



Workshop Manual e-up! 2017 ➤

Electric motor (210, LS1)

Engine ID

EAB
A

Edition 03.2018



List of Workshop Manual Repair Groups

Repair Group

00 - Technical data

93 - Electric drive systems



Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.



Contents

00 - Technical data	1
1 Safety information	1
1.1 Safety precautions when working on a high-voltage system	1
1.2 Safety precautions when working in the vicinity of high-voltage components	2
1.3 Safety precautions when using testers and measuring instruments during a road test	2
1.4 Safety precautions when working on the cooling system	2
2 Repair instructions	3
2.1 Contact corrosion	3
2.2 Routing and attachment of lines	3
2.3 Rules for cleanliness when working on high-voltage system	3
3 Classification of dangers of the high-voltage system	4
93 - Electric drive systems	11
1 High-voltage system	11
1.1 Overview of fitting locations - high-voltage system	11
1.2 Testing high-voltage components and high-voltage cables	12
2 Warning stickers	13
2.1 Overview of fitting locations - warning stickers	13
3 High-voltage battery unit	17
3.1 Assembly overview - high-voltage battery	17
3.2 Visual inspection of high-voltage battery 1 AX2	24
3.3 Performing diagnosis on high-voltage battery 1 AX2	24
3.4 Removing and installing high-voltage battery 1 AX2	25
3.5 Raising high-voltage battery 1 AX2	30
3.6 Leakage test High-voltage battery 1 AX2	32
3.7 Checking high-voltage battery 1 AX2 for leaks	33
3.8 Opening high-voltage battery 1 AX2	34
3.9 Voltage and insulation measurement	38
3.10 Opening the electric circuit	40
3.11 Sealing high-voltage battery 1 AX2	42
3.12 Removing and installing module monitor control unit for batteries J497	46
3.13 Removing and installing switching unit for high-voltage battery SX6	47
3.14 Removing and installing battery regulation control unit J840	50
3.15 Removing and installing charge voltage control unit for high-voltage battery J966	52
3.16 Removing and installing cable guide	53
3.17 Visual check of wiring harness	57
3.18 Removing and installing battery test lead	57
3.19 Discharging and charging capacitors	58
3.20 Removing and installing capacitors	60
3.21 Charging and discharging the battery modules	60
3.22 Removing and installing battery modules	62
3.23 Removing and installing crash bar	104
4 Power and control electronics for electric drive	106
4.1 Assembly overview - power and control electronics for electric drive	106
4.2 Removing and installing power and control electronics for electric drive JX1	107
4.3 Removing and installing high-voltage system fuse 3 S353	111
5 Three-phase current drive	115
5.1 General description	115
5.2 Assembly overview - three-phase current drive	115
5.3 Removing and installing cover for motor compartment	117
5.4 Removing and installing three-phase current drive VX54	118
5.5 Renewing three-phase current drive VX54	126



5.6	Calibrating three-phase current drive VX54	126
5.7	Removing and installing gearbox	126
5.8	Removing and installing drive motor temperature sender G712	127
5.9	Removing and installing drive motor rotor position sender 1 G713	129
6	Engine (motor) control unit	132
6.1	Assembly overview - engine control unit	132
6.2	Removing and installing engine (motor) control unit J623	133
6.3	Removing and installing bracket for engine (motor) control unit J623	135
7	High-voltage cables	137
7.1	General description	137
7.2	Overview of fitting locations - high-voltage cables	137
7.3	Removing and installing high-voltage wiring harness for drive motor PX2	138
8	Cooling system for high-voltage system	142
8.1	Assembly overview - high-voltage system cooling components	142
8.2	Coolant hose connection diagram	143
8.3	Checking cooling system for leaks	144
8.4	Draining and adding coolant	146
9	Coolant pump, regulation of cooling system	150
9.1	Assembly overview - coolant regulator unit	150
9.2	Removing and installing power and control electronics for electric drive V508	151
9.3	Removing and installing coolant pump for high temperature circuit V467	152
9.4	Removing and installing temperature sender after electric drive motor G788	153
10	Radiator and radiator fan	155
10.1	Assembly overview - radiator and radiator fan	155
10.2	Removing and installing radiator	156
10.3	Removing and installing cowl with radiator fan	159
10.4	Removing and installing radiator fan V7	160
11	High-voltage heater (PTC)	162
12	Electrical air conditioner compressor	163
13	De-energising high-voltage system	164
14	Recommissioning high-voltage system	166
15	Potential equalisation lines	167
15.1	Overview of fitting locations - potential equalisation lines	167
15.2	Potential equalisation lines - high-voltage battery 1 AX2	168
15.3	Potential equalisation lines - power and control electronics for electric drive JX1	168
15.4	Potential equalisation lines - charging unit 1 for high-voltage battery AX4	169
15.5	Potential equalisation lines - three-phase current drive VX54	169
15.6	Potential equalisation lines - high-voltage heater (PTC) Z115	169
15.7	Potential equalisation lines - electrical air conditioner compressor V470	170
16	Charging socket	171
16.1	Assembly overview - charging socket	171
16.2	Removing and installing high-voltage battery charging socket 1 UX4	172
16.3	Removing and installing actuator for high-voltage charging socket lock 1 F498	178
16.4	Manual release mechanism for charging socket	180
17	Charging unit for high-voltage battery	182
17.1	Assembly overview - charging unit for high-voltage battery	182
17.2	Removing and installing charging unit 1 for high-voltage battery AX4	183
17.3	Removing and installing bracket for charging unit 1 for high-voltage battery AX4	186
18	Driving sound and engine sound	188
18.1	Overview of fitting locations - driving sound and engine sound	188
18.2	Removing and installing engine sound generator control unit J943	189
18.3	Removing and installing actuator 1 for engine sound generator R257	190
19	Accelerator pedal	192

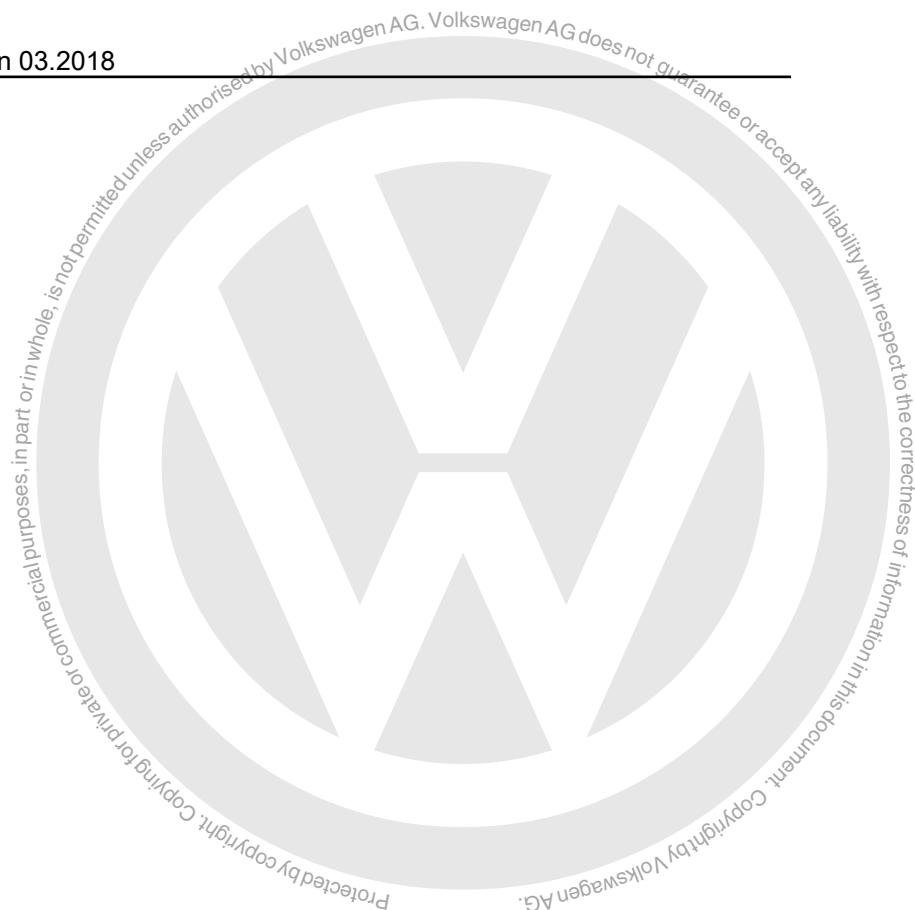


19.1	Assembly overview - accelerator module	192
19.2	Removing and installing accelerator pedal module	193



e-up! 2017 ➤

Electric motor (210, LS1) - Edition 03.2018





00 – Technical data

1 Safety information

(VRL011554; Edition 03.2018)

⇒ [“1.1 Safety precautions when working on a high-voltage system”, page 1](#)

⇒ [“1.2 Safety precautions when working in the vicinity of high-voltage components”, page 2](#)

⇒ [“1.3 Safety precautions when using testers and measuring instruments during a road test”, page 2](#)

⇒ [“1.4 Safety precautions when working on the cooling system”, page 2](#)

1.1 Safety precautions when working on a high-voltage system

Danger to life due to high voltage

The high-voltage system is under high voltage. Severe or fatal injury due to electric shock.

- Persons with life-preserving or other electronic medical devices in or on their body must not perform any work on the high-voltage system. Such medical devices include internal analgesic pumps, implanted defibrillators, pacemakers, insulin pumps and hearing aids.
- The high-voltage system must be de-energised by a suitably qualified technician.

Risk of injury due to unexpected motor start

On electric and hybrid vehicles, it can easily be missed that the vehicle is in „ready“ mode. There is a risk of parts of the body becoming trapped or drawn in.

- Switch off ignition.
- Always store the ignition key outside the vehicle.

Risk of damage to high-voltage cables

Improper handling can damage the insulation of high-voltage cables or connectors.

- Never support yourself on high-voltage cables or connectors.
- Never support tools on high-voltage cables or connectors.
- Never kink or severely bend high-voltage cables.
- Always connect high-voltage connectors according to coding.



1.2 Safety precautions when working in the vicinity of high-voltage components

Danger to life due to high voltage

The high-voltage system is under high voltage. If high-voltage components and high-voltage cables are damaged, there is a risk of severe or fatal injury due to electric shock.

- Carry out a visual inspection on high-voltage components and cables.
- Never use cutting or forming tools, or any other sharp-edged tools.
- Never use heat sources such as welding, brazing, soldering, hot air or thermal bonding equipment.

1.3 Safety precautions when using testers and measuring instruments during a road test

Risk of injury caused by unsecured testing and measuring instruments

When the front passenger airbag is triggered in an accident, insufficiently secured testing and measuring instruments become dangerous projectiles.

- Secure testing and measuring instruments on the rear seat.

or

- Have a second person operate the test and measuring equipment on the rear seat.

1.4 Safety precautions when working on the cooling system

Danger of scalding by hot coolant

On a warm engine, the cooling system is under high pressure. Danger of scalding by steam and hot coolant.

- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.



2 Repair instructions

⇒ [“2.1 Contact corrosion”, page 3](#)

⇒ [“2.2 Routing and attachment of lines”, page 3](#)

⇒ [“2.3 Rules for cleanliness when working on high-voltage system”, page 3](#)

2.1 Contact corrosion

Contact corrosion can occur if non-approved fasteners are used on the vehicle (bolts, nuts, washers etc.).

For this reason, only connecting elements with a special surface coating have been fitted.

Furthermore, rubber and plastic components as well as adhesives are made of non-conductive materials.

If there is any doubt about the suitability of parts, a general rule is to use new parts ⇒ [Electronic parts catalogue](#).

Please take note of the following:

- ◆ Only use genuine replacement parts which are tested and compatible with aluminium.
- ◆ Only use Volkswagen Genuine Accessories.
- ◆ Damage resulting from contact corrosion is not covered by the warranty.

2.2 Routing and attachment of lines

- ◆ Mark lines prior to removal to prevent them from being interchanged and to ensure that they are fitted in their original positions. This applies for fuel, hydraulic and vacuum lines as well as lines for activated charcoal filter system and electrical wiring. Make sketches or take photographs if necessary.
- ◆ To avoid damaging pipes and wires, ensure adequate clearance from all moving or hot components in the engine compartment on account of the confined space.

2.3 Rules for cleanliness when working on high-voltage system

When working on the high-voltage system, pay careful attention to the following rules for cleanliness:

- ◆ Thoroughly clean all connections/inspection holes and corresponding surrounding areas before disconnecting/opening them.
- ◆ Place removed parts on a clean surface and cover them over. Use lint-free cloths only.
- ◆ Carefully cover opened components or seal them if repairs cannot be carried out immediately.
- ◆ Fit only clean components.
- ◆ Do not remove new parts from packaging until immediately before installing.
- ◆ Do not use parts that have been kept unpackaged (for example in toolboxes).
- ◆ Transportation and protective packaging and sealing caps must be removed only immediately before fitting.
- ◆ If system is open, do not work with compressed air. Do not move the vehicle.



3 Classification of dangers of the high-voltage system

DANGER

The high-voltage network of the vehicle and the high voltage battery are dangerous and may cause burns, other injuries and fatal electric shocks.

- Only suitably qualified professionals may carry out work on the high-voltage system and other systems indirectly influenced by it.

In case of queries or uncertainties in relation to the terms “High-voltage Technician”, “High Voltage Experts”, or in relation to the high-voltage system, the importer responsible must be consulted before any work is undertaken.

- Repair tasks are always to be carried out in compliance with the applicable statutory regulations, other legal requirements, the recognised technical rules, any applicable accident prevention regulations (in Germany including, but not limited to BGI/GUV-I 8686 - Qualification for Working on Vehicles with High-voltage Systems), as well as this repair manual.

Before work on the high-voltage system is started, a high-voltage technician must de-energise the high-voltage system

⇒ [page 164](#).

The types of work for which the high-voltage system has to be de-energised are indicated in the list entitled “Work on the high-voltage system” ⇒ [page 4](#).

Work during which the high-voltage system has to be de-energised:

- ◆ Only the HVT is authorised to de-energise the high-voltage system so that it is certified.
- ◆ All work on an e-up! must be carried out only by those who are at least qualified as electrically instructed persons (EuP).
- ◆ Regardless of the work to be performed, visually inspect high-voltage components in the work area.
- ◆ The high-voltage cables must not be extensively bent or kinked.
- ◆ In the event of conspicuous findings or uncertainties, the high-voltage technician (HVT) or the high-voltage expert (HVE) must be consulted.
- ◆ Work involving metal-removing, deforming and sharp-edged tools or heat sources such as welding, soldering, hot air, thermal bonding and infrared dryers in the vicinity of high-voltage components and cables is prohibited. In this case, the high-voltage system must be de-energised and the respective component removed or sufficiently protected.
- ◆ All listed work refers to the removal and installation or the renewal of the individual components.
- ◆ For reasons of safety, the following activities must not be carried out during charging.
- ◆ Activities that prolong the charging process.
- ◆ Activities for which the vehicle must be de-energised and made safe in accordance with the ensuing hazard rating.
- ◆ Activities during which the vehicle is moved and cables and connectors could be placed under strain (pulled).



- ◆ Activities during which the connected charging cable could present a danger of tripping and injury.
- ◆ Activities during which the charging cable could block work paths and emergency exit routes.
- ◆ Activities on the 12V battery.
- ◆ The high-voltage system does not have to be de-energised during regular maintenance work.

Explanation of qualifications

Working on high-voltage system

Qualification	Work area
EIP (person with electrical training)	The EIP is permitted to carry out general repairs and servicing on the vehicle as well as work on the de-energised high-voltage system assigned by the HVT.
HVT (high-voltage technician)	Due to his or her qualifications, the high-voltage technician has the same authorisation as an electrically instructed person. In addition, he or she is permitted to carry out certified testing that the high-voltage system has been de-energised. The HVT may perform the following work on the high-voltage system: <ol style="list-style-type: none"> 1. De-energise and certify. 2. Securing system to prevent reactivation. 3. Ascertain that the system is de-energised. 4. Authorising the EIP to perform work on high-voltage system. 5. Commissioning vehicle.
HVE (high-voltage expert)	The HVE is a trained HVT with additional qualification. He is able to disable the high-voltage system. In the event that the HVT is unable to do this with conventional tools and measurements. If the HVT's authorisation for work on the high-voltage system ends, the HVE must continue the work. It is exclusively the HVE's task to deactivate the high-voltage system if this cannot be carried out with the HVT's usual equipment or methods.
When working on the following components:	Minimum qualification ➔ page 5
De-energise high-voltage system	HVT

**Work on the motor unit**

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	yes (manual power disconnect)		No	
Three-phase current drive - VX54-	X			Person with electrical training
Electric drive motor - V141-	X			Person with electrical training
Drive motor temperature sender/rotor position sender -G712- / -G713-	X			Person with electrical training

Work on power and control electronics for electric drive

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	yes (manual power disconnect)		No	
Power and control electronics for electric drive - JX1- with ◆ Control unit for electric drive - J841- ◆ Intermediate circuit capacitor 1 - C25- ◆ Voltage converter - A19- ◆ DC/AC converter for drive motor - A37-	X			Person with electrical training
High-voltage system fuse 3 - S353-	X			Person with electrical training

Work on high-voltage system

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	Yes (diagnostic and manual power disconnection)		No	
Potential equalisation (earth) cables with connection to HV components	X			HVT
Measurement of insulation resistance	X			HVT
TW - Service plug for high-voltage system (service plug, service disconnect)			X	Person with electrical training
PX - High-voltage cables (orange) in vehicle	X			HVT



Work on heating and air conditioning system

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ➔ page 5
	yes (manual power disconnect)		No	
Electrical air conditioner compressor - V470-	X			Person with electrical training
High-voltage heater (PTC) - Z115-	X			Person with electrical training
Work on heating and air conditioning system in passenger compartment			X	Person with electrical training
Refrigerant lines in the vehicle periphery (work which is not directly on the AC compressor and can be carried out without opening the refrigerant circuit, e.g. detaching and securing refrigerant lines)			X	Person with electrical training
Air conditioning performance test (for checking the pressure in the refrigerant circuit by means of air conditioning service equipment)			X	Person with electrical training
Refrigerant lines directly on the AC compressor	X			Person with electrical training
Extracting, evacuating or replenishing refrigerant			X	Person with electrical training
Coolant circulation pump before power and control electronics for electric drive - V508-			X	Person with electrical training

Work on charging connection

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ➔ page 5
	yes (manual power disconnect)		No	
High-voltage battery charging socket 1 - UX4- with ♦ Temperature sender for charging socket 1 - G853- ♦ LED module for charging socket 1 - L263- ♦ Actuator for high-voltage charging socket lock 1 - F498-	X			Person with electrical training
Immediate charge button - E766-			X	Person with electrical training
Emergency release for charging connector	X			Person with electrical training
Charging high-voltage battery in workshop area			X	Person with electrical training

**Work on charging unit**

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	yes (manual power disconnect)		No	
Charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-	X			Person with electrical training

Work on high-voltage battery

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	yes (manual power disconnect)		No	
Removing and installing underbody covers			X	Person with electrical training
Removing and installing high-voltage battery 1 - AX2-	X			HVT
Disconnecting high-voltage network connection	X			HVT
Disconnecting low-voltage connection of high-voltage battery			X	Person with electrical training
Removing and installing high-voltage battery service cover			X	HVE
Battery regulation control unit - J840-			X	HVE
Module monitor control unit for batteries - J497- (battery removed)				HVE
Switching unit for high-voltage battery - SX6- (battery removed)				HVE
Open high-voltage battery 1 - AX2- (battery removed)				HVE
Bond high-voltage battery 1 - AX2- (battery removed)				HVE
Battery module 1 - J991- and other battery modules (battery removed)				HVE

Working on accident vehicles

When working on the following components:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	yes (manual power disconnect)		No	
Assessment of condition of high-voltage battery 1 - AX2-				HVT
Body work (with straightening jig)	X			Person with electrical training
Painting vehicle - observe instructions in paint manual.			X	Person with electrical training



Work in the vicinity of high-voltage components

When working on the following components or when doing the following work:	Must the HVT de-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	yes (manual power disconnect)		No	
Body work (assembly work as well as glass and dent repairs)			X	Person with electrical training
Gearbox, with electric drive motor	X			Person with electrical training
Steering rack	X			Person with electrical training
Front subframe	X			Person with electrical training
Front brakes			X	Person with electrical training
Rear brakes			X	Person with electrical training
Brake servo			X	Person with electrical training
Brake pressure accumulator for energy recovery			X	Person with electrical training
Rear axle running gear			X	Person with electrical training
Underbody cover			X	Person with electrical training
When welding, cover high-voltage components and visually inspect following work	X			Person with electrical training
Work involving metal-removing, deforming and sharp-edged tools or heat sources such as welding, soldering, hot air, thermal bonding and infrared drying in the vicinity of high-voltage components and cables	X			Person with electrical training
Work for which the engine is lifted, on right side (e.g. engine mounting)			X	Person with electrical training
Work for which the engine is lifted, on left side (e.g. gearbox mounting)	X			Person with electrical training
Control units and electric components of 12-V system (excluding airbag)			X	Person with electrical training
Battery - A-			X	Person with electrical training
Front left headlight - MX1-			X	Person with electrical training
Front right headlight - MX2-			X	Person with electrical training
Change bulb in headlight			X	Person with electrical training

**General work**

When working on the following components:	De-energise high-voltage system before work is started?			Minimum qualification ⇒ page 5
	yes (manual power disconnect)		No	
Draining and replenishing fluids (coolant and oils)			X	Person with electrical training
Coolant circuit and coolant expansion tank			X	Person with electrical training
Changing tyres			X	Person with electrical training
Miscellaneous work on 12 V system (excluding airbag)			X	Person with electrical training
Work on earth points of 12 V system (without potential equalisation lines)			X	Person with electrical training
Tail lights			X	Person with electrical training
Renewal or repair of glazing			X	Person with electrical training
Repair work in passenger compartment			X	Person with electrical training
Repair work in roof area			X	Person with electrical training
Repair work on rear lid			X	Person with electrical training
Repair work on bumpers			X	Person with electrical training
Move lock carrier to service position	X			Person with electrical training
Removing and installing lock carrier	X			Person with electrical training
Repair work on lock carrier	X			Person with electrical training

93 – Electric drive systems

1 High-voltage system

⇒ [“1.1 Overview of fitting locations - high-voltage system”, page 11](#)

⇒ [“1.2 Testing high-voltage components and high-voltage cables”, page 12](#)

1.1 Overview of fitting locations - high-voltage system

1 - High-voltage battery charging socket 1 - UX4-

- ☐ Assembly overview
⇒ [page 171](#)
- ☐ Removing and installing
⇒ [page 172](#)

2 - High-voltage battery 1 - AX2-

- ☐ Assembly overview
⇒ [page 17](#)
- ☐ Removing and installing
⇒ [page 25](#)

3 - Power and control electronics for electric drive - JX1-

- ☐ Assembly overview
⇒ [page 106](#)
- ☐ Removing and installing
⇒ [page 107](#)

Integrated components:

- ◆ Control unit for electric drive - J841-
- ◆ Intermediate circuit capacitor 1 - C25-
- ◆ Voltage converter - A19-
- ◆ DC/AC converter for drive motor - A37-

4 - Charging unit 1 for high-voltage battery - AX4-

- ☐ With control unit for high-voltage battery charger - J1050-
- ☐ Assembly overview
⇒ [page 182](#)
- ☐ Removing and installing ⇒ [page 183](#)

5 - High-voltage heater (PTC) - Z115-

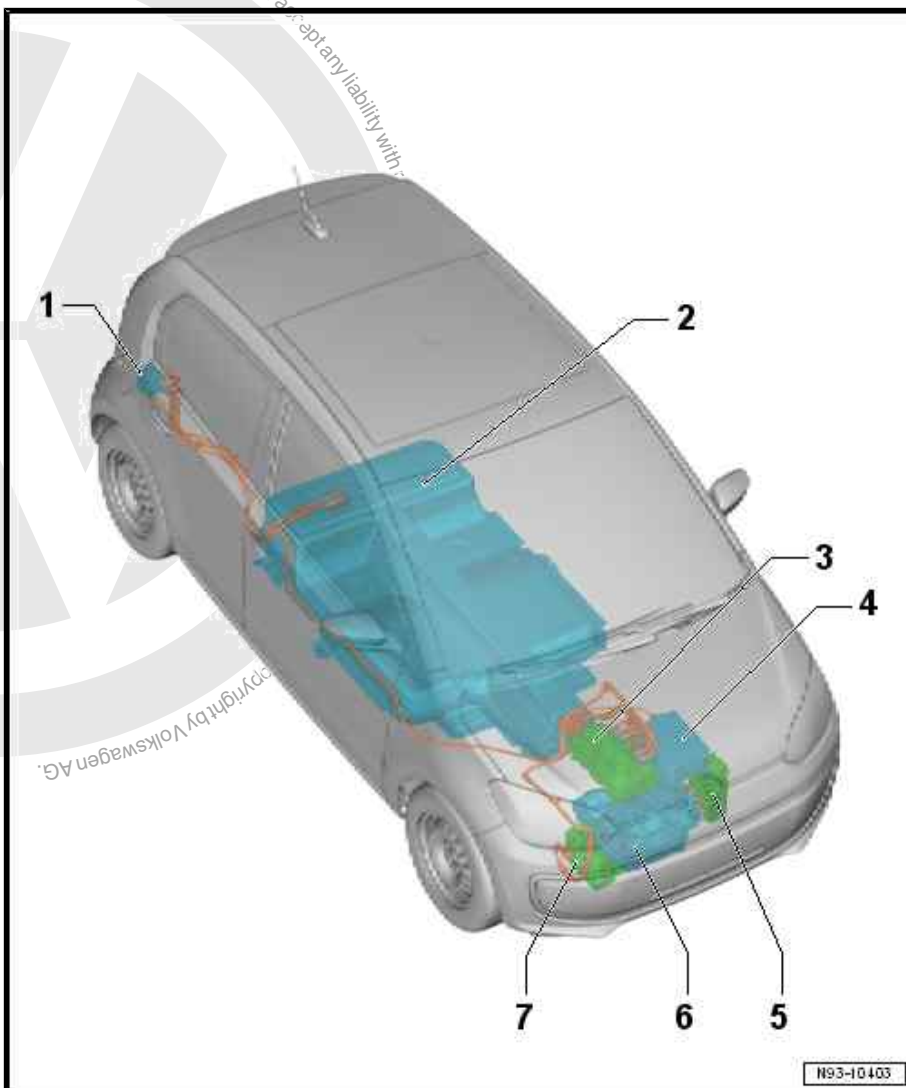
- ☐ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing High-voltage heater (PTC) - Z115- and high-voltage heater control unit (PTC) - J848-

6 - Three-phase current drive - VX54-

- ☐ Assembly overview ⇒ [page 115](#)
- ☐ Removing and installing ⇒ [page 118](#)

Integrated components:

- ◆ Electric drive motor - V141-



N93-10403



- ◆ Drive motor temperature sender - G712-
- ◆ Drive motor rotor position sender 1 - G713-

7 - Electrical air conditioner compressor - V470-

- Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing Electrical air conditioner compressor - V470-

1.2 Testing high-voltage components and high-voltage cables

- Check high-voltage components and high-voltage cables for external damage.
- Check insulation of high-voltage cables and potential equalisation lines.





2 Warning stickers

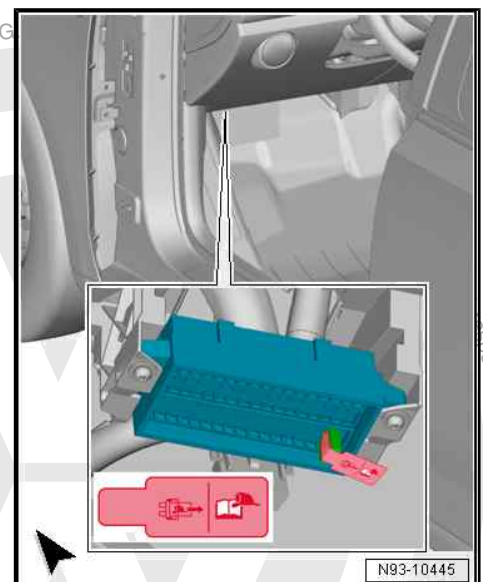
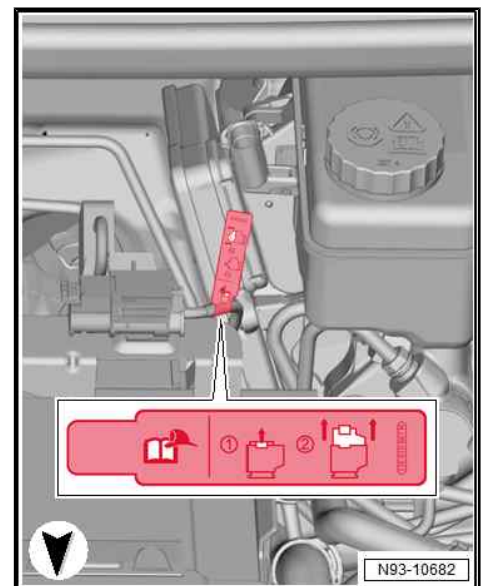
⇒ **"2.1 Overview of fitting locations - warning stickers",
page 13**

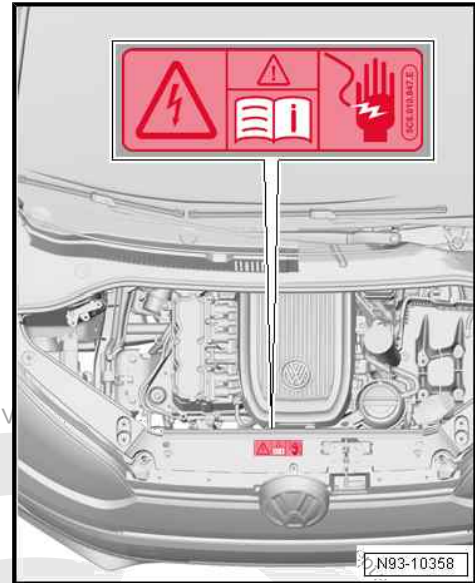
2.1 Overview of fitting locations - warning stickers

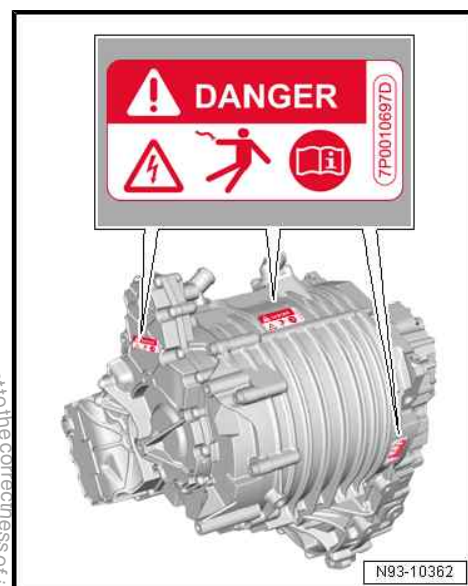
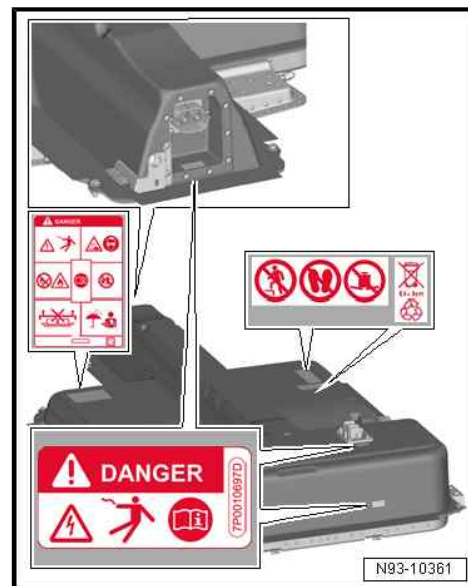
There are warning stickers on all high-voltage components.

When performing maintenance work, ensure that these warning stickers are not soiled or damaged and are present on all high-voltage components.

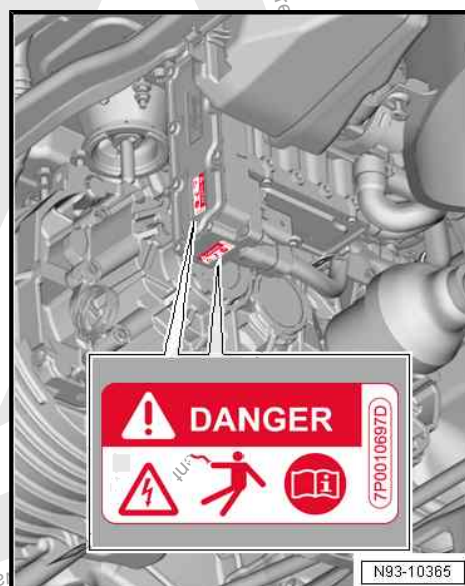
Warning stickers must be fitted on following assembly groups:







Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by Volkswagen AG. Volkswagen AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by Volkswagen AG.



- ◆ Rescue information, in motor compartment underneath cover for motor compartment
- ◆ Rescue information, interior
- ◆ Front lock carrier
- ◆ Service flap, battery regulation control unit
- ◆ Battery regulation control unit
- ◆ High-voltage battery 1 - AX2-
- ◆ Three-phase current drive - VX54-
- ◆ Power and control electronics for electric drive - JX1-
- ◆ Electrical air conditioner compressor - V470-
- ◆ High-voltage heater (PTC) - Z115-
- ◆ Charging unit 1 for high-voltage battery - AX4-





3 High-voltage battery unit

- ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)
- ⇒ [“3.2 Visual inspection of high-voltage battery 1 AX2”, page 24](#)
- ⇒ [“3.3 Performing diagnosis on high-voltage battery 1 AX2”, page 24](#)
- ⇒ [“3.4 Removing and installing high-voltage battery 1 AX2”, page 25](#)
- ⇒ [“3.5 Raising high-voltage battery 1 AX2”, page 30](#)
- ⇒ [“3.6 Leakage test High-voltage battery 1 AX2”, page 32](#)
- ⇒ [“3.7 Checking high-voltage battery 1 AX2 for leaks”, page 33](#)
- ⇒ [“3.8 Opening high-voltage battery 1 AX2”, page 34](#)
- ⇒ [“3.9 Voltage and insulation measurement”, page 38](#)
- ⇒ [“3.10 Opening the electric circuit”, page 40](#)
- ⇒ [“3.11 Sealing high-voltage battery 1 AX2”, page 42](#)
- ⇒ [“3.12 Removing and installing module monitor control unit for batteries J497”, page 46](#)
- ⇒ [“3.13 Removing and installing switching unit for high-voltage battery SX6”, page 47](#)
- ⇒ [“3.14 Removing and installing battery regulation control unit J840”, page 50](#)
- ⇒ [“3.15 Removing and installing charge voltage control unit for high-voltage battery J966”, page 52](#)
- ⇒ [“3.16 Removing and installing cable guide”, page 53](#)
- ⇒ [“3.17 Visual check of wiring harness”, page 57](#)
- ⇒ [“3.19 Discharging and charging capacitors”, page 58](#)
- ⇒ [“3.20 Removing and installing capacitors”, page 60](#)
- ⇒ [“3.21 Charging and discharging the battery modules”, page 60](#)
- ⇒ [“3.22 Removing and installing battery modules”, page 62](#)
- ⇒ [“3.23 Removing and installing crash bar”, page 104](#)

3.1 Assembly overview - high-voltage battery

Assembly overview I - high-voltage battery

There are two versions of the high-voltage battery 1 - AX2- :

- ◆ Without a DC charging connection
- ◆ With a DC charging connection



1 - Nuts

- ☐ Qty. 4
- ☐ Renew after removal
- ☐ 4 Nm

2 - Bolts

- ☐ Qty. 8
- ☐ 10 Nm

3 - Upper part of battery

- ☐ With shielding
- ☐ Renew after removal

4 - Locating piece

5 - Charging connection

- ☐ DC-charging equipment version

6 - Seal

- ☐ Renew after removal

7 - Battery modules

- ☐ Assembly overview
⇒ [page 20](#)
- ☐ Connection diagram
⇒ [page 21](#)

8 - Bolts

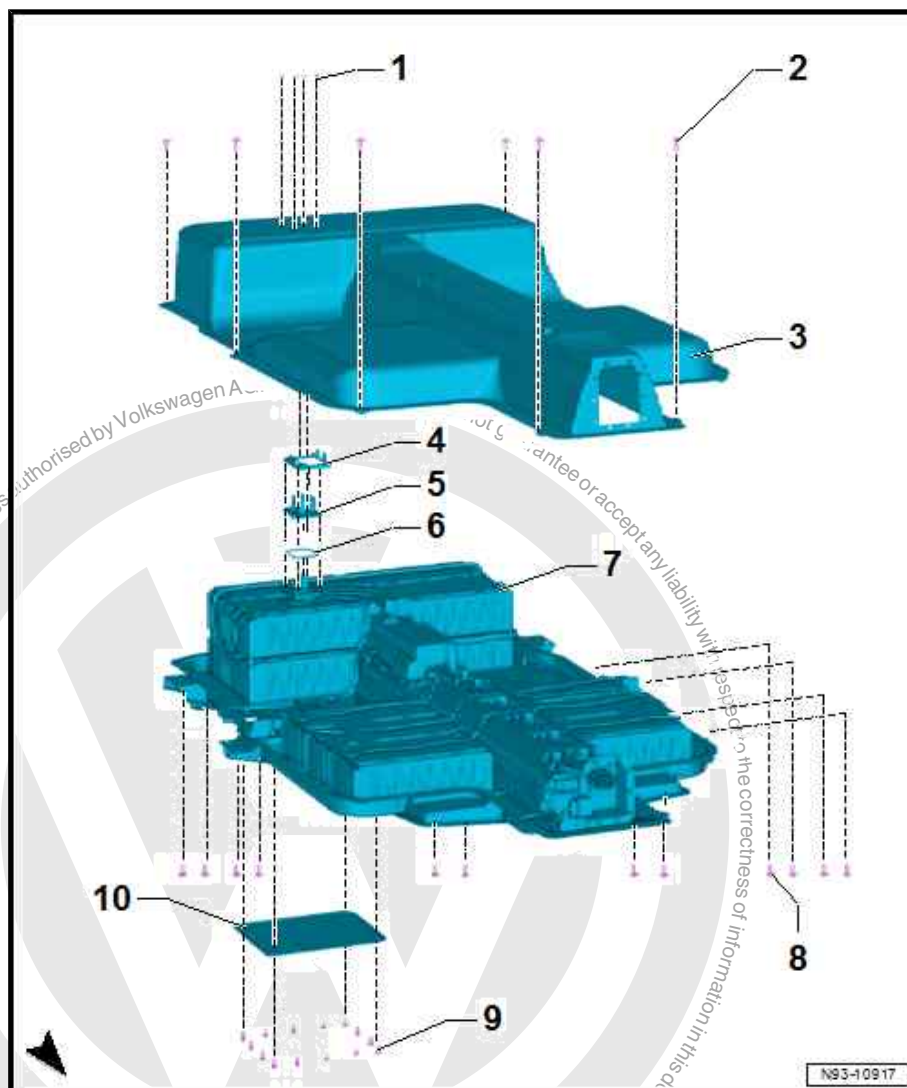
- ☐ Qty. 12
- ☐ 40 Nm

9 - Bolts

- ☐ Qty. 14
- ☐ Observe tightening sequence ⇒ [page 52](#)
- ☐ 5.5 Nm

10 - Maintenance cover

- ☐ Renew after removal
- ☐ Remove the service cover from its packaging only immediately before installing
- ☐ Check service cover seal for damage
- ☐ Apply four-eyes principle when installing service cover
- ☐ Removing and installing ⇒ [page 50](#)



Assembly overview II - high-voltage battery



1 - Battery regulation control unit - J840-

- ☐ Removing and installing
⇒ [page 50](#)

2 - Switching unit for high-voltage battery - SX6-

- ☐ Removing and installing
⇒ [page 47](#)

3 - Module monitor control unit for batteries - J497-

- ☐ For battery modules
- ☐ Removing and installing
⇒ [page 46](#)

4 - Silicate bag

- ☐ Renew every time high-voltage battery 1 - AX2- is opened
- ☐ Remove from packaging only immediately before bonding

5 - Wiring guide

- ☐ Removing and installing
⇒ [page 53](#)

6 - Bolts

- ☐ For upper modules
- ☐ Qty. 4 per battery module
- ☐ 8 Nm

7 - Bolts

- ☐ Mountings for upper modules and fastener for lower modules
- ☐ Qty. 4 per battery module
- ☐ Renew after removal
- ☐ 8 Nm +180°

8 - Battery modules

- ☐ Assembly overview ⇒ [page 20](#)
- ☐ Connection diagram ⇒ [page 21](#)

9 - Lower shell of battery

10 - Bolts

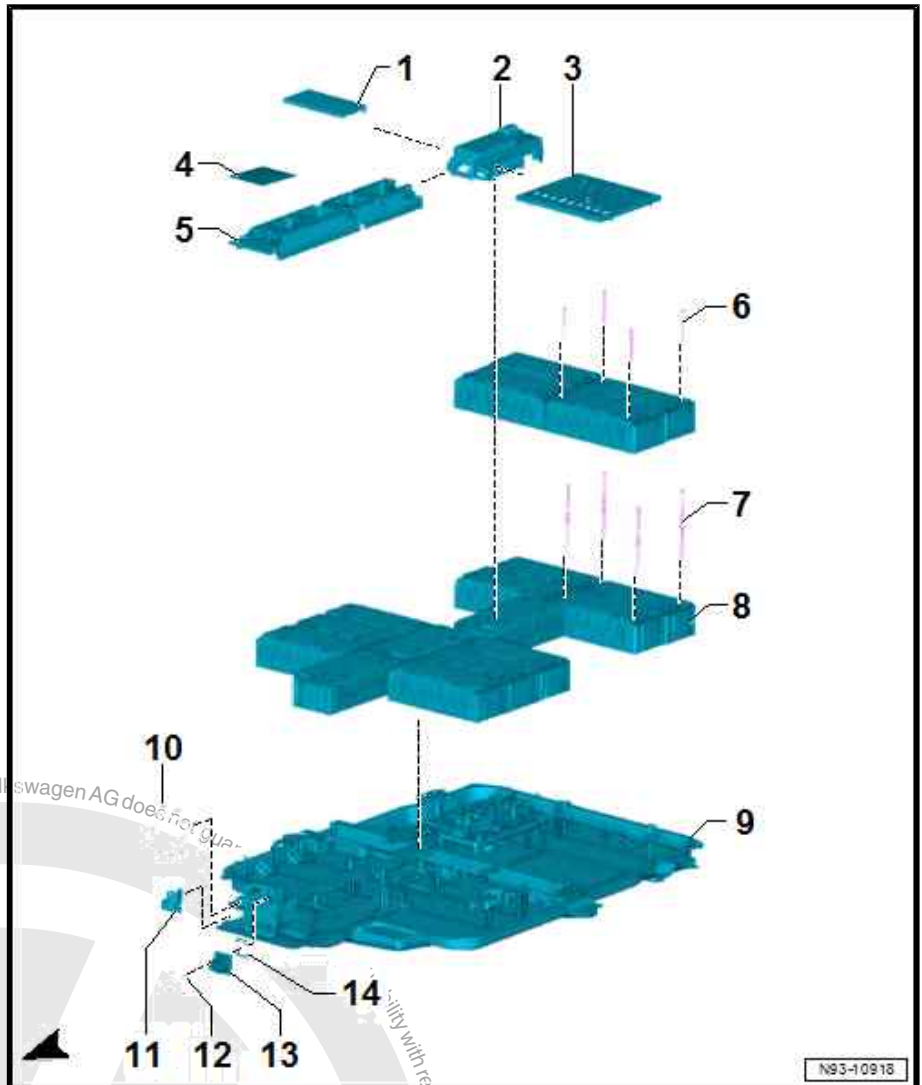
- ☐ Qty. 10
- ☐ 4 Nm

11 - Bracket

- ☐ For onboard electrical system wiring harness

12 - Bolts

- ☐ Qty. 4
- ☐ Renew after removal
- ☐ 4 Nm





13 - High-voltage network wiring junction

14 - Seal

- ☐ Renew after removal

Assembly overview - battery modules

0 - Battery module 0 - J1068-

- ☐ Removing and installing
⇒ [page 62](#)

1 - Battery module 1 - J991-

- ☐ Removing and installing
⇒ [page 64](#)

2 - Battery module 2 - J992-

- ☐ Removing and installing
⇒ [page 66](#)

3 - Battery module 3 - J993-

- ☐ Removing and installing
⇒ [page 68](#)

4 - Battery module 4 - J994-

- ☐ Removing and installing
⇒ [page 71](#)

5 - Battery module 5 - J995-

- ☐ Removing and installing
⇒ [page 73](#)

6 - Battery module 6 - J996-

- ☐ Removing and installing
⇒ [page 75](#)

7 - Battery module 7 - J997-

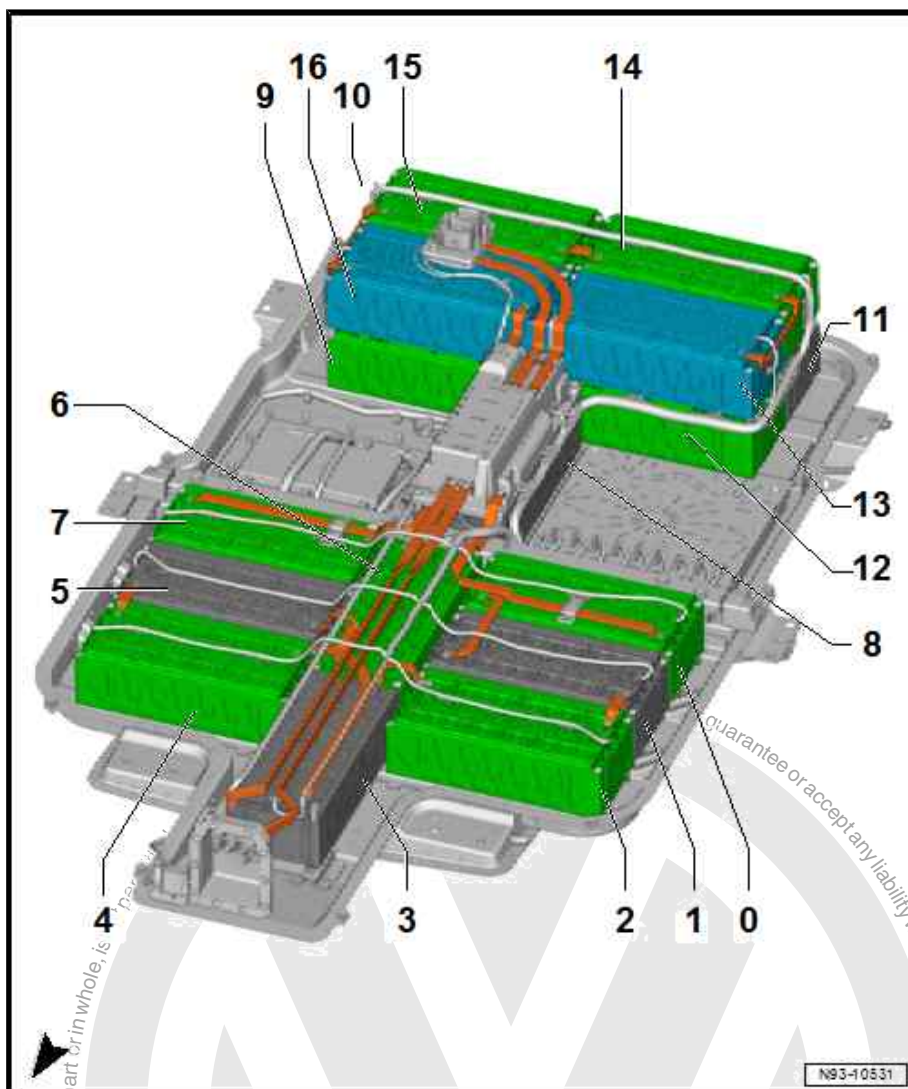
- ☐ Removing and installing
⇒ [page 79](#)

8 - Battery module 8 - J998-

- ☐ Removing and installing
⇒ [page 81](#)

9 - Battery module 9 - J999-

- ☐ Removing and installing





⇒ [page 84](#)

10 - Battery module 10 - J1000-

- ❑ Removing and installing ⇒ [page 86](#)

11 - Battery module 11 - J1001-

- ❑ Removing and installing ⇒ [page 89](#)

12 - Battery module 12 - J1002-

- ❑ Removing and installing ⇒ [page 91](#)

13 - Battery module 13 - J1045-

- ❑ Removing and installing ⇒ [page 94](#)

14 - Battery module 14 - J1046-

- ❑ Removing and installing ⇒ [page 97](#)

15 - Battery module 15 - J1047-

- ❑ Removing and installing ⇒ [page 99](#)

16 - Battery module 16 - J1048-

- ❑ Removing and installing ⇒ [page 102](#)

Connection diagram for battery module

The battery modules are connected in series.



0 - Battery module 0 - J1068-

- ☐ Removing and installing
⇒ [page 62](#)
- ☐ Nuts for high-voltage
connecting piece
- ☐ 7.5 Nm

1 - Battery module 1 - J991-

- ☐ Removing and installing
⇒ [page 64](#)
- ☐ Nuts for high-voltage
connecting piece
- ☐ 7.5 Nm

2 - Battery module 2 - J992-

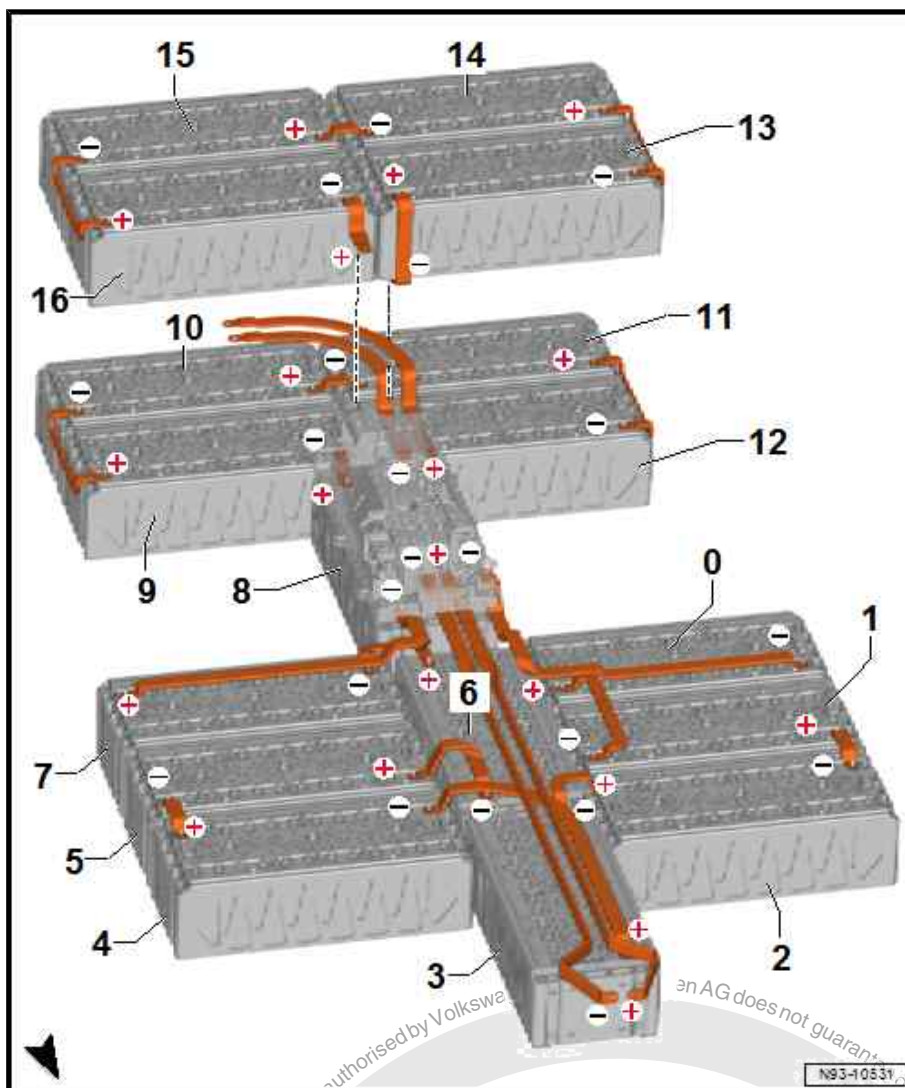
- ☐ Removing and installing
⇒ [page 66](#)
- ☐ Nuts for high-voltage
connecting piece
- ☐ 7.5 Nm

3 - Battery module 3 - J993-

- ☐ Removing and installing
⇒ [page 68](#)
- ☐ Nuts for high-voltage
connecting piece
- ☐ 7.5 Nm

4 - Battery module 4 - J994-

- ☐ Removing and installing
⇒ [page 71](#)
- ☐ Nuts for high-voltage





connecting piece

- ☐ 7.5 Nm

5 - Battery module 5 - J995-

- ☐ Removing and installing ⇒ [page 73](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

6 - Battery module 6 - J996-

- ☐ Removing and installing ⇒ [page 75](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

7 - Battery module 7 - J997-

- ☐ Removing and installing ⇒ [page 79](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

8 - Battery module 8 - J998-

- ☐ Removing and installing ⇒ [page 81](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

9 - Battery module 9 - J999-

- ☐ Removing and installing ⇒ [page 84](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

10 - Battery module 10 - J1000-

- ☐ Removing and installing ⇒ [page 86](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

11 - Battery module 11 - J1001-

- ☐ Removing and installing ⇒ [page 89](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

12 - Battery module 12 - J1002-

- ☐ Removing and installing ⇒ [page 91](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

13 - Battery module 13 - J1045-

- ☐ Removing and installing ⇒ [page 94](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

14 - Battery module 14 - J1046-

- ☐ Removing and installing ⇒ [page 97](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

15 - Battery module 15 - J1047-

- ☐ Removing and installing ⇒ [page 99](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

16 - Battery module 16 - J1048-



- ☐ Removing and installing ⇒ [page 102](#)
- ☐ Nuts for high-voltage connecting piece
- ☐ 7.5 Nm

3.2 Visual inspection of high-voltage battery 1 - AX2-

Procedure



CAUTION

Danger of burns from hot high-voltage battery.

Risk of burns to hands.

- Wear protective gloves.



Note

Inform the high-voltage expert if any problems arise or entries in the event memory appear.

Check high-voltage battery 1 - AX2- for

- ◆ Cracks in battery case or battery tray
- ◆ Deformation of battery case or battery tray
- ◆ Colour changes due to temperature and tarnishing of housing
- ◆ Escaping electrolyte
- ◆ Damage to high-voltage contacts
- ◆ Legible and available information and warning stickers
- ◆ Fitted potential equalisation line
- ◆ Corrosion damage
- ◆ The DC sealing plug, which is inserted in its as-received condition, must seal the unassigned DC connection of the AC version and remain in place.
- Inform the high-voltage expert if any problems arise or entries in the event memory appear.
- After a visual inspection, carry out a diagnosis on high-voltage battery 1 - AX2- ⇒ [page 24](#) .

3.3 Performing diagnosis on high-voltage battery 1 - AX2-

Special tools and workshop equipment required

- ◆ Vehicle diagnostic tester

Procedure



Note

Carry out the diagnosis on the high-voltage battery 1 - AX2- when it is installed in the vehicle.

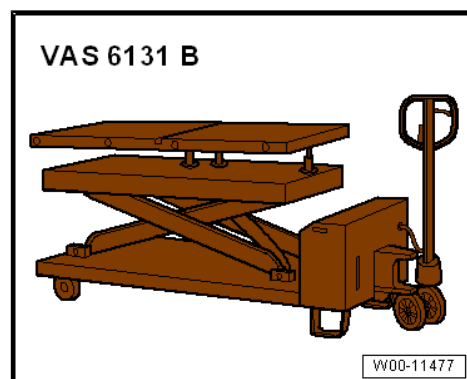
- Start Guided Fault Finding ⇒ Vehicle diagnostic tester.



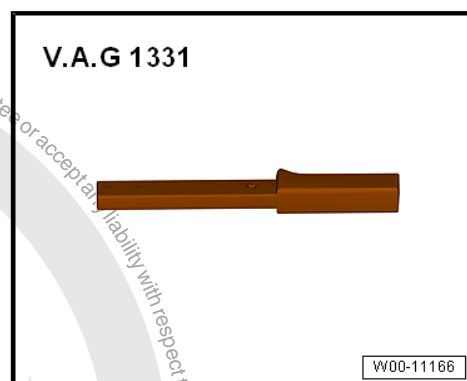
3.4 Removing and installing high-voltage battery 1 - AX2-

Special tools and workshop equipment required

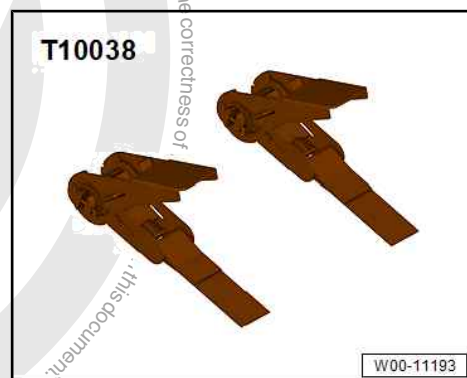
- ◆ Scissor-type assembly platform - VAS 6131 B-



- ◆ Torque wrench - V.A.G 1331-



- ◆ Tensioning strap - T10038-



- ◆ Set of mountings for Audi - VAS 6131/10-
- ◆ Supplementary set, Audi Q7 > 2005 - VAS 6131/13-

Removing

- Carry out visual inspection of high-voltage battery 1 - AX2-
⇒ [page 24](#) .



DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



⚠ CAUTION

Danger of burns from hot high-voltage battery.

Risk of burns to hands.

- Wear protective gloves.



Note

It is not possible to remove high-voltage battery 1 - AX2- on all lifting platforms. Ensure that there is sufficient clearance.

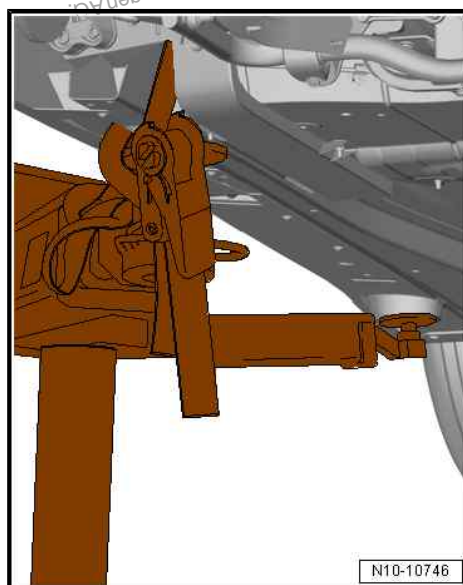
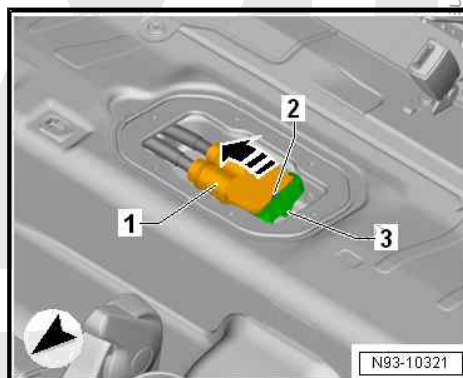
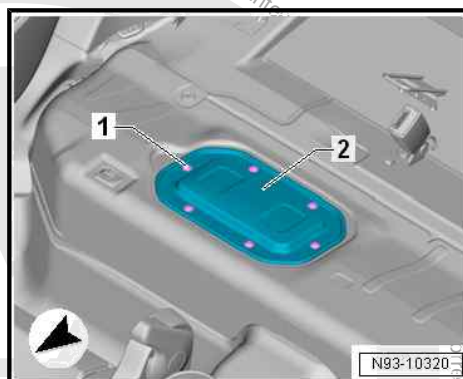
Vehicles with DC charging connection

- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat / individual seats .
- Unscrew bolts -1-.
- Remove cover -2-.

- Raise fuse -2-.
- Pull locating lug -3- forwards.
- Swing up bar in -direction of arrow-.

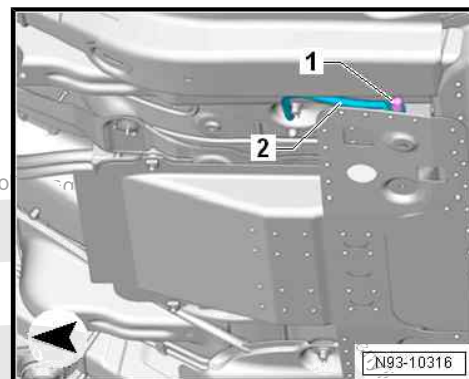
Continuation for all vehicles

- Raise vehicle.
- Secure vehicle using tensioning strap - T10038- .
- Remove underbody covers ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview - underbody covers, e-up! .

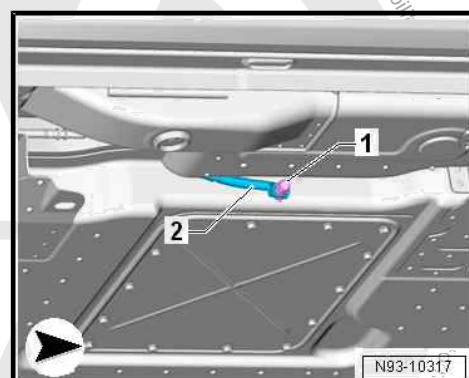




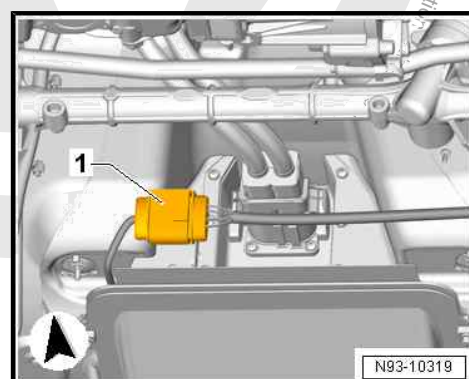
- Unscrew nut -1-.
- Detach potential equalisation line on left -2-.



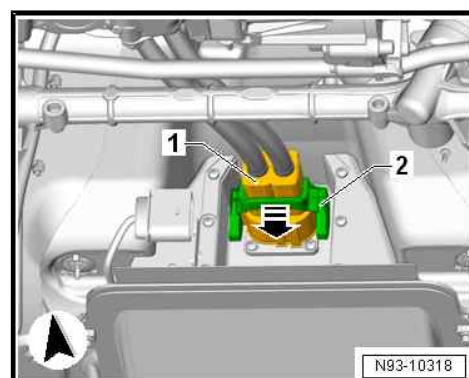
- Unscrew nut -1-.
- Detach potential equalisation line on right -2-.



- Disconnect connector -1-.

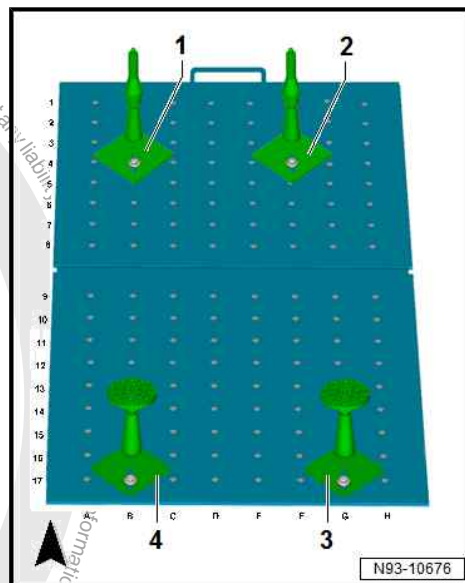


- Disconnect electrical connector -1- by releasing retaining clip -2- in -direction of arrow-.



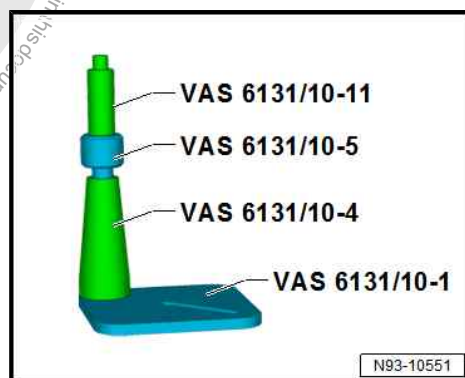


Prepare supports and scissor-type assembly platform:



Front supports -1 and 2:-

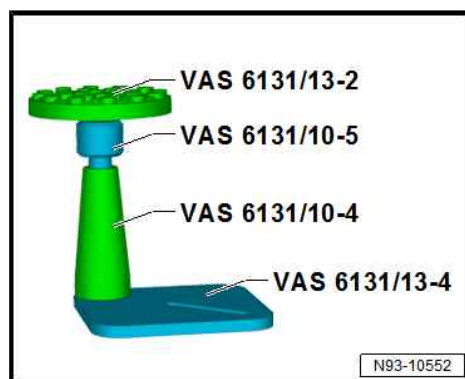
- ◆ Plate - VAS 6131/10-1-
- ◆ Taper - VAS 6131/10-4-
- ◆ Knurled section - VAS 6131/10-5-
- ◆ Support - VAS 6131/10-11-



Rear supports -3 and 4-

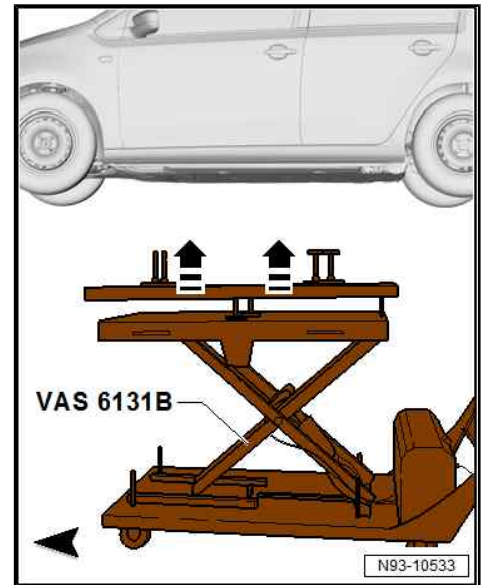
- ◆ Support - VAS 6131/13-2-
- ◆ Taper - VAS 6131/10-4-
- ◆ Knurled section - VAS 6131/10-5-
- ◆ Plate - VAS 6131/13-4-

Continuation, removing high-voltage battery 1 - AX2-

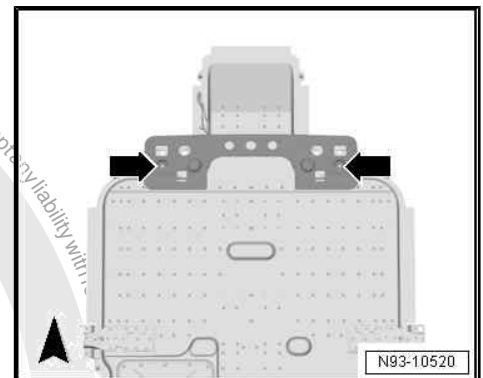




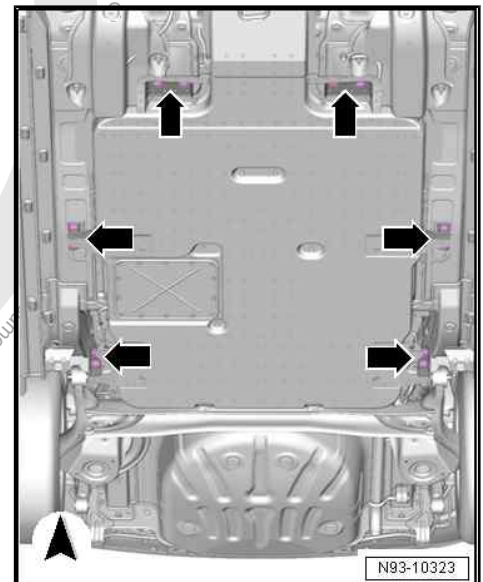
- Place prepared scissor-type assembly platform under vehicle -arrow-, and align.



- Guide front supports into holes -arrows-.



- Unscrew bolts -arrows-.





- Lower high-voltage battery 1 - AX2- 3 cm -arrow A-.
- Push high-voltage battery 1 - AX2- 2 cm in direction of travel -arrow B-.
- Lower high-voltage battery 1 - AX2- completely -arrow C-.

Installing

Install in reverse order of removal, observing the following:

- Align high-voltage battery 1 - AX2- under vehicle using scissor-type assembly platform - VAS 6131 B- .
- Raise scissor-type assembly platform - VAS 6131 B- enough to guide high-voltage battery 1 - AX2- past rear axle.
- Carefully raise high-voltage battery 1 - AX2- further.
- Bolt on high-voltage battery 1 - AX2- .

⚠ WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Commission high-voltage system ⇒ [page 166](#) .

Specified torques

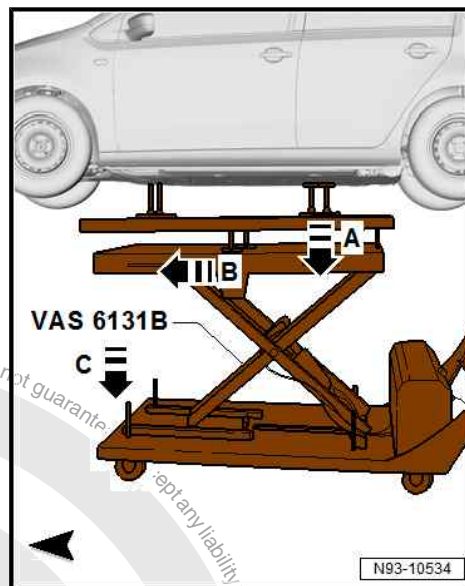
- ♦ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)
- ♦ ⇒ [“15.1 Overview of fitting locations - potential equalisation lines”, page 167](#)

Component	Specified torque
Bolts for fuel gauge sender cover	8 Nm

3.5 Raising high-voltage battery 1 - AX2-

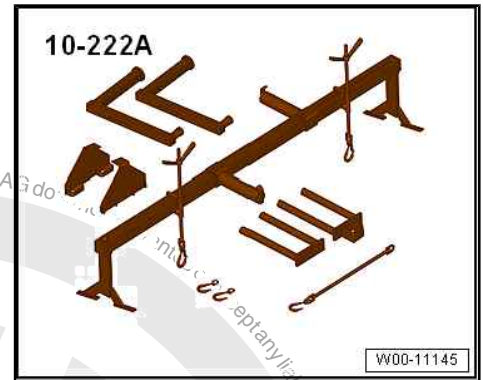
Special tools and workshop equipment required

- ♦ Workshop hoist - VAS 6100-





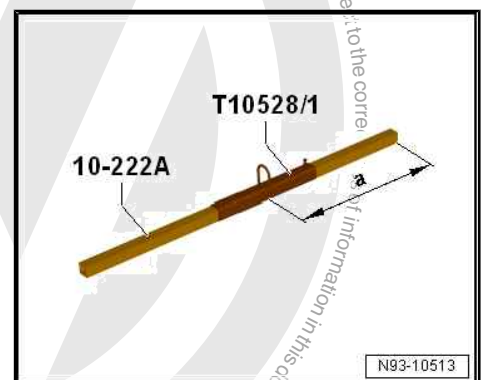
◆ Support - 10 - 222 A-



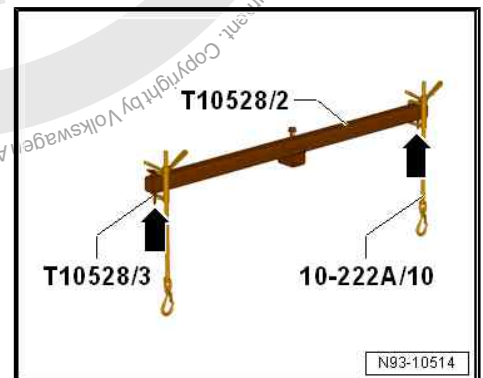
◆ Towing bracket - T10528-

Procedure

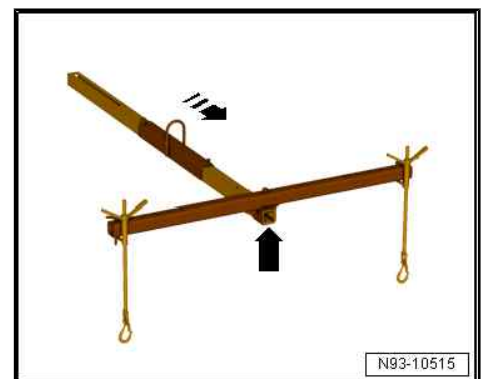
- Push support - T10528/1- onto support bracket - 10 - 222 A- .
- Adjust support - T10528/1- to -dimension a-, and lock it in position.
- -Dimension a- = 515 mm
- Hook support bracket - 10 - 222 A- with support - T10528/1- onto workshop hoist VAS 6100- .



- Push 2 hooks - 10 - 222 A /10- onto first cross member - T10528/2- as shown in illustration.
- Push locking pins - T10528/3- into outer positions 6 -arrows-.

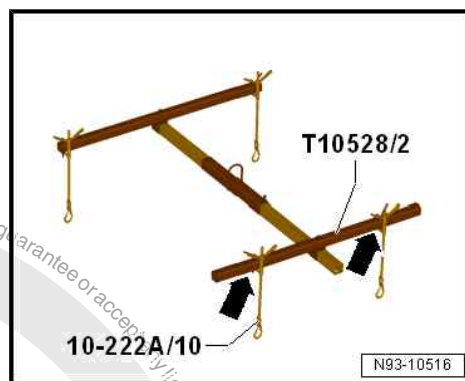


- Push prepared cross member - T10528/2- onto support bracket - 10 - 222 A- in -direction of arrow-.
- End of cross member - T10528/2- must be flush -arrow-.
- Lock cross member - T10528/2- in position.





- Push 2 hooks - 10 - 222 A /10- onto second cross member - T10528/2- as shown in illustration.
- Push locking pins - T10528/3- into inner positions 2 -arrows-.
- Push second prepared cross member - T10528/2- onto support bracket - 10 - 222 A- .
- Leave locking mechanism of cross member - T10528/2- loose.



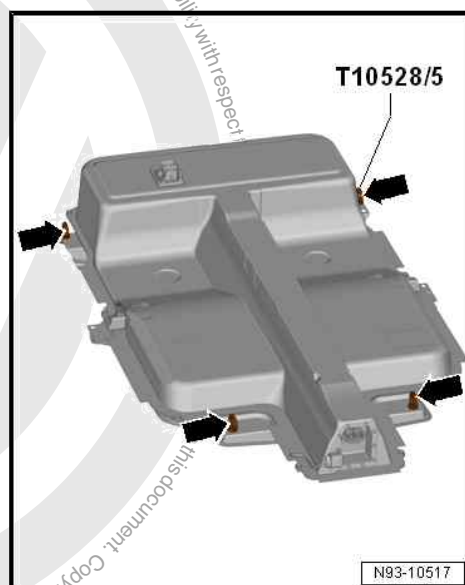
- Attach lifting eye bolts - T10528/5- to high-voltage battery 1 - AX2- at indicated positions -arrows-.
- Move workshop hoist - VAS 6100- over high-voltage battery 1 - AX2- with prepared support - T10528- .



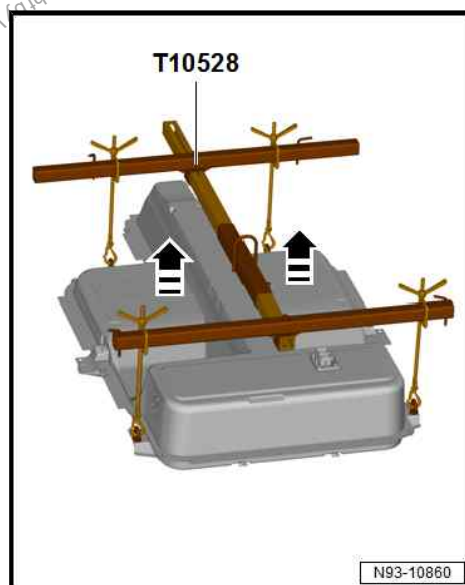
Note

Do not rest support - T10528- on high-voltage battery 1 - AX2- .

- Attach hooks - 10 - 222 A /10- to lifting eye bolts - T10528/5- -arrows-.
- Align second, still loose cross member - T10528/2- straight, and fix it in position.



- Raise high-voltage battery 1 - AX2- in -direction of arrow-.



3.6 Leakage test High-voltage battery 1 - AX2-

Special tools and workshop equipment required

- ♦ -Vehicle diagnostic tester-
- ♦ Leak tester - VAS 6911-



- ◆ Autonomous software - VAS 6910/5-
- ◆ Rubber bungs - VAS 6911/10-



Note

- ◆ *A leakage test must always be carried out before opening and after closing the high-voltage battery 1 - AX2- .*
- ◆ *The leakage test is carried out with the leak tester - VAS 6911- in conjunction with the autonomous software - VAS 6910/5- .*

Procedure

- Unclip venting elements.
- Seal venting elements with rubber bungs - VAS 6911/10- .
- Take leak tester - VAS 6911- out of carrying case.
- Set leak tester - VAS 6911- on a flat surface.
- Connect current supply to leak tester - VAS 6911- .
- Start autonomous software - VAS 6910/5- in the ⇒ Vehicle diagnostic tester.
- Under the diagnosis menu in the autonomous software - VAS 6910/5- , start the leakage test.



Note

- ◆ *The further procedure for the leakage test is shown in the autonomous software - VAS 6910/5- .*
- ◆ *All steps in the autonomous software - VAS 6910/5- must be carried out as described.*
- If leakage is determined, carry out a check to find its source
⇒ [page 33](#) .
- Install venting elements.

3.7 Checking high-voltage battery 1 - AX2- for leaks

Special tools and workshop equipment required

- ◆ Leak detecting system - VAS 6911/14-
- ◆ Test plug set - VAS 6911/3-
- ◆ Gas leak detecting system - VAS 523 003-
- Connect leak detection system - VAS 6911/14- to high-voltage battery 1 - AX2- .
- Allow forming gas into high-voltage battery 1 - AX2- .
- Slowly guide gas leak detector - VAS 523 003- over bond seam and seals, while observing the display on gas leak detector - VAS 523 003- .
- Locate any leakage.



3.8 Opening high-voltage battery 1 - AX2-

! DANGER

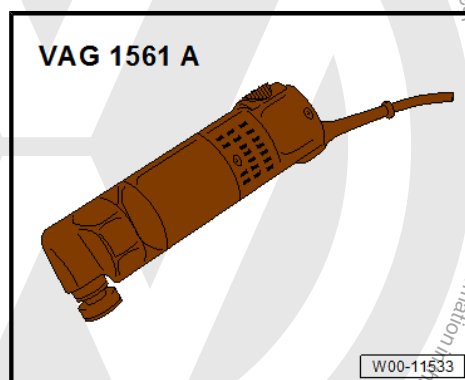
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

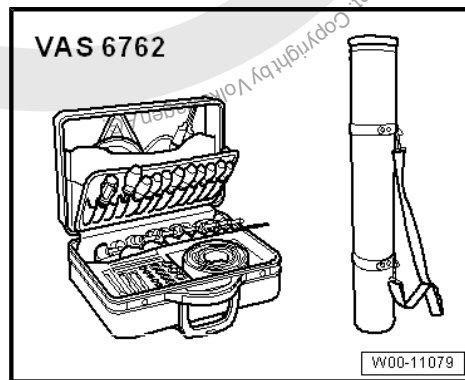
- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ Electric cutter - V.A.G 1561A-



- ◆ Cutter, 27 mm - VAS 6900/1-
- ◆ High-voltage tool set - VAS 6762-



- ◆ Repair set for high-voltage battery - VAS 6900-
- ◆ High-voltage tool set - VAS 6883-
- ◆ Safety cover - T10437-
- ◆ Commercially available vacuum cleaner with plastic nozzle

Procedure

! DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

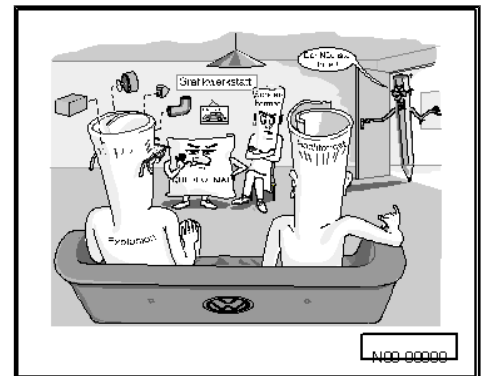
- De-energise high-voltage system ⇒ [page 164](#) .



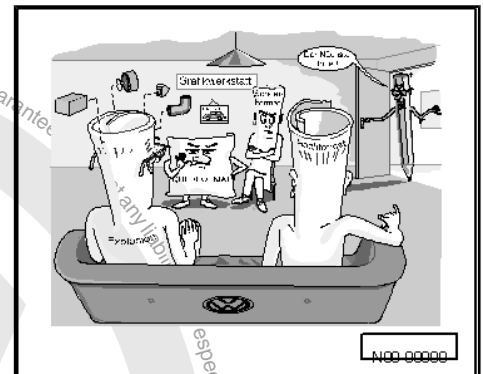
Note

- ◆ *A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.*
- ◆ *If the high-voltage battery 1 - AX2- is to be opened, it must be reported accordingly beforehand. Work on the battery must never be performed autonomously.*

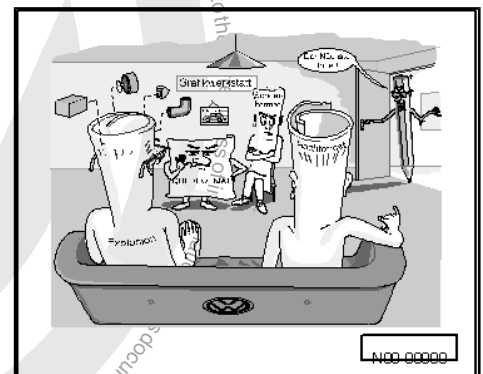
- Remove high-voltage battery 1 - AX2- ⇒ [page 25](#) .
- Carry out leakage test high-voltage battery 1 - AX2- ⇒ [page 32](#) .
- Release connector -1- in -direction of arrow-.
- Unscrew bolts -2-.



- Unscrew nuts -1- from charging connection -2-.
- Unclip charging connection -arrows-.



- Turn over charging connection in direction of -arrow-.
- Remove fuse -2-. To do this, lever it off at sides, and pull it off towards outside.
- Unpin the two wires ⇒ Electrical system; General information; Rep. gr. 97 ; Lines .



- Bend shielding arrows- upwards by 90°.
- Fit cutter, 27 mm - VAS 6900/1- to electric cutter - V.A.G 1561A- .
- Set speed setting on electric cutter - V.A.G 1561A- to 4.

Note

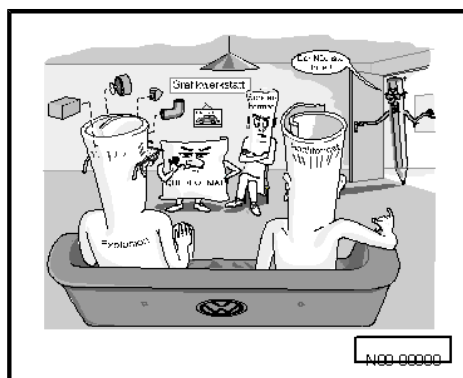
- ◆ *Hold the electric cutter - V.A.G 1561A- with both hands at its rear end.*
- ◆ *Wear protective gloves, safety goggles and ear protection!*
- Starting at rear left, cut through bonded seam using electric cutter - V.A.G 1561A- and cutter, 27 mm - VAS 6900/1- . Always guide electric cutter - V.A.G 1561A- along the upper shell while doing so.

Note

There are spacers positioned in regular intervals along the bonded seam.

Overview of spacers

- 1 - Spacers at threaded connections
- 2 - Spacers in bonded seam



-

-



3. High-voltage battery unit
- 37**



3.9 Voltage and insulation measurement

DANGER

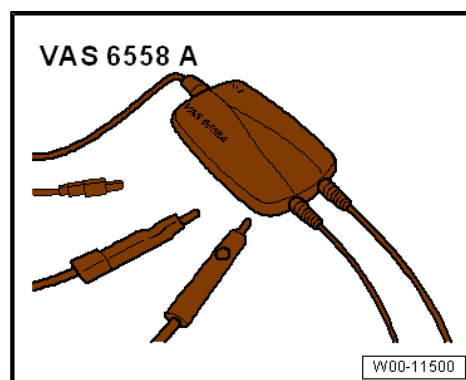
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ♦ High-voltage test module - VAS 6558 A-



- ♦ High-voltage test adapter - VAS 6558/16
- ♦ Vehicle diagnostic tester

Procedure

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .
- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .

Measuring voltage at traction power cables to make sure that high-voltage system is de-energised



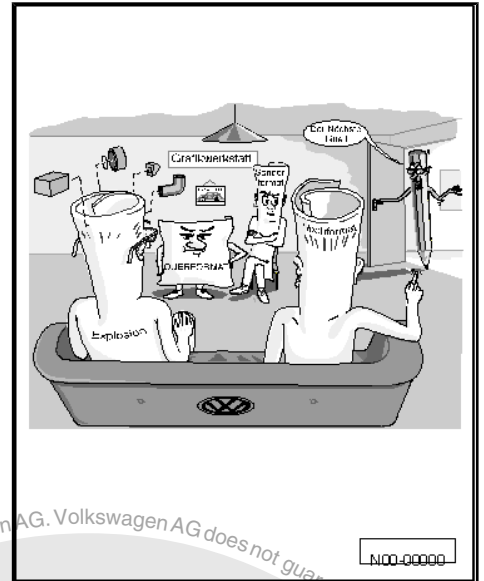
Note

- ♦ *When working on the battery modules without wearing appropriate high-voltage protection clothing, the voltage must not exceed 60 V. For this, the voltage of the battery modules must be reduced.*
- ♦ *All tests are performed with the high-voltage test module - VAS 6558 A- and the ⇒ Vehicle diagnostic tester.*



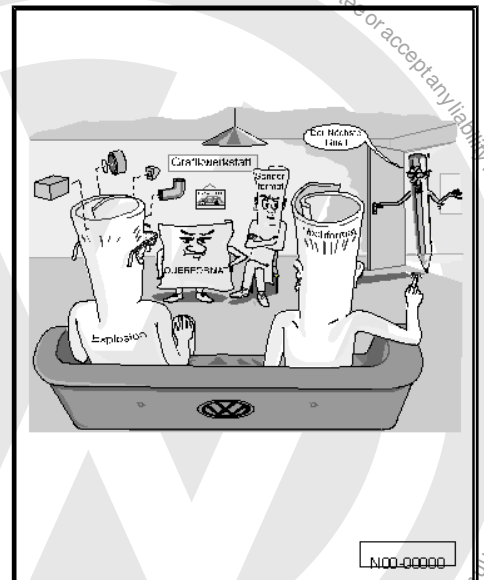
- Measure voltage between HV+ -arrow B- and HV- -arrow A-.
- Specification: max. 10V

Make sure that the high-voltage system is de-energised by measuring voltage at charging connection



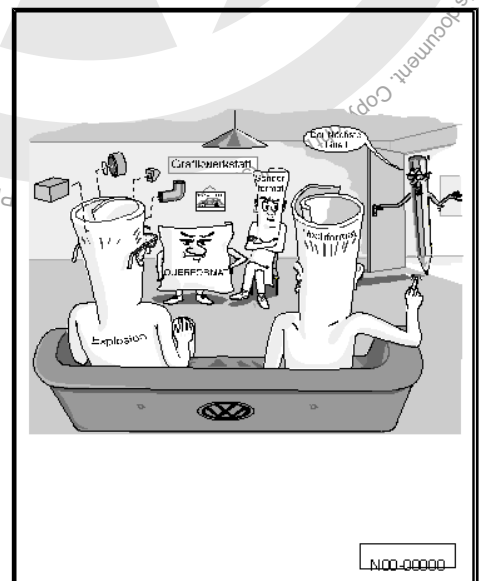
- Measure voltage between HV+ -arrow A- and HV- -arrow B-.
- Specification: max. 10V

Checking voltage of high-voltage battery 1 - AX2- .



- Measure voltage between HV+ -arrow B- and HV- -arrow A-.
- Make a note of the voltage of high-voltage battery 1 - AX2- .

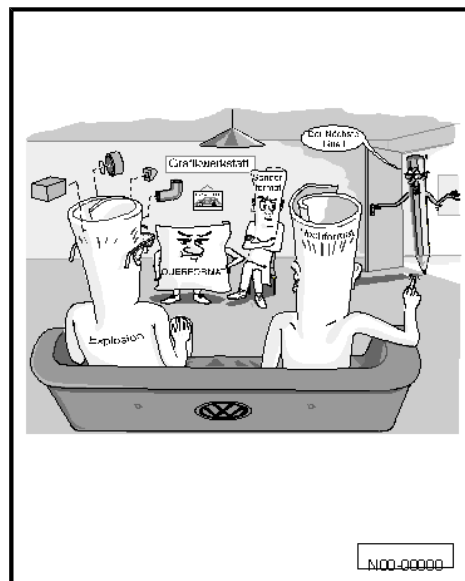
Checking voltage at housing



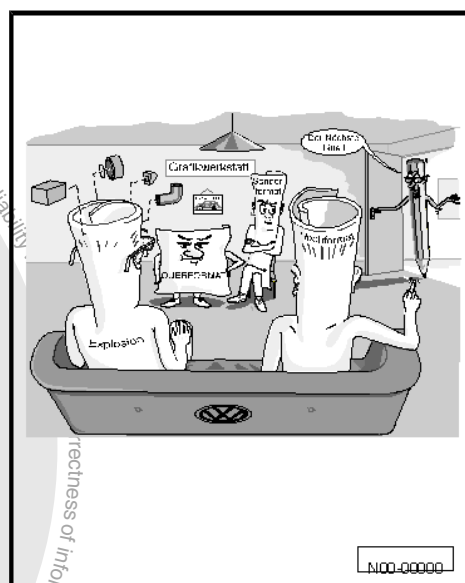


- Measure voltage between HV+ -arrow A- and housing -arrow B-.
- Specification: max. 10V

Checking voltage at housing



- Measure voltage between HV- -arrow B- and housing -arrow A-.
- Specification: max. 10V



3.10 Opening the electric circuit

⚠ DANGER

Danger to life due to high voltage.

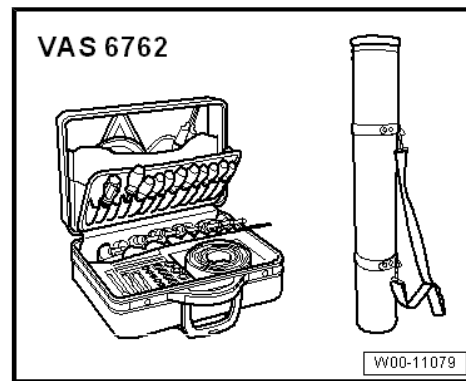
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required



◆ High-voltage tool set - VAS 6762-



◆ High-voltage tool set - VAS 6883-

Procedure

! DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Switch off voltage supply of high-voltage diagnostic box - VAS 5581- .



Note

When connected in the wrong order, the component may become damaged.

- Pull off connectors in the sequence -1 through 10-.



Note

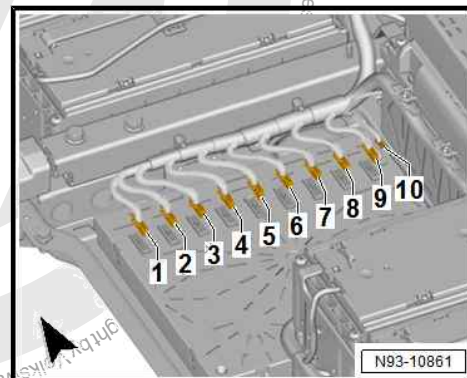
The electrical circuit is opened by removing the connecting piece for battery module on the input side from the negative terminal of a master module.

Coupling point battery module 14 - J1046- and battery module 15 - J1047-



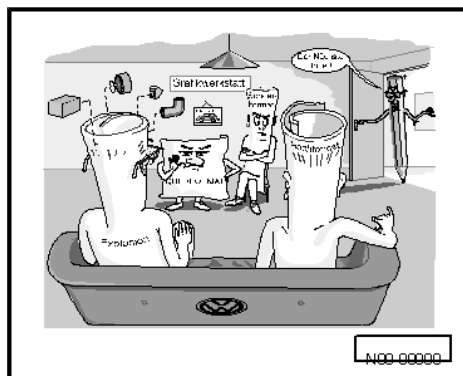
Note

Mark the installation position of the connectors and high-voltage connecting pieces.





- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 14 - J1046- and battery module 15 - J1047- .
- Fold down accidental contact protection cover.
- Discharge capacitor ⇒ [page 58](#) .



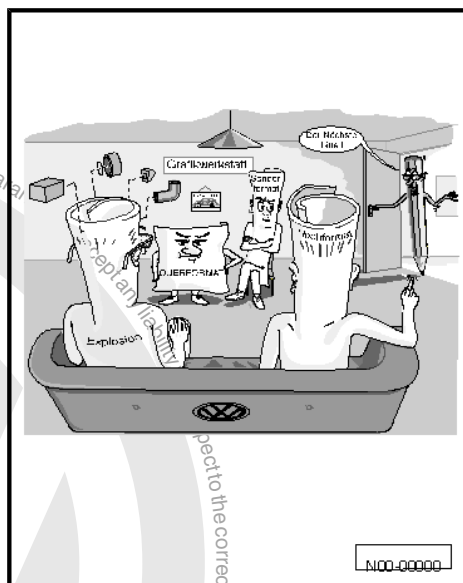
- Measure voltage between HV+ -arrow B- and HV- -arrow A-.
- Specification: $\leq 5V$



Note

The voltage »decreases« during the measurement.

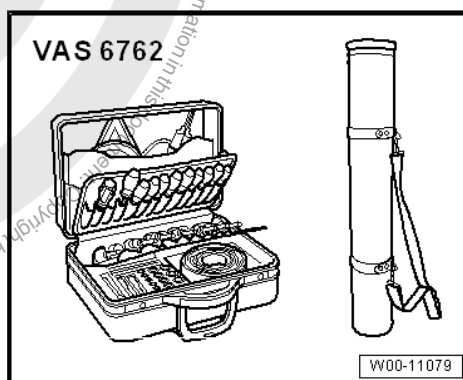
- Repeat measurement.
- Perform visual inspection on wiring harness ⇒ [page 57](#) .



3.11 Sealing high-voltage battery 1 - AX2-

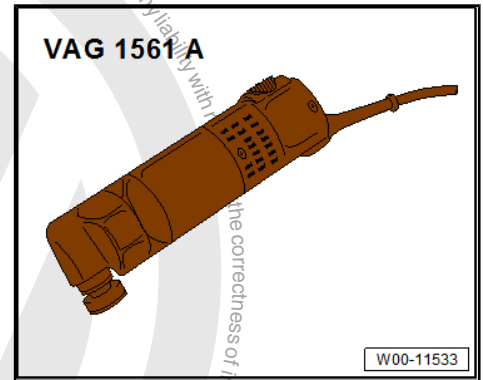
Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-

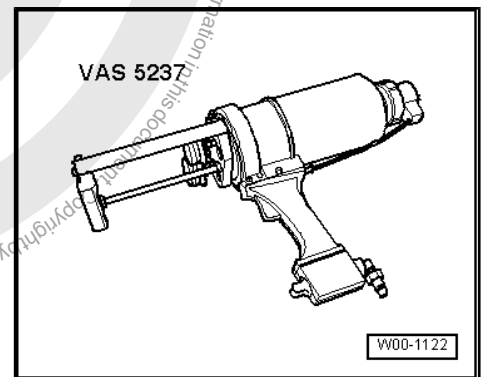




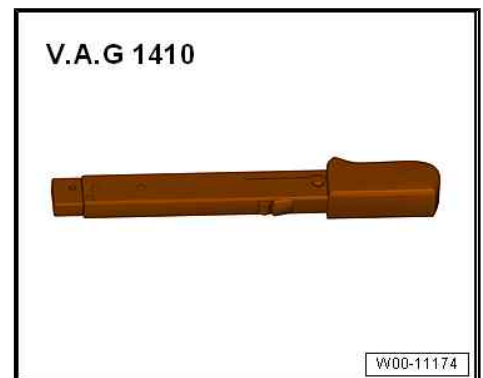
- ◆ Electric cutter - V.A.G 1561A-



- ◆ Double cartridge gun - VAS 5237-



- ◆ Torque wrench - V.A.G 1410-



- ◆ Autonomous software - VAS 6910/5-
- ◆ Repair set for high-voltage battery - VAS 6900-
- ◆ Commercially available vacuum cleaner with plastic nozzle

Procedure

- Before bonding, perform diagnosis of high-voltage battery 1 - AX2- → [page 24](#).

NOTICE

Risk of damage to paintwork structure caused by activator.

- Apply activator precisely onto adhesive bead without spilling.



Preparing lower part of battery



Note

- ◆ *Cut back the residual adhesive sealant to 1...2 mm only immediately before bonding.*
- ◆ *The remaining material serves as adhesion base for newly applied 2-pack window adhesive.*
- Using electric cutter - V.A.G 1561A- and scraper, 25 mm - VAS 6900/2- , cut back adhesive bead on lower part of battery to 1 ... 2 mm. Do not remove it completely.
- Use a vacuum cleaner with plastic nozzle to clean the lower part of battery until sealing material and dirt are completely removed.
- If necessary, rectify any paintwork damage in accordance with
⇒ General information, Paint; Rep. gr. 00 .
- Renew seal for high-voltage network connection.



NOTICE

Risk of damage to paintwork structure caused by activator.

- **Apply activator precisely onto adhesive bead without spilling.**
- Apply activator to bonding surface of lower part of battery. Allow activator to flash off for the prescribed flash-off time.

Preparing new upper shell of high-voltage battery

- Clean bonding surface with cleaning solution.
- Sand bonding surface.
- Clean bonding surface with cleaning solution.
- Coat bonding surface with glass/paint primer. Allow glass/paint primer to flash off for the prescribed flash-off time.

Preparations before sealing

- Check spacers for completeness and proper seating.
- Mark spacers on upper shell of high-voltage battery.
- Open one-handed clamps - VAS 6900/4- and distribute around high-voltage battery 1 - AX2- .
- Prepare bolts for upper shell of high-voltage battery.
- Prepare tools.
- Prepare 2-pack window adhesive, twice if necessary.

Sealing high-voltage battery 1 - AX2-

- Prepare double cartridge gun - VAS 5237- and 2-pack window adhesive.
- Insert new silicate bags.

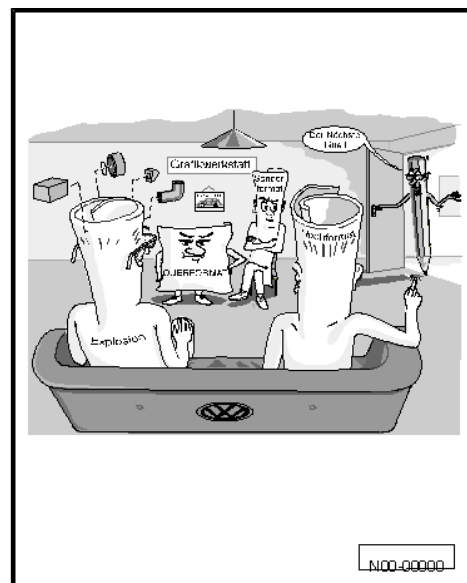


- Bend shielding -arrows- back to original position.



- ### Specified torques

-





3.12 Removing and installing module monitor control unit for batteries - J497-

DANGER

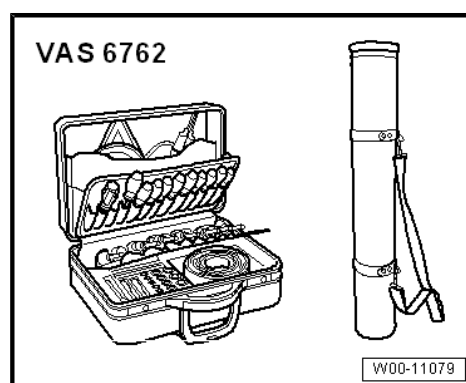
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ♦ High-voltage tool set - VAS 6762-



Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

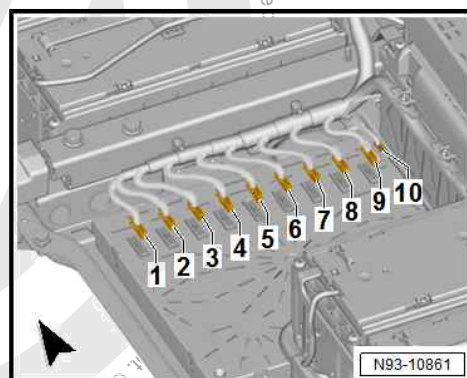
- De-energise high-voltage system ➔ [page 164](#) .
- Open high-voltage battery 1 - AX2- ➔ [page 34](#) .



Note

When connected in the wrong order, the component may become damaged.

- Pull off connectors in the sequence -1 through 10-.





- Release fasteners -2- in direction of -arrows-, respectively.
- Remove module monitor control unit for batteries - J497 - -1-.

Installing

Install in reverse order of removal, observing the following:

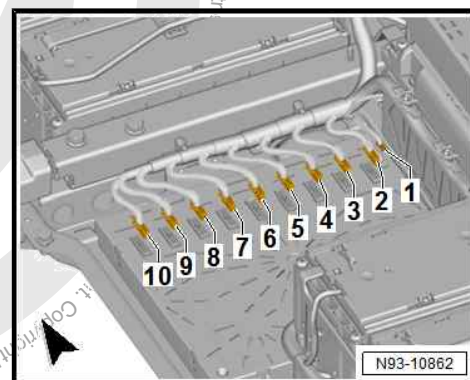
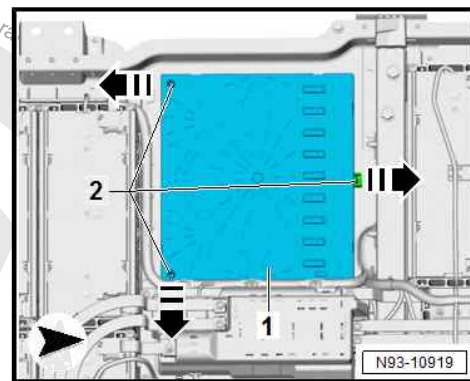
- Perform visual inspection on wiring harness ⇒ [page 57](#).



Note

When connected in the wrong order, the component may become damaged.

- Connect connectors in the sequence -1 through 10-.



3.13 Removing and installing switching unit for high-voltage battery - SX6-



DANGER

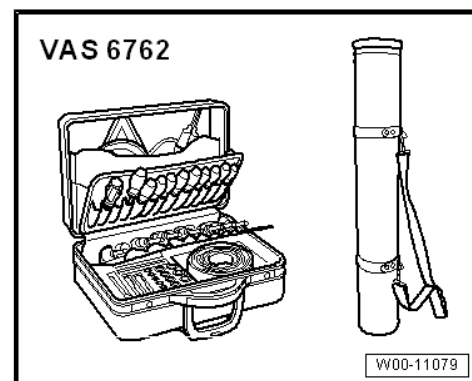
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-



Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .
- Carefully cut open cable fasteners -arrows-.

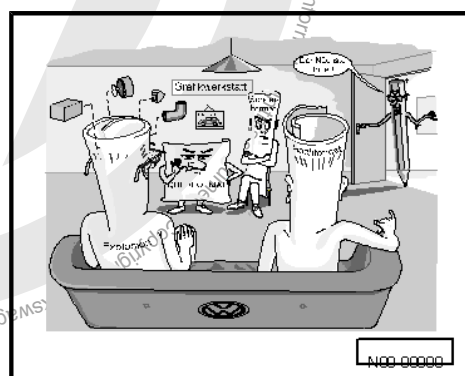
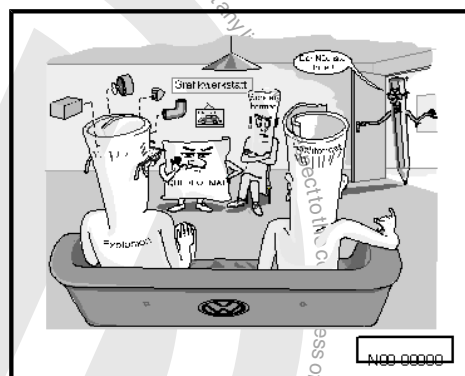
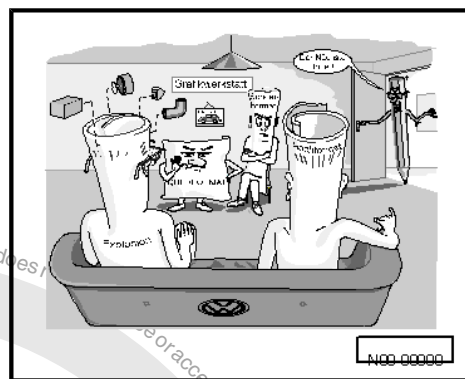


Note

Do not unclip the cable retainers, because otherwise the switching unit for high-voltage battery - SX6- may become damaged.

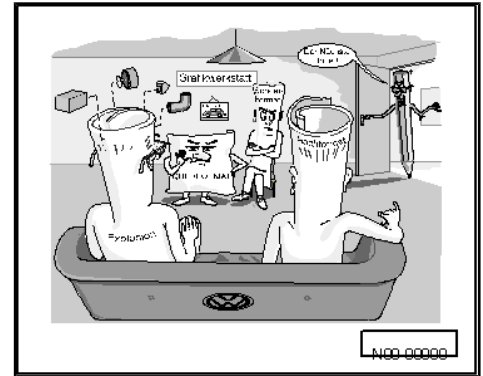
- Disconnect connectors 1 and 2- from switching unit for high-voltage battery - SX6- -3-.

- Fold up accidental contact protection cover -1-.
- Unscrew bolt -2-.
- Unscrew nut -3-.
- Disconnect electrical connector -4-.

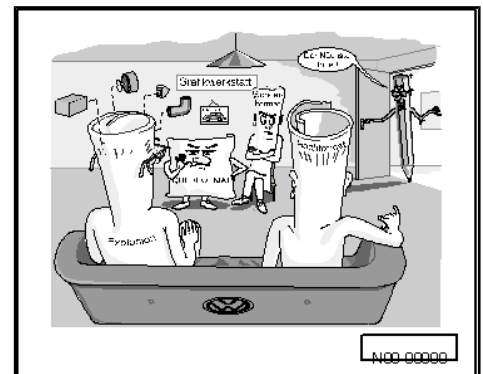




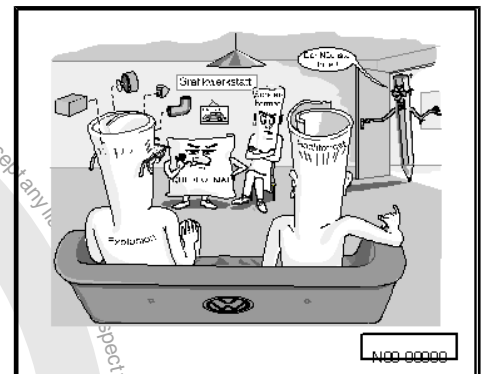
- Unclip cable retainer -1- -arrow-, and detach it in -direction of arrow-.
- Remove high-voltage connecting piece between battery module 0 - J1068- and switching unit for high-voltage battery - SX6- .
- Fold down accidental contact protection cover.



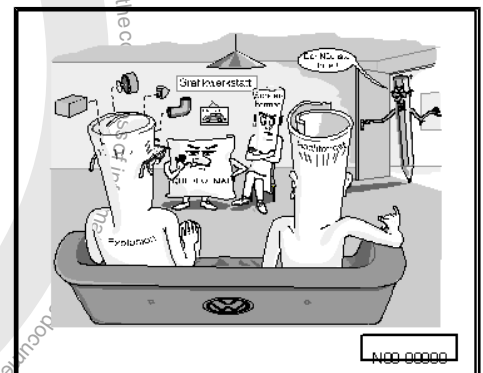
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between switching unit for high-voltage battery - SX6- and battery module 16 - J1048- .
- Fold down accidental contact protection cover.



- Unscrew bolts -1-.
- Pull cables back slightly.



- Unscrew bolts -3-.
- Detach charging cables -1 and 2-.





- Unscrew bolts -2-, and detach switching unit for high-voltage battery - SX6- -1-.

Installing

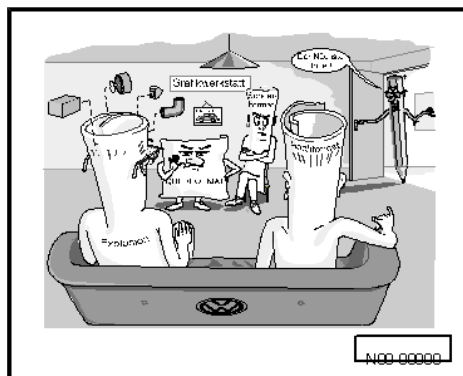
Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ➔ [page 57](#) .



Note

When connected in the wrong order, the component may become damaged.



- Connect connectors in the sequence -1 through 10-.



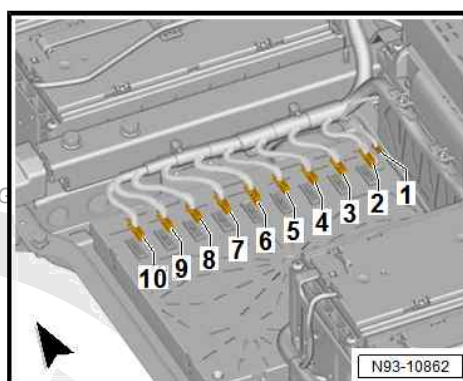
Note

The adherence to the correct specified torques must be verified by a second mechanic.

Specified torques

- ♦ ➔ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

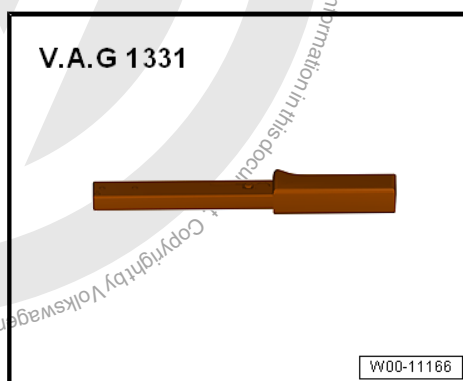
Component	Specified torque	Note
Nuts and bolts for high-voltage connecting piece	7.5 Nm	Renew
Bolts for switching unit for high-voltage battery - SX6-	9 Nm	Renew



3.14 Removing and installing battery regulation control unit - J840-

Special tools and workshop equipment required

- ♦ Torque wrench - V.A.G 1331-



Note

When replacing the battery regulation control unit - J840- there is no need to carry out a leakage test.

Removing

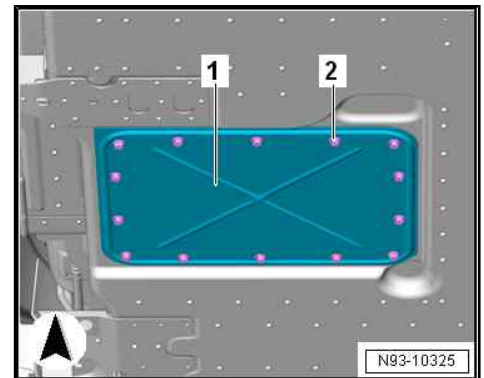
- Carry out visual inspection of high-voltage battery 1 - AX2- ➔ [page 24](#) .



- Remove underbody covers ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview - underbody covers, e-up! .
- Unscrew bolts -2-.
- Remove cover -1-.

i Note

The cover for the battery regulation control unit - J840- must be renewed following removal.

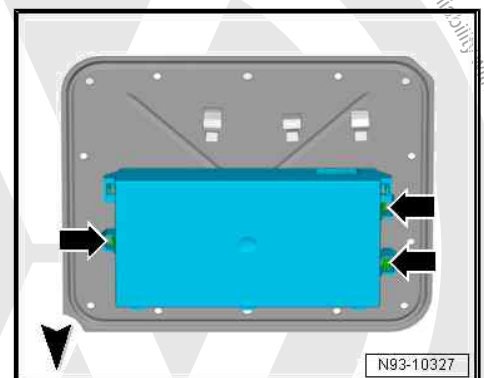
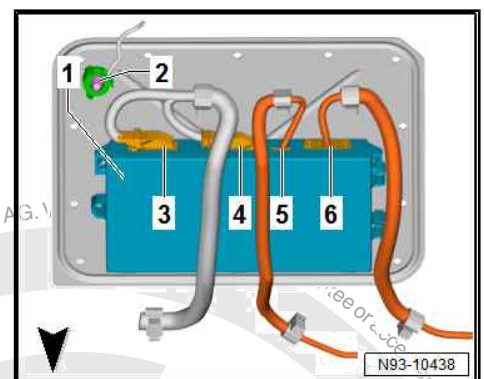


- Unscrew nut -2-.
- Remove potential equalisation line.

i Note

The cables -5 and 6- are high-voltage cables!

- Disconnect electrical connectors -3 through 6- from battery regulation control unit - J840- -1-.
- Release battery regulation control unit - J840- -arrows-, and remove it.





- Twist off retaining clips for wiring harnesses -1- in -direction of arrow-.

Installing

Install in reverse order of removal, observing the following:



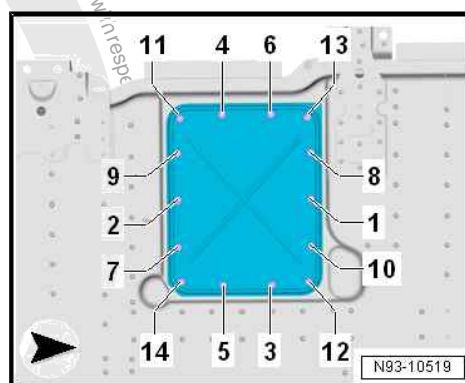
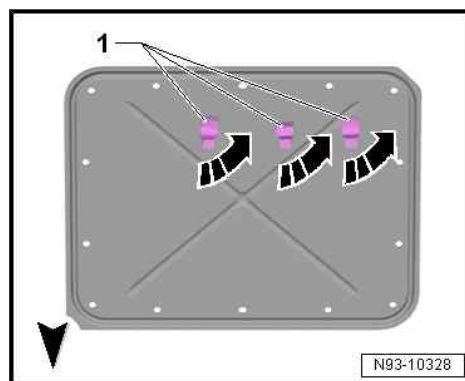
Note

- ♦ The service cover must be renewed following removal.
 - ♦ Remove the service cover from its packaging only immediately before installing.
 - ♦ Check service cover seal for damage. If the seal is damaged, a new service cover must be installed.
 - ♦ Apply four-eyes principle when installing service cover.
 - ♦ If the bolts cannot be tightened, install new cap nuts ⇒ *Electronic parts catalogue*.
- Perform visual inspection on wiring harness ⇒ [page 57](#).

Tightening sequence for service cover

Specified torques

- ♦ ⇒ [3.1 Assembly overview - high-voltage battery](#), page 17



Component	Specified torque
Nut for earth point	9 Nm

3.15 Removing and installing charge voltage control unit for high-voltage battery - J966-

Removing

- Remove front left seat ⇒ Seat frames; Rep. gr. 72 ; Front seat; Removing and installing front seat .
- Raise floor covering sufficiently for access to charge voltage control unit for high-voltage battery - J966- .

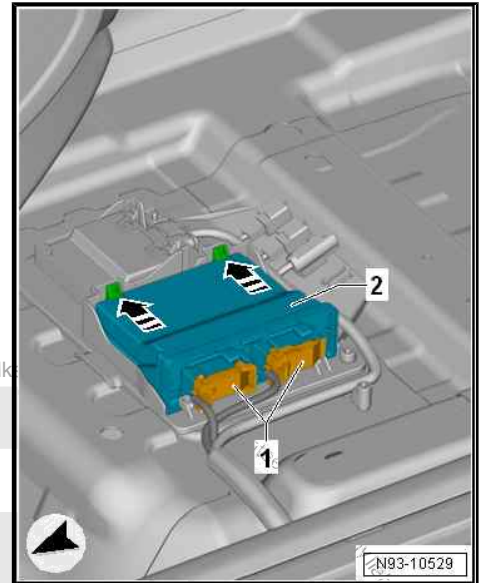


- Unplug electrical connectors -1-.
- Release locking lugs in -direction of arrow-.
- Swing out charge voltage control unit for high-voltage battery - J966- -2- upwards.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ➔ [page 57](#) .



3.16 Removing and installing cable guide

DANGER

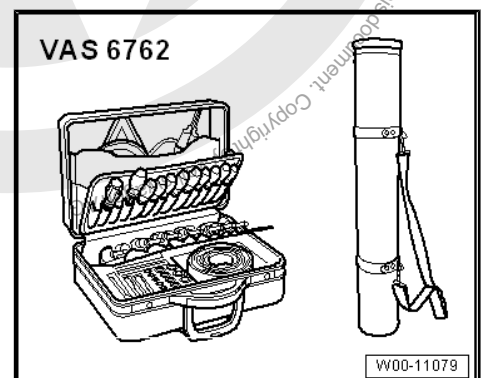
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

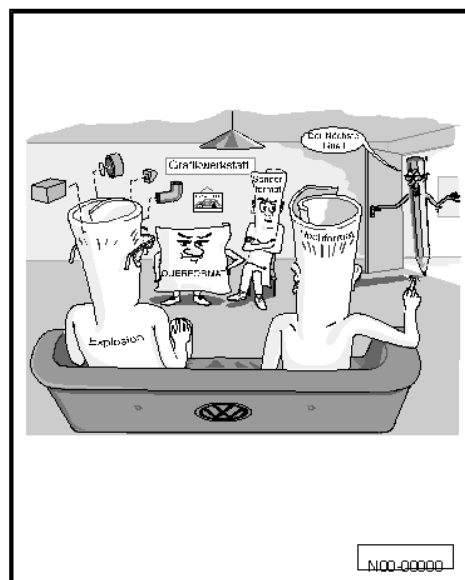
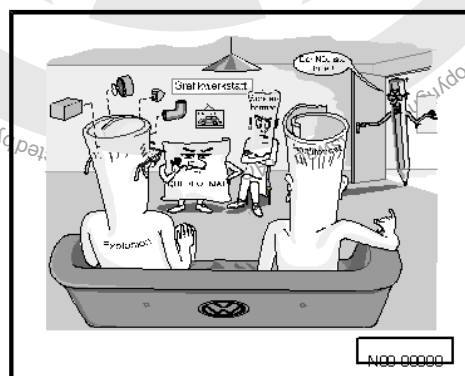
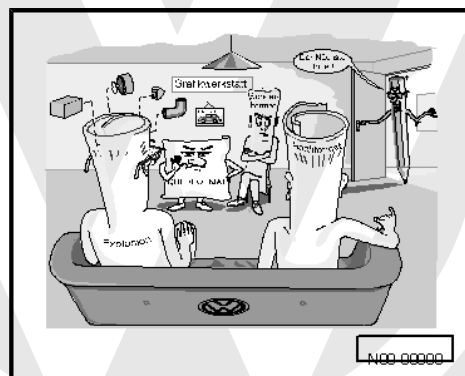
- De-energise high-voltage system ➔ [page 164](#) .



Note

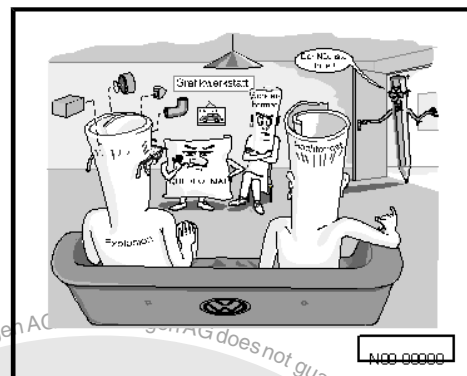
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#)
- Open electrical circuit ⇒ [page 40](#) .
- Fold up accidental contact protection cover -1-.
- Unscrew bolt -2-.
- Unscrew nut -3-.
- Disconnect electrical connector -4-.
- Unclip cable retainer -1- -arrow-, and detach it in -direction of arrow-.
- Remove high-voltage connecting piece between battery module 0 - J1068- and switching unit for high-voltage battery - SX6- .
- Fold down accidental contact protection cover.
- Carefully open cable fastener -2-, and remove wire from retainer -1-.

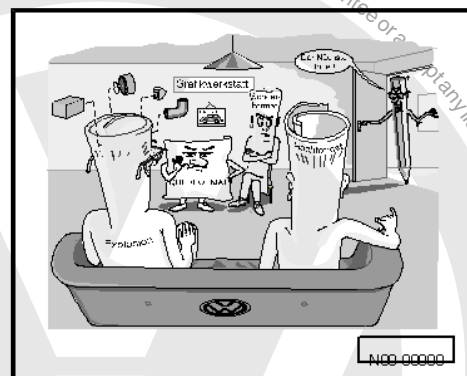




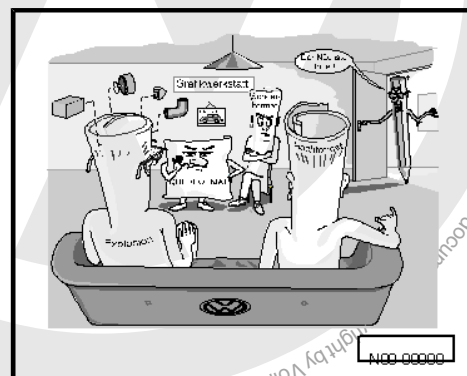
- Disconnect connectors -1, 2 and 3-.
- Lay wires of battery modules on top.



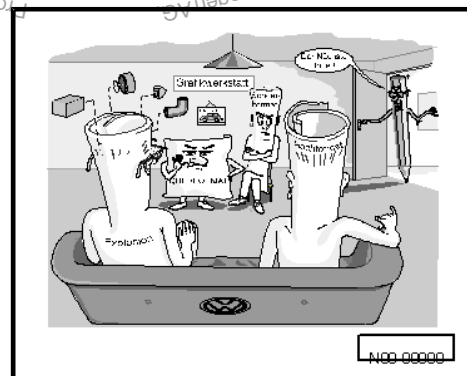
- Disconnect connectors -1, 2 and 3-.

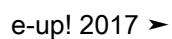


- Unclip cable retainer -arrow-, and detach it in -direction of arrow-.
- Lay wires of battery modules on top.



- Unscrew bolts -1-.





- Unscrew bolts -1-.
- Remove traction power cables.
- Remove silicate bags -1-.



- Unclip wiring harnesses -3- from cable guide -2-, and lay them to one side.
- Unscrew bolts -1-, and remove cable guide upwards.

Installing

Install in reverse order of removal, observing the following:

- Renew silicate bags.
- Perform visual inspection on wiring harness ⇒ [page 57](#) .



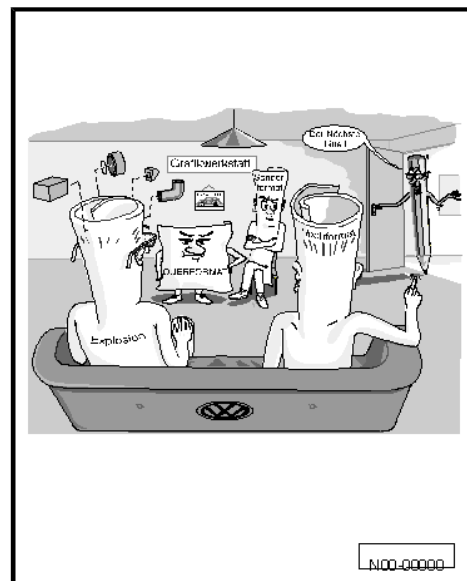
Note

The adherence to the correct specified torques must be verified by a second mechanic.

Specified torques

- ♦ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts and bolts for high-voltage connecting piece	7.5 Nm	Renew
Bolts for cable guide	8 Nm	Renew



3.17 Visual check of wiring harness



Note

After an electrical connector has been disconnected, it must be checked for damage.

Visual check of wiring harness

- ♦ Check catches for damage
- ♦ Make sure connector pins are not bent
- ♦ Make sure connector pins are properly inserted

3.18 Removing and installing battery test lead



Note

The test lead of the battery is cast into the bottom section of the battery housing. This has to be renewed for replacement of the test lead.

Removing

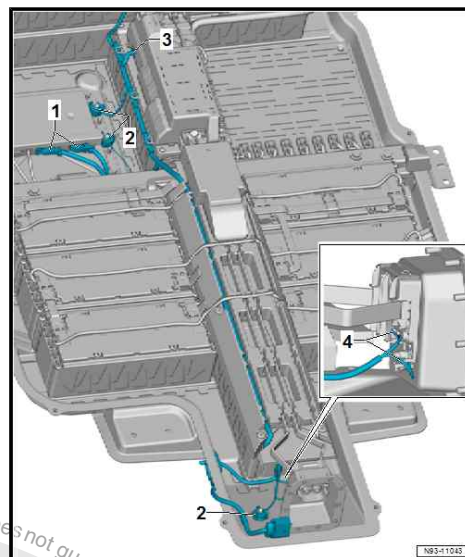
- Remove battery module 3 - J993- ⇒ [page 68](#) .
- Detach connector -1- of battery regulation control unit - J840- .
- Detach connector -2- of switching unit for high-voltage battery - SX6- .



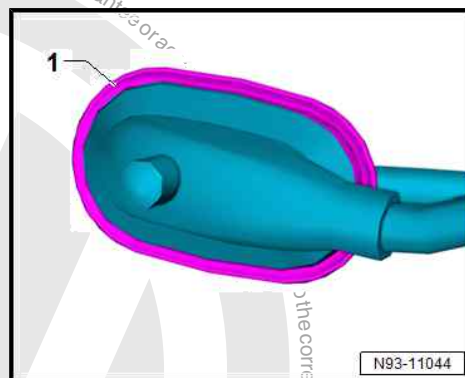
- Loosen nuts -3-.

Installing

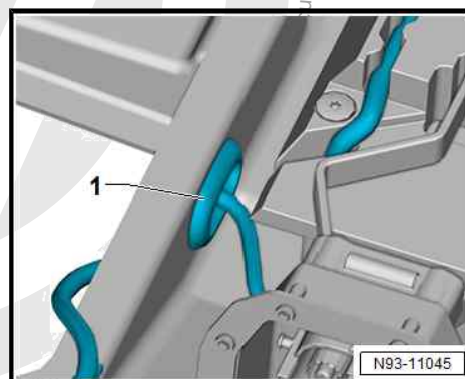
- Coat bonding surface area of cable feedthrough with glass/paint primer. Allow glass/paint primer to dry for the prescribed flash-off time.



- Prepare test lead for bonding in bottom section of battery housing. Coat cable feedthrough at sealing lip all around with 2-pack window adhesive as shown -1-.



- Fill cable feedthrough -1- with 2-pack window adhesive. Then spread adhesive on side and attach to bottom section of battery housing.
- Installation of test lead and battery module 3 - J993- is carried out in reverse order.



3.19 Discharging and charging capacitors

⚠ DANGER

Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

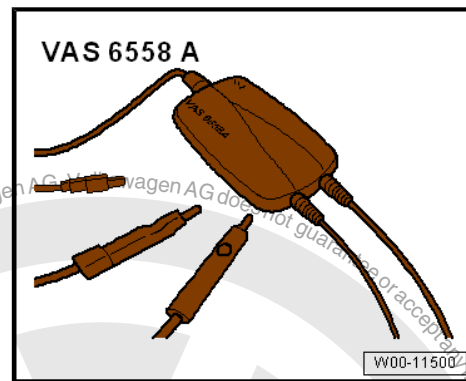
- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

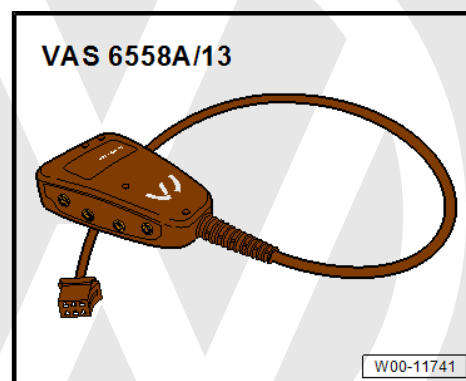
- ◆ -Vehicle diagnostic tester-



- ◆ High-voltage test module - VAS 6558 A-



- ◆ Adapter - VAS 6558A/13-



- ◆ Autonomous software - VAS 6910/5-

! DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

- ◆ *Before each repair on the high-voltage battery 1 - AX2- the capacitors must discharge and charge again when the repair is finished.*
- ◆ *The entire voltage of the high-voltage battery 1 - AX2- is stored in the capacitors until the capacitors are discharged.*
- ◆ *The capacitors are discharged using the autonomous software - VAS 6910/5- in conjunction with the high-voltage testing module - VAS 6558 A- and adapter - VAS 6558A/13- .*
- ◆ *The user is informed on the discharged capacitors through the autonomous software - VAS 6910/5- together with the high-voltage test module - VAS 6558 A- .*
- ◆ *All steps for discharging the capacitors are indicated via the autonomous software - VAS 6910/5- .*

Discharging capacitors

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



- Start autonomous software - VAS 6910/5- in the ⇒ Vehicle diagnostic tester.



Note

- ♦ *The further procedure for the discharging and charging the capacitors is shown via the autonomous software - VAS 6910/5-.*
- ♦ *All steps in the autonomous software - VAS 6910/5- must be carried out as described.*

Charging capacitors

- Charging the capacitors is done in reverse order, observing the following:
- Perform visual inspection on wiring harness ⇒ [page 57](#) .

3.20 Removing and installing capacitors

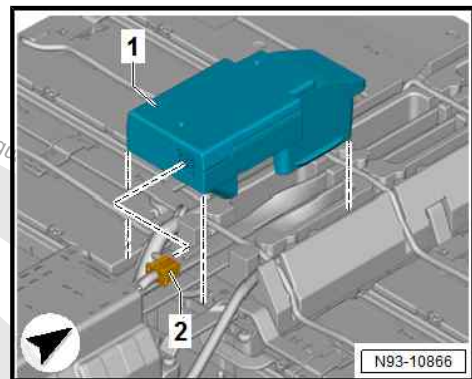
Removing

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Separate electrical connector -2-.
- Remove capacitors with protective housing -1- upwards.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .
- Charge capacitors ⇒ [page 58](#) .



3.21 Charging and discharging the battery modules

DANGER

Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

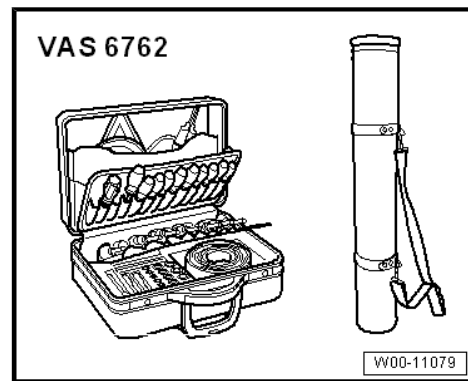
- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ♦ -Vehicle diagnostic tester-



- ◆ High-voltage tool set - VAS 6762-



- ◆ Autonomous software - VAS 6910/5-
- ◆ Module balancer - VAS 6910-

Procedure

DANGER

**Danger to life due to high voltage.
Severe or fatal injury due to electric shock.**

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .
- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .
- Discharge capacitors ⇒ [page 58](#) .
- Remove the corresponding battery module ⇒ [page 62](#) .



Note

If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- .

- Start autonomous software - VAS 6910/5- in the ⇒ Vehicle diagnostic tester.



Note

- ◆ *The further procedure for discharging and charging the capacitors using the module balancer - VAS 6910- is shown via the autonomous software - VAS 6910/5- .*
- ◆ *All steps in the autonomous software - VAS 6910/5- must be carried out as described.*



3.22 Removing and installing battery modules

⇒ ["3.22.1 Removing and installing battery module 0 J1068", page 62](#)

⇒ ["3.22.2 Removing and installing battery module 1 J991", page 64](#)

⇒ ["3.22.3 Removing and installing battery module 2 J992", page 66](#)

⇒ ["3.22.4 Removing and installing battery module 3 J993", page 68](#)

⇒ ["3.22.5 Removing and installing battery module 4 J994", page 71](#)

⇒ ["3.22.6 Removing and installing battery module 5 J995", page 73](#)

⇒ ["3.22.7 Removing and installing battery module 6 J996", page 75](#)

⇒ ["3.22.8 Removing and installing battery module 7 J997", page 79](#)

⇒ ["3.22.9 Removing and installing battery module 8 J998", page 81](#)

⇒ ["3.22.10 Removing and installing battery module 9 J999", page 84](#)

⇒ ["3.22.11 Removing and installing battery module 10 J1000", page 86](#)

⇒ ["3.22.12 Removing and installing battery module 11 J1001", page 89](#)

⇒ ["3.22.13 Removing and installing battery module 12 J1002", page 91](#)

⇒ ["3.22.14 Removing and installing battery module 13 J1045", page 94](#)

⇒ ["3.22.15 Removing and installing battery module 14 J1046", page 97](#)

⇒ ["3.22.16 Removing and installing battery module 15 J1047", page 99](#)

⇒ ["3.22.17 Removing and installing battery module 16 J1048", page 102](#)

3.22.1 Removing and installing battery module 0 - J1068-

DANGER

Danger to life due to high voltage.

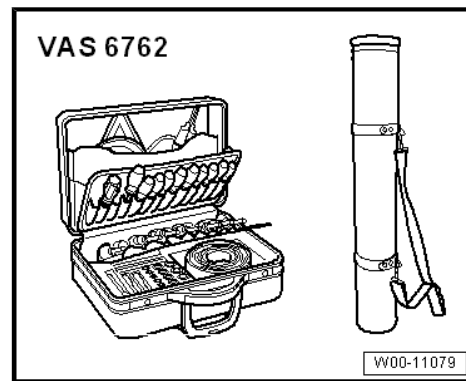
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required



- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

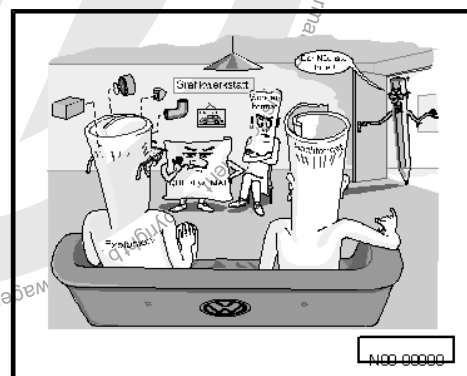
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery -1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



Note

- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove cable guide ⇒ [page 53](#) .
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 0 - J1068- and battery module 1 - J991- .
- Fold down accidental contact protection cover -1-.





- Unscrew bolts -2-, and remove battery module 0 - J1068- -1-.

**Note**

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

Perform visual inspection on wiring harness ➔ [page 57](#) .

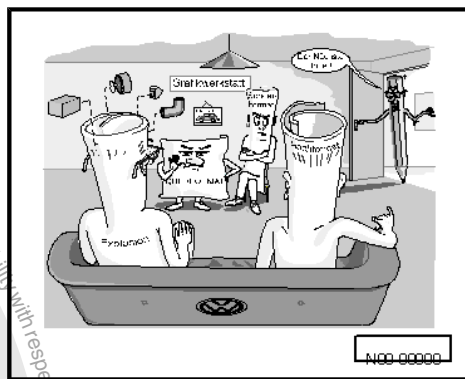
**Note**

- ◆ The battery module must be properly seated in the mounting.
 - ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
 - ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ➔ [page 47](#) .

Specified torques

- ◆ ➔ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.2 Removing and installing battery module 1 - J991-

**DANGER**

Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

-
- VAS 6762**
- Diagram illustrating the VAS 6762 carrying case, showing the open case with internal compartments and the closed case with a carrying strap.
- W00-11079

- ! DANGER**

Severe or fatal injury due to electric shock.

- 



- Unscrew bolts -2-, and remove battery module 1 - J991- -1-.

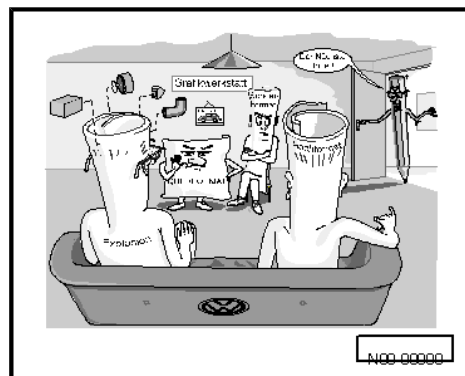
**Note**

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ➔ [page 57](#) .

**Note**

- ♦ The battery module must be properly seated in the mounting.
- ♦ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ♦ The adherence to the correct specified torques must be verified by a second mechanic.

- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ➔ [page 47](#) .

Specified torques

- ♦ ➔ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.3 Removing and installing battery module 2 - J992-

**DANGER**

Danger to life due to high voltage.

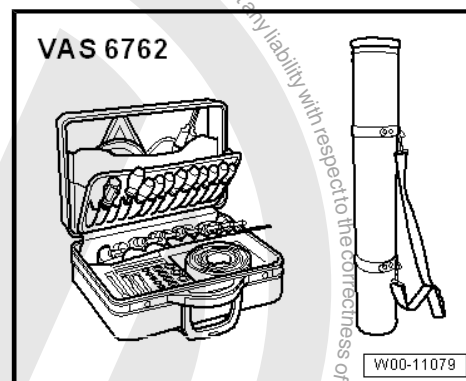
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required



◆ High-voltage tool set - VAS 6762-



◆ High-voltage tool set VAS 6883-

Removing

! DANGER

**Danger to life due to high voltage.
Severe or fatal injury due to electric shock.**

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

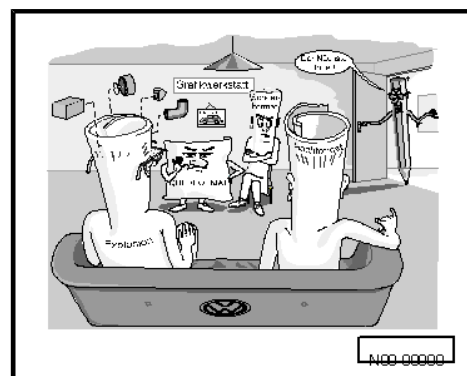
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



Note

- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove cable guide ⇒ [page 53](#) .
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 3 - J993- and battery module 4 - J994- .
- Fold down accidental contact protection cover -1-.



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 2 - J992- and battery module 3 - J993- .
- Fold down accidental contact protection cover -1-.



- Unscrew bolts -2-, and remove battery module 2 - J992- -1-



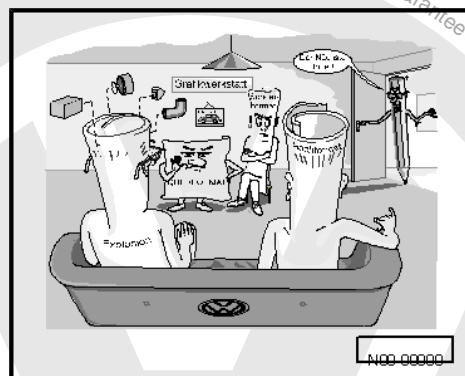
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness → page 57



Note

- ◆ *The battery module must be properly seated in the mounting.*
- ◆ *Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.*
- ◆ *The adherence to the correct specified torques must be verified by a second mechanic.*
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ **page 47**.

Specified torques

- ◆ ⇒ “3.1 Assembly overview - high-voltage battery”, page 17

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.4 Removing and installing battery module



DANGER

Danger to life due to high voltage.

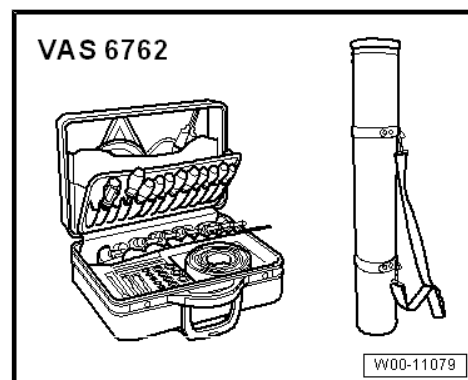
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.



Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2 ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .

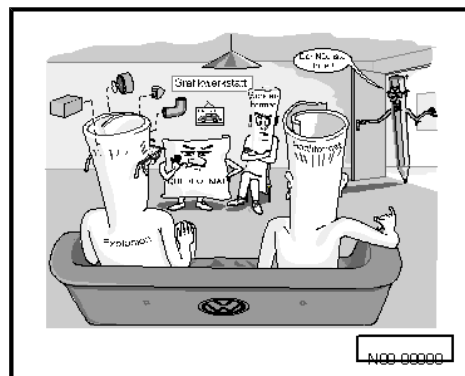


Note

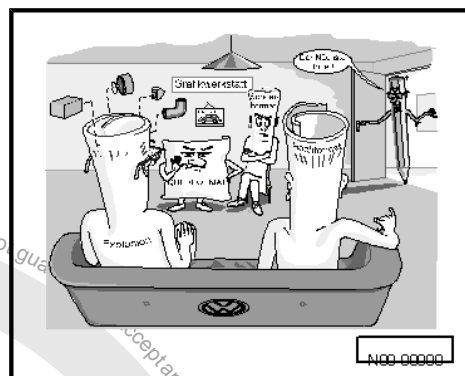
- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove cable guide ⇒ [page 53](#) .



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 3 - J993- and battery module 4 - J994- .
- Fold down accidental contact protection cover -1-.



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 2 - J992- and battery module 3 - J993- .
- Fold down accidental contact protection cover -1-.



- Unscrew bolts -2- and remove battery module 3 - J993- -1-.



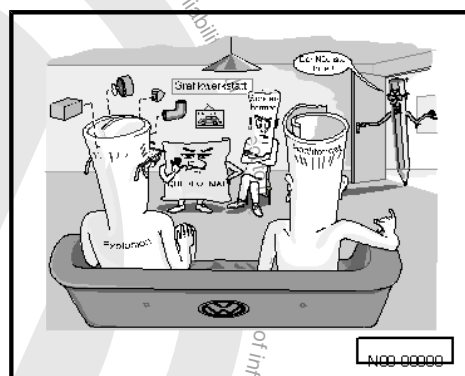
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.

- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ ["3.1 Assembly overview - high-voltage battery", page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.5 Removing and installing battery module 4 - J994-

! DANGER

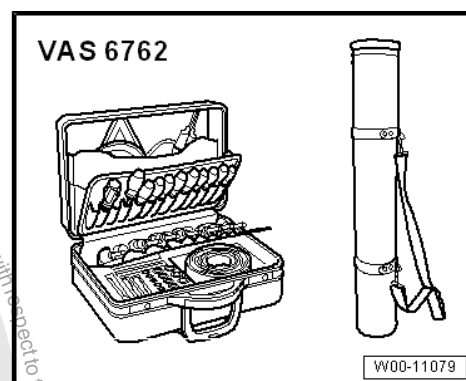
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

! DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

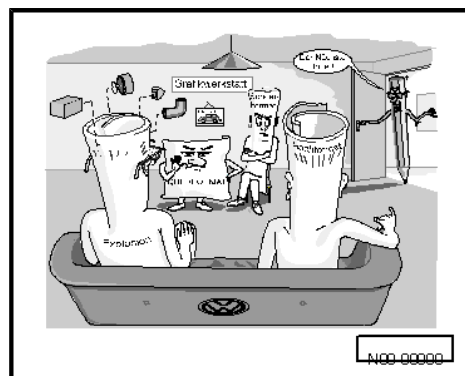
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



Note

- ◆ If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .
- ◆ Mark the installation position of the connectors and high-voltage connecting pieces.
- Remove cable guide ⇒ [page 53](#) .
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 3 - J993- and battery module 4 - J994- .
- Fold down accidental contact protection cover -1-.

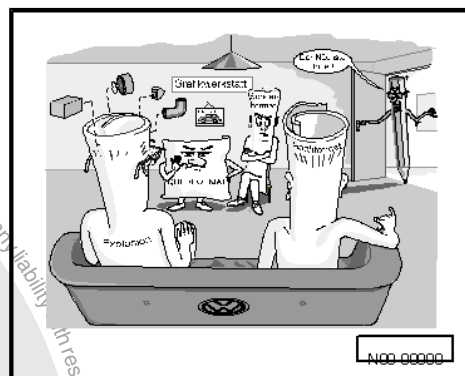


- Unscrew bolts -2-, and remove battery module 4 - J994- -1-.



Note

- ◆ The illustration shows battery module 2 - J992- .
- ◆ Place battery module on a clean surface with the battery terminals facing upwards and cover it.



Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor/control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.6 Removing and installing battery module 5 - J995-

⚠ DANGER

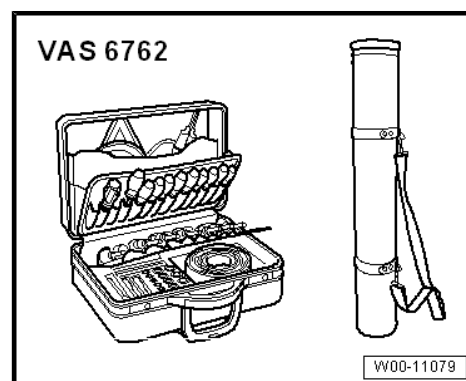
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

⚠ DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

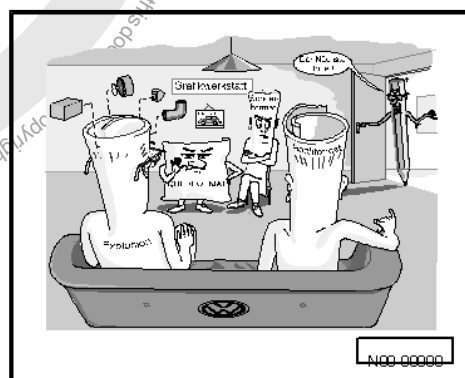
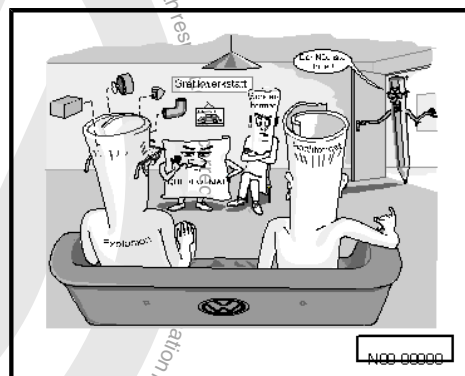
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



Note

- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ➤ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove cable guide ➤ [page 53](#) .
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 3 - J993- and battery module 4 - J994- .
- Fold down accidental contact protection cover -1-.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 5 - J995- and battery module 6 - J996- .
- Fold down accidental contact protection cover -1-.





- Unscrew bolts -2-, and remove battery module 5 - J995- -1-.



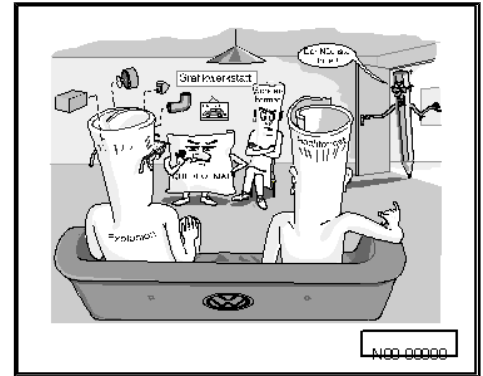
Note

- ◆ The illustration shows battery module 1 - J991-.
- ◆ Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
 - ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
 - ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#).

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.7 Removing and installing battery module 6 - J996-



DANGER

Danger to life due to high voltage.

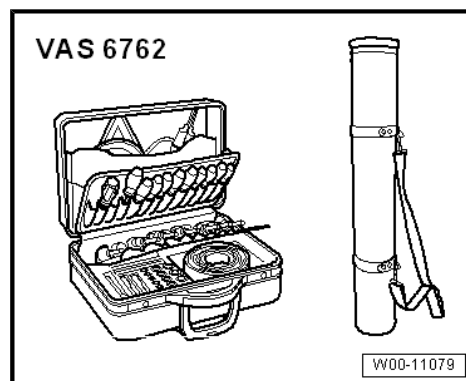
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required



- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ➔ [page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ➔ [page 34](#) .
- Open electrical circuit ➔ [page 40](#) .

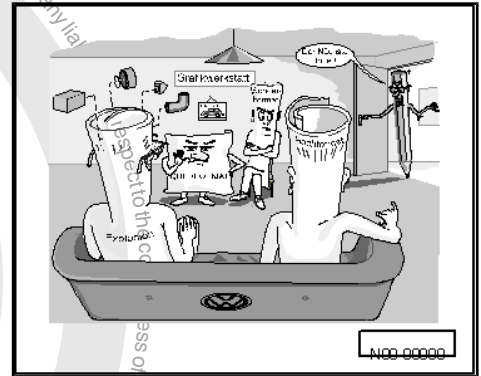


Note

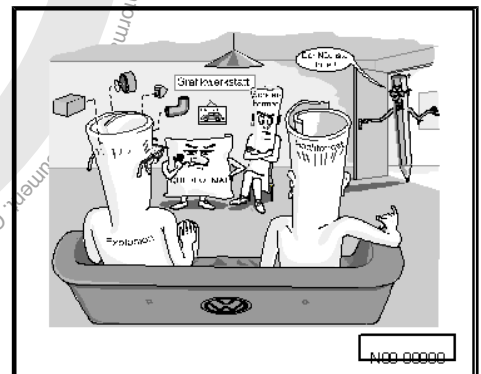
- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ➔ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove cable guide ➔ [page 53](#) .
- Remove switching unit for high-voltage battery - SX6- ➔ [page 47](#) .



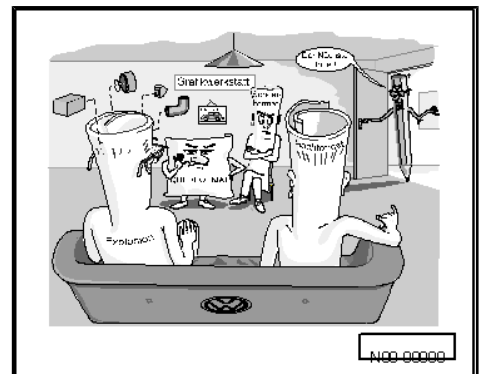
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 3 - J993- and battery module 4 - J994- .
- Fold down accidental contact protection cover -1-.



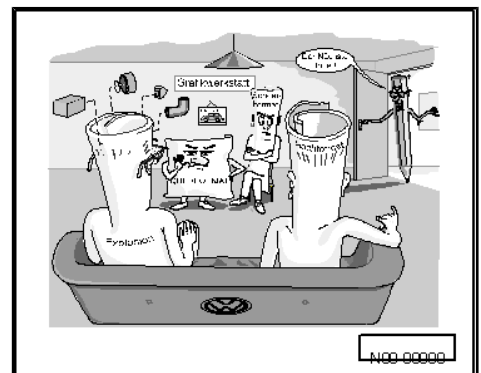
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 2 - J992- and battery module 3 - J993- .
- Fold down accidental contact protection cover -1-.



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 5 - J995- and battery module 6 - J996- .
- Fold down accidental contact protection cover -1-.

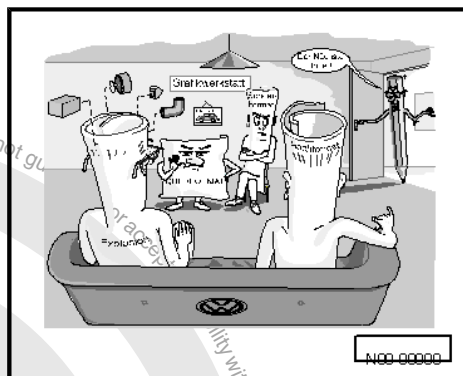


- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 7 - J997- and battery module 8 - J998- .
- Fold down accidental contact protection cover -1-.

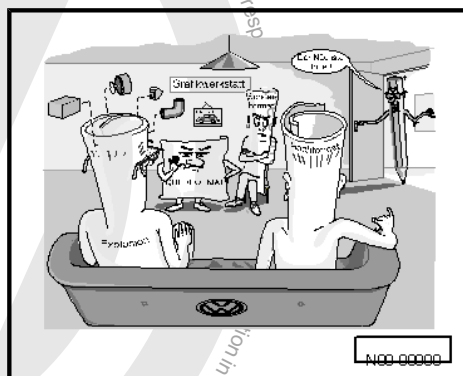




- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 6 - J996- and battery module 7 - J997- .
- Fold down accidental contact protection cover -1-.



- Disconnect connector -arrow-, and lay wire -1- to one side.

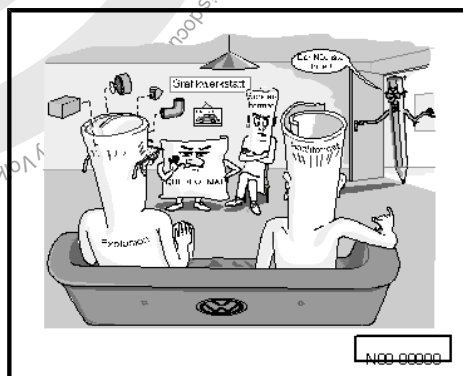


- Unscrew bolts -2-, and remove battery module 6 - J996- -1-.



Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.



Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ➔ [page 57](#) .



Note

- ♦ The battery module must be properly seated in the mounting.
 - ♦ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
 - ♦ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ➔ [page 47](#) .

Specified torques

- ♦ ➔ ["3.1 Assembly overview - high-voltage battery", page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.8 Removing and installing battery module 7 - J997-

DANGER

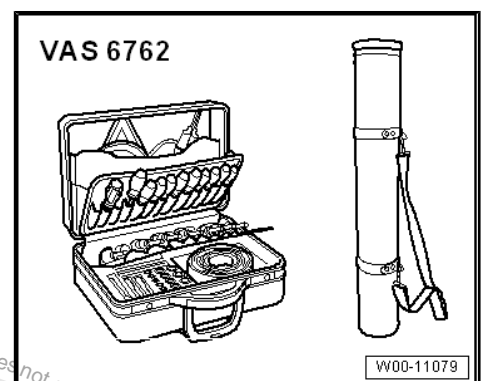
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

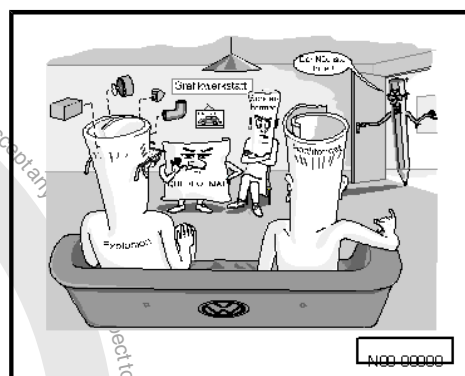
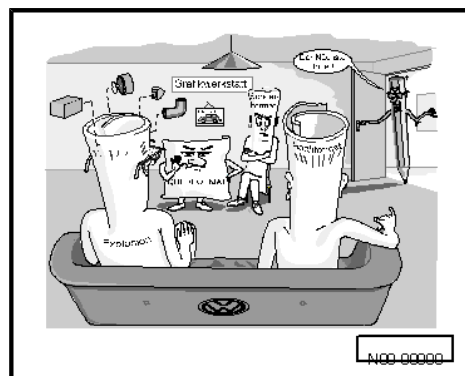
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



Note

- ◆ If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .
- ◆ Mark the installation position of the connectors and high-voltage connecting pieces.
- Remove cable guide ⇒ [page 53](#) .
- Remove switching unit for high-voltage battery - SX6- ⇒ [page 47](#) .
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 7 - J997- and battery module 8 - J998- .
- Fold down accidental contact protection cover -1-.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 6 - J996- and battery module 7 - J997- .
- Fold down accidental contact protection cover -1-.





- Unscrew bolts -2-, and remove battery module 7 - J997- -1-.

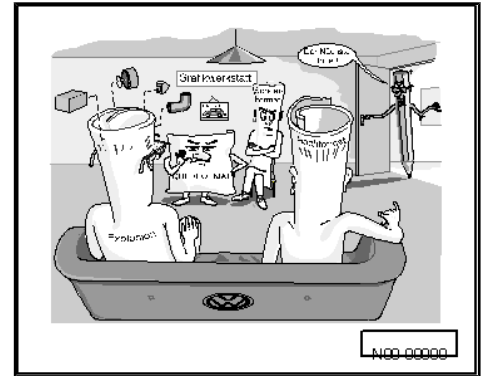
Note

- ◆ The illustration shows battery module 0 - J1068-.
- ◆ Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.9 Removing and installing battery module 8 - J998-

! DANGER

Danger to life due to high voltage.

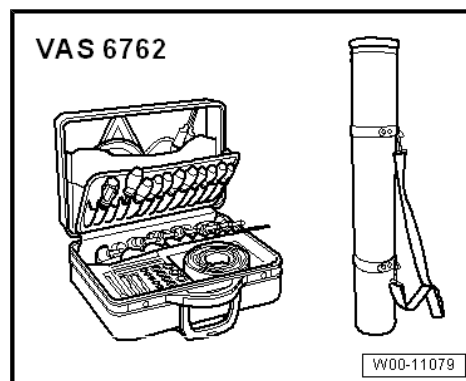
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required



◆ High-voltage tool set - VAS 6762-



◆ High-voltage tool set - VAS 6883-

Removing

! DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .

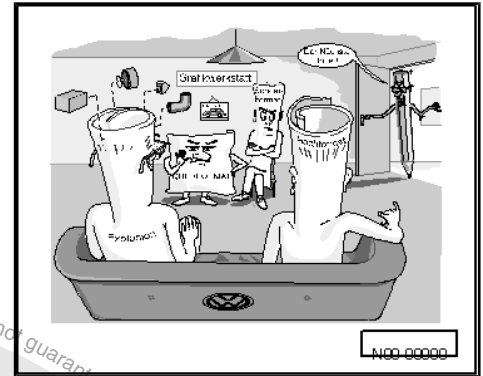


Note

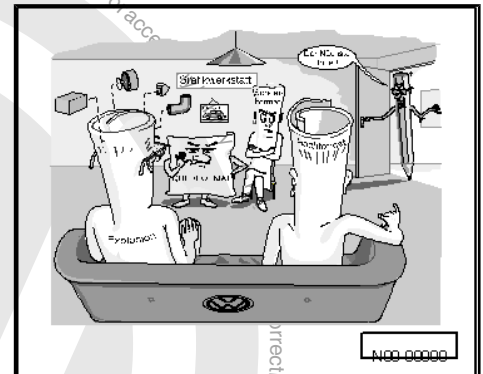
- ◆ If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .
- ◆ Mark the installation position of the connectors and high-voltage connecting pieces.
- Remove cable guide ⇒ [page 53](#) .
- Remove switching unit for high-voltage battery - SX6- ⇒ [page 47](#) .
- Remove battery module 16 - J1048- ⇒ [page 102](#) .



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 7 - J997- and battery module 8 - J998- .
- Fold down accidental contact protection cover -1-.



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 8 - J998- and battery module 9 - J999- .
- Fold down accidental contact protection cover -1-.



- Unscrew bolts -2-, and remove battery module 8 - J998- -1-.



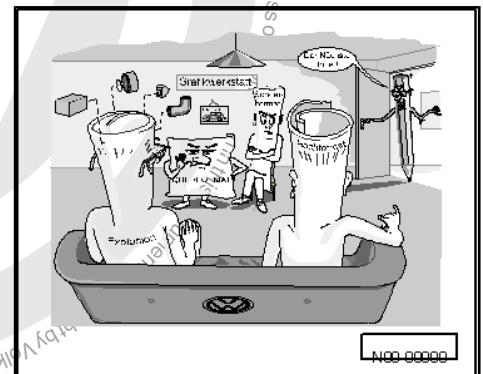
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.

- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.10 Removing and installing battery module 9 - J999-

DANGER

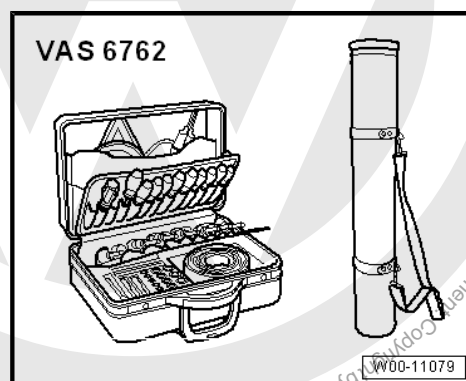
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



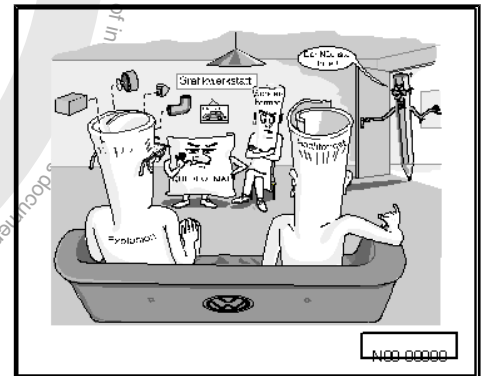
Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .

**Note**

- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove switching unit for high-voltage battery - SX6- ⇒ [page 47](#) .
- Remove battery module 15 - J1047- ⇒ [page 99](#) .
- Remove battery module 16 - J1048- ⇒ [page 102](#) .
- Unplug electrical connectors -3-.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -4- between battery module 9 - J999- and battery module 10 - J1000- .
- Fold down accidental contact protection cover -1-.





- Unscrew bolts -2-, and remove battery module 9 - J999- -1-.



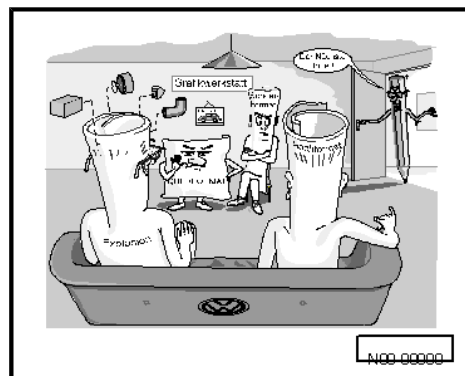
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ➔ [page 57](#) .



Note

- ♦ The battery module must be properly seated in the mounting.
 - ♦ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
 - ♦ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ➔ [page 47](#) .

Specified torques

- ♦ ➔ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.11 Removing and installing battery module 10 - J1000-



DANGER

Danger to life due to high voltage.

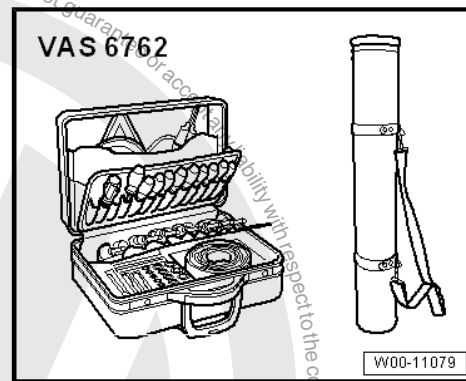
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required



- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system [⇒ page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- [⇒ page 34](#) .
- Open electrical circuit [⇒ page 40](#) .

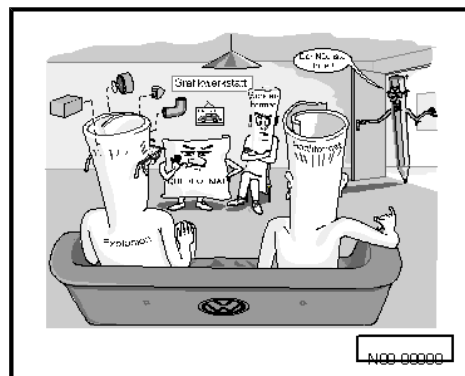


Note

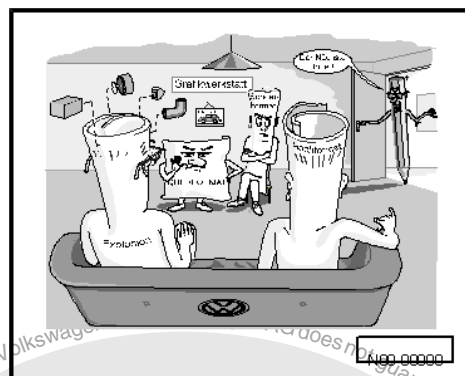
- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- [⇒ page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove switching unit for high-voltage battery - SX6- [⇒ page 47](#) .
- Remove battery module 14 - J1046- [⇒ page 97](#) .
- Remove battery module 15 - J1047- [⇒ page 99](#) .
- Remove battery module 16 - J1048- [⇒ page 102](#) .



- Unplug electrical connectors -3-.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -4- between battery module 9 - J999- and battery module 10 - J1000- .
- Fold down accidental contact protection cover -1-.



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 10 - J1000- and battery module 11 - J1001- .
- Fold down accidental contact protection cover -1-.



- Unscrew bolts -2-, and remove battery module 10 - J1000- -1-.



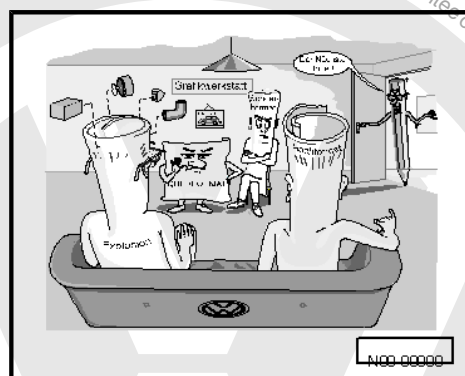
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ➔ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ➔ [page 47](#) .

Specified torques

- ◆ ➔ ["3.1 Assembly overview - high-voltage battery", page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.12 Removing and installing battery module 11 - J1001-



DANGER

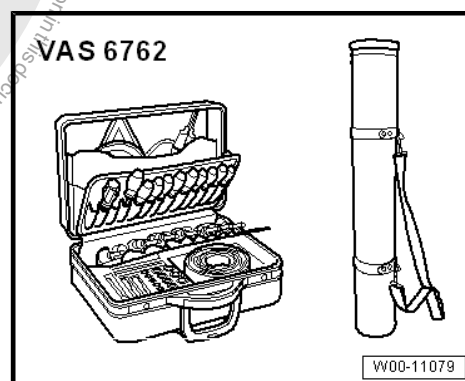
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing



DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

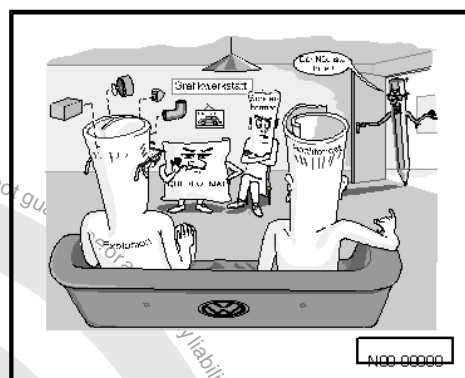
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



Note

- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ➔ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove switching unit for high-voltage battery - SX6- ➔ [page 47](#) .
- Remove battery module 13 - J1045- ➔ [page 94](#) .
- Remove battery module 14 - J1046- ➔ [page 97](#) .
- Remove battery module 15 - J1047- ➔ [page 99](#) .
- Disconnect connectors -4- of wiring harness.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 11 - J1001- and battery module 12 - J1002- .
- Fold down accidental contact protection cover -1-.





- Unscrew bolts -2-, and remove battery module 11 - J1001-1-.

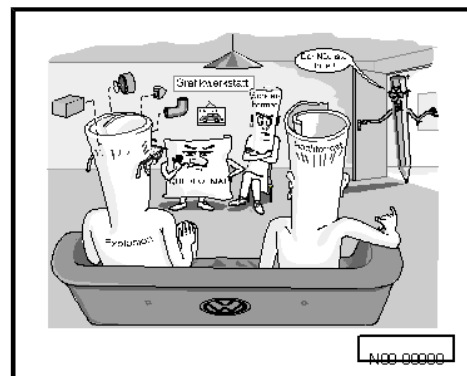
i Note

- ◆ *The illustration shows battery module 10 - J1000-.*
- ◆ *Place battery module on a clean surface with the battery terminals facing upwards and cover it.*

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



i Note

- ◆ *The battery module must be properly seated in the mounting.*
 - ◆ *Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.*
 - ◆ *The adherence to the correct specified torques must be verified by a second mechanic.*
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.13 Removing and installing battery module 12 - J1002-

⚠ DANGER

Danger to life due to high voltage.

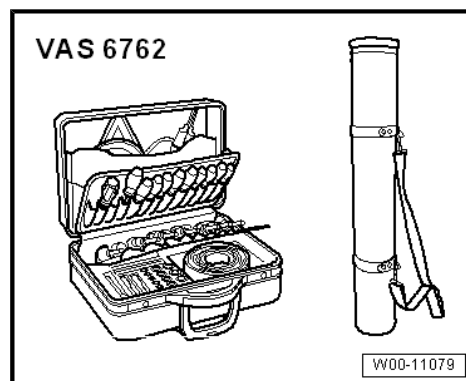
Electrical shocks will cause serious injuries or death.

- **Wear protective clothing against the thermal hazards of an electric arc.**
- **Wear an insulated helmet with face shield.**
- **Wear protective gloves.**
- **Wear safety shoes.**

Special tools and workshop equipment required



- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ➔ [page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ➔ [page 34](#) .
- Open electrical circuit ➔ [page 40](#) .

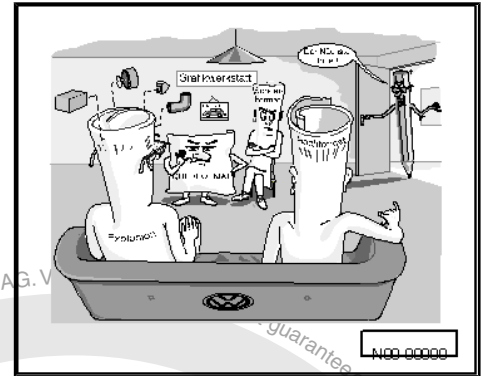


Note

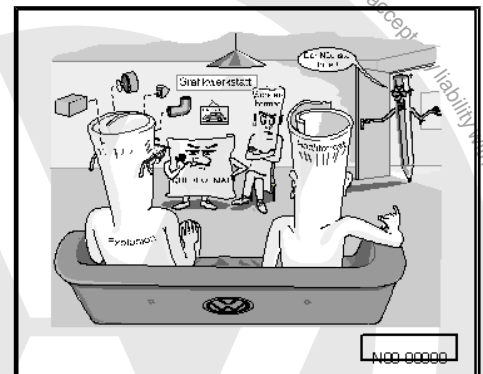
- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ➔ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Remove switching unit for high-voltage battery - SX6- ➔ [page 47](#) .
- Remove battery module 13 - J1045- ➔ [page 94](#) .
- Remove battery module 14 - J1046- ➔ [page 97](#) .



- Unclip wiring harness -arrows-.



- Disconnect connectors -4- of wiring harness.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 11 - J1001- and battery module 12 - J1002- .
- Cover high-voltage connecting piece -3- with an appropriate guard.
- Fold down accidental contact protection cover -1-.



- Fold up accidental contact protection cover -1-.
- Unscrew nut -2-.
- Remove high-voltage connecting piece -3- for battery module 12 - J1002- .
- Fold down accidental contact protection cover -1-.





- Unscrew bolts -2-, and remove battery module 12 - J1002-1-.



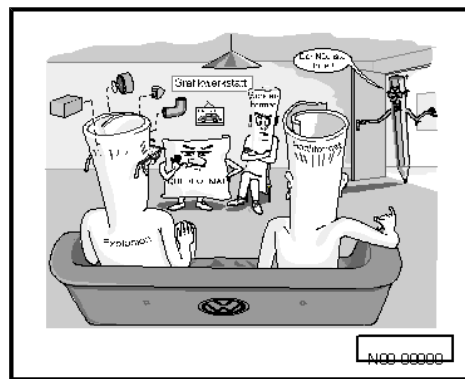
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.14 Removing and installing battery module 13 - J1045-



DANGER

Danger to life due to high voltage.

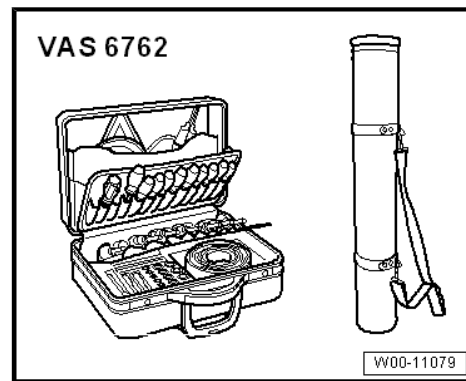
Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required



- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

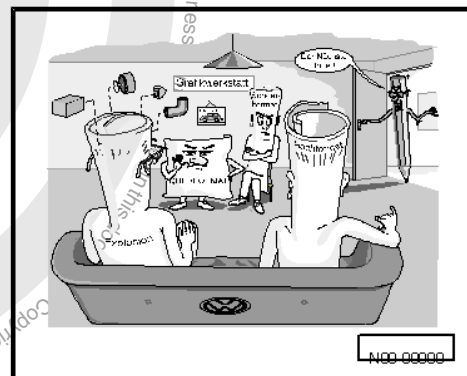
A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



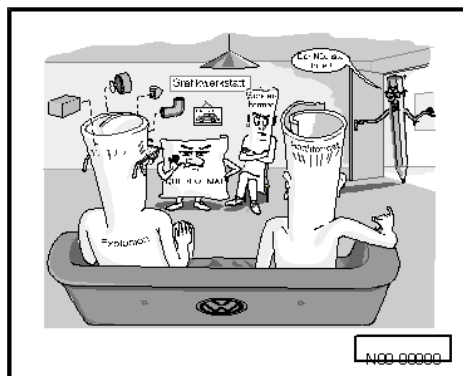
Note

- ◆ *If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#) .*
- ◆ *Mark the installation position of the connectors and high-voltage connecting pieces.*
- Disconnect connectors -4- of wiring harness.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 13 - J1045- and battery module 14 - J1046- .
- Fold up accidental contact protection cover -1-.





- Unscrew nut -2-.
- Unscrew nut -2-.
- Remove high-voltage connecting piece -3-, and cover it with an appropriate guard.



- Unscrew bolts -2-.
- Slightly pull away high-voltage connecting piece -3-, and remove battery module 13 - J1045- -1-.



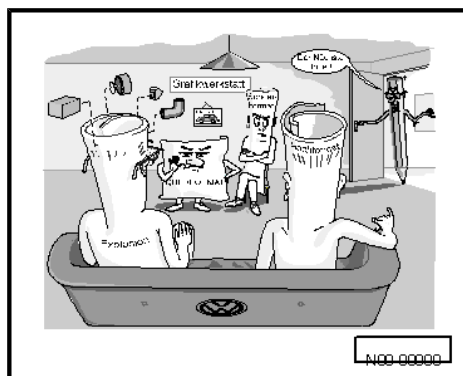
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.15 Removing and installing battery module 14 - J1046-

! DANGER

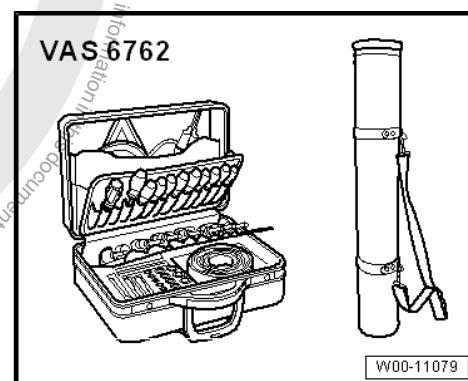
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ◆ High-voltage tool set - VAS 6762-



- ◆ High-voltage tool set - VAS 6883-

Removing

! DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

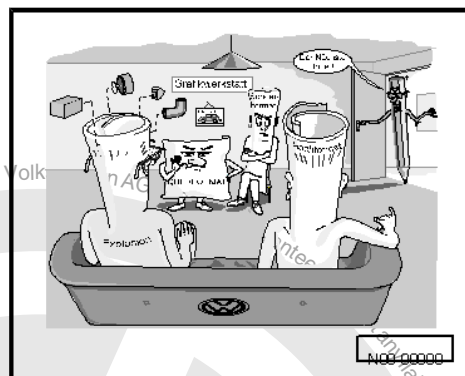
- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



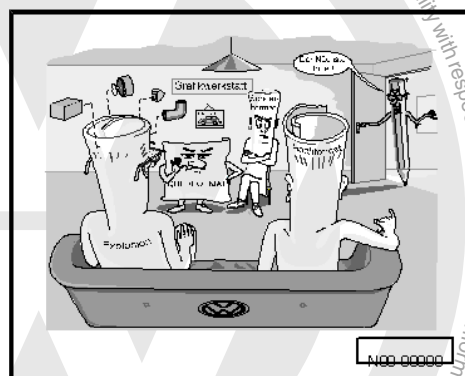
Note

- ◆ If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ➔ [page 60](#) .
- ◆ Mark the installation position of the connectors and high-voltage connecting pieces.

- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 14 - J1046- and battery module 15 - J1047- .
- Fold down accidental contact protection cover -1-.



- Disconnect connectors -4- of wiring harness.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 13 - J1045- and battery module 14 - J1046- .
- Fold up accidental contact protection cover -1-.
- Unscrew nut -2-.





- Unscrew bolts -2-, and remove battery module 14 - J1046-1-.



Note

- ◆ The illustration shows battery module 15 - J1047-.
- ◆ Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#).



Note

- ◆ The battery module must be properly seated in the mounting.
 - ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
 - ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#).

Specified torques

- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.22.16 Removing and installing battery module 15 - J1047-



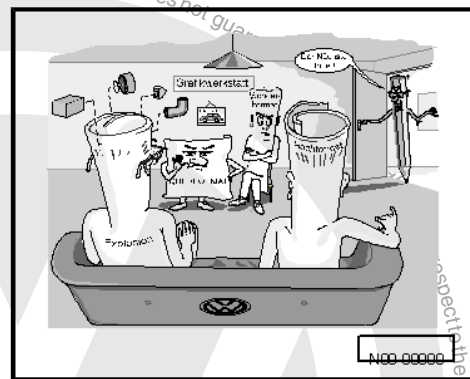
DANGER

Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

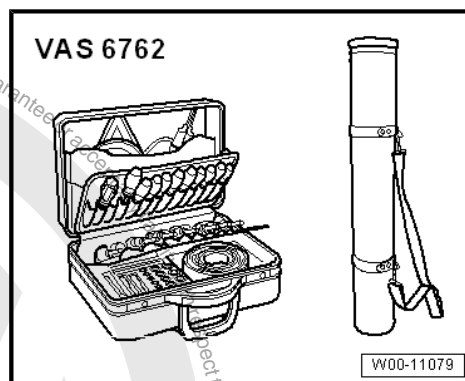
- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required





◆ High-voltage tool set - VAS 6762-



◆ High-voltage tool set - VAS 6883-

Removing

! DANGER**Danger to life due to high voltage.****Severe or fatal injury due to electric shock.**

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ➔ [page 164](#) .

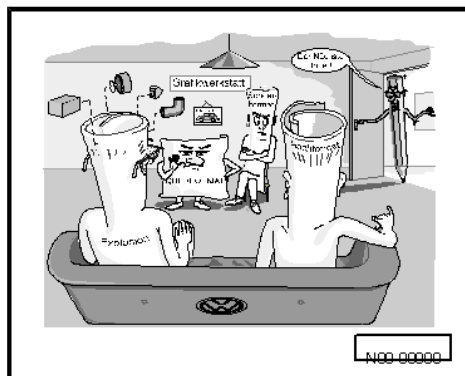
**Note**

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

- Open high-voltage battery 1 - AX2- ➔ [page 34](#) .
- Open electrical circuit ➔ [page 40](#) .

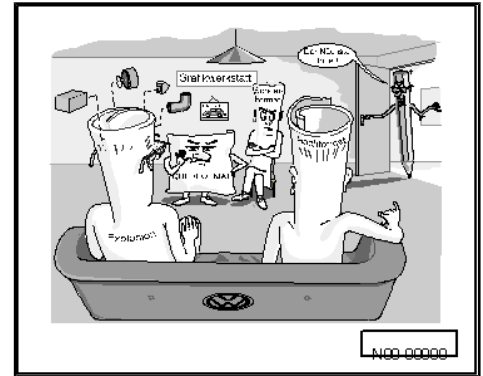
**Note**

- ◆ If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ➔ [page 60](#) .
- ◆ Mark the installation position of the connectors and high-voltage connecting pieces.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 14 - J1046- and battery module 15 - J1047- .
- Fold down accidental contact protection cover -1-.





- Unplug electrical connectors -3-.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -4- between battery module 15 - J1047- and battery module 16 - J1048- .
- Fold down accidental contact protection cover -1-.
- Fold up accidental contact protection cover -1-.



- Unscrew bolts -2-, and remove battery module 15 - J1047- -1-.



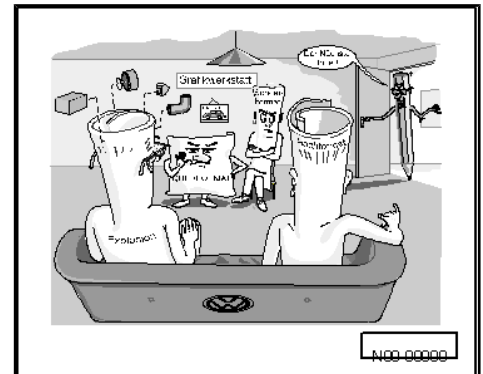
Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#).



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

- ◆ ⇒ ["3.1 Assembly overview - high-voltage battery", page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew



3.22.17 Removing and installing battery module 16 - J1048-

DANGER

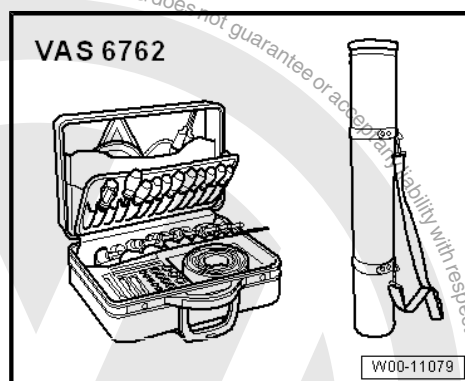
Danger to life due to high voltage.

Electrical shocks will cause serious injuries or death.

- Wear protective clothing against the thermal hazards of an electric arc.
- Wear an insulated helmet with face shield.
- Wear protective gloves.
- Wear safety shoes.

Special tools and workshop equipment required

- ♦ High-voltage tool set - VAS 6762-



- ♦ High-voltage tool set - VAS 6883-

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#).



Note

A second qualified person is required for all work on an open high-voltage battery. The second person must not actively work on the high-voltage battery, but offers assistance in the case of an accident.

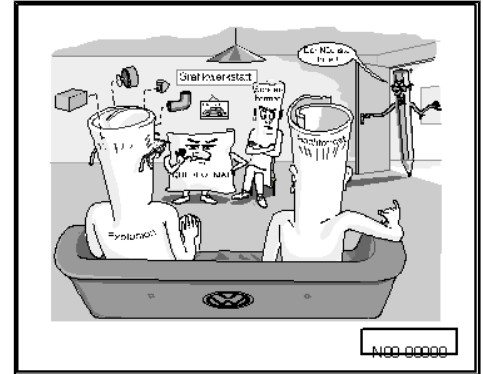
- Open high-voltage battery 1 - AX2- ⇒ [page 34](#) .
- Open electrical circuit ⇒ [page 40](#) .



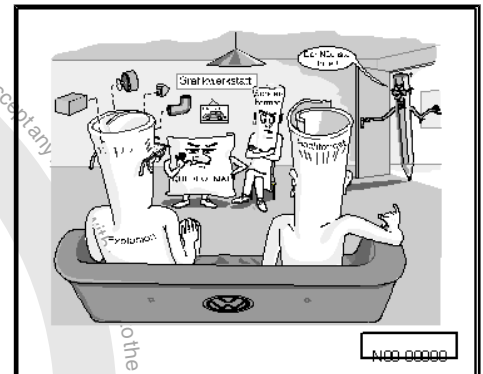
Note

- ◆ If a new battery module is installed, the charge level must be adapted with the module balancer - VAS 6910- and the autonomous software - VAS 6910/5- ⇒ [page 60](#).
- ◆ Mark the installation position of the connectors and high-voltage connecting pieces.

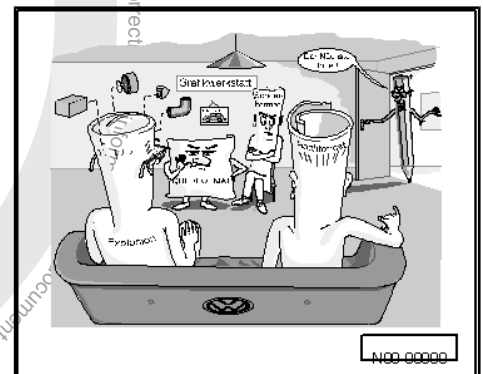
- Unscrew bolts -3-, and remove charging cables -1 and 2-.



- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between switching unit for high-voltage battery - SX6- and battery module 16 - J1048-
- Fold down accidental contact protection cover -1-.



- Unplug electrical connectors -3-.
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -4- between battery module 15 - J1047- and battery module 16 - J1048-.
- Fold down accidental contact protection cover -1-.
- Fold up accidental contact protection cover -1-.





- Unscrew bolts -2-, and remove battery module 16 - J1048-1-.



Note

Place battery module on a clean surface with the battery terminals facing upwards and cover it.

Installing

Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .



Note

- ◆ The battery module must be properly seated in the mounting.
- ◆ Every time a high-voltage connecting piece has been installed, subsequent measurements must be performed to make sure it is not short-circuited to the housing.
- ◆ The adherence to the correct specified torques must be verified by a second mechanic.
- Adhere to the correct sequence when connecting the module monitor control unit for batteries - J497- ⇒ [page 47](#) .

Specified torques

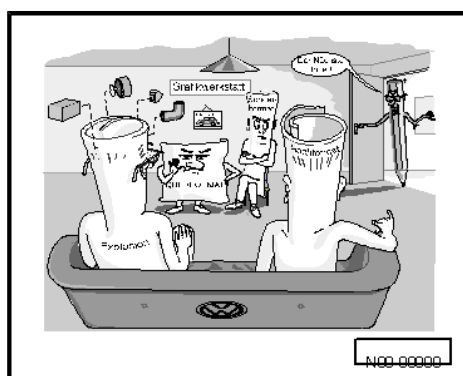
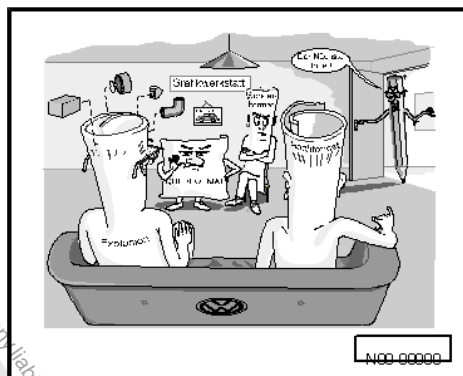
- ◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts for high-voltage connecting piece	7.5 Nm	Renew

3.23 Removing and installing crash bar

Removing

- Remove switching unit for high-voltage battery - SX6- ⇒ [page 47](#) .
- Fold up accidental contact protection cover -1-.
- Unscrew nuts -2-.
- Remove high-voltage connecting piece -3- between battery module 7 - J997- and battery module 8 - J998- .
- Fold down accidental contact protection cover -1-.





- Unscrew bolts -2-.
- Carefully remove crash bar -1- from battery.

Installing

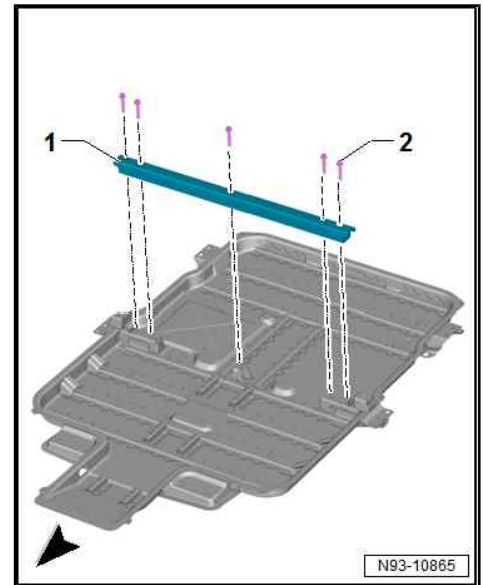
Install in reverse order of removal, observing the following:

- Perform visual inspection on wiring harness ⇒ [page 57](#) .

Specified torques

◆ ⇒ [“3.1 Assembly overview - high-voltage battery”, page 17](#)

Component	Specified torque	Note
Nuts and bolts for high-voltage connecting piece	7.5 Nm	Renew
Bolts for switching unit for high-voltage battery - SX6-	9 Nm	Renew
Bolts for crash bar	35 Nm	





4 Power and control electronics for electric drive

⇒ "4.1 Assembly overview - power and control electronics for electric drive", page 106

⇒ "4.2 Removing and installing power and control electronics for electric drive JX1", page 107

⇒ "4.3 Removing and installing high-voltage system fuse 3 S353", page 111

4.1 Assembly overview - power and control electronics for electric drive

1 - Bolts

- ☐ Qty. 7
- ☐ Renew after removal
- ☐ Observe tightening sequence ⇒ [page 111](#)
- ☐ 7 Nm

2 - Cover

3 - Safety cover

- ☐ Renew after removal

4 - Bolts

- ☐ Qty. 2
- ☐ 2.7 Nm

5 - High-voltage system fuse 3 S353-

- ☐ Removing and installing ⇒ [page 111](#)

6 - Bolts

- ☐ Qty. 4
- ☐ 20 Nm

7 - Cover

8 - Nuts

- ☐ Qty. 2
- ☐ 15 Nm

9 - Battery positive and negative cables

- ☐ Between voltage converter - A19- and battery

10 - Power and control electronics for electric drive - JX1-

- ☐ Removing and installing ⇒ [page 107](#)

11 - Bolts

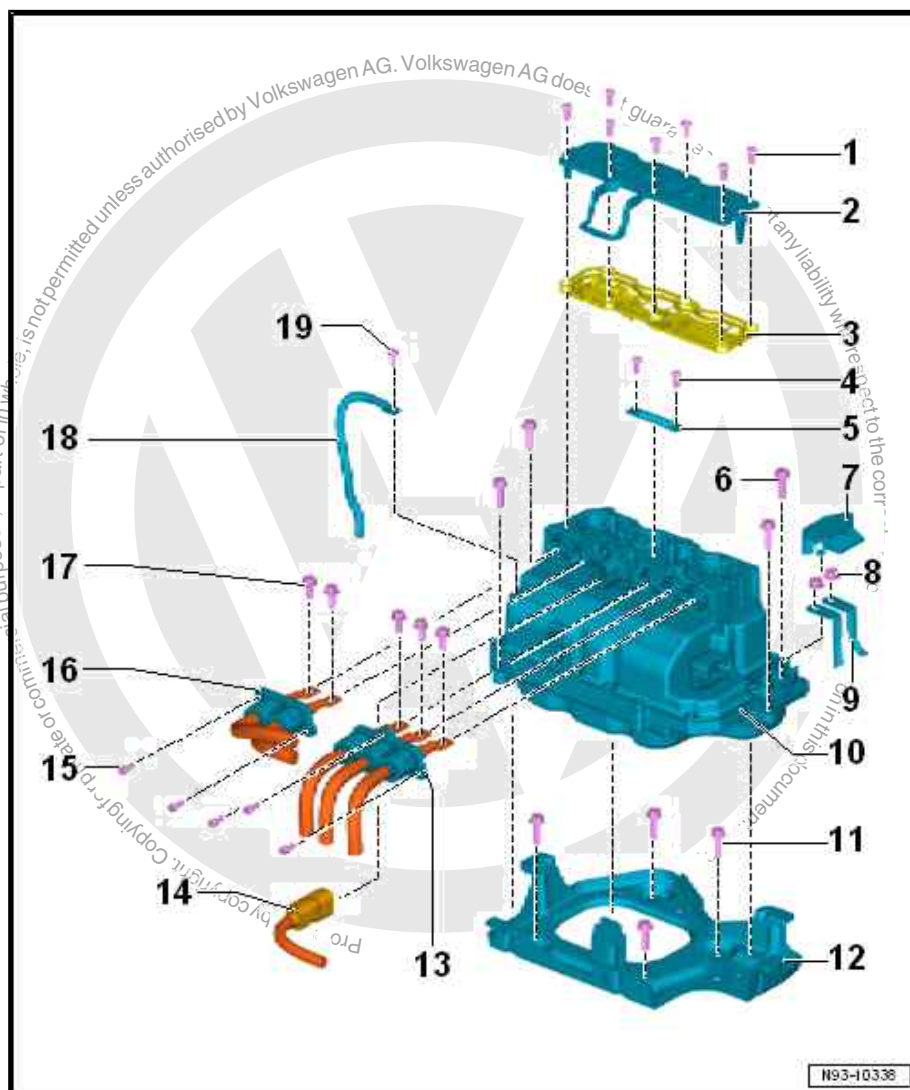
- ☐ Qty. 4
- ☐ 20 Nm

12 - Console

- ☐ For power and control electronics for electric drive - JX1-

13 - High-voltage wiring harness for drive motor - PX2-

- ☐ To electric drive motor - V141-





14 - High-voltage wire for charging unit 1/wiring junction - P12-

- ☐ To high-voltage wiring junction

15 - Bolts

- ☐ Qty. 5
- ☐ 5 Nm

16 - High-voltage wiring harness for high-voltage battery - PX1-

- ☐ To high-voltage battery 1 - AX2-

17 - Bolts

- ☐ Qty. 5
- ☐ 20 Nm

18 - Potential equalisation line

- ☐ Overview of fitting locations [⇒ page 167](#)

19 - Bolt

- ☐ 9 Nm

4.2 Removing and installing power and control electronics for electric drive - JX1-



Note

The power and control electronics for electric drive - JX1- includes the electric drive control unit - J841-.

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-

V.A.G 1331



W00-11166

- ◆ Torque wrench - V.A.G 1410-

V.A.G 1410



W00-11174



Removing

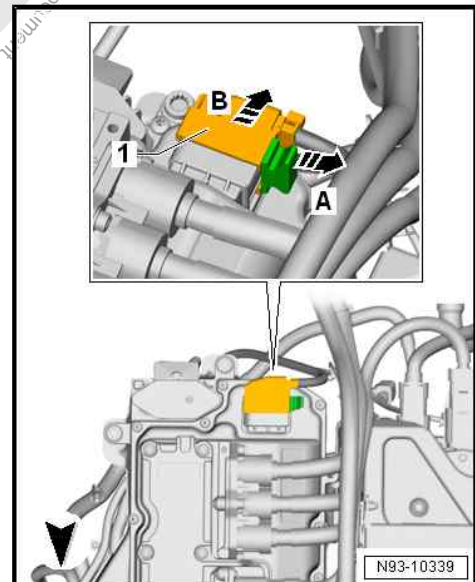
DANGER

Danger to life due to high voltage.

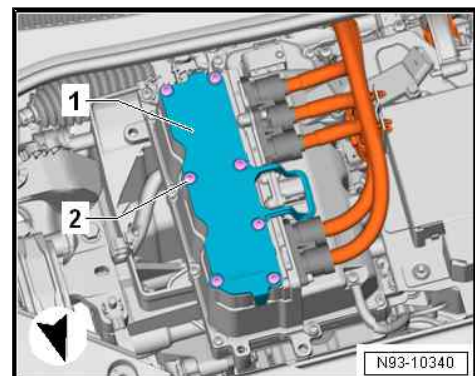
Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ➔ [page 164](#) .
- Disconnect 12-V battery - A- ➔ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Remove underbody covers ➔ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview - underbody covers, e-up! .
- Drain coolant ➔ [page 146](#) .
- Remove bracket for engine (motor) control unit - J623- ➔ [page 135](#) .
- Release connector -1- in -direction of arrow A-.
- Pull off electrical connector -1- in -direction of arrow B-.

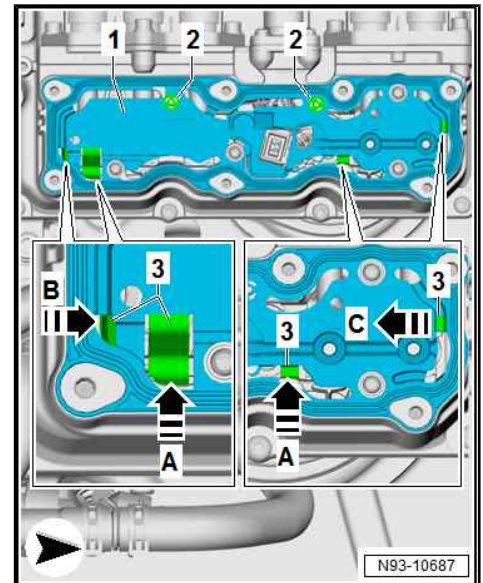


- Unscrew bolts -2-.
- Remove cover -1-.

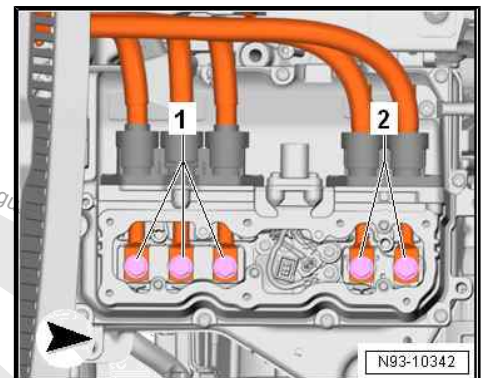




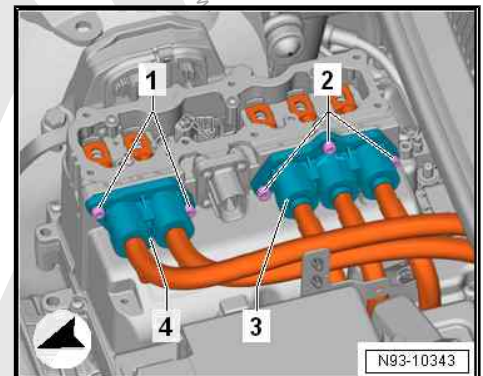
- Release catches -3- in direction of -arrows A, B and C-.
- Unclip catches -2- upwards.
- Remove safety cover -1-.



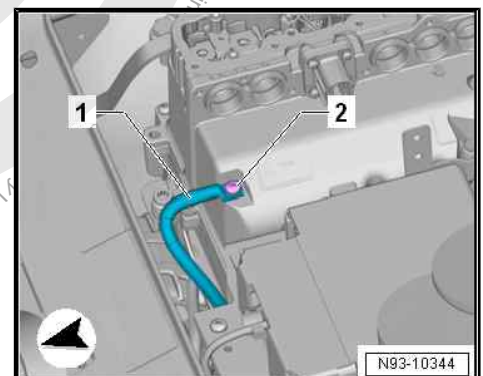
- Unscrew bolts -1 and 2-.



- Unscrew bolts -1 and 2-.
- Pull out high-voltage wiring harnesses PX1 -4- and PX2 -3-.
- Fit cover back on power and control electronics for electric drive - JX1 -.



- Unscrew bolt -2-.
- Remove potential equalisation line -1-.

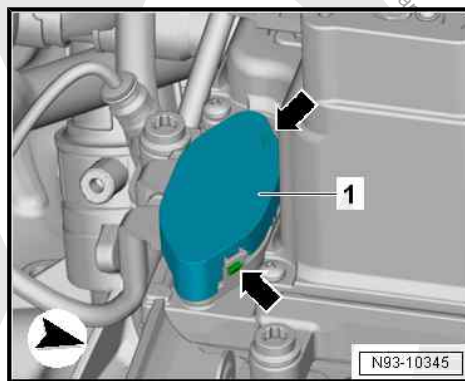




e-up! 2017 ➤

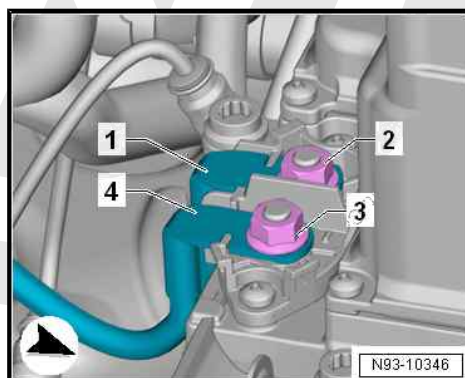
Electric motor (210, LS1) - Edition 03.2018

- Unclip cover -1- -arrows-.



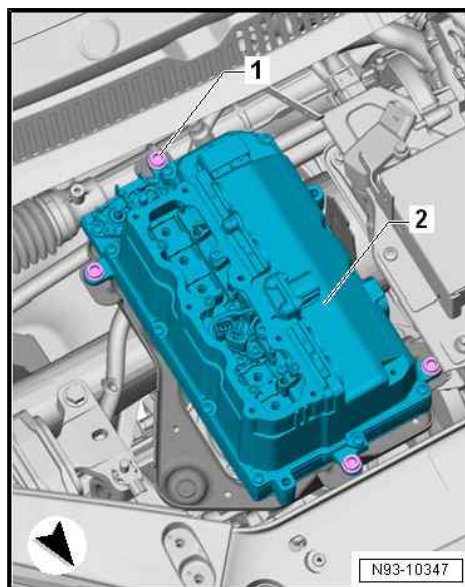
- Unscrew nuts -2 and 3-.

- Detach battery positive and negative cables -1 and 4-.



- Remove bolts -1- for power and control electronics for electric drive - JX1- -2-.

- Raise power and control electronics for electric drive - JX1- slightly, and swing to left.

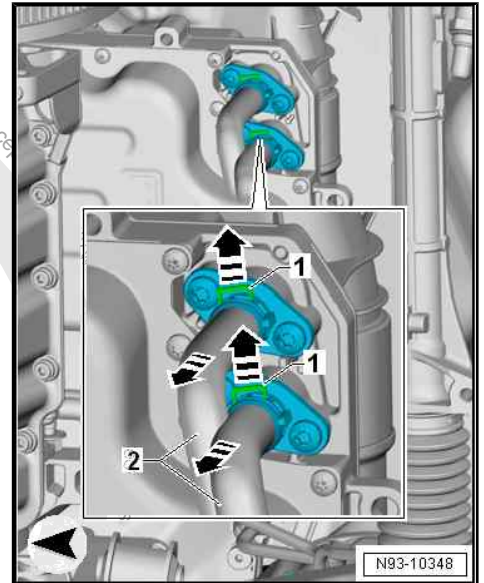




- Release clips -1- in -direction of arrow-.
- Pull off coolant hoses -2-.
- Remove power and control electronics for electric drive - JX1- upwards.

Installing

Install in reverse order of removal, observing the following:



Tightening sequence for cover

- Renew bolts after removing.

NOTICE

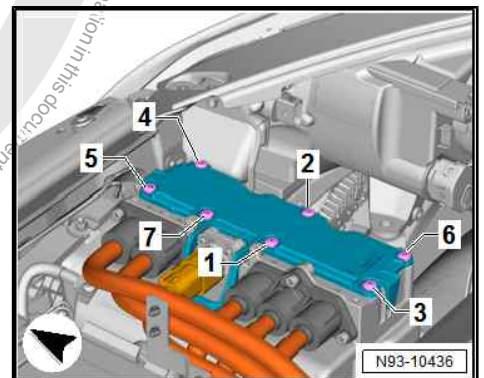
If the power and control electronics for electric drive - JX1- has been renewed, it must be adapted to the immobiliser ⇒ Vehicle diagnostic tester.

WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.



- Commission high-voltage system ⇒ [page 166](#) .

Specified torques

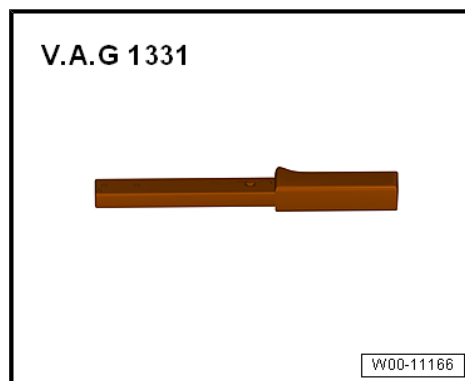
- ◆ ⇒ [“4.1 Assembly overview - power and control electronics for electric drive”, page 106](#)
- ◆ ⇒ [“15.1 Overview of fitting locations - potential equalisation lines”, page 167](#)

4.3 Removing and installing high-voltage system fuse 3 - S353-

Special tools and workshop equipment required



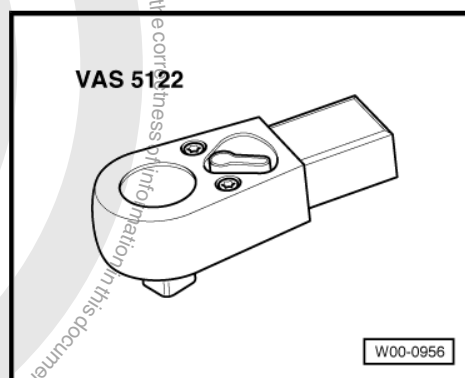
◆ Torque wrench - V.A.G 1331-



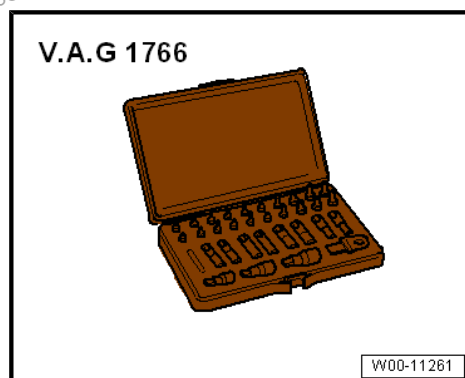
◆ Torque wrench - V.A.G 1783-



◆ Reversible ratchet - VAS 5122-



◆ TORX bit set - V.A.G 1766-





Removing

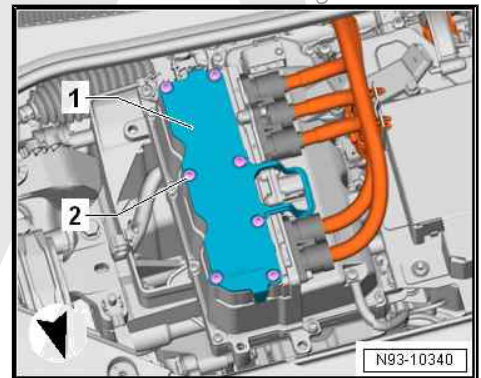
DANGER

Danger to life due to high voltage.

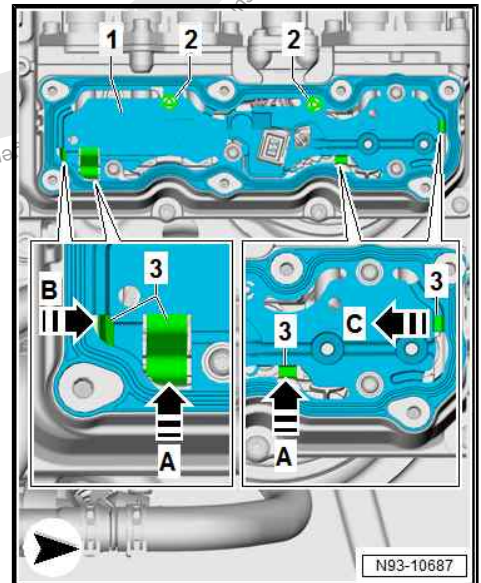
Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ➔ [page 164](#) .
- Disconnect 12-V battery - A- ➔ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Unscrew bolts -2-.
- Remove cover -1-.



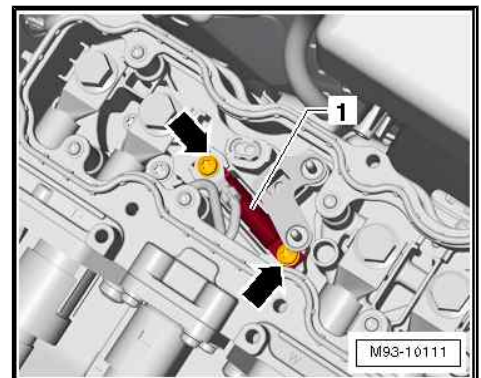
- Release catches -3- in direction of -arrows A, B and C-.
- Unclip catches -2- upwards.
- Remove safety cover -1-.



- Unscrew bolts -arrows-.
- Remove high-voltage system fuse 3 - S353- -1-.

Installing

Install in reverse order of removal, observing the following:





Tightening sequence for cover

WARNING

Danger to life due to high voltage.

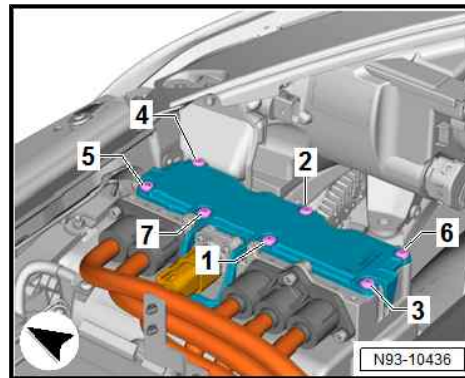
Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Commission high-voltage system ⇒ [page 166](#)

Specified torques

- ♦ ⇒ [“4.1 Assembly overview - power and control electronics for electric drive”, page 106](#)





5 Three-phase current drive

⇒ [“5.1 General description”, page 115](#)

⇒ [“5.2 Assembly overview - three-phase current drive”, page 115](#)

⇒ [“5.3 Removing and installing cover for motor compartment”, page 117](#)

⇒ [“5.4 Removing and installing three-phase current drive VX54 ”, page 118](#)

⇒ [“5.5 Renewing three-phase current drive VX54 ”, page 126](#)

⇒ [“5.6 Calibrating three-phase current drive VX54 ”, page 126](#)

⇒ [“5.7 Removing and installing gearbox”, page 126](#)

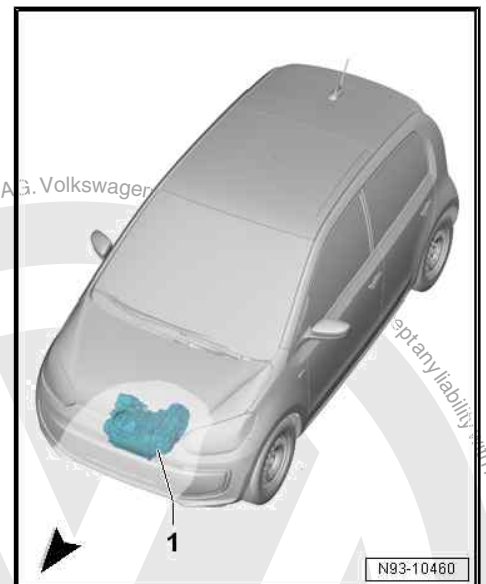
⇒ [“5.8 Removing and installing drive motor temperature sender G712 ”, page 127](#)

⇒ [“5.9 Removing and installing drive motor rotor position sender 1 G713 ”, page 129](#)

5.1 General description

The three-phase current drive - VX54- -1- is located where the combustion engine would otherwise be. It acts directly on the input shaft and has the following tasks:

- ◆ Acts as a motor to drive the vehicle purely by electric means.
- ◆ Acts as a generator to supply the vehicle electrical system with current and charge the high-voltage battery 1 - AX2- .



5.2 Assembly overview - three-phase current drive



1 - Cover for motor compartment

- ☐ Cover for engine (motor) control unit - J623-
- ☐ Removing and installing ➔ [page 117](#)

2 - Engine (motor) control unit - J623-

- ☐ Removing and installing ➔ [page 133](#)

3 - Bracket for engine (motor) control unit - J623-

- ☐ Bolted to charging unit 1 for high-voltage battery - AX4-
- ☐ Removing and installing ➔ [page 135](#)

4 - Charging unit 1 for high-voltage battery - AX4-

- ☐ Secured with bracket to cross member
- ☐ Must be removed in order to remove electric drive motor - V141-
- ☐ Removing and installing ➔ [page 183](#)

5 - Bolts

- ☐ Renew after removal
- ☐ M12 x 1.5 x 85
- ☐ Qty. 2
- ☐ 60 Nm + 180°

6 - Suspension link

- ☐ Must only be detached in order to remove electric drive motor - V141-

7 - Coolant hoses

- ☐ For cooling three-phase current drive - VX54- ➔ [page 142](#)

8 - Three-phase current drive - VX54-

- ☐ Removing and installing ➔ [page 118](#)

Integrated components:

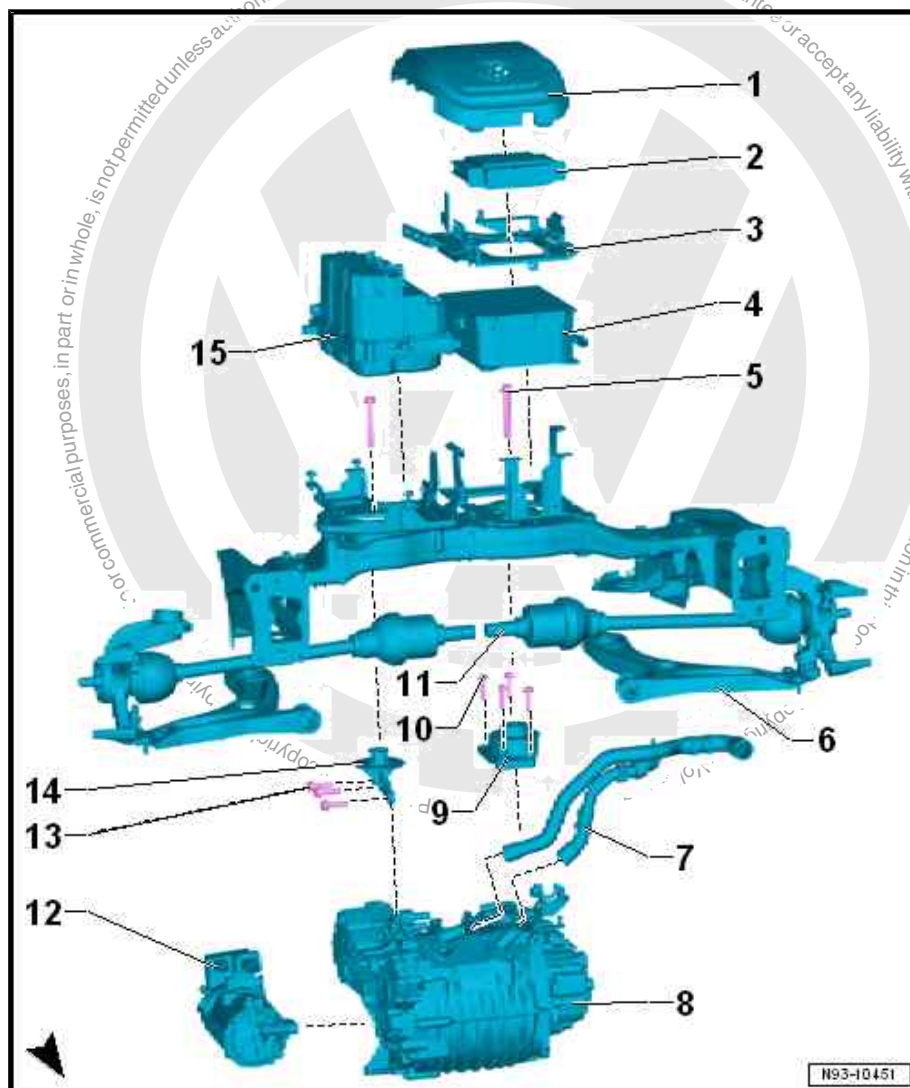
- ◆ Electric drive motor - V141-
- ◆ Drive motor temperature sender - G712-
- ◆ Drive motor rotor position sender 1 - G713-
 - ☐ Renew cover seal
 - ☐ Renew bolts for cover

9 - Mountings

- ☐ Mounting for three-phase current drive - VX54-
- ☐ Removing and installing ➔ [page 126](#)

10 - Bolts

- ☐ Renew after removal
- ☐ M10 x 40
- ☐ Qty. 4
- ☐ 40 Nm + 90°





11 - Drive shaft

- ☐ For transmitting power of three-phase current drive - VX54-
- ☐ Must only be detached for removal of three-phase current drive - VX54-

12 - Electrical air conditioner compressor - V470-

- ☐ Must only be detached for removal of three-phase current drive - VX54-

13 - Bolts

- ☐ Renew after removal
- ☐ M10 x 40
- ☐ Qty. 3
- ☐ 40 Nm + 90°

14 - Mountings

- ☐ Mounting for three-phase current drive - VX54-
- ☐ Removing and installing => [page 126](#)

15 - Power and control electronics for electric drive - JX1-

- ☐ With electric drive control unit - J841-
- ☐ Secured with bracket to cross member
- ☐ Must be removed in order to remove three-phase current drive - VX54-
- ☐ Removing and installing => [page 107](#)

5.3 Removing and installing cover for motor compartment

Removing

- Carefully pull cover for motor compartment -1- off mountings
- 2- one at a time.

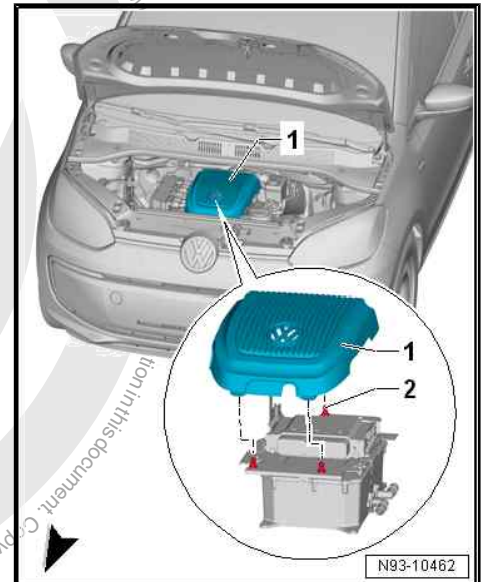
Installing

Install in reverse order of removal.



Note

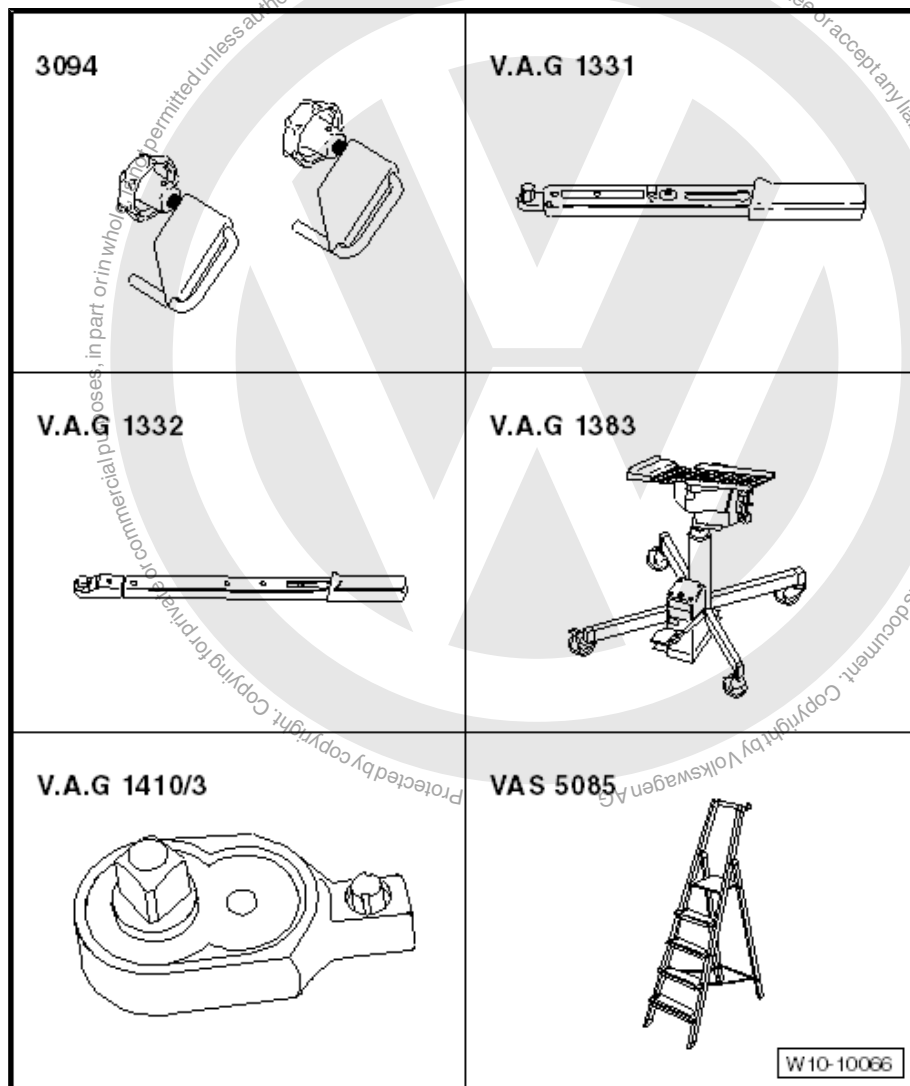
Before assembling, check fastening elements for damage and renew as necessary.





5.4 Removing and installing three-phase current drive - VX54-

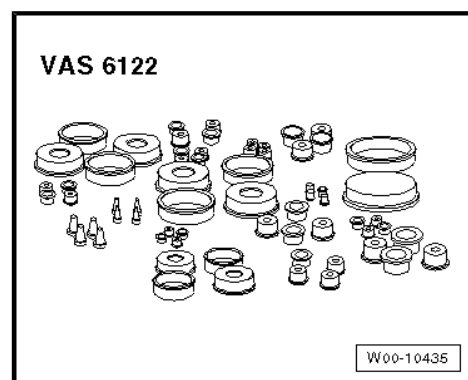
Special tools and workshop equipment required



- ◆ Hose clamps to 25 mm - 3094-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Ratchet attachment - V.A.G 1410/3-
- ◆ Ladder - VAS 5085- or commercially available item
- ◆ Adjustment plate - 3282/68-



- ◆ Gearbox support - 3282-
- ◆ Workshop hoist - VAS 6100-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Spring-type clip pliers - VAS 6362-
- ◆ Wedge - T10161-
- ◆ Engine bung set - VAS 6122-





- ◆ Torque wrench - V.A.G 1410-



Removing

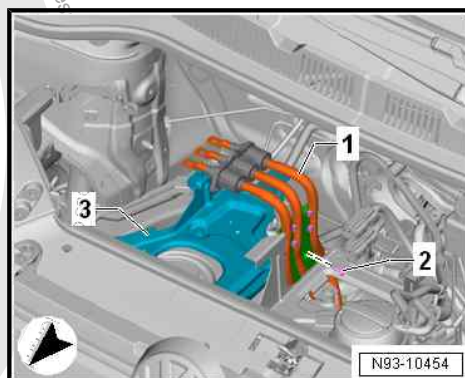
DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

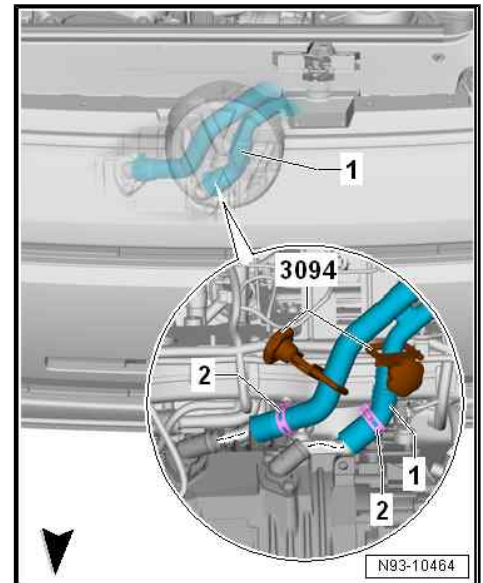
- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .
- Disconnect 12-V battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and connecting battery .
- Remove cover for motor compartment ⇒ [page 117](#) .
- Remove engine control unit - J623- ⇒ [page 133](#) .
- Remove bracket for engine (motor) control unit - J623- ⇒ [page 135](#) .
- Remove underbody covers ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview - underbody covers, e-up! .
- Drain coolant ⇒ [page 146](#) .
- Remove charging unit 1 for high-voltage battery - AX4- ⇒ [page 183](#) .
- Remove power and control electronics for electric drive - JX1- ⇒ [page 107](#) .
- Unscrew bolt -2-.
- Remove high-voltage wiring harness for drive motor - PX2- with bracket -1- from bracket for power and control electronics for electric drive - JX1- -3-.

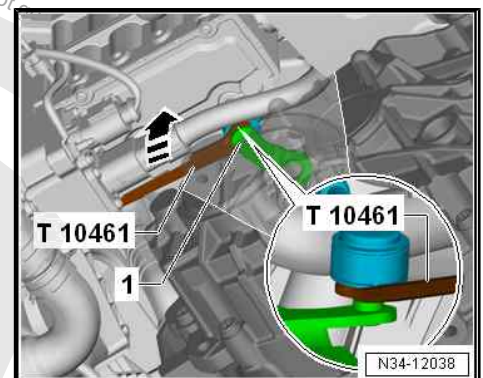




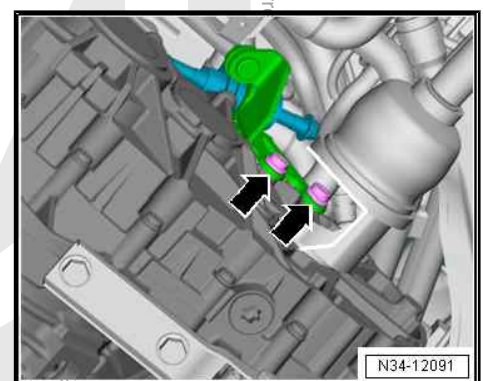
- Clamp off coolant hoses -1- at top of three-phase current drive - VX54- using hose clamps, up to 25 mm - 3094- .
- Open hose clips -2- using hose clip pliers - VAS 6362- and push them back.
- Pull coolant hoses -1- off three-phase current drive - VX54- .
- Seal coolant connections and hoses using engine bung set - VAS 6122- .



- Lever selector lever cable off park lock lever -1- using open end spanner 14 mm - T10461- in -direction of arrow-.

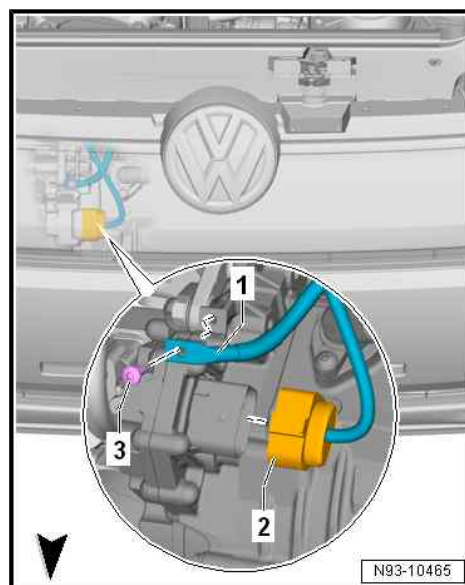


- Unbolt cable support bracket together with selector lever cable from gearbox -arrows-.

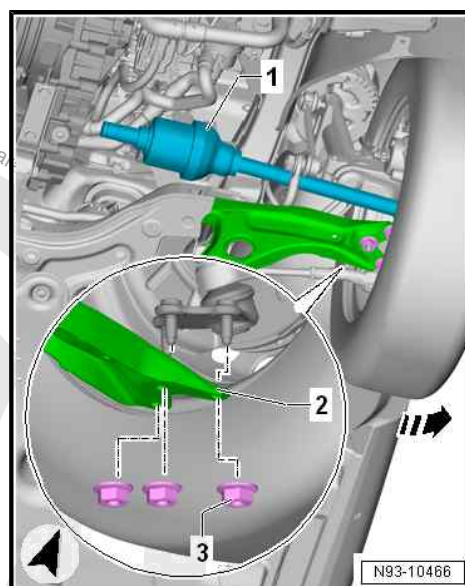




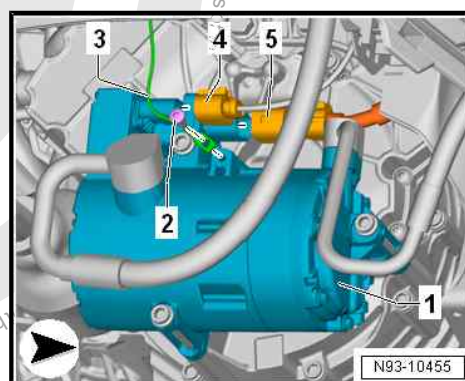
- Unscrew bolt -3-.
- Remove potential equalisation line -1- from three-phase current drive - VX54- .
- Release electrical connector for rotor position and temperature of drive motor -2- on three-phase current drive - VX54- , and pull it off.
- Wrap connector in a clean cloth so that no coolant can come in contact with connector.



- Unscrew nuts -3- on both sides.
- Pull off suspension link -2- downwards. When doing this, swing front axle away in -direction of arrow-.
- Apply wedge - T10161- between gearbox housing and triple roller joint -1- on both sides.
- Press inner joint out of gearbox with a blow to wedge - T10161- using a rubber hammer.
- Secure drive shaft -1- to body on both sides using workshop materials.

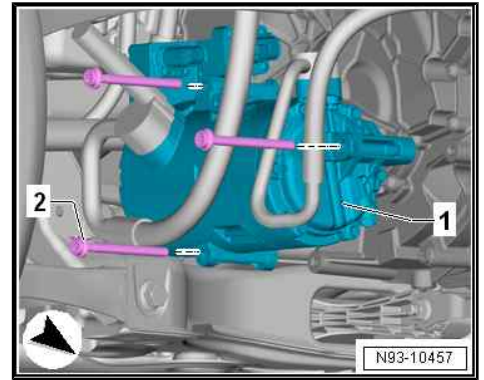


- Partially detach front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing front wheel housing liner .
- Unscrew bolt -2-.
- Remove potential equalisation line -3- from electrical air conditioner compressor - V470- -1-.
- Disconnect electrical connectors -4 and 5-.

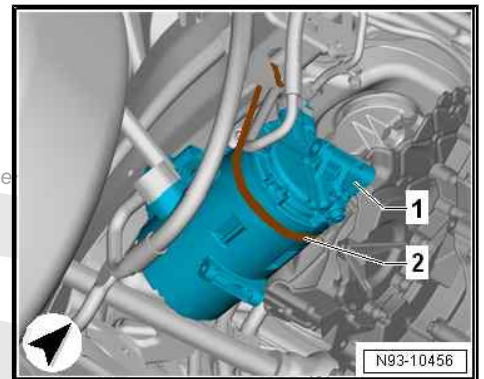




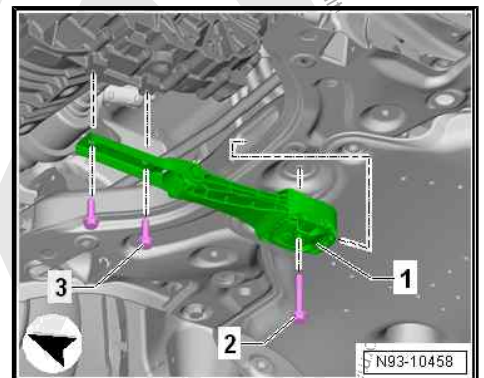
- Unscrew bolts -2-.



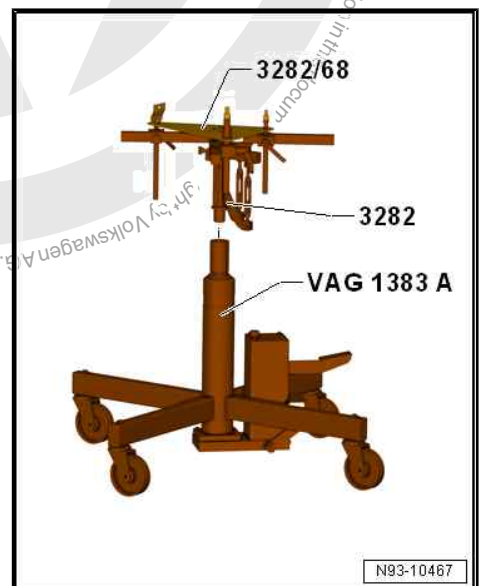
- Detach electrical air conditioner compressor - V470- -1- from bracket.
- Secure electric air conditioner compressor - V470- to body using workshop materials -2-.



- Unscrew bolts -2- and -3-, and remove pendulum support -1- from subframe.

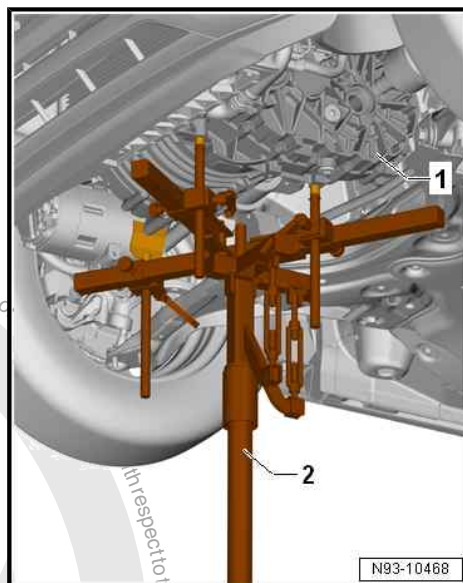


- Fit gearbox support - 3282- to engine and gearbox jack - V.A.G 1383 A- .
- Use adjustment plate - 3282/68- to align supports.

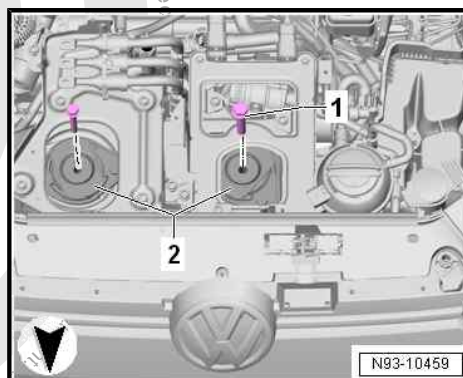




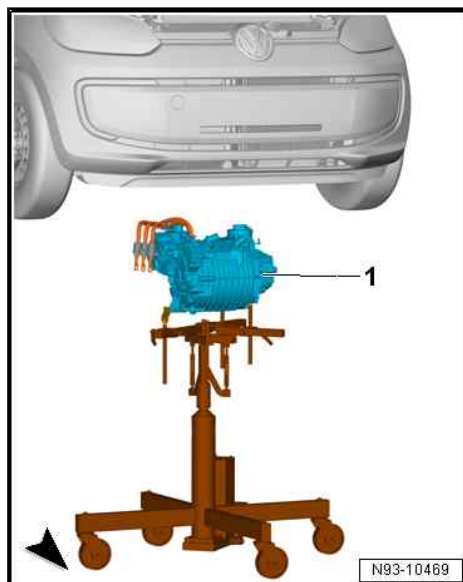
- Position engine and gearbox jack - V.A.G 1383 A- -2- under three-phase current drive - VX54- -1-, and secure jack to drive.



- Unscrew bolts -1- from mounting brackets -2- from above using ladder - VAS 5085- .

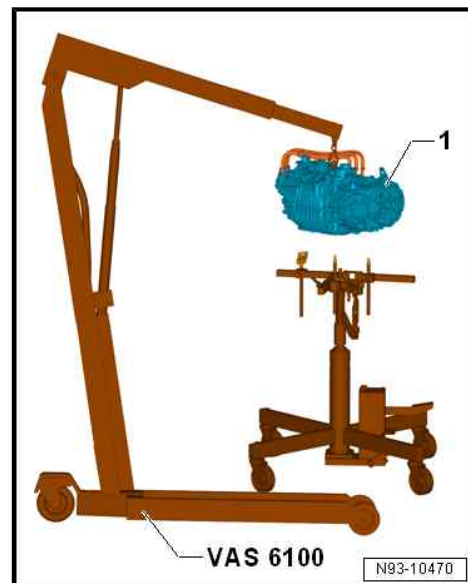


- Lower three-phase current drive - VX54- -1-, while carefully guiding three-phase high-voltage cables out of motor compartment.





- Remove three-phase current drive - VX54- -1- from engine and gearbox jack - VAS 6100- using workshop hoist - 10 - 222 A /12- and shackle - V.A.G 1383 A- .

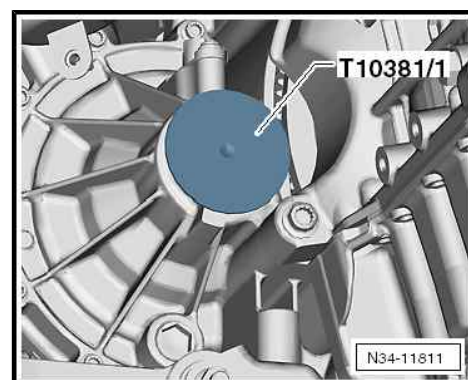


- Insert closure caps - T10381/1- into gearbox.

Installing:

Install in reverse order of removal, observing the following:

- Adjust selector lever cable ⇒ Power transmission; Rep. gr. 34 ; Selector mechanism; Checking and adjusting selector lever cable .



⚠ WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Commission high-voltage system ⇒ [page 166](#)

Specified torques

- ◆ ⇒ [“5.2 Assembly overview - three-phase current drive”, page 115](#)
- ◆ Electrical air conditioner compressor - V470- ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Assembly overview - drive unit of air conditioner compressor
Electrical air conditioner compressor - V470-
- ◆ Front axle ⇒ Running gear, axles, steering; Rep. gr. 40 ; Front axle; Overview - front axle
- ◆ Selector lever cable on gearbox ⇒ Rep. gr. 34 ; Selector mechanism; Assembly overview - selector mechanism



Note

- ◆ *The contact surfaces of the potential equalisation line must be checked prior to installation.*
- ◆ *The contact surfaces must be free of dirt, rust and grease.*
- ◆ *If not, clean the contact surfaces using the contact surface cleaning set - VAS 6410- ⇒ Electrical system; Rep. gr. 97 ; General information; Contact surface cleaning set VAS 6410 .*



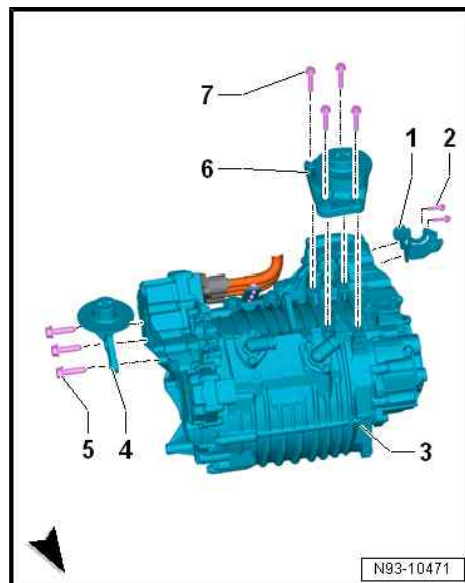
5.5 Renewing three-phase current drive - VX54-

Renewing three-phase current drive - VX54-

- Unscrew bolts -2- for cable support bracket -1-, and secure bracket to new three-phase current drive - VX54- .
- Unscrew bolts -5- for motor mounting -4-, and secure mounting to new three-phase current drive - VX54- .
- Unscrew bolts -7- for gearbox mounting -6-, and secure mounting to new three-phase current drive - VX54- .

Specified torques

Component	Specified torque	Note
Item -2-: bolt	40 Nm +90° further	Renew
Item -5-: bolt	40 Nm +90° further	Renew
Item -7-: bolt	40 Nm +90° further	Renew



5.6 Calibrating three-phase current drive - VX54-



Note

It is necessary to calibrate the three-phase current drive - VX54- if

- ◆ The event memory of systems relevant to OBD were deleted.
- ◆ The software for the electric drive control unit - J841- was updated.
- ◆ The power and control electronics for electric drive - JX1- were renewed.
- ◆ The three-phase current drive - VX54- was renewed.

In these cases, calibration will occur automatically the first time the vehicle is driven. The power output of the drive motor is restricted until the motor has been successfully calibrated.

A test drive is necessary for calibration.

Test precondition:

Vehicle is ready to be driven and the high-voltage system has been recommissioned ⇒ Vehicle diagnostic tester.

Calibration:

- Calibrate three-phase current drive - VX54- ⇒ Vehicle diagnostic tester.

5.7 Removing and installing gearbox



Note

Separate renewal of the gearbox is not planned at present.



5.8 Removing and installing drive motor temperature sender - G712-

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-



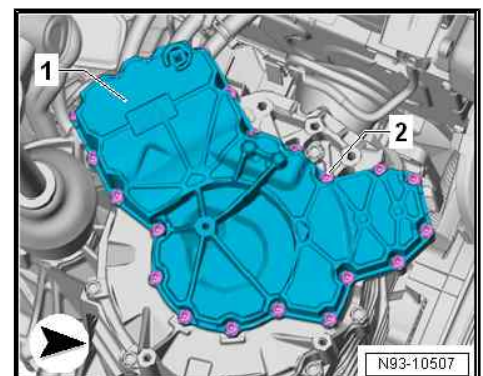
Removing

DANGER

**Danger to life due to high voltage.
Severe or fatal injury due to electric shock.**

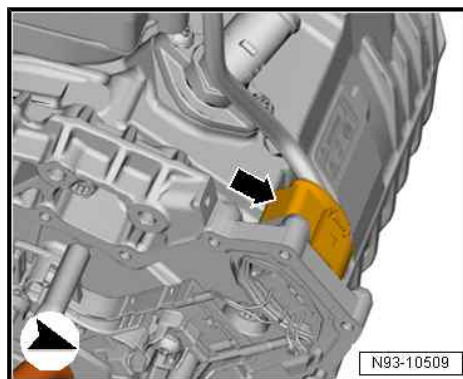
- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .
- Select Park position for gearbox.
- Remove underbody covers ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview - underbody covers, e-up! .
- Remove front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing wheel housing liner .
- Unbolt electrical air conditioner compressor - V470- , and secure it to body ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing electrical air conditioner compressor - V470- .
- Unscrew bolts -2-.
- Remove cover -1-.

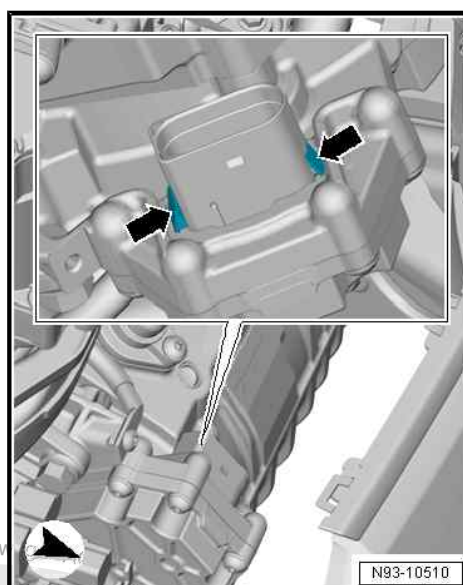




- Separate electrical connector -arrow-.



- Release 2 locking lugs -arrows-.
- Unclip connector from housing.
- Note connector assignment for drive motor temperature sender - G712- .
- Open catches.
- Unpin wires of drive motor temperature sender - G712- from connector.

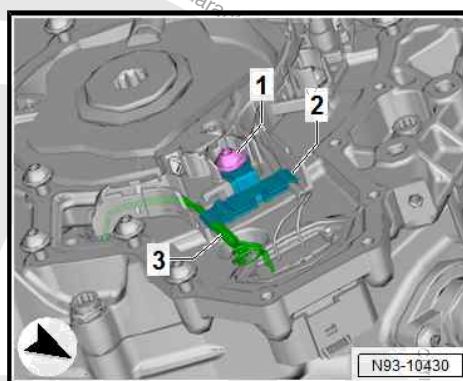


- Unscrew bolt -1-.
- Remove contact bridge -2-.
- Pull drive motor temperature sender - G712- -3- out of rotor.

Installing

Install in reverse order of removal, observing the following:

- Renew gasket between cover and housing.



⚠ WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Commission high-voltage system ➔ [page 166](#)

Specified torques

Component	Specified torque	Note
Bolt for contact bridge for sensor wiring harness	6 Nm + 90°	Renew
Cover bolts	8 Nm + 120°	Renew
Sender wheel bolt	120 Nm	



5.9 Removing and installing drive motor rotor position sender 1 - G713-

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-

V.A.G 1331



W00-11166

- ◆ Torque wrench - V.A.G 1410-

V.A.G 1410



W00-11174

Removing

DANGER

Danger to life due to high voltage.

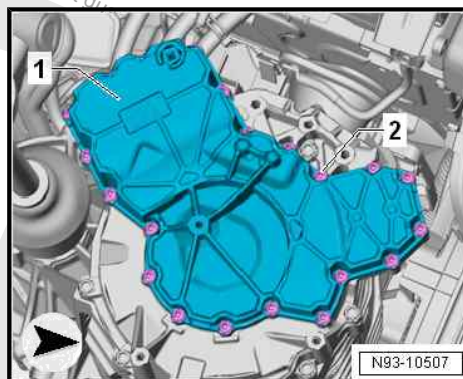
Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

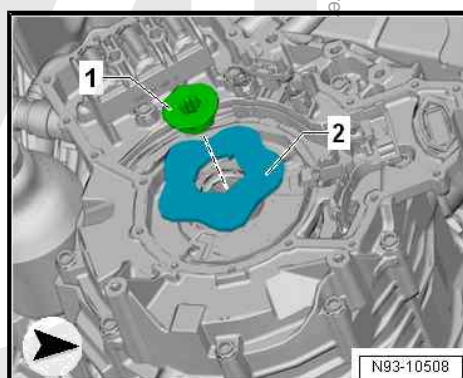
- De-energise high-voltage system ⇒ [page 164](#) .
- Select Park position for gearbox.
- Remove underbody covers ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview, underbody covers, e-up! .
- Remove front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing wheel housing liner .
- Unbolt electrical air conditioner compressor - V470- , and secure it to body ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing electrical air conditioner compressor - V470- .



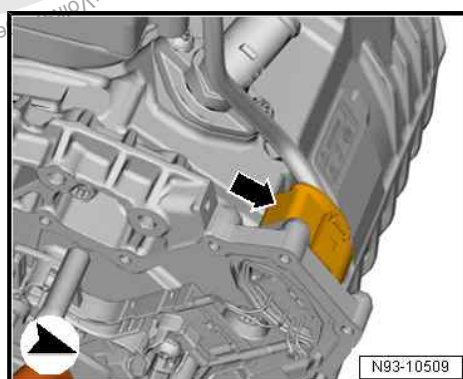
- Unscrew bolts -2-.
- Remove cover -1-.



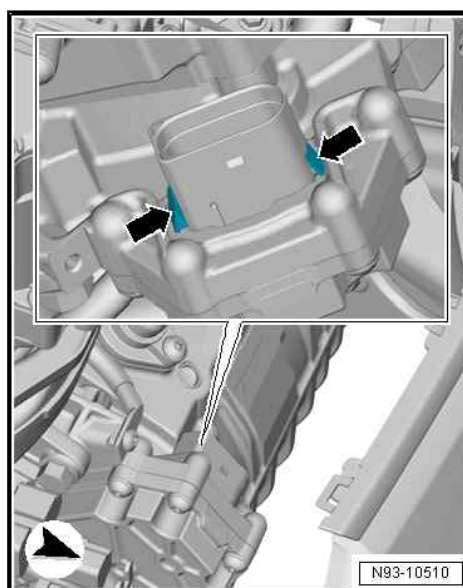
- Unscrew sender wheel bolt -1-.
- Remove washer -2-.



- Separate electrical connector -arrow-.

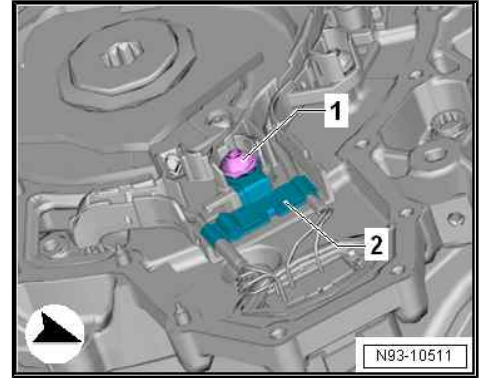


- Release 2 locking lugs -arrows-.
- Unclip connector from housing.
- Note connector assignment for drive motor rotor position sender 1 - G713- .
- Open catches.
- Unpin wires of drive motor rotor position sender 1 - G713- from connector.





- Unscrew bolt -1-.
- Remove contact bridge -2-.



- Unscrew bolts -2-.
- Remove drive motor rotor position sender 1 - G713- -1-.

Installing

Install in reverse order of removal, observing the following:

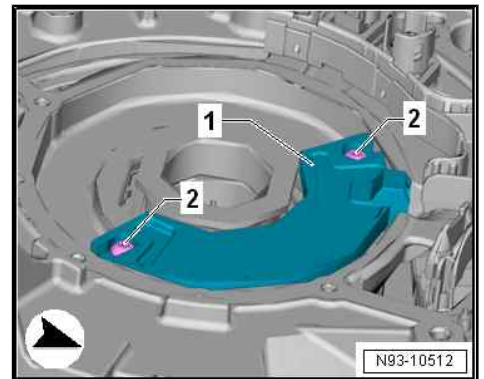
- Renew gasket between cover and housing.

WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- **Have a qualified technician re-energise the high-voltage system.**



- Commission high-voltage system ⇒ [page 166](#)

Specified torques

Component	Specified torque	Note
Bolts for drive motor rotor position sender 1 - G713-	5 Nm +90°	Renew
Bolt for contact bridge for sensor wiring harness	6 Nm +90°	Renew
Cover bolts	8 Nm +120°	Renew
Sender wheel bolt	120 Nm	

6 Engine (motor) control unit

⇒ ["6.1 Assembly overview - engine control unit", page 132](#)

⇒ ["6.2 Removing and installing engine \(motor\) control unit J623", page 133](#)

⇒ ["6.3 Removing and installing bracket for engine \(motor\) control unit J623", page 135](#)

6.1 Assembly overview - engine control unit

1 - Shear bolt

2 - Protective housing

3 - Engine (motor) control unit - J623-

- ☐ Removing and installing
⇒ [page 133](#)

4 - Maintenance connector for high-voltage system - TW- (service disconnecter)

- ☐ Secured with lock after system has been de-energised
- ☐ Must be unclipped in order to remove bracket -4-

5 - Bolts

- ☐ Qty. 4
- ☐ For bolting bracket for engine (motor) control unit - J623- to charging unit 1 for high-voltage battery - AX4-
- ☐ 9 Nm

6 - Bracket

- ☐ Bracket for engine (motor) control unit - J623- is bolted to bracket for charging unit 1 for high-voltage battery - AX4-6-
- ☐ Removing and installing
⇒ [page 135](#)

7 - Retainer

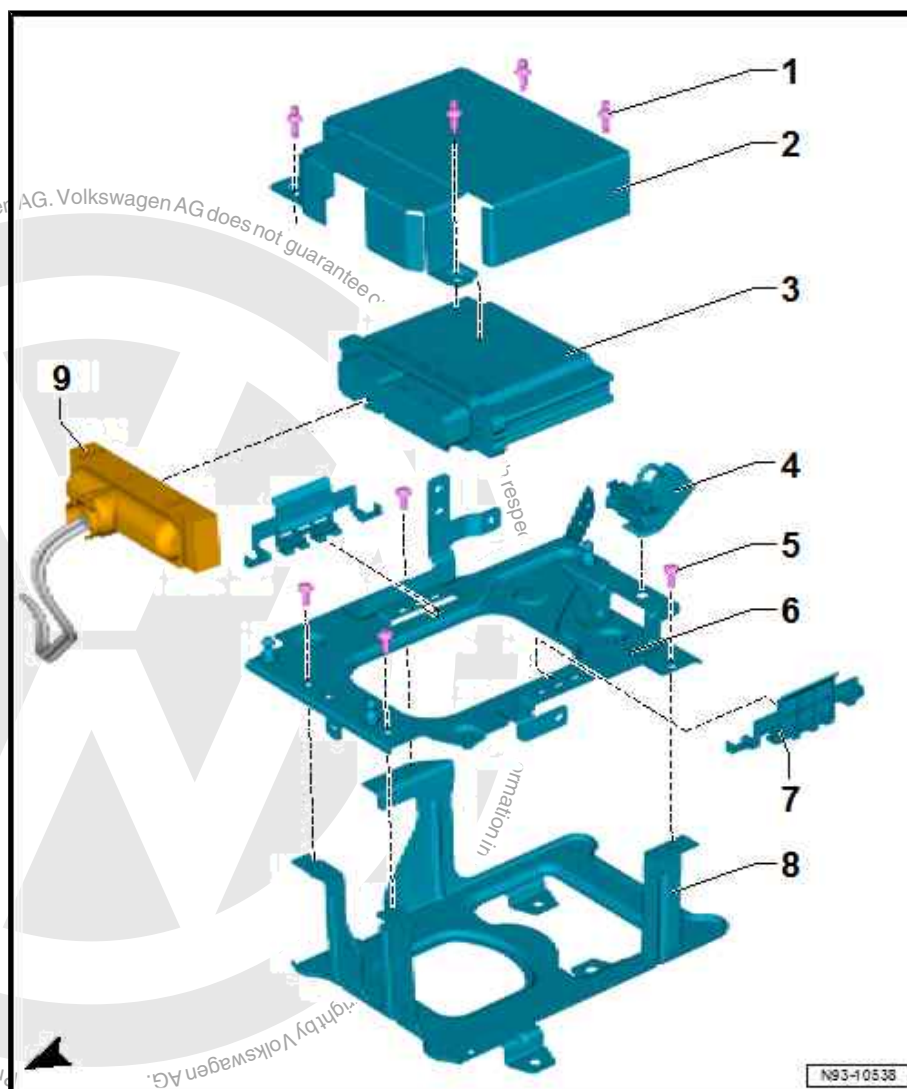
- ☐ Qty. 2, plastic
- ☐ Retainers clipped into bracket for engine (motor) control unit - J623-

8 - Bracket

- ☐ Bracket for charging unit 1 for high-voltage battery - AX4-
- ☐ Secured to cross member
- ☐ Removing and installing ⇒ [page 186](#)

9 - Wiring harness

- ☐ Wiring harness for engine (motor) control unit - J623-





6.2 Removing and installing engine (motor) control unit - J623-

⇒ [“6.2.1 Removing and installing engine control unit J623 without protective housing”, page 133](#)

⇒ [“6.2.2 Removing and installing engine \(motor\) control unit J623 with protective housing”, page 133](#)

6.2.1 Removing and installing engine control unit - J623- without protective housing

Removing

The adaptation values must be read from the old engine (motor) control unit before the engine (motor) control unit - J623- is renewed ⇒ Vehicle diagnostic tester.

If the engine (motor) control unit - J623- is renewed, it must be adapted to the electronic immobiliser using ⇒ Vehicle diagnostic tester in “Guided Functions” mode.

- Disconnect 12-V battery.
- Remove cover for motor compartment ⇒ [page 117](#).
- Release electrical connector -3- on engine (motor) control unit - J623-.
- Remove connector -3-.
- Remove engine (motor) control unit - J623- -1- from brackets -2-.

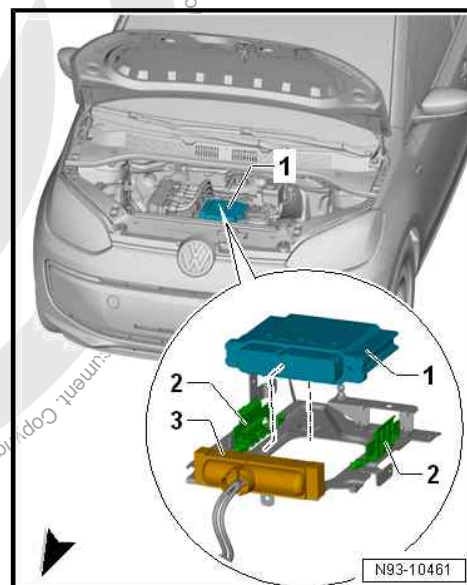
Installing

Install in reverse order of removal.



Note

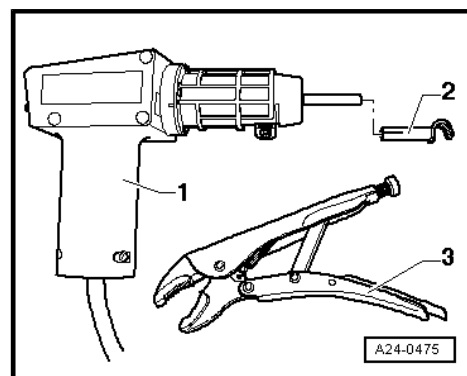
Before assembling, check fastening elements for damage and renew as necessary.



6.2.2 Removing and installing engine (motor) control unit - J623- with protective housing

Special tools and workshop equipment required

- ◆ Hot air blower - VAS 1978/14A- -item 1- with nozzle -2- from wiring harness repair set - VAS 1978 B-





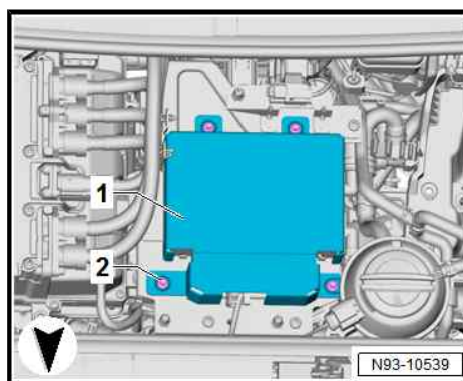
- ◆ Small grinder (commercially available)
- ◆ Vehicle diagnostic tester

Removing

The adaptation values must be read from the old engine (motor) control unit before the engine (motor) control unit - J623- is renewed ⇒ Vehicle diagnostic tester.

If the engine (motor) control unit - J623- is renewed, it must be adapted to the electronic immobiliser using ⇒ Vehicle diagnostic tester in "Guided Functions" mode.

- Disconnect 12-V battery.
- Remove cover for motor compartment ⇒ [page 117](#) .
- To remove protective housing -1-, unscrew shear bolts -2- as follows:



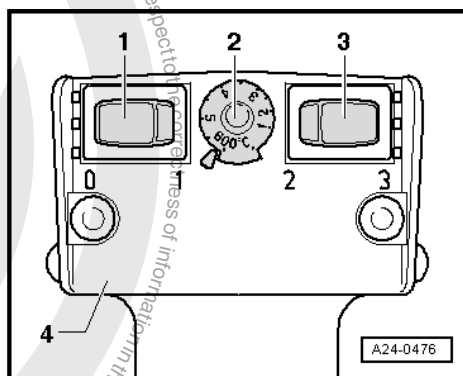
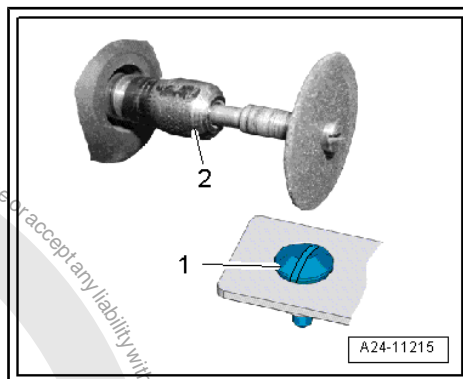
- Make groove (for a screwdriver) in head of shear bolt -1- using a small grinder -2-.



Note

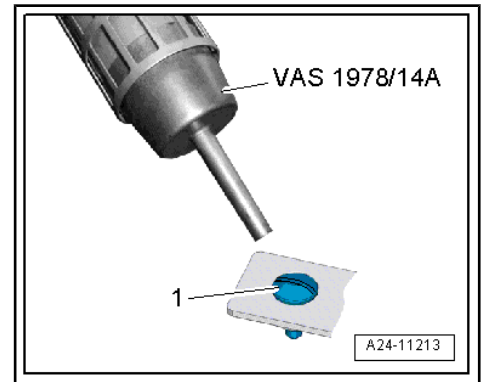
The threads of the shear bolts are secured with locking fluid. To unscrew these bolts, the threads must therefore be heated with the hot air blower.

- Set up hot air blower as shown in illustration:
- ◆ Turn potentiometer for temperature adjustment -2- to maximum heater output
- ◆ Set two-stage switch for air flow rate -3- to position 3

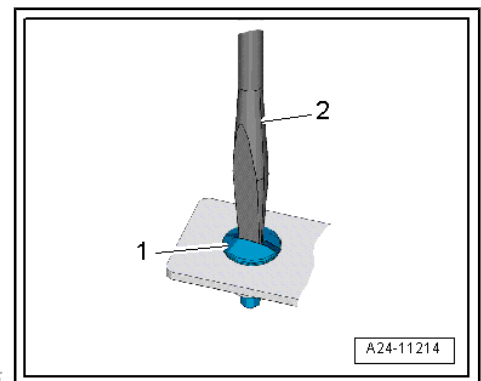




- Heat head of shear bolt -1- for approx. 20 to 30 seconds.



- Unscrew shear bolt -1- with screwdriver -2-.
- Remove protective housing from engine (motor) control unit - J623- .



- Release electrical connector -3- on engine (motor) control unit - J623- .
- Remove connector -3-.
- Remove engine (motor) control unit - J623- -1- from brackets -2-.

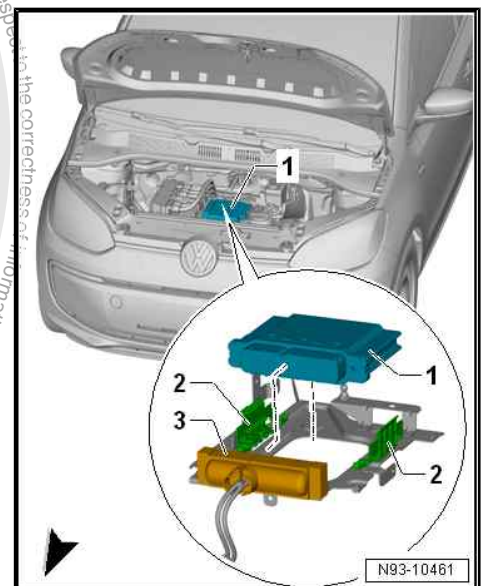
Installing

Install in reverse order of removal.



Note

Before assembling, check fastening elements for damage and renew as necessary.

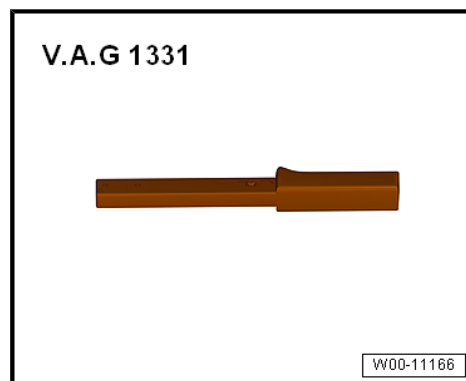


6.3 Removing and installing bracket for engine (motor) control unit - J623-

Special tools and workshop equipment required



- ◆ Torque wrench - V.A.G 1331-



Removing

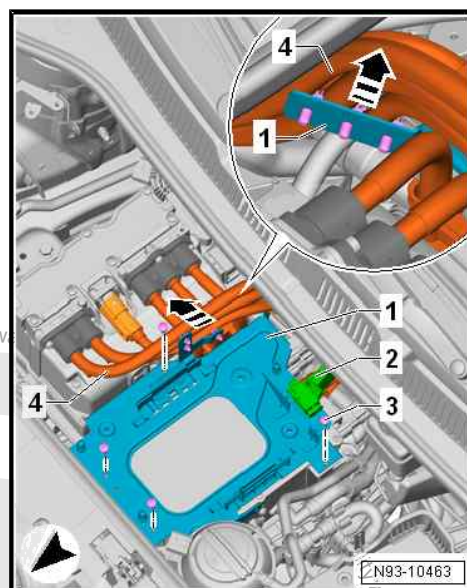
- Remove engine control unit - J623- ➔ [page 133](#) .
- Unclip high-voltage cables -4- from bracket for engine (motor) control unit - J623- -1- in -direction of arrow-.
- Unclip (low-voltage) service disconnecter -2- from bracket for engine (motor) control unit - J623- -1-.
- Unscrew bolts -3-.
- Remove bracket for engine (motor) control unit - J623- -1- upwards out of vehicle.

Installing

Install in reverse order of removal, observing the following:

Specified torque

- ◆ ➔ ["6.1 Assembly overview - engine control unit", page 132](#)





7 High-voltage cables

⇒ [“7.1 General description”, page 137](#)

⇒ [“7.2 Overview of fitting locations - high-voltage cables”, page 137](#)

⇒ [“7.3 Removing and installing high-voltage wiring harness for drive motor PX2”, page 138](#)

7.1 General description

The following high-voltage cables connect the high-voltage components:

- ◆ High-voltage wiring harness for high-voltage battery - PX1-
- ◆ High-voltage wiring harness for drive motor - PX2-
- ◆ High-voltage cable for high-voltage heater (PTC) - P11-
- ◆ High-voltage cable for electric air conditioner compressor - P3-
- ◆ High-voltage cable for charging unit 1 for high-voltage battery - AX4-
- ◆ High-voltage wiring harness for High-voltage battery charging socket 1 - UX4-

7.2 Overview of fitting locations - high-voltage cables



1 - Bolts

- ☐ Qty. 2
- ☐ ➔ [Item 17 \(page 107\)](#)

2 - High-voltage wiring harness for high-voltage battery - PX1-

- ☐ To high-voltage battery 1 - AX2-

3 - High-voltage wire for charging unit 1/wiring junction - P12-

- ☐ To high-voltage wiring junction

4 - Bolts

- ☐ Qty. 3
- ☐ 20 Nm

5 - Bolts

- ☐ Qty. 3
- ☐ ➔ [Item 17 \(page 107\)](#)

6 - Bolts

- ☐ Qty. 3
- ☐ ➔ [Item 15 \(page 107\)](#)

7 - High-voltage wiring harness for drive motor - PX2-

- ☐ To electric drive motor - V141-
- ☐ Removing and installing ➔ [page 138](#)

8 - Bolts

- ☐ Qty. 4
- ☐ ➔ [Item 15 \(page 107\)](#)

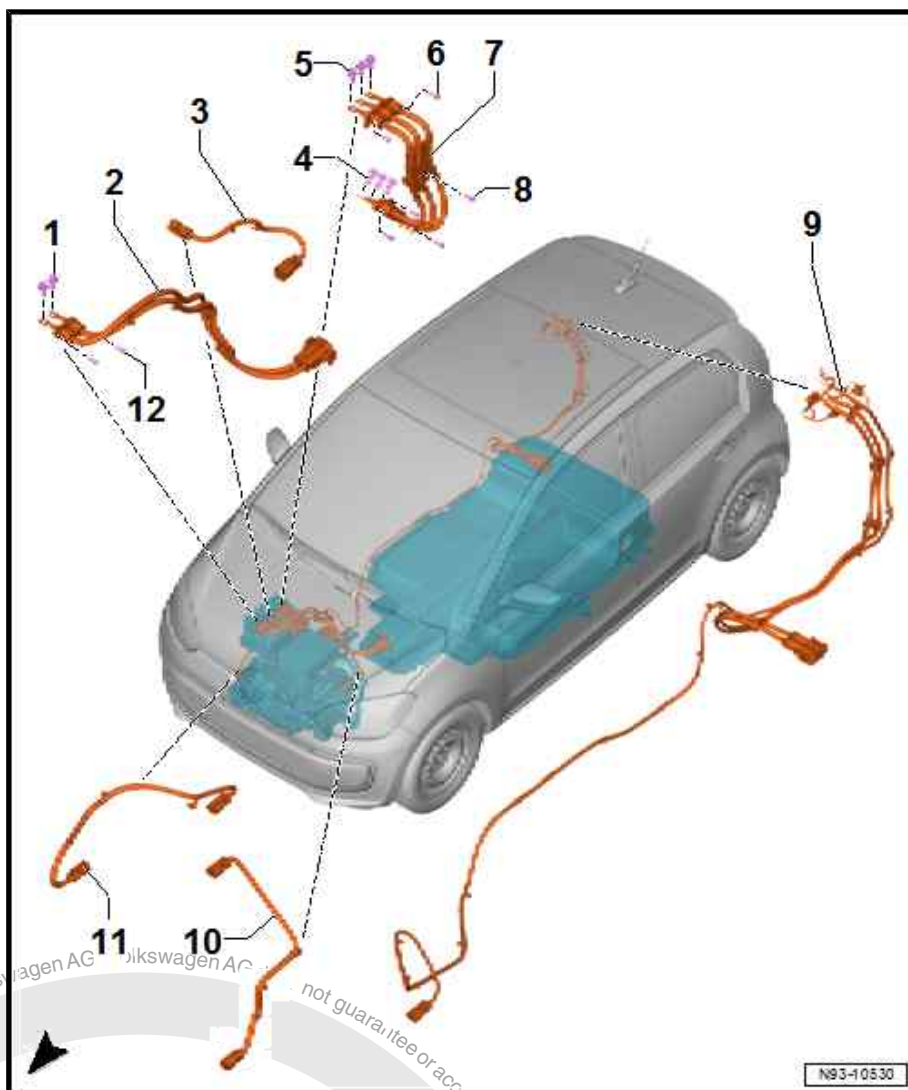
9 - Charging cable 1 - P20-

10 - High-voltage cable for high-voltage heater (PTC) - P11-

11 - High-voltage cable for electric air conditioner compressor - P3-

12 - Bolts

- ☐ Qty. 2
- ☐ ➔ [Item 15 \(page 107\)](#)

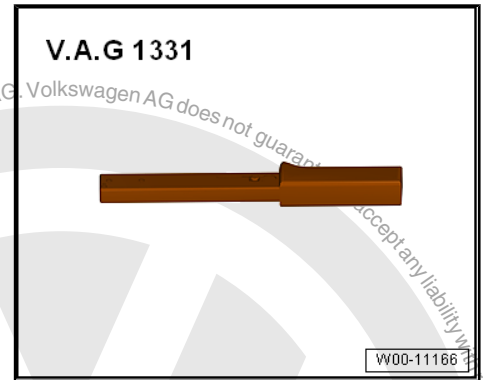


7.3 Removing and installing high-voltage wiring harness for drive motor - PX2-

Special tools and workshop equipment required



- ◆ Torque wrench - V.A.G 1331-



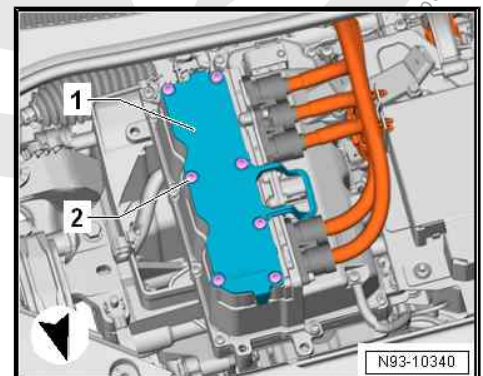
Removing

DANGER

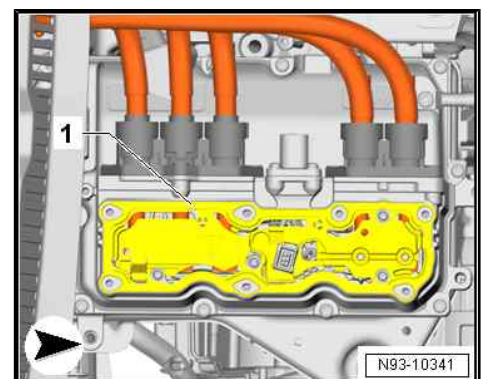
**Danger to life due to high voltage.
Severe or fatal injury due to electric shock.**

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system [= page 164](#) .
- Select Park position for gearbox.
- Unscrew bolts -2-.
- Remove cover -1-.

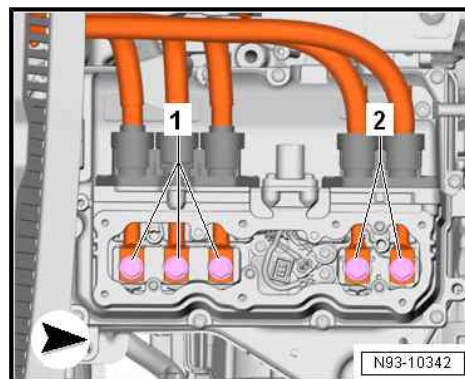


- Unclip and remove safety cover -1-.

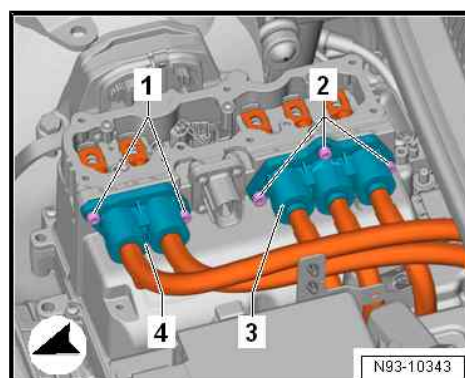




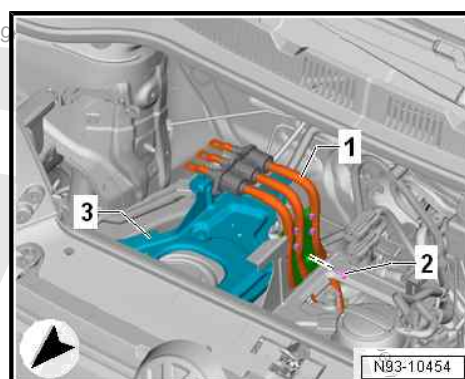
- Unscrew bolts -1-.



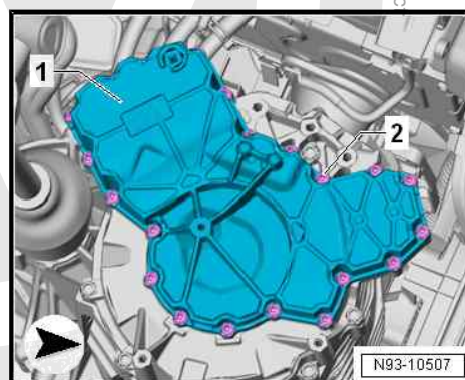
- Unscrew bolts -2-.
- Pull out high-voltage wiring harness for drive motor - PX2- -3-.
- Fit cover back on power and control electronics for electric drive - JX1- .



- Unscrew bolt -2-.
- Remove high-voltage wiring harness for drive motor - PX2- with bracket -1- from bracket for power and control electronics for electric drive - JX1- -3-.
- Remove underbody covers ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview - underbody covers, e-up! .
- Remove front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing wheel housing liner .
- Unbolt electrical air conditioner compressor - V470- , and secure it to body ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing electrical air conditioner compressor V470- .

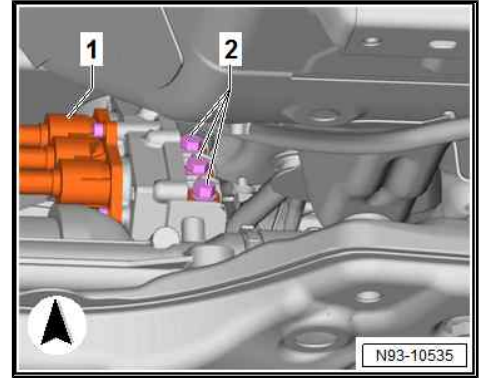


- Unscrew bolts -2-.
- Remove cover -1-.

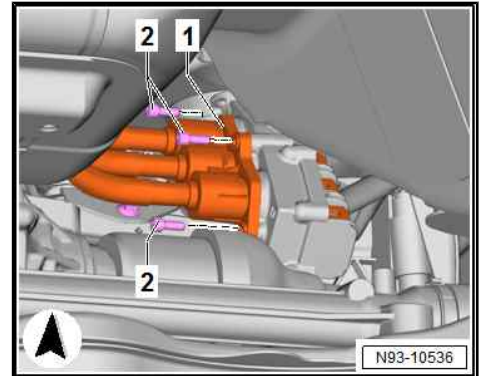




- Unscrew bolts -2- from high-voltage wiring harness for drive motor - PX2- -1-.



- Unscrew bolts -2- from high-voltage wiring harness for drive motor - PX2- -1-.



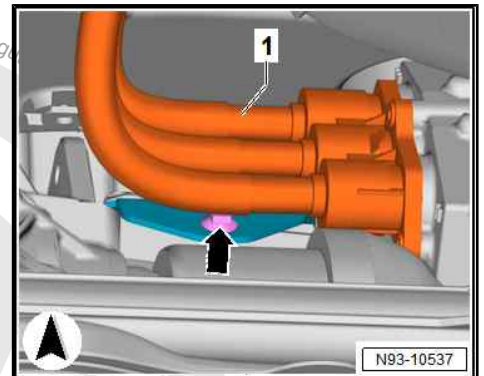
- Unclip high-voltage wiring harness for drive motor - PX2- -1- from retainer -arrow-.
- Pull high-voltage wiring harness for drive motor - PX2- -1- out of three-phase current drive, and remove it upwards.

Installing

- Install in reverse order of removal, observing the following:

Specified torques

- ◆ ⇒ [“4.1 Assembly overview - power and control electronics for electric drive”, page 106](#)
- ◆ ⇒ [“7.2 Overview of fitting locations - high-voltage cables”, page 137](#)



Component	Specified torque	Note
Bolts for drive motor cover	8 Nm +120°	Renew
Bolts on high-voltage wiring harness for drive motor - PX2- , M8 x 20	20 Nm +45°	Renew
Bolts securing high-voltage wiring harness for drive motor - PX2- to housing, M6 x 20	5 Nm	

8 Cooling system for high-voltage system

⇒ ["8.1 Assembly overview - high-voltage system cooling components", page 142](#)

⇒ ["8.2 Coolant hose connection diagram", page 143](#)

⇒ ["8.3 Checking cooling system for leaks", page 144](#)

⇒ ["8.4 Draining and adding coolant", page 146](#)

8.1 Assembly overview - high-voltage system cooling components

1 - Power and control electronics for electric drive - JX1-

- ☐ Integrated into coolant circuit
- ☐ With electric drive control unit - J841-
- ☐ Removing and installing ⇒ [page 107](#)

2 - Heat exchanger for heater

- ☐ Removing and installing ⇒ Heating, ventilation and air conditioning; Rep. gr. 87 ; Heating and air conditioning unit, front; Removing and installing heat exchanger

3 - Charging unit 1 for high-voltage battery - AX4-

- ☐ Integrated into coolant circuit
- ☐ With control unit for high-voltage battery charger - J1050-
- ☐ Removing and installing ⇒ [page 183](#)

4 - System coolant circuit high-voltage heater (PTC) - Z115-

- ☐ System coolant circuit with coolant pump for high-temperature circuit - V467-

5 - System coolant circuit three-phase current drive - VX54-

- ☐ System coolant circuit with pump before power and control electronics for electric drive - V508-

6 - Coolant expansion tank

- ☐ Leakage test ⇒ [page 144](#)

7 - Coolant pump for high-temperature circuit - V467-

- ☐ Removing and installing ⇒ [page 152](#)

8 - Radiator for engine coolant

- ☐ Removing and installing ⇒ [page 156](#)





9 - High-voltage heater (PTC) - Z115-

- ☐ Secured to cross member
- ☐ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing High-voltage heater (PTC) - Z115- and high-voltage heater control unit (PTC) - J848-

10 - Three-phase current drive - VX54-

- ☐ Integrated into coolant circuit
- ☐ Removing and installing ⇒ [page 118](#)

11 - Pump before power and control electronics for electric drive - V508-

- ☐ Removing and installing ⇒ [page 151](#)

12 - Temperature sender after drive motor for electric drive system - G788-

- ☐ Removing and installing ⇒ [page 153](#)

13 - Restrictor with non-return valve

8.2 Coolant hose connection diagram

1 - Power and control electronics for electric drive - JX1-

- ☐ With electric drive control unit - J841-
- ☐ Removing and installing ⇒ [page 107](#)

2 - Temperature sender after drive motor for electric drive system - G788-

- ☐ Removing and installing ⇒ [page 153](#)

3 - Pump before power and control electronics for electric drive - V508-

- ☐ Removing and installing ⇒ [page 151](#)

4 - Charging unit 1 for high-voltage battery - AX4-

- ☐ With control unit for high-voltage battery charger - J1050-
- ☐ Removing and installing ⇒ [page 183](#)

5 - Coolant expansion tank

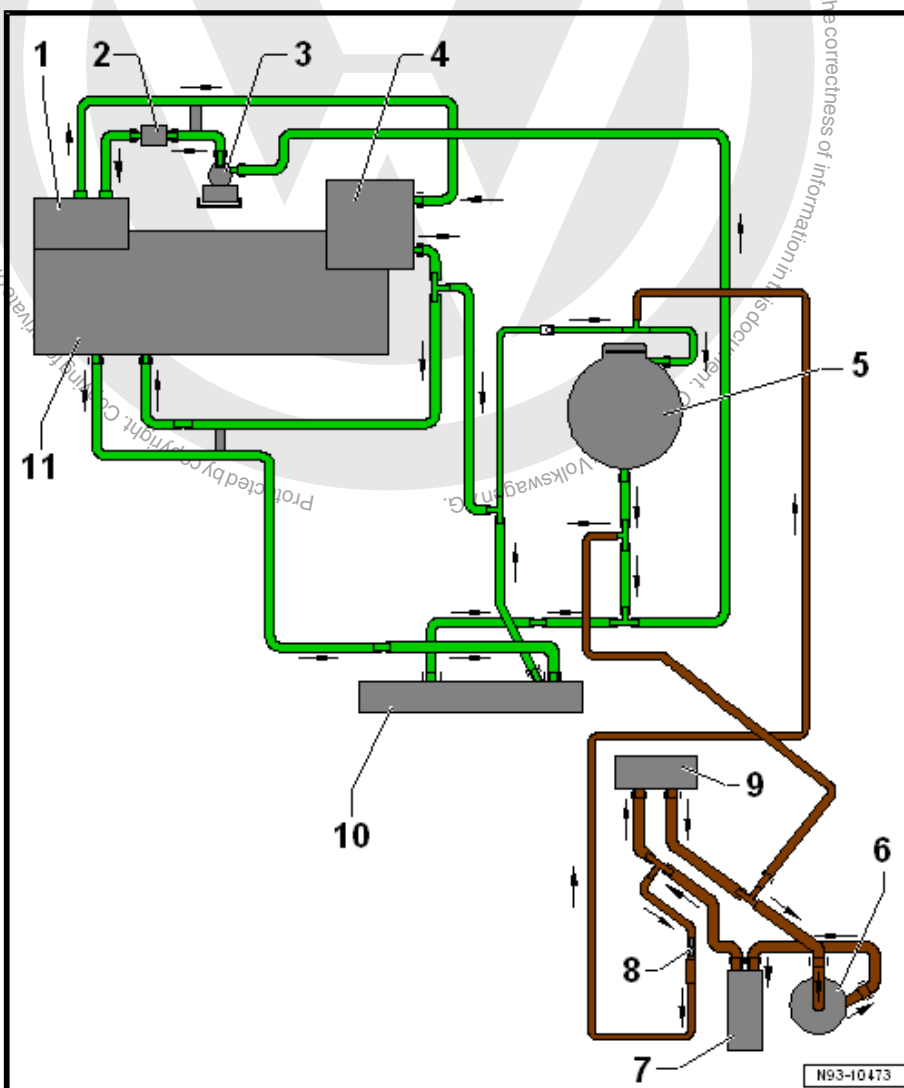
- ☐ Leakage test ⇒ [page 144](#) .

6 - Coolant pump for high-temperature circuit - V467-

- ☐ Removing and installing ⇒ [page 152](#)

7 - High-voltage heater (PTC) - Z115-

- ☐ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing High-voltage heater (PTC) - Z115- and high-voltage heater control unit (PTC) - J848-





8 - Restrictor with non-return valve

9 - Heat exchanger for heater

- ❑ Removing and installing ⇒ Heating, ventilation and air conditioning; Rep. gr. 87 ; Heating and air conditioning unit, front; Removing and installing heat exchanger

10 - Radiator for engine coolant

- ❑ Removing and installing ⇒ [page 156](#)

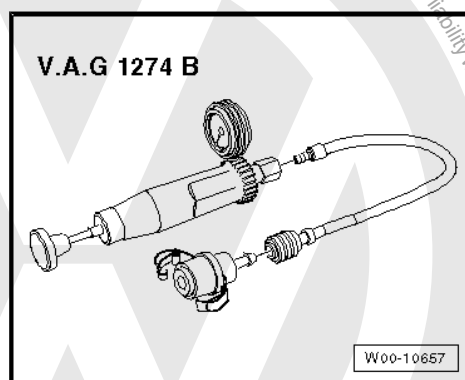
11 - Three-phase current drive - VX54-

- ❑ Integrated into coolant circuit
- ❑ Removing and installing ⇒ [page 118](#)

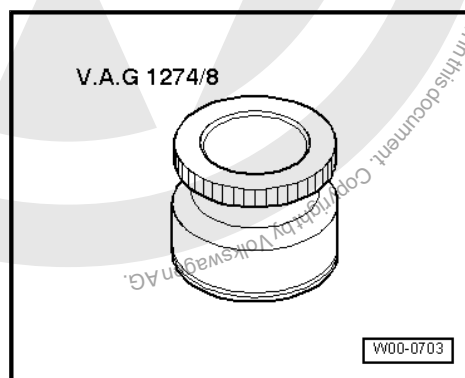
8.3 Checking cooling system for leaks

Special tools and workshop equipment required

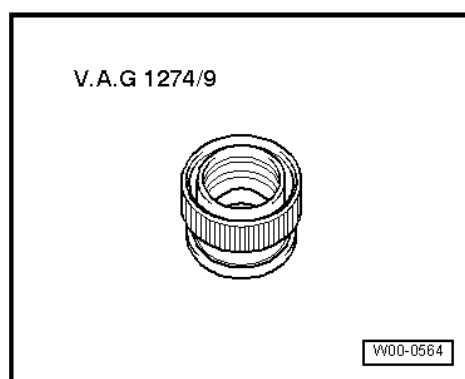
- ◆ Cooling system tester - V.A.G 1274 B-



- ◆ Adapter for cooling system tester - V.A.G 1274/8-

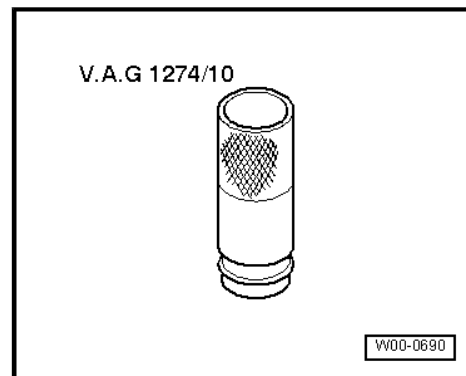


- ◆ Adapter for cooling system tester - V.A.G 1274/9-





- ◆ Adapter for cooling system tester - V.A.G 1274/10-



Prerequisites for check

- Cooling system at operating temperature

Test sequence

CAUTION

On a warm engine, the cooling system is under high pressure. Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.

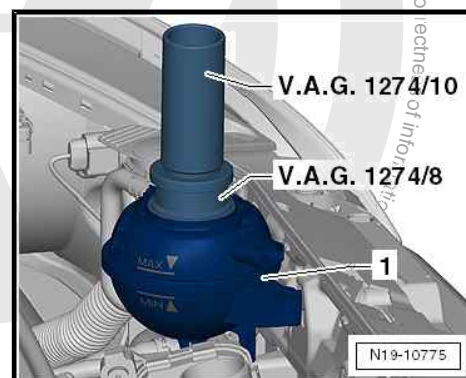
- Screw adapter for cooling system tester - V.A.G 1274/8- into coolant expansion tank -1-.
- Screw adapter for cooling system tester - V.A.G 1274/10- into adapter for cooling system tester - V.A.G 1274/8- .
- Clamp connector - V.A.G 1274 B/1- into adapter for cooling system tester - V.A.G 1274/10- .
- Connect connector - V.A.G 1274 B/1- to cooling system tester - V.A.G 1274 B- using supplied hose.
- Using hand pump of tester, build up a pressure of approx. 1.5 bar.

CAUTION

Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

- Release pressure by pressing pressure relief valve on cooling system tester until the gauge shows a pressure of 0.



If the pressure drops:

- Search for leaks within engine compartment and on underside of vehicle.

Check pressure relief valve in cap.



- Screw cap -1- into adapter for cooling system tester - V.A.G 1274/9- -2-.
- Clamp connector - V.A.G 1274 B/1- into adapter for cooling system tester - V.A.G 1274/9- .
- Connect connector - V.A.G 1274 B/1- to cooling system tester - V.A.G 1274 B- using supplied hose.
- Build up a pressure of 1.6 bar max. using hand pump of cooling system tester.

The pressure relief valve must still remain closed.

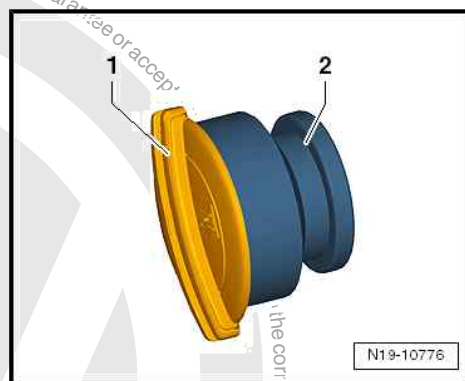
If the pressure relief valve opens prematurely:

- Renew cap.
- Increase pressure.

The pressure relief valve must open once the opening pressure is exceeded.

If the pressure relief valve does not open:

- Renew cap.



8.4 Draining and adding coolant

Special tools and workshop equipment required

<p>T10007 A</p>	<p>VAS 6208</p>
<p>VAS 6340</p>	<p>VAS 6096</p>
<p>V.A.G 1274/8</p>	<p>W19-10042</p>



- ◆ Refractometer - T10007 A-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers - VAS 6340- or hose clip pliers - VAS 6362-
- ◆ Coolant system charge unit - VAS 6096-
- ◆ Adapter for cooling system tester - V.A.G 1274/8-

Draining

CAUTION

On a warm engine, the cooling system is under high pressure.
Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.

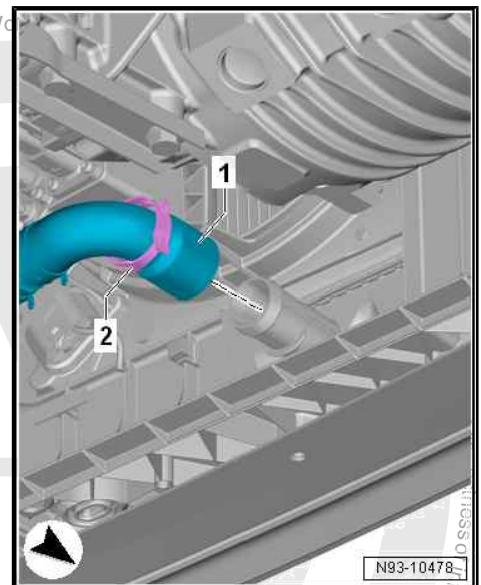
- Remove underbody covers ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody cover; Assembly overview - underbody covers, e-up! .
- Release hose clip -2-.
- Pull coolant hose -1- off radiator.
- Drain coolant into drip tray for workshop hoist - VAS 6208- .



Note

Observe regulations for disposing of used coolant.

Filling





Note

- ◆ The water used for mixing has a major influence on the effectiveness of the coolant. Because the water quality differs from country to country and even from region to region, the quality of the water to be used in the cooling system has been specified by Volkswagen. Distilled water fulfils all requirements. Therefore, only ever use distilled water when mixing coolant for topping up or renewing coolant.
- ◆ Use only coolant additives which conform with the ⇒ *Electronic parts catalogue (ETKA)*. Other coolant additives may reduce corrosion protection substantially. The resulting damage could lead to loss of coolant and subsequent severe damage to the motor.
- ◆ Mixed in the proper proportions, coolant inhibits frost and corrosion damage as well as scaling. Such additives also raise the boiling point of the coolant. For this reason, the cooling system must be filled all-year-round with coolant additives.
- ◆ Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
- ◆ Use **ONLY** refractometer - T10007A- for determining current anti-freeze value.
- ◆ Frost protection must be guaranteed down to -25°C as a minimum and, in countries with arctic conditions, down to approx. -36°C . Increasing the frost protection is permissible only if climatic conditions require stronger frost protection. It may, however, be increased only to a maximum of -48°C . Otherwise, the cooling effect will be impaired.
- ◆ Do not reduce the coolant concentration by adding water even in warmer seasons and in warmer countries. Frost protection must be guaranteed down to at least -25°C .
- ◆ Read off anti-freeze figures for respective replenished coolant additives.
- ◆ The temperature read off the refractometer - T10007A- corresponds the »ice flocculation point«. Flakes of ice may start forming in the coolant at this temperature.
- ◆ Never reuse old coolant.
- ◆ Use only a water/coolant additive mixture as a slip agent for coolant hoses.



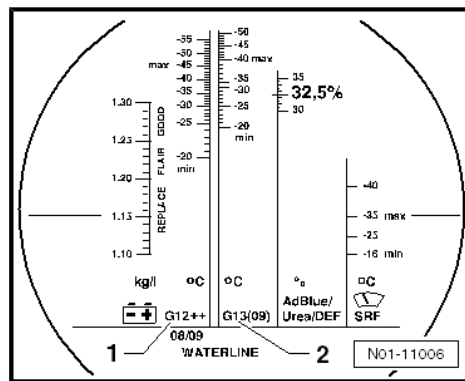
Note

To ensure optimum protection against corrosion, use only distilled water for mixing with coolant additives.

Recommended mixing ratios (use only distilled water for mixing):

Frost protection to	Coolant additive
-25°C	40%
-36°C	50%

1) The quantity of coolant can vary depending on the vehicle equipment.





- Connect coolant hose -1-.
- Secure coolant hose with hose clip -2-.
- Screw adapter for cooling system tester - V.A.G 1274/8- onto expansion tank.



Note

The coolant pumps must be actuated in order to fill the coolant system ⇒ Vehicle diagnostic tester.

- Actuate coolant pumps ⇒ Vehicle diagnostic tester.
- Fill coolant circuit using cooling system charge unit - VAS 6096- ⇒ Operating instructions for cooling system charge unit VAS 6096 .
- Fill with coolant up to max. mark on expansion tank -1-.
- Fit cooling system tester - V.A.G 1274 B- onto coolant expansion tank.
- Apply pressure of 1.5 bar to cooling system. See [page 144](#) .
- Seal coolant expansion tank -1- with cap -2-.
- Carry out test drive to bring coolant to operating temperature.

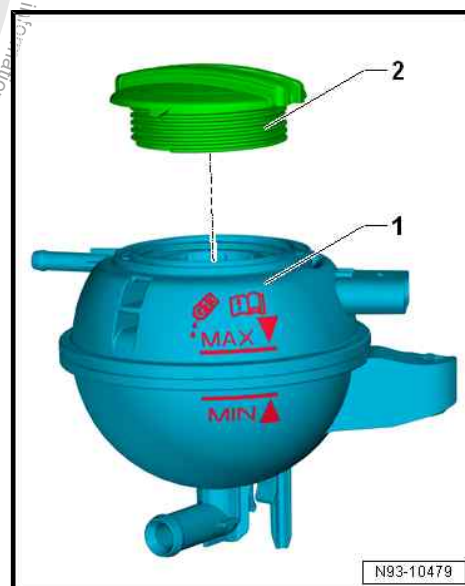
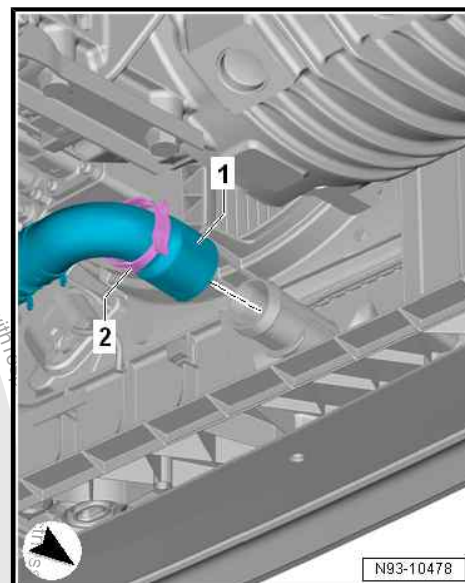


CAUTION

On a warm engine, the cooling system is under high pressure. Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.



- Check coolant level and top up as needed.
- When the motor is at operating temperature, the coolant level may be at or above the "MAX" mark.
- When the motor is cold, the coolant level must be between the "MIN" mark and the "MAX" mark.

9 Coolant pump, regulation of cooling system

⇒ "9.1 Assembly overview - coolant regulator unit", page 150

⇒ "9.2 Removing and installing power and control electronics for electric drive V508", page 151

⇒ "9.3 Removing and installing coolant pump for high temperature circuit V467", page 152

⇒ "9.4 Removing and installing temperature sender after electric drive motor G788", page 153

9.1 Assembly overview - coolant regulator unit

1 - Restrictor with non-return valve

2 - Temperature sender after drive motor for electric drive system - G788-

- ☐ Removing and installing
⇒ page 153

3 - Seal

- ☐ Renew after removal

4 - Retaining clip

- ☐ Securing clip for temperature sender after electric drive motor - G788-

5 - Cross member

- ☐ Cross member for three-phase current drive - VX54-

6 - Bracket

- ☐ Bracket attached to cross member
- ☐ Bracket for high-voltage heater (PTC) - Z115- and coolant pump for high-temperature circuit - V467-

7 - Retaining clip

- ☐ Qty. 2

8 - Coolant pump for high-temperature circuit - V467-

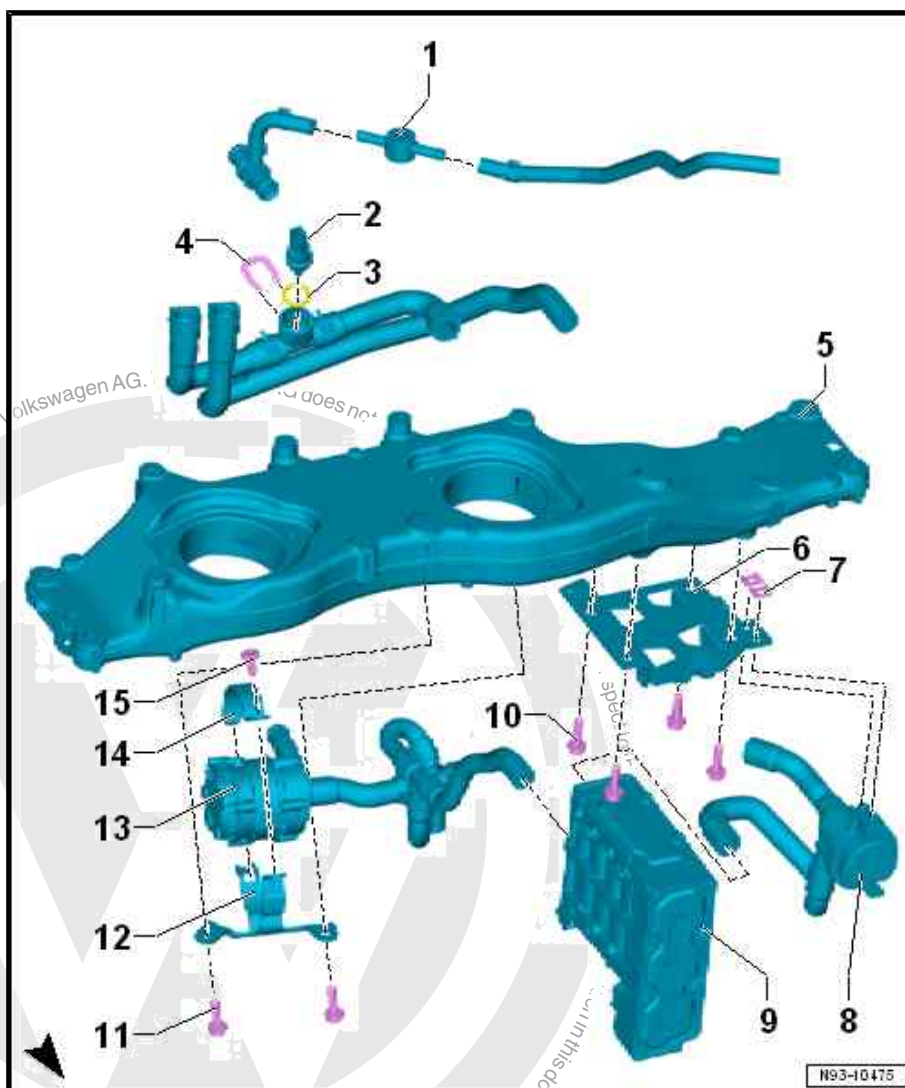
- ☐ Removing and installing
⇒ page 152

9 - High-voltage heater (PTC) - Z115-

- ☐ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Coolant circuit; Removing and installing High-voltage heater (PTC) - Z115- and high-voltage heater control unit (PTC) - J848-

10 - Bolts

- ☐ Qty. 4
- ☐ 9 Nm





11 - Bolts

- ☐ Qty. 2
- ☐ 9 Nm

12 - Bracket

- ☐ Lower part of bracket for pump before power and control electronics for electric drive - V508-

13 - Pump before power and control electronics for electric drive - V508-

- ☐ Removing and installing ⇒ [page 151](#)

14 - Bracket

- ☐ Upper part of bracket for pump before power and control electronics for electric drive - V508-

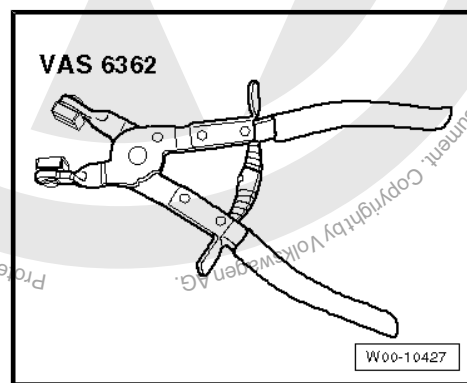
15 - Bolt

- ☐ 9 Nm

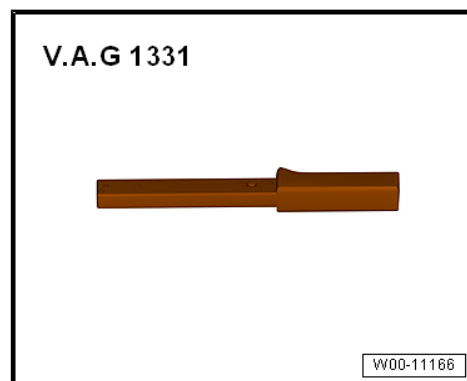
9.2 Removing and installing power and control electronics for electric drive - V508-

Special tools and workshop equipment required

- ◆ Spring-type clip pliers - VAS 6362-



- ◆ Torque wrench - V.A.G 1331-

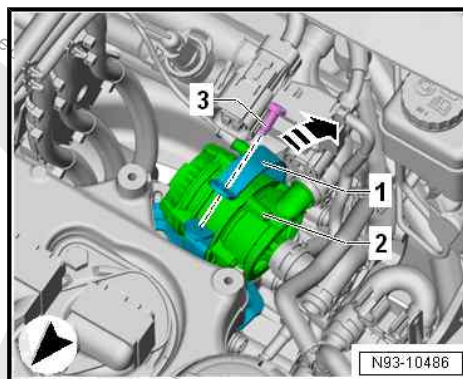


Removing

- Drain coolant ⇒ [page 146](#) .
- Remove bracket for engine (motor) control unit - J623-
⇒ [page 135](#) .
- Remove bracket for charging unit 1 for high-voltage battery -
AX4- ⇒ [page 186](#) .



- Unscrew bolt -3-.
- Detach upper part of bracket -1- in -direction of arrow- from coolant pump -2-, unhook from lower part of bracket and remove.

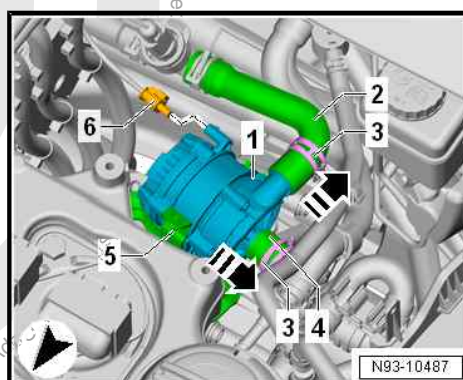


- Disconnect electrical connector -6-.
- Loosen hose clip -3-.
- Pull coolant hoses -2- and -4- off coolant pump -1- in -direction of arrow-.
- Detach coolant pump -1- from lower part of bracket -5-.

Installing

Install in reverse order of removal, observing the following:

- Add coolant ⇒ [page 146](#) .
- Observe electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



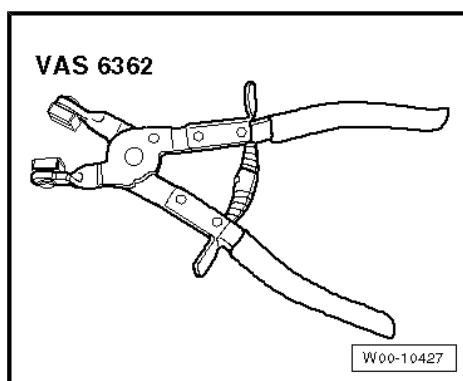
Specified torques

- ◆ ⇒ [“9.1 Assembly overview - coolant regulator unit”, page 150](#)

9.3 Removing and installing coolant pump for high temperature circuit - V467-

Special tools and workshop equipment required

- ◆ Spring-type clip pliers - VAS 6362-



Removing

- Drain coolant ⇒ [page 146](#) .



- Disconnect electrical connector -5-.
- Release hose clips -2-.
- Pull coolant hoses -3- and -4- off coolant pump -1- in -direction of arrow-.
- Release and remove securing clips -7-.
- Remove coolant pump -1- from bracket -6-.

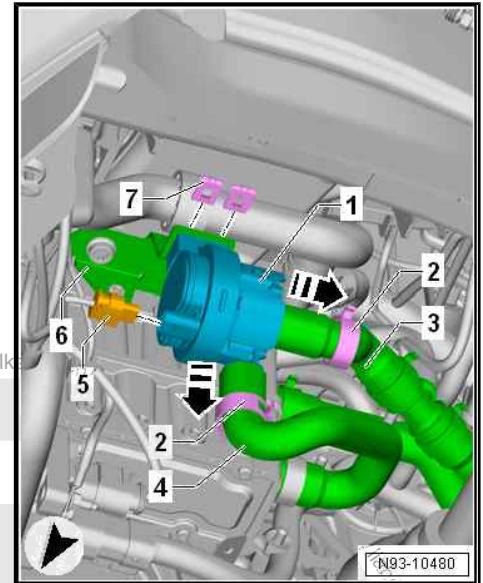
Installing

Install in reverse order of removal, observing the following:

- Add coolant → [page 146](#) .
- Observe electrical connections and routing → Current flow diagrams, Electrical fault finding and Fitting locations.

Specified torques

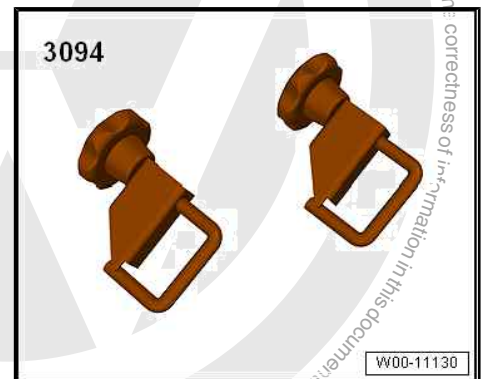
- ◆ ⇒ [“9.1 Assembly overview - coolant regulator unit”, page 150](#)



9.4 Removing and installing temperature sender after electric drive motor - G788-

Special tools and workshop equipment required

- ◆ Hose clamps to 25 mm - 3094-



Removing

⚠ CAUTION

On a warm engine, the cooling system is under high pressure. Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.

- Engine cold.



- Disconnect electrical connector -4-.
- Clamp off coolant hose before and after temperature sender using hose clamps up to 25 mm - 3094- .
- Pull off securing clip -5-.
- Remove temperature sender after electric drive motor - G788-3- with seal -2- from union -1-.

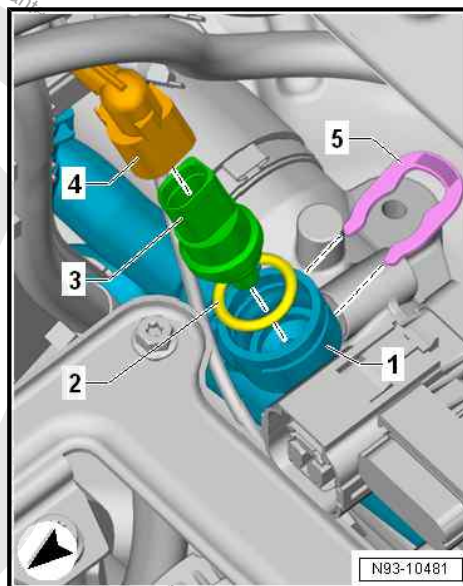
Installing

Install in reverse order of removal, observing the following:

- Check coolant level and top up as needed ⇒ [page 146](#) .
- Observe electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Specified torques

- ♦ ⇒ [“9.1 Assembly overview - coolant regulator unit”, page 150](#)





10 Radiator and radiator fan

⇒ ["10.1 Assembly overview - radiator and radiator fan", page 155](#)

⇒ ["10.2 Removing and installing radiator", page 156](#)

⇒ ["10.3 Removing and installing cowling with radiator fan", page 159](#)

⇒ ["10.4 Removing and installing radiator fan V7", page 160](#)

10.1 Assembly overview - radiator and radiator fan

1 - Cap

- ☐ Checking ⇒ [page 144](#)
- ☐ Check using cooling system tester - V.A.G 1274 B- and adapter for cooling system tester - V.A.G 1274/9-
- ☐ Test pressure: 1.4 to 1.6 bar

2 - Expansion tank

- ☐ Check for leaks
⇒ [page 144](#)
- ☐ Check cooling system for leaks using cooling system tester - V.A.G 1274 B- and adapter for cooling system tester - V.A.G 1274/8-
- ☐ Connection diagram for coolant hoses
⇒ [page 143](#)

3 - Coolant hose

- ☐ Connection diagram for coolant hoses
⇒ [page 143](#)
- ☐ Check for firm seating

4 - Upper coolant hose

- ☐ Connection diagram for coolant hoses
⇒ [page 143](#)
- ☐ Check for firm seating

5 - Radiator mounting

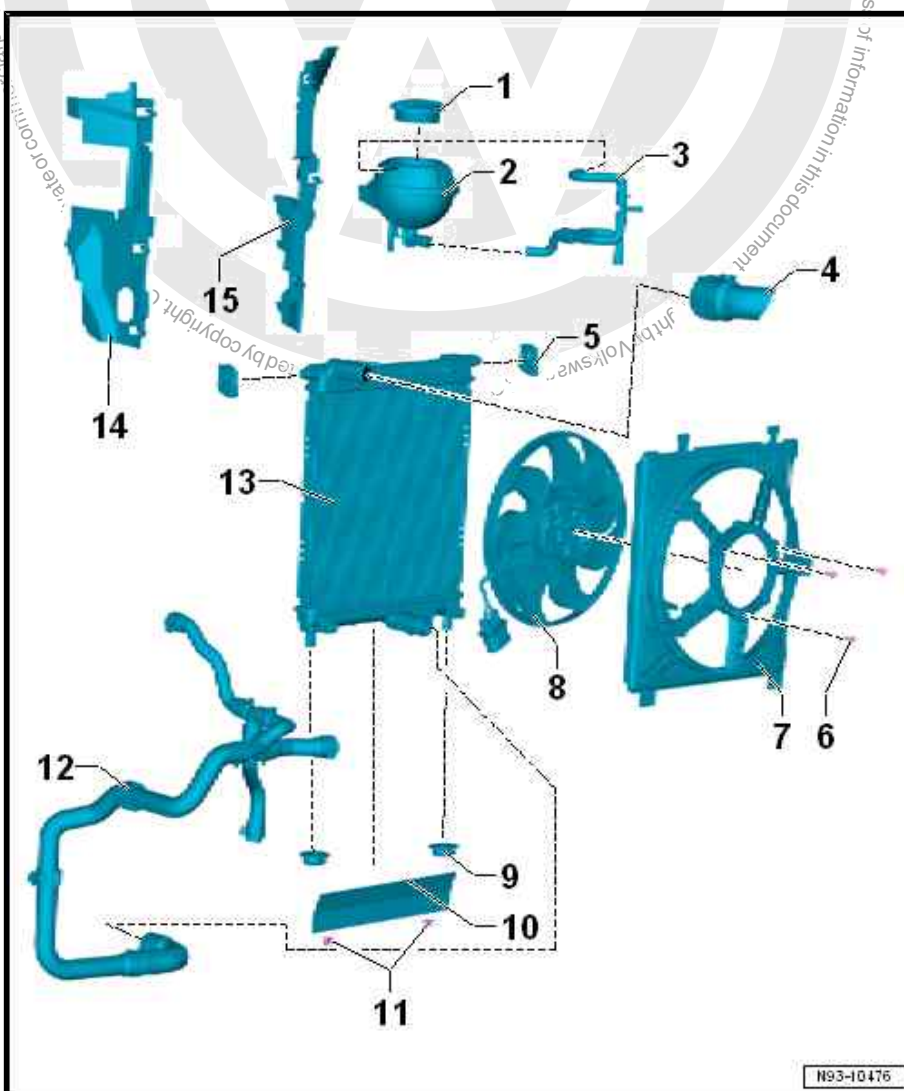
- ☐ At top of radiator
- ☐ Observe installation position
- ☐ Note locking mechanism ⇒ [page 156](#) .

6 - Bolts

- ☐ For securing radiator fan - V7- to cowling
- ☐ Qty. 3
- ☐ 10 Nm

7 - Cowling

- ☐ Removing and installing ⇒ [page 159](#)





8 - Radiator fan - V7-

- ☐ Removing and installing ⇒ [page 160](#)

9 - Radiator mounting

- ☐ At bottom of radiator
- ☐ Ensure proper seating in lock carrier

10 - Lower air guide

- ☐ Attached to bottom of lock carrier

11 - Retaining clip

- ☐ Qty. 2
- ☐ Attaches air guide to bottom of lock carrier

12 - Lower coolant hose

- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)
- ☐ Check for firm seating

13 - Radiator for engine coolant

- ☐ Removing and installing ⇒ [page 156](#)
- ☐ Connection diagram for coolant hoses ⇒ [page 143](#)
- ☐ After renewing, renew entire coolant ⇒ [page 146](#)

14 - Air guide, left

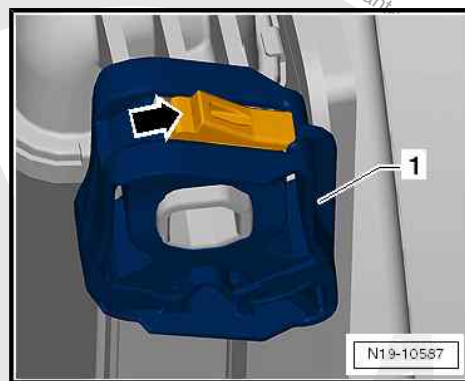
- ☐ Air guide for radiator
- ☐ Engaged in lock carrier

15 - Air guide, right

- ☐ Air guide for radiator
- ☐ Engaged in lock carrier

Locking mechanism of radiator mounting

- To release radiator mounting -1- from lock carrier, locking lug must be pressed down -arrow-.



10.2 Removing and installing radiator

Removing

CAUTION

Danger of injury; the radiator fans can run at any time.

- Separate electrical connectors.



CAUTION

On a warm engine, the cooling system is under high pressure. Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

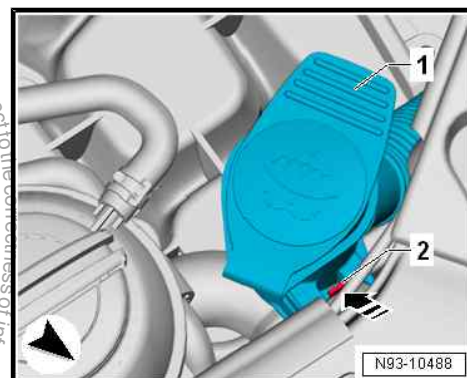
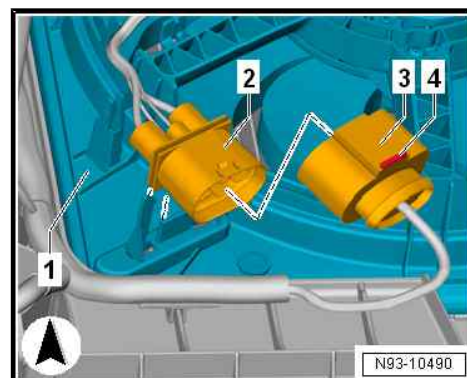
- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.

- Remove front bumper ⇒ General body repairs, exterior; Rep. gr. 63 ; Front bumper; Removing and installing front bumper .
- Remove front left headlights ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights
- Remove condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser .

Note

To prevent damage to condenser, refrigerant lines or hoses, ensure that lines and hoses are not stretched, kinked or bent.

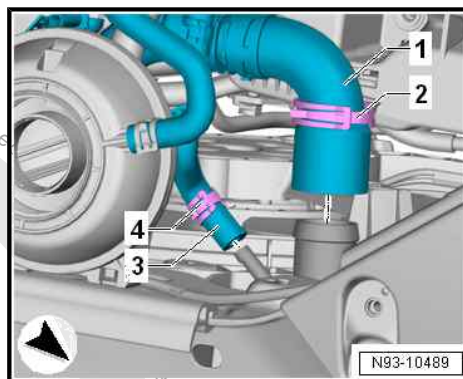
- Drain coolant ⇒ [page 146](#) .
- Release connector -3- at locking lug -4-, and pull off wiring harness -2- for radiator fan.
- Detach wiring harness -2- from retainer on cowling -1-.



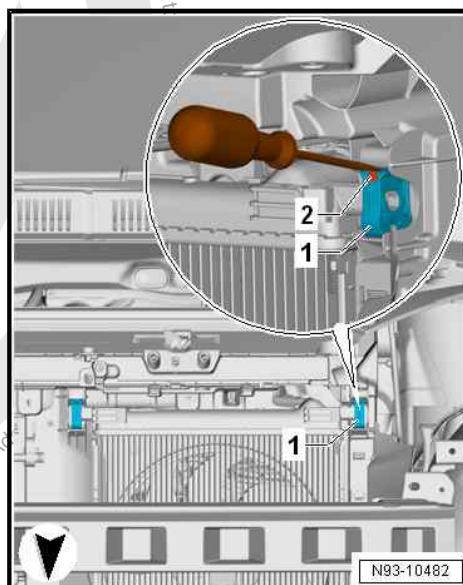
- Release locking lug -2- on filler neck -1- in -direction of arrow-.
- Remove filler neck -1- upwards out of lock carrier.



- Open hose clips -2- and -4- using hose clip pliers - VAS 6362- , and push them back.
- Pull coolant hoses -1- and -3- off top of radiator.



- Release locking lugs -2- of radiator mountings -1- on both sides using a screwdriver ➤ [page 156](#) .
- Pull radiator slightly out of the two upper lock carrier supports.





- Tip radiator -1- further forwards in -direction of arrow A-.
- Pull radiator -1- upwards in -direction of arrow B- on right side.
- Tip radiator -1- further forwards in -direction of arrow A- out of lock carrier.
- Pull radiator -1- out of mountings in -direction of arrow C- and remove.

If radiator is to be renewed:

- Remove cowling with radiator fan ⇒ [page 159](#).

Installing

Install in reverse order of removal observing the following:



Note

To prevent damage to condenser, refrigerant lines or hoses, ensure that lines and hoses are not stretched, kinked or bent.

- Install condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser .
- Install front left headlight ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .
- Observe electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install front bumper ⇒ General body repairs, exterior; Rep. gr. 63 ; Front bumper; Removing and installing front bumper .
- Add coolant ⇒ [page 146](#) .

10.3 Removing and installing cowling with radiator fan

Removing



CAUTION

Danger of injury; the radiator fans can run at any time.

- Separate electrical connectors.



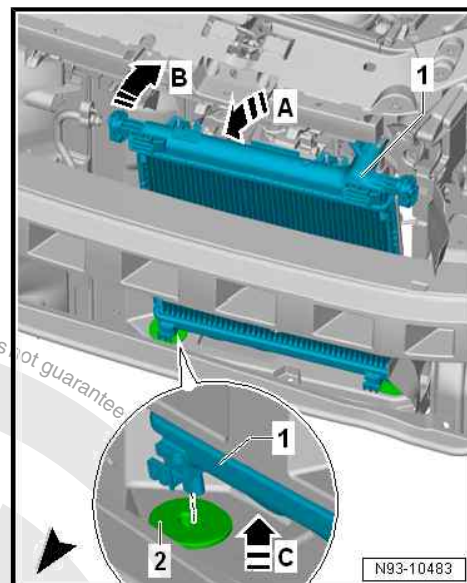
CAUTION

On a warm engine, the cooling system is under high pressure. Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.

- Remove radiator ⇒ [page 156](#) .





- Press locking lug -3- on radiator -1- in -direction of arrow A- while simultaneously releasing cowling -2-.
- Pull cowling -2- in -direction of arrow B- out of lower radiator mounting -1-.
- Remove cowling together with radiator fan - V7- .

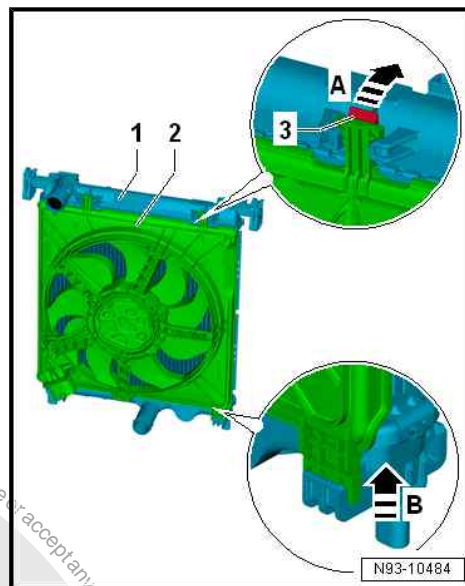
If cowling is to be renewed:

- Remove radiator fan - V7- ➔ [page 159](#) .

Installing

Install in reverse order of removal, observing the following:

- Install radiator ➔ [page 156](#) .
- Observe electrical connections and routing ➔ Current flow diagrams, Electrical fault finding and Fitting locations.



10.4 Removing and installing radiator fan - V7-

Removing

⚠ CAUTION

Danger of injury; the radiator fans can run at any time.

- Separate electrical connectors.

⚠ CAUTION

On a warm engine, the cooling system is under high pressure. Danger of scalding by steam and hot coolant.

Skin and other parts of the body may be scalded.

- Wear protective gloves.
- Wear protective goggles.
- Reduce excess pressure by covering cap of coolant expansion tank with cloths and opening it carefully.

- Remove radiator ➔ [page 156](#) .
- Removing cowling with radiator fan - V7- ➔ [page 159](#) .



- Remove wiring harness -4- from retainer on cowl -1-.
- Unscrew bolts -2-.
- Unthread wiring harness -4- from cowl -1-.
- Remove radiator fan - V7- -3- from cowl -1-.

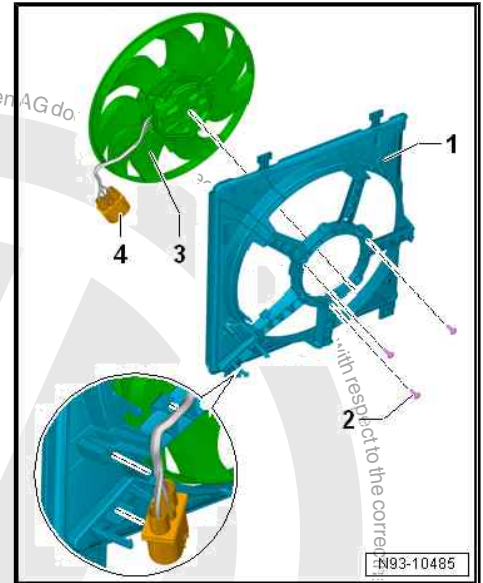
Installing

Install in reverse order of removal, observing the following:

- Install radiator ⇒ [page 156](#)
- Observe electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Specified torque:

- ◆ Bolt ⇒ [Item 6 \(page 155\)](#)





11 High-voltage heater (PTC)

Overview of fitting locations ⇒ Heating, air conditioning; Rep. gr.
87 ; Coolant circuit; Overview of fitting locations - coolant circuit .





12 Electrical air conditioner compressor

The electrical air conditioner compressor - V470- is installed on the right in the front in the engine compartment.

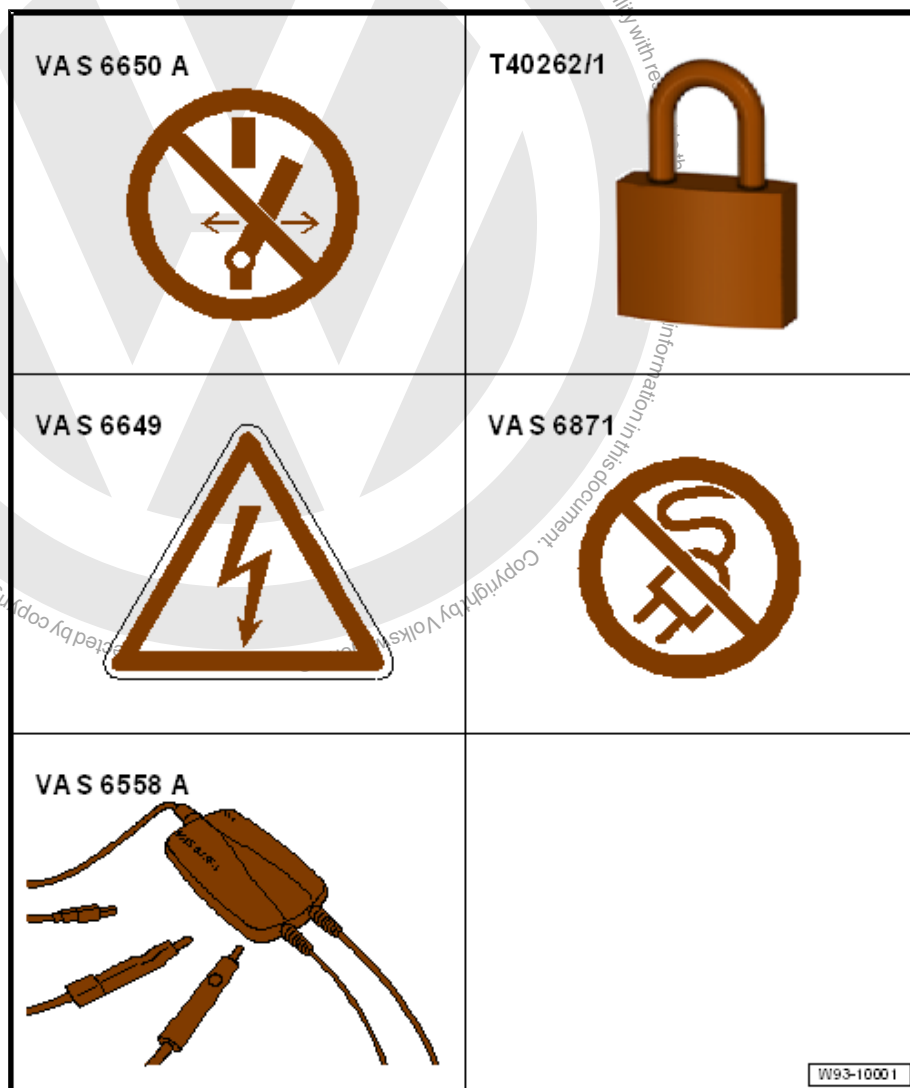
Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ;
Air conditioner compressor; Removing and installing Electrical air
conditioner compressor - V470-





13 De-energising high-voltage system

Special tools and workshop equipment required



- ◆ Hybrid test module - VAS 6558 A-
- ◆ Hybrid vehicle high voltage warning - VAS 6649-
- ◆ Warning sign "Do not switch" - VAS 6650 A-
- ◆ Charging prohibited warning sign - VAS 6871-
- ◆ Padlock - T40262/1-
- ◆ Pick-up clamps - V.A.G 1594/14-

If problems occur during individual steps of the de-energisation procedure, inform the high-voltage expert.

The post - VAS 6884- can be used to secure the vehicle.

- Park the vehicle in a secure manner.
- Prepare test report.
- Have calibrated voltage tester with suitable test probes ready.
- Prepare signs/notices and cordoning off equipment as needed.



- De-energise high-voltage system ⇒ Vehicle diagnostic tester.





14 **Recommissioning high-voltage system**

- Commission high-voltage system ⇒ Vehicle diagnostic tester.





15 Potential equalisation lines

⇒ ["15.1 Overview of fitting locations - potential equalisation lines", page 167](#)

⇒ ["15.2 Potential equalisation lines - high-voltage battery 1 AX2", page 168](#)

⇒ ["15.3 Potential equalisation lines - power and control electronics for electric drive JX1", page 168](#)

⇒ ["15.4 Potential equalisation lines - charging unit 1 for high-voltage battery AX4", page 169](#)

⇒ ["15.5 Potential equalisation lines - three-phase current drive VX54", page 169](#)

⇒ ["15.6 Potential equalisation lines - high-voltage heater \(PTC\) Z115", page 169](#)

⇒ ["15.7 Potential equalisation lines - electrical air conditioner compressor V470", page 170](#)

15.1 Overview of fitting locations - potential equalisation lines

1 - Potential equalisation line for high-voltage battery 1 - AX2- on right

- ☐ Specified torques
⇒ [page 168](#)

2 - Potential equalisation line for high-voltage battery 1 - AX2- on left

- ☐ Specified torques
⇒ [page 168](#)

3 - Potential equalisation line for charging unit 1 for high-voltage battery - AX4-

- ☐ Specified torques
⇒ [page 169](#)

4 - Potential equalisation line for high-voltage heater (PTC) - Z115-

- ☐ Specified torques
⇒ [page 169](#)

5 - Potential equalisation line for three-phase current drive - VX54-

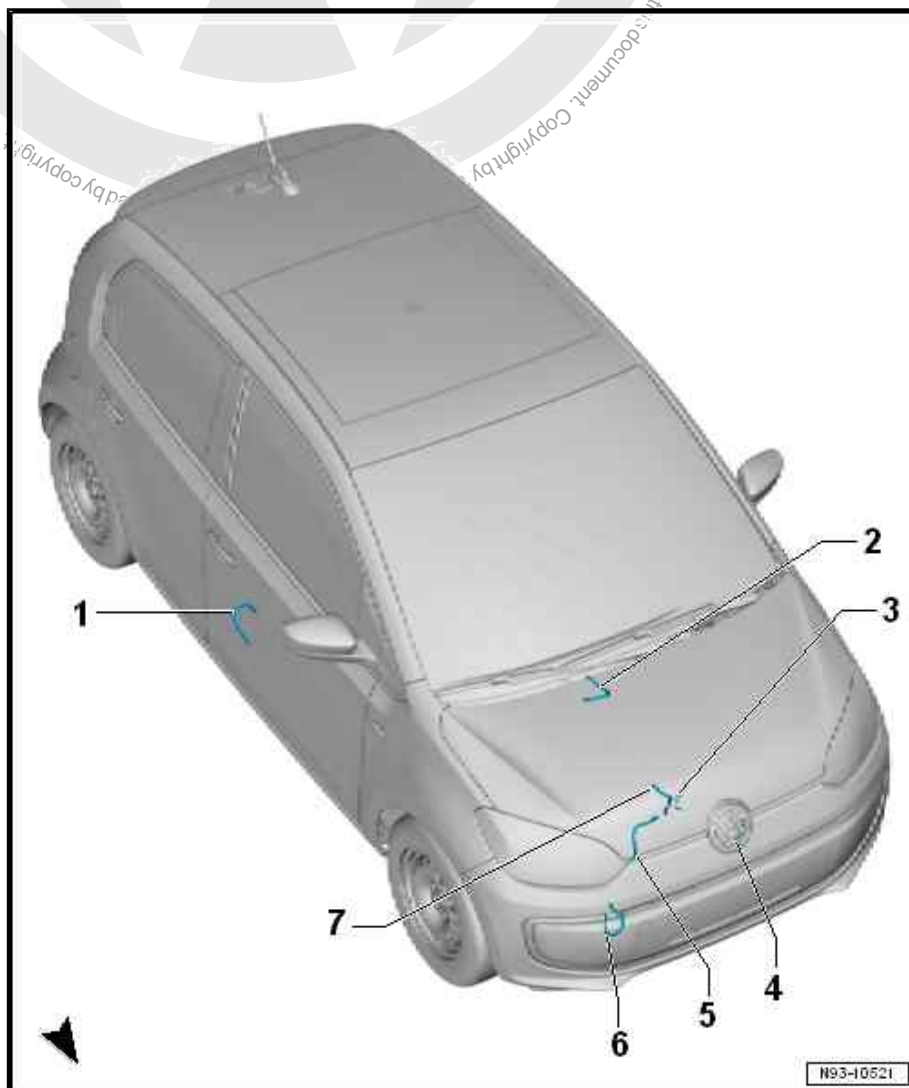
- ☐ Specified torques
⇒ [page 169](#)

6 - Potential equalisation line for electrical air conditioner compressor - V470-

- ☐ Specified torques
⇒ [page 170](#)

7 - Potential equalisation line for power and control electronics for electric drive - JX1-

- ☐ Specified torques
⇒ [page 168](#)



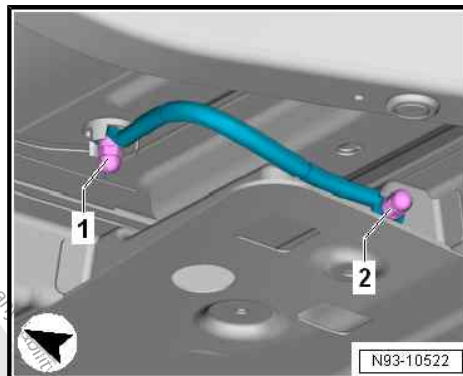


15.2 Potential equalisation lines - high-voltage battery 1 - AX2-

Potential equalisation line for high-voltage battery 1 - AX2- on left

Specified torques

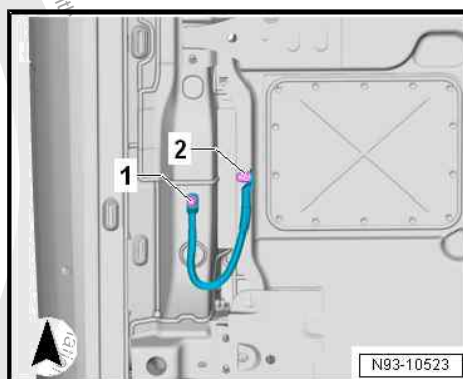
Component	Specified torque
Nut -1-	20 Nm
Nut -2-	20 Nm



Potential equalisation line for high-voltage battery 1 - AX2- on right

Specified torques

Component	Specified torque
Nut -1-	20 Nm
Nut -2-	20 Nm

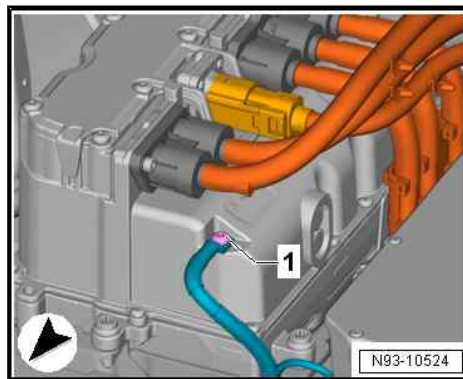


15.3 Potential equalisation lines - power and control electronics for electric drive - JX1-

Potential equalisation line for power and control electronics for electric drive - JX1-

Specified torques

Component	Specified torque
Bolt -1-	9 Nm



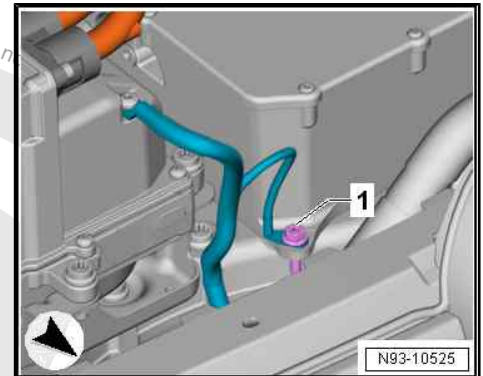


15.4 Potential equalisation lines - charging unit 1 for high-voltage battery - AX4-

Potential equalisation line for charging unit 1 for high-voltage battery - AX4-

Specified torques

Component	Specified torque
Bolt -1-	9 Nm

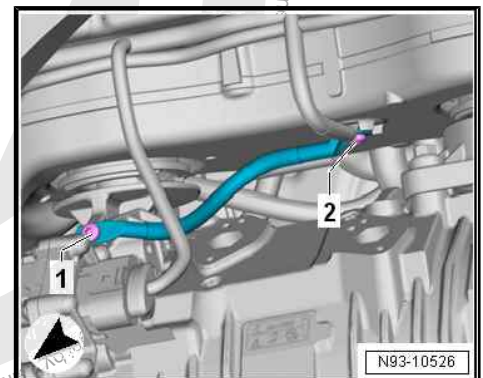


15.5 Potential equalisation lines - three-phase current drive - VX54-

Potential equalisation line for three-phase current drive - VX54-

Specified torques

Component	Specified torque
Bolt -1-	9 Nm
Bolt -2-	9 Nm

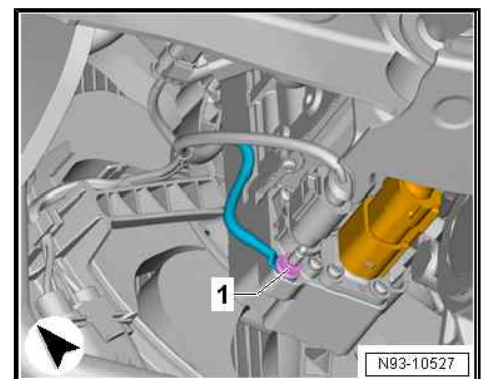


15.6 Potential equalisation lines - high-voltage heater (PTC) - Z115-

Potential equalisation line for high-voltage heater (PTC) - Z115-

Specified torques

Component	Specified torque
Nut -1-	9 Nm



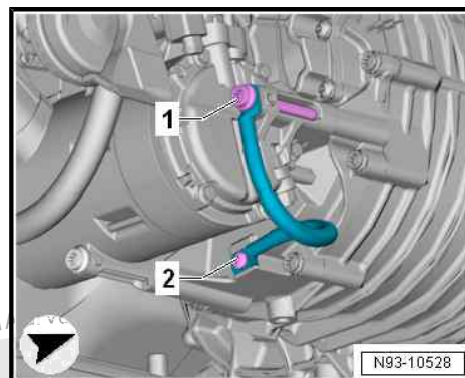


15.7 Potential equalisation lines - electrical air conditioner compressor - V470-

Potential equalisation line for electrical air conditioner compressor - V470-

Specified torques

Component	Specified torque
Bolt -1-	23 Nm
Bolt -2-	9 Nm





16 Charging socket

⇒ ["16.1 Assembly overview - charging socket", page 171](#)

⇒ ["16.2 Removing and installing high-voltage battery charging socket 1 UX4", page 172](#)

⇒ ["16.3 Removing and installing actuator for high-voltage charging socket lock 1 F498", page 178](#)

⇒ ["16.4 Manual release mechanism for charging socket", page 180](#)

16.1 Assembly overview - charging socket

⇒ ["16.1.1 Assembly overview - charging socket, EU and China", page 171](#)

⇒ ["16.1.2 Assembly overview - charging socket, Japan", page 172](#)

16.1.1 Assembly overview - charging socket, EU and China

1 - Tank flap unit

- ☐ Assembly overview ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Assembly overview - tank flap unit
- ☐ Removing and installing ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing fuel tank flap unit .

2 - Bolts

- ☐ Qty. 4
- ☐ 4 Nm

3 - High-voltage battery charging socket 1 - UX4-

- ☐ Removing and installing
⇒ [page 172](#)

4 - Bracket

5 - Nuts

- ☐ Qty. 4
- ☐ 9 Nm

6 - Vehicle electrical system connection

7 - Nut

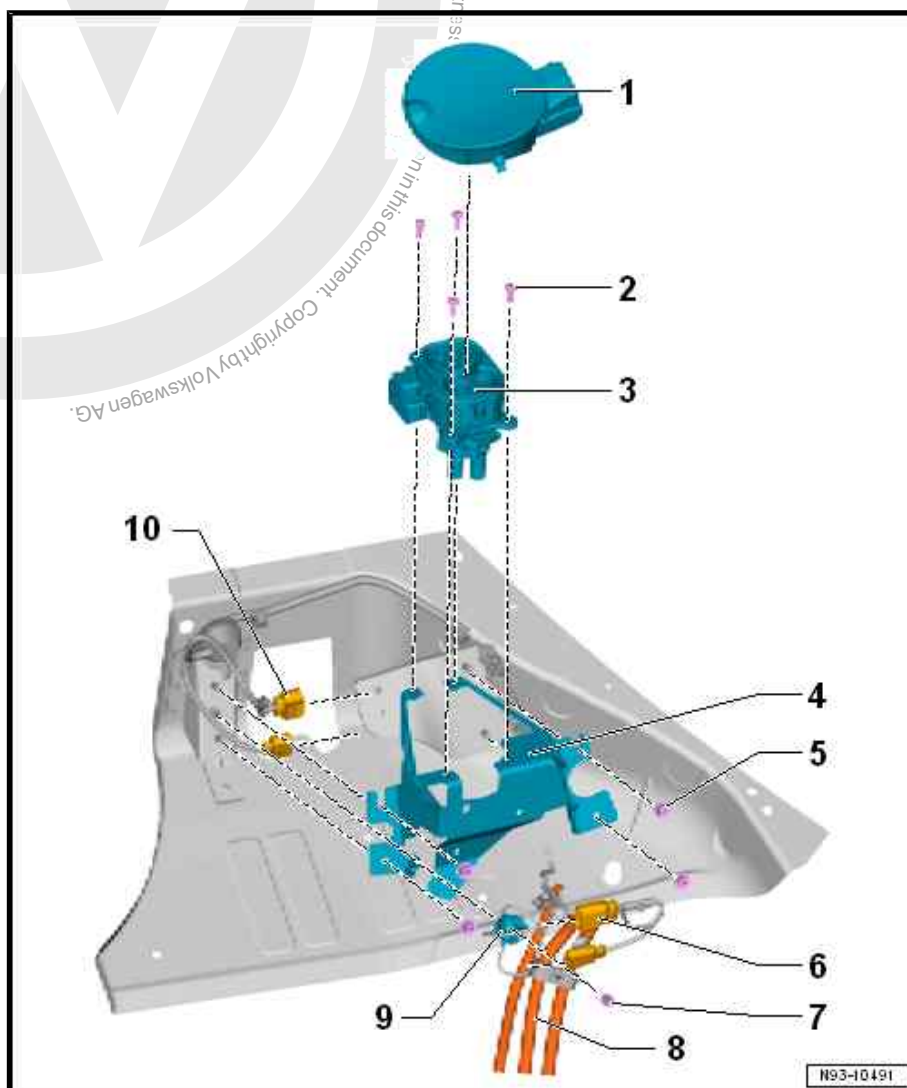
- ☐ 9 Nm

8 - High-voltage cables

- ☐ General description
⇒ [page 137](#)

9 - Earth connection

10 - Vehicle electrical system





16.1.2 Assembly overview - charging socket, Japan

1 - Bracket

2 - Bolts

- Qty. 4
- 9 Nm

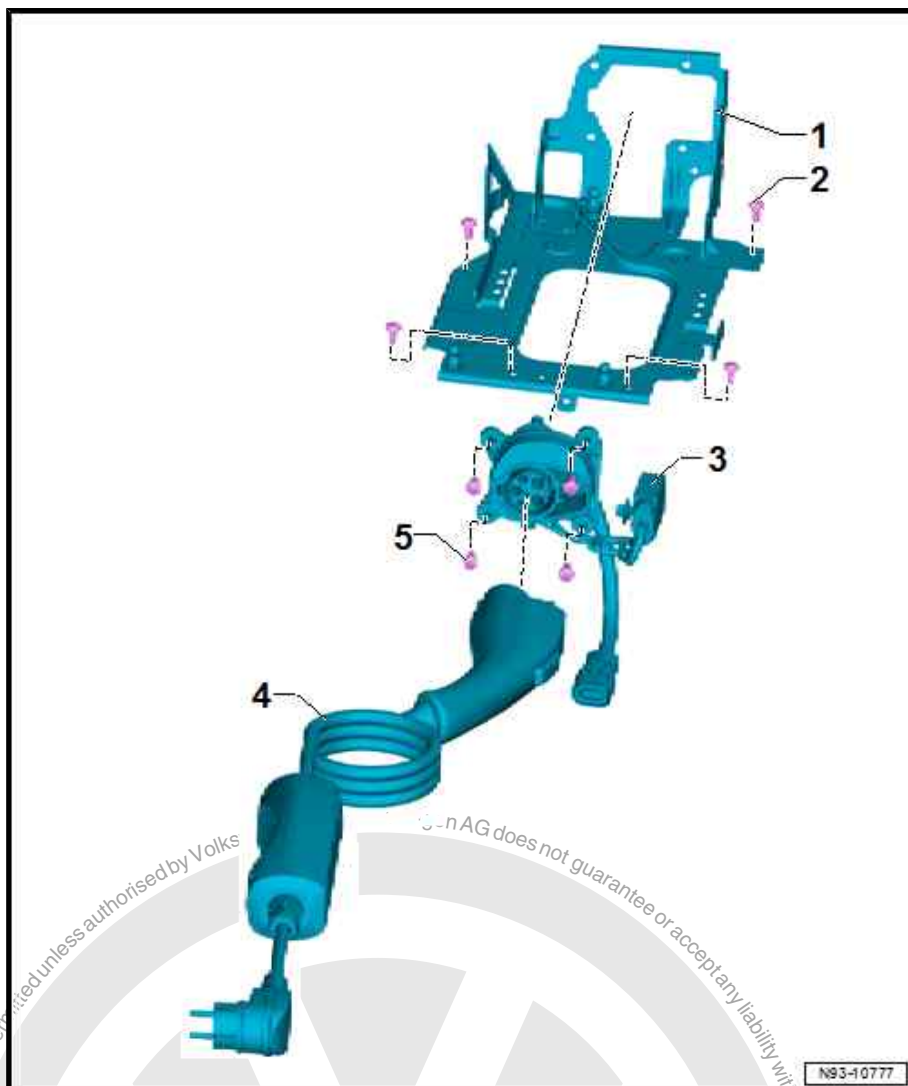
3 - High-voltage battery charging socket 1 - UX4-

- Removing and installing
⇒ [page 172](#)

4 - Charging cable

5 - Bolts

- Qty. 4
- 4 Nm



16.2 Removing and installing high-voltage battery charging socket 1 - UX4-

⇒ ["16.2.1 Removing and installing high-voltage battery charging socket 1 UX4 , EU and China", page 172](#)

⇒ ["16.2.2 Removing and installing high-voltage battery charging socket 1 UX4 , Japan", page 176](#)

16.2.1 Removing and installing high-voltage battery charging socket 1 - UX4- , EU and China

Special tools and workshop equipment required



◆ Torque wrench - V.A.G 1331-

V.A.G 1331



W00-11166

◆ Torque wrench - V.A.G 1410-

V.A.G 1410



W00-11174

Removing



DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .



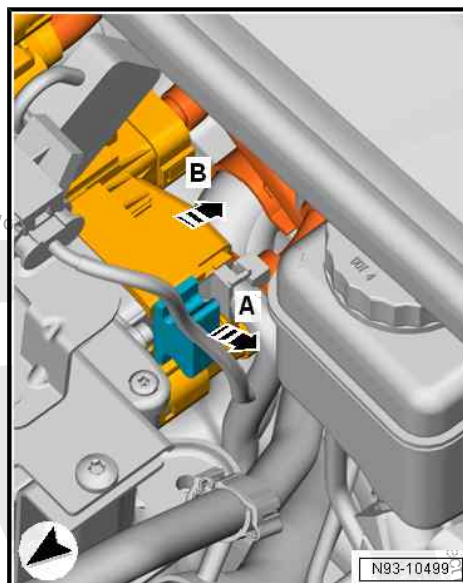
Note

The high-voltage battery charging socket 1 - UX4- can be removed only together with the charging cable.

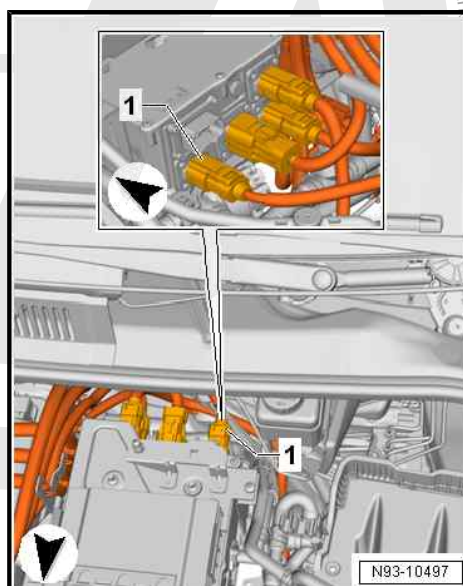
- Remove high-voltage battery 1 - AX2- ⇒ [page 25](#) .



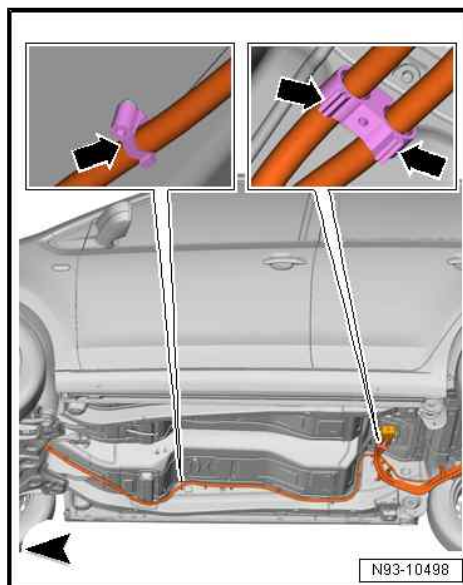
- Release connector in -direction of arrow A-.
- Pull off connector in -direction of arrow B-.



- Release high-voltage cable -1- from behind using a small screwdriver.

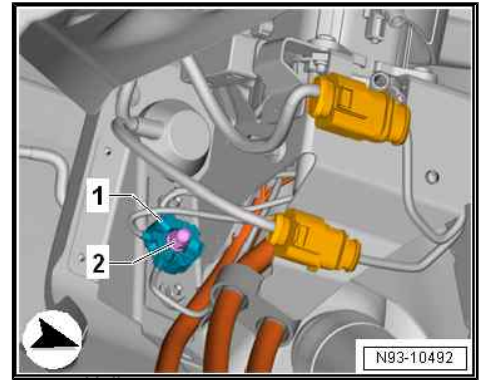


- Detach high-voltage cables from body -arrows-, and move them free.
- Remove rear right wheel.
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing wheel housing liner .

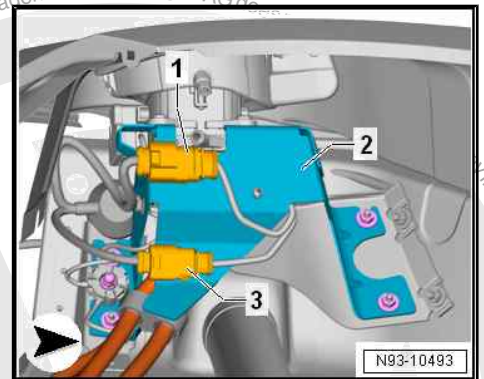




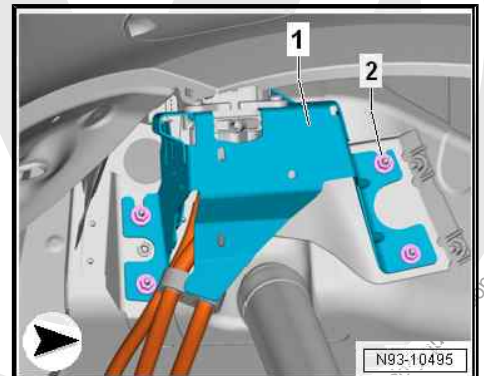
- Unscrew nut -2-.
- Pull off earth connection -1-.



- Disconnect electrical connectors -1 and 3-.
- Unclip electrical connectors -1 and 3- from bracket -2-.

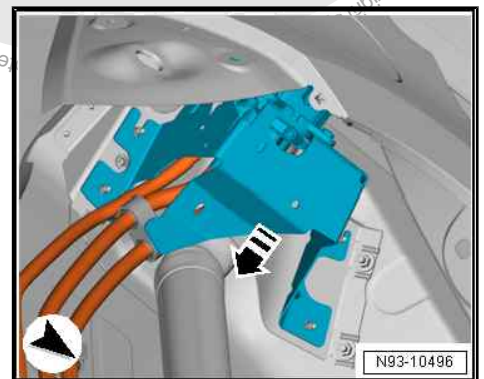


- Unscrew nuts -2- on left and right of bracket -1-.



- Pull high-voltage battery charging socket 1 - UX4- off studs.
- Swing out high-voltage battery charging socket 1 - UX4- downwards in -direction of arrow-.

If high-voltage battery charging socket 1 - UX4- is to be renewed





- Unscrew bolts -1-.
- Remove high-voltage battery charging socket 1 - UX4- -2- from bracket -3-.

Installing

Install in reverse order of removal, observing the following:

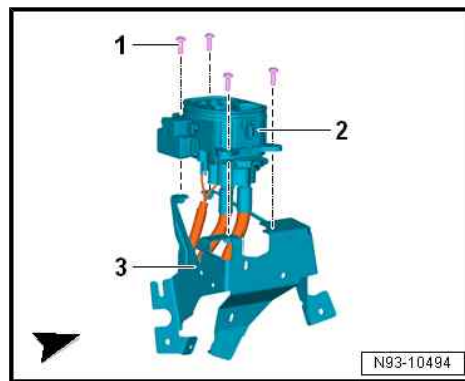


WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- **Have a qualified technician re-energise the high-voltage system.**



- Re-energise high-voltage system ⇒ Electric motor (210, LS1); Rep. gr. 93 ; Re-energising high-voltage system .

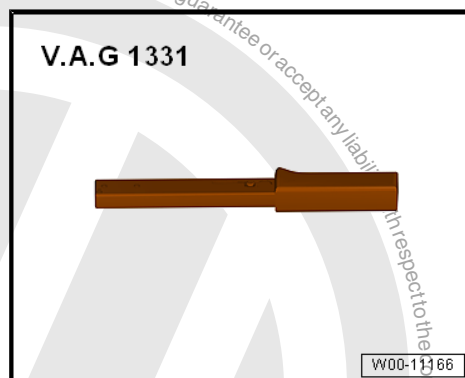
Specified torques

- ♦ ⇒ [“16.1 Assembly overview - charging socket”, page 171](#)

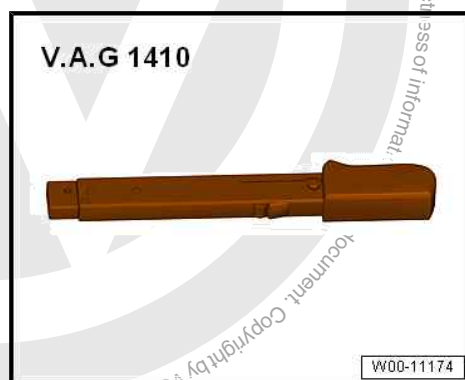
16.2.2 Removing and installing high-voltage battery charging socket 1 - UX4- , Japan

Special tools and workshop equipment required

- ♦ Torque wrench - V.A.G 1331-



- ♦ Torque wrench - V.A.G 1410-



Removing



DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- **The high-voltage system must be de-energised by a suitably qualified technician.**

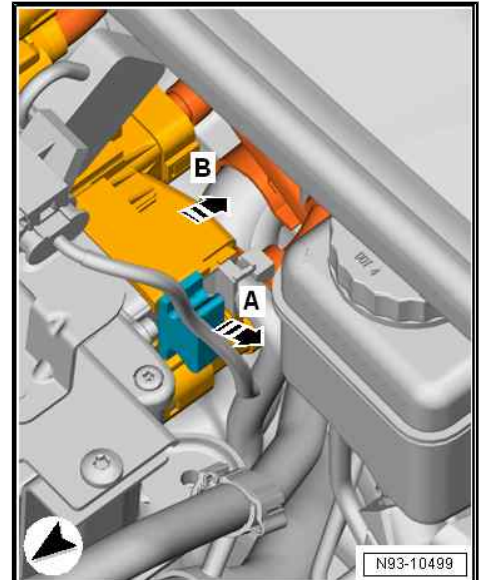


- De-energise high-voltage system ⇒ [page 164](#) .

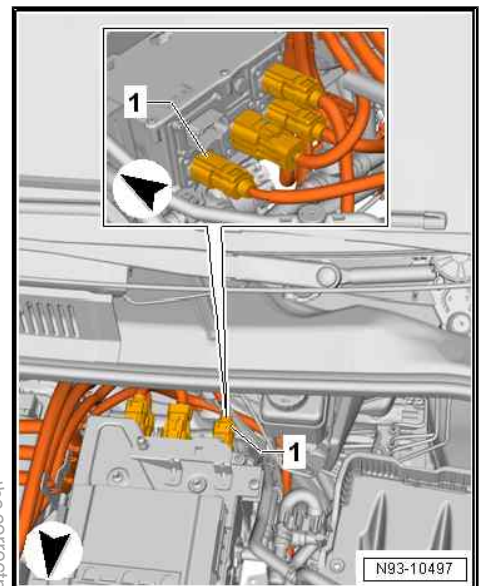
i Note

The high-voltage battery charging socket 1 - UX4- can be removed only together with the charging cable.

- Remove high-voltage battery 1 - AX2- ⇒ [page 25](#) .
- Release connector in -direction of arrow A-.
- Pull off connector in -direction of arrow B-.

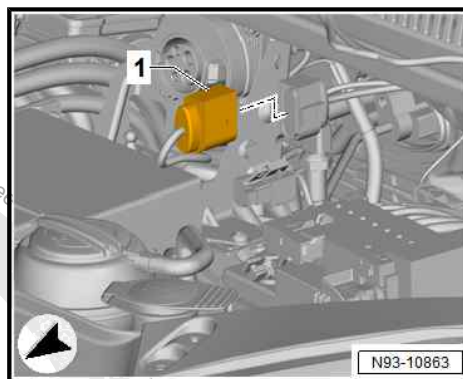


- Release high-voltage cable -1- from behind using a small screwdriver.





- Disconnect connector -1-.
- Unclip counter piece from bracket.



- Unscrew bolts -2-.
- Pull high-voltage battery charging socket 1 - UX4- -1- in -direction of arrow- out of bracket.

Installing

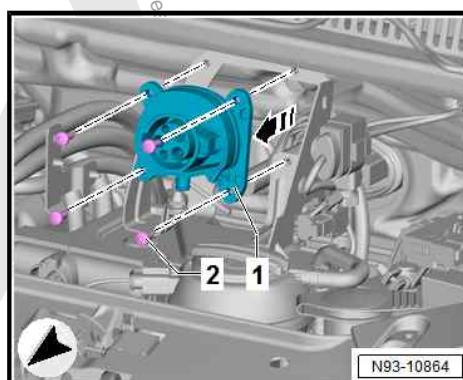
Install in reverse order of removal, observing the following:

⚠ WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- **Have a qualified technician re-energise the high-voltage system.**



- Re-energise high-voltage system ⇒ Electric motor (210, LS1); Rep. gr. 93 ; Re-energising high-voltage system .

Specified torques

- ♦ ⇒ ["16.1 Assembly overview - charging socket", page 171](#)

16.3 Removing and installing actuator for high-voltage charging socket lock 1 - F498-

Special tools and workshop equipment required

- ♦ Torque wrench 50-100Ncm - VAS 6253A-

⚠ DANGER

Danger to life from high voltage.

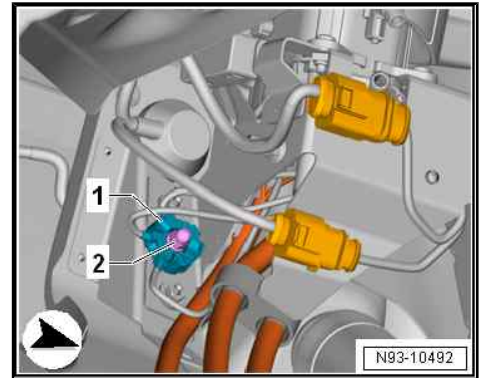
Severe or fatal injury due to electric shock.

- **The high-voltage system must be de-energised by a suitably qualified technician.**

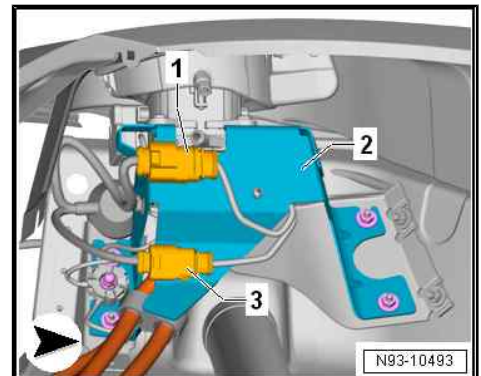
- De-energise high-voltage system ⇒ [page 164](#) .
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing rear wheel housing liner .



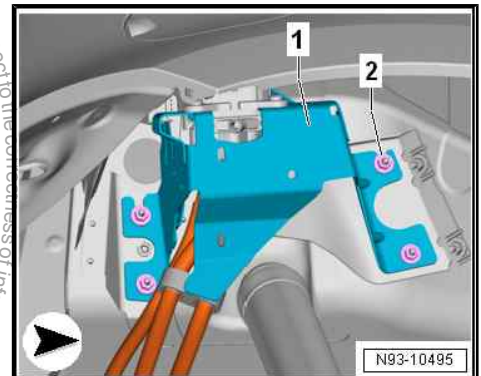
- Unscrew nut -2-.
- Pull off earth connection -1-.



- Disconnect electrical connectors -1 and 3-.
- Unclip electrical connectors -1 and 3- from bracket -2-.

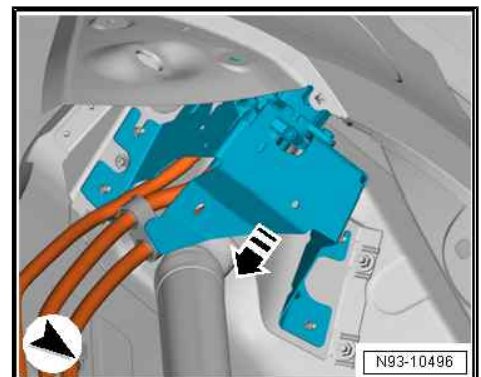


- Unscrew nuts -2- on left and right of bracket -1-.



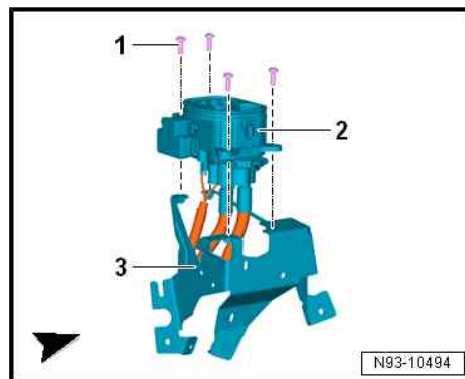
Pull high-voltage battery charging socket 1 - UX4- off studs.

- Swing out high-voltage battery charging socket 1 - UX4- downwards in -direction of arrow-.





- Unscrew bolts -1-.
- Remove high-voltage battery charging socket 1 - UX4- -2- from bracket -3-.



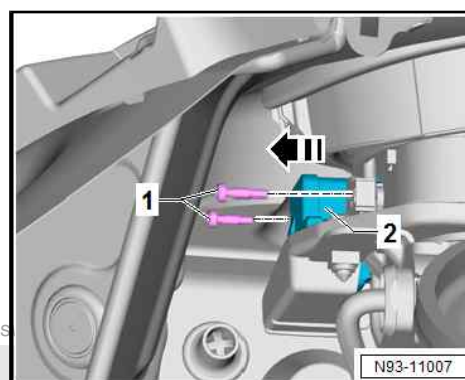
- Unscrew bolts -1-.
- Remove actuator for high-voltage charging socket lock 1 - F498- -2-.

Installing

Install in reverse order of removal, observing the following:

Specified torques

Component	Specified torque
Bolts for actuator for high-voltage charging socket lock 1 - F498- -1-	1.2 Nm



♦ ⇒ ["16.1 Assembly overview - charging socket", page 171](#)

⚠ WARNING

Danger to life from high voltage.

Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Re-energise high-voltage system ⇒ Electric motor (210, LS1); Rep. gr. 93 ; Re-energising high-voltage system .



Note

Once the high-voltage system has been installed and energised, check the function of the actuator for high-voltage charging socket lock 1 - F498- .

16.4 Manual release mechanism for charging socket



Note

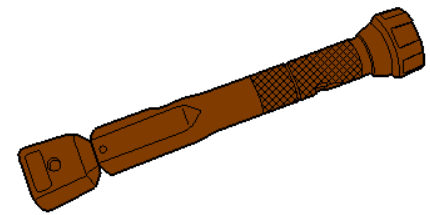
- ♦ When charging, the charging connector is blocked through an actuator.
- ♦ In the event of an actuator failure, the charging connector can no longer be disconnected from the high-voltage battery charging socket 1 - UX4- .
- ♦ Apart from the electrical emergency release, a mechanical emergency release of the actuator is possible, too.



Special tools and workshop equipment required

- ◆ Torque wrench - VAS 6253A-

VAS 6253A



W00-11878

Removing

DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing rear wheel housing liner .
- Unscrew bolts -1-.
- Push actuator -2- in -direction of arrow- to release connector from charging cable 1 - P20- .

Installing

Install in reverse order of removal, observing the following:

WARNING

Danger to life due to high voltage.

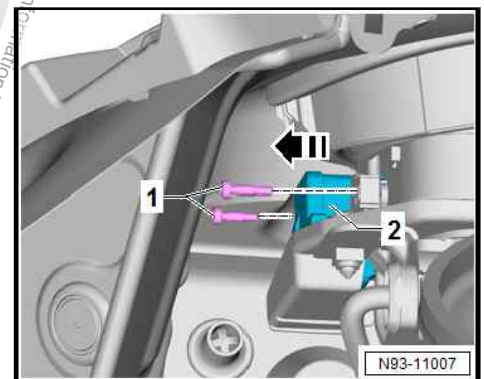
Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Commission high-voltage system ⇒ [page 166](#) .

Specified torques

Component	Specified torque
Bolts -1-	1.2 Nm



17 Charging unit for high-voltage battery

⇒ "17.1 Assembly overview - charging unit for high-voltage battery", page 182

⇒ "17.2 Removing and installing charging unit 1 for high-voltage battery AX4", page 183

⇒ "17.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4", page 186

17.1 Assembly overview - charging unit for high-voltage battery

1 - Charging unit 1 for high-voltage battery - AX4-

- ☐ Removing and installing
⇒ page 183

2 - Bolts

- ☐ Qty. 4
- ☐ 9 Nm

3 - High-voltage cable

- ☐ To high-voltage heater (PTC) - Z115-

4 - High-voltage cable

- ☐ To electrical air conditioner compressor - V470-

5 - High-voltage cable

- ☐ To power and control electronics for electric drive - JX1-

6 - High-voltage cable

- ☐ From high-voltage battery charging socket 1 - UX4-

7 - Connection for vehicle electrical system

8 - Coolant hose

9 - Clip

10 - Console

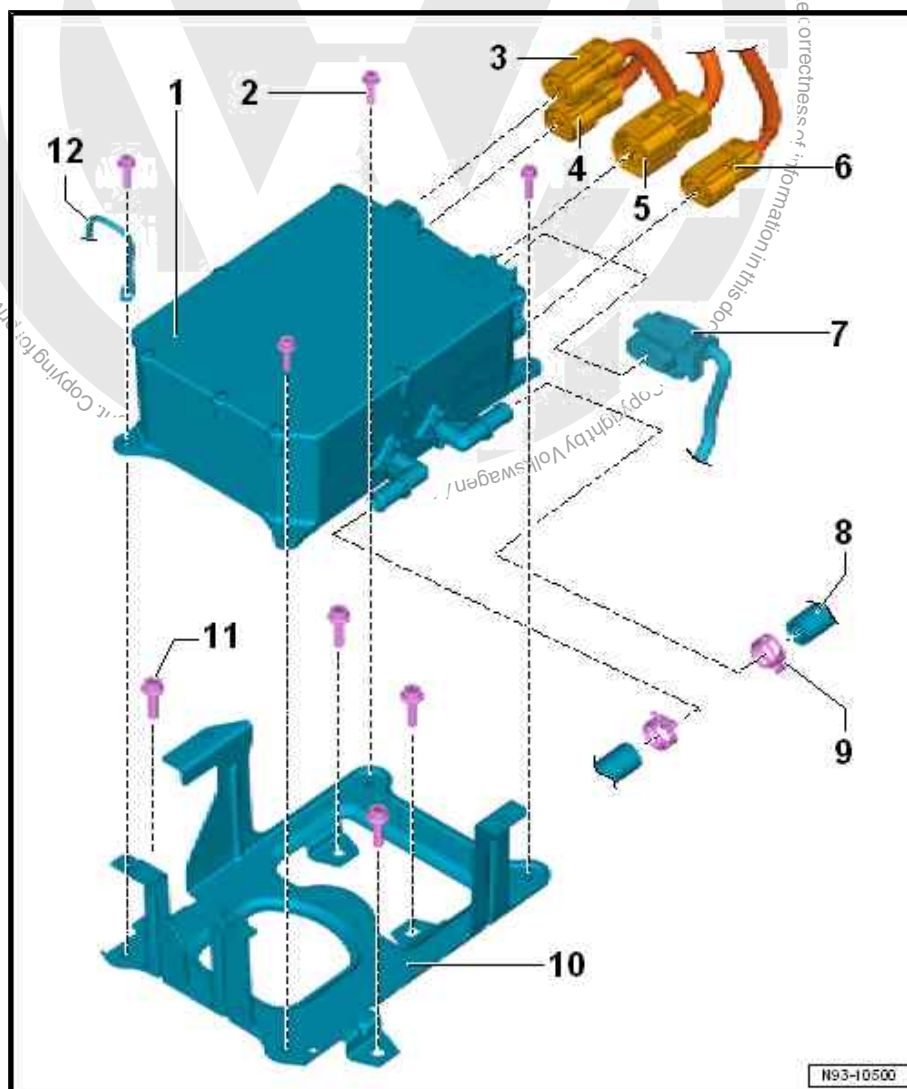
- ☐ Removing and installing
⇒ page 186

11 - Bolts

- ☐ Qty. 4
- ☐ 20 Nm

12 - Potential equalisation line

- ☐ Overview of fitting locations ⇒ page 167





17.2 Removing and installing charging unit 1 for high-voltage battery - AX4-



Note

Charging unit 1 for high-voltage battery - AX4- contains control unit for high-voltage battery charging unit - J1050-

Special tools and workshop equipment required

- ◆ Torque wrench - V.A.G 1331-

V.A.G 1331



W00-11166

Removing



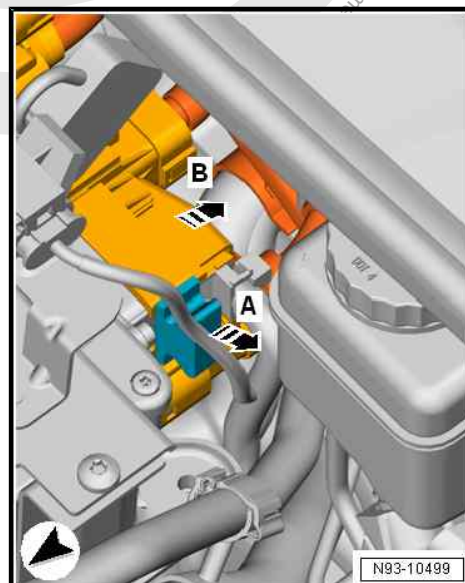
DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

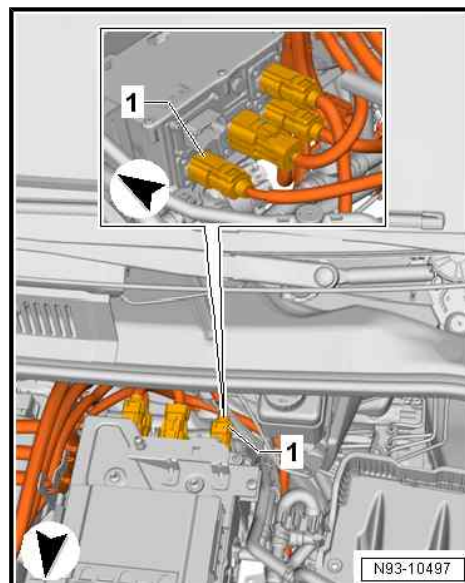
- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .
- Drain coolant ⇒ [page 146](#) .
- Remove cover for motor compartment ⇒ [page 117](#) .
- Remove bracket for engine (motor) control unit - J623- ⇒ [page 135](#) .
- Release connector in -direction of arrow A-.
- Pull off connector in -direction of arrow B-.

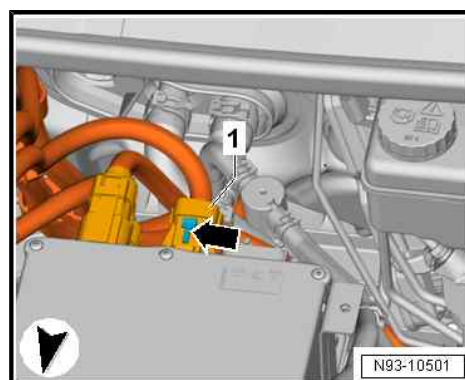




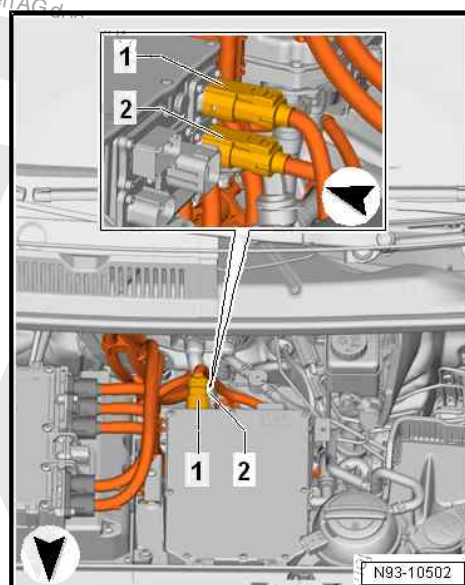
- Release high-voltage cable -1- from behind using a small screwdriver.



- Release high-voltage cable -1- -arrow-, and pull it off.



- To release and pull of high-voltage cables -1 and 2-, carry out the following steps:



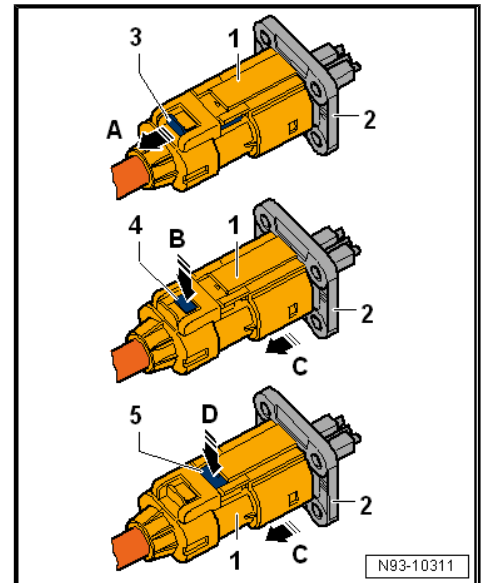


- Pull locking lug -3- in -direction of arrow A-.
- Press lug -4- in -direction of arrow B- while pulling connector -1- in -direction of arrow C- off connector mounting -2-.

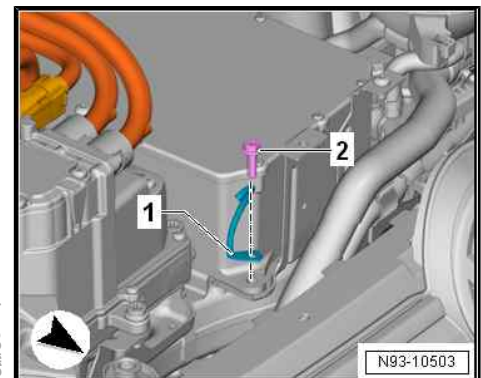
i Note

Connector -1- can be pulled about 5 mm out of connector mounting -2-.

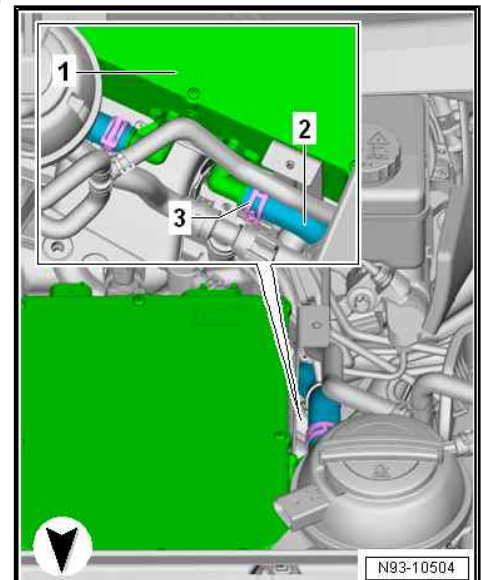
- Press lug -5- in -direction of arrow D- while pulling connector -1- in -direction of arrow C- completely off connector support -2-.



- Unscrew bolt -2-.
- Remove potential equalisation line -1-.



- Loosen clips on right and left -3-.
- Pull water hoses -2- off charging unit 1 for high-voltage battery -AX4- -1-.





- Unscrew bolts -2-.
- Remove charging unit 1 for high-voltage battery - AX4- -1- upwards.

Installing

Install in reverse order of removal, observing the following:



WARNING

Danger to life due to high voltage.

Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Commission high-voltage system ⇒ [page 166](#)

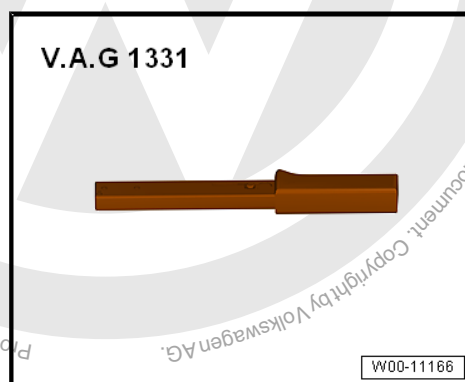
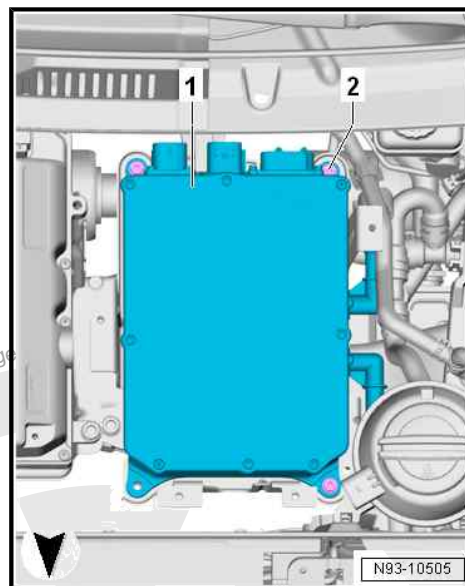
Specified torques

- ♦ ⇒ [“17.1 Assembly overview - charging unit for high-voltage battery”, page 182](#)
- ♦ ⇒ [“15.1 Overview of fitting locations - potential equalisation lines”, page 167](#)

17.3 Removing and installing bracket for charging unit 1 for high-voltage battery - AX4-

Special tools and workshop equipment required

- ♦ Torque wrench - V.A.G 1331-



Removing



DANGER

Danger to life due to high voltage.

Severe or fatal injury due to electric shock.

- The high-voltage system must be de-energised by a suitably qualified technician.

- De-energise high-voltage system ⇒ [page 164](#) .
- Remove charging unit 1 for high-voltage battery - AX4- ⇒ [page 183](#) .
- Unclip coolant hoses from bracket.



- Unscrew bolts -2-.
- Remove bracket -1- upwards.

Installing

Install in reverse order of removal, observing the following:

WARNING

Danger to life due to high voltage.

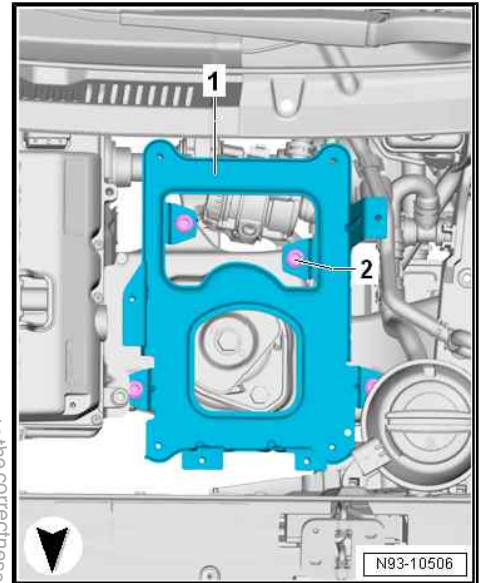
Electrical shocks can cause serious injuries or death.

- Have a qualified technician re-energise the high-voltage system.

- Commission high-voltage system ⇒ [page 166](#)

Specified torques

- ◆ ⇒ [“17.1 Assembly overview - charging unit for high-voltage battery”, page 182](#)





18 Driving sound and engine sound

⇒ ["18.1 Overview of fitting locations - driving sound and engine sound", page 188](#)

⇒ ["18.2 Removing and installing engine sound generator control unit J943", page 189](#)

⇒ ["18.3 Removing and installing actuator 1 for engine sound generator R257", page 190](#)

18.1 Overview of fitting locations - driving sound and engine sound

⇒ ["18.1.1 Overview of fitting locations - vehicle noise/engine sound, Europe", page 188](#)

⇒ ["18.1.2 Overview of fitting locations - vehicle noise/engine sound, Japan/China", page 189](#)

18.1.1 Overview of fitting locations - vehicle noise/engine sound, Europe

1 - Actuator 1 for engine sound generator - R257-

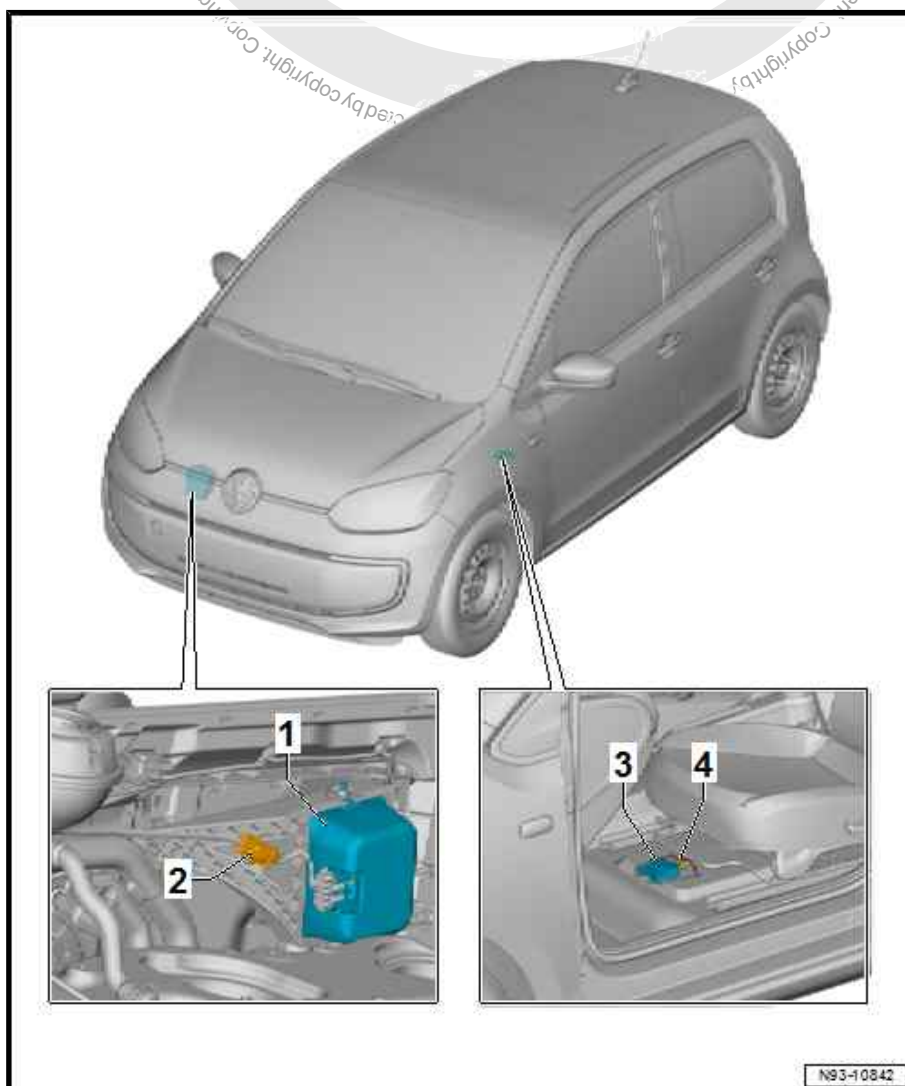
- ❑ Removing and installing
⇒ [page 190](#)

2 - Electrical connector

3 - Engine sound generator control unit - J943-

- ❑ ⇒ [page 189](#)

4 - Electrical connector





18.1.2 Overview of fitting locations - vehicle noise/engine sound, Japan/China

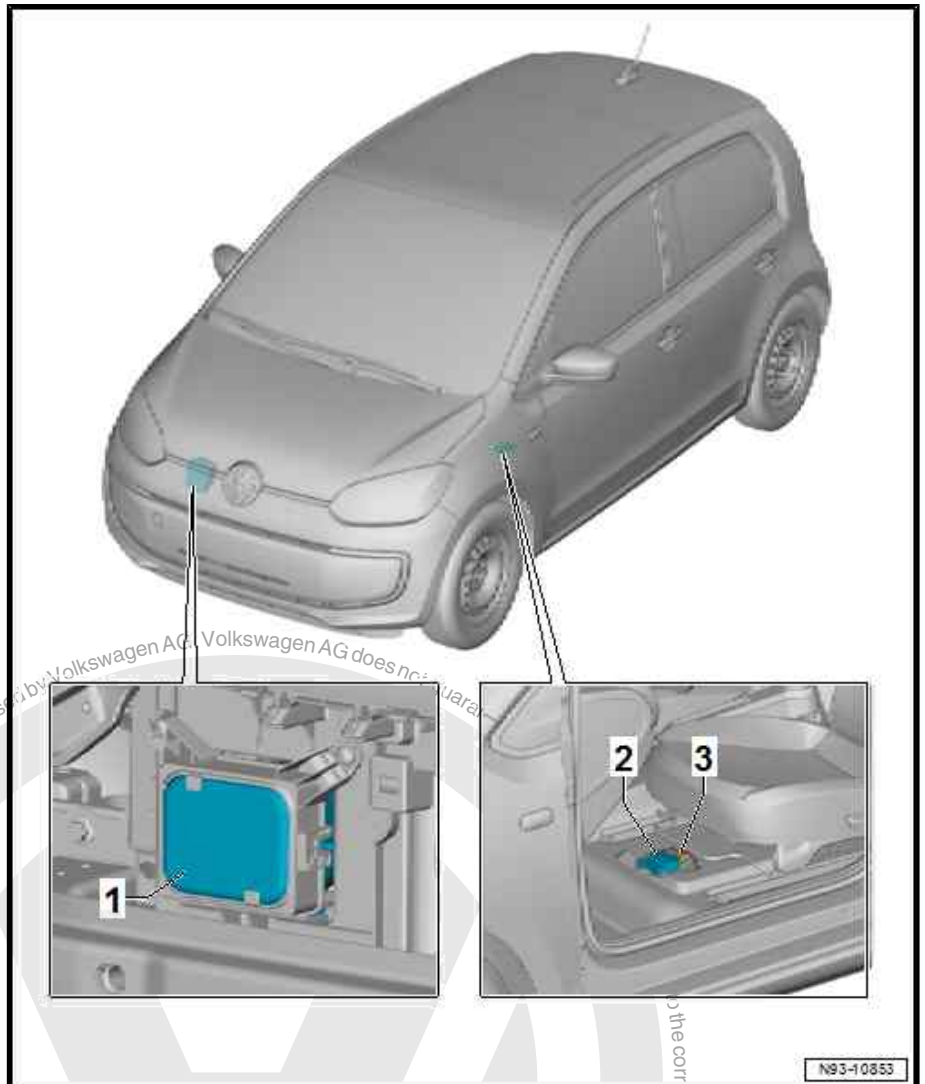
1 - Actuator 1 for engine sound generator - R257-

- Removing and installing
⇒ [page 190](#)

2 - Engine sound generator control unit - J943-

- ⇒ [page 189](#)

3 - Electrical connector



18.2 Removing and installing engine sound generator control unit - J943-

Removing

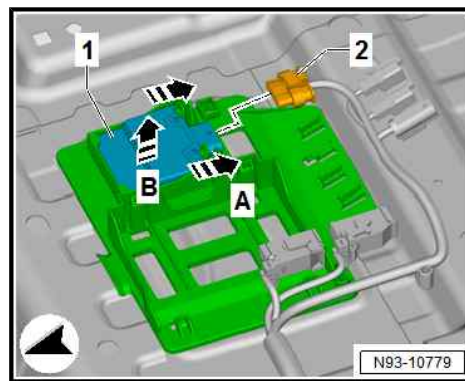
- Fold aside floor covering until engine sound generator control unit - J943- can be accessed ⇒ General body repairs, interior; Rep. gr. 70 ; Trims, interior; Removing and installing floor covering .



- Separate electrical connector -2-.
- Release engine sound generator control unit - J943- -1- in -direction of arrow A-.
- Remove engine sound generator control unit - J943- -1- up-wards in -direction of arrow B-.

Installing

Install in reverse order of removal.



18.3 Removing and installing actuator 1 for engine sound generator - R257-

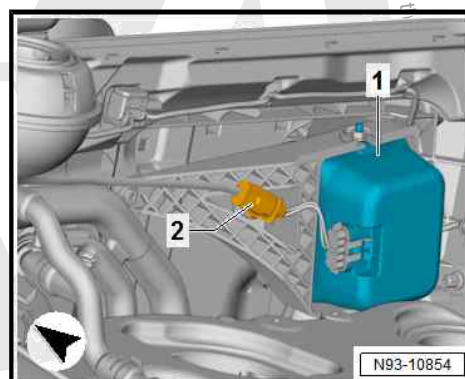
⇒ ["18.3.1 Removing and installing actuator 1 for engine sound generator R257 , Europe", page 190](#)

⇒ ["18.3.2 Removing and installing actuator 1 for engine sound generator R257 , Japan/China", page 191](#)

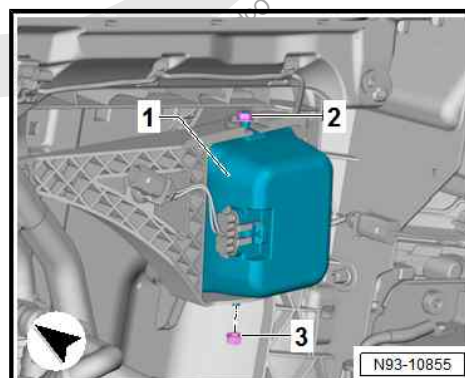
18.3.1 Removing and installing actuator 1 for engine sound generator - R257- , Europe

Removing

- Disconnect connector -2- from actuator 1 for engine sound generator - R257- -1-.



- Loosen nut -2- on actuator 1 for engine sound generator - R257- -1-.
- Unscrew nut -3-.





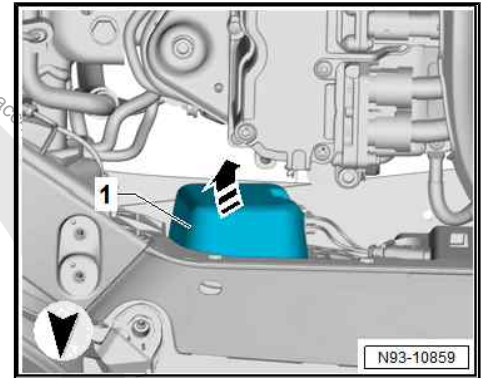
- Swing out actuator 1 for engine sound generator - R257- -1- in -direction of arrow -.

Installing

Install in reverse order of removal, observing the following:

Specified torques

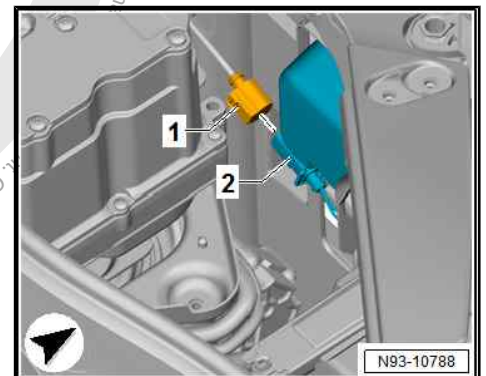
Component	Specified torque
Nuts	8 Nm



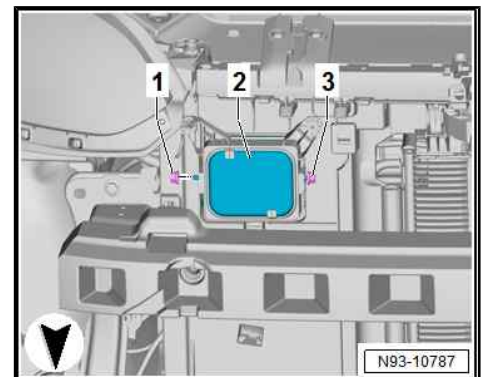
18.3.2 Removing and installing actuator 1 for engine sound generator - R257- , Japan/ China

Removing

- Disconnect connector -2- from actuator 1 for engine sound generator - R257- -1-.



- Loosen nut -3- on actuator 1 for engine sound generator - R257- -1-.
- Unscrew nut -1-.



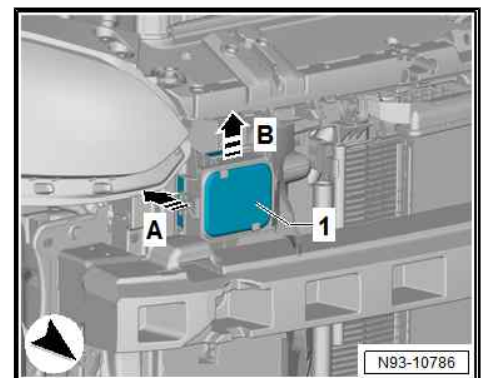
- Guide actuator 1 for engine sound generator - R257- -1- inwards in -direction of arrow A-.
- Swing out actuator 1 for engine sound generator - R257- -1- upwards in -direction of arrow B-.

Installing

Install in reverse order of removal, observing the following:

Specified torques

Component	Specified torque
Nuts	8 Nm





19 Accelerator pedal

⇒ ["19.1 Assembly overview - accelerator module", page 192](#)

⇒ ["19.2 Removing and installing accelerator pedal module", page 193](#)

19.1 Assembly overview - accelerator module

1 - Mounting bracket

- ☐ Mounting bracket for brake pedal and accelerator pedal module
- ☐ Removing and installing
⇒ Running gear, axles, steering; Rep. gr. 46 ;
Brake pedal; Removing and installing mounting bracket

2 - Wiring harness

- ☐ Wiring harness with electrical connector for accelerator pedal module

3 - Fastener

- ☐ To engage accelerator pedal module at top of mounting bracket

4 - Gas pedal module

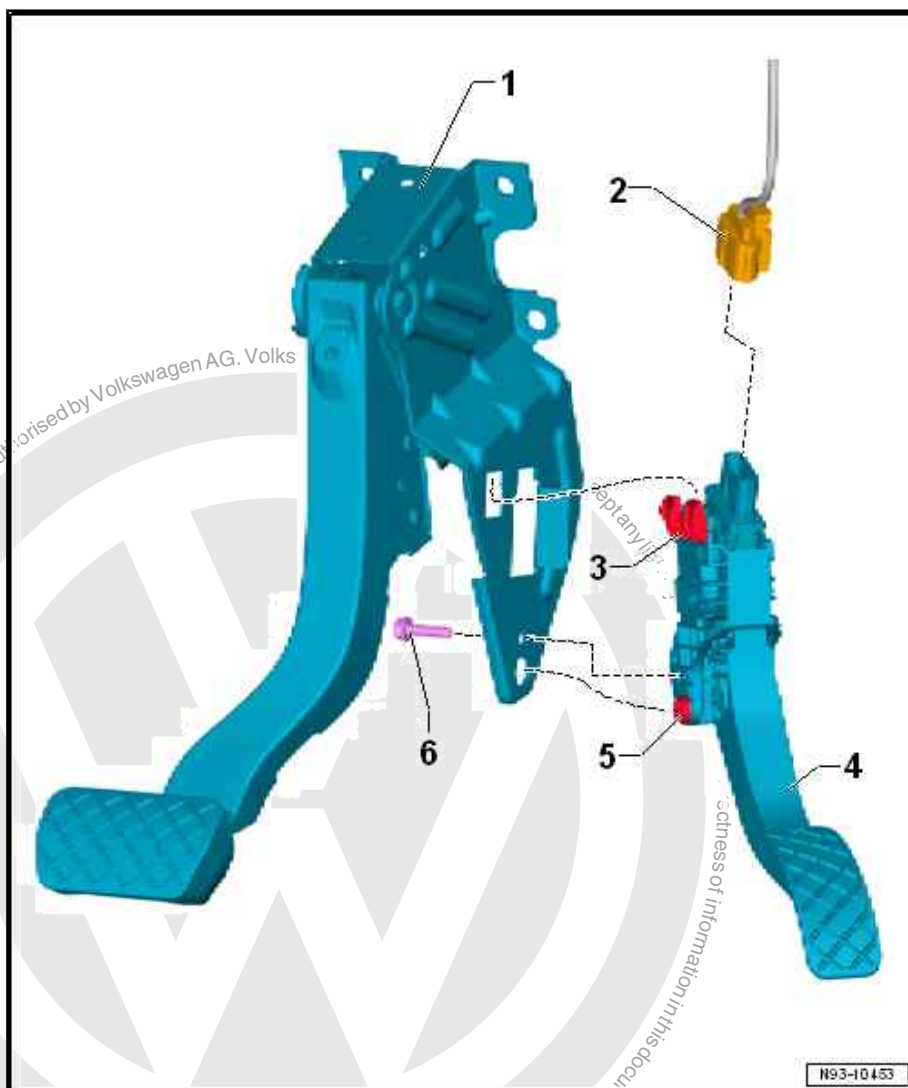
- ☐ Accelerator pedal module - GX2- with accelerator pedal position sender - G79-
- ☐ Removing and installing
⇒ [page 193](#)

5 - Locating device

- ☐ To engage/locate accelerator pedal module at bottom of mounting bracket

6 - Bolt

- ☐ 6 Nm





19.2 Removing and installing accelerator pedal module

Removing

- Unscrew bolt -3-.
- Move base of accelerator pedal module - GX2- away slightly so that locating device -2- is clear.
- Pull accelerator pedal module - GX2- downwards slightly. In the process, detach upper fasteners -4- from mounting bracket.
- Disconnect electrical connector -5- from accelerator pedal module - GX2- .
- Remove accelerator pedal module - GX2- -1- from footwell.

Installing

Install in reverse order of removal, observing the following:

Specified torques

- ◆ ⇒ [“19.1 Assembly overview - accelerator module”, page 192](#)

