eddicy A Schaltbau Brand

HV

Connectors for high powers
in DC applications
Assembly and maintenance
instructions

Document revision

Date	Version	Description	Pages
2024-08-06	V 1.0	1st edition	All

Contents

Important background information

Legal information

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Conventions for these instructions

These instructions outline the installation and maintenance of the connector.
In these instructions, cross references are shown in ***bold and italics***.
The following symbols are used in these instructions to highlight safety instructions and information of particular importance:

Symbol / signal word	Meaning	Possible consequences
DANGER	Directly threatening danger	Death or severe injuries will result
WARNING	Dangerous situation	Death or severe injuries may occur
CAUTION	Dangerous situation	Slight or minor injuries may occur
ATTENTION	Warning of possible property damage	Material damage to the system, assemblies or nearby property may occur
INFO	Notes on technical features, methods for simplifying work or other information of particular importance	

General and safety information

The connectors dealt with here are parts of high-voltage systems for special application areas. They have been designed and tested according to the relevant accepted codes of practice. In general, if electrical equipment is deployed incorrectly, operated incorrectly or inadequately maintained with unauthorised work being performed, the results could include severe harm to health and property damage. Consequently, these instructions must be strictly observed for the operation, maintenance and installation of the connectors.
If anything is not clear, clarification must be sought with any queries stating the device type and the serial number.
For installation, operation and maintenance, it is required that planning and execution of the mechanical and electrical installations, transport, erection and commissioning as well as maintenance and repair work must be carried out by responsible specialists with appropriate technical knowledge.
This applies both to compliance with the general installation and safety regulations for working on low voltage installations and also the correct use of approved tools. Electrical devices must, as far as possible, be protected against moisture and dust during installation, operation or storage.

Observation of the instructions

- Personnel must read, understand and observe the instructions for all work that arises.
- Always comply with all safety instructions strictly and precisely!

Duties of the operating company

- Comply with the relevant national regulations and other applicable safety regulations for the use and assembly of connectors and plug/socket combinations.
- Observe all applicable national regulations, all safety, accident prevention and environmental protection regulations as well as the recognised technical rules for safe and correct working.
- Regularly check all fitted protection and safety equipment for correct function.
- Work on electrical equipment must only be carried out by a qualified electrician or by instructed persons under the supervision and control of a qualified electrician in accordance with electrical regulations.
- A specialist is someone who, on the basis of their technical training, knowledge and experience as well as knowledge of the relevant regulations, is able to assess the work assigned to them and identify possible dangers.
- Ensure that the components are installed in accordance with the information in these instructions. Improper installation can result in malfunctions or damage.
- Personnel must be clearly informed about who is responsible for service and maintenance work on the connectors.

Intended use

- The connectors are designed exclusively for making and breaking pluggable connections between components, devices and systems. They are used to conduct electrical energy.
- It must be ensured that the plugs or sockets are always fitted with socket contacts on the live side as per DIN EN IEC 61984.
- Crimp connections must be made as per DIN EN IEC 60352-2, Solderless Connections.
- It must be ensured that connecting cables are free from impermissible tensile, compressive, bending and torsional loads.
- None of the conditions of use as specified in our ***Catalogue A88*** in the section "***Technical data***", such as voltages, currents, ambient conditions, etc., may be changed.
- Only personnel who fulfil the requirements given in these installation and maintenance instructions may work on the connectors.
- As per DIN EN IEC 61984, the connectors are components that must not be plugged in or disconnected when they are live.
- If it is difficult to connect or disconnect the connectors, this indicates a problem (e.g. dirt, bent contacts, etc.), the cause of which must be rectified immediately. Plugging together of plug and socket connectors using excess force is not permitted.
- To fulfil the requirements of the protection class, and for protection against dirt and moisture ingress, the socket lid must always be closed correctly when the socket is unplugged.
- Do not overload the components or devices beyond their specified loading limits. Overloading can lead to premature wear or damage. Failure to observe these notes can result in damage to the sockets, components or devices resulting in the guarantee becoming invalid. To ensure optimum performance and a long service life of the sockets, components or devices, they must always be used and maintained correctly.
- Do not try to repair components or devices yourself or use spare parts other than those authorised by the manufacturer. If necessary, contact an authorised service technician.
- Only use the connectors in the described application area and use only with original parts. Any other use or any modification of the connectors is considered improper use. No liability will be accepted for damage resulting from improper use or incorrect operation.

Ambient conditions

ATTENTION

The connectors were designed for special ambient conditions.

- Only operate the connectors under the ambient conditions, such as temperature ranges and IP protection classes, as specified in our ***Catalogue A88*** under the section "***Technical data***". Download from: www.schaltbau.com

Note:
At very low or very high ambient temperatures that are approaching the approved operating temperature range in our ***Catalogue A88*** in the section "***Technical data***": greater force may be required for plugging or disconnecting and consequently the service life of plugs and sockets may be shortened by increased wear.

Hazards and safety precautions

Electrical hazards

DANGER

The connectors contain components that are live with dangerous voltages. Danger to life!

Always observe the following safety rules before starting work on electrical systems:

- Disconnect
- Secure to prevent switching back on
- Clearly identify the working area
- Check that a voltage-free state exists
- Earth and short-circuit
- In addition to the main electric circuits, also disconnect additional and auxiliary circuits.
- Cover or cordon off adjoining live parts.
- A zero-volts state can only be certified by a qualified electrician.

WARNING

Dirt, moisture, snow and ice on the inside of sockets will contaminate the plug. Connecting up a soiled plug to a socket could result in a fatal electric shock!

- Before inserting a plug into a socket, always check that there is no dirt, moisture, snow or ice inside the socket.
- Do not insert any plug into a socket if it is dirty, wet or has been soiled by snow and ice.
- Remove any dirt, moisture, snow or ice from the inside of sockets and the plug, ensuring there are absolutely no residues.
- Never couple up a soiled plug to a socket.

Mechanical hazards

⚠ CAUTION

The connectors contain components that are mechanically loaded. Risk of crushing!

- Use suitable tools when performing installation and maintenance work on the connectors.
- Secure parts that are under mechanical stress before fitting or removing them.

⚠ CAUTION

The connectors include sharp-edged components. Risk of injury!

- Use suitable tools when performing installation and maintenance work on the connectors.
- Wear safety gloves when handling components with sharp edges.

Other hazards

⚠ WARNING

Incorrect use can lead to accidents and severe personal injury.

- Only use the connectors for the purposes indicated in the specifications and data sheets.
- The manufacturer will not be responsible for accidents resulting from incorrect use of the product.
- We recommend the use of residual current protection systems in systems with voltages greater than safety extra-low voltages.

⚠ WARNING

Making and breaking connections when the connectors are under load can cause arcing. There is a risk of fire or explosions if explosive substances or any type of ignition source are in the vicinity.

- Never connect or disconnect the connectors under load.

⚠ CAUTION

Depending on the ambient temperature and other operating conditions, operation may cause the connectors to become hot. Danger of burns to the hands!

- Wear safety gloves when connecting or disconnecting the connectors at high ambient temperatures.

Measures for preventing damage and malfunctions

To ensure a long service life and fault-free operation of all components and equipment, the following instructions must be observed:

ATTENTION

Corrosive liquids can damage the connectors.

- Ensure that the connectors do not come into contact with corrosive liquids.
- Do not use any corrosive or abrasive cleaning agents to clean the components or devices.

ATTENTION

Improper handling of the connectors, e.g. hard impact on the floor, can cause breaks, cracks and deformation.

- Ensure that connectors are handled correctly.
- Do not throw a plug with cable onto the floor.
- Perform periodic visual checks of the connectors to detect any damage that may have occurred.
- Replace any damaged parts immediately.

ATTENTION

Improper handling when plugging in or unplugging the connectors may damage them. If parts are damaged, the operating safety of the connectors is no longer ensured.

- Ensure that plugs and sockets are not tilted.
- Before plugging together, ensure that plug, socket and socket lid are not soiled. If necessary remove any soiling that may be present.
- To undo a plug connection, always pull on the connector, never on the cable.
- Do not use extension pipes or similar tools to open the socket lid or other mechanical components or equipment, especially when they are iced up or stiff.
- Do not use a hammer or other tool to separate a plug connection.
- Always return the socket lid manually, do not allow it to spring back!
- Ensure that the socket lid is always correctly closed when unplugged.

ATTENTION

Improper use can damage the connectors. If parts are damaged, the operating safety of the connectors is no longer ensured.

- Ensure that connectors are used correctly.
- Do not use the locking lever with handle as a lifting aid.
- The handle, lever or any other surface of the socket, connector, components or devices must not be used as a climbing aid during maintenance, shunting work or other activities.

ATTENTION

If connector components are damaged, worn and/or soiled, the operational safety of the plug connection is no longer ensured.

- Perform periodic visual checks of the connectors for any wear, damage or soiling.
- Renew any damaged parts immediately.
- Remove any soiling immediately without leaving any residues.
- If any parts are permanently soiled, replace them.

Description

HV series connectors are suitable for a wide range of high power applications.
The connectors can be used for energy transfer at rail vehicle or truck transitions or to connect the tractor unit and trailer of heavy electric vehicles. Other applications include the connection of powerful battery packs - here the HV series is used as a high-performance charging connector.
The feedback for the presence of a plug can optionally be made via a snap-action switch integrated in the socket.

The following components are available for HV-series connectors:

- Plug with cable gland or gland for corrugated tube
- Pin contacts for plugs (main, PE and signal contacts) with different connection cross sections
- Plug with cable gland or gland for corrugated tube, optionally with a snap-action switch for detection of a correctly inserted plug
- Socket contacts for sockets (main, PE and signal contacts) with different connection cross sections

Plug

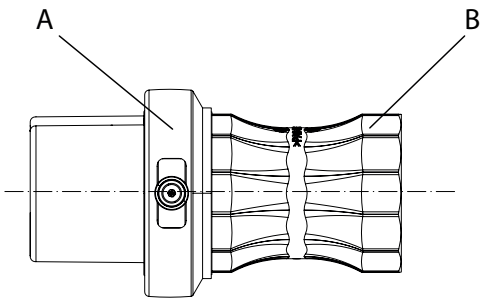
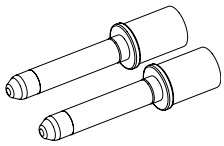


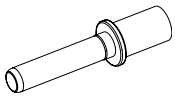
Fig. 1: Plug with cable gland or gland for corrugated tube

A Plug, including pin contacts
B End housing for cable gland or gland for corrugated tube (M63x1.5 - 15 deep), 68 AF

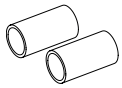
Pin contacts for plugs



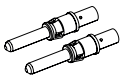
Main contacts with contact protection Ø 10 mm
Connection cross section:
50 / 70 / 95 mm²
(for contact chambers 1 + 2)



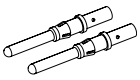
PE contact Ø 10 mm
Connection cross section:
50 mm²
(for contact chamber 5)



Reducing bushings for main and PE contacts for reduction of the connection cross section from 50 to 35 mm²



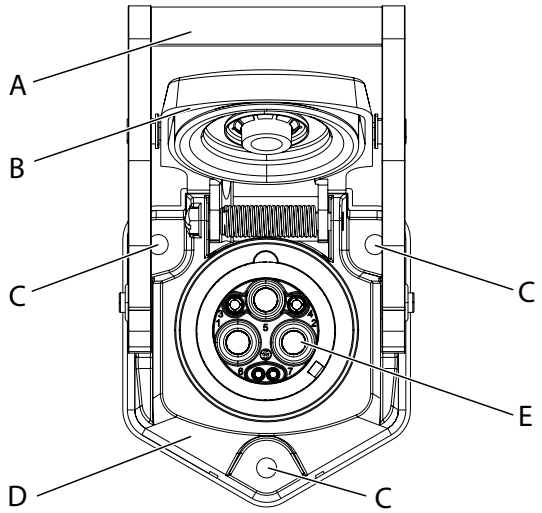
Signal contacts Ø 4 mm
Connection cross section:
2.5 / 4 / 6 mm²
(for contact chambers 3 +4)



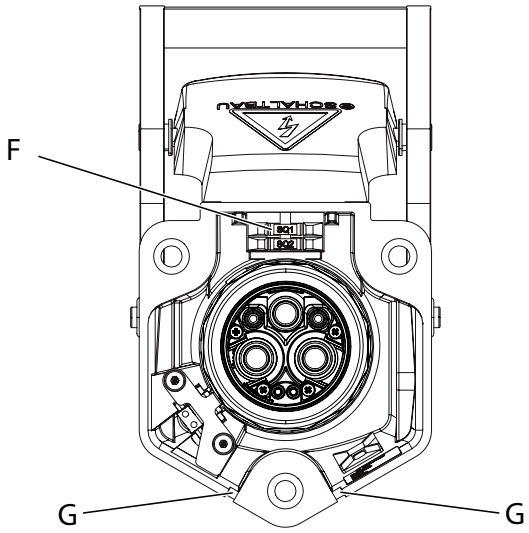
Signal contacts Ø 3 mm
Connection cross section:
0.75...1 / 2.5 mm²
(for contact chambers 6 +7)

Reducing bushings for signal contacts for reducing the connection cross section
- from 2.5 to 1.5 mm²
- from 2.5 to 1.0 mm²
- from 2.5 to 0.5 mm²

Socket



Front view



Rear view (without flange seal)

Fig. 2: HV socket

A Cover grip
B Lid
C Mounting holes Ø 8.8 mm: Tightening torque min. 15 Nm
D Socket housing
E Contact insert with socket contacts
F Terminal strip for snap-action switch: SQ1, SQ2, connection cross section max. 2.5 mm, (only for version with snap-action switch)
G Drainage slot (only for version with drainage slot)

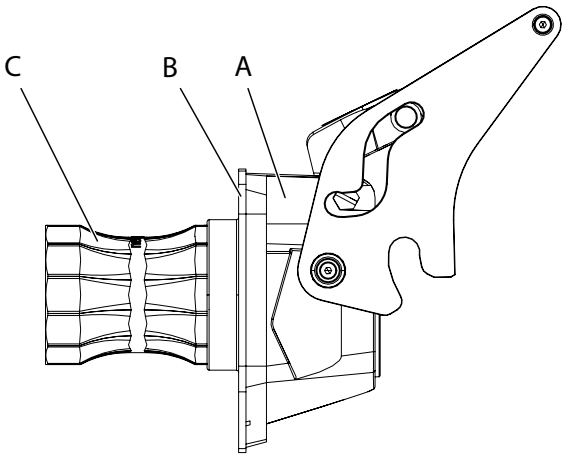
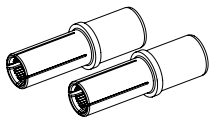


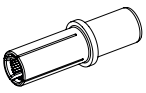
Fig. 3: HV socket with cable gland or gland for corrugated tube

A Socket, including socket contacts
B Flange seal
C End housing for cable gland or gland for corrugated tube (M63x1.5 - 15 deep), 68 AF

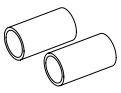
Socket contacts for sockets



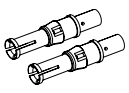
Main contacts with contact protection Ø 10 mm
Connection cross section: 50 / 70 / 95 mm²
(for contact chambers 1 + 2)



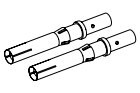
PE contact Ø 10 mm
Connection cross section: 50 mm²
(for contact chamber 5)



Reducing bushings for main and PE contacts for reduction of the connection cross section from 50 to 35 mm²



Signal contacts Ø 4 mm
Connection cross section: 2.5 / 4 / 6 mm²
(for contact chambers 3 +4)



Signal contacts Ø 3 mm
Connection cross section: 0.75...1 / 2.5 mm²
(for contact chambers 6 +7)

Reducing bushings for signal contacts for reducing the connection cross section
- from 2.5 to 1.5 mm²
- from 2.5 to 1.0 mm²
- from 2.5 to 0.5 mm²

Installation

Always observe all safety instructions in sections ***„General and safety information“*** and ***„Hazards and safety precautions“***, before starting the installation work.

ATTENTION

If parts are damaged, the operating safety of the plug connection is no longer ensured.

- Before commencing installation, check all parts for possible transport damage.
- Do not install damaged parts.

ATTENTION

- During installation, ensure that dirt cannot penetrate the connector from any construction work being carried out nearby.

The dimensions of all connector components for vehicle interfaces can be found in the corresponding data sheets or in our ***Catalogue A88***. Download from: www.schaltbau.com

Socket

Requirements / preparatory measures

Crimp connections must be made as per DIN EN IEC 60352-2, Solderless Connections.
The surface of the mounting surface must have average roughness height Rz of 6.3 ...12.5 µm.
The installation position of the socket must be such that it is not tilted more than 30°.

DANGER

The earthing connection is made via the mounting holes. An electrically conducting path must be ensured between the socket and the mounting surface!

- Before installation, ensure that the earthing surfaces A (***Fig. 4***) on the socket and mounting surface C (***Fig. 5***) are free from paint and any soiling.
- If necessary, completely remove any paint and possible soiling from the earthing surfaces, e.g. using a brass brush. The earthing surfaces must be bright metal.

- The socket is attached to a suitable mounting surface on a vehicle wall using 3 M8 hexagon socket screws. To prevent the screws from coming undone, provide suitable screw locking elements.
- The tightening torque (at least 15 Nm) and the length of the mounting screws must be specified dependent on the design circumstances.
- The dimensions and arrangement of mounting holes must be taken from ***Fig. 5***.

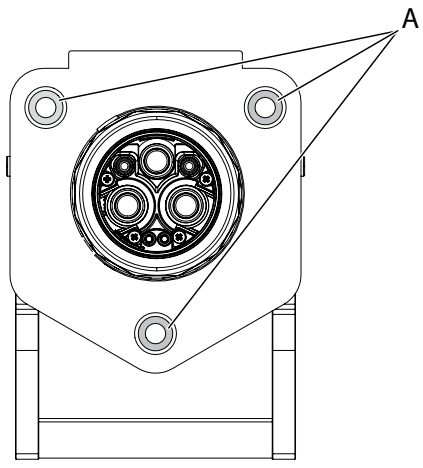


Fig. 4: Socket earthing surfaces
A Spray-galvanised earthing surfaces

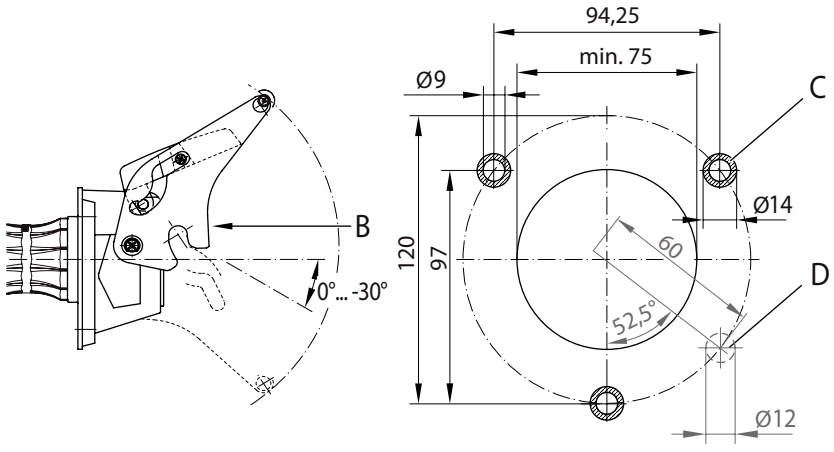


Fig. 5: Mounting holes for sockets
B Mounting holes, view from the front
C Hatched area: paint-free, galvanised or tinned
D Optional cable gland for snap-action switch (with separate wiring)

Pinout / connection diagram

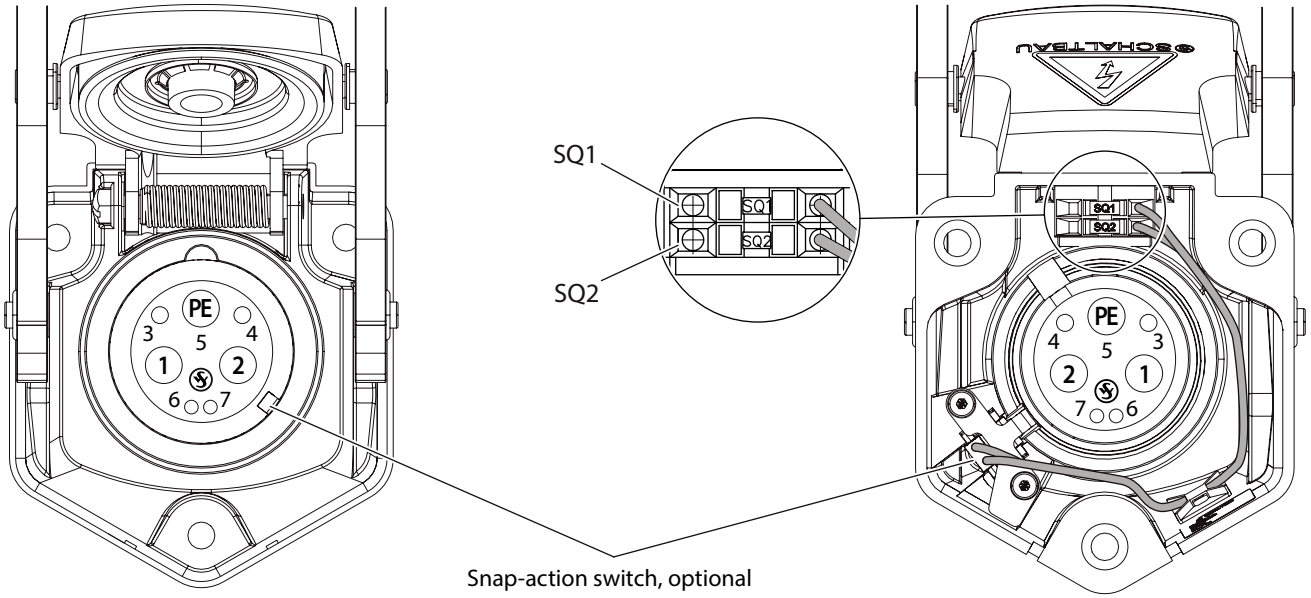


Fig. 6: Labelling of the socket contacts and terminal strip on the socket

Contact designation	Labelling of the pin contacts on the socket	Cable cross section [mm²]
Main contacts	1, 2	95 / 50 / 70
PE protective earth conductor	5	50
Signal contacts Ø 4 mm	3, 4	2.5 / 4 / 6
Signal contacts Ø 3 mm	6, 7	0.75...1 / 2.5
Terminals for snap-action switch connection (optional)	SQ1 / SQ2	2.5

* Only for socket versions with a snap-action switch for detection of an inserted plug

Socket assembly

Tools required

- Insulation stripping tool
- Crimping tools, crimp inserts (see section ***„Tools“***)

Cable stripping for main and PE contacts

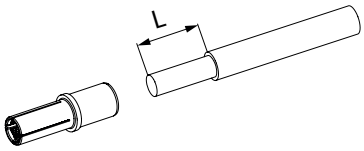


Fig. 7:

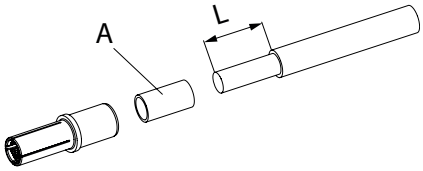


Fig. 8:

1. Strip cables for the main contacts - depending on the wire cross-section - to length L as indicated in the table below (***Fig. 7***).
   If a reduction of the connection cross section is necessary, use reducing bushing (A) (***Fig. 8***).

Contact Ø [mm]	Cable cross section [mm²]	With reducing bushing (A)	Stripping length L [mm]
10	35	Rb-50/35	20
	50	-	
	70	-	
	95	-	25

Cable crimping at main and PE contacts

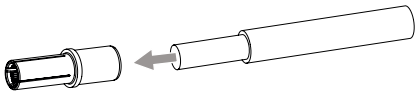


Fig. 9:

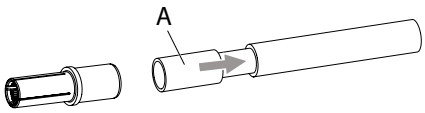


Fig. 10:

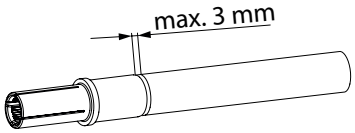


Fig. 11:

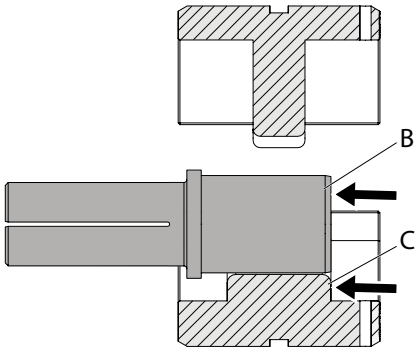


Fig. 12:

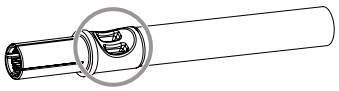


Fig. 13:

Without use of reducing sleeves:

1. Push the bare cable braid into the connection area of the contact (***Fig. 9***).

With use of reducing bushings:

1. Push the reducing bushing (A) as shown in ***Fig. 10*** onto the bare cable braid and push the cable braid together with the reducing bushing into the connection area of the contact.
2. When doing so, ensure that the gap between insulation and contact is not more than 3 mm (***Fig. 11***).
3. Insert a crimp insert suitable for the cable cross section into the crimp tool (see section ***„Tools“***).
4. When inserting and crimping the contact in the crimp insert, ensure that the end face of the contact in the connection area (***Fig. 12/***B) is flush with the end face of the crimp anvil (***Fig. 12/***C).
5. Crimp contact and cable (if necessary including the reducing bushing) as shown in ***Fig. 13***.

Cable stripping for signal contacts

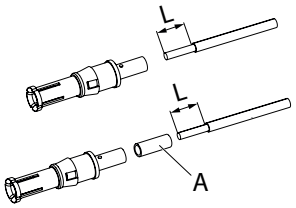


Fig. 14:

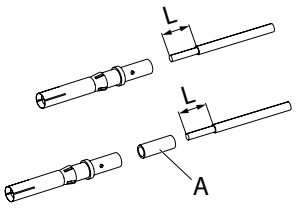


Fig. 15:

1. Strip the cables for the signal contacts to length L as indicated in the table below (***Fig. 14*** or ***Fig. 15***).
   If a reduction of the connection cross section is necessary, use reducing bushing (A) (***Fig. 14*** or ***Fig. 15***).

Contact Ø [mm]	Cable cross section [mm²]	With reducing bushing (A)	Stripping length L [mm]
4	0.5	Rb-2.5/0.5	8.5
	0.75...1	Rb-2.5/1.0	
	1.5	Rb-2.5/1.5	
	2.5	-	
	4	-	
	6	-	
3	0.5	Rb-2.5/0.5	
	0.75...1	-	
	1.5	Rb-2.5/1.5	
	2.5	-	

Cable crimping at signal contacts

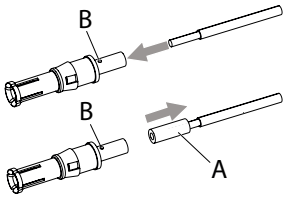


Fig. 16:

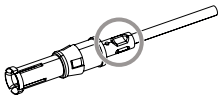


Fig. 17:

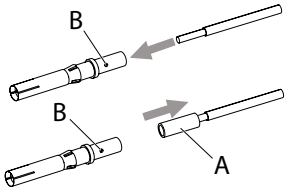


Fig. 18:

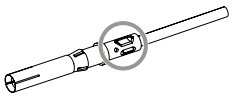


Fig. 19:

Without use of reducing sleeves:

1. Push the bare cable braid into the connection area of the contact (***Fig. 16*** or ***Fig. 18***).

With use of reducing bushings:

1. Push the reducing bushing (A) as shown in ***Fig. 16*** or ***Fig. 18*** onto the bare cable braid and push the cable braid together with the reducing bushing into the connection area of the contact.

2. Push the cable braid (if necessary including the reducing bushing)into the contact until it is visible in the checking hole (***Fig. 16***/B bzw. ***Fig. 18***/B).
3. Crimp contact and cable (if necessary including the reducing bushing) using the crimping tool (see section ***„Tools“***), as shown in ***Fig. 17*** or ***Fig. 19***.

4. Check the crimp connections for tight and correct connection.
   - Ensure that no individual wire threads project out.
   - Check the tightening force according to DIN EN 61238-1.

Socket contact installation

Tools required

- Screwdriver: EJOT TORX PLUS® / AUTOSERT ® 10IP
- Torque wrench Tightening torque 1.4 Nm

Assembly steps overview

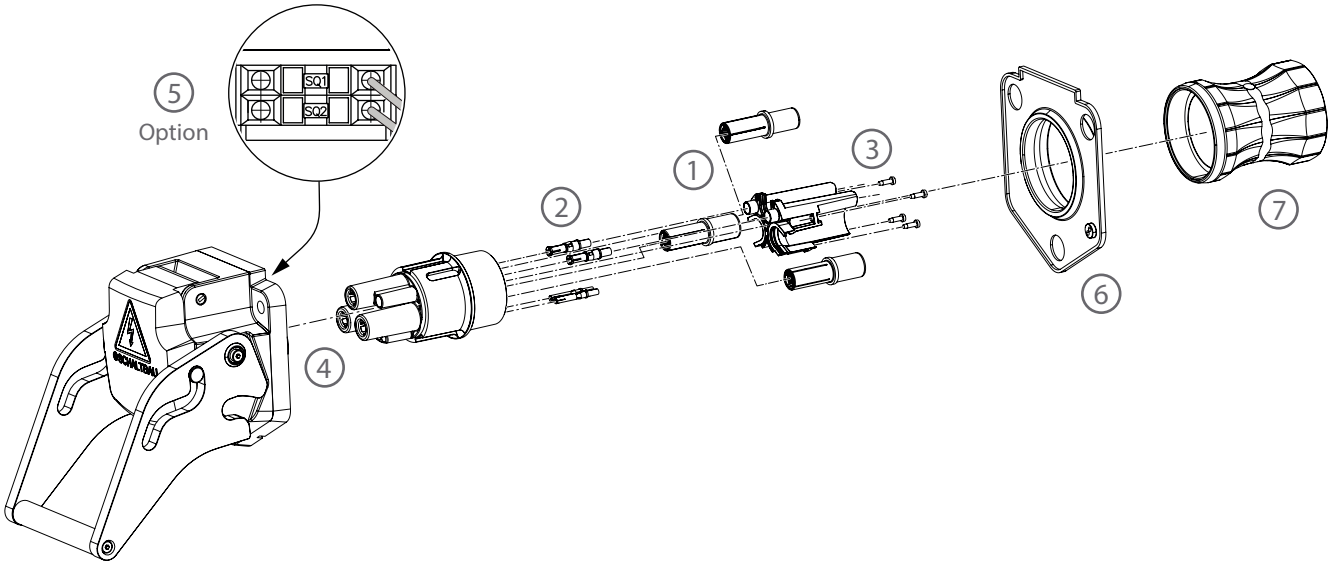


Fig. 20: Socket assembly steps overview

The assembly steps (1) to (7) are described in detail on the following pages.

1 Main and PE contact installation

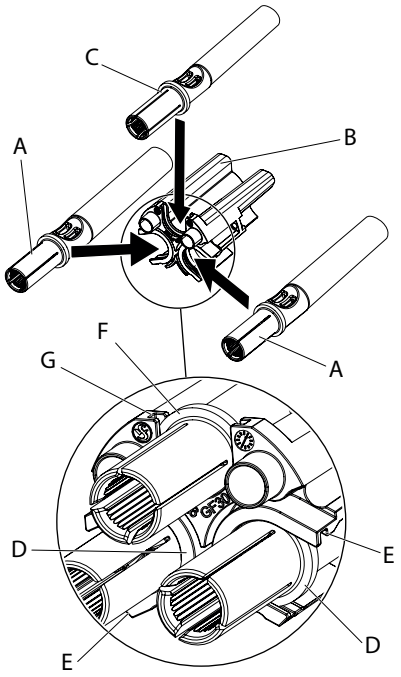


Fig. 21:

WARNING

An incorrect connection could result in a fatal electric shock.

- Observe the polarity.

1. Push the main contacts (A) with crimped cables from the side into the contact holder (B). The collar (D) of the contacts must be inserted into the corresponding guide (E) (***Fig. 21***).
2. Push the PE contact (C) from above into the contact holder (B). The collar (F) of the contact must be inserted into the corresponding guide (G) (***Fig. 21***).

2 Signal contact installation

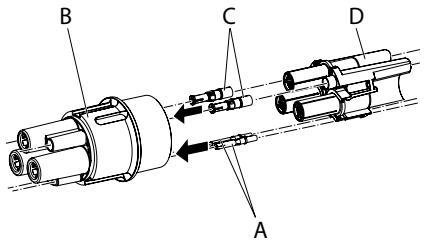


Fig. 22:

1. Push the signal contacts (A) with crimped cables into the respective chamber in the contact insert (B) until the retaining clip engages (***Fig. 22***).
2. Push the signal contacts (C) with crimped cables through the respective guide channel of the contact holder (D) and push into the contact insert (B) until the retaining clip engages in the contact insert (B) (***Fig. 22***).
3. Pull gently on the cables to check whether the contacts are correctly fixed and the retaining clips are engaged.

3 Inserting contact holder with contacts into the contact insert

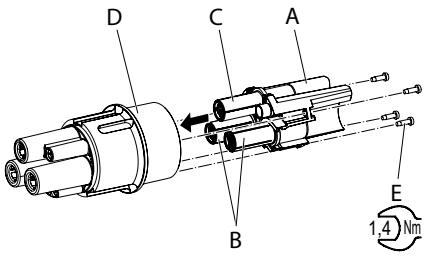


Fig. 23:

1. Push contact holder (A) with contacts (B and C) into the contact insert (D) (***Fig. 23***).
2. Screw the contact holder (A) to the contact insert (D) using four mounting screws (E) (***Fig. 23***).
   Tightening torque: 1.4 Nm

4 Pushing the contact insert into the socket

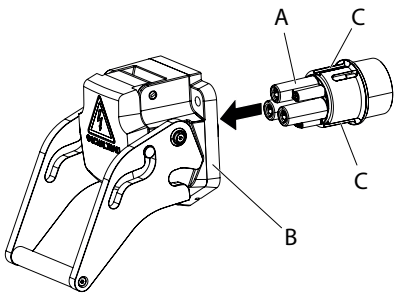


Fig. 24:

1. Push the ready-made and fully assembled contact insert (A) into the socket (B) (***Fig. 24***).
   In doing so be aware of keying (C).

5 Clipping on the cable for the snap-action switch (option)

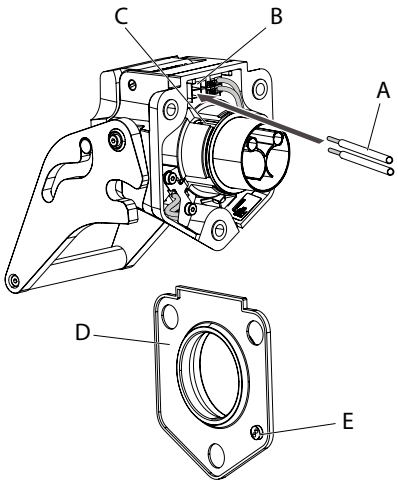


Fig. 25:

1. Connect the stripped cable strands of the snap-action switch to terminals SQ1 and SQ2 (left empty terminal chambers) on the terminal strip (B) (***Fig. 25***).
2. Guide the other ends of the cables out of the socket through the opening (C) on the contact holder and the contact insert.

Alternatively:

1. Connect the stripped cable strands of the snap-action switch to terminals SQ1 and SQ2 (left empty terminal chambers) on the terminal strip (B) (***Fig. 25***).
2. Pierce the seal (D) at the intended point (E) with a sharp pointed tool and pull the two cable strands through the flange seal at the pierced point (E).
   In doing so, always secure the cable strands with protective tubing!
   - Ensure that the cable strands are not caught up!

6 + 7 Installing the flange seal and end housing

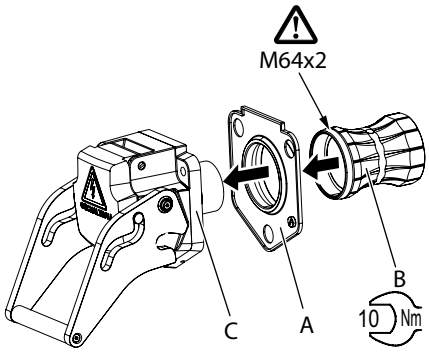


Fig. 26:

1. Before installation, thread the flange seal (A) end housing (B) from the loose end onto the existing wiring harnesses.
2. Push the flange seal (A) onto the socket housing (C) and align it with the outer contour of the socket flange. (***Fig. 26***).
3. Screw end housing (B) onto socket (C).
   - In doing so, observe the direction of the end housing (male thread M64x2)
   - Tightening torque: 10 Nm

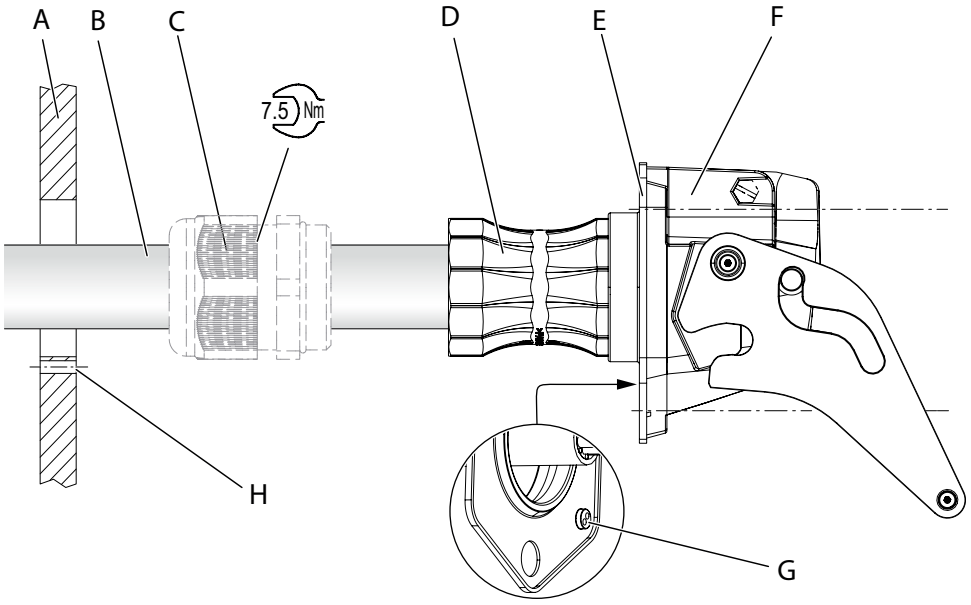


Fig. 27: Socket installation

A Vehicle wall / fastening surface
B Connecting cable or corrugated tube
C Cable gland or gland for corrugated tube (not supplied)
D End housing (tightening torque: 10 Nm)
E Flange seal
F Socket housing
G Only for version with snap-action switch:
Opening for cable strands through flange seal (for alternative connection of the snap-action switch with separate wiring)
H Only for version with snap-action switch:
Opening for cable strands through flange seal (for alternative connection of the snap-action switch with separate wiring)

1. Screw the cable gland (C) or gland for corrugated tube (not supplied) to the end housing (D) (tightening torque: 7.5 Nm).
2. Push the connecting cable (B) of the pre-assembled and fully mounted socket with the loose end from the front through the cable opening (Ø at least 75 mm) on the vehicle wall (A).
3. **Only for alternative connection of the snap-action switch with separate wiring:**
   Pull the two separate cable strands of the snap-action switch, which are routed through the flange seal at the pierced point (G), through the prepared separate mounting hole (H) in the vehicle wall. (See also ***„Fig. 5: Mounting holes for sockets" on page 8***)
   - In doing so, always secure the cable strands with protective tubing!
   - Ensure that the cable strands are not caught up!
4. Ensure that the flange seal (F) is aligned in accordance with the external contour of the socket flange.
5. Fix the socket with flange seal (F) to the vehicle wall (A).
6. Screw the socket to the vehicle wall (A) using 3 M8 hexagon socket screws plus suitable screw locking elements.
7. Tighten the screws according to the vehicle manufacturer's specification (at least 15 Nm).

Check

1. Check that all installed parts are correctly positioned and will not come loose.
2. Check that the socket lid operates correctly.
3. Check that the snap-action switch operates correctly.

DANGER

The socket contains components that may be under high voltage. Danger to life!

- Prior to first use of the socket, it must undergo a high-voltage test.

4. Prior to first use check the socket in accordance with EN 50215.

Plug

Requirements / preparatory measures

Crimp connections must be made as per DIN EN IEC 60352-2, Solderless Connections.

Pinout / connection diagram

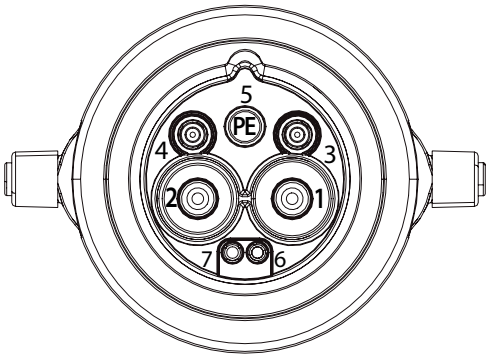


Fig. 28: Labelling of the pin contacts on the plug

Contact designation	Labelling of the contacts on the plug	Cable cross section [mm²]
Main contacts	1, 2	95 / 50 / 70
PE protective earth conductor	5	50
Signal contacts Ø 4 mm	3, 4	2.5 / 4 / 6
Signal contacts Ø 3 mm	6, 7	0.75...1 / 2.5

Plug assembly

Tools required

- Insulation stripping tool
- Crimping tools, crimp inserts (see section ***„Tools“***)

Cable stripping for main and PE contacts

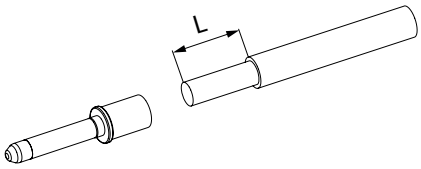


Fig. 29:

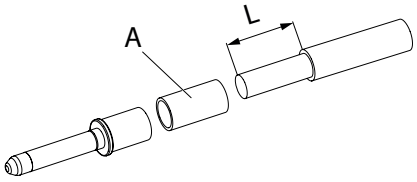


Fig. 30:

1. Strip cables for the main contacts - depending on the wire cross-section - to length L as indicated in the table below (***Fig. 29***).
   If a reduction of the connection cross section is necessary, use reducing bushing (A) (***Fig. 30***).

Contact Ø [mm]	Cable cross section [mm²]	With reducing bushing (A)	Stripping length L [mm]
10	35	Rb-50/35	20
	50	-	
	70	-	
	95	-	25

Cable crimping at main and PE contacts

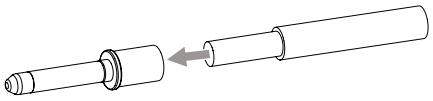


Fig. 31:

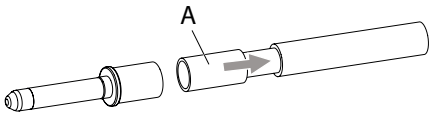


Fig. 32:

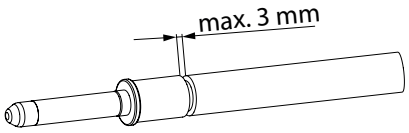


Fig. 33:

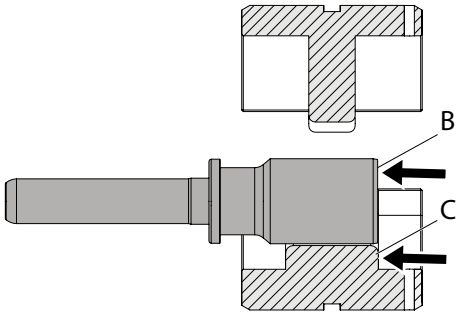


Fig. 34:

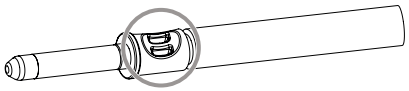


Fig. 35:

Without use of reducing sleeves:

1. Push the bare cable braid into the connection area of the contact (***Fig. 31***).

With use of reducing bushings:

1. Push the reducing bushing (A) as shown in ***Fig. 32*** onto the bare cable braid and push the cable braid together with the reducing bushing into the connection area of the contact.
2. When doing so, ensure that the gap between insulation and contact is not more than 3 mm (***Fig. 33***).
3. Insert a crimp insert suitable for the cable cross section into the crimp tool (see section ***„Tools“***).
4. When inserting and crimping the contact in the crimp insert, ensure that the end face of the contact in the connection area (***Fig. 34/***B) is flush with the end face of the crimp anvil (***Fig. 34/***C).
5. Crimp contact and cable (if necessary including the reducing bushing) as shown in ***Fig. 35***.

Cable stripping for signal contacts

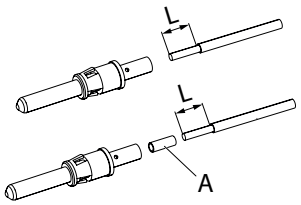


Fig. 36:

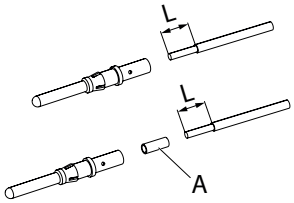


Fig. 37:

1. Strip the cables for the signal contacts to length L as indicated in the table below (***Fig. 36*** or ***Fig. 37***).
   If a reduction of the connection cross section is necessary, use reducing bushing (A) (***Fig. 36*** or ***Fig. 37***).

Contact Ø [mm]	Cable cross section [mm²]	With reducing bushing (A)	Stripping length L [mm]
4	0.5	Rb-2.5/0.5	8.5
	0.75...1	Rb-2.5/1.0	
	1.5	Rb-2.5/1.5	
	2.5	-	
	4	-	
	6	-	
3	0.5	Rb-2.5/0.5	
	0.75...1	-	
	1.5	Rb-2.5/1.5	
	2.5	-	

Cable crimping at signal contacts

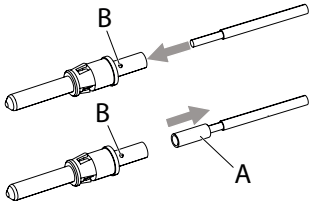


Fig. 38:

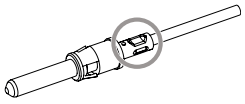


Fig. 39:

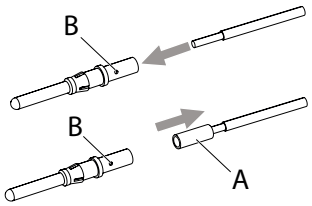


Fig. 40:

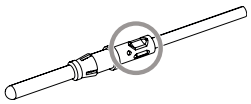


Fig. 41:

Without use of reducing sleeves:

1. Push the bare cable braid into the connection area of the contact (***Fig. 38*** or ***Fig. 40***).

With use of reducing bushings:

1. Push the reducing bushing (A) as shown in ***Fig. 38*** or ***Fig. 40*** onto the bare cable braid and push the cable braid together with the reducing bushing into the connection area of the contact.

2. Push the cable braid (if necessary including the reducing bushing)into the contact until it is visible in the checking hole (***Fig. 38***/B bzw. ***Fig. 40***/B).
3. Crimp contact and cable (if necessary including the reducing bushing) using the crimping tool (see section ***„Tools“***), as shown in ***Fig. 39*** or ***Fig. 41***.

4. Check the crimp connections for tight and correct connection.
   - Ensure that no individual wire threads project out.
   - Check the tightening force according to DIN EN 61238-1.

Pin contact installation

Tools required

- Screwdriver: EJOT TORX PLUS® / AUTOSERT ® 10IP
- Torque wrench Tightening torque 1.4 Nm

Assembly steps overview

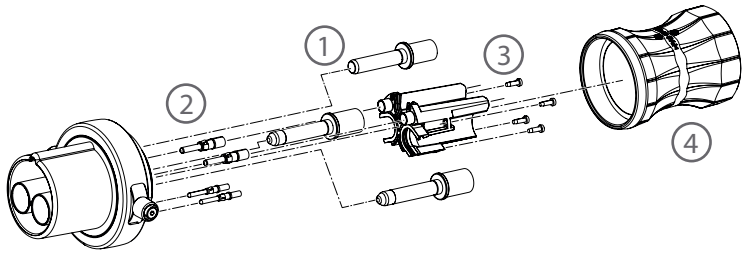


Fig. 42: Plug assembly steps overview

The assembly steps (1) to (4) are described in detail on the following pages.

1 Main and PE contact installation

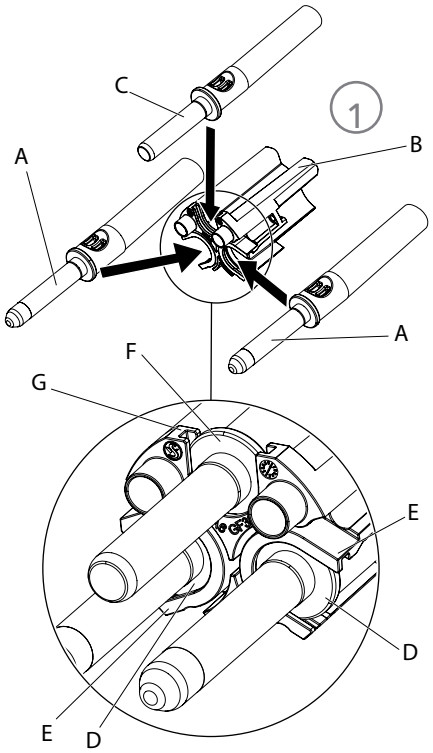


Fig. 43:

WARNING

An incorrect connection could result in a fatal electric shock.

- Observe the polarity.

1. Push the main contacts (A) with crimped cables from the side into the contact holder (B). The collar (D) of the contacts must be inserted into the corresponding guide (E) (***Fig. 43***).
2. Push the PE contact (C) from above into the contact holder (B). The collar (F) of the contact must be inserted into the corresponding guide (G) (***Fig. 43***).

2 Signal contact installation

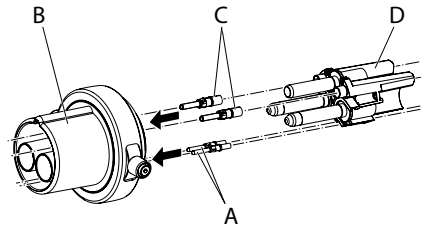


Fig. 44:

1. Push the signal contacts (A) with crimped cables into the respective chamber in the contact insert (B) until the retaining clip engages (***Fig. 44***).
2. Push the signal contacts (C) with crimped cables through the respective guide channel of the contact holder (D) and push into the contact insert (B) until the retaining clip engages in the contact insert (B) (***Fig. 44***).
3. Pull gently on the cables to check whether the contacts are correctly fixed and the retaining clips are engaged.

3 Inserting contact holder with contacts into the contact insert

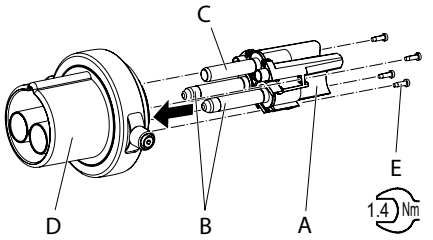


Fig. 45:

1. Push contact holder (A) with contacts (B and C) into the contact insert (D) (***Fig. 45***).
2. Screw the contact holder (A) to the contact insert (D) using four mounting screws (E) (***Fig. 45***).
   Tightening torque: 1.4 Nm

4 End housing installation

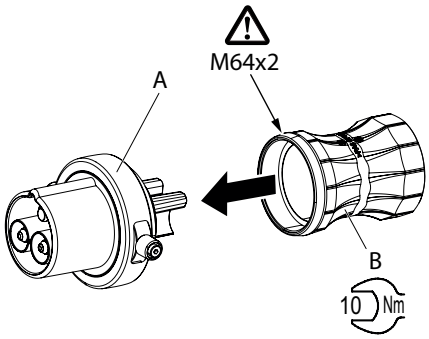


Fig. 46:

1. Before installation, thread the end housing (B) from the loose end onto the existing wiring harnesses.
2. Screw the end housing (B) onto the plug housing (A) (***Fig. 46***).
   - In doing so, observe the direction of the end housing (male thread M64x2)
   - Tightening torque: 10 Nm

Plug installation

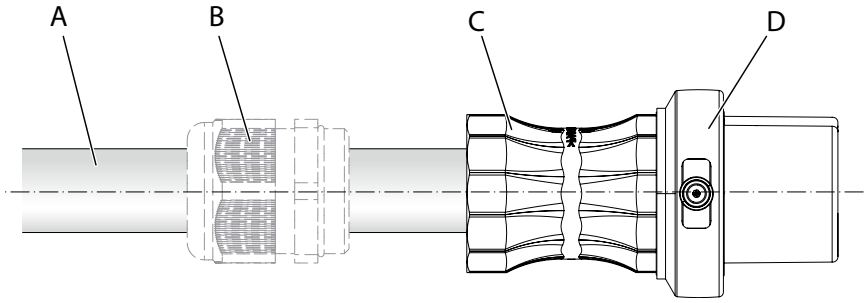


Fig. 47: Plug installation

A Connecting cable or corrugated tube
B Cable gland or gland for corrugated tube (not supplied)
C End housing (tightening torque: 10 Nm)
D Plug housing

1. Screw the cable gland or gland for corrugated tube (B) into the end housing (C).
2. Secure the cable (A) or corrugated tube (A) by tightening the gland (B).

Check

1. Check that all installed parts are correctly positioned and will not come loose.
2. All contacts must be aligned and under no circumstances must they be skewed.
3. Check that the strain relief is tightly fastened.

DANGER

The plug contains components that may be at a high voltage. Danger to life!

- Prior to first use of the plug plus connecting cable, the assembly must be tested at high voltage.

4. Prior to first use check the plug with connecting cable in accordance with EN 50215.

Plugging-in process

Always observe all safety instructions in sections ***„General and safety information"*** and ***„Hazards and safety precautions"***, before performing a plugging-in or unplugging process.

Plugging in

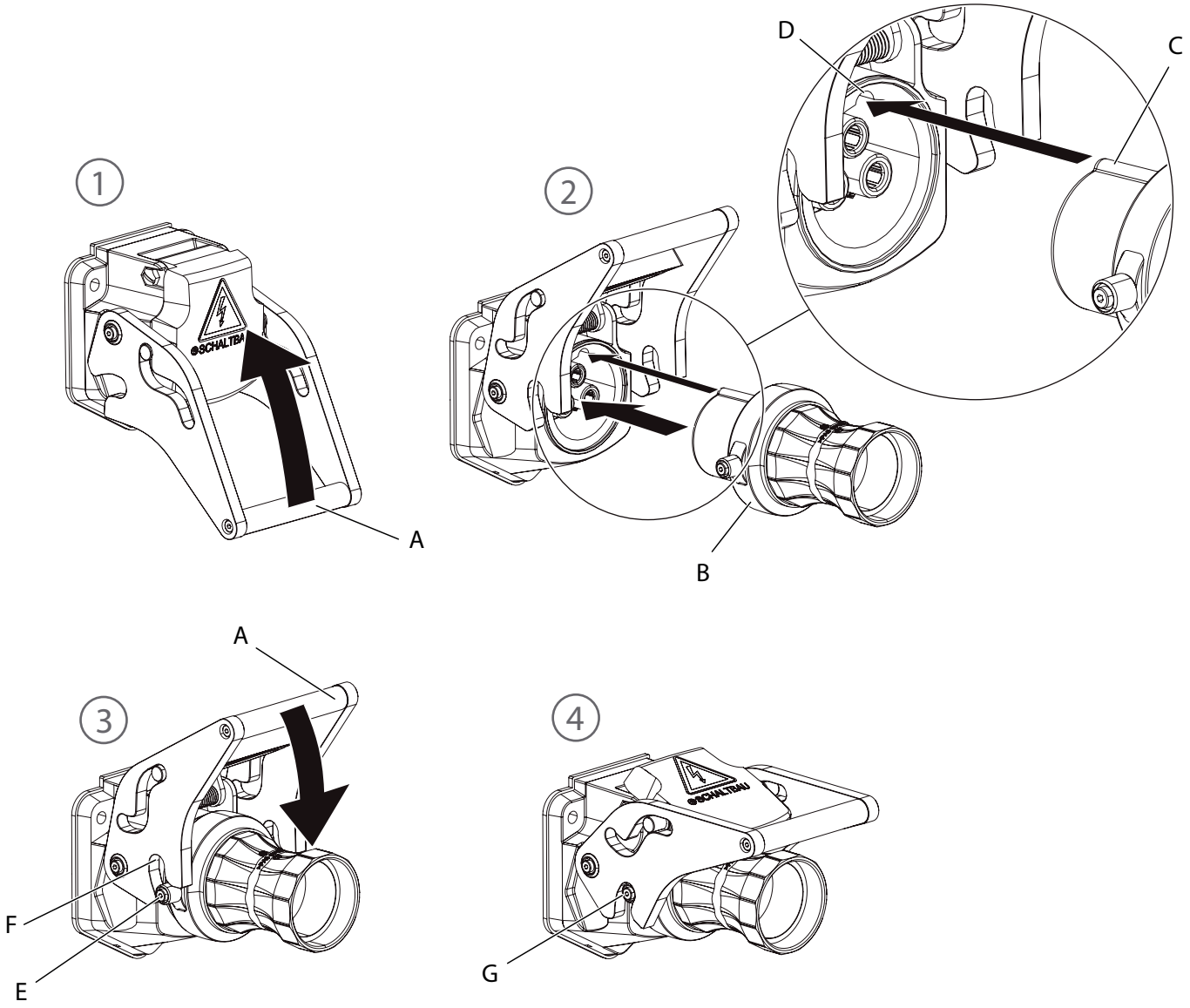


Fig. 48: Plugging in the plug

1. Hold the lid by the handle (A) and fold it fully up.
2. Insert plug (B) into the socket so that guide (C) on the plug slides into groove (D) of the socket without having to apply excess force. In doing so, ensure that the plug and socket are aligned (a plug positioned at an angle will be difficult or impossible to insert manually).
3. Fold the lid down at the handle (A) so that the side supports (E) on the plug engage in the side contour slots (F) on the lid.
4. Fully close the lid. In doing so, the plug is automatically pulled into its end position in the socket and then locked with the help of the two side supports (G).

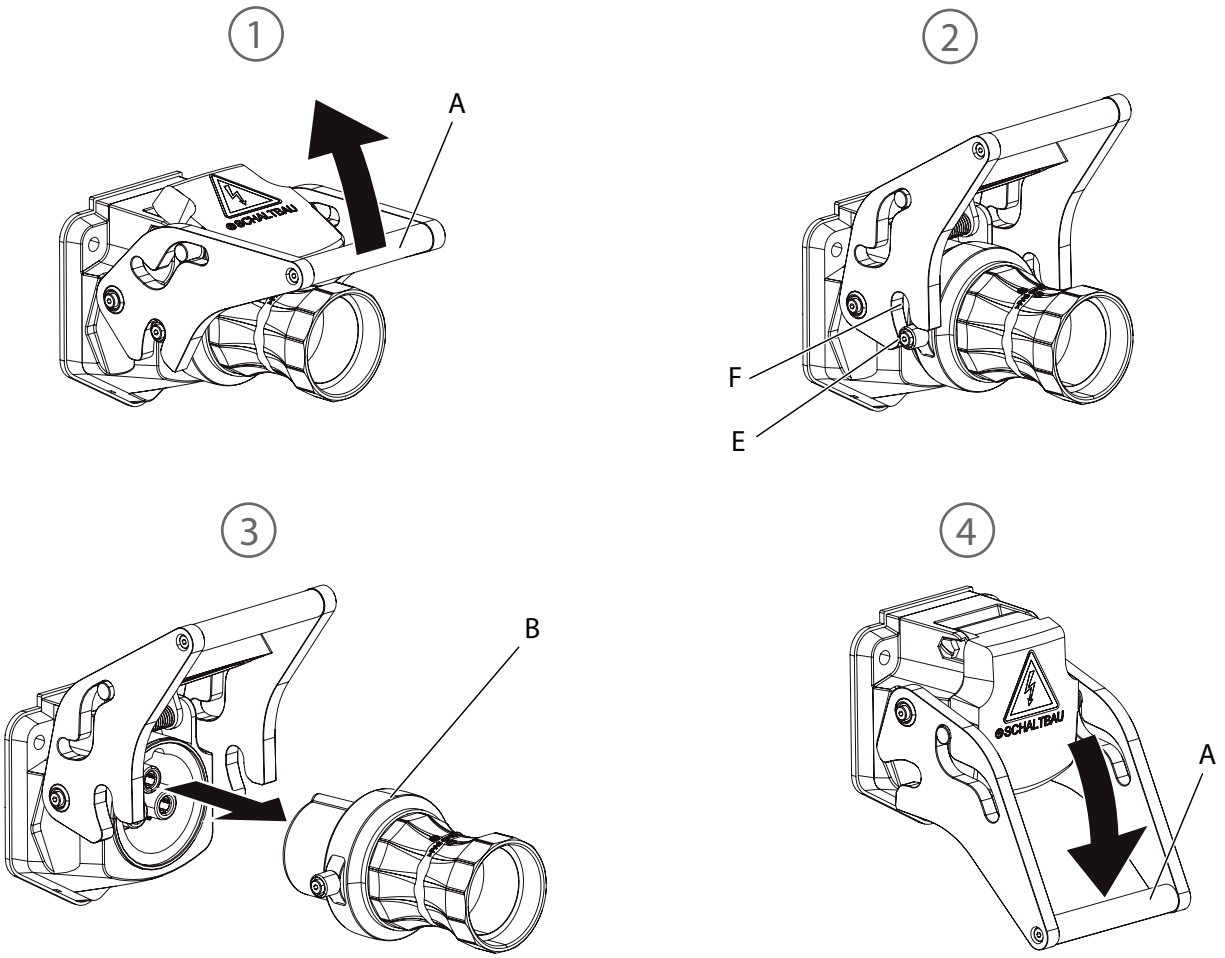


Fig. 49: Disconnecting a plug

1. Hold the lid by the handle (A) and fold it up. This automatically pulls the plug out of the socket.
2. Fold the lid fully up so that the side supports (E) on the plug are released from the side contour slots (F) on the lid.
3. Remove the plug (B) from the socket.
4. Fully close the lid using the handle (A). In doing so, ensure that the lid forms a tight seal with the socket housing.

ATTENTION

To fulfil the requirements of the protection class, and for protection against dirt and moisture ingress, the socket lid must always be closed correctly when the socket is unplugged.

Maintenance

Always observe all safety instructions in sections ***„General and safety information"*** and ***„Hazards and safety precautions"***, before starting any maintenance work.
The following is a list of all maintenance work that may be carried out on the connectors by a specialist.

Maintenance intervals

Check/maintenance	Interval
Visual inspection of - Plug and connecting cable - Sockets	Upon every plugging-in process
Complete maintenance, during which all parts of the plug connection must be checked for damage and correct functioning.	Every 35 to 42 days

Visual check upon every plugging-in process

Plugs, connecting cables and sockets must be visually checked every time they are plugged in.

DANGER

If damage to the cable, plug, socket, socket lid or seals is visible during a visual check, the safety of the plug connection is no longer ensured.

- Immediately submit damaged connector components for maintenance.
- Immediately replace damaged parts with new parts.

In addition to the visual check upon each plugging-in process, complete maintenance must be carried out every 35 to 42 days, during which all parts of the plug connection must be checked for damage and correct functioning.

Socket maintenance

Connector element	Visual /function check/maintenance	Actions
Socket housing	Check for: - Visible damage - Loose or missing fastenings - Correct seating	If faults exist: - Repair elements - Renew any damaged parts immediately
Socket lid	Check for: - Visible damage - Loose or missing fastenings - Correct seating - Sufficient closing force - Cracked or porous lid seal - Broken or deformed torsional spring - Soiling Grease: - Grease locking link and bearing points with OPTITEMP TT1 low-temperature grease	If faults exist: - Repair elements - Renew any damaged parts immediately - Remove soiling
Fastening flange	Check for: - Cracked or porous rubber seal	If faults exist: - Renew rubber seal immediately
Contact insert	Check for: - Visible damage - Soiling	If faults exist: - Repair elements - Renew any damaged parts immediately - Remove soiling
Warning sign ("Danger Electricity")	Check for: - Missing or damaged warning signs	If faults exist: - Replace missing or damaged warning signs

Grease the locking link and bearing points of the socket lid

During the plugging-in and unplugging process, the plug is automatically guided by the locking link of the socket lid and automatically pulled in or out.
To maintain fault-free operation, the parts of this device on the socket must be greased with OPTITEMP TT1 low-temperature grease every 35 to 42 days.

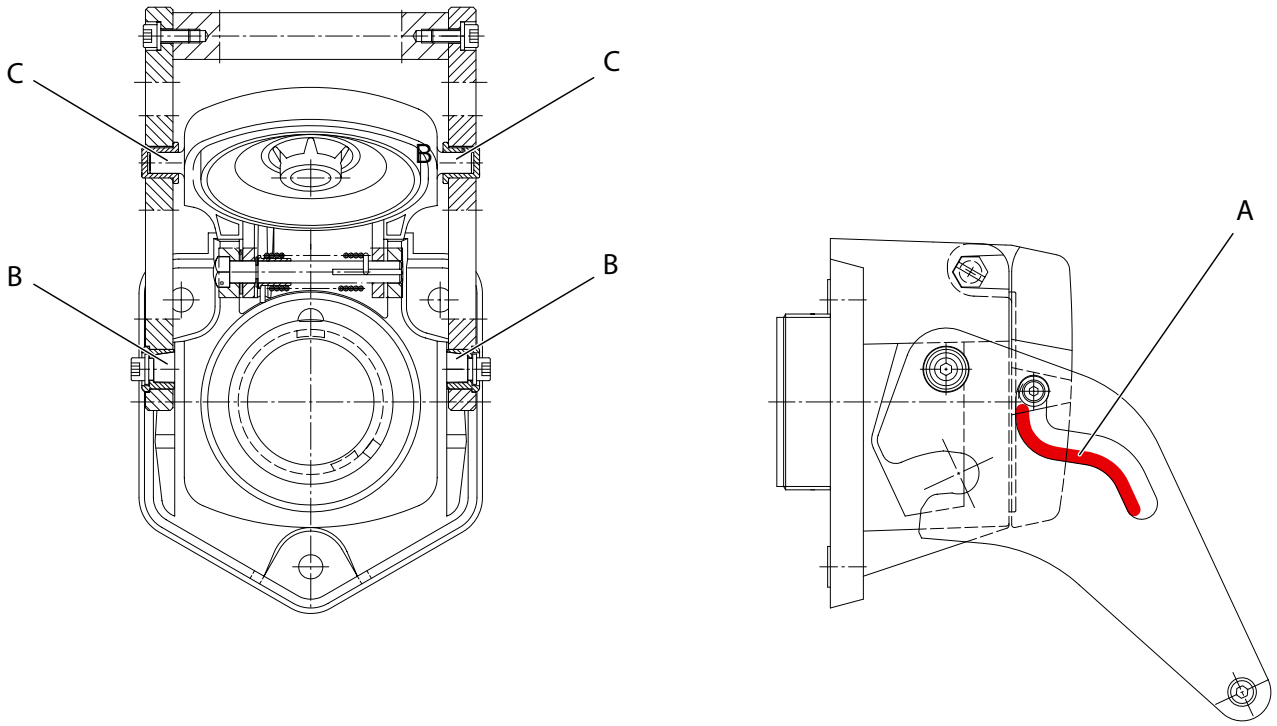


Fig. 50: Lubrication points on the socket lid

1. Grease the red marked area (A) of the locking link shown in ***Fig. 50***.
2. Grease bearing (B) and bush (C).

Plug maintenance

Connector element	Visual /function check/maintenance	Actions
Plug	Check for: - Housing damage - Damage to the guide pins - Ease of movement when plugging in - Secure locking when plugged in - Effective strain relief	If faults exist: - Repair elements - Renew any damaged parts immediately
Connecting cable	Check for: - Damage to the cable sheath - Kinking or pinch points - Indications of mechanical overloading	If faults exist: - Repair elements - Renew any damaged parts immediately

Disassembly of signal contacts

Tools required

- Extraction tools (see section ***„Tools“***)

Removing signal contacts

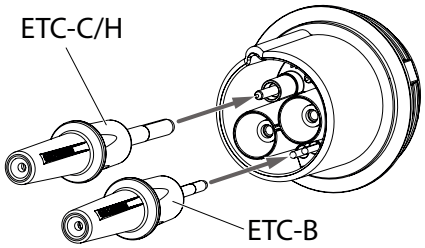


Fig. 51:

1. Insert the appropriate extraction tool (see section ***„Tools“***) over the contact as far as it will go. This unlocks the retaining clip used to secure the contact.
2. Press the contacts backwards out of the contact chambers as shown in ***Fig. 51***.
3. Pull the contacts completely out of the housing by pulling gently on the cable.

Tools

Crimping tools

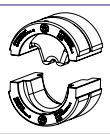
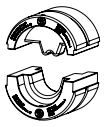
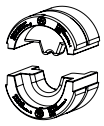
Fig. 52: CTH-U/≤300
Hydraulic crimping tool without crimp inserts, for main contacts and PE contacts (Art. no. 1-1440-357320)

Fig. 53: CTE-U/≤400
Electrical crimping tool without crimp inserts, for main contacts and PE contacts (Art. no. 1-1440-355163)

Fig. 54: CTM-H/≤6.00 crimping tool for signal contacts (Art. no. 1-1440-339551)

The holders for the crimp inserts for crimping tools CTH-U/≤300 and CTE-U/≤400 are standardised for 130 kN. In this way, other crimp inserts / crimping formers can be used so that the crimping tools can be used universally.

Crimp insert sets for crimping tools CTH-U/≤300 and CTE-U/≤400 for main contacts

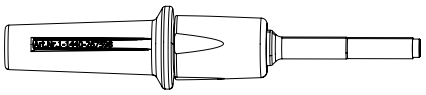
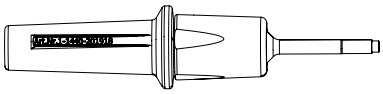
Cable cross-section main contacts [mm²]	With reducing bushing	Crimp insert set Ordering code	Art. no.:	Figure
95	-	CID-W-95/S	1-1440-354258	
70	-	CID-W-70/S	1-1440-354256	
50	-	CID-W-50/S	1-1440-354255	
35	Rb-50/35			

Crimp insert set for crimping tools CTH-U/≤300 and CTE-U/≤400 for PE contacts

PE contact cable cross section [mm²]	With reducing bushing	Crimp insert set Ordering code	Art. no.:	Figure
50	-	CID-W-50/S	1-1440-354255	
35	Rb-50/35			

Extraction tool for signal contacts

Special extraction tools are necessary for disassembly of signal contacts. The extraction tools are suitable for pin contacts (for plugs) as well as for socket contacts (for sockets).
You can determine the correct extraction tools from the following table.

Extraction tool Ordering code	Art. no.:	Description	Signal contact Ø		Figure
			4 mm	3 mm	
ETC-C/H	1-1440-267598	Extraction tool for signal contacts	•	---	
ETC-B	1-1440-201918	Extraction tool for signal contacts	---	•	

Technical data

Technical data and information on the material properties of HV series connectors can be found in our ***A88 catalogue***.
Download from: www.schaltbau.com

Notes

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