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Version 3

Title

Battery Electric Vehicle (BEV) - Diagnostic Trouble Code (DTC) Troubleshooting Ending In No Fault Found

Abstract

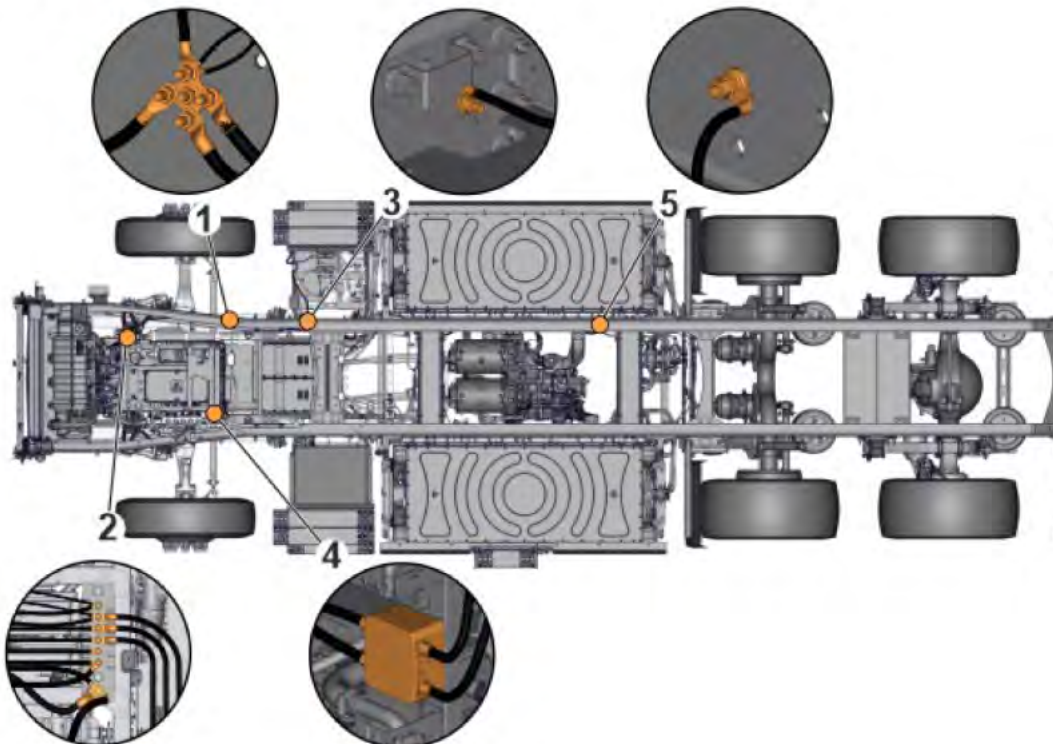
Additional information for fault code diagnostics resulting in no fault found

Content

If a BEV has active diagnostic trouble codes the first steps should be to check all grounds for a good clean and tight connection.

For a complete list of ground locations refer to the description, design and function document in Impact titled Electrical Power and Ground System Description under function group 37. See example image below.

24 V grounding locations



Tags

Live UI

mack

volvo

ground



Categories

Make and Model > Mack > LR Electric

Make and Model > Volvo > VNR Electric

Vehicle System > Battery Electric Systems

Electrical Power and Ground, System Description

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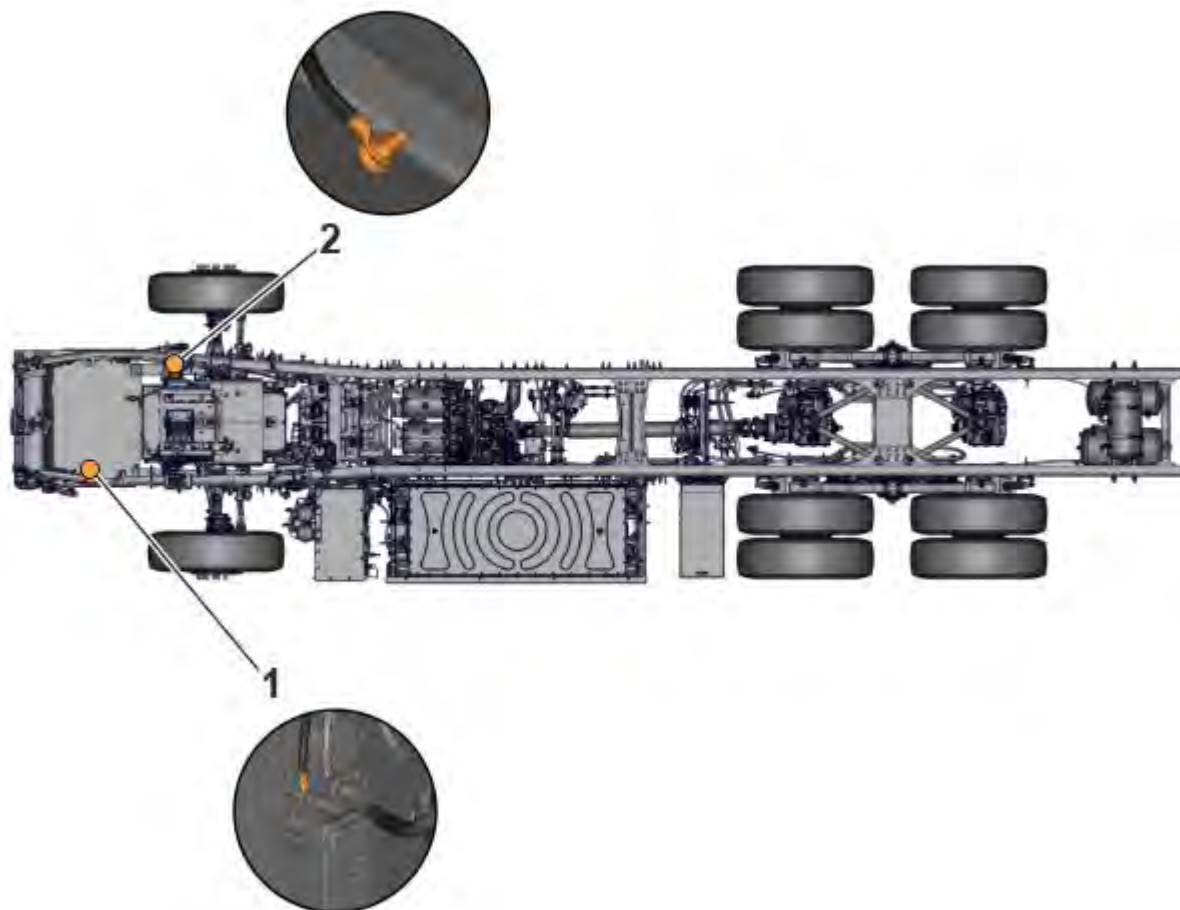
[24 V power](#)

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Electrical power and ground, system description

Overview

12 V grounding

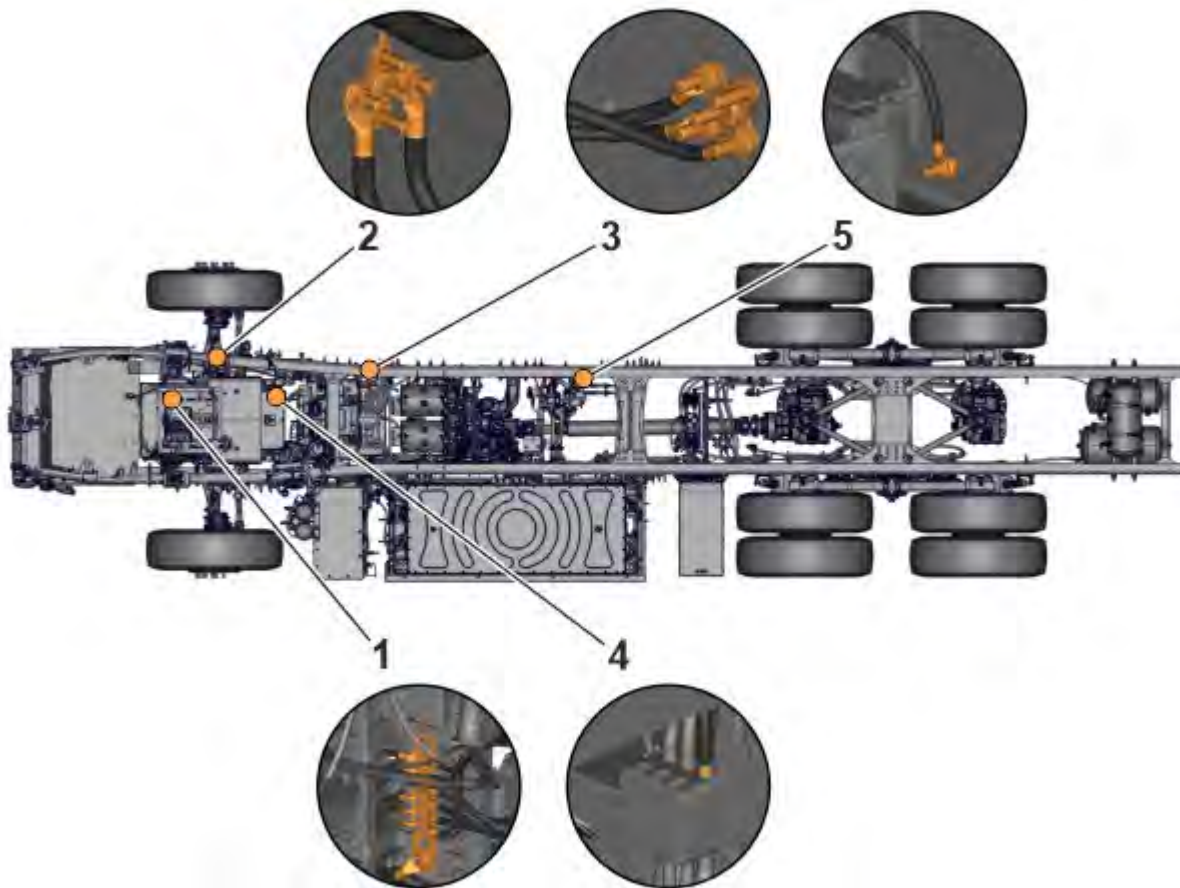


1	Chassis ground (X136) (front left)
2	Chassis ground (X135) (front right)

24 V grounding locations

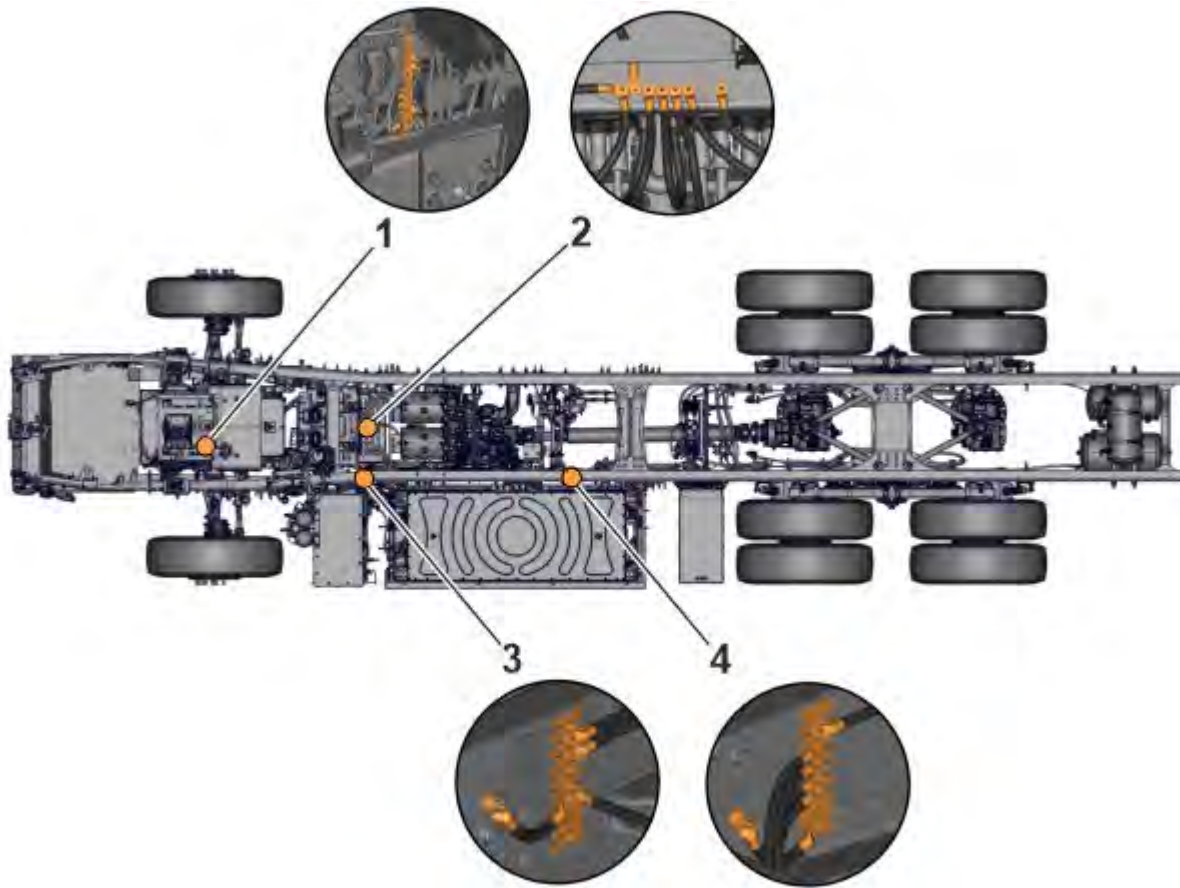
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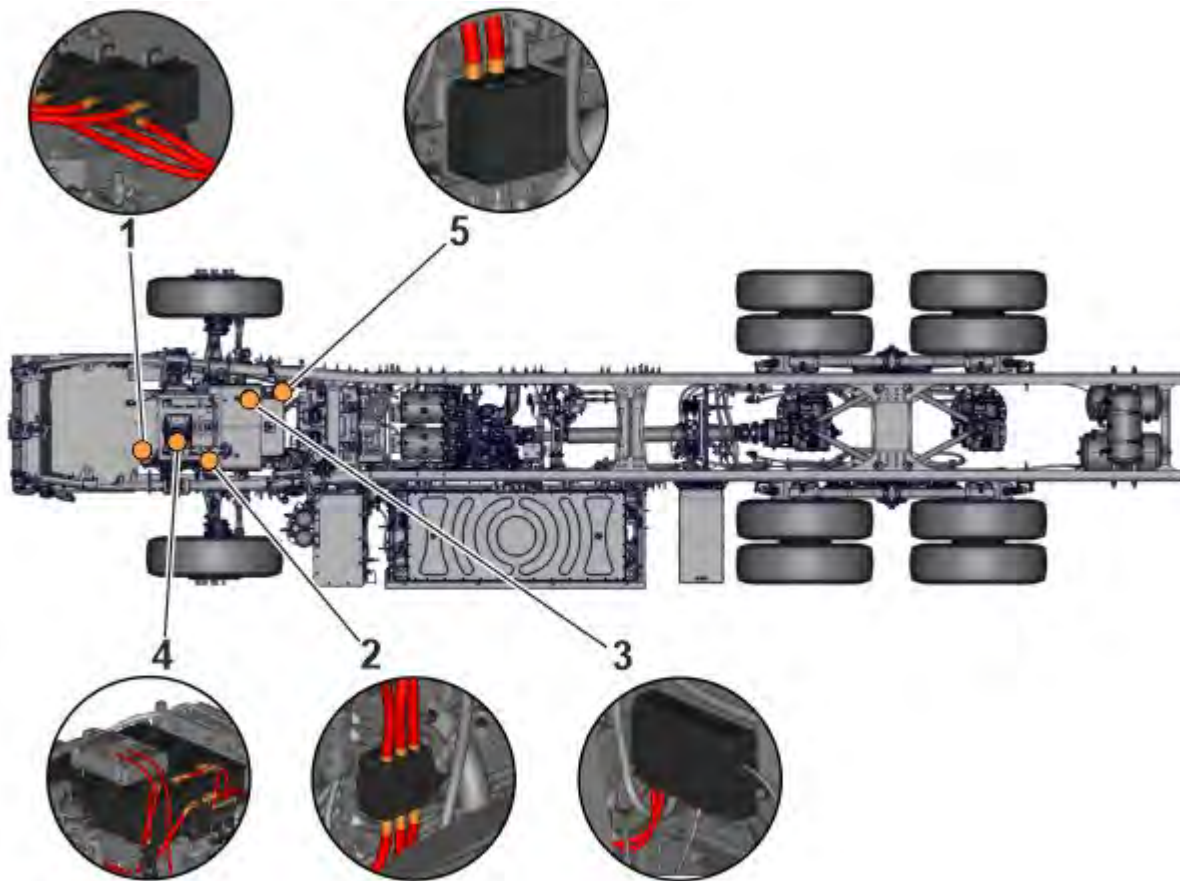
1	Ground junction (X87) (front)
2	Chassis ground (X911) (front right)
3	Chassis ground (X912) (mid right)
4	Chassis ground (X86) (right)
5	Chassis ground (X913) (mid right)

600 V grounding locations



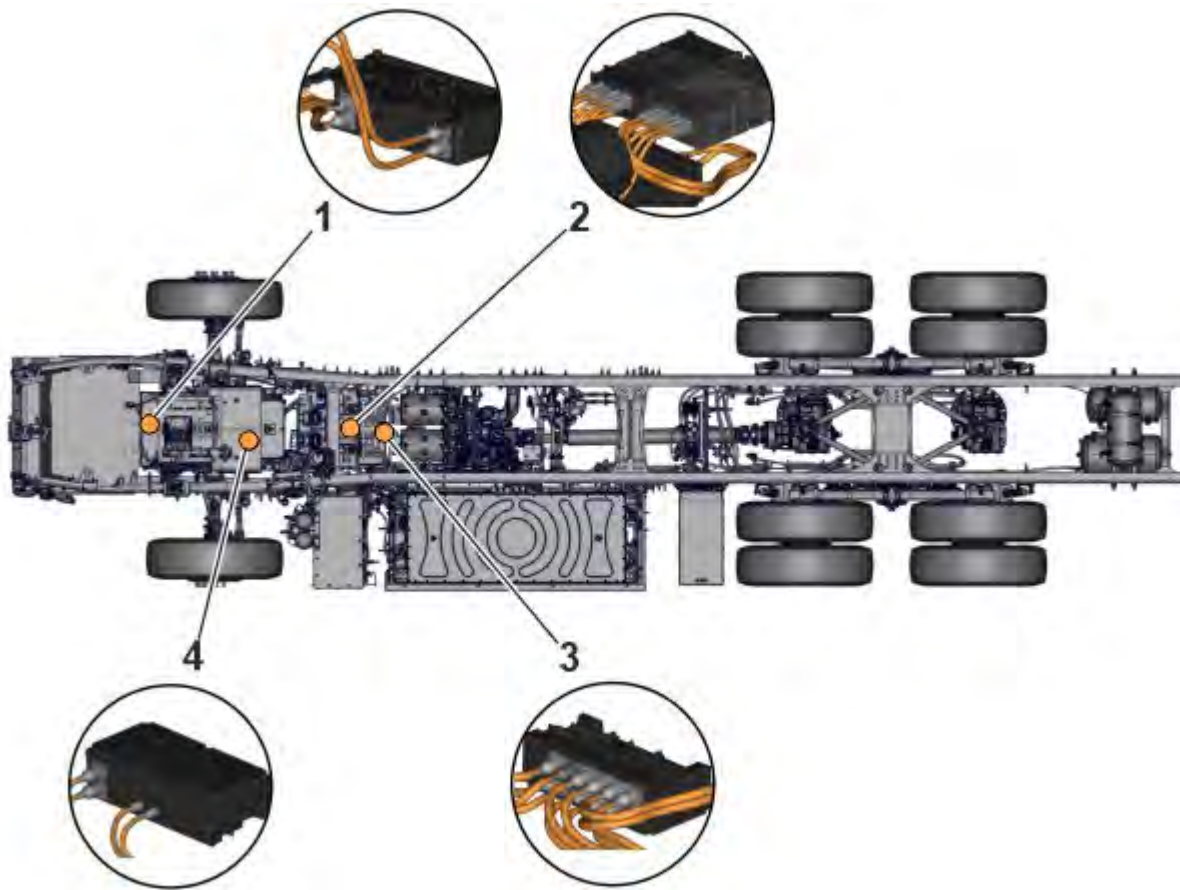
1	Ground bar MPB (Modular Power Box) (X85) (front)
2	Ground bar (X81) (chassis center)
3	Ground bar (X82) (chassis center left)
4	Ground bar (X83) (chassis rear left)

24 V power locations



1	Heater relay (front)
2	Six-way junction box
3	Fuse box FM21
4	24 V battery
5	Six-way junction box

600 V power locations



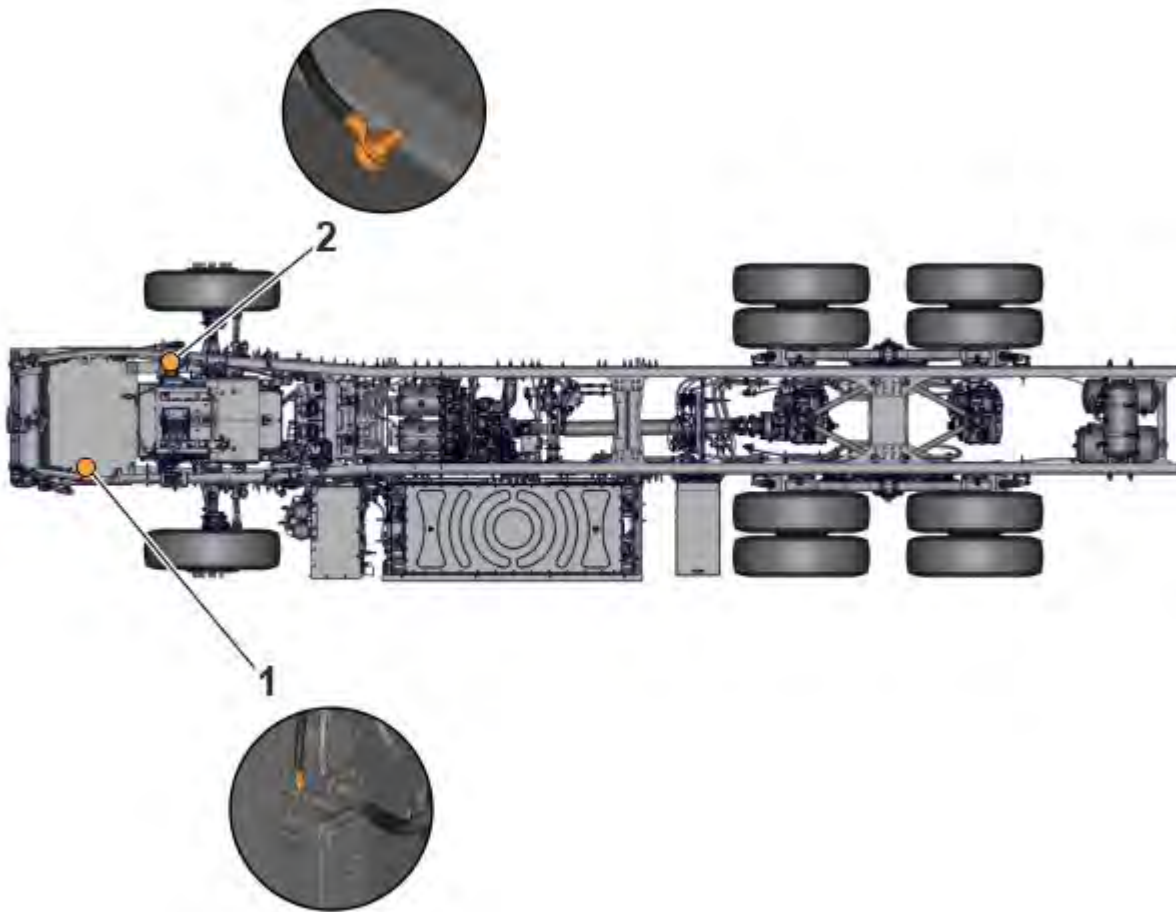
1	CSU (Charging Switch Unit)
2	EMD (Electric Motor Drive)
3	TVJB (Traction Voltage Junction Box) (7 HCC (High-Current Connection) and 0 LCC (Low-Current Connection))
4	TVJB (2 HCC and 5 LCC)

Description

The electrical components of the vehicle must be grounded to function properly. One of the most important reasons for grounding is to protect the electrical components and vehicle from electrical surges. The main ground stud completes vehicle circuits by serving as a return path for the flow of current. Vehicle electrical components are either grounded directly to the main ground stud on the side member (frame rail) or to the other ground studs located throughout the vehicle.

Electrical power is necessary for all the electrical components to function. Electrical power is supplied to all the electrical components by power connections through cables and terminals.

12 V grounding



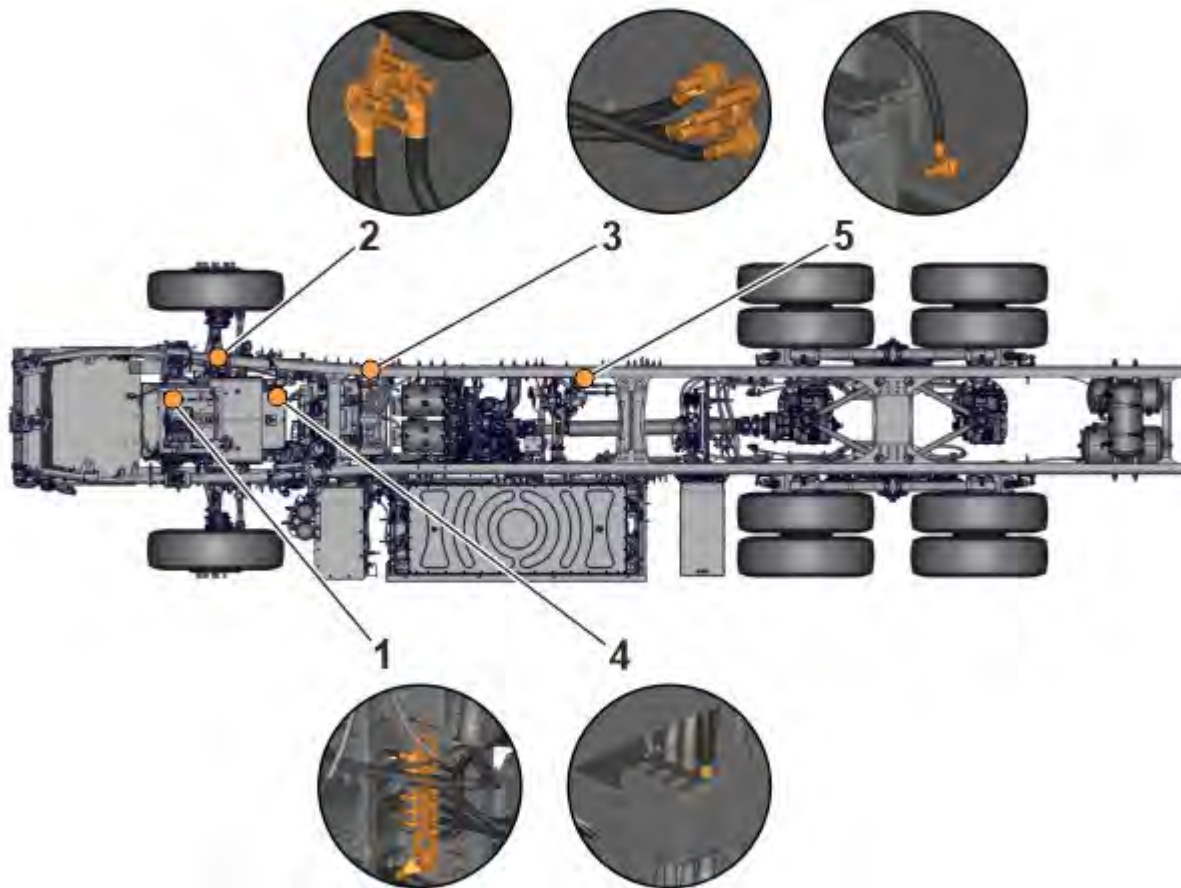
Chassis ground front left (X136)

One cable is connected at this grounding point. The cable is connected from the chassis ground front left (X136) to the chassis ground front right (X135). The cable is also connected from chassis ground front left (X136) to fuses, switches and control units.

Chassis ground front right (X135)

Chassis ground front right (X135) is connected to chassis ground front left (X136).

24 V grounding



Ground junction front (X87)

Ground junction front (X87) is connected to chassis ground front left (X136), a six way junction box, chassis ground mid right (X86) and grounds the following:

- PUCU (PUmp Control Unit)
- Heater
- Battery equalizer
- FRC (Fuse and Relay Center)
- CSU
- Electronic unit cooling/conversion box.

Chassis ground front right (X911)

Chassis ground front right (X911) is connected to a six-way junction box (X86) located on the right-hand side of the vehicle and grounds the 24 V batteries.

Chassis ground mid right (X912)

Chassis ground mid right (X912) grounds the following:

- EHPS (Electro-Hydraulic Power Steering)
- Air compressor.

Chassis ground right (X86)

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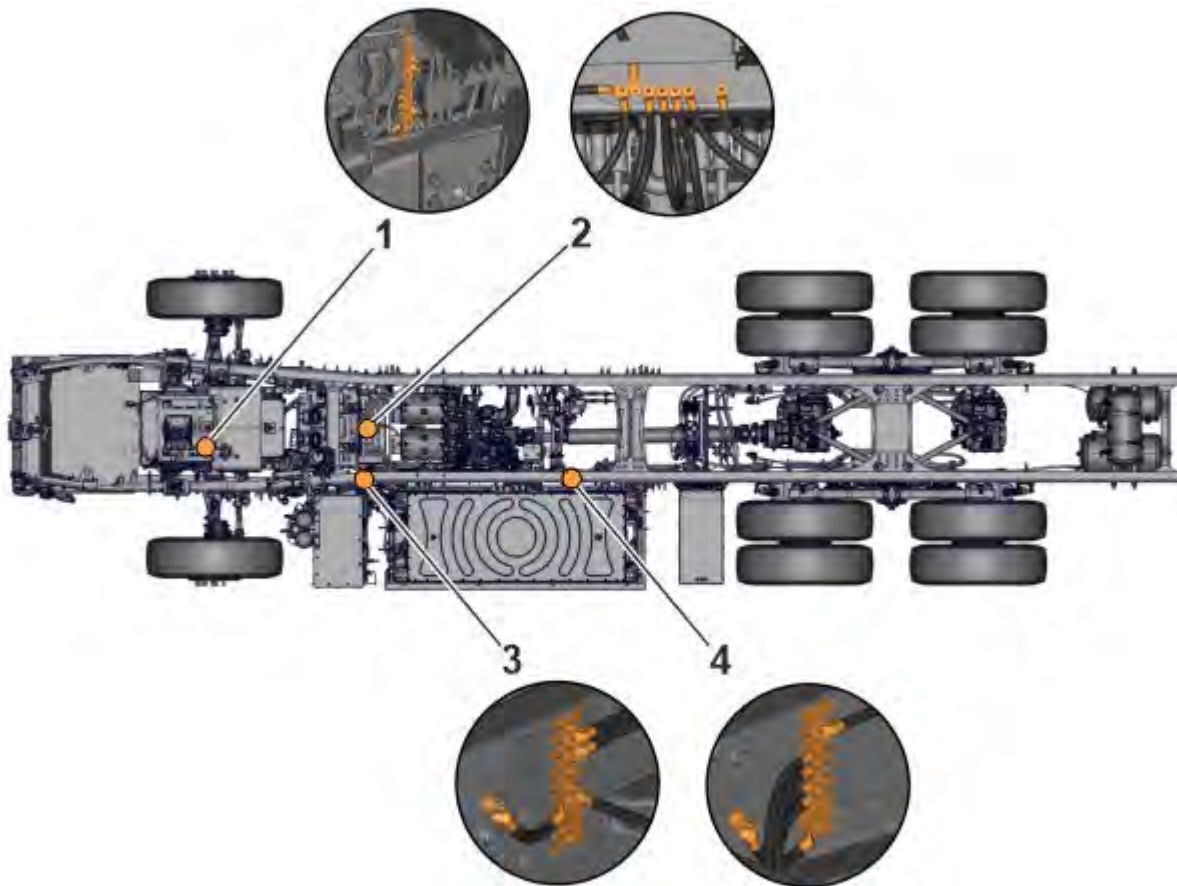
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Chassis ground right (X86) grounds the 12 V batteries and is connected to the chassis ground front right (X911). The chassis ground right (X86) is also connected to the DC/DC converter and to the ground junction front (X87).

Chassis ground mid right (X913)

Chassis ground mid right (X913) grounds the heater. The heater is used to heat the traction batteries.

600 V grounding



Ground bar MPB front (X85)

Ground bar MPB front (X85) is connected to the ground bar chassis center (X81) and grounds the electrical components such as:

- TVMU (Traction Voltage Monitoring Unit)
- TVJB (2 HCC and 5 LCC)
- CSU
- DC/DC converters.

Ground bar chassis center (X81)

Ground bar chassis center (X81) is connected to the ground bar MPB front (X85), the ground bar chassis center left (X82) and the chassis ground mid left (X83). The ground bar chassis center (X81) grounds the following:

- EPS (Electric Propulsion System)

- EMD
-
- TVJB (7 HCC and 0 LCC).

Ground bar chassis center left (X82)

Ground bar chassis center left (X82) is connected to the ground bar chassis center (X81) and grounds the traction batteries.

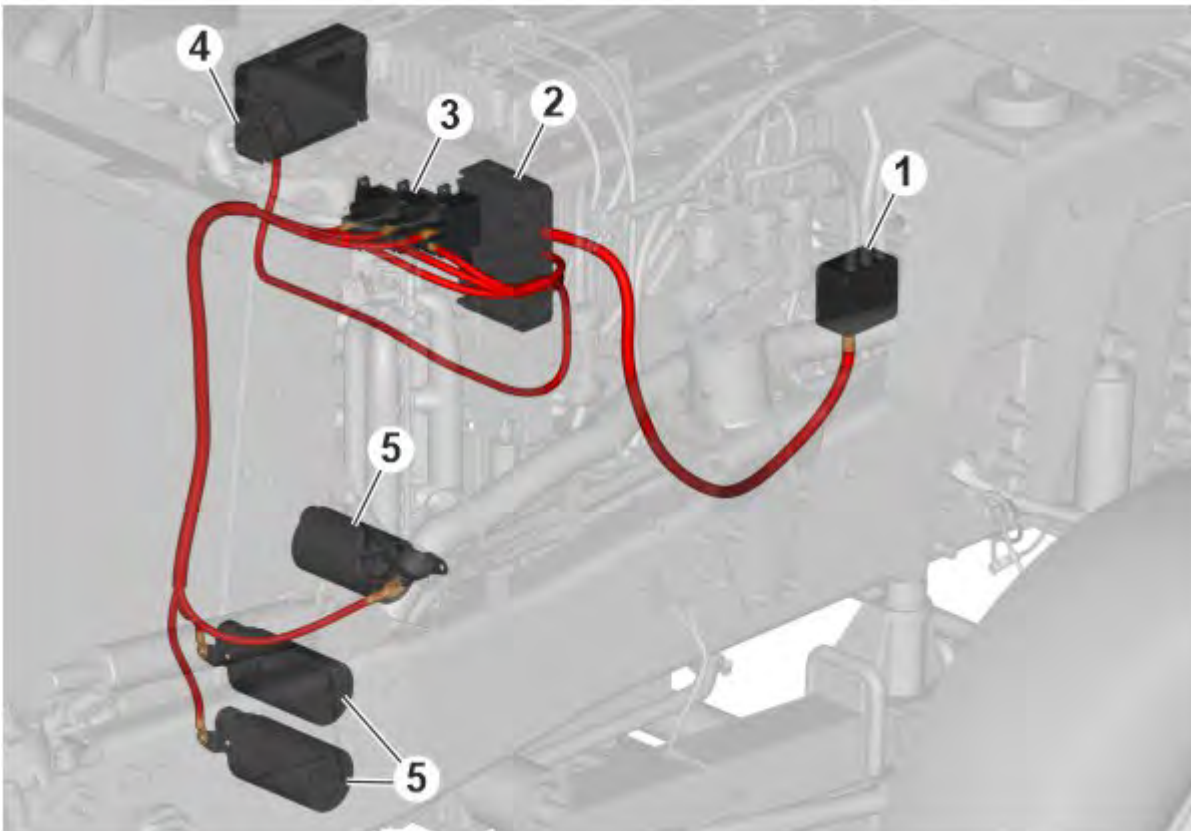
Ground bar chassis rear left (X83)

Ground bar chassis rear left (X83) is connected to the ground bar chassis center (X81) and grounds the electrical components such as:

- EMD
-
- ePTO (electromobility Power Take-Off)
-
- Traction batteries.

24 V power

Heater relay

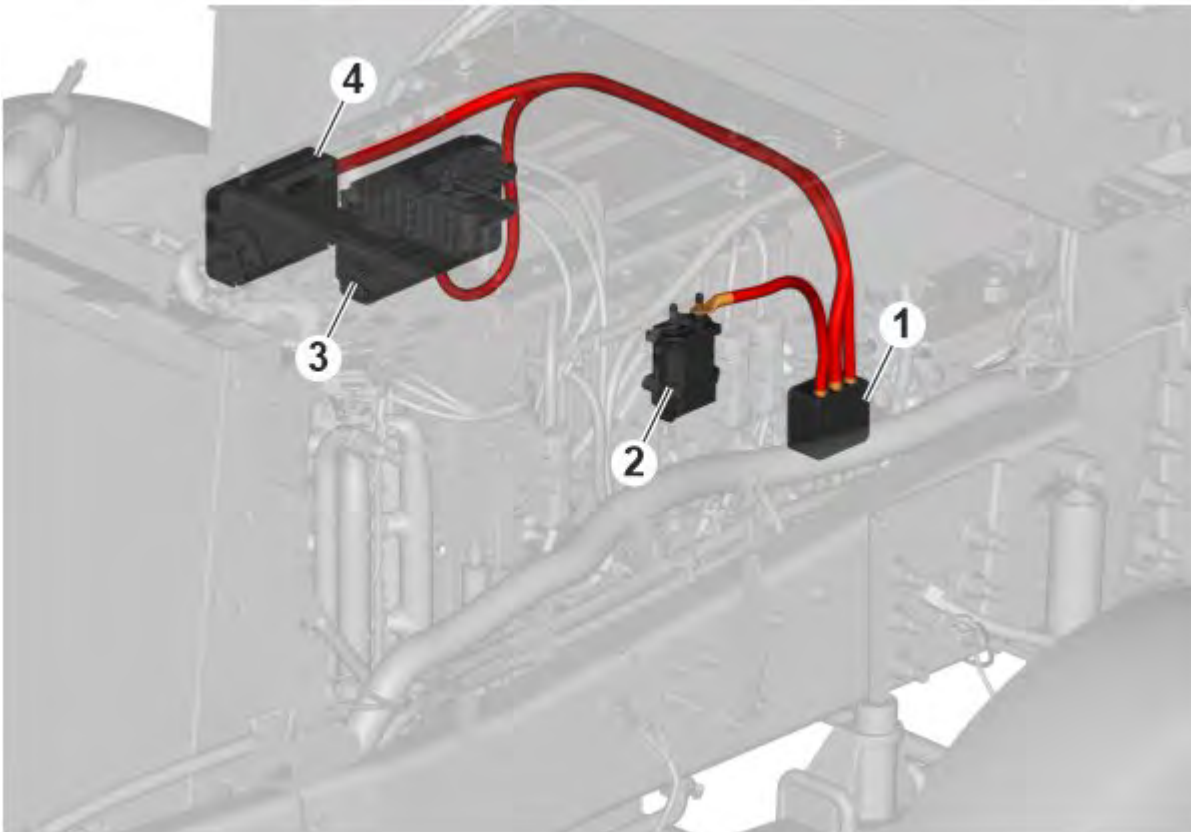


The power flows from a six-way junction box (1) to the three heater relays (3) via a fuse box FM22 . (2) Fuses are used to limit the electrical current flowing through the wires to protect certain components. The components connected to the heater relay are the heater (5) and the fuse box FM20 . (4) The heater relays are connected to the ESS (Energy Storage System) through cables. The power to run the heater ESS is supplied through these cables.

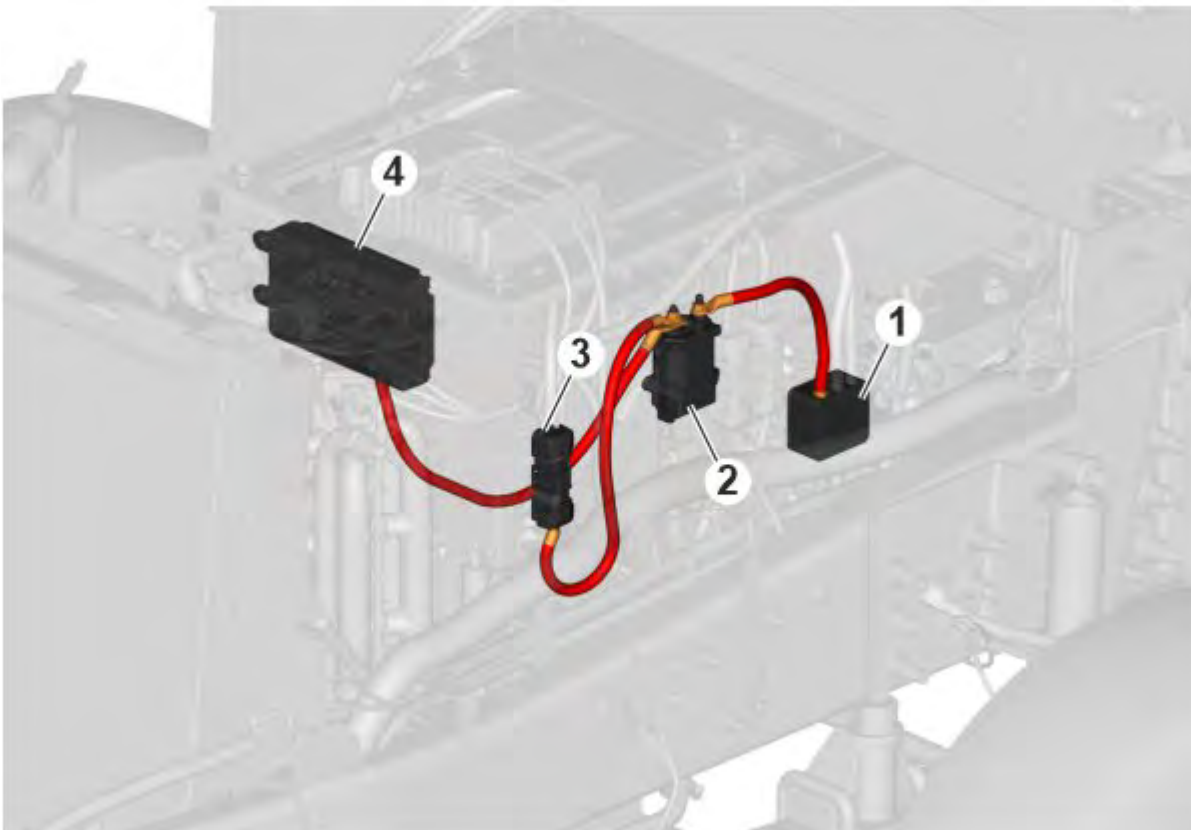
Six-way junction box

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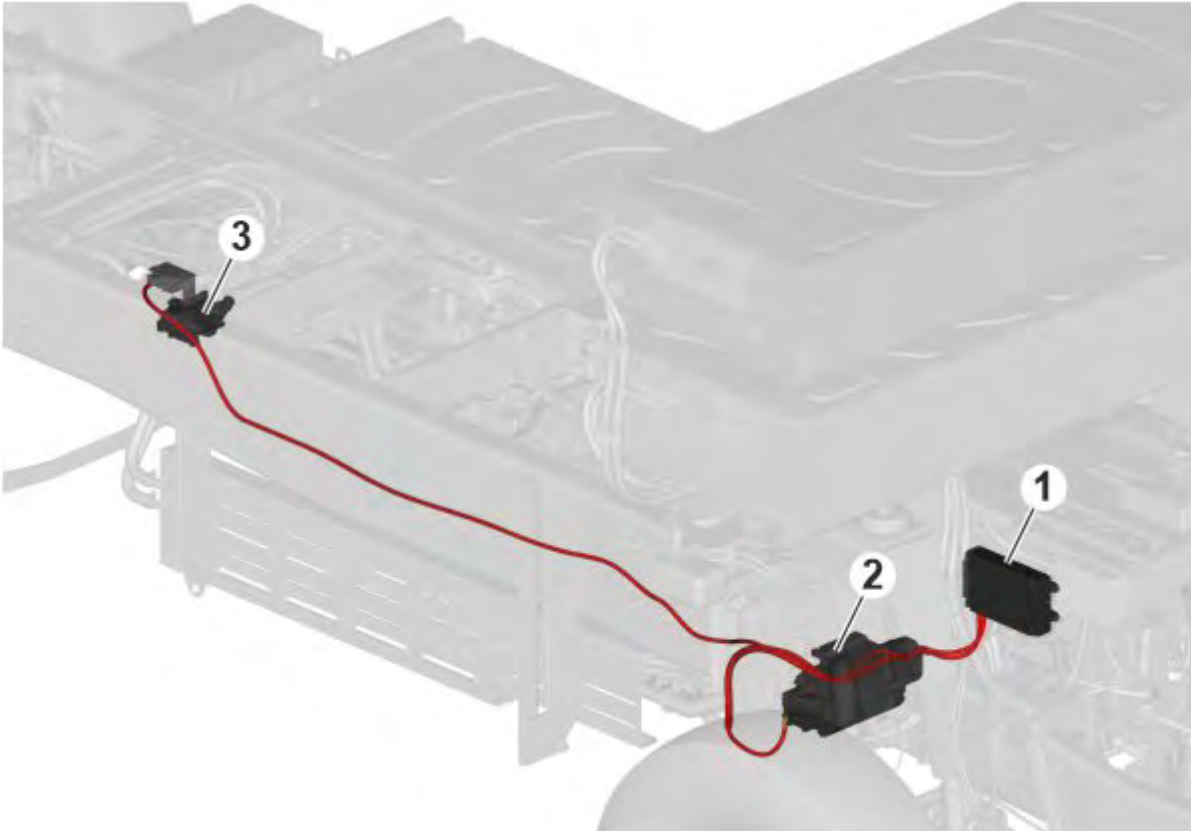


The six-way junction box (1) is connected to the main switch (2) , fuse box FM21 (3) and fuse box FM20 (4) .



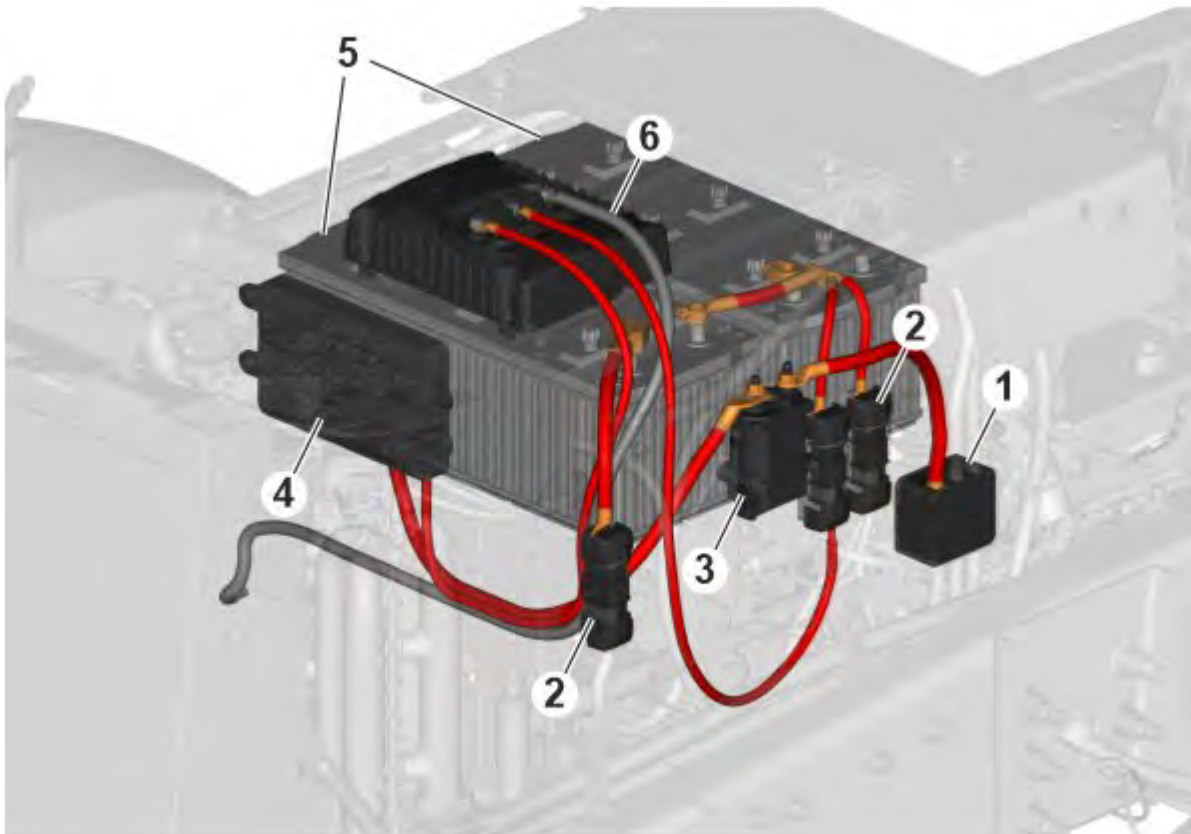
Also, the six-way junction box (1) is connected to the main switch (2), fuse (3) and fuse box FM23 .
 (4) The main switch is an automatic switch and it disconnects many electrical components and functions in the 24 V system.

Fuse box (FM21)



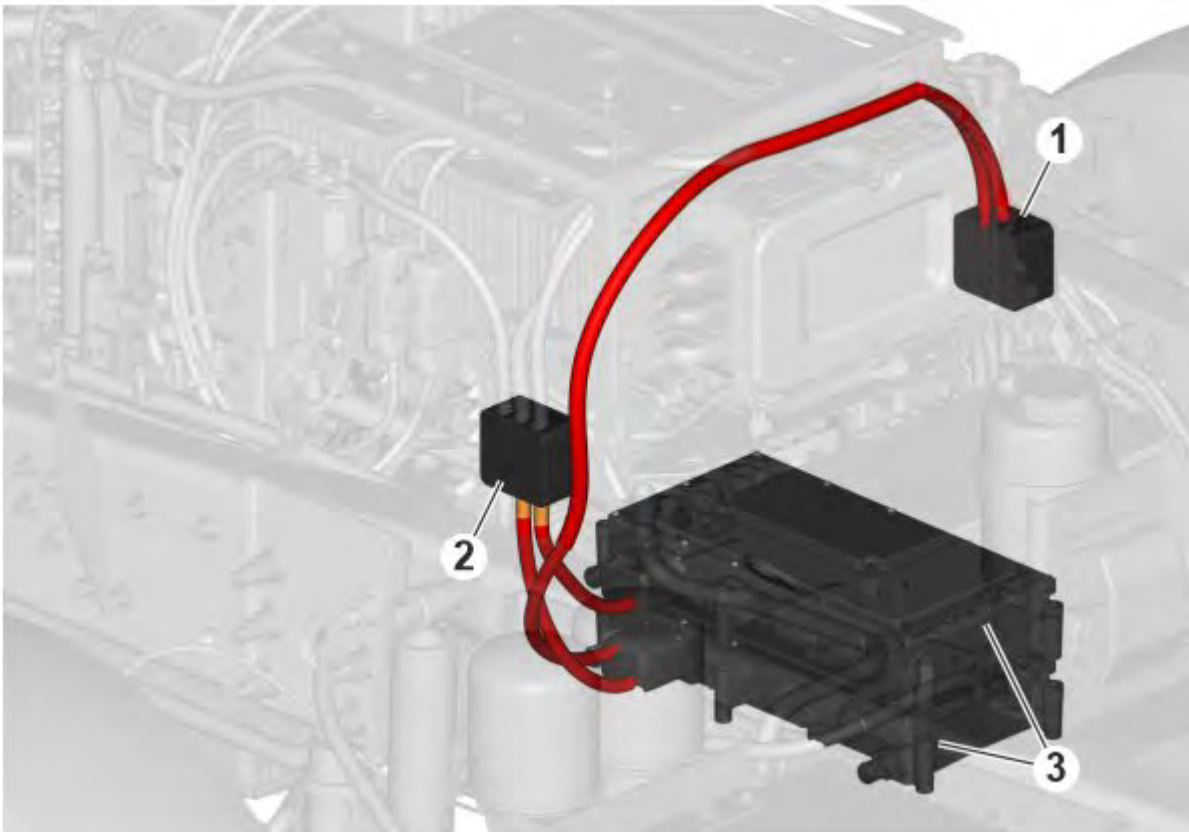
The power flows from the fuse box FM21 (1) to the EHPS (2) and the relay (3) . From the relay, the power flows to the coolant heater. The purpose of the electrical coolant heater is to heat the ESS by circulating the coolant through the ESS coolant circuit. The EHPS is an electro-hydraulic unit that provides the necessary energy to ensure the performance of power steering on the vehicle.

24 V battery



The 24 V battery (5) receives its power supply from a six-way junction box (1) via the main switch (3) , fuse (2) and fuse box FM23 . (4) The power is also supplied to the battery equalizer (6) . The 24 V DC (Direct Current) system provides power and controls all the 24 V DC electrical and electronic components. 24 V DC also enables the traction voltage system components to communicate and transfer signals between different control units. The 24 V DC system is powered by two 12 V batteries.

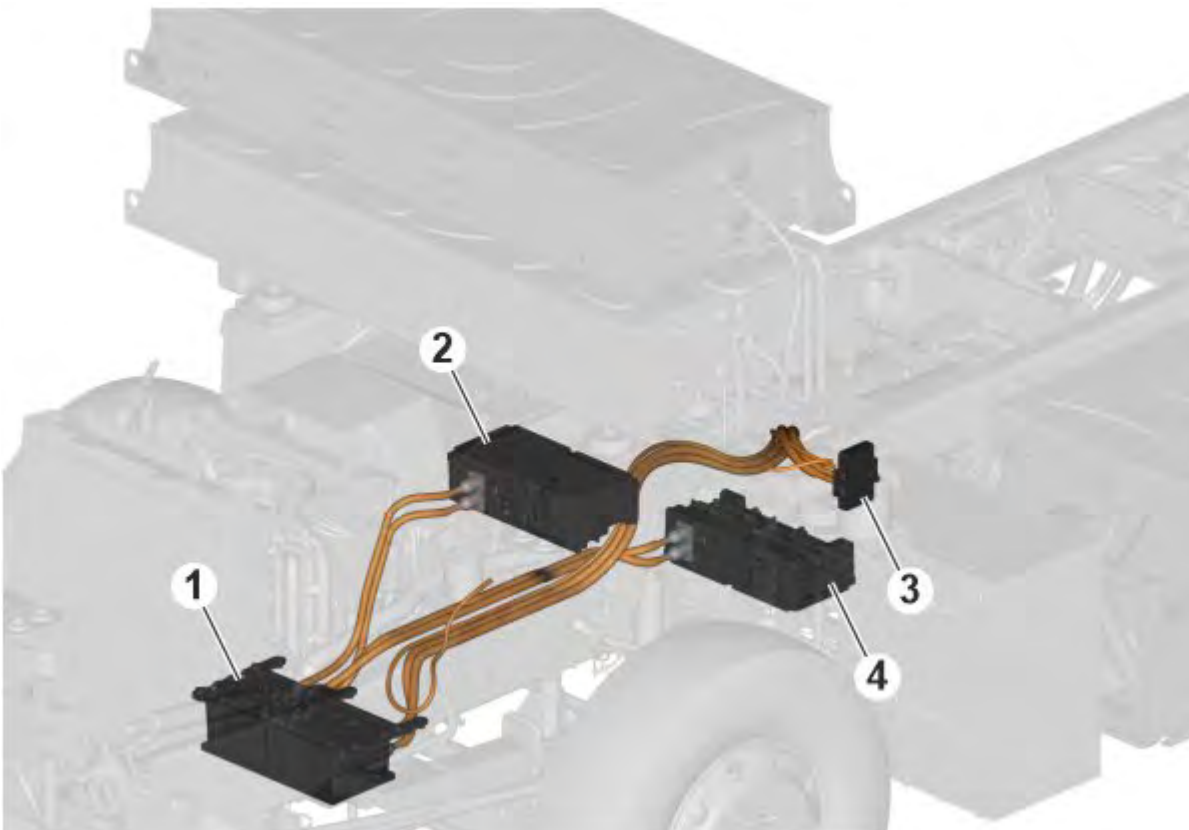
Six-way junction box



The power flows from the six-way junction box (2) to the DC/DC converters (3) . The DC/DC converters convert 600 V DC to 24 V DC and are connected to the grounding points such as chassis ground (front right) (X911) and ground junction front (X87) via MPB box (1) .

600 V power

CSU

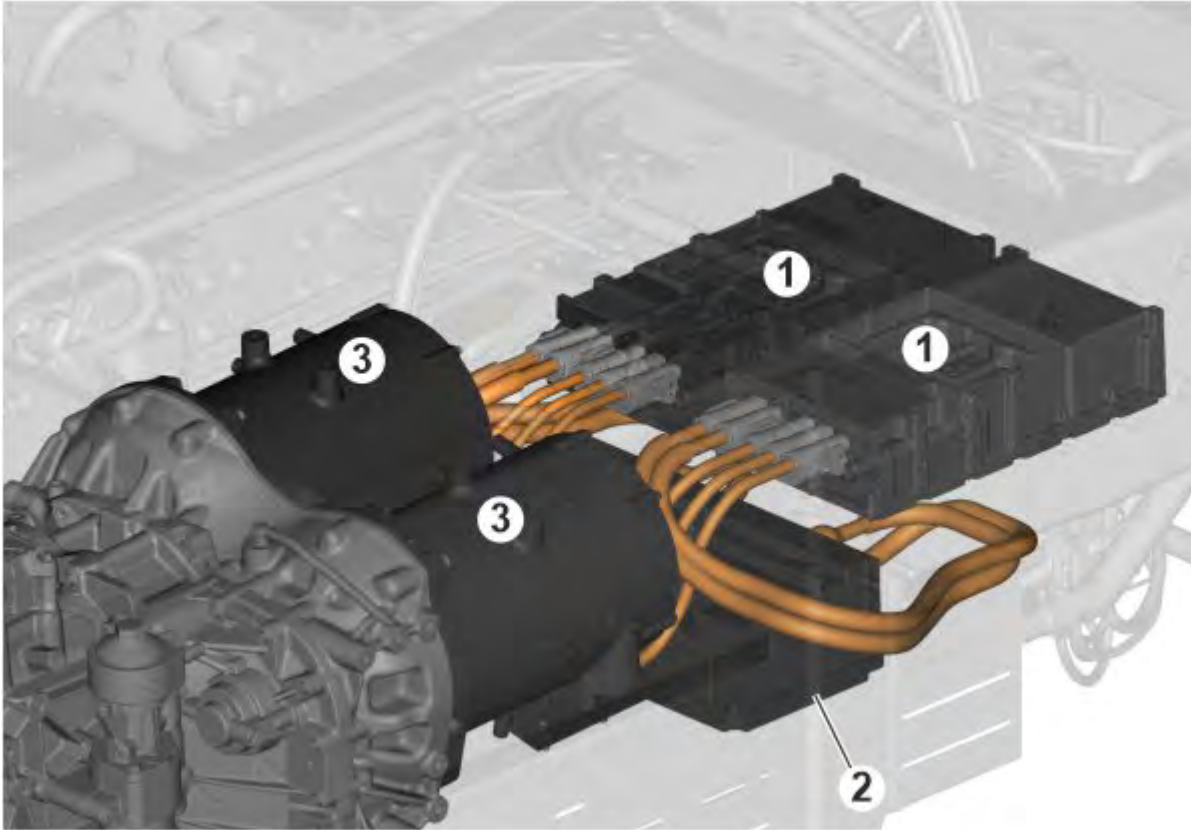


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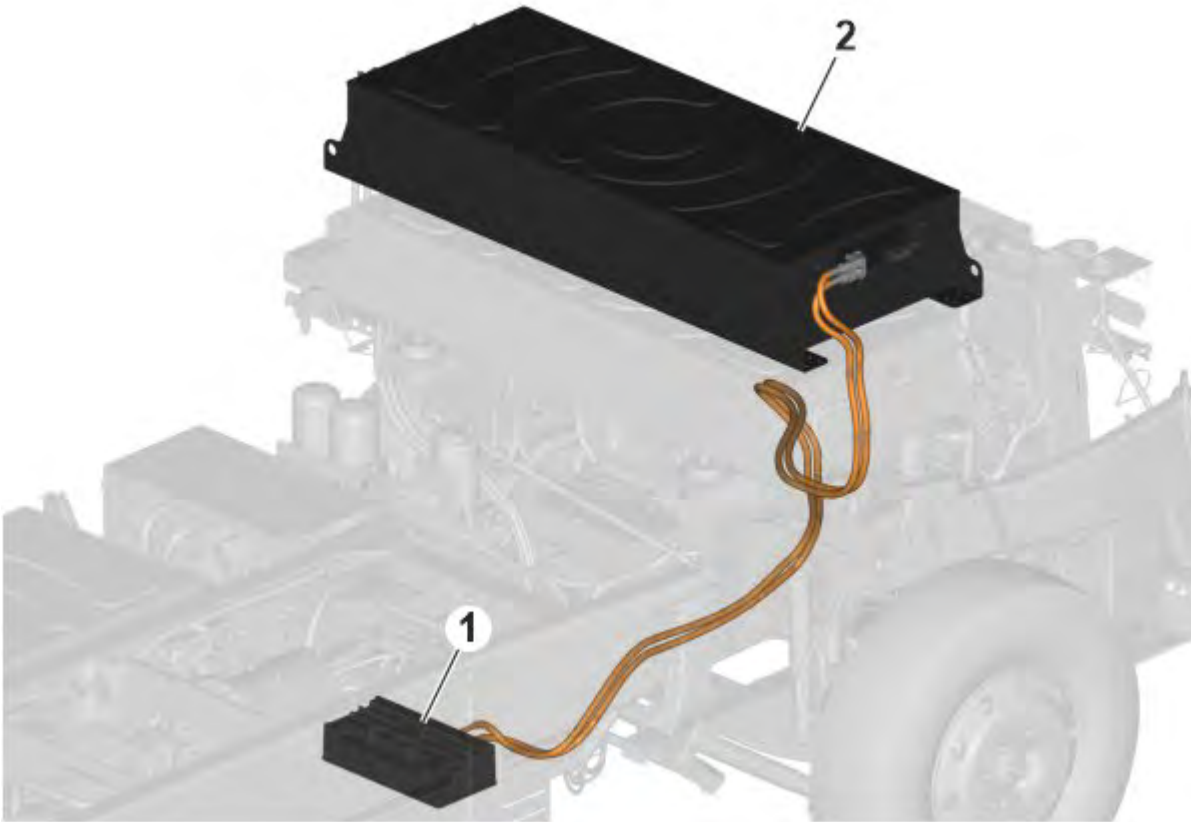
The power flows from TVJB (4) (7 HCC and 0 LCC) to the CSU (1) . The CSU is a part of the electrical interface between the DC charging inlet and the traction voltage system. The components connected to the CSU are TVJB (2) (2 HCC and 5 LCC) and CCS (Combined Charging System) (3) .

EMD

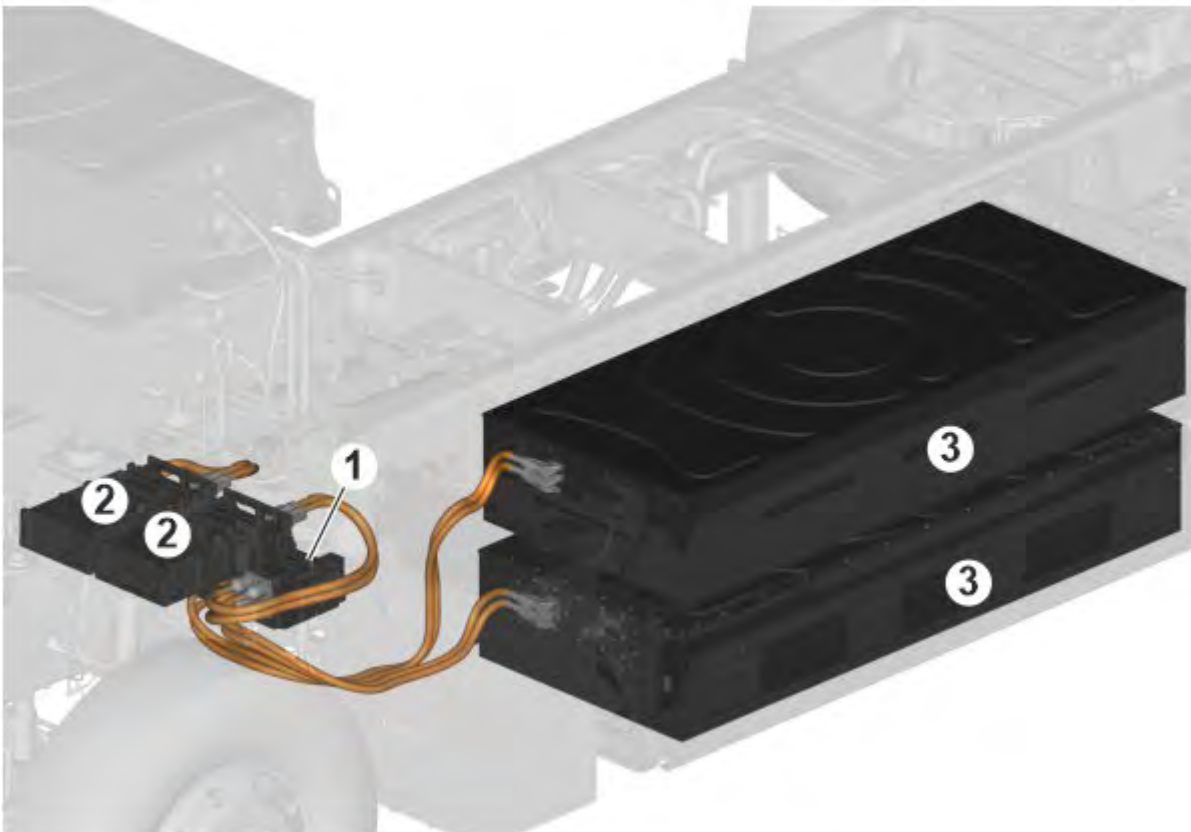


Power flows from the EMD (1) to the electric motor (3) . The EMD activates and deactivates the power electronics and the torque capability of the MDS (Motor Drive System) on request from the PCM (Powertrain Control Module) and the HPCU (Hybrid Powertrain Control Unit). The components connected with EMD are the electric motor and TVJB (2) (7 HCC and 0 LCC).

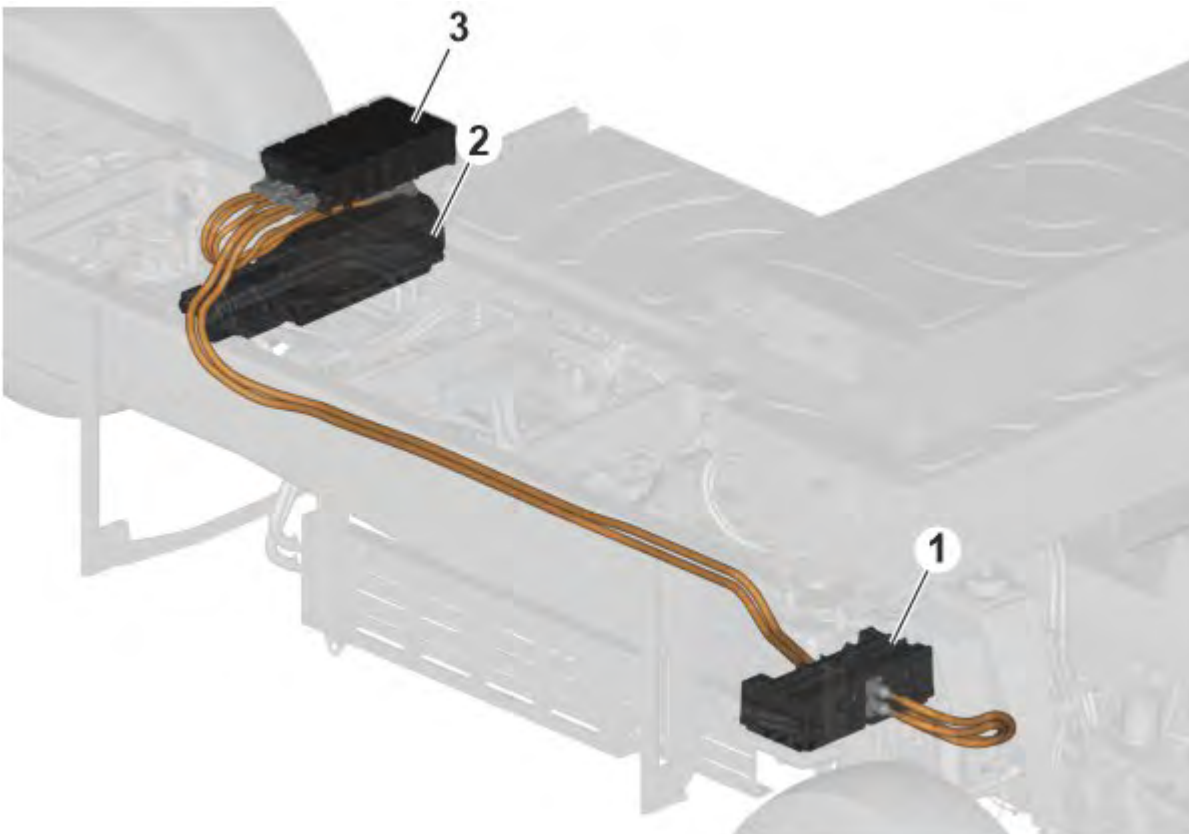
TVJB (7 HCC and 0 LCC)



The power from TVJB (1) (7 HCC and 0 LCC) flows to the traction battery (2) . The TVJB electrically connects to the different types of traction voltage components in the EPS.

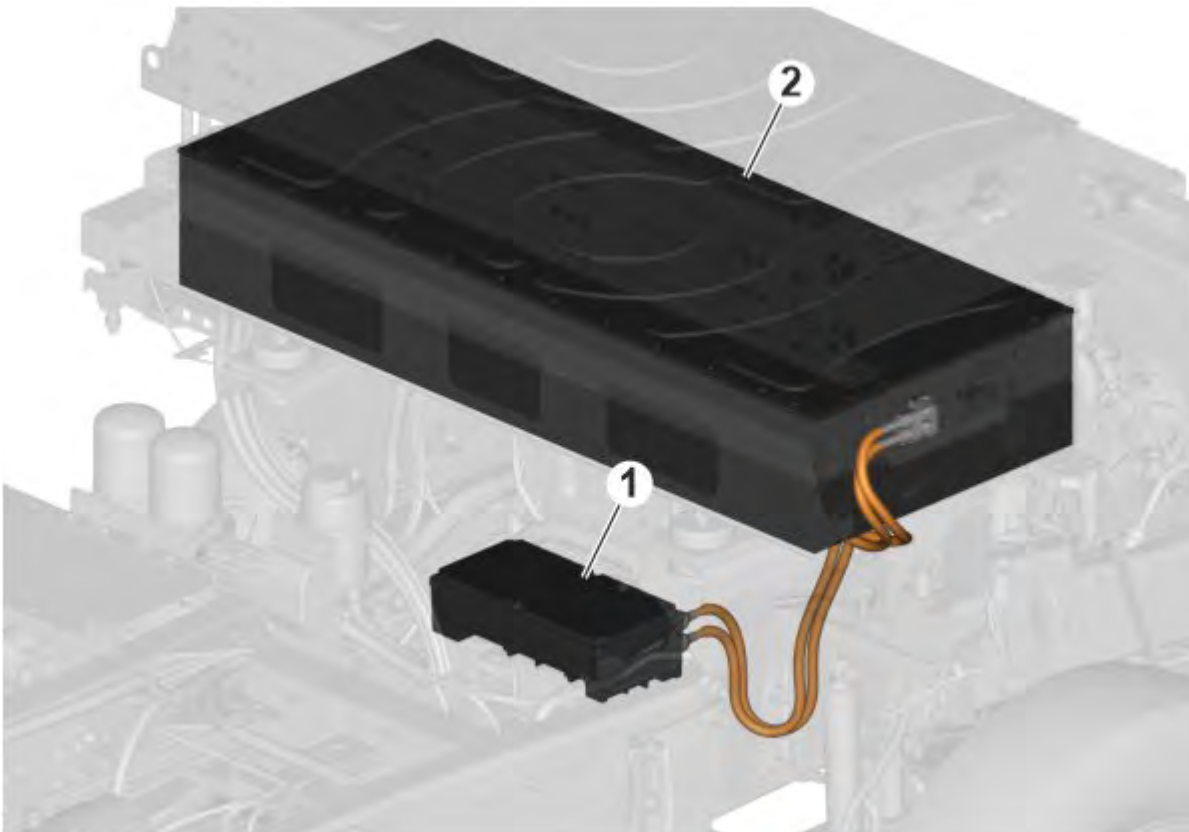


The power from EMD (2) flows to the TVJB (1) (7 HCC and 0 LCC). The TVJB (7 HCC and 0 LCC) is also connected to the traction batteries (3).



The TVJB **(1)** (7 HCC and 0 LCC) also supplies the power to the EMD **(3)** and ePTO **(2)**. The ePTO is an electrical power take-off that consists of an electric machine EM (Electric Motor) and a hydraulic pump.

TVJB (2 HCC and 5 LCC)



The power flows from TVJB **(1)** to the traction battery **(2)** .