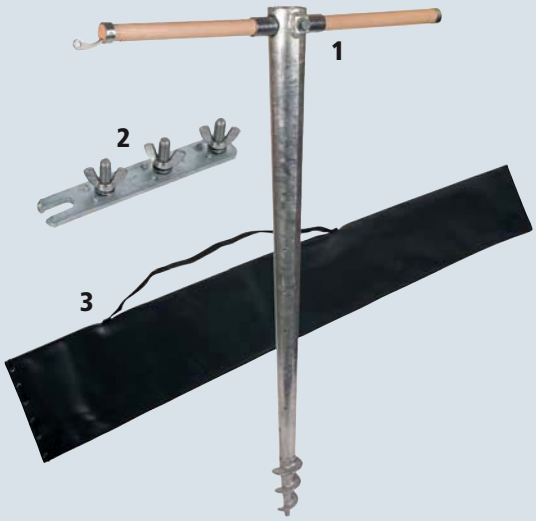
- For overhead line systems
- For driving the tubular earth electrode with drill into the ground
- Kit includes tubular earth electrode, three-pole earthing busbar and artificial leather bag

Crimped cable lugs, type **PK3:**
Anti-rotation hook-type cable lug mounted on a three-pole earthing busbar.

Earthing busbar and earthing cables mounted on a tubular earth electrode

General Information:	
Material (tubular earth electrode)	St/tZn
Material (bolt)	StSt (V2A)
Material (handle)	Wood
Material (earthing bar)	St/tZn

Kit includes:	
Pos. No.	Part No.
1	644 000
2	799 019
3	766 601
For more detailed information on these products, see Accessory chapter	



Accessory for Earthing Kit

Tubular earth electrode with drill

Part No.	644 000
Total length (l_G)	1000 mm
Military No.	VG 96953 T10 A0001
Supply No.	5975-12-120-0006

Three-pole Earthing Busbar

With slot for mounting the earthing busbar on the tubular earth electrode, for hook-type cable lug of type PK3

Type	ESS 3P M10 FM
Part No.	799 019
Dimensions	180 x 30 x 5 mm
Bolt	3x M10 x 35 mm

Type	ES 3P FL ER
Part No.	799 009
Total length (l_G)	1000 mm
Bolt	M10 x 35 mm

Earth Connecting Elements – Universal Earth Clamps

Clamping range 20 or 30 mm

Universal earth clamp with handle connected to a fixed ball point

- To be fitted to the earth cable end for connection to fixed ball points, T pins, round and flat conductors
- For wide clamping ranges up to 30 mm
- Anti-rotation cable lug of type PK1
- Earthing and short-circuiting devices can be configured online by means of the earthing and short-circuiting configurator

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

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (clamp body)	Copper alloy/gal Sn
Material (shaft)	Copper alloy/gal Sn
Material (pressure plate)	St/gal Zn

*) Clamping range and maximum cable cross-section of universal clamps used for:			
Fixed ball point ∅	Phase T pin collar width	Rd / Fl clamping range	Cable cross-section
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm²
20 / 25 / 30 mm	15 / 18 mm	–	95 mm²
– / 25 / 30 mm	–	–	120 mm²

Universal Clamps with Wing Bolt

Type	UEK 25 FS	UEK 30 FS
Part No.	774 034	774 130
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

*) See table for clamping ranges and maximum cable cross-sections of universal clamps

Universal Clamps with plastic Handle

Type	UEK 25 HG	UEK 30 HG
Part No.	774 234	774 330
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

*) See table for clamping ranges and maximum cable cross-sections of universal clamps

Universal Clamps with Tommy Bar

Type	UEK 25 SKN	UEK 30 SKN
Part No.	774 434	774 530
For fixed ball point ∅	20 / 25 mm	30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

*) See table for clamping ranges and maximum cable cross-sections of universal clamps

The clamps must have the same maximum short-circuit current as the earthing and short-circuiting cables!

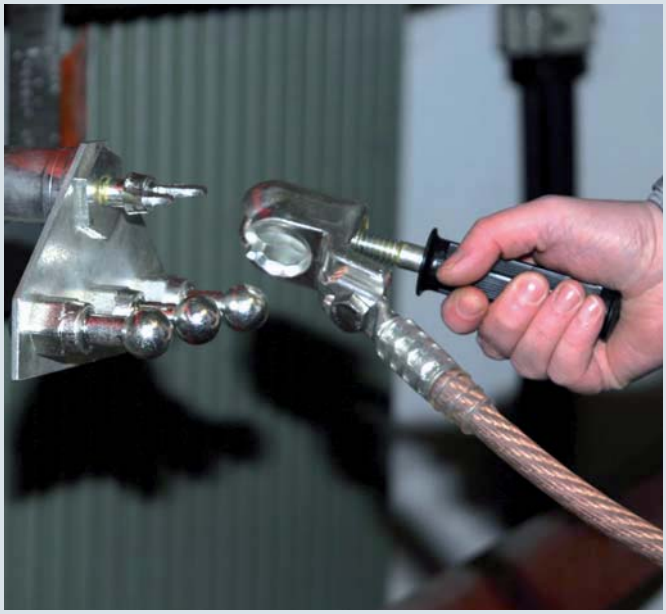
Accessory, kit parts and spare parts from page 195

Earth Connecting Elements – Ball Head Caps

∅20 or 25 mm, rigid

- To be fitted to the earth cable end for connection to fixed ball points (∅20 or 25 mm)
- Ball head cap with wing bolt or handle
- Anti-rotation cable lug of type PK1
- Earthing and short-circuiting devices can be configured online by means of the earthing and short-circuiting configurator

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



Ball head cap with handle to be connected to an earth connecting plate

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (clamp body)	Copper alloy/gal Sn
Material (shaft)	Copper alloy/gal Sn
Material (pressure plate)	Copper alloy/gal Sn

Rigid Ball Head Caps with Wing Bolt

Type	KKH 20 FS	KKH 25 FS
Part No.	772 312	772 322
For fixed ball point ∅	20 mm	25 mm
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Rigid Ball Head Caps with plastic Handle

Type	KKH 20 HG	KKH 25 HG
Part No.	772 313	772 323
For fixed ball point ∅	20 mm	25 mm
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

The clamps must have the same maximum short-circuit current as the earthing and short-circuiting cables!

Earth Connecting Elements – Earth Connectors

Earth connector with wing bolt

- To be fitted to the earth cable end for connection to M12/M16 connectors or ring groove (∅16 mm)
- Wing bolt or tommy bar
- Anti-rotation cable lug of type PK1 / PK2
- Earthing and short-circuiting devices can be configured online by means of the earthing and short-circuiting configurator

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (terminal lug)	E-Cu/gal Sn
Material (wing nut)	Copper alloy/gal Sn

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

Earth Connector with Wing Nut

Type	EAS EK FM 12	EAS EK FM 16
Part No.	775 621	775 631
Dimensions	M12	M16
Anti-rotation cable lug	PK1	PK1
For cable cross-sections	16 ... 150 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	42.0 kA	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA	29.6 kA

Earth Connector with Wing Bolt

Type	EAS EK FS 12	EAS EK FS 16
Part No.	775 626	775 636
Dimensions	M12 x 15 mm	M16 x 15 mm
Anti-rotation cable lug	PK1	PK1
For cable cross-sections	16 ... 150 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	42.0 kA	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA	29.6 kA

Earth Bushing with Wing Bolt

For fixed earthing points with ring groove

Type	EAB RN 16 FS
Part No.	790 150
Dimensions	∅16 mm
Anti-rotation cable lug	PK1
For cable cross-sections	16 ... 150*) mm²
Max. short-circuit current I_k 0.5 s	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA

*) For cable lengths > 4000 mm: max. up to 95 mm² (26.5 kA / 0.5 s)

Earth Bushing with Tommy Bar

For fixed earthing points with ring groove

Type	EAB RN 16 SKN
Part No.	790 160
Dimensions	∅16 mm
Anti-rotation cable lug	PK2
For cable cross-sections	16 ... 150**) mm²
Max. short-circuit current I_k 0.5 s	29.6 kA
Max. short-circuit current I_k 1 s	29.6 kA

**) Max. short-circuit current of 29.6 kA even in case of I_k 1 s

The clamps must have the same maximum short-circuit current as the earthing and short-circuiting cables!

Earth Connecting Elements – Earth Milling Clamps

- To be fitted to the earth cable end for connection to flat profiles up to 40 mm
- Milling plate, disc springs and long tommy bar for reliable contact
- Anti-rotation cable lug of type PK1
- Earthing and short-circuiting devices can be configured online by means of the earthing and short-circuiting configurator

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

Earth milling clamp used on a coated steel tower

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (clamp body)	MCI/gal Zn
Material (shaft)	Brass/gal Zn
Material (milling plate)	St, hardened/chrome-plated
Material (spring)	Spring steel

Earth Milling Clamp with Tommy Bar and Disc Springs

Type	EFK FL40 SKN
Part No.	792 190
Clamping range	Up to 40 mm
For cable cross-sections	25 ... 95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA

Earth Milling Clamp with Tommy Bar

Type	EFK FL30 SKN
Part No.	792 030
Clamping range	Up to 30 mm
For cable cross-sections	25 ... 50 mm²
Max. short-circuit current I_k 0.5 s	14.0 kA
Max. short-circuit current I_k 1 s	9.9 kA

The clamps must have the same maximum short-circuit current (I_k 0.5 s or I_k 1 s) as the earthing and short-circuiting cables!

Single-Part Earthing Sticks for Switchgear Installations

Earthing stick used for attaching an earthing and short-circuiting device to an installation

- For attaching earthing and short-circuiting devices
- Available in different lengths
- Light-weight construction
- Hexagon shaft (width across flats 19 mm) or T pin shaft

General Information:	
Standard	T pin shaft DIN 48087
Temperature range	– 25 °C ... + 55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap or plug-in coupling for extending the handle

Earthing sticks are hand-held insulating sticks for approaching clamps of earthing and short-circuiting devices to parts of electrical installations for earthing and short-circuiting purposes.
They consist of an insulating element, black ring, handle and coupling for attaching clamps. Earthing sticks have to be selected according to the **weight** of the earthing and short-circuiting device (see also "max. load on the 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 connecting component. It ensures that the user maintains the required safety distance and provides sufficient insulation. In installations exceeding 1 kV, the insulating element must have a minimum length of 500 mm.

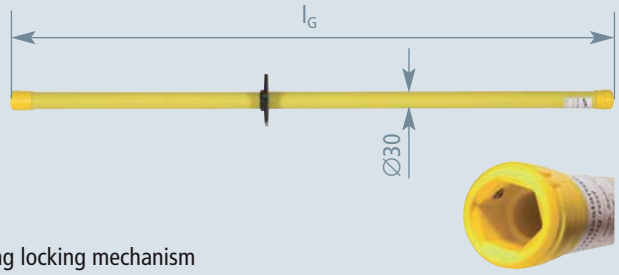
The plug-in coupling allows for easy handle extension of ES STK earthing sticks.

Earthing sticks with bayonet locking mechanism (T pin shaft) can also be used for clamps with hexagon shafts by attaching an AES SQ SK adapter is used.

Accessory, kit parts and spare parts from page 195

Single-Part Earthing Sticks for Switchgear Installations

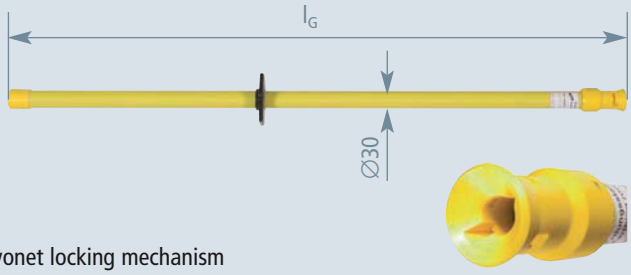
Earthing Stick, hexagon Shaft



Spring locking mechanism

Type	ES SK 1000	ES SK 1500
Part No.	761 010	761 015
Total length (l_G)	1000 mm	1500 mm
Length (handle) (l_H)	430 mm	930 mm
Max. load on the operating head	35 kg	35 kg

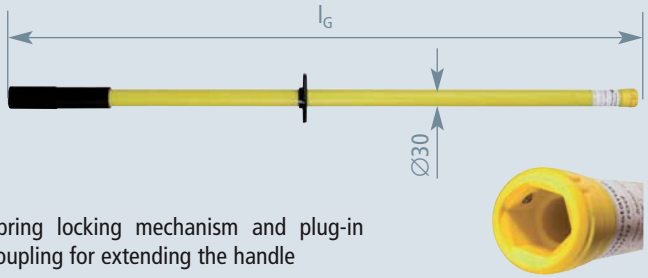
Earthing Stick, T Pin Shaft



Bayonet locking mechanism

Type	ES SQ 1000	ES SQ 1500
Part No.	761 011	761 016
Total length (l_G)	1000 mm	1500 mm
Length (handle) (l_H)	430 mm	930 mm
Max. load on the operating head	35 kg	35 kg

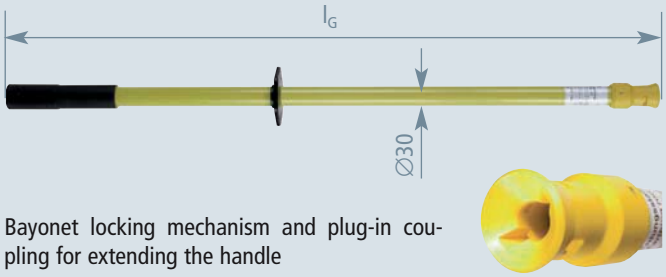
Earthing Stick, hexagon Shaft, plug-in Coupling



Spring locking mechanism and plug-in coupling for extending the handle

Type	ES SK STK 1000	ES SK STK 2000
Part No.	761 001	761 003
Total length (l_G)	1000 mm	2000 mm
Length (handle) (l_H)	430 mm	1430 mm
Max. load on the operating head	35 kg	20 kg

Earthing Stick, T Pin Shaft, plug-in Coupling



Bayonet locking mechanism and plug-in coupling for extending the handle

Type	ES SQ STK 1000	ES SQ STK 2000
Part No.	761 002	761 004
Total length (l_G)	1000 mm	2000 mm
Length (handle) (l_H)	430 mm	1430 mm
Max. load on the operating head	35 kg	20 kg

Accessory for Single-Part Earthing Sticks for Switchgear Installations

Adapter with hexagon Shaft / T Pin Shaft

Suitable for insertion into earthing sticks with coupling for T pin shafts (bayonet locking mechanism) to accept clamps with hexagon shaft.

The lock nut allows to fix the adapter on the earthing stick.

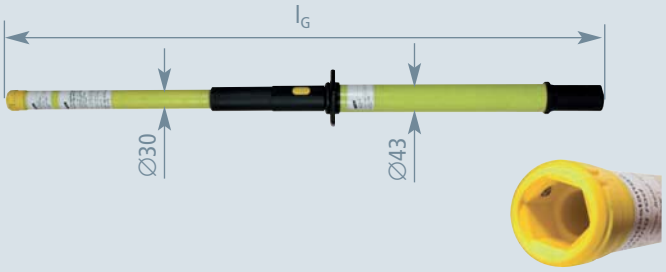
Type	AD ES SQ SK
Part No.	765 001
Length	130 mm

Two-Part Earthing Sticks for Switchgear Installations

- For attaching earthing and short-circuiting devices
- Modular for easy transport
- Light-weight construction
- Hexagon shaft (width across flats 19) or T pin shaft

General Information:	
Standard	T pin shaft DIN 48087
Temperature range	– 25 °C ... + 55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
End fitting	Plug-in coupling for extending the handle

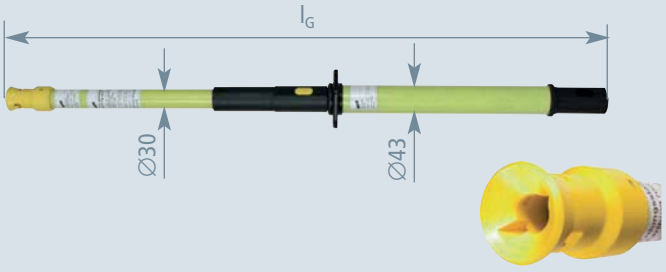
Earthing Stick, hexagon Shaft



Spring locking mechanism and plug-in coupling for extending the handle

Type	EST SK STK 920
Part No.	761 070
Total length (l_G)	920 mm
Handle length (l_H)	415 mm
Max. load on the operating head	35 kg

Earthing Stick, T Pin Shaft



Bayonet locking mechanism and plug-in coupling for extending the handle

Type	EST SQ STK 920
Part No.	761 075
Total length (l_G)	920 mm
Handle length (l_H)	415 mm
Max. load on the operating head	35 kg

Accessory, kit parts and spare parts from page 195

Telescopic Earthing Sticks for Overhead Lines

- For use in outdoor installations
- Robust aluminium cone coupling
- Telescopic stick, length gradually adjustable
- For phase screw clamps and clamps with long T pin shaft

Earthing stick with aluminium cone coupling used for clamps with long shaft in accordance with DIN 48087.

A square tube (26 mm) can be pulled out of the round insulating tube and can be fixed in any position between l_{min} and l_{max} using the star-shaped handle.

Telescopic earthing stick with aluminium cone coupling and phase screw clamp

End fitting with eye (Al/rubber) or plug-in coupling with eye (Al/rubber) for extending the handle

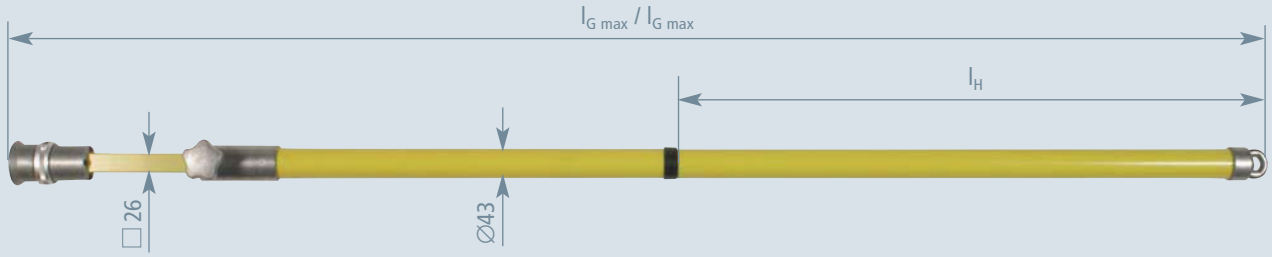
Lockable adjusting ring
The adjusting ring on the cone has the following functions:

– Position "AUF" (= OPEN): Stick can be removed from the clamp after the earthing and short-circuiting device has been attached
– Position "ZU" (= CLOSED): Stick and clamp remain coupled even after the earthing and short-circuiting device has been attached

General Information:	
Temperature range	– 25 °C ... + 55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (threaded coupling, star-shaped handle)	Aluminium alloy
End fitting	Aluminium/rubber eye / Plug-in coupling for extending the handle

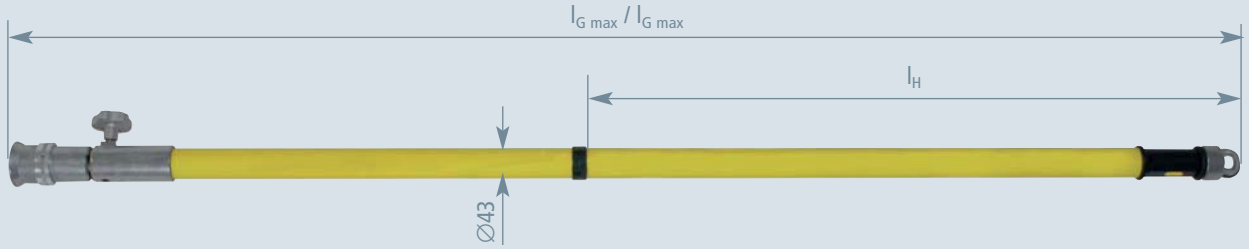
Telescopic Earthing Sticks for Overhead Lines

Telescopic Earthing Stick, T Pin Shaft



Type	ESTC SQL 4000	ESTC SQL 5000
Part No.	**769 400**	**769 500**
Total length ($l_{G\,max}$/ $l_{G\,min}$)	4000 / 2170 mm	5000 / 2670 mm
Length (handle) (l_H)	1400 mm	1900 mm
Max. load on the operating head (l_{max}/ l_{min})	12 / 35 kg	10 / 35 kg

Telescopic Earthing Stick, T Pin Shaft, plug-in Coupling



Type	ESTC SQL STK 3000
Part No.	**769 300**
Total length ($l_{G\,max}$/ $l_{G\,min}$)	3000 / 1670 mm
Length (handle) (l_H)	900 mm
Max. load on the operating head (l_{max}/ l_{min})	18 / 35 kg

Accessory, kit parts and spare parts from page 195

Multi-Part Earthing Sticks for Overhead Lines

- For outdoor use
- Robust aluminium cone coupling
- Postive and non-positive threaded coupling
- Transport length of 1500 mm
- Total lengths up to 6000 mm
- For phase screw clamps and clamps with long T pin shaft

Earthing stick with aluminium cone coupling for clamps with long shaft according to DIN 48087

Earthing stick consisting of a top section, intermediate section and end fitting

Robust aluminium threaded coupling allows positive and non-postive connection due to the screw connection and gearing

Lockable adjusting ring
The adjusting ring on the cone has the following functions:

– Position "AUF" (= OPEN): Stick can be removed from the clamp after the earthing and short-circuiting device has been attached
– Position "ZU" (= CLOSED): Stick and clamp remain coupled even after the earthing and short-circuiting device has been attached

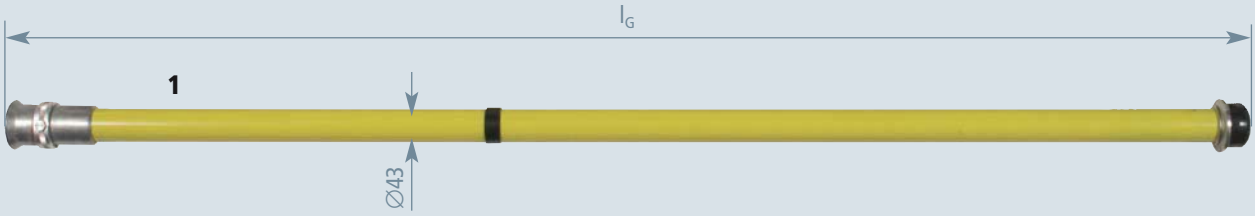
General Information:	
Temperature range	– 25 °C ... + 55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (threaded coupling)	Aluminium alloy
Material (end fitting)	Al/rubber eye

Multi-Part Earthing Sticks for Overhead Lines

Possible combinations:
- Top section (**1**) only
- Top section (**1**) + end fitting (**3**)
- Top section (**1**) + max. 2 intermediate sections (**2**) + end fitting (**3**)

Load values for extendible earthing sticks:		
Total length l_G	**Pos. No.**	**Max. load on operating head**
6000 mm	1+2+2+3	8 kg
4500 mm	1+2+3	15 kg
3000 mm	1+3	30 kg
1500 mm	1	35 kg

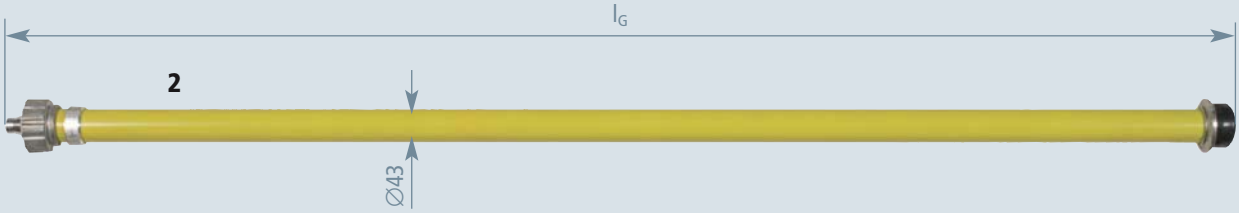
Telescopic Earthing Stick – Top Section



With plastic cap above the coupling element

Type	**EST KS SQL 1500**
Part No.	**769 503**
Diameter	43 mm
Total length (l_G)	1500 mm

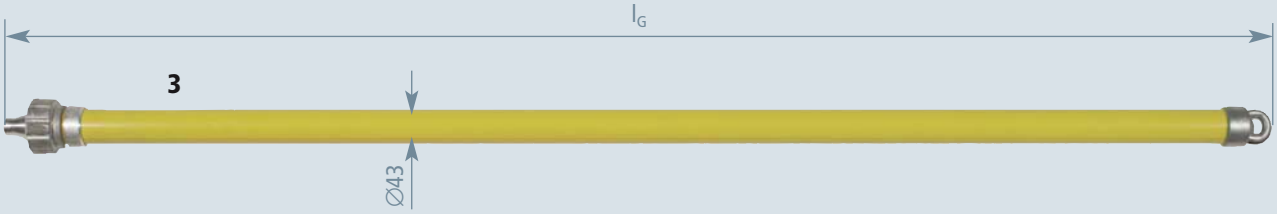
Telescopic Earthing Stick – Intermediate Section



With plastic cap above the coupling element

Type	**EST ZS 1500**
Part No.	**769 504**
Diameter	43 mm
Total length (l_G)	1500 mm

Telescopic Earthing Stick – End Fitting



With aluminium / rubber eye

Type	**EST ES 1500**
Part No.	**769 505**
Diameter	43 mm
Total length (l_G)	1500 mm

Accessory, kit parts and spare parts from page 195

DEHN Form No. 2151/E/0412

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

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

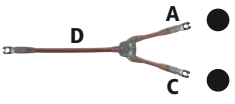
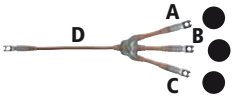
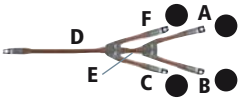
EaS Configurator: www.dehn.de/en/euk

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: 250 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 Accessory (optional) (see easy choice):

☐ **Earthing stick**	Type or Part No.

DEHN + SÖHNE GmbH + Co.KG.
Hans-Dehn-Str. 1
Postfach 1640
92306 Neumarkt
Germany
Tel. +49 9181 906-0
Fax +49 9181 906-1444
info@dehn.de
www.dehn.de
Technical Support:
Tel. +49 9181 906-1510

Easy Choice – Phase Connecting Elements and Earthing Sticks

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

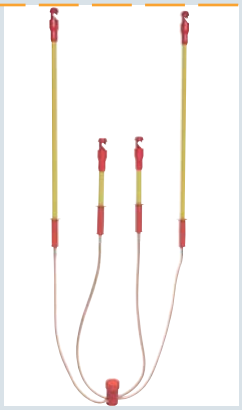
Accessory, kit parts and spare parts from page 195

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	Max. short-circuit current
							I_k 0.5 s	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	Phase T Pin Collar width	Rd / Fl Clamping range	Max. cable cross-section	Max. short-circuit current	Max. short-circuit current
				I_k 0.5 s	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

Equipment for Voltages up to 1000 V

Device	Nominal voltage U_N	Application	Page	
Earthing and Short-circuiting Device, fully insulated, Type VI	up to 1000 V	Fully insulated, shock-proof version Earthing cartridges with T connection Fully equipped kit for cable distribution cabinets	114	
Earthing and Short-circuiting Device, partly insulated, Type TI	up to 1000 V	Earthing cartridges with M10 connection Screw-in earthing insert for D-type fuse links Fully equipped kit for cable distribution cabinets	116	
Earthing and Short-circuiting Device **For crane conductor bars**	up to 1000 V	Allows to lock the clamping range For insulated or uninsulated conductor bars	119	
Earthing and Short-circuiting Device **For overhead lines up to ∅12 mm**	up to 1000 V	Insulated clamps for overhead conductors 4-pole version, extendible up to 6 poles Reliable conductivity due to a copper bar in the insulating tube	120	
Earthing and Short-circuiting Device **For street lighting systems**	up to 1000 V	For D-type fuse links of junction and fuse boxes of street lighting systems Fully equipped kit	121	
Earthing Handle	up to 1000 V	For applying earthing and short-circuiting devices in low-voltage installations End fitting with plug-in coupling for handle extension Light-weight construction Hexagon shaft or T pin shaft	122	
SPN **Two-pole Voltage Detector**	100 ... 500 V 120 ... 1000 V	For use in wet weather conditions 2 versions with different measuring ranges No batteries required Can also be used in overhead line networks by attaching extension prods	123	
Storage Bags and Transport Cases		Sheet metal or plastic case Artificial leather or canvas bag	187	

Accessory, kit parts and spare parts from page 195

Three-pole Earthing and Short-Circuiting Kit VI

Kit for low-voltage installations, fully insulated type VI

Attaching a fully insulated earthing and short-circuiting device using an earthing handle of type VI

- Fully insulated, shock-proof version
- Fully equipped kit for cable distribution cabinets
- Safe operation with insulated earthing handle of type VI (with dual function), suitable for both inserting and removing earthing cartridges with T connection as well as for attaching earthing and short-circuiting devices (EaS devices)
- Waterproof, plastic-sheathed cable entry and node unit, additionally protected against twisting
- Other cable lengths can be selected online via the earthing and short-circuiting configurator

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

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C

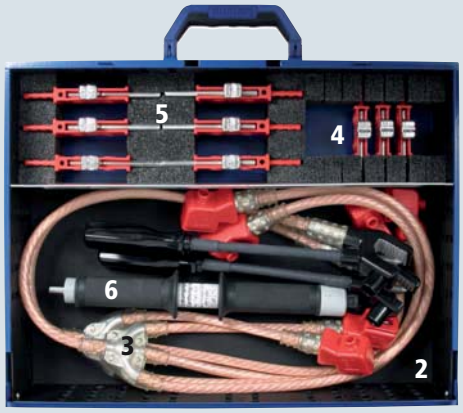
Earthing cartridge with T connection, fully insulated connector and earthing handle. Longer T pin for moving the connection point forward for lower situated NH fuse holders is available on request.

Kit in plastic Case

Type	EKS VI 2F KVS KK
Part No.	745 903
Variant No. of the earthing and short-circuiting device	V162LDM
Dimensions	445 x 345 x 100 mm

Note: When ordering please specify the Variant No.

Kit in Sheet Metal Case



Type	EKS VI 2F KVS SBK
Part No.	745 901
Variant No. of the earthing and short-circuiting device	V162LDM
Dimensions	440 x 330 x 100 mm

Note: When ordering please specify the Variant No.

Accessory, kit parts and spare parts from page 195

Plastic Case, empty

With foam padding

Type	KKL EKS VI KVS
Part No.	745 902
Dimensions	445 x 345 x 100 mm


1

Sheet Metal Case, empty

With foam padding

Type	SBKL EKS VI KVS
Part No.	745 900
Dimensions	440 x 330 x 100 mm


2

Earthing and Short-Circuiting Device VI, Earth Clamp with flexible adjustable Handle

Adjustable handle with two positions, clamping range up to 20 mm, for cable distribution cabinets

Type	EKV3 25VI DG	EKV3 35VI DG
Part No.	745 325	745 335
Variant No.	V162LDM	VE5K3HM
Cable cross-section	25/25 mm²	35/35 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA	10.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	6.9 kA

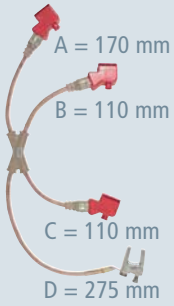
Note: When ordering please specify the Variant No.

Earthing and Short-Circuiting Device VI, spring-loaded Earth Clamp

Clamping range up to 24 mm, installation via adjustable handle (Part No. 745 921), for service entrance boxes

Type	EKV3 16VI EK
Part No.	745 340
Variant No.	VZPW9LG
Cable cross-section	16/16 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA
Max. short-circuit current I_k 1 s	3.2 kA

Note: When ordering please specify the Variant No.



VI Earthing Handle

With dual function

- For installing earthing cartridges with T connection into NH fuse holders
- For connecting VI earthing and short-circuiting devices to earthing cartridges

Type	EG 00 4A VI
Part No.	745 922
Length	285 mm


6

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting spring-loaded earth clamps

Type	DGF EKV VI
Part No.	745 921
Length	290 mm

Plastic Case, empty

With foam padding and hook-and-loop fastener

Type	KK 56 41 17 EK VI TI
Part No.	745 952
Dimensions	565 x 410 x 170 mm

Earthing and Short-Circuiting Device VI, spring-loaded Earth Clamp

Clamping range up to 24 mm, installation via adjustable handle (Part No. 745 921), for cable distribution cabinets

Type	EKV3 25VI EK	EKV3 35VI EK
Part No.	745 326	745 336
Variant No.	VMRSJWD	VEH4JQY
Cable cross-section	25/25 mm²	35/35 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA	10.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	6.9 kA

Note: When ordering please specify the Variant No.

Spring-loaded compact Clamp

With T connection and hexagon bolt (width A/F 10) for installation via VI earthing handle and fixation via flexible shaft

Type	KK TA 0 24 SK10
Part No.	745 503
Clamping range	Up to 24 mm
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA

NEW

NH 00 Earthing Cartridges

With T connection for installation into NH fuse holders and blocks of size NH 00

For use with VI earthing handle

Type	EP NH00 VI TA
Part No.	745 905
Size	00
Max. cable cross-section	35 mm²
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA


4

NH 1 ... 3 Earthing Cartridges

With T connection for installation into NH fuse holders and blocks of size NH 1 ... 3

For use with VI earthing handle

Type	EP NH1 3 VI TA
Part No.	745 910
Size	1 ... 3
Max. cable cross-section	35 mm²
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA


5

NH 4a Earthing Cartridges

Type	EP NH4A VI TA
Part No.	745 915
Size	4a
Max. cable cross-section	35 mm²
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA

Three-pole Earthing and Short-Circuiting Kit TI

Kit for low-voltage installations, partly insulated type TI

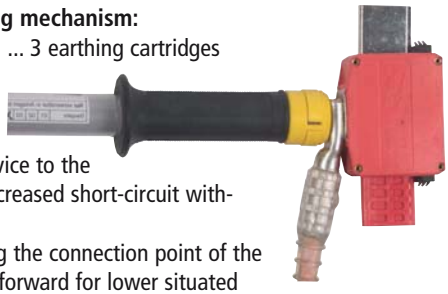
Attaching a partly insulated earthing and short-circuiting device using an earthing handle of type TI

- Fully equipped kit for cable distribution cabinets
- Safe operation with insulated earthing handle of type TI (with dual function), suitable both for installing and removing earthing cartridges with M10 connection as well as for attaching earthing and short-circuiting devices (EaS devices)
- Waterproof, plastic-sheathed cable entry and node unit, additionally protected against twisting
- Other cable lengths can be selected online via the earthing and short-circuiting configurator

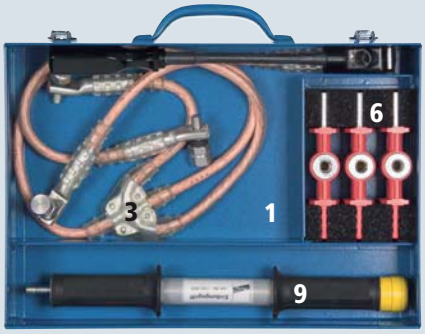
EaS Configurator: www.dehn.de/en/euk

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C

Additional locking mechanism:
The claws of size 1 ... 3 earthing cartridges spread out when attaching the earthing and short-circuiting device to the NH fuse holder (increased short-circuit withstand capability).
Adapter for moving the connection point of the earthing cartridge forward for lower situated NH fuse holders is available on request.



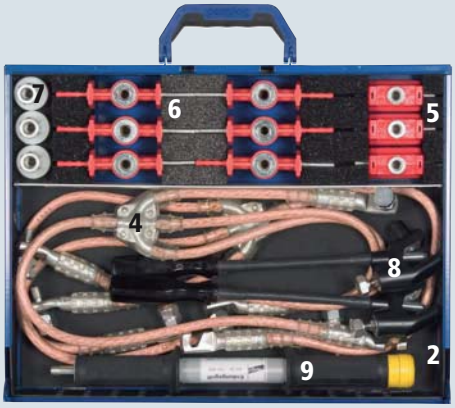
Kit I in Sheet Metal Case



Type	EKS TI KVS SBK
Part No.	766 302
Variant No. of the earthing and short-circuiting device	VSUN6NV
Dimensions	380 x 260 x 80 mm

Note: When ordering please specify the Variant No.

Kit II in Sheet Metal Case



Type	EKS TI 2F KVS SBK
Part No.	745 500
Variant No. of the earthing and short-circuiting device	VUKMT58
Dimensions	440 x 330 x 66 mm

Note: When ordering please specify the Variant No.

Other cable lengths or customised kits are available on request.

Accessory, kit parts and spare parts from page 195

Sheet Metal Case, empty


1

Type	SBKL EKS TI KVS
Part No.	766 300
Colour	Blue
Dimensions	380 x 260 x 80 mm

Sheet Metal Case, empty

With foam padding


2

Type	SBKL EKS TI KVS 2F
Part No.	766 298
Colour	Blue
Dimensions	440 x 330 x 66 mm

Earthing and Short-Circuiting Device TI, Earth Clamp with flexible adjustable Handle

Adjustable handle with two positions, clamping range up to 20 mm, for cable distribution cabinets

Type	EKV3 25TI DG	EKV3 35TI DG
Part No.	745 345	745 346
Variant No.	VSUN6NV	VSHDQZB
Cable cross-section	25/25 mm²	35/35 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA	10.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	6.9 kA

Note: When ordering please specify the Variant No.

Earthing and Short-Circuiting Device TI with hook-shaped Cable Lug on the Earth Cable End

For installation of earth clamps Part No. 745 602 or 745 502, for cable distribution cabinets

Typ EKV3 ...	16TI HK	25TI HK	35TI HK
Part No.	745 358	745 359	745 360
Variant No.	V3RQASE	VUKMT58	VDZ2VDX
Cable cross-section	16/16 mm²	25/25 mm²	35/35 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA
Max. short-circuit current I_k 1 s	3.2 kA	4.9 kA	6.9 kA

Note: When ordering please specify the Variant No.

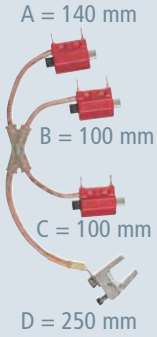
Earthing and Short-Circuiting Device TI, spring-loaded Earth Clamp

Clamping range up to 24 mm and fixation via adjustable handle (Part No. 745 921),

fixed earthing cartridges of size 00 on the phase cable end, for service entrance boxes

Type	EKV3 NH00 TI
Part No.	745 365
Variant No.	V1RC3P2
Cable cross-section	16/16 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA
Max. short-circuit current I_k 1 s	3.2 kA

Note: When ordering please specify the Variant No.



Earthing and Short-Circuiting Device TI, spring-loaded Earth Clamp

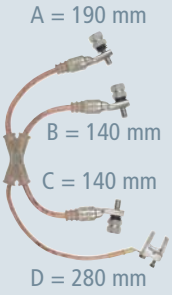
Clamping range up to 24 mm and fixation via adjustable handle (Part No. 745 921),

screw-on cable lugs with M10 hexagon pin on the phase cable end,

to be screwed onto earthing cartridges with M10 connection of service entrance boxes

Type	EKV3 16TI EK
Part No.	745 363
Variant No.	VSB29AH
Cable cross-section	16/16 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA
Max. short-circuit current I_k 1 s	3.2 kA

Note: When ordering please specify the Variant No.



NH 00 Earthing Cartridges

With M10 connection for insertion into NH fuse holders and blocks of size NH 00

For use with TI earthing handle

Type	EP NH00 TI M10
Part No.	745 302
Size	00
Max. cable cross-section	35 mm²
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA


5

NH 1 ... 3 Earthing Cartridges

With M10 connection for insertion into NH fuse holders and blocks of size NH 1 ... 3

For use with TI earthing handle

Type	EP NH1 3 TI M10
Part No.	745 018
Size	1 ... 3
Max. cable cross-section	35 mm²
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA


6

NH 4a Earthing Cartridges

With M10 connection for insertion into NH fuse holders and blocks of size NH 4a

For use with TI earthing handle (Part No. 745 400/S03)

Type	EP NH4A TI M10
Part No.	745 016
Size	4a
Max. cable cross-section	35 mm²
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA

NH 1 ... 3 Earthing Cartridges with Grip Lugs

With M10 connection for use with TI earthing handle or NH fuse handle with sleeve (Part No. 785 645)

Type	EP NH1 3 TI GL M10
Part No.	745 017
Size	1 ... 3
Max. cable cross-section	35 mm²
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA

Three-pole Earthing and Short-Circuiting Kit TI

Kit Parts

Screw-in Earthing Insert with M10 Connection, insulated

Insulated thread

To be screwed into E27 and E33 threaded fuse holders using a TI earthing handle

7

Type	ESE E27 TI M10	ESE E33 TI M10
Part No.	745 201	745 202
Size	E27	E33
Conctact pin	Brass/gal CuSn	Brass/gal CuSn
Thread	Plastic	Plastic
Max. cable cross-section	25 mm²	25 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA	7.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	4.9 kA

Screw-in Earthing Insert with M10 Connection

Conductive thread

To be screwed into E27 and E33 threaded fuse holders using TI earthing handle

Type	ESE E27 KBI M10	ESE E33 KBI M10
Part No.	745 203	745 204
Size	E27	E33
Contact pin	Plastic	Plastic
Thread	Brass/gal CuSn	Brass/gal CuSn
Max. cable cross-section	25 mm²	25 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA	7.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	4.9 kA

Earth Clamp with flexible adjustable Handle and two Setting Positions

To be connected to the earth cable end of earthing and short-circuiting devices for cable distribution cabinets, with M8 terminal stud, protection against twisting and nut

8

Type	EK I FL20 DGF
Part No.	745 602
Clamping range	Up to 20 mm

Bare Earth Clamp with Wing Bolt

To be connected to the earth cable end of earthing and short-circuiting devices for cable distribution cabinets, with M8 bolt, protection against twisting and nut

Type	EK FL20 FS
Part No.	745 502
Clamping range	Up to 20 mm

TI Earthing Handle

With dual function

- For installing earthing cartridges or screw-in earthing inserts with M10 terminal
- For connecting TI earthing and short-circuiting devices to earthing cartridges (socket wrench insert size 19)

9

Type	EG TI EKV
Part No.	745 400
Length	355 mm

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting spring-loaded earth clamps

Type	DGF EKV VI
Part No.	745 921
Length	290 mm

Plastic Case, empty

With foam padding and hook-and-loop fastener

Type	KK 56 41 17 EK VI TI
Part No.	745 952
Dimensions	565 x 410 x 170 mm

Accessory, kit parts and spare parts from page 195

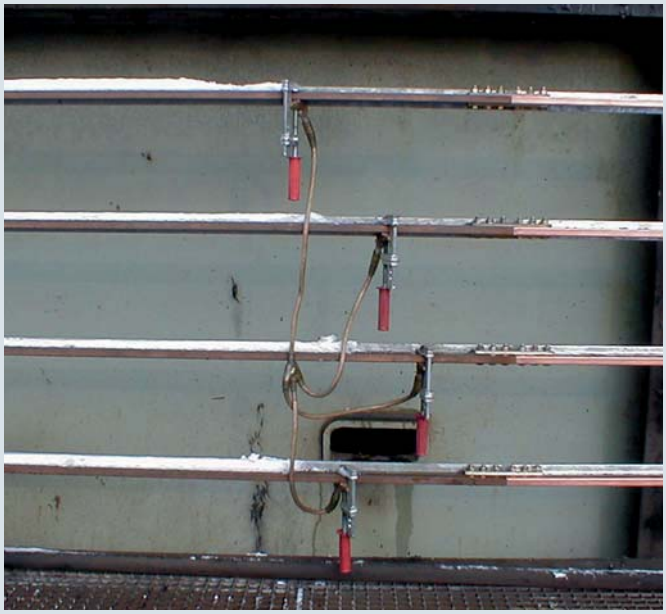
Three-pole Earthing and Short-Circuiting Devices

Equipment for Voltages up to 1000 V

With clamps for crane conductor bars

- For insulated or uninsulated conductor bars of cranes and lifting equipment
- Allows to lock the clamping range of the clamps in several positions
- Waterproof, plastic-sheathed cable entries and node unit, with additional protection against twisting
- Other cable lengths can be selected online via the earthing and short-circuiting configurator

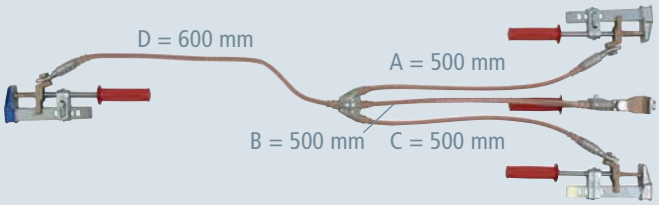
EaS Configurator: www.dehn.de/en/euk

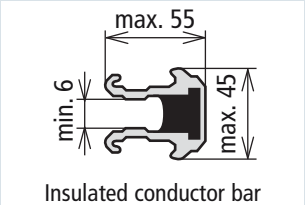


Three-pole earthing and short-circuiting device with clamps

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (clamp body)	MCI/gal Zn
Material (pressure plates)	Copper alloy
Material (short-circuiting cables)	Highly flexible copper

With Clamps for insulated Conductor Bars



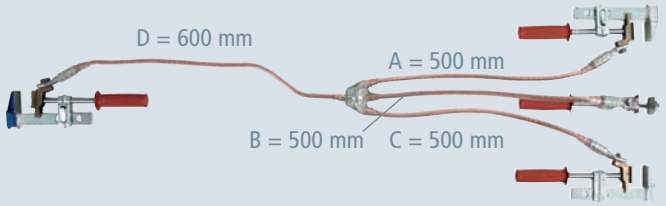


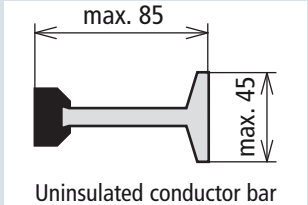
Insulated conductor bar

Type	EKV3 25IS ZK	EKV3 35IS ZK	EKV3 50IS ZK
Part No.	745 370	745 371	745 372
Variant number	VH8QTCZ	VKB2Q6J	VP6YV4T
Clamping range	55 mm	55 mm	55 mm
Cable cross-section	25/25 mm²	35/35 mm²	50/50 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA	10.0 kA	14.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	6.9 kA	9.9 kA

Note: When ordering please specify the Variant No.

With Clamps for uninsulated Conductor Bars





Uninsulated conductor bar

Type	EKV3 25BS ZK	EKV3 35BS ZK
Part No.	745 375	745 376
Variant number	VQKTK4T	VN63A91
Clamping range	85 mm	85 mm
Cable cross-section	25/25 mm²	35/35 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA	10.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	6.9 kA

Note: When ordering please specify the Variant No.

The clamp for the PEN conductor is marked in blue.

Four-pole to six-pole Earthing and Short-Circuiting Devices

For low-voltage overhead conductors up to ∅12 mm (95 mm²)

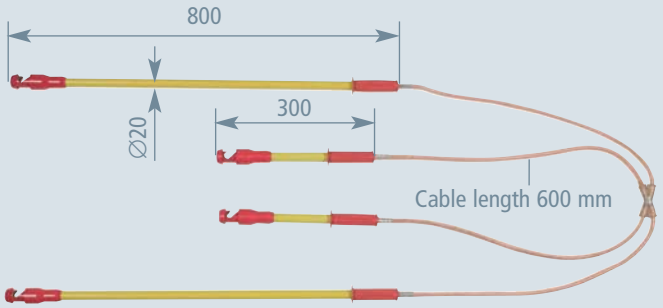
Sample construction of a four-pole short-circuiting device

- **Insulated screw clamps for overhead conductors**
- **Four-pole version, extendible up to six poles**
- **Reliable conductivity due to copper bar in the insulating tube**

The devices have an insulated threaded stick (with handle) for safe contact with the overhead lines and for fast installation (reliable contact due to spring-loaded screw clamp) at the overhead conductors.
The fully insulated device is available as four-pole (with fixed node unit), five-pole or six-pole version (with extendible node unit).

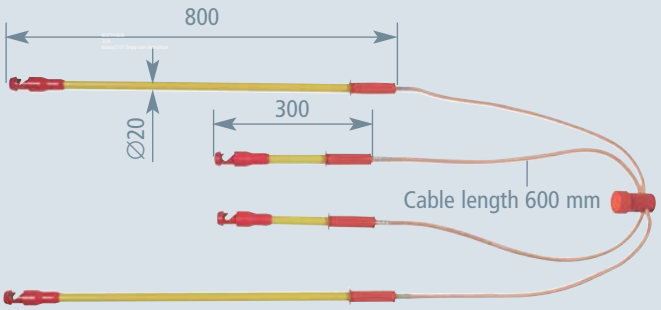
General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
Length (insulating tube)	2x 300 mm, 2x 800 mm
Material (clamp body)	Copper alloy, insulated
Material (short-circuiting cables)	Highly flexible copper
Length (short-circuiting cables)	600 mm

Four-pole Node Unit



Type	KV4 25 NSFL ISK95
Part No.	742 225
Cable cross-section	25 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA
Max. short-circuit current I_k 1 s	4.9 kA

Four-pole Node Unit, extendable up to five to six-pole



Type	KV4 25 NSFL ISK95 E
Part No.	742 425
Cable cross-section	25 mm²
Max. short-circuit current I_k 0.5 s	7.0 kA
Max. short-circuit current I_k 1 s	4.9 kA

Other cable or insulating tube length are available on request.

Additional single-pole Conductors

Type	ZA 25 ISK95 300	ZA 25 ISK95 800
Part No.	740 300	740 800
Cable cross-section	25 mm²	25 mm²
Length(insulating tube)	300 mm	800 mm
Max. short-circuit current I_k 0.5 s	7.0 kA	7.0 kA
Max. short-circuit current I_k 1 s	4.9 kA	4.9 kA

Accessory, kit parts and spare parts from page 195

Three-pole Earthing and Short-Circuiting Kit for Street Lighting Systems

Equipment for Voltages up to 1000 V

- For junction and fuse boxes of street lighting systems
- For E14 fuse links
- E27 to E14 aluminium adapter
- Max. backup fuse 32 A power circuit breaker (B characteristic)

Type	EKV ÜGK MB S
Part No.	745 105
Dimensions	395 x 295 x 105 mm

Earthing and short-circuiting device installed at a junction and fuse box of a street lighting mast

Accessory for Earthing and Short-Circuiting Kit

E27 / E14 Adapter

Reducing insert for converting from E27 to E14 threads
Allows to use earthing and short-circuiting devices with E14 screw-in earthing inserts even for E27 threads

Type	RED E27 E14 ÜGK MB
Part No.	745 108
Dimensions	∅30 x 25 mm
Material	Aluminium

Installation Adapter

For installing E27 / E14 adapters and gauge rings for D-fuses DII and DIII

Type	PSS DII
Part No.	745 109
Dimensions	∅30 x 110 mm
Material	Plastic

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert
For connecting spring-loaded earth clamps

Type	DGF EKV VI
Part No.	745 921
Length	290 mm

Accessory for Earthing and Short-Circuiting Kit

Plastic Case, empty

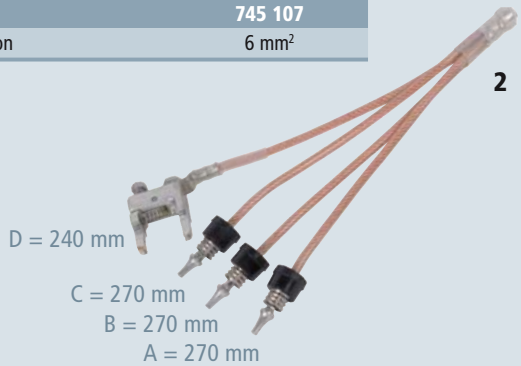
With foam padding

Type	KKL EKV ÜGK MB
Part No.	745 106
Dimensions	395 x 295 x 105 mm

Earthing and Short-Circuiting device for Street Lighting Systems

With 3 fixed E14 screw-in earthing inserts and spring-loaded earth clamp, clamping range up to 24 mm (fixation using an adjustable handle, Part No. 745 921)

Type	EKV ÜGK MB
Part No.	745 107
Cable cross-section	6 mm²



Accessory, kit parts and spare parts from page 195

Earthing Handle

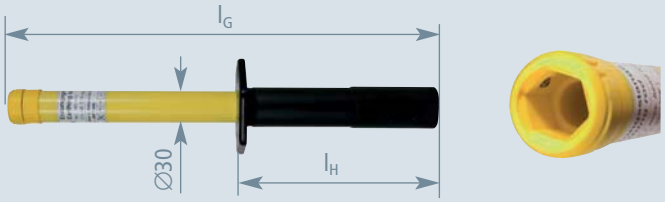
For low-voltage installations

Applying an earthing and short-circuiting device in a low-voltage switchgear installation using an earthing handle

- For applying earthing and short-circuiting devices in low-voltage installations
- End fitting with plug-in coupling for handle extension
- Light-weight construction
- Hexagon shaft (width across flats 19) or T pin shaft

General Information:	
Standard	T pin shaft DIN 48087
Temperature range	– 25 °C ... + 55 °C
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (coupling)	Plastic
Material (end fitting)	Plug-in coupling for extending the handle

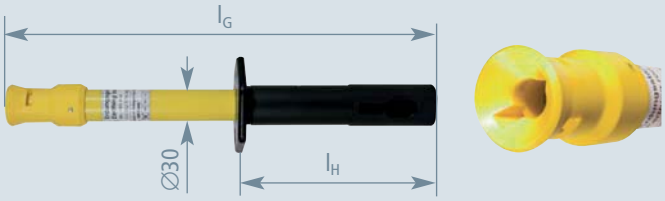
Earthing Handle, STK hexagon shaft



Spring locking mechanism and plug-in coupling for extending the handle

Type	EG SK STK 400
Part No.	745 415
Total length (l_G)	400 mm
Length (handle) (l_H)	185 mm

Earthing Handle, STK T Pin shaft



Bayonet locking mechanism and plug-in coupling for extending the handle

Type	EG SQ STK 400
Part No.	745 414
Total length (l_G)	400 mm
Length (handle) (l_H)	185 mm

Accessory, kit parts and spare parts from page 195

Two-pole SPN Voltage Detector

Equipment for Voltages up to 1000 V

Nominal voltages up to 1000 V

- Extremely shock-resistant, waterproof and dust-proof enclosure
- Sensor with easily identifiable switching point
- Two versions with different measuring ranges
- For use in overhead line networks by attaching extension prods
- No batteries required
- Safe two-hand operation
- CAT IV offers maximum safety against impulse voltage

Two-pole SPN voltage detector used with extension prods for overhead lines

Each handle of the voltage detector is fitted with a test button. These buttons activate the measuring element and LED display. High-resistance tests (LCD) can be performed without pressing the buttons and low-resistance tests by pressing the buttons.

General Information:	
Standard	EN/IEC 61243-3 (DIN VDE 0682 Part 401)
Temperature range	– 10 °C ... + 55 °C
Degree of protection	IP 65
Use	Suitable for use in wet weather conditions
Material (indicator)	Safety enclosure made of solid rubber
Indication	Moving-iron instrument, LCD and LED
Connecting cable	Rubber-sheathed cable, highly flexible, 1000 mm
Overvoltage category	CAT IV in accordance with IEC 60664-1

Accessory for Two-pole SPN Voltage Detector

Extension Prod

For use in overhead line networks, to be screwed onto the basic device

Type	VS 500 SPN II
Part No.	766 542
Length	500 mm

Storage Bag, empty

For SPN voltage detectors (basic device with extension prods)

Type	AT SPN II
Part No.	766 543
Material	Artificial leather

Basic devices

Type	SPN 500	SPN 1000
Part No.	766 541	766 545
Nominal voltage range U_N	100 ... 500 V	120 ... 1000 V
Frequency range	0 ... 100 Hz	0 ... 100 Hz
Dimensions (indicator)	274 x 75 x 47 mm	274 x 75 x 47 mm

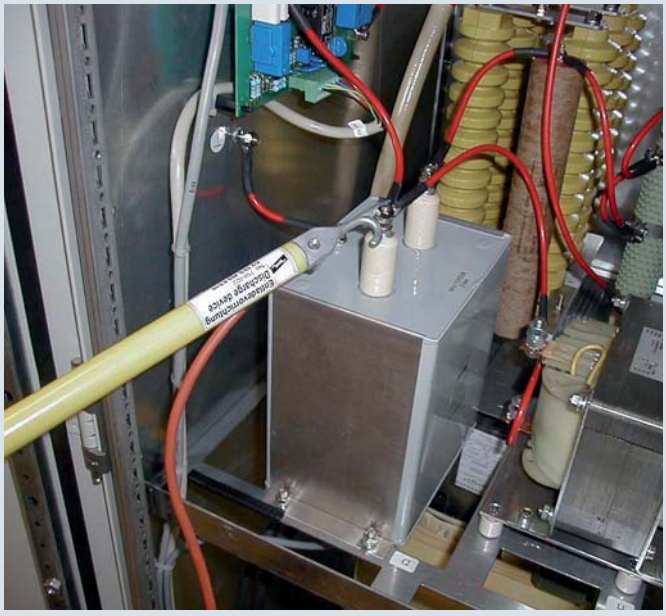
Other versions are available on request.

Accessory, kit parts and spare parts from page 195

Single-pole Earthing and Discharge Devices

Further Equipment

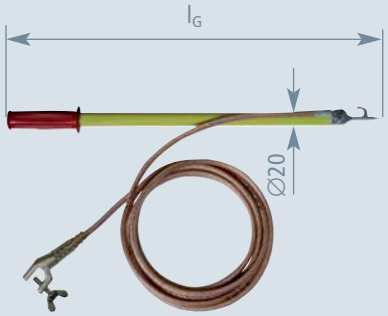
- For discharging static charges
- Different contact electrodes
- Coupling electrode, especially for round conductors (∅12 ... 26.5 mm) of electrostatic precipitator systems
- Waterproof, plastic-sheathed cable entries, additionally protected against twisting



Single-pole device for discharging static charges

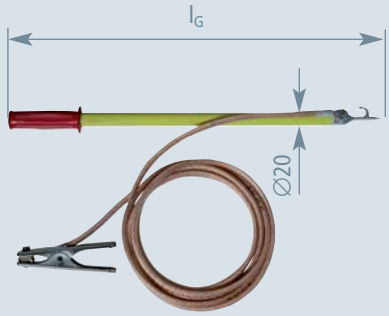
General Information:	
Use	Not suitable for use in wet weather conditions
Material (contact electrode)	Copper alloy/gal Sn
Material (contact and coupling electrode)	Zamak
Material (coupling electrode)	Bronze/gal Sn
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (earthing cable)	Highly flexible copper

with Handle and Earth Clamp with Wing Bolt



Type	EV TES 465 EK
Part No.	758 020
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	550 mm
Clamping range	Up to 20 mm

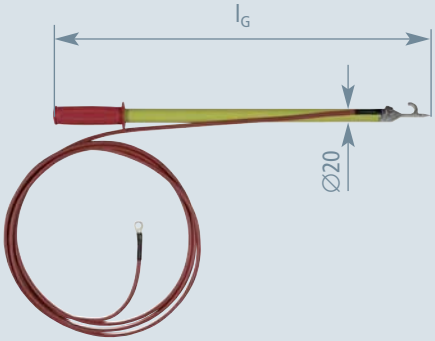
with Handle and Spring-loaded Earth Clamp



Type	EV TES 465 EZ
Part No.	758 021
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	550 mm
Clamping range	Up to 18 mm

with Handle and Earth Cable Lug

Type	EV TES 465 KS10
Part No.	758 022
Cable length	3500 mm
Cable cross-section	10 mm²
Cable sheath	Red silicone cable
Total length (l_G)	550 mm

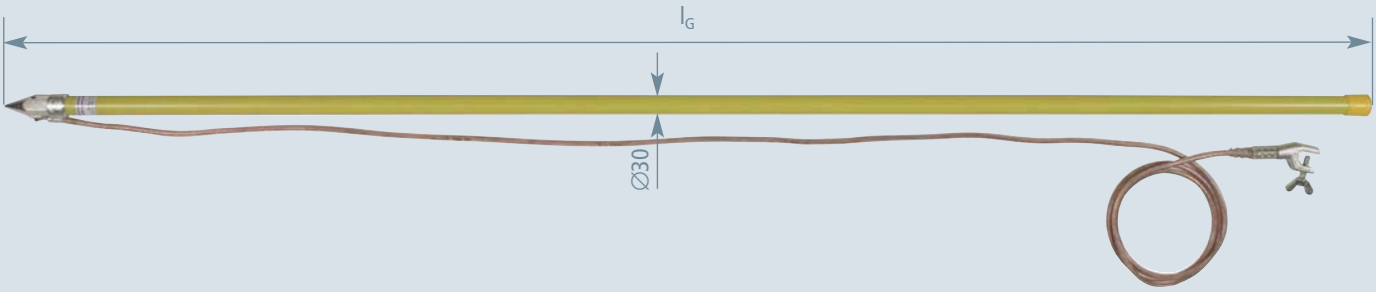


Hole (∅8.4 mm) and silicone conductor

Accessory, kit parts and spare parts from page 195

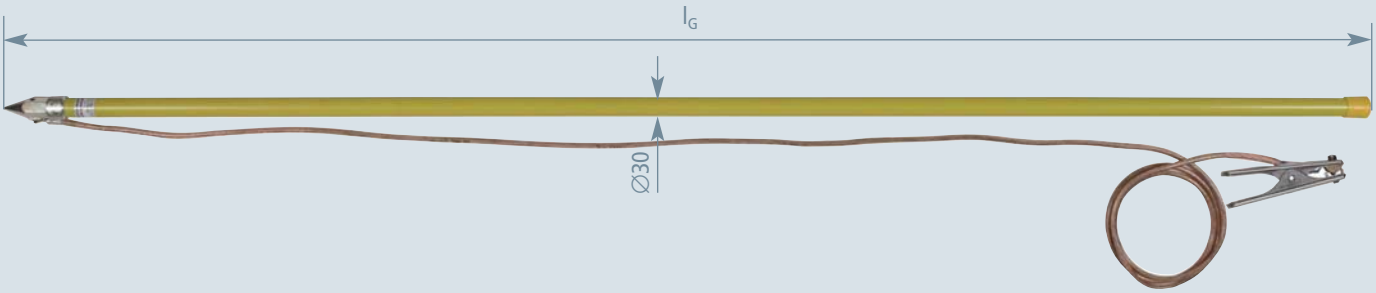
Single-pole Earthing and Discharge Devices

with Earth Clamp with Wing Bolt



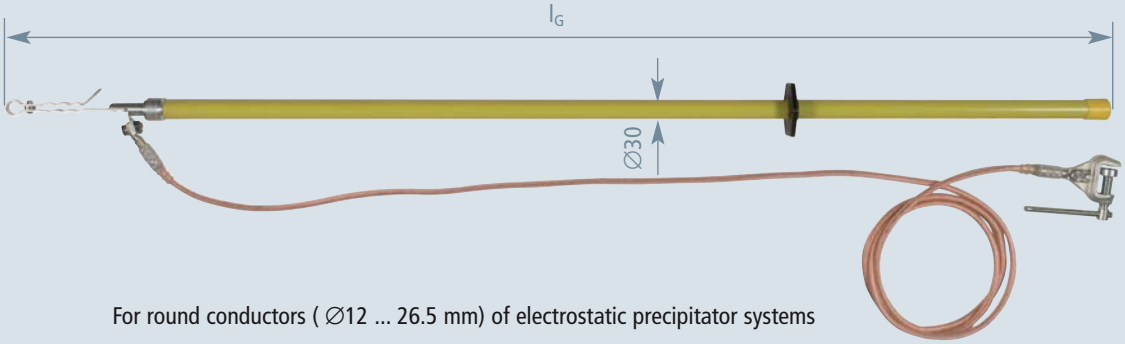
Type	EV TS 2000 EK
Part No.	758 001
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	2050 mm
Clamping range	Up to 20 mm

with Spring-loaded Earth Clamp



Type	EV TS 2000 EZ
Part No.	758 003
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	2050 mm
Clamping range	Up to 18 mm

with Earth Clamp with Tommy Bar

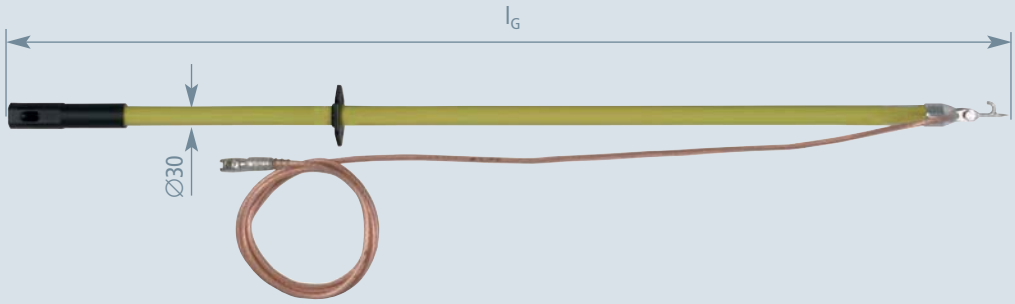


For round conductors (∅12 ... 26.5 mm) of electrostatic precipitator systems

Type	EV EH 1725 EK
Part No.	758 015
Cable length	3500 mm
Cable cross-section	25 mm²
Cable sheath	Transparent
Total length (l_G)	1725 mm
Clamping range	Up to 30 mm

Accessory, kit parts and spare parts from page 195

Single-pole Earthing and Discharge Devices
with plug-in Coupling and Earth Cable Lug



PK1 Crimped cable lug (hole ∅12.5 mm, protected against twisting).

Type	EV TES STK 1500 KS
Part No.	**758 025**
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	1500 mm

Accessory, kit parts and spare parts from page 195

Live Working

Permanent availability of electricity has become a decisive factor in international competition. At the same time, power interruptions must be reduced as a result of the increasing cost pressure. This makes it difficult to ensure reliability of existing installations and to perform maintenance work as entire parts of the installation cannot be isolated and the only alternative is live working. DEHN + SÖHNE has long-standing experience in the field of live working and has developed products which can be found in the DELTEC product range.

Isolating installations for maintenance work

Electrical equipment and low-voltage, medium-voltage and high-voltage systems such as overhead lines, transformer substations, switchgear installations, distribution boards, transformer cells or cable distribution cabinets cannot be isolated or can only be isolated with great effort due to undesired downtimes and costly work on Sundays and public holidays.

Live cleaning

Clean installations increase system reliability
Soiled electrical installations and adverse weather conditions (moisture) may cause power failure, damage to the equipment and even personal injuries as a result of an electrical arc. In medium-voltage installations, dust layers and residues from lubricants on insulators and cable sealing ends may cause failure. In cable distribution boards and low-voltage installations, cobwebs, weeds and dust are likely to occur.

Regular cleaning intervals
Surveys revealed that open indoor installations and cable distribution cabinets have to be cleaned at regular intervals between 6 months and 2 years depending on the type and degree of pollution.

Dry suction cleaning combined with damp cleaning
Dry cleaning work is performed by suction cleaning with operating heads or brushing soiled parts of the installation while simultaneously sucking the dirt away. Loose layers of dust and cobwebs are easily cleaned with little effort. Damp cleaning eliminates oily and tough pollutant layers with the help of sponges soaked with special insulating cleaning liquid. This type of work is performed according to "hot stick working" procedure.

Dry suction cleaning equipment
Suction cleaning equipment consists of a cleaning head (operating heads, brushes), intake tube with handle, extension, intake hose and suction device.
All single parts are made of plastic and are fully insulated. The shape of the brushes and operating heads is largely adapted to the parts of installations to be cleaned.
The special plug-in coupling system of the dry cleaning equipment prevents accidental use of accessories not intended for this application (e.g. acessories of industrial vacuum cleaners).

Requirements on the vacuum cleaner
The vacuum cleaner used must meet the following requirements:

- The industrial vacuum cleaner must have a minimum air velocity of 20 m/s and a visual indication of the intake capacity.
- The intake hose must have a continuous inner diameter ≥ ∅30 mm and must not contain any metal parts.

Damp cleaning equipment
Damp cleaning equipment consists of special cleaning heads (sponge holders), an insulating stick with handle and extension elements. All single parts are fully insulated. The plug-in system of operating heads and sponges allows easy and fast replacement of dirty sponges. Only approved sponges may be used for this purpose.

Refilling cable sealing ends

Refilling insulating oil into cable sealing ends
The refilling device considerably reduces the refilling procedure, making it safer and easier. The insulating oil is heated according to the manufacturers' specifications and filled into the cable sealing end by simply pushing a button on the refilling lance. The compact device with rolls has a max. capacity of 5 litres of insulating oil. The screw plug at the cable sealing end is loosened with an insulated screw driver (insulating operating stick with interchangeable operating head). This type of work is performed according to "hot stick working" procedure.

Equipment for refilling insulating oil into cable sealing ends
Refilling equipment consists of a pumping unit with a reservoir, regulated heating, pump, refilling lance and an insulated screw driver system consisting of an insulating stick with a manually operated mechanism (adjustable handle) and interchangeable operating heads (straight and angled) with a safety plug-in system accepting different bits and screw plugs. The refilling lance and the pumping unit are connected via a hose and a control line (pump ON/OFF). The refilling lance and the screw driver are fully insulated. Special plastic screw plugs are available for different cable sealing ends which are attached to the insulated screw driver.

Requirements on installers

Selection of electrically skilled persons for live working
Only electrically skilled persons with experience of several years in the operation and maintenance of electrical installations are allowed to perform maintenance and repair work. Electrically skilled persons must be theoretically and practically trained for this type of work.

Training as live worker
The training for specialised live workers is based on detailed target descriptions as required by the German professional association for precision and electrical engineering. It includes theoretical and practical training and a "live working" certificate upon completion of the training.

"Live working" procedure

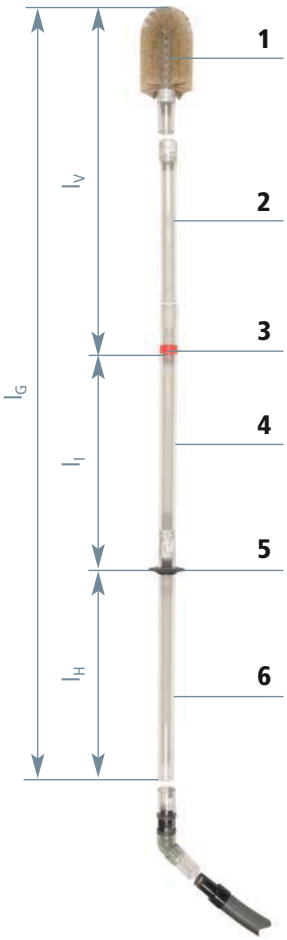
During hot stick working, the worker keeps a predefined distance from live parts of the installation and uses insulating sticks/operating sticks.

Design of operating sticks

Operating sticks according to DIN VDE 0681/0682 are hand-held devices for operating, testing and shielding live equipment. They consist of one or several insulating sticks rated for the nominal voltage of the equipment and of an operating head designed for the intended application. **Operating sticks**, are for example **intake tubes**, **insulating sticks**, **locking sticks**, **refilling lances** or **insulated screw drivers**. They are marked with a **triangle symbol** ⧋ on the rating plate.

An operating stick consists of a **handle**, an **insulating element** and an **operating head**.

The **operating head** is the part of the operating stick containing the operating element, for example cleaning heads and brushes of a dry cleaning kit or the sponge holders of a damp cleaning kit.
The **insulating element** is the part of the operating stick between the hand guard and red ring. It provides the user with a safety distance and sufficient isolation for safe operation.
The **extension** is the part of the operating stick between the insulating and operating element of the operating head. It allows the user to reach remote parts of the installation and to pass the operating head next to live parts.
The **hand guard** provides a visible barrier between the handle and the insulating element and prevents the user from making contact with the insulating element.
The **red ring** indicates the end of the insulating element in the direction of the operating head. It provides a visible barrier and prevents the user from making contact with live parts of the installation. The insulating element between the red ring and hand guard must not contact live parts, however, contact with earthed parts is allowed.



1 Operating head
2 Extension
3 Red ring
4 Insulating element
5 Hand guard
6 Handle

Dimensions:
l_H Length of the handle
l_I Length of the insulating element
l_V Length of the extension
l_G Total length

Design

Live Working

Selection Guide

Live Working Product Range

Devices	Nominal voltage U_N / Frequency f_N	Application	Page	
TRS NS Dry Cleaning Kit	up to 1000 V / 15 ... 60 Hz	Live cleaning by suction Specially adapted operating heads for intensive cleaning Plug-in coupling system allows fast replacement of operating heads	132	
TRS MS **TRS MS V1** **Dry Cleaning Kit**	up to 36 kV / 15 ... 60 Hz	Live cleaning by suction Transparent intake tubes for enhanced safety Specially adapted operating heads for intensive cleaning Plug-in coupling system allows fast replacement of operating heads	135	 
FRS ZK MS Damp Cleaning Kit	up to 36 kV / 15 ... 60 Hz	Damp cleaning element for use under live conditions with special cleaning liquid Universal gear coupling for replacing and adjusting the angle of operating heads Plug-in operating heads allows fast and easy replacement of sponges	137	
TFRS MS Combined Cleaning Kit	up to 36 kV / 15 ... 60 Hz	Combined equipment for dry and damp cleaning Transparent intake tubes for enhanced safety Specially adapted operating heads for intensive cleaning Universal gear coupling for replacing and adjusting the angle of operating heads Plug-in operating heads allows fast and easy replacement of sponges	138	
NFG MS Refilling Device	up to 36 kV / 15 ... 60 Hz	Refilling of insulating oil under live conditions Safe, fast and easy refilling procedure	144	
MS Insulated Screw Driver	up to 36 kV / 15 ... 60 Hz	For loosening and tightering the screw plugs of cable sealing ends under live conditions With interchangeable operating heads	146	

Maintenance tests

According to German regulations (BGV A3), operating sticks have to be tested for compliance with the prescribed limits as stated in the Electrical Safety Rules. This test includes:

- measurement of the leakage current,
- test for protection against bridging,
- visual inspection

This maintenance test is documented in a test report and on the device.

The test intervals depend on the operating conditions of the operating stick e.g. frequency of use, environmental conditions and transport. According to German regulations, however, it is advisable to carry out a maintenance test **at least** every **6 years**.

TRS NS Dry Cleaning Kit

Nominal voltages up to 1000 V / 15 ... 60 Hz

Live cleaning of a low-voltage switchgear installation using the TRS NS dry cleaning kit

- For indoor and outdoor installations
- Equipment for suction cleaning under live conditions
- For dry cleaning of cable distribution cabinets, open indoor installations and control cabinets
- Specially adapted operating heads for intensive cleaning
- Plug-in coupling system allows fast replacement of operating heads
- Regulation of intake air in the handle area

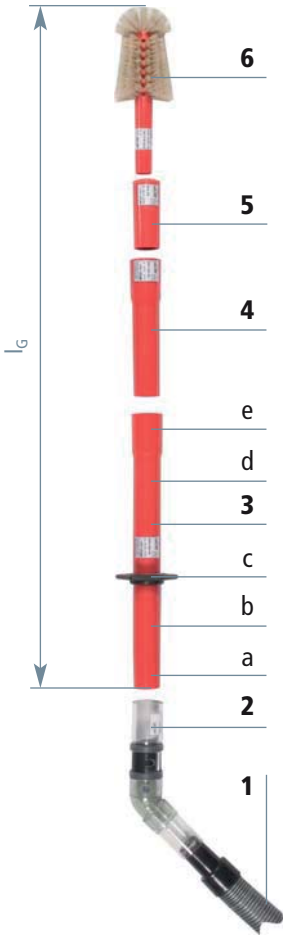
General Information:	
Standard	Based on DIN VDE 0680 Part 3
Use	Not suitable for use in wet weather conditions

Requirements

Cleaning work up to 1000 V must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements". In Germany TRS NS dry cleaning kits are subject to BGV A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).

Chamfered flat cleaning head in use

Tubular brush in use



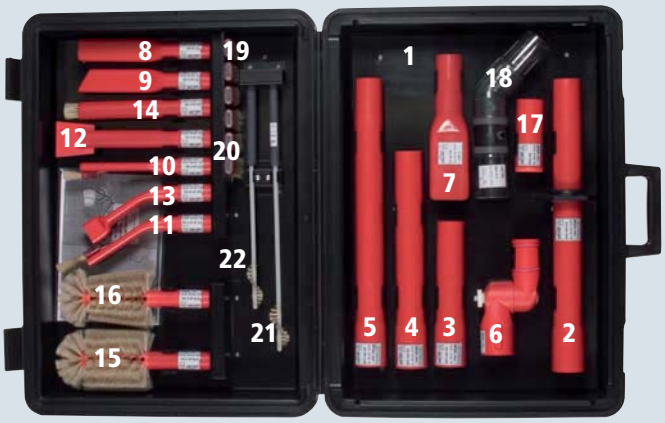
Design

1 Intake hose
2 Intake hose adapter
3 Intake tube with
  a Lower connecting part
  b Handle
  c Hand guard
  d Insulating element
  e Top connecting part
4 Extension tube
5 Intake tube adapter
6 Cleaning head

Dimensions:

$l_{G\ min}$ = 560 mm
$l_{G\ max}$ = 1350 mm

Fully equipped plastic case



Type	TRS NS
Part No.	785 502
Dimensions	530 x 390 x 170 mm

Single Parts for TRS NS Dry Cleaning Kit

Plastic Case, empty

With retaining clips

Type	KKL TRS NS
Part No.	785 506
Colour	Black
Dimensions	530 x 390 x 170 mm


1

Extension

Insulating tube, with top and lower connecting part

Type	SRV 200 NS	SRV 300 NS	SRV 400 NS
Part No.	785 521	785 522	785 523
Diameter	40 mm	40 mm	40 mm
Dimensions	200 mm	300 mm	400 mm


3-5

Flat Cleaning Head 55

Width: 55 mm

Type	FD 55 NS
Part No.	785 540
Diameter	40 mm
Dimensions	200 mm


7

Flat Cleaning Head 35

Width: 35 mm, 60° outlet, chamfered

Type	FD 35 S NS
Part No.	785 542
Diameter	25 mm
Dimensions	200 mm


9

Flat Cleaning Head 35

Width: 35 mm, 30° angled, with detachable brush

Type	FD 35 W P NS
Part No.	785 591
Diameter	25 mm
Dimensions	240 mm


11

Single Parts for TRS NS Dry Cleaning Kit

Intake Tube with Handle

For use as operating tube with handle and hand guard, with top and lower connecting part

Type	SRH 400 NS
Part No.	785 520
Dimensions	380 mm


2

Adjustable Angle

Lockable, adjustable due to 15° gearing, with top and lower connecting part

Type	SRW V NS
Part No.	785 530
Diameter	40 mm
Dimensions	300 mm


6

Flat Cleaning Head 35

Width: 35 mm

Type	FD 35 NS
Part No.	785 541
Diameter	25 mm
Dimensions	200 mm


8

Flat Cleaning Head 35

Width: 35 mm, straight, with detachable brush

Type	FD 35 P NS
Part No.	785 590
Diameter	25 mm
Dimensions	230 mm


10

Round Cleaning Head

With scraper (50 mm)

Type	RD 25 S NS
Part No.	785 560
Diameter	25 mm
Dimensions	240 mm


12

TRS NS Dry Cleaning Kit

Single Parts

13 

Cross Cleaning Head 35

Width: 35 mm, 30° angled

Type	QD 35 W NS
Part No.	785 543
Diameter	25 mm
Dimensions	200 mm

14 

Round Cleaning Head

With brush

Type	RD 25 P NS
Part No.	785 570
Diameter	25 mm
Dimensions	230 mm

15 

Tubular Brush 85 mm

Cylindrical bristles

Type	STB 85 Z NS
Part No.	785 550
Diameter	25 mm
Dimensions	240 mm

16 

Tubular Brush 85 mm

Conical bristles

Type	STB 85 K NS
Part No.	785 555
Diameter	25 mm
Dimensions	240 mm

17 

Intake Tube Adapter

For brushes and cleaning heads (∅25 mm)

Type	SRA NS
Part No.	785 515
Diameter	40 / 25 mm
Dimensions	100 mm

18 

Intake Hose Adapter

Adjustable, 120° angled, regulation of intake air, for use with intake hose system (∅35 mm)

Type	SSA W D
Part No.	785 200
Diameter	35 / 40 mm

19 

Spare Brush

Short bristles, for flat cleaning heads with detachable brush

Type	EP 25 K NS
Part No.	785 595
Dimensions	25 mm
PU	3 pieces

20 

Spare Brush

Long bristles, for flat cleaning heads, with detachable brush

Type	EP 25 L NS
Part No.	785 596
Dimensions	40 mm
PU	3 pieces

21 

Cleaning Brush

For individual kit parts (∅40 mm)

Type	RB 40 NS
Part No.	785 580
Diameter	45 mm
Dimensions	410 mm

22 

Cleaning Brush

For individual kit parts (∅25 mm)

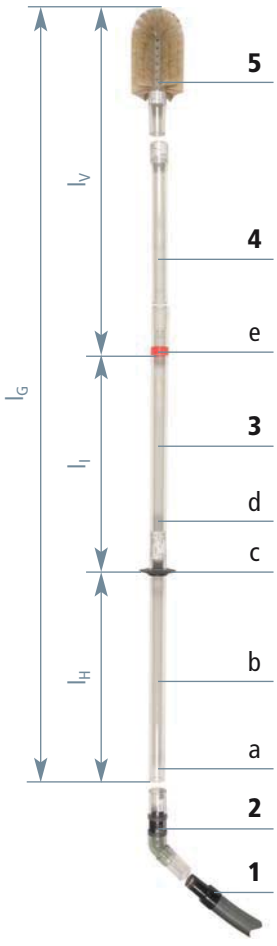
Type	RB 20 NS
Part No.	785 585
Diameter	30 mm
Dimensions	330 mm

TRS MS Dry Cleaning Kit

Nominal voltages up to 36 kV / 15 ... 60 Hz

- For indoor and outdoor installations
- Equipment for live cleaning by means of suction
- For dry cleaning of transformers and switchgear installations
- Transparent intake tubes ensure enhanced safety
- Specially adapted operating heads for intensive cleaning
- Plug-in coupling system allows fast replacement of operating heads

Live cleaning of a transformer using the TRS MS dry cleaning kit



Design

1 Intake hose
2 Intake hose adapter
3 Intake tube with
  a Lower connecting part
  b Handle
  c Hand guard
  d Insulating element
  e Red ring
4 Extension tube
5 Cleaning head

Dimensions:

l_H Length of the handle = 540 mm
l_I Length of the insulating element = 535 mm
l_V Length of the extension
$l_{V\,min}$ = 115 mm,
$l_{V\,max}$ = 2515 mm
l_G Total length of the intake tube
$l_{G\,min}$ = 1180 mm,
$l_{G\,max}$ = 3580 mm

General Information:	
Standard	DIN VDE 0682 Part 621
Use	Not suitable for use in wet weather conditions

Requirements

Cleaning work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany TRS MS dry cleaning kits are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).

Cleaning an insulator with a flat cleaning head and 135° angled intake tube

Cleaning an insulator with a tubular brush

TRS MS Dry Cleaning Kit

TRS MS Dry Cleaning Kit

Fully equipped GRP case

Type	TRS MS
Part No.	785 100
Dimensions	1200 x 270 x 165 mm

TRS MS V1 Dry Cleaning Kit

Fully equipped GRP case

Type	TRS MS V1
Part No.	785 112
Dimensions	1200 x 270 x 165 mm

FRS ZK MS Damp Cleaning Kit

Cleaning Equipment

Nominal voltages up to 36 kV / 15 ... 60 Hz

- For indoor and outdoor installations
- Damp cleaning equipment for use under live conditions with special cleaning liquid
- Universal gear coupling for replacing and adjusting the angle of operating heads
- Rigid and flexible plug-in operating heads allow fast and easy replacement of the sponges

Damp cleaning of a transformer using the FRS ZK MS damp cleaning kit

Application

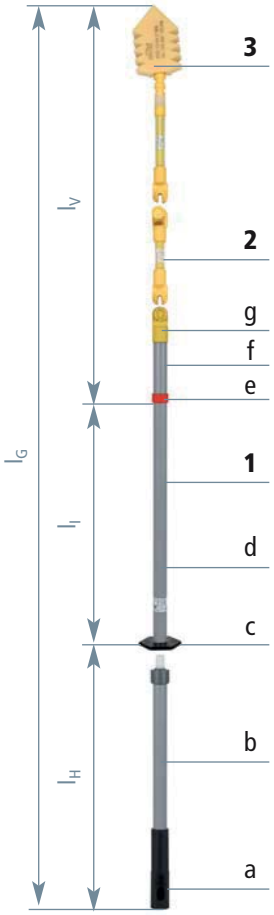
Damp sponges allow to remove tough pollution layers and to clean oily transformer surfaces. Special insulating cleaning liquids (e.g. Rivolta SLX 500; SLX TOP or SLX Super from Bremer & Leguil, Duisburg/Germany, and Florin 2000 from Flore, Koblenz/Germany) must be selected according to the rated voltage of the installation and the environmental conditions.

Requirements

Cleaning work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany FRS ZK MS damp cleaning kits are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).

General Information:	
Standard	Based on DIN VDE 0681 Part 1 and DIN VDE 0682 Part 621
Standard (universal gear coupling)	EN/IEC 60832 (DIN VDE 0682 Part 211)
Use	Not suitable for use in wet weather conditions

The universal gear coupling permits fast replacement of operating heads and extensions



1 Insulating stick with
- a End fitting with plug-in coupling
- b Handle
- c Hand guard
- d Insulating element
- e Red ring
- f Extension
- g Top connecting part

2 Extension tube

3 Operating head with sponge

Dimensions:

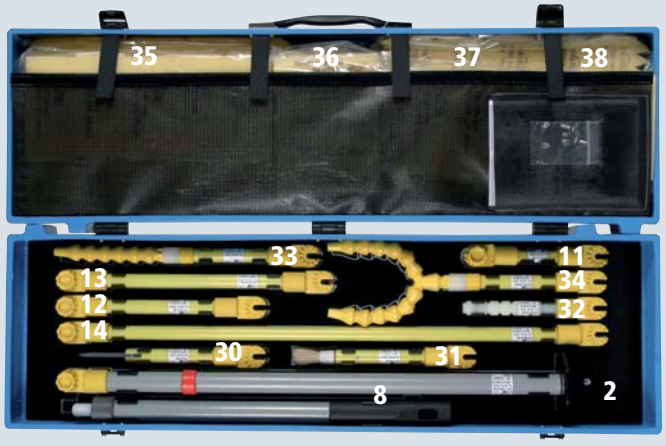
l_H Length of the handle = 510 mm

l_I Length of the insulating element = 525 mm

l_V Length of the extension
$l_{V\,min}$ = 350 mm,
$l_{V\,max}$ = 2100 mm

l_G Total length
$l_{G\,min}$ = 1450 mm,
$l_{G\,max}$ = 3250 mm

Design

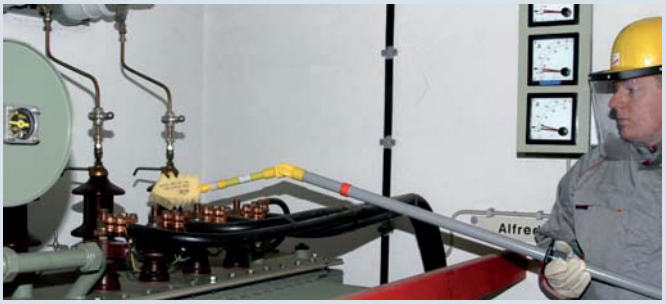


Fully equipped GRP case

Type	FRS ZK MS
Part No.	785 940
Dimensions	850 x 300 x 200 mm

TFRS MS Combined Cleaning Kit

Nominal voltages up to 36 kV / 15 ... 60 Hz



TFRS MS combined cleaning kit used for dry and damp cleaning of a transformer under live conditions

- For indoor and outdoor installations
- Combined dry and damp cleaning kit for cleaning under live conditions
- Transparent intake tubes ensure enhanced safety
- Specially adapted operating heads for intensive cleaning
- Universal gear coupling for replacing and adjusting the angle of operating heads
- Rigid and flexible plug-in operating heads allow fast and easy replacement of the sponges

Application

Dry cleaning work is performed by suction cleaning with operating heads or brushing soiled parts of the installation while simultaneously sucking the dirt away. Loose dust layers and cobwebs are easily removed with little effort. Damp cleaning eliminates oily and tough contaminants with the help of sponges soaked with special insulating cleaning liquids.

General Information:	
Standard	Based on DIN VDE 0681 Part 1 and DIN VDE 0682 Part 621
Standard (universal gear coupling)	EN/IEC 60832 (DIN VDE 0682 Part 211)
Use	Not suitable for use in wet weather conditions

Fully equipped GRP case and leather bag

Requirements

Cleaning work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany TFRS MS combined cleaning kit are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).

Type	TFRS MS
Part No.	785 950
Dimensions (bag)	1400 x 280 mm
Dimensions (case)	850 x 410 x 400 mm

Customised kits are available on request.

GRP Case, empty

With retaining clips and printed top and bottom insert

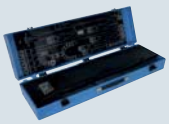
Type	KKL TRS MS
Part No.	785 301
Colour	Blue
Dimensions	1200 x 270 x 165 mm

1

GRP Case, empty

With retaining clips and printed bottom insert

Type	KKL FRS ZK MS
Part No.	785 229
Colour	Blue
Dimensions	850 x 300 x 200 mm



2

GRP Case, empty

With retaining clips and printed top and bottom insert

Type	KKL TFRS MS
Part No.	785 951
Colour	Blue
Dimensions	850 x 410 x 400 mm

3

Artificial Leather Bag, empty

With zip and shoulder strap

Type	KLT 140 28
Part No.	785 952
Colour	Black
Dimensions	1400 x 280 mm

4

90° angled Intake Tube

Type	SRW 90 MS
Part No.	785 131
Diameter	40 mm
Dimensions	120 mm

5

135° angled Intake Tube

Type	SRW 135 MS
Part No.	785 132
Diameter	40 mm
Dimensions	100 mm

6

Angled Intake Tube

Lockable, adjustable due to 15° gearing, for positioning the cleaning heads

Type	SRW V MS
Part No.	785 130
Diameter	40 mm
Dimensions	160 mm

7

Insulating Stick with Handle and plug-in Coupling

For use as operating stick with handle, hand guard, insulating element, red ring and extension, extendible handle

Type	ISH T 1300 ZK MS
Part No.	785 315
Diameter	30 mm
Dimensions	1300 mm

8

Intake Tube with Handle

For use as operating tube with handle, hand guard, insulating element, red ring and extension

Type	SRH 1180 MS
Part No.	785 120
Diameter	40 mm
Dimensions	1180, insulating element 525 mm

9

Insulating Stick with Handle and plug-in Coupling

Consisting of one element

Type	ISH 1300 ZK MS
Part No.	785 325
Diameter	30 mm
Dimensions	1300 mm

10

Extension

Type	ISV 220 ZK MS	ISV 320 ZK MS
Part No.	785 316	785 317
Diameter	20 mm	20 mm
Dimensions	220 mm	320 mm

Type	ISV 420 ZK MS	ISV 820 ZK MS
Part No.	785 318	785 319
Diameter	20 mm	20 mm
Dimensions	420 mm	820 mm

11-14

Extension

Type	SRV 200 MS	SRV 400 MS	SRV 800 MS
Part No.	785 121	785 122	785 123
Diameter	40 mm	40 mm	40 mm
Dimensions	200 mm	400 mm	800 mm

15-17

Single Parts for MS Cleaning Kit

18 

Rectangular Brush

Type	REB 1095 MS
Part No.	785 160
Diameter	40 mm
Dimensions	105 x 90 x 50 mm

19-20 

Half-round Brush

For cleaning insulators as well as horizontal and vertical openings. The brush can be attached to SRW V MS angled intake tubes that can be adjusted to lead the brush around the complete insulator.

Type	HRB 120 MS	HRB 190 MS
Part No.	785 140	785 150
Diameter	40 / 120 mm	40 / 190 mm

21 

Tubular Brush 120 mm

Cylindrical bristles

Type	STB 120 MS
Part No.	785 170
Diameter	40 mm
Dimensions	250 mm

22 

Tubular Brush 85 mm

Cylindrical bristles

Type	STB 80 MS
Part No.	785 171
Diameter	25 mm
Dimensions	240 mm

23 

Tubular Brush 85 mm

Conical bristles

Type	STB 80 K MS
Part No.	785 172
Diameter	25 mm
Dimensions	240 mm

24 

Round Head Brush

Type	BB 245 MS
Part No.	785 151
Diameter	40 mm
Dimensions	390 mm

25 

Cleaning Head 60

Width: 60 mm

Type	FD 60 MS
Part No.	785 220
Diameter	40 mm
Dimensions	190 mm

26 

Cleaning Head 110

Width: 110 mm

Type	FD 110 MS
Part No.	785 221
Diameter	40 mm
Dimensions	260 mm

27 

Cleaning Head 210

Width: 210 mm

Type	FD 210 MS
Part No.	785 223
Diameter	40 mm
Dimensions	255 mm

28 

Flat Cleaning Head 35

Type	FD 35 S MS
Part No.	785 551
Diameter	40 mm
Dimensions	35 mm

29 

Flat Cleaning Head

Width: 35 mm, 30° angled, with detachable brush

Type	FD 35 W P MS
Part No.	785 552
Diameter	40 mm
Dimensions	35 mm

30 

Scraper

Type	S 30 ZK MS
Part No.	785 320
Diameter	20 mm
Dimensions	280 mm

31 

Round Brush

Type	RP 15 ZK MS
Part No.	785 321
Diameter	20 mm
Dimensions	270 mm

Cleaning Equipment

Rigid Operating Head

For attaching cleaning sponges

Type	AK RS S ZK MS
Part No.	785 324
Diameter	20 mm
Dimensions	200 mm

32

Single Operating Head

Flexible, for attaching cleaning sponges

Type	AK RS ZK MS
Part No.	785 322
Diameter	20 mm
Dimensions	400 mm

33

Dual Operating Head

Flexible, for attaching cleaning sponges

Type	AK RS 2 ZK MS
Part No.	785 323
Diameter	20 mm
Dimensions	415 mm

34

Rectangular Cleaning Sponge

Type	RS 1544 MS
Part No.	785 274
Dimensions	150 x 40 x 40 mm
PU	5 pieces

35

Rectangular Cleaning Sponge

Type	RS 1574 MS
Part No.	785 275
Dimensions	150 x 70 x 40 mm
PU	5 pieces

36

Rectangular Cleaning Sponge, serrated

Type	RS 15104 Z MS
Part No.	785 279
Dimensions	150 x 100 x 40 mm
PU	5 pieces

37

Rectangular Cleaning Sponge, serrated

Type	RSD 15104 Z MS
Part No.	785 280
Dimensions	150 x 100 x 40 mm
PU	5 pieces

38

Intake Hose Adapter

Adjustable, 120° angled, regulation of intake air, for use with intake hose system (∅35 mm)

Type	SSA W D
Part No.	785 200
Diameter	35 / 40 mm

39

Intake Tube Adapter

For brushes and cleaning heads (∅25 mm)

Type	SRA MS
Part No.	785 212
Diameter	40 / 25 mm
Dimensions	100 mm

40

Operating Head Adapter

Universal gear coupling / transparent tube (∅25 mm)

Type	AKA TF ZK MS
Part No.	785 259
Diameter	40 mm
Dimensions	125 mm

41

Single Parts for MS Cleaning Kit

42

Digital Hygrometer/Thermometer

For verifying the climatic conditions that must be adhered to.

Measuring range: – 20 °C ... + 70 °C (temperature), 10 ... 95 % (relative air humidity)

Type	DHTM
Part No.	785 180
Dimensions	140 x 65 mm

43

Digital Hygrometer/Thermometer

For verifying the climatic conditions that must be adhered to.

Measuring range: 0 °C ... + 50 °C (temperature), 5 ... 95 % (relative air humidity)

Type	DHTM T 615
Part No.	785 181
Dimensions	57 x 190 x 42 mm

44

Insulating Mirror

For visual inspection of hidden electrical components

Type	ISP 135 MS
Part No.	785 190
Diameter	40 / 135 mm

45

Spray Bottle

For cleaning liquids

Type	SF FRF MS
Part No.	785 953
Capacity	500 ml

46

Spare Brush

For FD 39 WP MS flat cleaning heads

Type	EP 25 L MS
Part No.	785 224
Dimensions	40 mm
PU	3 pieces

47

Cleaning Brush

For individual kit parts (∅40 mm), modular

Type	RB 50 MS
Part No.	785 210
Diameter	45 mm
Dimensions	1430 mm

48

Cleaning Brush

For individual kit parts (∅25 mm)

Type	RB 20 NS
Part No.	785 585
Diameter	30 mm
Dimensions	330 mm

49

Barrier Rod

Modular, for use as visible working limit

Type	AS MS
Part No.	785 109
Dimensions	2200 mm

Industrial Vacuum Cleaner

For dry and combined cleaning kits

Equipment:

The industrial vacuum cleaner consists of a 25 l plastic container, 2 large wheels, 2 guide wheels with locking brakes, handle and cable holder, socket outlet with automatic switch-on mechanism, electromagnetic pulse filter cleaning, automatic vibration function, speed control, volume flow control, acceleration rate controller, electronic running feature, moisture identification with sensor-controlled disconnection, 2 new polyester filter cassettes, FKP 4300, filter area 2 x 4300 cm^2 = 8600 cm^2, dust collection capacity in accordance with BIA, class C, cord length: 8 m

Technical data:

– Intake hose with straight connecting adapter (∅35 mm), 5 m long

Type	HIS 1400 TRS
Part No.	785 310
Nominal capacity	1400 W
Nominal voltage	230 V
Max. air flow	61 l/s
Max. low air pressure	248 mbars
Capacity (container)	25 l gross volume, 20 l for dust, 15 l for water
Dimensions	400 x 400 x 560 mm

Reducing Inserts

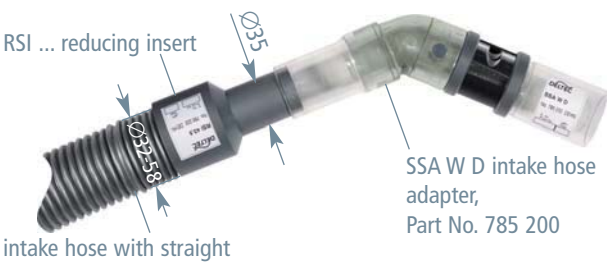
For connection between SSA W D intake hose adapter and intake hoses from other manufacturers with different diameters and straight connecting adapter.

Type	RSI 32	RSI 34	RSI 35
Part No.	785 213	785 214	785 215
Diameter	35 / 32 mm	35 / 34 mm	35 / 35 mm
Dimensions	105 mm	105 mm	105 mm

Type	RSI 38	RSI 45
Part No.	785 216	785 217
Diameter	35 / 38 mm	35 / 45 mm
Dimensions	105 mm	105 mm

Type	RSI 51	RSI 58
Part No.	785 218	785 219
Diameter	35 / 51 mm	35 / 58 mm
Dimensions	105 mm	105 mm

Application:



90° angled flat Cleaning Head with detachable Brush

For TRS NS dry cleaning kits

Type	FWD 35 P NS
Part No.	785 592
Diameter	25 mm
Dimensions	200 mm

Intake Tube with Handle

For TRS MS and TFRS MS cleaning kits

Type	SRH 1180 IS 650 MS
Part No.	785 119
Diameter	40 mm
Dimensions	1180 mm, insulating element 650 mm

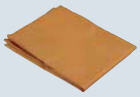
HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	HV STK 710
Part No.	766 335
Diameter	30 mm
Total length (l_G)	710 mm
Material	Glass-fibre reinforced polyester tube
Colour	Grey

Cover

Type	AP 152 G
Part No.	785 110
Colour	Yellow
Dimensions	1500 x 2000 mm



Canvas Bag, empty

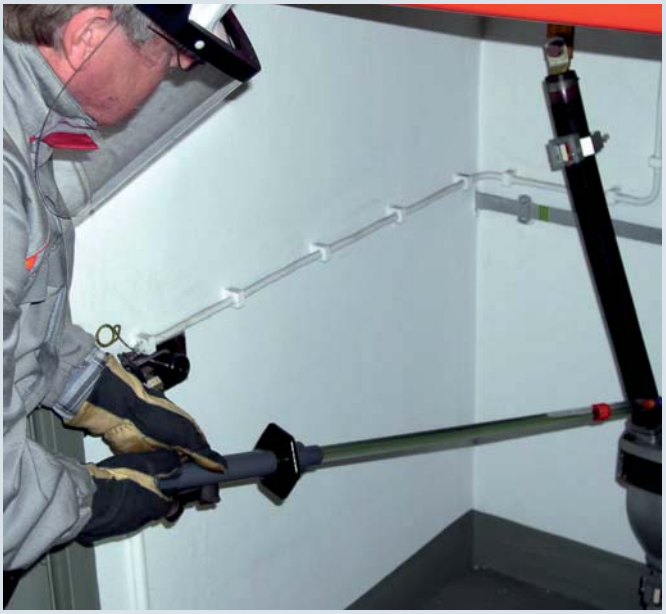
With two separate internal pockets and shoulder strap

For intake hose, cover, safety helmet with face shield, working gloves

Type	STT 55 27 30
Part No.	785 111
Colour	Olive
Dimensions	550 x 270 x 300 mm

NFG MS Refilling Device

Nominal voltages up to 36 kV / 15 ... 60 Hz



Refilling of hot HT mass under live conditions

- For indoor and outdoor installations
- Equipment for refilling hot HT mass into paper-insulated mass-impregnated cables under live conditions
- Safe, fast and easy refilling procedure
- Transparent insulating refilling lance ensures enhanced safety

General Information:	
Standard	Based on DIN VDE 0681 Part 1 and DIN VDE 0682 Part 621
Design	Not suitable for use in wet weather conditions

Design

The refilling device consists of a pumping unit with a reservoir, regulated heating and pump as well as an insulating refilling lance. The oil reservoir can be removed for easy transport and can be sealed with a cover. The pump and the insulating refilling lance are connected by means of a temperature-resistant, removable and highly flexible refilling hose and a pump control cable (Ein [On]/Aus [Off] circuit). All components are arranged on a transport vehicle (with additional support brackets), suitable for mounting.

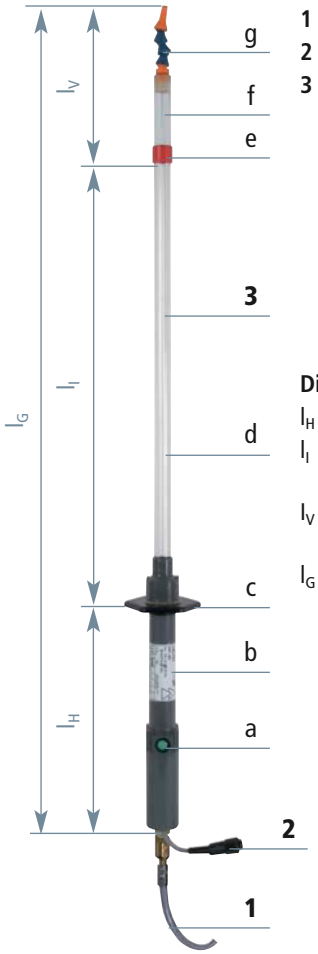
When working under live conditions, the screw plugs of cable sealing ends are removed and replaced with an insulated screw driver.

Special plastic screw plugs can be used for sealing the cable ends.

Requirements

The refilling device is to be used under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany NFG MS refilling devices are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sectors (BGETEM).

After lifting the conveying pump out of the HT mass, the oil reservoir can be removed from the NFG MS for refilling.



1 Highly flexible filling hose
2 Control line
3 Refilling lance with
- a Pushbutton
- b Handle
- c Hand guard
- d Insulating element
- e Red ring
- f Extension
- g Flexible refilling device

Dimensions:

l_H Length of the handle = 285 mm
l_I Length of the insulating element = 525 mm
l_V Length of the extension = 180 mm
l_G Total length = 980 mm

Design

MS Refilling Device

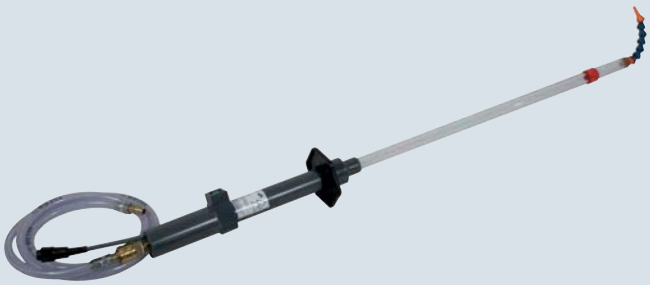
Fully equipped with insulating refilling lance and reservoir

Type	NFG MS
Part No.	785 260
Nominal capacity	1200 W
Supply voltage	230 V
Frequency	50 Hz
Reservoir size	5 litres
Heating control range	0 °C ... + 120 °C
Thermometer indication range	0 °C ... + 120 °C
Dimensions	632 x 329 x 1490 mm

Accessory for NFG MS Refilling Device

Insulating Refilling Lance

Operating stick with detachable, highly flexible filling hose (1350 mm), handle, hand guard, insulating element, red ring, extension and flexible lance tip



Type	INFL MS
Part No.	785 261
Diameter	30 / 20 mm
Dimensions	980 mm

Other lengths of insulating refilling lances are available on request.

Reservoir

Made of stainless steel, with cover and adjustable ventilation

Type	OEB NFG MS	RFB NFG MS
Part No.	785 264	785 295
Capacity (heating element)	950 W	No heating element
Dimensions	320 x 165 x 164 mm	320 x 165 x 164 mm

GRP Case, empty

Max. capacity:

3 NFG MS reservoirs

Type	KKL B NFG MS
Part No.	785 299
Colour	Blue
Dimensions	600 x 380 x 220 mm

MS Screw Driver Set

Nominal voltages up to 36 kV / 15 ... 60 Hz

Loosening the locking screw using the MS insulated screw driver

- For indoor and outdoor installations
- For loosening and tightening the screw plugs of cable sealing ends under live conditions
- With interchangeable operating heads (straight and angled)

General Information:	
Standard	Based on DIN VDE 0681 Partl 1
Use	Not suitable for use in wet weather conditions

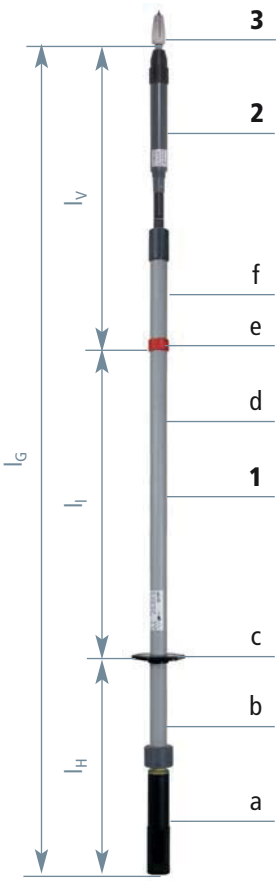
Application

The insulated screw driver with interchangeable operating heads (straight and angled) for attaching special bits and screw plugs allows to loosen or tighten the screw plugs of cable sealing ends under live conditions. Only tested bits (screw plug blade inserts) and special screw plugs may be used.

Requirements

Maintenance work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany MS screw drivers are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sectors (BGETEM).

Apart from the insulated screw driver kit, the plastic case allows transport of the insulating refilling lance including filling hose and special screw plugs. These elements, however, are not included in delivery.



1 Operating stick with
- a Adjustable handle
- b Handle
- c Hand guard
- d Insulating element
- e Red ring
- f Extension

2 Operating head, straight or angled (30° or 70°)

3 Special bit

Dimensions:

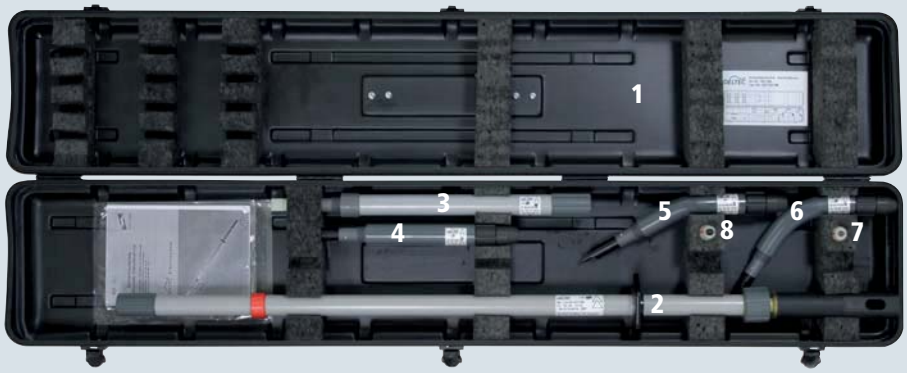
l_H Length of the handle = 385 mm

l_I Length of the insulating element = 525 mm

l_V Length of the extension = 430 mm

l_G Total length = 1375 mm

Design



Fully equipped plastic case

Type	SDS KEV MS
Part No.	785 265
Dimensions	1270 x 215 x 140 mm
Material (operating head)	PVC
Material (handle)	Plastic
Material (insulating stick)	Glass-fibre reinforced polyester tube

Further insulating element extensions, operating heads and special bits are available on request.

Single Parts for MS Screw Driver Set

Plastic Case, empty

With foam padding

Type	KKL SDS KEV MS
Part No.	785 298
Colour	Black
Dimensions	1270 x 215 x 140 mm

Single Parts for MS Screw Driver Set

Operating Stick with adjustable Handle

With plug-in coupling for extending the handle, hand guard, insulating element, red ring and extension

Type	BS SD KEV MS 1120
Part No.	785 266
Diameter	30 mm
Dimensions	1135 mm

Extension

For operating sticks

Type	VL 350 SD KEV MS
Part No.	785 273
Diameter	30 mm
Dimensions	350 mm

Straight Operating Head

With hexagon socket for attaching special bits and special screw plugs

Type	AK SD KEV MS
Part No.	785 267
Diameter	30 mm
Dimensions	310 mm

30° angled Operating Head

With hexagon socket for attaching special bits and special screw plugs

Type	AK SD W30 KEV MS
Part No.	785 268
Diameter	30 mm
Dimensions	270 mm

70° angled Operating Head

With hexagon socket for attaching special bits and special screw plugs

Type	AK SD W70 KEV MS
Part No.	785 269
Diameter	30 mm
Dimensions	300 mm

Special Bit 13 mm

With safety plug-in system suitable for AK SD ... operating heads

Type	BIT 13 SD KEV MS
Part No.	785 271
Diameter	25 mm
Dimensions	50 mm

Special Bit 8 mm

With safety plug-in system suitable for AK SD ... operating heads

Type	BIT 8 SD KEV MS
Part No.	785 272
Diameter	25 mm
Dimensions	50 mm

Special Screw Plugs

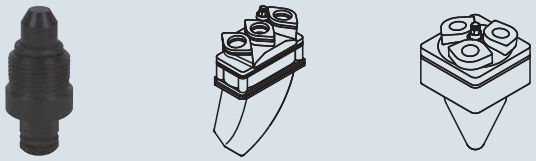
Nominal voltages up to 36 kV

Screwing a special screw plug into a cable sealing end using an angled operating head

- For indoor and outdoor installations
- For sealing cable sealing ends
- For use with operating heads of type AK SD ...
- With safety plug-in system
- UV-resistant

General Information:	
Use	Not suitable for use in wet weather conditions

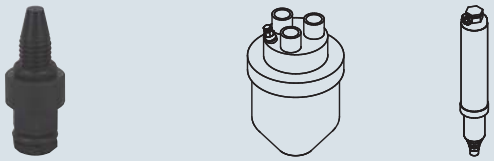
Special Screw Plug (F & G)



For cable sealing ends

Type	VS F&G M22 F
Part No.	785 281
Dimensions	M22 x 55 mm
PU	12 pc(s)

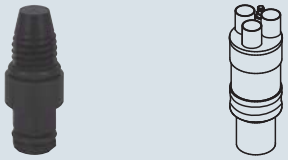
Special Screw Plug (Köttgen)



For cable sealing ends

Type	VS KOET M10
Part No.	785 282
Dimensions	M10 x 45 mm
PU	12 pc(s)

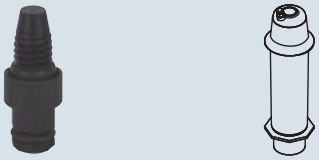
Special Screw Plug (Raychem)



For cable sealing ends

Type	VS RAY M14
Part No.	785 283
Dimensions	M14 x 45 mm
PU	12 pc(s)

Special Screw Plug (GOW)



For cable sealing ends

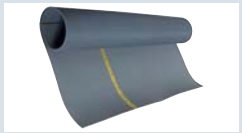
Type	VS GOW M12
Part No.	785 284
Dimensions	M12 x 45 mm
PU	12 pc(s)

Special screw plugs for cable sealing ends from other manufacturers are available on request.

Live Working

Selection Guide

Protective and Auxiliary Equipment

Device	Nominal voltage U_N	Application	Page	
DEHNcare APS	up to 1000 V	Arc-fault-tested face shield suitable for all standard safety helmets for electricians	150	
DEHNcare ESH		Insulating safety helmet for electricians (EN 50365) six-point suspension with sweatband		
DEHNcare APG		Arc-fault-tested protective gloves	152	
PPE – Personal Protective Equipment	up to 1000 V	Safety helmet	154	
		NH fuse puller with sleeve		
		Insulating gloves		
Covering Material	up to 1000 V	Insulated platform	156	
		Covering material	158	
		Insulated mats for insulating the operating location		
	up to 50 kV		159	
Lock-out Systems	up to 1000 V	Insulating plugs	160	
		Insulating blades		
		Lock-out systems		

DEHNcare APS and ESH

Nominal voltages up to 1000 V

Attaching an earthing and short-circuiting device using the required personal protective equipment

Prevent injuries – Stay healthy

- High wearing comfort
- High degree of protection and low wear due to energy-absorbing nanoparticles
- Excellent visibility due to anti-mist coating and high light transmittance
- Face shield with clip for easy insertion into the helmet
- Certified according to the requirements of directive 89/686/EEC on personal protective equipment

General Information:	
Standard	EN 50365 (safety helmet for electricians), EN 166 and EN 177 (face shield), box test in accordance with IEC 61482-1-2, ATPV test in accordance with IEC 61482-1-1

By pressing the rotary knob the head strap is loosened. If the rotary knob is turned, the head strap is adjusted to the head size of the user.

Use of the protective equipment

Arc-fault-tested Face Shield with Clip and Chin Protector

Fits the slot in the ESH safety helmet for electricians

Type	APS CL2 SC	APS 12C SC
Part No.	785 746	785 747
Nominal voltage up to (U_N)	1000 V	1000 V
Material	Plastic	Plastic
Wall thickness	1.5 mm	1.5 mm
Incident energy after box test	(class 2) 423 kJ / m^2	(class 2) 423 kJ / m^2
ATPV (Arc Thermal Performance Value)	—	12 cal / cm^2
Visible Light Transmittance (VLT)	> 75 %	65 % ... 75 %

Arc-fault-tested Safety Helmet with Strap and Chin Protector

Suitable for all standard safety helmets for electricians

Type	APS CL2 FS	APS 12C FS
Part No.	785 748	785 749
Nominal voltage up to (U_N)	1000 V	1000 V
Material	Plastic	Plastic
Wall thickness	1.5 mm	1.5 mm
Incident energy after box test	(class 2) 423 kJ / m^2	(class 2) 423 kJ / m^2
ATPV (Arc Thermal Performance Value)	—	12 cal / cm^2
Visible Light Transmittance (VLT)	> 75 %	65 % ... 75 %

Safety Helmet for Electricians

- Electrically isolating safety helmet for electricians (EN 50365)
- For nominal voltages up to 1000 V
- With slot for APS ... SC face shield
- Adjustable to head sizes from 51 to 63 cm via push/rotary knob
- Six-point suspension with sweatband
- ABS shell

Type	ESH 1000 S Y	ESH 1000 S W	ESH 1000 S O	ESH 1000 S B	ESH 1000 S R
Part No.	785 740	785 741	785 742	785 743	785 744
Nominal voltage up to (U_N)	1000 V	1000 V	1000 V	1000 V	1000 V
Colour	Yellow	White	Orange	Blue	Red
Material	ABS plastic	ABS plastic	ABS plastic	ABS plastic	ABS plastic

DEHNcare APG

Protective gloves

Actuation of an NH fuse puller using protective gloves

Prevent injuries – Stay healthy

- For protection against thermal and mechanical risks
- Excellent fit due to special glove cut
- Good touch sensitivity due to soft leather inner surface of the gloves
- Breathable materials maximise wearing comfort
- Certified according to the requirements of directive 89/686/EEC on personal protective equipment

General Information:	
Standard	Box test in accordance with IEC 61482-1-2, ATPV test in accordance with IEC 61482-1-1, DIN EN 388, DIN EN 407
Material (glove palm)	Siliconised calf grain leather
Material (glove back)	100% Kevlar® interlock knit
Material (sewing thread)	Kevlar®

Notes

Article 5 of the German Labour Protection Law requires employers to perform a hazard analysis.
This hazard analysis also involves arc fault protection.
Employers must select and provide approved protective clothing including helmets, face shields and gloves to protect personnel against the hazards of arc faults.
They must also ensure that each employee who is exposed to the hazards of arc faults wears protective clothing.
Protective gloves of type APG are no insulating gloves in accordance with EN/IEC 60903 (DIN VDE 0682 Part 311) for live working.

Live Working

Protective and Auxiliary Equipment

DEHNcare APG

Arc-Fault-Tested protective Gloves

Glove size
Measure the circumference around your knuckles to determine your correct glove size.

Order example
Glove size 10 is recommended for a circumference around your knuckles of 24 cm.

Glove size:	
Circumference around the knuckles	**Glove size**
20.3 cm	8
22.9 cm	9
25.4 cm	10
27.9 cm	11
30.5 cm	12

Type	APG 8	APG 9	APG 10	APG 11	APG 12
Part No.	**785 796**	**785 797**	**785 798**	**785 799**	**785 800**
Incident energy	(class 2) 423 kJ / m^2	(class 2) 423 kJ / m^2	(class 2) 423 kJ / m^2	(class 2) 423 kJ / m^2	(class 2) 423 kJ / m^2
ATPV (Arc Thermal Performance Value)	32.8 cal / cm^2	32.8 cal / cm^2	32.8 cal / cm^2	32.8 cal / cm^2	32.8 cal / cm^2
Total length	310 mm	320 mm	330 mm	340 mm	350 mm
Gauntlet length	100 mm	100 mm	100 mm	100 mm	100 mm
Size	8	9	10	11	12

PPE – Personal Protective Equipment

Nominal voltages up to 1000 V

Live working with insulating gloves up to 1000 V

- For working on live parts
- Insulating gloves combine excellent fit and high elasticity with maximum insulation resistance
- Two different models to suit your needs

General Information:	
Standard (gloves)	EN 60903 (DIN VDE 0682 Part 311)
Standard (face shield)	DIN EN 166 and additional GS-ET-29 requirements of the trade association
Standard (NH fuse puller)	DIN VDE 0680 Part 4

Maintenance test
The pneumatic glove tester allows to perform maintenance tests in compliance with the relevant standard and even detects minimal damage to the insulating gloves. Gloves should be inspected before each use, therefore the glove tester is an indispensable and very practical safety tool.

Face Shield with Strap

- Arc-fault-tested in accordance with GS-ET-29 test principle
- High Visible Light Transmittance (VLT)
- Coating on both sides prevents misting up, polished edges, 1.5 mm thick
- The face shield can be locked into the use and non-use position
- Suitable for all common safety helmets for electricians

Type	SSC ASH NS
Part No.	**785 427**
Nominal voltage up to (U_N)	1000 V
Wall thickness	1.5 mm
Size	Universal
Material	Plastic
Incident energy after box test	(class 1) 135 kJ / m²
Visible Light Transmittance (VLT)	> 75 %

NH Fuse Puller with Sleeve

- NH fuse puller in accordance with DIN VDE 0680 Part 4 with sleeve made of coated cotton fabric
- For actuating fuses of sizes NH00, 1, 2 and 3

Type	NHS AG 00 3 NS
Part No.	**785 645**
Nominal voltage up to (U_N)	1000 V
Colour	Brown
Material	Coated cotton fabric

PPE – Personal Protective Equipment

Insulating Gloves, Category M

For high mechanical stress

Type	IHS 00 M 9 NS	IHS 00 M 10 NS	IHS 0 M 9 NS	IHS 0 M 10 NS
Part No.	785 491	785 492	785 493	785 494
Class	00	00	0	0
Nominal voltage up to (U_N)	500 V	500 V	1000 V	1000 V
Colour	Beige	Beige	Beige	Beige
Wall thickness	0.5 mm	0.5 mm	1.0 mm	1.0 mm
Size	9	10	9	10

Insulating Gloves, Category RC

Resistant to acid, oil, ozone, high mechanical stress and extremely low temperatures
With inner coating and textured gripping surface

Type	IHS 00 RC 9 NS	IHS 00 RC 10 NS
Part No.	785 495	785 496
Class	00	00
Nominal voltage up to (U_N)	500 V	500 V
Colour	Orange	Orange
Wall thickness	0.9 mm	0.9 mm
Size	9	10

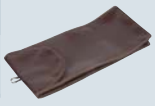
Sizes 8 and 11 are available on request.

Accessory for insulating Gloves

Storage Bag, empty

With hook-and-loop fastener and coupling hook

Type	AT IHS NS
Part No.	785 490
Colour	Brown
Dimensions	400 x 180 x 50 mm



Accessory for insulating Gloves

Pneumatic Glove Tester

For performing tests required by the standard

Type	PHSP NS
Part No.	785 497
Colour	Grey

Insulating Equipment for Airport Lighting Systems

Nominal voltages up to 17.5 kV / 15 ... 60 Hz

Replacement of a faulty illuminant (airport lighting system) at a runway

- Equipment for live maintenance and repair work on airport lighting systems
- Insulated platform for insulating the operating location
- Circumferential, fluorescent marker tape indicates the maximum permissible height for plants in green spaces and can be used as reflector at night
- Two removable kneeling cushions for comfortable working
- Replaceable skids for easy positioning and transport

General Information:	
Standard	Based on DIN VDE 0681 Part 1
Relative air humidity	≤ 90%
Temperature range	– 25 °C ... + 55 °C
Use	Not suitable for use in wet weather conditions
Material (insulated platform)	Glass-fibre reinforced plastic
Material (extension)	Glass-fibre reinforced rod

Application

The insulated platform and the insulating extension are used for e.g. replacing illuminants at airport lighting systems under live conditions.
The insulated platform insulates the operating location during live working. The insulating extension is used as insulating intermediate section between the ratchet (with 13 mm square) and operating head (e.g. 17 mm bushing).

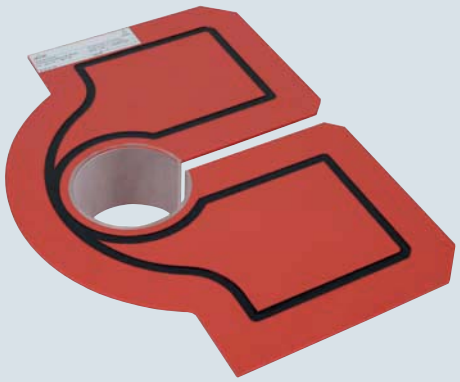
The insulating extension is used as insulating intermediate section when attaching the illuminant.

Application:
Insulating extension with operating head and ratchet with torque adjustment.

Insulating extension
IV VK13 SW17 1000
Part No. 785 445

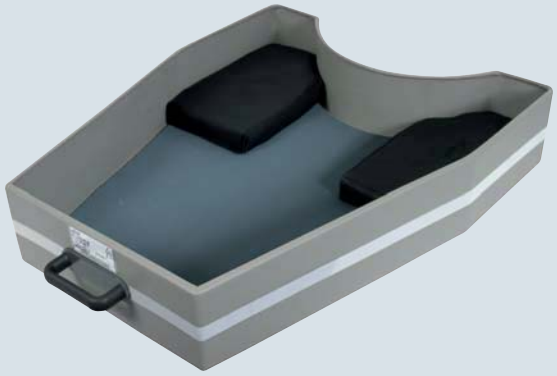
Insulating Equipment for Airport Lighting Systems

Insulating Insert for buried Beacons



Type	IE UF LF 150	IE UF LF 200
Part No.	785 440	785 441
Nominal voltage up to (U_N)	1000 V / a.c.; 1500 V / d.c.	1000 V /a.c.; 1500 V / d.c.
Diameter	150 mm	200 mm
Dimensions	600 x 440 mm	600 x 460 mm

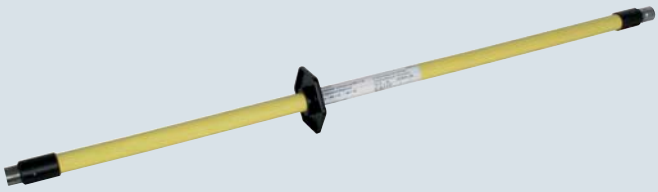
IW insulated Platform



For beacons up to a maximum diameter of 225 mm

Type	IW 17.5 890 650 180
Part No.	785 408
Nominal voltage up to (U_N)	17.5 kV
Dimensions	890 x 650 x 180 mm

Insulating Extension



With 13 mm square and width across flats 17 for torque limiter

Type	IV VK13 SW17 1000
Part No.	785 445
Nominal voltage up to (U_N)	1000 V / a.c.; 1500 V / d.c.
Length	1000 mm

Covering Material and insulated Mats

Covering live parts

- Protection against accidental and direct contact with live parts
- For covering adjacent live parts
- Available in different lengths, widths, thicknesses and colours
- Insulated rubber mats for insulating the operating location

General Information:	
Standard	DIN VDE 0680 Part 1

Insulated Covering Material (Crystal Clear)

Type	ATK 135 50M NS	ATK 135 ..M NS
Part No.	785 465	785 466
Nominal voltage up to (U_N)	1000 V	1000 V
Length	50 m	Any up to 50 m *)
Width	1350 mm	1350 mm
Thickness	0.5 mm	0.5 mm
Colour	Crystal clear	Crystal clear

Insulated Covering Material (Transparent)

Type	ATK 120 25M NS	ATK 120 ..M NS
Part No.	785 467	785 468
Nominal voltage up to (U_N)	1000 V	1000 V
Length	25 m	Any up to 25 m *)
Width	1200 mm	1200 mm
Thickness	1.0 mm	1.0 mm
Colour	Transparent	Transparent

*) *Required length to be specified at order!*

Covering Material and insulated Mats

Insulated Covering Material (Chloroprene Rubber)

For covering insulators

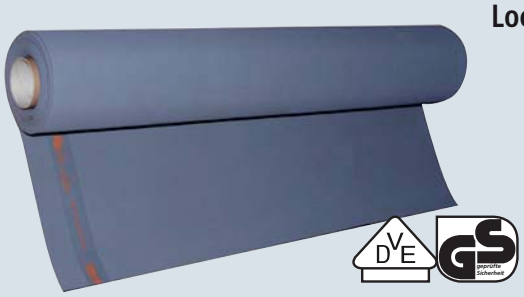
Type	WBN 200 2,5M NS
Part No.	785 646
Nominal voltage up to (U_N)	1000 V
Length	2.5 m
Width	200 mm
Thickness	1.0 mm
Colour	Red

Insulated Covering Material (Chloroprene Rubber)

Flexible at low temperatures

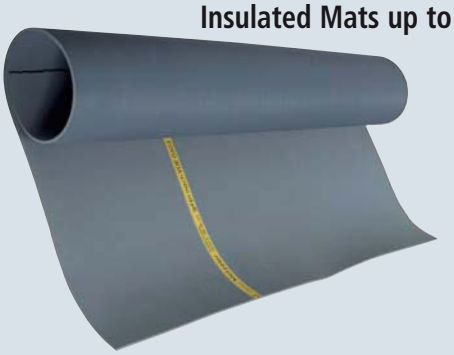
Type	ATN 140 10M NS	ATN 140 ..M NS
Part No.	785 471	785 472
Nominal voltage up to (U_N)	1000 V	1000 V
Length	10 m	Any up to 10 m *)
Width	1400 mm	1400 mm
Thickness	1.0 mm	1.0 mm
Colour	Red	Red

Insulated Rubber Mats for Insulating the Operating Location



Type	IMG SI 1M NS	IMG SI 10M NS	IMG SI ..M NS
Part No.	785 455	785 457	785 456
Nominal voltage up to (U_N)	1000 V	1000 V	1000 V
Length	1 m	10 m	Any up to 10 m *)
Width	1000 mm	1000 mm	1000 mm
Thickness	3.0 mm	3.0 mm	3.0 mm
Colour	Grey	Grey	Grey

Insulated Mats up to 50 kV



For use in electrical control and test rooms, dielectric strength of 50 kV, tested to DIN VDE 0303 Part 21

Type	IMG SAN 1M 10M	IMG SAN 1M ..M
Part No.	785 459	785 458
Nominal voltage up to (U_N)	50 kV	50 kV
Length	10 m	Any up to 10 m *)
Width	1000 mm	1000 mm
Thickness	4.5 mm	4.5 mm
Colour	Grey	Grey

*) *Required length to be specified at order!*

Accessory for Covering Material and insulated Mats

Clip

With insulated steel spring

With VDE/GS sign

Type	KK 35 NS
Part No.	785 647
Max. clamping range	35 mm
Dimensions	170 / 110 mm
Material	Plastic

Eye

Consists of two elements

Type	OEK 12 NS
Part No.	785 649
Dimensions	∅12 / 26 mm
Material	Plastic

Hook

Type	HK 8 NS
Part No.	785 648
Dimensions	∅8, 130 / 72 mm
Material	Plastic

Nominal voltages up to 1000 V

Lock-out system with 3 modules

- Protection against reconnection
- Symbol "Nicht schalten" [Do not close the circuit] acc. to German regulations (VBG 125)
- Insulating plug for screw inserts
- Insulating blade for NH fuse holders
- Lock-out systems for circuit breakers

General Information:	
Standard	VBG 125 and DIN 40008
For	Indoor installations

Insulating Plug

For screw inserts

Type	SE E14	SE E18	SE E27 E33
Part No.	785 639	785 650	785 640
Size	E14	E18	E27 and 33
Diameter	20 mm	25 mm	45 mm
Dimensions	∅20 x 40 mm	∅25 x 40 mm	∅45 x 55 mm

Insulating Blade

For NH fuse holders and distribution blocks

Type	SE NH00	SE NH0	SE NH1	SE NH2 3
Part No.	785 641	785 642	785 643	785 644
Size	00	0	1	2 and 3
Blade	38 x 5	38 x 5	38 x 5	38 x 5
Dimensions	80 mm	125 mm	135 mm	150 mm

Lock-out System

For single-pole and multipole circuit breakers with a clamping range of 45 mm

Type	SE REG 1TE	SE REG 2TE	SE REG 3TE
Part No.	785 638	785 652	785 637
Size	1 module	2 modules	3 modules
Dimensions	52 x 17 mm	52 x 34 mm	52 x 51 mm

Selection Guide

Voltage Detector

Device	Nominal Voltage U_N / Frequency f_N	Application, Indication	Page
PHE Kit	15 kV / 16.7 Hz	For use in wet weather conditions For overhead contact lines of electric railways With self-testing element Visual indicator Easy transport 4 / 6-part unit	162
PHE III	25 kV / 50 Hz	For use in wet weather conditions For overhead contact lines of electric railways With self-testing element Visual and acoustic indicator Easy transport	164
PHE	3...20 kV / 50 or 16.7 Hz, switchable 6...20 kV / 16.7 Hz 15 kV / 16.7 Hz	For use in wet weather conditions For use in three-phase systems and single-ended mono phase switching stations For traction power lines With self-testing element Visual indicator Easy transport	165
PHE III Kit	110...132 kV / 50 and 16.7 Hz	For use in wet weather conditions For indoor and outdoor installations For use in 50 Hz three-phase systems and 16.7 Hz centre-earthed monophase traction power lines With self-testing element Visual and acoustic indicator Easy transport	167
HSA 194	110...420 kV / 16.7 Hz	For use in wet weather conditions Non-contact voltage detector For centre-earthed monophase traction power lines	168
ASP	110...132 kV / 16.7 Hz	With self-testing element Visual and acoustic indicator	169
PHE/G	1...24 kV / d.c. voltage	For use in wet weather conditions For indoor and outdoor installations With self-testing element Visual indicator Easy transport Two-pole unit (one stick/two sticks)	170
Storage Bags and Transport Cases			187

Maintenance tests according to GUV-V A2

According to German regulations (GUV-V A2), voltage detectors have to be tested for compliance with the prescribed limits as stated in the Electrical Safety Rules. This test is performed in the high-voltage test laboratory of DEHN + SÖHNE and includes

- measurement of the leakage current,
- test for clear indication,
- test for protection against bridging,
- visual inspection, manual tests and measurements.

This maintenance test is documented in a test report and on the device.

The test intervals depend on the operating conditions of the voltage detector, e.g. frequency of use, environmental conditions and transport. According to German regulations, however, it is advisable to carry out a maintenance test **at least** every **6 years**.

PHE Voltage Detector Kit

Nominal voltage 15 kV / 16.7 Hz

PHE voltage detector with visual indicator used on an overhead contact line of National German National Railways (DB)

Easy and safe testing

- For overhead contact lines of electric railways
- Cost-effective/space-saving transport
- Easy to use due to simple plug-in system

General Information:	
Standard	DIN VDE 0681 Part 6
Use	Suitable for use in wet weather conditions
Self-testing element	Yes
Material (test electrode)	St/gal Zn
Material (test prod)	Glass-fibre reinforced polyester tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 619	**7**	766 076
2	766 678	**8**	766 077
3	766 677	**9**	766 889
4	766 072	**10**	766 602
5	766 075	**11**	766 704
6	766 073		

For more detailed information on these products, see Accessory chapter

Insulating stick with anti-rotation plug-in coupling

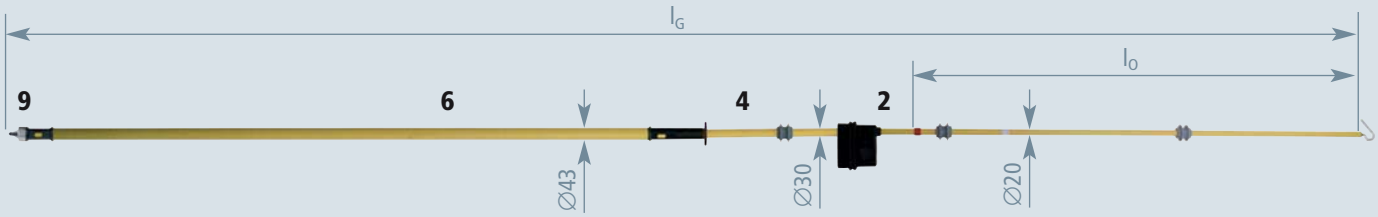
End fitting with plug-in coupling and non-slip eye

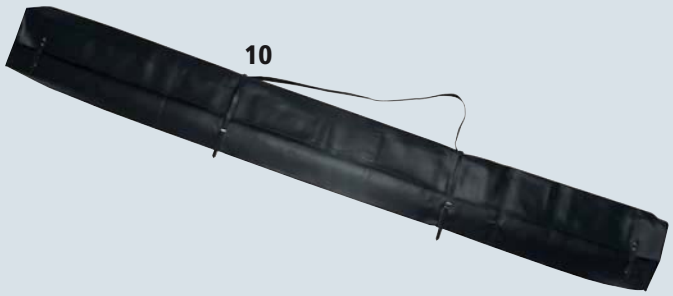
Two-part test prod with robust threaded coupling (six-part kit for transport in motor vehicles)

Accessory, kit parts and spare parts from page 195

PHE Voltage Detector Kit

Nominal Voltage 15 kV / 16.7 Hz

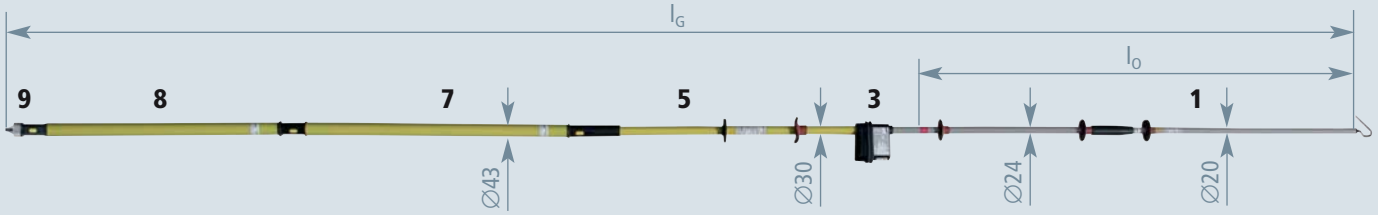


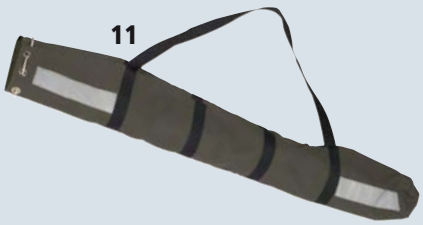


Modular (four elements)

Type	PHE 15 16.7 4T TA
Part No.	766 616
Nominal voltage (U_N)	15 kV
Frequency	16.7 Hz
Total length (l_G)	4890 mm
Insertion depth (l_O)	1675 mm
DB drawing No.	3 Ebgw 02.51
DB material No.	237 129

Nominal Voltage 15 kV / 16.7 Hz (for Transport in Motor Vehicles)





Modular (six elements)

Type	PHE 15 16.7 6T TA
Part No.	766 617
Nominal voltage (U_N)	15 kV
Frequency	16.7 Hz
Total length (l_G)	4900 mm
Insertion depth (l_O)	1675 mm
DB drawing No.	3 Ebgw 02.53
DB material No.	652 975

Voltage detectors for other nominal voltages and frequencies are available on request.

PHE III Voltage Detector

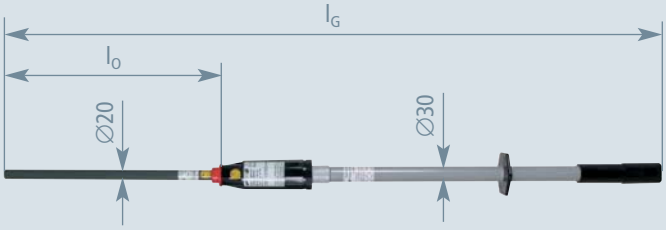
Nominal voltage 25 kV / 50 Hz

Easy and safe testing

- For overhead contact lines of electric railways
- Reliable indication
- Cost-effective/space-saving transport
- Easy to use due to simple plug-in system

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
Indication	Visual and acoustic
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Nominal Voltage 25 kV / 50 Hz



Category "S" for single-ended monophase systems

Type	PHE3 25 S 50 1P
Part No.	767 125
Nominal voltage (U_N)	25 kV / 50 Hz
Category	S
Total length (l_G)	1680 mm
Insertion depth (l_O)	880 mm

Plugging a HV STK extension handle into an IS PHE STK insulating stick

Accessory, kit parts and spare parts from page 195

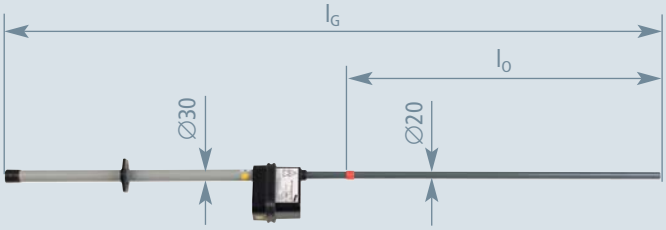
Nominal voltage ranges 3 ... 20 kV / 50 Hz and 6 ... 20 kV / 16.7 Hz

- Safe verification of isolation from supply voltage
- For three-phase and single-ended monophase systems
- For electric point heating systems
- Reliable indication
- Cost-effective/space-saving transport
- Universal device with different nominal ranges

PHE voltage detector with visual indicator used on a switchgear installation

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411) and E DIN VDE 0682 Part 421
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
Indication	Visual
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

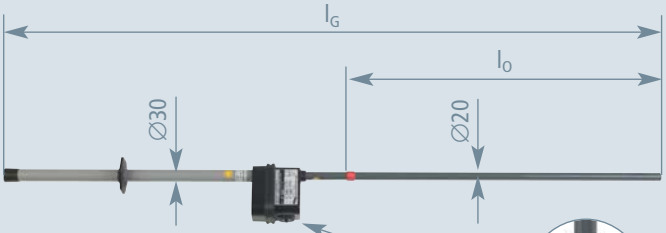
Nominal Voltage Ranges up to 20 kV / 16.7 Hz



For single-ended monophase switchgear installations and point heating systems

Type	PHE 6 20 S 16.7 1P
Part No.	767 415
Nominal voltage / frequency (U_N / f_N)	6 ... 20 kV / 16.7 Hz
Total length (l_G)	1590 mm
Insertion depth (l_O)	770 mm
DB drawing No.	3 Ebgw 02.52
DB material No.	738 302

Nominal Voltage Ranges up to 20 kV / 50 Hz or 16.7 Hz, switchable



For three-phase systems and single-ended monophase switchgear installations

Special features of the switchable voltage detector:
The selector switch can be moved into three positions for the relevant voltage/frequency ranges:

3 ... 10 kV / 50 Hz – Three-phase current
6 ... 20 kV / 50 Hz – Three-phase current
6 ... 20 kV / 16.7 Hz – Single-ended monophase systems

For safety reasons, the detector can only be switched on if the selector switch is switched to the most sensitive range of 3 kV to 10 kV / 50 Hz. The switch snaps into the relevant position and provides protection against accidental switching.
A magnetically operated, wear-resistant reed switch changes the switching position.

Type	PHE 3 20 S FU 1P
Part No.	767 416
Nominal voltage / frequency (U_N / f_N)	3 ... 10 kV / 50 Hz; 6 ... 20 kV / 50 Hz; 6 ... 20 kV / 16.7 Hz
Total length (l_G)	1590 mm
Insertion depth (l_O)	770 mm
DB drawing No.	3 Ebgw 02.54
DB material No.	743 361

Voltage detectors for other nominal voltages and frequencies are available on request.

PHE Voltage Detector

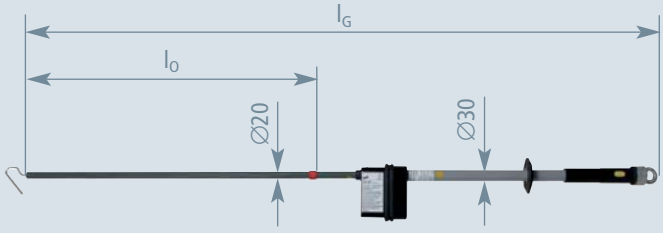
Nominal voltage 15 kV / 16.7 Hz

Easy and safe testing

- Specifically for traction power lines
- Easy to use
- Cost-effective/space-saving transport

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
Indication	Visual
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Nominal Voltage 15 kV / 16.7 Hz



Hook-shaped electode and end fitting included

Type	PHE 15 16.7 BEL STK
Part No.	767 413
Nominal voltage / frequency (U_N / f_N)	15 kV / 16.7 Hz
Total length (l_G)	1645 mm
Insertion depth (l_O)	765 mm
DB drawing No.	3 Ebgw 02.55
DB material No.	964 851

Voltage detectors for other nominal voltages and frequencies are available on request.

Use for traction power lines

Voltage detectors for traction power lines have a shorter extension than voltage detectors for overhead contact lines. To ensure reliable indication, the PHE 15 16.7 BEL STK voltage detector may only be used for railway power lines, but not for other components of overhead contact lines. Moreover, it must not be used from ladder trolleys for overhead contact lines.

Traction power lines are supply lines, line feeders, bypass lines, connecting lines, feeder lines, 15 kV cables, cable sealing ends, switch lines and transverse switch lines.

End fitting with plug-in coupling and non-slip eye

Accessory, kit parts and spare parts from page 195

PHE III Voltage Detector Kit

Nominal voltage 110 ... 132 kV / 50 and 16.7 Hz

Safe verification of isolation from supply voltage

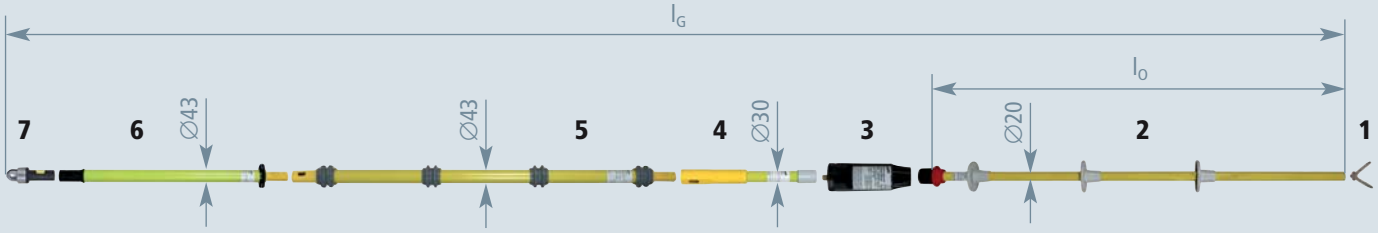
- Voltage detector for 50 Hz three-phase systems and 16.7 Hz centre-earthed monophase traction power lines
- Range does not have to be switched
- Cost-effective
- Cost-effective/space-saving transport

PHE III voltage detector used on a 110 kV outdoor switching station

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 924	5	766 128
2	767 771	6	766 120
3	767 129	7	766 889
4	766 352	8	766 996
For more detailed information on these products, see Accessory chapter			

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
For	Indoor and outdoor installations
Indication	Visual and acoustic
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Nominal Voltage Range 110 ... 132 kV / 50 and 16.7 Hz



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Kit includes:		
Type	Part No.	No.
PHE3 110 132 S	767 130	1+2+3+4+5+6+7
KLT 133 34 10	766 996	8

Type	PHE3S 110 132 S
Part No.	767 131
Nominal voltage (U_N)	110 ... 132 kV
Category	S
Total length (l_G)	3440 mm
Insertion depth (l_O)	880 mm
DB drawing No.	3 Eku 710 001
DB material No.	01 101 358

Voltage detectors for other nominal voltages and frequencies are available on request.

Accessory, kit parts and spare parts from page 195

HSA 194 Non-Contact Voltage Detector

Nominal voltage range 110 ... 420 kV / 16.7 Hz

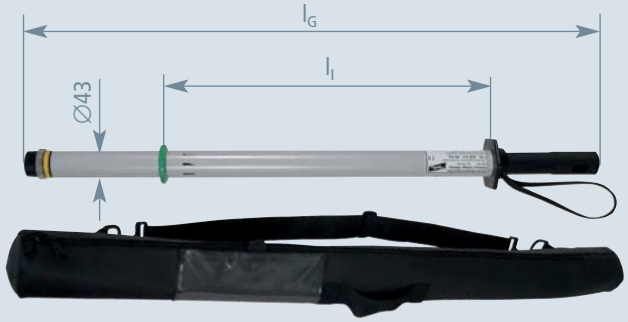
Non-contact voltage detector used for a 110 kV overhead line

Easy and safe testing

- For verifying safe isolation from supply voltage of centre-earthed monophase traction power lines without making contact
- Cost-effective/space-saving transport

General Information:	
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	Suitable for use in wet weather conditions
Indication	Visual and acoustic
Self-testing element	Yes
Material (insulating stick)	Glass-fibre reinforced polyester tube

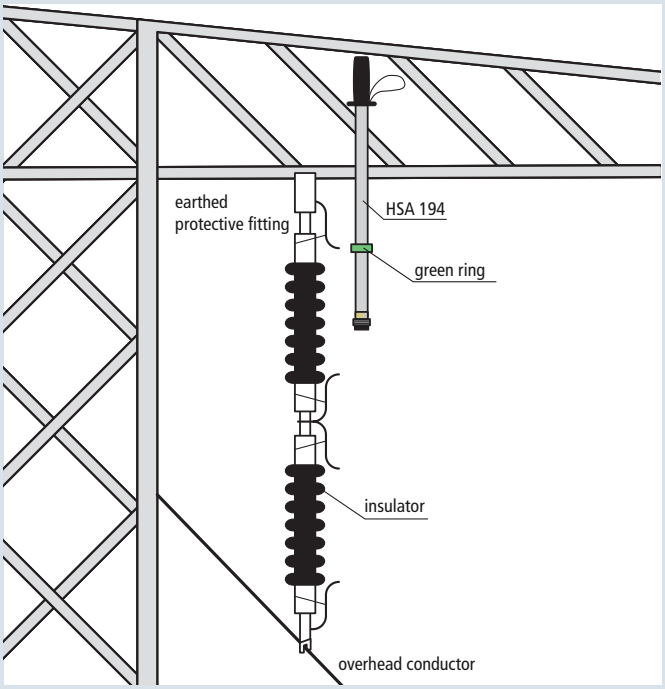
Nominal Voltage Range 110 ... 420 kV / 16.7 Hz



Plug-in coupling for extending the handle
Storage bag included in delivery

Type	HSA194 110 420 16.7
Part No.	767 542
Nominal voltage range (U_N)	110 ... 420 V
Total length (l_G)	935 mm
Insulating clearance (l_I)	540 mm
DB drawing No.	3 Ekgw 02.54

If required, non-contact voltage detectors can be equipped with lithium batteries at an extra charge and are available for other nominal voltages and frequencies on request.



Application notes
The HSA 194 non-contact voltage detector is used for verifying safe isolation from supply voltage from the crossarm of the overhead line tower. The green ring on the HSA 194 is used to make contact with the last earthed protective fitting (or earthed insulator cap) so that the measuring head of the voltage detector points in the direction of the overhead conductor fixed to the other end of the insulator (stick axis of the HSA 194 parallel to the longitudinal axis of the insulator). The "Voltage present" state of the overhead conductor is indicated by visual (red flashing light) and acoustic (audible signal) signals.

Accessory, kit parts and spare parts from page 195

ASP Non-Contact Voltage Detector Kit

Nominal voltage range 110 ... 132 kV / 16.7 Hz

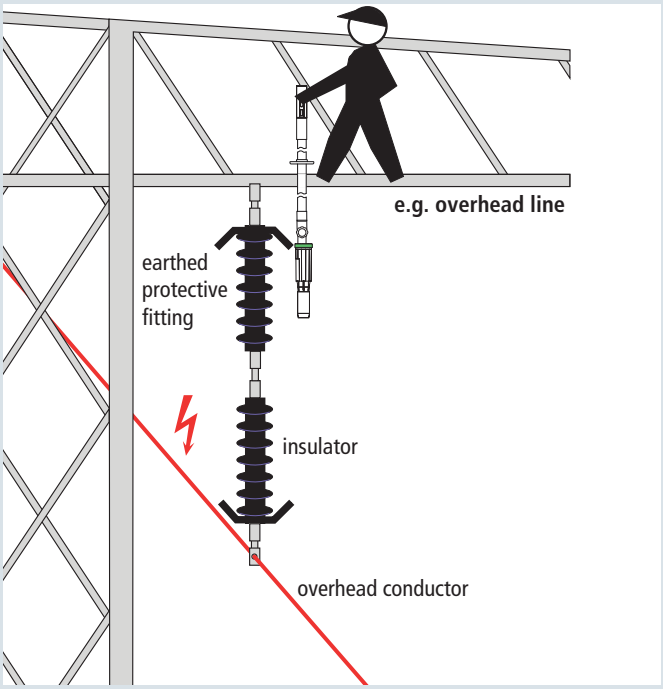
Easy and safe testing

- For verifying safe isolation from supply voltage of centre-earthed monophase traction power lines without making contact
- Cost-effective
- Cost-effective/space-saving transport

Devices of category "L" can only be used for overhead lines.

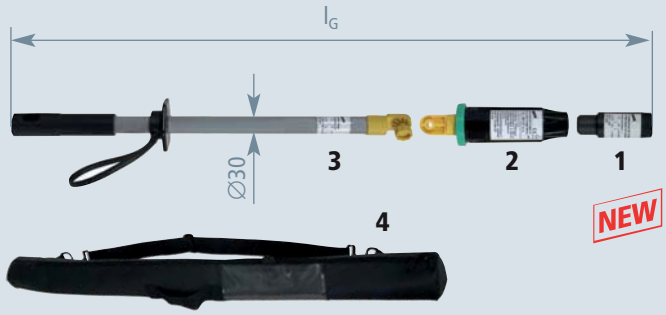
Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	767 576	3	766 369
2	767 564	4	767 574
For more detailed information on these products, see Accessory chapter			

General Information:	
Temperature range	– 25 °C ... + 55 °C
Use	Suitable for use in wet weather conditions
For	Overhead lines
Indication	Visual and acoustic
Self-testing element	Yes
Material (indicator)	Plastic, fully insulated
Material (electric field sensor)	Plastic (black)
Material (insulating stick)	Glass-fibre reinforced polyester tube



Use for overhead lines
The green ring on the ASP non-contact voltage detector with category "L" electric field sensor is used to make contact with the last earthed protective fitting in such a way that the electric field sensor points in the direction of the overhead conductor fixed at the other end of the insulator.

Nominal Voltage Range 110 ... 132 kV / 16.7 Hz



Category "L" for overhead lines

Kit includes:		
Type	Part No.	No.
ASP 110 132 16.7 L	767 585	1+2+3
KLT 104 9	767 574	4

Type	ASPS 110 132 16.7 L
Part No.	767 565
Nominal voltage (U_N)	110 ... 132 kV
Frequency	16.7 Hz
Total length (l_G)	960 mm
Category	L
DB drawing No.	3 Eku 710 002

Voltage detectors for other nominal voltages and frequencies are available on request.

PHE/G d.c. Voltage Detector

Nominal voltage up to 24 kV d.c.

PHE/G II d.c. voltage detector for d.c. links (ICE power car)

Safe verification of isolation from supply voltage

- For use in direct voltage systems (electrified rail networks, d.c. links)
- Reliable indication
- Easy to use due to compact design
- User-friendly

General Information:	
Standard	Based on EN/IEC 61243-2 (DIN VDE 0682 Part 412)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Use	For use in wet weather conditions
For	Indoor and outdoor installations, for example d.c. voltage systems (electrified rail networks, d.c. links)
Indication	Visual
Self-testing element	With self-testing element
Material (test prod)	Glass-fibre reinforced polyester tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube
Material (earthing/ connecting cable)	Copper cable, highly flexible

The two-pole PHE/G II d.c. voltage detector is specifically designed for d.c. links in electric locomotives. Due to the confined space in electric locomotives, it has a total length of only 800 mm. The voltage detector is supplied with a nominal voltage U_N = 3 kV and a response voltage U_t = 120 V (Part No. 767 602 / SN7216).

Voltage detectors for other nominal voltages are available on request.

The test prod of d.c. voltage detectors is colour-coded according to the polarity of the test prod:

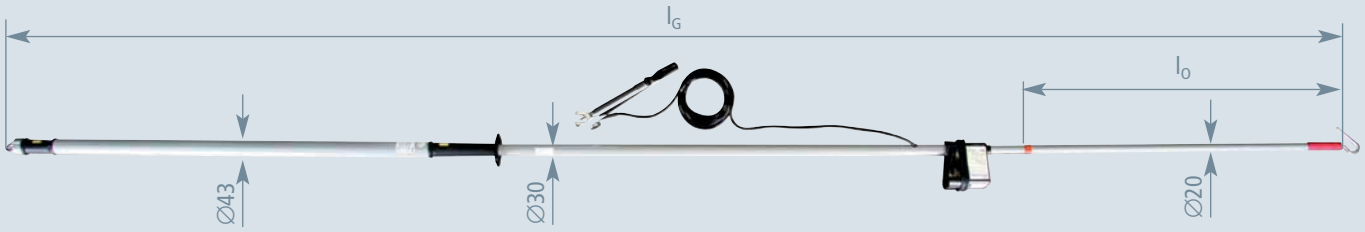
positive pole – red;

negative pole – blue.

Earth clamp with adjustable handle and **magnet**

Accessory, kit parts and spare parts from page 195

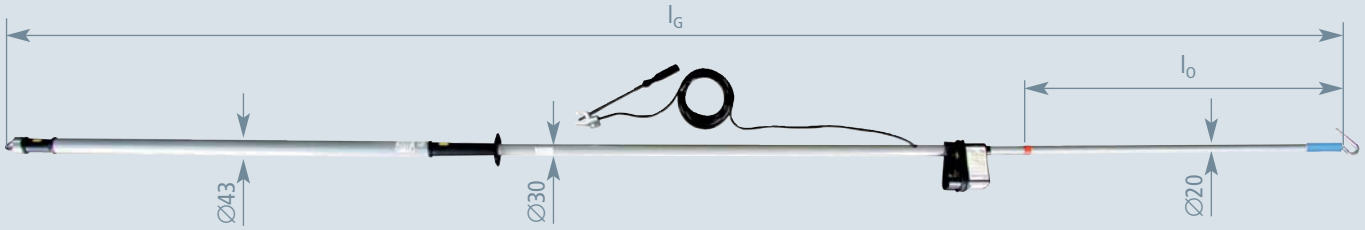
PHE/G I for Overhead Contact Lines, positive Pole



One stick (four elements)
- For direct voltage systems with earthed negative pole
- For nominal voltages up to **24 kV d.c.**
- Positive pole: Indicator with test prod
- Negative pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.FD P SN7...
Part No.	767 650
Length (earthing cable)	6000 mm
Total length (l_G)	4120 mm
Insertion depth (l_O)	1020 mm

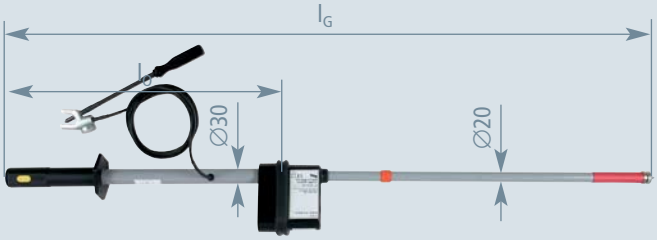
PHE/G I for Overhead Contact Lines, negative Pole



One stick (four elements)
- For direct voltage systems with earthed positive pole
- For nominal voltages up to **24 kV d.c.**
- Negative pole: Indicator with test prod
- Positive pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.FD M SN7...
Part No.	767 655
Length (earthing cable)	6000 mm
Total length (l_G)	4120 mm
Insertion depth (l_O)	1020 mm

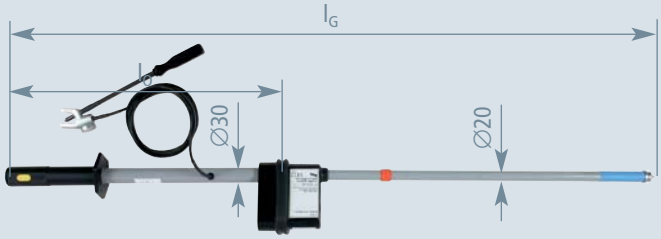
PHE/G I for Switchgear Installations, positive Pole



One stick
- For direct voltage systems with earthed negative pole
- For nominal voltages up to **24 kV d.c.**
- Positive pole: Indicator with test prod
- Negative pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.S P SN7...
Part No.	767 660
Length (earthing cable)	2000 mm
Total length (l_G)	1260 mm
Insertion depth (l_O)	530 mm

PHE/G I for Switchgear Installations, negative Pole

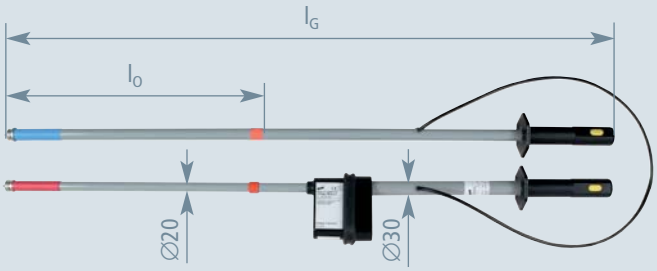


One stick
- For direct voltage systems with earthed positive pole
- For nominal voltages up to **24 kV d.c.**
- Negative pole: Indicator with test prod
- Positive pole: Earth clamp
- Response voltage $U_t = 0.5 \times U_N$
- Nominal voltage (U_N) to be specified at order!

Type	PHEG1.S M SN7...
Part No.	767 665
Length (earthing cable)	2000 mm
Total length (l_G)	1260 mm
Insertion depth (l_O)	530 mm

PHE/G d.c. Voltage Detector

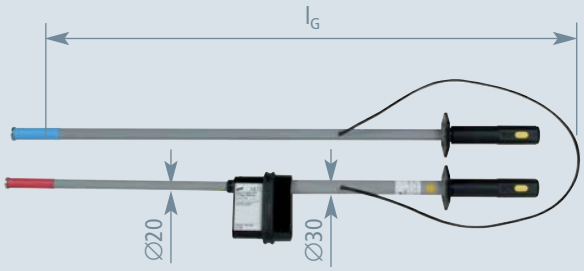
PHE/G II for Switchgear Installations and d.c. Links up to 24 kV d.c.



Two sticks
- For unearthed direct voltage systems
- For nominal voltages up to **24 kV d.c.**
- For d.c. links
- Positive pole: Indicator with test prod
- Negative pole: Insulating stick
- Response voltage U_t = 0.5 x U_N
- Nominal voltage (U_N) to be specified at order!

Type	PHEG2.P SN7...
Part No.	767 670
Length (connecting cable)	1250 mm
Total length (l_G)	1250 mm
Insertion depth (l_O)	540 mm

PHE/G II for Switchgear Installations and d.c. Links up to 7.5 kV d.c.



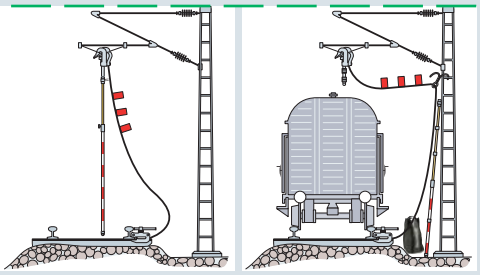
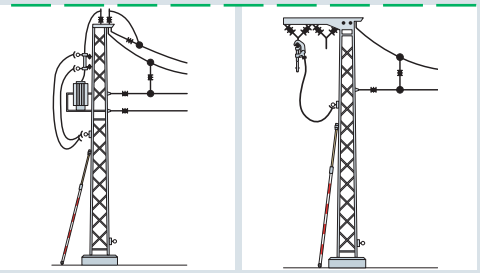
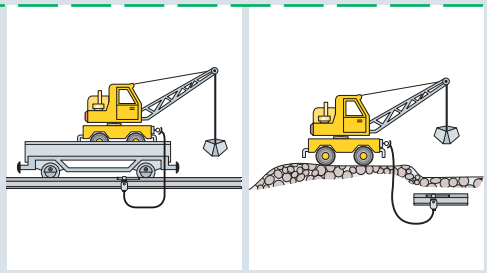
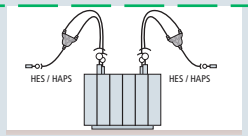
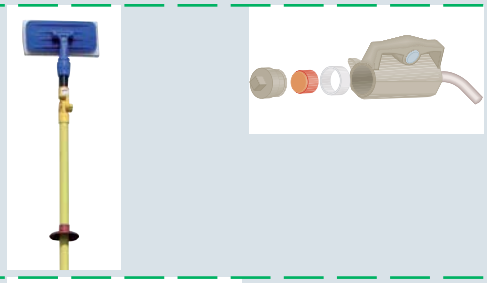
Two sticks
- For unearthed direct voltage systems
- For nominal voltages up to **7.5 kV d.c.**
- For d.c. links (e.g. electric locomotive; $U_A \leq 120$ V, l_G = 800 mm)
- Positive pole: Indicator with test prod
- Negative pole: Insulating stick
- Response voltage U_t = 0.5 x U_N
- Nominal voltage (U_N) to be specified at order!

Type	PHEG2 P SN7...
Part No.	767 602
Length (connecting cable)	1200 mm
Total length (l_G)	1075 mm

Other lengths and response values (U_t) are available on request.

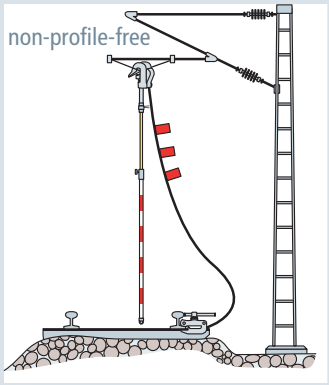
Accessory, kit parts and spare parts from page 195

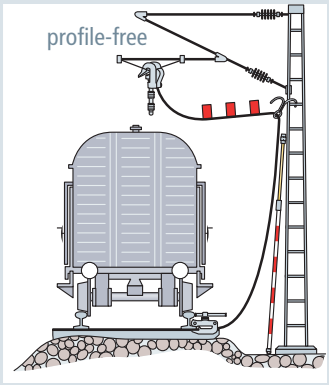
Earthing Devices

Device	Application, Device	Page	
Kit for Overhead Contact Lines	Profile-free or non-profile-free Kit for transport in motor vehicles (profile-free or non-profile-free)	174	
Kit for Transformers at Overhead Contact Line Towers	For earthing at fuse carriers For earthing towers next railway tracks	176	
Kit for Construction Machines, Lifting Gear, Maintenance Vehicles	For equipment on maintenance vehicles For on-track equipment For off-track equipment	177	
Kit for electric Point and Train Pre-Heating Systems	For electrical point heating systems For electrical train pre-heating systems	178	
Single Parts of Railway Earthing Devices	Earthing and short-circuiting devices	178	
	Phase connecting elements	180	
	Earth connecting elements	181	
	Earthing sticks	182	
	Fix ball points, earth connecting plates	183	
Further Equipment **Insulating Stick Kit**	For cleaning the windscreens of electric locomotives	185	
Fuse Link	For voltage-limiting devices	186	
Storage Bags and Transport Cases	Sheet metal or plastic case Artificial leather or canvas bag	187	

Kit for Overhead Contact Lines

Non-profile-free and profile-free



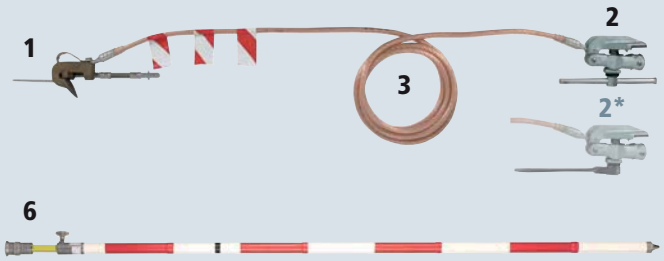


Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	784 755	5	740 124
2	792 450	6	769 502
2*	792 453	7	769 508
3	751 085	8	769 506
4	751 120	9	785 111

General Information:

Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)

Kit for Overhead Contact Lines (non-profile-free)

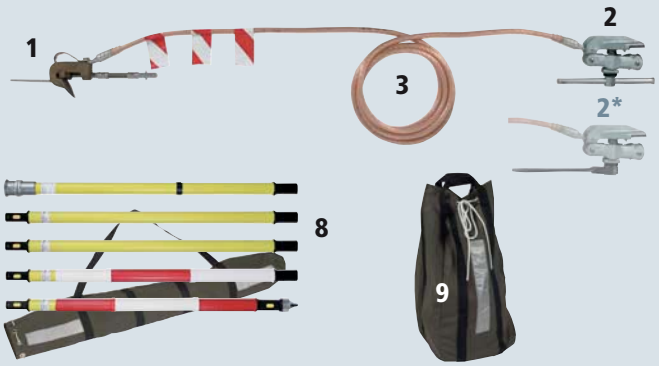


Telescopic earthing stick with adjusting ring (max. 5 m long), single-pole earthing and short-circuiting device (tommy bar)

Kit includes:		
Type	Part No.	No.
ESTC SQL RW 5000	1x 769 502	6
EKV K 50 8500	1x 751 086	1+2+3
EKV R 50 8500	– 751 087	1+2*+3
* Version with ratchet is available on request		

Type	BEV OL NPF K
Part No.	750 210
Cable cross-section	50 mm²
Cable length	8500 mm
DB drawing No.	3 Ebgw 01.51
DB material No.	237 117

Kit for Overhead Contact Lines for Transport in Motor Vehicles (non-profile-free)



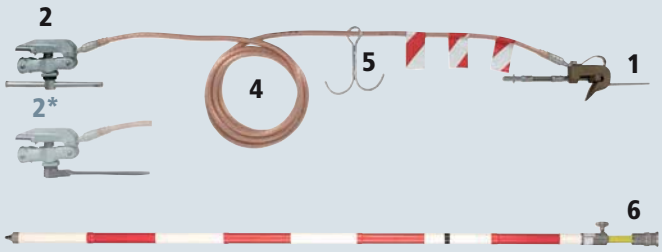
For technical emergency service and emergency management

Telescopic earthing stick kit consisting of six elements, pluggable (max. 5 m long), (canvas bag (Part No. 769 509) included), single-pole earthing and short-circuiting device (tommy bar), canvas bag

Kit includes:		
Type	Part No.	No.
EST SQL RW 4915 TA	1x 769 506	8
EKV K 50 8500	2x 751 086	1+2+3
EKV R 50 8500	– 751 087	1+2*+3
STT 55 27 30	1x 785 111	9
* Version with ratchet is available on request		

Type	BEV OL NPF PKW K
Part No.	750 196
Cable cross-section	50 mm²
Cable length	8500 mm
DB drawing No.	3 Ebgw 01.67
DB material No.	237 125

Kit for Overhead Contact Lines (profile-free**)

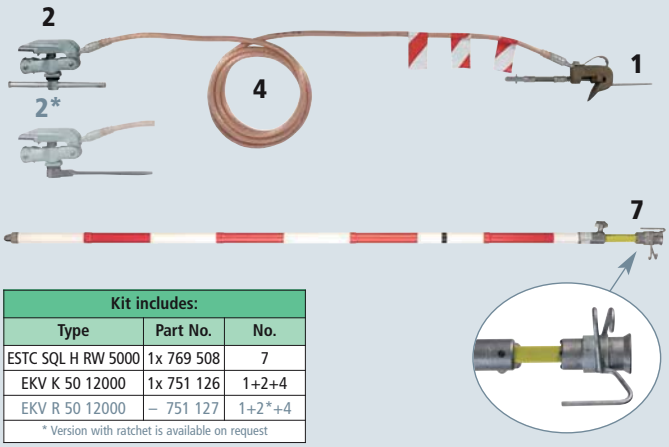


Kit includes:		
Type	Part No.	No.
ESTC SQL RW 5000	1x 769 502	6
EKV K H 50 12000	1x 751 121	1+2+4+5
EKV R H 50 12000	– 751 122	1+2*+4+5
* Version with ratchet is available on request		

Telescopic earthing stick with adjusting ring (max. 5 m long), single-pole earthing and short-circuiting device with suspension hook (tommy bar)

Type	BEV OL PF K
Part No.	**750 211**
Cable cross-section	50 mm²
Cable length	12000 mm
DB drawing No.	3 Ebgw 01.51
DB material No.	237 118

Kit for Overhead Contact Lines (profile-free**)

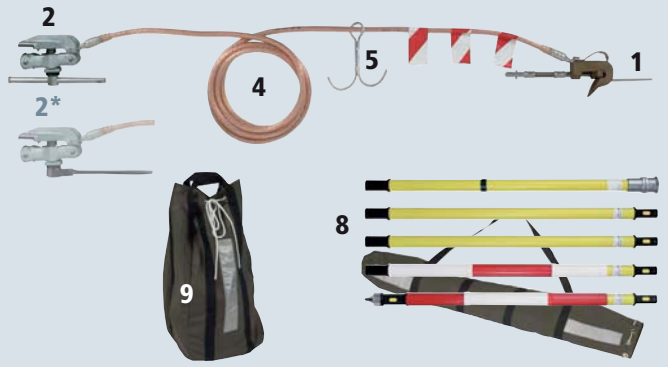


Kit includes:		
Type	Part No.	No.
ESTC SQL H RW 5000	1x 769 508	7
EKV K 50 12000	1x 751 126	1+2+4
EKV R 50 12000	– 751 127	1+2*+4
* Version with ratchet is available on request		

Telescopic earthing stick with cable entry and suspension hook (max. 5 m long), single-pole earthing and short-circuiting device (tommy bar)

Type	BEV OL PF V2 K
Part No.	**750 214**
Cable cross-section	50 mm²
Cable length	12000 mm
DB drawing No.	3 Ebgw 01.51
DB material No.	237 115

Kit for Overhead Contact Lines for Transport in Motor Vehicles (profile-free**)



Kit includes:		
Type	Part No.	No.
EST SQL RW 4915 TA	2x 769 506	8
EKV K H 50 12000	2x 751 121	1+2+4+5
EKV R H 50 12000	– 751 122	1+2*+4+5
STT 55 27 30	1x 785 111	9
* Version with ratchet is available on request		

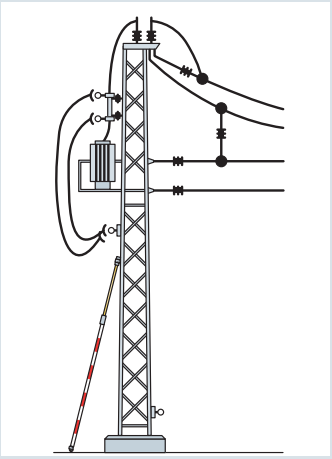
For technical emergency service and emergency management

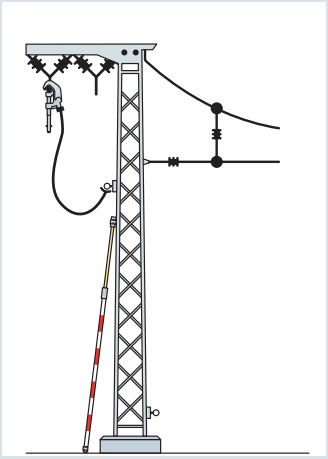
Telescopic earthing stick kit consisting of six elements, pluggable (max. 5 m long), (canvas bag (Part No. 769 509) included), single-pole earthing and short-circuiting device (tommy bar), canvas bag

Type	BEV OL PF PKW K
Part No.	**750 200**
Cable cross-section	50 mm²
Cable length	12000 mm
DB drawing No.	3 Ebgw 01.67

***) Profile-free earthing means that the earthing cable can be suspended on the tower thus allowing for limited diesel locomotive operation.*

Kit for Towers



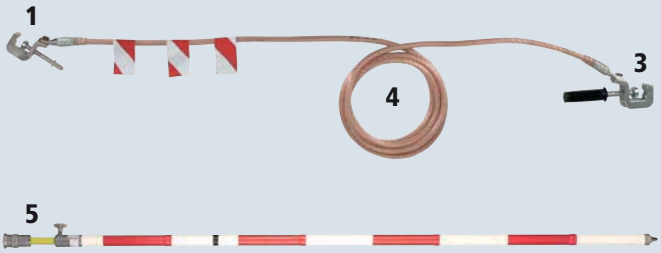


Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	773 251	4	751 040
2	784 352	5	769 352
3	774 251		

General Information:

Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)

Kit for Transformers at Overhead Contact Line Towers



For earthing at fuse carriers

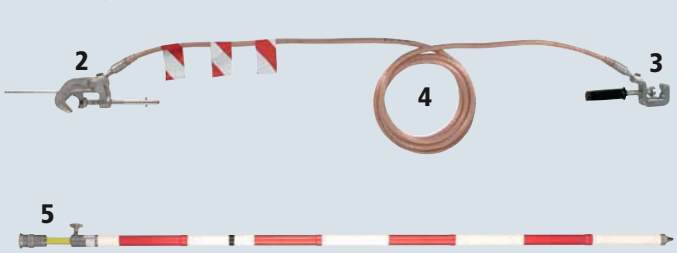
Telescopic earthing stick with adjusting ring (max. 3.5 m long),

single-pole earthing and short-circuiting device with universal clamp, T pin shaft and handle

Kit includes:		
Type	Part No.	No.
ESTC SQL RW 3500	1x 769 352	5
EKV UK 50 4000	2x 750 041	1+3+4

Type	BEV US OL ST
Part No.	750 212
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57
DB material No.	237 121

Kit for Supply Lines, Line Feeders, Bypass Lines and other Types of Lines



For earthing the supply line and traction current lines

Telescopic earthing stick with adjusting ring (max. 3.5 m long), single-pole earthing and short-circuiting device with conductor clamp and universal clamp with handle

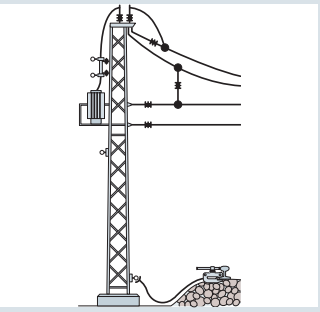
Kit includes:		
Type	Part No.	No.
ESTC SQL RW 3500	1x 769 352	5
EKV LK 50 4000	1x 750 042	2+3+4

Type	BEV SVUL
Part No.	750 213
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57
DB material No.	237 119

Applications

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)

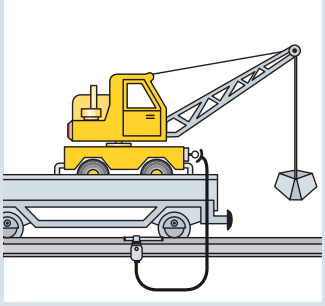
Earthing Device for Towers or Railway Tracks



Application 1:

Earthing the supply line

Single-pole earthing and short-circuiting device (50 mm²), 8.5 m long, with universal clamp with handle and clamp for railway tracks (tommy bar)



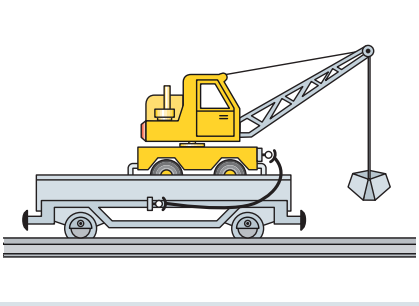
Application 2:

Equipment on maintenance vehicles, earthed track

Single-pole earthing and short-circuiting device (50 mm²), 8.5 m long, with universal clamp with handle and clamp for railway tracks (tommy bar) (clamp for railway tracks with ratchet available on request)

Type	BEV MF SE K
Part No.	751 191
Cable cross-section	50 mm²
Cable length	8500 mm
DB drawing No	3 Ebgw 01.56

Earthing Device for dedicated Busbars



Equipment on maintenance vehicles, earthed track

Single-pole earthing and short-circuiting device with two universal clamps with handle

Type	BEV MF LTE
Part No.	751 192
Cable cross-section	50 mm²
Cable length	8500 mm
DB drawing No	3 Ebgw 01.56

Earthing Device for adjacent Tracks

Single-pole earthing and short-circuiting device with universal clamp with handle and clamp for railway tracks (tommy bar) (clamp for railway tracks with ratchet is available on request)

Application 1: **Equipment on maintenance vehicles**
Equipment on maintenance vehicles, unearthed track (construction site)*

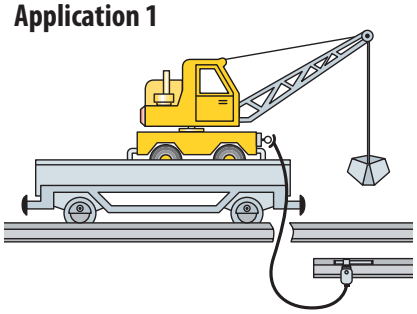
Application 2: **Equipment or vehicles**
Equipment or vehicles on or in close proximity to the track, unearthed track (construction site)*, on-track crane

Application 3: **Off-track vehicle**
Off-track vehicle

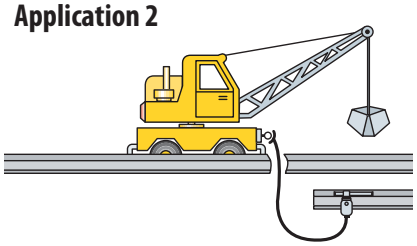
* In case of single-track segments, the non-existing adjacent track is replaced by an earthing cable. A universal clamp with handle is to be used instead of a clamp for railway tracks.

Type	BEV BM HZ BDW K
Part No.	751 193
Cable cross-section	50 mm²
Cable length	12000 mm
DB drawing No.	3 Ebgw 01.56
DB material No.	237 120

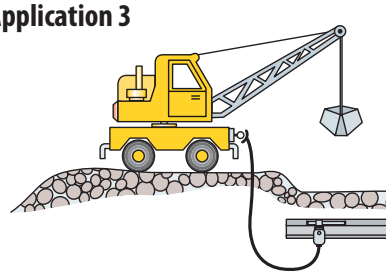
Application 1



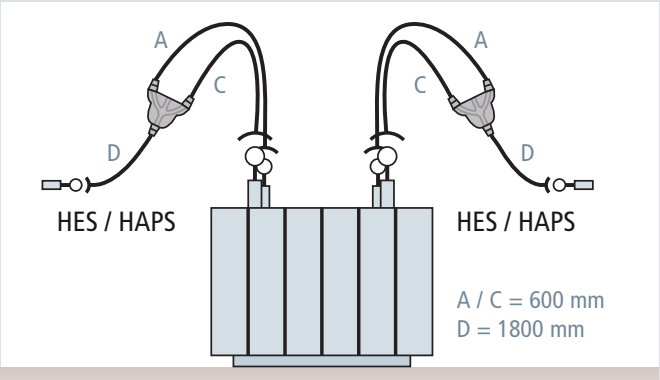
Application 2



Application 3



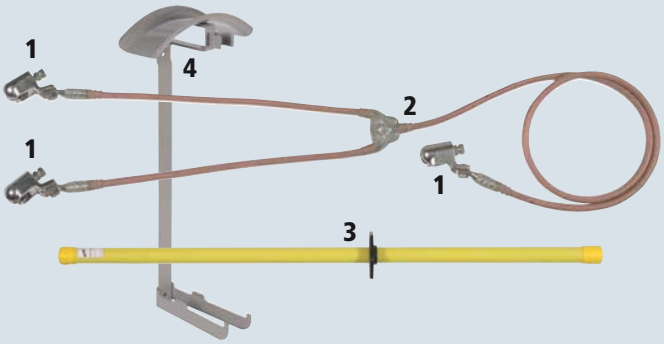
Kit for electric Point and Train Pre-Heating Systems



Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	772 320	3	761 015
2	750 202	4	700 000

General Information:

Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)



For the initial equipment of a transformer of electric point and train pre-heating systems

Kit includes:		
Type	Part No.	No.
ES SK 1500	1x 761 015	3
EKV2 50 KKH 600 1800	2x 751 150	1 (3x)+2
HV EKV ES30	1x 700 000	4

Type	BEV WHA ZVA
Part No.	750 215
DB drawing No.	3 Ebgw 01.70
DB material No.	742 402

For voltage detectors for electric point heating systems, please refer to the PHE voltage detector chapter.

Earthing and Short-Circuiting Devices

General Information:

Standard	EN/IEC 61230 (DIN VDE 0683 Part 100) and IEC 61138

Single-pole EaS Device

Earth Clamp for Overhead Contact Lines and Clamp for Railway Tracks with Tommy Bar

Phase cable end: Earth clamp for overhead contact lines, clamping range ∅4–15 mm

Earth cable end: Clamp for railway tracks with tommy bar

Type	EKV K 50 8500	EKV K 50 12000	EKV K H 50 12000
Part No.	751 086	751 126	751 121
Cable cross-section	50 mm²	50 mm²	50 mm²
Cable length	8500 mm	12000 mm	12000 mm
DB drawing No.	3 Ebgw 01.51/67	3 Ebgw 01.51/67	3 Ebgw 01.51/67
Hook	—	—	✔ —

Single-pole EaS Device

Earth Clamp for Overhead Contact Lines and Clamp for Railway Tracks with Ratchet

Phase cable end: Earth clamp for overhead contact lines, clamping range ∅4–15 mm

Earth cable end: Clamp for railway tracks with ratchet

Type	EKV R 50 8500	EKV R 50 12000	EKV R H 50 12000
Part No.	751 087	751 127	751 122
Cable cross-section	50 mm²	50 mm²	50 mm²
Cable length	8500 mm	12000 mm	12000 mm
DB drawing No.	3 Ebgw 01.51/67	3 Ebgw 01.51/67	3 Ebgw 01.51/67
Hook	—	—	✔ —

Single-pole EaS Device

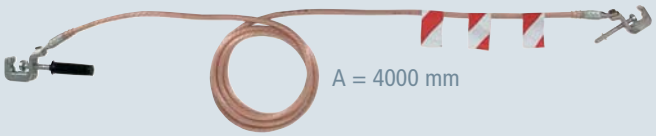
Conductor Clamp and Universal Earth Clamp with Handle

Phase cable end: Conductor clamp, T pin shaft
Earth cable end: Universal clamp, plastic handle

Type	EKV LK 50 4000
Part No.	750 042
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57

Single-pole EaS Device

Universal Earth Clamps with T Pin and Handle

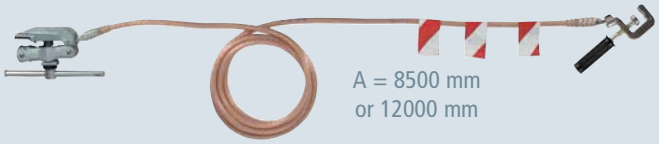


Phase cable end: Universal clamp, T pin shaft
Earth cable end: Universal clamp, plastic handle

Type	EKV UK 50 4000
Part No.	750 041
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57

Single-pole EaS Device

Universal Earth Clamp and Clamp for Railway Tracks



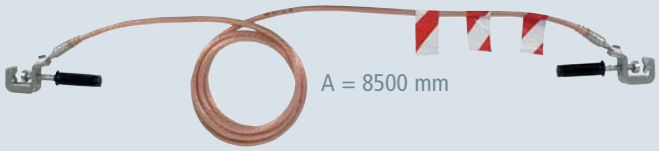
Phase cable end: Universal clamp, plaatic handle
Earth cable end: Clamp for railway tracks with tommy bar

Type	BEV MF SE K	BEV BM HZ BDW K
Part No.	751 191	751 193
Cable cross-section	50 mm²	50 mm²
Cable length	8500 mm	12000 mm
DB drawing No.	3 Ebgw 01.56	3 Ebgw 01.56

Version with ratchet is available on request.

Single-pole EaS Device

Two Universal Earth Clamps with Handle



Phase cable end: Universal clamp, plastic handle
Earth cable end: Universal clamp, plastic handle

Type	BEV MF LTE
Part No.	751 192
Cable cross-section	50 mm²
Cable length	8500 mm

Accessory for Earthing and Short-Circuiting Devices

Single-pole Earthing and Short-Circuiting Cable, unequipped

With red and white marking and hole in the terminal lug (∅10.5 mm), type PK2 cable lug without cut-out

Type EKS 50 ...	BEV 4M	BEV 8.5M	BEV 12M
Part No.	751 040	751 085	751 120
Cable cross-section	50 mm²	50 mm²	50 mm²
Cable length	4000 mm	8500 mm	12000 mm
DB drawing No.	3 Ebgw 01.57	3 Ebgw 01.51	3 Ebgw 01.51
DB material No.	157 511	157 512	157 513

Type EKS 50 ...	BEV 13M	BEV 14M
Part No.	751 130	751 140
Cable cross-section	50 mm²	50 mm²
Cable length	13000 mm	14000 mm
DB drawing No.	—	—
DB material No.	—	—

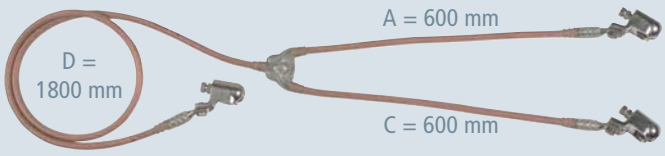
Suspension Hook

For (profile-free) suspending of earthing cables on towers

Type	EHH BEV OL
Part No.	740 124
DB drawing No.	3 Ebgw 01.51
DB material No.	778 794

Two-pole EaS Devices

Ball Head Caps



Phase cable end: Two ball head caps (∅25 mm), hexagon shaft
Earth cable end: Ball head cap (∅25 mm), hexagon shaft

Type	EKV2 50 KKH 600 1800
Part No.	751 150
Cable cross-section	50 mm²
Cable length	600/1800 mm
DB drawing No.	3 Ebgw 01.70
DB material No.	742 400

Phase Connecting Elements

Conductor Clamp

With contact electrode and threaded T pin shaft according to DIN 48087
For supply and traction power lines

Type	LK 4 40 TS SQL
Part No.	784 352
Clamping range	∅4 - 40 mm
DB drawing No.	3 Ebgw 01.65
DB material No.	157 539

Earth Clamp for Overhead Contact Lines

With contact electrode and flexible threaded T pin shaft according to DIN 48087
For overhead contact lines 80 a.c. to 120 a.c.

Type	FEK 4 15 TS FSQL
Part No.	784 755
Clamping range	∅4 - 15 mm
DB drawing No.	3 Ebgw 01.54
DB material No.	157 536

Clamp for Railway Tracks with Tommy Bar

With detachable tommy bar (locking spring)
For profile-free earthing of track profiles S49, S54, S64 and UIC60

Type	SAK PFE KN
Part No.	792 450
DB drawing No.	3 Ebgw 01.53
DB material No.	157 535

Clamp for Railway Tracks with Ratchet

With detachable ratchet
For profile-free earthing of track profiles S49, S54, S64 and UIC60

Type	SAK PFE RA
Part No.	792 453
DB drawing No.	3 Ebgw 01.53
DB material No.	157 549

Universal Clamp, T Pin Shaft

T pin according to DIN 48087
For flat and round conductors up to 30 mm and fixed ball points, ball (∅25 mm)

Type	UK K25 FL30 SQL
Part No.	773 251
Clamping range	30 mm
DB drawing No.	4 Ebgw 01.59
DB material No.	157 538

Universal Clamp with plastic Handle

For flat and round conductors up to 30 mm and fixed ball points, ball (∅25 mm)

Type	UK K25 FL30 HG
Part No.	774 251
Clamping range	30 mm
DB drawing No.	4 Ebgw 01.64
DB material No.	157 537

Earthing Sticks

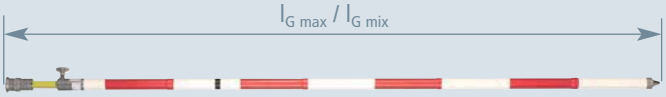
For threaded T pin shafts (bayonet locking mechanism)

- For outdoor use
- Robust aluminium cone coupling
- Telescopic stick, gradually adjustable via star handle
- Only suitable for phase screw clamps and clamps with long T pin shaft

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100)
Temperature range	– 25 °C ... + 55 °C

Lockable adjusting ring
The adjusting ring on the cone has the following functions:
– Position "AUF" (= OPEN): Stick can be removed from the clamp after the earthing and short-circuiting device has been connected
– Position "ZU" (= CLOSED): Stick and clamp remain coupled even after the earthing and short-circuiting device has been connected

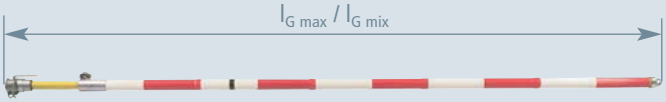
Telescopic Earthing Stick



For threaded T pin shafts (bayonet locking mechanism)

Type	ESTC SQL RW 3500	ESTC SQL RW 5000
Part No.	769 352	769 502
Total length ($l_{G\,max}$ / $l_{G\,min}$)	3500 / 1920 mm	5000 / 2670 mm
Max. load on the operating head (l_{max} / l_{min})	12 / 35 kg	10 / 35 kg
DB drawing No.	3 Ebgw 01.58	3 Ebgw 01.52
DB material No.	157 534	157 533

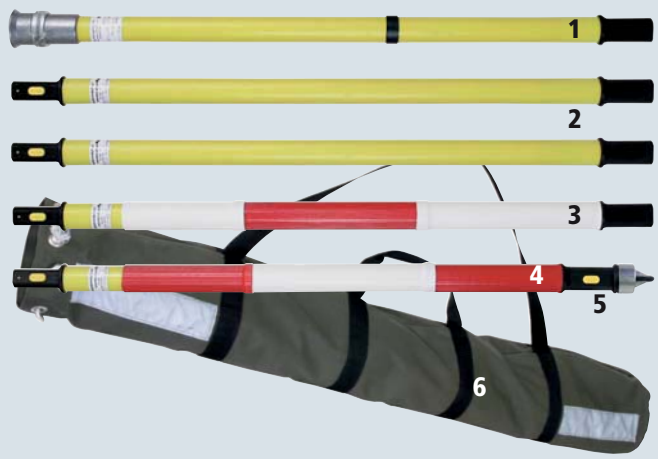
Telescopic Earthing Stick with Cable Entry and Hook



For threaded T pin shafts (bayonet locking mechanism)
The clamp coupling is fitted with an additional cable guide and a hook for securing the earthing cable and earthing stick at the tower (without adjusting ring)

Type	ESTC SQL H RW 5000
Part No.	769 508
Total length ($l_{G\,max}$ / $l_{G\,min}$)	5000 / 2670 mm
Max. load on the operating head (l_{max} / l_{min})	10 / 35 kg
DB drawing No.	3 Ebgw 01.55
DB material No.	612 142

Six-part Earthing Stick Kit (for Transport in Motor Vehicles)



For threaded T pin shafts (bayonet locking mechanism)

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	1x 766 074	4	1x 766 079
2	2x 766 076	5	1x 766 889
3	1x 766 078	6	1x 769 509
For more detailed information on these products, see Accessory chapter			

Type	EST SQL RW 4915 TA
Part No.	769 506
Total length ($l_{G\,max}$ / $l_{G\,min}$)	4905 / 1045 mm
Max. load on the operating head (l_{max} / l_{min})	10 / 35 kg
DB drawing No.	3 Ebgw 01.68
DB material No.	157 489

Fixed Ball Points

Earthing Devices

- M12 or M16 threaded pin available in different lengths
- With or without hexagon nut and flat washer
- Suitable for fixing cable lugs or connecting busbars according to DIN 43673 Part 1

Universal clamp mounted on the fixed ball point of a steel tower

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 1
Material (fixed point)	E-Cu/gal Sn
Material (threaded pin)	StSt A2-70
Hexagon nut	DIN 985-M12-8 / gal Zn; DIN 985-M16-8 / gal Zn;
Tightening torque	M12: 80 Nm; M16: 150 Nm

Straight with threaded Pin and Nut

Ball head (∅25 mm)

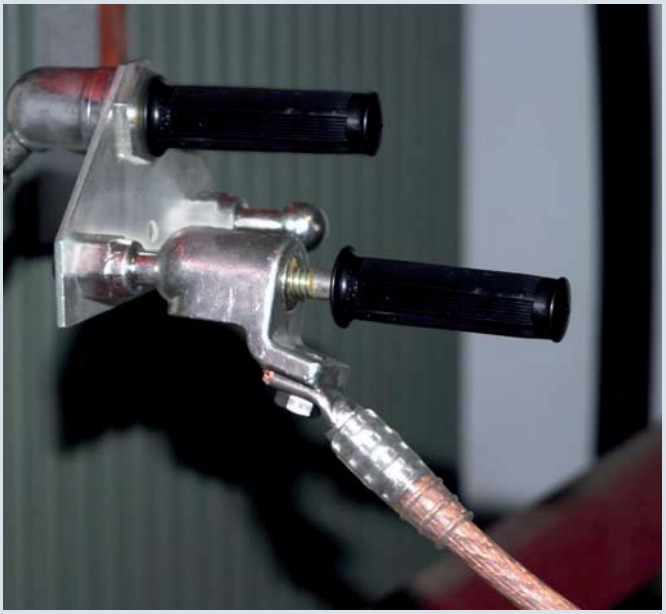
Type ...	M16 25 SKM	M12 35 SKM	M16 45 SKM
Part No.	755 626	755 627	755 646
Fixed ball point ∅	25 mm	25 mm	25 mm
Dimensions	M16 x 25 mm	M12 x 35 mm	M16 x 45 mm
DB drawing No.	3 Ebgw 01.63	3 Ebgw 01.63	3 Ebgw 01.63
DB material No.	157 541	622 014	157 542

Straight with threaded Pin

Ball head (∅25 mm)

Type	KFP 25 M16 25
Part No.	755 636
Fixed ball point ∅	25 mm
Dimensions	M16 x 25 mm
DB drawing No.	3 Ebgw 01.63
DB material No.	609 426

Earth Connecting Plate and Terminal Lug



Ball head cap with handle mounted on an earth connecting plate

- Earth connecting plate with adjustable ball head cap and handle
- Terminal lug with one or two fixed ball point(s) (∅25 mm)
- For connecting single-pole earthing and short-circuiting devices to transformers of overhead contact line towers or to fuse holders

Earth Connecting Plate

With adjustable ball head cap (∅25 mm) and plastic handle
For combination of two single-pole earthing and short-circuiting devices and connection to a fixed ball point (∅25 mm)

Type	EAP 2 25 KKH HG
Part No.	728 501
Fixed ball point ∅	25 mm
Dimensions	170 x 110 x 4 mm
DB drawing No.	3 Ebgw 01.66
DB material No.	157 540

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 1
Material (earth connection plate)	Cu / gal Sn
Material (connection lug)	4 mm: Cu / gal Sn; 6 mm: St / tZn
Material (fixed point)	E-Cu/gal Sn
Material (threaded bolt)	StSt A2-70

Terminal Lug with one Fixed Ball Point

With two holes
To be connected to a fuse holder

Type	EAP 25 SIT US OL
Part No.	728 503
Fixed ball point ∅	25 mm
Dimensions	155 x 30 x 4 mm
DB drawing No.	4 Ebgw 01.60
DB material No.	157 545

Terminal Lug with two Fixed Ball Points

With two holes
To be connected to towers

Type	EAP 2 25 MA US OL
Part No.	728 502
Fixed ball point ∅	25 mm
Dimensions	140 x 40 x 6 mm
DB drawing No.	3 Ebgw 01.61
DB material No.	157 548

Safety Equipment for electric Railways

Insulating Stick Kit for Cleaning the Windscreens of electric Locomotives

Further Equipment

Nominal voltages up to 7.5 kV / d.c. and 25 kV / a.c.

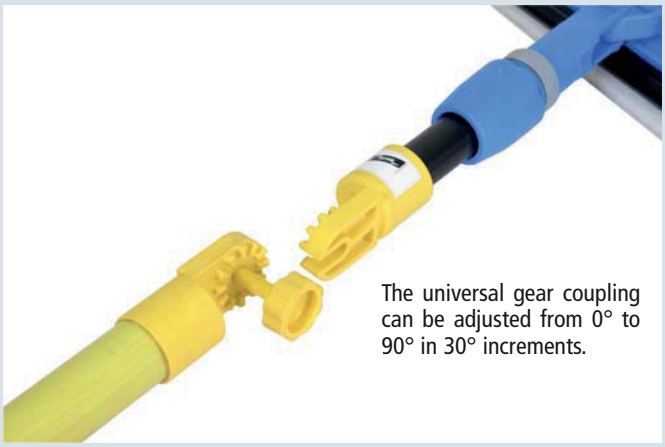
- For use in wet weather conditions
- Insulating stick kit for cleaning the windscreens of electric locomotives
- Protection against accidental contact with live parts (e.g. overhead contact lines)
- Adjustable inclination angle of the operating head

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 048	3	766 056
2	766 055	4	766 057
For more detailed information on these products, see Accessory chapter			

Insulating stick kit used for cleaning the windscreen of an electric locomotive

Note:
In accordance with EN/IEC 61243-1 (DIN VDE 0682 Part 411) IS 25 ZK 2885 insulating sticks and AD ZK 25 200 adapters can be used for nominal voltages up to 7.5 kV d.c. and 25 kV a.c. even in wet weather conditions. The cleaning agent must not exceed the maximum conductivity of 1000 µS / cm.
Due to the risk of bridging, water and cleaning agents must not be used to clean live parts of installations.

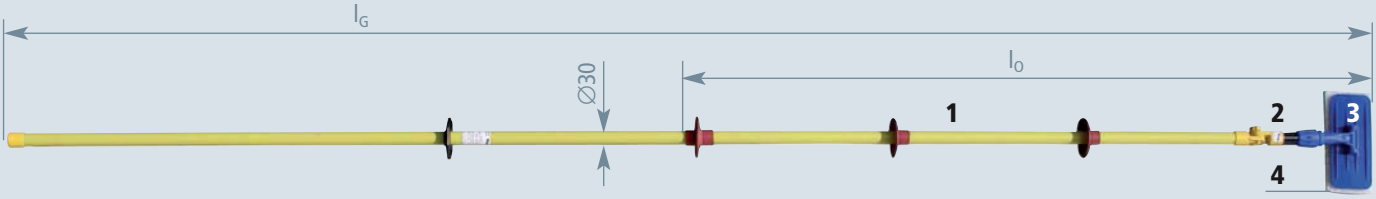
General Information:	
Standard	Wet test in accordance with EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Material (insulating tube)	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap



The universal gear coupling can be adjusted from 0° to 90° in 30° increments.

Adapter with gear coupling for attaching the cleaning head

The hook-and-loop fastener allows fast replacement of the cleaning pad.



Type	IS 25 ZK RK 3160
Part No.	766 340
Nominal voltage U_N a.c.	Up to 25 kV
Nominal voltage U_N d.c.	Up to 7.5 kV
Total length (l_G)	3160 mm
Insertion depth (l_O)	1630 mm

SDS

Voltage limiting device

- **Electrical isolation of insulated track sections and earthed parts of installations**
- **Safe equipotential bonding in case of a short circuit or earth fault at the overhead contact line due to high-current-resistant welding of the electrodes**
- **Discharge of lightning surges without formation of short circuits due to lightning-resistant SDS ... voltage limiting device**
- **Short-circuit withstand capability up to 25 kA_{rms} /100 ms; 36 kA_{rms} /75 ms**

DIN EN 50122-1 describes the use of voltage limiting devices for d.c. and a.c. traction systems for so-called "open traction system earthing" of conductive components of overhead contact lines and current collectors. In order to prevent the occurrence of hazardous surges between the insulated tracks or track sections of electric railways and earthed parts of the installation, voltage limiting devices (SDS ...) are used.

Their function is to permanently connect parts of the installation in the overhead contact line and current collector areas to the return conductor as soon as the threshold voltage is exceeded.

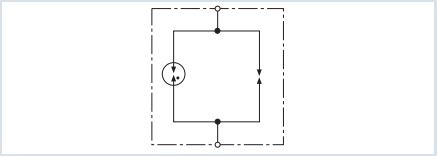
Cylindrical SDS spark gap unit for use with rail adapter Siemens No. 8WL6503-xx

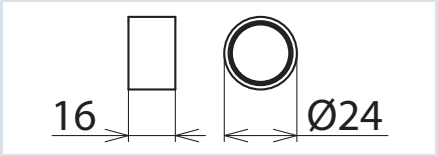
In case of atmospheric overvoltages, the lightning-resistant SDS ... voltage limiting device is capable of returning to its initial state after discharging the impulse current. Only if the specified lightning current load is exceeded, a permanent short-circuit is initiated by heavy-current-resistant welding of the electrodes and the fuse link has to be replaced.

The SDS voltage limiting device consists of a spark gap unit and the respective connecting kit for direct connection to the rail or overhead contact line tower.

The spark gap unit of type SDS 1 (Part No. 923 110) developed by DEHN + SÖHNE has also been approved by the German Federal Railway Authority (EBA).

SDS ...

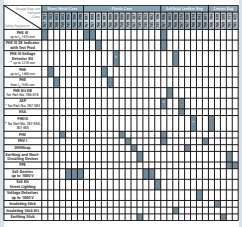




Type	SDS 1	SDS 2	SDS 3	SDS 4	SDS 5
Part No.	923 110	923 117	923 116	923 118	923 119
Power frequency sparkover voltage (U_{aw})	≤ 940 V	—	—	—	—
d.c. sparkover voltage (U_{ag})	600 V +/- 20 %	350 V +/- 20 %	550 V	230 V +/- 20 %	120 V +/- 20 %
Impulse sparkover voltage	≤ 1400 V (1 kV/µs)	≤ 900 V (1 kV/µs)	≤ 1000 V (1 kV/µs)	≤ 650 V (1 kV/µs)	≤ 600 V (1 kV/µs)
Self-extinguishing capability	300 A / 65 V	—	—	—	—
Lightning current discharge capacity (10/350 µs) 0,1x / 0,5x / 1x	5 kA	2 kA	2.5 kA	2.5 kA	2 kA
Lightning current withstand capability (10/350 µs)	25 kA	25 kA	25 kA	25 kA	25 kA
Impulse current discharge capacity (8/20 µs) 0,1x / 0,5x / 1x	—	—	—	20 kA	20 kA
Safe short-circuit due to welding of the electrodes for alternating currents @ 100 ms	≥ 1.5 kA / 1000 V / 100 ms	—	—	—	—
Safe short-circuit due to welding of the electrodes for alternating currents @ 30 ms	≥ 2.5 kA / 1000 V / 30 ms	—	—	—	—
Safe short-circuit due to welding of the electrodes for direct currents	≥ 750 A / 250 ms	≥ 600 A / 250 ms	—	≥ 600 A / 250 ms	≥ 600 A / 250 ms
Short-circuit withstand capability	25 kA_{rms} / 100 ms; 36 kA_{rms} / 75 ms	25 kA_{rms} / 100 ms; 36 kA_{rms} / 75 ms	25 kA_{rms} / 100 ms; —	25 kA_{rms} / 100 ms; 36 kA_{rms} / 75 ms	25 kA_{rms} / 100 ms; 36 kA_{rms} / 75 ms
Long-term current	1 kA_{rms} for t ≤ 120 s	1 kA_{rms} for t ≤ 120 s	—	1 kA_{rms} for t ≤ 120 s	1 kA_{rms} for t ≤ 120 s
Leakage current (I_{lc})	< 1 µA for 100 V dc	< 1 µA for 100 V dc	—	< 1 µA for 100 V dc	< 1 µA for 100 V dc
Operating temperature range (T_U)	-40 °C...+80 °C	-40 °C...+80 °C	-40 °C...+80 °C	-40 °C...+80 °C	-40 °C...+80 °C
For mounting on	voltage breakdown protectors/SIEMENS rail adapters No. 8WL6503-xx				
Tightening torque of the fuse link in the busbar adapter	15 Nm	15 Nm	15 Nm	15 Nm	15 Nm
Approvals	EBA	—	—	—	—
DB Drawing No.	4 Ebs 15.13.20 Blatt 2	—	—	—	—

Accessory, kit parts and spare parts from page 195

Storage Bags and Transport Cases

Case / Bag	Design	Page	
Sheet Metal Case	Hammer-tone finished With retaining springs With foam padding	188	 
Plastic Case	With foam padding	189	 
Artificial Leather Bag	With carrier handle With shoulder strap	191	
Canvas Bag	With carrier handle	192	
	With two separate internal pockets		
Easy Choice		193	

Sheet Metal Case

Sheet Metal Case for PHE III

Hammer-tone finished with foam padding

Type	SKL 95 21 10
Part No.	767 701
Dimensions	950 x 210 x 100 mm
Colour	Blue

Sheet Metal Case for PHE

Hammer-tone finished with retaining springs

Type	SKL 92 16 10	SKL 116 16 10
Part No.	766 703	766 603
Dimensions	920 x 160 x 100 mm	1150 x 160 x 100 mm
Colour	Blue	Blue

Sheet Metal Case for PHV

Hammer-finished with foam padding

Type	SKL 95 21 10 V2
Part No.	759 003
Dimensions	950 x 210 x 100 mm
Colour	Blue

Sheet Metal Case for Earthing and Short-Circuiting Device VI – Kit

With foam padding

Type	SBKL EKS VI KVS
Part No.	745 900
Dimensions	440 x 330 x 100 mm
Colour	Blue

Sheet Metal Case for Earthing and Short-Circuiting Device TI – Kit I

Type	SBKL EKS TI KVS
Part No.	766 300
Dimensions	380 x 260 x 80 mm
Colour	Blue

Sheet Metal Case for Earthing and Short-Circuiting Device TI – Kit II

With foam padding

Type	SBKL EKS TI KVS 2F
Part No.	766 298
Dimensions	440 x 330 x 66 mm
Colour	Blue

Accessory

Plastic Case

Storage Bags and Transport Cases

Plastic Case for PHE III

With foam padding

Type	KKL PHE3	KKL PHE3 L
Part No.	767 997	767 999
Dimensions	930 x 215 x 140 mm	1270 x 215 x 140 mm
Colour	Black	Black

Plastic Case for PHE III Indicator with Test Prod

With foam padding

Type	KKL PK PHE3 L
Part No.	766 036
Dimensions	395 x 295 x 105 mm
Colour	Grey

Plastic Case for PHE

With foam padding

Type	KKL PHE	KKL PHE L
Part No.	766 997	766 999
Dimensions	930 x 215 x 140 mm	1270 x 215 x 140 mm
Colour	Black	Black

Plastic Case for PHE III Kit

With foam padding

Type	KKL PHE3 60 110
Part No.	766 998
Dimensions	1270 x 215 x 140 mm
Colour	Black

Plastic Case for PHV

With foam padding

Type	KKL PHV
Part No.	759 999
Dimensions	930 x 215 x 140 mm
Colour	Black

Plastic Case for PHV I

With foam padding

Type	KKL PHV1
Part No.	759 998
Dimensions	1270 x 215 x 140 mm
Colour	Black

Plastic Case

Plastic Case for DEHNcap

With foam padding

Type	KKL DCA
Part No.	767 107
Dimensions	395 x 295 x 105 mm
Colour	Grey

Plastic Case for Earthing Stick

With retaining springs for two-part earthing stick

Type	KK 56 41 17 EK HK
Part No.	745 953
Dimensions	565 x 410 x 170 mm
Colour	Black

Plastic Case for Earthing and Short-Circuiting Device VI/TI

With foam padding and velcro fastener

Type	KK 56 41 17 EK VI TI
Part No.	745 952
Dimensions	565 x 410 x 170 mm
Colour	Black

Plastic Case for Earthing and Short-Circuiting Device VI – Kit

With foam padding

Type	KKL EKS VI KVS
Part No.	745 902
Dimensions	445 x 345 x 100 mm
Colour	Black

Plastic Case for EKV ÜGK

With foam padding

Type	KKL EKV ÜGK MB
Part No.	745 106
Dimensions	395 x 295 x 105 mm
Colour	Grey

Accessory

Artificial Leather Bag

Storage Bags and Transport Cases

Artificial Leather Bag for PHE III, PHE, ASP, PHV and PHV I

With shoulder strap and carrier handle

Type	KLT 101 30 10
Part No.	767 996
Dimensions	1010 x 300 x 100 mm
Colour	Black

Artificial Leather Bag for PHE

With carrier handle

Type	KLT 247 10 22
Part No.	766 602
Dimensions	2470 x 220 x 100 mm
Colour	Black
DB Drawing No.	3 Ebgw 02.51

Artificial Leather Bag

With zip and carrier handle

Type	KLT 133 34 10
Part No.	766 996
Dimensions	1330 x 345 x 100 mm
Colour	Black

Artificial Leather Bag for ASP and HSA

With zip and carrier handle

Type	KLT 104 9
Part No.	767 574
Dimensions	∅90 x 1040 mm
Colour	Black

Artificial Leather Bag for DEHNcap/PC

With carrier handle

Type	KLT 23 16 4
Part No.	767 500
Dimensions	235 x 160 x 40 mm
Colour	Black

Artificial Leather Bag for PHE/G

With carrier handle

Type	KLT 160 17
Part No.	766 614
Dimensions	∅170 x 1600 mm
Colour	Black

Artificial Leather Bag for SPN

For SPN voltage detectors (basic device with extension prods)

Type	AT SPN II
Part No.	766 543
Dimensions	535 x 160 mm
Colour	Black

Artificial Leather Bag for PHE, PHV I

With carrier handle

Type	KLT 121 25 16
Part No.	766 601
Dimensions	1200 x 250 x 160 mm
Colour	Black

Canvas Bag

Canvas Bag for PHE

With carrier handle

Type	STT 120 30 15
Part No.	766 704
Dimensions	1220 x 390 x 150 mm
Colour	Olive

Canvas Bag for Earthing and Short-Circuiting Device and PPE

With two separate internal pockets and carrier handle

Type	STT 55 27 30
Part No.	785 111
Dimensions	550 x 255 x 300 mm
Colour	Olive
DB Drawing No.	3 Ebgw 01.67

Canvas Bag for ISMTC

With carrier handle

Type	STT 180 20
Part No.	766 039
Dimensions	∅200 x 1800 mm
Colour	Olive

Storage Bag

Type	AT PSA NS
Part No.	785 425
Dimensions	∅300, 500 mm
Colour	Blue

Canvas Bag for Earthing Stick

For six-part earthing stick (for transport in motor vehicles), with carrier handle

Type	STT 110 15
Part No.	769 509
Dimensions	∅150 x 1100 mm
Colour	Olive
DB Drawing No.	3 Ebgw 01.67

Storage Bags and Transport Cases

Safety Equipment \ Storage Bags and Transport Cases	Sheet Metal Case							Plastic Case											Artificial Leather Bag							Canvas Bag				
	767 701	766 703	766 603	759 003	745 900	766 300	766 298	767 997	767 999	766 036	766 997	766 999	766 998	759 999	759 998	767 107	745 953	745 952	745 902	745 106	767 996	766 602	766 996	767 574	767 500	766 614	766 543	766 601	766 704	766 039	769 509	785 111	785 425
PHE III up to l_G 1675 mm	■							■	■												■												
PHE III ZK Indicator with Test Prod										■											■												
PHE III Voltage Detector Kit * up to 1270 mm													*										■										
PHE up to l_G 1460 mm		■									■																						
PHE from l_G 1565 mm			■									■																					
PHE Kit DB for Part No. 766 616																						■											
ASP * for Part No. 767 583																					*			■									
HSA																								■									
PHE/G * for Part No. 767 650, 767 655																										*				■			
PHV				■										■							■												
PHV I															■						■							■					
DEHNcap																■									■								
Earthing and Short-Circuiting Devices																	■															■	
PPE																																■	■
EaS Devices up to 1000 V					■	■	■											■	■														
EaS Kit Street Lighting																				■													
Voltage Detectors up to 1000 V																											■						
Insulating Stick																														■			
Insulating Stick Kit																							■										
Earthing Stick																	■														■		

Devices	Application	Page	
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Electrodes

- Safe contact with the part of the installation to be tested
- With M8 thread, to be screwed on the test prods of PHE III and PHE voltage detectors as well as PHV phase comparators

Onion-shaped Electrode

Type	EL M8 SZ PHE PHV
Part No.	766 913
Nominal voltage (U_N)	From 3 kV
Material	Brass/gal CuSn

Pin-shaped Electrode

Type	EL M8 S PHE PHV
Part No.	766 925
Nominal voltage (U_N)	From 3 kV
Material	StSt

Hook-shaped Electrode

Type	EL M8 H PHE
Part No.	766 923
Nominal voltage (U_N)	For overhead lines only
Material	Steel/gal Zn

Fork-shaped Electrode

Type	EL M8 G PHE
Part No.	766 924
Nominal voltage (U_N)	For overhead lines only
Material	StSt

V-shaped Electrode

Type	EL M8 V PHE PHV
Part No.	766 927
Nominal voltage (U_N)	From 3 kV
Material	Cu/gal Sn

Eaton Holec Magnefix Electrode

For Eaton Holec Magnefix switchgear installations of type MA, MD4, MF, MG, MY

Type	EL M8 MAG PHE PHV
Part No.	766 915
Nominal voltage (U_N)	3 ... 15 kV
Material	Brass/gal CuSn, PVC

Test Prods for PHE III and PHE Voltage Detectors

- **Test prod with integrated test electrode allows safe contact with the part of the installation to be tested**

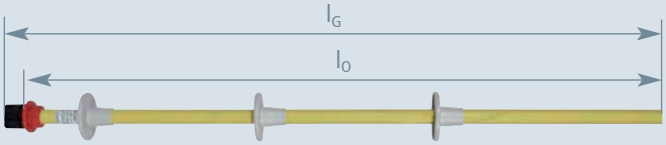
General Information:	
Colour	Grey or yellow
Diameter	∅20 mm
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin

Test Prod for Switchgear Installations and Overhead Lines

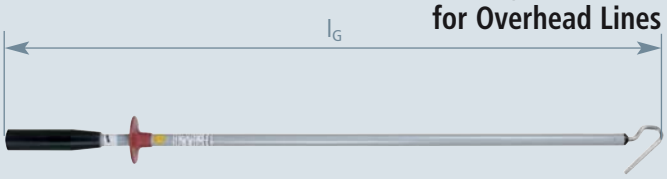
Category "S"

Type	S60 PS PHE 285	S61 PS PHE 435	S62 PS PHE 620	S63 PS PHE 780	S64 PS PHE 880
Part No.	767 760	767 761	767 762	767 763	767 764
Total length (l_G)	320 mm	470 mm	655 mm	815 mm	915 mm
Insertion depth (l_O)	285 mm	435 mm	620 mm	780 mm	880 mm

Type	S66 PS PHE 880
Part No.	767 771
Total length (l_G)	915 mm
Insertion depth (l_O)	880 mm

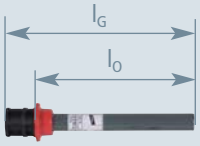


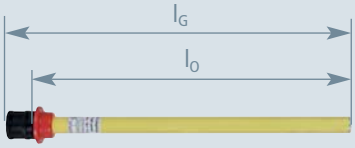
Test Prod for PHE Voltage Detectors for Overhead Lines



Type	PS PHE 15 16.7
Part No.	766 619
Total length (l_G)	1060 mm
DB drawing No.	3 Ebgw 02.53

Test Prod for Overhead Lines

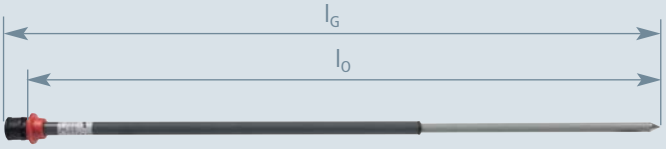




Category "L"

Type	L71 PS PHE 185	L72 PS PHE 405
Part No.	767 766	767 772
Total length (l_G)	220 mm	415 mm
Insertion depth (l_O)	185 mm	380 mm
Colour	Grey	Yellow

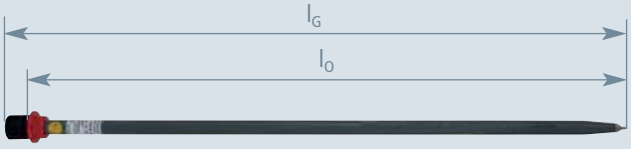
Test Prod for Mipak Switchgear Installations



Category "S"
for PHE III voltage detectors (Part No. 767 731/S and 767 750/S)

Type	S65 M PS PHE 905
Part No.	767 767
Total length (l_G)	940 mm
Insertion depth (l_O)	905 mm

Test Prod for Siemens 8CK Switchgear Installations



Category "S"
for PHE III voltage detectors (Part No. 767 721, 767951, 767 722, 767 740 and 767940)

Type	S63 PS PHE 8CK
Part No.	767 768
Total length (l_G)	880 mm
Insertion depth (l_O)	845 mm

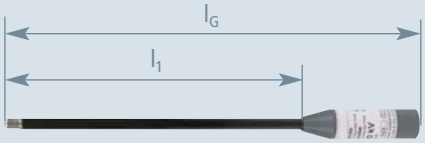
Other types are available on request.

Probes

- Safe contact with the part of the installation to be tested
- With M8 thread, to be screwed on test electrodes of PHE and PHE III voltage detectors
- For switchgear installations with limited access
- Available in different lengths and angles

General Information:	
Use	Not suitable for use in wet weather conditions

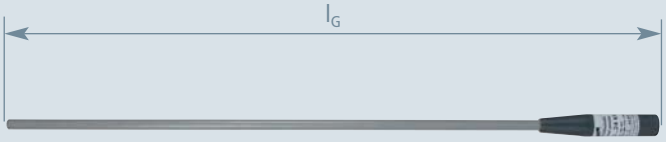
Straight Test Probe



For switchgear installations with limited access (e.g. Calor Emag/Isopond and Krone/KES)

Type	PSO M8 PHE
Part No.	766 916
Nominal voltage (U_N)	3 ... 24 kV
Diameter	11 mm
Total length (l_G)	420 mm
Length (l_1)	300 mm

Straight Test Probe, 800 mm



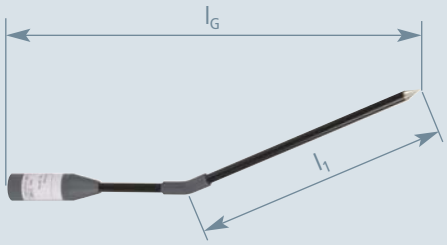
For transformer stations and switchgear installations that require a greater insertion depth

Suitable for use in wet weather conditions

Type	PSO M8 PHE L800
Part No.	766 960
Nominal voltage (U_N)	3 ... 24 kV
Diameter	14 mm
Total length (l_G)	890 mm

Probes

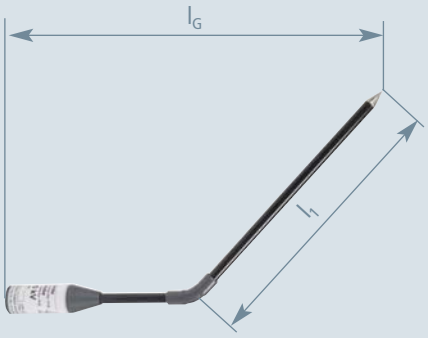
25° angled Test Probe



For switchgear installations with limited access

Type	PSO M8 W25 PHE
Part No.	766 940
Nominal voltage (U_N)	3 ... 24 kV
Diameter	11 mm
Total length (l_G)	450 mm
Length (l_1)	280 mm

45° angled Test Probe



For switchgear installations with limited access

Type	PSO M8 W45 PHE
Part No.	766 941
Nominal voltage (U_N)	3 ... 24 kV
Diameter	11 mm
Total length (l_G)	395 mm
Length (l_1)	280 mm

90° angled Test Probe

For switchgear installations with limited access and remotely situated contacts

Type	PSO M8 W90 PHE
Part No.	766 950
Nominal voltage (U_N)	3 ... 36 kV
Diameter	20 mm
Total length (l_G)	215 mm
Length (l_1)	370 mm

Test probes for other special switchgear installations are available on request.

Field Sensor

Electric field sensors for ASP non-contact voltage detectors

Suitable for use in wet weather conditions

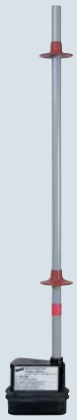
Type	EFS L 127	EFS S 167
Part No.	767 576	767 577
Category	L	S
Total length (l_G)	127 mm	167 mm
Material	Plastic	Plastic
Colour	Black	Black

Indicators

Indicator with M12 threaded Pin

Typ PHE3 ...	A 30 60 S	A 30 60 L	A 60 110 S
Part No.	767 972	767 974	767 734
Nominal voltage (U_N)	30 ... 60 kV	30 ... 60 kV	60 ... 110 kV
Category	S	L	S
Total length (l_G)	190 mm	190 mm	190 mm

Type	PHE3 A 60 110 L	PHE3 A 60 110 S IT
Part No.	767 726	767 963
Nominal voltage (U_N)	60 ... 110 kV	60 ... 110 kV
Category	L	S
Total length (l_G)	190 mm	190 mm



Type	PHE3 A 60 132 SL	PHE3 A 110 132 S
Part No.	767 732	767 129
Nominal voltage (U_N)	60 ... 132 kV	110 ... 132 kV
Category	S / L	S
Total length (l_G)	190 mm	190 mm

Indicator

Type	PHE A 15 16.7
Part No.	766 677
Nominal voltage (U_N)	15 kV / 16.7 Hz
Total length (l_G)	930 mm
Diameter	24 mm
DB drawing No.	3 Ebgw 02.53

Indicator with Gear Coupling

Type	PHE3 A 20 SL ZK
Part No.	767 722
Nominal voltage (U_N)	20 kV
Category	S / L
Total length (l_G)	230 mm

Type	PHE3 A 10 30 S	PHE3 A 60 132 SL ZK
Part No.	767 965	767 735
Nominal voltage (U_N)	10 ... 30 kV	60 ... 132 kV
Category	S	S / L
Total length (l_G)	230 mm	230 mm

ASP Indicator

Category "S" and "L"

Type	ASP A 110 132 16.7 L	ASP A 110 420 L ZK
Part No.	767 564	767 591
Nominal voltage (U_N)	110 ... 132 kV	110 ... 420 kV
Category	L	L
Total length (l_G)	230 mm	230 mm

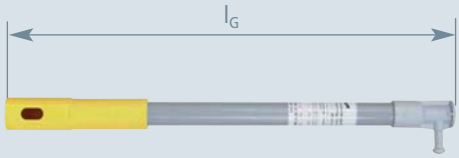
Type	ASP A 110 420 S ZK	ASP A 110 420 SL ZK
Part No.	767 592	767 593
Nominal voltage (U_N)	110 ... 420 kV	110 ... 420 kV
Category	S	S / L
Total length (l_G)	230 mm	230 mm

Indicator with Test Prod

Indicator with Test Prod

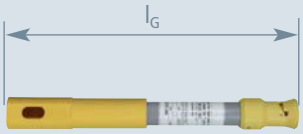
Type	PHE PK 15 16.7
Part No.	766 678
Nominal voltage (U_N)	15 kV / 16.7 Hz
Total length (l_G)	1900 mm
Diameter	20 mm
DB drawing No.	3 Ebgw 02.51

STK Switching Stick Head



Type	SSK 36 STK 560
Part No.	766 164
Diameter	30 mm
Total length (l_G)	560 mm
Material (switching stick head)	Glass-fibre reinforced polyester tube
Colour	Grey
Material (switching pin)	Plastic-sheathed steel

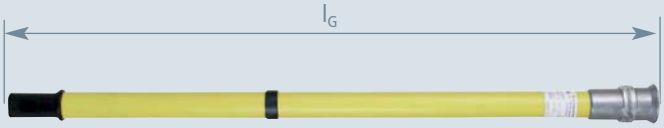
Operating Head with plug-in Coupling / T Pin Shaft



Plastic plug-in coupling (bayonet locking mechanism) for indoor use

Type	AK 36 SQ STK 360
Part No.	766 365
Diameter	30 mm
Total length (l_G)	360 mm
Material (operating head)	Plastic
Colour	Yellow

SQL Operating Head



Type	ES SQL STK 43 1045
Part No.	766 074
Diameter	43 mm
Total length (l_G)	1045 mm
DB drawing No.	3 Ebgw 01.68

Operating Head with plug-in Coupling / long T Pin Shaft

Aluminium cone coupling with adjusting ring (bayonet locking mechanism) for earthing and short-circuiting in outdoor installations

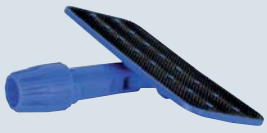
Type	AK SQL STK 365
Part No.	766 465
Diameter	43 mm
Total length (l_G)	365 mm
Material (operating head)	Aluminium
Colour	Yellow

Contacting Aid

For telescopic insulating sticks

Type	AK AH ZK ISMTC
Part No.	766 049
Total length (l_G)	340 mm

Cleaning Head



Flexibly adjustable, for attaching cleaning pads

Type	RK 230 100 AS25
Part No.	766 056
Diameter	25 mm
Dimensions	230 x 100 mm

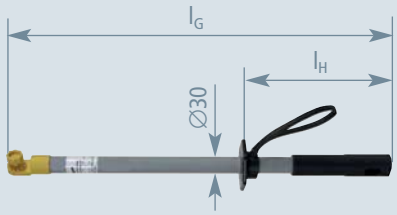
Accessory for Cleaning Head

Rectangular Cleaning Pad

Type	RP 250 115 20
Part No.	766 057
Dimensions	250 x 115 x 20 mm

Insulating Sticks

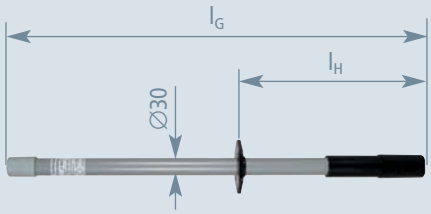
Insulating Stick with universal Gear Coupling and Hand Strap



Insulating stick with black hand guard and hand strap for safe operation and plug-in coupling for extending the handle

Type	IS ZK STK HS 670
Part No.	766 369
Diameter	30 mm
Total length (l_G)	670 mm
Length (handle) (l_H)	265 mm
Material	Glass-fibre reinforced polyester tube
Colour	Grey

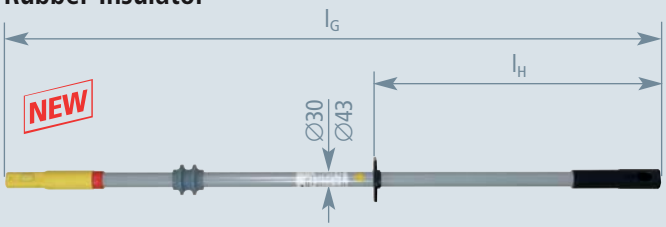
Insulating Stick with M12 Threaded Pin



Plug-in coupling for extending the handle

Type	IS M12 STK 640
Part No.	766 331
Diameter	30 mm
Total length (l_G)	640 mm
Handle length (l_H)	370 mm
Material	Glass-fibre reinforced polyester tube
Colour	Grey

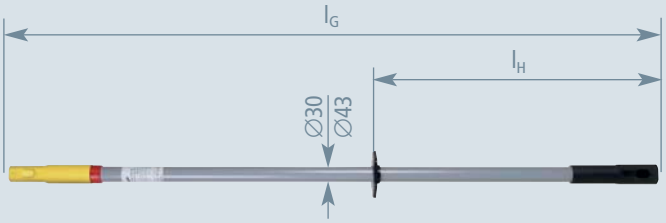
ISN 36 STK Insulating Stick with Silicon Rubber Insulator



Plug-in coupling at both ends for attaching extension elements, operating heads or adapters

Type	ISN 36 STK 30 1280	ISN 36 STK 43 1280
Part No.	766 367	766 468
Nominal voltage (U_N)	Up to 36 kV	Up to 36 kV
Diameter	30 mm	43 mm
Total length (l_G)	1280 mm	1280 mm
Length (handle) (l_H)	560 mm	560 mm
Material	Glass-fibre reinforced polyester tube	
Colour	Grey	Grey

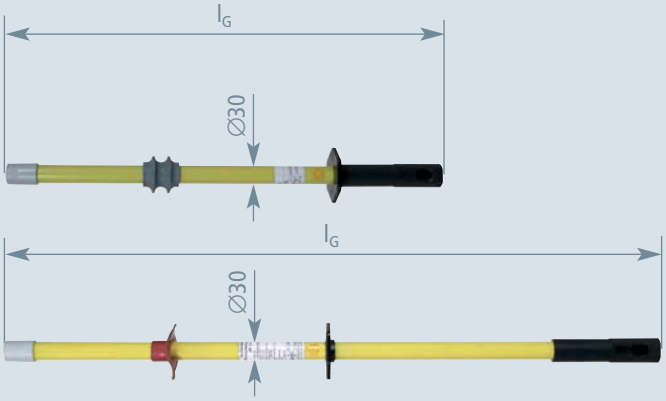
ISN 36 STK Insulating Stick



Plug-in coupling at both ends for attaching extension elements, operating heads or adapters

Typ	IS 36 STK 30 1280	IS 36 STK 43 1280
Art.-Nr.	766 363	766 463
Nominal voltage (U_N)	Up to 36 kV	Up to 36 kV
Diameter	30 mm	43 mm
Total length (l_G)	1280 mm	1280 mm
Length (handle) (l_H)	560 mm	560 mm
Material	Glass-fibre reinforced polyester tube	
Colour	Grey	Grey

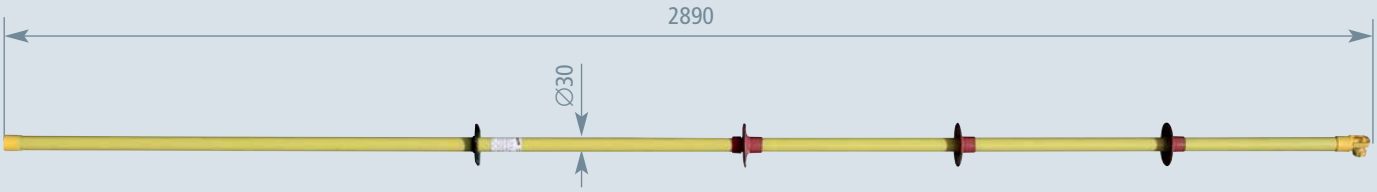
Insulating Stick for PHE Voltage Detectors for Overhead Lines



Type	IS M12 STK 30 720	IS M12 STK 30 1060
Part No.	766 072	766 075
Diameter	30 mm	30 mm
Total length (l_G)	720 mm	1060 mm
DB drawing No.	3 Ebgw 02.51	3 Ebgw 02.53

Insulating Sticks

Insulating Stick with Gear Coupling

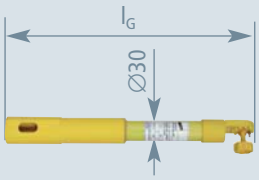


Consists of one element, with foam-filled insulating element

Type	IS 25 ZK 2885
Part No.	766 048
Diameter	30 mm
Dimensions	2890 mm
Material	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap

Insulating Elements

Insulating Element with Gear Coupling

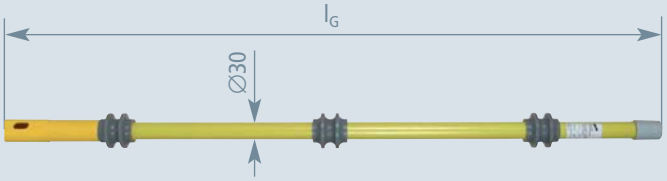


With plug-in coupling

Angle of the gear coupling – 30° / 0° / + 30°

Type	IT ZK30 STK 30 360
Part No.	766 358
Diameter	30 mm
Total length (l_G)	360 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

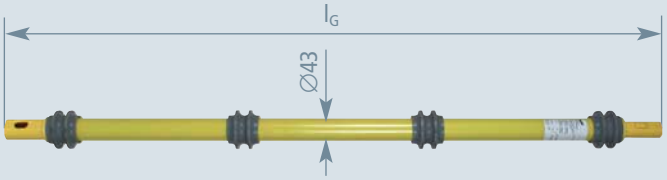
Insulating Element with M12 threaded Pin



With plug-in coupling for extending the handle

Type	IT M12 STK 30 700	IT M12 STK 30 1150
Part No.	766 114	766 115
Nominal voltage (U_N)	Up to 60 kV	Up to 110 kV
Diameter	30 mm	30 mm
Total length (l_G)	700 mm	1150 mm
Material	Glass-fibre reinforced polyester tube	
Colour	Yellow	Yellow

Insulating Element with plug-in Coupling

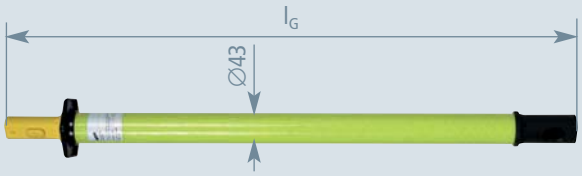


With plug-in coupling for extending the handle

Type	IT STK 43 1280
Part No.	766 128
Nominal voltage (U_N)	Up to 132 kV
Diameter	43 mm
Total length (l_G)	1280 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

Handles and Extensions

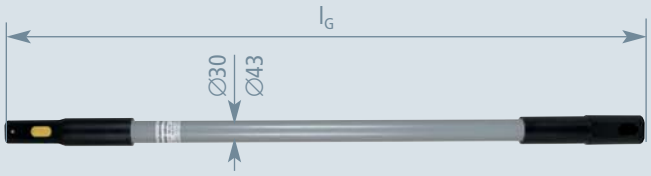
Handle



With hand guard and plug-in coupling for extending the handle

Type	H STK 43 800
Part No.	766 120
Diameter	43 mm
Total length (l_G)	800 mm

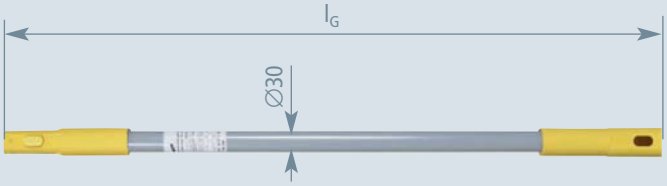
HV STK Extension Handle



Plug-in coupling at both ends for extending the handle

Type	HV STK 30 710	HV STK 43 910	HV STK 43 1280
Part No.	766 335	766 456	766 466
Diameter	30 mm	43 mm	43 mm
Total length (l_G)	710 mm	910 mm	1280 mm
Material	Glass-fibre reinforced polyester tube		
Colour	Grey	Grey	Grey

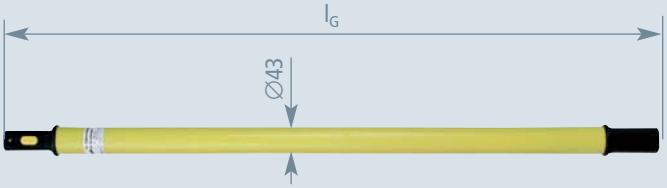
ISV 36 STK Insulating Stick Extension



Plug-in coupling at both ends for extending the insertion depth or the handle

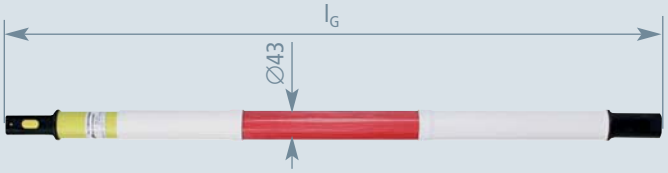
Type	ISV 36 STK 30 910	ISV 36 STK 30 1280
Part No.	766 356	766 366
Diameter	30 mm	30 mm
Total length (l_G)	910 mm	1280 mm
Material	Glass-fibre reinforced polyester tube	Glass-fibre reinforced polyester tube
Colour	Grey	Grey

Extension Handle



Plug-in coupling at both ends for extending the handle

Type	HV STK 43 975	HV STK 43 1045	HV STK 43 2350
Part No.	766 077	766 076	766 073
Diameter	43 mm	43 mm	43 mm
Total length (l_G)	975 mm	1045 mm	2350 mm
Material	Glass-fibre reinforced polyester tube		
DB drawing No.	3 Ebgw 02.53	3 Ebgw 02.53	3 Ebgw 02.51



Type	HV STK RW 43 1045	HV STK RW 43 975
Part No.	766 078	766 079
Diameter	43 mm	43 mm
Total length (l_G)	1045 mm	975 mm
DB drawing No.	3 Ebgw 01.68	3 Ebgw 01.68

End Fittings

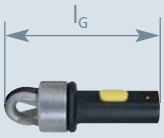
STK End Fitting

For use as termination and protection

Type	A STK
Part No.	766 888
Diameter	30 / 43 mm
Total length (l_G)	85 mm

STK End Fitting with Eye

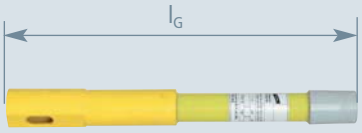
For use as protection and transport eye when working on overhead lines



Type	AR STK
Part No.	766 889
Diameter	30 / 43 mm
Total length (l_G)	150 mm

Adapter

Adapter with M12 threaded Pin



and plug-in coupling

Type	AD M12 STK 30 350
Part No.	766 352
Diameter	30 mm
Total length (l_G)	350 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

Adapter with plug-in Coupling / T Pin Shaft

For extending the handle of IS PHE insulating sticks by means of an ES SQ or ES SQL earthing stick

Type	AD HV STK SQ
Part No.	766 313
Total length (l_G)	280 mm

Adapter with Gear Coupling

Type	AD ZK STK 30 360
Part No.	766 359
Diameter	30 mm
Total length (l_G)	360 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

Adapter

With gear coupling and cone-shaped support, accommodates cleaning sponges (Part No. 766 056)

Type	AD ZK 25 200
Part No.	766 055
Diameter	25 mm
Total length (l_G)	200 mm

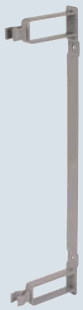
Storage Devices

For earthing and short-circuiting devices and sticks

Storage device for an earthing and short-circuiting device and an earthing stick

- Wall-mounted
- Easy and safe storage of earthing and short-circuiting devices, voltage detectors and operating sticks (∅30 or 43 mm)

For a Voltage Detector and an Earthing Stick



For a voltage detector and an earthing stick of any length

Hole spacing: 390 mm, holes: ∅7 mm

Type	HV P ST D24	HV P ST D30	HV P ST D40 45
Part No.	700 006	700 007	700 008
For stick diameters	24 mm	30 mm	40 ... 45 mm
Dimensions	530 x 30 x 136 mm	430 x 30 x 149 mm	530 x 30 x 149 mm
DB material No.	—	828 077	—

For an Earthing and Short-Circuiting Device and an Earthing Stick

For an earthing and short-circuiting device and an earthing stick of any length

Hole spacing: 424 mm, holes: ∅7 mm

Type	HV EKV ES30	HV EKV ES40
Part No.	700 000	700 002
For stick diameters	30 mm	43 mm
DB drawing No.	3 Ebgw 01.70	—
DB material No.	742 395	—

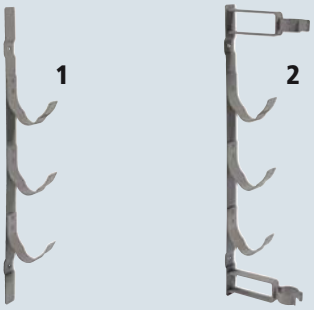
For an Earthing and Short-Circuiting Device and an Earthing Stick up to 1.5 m

For an earthing and short-circuiting device and an earthing stick with a length up to 1.5 m

Hole spacing: 104 mm, holes: ∅7 mm

Type	HV EKV ES30 1500
Part No.	700 003
For stick diameters	43 mm
Dimensions	214 x 150 mm

For HH Fuses and a Fuse Tong – Single Parts



Wall-mounted, holes ∅7 mm

Type	HV 3HH ET	HV 3HH SZ ET
Part No.	700 005	700 004
For	HH fuses	HH fuses and a fuse tong

For HH Fuses and a Fuse Tong – Kit

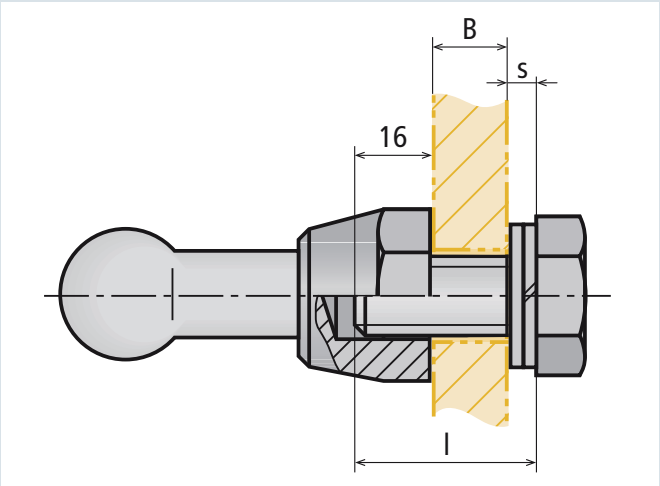
Kit includes:			
Kit type	Kit Part No.	consisting of:	Pos. No.
HV 3HH	700 015	2x 700 005	1
HV 3HH SZ	700 014	1x 700 005 1x 700 004	1 2

Wall-mounted, holes ∅7 mm

Type	HV 3HH	HV 3HH SZ
Part No.	700 015	700 014
For	3 HH fuses	3 HH fuses and a fuse tong

Installation Devices

For fixed ball and earthing points



Determination of the required bolt length

- **Hexagon bolt for fixing busbar connections according to DIN 43673 Part 1**
- **Spring-loaded pressure plate for installing M12 or M16 fixed points on aluminium busbars**

Determination of the bolt length l
l (mm) = B + s + 16
Important! Required bolt length < l

l = Bolt length
B = Thickness of the busbar
s = Thickness of the spring washer and washer

General Information:	
Standard (hexagon bolts)	In accordance with DIN 933
Standard (spring washers)	In accordance with DIN 128
Standard (washers)	In accordance with DIN 125

Hexagon Bolts

Type	SKS M12 25 V2A	SKS M12 30 V2A	SKS M12 35 V2A	SKS M16 30 V2A
Part No.	561 925	561 930	561 935	561 931
Dimensions	M12 x 25 mm	M12 x 30 mm	M12 x 35 mm	M16 x 30 mm
Material	StSt A2-70	StSt A2-70	StSt A2-70	StSt A2-70
Tightening torque	80 Nm	80 Nm	80 Nm	150 Nm

Spring Washers

Type	FR A12 V2A	FR A16 V2A
Part No.	524 912	524 913
Dimensions	A12 (s = 2.4) mm	A16 (s = 2.8) mm
Material	StSt A2-70	StSt A2-70

Washers

Type	SCH A13 V2A	SCH A17 V2A
Part No.	525 912	525 916
Dimensions	A13 (s = 2.4) mm	A17 (s = 3.0) mm
Material	StSt A2-70	StSt A2-70

Square spring-loaded Pressure Plate

For reliable contact and permanent installation of fixed ball points on aluminium busbars.

Pressure plates must be installed on both ends of the busbar.

Type	DP 40 40 B13 AL	DP 50 50 B17 AL
Part No.	525 001	525 002
Dimensions	M12, 40 x 40 x 6 mm	M16, 50 x 50 x 8 mm
Material	Highly resistant aluminium alloy	

Other lengths are available on request.

Mignon Battery

Type	MZ 1.5V L91 FR6 LI 4	MZ 1.5V IEC LR6 AL
Part No.	766 611	766 613
Description	Mignon battery 1.5 V, lithium	Mignon battery 1.5 V, alkaline manganese
PU	4 pieces	1 piece

Block Battery

Type	EB 9V LI	EB 9V AL
Part No.	767 712	767 713
Description	9 V block battery, lithium	9 V block battery, alkaline manganese
PU	1 piece	1 piece

Electric Bulb

Type	GL 3.5V 0.2A E10
Part No.	766 605
Description	small electric bulb 3.5 V / 0.2 A
Suitable for	PHE

Sealing Ring

Type	DR PS PHE3	DR PHV
Part No.	767 779	767 778
Suitable for	PHE III test prod and ASP electric field sensor	PHV basic device

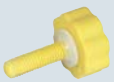
Protective Rubber for PHE

Type	FSG PHE
Part No.	767 776
Suitable for	PHE

Protective Rubber for PHG II and PHV

Type	FSG PHG2 PHV
Part No.	767 777
Suitable for	PHG II and PHV

Plastic Star Grip Screw



Type	KS SG BLS 8
Part No.	766 105
Suitable for	Universal gear coupling

Support

Type	AH ISMTC
Part No.	766 038
Suitable for	telescopic insulating stick

Index of Part No.

Part No.	Instr. No.	Weight	VPE	VE	Page
336 020	—	118 g	1	pc(s).	81
336 025	—	252 g	1	pc(s).	81
524 912	—	4 g	1	pc(s).	208
524 913	—	8 g	1	pc(s).	208
525 001	—	19 g	10	pc(s).	208
525 002	—	37 g	10	pc(s).	208
525 912	—	5 g	1	pc(s).	208
525 916	—	10 g	1	pc(s).	208
561 925	—	35 g	1	pc(s).	208
561 930	—	39 g	1	pc(s).	208
561 931	—	77 g	1	pc(s).	208
561 935	—	42 g	1	pc(s).	208
644 000	—	4.45 kg	1	pc(s).	97
700 000	—	1.16 kg	1	pc(s).	207
700 002	—	1.15 kg	1	pc(s).	207
700 003	—	700 g	1	pc(s).	207
700 004	—	1 kg	1	pc(s).	207
700 005	—	707 g	1	pc(s).	207
700 006	—	780 g	1	pc(s).	206
700 007	—	780 g	1	pc(s).	206
700 008	—	803 g	1	pc(s).	206
700 014	—	1.71 kg	1	pc(s).	207
700 015	—	1.41 kg	1	pc(s).	207
705 500	—	122 g	1	pc(s).	81
705 501	—	152 g	1	pc(s).	81
705 504	—	183 g	1	pc(s).	81
705 510	—	240 g	1	pc(s).	81
706 200	1018	172 g	1	pc(s).	78
706 235	1018	219 g	1	pc(s).	77
706 300	1018	129 g	1	pc(s).	76
706 600	1018	158 g	1	pc(s).	78
706 645	1018	274 g	1	pc(s).	77
707 200	1018	204 g	1	pc(s).	78
707 235	1018	259 g	1	pc(s).	78
707 600	1018	191 g	1	pc(s).	78
707 645	1018	299 g	1	pc(s).	78
712 001	—	1.23 kg	1	m	89
712 100	—	7.06 kg	1	pc(s).	88
712 200	—	5.67 kg	1	pc(s).	88
712 300	—	5.5 kg	1	pc(s).	88
712 301	—	4.72 kg	1	pc(s).	88
712 401	—	8.53 kg	1	pc(s).	89
712 500	—	9.48 kg	1	pc(s).	89
715 001	—	1.52 kg	1	m	89
715 100	—	8.55 kg	1	pc(s).	88
715 200	—	6.67 kg	1	pc(s).	88
715 300	—	6.5 kg	1	pc(s).	88
715 301	—	5.8 kg	1	pc(s).	88
715 401	—	9.68 kg	1	pc(s).	89
715 500	—	10.81 kg	1	pc(s).	89
716 001	—	184 g	1	m	89
716 100	—	1.17 kg	1	pc(s).	88
716 200	—	1.07 kg	1	pc(s).	88
716 300	—	1 kg	1	pc(s).	88
716 401	—	1.88 kg	1	pc(s).	89
716 500	—	2.1 kg	1	pc(s).	89
720 010	1018	314 g	1	pc(s).	79
720 012	1018	347 g	1	pc(s).	79
720 014	1018	329 g	1	pc(s).	79
720 016	1018	309 g	1	pc(s).	79
720 018	1018	296 g	1	pc(s).	79
720 020	1018	276 g	1	pc(s).	79
725 001	—	207 g	1	m	89
725 010	1018	410 g	1	pc(s).	79
725 012	1018	400 g	1	pc(s).	79
725 014	1018	385 g	1	pc(s).	79
725 016	1018	365 g	1	pc(s).	79
725 018	1018	345 g	1	pc(s).	79
725 020	1018	320 g	1	pc(s).	79
725 100	—	1.48 kg	1	pc(s).	88
725 200	—	1.27 kg	1	pc(s).	88
725 300	—	1.58 kg	1	pc(s).	88
725 401	—	1.99 kg	1	pc(s).	89
725 500	—	2.22 kg	1	pc(s).	89
728 300	1011	1.21 kg	1	pc(s).	82
728 312	1733	270 g	1	pc(s).	92
728 316	—	1.05 kg	1	pc(s).	82
728 320	—	855 g	1	pc(s).	82
728 325	—	1.12 kg	1	pc(s).	82
728 500	1011	1.82 kg	1	pc(s).	82
728 501	1011	1.57 kg	1	pc(s).	184
728 502	1011	708 g	1	pc(s).	184
728 503	1011	453 g	1	pc(s).	184
728 520	1011	1.55 kg	1	pc(s).	82
731 011	1011	690 g	1	pc(s).	83
731 013	1011	850 g	1	pc(s).	83
731 015	1011	1 kg	1	pc(s).	83
731 027	1011	1.97 kg	1	pc(s).	83
731 037	1011	2.66 kg	1	pc(s).	83
735 001	—	366 g	1	m	89
735 100	—	2.23 kg	1	pc(s).	88
735 200	—	1.67 kg	1	pc(s).	88
735 300	—	2.08 kg	1	pc(s).	88
735 401	—	2.59 kg	1	pc(s).	89
735 500	—	2.9 kg	1	pc(s).	89
740 124	—	255 g	1	pc(s).	179
740 300	1011	700 g	1	pc(s).	120
740 800	1011	1.25 kg	1	pc(s).	120
742 225	1011	3.49 kg	1	pc(s).	120
742 425	1011	3.78 kg	1	pc(s).	120
745 016	—	467 g	1	pc(s).	117
745 017	—	277 g	1	pc(s).	117
745 018	—	271 g	1	pc(s).	117
745 105	1502	1.83 kg	1	pc(s).	121
745 106	1502	890 g	1	pc(s).	190
745 107	1502	286 g	1	pc(s).	121
745 108	1502	20 g	1	pc(s).	121
745 109	1502	18 g	1	pc(s).	121
745 201	1034	65 g	1	pc(s).	118
745 202	1034	90 g	1	pc(s).	118
745 203	1034	102 g	1	pc(s).	118
745 204	1034	145 g	1	pc(s).	118
745 302	—	110 g	1	pc(s).	117
745 325	—	1.85 kg	1	pc(s).	115
745 326	—	1.8 kg	1	pc(s).	115
745 335	—	2.85 kg	1	pc(s).	115
745 336	—	2.8 kg	1	pc(s).	115
745 340	—	700 g	1	pc(s).	115
745 345	—	1.19 kg	1	pc(s).	117
745 346	—	1.48 kg	1	pc(s).	117
745 358	—	1.15 kg	1	pc(s).	117
745 359	—	1.24 kg	1	pc(s).	117
745 360	—	1.43 kg	1	pc(s).	117
745 363	—	900 g	1	pc(s).	117
745 365	—	687 g	1	pc(s).	117
745 370	—	6.07 kg	1	pc(s).	119
745 371	—	6.07 kg	1	pc(s).	119
745 372	—	6.57 kg	1	pc(s).	119
745 375	—	5.61 kg	1	pc(s).	119
745 376	—	5.54 kg	1	pc(s).	119
745 400	1034	417 g	1	pc(s).	118
745 414	1707	285 g	1	pc(s).	122
745 415	1707	275 g	1	pc(s).	122
745 500	1034	7.57 kg	1	pc(s).	116
745 502	1034	360 g	1	pc(s).	118
745 503	1747	154 g	1	pc(s).	115
745 602	1034	580 g	1	pc(s).	118
745 900	1034	3.71 kg	1	pc(s).	188
745 901	1351	6.89 kg	1	pc(s).	114
745 902	1034	1.62 kg	1	pc(s).	190
745 903	1351	7 kg	1	pc(s).	114
745 905	1351	75 g	1	pc(s).	115
745 910	1351	190 g	1	pc(s).	115
745 915	1351	420 g	1	pc(s).	115
745 921	1351	220 g	1	pc(s).	115
745 922	1351	220 g	1	pc(s).	115
745 952	—	4.9 kg	1	pc(s).	190
745 953	—	4.95 kg	1	pc(s).	190
750 001	—	535 g	1	m	89
750 041	—	4.22 kg	1	pc(s).	179
750 042	—	4.06 kg	1	pc(s).	179
750 100	—	3.1 kg	1	pc(s).	88
750 196	1011	26.58 kg	1	pc(s).	174
750 200	1011	16.95 kg	1	pc(s).	175
750 202	—	2.47 kg	1	pc(s).	88
750 210	1011	13.44 kg	1	pc(s).	174
750 211	1011	15.55 kg	1	pc(s).	175
750 212	1011	13 kg	1	pc(s).	176

Part No.	Instr. No.	Weight	VPE	VE	Page
750 213	1011	8.76 kg	1	pc(s).	176
750 214	1011	15.6 kg	1	pc(s).	175
750 215	1011	7.3 kg	1	pc(s).	178
750 300	—	2.5 kg	1	pc(s).	88
750 301	—	2.21 kg	1	pc(s).	88
750 401	—	3.68 kg	1	pc(s).	89
750 500	—	250 g	1	pc(s).	81
750 510	—	4.11 kg	1	pc(s).	89
751 040	1011	2.6 kg	1	pc(s).	179
751 085	1011	4.98 kg	1	pc(s).	179
751 086	—	9 kg	1	pc(s).	178
751 087	—	9.13 kg	1	pc(s).	178
751 120	1011	6.86 kg	1	pc(s).	179
751 121	—	11.14 kg	1	pc(s).	178
751 122	—	11.27 kg	1	pc(s).	178
751 126	—	10.88 kg	1	pc(s).	178
751 127	—	11.01 kg	1	pc(s).	178
751 130	1011	7.39 kg	1	pc(s).	179
751 140	1011	7.93 kg	1	pc(s).	179
751 150	1011	4.8 kg	1	pc(s).	179
751 191	1011	8.82 kg	1	pc(s).	179
751 192	1011	6.68 kg	1	pc(s).	179
751 193	1011	10.28 kg	1	pc(s).	179
754 200	1018	131 g	1	pc(s).	77
754 235	1018	184 g	1	pc(s).	77
754 600	1018	116 g	1	pc(s).	77
754 645	1018	287 g	1	pc(s).	77
755 200	1018	220 g	1	pc(s).	77
755 225	1018	265 g	1	pc(s).	77
755 245	1018	278 g	1	pc(s).	77
755 501	—	298 g	1	pc(s).	81
755 600	1018	204 g	1	pc(s).	77
755 626	1018	301 g	1	pc(s).	183
755 627	1018	311 g	1	pc(s).	183
755 636	1018	310 g	1	pc(s).	183
755 645	1018	319 g	1	pc(s).	77
755 646	1018	330 g	1	pc(s).	183
756 200	1018	357 g	1	pc(s).	78
756 245	1018	434 g	1	pc(s).	77
756 300	1018	212 g	1	pc(s).	76
756 600	1018	356 g	1	pc(s).	78
756 645	1018	470 g	1	pc(s).	77
757 200	1018	395 g	1	pc(s).	78
757 245	1018	454 g	1	pc(s).	78
757 600	1018	370 g	1	pc(s).	78
757 645	1018	491 g	1	pc(s).	78
758 001	1152	2.22 kg	1	pc(s).	126
758 003	1152	1.95 kg	1	pc(s).	126
758 015	1152	2.62 kg	1	pc(s).	126
758 020	1152	1.34 kg	1	pc(s).	125
758 021	1152	1.1 kg	1	pc(s).	125
758 022	1152	700 g	1	pc(s).	125
758 025	—	1.49 kg	1	pc(s).	127
759 003	—	6.2 kg	1	pc(s).	188
759 111	1455	200 g	1	pc(s).	35
759 121	1455	154 g	1	pc(s).	35
759 300	1455	1.2 kg	1	pc(s).	34
759 603	1455	205 g	1	pc(s).	35
759 604	1455	349 g	1	pc(s).	35
759 605	1455	336 g	1	pc(s).	35
759 606	1450	1.63 kg	1	pc(s).	36
759 608	1455	295 g	1	pc(s).	35
759 610	1455	405 g	1	pc(s).	35
759 611	1455	346 g	1	pc(s).	35
759 612	1450	1.8 kg	1	pc(s).	36
759 615	1455	400 g	1	pc(s).	35
759 616	1450	1.9 kg	1	pc(s).	36
759 620	1455	340 g	1	pc(s).	35
759 621	1455	370 g	1	pc(s).	35
759 622	1455	425 g	1	pc(s).	35
759 624	1450	1.8 kg	1	pc(s).	36
759 630	1455	344 g	1	pc(s).	35
759 633	1455	443 g	1	pc(s).	35
759 998	—	3.32 kg	1	pc(s).	189
759 999	—	2.38 kg	1	pc(s).	189
761 001	1707	400 g	1	pc(s).	103
761 002	1707	400 g	1	pc(s).	103
761 003	1707	840 g	1	pc(s).	103
761 004	1707	1.99 kg	1	pc(s).	103
761 010	1707	980 g	1	pc(s).	103
761 011	1707	1.05 kg	1	pc(s).	103
761 015	1707	1.35 kg	1	pc(s).	103
761 016	1707	1.36 kg	1	pc(s).	103
761 070	—	800 g	1	pc(s).	104
761 075	—	800 g	1	pc(s).	104
763 100	1709	600 g	1	pc(s).	57
763 111	1773	600 g	1	pc(s).	56
763 150	1709	600 g	1	pc(s).	57
763 180	1709	850 g	1	pc(s).	57
763 181	1773	850 g	1	pc(s).	56
763 211	1082	1.28 kg	1	pc(s).	64
763 221	1082	—	1	pc(s).	64
763 231	1082	—	1	pc(s).	65
763 241	1082	—	1	pc(s).	65
763 510	1773	962 g	1	pc(s).	56
763 511	1773	610 g	1	pc(s).	56
763 512	1773	800 g	1	pc(s).	56
763 610	1709	962 g	1	pc(s).	57
763 611	1709	610 g	1	pc(s).	57
763 612	1709	800 g	1	pc(s).	57
763 615	1709	1.42 kg	1	pc(s).	57
763 620	1709	800 g	1	pc(s).	57
765 001	—	190 g	1	pc(s).	103
765 005	—	117 g	1	pc(s).	52
765 009	—	145 g	1	pc(s).	52
765 040	1435	2.13 kg	1	pc(s).	59
765 041	1435	2.28 kg	1	pc(s).	59
765 042	1435	2.59 kg	1	pc(s).	59
765 050	1435	2.15 kg	1	pc(s).	59
765 051	1435	2.29 kg	1	pc(s).	59
765 052	1435	2.59 kg	1	pc(s).	59
766 001	1119	416 g	1	pc(s).	55
766 002	1708	810 g	1	pc(s).	55
766 036	—	968 g	1	pc(s).	189
766 037	1494	6.56 kg	1	pc(s).	17
766 038	—	275 g	1	pc(s).	209
766 039	—	712 g	1	pc(s).	192
766 040	1785	820 g	1	pc(s).	60
766 041	1785	1 kg	1	pc(s).	60
766 042	1785	1.12 kg	1	pc(s).	60
766 048	—	2.6 kg	1	pc(s).	203
766 049	—	165 g	1	pc(s).	201
766 055	—	120 g	1	pc(s).	205
766 056	—	204 g	1	pc(s).	201
766 057	—	75 g	1	Sa	201
766 072	—	400 g	1	pc(s).	202
766 073	—	1.6 kg	1	pc(s).	204
766 074	1707	1.2 kg	1	pc(s).	201
766 075	—	520 g	1	pc(s).	202
766 076	—	800 g	1	pc(s).	204
766 077	—	740 g	1	pc(s).	204
766 078	—	1 kg	1	pc(s).	204
766 079	—	1 kg	1	pc(s).	204
766 100	1708	400 g	1	pc(s).	55
766 105	—	10 g	1	pc(s).	209
766 111	1772	400 g	1	pc(s).	53
766 114	—	—	1	pc(s).	203
766 115	—	725 g	1	pc(s).	203
766 120	—	690 g	1	pc(s).	204
766 122	—	800 g	1	pc(s).	55
766 128	—	1.3 kg	1	pc(s).	203
766 164	—	400 g	1	pc(s).	201
766 210	1772	416 g	1	pc(s).	53
766 211	1772	419 g	1	pc(s).	53
766 215	1772	810 g	1	pc(s).	53
766 216	1772	820 g	1	pc(s).	53
766 222	1772	—	1	pc(s).	53
766 298	1034	3.7 kg	1	pc(s).	188
766 300	1034	1.2 kg	1	pc(s).	188
766 301	1708	400 g	1	pc(s).	55
766 302	1034	4.38 kg	1	pc(s).	116
766 310	1772	400 g	1	pc(s).	53
766 311	1708	419 g	1	pc(s).	55
766 313	—	413 g	1	pc(s).	205
766 315	1708	820 g	1	pc(s).	55
766 322	—	800 g	1	pc(s).	55
766 323	1614	5.8 kg	1	pc(s).	51
766 324	1774	5.8 kg	1	pc(s).	49
766 325	1614	5.6 kg	1	pc(s).	51
766 326	1774	5.6 kg	1	pc(s).	49
766 331	—	375 g	1	pc(s).	202
766 332	1772	—	1	pc(s).	53
766 335	—	400 g	1	pc(s).	204
766 340	1636	3 kg	1	pc(s).	185
766 352	—	250 g	1	pc(s).	205
766 356	—	400 g	1	pc(s).	204
766 358	—	—	1	pc(s).	203

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766 364	—	240 g	1	pc(s).	48
766 365	—	200 g	1	pc(s).	201
766 366	—	600 g	1	pc(s).	204
766 367	1774	600 g	1	pc(s).	202
766 368	—	340 g	1	pc(s).	17
766 369	—	388 g	1	pc(s).	202
766 450	1614	7.6 kg	1	pc(s).	51
766 451	1774	7.6 kg	1	pc(s).	49
766 452	1614	6.6 kg	1	pc(s).	51
766 453	1774	6.6 kg	1	pc(s).	49
766 456	1708	800 g	1	pc(s).	204
766 463	—	1 kg	1	pc(s).	202
766 465	—	800 g	1	pc(s).	201
766 466	1708	1 kg	1	pc(s).	204
766 468	1774	1 kg	1	pc(s).	202
766 541	1507	397 g	1	pc(s).	123
766 542	1507	71 g	1	pc(s).	123
766 543	1507	148 g	1	pc(s).	191
766 545	1507	397 g	1	pc(s).	123
766 601	—	319 g	1	pc(s).	191
766 602	—	1.31 kg	1	pc(s).	191
766 603	—	6 kg	1	pc(s).	188
766 605	—	2 g	1	pc(s).	209
766 611	—	94 g	1	Sa	209
766 613	—	24 g	1	pc(s).	209
766 614	—	600 g	1	pc(s).	191
766 616	1138	5.09 kg	1	pc(s).	163
766 617	1234	4.95 kg	1	pc(s).	163
766 619	—	600 g	1	pc(s).	197
766 677	—	1.4 kg	1	pc(s).	200
766 678	—	1.6 kg	1	pc(s).	200
766 703	—	800 g	1	pc(s).	188
766 704	—	720 g	1	pc(s).	192
766 706	1075	800 g	1	pc(s).	29
766 710	1075	1.7 kg	1	pc(s).	29
766 720	1075	1.7 kg	1	pc(s).	29
766 888	—	63 g	1	pc(s).	205
766 889	—	172 g	1	pc(s).	205
766 913	—	42 g	1	pc(s).	196
766 915	—	220 g	1	pc(s).	196
766 916	—	125 g	1	pc(s).	198
766 923	—	84 g	1	pc(s).	196
766 924	—	46 g	1	pc(s).	196
766 925	—	10 g	1	pc(s).	196
766 927	—	15 g	1	pc(s).	196
766 940	—	145 g	1	pc(s).	199
766 941	—	150 g	1	pc(s).	199
766 950	—	339 g	1	pc(s).	199
766 960	—	310 g	1	pc(s).	198
766 996	—	4 kg	1	pc(s).	191
766 997	—	2.39 kg	1	pc(s).	189
766 998	—	3.36 kg	1	pc(s).	189
766 999	—	3.32 kg	1	pc(s).	18
767 101	1240	60 g	1	pc(s).	40
767 102	1240	62 g	1	pc(s).	40
767 107	—	880 g	1	pc(s).	190
767 110	1239	119 g	1	pc(s).	41
767 111	1259	190 g	1	pc(s).	42
767 112	1259	150 g	1	pc(s).	42
767 121	1281	150 g	1	pc(s).	43
767 122	1281	185 g	1	pc(s).	43
767 125	—	1.26 kg	1	pc(s).	164
767 129	—	—	1	pc(s).	200
767 130	1783	3.46 kg	1	pc(s).	167
767 131	—	6.2 kg	1	pc(s).	167
767 132	1260	640 g	1	pc(s).	44
767 133	1283	85 g	1	pc(s).	46
767 135	1323	85 g	1	pc(s).	46
767 136	1337	65 g	1	pc(s).	46
767 139	—	820 g	1	pc(s).	44
767 150	—	1.94 kg	1	pc(s).	45
767 403	1535	2.15 kg	1	pc(s).	25
767 406	1535	1.3 kg	1	pc(s).	25
767 410	1535	1.4 kg	1	pc(s).	25
767 413	1720	1.77 kg	1	pc(s).	166
767 415	1365	1.52 kg	1	pc(s).	165
767 416	1365	2.62 kg	1	pc(s).	165
767 418	1535	1.2 kg	1	pc(s).	25
767 420	1535	2.38 kg	1	pc(s).	25
767 428	1535	1.4 kg	1	pc(s).	25
767 430	1535	1.5 kg	1	pc(s).	25
767 433	1535	1.5 kg	1	pc(s).	25
767 438	1535	1.6 kg	1	pc(s).	25
767 500	—	280 g	1	pc(s).	191
767 542	1606	5.35 kg	1	pc(s).	168
767 552	1243	1.98 kg	1	pc(s).	28
767 564	—	—	1	pc(s).	200
767 565	—	2.03 kg	1	pc(s).	169
767 571	1665	1.46 kg	1	pc(s).	27
767 572	1665	1.73 kg	1	pc(s).	27
767 573	1665	3.74 kg	1	pc(s).	27
767 574	—	500 g	1	pc(s).	191
767 576	—	214 g	1	pc(s).	199
767 577	—	380 g	1	pc(s).	199
767 581	1665	957 g	1	pc(s).	27
767 582	1665	1.23 kg	1	pc(s).	27
767 583	1665	1.45 kg	1	pc(s).	27
767 585	1665	—	1	pc(s).	169
767 591	—	809 g	1	pc(s).	200
767 592	—	—	1	pc(s).	200
767 593	—	471 g	1	pc(s).	200
767 602	1121	2.1 kg	1	pc(s).	32/172
767 650	1121	4.2 kg	1	pc(s).	31/171
767 655	1121	2.2 kg	1	pc(s).	31/171
767 660	1121	2.2 kg	1	pc(s).	31/171
767 665	1121	4.2 kg	1	pc(s).	31/171
767 670	1121	2.6 kg	1	pc(s).	32/172
767 701	—	5.7 kg	1	pc(s).	188
767 703	1598	1.01 kg	1	pc(s).	13
767 706	1598	1.01 kg	1	pc(s).	13
767 710	1598	1.01 kg	1	pc(s).	13
767 711	1598	1.16 kg	1	pc(s).	13
767 712	—	35 g	1	pc(s).	209
767 713	—	44 g	1	pc(s).	209
767 720	1598	1.07 kg	1	pc(s).	13
767 721	1598	1.23 kg	1	pc(s).	13
767 722	—	474 g	1	pc(s).	200
767 724	—	4.22 kg	1	pc(s).	19
767 725	—	9.1 kg	1	pc(s).	19
767 726	—	235 g	1	pc(s).	200
767 730	1598	1.13 kg	1	pc(s).	13
767 731	1598	1.29 kg	1	pc(s).	13
767 732	—	420 g	1	pc(s).	200
767 733	1598	1.29 kg	1	pc(s).	13
767 734	—	420 g	1	pc(s).	200
767 735	—	400 g	1	pc(s).	200
767 740	1598	1.45 kg	1	pc(s).	13
767 750	1598	1.51 kg	1	pc(s).	13
767 760	—	177 g	1	pc(s).	197
767 761	—	282 g	1	pc(s).	197
767 762	—	353 g	1	pc(s).	197
767 763	—	529 g	1	pc(s).	197
767 764	—	506 g	1	pc(s).	197
767 766	—	129 g	1	pc(s).	197
767 767	—	440 g	1	pc(s).	197
767 768	—	445 g	1	pc(s).	197
767 771	—	600 g	1	pc(s).	197
767 772	—	280 g	1	pc(s).	197
767 776	—	58 g	1	pc(s).	209
767 777	—	46 g	1	pc(s).	209
767 778	—	3 g	1	pc(s).	209
767 779	—	3 g	1	pc(s).	209
767 903	1598	992 g	1	pc(s).	15
767 906	1598	992 g	1	pc(s).	15
767 910	1598	992 g	1	pc(s).	15
767 920	1598	1.1 kg	1	pc(s).	15
767 921	1788	1.65 kg	1	pc(s).	17
767 922	1788	1.07 kg	1	pc(s).	17
767 930	1598	1.17 kg	1	pc(s).	15
767 931	1788	1.08 kg	1	pc(s).	17
767 932	1788	1.07 kg	1	pc(s).	17
767 940	1598	1.39 kg	1	pc(s).	15
767 941	1598	1.17 kg	1	pc(s).	15
767 950	1598	1.44 kg	1	pc(s).	15
767 951	1598	1.26 kg	1	pc(s).	15
767 960	1598	1.32 kg	1	pc(s).	15
767 961	1598	1.32 kg	1	pc(s).	15
767 962	1598	1.77 kg	1	pc(s).	23
767 963	—	—	1	pc(s).	200
767 964	1598	—	1	pc(s).	23
767 965	—	—	1	pc(s).	200
767 970	1598	5.8 kg	1	pc(s).	21
767 971	1598	2.35 kg	1	pc(s).	21
767 972	—	—	1	pc(s).	200
767 973	1598	2.06 kg	1	pc(s).	21
767 974	—	—	1	pc(s).	200
767 975	1598	5.42 kg	1	pc(s).	21
767 980	1598	5.98 kg	1	pc(s).	21
767 981	1598	5.66 kg	1	pc(s).	22
767 982	1598	7.4 kg	1	pc(s).	22
767 983	1598	6.38 kg	1	pc(s).	23
767 984	1598	6.2 kg	1	pc(s).	23
767 990	1598	2.7 kg	1	pc(s).	21
767 991	1598	2.35 kg	1	pc(s).	22

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767 993	1598	3.82 kg	1	pc(s).	23
767 996	—	2.3 kg	1	pc(s).	191
767 997	—	2.42 kg	1	pc(s).	189
767 999	—	3.4 kg	1	pc(s).	189
769 300	1707	2.8 kg	1	pc(s).	106
769 352	1707	4.8 kg	1	pc(s).	182
769 400	1707	3.68 kg	1	pc(s).	106
769 500	1707	4.68 kg	1	pc(s).	106
769 502	1707	5.6 kg	1	pc(s).	182
769 503	1707	1.64 kg	1	pc(s).	108
769 504	1707	1.6 kg	1	pc(s).	108
769 505	1707	1.46 kg	1	pc(s).	108
769 506	1707	6.5 kg	1	pc(s).	182
769 508	1707	4.5 kg	1	pc(s).	182
769 509	—	358 g	1	pc(s).	192
770 001	—	753 g	1	m	89
770 100	—	4.22 kg	1	pc(s).	88
770 200	—	3.07 kg	1	pc(s).	88
770 300	—	3.5 kg	1	pc(s).	88
770 301	—	2.96 kg	1	pc(s).	88
770 401	—	4.8 kg	1	pc(s).	89
770 500	—	5.36 kg	1	pc(s).	89
772 310	—	469 g	1	pc(s).	91
772 311	—	482 g	1	pc(s).	91
772 312	1011	480 g	1	pc(s).	99
772 313	1011	400 g	1	pc(s).	99
772 314	1011	446 g	1	pc(s).	96
772 320	—	785 g	1	pc(s).	91
772 321	—	756 g	1	pc(s).	91
772 322	1011	747 g	1	pc(s).	99
772 323	1011	876 g	1	pc(s).	99
772 324	1011	719 g	1	pc(s).	96
772 330	—	560 g	1	pc(s).	91
772 331	—	566 g	1	pc(s).	91
772 340	—	878 g	1	pc(s).	91
772 341	—	902 g	1	pc(s).	91
773 034	—	634 g	1	pc(s).	91
773 130	—	801 g	1	pc(s).	91
773 234	—	661 g	1	pc(s).	91
773 236	—	714 g	1	pc(s).	96
773 251	1011	901 g	1	pc(s).	181
773 330	—	830 g	1	pc(s).	91
773 331	1011	793 g	1	pc(s).	96
774 034	—	662 g	1	pc(s).	98
774 130	1011	780 g	1	pc(s).	98
774 234	—	772 g	1	pc(s).	98
774 251	1011	955 g	1	pc(s).	181
774 330	1011	941 g	1	pc(s).	98
774 434	—	712 g	1	pc(s).	98
774 530	1011	700 g	1	pc(s).	98
775 621	1011	311 g	1	pc(s).	100
775 626	1011	343 g	1	pc(s).	100
775 631	1011	290 g	1	pc(s).	100
775 636	1011	350 g	1	pc(s).	100
784 032	1011	969 g	1	pc(s).	93
784 038	1011	1.01 kg	1	pc(s).	93
784 085	1011	872 g	1	pc(s).	93
784 201	1011	880 g	1	pc(s).	93
784 301	1011	1.7 kg	1	pc(s).	93
784 352	1011	806 g	1	pc(s).	180
784 401	1011	1.3 kg	1	pc(s).	93
784 461	1649	1.28 kg	1	pc(s).	95
784 463	1649	1.62 kg	1	pc(s).	95
784 480	1011	600 g	1	pc(s).	93
784 490	—	533 g	3	pc(s).	95
784 501	1011	1.95 kg	1	pc(s).	93
784 755	1011	1.54 kg	1	pc(s).	180
785 100	1224	18 kg	1	pc(s).	136
785 109	—	504 g	1	pc(s).	142
785 110	—	700 g	1	pc(s).	143
785 111	—	612 g	1	pc(s).	192
785 112	1224	17.8 kg	1	pc(s).	136
785 119	—	700 g	1	pc(s).	143
785 120	1224	700 g	1	pc(s).	139
785 121	—	110 g	1	pc(s).	139
785 122	—	220 g	1	pc(s).	139
785 123	—	430 g	1	pc(s).	139
785 130	—	130 g	1	pc(s).	139
785 131	—	160 g	1	pc(s).	139
785 132	—	150 g	1	pc(s).	139
785 140	—	340 g	1	pc(s).	140
785 150	—	320 g	1	pc(s).	140
785 151	—	260 g	1	pc(s).	140
785 160	—	90 g	1	pc(s).	140
785 170	—	255 g	1	pc(s).	140
785 171	—	105 g	1	pc(s).	140
785 172	—	100 g	1	pc(s).	140
785 180	—	150 g	1	pc(s).	142
785 181	—	181 g	1	pc(s).	142
785 190	—	389 g	1	pc(s).	142
785 200	—	180 g	1	pc(s).	141
785 210	—	260 g	1	pc(s).	142
785 212	—	71 g	1	pc(s).	141
785 213	—	320 g	1	pc(s).	143
785 214	—	320 g	1	pc(s).	143
785 215	—	320 g	1	pc(s).	143
785 216	—	320 g	1	pc(s).	143
785 217	—	320 g	1	pc(s).	143
785 218	—	320 g	1	pc(s).	143
785 219	—	320 g	1	pc(s).	143
785 220	—	82 g	1	pc(s).	140
785 221	—	200 g	1	pc(s).	140
785 223	—	290 g	1	pc(s).	140
785 224	—	11 g	1	Sa	142
785 229	—	6 kg	1	pc(s).	139
785 259	—	94 g	1	pc(s).	141
785 260	1396	21.5 kg	1	pc(s).	145
785 261	—	760 g	1	pc(s).	145
785 264	—	2.5 kg	1	pc(s).	145
785 265	1444	7.29 kg	1	pc(s).	147
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785 267	—	291 g	1	pc(s).	147
785 268	—	293 g	1	pc(s).	147
785 269	—	292 g	1	pc(s).	147
785 271	—	17 g	1	pc(s).	147
785 272	—	21 g	1	pc(s).	147
785 273	—	270 g	1	pc(s).	147
785 274	—	33 g	1	Sa	141
785 275	—	63 g	1	Sa	141
785 279	—	68 g	1	Sa	141
785 280	—	60 g	1	Sa	141
785 281	—	15 g	12	pc(s).	148
785 282	—	7 g	12	pc(s).	148
785 283	—	8 g	12	pc(s).	148
785 284	—	7 g	12	pc(s).	148
785 295	—	2.5 kg	1	pc(s).	145
785 298	—	3.41 kg	1	pc(s).	147
785 299	—	5.4 kg	1	pc(s).	145
785 301	—	6 kg	1	pc(s).	139
785 310	—	12.7 kg	1	pc(s).	143
785 315	—	632 g	1	pc(s).	139
785 316	—	95 g	1	pc(s).	139
785 317	—	130 g	1	pc(s).	139
785 318	—	152 g	1	pc(s).	139
785 319	—	247 g	1	pc(s).	139
785 320	—	88 g	1	pc(s).	140
785 321	—	97 g	1	pc(s).	140
785 322	—	132 g	1	pc(s).	141
785 323	—	182 g	1	pc(s).	141
785 324	—	89 g	1	pc(s).	141
785 325	—	600 g	1	pc(s).	139
785 408	1622	9.8 kg	1	pc(s).	157
785 425	—	280 g	1	pc(s).	192
785 427	1767	300 g	1	pc(s).	154
785 440	1622	2.25 kg	1	pc(s).	157
785 441	1622	2.2 kg	1	pc(s).	157
785 445	1622	1.07 kg	1	pc(s).	157
785 455	—	3.6 kg	1	pc(s).	159
785 456	—	3.6 kg	1	m	159
785 457	—	36 kg	1	pc(s).	159
785 458	—	5.8 kg	1	m	159
785 459	—	56 kg	1	pc(s).	159
785 465	—	41.5 kg	1	pc(s).	158
785 466	—	830 g	1	m	158
785 467	—	38 kg	1	pc(s).	158
785 468	—	1.64 kg	1	m	158
785 471	—	20 kg	1	pc(s).	159
785 472	—	1.95 kg	1	m	159
785 490	—	240 g	1	pc(s).	155
785 491	—	140 g	1	Pa	155
785 492	—	140 g	1	Pa	155
785 493	—	160 g	1	Pa	155
785 494	—	160 g	1	Pa	155
785 495	—	290 g	1	Pa	155
785 496	—	290 g	1	Pa	155
785 497	—	660 g	1	pc(s).	155
785 502	1261	7.2 kg	1	pc(s).	133
785 506	—	5.3 kg	1	pc(s).	133

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Notes

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– Colour trademark "red" 302 40 296.9

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Abbreviations

Instr. No.	Instructions for use No.
VPE	Packing unit
VE	Quantity per unit (piece, metre, set or pair)
Stk.	Piece
m	Metre
Sa	Set
Pa	Pair
STK	Plug-in coupling
ZK	Universal gear coupling
SK	Hexagon shaft
SQ	T pin shaft
SQL	Long T pin shaft
PFP	Fixed phase point
FS	Wing bolt
HG	Plastic handle
NS	Low-voltage -1000 V
MS	Medium-voltage -36 kV
TI	Partly insulated
VI	Fully insulated

Conversion List EaS Devices

Part No.	Variant No.
711 025	VSUSPSQ
711 031	V1YZ3L6
711 044	VE1T6A9
711 045	VTUMV5L
711 046	VLXJNYB
711 049	VQBFMVS
711 050	VCDAK6Q
711 053	VMD2JMZ
711 060	V4RD636
711 061	VRSSSBX
711 064	VVAH34F
711 065	VS8MB8B
711 068	VQUYPTY
711 069	VUBAZLG
711 317	V4GN94T
711 325	VRL934N
711 331	V2AYNJJ
711 350	VTSY9XH
711 351	V8ZQEUM
711 353	VW1ECHC
711 354	VLMAF1L
711 356	VDNQB1T
711 357	V59G6XV
711 358	VFJSUAG
711 359	VYF4YEJ
711 360	VSUTC9Y
711 362	VRPSCXL
711 363	VLBKQD3
711 365	VE2HXN5
711 366	VEWYTG6
711 367	VYHEXQP
711 368	VJR1UKK
711 369	VYKR63U
711 370	VA5E7H5
711 372	V772G2C
711 373	VB8B34N
711 375	VDT6K3C
711 376	V7HCU52
711 377	VFN4WTN
711 378	VLJ68A8
711 379	V7TM9N6
711 380	V99MXGX
711 382	VEZNVYJ
711 383	VKU92MH
711 385	VS82RW5
711 386	VG3KSH4
711 387	V34WUBA
711 388	VGDJ7SK
711 389	VENX63L
711 390	VEEGERZ
711 392	VR68JEM
711 393	VDETPMN
712 025	VE8WZ1W
712 031	V5NME1N
712 044	VZCU1TY
712 045	VN7Z2RZ
712 046	VMUCEH5
712 049	VJ8VRQJ
712 050	VWRZFKX
712 053	VZTKJ9K
712 060	VZF9JKJ
712 061	VYTJJ23
712 064	VVVSDQB
712 065	V12QSRJ
712 068	VUYUF4G
712 069	VWK91T1
712 073	V91P6T4
712 075	V2DLHU8
712 076	V3RCCC7
712 107	VKYYNKC
712 123	VASXABX
712 125	V2LWDK3
712 127	VMRG45C
712 135	VN2Y5Q1
712 139	V7JPAT3
712 171	VBBCS9Z
712 172	VHDXTPA
712 173	V5CC446
712 317	V4NK7ZF
712 325	VMTB5F7
712 331	VMXV1VK
712 350	VCBACWY
712 351	VL1XVBH
712 356	VGGH5XH
712 357	VG7AWAD
712 358	V7N6439
712 359	VJ3LCX6
712 360	V2YYL7V
712 362	V4X4YU8
712 363	VY7DWFA
712 365	VVUGU5T
712 366	V4PSS1S
712 367	V293GEU
712 368	VKHAE3J
712 369	V2XJV7G
712 370	V6QT4NC
712 372	VUMTLQG
712 373	VXW23MB
712 374	V3K847Z
712 375	VA6VR6Q
712 376	V3B3UQ3
712 378	VLTR2ND
712 379	V4NR48U
712 380	VYQA88X
712 382	VGJBD1T
712 383	V3QVW33
712 384	VT8XHFS
712 385	VL69TVV
712 386	VFH38PN
712 388	VCC99R6
712 389	V17HKPC
712 390	VPHGEBG
712 392	VLUK37V
712 393	VGQ1BVV
712 604	V8115WA
712 802	V1CV654
712 803	VPZQYFF
712 804	V31P599
712 806	VBAGHUX
712 807	V6TDQYM
712 811	VAPQBJZ
712 812	V8AUEKX
712 813	VBQXB34
712 815	V22299H
712 816	V62TQA8
712 841	VZJMNEN
712 842	V9UDX2F
712 843	VLS4RHM
712 845	VW4MHGQ
712 846	V1VZCMP
712 861	VQC6L7X
712 862	VCYWVPY
712 863	VAB1FV6
712 865	VACNLP8
712 866	V4PH61X
712 950	V4C1TCQ
712 951	V478EF9
715 025	VR688CW
715 031	VMV6X85
715 044	VVYAW28
715 046	VMBNDQB
715 050	VR9DVNF
715 053	VUS5RRZ
715 061	VVCABVX
715 065	VQA4VCD
715 068	VBP8YK7
715 069	V9B84MW
715 317	VCRPFWY
715 325	V3NRUS8
715 331	V8N2TVX
715 350	VHBWUNH
715 351	VZBSKYB
715 356	VK3BMXP
715 357	VNDPX7S
715 358	VUPZSM5
715 359	V2ZFW21
715 360	VTQV8NF
715 362	VULRXQG
715 363	VF3TX75
715 365	VMQWD87
715 366	VXBV1MP
715 367	VW6NFTQ
715 368	VSYUZYU
715 369	V33M4JL
715 370	VKNK9YT
715 372	VNF9DR7
715 373	VMWJP4E
715 374	VEPBUSF
715 375	VQQA8ZU
715 376	VLDPDJ6
715 378	VBZ6V3S
715 379	V7JVGLS
715 380	VFSJ6GG
715 382	V2EVTLW
715 383	VPQA57N
715 384	VZTD96U
715 385	VL55ZFN
715 386	V58S8N5
715 388	VJKMTEY
715 389	VQQRNWP
715 390	V94C53H
715 392	V86TZPA
715 393	VWXM7XF
715 604	V11E77B
715 950	VAUTRKE
715 951	VPZ3MLG
725 025	VGK338W
725 031	VSV8EYY
725 044	VZBV32Q
725 045	VXUVL6J
725 046	VYYTU8S
725 048	VGGR6AW
725 049	V259F6X
725 050	VQRMRS1
725 052	V4DGG87
725 053	VJ5AQED
725 060	VKFQ7Y5
725 061	VBQ44HR
725 063	V5RVBJM
725 064	VAS1WX7
725 065	VBV1K2D
725 067	V8P397H
725 068	VCE3GHL
725 069	VL5CXAT
725 101	VW17KTH
725 103	V6C3Q27
725 104	V36B5C5
725 105	V244QB6
725 106	V4ETA8H
725 107	VQ1Y3QZ
725 108	VGT6MJX
725 110	VCP2UFG
725 112	VMVTYXH
725 113	V96JHLJ
725 114	V3ZGMRV
725 115	V2ZHTWC
725 117	VTU3FXF
725 123	V8XDNPD
725 125	VW6P4JC
725 127	VMV4LB1
725 132	VGXLR3B
725 134	VK9G9UB
725 135	V5R5FB9
725 136	VLDDJ97
725 138	VKSELRQ
725 139	V2KPDND
725 317	VRBDGH9
725 325	VMPK9SQ
725 331	V2L1YJ8
725 357	VZGWFYX
725 358	VTNZLZY
725 359	VTKP6TK
725 360	VUFZN7T
725 362	VNR87MS
725 363	VKCX2XN
725 365	VEMU17J
725 367	VGWSU8G
725 368	V1SXR1Q
725 369	VGV4M8S
725 370	VE3BZVR
725 372	VTB9WVC
725 373	VD5KG9W
725 375	VKZ57BL
725 377	VSYPQGG
725 378	VKKS85U
725 379	VA8HJYU
725 380	V3TU5KE
725 382	V768UCY
725 383	VWH5KZ9
725 385	VHR6GRD
725 387	VXT2ZC8
725 388	V6XJJ2K
725 389	VS9CTQF
725 390	VEKR57C
725 392	V3XVRYH
725 393	V2M12P7
725 604	VNC1S9W
725 618	VRDSN66
725 619	V8646PA
725 620	VMFPPH3
725 621	VJAJCEL
725 718	VEE97GA
725 719	VPUQEZY
725 720	V9YPM5V
725 721	V9JY75X
725 802	VS5FLXX
725 804	V1DNFBC
725 806	VYSPP6E
725 807	VGD1EZ8
725 811	VDTTDE3
725 813	VN6GT4A
725 815	V4QD9ZG
725 816	VB1SABS
725 821	VR5N9BK
725 822	VNH8MAC
725 823	V7XNCZ5
725 825	V8UW776
725 826	VMYTHEM
725 831	VXT7RNE
725 832	VHBCFBH
725 833	V1FQE9S
725 835	V8VF7CP
725 836	VF693LG
735 025	VZGQ3SR
735 031	VMQ1162
735 044	VQYQNGQ
735 045	VFVAHX2
735 046	VBQC9NR
735 048	VJT1C7V
735 049	VT854M9
735 050	VY16XXP
735 052	VWDT71S
735 053	V3QXGLK
735 060	V3C9LLG
735 061	VZDZVAJ
735 063	VQ4VG9W
735 064	VP9S1Q1
735 065	V4F8WMT
735 067	VZFGW3P
735 068	VJTDFXD
735 069	VMGSB6N
735 101	VHX2314
735 103	VVG5MGG
735 104	VCQ5VHL
735 105	VWC4LQ6
735 106	V4FAD1T
735 107	V8CX35Z
735 108	VT3HCAP
735 110	VDCXLB3
735 112	VCJXH1D
735 113	VC1ERK1
735 114	VKWUX5M
735 115	VD771BW
735 117	V9KFP4D
735 123	V73U6T8
735 125	V6ZU77Q
735 127	VW3AA59
735 132	VNZA8BG
735 134	VRKFLGP
735 135	VEVC88L
735 136	V9746CX
735 138	VZVE8AN
735 139	VKDSSSD
735 317	V8ZNSNV
735 325	VLLJ6QP
735 331	VS5EW7H
735 357	VH2E9XU
735 358	V2WL665
735 359	V7MCBSS
735 360	VCK9VSV
735 362	VW96P5V
735 363	VBDY922
735 365	VF8ZG5K
735 367	VSK5E2J
735 368	V8DXNGZ
735 369	VPH1D4A
735 370	V7AMLLQ
735 372	VCPN2WV
735 373	VSNXHDG
735 375	VHW33QC
735 377	VTLW8ST
735 378	VGLLCD9
735 379	V33KFTR
735 380	V4UH7EZ
735 382	VVM4KGN
735 383	V8953S5
735 385	VMQTE8X
735 387	V4G22DQ
735 388	VERRBY4
735 389	VZH3WCJ
735 390	VTGCMNB
735 392	VTUSXJU
735 393	VQRP4YY
735 604	V18JQHQ
735 618	V3WJMYY
735 619	V9TQZU5
735 620	V8W71S4
735 621	VYH2741
735 718	V1FCC8E
735 719	VDZU7C9
735 720	V9YWUP6
735 721	VQ8K8JL
735 802	VRM3DGE
735 804	VW3CNVB
735 806	VJPBRG7
735 807	VPQD4CQ
735 811	VJEKSK4
735 813	VENMVY5
735 815	VAAXPTN
735 816	V7Y6Q8Y
735 821	VNRCV5Y
735 822	V3J1QF8
735 823	VFXCRCJ
735 825	V556HLB
735 826	VV1G5YV
735 831	VK94NLM
735 832	VXDSR1B
735 833	VJH5VX8
735 835	V5VN56Z
735 836	VK6HC5U

Part No.	Variant No.
743 225	VH8QTCZ
743 235	VKB2Q6J
743 250	VP6YV4T
743 325	VQKTK4T
743 335	VN63A91
745 426	VSUN6NV
745 436	VSHDQZB
745 458	VUKMT58
745 459	V3RQASE
745 460	VDZ2VDX
745 816	VSB29AH
745 817	V1RC3P2
745 925	V162LDM
745 926	VMRSJWD
745 935	VE5K3HM
745 936	VEH4JQY
745 940	VZPW9LG
750 025	VBAAV8C
750 031	VJSM52N
750 044	VKCP5AF
750 045	VMN4GDZ
750 046	VBK1GY5
750 048	VUZTS45
750 049	VALQ5Y4
750 050	VB9YGVM
750 052	V5MJ1D4
750 053	V8Z7P3F
750 060	VFHAVQS
750 061	VVCR31N
750 063	VZWBHCN
750 064	VUZ8MS2
750 065	V8YNRNE
750 067	VX8CUBA
750 068	V4SLGNC
750 069	VDSMJ3S
750 101	VTZD7GJ
750 103	V9L1MTM
750 104	V7V4L8U
750 105	VEEP6AW
750 106	V7ETTH4
750 107	VD68BWT
750 108	VKAMEV6
750 110	VAB24MU
750 112	VRPVAYL
750 113	VK7856S
750 114	VFQE9GC
750 123	VVQ8G74
750 125	VBC3ZW8
750 127	VGYM5TJ
750 132	VA4T7G7
750 134	V64BSPZ
750 135	VKREU61
750 136	V1GQJTW
750 138	VCBZM3C
750 139	V484AUS
750 317	VK3UPSM
750 325	VLCRPCB
750 331	VKVTFX2
750 350	VD28FAD
750 351	VUCHGY5
750 353	VZKJEJD
750 354	VQSQ6PK
750 356	VWHHBRA
750 357	VYS9QVG
750 358	VZGZMYB
750 359	V2YMX28
750 360	VRCU995
750 362	VNYZ52U
750 363	V1TGQ4X
750 365	VLJNZWC
750 366	VGZPJDH
750 367	VPJMGKF
750 368	VQM3HNW
750 369	VTW95D3
750 370	VVVK1JQ
750 372	V9XQCNN
750 373	VM2NED8
750 375	VNTCK8P
750 376	VDRNJ2S
750 377	VKJV3VM
750 378	VTQTSQV
750 379	VNV2RG2
750 380	VJUSUHD
750 382	VVZLD6Y
750 383	VFMDAKW
750 385	V4VEYJU
750 386	VQGRY7F
750 387	V4HCYVD
750 388	VTFCTME
750 389	V6SP1XB
750 390	V5KBVJ9
750 392	V3NYZMV
750 393	V29HNHP
750 604	VN35H5D
750 802	V37MFYV
750 803	VVB5WXA
750 804	VUFEJR5
750 806	VS2K1LW
750 807	VHLFKA8
750 811	VV2ZFCE
750 812	VQAUPLL
750 813	VEEKVNP
750 815	V9P37D2
750 816	V2X4BT2
750 821	VTF714Z
750 822	VPXTVLH
750 823	VVBEQYR
750 825	VARQN3A
750 826	V5AC9LR
750 831	V3NXQPG
750 832	VKFT31E
750 833	VBU3KP2
750 835	VMBDCM1
750 836	VFGTQXS
770 025	VZ6JQNW
770 031	VRVY69X
770 044	VSJKZDX
770 045	VEAN8EN
770 046	VM19WAG
770 049	V1SCQ5Z
770 050	VKB9CSW
770 053	V7F1ZUL
770 060	VGU6HRH
770 061	V37GK1H
770 064	VM8AMR1
770 065	VZ5R8NL
770 068	VQBKB5F
770 069	VPPD4XQ
770 103	VWZV92M
770 104	VLBNNQ8
770 105	V1RE55J
770 106	VT4G9E6
770 107	VEW85JV
770 110	VS2F8V2
770 112	VBPD68R
770 113	V3E3D6R
770 114	V5VJ9SY
770 123	VZAN94L
770 125	VFJ44TW
770 127	V22Y229
770 134	VMVRJEM
770 135	V2TLVK7
770 138	VJWZJ3G
770 139	V2TSJVZ
770 317	V2FEYLZ
770 325	VLU29GH
770 331	VAEP8C2
770 350	VQYP8B2
770 351	VM8PZQW
770 353	VCV465D
770 354	V1SEZ7V
770 356	VCQPRBW
770 357	V8BHQB8
770 358	VLGTEJU
770 359	VXG61F5
770 360	VHEHJXY
770 362	VY7DCHG
770 363	VG5HBEM
770 365	VJAPTE4
770 366	VRAPPLM
770 367	VB4G2U9
770 368	VGEGSMA
770 369	VF5G9V2
770 370	V1JF2W8
770 372	VHMKBDN
770 373	VHTU76U
770 375	VA3FMB1
770 376	VJUVQ2H
770 377	VAKDTQ8
770 378	VBLEQAT
770 379	VFKR4Y7
770 380	VK8HC15
770 382	VTEY43R
770 383	VG73XL3
770 385	VB3QZ96
770 386	VYGUWYZ
770 387	VLGHLHM
770 388	VK7X51U
770 389	VZMPSQE
770 390	VL67HCY
770 392	VQPB743
770 393	VXREKV1
770 604	VTCS2XV
770 802	VJKLDM9
770 803	VN9BS4D
770 804	VZLCL8A
770 806	VV2HPN4
770 807	VJBA1NB
770 811	VR5YMHR
770 812	VNYRU9G
770 813	VVWUEFN
770 815	VJV9F84
770 816	V9FXVRN
770 821	VMPFLNJ
770 822	VEJC5DF
770 823	VK6ESW9
770 825	VXPMZAD
770 826	VFTAWJF
770 831	V1JTFDE
770 832	VDV4LWB
770 833	VCY38F6
770 835	V4RJ7A2
770 836	VX5JF6F
776 412	V797FE6
776 415	VB53TC9
776 425	VSY71K4
776 435	V9JF26K
776 450	VRJG23Y
776 470	VPZBBSL
776 495	VZC3FST
794 025	VBSMFKC
794 031	VDFWBWD
794 044	VXQCVCN
794 045	V4J9UXX
794 046	VR83S6V
794 048	VMC9DQV
794 049	VVLHVTC
794 050	VJVK21S
794 052	VV8VRZH
794 053	VSEX7VE
794 060	V9HUZQM
794 061	VU6CUGZ
794 064	V67KLG2
794 065	VS36XJY
794 068	VK69GAC
794 069	VBZ9QTH
794 125	VEYAYGD
794 127	V1K5YTF
794 134	V9SQTQM
794 135	VXS9KPS
794 138	V7LQTFV
794 139	VLWG7T3
794 317	V4NRQE1
794 325	VQUNKCZ
794 331	VVK556A
794 350	V5SVXPH
794 351	VCH8YCP
794 353	V31U99G
794 354	VTR7ZZD
794 356	VW3DBLC
794 357	V8F74EG
794 358	VVLA46C
794 359	VU3KD1Q
794 360	VPXL118
794 362	VY3ARQW
794 363	VFDY3DQ
794 365	V8RTUHC
794 366	VSFQ9ZG
794 367	VA72VVU
794 368	VAEJGBQ
794 369	V4JDGS2
794 370	VBTY7PB
794 372	V5QGZHZ
794 373	VAME5X5
794 375	V5DYR2W
794 376	VDEFR59
794 377	VXDR81Q
794 378	VA2225Y
794 379	VZXJ2FA
794 380	VHEF76J
794 382	VCN3NCE
794 383	VSFP1GU
794 385	VL57XQ9
794 386	VKMPATQ
794 387	VLXY3LH
794 388	VL8T7HK
794 389	VBJGR5A
794 390	VJHAN6V
794 392	V1E2MDU
794 393	V7WX8SR
795 025	VL2SENW
795 031	VQ5P928
795 038	V7M4G4Y
795 039	VDT3T2Z
795 041	V356C5K
795 042	VX8NNWD
795 043	VFPDUFB
795 044	VFA5K2X
795 045	VAV834Q
795 046	V4H5CJH
795 048	V67JB8K
795 049	VX11PRS
795 050	VYVR9QF
795 053	VA64F22
795 060	VYXJE79
795 061	VPR2BV4
795 064	V96XGRY
795 065	V5VTF1M
795 068	V5UZSH7
795 069	VW3UYUB
795 103	VPUDKFT
795 104	VN9HWC2
795 105	V7PN1G9
795 106	V65RR5D
795 107	VRQD6H2
795 110	VBX7XDG
795 112	VZA7PEZ
795 113	V52GS6X
795 114	VG6A9D2
795 123	VJ4VQVZ
795 317	VA3G5RT
795 325	VRN7PRE
795 331	VKVA6E5
795 350	VVUD5DD
795 351	VNH1BXX
795 356	V5J66JU
795 357	VNY25QX
795 358	VD6S3TM
795 359	VCB21XA
795 360	V2WYQC1
795 362	VZEUA2A
795 363	VVKV3DN
795 365	VYFU66X
795 366	VL61UF3
795 367	VKPDYFL
795 368	VDNB939
795 369	VBSVW4J
795 370	VCDBKRZ
795 372	V5TTTRS
795 373	VDS53CN
795 374	VR32NHV
795 375	V6DHDU7
795 376	VG13KVF
795 378	V97KK63
795 379	VQ8FYQU
795 380	VQWUXJD
795 382	VLQY6LG
795 383	VF3L4VY
795 384	VZFAZME
795 385	VM1A6BG
795 386	V4NWSAD
795 388	V2AJRXP
795 389	V62YAXX
795 390	V81BD5Y
795 392	VVH5CZ1
795 393	VBQG7FR
795 604	VLB2F3G
795 802	V56B2KD
795 803	VBSK4M8
795 804	VRZKGQ9
795 806	VETJPMF
795 807	V1QKPL1
795 811	VFE63YT
795 812	V3CXX3D
795 813	V5UYSYN
795 815	VCXK4CS
795 816	VCZ332G
795 821	VC51J3J
795 822	VY1X9QL
795 823	VRCW7VG
795 825	VZW74Y2
795 826	VY3YS93
795 831	V1Y86WG
795 832	VT3J1P4
795 833	VAMMRBG
795 835	VRAB9WB
795 836	VJ1PKY1
795 950	V64V85W
795 951	VT9FREL

Key Words

Surge Protection
Lightning Protection
Safety Equipment
DEHN protects.

DEHN + SÖHNE
GmbH + Co.KG.

Hans-Dehn-Str. 1
Postfach 1640
92306 Neumarkt
Germany

Tel. +49 9181 906-0
Fax +49 9181 906-1444
export@dehn.de
www.dehn.de

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