Safety Equipment

Main Catalogue 2014/2015

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New Products

Passive arc fault protection DEHNcare®

DEHNcare® APJ and APT
- APJ protective jacket, sizes 46 to 58
- APT protective trousers, sizes from 46 to 58

See page 166

Arc fault protection

DEHNcare® APC
- APC protective coat, sizes 48/50, 52/54, 56/58

See page 167

Active arc fault protection system DEHNarc

• Control unit for detecting and extinguishing arc faults
See page 171

• Test case
See page 171

• Connecting cables for the control unit, short-circuiting cartridges and disconnecting blade
See page 172

• Junction piece to be mounted on in-line fuse switch disconnectors
See page 171

• Retaining device for the control unit to be mounted on the switchrack
See page 172

• Short-circuiting cartridge for use in in-line fuse switch disconnectors
• Disconnecting blade for use in in-line fuse switch disconnectors
See page 171

SPN voltage detector
- Extremely shock-proof, waterproof and dustproof enclosure
- Phase, rotation field and continuity test
- No battery required

See page 49

Products for working according to the 5 safety rules

Phase connecting element
- To be screwed to an M16 female thread

See page 84

Round pin clamp
- For round pins in switchgear installations

See page 83

Adapter T pin shaft / long T pin shaft
- Bayonet locking mechanism
- Lock nut allows to fix the adapter on the earthing stick

See page 96

Earth connecting plate
- Made of aluminium

See page 76

Three-pole phase connecting plate with round pin
- For phase clamps

See page 88

Mast adapter for SDS voltage-limiting devices
- To be mounted to the mast profile of the overhead line mast of electric railways
- SDS can be replaced without removing the mast adapter

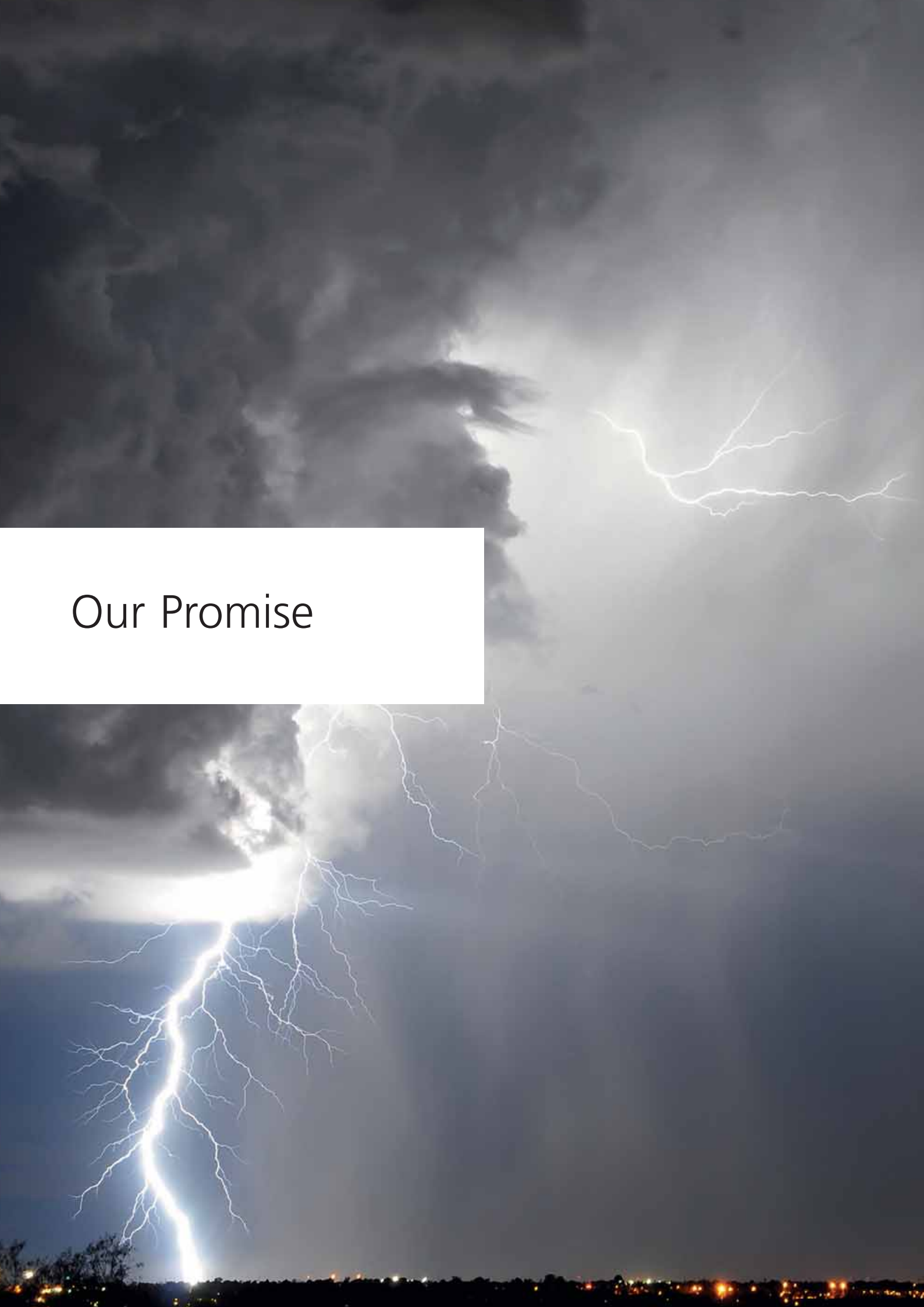
See page 178

Safety Equipment
Main Catalogue 2014/2015

Valid as of 1st January 2014

This catalogue replaces the Safety Equipment Main Catalogue published in 2012/2013.

DS396/E/0114



Our Promise

"We set our goals together with our customers and partners."

Dr. Philipp Dehn
Executive Director

"The future is not an unknown, but a chance."

Dr. Peter Zahlmann
Executive Director

"We focus on our customers in more than 70 countries worldwide."

Helmut Pusch
Executive Director

DEHN protects.

Our family-owned company specialises in surge protection, lightning protection and safety equipment. Therefore, we are doing the utmost to protect lives and assets. Our pioneering spirit and innovative ideas have defined our company for more than 100 years and made us a market leader with more than 1,500 employees. Our market insight, determination and ideas are reflected in our products and safety concepts.

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

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

Fair partnership for the best solution

Our goal is to be a reliable and fair partner for our industrial, commercial and technical customers all over the world. To this end, we always focus on the best solution to eliminate protection problems.

Our sales teams in Germany, our global network of 17 subsidiaries and offices as well as more than 70 international sales partners ensure competent and customer-oriented marketing of our products. Proximity and close contact to our customers is of utmost importance to us, be it on-site support by our experienced team, our telephone hotline or personal contact at trade fairs. In hundreds of seminar, workshops, trainings and conferences held every year throughout the world, we impart practical knowledge on our products and solutions based on specific sample applications, physical interactions and standardisation. Our "Lightning Protection Guide" and brochures will broaden your practical knowledge.

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

DEHN + SÖHNE GmbH + Co.KG.

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1. VDE standards for safety equipment and devices

DIN VDE 0680

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

Part 1 "Personal protective equipment and protective insulating devices"

Part 3 "Operating rods and current collecting devices"

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

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

Part 7 "Socket spanner"

DIN VDE 0681

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

Part 1 "General requirements" for DIN VDE 0681 Parts 2 to 4 (and draft DIN VDE V 0681-1/01.2013)

Part 2 "Operating rods" (and draft DIN VDE V 0681-1/01.2013)

Part 3 "Fuse tongs" (and draft DIN VDE V 0681-1/01.2013)

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

DIN VDE 0682

"Apparatus and equipment for live working"

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

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

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

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

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

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

Part 321 "Electrically insulating helmets for use on low voltage installations" (EN 50365)

Part 401 "Two-pole low voltage type" (IEC/EN 61243-3)

Part 411 "Capacitive type to be used for voltages exceeding 1 kV a.c." (IEC/EN 61243-1)

Part 412 "Resistive type to be used for voltages of 1 kV to 36 kV" (IEC/EN 61243-2)

Part 415 "Voltage detecting systems" (IEC/EN 61243-5)

Part 417 "Voltage detectors – Distance voltage detectors" (preliminary standard DIN VDE V 0682-417/ 10.2013)

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

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

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

Part 513 "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 "Insulating protective barriers above 1 kV"

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

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

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

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

DIN VDE 0683

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

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

Part 200 "Earthing or earthing and short-circuiting equipment using lances as a short-circuiting device – Lance earthing" (IEC/EN 61219)

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	Coating material
gal Sn	Tin-plated
gal Zn	Galvanised
tZn	Hot-dip galvanised
Brass gal Sn	Bronze, tin-plated

2.2 Types of conductors

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

5. Maintenance Tests

3. Minimum lengths of insulating elements for

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

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

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

4. Application

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

Symbol used in our cat.	Application
	**Not suitable for use in wet weather conditions** For indoor and outdoor installations For use in indoor and outdoor installations, but not in wet weather conditions.
	**Suitable for use in wet weather conditions** For indoor and outdoor installations For use in indoor and outdoor installations, in all weather conditions (even if the operating stick gets wet).
	**For indoor installations only!**

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

Work according to the 5 Safety Rules

When working in and on electrical installations, the following five safety rules must be observed to prevent electrical accidents:

Five safety rules:

1. Disconnect completely

The electrical installation must be disconnected from live parts on all poles.

2. Secure against re-connection

Re-connection must be reliably prevented to ensure that an installation where work is in progress is not accidentally re-connected. This is achieved, for example, by replacing the unscrewed fuses in low-voltage installations by lockable lock-out devices.

3. Verify that the installation is dead

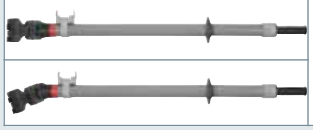
Suitable measuring / test equipment such as voltage detectors must be used to verify on all poles that the installation is dead.

4. Carry out earthing and short-circuiting

After verifying that the installation is dead, the cables and the earthing system are connected to short-circuit-proof earthing and short-circuiting devices.
It must be observed that the relevant parts must be earthed before they are short-circuited.

5. Provide protection against adjacent live parts

According to the five safety rules, adjacent parts are parts located in the vicinity zone. If parts of an electrical installation in the vicinity of the work location cannot be disconnected, additional precautions must be taken before work starts as is the case with work in the vicinity of live parts.

Product	Type	Nominal voltage U_N / Frequency f_N	Application	Page
IS STK Insulating Stick Kit				
	**IS STK Insulating Stick Kit**	up to 36 kV / 50 Hz	For use in indoor and outdoor installations Anti-rotation plug-in coupling protected against bridging Easy transport due to modular sticks Kits for a variety of applications For use as switching stick, earthing stick or operating stick	10
IS Insulating Sticks				
	**IS Insulating Sticks**	up to 123 kV / 50 Hz	For use in indoor and outdoor installations Screw-on switching stick head allows for use as switching stick Supporting head with hexagon shaft or T pin shaft For use as earthing stick For use as operating stick for insulating protective shutters	13
SCS Switching Sticks				
	**SCS Switching Sticks**	up to 123 kV / 50 Hz	For indoor and outdoor installations Fully insulated, massive switching stick head Allows deep access into the installation For use as operating stick for insulating protective shutters	16
SZ Fuse Tongs				
	**SZ Fuse Tongs**	up to 36 kV / 50 Hz	Operating head with two adjustable jaws Straight or 20° angled operating head Secure clamping Wide clamping range from Ø30 to 90 mm	18
RST Rescue Rods				
	**RST Rescue Rods**	up to 36 kV / 50 Hz	For use in indoor and outdoor installations Fully insulated and fixed rescue hook For rescuing persons from the live working zone in the event of an electrical accident	20
Storage Bags and Transport Cases				
	Sheet metal or plastic case Artificial leather or canvas bag			185
Maintenance Tests				176
	According to German regulations (BGV A3), operating sticks have to be tested for compliance with the prescribed limits as stated in the Electrical Safety Rules. This test is performed in the high-voltage test laboratory of DEHN + SÖHNE and includes – measurement of the leakage current, – test for protection against bridging, – visual inspection, manual tests and measurements. This maintenance test is documented in a test report and on the device. Prior to each use, operating sticks must be visually inspected for signs of damage or any other defect.			

IS STK Insulating Stick Kit

Work according to the 5 Safety Rules

Nominal Voltages up to 36 kV / 50 Hz

1. Disconnect completely – Operating Sticks

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

Easy and safe working

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

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 164	6 ✹	766 463
2	766 365	6 🌧	766 468
3	766 465	7	766 456
4	766 356	8	766 466
5 ✹	766 363	9	766 996
5 🌧	766 367		

For more detailed information on these products, see Accessories chapter

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

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

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

Dirt-repellent end fittings with plug-in coupling

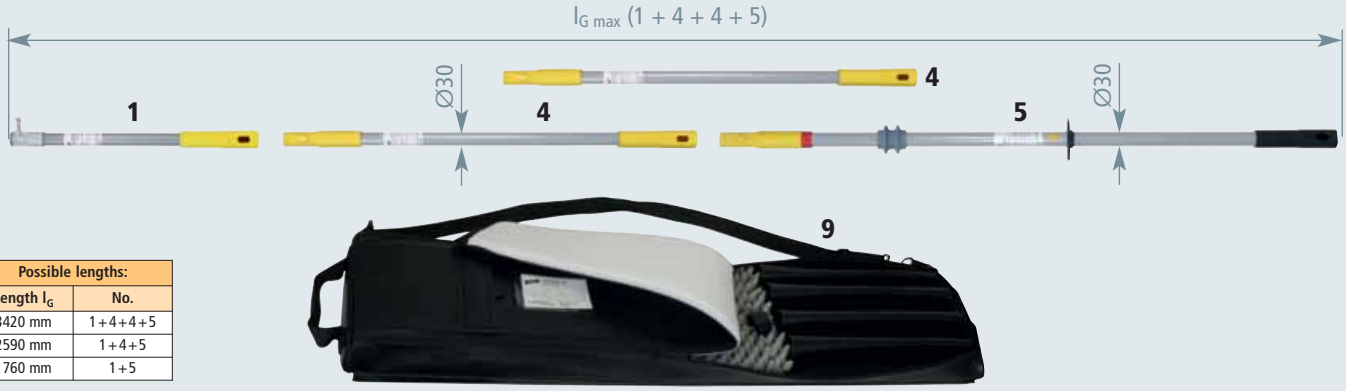
Accessories, spare parts and kit parts from page 193

Work according to the 5 Safety Rules

IS STK Insulating Stick Kit

1. Disconnect completely – Operating Sticks

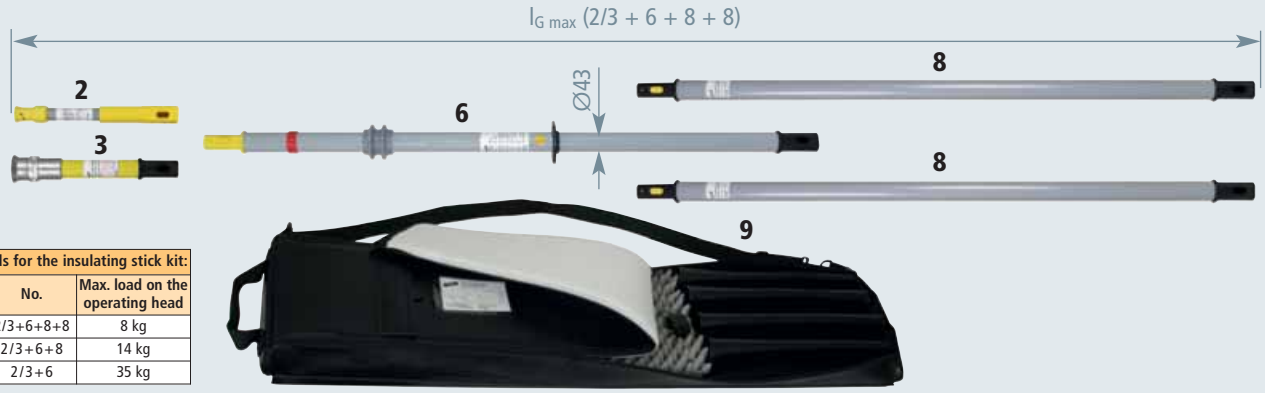
Switching Stick Kit Ø30 mm



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

Type	SCSS 36 STK 30	SCSSN 36 STK 30
Part No.	766 323	766 324
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV
Max. total length ($l_{G\,max}$)	3420 mm	3420 mm
For	☀	☂

Earthing Stick Kit Ø43 mm



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

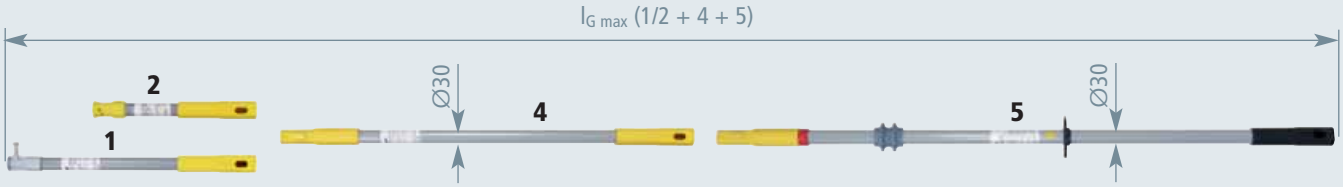
Type	ESS STK 43	ESSN STK 43
Part No.	766 450	766 451
Max. total length ($l_{G\,max}$)	3960 mm	3960 mm
For	☀	☂

IS STK Insulating Stick Kit

Work according to the 5 Safety Rules

Earthing Stick Kit Ø30 mm

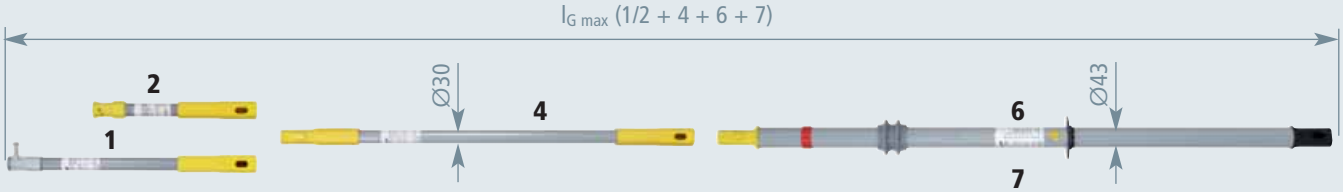
1. Disconnect completely – Operating Sticks



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

Type	ASS 36 STK 30	ASSN 36 STK 30
Part No.	766 325	766 326
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV
Max. total length ($l_{G\,max}$)	2590 mm	2590 mm
For	☀	☁

Earthing Stick Kit Ø43 mm



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

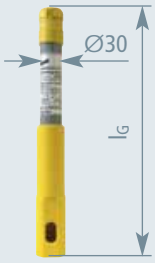
Type	ASS 36 STK 30 43	ASSN 36 STK 43
Part No.	766 452	766 453
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV
Max. total length ($l_{G\,max}$)	3420 mm	3420 mm
For	☀	☁

Accessory for IS STK Insulating Stick Kit

Operating Head with plug-in Coupling / hexagon Shaft

For indoor use

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



Accessories, spare parts and kit parts from page 193

Easy and safe working

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

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

IS SK insulating stick fitted with SSK M12 switching stick head.

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

General Information:	
Standard (switching stick head)	E DIN VDE V 0681-2
Standard (insulating stick)	E DIN VDE V 0681-1
Standard (operating stick)	DIN VDE 0682-552
Not suitable for use in wet weather conditions	
For use in wet weather conditions	
For	Indoor and outdoor installations
Material	Glass-fibre reinforced polyester tube

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

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

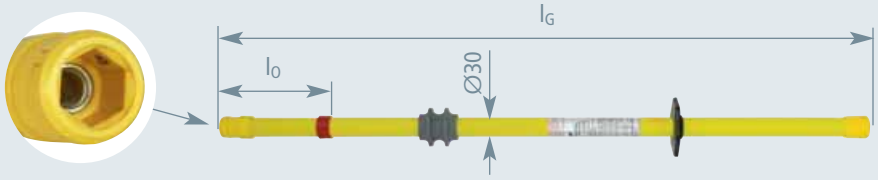
IS Insulating Sticks

Work according to the 5 Safety Rules

Insulating Stick, hexagon Shaft

1. Disconnect completely – Operating Sticks

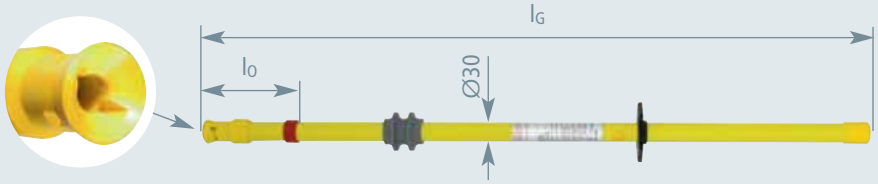
With M12 thread and spring locking mechanism
- Can be used as switching stick by attaching a switching stick head (Part No. 765 005)
- Can be used as earthing stick



Type	IS 36 SK 1000	IS 36 SK 1500	ISN 36 SK 1000	ISN 36 SK 1500
Part No.	**766 001**	**766 002**	**766 210**	**766 215**
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV
Total length (l_G)	1000 mm	1500 mm	1000 mm	1500 mm
Insertion depth (l_0)	175 mm	475 mm	175 mm	475 mm
For	✹	✹	🌧	🌧

Insulating Stick, T Pin Shaft

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

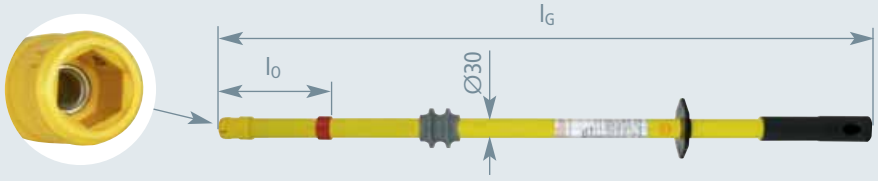


Type	IS 36 SQ 1000	IS 36 SQ 1500	ISN 36 SQ 1000	ISN 36 SQ 1500
Part No.	**766 311**	**766 315**	**766 211**	**766 216**
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV
Max. load on the operating head *)	17 kg	17 kg	17 kg	17 kg
Total length (l_G)	1025 mm	1525 mm	1025 mm	1525 mm
Insertion depth (l_0)	150 mm	500 mm	150 mm	500 mm
For	✹	✹	🌧	🌧

*) Max. shutter weight when inserting insulating protective shutters

Insulating Stick, hexagon Shaft, plug-in Coupling

With M12 thread, spring locking mechanism and plug-in coupling for extending the handle
- Can be used as switching stick by attaching a switching stick head (Part No. 765 005)
- Can be used as earthing stick



Type	IS 36 SK STK 1000	IS 123 SK STK 2000	ISN 36 SK STK 1000
Part No.	**766 100**	**766 122**	**766 111**
Nominal voltage (U_N)	1 ... 36 kV	1 ... 123 kV	1 ... 36 kV
Total length (l_G)	1000 mm	2000 mm	1000 mm
Insertion depth (l_0)	175 mm	200 mm	175 mm
For	✹	✹	🌧

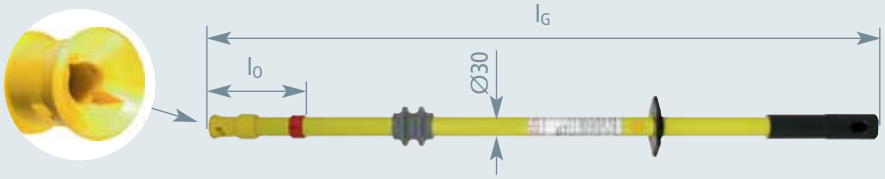
Accessories, spare parts and kit parts from page 193

1. Disconnect completely – Operating Sticks

Insulating Stick, T Pin Shaft, plug-in Coupling

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

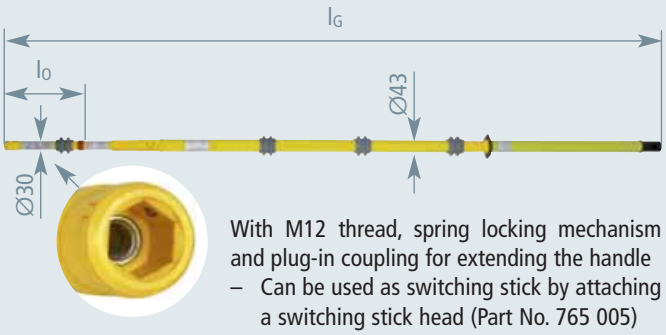
- Can be used as switching stick by attaching a switching stick head (Part No. 765 009)
- Can be used as earthing stick
- Can be used as operating stick for inserting insulating protective shutters



Type	IS 36 SQ STK 1000	IS 123 SQ STK 2000	ISN 36 SQ STK 1000
Part No.	**766 301**	**766 322**	**766 310**
Nominal voltage (U_N)	1 ... 36 kV	1 ... 123 kV	1 ... 36 kV
Max. load on the operating head *)	17 kg	8 kg	17 kg
Total length (l_G)	1025 mm	2000 mm	1025 mm
Insertion depth (l_O)	150 mm	200 mm	150 mm
For	☀	☀	☂

*) Max. shutter weight when inserting insulating protective shutters

Insulating Stick, detachable, hexagon Shaft, plug-in Coupling

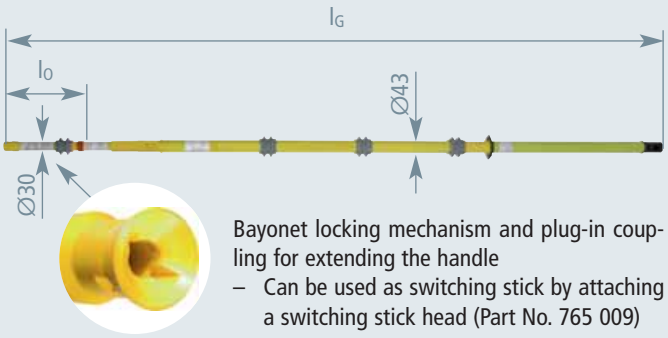


With M12 thread, spring locking mechanism and plug-in coupling for extending the handle

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

Type	ISN 123 SK STK 2500
Part No.	**766 222**
Nominal voltage (U_N)	123 kV
Total length (l_G)	2490 mm
Insertion depth (l_O)	285 mm
For	☂

Insulating Stick, detachable, T Pin Shaft, plug-in Coupling



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

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

Type	ISN 123 SQ STK 2500
Part No.	**766 332**
Nominal voltage (U_N)	123 kV
Total length (l_G)	2495 mm
Insertion depth (l_O)	290 mm
For	☂

Accessory for IS Insulating Sticks

Screw-on Switching Stick Head for IS SK Insulating Sticks

With M12 thread

In accordance with E DIN VDE V 0681-2

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

Accessory for IS Insulating Sticks

Switching Stick Head for IS SQ Insulating Sticks

With T pin shaft (bayonet locking mechanism)

In accordance with E DIN VDE V 0681-2

T pin shaft in accordance with DIN 48087

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

Type	SSK SQ
Part No.	**765 009**
Material	Polyamide

SCS Switching Sticks

Work according to the 5 Safety Rules

Nominal Voltages up to 123 kV / 50 Hz

1. Disconnect completely – Operating Sticks

Switching a disconnector by means of an SCS switching stick

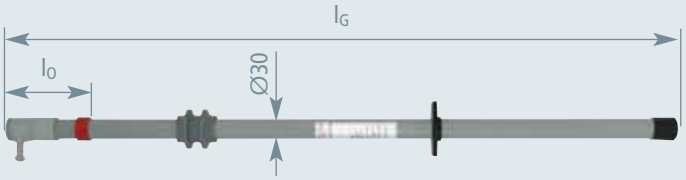
Easy and safe working

- Cost-effective
- User-friendly

General Information:	
Standard (switching stick head)	E DIN VDE V 0681-2
Standard (switching stick)	E DIN VDE V 0681-1 and -2
Standard (insulating stick)	E DIN VDE V 0681-1
Standard (operating stick)	DIN VDE 0682-552
Not suitable for use in wet weather conditions	☀
For use in wet weather conditions	🌧
For	Indoor and outdoor installations
Design	Fully insulated, massive switching stick head
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (switching pin)	Steel, plastic-sheathed

Nominal Voltages up to 72.5 kV

With end cap



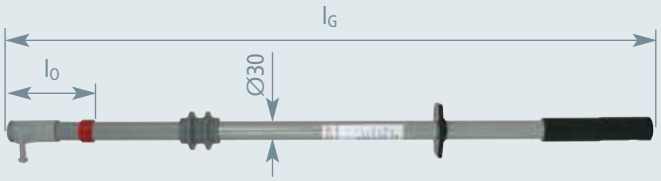
Type	SCS 36 1000	SCS 36 1500	SCS 36 2000	SCS 72 1500	SCS 72 2000	SCSN 36 1000	SCSN 36 1500	SCSN 36 2000
Part No.	763 610	763 611	763 612	763 615	763 620	763 510	763 511	763 512
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV	1 ... 72.5 kV	1 ... 72.5 kV	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV
Max. load on the operating head	17 kg	17 kg	9 kg	—	—	17 kg	17 kg	9 kg
Total length (l_G)	1030 mm	1500 mm	2000 mm	1500 mm	2000 mm	1030 mm	1500 mm	2000 mm
Insertion depth (l_0)	135 mm	415 mm	765 mm	290 mm	690 mm	135 mm	415 mm	765 mm
For	☀	☀	☀	☀	☀	🌧	🌧	🌧

Accessories, spare parts and kit parts from page 193

1. Disconnect completely – Operating Sticks

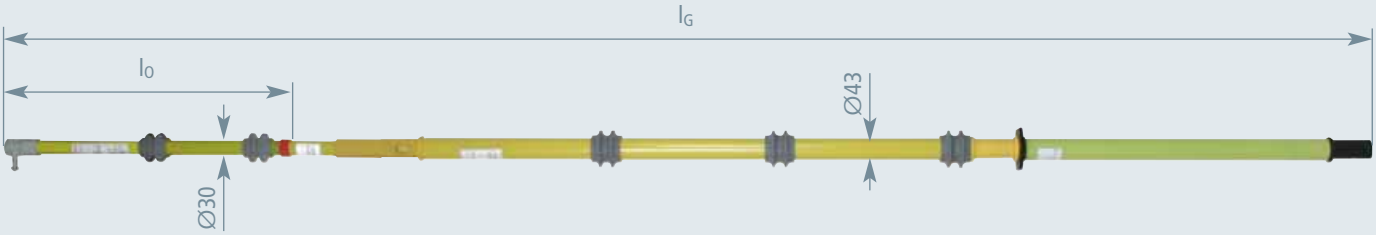
Nominal Voltages up to 123 kV

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



Type	SCS 36 STK 1000	SCS 72 STK 1500	SCS 123 STK 2000	SCSN 36 STK 1000
Part No.	**763 100**	**763 150**	**763 180**	**763 111**
Nominal voltage (U_N)	1 ... 36 kV	1 ... 72.5 kV	1 ... 123 kV	1 ... 36 kV
Max. load on the operating head	17 kg	—	—	17 kg
Total length (l_G)	1000 mm	1500 mm	2000 mm	1000 mm
Insertion depth (l_O)	135 mm	290 mm	200 mm	135 mm
For	☀	☀	☀	🌧

Nominal Voltages up to 123 kV, modular



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

Type	SCSN 123 STK 2800
Part No.	**763 181**
Nominal voltage (U_N)	123 kV
Total length (l_G)	2840 mm
Insertion depth (l_O)	640 mm
For	🌧

SZ Fuse Tongs

Work according to the 5 Safety Rules

Nominal Voltages up to 36 kV / 50 Hz

1. Disconnect completely – Operating Sticks

SZ fuse tongs for inserting and removing HV HBC fuses

Easy and safe working

- User-friendly

General Information:	
Standard	DIN VDE 0681-3
Not suitable for use in wet weather conditions	✷
Design	Straight and 20° angled clamp body
Clamping range	Wide clamping range from Ø30 to 90 mm
Material (insulating stick)	Glass-fibre reinforced polyester tube
Material (operating head)	Glass-fibre reinforced polyamide
Material (adjustable handle)	Polyamide
Material (reducing insert)	Polyamide
Colour	Grey

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

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

The reducing insert delivered with the SZ fuse tong allows low clamping ranges from Ø30 to 50 mm.
Without reducing insert, HV HBC fuses from Ø50 to 90 mm can be actuated.

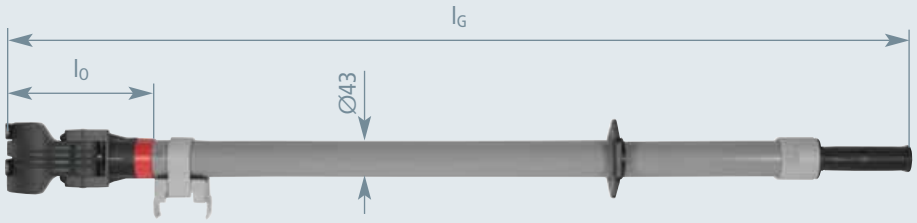
Accessories, spare parts and kit parts from page 193

Work according to the 5 Safety Rules

SZ Fuse Tongs

1. Disconnect completely – Operating Sticks

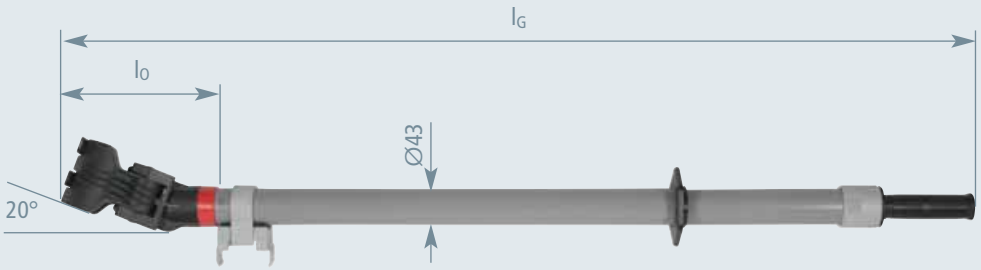
Straight SZ Fuse Tong



Type	SZ HH 1060	SZ HH 1250	SZ HH 1500
Part No.	765 040	765 041	765 042
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV
Clamping range	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm
Total length (l_G)	1060 mm	1250 mm	1500 mm
Insertion depth (l_O)	185 mm	185 mm	185 mm

*) Only if used with reducing insert

20° angled SZ Fuse Tong



Type	SZ HH W20 1070	SZ HH W20 1250	SZ HH W20 1500
Part No.	765 050	765 051	765 052
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV
Clamping range	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm	30 ... 50*) / 50 ... 90 mm
Total length (l_G)	1070 mm	1250 mm	1500 mm
Insertion depth (l_O)	195 mm	195 mm	195 mm

*) Only if used with reducing insert

Accessory for SZ Fuse Tongs

Storage Devices for HV HBC Fuses

Wall-mounted

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

Storage Devices for HV HBC Fuses and Fuse Tong

Wall-mounted

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

Note: Two storage devices are required!

Accessory for SZ Fuse Tongs

Storage Device Kit for HV HBC Fuses or HV HBC fuses and Fuse Tong

Wall-mounted

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

RST Rescue Rods

Work according to the 5 Safety Rules

Nominal Voltages up to 36 kV / 50 Hz

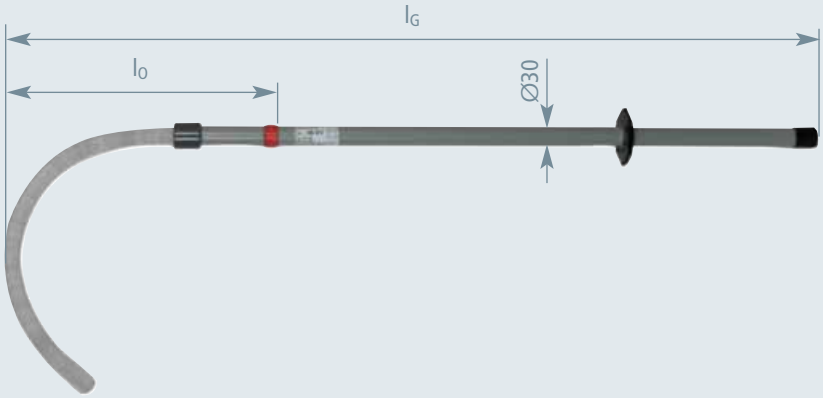
1. Disconnect completely – Operating Sticks

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

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

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

Rescue Rod up to 36 kV



Type	RST 36 1000	RST 36 1500	RST 36 2000
Part No.	766 040	766 041	766 042
Nominal voltage (U_N)	1 ... 36 kV	1 ... 36 kV	1 ... 36 kV
Total length (l_G)	1235 mm	1695 mm	2195 mm
Insertion depth (l_O)	410 mm	620 mm	970 mm

Accessories, spare parts and kit parts from page 193

2. Secure against Re-Connection – Lock-out Systems

Nominal Voltages up to 1000 V

- Protection against re-connection
- Symbol "Nicht schalten" [Do not close the circuit] acc. to German regulations (VBG 125)
- Insulating plugs for screw inserts
- Insulating blades for NH fuse holders
- Lock-out systems for circuit breakers

Lock-out system for three modular widths

General Information:	
Standard	VBG 125 and DIN 40008
For	Indoor installations

Lock-out System

For single-pole and multipole circuit breakers with a clamping range of 45 mm

Type	SE REG 1TE	SE REG 2TE	SE REG 3TE
Part No.	785 638	785 652	785 637
Size	1 modular width	2 modular widths	3 modular widths
Dimensions	52 x 17 mm	52 x 34 mm	52 x 51 mm

Insulating Plug

For screw inserts

Type	SE E14	SE E18	SE E27 E33
Part No.	785 639	785 650	785 640
Size	E14	E18	E27 and 33
Diameter	20 mm	25 mm	45 mm
Dimensions	Ø20 x 40 mm	Ø25 x 40 mm	Ø45 x 55 mm

Insulating Blade

For NH fuse holders and distribution blocks

Type	SE NH00	SE NH0	SE NH1	SE NH2 3
Part No.	785 641	785 642	785 643	785 644
Size	00	0	1	2 and 3
Blade	13 x 5 mm	38 x 5 mm	38 x 5 mm	38 x 5 mm
Dimensions	80 mm	125 mm	135 mm	150 mm

3. Verify that the Installation is dead – Voltage Detectors

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

Only electrotechnically skilled or instructed persons are allowed to verify safe isolation from supply voltage on all poles at the work location or as close as possible to the work location.

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

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

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

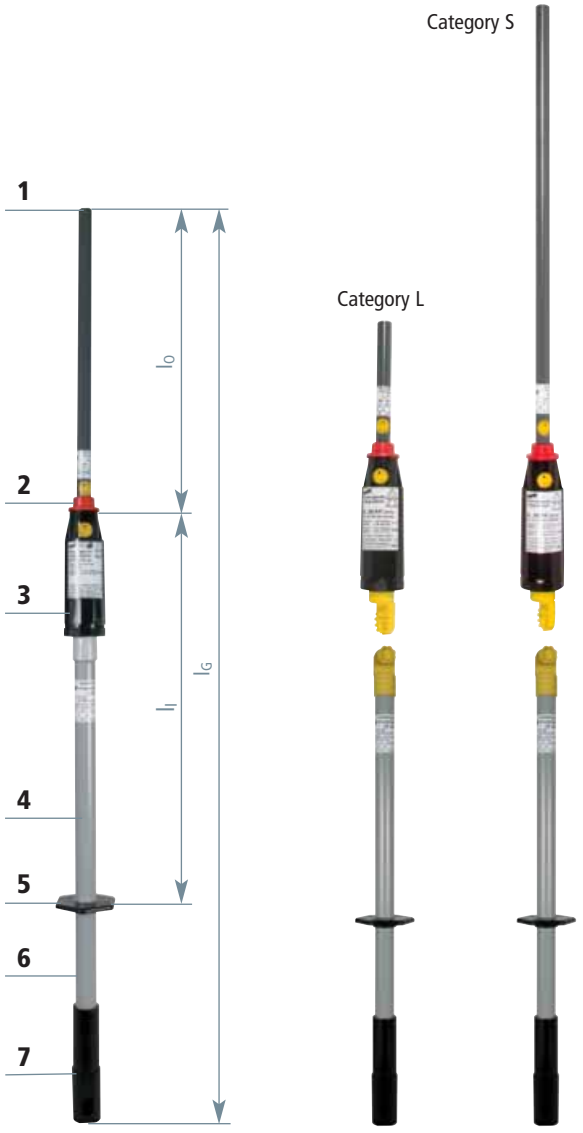
Voltage detectors labelled with "For indoor use only" may only be used in indoor installations.

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

Design of voltage detectors
Voltage detectors according to IEC/EN 61243-1 (DIN VDE 0682-411) are **single-pole** devices designed to make contact with the part of the installation to be tested.
There are **two mechanically different designs** of voltage detectors: Complete and separate voltage detectors.
Complete voltage detectors (PHE III, PHE and PHG II) consist of an insulating stick, indicator and test prod and are tested as a complete unit.
Separate voltage detectors (PHE III indicator with test prod) must be attached to a suitably rated insulating stick.
Single-pole **voltage detectors** typically consist of a **handle**, **insulating element**, **indicator** and **test prod** with **contact electrode**.

The **insulating element** is the section of a voltage detector between the hand guard and the red ring. It ensures that the user maintains an adequate safety distance for safe operation.
The **test prod** (contact electrode extension) with a contact electrode **above the red ring** allows to reach remote parts of the installation and to **eliminate** the influence of **interference fields**.
Voltage detectors are classified into two categories based on their behaviour in case of interference fields or their field of application.
Voltage detectors of **category L** (line) with a short test prod (without contact electrode extension) are designed for use on overhead lines.
Voltage detector of **category S** (switchgear) with a long test prod (with contact electrode extension) are resistant to interference fields and are therefore used in switchgear installations. They are also suitable for overhead lines.

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



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

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

Application of Voltage Detectors

in factory assembled switchgear installations

Tests carried out in cooperation with switchgear manufacturers have shown that our PHE, PHE III and PHG II voltage detectors (category "S") can be used in factory assembled switchgear installations (e.g. in accordance with DIN VDE 0670 or EN/IEC 62271-200 (DIN VDE 0671-200)).

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

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

Accessories, spare parts and kit parts from page 193

Work according to the 5 Safety Rules – 3. Verify that the Installation is dead

Selection Guide

Product	Type	Nominal voltage U_N / Frequency f_N	Application, Indication	Page
PHE III Voltage Detector				
	**PHE III** **PHE III indicator with test prod** **PHE III Kit**	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 20 kV / 50 Hz 60...110 and 60...132 kV / 50 Hz	For use in wet weather conditions For indoor and outdoor installations With self-testing element Visual and acoustic indicator Easy transport Fast battery replacement without additional tools	26 29 31
PHE Voltage Detector				
	**PHE** **PHE Kit**	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 15 kV / 16.7 Hz	For use in wet weather conditions For indoor and outdoor installations With self-testing element Visual indicator Easy transport	37 40
Non-Contact Voltage Detector				
	**ASP** **HSA**	110...420 kV / 50 Hz or 16.7 Hz 1...420 kV / 50 Hz	For use in wet weather conditions Non-contact voltage detector For overhead lines and outdoor switching stations With self-testing element Visual and acoustic indicator	42 44
PHG II Voltage Detector				
	**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	46
PHE/G d.c. Voltage Detector				
	**PHE/G**	1...24 kV / d.c. voltage	For use in wet weather conditions For indoor and outdoor installations With self-testing element Visual indicator Easy transport Two-pole unit (one stick / two sticks)	47
SPN Voltage Detector				
	**SPN**	100...500 V 120...1000 V	For use in wet weather conditions Two versions with different measuring ranges No batteries required Can also be used in overhead line networks by attaching extension prods	50
Storage Bags and Transport Cases				
	Sheet metal or plastic case Artificial leather or canvas bag			185

Maintenance Tests

176

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

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

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

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

PHE III Voltage Detector

Nominal Voltages up to 30 kV / 50 Hz

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

Safe verification of isolation from supply voltage

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

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

Testing with integrated electrode

Testing with screwed-on V-shaped electrode

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

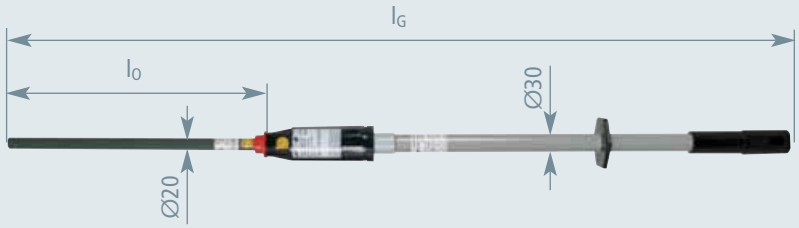
Universal gear coupling allows to adjust the angle of the voltage detector

Accessories, spare parts and kit parts from page 193

PHE III Voltage Detector

Nominal Voltages up to 30 kV / 50 Hz, M12 Thread

Category "S"



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

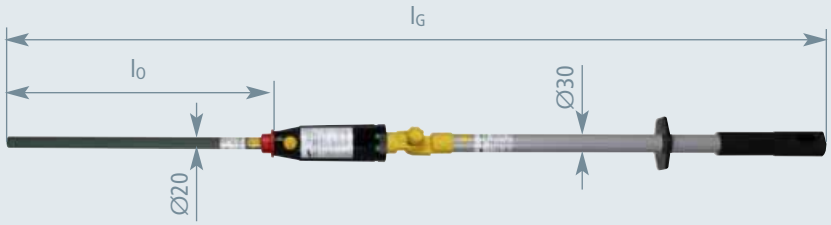
Type	PHE3 3 10 S	PHE3 6 20 S	PHE3 10 30 S
Part No.	767 711	767 721	767 731
Nominal voltage (U_N)	3 ... 10 kV	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	1415 mm	1575 mm	1675 mm
Insertion depth (l_O)	620 mm	780 mm	880 mm

Type	PHE3 25 S 50 1P
Part No.	767 125
Nominal voltage (U_N)	25 kV
Total length (l_G)	1680 mm
Insertion depth (l_O)	880 mm

For single-ended monophase installations

Nominal Voltages up to 30 kV / 50 Hz, Gear Coupling

Category "S"



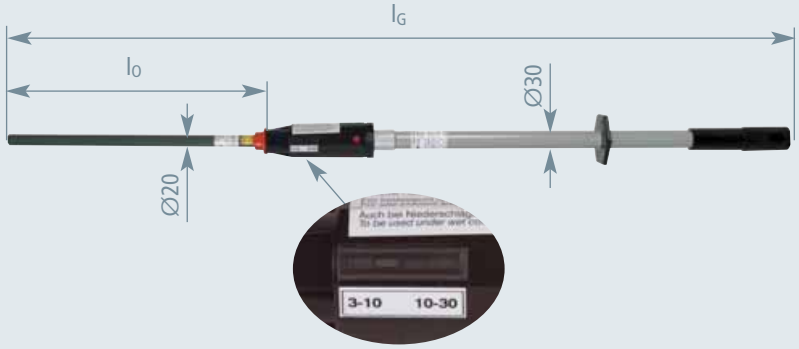
Type	PHE3 3 S ZK	PHE3 6 S ZK	PHE3 10 S ZK	PHE3 20 S ZK	PHE3 30 S ZK
Part No.	767 903	767 906	767 910	767 920	767 930
Nominal voltage (U_N)	3 kV	6 kV	10 kV	20 kV	30 kV
Total length (l_G)	1150 mm	1150 mm	1150 mm	1300 mm	1485 mm
Insertion depth (l_O)	285 mm	285 mm	285 mm	435 mm	620 mm

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

Nominal Voltage Ranges up to 30 kV / 50 Hz, switchable / M12 Thread

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

Category "S"



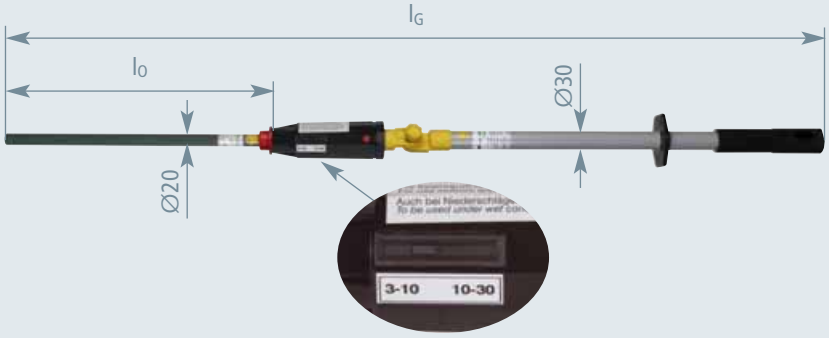
Type	PHE3 U 3 30 S
Part No.	767 733
Nominal voltage (U_N)	3 ... 10 / 10 ... 30 kV
Total length (l_G)	1675 mm
Insertion depth (l_O)	880 mm

PHE III Voltage Detector

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

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

Category "S"

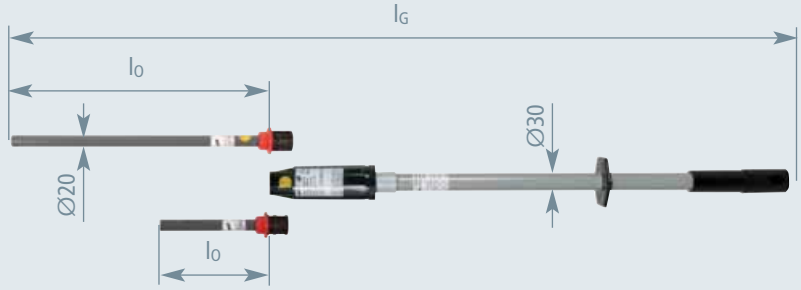


Type	PHE3 U 3 30 S ZK
Part No.	767 960
Nominal voltage (U_N)	3 ... 10 / 10 ... 30 kV
Total length (l_G)	1745 mm
Insertion depth (l_O)	880 mm

Nominal Voltage Ranges up to 30 kV / 50 Hz, Test Set, M12 Thread

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

Category "S" and "L"

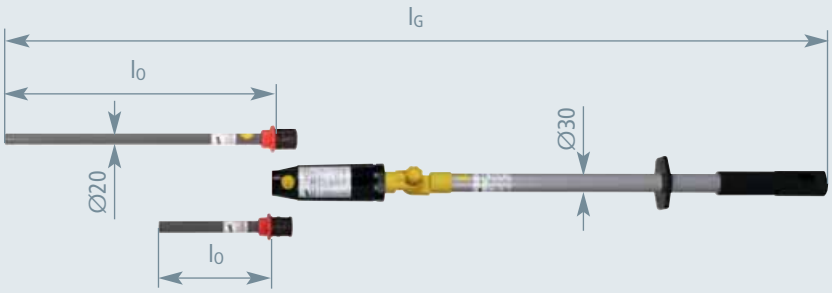


Type	PHE3 6 20 SL	PHE3 10 30 SL
Part No.	767 740	767 750
Nominal voltage (U_N)	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	1575 / 980 mm	1675 / 980 mm
Insertion depth (l_O)	780 / 185 mm	880 / 185 mm

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

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

Category "S" and "L"



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

Accessories, spare parts and kit parts from page 193

PHE III ZK Indicator with Test Prod

Nominal Voltages up to 30 kV / 50 Hz

Safe verification of isolation from supply voltage

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

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

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

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

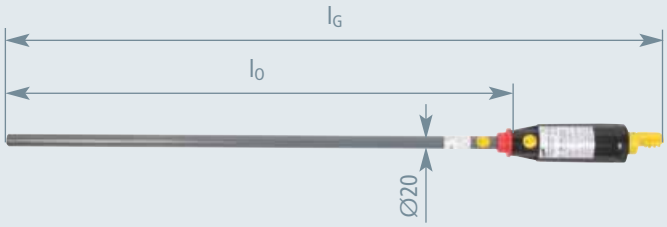
Standby function
The PHE III indicator with test prod has a standby function that automatically activates the device as soon as contact with energised equipment is made (without previous self-test) and visually and acoustically indicates "voltage present". When making contact with de-energised equipment,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

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

PHE III ZK Indicator with Test Prod

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

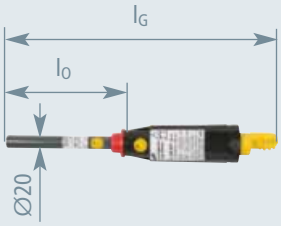
Category "S"



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

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

Category "L"



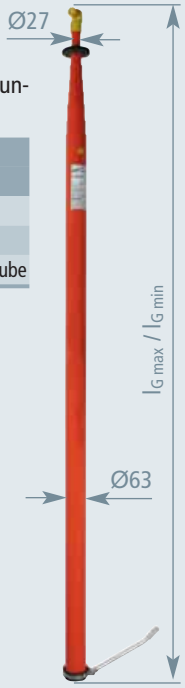
Type	PHE3 PK6 20 L SB ZK	PHE3 PK10 30 L SB ZK
Part No.	767 922	767 932
Nominal voltage (U_N)	6 ... 20 kV	10 ... 30 kV
Total length (l_G)	415 mm	415 mm
Insertion depth (l_O)	185 mm	185 mm

Accessory for PHE III ZK Indicator with Test Prod

For PHE III Indicator with Test Prod, with universal Gear Coupling

With scale for measuring the ground clearance, mounted support included

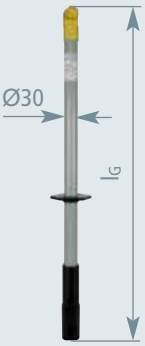
Type	ISMTC N 36 ZK 10600
Part No.	766 037
Nominal voltage (U_N)	Up to 36 kV
Total length ($l_{G\,max}$ / $l_{G\,min}$)	10,600 / 1750 mm
Material	Glass-fibre reinforced epoxy resin tube



Accessory for PHE III ZK Indicator with Test Prod

or PHE III Indicator with Test Prod, with universal Gear Coupling

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



Accessories, spare parts and kit parts from page 193

PHE III Voltage Detector Kit

Nominal Voltage 10 ... 132 kV / 50 Hz

Safe verification of isolation from supply voltage

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

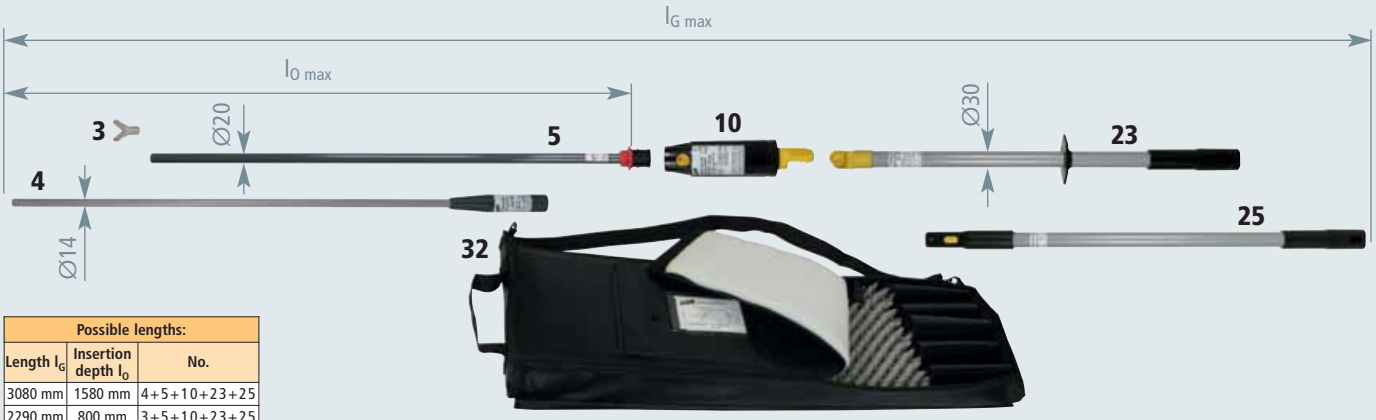
PHE III voltage detector used on a 110 kV outdoor station

Kid includes:							
Pos. No.	Part No.	Pos. No.	Part No.	Pos. No.	Part No.	Pos. No.	Part No.
1	766 924	**10**	767 722	**19**	767 129	**28**	766 128
2	766 923	**11**	767 972	**20**	766 352	**29**	766 120
3	766 927	**12**	767 974	**21**	766 359	**30**	766 049
4	766 960	**13**	767 734	**22**	766 358	**31**	766 889
5	767 763	**14**	767 726	**23**	766 368	**32**	767 996
6	767 764	**15**	767 732	**24**	766 037	**33**	766 996
7	767 766	**16**	767 735	**25**	766 335	**34**	766 036
8	767 771	**17**	767 963	**26**	766 114	**35**	766 998
9	767 772	**18**	767 965	**27**	766 115	**36**	766 039
For more detailed information on these products, see Accessories chapter							

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

PHE III Voltage Detector Kit

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



Possible lengths:		
Length l_G	Insertion depth l_O	No.
3080 mm	1580 mm	4+5+10+23+25
2290 mm	800 mm	3+5+10+23+25
1660 mm	800 mm	3+5+10+23

Category "S"

Type	PHE3S 20 S ZK
Part No.	**767 724**
Nominal voltage (U_N)	20 kV
Total length ($l_{G\ max}$)	3080 mm
Insertion depth ($l_{O\ max}$)	1580 mm

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

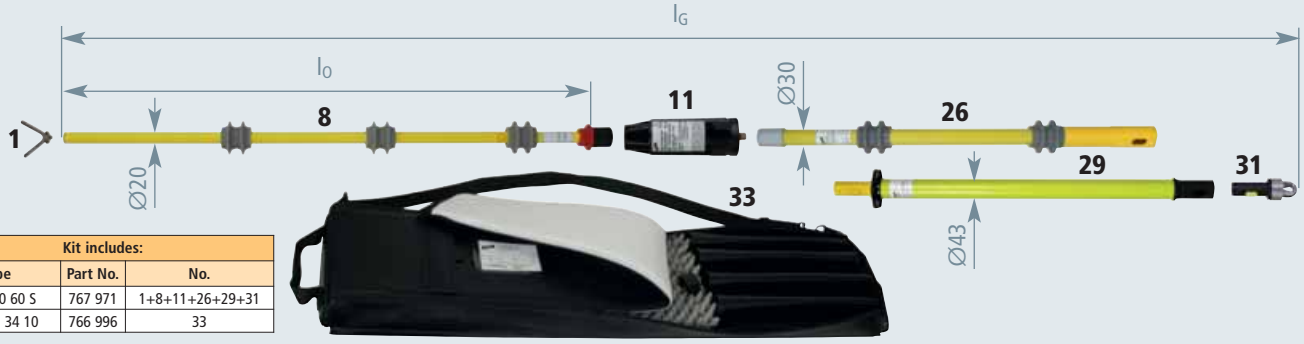
Category "L"

Type	PHE3S 20 L ZK
Part No.	**767 725**
Nominal voltage (U_N)	20 kV
Total length ($l_{G\ max}$ / $l_{G\ min}$)	11,000 / 2150 mm
Insertion depth (l_O)	190 mm

Accessories, spare parts and kit parts from page 193

PHE III Voltage Detector Kit

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

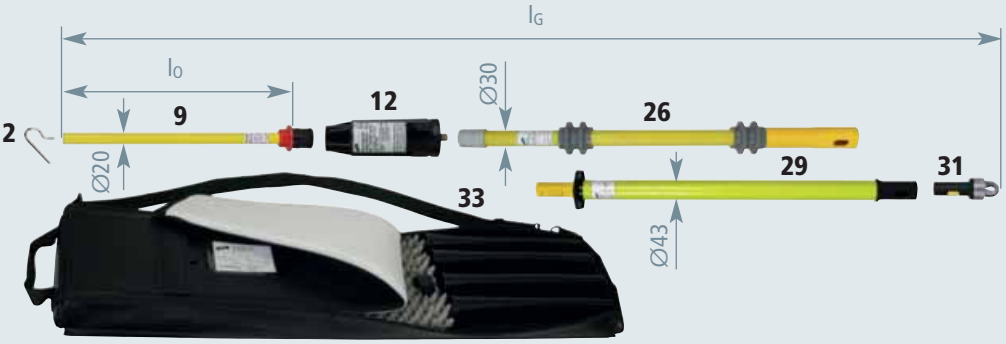


Kit includes:		
Type	Part No.	No.
PHE3 30 60 S	767 971	1+8+11+26+29+31
KLT 133 34 10	766 996	33

Category "S"

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

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

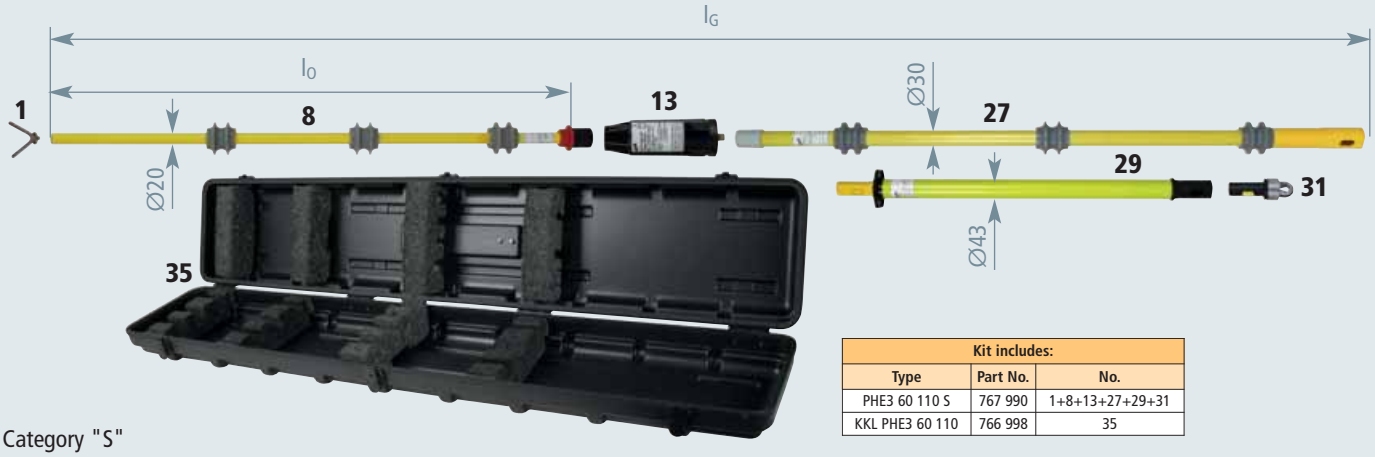


Kit includes:		
Type	Part No.	No.
PHE3 30 60 L	767 973	2+9+12+26+29+31
KLT 133 34 10	766 996	33

Category "L"

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

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



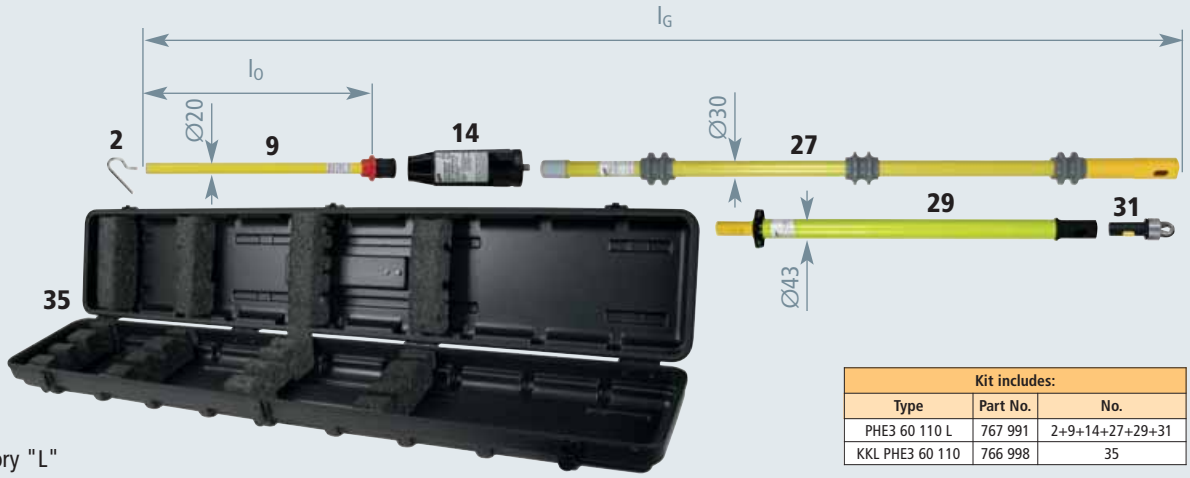
Kit includes:		
Type	Part No.	No.
PHE3 60 110 S	767 990	1+8+13+27+29+31
KKL PHE3 60 110	766 998	35

Category "S"

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

PHE III Voltage Detector Kit

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

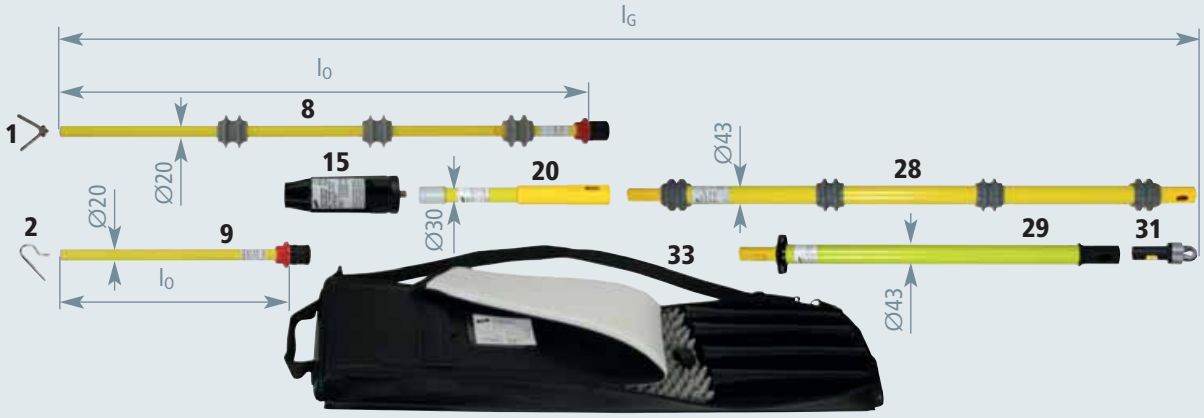


Kit includes:		
Type	Part No.	No.
PHE3 60 110 L	767 991	2+9+14+27+29+31
KKL PHE3 60 110	766 998	35

Category "L"

Type	PHE3S2 60 110 L
Part No.	767 981
Nominal voltage (U_N)	60 ... 110 kV
Total length (l_G)	2540 mm
Insertion depth (l_0)	380 mm

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



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

Kit includes:		
Type	Part No.	No.
PHE3 60 132 SL	767 992	1+2+8+9+15+20+ 28+29+31
KLT 133 34 10	766 996	33

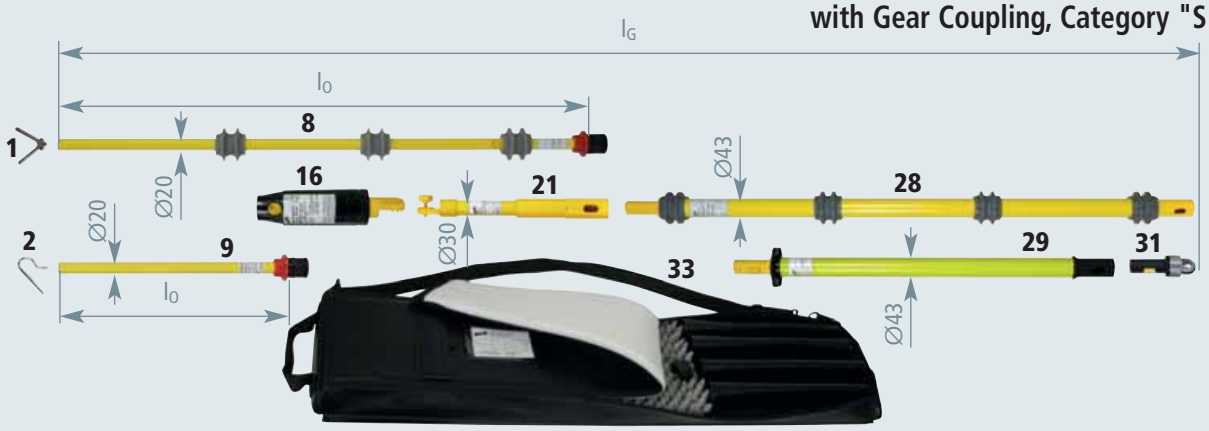
Category "S" and "L"

Type	PHE3S2 60 132 SL
Part No.	767 982
Nominal voltage (U_N)	60 ... 132 kV
Total length (l_G)	3440 / 2950 mm
Insertion depth (l_0)	880 / 380 mm

Accessories, spare parts and kit parts from page 193

PHE III Voltage Detector Kit

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



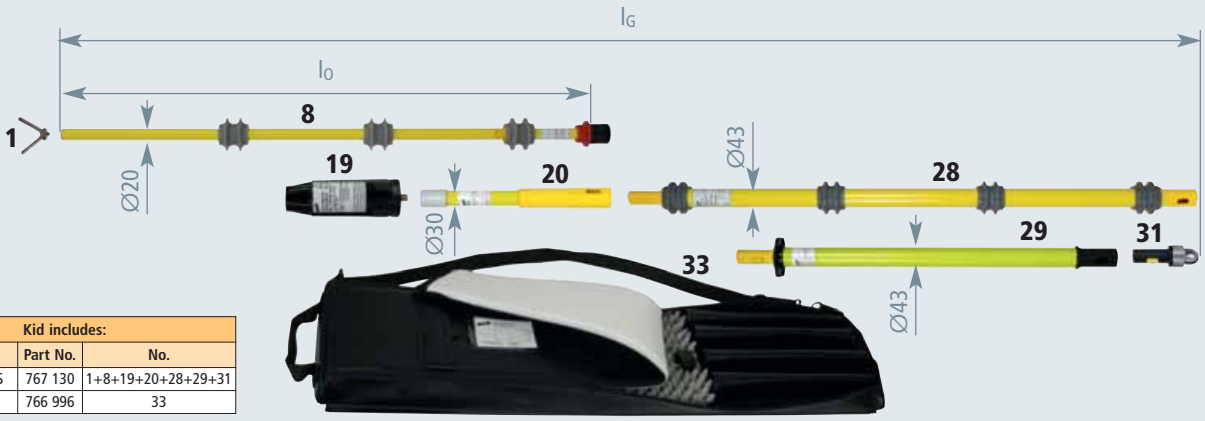
The test set includes two test prods of different lengths which are labelled "S" (long test prod) and "L" (short test prod) on the rating plate.

Category "S" and "L"

Kit includes:		
Type	Part No.	No.
PHE3 60 132 SL ZK	767 993	1+2+8+9+16+21+ 28+29+31
KLT 133 34 10	766 996	33

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

Nominal Voltage Range 110 ... 132 kV / 50 and 16.7 Hz, Category "S"



Kid includes:		
Type	Part No.	No.
PHE3 110 132 S	767 130	1+8+19+20+28+29+31
KLT 133 34 10	766 996	33

For 50 Hz three-phase systems and 16.7 Hz centre-earthed monophase traction power lines
Range does not have to be switched

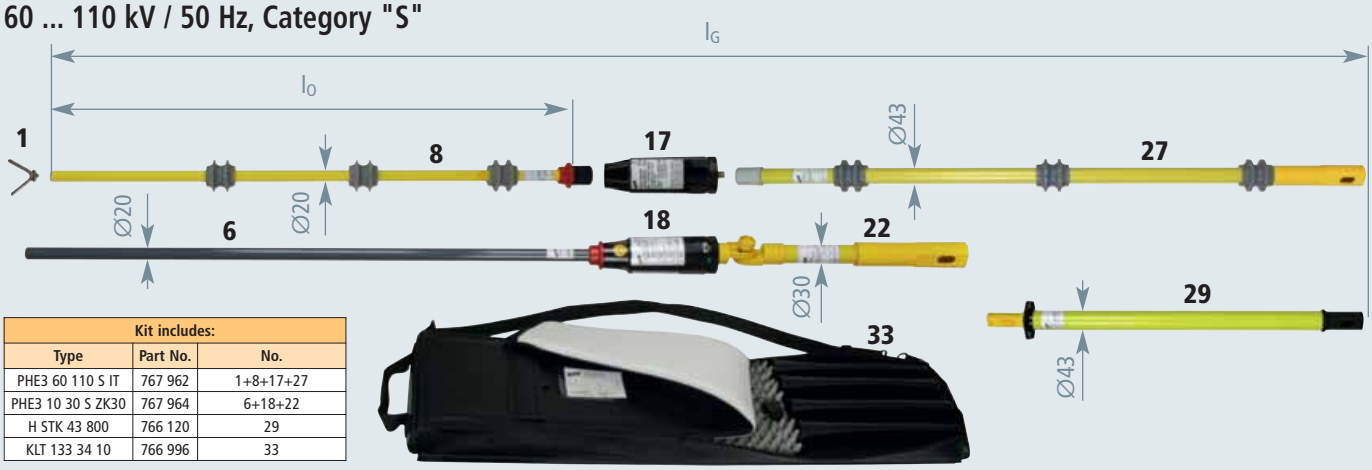
Category "S"

Type	PHE3S 110 132 S
Part No.	767 131
Nominal voltage (U_N)	110 ... 132 kV
Frequency	50 and 16.7 Hz
Total length (l_G)	3440 mm
Insertion depth (l_O)	880 mm
DB drawing No.	3 Eku 710 001
DB material No.	01 101 358

Accessories, spare parts and kit parts from page 193

PHE III Voltage Detector Kit

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



Kit includes:		
Type	Part No.	No.
PHE3 60 110 S IT	767 962	1+8+17+27
PHE3 10 30 S ZK30	767 964	6+18+22
H STK 43 800	766 120	29
KLT 133 34 10	766 996	33

With two voltage detectors of category "S"

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

Accessories, spare parts and kit parts from page 193

Easy and safe testing

- Reliable indication
- Easy to use

PHE voltage detector with visual indication

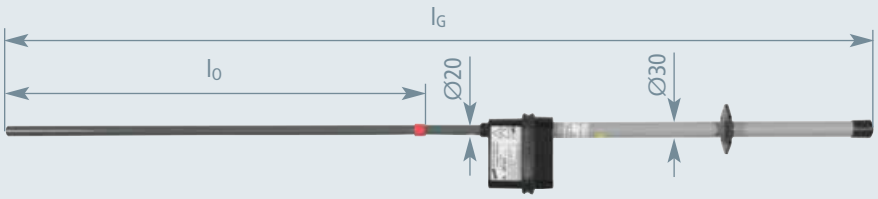
Before testing the installation for safe isolation from supply voltage, the voltage detector must be tested for correct operation. When pressing the "TEST" button, the red indicator light flashes.

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

General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682-411) and E DIN VDE 0682-421
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
For use in wet weather conditions	
For	Indoor and outdoor installations
Indication	Visual
Self-testing element	Yes
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Nominal Voltages up to 30 kV / 50 Hz

Category "S"



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

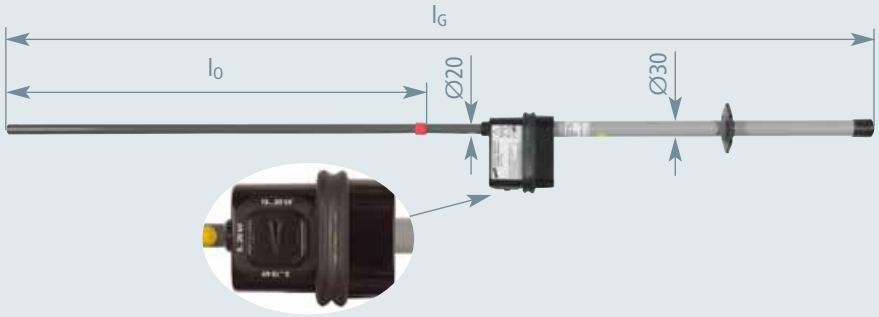
Type	PHE 3 10 S	PHE 6 20 S	PHE 15 30 S
Part No.	767 410	767 420	767 430
Nominal voltage (U_N)	3 ... 10 kV	6 ... 20 kV	15 ... 30 kV
Total length (l_G)	1375 mm	1565 mm	1565 mm
Insertion depth (l_O)	580 mm	770 mm	770 mm

PHE Voltage Detector

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

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

Category "S"



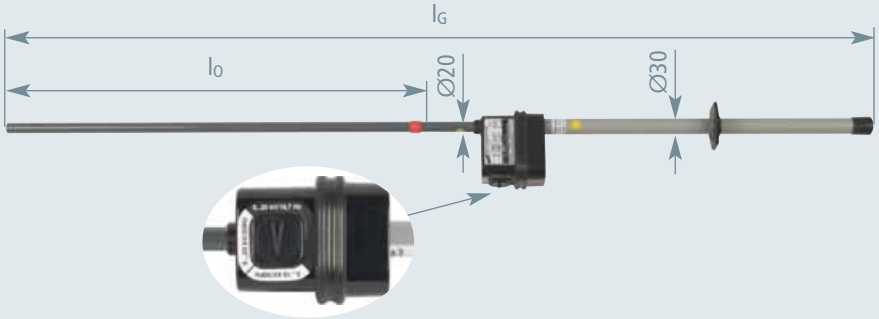
Type	PHE U 3 30 S
Part No.	767 433
Nominal voltage (U_N)	3 ... 10 / 6 ... 20 / 15 ... 30 kV
Total length (l_G)	1565 mm
Insertion depth (l_O)	770 mm

Nominal Voltage Ranges 20 kV / 50 Hz or 16.7 Hz, switchable

For three-phase systems and single-ended monophase switchgear installations

Special features of the switchable voltage detector:
The selector switch can be moved into three positions for the relevant voltage and frequency ranges:
3 ... 10 kV / 50 Hz – Three-phase current
6 ... 20 kV / 50 Hz – Three-phase current
6 ... 20 kV / 16.7 Hz –
Single-ended monophase systems

For safety reasons, the detector can only be switched on if the selector switch is switched to the most sensitive range of 3 kV to 10 kV / 50 Hz. The switch snaps into the relevant position and provides protection against accidental switching. A magnetically operated, wear-resistant reed switch changes the switching position.

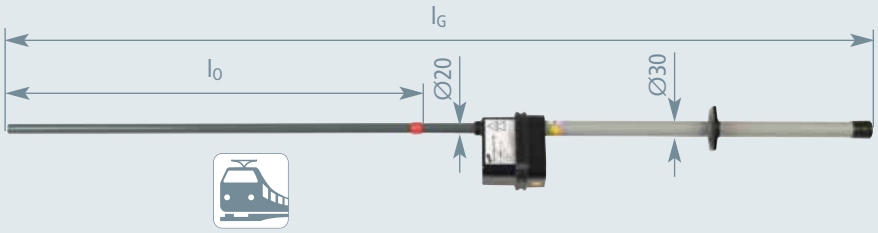


Type	PHE 3 20 S FU 1P
Part No.	767 416
Nominal voltage (U_N)	3 ... 20 kV
Total length (l_G)	1560 mm
Insertion depth (l_O)	770 mm
DB drawing No.	3 Ebgw 02.54
DB material No.	743 361

Accessories, spare parts and kit parts from page 193

Nominal Voltage Ranges up to 20 kV / 16.7 Hz

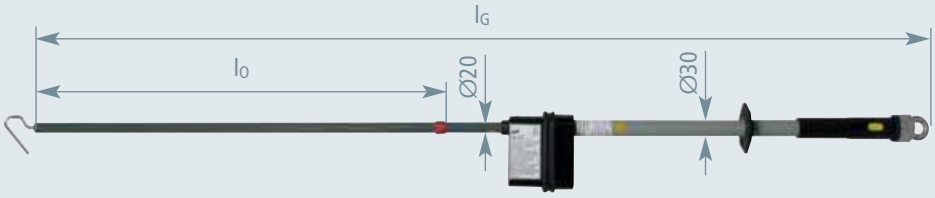
For single-ended monophase switchgear installations and point heating systems



Type	PHE 6 20 S 16.7 1P
Part No.	**767 415**
Nominal voltage (U_N)	6 ... 20 kV
Frequency	16.7 Hz
Total length (l_G)	1560 mm
Insertion depth (l_O)	770 mm

Nominal Voltage 15 kV / 16.7 Hz

For traction power lines
Hook-shaped electode and end fitting with plug-in coupling and non-slip eye included



Use for traction power lines

Voltage detectors for traction power lines have a shorter extension than voltage detectors for overhead contact lines. To ensure reliable indication, the PHE 15 16.7 BEL STK voltage detector may only be used for traction power lines, but not for other components of overhead contact lines. Moreover, it must not be used from ladder trolleys for overhead contact lines.
Traction power lines are supply lines, line feeders, bypass lines, connecting lines, feeder lines, 15 kV cables, cable sealing ends, switch lines and transverse switch lines.

Type	PHE 15 16.7 BEL STK
Part No.	**767 413**
Nominal voltage (U_N)	15 kV
Frequency	16.7 Hz
Total length (l_G)	1645 mm
Insertion depth (l_O)	765 mm

PHE Voltage Detector Kit

Nominal Voltage 15 kV / 16.7 Hz

PHE voltage detector with visual indicator used on an overhead contact line of German Railways (DB)

Easy and safe testing

- For overhead contact lines of electric railways
- Cost-effective / space-saving transport
- Easy to use due to simple plug-in system

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 619	7	766 076
2	766 678	8	766 077
3	766 677	9	766 889
4	766 072	10	766 602
5	766 075	11	766 704
6	766 073		

For more detailed information on these products, see Accessories chapter

General Information:	
Standard	DIN VDE 0681-6
For use in wet weather conditions	
Indication	Visual
Self-testing element	Yes
Material (test electrode)	St/gal Zn
Material (test prod)	Glass-fibre reinforced polyester tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube

Insulating stick with anti-rotation plug-in coupling

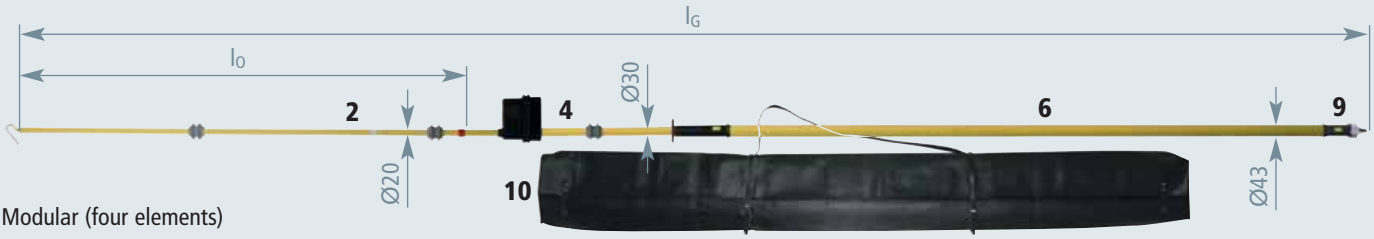
End fitting with plug-in coupling and non-slip eye

Two-part test prod with robust threaded coupling (six-part kit for transport in motor vehicles)

Accessories, spare parts and kit parts from page 193

PHE Voltage Detector Kit

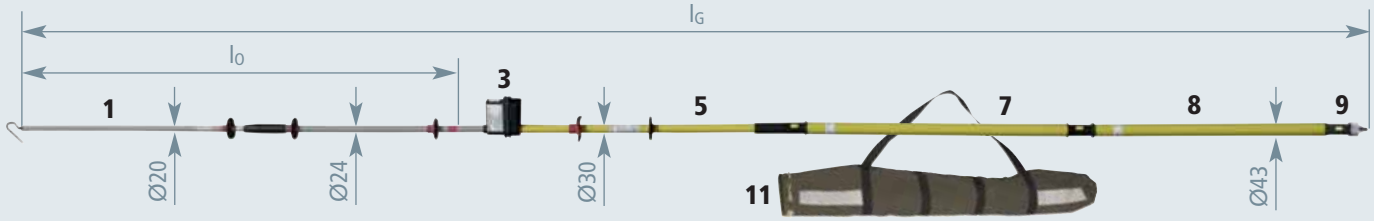
Nominal Voltage 15 kV / 16.7 Hz



Modular (four elements)

Type	PHE 15 16.7 4T TA
Part No.	766 616
Nominal voltage (U_N)	15 kV
Frequency	16.7 Hz
Total length (l_G)	4890 mm
Insertion depth (l_O)	1675 mm
DB drawing No.	3 Ebgw 02.51
DB material No.	237 129

Nominal Voltage 15 kV / 16.7 Hz (for Transport in Motor Vehicles)



Modular (six elements)

Type	PHE 15 16.7 6T TA
Part No.	766 617
Nominal voltage (U_N)	15 kV
Frequency	16.7 Hz
Total length (l_G)	4900 mm
Insertion depth (l_O)	1675 mm
DB drawing No.	3 Ebgw 02.53
DB material No.	652 975

ASP Non-Contact Voltage Detector

Nominal Voltage Range 110 ... 420 kV / 50 Hz

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

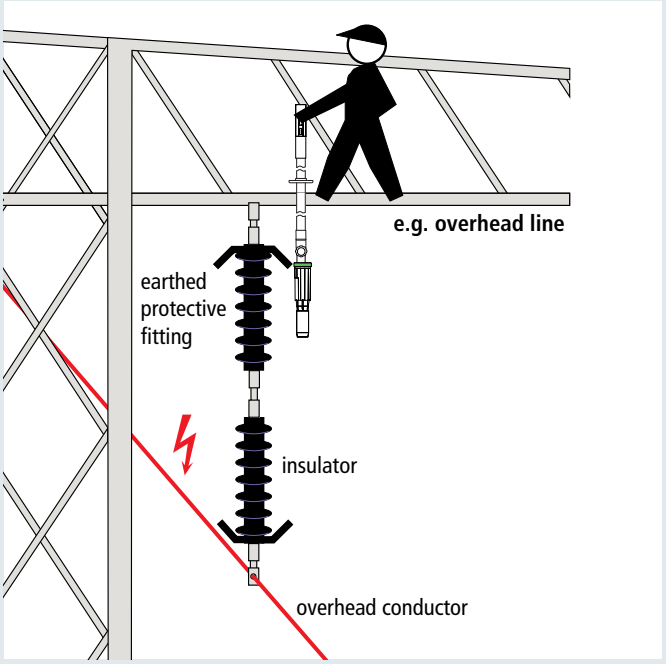
Easy and safe testing

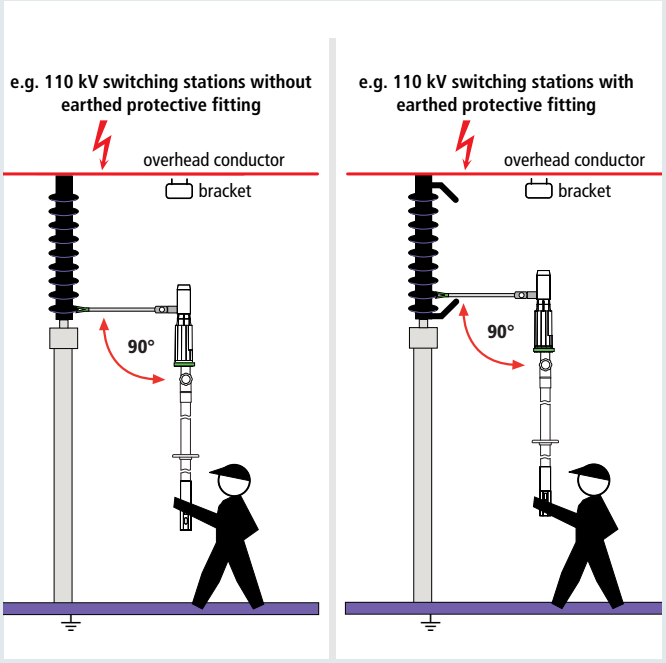
- Easy to use due to compact design
- Cost-effective / space-saving transport

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	767 576	6	767 564
2	767 577	7	766 369
3	767 591	8	767 574
4	767 592	9	767 996
5	767 593		
For more detailed information on these products, see Accessories chapter			

General Information:	
Temperature range	– 25 °C ... + 55 °C
For use in wet weather conditions	
For	Overhead lines and outdoor switching stations
Indication	Acoustic and visual
Self-testing element	Yes
Material (indicator)	Plastic, fully insulated, black
Material (electric field sensor)	Plastic, black
Material (insulating stick)	Glass-fibre reinforced polyester tube

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





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

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

Accessories, spare parts and kit parts from page 193

Category "L", 50 Hz

For overhead lines in accordance with the DIN VDE V 0682-417/10.2013 preliminary standard

Category "L"

Kit includes:		
Type	Part No.	No.
ASP 110 420 L	767 581	1+3+7
KLT 104 9	767 574	8

Type	ASPS 110 420 L
Part No.	767 571
Nominal voltage (U_N)	110 ... 420 kV
Frequency	50 Hz
Total length (l_G)	960 mm

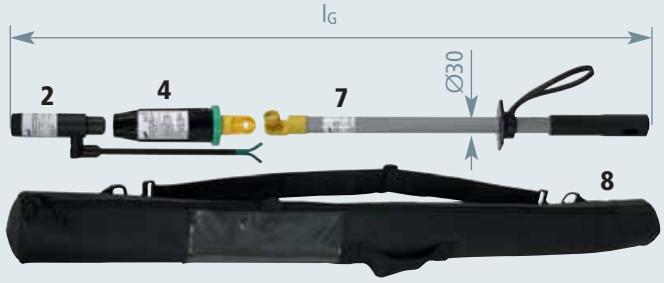
Category "L", 16.7 Hz

For contactless verification of safe isolation from supply voltage on centre-earthed monophase traction power lines

Kit includes:		
Type	Part No.	No.
ASP 110 132 16.7 L	767 585	1+6+7
KLT 104 9	767 574	8

Type	ASPS 110 132 16.7 L
Part No.	767 565
Nominal voltage (U_N)	110 ... 132 kV
Frequency	16.7 Hz
Total length (l_G)	960 mm
DB drawing No.	3 Eku 710 002

Category "S", 50 Hz



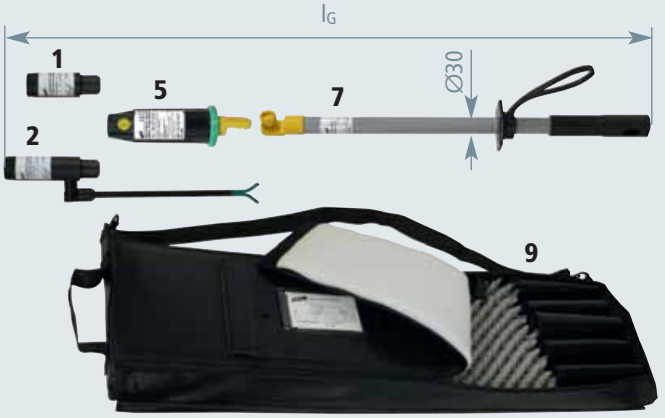
For outdoor switching stations

Category "S"

Kit includes:		
Type	Part No.	No.
ASP 110 420 S	767 582	2+4+7
KLT 104 9	767 574	8

Type	ASPS 110 420 S
Part No.	767 572
Nominal voltage (U_N)	110 ... 420 kV
Frequency	50 Hz
Total length (l_G)	1000 mm

Category "S / L", 50 Hz



For overhead lines and outdoor switching stations

Category "L" and "S"

Kit includes:		
Type	Part No.	No.
ASP 110 420 S L	767 583	1+2+5+7
KLT 101 30 10	767 996	9

Type	ASPS 110 420 S L
Part No.	767 573
Nominal voltage (U_N)	110 ... 420 kV
Frequency	50 Hz
Total length (l_G)	1000 mm

HSA 194 Non-Contact Voltage Detector

Nominal Voltage Range 110 ... 420 kV / 16.7 Hz

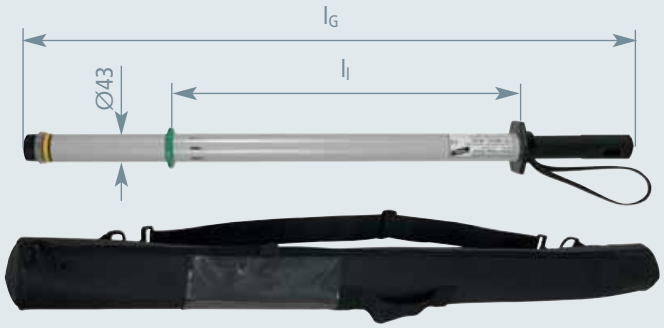
Non-contact voltage detector used on a 110 kV overhead line

Easy and safe testing

- For contactlessly verifying safe isolation from supply voltage on centre-earthed monophase traction power lines
- Cost-effective / space-saving transport

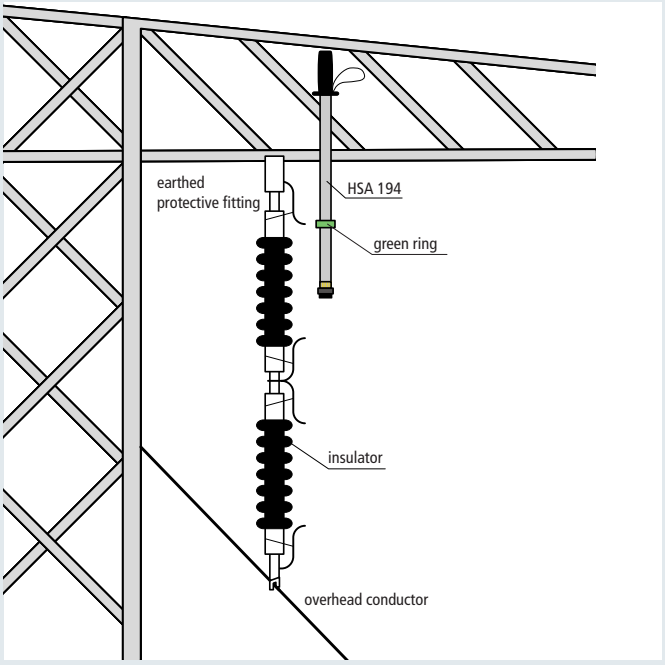
General Information:	
Temperature range	– 25 °C ... + 55 °C, climatic category N
For use in wet weather conditions	
Indication	Acoustic and visual
Self-testing element	Yes
Material (insulating stick)	Glass-fibre reinforced polyester tube

Nominal Voltage Range 110 ... 420 kV / 16.7 Hz



Plug-in coupling for extending the handle
Storage bag included in delivery

Type	HSA194 110 420 16.7
Part No.	767 542
Nominal voltage range (U_N)	110 ... 420 V
Total length (l_G)	940 mm
Insulating clearance (l_I)	540 mm
DB drawing No.	3 Ekgw 02.54



Application notes

The HSA 194 non-contact voltage detector is used for verifying safe isolation from supply voltage from the crossarm of the overhead line tower. The green ring on the HSA 194 is used to make contact with the last earthed protective fitting (or earthed insulator cap) so that the measuring head of the voltage detector points in the direction of the overhead conductor fixed at the other end of the insulator (stick axis of the HSA 194 parallel to the longitudinal axis of the insulator). "Voltage present" is indicated visually (red flashing light) and acoustically (audible signal).

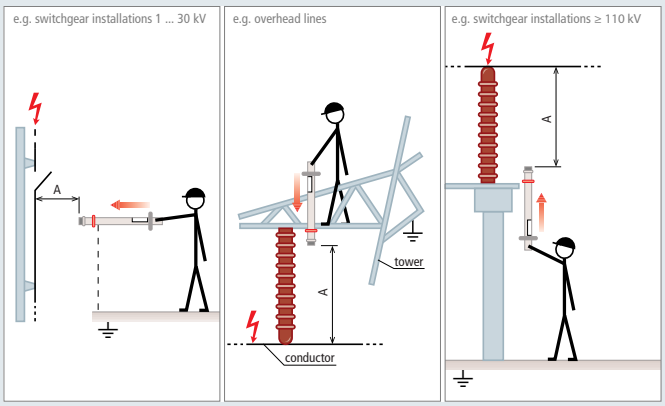
HSA 205 High-Voltage Indicator

Nominal Voltage Range 1 ... 420 kV / 50 Hz

- **For contactlessly verifying safe isolation from supply voltage on switchgear installations and high-voltage overhead lines**
- **Wide nominal voltage range**
- **Storage bag included**

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

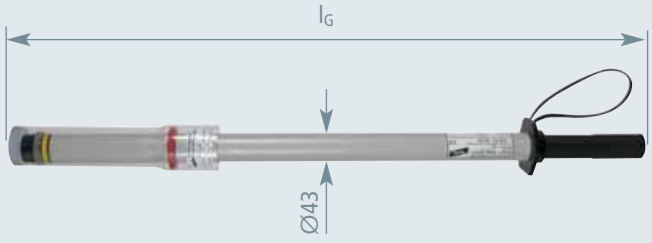
Minimum distances A according to nominal voltage:		
Selected voltage range	**Nominal voltage acc. to DIN VDE 0105 Part 1**	**Min. safety distance A**
Red 1 ... 30 kV	1 up to 6 kV	90 mm indoor installations
	6 up to 10 kV	120 mm indoor installations
	1 up to 10 kV	150 mm outdoor installations
	10 up to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



Application notes

The operating head of HSA 205 non-contact voltage detectors is fitted with a yellow switching ring, which is used to set the required nominal voltage range, either 1 to 30 kV, 30 to 220 kV or 110 to 420 kV.
The transparent insulating cap must be used in the voltage range from 1 to 30 kV. Provided that the insulating tube and cap of the non-contact voltage detector are 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!

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



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

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

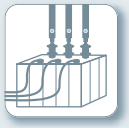
PHG II Voltage Detector

Nominal Voltages up to 20 kV / 50 Hz

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

Easy and safe testing

- Cost-effective
- Reliable indication

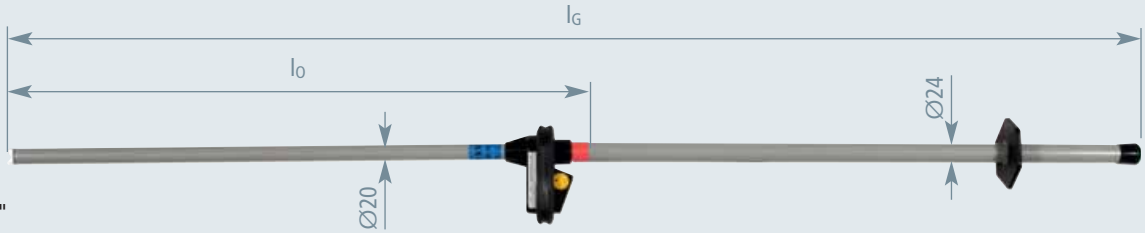


General Information:	
Standard	EN/IEC 61243-1 (DIN VDE 0682-411)
Temperature range	– 25 °C ... + 55 °C, climatic category N
Design	Complete
Not suitable for use in wet weather conditions	✷
For	Indoor installations
Indication	Visual, 3 LEDs
Function	Passive voltage detector without batteries
Material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

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

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

Nominal Voltages up to 20 kV / 50 Hz



Category "S"

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

Accessories, spare parts and kit parts from page 193

PHE/G d.c. Voltage Detector

Nominal Voltage up to 24 kV d.c.

Safe verification of isolation from supply voltage

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

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

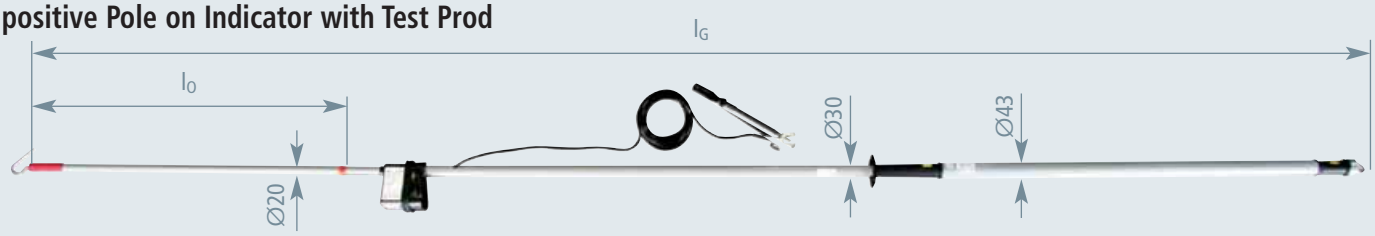
The test prod of d.c. voltage detectors is colour-coded according to the polarity of the test prod:
positive pole – red;
negative pole – blue.

Earth clamp with adjustable handle and **magnet**

General Information:	
Standard	Based on EN/IEC 61243-2 (DIN VDE 0682-412)
Temperature range	– 25 °C ... + 55 °C, climatic category N
For use in wet weather conditions	
For	Indoor and outdoor installations
Indication	Visual
Self-testing element	Yes
Material (test prod)	Glass-fibre reinforced polyester tube
Material (indicator)	Plastic, fully insulated
Material (insulating stick)	Glass-fibre reinforced polyester tube
Material (earthing / connecting cable)	Highly flexible copper cable

PHE/G d.c. Voltage Detector

PHE/G I for Overhead Contact Lines, positive Pole on Indicator with Test Prod

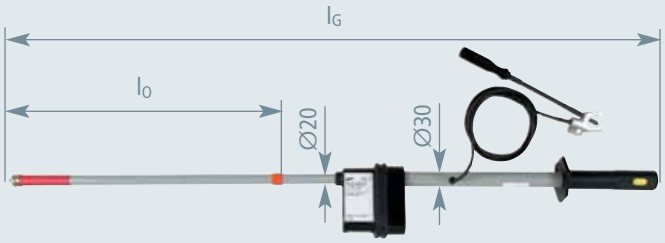


One stick (four elements)
– For direct voltage systems with earthed negative pole
– Positive pole: Indicator with test prod
– Negative pole: Earth clamp

Type	PHEG1.FD P SN7647	PHEG1.FD P SN7544
Part No.	767 656	767 652
Response voltage U_t	300 V	750 V
Nominal voltage U_N	600 ... 750 V	1.5 kV
Length (earthing cable)	6000 mm	6000 mm
Total length (l_G)	4125 mm	4125 mm
Insertion depth (l_O)	1015 mm	1015 mm
Earth clamp	With magnet	With magnet

PHE/G I for Switchgear Installations, positive Pole on Indicator with Test Prod

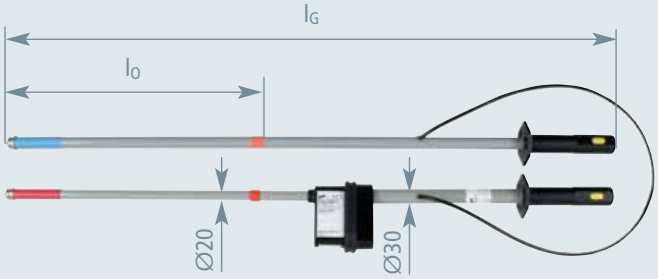
One stick
– For direct voltage systems with earthed negative pole
– Positive pole: Indicator with test prod
– Negative pole: Earth clamp



Type	PHEG1.S P SN7401
Part No.	767 666
Response voltage U_t	120 V
Nominal voltage U_N	1 ... 24 kV
Length (earthing cable)	2000 mm
Total length (l_G)	1260 mm
Insertion depth (l_O)	535 mm
Earth clamp	With magnet

PHE/G II for Switchgear Installations

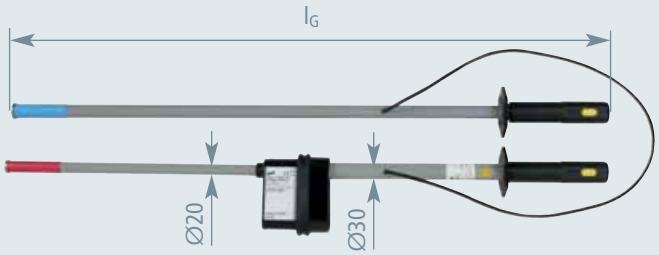
Two sticks
– For unearthed direct voltage installations
– For d.c. links
– Positive pole: Indicator with test prod
– Negative pole: Insulating stick



Type	PHEG2.P SN7517
Part No.	767 671
Response voltage U_t	90 V
Nominal voltage U_N	1 ... 24 kV
Length (connecting cable)	1200 mm
Total length (l_G)	1260 mm
Insertion depth (l_O)	545 mm

Accessories, spare parts and kit parts from page 193

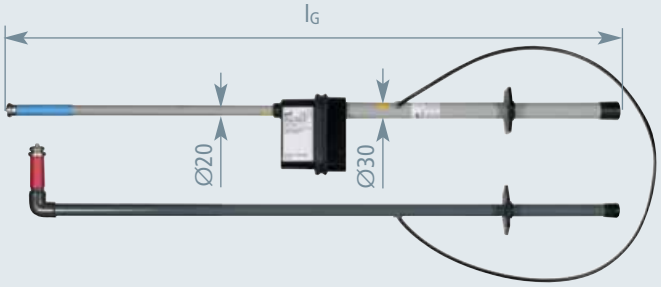
PHE/G II for Switchgear Installations and d.c. Links



Two sticks
- For unearthed direct voltage installations
- For d.c. links (e.g. for electric locomotives; Part No. 767 647)
- Positive pole: Indicator with test prod
- Negative pole: Insulating stick

Type	PHEG2 P SN7259	PHEG2 P SN7552	PHEG2 P SN7194
Part No.	**767 645**	**767 647**	**767 637**
Response voltage U_t	120 V	90 V	750
Nominal voltage U_N	1 ... 12 kV	1 ... 4.2 kV	1.5 kV
Length (connecting cable)	1200 mm	1200 mm	1200 mm
Total length (l_G)	1085 mm	600 mm	1085 mm

PHE/G II, angled positive Pole



Two sticks
- For unearthed direct voltage installations
- For d.c. links
- Positive pole: Indicator with test prod
- Negative pole: Insulating stick

Type	PHEG2 P SN7346
Part No.	**767 639**
Response voltage U_t	150 V
Nominal voltage U_N	750 V
Length (connecting cable)	1200 mm
Total length (l_G)	1100 mm

Two-pole SPN Voltage Detector

Nominal Voltage up to 1000 V

Two-pole SPN voltage detector used with extension prods for overhead lines

- **Extremely shock-resistant, waterproof and dust-proof enclosure**
- **Phase, rotation field and continuity test**
- **Two versions with different measuring ranges**
- **For use in overhead line networks by attaching extension prods**
- **No battery required**
- **Safe two-hand operation**

NEW

General Information:	
Standard	EN/IEC 61243-3 (DIN VDE 0682-401)
Temperature range	– 15 °C ... + 45 °C
Degree of protection	IP 65
For use in wet weather conditions	
Material (indicator)	Safety enclosure made of solid rubber
Indicator	Moving-iron instrument, LCD and LED
Connecting cable	Rubber-sheathed cable, highly flexible, 1000 mm
Overvoltage category	CAT IV 600 V / CAT III 1000 V in accordance with IEC 60664-1

Each handle of the voltage detector is fitted with a test button. These buttons activate the measuring element and LED display. High-resistance tests (LCD) can be performed without pressing the buttons and low-resistance tests by pressing the buttons.

SPN Voltage Detector

Basic devices

Type	SPN 500PR	SPN 1000PR
Part No.	766 544	766 548
Nominal voltage range U_N	100 ... 500 V	120 ... 1000 V
Frequency range	0 ... 100 Hz	0 ... 100 Hz
Dimensions (indicator)	274 x 75 x 47 mm	274 x 75 x 47 mm

Accessory for Two-pole SPN Voltage Detector

Extension Prod

For use in overhead line networks, to be screwed onto the basic device

Type	VS 500 SPN II
Part No.	766 542
Length	500 mm

Artificial Leather Bag, empty

For SPN voltage detectors (basic device with extension prods)

Type	AT SPN II
Part No.	766 543
Dimensions	535 x 160 mm
Colour	Black

Accessories, spare parts and kit parts from page 193

Design of Phase Comparators

3. Verify that the Installation is dead – Phase Comparator

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

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

Phase comparators without self-testing element have to be tested for correct operation by making contact with a part of the installation connected to operating voltage.
Testing in-phase conditions by means of a phase comparator is considered live working.

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

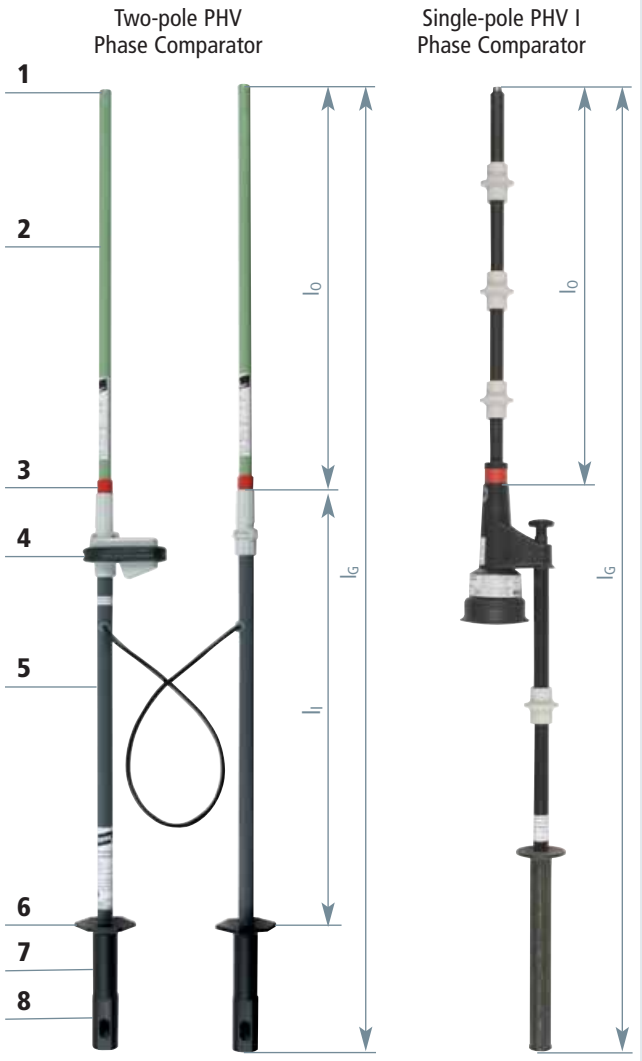
Phase comparators labelled "For indoor and outdoor installations" must not be used in wet weather conditions.

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

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

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

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



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

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

Storage Bags and Transport Cases

Sheet metal or plastic case
Artificial leather or canvas bag

185

Accessories, spare parts and kit parts from page 193

Two-pole PHV Phase Comparator

Nominal Voltages up to 24 kV / 50 Hz

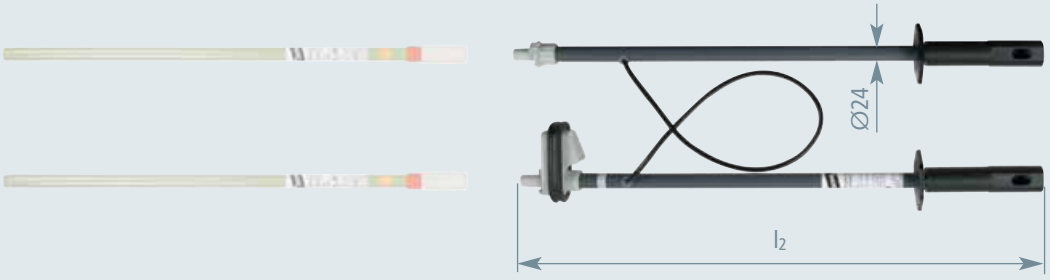
Two-pole PHV phase comparator with a pair of green test prods (15 ... 24 kV) used in a 20 kV switchgear installation

Easy and safe testing

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

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

PHV Test Unit



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

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

Two-pole PHV Phase Comparator

3. Verify that the Installation is dead – Phase Comparator

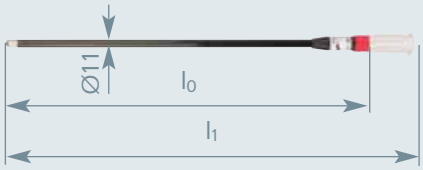
Straight Test Prods

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

Type	PS 3 3.6 PHV	PS 5 7.2 PHV	PS 10 12 PHV	PS 10 17.5 PHV	PS 15 24 PHV
Part No.	759 603	759 605	759 610	759 615	759 620
Nominal voltage (U_N)	3 ... 3.6 kV	5 ... 7.2 kV	10 ... 12 kV	10 ... 17.5 kV	15 ... 24 kV
Colour	Grey	White	Yellow	Grey	Green
Length (test prod) (l_1)	370 mm	670 mm	670 mm	670 mm	670 mm
Insertion depth (l_0)	305 mm	605 mm	605 mm	605 mm	605 mm

Test Prods (Ø11 mm)

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

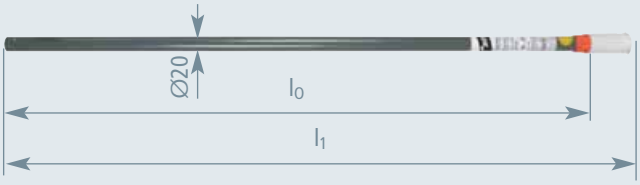


Note: Two tests prods are required for a test unit.

Type	PS 10 12 PHV D11	PS 20 24 PHV D11
Part No.	759 111	759 121
Nominal voltage (U_N)	10 ... 12 kV	20 ... 24 kV
Colour	Black	Black
Length (test prod) (l_1)	415 mm	585 mm
Insertion depth (l_0)	350 mm	520 mm

Long Test Prods

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

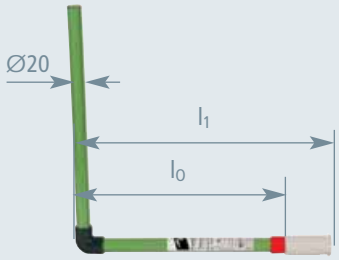


Note: Two tests prods are required for a test unit.

Type	PS 15 24 PHV L880
Part No.	759 621
Nominal voltage (U_N)	15 ... 24 kV
Colour	Grey
Length (test prod) (l_1)	880 mm
Insertion depth (l_0)	815 mm

90° angled Test Prods

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



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

Type	PS 3 3.6 PHV W90	PS 5 7.2 PHV W90	PS 10 12 PHV W90	PS 15 24 PHV W90
Part No.	759 604	759 608	759 611	759 622
Nominal voltage (U_N)	3 ... 3.6 kV	5 ... 7.2 kV	10 ... 12 kV	15 ... 24 kV
Colour	Grey	White	Yellow	Green
Length (test prod) (l_1)	430 mm	430 mm	430 mm	430 mm
Insertion depth (l_0)	365 mm	365 mm	365 mm	365 mm

Accessories, spare parts and kit parts from page 193

Single-pole PHV I Phase Comparator

Nominal Voltages up to 36 kV / 50 Hz

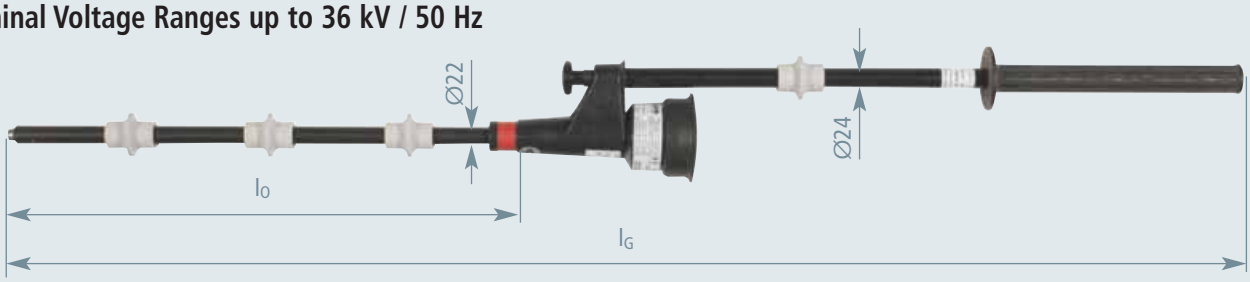
Single-pole PHV I phase comparator used in a switchgear installation

Safe testing

- Reliable indication

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

Nominal Voltage Ranges up to 36 kV / 50 Hz



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

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

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

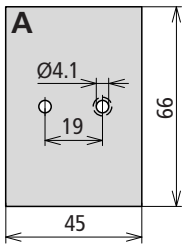
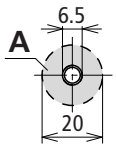
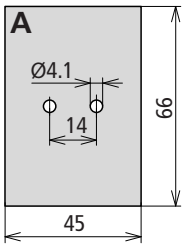
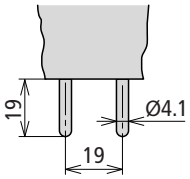
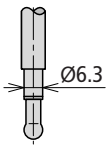
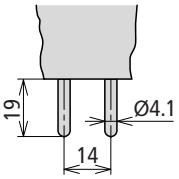
Accessories, spare parts and kit parts from page 193

3. Verify that the Installation is dead – DEHNcap Voltage Detecting System

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

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

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

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

Selection Guide

Product	Type	Nominal voltage U_N / Frequency f_N	Application, Indication	Page
DEHNcap/P Voltage Indicator				
	**DEHNcap/P**	up to 45 kV / 50 Hz	Passive indicator without batteries LED indication Can also be used as permanent voltage indicator	**58**
	**DEHNcap/P Test Unit**	230 V / 50 Hz	For testing for correct operation Plugs into 230 V socket outlets For HR and LRM indicators	
DEHNcap/A Voltage Indicator				
	**DEHNcap/A**	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	**59**
DEHNcap/IT Interface Test Unit				
	**DEHNcap/IT**	up to 45 kV / 50 Hz	Active indicator for maintenance tests Indication by two separate LEDs With self-testing element and battery monitoring system Automatic deactivation after use	**60**
DEHNcap/PC Phase Comparator				
	**DEHNcap/ PC-LRM**	up to 45 kV / 50 Hz	Active indicator for testing in-phase conditions Indication by three separate LEDs Can be used for HR test sockets with two HR-LRM test adapters Comparator detects zero crossings of the systems to be compared With battery monitoring device	**61**
DEHNcap HR – LRM Test Set				
	**DEHNcap HR – LRM Test Set**	up to 45 kV / 50 Hz	Fully equipped test set	**62**
DEHNcap Test Adapter / Measuring Impedance				
	**Test Adapter** **Measuring Impedance**			**63**
Storage Bags and Transport Cases				
			Sheet metal or plastic case Artificial leather or canvas bag	**185**

Maintenance Tests

176

According to German regulations (BGV A3), capacitive voltage detecting systems have to be tested for compliance with the prescribed limits as stated in the Electrical Safety Rules. This test is performed in the high-voltage test laboratory of DEHN + SÖHNE.
This maintenance test is documented in a test report and on the device.
The test intervals depend on the operating conditions of the voltage detecting systems, e.g. frequency of use, environmental conditions and transport. According to German regulations, however, it is advisable to carry out a maintenance test **at least** every **6 years**.

DEHNcap/P Voltage Indicator

Nominal Voltages up to 45 kV / 50 Hz

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

Easy verification of isolation from supply voltage

- **Cost-effective**

General Information:	
Standard	EN/IEC 61243-5 (DIN VDE 0682-415)
Temperature range	– 25 °C ... + 55 °C
Degree of protection	IP 66
Type of device	Voltage indicator
Use	Can also be used as permanent voltage indicator

Test for correct operation

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

DEHNcap/P – HR

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

DEHNcap/P – LRM

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

Accessory for DEHNcap/P Voltage Indicator

Test Unit for DEHNcap/P

Test unit for testing DEHNcap/P voltage indicators or other HR (HO) or LRM indicators for correct operation. Both HR and LRM devices can be tested.

The test unit is plugged into the mains socket outlet and generates both test voltages for HR and LRM systems.

Type	TG DCA
Part No.	767 110
Nominal voltage (U_N)	Up to 230 V
Frequency	50 Hz
Nominal capacity	500 mW
Max. short-circuit current at the test socket	Approx. 20 µA
Dimensions	43 x 75 x 35 mm

DEHNcap/A Voltage Indicator

Nominal Voltages up to 45 kV / 50 Hz

Safe verification of isolation from supply voltage

- User-friendly
- Easy to use

Self-test of a DEHNcap/A voltage indicator

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

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

DEHNcap/A – HR

Type	SAG DCA A HR
Part No.	767 111
Dimensions	120 x 60 x 25 mm
Plug spacing	19 mm
Type of plug	2x multilam plugs Ø4 mm
Indication threshold (HR system)	90 V
Input impedance (HR system)	36 Mohms

DEHNcap/A – LRM

Type	SAG DCA A LRM
Part No.	767 112
Dimensions	120 x 60 x 25 mm
Plug spacing	14 mm
Type of plug	2x multilam plugs Ø4 mm
Indication threshold (LRM system)	5 V
Input impedance (LRM system)	2 Mohms

DEHNcap/IT Interface Test Unit

Nominal Voltages up to 45 kV / 50 Hz

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

Easy and safe testing

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

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

DEHNcap/IT – HR

Type Part No.	SPG DCA IT HR 767 121
Dimensions	120 x 60 x 25 mm
Plug spacing	19 mm
Type of plug	2 multilam plugs Ø4 mm
Input impedance (HR system)	36 Mohms
Test threshold	3.2 µA

DEHNcap/IT – LRM

Type Part No.	SPG DCA IT LRM 767 122
Dimensions	120 x 60 x 25 mm
Plug spacing	14 mm
Type of plug	2 multilam plugs Ø4 mm
Input impedance (LRM system)	2 Mohms
Test threshold	3.2 µA

Accessories, spare parts and kit parts from page 193

DEHNcap/PC-LRM Phase Comparator

Nominal Voltages up to 45 kV / 50 Hz

Easy and safe testing

- User-friendly
- Easy to use

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

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

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

DEHNcap/PC – LRM

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

DEHNcap/PC – LRM Phase Comparator Set

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

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

Accessory for DEHNcap/PC-LRM Phase Comparator

Artificial Leather Bag, empty

With shoulder strap

Type	KLT 23 16 4
Part No.	767 500
Suitable for	DCA PC
Dimensions	235 x 160 x 40 mm
Colour	Black

DEHNcap HR – LRM Test Set

Work according to the 5 Safety Rules

Nominal Voltages up to 45 kV / 50 Hz

3. Verify that the Installation is dead – DEHNcap Voltage Detecting System

Easy and safe testing

- Complete test set for universal use
- Easy to use

Set in a plastic case for verifying safe isolation from supply voltage and testing the interface as well as in-phase conditions in HR and LRM systems

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

DEHNcap HR – LRM Test Set

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

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

DEHNcap Test Adapter / Measuring Impedance

3. Verify that the Installation is dead – DEHNcap Voltage Detecting System

Easy and safe testing

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

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

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

LR-LRM Test Adapter

For mechanical adaptation of LR (NO) to LRM systems

Type	MA DCA LR LRM
Part No.	767 136
Dimensions	100 x 50 x 30 mm
Plug spacing	jack 6.3 mm
Socket spacing	14 mm
Type of plug	1 jack
Type of test socket	2 sockets Ø4 mm

HR-LRM Test Adapter

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

Type	MA DCA HR LRM
Part No.	767 133
Dimensions	90 x 50 x 30 mm
Plug spacing	19 mm
Socket spacing	14 mm
Type of plug	2 multilam plugs Ø4 mm
Type of test socket	2 sockets Ø4 mm

LRM-XC Measuring Impedance

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

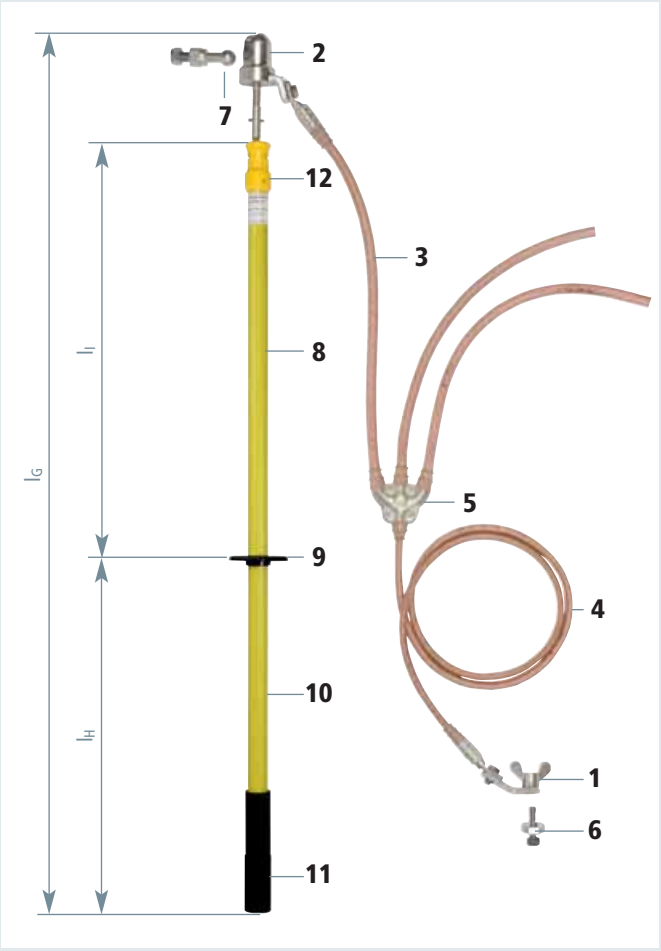
Type	MA DCA XC LRM
Part No.	767 135
Dimensions	90 x 50 x 30 mm
Plug spacing	14 mm
Socket spacing	16 mm
Type of plug	2 multilam plugs Ø4 mm
Type of test socket	2 sockets Ø4 mm

Accessories, spare parts and kit parts from page 193

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

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

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



Portable earthing and short-circuiting equipment

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

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

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

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

Earthing and Short-Circuiting Devices

Note:

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

Cable cross-section:

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

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

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

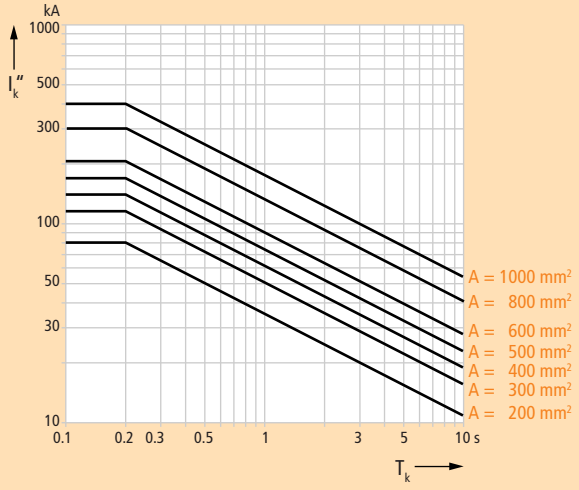
The **current carrying capacity** of the short-circuiting cable and the short-circuiting bar depends on the material, the cross-section (A) and the short-circuit time (T_k).

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

$$I_k" = I_k = I_a$$

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

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



Initial cable temperature 20 °C

Final cable temperature 250 °C

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

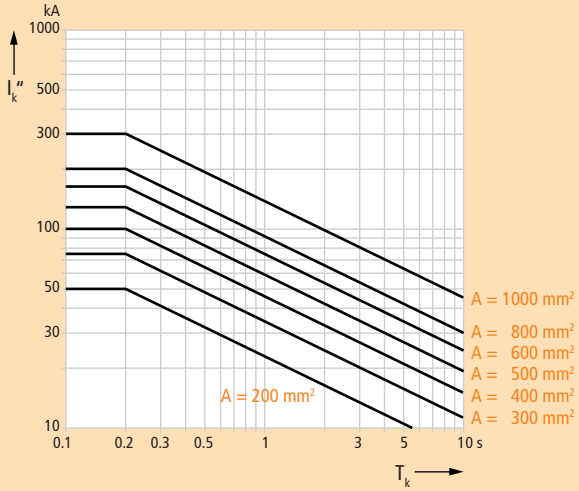
where:

A Busbars cross-section in mm²

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

T_k Short-circuit time in s

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



Initial cable temperature 20 °C

Final cable temperature 250 °C

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

where:

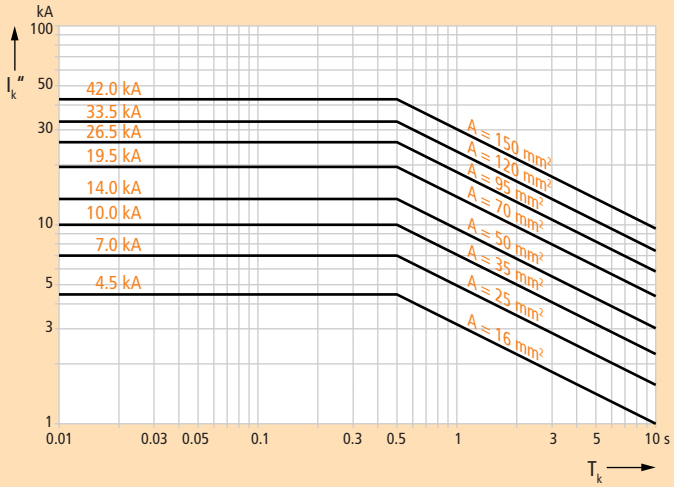
A Busbars cross-section in mm²

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

T_k Short-circuit time in s

Accessories, spare parts and kit parts from page 193

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



Initial cable temperature 20 °C

Final cable temperature 250 °C

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

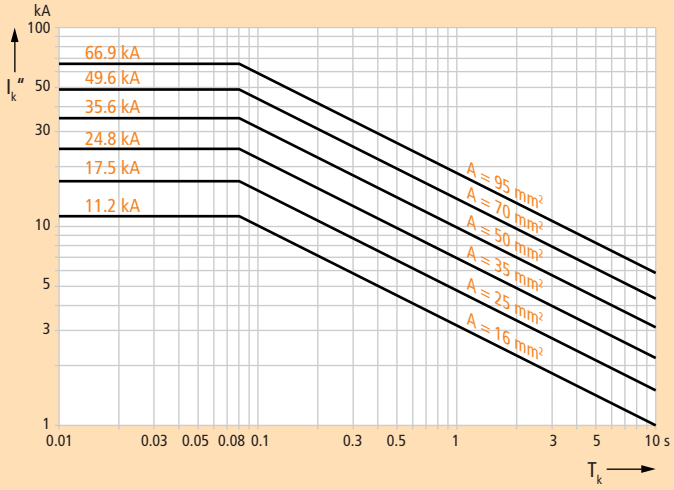
where:

A Cable cross-section in mm²

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

T_k Short-circuit time in s

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



Initial cable temperature 20 °C

Final cable temperature 250 °C

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

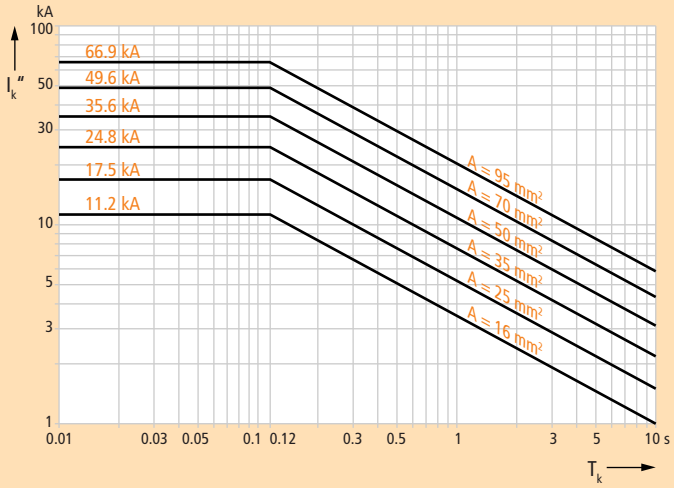
where:

A Cable cross-section in mm²

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

T_k Short-circuit time in s

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



Initial cable temperature 20 °C

Final cable temperature 400 °C

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

where:

A Cable cross-section in mm²

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

T_k Short-circuit time in s

Calculation example:

Known: Mains breaking capacity S_a
Short-circuit time T_k

Unknown: Required cable or bar cross-section A.

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

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

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

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

Notes:

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

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

Table:

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

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

*) catalogue data

Accessories, spare parts and kit parts from page 193

Selection Guide

Fixed Ball Points

∅20 or 25 mm

Straight fixed ball point mounted on a busbar

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

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

Angled fixed ball point

Angled with Terminal Lug

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

Accessories, spare parts and kit parts from page 193

Fixed Ball Points

Straight with threaded Pin and self-locking Nut

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

Straight with female Thread

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

Straight with threaded Pin

Type	KFP 25 M16 25
Part No.	755 636
Fixed ball point ∅	25 mm
Dimensions	M16 x 25 mm
Max. short-circuit current I_k 0.5 s	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA
DB drawing No.	3 Ebgw 01.63
DB material No.	609 426

Straight with threaded Pin, Nut and Washer

Type KFP ...	25 M16 25 SKM	25 M12 35 SKM	25 M16 45 SKM
Part No.	755 626	755 627	755 646
Fixed ball point ∅	25 mm	25 mm	25 mm
Dimensions	M16 x 25 mm	M12 x 35 mm	M16 x 45 mm
Max. short-circuit current I_k 0.5 s	42.0 kA	42.0 kA	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA	29.6 kA	29.6 kA
DB drawing No.	3 Ebgw 01.63	3 Ebgw 01.63	3 Ebgw 01.63
DB material No.	157 541	622 014	157 542

Fixed Ball Points

Straight with Round Conductor Half Shell for Round Copper Conductors

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

Type	KFP 25 RL 10	KFP 25 RL 12	KFP 25 RL 14	KFP 25 RL 16	KFP 25 RL 18	KFP 25 RL 20
Part No.	**725 010**	**725 012**	**725 014**	**725 016**	**725 018**	**725 020**
Fixed ball point Ø	25 mm	25 mm	25 mm	25 mm	25 mm	25 mm
For round conductor Ød	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm
Max. cable cross-section	95 mm²	95 mm²	95 mm²	95 mm²	95 mm²	95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA	26.5 kA	14 kA	26.5 kA	26.5 kA	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA	18.7 kA	9.9 kA	18.7 kA	18.7 kA	18.7 kA

45° angled with threaded Pin and self-locking Nut

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

45° angled with female Thread

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

Fixed Ball Points

90° angled with threaded Pin and self-locking Nut

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

90° angled with female Thread

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

Fixed Earthing Points

Ring Groove and Connectors

Fixed earthing point with ring groove and earth bushing

- For connecting earth bushings or earth connecting plates in accordance with DIN 48088-2
- Welding-type or bolted-type connector for connecting earth connectors with wing nut or wing bolt on the earth cable end
- Connectors with M12 or M16 threaded pin M12 or M16 female thread

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683-100) and DIN 48088-2 and -5
Material (fixed point)	Brass (CuNi2Si) / gal Sn
Material (threaded pin)	StSt A2-70
Hexagon nut	DIN 985-M12-8 / gal Zn; DIN 985-M16-8 / gal Zn
Tightening torque	M12: 80 Nm; M16: 150 Nm

Bolted-type earth connector with M12 threaded pin on an earthed part of an installation

Ring Groove Fixed Point with threaded Pin and Nut

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

Ring Groove Fixed Point with female Thread

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

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

Accessories, spare parts and kit parts from page 193

Welding-type Connector with threaded Pin

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

Welding-type Connector with female Thread

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

Bolted-type Connector with female Thread

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

Bolted-type Connector with threaded Pin and separate hexagon Nut

Type	AS SCHR M12 55	AS SCHR M16 65
Part No.	705 500	750 500
Dimensions	M12 x 55 mm	M16 x 65 mm
Width A/F	32 mm	41 mm
Max. cable cross-section	150 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	42 kA	42 kA
Max. short-circuit current I_k 1 s	29.6 kA	29.6 kA

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

Type	AS SCHR M16 55 M12
Part No.	705 510
Dimensions	M12 x 20 / M16 x 55 mm
Width A/F	41 mm
Max. cable cross-section	150 mm²
Max. short-circuit current I_k 0.5 s	42 kA
Max. short-circuit current I_k 1 s	29.6 kA

Earth Connecting Plates

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

- For indoor and outdoor installations
- Connecting plate with high short-circuit current carrying capacity
- Single-pole connection of the phase arms
- For connecting single-pole earthing and short-circuiting devices to transformers of overhead contact line masts or to fuse holders
- For fixed ball points (∅20 mm, ∅25 mm) or ring groove pins (∅16 mm)

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683-100) and fixed points in accordance with DIN 48088-1
Material (plate)	Aluminium
Material (terminal lug)	4 mm: Cu / gal Sn; 6 mm: St / tZn
Material (fixed point)	E-Cu or brass (CuNi2Si) / gal Sn

Anti-rotation earth milling clamp mounted on an earth connecting plate

With three Fixed Ball Points and Ball Head Cap

NEW

Type	EAPA 3 KFP 20 KKH	EAPA 3 KFP 25 KKH
Part No.	728 620	728 625
Fixed point ∅	20 mm	25 mm
Max. cable cross-section	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

With three Fixed Ball Points

NEW

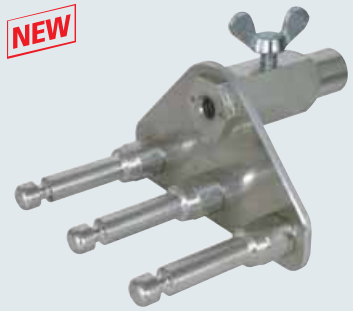
To be mounted on earth connecting clamps with anti-rotation element (PK1)

Type	EAPA 3 KFP 20 B13	EAPA 3 KFP 25 B13
Part No.	728 522	728 526
Fixed point ∅	20 mm	25 mm
Max. cable cross-section	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Accessories, spare parts and kit parts from page 193

Earth Connecting Plates

With three Ring Groove Fixed Points and Earth Bushing



Type	EAPA 3 RN 16 EAB
Part No.	728 516
Fixed point ∅	16 mm
Max. cable cross-section	95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA

With three Ring Groove Fixed Points

To be mounted on earth connecting clamps with anti-rotation element (PK1)

Type	EAPA 3 RN 16 B13
Part No.	728 506
Fixed point ∅	16 mm
Max. cable cross-section	95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA

With two Fixed Ball Points and Ball Head Cap

With adjustable ball head cap (∅25 mm) and plastic handle
For connecting two single-pole earthing and short-circuiting devices to one fixed ball point (∅25 mm)

Type	EAP 2 25 KKH HG
Part No.	728 501
Fixed point ∅	25 mm
DB drawing No.	3 Ebgw 01.66
DB material No.	157 540

Terminal Lug with one Fixed Ball Point

With two boreholes
To be connected to a fuse holder

Type	EAP 25 SIT US OL
Part No.	728 503
Fixed point ∅	25 mm
DB drawing No.	4 Ebgw 01.60
DB material No.	157 545

Terminal Lug with two Fixed Ball Points

With two boreholes
To be connected to a tower

Type	EAP 2 25 MA US OL
Part No.	728 502
Fixed point ∅	25 mm
DB drawing No.	3 Ebgw 01.61
DB material No.	157 548

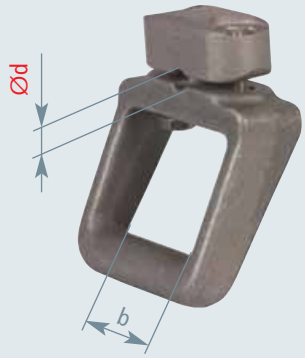
Fixed Phase Points

Fixed phase point mounted on an overhead line conductor

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

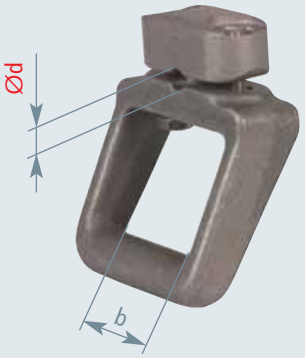
General Information:	
Standard	Clamp in accordance with DIN 48088-3
Material (clamp)	Aluminium or copper alloy
Material (bolt)	StSt

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



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

Fixed Phase Points for round Copper Conductors



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

Note: The exact conductor / cable diameter d must be specified when ordering!

Accessories, spare parts and kit parts from page 193

Earthing and Short-Circuiting Cables, unequipped

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

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

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

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

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

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

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

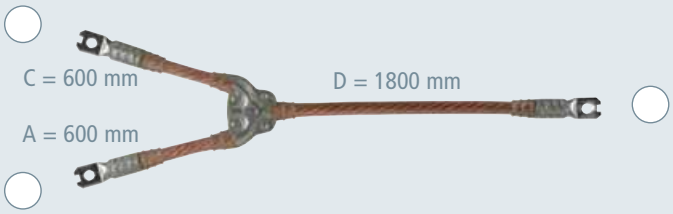
Crimped cable lugs, type **PK3:**
Hook-type cable lugs up to cable cross-sections of 35 mm² are available on request.

Earthing and Short-Circuiting Cables, unequipped

Single-pole Earthing and Short-Circuiting Cables

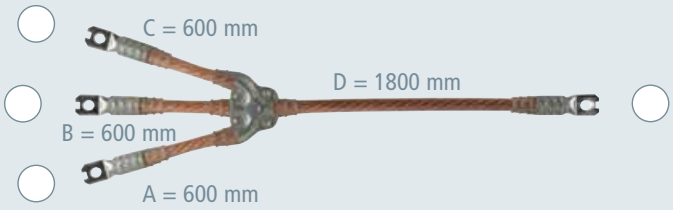
Type	EKV1+0 16	EKV1+0 25	EKV1+0 35	EKV1+0 50	EKV1+0 70	EKV1+0 95	EKV1+0 120	EKV1+0 150
Variant No.	V4YPRGE	VSY71K4	V9JF26K	VRJG23Y	VPZBBSL	VZC3FST	V797FE6	VB53TC9
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA	7.0 kA	10.0 kA	14.0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

Two-pole Earthing and Short-Circuiting Cables



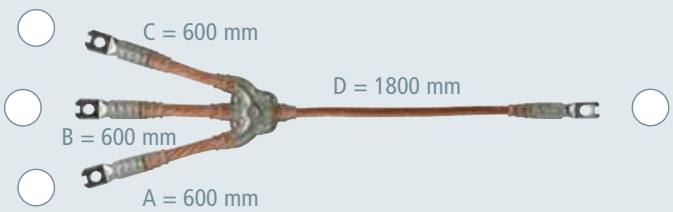
Type	EKV2+0 16 G	EKV2+0 25 G	EKV2+0 35 G	EKV2+0 50 G	EKV2+0 70 G	EKV2+0 95 G	EKV2+0 120 G	EKV2+0 150 G
Variant No.	V7265NS	VZL6TGH	VPHPZV2	VJ13VWW	VTJKEZU	VAM7M6H	VFV1Z7K	VLL6JWS
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Max. short-circuit current I_k 0.5 s	4.5 kA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

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



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

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

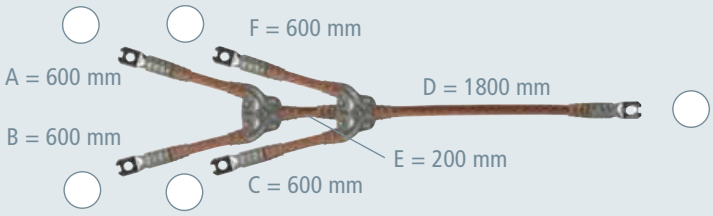


Type	EKV3+0 50 R	EKV3+0 70 R	EKV3+0 95 R	EKV3+0 120 R	EKV3+0 150 R
Variant No.	VN35H5D	VTCS2XV	VLB2F3G	V8115WA	V11E77B
Cable cross-section	50/25 mm²	70/35 mm²	95/35 mm²	120/50 mm²	150/50 mm²
Max. short-circuit current I_k 0.5 s	14.0 kA	19.5 kA	26.5 kA	33.5 kA	42.0 kA
Max. short-circuit current I_k 1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

Accessories, spare parts and kit parts from page 193

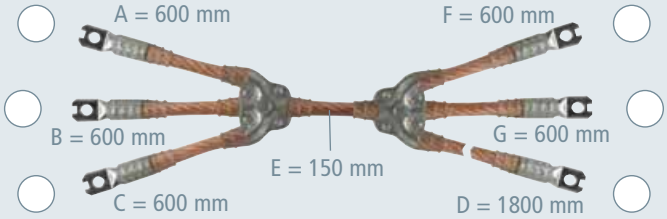
Earthing and Short-Circuiting Cables, unequipped

Four-pole Earthing and Short-Circuiting Cables



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

Five-pole Earthing and Short-Circuiting Cables



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

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

Earthing Cable in accordance with IEC 61138

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

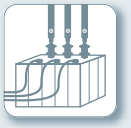
Type	ES YM2 16	ES YM2 25	ES YM2 35	ES YM2 50	ES YM2 70	ES YM2 95	ES YM2 120	ES YM2 150
Part No.	716 001	725 001	735 001	750 001	770 001	795 001	712 001	715 001
Cable cross-section	16 mm²	25 mm²	35 mm²	50 mm²	70 mm²	95 mm²	120 mm²	150 mm²
Minimum order quantity *)	1 m	1 m	1 m	1 m	1 m	1 m	1 m	1 m

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

Phase Connecting Elements for Switchgear Installations

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

- **To be fitted to the phase cable end of single-pole to five-pole earthing and short-circuiting devices**
- **Anti-rotation element PK1**
- **Earthing and short-circuiting devices can be configured online via the earthing and short-circuiting configurator**



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

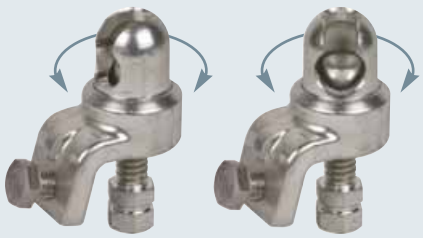
SK: Hexagon shaft

Two types of ball head caps are available:
– Rigid ball head cap
– Adjustable ball head cap (4x 90°)

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

SQ: T pin shaft (bayonet locking mechanism)

Rigid ball head cap



Adjustable ball head cap (4x 90°)

Accessories, spare parts and kit parts from page 193

Phase Connecting Elements for Switchgear Installations

Rigid Ball Head Cap, hexagon Shaft

Type	KKH 20 SK	KKH 25 SK
Part No.	772 310	772 320
For fixed ball point ∅	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

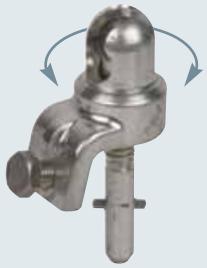
Rigid Ball Head Cap, T Pin Shaft

Type	KKH 20 SQ	KKH 25 SQ
Part No.	772 311	772 321
For fixed ball point ∅	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

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

Type	KKH 20 D SK	KKH 25 D SK
Part No.	772 330	772 340
For fixed ball point ∅	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

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



Type	KKH 20 D SQ	KKH 25 D SQ
Part No.	772 331	772 341
For fixed ball point ∅	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Round Pin Clamp, T Pin Shaft

NEW

For round pins in switchgear installations

Type	RBK 35 SQ
Part No.	715 312
For round pins ∅	35 mm
Anti-rotation element	PK1
For cable cross-sections	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA

Accessories, spare parts and kit parts from page 193

Phase Connecting Elements for Switchgear Installations

Universal Clamp, hexagon Shaft

Type	UK 25 SK	UK 30 SK
Part No.	773 034	773 130
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

Universal Clamp, T Pin Shaft

Type	UK 25 SQ	UK 30 SQ
Part No.	773 234	773 330
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

Phase Connecting Element, T Pin Shaft

NEW

With M16 threaded pin for installation in switchgear installations

Type	PAS EK SQ 16
Part No.	771 316
Dimensions	M16
Anti-rotation element	PK1
For cable cross-sections	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA

*) Clamping range and maximum cable cross-section of universal clamps used for:

Fixed ball point ∅	T pin collar width	Rd / Fl clamping range	Cable cross-section
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm²
20 / 25 / 30 mm	15 / 18 mm	–	95 mm²
– / 25 / 30 mm	–	–	120 mm²

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

Accessories, spare parts and kit parts from page 193

Phase Connecting Elements for Overhead Lines

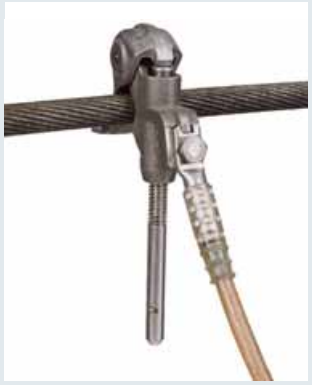
4. Carry out Earthing and Short-Circuiting – EaS Devices

- For connecting the phase cables of single-pole and three-pole earthing and short-circuiting devices to overhead lines
- With coupling aid for safe attachment on conductor cables
- Easy coupling due to spring-loaded clamp
- Anti-rotation element PK1 or PK2 and long threaded T pin shaft
- Earthing and short-circuiting devices can be configured online via the earthing and short-circuiting configurator

Phase screw clamps used on an overhead line

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

Phase screw clamp fitted with fixed coupling aid allows safe coupling



Spring-loaded phase screw clamp

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

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

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

Clamp with long shaft and earthing stick with aluminium cone coupling

Phase Connecting Elements for Overhead Lines

Standard Phase Screw Clamp

Short-circuit-proof, even if the conductor cables are corroded due to weathering

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

Phase Screw Clamp with Coupling Aid

Short-circuit-proof, even if the conductor cables are corroded due to weathering

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

Spring-loaded Phase Screw Clamp

Easy coupling due to spring-loaded clamp

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

Phase Screw Clamp with Wide Clamping Range

Ideally suited for use with Al and Al/St conductor cables, pipes and fixed phase points

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

Phase Screw Clamp

Ideally suited for use in inclined positions

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

Phase Screw Clamp with Safety Bow

Ideally suited for use in inclined positions

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

Accessories, spare parts and kit parts from page 193

Spring-Loaded Phase Clamp

Spring-loaded clamp for overhead lines without shaft
Single-pole or three-pole coupling aid for easy coupling and removal of the clamp, the spring-loaded clamp is connected by simply removing the coupling aid

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

Accessory for Spring-Loaded Phase Clamp

Single-pole Coupling Aid with Gear Coupling

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

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

Accessory for Spring-Loaded Phase Clamp

Three-pole Coupling Aid with T Pin Shaft

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

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

Phase Connecting Elements for Overhead Lines

Rigid Ball Head Cap

Type	KKH 20 SQL	KKH 25 SQL
Part No.	772 314	772 324
For fixed ball point ∅	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Universal Clamp

Type	UK 25 SQL	UK 30 SQL
Part No.	773 236	773 331
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

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

*) Clamping range and maximum cable cross-section of universal clamps used for:

Fixed ball point ∅	T pin collar width	Rd / Fl clamping range	Cable cross-section
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm²
20 / 25 / 30 mm	15 / 18 mm	–	95 mm²
– / 25 / 30 mm	–	–	120 mm²

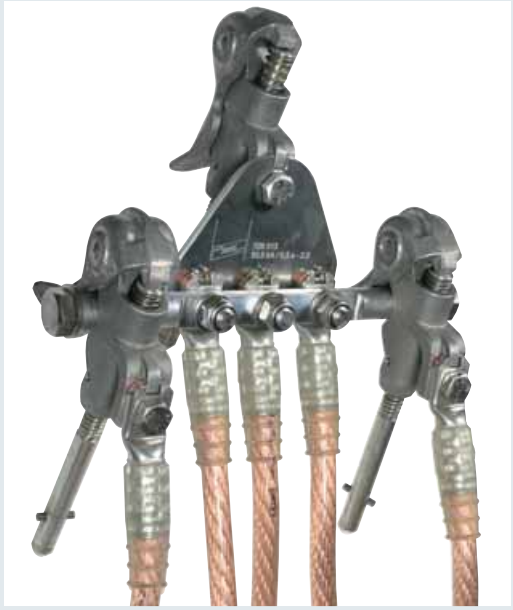
Accessory for Phase Connecting Elements

Three-pole Phase Connecting Plate with Round Pin

NEW

Phase connecting plate for phase clamps

Type	PAP 3 M12 SSM B13 RB
Part No.	728 313
Anti-rotation element	PK1
Borehole	∅12.5 mm
Max. short-circuit current I_k 0.5 s	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA



Accessory for Phase Connecting Elements

Two-pole Phase Connecting Plate

Allows to connect two phase screw clamps with PK1 anti-rotation element.

Type	PAP 2 M12 SSM B13
Part No.	728 312
Anti-rotation element	PK1
Borehole	∅12.5 mm
Max. short-circuit current I_k 0.5 s	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA

Accessories, spare parts and kit parts from page 193

Phase Connecting Elements for Railway Applications

Earth Clamp for Overhead Contact Lines

With contact electrode and flexible threaded T pin shaft according to DIN 48087
For 80 a.c. to 120 a.c. overhead contact lines

Type	FEK 4 15 TS FSQL
Part No.	784 755
Clamping range ∅	4 ... 15 mm
Anti-rotation element	PK2 (Ø10.5 mm)
DB drawing No.	3 Ebgw 01.54
DB material No.	157 536

Conductor Clamp

With contact electrode and threaded T pin shaft according to DIN 48087
For supply and traction power lines

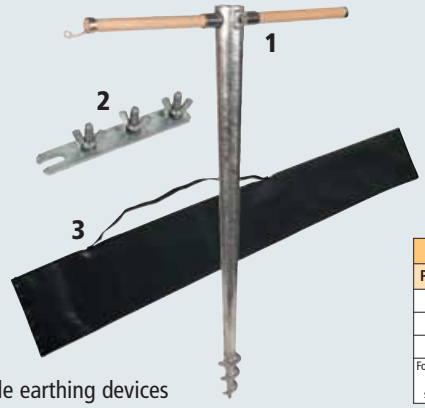
Type	LK 4 40 TS SQL
Part No.	784 352
Clamping range ∅	4 ... 40 mm
Anti-rotation element	PK2 (Ø10.5 mm)
DB drawing No.	3 Ebgw 01.65
DB material No.	157 539

Earthing Kit

Earthing busbar and earthing cables mounted on a tubular earth electrode

- 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

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



Kit includes:	
Pos. No.	Part No.
1	644 000
2	799 019
3	766 601

For more detailed information on these products, see Accessories chapter

For three-pole earthing devices

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

Single Parts for the Earthing Kit

Tubular earth electrode with drill

Type	ERO BSP ASSM10 1000 STTZN
Part No.	644 000
Length (drill)	1000 mm
Military name	VG 96953 T10 A0001
Stock No.	5975-12-120-0006

Three-pole Earthing Busbar

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

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

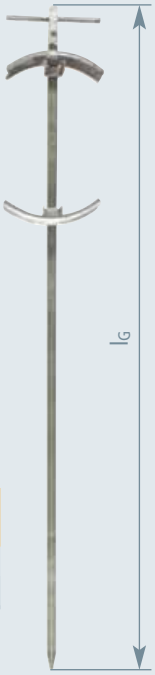
Earth Spike

- To be driven into the soil
- Two half-shells for earthing or extension cables
- Hot-dip galvanised verision

NEW

With M12 connection bolt

Type	ESP HVS 1500
Part No.	799 006
Total length (l_G)	1500 mm
Bolt	M12 x 25 mm



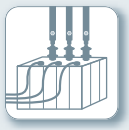
Accessories, spare parts and kit parts from page 193

Earth Connecting Elements for Switchgear and Overhead Lines

Clamping Range up to 40 mm

- For connecting the earth cable end to fixed ball points, T pins, round and flat conductors, connecting elements and flat profiles
- For wide clamping ranges up to 40 mm
- Anti-rotation element of type PK1 or PK2
- Earthing and short-circuiting devices can be configured online by means of the earthing and short-circuiting configurator

Universal earth clamp with handle connected to a fixed ball point



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

Earth milling clamp attached to a varnished steel mast

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683-100)
Temperature range	– 25 °C ... + 55 °C
Material (clamp body)	Copper alloy/gal Sn or MCI/gal Zn
Material (shaft)	Copper alloy/gal Sn or brass/gal Zn
Material (pressure plate)	Copper alloy/gal Sn or St/gal Zn
Material (terminal lug)	E-Cu/gal Sn
Material (wing nut)	Copper alloy/gal Sn
Material (milling plate)	St, hardened/chromed
Material (spring)	Spring steel

Universal Clamp with Wing Bolt

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

Type	UEK 25 FS	UEK 30 FS
Part No.	774 034	774 130
For fixed ball point Ø	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

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

Earth Connecting Elements for Switchgear and Overhead Lines

Universal Clamp with Handle

Type	UEK 25 HG	UEK 30 HG
Part No.	774 234	774 330
For fixed ball point ∅	20 / 25 mm	25 / 30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

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

Universal Clamp with Tommy Bar

Type	UEK 25 SKN	UEK 30 SKN
Part No.	774 434	774 530
For fixed ball point ∅	20 / 25 mm	30 mm
For T pins with a collar width of	15 mm	18 mm
Rd / Fl clamping range	20 mm	30 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120*) mm²	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA	23.7 kA

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

Rigid Ball Head Cap with Wing Bolt

Type	KKH 20 FS	KKH 25 FS
Part No.	772 312	772 322
For fixed ball point ∅	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Rigid Ball Head Cap with Handle

Type	KKH 20 HG	KKH 25 HG
Part No.	772 313	772 323
For fixed ball point ∅	20 mm	25 mm
Anti-rotation element	PK1	PK1
For cable cross-sections	16 ... 120 mm²	16 ... 150 mm²
Max. short-circuit current I_k 0.5 s	33.5 kA	42.0 kA
Max. short-circuit current I_k 1 s	23.7 kA	29.6 kA

Earth Connecting Element with Wing Nut

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

Earth Connecting Element with Wing Bolt

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

Accessories, spare parts and kit parts from page 193

Earth Connecting Elements for Switchgear and Overhead Lines

Earth Bushing with Wing Bolt

For fixed earthing points with ring groove

Type	EAB RN 16 FS
Part No.	790 150
Dimensions	Ø16 mm
Anti-rotation element	PK1
For cable cross-sections	16 ... 150*) mm²
Max. short-circuit current I_k 0.5 s	42.0 kA
Max. short-circuit current I_k 1 s	29.6 kA

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

Earth Bushing with Tommy Bar

For fixed earthing points with ring groove

Type	EAB RN 16 SKN
Part No.	790 160
Dimensions	Ø16 mm
Anti-rotation element	PK2
For cable cross-sections	16 ... 150**) mm²
Max. short-circuit current I_k 0.5 s	29.6 kA
Max. short-circuit current I_k 1 s	29.6 kA

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

Earth Milling Clamp with Tommy Bar and Disc Springs

Milling plate, disc springs and long tommy bar for reliable contact

Type	EKF FL40 SKN
Part No.	792 190
Clamping range	Up to 40 mm
Anti-rotation element	PK1
For cable cross-sections	25 ... 95 mm²
Max. short-circuit current I_k 0.5 s	26.5 kA
Max. short-circuit current I_k 1 s	18.7 kA

Earth Milling Clamp with Tommy Bar

Milling plate, disc springs and long tommy bar for reliable contact

Type	EFK FL30 SKN
Part No.	792 030
Clamping range	Up to 30 mm
Anti-rotation element	PK1
For cable cross-sections	25 ... 50 mm²
Max. short-circuit current I_k 0.5 s	14.0 kA
Max. short-circuit current I_k 1 s	9.9 kA

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

Accessories, spare parts and kit parts from page 193

Earth Connecting Elements for Railway Applications

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

Clamp for Railway Tracks with Tommy Bar

With detachable tommy bar (locking spring)
For profile-free earthing of track profiles S49, S54, S64 and UIC60

Type	SAK PFE KN
Part No.	792 450
Anti-rotation element	PK2 (Ø10.5 mm)
DB drawing No.	3 Ebgw 01.53
DB material No.	157 535

Clamp for Railway Tracks with Ratchet

With detachable ratchet
For profile-free earthing of track profiles S49, S54, S64 and UIC60

Type	SAK PFE RA
Part No.	792 453
Anti-rotation element	PK2 (Ø10.5 mm)
DB drawing No.	3 Ebgw 01.53
DB material No.	157 549

Universal Clamp, T Pin Shaft

Type	UK K25 FL30 SQL
Part No.	773 251
For fixed ball point Ø	25 / 30 mm
For T pins with a collar width of	18 mm
Rd / Fl clamping range	30 mm
Anti-rotation element	PK2 (Ø10.5 mm)
For cable cross-sections	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA
DB drawing No.	4 Ebgw 01.59
DB material No.	157 538

Universal Clamp with Handle

Type	UK K25 FL30 HG
Part No.	774 251
For fixed ball point Ø	25 / 30 mm
For T pins with a collar width of	18 mm
Rd / Fl clamping range	30 mm
Anti-rotation element	PK2 (Ø10.5 mm)
For cable cross-sections	16 ... 120*) mm²
Max. short-circuit current I_k 0.5 s	33.5 kA
Max. short-circuit current I_k 1 s	23.7 kA
DB drawing No.	4 Ebgw 01.64
DB material No.	157 537

Accessories, spare parts and kit parts from page 193

Earthing Sticks for Switchgear Installations

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

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

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

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

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

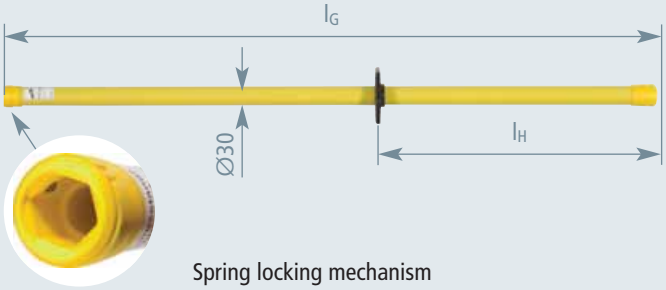
Earthing sticks with bayonet locking mechanism (T pin shaft) can also be used for clamps with hexagon shafts by attaching an AES SQ SK adapter.

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

Accessories, spare parts and kit parts from page 193

Earthing Sticks for Switchgear Installations

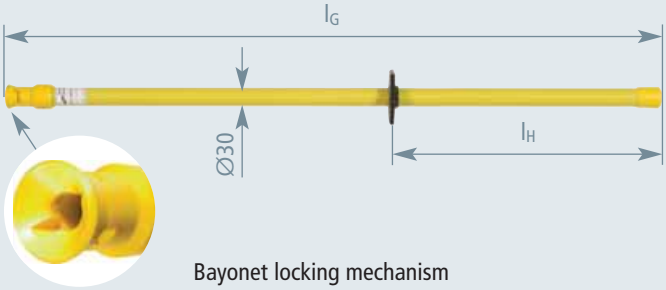
For Hexagon Shafts



Spring locking mechanism

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

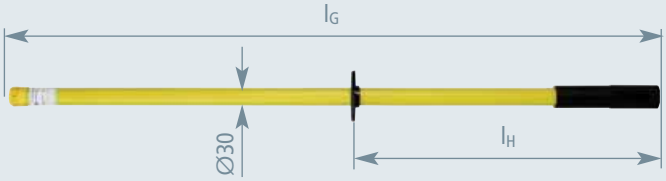
For T Pin Shafts



Bayonet locking mechanism

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

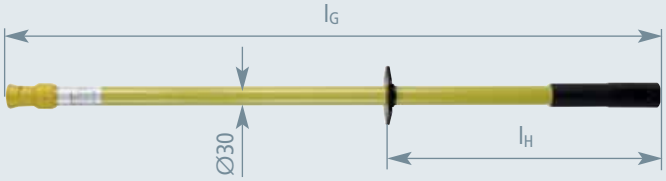
For Hexagon Shafts, Plug-in Coupling



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

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

For T Pin Shafts, Plug-in Coupling



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

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

Two-part, for Hexagon Shafts

Spring locking mechanism and plug-in coupling for handle extension

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

Two-part, for T Pin Shafts

Bayonet locking mechanism and plug-in coupling for handle extension

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

Accessory f. Earthing Sticks for Switchgear Installations

Adapter (T Pin Shaft / hexagon Shaft)

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

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

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

Accessory f. Earthing Sticks for Switchgear Installations

Adapter T Pin Shaft / long T Pin Shaft

NEW

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

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

Type	AD ES SQ SQL
Part No.	765 006
Length	185 mm

Accessories, spare parts and kit parts from page 193

Earthing Sticks for Overhead Lines

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

- **For outdoor use**
- **Robust aluminium cone coupling**
- **Total lengths up to 6000 mm**
- **Length of telescopic stick continuously adjustable via star knob**
- **For phase screw clamps and clamps with long T pin shaft**

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

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

Telescopic earthing stick with aluminium cone coupling and phase screw clamp

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

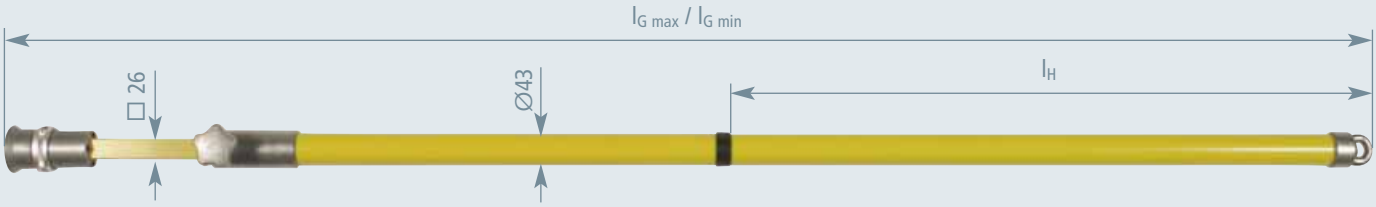
End fitting with eye (Al/rubber) or plug-in coupling with eye (Al/rubber) for extending the handle

Lockable adjusting ring
The adjusting ring on the cone has the following functions:
- Position "AUF" (= OPEN): Stick can be removed after the clamp has been attached
- Position "ZU" (= CLOSED): Stick and clamp remain coupled even after the clamp has been attached to the earthing and short-circuiting device

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

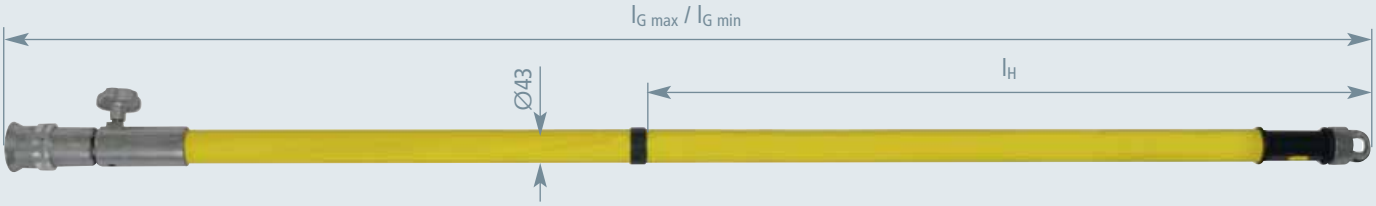
Earthing Sticks for Overhead Lines

Telescopic, for T Pin Shafts



Type	ESTC SQL 4000	ESTC SQL 5000
Part No.	**769 400**	**769 500**
Total length ($l_{G\,max}$ / $l_{G\,min}$)	4015 / 2180 mm	5015 / 2680 mm
Length (handle) (l_H)	1400 mm	1900 mm
Max. load on the operating head ($l_{G\,max}$ / $l_{G\,min}$)	12 / 35 kg	10 / 35 kg
Diameter	43 mm	43 mm

Telescopic, for T Pin Shafts, Plug-in Coupling



Type	ESTC SQL STK 3000
Part No.	**769 300**
Total length ($l_{G\,max}$ / $l_{G\,min}$)	2945 / 1615 mm
Length (handle) (l_H)	900 mm
Max. load on the operating head ($l_{G\,max}$ / $l_{G\,min}$)	18 / 35 kg
Diameter	43 mm

Accessory for Earthing Sticks for Overhead Lines

Adapter T Pin Shaft / long T Pin Shaft

NEW

Suitable for insertion into earthing sticks with aluminium cone coupling for T pin shafts (bayonet locking mechanism) to accept clamps with T pin shaft. The lock nut allows to fix the adapter on the earthing stick.

Type	AD ES SQ SQL
Part No.	**765 006**
Length	185 mm

Accessories, spare parts and kit parts from page 193

Earthing Sticks for Overhead Lines

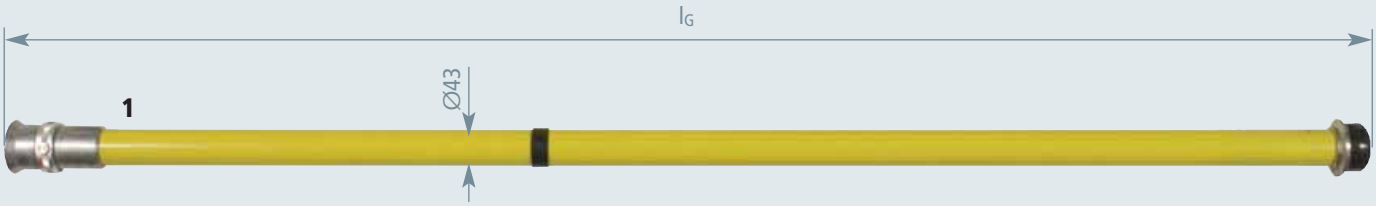
4. Carry out Earthing and Short-Circuiting – EaS Devices

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

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

Load values for extendible earthing sticks

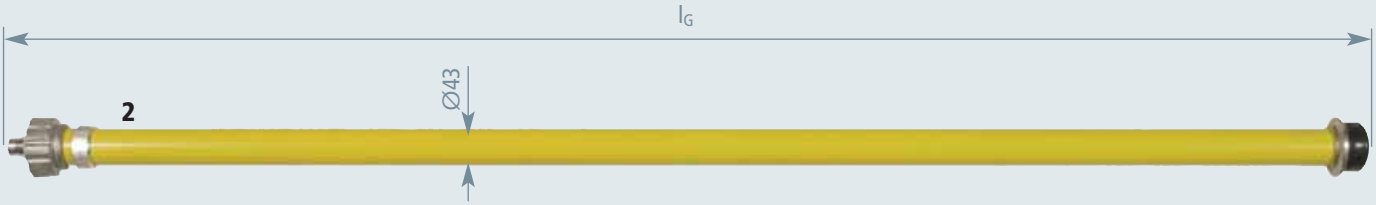
Multi-part, Top Section



With plastic cap on the coupling element

Type	EST KS SQL 1500
Part No.	769 503
Total length (l_G)	1600 mm
Diameter	43 mm

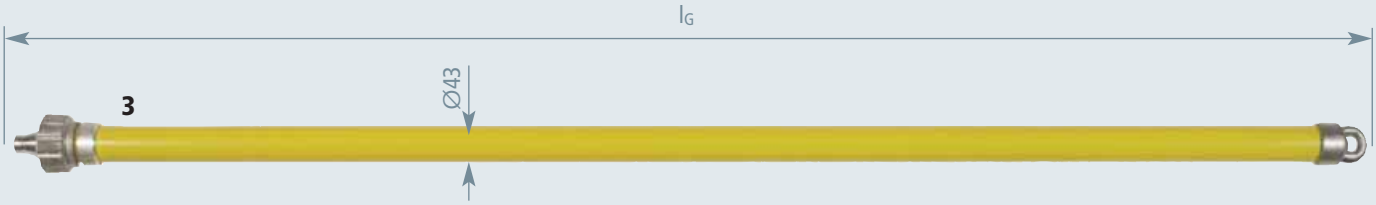
Multi-part, Intermediate Section



With plastic cap on the coupling element

Type	EST ZS 1500
Part No.	769 504
Total length (l_G)	1580 mm
Diameter	43 mm

Multi-part, End Fitting



With aluminium / rubber eye

Type	EST ES 1500
Part No.	769 505
Total length (l_G)	1590 mm
Diameter	43 mm

Accessories, spare parts and kit parts from page 193

Earthing Sticks for Railway Applications

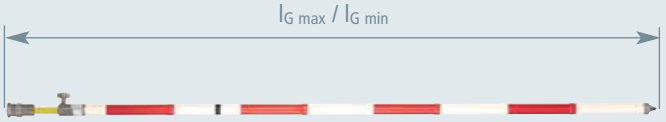
For threaded T pin Shafts

- For outdoor use
- Robust aluminium cone coupling
- Length of telescopic stick continuously adjustable via star knob
- Only suitable for phase screw clamps and clamps with long T pin shaft

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

Lockable adjusting ring
The adjusting ring on the cone has the following functions:
– Position "AUF" (= OPEN): Stick can be removed after the clamp has been attached
– Position "ZU" (= CLOSED): Stick and clamp remain coupled even after the clamp has been attached to the earthing and short-circuiting device

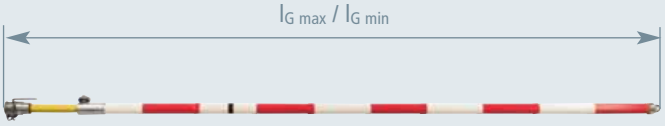
Telescopic Earthing Stick for T Pins



For threaded T pin shafts (bayonet locking mechanism)

Type	ESTC SQL RW 3500	ESTC SQL RW 5000
Part No.	769 352	769 502
Total length ($l_{G\,max}$ / $l_{G\,min}$)	3515 / 1935 mm	5015 / 2685 mm
Max. load on the operating head ($l_{G\,max}$ / $l_{G\,min}$)	12 / 35 kg	10 / 35 kg
DB drawing No.	3 Ebgw 01.58	3 Ebgw 01.52
DB material No.	157 534	157 533

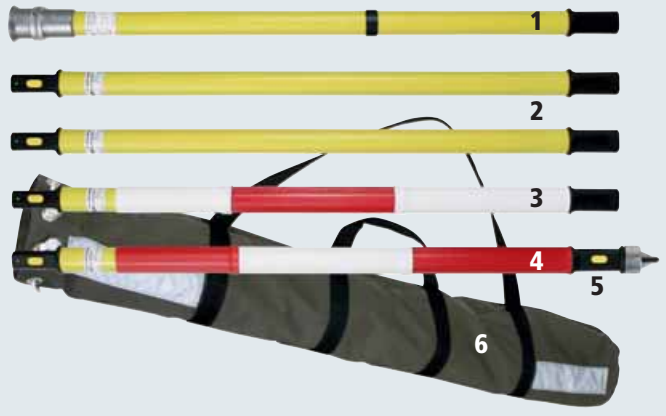
Telescopic Earthing Stick for T Pins with Cable Entry



For threaded T pin shafts (bayonet locking mechanism)
The coupling is fitted with an additional cable entry and a hook for securing the earthing cable and earthing stick at the tower (without adjusting ring)

Type	ESTC SQL H RW 5000
Part No.	769 508
Total length ($l_{G\,max}$ / $l_{G\,min}$)	5015 / 2685 mm
Max. load on the operating head ($l_{G\,max}$ / $l_{G\,min}$)	10 / 35 kg
DB drawing No.	3 Ebgw 01.55
DB material No.	612 142

Six-part, for T Pins



Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	1x 766 074	4	1x 766 079
2	2x 766 076	5	1x 766 889
3	1x 766 078	6	1x 769 509

For more detailed information on these products, see Accessories chapter

For threaded T pin shafts (bayonet locking mechanism)

Type	EST SQL RW 4915 TA
Part No.	769 506
Total length ($l_{G\,max}$ / $l_{G\,min}$)	4915 / 1055 mm
Max. load on the operating head ($l_{G\,max}$ / $l_{G\,min}$)	10 / 35 kg
DB drawing No.	3 Ebgw 01.68
DB material No.	157 489

EaS Configurator: Easy online Configuration

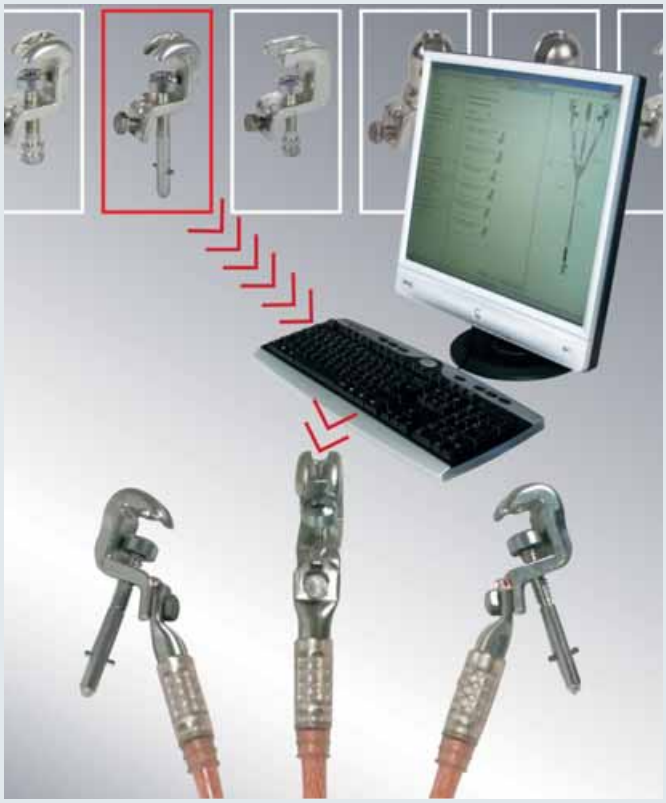
- **A suitable earthing and short-circuiting device can be easily selected online**
- **Unique laser printing on the earthing and short-circuiting device**
- **Individual configuration**
- **Permanent plausibility check in the background**
- **User-friendly interface**
- **To start the configuration,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

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

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

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

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

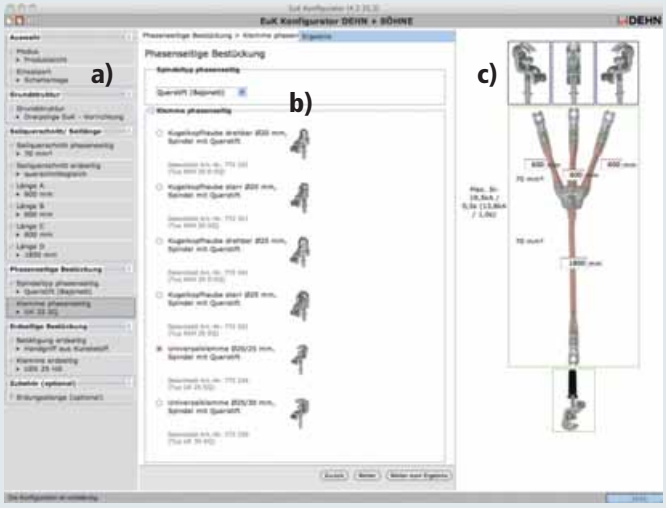


The earthing and short-circuiting configurator is graphically divided into three parts:

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

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

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

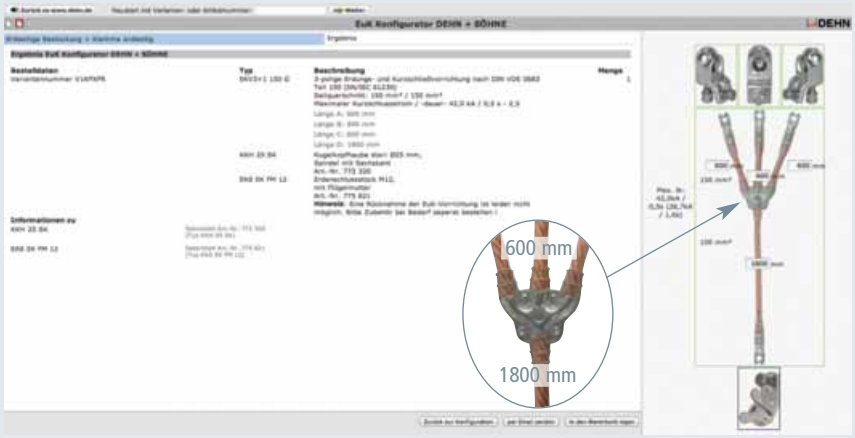


Examples of Possible Configurations

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

... easy configuration ...

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

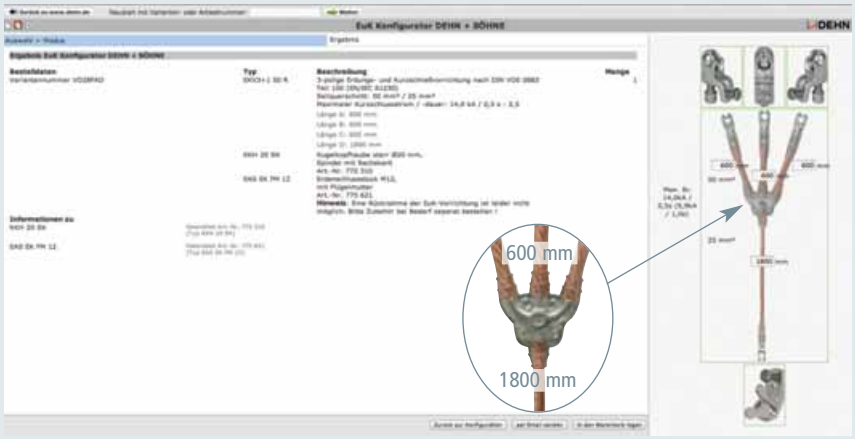


Type	EKV3+1 16 G	EKV3+1 25 G	EKV3+1 35 G	EKV3+1 50 G	EKV3+1 70 G	EKV3+1 95 G	EKV3+1 120 G	EKV3+1 150 G
Variant No.	VGJD2QX	VRDSN66	V3WJMYY	VU8P6LE	VCEY1U6	VA3926U	VAB3PJV	V1KPXFR
Phase cable end	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 20 SK	KKH 25 SK
Earth cable end	EAS EK FM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

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

... easy configuration ...

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



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

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

Accessory for Earthing and Short-Circuiting Devices

SK Earthing Stick

Spring locking mechanism

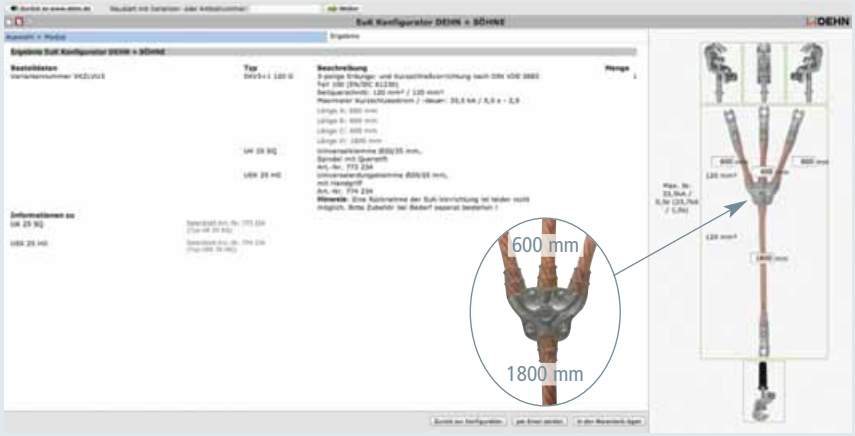
Type	ES SK 1000	ES SK 1500
Part No.	761 010	761 015
Length (l_G)	1000 mm	1500 mm

Examples of Possible Configurations

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

... easy configuration ...

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

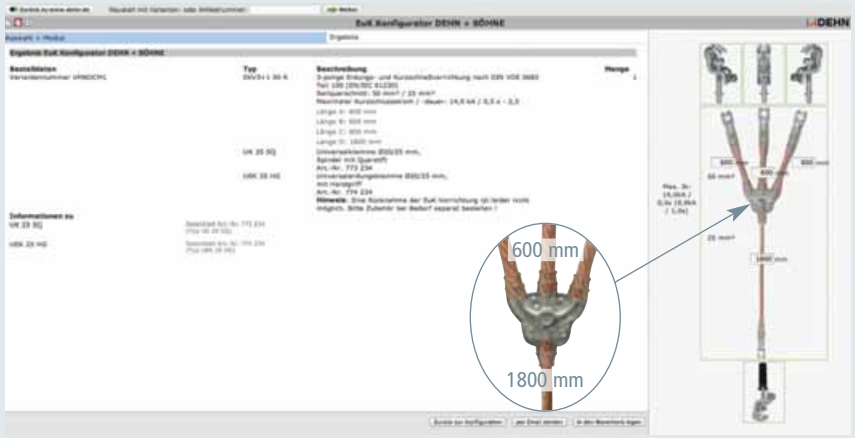


Type	EKV3+1 16 G	EKV3+1 25 G	EKV3+1 35 G	EKV3+1 50 G	EKV3+1 70 G	EKV3+1 95 G	EKV3+1 120 G
Variant No.	V8MCNWM	V8VF7CP	V5VN56Z	VPH98CT	VMLM2BZ	VE9HQHJ	VKZLVU3
Phase cable end	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ	UK 25 SQ
Earth cable end	UEK 25 HG	UEK 25 HG	UEK 25 HG	UEK 25 HG	UEK 25 HG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

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

... easy configuration ...

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



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

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

Accessory for Earthing and Short-Circuiting Devices

SQ Earthing Stick

Bayonet locking mechanism

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

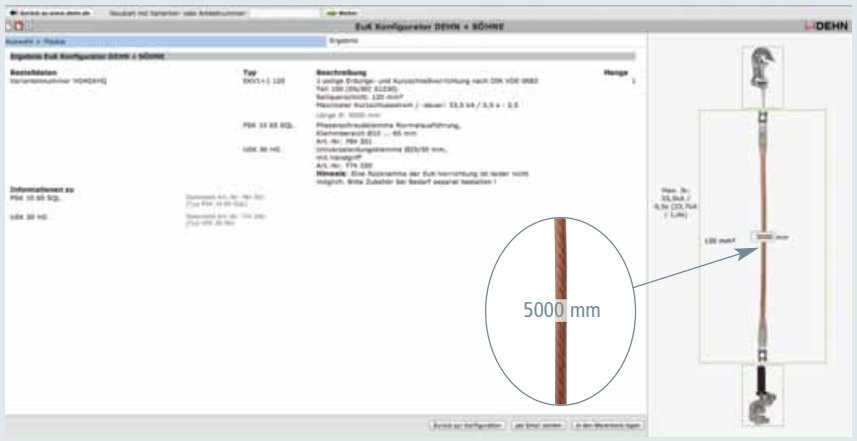
Accessories, spare parts and kit parts from page 193

Examples of Possible Configurations

Single-pole with Phase Screw Clamp

... easy configuration ...

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

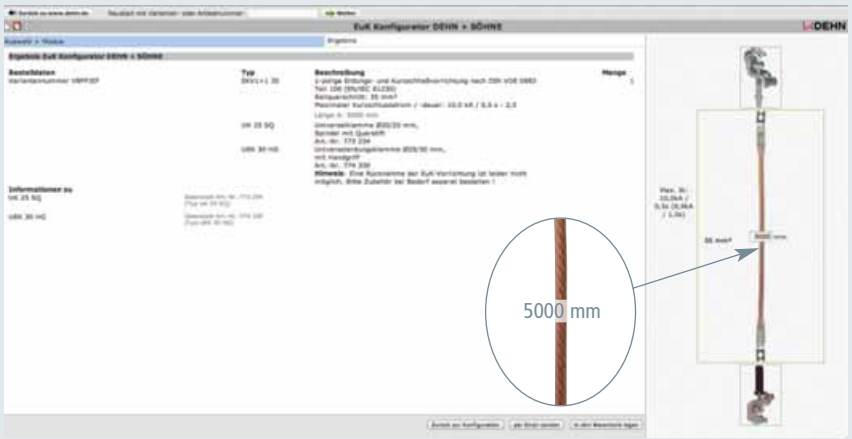


Type	EKV1+1 16	EKV1+1 25	EKV1+1 35	EKV1+1 50	EKV1+1 70	EKV1+1 95	EKV1+1 120
Variant No.	VE5E8FZ	VF33XR2	V43FCV8	V2KWXUL	VRP32FL	V2WPYVF	VG4GXHQ
Phase cable end	PSK 4 30 SQL	PSK 4 30 SQL	PSK 4 30 SQL	PSK 4 30 SQL	PSK 4 30 SQL	PSK 10 65 SQL	PSK 10 65 SQL
Earth cable end	EFK FL40 SKN	EFK FL40 SKN	EFK FL40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

Single-pole with Universal Clamp

... easy configuration ...

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



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

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

Telescopic Earthing Sticks

Type	ESTC SQL 5000	ESTC SQL STK 3000
Part No.	769 500	769 300
Total length ($l_{G\,max}$ / $l_{G\,min}$)	5015 / 2680 mm	2945 / 1615 mm
Length (handle) (l_H)	1900 mm	900 mm
Max. load on the operating head ($l_{G\,max}$ / $l_{G\,min}$)	10 / 35 kg	18 / 35 kg
Material (insulating tube)	Glass-fibre reinforced polyester tube	
Material (threaded coupling, star knob)	Aluminium alloy	
End fitting	Aluminium/rubber eye	Plug-in coupling for extending the handle

Accessory for Earthing and Short-Circuiting Devices

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

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

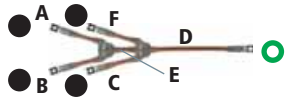
EaS Configurator: www.dehn.de/en/euk

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

1 For use with:

☐ Switchgear Installations ☐ Overhead Lines

2 Earthing and short-circuiting device:

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

3 Cross-section of the copper cable:

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

4 Cable lengths:

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

5 ● Phase connecting element (see easy choice):

Type or
Part No.

6 ○ Earth connecting element (see easy choice):

Type or
Part No.

7 Accessories (optional) (see easy choice):

☐ **Earthing stick**	Type or Part No.

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Easy Choice – Phase Connecting Elements and Earthing Sticks

Work according to the 5 Safety Rules

Phase Connecting Elements for Switchgear Installations:

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

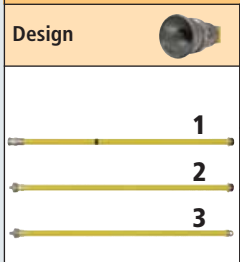
Earthing Sticks for Switchgear Installations:

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

Phase Connecting Elements for Overhead Lines:

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

Earthing Sticks for Overhead Lines:

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

Accessories, spare parts and kit parts from page 193

Work according to the 5 Safety Rules

Easy Choice – Earth Connecting Elements

Earth Connecting Elements:

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

Design	Type	Part No.	Dimensions	Clamping range Fl	Max. cable cross-section	Max. short-circuit current I_k 0.5 s	Max. short-circuit current I_k 1 s
	EAS EK FM 12	775 621	M12	–	16-150 mm²	42.0 kA	29.6 kA
	EAS EK FM 16	775 631	M16	–	16-150 mm²	42.0 kA	29.6 kA
	EAS EK FS 12	775 626	M12 x 15 mm	–	16-150 mm²	42.0 kA	29.6 kA
	EAS EK FS 16	775 636	M16 x 15 mm	–	16-150 mm²	42.0 kA	29.6 kA
	EAB RN 16 FS	790 150	Ø16 mm	–	16-150 mm²	42.0 kA	29.6 kA
	EAB RN 16 SKN	790 160	Ø16 mm	–	16-150 mm²	29.6 kA	29.6 kA
	EFK FL40 SKN	792 190	–	40 mm	16-95 mm²	26.5 kA	18.7 kA
	EFK FL30 SKN	792 030	–	30 mm	16-50 mm²	14.0 kA	9.9 kA

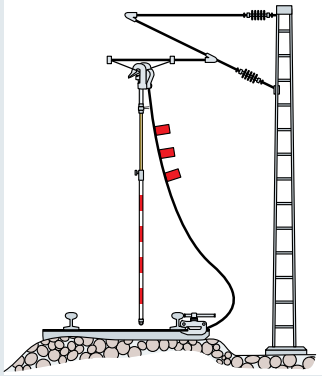
***) Clamping range and maximum cable cross-section of universal clamps used for:**

Fixed ball point Ø	T Pin Collar width	Rd / Fl Clamping range	Max. cable cross-section	Max. short-circuit current I_k 0.5 s	Max. short-circuit current I_k 1 s
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	16 mm²	4.5 kA	3.2 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	25 mm²	7.0 kA	4.9 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	35 mm²	10.0 kA	6.9 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	50 mm²	14.0 kA	9.9 kA
20 / 25 / 30 mm	15 / 18 mm	20 / 30 mm	70 mm²	19.5 kA	13.8 kA
20 / 25 / 30 mm	15 / 18 mm	–	95 mm²	26.5 kA	18.7 kA
– / 25 / 30 mm	–	–	120 mm²	33.5 kA	23.7 kA
–	–	–	150 mm²	42.0 kA	29.6 kA

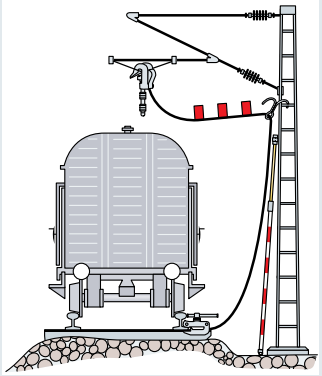
Kits for Railway Applications

Non-profile-free and profile-free

non-profile-free



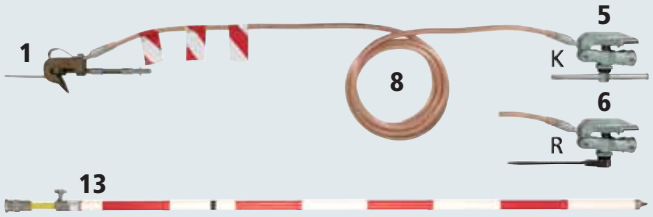
profile-free



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

Kit includes:					
Pos. No.	Part No.	Pos. No.	Part No.	Pos. No.	Part No.
1	784 755	8	751 085	15	769 506
2	773 251	9	751 120	16	769 352
3	784 352	10	751 040	17	761 015
4	772 320	11	750 202	18	785 111
5	792 450	12	740 124	19	700 000
6	792 453	13	769 502		
7	774 251	14	769 508		

Kit for Overhead Contact Lines (non-profile-free)



Kit includes:		
Type	Part No.	No.
Tommy bar (K) or ratchet (R)		
EKV K 50 8500	1x 751 086	1+5+8
EKV R 50 8500	1x 751 087	1+6+8
ESTC SQL RW 5000	1x 769 502	13

Telescopic earthing stick with adjusting ring (max. 5 m long)

Type	BEV OL NPF K	BEV OL NPF R
Part No.	750 210	750 218
Design	Tommy bar	Ratchet
Cable cross-section	50 mm²	50 mm²
Cable length	8500 mm	8500 mm
DB drawing No.	3 Ebgw 01.51	—
DB material No.	237 117	—

Kit for Overhead Contact Lines for Transport in Motor Vehicles (non-profile-free)

Kit includes:		
Type	Part No.	No.
Tommy bar (K) or ratchet (R)		
EKV K 50 8500	2x 751 086	1+5+8
EKV R 50 8500	2x 751 087	1+6+8
EST SQL RW 4915 TA	1x 769 506	15
STT 55 27 30	1x 785 111	18

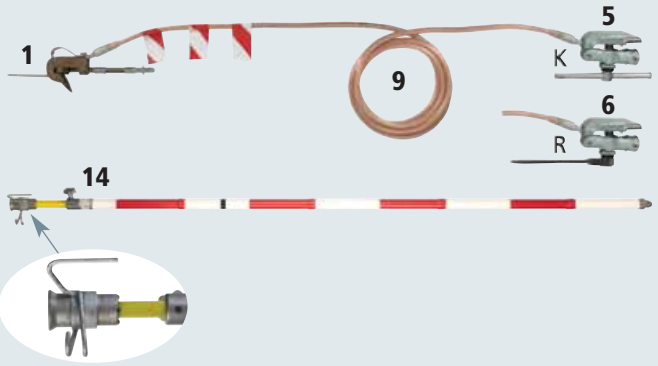
For technical emergency service and emergency management

Telescopic earthing stick kit consisting of six elements, pluggable (max. 5 m long)

Type	BEV OL NPF PKW K	BEV OL NPF PKW R
Part No.	750 196	750 216
Design	Tommy bar	Ratchet
Cable cross-section	50 mm²	50 mm²
Cable length	8500 mm	8500 mm
DB drawing No.	3 Ebgw 01.67	—
DB material No.	237 125	—

Accessories, spare parts and kit parts from page 193

Kit for Overhead Contact Lines (profile-free*)

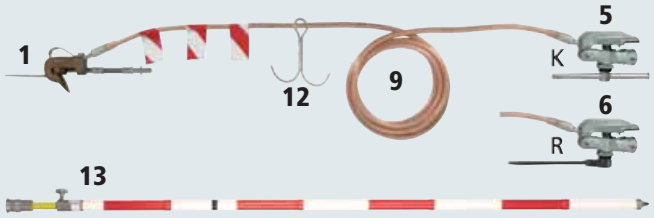


Kit includes:		
Type	Part No.	No.
Tommy bar (K) or ratchet (R)		
EKV K 50 12000	1x 751 126	1+5+9
EKV R 50 12000	1x 751 127	1+6+9
ESTC SQL H RW 5000	1x 769 508	14

Telescopic earthing stick with cable entry and suspension hook (max. 5 m long)

Type	BEV OL PF V2 K	BEV OL PF V2 R
Part No.	750 214	750 221
Design	Tommy bar	Ratchet
Cable cross-section	50 mm²	50 mm²
Cable length	12000 mm	12000 mm
DB drawing No.	3 Ebgw 01.51	—
DB material No.	237 115	—

Kit for Overhead Contact Lines (profile-free*)



Kit includes:		
Type	Part No.	No.
Tommy bar (K) or ratchet (R)		
EKV K H 50 12000	1x 751 121	1+5+9+12
EKV R H 50 12000	1x 751 122	1+6+9+12
ESTC SQL RW 5000	1x 769 502	13

Telescopic earthing stick with adjusting ring (max. 5 m long)

Type	BEV OL PF K	BEV OL PF R
Part No.	750 211	750 219
Design	Tommy bar	Ratchet
Cable cross-section	50 mm²	50 mm²
Cable length	12000 mm	12000 mm
DB drawing No.	3 Ebgw 01.51	—
DB material No.	237 118	—

Kit for Overhead Contact Lines for Transport in Motor Vehicles (profile-free*)

Kit includes:		
Type	Part No.	No.
Tommy bar (K) or ratchet (R)		
EKV K H 50 12000	2x 751 121	1+5+9+12
EKV R H 50 12000	2x 751 122	1+6+9+12
EST SQL RW 4915 TA	2x 769 506	15
STT 55 27 30	1x 785 111	18

For technical emergency service and emergency management

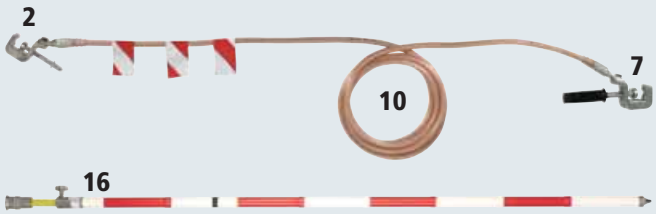
Telescopic earthing stick kit consisting of six elements, pluggable (max. 5 m long)

Type	BEV OL PF PKW K	BEV OL PF PKW R
Part No.	750 200	750 217
Design	Tommy bar	Ratchet
Cable cross-section	50 mm²	50 mm²
Cable length	12000 mm	12000 mm
DB drawing No.	3 Ebgw 01.67	—

*) Profile-free earthing means that the earthing cable can be suspended at the tower, thus allowing for limited diesel locomotive operation.

Kits for Railway Applications

Kit for Transformers at Overhead Line Towers



Kit includes:		
Type	Part No.	No.
EKV UK 50 4000	2x 750 041	2+7+10
ESTC SQL RW 3500	1x 769 352	16

For earthing on fuse carriers

Telescopic earthing stick with adjusting ring (max. 3.5 m long)

Type	BEV US OL ST
Part No.	750 212
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57
DB material No.	237 121

Kit for Supply Lines, Line Feeders, Bypass Lines and other Types of Lines

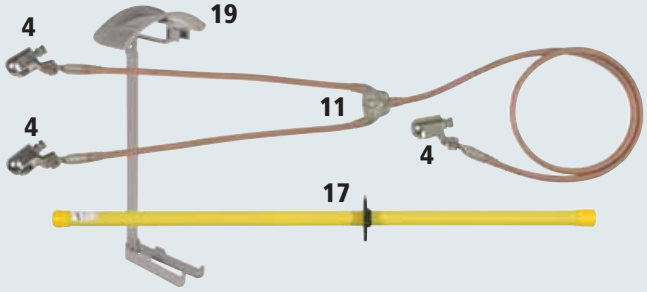
Kit includes:		
Type	Part No.	No.
EKV LK 50 4000	1x 750 042	3+7+10
ESTC SQL RW 3500	1x 769 352	16

For earthing the supply line and traction current lines

Telescopic earthing stick with adjusting ring (max. 3.5 m long)

Type	BEV SVUL
Part No.	750 213
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57
DB material No.	237 119

Kit for electric Point and Train Pre-Heating Systems



Kit includes:		
Type	Part No.	No.
EKV2 50 KKH 600 1800	2x 751 150	4 (3x)+11
ES SK 1500	1x 761 015	17
HV EKV ES30	1x 700 000	19

For the initial equipment of a transformer of electric point and train pre-heating systems

Type	BEV WHA ZVA
Part No.	750 215
Cable cross-section	50 mm²
Length of phase cable A	600 mm
Length of phase cable C	600 mm
Length of earthing cable	1800 mm
DB drawing No.	3 Ebgw 01.70
DB material No.	742 402

For voltage detectors for electric point heating systems, please refer to the PHE voltage detector chapter.

Earthing and Short-Circuiting Devices for Railway Applications

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

General Information:	
Standard	EN/IEC 61230 (DIN VDE 0683-100) and IEC 61138
Temperature range	– 25 °C ... + 55 °C

With Earth Clamp for Overhead Contact Lines and Clamp for Railway Tracks with Tommy Bar

Type	EKV K 50 8500	EKV K 50 12000	EKV K H 50 12000
Part No.	751 086	751 126	751 121
Cable cross-section	50 mm²	50 mm²	50 mm²
*Cable length	8500 mm	12000 mm	12000 mm
Hook	—	—	✔
DB drawing No.	3 Ebgw 01.51/67	3 Ebgw 01.51/67	3 Ebgw 01.51/67

With Earth Clamp for Overhead Contact Lines and Clamp For Railway Tracks with Ratchet

Type	EKV R 50 8500	EKV R 50 12000	EKV R H 50 12000
Part No.	751 087	751 127	751 122
Cable cross-section	50 mm²	50 mm²	50 mm²
Cable length	8500 mm	12000 mm	12000 mm
Hook	—	—	✔
DB drawing No.	3 Ebgw 01.51/67	3 Ebgw 01.51/67	3 Ebgw 01.51/67

With Universal Clamp (Handle) and Clamp for Railway Tracks with Tommy Bar

Type	BEV MF SE K	BEV BM HZ BDW K
Part No.	751 191	751 193
Cable cross-section	50 mm²	50 mm²
Cable length	8500 mm	12000 mm
DB drawing No.	3 Ebgw 01.56	3 Ebgw 01.56

With Universal Clamp (Handle) and Clamp for Railway Tracks with Ratchet

Type	BEV MF SE R	BEV BM HZ BDW R
Part No.	751 196	751 197
Cable cross-section	50 mm²	50 mm²
Cable length	8500 mm	12000 mm
DB drawing No.	3 Ebgw 01.56	3 Ebgw 01.56

With Universal Clamp (T Pin Shaft) and Universal Clamp (Handle)

Type	EKV UK 50 4000
Part No.	750 041
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57

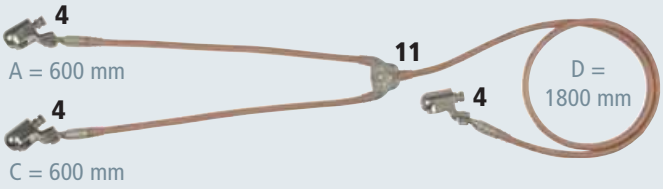
With Conductor Clamp and Universal Clamp (Handle)

Type	EKV LK 50 4000
Part No.	750 042
Cable cross-section	50 mm²
Cable length	4000 mm
DB drawing No.	3 Ebgw 01.57

With Universal Clamps (Handle) on both Sides

Type	BEV MF LTE
Part No.	751 192
Cable cross-section	50 mm²
Cable length	8500 mm
DB drawing No.	3 Ebgw 01.56

With Balll Head Caps ∅25 mm



Type	EKV2 50 KKH 600 1800
Part No.	751 150
Cable cross-section	50 mm²
Cable length	600 / 1800 mm
DB drawing No.	3 Ebgw 01.70
DB material No.	742 400

Accessory for Earthing and Short-Circuiting Devices for Railway Applications

Single-pole Earthing and Short-Circuiting Cable, unequipped

With red and white marking and hole in the terminal lug

Type EKS ...	50 BEV 4M	50 BEV 8.5M	50 BEV 12M
Part No.	751 040	751 085	751 120
Crimped cable lug	PK2 (Ø10.5 mm)	PK2 (Ø10.5 mm)	PK2 (Ø10.5 mm)
Cable cross-section	50 mm²	50 mm²	50 mm²
Cable length	4000 mm	8500 mm	12000 mm
DB drawing No.	3 Ebgw 01.57	3 Ebgw 01.51	3 Ebgw 01.51
DB material No.	157 511	157 512	157 513

Type	EKS 50 BEV 13M	EKS 50 BEV 14M
Part No.	751 130	751 140
Crimped cable lug	PK2 (Ø10.5 mm)	PK2 (Ø10.5 mm)
Cable cross-section	50 mm²	50 mm²
Cable length	13000 mm	14000 mm
DB drawing No.	—	—
DB material No.	—	—

Suspension Hook

For (profile-free) suspension of earthing cables on towers

Type	EHH BEV OL
Part No.	740 124
DB drawing No.	3 Ebgw 01.51
DB material No.	778 794

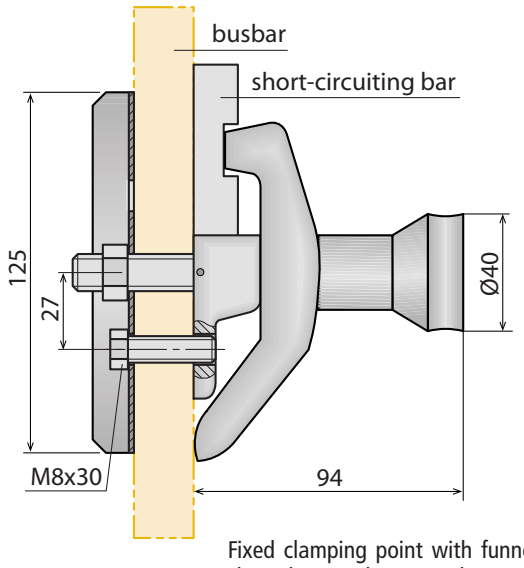
Accessories, spare parts and kit parts from page 193

Short-Circuiting Bar

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

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

Short-circuiting bar with earthing cable on a switchgear installation



Fixed clamping point with funnel-shaped nut and contact claw

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

The short-circuiting bar with longitudinal slot can be used for installations without direct neutral point earthing.
For connecting the earthing cable to the earthing system, it is fitted with a rigid ball head cap with a wing bolt for fixed ball points (Ø20 mm) (Part No. 772 312 (type KKH 20 FS)). Other equipment or cable lengths can be selected online via the earthing and short-circuiting configurator. Short-circuiting bars are available with two different coupling mechanisms for earthing sticks:

SK: Hexagon shaft

SQ: T pin shaft (bayonet locking mechanism)

Accessory for Short-Circuiting Bar

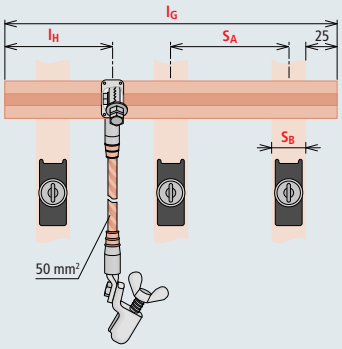
Fixed Clamping Point for Busbars

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

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

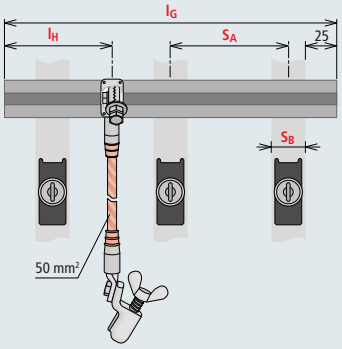
Short-Circuiting Bar

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



Type	KS60 8SK C	KS60 12SK C	KS60 8SQ C	KS60 12SQ C
Variant No.	VYKJW2W	VCS8GYU	V1TDM78	VU2EWNF
Coupling mechanism	SK	SK	SQ	SQ
Position of the coupling mechanism (l_H)	200 mm	200 mm	200 mm	200 mm
Profile	60 x 8 mm	60 x 12 mm	60 x 8 mm	60 x 12 mm
Total length (l_G)	500 mm	500 mm	500 mm	500 mm
Bar spacing (s_A)	150 mm	150 mm	150 mm	150 mm
Max. short-circuit current I_k 0.5 s	100 kA	130 kA	100 kA	130 kA
Max. short-circuit current I_k 1 s	70 kA	90 kA	70 kA	90 kA

Short-Circuiting Bar made of Aluminium (AlMgSi 0.5)



Type	KS60 8SK A	KS60 12SK A	KS60 8SQ A	KS60 12SQ A
Variant No.	VUZ656W	VLUZZB9	VUQ18JL	VNYHZGF
Coupling mechanism	SK	SK	SQ	SQ
Position of the coupling mechanism (l_H)	200 mm	200 mm	200 mm	200 mm
Profile	60 x 8 mm	60 x 12 mm	60 x 8 mm	60 x 12 mm
Total length (l_G)	500 mm	500 mm	500 mm	500 mm
Bar spacing (s_A)	150 mm	150 mm	150 mm	150 mm
Max. short-circuit current I_k 0.5 s	60 kA	100 kA	60 kA	100 kA
Max. short-circuit current I_k 1 s	45 kA	70 kA	45 kA	70 kA

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

Note: When ordering, please specify the variant No. generated online via the earthing and short-circuiting configurator or fill in the template on page 115 and send it to us.

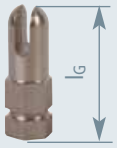
Accessory for Short-Circuiting Bar

SK Screw-Type Adapter

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

Hexagon shaft (width across flats 19)

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



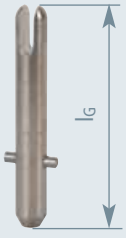
Accessory for Short-Circuiting Bar

SQ Screw-Type Adapter

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

T pin shaft (bayonet coupling mechanism)

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



Template for Short-circuiting Bars

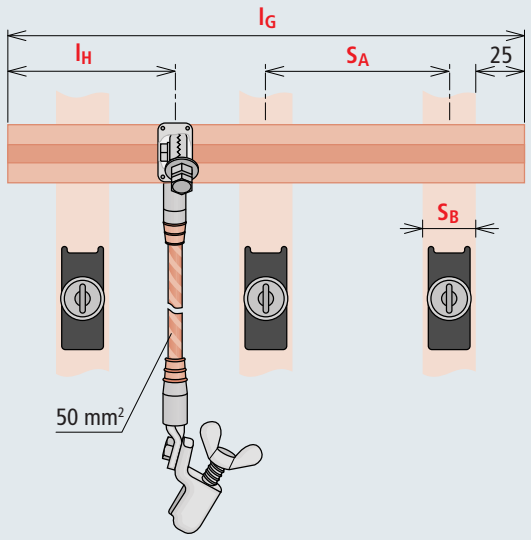
acc. to IEC/EN 61230 (DIN VDE 0683-100)

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

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

1 Material and short-circuit current:

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



2 Coupling mechanism:

☐ T pin shaft (bayonet) 

☐ Hexagon shaft 

3 Dimensions:

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

4 Cable length D (50 mm²):

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

5 Equipment of the earth cable end:

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

see easy choice:
☐ Type
or Part No.

6 Accessories (optional):

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

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

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

see easy choice
☐ **Earthing Stick**

Type or
Part No.

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

EaS Devices (fully insulated) for LV Cable Distribution Cabinets

Kit for Low-Voltage Installations

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

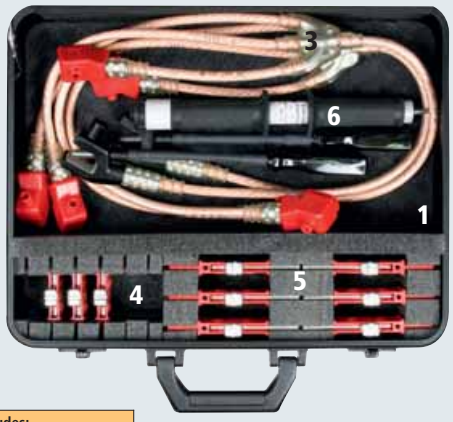
- Fully insulated, shock-proof version
- Fully equipped kit for cable distribution cabinets
- Safe operation with insulated earthing handle of type VI (with dual function), suitable for both inserting and removing earthing cartridges with T connection as well as for attaching earthing and short-circuiting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

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

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

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

Kit in Plastic Case



Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	1x 745 902	5	6x 745 910
3	2x V162LDM	6	1x 745 922
4	3x 745 905		
For more detailed information on these products, see Single Parts			

Type	EKS VI 2F KVS KK
Part No.	745 903
Variant No. of the EaS device	V162LDM
Dimensions	450 x 350 x 110 mm

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

Kit in Sheet Metal Case

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
2	1x 745 900	5	6x 745 910
3	2x V162LDM	6	1x 745 922
4	3x 745 905		
For more detailed information on these products, see Single Parts			

Type	EKS VI 2F KVS SBK
Part No.	745 901
Variant No. of the EaS device	V162LDM
Dimensions	440 x 330 x 100 mm

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

Accessories, spare parts and kit parts from page 193

EaS Devices (fully insulated) for LV Cable Distribution Cabinets

Single Parts

Plastic Case, empty

With foam padding

Type	KKL EKS VI KVS
Part No.	745 902
Dimensions	450 x 350 x 110 mm

Sheet Metal Case, empty

With foam padding

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

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

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

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

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

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

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

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

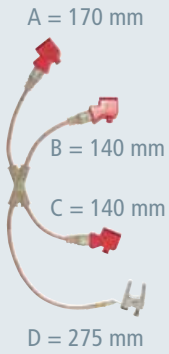
Note: When ordering, please specify a clear Variant No.

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

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

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

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



Spring-loaded compact Clamp

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

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

NH 00 Earthing Cartridges

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

For use with VI earthing handle

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

VI Earthing Handle

With dual function

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

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

NH 1 ... 3 Earthing Cartridges

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

For use with VI earthing handle

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

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting spring-loaded earth clamps

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

NH 4a Earthing Cartridges

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

Plastic Case, empty

With foam padding and hook-and-loop fastener

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

Accessories, spare parts and kit parts from page 193

EaS Devices (partly insulated) for LV Cable Distribution Cabinets

Kit for Low-Voltage Installations

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

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

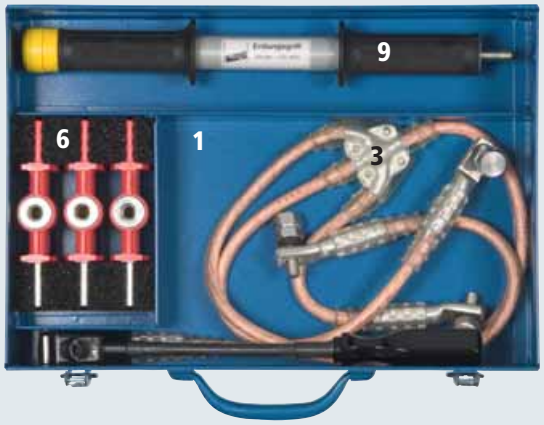
EaS Configurator: www.dehn.de/en/euk

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

Earthing cartridge with M10 connection, fully insulated connector and earthing handle.

Adapters for moving the connection point of the earthing cartridge forward for lower situated NH fuse holders are available on request.

Kit I in Sheet Metal Case

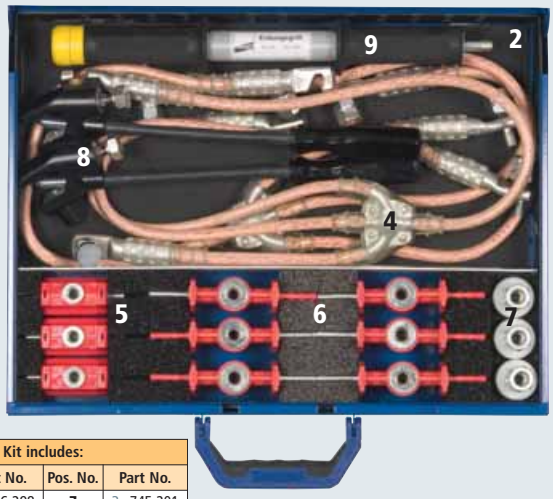


Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	1x 766 300	6	3x 745 018
3	1x VSUN6NV	9	1x 745 400
For more detailed information on these products, see Single Parts			

Type	EKS TI KVS SBK
Part No.	766 302
Variant No. of the EaS device	VSUN6NV
Dimensions	380 x 260 x 80 mm

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

Kit II in Sheet Metal Case



Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
2	1x 766 298	7	3x 745 201
4	2x VUKMT58	8	2x 745 602
5	3x 745 302	9	1x 745 400
6	6x 745 018		
For more detailed information on these products, see Single Parts			

Type	EKS TI 2F KVS SBK
Part No.	745 500
Variant No. of the EaS device	VUKMT58
Dimensions	440 x 330 x 66 mm

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

Accessories, spare parts and kit parts from page 193

EaS Devices (partly insulated) for LV Cable Distribution Cabinets

Single Parts

Sheet Metal Case, empty

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


1

Sheet Metal Case, empty

With foam padding

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


2

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

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

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

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

3

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

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

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

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

4

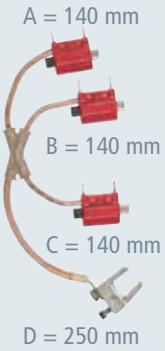
Earthing and Short-Circuiting Device TI, spring-loaded Earth Clamp

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

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

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

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



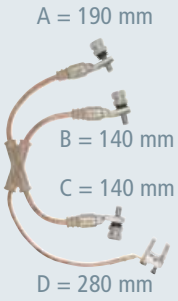
Earthing and Short-Circuiting Device TI, spring-loaded Earth Clamp

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

screw-on cable lugs with M10 hexagon pin on the phase cable end, to be screwed onto earthing cartridges with M10 connection of service entrance boxes

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

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



NH 00 Earthing Cartridges

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

For use with TI earthing handle

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


5

NH 1 ... 3 Earthing Cartridges

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

For use with TI earthing handle

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


6

NH 4a Earthing Cartridges

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

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

NH 1 ... 3 Earthing Cartridges with Grip Lugs

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

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

EaS Devices (partly insulated) for LV Cable Distribution Cabinets

Single Parts

Screw-in Earthing Insert with M10 Connection, insulated

Insulated thread

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

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

7

Screw-in Earthing Insert with M10 Connection

Conductive thread

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

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

Earth Clamp with flexible adjustable Handle and two Setting Positions

To be connected to the earth cable end of earthing and short-circuiting devices for cable distribution cabinets, with M8 pin, anti-rotation element and nut

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

8

Bare Earth Clamp with Wing Bolt

To be connected to the earth cable end of earthing and short-circuiting devices for cable distribution cabinets, with M8 pin, anti-rotation element and nut

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

TI Earthing Handle

With dual function

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

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

9

Spring-loaded Compact Clamp

With threaded bolt M8x12 mm and hexagon locking screw (width A/F 10)

Fixed by means of adjustable handle with flexible shaft

Type	KK M8 0 24 SK10
Part No.	745 508
Clamping range	Up to 24 mm
Max. short-circuit current I_k 0.5 s	10.0 kA
Max. short-circuit current I_k 1 s	6.9 kA

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting spring-loaded earth clamps

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

Plastic Case, empty

With foam padding and hook-and-loop fastener

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

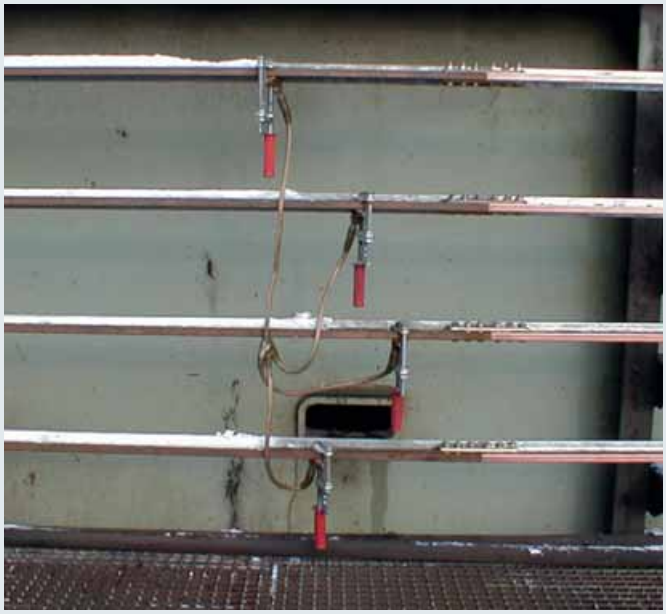
Accessories, spare parts and kit parts from page 193

Earthing and Short-Circuiting Devices for Crane Conductor Bars

With Clamps

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

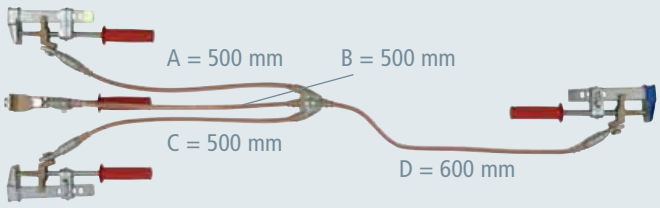
EaS Configurator: www.dehn.de/en/euk

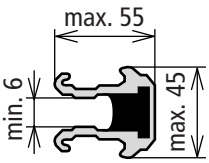


Three-pole earthing and short-circuiting device with clamps

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

With Clamps for Insulated Conductor Bars



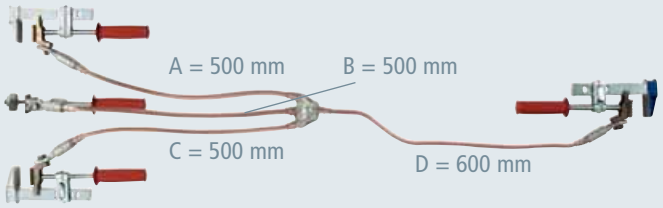


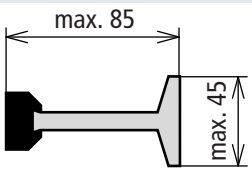
Insulated conductor bar

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

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

With Clamps for Uninsulated Conductor Bars





Uninsulated conductor bar

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

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

The clamp for the PEN conductor is marked in blue.

Earthing and Short-Circuiting Device for Street Lighting Systems

Work according to the 5 Safety Rules

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

Earthing and short-circuiting device installed at a junction and fuse box of a street lighting mast

- For junction and fuse boxes of street lighting systems
- For E14 fuse links
- E27 to E14 aluminium adapter
- Max. backup fuse 32 A power circuit breaker (B characteristic)

Type	EKV ÜGK MB S
Part No.	745 105
Dimensions	395 x 295 x 105 mm

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	1x 745 106	4	1x 745 109
2	2x 745 107	5	1x 745 921
3	6x 745 108		

For more detailed information on these products, see Single Parts

Single Parts for Earthing and Short-Circuiting Device for Street Lighting Systems

Plastic Case, empty

With foam padding

1

Type	KKL EKV ÜGK MB
Part No.	745 106
Dimensions	395 x 280 x 110 mm
Colour	Grey

Earthing and Short-Circuiting Device for Street Lighting Systems

With three fixed E14 screw-in earthing inserts and spring-loaded earth clamp, clamping range up to 24 mm (fixed via adjustable handle, Part No. 745 921)

Type	EKV ÜGK MB
Part No.	745 107
Cable cross-section	6 mm²

2

E27 / E14 Adapter

Reducing insert for converting from E27 to E14 threads

Allows to use earthing and short-circuiting devices with E14 screw-in earthing inserts even for E27 threads

Type	RED E27 E14 ÜGK MB
Part No.	745 108
Dimensions	∅30 x 25 mm
Material	Aluminium

3

Installation Adapter

For installing E27 / E14 adapters and gauge rings for D-fuses DII and DIII

Type	PSS DII
Part No.	745 109
Dimensions	∅30 x 110 mm
Material	Plastic

4

Adjustable Handle with flexible Shaft

With magnetic socket wrench insert

For connecting spring-loaded earth clamps

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

5

Earthing Handle for Low-Voltage Installations

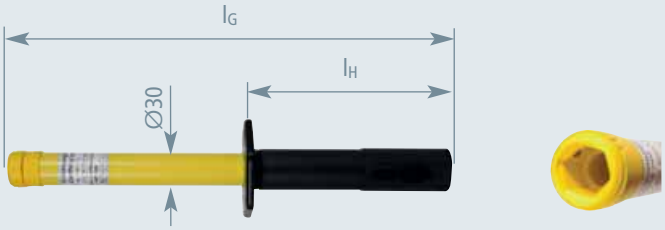
For Low-Voltage Installation

- For attaching earthing and short-circuiting devices in low-voltage installations
- End fitting with plug-in coupling for extending the handle
- Light-weight construction
- Hexagon shaft (width across flats 19) or T pin shaft

Attaching an earthing and short-circuiting device in a low-voltage switchgear installation using an earthing handle

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

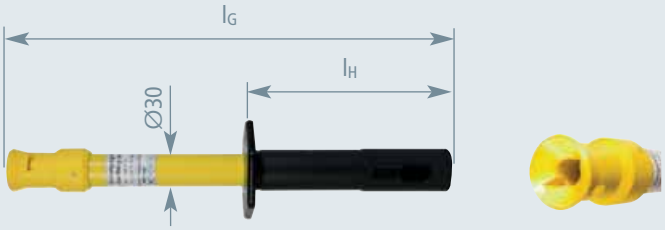
Earthing Handle for hexagon Shafts, plug-in Coupling



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

Type	EG SK STK 400
Part No.	745 415
Total length (l_G)	400 mm
Length (handle) (l_H)	185 mm

Earthing Handle for T Pin Shafts, plug-in Coupling



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

Type	EG SQ STK 400
Part No.	745 414
Total length (l_G)	400 mm
Length (handle) (l_H)	185 mm

Insulating Protective Shutters

5. Provide Protection against adjacent Live Parts – Insulating Protective Shutters

Rated Voltages from 1 to 36 kV

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

Inserting an insulating protective shutter (type A3) by means of an operating stick

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

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

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

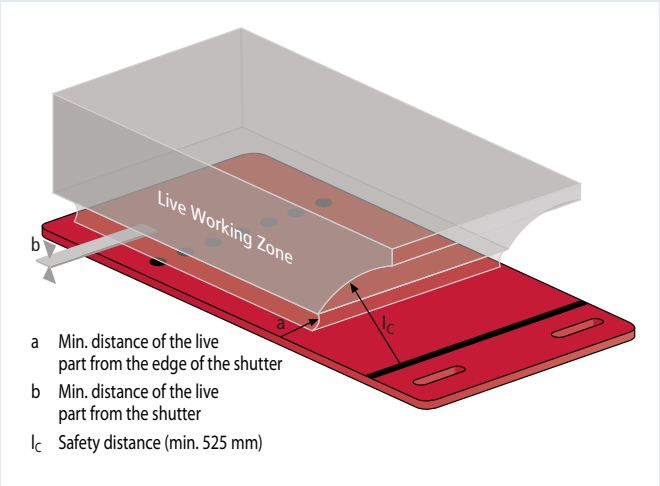
When used in medium-voltage installations, insulating protective shutters might have to be adapted, for example if it is not possible to insert shutters in the live working zone without risk due to unfavourably located drives, switch components or isolating plates. In such cases, a standard-compliant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

For enquiries and orders, please fill in the template on pages 130 to 132 or visit our website www.dehn-international.com.

Accessories, spare parts and kit parts from page 193

Insulating Protective Shutters

Rated Voltages from 1 to 36 kV



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

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

Note

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

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

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

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

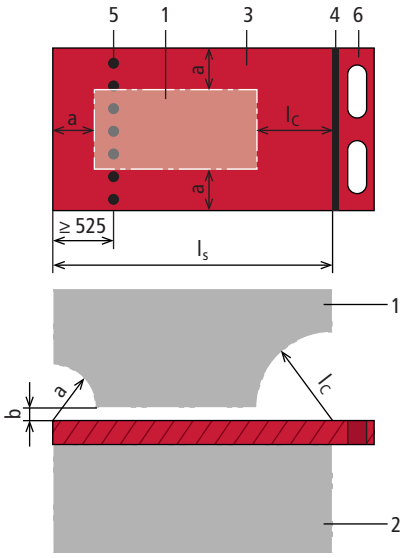
Due to the various designs of switchgear installations, DIN VDE 0682-552 defines four different basic types of protective shutters:

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

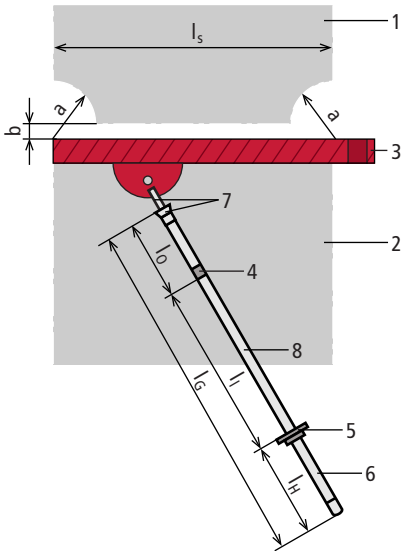
A2, protective section provides protection during inserting and removing insulating protective shutters

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

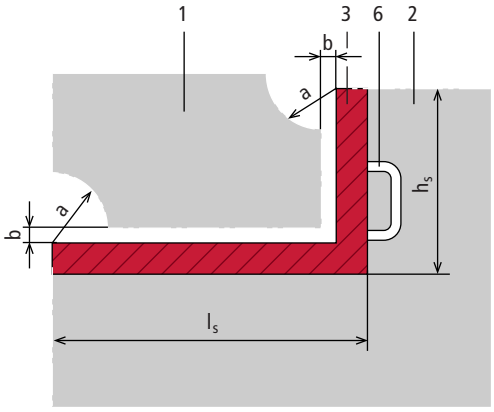
A4, protective device installed in the installation provides protection during inserting and removing insulating protective shutters



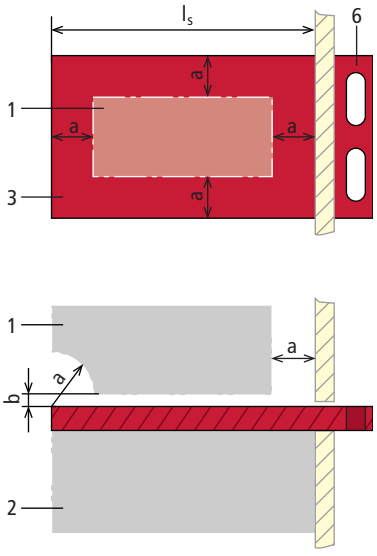
Protective shutter of type **A1** – Operation by hand



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



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



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

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

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

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

Insulating Protective Shutters

Type A1

Inserting an insulating protective shutter of type A1

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

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

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

Type A2

Inserting a transparent insulating protective shutter of type A2

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

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

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

Guide rails and other accessories are listed in our template.

Accessories, spare parts and kit parts from page 193

5. Provide Protection against adjacent Live Parts – Insulating Protective Shutters

Type A3

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

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

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

Inserting an insulating protective shutter of type A3 by means of an operating stick

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

Type A4

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

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

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

Inserting an insulating protective shutter of type A4

Guide rails and other accessories are listed in our template.

Template

DEHN form No. 2090/E/0112 (page 1)

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

acc. to DIN VDE 0682-552

Material: Rigid PVC

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

1 Switchgear installation:	
Type:	Rated voltage:

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

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

3 Recorded by:		
for internal use only, please do not fill in	Name:	
	Date:	

Person in charge:

Dept.	Name	Date	Remark
Sales			
Purchasing			

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

DEHN + SÖHNE
GmbH + Co.KG.

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92306 Neumarkt
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Technical Support:
Tel. +49 9181 906-1510

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

acc. to DIN VDE 0682-552

Material: Rigid PVC

ISP	/

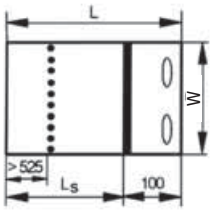
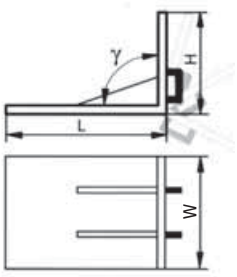
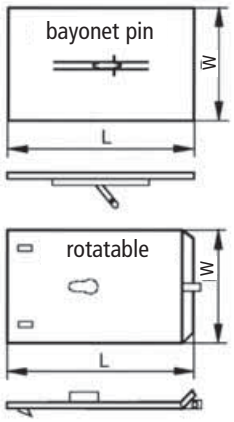
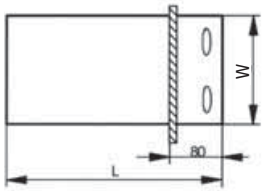
for internal use only, please do not fill in

1 Type of insulating protective shutter:

Thickness:	Type/Application	* Note:
☐ 5 mm	☐ With finger holes for operation by hand (A1)	Type A4 – The protective device of the installation must ensure full protection when inserting and removing insulating protective shutters!
☐ 6 mm	☐ With finger holes for operation by hand (A4*)	
☐ _____ mm	☐ With 1 bayonet pin for use with an operating stick (A3)	
	☐ With 2 bayonet pins for use with an operating stick (A3)	
	☐ Rotatable shutter for use with an operating stick (A3)	
	☐ With handle (A2)	

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

2 Dimensions of the insulating protective shutter:

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

Additional sketch for other types

Template

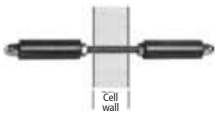
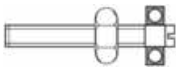
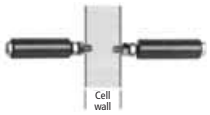
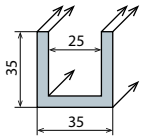
DEHN form No. 2090/E/0112 (page 3)

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

acc. to DIN VDE 0682-552

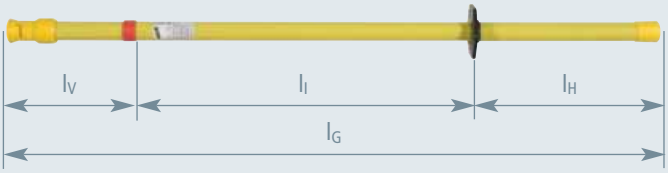
Material: Rigid PVC

Accessories:

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

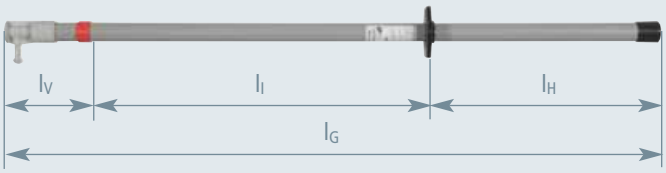
IS insulating stick – T pin shaft

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



SCS switching stick

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



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

Accessories, spare parts and kit parts from page 193

Cleaning Equipment

Permanent availability of electricity has become a decisive factor in international competition. At the same time, power interruptions must be reduced as a result of the increasing cost pressure. This makes it difficult to ensure reliability of existing installations and to perform maintenance work as entire parts of the installation cannot be disconnected and the only alternative is live working. DEHN + SÖHNE has long-standing experience in the field of live working and has developed products which can be found in the DELTEC product range.

Disconnecting installations for maintenance work

Electrical equipment and low-voltage, medium-voltage and high-voltage systems such as overhead lines, transformer substations, switchgear installations, distribution boards, transformer cells or cable distribution cabinets cannot be disconnected or can only be disconnected with great effort due to undesired downtimes or costly work on Sundays and public holidays.

Live cleaning

Clean installations increase system reliability
In case of adverse weather conditions (moisture), soiled installations, dust layers and residues from lubricants on insulators and cable sealing ends in medium-voltage installations, cobwebs and weeds in cable distribution boards as well as dust and lubricant layers in low-voltage installations may cause arc faults, resulting in power failure, damage to the equipment and even injury or death.

Regular cleaning intervals
Surveys revealed that open indoor installations and cable distribution cabinets have to be cleaned at regular intervals between 6 months and 2 years depending on the type and degree of pollution.

Dry suction cleaning combined with damp cleaning
Dry cleaning work is performed by suction cleaning with operating heads or brushing soiled parts of the installation while simultaneously sucking the dirt away. Loose layers of dust and cobwebs are easily cleaned with little effort. Damp cleaning eliminates oily and tough pollutant layers with the help of sponges soaked with special insulating cleaning liquid.
This type of work is performed according to the "hot stick working" procedure.

Dry suction cleaning equipment
Suction cleaning equipment consists of a cleaning head (operating heads, brushes), intake tube with handle, extension, intake hose and suction device.
All single parts are made of plastic and are fully insulated. The shape of the brushes and operating heads is largely adapted to the parts of installations to be cleaned.
The special plug-in coupling system of the dry cleaning equipment prevents accidental use of accessories not intended for this application (e.g. acessories of industrial vacuum cleaners).

Requirements on the vacuum cleaner
The vacuum cleaner used must meet the following requirements:

- The industrial vacuum cleaner must have a minimum air velocity of 20 m/s and a visual indication of the intake capacity.
- The intake hose must have a continuous inner diameter ≥ 30 mm and must not contain any metal parts.

Damp cleaning equipment
Damp cleaning equipment consists of special cleaning heads (sponge holders), an insulating stick with handle and extension elements. All single parts are fully insulated. The plug-in system of operating heads and sponges allows easy and fast replacement of dirty sponges. Only approved sponges may be used for this purpose.

Refilling cable sealing ends

Refilling insulating oil into cable sealing ends
The refilling device considerably reduces the refilling procedure, making it safer and easier. The insulating oil is heated according to the manufacturers' specifications and filled into the cable sealing end by simply pushing a button on the refilling lance. The compact device with rolls has a max. capacity of 5 litres of insulating oil. The screw plug at the cable sealing end is loosened with an insulated screw driver (insulating operating stick with interchangeable operating head). This type of work is performed according to the "hot stick working" procedure.

Equipment for refilling insulating oil into cable sealing ends
Refilling equipment consists of a pumping unit with a reservoir, regulated heating, pump, refilling lance and an insulated screw driver system consisting of an insulating stick with a manually operated mechanism (adjustable handle) and interchangeable operating heads (straight and angled) with a safety plug-in system accepting different bits and screw plugs. The refilling lance and the pumping unit are connected via a hose and a control line (pump ON/OFF). The refilling lance and the screw driver are fully insulated. Special plastic screw plugs are available for different cable sealing ends which are attached to the insulated screw driver.

Requirements on installers

Selection of electrically skilled persons for live working
Only electrically skilled persons with experience of several years in the operation and maintenance of electrical installations are allowed to perform maintenance and repair work. Electrically skilled persons must be theoretically and practically trained for this type of work.

Training as live worker
The training as specialised live worker is based on detailed target descriptions as required by the German professional association for precision and electrical engineering. It includes theoretical and practical training and a "live working" certificate upon completion of the training.

Live Working Product Range

"Live working" procedure

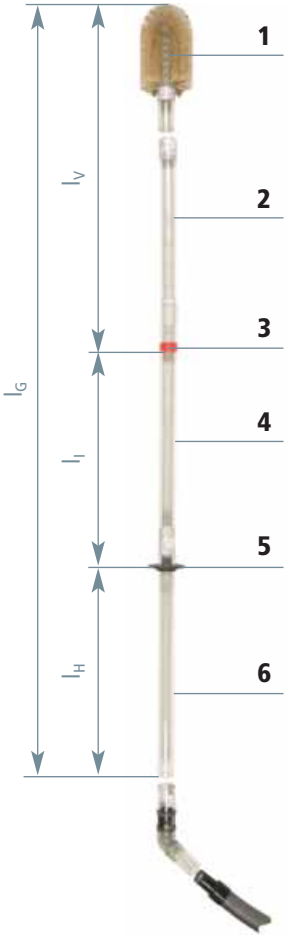
During hot stick working, the worker keeps a predefined distance from live parts of the installation and uses insulating sticks/operating sticks.

Design of operating sticks

Operating sticks according to DIN VDE 0681/0682 are hand-held devices for operating, testing and shielding live equipment. They consist of one or more insulating sticks rated for the nominal voltage of the equipment and of an operating head designed for the intended application. **Operating sticks**, are for example **intake tubes**, **insulating sticks**, **locking sticks**, **refilling lances** or **insulated screw drivers**. They are marked with a **triangle symbol** on the rating plate.

An operating stick consists of a **handle**, an **insulating element** and an **operating head**.

The **operating head** is the part of the operating stick containing the operating element, for example cleaning heads and brushes of a dry cleaning kit or the sponge holders of a damp cleaning kit.
The **insulating element** is the part of the operating stick between the hand guard and red ring. It provides the user with a safety distance and sufficient isolation for safe operation.
The **extension** is the part of the operating stick between the insulating and operating element of the operating head. It allows the user to reach remote parts of the installation and to pass the operating head next to live parts.
The **hand guard** provides a visible barrier between the handle and the insulating element and prevents the user from making contact with the insulating element.
The **red ring** indicates the end of the insulating element in the direction of the operating head. It provides a visible barrier and prevents the user from making contact with live parts of the installation. The insulating element between the red ring and hand guard must not contact live parts, however, contact with earthed parts is allowed.



Design

1 Operating head
2 Extension
3 Red ring
4 Insulating element
5 Hand guard
6 Handle

Dimensions:
l_H Length of the handle
l_I Length of the insulating element
l_V Length of the extension
l_G Total length

Product	Type	Nominal voltage U_N / frequency f_N	Application, Indication	Page
TRS NS Dry Cleaning Kit				
	**TRS NS**	up to 1000 V / 15 ... 60 Hz	Live cleaning by suction Specially adapted operating heads for intensive cleaning Plug-in coupling system allows fast replacement of operating heads	**136**
TRS MS Dry Cleaning Kit				
	**TRS MS** **TRS MS V1**	up to 15 kV / 15 ... 60 Hz	Live cleaning by suction Transparent intake tubes for enhanced safety Specially adapted operating heads for intensive cleaning Plug-in coupling system allows fast replacement of operating heads	**139**
FRS ZK MS Damp Cleaning Kit				
	**FRS ZK MS**	up to 36 kV / 15 ... 60 Hz	Damp cleaning equipment for use under live conditions with special cleaning liquid Universal gear coupling for replacing and adjusting the angle of operating heads Plug-in operating heads allow fast and easy replacement of sponges	**141**
TFRS MS Combined Cleaning Kit				
	**TFRS MS**	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 allow fast and easy replacement of sponges	**142**
NFG MS Refilling Device				
	**NFG MS**	up to 36 kV / 15 ... 60 Hz	Refilling of insulating oil under live conditions Safe, fast and easy refilling procedure	**148**
Insulating Stick Kit				
	**Insulating Stick Kit**	up to 7.5 kV / d.c. and 25 kV / a.c.	Insulating stick kit for cleaning the windscreens of electric locomotives	**153**

Maintenance Tests 176

Operating sticks must be subjected to electrotechnical tests. Therefore, we recommend to test them with the prescribed limits as stated in the Electrical Safety Rules according to German regulations (BGV A3). This test includes:

- measurement of the leakage current,
- test for protection against bridging,
- visual inspection

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

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

TRS NS Dry Cleaning Kit

Nominal Voltages up to 1000 V / 15 ... 60 Hz

Live cleaning of a low-voltage switchgear installation using the TRS NS dry cleaning kit

- For indoor and outdoor installations
- Equipment for suction cleaning under live conditions
- For dry cleaning of cable distribution cabinets, open indoor installations and control cabinets
- Specially adapted operating heads for intensive cleaning
- Plug-in coupling system allows fast replacement of operating heads
- Regulation of intake air in the handle area

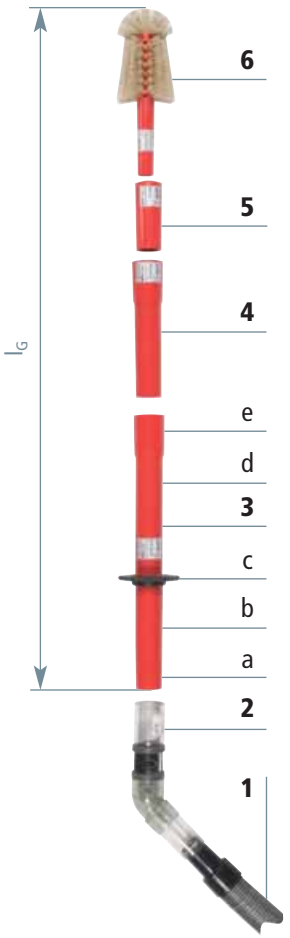
General Information:	
Standard	Based on DIN VDE 0680-3
Not suitable for use in wet weather conditions	✷

Requirements

Cleaning work up to 1000 V must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements". In Germany TRS NS dry cleaning kits are subject to BGV A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).

Chamfered flat cleaning head in use

Tubular brush in use



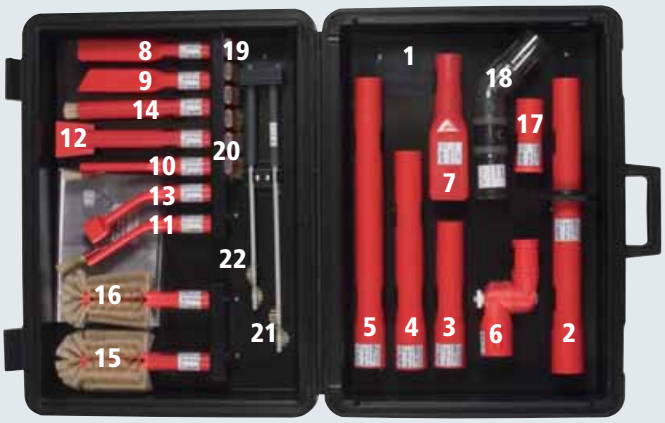
Design

1 Intake hose
2 Intake hose adapter
3 Intake tube with
  a Lower connecting part
  b Handle
  c Hand guard
  d Insulating element
  e Top connecting part
4 Extension tube
5 Intake tube adapter
6 Cleaning head

Dimensions:

$l_{G\ min}$ = 560 mm
$l_{G\ max}$ = 1350 mm

Cleaning Equipment



Fully equipped plastic case

Type	TRS NS
Part No.	785 502
Dimensions	560 x 410 x 170 mm

Single Parts for TRS NS Dry Cleaning Kit

Plastic Case, empty

With retaining clips

Type	KKL TRS NS
Part No.	785 506
Colour	Black
Dimensions	560 x 410 x 170 mm


1

Extension

Insulating tube, with top and lower connecting part

Type	SRV 200 NS	SRV 300 NS	SRV 400 NS
Part No.	785 521	785 522	785 523
Diameter	40 mm	40 mm	40 mm
Dimensions	200 mm	300 mm	400 mm


3-5

Flat Cleaning Head 55

Width: 55 mm

Type	FD 55 NS
Part No.	785 540
Diameter	40 mm
Dimensions	200 mm


7

Flat Cleaning Head 35

Width: 35 mm, 60° outlet, chamfered

Type	FD 35 S NS
Part No.	785 542
Diameter	25 mm
Dimensions	210 mm


9

Flat Cleaning Head 35

Width: 35 mm, 30° angled, with detachable brush

Type	FD 35 W P NS
Part No.	785 591
Diameter	25 mm
Dimensions	245 mm


11

Single Parts for TRS NS Dry Cleaning Kit

Intake Tube with Handle

For use as operating tube with handle and hand guard, with top and lower connecting part

Type	SRH 400 NS
Part No.	785 520
Dimensions	400 mm


2

Adjustable Angle

Lockable, adjustable due to 15° gearing, with top and lower connecting part

Type	SRW V NS
Part No.	785 530
Diameter	40 mm
Dimensions	160 mm


6

Flat Cleaning Head 35

Width: 35 mm

Type	FD 35 NS
Part No.	785 541
Diameter	25 mm
Dimensions	210 mm


8

Flat Cleaning Head 35

Width: 35 mm, straight, with detachable brush

Type	FD 35 P NS
Part No.	785 590
Diameter	25 mm
Dimensions	235 mm


10

Round Cleaning Head

With scraper (50 mm)

Type	RD 25 S NS
Part No.	785 560
Diameter	25 mm
Dimensions	245 mm


12

TRS NS Dry Cleaning Kit

Single Parts

Cross Cleaning Head 35

Width: 35 mm, 30° angled

Type	QD 35 W NS
Part No.	785 543
Diameter	25 mm
Dimensions	200 mm

13

Round Cleaning Head

With brush

Type	RD 25 P NS
Part No.	785 570
Diameter	25 mm
Dimensions	230 mm

14

Tubular Brush 85 mm

Cylindrical bristles

Type	STB 85 Z NS
Part No.	785 550
Diameter	25 mm
Dimensions	240 mm

15

Tubular Brush 85 mm

Conical bristles

Type	STB 85 K NS
Part No.	785 555
Diameter	25 mm
Dimensions	240 mm

16

Intake Tube Adapter

For brushes and cleaning heads (Ø25 mm)

Type	SRA NS
Part No.	785 515
Diameter	40 / 25 mm
Dimensions	100 mm

17

Intake Hose Adapter

Adjustable, 135° angled, regulation of intake air, for use with intake hose system (Ø35 mm)

Type	SSA W D
Part No.	785 200
Diameter	35 / 40 mm

18

Spare Brush

Short bristles, for flat cleaning heads with detachable brush

Type	EP 25 K NS
Part No.	785 595
Dimensions	25 mm
PU	3 pieces

19

Spare Brush

Long bristles, for flat cleaning heads, with detachable brush

Type	EP 25 L NS
Part No.	785 596
Dimensions	40 mm
PU	3 pieces

20

Cleaning Brush

For individual kit parts (Ø40 mm)

Type	RB 40 NS
Part No.	785 580
Diameter	50 mm
Dimensions	485 mm

21

Cleaning Brush

For individual kit parts (Ø25 mm)

Type	RB 20 NS
Part No.	785 585
Diameter	25 mm
Dimensions	485 mm

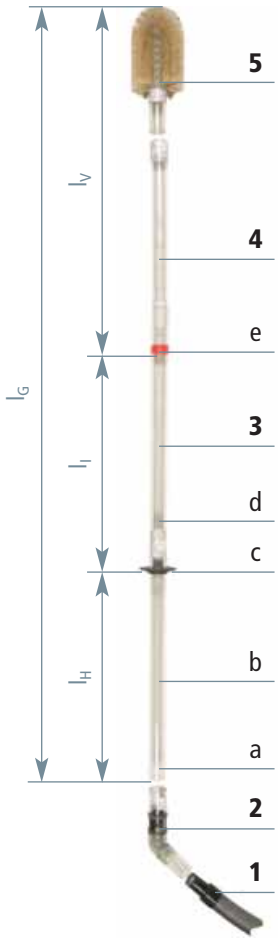
22

TRS MS Dry Cleaning Kit

Nominal Voltages up to 36 kV / 15 ... 60 Hz

- For indoor and outdoor installations
- Equipment for live cleaning by means of suction
- For dry cleaning of transformers and switchgear installations
- Transparent intake tubes ensure enhanced safety
- Specially adapted operating heads for intensive cleaning
- Plug-in coupling system allows fast replacement of operating heads

Live cleaning of a transformer using the TRS MS dry cleaning kit



1 Intake hose
2 Intake hose adapter
3 Intake tube with
  a Lower connecting part
  b Handle
  c Hand guard
  d Insulating element
  e Red ring
4 Extension tube
5 Cleaning head

Dimensions:

l_H Length of the handle = 540 mm
l_I Length of the insulating element = 535 mm
l_V Length of the extension
$l_{V\,min}$ = 115 mm,
$l_{V\,max}$ = 2515 mm
l_G Total length of the intake tube
$l_{G\,min}$ = 1180 mm,
$l_{G\,max}$ = 3580 mm

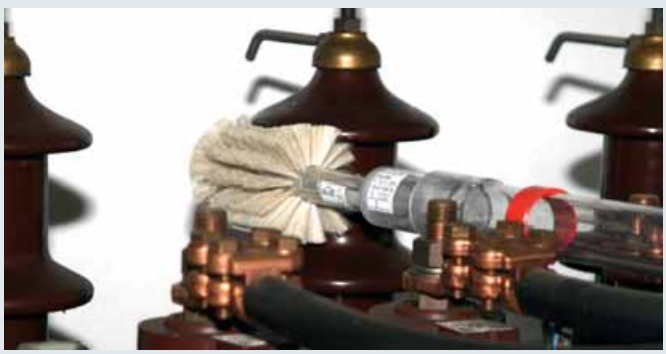
Design

General Information:	
Standard	DIN VDE 0682-621
Not suitable for use in wet weather conditions	✷

Requirements

Cleaning work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany TRS MS dry cleaning kits are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).

Cleaning an insulator with a flat cleaning head and 135° angled intake tube



Cleaning an insulator with a tubular brush

TRS MS Dry Cleaning Kit

TRS MS Dry Cleaning Kit

Fully equipped GRP case

Type	TRS MS
Part No.	785 100
Dimensions	1260 x 305 x 205 mm

TRS MS Dry Cleaning Kit V1

Fully equipped GRP case

Type	TRS MS V1
Part No.	785 112
Dimensions	1260 x 305 x 205 mm

FRS ZK MS Damp Cleaning Kit

Nominal Voltages up to 36 kV / 15 ... 60 Hz

- For indoor and outdoor installations
- Damp cleaning equipment for use under live conditions with special cleaning liquid
- Universal gear coupling for replacing and adjusting the angle of operating heads
- Rigid and flexible plug-in operating heads allow fast and easy replacement of the sponges

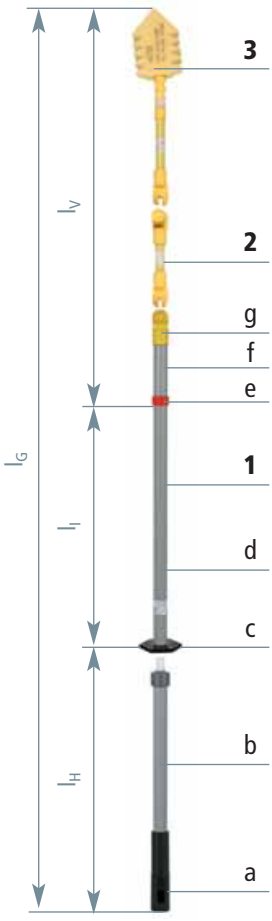
Damp cleaning of a transformer using the FRS ZK MS damp cleaning kit

Application

Damp sponges allow to remove tough pollution layers and to clean oily transformer surfaces. Special insulating cleaning liquids (e.g. Rivolta SLX 500; SLX TOP or SLX Super from Bremer & Leguil, Duisburg/Germany, and Florin 2000 from Flore, Koblenz/Germany) must be selected according to the rated voltage of the installation and the environmental conditions.

Requirements

Cleaning work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany FRS ZK MS damp cleaning kits are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).



Design

1 Insulating stick with
- a End fitting with plug-in coupling
- b Handle
- c Hand guard
- d Insulating element
- e Red ring
- f Extension
- g Top connecting part

2 Extension tube

3 Operating head with sponge

Dimensions:

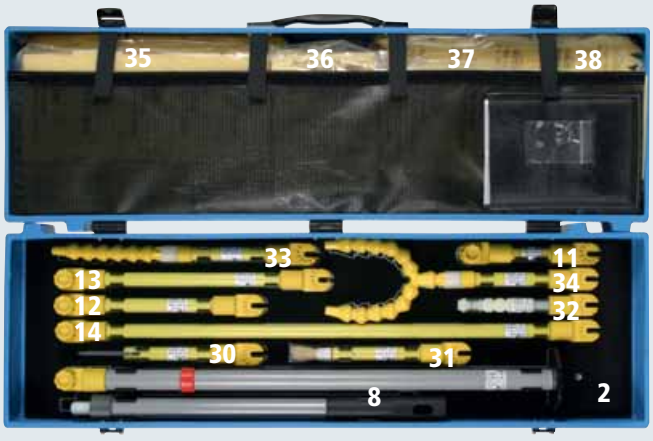
l_H Length of the handle = 510 mm

l_I Length of the insulating element = 525 mm

l_V Length of the extension
$l_{V\,min}$ = 350 mm,
$l_{V\,max}$ = 2100 mm

l_G Total length
$l_{G\,min}$ = 1450 mm,
$l_{G\,max}$ = 3250 mm

General Information:	
Standard	Based on DIN VDE 0681-1 and DIN VDE 0682-621
Standard (universal gear coupling)	EN/IEC 60832 (DIN VDE 0682-211)
Not suitable for use in wet weather conditions	✷

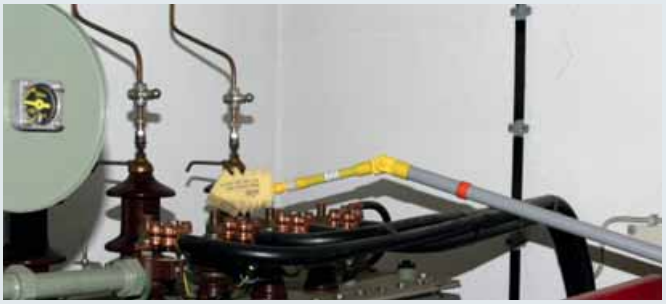


Fully equipped GRP case

Type	FRS ZK MS
Part No.	785 940
Dimensions	945 x 285 x 170 mm

TFRS MS Combined Cleaning Kit

Nominal Voltages up to 36 kV / 15 ... 60 Hz



TFRS MS combined cleaning kit used for dry and damp cleaning of a transformer under live conditions

- For indoor and outdoor installations
- Combined dry and damp cleaning kit for cleaning under live conditions
- Transparent intake tubes ensure enhanced safety
- Specially adapted operating heads for intensive cleaning
- Universal gear coupling for replacing and adjusting the angle of operating heads
- Rigid and flexible plug-in operating heads allow fast and easy replacement of the sponges

Application

Dry cleaning work is performed by suction cleaning with operating heads or brushing soiled parts of the installation while simultaneously sucking the dirt away. Loose dust layers and cobwebs are easily removed with little effort. Damp cleaning eliminates oily and tough contaminants with the help of sponges soaked with special insulating cleaning liquids.

General Information:	
Standard	Based on DIN VDE 0681-1 and DIN VDE 0682-621
Standard (universal gear coupling)	EN/IEC 60832 (DIN VDE 0682-211)
Not suitable for use in wet weather conditions	✷

Fully equipped GRP case and leather bag

Requirements

Cleaning work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany TFRS MS combined cleaning kit are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sector (BGETEM).

Type	TFRS MS
Part No.	785 950
Dimensions (bag)	1400 x 280 mm
Dimensions (case)	900 x 415 x 430 mm

Single Parts for MS Cleaning Kit

Cleaning Equipment

GRP Case, empty

With retaining clips and printed top and bottom insert

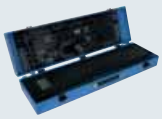
Type	KKL TRS MS
Part No.	785 301
Colour	Blue
Dimensions	1260 x 305 x 205 mm

1

GRP Case, empty

With retaining clips and printed bottom insert

Type	KKL FRS ZK MS
Part No.	785 229
Colour	Blue
Dimensions	850 x 300 x 200 mm



2

GRP Case, empty

With retaining clips and printed top and bottom insert

Type	KKL TFRS MS
Part No.	785 951
Colour	Blue
Dimensions	900 x 415 x 430 mm

3

Artificial Leather Bag, empty

With zip and shoulder strap

Type	KLT 140 28
Part No.	785 952
Colour	Black
Dimensions	1400 x 280 mm

4

90° angled Intake Tube

Type	SRW 90 MS
Part No.	785 131
Diameter	40 mm
Dimensions	130 mm

5

135° angled Intake Tube

Type	SRW 135 MS
Part No.	785 132
Diameter	40 mm
Dimensions	110 mm

6

Angled Intake Tube

Lockable, adjustable due to 15° gearing, for positioning the cleaning heads

Type	SRW V MS
Part No.	785 130
Diameter	40 mm
Dimensions	160 mm

7

Insulating Stick with Handle and plug-in Coupling

Modular

For use as operating stick with handle, hand guard, insulating element, red ring and extension, extendible handle

Type	IS T 36 ZK STK 1300
Part No.	785 315
Diameter	30 mm
Dimensions	1300 mm

8

Intake Tube with Handle

For use as operating tube with handle, hand guard, insulating element, red ring and extension

Type	SRH 1180 MS
Part No.	785 120
Diameter	40 mm
Dimensions	1180 mm, insulating element 525 mm

9

Insulating Stick with Handle and plug-in Coupling

Consisting of one element

Type	IS 36 ZK STK 1300
Part No.	785 325
Diameter	30 mm
Dimensions	1300 mm

10

Extension

Type	ISV 220 ZK MS	ISV 320 ZK MS
Part No.	785 316	785 317
Diameter	20 mm	20 mm
Dimensions	220 mm	320 mm

Type	ISV 420 ZK MS	ISV 820 ZK MS
Part No.	785 318	785 319
Diameter	20 mm	20 mm
Dimensions	420 mm	820 mm

11-14

Extension

Type	SRV 200 MS	SRV 400 MS	SRV 800 MS
Part No.	785 121	785 122	785 123
Diameter	40 mm	40 mm	40 mm
Dimensions	200 mm	400 mm	800 mm

15-17

Single Parts for MS Cleaning Kit

Rectangular Brush

Type	REB 1095 MS
Part No.	785 160
Diameter	40 mm
Dimensions	105 x 50 x 90 mm

18

Half-round Brush

For cleaning insulators as well as horizontal and vertical openings. The brush can be attached to SRW V MS angled intake tubes that can be adjusted to lead the brush around the complete insulator.

Type	HRB 120 MS	HRB 190 MS
Part No.	785 140	785 150
Diameter	40 / 120 mm	40 / 160 mm

19-20

Tubular Brush 130 mm

Cylindrical bristles

Type	STB 120 MS
Part No.	785 170
Diameter	40 mm
Dimensions	300 mm

21

Tubular Brush 85 mm

Cylindrical bristles

Type	STB 80 MS
Part No.	785 171
Diameter	25 mm
Dimensions	205 mm

22

Tubular Brush 85 mm

Conical bristles

Type	STB 80 K MS
Part No.	785 172
Diameter	25 mm
Dimensions	205 mm

23

Round Head Brush

Type	BB 245 MS
Part No.	785 151
Diameter	40 mm
Dimensions	390 mm

24

Cleaning Head 55

Width: 55 mm

Type	FD 60 MS
Part No.	785 220
Diameter	40 mm
Dimensions	200 mm

25

Cleaning Head 110

Width: 110 mm

Type	FD 110 MS
Part No.	785 221
Diameter	40 mm
Dimensions	255 mm

26

Cleaning Head 210

Width: 210 mm

Type	FD 210 MS
Part No.	785 223
Diameter	40 mm
Dimensions	255 mm

27

Flat Cleaning Head 35

Type	FD 35 S MS
Part No.	785 551
Diameter	25 mm
Dimensions	35 mm

28

Flat Cleaning Head 35

Width: 35 mm, 30° angled, with detachable brush

Type	FD 35 W P MS
Part No.	785 552
Diameter	25 mm
Dimensions	35 mm

29

Scraper

Type	S 30 ZK MS
Part No.	785 320
Diameter	20 mm
Dimensions	280 mm

30

Round Brush

Type	RP 15 ZK MS
Part No.	785 321
Diameter	20 mm
Dimensions	270 mm

31

Single Parts for MS Cleaning Kit

Cleaning Equipment

Rigid Operating Head

For attaching cleaning sponges

Type	AK RS S ZK MS
Part No.	785 324
Diameter	20 mm
Dimensions	200 mm

32

Single Operating Head

Flexible, for attaching cleaning sponges

Type	AK RS ZK MS
Part No.	785 322
Diameter	20 mm
Dimensions	400 mm

33

Dual Operating Head

Flexible, for attaching cleaning sponges

Type	AK RS 2 ZK MS
Part No.	785 323
Diameter	20 mm
Dimensions	415 mm

34

Rectangular Cleaning Sponge

Type	RS 1544 MS
Part No.	785 274
Dimensions	150 x 40 x 40 mm
PU	5 pieces

35

Rectangular Cleaning Sponge

Type	RS 1574 MS
Part No.	785 275
Dimensions	150 x 70 x 40 mm
PU	5 pieces

36

Rectangular Cleaning Sponge, serrated

Type	RS 15104 Z MS
Part No.	785 279
Dimensions	150 x 100 x 40 mm
PU	5 pieces

37

Triangular Cleaning Sponge, serrated

Type	RSD 15104 Z MS
Part No.	785 280
Dimensions	150 x 100 x 40 mm
PU	5 pieces

38

Intake Hose Adapter

Adjustable, 135° angled, regulation of intake air, for use with intake hose system (Ø35 mm)

Type	SSA W D
Part No.	785 200
Diameter	35 / 40 mm

39

Intake Tube Adapter

For brushes and cleaning heads (Ø25 mm)

Type	SRA MS
Part No.	785 212
Diameter	40 / 25 mm
Dimensions	100 mm

40

Operating Head Adapter

Universal gear coupling / transparent tube (Ø40 mm)

Type	AKA TF MS
Part No.	785 259
Diameter	40 mm
Dimensions	125 mm

41

Single Parts for MS Cleaning Kit

Digital Hygrometer / Thermometer

For verifying the climatic conditions that must be adhered to. Measuring range: – 20 °C ... + 70 °C (temperature), 10 ... 95 % (relative air humidity)

Type	DHTM
Part No.	785 180
Dimensions	140 x 65 mm

42

Digital Hygrometer / Thermometer

Digital hygrometer/thermometer for verifying the climatic conditions that must be adhered to, measuring range – 10 °C ... + 60 °C, 0 ... 100 % relative air humidity

Type	DHTM T 625
Part No.	785 181
Dimensions	182 x 64 x 40 mm

43

Insulating Mirror

For visual inspection of hidden electrical components

Type	ISP 135 ZK MS
Part No.	785 190
Diameter	40 / 135 mm

44

Spray Bottle

For cleaning liquids

Type	SF FRF MS
Part No.	785 953
Capacity	500 ml

45

Spare Brush

For FD 39 WP MS flat cleaning heads

Type	EP 25 L MS
Part No.	785 224
Dimensions	40 mm
PU	3 pieces

46

Cleaning Brush

For individual kit parts (∅40 mm), modular

Type	RB 50 MS
Part No.	785 210
Diameter	50 mm
Dimensions	1305 mm

47

Cleaning Brush

For individual kit parts (∅25 mm)

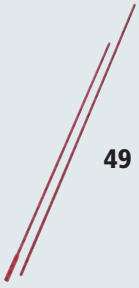
Type	RB 20 NS
Part No.	785 585
Diameter	25 mm
Dimensions	485 mm

48

Barrier Rod

Modular, for use as visible working limit

Type	AS MS
Part No.	785 109
Dimensions	2200 mm



49

Accessory for NS and MS Cleaning Kits

Cleaning Equipment

Industrial Vacuum Cleaner

For dry and combined cleaning kits

Equipment:

The industrial vacuum cleaner consists of a 25 l plastic container, 2 large wheels, 2 guide wheels with locking brakes, handle and cable holder, socket outlet with automatic switch-on mechanism, electromagnetic pulse filter cleaning, automatic vibration function, speed control, volume flow control, acceleration rate controller, electronic running feature, moisture identification with sensor-controlled disconnection, 2 new polyester filter cassettes, FKP 4300, filter area 2x 4300 cm^2 = 8600 cm^2, dust collection capacity in accordance with BIA, class C, cord length: 8 m

Technical data:

– Intake hose with straight connecting adapter (Ø35 mm), 5 m long

Type	HISC 1400
Part No.	785 310
Nominal capacity	1400 W
Nominal voltage	230 V
Max. air flow	61 l/s
Max. low air pressure	248 mbars
Capacity (container)	25 l gross volume, 20 l for dust, 15 l for water
Dimensions	400 x 400 x 560 mm

Reducing Inserts

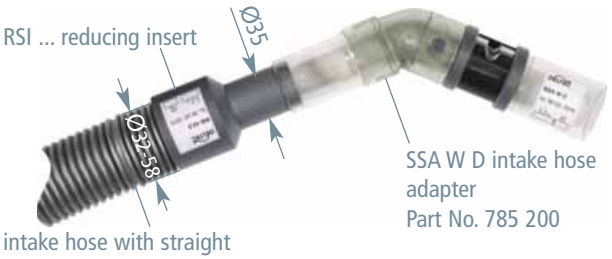
For connection between SSA W D intake hose adapter and intake hoses from other manufacturers with different diameters and straight connecting adapter.

Type	RSI 32	RSI 34	RSI 35
Part No.	785 213	785 214	785 215
Diameter	35 / 32 mm	35 / 34 mm	35 / 35 mm
Dimensions	105 mm	105 mm	105 mm

Type	RSI 38	RSI 45
Part No.	785 216	785 217
Diameter	35 / 38 mm	35 / 45 mm
Dimensions	105 mm	105 mm

Type	RSI 51	RSI 58
Part No.	785 218	785 219
Diameter	35 / 51 mm	35 / 58 mm
Dimensions	105 mm	105 mm

Application:



90° angled flat Cleaning Head with detachable Brush

For TRS NS dry cleaning kits

Type	FWD 35 P NS
Part No.	785 592
Diameter	25 mm
Dimensions	200 mm

Intake Tube with Handle

For TRS MS and TFRS MS cleaning kits

Type	SRH 1180 IS 650 MS
Part No.	785 119
Diameter	40 mm
Dimensions	1180 mm, insulating element 650 mm

HV STK Extension Handle

Plug-in coupling at both ends for extending the handle

Type	HV STK 30 710
Part No.	766 335
Diameter	30 mm
Total length (l_G)	710 mm
Material	Glass-fibre reinforced polyester tube
Colour	Grey

Canvas Bag, empty

With two separate internal pockets and carrier handle

For intake hose and cover

Type	STT 55 27 30
Part No.	785 111
Colour	Olive
Dimensions	550 x 270 x 300 mm

NFG MS Refilling Device

Nominal Voltages up to 36 kV / 15 ... 60 Hz

Refilling of hot HT mass under live conditions

- For indoor and outdoor installations
- Equipment for refilling hot HT mass into paper-insulated mass-impregnated cables under live conditions
- Safe, fast and easy refilling procedure
- Transparent insulating refilling lance ensures enhanced safety

General Information:	
Standard	Based on DIN VDE 0681-1 and DIN VDE 0682-621
Not suitable for use in wet weather conditions	✷

Design

The refilling device consists of a pumping unit with a reservoir, regulated heating and pump as well as an insulating refilling lance. The oil reservoir can be removed for easy transport and can be sealed with a cover. The pump and the insulating refilling lance are connected by means of a temperature-resistant, removable and highly flexible filling hose and a pump control cable (Ein [On]/Aus [Off] circuit). All components are arranged on a transport vehicle (with additional support brackets), suitable for mounting.

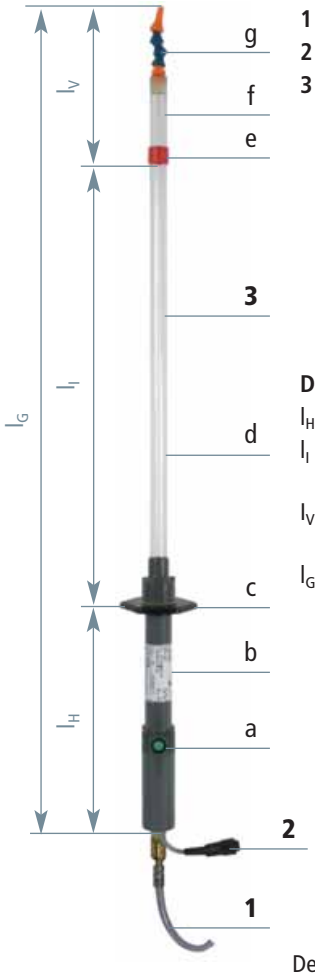
When working under live conditions, the screw plugs of cable sealing ends are removed and inserted with an insulated screw driver.

We recommend to use our special plastic screw plugs for sealing the cable ends.

Requirements

The refilling device is to be used under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany NFG MS refilling devices are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sectors (BGETEM).

After lifting the conveying pump out of the HT mass, the oil reservoir can be removed from the NFG MS for refilling.



Design

1 Highly flexible filling hose
2 Control line
3 Refilling lance with
- a Pushbutton
- b Handle
- c Hand guard
- d Insulating element
- e Red ring
- f Extension
- g Flexible refilling device

Dimensions:

l_H Length of the handle = 285 mm
l_I Length of the insulating element = 525 mm
l_V Length of the extension = 180 mm
l_G Total length = 980 mm

Fully equipped with insulating refilling lance and reservoir

Type	NFG MS
Part No.	785 260
Nominal capacity	1200 W
Supply voltage	230 V
Frequency	50 Hz
Reservoir size	5 litres
Heating control range	0 °C ... + 120 °C
Indicating range (temperature measurement)	0 °C ... + 120 °C
Dimensions	560 x 315 x 1490 mm

Accessory for Refilling Device NFG MS

Insulating Refilling Lance

Operating stick with detachable, highly flexible filling hose (1375 mm), handle, hand guard, insulating element, red ring, extension and flexible lance tip

Type	INFL MS
Part No.	785 261
Diameter	32 / 20 mm
Dimensions	1120 mm

Other refilling lance lengths are available on request.

Reservoir

Made of stainless steel, with cover and adjustable ventilation

Type	OEB NFG MS	RFB NFG MS
Part No.	785 264	785 295
Capacity (heating element)	950 W	No heating element
Dimensions	320 x 166 x 195 mm	295 x 166 x 195 mm

GRP Case, empty

Max. capacity:

3 NFG MS reservoirs

Type	KKL B NFG MS
Part No.	785 299
Colour	Blue
Dimensions	570 x 355 x 210 mm

MS Screw Driver Kit

Nominal Voltages up to 36 kV / 15 ... 60 Hz

Loosening a screw plug using the MS insulated screw driver

- For indoor and outdoor installations
- For loosening and tightening the screw plugs of cable sealing ends under live conditions
- With interchangeable operating heads (straight and angled)

General Information:	
Standard	Based on DIN VDE 0681-1
Not suitable for use in wet weather conditions	✷

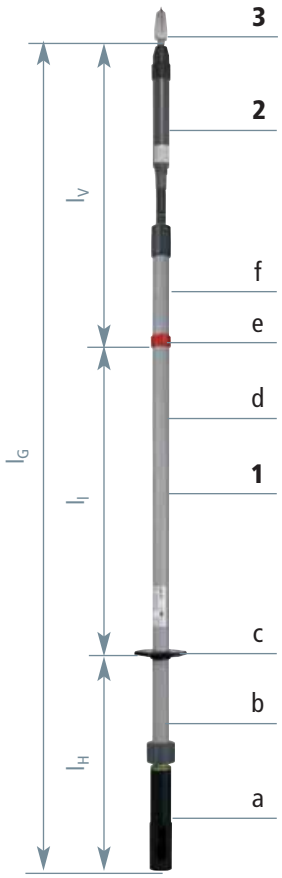
Application

The insulated screw driver with interchangeable operating heads (straight and angled) for attaching special bits and screw plugs allows to loosen or tighten the screw plugs of cable sealing ends under live conditions. Only tested bits (screw plug blade inserts) and special screw plugs may be used.

Requirements

Maintenance work from 1 to 36 kV must be carried out under supervision of a qualified electrician according to EN 50110-1 "Operation of electrical installations – Minimum Requirements", observing clauses 6.3.1 to 6.3.12. In Germany MS screw drivers are subject to BGV A3 and BGR A3 of the national accident prevention regulations (UVV) "Elektrische Anlagen und Betriebsmittel" [Electrical installations and equipment] stipulated by the German Employer's Liability Association for the energy, textile, electrical and media product sectors (BGETEM).

Plastic case for transporting the insulating screw driver kit, the insulating refilling lance including the filling hose and special screw plugs. These elements, however, are not included in delivery.



Design

1 Operating stick with
- a Adjustable handle
- b Handle
- c Hand guard
- d Insulating element
- e Red ring
- f Extension

2 Operating head, straight or angled (30° or 70°)

3 Special bit

Dimensions:

l_H Length of the handle = 385 mm

l_I Length of the insulating element = 525 mm

l_V Length of the extension = 430 mm

l_G Total length = 1375 mm

MS Screw Driver Kit

Screw Driver Kit

Fully equipped plastic case

Type	SDS KEV MS
Part No.	785 265
Dimensions	1270 x 215 x 140 mm
Material (operating head)	PVC
Material (handle)	Plastic
Material (insulating stick)	Glass-fibre reinforced polyester tube

Further insulating element extensions, operating heads and special bits are available on request.

Accessory for MS Screw Driver Kit

Plastic Case, empty

With foam padding

Type	KKL SDS KEV MS
Part No.	785 298
Colour	Black
Dimensions	1270 x 215 x 140 mm

Accessory for MS Screw Driver Kit

Operating Stick with adjustable Handle

With plug-in coupling for extending the handle, hand guard, insulating element, red ring and extension

Type	BS SD KEV MS 1120
Part No.	785 266
Diameter	30 mm
Dimensions	1125 mm

Extension

For operating sticks

Type	VL 350 SD KEV MS
Part No.	785 273
Diameter	30 mm
Dimensions	350 mm

Straight Operating Head

With hexagon socket for attaching special bits and special screw plugs

Type	AK SD KEV MS
Part No.	785 267
Diameter	30 mm
Dimensions	310 mm

30° angled Operating Head

With hexagon socket for attaching special bits and special screw plugs

Type	AK SD W30 KEV MS
Part No.	785 268
Diameter	30 mm
Dimensions	270 mm

70° angled Operating Head

With hexagon socket for attaching special bits and special screw plugs

Type	AK SD W70 KEV MS
Part No.	785 269
Diameter	30 mm
Dimensions	300 mm

Special Bit 13 mm

With safety plug-in system suitable for AK SD ... operating heads

Type	BIT 13 SD KEV MS
Part No.	785 271
Diameter	25 mm
Dimensions	50 mm

Special Bit 8 mm

With safety plug-in system suitable for AK SD ... operating heads

Type	BIT 8 SD KEV MS
Part No.	785 272
Diameter	25 mm
Dimensions	50 mm

Special Screw Plugs

Nominal Voltages up to 36 kV

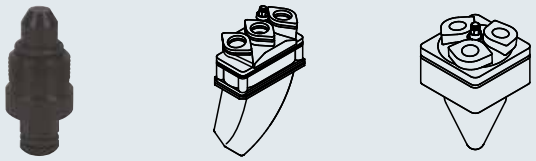
Screwing a special screw plug into a cable sealing end using an angled operating head

- For indoor and outdoor installations
- For sealing cable sealing ends
- For use with operating heads of type AK SD ...
- With safety plug-in system
- UV-resistant

General Information:

Not suitable for use in wet weather conditions

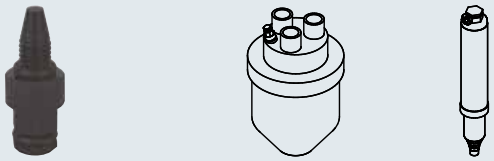
Special Screw Plug (F & G)



For cable sealing ends

Type	VS F&G M22 F
Part No.	785 281
Dimensions	M22 x 55 mm
PU	12 pieces

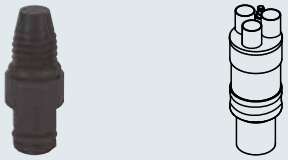
Special Screw Plug (Köttgen)



For cable sealing ends

Type	VS KOET M10
Part No.	785 282
Dimensions	M10 x 45 mm
PU	12 pieces

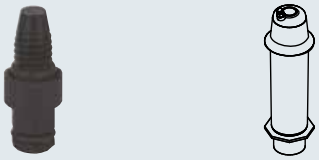
Special Screw Plug (Raychem)



For cable sealing ends

Type	VS RAY M14
Part No.	785 283
Dimensions	M14 x 45 mm
PU	12 pieces

Special Screw Plug (GOW)



For cable sealing ends

Type	VS GOW M12
Part No.	785 284
Dimensions	M12 x 45 mm
PU	12 pieces

Special screw plugs for cable sealing ends from other manufacturers are available on request.

Live Working

Insulating Stick Kit for Cleaning the Windscreens of Electric Locomotives

Cleaning Equipment

Nominal Voltages up to 7.5 kV / d.c. and 25 kV / a.c.

- For use in wet weather conditions
- Insulating stick kit for cleaning the windscreens of electric locomotives
- Protection against accidental contact with live parts (e.g. overhead contact lines)
- Adjustable inclination angle of the operating head

Insultating stick kit used for cleaning the windscreen of an electric locomotive

Note:

In accordance with EN/IEC 61243-1 (DIN VDE 0682-411), IS 25 ZK 2885 insulating sticks and AD ZK 25 200 adapters can also be used in wet weather conditions for nominal voltages up to 7.5 kV d.c. and 25 kV a.c. The cleaning agent must not exceed the maximum conductivity of 1000 µS / cm.

Due to the risk of bridging, water and cleaning agents must not be used to clean live parts of installations.

Kit includes:			
Pos. No.	Part No.	Pos. No.	Part No.
1	766 048	3	766 056
2	766 055	4	766 057
For more detailed information on these products, see Accessories chapter			

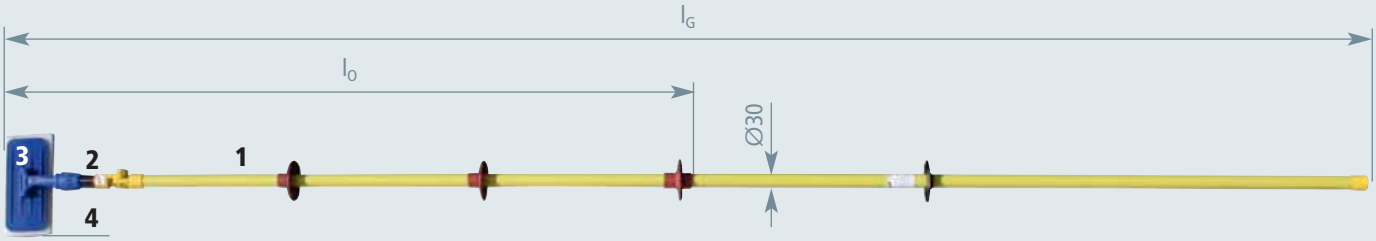
General Information:	
Standard	Wet test in accordance with EN/IEC 61243-1 (DIN VDE 0682-411)
For use in wet weather conditions	
Material (insulating tube)	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap

Adapter with gear coupling for attaching the cleaning head

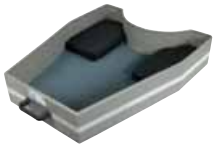
The hook-and-loop fastener allows fast replacement of the cleaning pad.

The universal gear coupling can be adjusted from 0° to 90° in 30° increments.

Insulating Stick Kit for Cleaning Windscreens



Type	IS 25 ZK RK 3160
Part No.	766 340
Nominal voltage U_N a.c.	Up to 25 kV
Nominal voltage U_N d.c.	Up to 7.5 kV
Total length (l_G)	3160 mm
Insertion depth (l_O)	1630 mm

Product	Nominal voltage U_N / Frequency f_N	Application	Page
PPE – Personal Protective Equipment			
	up to 1000 V	Face shield NH fuse puller with sleeve Insulating gloves	**156**
Insulating Equipment			
	up to 17.5 kV / 15...60 Hz	Insulated platform	**158**
Covering Material			
	up to 1000 V	Covering material and wrapping tape Insulating mats for insulating the operating location	**160**
	up to 50 kV		**161**

PPE – Personal Protective Equipment

Nominal Voltages up to 1000 V

Live working with insulating gloves up to 1000 V

- For working on live parts
- Insulating gloves combine excellent fit and high elasticity with maximum insulation resistance
- Two different models to suit your needs

General Information:	
Standard (gloves)	EN 60903 (DIN VDE 0682-311)
Standard (face shield)	DIN EN 166 and additional requirements; GS-ET-29 by the trade association
Standard (NH fuse puller)	DIN VDE 0680-4; GS-ET-29 by the trade association

Maintenance test
The pneumatic glove tester allows to perform maintenance tests in compliance with the relevant standard and even detects minimal damage to the insulating gloves. Gloves should be inspected before each use, therefore the glove tester is an indispensable and very practical safety tool.

Face Shield with Strap

- Arc-fault-tested in accordance with GS-ET-29 test principle
- High Visible Light Transmittance (VLT)
- Coating on both sides prevents misting up, polished edges, 1.5 mm thick
- The face shield can be locked into the use and non-use position
- Suitable for all common safety helmets for electricians

Type	SSC ASH NS
Part No.	785 427
Nominal voltage up to (U_N)	1000 V
Wall thickness	1.5 mm
Size	Universal
Material	Plastic
Incident energy after box test	(class 1) 135 kJ / m^2
Visible Light Transmittance (VLT)	> 75 %

NH Fuse Puller with Sleeve

- NH fuse puller in accordance with DIN VDE 0680-4 with sleeve made of coated cotton fabric
- For actuating fuses of sizes NH00, 1, 2 and 3

Type	NHS AG 00 3 NS
Part No.	785 645
Nominal voltage up to (U_N)	1000 V
Colour	Brown
Material	Coated cotton fabric

PPE – Personal Protective Equipment

Insulating Gloves, Category M

For high mechanical stress

Type	IHS 00 M 9 NS	IHS 00 M 10 NS	IHS 0 M 9 NS	IHS 0 M 10 NS
Part No.	785 491	785 492	785 493	785 494
Class	00	00	0	0
Nominal voltage up to (U_N)	500 V	500 V	1000 V	1000 V
Colour	Beige	Beige	Beige	Beige
Wall thickness	0.5 mm	0.5 mm	1.0 mm	1.0 mm
Size	9	10	9	10

Insulating Gloves, Category RC

Resistant to acid, oil, ozone, high mechanical stress and extremely low temperatures
With inner coating and textured gripping surface

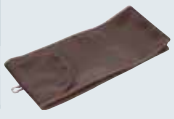
Type	IHS 00 RC 9 NS	IHS 00 RC 10 NS
Part No.	785 495	785 496
Class	00	00
Nominal voltage up to (U_N)	500 V	500 V
Colour	Orange	Orange
Wall thickness	0.9 mm	0.9 mm
Size	9	10

Accessory for PPE – Personal Protective Equipment

Storage Bag, empty

With hook-and-loop fastener and hook

Type	AT IHS NS
Part No.	785 490
Colour	Brown
Dimensions	400 x 180 x 50 mm



Accessory for PPE – Personal Protective Equipment

Pneumatic Glove Tester

For performing tests required by the standard

Type	PHSP NS
Part No.	785 497
Colour	Grey

Insulating Equipment for Airport Lighting Systems

Nominal Voltages up to 17.5 kV / 15 ... 60 Hz

Replacement of a faulty illuminant (airport lighting system) at a runway

- Equipment for live maintenance and repair work on airport lighting systems
- Insulated platform for insulating the operating location
- Circumferential, fluorescent marker tape indicates the maximum permissible height for plants in green spaces and can be used as reflector at night
- Two removable kneeling cushions for comfortable working
- Replaceable skids for easy positioning and transport

General Information:	
Standard	Based on DIN VDE 0681-1
Not suitable for use in wet weather conditions	✹
Relative air humidity	≤ 90%
Temperature range	– 25 °C ... + 55 °C
Use	Not suitable for use in wet weather conditions
Material (insulated platform)	Glass-fibre reinforced plastic
Material (extension)	Glass-fibre reinforced rod

Application:
The insulated platform and the insulating extension are used for e.g. replacing illuminants of airport lighting systems under live conditions. The insulated platform insulates the operating location during live working. The insulating extension is used as insulating intermediate section between the ratchet (with 13 mm square) and the operating head (e.g. 17 mm bushing).

The insulating extension is used as insulating intermediate section when attaching the illuminant.

Application:
Insulating extension with operating head and ratchet with torque adjustment.

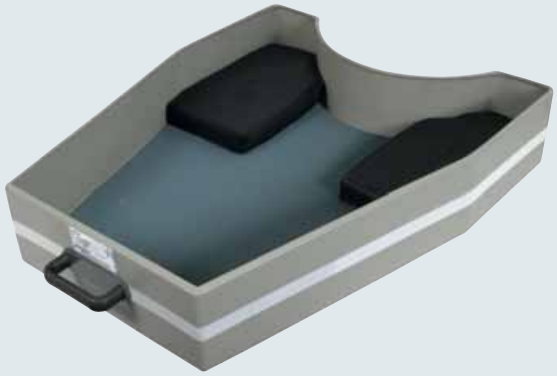
Insulating extension
IV VK13 SW17 1000
Part No. 785 445

Insulating Equipment for Airport Lighting Systems

Insulating Insert for Inset Lights

Type	IE UF LF 150	IE UF LF 200
Part No.	785 440	785 441
Nominal voltage up to (U_N)	1000 V / a.c.; 1500 V / d.c.	1000 V / a.c.; 1500 V / d.c.
Diameter	150 mm	200 mm
Dimensions	600 x 440 mm	600 x 460 mm

IW Insulated Platform



For inset lights up to a maximum diameter of 255 mm

Type	IW 17.5 890 650 180
Part No.	785 408
Nominal voltage up to (U_N)	17.5 kV
Dimensions	890 x 650 x 180 mm

Insulating Extension

With 13 mm square and width across flats 17 for torque limiter

Type	IV VK13 SW17 1000
Part No.	785 445
Nominal voltage up to (U_N)	1000 V / a.c.; 1500 V / d.c.
Length	1000 mm

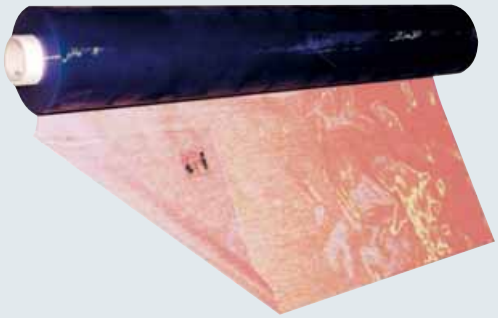
Covering Material and Insulating Mats

Covering live parts

- Protection against accidental and direct contact with live parts
- For covering adjacent live parts
- Available in different lengths, widths, thicknesses and colours
- Insulating rubber mats for insulating the operating location

General Information:	
Standard	Covering material: EN/IEC 61112 (DIN VDE 0682-511); Insulated mats: EN/IEC 61111 (DIN VDE 0682-512)

Covering Material (Crystal Clear Plastic)



Type	ATK 135 50M NS	ATK 135 ..M NS
Part No.	785 465	785 466
Class	0	0
Nominal voltage up to (U_N)	1000 V	1000 V
Length	50 m	Any up to 50 m *)
Width	1350 mm	1350 mm
Thickness	0.5 mm	0.5 mm
Colour	Crystal clear	Crystal clear

Covering Material (Transparent Plastic)

Type	ATK 120 25M NS	ATK 120 ..M NS
Part No.	785 467	785 468
Class	0	0
Nominal voltage up to (U_N)	1000 V	1000 V
Length	25 m	Any up to 25 m *)
Width	1200 mm	1200 mm
Thickness	1.0 mm	1.0 mm
Colour	Transparent	Transparent

*) *Required length to be specified at order!*

Covering Material and Insulating Mats

Wrapping Tape (EPDM Elastomer)

For covering insulators

Type	WBN 200 2,5M NS
Part No.	785 646
Class	0
Nominal voltage up to (U_N)	1000 V
Length	2.5 m
Width	200 mm
Thickness	1.0 mm
Colour	Red

Covering Material (EPDM Elastomer)

Flexible at low temperatures

Type	ATN 140 10M NS	ATN 140 ..M NS
Part No.	785 471	785 472
Class	0	0
Nominal voltage up to (U_N)	1000 V	1000 V
Length	10 m	Any up to 10 m *)
Width	1400 mm	1400 mm
Thickness	1.0 mm	1.0 mm
Colour	Red	Red

Insulating Rubber Mats for Insulating the Operating Location

Type	IMG SI 1M NS	IMG SI 10M NS	IMG SI ..M NS
Part No.	785 455	785 457	785 456
Class	0	0	0
Nominal voltage up to (U_N)	1000 V	1000 V	1000 V
Length	1 m	10 m	Any up to 10 m *)
Width	1000 mm	1000 mm	1000 mm
Thickness	3.0 mm	3.0 mm	3.0 mm
Colour	Grey	Grey	Grey

Insulating Mats up to 50 kV

For use in electrical switch and test rooms, dielectric strength of 50 kV, tested according to DIN VDE 0303-21

Type	IMG SAN 1M 10M	IMG SAN 1M ..M
Part No.	785 459	785 458
Nominal voltage up to (U_N)	50 kV	50 kV
Length	10 m	Any up to 10 m *)
Width	1000 mm	1000 mm
Thickness	4.5 mm	4.5 mm
Colour	Grey	Grey

*) *Required length to be specified at order!*

Accessory for Covering Material and Insulating Mats

Clip

With insulated steel spring

Type	KK 35 NS
Part No.	785 647
Max. clamping range	35 mm
Dimensions	170 / 110 mm
Material	Plastic

Accessory for Covering Material and Insulating Mats

Eye

Consists of two elements

Type	OEK 12 NS
Part No.	785 649
Dimensions	Ø12 / 26 mm
Material	Plastic

Hook

Type	HK 8 NS
Part No.	785 648
Dimensions	Ø8, 126 / 72 mm
Material	Plastic

Product	Application	Page
Passive Arc Fault Protection – DEHNcare® APG		
	Arc-fault-tested protective gloves	164
Passive Arc Fault Protection – DEHNcare® APJ, APT and APC		
	Arc-fault-tested protective coat	165
Passive Arc Fault Protection – DEHNcare® ESH and APS		
	Insulating safety helmet for electricians (EN 50365) Six-point suspension with sweatband Arc-fault-tested face shield, suitable for all standard safety helmets for electricians	168
Active Arc Fault Protection – Modular Arc Fault Protection System DEHNarc		
	DEHNarc protects persons from the effects of an arc during live working	170
Active Arc Fault Protection – Light Sensor Supports and Support Rails for DEHNarc		
	Support for installing the mobile arc fault protection system	173

DEHNcare® APG

Protective gloves

Actuation of an NH fuse puller using protective gloves

Prevent injuries – Stay healthy

- For protection against thermal and mechanical risks
- Excellent fit due to special glove cut
- Good touch sensitivity due to soft leather glove palm
- Breathable materials maximise wearing comfort
- Certified according to the requirements of the 89/686/EEC directive on personal protective equipment

General Information:	
Standard	Box test in accordance with IEC 61482-1-2; ATPV test in accordance with IEC 61482-1-1; DIN EN 388, DIN EN 407
Material (glove palm)	Siliconised calf grain leather
Material (glove back)	100% Kevlar® interlock knit
Material (sewing thread)	Kevlar®

Notes

Article 5 of the German Occupational Health and Safety Act requires employers to perform a hazard analysis.
This hazard analysis also involves arc fault protection.
Employers must select and provide approved protective clothing including helmets, face shields and gloves to protect personnel against the hazards of arc faults.
They must also ensure that each employee who is exposed to the hazards of arc faults wears protective clothing.
Protective gloves of type APG are no insulating gloves in accordance with EN/IEC 60903 (DIN VDE 0682-311) for live working.

Arc-fault-tested Protective Gloves

Glove size

Measure the circumference around your knuckles to determine your correct glove size.

Example

For a knuckle circumference of 24 cm, you would choose a size 10.

Glove size:	
Glove size	Circumference around your knuckles
8	20.3 cm
9	22.9 cm
10	25.4 cm
11	27.9 cm
12	30.5 cm

Type	APG 8	APG 9	APG 10	APG 11	APG 12
Part No.	785 796	785 797	785 798	785 799	785 800
Direct incident energy (E_{io})	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²
Extended direct incident energy (E_{io})	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²
Arc energy (W_{arc})	318 kJ	318 kJ	318 kJ	318 kJ	318 kJ
ATPV (Arc Thermal Performance Value)	32.8 cal / cm²	32.8 cal / cm²	32.8 cal / cm²	32.8 cal / cm²	32.8 cal / cm²
Total length	310 mm	320 mm	330 mm	340 mm	350 mm
Gauntlet length	100 mm	100 mm	100 mm	100 mm	100 mm
Size	8	9	10	11	12

* The distance of the specimen was reduced from 300 mm to 150 mm based on IEC 61482-1-2.

Passive Arc Fault Protection – DEHNcare®

Protective Jackets, Protective Trousers and Protective Coats

Prevent injuries – Stay healthy

- Breathable leather ensures high wearing comfort
- Flame-retardant zip and hook-and-loop fasteners
- Reflective strips
- Certified in compliance with the 89/686/EEC directive on personal protective equipment

NEW

General Information:	
Standard	Box test in accordance with IEC 61482-1-2; EN ISO 14116
Outer material	Siliconised calf grain leather, 100% Kevlar® interlock knit
Inner material	100% cotton
Material (sewing thread)	100% Kevlar®

Attaching an earthing and short-circuiting device using adequate personal protective equipment

Jacket with reinforced stand-up collar and useful pockets

Trousers with adjustable belt and useful cargo pockets

DEHNcare® APJ, APT and APC

Arc-Fault-Tested Protective Jacket

NEW

- Reinforced stand-up collar
- Useful pockets
- Zip and hook-and-loop fastener

Type	APJ 46	APJ 48	APJ 50	APJ 52	APJ 54	APJ 56	APJ 58
Part No.	785 769	785 770	785 771	785 772	785 773	785 774	785 775
Direct incident energy (E_{io})	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²
Extended direct incident energy (E_{io})	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²
Arc energy (W_{arc})	318 kJ	318 kJ	318 kJ	318 kJ	318 kJ	318 kJ	318 kJ
Size	46	48	50	52	54	56	58

* The distance of the specimen was reduced from 300 mm to 150 mm based on IEC 61482-1-2.

If the protective jacket is heavily soiled, it can be dry cleaned in a leather cleaner's.

Arc-Fault-Tested Protective Trousers

NEW

- Knee pads and pair of braces included
- Pockets for knee pads
- Adjustable belt

Type	APT 46	APT 48	APT 50	APT 52	APT 54	APT 56	APT 58
Part No.	785 779	785 780	785 781	785 782	785 783	785 784	785 785
Direct incident energy (E_{io})	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²
Extended direct incident energy (E_{io})	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²
Arc energy (W_{arc})	318 kJ	318 kJ	318 kJ	318 kJ	318 kJ	318 kJ	318 kJ
Size	46	48	50	52	54	56	58

* The distance of the specimen was reduced from 300 mm to 150 mm based on IEC 61482-1-2.

If the protective trousers are heavily soiled, they can be dry cleaned in a leather cleaner's.

Arc-Fault-Tested Protective Coat

NEW

- Reinforced stand-up collar
- Useful side pockets
- Zip and hook-and-loop fasteners

Type	APC 48 50	APC 52 54	APC 56 58
Part No.	785 755	785 756	785 757
Direct incident energy (E_{io})	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²
Extended direct incident energy (E_{io})	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²	(class 2*) 1050 ... 1390 kJ / m²
Arc energy (W_{arc})	318 kJ	318 kJ	318 kJ
Size	48 / 50	52 / 54	56 / 58

* The distance of the specimen was reduced from 300 mm to 150 mm based on IEC 61482-1-2.

If the protective coat is heavily soiled, it can be dry cleaned in a leather cleaner's.

Accessory for DEHNcare® APJ, APT and APC

Knee Pads

For arc-fault-tested protective trousers, to be inserted into the lining of the trouser legs (slit pockets)

Type	APA KP
Part No.	785 789
Material	Foam

Accessory for DEHNcare® APJ, APT and APC

Pair of Braces

For arc-fault-tested protective trousers with four hook-and-loop fasteners

Type	APA B
Part No.	785 788
Colour	Black

DEHNcare® ESH and APS

Nominal Voltages up to 1000 V

Attaching an earthing and short-circuiting device using adequate personal protective equipment

Prevent injuries – Stay healthy

- High wearing comfort
- High degree of protection and low wear due to energy-absorbing nanoparticles
- Excellent visibility due to anti-mist coating and high light transmittance
- Face shield with clip for easy mounting on the helmet
- Certified according to the requirements of the 89/686/EEC directive on personal protective equipment

General Information:	
Standard	EN 397 and EN 50365 (safety helmet for electricians); EN 166 and EN 177, GS-ET-29 (face shield); box test in accordance with IEC 61482-1-2; ATPV test in accordance with IEC 61482-1-1

By pressing the rotary knob the head strap is loosened. If the rotary knob is turned, the head strap is adjusted to the head size of the user.

Use of the protective equipment

DEHNcare® ESH and APS

Passive Arc Fault Protection – DEHNcare®

Safety Helmet for Electricians

- Electrically insulating safety helmet for electricians (EN 50365)
- For nominal voltages up to 1000 V
- With slot for APS ... SC face shield
- Adjustable to head sizes from 51 to 63 cm via push / rotary knob
- Six-point suspension with sweatband
- ABS plastic shell

Type	ESH 1000 S Y	ESH 1000 S W	ESH 1000 S O	ESH 1000 S B	ESH 1000 S R
Part No.	785 740	785 741	785 742	785 743	785 744
Nominal voltage up to (U_N)	1000 V	1000 V	1000 V	1000 V	1000 V
Colour	Yellow	White	Orange	Blue	Red
Material	ABS plastic	ABS plastic	ABS plastic	ABS plastic	ABS plastic
Standard	EN 397 and EN 50365	EN 397 and EN 50365	EN 397 and EN 50365	EN 397 and EN 50365	EN 397 and EN 50365

Arc-fault-tested Face Shield with Clip and Chin Protector

- In accordance with DIN EN 166 and EN 170
- Arc-fault-tested in accordance with GS-ET-29 and ASTM F2178
- Energy-absorbing nanoparticles homogeneously dispersed in the material
- High degree of protection and wear resistance
- High Visible Light Transmittance (VLT)
- Fits the slot in the ESH safety helmet for electricians

Type	APS CL2 SC	APS 12C SC
Part No.	785 746	785 747
Nominal voltage up to (U_N)	1000 V	1000 V
Material	Plastic	Plastic
Wall thickness	1.5 mm	1.5 mm
Incident energy after box test	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²
ATPV (Arc Thermal Performance Value)	—	12 cal / cm²
Visible Light Transmittance (VLT)	> 75 %	65 % ... 75 %
Standard	EN 166 and EN 177	EN 166 and EN 177

Arc-fault-tested Face Shield with Strap and Chin Protector

- In accordance with DIN EN 166 and EN 170
- Arc-fault-tested in accordance with GS-ET-29 and ASTM F2178
- Energy absorbing nanoparticles homogeneously dispersed in the material
- High degree of protection and wear resistance
- High Visible Light Transmittance (VLT)
- Suitable for all standard safety helmets for electricians

Type	APS CL2 FS	APS 12C FS
Part No.	785 748	785 749
Nominal voltage up to (U_N)	1000 V	1000 V
Material	Plastic	Plastic
Wall thickness	1.5 mm	1.5 mm
Incident energy after box test	(class 2) 423 kJ / m²	(class 2) 423 kJ / m²
ATPV (Arc Thermal Performance Value)	—	12 cal / cm²
Visible Light Transmittance (VLT)	> 75 %	65 % ... 75 %
Standard	EN 166 and EN 177	EN 166 and EN 177

Accessory for DEHNcare® ESH and APS

Chin Strap

NEW

For safety helmets for electricians, adjustable

Type	KR EHS 1000
Part No.	785 751
Type	Elastic

Mobile Arc Fault Protection System DEHNarc

Mobile arc fault protection system DEHNarc

- **Reliable arc fault detection**
- **Protection of persons in case of arc faults**
- **High availability of installations**
- **Mobile system can be quickly used in open switchgear installations**

NEW

General Information:	
Ambient temperature (during operation)	– 10 °C ... + 50 °C
Ambient temperature (storage)	– 30 °C ... + 70 °C
Nominal voltage	230/400 V / 50 Hz
Prospective short-circuit current	2-25 kA
Typical response time	5 ms (at 25 kA)

DEHNarc protects persons from the effects of an arc fault during live working.
It detects arc faults in an installation and immediately causes a short-circuit which trips the upstream overcurrent protective device. Consequently, the incident energy is considerably reduced. The protection system DEHNarc significantly limits the thermal effects of arc faults. BGI/GUV-I 5188 also refers to the mobile arc fault protection system to ensure personal protection. The mobile components (**Figure 1**)

– Control unit with three light sensors, mains and control line sockets
– Disconnecting blade
– Two short-circuiting cartridges
– Junction piece

can be integrated in an open switchgear installation within a few seconds, removed after the work has been carried out and used again for the next installation. This increases flexibility and minimises investment costs.

The light sensor supports, NH in-line fuse switch disconnector and the retaining device for the control unit are firmly fixed (**Figure 2**) to accept the control unit, sensors, short-circuiting cartridges, disconnecting blade and junction piece. The NH fuse block used for this purpose, which carries short-circuit currents up to 25 kA, can also be used during normal operation, for example as spare outgoing strip.

After fixing the sensors and all other mobile components and connecting them with one another via the control lines, all components are tested by means of an internal routine to ensure maximum protection against arc faults during live working (**Figure 3**). The sensors are aligned in such a way that they detect arc faults in any circumstance.

Figure 1: Mobile components of the arc fault protection system

Figure 2: Fixed components for the mobile arc fault protection system

Figure 3: Work on an open switchgear installation using a mobile arc fault protection system

Mobile Arc Fault Protection System DEHNarc

Active Arc Fault Protection

Control Unit

NEW

- Visual detection of an arc fault by means of three sensors and activation of the short-circuiting cartridges
- Visual and acoustic indication of the activation
- Self-testing element

Type	DARC STG
Part No.	781 000
Nominal voltage (U_N)	230 V
Overvoltage category	CAT II
Rated impulse withstand voltage	2.5 kV
Degree of protection	IP 20 (IP 30 in a connected state)
Enclosure dimensions (with sensors)	200 x 350 x 650 mm

Short-Circuiting Cartridge

- Short-circuiting cartridge with disconnector cover for use in in-line fuse switch disconnectors and for short-circuiting after receiving the signal of the control unit

Type	DARC KSP
Part No.	781 020
Nominal voltage (U_N)	230 / 400 V
Overvoltage category	CAT IV
Rated impulse withstand voltage	6 kV
Prospective short-circuit current	2-25 kA
Min. short-circuit persistence at 25 kA	70 ms (typ. 100 ms)
Dynamic short-circuit strength	2.1 x 25 kA = 52.5 kA (peak value)
Size	NH 3
Degree of protection	IP 20 (IP 30 in an installed / connected state)

Disconnecting Blade

- Disconnecting blade with disconnector cover for use in in-line fuse switch disconnectors. Galvanic connection between the busbar and the control unit.

Type	DARC TRM
Part No.	781 010
Nominal voltage (U_N)	230 / 400 V
Overvoltage category	CAT IV
Rated impulse withstand voltage	6 kV
Prospective short-circuit current	2-25 kA
Min. short-circuit persistence at 25 kA	70 ms (typ. 100 ms)
Dynamic short-circuit strength	2.1 x 25 kA = 52.5 kA (peak value)
Size	NH 3
Degree of protection	IP 20 (IP 30 in an installed / connected state)

Junction Piece

- Mounted in the fuse block to ensure a mechanical connection between the short-circuiting cartridges and the disconnecting blade

Type	DARC KST
Part No.	781 030
Tightening torque	32 Nm

Test Kit

- Test kit for testing the function of the short-circuiting cartridges and the disconnecting blade

Note: The disconnecting blades must be ordered separately.

Type	DARC PK KSP
Part No.	781 230
Nominal voltage (U_N)	230 V
Overvoltage category	CAT II
Rated impulse withstand voltage	2.5 kV
Degree of protection	IP 20 (IP 54 in a connected state)
Dimensions	550 x 420 x 300 mm

For more detailed information on the DEHNarc arc fault protection system, see installation instructions No. 1749.

Mobile Arc Fault Protection System DEHNarc

Light Sensor Spacer with plug-in Coupling

For use as intermediate element when mounting the two light sensors in the upper part of the low-voltage electrical equipment

Type	DARC LSDH
Part No.	781 100
Design	Plug-in coupling on both ends
Length	600 mm

Connecting Lines of the Control Unit – Short-Circuiting Cartridge

Connecting lines between the DARC STG control unit and the DARC KSP short-circuiting cartridge

Type	DARC VL 4 1000	DARC VL 4 1500
Part No.	781 130	781 150
Cable cross-section	4 mm²	4 mm²
Length (l_1)	1000 mm	1500 mm
Pull-out force of the plug	At least 70 N	At least 70 N

Retaining Device for the Control Unit

The retaining device is connected to the DIN rail by means of the two plastic locking bolts.

Type	DARC HV STG
Part No.	781 110
Material	Plastic

Connecting Lines Control Unit – Disconnecting Blade

Connecting lines between the DARC STG control unit and the DARC TRM disconnecting blade

Type	DARC VL 10 500	DARC VL 10 1000
Part No.	781 170	781 190
Cable cross-section	10 mm²	10 mm²
Length (l_1)	500 mm	1000 mm
Pull-out force of the plug	At least 70 N	At least 70 N

Accessory for Mobile Arc Fault Protection System DEHNarc

Transport Case

For control unit, junction piece, connecting lines and light sensor spacers

With wheels and foam padding

Type	DARC TK
Part No.	781 220
Degree of protection	IP 54
Dimensions	800 x 520 x 400 mm
Colour	Black

Light Sensor Supports and Support Rails for DEHNarc

Active Arc Fault Protection

- The light sensor supports are designed for mounting the light sensors of the arc fault protection system DEHNarc
- There are two options for fixing the light sensor supports:
  - Wall mounting (2x 781 085, 1x 781 090)
  - Mounting on a support rail (2x 781 080, 1x 781 040, 1x 781 060, 1x 781 090)

NEW

Mounting the light sensors by means of the light sensor support rail of a switchgear installation

Wall-mounted Light Sensor Support with Plug-in Coupling

To be mounted in the upper part of the low-voltage electrical equipment on a vertical wall

Type	DARC LSH WB
Part No.	781 085
Type	With four bolts ans plastic dowel
Length	170 mm

Light Sensor Support with Coupling

To be mounted on the lower C-rail of the low-voltage electrical equipment

Type	DARC LSH SB
Part No.	781 090
Type	With M10 threaded pin and nut for C-rails
Length	157 mm

Light Sensor Support with Plug-in Coupling

To be mounted in the hole of the light sensor support rail

Type	DARC LSH M10
Part No.	781 080
Type	With M10 threaded pin and nut
Length	136 mm

Light Sensor Support Rail, left

To be mounted to the DIN rail in the upper part of the low-voltage electrical equipment by means of a knurled nut

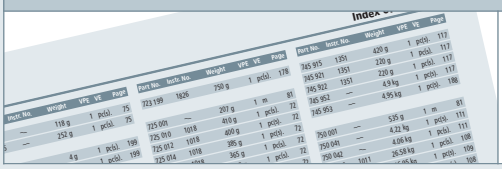
Type	DARC LSHS L 940
Part No.	781 040
Type	Angular rail
Length	940 mm

Light Sensor Support Rail, right

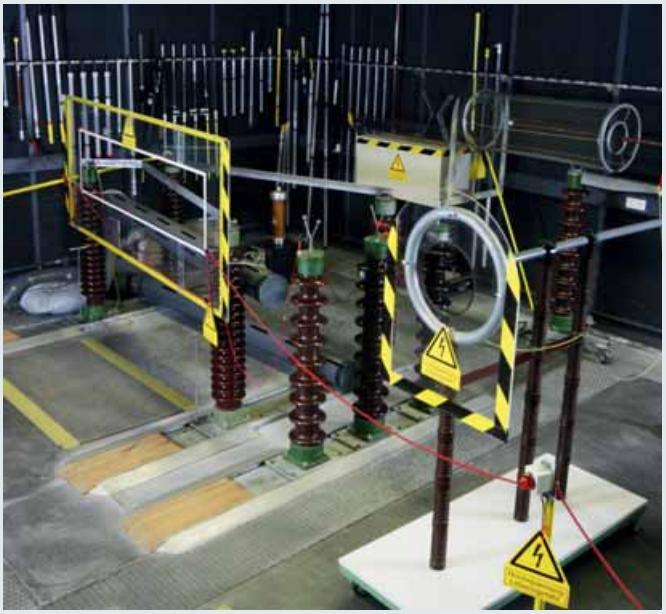
To be mounted to the DIN rail in the upper part of the low-voltage electrical equipment by means of a knurled nut

Type	DARC LSHS R 940
Part No.	781 060
Type	Angular rail
Length	940 mm

Further Equipment

Product	Type	Application	Page
Services			
		Maintenance tests	176
SDS Voltage Limiters			
	**SDS**	Voltage limiters	177
Barriers			
		Barrier	179
Discharge Devices			
		For discharging static charges Different contact electrodes	181
Storage Bags and Transport Cases			
		Sheet metal or plastic case Artificial leather or canvas bag	185
Accessories, Spare Parts and Kit Parts			
		Accessories Spare parts Kit parts	193 202 203
Index			
		Index of Variant Nos. Index of Part Nos. Index of types Key words	210 211 216 220

Maintenance Tests



One of our high-voltage laboratories

Only tested devices protect your life

- **Regular maintenance tests ensure that your devices are in a proper and safe condition**
- **Maintenance tests in DEHN + SÖHNE's high-voltage test laboratory for operating and earthing sticks, voltage detectors, phase comparators, devices for voltage detecting systems, earthing and short-circuiting devices**
- **Test is documented on the device and in a separate test report**

Voltage Detector Retest > 1 kV to IEC/EN 61243-1

Test Report No.: PHEC 005856 20131002

DETAILED INFORMATION ON THE UNIT

Voltage detector type: PHE III
Art.-No.: 767720
Test prod type: 767761
Insulating rod type: 766009
Last retest made (accord. to type label): repeat examination
Notes:
Customer: John Doe, 12345 Any City, Any Street 1
Goods receipt No.: 37630
Man.-No.: 005856
Man.-No.: 007051
Man.-No.: 010168
Nominal voltage: 20KV
Year of man.: 2007
Year of man.: 2007
Year of man.: 2007
dated: 16.06.2013

TEST IN ACCORDANCE WITH DIN VDE 0682 TEIL 411

1. Test by visual inspection
a) Orderly State
b) Mechanical damage
c) Arcing or leakage current effects
d) Instructions for Use
e) Unit complete
f) Markings readable
g) Construction visible
h) Red ring visible and present
i) Hollow parts closed
k) Degree of protection of indicator given (visual inspection of enclosure sealings)
l) Active indication signals
m) Self-test unit ready for operation

2. Test by handling
a) Individual parts locked against unintentional loosening
b) Hand guard and red ring are solidly fitted

3. Test by measurement
a) Length of insulating piece as determined
b) Length of extension piece as determined

4. Test on discharge current
Discharge current below 0.2 mA

5. Test on short-circuit withstand
Short-circuits or disruptive discharges

6. Test for clear indication
a) Clear indication
b) Clear perceptibility of visual indication
c) Clear perceptibility of acoustic indication

ADDITIONAL NOTES
Report number PHEC 005856 20131002
9 Volt battery changed.

ALL TESTED CHARACTERISTICS COMPLY WITH THE ABOVE MENTIONED STANDARD. THE MAINTENANCE TEST WAS PASSED SUCCESSFULLY AND WAS MARKED ON THE RATING PLATE:

Marks: 2013

Next maintenance test: 2019

NEUMARKT, 07.10.2013 - Meier Robert

Contact

DEHN + SÖHNE Standort 2
Service Centre (Returns)
Am Ludwigskanal 1
92360 Mühlhausen
E-mail retoure@dehn.de

Maintenance test criteria for protective and auxiliary equipment

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

- **Electrical isolation of insulated track sections and earthed parts of installations**
- **Safe equipotential bonding in case of a short-circuit or earth fault at the overhead contact line due to high-current-resistant welding of the electrodes**
- **Discharge of lightning surges without short-circuit formation due to lightning-resistant SDS ... voltage limiting device**
- **Short-circuit withstand capability up to 25 kA_{rms} / 100 ms; 36 kA_{rms} / 75 ms**

EN 50122-1 describes the use of voltage limiting devices for d.c. and a.c. traction systems for so-called "open traction system earthing" of conductive components of the overhead contact line and pantograph zone. Voltage limiting devices (SDS ...) are used to prevent the occurrence of hazardous surges between the insulated tracks or track sections of electric railways and earthed parts of the installation.

Their function is to permanently connect parts of the installation in the overhead contact line and pantograph zone to the return circuit as soon as the threshold voltage is exceeded.

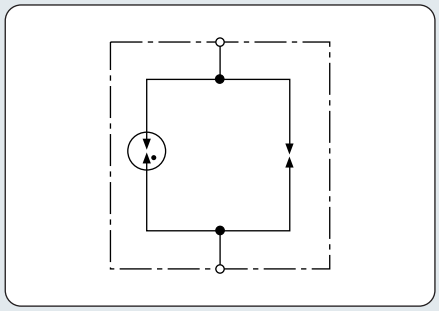
In case of atmospheric overvoltages, the lightning-resistant SDS ... voltage limiting device is capable of returning to its initial state after discharging the impulse current. Only if the specified lightning current load is exceeded, a permanent short-circuit is initiated by high-current-resistant welding 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 and can be directly connected to the rail or overhead contact line tower.

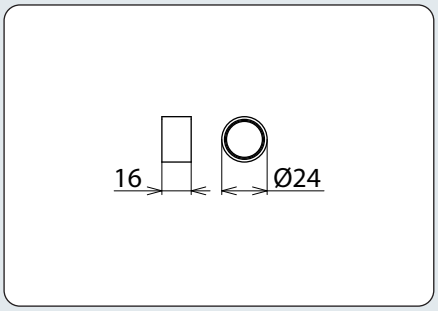
The spark gap unit of type SDS 1 (Part No. 923 110) developed by DEHN + SÖHNE has also been approved by the German Federal Railway Authority (EBA).

Voltage Limiter

SDS ...



Basic circuit diagram SDS ...



Dimension drawing SDS ...

- **Electrical isolation of insulated track sections and earthed parts of installations**
- **Safe equipotential bonding due to high-current-resistant welding of the electrodes in case of a short-circuit or earth fault at the overhead contact line**
- **Discharge of surges without short-circuit formation**

Type	SDS 1	SDS 2	SDS 3	SDS 4	SDS 5
Part No.	923 110	923 117	923 116	923 118	923 119
Power frequency sparkover voltage (U_{aw})	≤ 940 V	—	—	—	—
d.c. sparkover voltage (U_{ag})	600 V +/- 20 %	350 V +/- 20 %	550 V	230 V +/- 20 %	120 V +/- 20 %
Impulse sparkover voltage	≤ 1400 V (1 kV/µs)	≤ 900 V (1 kV/µs)	≤ 1000 V (1 kV/µs)	≤ 650 V (1 kV/µs)	≤ 600 V (1 kV/µs)
Self-extinguishing capability	300 A / 65 V	—	—	—	—
Lightning current discharge capacity (10/350 µs)					
0.1x / 0.5x / 1x	5 kA	2 kA	2.5 kA	2.5 kA	2 kA
Lightning current withstand capability (10/350 µs)	25 kA	25 kA	25 kA	25 kA	25 kA
Impulse current discharge capacity (8/20 µs) 0.1x / 0.5x / 1x	—	—	—	20 kA	20 kA
Safe short-circuit due to welding of the	≥ 2.5 kA / 1000 V / 30 ms,				
electrodes in case of alternating currents	≥ 1.5 kA / 1000 V / 100 ms	—	—	—	—
Safe short-circuit due to welding of the					
electrodes in case of direct currents	≥ 750 A / 250 ms	≥ 600 A / 250 ms	—	≥ 600 A / 250 ms	≥ 600 A / 250 ms
Short-circuit withstand capability	25 kA_{rms} / 100 ms;	25 kA_{rms} / 100 ms;	25 kA_{rms} / 100 ms	25 kA_{rms} / 100 ms;	25 kA_{rms} / 100 ms;
	36 kA_{rms} / 75 ms	36 kA_{rms} / 75 ms	—	36 kA_{rms} / 75 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_{PC})	< 1 µA at 100 V d.c.	< 1 µA at 100 V d.c.	—	< 1 µA at 100 V d.c.	< 1 µA at 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
To be mounted with			MA SDS M12 mast adapter		
Approvals	EBA	—	—	—	—
DB drawing No.	4 Ebs 15.13.20 Sheet 2	—	—	—	—

Accessory for Voltage Limiters

Mast Adapter for SDS Voltage Limiting Devices

For installation on the mast profile of an overhead line mast with D = 8-12 mm

Type	MA SDS M12
Part No.	723 199
Lightning current carrying capability (10/350 µs)	25 kA
Short-circuit withstand capability	21 kA_{rms} / 30 ms
Long-term current	1 kA_{rms} at t ≤ 120 s
Leakage current (I_{PC})	< 1 µA at 100 V d.c.
Dimensions of the threaded bolt	M12
Material	Brass
Degree of protection of the inner enclosure	IP 67

Accessories, spare parts and kit parts from page 193

Barrier

- **Barrier and accessories for providing protection for parts of an installation**

Barrier in a transformer station

Barrier

Robust design, suitable for indoor and outdoor installations

Type	AB 32 46 RW K L...
Part No.	700 099
Material	Glass-fibre reinforced polyester
Dimensions (W x H)	32 x 46 mm
Length	Any up to 6000 mm *)
Colour	Red / white

*) *Length must be specified when ordering!*

Barrier Holder

1 set = 2 pieces

Type	H AB 32 46 K
Part No.	700 098
Material	Plastic
Colour	Red

Single-pole Earthing and Discharge Devices

Discharge devices

- For discharging static charges
- Different contact electrodes
- Coupling electrode, especially for round conductors (∅12 ... 26.5 mm) of electrostatic precipitator systems
- Waterproof, plastic-sheathed cable entries, with additional anti-kink protection

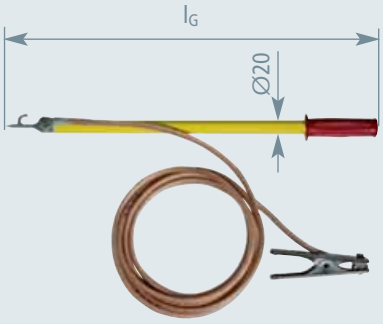
Single-pole device for discharging static charges

General Information:	
Use	Not suitable for use in wet weather conditions
Material (contact electrode)	Copper alloy/gal Sn
Material (contact and coupling electrode)	Zamak
Material (coupling electrode)	Bronze/gal Sn
Material (insulating tube)	Glass-fibre reinforced polyester tube
Material (earthing cable)	Highly flexible copper

With Handle and Earth Clamp with Wing Bolt

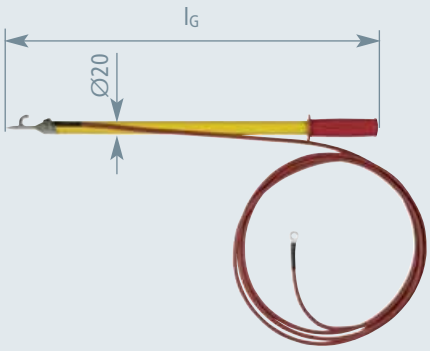
Type	EV TES 465 EK
Part No.	758 020
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	550 mm
Clamping range	Up to 20 mm

With Handle and Spring-loaded Earth Clamp



Type	EV TES 465 EZ
Part No.	758 021
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	550 mm
Clamping range	Up to 18 mm

With Handle and Cable Lug at the Earth Cable End



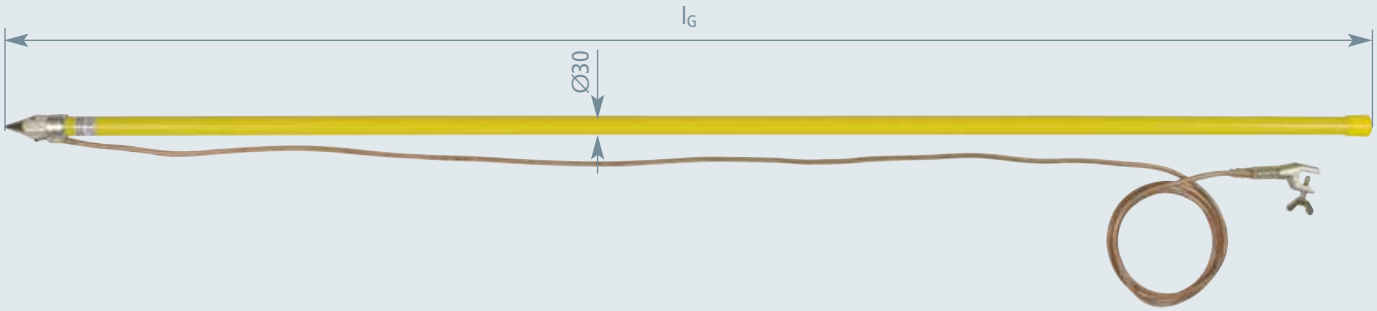
Hole (Ø8.4 mm) and silicone cable

Type	EV TES 465 KS10
Part No.	758 022
Cable length	3500 mm
Cable cross-section	10 mm²
Cable sheath	Red silicone cable
Total length (l_G)	550 mm

Accessories, spare parts and kit parts from page 193

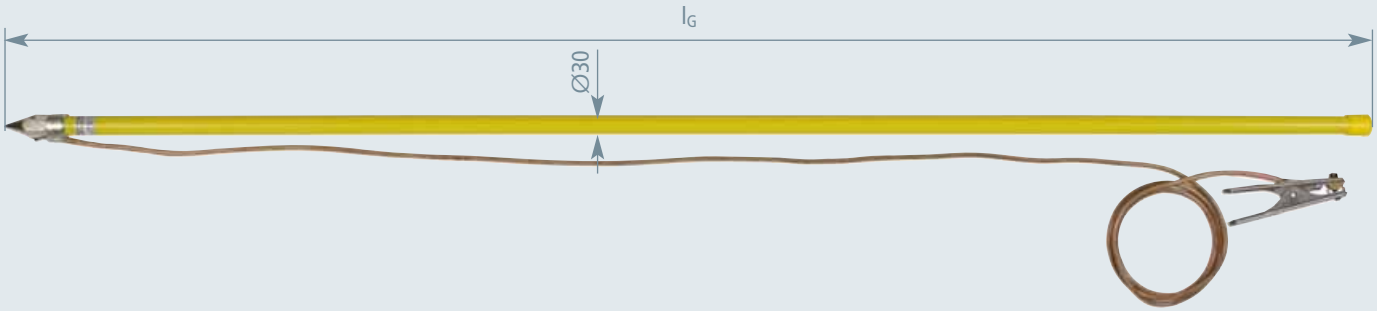
Single-pole Earthing and Discharge Devices

With Earth Clamp with Wing Bolt



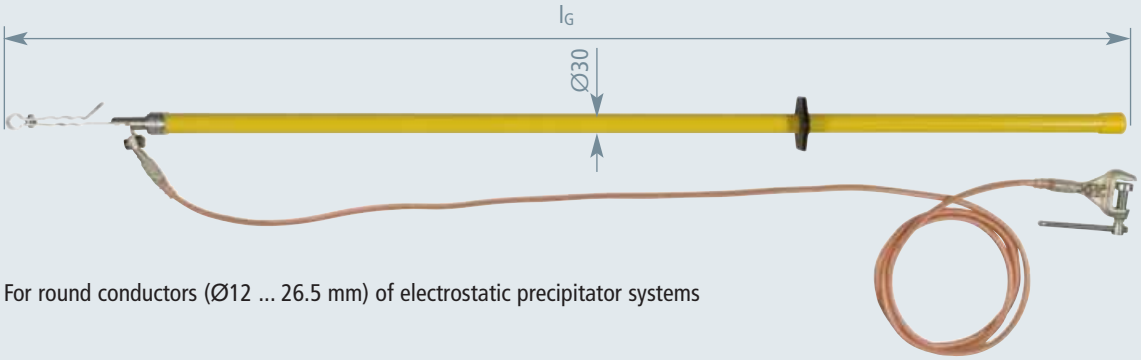
Type	EV TS 2000 EK
Part No.	**758 001**
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	2050 mm
Clamping range	Up to 20 mm

With Spring-loaded Earth Clamp



Type	EV TS 2000 EZ
Part No.	**758 003**
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	2050 mm
Clamping range	Up to 18 mm

With Earth Clamp with Tommy Bar



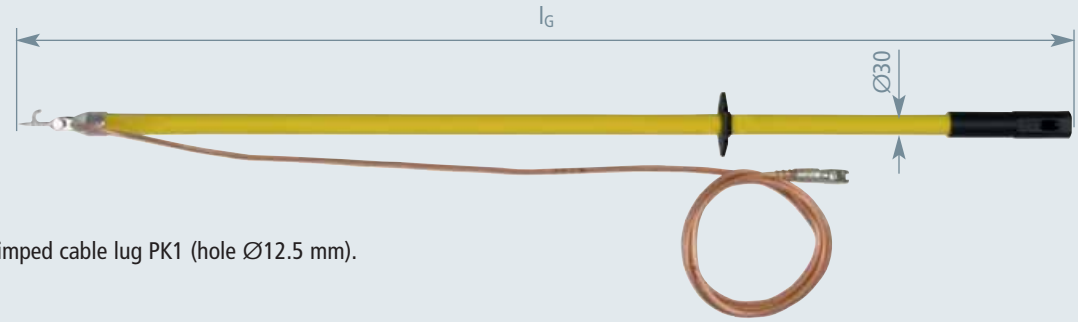
For round conductors (Ø12 ... 26.5 mm) of electrostatic precipitator systems

Type	EV EH 1725 EK
Part No.	**758 015**
Cable length	3500 mm
Cable cross-section	25 mm²
Cable sheath	Transparent
Total length (l_G)	1725 mm
Clamping range	Up to 30 mm

Single-pole Earthing and Discharge Devices

Discharge devices

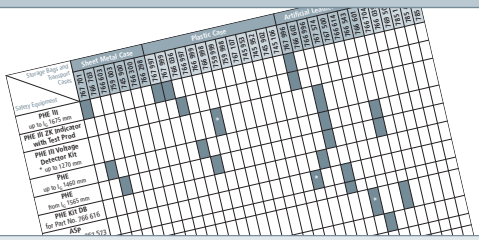
With plug-in Coupling and Cable Lug at the Earth Cable End



Anti-rotation crimped cable lug PK1 (hole Ø12.5 mm).

Type	EV TES STK 1500 KS
Part No.	**758 025**
Cable length	3500 mm
Cable cross-section	16 mm²
Cable sheath	Transparent
Total length (l_G)	1500 mm

Accessories, spare parts and kit parts from page 193

Product	Design	Page
Sheet Metal Case		
 	Hammer-tone finished With retaining springs With foam padding	186
Plastic Case		
 	With foam padding	187
Artificial Leather Bag		
 	With carrier handle With shoulder strap	189
Canvas Bag		
 	With carrier handle With two separate internal pockets	190
Plastic Bag / Rucksack		
 	With side handle, carrying strap and string With carrying straps and side net pocket with string	191
Easy Choice – Storage Bags and Transport Cases		
		192

Sheet Metal Case

Sheet Metal Case for PHE III

Hammer-tone finished with foam padding

Type	SKL 95 21 10
Part No.	767 701
Dimensions	950 x 210 x 115 mm
Colour	Blue

Sheet Metal Case for PHE

Hammer-tone finished with retaining springs

Type	SKL 92 16 10	SKL 116 16 10
Part No.	766 703	766 603
Dimensions	920 x 160 x 115 mm	1150 x 160 x 115 mm
Colour	Blue	Blue

Sheet Metal Case for PHV

Hammer-tone finished with foam padding

Type	SKL 95 21 10 V2
Part No.	759 003
Dimensions	950 x 210 x 115 mm
Colour	Blue

Sheet Metal Case for Earthing and Short-Circuiting Device VI/TI

Optionally available with foam padding

Type SBKL ...	EKS VI KVS	EKS TI KVS 2F	EKS TI KVS
Part No.	745 900	766 298	766 300
Dimensions	440 x 330 x 100 mm	440 x 330 x 66 mm	380 x 260 x 80 mm
Colour	Blue	Blue	Blue
Design	With foam padding	With foam padding	—

Plastic Case for PHE III

With foam padding

Type	KKL PHE3	KKL PHE3 L
Part No.	767 997	767 999
Dimensions	940 x 235 x 140 mm	1290 x 235 x 140 mm
Colour	Black	Black

Plastic Case for PHE III Indicator with Test Prod

With foam padding

Type	KKL PK PHE3 L
Part No.	766 036
Dimensions	390 x 280 x 80 mm
Colour	Grey

Plastic Case for PHE III Kit

With foam padding

Type	KKL PHE3 60 110
Part No.	766 998
Dimensions	1290 x 235 x 140 mm
Colour	Black

Plastic Case for PHE

With foam padding

Type	KKL PHE	KKL PHE L
Part No.	766 997	766 999
Dimensions	940 x 235 x 140 mm	1290 x 235 x 140 mm
Colour	Black	Black

Plastic Case for PHV and PHV I

With foam padding

Type	KKL PHV	KKL PHV1
Part No.	759 999	759 998
Dimensions	940 x 235 x 140 mm	1290 x 235 x 140 mm
Colour	Black	Black

Plastic Case for DEHNcap

With foam padding

Type	KKL DCA	KKL 26 22 5
Part No.	767 107	767 106
Dimensions	390 x 280 x 84 mm	265 x 215 x 50 mm
Colour	Grey	Black

Plastic Case

Plastic Case f. Earthing a. Short-Circuiting Device VI/TI

With foam padding and hook-and-loop fastener

Type	KK 56 41 17 EK VI TI	KKL EKS VI KVS
Part No.	745 952	745 902
Dimensions	565 x 410 x 170 mm	450 x 350 x 110 mm
Colour	Black	Black

Plastic Case for Earthing Stick

With retaining springs for two-part earthing stick

Type	KK 56 41 17 EK HK
Part No.	745 953
Dimensions	565 x 410 x 170 mm
Colour	Black

Artificial Leather Bag for PHE III, PHE, ASP, PHV, PHV I and IS STK

With zip and carrier handle

Type	KLT 101 30 10	KLT 133 34 10
Part No.	767 996	766 996
Dimensions	1010 x 300 x 100 mm	1300 x 345 x 100 mm
Colour	Black	Black

Artificial Leather Bag for PHE

With carrier handle

Type	KLT 247 10 22
Part No.	766 602
Dimensions	2470 x 220 x 100 mm
Colour	Black
DB drawing No.	3 Ebgw 02.51

Artificial Leather Bag for PHE and PHV I

With carrier handle

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

Artificial Leather Bag for PHE/G

With carrier handle

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

Artificial Leather Bag for ASP and HSA

With zip and carrier handle

Type	KLT 104 9
Part No.	767 574
Dimensions	Ø90 x 1040 mm
Colour	Black

Canvas Bag

Canvas Bag for PHE

With carrier handle

Type	STT 120 30 15
Part No.	766 704
Dimensions	1220 x 390 x 150 mm
Colour	Olive

Canvas Bag for ISMTC

With carrier handle

Type	STT 180 20
Part No.	766 039
Dimensions	Ø200 x 1900 mm
Colour	Olive

Canvas Bag for six-part Earthing Stick

With carrier handle

Type	STT 110 15
Part No.	769 509
Dimensions	Ø150 x 1100 mm
Colour	Olive
DB drawing No.	3 Ebgw 01.67

Canvas Bag for Earthing and Short-Circuiting Device

With two separate internal pockets and carrier handle

Type	STT 55 27 30
Part No.	785 111
Dimensions	550 x 255 x 300 mm
Colour	Olive
DB drawing No.	3 Ebgw 01.67

Storage Bag for DEHNcare® ESH, APS and APG

With side handle, carrying strap and string

Type	AT 50 30
Part No.	785 442
Suitable for	DEHNcare ESH, APS and APG
Dimensions	Ø300, 500 mm
Colour	Red / black

Storage Rucksack for complete DEHNcare® Protective Equipment

With carrying straps and side net pocket with string

Type	ARS 65 40
Part No.	785 443
Suitable for	DEHNcare protective equipment
Dimensions	650 x 400 mm
Colour	Red / black

Easy Choice

Storage Bags and Transport Cases / Safety Equipment	Sheet Metal Case							Plastic Case												Artificial Leather Bag								Storage Bag					
	767 701	766 703	766 603	759 003	745 900	766 300	766 298	767 997	767 999	766 036	766 997	766 999	766 998	759 999	759 998	767 107	745 953	745 952	745 902	745 106	767 996	766 602	766 996	767 574	767 500	766 614	766 543	766 601	766 704	766 039	769 509	785 111	785 442	785 443
PHE III up to l_G 1675 mm	■							■	■												■													
PHE III ZK Indicator with Test Prod										■											■													
PHE III Voltage Detector Kit * up to 1270 mm													*										■											
PHE up to l_G 1460 mm		■									■												■					■						
PHE from l_G 1565 mm			■									■											■					■						
PHE Kit DB for Part No. 766 616																						■												
ASP * for Part No. 767 573																					*			■										
HSA																								■										
PHE/G * for Part No. 767 656, 767 652																										*			■					
Voltage Detectors for LV Installations																											■							
PHV				■										■							■													
PHV I															■						■							■						
DEHNcap																■									■									
Earthing and Short-Circuiting Device																	■															■		
EaS Kit for LV Installations					■	■	■											■	■															
EaS Kit Street Lighting																				■														
Insulating Stick																														■				
Insulating Stick Kit																							■											
Earthing Stick																	■														■			
DEHNcare® ESH, APS and APG																																	■	
DEHNcare® for complete protective equipment																																		■

Electrodes

- Safe contact with the part of an installation to be tested
- With M8 thread, to be screwed on the test prods of PHE III and PHE voltage detectors as well as PHV phase comparators

Onion-shaped Electrode

Type	EL M8 SZ PHE PHV
Part No.	766 913
Nominal voltage (U_N)	From 3 kV
Material	Brass/gal CuSn

Pin-shaped Electrode

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

Hook-shaped Electrode

Type	EL M8 H PHE
Part No.	766 923
Application	For overhead lines only
Material	Steel/gal Zn

Fork-shaped Electrode

Type	EL M8 G PHE
Part No.	766 924
Application	For overhead lines only
Material	StSt

V-shaped Electrode

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

Eaton Holec Magnefix Electrode

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

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

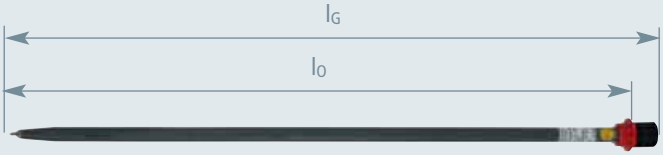
Test Prods

Accessories

- **Test prod with integrated test electrode allows safe contact with the part of an installation to be tested**

General Information:	
Colour	Grey or yellow
Diameter	20 mm
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin

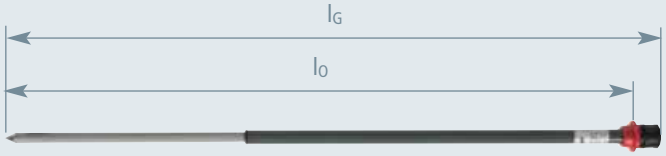
For Siemens 8CK Switchgear Installations



Category "S" for PHE III voltage detectors (Part Nos. 767 721, 767951, 767 722, 767 740 and 767940)

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

For Mipak Switchgear Installations



Category "S" for PHE III voltage detectors (and indicators), (Part Nos. 767 731 (767 796), 767 750 (767 728), 767 961 (767 956) and 767 950 (767 968)).

Type	S65 M PS PHE 905
Part No.	767 767
Total length (l_G)	940 mm
Insertion depth (l_0)	905 mm

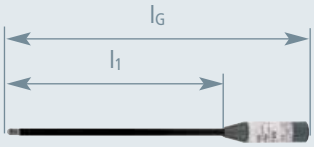
Test Probes

- Safe contact with the part of an installation to be tested
- With M8 thread, to be screwed on test electrodes of PHE and PHE III voltage detectors
- For switchgear installations with limited access
- Available in different lengths and angles

General Information:

Not suitable for use in wet weather conditions

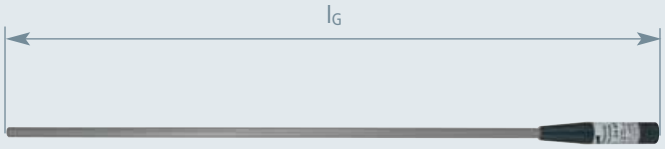
Straight Test Probe



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

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

Straight Test Probe, 800 mm

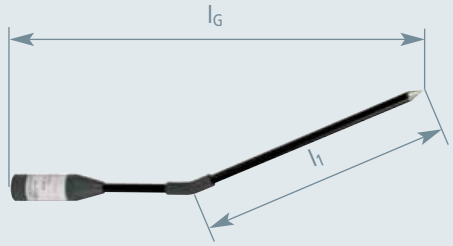


For transformer stations and switchgear installations that require a greater insertion depth

Suitable for use in wet weather conditions

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

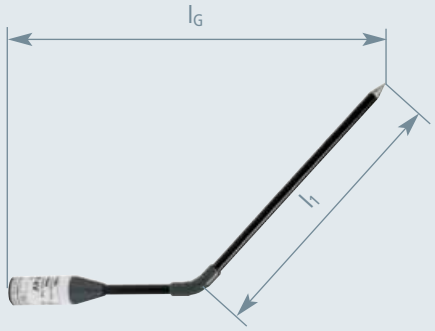
25° angled Test Probe



For switchgear installations with limited access

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

45° angled Test Probe



For switchgear installations with limited access

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

90° angled Test Probe

For switchgear installations with limited access and remotely situated contacts

Type	PSO M8 W90 PHE
Part No.	766 950
Nominal voltage (U_N)	3 ... 36 kV
Diameter	20 mm
Total length (l_G)	200 mm
Length (l_1)	370 mm

Adapters

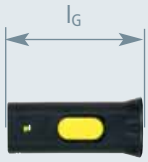
Adapter (Plug-In Coupling / T Pin Shaft)

For extending the handle of IS ... STK insulating sticks by means of an ES SQ or ES SQL earthing stick

Type	AD HV STK SQ
Part No.	766 313
Total length (l_G)	275 mm

End Fittings

STK End Fitting



For use as termination and protection

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

STK End Fitting with Eye

For use as protection and transport eye when working on overhead lines

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

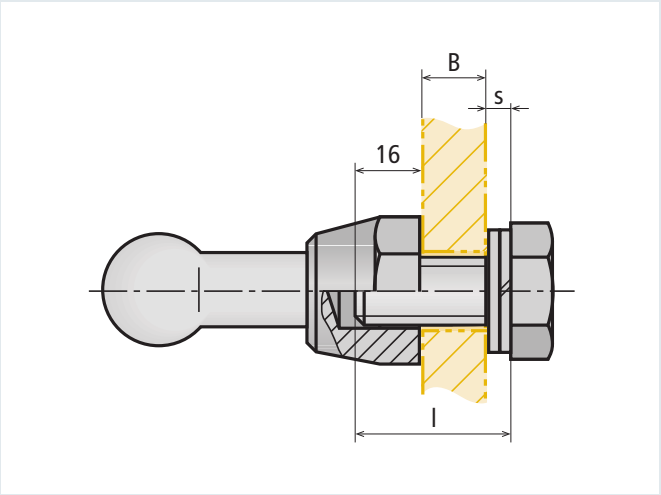
Accessories

For Fixed Ball and Earthing Points

- **Hexagon bolt for fixing busbar connections according to DIN 43673-1**
- **Spring-loaded pressure plate for installing M12 or M16 fixed points on aluminium busbars**

Determination of the bolt length l
l (mm) = B + s + 16
Important! Required bolt length < l

l = Bolt length
B = Thickness of the busbar
s = Thickness of the spring washer and washer



Determination of the required bolt length

General Information:	
Standard (hexagon bolts)	In accordance with DIN 933
Standard (spring washers)	In accordance with DIN 128
Standard (washers)	In accordance with DIN 125

Hexagon Bolts

Type	SKS M12 25 V2A	SKS M12 30 V2A	SKS M12 35 V2A	SKS M16 30 V2A
Part No.	561 925	561 930	561 935	561 931
Dimensions	M12 x 25 mm	M12 x 30 mm	M12 x 35 mm	M16 x 30 mm
Material	StSt A2-70	StSt A2-70	StSt A2-70	StSt A2-70
Tightening torque	80 Nm	80 Nm	80 Nm	150 Nm

Square spring-loaded Pressure Plate

For reliable contact and permanent installation of fixed ball points on aluminium busbars.
Pressure plates must be installed on both ends of the busbar.

Type	DP 40 40 B13 AL	DP 50 50 B17 AL
Part No.	525 001	525 002
Dimensions	M12, 40 x 40 x 6 mm	M16, 50 x 50 x 8 mm
Material	Highly resistant aluminium alloy	Highly resistant aluminium alloy

Spring Washers

Type	FR A12 V2A	FR A16 V2A
Part No.	524 912	524 913
Dimensions	A12 (s = 2.4) mm	A16 (s = 2.8) mm
Material	StSt A2-70	StSt A2-70

Washers

Type	SCH A13 V2A	SCH A17 V2A
Part No.	525 912	525 916
Dimensions	A13 (s = 2.4) mm	A17 (s = 3.0) mm
Material	StSt A2-70	StSt A2-70

Storage Devices

For Earthing and Short-Circuiting Devices and Sticks

Storage device for an earthing and short-circuiting device and an earthing stick

- **Wall-mounted**
- **Easy and safe storage of earthing and short-circuiting devices, voltage detectors and operating sticks (∅30 or 43 mm)**

For a Voltage Detector and an Earthing Stick

For a voltage detector and an earthing stick of any length

Hole spacing: 290/390 mm, holes: ∅7 mm

Type	HV P ST D24	HV P ST D30	HV P ST D40 45
Part No.	700 006	700 007	700 008
For stick diameters	24 mm	30 mm	40 ... 45 mm
Dimensions	530 x 30 x 136 mm	430 x 30 x 136 mm	530 x 30 x 149 mm
DB material No.	—	828 077	—

For an Earthing and Short-Circuiting Device and an Earthing Stick

For an earthing and short-circuiting device and an earthing stick of any length

Hole spacing: 424 mm, holes: Ø7 mm

Type	HV EKV ES30	HV EKV ES40
Part No.	700 000	700 002
For stick diameters	30 mm	43 mm
Dimensions	—	525 x 145 x 214 mm
DB drawing No.	3 Ebgw 01.70	—
DB material No.	742 395	—

For an Earthing and Short-Circuiting Device and an Earthing Stick up to 1.5 m

For an earthing and short-circuiting device and an earthing stick with a length up to 1.5 m

Hole spacing: 104 mm, holes: Ø7 mm

Type	HV EKV ES30 1500
Part No.	700 003
For stick diameters	30 / 43 mm
Dimensions	214 x 150 mm

For HV HBC Fuses and a Fuse Tong – Single Parts

Wall-mounted, holes Ø7 mm

Type	HV 3HH ET	HV 3HH SZ ET
Part No.	700 005	700 004
For	HV HBC fuses	HV HBC fuses and a fuse tong

Note: Two storage devices are required!

For HV HBC Fuses and a Fuse Tong – Kit

Kit includes:			
Kit type	Kit Part No.	consisting of:	Pos. No.
HV 3HH	700 015	2x 700 005	1
HV 3HH SZ	700 014	1x 700 005 1x 700 004	1 2

Wall-mounted, holes Ø7 mm

Type	HV 3HH	HV 3HH SZ
Part No.	700 015	700 014
For	3 HV HBC fuses	3 HV HBC fuses and a fuse tong

Spare Parts

Mignon Battery

Type	MZ 1.5V L91 FR6 LI 4	MZ 1.5 IEC LR6 AL
Part No.	766 611	766 618
Description	Mignon battery 1.5 V, lithium	Mignon battery 1.5 V, alkaline manganese
PU	4 pieces	1 piece

Block Battery

Type	EB 9V LI	EB 9V AL
Part No.	767 712	767 713
Description	9 V block battery, lithium	9 V block battery, alkaline manganese
PU	1 piece	1 piece

Electric Bulb

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

Sealing Ring

Type	DR PS PHE3	DR PHV
Part No.	767 779	767 778
Suitable for	PHE III test prod and ASP electric field sensor	PHV test unit

Protective Rubber for PHE

Type	FSG PHE
Part No.	767 776
Suitable for	PHE

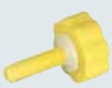
Protective Rubber for PHG II and PHV

Type	FSG PHG2 PHV
Part No.	767 777
Suitable for	PHG II and PHV

Support

Type	AH ISMTC
Part No.	766 038
Suitable for	Telescopic insulating stick

Plastic Star Grip Screw



Type	KS SG BLS 8
Part No.	766 105
Suitable for	Universal gear coupling
Total length (l_G)	42 mm

Test Prods

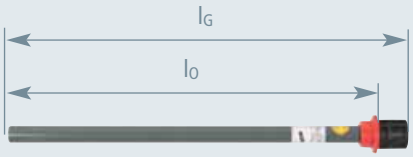
Kit Parts

- **Test prod with integrated test electrode allows safe contact with the part of an installation to be tested**

General Information:	
Colour	Grey or yellow
Diameter	20 mm
Material (test electrode)	Copper alloy/gal Sn
Material (test prod)	Glass-fibre reinforced epoxy resin tube

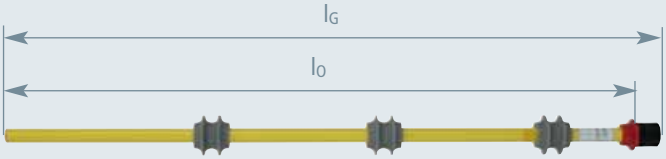
For PHE III up to 30 kV / Category "S"

Category "S"



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

For PHE III above 30 kV / Category "S"

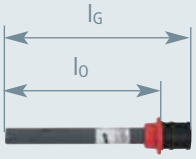


Category "S"

Type	S66 PS PHE 880
Part No.	767 771
Total length (l_G)	915 mm
Insertion depth (l_O)	880 mm

For PHE III up to 30 kV / Category "L"

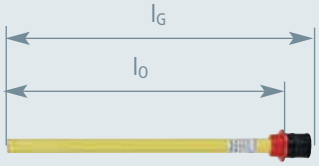
Category "L"



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

For PHE III above 30 kV / Category "L"

Category "L"



Type	L72 PS PHE 405
Part No.	767 772
Total length (l_G)	415 mm
Insertion depth (l_O)	380 mm

Indicators / Indicators with Test Prod

PHE III, with M12 threaded Pin

Type PHE3...	A 30 60 S	A 30 60 L	A 60 110 S
Part No.	767 972	767 974	767 734
Nominal voltage (U_N)	30 ... 60 kV	30 ... 60 kV	60 ... 110 kV
Category	S	L	S
Total length (l_G)	190 mm	190 mm	190 mm

Type	PHE3 A 60 110 L	PHE3 A 60 110 S IT
Part No.	767 726	767 963
Nominal voltage (U_N)	60 ... 110 kV	60 ... 110 kV
Category	L	S
Total length (l_G)	190 mm	190 mm

Type	PHE3 A 60 132 SL	PHE3 A 110 132 S
Part No.	767 732	767 129
Nominal voltage (U_N)	60 ... 132 kV	110 ... 132 kV
Category	S / L	S
Total length (l_G)	190 mm	190 mm

PHE III, with Gear Coupling

Type	PHE3 A 20 SL ZK
Part No.	767 722
Nominal voltage (U_N)	20 kV
Category	S / L
Total length (l_G)	230 mm

PHE III, with Gear Coupling

Type PHE3 ...	A 10 30 S ZK30	A 60 132 SL ZK
Part No.	767 965	767 735
Nominal voltage (U_N)	10 ... 30 kV	60 ... 132 kV
Category	S	S / L
Total length (l_G)	230 mm	230 mm

ASP, with Gear Coupling

Category "S" and "L"

Type ASP ...	A 110 132 16.7 L	A 110 420 L ZK
Part No.	767 564	767 591
Nominal voltage (U_N)	110 ... 132 kV / 16.7 Hz	110 ... 420 kV
Category	L	L
Total length (l_G)	230 mm	230 mm

Type ASP ...	A 110 420 S ZK	A 110 420 SL ZK
Part No.	767 592	767 593
Nominal voltage (U_N)	110 ... 420 kV	110 ... 420 kV
Category	S	S / L
Total length (l_G)	230 mm	230 mm

PHE Indicator (voltage detector for overhead lines, four-part)

Type	PHE PK 15 16.7
Part No.	766 678
Nominal voltage (U_N)	15 kV / 16.7 Hz
Total length (l_G)	1900 mm
Diameter	20 mm
DB drawing No.	3 Ebgw 02.51

PHE Indicator, with Test Prod (voltage detector for overhead lines, six-part)

Type	PS PHE 15 16.7
Part No.	766 619
Total length (l_G)	1060 mm

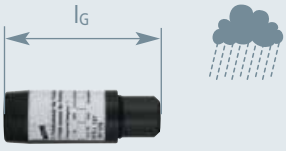
PHE Indicator (voltage detector for overhead lines, six-part)

Type	PHE A 15 16.7
Part No.	766 677
Nominal voltage (U_N)	15 kV / 16.7 Hz
Total length (l_G)	930 mm
Diameter	24 mm
DB drawing No.	3 Ebgw 02.53

Field Sensor

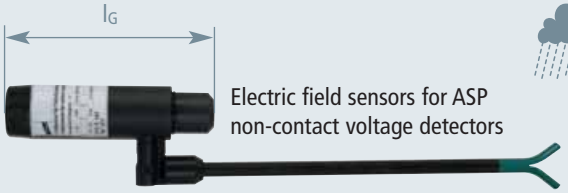
Category L

Electric field sensors for ASP non-contact voltage detectors



Type	EFS L 127
Part No.	767 576
Category	L
Total length (l_G)	127 mm
Material	Plastic
Colour	Black

Category S



Electric field sensors for ASP non-contact voltage detectors

Type	EFS S 167
Part No.	767 577
Category	S
Total length (l_G)	167 mm
Material	Plastic
Colour	Black

Operating Heads

Kit Parts

STK Switching Stick Head

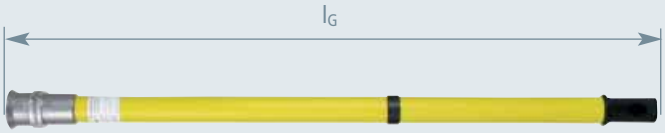
Type	SSK 36 STK 560
Part No.	766 164
Diameter	30 mm
Total length (l_G)	560 mm
Material (switching stick head)	Glass-fibre reinforced polyester tube
Colour	Grey
Material (switching pin)	Plastic-sheathed steel

STK Operating Head / T Pin Shaft

Plastic plug-in coupling (bayonet locking mechanism) for indoor use

Type	AK 36 SQ STK 360
Part No.	766 365
Diameter	30 mm
Total length (l_G)	360 mm
Material (operating head)	Plastic
Colour	Yellow

SQL Operating Head



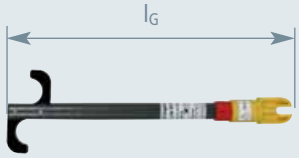
Type	ES SQL STK 43 1045
Part No.	766 074
Diameter	43 mm
Total length (l_G)	1045 mm
DB drawing No.	3 Ebgw 01.68

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	AK SQL STK 365
Part No.	766 465
Diameter	43 mm
Total length (l_G)	365 mm
Material (operating head)	Aluminium
Colour	Yellow

Contacting Aid



For telescopic insulating sticks

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

Cleaning Head

Flexibly adjustable, for attaching cleaning pads

Type	RK 230 100 AS25
Part No.	766 056
Dimensions	230 x 100 mm

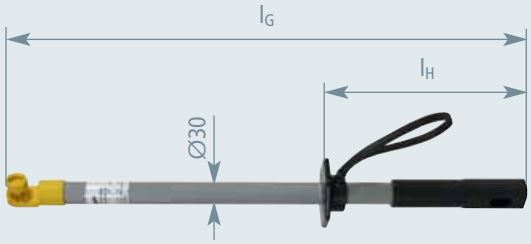
Accessory for Operating Head

Rectangular Cleaning Pad

Type	RP 250 115 20
Part No.	766 057
Dimensions	250 x 115 x 20 mm
PU	5 pieces

Insulating Sticks

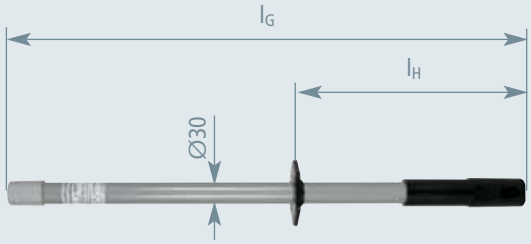
For ASP, with universal Gear Coupling



Plug-in coupling for extending the handle

Type	IS ZK STK HS 670
Part No.	766 369
Diameter	30 mm
Total length (l_G)	670 mm
Length (handle) (l_H)	270 mm
Material	Glass-fibre reinforced polyester tube
Colour	Grey

Insulating Stick with M12 Threaded Bushing

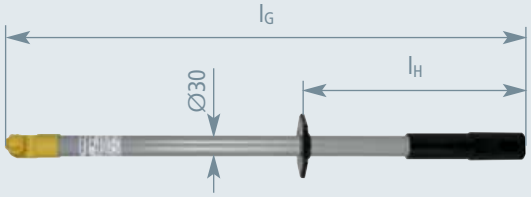


Plug-in coupling for extending the handle (Part No. 766 331)

End cap (Part No. 766 328)

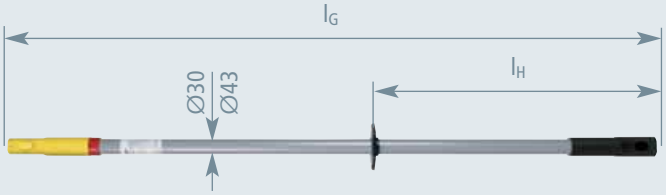
Type	IS M12 STK 640	IS M12 AK 625
Part No.	766 331	766 328
Diameter	30 mm	30 mm
Total length (l_G)	640 mm	640 mm
Length (handle) (l_H)	270 mm	270 mm
Material	Glass-fibre reinforced polyester tube	Glass-fibre reinforced polyester tube

For PHE III, with universal Gear Coupling



Type	IS ZK STK 670
Part No.	766 368
Nominal voltage (U_N)	Up to 36 kV
Total length (l_G)	670 mm
Length (handle) (l_H)	270 mm
Material	Glass-fibre reinforced polyester tube

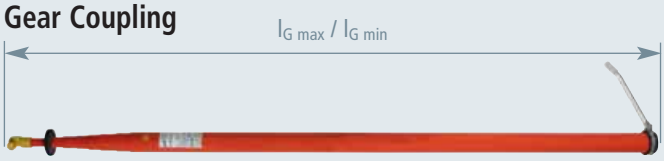
For IS STK, with plug-in Coupling



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

Type	IS 36 STK 30 1280	IS 36 STK 43 1280
Part No.	766 363	766 463
Nominal voltage (U_N)	Up to 36 kV	Up to 36 kV
Diameter	30 mm	43 mm
Total length (l_G)	1280 mm	1280 mm
Length (handle) (l_H)	560 mm	560 mm
Material	Glass-fibre reinforced polyester tube	Glass-fibre reinforced polyester tube
Colour	Grey	Grey

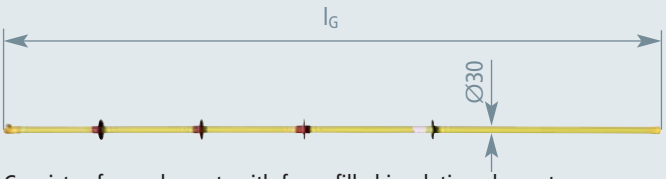
For PHE III Indicator with Test Prod, with universal Gear Coupling



With scale for measuring the ground clearance, mounted support included

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

For IS for cleaning Windscreens



Consists of one element, with foam-filled insulating element

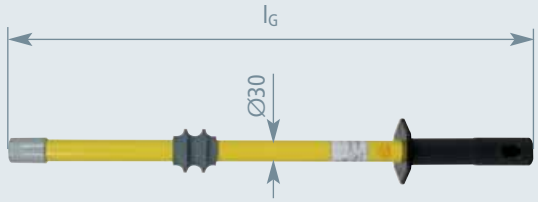
Type	IS 25 ZK 2885
Part No.	766 048
Diameter	30 mm
Total length (l_G)	2890 mm
Material	Glass-fibre reinforced polyester tube
End fitting	Non-slip plastic cap

Further Equipment

Insulating Sticks

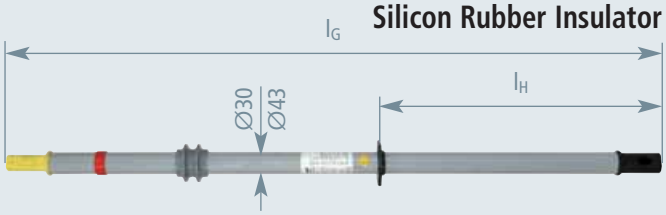
Kit Parts

For PHE (for Overhead Lines)



Type	IS M12 STK 30 720	IS M12 STK 30 1060
Part No.	766 072	766 075
Diameter	30 mm	30 mm
Total length (l_G)	720 mm	1060 mm
DB drawing No.	3 Ebgw 02.51	3 Ebgw 02.53

ISN 36 STK Insulating Stick with Silicon Rubber Insulator

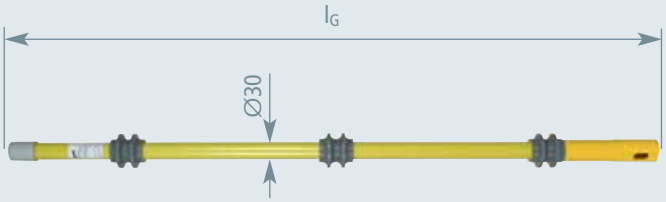


Plug-in coupling at both ends for attaching extension elements, operating heads or adapters

Type	ISN 36 STK 30 1280	ISN 36 STK 43 1280
Part No.	766 367	766 468
Nominal voltage (U_N)	Up to 36 kV	Up to 36 kV
Diameter	30 mm	43 mm
Total length (l_G)	1280 mm	1280 mm
Length (handle) (l_H)	560 mm	560 mm
Material	Glass-fibre reinforced polyester tube	Glass-fibre reinforced polyester tube
Colour	Grey	Grey

Insulating Elements

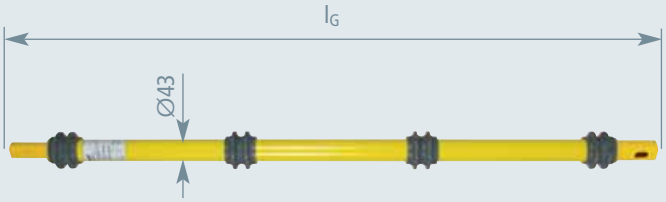
Insulating Element with M12 threaded Bushing



With plug-in coupling for extending the handle

Type	IT M12 STK 30 700	IT M12 STK 30 1150
Part No.	766 114	766 115
Nominal voltage (U_N)	Up to 60 kV	Up to 110 kV
Diameter	30 mm	30 mm
Total length (l_G)	700 mm	1150 mm
Material	Glass-fibre reinforced polyester tube	Glass-fibre reinforced polyester tube
Colour	Yellow	Yellow

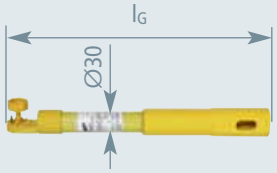
Insulating Element with plug-in Coupling



With plug-in coupling for extending the handle

Type	IT STK 43 1280
Part No.	766 128
Nominal voltage (U_N)	Up to 132 kV
Diameter	43 mm
Total length (l_G)	1280 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

Insulating Element with Gear Coupling



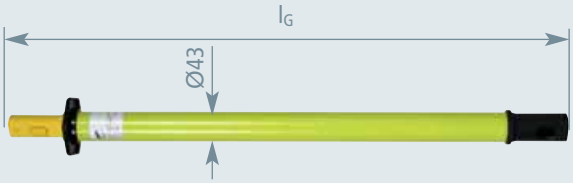
With plug-in coupling

Angle of the gear coupling: – 30° / 0° / + 30°

Type	IT ZK30 STK 30 360
Part No.	766 358
Diameter	30 mm
Total length (l_G)	360 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

Handles / Extensions

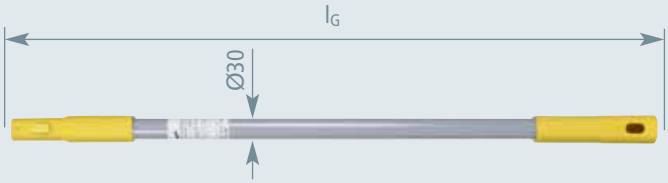
Handle



End fitting with plug-in coupling for extending the handle

Type	H STK 43 800
Part No.	766 120
Diameter	43 mm
Total length (l_G)	830 mm

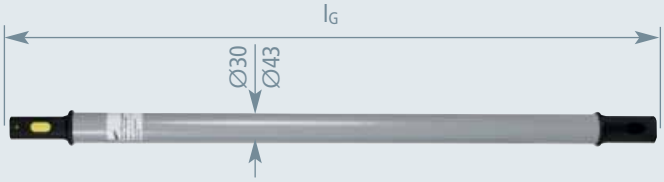
ISV 36 STK Insulating Stick Extension



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

Type	ISV 36 STK 30 910	ISV 36 STK 30 1280
Part No.	766 356	766 366
Diameter	30 mm	30 mm
Total length (l_G)	910 mm	1280 mm
Material	Glass-fibre reinforced polyester tube	Glass-fibre reinforced polyester tube
Colour	Grey	Grey

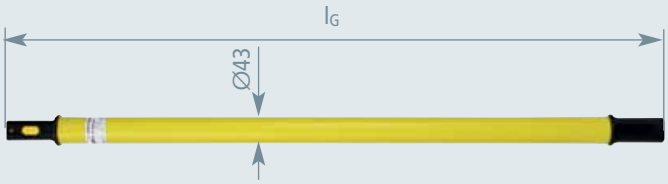
HV STK Extension Handle



Plug-in coupling at both ends for extending the handle

Type	HV STK 30 710	HV STK 43 910	HV STK 43 1280
Part No.	766 335	766 456	766 466
Diameter	30 mm	43 mm	43 mm
Total length (l_G)	710 mm	910 mm	1280 mm
Material	Glass-fibre reinforced polyester tube		
Colour	Grey	Grey	Grey

Extension Handle



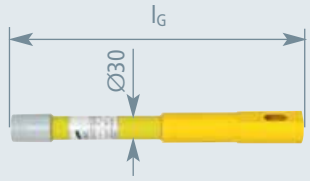
Plug-in coupling at both ends for extending the handle

Type	HV STK 43 975	HV STK 43 1045	HV STK 43 2350
Part No.	766 077	766 076	766 073
Diameter	43 mm	43 mm	43 mm
Total length (l_G)	975 mm	1045 mm	2350 mm
DB drawing No.	3 Ebgw 02.53	3 Ebgw 02.53	3 Ebgw 02.51

Extension Handle

Type	HV STK RW 43 975	HV STK RW 43 1045
Part No.	766 079	766 078
Diameter	43 mm	43 mm
Total length (l_G)	975 mm	1045 mm
DB drawing No.	3 Ebgw 01.68	3 Ebgw 01.68

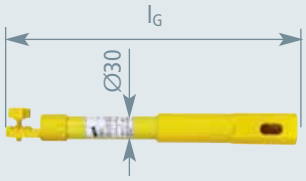
Adapter with M12 female Thread



With plug-in coupling

Type	AD M12 STK 30 350
Part No.	766 352
Diameter	30 mm
Total length (l_G)	350 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

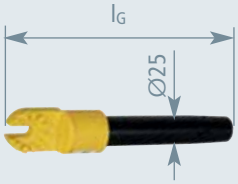
Adapter with Gear Coupling



With plug-in coupling

Type	AD ZK STK 30 360
Part No.	766 359
Diameter	30 mm
Total length (l_G)	360 mm
Material	Glass-fibre reinforced polyester tube
Colour	Yellow

Adapter with cone-shaped Support



With gear coupling and cone-shaped support, accommodates cleaning sponges (Part No. 766 056)

Type	AD ZK 25 200
Part No.	766 055
Diameter	25 mm
Total length (l_G)	200 mm

Notes

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Abbreviations

Instr. No.	Instructions for use No.
VPE	Packing unit
VE	Quantity per unit (piece, metre, set or pair)
pc(s).	Piece(s)
m	Metre
Sa	Set
Pa	Pair

Index of Variant Nos.

Index of Part Nos.

Part No.	Instr. No.	Weight	VPE	VE	Page
336 020	—	118 g	1	pc(s).	75
336 025	—	252 g	1	pc(s).	75
524 912	—	4 g	1	pc(s).	199
524 913	—	8 g	1	pc(s).	199
525 001	—	19 g	10	pc(s).	199
525 002	—	37 g	10	pc(s).	199
525 912	—	5 g	1	pc(s).	199
525 916	—	10 g	1	pc(s).	199
561 925	—	35 g	1	pc(s).	199
561 930	—	39 g	1	pc(s).	199
561 931	—	77 g	1	pc(s).	199
561 935	—	42 g	1	pc(s).	199
644 000	—	4.45 kg	1	pc(s).	90
700 000	—	1.16 kg	1	pc(s).	201
700 002	—	1.15 kg	1	pc(s).	201
700 003	—	700 g	1	pc(s).	201
700 004	—	1 kg	1	pc(s).	201
700 005	—	707 g	1	pc(s).	201
700 006	—	780 g	1	pc(s).	200
700 007	—	780 g	1	pc(s).	200
700 008	—	803 g	1	pc(s).	200
700 014	—	1.71 kg	1	pc(s).	201
700 015	—	1.41 kg	1	pc(s).	201
700 098	—	180 g	1	pc(s).	179
700 099	—	780 g	1	m	179
705 500	—	122 g	1	pc(s).	75
705 501	—	152 g	1	pc(s).	75
705 504	—	183 g	1	pc(s).	75
705 510	—	240 g	1	pc(s).	75
706 200	1018	172 g	1	pc(s).	72
706 235	1018	219 g	1	pc(s).	72
706 300	1018	129 g	1	pc(s).	70
706 600	1018	158 g	1	pc(s).	72
706 645	1018	274 g	1	pc(s).	72
707 200	1018	204 g	1	pc(s).	73
707 235	1018	259 g	1	pc(s).	73
707 600	1018	191 g	1	pc(s).	73
707 645	1018	299 g	1	pc(s).	73
712 001	—	1.23 kg	1	m	81
715 001	—	1.52 kg	1	m	81
715 312	1011	1.5 kg	1	pc(s).	83
716 001	—	184 g	1	m	81
720 010	1018	314 g	1	pc(s).	72
720 012	1018	347 g	1	pc(s).	72
720 014	1018	329 g	1	pc(s).	72
720 016	1018	309 g	1	pc(s).	72
720 018	1018	296 g	1	pc(s).	72
720 020	1018	276 g	1	pc(s).	72
723 199	1826	750 g	1	pc(s).	178
725 001	—	207 g	1	m	81
725 010	1018	410 g	1	pc(s).	72
725 012	1018	400 g	1	pc(s).	72
725 014	1018	385 g	1	pc(s).	72
725 016	1018	365 g	1	pc(s).	72
725 018	1018	345 g	1	pc(s).	72
725 020	1018	320 g	1	pc(s).	72
728 312	1733	270 g	1	pc(s).	88
728 313	1733	662 g	1	pc(s).	88
728 501	1011	900 g	1	pc(s).	77
728 502	1011	708 g	1	pc(s).	77
728 503	1011	453 g	1	pc(s).	77
728 506	—	867 g	1	pc(s).	77
728 516	—	1.44 kg	1	pc(s).	77
728 522	—	676 g	1	pc(s).	76
728 526	—	934 g	1	pc(s).	76
728 620	—	985 g	1	pc(s).	76
728 625	—	984 g	1	pc(s).	76
731 011	1011	690 g	1	pc(s).	78
731 013	1011	850 g	1	pc(s).	78
731 015	1011	1 kg	1	pc(s).	78
731 027	1011	1.97 kg	1	pc(s).	78
731 037	1011	2.66 kg	1	pc(s).	78
735 001	—	366 g	1	m	81
740 124	—	255 g	1	pc(s).	112
745 016	—	467 g	1	pc(s).	119
745 017	—	277 g	1	pc(s).	119
745 018	—	271 g	1	pc(s).	119
745 105	1502	1.83 kg	1	pc(s).	122
745 106	1502	890 g	1	pc(s).	122
745 107	1502	286 g	1	pc(s).	122
745 108	1502	20 g	1	pc(s).	122
745 109	1502	18 g	1	pc(s).	122
745 201	1034	65 g	1	pc(s).	120
745 202	1034	90 g	1	pc(s).	120
745 203	1034	102 g	1	pc(s).	120
745 204	1034	145 g	1	pc(s).	120
745 302	—	110 g	1	pc(s).	119
745 400	1034	250 g	1	pc(s).	120
745 414	1707	285 g	1	pc(s).	123
745 415	1707	275 g	1	pc(s).	123
745 500	1034	7.57 kg	1	pc(s).	118
745 502	1034	360 g	1	pc(s).	120
745 503	1747	154 g	1	pc(s).	117
745 508	1747	137 g	1	pc(s).	120
745 602	1034	580 g	1	pc(s).	120
745 900	1034	3.71 kg	1	pc(s).	186
745 901	1351	6.89 kg	1	pc(s).	116
745 902	1034	1.62 kg	1	pc(s).	188
745 903	1351	7 kg	1	pc(s).	116
745 905	1351	75 g	1	pc(s).	117
745 910	1351	190 g	1	pc(s).	117
745 915	1351	420 g	1	pc(s).	117
745 921	1351	220 g	1	pc(s).	117
745 922	1351	220 g	1	pc(s).	117
745 952	—	4.9 kg	1	pc(s).	117
745 953	—	4.95 kg	1	pc(s).	188
750 001	—	535 g	1	m	81
750 041	—	4.22 kg	1	pc(s).	111
750 042	—	4.06 kg	1	pc(s).	111
750 196	1011	26.58 kg	1	pc(s).	108
750 200	1011	16.95 kg	1	pc(s).	109
750 210	1011	13.44 kg	1	pc(s).	108
750 211	1011	15.55 kg	1	pc(s).	109
750 212	1011	13 kg	1	pc(s).	110
750 213	1011	8.76 kg	1	pc(s).	110
750 214	1011	15.6 kg	1	pc(s).	109
750 215	1011	7.3 kg	1	pc(s).	110
750 216	—	26.58 kg	1	pc(s).	108
750 217	—	17.08 kg	1	pc(s).	109
750 218	—	14.73 kg	1	pc(s).	108
750 219	—	16.87 kg	1	pc(s).	109
750 221	—	15.51 kg	1	pc(s).	109
750 500	—	250 g	1	pc(s).	75
751 040	1011	2.6 kg	1	pc(s).	112
751 085	1011	4.98 kg	1	pc(s).	112
751 086	—	9 kg	1	pc(s).	111
751 087	—	9.13 kg	1	pc(s).	111
751 120	1011	6.86 kg	1	pc(s).	112
751 121	—	11.14 kg	1	pc(s).	111
751 122	—	11.27 kg	1	pc(s).	111
751 126	—	10.88 kg	1	pc(s).	111
751 127	—	11.01 kg	1	pc(s).	111
751 130	1011	7.39 kg	1	pc(s).	112
751 140	1011	7.93 kg	1	pc(s).	112
751 150	1011	4.8 kg	1	pc(s).	112
751 191	1011	8.82 kg	1	pc(s).	111
751 192	1011	6.68 kg	1	pc(s).	112
751 193	1011	10.28 kg	1	pc(s).	111
751 196	1011	8.53 kg	1	pc(s).	111
751 197	1011	8.52 kg	1	pc(s).	111
754 200	1018	131 g	1	pc(s).	71
754 235	1018	184 g	1	pc(s).	71
754 600	1018	116 g	1	pc(s).	71
754 645	1018	287 g	1	pc(s).	71
755 200	1018	220 g	1	pc(s).	71
755 225	1018	265 g	1	pc(s).	71
755 245	1018	278 g	1	pc(s).	71
755 501	—	298 g	1	pc(s).	75
755 600	1018	204 g	1	pc(s).	71
755 626	1018	301 g	1	pc(s).	71
755 627	1018	311 g	1	pc(s).	71
755 636	1018	310 g	1	pc(s).	71
755 645	1018	319 g	1	pc(s).	71
755 646	1018	330 g	1	pc(s).	71

Index of Part Nos.

Part No.	Instr. No.	Weight	VPE	VE	Page
756 200	1018	357 g	1	pc(s).	72
756 245	1018	434 g	1	pc(s).	72
756 300	1018	212 g	1	pc(s).	70
756 600	1018	356 g	1	pc(s).	72
756 645	1018	470 g	1	pc(s).	72
757 200	1018	395 g	1	pc(s).	73
757 245	1018	454 g	1	pc(s).	73
757 600	1018	370 g	1	pc(s).	73
757 645	1018	491 g	1	pc(s).	73
758 001	1152	2.22 kg	1	pc(s).	182
758 003	1152	1.95 kg	1	pc(s).	182
758 015	1152	2.62 kg	1	pc(s).	182
758 020	1152	1.34 kg	1	pc(s).	181
758 021	1152	1.1 kg	1	pc(s).	181
758 022	1152	650 g	1	pc(s).	181
758 025	—	1.49 kg	1	pc(s).	183
759 003	—	6.2 kg	1	pc(s).	186
759 111	—	200 g	1	pc(s).	53
759 121	—	154 g	1	pc(s).	53
759 300	1455	1.2 kg	1	pc(s).	52
759 603	—	205 g	1	pc(s).	53
759 604	—	349 g	1	pc(s).	53
759 605	—	336 g	1	pc(s).	53
759 606	—	1.63 kg	1	pc(s).	54
759 608	—	295 g	1	pc(s).	53
759 610	—	405 g	1	pc(s).	53
759 611	—	346 g	1	pc(s).	53
759 612	1450	1.8 kg	1	pc(s).	54
759 615	—	400 g	1	pc(s).	53
759 616	1450	1.9 kg	1	pc(s).	54
759 620	—	340 g	1	pc(s).	53
759 621	—	370 g	1	pc(s).	53
759 622	—	425 g	1	pc(s).	53
759 624	1450	1.8 kg	1	pc(s).	54
759 998	—	3.32 kg	1	pc(s).	187
759 999	—	2.38 kg	1	pc(s).	187
761 001	1707	400 g	1	pc(s).	96
761 002	1707	400 g	1	pc(s).	96
761 003	—	840 g	1	pc(s).	96
761 004	—	1.99 kg	1	pc(s).	96
761 010	1707	980 g	1	pc(s).	96
761 011	1707	1.05 kg	1	pc(s).	96
761 015	1707	1.35 kg	1	pc(s).	96
761 016	1707	1.36 kg	1	pc(s).	96
761 070	—	800 g	1	pc(s).	96
761 075	—	800 g	1	pc(s).	96
763 100	1709	600 g	1	pc(s).	17
763 111	—	580 g	1	pc(s).	17
763 150	1709	600 g	1	pc(s).	17
763 180	1709	850 g	1	pc(s).	17
763 181	—	2.54 kg	1	pc(s).	17
763 211	1082	—	1	pc(s).	128
763 221	1082	—	1	pc(s).	128
763 231	1082	—	1	pc(s).	129
763 241	1082	—	1	pc(s).	129
763 510	—	520 g	1	pc(s).	16
763 511	—	660 g	1	pc(s).	16
763 512	—	820 g	1	pc(s).	16
763 610	1709	962 g	1	pc(s).	16
763 611	1709	610 g	1	pc(s).	16
763 612	1709	800 g	1	pc(s).	16
763 615	1709	1.42 kg	1	pc(s).	16
763 620	1709	800 g	1	pc(s).	16
765 001	—	190 g	1	pc(s).	96
765 005	1708	117 g	1	pc(s).	15
765 006	1707	460 g	1	pc(s).	96
765 009	1708	145 g	1	pc(s).	15
765 040	1435	2.13 kg	1	pc(s).	19
765 041	1435	2.28 kg	1	pc(s).	19
765 042	1435	2.59 kg	1	pc(s).	19
765 050	1435	2.15 kg	1	pc(s).	19
765 051	1435	2.29 kg	1	pc(s).	19
765 052	1435	2.59 kg	1	pc(s).	19
766 001	—	416 g	1	pc(s).	14
766 002	1708	810 g	1	pc(s).	14
766 036	—	968 g	1	pc(s).	187
766 037	1494	6.56 kg	1	pc(s).	206
766 038	—	275 g	1	pc(s).	202
766 039	—	712 g	1	pc(s).	190
766 040	1785	820 g	1	pc(s).	20
766 041	1785	1 kg	1	pc(s).	20
766 042	1785	1.12 kg	1	pc(s).	20
766 048	—	2.6 kg	1	pc(s).	206
766 049	—	165 g	1	pc(s).	205
766 055	—	120 g	1	pc(s).	209
766 056	—	204 g	1	pc(s).	205
766 057	—	75 g	1	Sa	205
766 072	—	400 g	1	pc(s).	207
766 073	—	1.6 kg	1	pc(s).	208
766 074	1707	1.2 kg	1	pc(s).	205
766 075	—	520 g	1	pc(s).	207
766 076	—	800 g	1	pc(s).	208
766 077	—	740 g	1	pc(s).	208
766 078	—	1 kg	1	pc(s).	208
766 079	—	1 kg	1	pc(s).	208
766 100	1708	400 g	1	pc(s).	14
766 105	—	10 g	1	pc(s).	202
766 111	—	560 g	1	pc(s).	14
766 114	—	400 g	1	pc(s).	207
766 115	—	725 g	1	pc(s).	207
766 120	—	690 g	1	pc(s).	208
766 122	—	800 g	1	pc(s).	14
766 128	—	1.3 kg	1	pc(s).	207
766 164	—	400 g	1	pc(s).	205
766 210	—	480 g	1	pc(s).	14
766 211	—	480 g	1	pc(s).	14
766 215	—	640 g	1	pc(s).	14
766 216	—	640 g	1	pc(s).	14
766 222	—	2.36 kg	1	pc(s).	15
766 298	1034	3.7 kg	1	pc(s).	186
766 300	1034	1.2 kg	1	pc(s).	186
766 301	1708	400 g	1	pc(s).	15
766 302	—	4.38 kg	1	pc(s).	118
766 310	—	560 g	1	pc(s).	15
766 311	1708	419 g	1	pc(s).	14
766 313	—	413 g	1	pc(s).	198
766 315	1708	820 g	1	pc(s).	14
766 322	—	800 g	1	pc(s).	15
766 323	1614	5.8 kg	1	pc(s).	11
766 324	1774	4.5 kg	1	pc(s).	11
766 325	1614	5.6 kg	1	pc(s).	12
766 326	—	4.3 kg	1	pc(s).	12
766 328	—	840 g	1	pc(s).	206
766 331	—	375 g	1	pc(s).	206
766 332	—	2.38 kg	1	pc(s).	15
766 335	1708	400 g	1	pc(s).	208
766 340	1636	3 kg	1	pc(s).	153
766 352	—	250 g	1	pc(s).	209
766 356	—	400 g	1	pc(s).	208
766 358	—	200 g	1	pc(s).	207
766 359	—	200 g	1	pc(s).	209
766 363	—	600 g	1	pc(s).	206
766 364	—	240 g	1	pc(s).	12
766 365	—	200 g	1	pc(s).	205
766 366	—	600 g	1	pc(s).	208
766 367	1774	600 g	1	pc(s).	207
766 368	—	340 g	1	pc(s).	206
766 369	—	388 g	1	pc(s).	206
766 450	1614	7.6 kg	1	pc(s).	11
766 451	—	6.2 kg	1	pc(s).	11
766 452	1614	6.6 kg	1	pc(s).	12
766 453	—	5.3 kg	1	pc(s).	12
766 456	1708	800 g	1	pc(s).	208
766 463	1614	1 kg	1	pc(s).	206
766 465	—	800 g	1	pc(s).	205
766 466	1708	1 kg	1	pc(s).	208
766 468	—	2.45 kg	1	pc(s).	207
766 542	1507	71 g	1	pc(s).	50
766 543	1507	148 g	1	pc(s).	50
766 544	1849	390 g	1	pc(s).	50
766 548	1849	390 g	1	pc(s).	50
766 601	—	319 g	1	pc(s).	189
766 602	—	1.31 kg	1	pc(s).	189
766 603	—	6 kg	1	pc(s).	186
766 605	—	2 g	1	pc(s).	202
766 611	—	94 g	1	Sa	202
766 614	—	600 g	1	pc(s).	189
766 616	1138	5.09 kg	1	pc(s).	41
766 617	1234	4.95 kg	1	pc(s).	41
766 618	—	25 g	1	pc(s).	202
766 619	—	600 g	1	pc(s).	204
766 677	—	1.4 kg	1	pc(s).	204
766 678	—	1.6 kg	1	pc(s).	204
766 703	—	5.03 kg	1	pc(s).	186
766 704	—	720 g	1	pc(s).	190
766 706	1075	800 g	1	pc(s).	46
766 710	1075	1.7 kg	1	pc(s).	46
766 720	1075	1.7 kg	1	pc(s).	46
766 888	—	63 g	1	pc(s).	198
766 889	—	172 g	1	pc(s).	198

Index of Part Nos.

Part No.	Instr. No.	Weight	VPE	VE	Page
766 913	—	42 g	1	pc(s).	194
766 915	—	220 g	1	pc(s).	194
766 916	—	125 g	1	pc(s).	196
766 923	—	84 g	1	pc(s).	194
766 924	—	46 g	1	pc(s).	194
766 925	—	10 g	1	pc(s).	194
766 927	—	15 g	1	pc(s).	194
766 940	—	145 g	1	pc(s).	197
766 941	—	150 g	1	pc(s).	197
766 950	—	339 g	1	pc(s).	197
766 960	—	310 g	1	pc(s).	196
766 996	—	4 kg	1	pc(s).	189
766 997	—	2.39 kg	1	pc(s).	187
766 998	—	3.36 kg	1	pc(s).	187
766 999	—	3.32 kg	1	pc(s).	187
767 101	1240	60 g	1	pc(s).	58
767 102	1240	62 g	1	pc(s).	58
767 106	—	375 g	1	pc(s).	187
767 107	—	880 g	1	pc(s).	187
767 110	1239	119 g	1	pc(s).	58
767 111	1259	190 g	1	pc(s).	59
767 112	1259	150 g	1	pc(s).	59
767 121	1281	150 g	1	pc(s).	60
767 122	1281	185 g	1	pc(s).	60
767 125	—	1.26 kg	1	pc(s).	27
767 129	—	400 g	1	pc(s).	204
767 131	—	6.2 kg	1	pc(s).	35
767 132	1260	640 g	1	pc(s).	61
767 133	1283	85 g	1	pc(s).	63
767 135	—	85 g	1	pc(s).	63
767 136	—	65 g	1	pc(s).	63
767 139	—	820 g	1	pc(s).	61
767 150	—	1.94 kg	1	pc(s).	62
767 403	1535	2.15 kg	1	pc(s).	37
767 406	1535	1.3 kg	1	pc(s).	37
767 410	1535	1.4 kg	1	pc(s).	37
767 413	1720	1.77 kg	1	pc(s).	39
767 415	1365	1.52 kg	1	pc(s).	39
767 416	1365	2.62 kg	1	pc(s).	38
767 418	1535	1.2 kg	1	pc(s).	37
767 420	1535	2.38 kg	1	pc(s).	37
767 428	1535	1.4 kg	1	pc(s).	37
767 430	1535	1.5 kg	1	pc(s).	37
767 433	1535	1.5 kg	1	pc(s).	38
767 438	1535	1.6 kg	1	pc(s).	37
767 500	—	280 g	1	pc(s).	61
767 542	1606	5.35 kg	1	pc(s).	44
767 552	1243	1.98 kg	1	pc(s).	45
767 564	—	464 g	1	pc(s).	204
767 565	1665	2.03 kg	1	pc(s).	43
767 571	1665	1.99 kg	1	pc(s).	43
767 572	1665	1.73 kg	1	pc(s).	43
767 573	1665	4.94 kg	1	pc(s).	43
767 574	—	500 g	1	pc(s).	189
767 576	—	214 g	1	pc(s).	204
767 577	—	380 g	1	pc(s).	204
767 591	—	809 g	1	pc(s).	204
767 592	—	465 g	1	pc(s).	204
767 593	—	471 g	1	pc(s).	204
767 637	—	2.1 kg	1	pc(s).	49
767 639	—	2.4 kg	1	pc(s).	49
767 645	—	2.6 kg	1	pc(s).	49
767 647	1121	2.1 kg	1	pc(s).	49
767 652	—	4.2 kg	1	pc(s).	48
767 656	—	4.2 kg	1	pc(s).	48
767 666	—	2.2 kg	1	pc(s).	48
767 671	—	2.6 kg	1	pc(s).	48
767 701	—	5.7 kg	1	pc(s).	186
767 703	1598	1.01 kg	1	pc(s).	27
767 706	1598	1.01 kg	1	pc(s).	27
767 710	1598	1.01 kg	1	pc(s).	27
767 711	1598	1.16 kg	1	pc(s).	27
767 712	—	37 g	1	pc(s).	202
767 713	—	44 g	1	pc(s).	202
767 720	1598	1.07 kg	1	pc(s).	27
767 721	1598	1.23 kg	1	pc(s).	27
767 722	—	474 g	1	pc(s).	204
767 724	1598	4.22 kg	1	pc(s).	32
767 725	1598	9.1 kg	1	pc(s).	32
767 726	—	235 g	1	pc(s).	204
767 730	1598	1.13 kg	1	pc(s).	27
767 731	1598	1.29 kg	1	pc(s).	27
767 732	—	589 g	1	pc(s).	204
767 733	1598	1.29 kg	1	pc(s).	27
767 734	—	420 g	1	pc(s).	204
767 735	—	589 g	1	pc(s).	204
767 740	1598	1.45 kg	1	pc(s).	28
767 750	1598	1.51 kg	1	pc(s).	28
767 760	—	177 g	1	pc(s).	203
767 761	—	282 g	1	pc(s).	203
767 762	—	353 g	1	pc(s).	203
767 763	—	529 g	1	pc(s).	203
767 764	—	506 g	1	pc(s).	203
767 766	—	129 g	1	pc(s).	203
767 767	—	440 g	1	pc(s).	195
767 768	—	445 g	1	pc(s).	195
767 771	—	600 g	1	pc(s).	203
767 772	—	280 g	1	pc(s).	203
767 776	—	58 g	1	pc(s).	202
767 777	—	46 g	1	pc(s).	202
767 778	—	3 g	1	pc(s).	202
767 779	—	3 g	1	pc(s).	202
767 903	1598	992 g	1	pc(s).	27
767 906	1598	992 g	1	pc(s).	27
767 910	1598	992 g	1	pc(s).	27
767 920	1598	1.1 kg	1	pc(s).	27
767 921	1788	1.65 kg	1	pc(s).	30
767 922	1788	1.07 kg	1	pc(s).	30
767 930	1598	1.17 kg	1	pc(s).	27
767 931	1788	1.08 kg	1	pc(s).	30
767 932	1788	1.07 kg	1	pc(s).	30
767 940	1598	1.39 kg	1	pc(s).	28
767 941	1598	1.17 kg	1	pc(s).	27
767 950	1598	1.44 kg	1	pc(s).	28
767 951	1598	1.26 kg	1	pc(s).	27
767 960	1598	1.32 kg	1	pc(s).	28
767 961	1598	1.32 kg	1	pc(s).	27
767 963	—	400 g	1	pc(s).	204
767 965	—	474 g	1	pc(s).	204
767 970	1598	5.8 kg	1	pc(s).	33
767 972	—	575 g	1	pc(s).	204
767 974	—	575 g	1	pc(s).	204
767 975	1598	5.42 kg	1	pc(s).	33
767 980	1598	5.98 kg	1	pc(s).	33
767 981	1598	5.66 kg	1	pc(s).	34
767 982	1598	7.4 kg	1	pc(s).	34
767 983	1598	6.38 kg	1	pc(s).	35
767 984	1598	6.2 kg	1	pc(s).	36
767 996	—	2.3 kg	1	pc(s).	189
767 997	—	2.42 kg	1	pc(s).	187
767 999	—	3.4 kg	1	pc(s).	187
769 300	1707	2.8 kg	1	pc(s).	98
769 352	1707	4.8 kg	1	pc(s).	100
769 400	1707	3.68 kg	1	pc(s).	98
769 500	1707	4.68 kg	1	pc(s).	98
769 502	1707	5.6 kg	1	pc(s).	100
769 503	1707	1.64 kg	1	pc(s).	99
769 504	1707	1.6 kg	1	pc(s).	99
769 505	1707	1.46 kg	1	pc(s).	99
769 506	1707	6.5 kg	1	pc(s).	100
769 508	1707	4.5 kg	1	pc(s).	100
769 509	—	358 g	1	pc(s).	190
770 001	—	753 g	1	m	81
771 316	1011	418 g	1	pc(s).	84
772 310	1011	469 g	1	pc(s).	83
772 311	—	482 g	1	pc(s).	83
772 312	—	480 g	1	pc(s).	92
772 313	1011	400 g	1	pc(s).	92
772 314	1011	446 g	1	pc(s).	88
772 320	1011	785 g	1	pc(s).	83
772 321	—	756 g	1	pc(s).	83
772 322	—	747 g	1	pc(s).	92
772 323	1011	876 g	1	pc(s).	92
772 324	1011	719 g	1	pc(s).	88
772 330	—	560 g	1	pc(s).	83
772 331	—	566 g	1	pc(s).	83
772 340	—	878 g	1	pc(s).	83
772 341	—	902 g	1	pc(s).	83
773 034	—	634 g	1	pc(s).	84
773 130	—	801 g	1	pc(s).	84
773 234	—	661 g	1	pc(s).	84
773 236	—	714 g	1	pc(s).	88
773 251	1011	901 g	1	pc(s).	94
773 330	—	830 g	1	pc(s).	84
773 331	1011	793 g	1	pc(s).	88
774 034	1011	662 g	1	pc(s).	91
774 130	1011	780 g	1	pc(s).	91
774 234	—	772 g	1	pc(s).	92
774 251	1011	955 g	1	pc(s).	94
774 330	1011	941 g	1	pc(s).	92
774 434	—	712 g	1	pc(s).	92

Index of Part Nos.

Part No.	Instr. No.	Weight	VPE	VE	Page
774 530	1011	700 g	1	pc(s).	92
775 621	1011	311 g	1	pc(s).	92
775 626	1011	343 g	1	pc(s).	92
775 631	1011	290 g	1	pc(s).	92
775 636	1011	350 g	1	pc(s).	92
781 000	—	12 kg	1	pc(s).	171
781 010	—	516 g	1	pc(s).	171
781 020	—	1.36 kg	1	pc(s).	171
781 030	—	1.4 kg	1	pc(s).	171
781 040	65332	894 g	1	pc(s).	173
781 060	65332	906 g	1	pc(s).	173
781 080	65332	270 g	1	pc(s).	173
781 085	65332	383 g	1	pc(s).	173
781 090	65332	230 g	1	pc(s).	173
781 100	—	355 g	1	pc(s).	172
781 110	—	105 g	1	pc(s).	172
781 130	—	67 g	1	pc(s).	172
781 150	—	94 g	1	pc(s).	172
781 170	—	104 g	1	pc(s).	172
781 190	—	167 g	1	pc(s).	172
781 220	—	12.97 kg	1	pc(s).	172
781 230	—	18.9 kg	1	pc(s).	171
784 032	1011	969 g	1	pc(s).	86
784 038	1011	1.01 kg	1	pc(s).	86
784 085	1011	872 g	1	pc(s).	86
784 201	1011	880 g	1	pc(s).	86
784 301	1011	1.7 kg	1	pc(s).	86
784 352	1011	806 g	1	pc(s).	89
784 401	1011	1.3 kg	1	pc(s).	86
784 461	1649	1.28 kg	1	pc(s).	87
784 463	1649	1.62 kg	1	pc(s).	87
784 480	1011	600 g	1	pc(s).	86
784 490	1011	533 g	3	pc(s).	87
784 501	1011	1.95 kg	1	pc(s).	86
784 755	1011	1.54 kg	1	pc(s).	89
785 100	1224	18 kg	1	pc(s).	140
785 109	—	504 g	1	pc(s).	146
785 111	—	612 g	1	pc(s).	190
785 112	1224	17.8 kg	1	pc(s).	140
785 119	—	700 g	1	pc(s).	147
785 120	—	700 g	1	pc(s).	143
785 121	—	110 g	1	pc(s).	143
785 122	—	220 g	1	pc(s).	143
785 123	—	430 g	1	pc(s).	143
785 130	—	130 g	1	pc(s).	143
785 131	—	160 g	1	pc(s).	143
785 132	—	150 g	1	pc(s).	143
785 140	—	340 g	1	pc(s).	144
785 150	—	320 g	1	pc(s).	144
785 151	—	260 g	1	pc(s).	144
785 160	—	90 g	1	pc(s).	144
785 170	—	255 g	1	pc(s).	144
785 171	—	105 g	1	pc(s).	144
785 172	—	100 g	1	pc(s).	144
785 180	—	150 g	1	pc(s).	146
785 181	—	250 g	1	pc(s).	146
785 190	—	389 g	1	pc(s).	146
785 200	—	180 g	1	pc(s).	145
785 210	—	260 g	1	pc(s).	146
785 212	—	71 g	1	pc(s).	145
785 213	—	320 g	1	pc(s).	147
785 214	—	320 g	1	pc(s).	147
785 215	—	320 g	1	pc(s).	147
785 216	—	320 g	1	pc(s).	147
785 217	—	320 g	1	pc(s).	147
785 218	—	320 g	1	pc(s).	147
785 219	—	320 g	1	pc(s).	147
785 220	—	82 g	1	pc(s).	144
785 221	—	200 g	1	pc(s).	144
785 223	—	290 g	1	pc(s).	144
785 224	—	11 g	1	Sa	146
785 229	—	6 kg	1	pc(s).	143
785 259	—	94 g	1	pc(s).	145
785 260	1396	21.5 kg	1	pc(s).	149
785 261	1396	760 g	1	pc(s).	149
785 264	1396	2.5 kg	1	pc(s).	149
785 265	1444	7.29 kg	1	pc(s).	151
785 266	1444	709 g	1	pc(s).	151
785 267	1444	291 g	1	pc(s).	151
785 268	1444	293 g	1	pc(s).	151
785 269	1444	292 g	1	pc(s).	151
785 271	1444	17 g	1	pc(s).	151
785 272	1444	21 g	1	pc(s).	151
785 273	1444	270 g	1	pc(s).	151
785 274	—	33 g	1	Sa	145
785 275	—	63 g	1	Sa	145
785 279	—	68 g	1	Sa	145
785 280	—	60 g	1	Sa.	145
785 281	—	15 g	12	pc(s).	152
785 282	—	7 g	12	pc(s).	152
785 283	—	8 g	12	pc(s).	152
785 284	—	7 g	12	pc(s).	152
785 295	—	2.5 kg	1	pc(s).	149
785 298	—	3.41 kg	1	pc(s).	151
785 299	—	5.4 kg	1	pc(s).	149
785 301	—	6 kg	1	pc(s).	143
785 310	—	12.7 kg	1	pc(s).	147
785 315	—	632 g	1	pc(s).	143
785 316	—	95 g	1	pc(s).	143
785 317	—	130 g	1	pc(s).	143
785 318	—	152 g	1	pc(s).	143
785 319	—	247 g	1	pc(s).	143
785 320	—	88 g	1	pc(s).	144
785 321	—	97 g	1	pc(s).	144
785 322	—	132 g	1	pc(s).	145
785 323	—	182 g	1	pc(s).	145
785 324	—	89 g	1	pc(s).	145
785 325	—	600 g	1	pc(s).	143
785 408	1622	9.8 kg	1	pc(s).	159
785 427	1767	300 g	1	pc(s).	156
785 440	1622	2.25 kg	1	pc(s).	159
785 441	1622	2.2 kg	1	pc(s).	159
785 442	—	280 g	1	pc(s).	191
785 443	—	520 g	1	pc(s).	191
785 445	1622	1.07 kg	1	pc(s).	159
785 455	—	3.6 kg	1	pc(s).	161
785 456	—	3.6 kg	1	m	161
785 457	—	36 kg	1	pc(s).	161
785 458	—	5.8 kg	1	m	160
785 459	—	56 kg	1	pc(s).	160

Index of Part Nos.

Part No.	Instr. No.	Weight	VPE	VE	Page
785 465	—	41.5 kg	1	pc(s).	160
785 466	—	830 g	1	m	160
785 467	—	38 kg	1	pc(s).	160
785 468	—	1.64 kg	1	m	160
785 471	—	20 kg	1	pc(s).	161
785 472	—	1.95 kg	1	m	161
785 490	—	240 g	1	pc(s).	157
785 491	—	140 g	1	Pa	157
785 492	—	140 g	1	Pa	157
785 493	—	160 g	1	Pa	157
785 494	—	160 g	1	Pa	157
785 495	—	290 g	1	Pa	157
785 496	—	290 g	1	Pa	157
785 497	—	660 g	1	pc(s).	157
785 502	1261	7.2 kg	1	pc(s).	137
785 506	—	5.3 kg	1	pc(s).	137
785 515	—	68 g	1	pc(s).	138
785 520	—	240 g	1	pc(s).	137
785 521	—	107 g	1	pc(s).	137
785 522	—	157 g	1	pc(s).	137
785 523	—	211 g	1	pc(s).	137
785 530	—	118 g	1	pc(s).	137
785 540	—	100 g	1	pc(s).	137
785 541	—	41 g	1	pc(s).	137
785 542	—	42 g	1	pc(s).	137
785 543	—	43 g	1	pc(s).	138
785 550	—	104 g	1	pc(s).	138
785 551	—	34 g	1	pc(s).	144
785 552	—	47 g	1	pc(s).	144
785 555	—	100 g	1	pc(s).	138
785 560	—	52 g	1	pc(s).	137
785 570	—	47 g	1	pc(s).	138
785 580	—	48 g	1	pc(s).	138
785 585	—	21 g	1	pc(s).	146
785 585	—	21 g	1	pc(s).	138
785 590	—	50 g	1	pc(s).	137
785 591	—	47 g	1	pc(s).	137
785 592	—	50 g	1	pc(s).	147
785 595	—	15 g	1	Sa	138
785 596	—	18 g	1	Sa	138
785 637	—	14 g	10	pc(s).	21
785 638	—	6 g	10	pc(s).	21
785 639	—	15 g	10	pc(s).	21
785 640	—	55 g	10	pc(s).	21
785 641	—	55 g	10	pc(s).	21
785 642	—	75 g	10	pc(s).	21
785 643	—	80 g	10	pc(s).	21
785 644	—	80 g	10	pc(s).	21
785 645	—	420 g	1	pc(s).	156
785 646	—	760 g	1	pc(s).	161
785 647	—	73 g	1	pc(s).	161
785 648	—	19 g	1	pc(s).	161
785 649	—	2 g	1	pc(s).	161
785 650	—	22 g	10	pc(s).	21
785 652	—	9 g	10	pc(s).	21
785 740	1767	336 g	1	pc(s).	169
785 741	1767	336 g	1	pc(s).	169
785 742	1767	336 g	1	pc(s).	169
785 743	1767	336 g	1	pc(s).	169
785 744	1767	336 g	1	pc(s).	169
785 746	1767	379 g	1	pc(s).	169
785 747	1767	379 g	1	pc(s).	169
785 748	1767	388 g	1	pc(s).	169
785 749	1767	388 g	1	pc(s).	169
785 751	1858	16 g	1	pc(s).	169
785 755	1813	2.35 kg	1	pc(s).	167
785 756	1813	2.5 kg	1	pc(s).	167
785 757	1813	2.7 kg	1	pc(s).	167
785 769	1813	1.67 kg	1	pc(s).	166
785 770	1813	1.71 kg	1	pc(s).	166
785 771	1813	1.86 kg	1	pc(s).	166
785 772	1813	1.89 kg	1	pc(s).	166
785 773	1813	1.9 kg	1	pc(s).	166
785 774	1813	1.94 kg	1	pc(s).	166
785 775	1813	1.96 kg	1	pc(s).	166
785 779	1813	1.49 kg	1	pc(s).	166
785 780	1813	1.54 kg	1	pc(s).	166
785 781	1813	1.63 kg	1	pc(s).	166
785 782	1813	1.66 kg	1	pc(s).	166
785 783	1813	1.76 kg	1	pc(s).	166
785 784	1813	1.8 kg	1	pc(s).	166
785 785	1813	2.04 kg	1	pc(s).	166
785 788	—	112 g	1	pc(s).	167
785 789	1813	75 g	1	Pa	167
785 796	1680	200 g	1	Pa	164
785 797	1680	200 g	1	Pa	164
785 798	1680	200 g	1	Pa	164
785 799	1680	200 g	1	Pa	164
785 800	1680	200 g	1	Pa	164
785 940	1379	10.85 kg	1	pc(s).	141
785 950	1508	27.3 kg	1	Stk	142
785 951	—	21.2 kg	1	pc(s).	143
785 952	—	1.43 kg	1	pc(s).	143
785 953	—	121 g	1	pc(s).	146
790 150	1011	450 g	1	pc(s).	93
790 160	1011	737 g	1	pc(s).	93
790 250	—	193 g	1	pc(s).	74
790 251	—	248 g	1	pc(s).	74
790 260	—	180 g	1	pc(s).	74
790 261	—	277 g	1	pc(s).	74
792 030	1011	610 g	1	pc(s).	93
792 190	1011	1.2 kg	1	pc(s).	93
792 450	1011	2.95 kg	1	pc(s).	94
792 453	1011	2.95 kg	1	pc(s).	94
795 001	—	1 kg	1	m	81
795 040	—	890 g	1	pc(s).	113
795 213	1011	114 g	1	pc(s).	114
795 214	1011	118 g	1	pc(s).	114
799 006	—	4 kg	1	pc(s).	90
799 009	—	5.1 kg	1	pc(s).	90
799 019	—	328 g	1	pc(s).	90
923 110	1373	40 g	10	pc(s).	178
923 116	1372	42 g	10	pc(s).	178
923 117	1418	42 g	10	pc(s).	178
923 118	1513	38 g	10	pc(s).	178
923 119	1514	39 g	10	pc(s).	180

Index of Types

Index of Types

Index of Types

Index of Types

Key Words

Surge Protection
Lightning Protection
Safety Equipment
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