



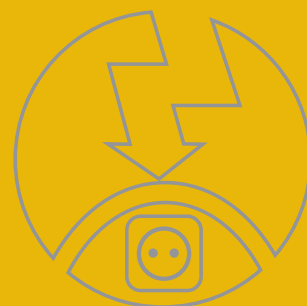
DEHN + SÖHNE

Safety Equipment

Main Catalogue 2009



Lightning Protection

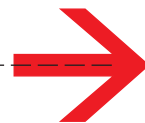


Surge Protection



Safety Equipment

. . . Your safety is our concern.



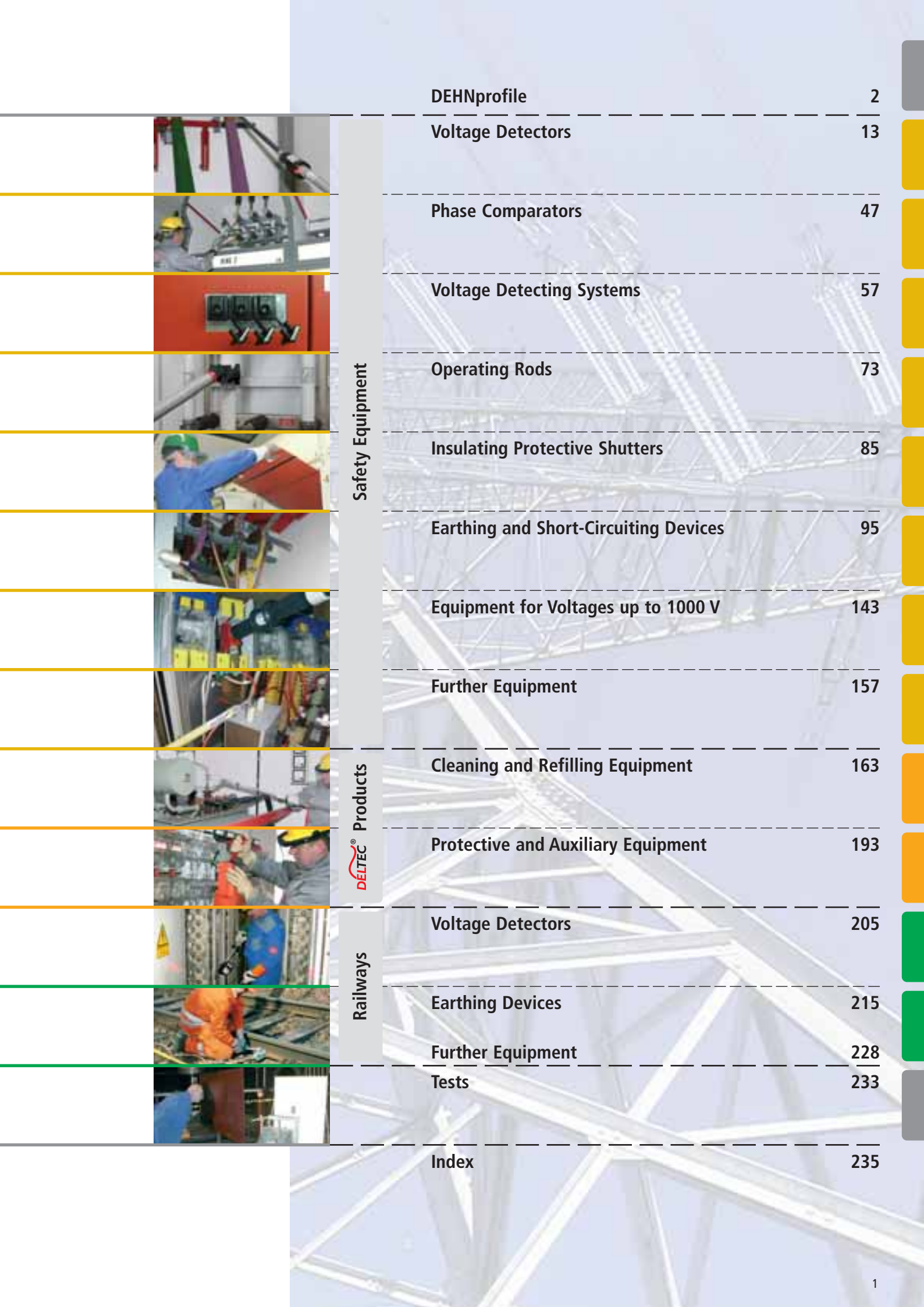
Valid from 1st January 2009

This catalogue replaces the Main Catalogue published in 2007.

We reserve the right to introduce changes in performance, configuration and technology, dimensions, weights and materials in the course of technical progress.

Misprints, errors and alterations excepted. Reproduction in any form whatsoever is forbidden without our authorisation.

Publication No. DS396/E/0109



		DEHNprofile	2
	Safety Equipment	Voltage Detectors	13
		Phase Comparators	47
		Voltage Detecting Systems	57
		Operating Rods	73
		Insulating Protective Shutters	85
		Earthing and Short-Circuiting Devices	95
		Equipment for Voltages up to 1000 V	143
		Further Equipment	157
	DELTEC® Products	Cleaning and Refilling Equipment	163
		Protective and Auxiliary Equipment	193
	Railways	Voltage Detectors	205
		Earthing Devices	215
		Further Equipment	228
		Tests	233
		Index	235

DEHN – Safety with Tradition.

Production around 1930.



Centre of lightning and surge protection and safety equipment.



Production of safety equipment in 2007.

At first there was the idea of diverting lightning to the ground without risk for house and home.

This was the challenge, Hans Dehn met in his company founded in Nuremberg in 1910. Since the beginning of the 1920s DEHN has produced lightning protection and earthing components. Over the years, a diversified product range for external lightning protection came into existence.

However, not only protecting systems and buildings against the effects of lightning, but also the protection of people installing and maintaining electrical systems became a central requirement.

In 1952, DEHN + SÖHNE extended production by the safety equipment product range, i. e. safety devices for working in/at electrical systems/installations.

The entering of electrical and electronic equipment in industries, administrations and households showed soon, that conventional lightning protection was not sufficient to protect these devices. With the experience of decades in the field of external lightning protection, the necessity of surge protection came up. Therefore, the first generation of surge protective devices (SPDs) of DEHN + SÖHNE was introduced to the market in 1954.

Today, the location in Neu-markt, Germany, unifies research and development, production, sales and administration for lightning protection, surge protection and safety equipment.

With approx. 850 employees, a process-orientated management, laboratories, computer-controlled production and a wide product range for safety, DEHN + SÖHNE is a worldwide recognised and leading family-owned company.

In the course of its history of almost 100 years, the initial handicraft business has become a worldwide operating industrial company with three product ranges:



Lightning Protection



Surge Protection



Safety Equipment

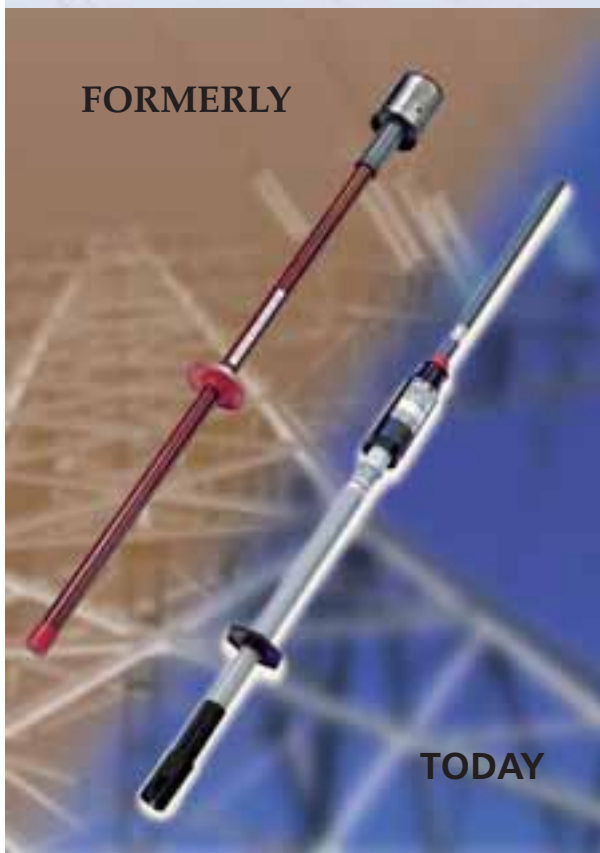
DEHN + SÖHNE is a booster of technological progress. We do intensive, application-related research work for customer-orientated solutions. The performance parameters of our impulse current test laboratories are unique worldwide.

With the experience in research and development, production, quality assurance and application of components for lightning and surge protection as well as safety equipment, we have influenced national and international standardisation considerably.

Our most important aim is to stipulate a maximum quality and safety level. This has made DEHN + SÖHNE known as a brand of quality far beyond the borders of Germany.

DEHN – Products for Safety.

FORMERLY



TODAY

Decades of experience.



High-voltages testing station.

DEHN – Quality and Safety.

DEHN + SÖHNE produce more than 3500 devices and components for your safety. Our products protect human lives and material assets. High quality requirements and awareness in the treatment of the environment is therefore a must.

In order to ensure this and make it also transparent for you as our customer, the company was certified according to DIN EN ISO 9001 and DIN EN ISO 14001. Annual examinations and complete reaudits every three years show the central significance of quality and environmental management in the company.

We cooperate intensively with international and national standard committees and take part in congresses worldwide. Thus, we foster nationally and internationally the aims and further development of lightning protection.

Our aim is to provide sophisticated, customer-orientated solutions to increase the efficiency of companies. Only those who are accessible can be quick, flexible and efficient.

We provide you with the necessary safety.



DEHN – Global Safety.

DEHN + SÖHNE supplies equipment and provides services covering lightning and surge protection as well as safety equipment worldwide. We have committed ourselves to continuous market presence, productivity, product quality and delivery in time. Proximity to customers is an essential prerequisite for the development of innovative and market orientated products. Spirit of innovation, flexibility and short decision making processes are features of DEHN + SÖHNE and beneficial to customers worldwide.

Only the adjustment to regional and local conditions ensures success on the market.

DEHN market presence means: 17 sales offices and 4 external storage areas in Germany, subsidiaries or representatives in more than 70 countries. Besides continuous participation in national and international fairs, DEHN + SÖHNE offers extensive technical support and customer service on site. We also organise seminars and lectures, provide detailed information and designing material, expert contributions to trade publications and a steady PR work on the subject of lightning and surge protection as well as safety equipment.

... Your safety is our concern. This not only applies to the protective features and benefits of our products, but also for the relationship with our customers and suppliers.

You always can be sure, we are your reliable partner.



Safe verifying of isolation from supply voltages with DEHN equipment!

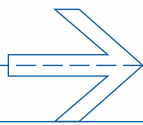


Safe earthing and short-circuiting with DEHN equipment!



Safe cleaning under live conditions with DEHN equipment!

DEHN – Worldwide.



Algeria
Argentina
Australia
Austria
Belgium
Belize
Bolivia
Brazil
Bulgaria
Canada
Cap Verde
Chile
China
Columbia
Costa Rica
Croatia
Cuba
Czech Republic
Denmark
El Salvador
Estonia
F.Y.R.O.M
Finland
France
Great Britain
Greece
Guatemala
Honduras
Hungary
Iceland
India
Iran
Ireland
Israel
Italy
Japan
Latvia
Lebanon
Lithuania
Luxembourg
Malaysia
Mauritius
Mexico

Netherlands
New Zealand
Nicaragua
Nigeria
Norway
Oman
Pakistan
Panama
Peru
Poland
Portugal
Romania
Russia
Saudi Arabia
Serbia
Singapore
Slovakia
Slovenia
South Africa
Spain
Sri Lanka
Sweden
Switzerland
Syria
Taiwan
Thailand
Turkey
Uganda
United Arab Emirates
USA
Venezuela

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

Please contact our Export
Department under

Tel. +49 9181 906 462

Fax +49 9181 906 444

or send an e-mail to
export@dehn.de



DEHN – Keeping you informed.

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 "Personnel 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 "Hand tools for use up to 1000 V a.c. and 1500 V d.c." (IEC/EN 60900)

Part 211 "Insulating poles (insulating sticks) and universal tool attachments (fittings) for live working" (IEC/EN 60832)

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

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

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 a.c." (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" (draft 10:2007; IEC 78/697/CD: 2007)

Part 512 "Electrical insulating matting" (draft 10.2007; IEC 78/698/CD: 2007)

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 live 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	Material
gal Sn	Tin plated
gal Zn	Galvanised
tZn	Hot-dip galvanised
Bronze gal Sn	Bronze, tin plated

2.3 Symbols

Symbol used in our catalogue	Description
	Fixed ball point
	T pin
	Round / Flat conductor
Light '⚡'	for "Voltage present"
Light '0'	for "No voltage present"

3. Minimum lengths of insulating parts for

- 1) Operating rods 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 U_N *)	Rated voltage U_r	Minimum length of the insulating part		
		1)	$L_{I \min}$ 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 rods and equipment are basically subdivided into the following types:

- **Not for use in wet weather conditions**



For indoor and outdoor installations

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

- **Also for use in wet weather conditions**

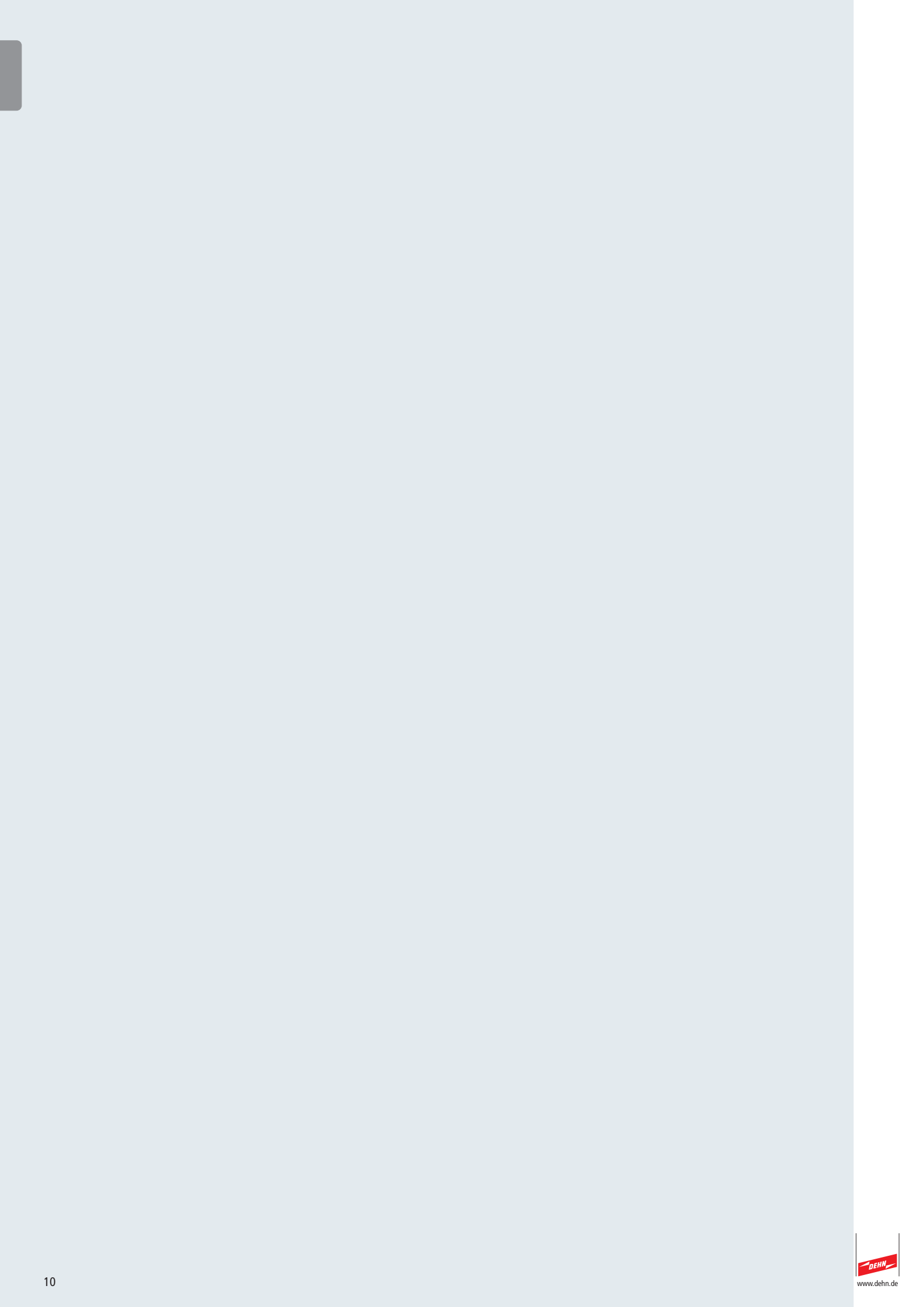


For indoor and outdoor installations

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

- **For indoor installations only!**





SAFETY EQUIPMENT

VOLTAGE DETECTORS

Design of Voltage Detectors

Voltage detectors according to IEC/EN 61243-1 (DIN VDE 0682 Part 411) are designed to verify safe isolation from supply voltages at work locations according to DIN VDE 0105 Part 100.

Safe isolation from supply voltages must be verified on all poles and as close to the work location as possible. This verification may only be performed by a qualified electrician or an electrotechnically instructed person.

Voltage detectors have to be tested for correct operation, immediately before and after use. For voltage detectors that do not have a self-testing element, the correct operation must be proven by testing the voltage detector on parts of the installation connected to supply voltage.

Verifying safe isolation from supply voltages with a voltage detector is considered as live working.

Voltage detectors may only be used for the nominal voltages / nominal voltage ranges as indicated on the rating plate. The operator may be at risk if the voltage detector is used at higher or lower voltages than indicated on the rating plate (incorrect indication, electric shock and electrical arcing).

Voltage detectors marked "For indoor use only", may be used indoors only.

Voltage detectors marked "For use in indoor and outdoor installations and for use in wet weather conditions" may be used for indoor and outdoor installations in all weather conditions (rain, snow, fog and dew).

Restrictions apply to the use of voltage detectors according to IEC/EN 61243-1 (DIN VDE 0682 Part 411) in factory assembled (type-tested) installations. Due to reduced insulation distances, electric flashover may occur when inserting the test prod into the installation. The user of the voltage detector or the operator of the switchgear installation should consult the manufacturer of the type-tested installation before using the voltage detector.

(Refer to Page 12 Table: Application of Voltage Detectors in type-tested factory assembled switchgear installations)

Design of a voltage detector

Single-pole voltage detectors according to IEC/EN 61243-1 (DIN VDE 0682 Part 411) are designed to make contact with the part of the electrical installation to be tested.

There are **two mechanically different types** of voltage detectors, i.e. complete or separate voltage detectors.

Complete voltage detectors (PHE III, PHE and PHG II) consist of an insulating rod, indicator and test prod, which have to be tested as a complete device.

Separate voltage detectors (PHE III electronic indicator) must be attached to a suitably rated insulating rod before use.

The basic design of single-pole **voltage detectors** consists of a **handle**, **insulating part**, **indicator** and **test prod** with **contact electrode**.

The **insulating part** is the section of the voltage detector between the handguard and red ring. This part provides an adequate safety distance and safe isolation from the supply voltage.

The **test prod** (extension for the contact electrode) with contact electrode consists of the part **above the red ring**. This part allows the user to reach remote parts of the installation and **eliminates** the influences of **interference fields**.

Voltage detectors are classified into two categories based on the requirements for performance against the influences of interference voltages or the desired application.

Voltage detector **category "L"** with a short test prod (no extension for the contact electrode) is designed for use on overhead lines.

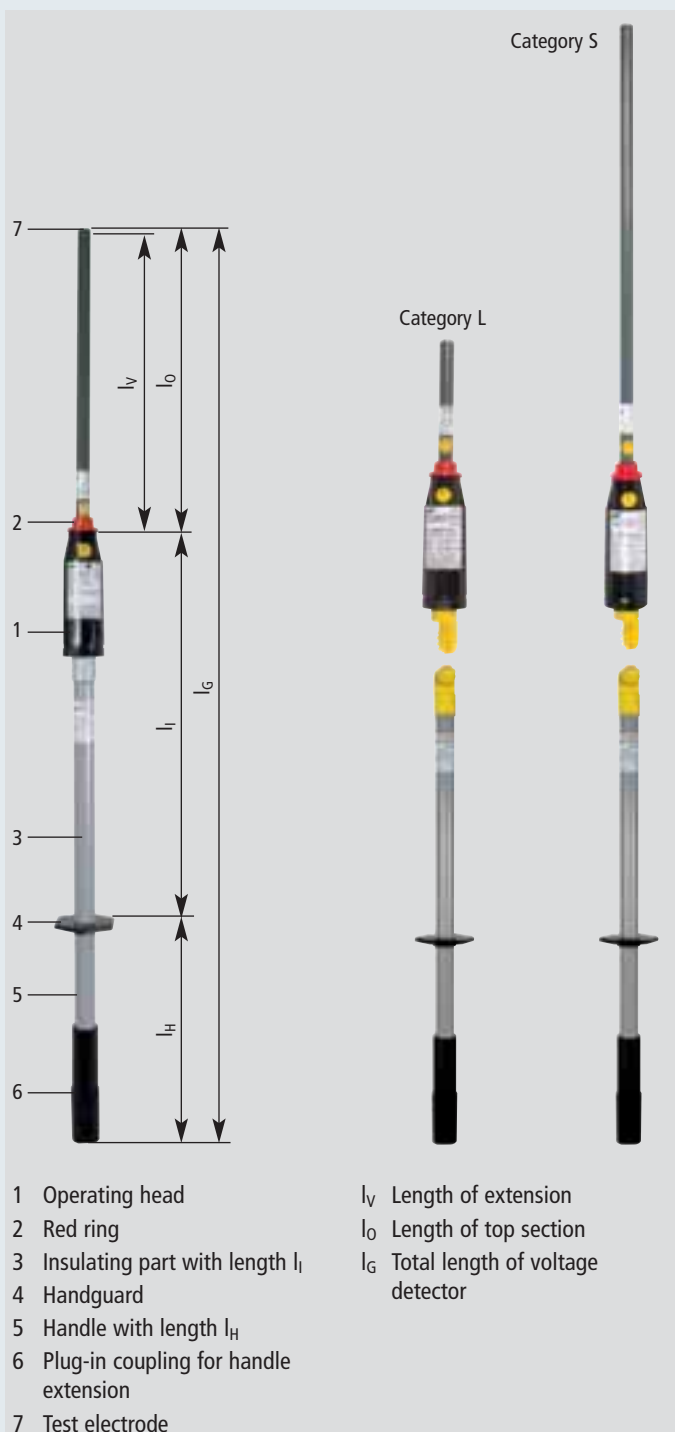
Voltage detector **category "S"** with a long test prod (with extension for the contact electrode) eliminates the influences of interference fields.

Even though this design is for use in switchgear installations, it may also be used on overhead lines.

The **handguard** provides a visible barrier between the handle and the insulating part and prevents the user from making contact with the insulating part.

The **red ring** indicates the end of the insulating part in the direction of the test electrode. It represents a visible limit and indicates which of the equipment may make contact with energised components in the installation. The insulating part is located between the red ring and the handguard may not make contact with energised components but contact with earthed components is allowed.

The **test electrode** is the part of the voltage detector that is used to make contact with the installation that has to be tested for supply voltage.



Application of Voltage Detectors

SAFETY EQUIPMENT

in type-tested, factory assembled switchgear installations

VOLTAGE DETECTORS

The applicability of our voltage detectors types PHE, PHE III and PHG II (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)) has been proven in tests performed in cooperation with switchgear manufacturers.


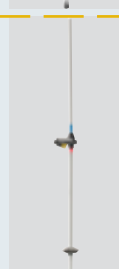


Switchgear manufacturer	Type	Nominal voltages U _N	Suitable voltage detectors
ABB	BA/BB systems, BAX systems, BD systems BC systems	10 ... 30 kV	PHE, PHE III and PHG II PHE, PHE III and PHG II
ABB Calor Emag	ZE3/4, ZE7/8, ZK4/5, ZK8 L7.6, ZS1, ZS8 ZW1 Isopond	10 ... 30 kV 10 kV	PHE, PHE III and PHG II PHE and PHE III 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 VEB Otto Buchwitz	D, WKC-D BSIG, CSIM	10 kV 20 kV	PHE, PHE III and PHG II PHE, PHE III and PHG II
BELUK	BET2308, BET231, BK219, BK216, BMB2, BRS; Compact load-break switchgear installations	20 kV	PHE, PHE III and PHG II PHE, PHE III
Driescher Moosburg	W12, W24, W36, WEL, F24 E2K, E3K, D12, D24; Compact load-break switchgear installations	12 ... 36 kV 12 ... 24 kV	PHE, PHE III and PHG II 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 Magnefix MMS, SVS, Xiria	3 ... 24 kV 3 ... 15 kV 3 ... 24 kV	PHE and PHE III with electrode, Part No. 766 927 PHE and PHE III with electrode, Part No. 766 915 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
Klöpfer	KMG	10 ... 20 kV	PHE, PHE III and PHG II
Krone	KH10, KHS10d, KHS10dp, KHS17I, KHS17II, KHS20, KHS30 KES10	10 ... 30 kV	PHE, PHE III and PHG II PHE, PHE III with test prod, 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	8 BD, 8 CK	6 ... 30 kV	PHE, PHE III with modified contact electrode (on request)
Before testing systems with a circuit breaker, the circuit- breaker has to be moved out	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.

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Selection Guide

Device	Nominal Voltage U_N / Frequency f_N	Application, Indication	Page			
PHE III and PHE III electronic indicator	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	Also for use in wet weather For indoor and outdoor installations With self-testing element Visual and acoustic indicator	14			
PHE III (Kit)	20 kV / 50 Hz 60 ... 110 kV / 50 Hz	Easy transport Fast battery replacement without tools				
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	Also for use in wet weather For indoor and outdoor installations With self-testing element Visual indicator Easy transport	30			
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	34			
ASP	110...420 kV / 50 Hz	Also for use in wet weather Non-contact voltage detector	35			
HSA 205	1...30 / 30...220 / 110...420 kV	For overhead lines and outdoor switchgears With self-testing element Visual and acoustic indicator				
PHE/G	1...7.5 kV / d.c. voltage	Also for use in wet weather For indoor and outdoor installations With self-testing element Visual indicator Easy transport Two-pole unit (single-/two-pole)	40			
Storage Bags and Transport Cases		Sheet metal or plastic case Artificial leather or canvas bag	70			

Maintenance tests

According to German regulations, voltage detectors have to be tested to ensure 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

- test for leakage current,
- test for clear indication,
- test for protection against bridging,
- test by visual check, manual test and measuring.

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

The intervals for maintenance tests depend on the operating conditions of the equipment, e.g. frequency of use, working conditions, and transport. According to German regulations, the maintenance tests **must not exceed 6 years**.



PHE III Voltage Detector

Nominal voltages up to 30 kV / 50 Hz

- Also for use in wet weather
- For indoor and outdoor installations
- With self-testing element
- Visual and acoustic indicator
- Wide nominal voltage ranges
- Easy transport due to detachable insulating rod and test prod
- Fast battery replacement without tools
- Test set with interchangeable test prods for switchgear installations and overhead lines

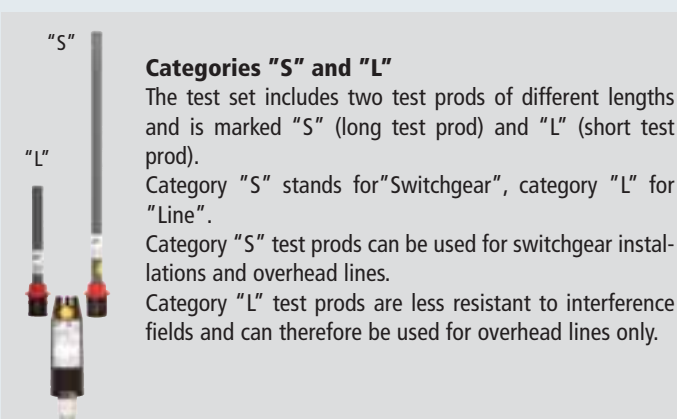


Self-testing element

The PHE III electronic voltage detector has an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector. The detector is only ready for operation if the function test was performed successfully.

Replacing the battery

The 9 V block battery can easily be replaced by hand without the use of additional tools. By simply unscrewing the plastic nut, access is allowed for fast and easy battery replacement. Low battery conditions of the PHE III voltage detector are indicated by both LEDs illuminated and an acoustic signal when switching on the voltage detector.



Categories "S" and "L"

The test set includes two test prods of different lengths and is marked "S" (long test prod) and "L" (short test prod).

Category "S" stands for "Switchgear", category "L" for "Line".

Category "S" test prods can be used for switchgear installations and overhead lines.

Category "L" test prods are less resistant to interference fields and can therefore be used for overhead lines only.

SAFETY EQUIPMENT

VOLTAGE DETECTORS

EN/IEC 61243-1 (DIN VDE 0682 Part 411)



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

Technical Data

Test prods	Glass-fibre reinforced epoxy resin tube, Ø20 mm, grey, detachable; Test electrode made of Cu alloy/gal Sn Ø20 mm, tooth shape for reliable contact, with M8 female thread for attaching electrodes and test probes
Indicator	Plastic, fully insulated, black
Indication	Visual: LED indication and Acoustic: Intermittent signal
Readiness for operation	Visual: Permanent green light
Voltage present	Visual: Red flashing light and Acoustic: Intermittent signal
No voltage present	Visual: Permanent green light
Insulating rod	Glass-fibre reinforced polyester tube, Ø30 mm, grey, detachable, with a handguard for safe operation and plug-in coupling for handle extension
Operating temperature range	– 25° C ... + 55° C, climatic category N

Special features of the switchable detector 3 ... 10 kV / 10 ... 30 kV:

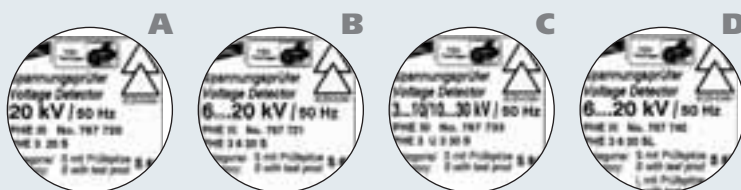
The nominal voltage selector switch allows for switching between two nominal voltage ranges. For safety reasons, the detector can only be switched on if the selector is switched to the most sensitive range of 3 kV to 10 kV. The switch snaps into the selected position and provides protection against unintentional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



SAFETY EQUIPMENT

VOLTAGE DETECTORS

PHE III Voltage Detector



Type	Nominal voltage U_N	Total length l_G	Insertion depth l_0	Part No.
------	--------------------------	-----------------------	--------------------------	-------------

A Nominal Voltages up to 30 kV / 50 Hz Category "S"

PHE3 3 S	3 kV	1080 mm	285 mm	767 703
PHE3 6 S	6 kV	1080 mm	285 mm	767 706
PHE3 10 S	10 kV	1080 mm	285 mm	767 710
PHE3 20 S	20 kV	1230 mm	435 mm	767 720
PHE3 30 S	30 kV	1415 mm	620 mm	767 730

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

PHE3 3 10 S	3 ... 10 kV	1415 mm	620 mm	767 711
PHE3 6 20 S	6 ... 20 kV	1575 mm	780 mm	767 721
PHE3 10 30 S	10 ... 30 kV	1675 mm	880 mm	767 731

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

PHE3 U 3 30 S	3 ... 10 / 10 ... 30 kV	1675 mm	880 mm	767 733
---------------	-------------------------	---------	--------	----------------

D Nominal Voltage Ranges up to 30 kV / 50 Hz, Test Set With 2 interchangeable test prods, Category "S" and "L"

PHE3 6 20 SL	6 ... 20 kV	1575 / 990 mm	780 / 185 mm	767 740
PHE3 10 30 SL	10 ... 30 kV	1675 / 990 mm	880 / 185 mm	767 750



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

PHE III Electronic Indicator

Nominal voltages up to 30 kV / 50 Hz

- Also for use in wet weather
- For indoor and outdoor installations
- With self-testing element
- Standby function
- Visual and acoustic indicator
- Wide nominal voltage ranges
- Fast battery replacement without tools
- Detachable test prod



Self-testing element

The PHE III electronic indicator has an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector.

Standby function

The PHE III electronic indicator has a standby function which automatically activates the indicator when making contact with energised equipment (without previous self-test) and visually and acoustically indicates "voltage present". When making contact with de-energised equipment, the indicator is not activated.

Categories "S" and "L"

Category "S" test prods (long test prod) can be used for both switchgear installations and overhead lines. Category "L" test prods (short test prod) are less resistant to interference fields and can therefore be used for overhead lines only.

Design:

In accordance with EN/IEC 61243-1 (DIN VDE 0682 Part 411) voltage detectors are divided into complete and separate devices. Complete devices are delivered as a complete unit, i.e. they consist of a test prod, indicator and suitably rated insulating rod.

The delivery of separate devices only includes the electronic indicator consisting of test prod and indicator. The corresponding insulating rod either has to be ordered separately (see next page "Insulating rods for PHE III voltage detectors") or has to be selected in accordance with standard requirements (see also installation instructions for PHE III electronic indicator).

Replacing the battery

The 9 V block battery can easily be replaced by hand without the use of additional tools. By simply unscrewing the plastic nut, access is allowed for fast and easy battery replacement. Low battery conditions of the PHE III voltage detector are indicated by both LEDs illuminated and an acoustic signal when switching on the voltage detector.



SAFETY EQUIPMENT

VOLTAGE DETECTORS

Electronic indicator according to EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Universal gear coupling according to EN/IEC 60832 (DIN VDE 0682 Part 211)



PHE III electronic indicator with universal gear coupling and insulating rod.

Technical Data

Test prods	Glass-fibre reinforced epoxyd resin tube, Ø20 mm, grey, detachable; test electrode made of copper alloy/gal Sn Ø20 mm, with tooth profile for safe contact, with M8 female thread for attaching electrodes and test probes
Indicator	Plastic, fully insulated, black
Indication	Visual: LED indication and Acoustic: Intermittent signal
Readiness for operation	Visual: Permanent green light
Voltage present	Visual: Red flashing light and Acoustic: Intermittent signal
No voltage present	Visual: Permanent green light
Operating temperature range	– 25° C ... + 55° C, climatic category N



Warning!

The PHE III electronic indicator may only be used in combination with a suitably rated insulating rod from the same equipment range.

SAFETY EQUIPMENT

VOLTAGE DETECTORS

PHE III Electronic Indicator



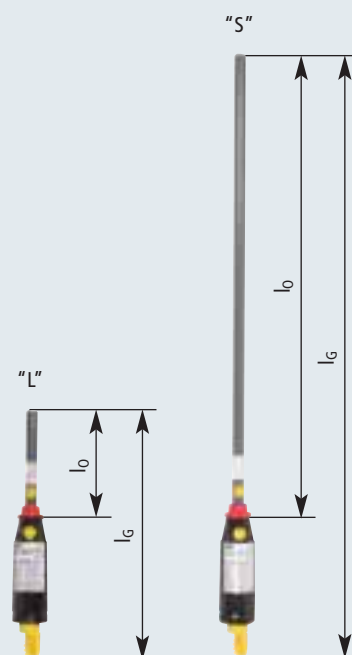
Type	Nominal voltage U_N	Category	Total length l_G	Insertion depth l_0	Part No.
------	--------------------------	----------	-----------------------	--------------------------	-------------

A PHE III Electronic Indicator with Universal Gear Coupling

Category "S" or "L"


PHE3 6 20 S SB ZK	6 ... 20 kV	S	1010 mm	780 mm	767 921
PHE3 10 30 S SB ZK	10 ... 30 kV	S	1110 mm	880 mm	767 931
PHE3 6 20 L SB ZK	6 ... 20 kV	L	415 mm	185 mm	767 922
PHE3 10 30 L SB ZK	10 ... 30 kV	L	415 mm	185 mm	767 932

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



Insulating Rods for PHE III Electronic Indicator

Nominal voltages up to 36 kV / 50 Hz

- Also for use in wet weather 
- For indoor and outdoor installations
- Sealing unit with plug-in coupling for handle extension
- Telescopic insulating rod up to 10.6 m
- With universal gear coupling to adjust the angle of PHE III electronic indicators



SAFETY EQUIPMENT

VOLTAGE DETECTORS

EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Universal gear coupling acc. to EN/IEC 60832 (DIN VDE 0682 Part 211)



Telescopic insulating rod for PHE III electronic indicator.

Technical Data

Insulating rod	Telescopic insulating rod: Glass-fibre reinforced epoxy resin tube Ø27 / 63 mm; Insulating rod: Glass-fibre reinforced polyester tube, Ø30 mm, with a handguard for safe operation
Sealing unit	Telescopic insulating rod: Non-slip plastic cap; Insulating rod: Plug-in coupling for handle extension

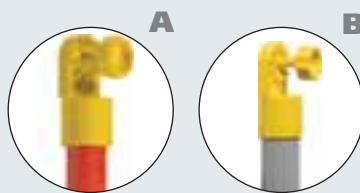


Plugging extension handle type HV STK into insulating rod type IS PHE STK.

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Insulating Rods for PHE III Electronic Indicator



Type	Total length $l_{G \max} / l_{G \min}$	Total length l_G	Handle length l_H	Part No.
------	---	-----------------------	------------------------	-------------

A Telescopic Insulating Rod with Universal Gear Coupling

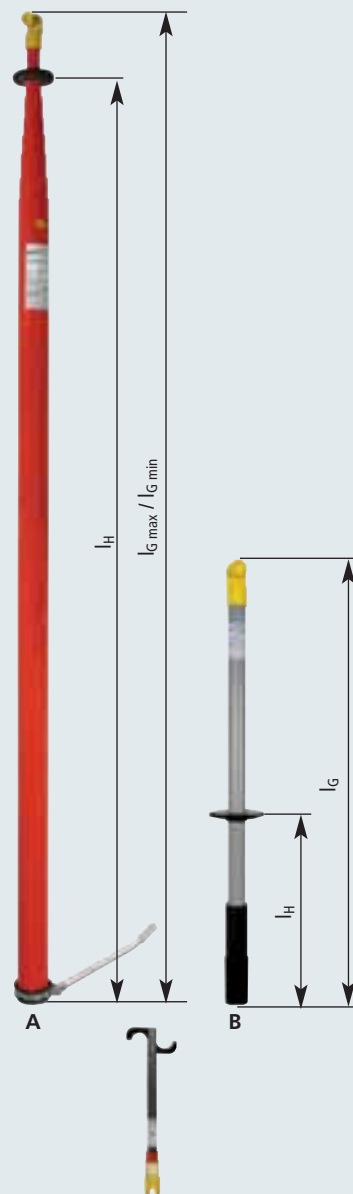
With scale for measuring the ground clearance and with mounted support

ISMTC N 36 ZK 10600	10,600 / 1750 mm		1680 mm	766 037 new
---------------------	------------------	--	---------	---

B Insulating Rod with Universal Gear Coupling

Sealing unit with plug-in coupling for extending the handle

IS ZK STK 670		670 mm	265 mm	766 368
---------------	--	--------	--------	----------------



Accessories for Telescopic Insulating Rods

Contacting Aid

For telescopic insulating rods

Type	Total length l_G	Part No.
AK AH ZK ISMTC	340 mm	766 049

Accessories for Insulating Rods for PHE III Electronic Indicator

Canvas Bag, empty

With shoulder strap

Max. capacity:

- 1 Telescopic insulating rod
- 1 Contacting aid
- 1 Test prod

Type	Colour	Dimensions	Part No.
STT 180 20		Ø200 x 1800 mm	766 039



Spare Part for Telescopic Insulating Rod

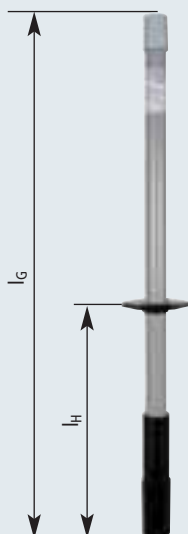
Support

Type	Part No.
AH ISMTC	766 038



Accessories for PHE III Voltage Detector

SAFETY EQUIPMENT VOLTAGE DETECTORS



Insulating Rod with Plug-in Coupling for Handle Extension

Type	Diameter	Total length l_G	Handle length l_H	Part No.
IS M12 STK 640	30 mm	640 mm	370 mm	766 331



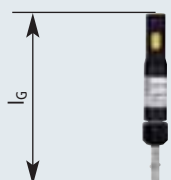
Plugging extension handle type HV STK into insulating rod type IS PHE STK.



HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335



Adapter – Plug-in Coupling / T pin Shaft

For extending the handle of insulating rods type IS PHE with earthing rod type ES SQ or ES SQL

Type	Total length l_G	Part No.
AD HV STK SQ	280 mm	766 313

STK Sealing Unit

Type	Diameter	Total length l_G	Part No.
A STK	30 / 43 mm	85 mm	766 888

new

STK Sealing Unit with Eye

Type	Diameter	Total length l_G	Part No.
AR STK	30 / 43 mm	150 mm	766 889

new



SAFETY EQUIPMENT

VOLTAGE DETECTORS

Accessories for PHE III Voltage Detector

Sheet Metal Case, empty

Hammer-finished with foam padding

Max. capacity:

- 1 PHE III indicator
- 1 Insulating rod
- 1 Extension handle or adapter type STK SQ
- 2 Test prods (S and L)
- 3 Electrodes

Type	Colour	Dimensions	Part No.
SKL 95 21 10	●	950 x 210 x 100 mm	767 701



Plastic Case, empty

With foam padding

Max. capacity:

- 1 PHE III indicator
- 1 Insulating rod
- 1 Extension handle or adapter type STK SQ
- 2 Test prods (S and L)
- 3 Electrodes

Case type KKL PHE3 L additionally includes:

- 1 Test probe, straight
- 1 Test probe, straight, 800 mm

Type	Colour	Dimensions	Part No.
KKL PHE3	●	930 x 215 x 140 mm	767 997
KKL PHE3 L	●	1270 x 215 x 140 mm	767 999



Artificial Leather Bag, empty

With shoulder strap and shoulder belt

Max. capacity:

- 1 PHE III indicator
- 1 Insulating rod
- 1 Extension handle or adapter type STK SQ
- 2 Test prods (S and L)
- 3 Electrodes
- 1 Test probe, straight
- 1 Test probe, straight, 800 mm

Type	Colour	Dimensions	Part No.
KLT 1010 300	●	1010 x 300 x 100 mm	767 996

new



Plastic Case, empty

With foam padding

Max. capacity:

- 1 PHE III indicator
- 1 Test prod (L)
- 3 Electrodes
- 1 Spare battery

Type	Colour	Dimensions	Part No.
KKL PK PHE3 L	●	395 x 295 x 105 mm	766 036



Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D30	●	30 mm	430 mm	700 007



PHE III Voltage Detector Kit

Nominal voltage 20 kV / 50 Hz

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Electronic indicator EN/IEC 61243-1 (DIN VDE 0682 Part 411)
Universal gear coupling EN/IEC 60832 (DIN VDE 0682 Part 211)

- For use in wet weather
- For indoor and outdoor installations
- Modular system allows for flexibility when used in switchgear installations and overhead lines
- With self-testing element
- Visual and acoustic indicator
- Fast battery replacement without additional tools



Self-testing element

The PHE III electronic indicator has an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector.

Categories "S" and "L"

Category "S" test prods (long test prod) can be used for both switchgear installations and overhead lines. Category "L" test prods (short test prod) are less resistant to interference fields and can therefore be used for overhead lines only.

Replacing the battery

The 9 V block battery can easily be replaced by hand without the use of additional tools. By simply unscrewing the plastic nut, access is allowed for fast and easy battery replacement. Low battery conditions of the PHE III voltage detector are indicated by both LEDs illuminated and an acoustic signal when switching on the voltage detector.



PHE III voltage detector with test probe.

Technical Data

Test prods	Glass-fibre reinforced epoxy resin tube, Ø20 mm, grey, detachable; Test electrode made of Cu alloy/gal Sn Ø20 mm, with tooth profile for reliable contact, with M8 female thread for attaching electrodes and test probes
Indicator	Plastic, fully insulated, black
Indication	Visual: LED indication and Acoustic: Intermittent signal
Readiness for operation	Visual: Permanent green light
Voltage present	Visual: Red flashing light and Acoustic: Intermittent signal
No voltage present	Visual: Permanent green light
Insulating rod	Glass-fibre reinforced polyester tube, Ø30 mm, grey, with a handguard for safe operation and plug-in coupling for handle extension
Operating temperature range	– 25° C ... +55° C, climatic category N

SAFETY EQUIPMENT

VOLTAGE DETECTORS

PHE III Voltage Detector Kit

Type	Version	Nominal voltage		Category	Part No.
			U _N		
A Voltage Detector Kit, PHE III 20 kV					
Category "S" for switchgear installations and overhead lines					
Pos.	Qty.	Type	Description		Part. No.
1	1	EL M8 V PHE PHV	V-shaped electrode		766 927
3	1	S63 PS PHE 780	Test prod "S 63", l = 780 mm		767 763
5	1	PSO M8 PHE L800	Test probe l = 800 mm		766 960
6	1	PHE3 A 20 SL ZK	Indicator, PHE III 20 kV		767 722
7	1	IS ZK STK 670	Insulating rod with universal gear coupling		766 368
8	1	HV STK 710	Extension handle l = 710 mm		766 335
11	1	KLT 1010 300	Artificial leather bag, empty		767 996
PHE3S 20 S		Voltage detector kit, complete		20 kV	S 767 724 new



B Voltage Detector Kit, PHE III 20 kV					
Category "L" for overhead lines					
Pos.	Qty.	Type	Description		Part. No.
2	1	EL M8 H PHE PHV	Hook-shaped electrode		766 923
4	1	L71 PS PHE 185	Test prod "L 71", l = 185 mm		767 766
6	1	PHE3 A 20 SL ZK	Indicator, PHE III 20 kV		767 722
9	1	ISMTC N 36 ZK 10600	Telescopic insulating rod with universal gear coupling and support		766 037
10	1	AK AH ZK ISMTC	Contacting aid for telescopic insulating rods		766 049
12	1	KKL PK PHE3 L	Plastic case, empty		766 036
13	1	STT 180 20	Canvas bag, empty		766 039
PHE3S 20 L		Voltage detector kit, complete		20 kV	L 767 725 new



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.

See next page for single parts related to PHE III voltage indicators.

Single Parts for PHE III Voltage Detector Kit

SAFETY EQUIPMENT VOLTAGE DETECTORS

V-shaped Electrode

Type	Nominal voltage U_N	Material	Position	Part No.
EL M8 V PHE PHV	from 3 kV	Cu/gal Sn	1	766 927

Hook-shaped Electrode

Type	Nominal voltage U_N	Material	Position	Part No.
EL M8 H PHE	for overhead lines only	steel/gal Zn	2	766 923

Test Prod for Switchgear Installations and Overhead Lines

Category "S"

Type	Total length l_G	Insertion depth l_0	Position	Part No.
S63 PS PHE 780	815 mm	780 mm	3	767 763

Test Prod for Overhead Lines

Category "L71" for 3 ... 36 kV

Type	Total length l_G	Insertion depth l_0	Position	Part No.
L71 PS PHE 185	220 mm	185 mm	4	767 766

Test Prod for Siemens 8CK Switchgear Installations

Category "S" for PHE III voltage detectors, Part Nos. 767 721, 767 722 and 767 740

Type	Total length l_G	Insertion depth l_0	Position	Part No.
S63 PS PHE 8CK	880 mm	845 mm		767 768

Test Probe, straight, 800 mm

For substations and switchgear installations that require a greater insertion depth

Type	Nominal voltage U_N	Diameter \varnothing	Total length l_G	Position	Part No.
PSO M8 PHE L800	3 ... 24 kV	14 mm	890 mm	5	766 960

PHE III Indicator

Category "S" and "L"

Type	Nominal voltage U_N	Length of indicator l_G	Position	Part No.
PHE3 A 20 SL ZK	20 kV	230 mm	6	767 722

Insulating Rod with Universal Gear Coupling

Sealing unit with plug-in coupling for extending the handle

Type	Total length l_G	Handle length l_H	Position	Part No.
IS ZK STK 670	670 mm	265 mm	7	766 368

HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Position	Part No.
HV STK 30 710	30 mm	710 mm	8	766 335

Adapter – Plug-in Coupling / T pin Shaft

For extending the handle of insulating rods type IS PHE with earthing rod type ES SQ or ES SQL

Type	Total length l_G	Part No.
AD HV STK SQ	280 mm	766 313

SAFETY EQUIPMENT

Single Parts for PHE III Voltage Detector Kit

VOLTAGE DETECTORS

Telescopic Insulating Rod with Universal Gear Coupling

With scale for measuring the ground clearance and with mounted support

Type	Total length $I_{G \max} / I_{G \min}$	Handle length I_H	Position	Part No.
ISMTC N 36 ZK 10600	10,600 / 1750 mm	1680 mm	9	766 037

new

Contacting Aid

For telescopic insulating rods

Type	Total length I_G	Position	Part No.
AK AH ZK ISMTC	340 mm	10	766 049

Artificial Leather Bag, empty

With shoulder strap and shoulder belt

Max. capacity:

- 1 PHE III indicator
- 1 Insulating rod
- 1 Extension handle or adapter type STK SQ
- 2 Test prods (S and L)
- 3 Electrodes
- 1 Test probe, straight
- 1 Test probe, straight, 800 mm

Type	Colour	Dimensions	Position	Part No.
KLT 1010 300	●	1010 x 300 x 100 mm	11	767 996

new

Plastic Case, empty

With foam padding

Max. capacity:

- 1 PHE III indicator
- 3 Electrodes
- 1 Test prod (L)
- 1 Spare battery

Type	Colour	Dimensions	Position	Part No.
KKL PK PHE3 L	●	395 x 295 x 105 mm	12	766 036

Canvas Bag, empty

With shoulder strap

Max. capacity:

- 1 Telescopic insulating rod
- 1 Contacting aid
- 1 Test prod

Type	Colour	Dimensions	Position	Part No.
STT 180 20	●	Ø200 x 1800 mm	13	766 039

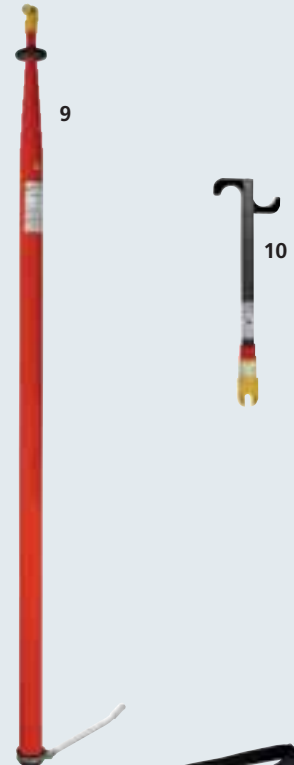
Sheet Metal Case, empty

Hammer-finished with foam padding

Max. capacity:

- 1 PHE III indicator
- 2 Test prods (S and L)
- 1 Insulating rod
- 3 Electrodes

Type	Colour	Dimensions	Part No.
SKL 95 21 10	●	950 x 210 x 100 mm	767 701



PHE III Voltage Detector Kit

Nominal voltage 60 ... 110 kV / 50 Hz

SAFETY EQUIPMENT

VOLTAGE DETECTORS

EN/IEC 61243-1 (DIN VDE 0682 Part 411)

- For use in wet weather
- For indoor and outdoor installations
- Modular system for use in switchgear installations and overhead lines
- With self-testing element
- Visual and acoustic indicator
- Easy transport due to detachable test prod and modular insulating rod
- Fast battery replacement without additional tools



Self-testing element

The electronic PHE III indicator has an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector.

Categories "S" and "L"

Category "S" test prods (long test prod) can be used for both switchgear installations and overhead lines. Category "L" test prods (short test prod) are less resistant to interference fields and can therefore be used for overhead lines only.

Replacing the battery

The 9 V block battery can easily be replaced by hand without the use of additional tools. By simply unscrewing the plastic nut, access is allowed for fast and easy battery replacement. Low battery conditions of the PHE III voltage detector are indicated by two illuminated LEDs and an acoustic signal when switching on the voltage detector.



PHE III voltage detector used in an 110 kV outdoor installation.

Technical Data

Test prods	Glass-fibre reinforced epoxy resin tube, Ø20 mm, yellow, detachable; Test electrode made of Cu alloy/gal Sn Ø20 mm, with tooth profile for reliable contact, with M8 female thread for attaching electrodes
Indicator	Plastic, fully insulated, black
Indication	Visual: LED indication and Acoustic: Intermittent acoustic signal
Readiness for operation	Visual: Permanent green light
Voltage present	Visual: Red flashing light and Acoustic: Intermittent acoustic signal
No voltage present	Visual: Permanent green light
Insulating rod	Glass fibre reinforced polyester tube, Ø43/30 mm, yellow, modular and detachable, with silicone shields, with a handguard for safe operation; Sealing unit with plug-in coupling for handle extension
Operating temperature range	– 25° C ... + 55° C, climatic category N

SAFETY EQUIPMENT

VOLTAGE DETECTORS

PHE III Voltage Detector Kit

		Nominal voltage		Max. total length		Part
Type		Version	U _N	Category	I _G	No.
A Voltage Detector Kit, PHE III 60 ... 110 kV						
Category "S" for switchgear installations and overhead lines						
Pos.	Qty.	Type	Description			Part No.
1	1	EL M8 G PHE	Fork-shaped electrode			766 924
4	1	S66 PS PHE 880	Test prod "S 66", l = 880 mm			767 771
5	1	PHE3 A 60 110 SL	Indicator, PHE III 60 ... 110 kV			767 723
8	1	IS M12 STK 1940	110 kV insulating rod, modular			766 011
10	1	AR STK	Sealing unit with eye			766 889
11	1	KKL PHE 60 110	Plastic case, empty			766 998
PHE3S 60 110 S		Voltage detector kit, complete		60 ... 110 kV	S	3020 mm
						767 780

B Voltage Detector Kit, PHE III 60 ... 110 kV						
Category "L" for overhead lines						
Pos.	Qty.	Type	Description		Part No.	
2	1	EL M8 H PHE	Hook-shaped electrode		766 923	
3	1	L72 PS PHE 405	Test prod "L 72", l = 380 mm		767 772	
5	1	PHE3 A 60 110 SL	Indicator, PHE III 60 ... 110 kV		767 723	
8	1	IS M12 STK 1940	110 kV insulating rod, modular		766 011	
10	1	AR STK	Sealing unit with eye		766 889	
11	1	KKL PHE 60 110	Plastic case, empty		766 998	
PHE3S 60 110 L		Voltage detector kit, complete		60 ... 110 kV	L	2520 mm
						767 781 new

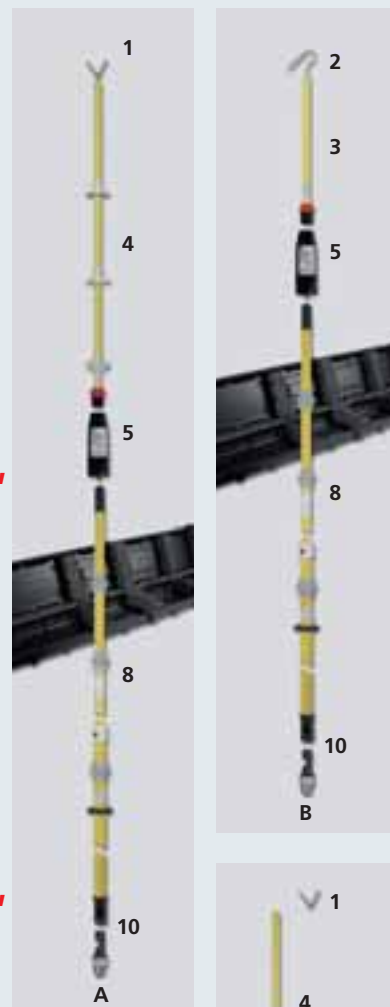
C Voltage Detector Kit, PHE III 60 ... 132 kV						
Category "S" and "L" for switchgear installations and overhead lines						
Pos.	Qty.	Type	Description		Part No.	
1	1	EL M8 G PHE	Fork-shaped electrode		766 924	
3	1	L72 PS PHE 405	Test prod "L 72", l = 380 mm		767 772	
4	1	S66 PS PHE 880	Test prod "S 66", l = 880 mm		767 771	
6	1	PHE3 A 60 132 SL	Indicator, PHE III 60 ... 132 kV		767 732	
9	1	IS M12 STK 2540	132 kV insulating rod, modular		766 015	
10	1	AR STK	Sealing unit with eye		766 889	
12	1	KLT 160 17	Artificial leather bag, empty		766 614	
PHE3S 60 132 SL		Voltage detector kit, complete		60 ... 132 kV	S / L	3620 mm
						767 782 new

D Electric Indicator Kit with Gear Coupling for PHE III 60 ... 132 kV						
Category "S" and "L" for switchgear installations and overhead lines (without insulating rod)						
Pos.	Qty.	Type	Description		Part No.	
1	1	EL M8 G PHE	Fork-shaped electrode		766 924	
3	1	L72 PS PHE 405	Test prod "L 72", l = 380 mm		767 772	
4	1	S66 PS PHE 880	Test prod "S 66", l = 880 mm		767 771	
7	1	PHE3 A 60 132 SL ZK	Indicator with gear coupling, PHE III 60 ... 132 kV		767 735	

Note: The PHE III 60 ... 132 kV indicator with gear coupling may only be used with a suitably rated insulating rod! Category "S" and "L" for switchgear installations and overhead lines

PHE3 AS 60 132 SL ZK	Indicator kit, complete	60 ... 132 kV	S / L	767 783 new
----------------------	-------------------------	---------------	-------	--------------------

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. See next page for single parts related to PHE III voltage detectors.



Single Parts for PHE III Voltage Detector Kit

SAFETY EQUIPMENT VOLTAGE DETECTORS



1

Fork-shaped Electrode

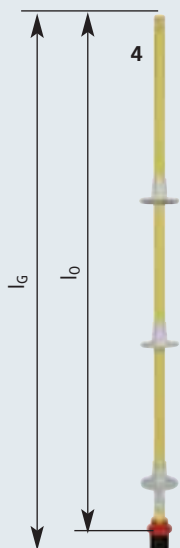
Type	Nominal voltage U_N	Material	Position	Part No.
EL M8 G PHE	for overhead lines only	StSt	1	766 924



2

Hook-shaped Electrode

Type	Nominal voltage U_N	Material	Position	Part No.
EL M8 H PHE	for overhead lines only	steel/gal Zn	2	766 923



4

3

Test Prod for Overhead Lines

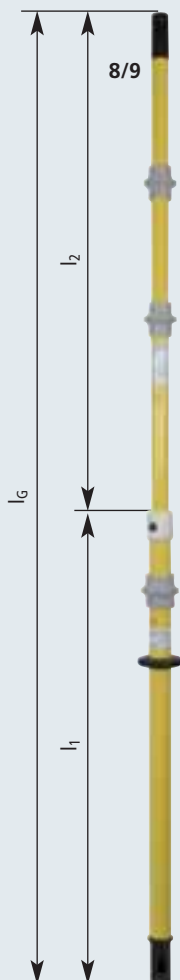
Category "L72" for 60 ... 110 (132) kV

Type	Total length l_G	Insertion depth l_0	Position	Part No.
L72 PS PHE 405	415 mm	380 mm	3	767 772

Test Prod for Switchgear Installations and Overhead Lines

Category "S 66" for 60 ... 110 (132) kV

Type	Total length l_G	Insertion depth l_0	Position	Part No.
S66 PS PHE 880	915 mm	880 mm	4	767 771



8/9

5/6



7

Indicator with M12 Threaded Pin

Category "S" and "L"

Type	Nominal voltage U_N	Length of indicator l_G	Position	Part No.
PHE3 A 60 110 SL	60 ... 110 kV	190 mm	5	767 723
PHE3 A 60 132 SL	60 ... 132 kV	190 mm	6	767 732

Indicator with Gear Coupling

Category "S" and "L"

Type	Nominal voltage U_N	Length of indicator l_G	Position	Part No.
PHE3 A 60 132 SL ZK	60 ... 132 kV	230 mm	7	767 735

Insulating Rod, 110 kV, modular

with M12 threaded socket and plug-in coupling

Type	Total length l_G	Length l_1	Length l_2	Position	Part No.
IS M12 STK 1940	1940 mm	930 mm	1120 mm	8	766 011

Insulating Rod, 132 kV, modular

with M12 threaded socket and plug-in coupling

Type	Total length l_G	Length l_1	Length l_2	Position	Part No.
IS M12 STK 2540	2540 mm	1225 mm	1445 mm	9	766 015

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Single Parts for PHE III Voltage Detector Kit

STK Sealing Unit

Type	Diameter	Total length l_G	Part No.
A STK	30 / 43 mm	85 mm	766 888

new



STK Sealing Unit with Eye

Type	Diameter	Total length l_G	Position	Part No.
AR STK	30 / 43 mm	150 mm	10	766 889

new



10

Plastic Case, empty

With foam padding

Max. capacity:

- 1 PHE III indicator, 60 ... 110 kV
- 1 Insulating rod 110 kV, modular
- 2 Test prods (S 66 and L 72)
- 2 Electrodes (Fork-shaped or hook-shaped electrode)

Type	Colour	Dimensions	Position	Part No.
KKL PHE3 60 110	●	1270 x 215 x 140 mm	11	766 998



11

Artificial Leather Bag, empty

With shoulder strap

Type	Colour	Dimensions	Position	Part No.
KLT 160 17	●	Ø170 x 1600 mm	12	766 614



12

Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D40 45	●	40 ... 45 mm	530 mm	700 008



PHE Voltage Detector

Nominal voltages up to 30 kV / 50 Hz

- Also for use in wet weather
- Category "S" for indoor and outdoor installations
- With self-testing element
- Visual indicator
- Wide nominal voltage ranges
- Easy transport due to detachable insulating rod



Self-testing element

The PHE electronic voltage detector has an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector. The detector is only ready for operation if the function test was performed successfully.

Replacing the battery

The PHE voltage detector operates on 4 Mignon IEC LR6 batteries housed in a separate battery compartment for easy battery replacement. Low battery conditions are indicated by both LEDs illuminated when switching on the voltage detector.



Before testing for safe isolation from supply voltages, correct operation of the voltage detector must be verified. When pressing the "TEST" button, the red light is flashing.



After releasing the button, the green LED lights up. The test for correct operation was successful and the detector is ready for operation.



SAFETY EQUIPMENT VOLTAGE DETECTORS

EN/IEC 61243-1 (DIN VDE 0682 Part 411)



PHE voltage detector with visual indicator.

Technical Data

Test prod	Glass-fibre reinforced epoxy resin tube, Ø20 mm, grey; Test electrode made of Cu alloy/gal Sn Ø20 mm, with tooth profile for reliable contact, with M8 female thread for attaching electrodes and test probes
Indicator	Plastic, fully insulated, black
Indication	Red LED '⚡' (flashing light); Green LED '0' (permanent light)
Insulating rod	Glass-fibre reinforced polyester tube, Ø30 mm, grey, detachable, with a handguard for safe operation; Sealing unit with non-slip plastic cap
Operating temperature range	– 25° C ... + 55° C, climatic category N



Special features of the switchable detector 3 ... 10 kV / 6 ... 20 kV / 15 ... 30 kV:

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

SAFETY EQUIPMENT

VOLTAGE DETECTORS

PHE Voltage Detector

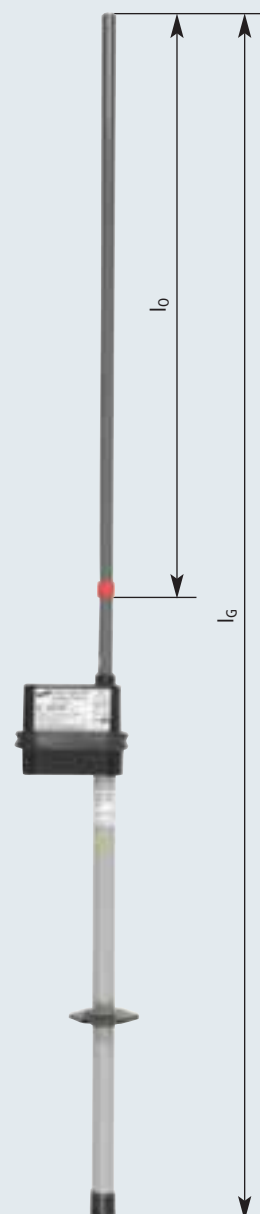


Type	Nominal voltage U_N	Total length l_G	Insertion depth l_0	Part No.
A Nominal Voltages up to 30 kV / 50 Hz Category "S"				
PHE 3 S	3 kV	1115 mm	320 mm	767 403
PHE 6 S	6 kV	1115 mm	320 mm	767 406
PHE 10 S	10 kV	1115 mm	320 mm	767 418
PHE 20 S	20 kV	1300 mm	505 mm	767 428
PHE 30 S	30 kV	1460 mm	665 mm	767 438

B Nominal Voltage Ranges up to 30 kV / 50 Hz Category "S"				
PHE 3 10 S	3 ... 10 kV	1375 mm	580 mm	767 410
PHE 6 20 S	6 ... 20 kV	1565 mm	770 mm	767 420
PHE 15 30 S	15 ... 30 kV	1565 mm	770 mm	767 430

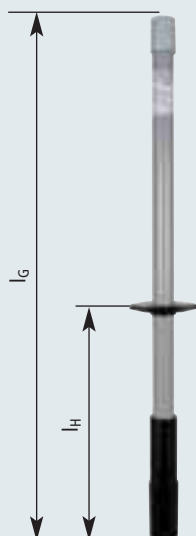
C Nominal Voltage Ranges up to 30 kV / 50 Hz, switchable Category "S"				
PHE U 3 30 S	3 ... 10 / 6 ... 20 / 15 ... 30 kV	1565 mm	770 mm	767 433

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



Accessories for PHE Voltage Detector

SAFETY EQUIPMENT VOLTAGE DETECTORS



Insulating Rod with Plug-in Coupling for Handle Extension

Type	Diameter	Total length l_G	Handle length l_H	Part No.
IS M12 STK 640	30 mm	640 mm	370 mm	766 331



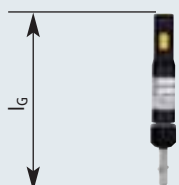
Plugging extension handle type HV STK into insulating rod type IS PHE STK.



HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335



Adapter – Plug-in Coupling / T pin Shaft

For extending the handle of insulating rods type IS PHE with earthing rod type ES SQ or ES SQL

Type	Total length l_G	Part No.
AD HV STK SQ	280 mm	766 313

STK Sealing Unit

Type	Diameter	Total length l_G	Part No.
A STK	30 / 43 mm	85 mm	766 888

new

STK Sealing Unit with Eye

Type	Diameter	Total length l_G	Part No.
AR STK	30 / 43 mm	150 mm	766 889

new



SAFETY EQUIPMENT

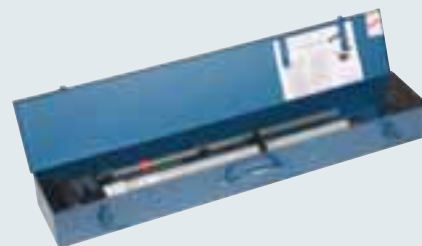
VOLTAGE DETECTORS

Accessories for PHE Voltage Detector

Sheet Metal Case, empty

Hammer-finished with retaining springs

Type	Colour	Dimensions	For PHE total length	Part No.
SKL 92 16 10	●	920 x 160 x 100 mm	up to 1460 mm	766 703
SKL 116 16 10	●	1160 x 160 x 100 mm	from 1460 mm	766 603



Plastic Case, empty

With foam padding

Type	Colour	Dimensions	For PHE total length	Part No.
KKL PHE	●	930 x 215 x 140 mm	up to 1460 mm	766 997
KKL PHE L	●	1270 x 215 x 140 mm	from 1460 mm	766 999



Artificial Leather Bag, empty

With shoulder strap

Type	Colour	Dimensions	Part No.
KLT 121 25 16	●	1200 x 250 x 160 mm	766 601



Artificial Leather Bag, empty

With shoulder strap and shoulder belt

Max. capacity:

- 1 PHE electronic indicator
- 1 Insulating rod
- 2 Extension handles
- 2 Electrodes

Type	Colour	Dimensions	Part No.
KLT 1010 300	●	1010 x 300 x 100 mm	767 996

new



Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D30	●	30 mm	430 mm	700 007



PHG II Voltage Detector

Nominal voltages up to 20 kV / 50 Hz

- For indoor installations
- Category "S" for switchgear installations
- Three LED indicator lights
- LEDs staggered at 120° allow for better visibility of the indication
- Passive voltage detector without batteries



Test for correct operation

EN 50110-1 (DIN VDE 0105 Part 100) requires that voltage detectors must be tested for correct operation shortly before and after use.

Voltage detectors without self-testing elements have to be tested for correct operation by attaching them to parts of the installation which are connected to supply voltage.



A Nominal Voltages up to 20 kV / 50 Hz Category "S"

Type	Nominal voltage U_N	Total length l_g	Insertion depth l_o	Part No.
PHG2 6	6 kV	1425 mm	720 mm	766 706
PHG2 10	10 kV	1425 mm	720 mm	766 710
PHG2 20	20 kV	1425 mm	720 mm	766 720

Voltage detectors for special switchgear installations are available on request.

Accessories for PHG II Voltage Detector

Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D24	●	24 mm	530 mm	700 006

SAFETY EQUIPMENT

VOLTAGE DETECTORS

EN/IEC 61243-1 (DIN VDE 0682 Part 411)



PHG II voltage detector used for a type-tested switchgear installation.

Technical Data

Test prod	Glass-fibre reinforced polyester tube, Ø20 mm, grey; Test electrode made of Cu/gal Sn, V-shaped electrode
Indicator	Plastic, black, with 3 LEDs
Indication	3 flashing LEDs for 'voltage present'
Insulating rod	Glass-fibre reinforced polyester tube, Ø24 mm, grey, with a handguard for safe operation; Sealing unit with non-slip plastic cap
Operating temperature range	– 25° C ... + 55° C, climatic category N

SAFETY EQUIPMENT

VOLTAGE DETECTORS

ASP Non-Contact Voltage Detector Kit

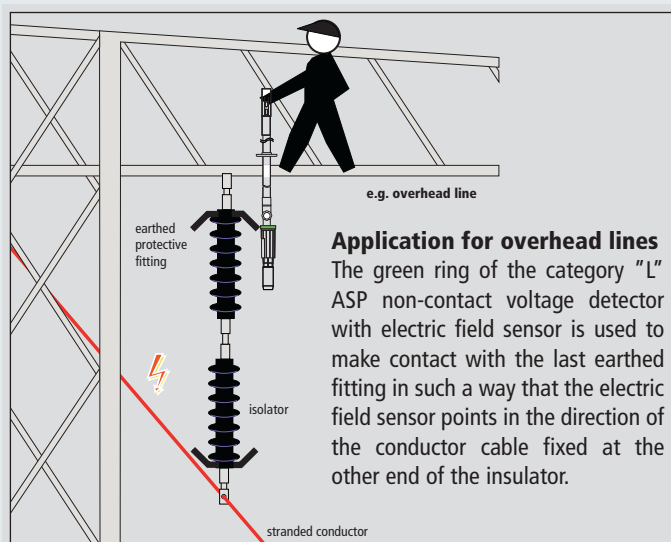
Nominal voltage range 110 ... 420 kV / 50 Hz



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

Technical Data

Indicator	Plastic, fully insulated, black
Electric field sensor	Plastic, black
Insulating rod	Glass-fibre reinforced polyester tube, Ø30 mm, grey, with a handguard and hand strap for safe operation; Sealing unit with plug-in coupling for extending the handle
Indicator	Visual: LED display and Acoustic: Intermittent acoustic signal
Readiness for operation	Visual: permanent green light
Voltage present	Visual: Red flashing light and Acoustic: Intermittent acoustic signal
No voltage present	Visual: permanent green light
Operating temperature range	– 25° C ... + 55° C



- For use in wet weather
- For overhead lines and outdoor switching stations
- With self-testing element
- Visual and acoustic indication
- Fast battery replacement without the use of additional tools



Self-testing element

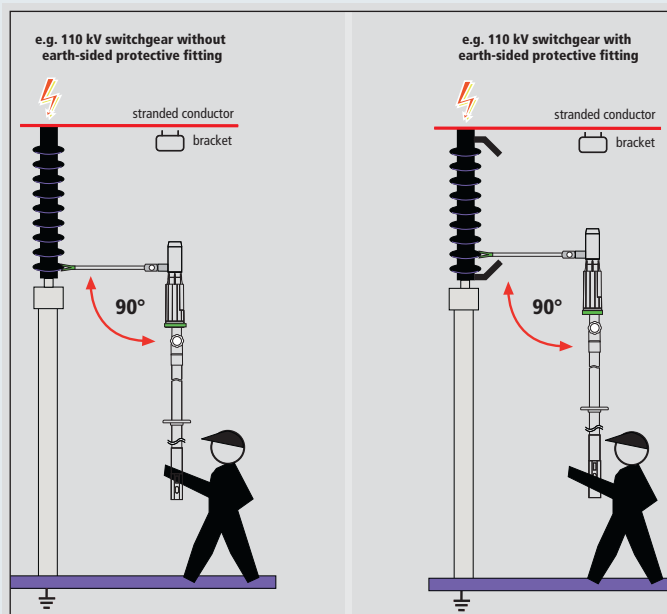
The ASP electronic indicator has an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the indicator.

Category "S" and "L"

Category "S" voltage detectors can only be used in outdoor installations. Category "L" voltage detectors can only be used for overhead lines. Category "S" / "L" voltage detectors can be used in both outdoor installations and for overhead lines.

Replacing the battery

The 9 V E block battery can easily be replaced by hand without the need for additional tools. By simply unscrewing the plastic nut, access is allowed for fast and easy replacement. Low battery conditions of the ASP indicator are indicated by both LEDs illuminated and an acoustic signal when switching on the detector.



ASP Non-Contact Voltage Detector Kit

SAFETY EQUIPMENT VOLTAGE DETECTORS



Type	Version	Nominal voltage		Part No.
		U _N	Category	

A Non-Contact Voltage Detector Kit, ASP 110 ... 420 kV

Category "L" for overhead lines

Pos.	Qty.	Type	Description	Part No.
1	1	ASP A 110 420 ZK	ASP indicator	767 570
2	1	EFS L 127	Electric field sensor, Category "L" overhead lines	767 576
4	1	IS ZK STK HS 670	Insulating rod with hand strap	766 369
5	1	KLT 104 9	Artificial leather bag, empty	767 574

ASP 110 420 L	Non-contact voltage detector kit, complete	110 ... 420 kV	L	767 571	new
---------------	--	----------------	---	----------------	-----



B Non-Contact Voltage Detector Kit, ASP 110 ... 420 kV

Category "S" for outdoor switching stations

Pos.	Qty.	Type	Description	Part No.
1	1	ASP A 110 420 ZK	ASP indicator	767 570
3	1	EFS S 167	Electric field sensor, Category "S" outdoor switching station	767 577
4	1	IS ZK STK HS 670	Insulating rod with hand strap	766 369
5	1	KLT 104 9	Artificial leather bag, empty	767 574

ASP 110 420 S	Non-contact voltage detector kit, complete	110 ... 420 kV	S	767 572	new
---------------	--	----------------	---	----------------	-----



C Non-Contact Voltage Detector Kit, ASP 110 ... 420 kV

Category "S / L" for overhead lines and outdoor switching stations

Pos.	Qty.	Type	Description	Part No.
1	1	ASP A 110 420 ZK	ASP indicator	767 570
2	1	EFS L 127	Electronic field sensor, Category "L" overhead lines	767 576
3	1	EFS S 167	Electronic field sensor, Category "S" outdoor switching station	767 577
4	1	IS ZK STK HS 670	Insulating rod with hand strap	766 369
6	1	KLT 1010 300	Artificial leather bag, empty	767 996

ASP 110 420 S L	Non-contact voltage detector kit, complete	110 ... 420 kV	S / L	767 573	new
-----------------	--	----------------	-------	----------------	-----

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

See next page for single parts related to the ASP non-contact voltage detector kit.

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Single Parts for ASP Non-Contact Voltage Detector

ASP Indicator

Category "S" and "L"

Type	Nominal voltage U_N	Category	Total length l_G	Position	Part No.
ASP A 110 420 ZK	110 ... 420 kV	S / L	230 mm	1	767 570 new

Electric Field Sensor

Type	Category	Total length l_G	Position	Part No.
EFS L 127	L	127 mm	2	767 576 new
EFS S 167	S	167 mm	3	767 577

Insulating Rod with Universal Gear Coupling and Hand Strap

Sealing unit with plug-in coupling for extending the handle

Type	Total length l_G	Handle length l_H	Position	Part No.
IS ZK STK HS 670	670 mm	265 mm	4	766 369 new

HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335

STK Sealing Unit with Eye

Type	Diameter	Total length l_G	Part No.
AR STK	30 / 43 mm	150 mm	766 889 new

Artificial Leather Bag, empty

With zip and shoulder strap

Max. capacity:

- 1 ASP indicator
- 1 Insulating rod
- 1 Electric field sensor

Type	Colour	Dimensions	Position	Part No.
KLT 104 9	●	Ø85 x 1040 mm	5	767 574 new

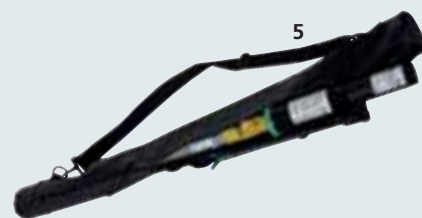
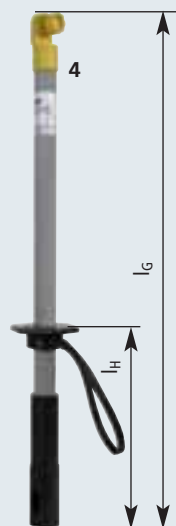
Artificial Leather Bag, empty

With shoulder strap and shoulder belt

Max. capacity:

- 1 ASP indicator
- 1 Insulating rod
- 2 Extension handles
- 2 Electric field sensors (S and L)

Type	Colour	Dimensions	Position	Part No.
KLT 1010 300	●	1010 x 300 x 100 mm	6	767 996 new



HSA 205 Non-Contact Voltage Detector

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

SAFETY EQUIPMENT

VOLTAGE DETECTORS

based on E DIN VDE 0682 Part 417

- Also for use in wet weather
- For testing switchgear installations and high-voltage overhead lines for safe isolation from supply voltages without making contact
- Wide nominal voltage range
- With self-testing element
- Visual and acoustic indicator
- Storage bag included in delivery



Self-testing element

The electronic HSA non-contact voltage detector has an integrated self-testing element. The self-test is performed automatically after switching on the detector.

Batteries

The HSA non-contact voltage detector operates on a 9 V block battery. This battery is inserted into the battery compartment by releasing the screws and removing the indicator. Low battery conditions are indicated by a permanent red light and by an additional constant acoustic signal.

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

Minimum distances A according to nominal voltage.



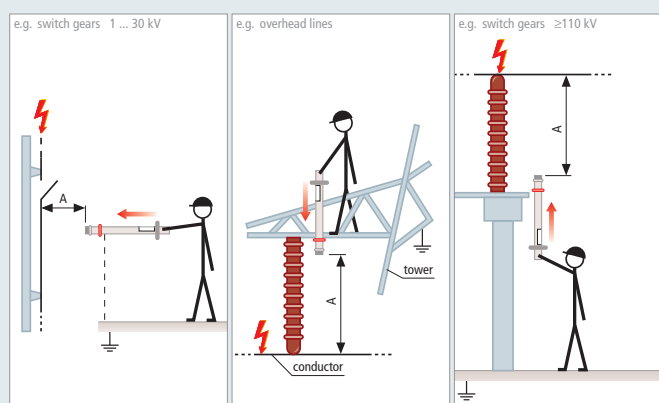
HSA 205 non-contact voltage detector with insulating cap used in a switchgear installation.

Technical Data

Readiness for operation	Green flashing light and acoustic signal at 2s intervals
Voltage present	Red flashing light and acoustic signal with increased frequency
No voltage present	Green flashing light and acoustic signal at 2s intervals
Insulating rod	Glass-fibre reinforced polyester tube, Ø43 mm, grey, with integrated measuring head as well as operating and indication unit with a green ring for contact indication

Operating temperature range

– 25° C ... + 55° C, climatic category N



Application notes

The operating head of the HSA 205 non-contact voltage detector 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.

The transparent insulating cap must be used for the voltage range 1 to 30 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!

SAFETY EQUIPMENT

VOLTAGE DETECTORS

HSA 205 Non-Contact Voltage Detector



Type	Nominal voltage U_N	Total length l_G	Part No.
------	--------------------------	-----------------------	-------------

A HSA 205 with Plug-in Coupling

Plug-in coupling for handle extension

Storage bag and insulating cap included in delivery.

HSA205 U 1 420 STK	1 ... 30 / 30 ... 220 / 110 ... 420 kV	950 mm	767 552
--------------------	--	--------	---------

HSA 205 voltage detectors with Lithium batteries and non-contact voltage detectors for other nominal voltages and frequencies are available on request.

NOTE: This HSA 205 non-contact voltage detector may not be sold in Germany!



Accessories for HSA 205 Non-Contact Voltage Detector

Insulating Cap

For HSA 205 within nominal voltage range 1 ... 30 kV

Type	Colour	Dimensions	Part No.
IK HSA205	transparent	Ø60 x 310 mm	767 559



HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335

Adapter – Plug-in Coupling / T pin Shaft

For extending the handle of insulating rods type IS PHE with earthing rod type ES SQ or ES SQL

Type	Total length l_G	Part No.
AD HV STK SQ	280 mm	766 313



Artificial Leather Bag, empty

With shoulder strap

Type	Colour	Dimensions	Part No.
KLT 98 9	●	Ø85 x 980 mm	767 531

Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D40 45	●	40 ... 45 mm	530 mm	700 008



PHE/G d.c. Voltage Detector

Nominal voltages up to 7.5 kV d.c.

- Also for use in wet weather
- For indoor and outdoor installations
- For use in d.c. systems (electrified rail networks, d.c. links)
- With self-testing element
- Visual indicator
- Optional earthing (positive or negative pole)
- Easy transport due to detachable insulating rod

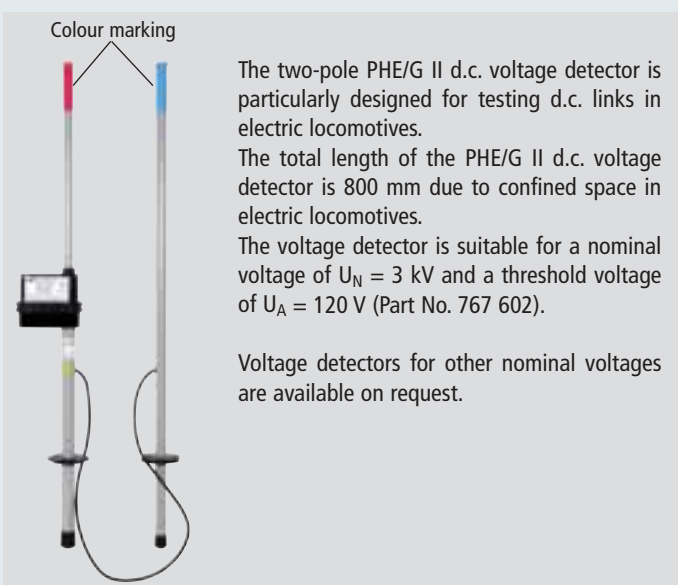


Self-testing element

Electronic PHE/GI and PHE/GII d.c. voltage detectors have an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector. The detector is only ready for operation if the function test was performed successfully.

Replacing the battery

The voltage detector operates on 4 Mignon IEC LR6 batteries housed in a separate battery compartment for easy battery replacement. Low battery conditions are indicated by both LEDs permanently illuminated when switching on the voltage detector (function test).



Colour marking

The two-pole PHE/G II d.c. voltage detector is particularly designed for testing d.c. links in electric locomotives.

The total length of the PHE/G II d.c. voltage detector is 800 mm due to confined space in electric locomotives.

The voltage detector is suitable for a nominal voltage of $U_N = 3 \text{ kV}$ and a threshold voltage of $U_A = 120 \text{ V}$ (Part No. 767 602).

Voltage detectors for other nominal voltages are available on request.

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Based on EN/IEC 61243-2 (DIN VDE 0682 Part 412)



PHE/G II d.c. voltage detector for d.c. links (ICE operating head).

Technical Data

Test prod	Glass-fibre reinforced polyester tube, grey; Test electrodes made of Cu alloy/gal Sn; PHE/G I (A) for overhead contact lines: Ø20 mm, hook-shaped electrode; PHE/G I (B) for switchgear installations and PHE/G II (C): Ø20 mm (B) or Ø20/30 mm (C), with tooth profile for safe contact, with M8 female thread for attaching electrodes and test probes
Colour marking	Polarity on the test prod: Positive pole: red; Negative pole: blue
Indicator	Plastic, fully insulated, black
Indication	Red LED '⚡' (flashing light); Green LED '0' (permanent light)
Insulating rod	Glass-fibre reinforced polyester tube, Ø43 / 30 mm, grey; PHE/G I (A) for overhead contact lines: Sealing unit with plug-in coupling and non-slip eye (Al/rubber); PHE/G I (B) for switchgear installations: Sealing unit with plug-in coupling for extending the handle; PHE/G II (C): Sealing unit with non-slip plastic cap
Connecting cable	Highly-flexible copper cable, plastic-insulated
Earth clamp	Flexible adjustable handle, MCl/gal Zn, clamping range: up to 20 mm
Operating temperature range	- 25° C ... + 55° C, climatic category N

SAFETY EQUIPMENT

VOLTAGE DETECTORS

PHE/G d.c. Voltage Detector



Type	Length of connecting cable	Total length l_G	Part No.
------	----------------------------	-----------------------	----------

A PHE/G I Overhead Contact Lines

Single-pole (3-part unit)

- For single-ended d.c. systems
- Threshold voltage $U_A = 0.5 \times U_N$
- Please specify the nominal voltage (U_N) when placing your order!
- Please specify the polarity (positive or negative earth) when placing your order!

PHEG1 ... FD	6000 mm	4060 mm	767 600
--------------	---------	---------	---------

B PHE/G I for Switchgear Installations

Single-pole

- For single-ended d.c. systems
- Threshold voltage $U_A = 0.5 \times U_N$
- Please specify the nominal voltage (U_N) when placing your order!
- Please specify the polarity (positive or negative earth) when placing your order!

PHEG1 ... S	2000 mm	1080 mm	767 601
-------------	---------	---------	---------

C PHE/G II

Two-pole

- For non-earthed d.c. systems
- For d.c. links (electric locomotives; $U_A \leq 120 \text{ V}$, $l_G = 800 \text{ mm}$)
- Indicator with red positive pole on test prod
- Please specify the threshold voltage (U_A) when placing your order!
- Please specify the nominal voltage (U_N) when placing your order!

PHEG2 ...	1200 mm	1075 mm	767 602
-----------	---------	---------	---------

Other lengths and threshold voltages (U_A) are available on request.

Accessories for PHE/G d.c. Voltage Detector, Part No. 767 600

Artificial Leather Bag, empty

With shoulder strap



Type	Colour	Dimensions	Part No.
KLT 160 17	●	Ø170 x 1600 mm	766 614

Accessories for PHE/G d.c. Voltage Detectors, Part No. 767 601 and 767 602

Artificial Leather Bag, empty

With shoulder strap

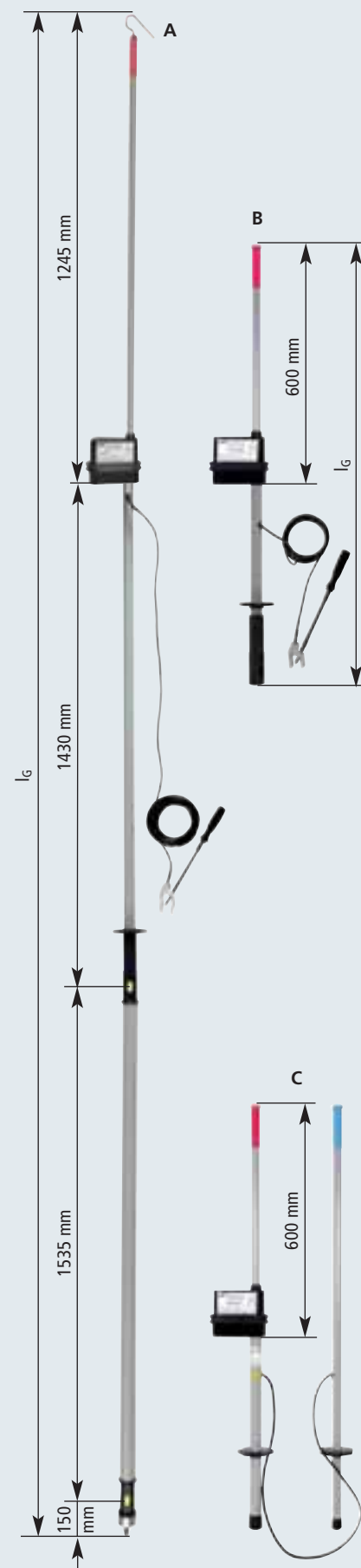
Type	Colour	Dimensions	Part No.
KLT 121 25 16	●	1200 x 250 x 160 mm	766 601

Canvas Bag, empty

With shoulder strap



Type	Colour	Dimensions	Part No.
STT 120 30 15	●	1200 x 300 x 150 mm	766 704



(Picture with transport lengths)

Electrodes

SAFETY EQUIPMENT VOLTAGE DETECTORS



Onion-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 SZ PHE PHV	from 3 kV	Ms/gal CuSn	766 913



Pin-shaped Electrode

With additional M6 thread

Type	Nominal voltage U_N	Material	Part No.
EL M8 S PHE PHV	from 3 kV	StSt	766 925



V-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 V PHE PHV	from 3 kV	Cu/gal Sn	766 927



Eaton Holec Magnefix Electrode

For Eaton Holec Magnefix switchgear installations type MA, MD4, MF, MG, MY

Type	Nominal voltage U_N	Material	Part No.
EL M8 MAG PHE PHV	3 ... 15 kV	Ms/gal CuSn, PVC	766 915



Hook-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 H PHE	for overhead lines only	steel/gal Zn	766 923



Fork-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 G PHE	for overhead lines only	StSt	766 924

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Test Probes

Test Probe, straight

For switchgear installations with limited access (e.g. Calor Emag/Isopond and Krone/KES)

Type	Nominal voltage U_N	Diameter \varnothing	Total length l_G	Length l_1	Part No.
PSO M8 PHE	3 ... 24 kV	11 mm	420 mm	300 mm	766 916

Test Probe, angled (25°)

For switchgear installations with limited access

Type	Nominal voltage U_N	Diameter \varnothing	Total length l_G	Length l_1	Part No.
PSO M8 W25 PHE	3 ... 24 kV	11 mm	450 mm	280 mm	766 940

Test Probe, angled (45°)

For switchgear installations with limited access

Type	Nominal voltage U_N	Diameter \varnothing	Total length l_G	Length l_1	Part No.
PSO M8 W45 PHE	3 ... 24 kV	11 mm	395 mm	280 mm	766 941

Test Probe, angled (90°)

For switchgear installations with limited access and remotely situated contacts

Type	Nominal voltage U_N	Diameter \varnothing	Total length l_G	Length l_1	Part No.
PSO M8 W90 PHE	3 ... 36 kV	20 mm	215 mm	370 mm	766 950

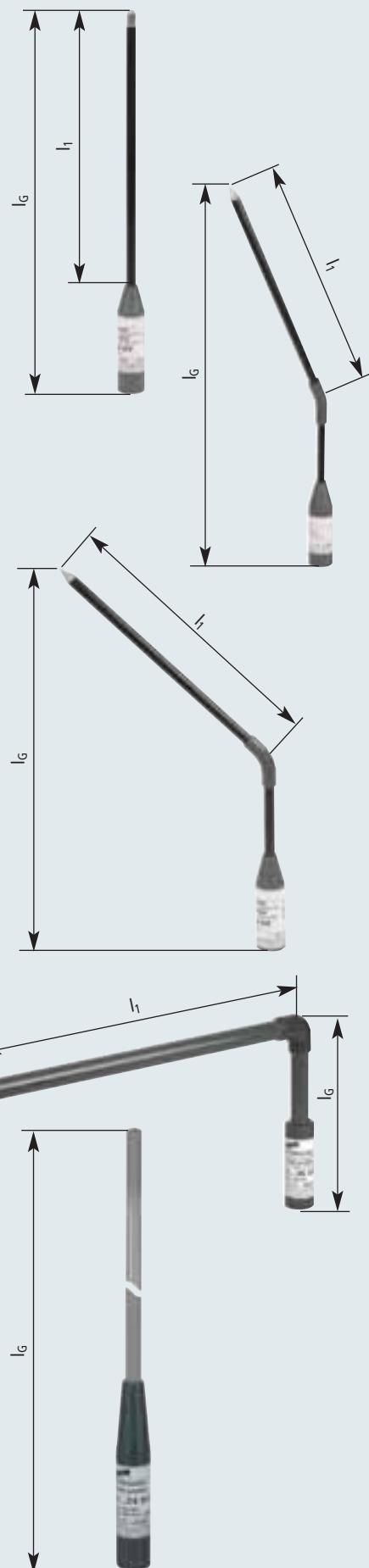
Note: Not for use in wet weather.

Test Probe, straight, 800 mm

For substations and switchgear installations that require a greater insertion depth

Also for use in wet weather

Type	Nominal voltage U_N	Diameter \varnothing	Total length l_G	Part No.
PSO M8 PHE L800	3 ... 24 kV	14 mm	890 mm	766 960

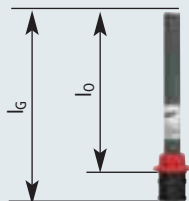


Spare Parts

Test Prods for PHE III Voltage Detector

SAFETY EQUIPMENT

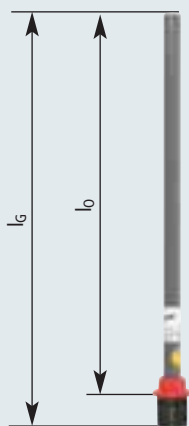
VOLTAGE DETECTORS



Test Prod for Overhead Lines

Category "L71" for 3 ... 36 kV

	Total length	Insertion depth	Part
Type	l_G	l_O	No.
L71 PS PHE 185	220 mm	185 mm	767 766



Test Prod for Switchgear Installations and Overhead Lines

Category "S"

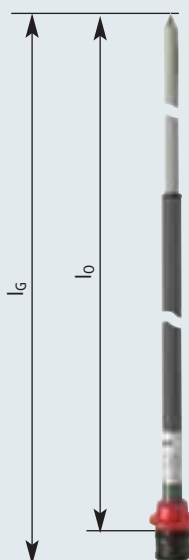
	Total length	Insertion depth	Part
Type	l_G	l_O	No.
S60 PS PHE 285	320 mm	285 mm	767 760
S61 PS PHE 435	470 mm	435 mm	767 761
S62 PS PHE 620	655 mm	620 mm	767 762
S63 PS PHE 780	815 mm	780 mm	767 763
S64 PS PHE 880	915 mm	880 mm	767 764



Test Prod for Siemens 8CK Switchgear Installations

Category "S" for PHE III voltage detectors, Part No. 767 721, 767 722 and 767 740

	Total length	Insertion depth	Part
Type	l_G	l_O	No.
S63 PS PHE 8CK	880 mm	845 mm	767 768



Test Prod for Mipak Switchgear Installations

Category "S" for PHE III voltage detectors, Part No. 767 731/S and 767 750/S

	Total length	Insertion depth	Part
Type	l_G	l_O	No.
S65 M PS PHE 905	940 mm	905 mm	767 767

SAFETY EQUIPMENT

VOLTAGE DETECTORS

Spare Parts

Electric Bulb

For PHE

Type	Description	Part No.
GL 3.5V 0.2A E10	Small electric bulb 3.5 V / 0.2 A	766 605



Mignon Battery

Type	Description	Part No.
MZ 1.5V L91 FR6 LI	Mignon battery 1.5 V, lithium	766 612
MZ 1.5V IEC LR6 AL	Mignon battery, 1.5 V, alkaline manganese	766 613



Block Battery

Type	Description	Part No.
EB 9V LI	9 V block battery, lithium	767 712
EB 9V AL	9 V block battery, alkaline manganese	767 713



Sealing Ring

Type	Description	Part No.
DR PS PHE3	Sealing ring for PHE III test prod and ASP electric field sensor	767 779



Protective Rubber

Type	Description	Part No.
FSG PHE	Protective rubber for PHE	767 776



Protective Rubber

Type	Description	Part No.
FSG PHG2 PHV	Protective rubber for PHG II and PHV	767 777



Plastic Star Grip Screw

Type	Description	Part No.
KS SG BLS 8	For universal gear couplings	766 105

new



SAFETY EQUIPMENT

PHASE COMPARATORS

Design of Phase Comparators

Phase comparators according to IEC/EN 61481 (DIN VDE 0682 Part 431) are designed for testing the in-phase condition of three-phase systems.

Tests for in-phase conditions shall be carried out by skilled or instructed persons only.

Phase comparators have to be tested for correct operation, immediately before and after use.

Phase comparators that do not have a self-testing element have to be tested for correct operation by attaching the phase comparator to parts of the installation which are connected to supply voltage.

Testing in-phase conditions with the aid of a phase comparators is considered as live working.

Phase comparators may only be used for the nominal voltages/nominal voltage ranges as indicated on the rating plate. The operator may be at risk if the phase comparator is used at higher or lower voltages than indicated on the rating plate (incorrect indication, electric shock and arcing).

Phase comparators marked "For indoor and outdoor systems" may not be used in wet weather.

Phase comparators marked "For use in indoor and outdoor installations and for use in wet weather conditions" may be used for indoor and outdoor installations in all weather conditions (e.g. rain, snow, fog and dew).

Restrictions apply to the use of phase comparators according to IEC/EN 61481 (DIN VDE 0682 Part 431) in factory assembled (type-tested) installations.

Due to reduced insulation distances, flashover may occur when inserting the test prod into the installation. The user of the phase comparator or operator of the switchgear installation should consult the manufacturer of the type-tested installation before using the phase comparator.

Design of a phase comparator

Phase comparators according to IEC/EN 61481 (DIN VDE 0682 Part 431) can be used as **two-pole devices** (resistive phase comparator) and as **single-pole devices** (capacitive phase comparator).

The design of the single-pole phase comparator resembles that of a capacitive voltage detector and it uses a microprocessor controlled memory system.

Classified as complete devices, both PHV and PHV I phase comparators are tested as complete devices.

Single-pole phase comparators consist of a handle with handguard, insulating part, indicator and test prod with test electrode. Two-pole phase comparators have an additional connecting cable.

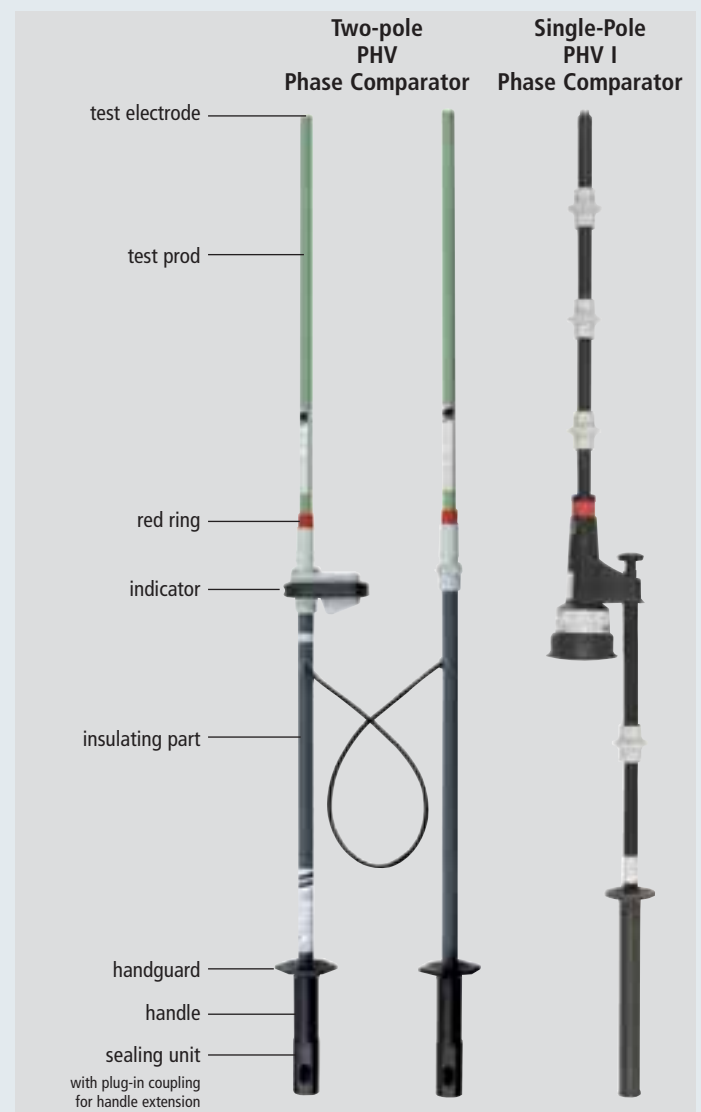
The **insulating part** is the section of the phase comparator between the handguard and the red ring. This insulating part provides adequate safety distance and safe isolation from supply voltage.

The **test prod** with test electrode above the red ring allows the user to reach remote parts of the installation and eliminates the effects of interference fields.

The **handguard** provides a visible barrier between the handle and the insulating part and prevents the user from making contact with the insulating part.

The **red ring** indicates the end of the insulating part in the direction of the test electrode. It represents a visible limit and indicates which part of the equipment may make contact with energised components in the installation. The insulating part is located between the red ring and handguard may not make contact with energised components but contact with earthed components is allowed.

The **test electrode** is the part of the phase comparator that is used to make contact with the installation that has to be tested.



Two-pole PHV Phase Comparator

Nominal voltages up to 36 kV / 50 Hz

SAFETY EQUIPMENT

PHASE COMPARATORS

EN/IEC 61481 (DIN VDE 0682 Part 431)



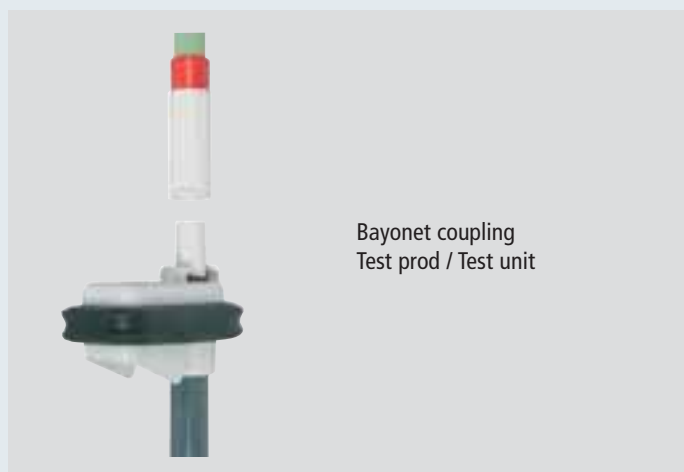
- Not for use in wet weather
- For indoor and outdoor installations
- Resistive, passive phase comparator
- Colour-coded test prods according to nominal voltage
- Eccentric mounting of the visual indication ensures good visibility
- Easy transport due to attachable test prods



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

Technical Data

Insulating rod	Glass-fibre reinforced epoxy resin tube, Ø24 mm, grey
Sealing unit	Plug-in coupling for handle extension
Indicator	Plastic, fully insulated, grey
Connecting cable	Highly flexible Cu cable, plastic-insulated, 800 mm long
Operating temperature range	– 25° C ... + 55° C, climatic category N
Test prod	Glass-fibre reinforced epoxy resin tube, Ø20 mm, grey, attachable; Test electrode made of Cu alloy/gal Sn, Ø20 mm, tooth shape for reliable contact, with M8 female thread for attaching electrodes
Indication	Flashing light for 'out-of-phase condition'



Bayonet coupling
Test prod / Test unit

PHV Test Unit



Type	Nominal voltage U_N	Length of test unit l_2	Part No.
A PHV Test Unit			
PHV 3 36 STK	3 ... 36 kV	750 mm	759 300

Other connecting cable lengths are available on request.







new

SAFETY EQUIPMENT

PHASE COMPARATORS

Test Prods for PHV



For insertion into the test unit

Type	Nominal voltage U_N	Colour	Prod length l_1	Insertion depth l_0	Part No.
A Test Prods, straight (1 pc. per unit)					
PS 3 3.6 PHV	3 ... 3.6 kV		381 mm	316 mm	759 603
PS 5 7.2 PHV	5 ... 7.2 kV		681 mm	616 mm	759 605
PS 10 12 PHV	10 ... 12 kV		681 mm	616 mm	759 610
PS 10 17.5 PHV	10 ... 17.5 kV		681 mm	616 mm	759 615
PS 15 24 PHV	15 ... 24 kV		681 mm	616 mm	759 620
PS 25 36 PHV	25 ... 36 kV		681 mm	616 mm	759 630

B Test Prods, Ø11 mm

(1 pc. per unit)


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

PS 10 12 PHV D11	10 ... 12 kV		415 mm	330 mm	759 111
PS 20 24 PHV D11	20 ... 24 kV		585 mm	520 mm	759 121

C Test Prods, long

(1 pc. per unit)


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

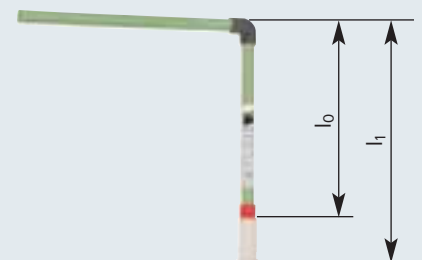
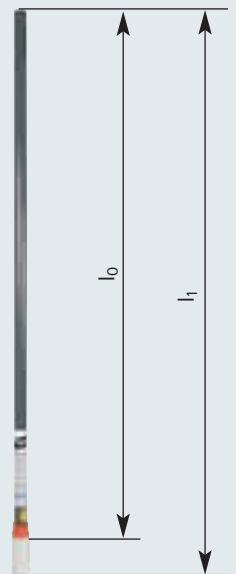
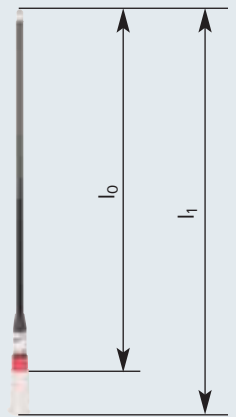
PS 15 24 PHV L880	15 ... 24 kV		880 mm	820 mm	759 621
-------------------	--------------	---	--------	--------	----------------

D Test Prods, angled (90°)

(1 pc. per unit)

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

PS 3 3.6 PHV W90	3 ... 3.6 kV		359 mm	274 mm	759 604
PS 5 7.2 PHV W90	5 ... 7.2 kV		359 mm	274 mm	759 608
PS 10 12 PHV W90	10 ... 12 kV		359 mm	274 mm	759 611
PS 15 24 PHV W90	15 ... 24 kV		359 mm	274 mm	759 622
PS 25 36 PHV W90	25 ... 36 kV		359 mm	274 mm	759 633



Types for other nominal voltages and special switchgear installations are available on request.

Single-pole PHV I Phase Comparator

Nominal voltages up to 36 kV / 50 Hz

SAFETY EQUIPMENT

PHASE COMPARATORS

EN/IEC 61481 (DIN VDE 0682 Part 431)

- For use in wet weather
- For indoor and outdoor installations
- Easy transport due to detachable insulating rod
- Frequency range 49.90 ... 50.10 Hz



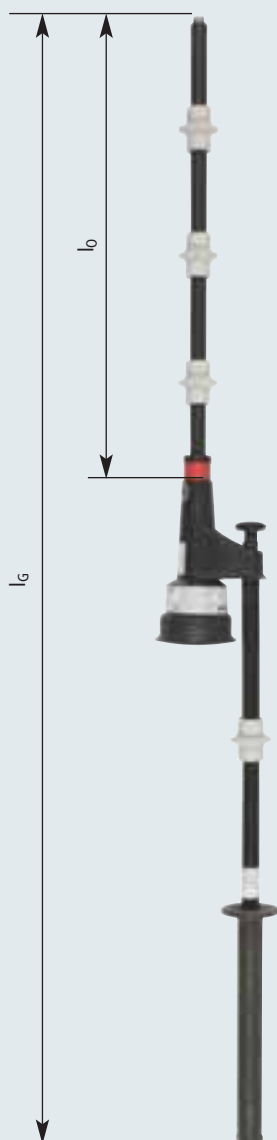
Self-testing element

The PHV I electronic phase comparator has an integrated self-testing element. By simply switching on the phase comparator, the electronic circuit is automatically tested for correct operation. The PHV I is only ready for operation if the function test was performed successfully and the yellow LED is permanently illuminated.

Replacing the battery

The PHV I phase comparator operates on 2 Mignon IEC LR6 batteries housed in a separate battery compartment for easy battery replacement.

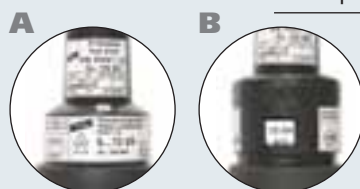
If batteries are low, the device can no longer be switched on or switches off automatically.



Single-pole PHV I phase comparator used at a switchgear installation.

Technical Data

Insulating rod	Glass-fibre reinforced polyester tube, Ø24 mm, black
Indicator	Plastic, fully insulated, black
Test prod	Plastic, Ø22 mm; Test electrode with tooth shape for safe contact, with M8 female thread for attaching electrodes
Operating temperature range	– 25° C ... + 55° C, climatic category N
Indication	Visual: LED indication
Readiness for operation	Permanent yellow light
In-phase condition	Permanent green light
Out-of-phase condition	Red flashing light



Type	Nominal voltage U_N	Total length l_g	Insertion depth l_o	Part No.
A Nominal Voltage Ranges up to 36 kV / 50 Hz				
PHV1 6 12	6 ... 12 kV	1400 mm	575 mm	759 606
PHV1 12 24	12 ... 24 kV	1600 mm	775 mm	759 612
PHV1 24 36	24 ... 36 kV	1600 mm	775 mm	759 624

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

PHV1 U 6 36	6 ... 12 / 12 ... 24 / 24 ... 36 kV	1600 mm	775 mm	759 616
-------------	-------------------------------------	---------	--------	----------------

SAFETY EQUIPMENT

PHASE COMPARATORS

Onion-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 SZ PHE PHV	from 3 kV	Ms/gal CuSn	766 913



Pin-shaped Electrode

With additional M6 thread

Type	Nominal voltage U_N	Material	Part No.
EL M8 S PHE PHV	from 3 kV	StSt	766 925



V-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 V PHE PHV	from 3 kV	Cu/gal Sn	766 927



Eaton Holec Magnefix Electrode

For Eaton Holec Magnefix switchgear installations type MA, MD4, MF, MG, MY

Type	Nominal voltage U_N	Material	Part No.
EL M8 MAG PHE PHV	3 ... 15 kV	Ms/gal CuSn, PVC	766 915



Accessories for Two-pole PHV Phase Comparators

HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335



Accessories

SAFETY EQUIPMENT
PHASE COMPARATORS**Sheet Metal Case, empty**

Hammer-finished with foam padding

Max. capacity:

1 PHV test unit

4 Test prods, l = 681 mm (l = 381 mm available on request)

Type	Colour	Dimensions	Part No.
SKL 95 21 10 V2	●	950 x 210 x 100 mm	759 003

**Plastic Case, empty**

With foam padding

Max. capacity:

1 PHV test unit

6 Test prods, straight

Type	Colour	Dimensions	Part No.
KKL PHV	●	930 x 215 x 140 mm	759 999

**Artificial Leather Bag, empty**

With shoulder strap

Type	Colour	Dimensions	Part No.
KLT 121 25 16	●	1200 x 250 x 160 mm	766 601

**Artificial Leather Bag, empty**

With shoulder strap and shoulder belt

Max. capacity PHV:

1 PHV test unit

2 Test prods

2 Electrodes

Max. capacity PHV I:

1 PHV I test head

1 Insulating rod

1 Electrode

Type	Colour	Dimensions	Part No.
KLT 1010 300	●	1010 x 300 x 100 mm	767 996

new

Accessories for Single-pole PHV I Phase Comparators

**Plastic Case, empty**

With foam padding

Type	Colour	Dimensions	Part No.
KKL PHV1	●	1270 x 215 x 140 mm	759 998

SAFETY EQUIPMENT

PHASE COMPARATORS

Spare Parts

Mignon Battery

Type	Description	Part No.
MZ 1.5V L91 FR6 LI	Mignon battery 1.5 V, lithium	766 612
MZ 1.5V IEC LR6 AL	Mignon battery, 1.5 V, alkaline manganese	766 613



Sealing Ring

Type	Description	Part No.
DR PHV	sealing ring for PHV test unit	767 778



Protective Rubber

Type	Description	Part No.
FSG PHG2 PHV	protective rubber for PHG II and PHV	767 777



SAFETY EQUIPMENT

Design of DEHNcap Voltage Detecting Systems

VOLTAGE DETECTING SYSTEMS

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

Verifying safe isolation from supply voltages may only be performed by a qualified electrician or electrotechnically instructed person.

Our range of products of capacitive voltage detecting systems consists of:

- Coupling units (K): DEHNcap/M...
- Indicators (A): DEHNcap/...

Coupling units, fixed parts of installations

Coupling units are components of a pluggable voltage detecting system fixed in switchgear installations. Coupling units consist of a coupling capacitance (2), connecting cable (3), voltage-limiting device (4), measuring circuit (5) and measuring point (6).

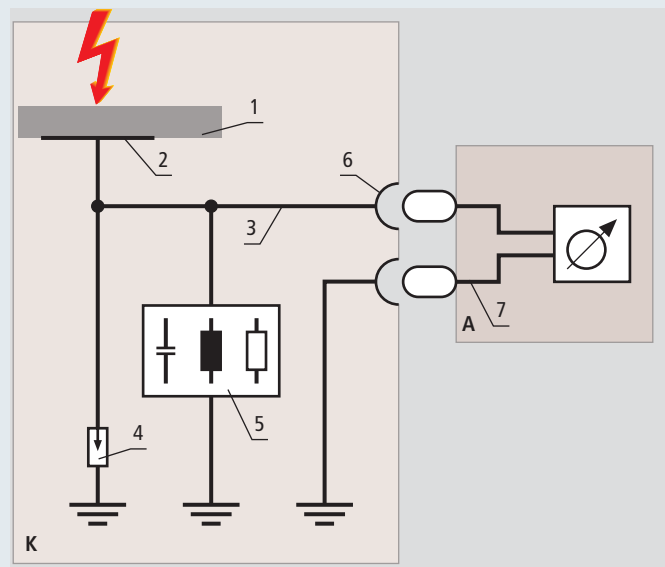
The coordinated components, capacitive divider insulator and interface module type DEHNcap/M, constitute one complete coupling unit. The capacitive divider insulator consists of the coupling capacitance while the voltage-limiting device, measuring circuit and measuring point are integrated in the DEHNcap/M interface module.

The DEHNcap/M interface module is designed for three-phase a.c. systems with reference to its threshold values.

If an equipment contains e.g. a bushing and a measuring transformer or another divider insulator contains the coupling capacitance, the coupling unit can be connected to the DEHNcap/MDS interface module with universal coupling electrode connection. Both the DEHNcap/M and DEHNcap/MDS interface modules are available as HR and LRM systems.

Response voltage, clear indication

In order to obtain a clear indication, the coupling units have to be designed in such a way that the indicator indicates "voltage present" in case of a line-to earth voltage of max. 45% of the nominal voltage. No indication may appear for a line-to-earth voltage of less than 10% of the rated voltage. These limit values apply to any type of voltage detecting system (HR, LRM system). This means that an interface voltages of 90 V for HR systems and 5 V for LRM systems must be reached within the above mentioned limits.



Capacitive voltage detecting system for high-voltage installations – Basic circuit diagram

K DEHNcap/M... coupling unit

A DEHNcap/... indicator

- 1 Live part of the high-voltage installation
- 2 Coupling capacitance (coupling electrode with coupling dielectric)
- 3 Connecting cable
- 4 Voltage-limiting device
- 5 Measuring circuit
- 6 Measuring point
- 7 Connecting cable

Nominal voltage and rated voltage

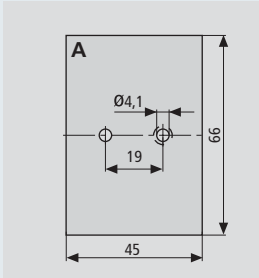
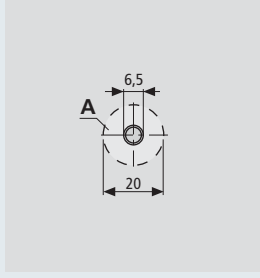
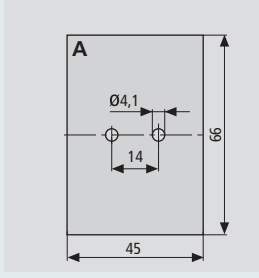
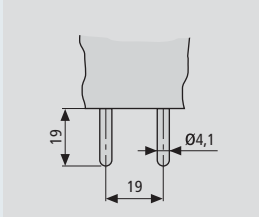
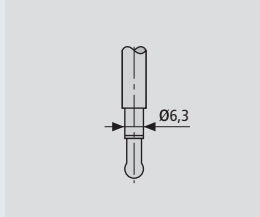
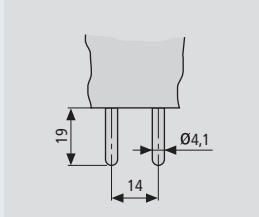
Coupling units according to EN/IEC 61243-5 (DIN VDE 0682 Part 415) are preferably installed into medium-voltage switchgear installations according to DIN VDE 0670 Part 6 or EN/IEC 62271-200 (DIN VDE 0671 Part 200). However, these standards specify different voltage values. EN/IEC 61243-5 (DIN VDE 0682 Part 415) for capacitive voltage detecting systems defines the voltage as nominal voltage. DIN VDE 0670 Part 6 for medium-voltage switchgear installations, however, defines the voltage as rated voltage.

EN/IEC 61243-5 (DIN VDE 0682 Part 415)	Nominal voltage	6 kV	10 kV	20 kV	30 kV
DIN VDE 0670 Part 6 EN/IEC 62271-200 (DIN VDE 0671 Part 200)	Rated voltage	7.2 kV	12 kV	24 kV	36 kV

DEHNcap Voltage Detecting Systems

SAFETY EQUIPMENT VOLTAGE DETECTING SYSTEMS

Electrical and mechanical requirements for the interfaces of pluggable 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 M Ω	2 M Ω	2 M Ω
Electrical response conditions of the interface	I	2.5 μ A	2.5 μ A	2.5 μ A
Electrical response conditions of the interface	U	90 V	5 V	5 V
Socket arrangement and minimum tooling border A for indicator or plug				
Plug arrangement				

SAFETY EQUIPMENT

Selection Guide

VOLTAGE DETECTING SYSTEMS

Device	Nominal voltage U_N / Frequency f_N	Application, Indication	Page	
Coupling Unit DEHNcap/MDS Interface Module	up to 45 kV / 50 Hz	Three-pole cable set Saline fog tested HR and LRM measuring point Adapted to existing coupling electrodes Separate coupling and front panel unit	58	
Coupling Unit DEHNcap/M Interface Module	up to 45 kV / 50 Hz	Three-pole cable set Saline fog tested HR and LRM test point Anti-rotation terminal for coupling electrodes	59	
DEHNcap/P Voltage Indicator	up to 45 kV / 50 Hz	Passive indicator without batteries LED indication Can also be used as permanent voltage detector	60	
DEHNcap/P Test Unit	230 V / 50 Hz	For testing for correct operation Plugs into 230 V socket outlets For HR and LRM indicators	61	
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	62	
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	64	
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 systems with two HR-LRM test adapters Comparator detects zero crossings of both installations to be compared With battery monitoring device	66	
Storage Bags and Transport Cases		Sheet metal or plastic case Artificial leather or canvas bag	70	

DEHNcap/MDS Interface Modules

Nominal voltages up to 45 kV / 50 Hz

- Three-pole cable set
- Saline fog tested
- For use as HR or LRM measuring point (measuring socket) incl. frame and socket cover
- Adapted to existing, capacitive coupling electrodes
- Separate coupling and front panel unit

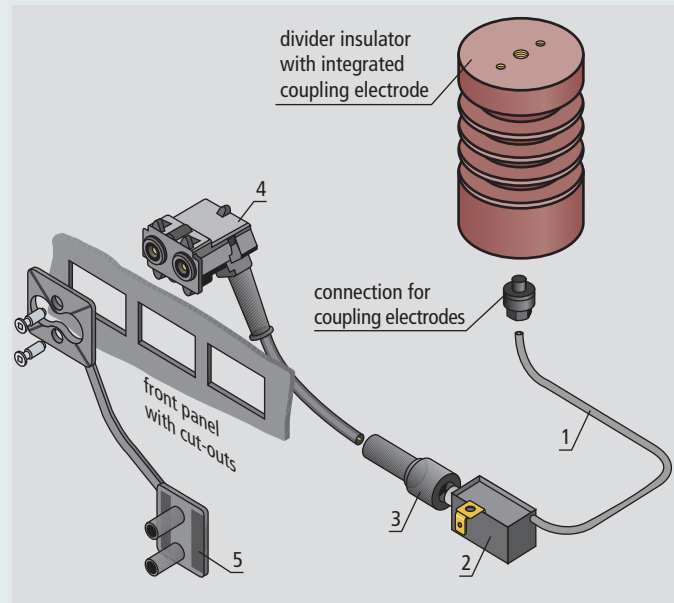
The **front panel unit** consists of a measuring point (measuring sockets), frame with socket cover and coaxial connecting cable.

The **coupling unit** consists of a connecting cable for coupling electrodes, integrated voltage-limiting device with earth connection and terminal for connecting cables (coaxial cable gland) to the front panel unit.

DEHNcap/MDS interface modules can be adapted to all types of devices that have capacitive coupling electrodes, e.g. divider insulators, voltage transformers, bushings as well as internal and external cone-type cable connectors.

Please specify the following data when placing your order:

- Type of measuring point (measuring socket): _____ HR system
or _____ LRM system
- Length of the connecting/coaxial cable to the front panel unit (if more or less than 4500 mm are required): _____ mm
- Value of existing coupling capacitance: _____ pF
- Nominal voltage of the installation: _____ kV



DEHNcap/MDS interface module (single-pole unit)

DEHNcap/MDS coupling unit

- 1 Connecting cable for coupling electrodes
- 2 Circuit with integrated voltage-limiting device and earth connection
- 3 Coaxial cable gland

DEHNcap/MDS front panel unit

- 4 Measuring sockets (HR/LRM interface) with coaxial connecting cable
- 5 Frame with socket cover

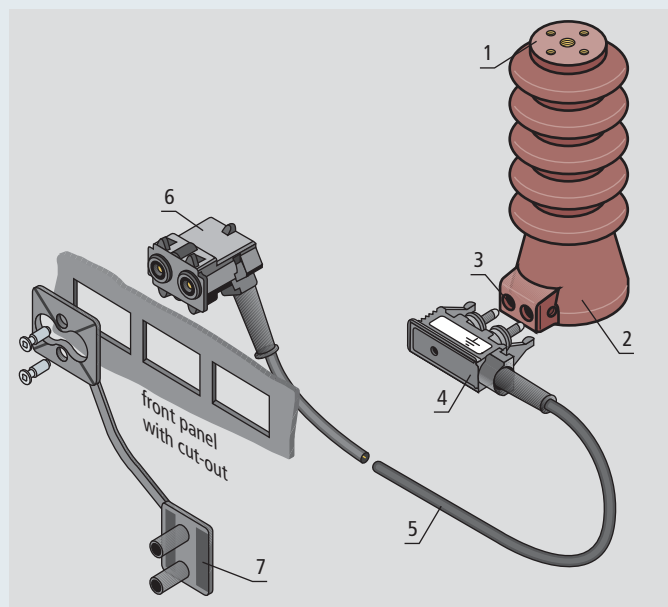


Type	Design	Distance between measuring sockets	Cable length	Packing unit	Part No.
A DEHNcap/MDS-HR					
FPE DCA HR	front panel unit	19 mm	4500 mm	3 pc(s).	767 815
AKE DCA HR	coupling unit		200 mm	3 pc(s).	767 816
B DEHNcap/MDS-LRM					
FPE DCA LRM	front panel unit	14 mm	4500 mm	3 pc(s).	767 825
AKE DCA LRM	coupling unit		200 mm	3 pc(s).	767 826

SAFETY EQUIPMENT

VOLTAGE DETECTING SYSTEMS

EN/IEC 61243-5 (DIN VDE 0682 Part 415)



DEHNcap/M interface module (single-pole unit)

- Three-pole cable set
- Saline fog tested
- For use as HR or LRM measuring point (measuring socket) incl. frame and socket cover
- Anti-rotation connection for coupling electrodes for divider insulators made by Driescher in Moosburg/Germany

Divider insulator

- 1 Fixing points for conductor bar
- 2 Fixing point and earth connection
- 3 Connection sockets for coupling electrodes

DEHNcap/M interface module

- 4 Terminal plug for coupling electrodes with integrated voltage-limiting device
- 5 Connecting cable (coaxial)
- 6 Measuring sockets (HR/LRM interface)
- 7 Frame with socket cover

Type	Nominal voltage U_N	For Driescher divider insulators*)	Distance between measuring sockets	Cable length	Packing unit	Part No.
------	--------------------------	---------------------------------------	---------------------------------------	-----------------	-----------------	-------------

A DEHNcap/M-HR

SM DCA M HR 6 12	6 ... 12 kV	2-45165983	19 mm	4000 mm	3 pc(s).	767 812 new
SM DCA M HR 10 24	10 ... 24 kV	2-45165984	19 mm	4500 mm	3 pc(s).	767 824 new
SM DCA M HR 20 38	20 ... 36 kV	2-45165985				
	20 ... 38.5 kV	2-45165986	19 mm	7000 mm	3 pc(s).	767 838 new



B DEHNcap/M-LRM

SM DCA M LRM 6 12	6 ... 12 kV	2-45165983	14 mm	4000 mm	3 pc(s).	767 822 new
SM DCA M LRM 10 24	10 ... 24 kV	2-45165984	14 mm	4500 mm	3 pc(s).	767 844 new
SM DCA M LRM 20 38	20 ... 36 kV	2-45165985				
	20 ... 38.5 kV	2-45165986	14 mm	7000 mm	3 pc(s).	767 868 new



*) Divider insulators are not included in our product range. If you wish to order divider insulators, please contact Driescher in Moosburg/Germany specifying this Part No.

DEHNcap/P Voltage Indicator

Nominal voltages up to 45 kV / 50 Hz

SAFETY EQUIPMENT

VOLTAGE DETECTING SYSTEMS

EN/IEC 61243-5 (DIN VDE 0682 Part 415)

- Passive voltage indicator without batteries
- LED indication
- Can also be used as permanent voltage detector

Technical Data

HR system	Threshold of indication 90 V, Input impedance 36 megohms
LRM system	Threshold of indication 5 V, Input impedance 2 megohms
Degree of protection	IP 66
Operating temperature range	– 25° C ... + 55° C
Indication	Red flashing LED, repetition frequency min. 1 Hz for 'voltage present'; No indication for 'no voltage present'

Functional test

EN 50110-1 (DIN VDE 0105 Part 100) requires that voltage indicators are tested for correct operation shortly before and after use. Functional tests of passive indicators without self-testing element have to be performed by plugging them into measuring sockets supplied with operating voltage or into a test unit (DEHNcap/P test unit).



Passive DEHNcap/P voltage indicator used for an encapsulated switchgear installation.



Type	Dimensions	Distance between plugs	Part No.
A DEHNcap/P – HR			
SAG DCA P HR	40 x 48 x 35 mm	19 mm	767 101
B DEHNcap/P – LRM			
SAG DCA P LRM	40 x 48 x 35 mm	14 mm	767 102

Accessories for DEHNcap/P Voltage Indicators

Plastic Case, empty

With foam padding

Max. capacity:

- 1 DEHNcap/PC
- 2 DEHNcap/A or IT
- 2 Test adapters
- 2 DEHNcap/P
- 1 DEHNcap/P test unit

Type	Colour	Dimensions	Part No.
KKL DCA	●	395 x 295 x 105 mm	767 107

SAFETY EQUIPMENT

VOLTAGE DETECTING SYSTEMS

DEHNcap/P Test Unit

Nominal voltage 230 V / 50 Hz

EN/IEC 61243-5 (DIN VDE 0682 Part 415)



Test unit for testing a DEHNcap/P passive voltage indicator for correct operation by plugging it into a 230 V socket outlet.

- Test unit for performing functional tests of DEHNcap/P voltage indicators
- Plugs into 230 V socket outlets
- For HR and LRM indicators

Technical Data

HR system	Test voltage 90 V ~, distance between sockets 19 mm
LRM system	Test voltage 5 V ~, distance between sockets 14 mm
Nominal power	500 mW
Max. short-circuit current at the test sockets	approx. 20 µA
Operating temperature range	– 25° C ... + 55° C

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

Type	Dimensions	Part No.
A Test Unit for DEHNcap/P HR/LRM		
TG DCA	43 x 75 x 35 mm	767 110



Accessories for DEHNcap/P Test Unit

Plastic Case, empty

With foam padding

Max. capacity:

- 1 DEHNcap/PC
- 2 DEHNcap/A or IT
- 2 Test adapters
- 2 DEHNcap/P
- 1 DEHNcap/P test unit

Type	Colour	Dimensions	Part No.
KKL DCA	●	395 x 295 x 105 mm	767 107



DEHNcap/A Voltage Indicator

Nominal voltages up to 45 kV / 50 Hz

SAFETY EQUIPMENT

VOLTAGE DETECTING SYSTEMS

EN/IEC 61243-5 (DIN VDE 0682 Part 415)

- Active voltage indicator for verifying safe isolation from supply voltages
- Indication by two separate LEDs
- With integrated self-testing element and battery monitoring device
- Automatically deactivated after use



Self-test of the DEHNcap/A voltage indicator.

Self-testing element

The DEHNcap/A electronic voltage indicator 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 after switching on the indicator. The voltage indicator is only ready for operation if the test button is pressed i.e. the function test was performed successfully.

Replacing the battery

The 9 V block battery can be replaced by hand without the use of tools. Low battery conditions are indicated by both LEDs illuminated (permanent light) when pressing the test button (functional test).

Technical Data

HR system	Threshold of indication 90 V, Input impedance 36 megohms
-----------	---

LRM system	Threshold of indication 5 V, Input impedance 2 megohms
------------	---

Operating temperature range	– 25° C ... + 55° C
-----------------------------	---------------------

Indication	Red LED '⚡' (flashing light) for 'voltage present'; Green LED '0' (permanent light) for 'no voltage present'
------------	---



Type	Dimensions	Distance between plugs	Part No.
A DEHNcap/A – HR			
SAG DCA A HR	120 x 60 x 25 mm	19 mm	767 111
B DEHNcap/A – LRM			
SAG DCA A LRM	120 x 60 x 25 mm	14 mm	767 112

SAFETY EQUIPMENT

Accessories for DEHNcap/A Voltage Indicator

VOLTAGE DETECTING SYSTEMS

HR-LRM Test Adapter

For electrical and mechanical adaptation of HR (HO) systems to LRM systems.

Used as a measuring impedance with $X_C = 36$ megohms for maintenance tests of HR coupling units (with suitable μA meter).

Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
MA DCA HR LRM	85 x 50 x 30 mm	19 mm	14 mm	767 133



LR-LRM Test Adapter

For mechanical adaptation of LR (NO) systems to LRM systems

Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
MA DCA LR LRM	105 x 50 x 30 mm	jack 6.3 mm	14 mm	767 136



Plastic Case, empty

With foam padding

Type	Colour	Dimensions	Part No.
KKL 26 22 5	●	265 x 225 x 50 mm	767 106



Plastic Case, empty

With foam padding

Max. capacity:

- 1 DEHNcap/PC
- 2 DEHNcap/A or IT
- 2 Test adapters
- 2 DEHNcap/P
- 1 DEHNcap/P test unit

Type	Colour	Dimensions	Part No.
KKL DCA	●	395 x 295 x 105 mm	767 107



DEHNcap/IT Interface Test Unit

Nominal voltages up to 45 kV / 50 Hz

SAFETY EQUIPMENT

VOLTAGE DETECTING SYSTEMS

EN/IEC 61243-5 (DIN VDE 0682 Part 415)

- Active indicator for maintenance tests at coupling units
- Indication by two separate LEDs
- With integrated self-testing element and battery monitoring device
- Automatically deactivated after use



DEHNcap/IT interface test unit allows for maintenance tests at coupling units of switchgear installations according to EN/IEC 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 after switching on the indicator. The interface test unit is only ready for operation if the test button is pressed i.e. the function test was performed successfully.

Replacing the battery

The 9 V block battery can be replaced by hand without the use of additional tools.

Low battery conditions are indicated by both LEDs illuminated (permanent light) when pressing the test button (function test).

Technical Data

HR system Input impedance 36 megohms

LRM system Input impedance 2 megohms

Test threshold 3.2 μ A

Operating temperature range – 25° C ... + 55° C

Indication Red LED 'no' (permanent light) for 'test not passed';
Green LED 'yes' (permanent light) for 'test passed'



Type	Dimensions	Distance between plugs	Part No.
A DEHNcap/IT – HR			
SPG DCA IT HR	120 x 60 x 25 mm	19 mm	767 121
B DEHNcap/IT – LRM			
SPG DCA IT LRM	120 x 60 x 25 mm	14 mm	767 122

SAFETY EQUIPMENT

Accessories for DEHNcap/IT Interface Test Unit

VOLTAGE DETECTING SYSTEMS

HR-LRM Test Adapter

For electrical and mechanical adaptation of HR (HO) systems to LRM systems.

Used as a measuring impedance with $X_C = 36$ megohms for maintenance tests of HR coupling units (with suitable μA meter).

Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
MA DCA HR LRM	85 x 50 x 30 mm	19 mm	14 mm	767 133

**LR-LRM Test Adapter**

For mechanical adaptation of LR (NO) systems to LRM systems

Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
MA DCA LR LRM	105 x 50 x 30 mm	jack 6.3 mm	14 mm	767 136

**XC-LRM Measuring Impedance**

Used as a measuring impedance with $X_C = 2$ megohms for maintenance tests of LRM coupling units (with suitable μA meter)

Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
MA DCA XC LRM	85 x 50 x 30 mm	14 mm	16 mm	767 135

**Plastic Case, empty**

With foam padding

Type	Colour	Dimensions	Part No.
KKL 26 22 5	●	265 x 225 x 50 mm	767 106

**Plastic Case, empty**

With foam padding

Max. capacity:

- 1 DEHNcap/PC
- 2 DEHNcap/A or IT
- 2 Test adapters
- 2 DEHNcap/P
- 1 DEHNcap/P test unit

Type	Colour	Dimensions	Part No.
KKL DCA	●	395 x 295 x 105 mm	767 107



DEHNcap/PC-LRM Phase Comparator

Nominal voltages up to 45 kV / 50 Hz

SAFETY EQUIPMENT

VOLTAGE DETECTING SYSTEMS

EN/IEC 61243-5 (DIN VDE 0682 Part 415)

- Active indicator for testing in-phase conditions of LRM systems
- Can be used for HR systems with two HR-LRM test adapters
- Indication by three separate LEDs
- Comparator detects zero crossings of both installations to be compared
- With battery monitoring device



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

The DEHNcap/PC-LRM phase comparator can also be used for phase comparison in HR systems with two optional HR-LRM adapters (Part No. 767 133). 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.

Replacing the battery

The 9 V block battery can be replaced by hand without the use of additional tools.

In case of low battery conditions, the device can no longer be switched on or switches off automatically.

Technical Data

LRM system	Threshold of indication 5 V, Input impedance 2 megohms
Measuring cables	3 measuring cables with 4 mm plug
Operating temperature range	– 25° C ... + 55° C
Indication	Red LED '≠' out-of-phase condition' (permanent light) if 'phase angle > 60° ' Green LED '=' (permanent light) 'in-phase condition'; Yellow LED 'POWER ON' (permanent light) for 'device ready for operation'



Type	Dimensions	Length of measuring cable	Part No.
A DEHNcap/PC – LRM			
PV DCA PC LRM	145 x 85 x 32 mm	2000 mm	767 132

SAFETY EQUIPMENT

Accessories for DEHNcap/PC-LRM Phase Comparator

VOLTAGE DETECTING SYSTEMS

HR-LRM Test Adapter

For electrical and mechanical adaptation of HR (HO) systems to LRM systems.

Used as a measuring impedance with $X_C = 36$ megohms for maintenance tests of HR coupling units (with suitable μA meter).

Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
MA DCA HR LRM	85 x 50 x 30 mm	19 mm	14 mm	767 133

**LR-LRM Test Adapter**

For mechanical adaptation of LR (NO) systems to LRM systems

Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
MA DCA LR LRM	105 x 50 x 30 mm	jack 6.3 mm	14 mm	767 136

**Plastic Case, empty**

With foam padding

Max. capacity:

- 1 DEHNcap/PC
- 2 DEHNcap/A or IT
- 2 Test adapters
- 2 DEHNcap/P
- 1 DEHNcap/P test unit

Type	Colour	Dimensions	Part No.
KKL DCA	●	395 x 295 x 105 mm	767 107

**Artificial Leather Bag, empty**

With shoulder strap

Type	Colour	Dimensions	Part No.
KLT 23 16 4	●	235 x 160 x 40 mm	767 500



DEHNcap Test Adapter/Measuring Impedance

SAFETY EQUIPMENT VOLTAGE DETECTING SYSTEMS

EN/IEC 61243-5 (DIN VDE 0682 Part 415)

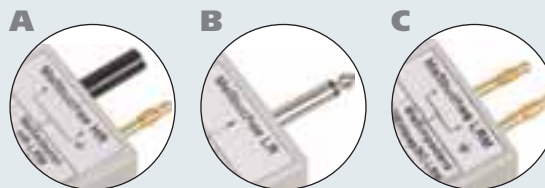
- Easy mechanical and electrical adaptation to HR, LR or XC test sockets
- Measuring impedance for maintenance tests of coupling units with suitable μA meter
- 4 mm safety plugs or sockets
- Energised HR plug, insulated



The HR-LRM test adapter allows for use of an LRM indicator for an HR test socket.

Technical Data

Terminal plug	Plug 2 x 4 mm or jack
Test sockets	Socket 2 x 24 mm
Operating temperature range	- 25° C ... + 55° C



Type	Dimensions	Distance between plugs	Distance between sockets	Part No.
A HR-LRM Test Adapter				
For electrical and mechanical adaptation of HR (HO) systems to LRM systems. Used as a measuring impedance with $X_C = 36$ megohms for maintenance tests of HR coupling units (with suitable μA meter).				
MA DCA HR LRM	85 x 50 x 30 mm	19 mm	14 mm	767 133
B LR-LRM Test Adapter				
For mechanical adaptation of LR (NO) systems to LRM systems				
MA DCA LR LRM	105 x 50 x 30 mm	jack 6.3 mm	14 mm	767 136
C XC-LRM Measuring Impedance				
Used as a measuring impedance with $X_C = 2$ megohms for maintenance tests of LRM coupling units (with suitable μA meter)				
MA DCA XC LRM	85 x 50 x 30 mm	14 mm	16 mm	767 135

SAFETY EQUIPMENT Accessories for DEHNcap Test Adapter/Test Impedance

VOLTAGE DETECTING SYSTEMS

Plastic Case, empty

With foam padding

Type	Colour	Dimensions	Part No.
KKL 26 22 5	●	265 x 225 x 50 mm	767 106



Plastic Case, empty

With foam padding

Max. capacity:

- 1 DEHNcap/PC
- 2 DEHNcap/A or IT
- 2 Test adapters
- 2 DEHNcap/P
- 1 DEHNcap/P test unit

Type	Colour	Dimensions	Part No.
KKL DCA	●	395 x 295 x 105 mm	767 107



Spare Parts

Block Battery

Type	Description	Part No.
EB 9V AL	9 V block battery, alkaline manganese	767 713
EB 9V LI	9 V block battery, lithium	767 712



For Voltage Detectors, Phase Comparators and Voltage Detecting Systems



Type	Dimensions	Colour	Part No.
A Sheet Metal Case			
SKL 92 16 10	920 x 160 x 100 mm	Blue	766 703
SKL 95 21 10 V2	950 x 210 x 100 mm	Blue	759 003
SKL 95 21 10	950 x 210 x 100 mm	Blue	767 701
SKL 116 16 10	1160 x 160 x 100 mm	Blue	766 603



B Plastic Case			
KKL 26 22 5	265 x 225 x 50 mm	Black	767 106
KKL PK PHE3 L	395 x 295 x 105 mm	Grey	766 036
KKL DCA	395 x 295 x 105 mm	Grey	767 107
KKL PHV	930 x 215 x 140 mm	Black	759 999
KKL PHE	930 x 215 x 140 mm	Black	766 997
KKL PHE3	930 x 215 x 140 mm	Black	767 997
KKL PHV1	1270 x 215 x 140 mm	Black	759 998
KKL PHE3 60 110	1270 x 215 x 140 mm	Black	766 998
KKL PHE L	1270 x 215 x 140 mm	Black	766 999
KKL PHE3 L	1270 x 215 x 140 mm	Black	767 999



C Artificial Leather Bag			
KLT 98 9	Ø85 x 980 mm	Black	767 531
KLT 104 9	Ø85 x 1040 mm	Black	767 574
KLT 160 17	Ø170 x 1600 mm	Black	766 614
KLT 23 16 4	235 x 160 x 40 mm	Black	767 500
KLT 1010 300	1010 x 300 x 100 mm	Black	767 996
KLT 121 25 16	1200 x 250 x 160 mm	Black	766 601
KLT 247 10 22	2470 x 220 x 100 mm	Black	766 602



D Canvas bag			
STT 110 15	Ø150 x 1100 mm	Green	769 509
STT 180 20	Ø200 x 1800 mm	Green	766 039
STT 120 30 15	1200 x 300 x 150 mm	Green	766 704

Example:

Requested: Storage bag and transport case for PHE III voltage detector, Part No. **767 720**





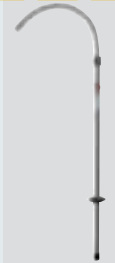
Result: Sheet Metal Case Part No. **767 701**
 or Plastic Case Part No. **767 997** and **767 999**
 or Artificial Leather Bag Part No. **767 996**

		Sheet metal case				Plastic case								Artificial leather bag						Canvas bag							
		766 703	759 003	767 701	766 603	767 106	766 036	767 107	759 999	766 997	767 997	759 998	766 998	766 999	767 999	767 531	767 574	766 614	767 500	767 996	766 601	766 602	769 509	766 039	766 704		
Voltage detector	766 616																										
	766 617																										
	767 403	●								●											●	●				●	
	767 406	●								●											●	●					
	767 410	●								●											●	●					
	767 415				●									●							●	●					
	767 416				●									●							●	●					
	767 418	●								●											●	●					
	767 420				●									●							●	●					
	767 428	●								●											●	●					
	767 430				●									●							●	●					
	767 433				●									●							●	●					
	767 438	●								●					●						●	●					
	767 542																●										
	767 571																	●									
	767 572																		●								
	767 573																				●						
	767 600																			●							
	767 601																					●				●	
	767 602																					●				●	
	767 703		●								●				●							●					
	767 706		●								●				●							●					
	767 710		●								●				●							●					
	767 711		●								●				●							●					
	767 720		●								●				●							●					
	767 721		●								●				●							●					
	767 724 – Kit		●								●				●							●					
	767 725 – Kit							●																	●		
	767 730		●								●				●							●					
	767 731		●								●				●							●					
	767 733		●								●				●							●					
	767 740		●								●				●							●					
767 750		●								●				●							●						
767 780 – Kit												●															
767 781 – Kit												●															
767 921		●								●				●							●						
767 922		●					●			●				●													
767 931		●								●				●							●						
767 932		●					●			●				●													
Phase comparator	759 300		●						●												●						
	759 606											●									●	●					
	759 612											●									●	●					
	759 616											●									●	●					
	759 624											●									●	●					
Voltage detecting system	767 101							●																			
	767 102							●																			
	767 110							●																			
	767 111					●		●																			
	767 112					●		●																			
	767 121					●		●																			
	767 122					●		●																			
	767 132					●		●											●								
	767 133					●		●																			
	767 135					●		●																			
	767 136					●		●																			

SAFETY EQUIPMENT

Selection Guide

OPERATING RODS

Device	Nominal voltage U_N / Frequency f_N	Application	Page	
IS STK Insulating Rods (Kit)	up to 36 kV / 50 Hz	Not for use in wet weather For indoor and outdoor installations Plug-in coupling protected against twisting and bridging Easy transport due to detachable rods Kits for a variety of applications For use as switching rod, earthing rod or operating rod	74	
IS Insulating Rods	up to 36 kV / 50 Hz	Not for use in wet weather For indoor and outdoor installations Attachable switching rod head allows for use as switching rod Supporting head for hexagon shaft or T pin shaft Also for use as earthing rod For use as operating rod for insulating protective shutters	78	
SCS Switching Rods	up to 72.5 kV / 50 Hz	Not for use in wet weather For indoor and outdoor installations Fully insulated, massive switching rod head Allows for deep access into the installation For use as operating rod for insulating protective shutters	81	
SZ Fuse Tongs	up to 36 kV	Not for use in wet weather Operating head with two adjustable jaws Straight or angled (20°) operating head Secure clamping Wide clamping range Ø30 ... 90 mm	82	
RST Rescue Rods	up to 36 kV / 50 Hz	Not for use in wet weather For indoor and outdoor installations Fully insulated rescue hook protected against twisting For rescuing persons (up to approx. 100 kg) from the live working zone in the event of electrical accidents	84	

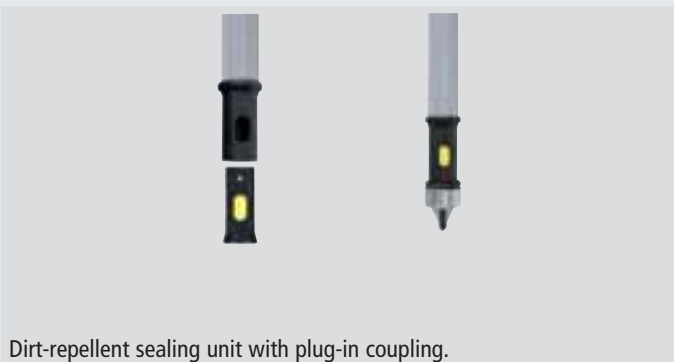
IS STK Insulating Rod Kit

Nominal voltages up to 36 kV / 50 Hz

- Not for use in wet weather
- For indoor and outdoor installations
- Plug-in coupling protected against twisting and bridging
- Easy transport due to detachable rods
- Kits for a variety of applications
- For use as switching rod, earthing rod or operating rod



Plastic plug-in coupling protected against twisting used as extension for the insulating rod (yellow coupling).



Dirt-repellent sealing unit with plug-in coupling.

SAFETY EQUIPMENT

OPERATING RODS

Insulating rod in accordance with DIN VDE 0681 Part 1
Switching rod head in accordance with DIN VDE 0681 Part 2



IS STK insulating rod with STK switching rod head used as switching rod.

Technical Data

Switching rod head	Glass-fibre reinforced polyester tube, Ø30 mm, grey, steel switching pin, sheathed overall in PVC
Operating head	Plastic coupling with T pin shaft, yellow; aluminium coupling with long T pin shaft
Insulating tube	Glass-fibre reinforced polyester tube, Ø30 mm or Ø43 mm, grey or yellow
Coupling	Plastic plug-in coupling protected against twisting, yellow or black



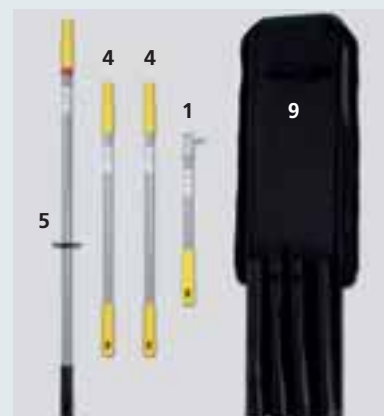
The artificial leather bag with reinforced back panel allows for safe transport and easy storage of the single components.

SAFETY EQUIPMENT

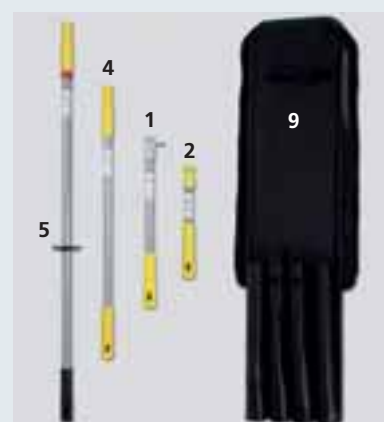
IS STK Insulating Rod Kit

OPERATING RODS

Type	Version	Nominal voltage U_N	Max. total length l_G	Max. load on the operating head	Part No.
A Switching Rod Kit with Ø30 mm					
In accordance with DIN VDE 0681 Part 1 and Part 2					
Pos.	Qty.	Type	Description		Part No.
1	1	SSK 36 STK 560	Switching rod head $l = 560$ mm		766 164
4	2	ISV 36 STK 30 910	Extension for insulating rod $l = 910$ mm		766 356
5	1	IS 36 STK 30 1280	Insulating rod $l = 1280$ mm		766 363
9	1	KLT 130 33	Artificial leather bag, empty		766 069
SCSS 36 STK 30	Switching rod kit, complete	up to 36 kV	3450 mm		766 323 new



B Operating Rod Kit for Protective Shutters with Ø30 mm					
In accordance with DIN VDE 0682 Part 552					
Pos.	Qty.	Type	Description		Part No.
1	1	SSK 36 STK 560	Switching rod head $l = 560$ mm		766 164
2	1	AK 36 SQ STK 360	STK operating head / T pin shaft		766 365
4	1	ISV 36 STK 30 910	Extension for insulating rod $l = 910$ mm		766 356
5	1	IS 36 STK 30 1280	Insulating rod $l = 1280$ mm		766 363
9	1	KLT 130 33	Artificial leather bag, empty		766 069
ASS 36 STK 30	Operating rod kit, complete	up to 36 kV	1700 mm 2600 mm	12 kg 5 kg	766 325 new



C Earthing Rod Kit with Ø43 mm					
Pos.	Qty.	Type	Description		Part No.
2	1	AK 36 SQ STK 360	STK operating head / T pin shaft		766 365
3	1	AK SQL STK 365	STK operating head / long T pin shaft		766 465
6	1	IS 36 STK 43 1280	Insulating rod $l = 1280$ mm		766 463
8	2	HV STK 43 1280	Extension handle $l = 1280$ mm		766 466
9	1	KLT 130 33	Artificial leather bag, empty		766 069
ESS STK 43	Earthing rod kit, complete		1600 mm 2800 mm 4000 mm	35 kg 14 kg 8 kg	766 450 new



D Operating Rod Kit for Protective Shutters with Ø43/30 mm					
In accordance with DIN VDE 0682 Part 552					
Pos.	Qty.	Type	Description		Part No.
1	1	SSK 36 STK 560	Switching rod head $l = 560$ mm		766 164
2	1	AK 36 SQ STK 360	STK operating head / T pin shaft		766 365
4	1	ISV 36 STK 30 910	Extension for insulating rod $l = 910$ mm		766 356
6	1	IS 36 STK 43 1280	Insulating rod $l = 1280$ mm		766 463
7	1	HV STK 43 910	Extension handle $l = 910$ mm		766 456
9	1	KLT 130 33	Artificial leather bag, empty		766 069
ASS 36 STK 43	Operating rod kit, complete	up to 36 kV	1700 mm 2600 mm	25 kg 15 kg	766 452 new

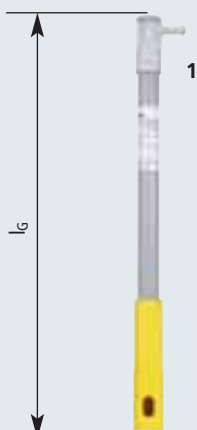


See next page for single parts for the IS STK insulating rod kit.

Single Parts of Insulating Rod IS STK (Kit)

SAFETY EQUIPMENT

OPERATING RODS



STK Switching Rod Head

Type	Diameter	Total length l_G	Position	Part No.
SSK 36 STK 560	30 mm	560 mm	1	766 164

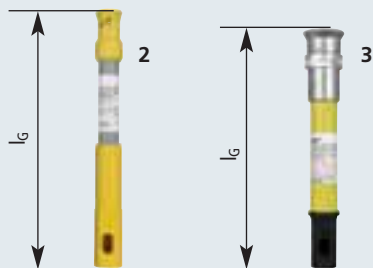
new

STK Operating Head / T Pin Shaft

Plastic coupling (bayonet locking mechanism) for indoor installations

Type	Diameter	Total length l_G	Position	Part No.
AK 36 SQ STK 360	30 mm	360 mm	2	766 365

new

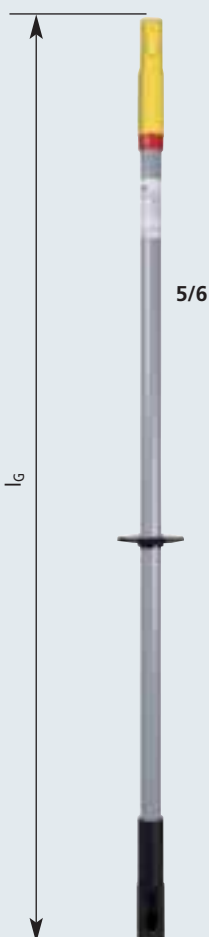


STK Operating Head / Long T Pin Shaft

Aluminium cone coupling with adjusting ring (bayonet locking mechanism) for earthing and short-circuiting in outdoor installations

Type	Diameter	Total length l_G	Position	Part No.
AK SQL STK 365	43 mm	365 mm	3	766 465

new



IS 36 STK Insulating Rod

Plug-in coupling at both ends for extension elements, operating heads or adapters

Type	Nominal voltage		Handle length		Total length l_G	Position	Part No.
	U_N	Diameter	l_H				
IS 36 STK 30 1280	up to 36 kV	30 mm	560 mm		1280 mm	5	766 363
IS 36 STK 43 1280	up to 36 kV	43 mm	560 mm		1280 mm	6	766 463

new

new

SAFETY EQUIPMENT

Single Parts of Insulating Rod IS STK (Kit)

OPERATING RODS

ISV 36 STK Extension for Insulating Rod

Plug-in coupling at both ends for extending the insertion depth or the handle

Type	Diameter	Total length		Position	Part No.	
		I _G				
ISV 36 STK 30 910	30 mm	910 mm		4	766 356	new
ISV 36 STK 30 1280	30 mm	1280 mm			766 366	

HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length		Position	Part No.	
		I _G				
HV STK 30 710	30 mm	710 mm			766 335	
HV STK 43 910	43 mm	910 mm		7	766 456	new
HV STK 43 1280	43 mm	1280 mm		8	766 466	new

STK Sealing Unit

Type	Diameter	Total length		Part No.	
		I _G			
A STK	30 / 43 mm	85 mm		766 888	new

STK Sealing Unit with Eye

Type	Diameter	Total length		Part No.	
		I _G			
AR STK	30 / 43 mm	150 mm		766 889	new

Artificial Leather Bag, empty

With zip and shoulder strap

Max. capacity:

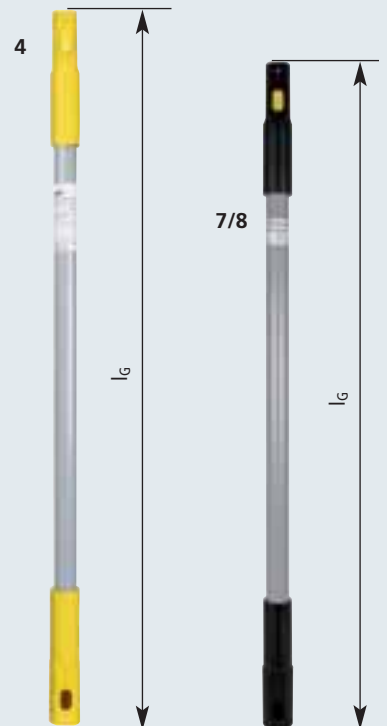
- 1 IS 36 STK insulating rod
- 2 ISV 36 STK extensions for insulating rods
- 1 STK switching rod head
- 1 Adapter or operating rod

Type	Colour	Dimensions	Position	Part No.
KLT 130 33	●	1300 x 300 mm	9	766 069

Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D30	●	30 mm	430 mm	700 007
HV P ST D40 45	●	40 ... 45 mm	530 mm	700 008



IS Insulating Rods

Nominal voltages up to 36 kV / 50 Hz

- Not for use in wet weather
- For indoor and outdoor installations
- Attachable switching rod head allows for use as switching rod
- Supporting head for hexagon shaft or T pin shaft
- For use as earthing rod
- For use as operating rod for insulating protective shutters in accordance with DIN VDE 0682 Part 552



SAFETY EQUIPMENT

OPERATING RODS

Insulating rod in accordance with DIN VDE 0681 Part 1
Switching rod head in accordance with DIN VDE 0681 Part 2



Switching a disconnector by means of an IS SK insulating rod with switching rod head.

Technical Data

Insulating tube	Glass-fibre reinforced polyester tube, Ø30 mm, yellow
Sealing unit	Slip-proof plastic cap or plug-in coupling for handle extension



IS SK insulating rod with SSK M12 switching rod head.



SSK SQ switching rod head mounted on an IS SQ insulating rod. The black knurled nut is locked into position using the insulating rod.



IS SK insulating rod for operating clamps with hexagon shaft of earthing and short-circuiting devices.

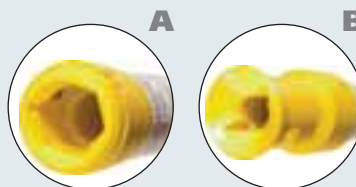


The handle of IS STK insulating rods can be easily extended via the plug-in coupling.

SAFETY EQUIPMENT

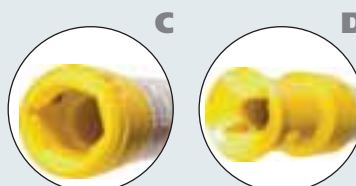
IS Insulating Rods

OPERATING RODS



Type	Nominal voltage U_N	Max. weight on the operating head*)	Total length l_G	Insertion depth l_o	Part No.
A Insulating Rods, Hexagon Shaft					
With M12 thread and spring locking mechanism					
– For use as switching rod with switching rod head, Part No. 765 005					
– For use as earthing rod					
IS 36 SK 1000	36 kV		1000 mm	175 mm	766 001
IS 36 SK 1500	36 kV		1500 mm	475 mm	766 002

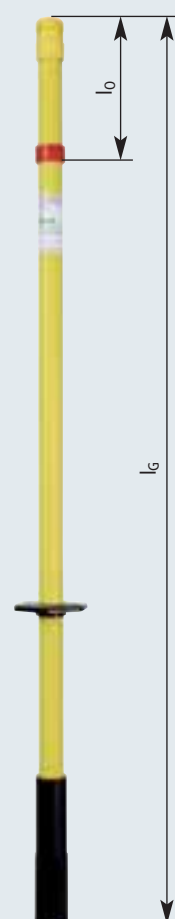
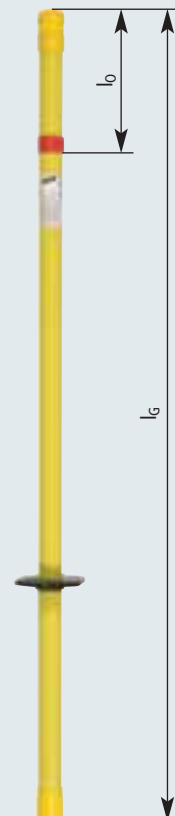
B Insulating Rods, T Pin Shaft					
Bayonet locking mechanism					
– For use as switching rod with switching rod head, Part No. 765 009					
– For use as earthing rod					
– For use as operating rod for insulating protective shutters					
IS 36 SQ 1000	36 kV	17 kg	1028 mm	150 mm	766 311
IS 36 SQ 1500	36 kV	17 kg	1528 mm	500 mm	766 315



Type	Nominal voltage U_N	Max. weight on the operating head*)	Total length l_G	Insertion depth l_o	Part No.
C STK Insulating Rod, Hexagon Shaft					
With M12 thread, spring locking mechanism and plug-in coupling for extending the handle					
– For use as switching rod with switching rod head Part No. 765 005					
– For use as earthing rod					
IS 36 SK STK 1000	36 kV		1000 mm	175 mm	766 100 new

D STK Insulating Rod, T Pin Shaft					
Bayonet locking mechanism and plug-in coupling for extending the handle					
– For use as switching rod with switching rod head Part No. 765 009					
– For use as earthing rod					
– For use as operating rod for insulated protective shutters					
IS 36 SQ STK 1000	36 kV	17 kg	1028 mm	150 mm	766 301 new

*) Max. shutter weight for the operation of insulating protective shutters.



Accessories for IS Insulating Rods

SAFETY EQUIPMENT

OPERATING RODS



Switching Rod Head for IS SK Insulating Rods, with M12 Thread

According to DIN VDE 0681 Part 2

Type	Material	Part No.
SSK M12	St, sheathed overall in PVC	765 005



Switching Rod Head for IS SQ Insulating Rods, with T Pin Shaft (Bayonet Locking Mechanism)

According to DIN VDE 0681 Part 2

T pin shaft acc. to DIN 48087

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

Type	Material	Part No.
SSK SQ	Polyamide	765 009



HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335
HV STK 43 910	43 mm	910 mm	766 456
HV STK 43 1280	43 mm	1280 mm	766 466

new

new



Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D30	●	30 mm	430 mm	700 007
HV P ST D40 45	●	40 ... 45 mm	530 mm	700 008

SAFETY EQUIPMENT

OPERATING RODS

DIN VDE 0681 Part 2



Switching a disconnector using an SCS switching rod.

Technical Data

Insulating tube	Glass-fibre reinforced polyester tube, Ø30 mm, grey
Switching pin	St, overall PVC sheathed, fixed
Sealing unit	Slip-proof plastic cap / plug-in coupling for handle extension

Type	Nominal voltage U_N	Max. load on the operating head *)	Total length l_G	Insertion depth l_0	Part No.
A Switching Rods					
SCS 36 1000	30 kV	17 kg	1030 mm	135 mm	763 610
SCS 36 1500	30 kV	17 kg	1500 mm	415 mm	763 611
SCS 36 2000	30 kV	9 kg	2000 mm	765 mm	763 612
SCS 72 1500	72.5 kV		1500 mm	290 mm	763 615
SCS 72 2000	72.5 kV		2000 mm	690 mm	763 620

B Switching Rods with Plug-In Coupling

SCS 36 STK 1000	36 kV	17 kg	1000 mm	135 mm	763 100 new
SCS 72 STK 1500	72.5 kV		1500 mm	290 mm	763 150 new

*) Max. shutter weight for handling insulating protective shutters. Other lengths are available on request.

Accessories for SCS Switching Rods


Storage Device

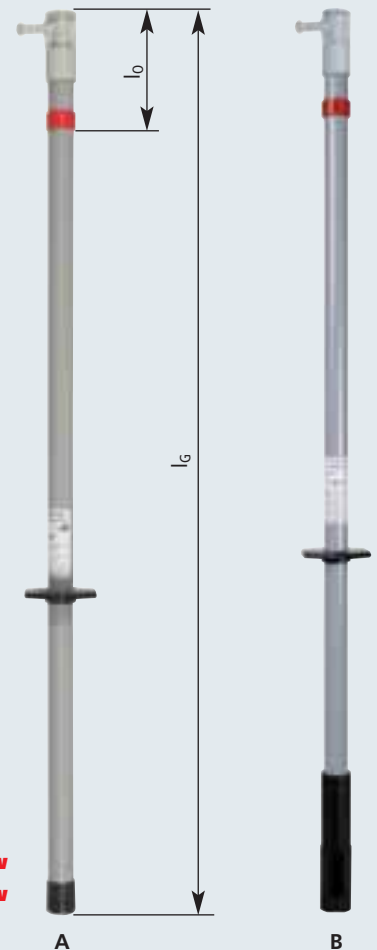
Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D30	●	30 mm	430 mm	700 007

SCS Switching Rods

Nominal voltages up to 72.5 kV / 50 Hz

- Not for use in wet weather 
- For indoor and outdoor installations
- Fully insulated, massive switching rod head
- Allows for deep access to the installation
- For use as operating rod for insulating protective shutters according to DIN VDE 0682 Part 552




SZ Fuse Tongs

Nominal voltages up to 36 kV

SAFETY EQUIPMENT

OPERATING RODS

DIN VDE 0681 Part 3

- Not for use in wet weather 
- Operating head with two adjustable jaws allows for use in case of restricted space between the poles
- Straight and angled (20°) operating head
- Secure clamping (up to 6.8 kg) due to symmetrical clamping jaws with integrated rubber surfaces
- Wide clamping range Ø30 ... 90 mm



Angled (20°) SZ fuse tongs for inserting and removing h.v.h.b.c. fuses.

A fuse tong is an operating rod used for working on energised parts of installations with voltages exceeding 1 kV a.c. The operating head is used for removing and inserting high-voltage high-breaking-capacity fuses (h.v.h.b.c. fuses). The clamping jaws are opened and closed by simply turning the adjustable handle.

Technical Data

Insulating rod	Glass-fibre reinforced polyester tube, Ø43 mm, grey
Clamping head	Glass-fibre reinforced polyamide, black
Adjustable handle	Polyamide, grey
Reduction insert	Polyamide, grey



In practice, the angled clamping head (20°) allows for safe and easy operation of h.v.h.b.c. fuses and makes it easy to install fuses in fuse holders that are not easily accessible.



The fuse tong offers a wide clamping range for fuses of a diameter of 50 mm to 90 mm. Used with the reduction insert, the clamping range is reduced to a diameter of 30 mm to 90 mm. The reducing insert is included in delivery.

SAFETY EQUIPMENT

SZ Fuse Tongs

OPERATING RODS

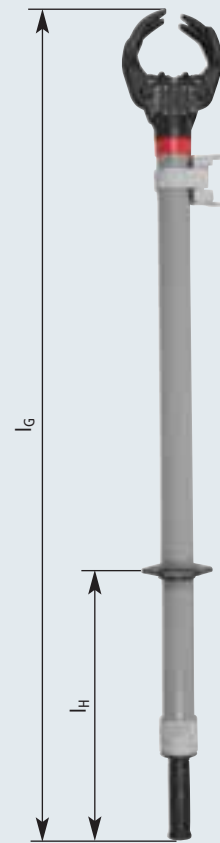


Type	Total length l_G	Handle length l_H	Part No.
A Straight type			
SZ HH 1060	1060 mm	350 mm	765 040
SZ HH 1250	1250 mm	530 mm	765 041
SZ HH 1500	1500 mm	780 mm	765 042

B Angled type (20°)

SZ HH W20 1070	1070 mm	350 mm	765 050
SZ HH W20 1250	1250 mm	530 mm	765 051
SZ HH W20 1500	1500 mm	780 mm	765 052

Other lengths are available on request.



Accessories for SZ Fuse Tongs

Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D40 45	●	40 ... 45 mm	530 mm	700 008



Wall-mounted Storage Device for h.v.h.b.c. Fuses and Fuse Tongs – Single Parts

Type	Application	Classification	Part No.
HV 3HH ET	for h.v.h.b.c. fuses	A	700 005
HV 3HH SZ ET	for h.v.h.b.c. fuses and fuse tong	B	700 004

Wall-mounted Storage Device for h.v.h.b.c. Fuses and Fuse Tongs – Set

Type	Application	Classification	Part No.
HV 3HH	for 3 h.v.h.b.c. fuses	2 x A	700 015
HV 3HH SZ	for 3 h.v.h.b.c. fuses and fuse tong	A + B	700 014



RST Rescue Rods

Nominal voltages up to 36 kV / 50 Hz

SAFETY EQUIPMENT

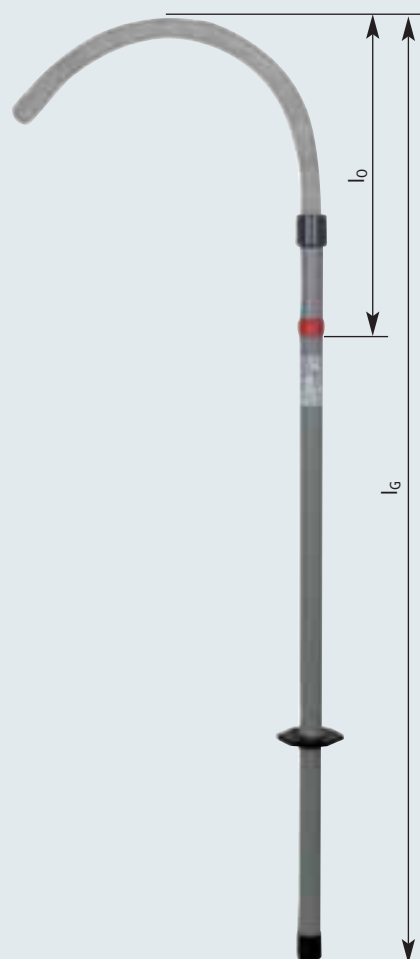
OPERATING RODS

Based on DIN VDE 0681 Part 1

- Not for use in wet weather
- For use in indoor and outdoor installations
- Fixed rescue hook, protected against bridging
- For rescuing persons (up to approx. 100 kg) from the live working zone in the event of electrical accidents



Rescuing an electric shock victim from the live working zone by means of an insulated RST rescue rod.



Technical Data

Hook	PVC-HI complete rod
Insulating tube	Glas-fibre-reinforced polyester tube, Ø30 mm, grey
Sealing unit	Non-slip plastic cap

Type	Total length l_G	Insertion depth l_0	Part No.
A Rescue Rod up to 36 kV			
RST 36 1000	1000 mm	175	766 040
RST 36 1500	1500 mm	425	766 041
RST 36 2000	2000 mm	775	766 042

Accessories for RST Rescue Rods

Storage Device

Wall-mounted



Type	Colour	Diameter	Dimensions	Part No.
HV P ST D30	●	30 mm	430 mm	700 007

SAFETY EQUIPMENT

INSULATING PROTECTIVE SHUTTERS

DIN VDE 0682 Part 552



Inserting an insulating protective shutter, type A1, by hand.

According to the five safety rules, adjacent parts are energised parts situated in the vicinity zone. If parts of an electrical installation close to the work location cannot be isolated, additional safety measures have to be taken before working in the vicinity of live parts.

Insulating protective shutters according to DIN VDE 0682 Part 522 are used for protection against accidental contact with energised parts. The shutters are portable and are inserted by hand or by using an operating rod when parts of the installation are connected to supply voltage. They are designed for short-term use in electrical indoor installations according to DIN VDE 0101 with supply voltages from 1 kV to 36 kV a.c. and nominal frequencies below 100 Hz for protection against direct contact according to DIN VDE 0105 Part 100 when working in the vicinity of live parts.

Insulating protective shutters may require modifications when used in medium voltage systems. In some cases, it may not be possible to insert the shutters in the live working zone without risk due to unfavourably located switchgear drives, switching components or isolating plates. These problems can be resolved in accordance with the standard by matching cut-outs and pre-cutting the protective shutters. In these cases we require technical details from our customers. For this purpose, we have developed a special template for insulating protective shutters. This template can be used and to mark the exact location of the cut-outs.

Range of services

When retrofitting systems, measurements have to be taken on site. For operational reasons these measurements are carried out under live conditions since the system should not be isolated.

To provide adequate protection during insertion of the protective shutters and when the shutters are inserted, it is normally necessary to install new guide rails and supports for the protective shutters. If you do not have the qualified staff available on site for this type of work, we would be pleased to assist you with measurements (even under live conditions), adjusting (reworking) complex shutter arrangements and with the installation of guide rails and supports.

Insulating Protective Shutters

Rated voltages from 1 kV to 36 kV

- For indoor installations only
- Protection against accidental contact with live parts of the installation with rated voltages of 1 kV to 36 kV
- Four different designs allow for use in almost all types of switchgear installations
- Retrofitting of insulating protective shutters (even under live conditions) into systems can be provided as a service



Please request the above mentioned template when placing your order or download it from our website www.dehn.de:

DEHN form No. 2090 for shutters made of rigid PVC
(see chapter "Index")

Four different designs are available:

- Type A1, with finger holes, guide and limit marks for insertion by hand on guide rails
- Type A2, with angled handles (90°) and grips for insertion by hand on guide rails
- Type A3, with supporting device (bayonet pin) for insertion on guide rails using an operating rod
- Type A4, with finger holes for insertion by hand for use in factory assembled switchgear installations

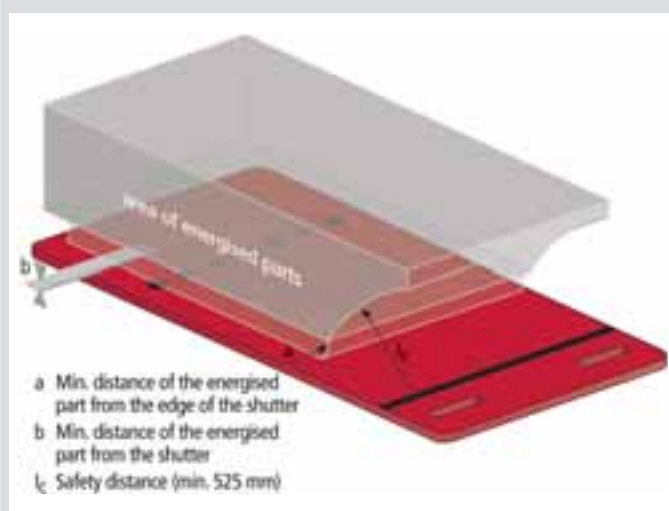


Example of the Live Working Zone

Rated voltages 1 kV up to 36 kV

SAFETY EQUIPMENT

INSULATING PROTECTIVE SHUTTERS



Live working zone of an insulating protective shutter type A1 (Example)

Rated voltage U_r	Minimum distance of the live part	
	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 are not designed for securing against reconnection. The protected area is the area which is separated by the insulating protective shutter from the area containing live parts of the installation. The shutter and shutter edge must maintain the minimum safety distances from energised parts as indicated in the table.

The protective part (with length l_s and, if required, height h_s) of insulating protective shutters is the part that provides protection from accidental contact with live parts. It is fitted with either a handle or a coupling unit for attaching it to an operating rod.

Outside of the area enclosing the live parts, gaps between shutter edge and cell wall are permissible as follows:

- 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 within the area of a switch subconstruction

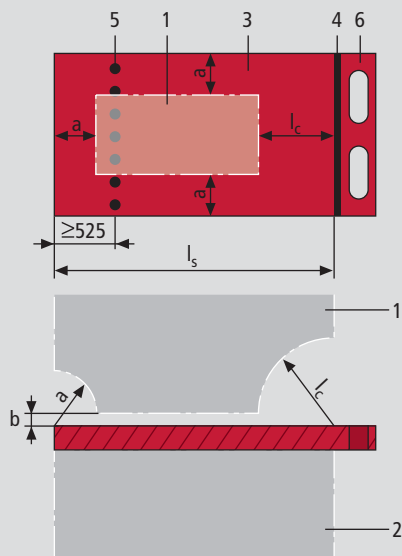
SAFETY EQUIPMENT INSULATING PROTECTIVE SHUTTERS

Designs

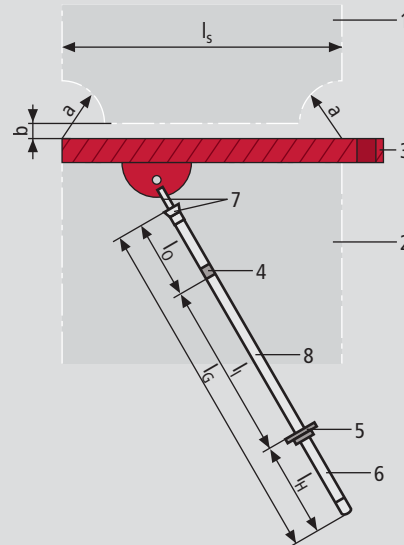
Rated voltages 1 kV up to 36 kV

Due to the variety in design of existing switchgear installations, DIN VDE 0682 Part 552 defines four basic types of protective shutters:

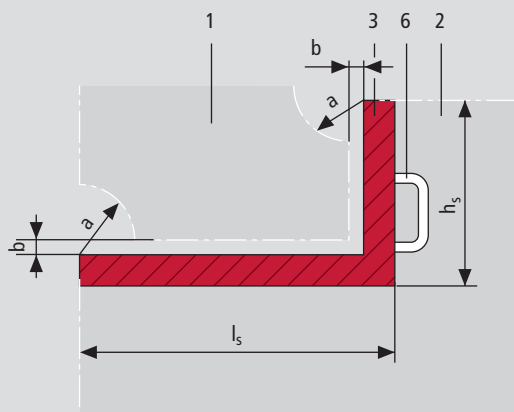
- Type **A1**, with finger holes, guide and limit marks for operation by hand on guide rails
- Type **A2**, with angled handles (90°) and grips for operation by hand on guide rails
- Type **A3**, with supporting device (bayonet pin) for operation on guide rails using an operating rod
- Type **A4**, with finger holes for operation by hand, for use in factory assembled switchgear installations



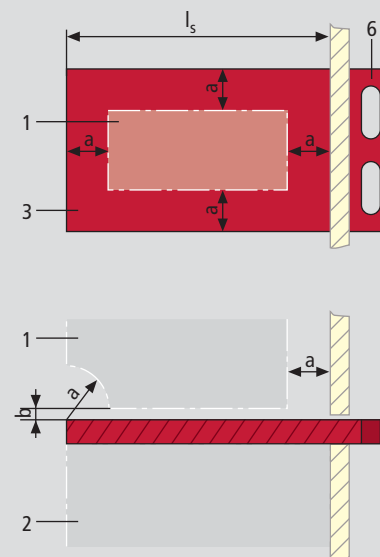
Protective shutter type **A1** – Operation by hand



Protective shutter type **A3** – Operation using an operating rod



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



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

- 1 Live working area
- 2 Protected area
- 3 Protective section with length l_s (and height h_s)
- 4 Limit mark or red ring
- 5 Guide mark or handguard
- 6 Handle
- 7 Coupling
- 8 Insulating element of the operating rod with length l_i

- l_o Total length of the operating rod
- l_h Length of the upper section of the operating rod
- l_i Length of the handle of the operating rod
- l_i Length of the insulating element of the operating rod
- l_s Length of the protective section
- l_c Protection distance

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

Insulating Protective Shutters, Types A1 and A2

Rated voltages 1 kV up to 36 kV

SAFETY EQUIPMENT

INSULATING PROTECTIVE SHUTTERS



Inserting an insulating protective shutter, type A1, by hand.

Type	Rated voltage U_r	Material	Part No.
A Type A1			
With finger holes, guide and limit mark for inserting and removing insulating protective shutters on / from guide rails by hand.			
The guide mark is a dotted line with a minimum distance of 525 mm from the rear shutter edge. This mark must not be surpassed when inserting the shutter.			
The limit mark is a continuous line and indicates the limit of the handle from the protective section. This mark must not be exceeded when inserting the shutter and must be at least 525 mm away from live parts when the shutter has been inserted.			
ISP 36 PVC A1...	36 kV	rigid PVC	763 211

When placing your order, please fill in the template on pages 253-255 (DEHN Form No. 2090) and fax it to DEHN + SÖHNE.

The template can also be downloaded from the Publications area of the DEHN + SÖHNE website www.dehn.de.

Guide rails and further accessories are also listed in the above mentioned form.



Inserting an insulating protective shutter (transparent), type A2.

B Type A2			
With angled handle (90°) and hand grips for inserting or removing insulating protective shutters on / from guide rails by hand. Other angled handle (70° ... 270°) are available on request.			
The height of the handle has to be defined to ensure that energised parts of the installation situated above the shutter are completely covered.			
ISP 36 PVC A2...	36 kV	rigid PVC	763 221

When placing your order, please fill in the template on pages 253-255 (DEHN Form No. 2090) and fax it to DEHN + SÖHNE.

The template can also be downloaded from the Publications area of the DEHN + SÖHNE website www.dehn.de.

Guide rails and further accessories are also listed in the above mentioned form.

SAFETY EQUIPMENT

INSULATING PROTECTIVE SHUTTERS

Insulating Protective Shutters, Types A3 and A4

Rated voltages 1 kV up to 36 kV

Type	Rated voltage U _r	Material	Part No.
C Type A3			
With supporting device (bayonet pin) for inserting and removing insulating protective shutters on / from guide rails using an operating rod.			
This shutter type is also available with a slot and a supporting device (rotatable shutter). The shutter is operated using an operating rod with switching rod head.			
Two persons are required for installing shutter sizes exceeding 1 m ² . For this purpose two operating rod couplings are required.			
Moreover, the shutter can also be provided with rolls for easier handling.			
ISP 36 PVC A3...	36 kV	rigid PVC	763 231

When placing your order, please fill in the template on pages 253-255 (DEHN Form No. 2090) and fax it to DEHN + SÖHNE.

The template can also be downloaded from the Publications area of the DEHN + SÖHNE website www.dehn.de.

Guide rails and further accessories are also listed in the above mentioned form.



Inserting an insulating protective shutter, type A3, by operating rod



Operating rod with T pin shaft (bayonet type) and coupling with T pin shaft at the insulating protective shutter.

D Type A4

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

The shutter is inserted into the closed installation through a slot.

The protection device of the installation must ensure full protection when inserting and removing the shutter.

In type-tested switchgear installations according to DIN VDE 0670 Parts 6 and 7 or EN/IEC 62271-200 (DIN VDE 0671 Part 200), insulating protective shutters may only be used after consulting with the manufacturer of the switchgear installation

ISP 36 PVC A4...	36 kV	rigid PVC	763 241
------------------	-------	-----------	----------------

When placing your order, please fill in the template on pages 253-255 (DEHN Form No. 2090) and fax it to DEHN + SÖHNE.

The template can also be downloaded from the Publications area of the DEHN + SÖHNE website www.dehn.de.

Guide rails and further accessories are also listed in the above mentioned form.



Inserting an insulating protective shutter, type A4.

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

Earthing and Short-circuiting Devices

Earthing and short-circuiting at the work location is a vital part of the five safety rules. Earthing and short-circuiting ensure the protection of personnel from dangerous voltages that may be caused by induced voltages, atmospheric surges or accidental reconnection of the supply voltage. Isolation from supply voltages must be verified immediately before installing portable earthing and short-circuiting devices at the installation point.

When connecting the earthing and short-circuiting device, the earthing cable must be connected to the earthing system first in order to discharge any residual potential or induced voltages.

Portable earthing and short-circuiting devices according to IEC/EN 61230 (DIN VDE 0683 Part 100) are hand-held devices used to approach the connecting points of electrical parts of an installation for earthing and short-circuiting purposes and to connect them to the connecting points. These devices are applied without restricted guidance e.g. guide slots, sockets, guide rails.

The device consists of an earthing and short-circuiting device (E+S devices) and an earthing rod.

The purpose of **earthing and short-circuiting devices** is to earth and short-circuit electrical circuits. It consists of an earthing device and a short-circuiting device.

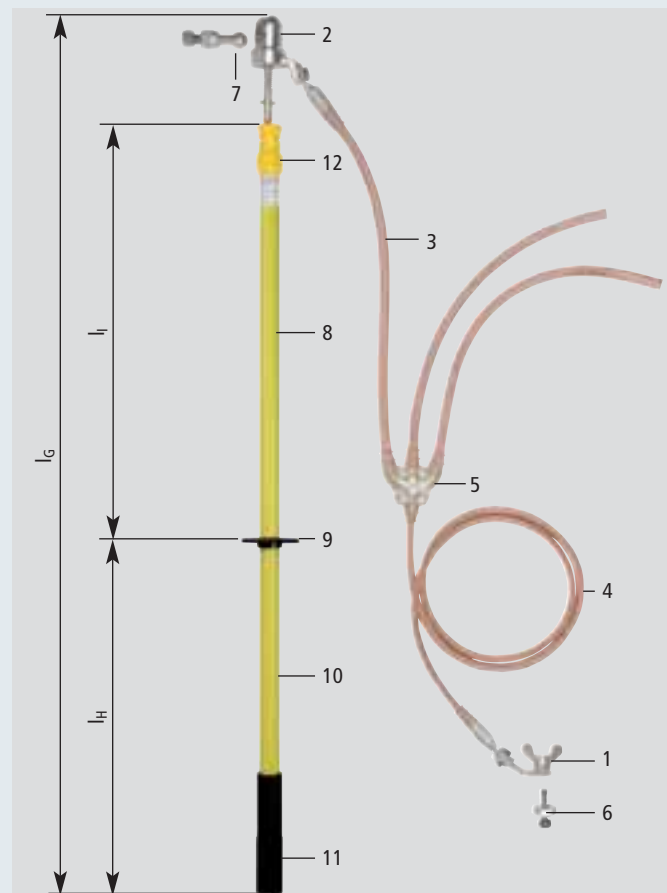
The **earthing device** connects the earthing system to a short-circuiting device or to the equipment to be earthed (Figures a to d). It consists of a connecting component (1) and earthing cable (4).

The **short-circuiting device** connects the phase conductors that have to be short-circuited (6). It consists of connecting components (2), short-circuiting cables or short-circuiting busbars (3) and connecting pieces, if required (5).

The **short-circuiting bar** is a rigid short-circuiting device.

Connecting pieces connect the short-circuiting cables to each other and to the earthing cable or the short-circuiting bar to the earthing cable.

Connecting components connect the earthing and short-circuiting cables or bars to the earthing system and parts of the installation either directly or via connecting links such as cable lugs or, if required, connecting points.



Portable earthing and short-circuiting device

- | | |
|---|---------------------------------------|
| 1 Connecting component to earthing system | 6 Connecting point to earthing system |
| 2 Connecting component to conductor | 7 Connecting point to conductor |
| 3 Short-circuiting cable | 8 Insulating part with length l_I |
| 4 Earthing cable | 9 Handguard |
| 5 Connecting piece | 10 Handle with length l_H |
| | 11 Sealing unit with plug-in |
| | 12 Coupling |

Connecting points are points in the installation, to which coupling are connected earthing and short-circuiting devices (e.g. cables, bars, fixed ball points, cylinder bolts, brackets etc.). Maximum short-circuit strength can be achieved by connecting the ball head cap of the earthing and short-circuiting device to fixed ball points.

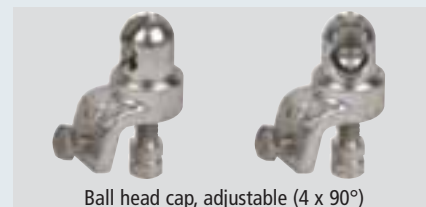
Two types of ball head caps are available:

- Ball head cap, rigid
- Ball head cap, adjustable (4 x 90°)

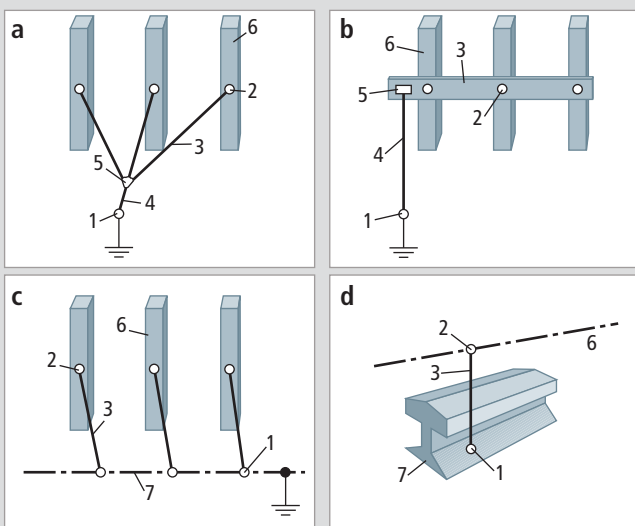
The adjustable ball head cap allows the user to position the earthing and short-circuiting device in the most favourable operating position by adjusting the ball head cap, even if the fixed ball points are unfavourably located. Using angled fixed ball points is therefore mostly unnecessary.



Ball head cap, rigid



Ball head cap, adjustable (4 x 90°)



- | | |
|--|--|
| a 3-pole unit with short-circuiting cables and earthing cable | 1 Connecting component to earthing system |
| b 3-pole unit with short-circuiting bar and earthing cable | 2 Connecting component to conductor |
| c Single-pole unit with short-circuiting cables | 3 Earthing and short-circuiting cable or earthing busbar |
| d Single-pole unit with short-circuiting cable for earthing railways | 4 Earthing cable |
| | 5 Connecting piece |
| | 6 Phase conductor |
| | 7 Earthing system (earthing busbar, rail) |

Earthing and Short-circuiting Devices

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

An **earthing rod** is a hand-held insulating rod for approaching the connecting components of earthing and short-circuiting devices to parts of electrical installations for earthing and short-circuiting purposes. It consists of an insulating part, black ring, handle and coupling for a connecting component. Earthing rods are selected according to the **weight** of the respective earthing and short-circuiting devices (See specification: "max. load on operating head in kg").

The **insulating part** is the part of the earthing rod between the black ring and the end of the earthing rod in the direction of the connecting component. It ensures that the user maintains a safe distance and provides sufficient insulation. The insulating part l_i must have a minimum length of 500 mm.

A complete device for earthing and short-circuiting device according to EN/IEC 61230 (DIN VDE 0683 Part 100) includes e.g.

- 1 Fixed point / Fixed ball point
- 2 Single-pole or three-pole earthing and short-circuiting device or short-circuiting bar
- 3 Fixed earthing point
- 4 Earthing rod

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).

Remark:

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.

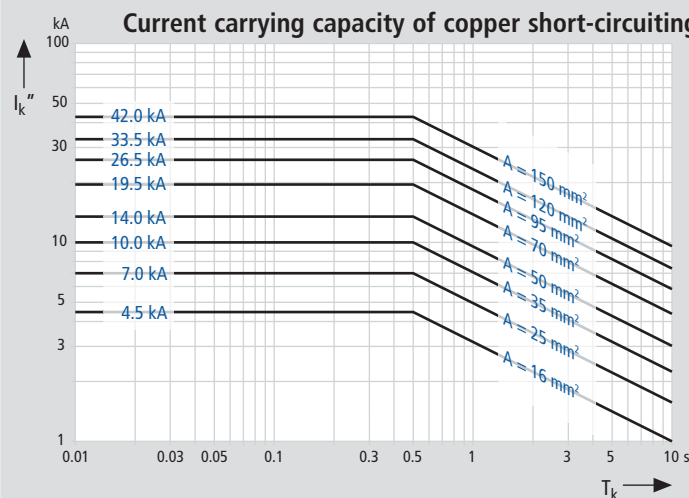
Cable cross section:

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
	25 mm ²	25 mm ²
	35 mm ²	35 mm ²
	50 mm ²	25 mm ²
	70 mm ²	35 mm ²
	95 mm ²	35 mm ²
	120 mm ²	50 mm ²
	150 mm ²	50 mm ²

These earthing and short-circuiting devices with reduced earthing cable cross sections can be used for all types of installations with **compensated systems** (no solidly earthed systems, i.e. with impedance neutral earthing). For installations with **solid earthing**, earthing and short-circuiting cables must have equal cross sections (available on request).

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

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

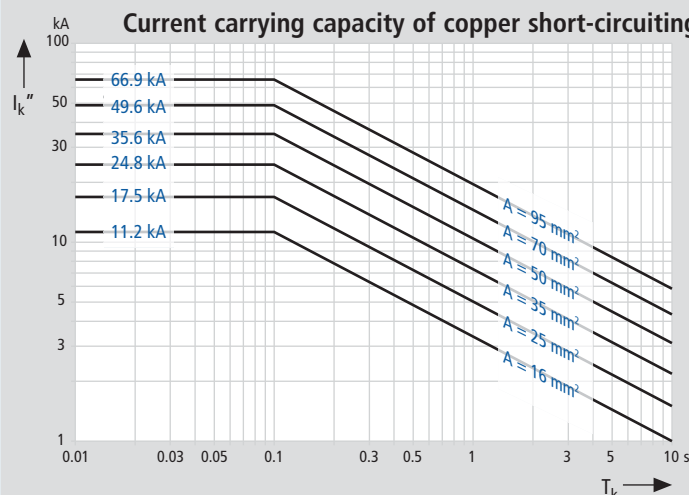
where

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

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

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

SAFETY EQUIPMENT

Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

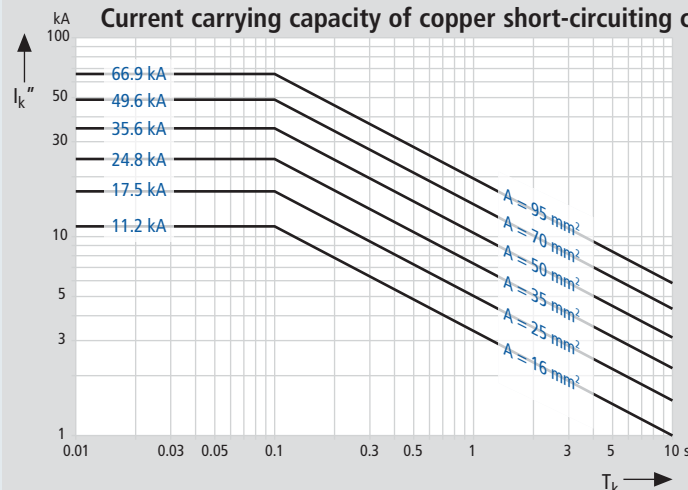
The **current carrying capacity** of the short-circuiting cable and the short-circuiting bar depends on the material, the cross section (A) and the short-circuit time (T_k).

Calculations were based on the most critical case, i.e. an off-generator short circuit ($\mu = 1$) and are maximum d.c. component ($\chi = 1.8$) with I_k'' being the maximum initial short-circuit 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 for an installation.

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



Initial cable temperature 20° C

Final cable temperature 400° C

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

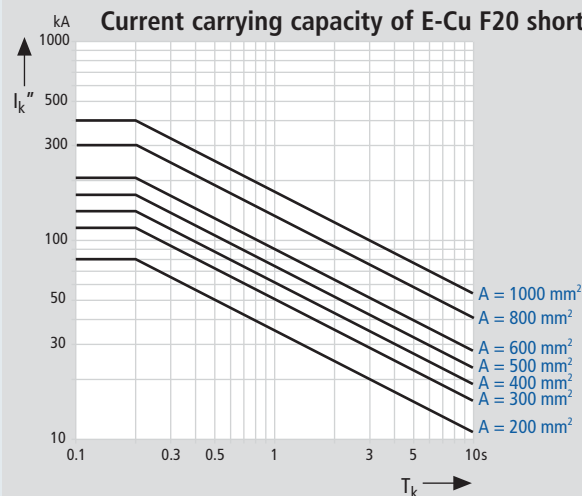
where

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 E-Cu F20 short-circuiting busbars



Initial cable temperature 20° C

Final cable temperature 250° C

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

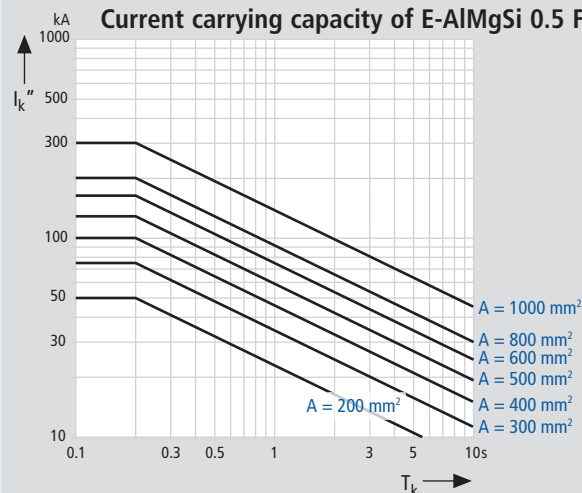
where

A 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 E-AlMgSi 0.5 F17 short-circuiting busbars



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 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

SAFETY EQUIPMENT

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.

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

$$\text{Single-phase a.c. current } I_k'' = I_k = I_a = \frac{S_a}{U_N}$$

I_k'' , the required cable or bar cross section can now be calculated with the value of the above equation or can be taken from the diagrams. The permissible short-circuit current of an earthing and short-circuiting device expressed by indicating the cross-section of 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 equal 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 termination 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 connection parts and termination points,
 3. Installing the devices directly next to each other, with parallel arrangement of cables,
 4. The loading capacity per lead must be reduced to 75% of the loading 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 for 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. permissible short-circuit current I_k at a duration of				
	10 s	5 s	2 s	1 s	≤ 0.5 s
16 mm ²	1 000 A	1 400 A	2 200 A	3 200 A	4 500 A
25 mm ²	1 600 A	2 200 A	3 500 A	4 900 A	7 000 A
35 mm ²	2 200 A	3 100 A	4 900 A	6 900 A	10 000 A
50 mm ²	3 100 A	4 400 A	7 000 A	9 900 A	14 000 A
70 mm ²	4 400 A	6 200 A	9 800 A	13 800 A	19 500 A
95 mm ²	5 900 A	8 400 A	13 200 A	18 700 A	26 500 A
120 mm ²	7 500 A	10 600 A	16 700 A	23 700 A	33 500 A
150 mm ²	9 400 A	13 200 A	20 900 A	29 600 A	42 000 A
					our catalogue data

SAFETY EQUIPMENT

Selection Guide

EARTHING AND SHORT-CIRCUITING DEVICES

Components

Page

Fixed Points

96



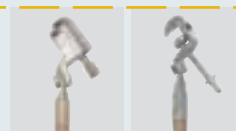
Three-pole Earthing and Short-circuiting Devices

104



Single-pole Earthing and Short-circuiting Devices

114



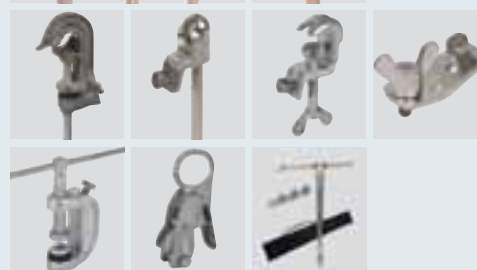
Cables

122



Connecting Elements

124



Earthing Rods

134



Installation Devices

140



Storage Devices

141



Fixed Phase and Earthing Points

Fixed ball points, straight and angled, ball Ø20 or 25 mm

- Suitable for fixing cable lugs or connecting busbars according to DIN 43673 Part 1
- Self-locking nut
- Formed (not cut) M12 or M16 female thread
- M12 or M16 threaded bolt

Technical Data

Fixed point	E-Cu/gal Sn
Threaded bolt	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

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 1



Straight fixed ball point installed on a busbar.



Type	Fixed ball point Ø	Dimensions	Width A/F	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	--------------------	------------	-----------	--------------------------	--------------------------------------	----------

A Straight, with threaded Bolt and Nut

KFP 20 M12 35 SSM	20 mm	M12 x 35 mm	24 mm	120 mm ²	23.7 kA	754 235
KFP 20 M16 45 SSM	20 mm	M16 x 45 mm	24 mm	120 mm ²	23.7 kA	754 645
KFP 25 M12 25 SSM	25 mm	M12 x 25 mm	27 mm	150 mm ²	29.6 kA	755 225
KFP 25 M12 45 SSM	25 mm	M12 x 45 mm	27 mm	150 mm ²	29.6 kA	755 245
KFP 25 M16 45 SSM	25 mm	M16 x 45 mm	27 mm	150 mm ²	29.6 kA	755 645

B Straight, with female Thread

KFP 20 M12	20 mm	M12	24 mm	120 mm ²	23.7 kA	754 200
KFP 20 M16	20 mm	M16	24 mm	120 mm ²	23.7 kA	754 600
KFP 25 M12	25 mm	M12	27 mm	150 mm ²	29.6 kA	755 200
KFP 25 M16	25 mm	M16	27 mm	150 mm ²	29.6 kA	755 600

C Angled, with Terminal Lug

KFP 20 S AL 12	20 mm	45 x 30 x 9 mm		50 mm ²	9.9 kA	706 300
KFP 25 S AL 12	25 mm	50 x 30 x 9 mm		95 mm ²	18.7 kA	756 300

Other threaded bolt lengths are available on request.

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

Fixed Phase and Earthing Points

Fixed ball points, angled,
ball Ø20 or 25 mm

EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 1



Angled fixed ball point.

- Suitable for fixing cable lugs or connecting busbars according to DIN 43673 Part 1
- Self-locking nut
- Formed (not cut) M12 or M16 female thread
- M12 or M16 threaded bolt

Technical Data

Fixed point E-Cu/gal Sn

Threaded bolt StSt A2-70

Hexagon nut DIN 985-M12-8 / gal Zn;
DIN 985-M16-8 / gal ZnTightening torque M12: 80 Nm;
M16: 150 Nm

Type	Fixed ball point Ø	Dimensions	Width A/F	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	--------------------	------------	-----------	--------------------------	--------------------------------------	----------

A Angled (45°), with threaded Bolt and Nut

KFP 20 W45 M12 35SSM	20 mm	M12 x 35 mm	24 mm	70 mm ²	13.8 kA	706 235
KFP 20 W45 M16 45SSM	20 mm	M16 x 45 mm	24 mm	70 mm ²	13.8 kA	706 645
KFP 25 W45 M12 45SSM	25 mm	M12 x 45 mm	27 mm	95 mm ²	18.7 kA	756 245
KFP 25 W45 M16 45SSM	25 mm	M16 x 45 mm	27 mm	95 mm ²	18.7 kA	756 645

B Angled (45°), with female Thread

KFP 20 W45 M12	mm	M16	27 mm	95 mm ²	18.7 kA	756 600
----------------	----	-----	-------	--------------------	---------	----------------

C Angled (90°), with threaded Bolt and Nut

KFP 20 W90 M12 35SSM	20 mm	M12 x 35 mm	24 mm	70 mm ²	13.8 kA	707 235
KFP 20 W90 M16 45SSM	20 mm	M16 x 45 mm	24 mm	70 mm ²	13.8 kA	707 645
KFP 25 W90 M12 45SSM	25 mm	M12 x 45 mm	27 mm	95 mm ²	18.7 kA	757 245
KFP 25 W90 M16 45SSM	25 mm	M16 x 45 mm	27 mm	95 mm ²	18.7 kA	757 645

D Angled (90°), with female Thread

KFP 20 W90 M12	20 mm	M12	24 mm	70 mm ²	13.8 kA	707 200
KFP 20 W90 M16	20 mm	M16	24 mm	70 mm ²	13.8 kA	707 600
KFP 25 W90 M12	25 mm	M12	27 mm	95 mm ²	18.7 kA	757 200
KFP 25 W90 M16	25 mm	M16	27 mm	95 mm ²	18.7 kA	757 600

Other threaded bolt lengths are available on request.



Fixed Phase and Earthing Points

Fixed ball points, for round conductors, ball Ø20 or 25 mm

- For round copper conductors
- Installation bolts made of stainless steel

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

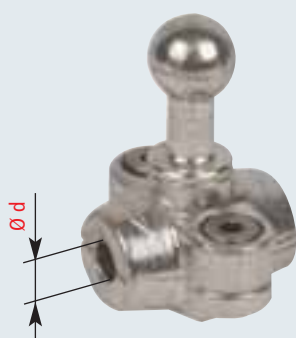
EN/IEC 61230 (DIN VDE 0683 Part 100)



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

Technical Data

Ball pin	E-Cu/gal Sn
Round conductor components	Cu alloy/gal Sn
Installation bolts	Hexagon socket-head bolts, StSt



Type	Fixed ball point Ø	For round conductor Ø d	Max. short-circuit current I_k 1 s	Part No.
------	--------------------	-------------------------	--------------------------------------	----------

A Round Conductor Ø10-20 mm

KFP 20 RL 10	20 mm	10 mm	9.9 kA	720 010
KFP 20 RL 12	20 mm	12 mm	9.9 kA	720 012
KFP 20 RL 14	20 mm	14 mm	9.9 kA	720 014
KFP 20 RL 16	20 mm	16 mm	9.9 kA	720 016
KFP 20 RL 18	20 mm	18 mm	9.9 kA	720 018
KFP 20 RL 20	20 mm	20 mm	9.9 kA	720 020
KFP 25 RL 10	25 mm	10 mm	18.7 kA	725 010
KFP 25 RL 12	25 mm	12 mm	18.7 kA	725 012
KFP 25 RL 14	25 mm	14 mm	18.7 kA	725 014
KFP 25 RL 16	25 mm	16 mm	18.7 kA	725 016
KFP 25 RL 18	25 mm	18 mm	18.7 kA	725 018
KFP 25 RL 20	25 mm	20 mm	18.7 kA	725 020

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

Note: Please specify the conductor diameter d when placing your order!

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

Fixed Earthing Points

Grooved ring Ø16 mm

EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 2



Fixed earthing point with grooved ring and earth connector.

- For connecting earth connectors or earth connecting plates according to DIN 48088 Part 2
- Self-locking nut
- Formed (not cut) M12 or M16 female thread
- M12 or M16 threaded bolt

Technical Data

Fixed point	Brass (CuNi2Si) / gal Sn
Threaded bolt	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

Type	Dimensions	Width A/F	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	------------	--------------	-----------------------------	---	-------------

A Grooved Ring Ø16 mm, threaded Bolt and Nut

EFP 16 RN M12 35 SSM	M12 x 35 mm	22 mm	150 mm ²	29.6 *) kA	790 251
EFP 16 RN M16 45 SSM	M16 x 45 mm	22 mm	150 mm ²	29.6 *) kA	790 261

B Grooved Ring Ø16 mm, with female Thread

EFP 16 RN M12	M12	22 mm	150 mm ²	29.6 *) kA	790 250
EFP 16 RN M16	M16	22 mm	150 mm ²	29.6 *) kA	790 260

*) For earthing and short-circuiting devices with cable lengths ≥ 2.5 m: 18.7 kA / 1 s



Fixed Earthing Points

Connectors

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

SAFETY EQUIPMENT EARTHING AND SHORT-CIRCUITING DEVICES

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



Earth connector with M12 threaded bolt for connection to an earthed part of the installation.



Type	Dimensions	Width A/F	Material	Part No.
------	------------	--------------	----------	-------------

A Welding-type Connector, with threaded Bolt

AS SCHW M12 25	M12 x 25 mm		St/gal Zn	705 501
AS SCHW M16 30	M16 x 30 mm		St/gal Zn	755 501

B Welding-type Connector, with female Thread

AS SCHW M12	M12		St/gal Zn	336 020
AS SCHW M16	M16		St/gal Zn	336 025

C Bolted-type Connector, with female Thread

AS SCHR M12 M12 40	M12 / M12 x 40 mm	27 mm	Cu alloy/gal Sn	705 504
--------------------	-------------------	-------	-----------------	---------

D Bolted-type Connector, with threaded Bolt and separate hexagon Nut

AS SCHR M12 55	M12 x 55 mm	32 mm	StSt / Cu alloy/gal Sn / St/tZn	705 500
AS SCHR M16 65	M16 x 65 mm	41 mm	StSt / Cu alloy/gal Sn / St/tZn	750 500

E Bolted-type Connector, for converting from M12 to M16 threaded Bolt

AS SCHR M16 55 M12	M12 x 20 / M16 x 55 mm	41 mm	StSt / Cu alloy/gal Sn	705 510
--------------------	------------------------	-------	------------------------	---------

SAFETY EQUIPMENT

Earth Connecting Plates

EARTHING AND SHORT-CIRCUITING DEVICES

Fixed points according to EN/IEC 61230 (DIN VDE 0683 Part 100) and DIN 48088 Part 1

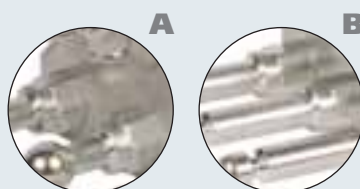


Earth connecting plate with fixed ball points and ball head cap with insulated handle.

Technical Data

Fixed point	Brass (CuNi2Si) / gal Sn
Threaded bolt	StSt A2-70
Hexagon nut	DIN 985-M12-8 / gal Zn; DIN 985-M16-8 / gal Zn

- For indoor and outdoor installations
- Connecting plate with high short-circuit carrying capacity
- Allows for individual connection of the short-circuiting cables
- For fixed ball points Ø20, Ø25 mm or grooved ring bolt Ø16 mm



Type	Fixed point Ø	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	---------------	--------------------------	--------------------------------------	----------

A With Ball Head Cap and 3 Fixed Ball Points

EAP 3 20 KKH	20 mm	120 mm ²	23.7 kA	728 300
EAP 3 25 KKH	25 mm	150 mm ²	29.6 kA	728 500

B With Earth Connector and 3 Fixed Earthing Points, with grooved Ring

EAP 3 16 RN	16 mm	95 mm ²	18.7 kA	728 520
-------------	-------	--------------------	---------	---------

Other types are available on request.



Fixed Phase Points

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

Clamp according to DIN 48088 Part 3

- 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 with greater clamp widths available on request



Fixed phase point installed on an overhead line conductor.

Technical Data

Clamp	Al or Cu alloy
Screws	StSt



Type	For conductor Ø d	Clamp width b	Max. short-circuit current I _k 1 s	Part No.
------	----------------------	------------------	--	-------------

A Fixed Phase Points for Al and Al/St Cables

PFP 11 33 AL 60 82	11.0 ... 33 mm	82 mm	23.7 kA	731 011
PFP 34 48 AL 60 98	33.1 ... 48 mm	98 mm	23.7 kA	731 013
PFP 49 70 AL 60 126	48.1 ... 70 mm	126 mm	23.7 kA	731 015

B Fixed Phase Points for round Copper Conductors

PFP 11 33 CU 60 82	11.0 ... 33 mm	82 mm	23.7 kA	731 027
PFP 34 48 CU 60 98	33.1 ... 48 mm	98 mm	23.7 kA	731 037

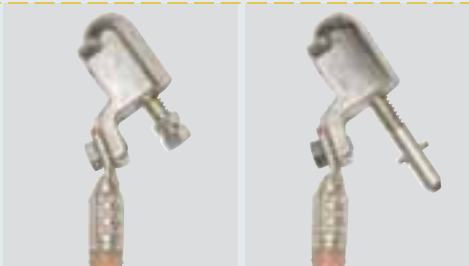



Note: Please indicate the conductor diameter d when placing your order.

SAFETY EQUIPMENT

Quick Overview

EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)

Components	Type	Page	Phase connecting elements	
Earthing and Short-Circuiting Devices				
Ball Head Cap, rigid, hexagon Shaft	Three-pole	104		
	Single-pole	114		
Ball Head Cap, rigid, T pin Shaft	Three-pole	105		
	Single-pole	115		
Earthing and Short-Circuiting Devices				
Ball Head Cap, adjustable (4 x 90°), hexagon Shaft	Three-pole	106		
	Single-pole	116		
Ball Head Cap, adjustable (4 x 90°), T pin Shaft	Three-pole	107		
	Single-pole	117		
Earthing and Short-Circuiting Devices				
Universal Clamp, Clamping Range 20 / 25 mm, hexagon Shaft	Three-pole	108		
	Single-pole	118		
Universal Clamp, Clamping Range 20 / 25 mm, T pin Shaft	Three-pole	109		
	Single-pole	119		
Earthing and Short-Circuiting Devices				
Universal Clamp, Clamping Range 25 / 30 mm, hexagon Shaft	Three-pole	110		
	Single-pole	120		
Universal Clamp, Clamping Range 25 / 30 mm, T pin Shaft	Three-pole	111		
	Single-pole	121		

Three-pole Earthing and Short-circuiting Devices

SAFETY EQUIPMENT

Ball head cap, rigid, hexagon shaft EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)

Phase connecting elements

KKH 20 SK
KKH 25 SK

a b c = 600 mm

d = 1800 mm



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA

Earth connecting elements



EAS EK FM 12



EAS EK FS 12



EAB RN 16 FS

Part No.

Part No.

Part No.

725 618
735 618
750 350
770 350
794 350
711 350

725 317
735 317
750 317
770 317
794 317
711 317

725 358
735 358
750 358
770 358
794 358
711 358



EAS EK FM 16



EAS EK FS 16



EFK FL30 SKN

Part No.

Part No.

Part No.

725 362
735 362
750 362
770 362
794 362
711 362

725 363
735 363
750 363
770 363
794 363
711 363

725 360
735 360
750 360
770 360
794 360
711 360

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HGUEK 25 FS
UEK 30 FS

Part No.

Part No.

Part No.

725 619
735 619
750 356
770 356
794 356
711 356

725 357
735 357
750 357
770 357
794 357
711 357

725 359
735 359
750 359
770 359
794 359
711 359

Other cable lengths as well as types with unreduced cross sections of earthing cables, other earth clamps and earth connection units are available on request. Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Three-pole Earthing and Short-Circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

Ball head cap, rigid, T pin shaft

EN/IEC 61230 (DIN VDE 0683 Part 100)

Earth connecting elements

Phase connecting elements



EAS EK FM 12



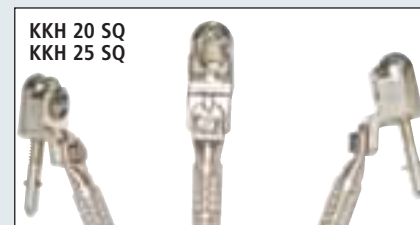
EAS EK FS 12



EAB RN 16 FS

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 620	725 365	725 368
735 620	735 365	735 368
750 351	750 365	750 368
770 351	770 365	770 368
794 351	794 365	794 368
711 351	711 365	711 368
795 351	795 365	795 368
712 351	712 365	712 368
715 351	715 365	715 368



EAS EK FM 16



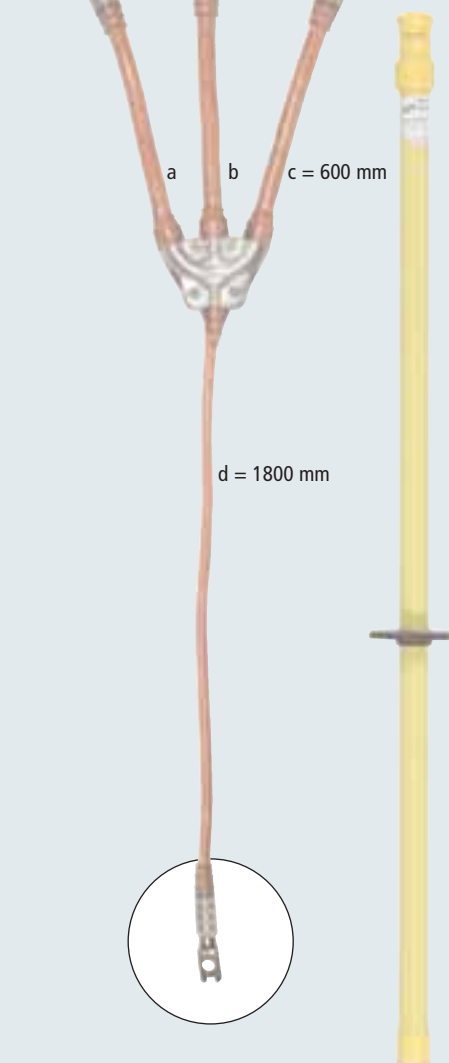
EAS EK FS 16



EFK FL30 SKN

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 372	725 373	725 370
735 372	735 373	735 370
750 372	750 373	750 370
770 372	770 373	770 370
794 372	794 373	794 370
711 372	711 373	711 370
795 372	795 373	795 370
712 372	712 373	712 370
715 372	715 373	715 370

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HGUEK 25 FS
UEK 30 FS

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 621	725 367	725 369
735 621	735 367	735 369
750 366	750 367	750 369
770 366	770 367	770 369
794 366	794 367	794 369
711 366	711 367	711 369
795 366	795 367	795 369
712 366	712 367	712 369
715 366	715 367	715 369

Other cable lengths as well as types with unreduced cross sections of earthing cables, other earth clamps and earth connection units are available on request. Earthing rod is not included in delivery.

Three-pole Earthing and Short-circuiting Devices

SAFETY EQUIPMENT

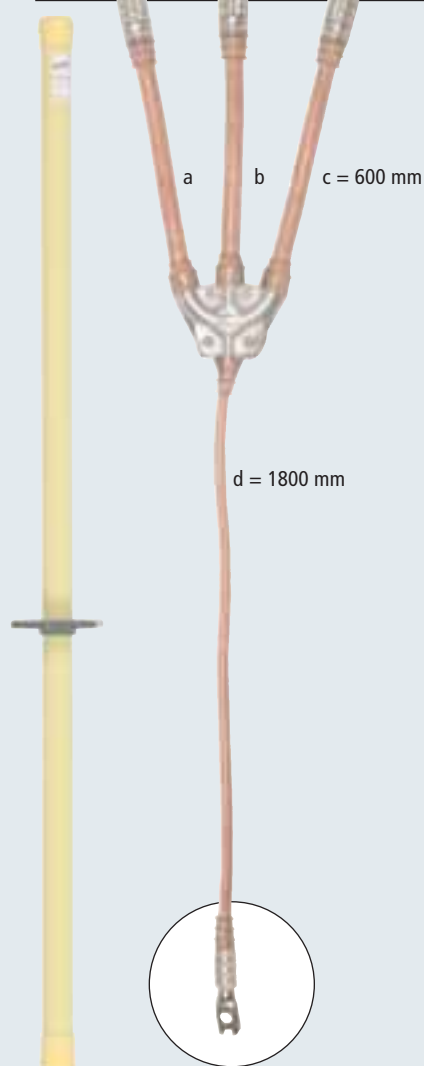
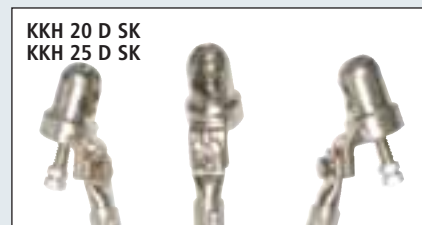
Ball head cap, adjustable (4 x 90°), hexagon shaft

EARTHING AND SHORT-CIRCUITING DEVICES

IEC/EN 61230 (DIN VDE 0683 Part 100)

Phase connecting elements

Earth connecting elements



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA



EAS EK FM 12



EAS EK FS 12



EAB RN 16 FS

Part No.	Part No.	Part No.
725 718	725 375	725 378
735 718	735 375	735 378
750 353	750 375	750 378
770 353	770 375	770 378
794 353	794 375	794 378
711 353	711 375	711 378
795 374	795 375	795 378
712 374	712 375	712 378
715 374	715 375	715 378



EAS EK FM 16



EAS EK FS 16



EFK FL30 SKN

Part No.	Part No.	Part No.
725 382	725 383	725 380
735 382	735 383	735 380
750 382	750 383	750 380
770 382	770 383	770 380
794 382	794 383	794 380
711 382	711 383	711 380
795 382	795 383	795 380
712 382	712 383	712 380
715 382	715 383	715 380

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HGUEK 25 FS
UEK 30 FS

Part No.	Part No.	Part No.
725 719	725 377	725 379
735 719	735 377	735 379
750 376	750 377	750 379
770 376	770 377	770 379
794 376	794 377	794 379
711 376	711 377	711 379
795 376	795 950	795 379
712 376	712 950	712 379
715 376	715 950	715 379

Other cable lengths as well as types with unreduced cross sections of earthing cables, other earth clamps and earth connection units are available on request. Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Three-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

Ball head cap, adjustable (4 x 90°),
T pin shaft

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements

Phase connecting elements



EAS EK FM 12



EAS EK FS 12



EAB RN 16 FS

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 720	725 385	725 388
735 720	735 385	735 388
750 354	750 385	750 388
770 354	770 385	770 388
794 354	794 385	794 388
711 354	711 385	711 388
795 384	795 385	795 388
712 384	712 385	712 388
715 384	715 385	715 388



EAS EK FM 16



EAS EK FS 16



EFK FL30 SKN

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 392	725 393	725 390
735 392	735 393	735 390
750 392	750 393	750 390
770 392	770 393	770 390
794 392	794 393	794 390
711 392	711 393	711 390
795 392	795 393	795 390
712 392	712 393	712 390
715 392	715 393	715 390

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HGUEK 25 FS
UEK 30 FS

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25/25 mm ²	4.9 kA
20 mm	35/35 mm ²	6.9 kA
20 mm	50/25 mm ²	9.9 kA
20 mm	70/35 mm ²	13.8 kA
20 mm	95/35 mm ²	18.7 kA
20 mm	120/50 mm ²	23.7 kA
25 mm	95/35 mm ²	18.7 kA
25 mm	120/50 mm ²	23.7 kA
25 mm	150/50 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 721	725 387	725 389
735 721	735 387	735 389
750 386	750 387	750 389
770 386	770 387	770 389
794 386	794 387	794 389
711 386	711 387	711 389
795 386	795 951	795 389
712 386	712 951	712 389
715 386	715 951	715 389

Other cable lengths as well as types with unreduced cross sections of earthing cables, other earth clamps and earth connection units are available on request. Earthing rod is not included in delivery.

Three-pole Earthing and Short-circuiting Devices

Universal clamp, clamping range 20 / 25 mm, hexagon shaft

Phase connecting elements

EARTHING AND SHORT-CIRCUITING DEVICES

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements



EAS EK FM 12



EAB RN 16 FS

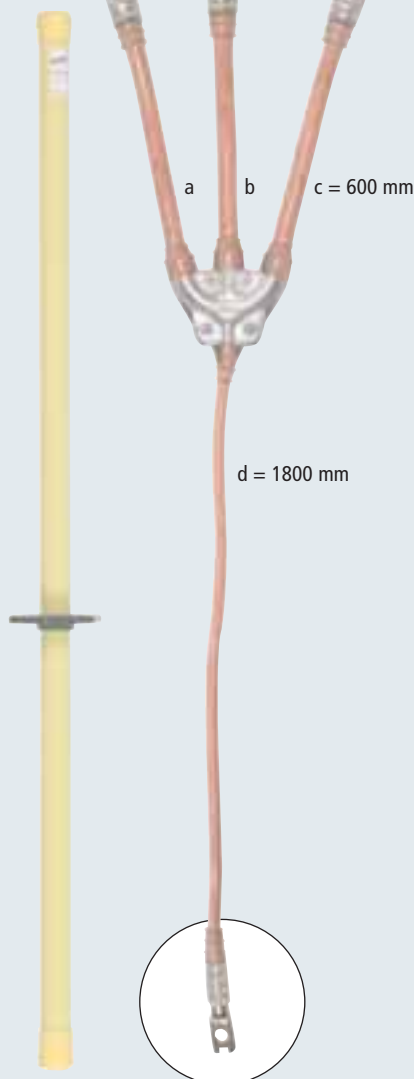


UK 25 SK



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
20 / 25 mm	15 mm	20 mm	25/25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35/35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50/25 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70/35 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95/35 mm ²	18.7 kA
— / 25 mm	—	—	120/50 mm ²	23.7 kA

Part No.	Part No.
725 823	725 826
735 823	735 826
750 823	750 826
770 823	770 826
795 823	795 826
712 843	712 846



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
20 / 25 mm	15 mm	20 mm	25/25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35/35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50/25 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70/35 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95/35 mm ²	18.7 kA
— / 25 mm	—	—	120/50 mm ²	23.7 kA



UEK 25 FS



EFK FL30 SKN



UEK 25 HG



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
20 / 25 mm	15 mm	20 mm	25/25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35/35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50/25 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70/35 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95/35 mm ²	18.7 kA
— / 25 mm	—	—	120/50 mm ²	23.7 kA

Part No.
725 825
735 825
750 825
770 825
795 825
712 845

Other cable lengths as well as types with unreduced cross sections of earthing cables or other earth clamps and earth connection units are available on request.
Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Three-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

Universal clamp, clamping
range 20 / 25 mm, T pin shaft

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements

Phase connecting elements



EAS EK FM 12



EAB RN 16 FS

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
20 / 25 mm	15 mm	20 mm	25/25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35/35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50/25 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70/35 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95/35 mm ²	18.7 kA
— / 25 mm	—	—	120/50 mm ²	23.7 kA

Part No.

725 833

735 833

750 833

770 833

795 833

712 863

Part No.

725 836

735 836

750 836

770 836

795 836

712 866



UEK 25 FS



EFK FL30 SKN

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
20 / 25 mm	15 mm	20 mm	25/25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35/35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50/25 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70/35 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95/35 mm ²	18.7 kA
— / 25 mm	—	—	120/50 mm ²	23.7 kA

Part No.

725 832

735 832

750 832

770 832

795 832

712 862

Part No.

725 831

735 831

750 831

770 831

795 831

712 861



UEK 25 HG

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
20 / 25 mm	15 mm	20 mm	25/25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35/35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50/25 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70/35 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95/35 mm ²	18.7 kA
— / 25 mm	—	—	120/50 mm ²	23.7 kA

Part No.

725 835

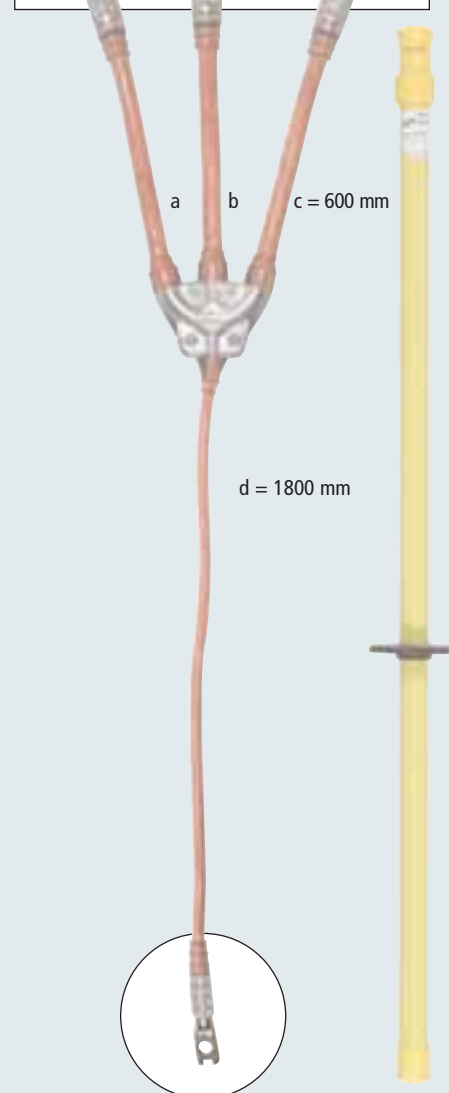
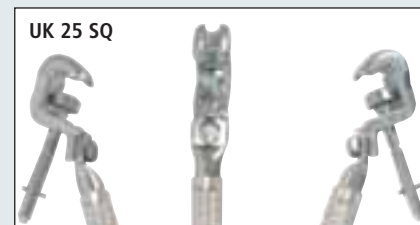
735 835

750 835

770 835

795 835

712 865



Other cable lengths as well as types with unreduced cross sections of earthing cables, other earth clamps and earth connection units are available on request. Earthing rod is not included in delivery.

Three-pole Earthing and Short-circuiting Devices

Universal clamp, clamping range 25 / 30 mm, hexagon shaft

Phase connecting elements

EARTHING AND SHORT-CIRCUITING DEVICES

IEC/EN 61230 (DIN VDE 0683 Part 100)

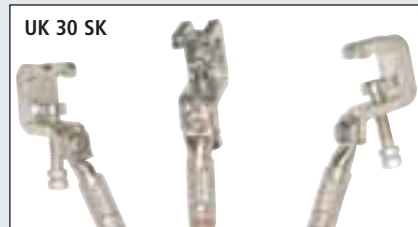
Earth connecting elements



EAS EK FM 12



EAB RN 16 FS

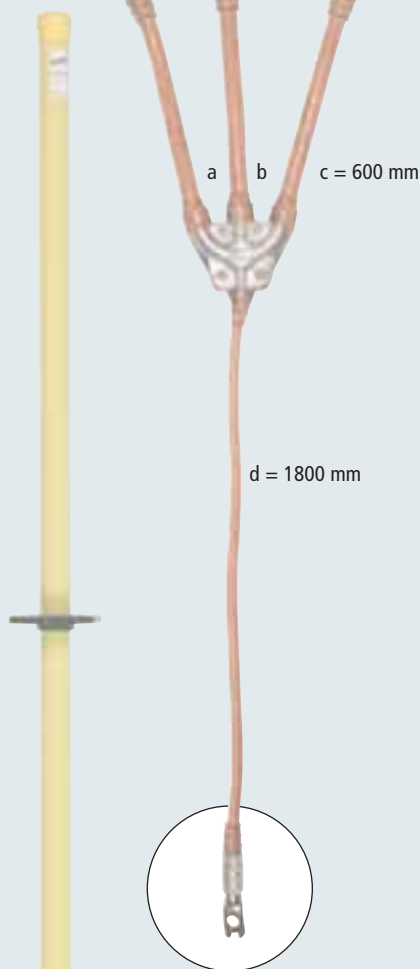


UK 30 SK

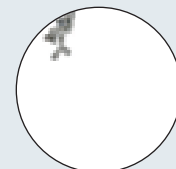


Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25/25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35/35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50/25 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70/35 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95/35 mm ²	18.7 kA
25 / 30 mm	—	—	120/50 mm ²	23.7 kA

Part No.	Part No.
725 804	725 807
735 804	735 807
750 804	750 807
770 804	770 807
795 804	795 807
712 804	712 807



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25/25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35/35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50/25 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70/35 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95/35 mm ²	18.7 kA
25 / 30 mm	—	—	120/50 mm ²	23.7 kA



UEK 30 FS



EFK FL30 SKN



UEK 30 HG



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25/25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35/35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50/25 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70/35 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95/35 mm ²	18.7 kA
25 / 30 mm	—	—	120/50 mm ²	23.7 kA

Part No.
725 806
735 806
750 806
770 806
795 806
712 806

Other cable lengths as well as types with unreduced cross sections of earthing cables, other earth clamps and earth connection units are available on request. Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Three-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

Universal clamp, clamping
range 25 / 30 mm, T pin shaft

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements

Phase connecting elements



EAS EK FM 12



EAB RN 16 FS

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25/25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35/35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50/25 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70/35 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95/35 mm ²	18.7 kA
25 / 30 mm	—	—	120/50 mm ²	23.7 kA

Part No.

Part No.

725 813

725 816

735 813

735 816

750 813

750 816

770 813

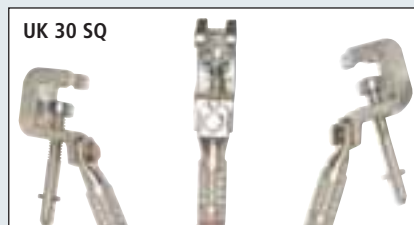
770 816

795 813

795 816

712 813

712 816



UK 30 SQ



UEK 30 FS



EFK FL30 SKN

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25/25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35/35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50/25 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70/35 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95/35 mm ²	18.7 kA
25 / 30 mm	—	—	120/50 mm ²	23.7 kA

Part No.

Part No.

725 117

725 811

735 117

735 811

750 812

750 811

770 812

770 811

795 812

795 811

712 812

712 811



UEK 30 HG

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25/25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35/35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50/25 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70/35 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95/35 mm ²	18.7 kA
25 / 30 mm	—	—	120/50 mm ²	23.7 kA

Part No.

725 815

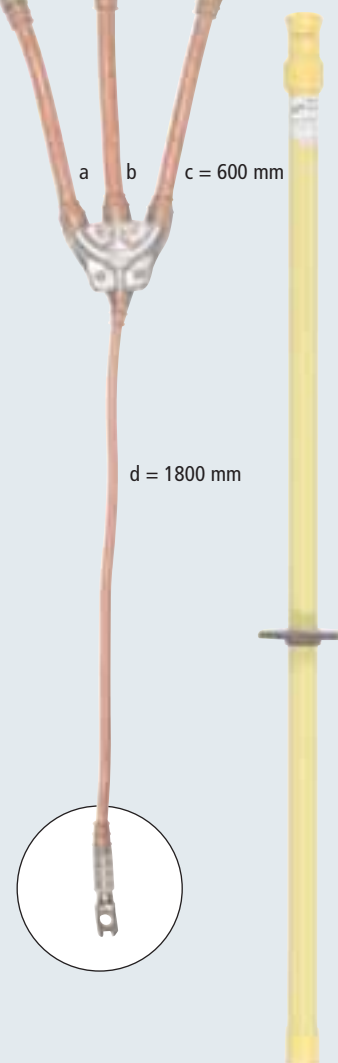
735 815

750 815

770 815

795 815

712 815



Other cable lengths as well as types with unreduced cross sections of earthing cables, other earth clamps and earth connection units are available on request.
Earthing rod is not included in delivery.

Three-pole Earthing and Short-circuiting Devices

SAFETY EQUIPMENT

Short-circuiting bar

EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)

- With longitudinal slot for reliable contact
- For copper or aluminium busbars up to a thickness of 25 mm
- Other bar and earthing cable lengths available on request
- Operation by earthing rods with hexagon or T pin shaft



Short-circuiting bar with earthing cable in a switchgear installation.

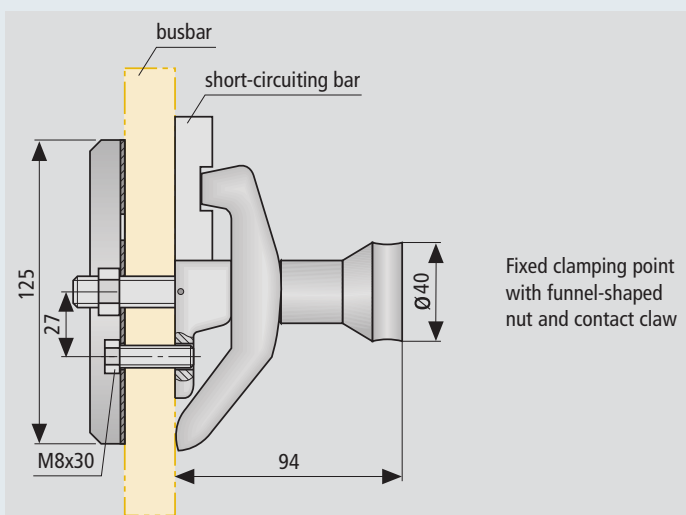
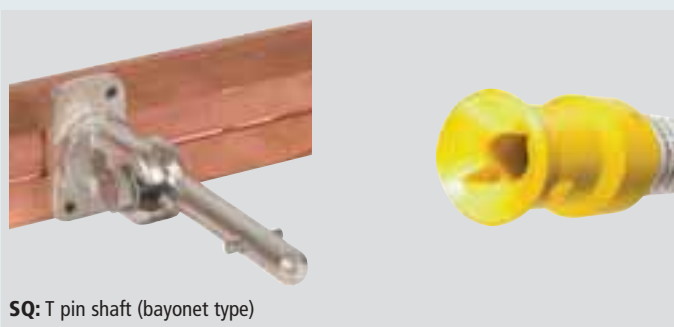
The short-circuiting bar with longitudinal slot can be used for installations with compensated systems.

The earthing cable is fitted with a ball head cap with wing nut for fixed ball points Ø20 mm for connection to the earthing system (other equipment is available on request).

The short-circuiting bars are available with 2 different coupling devices for operation with earthing rods:

Technical Data

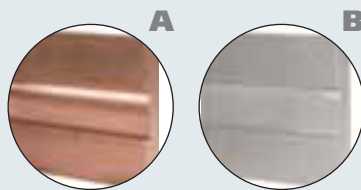
Earthing cable	Cu, highly flexible
Cable cross section	50 mm ²
Cable length	2500 mm
Operating temperature range	– 25° C ... + 55° C



SAFETY EQUIPMENT

Three-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES



Type	Coupling device	Profile h x w	Total length l_G	Max. short-circuit current I_k 1 s	Part No.
------	-----------------	------------------	-----------------------	---	-------------

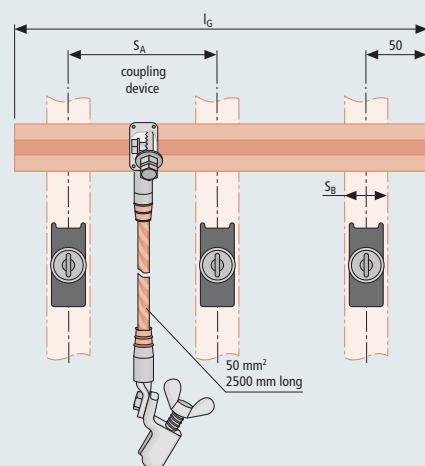
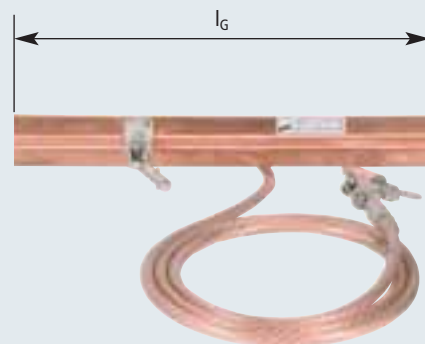
A Short-circuiting Bar made of E-Cu F20

KSS 60 8 CU SK	SK	60 x 8 mm	520 mm	70.0 kA	795 038
KSS 60 12 CU SK	SK	60 x 12 mm	520 mm	90.0 kA	795 039
KSS 60 8 CU SQ	SQ	60 x 8 mm	520 mm	70.0 kA	795 041
KSS 60 12 CU SQ	SQ	60 x 12 mm	520 mm	90.0 kA	795 045

B Short-circuiting Bar made of AlMgSi 0.5

KSS 60 8 AL SK	SK	60 x 8 mm	520 mm	45.0 kA	795 042
KSS 60 12 AL SK	SK	60 x 12 mm	520 mm	70.0 kA	795 043
KSS 60 8 AL SQ	SQ	60 x 8 mm	520 mm	45.0 kA	795 048
KSS 60 12 AL SQ	SQ	60 x 12 mm	520 mm	70.0 kA	795 049

Note: Please specify the bar distance (S_A) and bar width (S_B) when placing your order.

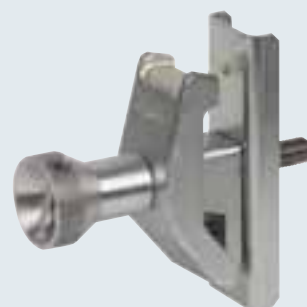


Accessories for Three-pole Earthing and Short-circuiting Devices

Fixed Clamping Points for Busbars

With funnel-shaped nut and contact claw

Type	Part No.
KLFP M12 KSS	795 040



SK Screw Adapter

Hexagon terminal, width across flats 19

Type	Total length l_G	Part No.
SA KLFP SK	60 mm	795 214



SQ Screw Adapter

T pin shaft (bayonet type)

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



Single-pole Earthing and Short-circuiting Devices

SAFETY EQUIPMENT

Ball head cap, rigid, hexagon shaft EARTHING AND SHORT-CIRCUITING DEVICES

IEC/EN 61230 (DIN VDE 0683 Part 100)

Phase connecting elements

Earth connecting elements

KKH 20 SK
KKH 25 SK

a = 2500 mm



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25 mm ²	4.9 kA
20 mm	35 mm ²	6.9 kA
20 mm	50 mm ²	9.9 kA
20 mm	70 mm ²	13.8 kA
20 mm	95 mm ²	18.7 kA
20 mm	120 mm ²	23.7 kA
25 mm	95 mm ²	18.7 kA
25 mm	120 mm ²	23.7 kA
25 mm	150 mm ²	29.6 kA



Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25 mm ²	4.9 kA
20 mm	35 mm ²	6.9 kA
20 mm	50 mm ²	9.9 kA
20 mm	70 mm ²	13.8 kA
20 mm	95 mm ²	18.7 kA
20 mm	120 mm ²	23.7 kA
25 mm	95 mm ²	18.7 kA
25 mm	120 mm ²	23.7 kA

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HG

EAB RN 16 FS

UEK 25 FS
UEK 30 FS

EFK FL30 SKN

*) Earth side for fixed ball points only

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Single-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

Ball head cap, rigid, T pin shaft

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements

Phase connecting elements

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HG

EAB RN 16 FS

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s	Part No.	Part No.	Part No.
20 mm	25 mm ²	4.9 kA	725 031	725 053	725 050
20 mm	35 mm ²	6.9 kA	735 031	735 053	735 050
20 mm	50 mm ²	9.9 kA	750 031	750 053	750 050
20 mm	70 mm ²	13.8 kA	770 031	770 053	770 050
20 mm	95 mm ²	18.7 kA	794 031	794 053	794 050
20 mm	120 mm ²	23.7 kA	711 031	711 053	711 050
25 mm	95 mm ²	18.7 kA	795 031	795 053	795 050
25 mm	120 mm ²	23.7 kA	712 031	712 053	712 050
25 mm	150 mm ²	29.6 kA	715 031	715 053	715 050

UEK 25 FS
UEK 30 FS

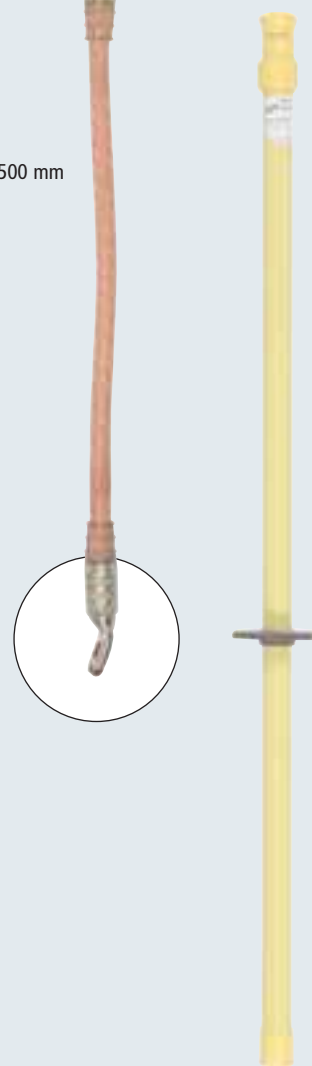
EFK FL30 SKN

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s	Part No.	Part No.
20 mm	25 mm ²	4.9 kA	725 049	725 052
20 mm	35 mm ²	6.9 kA	735 049	735 052
20 mm	50 mm ²	9.9 kA	750 049	750 052
20 mm	70 mm ²	13.8 kA	770 049	
20 mm	95 mm ²	18.7 kA	794 049*)	
20 mm	120 mm ²	23.7 kA	711 049*)	
25 mm	95 mm ²	18.7 kA	794 052*)	
25 mm	120 mm ²	23.7 kA	712 049*)	

*) Earth side for fixed ball points only

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.KKH 20 SQ
KKH 25 SQ

a = 2500 mm



Single-pole Earthing and Short-circuiting Devices

SAFETY EQUIPMENT

Ball head cap, adjustable (4 x 90°), hexagon shaft

EARTHING AND SHORT-CIRCUITING DEVICES

IEC/EN 61230 (DIN VDE 0683 Part 100)

Phase connecting elements

Earth connecting elements

KKH 20 D SK
KKH 25 D SK

a = 2500 mm

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HG

EAB RN 16 FS

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25 mm ²	4.9 kA
20 mm	35 mm ²	6.9 kA
20 mm	50 mm ²	9.9 kA
20 mm	70 mm ²	13.8 kA
20 mm	95 mm ²	18.7 kA
20 mm	120 mm ²	23.7 kA
25 mm	95 mm ²	18.7 kA
25 mm	120 mm ²	23.7 kA
25 mm	150 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 325	725 068	725 061
735 325	735 068	735 061
750 325	750 068	750 061
770 325	770 068	770 061
794 325	794 068	794 061
711 325	711 068	711 061
795 325	795 068	795 061
712 325	712 068	712 061
715 325	715 068	715 061

UEK 25 FS
UEK 30 FS

EFK FL30 SKN

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25 mm ²	4.9 kA
20 mm	35 mm ²	6.9 kA
20 mm	50 mm ²	9.9 kA
20 mm	70 mm ²	13.8 kA
20 mm	95 mm ²	18.7 kA
20 mm	120 mm ²	23.7 kA
25 mm	95 mm ²	18.7 kA
25 mm	120 mm ²	23.7 kA

Part No.	Part No.
725 060	725 063
735 060	735 063
750 060	750 063
770 060	
794 060*)	
711 060*)	
795 060*)	
712 060*)	

*) Earth side for fixed ball points only

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Single-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

Ball head cap, adjustable (4 x 90°),
T pin shaft

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements

Phase connecting elements

KKH 20 FS
KKH 25 FSKKH 20 HG
KKH 25 HG

EAB RN 16 FS

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25 mm ²	4.9 kA
20 mm	35 mm ²	6.9 kA
20 mm	50 mm ²	9.9 kA
20 mm	70 mm ²	13.8 kA
20 mm	95 mm ²	18.7 kA
20 mm	120 mm ²	23.7 kA
25 mm	95 mm ²	18.7 kA
25 mm	120 mm ²	23.7 kA
25 mm	150 mm ²	29.6 kA

Part No.	Part No.	Part No.
725 331	725 069	725 065
735 331	735 069	735 065
750 331	750 069	750 065
770 331	770 069	770 065
794 331	794 069	794 065
711 331	711 069	711 065
795 331	795 069	795 065
712 331	712 069	712 065
715 331	715 069	715 065

KKH 20 D SQ
KKH 25 D SQ

a = 2500 mm

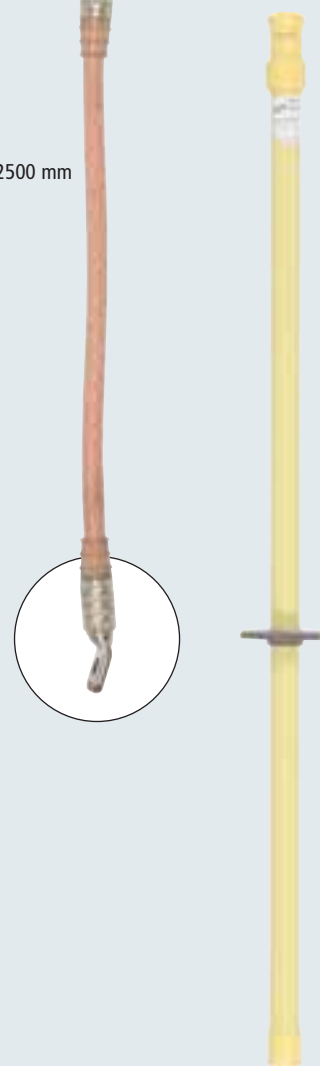
UEK 25 FS
UEK 30 FS

EFK FL30 SKN

Fixed ball point Ø	Cable cross section	Max. short-circuit current I_k 1 s
20 mm	25 mm ²	4.9 kA
20 mm	35 mm ²	6.9 kA
20 mm	50 mm ²	9.9 kA
20 mm	70 mm ²	13.8 kA
20 mm	95 mm ²	18.7 kA
20 mm	120 mm ²	23.7 kA
25 mm	95 mm ²	18.7 kA
25 mm	120 mm ²	23.7 kA

Part No.	Part No.
725 064	725 067
735 064	735 067
750 064	750 067
770 064	
794 064*)	
711 064*)	
795 064*)	
712 064*)	

*) Earth side for fixed ball points only

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.

Single-pole Earthing and Short-circuiting Devices

Universal clamp, clamping range 20 / 25 mm, hexagon shaft

Phase connecting elements

EARTHING AND SHORT-CIRCUITING DEVICES

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements



UEK 25 FS



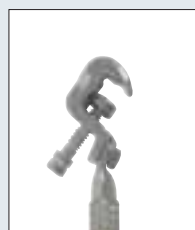
UEK 25 HG



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
20 / 25 mm	15 mm	20 mm	25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95 mm ²	18.7 kA
— / 25 mm	—	—	120 mm ²	23.7 kA

*) Earth side for fixed ball points only

Part No.	Part No.
725 103	725 106
735 103	735 106
750 103	750 106
770 103	770 106
795 103*)	795 106*)
712 073*)	712 076*)



UK 25 SK

a = 2500 mm



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
20 / 25 mm	15 mm	20 mm	25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95 mm ²	18.7 kA



EFK FL30 SKN



EFK FL40 SKN

Part No.	Part No.
725 101	725 104
735 101	735 104
750 101	750 104
	770 104
	795 104



EAB RN 16 FS

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
20 / 25 mm	15 mm	20 mm	25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95 mm ²	18.7 kA
— / 25 mm	—	—	120 mm ²	23.7 kA

Part No.
725 105
735 105
750 105
770 105
795 105
712 075

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Single-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

Universal clamp, clamping
range 20 / 25 mm, T pin shaft

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements

Phase connecting elements



UEK 25 FS



UEK 25 HG

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
20 / 25 mm	15 mm	20 mm	25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95 mm ²	18.7 kA
— / 25 mm	—	—	120 mm ²	23.7 kA

Part No.

Part No.

725 110

725 114

735 110

735 114

750 110

750 114

770 110

770 114

795 110*)

795 114*)

712 171*)

712 173*)

*) Earth side for fixed ball points only



EFK FL30 SKN



EFK FL40 SKN

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
20 / 25 mm	15 mm	20 mm	25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95 mm ²	18.7 kA

Part No.

Part No.

725 108

725 112

735 108

735 112

750 108

750 112

770 112

770 112

795 112

795 112



EAB RN 16 FS

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
20 / 25 mm	15 mm	20 mm	25 mm ²	4.9 kA
20 / 25 mm	15 mm	20 mm	35 mm ²	6.9 kA
20 / 25 mm	15 mm	20 mm	50 mm ²	9.9 kA
20 / 25 mm	15 mm	20 mm	70 mm ²	13.8 kA
20 / 25 mm	15 mm	—	95 mm ²	18.7 kA
— / 25 mm	—	—	120 mm ²	23.7 kA

Part No.

725 113

735 113

750 113

770 113

795 113

712 172

UK 25 SQ

a = 2500 mm

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.

Single-pole Earthing and Short-circuiting Devices

Universal clamp, clamping range 25 / 30 mm, hexagon shaft

Phase connecting elements

EARTHING AND SHORT-CIRCUITING DEVICES

IEC/EN 61230 (DIN VDE 0683 Part 100)

Earth connecting elements



UEK 30 FS



UEK 30 HG



UK 30 SK

a = 2500 mm



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95 mm ²	18.7 kA
25 / 30 mm	—	—	120 mm ²	23.7 kA

*) Earth side for fixed ball points only



EFK FL30 SKN



EFK FL40 SKN



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95 mm ²	18.7 kA



EAB RN 16 FS



Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I_k 1 s
25 / 30 mm	18 mm	30 mm	25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95 mm ²	18.7 kA
25 / 30 mm	—	—	120 mm ²	23.7 kA

Part No.
725 125
735 125
750 125
770 125
794 125*)
712 125*)

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.

SAFETY EQUIPMENT

Single-pole Earthing and Short-circuiting Devices

EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)

Universal clamp, clamping
range 25 / 30 mm, T pin shaft

Earth connecting elements

Phase connecting elements



UEK 30 FS



UEK 30 HG

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
25 / 30 mm	18 mm	30 mm	25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95 mm ²	18.7 kA
25 / 30 mm	—	—	120 mm ²	23.7 kA

Part No.

Part No.

725 127

725 107

735 127

735 107

750 127

750 107

770 127

770 107

794 127*)

795 107*)

712 127*)

712 107*)

*) Earth side for fixed ball points only



EFK FL30 SKN



EFK FL40 SKN

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
25 / 30 mm	18 mm	30 mm	25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95 mm ²	18.7 kA

Part No.

Part No.

725 136

725 138

735 136

735 138

750 136

750 138

770 138

770 138

794 138

794 138



EAB RN 16 FS

Fixed ball point Ø	Phase T pin Collar width	Rd / FI Clamping range	Cable cross section	Max. short-circuit current I _k 1 s
25 / 30 mm	18 mm	30 mm	25 mm ²	4.9 kA
25 / 30 mm	18 mm	30 mm	35 mm ²	6.9 kA
25 / 30 mm	18 mm	30 mm	50 mm ²	9.9 kA
25 / 30 mm	18 mm	30 mm	70 mm ²	13.8 kA
25 / 30 mm	18 mm	—	95 mm ²	18.7 kA
25 / 30 mm	—	—	120 mm ²	23.7 kA

Part No.

725 139

735 139

750 139

770 139

794 139

712 139

UK 30 SQ

a = 2500 mm

Other cable lengths and earth clamps are available on request.
Earthing rod is not included in delivery.

Earthing and Short-circuiting Cables

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)

- To be equipped with connecting components
- Transparent sheathing
- Waterproof plastic-sheathed cable entries and node unit, with additional protection against twisting
- Standard crimped cable lugs, type PK1, protected against twisting



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

Technical Data

Cable	E-Cu, extra finely stranded and highly flexible
Sheath	Thermoplastic polymer (flexible PVC compound YM2), uncoloured and transparent
Hole in terminal lug	Ø12.5 mm
Operating temperature range	– 25° C ... + 55° C

Example of price calculation:

For earthing and short-circuiting devices with customised lengths

Three-pole earthing and short-circuiting device, cable cross section 70 mm², like Part No. 770 350, but with conductor lengths of a = 1000 mm and b = 2200 mm

Standard type: a: 70 mm², 3 x 600 = 1800 mm
b: 35 mm², 1 x 1800 = 1800 mm

Customised type: a: 70 mm², 3 x 1000 = 3000 mm
b: 35 mm², 1 x 2200 = 2200 mm

Difference between cable lengths: a: 70 mm² = 1200 mm
b: 35 mm² = 400 mm

Price of standard type, Part No. 770 350 Euro 460.–

Price of difference between cable lengths

Part No. 770 001, 1200 mm x 41.– per 1000 mm Euro 49.20

Part No. 735 001, 400 mm x 20.70 per 1000 mm Euro 9.08

Price of customised unit, total Euro 518.28

Prices without obligation (as of 2009).



Crimped cable lugs, **PK1** type:
Standard cable lug with cut-out for protection against twisting.



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



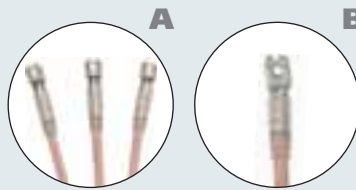
Crimped cable lugs, **PK3** type:
Hook-type cable lugs up to cable cross sections of 35 mm² are available on request.

Note:
Other hole diameters for terminal lugs are available on request.

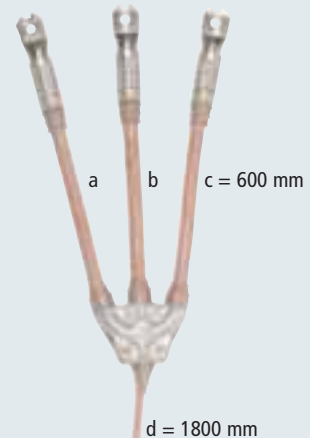
SAFETY EQUIPMENT

Earthing and Short-circuiting Cables

EARTHING AND SHORT-CIRCUITING DEVICES



Type	Type of crimped cable lug	Cable cross section	Max. short-circuit current I_k 1 s	Part No.
A Three-pole Earthing and Short-circuiting Cables				
Without equipment				
EKS3 PK1 25 25	PK1	25/25 mm ²	4.9 kA	725 604
EKS3 PK1 35 35	PK1	35/35 mm ²	6.9 kA	735 604
EKS3 PK1 50 25	PK1	50/25 mm ²	9.9 kA	750 604
EKS3 PK1 70 35	PK1	70/35 mm ²	13.8 kA	770 604
EKS3 PK1 95 35	PK1	95/35 mm ²	18.7 kA	795 604
EKS3 PK1 120 50	PK1	120/50 mm ²	23.7 kA	712 604
EKS3 PK1 150 50	PK1	150/50 mm ²	29.6 kA	715 604

**B Single-pole Earthing and Short-circuiting Cables**
Without equipment

EKS1 PK1 25 5000	PK1	25 mm ²	4.9 kA	776 425
EKS1 PK1 35 5000	PK1	35 mm ²	6.9 kA	776 435
EKS1 PK1 50 5000	PK1	50 mm ²	9.9 kA	776 450
EKS1 PK1 70 5000	PK1	70 mm ²	13.8 kA	776 470
EKS1 PK1 95 5000	PK1	95 mm ²	18.7 kA	776 495
EKS1 PK1 120 5000	PK1	120 mm ²	23.7 kA	776 412
EKS1 PK1 150 5000	PK1	150 mm ²	29.6 kA	776 415

a = 5000 mm

Other cable lengths, types with unreduced earthing cable cross sections as well as line and earth clamps and cables with crimped cable lugs without protection against twisting (PK2) are available on request.

Accessories for Earthing and Short-circuiting Cables

Earthing Cables in accordance with IEC 61138

For earthing and short-circuiting devices with customised lengths

Type	Cable cross section	Part No.
ES YM2 16	16 mm ²	716 001
ES YM2 25	25 mm ²	725 001
ES YM2 35	35 mm ²	735 001
ES YM2 50	50 mm ²	750 001
ES YM2 70	70 mm ²	770 001
ES YM2 95	95 mm ²	795 001
ES YM2 120	120 mm ²	712 001
ES YM2 150	150 mm ²	715 001



Phase Connecting Elements

Phase screw clamps for overhead line conductors Ø4 to 85 mm

- Phase clamps for connecting single-pole and three-pole earthing and short-circuiting devices to overhead lines
- Coupling aid for safe coupling to overhead line conductors
- Easy coupling due to spring tension
- Type PK1 or PK2 protected against twisting, long threaded T pin shaft

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)
Threaded T pin shaft DIN 48087



Phase screw clamps used on an overhead line.



Phase screw clamp with fixed coupling aid for safe coupling



Phase screw clamp with spring tension

Technical Data

Spring load unit	Al alloy
Clamping unit	Al alloy
Shaft	Cu alloy/gal Sn or StSt
Coupling aid	St/gal Zn



Crimped cable lugs, **PK1** type: Standard cable lug with cut-out for protection against twisting.



Crimped cable lugs, **PK2** type: Standard cable lug without cut-out which can be connected to components from other manufacturers. Only available on request.



Clamp with long shaft and earthing rod with aluminium cone coupling.

SAFETY EQUIPMENT

Phase Connecting Elements

EARTHING AND SHORT-CIRCUITING DEVICES



Type	Clamping range Ø	Protection against twisting	For cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	------------------	-----------------------------	-------------------------	--------------------------------------	----------

A Standard Phase Screw Clamps

Short-circuit-proof, even in case of corroded conductor cables due to weathering

PSK 4 30 SQ	4 ... 30 mm	PK1	25 ... 70 mm ²	13.8 kA	784 201
PSK 10 65 SQ	10 ... 65 mm	PK1	25 ... 120 mm ²	23.7 kA	784 301

B Phase Screw Clamps with Coupling Aid

Short-circuit-proof, even in case of corroded conductor cables due to weathering

PSK 4 30 SQ EH	4 ... 30 mm	PK1	25 ... 70 mm ²	13.8 kA	784 401
PSK 10 65 SQ EH	10 ... 65 mm	PK1	25 ... 120 mm ²	23.7 kA	784 501

C Phase Screw Clamp with Spring Tension

Easy coupling with spring-loaded clamp

PSK FV 4 30 SQ	4 ... 30 mm	PK1	25 ... 70 mm ²	13.8 kA	784 480
----------------	-------------	-----	---------------------------	---------	----------------

D Phase Screw Clamp with wide Clamping Range

Ideally suited for use with Al and Al/St conductor cables, tubular busbars and fixed phase points

PSK 10 85 SQ	10 ... 85 mm	PK2	25 ... 120 mm ²	23.7 kA	784 085
--------------	--------------	-----	----------------------------	---------	----------------

E Phase Screw Clamp

Ideally suited for angled positions

PSK 12 30 SQ	12 ... 30 mm	PK2	25 ... 95 mm ²	18.7 kA	784 032
--------------	--------------	-----	---------------------------	---------	----------------

Clamps must have the same maximum short-circuit current as earthing and short-circuiting conductors (I_k 1 s in A)!



Phase Connecting Elements

SAFETY EQUIPMENT

Ball head caps and universal clamps EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)
Threaded T pin shaft DIN 48087

- Phase clamps for connecting single-pole and three-pole earthing and short-circuiting devices
- Type PK1 protected against twisting



Connecting the universal clamp to a fixed ball point.

Technical Data

Clamping unit	Cu alloy/gal Sn
Shaft	Cu alloy/gal Sn
Spring load unit	Cu alloy/gal Sn or St/Zn

Two types of ball head caps are available:

- Rigid ball head cap
- Adjustable ball head cap (4x 90°)

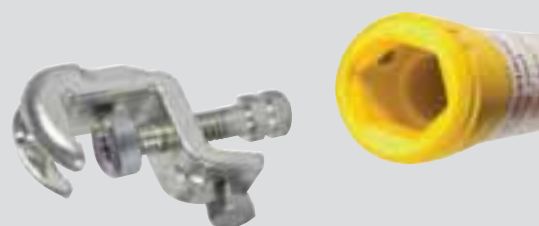
The adjustable ball head cap allows the user to connect the earthing and short-circuiting device to fixed ball points that are installed in difficult positions. In the vast majority of cases, the use of angled fixed ball points is therefore no longer necessary.



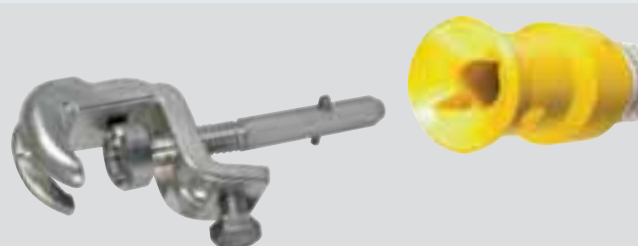
Rigid ball head cap



Adjustable ball head cap (4 x 90°)



SK: Hexagon shaft



SQ: T pin shaft (bayonet locking mechanism)

SAFETY EQUIPMENT

Phase Connecting Elements

EARTHING AND SHORT-CIRCUITING DEVICES



Type	Fixed ball point Ø	Phase T pin Collar width	Rd / Fl Clamping range	For cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	-----------------------	-----------------------------	---------------------------	----------------------------	---	-------------

A Ball Head Cap, rigid, hexagon Shaft

KKH 20 SK	20 mm			25 ... 120 mm ²	23.7 kA	772 310
KKH 25 SK	25 mm			25 ... 150 mm ²	29.6 kA	772 320

B Ball Head Cap, rigid, T pin Shaft

KKH 20 SQ	20 mm			25 ... 120 mm ²	23.7 kA	772 311
KKH 25 SQ	25 mm			25 ... 150 mm ²	29.6 kA	772 321

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

KKH 20 D SK	20 mm			25 ... 120 mm ²	23.7 kA	772 330
KKH 25 D SK	25 mm			25 ... 150 mm ²	29.6 kA	772 340

D Ball Head Cap, adjustable (4 x 90°), T pin Shaft

KKH 20 D SQ	20 mm			25 ... 120 mm ²	23.7 kA	772 331
KKH 25 D SQ	25 mm			25 ... 150 mm ²	29.6 kA	772 341

E Universal Clamp, hexagon Shaft

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

UK 25 SK	20 / 25 mm	15 mm	20 mm	25 ... 120 *) mm ²	23.7 kA	773 034
UK 30 SK	25 / 30 mm	18 mm	30 mm	25 ... 120 *) mm ²	23.7 kA	773 130

F Universal Clamp, T pin Shaft

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

UK 25 SQ	20 / 25 mm	15 mm	20 mm	25 ... 120 *) mm ²	23.7 kA	773 234
UK 30 SQ	25 / 30 mm	18 mm	30 mm	25 ... 120 *) mm ²	23.7 kA	773 330

*) Clamping range and maximum cable cross section for universal clamps at:

Fixed ball point Ø	Phase T pin Collar width	Rd / Fl Clamping range	Cable cross section
20 / 25 / 30 mm	15 / 18 mm	—	95 mm ²
— / 25 / 30 mm	—	—	120 mm ²

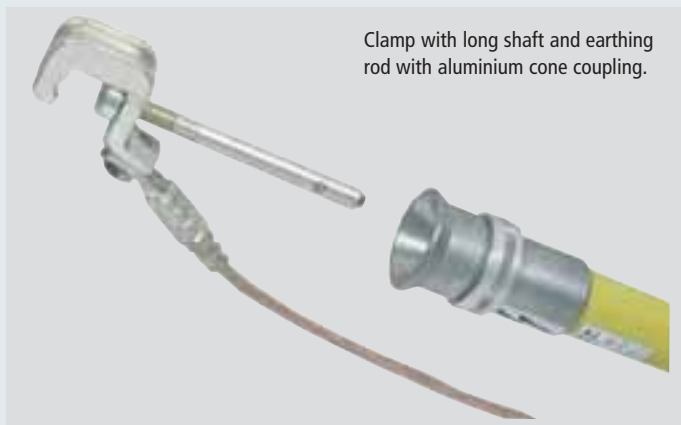
Clamps must have the same maximum short-circuit current as earthing and short-circuiting conductors (I_k 1 s in A)!



Phase Connecting Elements

Clamps with long shaft

- Phase clamps for connecting single-pole and three-pole earthing and short-circuiting devices to overhead lines
- Long threaded T pin shaft for earthing rods with robust aluminium cone coupling
- Type PK1 protected against twisting



*) Clamping range and maximum cable cross section for universal clamps at:

Fixed ball point Ø	Phase T pin Collar width	Rd / Fl Clamping range	Cable cross section
20 / 25 / 30 mm	15 / 18 mm	—	95 mm ²
— / 25 / 30 mm	—	—	120 mm ²

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)
Threaded T pin shaft according to DIN 48087



Rigid ball head cap with long shaft and earthing rod.

Technical Data

Clamping unit	Cu alloy/gal Sn
Shaft	Cu alloy/gal Sn
Spring load unit	Cu alloy/gal Sn or St/Zn



Type	Fixed ball point Ø	Phase T pin Collar width	Rd / Fl Clamping range	For cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	--------------------	--------------------------	------------------------	-------------------------	--------------------------------------	----------

A Ball Head Cap, rigid, long T pin Shaft

KKH 20 SQL	20 mm			25 ... 120 mm ²	23.7 kA	772 314
KKH 25 SQL	25 mm			25 ... 150 mm ²	29.6 kA	772 324

B Universal Clamp, long T pin Shaft

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

UK 25 SQL	20 / 25 mm	15 mm	20 mm	25 ... 120 *) mm ²	23.7 kA	773 236
UK 30 SQL	25 / 30 mm	18 mm	30 mm	25 ... 120 *) mm ²	23.7 kA	773 331

Clamps must have the same maximum short-circuit current as earthing and short-circuiting conductors (I_k 1 s in A)!



SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

Earth Connecting Elements

Universal earth clamps, clamping
range 20 or 30 mm

EN/IEC 61230 (DIN VDE 0683 Part 100)



Universal earth clamp with insulated handle connected to a fixed ball point.

- For earth connection to fixed ball points, phase T pins, round and flat conductors
- For wide clamping ranges up to 30 mm
- Type PK1 protected against twisting

Technical Data

Clamping unit, shaft	Cu alloy/gal Sn
Spring load unit	St/gal Zn

*) Clamping range and maximum cable cross section for universal clamps at:

Fixed ball point Ø	Phase T pin Collar width	Rd / Fl Clamping range	Cable cross section
20 / 25 / 30 mm	15 / 18 mm	—	95 mm ²
— / 25 / 30 mm	—	—	120 mm ²



Type	Fixed ball point Ø	Phase T pin Collar width	Rd / Fl Clamping range	For cable cross section	Max. short-circuit current I _k 1 s	Part No.
------	--------------------	--------------------------	------------------------	-------------------------	---	----------

A Universal Earth Clamps, with Wing Bolt

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

UEK 25 FS	20 / 25 mm	15 mm	20 mm	25 ... 120 *) mm ²	23.7 kA	774 034
UEK 30 FS	25 / 30 mm	18 mm	30 mm	25 ... 120 *) mm ²	23.7 kA	774 130

B Universal Earth Clamps, with insulated Handle

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

UEK 25 HG	20 / 25 mm	15 mm	20 mm	25 ... 120 *) mm ²	23.7 kA	774 234
UEK 30 HG	25 / 30 mm	18 mm	30 mm	25 ... 120 *) mm ²	23.7 kA	774 330

C Universal Earth Clamps, with Tommy Bar

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

UEK 25 SKN	20 / 25 mm	15 mm	20 mm	25 ... 120 *) mm ²	23.7 kA	774 434
UEK 30 SKN	25 / 30 mm	18 mm	30 mm	25 ... 120 *) mm ²	23.7 kA	774 530

Clamps must have the same maximum short-circuit current as earthing and short-circuiting conductors (I_k 1 s in A)!



Earth Connecting Elements

SAFETY EQUIPMENT

Ball head caps Ø20 or 25 mm, rigid EARTHING AND SHORT-CIRCUITING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)

- For earth connection to fixed ball points, Ø20 or 25 mm
- Ball head cap with wing bolt or insulated handle
- Type PK1 protected against twisting



Ball head cap with insulated handle connected to an earth connecting plate.

Technical Data

Clamping unit, shaft	Cu alloy/gal Sn
Spring load unit	Cu alloy/gal Sn



Type	Fixed ball point Ø	For cable cross section	Max. short-circuit current I_k 1 s	Part No.
A Ball Head Caps, rigid, with Wing Bolt				
KKH 20 FS	20 mm	25 ... 120 mm ²	23.7 kA	772 312
KKH 25 FS	25 mm	25 ... 150 mm ²	29.6 kA	772 322

B Ball Head Caps, rigid, with insulated Handle

KKH 20 HG	20 mm	25 ... 120 mm ²	23.7 kA	772 313
KKH 25 HG	25 mm	25 ... 150 mm ²	29.6 kA	772 323

Clamps must have the same maximum short-circuit current as earthing and short-circuiting conductors (I_k 1 s in A)!

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

Earth Connecting Elements

Earth connection units

EN/IEC 61230 (DIN VDE 0683 Part 100)



Earth connection unit with wing bolt.

- For earth connection to M12/M16 connection units or grooved ring Ø16 mm
- Wing bolt or tommy bar
- Type PK1 or PK2 protected against twisting

Technical Data

Terminal lug	E-Cu/gal Sn
Wing nut	Cu alloy/gal Sn

Type	Dimensions	Protection against twisting	For cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	------------	-----------------------------	-------------------------	--------------------------------------	----------

A Earth Connection Units with Wing Nut

EAS EK FM 12	M12	PK1	25 ... 150 mm ²	29.6 kA	775 621
EAS EK FM 16	M16	PK1	25 ... 150 mm ²	29.6 kA	775 631

B Earth Connection Units with Wing Bolt

EAS EK FS 12	M12 x 15 mm	PK1	25 ... 150 mm ²	29.6 kA	775 626
EAS EK FS 16	M16 x 15 mm	PK1	25 ... 150 mm ²	29.6 kA	775 636

C Earth Connection Sockets for Fixed Earthing Point with grooved Ring*) for cable lengths ≥ 2500 mm: max. up to 95 mm²

EAB RN 16 FS	Ø16 mm	PK2	25 ... 150 *) mm ²	29.6 kA	790 150
--------------	--------	-----	-------------------------------	---------	----------------

D Earth Connection Sockets for Fixed Earthing Point with grooved Ring*) for cable lengths ≥ 2500 mm: max. up to 95 mm²

EAB RN 16 SKN	Ø16 mm	PK2	25 ... 120 *) mm ²	23.7 kA	790 160
---------------	--------	-----	-------------------------------	---------	----------------

Clamps must have the same maximum short-circuit current as earthing and short-circuiting conductors (I_k 1 s in A)!



Earth Connecting Elements

Earth milling clamps

- For earth connection to flat profiles up to 40 mm
- Milling plate, disc springs and long tommy bar for reliable contact
- Type PK1 protected against twisting

SAFETY EQUIPMENT EARTHING AND SHORT-CIRCUITING DEVICES

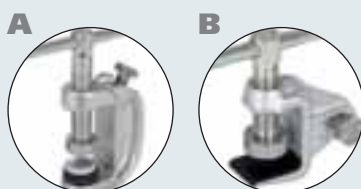
EN/IEC 61230 (DIN VDE 0683 Part 100)



Earth milling clamp used for coated steel masts.

Technical Data

Clamping unit	MCl/gal Zn
Shaft	Ms/gal Zn
Milling plate	hardened steel/chrome-plated
Spring	Spring steel



Type	Clamping range	For cable cross section	Max. short-circuit current I_k 1 s	Part No.
------	----------------	-------------------------	--------------------------------------	----------

A Earth Milling Clamp for flat Profiles With disc springs

EFK FL40 SKN	up to 40 mm	25 ... 95 mm ²	18.7 kA	792 190
--------------	-------------	---------------------------	---------	---------

B Earth Milling Clamp for flat Profiles

EFK FL30 SKN	up to 30 mm	25 ... 50 mm ²	9.9 kA	792 030
--------------	-------------	---------------------------	--------	---------

Clamps must have the same maximum short-circuit current as earthing and short-circuiting conductors (I_k 1 s in A)!

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

Earth Connecting Elements

Earthing kit



Earthing busbar and earthing cables mounted on a tubular earth electrode.

Technical Data

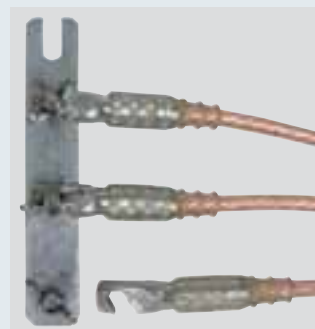
Tubular earth electrode St/tZn

Bolt M10 x 35 mm StSt (V2A)

Handle Wood

Earthing busbar St/tZn

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



Crimped cable lugs, **PK3** type: Hook-type cable lug protected against twisting mounted on a three-pole earthing busbar.

Type	Model		Total length l _G	Part No.
A Earthing Kit				
Pos.	Qty.	Type	Description	Part No.
1	1		Tubular earth electrode with drill	644 000
2	1	ESS 3P M10 FM	Three-pole earthing busbar	799 019
3	1	KLT 121 25 16	Artificial leather bag, empty	766 601
ES 3P FL ER		Earthing kit, complete		1000 mm
				799 009

Single Parts for Earthing Kit

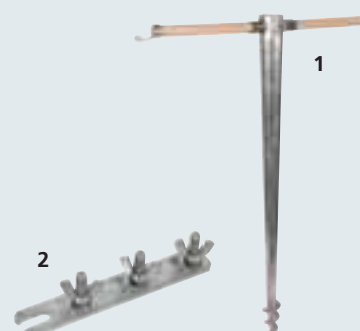
Tubular earth electrode with drill

Total length l_G	Position	Part No.
1000 mm	1	644 000

Three-Pole Earthing Busbar

With slot, to be mounted on the tubular earth electrode and for hook-type cable lug type PK3

Type	Dimensions	Position	Part No.
ESS 3P M10 FM	180 x 30 x 5 mm	2	799 019 new



Earthing Rods, single-section

SAFETY EQUIPMENT

EARTHING AND SHORT-CIRCUITING DEVICES

T pin shaft according to DIN 48087

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



Earthing rod for attaching an earthing and short-circuiting device to an installation.

Earthing rods are portable insulating rods for approaching the connecting components of earthing and short-circuiting devices to parts of electrical power installations for earthing and short-circuiting purposes. They consist of an insulating part, black ring, handle and coupling for attaching connecting components. Earthing rods 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 part** is the part of the earthing rod between the black ring and the end of the earthing rod in the direction of the connecting component. It provides the user with the necessary safety distance and sufficient insulation. The insulating part must have a minimum length of 500 mm.

Technical Data

Insulating tube	Glass-fibre reinforced polyester tube, Ø30 mm, yellow
Clamp coupling	Plastic, yellow
Sealing unit	Non-slip plastic cap or plug-in coupling for handle extension
Handguard	Plastic, black
Operating temperature range	– 25° C ... + 55° C



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

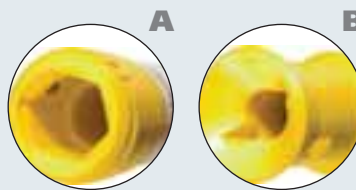


The plug-in coupling allows for easy handle extension of ES STK earthing rods.

SAFETY EQUIPMENT

Earthing Rods, single-section

EARTHING AND SHORT-CIRCUITING DEVICES



Type	Total length l_G	Handle length l_H	Max. load on operating head	Part No.
------	-----------------------	------------------------	--------------------------------	-------------

A Earthing Rod, Hexagon Shaft

Spring locking mechanism

ES SK 1000	1000 mm	430 mm	35 kg	761 010
ES SK 1500	1500 mm	930 mm	35 kg	761 015

B Earthing Rod, T pin Shaft

Bayonet locking mechanism

ES SQ 1000	1000 mm	430 mm	35 kg	761 011
ES SQ 1500	1500 mm	930 mm	35 kg	761 016

**C STK Earthing Rod, Hexagon Shaft**

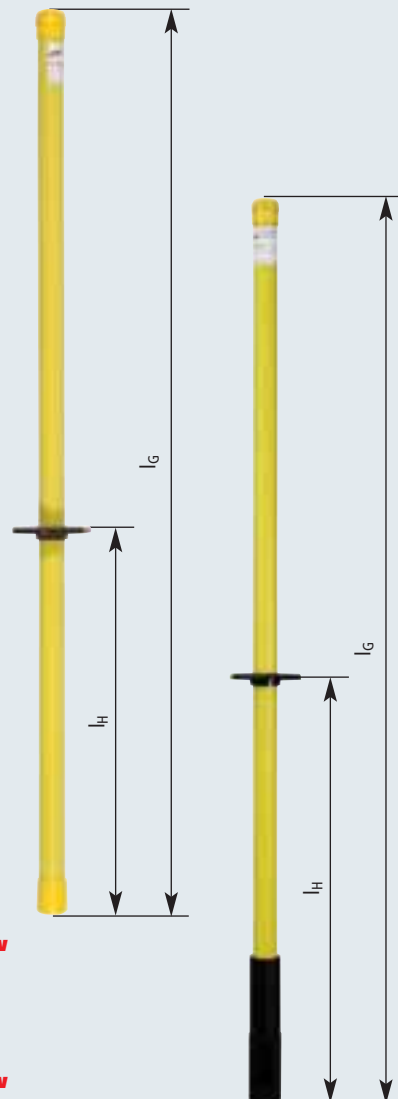
Spring locking mechanism and plug-in coupling for extending the handle

ES SK STK 1000	1000 mm	430 mm	35 kg	761 001	new
----------------	---------	--------	-------	---------	-----

D STK Earthing Rod, T Pin Shaft

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

ES SQ STK 1000	1000 mm	430 mm	35 kg	761 002	new
----------------	---------	--------	-------	---------	-----



Modular units available on request.

Accessories for Earthing Rods, single-section

Adapter for T Pin Shaft / Hexagon Shaft

Suitable for connection to earthing rods with T pin shaft coupling (bayonet locking mechanism) to allow insertion of clamps with hexagon shafts. The lock nut allows the adapter to be fixed to the earthing rod.

Type	Part No.
AES SQ SK	765 001



HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

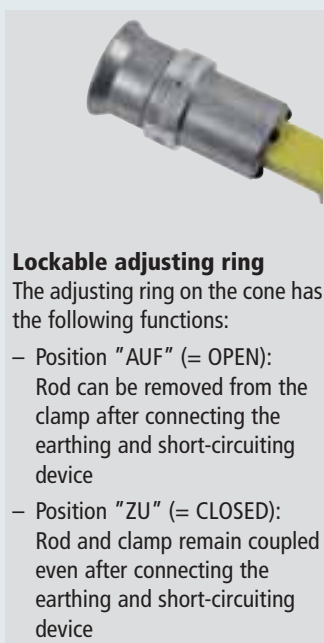
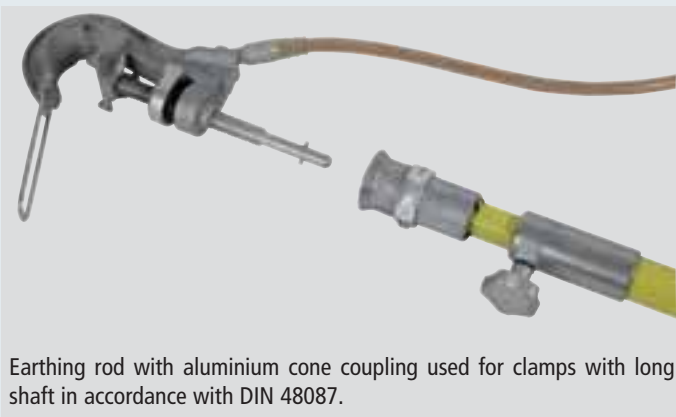
Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335
HV STK 43 910	43 mm	910 mm	766 456
HV STK 43 1280	43 mm	1280 mm	766 466



Telescopic Earthing Rods

For T pin shafts (bayonet locking mechanism)

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



EARTHING AND SHORT-CIRCUITING DEVICES

SAFETY EQUIPMENT



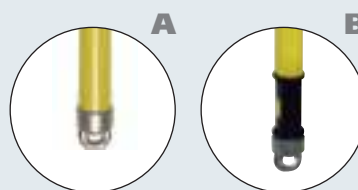
Technical Data

Insulating tube	Glass-fibre reinforced polyester tube, yellow; a square tube, 26 mm, can be pulled out of the round insulating tube, Ø43 mm, and can be fixed in any position between I_{\min} and I_{\max} using the star-shaped handle
Threaded coupling, star-shaped handle	Al alloy
Black ring	Plastic
Sealing unit	Al/rubber eye or plug-in coupling with Al/rubber eye for extending the handle
Operating temperature range	– 25° C ... + 55° C

SAFETY EQUIPMENT

Telescopic Earthing Rods

EARTHING AND SHORT-CIRCUITING DEVICES



Type	Total length $l_{G \max} / l_{G \min}$	Handle length l_H	Max. load on operating head l_{\max} / l_{\min}	Part No.
------	---	------------------------	--	-------------

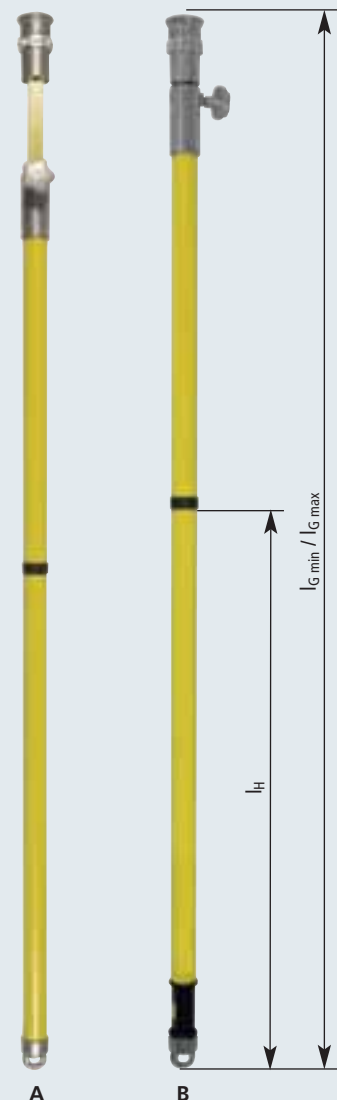
A Telescopic Earthing Rod

ESTC SQL 5000	5000 / 2670 mm	1900 mm	10 / 35 kg	769 500
---------------	----------------	---------	------------	---------

B Telescopic Earthing Rod with Plug-In Coupling

ESTC SQL 3000	3000 / 1670 mm	900 mm	18 / 35 kg	769 300 new
---------------	----------------	--------	------------	--------------------

Other telescopic earthing rods are available on request.



Accessories for Telescopic Earthing Rods with Plug-in Coupling

STK Sealing Unit

Type	Diameter	Total length l_G	Part No.
A STK	30 / 43 mm	85 mm	766 888 new



STK Sealing Unit with Eye

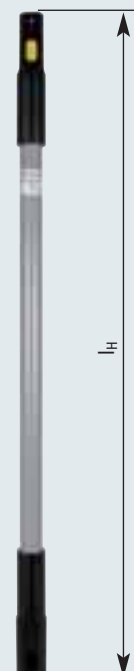
Type	Diameter	Total length l_G	Part No.
AR STK	30 / 43 mm	150 mm	766 889 new



HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 43 910	43 mm	910 mm	766 456 new
HV STK 43 1280	43 mm	1280 mm	766 466



Earthing Rods, multi-section

For T pin shafts (bayonet locking mechanism)

- For use in outdoor installations
- Robust aluminium cone coupling
- Telescopic rod, length gradually adjustable
- Cone-shaped male and female threaded coupling
- Transport length 1500 mm
- Total lengths up to 6000 mm
- For phase screw clamps and clamps with long T pin shaft

Possible combinations:

- Top section (A) only
- Top section (A) + sealing unit (C)
- Top section (A) + max. 2 intermediate sections (B) + sealing unit (C)

Load values for extendible earthing rods

Total length	Part	Max. load on operating head
1500 mm	A	35 kg
3000 mm	A + C	30 kg
4500 mm	A + B + C	15 kg
6000 mm	A + B + B + C	8 kg



Earthing rod consisting of a top section, intermediate section and sealing unit.



Robust cone-shaped male and female aluminium threaded coupling allows for secure coupling of the earthing rod sections due to the screw-type connection and the locking pins



Lockable adjusting ring

The adjusting ring on the cone has the following functions:

- Position "AUF" (= OPEN): Rod can be removed from the clamp after connecting the earthing and short-circuiting device
- Position "ZU" (= CLOSED): Rod and clamp remain coupled even after connecting the earthing and short-circuiting device

Technical Data

Insulating tube	Glass-fibre reinforced polyester tube, Ø43 mm, yellow
Threaded coupling	Al alloy
Black ring	Plastic
Sealing unit	Al/rubber
Operating temperature range	– 25° C ... + 55° C



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

SAFETY EQUIPMENT

Earthing Rods, multi-section

EARTHING AND SHORT-CIRCUITING DEVICES



Type	Length	Part No.
A Earthing Rod – Top Section With plastic cap for protecting the coupling element		
EST KS SQL 1500	1500 mm	769 503
B Earthing Rod – Intermediate Section With plastic cap for protecting the coupling element		
EST ZS 1500	1500 mm	769 504
C Earthing Rod – Sealing Unit With aluminium / rubber eye		
EST ES 1500	1500 mm	769 505

Other earthing rods are available on request.



Installation Devices

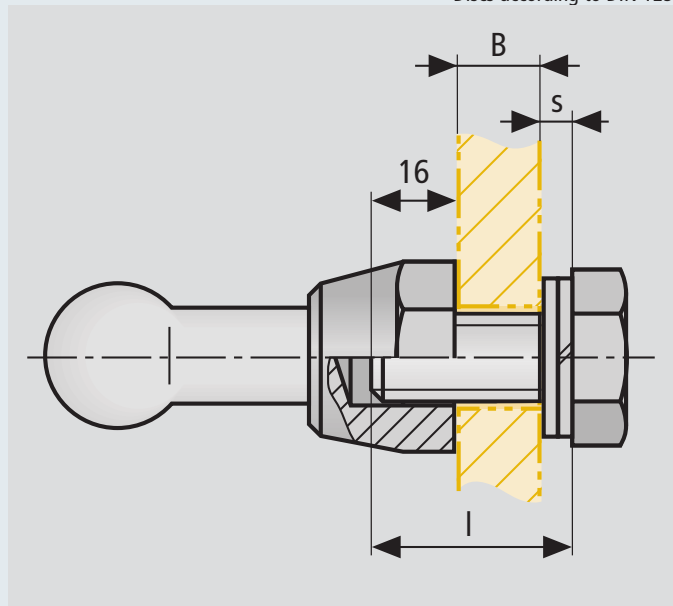
SAFETY EQUIPMENT

For fixed ball and earthing points

EARTHING AND SHORT-CIRCUITING DEVICES

- Hexagon bolt for installation of busbar connections according to DIN 43673 Part 1
- Spring-loaded pressure plate for installing M12 or M16 fixed points on aluminium busbars

Hexagon bolts according to DIN 933
Spring washers according to DIN 128
Discs according to DIN 125



Determination of the required bolt length l.

Technical Data

Hexagon bolts	StSt A2-70 (DIN 933)
Spring washers	StSt A2-70 (DIN 128)
Discs	StSt A2-70 (DIN 125)
Pressure plate	Highly resistant Al alloy
Tightening torque	M12: 80 Nm; M16: 150 Nm

Determination of bolt length l

$$l \text{ (mm)} = B + s + 16$$

Important! Required bolt length < l

l = Bolt length

B = Thickness of busbar

s = Thickness of spring washer and disc



Type	Dimensions	Part No.
A Installation Device – Hexagon Bolts		
SKS M12 25 V2A	M12 x 25 mm	561 925
SKS M12 30 V2A	M12 x 30 mm	561 930
SKS M12 35 V2A	M12 x 35 mm	561 935
SKS M16 30 V2A	M16 x 30 mm	561 931
B Installation Device – Spring Washers		
FR A12 V2A	A12 (s = 2.4)	524 912
FR A16 V2A	A16 (s = 2.8)	524 913
C Installation Device – Discs		
SCH A13 V2A	A13 (s = 2.4)	525 912
SCH A17 V2A	A17 (s = 3.0)	525 916
D 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.		
DP 40 40 B13 AL	M12, 40 x 40 x 6 mm	525 001
DP 50 50 B17 AL	M16, 50 x 50 x 8 mm	525 002

Other lengths are available on request.

SAFETY EQUIPMENT**EARTHING AND SHORT-CIRCUITING DEVICES****Storage Devices****For earthing and short-circuiting devices and earthing rods**

Storage device for earthing and short-circuiting devices and earthing rods.

- Wall-mounted
- For easy and safe storage of earthing and short-circuiting devices and earthing rods Ø30 or 43 mm



Type	For rod Ø	Material	Part No.
A Storage Device			
For earthing and short-circuiting devices and earthing rods of any length Hole distance 424 mm, holes Ø7 mm			
HV EKV ES30	30 mm	steel	700 000
HV EKV ES40	43 mm	steel	700 002

- B Storage Device**
For earthing and short-circuiting devices and earthing rods with lengths up to 1.5 m
Hole distance 104 mm, holes Ø7 mm






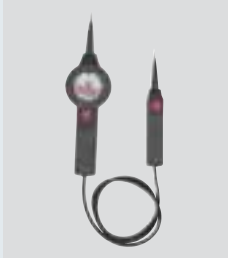
HV EKV ES30 1500	30 mm	steel	700 003
------------------	-------	-------	---------



SAFETY EQUIPMENT

Selection Guide

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, shockproof version Earthing cartridges with T connection Complete kit for cable distribution cabinets	144	
Earthing and Short-circuiting Device, partly insulated, Type TI	up to 1000 V	Earthing cartridges with M10 connection Earthing screw insert for D-type fuse links Complete kit for cable distribution cabinets	147	
Earthing and Short-circuiting Device For overhead lines up to Ø12 mm	up to 1000 V	Insulated clamps for overhead line conductors 4-pole device, extendible up to 6 poles Reliable conductivity due to a copper bar inside of the insulating tube	151	
Earthing and Short-circuiting Device For street lighting installations	up to 1000 V	For E + S D-type fuse links of cable junction and fuse boxes for street lighting installations Aluminium adapter for converting from E27 to E14 threads Complete kit	152	
Earthing and Short-circuiting Device For crane busbars	up to 1000 V	Allows for locking of the clamping area For insulated or uninsulated busbars	154	
Earthing Handle	up to 1000 V	For insertion of earthing and short-circuiting devices into low-voltage installations Sealing unit with plug-in coupling for handle extension Light-weight construction Hexagon shaft or T pin shaft	155	
Two-pole Voltage Detector SPN	100 ... 500 V 120 ... 1000 V	Also for use in wet weather 2 types with different measuring ranges No batteries required Can also be used in overhead line networks by attaching extension prods	156	

Three-pole Earthing and Short-circuiting Devices Type VI

SAFETY EQUIPMENT

Kit for low-voltage installations, fully insulated, Type VI

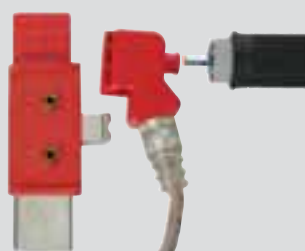
EQUIPMENT FOR VOLTAGES UP TO 1000 V

EN/IEC 61230 (DIN VDE 0683 Part 100)

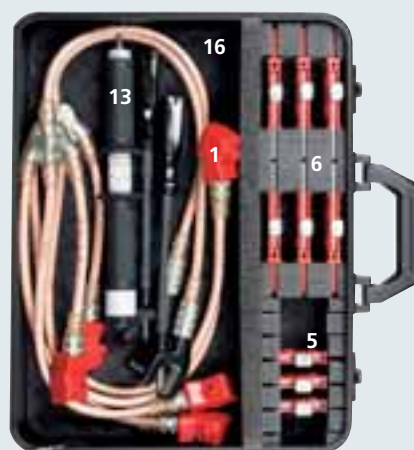
- Fully insulated, shock-proof version
- Complete kit for cable distribution cabinets
- Safe operation with insulated earthing handle Type VI (with dual function), suitable for both inserting and removing earthing cartridges with T connection as well as for installing the earthing and short-circuiting device (E+S device)
- Waterproof, plastic-sheathed cable entry and node unit, with additional protection against twisting



Installation of the fully insulated earthing and short-circuiting device using earthing handle Type VI.



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



Type	Dimensions		Part No.
A Fully insulated Version in a Plastic Case			
The standard kit includes:			
Pos.	Qty.	Description	Part No.
1	2	Earthing and short-circuiting device, fully insulated, 25 mm²	745 925
5	3	Earthing cartridges size 00	745 905
6	6	Earthing cartridges size 1 ... 3	745 910
13	1	Earthing handle Type VI	745 922
16	1	Plastic case	745 902
EKS VI 2F KVS KK		445 x 345 x 100 mm	745 903

B Fully insulated Version in a Sheet Metal Case			
The standard kit includes:			
Pos.	Qty.	Description	Part No.
1	2	Earthing and short-circuiting device, fully insulated, 25 mm ²	745 925
5	3	Earthing cartridges size 00	745 905
6	6	Earthing cartridges size 1 ... 3	745 910
13	1	Earthing handle Type VI	745 922
17	1	Sheet metal case	745 900
EKS VI 2F KVS SBK			440 x 300 x 100 mm
			745 901

Other cable lengths or customised kits are available on request.

SAFETY EQUIPMENT

EQUIPMENT FOR VOLTAGES UP TO 1000 V

Single Parts of three-pole Earthing and Short-circuiting Devices, Type VI

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

Adjustable handle with 2 positions, clamping range up to 20 mm
For cable distribution cabinets

Type	Cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
EKV3 25 VI KVS DGF	25 mm ²	4.9 kA	1	745 925
EKV3 35 VI KVS DGF	35 mm ²	6.9 kA		745 935

Earthing and Short-circuiting Device Type VI, with spring-loaded Earth Clamp

Clamping range up to 24 mm and installation via adjustable handle, Part No. 745 921
For cable distribution cabinets

Type	Cable cross section	Max. short-circuit current I_k 1 s	Part No.
EKV3 25 VI KVS EK24	25 mm ²	4.9 kA	745 926
EKV3 35 VI KVS EK24	35 mm ²	6.9 kA	745 936

Earthing and Short-circuiting Device Type VI, with spring-loaded Earth Clamp

Clamping range up to 24 mm and installation via adjustable handle, Part No. 745 921
For service entrance boxes

Type	Cable cross section	Max. short-circuit current I_k 1 s	Part No.
EKV3 16 VI HAK EK24	16 mm ²	3.2 kA	745 940

Earthing Cartridges NH 00

With T connection for installation into NH fuse holders and blocks, size NH 00
For use with earthing handle Type VI

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
EP NH00 VI TA	00	35 mm ²	6.9 kA	5	745 905

Earthing Cartridges NH 1 ... 3

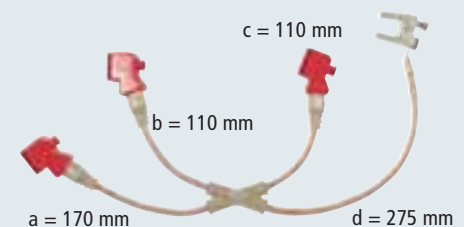
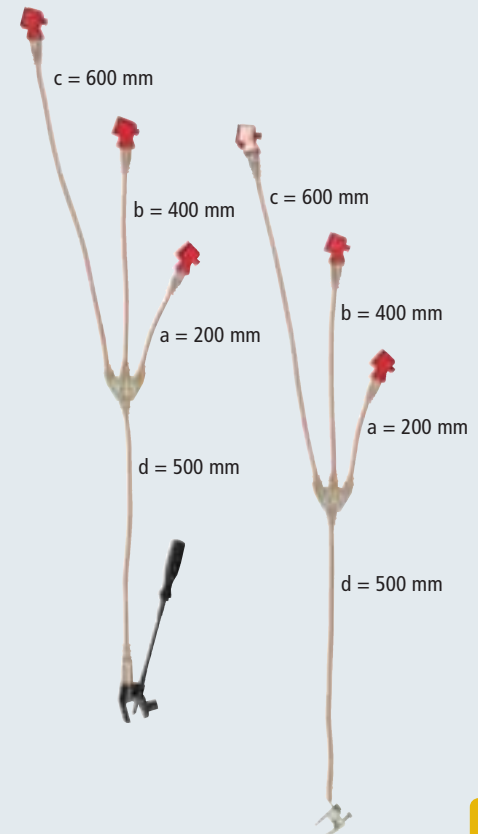
With T connection for installation into NH fuse holders and blocks, sizes NH 1 ... 3
For use with earthing handle Type VI

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
EP NH1 3 VI TA	1 ... 3	35 mm ²	6.9 kA	6	745 910

Earthing Cartridges NH 4a

With T connection for installation into NH fuse holders and blocks size NH 4a
For use with earthing handle Type VI

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
EP NH4A VI TA	4a	35 mm ²	6.9 kA	745 915



Single Parts of three-pole Earthing and Short-circuiting Devices, Type VI

SAFETY EQUIPMENT

EQUIPMENT FOR VOLTAGES UP TO 1000 V

Earthing Handle Type VI

With dual function

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



Type	Length	Position	Part No.
EG 00 4A VI	285 mm	13	745 922

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting the spring-loaded earth clamp



Type	Length	Part No.
DGF EKV VI	270 mm	745 921



Plastic Case, empty

With foam padding

Type	Colour	Dimensions	Position	Part No.
KKL EKS VI KVS	●	445 x 345 x 100 mm	16	745 902



Sheet Metal Case, empty

With foam padding

Type	Colour	Dimensions	Position	Part No.
SBKL EKS VI KVS	●	440 x 330 x 100 mm	17	745 900

SAFETY EQUIPMENT Three-pole Earthing and Short-circuiting Devices Type TI

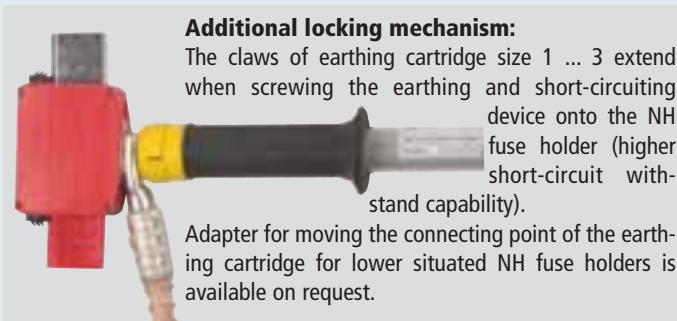
EQUIPMENT FOR VOLTAGES UP TO 1000 V Kit for low-voltage installations, partly insulated, Type TI

EN/IEC 61230 (DIN VDE 0683 Part 100)



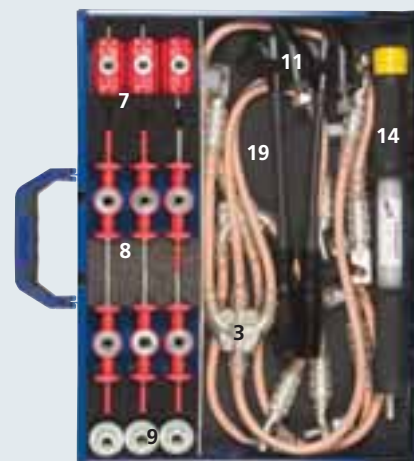
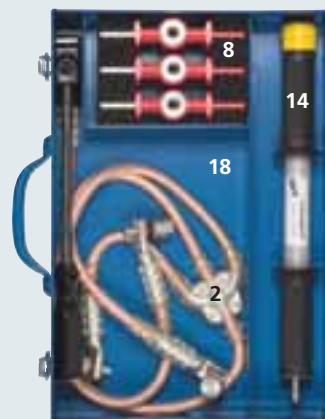
Installation of the the partly insulated earthing and short-circuiting device using earthing handle Type TI

- Complete kit for cable distribution cabinets
- Safe operation with insulated earthing handle TI (with dual function), suitable both for installing and removing earthing cartridges with M10 connection as well as for installing the earthing and short-circuiting device (E+S device)
- Waterproof, plastic-sheathed cable entry and node unit, with additional protection against twisting



Type	Dimensions		Part No.
A Kit I – Partly insulated Version in a Sheet Metal Case			
Standard kit includes:			
Pos.	Qty.	Description	Part No.
2	1	Earthing and short-circuiting device, partly insulated, 25 mm²	745 426
8	3	Earthing cartridges size 1 ... 3	745 018
14	1	Earthing handle Type TI	745 400
18	1	Sheet metal case	766 300
EKS TI KVS SBK		380 x 260 x 80 mm	766 302

B Kit II – Partly insulated Version in a Sheet Metal Case			
Standard kit includes:			
Pos.	Qty.	Description	Part No.
3	2	Earthing and short-circuiting device, partly insulated, 25 mm²	745 458
7	3	Earthing cartridges size 00	745 302
8	6	Earthing cartridges size 1 ... 3	745 018
9	3	Earthing screw inserts size E33	745 202
11	2	Earth clamps, insulated	745 602
14	1	Earthing handle Type TI	745 400
19	1	Sheet metal case	766 298
EKS TI 2F KVS SBK			745 500
440 x 330 x 66 mm			

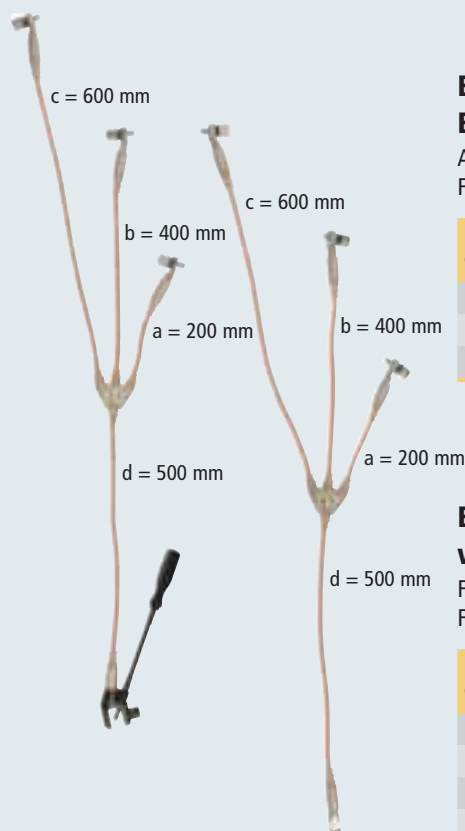


Other cable lengths or customised kits are available on request.

Single Parts of three-pole Earthing and Short-circuiting Devices, Type TI

SAFETY EQUIPMENT

EQUIPMENT FOR VOLTAGES UP TO 1000 V



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

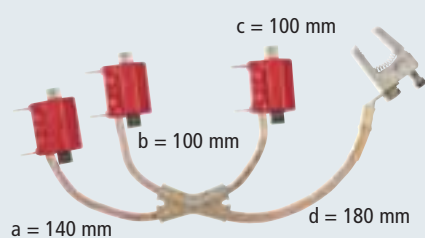
Adjustable handle with 2 positions, clamping range up to 20 mm
For cable distribution cabinets

Type	Cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
EKV3 25 TI KVS DGF	25 mm ²	4.9 kA	2	745 426
EKV3 35 TI KVS DGF	35 mm ²	6.9 kA		745 436
EKV3 50 TI KVS DGF	50 mm ²	9.9 kA		745 451

Earthing and Short-circuiting Device Type TI, with Hook-shaped Cable Lug

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

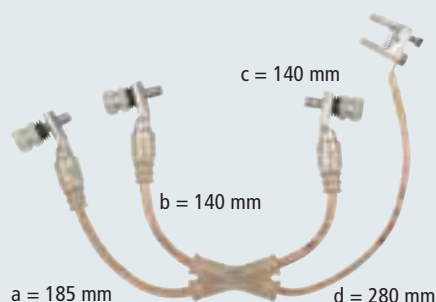
Type	Cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
EKV3 16 TI KVS HKS	16 mm ²	3.2 kA		745 459
EKV3 25 TI KVS HKS	25 mm ²	4.9 kA	3	745 458
EKV3 35 TI KVS HKS	35 mm ²	6.9 kA		745 460
EKV3 50 TI KVS HKS	50 mm ²	9.9 kA		745 461



Earthing and Short-circuiting Device Type TI, with Spring-loaded Earth Clamp

Clamping range up to 24 mm and installation with adjustable handle, Part No. 745 921
Fixed earthing cartridges size 00 on the phase side
For service entrance boxes

Type	Cable cross section	Max. short-circuit current I_k 1 s	Part No.
EKV3 NH00 TI EK24	16 mm ²	3.2 kA	745 817



Earthing and Short-circuiting Device Type TI, with Spring-loaded Earth Clamp

Clamping range up to 24 mm and installation with adjustable handle, Part No. 745 921
Screw cable lugs with M10 hexagon bolt on the phase side
For installation on earthing cartridges with M10 terminal at service entrance boxes

Type	Cable cross section	Max. short-circuit current I_k 1 s	Part No.
EKV3 SKB M10 TI EK24	16 mm ²	3.2 kA	745 816

SAFETY EQUIPMENT

EQUIPMENT FOR VOLTAGES UP TO 1000 V

Single Parts of three-pole Earthing and Short-circuiting Devices, Type TI

Earthing Cartridges NH 00

With M10 terminal for insertion into NH fuse holders and blocks, size NH 00
For use with earthing handle type TI

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
EP NH00 TI M10	00	35 mm ²	6.9 kA	7	745 302



Earthing Cartridges NH 1 ... 3

With M10 terminal for insertion into NH fuse holders and blocks, sizes NH 1 ... 3
For use with earthing handle type TI

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
EP NH1 3 TI M10	1 ... 3	35 mm ²	6.9 kA	8	745 018



Earthing Cartridges NH 4a

With M10 terminal for insertion into NH fuse holders and blocks, size NH 4a
For use with earthing handle type TI (Part No. 745 400/S03)

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
EP NH4A TI M10	4a	35 mm ²	6.9 kA	745 016

Earthing Cartridges NH 1 ... 3 with additional Locking Mechanism

With M10 terminal
The claws of the earthing cartridges spread out when the earthing and short-circuiting device is connected to the NH fuse holder and thus allow for higher short-circuit withstand capability

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
EP NH1 3 TI A M10	1 ... 3	50 mm ²	9.9 kA	745 401



Earthing Cartridges NH 1 ... 3 with Grip Lugs

With M10 terminal for use with earthing handle type TI or NH fuse handle with sleeve,
Part No. 785 645

Type	Size	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
EP NH1 3 TI GL M10	1 ... 3	35 mm ²	6.9 kA	745 017



Screw-in Earthing Insert with M10 Terminal

Insulated thread
For screwing into E27 and E33 threaded fuse holders using earthing handle type TI

Type	Size	Contact pin	Thread	Max. cable cross section	Max. short-circuit current I_k 1 s	Position	Part No.
ESE E27 TI M10	E27	Ms/gal CuSn	plastic	25 mm ²	4.9 kA		745 201
ESE E33 TI M10	E33	Ms/gal CuSn	plastic	25 mm ²	4.9 kA	9	745 202



Screw-in Earthing Insert with M10 Terminal

Conductive thread
For screwing into E27 and E33 threaded fuse holders using earthing handle type TI

Type	Size	Contact pin	Thread	Max. cable cross section	Max. short-circuit current I_k 1 s	Part No.
ESE E27 KBI M10	E27	plastic	Ms/gal CuSn	25 mm ²	4.9 kA	745 203
ESE E33 KBI M10	E33	plastic	Ms/gal CuSn	25 mm ²	4.9 kA	745 204



Single Parts of three-pole Earthing and Short-circuiting Devices, Type TI

SAFETY EQUIPMENT

EQUIPMENT FOR VOLTAGES UP TO 1000 V



Earth Clamp with flexible adjustable Handle and two Setting Positions

For earth connection to earthing and short-circuiting devices for cable distribution cabinets, with M8 terminal bolt, protection against twisting and nut

Type	Clamping range	Position	Part No.
EK I FL20 DGF	up to 20 mm	11	745 602



Earth Clamp, bare, with Wing Bolt

For earth connection to earthing and short-circuiting devices for cable distribution cabinets, with M8 terminal bolt, protection against twisting and nut

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

Earthing Handle Type TI

With dual function

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



Type	Length	Position	Part No.
EG TI EKV	355 mm	14	745 400

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting the spring-loaded earth clamp



Type	Length	Position	Part No.
DGF EKV VI	270 mm	15	745 921



Sheet Metal Case, empty

Type	Colour	Dimensions	Position	Part No.
SBKL EKS TI KVS	Blue	440 x 330 x 66 mm	18	766 300



Sheet Metal Case, empty

With foam padding

Type	Colour	Dimensions	Position	Part No.
SBKL EKS TI KVS 2F	Blue	380 x 260 x 80 mm	19	766 298

SAFETY EQUIPMENT

Four-pole to six-pole Short-circuiting Devices

EQUIPMENT FOR VOLTAGES UP TO 1000 V For low voltage overhead conductors up to Ø12 mm (95 mm²)

EN/IEC 61230 (DIN VDE 0683 Part 100)



Sample construction of a four-pole short-circuiting device.

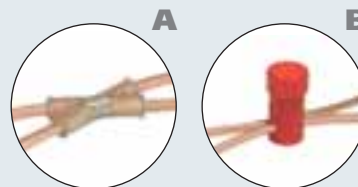
- Insulated screw clamps for overhead conductors
- Four-pole unit, extendible up to 6 poles
- Reliable conductivity due to copper bar in the insulating tube

Technical Data

Insulating tube	Glass-fibre reinforced polyester, Ø20 mm, yellow, Lengths: 2x 300 mm, 2x 800 mm
Clamping part	Cu alloy, insulated
Short-circuiting cables	Cu, highly flexible, cable lengths 600 mm
Node units	Cu alloy, insulated
Temperature range	– 25° C ... + 55° C

The devices have an insulated threaded rod (with handle) for safe contact with the overhead lines and for fast installation (reliable contact due to spring-loaded screw clamp) at the conductors.

The fully insulated device is available as four-pole (with fixed node unit), five-pole or six-pole type (with extendible node unit).



Type	Cable cross section	Max. short-circuit current I_k 1 s	Part No.
A Four-pole Node Unit			
KV4 25 NSFL ISK95	25 mm ²	4.9 kA	742 225
B Four-pole Node Unit, extendible to five or six Poles			
KV4 25 NSFL ISK95 E	25 mm ²	4.9 kA	742 425

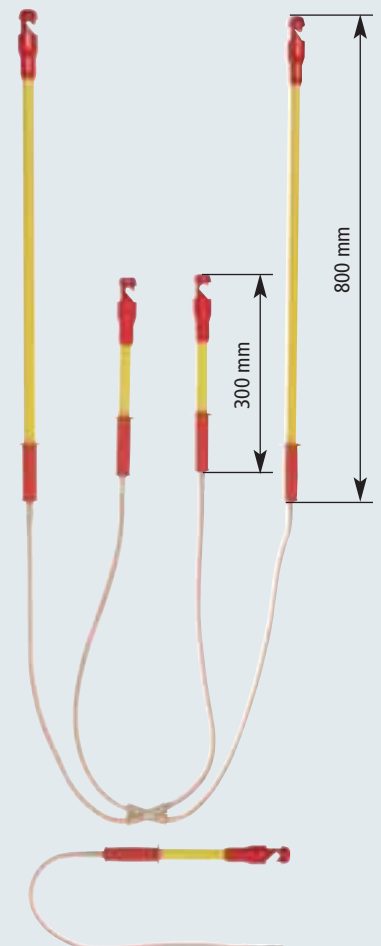
Other cable and insulating tube lengths are available on request.

Additional single-pole Conductors

With insulated screw clamp, short-circuiting cable, 600 mm long, with connector for extending the four-pole short-circuiting device, Part No. 745 425.

The connectors are screwed into the node unit (B model).

Type	Cable cross section	Max. short-circuit current I_k 1 s	Length of insulating tube	Part No.
ZA 25 ISK95 300	25 mm ²	4.9 kA	300 mm	740 300
ZA 25 ISK95 800	25 mm ²	4.9 kA	800 mm	740 800



Earthing and Short-circuiting Device

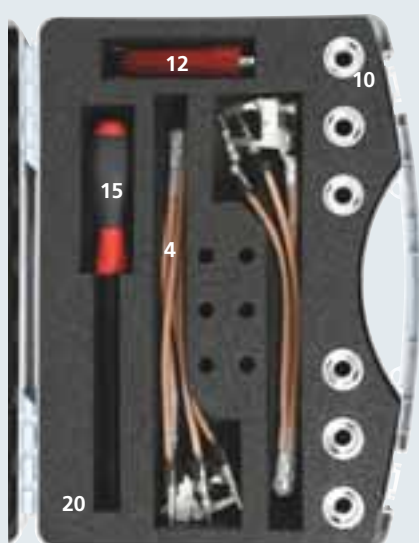
Kit for street lighting installations

- For junction and fuse boxes of street lighting installations
- For E14 fuse links
- Aluminium adapter for converting from E27 to E14 threads
- Max. backup fuse 32 A power circuit breaker (B characteristic)

SAFETY EQUIPMENT EQUIPMENT FOR VOLTAGES UP TO 1000 V



Earthing and short-circuiting device installed at a junction and fuse box of a street lighting mast.



Type		Dimensions		Part No.
A Kit for Street Lighting Installations in a Plastic Case				
Standard kit includes:				
Pos.	Qty.	Description	Part No.	
4	2	Standard earthing and short-circuiting device, E14 screw-in earthing insert, 6 mm²	745 107	
10	6	E27 / E14 adapter	745 108	
12	1	Installation adapter	745 109	
15	1	Adjustable handle with flexible shaft	745 921	
20	1	Plastic case	745 106	
EKV ÜGK MB S		395 x 295 x 105 mm	745 105	

Customised kits are available on request.

SAFETY EQUIPMENT

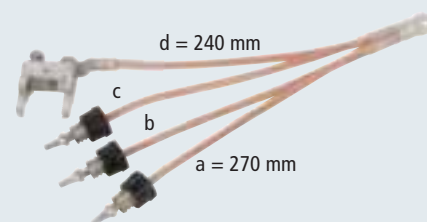
EQUIPMENT FOR VOLTAGES UP TO 1000 V

Single Parts of Earthing and Short-circuiting Devices

Earthing and Short-circuiting Device for Street Lighting Installations

With 3 fixed E14 earthing screw inserts and spring-loaded earth clamp, clamping range up to 24 mm (installation with adjustable handle, Part No. 745 921)

Type	Cable cross section	Position	Part No.
EKV ÜGK MB	6 mm ²	4	745 107



E27 / E14 Adapter

Reducing insert for converting from E27 to E14 threads

Allows for use of the earthing and short-circuiting device with E14 earthing screw inserts, even for E27 threads

Type	Dimensions	Material	Position	Part No.
RED E27 E14 ÜGK MB	Ø30 x 25 mm	Al	10	745 108



Installation Adapter

For installing the E27/E14 adapter and D-gauges DII and DIII

Type	Dimensions	Material	Position	Part No.
PSS DII	Ø30 x 110 mm	plastic	12	745 109



Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting the spring-loaded earth clamp

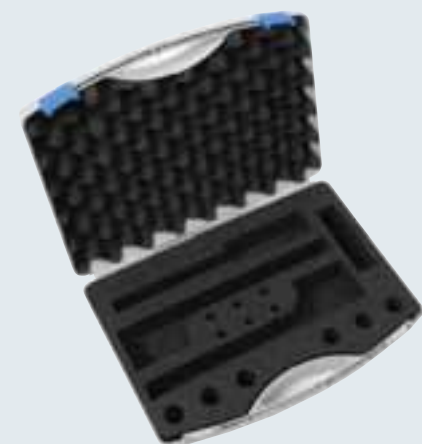
Type	Length	Position	Part No.
DGF EKV VI	270 mm	15	745 921



Plastic Case, empty

With foam padding

Type	Colour	Dimensions	Position	Part No.
KKL EKV ÜGK MB	●	395 x 295 x 105 mm	20	745 106



Three-pole Earthing and Short-circuiting Devices

With clamps for crane conductor bars

SAFETY EQUIPMENT

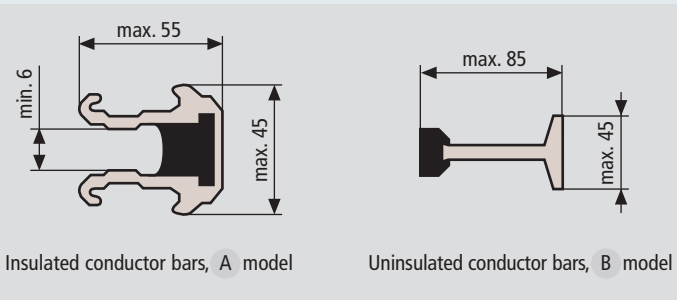
EQUIPMENT FOR VOLTAGES UP TO 1000 V

EN/IEC 61230 (DIN VDE 0683 Part 100)

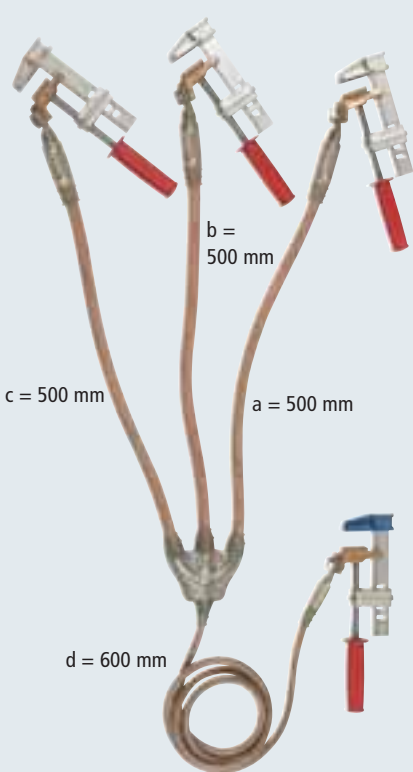
- For insulated or uninsulated conductor bars of cranes and lifting equipment
- Allows for locking the clamping range of the clamps in several positions
- Waterproof, plastic-sheathed cable entries and node unit, with additional protection against twisting



Three-pole earthing and short-circuiting device with clamps.



Technical Data	
Clamping part	MCl/gal Zn
Pressure plates	Cu alloy
Cable entries, node unit	Cu, plastic-sheathed, transparent and colourless
Short-circuiting cables	Cu, highly flexible
Operating temperature range	– 25° C ... + 55° C



Type	Cable cross section	Max. short-circuit current I _k 1 s	Part No.
A Clamps for insulated conductor bars Clamping range up to 55 mm			
EKV3 25 IS ZK55	25/25 mm ²	4.9 kA	743 225
EKV3 35 IS ZK55	35/35 mm ²	6.9 kA	743 235
EKV3 50 IS ZK55	50/50 mm ²	9.9 kA	743 250
B Clamps for uninsulated conductor bars Clamping range up to 85 mm			
EKV3 25 BS ZK85	25/25 mm ²	4.9 kA	743 325
EKV3 35 BS ZK85	35/35 mm ²	6.9 kA	743 335

The clamp for the PEN conductor is marked blue.

SAFETY EQUIPMENT

Earthing Handle

EQUIPMENT FOR VOLTAGES UP TO 1000 V

For use in low-voltage installations

T pin shaft, DIN 48087

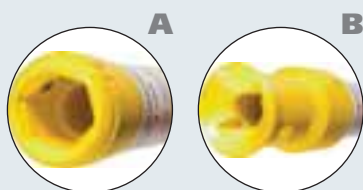


Installation of an earthing and short-circuiting device into a low-voltage switchgear installation using an earthing handle

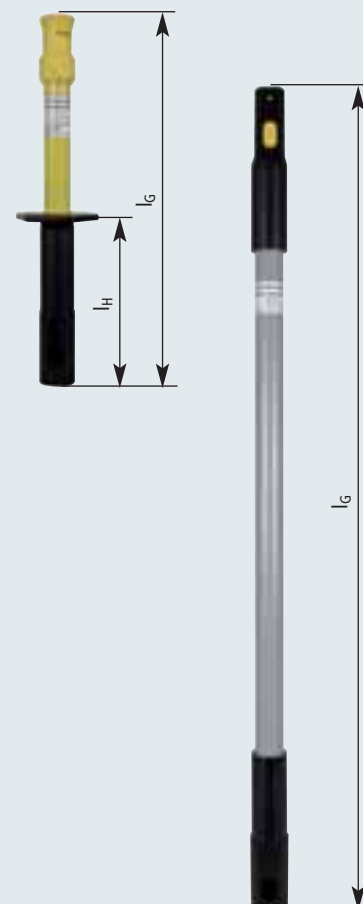
- For installation of earthing and short-circuiting devices into low-voltage installations
- Sealing unit with plug-in coupling for handle extension
- Light-weight construction
- Hexagon shaft (width across flats 19) or T pin shaft

Technical Data

Insulating tube	Glass-fibre-reinforced polyester tube, Ø30 mm, yellow
Clamp coupling	Plastic, yellow
Sealing unit	Plug-in coupling for extending the handle
Handguard	Plastic, black
Operating temperature range	– 25° C ... + 55° C



Type	Total length l_G	Handle length l_H	Part No.
A STK Earthing Rod, Hexagon Shaft			
Spring locking mechanism and plug-in coupling for extending the handle			
EG SK STK 400	400 mm	185 mm	745 415 new
B STK Earthing Rod, T Pin Shaft			
Bayonet locking mechanism and plug-in coupling for extending the handle			
EG SQ STK 400	400 mm	185 mm	745 414 new



Accessories for Earthing Handle

HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335

Two-pole SPN Voltage Detector

Nominal voltages up to 1000 V

- Also for use in wet weather
- Extremely shock-resistant, waterproof and dust-proof enclosure
- Two types with different measuring ranges
- Also for use in overhead line networks by attaching extension prods
- No batteries required
- Safe two-hand operation



The voltage detector is equipped with a test button in each handle. The buttons activate the measuring element and LED indication. High-resistance tests (LCD display) can be performed without pressing the button and low-resistance tests by pressing the button.

SAFETY EQUIPMENT

EQUIPMENT FOR VOLTAGES UP TO 1000 V



EN/IEC 61243-3 (DIN VDE 0682 Part 401)



Two-pole SPN voltage detector used with extension prods in overhead lines.

Technical Data

Frequency range	0 ... 100 Hz
Indicator	Safety enclosure made of solid rubber
Degree of protection	IP 65
Indication	Moving-iron instrument, LCD and LED
Operating temperature range	– 10° C ... + 55° C
Connecting cable	Rubber-sheathed cable, highly flexible, 1000 mm
Overvoltage category	CAT IV acc. to IEC 60664-1



Type	Nominal voltage range U_N	Dimensions of indicator	Part No.
------	-----------------------------	-------------------------	----------

A SPN Voltage Detector

Basic devices

SPN 500	100 ... 500 V	274 x 75 x 47 mm	766 541
SPN 1000	120 ... 1000 V	274 x 75 x 47 mm	766 545

Other versions are available on request.

Accessories for Two-pole SPN Voltage Detectors

Extension Prod

For use in overhead line networks by screwing onto the basic device

Type	Length	Part No.
VS 500 SPN II	500 mm	766 542

Storage Bag, empty

For SPN voltage detectors (basic device with extension prods)

Type	Material	Part No.
AT SPN II	artificial leather	766 543



SAFETY EQUIPMENT

FURTHER EQUIPMENT

Set of Warning Signs



Warning signs displayed at an electrical installation.

- Warning signs for working at electrical installations in accordance with EN 50110-1 (DIN VDE 0105 Parts 100 and 1)
- Complete set with all important warning signs (German language)
- Other warning, mandatory, prohibition or information signs are available on request

Type		Material	Part No.
A Set of Warning Signs			
Pos.	Qty.	Description	Dimensions
1	1	Sign "VDE-Bestimmungen für den Betrieb von elektrischen Anlagen" [Engl.: "German national regulations for operation of electrical installations"] (German language)	1000 x 660 mm
2	1	Sign "Erste Hilfe" [Engl.: "First Aid"] acc. to BGI 510 (German language)	595 x 410 mm
3	1	Sign "Merkblatt für Brandbekämpfung im Bereich elektrischer Anlagen" [Engl.: "Information on fire-fighting close to electrical installations"] (German language)	500 x 350 mm
4	1	Prohibition sign "Nicht schalten. Es wird gearbeitet." [Engl.: "No switching! Electrical work!"] (German language)	300 x 200 mm
5	1	Warning sign "Hochspannung – Lebensgefahr" [Engl.: "Danger! High Voltage!"] (German language)	237 x 200 mm
6	1	Sign "Achtung! Geerdet und kurzgeschlossen!" [Engl.: "Warning! Earthed and short-circuited system!"] (German language)	120 x 200 mm
7	1	Sign "5 Sicherheitsregeln" [Engl.: "5 Safety Rules"] (German language)	120 x 200 mm
WHSS EA K		plastic	700 011



Single-pole Earthing and Discharge Devices

SAFETY EQUIPMENT FURTHER EQUIPMENT

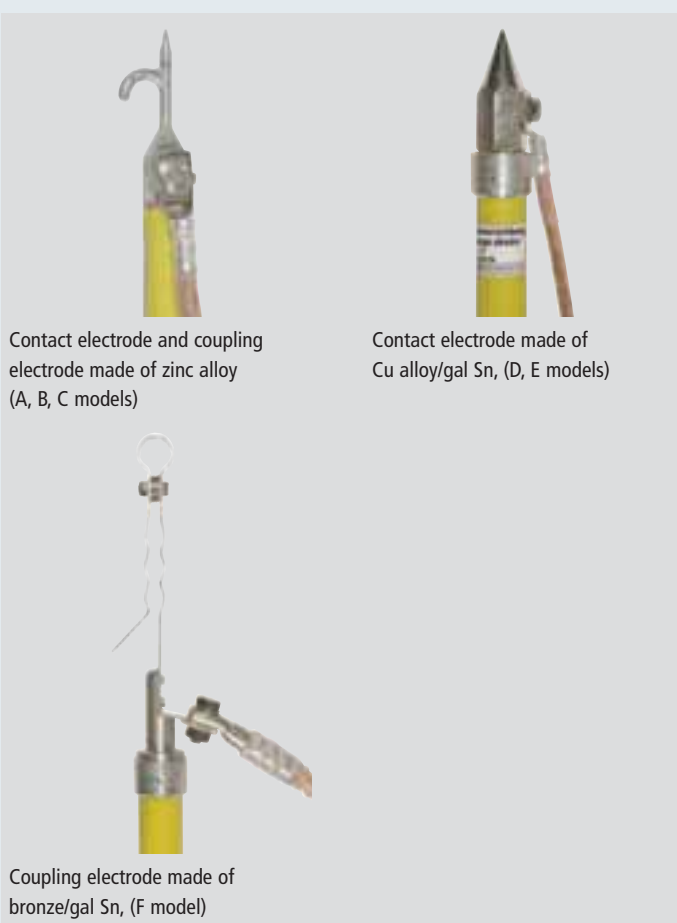
- For discharging static charges
- Different contact electrodes
- Coupling electrode, especially for round conductors Ø12 ... 26.5 mm of electrostatic precipitator systems
- Waterproof plastic-sheathed cable entries, with additional protection against twisting



Single-pole device for discharging static charges.

Technical Data

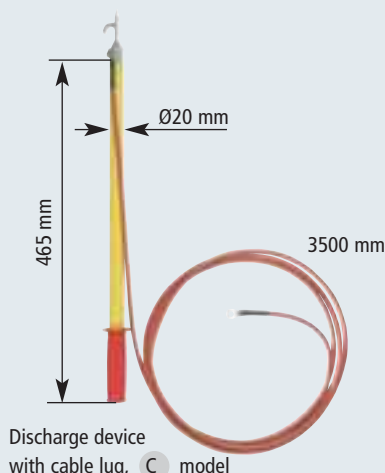
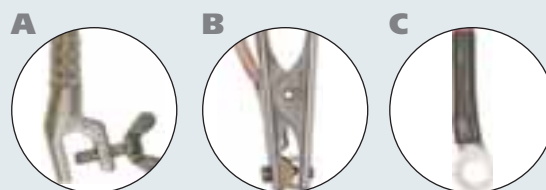
Contact electrodes	Zinc alloy or Cu alloy/gal Sn
Coupling electrode	Bronze/gal Sn
Insulating tube	Glass-fibre reinforced polyester tube, Ø20 mm or Ø30 mm, yellow
Earthing cable	Cu, highly flexible, transparent or red
Cable length	3500 mm



Contact electrode and coupling electrode made of zinc alloy (A, B, C models)

Contact electrode made of Cu alloy/gal Sn, (D, E models)

Coupling electrode made of bronze/gal Sn, (F model)



Discharge device with cable lug, C model

Type	Cable cross section	Cable sheath	Clamping range	Part No.
A Discharge Device with Handle and Earth Clamp with Wing Bolt				
EV TES 465 EK	16 mm ²	transparent	up to 20 mm	758 020
B Discharge Device with Handle and Spring-loaded Earth Clamp				
EV TES 465 EZ	16 mm ²	transparent	up to 18 mm	758 021
C Discharge Device with Handle and Earth Cable Lug Hole Ø8.4 mm and silicone conductor				
EV TES 465 KS10	10 mm ²	●		758 022

SAFETY EQUIPMENT

FURTHER EQUIPMENT

Single-pole Earthing and Discharge Devices



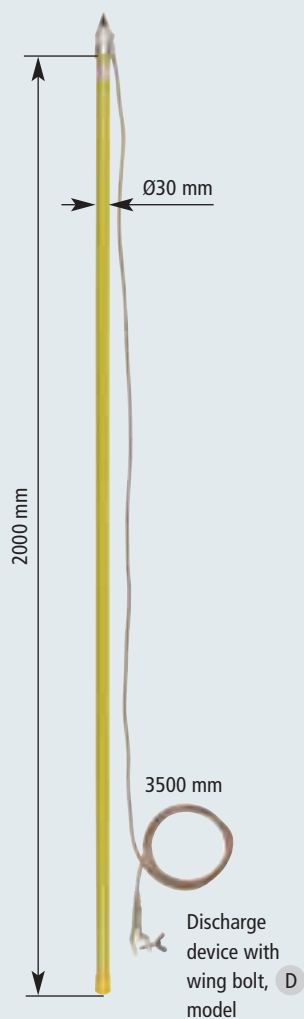
Type	Cable cross section	Cable sheath	Clamping range	Part No.
------	---------------------	--------------	----------------	----------

D Discharge Device and Earth Clamp with Wing Bolt

EV TS 2000 EK	16 mm ²	transparent	up to 20 mm	758 001
---------------	--------------------	-------------	-------------	----------------

E Discharge Device and Spring-loaded Earth Clamp

EV TS 2000 EZ	16 mm ²	transparent	up to 18 mm	758 003
---------------	--------------------	-------------	-------------	----------------

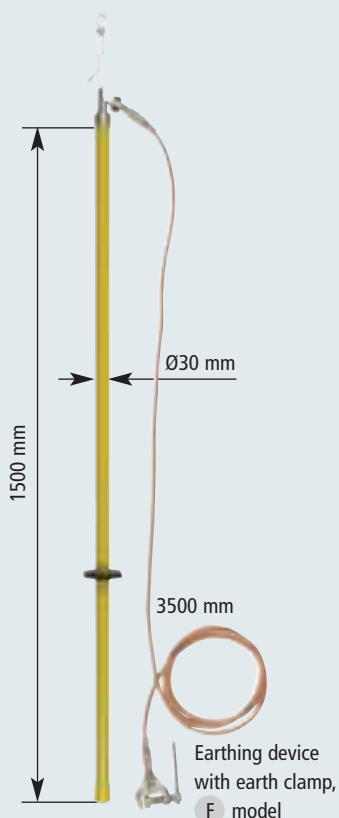


Type	Cable cross section	Cable sheath	Clamping range	Part No.
------	---------------------	--------------	----------------	----------

F Earthing Device and Earth Clamp with Tommy Bar

For round conductors Ø12 ... 26.5 mm of electrostatic precipitator systems

EV EH 1725 EK	25 mm ²	transparent	up to 30 mm	758 015
---------------	--------------------	-------------	-------------	----------------



LIVE WORKING

DELTEC® – Product range

The permanent availability of electrical energy has become a decisive factor for international competition. At the same time, power interruptions must be reduced due to increasing cost pressure. This makes it difficult to ensure the operating safety of existing installations and to perform maintenance work, as entire parts of the installation cannot be isolated and the only remaining alternative is live working.

DEHN + SOHNE has gained considerable experience in the field of live working and has developed new 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, switchgears and distribution boards, transformer cells or cable distribution cabinets cannot be isolated or can only be isolated with great effort due to undesired disconnecting times and costly work on Sundays and public holidays.

Live cleaning**Clean installations increase operating safety**

Dirty electrical installations and adverse weather conditions (moisture) can cause power failures, damage to the equipment and even personal injuries as a result of an electrical arc. In medium voltage installations, layers of dust or insulator lubricants can cause failures. In cable distribution boards and low voltage installations, cobwebs, weeds and dust are considered more likely causes.

Regular cleaning intervals

The results of surveys showed that cleaning of open indoor installations and cable distribution cabinets has to be performed at regular intervals between 6 months and 2 years depending on the type and degree of dirt.

Dry cleaning by suction combined with damp cleaning

Dry cleaning work is performed with operating heads that are used to clean or brush dirty parts of the installation while simultaneously sucking the dirt away. Loose layers of dust and cobwebs are easily cleaned with little effort. Oily and tough pollutant layers are removed by damp cleaning using sponges and special insulating cleaning liquid.

This type of work is performed according to "hot stick working" procedure.

Equipment for dry cleaning by suction

Equipment for cleaning by suction 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 the accidental use of accessories not designed for this type of application (e.g. accessories of industrial vacuum cleaners).

Requirements for the vacuum cleaner

The vacuum cleaner used must meet the following requirements:

- The industrial suction device must have a minimum air velocity of 20 m/s and a visual control indication of the intake capacity.
- The intake hose must have a continuous inner diameter $\geq \varnothing 30$ mm and must not contain metal parts

Equipment for damp cleaning

The equipment for damp cleaning consists of special cleaning heads (sponge supports), insulating rod with handle and extension elements. All single parts are fully insulated. The plug-in device of operating heads and sponges allows for easy and fast replacement of dirty sponges. Only approved and marked sponges may be used for these applications.

Refilling of cable ends**Refilling insulating oil into cable ends**

The newly developed refilling device considerably reduces the cable refilling procedure and makes it safer and easier. The insulating oil is then heated according to the manufacturers' specifications and filled into the cable end by simply pushing a button on the refilling lance. The compact device with rolls has a capacity of max. 5 litres of insulating oil. An insulated screw driver is used for loosening the locking screw at the cable end (insulated operating rod with interchangeable operating head). This type of work is performed according to "hot stick working" procedure.

Equipment for refilling insulating oil into cable ends

The refilling device consists of a pumping unit with a container, regulated heating, pump and refilling lance. The insulated screw driver system consists of an insulating rod with a manually operated mechanism (adjustable handle), interchangeable operating heads (straight and angled) with a safety plug-in system that supports different screw type bits. 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. Specially adapted plastic screws are available for different cable ends which are attached to the insulated screw driver.

Requirements for the installer**Selection of electricians for live working**

Maintenance work may only be performed by electricians with experience in the operation and maintenance of electrical installations. The electricians must be trained by completing the theoretical and practical training required 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 accident prevention and insurance association for precision and electrical engineering. It includes theoretical and practical training and the issue of a "Live Working" certificate after completion of the training.

Equipment Programme for Live Working

“Live working” procedure

During the hot stick working procedure, the worker keeps a predefined distance from energised parts of the installation and carries out his work with insulating rods/operating rods.

Design of operating rods

Operating rods according to DIN VDE 0681/0682 are hand-held devices for operating, testing and shielding distances from energised equipment. They consist of one or several insulating rods rated for the nominal equipment voltage and of an operating head designed for the intended application. **Operating rods**, are e.g. **intake tubes**, **insulating rods**, **locking rods**, **refilling lances** or **insulated screw drivers**. They are marked with the  symbol on the rating plate.

An operating rod consists of a **handle**, **insulating part** and **operating head**.

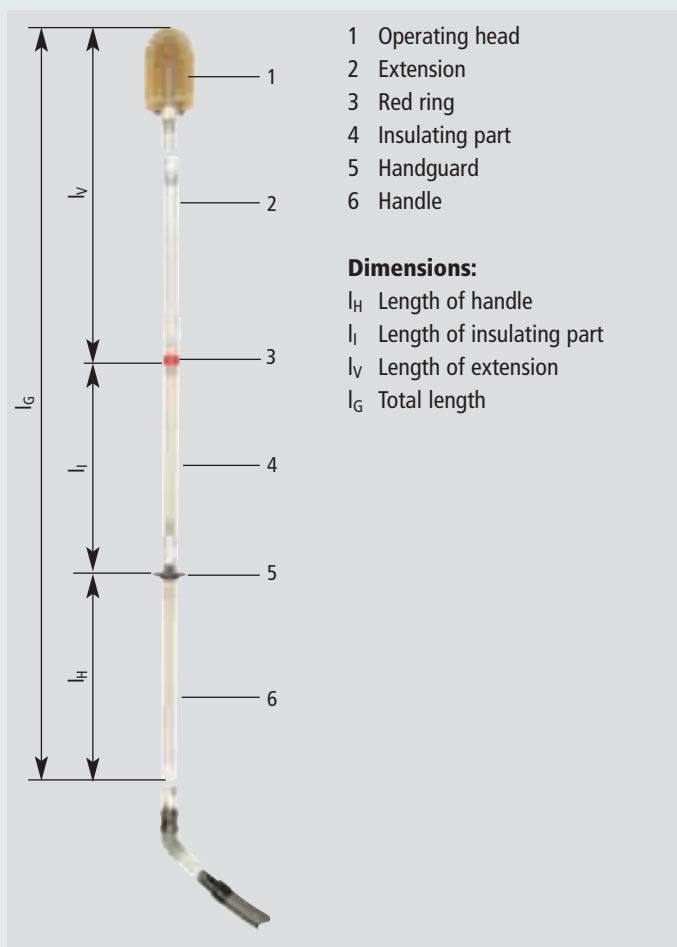
The **operating head** is the part of the operating rod containing the operating element, e.g. operating heads and brushes of a cleaning kit or the sponge supports of a damp cleaning kit.

The **insulating part** is the part of the operating rod between the handguard 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 between the insulating part and operating element of the operating head. It allows the user to reach remote parts of the installation and to pass the operating head close to energised parts.

The **handguard** provides a visible barrier between the handle and the insulating part and prevents the user from making contact with the insulating part.

The **red ring** indicates the end of the insulating part 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 part between the red ring and handguard may not make contact with energised components but contact with earthed components is allowed.



EQUIPMENT PROGRAMME FOR LIVE WORKING

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 for fast replacement of operating heads	164	
TRS MS 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 for fast replacement of operating heads	168	
FRS ZK MS Damp Cleaning Kit	up to 36 kV / 15 ... 60 Hz	Equipment for damp cleaning under live conditions with special cleaning liquid Universal gear coupling for replacing and adjusting the angle of operating heads Plug-in operating heads for fast and easy replacement of sponges	172	
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 for fast and easy replacement of sponges	176	
NFG MS Refilling Device	up to 36 kV / 15 ... 60 Hz	Refilling of insulating oil under live conditions Safe, fast and easy refilling procedure	186	
MS Insulating Screw Driver	up to 36 kV / 15 ... 60 Hz	For removing and replacing cable end locking screws under live conditions With interchangeable operating heads	188	

TRS NS Dry Cleaning Kit

Nominal voltages up to 1000 V / 15 ... 60 Hz

LIVE CLEANING EQUIPMENT

- Not for use in wet weather
- For indoor and outdoor installations
- Equipment for live cleaning by means of suction
- 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 the operating heads
- Regulation of intake air in the handle area



Based on DIN VDE 0680 Part 3
Tubes according to IEC 61235



Live cleaning of a low-voltage switchgear installation using the TRS NS dry cleaning kit

Requirements

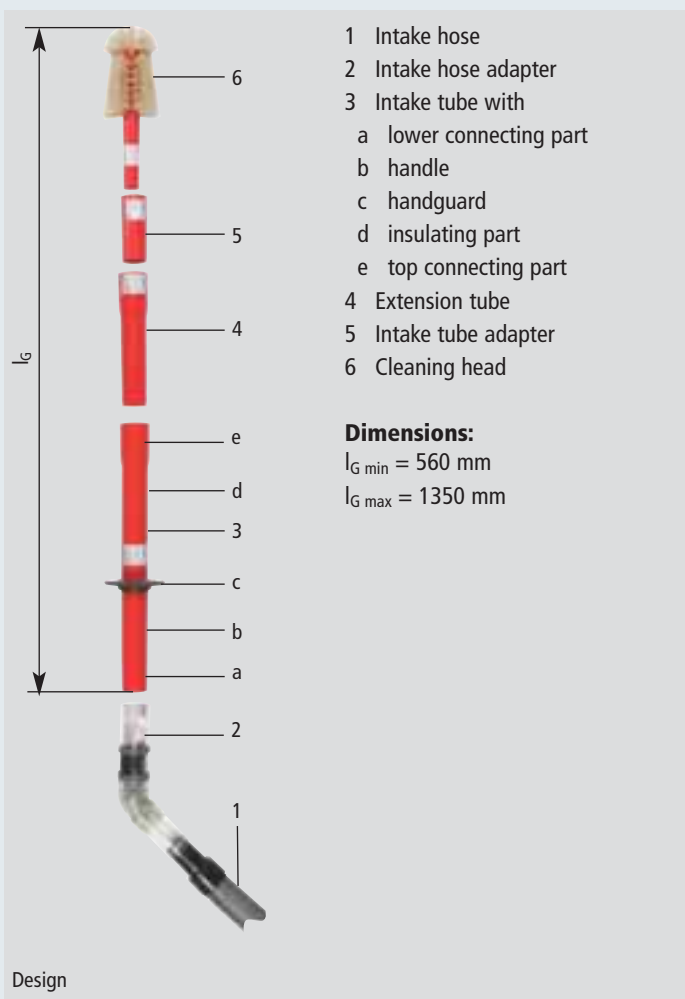
TRS NS allows maintenance work to be done under supervision of a qualified electrician at voltages up to 1000 V according to EN 50110-1 "Operation of electrical installations – Minimum Requirements". In Germany apply sections BGV A3 and of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] issued by the German Employer's Liability Association for Precision and Electrical Engineering (BGFE).



Chamfered flat cleaning head in use.



Tubular brush in use.



LIVE CLEANING EQUIPMENT

Type	Model	Part No.
------	-------	----------

A TRS NS Dry Cleaning Kit

Standard kit includes:

Pos.	Qty.	Type	Description	Part No.
1	1	SRH 400 NS	Intake tube with handle	785 520
2	1	SRV 200 NS	Extension, 200 mm	785 521
3	1	SRV 300 NS	Extension, 300 mm	785 522
4	1	SRV 400 NS	Extension, 400 mm	785 523
5	1	SRW V NS	Angle, adjustable	782 530
6	1	FD 55 NS	Flat cleaning head 55	785 540
7	1	FD 35 NS	Flat cleaning head 35	785 541
8	1	FD 35 S NS	Flat cleaning head 35, chamfered	785 542
9	1	FD 35 P NS	Flat cleaning head 35, straight	785 590
10	1	FD 35 W P NS	Flat cleaning head 35, angled	785 591
11	1	RD 25 S NS	Round cleaning head with scraper	785 560
12	1	QD 35 W NS	Cross cleaning head 35	785 543
13	1	RD 25 P NS	Round cleaning head with brush	785 570
14	1	STB 85 Z NS	Tubular brush, cylindrical bristles	785 550
15	1	STB 85 K NS	Tubular brush, conical bristles	785 555
16	1	SRA NS	Intake tube adapter, for brushes and cleaning heads	785 515
37	1	SSA W D	Intake hose adapter	785 200
17	3	EP 25 K NS	Spare brush, short bristles	785 595
18	3	EP 25 L NS	Spare brush, long bristles	785 596
43	1	RB 40 NS	Cleaning brush for individual kit parts Ø40 mm	785 580
44	1	RB 20 NS	Cleaning brush for individual kit parts Ø25 mm	785 585
19	1	KKL TRS NS	Plastic case	785 506

TRS NS	Contents and plastic case included	785 502
--------	------------------------------------	---------



Single Parts of TRS NS Dry Cleaning Kit

Plastic Case, empty

With retaining clips

Type	Colour	Dimensions	Position	Part No.
KKL TRS NS	●	530 x 390 x 170 mm	19	785 506

Intake Tube with Handle

For use as operating tube with handle and handguard, with top and lower connecting part

Type	Dimensions	Position	Part No.
SRH 400 NS	380 mm	1	785 520



Single Parts of TR S NS Dry Cleaning Kit



LIVE CLEANING EQUIPMENT

Extension

Insulating tube, with top and lower connecting part



Type	Diameter	Dimensions	Position	Part No.
SRV 200 NS	40 mm	200 mm	2	785 521
SRV 300 NS	40 mm	300 mm	3	785 522
SRV 400 NS	40 mm	400 mm	4	785 523

Adjustable Angle

Lockable, adjustable due to 15° gearing, with top and lower connecting part



Type	Diameter	Dimensions	Position	Part No.
SRW V NS	40 mm	300 mm	5	785 530

Flat Cleaning Head 55

Width: 55 mm



Type	Diameter	Dimensions	Position	Part No.
FD 55 NS	40 mm	200 mm	6	785 540

Flat Cleaning Head 35

Width: 35 mm



Type	Diameter	Dimensions	Position	Part No.
FD 35 NS	25 mm	200 mm	7	785 541

Flat Cleaning Head 35

Width: 35 mm, Outlet: 60°, chamfered



Type	Diameter	Dimensions	Position	Part No.
FD 35 S NS	25 mm	200 mm	8	785 542

Flat Cleaning Head 35

Width: 35 mm, straight, with detachable brush



Type	Diameter	Dimensions	Position	Part No.
FD 35 P NS	25 mm	230 mm	9	785 590

Flat Cleaning Head 35

Width: 35 mm, angled: 30°, with detachable brush



Type	Diameter	Dimensions	Position	Part No.
FD 35 W P NS	25 mm	240 mm	10	785 591

Round Cleaning Head

With scraper 50 mm



Type	Diameter	Dimensions	Position	Part No.
RD 25 S NS	25 mm	240 mm	11	785 560

Cross Cleaning Head 35

Width: 35 mm, angled (30°)



Type	Diameter	Dimensions	Position	Part No.
QD 35 W NS	25 mm	200 mm	12	785 543

LIVE CLEANING EQUIPMENT

Round Cleaning Head

With brush

Type	Diameter	Dimensions	Position	Part No.
RD 25 P NS	25 mm	230 mm	13	785 570



Tubular Brush

Cylindrical bristles

Type	Diameter	Dimensions	Position	Part No.
STB 85 Z NS	25 / 85 mm	240 mm	14	785 550



Tubular Brush

Conical bristles

Type	Diameter	Dimensions	Position	Part No.
STB 85 K NS	25 / 85 mm	240 mm	15	785 555



Intake Tube Adapter

For brushes and cleaning heads Ø25 mm

Type	Diameter	Dimensions	Position	Part No.
SRA NS	40 / 25 mm	100 mm	16	785 515



Intake Hose Adapter

Adjustable, angled (120°), with regulation of intake air, for use with intake hose system Ø35 mm

Type	Diameter	Position	Part No.
SSA W D	35 / 40 mm	37	785 200



Spare Brush

Short bristles, for flat cleaning heads with detachable brush

Type	Dimensions	PU	Position	Part No.
EP 25 K NS	25 mm	3 pc(s).	17	785 595



Spare Brush

Long bristles, for flat cleaning heads, with detachable brush

Type	Dimensions	PU	Position	Part No.
EP 25 L NS	40 mm	3 pc(s).	18	785 596



Cleaning Brush

For individual kit parts Ø40 mm

Type	Diameter	Dimensions	Position	Part No.
RB 40 NS	45 mm	410 mm	43	785 580



Cleaning Brush

For individual kit parts Ø25 mm

Type	Diameter	Dimensions	Position	Part No.
RB 20 NS	30 mm	330 mm	44	785 585




TRS MS Dry Cleaning Kit

Nominal voltages up to 36 kV / 15 ... 60 Hz

LIVE CLEANING EQUIPMENT



DIN VDE 0682 Part 621

- Not for use in wet weather 
- For indoor and outdoor installations
- Equipment for live cleaning by means of suction
- For dry cleaning of transformers and switchgear installations
- Transparent intake tubes for enhanced safety
- Specially adapted operating heads for intensive cleaning
- Plug-in coupling system allows fast replacement of the operating heads



Live cleaning of a transformer using the TRS MS dry cleaning kit.

Requirements

TRS MS allows maintenance work to be done under supervision of a qualified electrician at voltages from 1 to 36 kV according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany apply sections BGV A3 and BGR

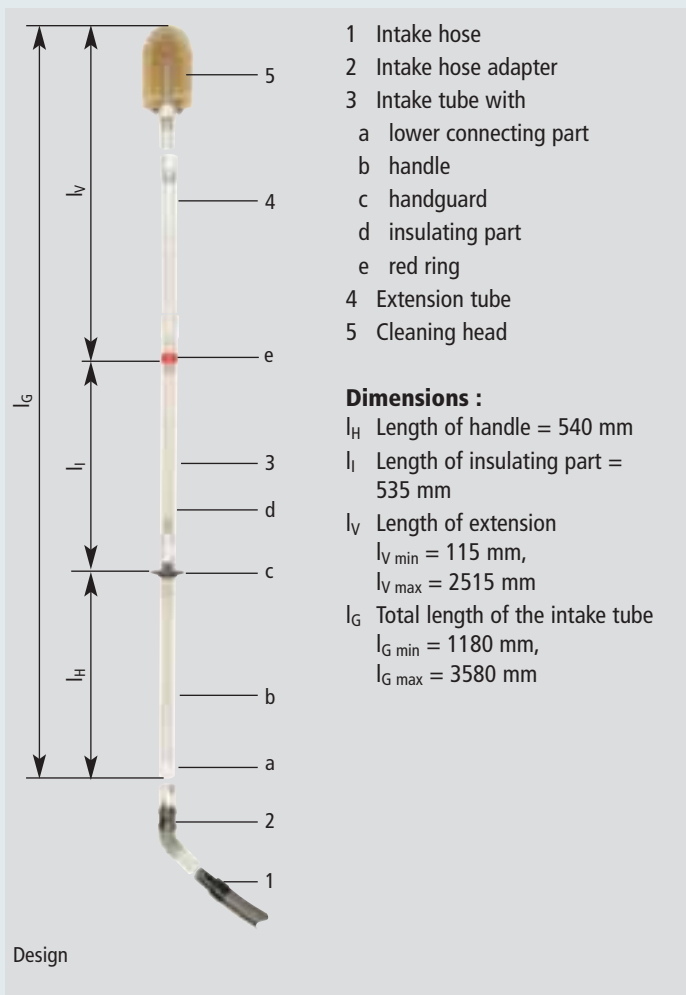
A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] issued by the German Employer's Liability Association for Precision and Electrical Engineering (BGFE).



Cleaning an insulator with a flat cleaning head and angled intake tube (135°).



Cleaning an insulator with a tubular brush.



LIVE CLEANING EQUIPMENT

Type	Model	Part No.
------	-------	----------

A TR S MS Dry Cleaning Kit

Standard kit includes

Pos.	Qty.	Type	Description	Part No.
3	1	SRH 1180 MS	Intake tube with handle	785 120
8	2	SRV 200 MS	Extension, 200 mm	785 121
9	2	SRV 400 MS	Extension, 400 mm	785 122
10	2	SRV 800 MS	Extension, 800 mm	785 123
11	1	SRW 90 MS	Angled intake tube, 90°	785 131
12	1	SRW 135 MS	Angled intake tube, 135°	785 132
13	1	SRW V MS	Angled intake tube, lockable	785 130
21	1	REB 1095 MS	Rectangular brush	785 160
22	1	HRB 120 MS	Half-round brush 120	785 140
23	1	HRB 190 MS	Half-round brush 190	785 150
25	1	STB 120 MS	Tubular brush, 250 mm	785 170
29	1	FD 60 MS	Cleaning head 60	785 220
30	1	FD 110 MS	Cleaning head 110	785 221
37	1	SSA W D	Intake hose adapter	785 200
38	1	ISP 135 ZK MS	Insulating mirror	785 190
40	1	DHTM	Digital hygrometer/thermometer	785 180
42	1	RB 50 MS	Cleaning brush for individual kit parts	785 210
51	1	KKL TR S MS	GRP case, blue	785 301

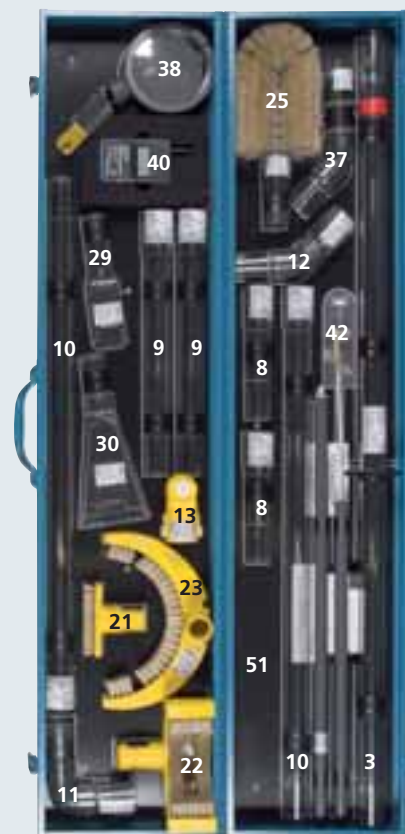
TR S MS	Contents and GRP case included	785 100
---------	--------------------------------	----------------

B TR S MS V1 Dry Cleaning Kit

Standard kit includes

Pos.	Qty.	Type	Description	Part No.
3	1	SRH 1180 MS	Intake tube with handle	785 120
8	2	SRV 200 MS	Extension, 200 mm	785 121
9	2	SRV 400 MS	Extension, 400 mm	785 122
10	1	SRV 800 MS	Extension, 800 mm	785 123
11	1	SRW 90 MS	Angled intake tube, 90°	785 131
12	1	SRW 135 MS	Angled intake tube, 135°	785 132
13	1	SRW V MS	Angled intake tube, lockable	785 130
21	1	REB 1095 MS	Rectangular brush	785 160
22	1	HRB 120 MS	Half-round brush 120	785 140
25	1	STB 120 MS	Tubular brush, 250 mm	785 170
26	1	STB 80 MS	Tubular brush, cylindrical bristles	785 171
27	1	STB 80 K MS	Tubular brush, conical bristles	785 172
29	1	FD 60 MS	Cleaning head 60	785 220
30	1	FD 110 MS	Cleaning head 110	785 221
36	1	SRA MS	Intake tube adapter	785 212
37	1	SSA W D	Intake hose adapter	785 200
38	1	ISP 135 ZK MS	Insulating mirror	785 190
40	1	DHTM	Digital hygrometer/thermometer	785 180
42	1	RB 50 MS	Cleaning brush for individual kit parts	785 210
51	1	KKL TR S MS	GRP case, blue	785 301

TR S MS V1	Contents and GRP case included	785 112
------------	--------------------------------	----------------



Single Parts of TRS MS Dry Cleaning Kit


LIVE CLEANING EQUIPMENT



51

GRP Case, empty

With retaining clips and printed top and bottom insert

Type	Colour	Dimensions	Position	Part No.
KKL TRS MS		1200 x 270 x 165 mm	51	785 301



3

Intake Tube with Handle

For use as operating tube with handle, handguard, insulating part, red ring and extension

Type	Diameter	Dimensions	Position	Part No.
SRH 1180 MS	40 mm	1180, insulating part 525 mm	3	785 120



8-10

Extension

Type	Diameter	Dimensions	Position	Part No.
SRV 200 MS	40 mm	200 mm	8	785 121
SRV 400 MS	40 mm	400 mm	9	785 122
SRV 800 MS	40 mm	800 mm	10	785 123



11

Angled Intake Tube, 90°

Type	Diameter	Dimensions	Position	Part No.
SRW 90 MS	40 mm	120 mm	11	785 131



12

Angled Intake Tube, 135°

Type	Diameter	Dimensions	Position	Part No.
SRW 135 MS	40 mm	100 mm	12	785 132



13

Angled Intake Tube

Lockable, adjustable due to 15° gearing, for positioning the cleaning heads

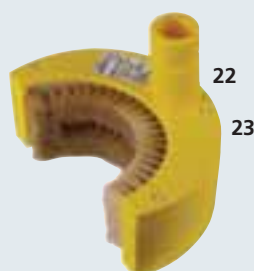
Type	Diameter	Dimensions	Position	Part No.
SRW V MS	40 mm	160 mm	13	785 130



21

Rectangular Brush

Type	Diameter	Dimensions	Position	Part No.
REB 1095 MS	40 mm	105 x 90 x 50 mm	21	785 160



22

23

Half-round Brush

For cleaning insulators as well as horizontal and vertical openings. The brush can be attached to angled intake tube type SRW V MS that can be adjusted to lead the brush around the complete insulator.

Type	Diameter	Position	Part No.
HRB 120 MS	40 / 120 mm	22	785 140
HRB 190 MS	40 / 190 mm	23	785 150



25

Tubular Brush

Type	Diameter	Dimensions	Position	Part No.
STB 120 MS	40 / 120 mm	250 mm	25	785 170

LIVE CLEANING EQUIPMENT

Tubular Brush

Cylindrical bristles

Type	Diameter	Dimensions	Position	Part No.
STB 80 MS	25 / 85 mm	240 mm	26	785 171



26

Tubular Brush

Conical bristles

Type	Diameter	Dimensions	Position	Part No.
STB 80 K MS	25 / 85 mm	240 mm	27	785 172



27

Cleaning Head 60

Width: 60 mm

Type	Diameter	Dimensions	Position	Part No.
FD 60 MS	40 mm	190 mm	29	785 220



29

Cleaning Head 110

Width: 110 mm

Type	Diameter	Dimensions	Position	Part No.
FD 110 MS	40 mm	260 mm	30	785 221



30

Intake Tube Adapter

For brushes and cleaning heads Ø25 mm

Type	Diameter	Dimensions	Position	Part No.
SRA MS	40 / 25 mm	100 mm	36	785 212



36

Intake Hose Adapter

Adjustable, angled (120°), with regulation of intake air, for use with intake hose system Ø35 mm

Type	Diameter	Position	Part No.
SSA W D	35 / 40 mm	37	785 200



37

Insulating Mirror

For visual inspection of hidden electrical components

Type	Diameter	Position	Part No.
ISP 135 ZK MS	40 / 135 mm	38	785 190



38

Digital Hygrometer/Thermometer

For verifying the climatic conditions that must be adhered to.

Measuring range – 20° C ... + 70° C, 10 ... 95% relative air humidity

Type	Dimensions	Position	Part No.
DHTM	140 x 65 mm	40	785 180



40

Cleaning Brush

For individual kit parts Ø40 mm, modular

Type	Diameter	Dimensions	Position	Part No.
RB 50 MS	45 mm	1430 mm	42	785 210




42

FRS ZK MS Damp Cleaning Kit

Nominal voltages up to 36 kV / 15 ... 60 Hz

LIVE CLEANING EQUIPMENT

- Not for use in wet weather 
- For indoor and outdoor installations
- Equipment for damp cleaning 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

Application

Damp sponges allow for removing tough pollution layers and cleaning oily transformer surfaces. The special insulating cleaning liquid (e.g. Rivolta SLX 500; SLX TOP or SLX Super made by Bremer & Leguil, Duisburg/Germany, and Florin 2000 made by Flore, Koblenz/Germany) has to be selected in accordance with the rated voltage of the installation and environmental conditions.

Requirements

FRS ZK MS allows maintenance work to be done under supervision of a qualified electrician at voltages from 1 to 36 kV according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany apply sections BGV A3 and BGR



Based on DIN VDE 0681 Part 1 and DIN VDE 0682 Part 621
Universal gear coupling according to EN/IEC 60832
(DIN VDE 0682 Part 211)



Damp cleaning of a transformer using the FRS ZK MS damp cleaning kit.

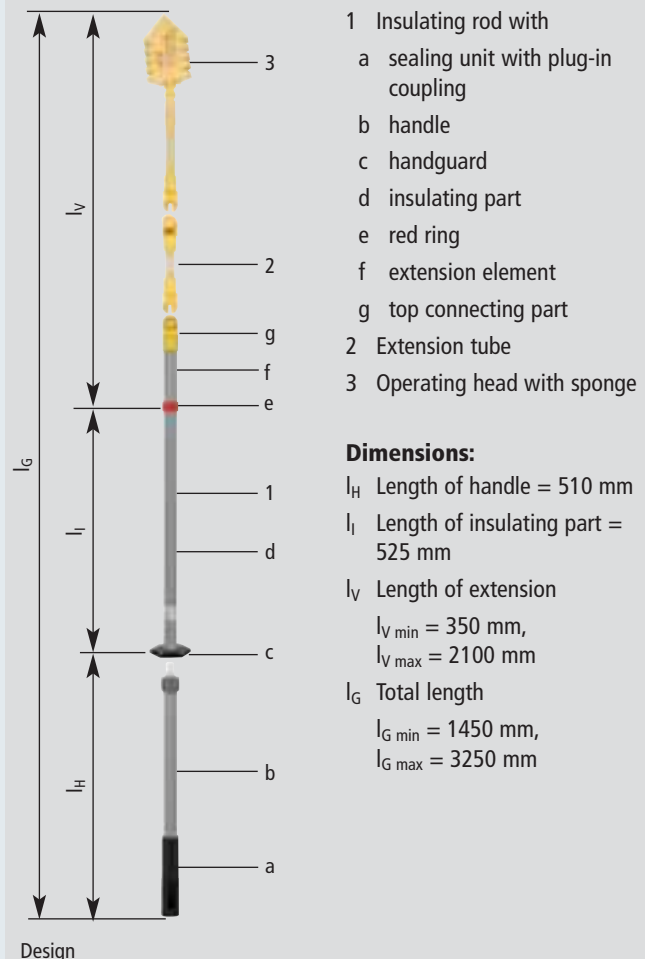
A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] issued by the German Employer's Liability Association for Precision and Electrical Engineering (BGFE).



The universal gear coupling permits fast replacement of operating heads and extension elements.

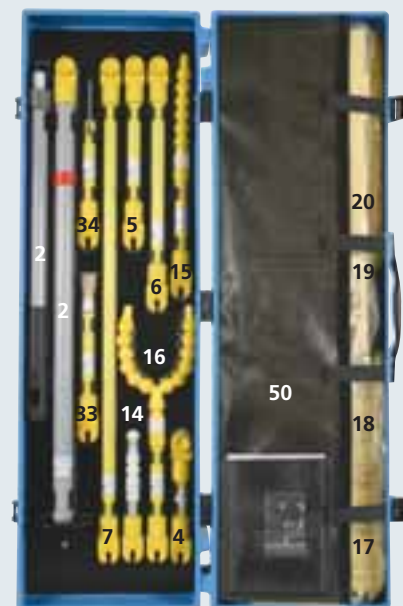


Damp cleaning of an insulator with a dual operating head.



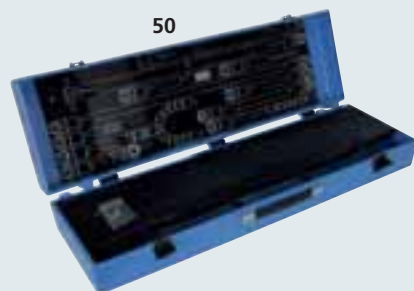
LIVE CLEANING EQUIPMENT

Type	Model			Part No.
A FRS ZK MS Damp Cleaning Kit				
Standard kit includes				
Pos.	Qty.	Type	Description	Part No.
2	1	IS T 36 ZK STK 1300	Insulating rod with handle and plug-in coupling	785 315
4	1	ISV 220 ZK MS	Extension, 220 mm	785 316
5	1	ISV 320 ZK MS	Extension, 320 mm	785 317
6	1	ISV 420 ZK MS	Extension, 420 mm	785 318
7	1	ISV 820 ZK MS	Extension, 820 mm	785 319
14	1	AK RS S ZK MS	Operating head, rigid	785 324
15	1	AK RS ZK MS	Single operating head, flexible	785 322
16	1	AK RS 2 ZK MS	Dual operating head, flexible	785 323
17	10	RS 1544 MS	Rectangular cleaning sponge	785 274
18	10	RS 1574 MS	Rectangular cleaning sponge	785 275
19	10	RS 15104 Z MS	Rectangular cleaning sponge, serrated	785 279
20	10	RSD 15104 Z MS	Triangular cleaning sponge, serrated	785 280
33	1	RP 15 ZK MS	Round brush	785 321
34	1	S 30 ZK MS	Scraper	785 320
50	1	KKL FRS ZK MS	GRP case, blue	785 229
FRS ZK MS			Contents and GRP case included	785 940



Single Parts of FRS ZK MS Damp Cleaning Kit

LIVE CLEANING EQUIPMENT



50

GRP Case, empty

With retaining clips and printed bottom insert

Type	Colour	Dimensions	Position	Part No.
KKL FRS ZK MS	Blue	850 x 300 x 200 mm	50	785 229



2

Insulating Rod with Handle and Plug-In Coupling

For use as operating rod with handle, handguard, insulating part, red ring and extension, extendible handle

Type	Dimensions	Position	Part No.
IS T 36 ZK STK 1300	1300 mm	2	785 315



4-7

Extension

Type	Diameter	Dimensions	Position	Part No.
ISV 220 ZK MS	20 mm	220 mm	4	785 316
ISV 320 ZK MS	20 mm	320 mm	5	785 317
ISV 420 ZK MS	20 mm	420 mm	6	785 318
ISV 820 ZK MS	20 mm	820 mm	7	785 319



33

Round Brush

Type	Diameter	Dimensions	Position	Part No.
RP 15 ZK MS	20 mm	270 mm	33	785 321



34

Scraper

Type	Diameter	Dimensions	Position	Part No.
S 30 ZK MS	20 mm	280 mm	34	785 320

LIVE CLEANING EQUIPMENT

Rigid Operating Head

For attaching cleaning sponges

Type	Diameter	Dimensions	Position	Part No.
AK RS S ZK MS	20 mm	200 mm	14	785 324



14

Single Operating Head

Flexible, for attaching cleaning sponges

Type	Diameter	Dimensions	Position	Part No.
AK RS ZK MS	20 mm	400 mm	15	785 322

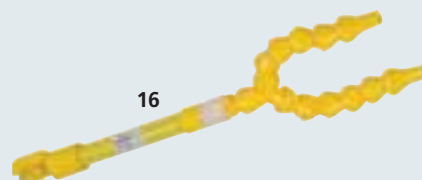


15

Dual Operating Head

Flexible, for attaching cleaning sponges

Type	Diameter	Dimensions	Position	Part No.
AK RS 2 ZK MS	20 mm	415 mm	16	785 323



16

Rectangular Cleaning Sponge

Type	Dimensions	PU	Position	Part No.
RS 1544 MS	150 x 40 x 40 mm	5 pc(s)	17	785 274



17

Rectangular Cleaning Sponge

Type	Dimensions	PU	Position	Part No.
RS 1574 MS	150 x 70 x 40 mm	5 pc(s)	18	785 275



18

Rectangular Cleaning Sponge, serrated

Type	Dimensions	PU	Position	Part No.
RS 15104 Z MS	150 x 100 x 40 mm	5 pc(s)	19	785 279



19

Triangular Cleaning Sponge, serrated

Type	Dimensions	PU	Position	Part No.
RSD 15104 Z MS	150 x 100 x 40 mm	5 pc(s)	20	785 280



20

TFR S MS Combined Cleaning Kit




Nominal voltages up to 36 kV / 15 ... 60 Hz

LIVE CLEANING EQUIPMENT



Based on DIN VDE 0681 Part 1 and DIN VDE 0682 Part 621
Universal gear coupling acc. to EN/IEC 60832
(DIN VDE 0682 Part 211)

- Not for use in wet weather 
- For indoor and outdoor installations
- Combined kit for dry and damp cleaning under live conditions
- 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
- Rigid and flexible plug-in operating heads allow fast and easy replacement of the sponges



Dry and damp cleaning of a transformer under live conditions using the TFR S MS combined cleaning kit.

Application

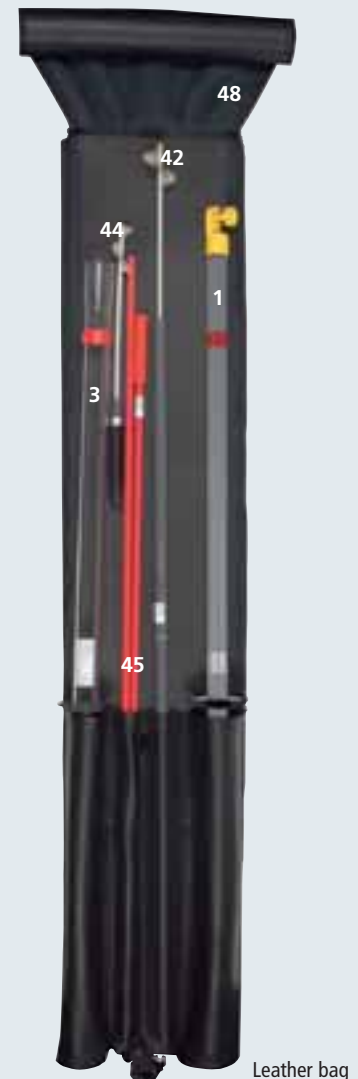
Dry cleaning work is performed with operating heads that are used to clean or brush dirty parts of the installation while simultaneously sucking the dirt away. Loose layers of dust and cobwebs are easily cleaned with little effort. Oily and tough pollutant layers are removed by damp cleaning using sponges and special insulating cleaning liquids.

Requirements

TFR S MS allows maintenance work to be done under supervision of a qualified electrician at voltages from 1 to 36 kV according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany apply sections BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] issued by the German Employer's Liability Association for Precision and Electrical Engineering (BGFE).

A TFR S MS Combined Cleaning Kit

Pos.	Qty.	Type	Description	Part No.
Standard Equipment – Leather bag				
1	1	IS 36 ZK STK 1300	Insulating rod with handle, and plug-in coupling, single-part	785 325
3	1	SRH 1180 MS	Intake tube with handle	785 120
42	1	RB 50 MS	Cleaning brush, for individual kit parts	785 210
44	1	RB 20 NS	Cleaning brush, for individual kit parts Ø25 mm	785 585
45	1	AS MS	Locking rod	785 109
48	1	KLT 140 28	Storage bag	785 952



Leather bag

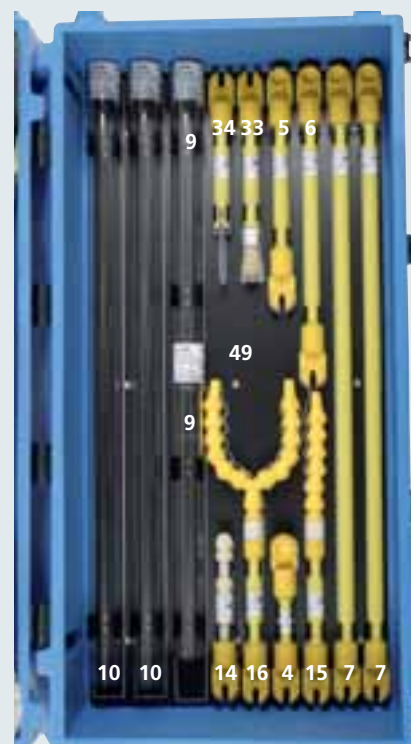
LIVE CLEANING EQUIPMENT

Type	Model	Part No.
------	-------	----------

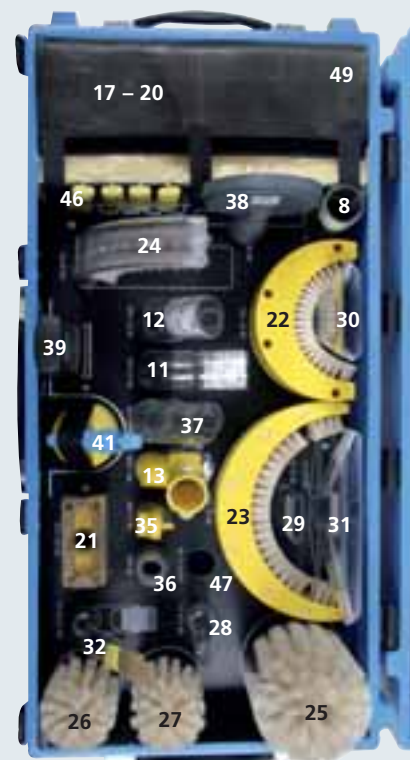
A TFR5 MS Combined Cleaning Kit

Pos.	Qty.	Type	Description	Part No.
Standard Equipment – Case Cover				
4	1	ISV 220 ZK MS	Extension, 220 mm	785 316
5	1	ISV 320 ZK MS	Extension, 320 mm	785 317
6	1	ISV 420 ZK MS	Extension, 420 mm	785 318
7	2	ISV 820 ZK MS	Extension, 820 mm	785 319
9	2	SRV 400 MS	Extension, 400 mm	785 122
10	2	SRV 800 MS	Extension, 800 mm	785 123
14	1	AK RS S ZK MS	Operating head, rigid	785 324
15	1	AK RS ZK MS	Single operating head, flexible	785 322
16	1	AK RS 2 ZK MS	Dual operating head, flexible	785 323
33	1	RP 15 ZK MS	Round brush	785 321
34	1	S 30 ZK MS	Scraper	785 320
Standard Equipment – Case Bottom				
8	1	SRV 200 MS	Extension, 200 mm	785 121
11	1	SRW 90 MS	Angled intake tube 90°	785 131
12	1	SRW 135 MS	Angled intake tube 135°	785 132
13	1	SRW V MS	Angled intake tube, lockable	785 130
17	10	RS 1544 MS	Rectangular cleaning sponge	785 274
18	5	RS 1574 MS	Rectangular cleaning sponge	785 275
19	5	RS 15104 Z MS	Rectangular cleaning sponge, serrated	785 279
20	5	RSD 15104 Z MS	Triangular cleaning sponge, serrated	785 280
21	1	REB 1095 MS	Rectangular brush	785 160
22	1	HRB 120 MS	Half-round brush 120	785 140
23	1	HRB 190 MS	Half-round brush 190	785 150
24	1	BB 245 MS	Arc brush	785 151
25	1	STB 120 MS	Tubular brush, 250 mm	785 170
26	1	STB 80 MS	Tubular brush, cylindrical bristles	785 171
27	1	STB 80 K MS	Tubular brush, conical bristles	785 172
28	1	FD 35 S MS	Flat cleaning head 35	785 551
29	1	FD 60 MS	Cleaning head 60	785 220
30	1	FD 110 MS	Cleaning head 110	785 221
31	1	FD 210 MS	Cleaning head 210	785 223
32	1	FD 35 W P MS	Flat cleaning head with brush	785 552
35	1	AKA TF MS	Operating head adapter	785 259
36	1	SRA MS	Intake tube adapter	785 212
37	1	SSA W D	Intake hose adapter	785 200
38	1	ISP 135 ZK MS	Insulated mirror	785 190
39	1	DHTM T 615	Digital hygrometer/thermometer	785 181
41	1	SF FRF MS	Spray bottle	785 953
46	4	EP 25 L MS	Spare brush	785 224
47	1	RSI ...	Reducing insert (not included in delivery)	—
49	1	KKL TFR5 MS	GRP case, blue	785 951

Case cover



Case bottom



TFR5 MS	Contents, GRP case and leather bag included	785 950
---------	---	---------

Customised kits are available on request.

Single Parts of TFRS MS Combined Cleaning Kit

Standard Equipment – Leather Bag

LIVE CLEANING EQUIPMENT



Artificial Leather Bag, empty

With zip and shoulder strap

Type	Colour	Dimensions	Position	Part No.
KLT 140 28	●	1400 x 280 mm	48	785 952



Insulating Rod with Handle and Plug-In Coupling

Single-part unit

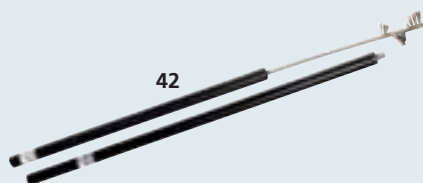
Type	Diameter	Dimensions	Position	Part No.
IS 36 ZK STK 1300	30 mm	1300 mm	1	785 325



Intake Tube with Handle

For use as operating tube with handle, handguard, insulating part, red ring and extension

Type	Diameter	Dimensions	Position	Part No.
SRH 1180 MS	40 mm	1180, insulating part 525 mm	3	785 120



Cleaning Brush

For individual kit parts Ø40 mm, modular

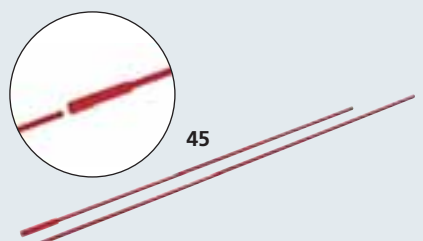
Type	Diameter	Dimensions	Position	Part No.
RB 50 MS	45 mm	1430 mm	42	785 210



Cleaning Brush

For individual kit parts Ø25 mm

Type	Diameter	Dimensions	Position	Part No.
RB 20 NS	30 mm	330 mm	44	785 585



Locking Rod

Modular, for use as visible working limit

Type	Dimensions	Position	Part No.
AS MS	2200 mm	45	785 109

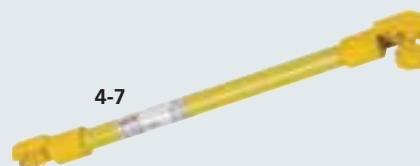
GRP Case, empty

With retaining clips and printed top and bottom insert

Type	Colour	Dimensions	Position	Part No.
KKL TFR5 MS	●	850 x 410 x 400 mm	49	785 951

**Extension**

Type	Diameter	Dimensions	Position	Part No.
ISV 220 ZK MS	20 mm	220 mm	4	785 316
ISV 320 ZK MS	20 mm	320 mm	5	785 317
ISV 420 ZK MS	20 mm	420 mm	6	785 318
ISV 820 ZK MS	20 mm	820 mm	7	785 319

**Extension**

Type	Diameter	Dimensions	Position	Part No.
SRV 200 MS	40 mm	200 mm	8	785 121
SRV 400 MS	40 mm	400 mm	9	785 122
SRV 800 MS	40 mm	800 mm	10	785 123

**Angled Intake Tube, 90°**

Type	Diameter	Dimensions	Position	Part No.
SRW 90 MS	40 mm	120 mm	11	785 131

**Angled Intake Tube, 135°**

Type	Diameter	Dimensions	Position	Part No.
SRW 135 MS	40 mm	100 mm	12	785 132

**Angled Intake Tube**

Lockable, adjustable due to 15° gearing, for positioning the cleaning heads

Type	Diameter	Dimensions	Position	Part No.
SRW V MS	40 mm	160 mm	13	785 130



Single Parts of TFRS MS Combined Cleaning Kit

Standard Equipment – Case

LIVE CLEANING EQUIPMENT

14



Rigid Operating Head

For attaching the cleaning sponges

Type	Diameter	Dimensions	Position	Part No.
AK RS S ZK MS	20 mm	200 mm	14	785 324

15

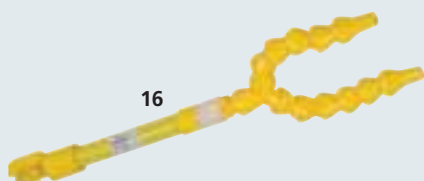


Single Operating Head

Flexible, for attaching the cleaning sponges

Type	Diameter	Dimensions	Position	Part No.
AK RS ZK MS	20 mm	400 mm	15	785 322

16



Dual Operating Head

Flexible, for attaching the cleaning sponges

Type	Diameter	Dimensions	Position	Part No.
AK RS 2 ZK MS	20 mm	415 mm	16	785 323

17



Rectangular Cleaning Sponge

Type	Dimensions	PU	Position	Part No.
RS 1544 MS	150 x 40 x 40 mm	5 pc(s).	17	785 274

18



Rectangular Cleaning Sponge

Type	Dimensions	PU	Position	Part No.
RS 1574 MS	150 x 70 x 40 mm	5 pc(s).	18	785 275

19



Rectangular Cleaning Sponge, serrated

Type	Dimensions	PU	Position	Part No.
RS 15104 Z MS	150 x 100 x 40 mm	5 pc(s).	19	785 279

20



Triangular Cleaning Sponge, serrated

Type	Dimensions	PU	Position	Part No.
RSD 15104 Z MS	150 x 100 x 40 mm	5 pc(s).	20	785 280

21



Rectangular Brush

Type	Diameter	Dimensions	Position	Part No.
REB 1095 MS	40 mm	105 x 90 x 50 mm	21	785 160



22

23

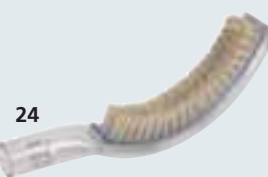
Half-round Brush

For cleaning insulators as well as horizontal and vertical openings. The brush can be attached to angled intake tube type SRW V MS that can be adjusted to lead the brush around the complete insulator.

Type	Diameter	Position	Part No.
HRB 120 MS	40 / 120 mm	22	785 140
HRB 190 MS	40 / 190 mm	23	785 150

Arc Brush

Type	Diameter	Dimensions	Position	Part No.
BB 245 MS	40 mm	390 mm	24	785 151



24

Tubular Brush

Type	Diameter	Dimensions	Position	Part No.
STB 120 MS	40 / 120 mm	250 mm	25	785 170



25

Tubular Brush

Cylindrical bristles

Type	Diameter	Dimensions	Position	Part No.
STB 80 MS	25 / 85 mm	240 mm	26	785 171



26

Tubular Brush

Conical bristles

Type	Diameter	Dimensions	Position	Part No.
STB 80 K MS	25 / 85 mm	240 mm	27	785 172



27

Flat Cleaning Head 35

Type	Diameter	Dimensions	Position	Part No.
FD 35 S MS	40 mm	35 mm	28	785 551



28

Cleaning Head 60

Width: 60 mm

Type	Diameter	Dimensions	Position	Part No.
FD 60 MS	40 mm	190 mm	29	785 220



29

Cleaning Head 110

Width: 110 mm

Type	Diameter	Dimensions	Position	Part No.
FD 110 MS	40 mm	260 mm	30	785 221



30

Cleaning Head 210

Width: 210 mm

Type	Diameter	Dimensions	Position	Part No.
FD 210 MS	40 mm	255 mm	31	785 223



31

Single Parts of TFRS MS Combined Cleaning Kit

Standard Equipment – Case

LIVE CLEANING EQUIPMENT



Flat Cleaning Head 35

Width: 35 mm, angled (30°), with detachable brush

Type	Diameter	Dimensions	Position	Part No.
FD 35 W P MS	40 mm	35 mm	32	785 552



Round Brush

Type	Diameter	Dimensions	Position	Part No.
RP 15 ZK MS	20 mm	270 mm	33	785 321



Scraper

Type	Diameter	Dimensions	Position	Part No.
S 30 ZK MS	20 mm	280 mm	34	785 320



Operating Head Adapter

Universal gear coupling / transparent tube Ø25 mm

Type	Diameter	Dimensions	Position	Part No.
AKA TF ZK MS	40 mm	125 mm	35	785 259



Intake Tube Adapter

For brushes and cleaning heads Ø25 mm

Type	Diameter	Dimensions	Position	Part No.
SRA MS	40 / 25 mm	100 mm	36	785 212



Intake Hose Adapter

Adjustable, angled (120°), with regulation of intake air, for use with intake hose system Ø35 mm

Type	Diameter	Position	Part No.
SSA W D	35 / 40 mm	37	785 200

Insulating Mirror

For visual inspection of hidden electrical components

Type	Diameter	Position	Part No.
ISP 135 ZK MS	40 / 135 mm	38	785 190



Digital Hygrometer/Thermometer

For verifying the climatic conditions that must be adhered to.
Measuring range 0° C ... +50° C, 5 ... 95% relative air humidity

Type	Dimensions	Position	Part No.
DHTM T 615	57 x 190 x 42 mm	39	785 181



Spray Bottle

For cleaning liquids

Type	Capacity	Position	Part No.
SF FRF MS	500 ml	41	785 953



Spare Brush

For flat cleaning heads type FD 39 WP MS

Type	Dimensions	PU	Position	Part No.
EP 25 L MS	40 mm	3 pc(s).	46	785 224



Accessories for NS and MS Cleaning Kits

LIVE CLEANING EQUIPMENT



Industrial Vacuum Cleaner

For dry and combined cleaning kits

Equipment

The equipment consists of a 25 l plastic container, 2 large wheels, 2 lockable guide wheels, handle and cable hook, socket outlet with automatic closing mechanism, electromagnetic impulse filter cleaning, automatic vibration, revolution regulation, volume indication, acceleration rate controller, electronic running feature, moisture identification with sensor-controlled disconnection, 2 new polyester filter cassettes, FKP 4300, filter area $2 \times 4300 \text{ cm}^2 = 8600 \text{ cm}^2$, dust retaining capacity in accordance with BIA, Utilisation Category C, supply cable length 8 m

Technical Data

- Two-stage motor blower with bypass cooling
- Nominal capacity max. 1400 watts, 230 V 50/60 Hz
- Max. air flow (blower) 61 l/s
- Max. low air pressure (blower) 248 mbars
- Container: 25 l gross volume, 20 l for dust, 15 l for water
- Intake hose with straight connecting adapter Ø35 mm, 5 m

Type	Dimensions	Part No.
HIS 1400 TRS	400 x 400 x 560 mm	785 310

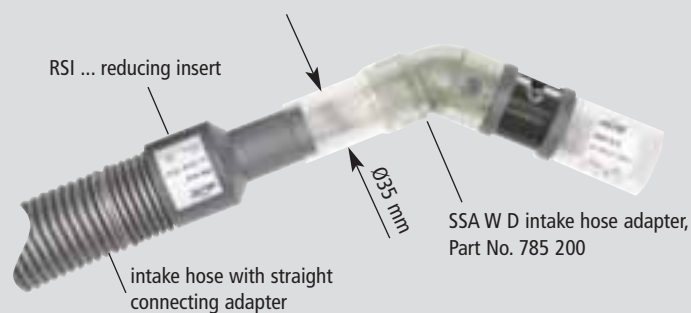
Reducing Inserts

For connection between SSA W D intake hose adapter and intake hoses from other manufacturers with different diameters and straight connecting adapter.



Type	Diameter	Dimensions	Part No.
RSI 32	35 / 32 mm	105 mm	785 213
RSI 34	35 / 34 mm	105 mm	785 214
RSI 35	35 / 35 mm	105 mm	785 215
RSI 38	35 / 38 mm	105 mm	785 216
RSI 45	35 / 45 mm	105 mm	785 217
RSI 51	35 / 51 mm	105 mm	785 218
RSI 58	35 / 58 mm	105 mm	785 219

Application:



LIVE CLEANING EQUIPMENT

Flat Cleaning Head, angled (90°), with detachable Brush

For TRS NS cleaning kits

Type	Diameter	Dimensions	Part No.
FWD 35 P NS	25 mm	200 mm	785 592



Intake Tube with Handle

For TRS MS and TFRS MS cleaning kits

Type	Diameter	Dimensions	Part No.
SRH 1180 IS 650 MS	40 mm	1180 mm, insulating part 650 mm	785 119



HV STK Extension Handle

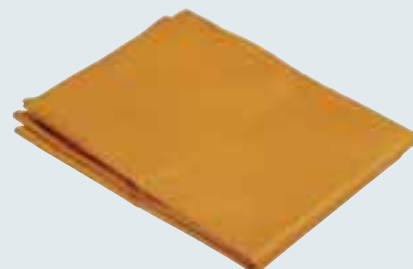
Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l _G	Part No.
HV STK 30 710	30 mm	710 mm	766 335



Cover

Type	Colour	Dimensions	Part No.
AP 152 G	Yellow	1500 x 2000 mm	785 110



Canvas Bag, empty

With two separate internal pockets and shoulder strap

For intake hose, cover, safety helmet with face shield, working gloves or two earthing and short-circuiting devices (kit for transport in motor vehicles)

Type	Colour	Dimensions	Part No.
STT 55 27 30	Green	550 x 270 x 300 mm	785 111



NFG MS Refilling Device



Nominal voltages up to 36 kV / 15 ... 60 Hz

REFILLING EQUIPMENT

- Not for use in wet weather
- 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 insulated refilling lance for enhanced safety



Based on DIN VDE 0681 Part 1 and
DIN VDE 0682 Part 621



Refilling of hot HT mass under live conditions.

Design

The refilling device consists of a pumping unit with a container, regulated heating and pump as well as an insulated refilling lance. The oil reservoir can be removed from the mobile unit for easy transport and can be sealed. The pump and the insulated 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), ready for mounting.

When working under live conditions, the sealing end screws are removed and replaced with an insulated screw driver. Special plastic screws can be used for resealing the cable ends.

Requirements

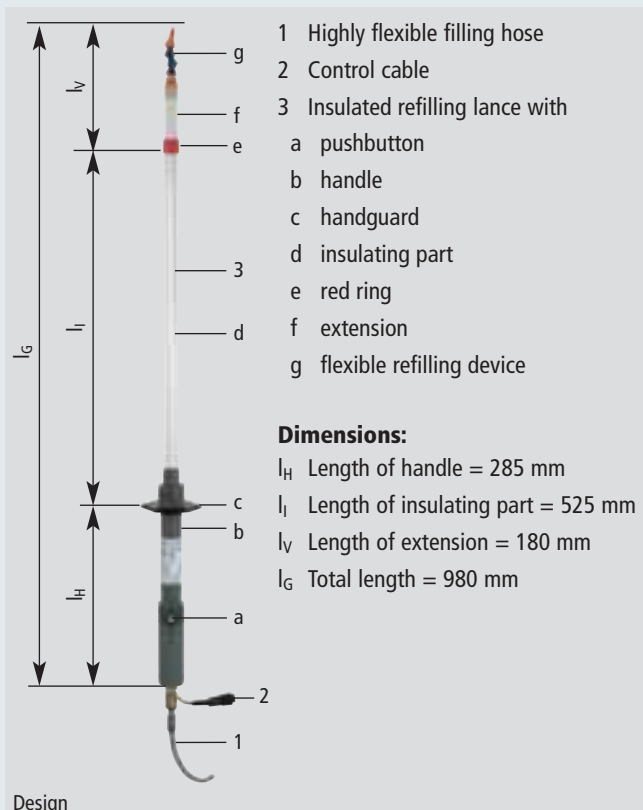
The refilling device is to be used under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany apply sections BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] issued by the German Employer's Liability Association for Precision and Electrical Engineering (BGFE).



After lifting the conveying pump out of the HT mass, the oil reservoir can be removed for refilling.

Technical Data

Nominal capacity	1200 W
Power supply	230 V / 50 Hz
Container size	5 litres
Heating control range	0° C ... + 120° C
Indication range of thermometer	0° C ... + 120° C



REFILLING EQUIPMENT

Type	Part No.
A MS Refilling Device Insulated refilling lance and oil reservoir included	
NFG MS	785 260


Other lengths of insulated refilling lances are available on request.



Accessories for NFG MS Refilling Device

Insulated Refilling Lance

Operating rod with detachable, highly flexible filling hose (1350 mm), handle, handguard, insulating part, red ring, extension and flexible lance tip

Type	Diameter	Dimensions	Part No.
INFL MS 	30 / 20 mm	980 mm	785 261



Reservoir

Made of stainless steel, with cover and adjustable ventilation.

Type	Capacity of heating element	Dimensions	Part No.
OEB NFG MS	950 W	320 x 165 x 164 mm	785 264
RFB NFG MS	no heating element	320 x 165 x 164 mm	785 295



GRP Case, empty

Max. capacity:

3 NFG MS reservoirs

Type	Colour	Dimensions	Part No.
KKL B NFG MS		600 x 380 x 220 mm	785 299



MS Insulated Screw Driver

Nominal voltages up to 36 kV / 15 ... 60 Hz

REFILLING EQUIPMENT

Based on DIN VDE 0681 Part 1



- Not for use in wet weather
- For indoor and outdoor installations
- For loosening and tightening cable end locking screws under live conditions
- With interchangeable operating heads (straight and angled)



Loosening the locking screw using the MS insulated screw driver.

Application

The insulated screw driver with interchangeable operating heads (straight and angled) allows for the connection of special bits and locking screws that are used to open and close cable ends under live conditions. Only tested bits (screw blade inserts) and special locking screws may be used.

Requirements

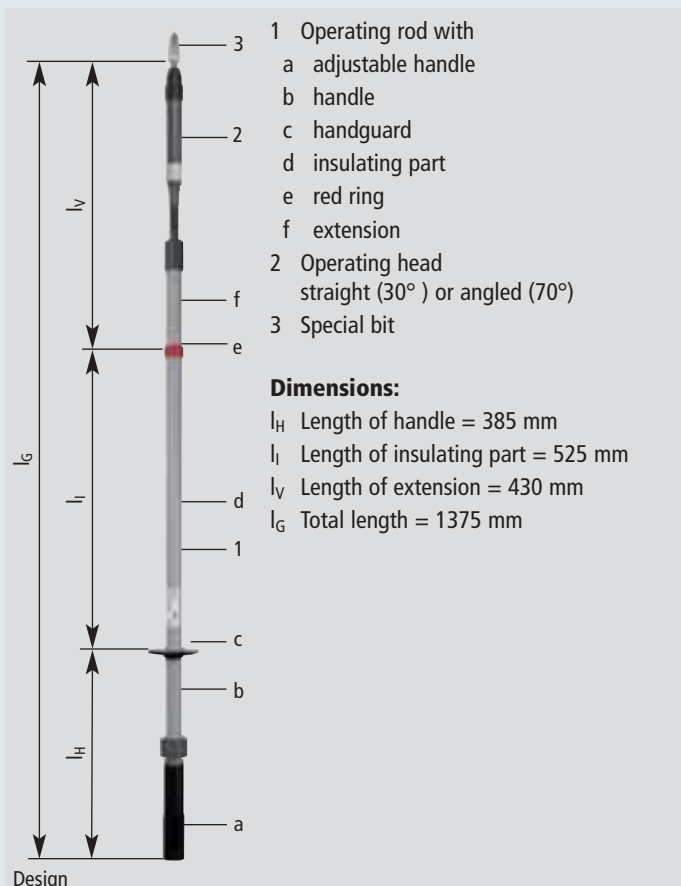
MS insulated screw drivers allow maintenance work to be done under supervision of a qualified electrician at voltages up to 1 to 36 kV according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany apply sections BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] issued by the German Employer's Liability Association for Precision and Electrical Engineering (BGFE).



Apart from the insulated screw driver kit, the plastic case allows for transport of the insulated refilling lance incl. filling hose and special locking screws. These elements, however, are not included in delivery.

Technical Data

Insulating rod	Glass-fibre reinforced polyester tube, Ø30 mm, grey
Handle	Plastic, black
Operating head	PVC, Ø30 mm, for attaching special bits and locking screws



REFILLING EQUIPMENT

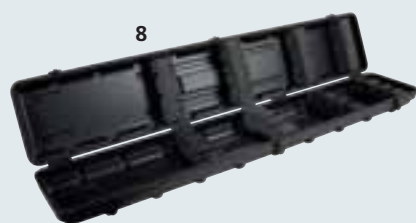
Type				Model	Part No.
A Screw Driver Kit					
Pos.	Qty.	Type	Description		Part No.
1	1	BS 1125 SD KEV MS	Operating rod with adjustable handle		785 266
2	1	VL 350 SD KEV MS	Extension		785 273
3	1	AK SD KEV MS	Operating head, straight		785 267
4	1	AK SD W30 KEV MS	Operating head, angled (30°)		785 268
5	1	AK SD W70 KEV MS	Operating head, angled (70°)		785 269
6	1	BIT 13 SD KEV MS	Special bit 13 mm		785 271
7	1	BIT 8 SD KEV MS	Special bit 8 mm		785 272
8	1	KKL SDS KEV MS	Plastic case		785 298
SDS KEV MS		Contents and plastic case included			785 265

Further extensions for the insulating part, operating heads and special bits are available on request.



Single Parts of MS Insulated Screw Driver

REFILLING EQUIPMENT



Plastic Case, empty

With foam padding

Type	Colour	Dimensions	Part No.
KKL SDS KEV MS	●	1270 x 215 x 140 mm	785 298



Operating Rod with Adjustable Handle

With plug-in coupling for extension handle, handguard, insulating part, red ring and extension

Type	Diameter	Dimensions	Position	Part No.
BS 1125 SD KEV MS	30 mm	1135 mm	1	785 266



Extension

For operating rod

Type	Diameter	Dimensions	Position	Part No.
VL 350 SD KEV MS	30 mm	350 mm	2	785 273



Operating Head, straight

With hexagon terminal for attaching special bits and special locking screws

Type	Diameter	Dimensions	Position	Part No.
AK SD KEV MS	30 mm	310 mm	3	785 267



Operating Head, angled (30°)

With hexagon terminal for attaching special bits and special locking screws

Type	Diameter	Dimensions	Position	Part No.
AK SD W30 KEV MS	30 mm	270 mm	4	785 268



Operating Head, angled (70°)

With hexagon terminal for attaching special bits and special locking screws

Type	Diameter	Dimensions	Position	Part No.
AK SD W70 KEV MS	30 mm	300 mm	5	785 269



Special Bit 13 mm

With safety plug-in system, for use with operating heads type AK SD ...

Type	Diameter	Dimensions	Position	Part No.
BIT 13 SD KEV MS	25 mm	50 mm	6	785 271



Special Bit 8 mm

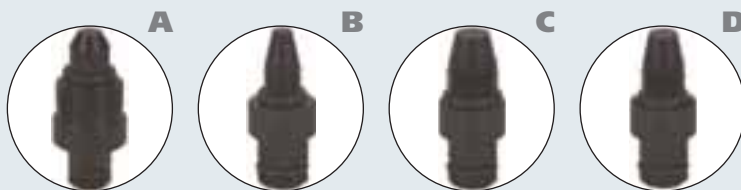
With safety plug-in system, for use with operating heads type AK SD ...

Type	Diameter	Dimensions	Position	Part No.
BIT 8 SD KEV MS	25 mm	50 mm	7	785 272

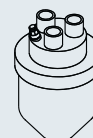
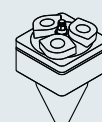


Screwing a special locking screw into the cable end using an angled operating head.

- Not for use in wet weather
- For indoor and outdoor installations
- For sealing cable ends
- For use with operating heads type AK SD ...
- With safety plug-in system
- UV-resistant



Type	Dimensions	PU	Part No.
A Special Locking Screw from F&G For cable ends			
VS F&G M22 F	M22 x 55 mm	12 pc(s).	785 281
B Special Locking Screw from Kottgen For cable ends			
VS KOET M10	M10 x 45 mm	12 pc(s).	785 282
C Special Locking Screw from Raychem For cable ends			
VS RAY M14	M14 x 45 mm	12 pc(s).	785 283
D Special Locking Screw from GOW For cable ends			
VS GOW M12	M12 x 45 mm	12 pc(s).	785 284



Special locking screws for cable ends from other manufacturers are available on request.

PROTECTIVE AND AUXILIARY EQUIPMENT

Device	Nominal voltage U_N	Application	Page	
PPE – Personal Protective Equipment	up to 1000 V	Safety helmet	194	
		Face shield		
		NH fuse puller with protective sleeve		
		Protective gloves		
		Insulated gloves		
Covering Material	up to 1000 V	Insulated platform IW	200	
		Covering material		
		Insulated mats for insulating standing surfaces		
				
Lock-out Systems	up to 1000 V	Insulating plug	204	
		Insulating blade		
		Lock-out systems		

PPE – Personal Protective Equipment

Nominal voltages up to 1000 V

PROTECTIVE AND AUXILIARY EQUIPMENT

- Coating on the inner surface of the face shield prevents misting up
- U-shaped rubber strap can be attached to all types of safety helmets with or without drip peak
- Two locking positions: The face shield can be locked into the use and non-use position
- Safety helmet available in different colours
- NH fuse puller with protective sleeve made from coated cotton fabric

Safety helmet according to DIN EN 397
Face shield according to DIN EN 166
NH fuse puller according to DIN VDE 0680 Part 4



Inserting an NH fuse using the required personal protective equipment.

PROTECTIVE AND AUXILIARY EQUIPMENT

Type	Nominal voltage up to U _N	Colour	Material	Part No.
A Safety Helmet				
Adjustable to head sizes from 52 to 63 cm				
ASH G NS	1000 V	Yellow	special polyethylene	785 426
ASH W NS	1000 V	White	special polyethylene	785 429
ASH O NS	1000 V	Orange	special polyethylene	785 436
ASH B NS	1000 V	Blue	special polyethylene	785 437
ASH R NS	1000 V	Red	special polyethylene	785 438



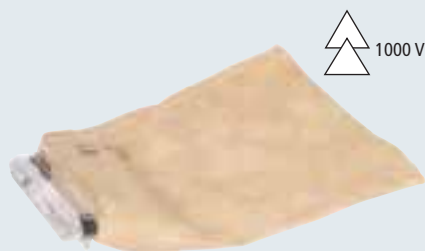
- B Face Shield**
Protection against exposure to arcing faults
Coating on the inner surface prevents misting up, polished edges, 1.5 mm thick
U-shaped rubber strap can be attached to all types of safety helmets with or without drip peak.
The face shield can be locked into the use and non-use position.

SSC ASH NS	1000 V		plastic	785 427
------------	--------	--	---------	---------



- C NH Fuse Puller with Protective Sleeve**
For NH fuses size 00, 1, 2 and 3

NHS AG 00 3 NS	1000 V	Brown	coated cotton fabric	785 645
----------------	--------	-------	----------------------	---------



Accessories for Safety Helmet

Chin Strap

Type	Part No.
KR ASH NS	785 428



Accessories for PPE – Personal Protective Equipment

Storage Bag, empty

For face shields, safety helmets and NH fuse pullers

Type	Colour	Dimensions	Part No.
AT PSA NS	Blue	Ø300, 500 mm	785 425



PPE – Personal Protective Equipment

Protective Gloves

- For maintenance and repair work at electrical installations
- For protection against thermal and mechanical risks
- Underwent 7 kA/0.5 s arcing fault test (box test) in accordance with EN 61482-1-2 (DIN VDE 0682 Part 306-1-2)
- EC type-examination certificate issued by an accredited certification body
- Excellent fit due to special glove cut
- Good touch sensitivity due to soft leather inner surface of the gloves
- High wearing comfort due to use of breathable materials

Notes

In accordance with article 5 of the German labour protection law, employers have to perform a hazard analysis.

This hazard analysis also involves the protection against arcing faults. Employers have to select and provide tested protective clothing including helmets, face shields and gloves to protect personnel against arcing fault hazards.

Employers also have to ensure that protective clothing is worn during works presenting arcing fault hazards.

Protective gloves Type APG are no insulated gloves in accordance with EN/IEC 60903 (DIN VDE 0682 Part 311) for live working.

Application

Evaluation of accidents has shown that serious burns caused by arcing faults in low-voltage installations could have been prevented if adequate protective clothing (PPE) had been worn.

Protective gloves Type APG (Arc Protective Glove) are particularly designed for maintenance and repair work in and at electrical installations. The protective gloves as well as the material used have been tested in accordance with EN 61482-1-2 (box test) for protection against skin burns due to thermal hazards of an arcing fault. The extra long, elastic glove gauntlet allows for fixing the sleeve of the protective clothing and ensures protection of the forearm. The excellent fit of the gloves and the high touch sensitivity in the finger and thumb region allow skilled persons to carry out almost all types of operations and installations in and at electrical installations. The high wearing comfort ensures long wearing of the gloves.

PROTECTIVE AND AUXILIARY EQUIPMENT

DELTEC®

DIN EN 388
DIN EN 407

Box test in accordance with EN 61482-1-2 (DIN VDE 0682 Part 306-1-2)



Actuation of an NH fuse puller using protective gloves.

Technical Data

Inner surface of the glove	Siliconised calf grain leather, beige
Back of the glove	Interlock knit fabric, 100% Kevlar®, coated with a flame-retardant poly-chloroprene foam (Neoprene®), black
Sewing thread	Kevlar®

Marking of the protective glove

	Observe instructions for use
	Protection against thermal risks according to EN 407: 2004 Performance levels: 4 X 3 X X X (tested on protective gloves which are as good as new) X – Large splashes of molten metal X – Small splashes of molten metal X – Radiant heat 3 – Convective heat X – Contact heat 4 – Flammability Performance levels marked with X are not applicable.
	Protection against mechanical risks according to EN 388: 2003 Performance levels: 1 1 1 (tested on protective gloves which are as good as new) 1 – Puncture resistance (Attention: No protection against sharp objects such as injection needles, ...) 1 – Tear resistance 1 – Blade cut resistance 1 – Abrasion

PROTECTIVE AND AUXILIARY EQUIPMENT



A



Type	Arcing fault value in accordance with the box test	Total length	Gauntlet length	Size	Part No.
------	---	-----------------	--------------------	------	-------------

A Protective Gloves

APG 8	7 kA / 0.5 s	310 mm	100 mm	8	785 796	new
APG 9	7 kA / 0.5 s	320 mm	100 mm	9	785 797	new
APG 10	7 kA / 0.5 s	330 mm	100 mm	10	785 798	new
APG 11	7 kA / 0.5 s	340 mm	100 mm	11	785 799	new



Measuring the circumference around the knuckles with a measuring tape

Glove size

Measure the circumference around your knuckles to determine your correct glove size.

Circumference around the knuckles	Glove size
20.3 cm	8
22.9 cm	9
25.4 cm	10
27.9 cm	11

Ordering example

For a circumference around the knuckles of 24 cm we recommend glove size 10.

PSE – Personal Safety Equipment

Insulated Gloves up to 1000 V

PROTECTIVE AND AUXILIARY EQUIPMENT

EN 60903 (DIN VDE 0682 Part 311)

- For working on live parts
- Insulated gloves combine excellent fit and high elasticity with maximum insulating capacity
- Two different models according to requirements



Live working with insulated gloves up to 1000 V.

Maintenance test

The pneumatic glove tester allows the user to perform maintenance tests as required by the relevant standards and detects even minimal damage to the insulated gloves. Maintenance tests should be performed every time before the gloves are used therefore the glove tester is an indispensable and very practical safety tool.



Technical Data

Category M	Higher mechanical stresses
Category RC	Resistant to acids, oil, ozone and higher mechanical stresses as well as extremely low temperatures

PROTECTIVE AND AUXILIARY EQUIPMENT



Type	Class	Nominal voltage up to U_N	Elastomer thickness	Size	Part No.
A Category M / Beige					
IHS 00 M 9 NS	00	500 V	0.5 mm	9	785 491
IHS 00 M 10 NS	00	500 V	0.5 mm	10	785 492
IHS 0 M 9 NS	0	1000 V	1.0 mm	9	785 493
IHS 0 M 10 NS	0	1000 V	1.0 mm	10	785 494

B Category RC / Black

With internal coating and structured gripping surface

IHS 00 RC 9 NS	00	500 V	0.9 mm	9	785 495
IHS 00 RC 10 NS	00	500 V	0.9 mm	10	785 496

Sizes 8 and 11 are available on request.



Accessories for PSE – Personal Safety Equipment

Storage Bag, empty

With hook-and-loop fastener and coupling hook

Type	Colour	Dimensions	Part No.
AT IHS NS	●	400 x 180 x 50 mm	785 490

**Pneumatic Glove Tester**

For maintenance tests according to standard requirements

Type	Colour	Part No.
PHSP NS	●	785 497




Insulated Platform IW

**Nominal voltages up to
17.5 kV / 15 ... 60 Hz**

PROTECTIVE AND AUXILIARY EQUIPMENT

based on DIN VDE 0681 Part 1

- Not for use in wet weather 
- Equipment for live maintenance and repair work at airport lighting systems
- Insulated platform for insulating standing surfaces
- Continuous, fluorescent limit mark indicates maximum permissible height for plants when used in green spaces and can be used as reflector at night
- Two removable kneeling cushions for comfortable working
- Replacable skids for easy positioning and transport



Replacement of a faulty illuminant (airport lighting system) at a runway.

Application

The insulated platform and the GRP extension are used for e.g. replacing illuminants at airport lighting systems under live conditions.

The insulated platform insulates the standing surface during live working. The GRP extension is used as insulating intermediate section between the ratchet (with 13 mm square) and operating head (e.g. 17 mm socket).

Requirements

Maintenance and repair work exceeding 1 to 36 kV may only be performed under the supervision of a skilled person in accordance with EN 50110-1 "Operation of Electrical Installations – Minimum Requirements", Sections 6.3.1 to 6.3.12. In Germany sections BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] issued by the German Employer's Liability Insurance Association for Precision and Electrical Engineering apply.

Technical Data

Insulated platform	Glass fibre reinforced plastic, 4 mm, light grey
Extension	Glass fibre reinforced rod, Ø16 mm, white
Operating temperature range	– 25° C ... + 55° C
Relative air humidity	≤ 90%



The GRP extension is used as insulating intermediate section when attaching the illuminant.

PROTECTIVE AND AUXILIARY EQUIPMENT

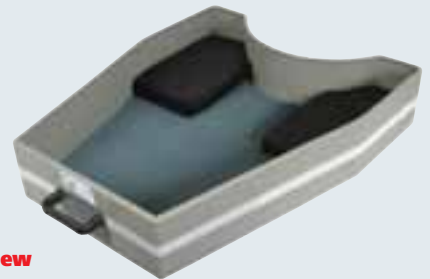


Type	Nominal voltage up to U_N	Part No.
------	--------------------------------	-------------

A Insulated Platform IW

For beacons up to a diameter of max. 225 mm

IW 17.5 890 650 180	17.5 kV	785 408 new
---------------------	---------	--------------------



Accessories for Insulated Platform IW

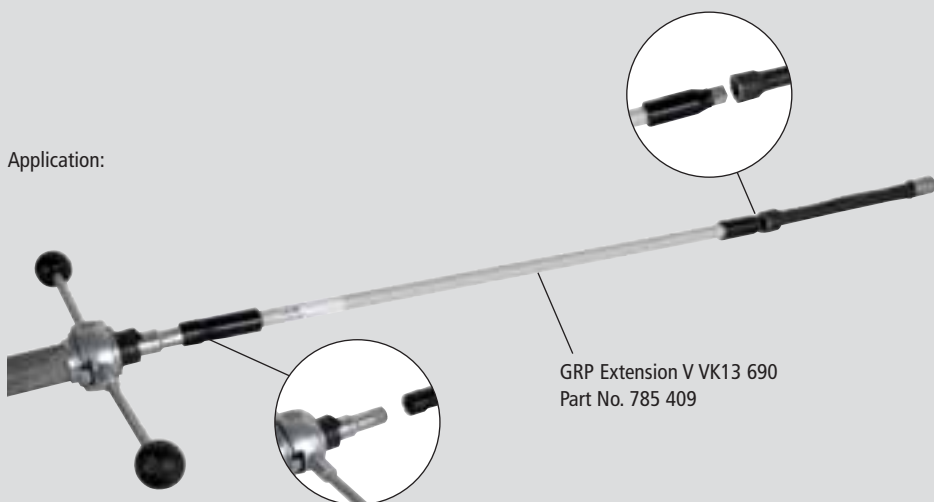
GRP Extension

Insulating intermediate section between ratchet (with 13 mm square) and operating head (17 mm socket)

Type	Length	Part No.
V VK13 690	690 mm	785 409 new



Application:

GRP Extension V VK13 690
Part No. 785 409

GRP extension between ratchet with torque adjustment and operating head.

Covering Material and Insulated Mats

Nominal voltages up to 1000 V

PROTECTIVE AND AUXILIARY EQUIPMENT

DIN VDE 0680 Part 1

- Protection against accidental and direct contact with energised parts
- For covering adjacent energised parts
- Available in different lengths, widths, thicknesses and colours
- Insulated rubber mats for standing surface insulation



Covering of live parts.



Type	Length	Width	Thickness	Colour	Part No.
------	--------	-------	-----------	--------	----------

A Insulated Covering Material (Crystal Clear)

ATK 135 50M NS	50 m	1350 mm	0.5 mm	crystal clear	785 465
ATK 135 ..M NS	as required, up to 50 m*)	1350 mm	0.5 mm	crystal clear	785 466

B Insulated Covering Material (Transparent)

ATK 120 25M NS	25 m	1200 mm	1.0 mm	transparent	785 467
ATK 120 ..M NS	as required, up to 25 m*)	1200 mm	1.0 mm	transparent	785 468

C Insulated Covering Material (Chloroprene Rubber)

Flexible even at low temperatures

ATN 140 10M NS	10 m	1400 mm	1.0 mm	●	785 471
ATN 140 ..M NS	as required, up to 10 m*)	1400 mm	1.0 mm	●	785 472

D Insulated Covering Material (Chloroprene Rubber)

For covering insulators

WBN 200 2,5M NS	2.5 m	200 mm	1.0 mm	●	785 646
-----------------	-------	--------	--------	---	----------------

*) Please specify the required length when placing your order.

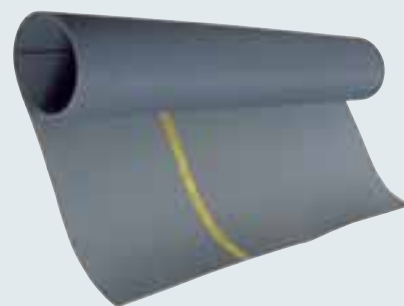
PROTECTIVE AND AUXILIARY EQUIPMENT

Type	Length	Width	Thickness	Colour	Part No.
E Insulated Rubber Mats for Standing Surface Insulation					
IMG SI 1M NS	1 m	1000 mm	3.0 mm	●	785 455
IMG SI ..M NS	as required, up to 10 m*)	1000 mm	3.0 mm	●	785 456
IMG SI 10M NS	10 m	1000 mm	3.0 mm	●	785 457

**F Insulated Mat**

For use in electrical control and test rooms,
with a dielectric strength of 50 kV, tested according to DIN VDE 0303 Part 2

IMG SAN 1M ..M	as required, up to 10 m*)	1000 mm	4.5 mm	●	785 458
IMG SAN 1M 10M	10 m	1000 mm	4.5 mm	●	785 459



*) Please specify the required length when placing your order.

Accessories for Covering Material and Insulated Mats

Clip

With insulated steel spring

Type	Max. clamping range	Dimensions	Material	Part No.
KK 35 NS	35 mm	170 / 110 mm	plastic	785 647

**Hook**

Type	Dimensions	Material	Part No.
HK 8 NS	Ø8, 130 / 72 mm	plastic	785 648

**Eye**

2-part unit

Type	Dimensions	Material	Part No.
OEK 12 NS	Ø12 / 26 mm	plastic	785 649



Lock-out Systems

Nominal voltages up to 1000 V

PROTECTIVE AND AUXILIARY EQUIPMENT

VBG 125 and DIN 40008

- For indoor installations
- Protection against reconnection
- Symbol "Nicht schalten" [Do not close the circuit] acc. to national regulations (VBG 125)
- Insulating plug for screw insert
- Insulating blade for NH fuse holders
- Lock-out system for circuit breakers



Lock-out system with 3 modules (mods.)

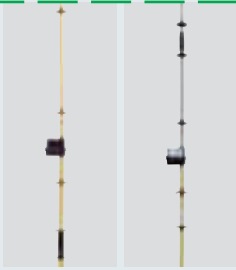


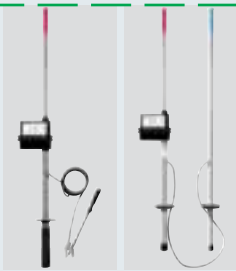



Type	Size	Dimensions	Part No.
A Insulating Plug For screw insert			
SE E14	E14	Ø20 x 40 mm	785 639
SE E18	E18	Ø25 x 40 mm	785 650
SE E27 E33	E27 and 33	Ø45 x 55 mm	785 640
B Insulating Blade For NH fuse holders and distribution blocks			
SE NH00	00	80 mm	785 641
SE NH0	0	125 mm	785 642
SE NH1	1	135 mm	785 643
SE NH2 3	2 and 3	150 mm	785 644
C Lock-out System For single-pole and multi-pole circuit breakers with a clamping range of 45 mm			
SE REG 1TE	1 mod.	52 x 17 mm	785 638
SE REG 2TE	2 mods.	52 x 34 mm	785 652
SE REG 3TE	3 mods.	52 x 51 mm	785 637

RAILWAYS

Selection Guide

VOLTAGE DETECTORS

Device	Nominal Voltage U_N / Frequency f_N	Application, Indication	Page	
PHE	15 kV / 16.7 Hz	Also for use in wet weather For overhead contact lines of electrical railways With self-testing element Visual indicator Easy transport 6-part unit	206	
PHE	3...10 / 6...20 kV / 50 Hz 6...20 kV / 16.7 Hz switchable	Also for use in wet weather For use in three-phase systems and single-ended mono-phase switchgear installations For electrical point heating systems With self-testing element Visual indicator Easy transport	208	
HSA 194	110...420 kV / 16.7 Hz	Also for use in wet weather Non-contact voltage detector For centre-earthed mono-phase traction current lines With self-testing element Visual and acoustic indicator	210	
PHE/G	1...7.5 kV / d.c. voltage	Also for use in wet weather For indoor and outdoor installations With self-testing element Visual indicator Two-pole unit (single-pole/two-pole) Easy transport	212	
Storage Bags and Transport Cases		Sheet metal or plastic case Artificial leather or canvas bag	70	

Maintenance tests

According to German regulations, voltage detectors have to be tested to ensure compliance with the limits as stated in the Electrical Safety Rules. This test is performed in the high voltage test facility of DEHN + SÖHNE and includes

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

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

The intervals for maintenance tests depend on the operating conditions of the equipment, e.g. frequency of use, environmental conditions and transport. According to German regulations, the maintenance tests **must not exceed 6 years**.



PHE Voltage Detector

Nominal voltages 15 kV / 16.7 Hz

RAILWAYS

VOLTAGE DETECTORS

DIN VDE 0681 Part 6

- Also for use in wet weather
- For use in overhead contact lines of electrical railways
- With self-testing element
- Visual indication
- Easy transport due to detachable insulating rod
- 6-part unit for transport in motor vehicles
- Storage bag included in delivery



Self-testing element

The PHE electronic voltage detector has an integrated self-testing element that automatically test the electronic circuit for correct operation (threshold) after switching on the detector. The detector is only ready for operation if the function test was performed successfully.

Replacing the battery

The PHE voltage detector operates on 4 Mignon IEC LR6 batteries housed in a separate battery compartment for easy battery replacement. Low battery conditions are indicated by both LEDs illuminated when switching on the voltage detector.



PHE voltage detector with visual indicator used at an overhead contact line of German Railways.



Two-part test prod with robust threaded coupling

6-part unit (for transport in motor vehicles)



Insulating rod with plug-in coupling protected against twisting



Sealing unit with plug-in coupling and non-slip eye.

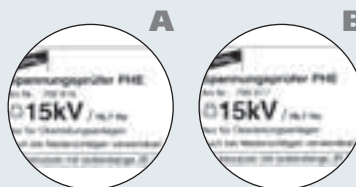
Technical Data

Test prod	Glass-fibre reinforced polyester tube; with fixed hook-shaped electrode made of St/gal Zn and waterproof silicone elastomer shields; PHE 4-part (A): Ø20 mm, yellow; PHE 6-part (B): Ø20/24 mm, grey, with threaded coupling
Indicator	Plastic, fully insulated, black
Indication	Red light '4' (permanent light); Green light '0' (permanent light)
Insulating rod	Glass-fibre reinforced polyester tube, Ø30/43 mm, yellow, detachable, with waterproof silicone elastomer shields, handguard and plug-in coupling; Sealing unit with plug-in coupling and non-slip eye (Al/rubber)

RAILWAYS

PHE Voltage Detector

VOLTAGE DETECTORS



Type	Nominal voltage/ frequency U_N / f_N	Total length l_G	Insertion depth l_0	DB Drawing No.	DB Material No.	Part No.
------	---	-----------------------	--------------------------	-------------------	--------------------	-------------

A Voltage Detector Kit PHE 15 kV / 16.7 Hz

Modular (4-part unit)

Pos.	Qty.	Type	Description	Part No.
2	1	PHE A 15 16.7 PS	Indicator PHE 15 kV / 16.7 Hz	766 678
4	1	IS M12 STK 30 720	Insulating rod, $l = 720$ mm	766 072
6	1	HV STK 43 2350	Extension handle, $l = 2350$ mm	766 073
9	1	AR STK	Sealing unit with eye STK	766 889
10	1	KLT 247 10 22	Artificial leather bag, empty	766 602

PHE 15 16.7 4T TA	15 kV / 16.7 Hz	4890 mm	1675 mm	3 Ebgw 02.51	237 129	766 616	new
-------------------	-----------------	---------	---------	--------------	---------	----------------	------------

B Voltage Detector Kit PHE 15 kV / 16.7 Hz (for Transport in Motor Vehicles)

Modular (6-part unit)

Pos.	Qty.	Type	Description	Part No.
1	1	PS PHE 15 16.7	Test prod upper part PHE 15 kV	766 619
3	1	PHE A 15 16.7	Indicator PHE 15 kV / 16.7 Hz	766 677
5	1	IS M12 STK 30 1060	Insulating rod, $l = 1060$ mm	766 075
7	1	HV STK 43 1045	Extension handle, $l = 1045$ mm	766 076
8	1	HV STK 43 975	Extension handle, $l = 975$ mm	766 077
9	1	AR STK	Sealing unit with eye STK	766 889
11	1	STT 120 30 15	Canvas bag, empty	766 704

PHE 15 16.7 6T TA	15 kV / 16.7 Hz	4900 mm	1675 mm	3 Ebgw 02.53	652 975	766 617	new
-------------------	-----------------	---------	---------	--------------	---------	----------------	------------

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

Accessories for PHE Voltage Detector, Part No. 766 616

Artificial Leather Bag, empty

With shoulder strap



Type	Colour	Dimensions	DB Drawing No.	Part No.
KLT 247 10 22	●	2470 x 220 x 100 mm	3 Ebgw 02.51	766 602

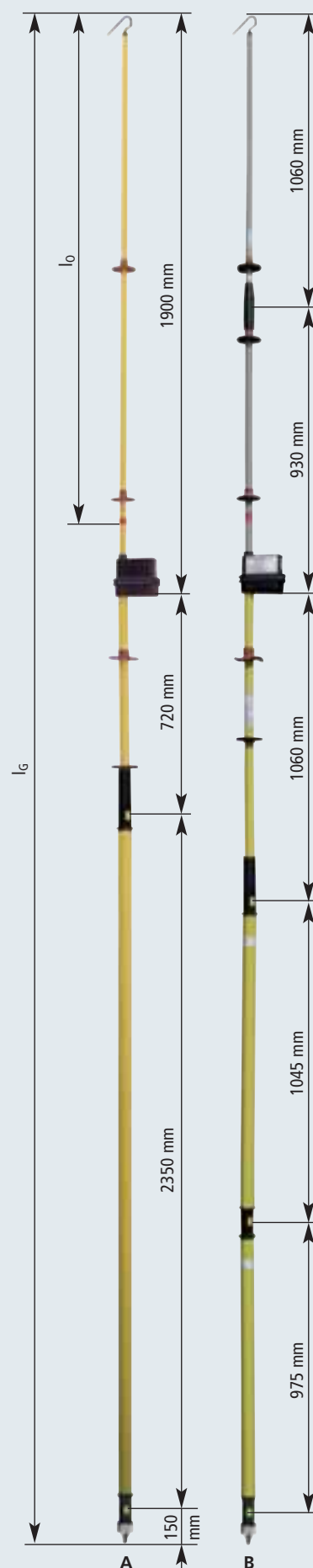
Accessories for PHE Voltage Detector, Part No. 766 617

Canvas Bag, empty

With shoulder strap



Type	Colour	Dimensions	Part No.
STT 120 30 15	●	1200 x 300 x 150 mm	766 704



(Picture including transport lengths)

PHE Voltage Detector

RAILWAYS

**Nominal voltage ranges 3 ... 20 kV / 50 Hz and
6 ... 20 kV / 16.7 Hz**

VOLTAGE DETECTORS

EN/IEC 61243-1 (DIN VDE 0682 Part 411)
E DIN VDE 0682 Part 421

- Also for use in wet weather
- For three-phase systems and single-ended mono-phase switchgear installations
- For electrical point heating systems
- With self-testing element
- Visual indicator
- Wide nominal voltage ranges
- Easy transport due to detachable insulating rod



Self-testing element

The PHE electronic voltage detector has an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector. The detector is only ready for operation if the function test was performed successfully.

Replacing the battery

The PHE voltage detector operates on 4 Mignon IEC LR6 batteries housed in a separate battery compartment for easy battery replacement. Low battery conditions are indicated by both LEDs illuminated when switching on the voltage detector.

Use in type-tested switchgear installations

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. Due to reduced insulation distances, electric flash over may occur when inserting the test prod into the installation. The user of the voltage detector or operator of the switchgear installation should consult the manufacturer of the type-tested installation before using the voltage detector (Refer to Page 12-Table: Applications of Voltage Detectors in type-tested, factory assembled switchgear installations).



Before testing for safe isolation from supply voltages, the correct operation of the voltage detector must be verified. When pressing the "TEST" button, the red LED is flashing.



After releasing the button, the green LED lights up. The test for correct operation was performed successfully and the detector is ready for use.



PHE voltage detector with visual indication used in a switchgear installation.

Technical Data

Test prod	Glass-fibre reinforced epoxy resin tube, Ø20 mm, grey; Test electrode made of Cu alloy/gal Sn, Ø20 mm, tooth shape for reliable contact, with M8 female thread for attachable electrodes and test probes
Indicator	Plastic, fully insulated, black
Indication	Red light '4' (permanent light); Green light '0' (permanent light)
Insulating rod	Glass-fibre reinforced polyester tube, Ø30 mm, grey, detachable, with a handguard for safe operation; Sealing unit with non-slip plastic cap



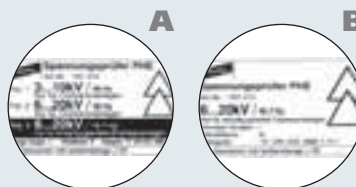
Special features of the switchable voltage detector:

A selector switch for nominal voltages 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 mono-phase systems
For safety reasons, the detector can only be switched on with the selector switched to the most sensitive range of 3 kV to 10 kV / 50 Hz. The switch snaps into the respective position and is protected against accidental switching. A magnetically operated, wear-resistant reed switch changes the switching position.

RAILWAYS

PHE Voltage Detector

VOLTAGE DETECTORS



Type	Nominal voltage/ frequency U_N / f_N	Total length l_G	Insertion depth l_0	DB Drawing No.	DB Material No.	Part No.
A Nominal Voltage Ranges up to 20 kV / 50 Hz or 16.7 Hz, switchable For three-phase systems and single-ended mono-phase switchgear installations						
PHE U 3 20 16.7 50	3 ... 10 kV / 50 Hz; 6 ... 20 kV / 50 Hz; 6 ... 20 kV / 16.7 Hz	1590 mm	770 mm	3 Ebgw 02.54	743 361	767 416

B Nominal Voltage Ranges up to 20 kV / 16.7 Hz For single-ended mono-phase switchgear installations and point heating systems						
PHE 6 20 16.7	6 ... 20 kV / 16.7 Hz	1590 mm	770 mm	3 Ebgw 02.52	738 302	767 415

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

Accessories for PHE Voltage Detector

Onion-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 SZ PHE PHV	from 3 kV	Ms/gal CuSn	766 913

Pin-shaped Electrode

With additional M6 thread

Type	Nominal voltage U_N	Material	Part No.
EL M8 S PHE PHV	from 3 kV	StSt	766 925

V-shaped Electrode

Type	Nominal voltage U_N	Material	Part No.
EL M8 V PHE PHV	from 3 kV	Cu/gal Sn	766 927

Plastic Case, empty

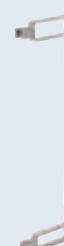
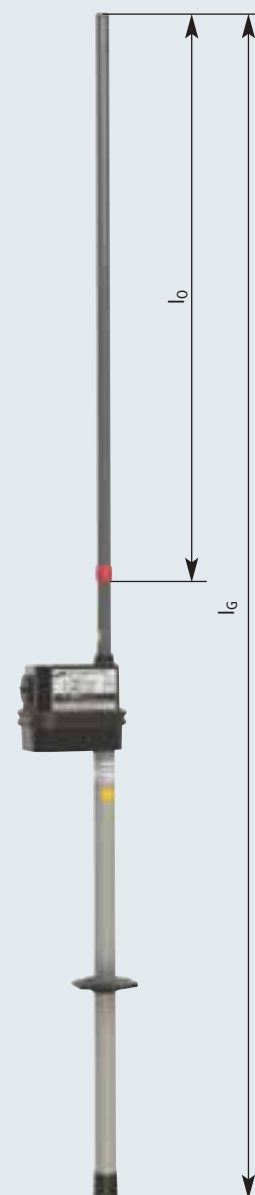
With foam padding

Type	Colour	Dimensions	For PHE Total length	Part No.
KKL PHE L	●	1270 x 215 x 140 mm	from 1460 mm	766 999

Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D30	●	30 mm	430 mm	700 007



HSA 194 Non-Contact Voltage Detector

RAILWAYS

Nominal voltage range 110 ... 420 kV / 16.7 Hz

VOLTAGE DETECTORS

- Also for use in wet weather
- For testing centre-earthed mono-phase railway traction current lines for safe isolation from supply voltages without making contact
- With self-testing element
- Visual and acoustic indicator
- Storage bag included in delivery



Self-testing element

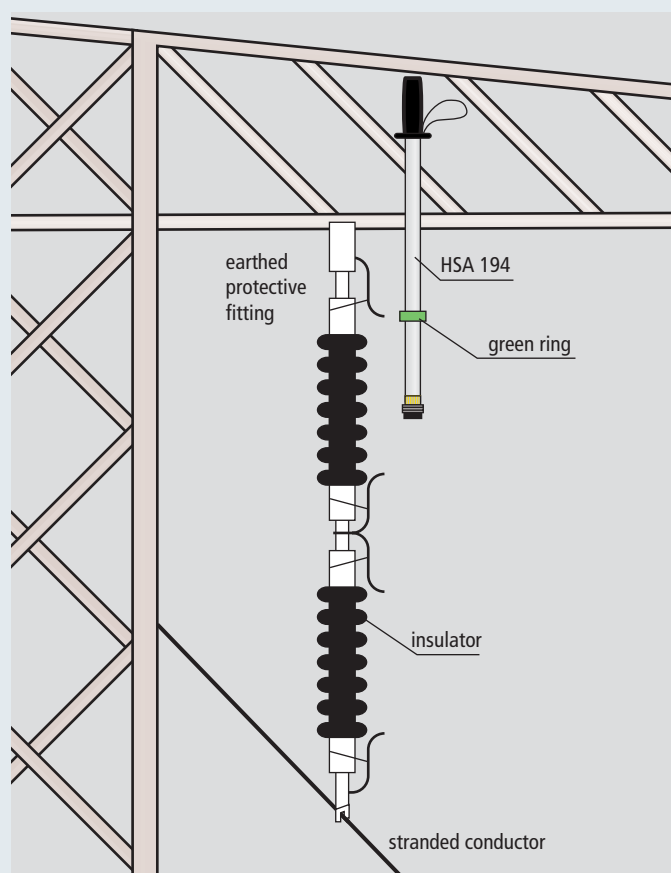
The HSA non-contact voltage detector has an integrated self-testing element. The test is automatically performed after switching on the detector.

Batteries

The HSA non-contact voltage detector operates on a 9 V block battery. Low battery conditions are indicated by a permanent red light and an additional constant acoustic signal.



Non-contact voltage detector used for a 110 kV overhead line.



Technical Data

Readiness for operation	Green flashing light and acoustic signal at 2s intervals
Voltage present	Red flashing light and acoustic signal with increased frequency
No voltage present	Green flashing light and acoustic signal at 2s intervals
Insulating rod	Glass-fibre reinforced polyester tube, Ø43 mm, grey colour, with integrated measuring head as well as operating and indication part and green ring (contact marking)
Operating temperature range	– 25° C ... + 55° C, climatic category N

Application notes

For verifying safe isolation from supply voltages, the non-contact voltage detector is used from the crossarm of the overhead line tower. The green ring of HSA 194 is used to make contact with the last earthed protective fitting (or earthed insulator cap) to ensure that the measuring head of the voltage detector points in the direction of the stranded conductor at the other end of the insulator (rod axis of HSA 194 parallel to the longitudinal axis of the insulator). The "Voltage present" state of the stranded conductor is indicated both visually (red flashing light) and acoustically (audible signal).

RAILWAYS

HSA 194 Non-Contact Voltage Detector

VOLTAGE DETECTORS



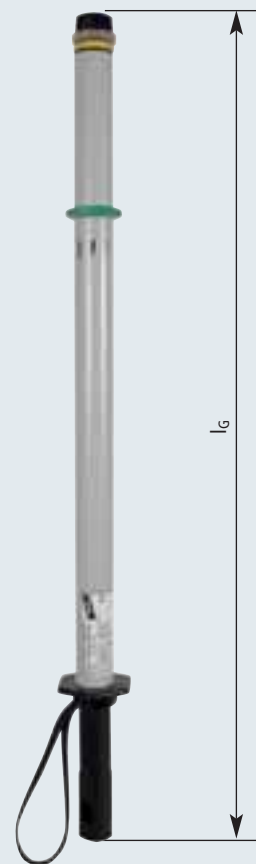
Type	Nominal voltage range/ frequency U_N / f_N	Total length l_G	DB Drawing No.	Part No.
------	---	-----------------------	-------------------	-------------

A HSA 194 with Plug-in Coupling

Plug-in coupling for extending the handle
Storage bag included in delivery

HSA194 110 420 16.7	110 ... 420 kV / 16.7 Hz	935 mm	3 Ekgw 02.54	767 542
---------------------	--------------------------	--------	--------------	----------------

Non-contact voltage detectors can be equipped with Lithium batteries at an extra charge.
Voltage detectors for other nominal voltages and frequencies are available on request.



Accessories for HSA 194 Non-Contact Voltage Detector

HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	Diameter	Total length l_G	Part No.
HV STK 30 710	30 mm	710 mm	766 335

Adapter – Plug-in Coupling / T pin Shaft

For extending the handle of insulating rods type IS PHE with earthing rod type ES SQ or ES SQL

Type	Total length l_G	Part No.
AD HV STK SQ	280 mm	766 313

Artificial Leather Bag, empty

With shoulder strap

Type	Colour	Dimensions	Part No.
KLT 98 9	●	Ø85 x 980 mm	767 531

Storage Device

Wall-mounted

Type	Colour	Diameter	Dimensions	Part No.
HV P ST D40 45	●	40 ... 45 mm	530 mm	700 008




PHE/G d.c. Voltage Detector

Nominal voltages up to 7.5 kV d.c.

RAILWAYS

VOLTAGE DETECTORS

Based on EN/IEC 61243-2 (DIN VDE 0682 Part 412)

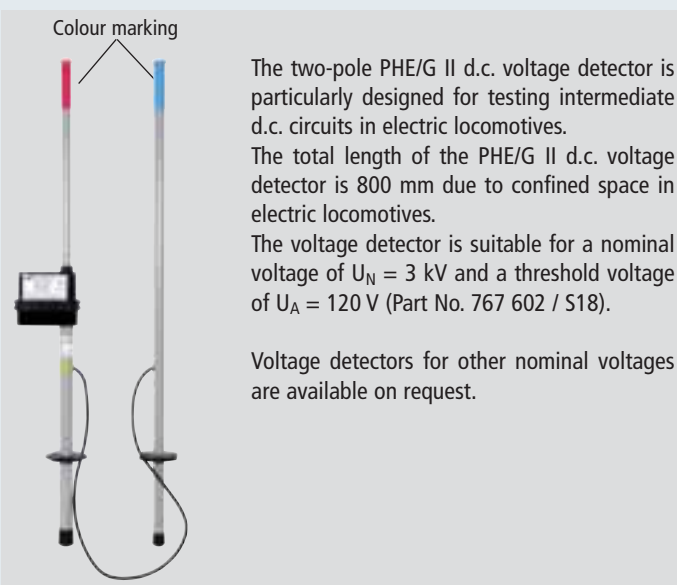
- Also for use in wet weather 
- For indoor and outdoor installations
- For use in d.c. systems (electrified rail networks, d.c. links)
- With self-testing element
- Visual indicator
- Optional earthing (positive or negative pole)
- Easy transport due to detachable insulating rod

Self-testing element

Electronic PHE/GI and PHE/GII d.c. voltage detectors have an integrated self-testing element that automatically tests the electronic circuit for correct operation (threshold) after switching on the detector. The detector is only ready for operation if the function test was performed successfully.

Replacing the battery

The voltage detector operates on 4 Mignon IEC LR6 batteries housed in a separate battery compartment for easy battery replacement. Low battery conditions are indicated by both LEDs permanently illuminated when switching on the voltage detector (function test).



PHE/G II d.c. voltage detector for d.c. links (ICE operating head).

Technical Data

Test prod	Glass-fibre reinforced polyester tube, grey; Test electrodes made of Cu alloy/gal Sn; PHE/G I (A) for overhead contact lines: Ø20 mm, hook-shaped electrode; PHE/G I (B) for switchgear installations and PHE/G II (C): Ø20 mm (B) or Ø20/30 mm (C), with tooth profile for safe contact, with M8 female thread for attaching electrodes and test probes
Colour marking	Polarity on the test prod: Positive pole: red; Negative pole: blue
Indicator	Plastic, fully insulated, black
Indication	Red LED 'H' (flashing light); Green LED '0' (permanent light)
Insulating rod	Glass-fibre reinforced polyester tube, Ø43 / 30 mm, grey; PHE/G I (A) for overhead contact lines: Sealing unit with plug-in coupling and non-slip eye (Al/rubber); PHE/G I (B) for switchgear installations: Sealing unit with plug-in coupling for extending the handle; PHE/G II (C): Sealing unit with non-slip plastic cap
Connecting cable	Highly-flexible copper cable, plastic-insulated
Earth clamp	Flexible adjustable handle, MCl/gal Zn, clamping range: up to 20 mm
Operating temperature range	- 25° C ... + 55° C, climatic category N

RAILWAYS

PHE/G d.c. Voltage Detector

VOLTAGE DETECTORS



Type	Length of connecting cable	Total length l_G	Part No.
------	-------------------------------	-----------------------	-------------

A PHE/G I Overhead Contact Lines

Single-pole (3-part unit)

- For single-ended d.c. systems
- Threshold voltage $U_A = 0.5 \times U_N$
- Please specify the nominal voltage (U_N) when placing your order!
- Please specify the polarity (positive or negative earth) when placing your order!

PHEG1 ... FD	6000 mm	4060 mm	767 600
--------------	---------	---------	---------

B PHE/G I for Switchgear Installations

Single-pole

- For single-ended d.c. systems
- Threshold voltage $U_A = 0.5 \times U_N$
- Please specify the nominal voltage (U_N) when placing your order!
- Please specify the polarity (positive or negative earth) when placing your order!

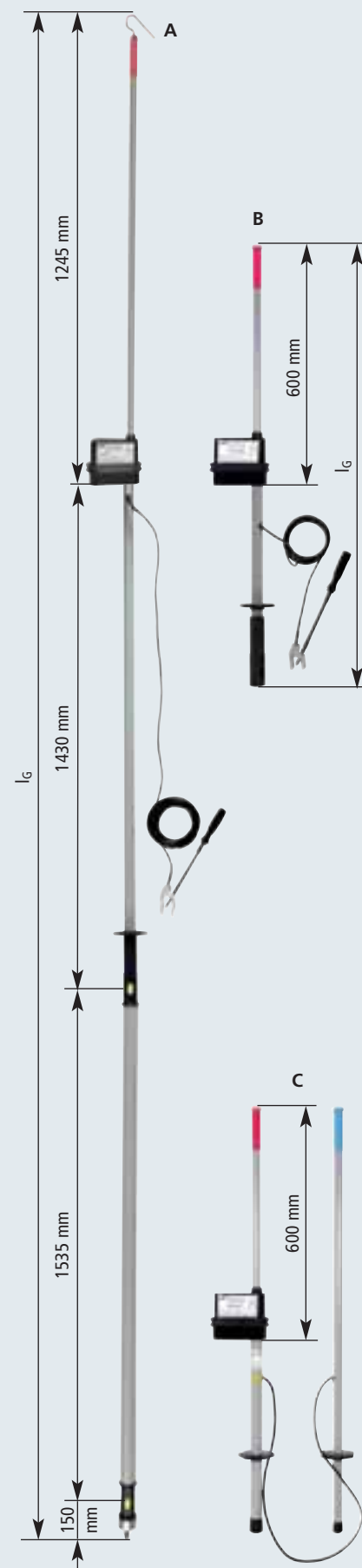
PHEG1 ... S	2000 mm	1080 mm	767 601
-------------	---------	---------	---------

C PHE/G II

Two-pole

- For non-earthed d.c. systems
- For d.c. links (electric locomotives; $U_A \leq 120 \text{ V}$, $l_G = 800 \text{ mm}$)
- Indicator with red positive pole on test prod
- Please specify the threshold voltage (U_A) when placing your order!
- Please specify the nominal voltage (U_N) when placing your order!

PHEG2 ...	1200 mm	1075 mm	767 602
-----------	---------	---------	---------

Other lengths and threshold voltages (U_A) are available on request.

(Picture with transport lengths)

Accessories for PHE/G d.c. Voltage Detectors

RAILWAYS

VOLTAGE DETECTORS



Onion-shaped Electrode

Nominal voltage			Part
Type	U_N	Material	No.
EL M8 SZ PHE PHV	from 3 kV	Ms/gal CuSn	766 913



Pin-shaped Electrode

With additional M6 thread

Nominal voltage			Part
Type	U_N	Material	No.
EL M8 S PHE PHV	from 3 kV	StSt	766 925



V-shaped Electrode

Nominal voltage			Part
Type	U_N	Material	No.
EL M8 V PHE PHV	from 3 kV	Cu/gal Sn	766 927



Hook-shaped Electrode

Nominal voltage			Part
Type	U_N	Material	No.
EL M8 H PHE	for overhead lines only	steel/gal Zn	766 923



Fork-shaped Electrode

Nominal voltage			Part
Type	U_N	Material	No.
EL M8 G PHE	for overhead lines only	StSt	766 924

Accessories for PHE/G d.c. Voltage Detector, Part No. 767 600

Artificial Leather Bag, empty

With shoulder strap



			Part
Type	Colour	Dimensions	No.
KLT 160 17	●	Ø170 x 1600 mm	766 614

Accessories for PHE/G d.c. Voltage Detector, Part No. 767 601 and 767 602

Artificial Leather Bag, empty

With shoulder strap



			Part
Type	Colour	Dimensions	No.
KLT 121 25 16	●	1200 x 250 x 160 mm	766 601



Canvas Bag, empty

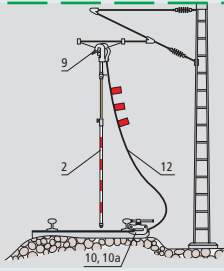
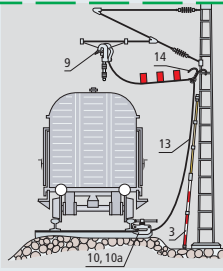
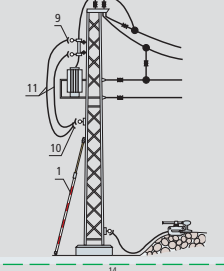
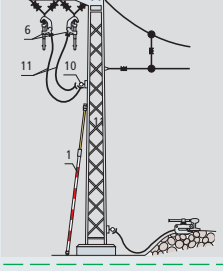
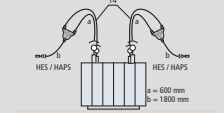
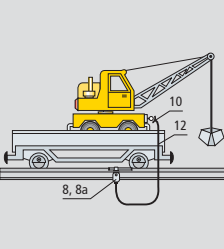
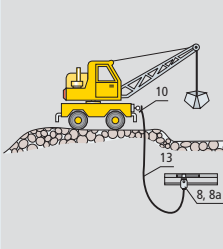

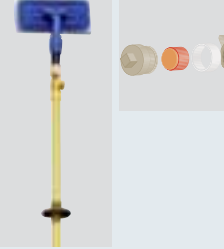
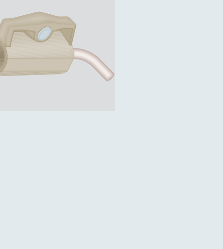
With shoulder strap

			Part
Type	Colour	Dimensions	No.
STT 120 30 15	●	1200 x 300 x 150 mm	766 704

RAILWAYS

Selection Guide

EARTHING DEVICES

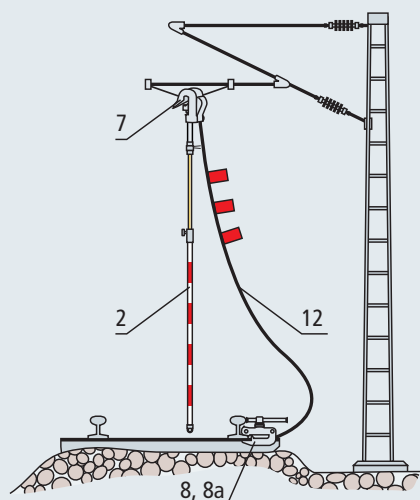
Device	Application, Device	Page		
Kit for Overhead Contact Lines	Profile-free or not profile-free Profile-free or not profile-free Kit for transport in motor vehicles	216		
Kit for Transformers at Overhead Line Towers	For earthing rail supports For earthing towers next to rails	218		
Kit for Heating Systems of Railway Points and Trains	For electrical heating systems of railway points For electrical preheating systems of trains	219		
Kit for Construction Machines, Cranes, Maintenance Vehicles	For equipment on maintenance vehicles For equipment on rails For trackless equipment	220		
Single Parts of Earthing Devices for Railways	Earthing rods Universal clamps Rail earth clamps Earthing and short-circuiting cables Storage bags Storage devices Fixed ball points Ø25 mm Earth connecting plates	222		
Further Equipment Insulating Rod Kit	For cleaning the windows of electric locomotives	228		
Fuse Link	For voltage-limiting devices	230		

Earthing Devices for Railways

Kits for Overhead Contact Lines

RAILWAYS

EARTHING DEVICES



Type	DB Drawing No.	DB Material No.	Part No.
------	-------------------	--------------------	-------------

A Kit for Overhead Contact Lines (not profile-free)

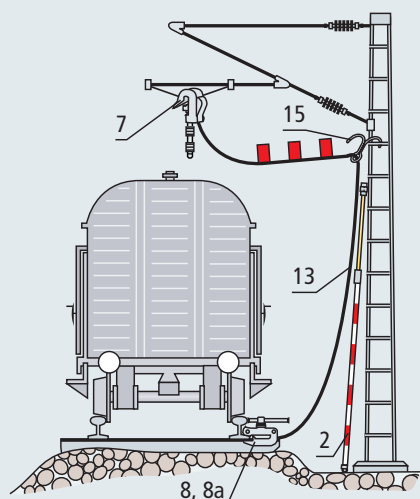
Cable length 8.5 m, telescopic earthing rod with adjusting ring

Kit includes

Pos.	Qty.	Description	Part No.
2	1	Telescopic earthing rod with adjusting ring (max. 5 m long)	769 502
7	1	Earth clamp for contact wires	784 755
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
12	1	Earthing and short-circuiting cable (50 mm², 8.5 m long)	751 085

*) Type 8a is available on request

BEV OL NPF K	3 Ebgw 01.51	237 117	750 210
--------------	--------------	---------	----------------



B Kit for Overhead Contact Lines (profile-free)

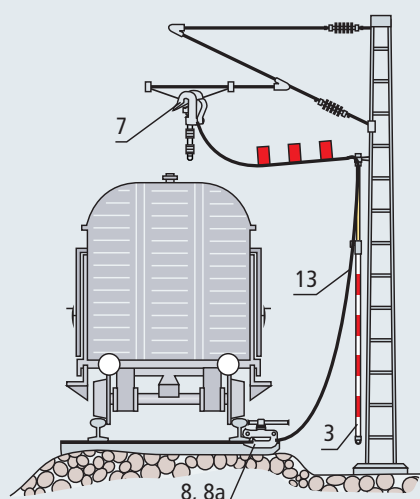
Cable length 12 m, removable to one side with additional hook, telescopic earthing rod with adjusting ring

Kit includes

Pos.	Qty.	Description	Part No.
2	1	Telescopic earthing rod with adjusting ring (max. 5 m long)	769 502
7	1	Earth clamp for contact wires	784 755
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
13	1	Earthing and short-circuiting cable (50 mm², 12 m long)	751 120
15	1	Hook	740 124

*) Type 8a is available on request

BEV OL PF K	3 Ebgw 01.51	237 118	750 211
-------------	--------------	---------	----------------



C Kit for Overhead Contact Lines (profile-free)

Cable length 12 m, removable to one side with additional hook, telescopic earthing rod with cable entry and hook

Kit includes

Pos.	Qty.	Description	Part No.
3	1	Telescopic earthing rod without adjusting ring (max. 5 m long)	769 508
7	1	Earth clamp for contact wires	784 755
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
13	1	Earthing and short-circuiting cable (50 mm², 12 m long)	751 120

*) Type 8a is available on request

BEV OL PF V2 K	3 Ebgw 01.51	237 115	750 214
----------------	--------------	---------	----------------

RAILWAYS

EARTHING DEVICES

Earthing Devices for Railways

Kits for Overhead Contact Lines

Type	DB Drawing No.	DB Material No.	Part No.
------	-------------------	--------------------	-------------

D Kit for Overhead Contact Lines for Transport in Motor Vehicles (not profile-free)

For technical emergency service and emergency management

Cable length 8.5 m, 6-part earthing rod kit

Kit includes

Pos.	Qty.	Description	Part No.
4	1	6-part modular earthing rod (incl. canvas bag, Part No. 769 509)	769 506
7	2	Earth clamp for contact wires	784 755
8	2	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
12	2	Earthing and short-circuiting cable (50 mm ² , 8.5 m long)	751 085
16	1	Canvas bag	785 111

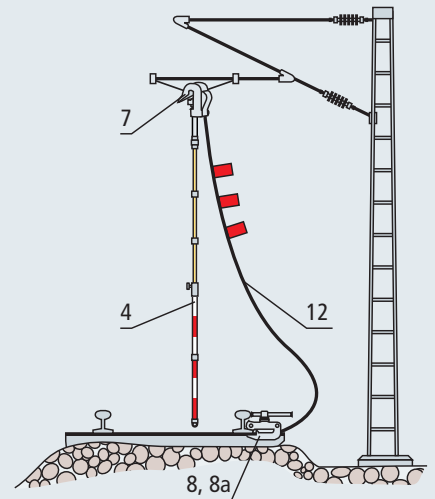
*) Type 8a is available on request

BEV OL NPF PKW K

3 Ebgw 01.67

237 125

750 196



E Kit for Overhead Contact Lines for Transport in Motor Vehicles (profile-free)

For technical emergency service and emergency management

Cable length 12 m, removable to one side with additional hook,
6-part earthing rod kit

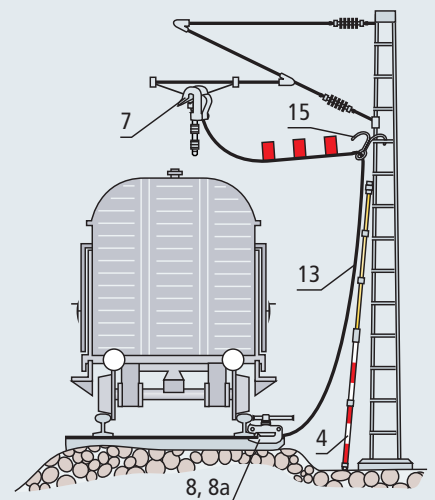
Kit includes

Pos.	Qty.	Description	Part No.
4	2	6-part modular earthing rod kit (incl. canvas bag, Part No. 769 509)	769 506
7	2	Earth clamp for contact wires	784 755
8	2	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
13	2	Earthing and short-circuiting cable (50 mm ² , 12 m long)	751 120
15	2	Hook	740 124
16	1	Canvas bag	785 111

*) Type 8a is available on request

BEV OL PF PKW K

750 200



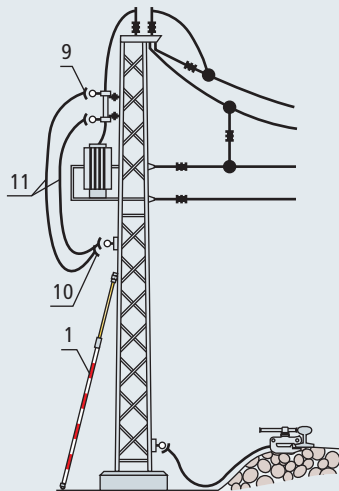
Profile-free earthing means that the earthing cable can be attached to the tower thus allowing for limited diesel locomotive operation.

Earthing Devices for Railways

Kits for earthing Towers

RAILWAYS

EARTHING DEVICES



Type	DB Drawing No.	DB Material No.	Part No.
------	-------------------	--------------------	-------------

A Kit for Transformers at Overhead Line Towers

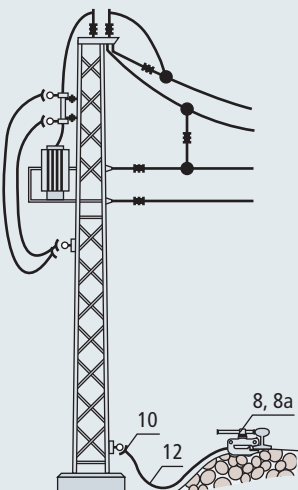
For earthing at fuse carriers

Cable length 4 m, telescopic earthing rod with adjusting ring

Kit includes

Pos.	Qty.	Description	Part No.
1	1	Telescopic earthing rod with adjusting ring (max. 3.5 m long)	769 352
9	2	Universal clamp, T pin shaft	773 251
10	2	Universal clamp, with insulated handle	774 251
11	2	Earthing and short-circuiting cable (50 mm ² , 4 m long)	751 040

BEV US OL ST	3 Ebgw 01.57	237 121	750 212
--------------	--------------	---------	----------------



B Kit for Earthing Towers next to Rails

For earthing the supply line

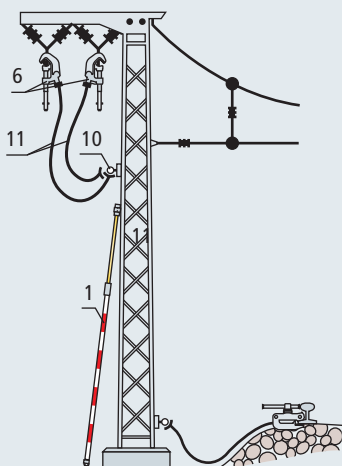
Cable length 8.5 m, telescopic earthing rod with adjusting ring

Kit includes

Pos.	Qty.	Description	Part No.
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
10	1	Universal clamp, with insulated handle	774 251
12	1	Earthing and short-circuiting cable (50 mm ² , 8.5 m long)	751 085

*) Type 8a is available on request

BEV MF SE K	3 Ebgw 01.56		751 191
-------------	--------------	--	----------------



C Kit for Supply Lines, Line Feeders, Bypass Lines and other Types of Lines

For earthing the supply line and traction current lines

Cable length 4 m, telescopic earthing rod with adjusting ring

Kit includes

Pos.	Qty.	Description	Part No.
1	1	Telescopic earthing rod with adjusting ring (max. 3.5 m long)	769 352
6	1	Conductor clamp	784 352
10	1	Universal clamp, with insulated handle	774 251
11	1	Earthing and short-circuiting cable (50 mm ² , 4 m long)	751 040

BEV SVUL	3 Ebgw 01.57	237 119	750 213
----------	--------------	---------	----------------

RAILWAYS

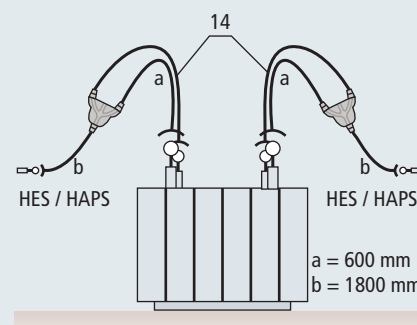
Earthing Device for Railways

EARTHING DEVICES

For heating systems of railway points and trains

Type	DB		Part
	Drawing No.	Material No.	No.
A Kit for Heating Systems of Railway Points and Trains			
For supply of a transformer used for electrical heating systems for railway points and electrical preheating systems for trains			
Kit includes			
Pos.	Qty.	Description	Part No.
5	1	Single-part earthing rod	761 015
14	2	Two-pole earthing and short-circuiting device 50 mm ² , with ball head caps Ø25 mm	751 150
17	1	Storage device	700 000
BEV WHA ZVA		3 Ebgw 01.70	742 402
			750 215

For voltage detectors for electrical heating systems of railway points, see PHE voltage detectors

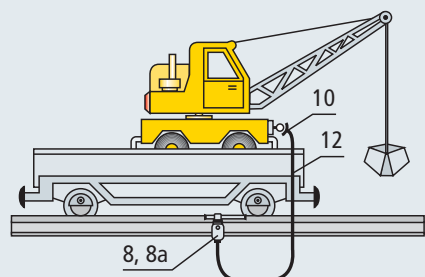


Earthing Devices for Railways

Kits for construction machines, cranes, maintenance vehicles

RAILWAYS

EARTHING DEVICES



Type	DB Drawing No.	DB Material No.	Part No.
------	-------------------	--------------------	-------------

A Kit for Earthing next to Rails

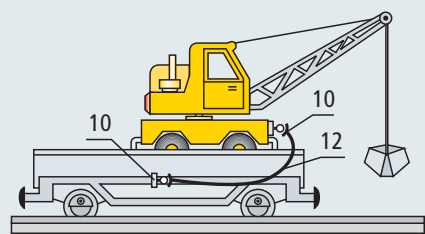
Equipment on maintenance vehicles, earthed rails,
earthing at rails with earth clamp for rails

Kit includes

Pos.	Qty.	Description	Part No.
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
10	1	Universal clamp, with insulated handle	774 251
12	1	Earthing and short-circuiting cable (50 mm ² , 8.5 m long)	751 085

*) Type 8a is available on request

BEV MF SE K	3 Ebgw 01.56	751 191
-------------	--------------	----------------



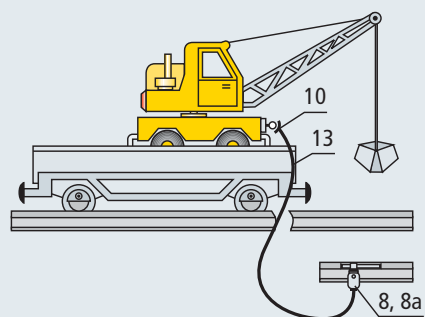
B Kit for Earthing at Dedicated Busbars

Equipment on maintenance vehicles, earthed rails,
earthing at dedicated busbars with universal clamps

Kit includes

Pos.	Qty.	Description	Part No.
10	2	Universal clamp, with insulated handle	774 251
12	1	Earthing and short-circuiting cable (50 mm ² , 8.5 m long)	751 085

BEV MF LTE	3 Ebgw 01.56	751 192
------------	--------------	----------------



C Kit for Earthing at Adjacent Tracks

Equipment on maintenance vehicles, unearthed rail (construction site)¹,
Earthing at adjacent tracks with earth clamp for rails

Kit includes

Pos.	Qty.	Description	Part No.
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
10	1	Universal clamp, with insulated handle	774 251
13	1	Earthing and short-circuiting cable (50 mm ² , 12 m long)	751 120

*) Type 8a is available on request

¹ For single-track lines, non-existing adjacent tracks are replaced by an earthing cable.
Instead of Pos. 8 or 8a, Pos. 10 has to be used.

BEV BM HZ BDW K	3 Ebgw 01.56	237 120	751 193
-----------------	--------------	---------	----------------

RAILWAYS

EARTHING DEVICES

Earthing Devices for Railways

Kits for construction machines,
cranes, maintenance vehicles

Type	DB Drawing No.	DB Material No.	Part No.
------	-------------------	--------------------	-------------

D Kit for Earthing at Adjacent Tracks

Equipment or vehicles on or close to rails,
unearthed rails (construction site)¹, cranes running on rails,
Earthing at adjacent tracks with earthing clamp for rails

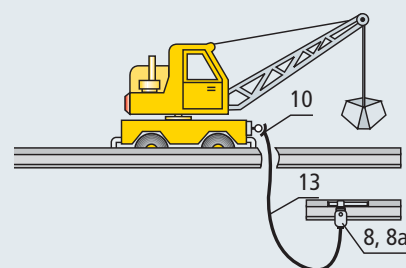
Kit includes

Pos.	Qty.	Description	Part No.
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
10	1	Universal clamp, with insulated handle	774 251
13	1	Earthing and short-circuiting cable (50 mm ² , 12 m long)	751 120

*) Type 8a is available on request

¹ For single-track lines, non-existing adjacent tracks are replaced by an earthing cable.
Instead of Pos. 8 or 8a, Pos. 10 has to be used.

BEV BM HZ BDW K	3 Ebgw 01.56	237 120	751 193
-----------------	--------------	---------	----------------

**E Kit for Earthing at Adjacent Tracks**

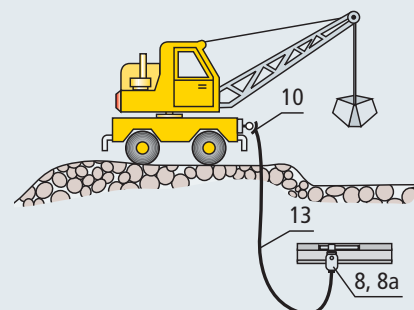
Off-track vehicle,
Earthing at adjacent tracks with earth clamp for rails

Kit includes

Pos.	Qty.	Description	Part No.
8	1	Earth clamp for rails (tommy bar)	792 450
8a*)	–	Earth clamp for rails (ratchet)	792 453
10	1	Universal clamp, with insulated handle	774 251
13	1	Earthing and short-circuiting cable (50 mm ² , 12 m long)	751 120

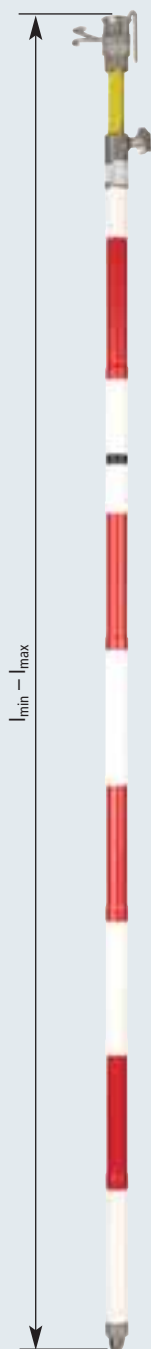
*) Type 8a is available on request

BEV BM HZ BDW K	3 Ebgw 01.56	237 120	751 193
-----------------	--------------	---------	----------------



Single Parts of Earthing Devices for Railways

RAILWAYS EARTHING DEVICES



1/2



3

Telescopic Earthing Rod

(Pos. 1 and 2)

For threaded T pin shafts (bayonet locking mechanism)

	Total length	Maximum load on	DB	DB	Part
Type	$l_{G \max} / l_{G \min}$	operating head l_{\max} / l_{\min}	Drawing No.	Material No.	No.
ESTC SQL RW 3500	3500/1920 mm	12/35 kg	3 Ebgw 01.58	157 534	769 352
ESTC SQL RW 5000	5000/2670 mm	10/35 kg	3 Ebgw 01.52	157 533	769 502

Telescopic Earthing Rod with Cable Entry and Hook

(Pos. 3)

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 rod at the tower (no adjusting ring)

	Total length	Maximum load on	DB	DB	Part
Type	$l_{G \max} / l_{G \min}$	operating head l_{\max} / l_{\min}	Drawing No.	Material No.	No.
ESTC SQL H RW 5000	5000/2670 mm	10/35 kg	3 Ebgw 01.55	612 142	769 508



Lockable adjusting ring

The adjusting ring on the cone has the following functions:

- Position "AUF" (= OPEN):
Rod can be removed from the clamp after connecting the earthing and short-circuiting device
- Position "ZU" (= CLOSED):
Rod and clamp remain coupled even after connecting the earthing and short-circuiting device

RAILWAYS

Single Parts of Earthing Devices for Railways

EARTHING DEVICES

6-part Earthing Rod Kit (for Transport in Motor Vehicles)

(Pos. 4)

For threaded T pin shafts (bayonet locking mechanism)

Kit includes

Pos.	Qty.	Type	Description	Part No.
4a	1	ES SQL STK 43 1045	Operating head earthing rod, SQL, l = 1045 mm	766 074
4b	2	HV STK 43 1045	Extension handle, l = 1045 mm	766 076
4c	1	HV STK RW 43 1045	Extension handle, red and white, l = 1045 mm	766 078
4d	1	HV STK RW 43 975	Extension handle, red and white, l = 975 mm	766 079
4e	1	AR STK	Sealing unit with eye STK	766 889
4f	1	STT 110 15	Canvas bag, empty	769 509

Type	Total length $l_{G \max} / l_{G \min}$	Maximum load on operating head I_{\max} / I_{\min}	DB Drawing No.	DB Material No.	Part No.
EST SQL RW 4915 TA	4915/5x1045 mm	10/35 kg	3 Ebgw 01.68	157 489	769 506 new

6-part Earthing Rod Kit (for Transport in Motor Vehicles)

For threaded T pin shafts (bayonet locking mechanism)

Without canvas bag

Kit includes

Pos.	Qty.	Type	Description	Part No.
4a	1	ES SQL STK 43 1045	Operating head earthing rod, SQL, l = 1045 mm	766 074
4b	2	HV STK 43 1045	Extension handle, l = 1045 mm	766 076
4c	1	HV STK RW 43 1045	Extension handle, red and white, l = 1045 mm	766 078
4d	1	HV STK RW 43 975	Extension handle, red and white, l = 975 mm	766 079
4e	1	AR STK	Sealing unit with eye STK	766 889

Type	Total length $l_{G \max} / l_{G \min}$	Maximum load on operating head I_{\max} / I_{\min}	DB Drawing No.	DB Material No.	Part No.
EST SQL RW 4915	4915/5x1045 mm	10/35 kg	3 Ebgw 01.68	157 484	769 510 new

Canvas Bag, empty

(for Pos. 4)

For 6-part earthing rod for transport in motor vehicle, with shoulder strap

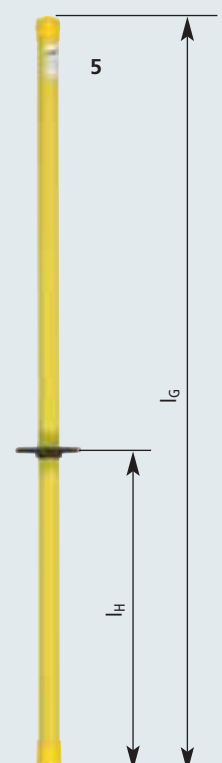
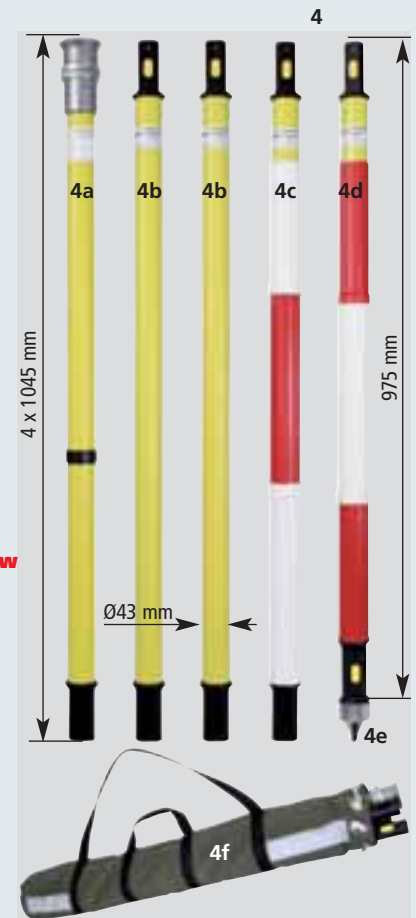
Type	Colour	Dimensions	DB Drawing No.	Part No.
STT 110 15		Ø150 x 1100 mm	3 Ebgw 01.67	769 509

Earthing Rod, Hexagon Shaft

(Pos. 5)

Spring locking mechanism

Type	Total length l_G	Handle length l_H	Max load on operating head	DB Drawing No.	DB Material No.	Part No.
ES SK 1500	1500 mm	930 mm	35 kg	3 Ebgw 01.70	742 401	761 015



Single Parts of Earthing Devices for Railways

RAILWAYS EARTHING DEVICES



Conductor Clamp

(Pos. 6)

With prod and threaded T pin shaft according to DIN 48087
For supply and traction current lines

Type	Clamping range	DB Drawing No.	DB Material No.	Part No.
LK 4 40 TS SQ	Ø4 - 40 mm	3 Ebgw 01.65	157 539	784 352

Earth Clamp for Contact Wires

(Pos. 7)

With prod and flexible threaded T pin shaft according to DIN 48087
For contact wires AC 80 to AC 120

Type	Clamping range	DB Drawing No.	DB Material No.	Part No.
FEK 4 15 TS FSQ	Ø4 - 15 mm	3 Ebgw 01.54	157 536	784 755



Earth Clamp for Rails

(Pos. 8)

With detachable tommy bar (locking spring)
For profile-free earthing of rail profiles S49, S54, S64 and UIC60

Type	DB Drawing No.	DB Material No.	Part No.
SAK PFE KN	3 Ebgw 01.53	157 535	792 450

Earth Clamp for Rails

(Pos. 8a)

With detachable ratchet
For profile-free earthing of rail profiles S49, S54, S64 and UIC60

Type	DB Drawing No.	DB Material No.	Part No.
SAK PFE RA	3 Ebgw 01.53	157 549	792 453



Universal Clamp, T Pin Shaft

(Pos. 9)

T pin according to DIN 48087
For flat and round conductors up to 30 mm and fixed ball points, ball Ø25 mm

Type	DB Drawing No.	DB Material No.	Part No.
UK K25 FL30 SQ	4 Ebgw 01.59	157 538	773 251



Universal Clamp, with insulated Handle

(Pos. 10)

For flat and round conductors up to 30 mm and fixed ball points, ball Ø25 mm

Type	DB Drawing No.	DB Material No.	Part No.
UK K25 FL30 HG	4 Ebgw 01.64	157 537	774 251

RAILWAYS

Single Parts of Earthing Devices for Railways

EARTHING DEVICES

Single-pole Earthing and Short-circuiting Cable

(Pos. 11-13)

Without fittings, with red and white marking and hole in terminal lug, Ø10.5 mm, type PK2 without cut-out at the cable lug

Type	Cable cross section	Cable length	DB Drawing No.	DB Material No.	Part No.
EKS 50 BEV 4M	50 mm ²	4000 mm	3 Ebgw 01.57	157 511	751 040
EKS 50 BEV 8.5M	50 mm ²	8500 mm	3 Ebgw 01.51	157 512	751 085
EKS 50 BEV 12M	50 mm ²	12000 mm	3 Ebgw 01.51	157 513	751 120
EKS 50 BEV 13M	50 mm ²	13000 mm	—	—	751 130
EKS 50 BEV 14M	50 mm ²	14000 mm	—	—	751 140

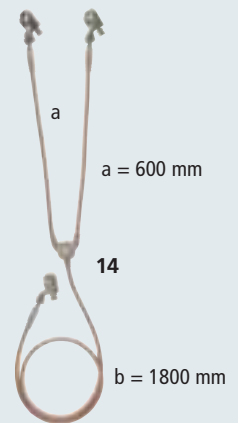


Two-pole Earthing and Short-circuiting Device

(Pos. 14)

Fitted with 3 ball head caps, Ø25 mm, hexagon shaft

	Cable cross section	Cable length	DB Drawing No.	DB Material No.	Part No.
	50 mm ²	600/1800 mm	3 Ebgw 01.70	742 400	751 150

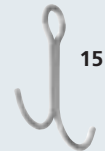


Hook

(Pos. 15)

For (profile-free) securing of earthing cables at towers

Type	DB Drawing No.	Part No.
EHH BEV OL	3 Ebgw 01.51	740 124



Canvas Bag, empty

(Pos. 16)

With two separate internal pockets and shoulder strap
For intake hose, cover, safety helmet with face shield, working gloves or two earthing and short-circuiting devices (kit for transport in motor vehicles)

Type	Colour	Dimensions	DB Drawing No.	Part No.
STT 55 27 30	●	550 x 270 x 300 mm	3 Ebgw 01.67	785 111



Storage Device

(Pos. 17)

For earthing and short-circuiting devices and earthing rods of any length
Hole distance 424 mm, holes Ø7 mm

Type	For rod Ø	Material	DB Drawing No.	DB Material No.	Part No.
HV EKV ES30	30 mm	steel	3 Ebgw 01.70	742 395	700 000



Fixed Ball Points

RAILWAYS

EARTHING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)
DIN 48088 Part 1

- M12 or M16 threaded pin available in different lengths
- With or without hexagon nut and flat washer
- Suitable for fixing cable lugs or busbar connection according to DIN 43673 Part 1



Universal clamp mounted on a fixed ball point at a steel tower.

Technical Data

Fixed point	E-Cu/gal Sn
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



Type	Fixed ball point Ø	Dimensions	DB Drawing No.	DB Material No.	Part No.
------	--------------------	------------	----------------	-----------------	----------

A Fixed Ball Point, straight, Ball Ø25 mm

With threaded pin, hexagon nut and flat washer

KFP 25 M16 25 SKM	25 mm	M16 x 26 mm	3 Ebgw 01.63	157 541	755 626
KFP 25 M12 35 SKM	25 mm	M12 x 35 mm	3 Ebgw 01.63	622 014	755 627
KFP 25 M16 45 SKM	25 mm	M16 x 46 mm	3 Ebgw 01.63	157 542	755 646



B Fixed Ball Point, Straight, Ball Ø25 mm

Without threaded pin, hexagon nut and flat washer

KFP 25 M16 25	25 mm	M16 x 26 mm	3 Ebgw 01.63	157 542	755 636
---------------	-------	-------------	--------------	---------	----------------

RAILWAYS

Earth Connecting Plate with Terminal Lug

EARTHING DEVICES

EN/IEC 61230 (DIN VDE 0683 Part 100)
DIN 48088 Part 1



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 points Ø25 mm
- For connecting single-pole earthing and short-circuiting devices to transformers of overhead line towers or to fuse holders

Technical Data

Earth connecting plate	Cu / gal Sn
Terminal lug	4 mm: Cu / gal Sn; 6 mm: St / tZn
Fixed point	E-Cu/gal Sn
Threaded pin	StSt A2-70

Type	Fixed ball point Ø	Dimensions	DB Drawing No.	DB Material No.	Part No.
------	--------------------	------------	----------------	-----------------	----------

A Earth Connecting Plate

With adjustable ball head cap, Ø25 mm and insulated handle
For combination of 2 single-pole earthing and short-circuiting devices and connection to a fixed ball point Ø25 mm.

EAP 2 25 KKH HG	25 mm	170x110x4 mm	3 Ebgw 01.66	157 540	728 501
-----------------	-------	--------------	--------------	---------	----------------

B Terminal Lug

With 2 holes
With fixed ball point for the connection to fuse holders (Part No. 728 503)
or
with two fixed ball points for the connection to towers (Part No. 728 502)

EAP 25 SIT US OL	25 mm	155x30x4 mm	4 Ebgw 01.61	157 545	728 503
EAP 2 25 MA US OL	25 mm	140x40x6 mm	3 Ebgw 01.61	157 548	728 502



Insulating Rod Kit for Cleaning the Windows of Electric Locomotives

RAILWAYS

Nominal voltages up to 7.5 kV / d.c. and 25 kV / a.c.

FURTHER EQUIPMENT

Wet test based on EN/IEC 61243-1 (DIN VDE 0682 Part 411)

- For use in wet weather
- Insulating rod kit for cleaning the windows of electric locomotives
- Protection against accidental contact with live parts (e.g. overhead contact lines)
- Inclination angle of the operating head can be adjusted



Insulating rod kit used for cleaning the windows of an electric locomotive.

Note:

In accordance with EN/IEC 61243-1 (DIN VDE 0682 Part 411) insulating rods type IS 25 ZK 2885 and adapter type AD ZK 25 200 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 may not exceed the maximum permissible conductivity of 1000 µS / cm.

Live parts of installations must not be cleaned using water and cleaning agents due to the danger of bridging.

Technical Data

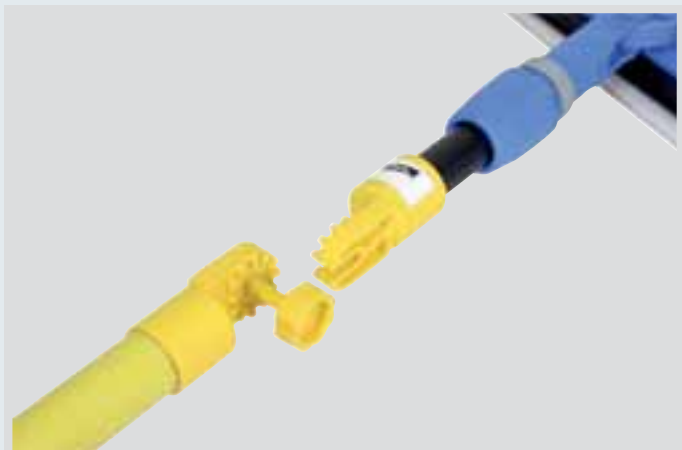
Insulating tube	Glass-fibre reinforced polyester tube, Ø30 mm, yellow, single-part, with a handguard for safe operation and with waterproof silicone elastomer shields; foamed insulating part
Sealing unit	Non-slip plastic cap



Adapter with gear coupling for attaching the cleaning head.



The hook-and-loop fastener allows fast replacement of the cleaning pad.



The universal gear coupling allows for adjusting the required operating angle from 0° to 90° in steps of 30°.

RAILWAYS Insulating Rod Kit for Cleaning the Windows of Electric Locomotives

FURTHER EQUIPMENT

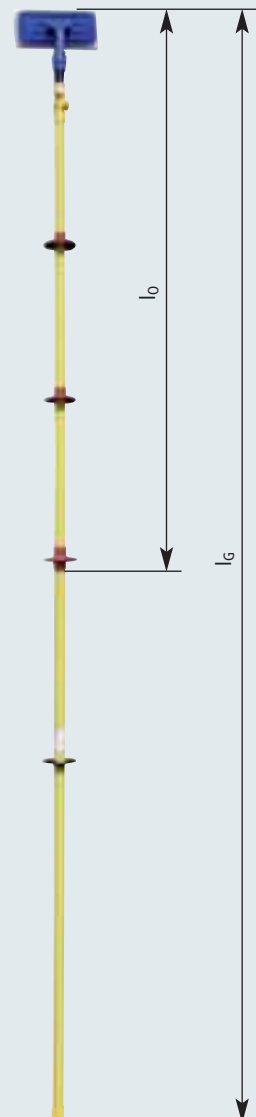


Type	Nominal voltage/ frequency U_N / f_N	Total length l_G	Insertion depth l_0	Part No.
------	---	-----------------------	--------------------------	-------------

A Insulating Rod Kit for Cleaning the Windows of Electric Locomotives

Pos.	Qty.	Type	Description	Part No.
1	1	IS 25 ZK 2885	Insulating rod with handle	766 048
2	1	AD ZK 25 200	Adapter	766 055
3	1	RK 230 100 AS25	Cleaning head	766 056
4	1	RP 250 115 20	Cleaning pad	766 057

IS 25 ZK RK 315	up to 7.5 kV / d.c. up to 25 kV / a.c.	3160 mm	1630 mm	766 340 new
-----------------	---	---------	---------	--------------------



Single Parts for Insulating Rod Kit for Cleaning the Windows of Electric Locomotives

Insulating Rod with Gear Coupling

Single-part unit, with foamed insulating part

Type	Diameter	Dimensions	Position	Part No.
IS 25 ZK 2885	30 mm	2890 mm	1	766 048 new

Adapter

With gear coupling and cone-shaped support

Type	Diameter	Dimensions	Position	Part No.
AD ZK 25 200	25 mm	200 mm	2	766 055 new

Cleaning Head

Flexibly adjustable, for the attachment of cleaning pads

Type	Diameter	Dimensions	Position	Part No.
RK 230 100 AS25	25 mm	230 x 100 mm	3	766 056 new

Rectangular Cleaning Pad

Type	Dimensions	PU	Position	Part No.
RP 250 115 20	250 x 115 x 20 mm	1 pc(s).	4	766 057 new



SDS

Voltage Limiting Device

RAILWAYS

FURTHER EQUIPMENT

- 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
- Discharging of surges without formation of short circuits due to lightning-resistant SDS ... voltage limiting device
- Short-circuit withstand capability
25 kA_{rms} / 100 ms; 36 kA_{rms} / 75 ms



SDS ...: Cylindrical SDS spark gap unit for insertion into rail adapter Siemens No. 8WL6503-xx

SDS ... NH00: SDS Spark gap unit for insertion into NH fuse holders, size 00

DIN EN 50122-1 describes the use of voltage limiting devices for d.c. and a.c. railways for so-called "open earthing of railways" for live 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 electrical railways and earthed parts of the installation, voltage limiting devices (SDS ...) are used.

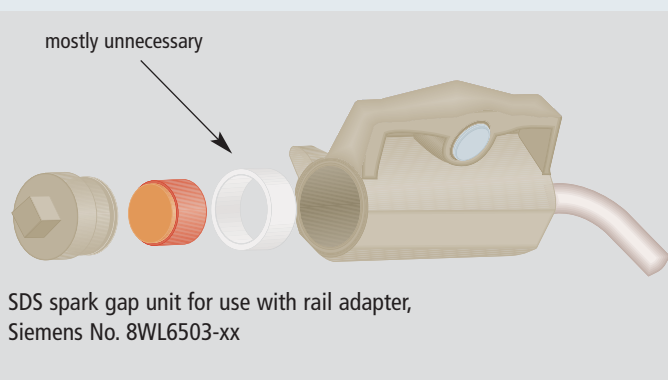
Their function is to connect parts of the installation in overhead contact lines and current collectors permanently to the return circuit, as soon as the threshold voltage is exceeded.

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 loads are 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 type SDS 1, Part No. 923 110, developed by DEHN + SÖHNE, has also been approved by the German Federal Railway Authority (EBA).

Type SDS ... NH 00 is designed for installation into NH00 fuse holders or insulators. In connection with DEHNisola leakage current detecting device, the user can locate a short-circuited spark gap unit quickly and easily.



SDS spark gap unit for use with rail adapter, Siemens No. 8WL6503-xx



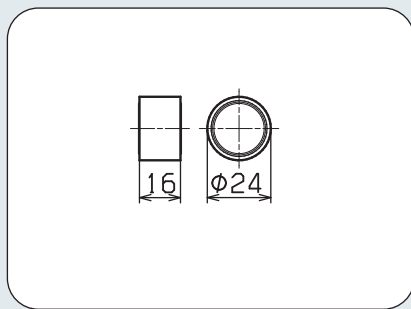
SDS 2 NH00 installed into a mains connection box with DEHNisola combined condition monitoring device

RAILWAYS

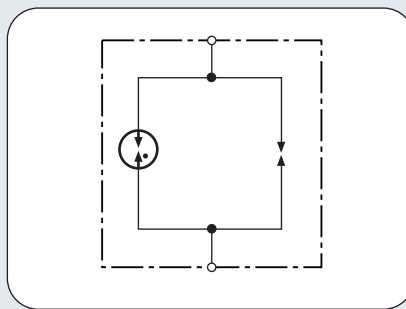
FURTHER EQUIPMENT

SDS

SDS ...



Dimension drawing SDS ...



Basic circuit diagramm SDS ...



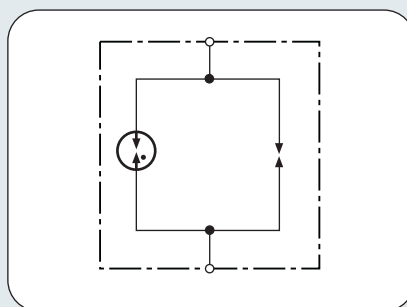
	SDS 1	SDS 2	SDS 3	SDS 4	SDS 5
Power frequency sparkover voltage U_{aw}	≤ 940 V	—	—	—	—
d.c. sparkover voltage U_{ag}	600 V +/- 20 %	350 V +/- 20 %	550 V	230 V +/- 20 %	120 V +/- 20 %
Impulse sparkover voltage	≤ 1400 V (1 kV/ μ s)	≤ 900 V (1 kV/ μ s)	≤ 1000 V (1 kV/ μ s)	≤ 650 V (1 kV/ μ s)	≤ 600 V (1 kV/ μ s)
Self-extinguishing capability	300 A / 65 V	—	—	—	—
Lightning current discharge capacity (10/350 μ s) 0.1x / 0.5x / 1x	5 kA	2 kA	2.5 kA	2,5 kA	2 kA
Lightning current withstand capability (10/350 μ s)	25 kA	25 kA	25 kA	25 kA	25 kA
Impulse current discharge capacity (8/20 μ s) 0.1x / 0.5x / 1x	—	—	—	20 kA	20 kA
Safe short circuit due to welding of the electrodes for a.c. currents @ 100 ms	≥ 1.5 kA / 1000 V / 100 ms	—	—	—	—
Safe short circuit due to welding of the electrodes for a.c. currents @ 30 ms	≥ 2.5 kA / 1000 V / 30 ms	—	—	—	—
Safe short circuit due to welding of the electrodes for d.c. 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 μ A for 100 V d.c.	< 1 μ A for 100 V d.c.	—	< 1 μ A for 100 V d.c.	< 1 μ A for 100 V d.c.
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	allows for installation into voltage breakdown protector/rail adapter SIEMENS No. 8WL6503-xx				
Tightening torque of the fuse link in the busbar adapter	15 Nm	15 Nm	15 Nm	15 Nm	15 Nm
Approvals, Certifications	EBA	—	—	—	—
DB Drawing No.	4 Ebs 15.13.20 Sheet 2	—	—	—	—

Ordering information					
Type	SDS 1	SDS 2	SDS 3	SDS 4	SDS 5
Part No.	923 110	923 117	923 116	923 118	923 119
Packing unit	10 pc(s).	10 pc(s).	10 pc(s).	10 pc(s).	10 pc(s).

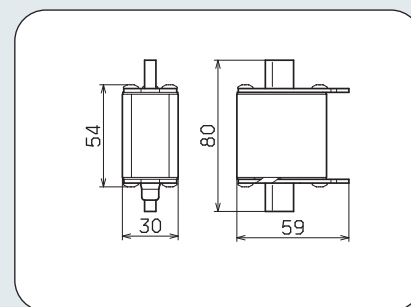
SDS RAILWAYS

SDS ... in NH 00 enclosure

FURTHER EQUIPMENT



Basic circuit diagram SDS ... NH00



Dimension drawing SDS ... NH00

	SDS 1 NH00	SDS 2 NH00	SDS 3 NH00	SDS 4 NH00	SDS 5 NH00
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/ μ s)	≤ 900 V (1 kV/ μ s)	≤ 1000 V (1 kV/ μ s)	≤ 650 V (1 kV/ μ s)	≤ 600 V (1 kV/ μ s)
Self-extinguishing capability	300 A / 65 V	—	—	—	—
Lightning current discharge capacity (10/350 μ s) 0.1x / 0.5x / 1x	5 kA	2 kA	2.5 kA	2.5 kA	2 kA
Lightning current withstand capability (10/350 μ s)	25 kA	25 kA	25 kA	25 kA	25 kA
Impulse current discharge capacity (8/20 μ s) 0.1x / 0.5x / 1x	—	—	—	20 kA	20 kA
Safe short circuit due to welding of the electrodes for d.c. currents	≥ 750 A / 250 ms	≥ 600 A / 250 ms	≥ 600 A / 250 ms	≥ 600 A / 250 ms	≥ 600 A / 250 ms
Short circuit withstand capability	10 kA / 50 ms	10 kA / 50 ms	10 kA / 50 ms	10 kA / 50 ms	10 kA / 50 ms
Long-term current	1 kA _{rms} for t \leq 120 s	1 kA _{rms} for t \leq 120 s	1 kA _{rms} for t \leq 120 s	1 kA _{rms} for t \leq 120 s	1 kA _{rms} for t \leq 120 s
Leakage current I_{lc}	< 1 μ A for 100 V d.c.	< 1 μ A for 100 V d.c.	< 1 μ A for 100 V d.c.	< 1 μ A for 100 V d.c.	< 1 μ A for 100 V d.c.
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	NH fuse holder, size 00				
Enclosure material	red thermoplastic, UL 94 V-0				
Min. degree of protection for enclosure	IP 54	IP 54	IP 54	IP 54	IP 54
Ordering information					
Type	SDS 1 NH00	SDS 2 NH00	SDS 3 NH00	SDS 4 NH00	SDS 5 NH00
Part No.	923 124	923 123	923 125	923 126	923 127
Packing unit	1 pc(s).	1 pc(s).	1 pc(s).	1 pc(s).	1 pc(s).

Tests on our Safety Equipment

Our safety equipment tried and tested allows for safe working in electrical systems. It complies with the state-of-the-art technology as well as with the national regulations for the prevention of accidents (UVV) and exceeds the requirements of international and national standards.

The high quality and reliability of our safety equipment is ensured by a number of process inspections.

The following pictures show type tests on our safety equipment.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Fig. 1: Test for visibility
PHG II Voltage Detector
(High-voltage test field, DEHN + SÖHNE,
Neumarkt/Germany)

Fig. 2: Testing the discharge current of PHE
Voltage Detector under wet conditions
(High-voltage test facility, DEHN + SÖHNE,
Neumarkt/Germany)

Fig. 3: Test for resistance against interference
fields of PHE III Voltage Detector
(High-voltage test facility, DEHN + SÖHNE,
Neumarkt/Germany)

Fig. 4: Test for protection against bridging of
PHV Phase Comparator
(High-voltage test facility, DEHN + SÖHNE,
Neumarkt/Germany)

Fig. 5: 3-pole earthing and short-circuiting
device for fixed ball points
– before testing
(IPH, Berlin/Germany)

Fig. 6: 3-pole earthing and short-circuiting
device for fixed ball points
– after successful test
(IPH, Berlin/Germany)

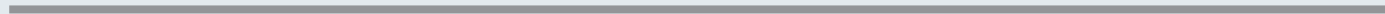
Fig. 7: Insulation test of
PHG II Voltage Detector
(High-voltage test facility, DEHN + SÖHNE,
Neumarkt/Germany)

Fig. 8: Test for protection against bridging
TRS MS Dry Cleaning Kit
(High-voltage test facility, DEHN + SÖHNE,
Neumarkt/Germany)

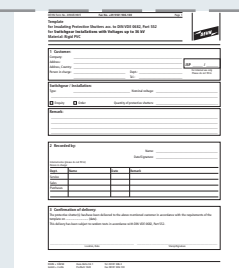
Fig. 9: Test for protection against bridging
FRS MS Damp Cleaning Kit
(High-voltage test facility, DEHN + SÖHNE,
Neumarkt/Germany)



Fig. 9



Index/Document	Contents	Page
Index of Part No.	Part No. Instruction for use No. Weight Packing unit Quantity per unit Page	236
Type / Product Index	Type Product Part No. Page	245
Legal Notes		251
General Terms of Sale		252
Template for Insulating Protective Shutters	DEHN Form No. 2090	253
Key Words		256



Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
336 020	—	0.12	1 ST	100	711 061	1011	4.90	1 ST	116	712 064	1011	5.04	1 ST	117
336 025	—	0.25	1 ST	100	711 064	1011	4.90	1 ST	117	712 065	1011	5.20	1 ST	117
					711 065	1011	4.90	1 ST	117	712 068	1011	5.10	1 ST	116
524 912	—	0.01	1 ST	140	711 068	1011	4.81	1 ST	116	712 069	1011	5.10	1 ST	117
524 913	—	0.01	1 ST	140	711 069	1011	4.81	1 ST	117	712 073	—	4.88	1 ST	118
					711 317	1011	6.85	1 ST	104	712 075	—	5.14	1 ST	118
525 001	—	0.02	10 ST	140	711 325	1011	4.75	1 ST	116	712 076	—	5.27	1 ST	118
525 002	—	0.04	10 ST	140	711 331	1011	4.75	1 ST	117	712 107	1011	5.40	1 ST	121
525 912	—	0.01	1 ST	140	711 350	1011	6.82	1 ST	104	712 123	1011	5.40	1 ST	120
525 916	—	0.01	1 ST	140	711 351	1011	6.82	1 ST	105	712 125	1011	5.38	1 ST	120
					711 353	1011	7.10	1 ST	106	712 127	1011	5.38	1 ST	121
561 925	—	0.04	1 ST	140	711 354	1011	7.10	1 ST	107	712 135	1011	5.52	1 ST	120
561 930	—	0.04	1 ST	140	711 356	1011	7.07	1 ST	104	712 139	1011	5.52	1 ST	121
561 931	—	0.08	1 ST	140	711 357	1011	7.12	1 ST	104	712 171	—	4.94	1 ST	119
561 935	—	0.04	1 ST	140	711 358	1011	7.25	1 ST	104	712 172	—	4.92	1 ST	119
					711 359	1011	7.22	1 ST	104	712 173	—	5.04	1 ST	119
644 000	—	4.45	1 ST	133	711 360	1011	7.10	1 ST	104	712 317	1011	7.75	1 ST	104
					711 362	1011	6.82	1 ST	104	712 325	1011	5.00	1 ST	116
700 000	—	1.16	1 ST	141	711 363	1011	6.85	1 ST	104	712 331	1011	5.00	1 ST	117
700 002	—	1.15	1 ST	141	711 365	1011	6.85	1 ST	105	712 350	1011	7.72	1 ST	104
700 003	—	0.70	1 ST	141	711 366	1011	7.07	1 ST	105	712 351	1011	7.72	1 ST	105
700 004	—	1.00	1 ST	83	711 367	1011	7.12	1 ST	105	712 356	1011	8.20	1 ST	104
700 005	—	0.71	1 ST	83	711 368	1011	7.25	1 ST	105	712 357	1011	8.30	1 ST	104
700 006	—	0.78	1 ST	34	711 369	1011	7.22	1 ST	105	712 358	1011	8.13	1 ST	104
700 007	—	0.78	1 ST	21	711 370	1011	7.10	1 ST	105	712 359	1011	8.20	1 ST	104
700 008	—	0.80	1 ST	29	711 372	1011	6.82	1 ST	105	712 360	1011	8.00	1 ST	104
700 011	—	3.60	1 ST	157	711 373	1011	6.85	1 ST	105	712 362	1011	7.72	1 ST	104
700 014	—	1.71	1 ST	83	711 375	1011	7.10	1 ST	106	712 363	1011	7.72	1 ST	104
700 015	—	1.41	1 ST	83	711 376	1011	7.40	1 ST	106	712 365	1011	7.75	1 ST	105
					711 377	1011	7.50	1 ST	106	712 366	1011	7.32	1 ST	105
705 500	—	0.12	1 ST	100	711 378	1011	7.50	1 ST	106	712 367	1011	7.37	1 ST	105
705 501	—	0.15	1 ST	100	711 379	1011	7.50	1 ST	106	712 368	1011	8.13	1 ST	105
705 504	—	0.18	1 ST	100	711 380	1011	7.40	1 ST	106	712 369	1011	7.35	1 ST	105
705 510	—	0.24	1 ST	100	711 382	1011	7.10	1 ST	106	712 370	1011	7.35	1 ST	105
					711 383	1011	7.10	1 ST	106	712 372	1011	7.72	1 ST	105
706 200	1018	0.17	1 ST	97	711 385	1011	7.20	1 ST	107	712 373	1011	7.72	1 ST	105
706 235	1018	0.22	1 ST	97	711 386	1011	7.50	1 ST	107	712 374	1011	8.10	1 ST	106
706 300	1018	0.13	1 ST	96	711 387	1011	7.60	1 ST	107	712 375	1011	8.10	1 ST	106
706 600	1018	0.16	1 ST	97	711 388	1011	7.60	1 ST	107	712 376	1011	8.60	1 ST	106
706 645	1018	0.27	1 ST	97	711 389	1011	7.60	1 ST	107	712 378	1011	8.50	1 ST	106
					711 390	1011	7.50	1 ST	107	712 379	1011	8.70	1 ST	106
707 200	1018	0.20	1 ST	97	711 392	1011	7.20	1 ST	107	712 380	1011	8.50	1 ST	106
707 235	1018	0.26	1 ST	97	711 393	1011	7.20	1 ST	107	712 382	1011	8.10	1 ST	106
707 600	1018	0.19	1 ST	97						712 383	1011	8.10	1 ST	106
707 645	1018	0.30	1 ST	97						712 384	1011	8.10	1 ST	107
										712 385	1011	8.20	1 ST	107
711 025	—	4.75	1 ST	114	712 001	—	1.23	1 M	123	712 386	1011	8.70	1 ST	107
711 031	1011	4.75	1 ST	115	712 025	1011	5.00	1 ST	114	712 388	1011	8.60	1 ST	107
711 044	1011	4.81	1 ST	114	712 031	1011	5.00	1 ST	115	712 389	1011	8.80	1 ST	107
711 045	1011	4.90	1 ST	114	712 044	1011	5.10	1 ST	114	712 390	1011	8.60	1 ST	107
711 046	1011	4.90	1 ST	114	712 045	1011	5.04	1 ST	114	712 392	1011	8.20	1 ST	107
711 049	1011	4.90	1 ST	115	712 046	1011	5.20	1 ST	114	712 393	1011	8.20	1 ST	107
711 050	1011	4.90	1 ST	115	712 049	1011	5.04	1 ST	115	712 604	1011	4.63	1 ST	123
711 053	1011	4.81	1 ST	115	712 050	1011	5.20	1 ST	115	712 802	1011	8.13	1 ST	110
711 060	1011	4.90	1 ST	116	712 053	1011	5.10	1 ST	115	712 803	1011	8.37	1 ST	110
					712 060	1011	5.04	1 ST	116					
					712 061	1011	5.20	1 ST	116					

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
712 804	1011	7.83	1 ST	110	715 378	1011	9.10	1 ST	106	725 106	1011	2.00	1 ST	118
712 806	1011	8.50	1 ST	110	715 379	1011	9.20	1 ST	106	725 107	1011	2.73	1 ST	121
712 807	1011	8.25	1 ST	110	715 380	1011	9.00	1 ST	106	725 108	1011	2.23	1 ST	119
712 811	1011	8.20	1 ST	111	715 382	1011	8.65	1 ST	106	725 110	1011	2.34	1 ST	119
712 812	1011	8.40	1 ST	111	715 383	1011	8.70	1 ST	106	725 112	1011	2.93	1 ST	119
712 813	1011	7.85	1 ST	111	715 384	1011	8.75	1 ST	107	725 113	1011	2.33	1 ST	119
712 815	1011	8.60	1 ST	111	715 385	1011	8.75	1 ST	107	725 114	1011	2.47	1 ST	119
712 816	1011	8.30	1 ST	111	715 386	1011	9.25	1 ST	107	725 115	1011	4.78	1 ST	110
712 841	—	7.30	1 ST	108	715 388	1011	9.15	1 ST	107	725 117	1011	4.86	1 ST	111
712 842	—	7.41	1 ST	108	715 389	1011	9.30	1 ST	107	725 123	1011	2.70	1 ST	120
712 843	—	7.03	1 ST	108	715 390	1011	9.10	1 ST	107	725 125	1011	2.56	1 ST	120
712 845	—	7.51	1 ST	108	715 392	1011	8.75	1 ST	107	725 127	1011	2.59	1 ST	121
712 846	—	7.39	1 ST	108	715 393	1011	8.80	1 ST	107	725 132	1011	2.33	1 ST	120
712 861	—	5.60	1 ST	109	715 604	1011	5.80	1 ST	123	725 134	1011	3.03	1 ST	120
712 862	—	7.49	1 ST	109	715 950	1011	9.10	1 ST	106	725 135	1011	2.42	1 ST	120
712 863	—	7.11	1 ST	109	715 951	1011	9.35	1 ST	107	725 136	1011	2.36	1 ST	121
712 865	—	7.26	1 ST	109						725 138	1011	3.06	1 ST	121
712 866	—	7.47	1 ST	109	716 001	—	0.18	1 M	123	725 139	1011	2.46	1 ST	121
712 950	1011	8.70	1 ST	106						725 317	1011	3.26	1 ST	104
712 951	1011	8.80	1 ST	107	720 010	1018	0.31	1 ST	98	725 325	1011	2.00	1 ST	116
					720 012	1018	0.35	1 ST	98	725 331	1011	2.00	1 ST	117
715 001	—	1.52	1 M	123	720 014	1018	0.33	1 ST	98	725 357	1011	3.60	1 ST	104
715 025	—	6.00	1 ST	114	720 016	1018	0.31	1 ST	98	725 358	1011	3.66	1 ST	104
715 031	—	6.00	1 ST	115	720 018	1018	0.30	1 ST	98	725 359	1011	3.67	1 ST	104
715 044	1011	6.10	1 ST	114	720 020	1018	0.28	1 ST	98	725 360	1011	3.58	1 ST	104
715 046	1011	5.92	1 ST	114						725 362	1011	3.21	1 ST	104
715 050	1011	5.95	1 ST	115	725 001	—	0.21	1 M	123	725 363	1011	3.27	1 ST	104
715 053	—	6.15	1 ST	115	725 010	1018	0.41	1 ST	98	725 365	1011	3.30	1 ST	105
715 061	1011	6.05	1 ST	116	725 012	1018	0.40	1 ST	98	725 367	1011	3.62	1 ST	105
715 065	1011	6.10	1 ST	117	725 014	1018	0.39	1 ST	98	725 368	1011	3.70	1 ST	105
715 068	1011	6.25	1 ST	116	725 016	1018	0.37	1 ST	98	725 369	1011	3.70	1 ST	105
715 069	1011	6.30	1 ST	117	725 018	1018	0.35	1 ST	98	725 370	1011	3.60	1 ST	105
715 317	1011	8.25	1 ST	104	725 020	1018	0.32	1 ST	98	725 372	1011	3.24	1 ST	105
715 325	1011	6.15	1 ST	116	725 025	1011	1.92	1 ST	114	725 373	1011	3.30	1 ST	105
715 331	1011	6.15	1 ST	117	725 031	1011	1.93	1 ST	115	725 375	1011	3.52	1 ST	106
715 350	1011	8.25	1 ST	104	725 044	1011	2.03	1 ST	114	725 377	1011	3.85	1 ST	106
715 351	1011	8.30	1 ST	105	725 045	1011	1.90	1 ST	114	725 378	1011	3.93	1 ST	106
715 356	1011	8.75	1 ST	104	725 046	1011	2.10	1 ST	114	725 379	1011	3.93	1 ST	106
715 357	1011	8.85	1 ST	104	725 048	1011	2.00	1 ST	114	725 380	1011	3.83	1 ST	106
715 358	1011	8.70	1 ST	104	725 049	1011	2.11	1 ST	115	725 382	1011	3.48	1 ST	106
715 359	1011	8.80	1 ST	104	725 050	1011	2.11	1 ST	115	725 383	1011	3.54	1 ST	106
715 360	1011	8.60	1 ST	104	725 052	1011	1.80	1 ST	115	725 385	1011	3.55	1 ST	107
715 362	1011	8.20	1 ST	104	725 053	1011	2.05	1 ST	115	725 387	1011	3.88	1 ST	107
715 363	1011	8.30	1 ST	104	725 060	1011	2.20	1 ST	116	725 388	1011	3.95	1 ST	107
715 365	1011	8.30	1 ST	105	725 061	1011	2.19	1 ST	116	725 389	1011	3.95	1 ST	107
715 366	1011	8.80	1 ST	105	725 063	1011	2.10	1 ST	116	725 390	1011	3.85	1 ST	107
715 367	1011	8.90	1 ST	105	725 064	1011	2.20	1 ST	117	725 392	1011	3.50	1 ST	107
715 368	1011	8.70	1 ST	105	725 065	1011	2.20	1 ST	117	725 393	1011	3.56	1 ST	107
715 369	1011	8.85	1 ST	105	725 067	1011	2.10	1 ST	117	725 604	1011	1.58	1 ST	123
715 370	1011	8.60	1 ST	105	725 068	1011	2.12	1 ST	116	725 618	1011	3.25	1 ST	104
715 372	1011	8.30	1 ST	105	725 069	1011	2.13	1 ST	117	725 619	1011	3.47	1 ST	104
715 373	1011	8.31	1 ST	105	725 101	1011	2.20	1 ST	118	725 620	1011	3.28	1 ST	105
715 374	1011	8.70	1 ST	106	725 103	1011	2.30	1 ST	118	725 621	1011	3.50	1 ST	105
715 375	1011	8.45	1 ST	106	725 104	1011	2.90	1 ST	118	725 718	1011	3.53	1 ST	106
715 376	1011	9.15	1 ST	106	725 105	1011	2.30	1 ST	118	725 719	1011	3.74	1 ST	106

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
725 720	1011	3.54	1 ST	107	735 104	1011	3.26	1 ST	118	735 718	1011	4.00	1 ST	106
725 721	1011	3.76	1 ST	107	735 105	1011	2.67	1 ST	118	735 719	1011	4.24	1 ST	106
725 802	1011	4.55	1 ST	110	735 106	1011	2.80	1 ST	118	735 720	1011	4.03	1 ST	107
725 804	1011	4.24	1 ST	110	735 107	1011	3.08	1 ST	121	735 721	1011	4.26	1 ST	107
725 806	1011	4.91	1 ST	110	735 108	—	2.60	1 ST	119	735 802	1011	5.04	1 ST	110
725 807	1011	4.65	1 ST	110	735 110	1011	2.70	1 ST	119	735 804	1011	4.73	1 ST	110
725 811	1011	4.63	1 ST	111	735 112	1011	3.29	1 ST	119	735 806	1011	5.41	1 ST	110
725 813	1011	4.32	1 ST	111	735 113	1011	2.70	1 ST	119	735 807	1011	5.15	1 ST	110
725 815	1011	5.00	1 ST	111	735 114	1011	2.83	1 ST	119	735 811	1011	5.12	1 ST	111
725 816	1011	4.75	1 ST	111	735 115	1011	5.27	1 ST	110	735 813	1011	4.82	1 ST	111
725 821	1011	4.16	1 ST	108	735 117	1011	5.36	1 ST	111	735 815	1011	5.50	1 ST	111
725 822	1011	4.27	1 ST	108	735 123	1011	3.05	1 ST	120	735 816	1011	5.23	1 ST	111
725 823	1011	3.85	1 ST	108	735 125	1011	2.92	1 ST	120	735 821	1011	4.66	1 ST	108
725 825	1011	4.40	1 ST	108	735 127	1011	2.95	1 ST	121	735 822	1011	4.76	1 ST	108
725 826	1011	4.27	1 ST	108	735 132	1011	2.69	1 ST	120	735 823	1011	4.35	1 ST	108
725 831	1011	4.25	1 ST	109	735 134	1011	3.38	1 ST	120	735 825	1011	4.90	1 ST	108
725 832	1011	4.35	1 ST	109	735 135	1011	2.80	1 ST	120	735 826	1011	4.76	1 ST	108
725 833	1011	3.95	1 ST	109	735 136	1011	2.72	1 ST	121	735 831	—	4.75	1 ST	109
725 835	1011	4.50	1 ST	109	735 138	1011	3.42	1 ST	121	735 832	1011	4.85	1 ST	109
725 836	1011	4.35	1 ST	109	735 139	1011	2.82	1 ST	121	735 833	1011	4.43	1 ST	109
728 300	—	1.21	1 ST	101	735 317	1011	3.75	1 ST	104	735 835	1011	4.98	1 ST	109
728 500	—	1.82	1 ST	101	735 325	1011	2.31	1 ST	116	735 836	1011	4.75	1 ST	109
728 501	—	1.57	1 ST	227	735 331	1011	2.37	1 ST	117	740 124	—	0.01	1 ST	225
728 502	—	0.71	1 ST	227	735 357	1011	4.10	1 ST	104	740 300	1011	0.70	1 ST	151
728 503	—	0.45	1 ST	227	735 358	1011	4.16	1 ST	104	740 800	1011	1.25	1 ST	151
728 520	—	1.55	1 ST	101	735 359	1011	4.05	1 ST	104	742 225	1011	3.49	1 ST	151
731 011	—	0.62	1 ST	102	735 360	1011	4.06	1 ST	104	742 425	1011	3.78	1 ST	151
731 013	—	0.85	1 ST	102	735 362	1011	3.70	1 ST	104	743 225	1011	5.86	1 ST	154
731 015	—	1.00	1 ST	102	735 363	1011	3.77	1 ST	104	743 235	1011	6.07	1 ST	154
731 027	—	1.97	1 ST	102	735 365	1011	3.80	1 ST	105	743 250	1011	6.57	1 ST	154
731 037	—	2.66	1 ST	102	735 367	1011	4.12	1 ST	105	743 325	1011	5.61	1 ST	154
735 001	—	0.37	1 M	123	735 368	1011	4.19	1 ST	105	743 335	1011	5.54	1 ST	154
735 025	1011	2.25	1 ST	114	735 369	1011	4.20	1 ST	105	745 016	—	0.47	1 ST	149
735 031	1011	2.29	1 ST	115	735 370	1011	4.10	1 ST	105	745 017	—	0.28	1 ST	149
735 044	1011	2.34	1 ST	114	735 372	1011	3.74	1 ST	105	745 018	—	0.27	1 ST	149
735 045	1011	2.47	1 ST	114	735 373	1011	3.80	1 ST	105	745 105	—	1.83	1 ST	152
735 046	1011	2.47	1 ST	114	735 375	1011	3.93	1 ST	106	745 106	—	0.89	1 ST	153
735 048	1011	2.36	1 ST	114	735 377	1011	4.35	1 ST	106	745 107	—	0.29	1 ST	153
735 049	1011	2.48	1 ST	115	735 378	1011	4.42	1 ST	106	745 108	—	0.02	1 ST	153
735 050	1011	2.48	1 ST	115	735 379	1011	4.43	1 ST	106	745 109	—	0.02	1 ST	153
735 052	1011	2.37	1 ST	115	735 380	1011	4.32	1 ST	106	745 201	—	0.07	1 ST	149
735 053	—	2.40	1 ST	115	735 382	1011	3.97	1 ST	106	745 202	—	0.09	1 ST	149
735 060	1011	2.56	1 ST	116	735 383	1011	4.03	1 ST	106	745 203	—	0.10	1 ST	149
735 061	1011	2.55	1 ST	116	735 385	1011	4.04	1 ST	107	745 204	—	0.15	1 ST	149
735 063	1011	2.45	1 ST	116	735 387	1011	4.38	1 ST	107	745 302	—	0.11	1 ST	149
735 064	1011	2.56	1 ST	117	735 388	1011	4.45	1 ST	107	745 400	—	0.42	1 ST	150
735 065	1011	2.53	1 ST	117	735 389	1011	4.45	1 ST	107	745 401	—	0.14	1 ST	149
735 067	1011	2.45	1 ST	117	735 390	1011	4.35	1 ST	107	745 414	—	0.28	1 ST	155
735 068	1011	2.43	1 ST	116	735 392	1011	4.00	1 ST	107	745 415	—	0.26	1 ST	155
735 069	1011	2.50	1 ST	117	735 393	1011	4.05	1 ST	107	745 426	1034	1.19	1 ST	148
735 101	1011	2.56	1 ST	118	735 604	1011	2.08	1 ST	123	745 436	1034	1.48	1 ST	148
735 103	1011	2.67	1 ST	118	735 618	1011	3.76	1 ST	104					
					735 619	1011	3.97	1 ST	104					
					735 620	1011	3.78	1 ST	105					
					735 621	1011	4.02	1 ST	105					

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
745 451	1034	2.14	1 ST	148	750 123	1011	3.51	1 ST	120	750 500	—	0.25	1 ST	100
745 458	1034	1.24	1 ST	148	750 125	1011	3.37	1 ST	120	750 604	1011	2.21	1 ST	123
745 459	1034	1.15	1 ST	148	750 127	1011	3.37	1 ST	121	750 802	1011	5.27	1 ST	110
745 460	1034	1.43	1 ST	148	750 132	1011	3.13	1 ST	120	750 803	1011	5.50	1 ST	110
745 461	1034	1.80	1 ST	148	750 134	1011	3.72	1 ST	120	750 804	1011	4.96	1 ST	110
745 500	1155	7.57	1 ST	147	750 135	1011	3.25	1 ST	120	750 806	1011	5.63	1 ST	110
745 502	—	0.36	1 ST	150	750 136	1011	3.13	1 ST	121	750 807	1011	5.37	1 ST	110
745 602	—	0.58	1 ST	150	750 138	1011	3.72	1 ST	121	750 811	1011	5.35	1 ST	111
745 816	1034	0.01	1 ST	148	750 139	1011	3.13	1 ST	121	750 812	1011	5.60	1 ST	111
745 817	1034	0.01	1 ST	148	750 196	1011	26.58	1 ST	216	750 813	1011	5.13	1 ST	111
745 900	—	3.71	1 ST	146	750 200	—	29.43	1 ST	216	750 815	1011	5.35	1 ST	111
745 901	1351	6.89	1 ST	144	750 210	1011	13.44	1 ST	216	750 816	1011	5.50	1 ST	111
745 902	—	1.67	1 ST	146	750 211	1011	15.55	1 ST	216	750 821	1011	4.88	1 ST	108
745 903	1351	7.00	1 ST	144	750 212	1011	13.00	1 ST	218	750 822	1011	5.00	1 ST	108
745 905	—	0.08	1 ST	145	750 213	1011	8.76	1 ST	218	750 823	1011	4.57	1 ST	108
745 910	—	0.19	1 ST	145	750 214	1011	15.60	1 ST	216	750 825	1011	5.12	1 ST	108
745 915	—	0.42	1 ST	145	750 215	1011	7.30	1 ST	219	750 826	1011	4.98	1 ST	108
745 921	—	0.22	1 ST	146	750 317	1011	3.97	1 ST	104	750 831	1011	5.00	1 ST	109
745 922	1351	0.22	1 ST	146	750 325	1011	2.85	1 ST	116	750 832	1011	5.10	1 ST	109
745 925	1351	1.85	1 ST	145	750 331	1011	2.85	1 ST	117	750 833	1011	4.65	1 ST	109
745 926	1351	1.80	1 ST	145	750 350	1011	3.97	1 ST	104	750 835	1011	5.20	1 ST	109
745 935	1351	2.85	1 ST	145	750 351	1011	3.91	1 ST	105	750 836	1011	5.10	1 ST	109
745 936	1351	2.80	1 ST	145	750 353	1011	4.23	1 ST	106					
745 940	1358	0.01	1 ST	145	750 354	1011	4.40	1 ST	107	751 040	—	2.60	1 ST	225
					750 356	1011	4.20	1 ST	104	751 085	1011	4.98	1 ST	225
750 001	—	0.54	1 M	123	750 357	1011	4.30	1 ST	104	751 120	1011	6.86	1 ST	225
750 025	1011	2.77	1 ST	114	750 358	1011	4.38	1 ST	104	751 130	—	7.39	1 ST	225
750 031	1011	2.77	1 ST	115	750 359	1011	4.40	1 ST	104	751 140	—	7.93	1 ST	225
750 044	1011	2.83	1 ST	114	750 360	1011	4.30	1 ST	104	751 150	1011	4.80	1 ST	225
750 045	1011	3.05	1 ST	114	750 362	1011	3.93	1 ST	104	751 191	1011	8.41	1 ST	218
750 046	1011	2.92	1 ST	114	750 363	1011	4.00	1 ST	104	751 192	1011	6.43	1 ST	220
750 048	1011	2.80	1 ST	114	750 365	1011	3.91	1 ST	105	751 193	1011	10.48	1 ST	220
750 049	1011	3.05	1 ST	115	750 366	1011	4.22	1 ST	105					
750 050	1011	2.92	1 ST	115	750 367	1011	4.35	1 ST	105	754 200	1018	0.13	1 ST	96
750 052	1011	2.80	1 ST	115	750 368	1011	4.41	1 ST	105	754 235	1018	0.18	1 ST	96
750 053	1011	2.83	1 ST	115	750 369	1011	4.45	1 ST	105	754 600	1018	0.12	1 ST	96
750 060	1011	3.00	1 ST	116	750 370	1011	4.31	1 ST	105	754 645	1018	0.29	1 ST	96
750 061	1011	2.50	1 ST	116	750 372	1011	4.00	1 ST	105					
750 063	1011	2.88	1 ST	116	750 373	1011	4.02	1 ST	105	755 200	1018	0.22	1 ST	96
750 064	1011	3.00	1 ST	117	750 375	1011	4.25	1 ST	106	755 225	1018	0.27	1 ST	96
750 065	1011	3.00	1 ST	117	750 376	1011	4.45	1 ST	106	755 245	1018	0.28	1 ST	96
750 067	1011	2.88	1 ST	117	750 377	1011	4.58	1 ST	106	755 501	—	0.30	1 ST	100
750 068	1011	2.92	1 ST	116	750 378	1011	4.65	1 ST	106	755 600	1018	0.20	1 ST	96
750 069	1011	2.92	1 ST	117	750 379	1011	4.65	1 ST	106	755 626	1018	0.30	1 ST	226
750 101	1011	3.00	1 ST	118	750 380	1011	4.55	1 ST	106	755 627	—	0.31	1 ST	226
750 103	1011	3.30	1 ST	118	750 382	1011	4.20	1 ST	106	755 636	—	0.31	1 ST	226
750 104	1011	3.59	1 ST	118	750 383	1011	4.25	1 ST	106	755 645	1018	0.32	1 ST	96
750 105	1011	3.11	1 ST	118	750 385	1011	4.30	1 ST	107	755 646	1018	0.33	1 ST	226
750 106	—	3.24	1 ST	118	750 386	1011	4.50	1 ST	107					
750 107	1011	3.51	1 ST	121	750 387	1011	4.60	1 ST	107	756 200	1018	0.36	1 ST	97
750 108	1011	3.00	1 ST	119	750 388	1011	4.70	1 ST	107	756 245	1018	0.43	1 ST	97
750 110	1011	3.12	1 ST	119	750 389	1011	4.70	1 ST	107	756 300	1018	0.21	1 ST	96
750 112	1011	3.59	1 ST	119	750 390	1011	4.60	1 ST	107	756 600	1018	0.36	1 ST	97
750 113	1011	3.11	1 ST	119	750 392	1011	4.30	1 ST	107	756 645	1018	0.47	1 ST	97
750 114	1011	3.24	1 ST	119	750 393	1011	4.30	1 ST	107					

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
757 200	1018	0.40	1 ST	97	765 005	—	0.12	1 ST	80	766 543	—	0.15	1 ST	156
757 245	1018	0.45	1 ST	97	765 009	—	0.15	1 ST	80	766 545	1507	0.40	1 ST	156
757 600	1018	0.37	1 ST	97	765 040	1435	2.13	1 ST	83	766 601	—	0.32	1 ST	33
757 645	1018	0.49	1 ST	97	765 041	1435	2.28	1 ST	83	766 602	—	1.31	1 ST	207
					765 042	1435	2.59	1 ST	83	766 603	—	6.00	1 ST	33
758 001	1152	2.22	1 ST	159	765 050	1435	2.15	1 ST	83	766 605	—	0.01	1 ST	45
758 003	1152	1.95	1 ST	159	765 051	1435	2.29	1 ST	83	766 612	—	0.02	1 ST	45
758 015	1152	2.62	1 ST	159	765 052	1435	2.59	1 ST	83	766 613	—	0.02	1 ST	45
758 020	1152	1.34	1 ST	159						766 614	—	0.60	1 ST	41
758 021	1152	1.10	1 ST	159	766 001	1119	0.42	1 ST	79	766 616	1138	—	1 ST	207
758 022	1152	0.70	1 ST	159	766 002	1119	0.81	1 ST	79	766 617	1234	—	1 ST	207
					766 011	—	0.01	1 ST	28	766 703	—	5.03	1 ST	33
759 003	—	6.20	1 ST	52	766 015	—	0.01	1 ST	28	766 704	—	0.72	1 ST	41
759 111	1455	0.20	1 ST	49	766 036	—	0.97	1 ST	21	766 706	1075	0.80	1 ST	34
759 121	1455	0.15	1 ST	49	766 037	1494	5.20	1 ST	19	766 710	1075	1.70	1 ST	34
759 300	1455	1.00	1 ST	48	766 038	—	0.28	1 ST	19	766 720	1075	1.70	1 ST	34
759 603	1455	0.21	1 ST	49	766 039	—	0.71	1 ST	19	766 888	—	0.01	1 ST	20
759 604	1455	0.35	1 ST	49	766 040	—	0.82	1 ST	84	766 889	—	0.01	1 ST	20
759 605	1455	0.34	1 ST	49	766 041	—	1.00	1 ST	84	766 913	—	0.04	1 ST	42
759 606	1450	1.63	1 ST	50	766 042	—	1.12	1 ST	84	766 915	—	0.22	1 ST	42
759 608	1455	0.30	1 ST	49	766 048	—	0.01	1 ST	229	766 916	—	0.13	1 ST	43
759 610	1455	0.41	1 ST	49	766 049	—	0.17	1 ST	19	766 923	—	0.08	1 ST	24
759 611	1455	0.35	1 ST	49	766 055	—	0.01	1 ST	229	766 924	—	0.05	1 ST	28
759 612	1450	1.80	1 ST	50	766 056	—	0.01	1 SA	229	766 925	—	0.01	1 ST	42
759 615	1455	0.40	1 ST	49	766 057	—	0.01	1 ST	229	766 927	—	0.02	1 ST	24
759 616	1450	1.90	1 ST	50	766 069	—	1.80	1 ST	77	766 940	—	0.15	1 ST	43
759 620	1455	0.34	1 ST	49	766 100	—	—	1 ST	79	766 941	—	0.15	1 ST	43
759 621	1455	0.37	1 ST	49	766 105	—	0.01	1 ST	45	766 950	—	0.34	1 ST	43
759 622	1455	0.43	1 ST	49	766 164	—	0.01	1 ST	76	766 960	—	0.31	1 ST	43
759 624	1450	1.80	1 ST	50	766 298	—	3.70	1 ST	150	766 960	—	0.31	1 ST	24
759 630	1455	0.34	1 ST	49	766 300	—	1.20	1 ST	150	766 997	—	2.39	1 ST	33
759 633	1455	0.44	1 ST	49	766 301	—	—	1 ST	79	766 998	—	3.36	1 ST	29
759 998	—	3.32	1 ST	52	766 302	1034	4.38	1 ST	147	766 999	—	3.32	1 ST	33
759 999	—	2.38	1 ST	52	766 311	1120	0.42	1 ST	79					
					766 313	—	0.42	1 ST	20	767 101	1240	0.06	1 ST	60
761 001	—	—	1 ST	135	766 315	1120	0.82	1 ST	79	767 102	1240	0.06	1 ST	60
761 002	—	—	1 ST	135	766 323	—	—	1 ST	75	767 106	—	0.38	1 ST	63
761 010	—	0.90	1 ST	135	766 325	—	—	1 ST	75	767 107	—	0.89	1 ST	61
761 011	—	0.42	1 ST	135	766 331	—	0.01	1 ST	20	767 110	1239	0.12	1 PA	61
761 015	—	0.55	1 ST	135	766 335	—	0.40	1 ST	20	767 111	1259	0.19	1 ST	62
761 016	—	0.65	1 ST	135	766 340	—	—	1 ST	229	767 112	1259	0.15	1 ST	62
					766 356	—	0.01	1 ST	77	767 121	1281	0.15	1 ST	64
763 100	—	—	1 ST	81	766 363	—	0.01	1 ST	76	767 122	1281	0.19	1 ST	64
763 150	—	—	1 ST	81	766 365	—	0.01	1 ST	76	767 132	1260	0.64	1 ST	66
763 211	1082	—	1 ST	88	766 366	—	0.01	1 ST	77	767 133	1283	0.09	1 ST	68
763 221	1082	—	1 ST	88	766 368	—	0.01	1 ST	19	767 135	1323	0.09	1 ST	68
763 231	1082	—	1 ST	88	766 369	—	0.01	1 ST	19	767 136	1337	0.07	1 ST	68
763 241	1082	—	1 ST	88	766 450	—	—	1 ST	75	767 403	1428	1.30	1 ST	31
763 610	1013	0.96	1 ST	81	766 452	—	—	1 ST	75	767 406	1428	1.30	1 ST	31
763 611	1013	0.61	1 ST	81	766 456	—	0.01	1 ST	77	767 410	1428	2.46	1 ST	31
763 612	1013	0.79	1 ST	81	766 463	—	0.01	1 ST	76	767 415	1365	2.66	1 ST	209
763 615	1013	1.42	1 ST	81	766 465	—	0.01	1 ST	76	767 416	1365	2.62	1 ST	209
763 620	1013	1.03	1 ST	81	766 466	—	0.01	1 ST	77	767 418	1428	1.22	1 ST	31
					766 541	1507	0.40	1 ST	156	767 420	1428	2.66	1 ST	31
765 001	—	0.19	1 ST	135	766 542	—	0.07	1 ST	156	767 428	1428	1.40	1 ST	31

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
767 430	1428	2.64	1 ST	31	767 782	—	—	1 ST	27	770 114	1011	3.83	1 ST	119
767 433	1428	2.65	1 ST	31	767 783	—	—	1 ST	27	770 123	1011	4.11	1 ST	120
767 438	1428	1.26	1 ST	31	767 812	—	—	1 ST	59	770 125	1011	3.97	1 ST	120
767 500	—	0.24	1 ST	66	767 815	1352	0.99	1 ST	58	770 127	1011	3.97	1 ST	121
767 531	—	0.55	1 ST	211	767 816	1352	0.14	1 ST	58	770 134	1011	4.32	1 ST	120
767 542	—	0.70	1 PA	211	767 822	—	—	1 ST	59	770 135	1011	3.85	1 ST	120
767 552	1243	1.98	1 ST	39	767 824	—	—	1 ST	59	770 138	1011	4.32	1 ST	121
767 559	—	0.25	1 ST	39	767 825	1352	0.99	1 ST	58	770 139	1011	3.85	1 ST	121
767 570	—	0.01	1 ST	37	767 826	1352	0.14	1 ST	58	770 317	1011	4.63	1 ST	104
767 571	—	—	1 ST	36	767 838	—	—	1 ST	59	770 325	1011	3.34	1 ST	116
767 572	—	—	1 ST	36	767 844	—	—	1 ST	59	770 331	1011	3.34	1 ST	117
767 573	—	—	1 ST	36	767 868	—	—	1 ST	59	770 350	1011	4.63	1 ST	104
767 574	—	0.01	1 ST	37	767 921	1451	1.65	1 ST	17	770 351	1011	4.63	1 ST	105
767 576	—	0.01	1 ST	37	767 922	1451	2.15	1 ST	17	770 353	1011	4.87	1 ST	106
767 577	—	0.01	1 ST	37	767 931	1451	0.96	1 ST	17	770 354	1011	4.91	1 ST	107
767 600	1121	4.50	1 ST	41	767 932	1451	0.59	1 ST	17	770 356	1011	4.89	1 ST	104
767 601	1121	2.20	1 ST	41	767 996	—	2.30	1 ST	21	770 357	1011	4.89	1 ST	104
767 602	1479	2.10	1 ST	41	767 997	—	2.42	1 ST	21	770 358	1011	5.03	1 ST	104
767 701	—	5.70	1 ST	21	767 999	—	3.40	1 ST	21	770 359	1011	4.99	1 ST	104
767 703	1252	0.80	1 ST	15						770 360	1011	4.90	1 ST	104
767 706	1252	0.80	1 ST	15	769 300	1011	2.68	1 ST	137	770 362	1011	4.63	1 ST	104
767 710	1252	0.80	1 ST	15	769 352	—	4.80	1 ST	222	770 363	1011	4.63	1 ST	104
767 711	1252	0.97	1 ST	15	769 500	1011	4.68	1 ST	137	770 365	1011	4.63	1 ST	105
767 712	—	0.04	1 ST	45	769 502	1011	6.12	1 ST	222	770 366	1011	4.89	1 ST	105
767 713	—	0.04	1 ST	45	769 503	—	1.64	1 ST	139	770 367	1011	4.89	1 ST	105
767 720	1252	0.90	1 ST	15	769 504	—	1.60	1 ST	139	770 368	1011	5.03	1 ST	105
767 721	1252	1.08	1 ST	15	769 505	—	1.46	1 ST	139	770 369	1011	4.99	1 ST	105
767 722	—	0.47	1 ST	24	769 506	—	0.01	1 ST	223	770 370	1011	4.90	1 ST	105
767 723	—	0.40	1 ST	28	769 508	—	4.50	1 ST	222	770 372	1011	4.63	1 ST	105
767 724	—	—	1 ST	23	769 509	—	0.36	1 ST	223	770 373	1011	4.63	1 ST	105
767 725	—	—	1 ST	23	769 510	—	0.01	1 ST	223	770 375	1011	4.87	1 ST	106
767 730	1252	1.13	1 ST	15						770 376	1011	5.15	1 ST	106
767 731	1252	1.18	1 ST	15	770 001	—	0.75	1 M	123	770 377	1011	5.20	1 ST	106
767 732	—	0.42	1 ST	28	770 025	1011	3.28	1 ST	114	770 378	1011	5.28	1 ST	106
767 733	1252	1.18	1 ST	15	770 031	—	3.34	1 ST	115	770 379	1011	5.28	1 ST	106
767 735	—	0.40	1 ST	28	770 044	1011	3.22	1 ST	114	770 380	1011	5.18	1 ST	106
767 740	1252	1.27	1 ST	15	770 045	1011	3.49	1 ST	114	770 382	1011	4.87	1 ST	106
767 750	1252	1.33	1 ST	15	770 046	1011	3.48	1 ST	114	770 383	1011	4.87	1 ST	106
767 760	—	0.18	1 ST	44	770 049	1011	3.49	1 ST	115	770 385	1011	4.91	1 ST	107
767 761	—	0.28	1 ST	44	770 050	1011	3.48	1 ST	115	770 386	1011	5.15	1 ST	107
767 762	—	0.35	1 ST	44	770 053	1011	3.40	1 ST	115	770 387	1011	5.24	1 ST	107
767 763	—	0.44	1 ST	44	770 060	—	3.49	1 ST	116	770 388	1011	5.32	1 ST	107
767 763	—	0.44	1 ST	24	770 061	1011	3.48	1 ST	116	770 389	1011	5.32	1 ST	107
767 764	—	0.51	1 ST	44	770 064	1011	3.49	1 ST	117	770 390	1011	5.22	1 ST	107
767 766	—	0.13	1 ST	24	770 065	1011	3.48	1 ST	117	770 392	1011	4.91	1 ST	107
767 767	—	0.44	1 ST	44	770 068	1011	3.40	1 ST	116	770 393	1011	4.91	1 ST	107
767 768	—	0.45	1 ST	24	770 069	1011	3.40	1 ST	117	770 604	1011	2.96	1 ST	123
767 771	—	0.60	1 ST	28	770 103	1011	3.95	1 ST	118	770 802	1011	5.45	1 ST	110
767 772	—	0.28	1 ST	28	770 104	1011	4.19	1 ST	118	770 803	1011	5.65	1 ST	110
767 776	—	0.06	1 ST	45	770 105	1011	3.70	1 ST	118	770 804	1011	5.20	1 ST	110
767 777	—	0.05	1 ST	45	770 106	1011	3.82	1 ST	118	770 806	1011	5.85	1 ST	110
767 778	—	0.01	1 ST	53	770 107	1011	4.11	1 ST	121	770 807	1011	5.53	1 ST	110
767 779	—	0.01	1 ST	45	770 110	1011	3.70	1 ST	119	770 811	1011	5.49	1 ST	111
767 780	—	—	1 ST	27	770 112	1011	4.19	1 ST	119	770 812	1011	5.69	1 ST	111
767 781	—	—	1 ST	27	770 113	1011	3.70	1 ST	119	770 813	1011	5.25	1 ST	111

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
770 815	1011	5.89	1 ST	111	776 495	1011	5.96	1 ST	123	785 266	1444	0.71	1 ST	190
770 816	1011	5.57	1 ST	111						785 267	—	0.29	1 ST	190
770 821	1011	5.52	1 ST	108	784 032	—	0.95	1 ST	125	785 268	—	0.29	1 ST	190
770 822	1011	5.62	1 ST	108	784 085	—	0.87	1 ST	125	785 269	—	0.29	1 ST	190
770 823	1011	5.21	1 ST	108	784 201	—	0.88	1 ST	125	785 271	—	0.02	1 ST	190
770 825	1011	5.73	1 ST	108	784 301	—	1.70	1 ST	125	785 272	—	0.02	1 ST	190
770 826	1011	5.60	1 ST	108	784 352	—	0.81	1 ST	224	785 273	—	0.27	1 ST	190
770 831	1011	5.55	1 ST	109	784 401	—	1.30	1 ST	125	785 274	—	0.03	1 SA	175
770 832	1011	5.65	1 ST	109	784 480	—	0.60	1 ST	125	785 275	—	0.06	1 SA	175
770 833	1011	5.25	1 ST	109	784 501	—	1.95	1 ST	125	785 279	—	0.07	1 SA	175
770 835	1011	5.75	1 ST	109	784 755	—	1.54	1 ST	224	785 280	—	0.06	1 SA	175
770 836	1011	5.65	1 ST	109						785 281	—	0.02	1 ST	191
					785 100	1224	18.00	1 ST	169	785 282	—	0.01	1 ST	191
772 310	—	0.47	1 ST	127	785 109	—	0.50	1 ST	178	785 283	—	0.01	1 ST	191
772 311	—	0.48	1 ST	127	785 110	—	0.70	1 ST	185	785 284	—	0.01	1 ST	191
772 312	—	0.48	1 ST	130	785 111	—	0.61	1 ST	185	785 295	—	2.50	1 ST	187
772 313	—	0.40	1 ST	130	785 112	1224	17.80	1 ST	169	785 298	—	3.41	1 ST	190
772 314	—	0.45	1 ST	128	785 119	—	0.70	1 ST	185	785 299	—	5.40	1 ST	187
772 320	—	0.79	1 ST	127	785 120	1224	0.70	1 ST	170	785 301	—	6.00	1 ST	170
772 321	—	0.76	1 ST	127	785 121	—	0.11	1 ST	170	785 310	—	12.70	1 ST	184
772 322	—	0.75	1 ST	130	785 122	—	0.22	1 ST	170	785 315	—	0.01	1 ST	174
772 323	—	0.88	1 ST	130	785 123	—	0.43	1 ST	170	785 316	—	0.10	1 ST	174
772 324	—	0.72	1 ST	128	785 130	—	0.13	1 ST	170	785 317	—	0.13	1 ST	174
772 330	—	0.56	1 ST	127	785 131	—	0.16	1 ST	170	785 318	—	0.15	1 ST	174
772 331	—	0.57	1 ST	127	785 132	—	0.15	1 ST	170	785 319	—	0.25	1 ST	174
772 340	—	0.88	1 ST	127	785 140	—	0.34	1 ST	170	785 320	—	0.09	1 ST	174
772 341	—	0.90	1 ST	127	785 150	—	0.32	1 ST	170	785 321	—	0.10	1 ST	174
					785 151	—	0.26	1 ST	181	785 322	—	0.13	1 ST	175
773 034	—	0.63	1 ST	127	785 160	—	0.09	1 ST	170	785 323	—	0.18	1 ST	175
773 130	—	0.80	1 ST	127	785 170	—	0.26	1 ST	170	785 324	—	0.09	1 ST	175
773 234	—	0.66	1 ST	127	785 171	—	0.11	1 ST	171	785 325	—	0.01	1 ST	178
773 236	—	0.71	1 ST	128	785 172	—	0.10	1 ST	171	785 408	—	9.80	1 ST	201
773 251	—	0.90	1 ST	224	785 180	—	0.15	1 ST	171	785 409	—	0.60	1 ST	201
773 330	—	0.83	1 ST	127	785 181	—	0.18	1 ST	183	785 425	—	0.28	1 ST	195
773 331	—	0.79	1 ST	128	785 190	—	0.39	1 ST	171	785 426	—	0.34	1 ST	195
					785 200	—	0.18	1 ST	167	785 427	—	0.30	1 ST	195
774 034	—	0.66	1 ST	129	785 210	—	0.26	1 ST	171	785 428	—	0.01	1 ST	195
774 130	—	0.78	1 ST	129	785 212	—	0.07	1 ST	171	785 429	—	0.34	1 ST	195
774 234	—	0.77	1 ST	129	785 213	—	0.32	1 ST	184	785 436	—	0.34	1 ST	195
774 251	—	0.96	1 ST	224	785 214	—	0.32	1 ST	184	785 437	—	0.34	1 ST	195
774 330	—	0.94	1 ST	129	785 215	—	0.32	1 ST	184	785 438	—	0.34	1 ST	195
774 434	—	0.71	1 ST	129	785 216	—	0.32	1 ST	184	785 455	—	3.60	1 ST	202
774 530	—	0.70	1 ST	129	785 217	—	0.32	1 ST	184	785 456	—	3.60	1 ST	202
					785 218	—	0.32	1 ST	184	785 457	—	36.00	1 ST	202
775 621	—	0.31	1 ST	131	785 219	—	0.32	1 ST	184	785 458	—	0.01	1 ST	202
775 626	—	0.34	1 ST	131	785 220	—	0.08	1 ST	171	785 459	—	58.00	1 ST	202
775 631	—	0.29	1 ST	131	785 221	—	0.20	1 ST	171	785 465	—	41.50	1 ST	202
775 636	—	0.35	1 ST	131	785 223	—	0.29	1 ST	181	785 466	—	3.80	1 ST	202
					785 224	—	0.01	1 SA	183	785 467	—	38.00	1 ST	202
776 412	1011	7.06	1 ST	123	785 229	—	6.00	1 ST	174	785 468	—	1.64	1 ST	202
776 415	1011	8.55	1 ST	123	785 259	—	0.09	1 ST	182	785 471	—	19.50	1 ST	202
776 425	1011	1.48	1 ST	123	785 260	1396	21.50	1 ST	187	785 472	—	1.95	1 ST	202
776 435	1011	2.23	1 ST	123	785 261	—	0.76	1 ST	187	785 490	—	0.24	1 ST	199
776 450	1011	3.10	1 ST	123	785 264	—	2.50	1 ST	187	785 491	—	0.14	1 ST	199
776 470	1011	4.22	1 ST	123	785 265	1444	7.29	1 ST	189	785 492	—	0.14	1 ST	199

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
785 493	—	0.16	1 ST	199	790 150	—	0.45	1 ST	131	794 373	1011	6.10	1 ST	105
785 494	—	0.16	1 ST	199	790 160	—	0.74	1 ST	131	794 375	1011	6.32	1 ST	106
785 495	—	0.29	1 ST	199	790 250	—	0.19	1 ST	99	794 376	1011	6.54	1 ST	106
785 496	—	0.29	1 ST	199	790 251	—	0.25	1 ST	99	794 377	1011	6.65	1 ST	106
785 497	—	0.66	1 ST	199	790 260	—	0.18	1 ST	99	794 378	1011	6.72	1 ST	106
785 502	1261	7.20	1 ST	165	790 261	—	0.28	1 ST	99	794 379	1011	6.73	1 ST	106
785 506	—	5.30	1 ST	165						794 380	1011	6.62	1 ST	106
785 515	—	0.07	1 ST	167	792 030	—	0.61	1 ST	132	794 382	1011	6.27	1 ST	106
785 520	1261	0.24	1 ST	165	792 190	—	1.20	1 ST	132	794 383	1011	6.33	1 ST	106
785 521	—	0.11	1 ST	166	792 450	—	2.95	1 ST	224	794 385	1011	6.35	1 ST	107
785 522	—	0.16	1 ST	166	792 453	—	2.95	1 ST	224	794 386	1011	6.56	1 ST	107
785 523	—	0.21	1 ST	166						794 387	1011	6.68	1 ST	107
785 530	—	0.12	1 ST	166	794 025	1011	4.17	1 ST	114	794 388	1011	6.75	1 ST	107
785 540	—	0.10	1 ST	166	794 031	1011	4.62	1 ST	115	794 389	1011	6.75	1 ST	107
785 541	—	0.04	1 ST	166	794 044	1011	4.29	1 ST	114	794 390	1011	6.65	1 ST	107
785 542	—	0.04	1 ST	166	794 045	1011	4.36	1 ST	114	794 392	1011	6.30	1 ST	107
785 543	—	0.04	1 ST	166	794 046	1011	4.35	1 ST	114	794 393	1011	6.36	1 ST	107
785 550	—	0.10	1 ST	167	794 048	1011	4.75	1 ST	114					
785 551	—	0.03	1 ST	181	794 049	1011	4.31	1 ST	115	795 001	—	1.00	1 M	123
785 552	—	0.05	1 ST	182	794 050	1011	4.36	1 ST	115	795 025	1011	4.69	1 ST	114
785 555	—	0.10	1 ST	167	794 052	1011	4.75	1 ST	115	795 031	1011	4.70	1 ST	115
785 560	—	0.05	1 ST	166	794 053	1011	4.30	1 ST	115	795 038	1011	4.70	1 ST	113
785 570	—	0.05	1 ST	167	794 060	1011	4.45	1 ST	116	795 039	1011	5.80	1 ST	113
785 580	—	0.05	1 ST	167	794 061	1011	4.45	1 ST	116	795 040	—	0.89	1 ST	113
785 585	—	0.02	1 ST	167	794 064	1011	4.46	1 ST	117	795 041	1011	4.70	1 ST	113
785 590	—	0.05	1 ST	166	794 065	1011	4.45	1 ST	117	795 042	1011	3.20	1 ST	113
785 591	—	0.05	1 ST	166	794 068	1011	4.38	1 ST	116	795 043	1011	3.50	1 ST	113
785 592	—	0.05	1 ST	185	794 069	1011	4.38	1 ST	117	795 044	1011	4.81	1 ST	114
785 595	—	0.02	1 SA	167	794 125	1011	4.80	1 ST	120	795 045	1011	5.80	1 ST	113
785 596	—	0.02	1 SA	167	794 127	1011	4.84	1 ST	121	795 046	1011	4.62	1 ST	114
785 637	—	0.01	1 ST	204	794 134	1011	5.28	1 ST	120	795 048	1011	3.20	1 ST	113
785 638	—	0.01	1 ST	204	794 135	1011	4.68	1 ST	120	795 049	1011	3.50	1 ST	113
785 639	—	0.02	1 ST	204	794 138	1011	5.30	1 ST	121	795 050	1011	4.64	1 ST	115
785 640	—	0.06	1 ST	204	794 139	1011	4.71	1 ST	121	795 053	1011	4.83	1 ST	115
785 641	—	0.06	1 ST	204	794 317	1011	6.10	1 ST	104	795 060	1011	4.89	1 ST	116
785 642	—	0.08	1 ST	204	794 325	1011	4.25	1 ST	116	795 061	1011	4.76	1 ST	116
785 643	—	0.08	1 ST	204	794 331	1011	4.26	1 ST	117	795 064	1011	4.91	1 ST	117
785 644	—	0.08	1 ST	204	794 350	1011	6.04	1 ST	104	795 065	1011	4.79	1 ST	117
785 645	—	0.42	1 ST	195	794 351	1011	6.08	1 ST	105	795 068	1011	4.95	1 ST	116
785 646	—	0.76	1 ST	202	794 353	1011	6.31	1 ST	106	795 069	1011	4.98	1 ST	117
785 647	—	0.07	1 ST	203	794 354	1011	6.35	1 ST	107	795 103	1011	4.56	1 ST	118
785 648	—	0.02	1 ST	203	794 356	1011	6.27	1 ST	104	795 104	1011	5.15	1 ST	118
785 649	—	0.01	1 ST	203	794 357	1011	6.40	1 ST	104	795 105	1011	4.56	1 ST	118
785 650	—	0.02	1 ST	204	794 358	1011	6.46	1 ST	104	795 106	1011	4.69	1 ST	118
785 652	—	0.09	1 ST	204	794 359	1011	6.47	1 ST	104	795 107	1011	4.98	1 ST	121
785 796	—	0.20	1 ST	197	794 360	1011	6.36	1 ST	104	795 110	1011	4.59	1 ST	119
785 797	—	0.20	1 ST	197	794 362	1011	6.00	1 ST	104	795 112	1011	5.18	1 ST	119
785 798	—	0.20	1 ST	197	794 363	1011	6.10	1 ST	104	795 113	1011	4.58	1 ST	119
785 799	—	0.20	1 ST	197	794 365	1011	6.09	1 ST	105	795 114	1011	4.72	1 ST	119
785 940	—	10.85	1 ST	173	794 366	1011	6.30	1 ST	105	795 123	1011	4.95	1 ST	120
785 950	1508	27.30	1 ST	177	794 367	1011	6.52	1 ST	105	795 213	—	0.11	1 ST	113
785 951	—	21.20	1 ST	179	794 368	1011	6.50	1 ST	105	795 214	—	0.12	1 ST	113
785 952	—	1.43	1 ST	178	794 369	1011	6.50	1 ST	105	795 317	1011	6.86	1 ST	104
785 953	—	0.12	1 ST	183	794 370	1011	6.38	1 ST	105	795 325	1011	4.85	1 ST	116
					794 372	1011	6.04	1 ST	105	795 331	1011	4.85	1 ST	117

Index of Part No.

Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page	Part No.	Instr. No.	Weight kg	VPE/VME	Page
795 350	1011	6.85	1 ST	104	795 383	1011	7.28	1 ST	106	795 826	1011	7.06	1 ST	108
795 351	1011	6.90	1 ST	105	795 384	1011	7.35	1 ST	107	795 831	1011	7.05	1 ST	109
795 356	1011	7.34	1 ST	104	795 385	1011	6.35	1 ST	107	795 832	1011	7.15	1 ST	109
795 357	1011	7.46	1 ST	104	795 386	1011	7.82	1 ST	107	795 833	1011	6.74	1 ST	109
795 358	1011	7.27	1 ST	104	795 388	1011	7.75	1 ST	107	795 835	1011	7.28	1 ST	109
795 359	1011	7.40	1 ST	104	795 389	1011	7.90	1 ST	107	795 836	1011	7.15	1 ST	109
795 360	1011	7.17	1 ST	104	795 390	1011	7.65	1 ST	107	795 950	1011	7.63	1 ST	106
795 362	1011	6.81	1 ST	104	795 392	1011	7.30	1 ST	107	795 951	1011	7.96	1 ST	107
795 363	1011	6.88	1 ST	104	795 393	1011	7.36	1 ST	107					
795 365	1011	6.90	1 ST	105	795 604	1011	4.38	1 ST	123	799 009	—	0,00	1 ST	133
795 366	1011	7.38	1 ST	105	795 802	1011	7.34	1 ST	110	799 019	—	0,33	1 ST	133
795 367	1011	7.50	1 ST	105	795 803	1011	7.57	1 ST	110					
795 368	1011	7.30	1 ST	105	795 804	1011	7.03	1 ST	110	923 110	1373	0.04	10 ST	233
795 369	1011	7.44	1 ST	105	795 806	1011	7.70	1 ST	110	923 116	1372	0.04	10 ST	233
795 370	1011	7.20	1 ST	105	795 807	1011	7.45	1 ST	110	923 117	1418	0.04	10 ST	233
795 372	1011	6.85	1 ST	105	795 811	1011	7.45	1 ST	111	923 118	1513	0.04	10 ST	233
795 373	1011	6.92	1 ST	105	795 812	1011	7.66	1 ST	111	923 119	1514	0.04	10 ST	233
795 374	1011	7.26	1 ST	106	795 813	1011	7.12	1 ST	111	923 123	1585	0.19	1 ST	234
795 375	1011	7.27	1 ST	106	795 815	1011	7.80	1 ST	111	923 124	1676	0.19	1 ST	234
795 376	1011	7.75	1 ST	106	795 816	1011	7.53	1 ST	111	923 125	1677	0.19	1 ST	234
795 378	1011	7.68	1 ST	106	795 821	1011	6.96	1 ST	108	923 126	1603	0.19	1 ST	234
795 379	1011	7.80	1 ST	106	795 822	1011	6.82	1 ST	108	923 127	1604	0.19	1 ST	234
795 380	1011	7.58	1 ST	106	795 823	1011	6.65	1 ST	108					
795 382	1011	7.22	1 ST	106	795 825	1011	7.20	1 ST	108					

Type	Product	Part No.	Page
A STK	STK Sealing unit	766 888	20
AD HV STK SQ	Adapter Plug-in coupling/SQ	766 313	20
AD ZK 25 200	Operating head with gear coupling	766 055	229
AES SQ SK	Adapter Earthing rod SQ/SK	765 001	135
AH ISMTC	Support ISMTC	766 038	19
AK 36 SQ STK 360	STK Operating head / T Pin shaft	766 365	76
AK AH ZK ISMTC	Contacting aid ISMTC	766 049	19
AK RS S ZK MS	Rigid operating head, FRS ZK MS	785 324	175
AK RS ZK MS	Single operating head, flexible, FRS ZK MS	785 322	175
AK SD KEV MS	Operating head, straight, SD	785 267	190
AK SD W30 KEV MS	Operating head, angled 30°, SD	785 268	190
AK SD W70 KEV MS	Operating head, angled 70°, SD	785 269	190
AK SQL STK 365	STK Operating head / Long T Pin shaft	766 465	76
AKA TF ZK MS	Operating head adapter, TFRS MS	785 259	182
AKE DCA HR	Coupling unit, DEHNcap/MDS-HR	767 816	58
AKE DCA LRM	Coupling unit, DEHNcap/MDS-LRM	767 826	58
AP 152 G	Cover 1.5x2 m	785 110	185
APG 8	Protective gloves, size 8	785 796	197
APG 9	Protective gloves, size 9	785 797	197
APG 10	Protective gloves, size 10	785 798	197
APG 11	Protective gloves, size 11	785 799	197
AR STK	STK Sealing unit with eye	766 889	20
AS MS	Locking rod, 2200 mm, TRS MS	785 109	178
AS SCHR M12 55	Bolted-type connector, M12x55 mm	705 500	100
AS SCHR M12 M12 40	Bolted-type connector, M12/M12x40 mm	705 504	100
AS SCHR M16 55 M12	Bolted-type connector, M12x20/M16x55 mm	705 510	100
AS SCHR M16 65	Bolted-type connector, M16x65 mm	750 500	100
AS SCHW M12	Welding-type connector, M12	336 020	100
AS SCHW M12 25	Welding-type connector, M12x25 mm	705 501	100
AS SCHW M16	Welding-type connector, M16	336 025	100
AS SCHW M16 30	Welding-type connector, M16x30 mm	755 501	100
ASH B NS	Safety helmet, blue	785 437	195
ASH G NS	Safety helmet, yellow	785 426	195
ASH O NS	Safety helmet, orange	785 436	195
ASH R NS	Safety helmet, red	785 438	195
ASH W NS	Safety helmet, white	785 429	195
ASP 110 420 L	Non-contact voltage detector, L	767 571	36
ASP 110 420 S	Non-contact voltage detector, S	767 572	36
ASP 110 420 S L	Non-contact voltage detector, S/L	767 573	36
ASP A 110 420 ZK	ASP Indicator, 110 ... 420 kV, S/L	767 570	37
ASS 36 STK 30	Operating rod Kit, Ø30 mm, 36 kV	766 325	75
ASS 36 STK 43	Operating rod Kit, Ø43/30 mm, 36 kV	766 452	75
AT IHS NS	Storage bag, 400x18x50 mm	785 490	199
AT PSA NS	Storage bag, PSA	785 425	195
AT SPN II	Artificial leather bag, 535x160 mm	766 543	156
ATK 120 ..M NS	Covering material, W=1200 mm, L= up to 25 m	785 468	202
ATK 120 25M NS	Covering material, W=1200 mm, L= 25 m	785 467	202
ATK 135 ..M NS	Covering material, W=1350 mm, L= up to 50 m	785 466	202
ATK 135 50M NS	Covering material, W=1350 mm, L= 50 m	785 465	202
ATN 140 ..M NS	Covering material, W=1400 mm, L= up to 10 m	785 472	202
ATN 140 10M NS	Covering material, W=1400 mm, L= 10 m	785 471	202
BB 245 MS	Arc brush, TFRS MS	785 151	181
BEV BM HZ BDW K	Earthing kit, adjacent tracks	751 193	220
BEV MF LTE	Earthing kit, dedicated busbars	751 192	220

Type	Product	Part No.	Page
BEV MF SE K	Kit for earthing towers next to rails	751 191	218
BEV OL NPF K	Earthing kit, overhead contact lines (not profile-free)	750 210	216
BEV OL NPF PKW K	Earthing kit, overhead contact lines, motor vehicles (not profile-free)	750 196	216
BEV OL PF K	Earthing kit, overhead contact lines (profile-free)	750 211	216
BEV OL PF PKW K	Earthing kit, overhead contact lines, motor vehicles (profile-free)	750 200	216
BEV OL PF V2 K	Earthing kit, overhead contact lines, motor vehicles (profile-free)	750 214	216
BEV SVUL	Kit for supply lines	750 213	218
BEV US OL ST	Kit for transformers at overhead line towers	750 212	218
BEV WHA ZVA	Kit, preheating systems at railway points/trains	750 215	219
BIT 13 SD KEV MS	Special bit, 13 mm, SD	785 271	190
BIT 8 SD KEV MS	Special bit, 8 mm, SD	785 272	190
BS 1125 SD KEV MS	Operating rod, adjustable handle, SD	785 266	190
DGF EKV VI	Adjustable handle with flexible shaft	745 921	146
DHTM	Digital hygro-/thermometer, TRS MS	785 180	171
DHTM T 615	Hygro-/Thermometer	785 181	183
DP 40 40 B13 AL	Spring-loaded pressure plate, M12	525 001	140
DP 50 50 B17 AL	Spring-loaded pressure plate, M16	525 002	140
DR PHV	Sealing ring, PHV	767 778	53
DR PS PHE3	Sealing ring, PHE III	767 779	45
EAB RN 16 FS	Earth connector, wing bolt	790 150	131
EAB RN 16 SKN	Earth connector, grooved ring	790 160	131
EAP 2 25 KKH HG	Earth connection plate, 25 mm, KKH, HG	728 501	227
EAP 2 25 MA US OL	Earth connection plate, 25 mm, towers	728 502	227
EAP 25 SIT US OL	Earth connection plate, 25 mm, fuse carriers	728 503	227
EAP 3 16 RN	Earth connection plate, 16 mm, grooved ring	728 520	101
EAP 3 20 KKH	Earth connection plate, 20 mm, ball head cap	728 300	101
EAP 3 25 KKH	Earth connection plate, 25 mm, ball head cap	728 500	101
EAS EK FM 12	Earth connection unit, wing bolt bolt M12	775 621	131
EAS EK FM 16	Earth connection unit, wing bolt bold M16	775 631	131
EAS EK FS 12	Earth connection unit, wing bolt M12x15 mm	775 626	131
EAS EK FS 16	Earth connection unit, wing bolt M16x15 mm	775 636	131
EB 9V AL	Battery, 9 V Block, alkaline manganese	767 713	45
EB 9V LI	Battery, 9 V Block, lithium	767 712	45
EFK FL30 SKN	Earth milling clamp, 30 mm, tommy bar	792 030	132
EFK FL40 SKN	Earth milling clamp, 40 mm	792 190	132
EFP 16 RN M12	Fixed earthing point, grooved ring M12	790 250	99
EFP 16 RN M12 35 SSM	Fixed earthing point, grooved ring M12x35 mm	790 251	99
EFP 16 RN M16	Fixed earthing point, grooved ring M16	790 260	99
EFP 16 RN M16 45 SSM	Fixed earthing point, grooved ring M16x45 mm	790 261	99
EFS L 127	Field sensor, L	767 576	37
EFS S 167	Field sensor, S	767 577	37
EG 00 4A VI	Earthing handle type VI	745 922	146
EG SK STK 400	Earthing handle, 400 mm, SK	745 415	155
EG SQ STK 400	Earthing handle, 400 mm, SQ	745 414	155
EG TI EKV	Earthing handle type TI	745 400	150
EHH BEV OL	Hook, for railway applications	740 124	225
EK FL20 FS	Earth clamp, 20 mm, wing bolt bolt	745 502	150
EK I FL20 DGF	Earth clamp, 20 mm, adjustable handle	745 602	150
EKS 50 BEV 4M	Earthing+short-circ. cable, single-pole, 50 mm², 4 m	751 040	225
EKS 50 BEV 8.5M	Earthing+short-circ. cable, single-pole, 50 mm², 8.5 m	751 085	225

Type / Product Index

Type	Product	Part No.	Page
EKS 50 BEV 12M	Earthing+short-circ. cable, single-pole, 50 mm ² , 12 m	751 120	225
EKS 50 BEV 13M	Earthing+short-circ. cable, single-pole, 50 mm ² , 13 m	751 130	225
EKS 50 BEV 14M	Earthing+short-circ. cable, single-pole, 50 mm ² , 14 m	751 140	225
EKS TI KVS SBK	Earthing and short-circuiting kit I, partly insulated, sheet metal case	766 302	147
EKS TI 2F KVS SBK	Earthing and short-circuiting kit II, partly insulated, sheet metal case	745 500	147
EKS VI 2F KVS KK	Earthing and short-circuiting kit, fully insulated, plastic case	745 903	144
EKS VI 2F KVS SBK	Earthing and short-circuiting kit, fully insulated, sheet metal case	745 901	144
EKS1 PK1 25 5000	Earthing+short-circ. cable, single-pole, 25 mm ² , 5 m	776 425	123
EKS1 PK1 35 5000	Earthing+short-circ. cable, single-pole, 35 mm ² , 5 m	776 435	123
EKS1 PK1 50 5000	Earthing+short-circ. cable, single-pole, 50 mm ² , 5 m	776 450	123
EKS1 PK1 70 5000	Earthing+short-circ. cable, single-pole, 70 mm ² , 5 m	776 470	123
EKS1 PK1 95 5000	Earthing+short-circ. cable, single-pole, 95 mm ² , 5 m	776 495	123
EKS1 PK1 120 5000	Earthing+short-circ. cable, single-pole, 120 mm ² , 5 m	776 412	123
EKS1 PK1 150 5000	Earthing+short-circ. cable, single-pole, 150 mm ² , 5 m	776 415	123
EKS3 PK1 25 25	Earthing+short-circ. cable, 3-pole, 25/25 mm ² , 5 m	725 604	123
EKS3 PK1 35 35	Earthing+short-circ. cable, 3-pole, 35/35 mm ² , 5 m	735 604	123
EKS3 PK1 50 25	Earthing+short-circ. cable, 3-pole, 50/25 mm ² , 5 m	750 604	123
EKS3 PK1 70 35	Earthing+short-circ. cable, 3-pole, 70/35 mm ² , 5 m	770 604	123
EKS3 PK1 95 35	Earthing+short-circ. cable, 3-pole, 95/35 mm ² , 5 m	795 604	123
EKS3 PK1 120 50	Earthing+short-circ. cable, 3-pole, 120/50 mm ² , 5 m	712 604	123
EKS3 PK1 150 50	Earthing+short-circ. cable, 3-pole, 150/50 mm ² , 5 m	715 604	123
EKV ÜGK MB	Earthing and short-circuiting device, street light installations	745 107	153
EKV ÜGK MB S	Kit for earthing and short-circuiting street light installations	745 105	152
EKV3 16 TI KVS HKS	Earthing and short-circuiting device, partly insulated, HKS, 16 mm ²	745 459	148
EKV3 16 VI HAK EK24	Earthing and short-circuiting device, fully insulated, 16 mm ²	745 940	145
EKV3 25 BS ZK85	Earthing and short-circuiting device, NS, BS, 25 mm ²	743 325	154
EKV3 25 IS ZK55	Earthing and short-circuiting device, NS, IS, 25 mm ²	743 225	154
EKV3 25 TI KVS DGF	Earthing and short-circuiting device, partly insulated, DGF, 25 mm ²	745 426	148
EKV3 25 TI KVS HKS	Earthing and short-circuiting device, partly insulated, HKS 25 mm ²	745 458	148
EKV3 25 VI KVS DGF	Earthing and short-circuiting device, fully insulated, DGF 25 mm ²	745 925	145
EKV3 25 VI KVS EK24	Earthing and short-circuiting device, fully insulated, EK24, 25 mm ²	745 926	145
EKV3 35 BS ZK85	Earthing and short-circuiting device, NS, BS, 35 mm ²	743 335	154
EKV3 35 IS ZK55	Earthing and short-circuiting device, NS, IS, 35 mm ²	743 235	154
EKV3 35 TI KVS DGF	Earthing and short-circuiting device, partly insulated, DGF, 35 mm ²	745 436	148
EKV3 35 TI KVS HKS	Earthing and short-circuiting device, partly insulated, HKS, 35 mm ²	745 460	148
EKV3 35 VI KVS DGF	Earthing and short-circuiting device, fully insulated, DGF, 35 mm ²	745 935	145
EKV3 35 VI KVS EK24	Earthing and short-circuiting device, fully insulated, EK24, 35 mm ²	745 936	145
EKV3 50 IS ZK55	Earthing and short-circuiting device, NS, IS, 50 mm ²	743 250	154
EKV3 50 TI KVS DGF	Earthing and short-circuiting device, partly insulated, DGF, 50 mm ²	745 451	148

Type	Product	Part No.	Page
EKV3 50 TI KVS HKS	Earthing and short-circuiting device, partly insulated, HKS, 50 mm ²	745 461	148
EKV3 NH00 TI EK24	Earthing and short-circuiting device, partly insulated, EK24, 16 mm ²	745 817	148
EKV3 SKB M10 TI EK24	Earthing and short-circuiting device, partly insulated, EK24, M10, 16 mm ²	745 816	148
EL M8 G PHE	Fork-shaped electrode	766 924	28
EL M8 H PHE	Hook-shaped electrode	766 923	24
EL M8 MAG PHE PHV	Eaton Holec Magnefix electrode	766 915	42
EL M8 S PHE PHV	Pin-shaped electrode	766 925	42
EL M8 SZ PHE PHV	Onion-shaped electrode	766 913	42
EL M8 V PHE PHV	V-shaped electrode	766 927	24
EP 25 K NS	Spare brush, short bristles, TRS NS	785 595	167
EP 25 L MS	Spare brush for flat cleaning heads, TFRS MS	785 224	183
EP 25 L NS	Spare brush, long bristles	785 596	167
EP NH00 TI M10	Earthing cartridge, NH 00, TI	745 302	149
EP NH00 VI TA	Earthing cartridge, NH 00, VI	745 905	145
EP NH1 3 TI A M10	Earthing cartridge, NH 1...3, TI, with locking device	745 401	149
EP NH1 3 TI GL M10	Earthing cartridge, NH 1...3, TI, with grip lugs	745 017	149
EP NH1 3 TI M10	Earthing cartridge, NH 1...3, TI	745 018	149
EP NH1 3 VI TA	Earthing cartridge, NH 1...3, VI	745 910	145
EP NH4A TI M10	Earthing cartridge, NH 4a, TI	745 016	149
EP NH4A VI TA	Earthing cartridge, NH 4a, VI	745 915	145
ES 3P FL ER	Earthing Kit for overhead line systems	799 009	133
ES SK 1000	Earthing rod, 1000 mm, SK	761 010	135
ES SK 1500	Earthing rod, 1500 mm, SK	761 015	135
ES SK STK 1000	Earthing rod, 1000 mm, SK STK	761 001	135
ES SQ 1000	Earthing rod, 1000 mm, SQ	761 011	135
ES SQ 1500	Earthing rod, 1500 mm, SQ	761 016	135
ES SQ STK 1000	Earthing rod, 1000 mm, SQ STK	761 002	135
ES YM2 16	Earthing cable, 16 mm ²	716 001	123
ES YM2 25	Earthing cable, 25 mm ²	725 001	123
ES YM2 35	Earthing cable, 35 mm ²	735 001	123
ES YM2 50	Earthing cable, 50 mm ²	750 001	123
ES YM2 70	Earthing cable, 70 mm ²	770 001	123
ES YM2 95	Earthing cable, 95 mm ²	795 001	123
ES YM2 120	Earthing cable, 120 mm ²	712 001	123
ES YM2 150	Earthing cable, 150 mm ²	715 001	123
ESE E27 KBI M10	Screw-in earthing insert, E27, with conductive thread	745 203	149
ESE E27 TI M10	Screw-in earthing insert, E27, with insulated thread	745 201	149
ESE E33 KBI M10	Screw-in earthing insert, E33, with conductive thread	745 204	149
ESE E33 TI M10	Screw-in earthing insert, E33, with insulated thread	745 202	149
ESS 3P M10 FM	Three-pole earthing busbar, PK3	799 019	133
ESS STK 43	Earthing rod kit, Ø43 mm, 36 kV	766 450	75
EST ES 1500	Earthing rod, base section, SQL	769 505	139
EST KS SQL 1500	Earthing rod, top section, SQL	769 503	139
EST SQL RW 4915	Earthing rod, 5-part unit, red/white, separable, SQL	769 510	223
EST SQL RW 4915 TA	Earthing rod, 5-part unit, red/white, separable, incl. bag, SQL	769 506	223
EST ZS 1500	Earthing rod, intermediate section	769 504	139
ESTC SQL 3000	Telescopic earthing rod, 3000 mm, SQL	769 300	137
ESTC SQL 5000	Telescopic earthing rod, 5000 mm, SQL	769 500	137
ESTC SQL H RW 5000	Telescopic earthing rod, red/white, hook, 5 m, SQL	769 508	222

Type	Product	Part No.	Page
ESTC SQL RW 3500	Telescopic earthing rod, red/white, 3.5 m, SQL	769 352	222
ESTC SQL RW 5000	Telescopic earthing rod, red/white, 5 m, SQL	769 502	222
EV EH 1725 EK	Earthing device, electrical filter systems, 1.5 m	758 015	159
EV TES 465 EK	Discharge device, 465 mm, earthing clamp	758 020	159
EV TES 465 EZ	Discharge device, 465 mm, spring-loaded earthing clamp	758 021	159
EV TES 465 KS10	Discharge device, 465 mm, earth cable with lug	758 022	159
EV TS 2000 EK	Discharge device, 2000 mm, earth clamp	758 001	159
EV TS 2000 EZ	Discharge device, 2000 mm, spring-loaded earth clamp	758 003	159
FD 110 MS	Flat cleaning head, 110 mm, TRS MS	785 221	171
FD 210 MS	Flat cleaning head, 210 mm, TRS MS	785 223	181
FD 35 NS	Flat cleaning head, 35 mm, TR NS	785 541	166
FD 35 P NS	Flat cleaning head with brush, 35 mm, TRS NS	785 590	166
FD 35 S MS	Flat cleaning head, chamfered, 35 mm, TRFS MS	785 551	181
FD 35 S NS	Flat cleaning head, chamfered, 35 mm, TRS NS	785 542	166
FD 35 W P MS	Flat cleaning head with brush, 30°, 35 mm, TRFS MS	785 552	182
FD 35 W P NS	Flat cleaning head with brush, 30°, 35 mm, TRS NS	785 591	166
FD 55 NS	Flat cleaning head, 55 mm, TRS NS	785 540	166
FD 60 MS	Flat cleaning head, 60 mm, TRS MS	785 220	171
FEK 4 15 TS FSQ	Earth clamp for contact wires	784 755	224
FPE DCA HR	Front panel unit, DEHNcap/MSD-HR	767 815	58
FPE DCA LRM	Front panel unit, DEHNcap/MDS-LRM	767 825	58
FR A12 V2A	Spring washer, A12	524 912	140
FR A16 V2A	Spring washer, A16	524 913	140
FRS ZK MS	Damp cleaning kit FRS ZK MS, complete	785 940	173
FSG PHE	Protective rubber, PHE	767 776	45
FSG PHG2 PHV	Protective rubber, PHG II and PHV	767 777	45
FWD 35 P NS	Flat cleaning head, angled 90°, 35 mm, TRS NS, with detachable brush	785 592	185
GL 3.5V 0.2A E10	Small electric bulb	766 605	45
HIS 1400 TRS	Industrial vacuum cleaner	785 310	184
HK 8 NS	Hook, Ø8 mm, NS	785 648	203
HRB 120 MS	Half-round brush, 120 mm, TRS MS	785 140	170
HRB 190 MS	Half-round brush, 190 mm, TRS MS	785 150	170
HSA194 110 420 16.7	HSA 194 Non-contact voltage detector, 16.7 Hz	767 542	211
HSA205 U 1 420 STK	HSA 205 Non-contact voltage detector	767 552	39
HV 3HH	Support bracket for 1 set of h.v.h.b.c. fuses and fuse tongs	700 015	83
HV 3HH ET	Storage device for h.v.h.b.c. fuses, single part	700 005	83
HV 3HH SZ	Storage device for 1 set of h.v.h.b.c. fuses, set	700 014	83
HV 3HH SZ ET	Storage device for fuse tongs, single part	700 004	83
HV EKV ES30	Storage device, D=30 mm	700 000	141
HV EKV ES30 1500	Storage device, D=30 mm, L= 1500 mm	700 003	141
HV EKV ES40	Storage device, D=43 mm	700 002	141
HV P ST D24	Storage device, rod, D=24 mm	700 006	34
HV P ST D30	Storage device, D=30 mm	700 007	21
HV P ST D40 45	Storage device, D=40...45 mm	700 008	29
HV STK 30 710	HV STK Extension handle, Ø30 mm, 710 mm	766 335	20
HV STK 43 1280	HV STK Extension handle, Ø43 mm, 1280 mm	766 466	77
HV STK 43 910	HV STK Extension handle, Ø43 mm, 910 mm	766 456	77

Type	Product	Part No.	Page
IHS 0 M 9 NS	Insulated gloves, size 9, class 0	785 493	199
IHS 0 M 10 NS	Insulated gloves, size 10, class 0	785 494	199
IHS 00 M 9 NS	Insulated gloves, size 9, class 00	785 491	199
IHS 00 M 10 NS	Insulated gloves, size 10, class 00	785 492	199
IHS 00 RC 9 NS	Insulated gloves, RC, size 9, class 00	785 495	199
IHS 00 RC 10 NS	Insulated gloves, RC, size 10, class 00	785 496	199
IK HSA205	Insulating cap for HSA 205 non-contact voltage detector	767 559	39
IMG SAN 1M ..M	Insulated mat, L= up to 10 m	785 458	202
IMG SAN 1M 10M	Insulated mat, L= 10 m	785 459	202
IMG SI ..M NS	Insulated rubber mat, L= up to 10 m	785 456	202
IMG SI 10M NS	Insulated rubber mat, L= 10 m	785 457	202
IMG SI 1M NS	Insulated rubber mat, L= 1 m	785 455	202
INFL MS	Insulated refilling lance, NFG MS	785 261	187
IS 25 ZK 2885	Insulating rod with gear coupling	766 048	229
IS 25 ZK RK 3160	Insulating rod kit for cleaning the windows of electric locomotives	766 340	229
IS 36 SK 1000	Insulating rod, 1000 mm, SK	766 001	79
IS 36 SK 1500	Insulating rod, 1500 mm, SK	766 002	79
IS 36 SK STK 1000	Insulating rod, 1000 mm, SK STK	766 100	79
IS 36 SQ 1000	Insulating rod, 1000 mm, SQ	766 311	79
IS 36 SQ 1500	Insulating rod, 1500 mm, SQ	766 315	79
IS 36 SQ STK 1000	Insulating rod, 1000 mm, SQ STK	766 301	79
IS 36 STK 30 1280	IS 36 STK Insulating rod, Ø30 mm, 1280 mm	766 363	76
IS 36 STK 43 1280	IS 36 STK Insulating rod, Ø43 mm, 1280 mm	766 463	76
IS 36 ZK STK 1300	Insulating rod with handle and plug-in coupling, 1300 mm, TRFS MS	785 325	178
IS M12 STK 1940	Insulating rod PHE, 110 kV, plug-in coupling	766 011	28
IS M12 STK 2540	Insulating rod PHE, 132 kV, plug-in coupling	766 015	28
IS M12 STK 640	Insulating rod PHE, extendable, plug-in coupling	766 331	20
IS T 36 ZK STK 1300	Insulating rod with handle, 1300 mm, FRS ZK MS	785 315	174
IS ZK STK 670	Insulating rod PHE, gear coupling, plug-in coupling	766 368	19
IS ZK STK HS 670	Insulating rod PHE, gear coupling, plug-in coupling, hand strap	766 369	37
ISMTC N 36 ZK 10600	Telescopic insulating rod, gear coupling	766 037	19
ISP 135 ZK MS	Insulating mirror, Ø135 mm, TRS MS	785 190	171
ISP 36 PVC A1...	Insulating protective shutter, A1	763 211	88
ISP 36 PVC A2...	Insulating protective shutter, A2	763 221	88
ISP 36 PVC A3...	Insulating protective shutter, A3	763 231	88
ISP 36 PVC A4...	Insulating protective shutter, A4	763 241	88
ISV 220 ZK MS	Extension, 220 mm, FRS ZK MS	785 316	174
ISV 320 ZK MS	Extension, 320 mm, FRS ZK MS	785 317	174
ISV 36 STK 30 910	ISV 36 STK Extension for insulating rod, 910 mm	766 356	77
ISV 36 STK 30 1280	ISV 36 STK Extension for insulating rod, 1280 mm	766 366	77
ISV 420 ZK MS	Extension, 420 mm, FRS ZK MS	785 318	174
ISV 820 ZK MS	Extension, 820 mm, FRS ZK MS	785 319	174
IW 17.5 890 650 180	Insulated Platform IW, 17.5 kV	785 408	201
KFP 20 M12	Fixed ball point 20 mm, M12	754 200	96
KFP 20 M12 35 SSM	Fixed ball point 20 mm, M12x35 mm	754 235	96
KFP 20 M16	Fixed ball point 20 mm, M16	754 600	96
KFP 20 M16 45 SSM	Fixed ball point 20 mm, M16x45 mm	754 645	96
KFP 20 RL 10	Fixed ball point 20 mm, round conductor 10 mm	720 010	98
KFP 20 RL 12	Fixed ball point 20 mm, round conductor 12 mm	720 012	98
KFP 20 RL 14	Fixed ball point 20 mm, round conductor 14 mm	720 014	98
KFP 20 RL 16	Fixed ball point 20 mm, round conductor 16 mm	720 016	98

Type / Product Index

Type	Product	Part No.	Page	Type	Product	Part No.	Page
KFP 20 RL 18	Fixed ball point 20 mm, round conductor 18 mm	720 018	98	KKL FRS ZK MS	GRP case, 850x300x200 mm	785 229	174
KFP 20 RL 20	Fixed ball point 20 mm, round conductor 20 mm	720 020	98	KKL PHE	Plastic case, 920x200x120 mm	766 997	33
KFP 20 S AL 12	Fixed ball point 20 mm, angled, with terminal lug	706 300	96	KKL PHE L	Plastic case, 1270x200x120 mm	766 999	33
KFP 20 W45 M12	Fixed ball point 20 mm, 45°, M12	706 200	97	KKL PHE3	Plastic case, 920x200x120 mm	767 997	21
KFP 20 W45 M12 35SSM	Fixed ball point 20 mm, 45°, M12x35 mm	706 235	97	KKL PHE3 60 110	Plastic case, 1270x200x120 mm	766 998	29
KFP 20 W45 M16	Fixed ball point 20 mm, 45°, M16	706 600	97	KKL PHE3 L	Plastic case, 1270x200x120 mm	767 999	21
KFP 20 W45 M16 45SSM	Fixed ball point 20 mm, 45°, M16x45 mm	706 645	97	KKL PHV	Plastic case, 920x200x120 mm	759 999	52
KFP 20 W90 M12	Fixed ball point 20 mm, 90°, M12	707 200	97	KKL PHV1	Plastic case, 1270x200x120 mm	759 998	52
KFP 20 W90 M12 35SSM	Fixed ball point 20 mm, 90°, M12x35 mm	707 235	97	KKL PK PHE3 L	Plastic case, 395x295x105 mm	766 036	21
KFP 20 W90 M16	Fixed ball point 20 mm, 90°, M16	707 600	97	KKL SDS KEV MS	Plastic case, 1130x200x120 mm	785 298	190
KFP 20 W90 M16 45SSM	Fixed ball point 20 mm, 90°, M16x45 mm	707 645	97	KKL TFRS MS	GRP case, 850x410x400 mm	785 951	179
KFP 25 M12	Fixed ball point 25 mm, M12	755 200	96	KKL TRS MS	GRP case, 1200x270x165 mm	785 301	170
KFP 25 M12 25 SSM	Fixed ball point 25 mm, M12x25 mm	755 225	96	KKL TRS NS	Plastic case, 530x390x170 mm	785 506	165
KFP 25 M12 35 SKM	Fixed ball point 25 mm, M12x35 mm	755 627	226	KLFP M12 KSS	Fixed clamping point for busbars	795 040	113
KFP 25 M12 45 SSM	Fixed ball point 25 mm, M12x45 mm	755 245	96	KLT 1010 300	Artificial leather bag, 1010x300 mm	767 996	21
KFP 25 M16	Fixed ball point 25 mm, M16	755 600	96	KLT 104 9	Artificial leather bag, Ø85x1040 mm	767 574	37
KFP 25 M16 25	Fixed ball point 25 mm, M16x25 mm	755 636	226	KLT 121 25 16	Artificial leather bag, 1210x250x160 mm	766 601	33
KFP 25 M16 25 SKM	Fixed ball point 25 mm, M16x25 mm	755 626	226	KLT 130 33	Artificial leather bag, 1300x300 mm	766 069	77
KFP 25 M16 45 SKM	Fixed ball point 25 mm, M16x45 mm	755 646	226	KLT 140 28	Artificial leather bag, 1400x280 mm	785 952	178
KFP 25 M16 45 SSM	Fixed ball point 20 mm, M16x45 mm	755 645	96	KLT 160 17	Artificial leather bag, Ø170x1600 mm	766 614	29
KFP 25 RL 10	Fixed ball point 25 mm, round conductor 10 mm	725 010	98	KLT 23 16 4	Artificial leather bag, 235x160x40 mm	767 500	67
KFP 25 RL 12	Fixed ball point 25 mm, round conductor 12 mm	725 012	98	KLT 247 10 22	Artificial leather bag, 2470x220x100 mm	766 602	207
KFP 25 RL 14	Fixed ball point 25 mm, round conductor 14 mm	725 014	98	KLT 98 9	Artificial leather bag, Ø95x980 mm	767 531	39
KFP 25 RL 16	Fixed ball point 25 mm, round conductor 16 mm	725 016	98	KR ASH NS	Chin strap for safety helmet	785 428	195
KFP 25 RL 18	Fixed ball point 25 mm, round conductor 18 mm	725 018	98	KS SG BLS 8	Plastic star grip screw	766 105	45
KFP 25 RL 20	Fixed ball point 25 mm, round conductor 20 mm	725 020	98	KSS 60 12 AL SK	Short-circuiting bar, 60x12 mm, SK, Al	795 043	113
KFP 25 S AL 12	Fixed ball point 25 mm, angled, with terminal lug	756 300	96	KSS 60 12 AL SQ	Short-circuiting bar, 60x12 mm, SQ, Al	795 049	113
KFP 25 W45 M12	Fixed ball point 25 mm, 45°, M12	756 200	97	KSS 60 12 CU SK	Short-circuiting bar, 60x12 mm, SK, Cu	795 039	113
KFP 25 W45 M12 45SSM	Fixed ball point 25 mm, 45°, M12x45 mm	756 245	97	KSS 60 12 CU SQ	Short-circuiting bar, 60x12 mm, SQ, Cu	795 045	113
KFP 25 W45 M16	Fixed ball point 25 mm, 45°, M16	756 600	97	KSS 60 8 AL SK	Short-circuiting bar, 60x8 mm, SK, Al	795 042	113
KFP 25 W45 M16 45SSM	Fixed ball point 25 mm, 45°, M16x45 mm	756 645	97	KSS 60 8 AL SQ	Short-circuiting bar, 60x8 mm, SQ, Al	795 048	113
KFP 25 W90 M12	Fixed ball point 25 mm, 90°, M12	757 200	97	KSS 60 8 CU SK	Short-circuiting bar, 60x8 mm, SK, Cu	795 038	113
KFP 25 W90 M12 45SSM	Fixed ball point 25 mm, 90°, M12x45 mm	757 245	97	KSS 60 8 CU SQ	Short-circuiting bar, 60x8 mm, SQ, Cu	795 041	113
KFP 25 W90 M16	Fixed ball point 25 mm, 90°, M16	757 600	97	KV4 25 NSFL ISK95	Short-circuiting device, 4-pole, l.v. overhead lines, 25 mm²	742 225	151
KFP 25 W90 M16 45SSM	Fixed ball point 25 mm, 90°, M16x45 mm	757 645	97	KV4 25 NSFL ISK95 E	Short-circuiting device, 5/6-pole, l.v. overhead lines, 25 mm²	742 425	151
KK 35 NS	Clip	785 647	203				
KKH 20 D SK	Ball head cap 20 mm, adjustable, SK	772 330	127	L71 PS PHE 185	PHE Test prod, L 71	767 766	24
KKH 20 D SQ	Ball head cap 20 mm, adjustable, SQ	772 331	127	L72 PS PHE 405	PHE Test prod, L 72	767 772	28
KKH 20 FS	Ball head cap 20 mm, FS	772 312	130	LK 4 40 TS SQ	Conductor clamp with prod, SQ	784 352	224
KKH 20 HG	Ball head cap 20 mm, HG	772 313	130				
KKH 20 SK	Ball head cap 20 mm, SK	772 310	127	MA DCA HR LRM	Test adapter, DEHNcap/HR-LRM	767 133	68
KKH 20 SQ	Ball head cap 20 mm, SQ	772 311	127	MA DCA LR LRM	Test adapter, DEHNcap/LR-LRM	767 136	68
KKH 20 SQL	Ball head cap 20 mm, SQL	772 314	128	MA DCA XC LRM	Test impedance, DEHNcap/XC-LRM	767 135	68
KKH 25 D SK	Ball head cap 25 mm, adjustable, SK	772 340	127	MZ 1.5V IEC LR6 AL	Battery 1.5 V, Mignon, alkaline manganese	766 613	45
KKH 25 D SQ	Ball head cap 25 mm, adjustable, SQ	772 341	127	MZ 1.5V L91 FR6 LI	Battery 1.5 V, Mignon, Lithium	766 612	45
KKH 25 FS	Ball head cap 25 mm, FS	772 322	130				
KKH 25 HG	Ball head cap 25 mm, HG	772 323	130	NFG MS	Refilling device, NFG MS	785 260	187
KKH 25 SK	Ball head cap 25 mm, SK	772 320	127	NHS AG 00 3 NS	NH fuse puller with protective sleeve	785 645	195
KKH 25 SQ	Ball head cap 25 mm, SQ	772 321	127				
KKH 25 SQL	Ball head cap 25 mm, SQL	772 324	128	OEB NFG MS	Reservoir, with heating element, NFG MS	785 264	187
KKL 26 22 5	Plastic case, 265x225x50 mm	767 106	63	OEK 12 NS	Eye, Ø12 mm, NS	785 649	203
KKL B NFG MS	GRP case, 600x380x220 mm	785 299	187				
KKL DCA	Plastic case, 395x295x105 mm	767 107	61	PFP 11 33 AL 60 82	Fixed phase point, 11.0 ... 33 mm, Al	731 011	102
KKL EKS VI KVS	Plastic case, 445x345x100 mm	745 902	146	PFP 11 33 CU 60 82	Fixed phase point, 11.0 ... 33 mm, Cu	731 027	102
KKL EKV ÜGK MB	Plastic case, 395x295x105 mm	745 106	153				

Type	Product	Part No.	Page
PFP 34 48 AL 60 98	Fixed phase point, 33.1 ... 48 mm, Al	731 013	102
PFP 34 48 CU 60 98	Fixed phase point, 33.1 ... 48 mm, Cu	731 037	102
PFP 49 70 AL 60 126	Fixed phase point, 48.1 ... 70 mm, Al	731 015	102
PHE 10 S	PHE voltage detector, 10 kV	767 418	31
PHE 15 16.7 4T TA	PHE voltage detector, 15 kV, 16.7 Hz	766 616	207
PHE 15 16.7 6T TA	PHE voltage detector, 15 kV, 16.7 Hz, motor vehicles	766 617	207
PHE 15 30 S	PHE voltage detector, 15 ... 30 kV	767 430	31
PHE 20 S	PHE voltage detector, 20 kV	767 428	31
PHE 3 10 S	PHE voltage detector, 3 ... 10 kV	767 410	31
PHE 3 S	PHE voltage detector, 3 kV	767 403	31
PHE 30 S	PHE voltage detector, 30 kV	767 438	31
PHE 6 20 16.7	PHE voltage detector, 6 ... 20 kV, 16.7 Hz	767 415	209
PHE 6 20 S	PHE voltage detector, 6 ... 20 kV	767 420	31
PHE 6 S	PHE voltage detector, 6 kV	767 406	31
PHE U 3 20 16.7 50	PHE voltage detector, 3 ... 20 kV, 16.7 Hz/50 Hz	767 416	209
PHE U 3 30 S	PHE voltage detector, 3 ... 30 kV	767 433	31
PHE3 10 30 L SB ZK	PHE III electronic indicator, I/ZK, standby, 10...30 kV	767 932	17
PHE3 10 30 S	PHE III voltage detector, 10 ... 30 kV	767 731	15
PHE3 10 30 S SB ZK	PHE III electronic indicator, S/ZK, standby, 10...30 kV	767 931	17
PHE3 10 30 SL	PHE III voltage detector, S/L, 10 ... 30 kV	767 750	15
PHE3 10 S	PHE III voltage detector, 10 kV	767 710	15
PHE3 20 S	PHE III voltage detector, 20 kV	767 720	15
PHE3 3 10 S	PHE III voltage detector, 3 ... 10 kV	767 711	15
PHE3 3 S	PHE III voltage detector, 3 kV	767 703	15
PHE3 30 S	PHE III voltage detector, 30 kV	767 730	15
PHE3 6 20 L SB ZK	PHE III electronic indicator, I/ZK, standby, 6...20 kV	767 922	17
PHE3 6 20 S	PHE III voltage detector, 6 ... 20 kV	767 721	15
PHE3 6 20 S SB ZK	PHE III electronic indicator, S/ZK, standby, 6...20 kV	767 921	17
PHE3 6 20 SL	PHE III voltage detector, S/L, 6 ... 20 kV	767 740	15
PHE3 6 S	PHE III voltage detector, 6 kV	767 706	15
PHE3 A 20 SL ZK	PHE III indicator, S/L, 20 kV	767 722	24
PHE3 A 60 110 SL	PHE III indicator, S/L, 60 ... 100 kV	767 723	28
PHE3 A 60 132 SL	PHE III indicator, 60 ... 132 kV	767 732	28
PHE3 A 60 132 SL ZK	PHE III indicator, 60 ... 132 kV	767 735	28
PHE3 AS 60 132 SL ZK	Electronic indicator kit with gear coupling, PHE III, 60 ... 132 kV	767 783	27
PHE3 U 3 30 S	PHE III voltage detector, 3 ... 30 kV	767 733	15
PHE3S 20 L	Voltage detector kit, PHE III, 20 kV, L	767 725	23
PHE3S 20 S	Voltage detector kit, PHE III, 20 kV, S	767 724	23
PHE3S 60 110 L	Voltage detector kit, PHE III, 60 ... 110 kV, L	767 781	27
PHE3S 60 110 S	Voltage detector kit, PHE III, 60 ... 110 kV, S	767 780	27
PHE3S 60 132 SL	Voltage detector kit, PHE III, 60 ... 132 kV, SL	767 782	27
PHEG1 ... FD	PHE/GI d.c. voltage detector for contact wires	767 600	41
PHEG1 ... S	PHE/GI d.c. voltage detector for switchgear installations	767 601	41
PHEG2 ...	PHE/GII d.c. voltage detector	767 602	41
PHG2 6	PHG II voltage detector, 6 kV	766 706	34
PHG2 10	PHG II voltage detector, 10 kV	766 710	34
PHG2 20	PHG II voltage detector, 20 kV	766 720	34
PHSP NS	Pneumatic glove tester	785 497	199
PHV 3 36 STK	PHV phase comparator, 3 ... 36 kV	759 300	48
PHV1 6 12	PHV I phase comparator, single-pole, 6-12 kV	759 606	50
PHV1 12 24	PHV I phase comparator, single-pole, 12-24 kV	759 612	50
PHV1 24 36	PHV I phase comparator, single-pole, 24-36 kV	759 624	50
PHV1 U 6 36	PHV I phase comparator, single-pole, 6-36 kV	759 616	50

Type	Product	Part No.	Page
PS 10 12 PHV	PHV test prod, 10 ... 12 kV	759 610	49
PS 10 12 PHV D11	PHV test prod, D=11 mm, 10 ... 12 kV	759 111	49
PS 10 12 PHV W90	PHV test prod, angled, 10 ... 12 kV	759 611	49
PS 10 17.5 PHV	PHV test prod, 10 ... 17.5 kV	759 615	49
PS 15 24 PHV	PHV test prod, 15 ... 24 kV	759 620	49
PS 15 24 PHV L880	PHV test prod, L=880 mm, 15 ...24 kV	759 621	49
PS 15 24 PHV W90	PHV test prod, angled, 15 ... 24 kV	759 622	49
PS 20 24 PHV D11	PHV test prod, D=11 mm, 20 ... 24 kV	759 121	49
PS 25 36 PHV	PHV test prod, 25 ... 36 kV	759 630	49
PS 25 36 PHV W90	PHV test prod, angled, 25 ... 36 kV	759 633	49
PS 3 3.6 PHV	PHV test prod, 3 ... 3.6 kV	759 603	49
PS 3 3.6 PHV W90	PHV test prod, angled, 3 ... 3.6 kV	759 604	49
PS 5 7.2 PHV	PHV test prod, 5 ... 7.2 kV	759 605	49
PS 5 7.2 PHV W90	PHV test prod, angled, 5 ... 7.2 kV	759 608	49
PSK 10 65 SQ	Phase screw clamp, 10 ... 65 mm, SQ	784 301	125
PSK 10 65 SQ EH	Phase screw clamp, 10 ... 65 mm, SQ, EH	784 501	125
PSK 10 85 SQ	Phase screw clamp, 10 ... 85 mm, SQ	784 085	125
PSK 12 30 SQ	Phase screw clamp, 12 ... 30 mm, SQ	784 032	125
PSK 4 30 SQ	Phase screw clamp, 4 ... 30 mm, SQ	784 201	125
PSK 4 30 SQ EH	Phase screw clamp, 4 ... 30 mm, SQ, EH	784 401	125
PSK FV 4 30 SQ	Phase screw clamp, 4 ... 30 mm, SQ FV	784 480	125
PSO M8 PHE	Test probe, M8	766 916	43
PSO M8 PHE L800	Test probe, extension, 800 mm	766 960	43
PSO M8 PHE L800	Test probe, extension, 800 mm	766 960	24
PSO M8 W25 PHE	PHE test probe, 25°	766 940	43
PSO M8 W45 PHE	PHE test probe, 45°	766 941	43
PSO M8 W90 PHE	PHE test probe, 90°	766 950	43
PSS DII	DII installation adapter	745 109	153
PV DCA PC LRM	DEHNcap/PC Phase comparator	767 132	66
QD 35 W NS	Cross cleaning head, angled, 30°, 35 mm, TRS NS	785 543	166
RB 20 NS	Cleaning brush for tubes Ø20 mm, TRS NS	785 585	167
RB 40 NS	Cleaning brush for tubes Ø40 mm, TRS NS	785 580	167
RB 50 MS	Cleaning brush for tubes Ø40 mm, TRS MS	785 210	171
RD 25 P NS	Round cleaning head with brush, TRS NS	785 570	167
RD 25 S NS	Round cleaning head with scraper, TRS NS	785 560	166
REB 1095 MS	Rectangular brush, TRS MS	785 160	170
RED E27 E14 ÜGK MB	E27/E14 Adapter	745 108	153
RFB NFG MS	Reservoir, without heating element, NFG MS	785 295	187
RK 230 100 AS25	Cleaning head, 230x100 mm	766 056	229
RP 15 ZK MS	Round brush, gear coupling, FRS ZK MS	785 321	174
RP 250 115 20	Cleaning pad, 250x115x20 mm	766 057	229
RS 15104 Z MS	Sponge, 150x100x40 mm, serrated, FRS ZK MS	785 279	175
RS 1544 MS	Sponge, 150x40x40 mm, FRS ZK MS	785 274	175
RS 1574 MS	Sponge, 150x70x40 mm, FRS ZK MS	785 275	175
RSD 15104 Z MS	Sponge, 150x100x40 mm, serrated, FRS ZK MS	785 280	175
RSI 32	Reducing insert, 35/32, TRS MS	785 213	184
RSI 34	Reducing insert, 35/34, TRS MS	785 214	184
RSI 35	Reducing insert, 35/35, TRS MS	785 215	184
RSI 38	Reducing insert, 35/38, TRS MS	785 216	184
RSI 45	Reducing insert, 35/45, TRS MS	785 217	184
RSI 51	Reducing insert, 35/51, TRS MS	785 218	184
RSI 58	Reducing insert, 35/58, TRS MS	785 219	184
RST 36 1000	Rescue rod, 1000 mm	766 040	84

Type / Product Index

Type	Product	Part No.	Page	Type	Product	Part No.	Page
RST 36 1500	Rescue rod, 1500 mm	766 041	84	SM DCA M HR 6 12	DEHNcap/M-HR interface module, 6 ... 12 kV	767 812	59
RST 36 2000	Rescue rod, 2000 mm	766 042	84	SM DCA M HR 10 24	DEHNcap/M-HR interface module, 10 ... 24 kV	767 824	59
S 30 ZK MS	Scraper, gear coupling, FRS ZK MS	785 320	174	SM DCA M HR 20 38	DEHNcap/M-HR interface module, 20 ... 38.5 kV	767 838	59
S60 PS PHE 285	PHE test prod, S 60	767 760	44	SM DCA M LRM 6 12	DEHNcap/M-LRM interface module, 6 ... 12 kV	767 822	59
S61 PS PHE 435	PHE test prod, S 61	767 761	44	SM DCA M LRM 10 24	DEHNcap/M-LRM interface module, 10 ... 24 kV	767 844	59
S62 PS PHE 620	PHE test prod, S 62	767 762	44	SM DCA M LRM 20 38	DEHNcap/M-LRM interface module, 20 ... 38.5 kV	767 868	59
S63 PS PHE 780	PHE test prod, S 63	767 763	24	SPG DCA IT HR	DEHNcap/IT-HR interface test unit	767 121	64
S63 PS PHE 8CK	PHE test prod, S 63 8CK	767 768	24	SPG DCA IT LRM	DEHNcap/IT-LRM interface test unit	767 122	64
S64 PS PHE 880	PHE test prod, S 64	767 764	44	SPN 500	SPN 500 voltage detector, 500 V	766 541	156
S65 M PS PHE 905	PHE test prod, S 65/M	767 767	44	SPN 1000	SPN 1000 voltage detector, 1000 V	766 545	156
S66 PS PHE 880	PHE test prod, S 66	767 771	28	SRA MS	Intakte tube adapter, Ø40/25 mm, TRS MS	785 212	171
SA KLFP SK	Screw adapter, hexagon	795 214	113	SRA NS	Intake tube adapter, Ø40/25 mm, TRS NS	785 515	167
SA KLFP SQ	Screw adapter, T pin	795 213	113	SRH 1180 IS 650 MS	Intake tube, insulating part 650 mm, Ø40 mm, TRS MS	785 119	178
SAG DCA A HR	DEHNcap/A-HR Voltage indicator	767 111	62	SRH 1180 MS	Intake tube, insulating part 525 mm, Ø40 mm, TRS MS	785 120	170
SAG DCA A LRM	DEHNcap/A-LRM Voltage indicator	767 112	62	SRH 400 NS	Intake tube with handle, 400 mm, TRS NS	785 520	165
SAG DCA P HR	DEHNcap/P-HR Voltage indicator	767 101	60	SRV 200 MS	Extension, 200 mm, TRS MS	785 121	170
SAG DCA P LRM	DEHNcap/P-LRM Voltage indicator	767 102	60	SRV 200 NS	Extension, 200 mm, TRS NS	785 521	166
SAK PFE KN	Earth clamp for rails, Tommy bar	792 450	224	SRV 300 NS	Extension, 300 mm, TRS NS	785 522	166
SAK PFE RA	Earth clamp for rails, ratchet	792 453	224	SRV 400 MS	Extension, 400 mm, TRS MS	785 122	170
SBKL EKS TI KVS	Steel plate case, 380x260x80 mm	766 300	150	SRV 400 NS	Extension, 400 mm, TRS NS	785 523	166
SBKL EKS TI KVS 2F	Steel plate case, 440x330x66 mm	766 298	150	SRV 800 MS	Extension, 800 mm, TRS MS	785 123	170
SBKL EKS VI KVS	Steel plate case, 440x330x100 mm	745 900	146	SRW 135 MS	Angled intake tube, 135°, TRS MS	785 132	170
SCH A13 V2A	Pressure plate, A13	525 912	140	SRW 90 MS	Angled intake tube, 90°, TRS MS	785 131	170
SCH A17 V2A	Pressure plate, A17	525 916	140	SRW V MS	Angled intake tube, adjustable, TRS MS	785 130	170
SCS 36 1000	Switching rod, 1000 mm, 36 kV	763 610	81	SRW V NS	Angled intake tube, adjustable, TRS NS	785 530	166
SCS 36 1500	Switching rod, 1500 mm, 36 kV	763 611	81	SSA W D	Intake tube adapter, Ø35/40 mm, TRS NS/MS	785 200	167
SCS 36 2000	Switching rod, 2000 mm, 36 kV	763 612	81	SSC ASH NS	Face shield	785 427	195
SCS 36 STK 1000	Switching rod, 1000 mm, 36 kV	763 100	81	SSK 36 STK 560	Switching head STK	766 164	76
SCS 72 1500	Switching rod, 1500 mm, 72 kV	763 615	81	SSK M12	Switching head, M12	765 005	80
SCS 72 2000	Switching rod, 2000 mm, 72 kV	763 620	81	SSK SQ	Switching head, T pin shaft	765 009	80
SCS 72 STK 1500	Switching rod, 1500 mm, 72 kV	763 150	81	STB 120 MS	Tubular brush, 120 mm, TRS MS	785 170	170
SCSS 36 STK 30	Switching rod kit, Ø30 mm, 36 kV	766 323	75	STB 80 K MS	Tubular brush, conical bristles, Ø80 mm, TRS MS	785 172	171
SDS KEV MS	Insulated screw driver, SD	785 265	189	STB 80 MS	Tubular brush, cylindrical bristles, Ø80 mm, TRS MS	785 171	171
SE E14	Lock-out system, 1000 V, E14	785 639	204	STB 85 K NS	Tubular brush, conical bristles, Ø85 mm, TRS NS	785 555	167
SE E18	Lock-out system, 1000 V, E18	785 650	204	STB 85 Z NS	Tubular brush, cylindrical bristles, TRS NS	785 550	167
SE E27 E33	Lock-out system, 1000 V, E27 + E33	785 640	204	STT 110 15	Canvas bag, Ø150x1100 mm	769 509	223
SE NH0	Lock-out system, 1000 V, NH0	785 642	204	STT 120 30 15	Canvas bag, 1200x300x150 mm	766 704	41
SE NH00	Lock-out system, 1000 V, NH00	785 641	204	STT 180 20	Canvas bag, Ø200x1800 mm	766 039	19
SE NH1	Lock-out system, 1000 V, NH1	785 643	204	STT 55 27 30	Canvas bag, 550x270x300 mm	785 111	185
SE NH2 3	Lock-out system, 1000 V, NH2 + NH3	785 644	204	SZ HH 1060	Fuse tongs, 1060 mm	765 040	83
SE REG 1TE	Lock-out system, 1000 V, 1 mod.	785 638	204	SZ HH 1250	Fuse tongs, 1250 mm	765 041	83
SE REG 2TE	Lock-out system, 1000 V, 2 mods.	785 652	204	SZ HH 1500	Fuse tongs, 1500 mm	765 042	83
SE REG 3TE	Lock-out system, 1000 V, 3 mods.	785 637	204	SZ HH W20 1070	Fuse tongs, angled, 1070 mm	765 050	83
SF FRF MS	Spray bottle, TFRS MS	785 953	183	SZ HH W20 1250	Fuse tongs, angled, 1250 mm	765 051	83
SKL 116 16 10	Sheet metal case, 1160x160x100 mm	766 603	33	SZ HH W20 1500	Fuse tongs, angled, 1500 mm	765 052	83
SKL 92 16 10	Sheet metal case, 920x160x100 mm	766 703	33	TFRS MS	Combined cleaning kit, TFRS MS	785 950	177
SKL 95 21 10	Sheet metal case, 950x210x100 mm	767 701	25	TG DCA	DEHNcap/P test unit	767 110	61
SKL 95 21 10	Sheet metal case, 950x210x100 mm	767 701	21	TRS MS	Dry cleaning kit, TRS MS	785 100	169
SKL 95 21 10 V2	Sheet metal case, 950x210x100 mm	759 003	52	TRS MS V1	Dry cleaning kit, TRS MS V1	785 112	169
SKS M12 25 V2A	Hexagon screw, M12x25 mm	561 925	140	TRS NS	Dry cleaning kit, TRS NS	785 502	165
SKS M12 30 V2A	Hexagon screw, M12x30 mm	561 930	140				
SKS M12 35 V2A	Hexagon screw, M12x35 mm	561 935	140				
SKS M16 30 V2A	Hexagon screw, M16x30 mm	561 931	140				

Type / Product Index

Type	Product	Part No.	Page
UEK 25 FS	Universal earth clamp 25 mm, FS	774 034	129
UEK 25 HG	Universal earth clamp 25 mm, HG	774 234	129
UEK 25 SKN	Universal earth clamp 20 mm, SKN	774 434	129
UEK 30 FS	Universal earth clamp 30 mm, FS	774 130	129
UEK 30 HG	Universal earth clamp 30 mm, HG	774 330	129
UEK 30 SKN	Universal earth clamp 30 mm, SKN	774 530	129
UK 25 SK	Universal earth clamp 25 mm, SK	773 034	127
UK 25 SQ	Universal earth clamp 25 mm, SQ	773 234	127
UK 25 SQL	Universal earth clamp 25 mm, SQL	773 236	128
UK 30 SK	Universal earth clamp 30 mm, SK	773 130	127
UK 30 SQ	Universal earth clamp 30 mm, SQ	773 330	127
UK 30 SQL	Universal earth clamp 30 mm, SQL	773 331	128
UK K25 FL30 HG	Universal earth clamp 30 mm, HG	774 251	224
UK K25 FL30 SQ	Universal earth clamp 30 mm, SQ	773 251	224
V VK13 690	GRP Extension, 690 mm	785 409	201
VL 350 SD KEV MS	Operating rod, extension, SD	785 273	190
VS 500 SPN II	SPN II Extension tip, 500 mm	766 542	156
VS F&G M22 F	Locking screw, F&G, SD	785 281	191
VS GOW M12	Locking screw, GOW, SD	785 284	191
VS KOET M10	Locking screw, Köttingen, SD	785 282	191
VS RAY M14	Locking screw, Raychem, SD	785 283	191

Type	Product	Part No.	Page
WBN 200 2,5M NS	Insulated tape, W=200 mm L=2.5 m	785 646	202
WHSS EA K	Set of warning signs	700 011	157
ZA 25 ISK95 300	Additional conductor, 25 mm ² , 300 mm	740 300	151
ZA 25 ISK95 800	Additional conductor, 25 mm ² , 800 mm	740 800	151

Abbreviations

SK	Hexagon shaft
SQ	T pin shaft
SQL	T pin shaft, long
FS	Wing bolt
HG	Handle
SKN	Tommy bar
EH	Coupling aid
FV	Spring tension

Legal Notes

Since we perform no designing of systems or system components, the suggested applications of our products should be considered as product information and for advisory purposes only. Our oral and written advice on application is based on experience and given to the best of our knowledge. However, it must be also considered without obligation. This applies particularly to the different conditions of use which are beyond our control. We recommend to check whether or not the DEHN product chosen is suitable for the intended application. Application, use and processing of our products take place beyond our control. Therefore, the product is completely subject to the user's responsibility.

All items for transport and storage are delivered without equipment.

Abbreviations:

VPE	Packing unit
VME	Quantity per unit
Instr. No.	Instructions for use No.
ST	Weight per unit
M	Weight per metre
SA	Weight per set

Trademarks:

...MIT SICHERHEIT DEHN.
and our logos



are registered trademarks of
DEHN + SÖHNE GMBH + CO. KG.

General Terms of Sale

1. General, Scope

- 1.1 All deliveries and services in business dealings with entrepreneurs take place exclusively under our general terms of sale (hereinafter "terms of sale"). We oppose deviating regulations, especially conflicting terms of purchase of the customer, unless we expressly agreed to the validity in writing. Our terms of sale apply even if we complete unconditional delivery to the customer while knowing that the terms of sale of the customer are in conflict with our own.
- 1.2 Our terms of sale apply to current business relationships and to all future transactions with the customer.
- 1.3 Collateral agreements must be made in writing.

2. Offer and Order, Reservation of Right of Modification and Copyright

- 2.1 Insofar as not expressly indicated by us as binding, documents such as diagrams, drawings, and measurements are only roughly binding.
- 2.2 Should our order confirmation contain reasonable expansions, limitations, or other modifications with respect to the order, then the customer's agreement is implied, if it does not immediately, at the latest however within 3 business days from receipt of the order confirmation, oppose it.
- 2.3 Our goods are only delivered in the packaging units indicated in the catalogues. If a different number of items is ordered, the amount and price of the net larger packaging unit is considered agreed upon.
- 2.4 We reserve the right to make technical modifications to our services, insofar as such modifications promote technical progress or are unavoidable based on other circumstances and are reasonable for the customer.
- 2.5 We reserve ownership and copyright rights to diagrams, drawings, calculations, and other documents; these may not be made available to third parties without our express written consent.

3. Prices, Value-Added Tax, Packaging Costs

- 3.1 Our prices are subject to change without notice.
- 3.2 Prices include, insofar as nothing else is arranged, customary packaging from our plant without value-added tax. On the day of invoicing, the legally identified VAT amount is to be reimbursed to us.
- 3.3 The cost of non-customary packaging, e.g., collective or seaworthy packaging, is invoiced separately. The customer bears the cost of the disposal or return of packaging.

4. Passing of Risk, Optional Insurance

The risk of accidental loss, destruction, or deterioration passes to the customer upon dispatch to the customer from our plant, even if carriage-paid delivery is agreed upon. At the request and expense of the customer, we will insure the delivery against breakage, damage to goods in transit, and fire damage.

5. Payment Due Dates, Discounts, Right of Refusal, Default, Small Order Quantity Surcharge

- 5.1 Unless otherwise agreed, invoices are payable net 10 days. Purchaser shall pay the costs of payment. Discount amounts are deductible only if they have been agreed on with us and all accounts payable due have been paid.
- 5.2 If purchaser is in default with his payments, interest on the outstanding amount shall be payable at the rate of 8% above the base interest rate. We reserve the right to prove and allege higher default damages. We reserve the right to cause default by demanding early payment. If we are required to advance performance and, if after the execution of the contract, it becomes apparent that our claim, in particular for payment, may be jeopardised by purchaser's inability to perform we may refuse performance.
- 5.3 The customer cannot charge counter-claims against our due payment claims or exercise a right of retention, unless the customer is entitled to a claim recognised by declaratory judgment that is not contested by us and if, while exercising the right of retention, the counter-claim from the customer is based on the same contractual relationship.
- 5.4 Orders, with the exception of cash sales, for which the net amount (invoiced amount without shipping costs and value-added tax) is less than € 75.00, a small order surcharge of € 25.00 will be charged.

6. Retention of Title, Assignment, Release of Securities

- 6.1 Delivered goods remain our property until the payment of all open business claims up to the point of invoicing. The claims of the customer including value-added tax from the resale of reserved goods, i.e., from a work performance using our goods, should already be transferred to us in the amount of the open invoice. In the case that the reserved goods from the customer are sold together with other goods that do not belong to us, whether it be without or after processing, or are delivered within the framework of a working contract, the assignment of the resulting claim of the reserve buyer is calculated in the amount of the value of the reserved goods.
- 6.2 Should the value of the granted securities exceed the claims by more than 20%, we are obliged to retransfer or release the securities upon request. We shall select the securities to be released.
- 6.3 Our goods may only be transferred within the framework of proper business activity. The customer is not allowed to pawn or transfer the ownership of goods that are still in our possession.
- 6.4 At our request, the customer is obliged to inform us of the purchaser and the arranged price and to show the assignment to its debtor.

7. Delivery Period and Appointment

- 7.1 The start of the delivery period presupposes the involvement of the customer for the clarification of all technical questions.
- 7.2 Delivery periods as well as delivery schedules will be appropriately extended if they cannot be adhered to as a result of military mobilisation, war, uprising, strike or lockout, delayed delivery of raw and auxiliary materials, late delivery by our suppliers, or similar circumstances beyond our control. A lasting obstruction under these circumstances gives us the right to withdraw from the contract without liability for damages.

8. Liability for Material and Title Defects

- 8.1 Insofar as there exists a defect of the contract subject that was beyond our control, we can choose to fix the defect or provide a defect-free contract subject (replacement).
- 8.2 Should the replacement (No. 8.1) not function properly, or should it be unreasonable to the customer, or should we seriously and conclusively refuse it or unreasonably delay it, or if other circumstances exist that, upon weighing mutual interests, justify immediate resignation or compensation, then the customer is entitled to choose to lower the contract price or to withdraw from the contract (No. 8.3) or demand compensation (No. 8.4). The customer is not entitled to withdraw from the contract if only insignificant contract inconformities exist, especially insignificant defects.
- 8.3 Insofar as the customer declares its withdrawal from the contract due to material or title defects after proper replacement (No. 8.2), it cannot also claim damages for the defect.
- 8.4 Insofar as the customer declares its withdrawal from the contract due to material or title defects after proper replacement (No. 8.2), it cannot also claim damages for the defect.
- 8.5 Material and title defect claims, including claims for compensation due to material and title defects, with the exception of claims under the Product Liability Act, lapse 12 months after delivery of the goods.
- 8.6 Numbers 8.1 through 8.5 do not impair the customer's rights if we maliciously concealed a defect or if we offered a quality guarantee.

9. Liability for Other Reasons

- 9.1 Our liability is excluded for slightly negligent infringement of immaterial contractual obligations. Our liability is limited to the contractual, foreseeable damages for slightly negligent infringement of other obligations.
- 9.2 The above regulation does not apply to claims under the Product Liability Act. Insofar as the limitation on liability pursuant to No. 9.1 for claims from the producer's liability pursuant to § 823 of the German Civil Code does not interfere, our liability is limited to the replacement of the insurance. Insofar as this does not occur or does not occur in full, we are liable up to the insured amount.

9.3 Insofar as our liability is excluded or limited, this also applies for the personal liability of all of our employees, representatives, and vicarious agents.

9.4 Our liability is unrestricted if the customer loses his/her life or suffers a bodily or health injury due to an action or failure attributable to us.

10. Return of Goods without Legal Liability

- 10.1 If no legal claim to return exists, delivered goods will be accepted only with previous written agreement from us as well as the issuance of a return number. Returns without a return number will be sent back – postage due – to the sender without inspection. The customer bears the shipping costs for the return delivery in No. 10.1.
- 10.2 The goods must still be in their original packaging. Special orders or deliveries, which date back more than three months or the net value of which is less than € 75.00, cannot be returned. A processing fee of 15% of the net value of the goods will be charged to cover the cost of the return. If the goods can no longer be resold at the list price at the time of the return, an additional deduction (old goods deduction) will be made in addition to the processing fee. If we make an exception and agree to accept the return of parts that are unpackaged or that are no longer in their original packaging, an expense remuneration of at least 15% will be charged for reworking and repackaging in addition to the processing fee and, if applicable, the old goods deduction.
- 10.3 Returned goods will only be credited to a new invoice. Credits cannot be used to clear invoices due at the time of the return.

11. Product Information, No Advisory Obligation

Our deliveries are intended only for specialty stores or skilled users. Our user information and instructions are limited to the details of each written product information (e.g., installation instructions, catalogues, data sheets). Further advisory obligations do not exist. Application, use, and processing of the products lie solely in the customer's realm of responsibility.

12. Use and Protection of Customer Data

We use customer data, which concern the business dealings with the customer, in terms of the Federal Data Protection Act.

13. Applicable Law, Jurisdiction

- 13.1 German law applies to the mutual contractual obligations, their materialisation, interpretation, and implementation as well as all resulting contractual and business relationships. The application of the UN Agreement on Contracts on the International Purchase of Goods and the thereafter-enacted laws of the Federal Republic of Germany is excluded.
- 13.2 Place of performance and jurisdiction for delivery, payment, and for all obligations, including those from exchange and check payments, is exclusively Nuremberg. We reserve the right to file a complaint against the customer at its official location.

14. VAT Identification Number

VAT ID No. DE 133251475

DEHN + SÖHNE GmbH + Co. KG.
Nürnberg – Neumarkt

Update October 2005

Template**for Insulating Protective Shutters acc. to DIN VDE 0682, Part 552****for Switchgear Installations with Voltages up to 36 kV****Material: Rigid PVC****1 Customer:**

Company: _____

Address: _____

Address, Country: _____

Person in charge: _____

Dept.: _____

Tel.: _____

JSP _____ / _____For internal use only
Please do not fill in**Switchgear / Installation:**

Type: _____

Nominal voltage: _____

☐ Enquiry☐ Order

Quantity of protective shutters: _____

Remark:

2 Recorded by:

Name: _____

Date/Signature: _____

Internal notes (please do not fill in)

Person in charge:

Dept.	Name	Date	Remark
Service			
Sales			
Purchases			

3 Confirmation of delivery:

The protective shutter(s) has/have been delivered to the above mentioned customer in accordance with the requirements of the template on (date).

This delivery has been subject to random tests in accordance with DIN VDE 0682, Part 552.

Location, Date

Stamp/Signature

Template
for Insulating Protective Shutters acc. to DIN VDE 0682, Part 552
for Switchgear Installations with Voltages up to 36 kV
Material: Rigid PVC



JSP ____ / ____

Type of insulating protective shutter

Type/Application

- ☐ with finger holes for operation by hand (A1)
☐ with finger holes for operation by hand (A4*)
☐ with 1 bayonet pin for working with operating rod (A3)
☐ with 2 bayonet pin for working with operating rod (A3)
☐ rotatable shutter for working with operating rod (A3)
☐ with handle (A2)

Thickness:

_____ mm

Colour:

Type/Insertion

- ☐ Standard type (insertable into guide rails, 9030)
☐ Insert allows for rotation of the shutter (by bearing pin guide)

* Note:

Type A4 – For inserting and removing the shutter, the front of the switchgear installation itself protects the operator from electrical shocks!

Shutter sizes exceeding 1 m² would require 2 persons for operation!

Type of insulating protective shutter

A1: 763 211

A2: 763 221

A3: 763 231

A4: 763 241

Dimension:

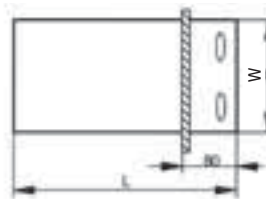
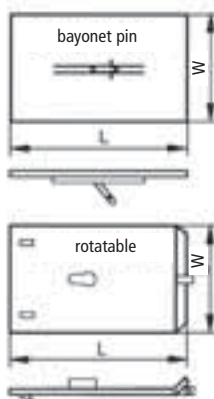
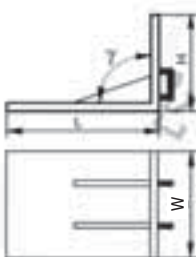
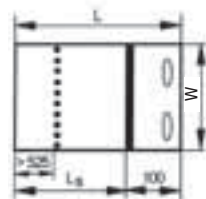
W _____ mm

L _____ mm

L_S _____ mm

H _____ mm

γ _____ The angle of the handle can be selected for angles between 70° to 290°.



Additional sketch for different types

x₁ Rear left corner (panel format)

x₂ Rear left corner (landscape format)

x₂

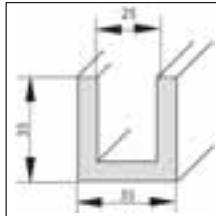
x₁

Template
for Insulating Protective Shutters acc. to DIN VDE 0682, Part 552
for Switchgear Installations with Voltages up to 36 kV
Material: Rigid PVC



Accessories

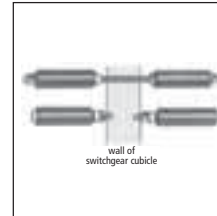
Guide Rails
9030



Bayonet Pin
9040



Bearing Pin
9010 / 9020



Magnetic Support
9060



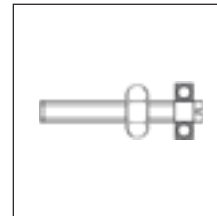
Supporting Device
9070 / 9080



Handle
9050

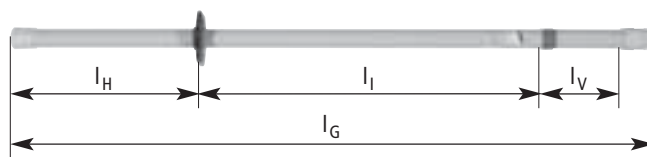


Ball Bearing

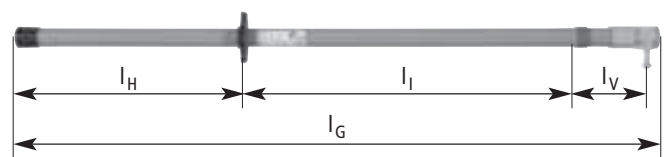


Type	Length in mm	Pieces

Insulating rod for voltages up to 36 kV
 with cone coupling
 for swivel pin



Switching rod for voltages up to 36 kV
 for slotted shutters



Nominal voltage	l_G	l_I	l_H	l_V	Part No. of insulating rod	Part No. of switching rod
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	2028 mm	525 mm	600 mm	890 mm	766 320	
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

Other lengths available on request!

Key Words

Product	Page	Product	Page	Product	Page
Adapter for T pin shaft / hexagon shaft	135	Electric bulb	45	Protective gloves	196
Adapter – Plug-in coupling	20	Electrodes	42	Protective rubber	45
Additional single-pole conductors	151	Equipment programme for live working	161	PSE – Personal safety equipment	198
Adjustable handle with flexible shaft	146	Example of price calculation	122	Regulations	8
Application of voltage detectors	12	Eye	203	RST Rescue rods	84
Artificial leather bag	70	Face shield for safety helmet	195	Safety helmet	195
ASP Non-contact voltage detector kit	35	Fixed ball points	226	Screw adapter SK and SQ	113
Ball head cap , adjustable (4x90°), hexagon shaft	116	Fixed ball points, angled	97	Screw-in earthing insert with M10 terminal	149
Ball head cap, adjustable (4x90°), hexagon shaft	106	Fixed ball points, for round conductors	98	SCS Switching rods	81
Ball head cap, adjustable (4x90°), T pin shaft	117	Fixed ball points, straight and angled	96	SDS	230
Ball head cap, adjustable (4x90°), T pin shaft	107	Fixed clamping points for busbars	113	SDS in NH 00 enclosure	232
Ball head cap, rigid, hexagon shaft	114	Fixed earthing points	99	Sealing ring	45
Ball head cap, rigid, hexagon shaft	104	Fixed phase and earthing points	96	Sealing unit	22
Ball head cap, rigid, T pin shaft	115	Fixed phase points	102	Set of warning signs	157
Ball head cap, rigid, T pin shaft	105	Four-pole to six-pole short-circuiting devices	151	Sheet metal case	70
Ball head caps and universal clamps	126/130	FRS ZK MS Damp cleaning kit	172	Short-circuiting bar	112
Ball head caps Ø20 or 25 mm, rigid	130	Grooved ring Ø16 mm	99	Short-circuiting devices, Type TI	148
Battery	45	Hexagon bolts	140	Short-circuiting devices, Type VI	145
Canvas bag	70	Hook	203/225	Single-pole earthing and discharge devices	158
Clamps with long shaft	128	HSA 194 Non-contact voltage detector	210	Single-pole earthing and short-circuiting devices	
Clip	203	HSA 205 Non-contact voltage detector	38	Ball head cap, rigid	114
Conductor clamp	224	HV STK Extension handle	22	Ball head cap, adjustable (4 x 90°)	116
Connectors	100	Industrial vacuum cleaner	184	Universal clamp, 25 mm	118
Covering material and insulated mats	202	Installation devices	140	Universal clamp, 30 mm	120
DEHNcap	57	Insulated gloves up to 1000 V	198	Single-pole PHV I Phase comparator	50
DEHNcap/A Voltage indicator	62	Insulated platform IW	200	Special locking screws	191
DEHNcap/IT Interface test unit	64	Insulating plug / Insulating blade	204	Spring washers	140
DEHNcap/M Interface modules	59	Insulating protective shutters	85	Square spring-loaded pressure plate	140
DEHNcap/MDS Interface modules	58	Insulating rod kit for cleaning the windows		Storage bags and transport cases, selection chart	70
DEHNcap/P Test unit	61	of electric locomotives	228	Storage devices for earthing and short-circuiting devices and earthing rods	141
DEHNcap/P Voltage indicator	60	Insulating rods for PHE III electronic indicator	18	Switching rod head	80
DEHNcap/PC-LRM Phase comparator	66	IS Insulating rods	78	SZ Fuse tongs	82
DEHNcap test adapter/measuring impedance	68	IS STK Insulating rod kit	74	Telescopic earthing rod	222
DEHNcap Voltage detecting systems	56	Kit for low-voltage installations, fully insulated, type VI	144	Telescopic insulating rod	19
Deltec	161	Kit for low-voltage installations, partly insulated, type TI	147	Terminal lug	227
Design of DEHNcap voltage detecting systems	55	Kit for street lighting installations	152	Test probes	43
Design of phase comparators	47	Lock-out systems	204	Test prods for PHE III Voltage detector	44
Design of voltage detectors	11	Maintenance tests	13	Test prods for PHV	49
Discharge device	158	MS Insulated screw driver	188	TFRS MS Combined cleaning kit	176
Discs	140	NFG MS Refilling device	186	Three-pole Earthing and Short-circuiting Devices	
Earth clamp	150	NH Fuse puller with protective sleeve	195	Ball head cap, rigid	104
Earth clamp for rails	224	Phase connecting elements	124	Ball head cap, adjustable (4 x 90°)	106
Earth connecting elements	129	Phase screw clamps for overhead line conductors	124	Universal clamp, 25 mm	108
Earth connecting plates	101/227	PHE III Electronic indicator	16	Universal clamp, 30 mm	110
Earth connection units	131	PHE III Voltage detector	14	Three-pole earthing and short-circuiting devices with clamps for crane conductor bars	154
Earth milling clamps	132	PHE III Voltage detector kit	22	Three-pole earthing and short-circuiting devices, Type TI	147
Earthing and short-circuiting cables	122	PHE Voltage detector	30	Three-pole earthing and short-circuiting devices, Type VI	144
Earthing cables in accordance with IEC 61138	123	PHE Voltage detector, 16.7 Hz	206	Three-pole earthing busbar	133
Earthing cartridges NH	145/149	PHE/G d.c. Voltage detector	40/212	TRS MS Dry cleaning kit	168
Earthing devices for railways		PHG II Voltage detector	34	TRS NS Dry cleaning kit	164
Kit for construction machines, cranes, maintenance vehicles	220	PHV Test unit	48	Tubular earth electrode with drill	133
Kit for earthing towers	218	Plastic case	70	Two-pole PHV Phase Comparator	48
Kit for overhead contact lines	216	Pneumatic glove tester	199	Two-pole SPN Voltage detector	156
Kit for heating systems of railway points and trains	219	PPE – Personal protective equipment	194	Universal earth clamps	129
Earthing handle	155			Voltage limiting device	230
Earthing kit	133				
Earthing rods, multi-section	138				
Earthing rods, single-section	134				
Earthing rods, telescopic	136				



DEHN + SÖHNE

**Lightning Protection
Surge Protection
Safety Equipment**

DEHN + SÖHNE
GmbH + Co.KG.
Hans-Dehn-Str. 1
Postfach 1640
92306 Neumarkt
Germany

Tel. +49 9181 906-0
Fax +49 9181 906-444
www.dehn.de
export@dehn.de