



SEAT Mii electric

SSP NO. 175



Technical status 07:19 Due to the constant development and improvement of the product, the data used in this course is subject to possible variations.

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TITLE: SSP175 - SEAT Mii Electric

AUTHOR: After Sales Training

Autovía A-2, km 585 08760 – Martorell, Barcelona (Spain)

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INTRODUCTION

SEAT launches the Mii electric. The first all-electric vehicle manufactured by the brand in the Bratislava factory (Slovakia).

It is an urban, light model with the autonomy required for day-to-day driving and that does not generate contaminating emissions.

The image shows the most important aspects of the SEAT Mii electric, which will be addressed in this Self-study programme.



The Mii electric's **air conditioning system** is based on the single-area Climatronic, which manages the heater and air conditioning electrical units.



The **exterior design** is noted for its emblems, which convey its marked all-electric character. The side-view mirrors have side indicators.



The gear shift with a B position for braking and the energy recovery are particularly noteworthy in the vehicle's **interior**. The dash panel insert with indications of the battery's charge and the electrical system are worth highlighting too.

The Lane Assist and Drive Profile with the ECO and ECO+ functions have been incorporated as **drive assistance systems**.



Instead of the conventional fuel intake, it has a standard high-voltage charging outlet that allows for a slow and fast charging.

The Mii electric's **brake system** has two new features: an eBKV brake servo and a pressure accumulator that supports the energy recovery in the deceleration stages.



D175-01

TECHNICAL DATA

The Mii electric combines practicality and dynamism with advanced technology. The motor is all-electric and has a power of **61 kW (82 CV)** and torque of 210 Nm. As a result, the Mii electric accelerates from 0 to 50 km/h in 3.9 seconds, making it the perfect ally in city driving and short intercity trips.

It equips a lithium-ion high-voltage battery with a **capacity of 36.8 kWh**, which is located in the vehicle's underbody.

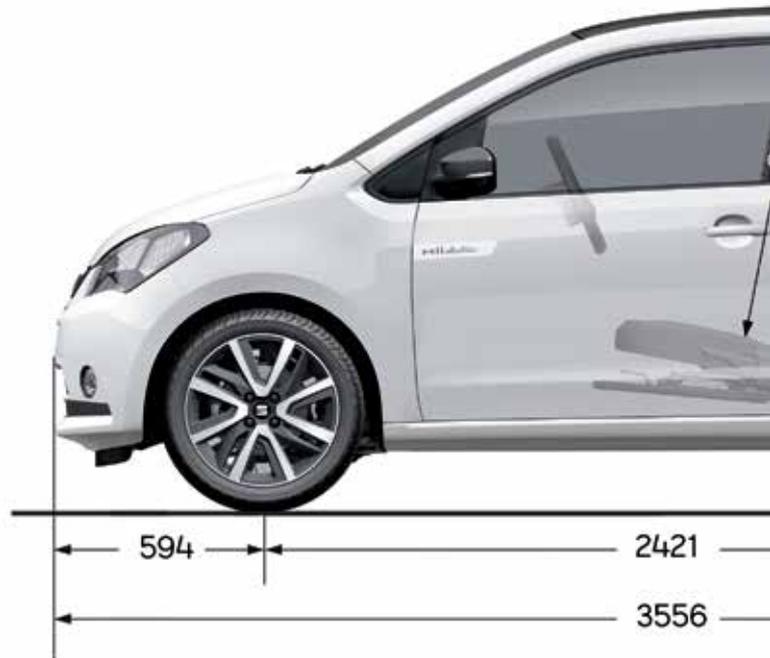
A five-door body is offered exclusively and is available in two trim levels:

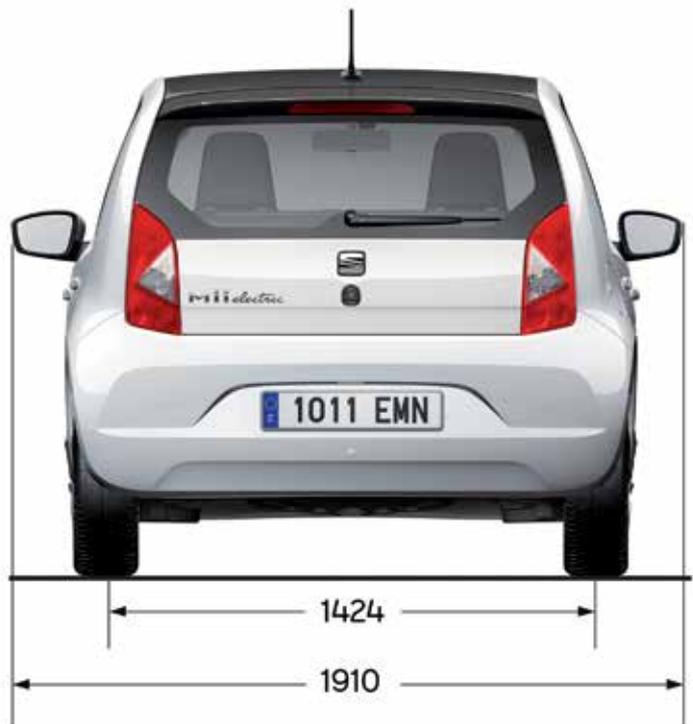
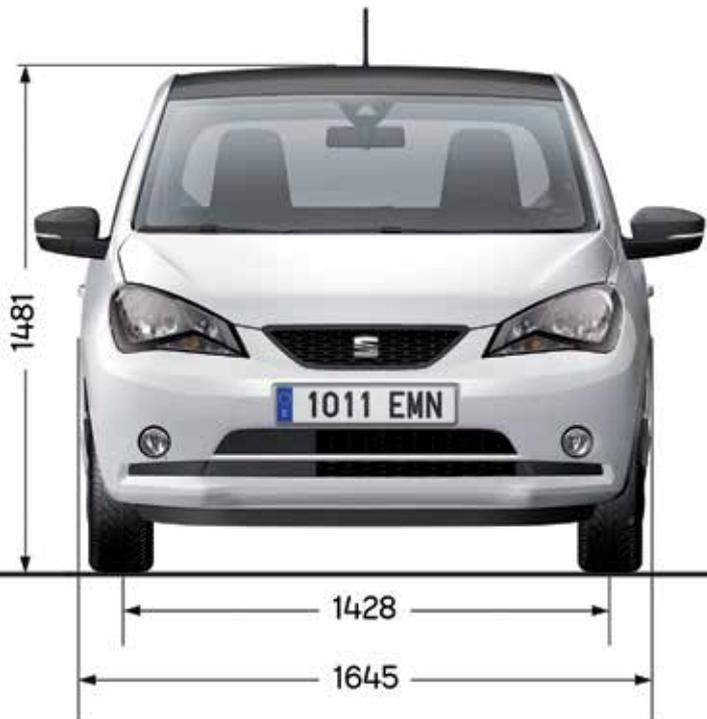
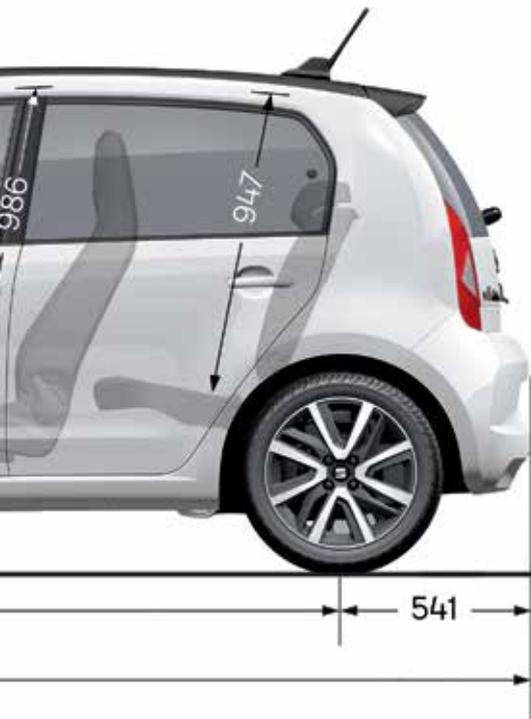
- **Mii electric.**
- **Mii electric Plus.**

The SEAT Mii electric equips sports heated and ergonomic seats, ambient light, a 5" colour-screen radio and LED turn signals integrated into the side-view mirrors.

Via the **SEAT DriveMii** and **SEAT CONNECT** smartphone applications, users can enjoy maximum connectivity with their vehicle and set parameters, such as the battery's charge or the air conditioning system.

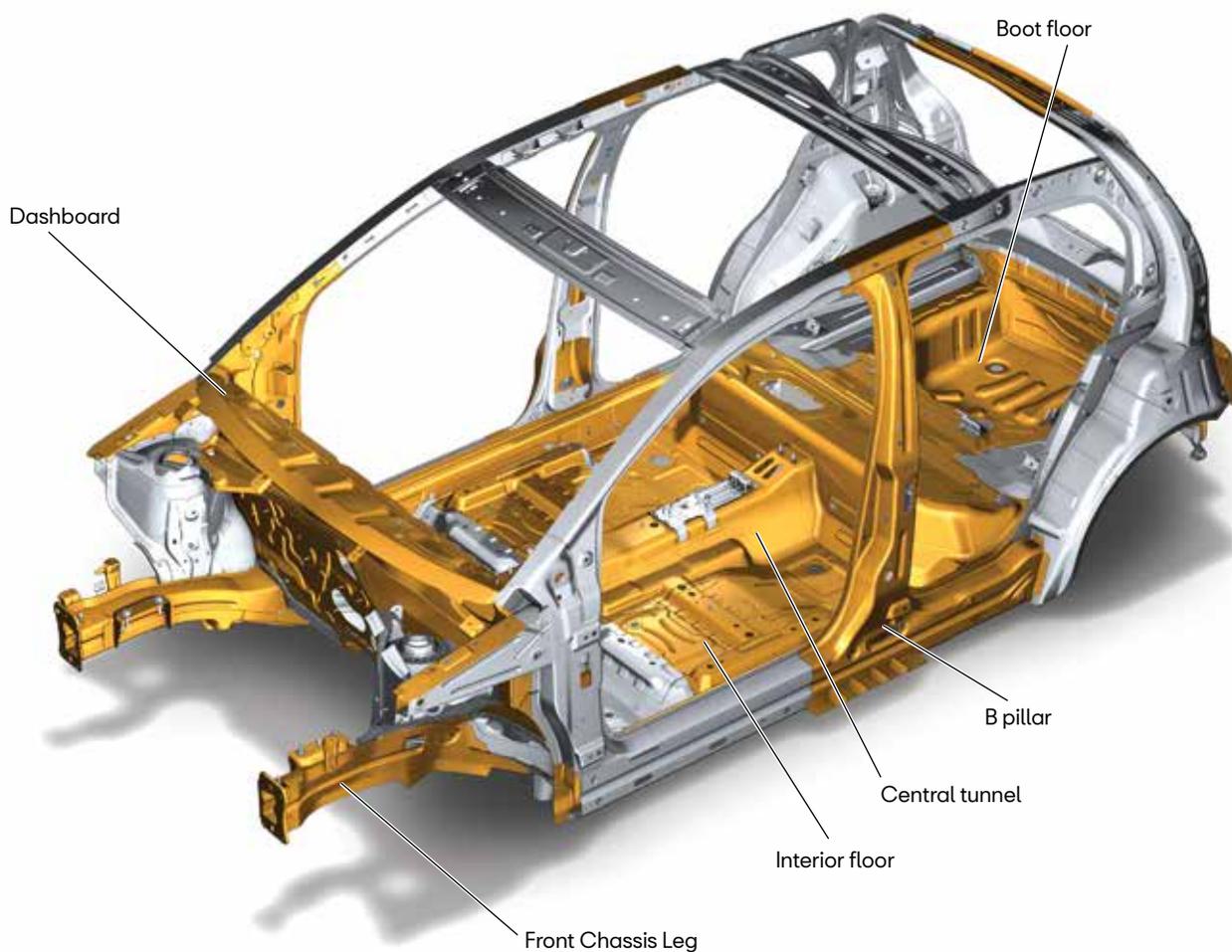
The image shows the SEAT Mii electric's main dimensions in detail.





D175-02

BODYWORK



D175-03

The Mii electric's body is self-supporting and has five doors.

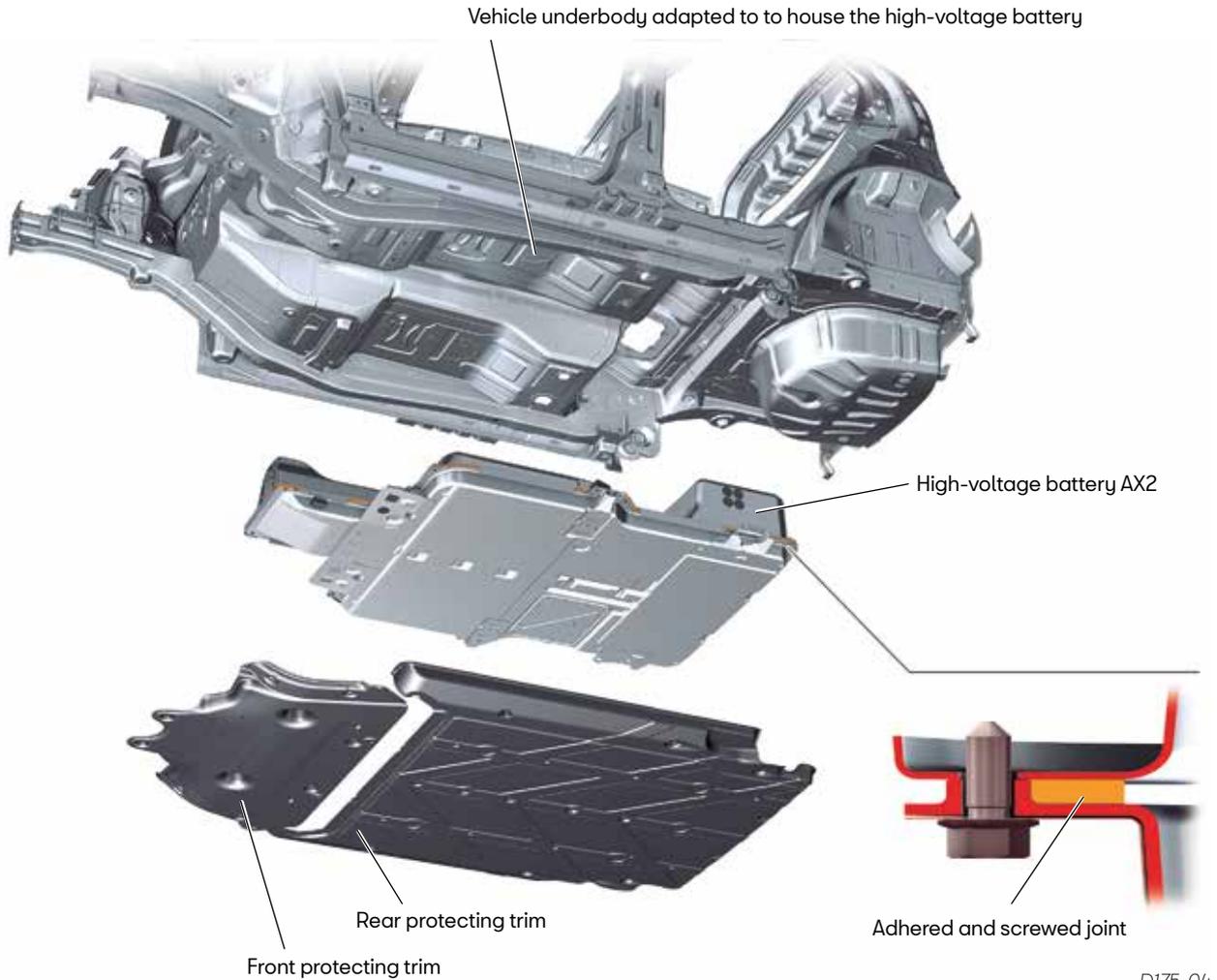
It has been designed to house all the components related to the electric drive. The image shows the areas that have been subject to changes:

- Front Chassis Leg
- Interior floor
- Boot floor
- Central tunnel
- Dashboard
- B pillar

The **Front Chassis Legs** include the necessary elements to support the top crossbeam. Element to which the Three-phase current drive VX54 is fixed to

The **interior floor** and **central tunnel** have been optimised to provide the largest space for the high-voltage battery and house its anchoring points.

The **B pillar** and the **dashboard** have been reinforced to comply with the special requirements of resistance against impacts.



D175-04

In addition to the changes in the bodywork's structural parts, other elements have been added:

- Connecting points to screw the high-voltage component's potential equalisation lines.
- Underbody plastic protectors
- Combination of adhered and screwed joints for the high-voltage battery.

The underbody is protected by two protecting trims: one at the back and another at the front.

The **front protecting trim** covers the motor compartment and the components.

The **rear protecting trim** covers the Mii electric's central area, from the front subframe to the rear axle,

completely covering the high-voltage battery and its connections.

The good condition of these protectors and fixings are essential, as any deformation in the battery's outer housing involves taking the vehicle to the quarantine area to be checked by a high-voltage expert.

In no case can the high-voltage battery's housing joints be manipulated without the corresponding technical qualification.

AIRBAG SYSTEM



Warning lamp for airbag deactivated on front passenger side.

Front passenger airbag

Crash sensor for front airbag G190

Side airbag crash sensor on driver and occupant side G179 and G180

Front seat belt tensioner igniters 1 N153 and N154

Seat occupied sensor, front passenger side G128





The Mii electric uses the **airbag management VW 12** in a single configuration to control and activate the airbags and seatbelts with tensioner

The airbag management's configuration in the Mii electric consists of the following:

- Driver airbag
- Front passenger airbag
- Front side airbags
- Curtain airbags
- Front seatbelts with tensioner
- Seat belt warning for all occupants
- Occupied seat warning in all seats
- Warning lamp for airbag deactivated on front passenger side
- Key operated switch to deactivate airbag on front passenger side

The airbag control unit J234 is located in the central tunnel, after the selector lever and under the centre console's cover.

The side airbag crash sensor on driver and occupant side G179 and G180 are located at the bottom of B Pillar, next to the front seat belt.

The key operated switch to deactivate airbag on front passenger side is located on the right side of the dashboard. The warning lamp for airbag deactivated on front passenger side K145 is located on interior mirror housing.

Due to equipping a **high-voltage battery**, the system incorporates an additional safety measure that deactivates the high-voltage network in the event of an accident.

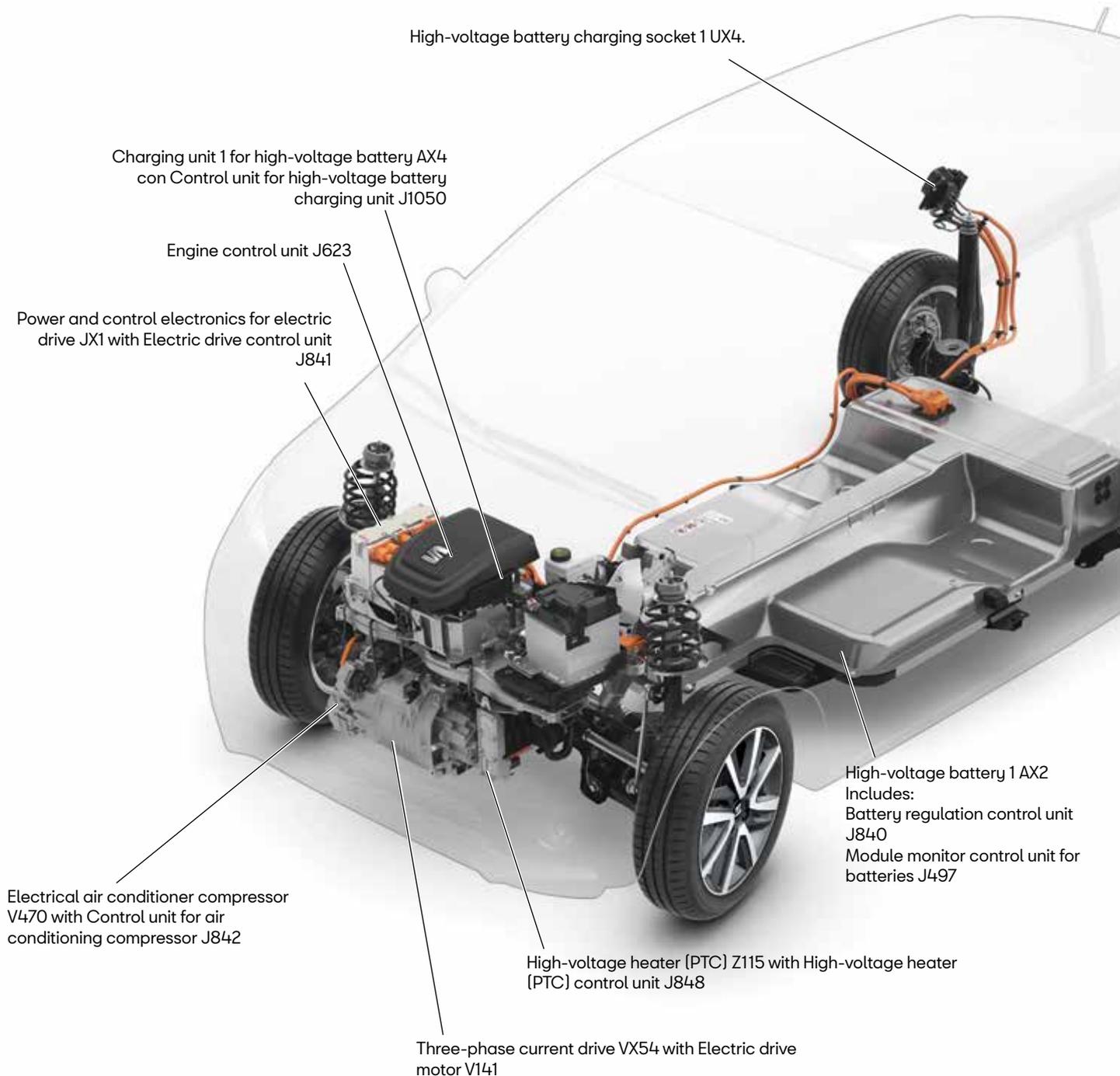
The airbag control unit J234 communicates with the battery regulation control unit J840 using a conventional cable. If the airbag detonates, it sends a crash signal, opening the high-voltage battery's contactors and setting the system to non-live status.

HIGH-VOLTAGE SYSTEM

The Mii electric uses an electric motor as a drive system. This involves installing a high-voltage system that is responsible for managing and feeding all the vehicle's onboard systems

The high-voltage system consists of the following components:

- **High-voltage battery 1 1 AX2**, which stores and supplies energy.

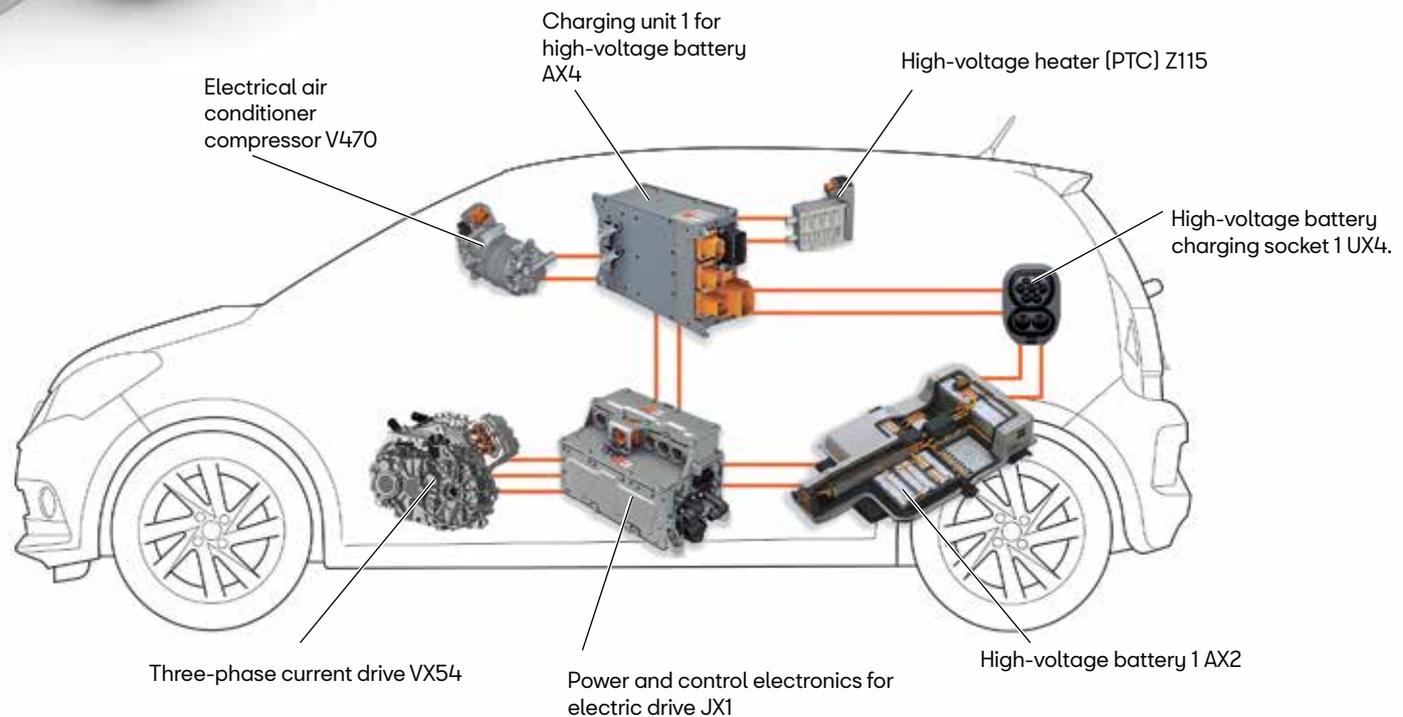


- **High-voltage battery charging socket 1 UX4**, which is used to charge the battery.
- **Charging unit 1 for high-voltage battery AX4**, which acts as a transformer during the charging stage.

- **Power and control electronics for electric drive JX1**, which converts the battery's direct charge into alternating current to supply the electric drive motor V141.
- **Three-phase current drive VX54**, which integrates the electric drive motor V141 and the one-speed transmission OCZ.
- **Electrical air conditioner compressor V470** to control the interior's climate.
- **High-voltage heater PTC Z115**, which rises the coolant's temperature for heating.

Another important component is the high-voltage cabling, always in colour orange and with the connectors mechanically coded to avoid connection errors.

The image shows the location of each of these components in the Mii electric.



D175-06

HIGH-VOLTAGE SYSTEM

WARNING IDENTIFICATIONS

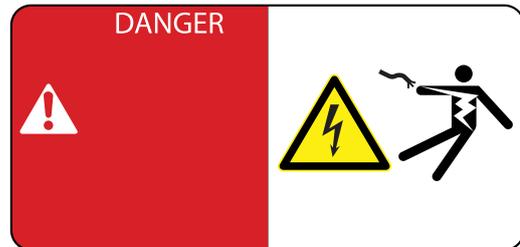
All the high-voltage components incorporate warning identifications that must be carried out. During maintenance or repair, they must be legible and in good condition.

In the event of finding a faulty or illegible identification, it must be replaced.

The Mii electric has the following warning identifications:



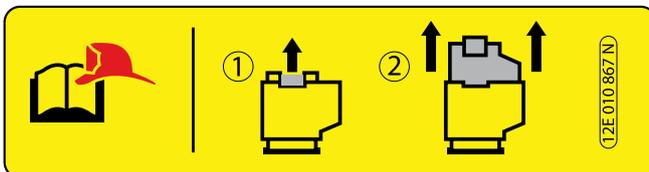
Warning in front lock carrier



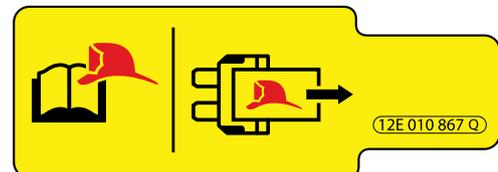
Warning in each high-voltage component



Warning on the high-voltage battery



Indication of supply cut-out connection in the motor compartment



Indication of the power cut-off fuse for vehicle rescue

D175-07

For more detailed information about the warning indications, see SSP 174: "Electromobility concepts".

PILOT LINE

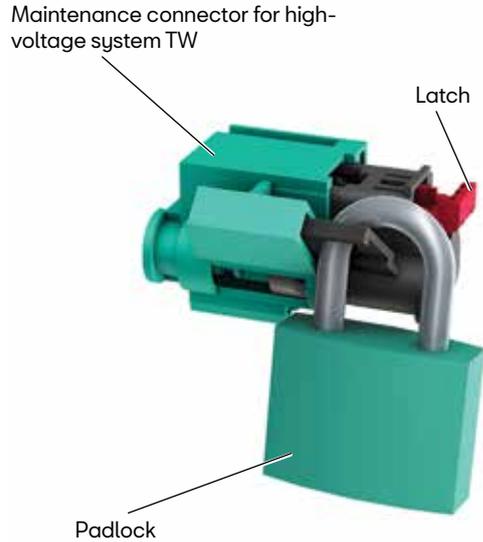
The pilot line is a looped connection between the components of the high-voltage system, and its purpose is to avoid any arcing in the connectors if they become disconnected while the high-voltage remains active.

The battery regulation control unit J840, which is located inside the high-voltage battery, is responsible for constantly checking the continuity of the pilot line. If any interruption is detected, it disconnects the high-voltage.

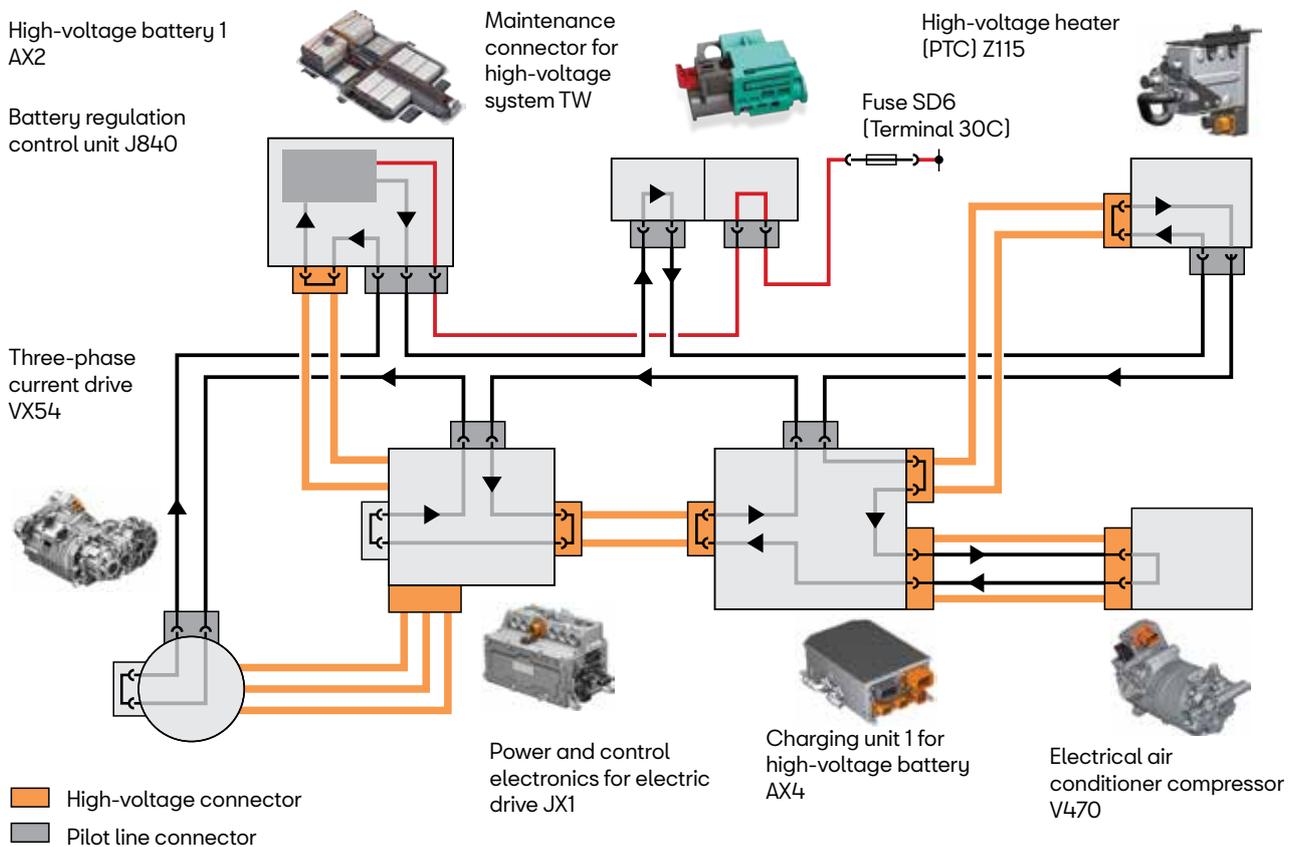
The following components are connected to the pilot line:

- High-voltage battery 1 AX2
- Charging unit 1 for high-voltage battery AX4
- Power and control electronics for electric drive JX1
- Maintenance connector for high-voltage system TW
- Electrical air conditioner compressor V470
- Three-phase current drive VX54
- High-voltage heater (PTC) Z115

The pilot line is interrupted if the maintenance connector for high-voltage system TW located in the engine compartment is disconnected. The supply of Terminal 30C to the Battery regulation control unit J840 is also cut off.



D175-08



D175-09

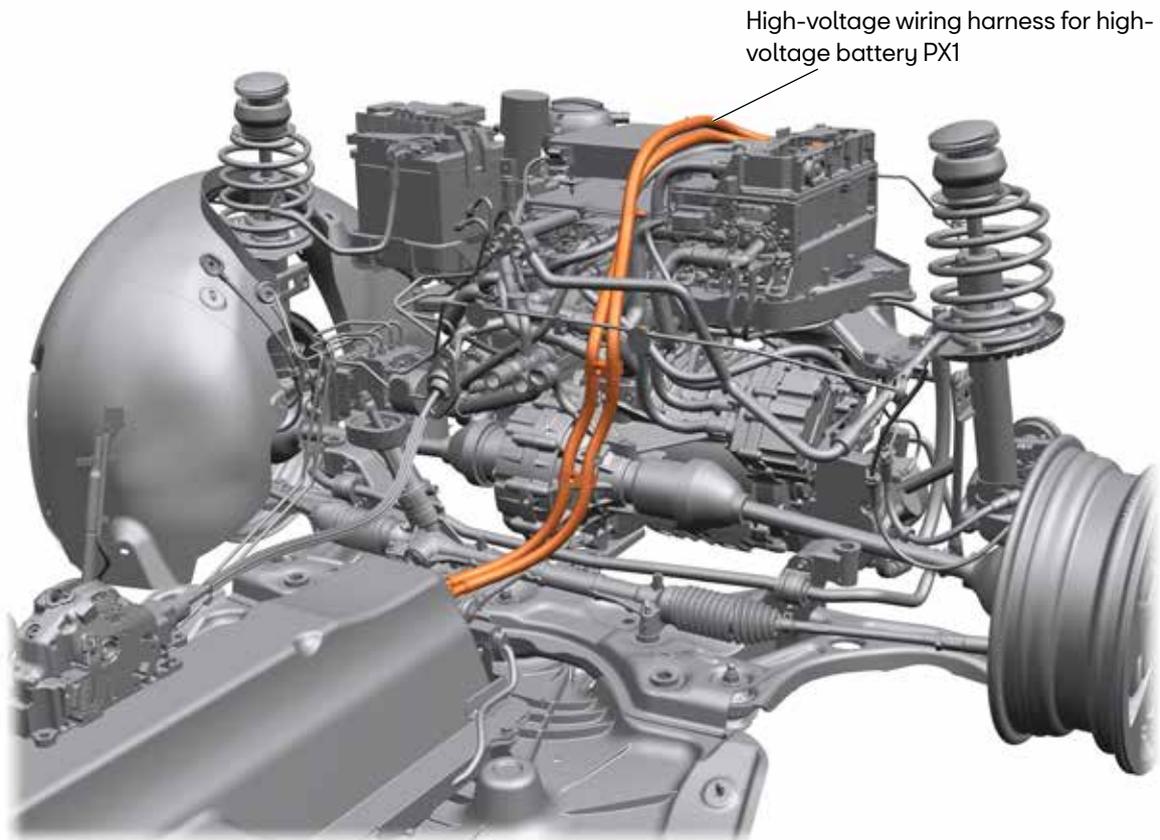
HIGH-VOLTAGE WIRING

One of the particularities of the Mii electric's system is the high-voltage system's electrical installation. It is noted for always being colour orange and having mechanically-coded connectors. The cables' section varies according to the function or the component they supply.

The following cables can be found in the Mii electric:

- High-voltage wiring harness for high-voltage battery PX1
- High-voltage wiring harness for drive motor PX2

- High-voltage wire for electrical air conditioner compressor P3
- High-voltage wire for high-voltage heater (PTC) P11
- High-voltage wire for electrical air conditioner compressor P3
- High-voltage wire for charging unit 1/wiring junction P12
- Charging cable P20



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In addition to the power supply cables, there are potential equalisation lines. These cables connect each high-voltage component's housing directly to the bodywork. It is a **safety measure** in case there is a high-voltage leak to the housing of any component.

As a safety measure to protect people, these cables must always be in good condition and replaced when they are damaged or present any anomaly.

The potential equalisation lines are:

- Potential equalisation line for high-voltage battery 1 AX2
- High-voltage battery Charging unit 1 for high-voltage battery AX4

- Potential equalisation line for power and control electronics for electric drive JX1
- Potential equalisation line for electrical air conditioner compressor V470
- Potential equalisation line for high-voltage heater (PTC) Z115
- Potential equalisation line for three-phase current drive VX54

THREE-PHASE CURRENT DRIVE VX54

The Mii electric's three-phase current drive VX54 is located at the front of the vehicle, under the bonnet, as if it were a front-wheel drive conventional engine.

This module consists of two subsets, the **electric drive motor V141** and the **one-speed transmission OCZ** (the gearbox is described in this self-study programme under the chapter Transmission).

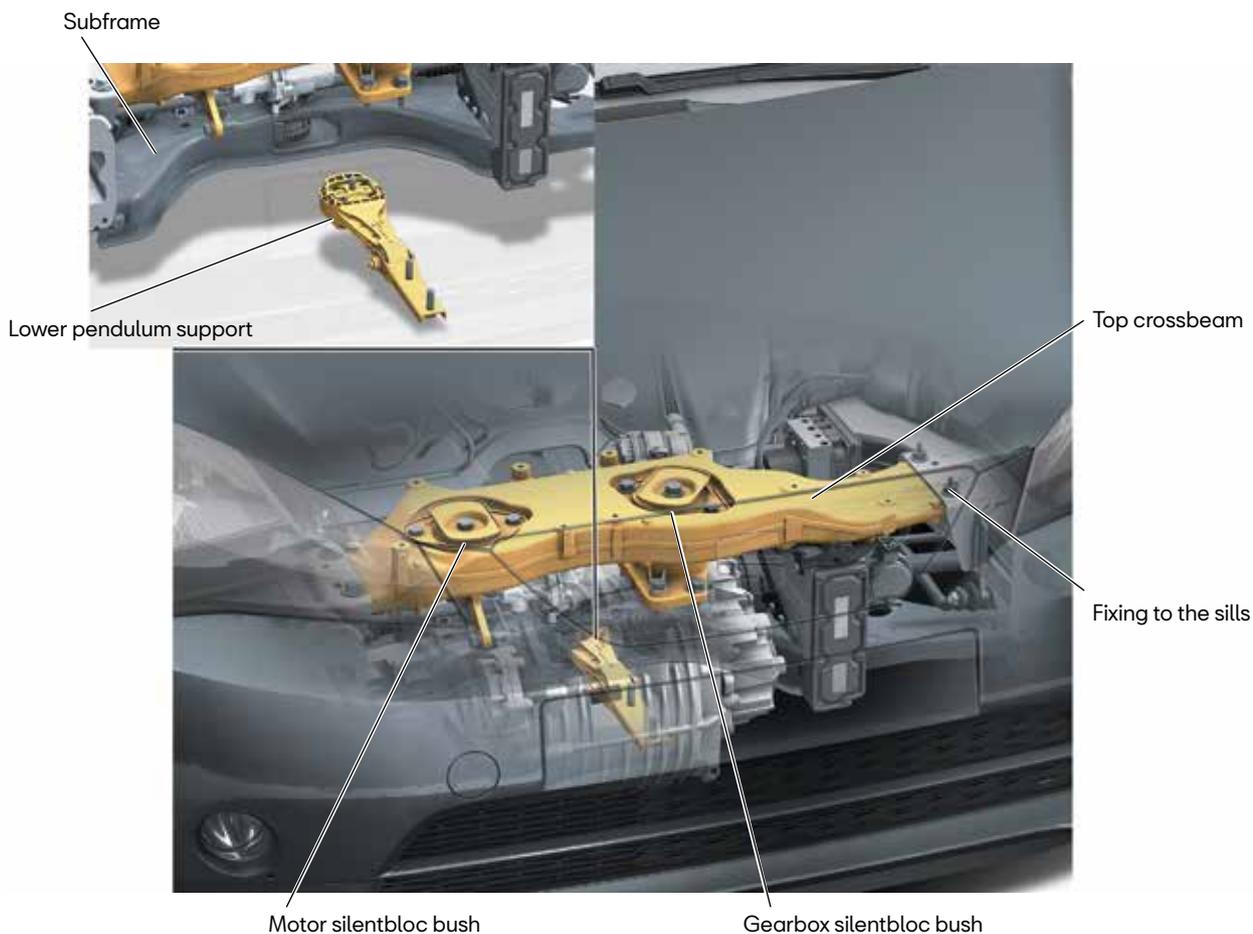
The electric motor code V141 is EBMA and is stamped on the motor's housing.



The three-phase current drive VX54 is fixed to the top crossbeam by means of two **silentbloc bushes**, one on the motor side and another on the gearbox side.

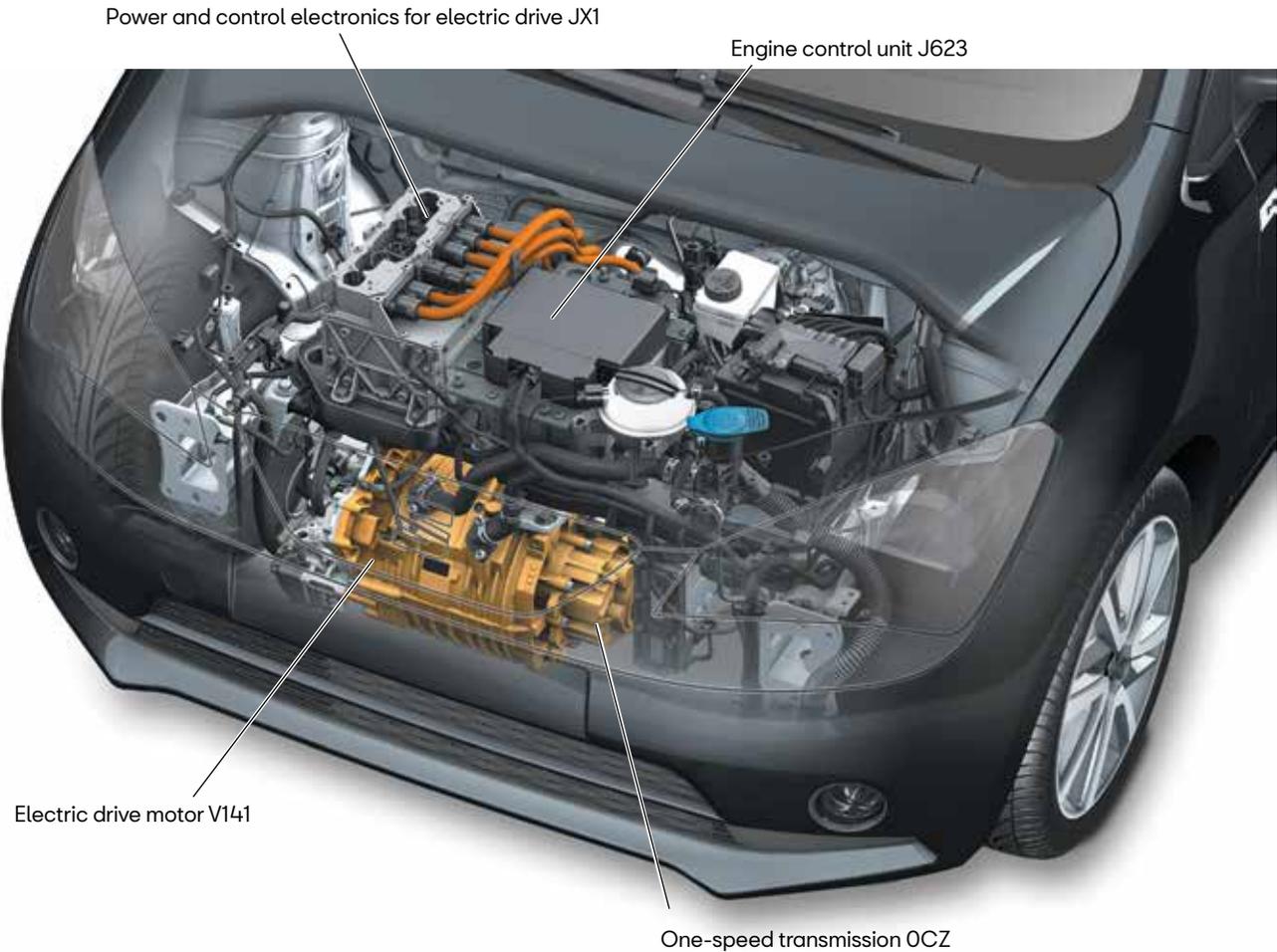
The top crossbeam is fastened to the front sills.

A pendulum support joins the three-phase current drive VX54 to the subframe to avoid any balancing movement



D175-12

HIGH-VOLTAGE SYSTEM



D175-13

ELECTRIC DRIVE MOTOR V141

The electric drive motor V141 runs with three-phase current supplied by the power and control electronics for electric drive JX1.

Internally, the motor **consists** of the following:

- Stator with a liquid-cooled housing
- Rotor with a permanent magnet.
- Rotor position sensor for the electric drive motor G713
- Temperature sensor for the electric drive motor G712

The motor generates a power of up to **61 kW**, delivered linearly and constantly between 2,500 rpm and 12,000 rpm.

The motor torque is **210 Nm** from the start of rotation up to approximately 3,000 rpm, which is when it gradually drops to the maximum running speed.

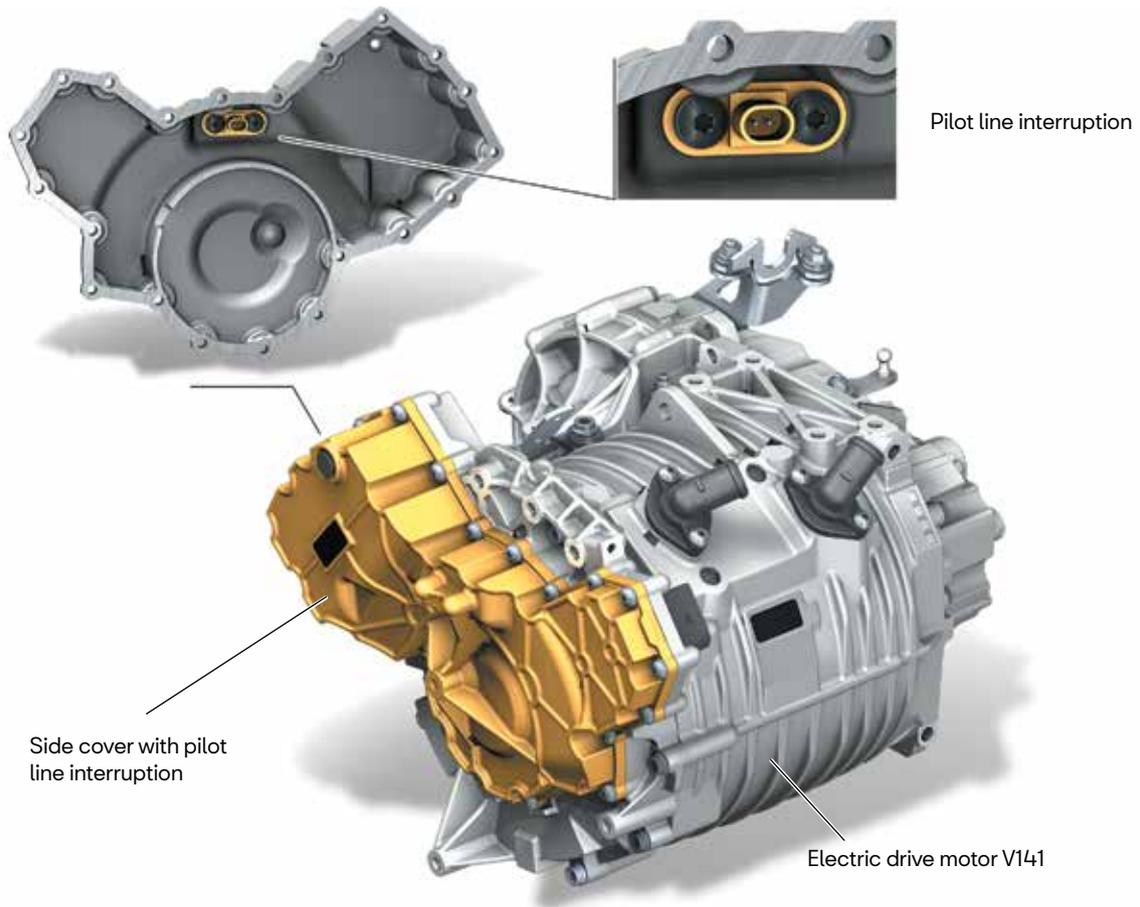
The motor performs the following **functions**:

- Driving the vehicle, acting as a motor.
- Recovering energy and acting as an engine brake in deceleration.

The electric drive motor V141 must be calibrated when:

- Updating the software installed on the electric drive control unit J841
- Replacing the power and control electronics for electric drive JX1
- Replacing the three-phase current drive VX54
- Deleting the relevant systems' incidents memory

To calibrate the motor, a test drive must be carried out, or else the motor will not run at full performance until it has been calibrated.



D175-14

The module's maintenance and repair work must be carried out by qualified personnel.

As an additional safety measure, the side cover of the electric drive motor V141 that is fastened to the three-phase current drive VX54 has an internal jumper that interrupts the pilot line when disassembled.

Once the cover has been removed, two motor senders can be accessed:

- Rotor position sensor for the electric drive motor G713
- Temperature sensor for the electric drive motor G712

Both senders are directly connected to the **Power and control electronics for electric drive JX1**

Neither of both senders have a supporting function; if there is no signal, the vehicle will be immobilised.

ROTOR POSITION SENDER FOR THE ELECTRIC DRIVE MOTOR G713

The position sender consists of an electronic system fixed to the motor's housing and a tone wheel joined to the rotor.

Both components face each other. When the motor rotates, the sender generates a signal that the power and control electronics for electric drive JX1 uses to recognise the motor's **rotation speed**.

TEMPERATURE SENDER FOR THE ELECTRIC DRIVE MOTOR G712

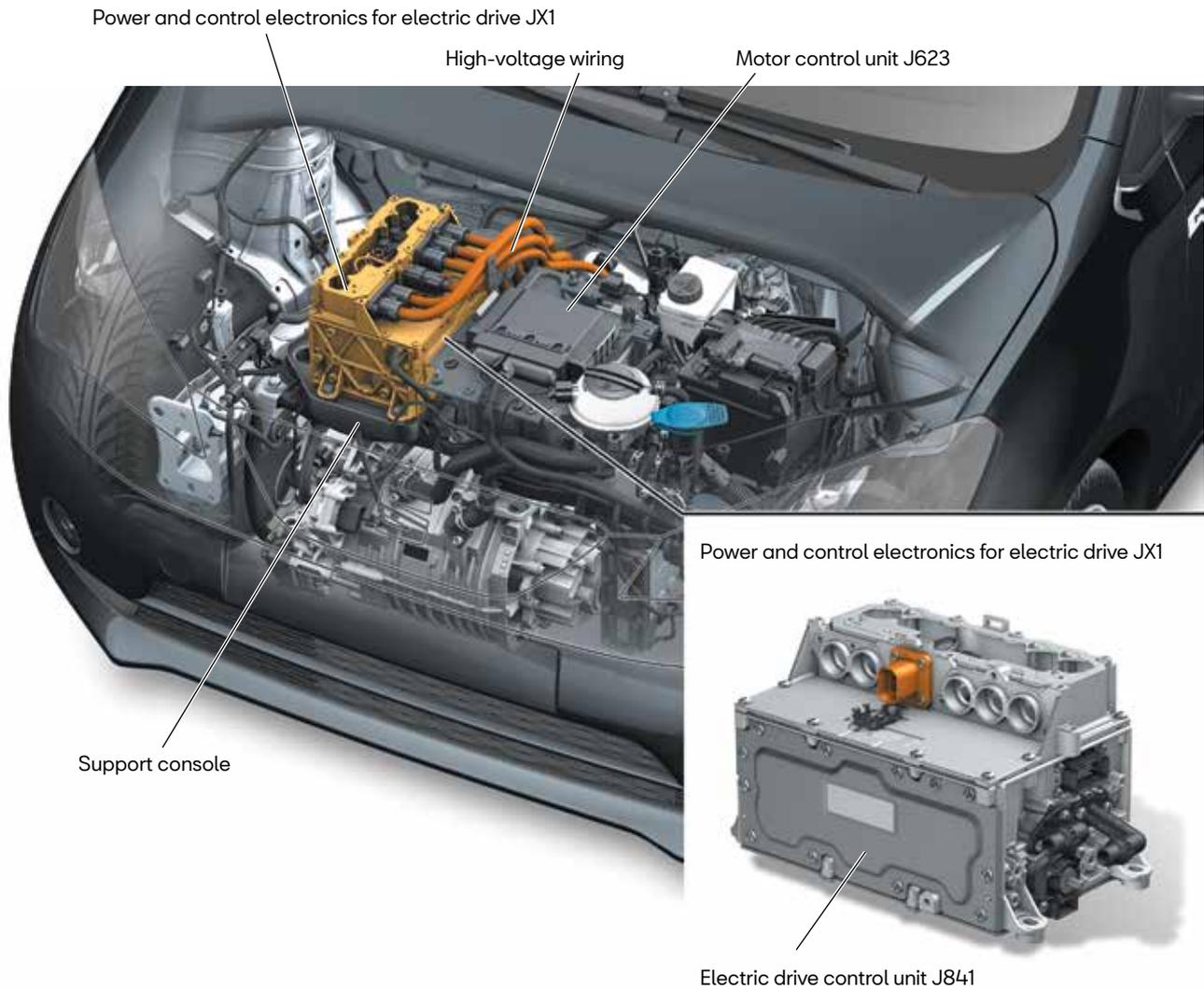
The temperature sender is fixed to the motor's housing and measures the temperature of the stator windings.

The power and control electronics for electric drive JX1 monitors the **motor's temperature** and avoids overheating.

If a temperature higher than 150°C is detected, the power is reduced.

If the temperature continues to increase, the electric drive motor V141 is disconnected completely.

HIGH-VOLTAGE SYSTEM



D175-15

POWER AND CONTROL ELECTRONICS FOR ELECTRIC DRIVE JX1

In the Mii electric the power and control electronics for electric drive is fixed to a support console, which is fastened to the powertrain's top crossbeam.

The power and control module performs the following three main functions:

Transform the high-voltage battery's direct current (DC) into three-phase alternating current (AC) to supply the electric drive motor V141.

Rectify the three-phase high-voltage alternating current (AC) from the electric drive motor V141 into direct current (DC) to charge the high-voltage battery in the deceleration and energy recovery stages.

Convert the direct current (DC) of the high-voltage battery into 12V direct current to supply the onboard consumers and charge the 12V battery.

The electric drive JX1 houses the electric drive control unit J841 and fuse 3 for the high-voltage system S353

The electric drive is inserted in the cooling circuit to avoid its temperature from rising excessively.

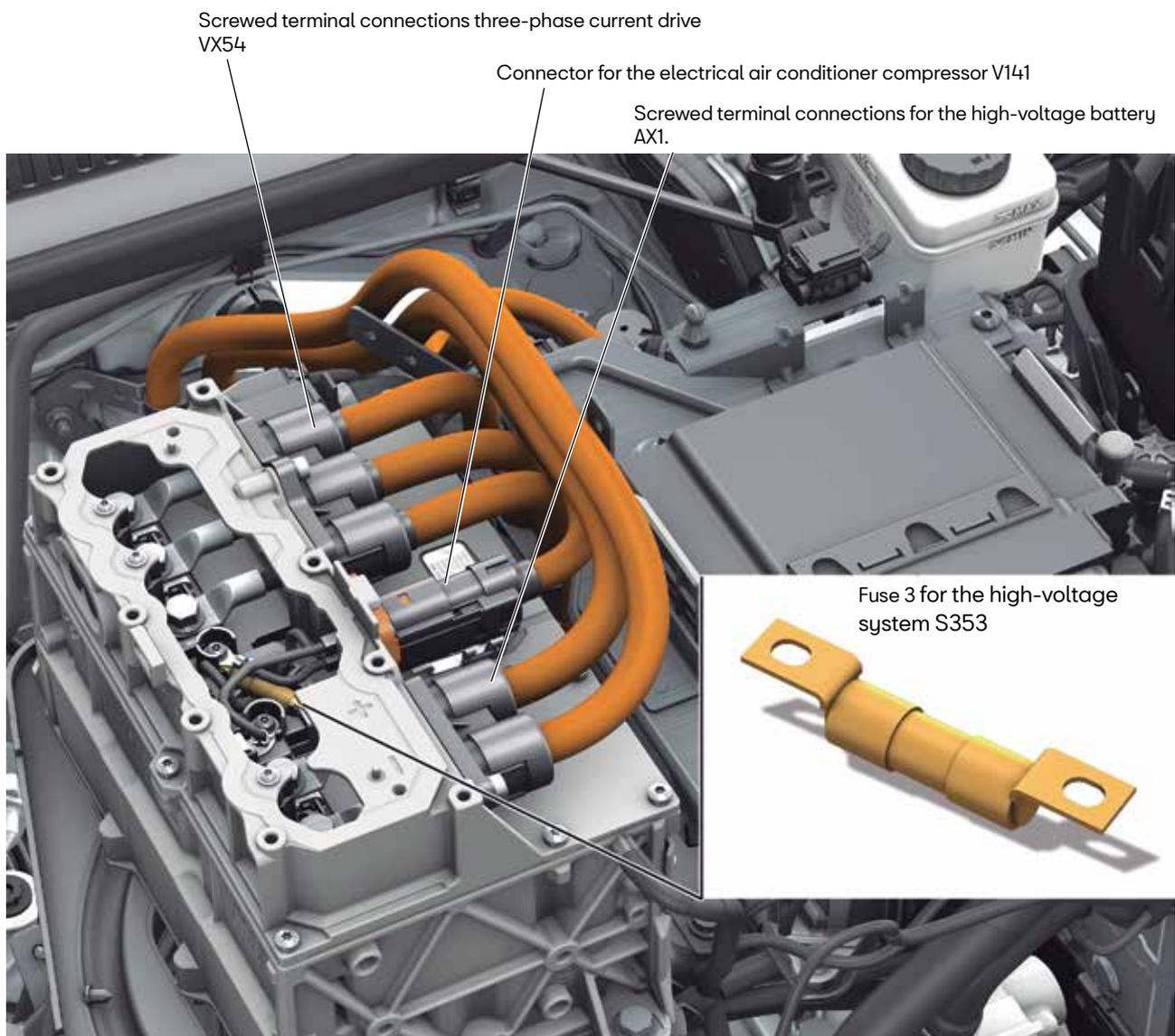
The power and control electronics for electric drive JX1 has the following **connectors**:

- 2 connectors for the high-voltage battery AX1
- 3 connectors for the three-phase current drive VX54
- 1 connector for the electrical air conditioner compressor V470

This last connector is colour orange and is in central position. While connected, it **impedes disassembling the top cover** of the power and control electronics for electric drive JX1 and it performs the function of interrupting the pilot line.

If the orange connector is disconnected, the pilot line will open and the high-voltage system will be deactivated.

The top cover is fastened to the housing using eight Torx screws, and it has an anti-humidity and contact protection seal. That is, to avoid any direct contact with the high-voltage connections. To ensure its correct functioning, the seal must be replaced every time the cover of the power and control electronics for electric drive JX1 is disassembled, as specified in ElsaPro.



D175-16

HIGH-VOLTAGE SYSTEM

THE HIGH-VOLTAGE BATTERY AX2

The battery is assembled on the Mii electric's underbody and is made up of modules that are, in turn, made up of lithium-ion cells.

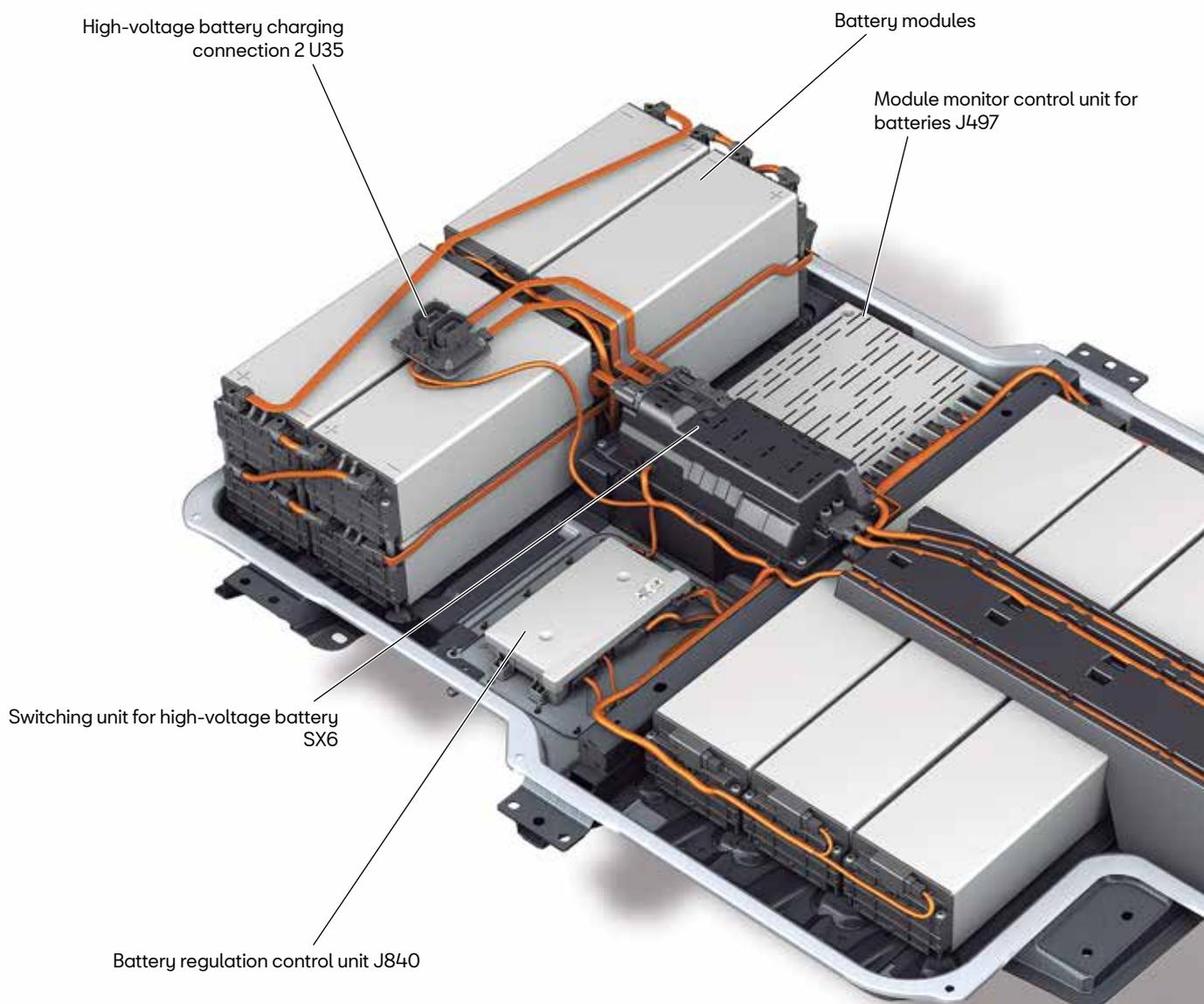
In addition to the modules, the battery contains the following inside:

- Battery regulation control unit J840
- Module monitor control unit for batteries J497
- Switching unit for high-voltage battery SX6
- High-voltage battery charging connection 1 U34

- High-voltage battery charging connection 2 U35
- Connection for the onboard network.

The high-voltage battery is closed hermetically and it cannot be accessed from outside. The battery regulation control unit J840 can be accessed via a cover for service work.

The high-voltage battery's interior can only be manipulated by suitably qualified personnel (High-voltage Expert - HVE).



The image shows a detailed view of the high-voltage battery's interior as well as the location of each internal component.

Technical specifications of the high-voltage battery AX2

Weight: 248 Kg

Capacity: 60 Ah

Working voltage: 210 - 357 V

Output: 36.8 kWh

Number of modules: 14

Number of cells per module: 12

Working temperature: -24 - 55 °C

The module monitor control unit for batteries J497

controls the insulation's protection, regulates each cells' charge level, controls the battery modules' temperature and manages the protection relays.

If it detects that a cell has more charge than others, it discharges it to the level of others, evening the high-voltage battery's global charge level.

The control unit J840 is responsible for monitoring the pilot line and checking the crash signal.

Switching unit for high-voltage battery SX6 with precharge contactor for high-voltage battery J1044 and DC charge contactors J1052 and J1053.

The high-voltage battery AX2 complies with the **IP6K7** and **IP6K9** protection standards, making it impervious to contact, dust, water penetration by immersion, pressurised water and steam jetting.



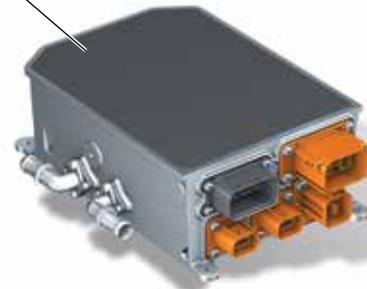
D175-17

HIGH-VOLTAGE SYSTEM

Power and control electronics for electric drive JX1



Charging unit 1 for high-voltage battery AX4 with Control unit for high-voltage battery charging unit J1050



D175-17

CHARGING UNIT 1 FOR HIGH-VOLTAGE BATTERY AX4

The charging unit 1 for high-voltage battery AX4 is located in the engine compartment and performs three groups of functions:

- **Transforms** the main's 240V alternating current (AC) into direct current (DC) to charge the high-voltage battery AX2.
- **Charges** the 12V battery; it converts the high-voltage battery's direct current into 12V direct current.
- **Supplies** the air conditioning system's components: High-voltage heater (PTC) Z115 and electrical air conditioner compressor V470

To perform the two first functions (transforming and charging), the charger inside incorporates the **control**

unit for high-voltage battery charging unit J1050, a AC/DC rectifier and a DC/DC converter.

The charging unit 1 for high-voltage battery AX4 is inserted in the cooling system to ensure it has an optimum working temperature.

If the temperature is high, the charging power will be limited, affecting the total charging time of the high-voltage battery AX2.

ELECTRICAL AIR CONDITIONER COMPRESSOR V470

The Mii electric's air conditioner compressor is on the right side of the motor, fastened to the motor's housing. It is activated electrically; therefore, it no longer equips a Poly-v belt.

The electrical air conditioner compressor V470 contains the **Control unit for air conditioning compressor J842**.

The charging unit 1 for high-voltage battery AX4 supplies high-voltage direct current (DC) to the air conditioner compressor.

It is transformed into three-phase alternating current (AC) in the compressor. The AC current is then used to excite the compressor's motor.

The control unit for air conditioning compressor J842 is responsible for this conversion.

The three-phase motor activates the air conditioner compressor. In the running stage, the compressor's absorbed power is approximately 4.4 kWh.

The air conditioner compressor has two electric

connectors:

- Electric connector for the 12V onboard network.
- The high-voltage mains socket with pilot line which is led from the charging unit 2 for high-voltage battery AX4

The high-voltage supply is protected by the **Fuse S353** located inside the power and control electronics for electric drive JX1.

The electrical air conditioner compressor V470 communicates with the climatronic control unit J255 via **LIN-Bus**. An R-1234YF-type refrigerant is used.

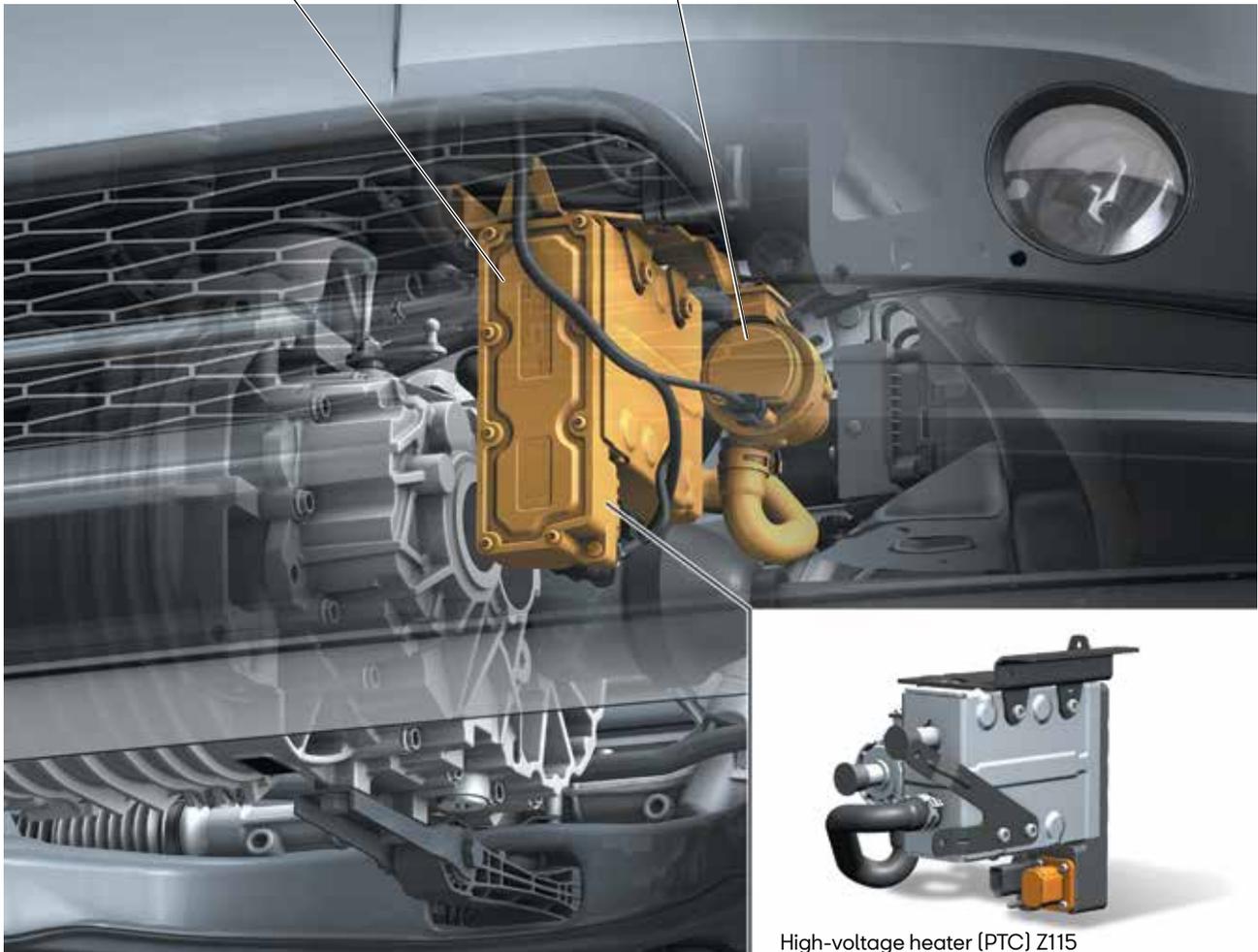


D175-18

HIGH-VOLTAGE SYSTEM

High-voltage heater (PTC) Z115

Coolant pump for high-temperature circuit V467



High-voltage heater (PTC) Z115

D175-20

HIGH-VOLTAGE HEATER (PTC) Z115

The Mii electric's high-voltage heater (PTC) Z115 is on the left in the motor compartment next to the gearbox and it integrates the high-voltage heater (PTC) control unit J848.

The function of the high-voltage heater (PTC) Z115 is to **heat the coolant** in the heater circuit and thus heat the interior.

The heater is part of the high-voltage network; it is connected to the Charging unit 1 for high-voltage battery AX4 and is included in the pilot line's circuit.

The high-voltage heater (PTC) control unit J848 is connected to the low voltage network (12V) and the **LIN-Bus**, which communicates with the Climatronic control unit J255.

Inside the heater is a circuit through which the coolant flows; a temperature sender at the entry and exit that

register the temperature and transmit the value to the Climatronic control unit J255.

The Climatronic control unit is in charge of calculating the required heating power and transmits it to the high-voltage heater (PTC) control unit J848 in a range between 0 and 100%.

Internally, the heater has three circuits that are activated by means of a pulse-width modulation (PWM) signal based on the intensity requested and a maximum power of **5.5 kW**.

If a timer has been programmed for the interior heating, the Climatronic control unit J255 is responsible for recording the parameters.

HIGH-VOLTAGE COOLING SYSTEM

The Mii electric's cooling circuit consists of the following:

- **High-voltage cooling circuit**
- **Interior heater circuit**

The Mii electric's coolant has no maintenance interval. If the circuit needs to be refilled, ElsaPro's instructions must be followed.

HIGH-VOLTAGE COOLING CIRCUIT

This circuit controls and **manages the high-voltage components' working temperature**, which generate a lot of heat, especially in the charging and electric driving stages. The circuit has an electric coolant pump located in the rear part of the three-phase current drive VX54.

The main components are:

- Power and control electronics for electric drive JX1
- Charging unit 1 for high-voltage battery AX4
- Three-phase current drive VX54

The motor control unit J623 regulates the circuit's temperature, which can reach up to 65°C. The motor

control unit activates the electric coolant pump to support cooling.

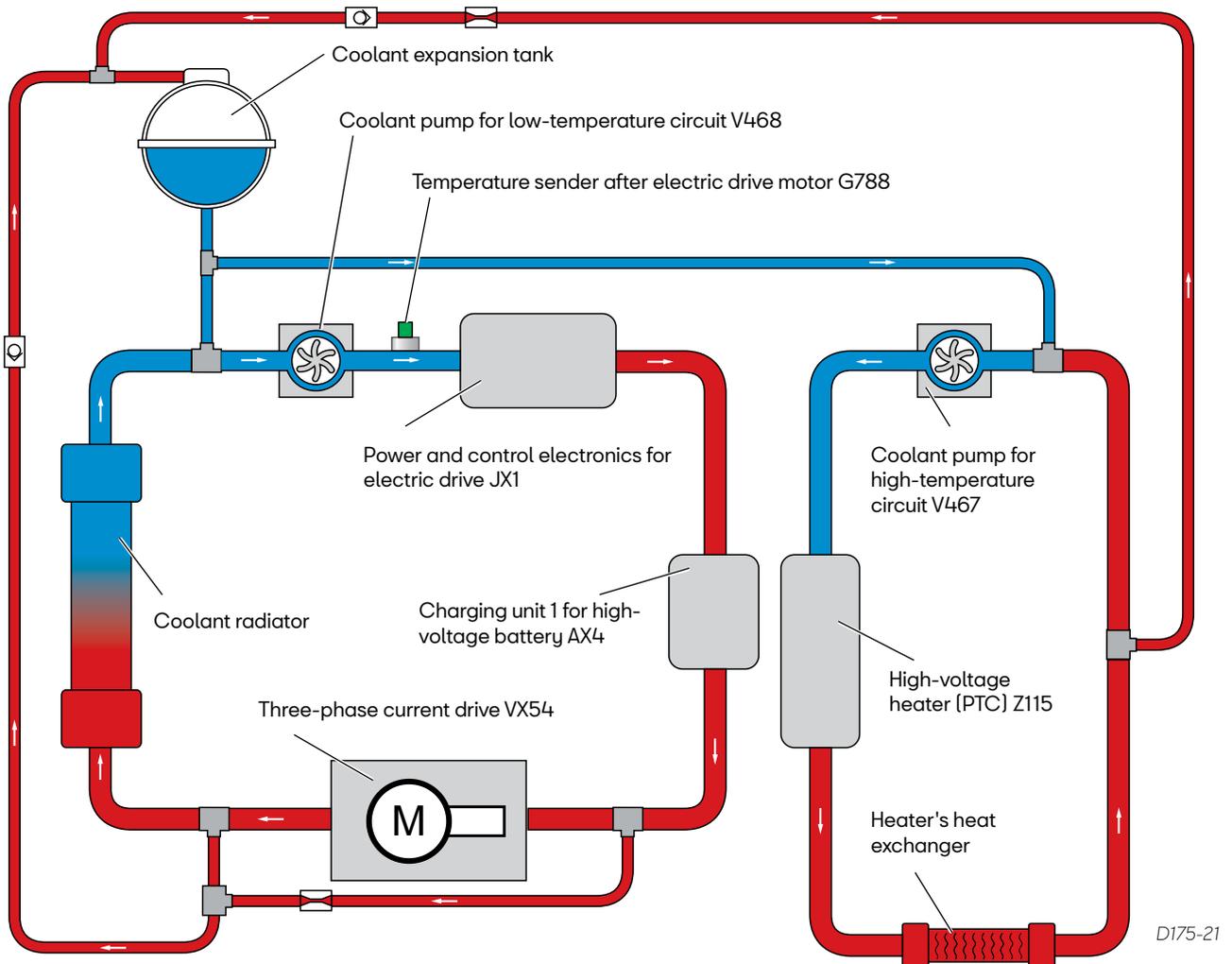
INTERIOR HEATER CIRCUIT

This circuit **heats the interior** when requested from the climate control system's controls.

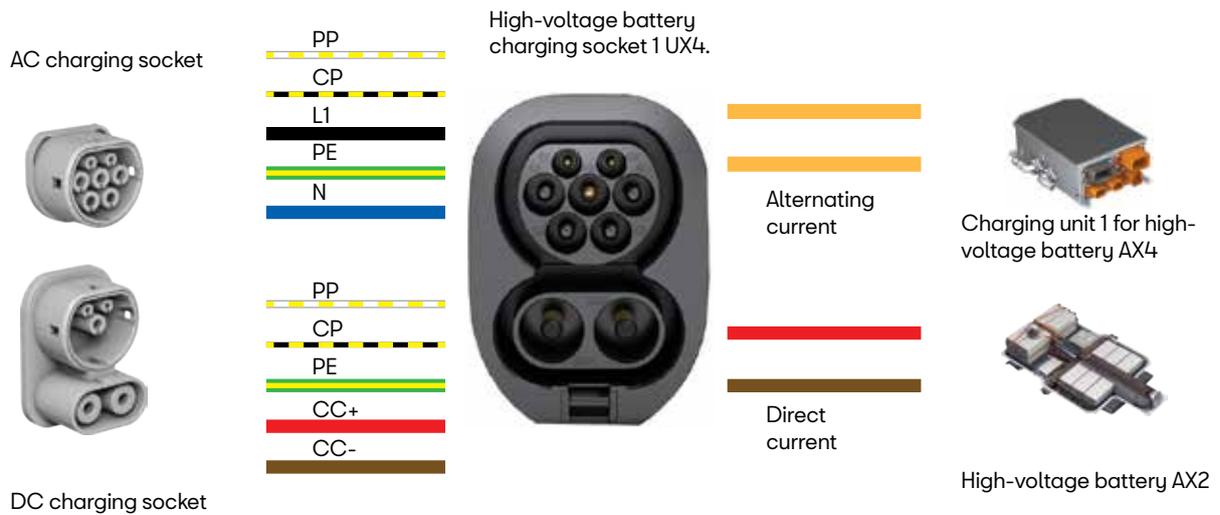
The main components are:

- High-voltage heater (PTC) Z115
- Heater's heat exchanger and coolant circulation pump

This second pump, assembled next to the high-voltage heater (PTC) Z115, is responsible for forcing the flow of coolant through the interior's heat exchanger.



HIGH-VOLTAGE SYSTEM



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HIGH-VOLTAGE BATTERY CHARGING SOCKET UX4

The Mii electric, as an electric vehicle, requires a charging socket to charge the high-voltage battery AX2. This socket, called UX4, is on the vehicle's rear right, in the same place as the fuel inlet of a conventional Mii.

It is a standard socket and it is compatible with the Mennekes and CCS connectors. The following types of charging can be employed:

- Charge using alternating current (AC).
- Charge using direct current (DC).

Charging socket contacts:

Each contact has a name and function:

- **PP line:** Proximity. It defines the maximum intensity of the charging current based on the cables' section.
- **CP line:** Pilot control. Authorises or cancels charging according to the vehicle's status.
- **PE line:** Ground connection.
- **L1 line:** Alternating current stage.
- **N line:** Alternating current neutral.
- **CC+ line:** Direct current positive.
- **CC- line:** Direct current negative.

The high-voltage battery charging socket UX4 has an **NTC-type temperature sender** that measures the charging plug's temperature at all times.

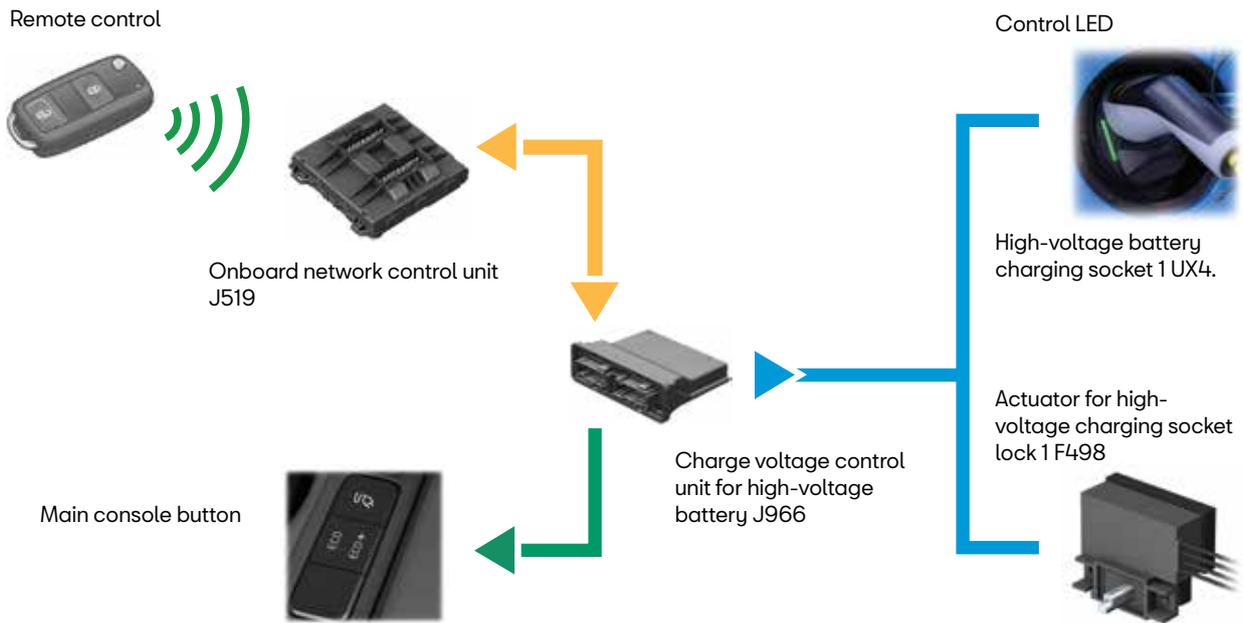
The charge voltage control unit for high-voltage battery J966 receives the signal from the temperature sender. This unit is assembled under the driver seat.

As a result, the system is protected against any overheating caused by the current flow.

When charging the battery using alternating current (AC), the current is led to the charging unit 1 for high-voltage battery AX4, which is responsible for transforming and rectifying the alternating current (AC) into direct current (DC) suitable to charge the battery. This occurs when the battery is charged using slow or medium charging.

On the other hand, if the Mii electric is charged using direct current (DC) -public charging station-, the current goes directly to the high-voltage battery. The battery is then charged using fast charging.

COMPONENTS OF THE CHARGING SOCKET



D175-23

CONTROL LED

Next to the Mii electric's high-voltage battery charging socket UX4 is the control LED, which indicates the charge status when connecting the charging plug. This control LED can light up in green, yellow and red according to the status:

- **LED lights up green:** Charging has started.
- **LED flickers in green:** The charging timer is activated.
- **LED lights up yellow:** No mains detected.
- **LED flickers in yellow:** The selector lever is not in P position and the charging process cannot be started.
- **LED lights up red:** there is a failure and the charging process cannot be started.

ACTUATOR FOR HIGH-VOLTAGE CHARGING SOCKET LOCK 1 F498

The charging socket has a lock actuator that **avoids** the charging cable from being **unplugged** if the charging process has not ended.

It is a 12V servo motor that inverts the polarity to move a catch that locks or unlocks the intake.

The charge voltage control unit for high-voltage battery J966 manages the lock actuator and is aware of its status via a micro-switch.

Through value block in ODIS, we can check the status of the connector, the number of locks in the charging socket and reset these values.

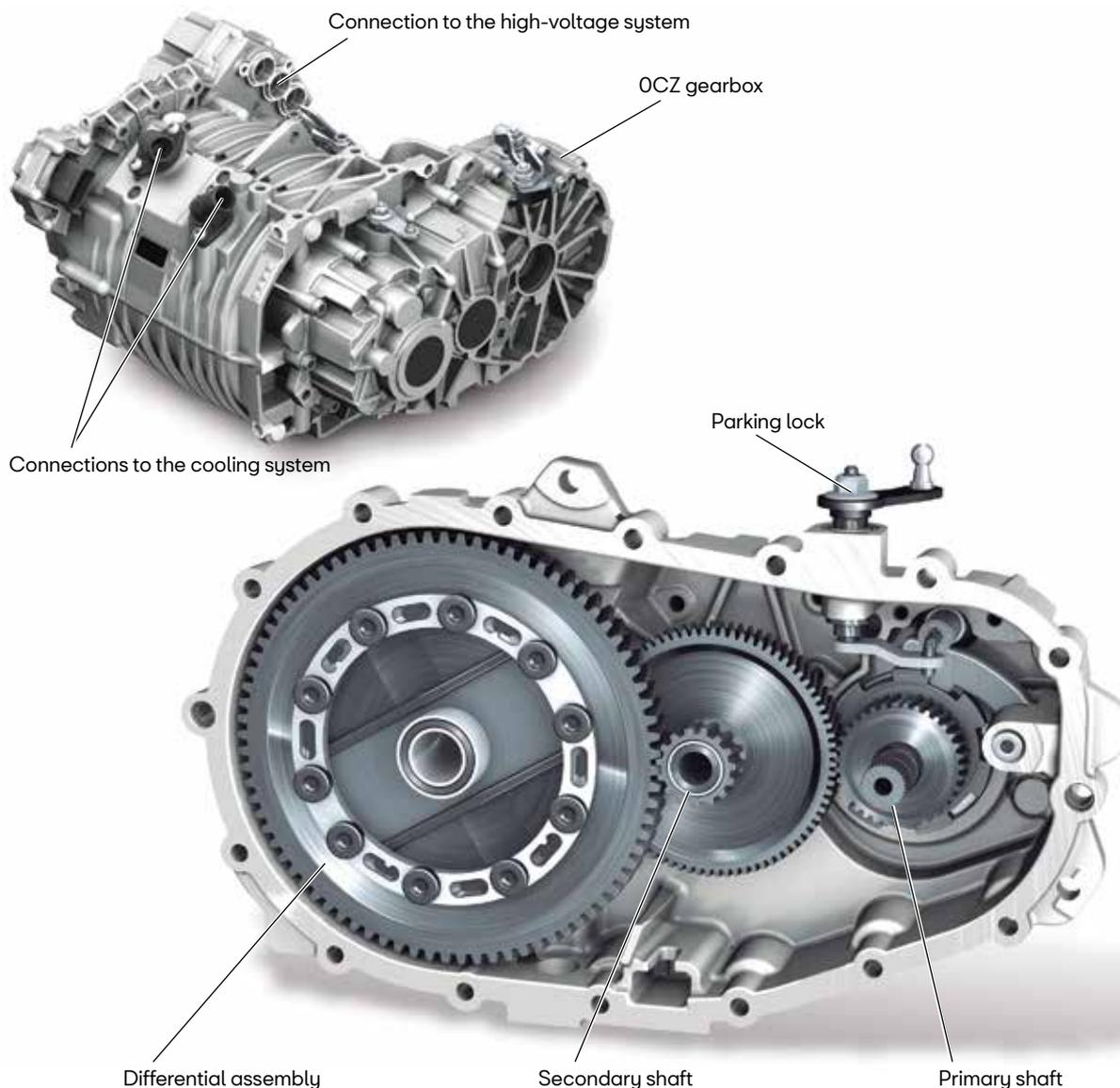
TRANSMISSION

ONE-SPEED TRANSMISSION OCZ

The Mii electric's gearbox is a one-speed transmission gearbox and is part of the three-phase current drive VX54.

The gearbox's code is **OCZ** and its main specifications are as follows:

- Weight: 16.3 kg
- Maximum input speed: 12,000 rpm
- Maximum input torque: 210 Nm
- Oil volume: 0.7 l
- Overall gearing ratio: 1:8'16
- Maximum forward speed: 130 km/h, electronically limited.
- Maximum reverse speed: 20 km/h, electronically limited.



D175-24

The gearbox has a single gearing ratio and therefore does not have any synchronisers or selector forks. The speed is adjusted to the rotation of the electric drive motor V141. If the vehicle is stopped, the motor will not run.

Reverse is carried out by inverting the rotating direction of the electric drive motor V141. The motor control unit J623 limits maximum speed to 20 km/h.

Internally, the one-speed transmission OCZ is made up of four groups of parts: a primary shaft, a secondary shaft, a differential set and the parking lock.

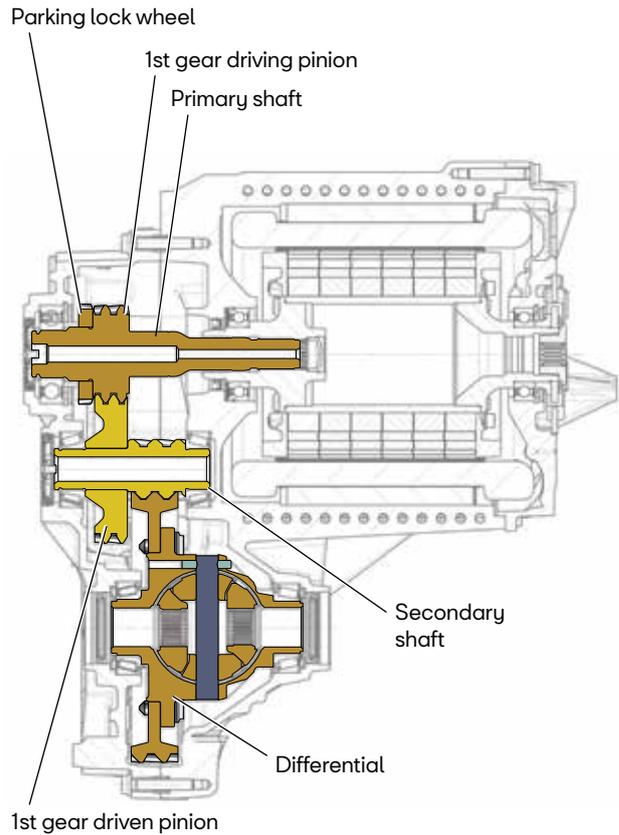
The **primary shaft** is supported by the gearbox housing on a ball bearing on one end, and on the other it fits in the rotor of the electric drive motor V141.

The primary shaft is hollow and the 1st gear's helical pinion is machined on it. The parking lock wheel is mounted on the primary shaft.

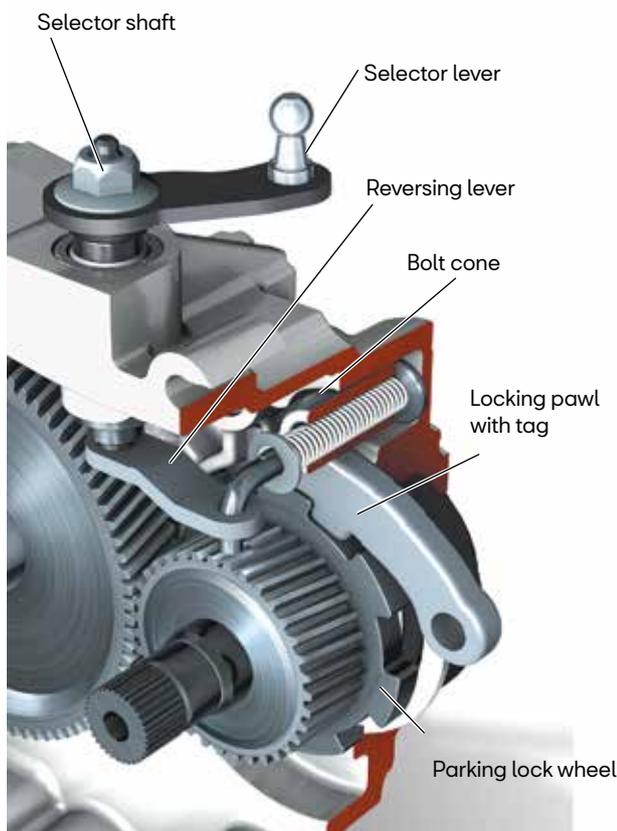
The **secondary shaft** is supported by two tapered roller bearings, one on each end.

The primary shaft is hollow and the differential crown's drive pinion is machined on it. The 1st gear's other pinion is mounted on the secondary shaft.

The **differential set** is supported by two tapered roller bearings, and it is made up of the crown and the differential, which contains 2 planetary and 2 satellite gears.



D175-24



D175-26

PARKING LOCK

It consists of a selector shaft in the gearbox housing, which is connected in its exterior end to the selector lever by means of a Bowden cable.

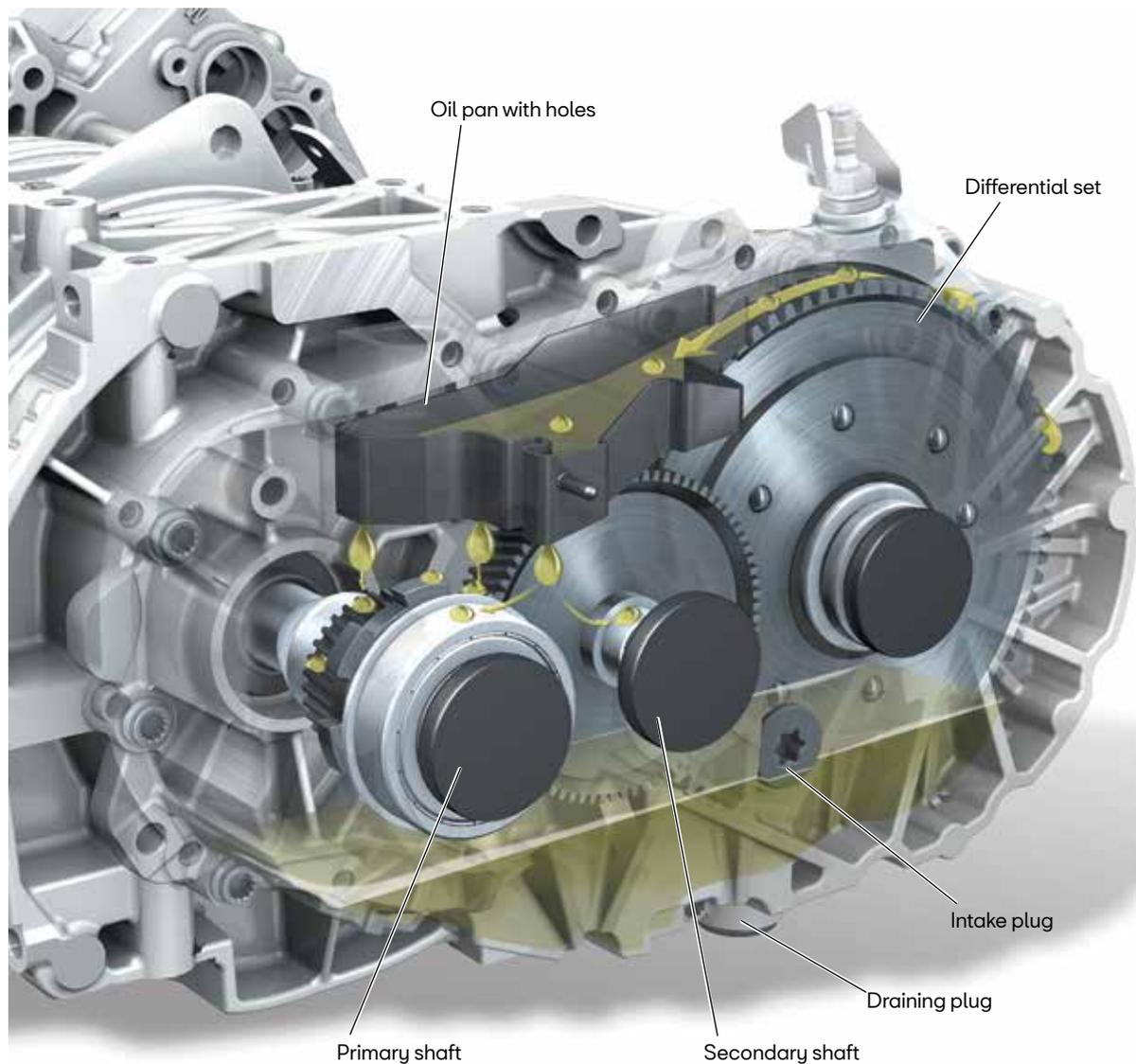
When shifting the selector lever to the P position, the selector shaft moves the reversing lever, to which it is connected. The reversing lever will maintain this new position thanks to the locating lug blocking it.

This movement of the set allows the bolt cone to move towards the locking pawl. The pawl has a tag on one end. The parking lock is achieved when the pawl tag is pushed into a gap on the parking lock wheel.

For safety reasons, the locking set has been designed (insertion force, shapes and angles of teeth and tag) so the gearbox cannot be locked at a speed over 5 km/h.

If driving at a higher speed and the parking lock is actuated inadvertently, the pawl tag will noisily strike the parking lock wheel's cogs.

TRANSMISSION



D175-27

GEARBOX LUBRICATION

The **gearbox lubrication system**'s capacity is of 0.7 litres, which are held at the housing's bottom.

When rotating, the differential set's crown takes the oil from below to an oil pan tray located on the top of the primary and secondary shafts. A series of holes made in this tray enables the oil to reach these two shafts and the pinion's high-friction areas, as well as the internal and external bearings of each shaft.

When the Mii electric moves in reverse, the pinions take the oil from the bottom and lubrication is achieved by

splash lubrication. As the maximum reverse speed is 20 km/h, this lubrication system is sufficient.

Note: Gear oil is used in the lubrication circuit of the Mii electric's gearbox, and no maintenance or oil change intervals have been set.



D175-28

SELECTOR LEVEL E313

The selector lever has 6 positions:

- P - Parking.
- R - Reverse.
- N - Neutral.
- D - Drive or direct.
- D1, D2 and D3 - Regenerative braking positions.
- B - Regenerative braking or brake.

The driver can select the different regenerative braking positions when needing the motor to brake the vehicle while going downhill. This braking effect is used to recharge the battery.

The regenerative braking positions act as an engine brake when lifting the foot off the accelerator.

Deceleration is the same, but the motor brake varies depending on the selected position. It is gradual, D1 achieving the lowest braking efficiency and B the highest.

If the lever is in P position, we must step on the brake and turn the ignition to change its position.

TRANSMISSION



FUNCTIONING

The lever is connected to the gearbox via a **mechanical cable**, which is only employed for the parking lock. The cable must be always adjusted when disassembling or repairing any related component and it must not be lubricated.

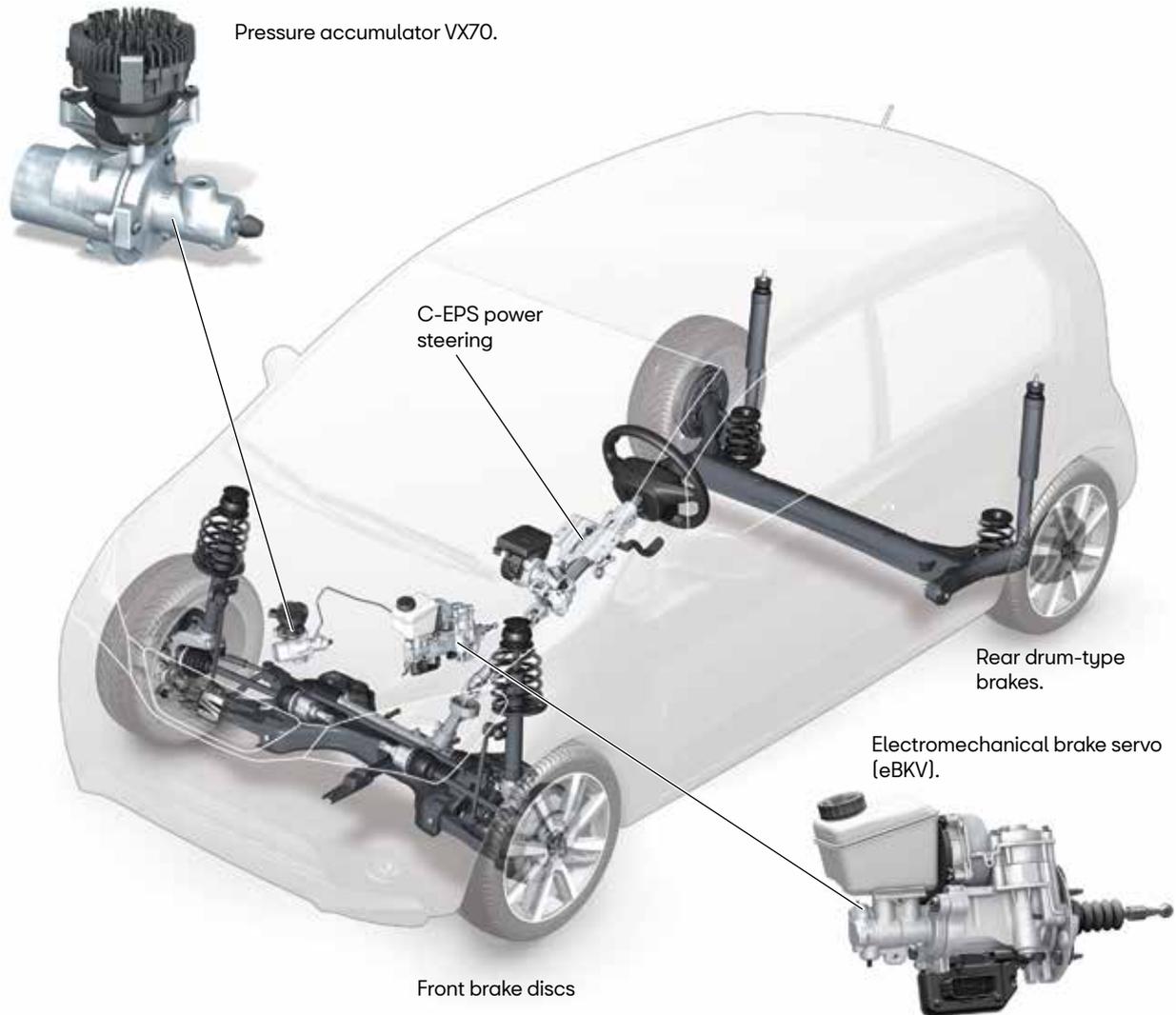
The motor control unit J623 is aware always of the selector lever's position via a permanent magnet and a series of hall senders. Depending on whether the lever is being moved longitudinally or transversally, the senders detect the signal variation and transmit it to the control unit.

The selector lever has an **emergency unlocking** mechanism that releases the parking lock and allows to push or tow the Mii electric when required.



D175-29

DRIVETRAIN



D175-30

The Mii electric equips axles used in other SEAT models. The front axle is a **McPherson** axle, and the rear axle is a **rigid torsion axle**.

The **power assisted steering** is electrical with assistance on the C-EPS steering and it integrates the power steering control unit J500.

This type of steering provides a smooth and precise sensation, allowing to manoeuvre with extreme ease.

The **TRW brake management system EBC460** performs the following functions:

- ABS: Anti-lock braking system.
- EBV: Electronic distribution of the brake force.
- HBA: Hydraulic brake assist.
- HHC: Hill hold control.
- RKA: Tyre pressure control.
- ASR: Traction control system.
- ESC: Electronic stability program.

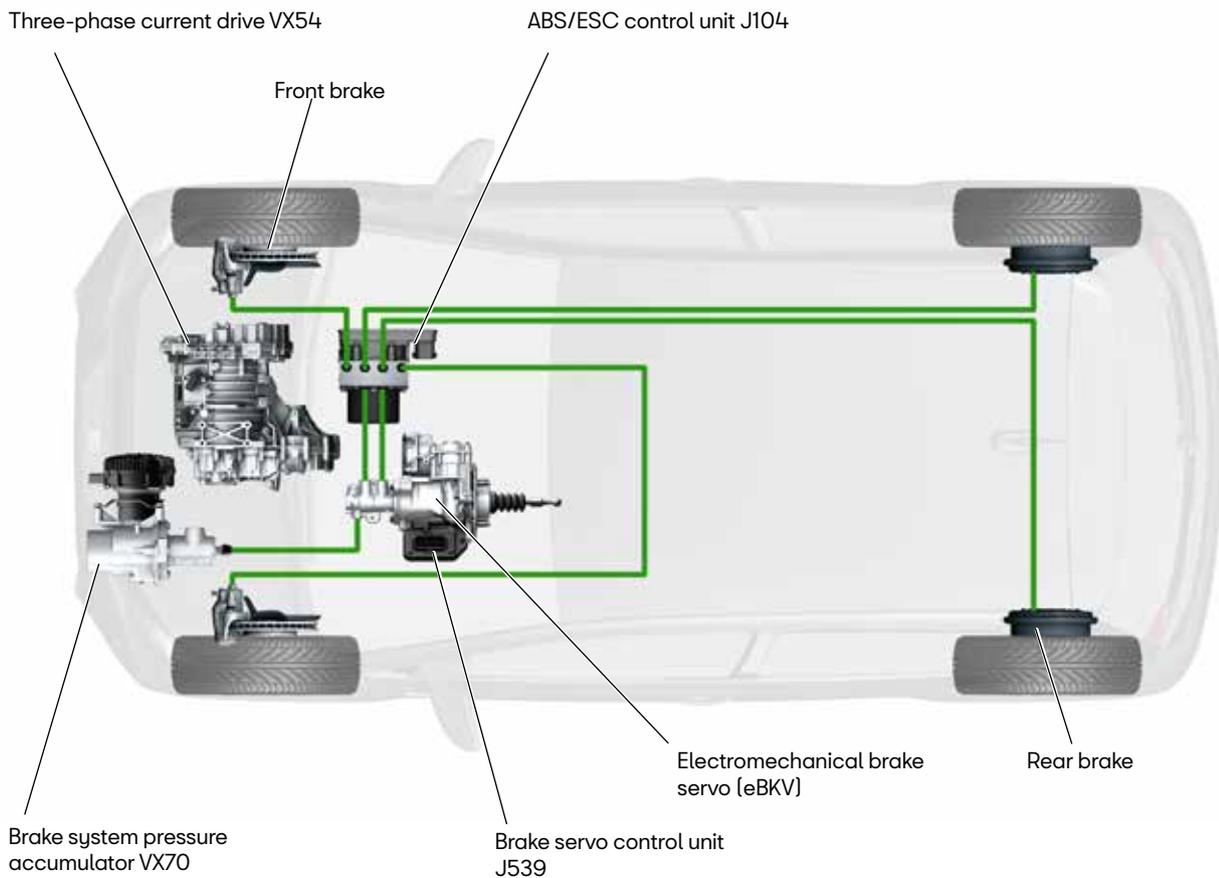
- E-MSR: Electric motor drag torque control.
- E-HBV: Intensification of braking force.

The Mii electric does not have a thermal motor that generates the required depression to activate the servoassist in the brake pedal; therefore, the braking system requires adapting.

To this end, the following components have been included:

- **Electromechanical brake servo eBKV** to assist the brake pedal in the energy recovery stages.
- **Brake system pressure accumulator VX70** to support the eBKV brake servo.

DRIVETRAIN



D175-31

BRAKE SYSTEM

The Mii electric's brake system has been adapted to electric vehicles and electric driving.

Depending on the condition of the battery and the high-voltage system, the three-phase current drive VX54 also acts as a brake. As conditions can vary due to multiple factors, a hydraulic brake system is required to compensate the electric braking variations.

This interrelationship between the electrical and hydraulic braking forces is known as **Brake Blending**.

The image shows a general view of the following components:

- Disc brakes on front wheels.
- Drum brakes on rear wheels.
- ABS/ESC control unit J104
- Brake system pressure accumulator VX70
- Electromechanical brake servo (eBKV)
- Tandem master cylinder
- Power and control electronics for electric drive JX1
- Three-phase current drive VX54

ELECTROMECHANICAL BRAKE SERVO (EBKV)

The electromechanical brake servo is located in the motor compartment.

The brake servo can multiply the braking force by 6 and also manages the brake lights.

It is made up of the following **components**:

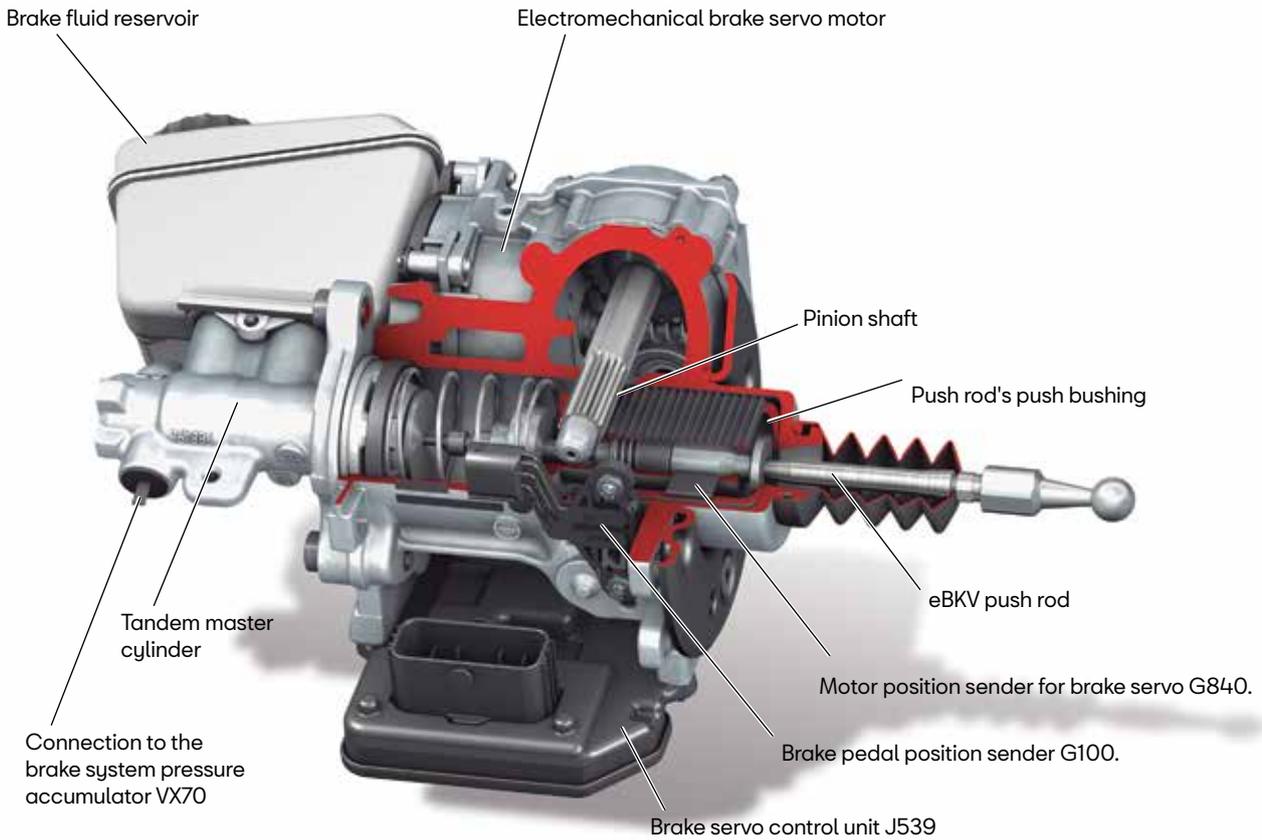
- Brake fluid reservoir
- Tandem master cylinder connected to the brake system pressure accumulator
- eBKV push rod
- Electromechanical brake servo motor
- Brake servo control unit J539

Electromechanical brake servo



Brake servo control unit J539

D175-32



D175-33

The push rod transmits the driver's desired braking value to the brake servo control unit J539 via the brake pedal position sender G100. The motor position sender for brake servo G840 informs the motor's position. With this information the brake servo control unit J539 calculates

the braking force required and supports the force applied by the driver to the brake pedal.

DRIVETRAIN

BRAKE SYSTEM PRESSURE ACCUMULATOR VX70

The purpose of the brake system pressure accumulator VX70 is to accumulate and release brake fluid in order to vary the hydraulic circuit's pressure.

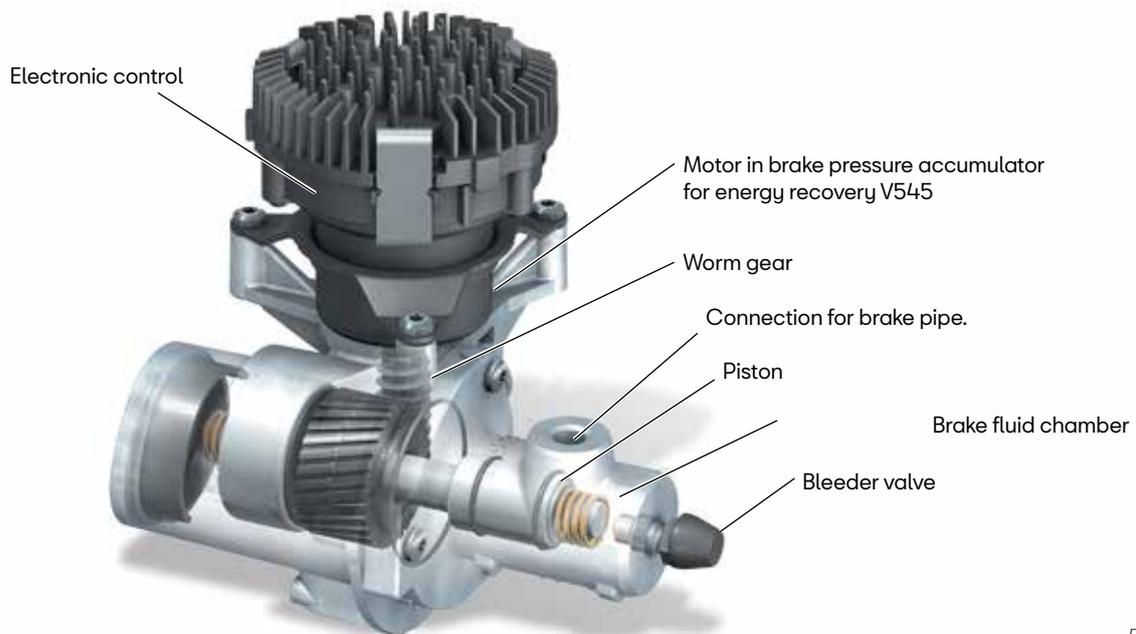
It is made up of a control unit and an electric motor that, by means of a worm gear, moves the piston inside the **accumulator chamber**, varying its internal capacity.

When the three-phase current drive VX54 acts as an alternator, it generates a braking force in the vehicle that must be compensated by it achieving a braking force equal to that requested by the driver on the brake pedal.

Then, the motor in brake pressure accumulator for energy recovery V545 draws the piston of the pressure accumulator VX70 and holds inside the chamber any brake liquid not required at that time.

If further braking force is required, the brake servo control unit J539 sends a signal to the brake system pressure accumulator VX70 so it releases brake liquid to the circuit again.

All these variations in the hydraulic circuit's pressure would be felt on the pedal, generating a strange sensation for the driver. To avoid this, the electromechanical brake servo (eBKV) and the brake system pressure accumulator VX70 are perfectly synchronised, maintaining the pedal in the position desired by the driver.



D175-34

BRAKE BLENDING

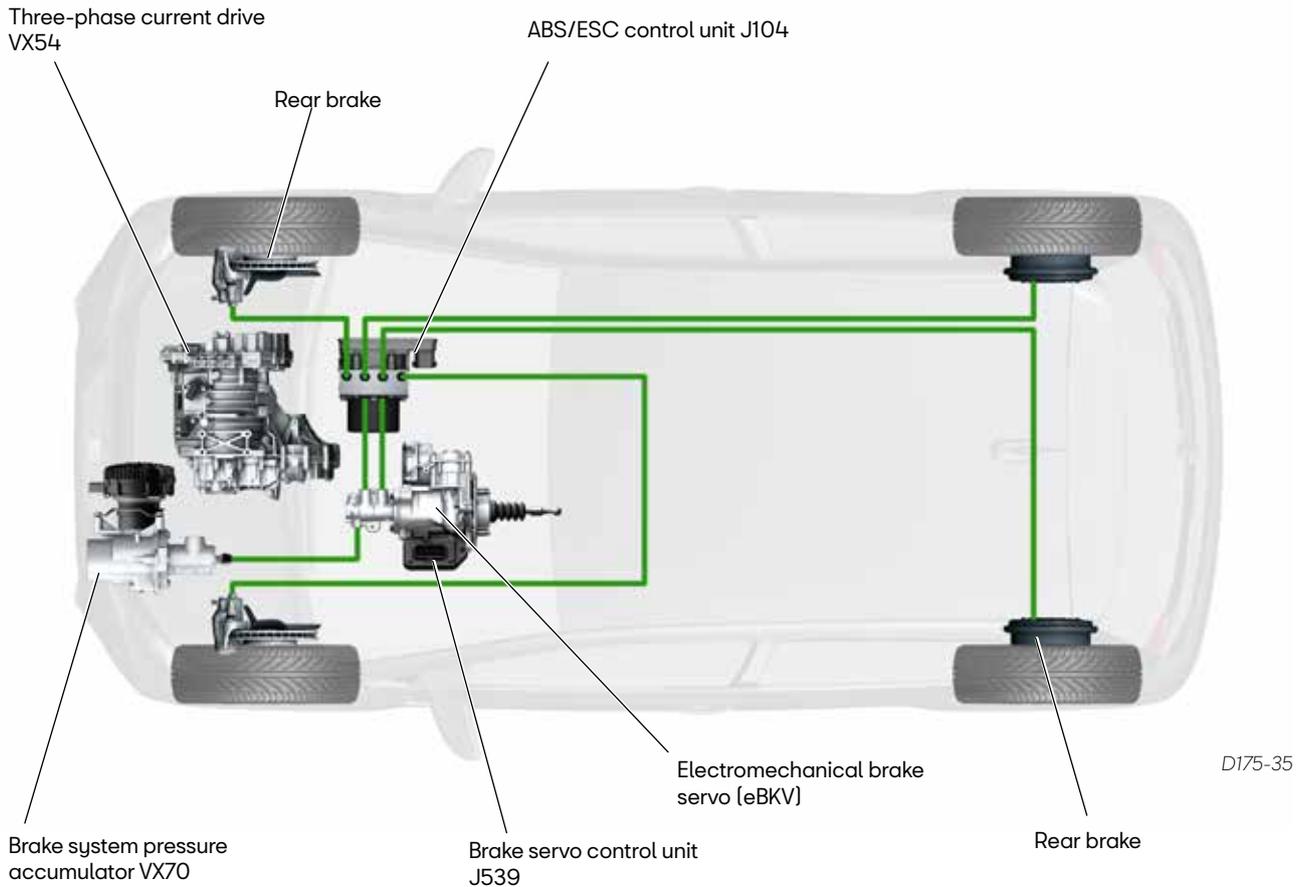
Brake blending is the support to braking provided by the three-phase current drive VX54.

Brake blending is based on a series of parameters of the high-voltage system, which are as follows:

- Vehicle speed
- Charge status of the high-voltage battery.
- Temperature of the high-voltage battery.
- Speed of the three-phase current drive.
- Motor torque of the three-phase current drive.

Once the driver transmits the desire to reduce the speed through the brake, the following three different situations can occur:

- Conventional braking
- Braking supported by the three-phase current drive VX54
- Braking insufficiently supported



CONVENTIONAL BRAKING

The driver steps on the brake pedal and the brake servo control unit J539 obtains an appropriate braking torque value through the **brake pedal position sender G100**.

The hydraulic circuit sends brake liquid pressure to the wheels to ensure the braking of the vehicle.

BRAKING SUPPORTED BY THE THREE-PHASE CURRENT DRIVE VX54

The power and control electronics for electric drive JX1 sends a signal to the brake servo control unit J539 informing that the conditions of the high-voltage system are appropriate for the three-phase current drive VX54 to act as an alternator and engine brake at the same time.

The brake hydraulic circuit's pressure is reduced according to the electric braking torque. This is achieved by the brake system pressure accumulator VX70 moving its internal piston, holding the brake fluid.

This way, depending on the situation, the braking can be carried out completely electrically.

BRAKING INSUFFICIENTLY SUPPORTED

If the conditions of the high-voltage system vary, the regenerative braking torque of the three-phase current drive VX54 may be reduced.

If this happens, the brake servo control unit J539 communicates to the brake system pressure accumulator VX70 the need to re-establish the pressure in the hydraulic circuit; therefore, the motor V545 will move the accumulator chamber's piston again in order to return the brake liquid to the circuit.

This situation is common when braking to stop the vehicle, as the regenerative braking torque is low at speeds below 10 km/h.

The sum of the regenerative braking force and the friction braking force must always be equal to the deceleration requested by the driver on the brake pedal.

DRIVING ASSISTANCE SYSTEMS

The Mii electric offers an extensive equipment in terms of driving assistance systems, especially for its sector.

The **Park Assist** helps manoeuvring when parking, and it includes three sensors on the rear bumper and indications on the Infotainment screen.

It also features the **Hill Hold Control**. This function, governed by the brake management system, provides the Mii electric an assistance system for starting on hills.

A new feature is the front camera, which is used in the **Lane Assist**. This assistance system is always active by default, and its status is indicated by means of a warning lamp on the dash panel insert. It can also be deactivated by pressing a button on the centre console.

Lastly, the **Drive Profile** allows selecting the driving profile by means of a button located on the centre console, next to the selector lever. The driving mode selected is displayed on the dash panel insert.

Three modes are available:

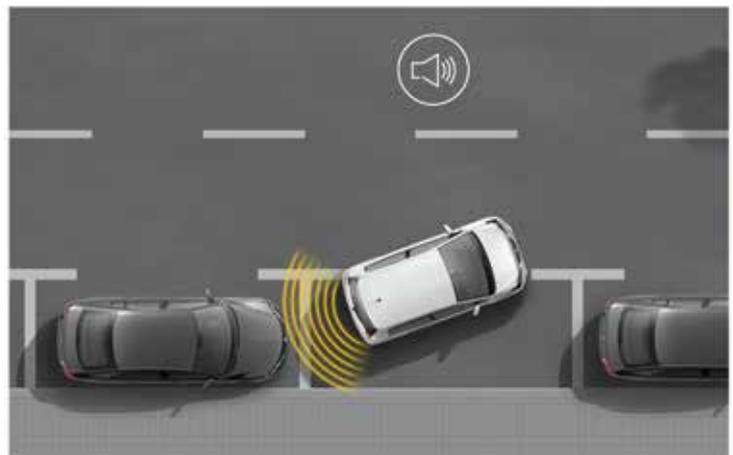
- Normal
- ECO
- ECO+

The ECO mode reduces the climate control system's power and limits the maximum power and motor torque. The vehicle's maximum speed in this mode is 120 km/h.

On ECO+ mode, the climate control system is automatically deactivated, the power is reduced to 40 kW, the torque delivery is reduced and the maximum speed that can be reached is 80 km/h.



Drive Profile



Park Assist



Hill Hold Control

Lane Assist

Lane Assist button



D175-36

ELECTRICAL SYSTEM

The Mii electric's electrical system has **two electrical installations**; the high-voltage electrical installation and the onboard installation.

The high-voltage installation has orange colour cabling with a section and insulation suited to the current flow that circulates through it. They also integrate the pilot line, which is responsible for disconnecting the high-voltage system in the event of disconnecting any component.

The connectors are mechanically coded to ensure the correct polarity.

The 12V installation for the onboard network has a wiring harness with two main parts: It has four fuse holders: SA, SB, SC and SD.

Among other components, the onboard network control units J519 and the emergency call module control unit and communication unit J949 are in the interior.

The image shows the location and the main functions of each in further detail.



The Mii electric's **immobiliser** is integrated into the **dash panel insert** as a master unit. It is 4C type and it includes the power and control electronics for electric drive JX1

The onboard network's battery is a 12V battery with a capacity of 36 Ah.

Fuse holder SA is on the battery. By means of terminal 30 it supplies:

- Power and control electronics for electric drive JX1
- Fuse holder SC and SD and terminal 15 relay.
- Power steering control unit J500
- ABS control unit J104
- Radiator fan.
- Brake servo control unit J539
-

Fuse holder SB is located next to the fuse holder SA, and by means of terminal 30, it supplies several components, among others: the onboard supply control unit J519, the battery monitoring control unit J367 and the ignition and start switch.



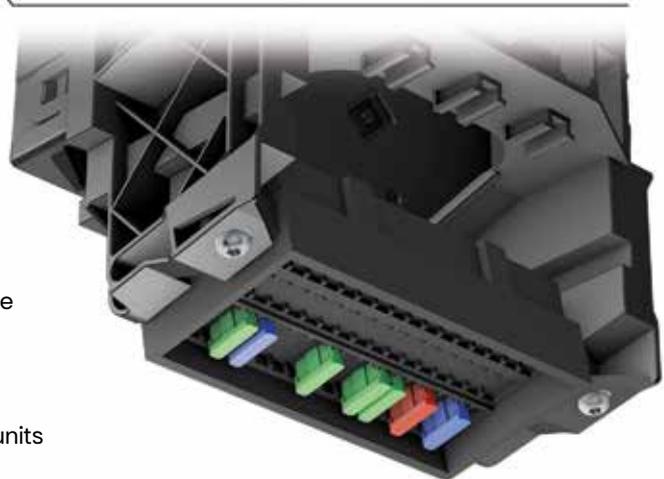
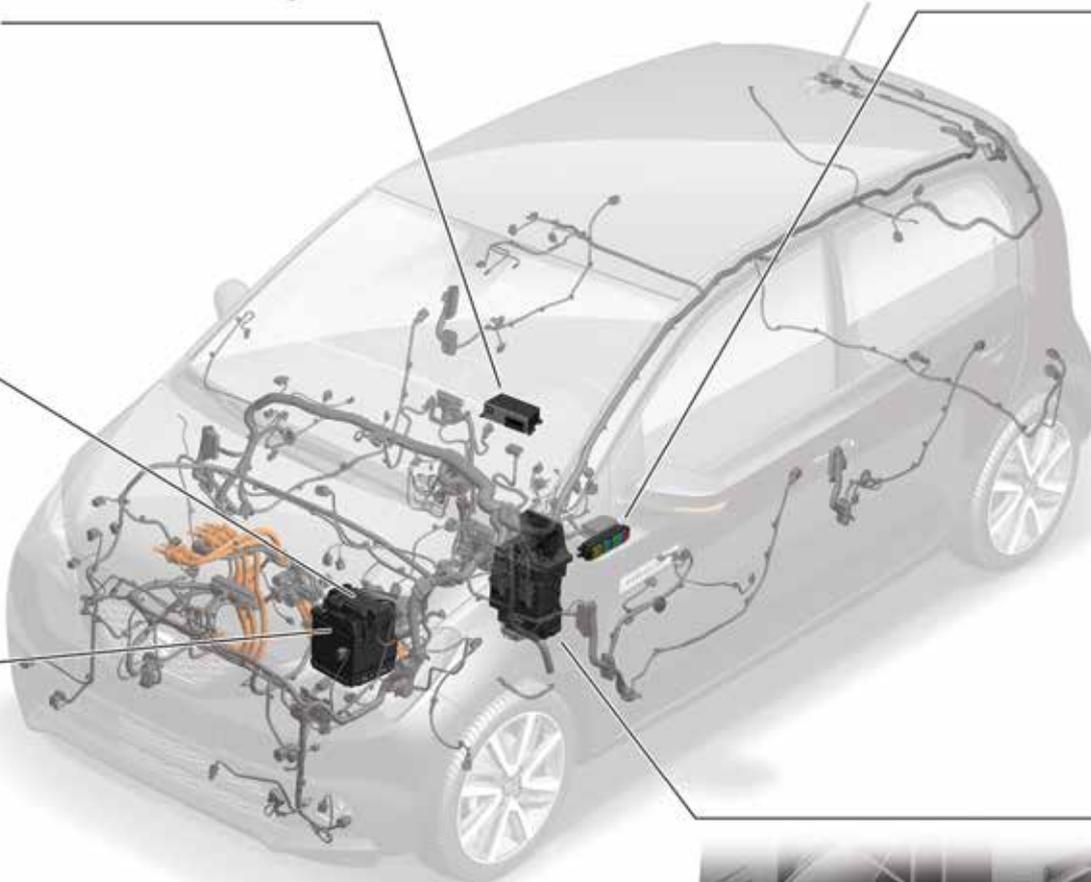
Fuse holder SD is on the left of the instrumentation panel trim, next to A pillar.

This fuse holder includes fuse SD6, which supplies terminal 30 C to the battery regulation control unit J840 to close and open the contactors.

The removal of fuse SD6 is reserved exclusively to qualified personnel, such as the SEAT HVE and the rescue services. It is a cut-out connection of terminal 30 C in the event of emergency.



The **emergency call module control unit and communication unit J949** is located under the front passenger seat.



Fuse folder SC is located in the compartment above the braking pedal, next to the diagnostics socket and the onboard supply control unit J519.

This fuse holder is responsible for supplying most of the components, such as the lights, radio, interior lighting, selector lever, dash panel insert, radiator fan, control units and so on.

ELECTRICAL SYSTEM

The architecture of the Mii electric's data buses incorporates a new communication line: the Hybrid CAN-Bus.

In total there are five main CAN-Bus lines, a private CAN-Bus, and three LIN-Bus lines.

The main CAN-Bus lines operate at a speed of 500Kbps and they are:

- Powertrain CAN-Bus
- Hybrid CAN-Bus
- Dash panel insert CAN-Bus
- Diagnosis CAN-Bus
- Private CAN-Bus

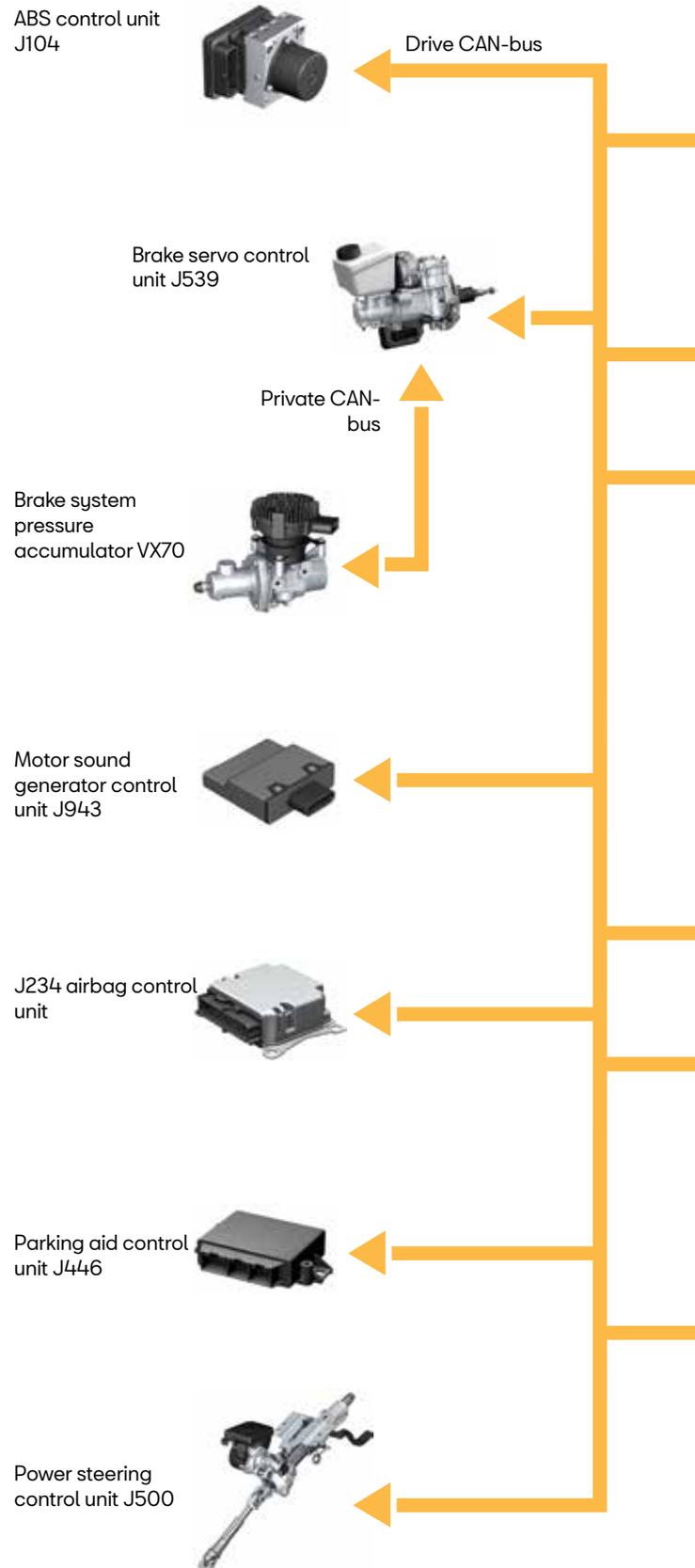
The Comfort CAN-Bus line transmits at 100Kbps. The LIN-Bus lines operate at a speed of 19.2Kbps and they are:

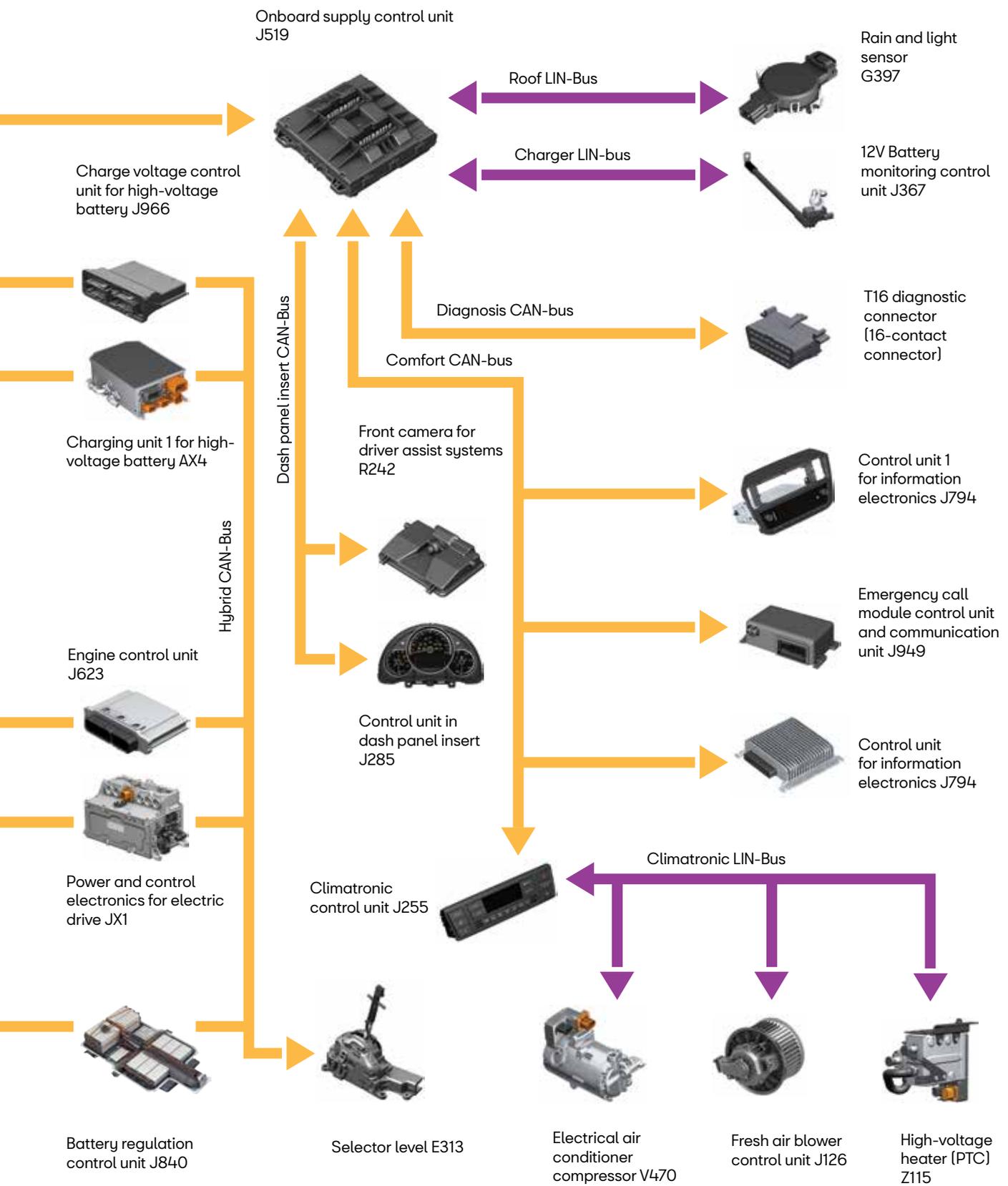
- Climatronic LIN-Bus
- Charger LIN-Bus
- Roof LIN-Bus

The Hybrid CAN-Bus communication line communicates all the high-voltage line's components. As they are part of the powertrain, they are connected to a second communication line: Powertrain CAN-Bus.

On the other hand, the onboard supply control unit J519, located behind the relay holder at the bottom left of the driver side, integrates the following:

- Gateway
- Data bus diagnostic interface J533





ELECTRICAL SYSTEM

EXTERIOR LIGHTING

The Mii electric's exterior lighting is made up of four elements. The main lights and the daytime running lights on the front, turn signals on the exterior mirrors and fixed tail lights and the third brake light at the rear.

HEADLIGHTS

The **main lights** are height-adjustable in three positions from a switch in the interior, next to the steering wheel, and they are made up of the following:

- Dipped beam and main beam headlights with H4 lamp
- Position light with 21W/5W lamp

- Turn signal with 21W amber lamp

The **day time running lights**, located in the same place as the front fog lights, have four LED diodes.



D175-39

REAR LIGHTS

The fixed tail lights contain all the rear lights' elements:

- Position light with double lamp on each side
- Turn signal with 21W amber lamp
- Fog light with 21W lamp on the left
- Number plate light with a single central lamp
- Double reversing light with 21W lamp
- Brake light with 21W/5W lamp
- Top brake light with a 16 LED plate and integrated rear washer jet



D175-40

ELECTRICAL SYSTEM



D175-41

DASH PANEL INSERT

The Mii electric's dash panel insert indicates the vehicle's condition in general and in particular everything related to the electric drive (charge status, driving mode, etc.).

This information is distributed into three clearly-differentiated spheres that make up the dash panel insert.

The **left sphere** provides information related to the following:

- Indication of availability to drive
- Energy recovery indicator in green
- Eco driving indicator in blue
- Normal driving indicator in white

The **central sphere** features the speedometer with a range between 0 and 160 km/h and the multifunction indicator display.

The dash panel insert's multifunction display provides the following information:

- Electric autonomy
- Current power consumption
- Average power consumption
- Information about the charge cycle and the remaining time
- Selected driving profile
- Availability to drive by means of the "READY" indication
- Power availability

The **right sphere** provides information about the battery's charge status in four clearly-differentiated quarters; the last one, in red, indicates an empty battery.

Additional warning lamps are included, such as:

- Lane Assist status warning lamp
- EV electrical system failure warning lamp
- Limited speed warning lamp

AVAILABLE POWER

The dash panel insert's indicator display shows information about the available power.

The Mii electric has all its power available provided that the high-voltage system's temperature and the battery's charge status is optimal.

The display then shows a full "E-max" progress bar.

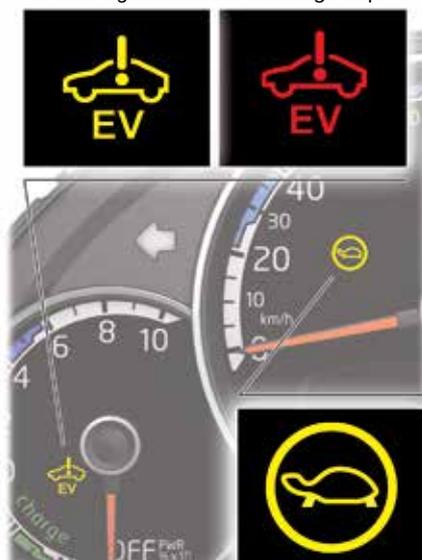
This maximum power will be available for approximately 30 seconds, from which the power will be reduced to "Normal".

If there is a low autonomy, the power can be reduced to 15kW to cover more kilometres.



D175-42

EV electrical system failure warning lamp



Limited speed warning lamp

LIMITED SPEED WARNING LAMP

When the high-voltage battery enters into reserve, the speed is limited automatically to 80 km/h and a turtle-shape warning lamp lights up on the dash panel insert. In addition, if it is not connected to a charge point, the maximum speed and power is reduced gradually.

EV ELECTRICAL SYSTEM FAILURE WARNING LAMP

If there is a failure in the electrical system, the EV warning lamp lights up in the dash panel insert's left sphere.

If it is an anomaly in the high-voltage system that needs to be checked, it will light up in colour yellow. If there is a serious failure in the system, it will light up in red and the vehicle will be immobilised.

D175-43

INFOTAINMENT

The Mii electric's **Infotainment system** provides an extensive amount of services that improves the driving experience.

It consists of the **control unit 1 for information electronics J794**, which includes:

- 5" colour screen
- Backlighting in red
- SD card reader
- USB port on the dashboard
- Bluetooth connection

Depending on the trim level, the system equips either 2 or 6 speakers.

The Mii electric equips an **exterior aerial** that integrates several aerials:

- Telephone, navigation system and auxiliary heater aerial R66
- Digital radio aerial R183
- R248 radio aerial

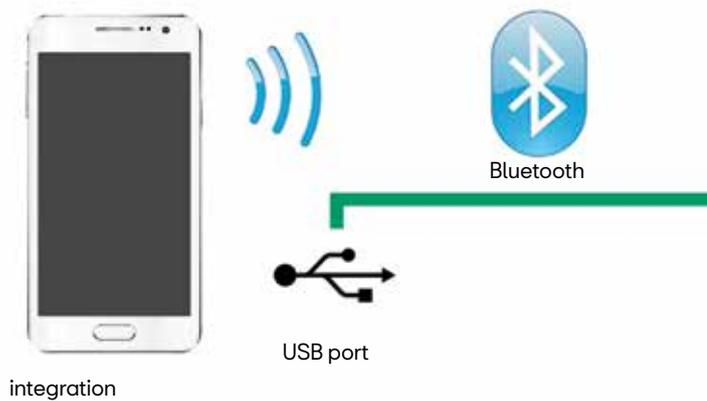
The following is provided via these three aerials:

- GSM and GPS signal to the emergency call module control unit J949
- FM/AM and DAB+ signal to receive analogue and digital radio
- Signal to control the auxiliary heater and the charge management

The **smartphone holder**, located at the top centre of the dashboard, allows placing a smartphone quickly and safely.

There are two Apps available in the SEAT Mii electric

- SEAT DriveMii App
- SEAT CONNECT App



SEAT DriveMii App is designed to be used while driving. It shows data related to the vehicle's condition, onboard computer, energy management, ECO trainer, information and breakdown calls and GPS navigation.

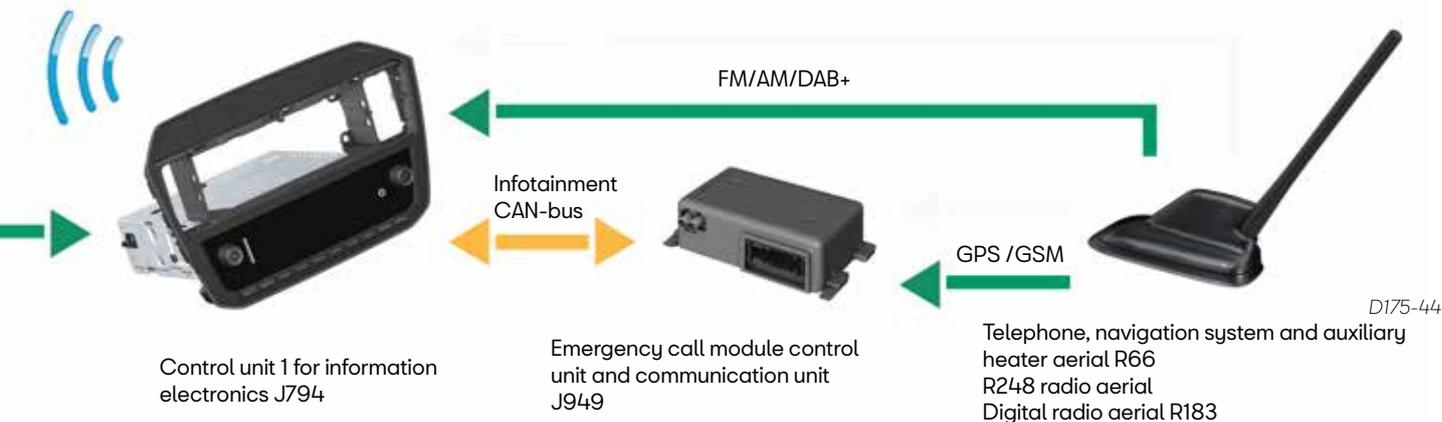
During the use of this application, the telephone and Infotainment equipment communicate via Bluetooth.

Smartphone holder

USB port on the dashboard

Control unit 1 for information electronics J794

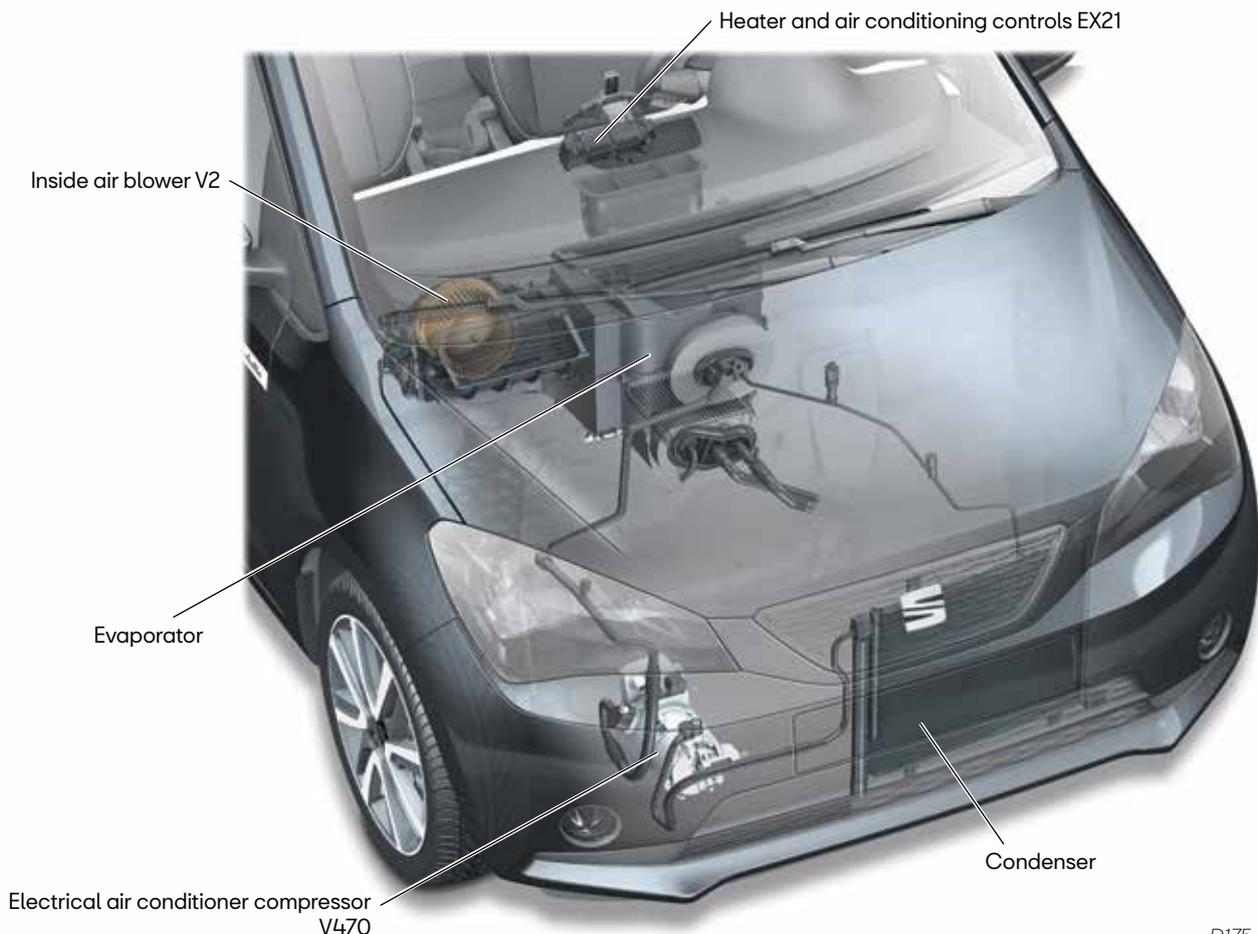
SD card reader



SEAT CONNECT App remotely provides information to the owner about the vehicle when not in it. The user can communicate with the Mii electric via the internet and set battery charging parameters, set departure times, set a climate temperature for the interior and many diverse functions. The **smartphone** must have an Android (5.0 or higher) or iOS (10.0 or higher) operating system.

The **emergency call module control unit and communication unit J949**, located under the front passenger seat, has an eSIM (virtual connection card) through which the vehicle connects to the internet. This unit is used to transmit the vehicle's data to the SEAT CONNECT app via the internet.

CLIMATE CONTROL SYSTEM



D175-45

The Mii electric's climate control system is managed through a single-area Climatronic that can be controlled in two ways:

- Timed
- Immediate climatization

TIMED

The climate control system can be programmed with a timer using the SEAT DriveMii App via the electric energy management system.

Once the desired time and temperature are set, the control unit for high-voltage battery charging unit J1050 activates the control unit for high-voltage battery charging unit J255. The latter is responsible for calculating the time required by the climate control system.

There are three parameters to consider when it comes to programming the timer:

- During the alternating current (AC) charging process, either the battery is charged or the compartment is climatized.
- During the direct current (DC) charging process, the climate control system can operate during the charging process provided that the vehicle is not disconnected from the charging point.

- In battery mode, the climate control system activates 10 minutes before the programmed departure time, provided that the battery charge is 20% or higher.

IMMEDIATE CLIMATISATION

Immediate climatization can be activated via SEAT CONNECT. This way, we can obtain the desired temperature in the interior. The message is sent via the APP to the emergency call module control unit and communication unit J949 to activate the air conditioning system.

This function can only be activated if the high-voltage battery's charge level is 20% or higher.

Depending on the selected driving profile, the climate control system can be limited. Therefore, when selecting the ECO or ECO+ profile, the electrical air conditioner compressor V470 and the high-voltage heater (PTC) Z115 become limited or deactivated.

The image shows a general view of the components.

HEATER AND AIR CONDITIONING CONTROLS EX21

The heater and air conditioning controls EX21 is located in the centre of the dashboard, above the Infotainment equipment.

The following functions are next to these controls:

- Heated windscreen switch E180
- Heated rear window switch
- Hazard warning lights switch
- Lane Assist switch



D175-46

HEATED WINDSCREEN Z2

The Mii electric has a windscreen with heating filaments for further energy efficiency.

It can be activated in two ways:

- Manually, via the heated windscreen switch E180
- Automatically, via the Climatronic control unit J255

If due to the humidity and temperature conditions the windscreen fogs up, the Climatronic control unit J255 will feed the heated windscreen.

If it is not sufficient, the electrical air conditioner compressor V470 will also activate.



D175-47

SEAT CONNECT



Driving data



Parking position



e-Manager



Vehicle status incl. Doors and lights



Remote climatisation



Departure times



D175-48

The purpose of the SEAT CONNECT App is to remotely provide the driver with information about the vehicle when not in it.

SEAT CONNECT will stop receiving and transmitting information when the ignition is on (terminal 15).

The vehicle is equipped with an emergency call module control unit and communication unit J949, located under the front passenger seat. This unit has an eSIM (virtual connection card) through which the vehicle connects to the internet.

SEAT CONNECT provides the customer the following benefits:

- Always being connected to their vehicle
- Knowing the vehicle's status at all times (lights, open doors, etc.)
- The comfort of entering the vehicle with the desired temperature

- Saving time and trouble by being able to find the vehicle easily thanks to the navigation to the parking space function
- Easily managing and saving on the electricity bill by programming via the App the charging of the vehicle during the hours with the best energy prices.

SEAT CONNECT has the following functions:

- Vehicle information
- Driving data
- Parking location
- Departure times
- Remote climatisation
- Charging manager

