

1

Connectors

EP series

Railway connectors for the
electro-pneumatic brake system and
emergency brake override
according to UIC 541-5 VE

Installation and maintenance
instructions

Manual F121-M.en



Document revision

Date	Version	Description	Pages
2024-02-29	V1.0	1st issue	All

Content

1. Important background information	4
1.1 Legal information	4
1.2 Conventions for these instructions	4
2. General and safety information	4
2.1 Observation of the instructions	4
2.2 Duties of the operating company	4
2.3 Intended use	4
2.4 Ambient conditions	5
3. Hazards and safety precautions.....	5
3.1 Electrical hazards	5
3.2 Mechanical hazards	5
3.3 Other hazards	6
3.4 Measures for preventing damage and malfunctions	6
4. Description.....	7
4.1 Plug.....	7
4.2 Coupling socket	8
End housing versions	8
Coupling socket with connecting cable, ready assembled.....	8
4.3 Blanking socket.....	9
4.4 Junction box	9
5. Installation	10
5.1 Coupling socket	10
Requirements / preparatory measures.....	10
Pinout / connection diagram	11
Installing a coupling socket (version without snap-action switch).....	12
Check	12
Installing a coupling socket (version with snap-action switch).....	13
Check	13
5.2 Blanking socket.....	14
Requirements / preparatory measures.....	14
Installing a blanking socket.....	14
Check	15
5.3 Plug with connecting cable and male-male cable	16
Requirements / preparatory measures.....	16
Pinout / connection diagram	16
Installing a plug with connecting cable.....	16
Check	16
5.4 Junction box	17
Requirements / preparatory measures.....	17
Pinout / connection diagram	17
Junction box installation	18
Check	18

6.	Plugging-in process.....	19
6.1	Plugging in.....	19
6.2	Disconnecting	20
7.	Maintenance	21
7.1	Maintenance intervals	21
7.2	Visual check upon every plugging-in process.....	21
7.3	Maintenance of coupling and blanking sockets.....	21
	Grease the locking link and bearing points of the socket lid	22
7.4	Maintenance of plug with connecting cable / male-male cable	22
7.5	Maintenance of the cable junction box.....	23
	Cleaning the condensation drainage screw.....	23
8.	Technical data.....	23

1. Important background information

1.1 Legal information

The instructions must not be reproduced, distributed, modified, communicated, translated into any other language or otherwise used, either in whole or in part, electronically or mechanically, without the express written permission of SCHALTBAU GmbH.


SCHALTBAU GmbH shall not be liable for any damage resulting from failure or partial failure to observe the instructions.


1.2 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:

 DANGER
<p>Indicates a directly threatening dangerous situation. Death or severe injuries will result if it is not prevented.</p>

 WARNING
<p>Indicates a possibly dangerous situation. Death or severe injuries may result if it is not prevented.</p>

 CAUTION
<p>Indicates a possibly dangerous situation. Medium or minor injuries may result if it is not prevented.</p>

ATTENTION
<p>Indicates a possibly detrimental situation. If it is not prevented, assemblies, the system or property in its surroundings could be damaged.</p>

	<p>Indicates technical features and methods to simplify working or indicates information of particular importance.</p>
---	--

2. 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.

2.1 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!

2.2 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.

2.3 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 F121.de* 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, when unplugged:
 - The socket lid must always be closed as intended;
 - the plugs of connecting cables must always be plugged into a blanking socket.
- When unplugged, male-male cables (EP VK Lxxxx), must always be correctly stowed in the vehicle.
- 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.

2.4 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 F121.de* under the section "**Technical data**". Download from: www.schaltbau.com/en/media-library/



Note:

At very low or very high ambient temperatures that are approaching the approved operating temperature range in our *Catalogue F121.de* in the section "**Technical data**":



- greater force may be required for plugging or disconnecting
- and consequently the service life of plugs and coupling sockets may be shortened by increased wear.

3. Hazards and safety precautions




3.1 Electrical hazards

	⚠ DANGER
	<p>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:</p> <ul style="list-style-type: none"> • Disconnect • Secure to prevent switching back on • Clearly mark out 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
	<p>Dirt, moisture, snow and ice on the inside of coupling and blanking sockets will contaminate the plug. Connecting up a soiled plug to a coupling socket could result in a fatal electric shock!</p> <ul style="list-style-type: none"> • Before inserting a plug into a coupling or blanking 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 coupling socket.

3.2 Mechanical hazards

	⚠ CAUTION
	<p>The connectors contain components that are mechanically loaded. Risk of crushing!</p> <ul style="list-style-type: none"> • 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
	<p>The connectors include sharp-edged components. Risk of injury!</p> <ul style="list-style-type: none"> • Use suitable tools when performing installation and maintenance work on the connectors. • Wear safety gloves when handling components with sharp edges.

3.3 Other hazards

	<p>⚠ WARNING</p> <ul style="list-style-type: none"> • Only use the connectors for the purposes indicated in the specifications and data sheets. Incorrect use can lead to accidents and severe personal injury. • 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.
	<p>⚠ WARNING</p> <p>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.</p> <ul style="list-style-type: none"> • Never connect or disconnect the connectors under load.
	<p>⚠ CAUTION</p> <p>Depending on the ambient temperature and other operating conditions, operation may cause the connectors to become hot. Danger of burns to the hands!</p> <ul style="list-style-type: none"> • Wear safety gloves when connecting or disconnecting the connectors at high ambient temperatures.

3.4 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
<p>Corrosive liquids can damage the connectors.</p> <ul style="list-style-type: none"> • 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
<p>Improper handling of the connectors, e.g. hard impact on the floor, can cause breaks, cracks and deformation.</p> <ul style="list-style-type: none"> • 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
<p>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.</p> <ul style="list-style-type: none"> • 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 when not plugged in <ul style="list-style-type: none"> - The plug of a connecting cable is always plugged into a blanking socket; - Male-male cables (EP VK Lxxxx) are always stowed in the driver's cab of the vehicle, - The socket lid is closed as intended.
ATTENTION
<p>Improper use can damage the connectors. If parts are damaged, the operating safety of the connectors is no longer ensured.</p> <ul style="list-style-type: none"> • 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
<p>If connector components are damaged, worn and/or soiled, the operational safety of the plug connection is no longer ensured.</p> <ul style="list-style-type: none"> • 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.

4. Description

Connectors compliant with UIC 541-5 VE of the EP series are responsible for making the electrical connection between the rail vehicles of a train for the electro-pneumatic brake system (EP brake) and the electro-pneumatic emergency brake override (EBO). Both systems use a common electrical cable that is routed in the train.

The feedback for the presence of a plug is made via a snap-action switch integrated in the coupling socket. Train end detection is implemented by a pin contact in the blanking socket.

The following components are available for EP-series connectors:

- Plug without connecting cable (EP ST)
- Plug with connecting cable of desired length, pre-assembled at one end (EP SK Lxxxx)
- Male-male cable of the desired length with 2 plugs, pre-assembled at both ends (EP VK Lxxxx)
- Coupling socket without connecting cable (EP KD)
 - Without/with snap-action switch (S0 / S1)
 - Without/with drainage slots (E0 / E1)
- Coupling socket with pre-assembled connecting cable of desired length (EP DK Lxxxx)
 - Without/with snap-action switch (S0 / S1)
 - Without/with drainage slots (E0 / E1)
- Various end housing versions (R0, R1, R2, R3, R4)
- Blanking socket (EP BD) for receipt of an uncoupled plug (including 1 pin contact for train end detection, otherwise unpopulated)
- Junction box (EP A1 / EP A2) with 11-pole or 9-pole terminal strip for connection of a plug with connecting cable (EP SK Lxxxx) and a coupling socket with connecting cable (EP DK Lxxxx)

4.1 Plug

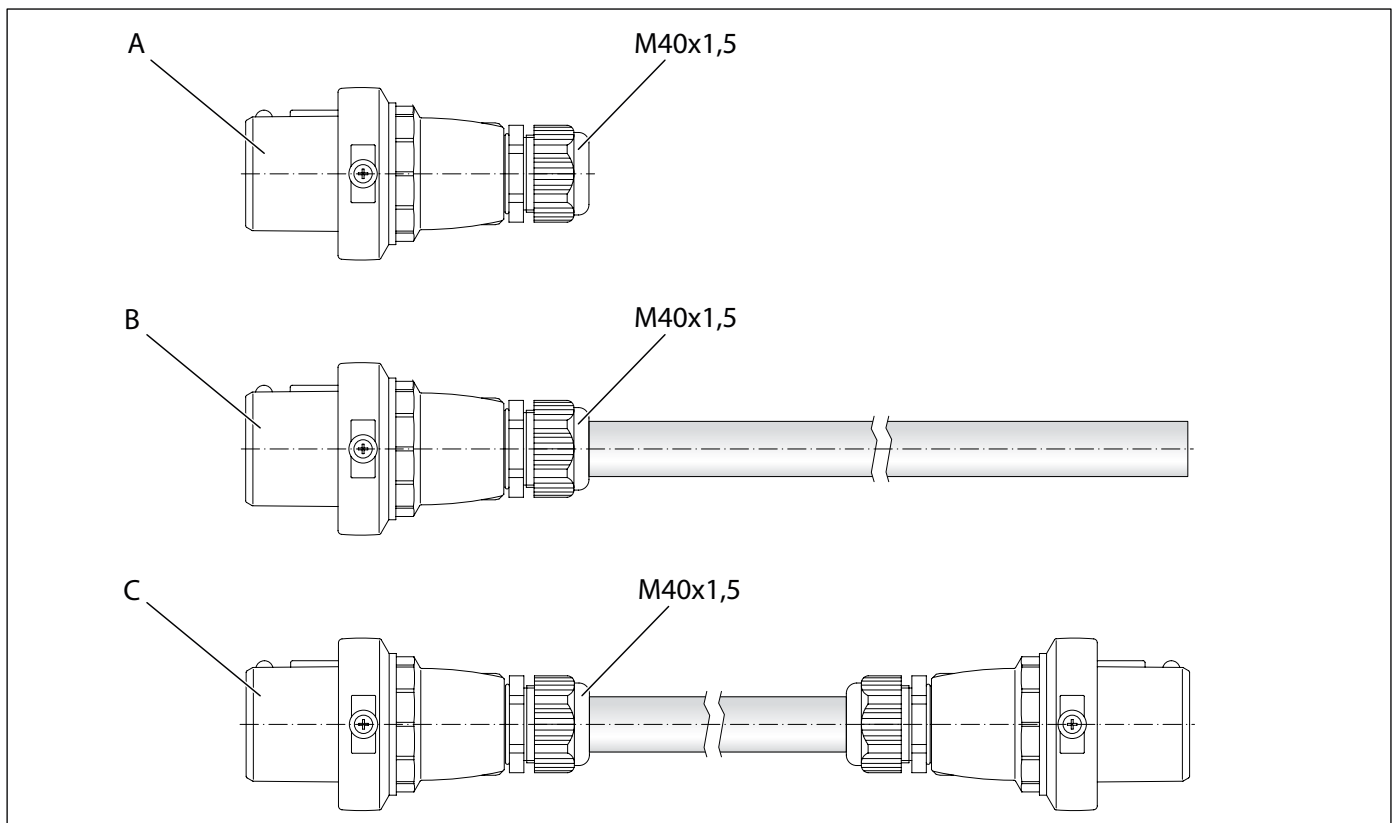


Fig. 1: Plug without/with connecting cable and male-male cable

- A Plug without connecting cable (EP ST), with end housing and M40x1.5 cable gland with integrated strain relief (clamping range \varnothing 19 - 28 mm)
- B Plug with connecting cable of the desired length (EP SK Lxxxx), pre-assembled at one end, with end housing and M40x1.5 cable gland with integrated strain relief (clamping range \varnothing 19 - 28 mm)
- C Male-male cable in desired length with 2 plugs (EP VK Lxxxx), pre-assembled at both ends, with end housing and M40x1.5 cable gland with integrated strain relief (clamping range \varnothing 19 - 28 mm)

4.2 Coupling socket

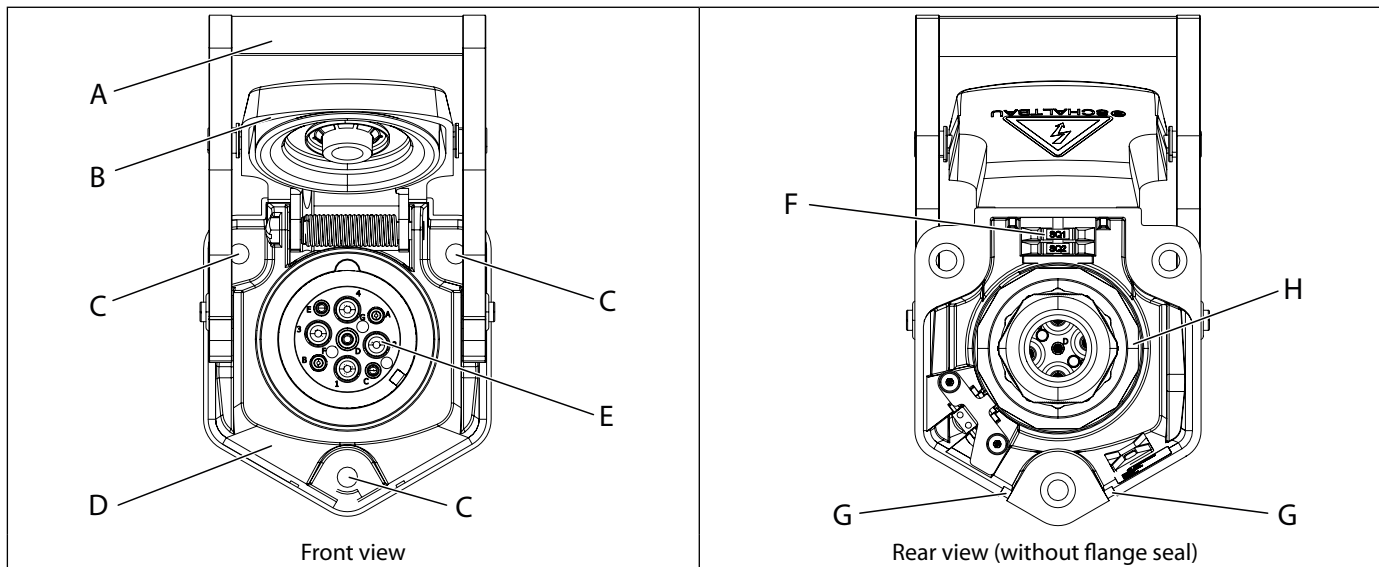


Fig. 2: Coupling socket EP KD / EP DK Rx Sx Ex

- A Cover grip
- B Lid
- C Mounting holes $\varnothing 8.8$ mm: Tightening torque min. 15 Nm
- D Socket housing
- E Pin contacts

- F Terminal strip for snap-action switch: SQ1, SQ2, wire cross section max. 2.5 mm, (only for version S1, with snap-action switch)
- G Drainage slot (only for version E1)
- H End housing (various versions: R0, R1, R2, R3, R4)

End housing versions

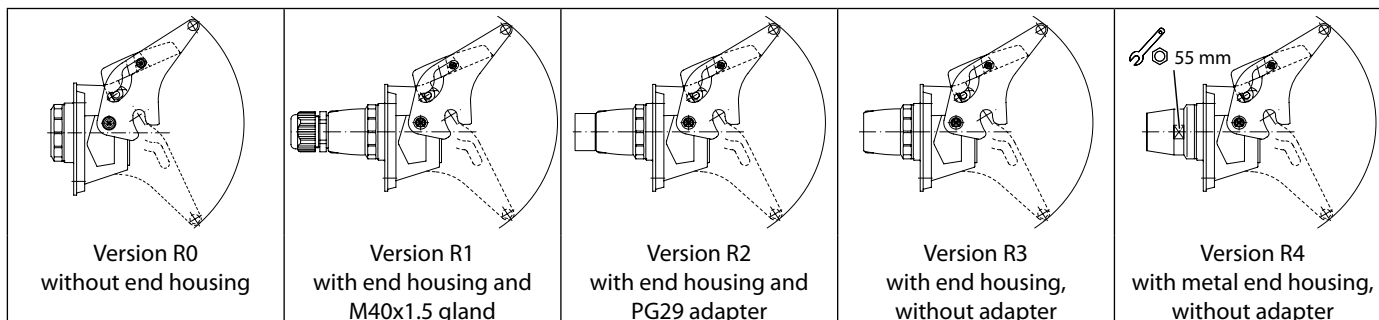


Fig. 3: End housing versions: R0, R1, R2, R3, R4

Coupling socket with connecting cable, ready assembled

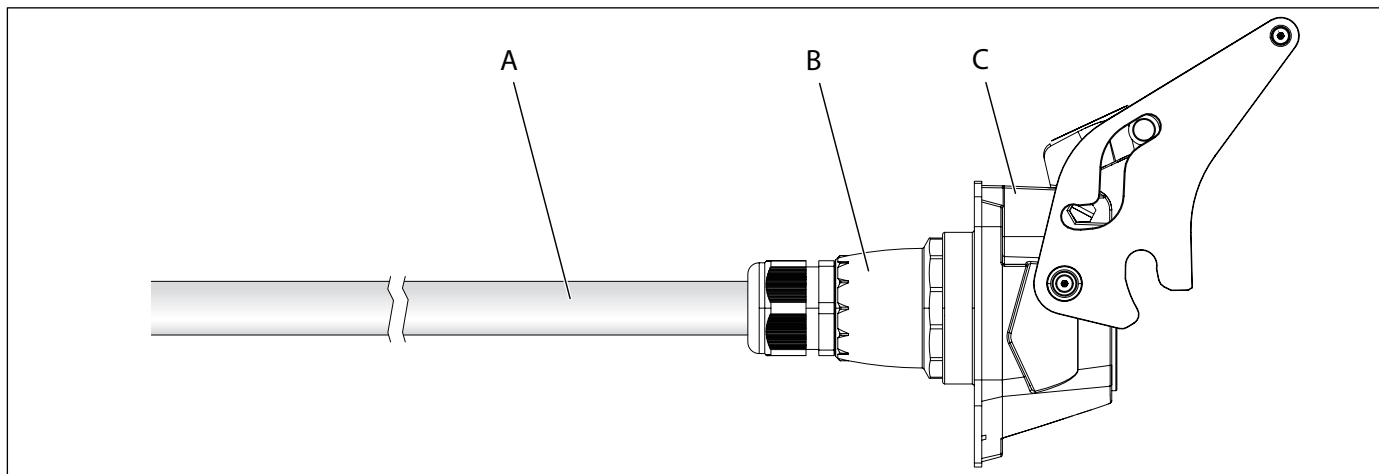


Fig. 4: Coupling socket with pre-assembled connecting cable of desired length (example in figure shows EP DK R1 Sx Ex Lxxxx)

- A Connecting cable
- B End housing (example in figure: Version R1 with end housing and M40x1.5 cable gland (clamping range $\varnothing 19 - 28$ mm))
- C Coupling socket including pin contacts

4.3 Blanking socket

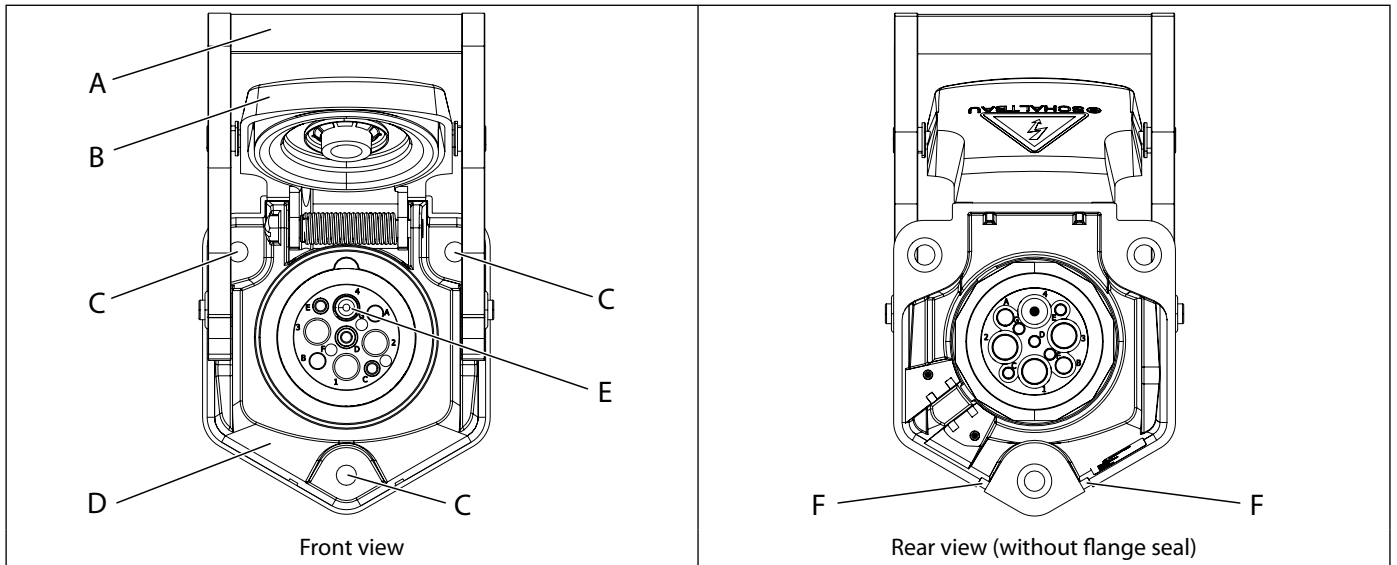


Fig. 5: Blanking socket EP BD Rx Sx Ex

- A Cover grip
- B Lid
- C Mounting holes \varnothing 8.8 mm: Tightening torque min. 15 Nm
- D Socket housing

- E 1 pin contact for train end detection (otherwise unpopulated)
- G Drainage slot (only for version E1)

4.4 Junction box

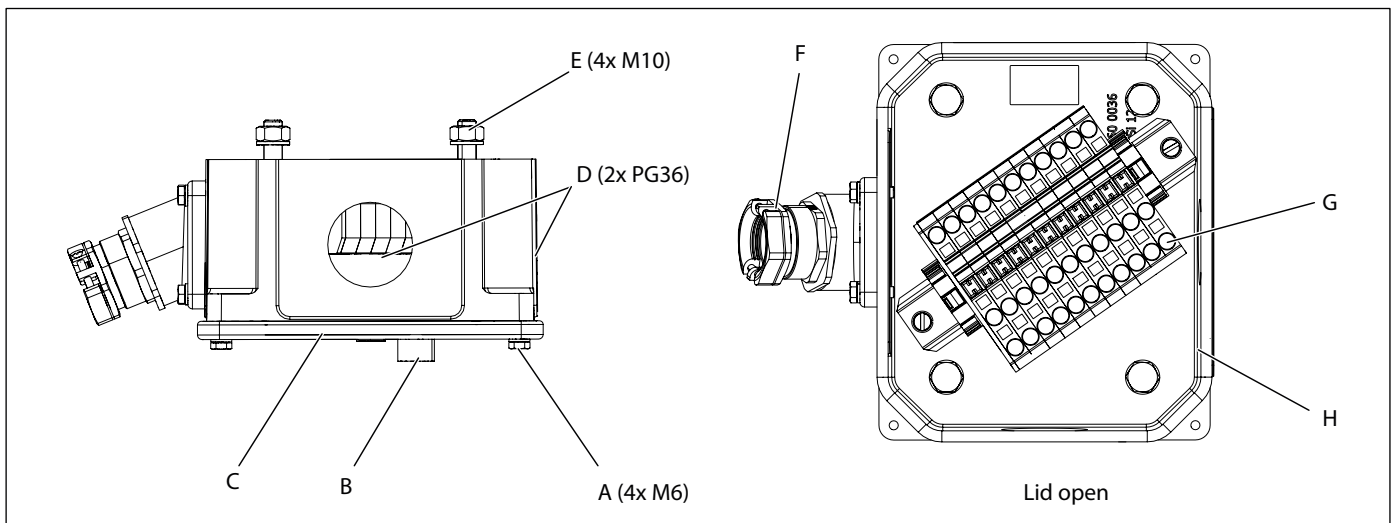


Fig. 6: Junction box (EP A1 / EP A2) for connection of a coupling socket with connecting cable (EP DK Lxxxx) and a plug with connecting cable (EP SK Lxxxx)

- A Lid screws M6 (4x)
- B Condensation drainage screw
- C Lid
- D Cable opening PG 36 (2x)
- E Mounting screw M10 (4x)
- F Cable gland for coupling socket cable (Clamping jaw gland PG29, clamping range \varnothing 19 - 29.5 mm)

- G Terminal strip, 11-pole (EP A1) or 9-pole (EP A2) for connection of a coupling socket with connecting cable (EP DK Lxxxx) as well as a plug with connecting cable (EP SK Lxxxx)
- H Lid seal

5. Installation

Always observe all safety instructions in sections "2. General and safety information" and "3. 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 F121.de*. Download from: www.schaltbau.com/en/media-library/

5.1 Coupling socket

Requirements / preparatory measures

- Crimp connections must be made as per DIN EN IEC 60352-2, Solderless Connections.
- All cable cross-sections for the electrical connection must be implemented in accordance with the specifications in UIC 541-5.
- The surface of the mounting surface must have average roughness height Rz of 6.3 ...12.5 µm.
- The installation position of the coupling socket must be such that it is not tilted more than 30°.

- The coupling 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 vehicle manufacturer's design circumstances.
- The dimensions and arrangement of mounting holes must be taken from *Fig. 8*:

DANGER

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

- Before installation, ensure that the earthing surfaces *A* (*Fig. 7*) on the coupling socket and mounting surface *C* (*Fig. 8*) 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.

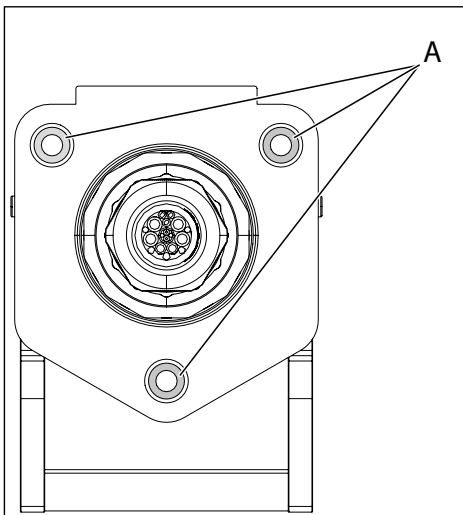


Fig. 7: Coupling socket earthing surfaces
A Spray-galvanised earthing surfaces

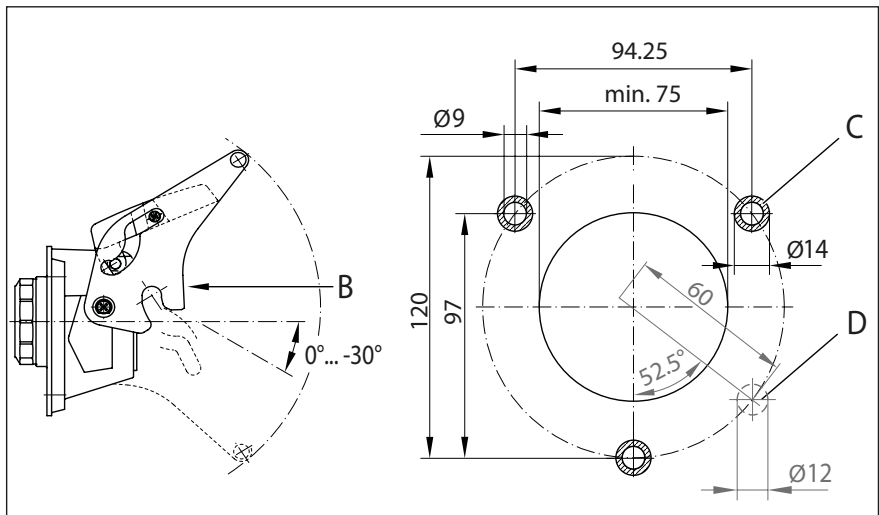


Fig. 8: Mounting holes for coupling or blanking socket
B Mounting holes, view from the front
C Hatched area: paint-free, galvanised or tinned
D Optional cable gland for cable wires of the snap-action switch (with separate wiring)

Pinout / connection diagram

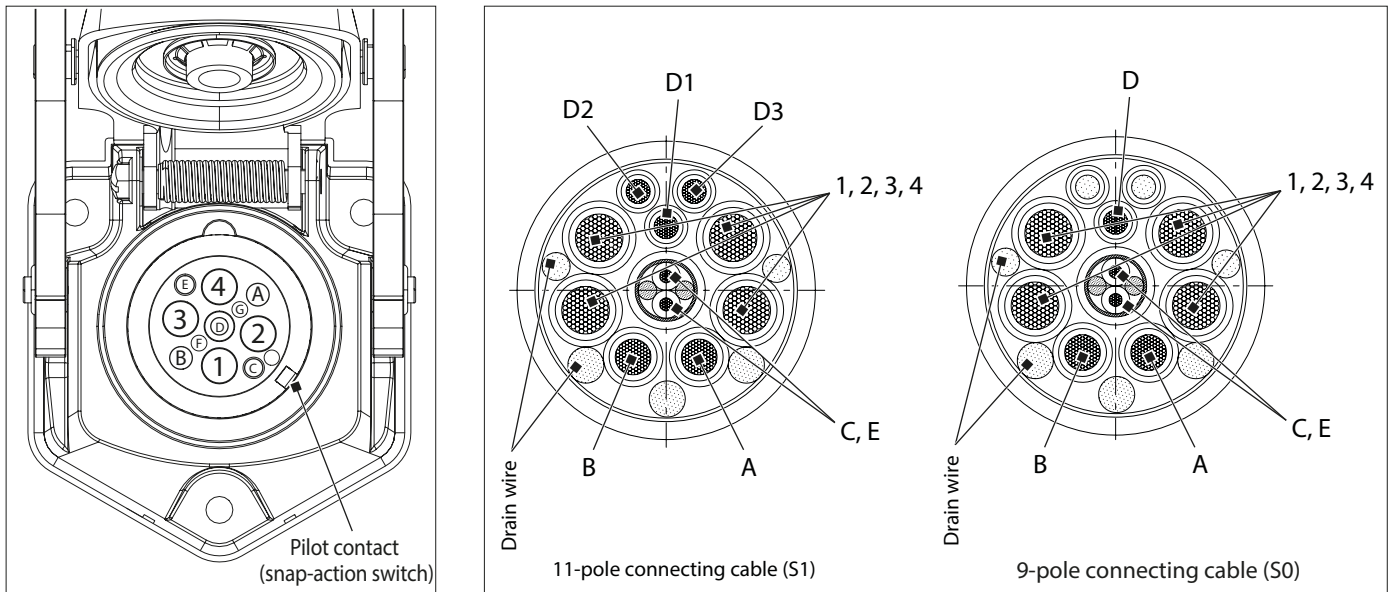


Fig. 9: Labelling of the pin contacts on the coupling socket and cable conductors of 11-pole (S1) and 9-pole (S0) connecting cables.

Labelling of the pin contacts on the coupling socket	Labelling of the cable conductors on the connecting cable		Cable cross section [mm ²]
	11-pole (S1)	9-pole (S0)	
1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	10
A, B	A, B	A, B	6
C, E	White, black	White, black	0.75 ... 1.0
D	D1	D	2.5
F, G	Not populated	Not populated	---
SQ1 (terminal strip for snap-action switch)	D2	---	2.5
SQ2 (terminal strip for snap-action switch)	D3	---	2.5

Installing a coupling socket (version without snap-action switch)

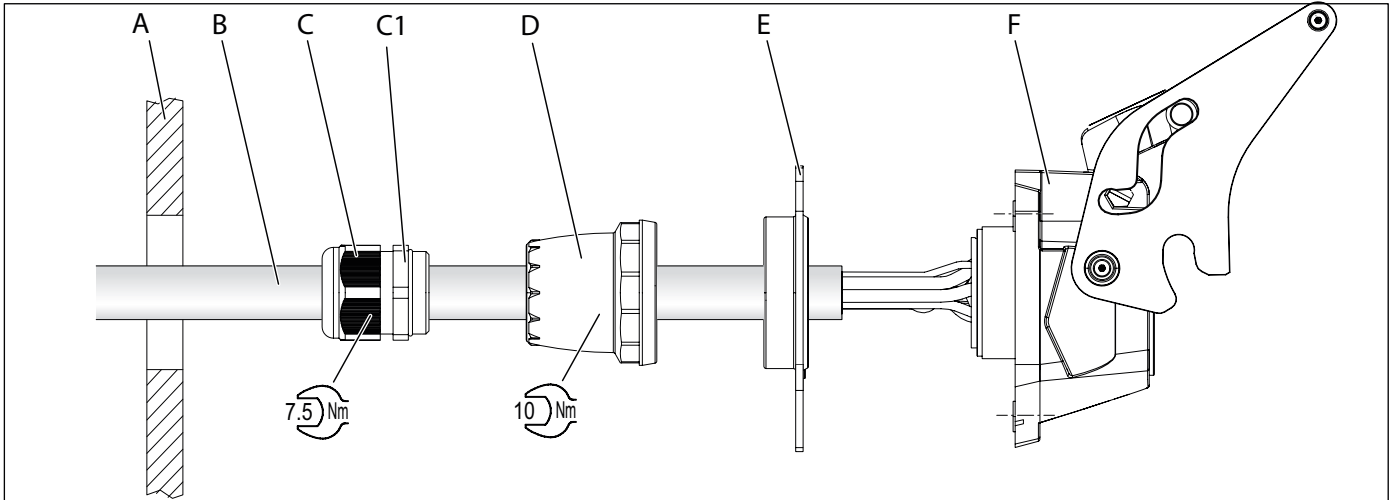


Fig. 10: Installing a coupling socket (version S0, without snap-action switch)

- | | |
|---|--|
| A Vehicle wall | D End housing (tightening torque: 10 Nm) |
| B Connecting cable | E Flange seal |
| C Cable gland (tightening torque: 7.5 Nm) | F Socket housing |
| C1 Strain relief | |

1. Push the flange seal (E) onto the socket housing (F) and align it with the outer contour of the socket flange.
2. Screw the end housing (D) onto the socket housing (F) (tightening torque: 10 Nm).
3. Screw the strain relief (C1) into the end housing (D) and secure the cable by tightening the cable gland (C) (tightening torque: 7.5 Nm).
4. Push the connecting cable (B) of the pre-assembled and fully mounted coupling socket with the loose end from the front through the cable opening (\varnothing at least 75 mm) on the vehicle wall (A).
5. Fix the coupling socket to the vehicle wall (A).
6. Screw the coupling 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 functions correctly.

	⚠ DANGER
	<p>The coupling socket contains components that may be under high voltage. Danger to life!</p> <ul style="list-style-type: none"> • Prior to first use of the coupling socket, it must undergo a high-voltage test.

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

Installed coupling socket

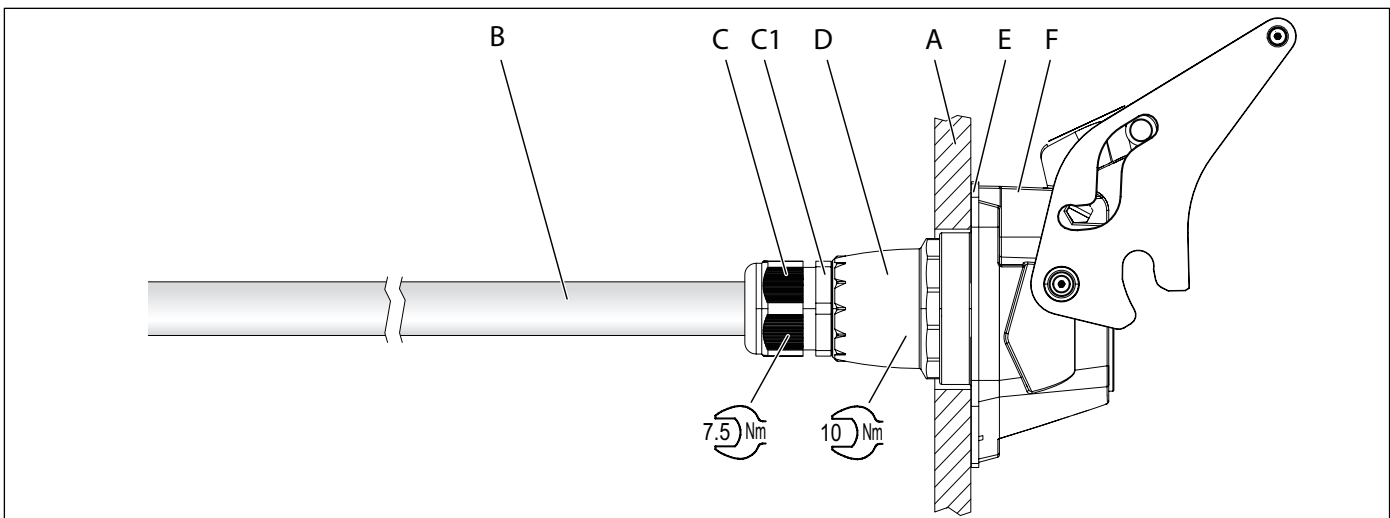


Fig. 11: Installed coupling socket with pre-assembled connecting cable of desired length (example in figure shows EP DK R1 Sx Ex Lxxxx)

- | | |
|---|--|
| A Vehicle wall | D End housing (tightening torque: 10 Nm) |
| B Connecting cable | E Flange seal |
| C Cable gland (tightening torque: 7.5 Nm) | F Socket housing |
| C1 Strain relief | |

Installing a coupling socket (version with snap-action switch)

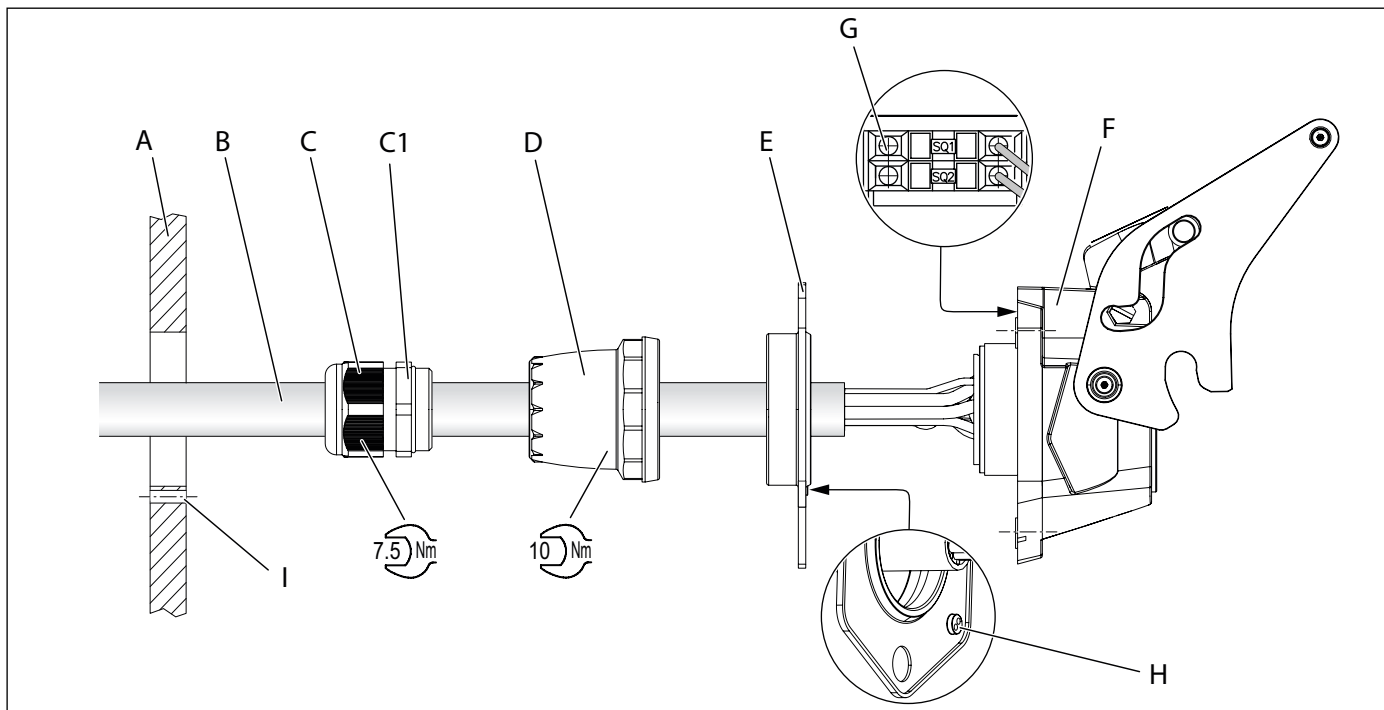


Fig. 12: Installing a coupling socket (version S1, with snap-action switch)

- | | |
|---|--|
| <p>A Vehicle wall
 B Connecting cable
 C Cable gland (tightening torque: 7.5 Nm)
 C1 Strain relief
 D End housing (tightening torque: 10 Nm)
 E Flange seal
 F Socket housing
 G Terminal strip for connection of the snap-action switch (terminals SQ1, SQ2)</p> | <p>H Opening for cable wires through flange seal (for alternative connection of the snap-action switch with separate wiring)
 I Opening for cable wires through vehicle wall (for alternative connection of the snap-action switch with separate wiring)</p> |
|---|--|

- To connect the snap-action switch, connect the 2 wires (D2 and D3) of the 11-pole connecting cable to terminals SQ1 and SQ2 (left empty chambers) on the terminal strip (G).
- Push the flange seal (E) onto the socket housing (F) and align it with the outer contour of the socket flange.
- Screw the end housing (D) onto the socket housing (F) (tightening torque: 10 Nm).
- Screw the strain relief (C1) into the end housing (D) and secure the cable by tightening the cable gland (C) (tightening torque: 7.5 Nm).
- Push the connecting cable (B) of the pre-assembled and fully mounted coupling socket with the loose end from the front through the cable opening (\varnothing at least 75 mm) on the vehicle wall (A).
- Fix the coupling socket to the vehicle wall (A).
- Screw the coupling socket to the vehicle wall (A) using 3 M8 hexagon socket screws plus suitable screw locking elements.
- Tighten the screws according to the vehicle manufacturer's specification (at least 15 Nm).

Alternatively, for the customer's own wiring of the snap-action switch:

- 1.1 Connect the stripped cable wires for connecting the snap-action switch to terminals SQ1 and SQ2 (left empty terminal chambers) on the terminal strip (G).
- 1.2 Pierce the flange seal at the intended point (H) with a pointed tool and pull the 2 cable wires for the snap-action switch through the flange seal and the prepared separate mounting hole (I) in the vehicle wall. (See also „Fig. 8: Mounting holes for coupling or blanking socket“ on page 10).
In doing so, always secure the wires with protective tubing!
- 1.3 Continue with installation steps 2 to 8 as described alongside.

Check

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

	⚠ DANGER
	<p>The coupling socket contains components that may be under high voltage. Danger to life!</p> <ul style="list-style-type: none"> • Prior to first use of the coupling socket, it must undergo a high-voltage test.

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

5.2 Blanking socket

Requirements / preparatory measures

- Crimp connections must be made as per DIN EN IEC 60352-2, Solderless Connections.
- All cable cross-sections for the electrical connection must be implemented in accordance with the specifications in UIC 541-5.
- The surface of the mounting surface must have average roughness height Rz of 6.3 ...12.5 µm.
- The installation position of the blanking socket must be such that it is not tilted more than 30°.

- The blanking 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 vehicle manufacturer's design circumstances.
- The dimensions and arrangement of mounting holes are identical to those of the coupling socket. See section "5.1 Coupling socket", Fig. 8.

⚠
DANGER

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

- Before installation, ensure that the earthing surfaces on the blanking socket and mounting surface are free of paint and any soiling. See section "5.1 Coupling socket", Fig. 7 and Fig. 8.
- 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.

Installing a blanking socket

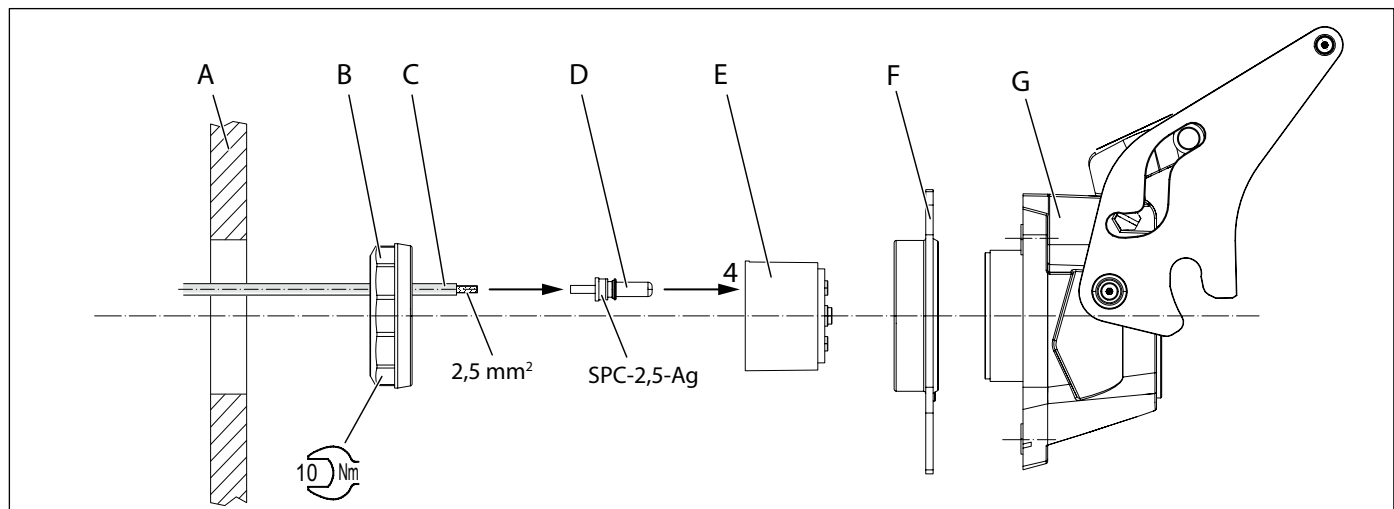


Fig. 13: Installing a blanking socket (example in figure shows EP BD R0, without end housing)

- | | |
|---|--|
| <p>A Vehicle wall</p> <p>B End housing (tightening torque: 10 Nm)</p> <p>C Cable wire for pin contact for train end detection, Cable cross section 2.5 mm²</p> <p>D Pin contact SPC 2.5 Ag for train end detection</p> | <p>E Contact insert</p> <p>F Flange seal</p> <p>G Socket housing</p> |
|---|--|

1. Crimp cable (C) for train end detection at pin contact (D).
2. Insert the pre-assembled pin contact (D) into the contact chamber 4 of the contact insert (E). In doing so, ensure that the pin contact is locked in the contact insert.
3. Insert contact insert (E) in the socket housing (G).
4. Push the flange seal (F) onto the socket housing (G) and align it with the outer contour of the socket flange.
5. Screw the end gland (B) onto the socket housing (G) (tightening torque: 10 Nm).
6. Push the cable (C) with the loose end from the front through the cable opening (Ø at least 75 mm) on the vehicle wall (A).
7. Fix the blanking socket to the vehicle wall (A).
8. Screw the blanking socket to the vehicle wall (A) using 3 M8 hexagon socket screws plus suitable screw locking elements.
9. Tighten the screws according to the vehicle manufacturer's specification (at least 15 Nm).

Blanking socket installed

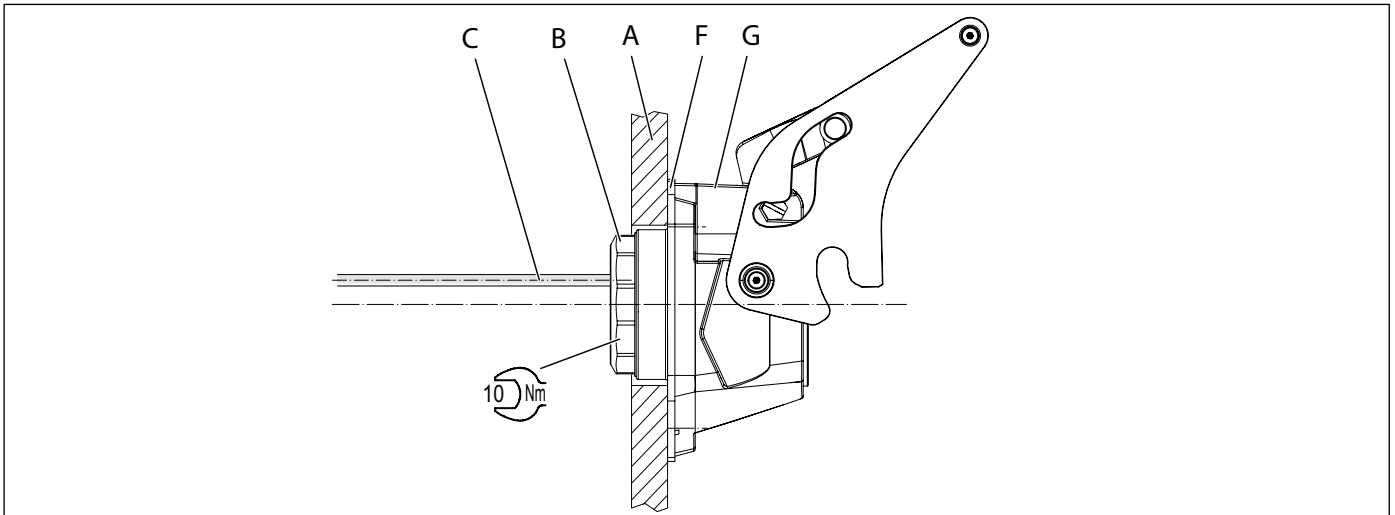



Fig. 14: Installed blanking socket (example in figure shows EP BD R0, without end housing)

- | | | | |
|---|--|---|----------------|
| A | Vehicle wall | F | Flange seal |
| B | End housing (tightening torque: 10 Nm) | G | Socket housing |
| C | Cable wire for pin contact for train end detection,
Cable cross section 2.5 mm ² | | |

Check

1. Check that all installed parts are correctly positioned and will not come loose.
2. Check that the socket lid functions correctly.
3. Check that the train end detection functions correctly.

	⚠ DANGER
	<p>The blanking socket contains components that may be under high voltage. Danger to life!</p> <ul style="list-style-type: none"> • Prior to first use of the blanking socket, it must undergo a high-voltage test.

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

5.3 Plug with connecting cable and male-male cable

Requirements / preparatory measures

- Crimp connections must be made as per DIN EN IEC 60352-2, Solderless Connections.
- All cable cross-sections for the electrical connection must be implemented in accordance with the specifications in UIC 541-5.

Pinout / connection diagram

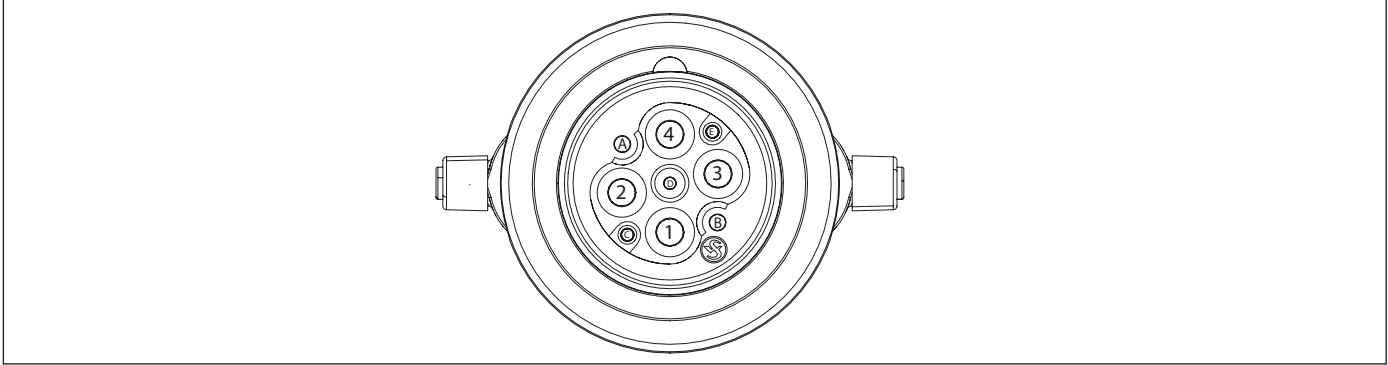


Fig. 15: Labelling of the female contacts on the plug

Labelling of the female contacts on the plug	Cable cross section [mm ²]
1, 2, 3, 4	10
A, B	6
C, E	0.75 ... 1.0
D	2.5

Installing a plug with connecting cable

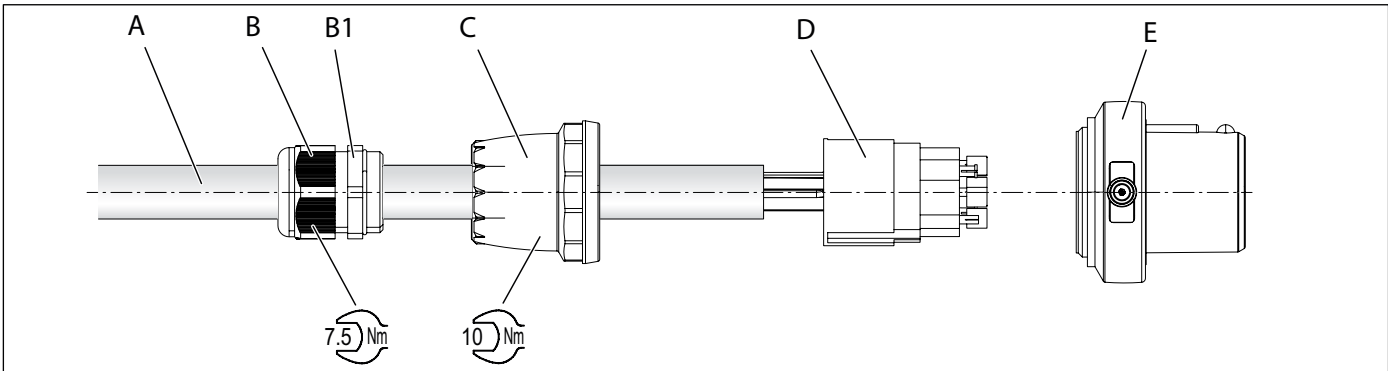


Fig. 16: Plug installation

- A Connecting cable
- B Cable gland (tightening torque: 7.5 Nm)
- B1 Strain relief
- C End housing (tightening torque: 10 Nm)
- D Contact insert
- E Plug housing

1. Insert assembled contact insert (D) into the plug housing (E).
2. Screw the end housing (C) to the plug housing (E) (tightening torque: 10 Nm).
3. Screw the strain relief (B1) into the end housing (C) and secure the cable (A) by tightening the gland (B) (tightening torque: 7.5 Nm).
4. For male-male cables: Fit plugs on both ends.

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 with connecting cable contains components that may be under high voltage. Danger to life!

- Prior to first use of the plug with connecting cable, it must undergo a high-voltage test.

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

5.4 Junction box

Requirements / preparatory measures

- All cable cross-sections for the electrical connection must be implemented in accordance with the specifications in UIC 541-5.
- The surface of the mounting surface must have average roughness height Rz of 6.3 ...12.5 µm.

⚠
DANGER

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

- Before installation, ensure that the earthing surfaces (Fig. 17/A) on the coupling socket and mounting surface (Fig. 18/B) are free of paint and any soiling.
- If necessary, completely remove any paint and possible soiling from the earthing surfaces, e.g. using a brass brush.

- A suitable mounting cross member with 4 holes must be provided for fastening.
- The junction box is aligned horizontally and screwed overhead to the horizontally aligned mounting cross member.
- Fastening is performed using 4 M10 screws. To prevent the screws from coming undone, provide suitable screw locking elements.
- The tightening torque must be specified dependent on the vehicle manufacturer's design circumstances.
- The dimensions and arrangement of mounting holes must be taken from Fig. 18:

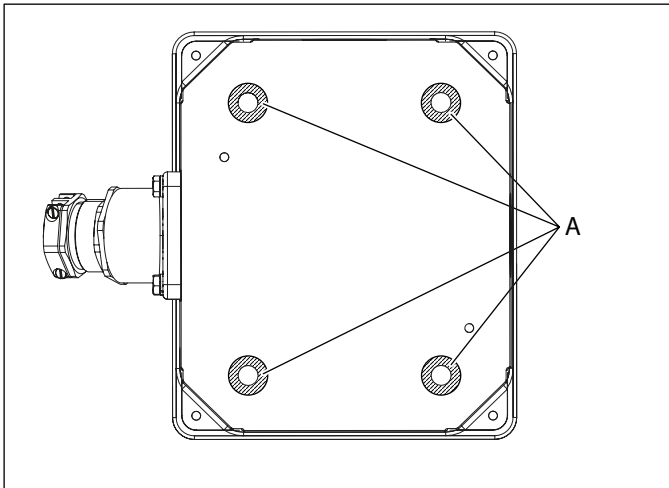


Fig. 17: View from below of the junction box
A Earthing surfaces

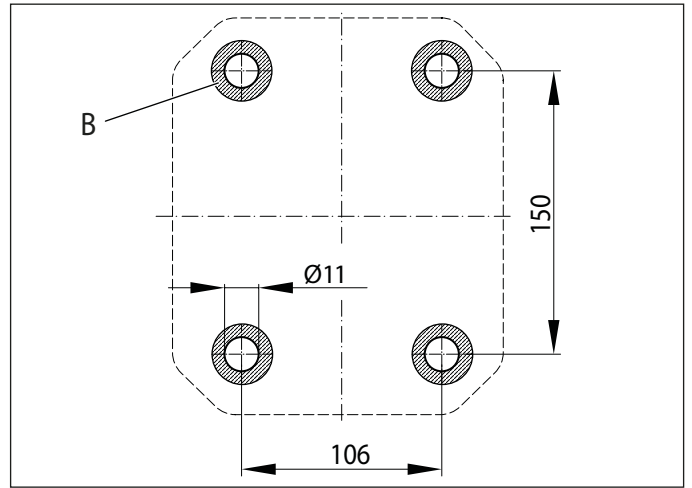


Fig. 18: Mounting holes for junction box
B Hatched area: paint-free, galvanised or tinned

Pinout / connection diagram

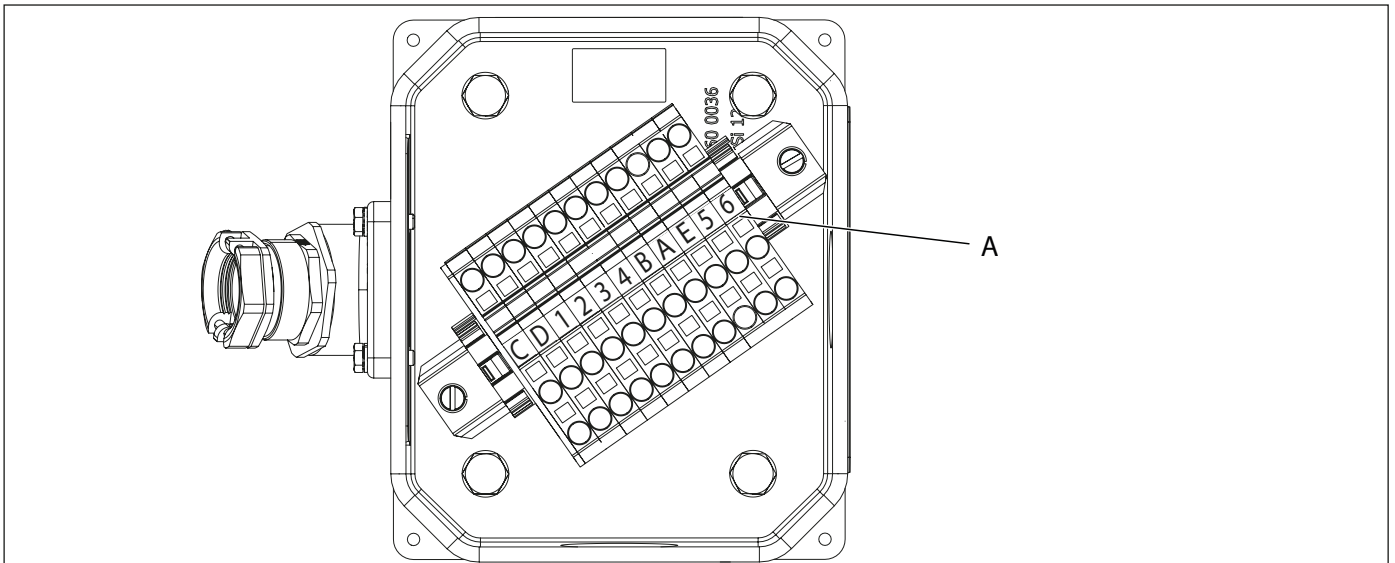


Fig. 19: Labelling of the connection terminals (A) on the junction box

Labelling of the connection terminals on the junction box	Labelling of the cable conductors on the connecting cable		Cable cross section [mm ²]
	11-pole (S1)	9-pole (S0)	
1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4	10
A, B	A, B	A, B	6
C, E	White, black	White, black	0.75 ... 1.0
D	D1	D	2.5
F, G	Not populated	Not populated	---
5 (terminal for snap-action switch)*	D2	---	2.5
6 (terminal for snap-action switch)*	D3	---	2.5

* Only for version EP A1 (junction box with 11-pole terminal strip)

Junction box installation

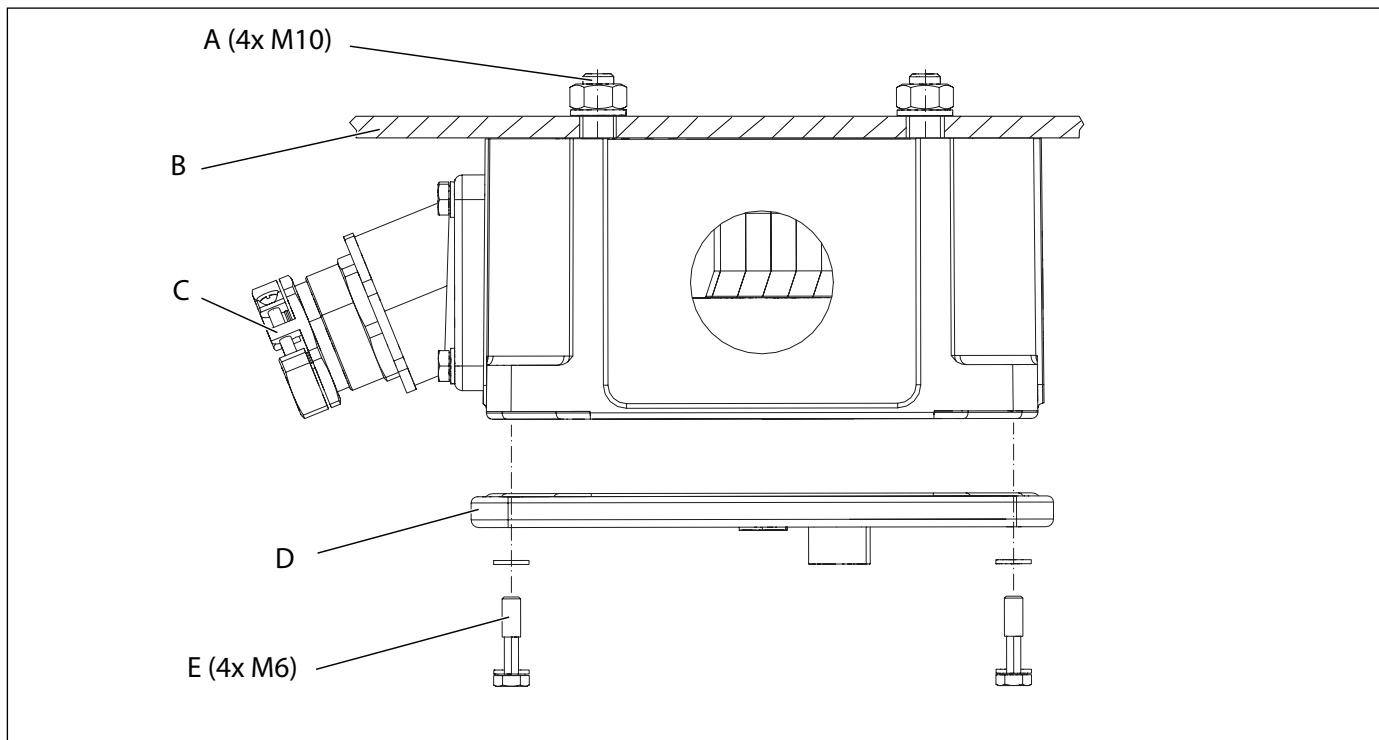


Fig. 20: Junction box installation

- A Mounting screws (4x M10)
- B Mounting cross member
- C Cable gland for coupling socket cable (clamping jaw gland PG29, clamping range Ø19 - 29.5 mm)
- D Lid
- E Lid screws (4x M6)

1. Undo the 4 M6 screws (E).
2. Remove the lid (D) from the junction box including the lid seal.
3. Screw the junction box horizontally to the mounting cross member (B) using 4 M10 screws (A) and suitable screw locking elements. (Tightening torque according to the vehicle manufacturer's specifications.)
4. Insert the connecting cable of the coupling socket into the junction box through cable gland (C).
5. Connect the cable wires of the junction box connecting cable to the terminal strip in the junction box in accordance with the pinout/connection diagram.
6. Fit the lid (D) of the junction box including the lid seal. Check that the lid seal is correctly inserted.
7. Screw the lid (D) tightly in place using 4 M6 screws (E).

Check

1. Check that all installed parts are correctly positioned and will not come loose.
2. Ensure that the cables are free from impermissible tensile, compressive, bending and torsional loads.

	⚠ DANGER
	<p>The junction box contains components that may be under high voltage. Danger to life!</p> <ul style="list-style-type: none"> • Prior to first use of the junction box, it must undergo a high-voltage test.

3. Prior to first use, check the junction box in accordance with EN 50215.

6. Plugging-in process

Always observe all safety instructions in sections “2. General and safety information” and “3. Hazards and safety precautions”, before performing a plugging-in or unplugging process.

6.1 Plugging in

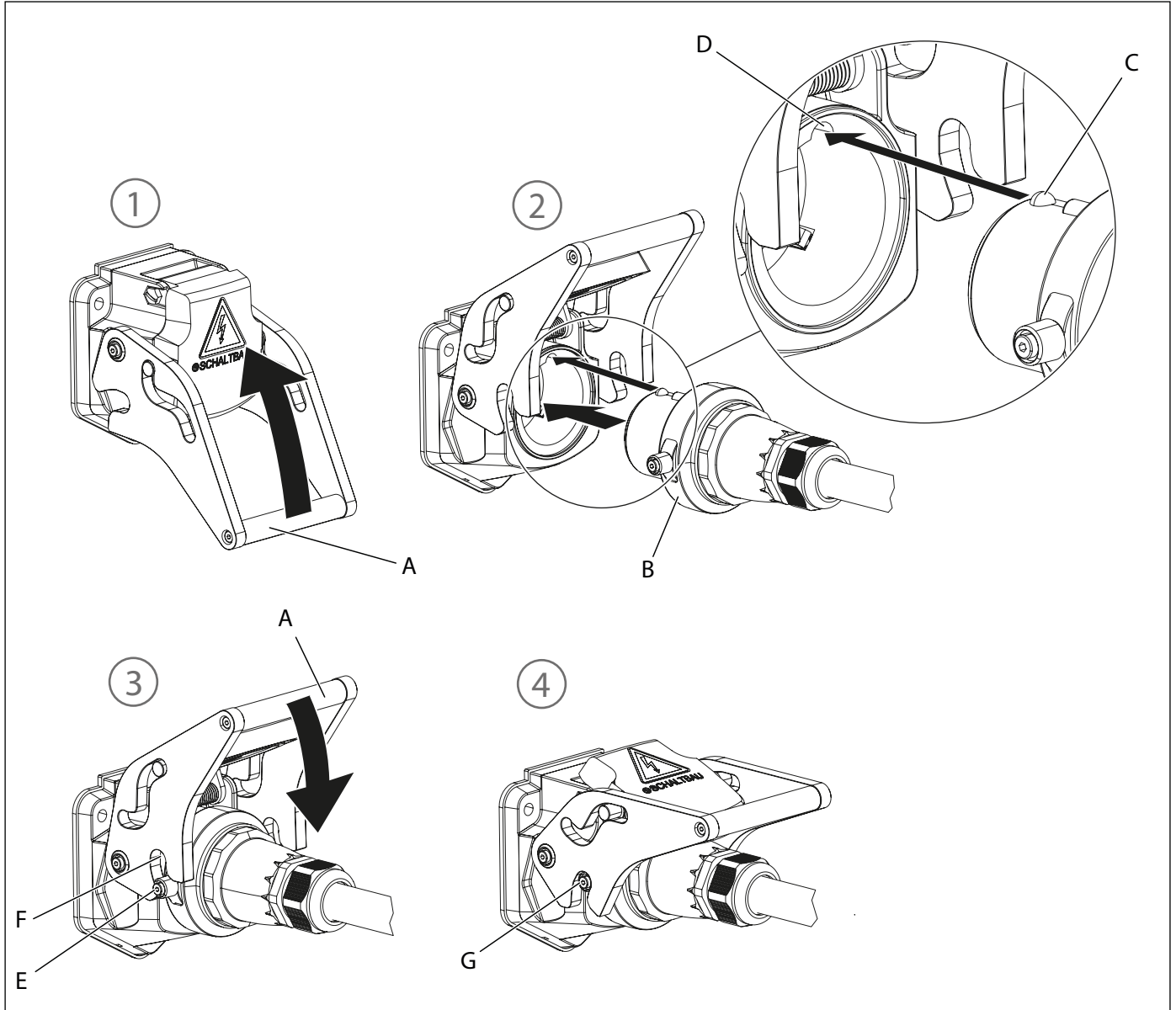


Fig. 21: Plugging in the plug

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).

6.2 Disconnecting

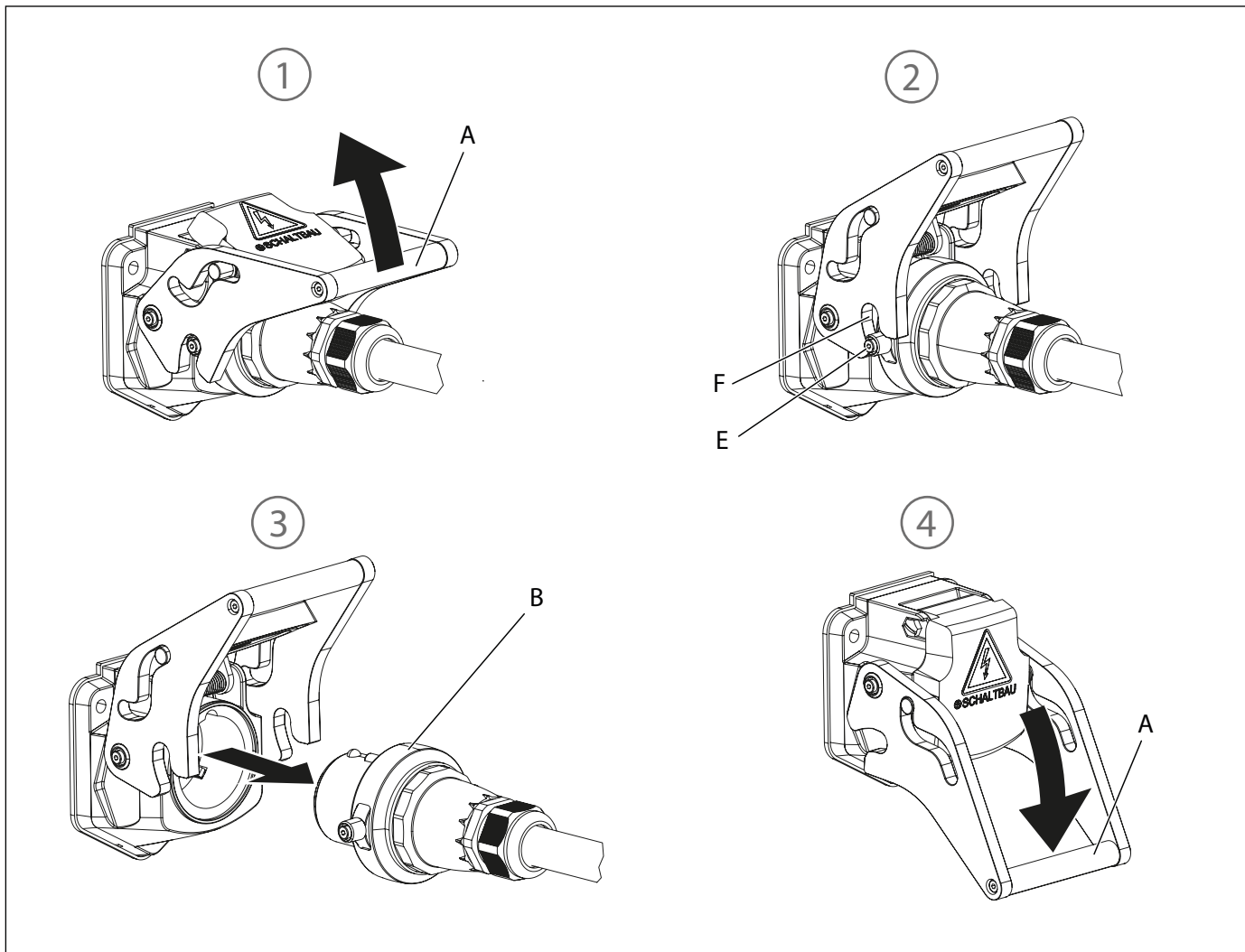


Fig. 22: Disconnecting a plug

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, when unplugged:

- The socket lid must always be closed as intended;
- The plugs of connecting cables must always be plugged into a blanking socket;
- Always store a male-male cable correctly in the vehicle.

7. Maintenance

Always observe all safety instructions in sections “2. General and safety information” and “3. 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.



7.1 Maintenance intervals

The condition of the connectors depends on the ambient conditions. The following periodic checks and maintenance must be carried out to ensure that the connectors operate correctly and have a long service life.

Check/maintenance	Interval
Visual inspection of <ul style="list-style-type: none"> - Plug and connecting cable - Coupling socket - Blanking socket - Cable junction box 	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

7.2 Visual check upon every plugging-in process

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

	 DANGER
	If damage to the cable, plug, socket, socket lid, junction box or seals is visible during a visual check, the safety of the plug connection is no longer ensured. <ul style="list-style-type: none"> • 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.

7.3 Maintenance of coupling and blanking sockets

Connector element	Visual /function check/maintenance	Actions
Socket housing	Check for: <ul style="list-style-type: none"> - Visible damage - Loose or missing fastenings - Correct seating 	If faults exist: <ul style="list-style-type: none"> - Repair elements - Renew any damaged parts immediately
Socket lid	Check for: <ul style="list-style-type: none"> - Visible damage - Loose or missing fastenings - Correct seating - Sufficient closing force - Cracked or porous lid seal - Broken or deformed torsional spring - Soiling Grease: <ul style="list-style-type: none"> - Grease locking link and bearing points with OPTITEMP TT1 low-temperature grease 	If faults exist: <ul style="list-style-type: none"> - Repair elements - Renew any damaged parts immediately - Remove soiling
Fastening flange	Check for: <ul style="list-style-type: none"> - Cracked or porous flange seal 	If faults exist: <ul style="list-style-type: none"> - Renew flange seal immediately
Contact insert	Check for: <ul style="list-style-type: none"> - Visible damage - Soiling 	If faults exist: <ul style="list-style-type: none"> - Repair elements - Renew any damaged parts immediately - Remove soiling
Warning sign (“Danger Electricity”)	Check for: <ul style="list-style-type: none"> - Missing or damaged warning signs 	If faults exist: <ul style="list-style-type: none"> - 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 coupling socket lid and automatically pulled in or out.

To maintain fault-free operation, the parts of this device on the socket and blanking sockets must be greased with OPTITEMP TT1 low-temperature grease every 35 to 42 days.

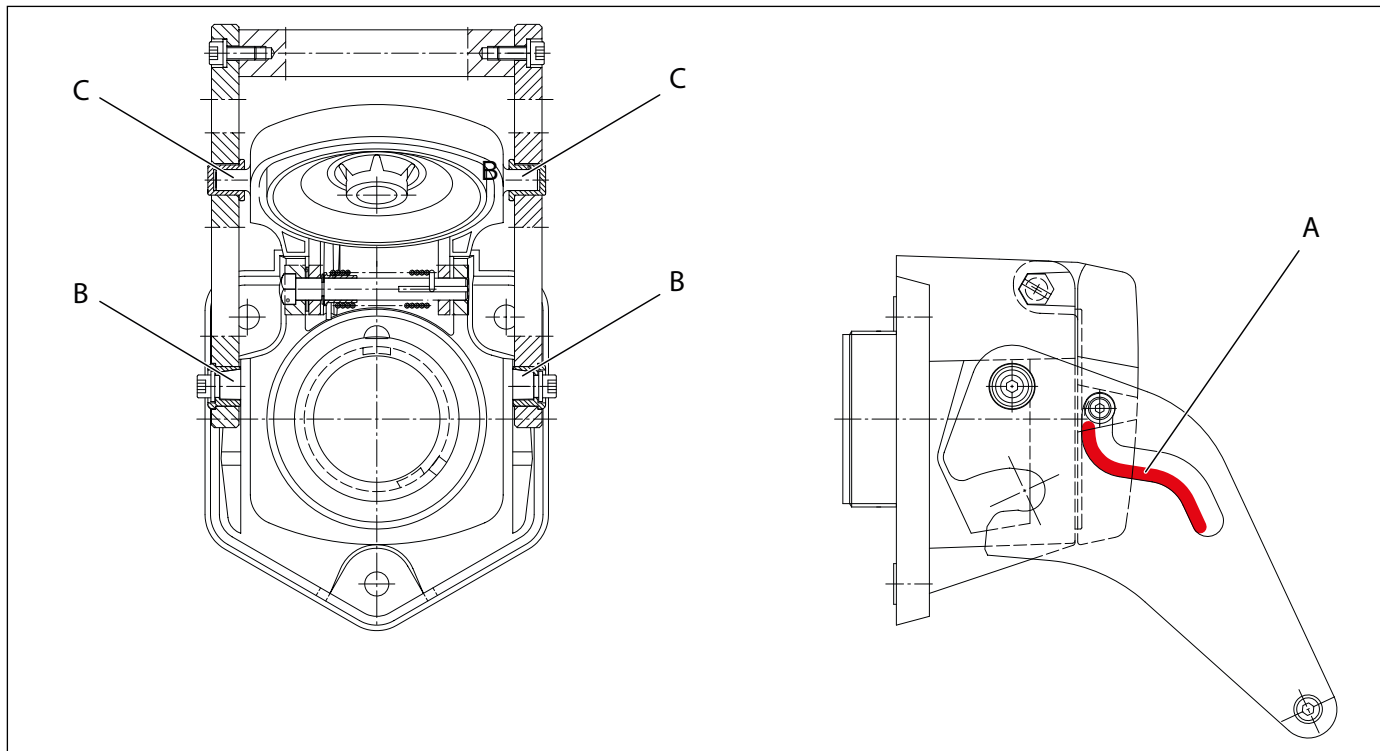


Fig. 23: Lubrication points on the socket lid

1. Grease the red marked area (A) of the locking link shown in Fig. 23.
2. Grease bearing (B) and bush (C).

7.4 Maintenance of plug with connecting cable / male-male cable

Connector element	Visual /function check/maintenance	Actions
Plug	Check for: <ul style="list-style-type: none"> - Housing damage - Damage to the guide pins - Ease of movement when plugging in - Secure locking when plugged in - Effective strain relief 	If faults exist: <ul style="list-style-type: none"> - Repair elements - Renew any damaged parts immediately
Connecting cable	Check for: <ul style="list-style-type: none"> - Damage to the cable sheath - Kinking or pinch points - Indications of mechanical overloading 	If faults exist: <ul style="list-style-type: none"> - Repair elements - Renew any damaged parts immediately

7.5 Maintenance of the cable junction box

Connector element	Visual /function check/maintenance	Actions
Cable junction box housing	Check for: - Visible damage - Loose or missing fastenings	If faults exist: - Repair elements - Renew any damaged parts immediately
Lid seal	Check for: - Visible damage - Correct seating - Cracks or porosity - Compressed points	If faults exist: - Repair elements - Renew any damaged parts immediately
Cable junction box insert	Check for: - Visible damage - Loose or missing fastenings - Soiling	If faults exist: - Repair elements - Renew any damaged parts immediately - Remove soiling
Condensation drainage screw	Check for: - Clogged and soiled condensation drainage screw on the lower lid	If faults exist: - Clean the clogged or soiled condensation drainage screw

Cleaning the condensation drainage screw

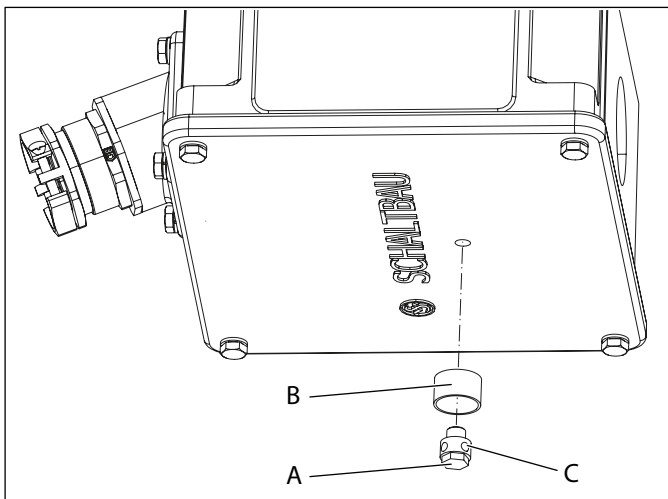


Fig. 24: Cleaning the condensation drainage screw

1. Unscrew the condensation drainage screw (A) (spanner: 10 mm AF) at the bottom on the housing lid of the junction box and remove it together with the sleeve (B).
2. Thoroughly clean the drainage screw (A), paying particular attention to the water drainage openings (C) in the screw. If necessary, blow out with compressed air.
3. Likewise clean the sleeve (B).
4. Screw the cleaned drainage screw (A) plus sleeve (B) back into the housing lid and tighten.
5. Draining screw tightening torque: 10 Nm

8. Technical data

Technical data and information on the material properties of EP series connectors are to be found in our *Catalogue F121.de*. Download from: www.schaltbau.com/en/media-library/

Schaltbau GmbH

For detailed information on our products and services visit our website – or give us a call!

Schaltbau GmbH
Hollerithstrasse 5
81829 Munich
Germany



Phone +49 89 9 30 05-0
Fax +49 89 9 30 05-350
Internet www.schaltbau.com
e-Mail contact@schaltbau.de

with compliments:



The production facilities of Schaltbau GmbH have been IRIS certified since 2008.



Certified to DIN EN ISO 14001 since 2002. For the most recent certificate visit our website.



Certified to DIN EN ISO 9001 since 1994. For the most recent certificate visit our website.

Electrical Components and Systems for Railway Engineering and Industrial Applications

Connectors

- Connectors manufactured to industry standards
- Connectors to suit the special requirements of communications engineering (MIL connectors)
- Charging connectors for battery-powered machines and systems
- Connectors for railway engineering, including UIC connectors
- Special connectors to suit customer requirements

Snap-action switches

- Snap-action switches with positive opening operation
- Snap-action switches with self-cleaning contacts
- Snap-action switch made of robust polyetherimide (PEI)
- Snap-action switch with two galvanically isolated contact bridges
- Special switches to suit customer requirements

Contactors Emergency disconnect switches

- Single and multi-pole DC contactors
- High-voltage AC/DC contactors
- Contactors for battery powered vehicles and power supplies
- Contactors for railway applications
- Terminal bolts and fuse holders
- DC emergency disconnect switches
- Special contactors to suit customer requirements

Electrics for rolling stock

- Equipment for driver's cab
- Equipment for passenger use
- High-voltage switchgear
- High-voltage heaters
- High-voltage roof equipment
- Equipment for electric brakes
- Design and engineering of train electrics to customer requirements