

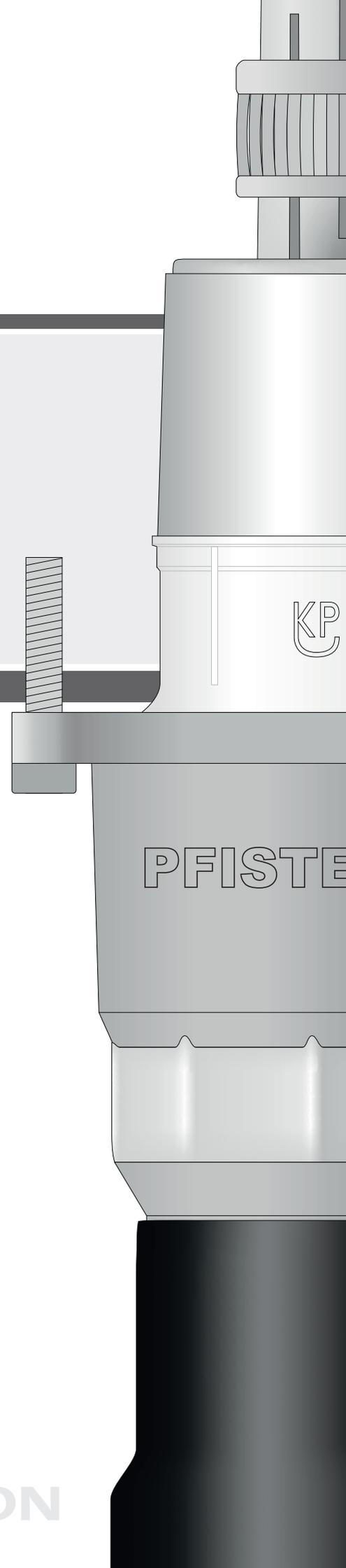
PFISTERER

MV-CONNEX Size 3 + 3-S wire screen

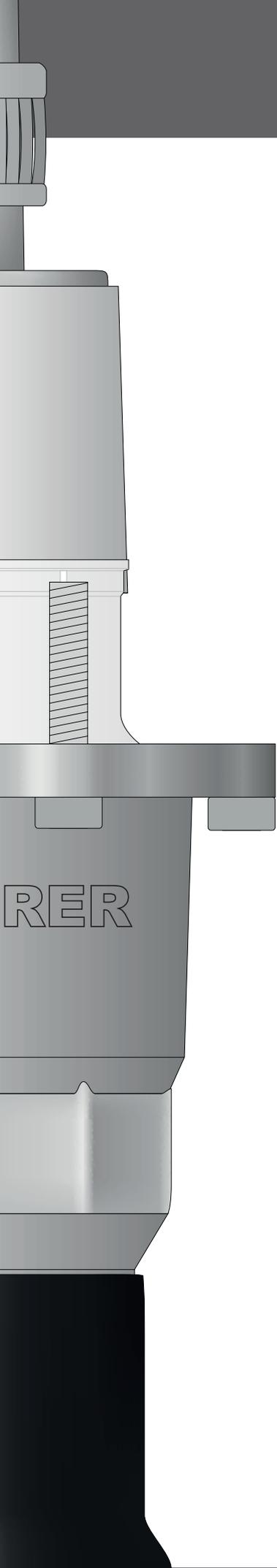
INSTALLATION INSTRUCTIONS

Inner cone

Take note of any additional instructions
prior to installation!!!



THE POWER CONNECTION



PFISTERER

1 Introduction

MV-CONNEX. The dry pluggable connection system for medium voltage networks.

CONNEX products provide an all-purpose plug-in connection system, which is fully insulated, metal-enclosed and touch-proof. It is also maintenance-free, suitable for outdoor use and waterproof. CONNEX can even be used under extreme conditions.

The MV-CONNEX range for medium voltage networks features a wealth of variants. In addition to the classic plug - socket combination, the program includes multiple sockets, busbar connectors, surge arresters, variants for the production of branching points above or below ground, motor connections and test fixtures.

With their simple installation, factory tested MV-CONNEX components speak for themselves. Working in difficult oil and gas environments during installation and commissioning of transformers and switchgear is no longer required.

Silicone – a key material in medium voltage engineering.

Water, dirt, grease and oil resistant, completely maintenance-free, impact-resistant and durable: Silicone is the ideal material for cable terminations and far superior to conventional materials. When used as a stress relief device in sealed applications, silicone performs much better than harder materials such as EPDM because it helps to even out temperature variations and unevenness in the cable surface. Silicone helps to prevent air gaps, and therefore dangerous partial discharges are avoided. PFISTERER takes extensive advantage of advanced LSR (Liquid Silicone Rubber) designs and special variations are made using RTV (Room Temperature Vulcanizing silicone).

2 General Information

With MV-CONNEX you have a modern cable connector system. The socket is already built into the switchgear. In the following instructions, the installation of the pluggable connector is described and illustrated step by step. Please observe the sequence of steps during the installation. Installation should be carried out by fitters who have been trained by PFISTERER.

2.1 Information regarding the installation instructions

These assembly instructions describe the safe and proper use of the product described. The specified warnings and instructions, and the applicable local accident prevention regulations must be observed together with general safety regulations.

Before starting work on the product, read the installation instructions all the way through, particularly the chapter on safety and specific safety precautions. It is vital that what is read is understood. The installation instructions are a part of the product. It must be kept available and accessible in the immediate vicinity of the product (e.g. control room, switch room) at all times.

2.2 Contents of the installation instructions

Any person who is tasked to perform work on or with the product must have read and understood the installation instructions before commencing the work. This is the case even if the person has already worked with this or a similar product or has been trained by the manufacturer. Knowing the contents of the installation instructions is one of the requirements for the protection of personnel from hazards and the avoidance of mistakes, and to operate the product safely and in a trouble-free manner. The operator is recommended to ensure that staff can demonstrate that they have taken note of the contents of these installation instructions.

2.3 Additional installation instructions

Depending on the scope of delivery (e.g. special versions or additional options that may have been ordered) these instructions may be supplemented by additional installation instructions, which must be observed and applied in the same way.

2.4 Copyright protection

These installation instructions are to be treated confidentially. It is exclusively intended for persons employed to use the product. All contents, text, drawings, images and other representations are protected under the Copyright Act and are subject to other intellectual property rights. Any misuse is punishable.

Any disclosure to third parties, including making copies of any type or in any form - even extracts - as well as the use and / or communication of the contents without written permission from the manufacturer is not allowed. Any infringements will lead to a claim for compensation. We reserve the right to assert further claims.

We reserve the right to exercise our intellectual property rights.

2.5 Liability and warranty

All information and data contained in these instructions were compiled taking account of the applicable standards and regulations, technological state-of-the-art and long standing expertise and experience.

These installation instructions are to be kept in the immediate vicinity of the product (e.g. the control room, switch room) and be accessible at all times to all persons who work on or with the product.

These installation instructions are to be read carefully before starting work on and with the product! The manufacturer accepts no liability for any damage or malfunction resulting from non-compliance with these installation instructions.

The text and illustrations do not necessarily represent the scope of delivery. The illustrations are not to scale. Due to fact that special versions or additional options may have been ordered, or innovative technical modifications may have been made, the actual scope of delivery can differ in some circumstances from the information and instructions described here. Pictorial representations may also differ. If you have any questions, please contact the manufacturer. We reserve the right to make technical modifications within the framework of improving performance characteristics and further development.

2.6 Guarantee

The warranty provisions are contained in the purchase agreement and the manufacturer's general terms and conditions.

The manufacturer shall make the final decision with a warranty claim as to whether the product or defective parts should be returned or a site visit is made.

2.7 Spare parts

Only use original spare parts from the manufacturer.

Where unapproved replacement parts are used, all warranty, service, compensation and liability claims against the manufacturer or its agents, distributors and representatives are no longer valid.

3 Safety

At the time of its development and manufacture, the product was built according to current, accepted rules of engineering and is safe to operate. However, the product can pose dangers if it is not used by professionally trained staff, or in an improper or unauthorised manner.

3.1 Intended use



Any use beyond the intended use and / or any other use of the product is prohibited and is considered not to be as intended. Any claims against the manufacturer and / or his authorised representative for damage resulting from improper use of the product are excluded. The operator is solely liable for all damages resulting from improper use.

Operational reliability can only be maintained if the product is used as intended. It may only be installed when the ambient temperature is within the range of **0 °C to 45 °C**. This refers to the preparation, laying or moving of the cable.

3.2 Changes and modifications to the product

To avoid hazards and to ensure optimum performance, no changes nor extensions or alterations may be made to the product that are not expressly approved by the manufacturer.

3.3 Responsibility of the operator

The product may only be operated in a technically flawless and operationally reliable condition. The information given in the installation instructions must be followed in its entirety!

In addition to the safety precautions and instructions given in this installation manual applicable to the area of use of the product, local accident prevention regulations and general safety must be observed and followed as well as regulations for the protection of the environment.

The operator and personnel authorised by him are responsible for trouble-free operation of the product and for clear definitions of the responsibilities for installation and repair of the product.

3.4 Risks that may arise from the use of the product

The product has been subjected to a risk analysis. The construction and design of the product resulting from this work is state of the art. The product is operationally reliable when used for its intended purpose. However, a residual risk remains! The product works with high voltages.



Risk of electrocution!
Electrical power can cause very serious injury.
If the insulating part or components are damaged, there is a risk of fatal injury from the electrical current.

Before starting work on electrical systems, note the following:

- 1 Isolate from the power supply.
- 2 Secure to prevent reconnection.
- 3 Check that the power is off.
- 4 Earth and short circuit.
- 5 Cover or make inaccessible adjacent live parts.

3.5 Safety in the workplace

Following the warnings and instructions given in this installation manual can prevent personal injury and damage to property while working with and on the product. Failure to follow these instructions may result in danger to persons and damage to or destruction of the product. Failure to follow the warnings and instructions given in this installation manual or the accident prevention regulations applicable to the application, together with general safety regulations, shall void any liability and claims for damages against the manufacturer or his authorised representative.

3.6 Personnel requirements



Only personnel that are authorised and trained by the manufacturer should operate the product. Staff will receive a certificate of training from the manufacturer. The certificate has a validity of 5 years.

Skilled personnel means those who, due to their technical training, knowledge, experience and understanding of the regulations that apply to the work assigned to them, can identify possible hazards. The responsibilities working on and with the product (installation, maintenance) must be clearly defined and adhered to, so that there is no lack of clarity as regards safety when it comes to the division of responsibilities. Only persons may work on and with the product who can be expected to do their job reliably. Do not perform any activity that may affect the safety of persons, the environment or the product.

Persons who are under the influence of drugs, alcohol or medication that affects their reactions are not allowed to work on and with the product under any circumstances.

When selecting personnel, the age and profession-specific regulations in force at the location where the product is used must be observed.

The personnel are obliged to immediately report any changes that occur in the product that may affect the safety of the operator.

3.7 Personal protective equipment (PPE)

During work on and with the product, the following must always be worn:



Protective clothing, tight-fitting work clothing (low tear resistance, no long sleeves, no rings or other jewelry, etc.).



Safety shoes for protection against heavy falling objects and slipping on a non-slip surface.

When working in high risk areas (depending on local conditions):



Helmet for protection from falling and flying parts and materials.

When carrying out cleaning and lubricating work, the following are to be worn:



Gloves to protect the skin against contact with hazardous substances.



Safety glasses to protect the eyes from liquids.

3.8 Warnings



In this installation manual, warnings are also indicated by warning symbols.

4 Transport / Storage

4.1 Scope of delivery

Check the package contents against the packing list to ensure it is complete. If anything is missing, contact the manufacturer immediately. Please refer to the Terms and Conditions of Sale and Delivery.

After the product has been delivered, immediately report any damage due to faulty packaging or transport to the carrier, the insurer and the supplying factory. Take steps to mitigate any damage that has already occurred and prevent any further damage.

4.2 Packaging

The predominant packaging materials are wood, cardboard and plastics (films, foams). Packing materials include materials which are included in the package to protect from moisture (e.g. silica gel bags).

If no agreement to the contrary has been made regarding the return of the packaging material, the packaging material remains with the customer.

Disposal must be environmentally sound and in accordance with the relevant waste disposal regulations. If necessary, hire a waste management company to dispose of the packaging material.

4.3 Storage



After unloading, the packages must be stored until installation. The product must not be unpacked!

The following rules apply for storage:

- Store in dry conditions. Maximum relative humidity: 60 %.
Ensure that the packages are not stored outdoors.
In addition, ensure that the floor of the storage area is dry during the storage period.
- Protect from direct sunlight.
Storage temperature -5 to 50 °C.
- Store in dust-free conditions.
- Avoid mechanical shock and damage.

4.4 Storage Time



For longer storage periods of over about 3 months check the measures taken to preserve the product. If aggressive weather conditions prevail, the protective materials may need to be replaced.

The storage time is generally not limited. However, consumables such as tapes, specialty lubricants and silver for the replication of a semi-conductive layer should be replaced two years after production date.

4.5 Disposal

If no return or disposal agreement has been made, disassembled components should be disposed of as below:

- Scrap the metallic materials.
- Send plastic elements to plastic recycling.
- Sort and dispose of remaining components according to material type.



Lubricants and other additives are subject to special waste treatment and may only be disposed of by authorised companies!

5 Installation Accessories

Special tools are required for assembly and disassembly.

5.1 Tools required



Name	Item No.	Description
Hydraulic compression tool	827 017 002	For axially pressing or pulling of the contact ring.
Compression head Size 3	305 675 003	Including pull out insert for hydraulic hand-held crimping pliers.
Impact head Size 3	559 214 003	For pre-assembly of the contact ring.
T-handle screwdriver SW 6	563 376 002	To tighten or loosening the screws of the CONNEX separable connector.

5.2 Recommended tools and accessories



Name	Item No.	Description
Insulation removal pliers	305 051 051	For longitudinal and radial cutting of the insulation to expose the conductor Ø 15 – 45 mm.
Replacement blades	305 063 063	
Peeling tools and outer jacket cutter - set XLPE - area 15 - 49 mm	827 951 001	For removal of the outer jacket, bonded semi-conductive layer and to chamfer the insulation.
Assembly socket Size 3	827 174 004	For pre-assembly of CONNEX cable terminal heads (e.g. in the workshop).

Name	Item No.	Description
Protection cap Size 3 (metal)	827 134 003	For protection of unplugged CONNEX cable terminal heads against damage and dirt (not voltage proof).
Blind cap Size 3	827 131 003	Contact protection for live CONNEX cable terminal heads.
Transport case (empty)	305 768 001	For keeping tools.
Pull off aid	827 229 001	For easy unplugging of CONNEX cable terminal heads.



5.3 Recommended tools and accessories as a complete set

Name	Item No.	Description
Assembly tool for CONNEX cable terminal heads in case Size 3 Size 2-3 Size 1-3	305 768 003 305 768 006 305 768 004	Consisting of hydraulic handheld crimping pliers, press head, impact head, T-handle screwdriver, insulation removal pliers, replacement blade, chain, assembly lever, hole bar.

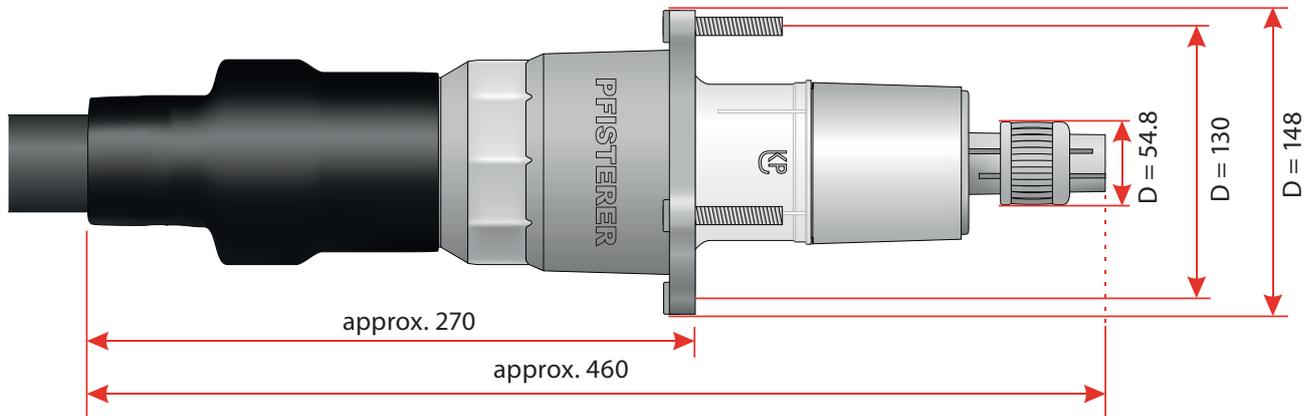


5.4 Round crimp tool and compression sleeves

Item No.	Code	Ø (mm)	Description
Crimping tool	Crimping tool	Outside diameter of compression sleeve	
300 632 632	HR 11	13.0	For round crimping the sleeves onto the fine wire conductors of the cable.
300 632 635	HR 16	18.5	
300 632 637	HR 20	22.5	
300 632 639	HR 22	25.0	
300 632 640	HR 25	28.5	
300 641 641	HR 28	32.0	
300 641 001	HR 32	36.5	

6 Technical Data / Configuration

6.1 Dimensions and weight(s)



Size 3 3-S		
Length, including heat-shrink tubing	[mm]	approx. 460
Outer diameter, max.	[mm]	148
Bolt circle	[mm]	130
Weight / Piece	[kg]	approx. 3.3
Contact ring	[mm]	55.8

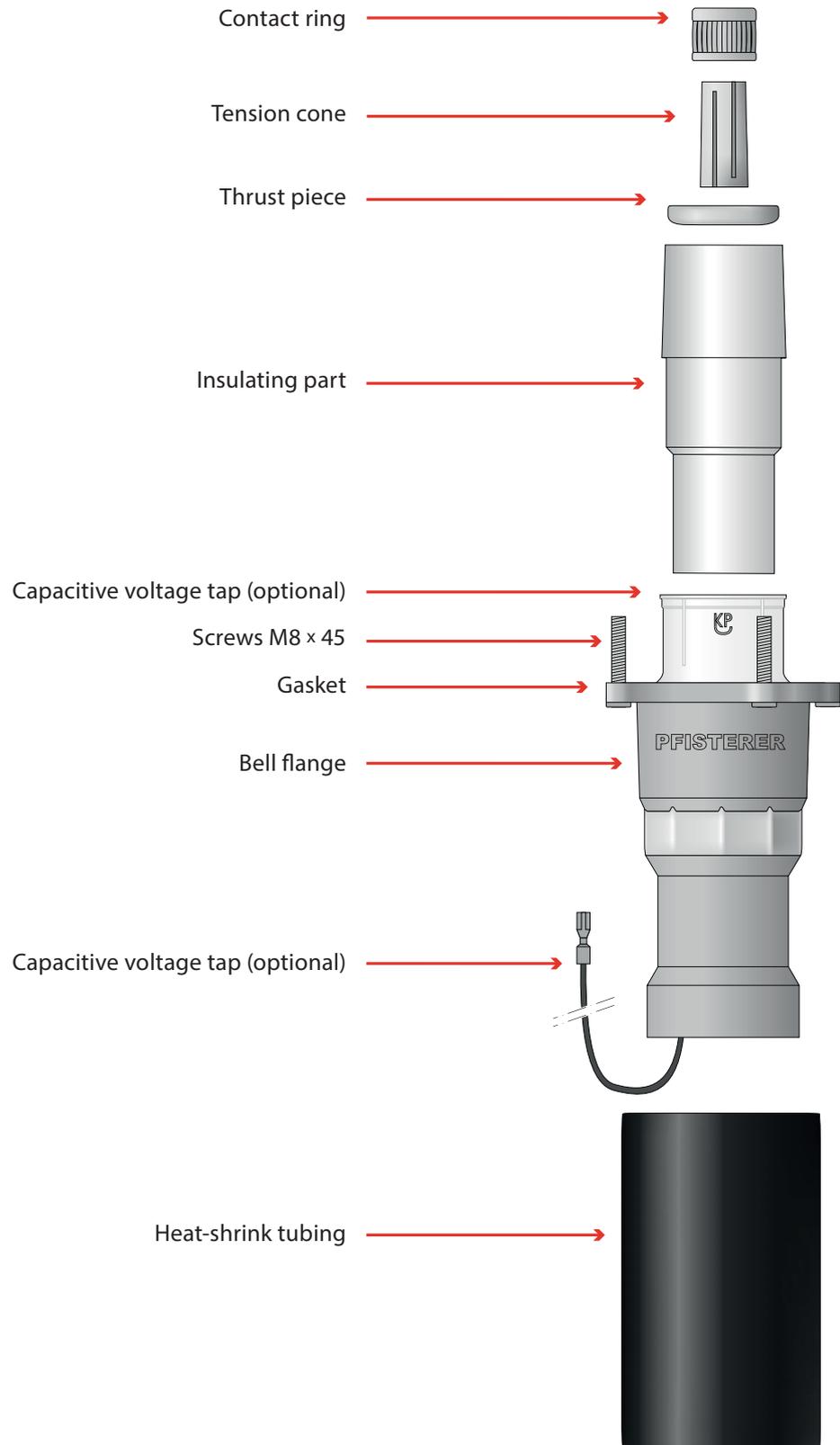
6.2 Cable data

With voltage tap			Size 3 3-S	
Conductor diameter* min. / max.	[mm]	6.1 / 36.0		
CSA, min. / max.	[mm ²]	35 / 800		
Diameter over insulation, min./max.	[mm]	15.5 / 46.0		

6.3 Characteristics

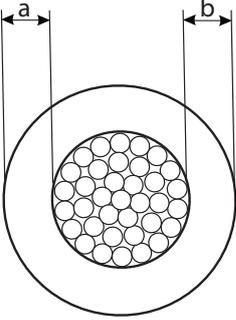
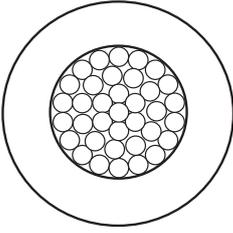
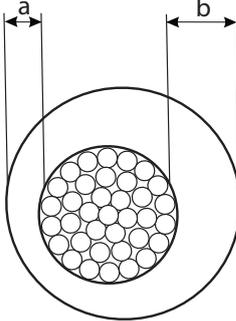
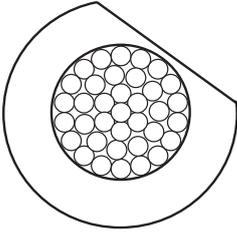
		Size 3	Size 3-S
Nominal current	I_n [A]	1250	1250
Max. operating voltage	U_m [kV]	42	52
Rated Withstand voltage	50 Hz/5 min [kV]	95	117
Rated lightning impulse	1.2/50 μ s [kV]	200	250
Partial discharge	$2 \times U_0$ [pC]	≤ 10	≤ 10
DC testing	15 min $6 \times U_0$ [kV]	125	156
Rated short time current	0.5 sec [kA]	63	63
	1 sec [kA]	50	50
Rated impulse current	[kA]	150	150

6.4 Configuration



7 Cable Quality

Check the eccentricity and any flattening of the cable using the following table.

Eccentricity	Flattening
 <p style="text-align: center;">✓</p>	 <p style="text-align: center;">✓</p>
<p>Maximum 15 % difference between thickest and thinnest point.</p> $0.85 \leq \frac{a}{b} \leq 1.15$ <p>The result must be within the following limits: Minimum: 0.85 Maximum: 1.15</p>	<p>No tolerance.</p> <p>No flattening allowed, the cable must be round.</p>
 <p style="text-align: center;">X</p>	 <p style="text-align: center;">X</p>

 Installation of the product where the above limits are not complied with may cause damage. If limits are exceeded, the cable must be reworked until it conforms to the tolerances specified. If this is not possible, the product should not be installed. In such cases, contact "PFISTERER Kontaktsysteme GmbH".

8 Installation / Assembly

8.1 Positioning

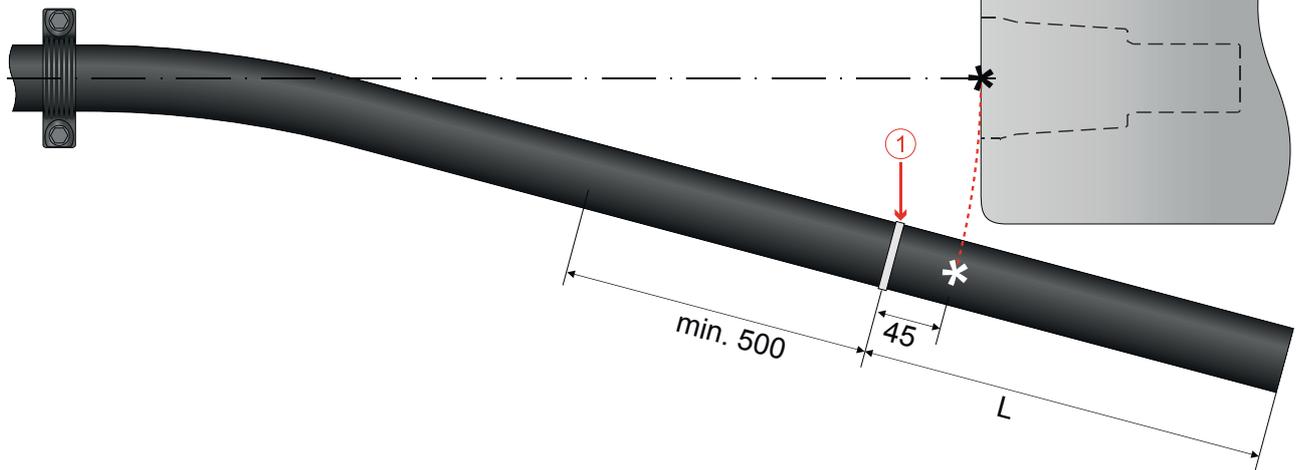
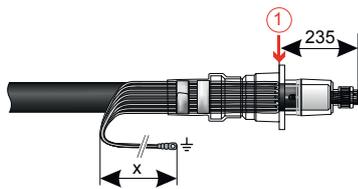


The installation is to be carried out in a clean and dry environment. The cable must be straightened 500 mm in front and behind the "jacket cut" (1). Only peel cable when it is straight. All dimensions in mm.

- 1 Mark the "jacket cut" (1) on the cable 45 mm below the socket.



In the case of cable with wire earth screen:
 $L = 235 \text{ mm} + x \text{ mm}$; however min. 400 mm
 $x =$ required length of the earth screen



8.2 Cable preparation

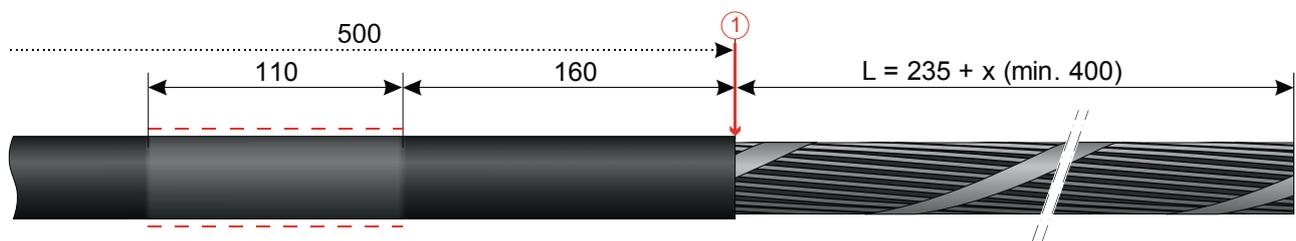
- 1 Remove outer jacket to "jacket cut" (1).

Recommended tools (see chapter 5.2, page 12):
 ▪ Peeling tool and outer jacket cutter set

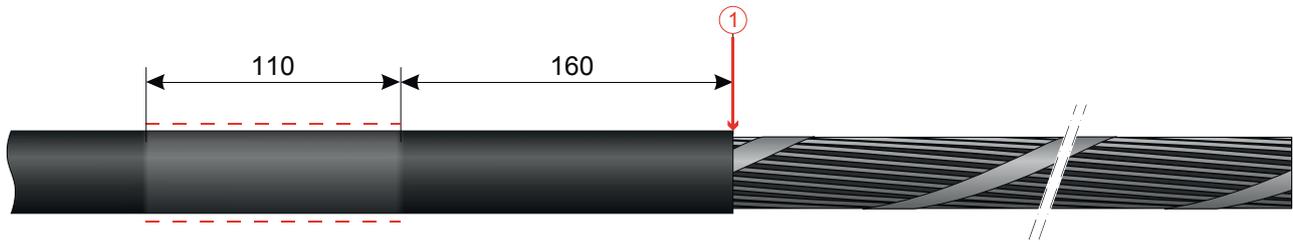
- 2 Roughen outer jacket over 110 mm in the shrinkage area with emery grit 60. - - -



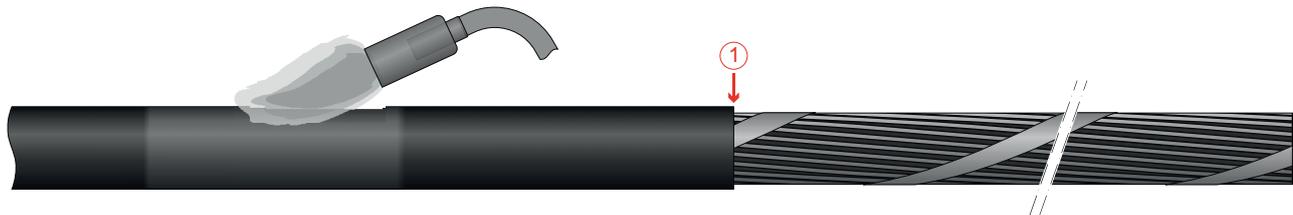
If the outer jacket is conductive, the conductive layer must be removed up to 500 mm behind the "jacket cut" (1) (e.g. by peeling, grinding, washing, ...).



3 Clean roughed area. - - -

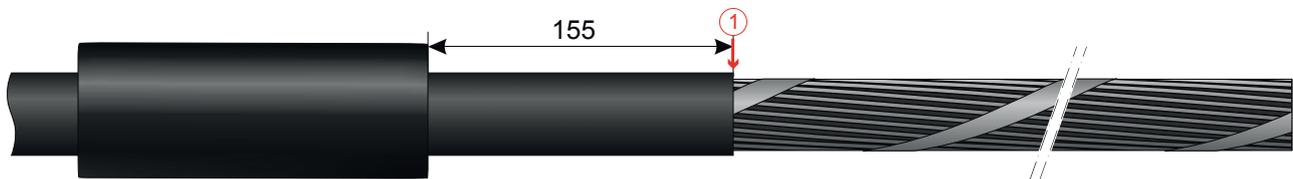


4 Flame the roughened area.

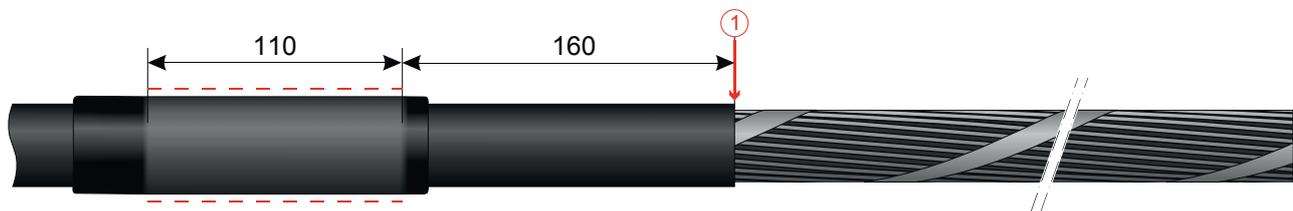


Only with cable < 38 mm outer diameter

5 Slide the smaller heat-shrink tubing over the cable to line it and shrink it on in the roughened area.

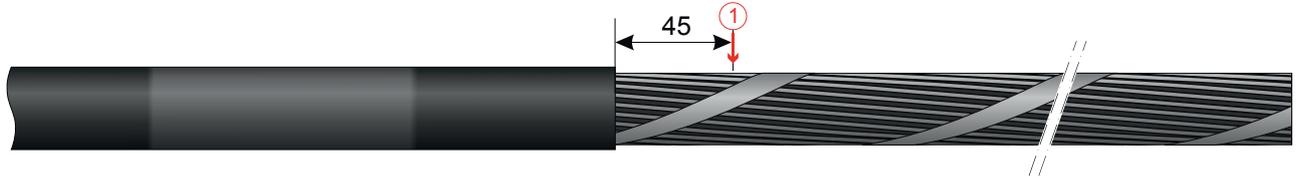


6 Again roughen the heat-shrink tubing in the shrinkage area with grit 60 emery over 110 mm. - - -



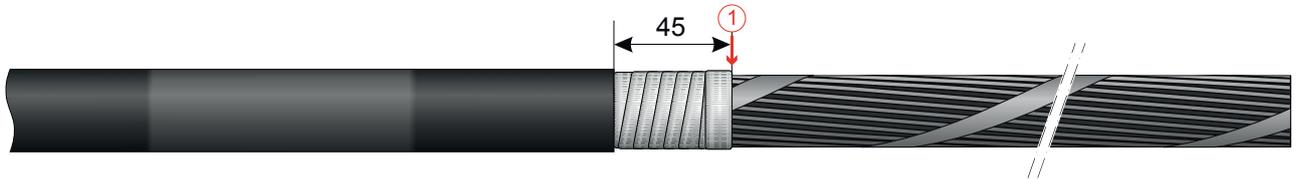
Only for cables with outer diameter > 58 mm

- 7 Remove outer jacket a further 45 mm behind the "jacket cut" (1).

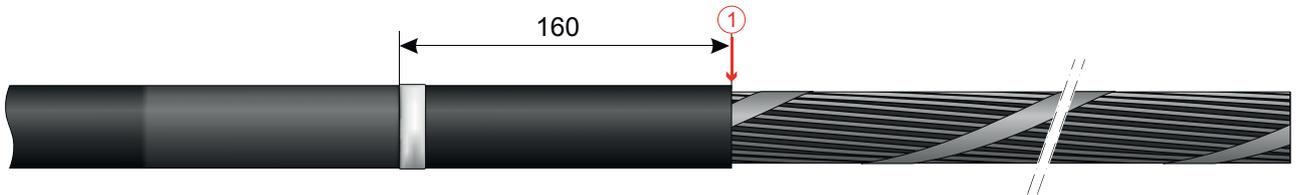


- 8 Apply woven insulating tape from the outer jacket for 40 mm to the "jacket cut" (1) with a 50 % overlap.

- 9 At the "jacket cut" (1), apply 2 – 3 more layers one on top of the other.

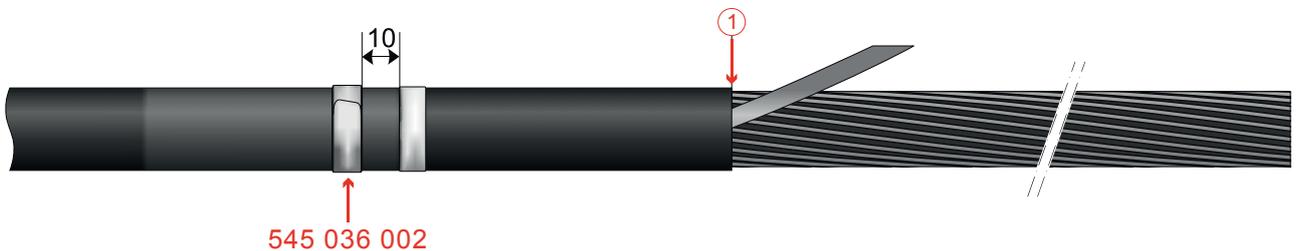


- 10 Apply the control mark 160 mm from the "jacket cut" (1).



- 11 Apply one layer of sealing tape 10 mm behind the control mark.

- 12 Remove balancing tape at the "jacket cut" (1).

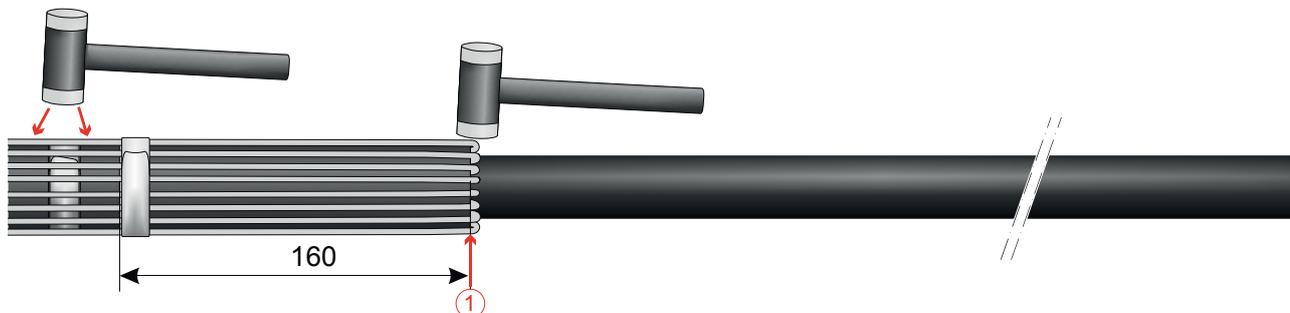


- 13 Fold back the screen wires and fix with insulating tape.

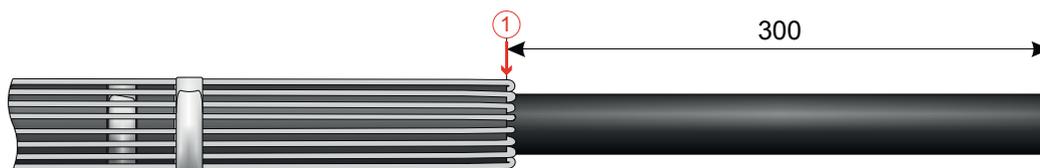


Fold the screen wires in parallel, without crossing over!
Important for water tightness.

- 14 Tap down screen wires on the "jacket cut" (1) and either side of the sealing tape.



- 15 Mark end of the cable 300 mm from the "jacket cut" (1) for a provisional cut and saw off straight with a hacksaw.



Only with peelable semi-conductive layer

- 16 In the section between 250 mm and 300 mm in front of the "jacket cut" (1) peel off samples of the semi-conductive layer. Then determine the difference between the semi-conductive layer and the peeled insulation layer using the enclosed measuring tape.



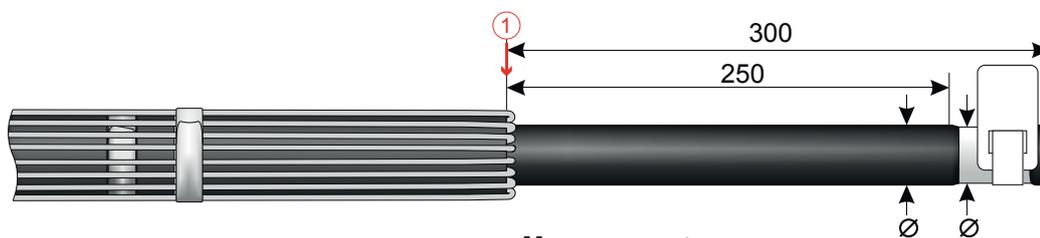
During the peeling process it is important to ensure that the semiconductor layer is completely removed and the insulation as little as necessary.

A difference of < 2 mm is considered to be a **normal** semi-conductive layer.

For follow-up instructions, see Step 17. page 22.

A difference of > 2 mm is considered to be a **thick** semi-conductive layer.

For follow-up instructions, see Chapter 8.8. page 36.

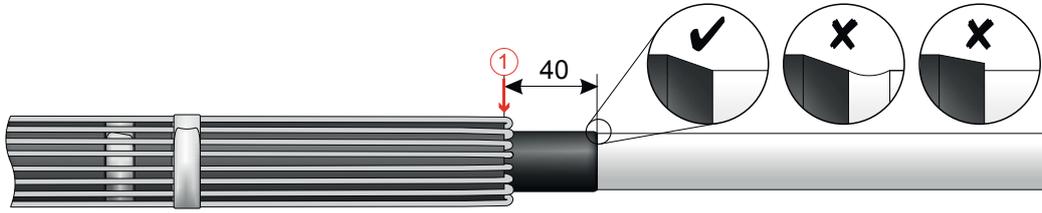


Measurement

$$\varnothing \text{ semi-conductive layer} - \varnothing \text{ insulation} = \varnothing \text{ difference}$$

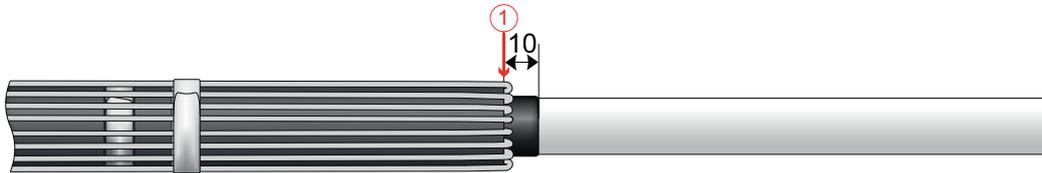
Only with a normal (< 2 mm) peelable semi-conductive layer

17 Peel semi-conductive layer using the peeling tool to 40 mm in front of the "jacket cut" (1). (Note instructions for the peeling tool.)

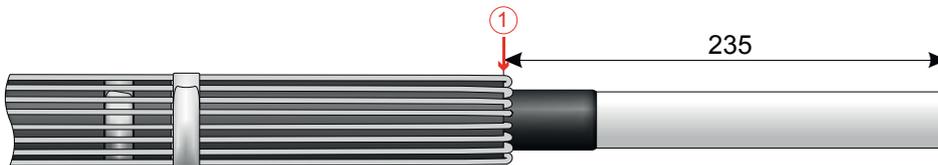


Only with strippable semi-conductive layer

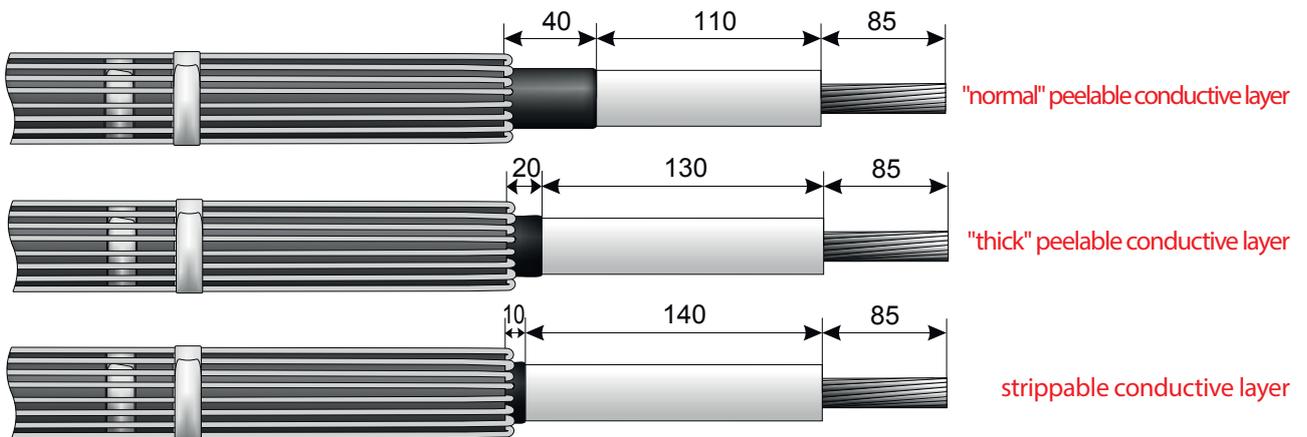
18 Remove strippable semi-conductive layer 10 mm from "jacket cut" (1).



19 Mark the cable 235 mm in front of the "jacket cut" (1) and saw off straight with a hacksaw - **do not use cable cutters!**



20 Remove 85 mm of the insulation to expose the conductor.



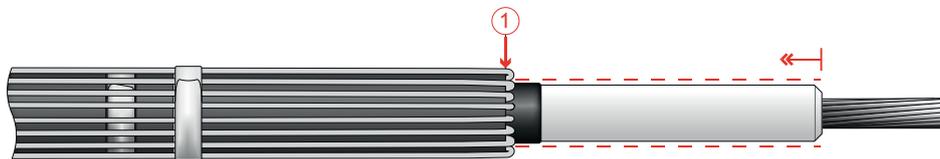
21 Chamfer the insulation edge.



Only with a thick (> 2 mm) peelable semi-conductive layer

Or with strippable semi-conductive layer

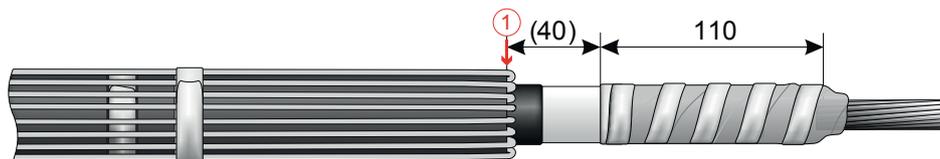
22 Clean the area - - - towards the "jacket cut" (1).



23 Apply adhesive tape 110 mm from the beginning of the insulation. Ensure the edge is straight and clean. Provide insulation in the direction of the conductor with protective wrapping.



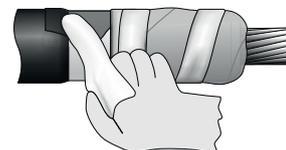
Do not roughen the surface!



24 Apply an additional conductive layer of dry graphite that forms a good covering - approx. 40 mm - on the semi-conductive layer and insulation. Take care to ensure insulation length of 110 mm is achieved.



Remove excess graphite!

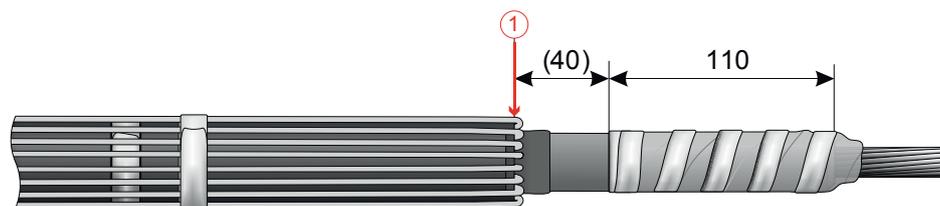


OR with some fine wire stranded conductors (RF) / customer specific use instead of dry graphite, silver for reproduction of a semi-conductive layer:

- Using silver for reproduction of a semi-conductive layer, first roughen the insulation and then the conductive layer from 30 mm with 120 grit electrical emery (enclosed).
- Apply one layer of silver for reproduction of a semi-conductive layer with the enclosed brush.



Shake the bottle well before use. After applying let dry thoroughly (minimum 10 min.)!



"thick" peelable conductive layer
strippable conductive layer

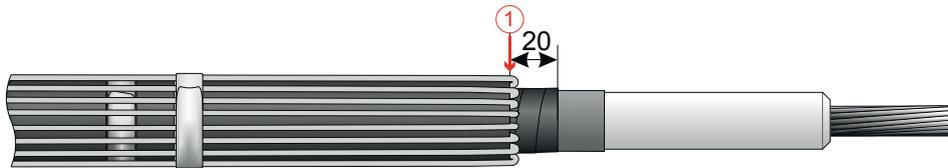
Remove the protective wrapping from the insulation.

Only with strippable semi-conductive layer

- 25 Stretch self-amalgamating semi-conductive tape lengthwise over approximately half the length and cut off the end. Apply the 20 mm semi-conductive tape with a 50 % overlap.



Wrap semi-conductive tape tightly, a straight edge is required at the front. Tear off the remainder of the semi-conductive tape. The edge of the strippable semi-conductive layer must be sealed.



Crimping tool no.
Chapter 5.4, page 13.

Only with fine wire stranded conductor

- 26 Slide the first compression sleeve onto the conductor with a 10 mm spacing from the insulation. Perform a round crimping operation with suitable tools.
- 27 Slide the second compression sleeve onto the conductor with a 10 mm spacing from the insulation. Perform a round crimping operation with suitable tools.

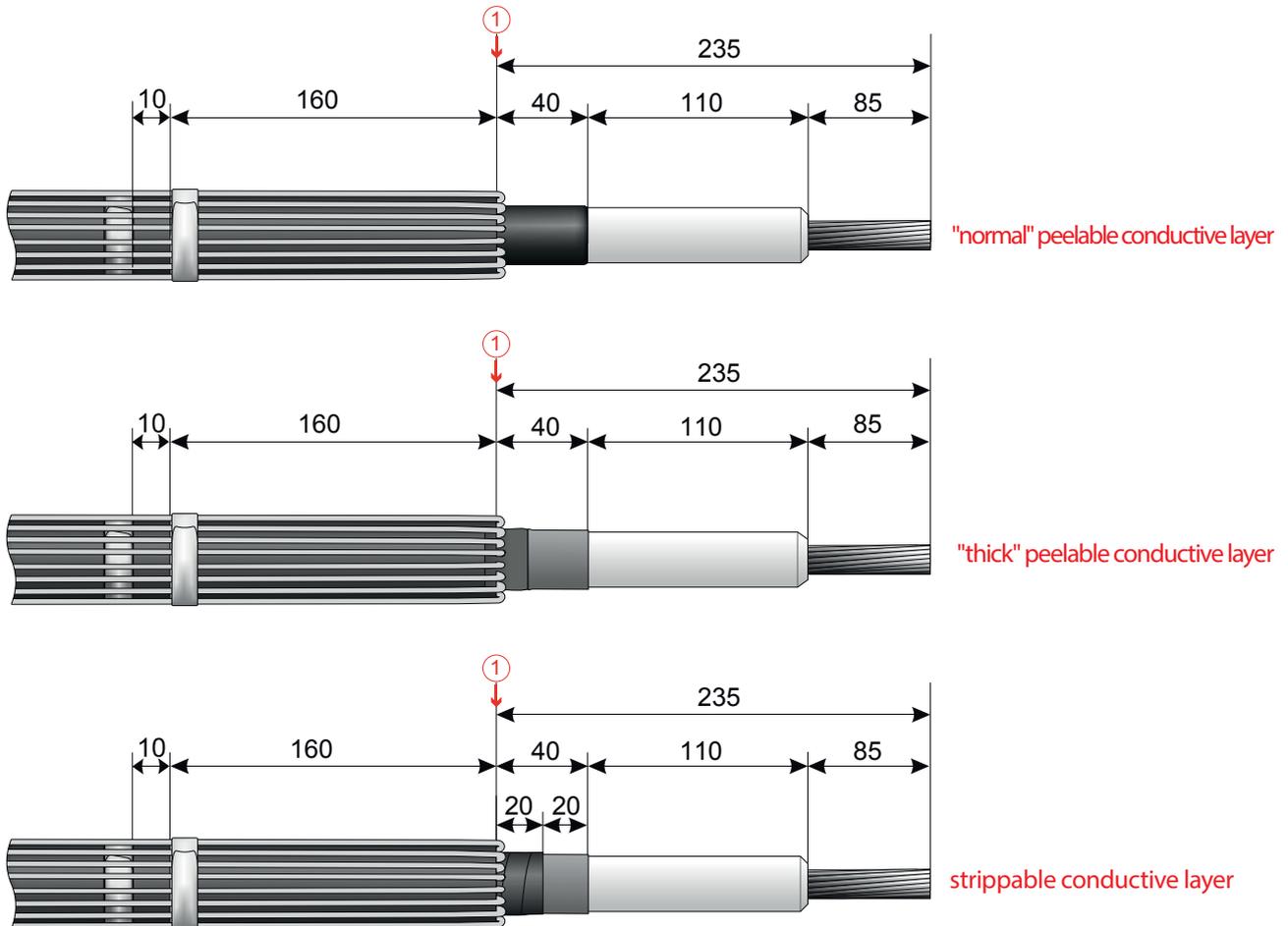


- 28 Saw off the conductor with the crimped-on sleeve 85 mm and then deburr the sleeve.



8.3 Checking

Control image for dimensions



Comparing the insulation diameter with application of the insulating part

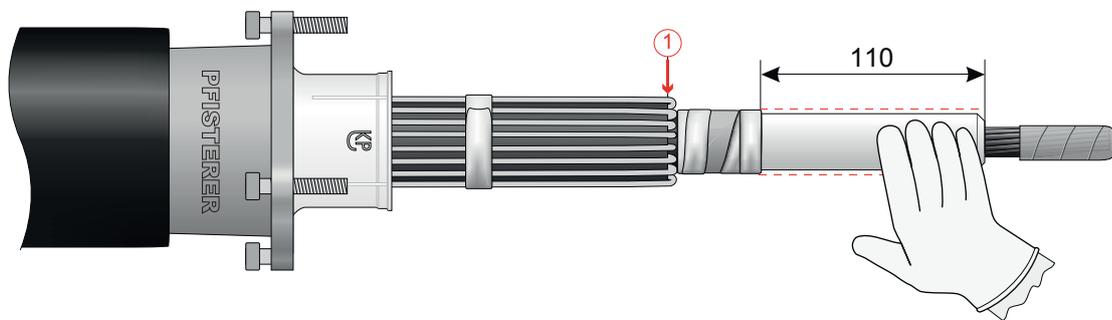
Check if the diameter of the insulation is within the working range of the insulating part (see label / packing list / insulating part). If the diameter is not within these values, **DO NOT INSTALL THE INSULATING PART.**

8.4 Assembly

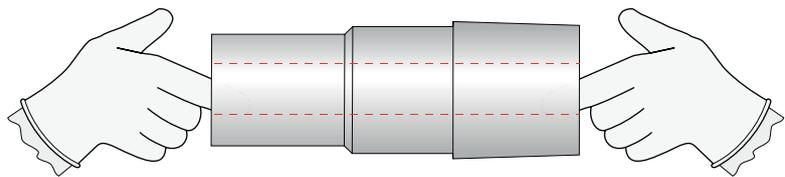
- 1 Apply a protective tape to the end of the conductor using insulating tape.



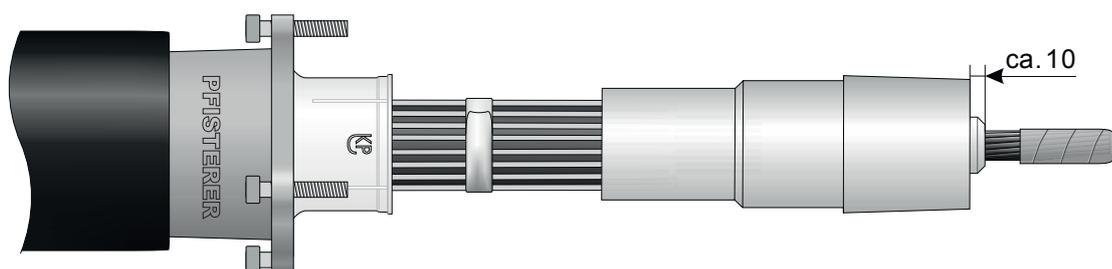
- 2 Apply self-adhesive tape, with the sticky side facing outwards, to form a protective wrapping over the conductive layer.
- 3 Slide the heat-shrink tubing and bell flange over the cable.
- 4 Clean the insulation. (Recommended cleaning agents: benzine, acetone.)
- 5 Grease the insulation thinly and evenly with PFISTERER MV-special grease.



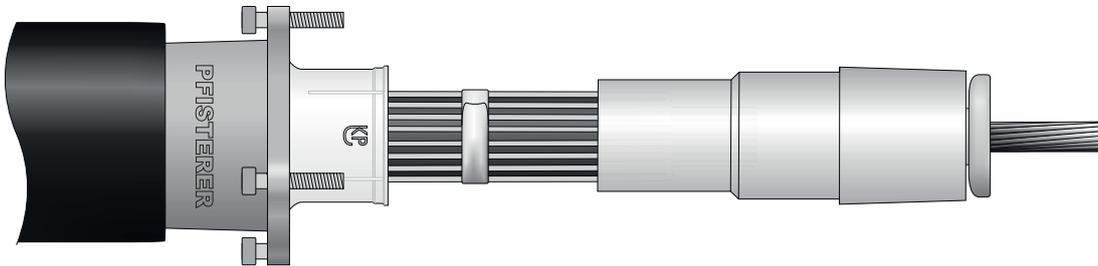
- 6 Remove the protective wrapping from the conductive layer.
- 7 Check the insulating part for cleanliness and completely grease the inside thinly and evenly with PFISTERER MV-special grease.



- 8 Slide the insulating part onto the insulation, until 10 mm of the insulation is exposed. Remove excess grease.



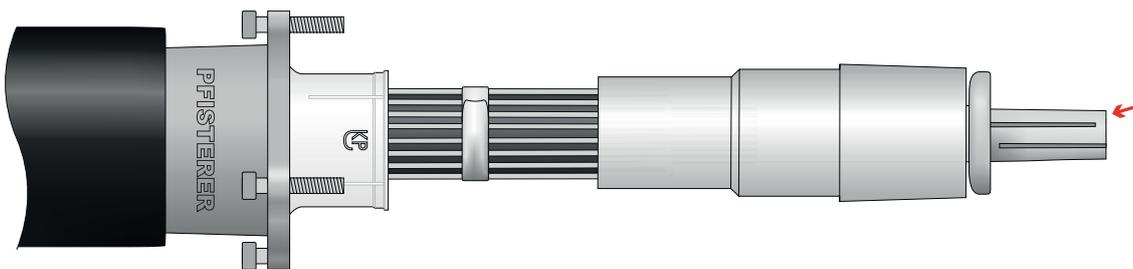
- 9 Remove the protective wrapping from the conductor.
- 10 Slide the thrust piece onto the conductor with the rounded side towards the insulating part.



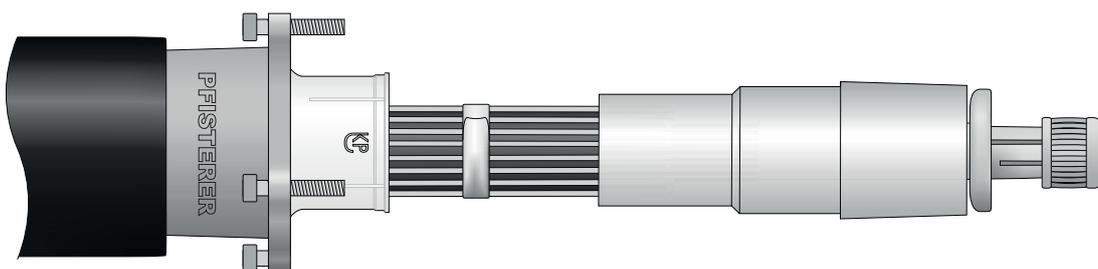
- 11 Slide the tension cone onto the conductor up to the thrust piece.



The conductor must not protrude past the tension cone!
 No grease may come into contact with the tension cone!
 Conductor and tension cone must be free of grease!



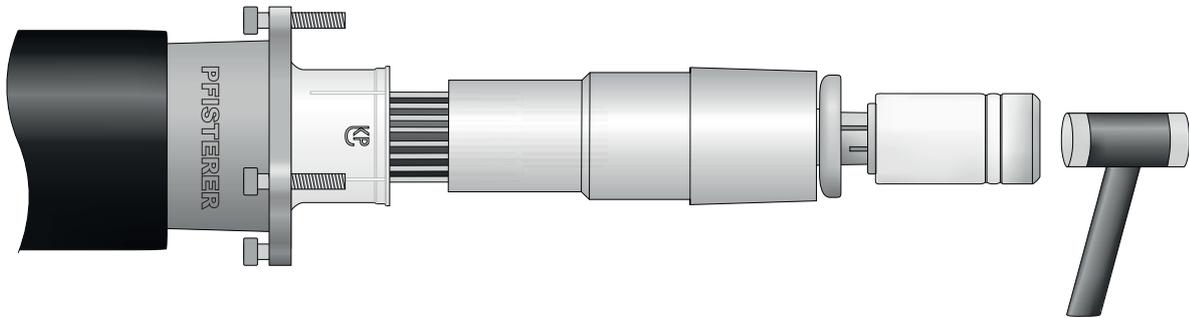
- 12 Slide the contact ring onto the tension cone.



- 13** Fix contact ring onto the tension cone with the impact head. The contact ring must no longer be able to rotate.

Recommended tools (see chapter 5.1, page 12):

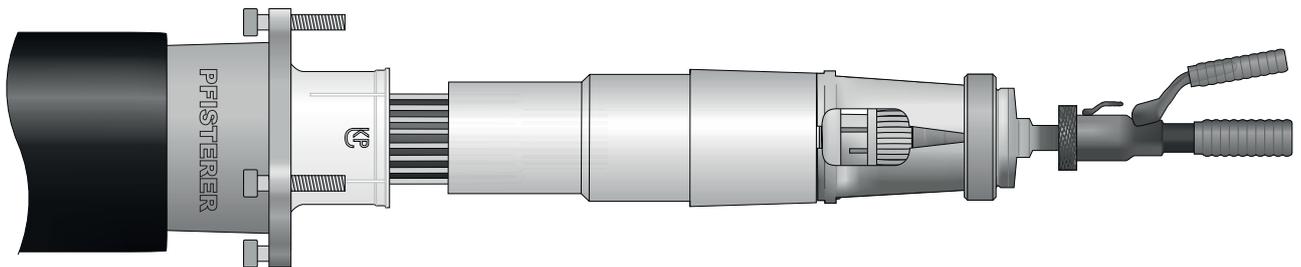
- Impact head



- 14** Slide the retaining ring of the compression head back and fix the half-shells behind the thrust piece.



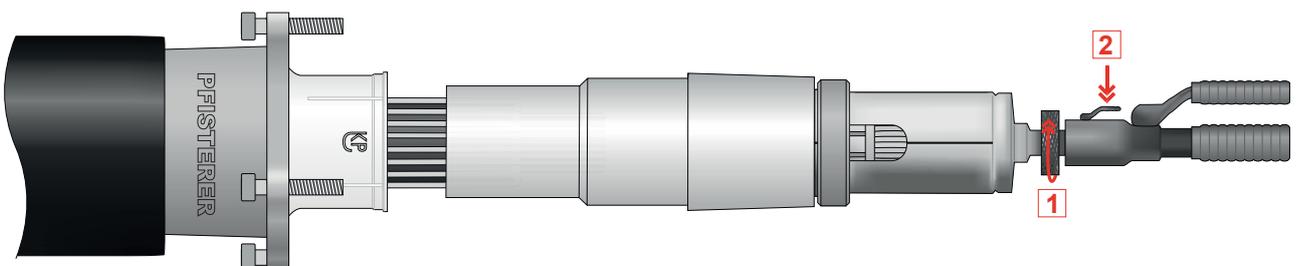
Do not damage the insulator.



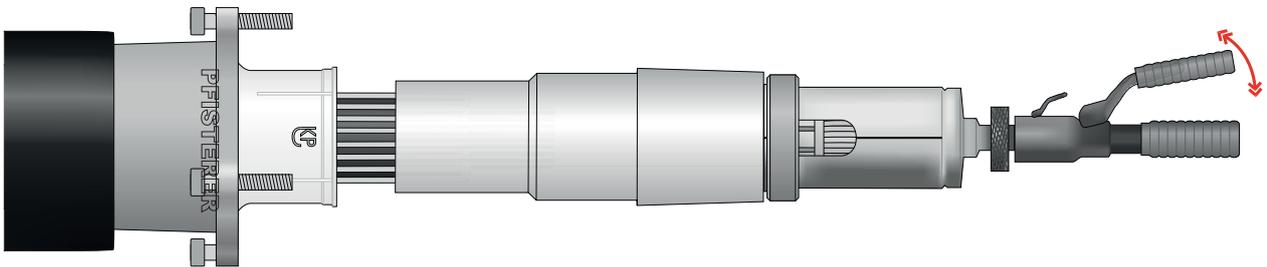
- 15** Squeeze the half-shells together and slide the retaining ring forward.
- 16** Turn the knurled wheel [1] of the hydraulic compression tool to the right until the insert of the compression tool makes contact with the contact ring.



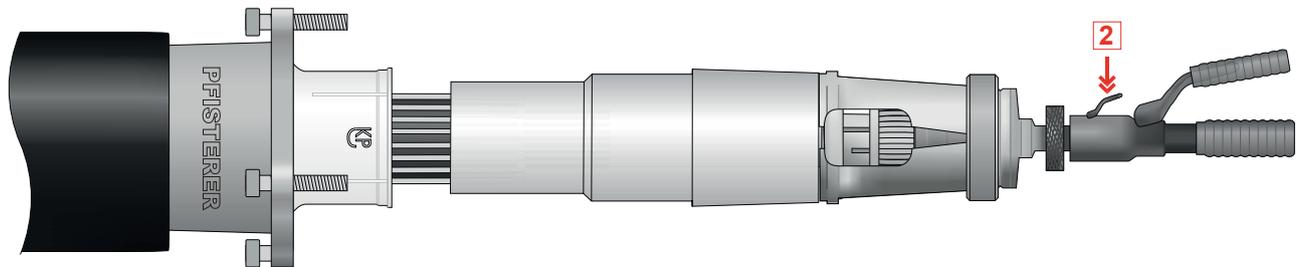
Release the hydraulic compression tool before operating [2].



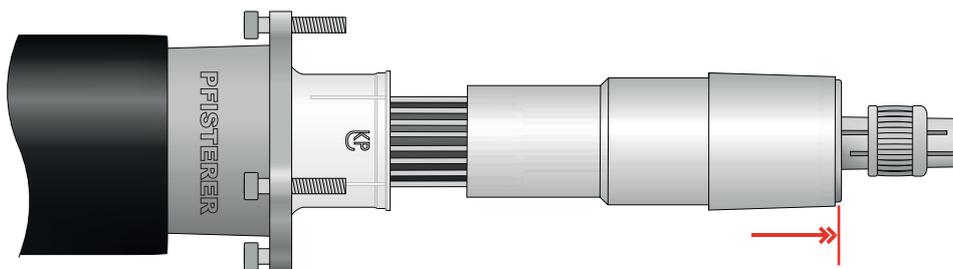
- 17 Press the contact ring onto the tension cone with the hydraulic compression tool until it reaches pressure.



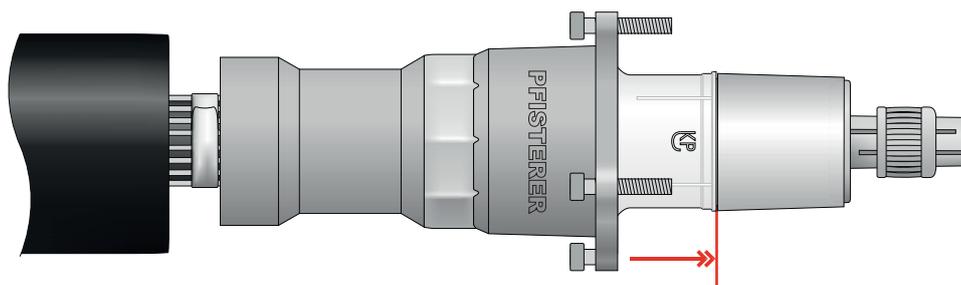
- 18 Release the hydraulic compression tool [2].
- 19 Slide the retaining ring of the press head back and open the half-shells.
- 20 Remove the hydraulic compression tool.



- 22 Pull the insulating part flush against the thrust piece.



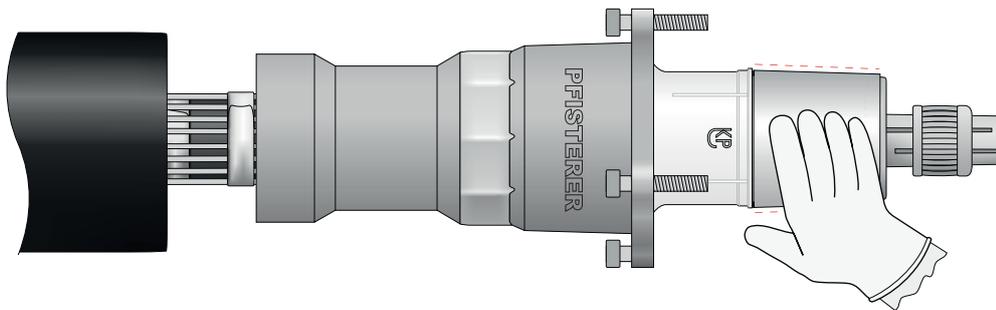
- 21 Slide the bell flange onto the insulating part.



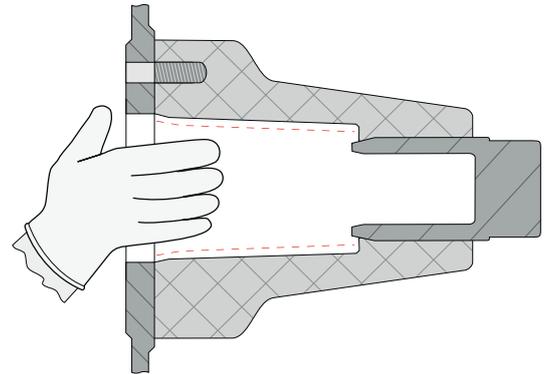


For installation outdoors vertically from above (for transformer applications), an extra set of seals must be used. Note additional steps (see chapter 8.6, page 34).

- 23 Clean the surface of the insulating part (recommended cleaning agents: benzene, acetone) and grease thinly and evenly with PFISTERER MV-special grease. Wear clean protective gloves (e.g. latex or plastic).



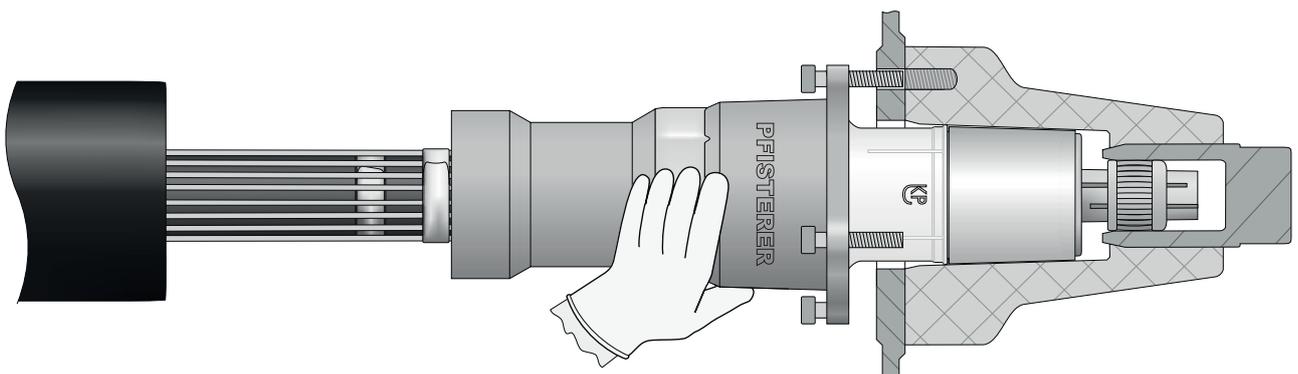
- 24 Clean the surface of the socket (recommended cleaning agents: benzene, acetone) and grease thinly and evenly with PFISTERER MV-special grease. Wear clean protective gloves (e.g. latex or plastic).
Do not apply grease to the contact area!



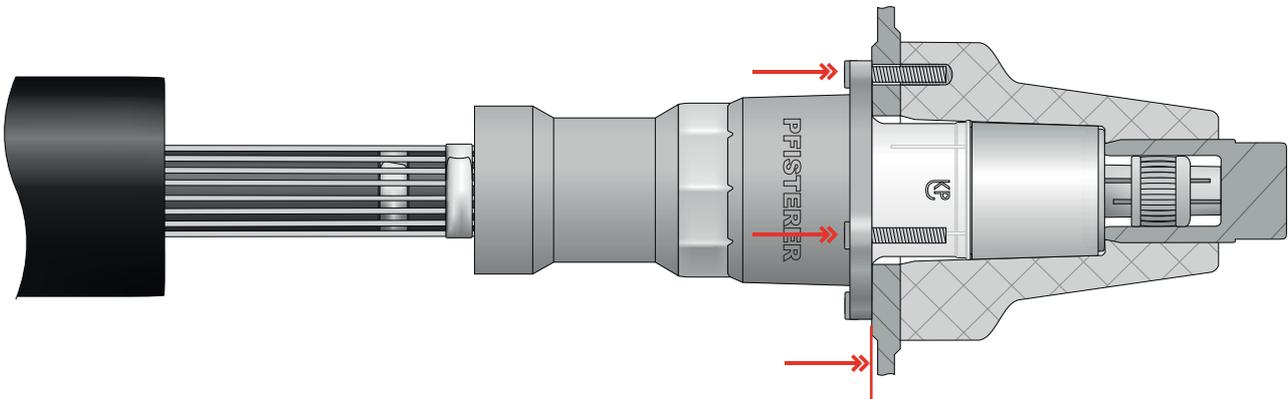
- 25 Introduce the CONNEX separable connector into socket and tighten the screws.



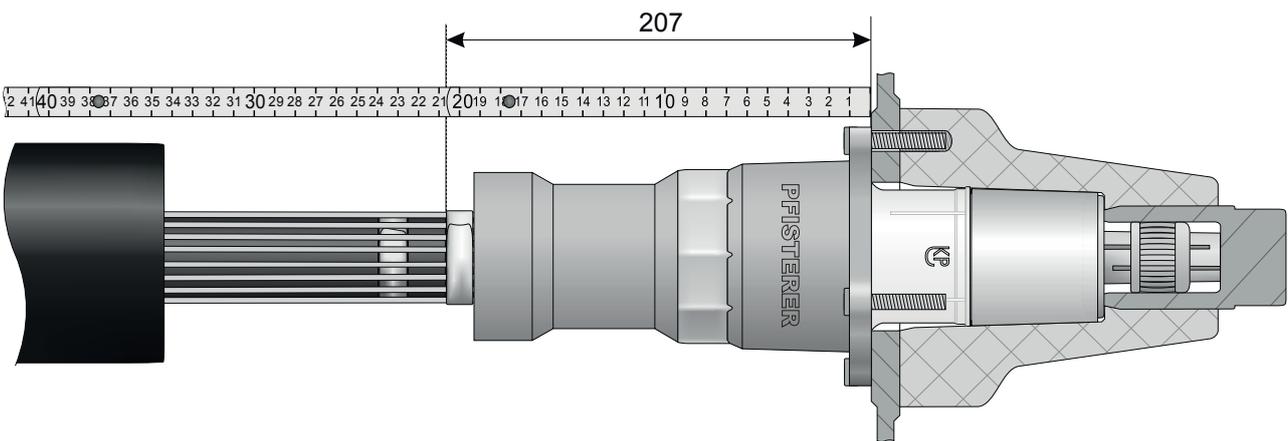
The bell flange must be held with pressure on the insulating part until the screws grip.



- 26 Tighten the screws all round with the SW6 T-handle screwdriver (torque 15 Nm).



- 27 Using the ruler, check the position of the control dimension 207 mm. If not achieved press the cable again. **Do not remove the check mark!**



Only with superflexible cable

- 28 For better adhesion of the heat-shrink tube, introduce a hose clamp between the sealing tape and the check mark on the outer jacket.



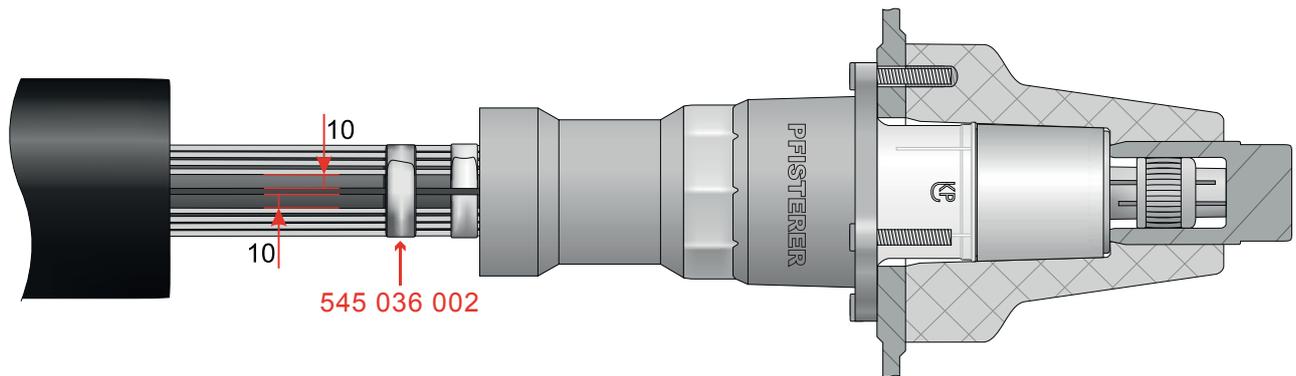
Only with capacitive voltage tap

- 29 Fix test lead with adhesive tape.



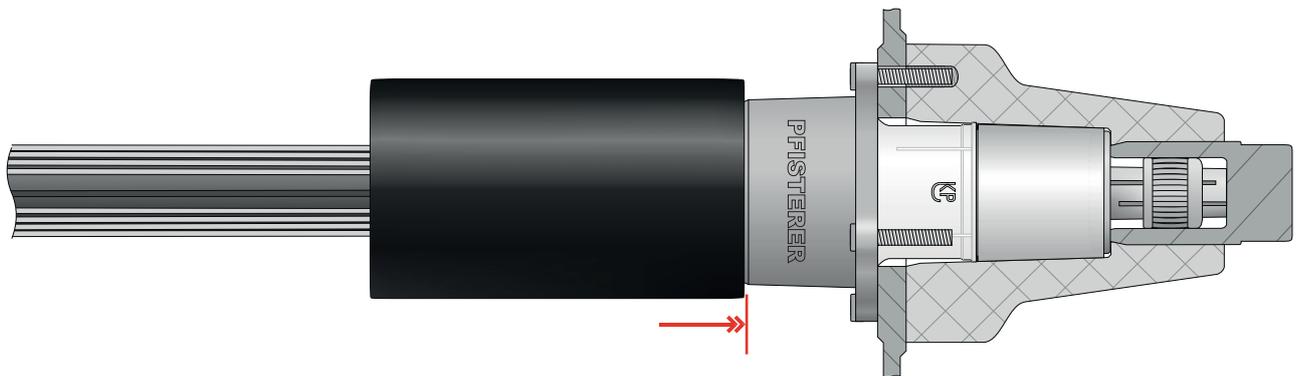
The test lead of the voltage tap may not cross over the screen wires and must run at a min. distance of 10 mm parallel to the screen wires.

- 30 Apply a further layer of sealing tape directly on top of the first layer.



In offshore / ground applications, the screen wires must be protected. See Chapter 8.7, Page 35.

- 31 Clean the outside of the bell flange.
32 Fix the heat-shrink tubing over bell flange on the ribbing.



- 33 Evenly heat the shrink tubing starting from the bell flange until the heat-shrink tubing fits evenly all round (below the ribbing) and the inner adhesive is exposed from both sides (see arrows).



A "setting time" of 1 hour is needed before starting up the system.

8.5 Earth connection

- 1 Cut the screen wires (not the test lead) to the required length and connect it to the earthing of the system.



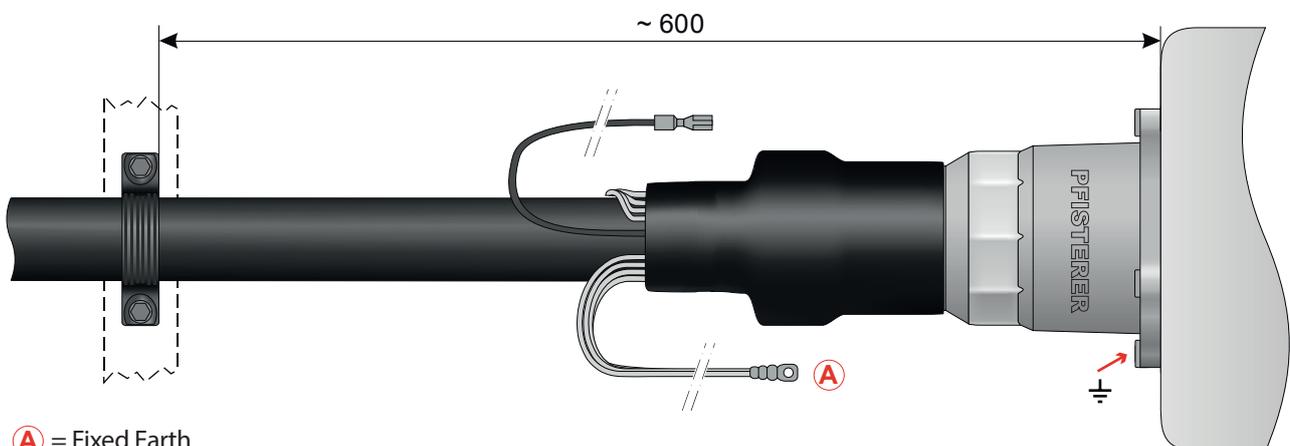
If the test lead of the voltage tap is not needed and is not connected to the constant voltage indicator system, it should be earthed separately.

- 2 The bell flange provides an earthing point, see arrow. The earthing point serves as a potential equalization.



The earthing point is not suitable for earthing the cable screen.

- 3 The first clamp should be placed approx. 600 mm from the flange of the unit.
- 4 The product can now be operated within the plant and it complies with all safety regulations.



(A) = Fixed Earth

8.6 Vertically from above



Additional sealing is required when installing vertically from the above.

Prepare socket and separable connector before the cable connector is plugged in.

Preparation of the cable connector:

- 1 Place Usit-rings [A] under the three mounting screws.

Preparation of bushing socket:



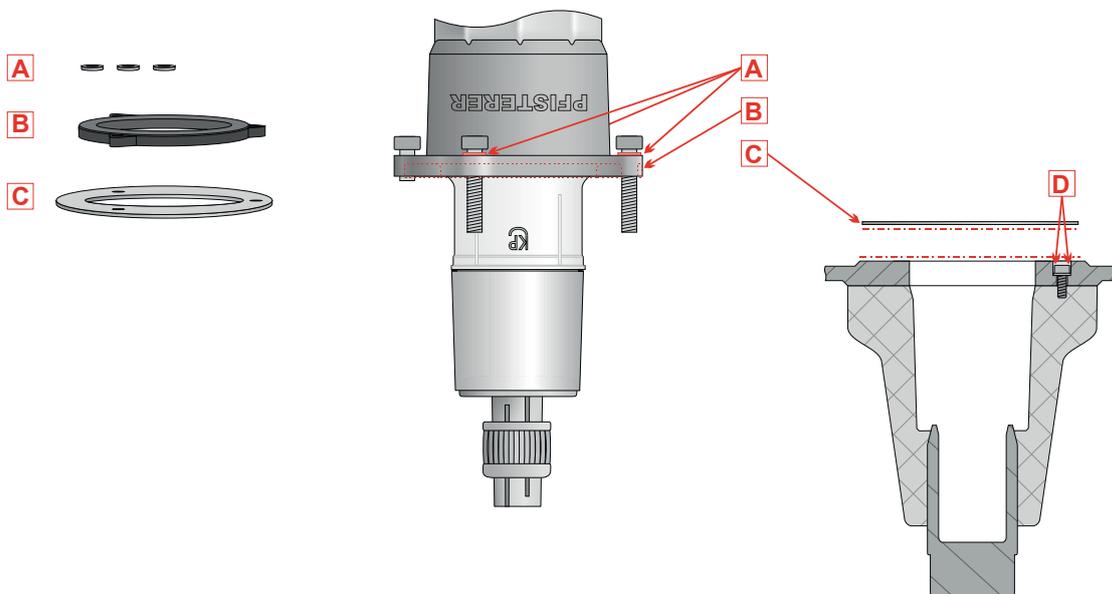
The sealing set is only to be used in combination with the screws, the Usit-rings, the washer and the Hylomar.

- 2 Completely fill the countersinks in the socket mounting with Hylomar [D].
- 3 Coat the sealing surface of the socket with Hylomar.
- 4 Coat the underside of the washer [C] with Hylomar and press it down with this side towards the sealing surface of the socket.

Earthing the separable connector:



The sealing set is only to be used in combination with the screws, the Usit-rings, the disc and the Hylomar.

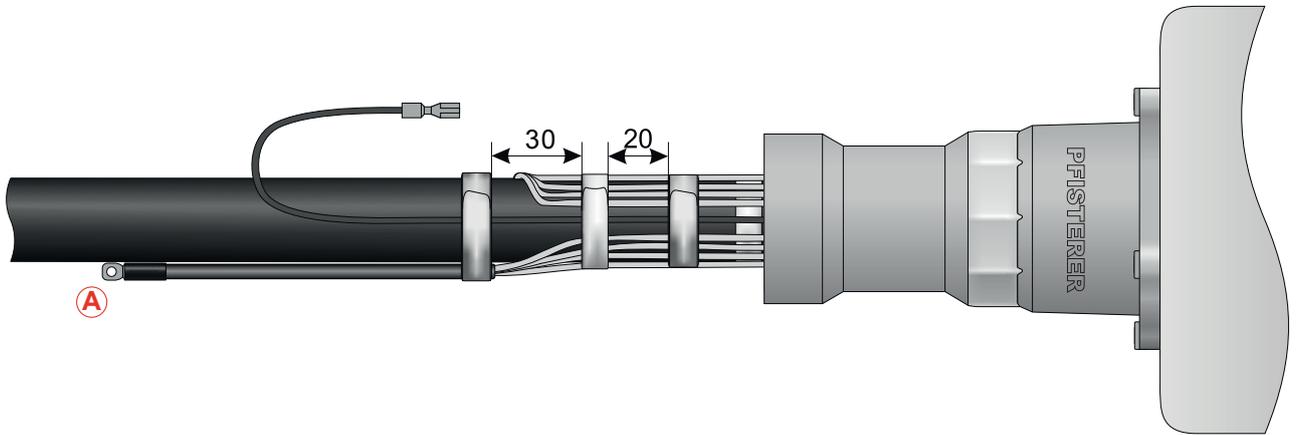


8.7 Sealing kit for offshore / ground applications

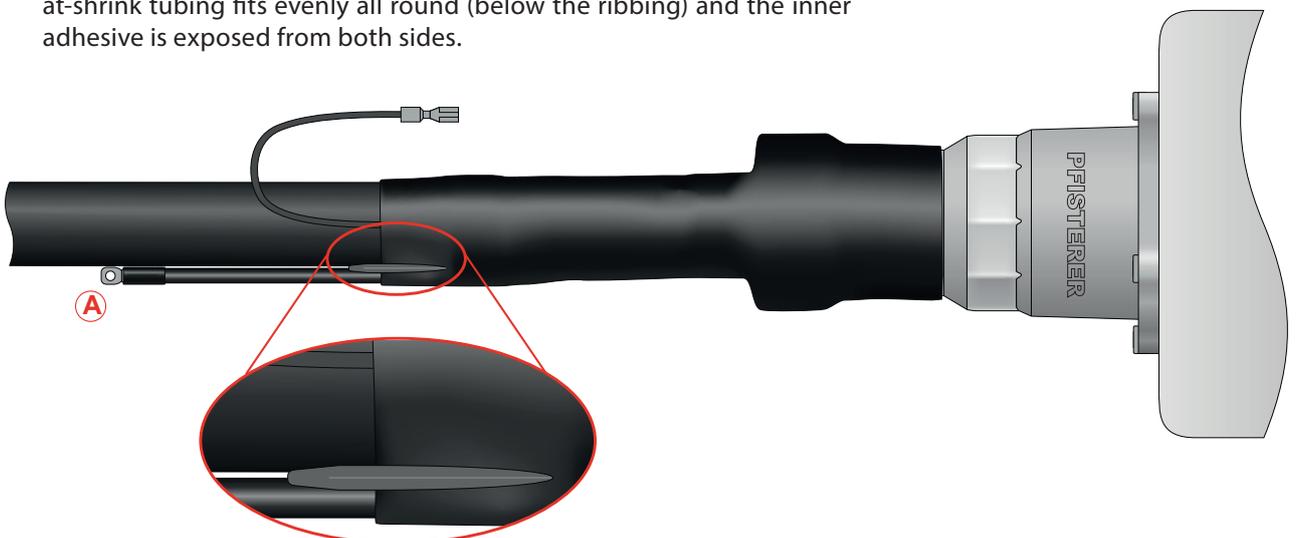


An additional sealing kit is required for offshore / ground applications. Prepare the screen wires for earthing before the large heat-shrink tubing is shrunk onto the bell flange.

- 1 Fix the screen wires 20 mm after the sealing tape with duct tape.
- 2 Bundle the screen wires together.
- 3 Apply the long slim heat-shrink tubing over the screen wires.
- 4 Apply the cable lug.
- 5 Place two more layer of sealing tape under and over the bundled screen wires.



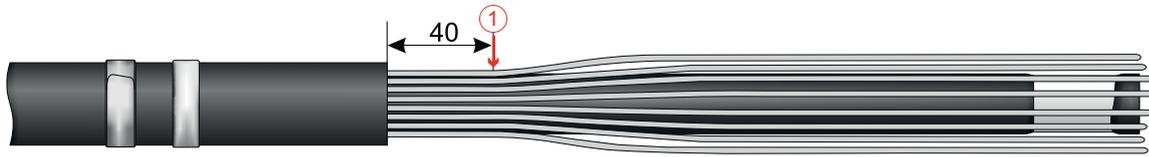
- 6 Heat the short shrink tubing at the cable lug and the long slim shrink tubing.
- 7 Position the Glue Peg on the large heat-shrink tubing between the cable and the heat-shrink covered screen wires.
- 8 Evenly heat the shrink tubing starting from the bell flange until the heat-shrink tubing fits evenly all round (below the ribbing) and the inner adhesive is exposed from both sides.



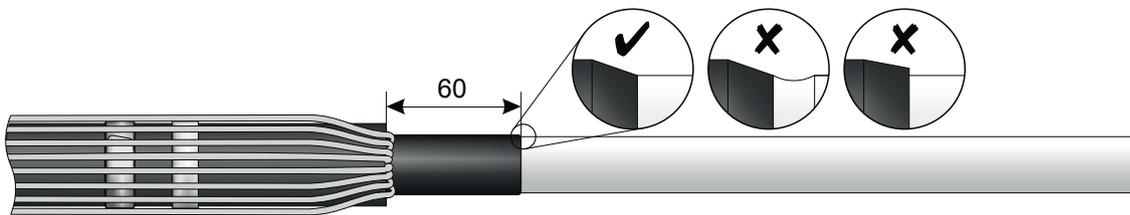
(A) = Fixed Earth

8.8 Thick conducting layer (Diameter > 2 mm)

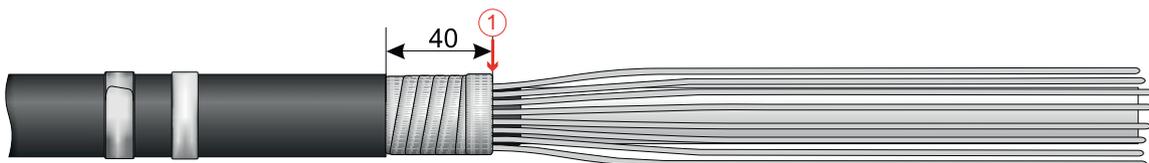
- 1 Remove outer jacket to 40 mm behind the „jacket cut“ (1).
- 2 Remove swellable tape and bend screen wires back.



- 3 Bend back screen wires for peeling.
- 4 Peel semiconductor layer using the peeling device to 60 mm in front of the outer jacket (note instructions for the peeling device).



- 5 Re-apply the screen wires.
- 6 Apply woven insulating tape up to 40 mm in front of the "jacket cut" (1) with a 50 % overlap.
- 7 At the "jacket cut" (1), apply 2–3 more layers.

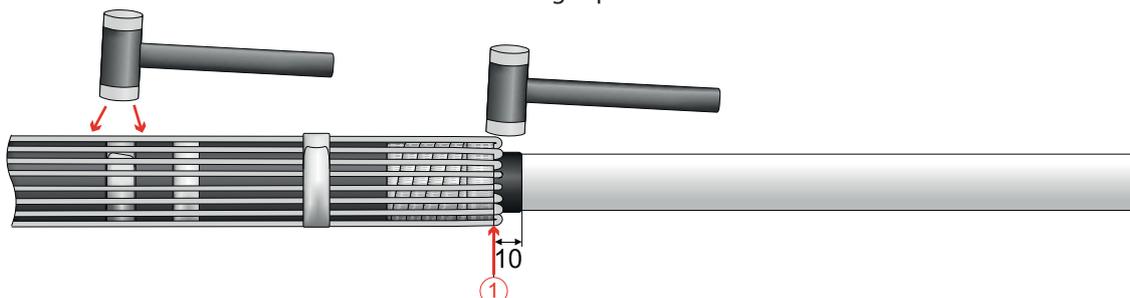


- 8 Wrap around screen wires and secure with insulating tape.



Wrap screen wires in parallel, without crossing over!

- 9 Tap down screen wires at the "jacket cut" (1) and either side of the sealing tape.



- 10 Go to Step 18 in Section 8.2, page 22.

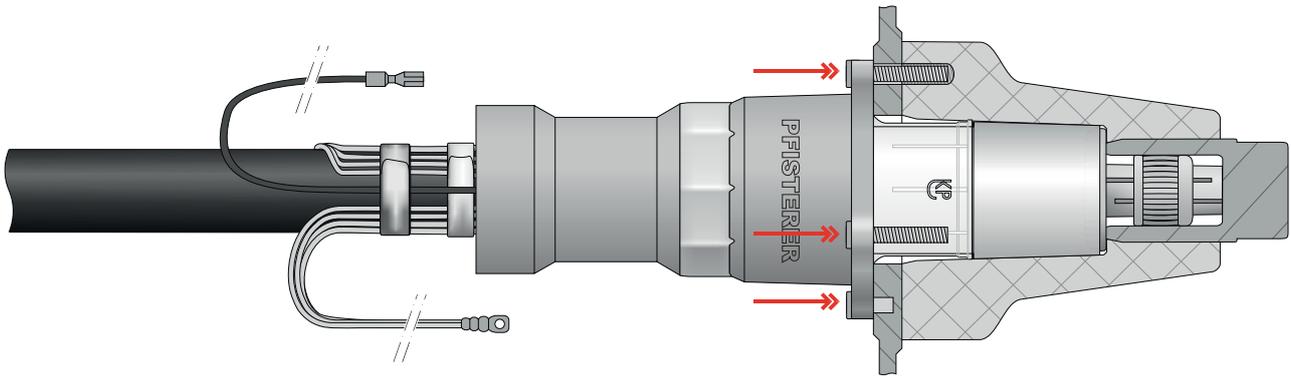
9 Dismantling / Removal

- 1 Loosen earthing.
- 2 Remove heat-shrink tubing.

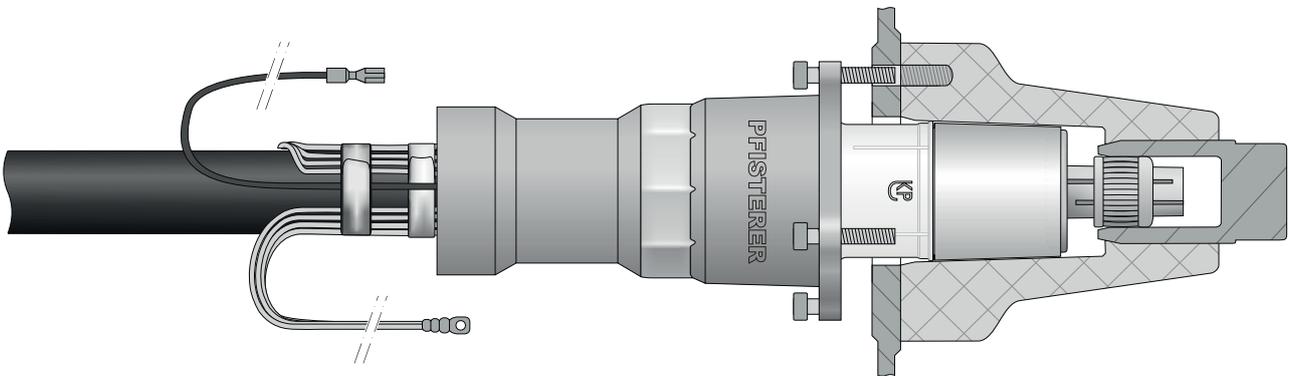


The screen wires underneath the shrinkable tubing and the test lead of the voltage tap must not be damaged.

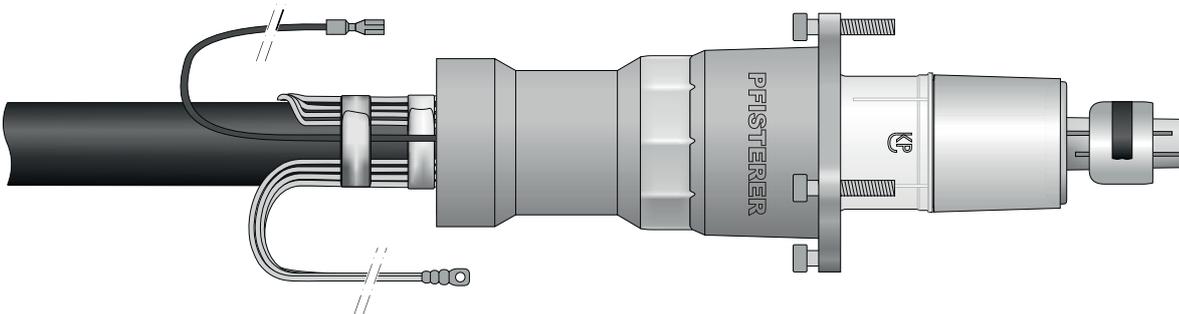
- 3 Loosen the screws all round with the SW6 T-handle screwdriver.



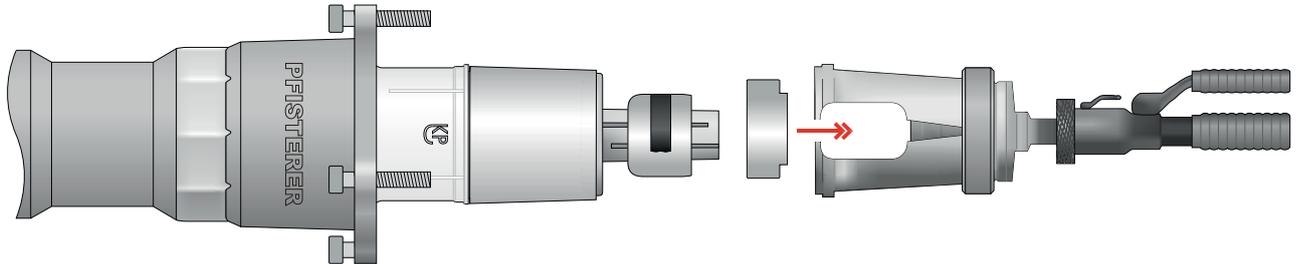
- 4 Pull the CONNEX termination out of the socket.



- 5 Assemble the two halves of the removal tools and fix it in place with adhesive tape.
- 6 Place the removal tools over the contact ring with its rounding towards the insulating part and squeeze together.

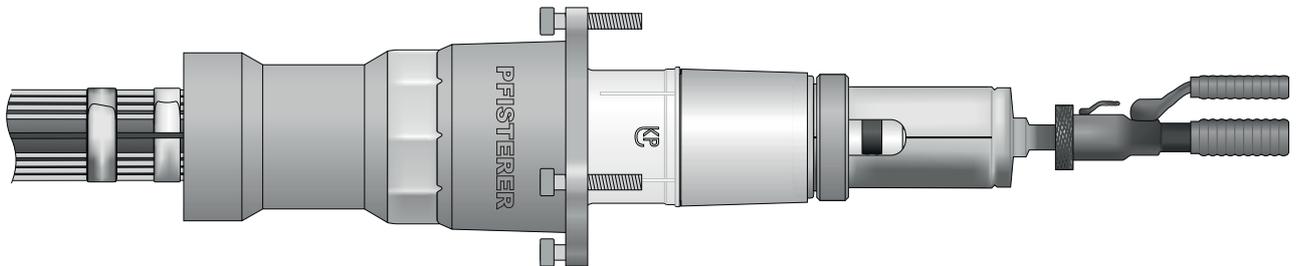


- 7 Place the pressure plate on the insert of the compression head and slide the retaining ring of the compression head to the back.



- 8 Place the half-shells of the compression head behind the removal tools and press together.

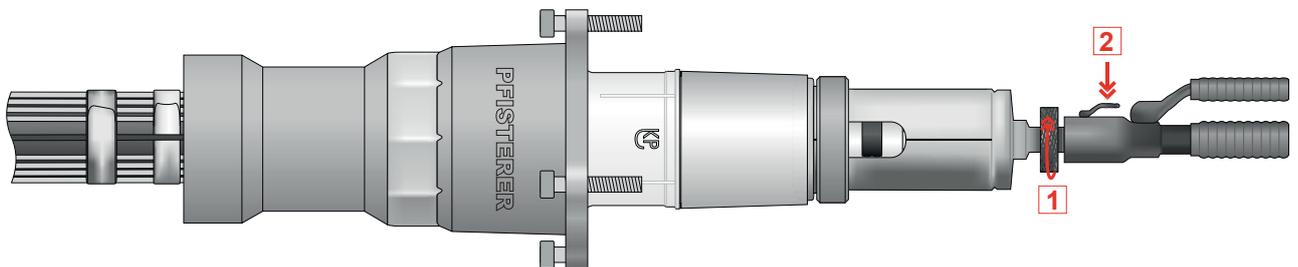
- 9 Slide the retaining ring forward.



- 10 Turn the knurled wheel [1] of the hydraulic compression tool to the right until the pressure plate of the compression head lies firmly on the tension cone.



Release the hydraulic compression tool before operating [2].

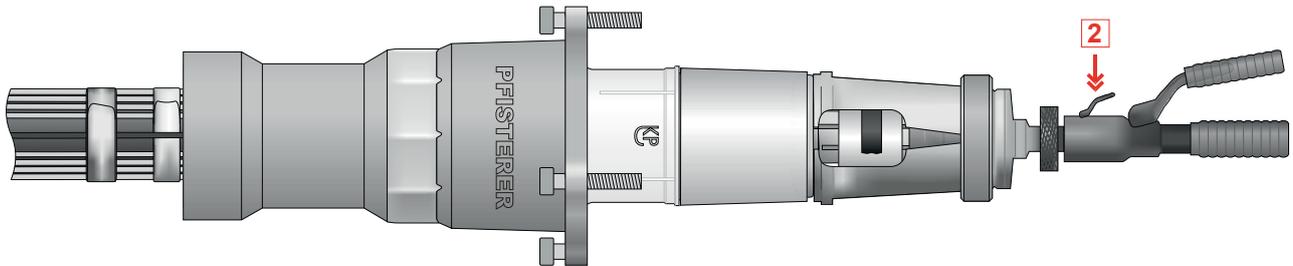


- 11 Pull the contact ring off the tension cone with the hydraulic compression tool.

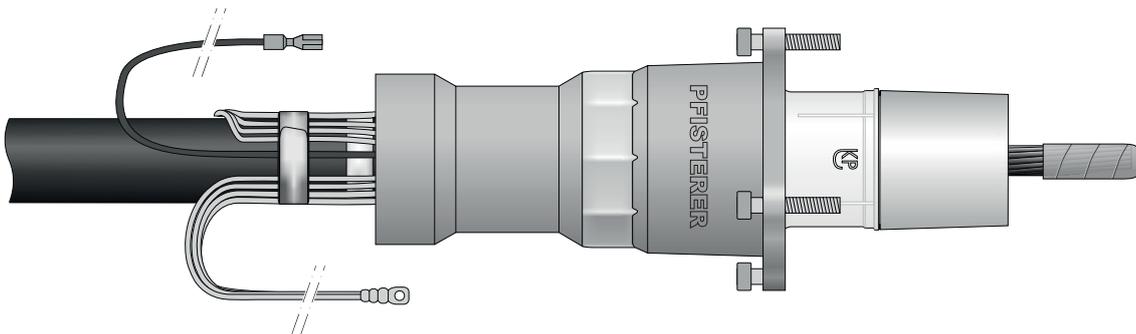


Release the hydraulic compression tool [2].

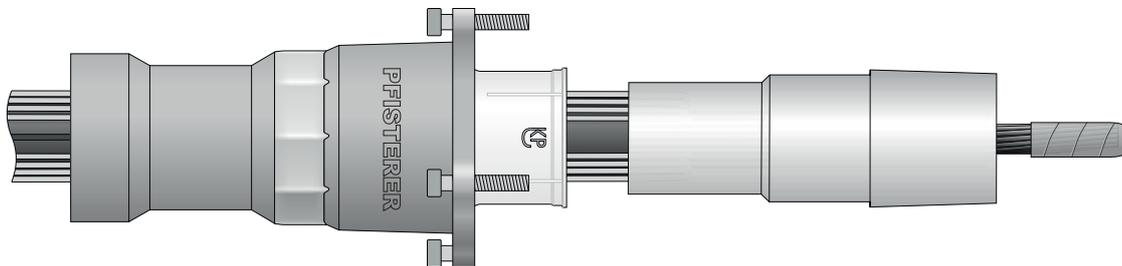
- 12 Slide the retaining ring of the compression head back and open the half-shells.



- 13 Remove the hydraulic compression tool.
- 14 Remove the tension cone and thrust piece.
- 15 Cover conductor end with protective wrapping.



- 16 Remove the insulating part and bell flange.



The tension cone, insulating part and heat-shrink tubing should **not be reused!**

10 Testing

10.1 Fittings required

Blind cap

- Size 3, No. 827 131-003

Contact protection for CONNEX separable connectors under tension.

10.2 Mounting blind cap

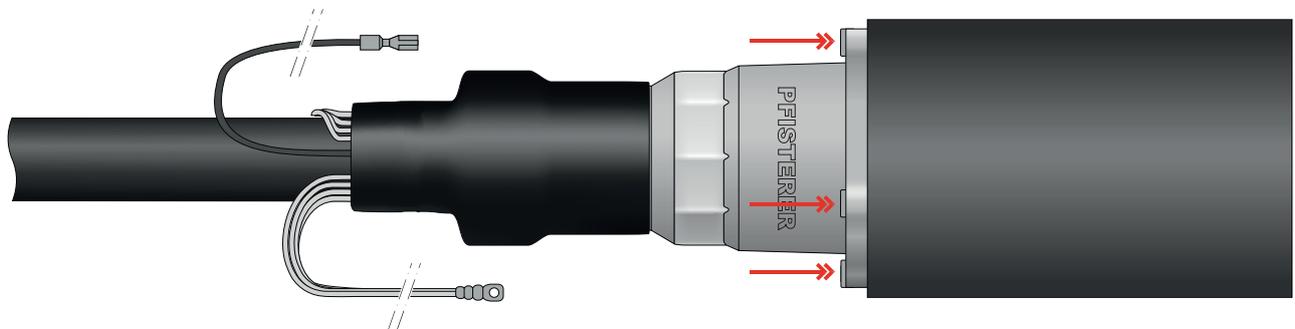


If the CONNEX cable termination is pulled out for test purposes, the CONNEX cable termination must be closed with a voltage-proof blind cap.

- 1 Position blind cap and tighten screws.



The socket and insulating part of the separable connector must be cleaned and lubricated with special grease MV, which can be ordered separately under 558 228 008.



Keep bell flange, cable screen and if appropriate test lead line separate.

10.3 Setup for commissioning test

max. operating voltage

Size 3-S, $U_o/U_N(U_M)$: 26/45(52) kV

Size 3, $U_o/U_N(U_M)$: 20.8/36(42) kV

max. test voltages

Size 3-S, VLF $3 \times U_o = 78$ kV, 60 min.

PD $2 \times U_o = 52$ kV ≤ 10 pC

Size 3, VLF $3 \times U_o = 63$ kV, 60 min.

PD $2 \times U_o = 42$ kV ≤ 10 pC

MV-CONNEX test and Transition connector

Size 3, No. 827 186-213

MV-CONNEX blind cap

Size 3, No. 827 133-001

MV-CONNEX test cable

Size 3-S, No. 810 105-352 (length 2.1m)

Size 3, No. 810 105-310 (length 1m)

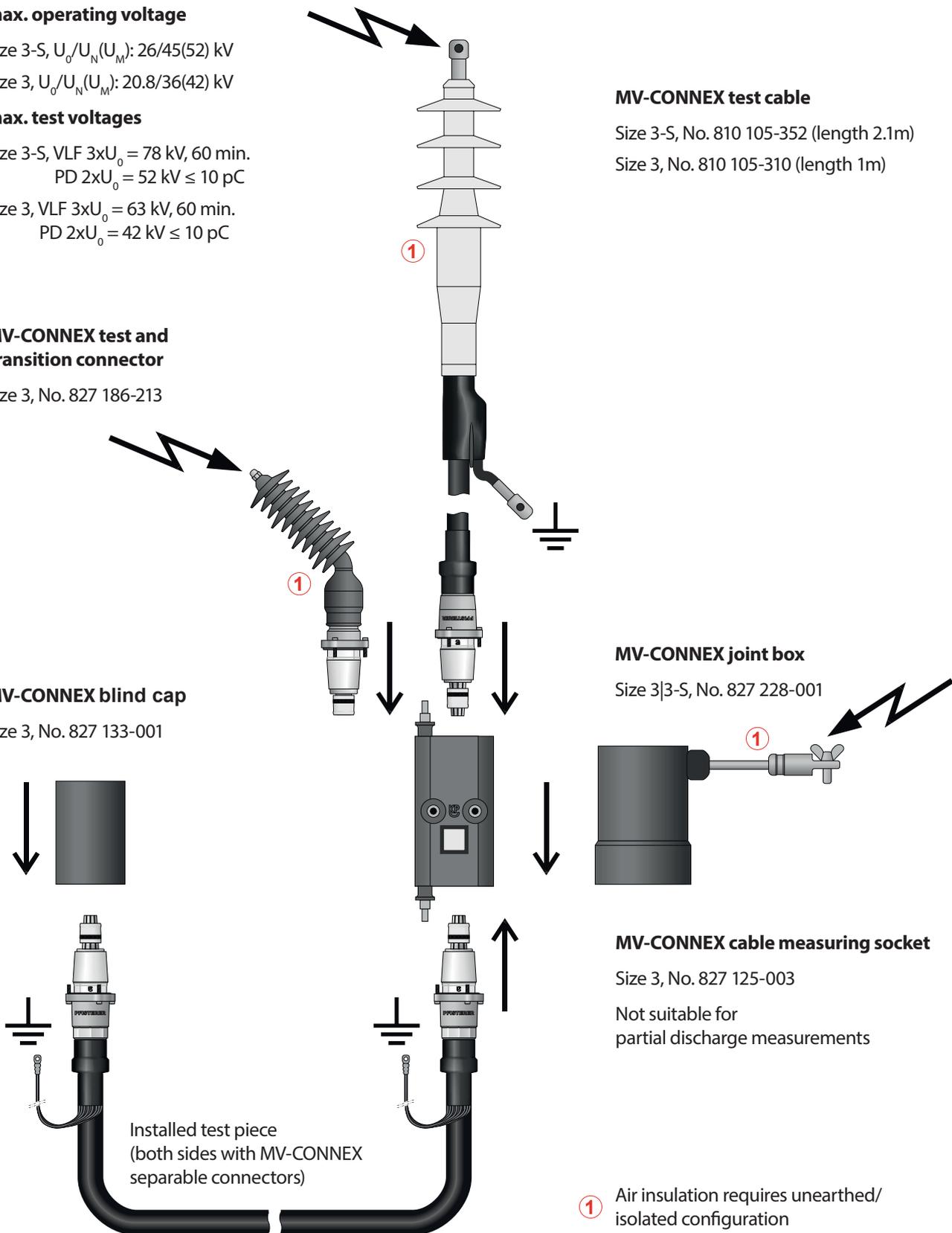
MV-CONNEX joint box

Size 3|3-S, No. 827 228-001

MV-CONNEX cable measuring socket

Size 3, No. 827 125-003

Not suitable for partial discharge measurements



① Air insulation requires unearthed/ isolated configuration

10.4 Sheath testing

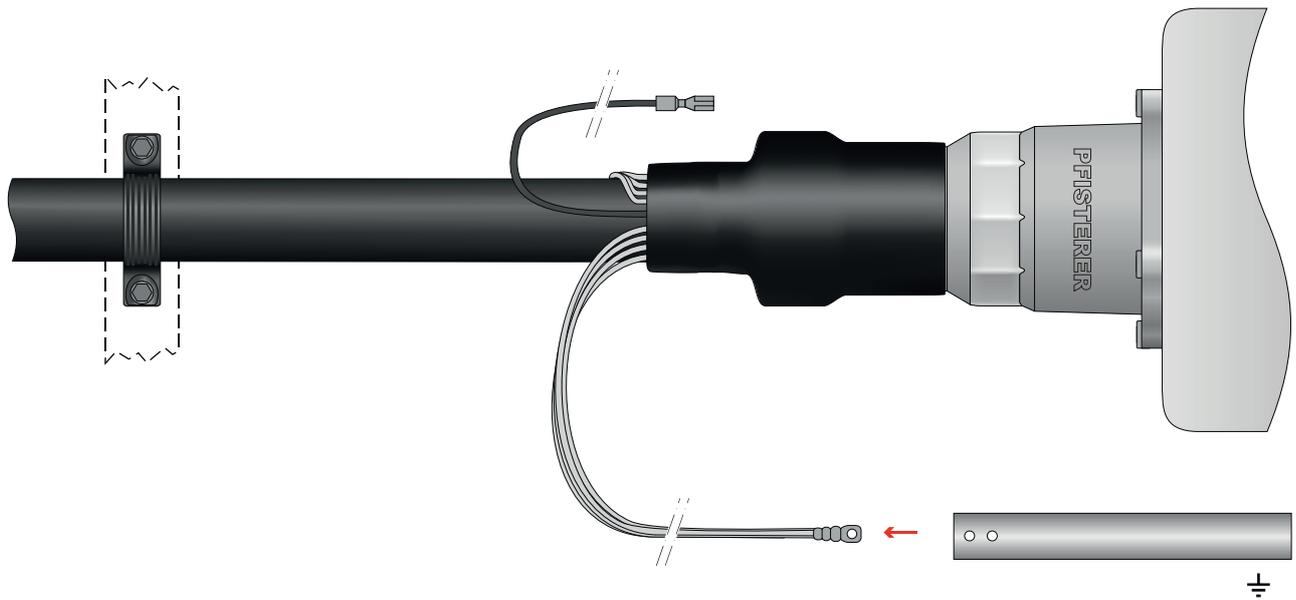


Carry out the sheath testing at max. 5 kV (DC voltage).

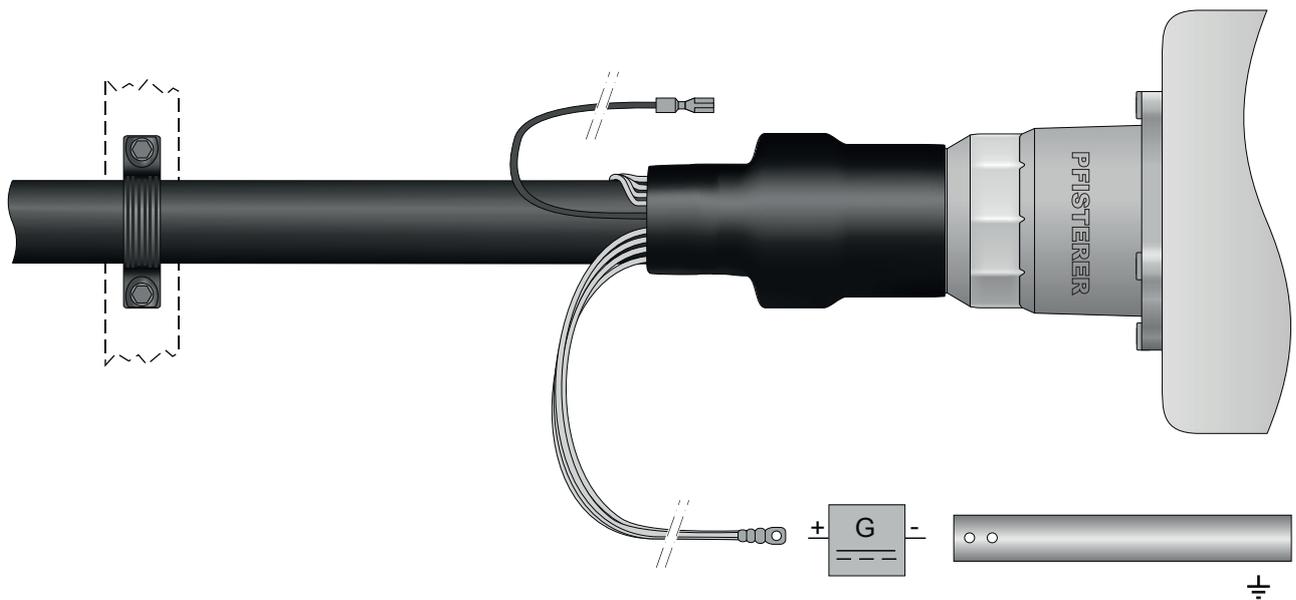
- 2 Loosen earth screen and test lead from system earth.



Beware of induced voltages on the cable screen!



- 1 Connect the DC voltage.



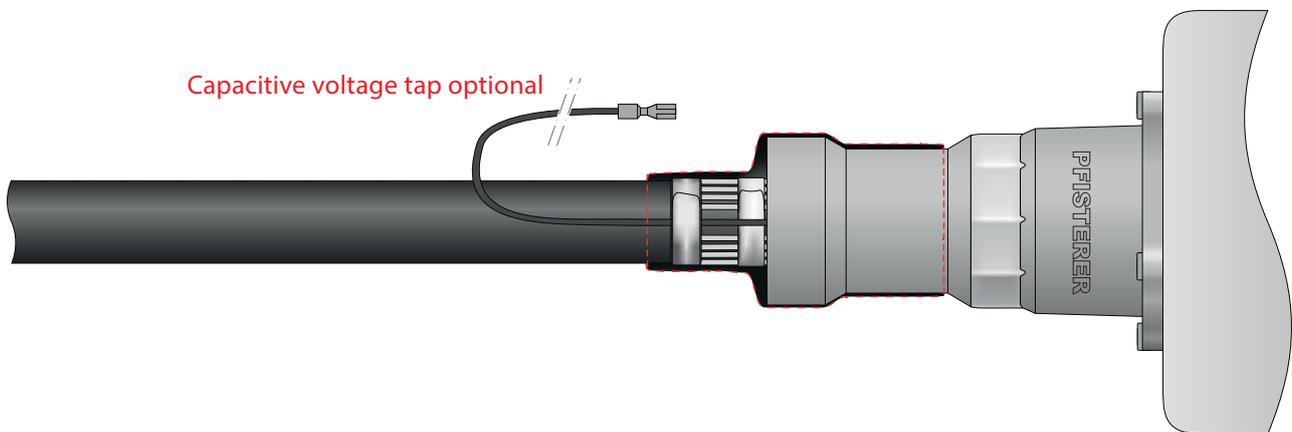
11 Single Earthing



Earthing principle depends on the network. The design of the cable, earthing principle, position and the use of the screen excess voltage limiter must be specified by the customer / project management.

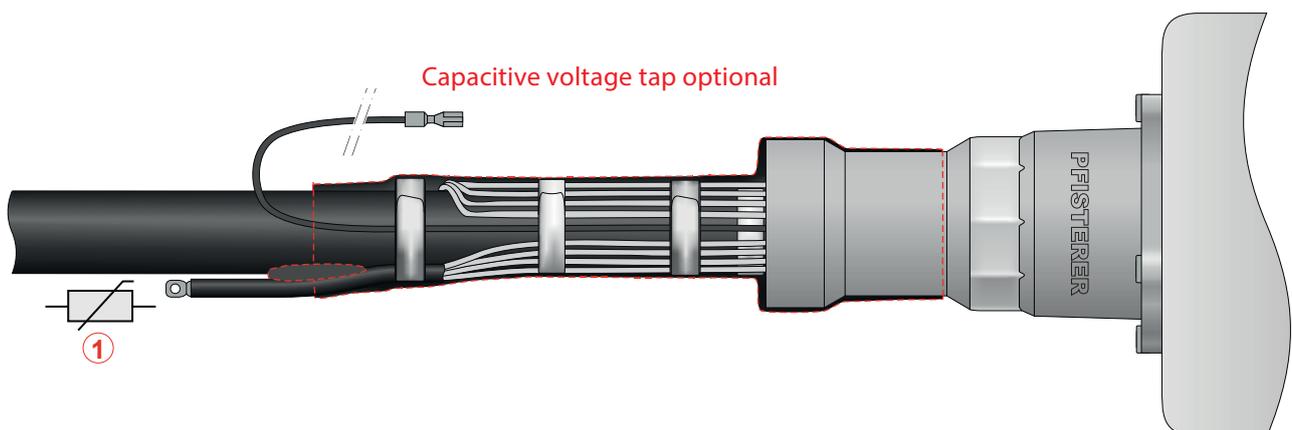
Option 1

- 1 Cut off screen wires at the height of the sealing tape.
- 2 Fix second layer of sealing tape directly on the first, thus fixing the wires.
- 3 Shrink heat-shrink tubing over bell flange and cable.



Option 2

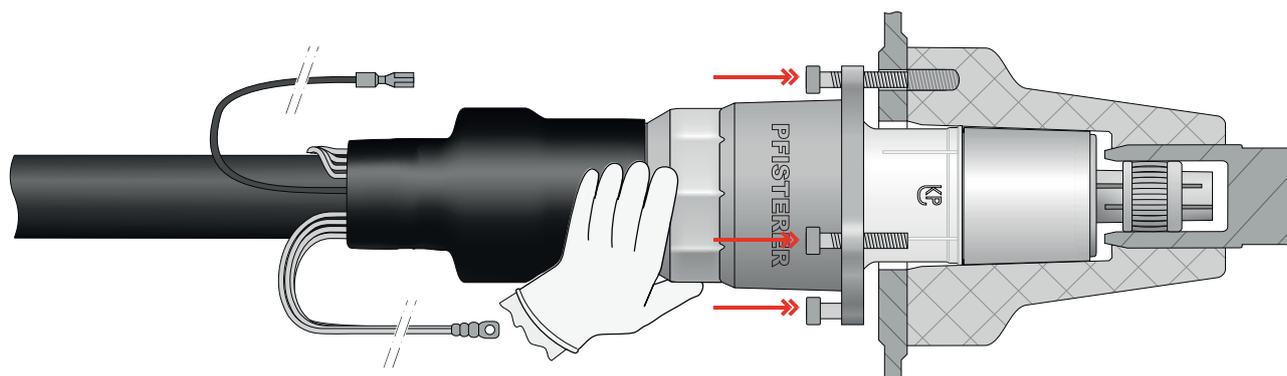
- 1 Fix the screen wires after the sealing tape with duct tape.
- 2 Bundle the screen wires together, press on the cable lug and shrink over the long heat-shrink tubing.
- 3 Place one layer of sealing tape above and below the heat-shrink tubing.
- 4 Position a tapping bracket on the large heat-shrink tubing between the cable and the heat-shrink tubing covered screen wires.
- 5 Shrink heat-shrink tubing over bell flange and cable.
- 6 Connect screen excess voltage limiter. ①



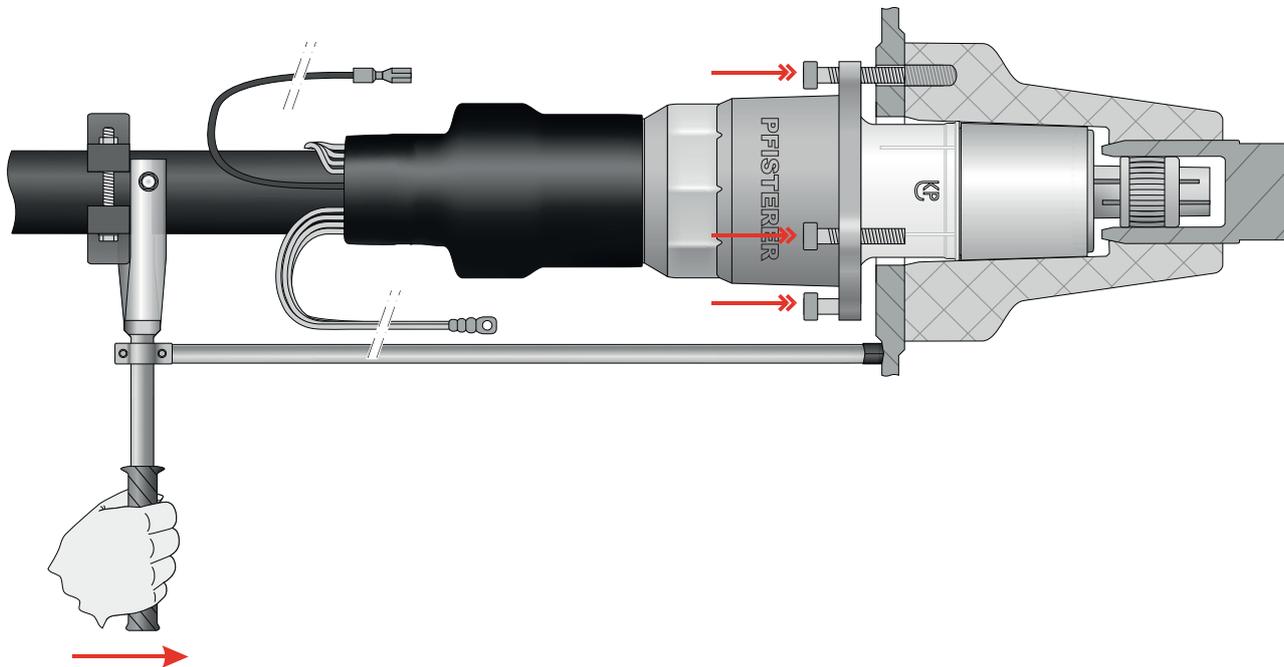
12 Unplugging / Plugging in

12.1 Unplugging

- 1 Loosen cable screen, test lead (if present) and remove the earthing of the bell flange.
- 2 Loosen the mounting screws and carefully unplug.



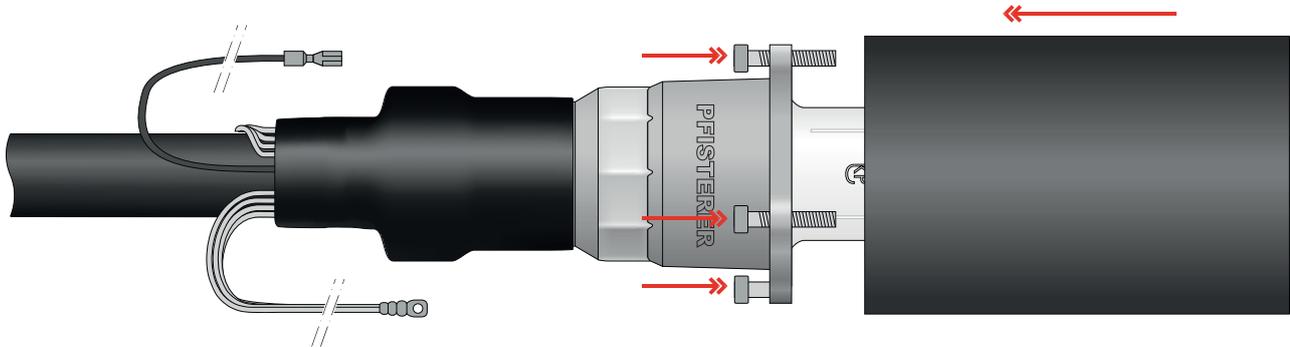
Optional removal device



- 3 Clean insulating part (recommended cleaning agent: benzene, acetone) and protective cap (not voltage-proof) or blind cap (permanent) raise.



When using the blind cap, grease is required!

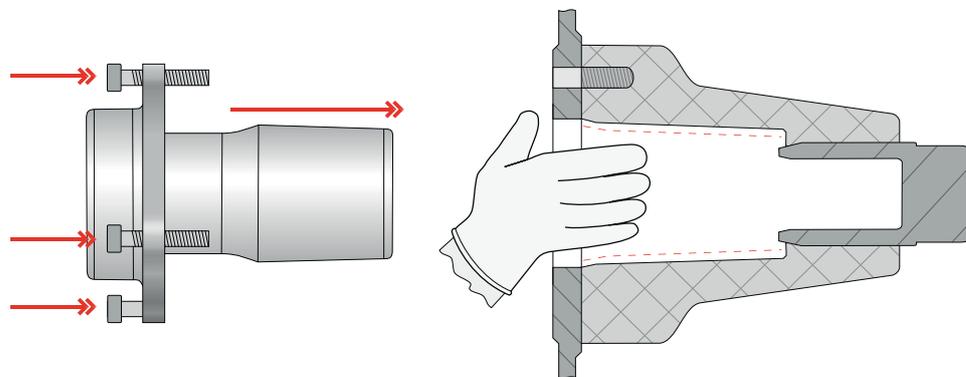


- 4 Clean the inside of the socket (recommended cleaning agents: benzene, acetone) and grease thinly and evenly with PFISTERER MV-special grease. Wear clean protective gloves (e.g. latex or plastic).

- 5 Insert cover (not voltage-proof) or dummy plug (voltage-proof).

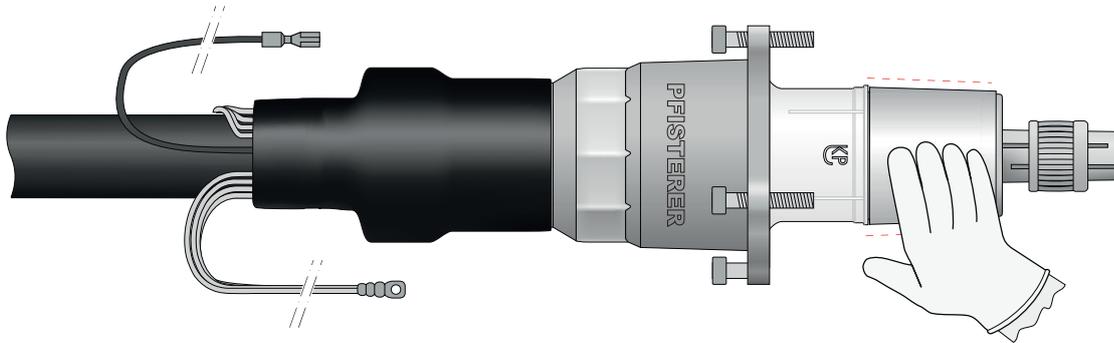


When using the dummy plug, grease is required!

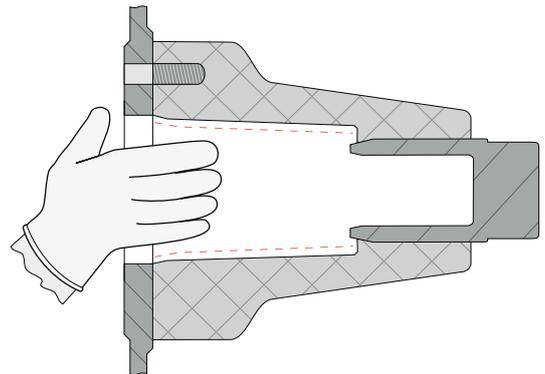


12.2 Plugging in

- 1 Clean the surface of the insulating part (recommended cleaning agents: benzene, acetone) and grease thinly with PFISTERER MV-special grease. Wear clean protective gloves (e.g. latex or plastic).



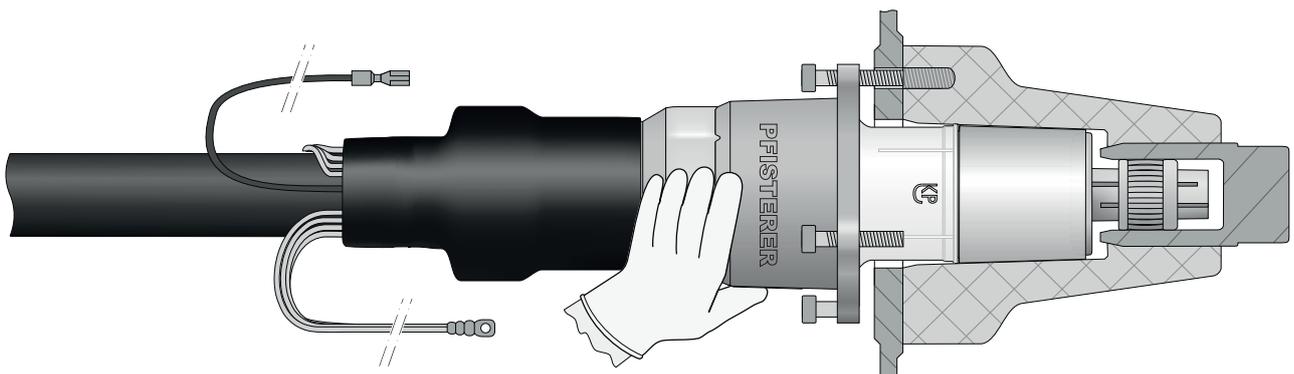
- 2 Clean the inside of the socket (recommended cleaning agents: benzene, acetone) and grease thinly with PFISTERER MV-special grease. Wear clean protective gloves (e.g. latex or plastic).
Do not apply grease to the contact area!



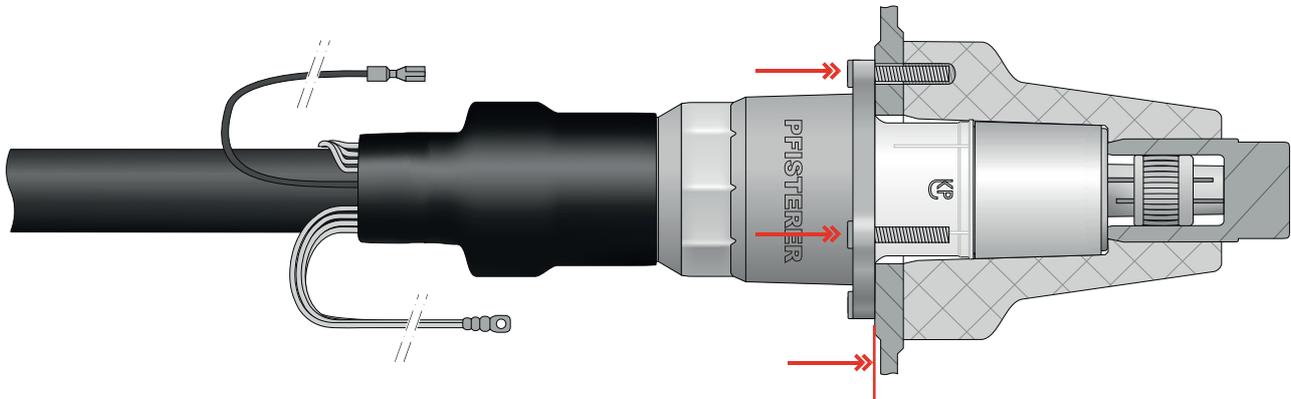
- 3 Introduce the CONNEX separable connector into socket and screw in the screws.



The bell flange must be held with pressure on the insulating part until the screws grip.



- 4 Tighten the screws all round with the SW6 T-handle screwdriver (torque 15 Nm).



A „settling time“ of 1 hour is needed before starting up the system.

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