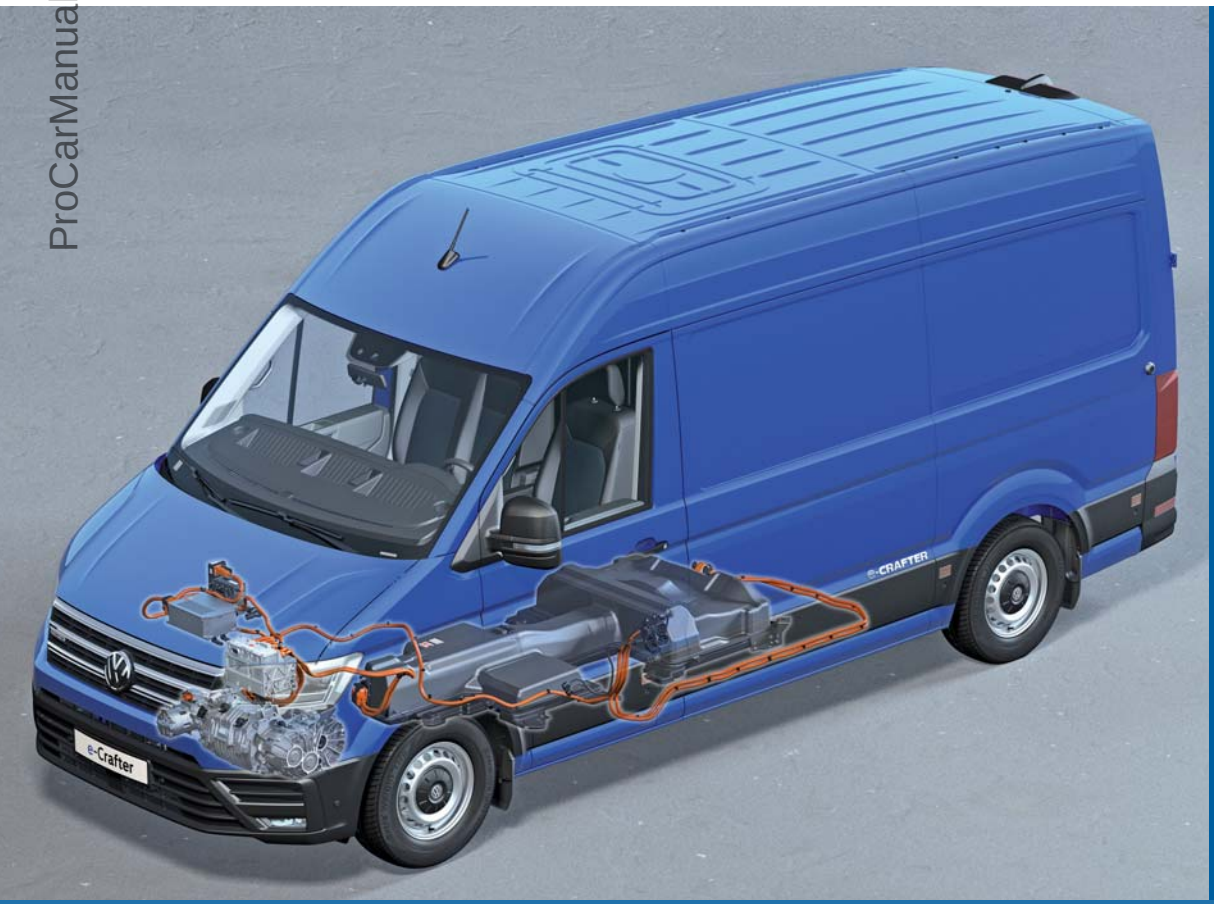
Service Training

Commercial Vehicles

Self-Study Programme 586

The e-Crafter



The Volkswagen Commercial Vehicle e-Volution

After more than 40 years of production of the LT1 and LT2, followed by the Crafter in 2 generations with combustion engine, now for the first time a pure electric drive is being used as standard in the Crafter. The high-voltage components and the technologies used for the remaining subassemblies guarantee safe and comfortable mobility. The electric motor boasts a power output of 100 kW and develops a maximum torque of 290 Nm from a standstill. Depending on the vehicle payload and route profile, the range is up to 173 kilometres, powered by a nominal lithium-ion high-voltage battery energy of 35.8 kW. The recuperation, i.e. the braking energy recovery, has been adapted for the e-Crafter with three-phase drive. Under certain circumstances, the three-phase current drive can cause a deceleration when in alternator mode. The power and control electronics for the electric drive supplies the energy generated to the high-voltage battery. With the e-Crafter, Volkswagen Commercial Vehicles is paving the way for sustainable, future-proof mobility.

Attention! Dangerous electric voltage!

The e-Crafter is a battery-driven electric vehicle. It features a high-voltage system with a rated voltage of 323 volts. This voltage level can be fatal. Only qualified employees may perform work on this vehicle. The minimum qualification required is an electrically instructed person.

The Self-Study Programme shows the design and function of new developments.
The contents will not be updated.

For current testing, adjustment and repair instructions, refer to the relevant service literature.

Important Note

Contents









The e-Crafter

The electric van is based on the Crafter 2017. Like the versions with diesel engines, the new e-Crafter is also equipped with state-of-the-art assistance and comfort systems.

Because the battery is integrated in the underbody, the charging volume of the electric version with just under 10.7 m^3 remains at the level of the conventional models with rear-wheel drive.

The payload of the e-Crafter is between 1.0 tonne and a gross weight of 3.5 tonnes, and 1.75 tonnes and a gross weight of 4.25 tonnes.

s586_002

The characteristic features of the e-Crafter

e-Crafter emblems in the front grille, on the side panels, in front of the wheel arches and at the rear left of the wing door at the height of the tail light

e-specific displays in Discover Media

Charging socket behind the tank cap

Instrument panel with e-specific displays

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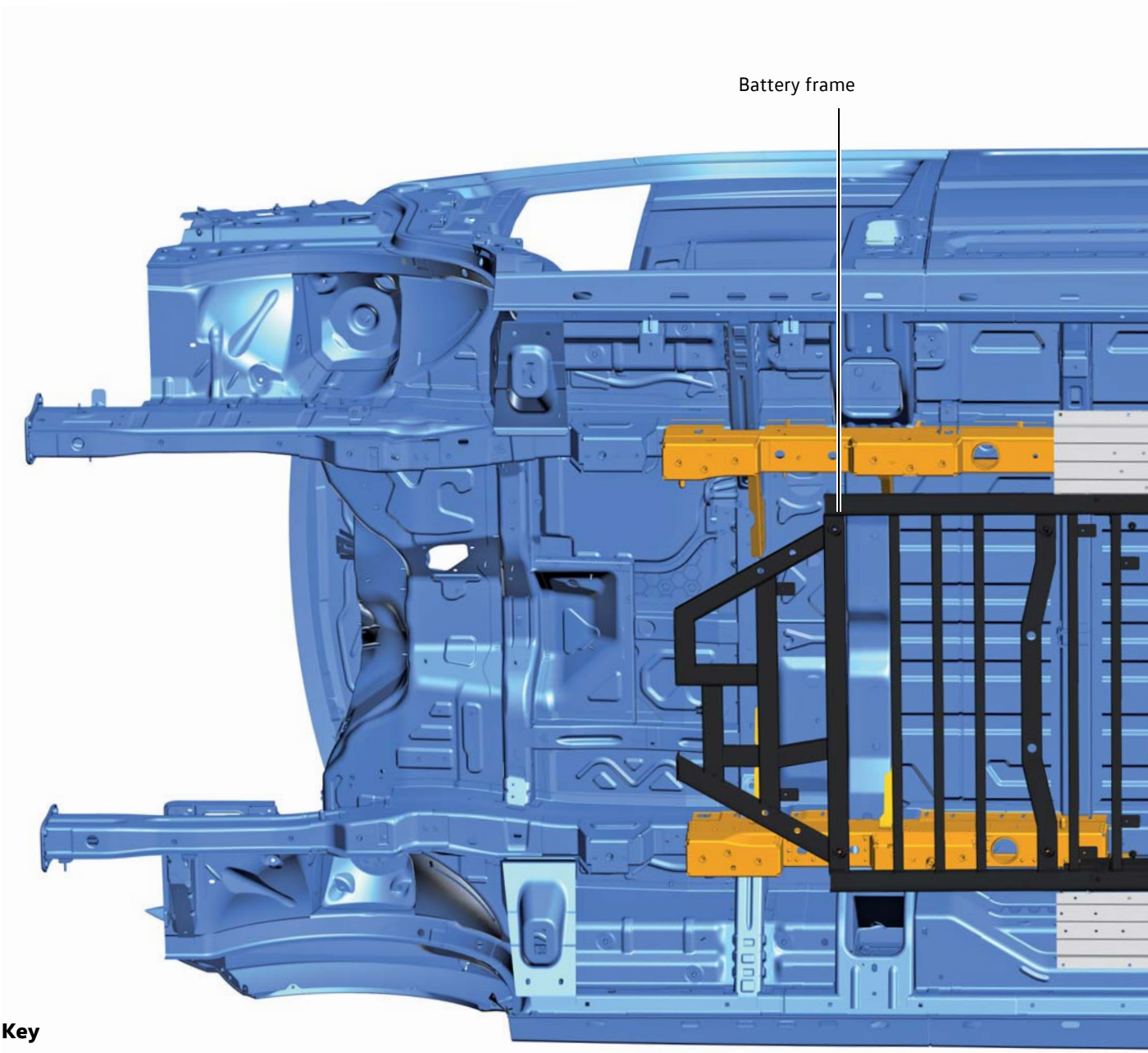
Body structure

The body structure is based on the vehicle body featured in the Crafter 2017. In order to do justice to crash safety requirements, the necessary changes to the geometry were implemented in the underbody, and additional components have been utilised.

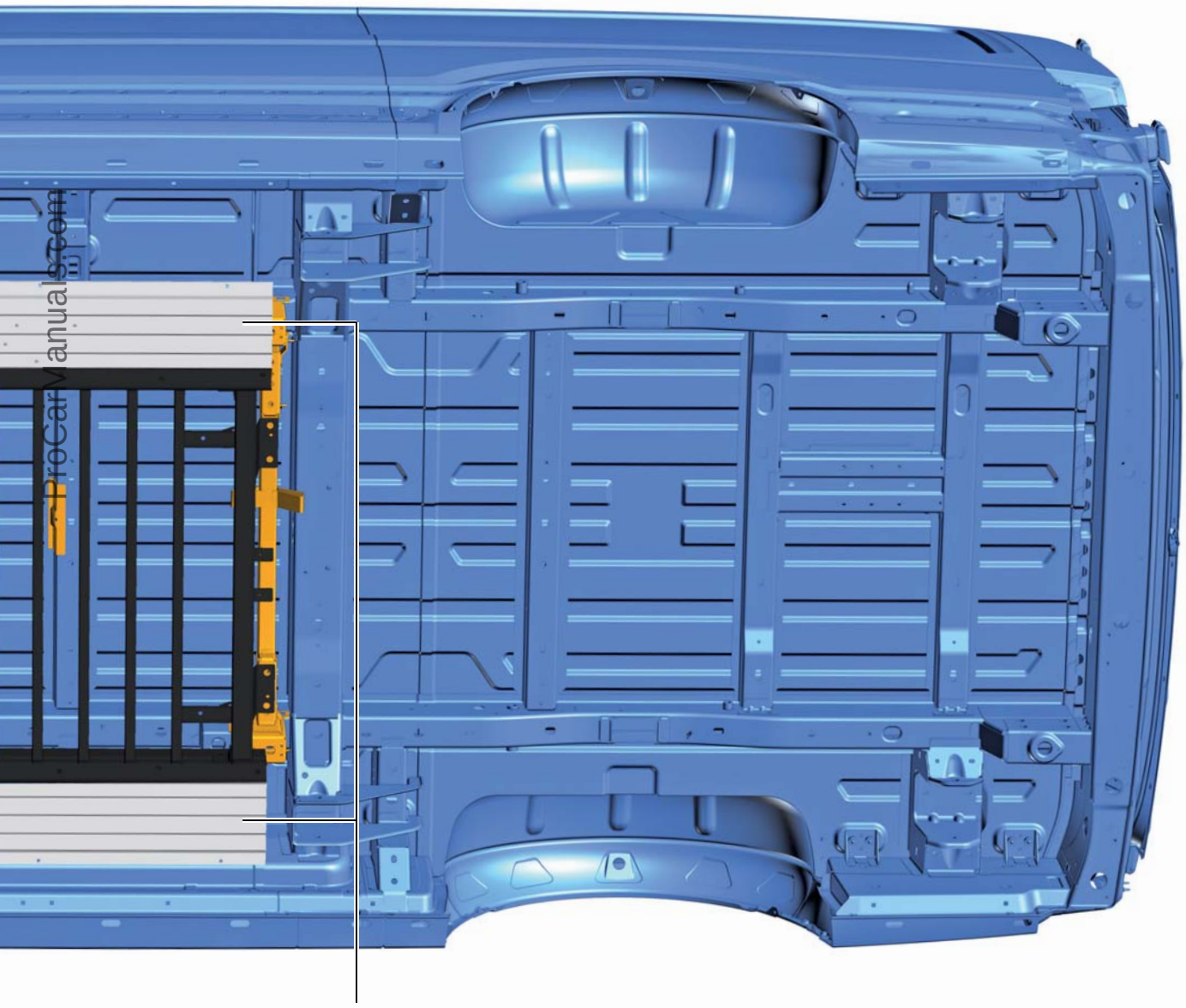


Key

Body changes specifically for the e-Crafter

Underbody

The underbody has been extended, which allows installation of the high-voltage battery, also allowing the stricter impact requirements this involves to be satisfied. In the lateral areas, additional crash elements are installed between the high-voltage battery and the sill panels. A support frame is located under the middle of the underbody, which serves as protection for the high-voltage battery from below. To protect against dirt, and to improve the drag coefficient, the front of the underbody features an underbody impact guard and there are 4 underbody covers in the middle.



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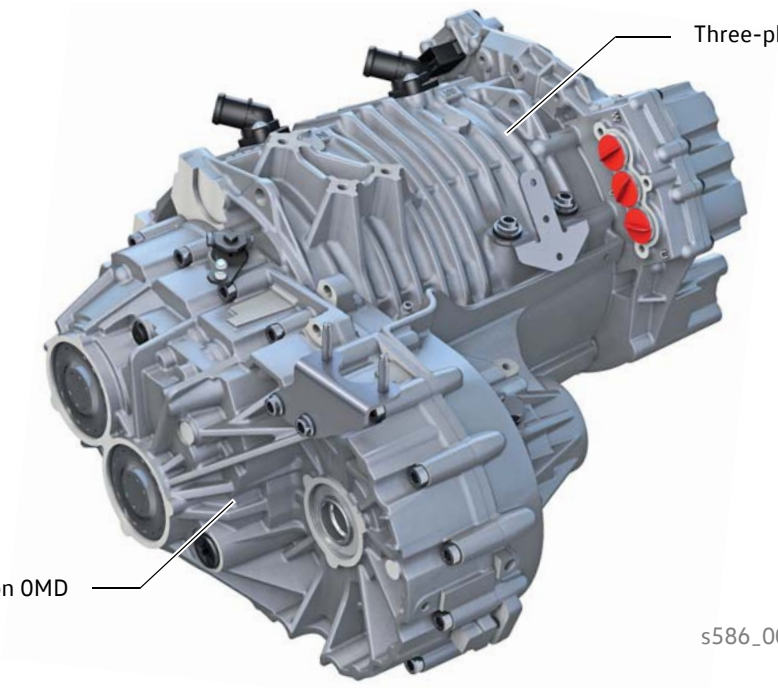
The 0MD 1-speed transmission

The 1-speed gearbox 0MD installed in the e-Crafter is comparable with the 1-speed gearbox in the e-Golf. All components, and in particular the gearbox lubrication, have been adapted to the higher torque and the higher input speed. As was the case in the e-Golf!, noise optimisation was an important development target for this gearbox.

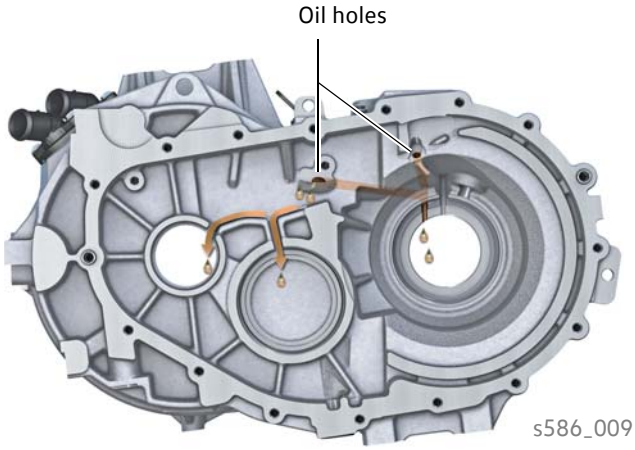


Technical data

Transmission designation	0MD
Number of gears	1
Transmission stages	2
Transmission ratios	Level 1: 3.192 (Z1 = 26; Z2 = 83) Level 2: 3.609 (Z3 = 23; Z4 = 83)
Max. input torque	290 Nm
Max. input speed	12,000 rpm
Weight (with oil)	32.2 kg
Oil volume	1.5 l
Driveshafts	Splined connection

You can find more information about the 1-speed gearbox in Self-Study Programme no. 530 “The e-Golf”.

Oil supply system



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The 1-speed gearbox 0MD of the e-Crafter uses splash lubrication. To ensure permanent lubrication, the final drive gear runs in the oil sump. This requires an appropriate design of the gearbox housing to ensure lubrication, cooling and oil distribution. Lubrication of the bearings for the drive shaft, drive shaft and axle drive is ensured on the gearbox and motor housing side by 2 transverse bores and grooves behind the bearing shells.

s586_008

Other necessary measures:

- Reinforced tapered roller bearings
- Reinforced and larger parking lock
- Reinforced toothing of the drive gears
- Reinforced differential

Selector lever

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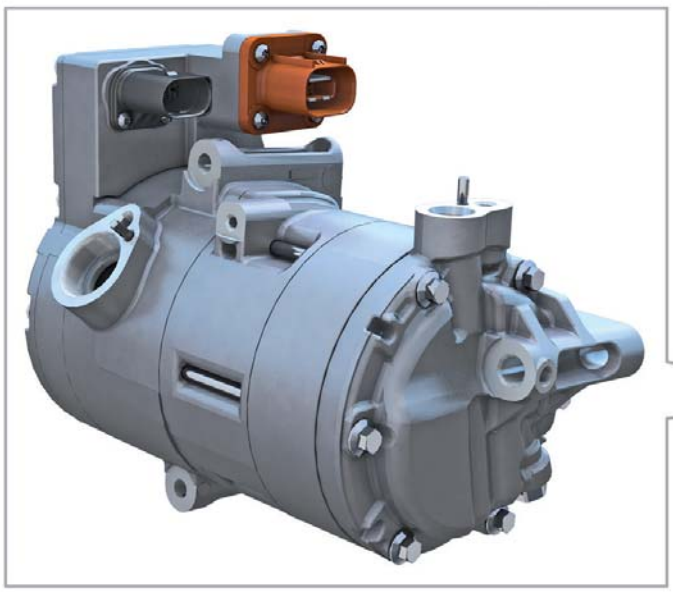
The 1-gear gearbox 0MD and the selector lever E313 are connected by a cable. This mechanical connection is used only to activate the parking lock. The mechanical and electrical components of the selector lever are installed in the housing of the selector lever E313. The locking mechanism for the selector lever E313 is provided by the selector lever lock solenoid N110. In the event of a defect or a power failure, the selector lever E313 remains locked. The manual emergency release is located on the left of the selector mechanism. To unlock the selector lever lock, pull the locking lever backwards and press the selector lever lock button at the same time.

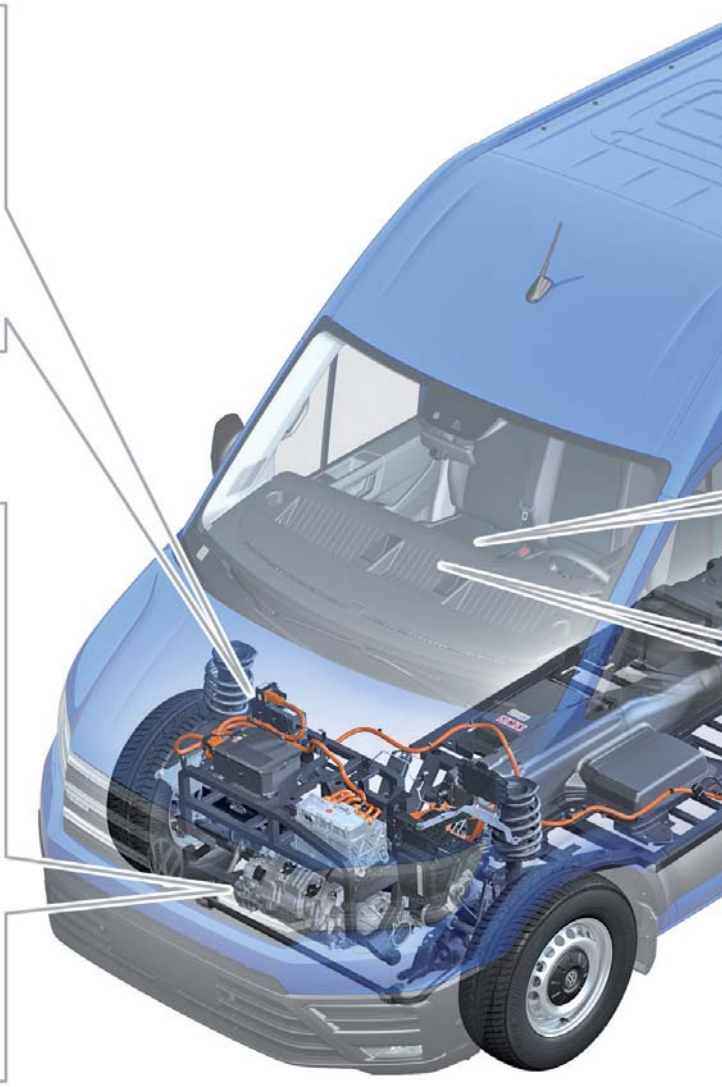
Overview of components

A 2-zone Climatronic is installed as series standard. The interior air conditioning of the vehicle is carried out entirely with a heat pump system via the operating states "cooling" and "heating". For cooling, the refrigerant circuit is switched on in the same way as for a normal air conditioning system. The system can switch from cooling to heating via the modified control of the expansion and shut-off valves. The hot refrigerant coming from the compressor is passed over the heating condenser and gives off its heat there to the air flowing through, which heats the interior. The Climatronic control unit J255 controls and monitors the temperature sensors and the air and temperature flaps in the interior. The thermal management control unit J1024 controls, regulates and manages the expansion valves, shut-off valves, high voltage heating (PTC) Z115, electric air conditioning compressor and refrigerant pressure and temperature senders.

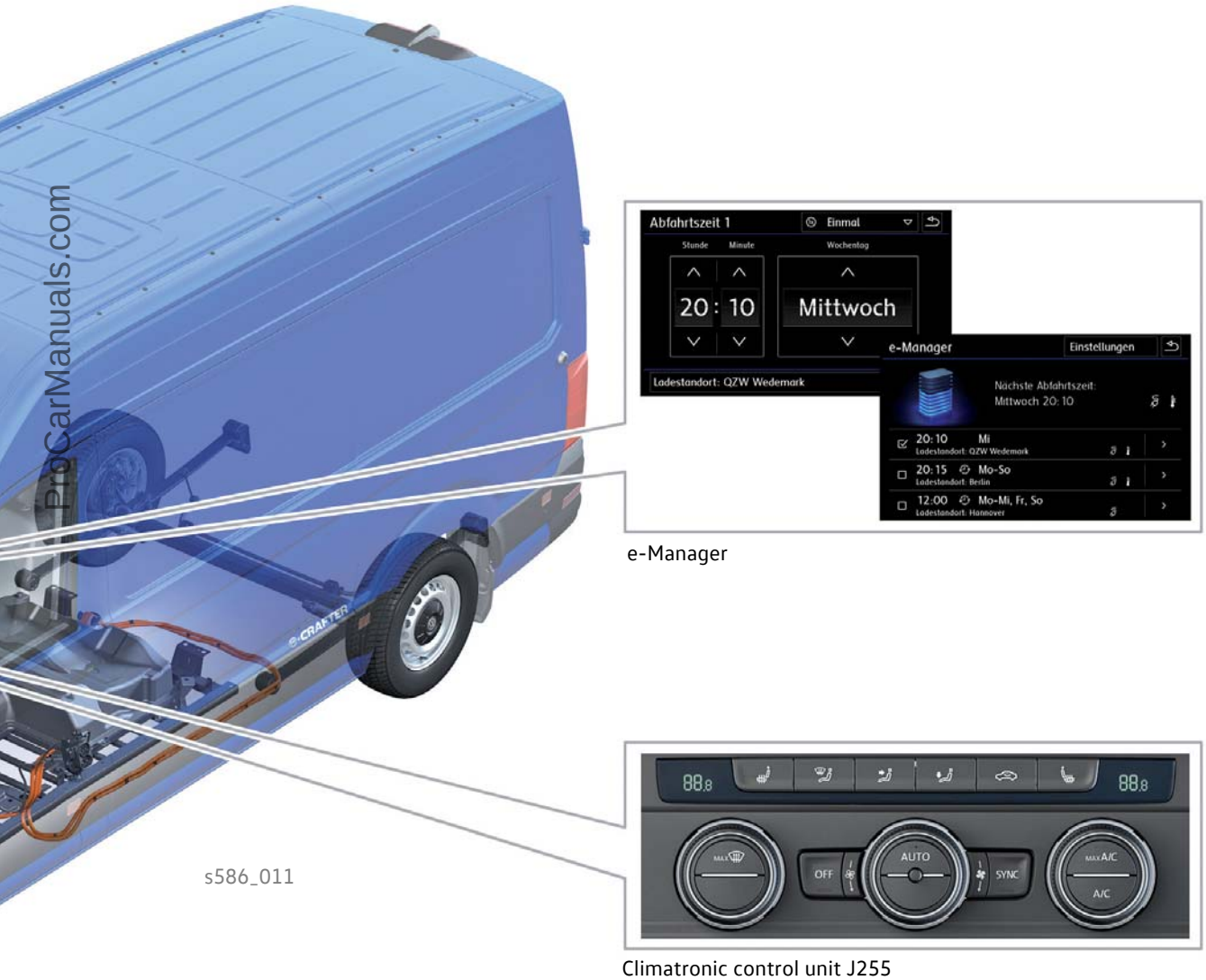
High-voltage heater (PTC) Z115



Electrical air conditioner compressor V470



The high-voltage heating (PTC) Z115 and the electric air conditioning compressor V470 operate on demand from the air conditioning control unit for heating/cooling. The set temperature request is sent via CAN bus to the thermal management control unit J1024.
The e-Manager can be used to program the auxiliary air conditioning with three departure times (timer).

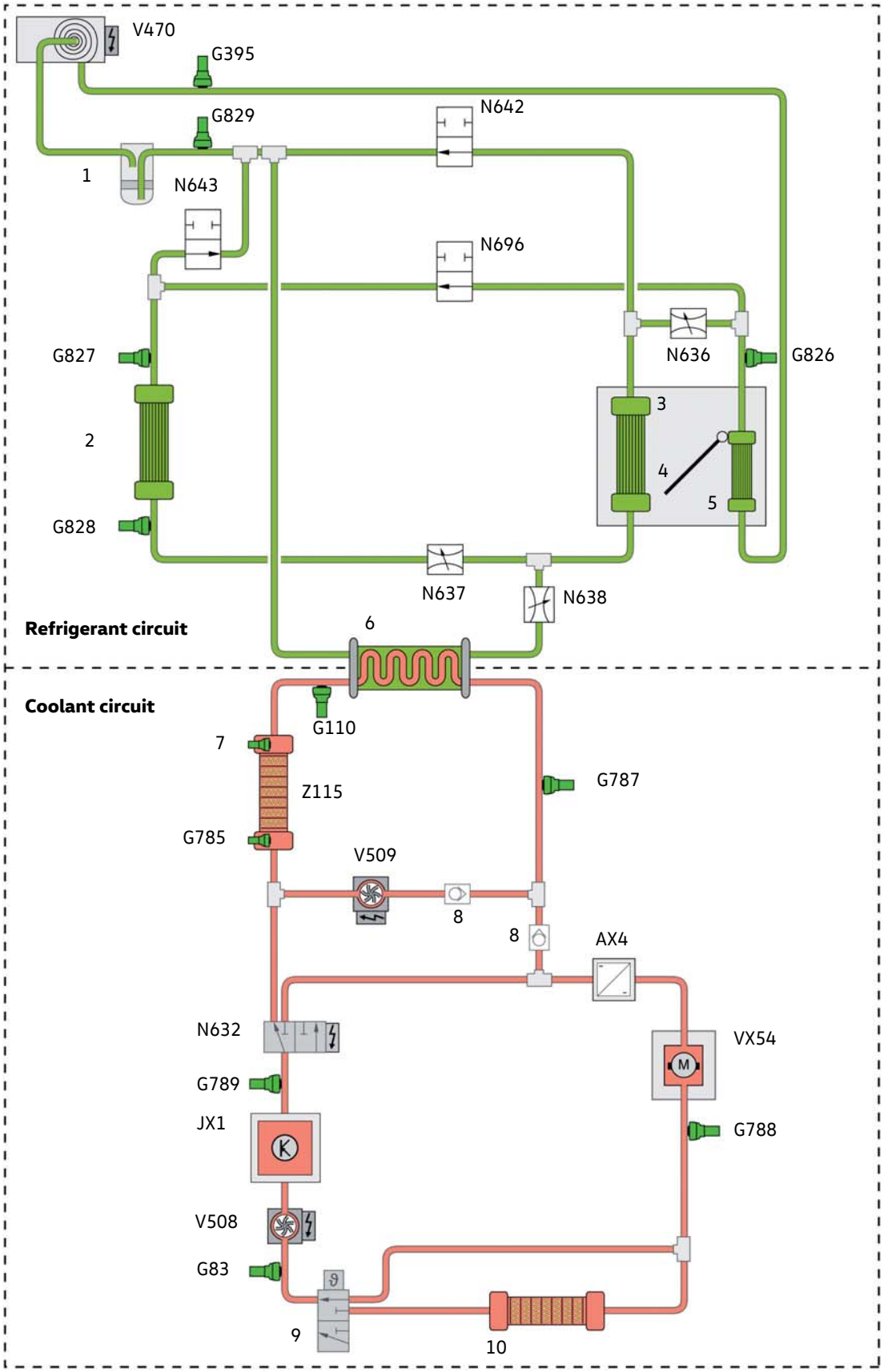


e-Manager

Climatronic control unit J255

More detailed information on the heat pump can be found in Self-Study Programme no. 532 "The Volkswagen Heat Pump".

System overview



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Key

AX4	Charging unit 1 for high-voltage battery
G83	Radiator outlet coolant temperature sender
G110	Air conditioning system coolant temperature sender
G395	Refrigerant pressure and temperature sender 1
G785	Temperature sender in the high-voltage heater (PTC)
G787	Temperature sender after heat exchanger
G788	Temperature sender after electric drive motor
G789	Temperature sender after power and control electronics for electric drive
G826	Refrigerant pressure and temperature sender 2
G827	Refrigerant pressure and temperature sender 3
G828	Refrigerant pressure and temperature sender 4
G829	Refrigerant pressure and temperature sender 5
JX1	Power and control electronics for electric drive
N632	Coolant changeover valve 1
N636	Refrigerant expansion valve 1
N637	Refrigerant expansion valve 2
N638	Refrigerant expansion valve 3
N642	Refrigerant shut-off valve 4
N643	Refrigerant shut-off valve 5
N696	Refrigerant shut-off valve 1
V470	Electrical air conditioner compressor
V508	Coolant circulation pump before power and control electronics for electric drive
V509	Coolant circulation pump before high-voltage heater (PTC)
VX54	Three-phase current drive
Z115	The high-voltage heater (PTC)

1	Dryer
2	Condenser
3	evaporator
4	Temperature flap
5	Heat condenser
6	Heat exchanger for heat condenser
7	Internal temperature sender in the high-voltage heater (PTC)
8	Non-return valve
9	Thermostat
10	Cooler

Refrigerant circuit

Coolant circuit

Expansion valves and shut-off valves

The refrigerant circuit has three expansion valves and three shut-off valves.

Expansion valve

The expansion valves are designed as ball valves with a V-shaped control edge increasing in size. The expansion valves are actuated by the thermal management control unit J1024 as and when required. The electric valve is controlled so as to take any position between 0% (closed) and 100% (fully open). The expansion valves are all identical in design and are connected to the thermal management control unit via a LIN bus.

The refrigerant flows through the N637 (EXV2) in one direction or the other according to the function (heating or cooling).

s586_070

Coolant

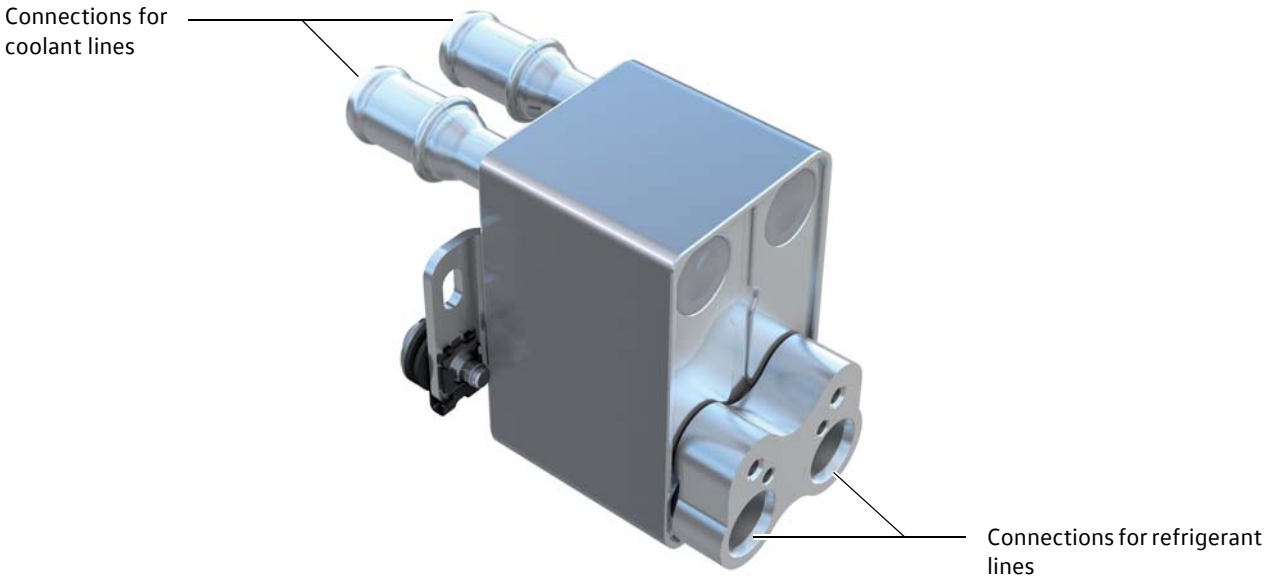
The shut-off valves have been designed as ball valves. They are all identical in design and are connected to the thermal management control unit via a LIN bus. The valves can be 0% (closed) or 100% (fully open).

s586_071

When a valve is replaced, it must be readdressed via the diagnostic software in the thermal management control unit J1024.

Heat exchanger

The heat exchanger is the link between the refrigerant circuit and the coolant circuit. It is required in some operating conditions for re-evaporation of the refrigerant.



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Air conditioning system coolant temperature sender G110

Task and function

The air conditioning system coolant temperature sender G110 measures the current coolant temperature before the heat exchanger and sends this information to the thermal management control unit J1024. If the measured waste heat temperature of the water-cooled high-voltage components is not sufficient to re-evaporate the refrigerant, the PTC heating element Z115 is activated to increase the temperature in the refrigerant circuit.

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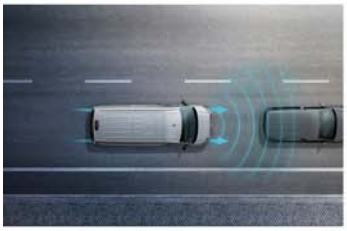
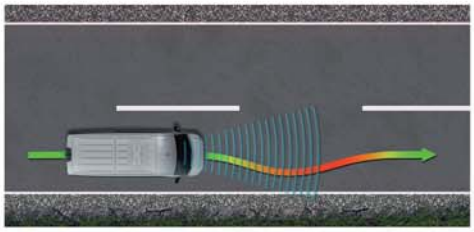
Overview of the driver assist systems

Available driver assist systems

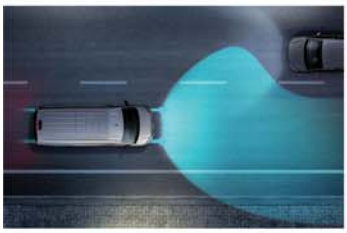
- Cruise control system (CCS)
- Speed limiter
- Parking aid (PDW)
- Rain/light sensor



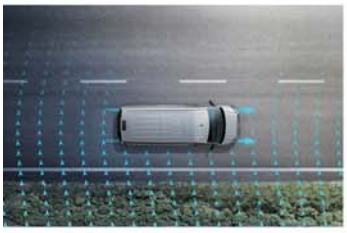
Area monitoring system (Front Assist) with City Emergency Brake



Lane departure warning (Lane Assist)



Main beam assist (FLA)



Side wind assist (ESC function)

Automatic Post-Collision Braking System

Hill Start Assist

Optical 360° parking system
(OPS) with flank protection

Reversing camera
(Rearview Camera System)

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Traffic sign detection
(Sign Assist)

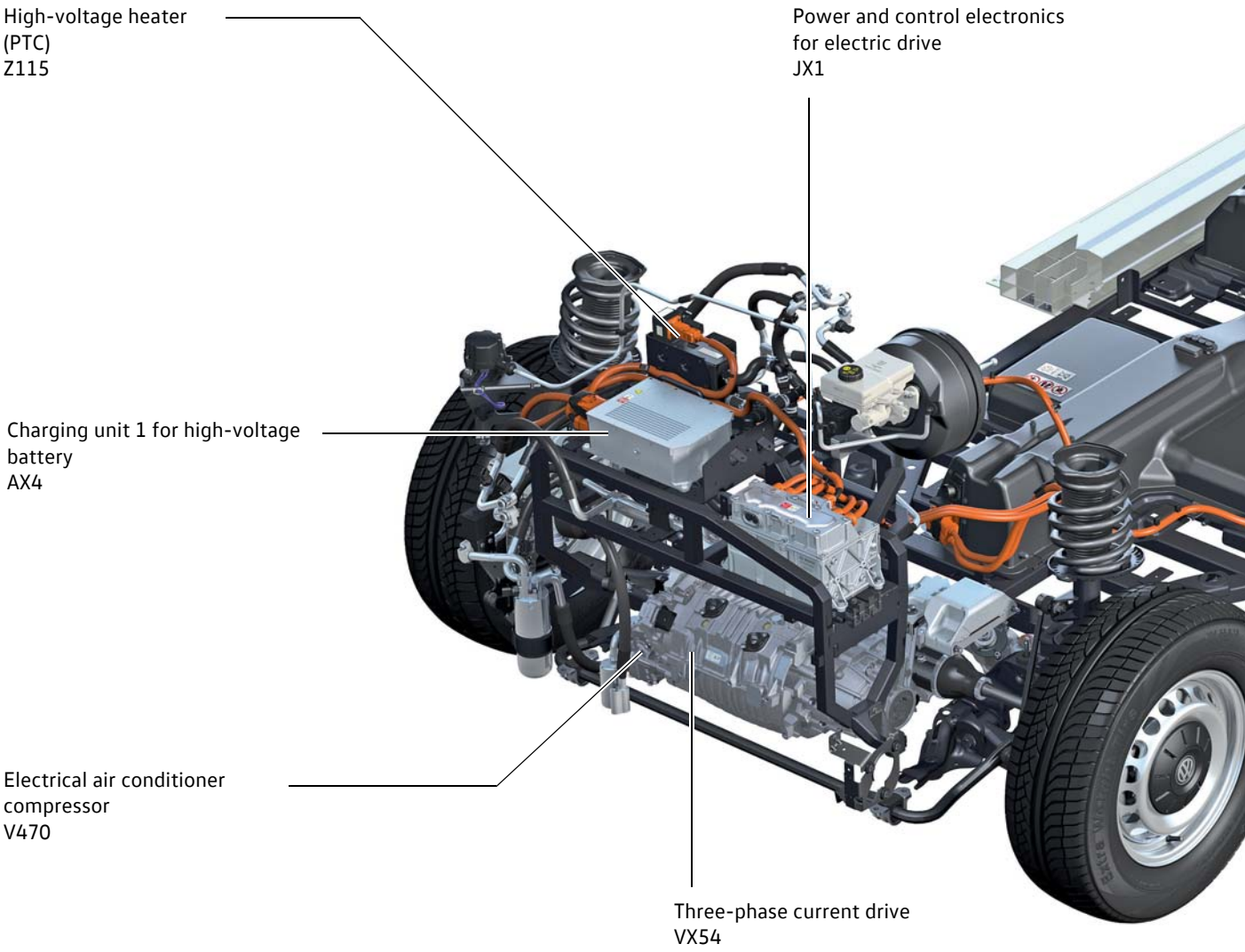
Driver Alert System
(DAS)

Tyre Pressure Monitoring System
(TPMS)

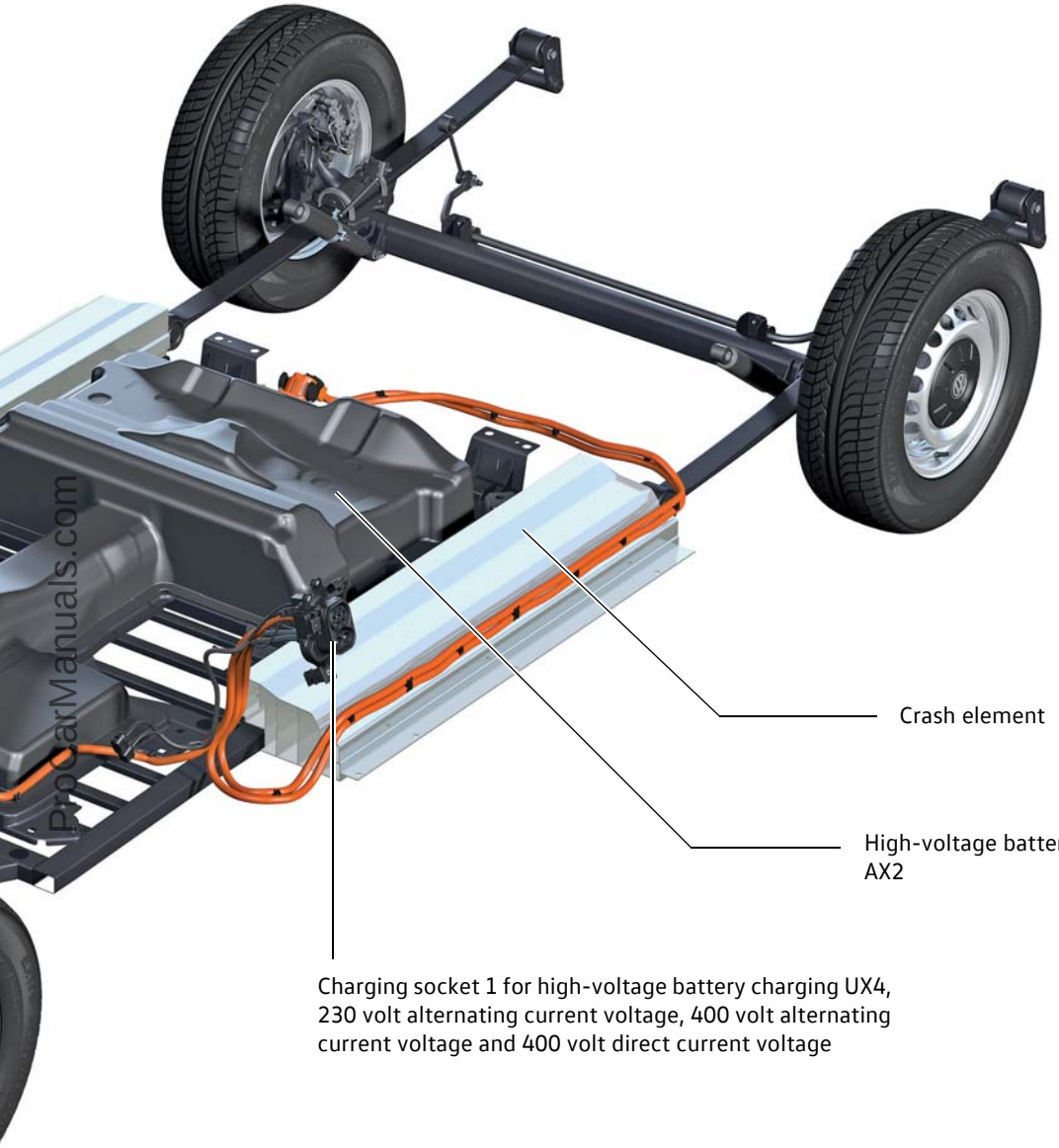
You will find further information on the driver assist systems in Self-Study Programme 567
"The Crafter 2017 assist systems".

The high-voltage system at a glance

The components of the high-voltage system have been installed to save space, ensuring there are no limitations imposed on the room available, along with operation.



Information on the warning signs can be found in Self-Study Programme no. 525 “The Jetta Hybrid” and no. 527 “The e-up!”.



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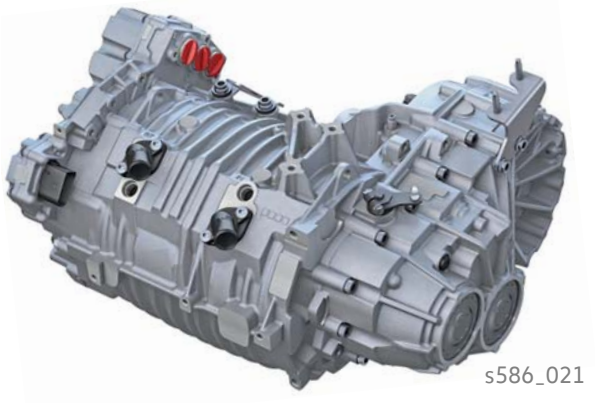
Attention! Dangerous electric voltage!

Please note that work on the electric vehicle may be carried out only by qualified personnel. Improper handling of the high-voltage equipment may lead to life-threatening situations. AC voltages of 25 volts or more and DC voltages of 60 volts or more are dangerous for humans. Therefore, please observe the safety information in the service literature, the vehicle diagnostic tester and on the vehicle itself.

Three-phase current drive VX54

The three-phase current drive VX54 features an identical design to the one in the e-Golf.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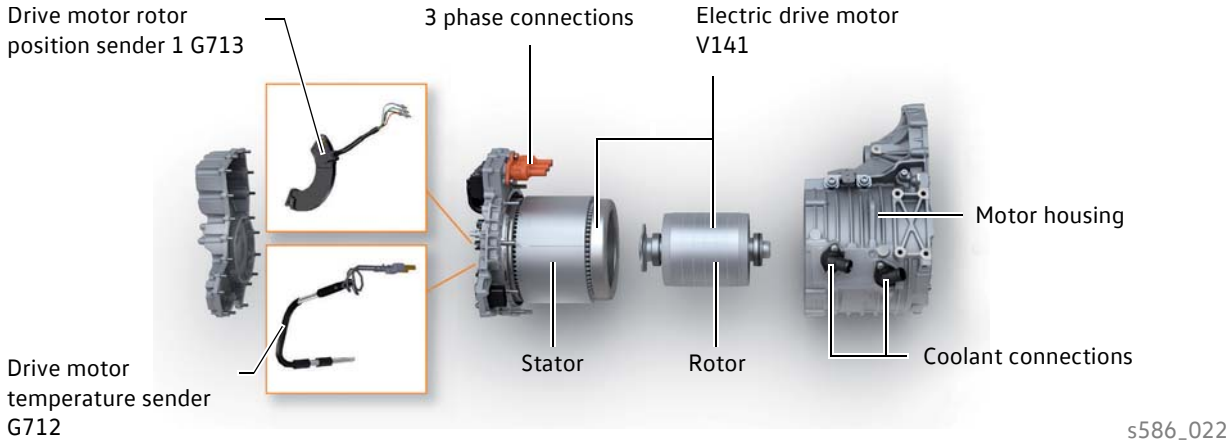
The electric drive motor V141 is comprised of a rotor and stator.

Design

The three-phase current drive VX54 includes:

- The electric drive motor V141
- The drive motor temperature sender G712
- The drive motor rotor position sender 1 G713
- 2 coolant connections and
- the 3 phase connections.



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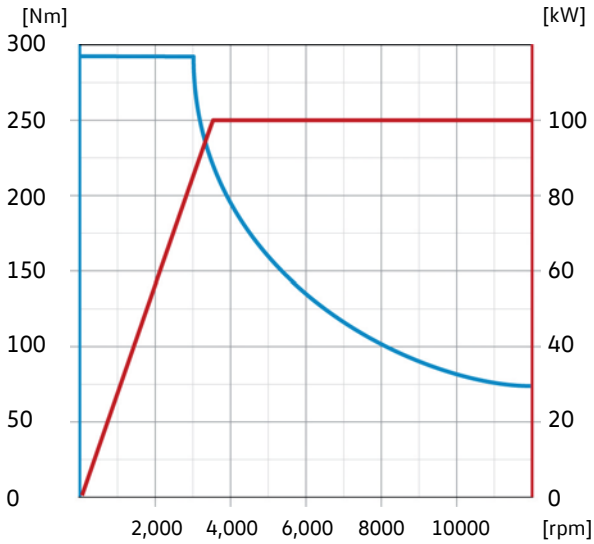
Technical data

Maximum output	100 kW
Maximum torque	290 Nm
Max. motor speed	12,000 rpm
Weight including gearbox	~106 kg
Efficacy	up to 94 %

Torque and power diagram



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More information about how the three-phase current drive VX54 functions can be found on Volkswagen TV.

Power and control electronics for electric drive JX1

The power and control electronics for electric drive JX1 are installed at the front of the motor compartment. It controls the energy flow from high-voltage battery 1 AX2 to the three-phase drive VX54 and sets the required (motor or generator) torque for the three-phase current drive. Furthermore, the power and control electronics for electric drive JX1 backs up the 12-volt vehicle electrical system via the integrated voltage converter A19.

Technical data

Voltage range	250 – 430 V
Maximum current	450 A
12 V charge current	120 A
Frequency	9 – 10 kHz
Weight	10.5 kg

Fitting location

The power and control electronics for electric drive JX1 are installed at the left of the motor compartment.

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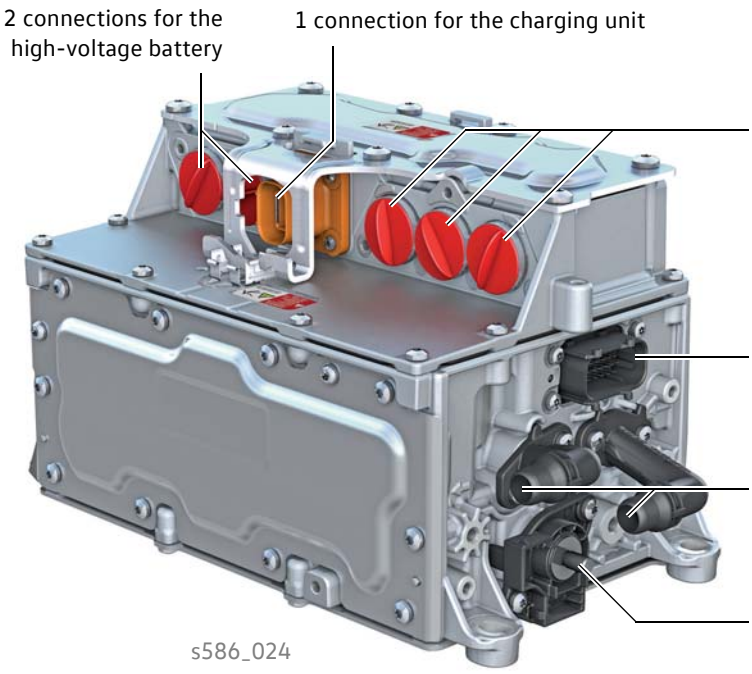

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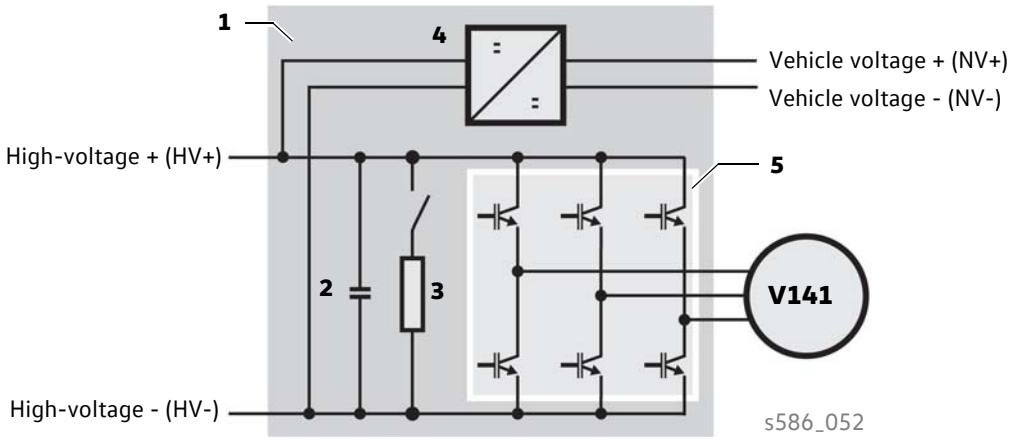
Design

The power and control electronics for electric drive JX1 are comprised of several integrated components. All components are controlled by the electric drive control unit J841. The following components are installed:

Key

1	Electric drive control unit J841
2	Intermediate circuit capacitor 1 C25
3	Discharge resistor for the intermediate circuit capacitor 1 C25
4	Voltage converter A19
5	DC/AC converter for drive motor A37



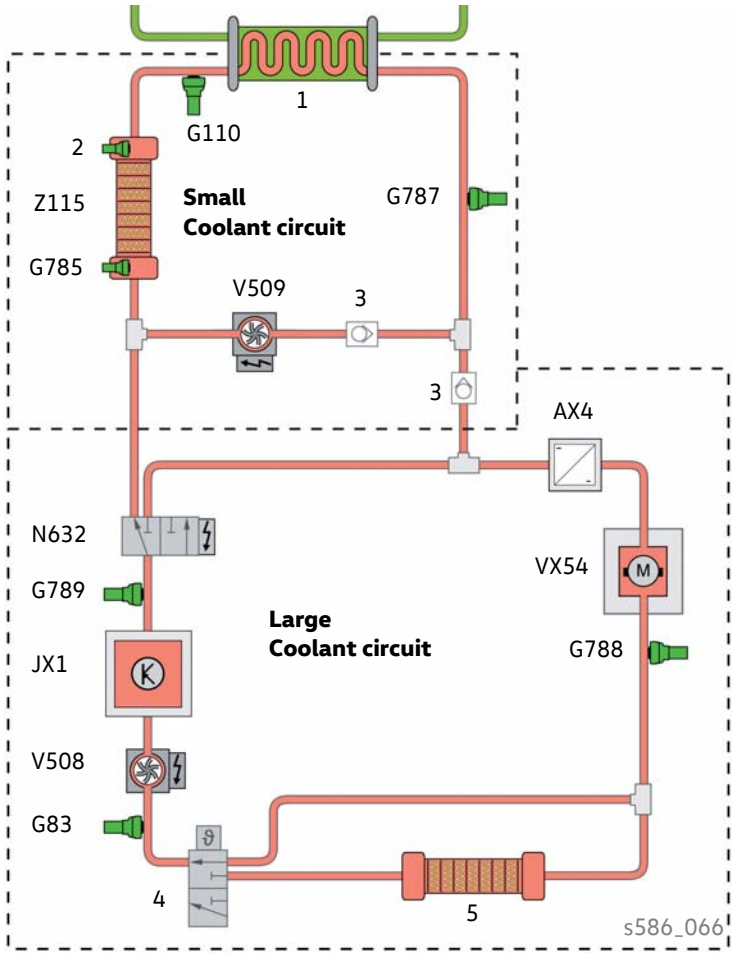
You will find further information on the power and control electronics in Self-Study Programme 530 "The e-Golf".

The coolant circuit

To protect against excessively high temperatures, the three-phase drive VX54, the charger 1 for high-voltage battery AX4 and the power and control electronics for electric drive JX1 are cooled by the coolant circuit. The coolant temperature amounts to as much as 65°C and is electronically monitored and regulated by the motor control unit J623.
The thermostat opens from a coolant temperature of approx. 30 °C, thereby opening the flow through the cooler. By controlling the shut-off valve N632, the coolant circuit is divided into two circuits. The large coolant circuit is also used for cooling the electrical components and the small coolant circuit is used for re-evaporation of the refrigerant in the heat exchanger.

Representation of the coolant circuit

The diagram gives an overview of the components of the coolant circuit.



Refrigerant circuit

Coolant circuit

Key

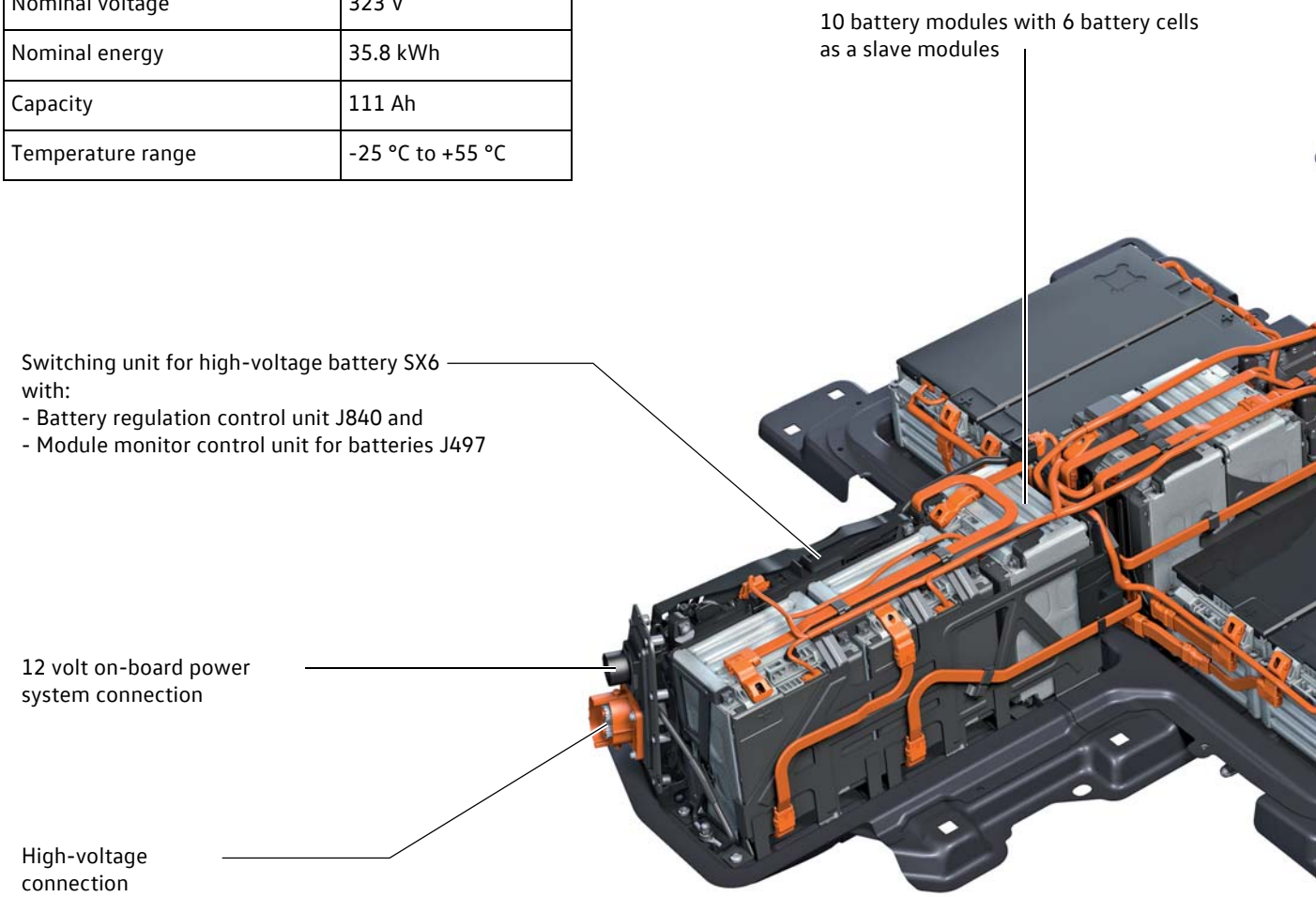
AX4	Charging unit 1 for high-voltage battery
G83	Radiator outlet coolant temperature sender
G110	Air conditioning system coolant temperature sender
G785	Temperature sender in the high-voltage heater (PTC)
G787	Temperature sender after heat exchanger
G788	Temperature sender after electric drive motor
G789	Temperature sender after power and control electronics for electric drive
JX1	Power and control electronics for electric drive
N632	Coolant changeover valve 1
V470	Electrical air conditioner compressor
V508	Coolant circulation pump before power and control electronics for electric drive
V509	Coolant circulation pump before high-voltage heater (PTC)
VX54	Three-phase current drive
Z115	The high-voltage heater (PTC)
1	Heat exchanger for heat condenser
2	Internal temperature sender in the high-voltage heater (PTC)
3	Non-return valve
4	Thermostat
5	Cooler

High-voltage battery 1 AX2

The high-voltage battery is installed under the vehicle and provides the energy needed for driving, heating and cooling. Lithium-ion battery cells are used for storing the energy.

Technical data

Weight	344 kg
Number of battery cells	264 with 3.7 V
Battery module	27
Nominal voltage	323 V
Nominal energy	35.8 kWh
Capacity	111 Ah
Temperature range	-25 °C to +55 °C

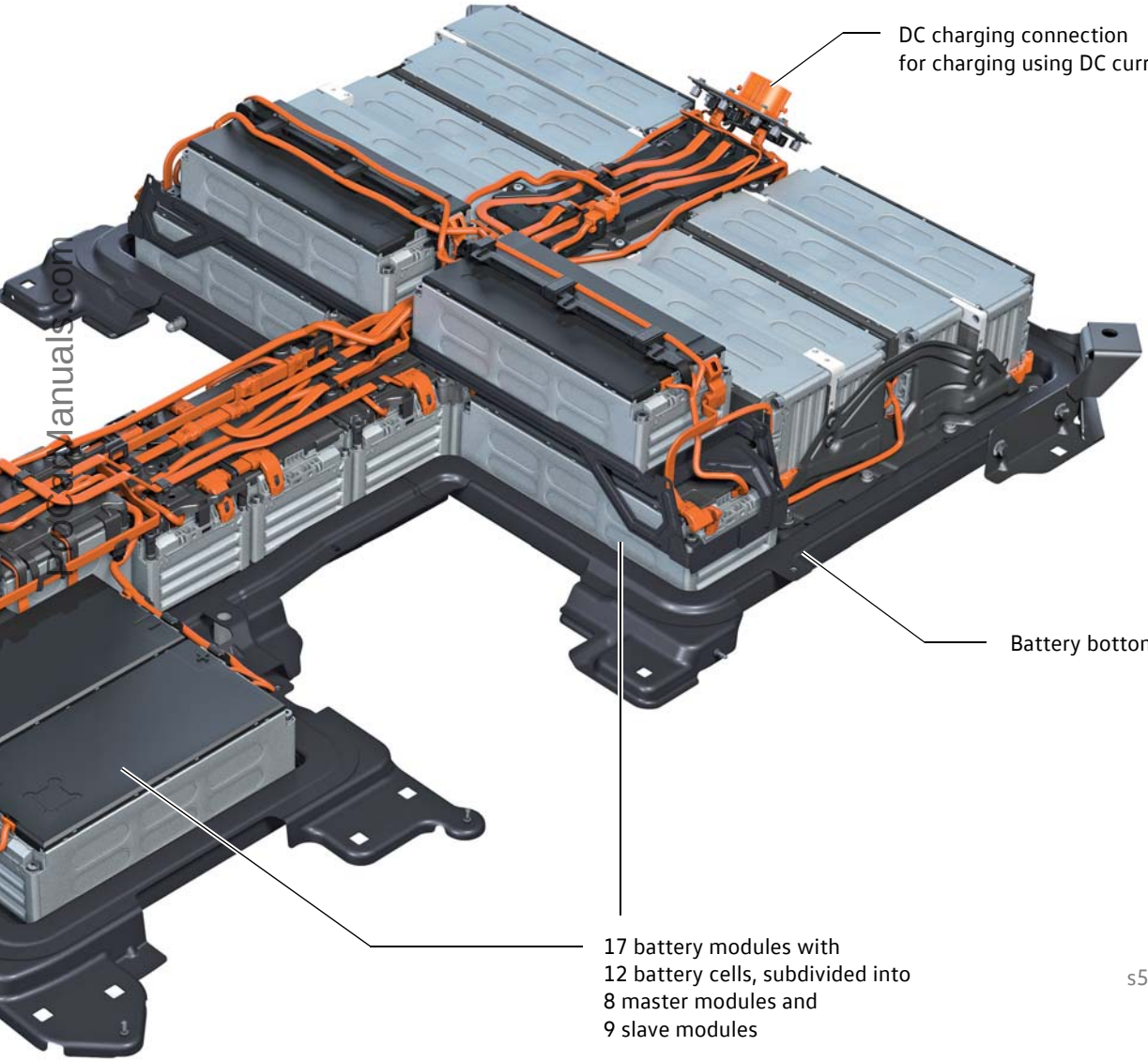


The battery regulation control unit J840, which has been integrated into the switching unit for high-voltage battery SX6, has the following functions:

- Monitoring of the pilot line
- Testing the crash signal
- Master function for the module monitor control unit for batteries J497

The module monitor control unit for batteries J497 has the following functions:

- Contactor controls
- Regulating the charge level
- Monitoring the isolation protection
- Current measurements upstream and downstream of the contactors



Attention! Dangerous electric voltage!
Please note that maintenance work on the high-voltage battery may only be carried out by qualified Volkswagen high-voltage experts.

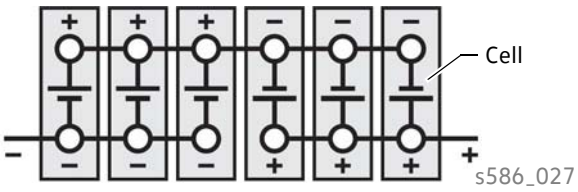
High-voltage system

Battery module

The e-Crafter has 27 battery modules connected in series.

- 8 master modules with 12 battery cells
- 9 slave modules with 12 battery cells
- 10 slave modules with six battery cells

Battery cell configuration (module with six battery cells)

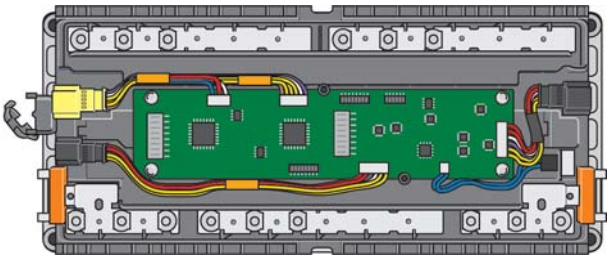


The battery modules are comprised of the battery cells. 3 battery cells configured in parallel are always connected in series.

Master modules

Each master module can have up to 4 slave modules connected to it. The master module controls the charge level, and monitors the module temperature and the cell voltage. The data are transmitted to the module monitor control unit for batteries J497 using a private data bus.

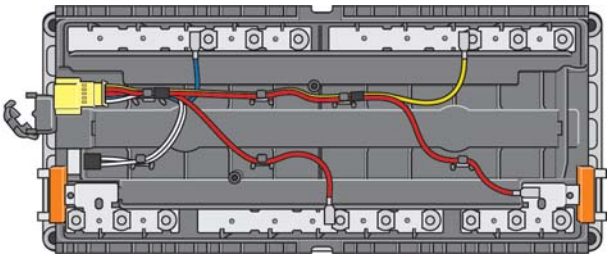
Master module with 12 battery cells



Slave modules

The slave modules register the cell voltage and temperature, and relay the data to the master module.

Slave module with 12 battery cells



Charging unit 1 for high-voltage battery AX4

Charging unit 1 for high-voltage battery AX4 is responsible for converting the alternating current sourced from the mains grid into direct current for charging the high-voltage battery 1 AX2. The control unit for high-voltage battery charging unit J1050 has been integrated for control purposes. A power distributor for the air-conditioning system has also been integrated.
Charging unit 1 for the high-voltage battery AX4 is housed in the motor compartment.

Fitting location

Charging unit 1 for high-voltage battery AX4 is housed in the motor compartment on the right.

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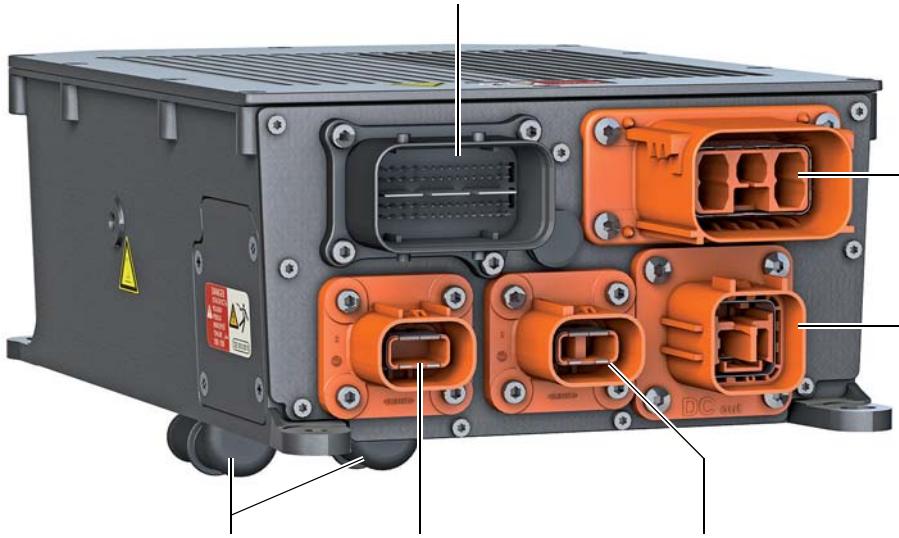

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Technical data

Input alternating current voltage, alternating current	100 – 400 V, 16 A/32A
Output direct current voltage, direct current	220 - 450V, 12A
Efficacy	93%
Weight	7.1kg

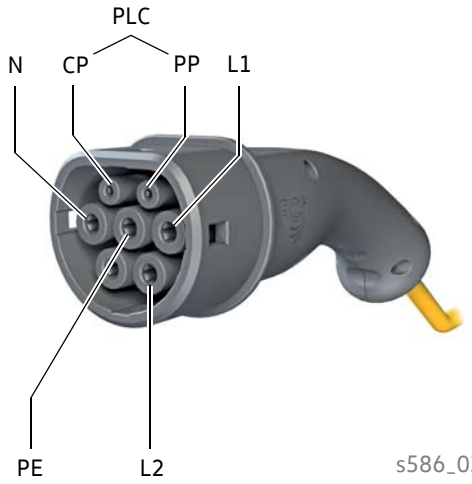
The charging connector

The charging socket 1 for high-voltage battery UX4 is the point connecting the vehicle with the external source of power.

The charge plug includes the following contacts:

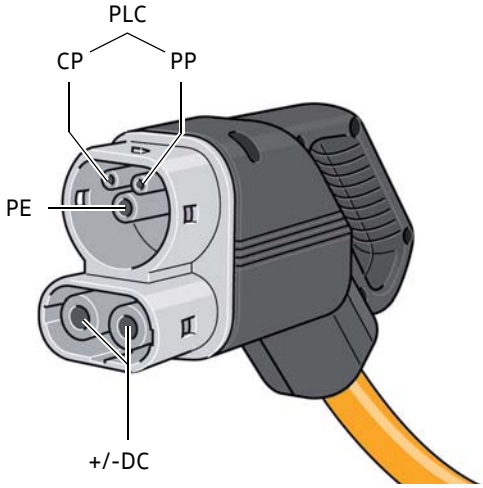
- PP - Proximity
  (max. rated current/wire cross-section)
- CP - Control Pilot
  (enable/cancel charging by the vehicle)
- PLC – Power Line Communication
  (communication with the charging station/charging cable)
- PE - Protected Earth
- L1 - Phase 1
- L2 - Phase 2
- N - Neutral
- +/-DC - DC current connection

AC charge plug option



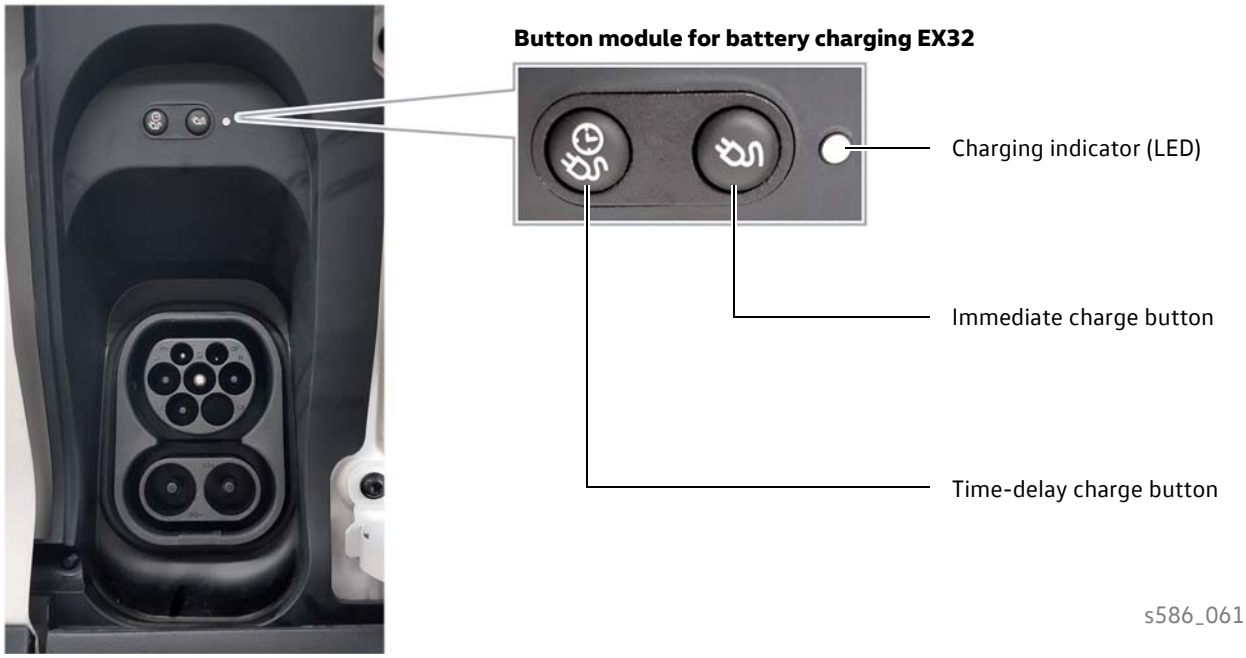
s586_031

DC charge plug option



s586_032

High-voltage battery charging socket 1 UX4

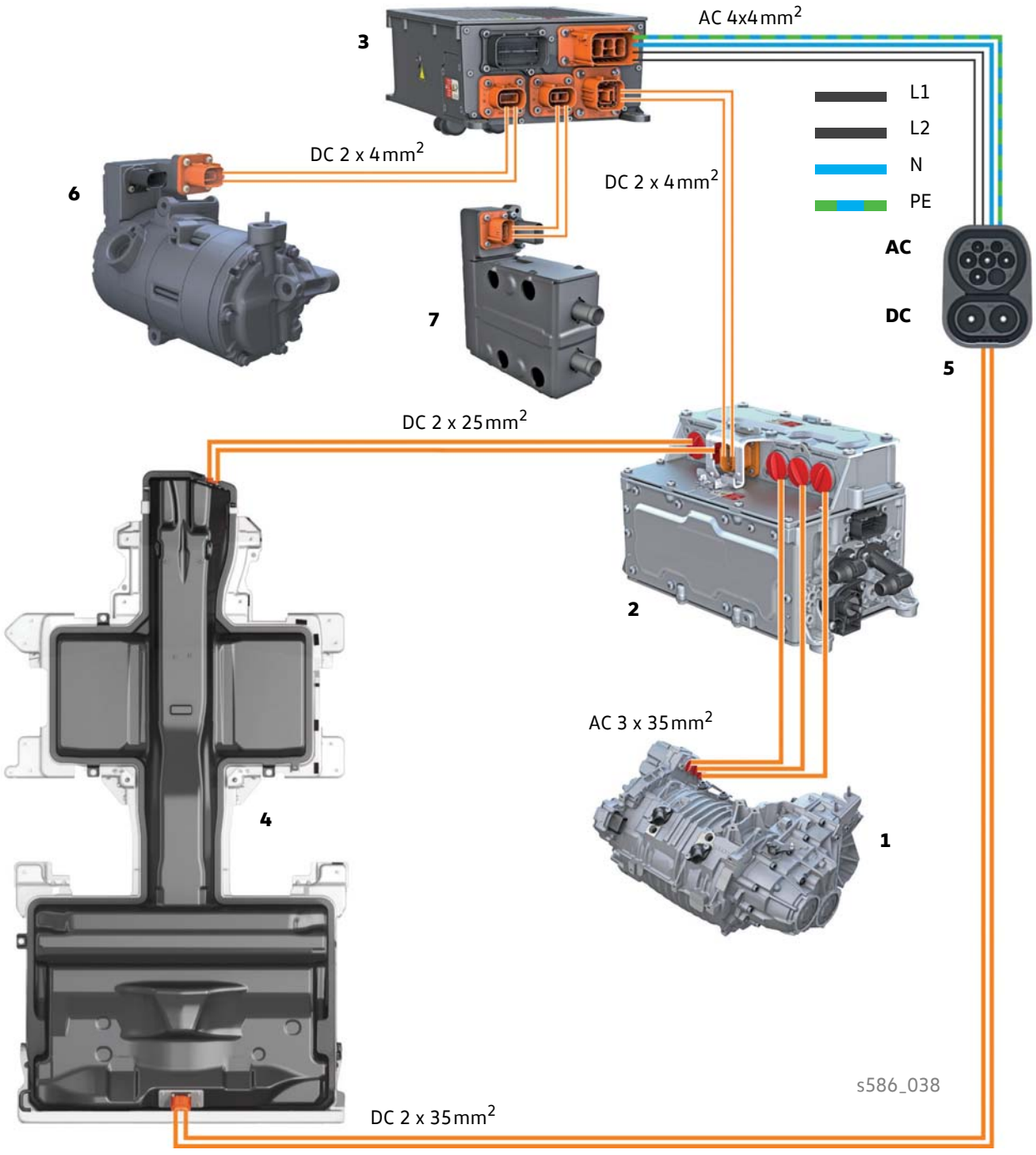


s586_061

High-voltage wire routing

The following diagram provides an overview of how the high-voltage wires are routed to the high-voltage components.

1 – Three-phase current drive VX54
2 – Power and control electronics for electric drive JX1
3 – Charging unit 1 for high-voltage battery AX4
4 – High-voltage battery 1 AX2
5 – High-voltage battery charging socket 1 UX4
6 – Electrical air conditioner compressor V470
7 – High-voltage heater (PTC) Z115

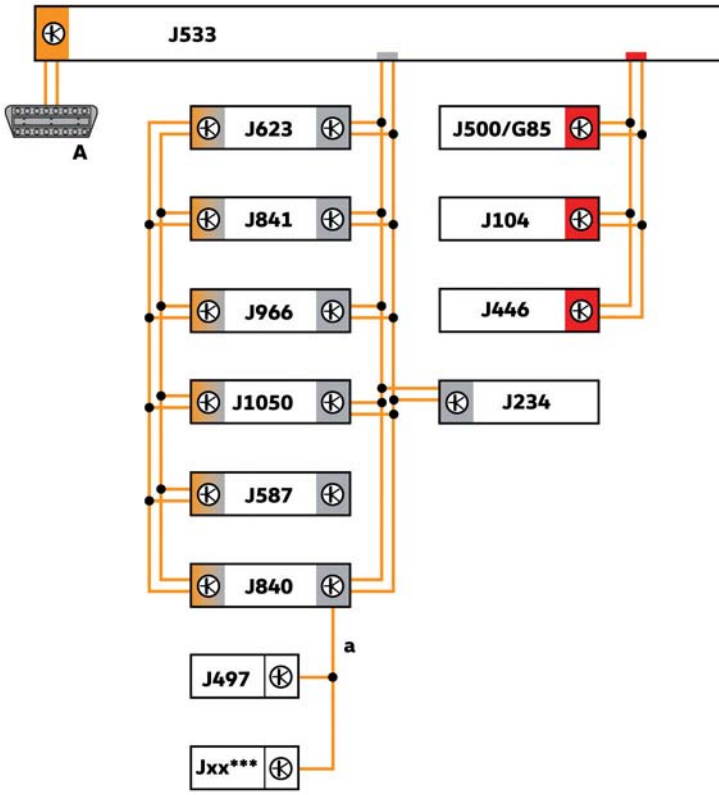


Networking concept

The networking concept is based on that of the MQB and has been expanded and adapted for the e-Crafter. All CAN bus systems in the e-Crafter have a transfer speed of 500 kbit/s. The LIN buses have a speed of 19.2 kbit/s.

The data bus diagnostic interface J533 contains the control system for several LIN buses and forms the link between the individual CAN buses as usual. Further LIN buses are connected to various control units.

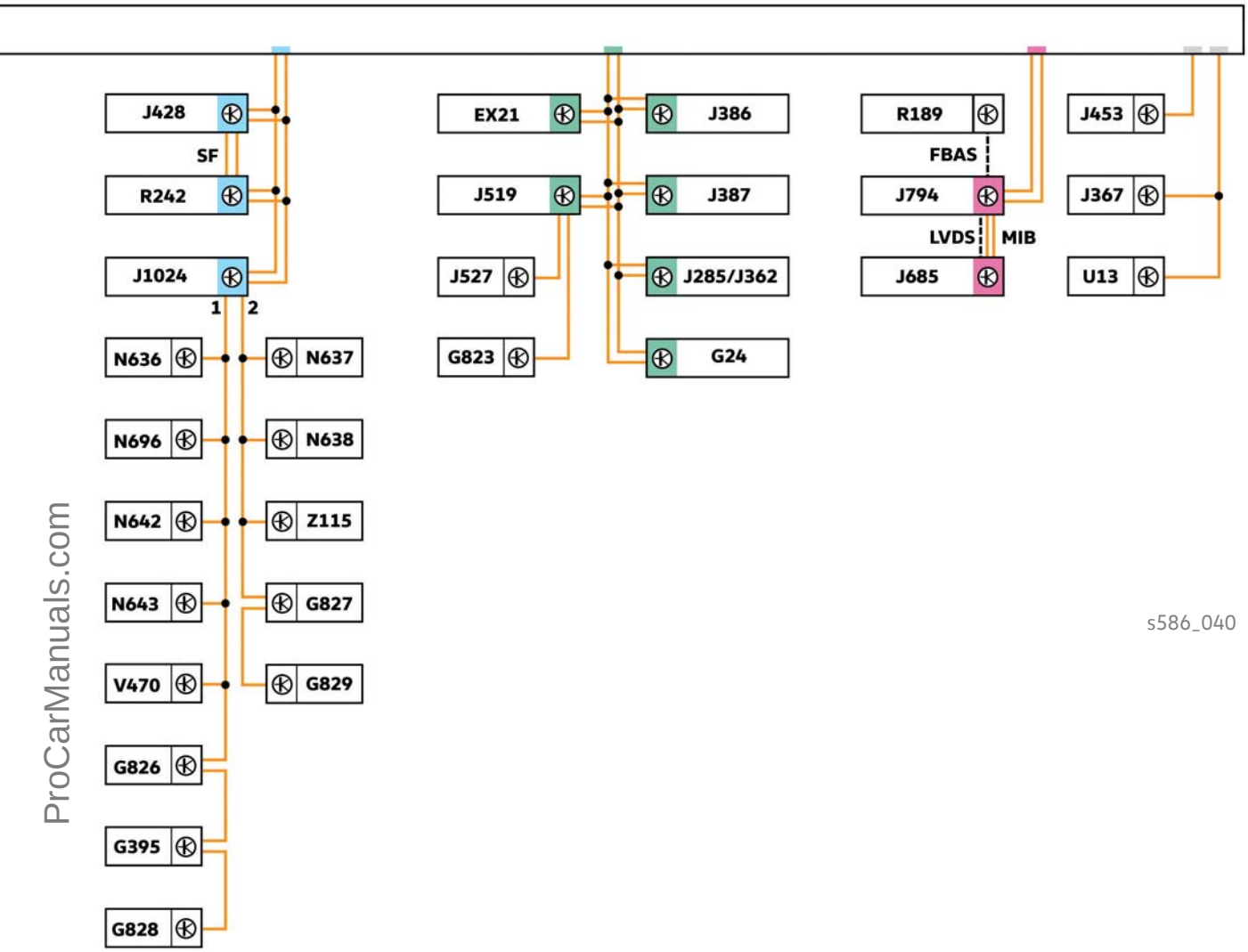
Due to the increased number of control units used for the drive, the hybrid CAN bus is used in addition to the powertrain CAN bus. This is a sub-bus (it is not connected to the data bus diagnostic interface J533) and is used for communication between the individual high-voltage components.



Key

	Powertrain CAN bus
	Hybrid CAN bus
	Running gear CAN bus
	CAN bus extended
	Convenience CAN bus
	Infotainment CAN bus
	LIN bus
	CAN bus line
	LIN bus line
A	Diagnostic CAN bus
CVBS	Colour Video Blanking Synchronisation signal
LVDS	Low voltage differential signalling
MIB	Modular infotainment matrix CAN bus
SF	Sensor fusion CAN bus
a	Private CAN bus
1	LIN bus 1
2	LIN bus 2

EX21	Heater and air conditioning controls
G24	Tachograph
G85	Steering angle sender
G395	Refrigerant pressure and temperature sender 1
G823	Air humidity, rain and light sensor
G826	Refrigerant pressure and temperature sender 2
G827	Refrigerant pressure and temperature sender 3
G828	Refrigerant pressure and temperature sender 4
G829	Refrigerant pressure and temperature sender 5
J104	ABS control unit
J234	Airbag control unit
J285	Control unit in dash panel insert
J362	Immobiliser control unit
J367	Battery monitor control unit
J386	Driver door control unit
J387	Front passenger door control unit
J428	Adaptive cruise control unit
J446	Parking aid control unit



J453 Multifunction steering wheel control unit
J497 Module monitor control unit for batteries
J500 Power steering control unit
J519 Onboard supply control unit
J527 Steering column electronics control unit
J533 Data bus diagnostic interface
J587 Selector lever sensors control unit
J623 Engine control unit
J685 Display unit for front information display and operating unit control unit
J794 Control unit 1 for information electronics
J840 Battery regulation control unit
J841 Electric drive control unit
J966 Charge voltage control unit for high-voltage battery
J1024 Thermal management control unit
J1050 Control unit for high-voltage battery charging unit
Jxx*** Battery modules 0-26: J991 – J1002; J1068; J1077 – J1085
N636 Refrigerant expansion valve 1
N637 Refrigerant expansion valve 2
N638 Refrigerant expansion valve 3
N642 Refrigerant shut-off valve 4
N643 Refrigerant shut-off valve 5
N696 Refrigerant shut-off valve 1
R189 Reversing camera
R242 Front camera for driver assist systems
U13 DC/AC converter with socket, 12 V - 230 V
V470 Electrical air conditioner compressor
Z115 The high-voltage heater (PTC)

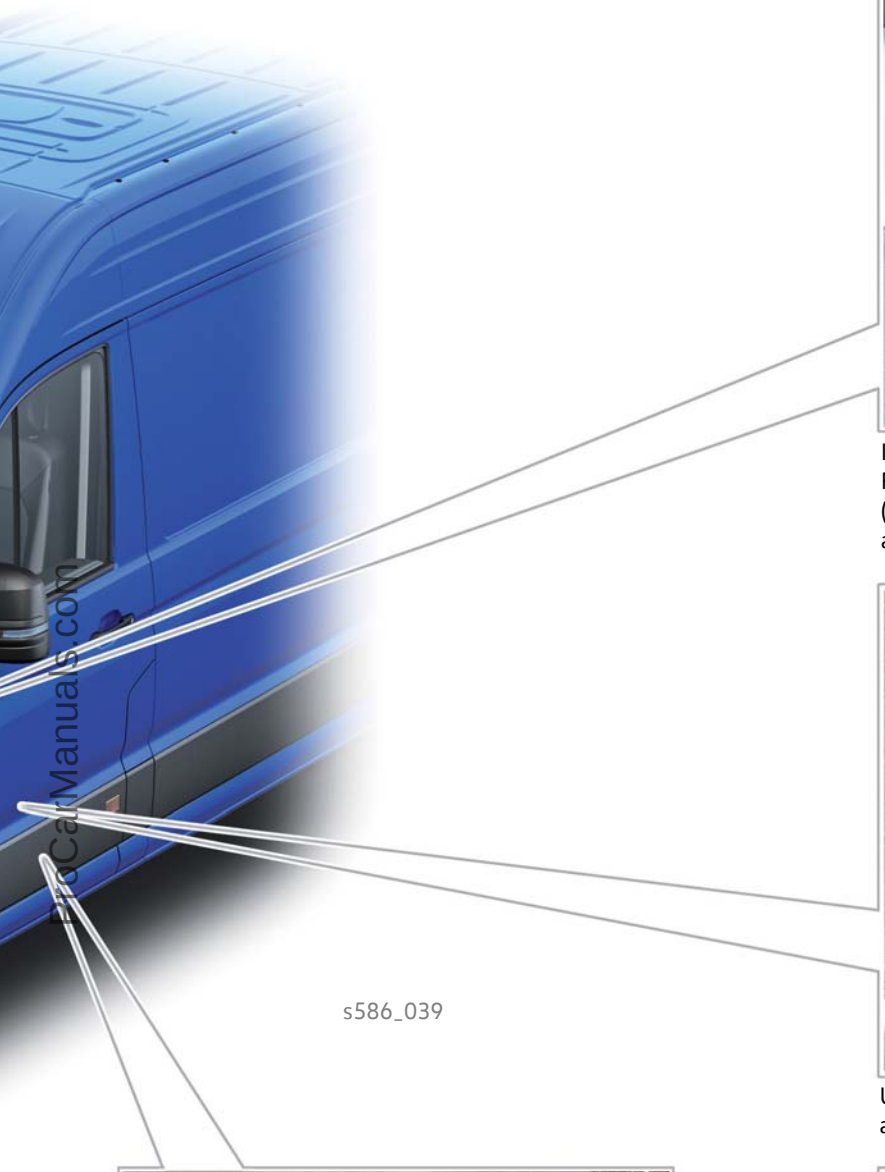
Fitting locations in the 12-volt vehicle electrical system

Despite electrification of the drive and the integration of the high-voltage system this involves, virtually all comfort components in the e-Crafter, except for the voltage supply, are supplied with power by the 12-volt vehicle electrical system.

Vacuum pump V22 for brake booster in the motor compartment on the right

Maintenance connector TW with instruction flag

Fuse carrier SH on left in engine compartment



In the dash panel
Relay carrier and fuse holder C
(SC) with onboard supply control unit J519
and instruction flag

Under driver seat, relay carrier
and fuse holder B (SB)

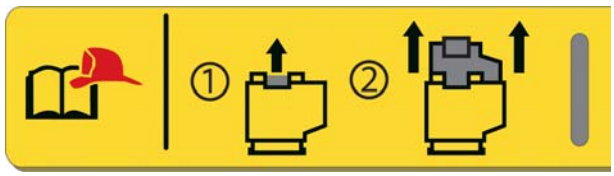
Battery under driver's footwell

Main fuses (SA) of the battery

Maintenance plug TW

The maintenance connector TW is located in the motor compartment and is marked with a warning sign. It is on the one hand an electrical connection in the 12 volt control circuit of the power contactors of the high-voltage battery, and on the other hand a component of the safety line. If the maintenance connector TW is opened, the safety line is opened and the 12 volt control circuit of the contactors is interrupted. The maintenance connector serves to disconnect the voltage of the high-voltage system. Please use the corresponding program in the vehicle diagnostic systems for opening and disconnecting the high-voltage system proficiently. After opening, the maintenance connector TW is secured against being switched on again with the padlock T40262/1.


s586_055

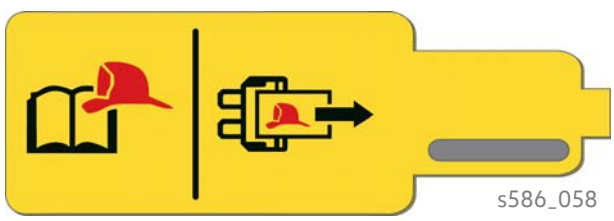


s586_056

Fuse carrier in the passenger compartment

The fuse for the voltage supply of the control current to the contactors is marked with a warning sign.


s586_057


s586_058

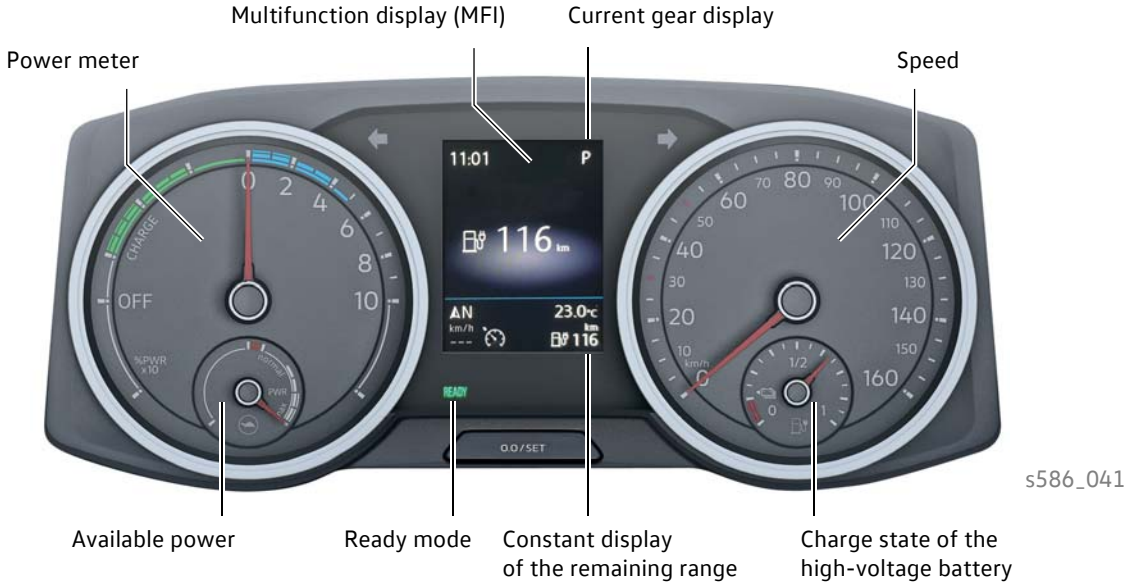
Dash panel insert

The dash panel insert features the following e-specific displays:

- Power meter
- Available power
- Charge level of the high-voltage battery

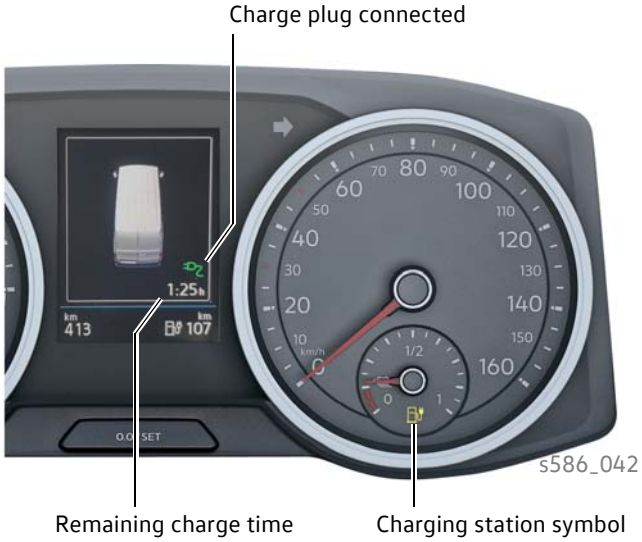
The modified multifunction display (MFI) can display the following additional information:

- Constant display of the remaining range
- Ready to drive with the display “READY”
- Current power consumption
- Average power consumption
- Charging mode display



s586_041

Charging mode display



s586_042

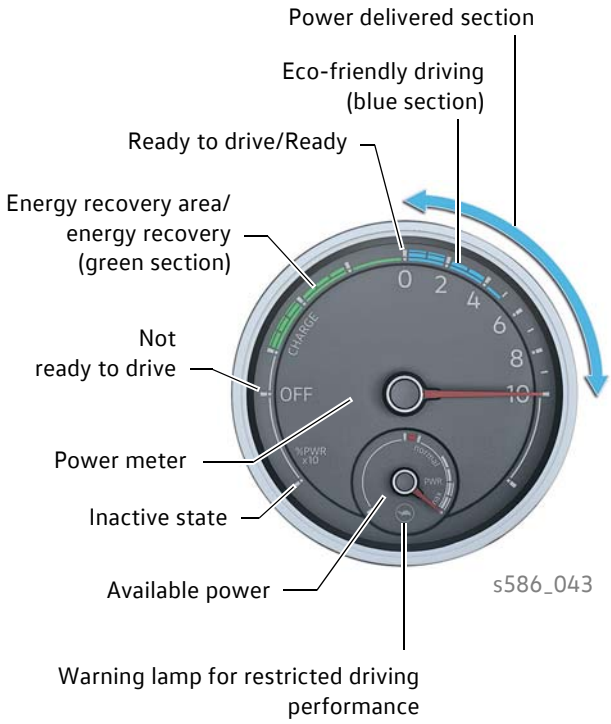
When charging is active, the indicator provides a reading of the current charge level of the high-voltage battery, and the charging station symbol flashes. The driver door must be opened for this to occur.

Left-hand instrument dial

The left-hand instrument dial is comprised of the
- Power meter
- Power availability, and
- Warning lamp for limited driving performance.

The power meter (which displays the power output as a percentage) shows the power demands. It is divided into the categories power delivered, eco-friendly driving, ready to drive, energy recovery, not ready to drive and standby.

The "power availability" display shows the power currently available.
If the indicator in the power availability instrument is pointing to the red area, then there are considerable restrictions to the drive power and comfort functions are switched off. When this occurs, the warning lamp for restricted vehicle performance (turtle) lights up in the dash panel insert.



s586_043

Inactive state

When in standby mode, the indicators in both displays point to the starting point of the scale, which is at the lower left.

s586_044

Ready mode

s586_045

The ready-to-drive display is indicated both by "READY" and by the indicator pointing to the 0 position. In addition, an acoustic signal will sound once. These displays appear when terminals S and 15 are active, and when terminal 50 is deactivated.

Availability of peak power

s586_046

If the indicator in the power availability instrument is in the "max" section, then the maximum power is available. The indicator in the power meter can deflect up to 10 (= 100%) in the event of full load acceleration, with the full power being available at all times.
The driving style determines how quickly the power availability decreases in the white section.

Available power

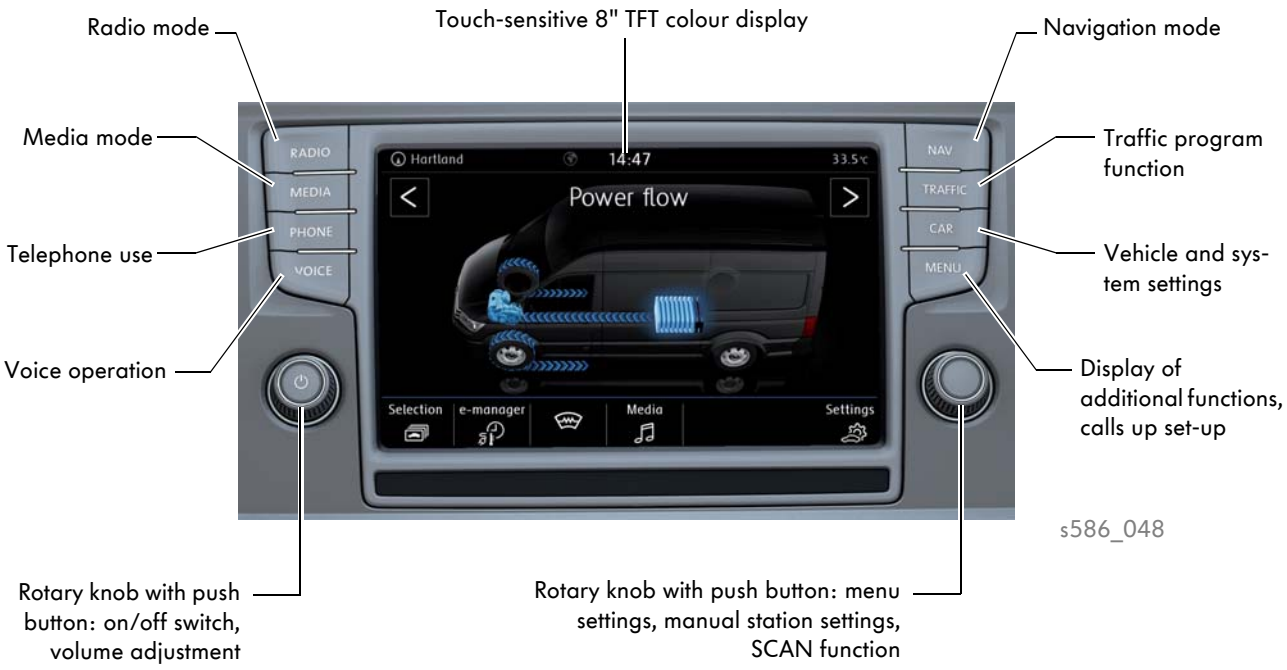
Display of the power availability

s586_047

If the indicator in the power availability instrument is in the "normal" section, then less than peak power is available. The position of the indicator shows how much power is available at most. The power meter display (= power demanded) cannot exceed the percentage currently shown by the power availability instrument.

Discover Media

Discover Media, a feature of the modular infotainment matrix (MIB), is installed as series standard.

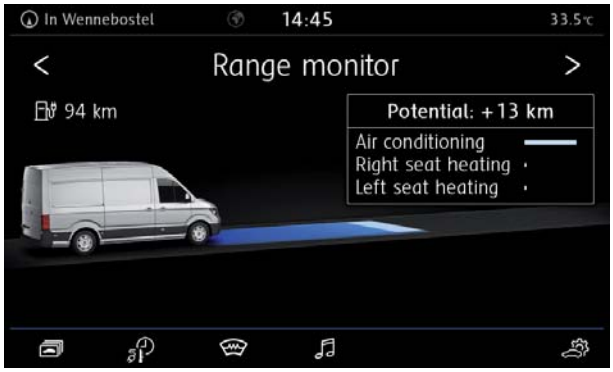


Discover Media has been modified for use in an electric vehicle, and now features the following additional functionalities:

- e-specific displays, such as:
  - Range monitor
  - Energy flow display
  - Energy recovery statistics
- e-Manager

You can find further information on the modular infotainment matrix and the Discover Media in Self-Study Programme no. 566 "The Crafter 2017".

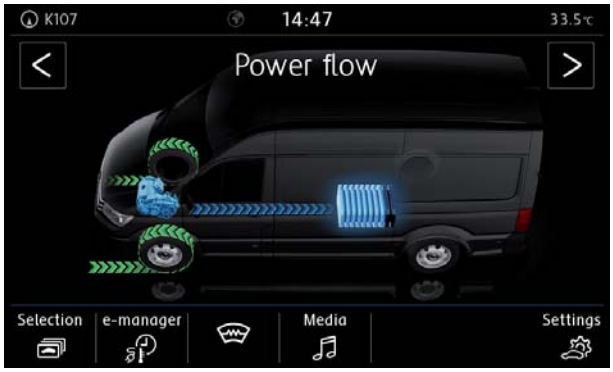
The e-specific displays



s586_049

Range monitor

The operating range display shows the current vehicle range in a diagram. Furthermore, the driver is informed about the potential (additional range) which can be utilised when convenience functions are switched off.
This function is activated by the data bus diagnostic interface J533.



s586_050

Energy flow display

The energy flow display uses an animated diagram to represent the flow of energy between the electric motor and the high-voltage battery when accelerating or braking.

The current being discharged is shown using a blue arrow, and green arrows pointing in the opposite direction show that the high-voltage battery is being charged when braking or using energy recovery. The high-voltage battery shown indicates the charge level.

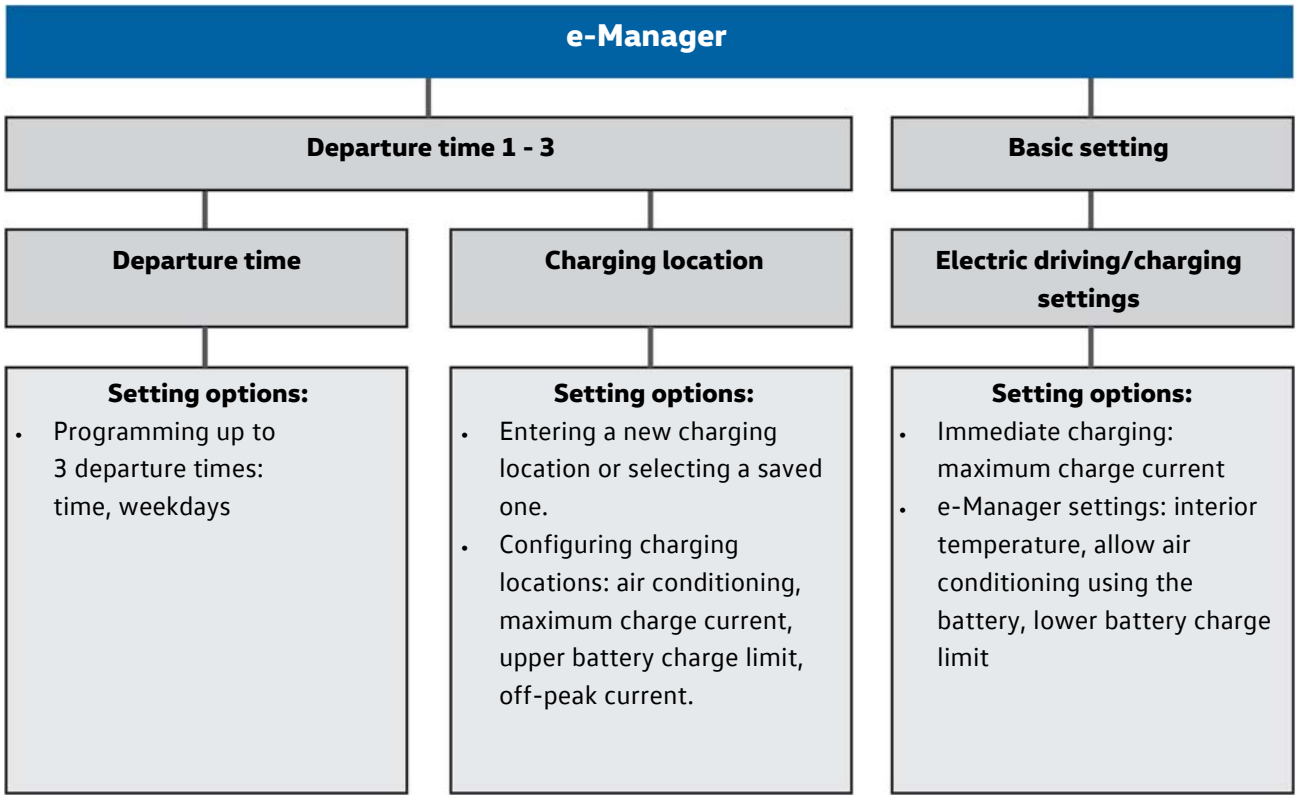
s586_051

Energy recovery statistics

The energy recovery statistics show the amount of energy recovered since the journey began. To show this, the energy recovered each minute is displayed using a column graph.

e-Manager

The user can use the e-Manager function to program vehicle charging and air conditioning in relation to departure times and charging locations. The following diagram provides an overview of the setting options:



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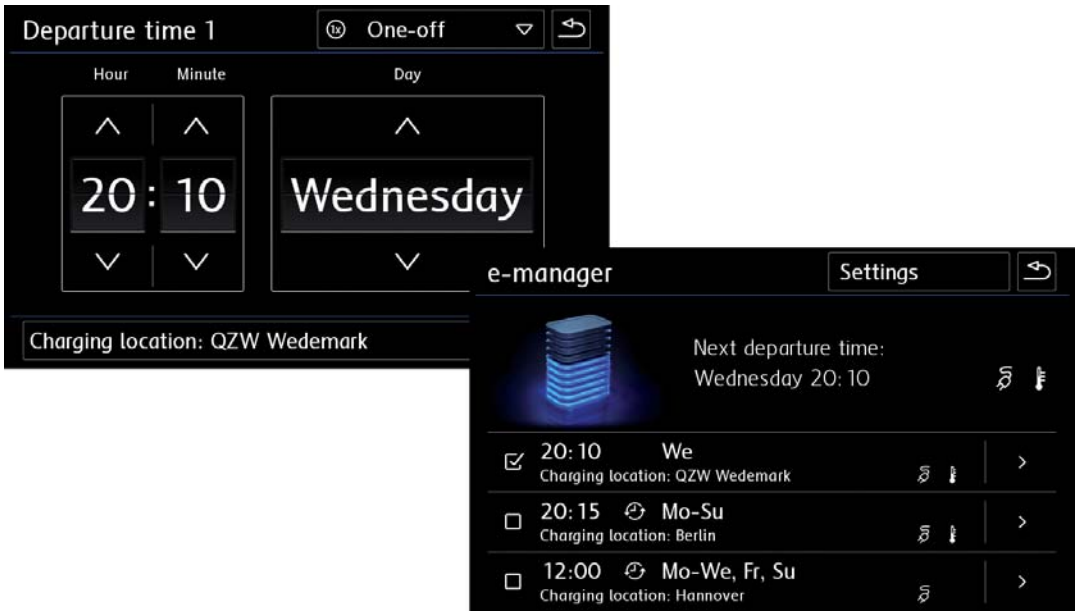

s586_062

The maintenance intervals

Inspections are time-dependent and mileage-dependent. The first inspection takes place after 30,000 km or 24 months, followed by every 12 months or 30,000 km after that, depending on which comes first. The production control number VI9 refers specifically to an electric vehicle.
The brake fluid inspection intervals remain the same: for the first time after 3 years, followed by every 2 years.

Inspection and additional work	30,000 km or 24 months	60,000 km or 36 months	90,000 km or 48 months	120,000 km or 60 months

Please observe the most recent information in the service literature.

Towing

Electric vehicles feature a fixed connection between the drive wheels and the three-phase current drive (electric drive motor). This connection cannot be undone without mechanical work. If the vehicle needs to be towed, there are 2 options:

1. **Towing the vehicle with the high-voltage system intact**
   Switch the ignition (terminal 15) to "On" and move the selector lever to the N position to allow electric freewheel mode. The vehicle can now be towed for a maximum distance of 50 km at 50 km/h using a rope or tow-bar.
   Using a bar for towing is recommended for safety reasons.

2. **Towing with a damaged high-voltage system**
   If it is not possible to activate the high-voltage system, the vehicle must be transported with the front axle raised. Freewheel mode cannot be activated, which creates a risk of overheating.
   The corresponding text message in the dash panel insert reads: “Towing damages electrical system”. Vehicle wallet.

The emergency start function

If the high-voltage battery has been discharged completely, there is still an option allowing the e-Crafter to be restarted twice for a short distance:

1. For approx. 100 metres, after switching the ignition off and on
2. For approx. 50 metres, after switching the ignition off and on once again
3. No more emergency starts are possible.

Also observe the information in the vehicle wallet!

The charging plug emergency release

The charging plug is locked and unlocked by the actuator for high-voltage charging plug lock 1 F498. If unlocking is not possible, emergency unlocking can be initiated by pressing and holding the immediate charge button in the button module for battery charging EX32 and simultaneously pressing the opening button on the remote control. If emergency unlocking is still not possible, the charging plug can be emergency unlocked via a Bowden cable. By pulling the emergency unlocking loop of the Bowden cable, the mechanism of the actuator for high-voltage charging plug lock 1 F498 is actuated directly and the locking pin in the charging socket is pulled back. Now the charging plug can be removed. The emergency release loop of the Bowden cable can be found at the bottom in the passenger compartment, behind the driver's seat.

Emergency release loop behind driver's seat

s586_060

Test your knowledge

Which answers are correct?

One or several of the given answers may be correct.

1. What particular measure has to be considered when renewing a shut-off or expansion valve?

❒ a) After installation, the new valve must be adapted using the diagnostic tester.

❒ b) There are no specifics to be considered.

❒ c) After installation, a waiting period of 30 minutes must be maintained before the heat pump system can be put back into operation. During this period, the valve is automatically adapted to the thermal management control unit.

2. What are the functions of the three-phase drive VX54 in the e-Crafter?

❒ a) Drive motor and alternator for high-voltage battery

❒ b) Starter for the electric drive motor

❒ c) Monitoring of activation by the power and control electronics for electric drive

3. On an e-Crafter, what is interrupted when the maintenance connector for high-voltage system TW is opened?

❒ a) Positive supply to the battery regulation control unit J840 and the pilot line

❒ b) Positive cable to the power and control electronics

❒ c) Voltage supply to the charging unit 1 for high-voltage battery AX4

4. The coolant circuit in the e-Crafter ...

❒ a) is also used to heat the vehicle interior.

❒ b) is only required to cool the high-voltage components.

❒ c) is required to ensure cooling of the high-voltage components as well as for re-evaporation of the refrigerant in the heat exchanger.

❒ d) has no dedicated water pump. Circulation is assured by the air conditioner compressor.

Answers:
1. a); 2. a); 3. a); 4. c)

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