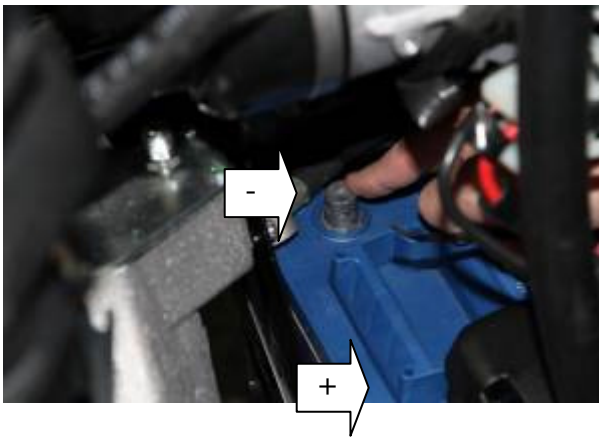
Chapter C

Drive train

C.1 Generally when working on power components

C.1.1 Removing the charge cable

- First remove the cable from the car.
- Then remove the cable from the outlet.



C.1.2 Disconnecting 12 V Gen 1

- Open the hood and disconnect the 12V battery.

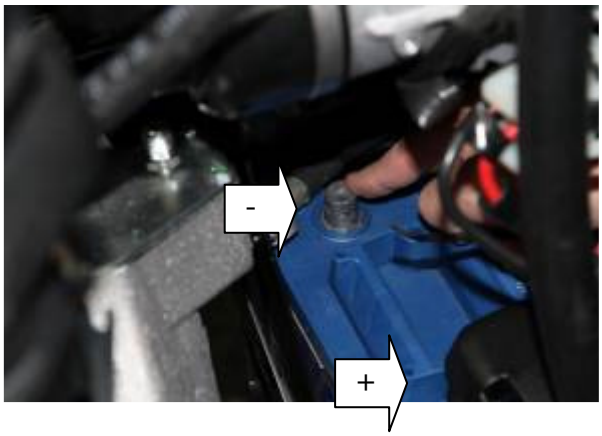
When the 12 V is disconnected the relays inside the BMI open and disconnecting the traction battery electrically from the rest of the car. The arrows indicates the plus (+) and the minus (-) poles on the 12 V battery.

C.1.3 Disconnecting 12 V Gen 2

Lift the vehicle and disconnect battery. Plus (+) poles. Secure the pole against accidental connection

Important!

Too avoid short circuit use only isolated tools.

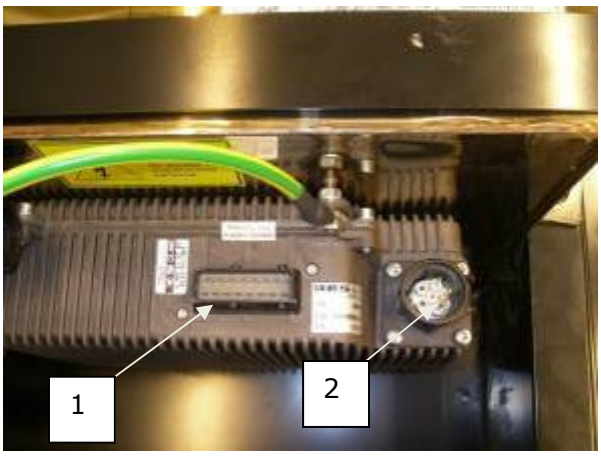


C1.4 Disconnecting traction battery Zebra type

- Open the hood and disconnect the 12V battery.

When the 12 V is disconnected the relays inside the BMI open and disconnecting the traction battery electrically from the rest of the car. The arrows indicates the plus (+) and the minus (-) poles on the 12 V battery.

- Push the passenger seat all the way back.
- Open the lid in the carpet.
- Unscrew the lid covering the service entrance to the battery.



- First disconnect the rectangular AMP connector (1) by pulling the red release mechanism and lifting the plug off.
- Second disconnect the round AC connector (2) after unscrewing it.

- Disconnect the two + and – traction cables from the traction battery.

C.1.4 Reconnecting

- First connect the traction battery in reverse order.

The + and – cables to the traction battery have different coding making it impossible to mix them up.

NOTE: Special not-conductive grease should be applied to the contacts (picture) making it easier to connect the cables. You will hear a click when the cables are connected correctly.

- Then reconnect the 12V battery.

C.2 Charge inlet

If the charge cable is connected, disconnect it. First from the car and then from the outlet.

Always disconnect the traction battery when working on the charge inlet. This is done through the service lid below the passenger seat. See Section C.1.3.

C.2.1 Changing the charge inlet and cables

- Remove the charge cable.
- Turn the ignition off.
- Disconnect the 12V battery.

Wait for 5 minutes to be sure all charged components in the PCU are discharged.

- Disconnect the traction battery as described in section C.1.3.

The cables are fastened inside the battery tray. To access and loosen the fasteners the battery tray must be lowered. See section C.3.6.

- Loosen fasteners and sleeve. Pull the cable with grey corrugal through the hole in the frame.

The cables are protected by two brackets between the motor compartment and the battery tray.

- Loosen the brackets and fasteners around the cables.

- Remove the signal cable. This is located behind the windscreen washer bottle by the strut LH.

The transformer and soft starter are located below the lid in the trunk. Loosen the cable which is to be replaced. They are labeled in and out.

- In = from the outlet to the soft starter.
- Out = from the transformer to the PCU.
- Unscrew the contact.
- Take the harness out. Note that the cables are fastened on several places.

C.2.2 Reconnecting

Reconnect in reverse order.

Tightening torque:

Contact = 7 Nm.

C.3 *Battery tray Zebra type*

The traction battery enables the propulsion of the vehicle. The battery is located in an isolated tray underneath the vehicle. Together with the battery you will also find the BMI (Battery Management Interface).

The car is delivered with two different battery technologies:
1) Zebra – Sodium-Nickel-Chloride
2) Enerdel – Lithium-ion

You can identify the battery by the label on the inside of the charge lid.

Zebra - Z36

Nominal voltage: 371V
Nominal capacity: 76 Ah/28,2 kWh
Description: High temperature, NaNiCl
Supplier description: Z36-371-ML3X-76
Manufacturer: MES-DEA
Weight: 244 kg

C.3.1 Important safety instructions

All safety instructions must be read carefully and fully understood before working on the battery. Contact THINK for any questions.
The safety instructions are classified after security risk:

DANGER: If the work is not in accordance with the instructions the result can be death or serious personal injury.

WARNING: If the work is not in accordance with the instructions the result can be personal injury.

CAUTION: If the work is not in accordance with the instructions the result can be material damage.

C.3.2 DANGER

1) Never disassemble the battery pack as it could cause exposure to high voltage, high temperature and corrosive materials.
2) Never short-circuit the traction battery by accidentally or intentionally bringing the terminals in contact with another metal object. A short-circuit can cause personal injury or a fire, and could also damage the battery pack.
3) Never hammer a nail into or the hammer itself on the battery pack.
4) Do never try to use the battery without the dedicated battery controller (BMI). Battery without BMI could cause exposure to dangerous voltages.

C.3.3 WARNING

1) If you ever detect excessive heat, discoloration of the battery surface, deformation or anything unusual about the battery pack it must not be used. Contact THINK.
2) If you ever detect a plopping noise from the battery pack, remove it as soon as possible because of a risk of overheating.
3) Never delete, by using ZEBRA® monitor, an INTERNAL ISO ERROR detected by the BMI and not substitute a BMI that detected an internal ISO error to continue to operate the battery (without authorization from THINK). A battery with an internal ISO error must be let cooled down and removed from a vehicle. The battery should be packed for transport when cold and if possible not charged. Using a battery after the detection of an internal ISO error can result in dangerous situation.
4) Never dispose used battery packs with other ordinary solid wastes. The battery must be returned to THINK or to a collection point determined by THINK for correct recycling. Please contact THINK for details. If the battery controller (BMI/BMS) is removed, protect the metal terminals with insulating tape in order to prevent accidental short-circuiting or contact with potential dangerous voltages.

C.3.4 CAUTION

1) Never expose the battery pack for fire.
2) Always confirm that the battery pack is compatible with your system before installing the battery pack.
3) Never expose the terminals of the battery pack to any other metal object. Whenever transporting it, pack the battery in the proper package.
4) The battery must be operated by the dedicated battery controller. Never try to charge or discharge a ZEBRA® ore EnerDel battery without its controller. Any maintenance operation or measure on the battery pack must be performed by trained personnel only.
5) A battery with an open or a heavily damaged case should be stored in open air and protected against water. Battery with a heavily damaged external case should be wrapped with polyethylene sheets before the packing, to avoid the risk of release of material or smell.
6) If any part of the human body may accidentally contact with a leakage from the battery pack, immediately wash with use large amounts of water. Remove any liquid that has contacted your clothes by washing them immediately with water.

C.3.5 Disassembling of Zebra battery

Position the car for lifting before the disassembling is started. See chapter A General information for information regarding lifting points. Place the gearshift in P (park) and turn the ignition off.

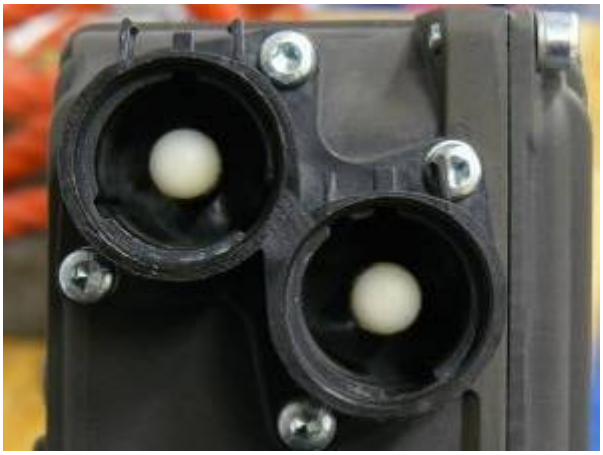
Read the safety instructions above before disassembling the traction battery.

The Zebra battery is a high temperature battery which operates between 250 and 350˚C. The battery is thermally isolated but should always be handled with care in case of heat leakage. Hot air can also come out of the cooling hoses.

- Open the lid below the passenger seat.
- Remove the lid to access the connectors.
- **DANGER**. High voltage!

Remove rings and other jewelleries that might get in contact with the battery!

- First disconnect the rectangular AMP connector by pulling the red release mechanism and lifting the plug off.
- Disconnect the round AC connector by first releasing the connector's barb.
- Unscrew the earth cable.



- Disconnect the traction cables for + and - on the traction battery.

The connectors have different coding to prevent them from being interchanged.

Be careful!

- Disconnect the cooling hoses outside the battery tray.

To access the hoses you need to lift/remove the rear carpet and remove the lid that covers the cooling fan compartment. See section C.5.1 Cooling fan disassembling.

You will probably have to disconnect the short hose at both ends.

Make sure the hoses aren't squeezed when the battery tray is lowered.

- Lift the vehicle and make sure there is sufficient clearance to lower the battery tray.

- Support the battery tray with a lifting table with a pallet on top.

The battery tray with the battery weighs approx *260 kg*.

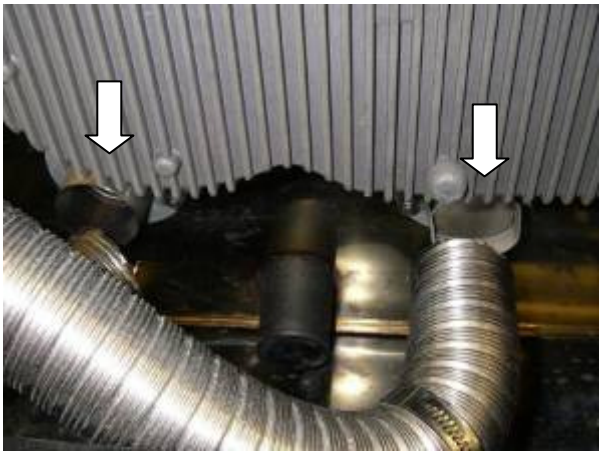
- Unscrew the 32 fastening bolts.

TIP: Loosen the bolts at the front and at the rear of the battery tray before the car is lowered onto the pallet.

Make sure the battery rests stable and that no cable is pulled or squeezed when the tray is lowered.

Make sure the isolation inside the battery compartment (inside the car) is not damaged. Replace if any visible damages.

The isolation is fastened with two-sided tape.

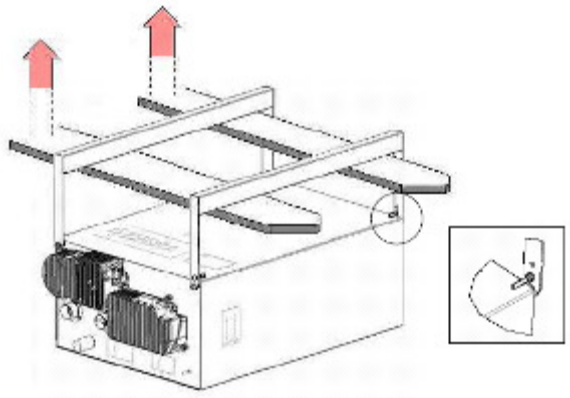


WARNING: Cooling hoses and hose clips may be very hot.

- Loosen cooling hoses inside the battery tray.

Inside the battery there are valves controlling the direction of the air flow.

- Remove the fasteners and straps.
- Remove the isolation pads. The parts can be reused if there aren't any visible damages.



The battery must be lifted with a special tool as shown in the pictures on the left/below. Lift in the handles.

Avoid sharp objects close to the battery. If they get in contact with the battery and make a hole in the housing the thermal isolation can be destroyed.

Special tools for lifting the battery can be ordered from THINK.

IMPORTANT:
Make sure the lifting device enters correctly!

The battery pack has hooks in all four corners.

- Lift the battery pack out of the battery tray.

- Note the serial number for both the old and the new battery pack. You can also read this from Zebra Monitor. Both serial numbers must be reported to THINK (via the warranty report).

C.3.6 Assembling

- Lower the battery into the tray.

Make sure the battery is placed correctly (behind the tab in the picture).

- Reconnect cooling hoses
- Install the thermal isolation pads around the battery. Parts can be reused if no visual damages are found.

- Fit the straps.

NOTE: Washer must be installed on both sides of the strap.

Tightening torques for strap bolts = 20 Nm.

- Lift the vehicle.
- Secure the cables to avoid the cables being squeezed.
- Place the complete battery with BMI and cooling hoses in the tray on the lifting device.
- Position the battery tray correctly below the car.
- Lift battery tray to position.
- Fasten bolts for battery tray (32 pcs.)

- Connect the grounding cable.
- Tightening torque grounding cable = 7 Nm
- Apply non-conductive grease on the traction battery cables (shown in picture) and connect. The connectors have different coding making it impossible mixing them up.
- Connect the round contact.
- Pull out the red lever on the rectangular connector, place the connector in position and push the lever in to fasten the connector.
- Fasten the cooling hoses to and from the battery cooling fan outside the battery tray.

NOTE: A brand new battery needs about 30 hours to reach operating temperature. Then it needs charging about 11-15 hours.

C.3.7 Pre heating and charging of new ZEBRA battery

A new battery is delivered cold and empty (0% SOC). Before the battery can be used it must first be heated and then charged. Heating takes approximately 30 hours and charging takes additional 11-15 hours. This can be done with battery in the vehicle and with a special tool with the battery outside the vehicle.

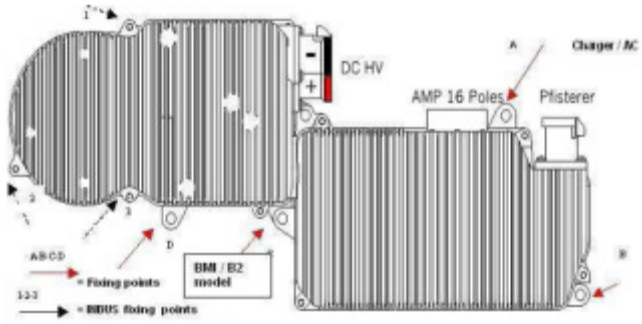
In the vehicle:
Install the battery as described earlier in this section. Connect the charge cable. Leave on plug until SOC is 100%.

With special tool:
Contact THINK for more information.

Heating tool for Zebra Z36

- Place the battery with BMI on a suitable location.
- Connect the special tool according to the instructions.

NOTE that pin 11 must have 12 V.



C.4 BMI (Battery Management Interface) replacement for ZEBRA type

- Connect the diagnostic tool and read and store all necessary battery data. See section C.4.1.
- Remove the battery tray as described in section C.3.6.
- Disassemble the BMI from the battery pack (fasteners/bolts marked A, B, C and D and screws marked 1, 2 and 3).

DANGER: Live high voltages will be freely accessible when the BMI is disassembled.
Only use isolated tools.
Use gloves protecting against voltages up to 1000 Volts.
Cover the opening revealed when the BMI is removed.

C.4.1 Battery data storage

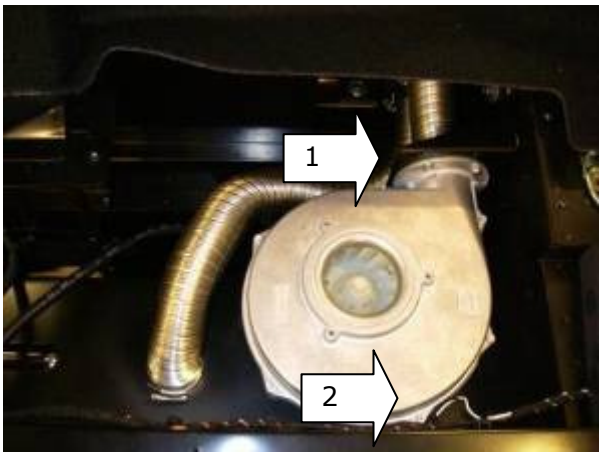
When the BMI is replaced the following battery data must be collected and saved:

I. The battery serial number.
II. Charging condition.
III. Number of defect cells (if any).
IV. Number of"Nameplate cycles".
V. The battery's address (VIN and owner).
VI. The car's mileage (if available).

C.5 Battery cooling fan ZEBRA

C.5.1 Disassembling

- Disconnect the 12V battery.
- Open the tailgate and lift the rear carpet.
- Unscrew the metal plate covering the fan compartment.



- Loosen the fan, three fasteners (1).
- Disconnect the connector (2).
- Disconnect cooling hoses.

C.5.2 Assembling

Assemble in reverse order.

Tightening torques
fan bolts = 7 Nm

C.6 *Battery tray EnerDel type*

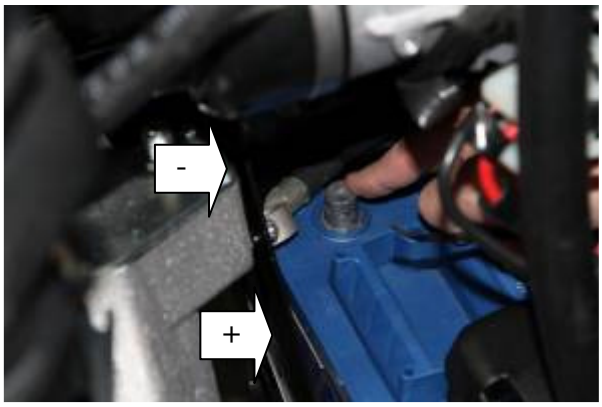
The traction battery enables the propulsion of the vehicle. The battery is located in an isolated tray underneath the vehicle. Together with the battery you will also find the BMI (Battery Management Interface).

The car is delivered with two different battery technologies:
1) Zebra – Sodium-Nickel-Chloride
2) Enerdel – Lithium-ion

You can identify the battery by the label on the inside of the charge lid.

EnerDel – E350-25

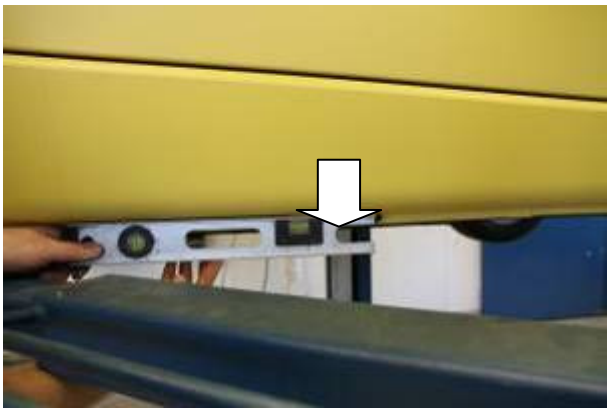
Nominal Voltage: 400V
Nominal Capacity: 70,4 Ah
Type: Lithium-ion
Description: E350-25
Supplier description: EnerDel Inc
Weight: 282 kg



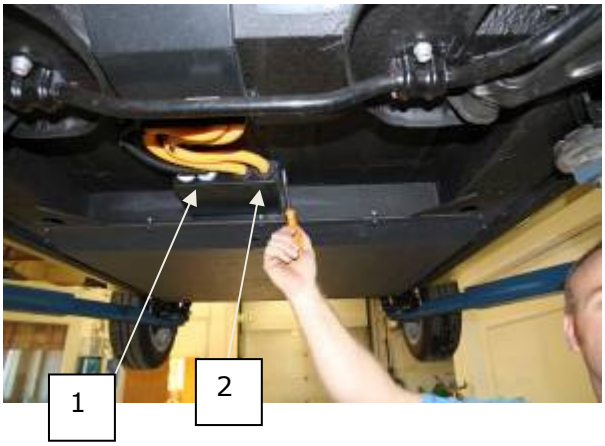
C.7 Disconnecting traction battery EnerDel type

- Open the hood and disconnect the 12V battery.

When the 12 V is disconnected the relays inside the BMS open and disconnecting the traction battery electrically from the rest of the car. The arrows indicates the plus (+) and the minus (-) poles on the 12 V battery.



- Lift the car make sure the car is lifted parallel with the floor



- Disassembly the cover for battery cable inlet, placed in front of the battery tray
- Release cable support for battery monitoring (1) and high Voltage line (2)

  Note: ORANGE CABLE HIGH VOLTAGE (400V) – Do not make sharp bends.

  <u>Damaged cable must be replaced</u>

- Disconnect the two orange cables to the + and – poles, for traction battery
- Connector lock releases by using special tool

Power cables 400V has a special connector that can only be mounted one way. It is important to use the right tools to avoid damage to the connector. Damaged contact needs to be replaced. (Corrosion must not occur)

Cable management and monitoring of battery pack has screwed joint. To release the cable locking sleeve rotated counterclockwise

C.7.1 Disassembling of battery EnerDel Li Ion

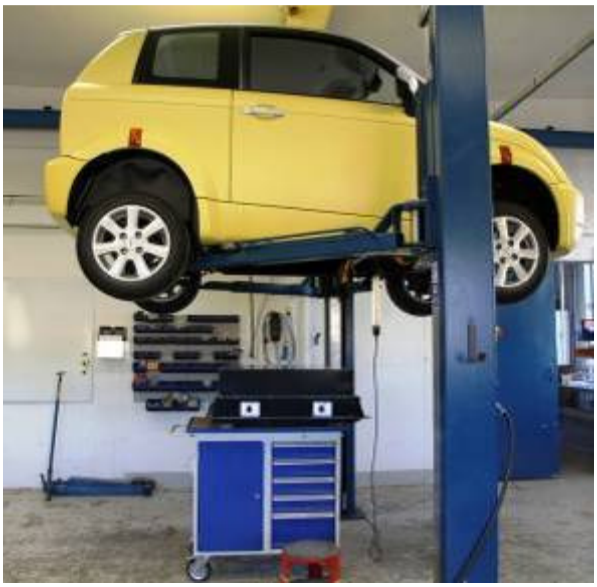
Trill must have the capacity to carry over 300 kg. (Battery pack weight 282Kg)

Trill table prepared by placing two wooden beams with the right distance. It is important that beams are placed close to the battery box page borders (front/rear). Measure the length of the battery box for the right location of support.

Battery box can only be lifted by flange (see instructions on the battery pack = **Battery box with battery weighs 282 kg.**

Dismount the 32 fastening screws that hold the battery case. Make sure the trill desktop is encountered and the wheels locked.

Lift the car to the earth cable is able to be released. Loosen the earth cable from the battery case.



- Battery pack is sealed and shall not be opened
- Note the serial number for both old and new battery pack. Both the serial numbers has to be reported to Think (complaint report).

Battery lifted with straps placed as shown on the battery case.
Lifting the battery by a fork lift place a wooden beam under each side to prevented deformation during the middle of the battery
Avoid sharp objects come into contact with the battery box hole in this will be able to damage the batteries.

C.7.2 Assembling battery EnerDel type

Assemble in reverse order.

Battery case is controlled in place using a long screwdriver. The car is lowered over the battery case. Assemble with all fasteners. Use original bolts.

Tightening torque 20Nm

C.8 PCU Type Gen1

The PCU contains the following components/functions:
Motor controller (DC/AC)
Traction battery charger (AC/DC)
12 V battery charger (DC/DC)

The PCU is maintenance free. Broken fuses inside the PCU can be replaced. In case of other faults the complete unit (as shown in the picture) must be replaced. Transport securing brackets over coolant pipes must be removed before installation.

C.8.1 Fuses

The PCU has 3 fuses that can be replaced without disassembling the unit completely.

- AC-Heater: When the car is on plug the traction battery is kept warm by an AC powered heating element. The fuse is placed just below the charge connector on the PCU. Turn the fuse holder a quarter of a turn and the fuse can be pulled out together with the holder.

- Fluid heater and air condition: The fluid heater is powered by the traction battery. So is the air condition in vehicles with this option. The fuses are located on the side of the so called"dog house", diagonally below the cable between the PCU and the motor. The upper fuse is for AC, the lower for the fluid heater.

Fuses:

1. AC-Heater = 10 A AC on the outside
2. Fluid heater = 25 A DC inside
3. Air Condition = 20 A DC inside

C.8.2 Disassembling

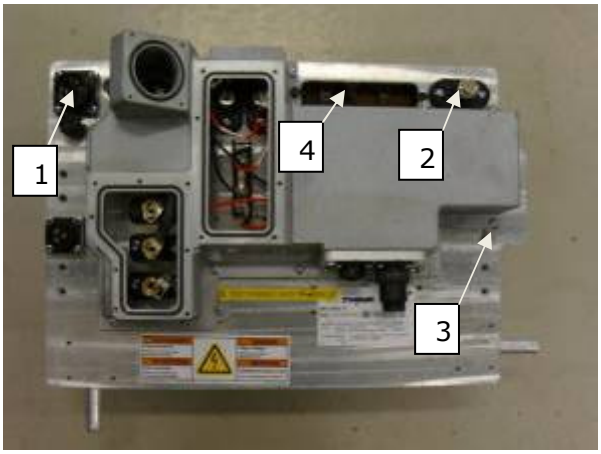
- Turn of the ignition and remove the key.
- Remove the charge cable.
- Open the hood and disconnect the 12V battery, see section C.1.2.
- Disconnect the traction battery, see section C.1.3.

Only use isolated tools when working on high voltages components.

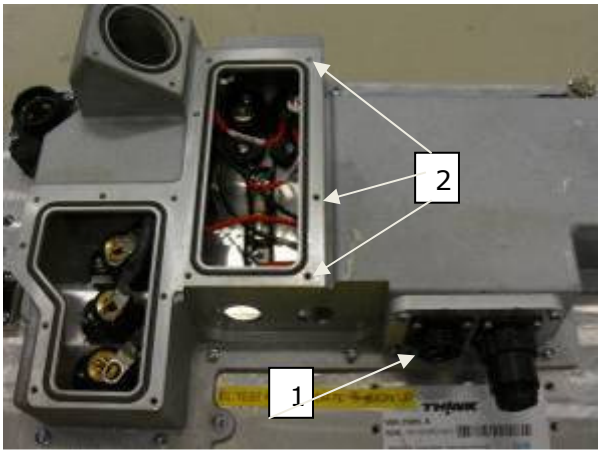
Wait for 5 minutes after disconnecting the traction battery to be sure that the PCU circuits are discharged.

Before disassembling the PCU you should consider removing or loosening the following:

- The hood
- Wiper with bracket and leaf screens.
- Vacuum pump.
- Air duct.
- Fluid heater.
- Power steering (not in this picture).



- Disconnect charge cable plug (1).
- Disconnect + 12 V (2).
- Disconnect 12 V grounding (3)
- Disconnect signal connectors (4). Use hexagon tool.

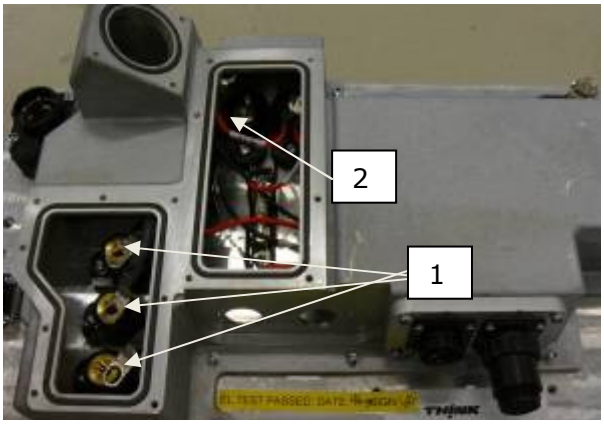


Disconnect the cables to the fluid heater and if present to the Air Condition (1).

Remove the front panel on the”dog house”. The panel has 14 fasteners (2).

Make sure there is no live voltage on the cables. Only use isolated tools.

Unscrew the four torx screws on the motor cable.



Disconnect all three motor cables (1).

Disconnect the traction cables (2) with strain reliever.

All cables are now disconnected.

Place a tray or similar below the car to catch the coolant when cooling hoses are disconnected from the PCU (2 pieces).

Squeeze the coolant hoses and loosen the clamps. Pull the hoses off.

- Loosen and remove any components that are in way of taking out the PCU.
- Loosen the el sub frame and pull it as far forward as possible. The frame is fastened with four (4) bolts on each side as shown in the picture. Eight (8) bolts in total.

- Unscrew the PCU from the frame, eight (8) bolts.
- Lift the PCU out.

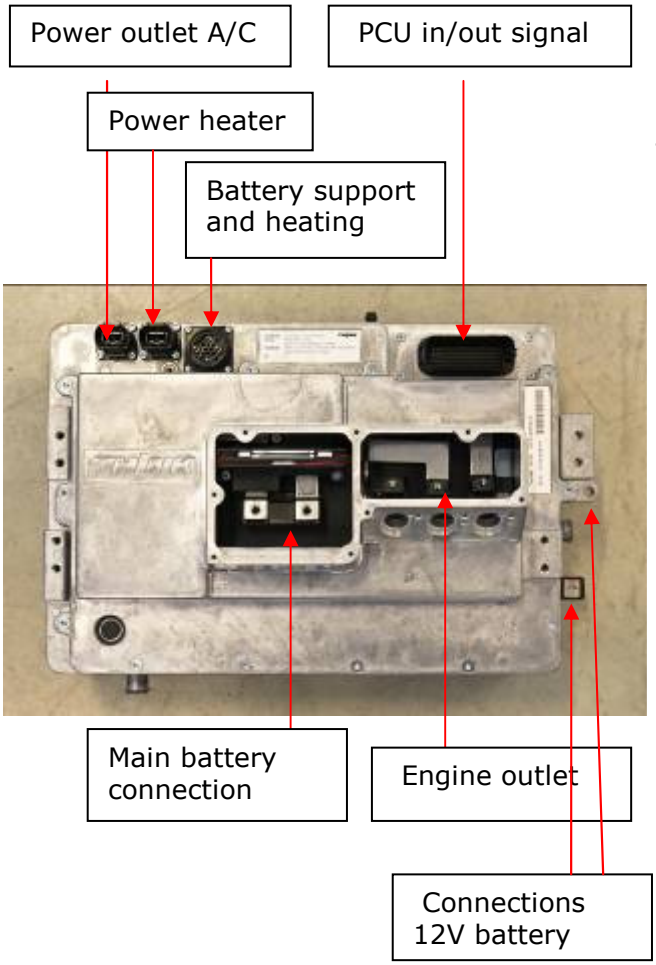
The PCU is close fit so be careful not damaging other parts, cables or the frame.

NOTE: Be extra careful with the motor cable.

C.9 PCU Type Gen2

The PCU contains the following components/functions:
Motor controller (DC/AC)
Traction battery charger (AC/DC)
12 V battery charger (DC/DC)

The PCU is maintenance free. In case of other faults the complete unit (as shown in the picture) must be replaced. Transport securing brackets over coolant pipes must be removed before installation.

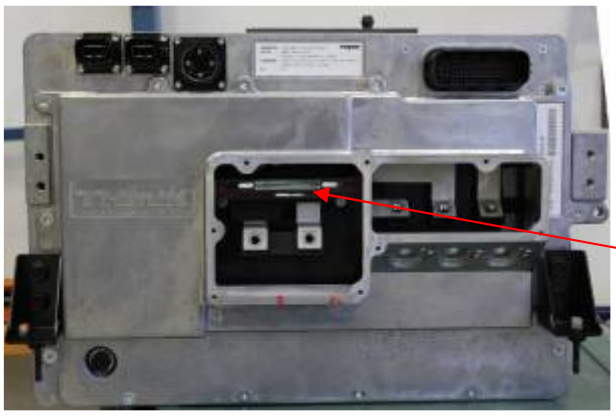


C.9.1 PCU Connections

PCU has 9 connections for AC and DC.
The distribution is as follows.

- 2 Contacts for 12V battery
- 2 pins contact Heating coupé
- 2 pins contact Air Condition
- 16 pins Contact (round) for battery heating and control
- 62 Pins for in / out signals
- 2 Contacts, battery main connectors
- 3 Contacts, 3 phase engine outlet

Warning!
Never disconnect cable for heater box or A/C when the system is powered. This will cause EPO(Emergency Power Off) The condition will harm components in the high volt system.



- Fluid heater and air conditioning: The fluid heater is powered by the traction battery. So is the air condition in vehicles with this option.

- When opening the hatch for traction battery a safety device (cut of switch) will be actuated. Its operated by a magnet mounted in the lid

Important!
Fuses are mounted inside the unit and are non replaceable :

Battery Heater = 10 A AC
(Zebra battery only)

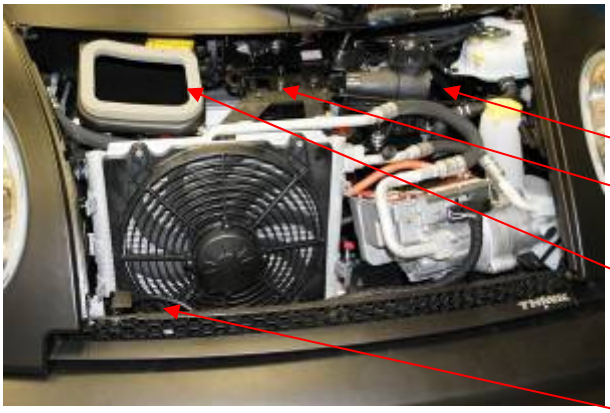
Fluid heater = 20 A DC
Air condition = 20 A DC

C.9.2 Disassembling PCU Gen2

- Turn of the ignition and remove the key.
- Remove the charge cable.
- Open the hood and disconnect the 12V battery, see section C.1.2.
- Disconnect the traction battery, see section C.1.3.

Only use isolated tools when working on high voltages components.

Wait for 5 minutes after disconnecting the traction battery to be sure that the PCU circuits are discharged.



Before disassembling the PCU you should consider removing or loosening the following:

- The hood
- Vacuum pump.
- The front screen wiper arrangements
- Windscreen viper with bracket and leaf screens.
- Air duct.
- Fluid heater.

If AC is fitted:

- Empty the AC system for R134
- Disconnect AC compressor unit
- Remove the condenser with fan

Dismount the windscreen wiper and lid cover. Lid cover is fastened by clips.

Removing the air intake, fitted with 1 fastener.

Disconnect cable for AC and heater

Dismount AC compressor and condenser. For details see chapter F

Removing the bracket for the windscreen wiper

Remove the wiper

Removing the lid for high voltage connections

Important!
Control with multi meter set to DC volts.
The multi meter must display 0 volts DC

Loosen the clamp for the cooling pipe on engine

Remove the hose from the engine and save the liquid.

Loosen the clamp for cooling hoses on PCU and remove the hose

Drain liquid from the heater

Disconnect the 2 cooling hoses on the PCU. One in the top and one on the left side of the PCU.

Disconnect 10 pins connector for battery monitoring

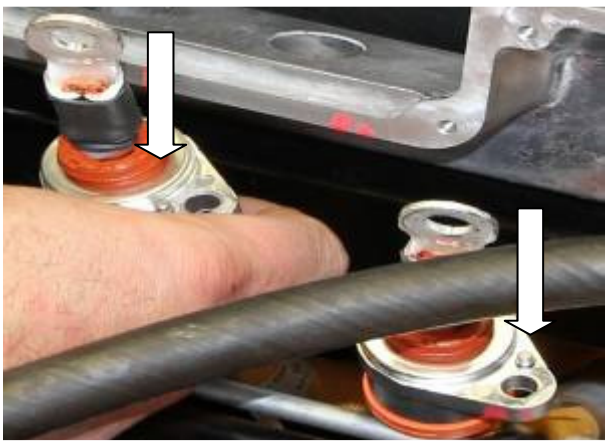
Dismount Vacuum pump for brake unit

Disconnect 62 pins connector

Disconnect 10 pins contact on motor

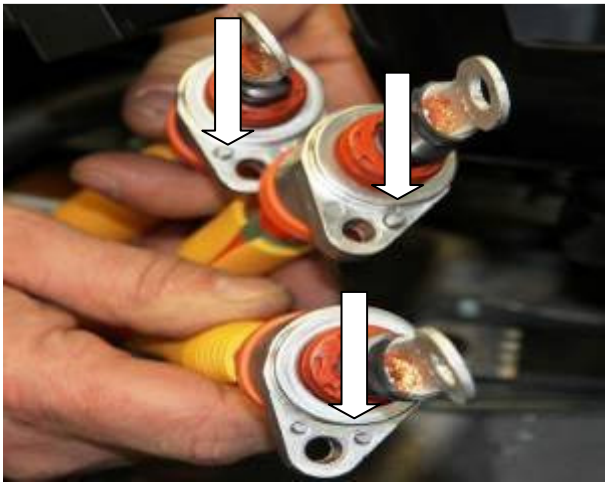
Loosen the screws for battery cables(2) and engine cables(3)

Check the cables and implementations for damages. Corrosion is not allowed.



Battery connections have unique control tap to prevent correct assembly.

Warning!
Incorrect connection can cause serious damage



Motor connections have unique control tap to prevent correct assembly.

Warning!
Incorrect connection can cause serious damages.

Unscrew front anchor for the PCU.

Remove the attachment mechanism

Loosen bracket for the PCU carrying frame. On the right and left side of the engine room

Loosen the PCU from torpedo wall. 4 screws

Loosen power steering pump from the support frame

Support frame is pushed forward and the PCU can be lifted out.

C.9.3 Torques

Motor:
L1 (M6) = 7 Nm
L2 (M8) = 20 Nm
L3 (M10) = 35 Nm

Traction battery:
Plus (+) (M8) = 20 Nm
Minus (-) (M6) = 7 Nm

Signal connectors on PCU = 3 Nm

C.9.4 Assembling

- Fasten the PCU to the el sub frame.
- Fasten the el sub frame in the car.
- Connect cooling hoses.
- Connect the following cables:
  - Motor cables, three -3- phases.
  - Battery cables.
- Fasten the cover.
- Fasten bayonet connectors.
- Connect signal cables.
- Fasten +12V cable.
- Fasten grounding cable (from PCU to -12V).

Connect the traction battery and the 12V battery. Fill coolant and bleed the system.

C.10 Motor

The motor is a three phase liquid cooled AC induction motor. It is maintenance free and should be replaced complete with cables if any faults occurs.

Max. torque: 90 Nm
Max. power: 34kW
Weight: 46kg

C.10.1 Disassembling

Motor and gearbox should be taken out in one unit and then disassembled.

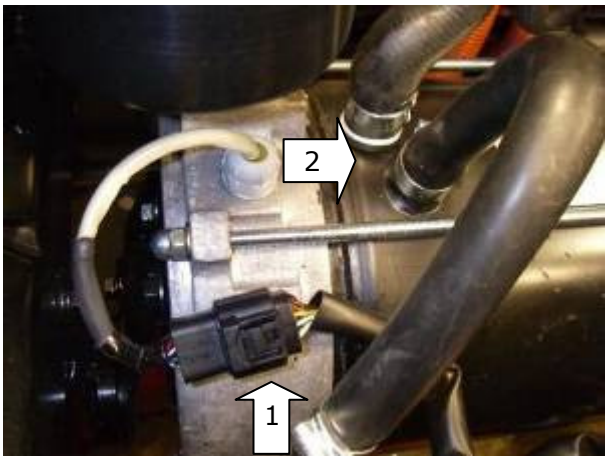
Electric Safety Precautions:

- **Only use isolated tools when working on electric components.**
- **Key off and take out the key**
- **Disconnect 12V battery**
- **Wait for 5 minutes after the ignition is turned off before you start working on the motor to be sure any capacitors on the PCU outlet is discharged.**
- **Secure the car to roll before the dismantling of the engine!**

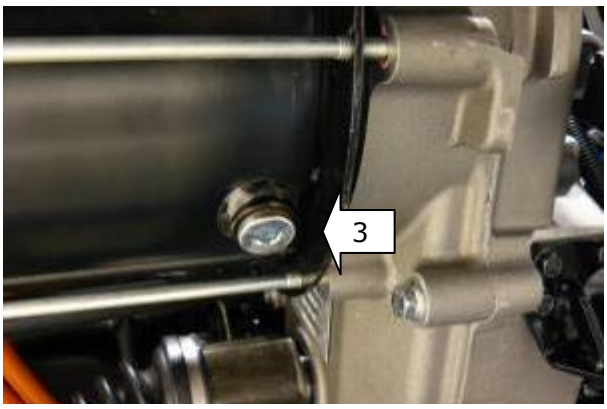
Gen 1 -> 590.1035A-C

Unscrew the motor cables. This is done on the PCU since the cables are directly connected to the windings inside the motor.

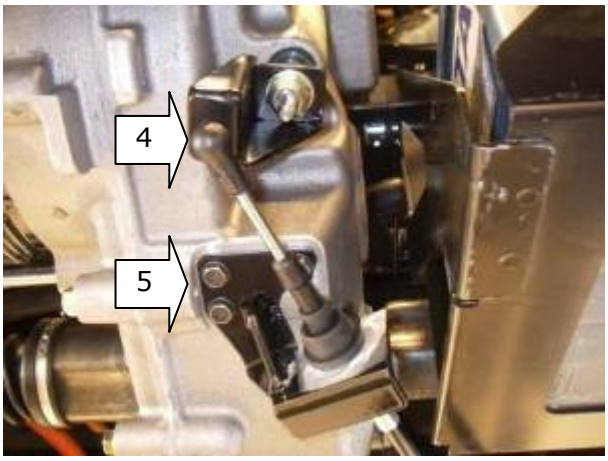
- Remove the PCU cover.
- **Make sure there is no voltage on the motor cables and on high volt connection.**
- Unscrew the four torx screws on the motor cable. (1)
- Unscrew the motor cables inside the PCU. (2)



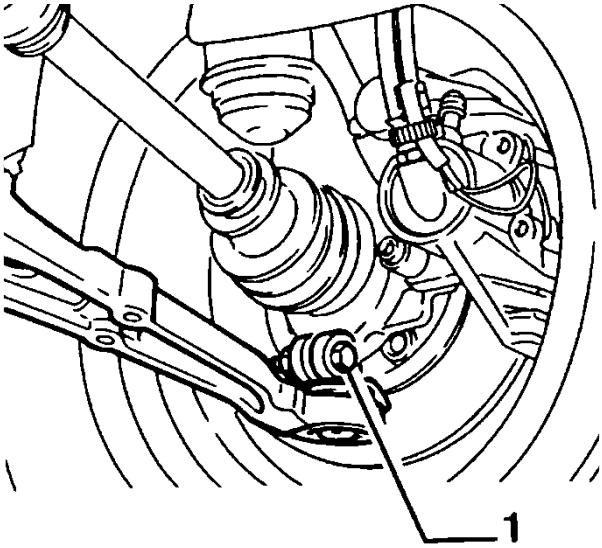
- Disconnect the signal cable (1) from motor to the PCU.



- To avoid spillage it's recommended to drain the coolant system partly before proceeding. Use the drain plug (3) at the bottom of the motor (45Nm tightening torque).
- Loosen the clamps on the coolant hoses (2) and disconnect the hoses.



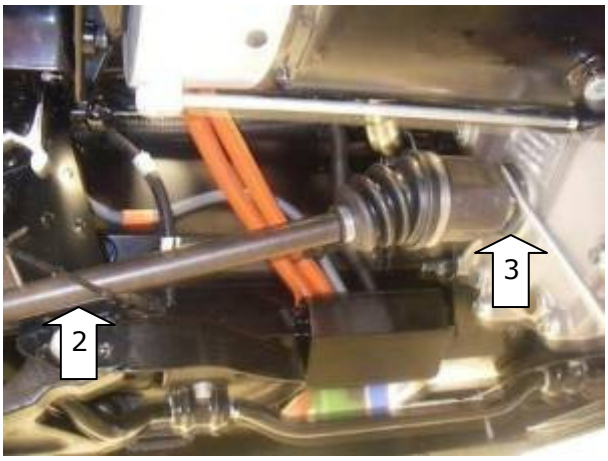
- Disconnect the gear cable (4).
- Unscrew the bracket (5).



- Remove the front wheels.
- Unscrew fastener for lower control arm (1).

- Pull the lower control arm slightly down to release the ball joint. (1)

NOTE: Inner bushings can be damaged if the lower control arm is pulled too far down.

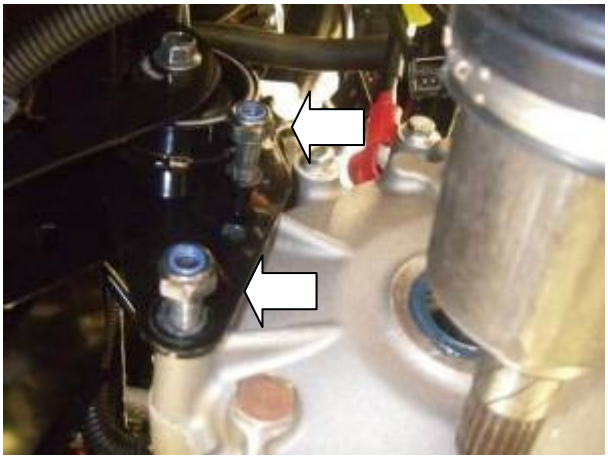


- Tie up the driveshaft so it will not fall down when loosened from the gearbox (2).
- Swing the strut outwards and pull the driveshaft out.

NOTE: Use a screwdriver or similar to be sure the inner joint comes out together with the driveshaft (3).

- Support the motor and gear.

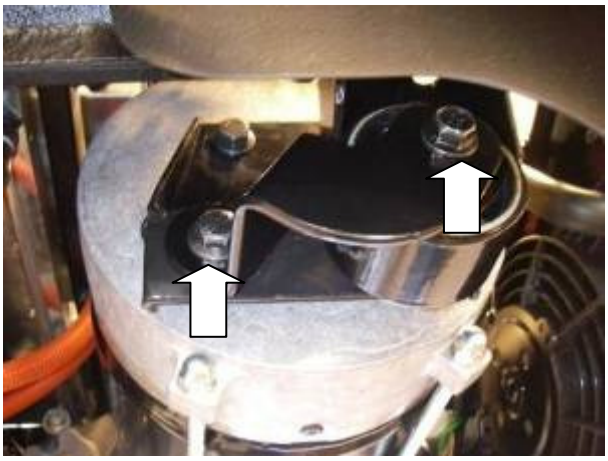
NOTE: Avoid to damaging the black motor paint.



Rear motor bracket (on the gearbox)

- Tie up the second driveshaft so it will not fall down when loosened from the gearbox.
- Swing the strut outwards and pull the driveshaft out.
- Unscrew the two rear gearbox screws

NOTE: Use a screwdriver or similar to be sure the inner joint comes out together with the driveshaft.

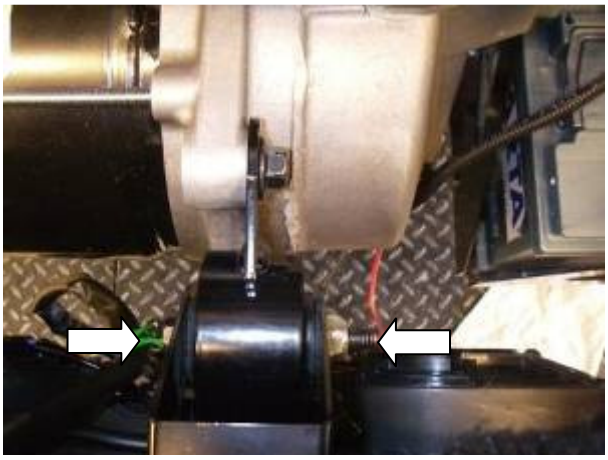


Motor bracket, passenger side.

- Support the motor and gear.
- Unscrew the nuts on the bolts for the motor bracket (on the gearbox).

Unscrew motor and gear brackets (three -3- pieces).

- Unscrew the bolt through the motor bracket.
- Unscrew the motor bracket.



Front motor bracket (on gear) from above

- Unscrew the nut and bolt on the gearbox bracket.

- Take the motor and gear down together.

Separate motor and gear.

In the picture you can see three -3- of four -4- long bolts holding motor and gear together.
Unscrew the bolts and separate motor and gear carefully.

NOTE: Position the gearbox as shown will avoid gearbox oil spillage.
Avoid to damaging the black motor paint.

C.10.2 Tightening torques

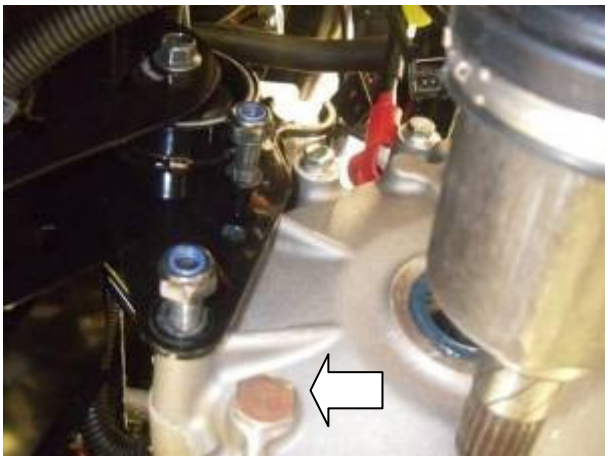
Bolts between motor and gear = 20 Nm
Gear cable bracket = 7 Nm
Motor Drain Plug = 45Nm
Motor bracket bolts front & rear = 42Nm
Motor bracket bolts side = 42Nm
Motor bracket bolts on gearbox = 57Nm

C.10.3 Assembling

Apply Loctite 574 Universal seal on the gearbox contact surface. See picture.
Assemble motor and gear.
Make sure motor and gear are correctly connected. If not this can cause discord from transmission and/or motor.
Fasten motor fasteners.
Fasten drive shafts.
Fasten gearshift bracket and gear wire.
Assemble lower control arms.
Connect the PCU.
Assemble coolant hoses.
Connect the 12V battery and the traction battery.
Fill necessary coolant and bleed the system.
Check functionality.

C.11 Gearbox

Motor and gearbox should be taken out in one unit and then disassembled.
See section C.10 for disassembling and separating.



C.11.1 Oil

<u>Red oil:</u>
Oil specification: ATF TQ DIII
Qty: 0,95 liters
Color: Red

<u>Green oil:</u>
Oil specification: SAE-PD 75W85
Qty: 0,75 liters
Color: Green

After fill oil through oil fill plug

When oil change or refill is required always change to green oil! (Drain all red oil and fill with green oil 0,75ltrs)

C.12 Drive shafts

C.12.1 Disassembling

- Remove the front wheel
- Loosen driveshaft nut
- Loosen lower ball joint
- Pull the control arm slightly down to release the ball joint

NOTE: Inner bushings can be damaged if the lower control arm is pulled too far down.

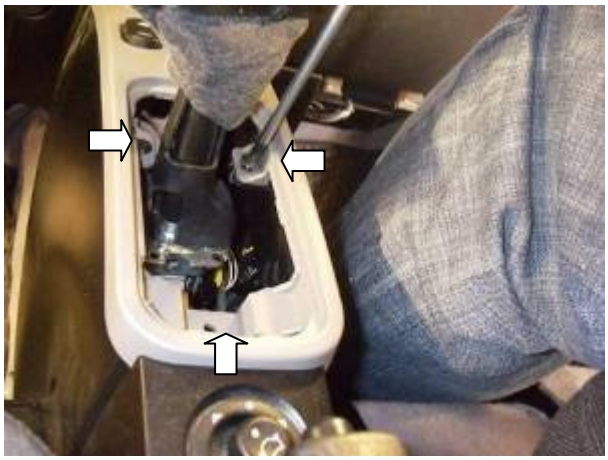
- Pull the driveshaft out of the hub

NOTE: It is important that the inner joint follows the driveshaft when this is removed. Use for example a screwdriver to release the joint together with the driveshaft.

Make sure the driveshaft locking spring is still located on the driveshaft.

C.12.2 Assembling

Assemble in reverse order. Make sure the locking ring is installed correctly.
Tightening torques:
Ball joint = 40 Nm
Driveshaft nut = 245Nm



C.13 Gearshift control

C.13.1 Disassembling

Flip the gearshift cover and remove it.

Unscrew the top cover on the gear console (3 fasteners).

Lift the top cover and pull it backwards.

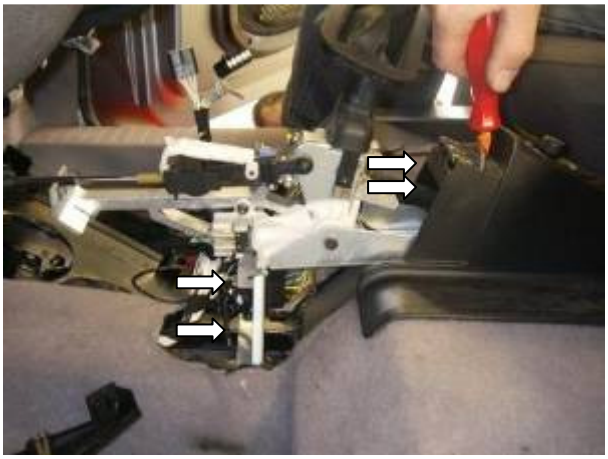
Disconnect the switches to the electrical windows.

Unscrew the two side panels from the centre console.

Remove the trim around the instrument panel (see section H Interior) to access side panels front fasteners.

Unscrew one fastener for each of the two side panels.

Unscrew fastener and tilt the side panel at the rear to release the fastening pin. Pull the side panel off.



Bracket with gearshift control can now be removed.

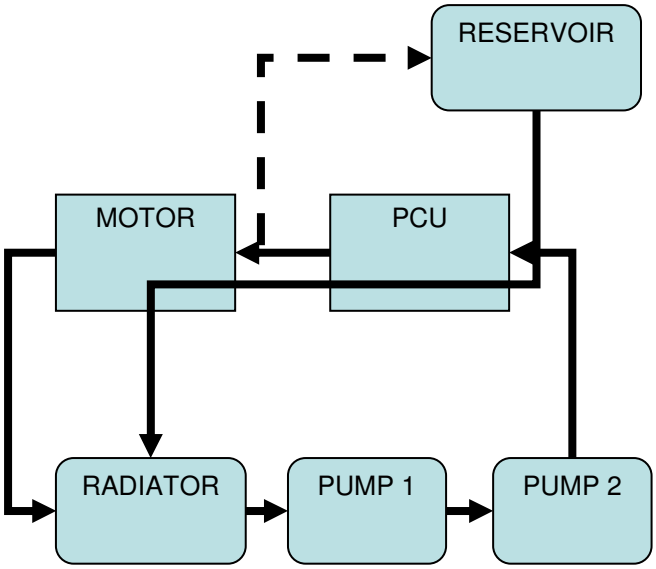
- Disconnect the gear cable.
- Disconnect connectors.
- Unscrew the four fasteners keeping the bracket to the lower frame.

C.13.2 Assembling

Assemble in reverse order.

Tightening torques:
Bracket to lower frame = 7Nm
Side panels (all fasteners) = 1,9Nm
Top lid = 1,9Nm

Motor and PCU cooling



C.14 Cooling system

The cooling system is a separate circuit that shares the reservoir with the heating circuit. The cooling system provides cooling for the motor and PCU as shown to the left.

The cooling system consists of the following components:

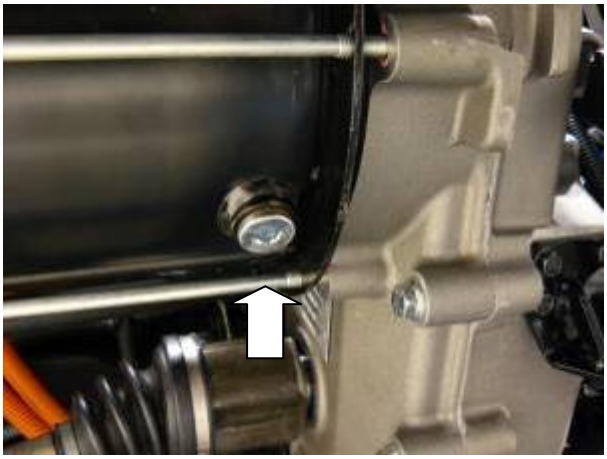
- Coolant reservoir.
- Two pumps.
- Radiator.
- Hoses and clamps.

Make sure the ignition is off and the car is not charging before any work on the cooling system is started.

Disconnect the 12V battery.

C.14.1 Draining

Disconnect the coolant hose between the pumps by the radiator and let the coolant run out into a tray.



An alternative solution is to drain the system through the draining plug under the motor.

Tightening torques:
Draining plug = 45 Nm

C.14.2 Bleeding

Bleeding is mandatory after any work on the cooling system. This must be done the following way:

1) Fill up the coolant reservoir if the level is low.
2) Turn the ignition on and leave the pumps running until no bubbles are coming out in the reservoir.
3) Check the coolant level. Top up if necessary.

The bleeding process should be finished within 30 minutes.

C.15 Hoses

C.15.1 Disassembling

- Squeeze the clamp together (as shown in the picture) making it possible to open it and push it away.
- Disconnect the cooling hose.

TIP: Place a tray or similar below the vehicle to catch the coolant.
Drain the cooling system before the hoses are disconnected. See section C.11.1.

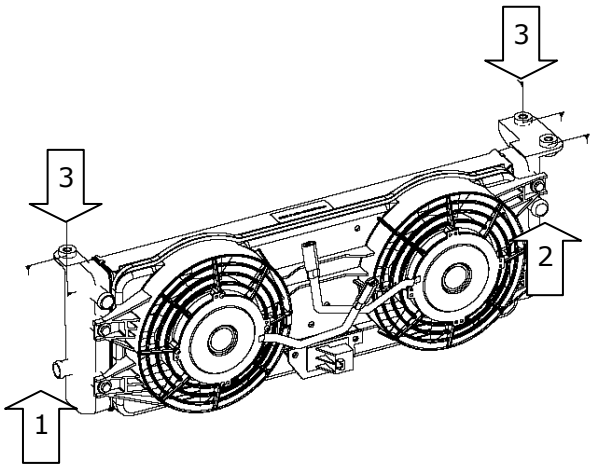
C.15.2 Coolant hoses replacement

Drain the coolant system as shown in section C.11.1 before any defect hoses are replaced.

C.15.3 Assembling

- Connect the new hose. Fasten the hose with the clamp.
- Fill the system with coolant.

Bleed the cooling system. See section C.11.2.



C.16 Radiator

C.16.1 Disassembling - complete

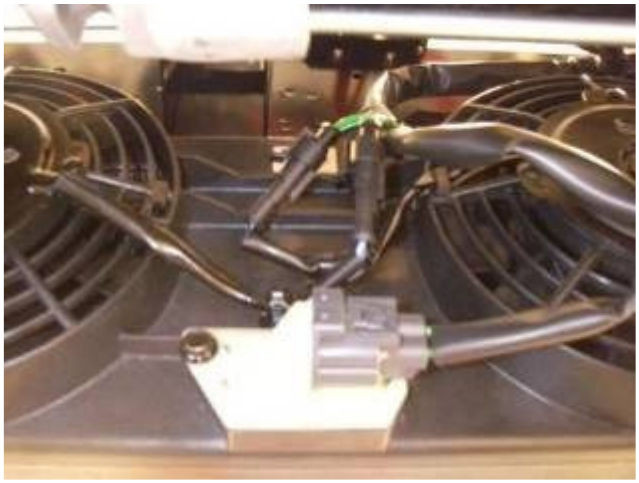
Make sure the charge cable is disconnected and the ignition is turned off before the work is started.

- Disconnect the 12V battery.
- Remove the grille and front bumper.
- Remove the power supply to the fans (on the back of the radiator).
- Remove the bottom coolant hose (1) and let the coolant run out in a tray.
- Remove the upper coolant hose (2).

Remove the three radiator fasteners (3); two on the right hand side and one on left.

C.16.2 Assembling

- Install the radiator with fans and resistor.
- Connect the power supply for the fans.
- Connect the coolant hoses.
- Install the front bumper and grille.
- Fill coolant.
- Connect the 12V battery.
- Bleeding: See section C.11.2



C.16.3 Fans and resistor

The fans are connected in parallel. In series there is a resistor giving fan speed 1. When the resistor is not connected the fans are activated on speed 2. In the resistor house you will also find a thermal fuse. If the fuse breaks the complete resistor house must be replaced.

C.16.4 Resistor replacement

- Disconnect the 12V battery.
- Disconnect the cable and unscrew the two fasteners holding the resistor house.

Remove the house and replace it with a new one.

C.16.5 Fan/motor replacement

- Make sure the charge cable is removed.
- Disconnect the 12V battery.
- Remove the grille and front bumper.
- Lift the car.
- Remove the power supply to the fans.

To remove the fans complete:

- Remove the four fasteners.

To replace the motor for one of the fans:

- Remove clip and remove fan blade.

- Unscrew the four fasteners holding the motor.
  Disconnect the cable and remove motor with harness.

C.16.6 Assembling

Assemble in reverse order.

Tightening torques:
Screws and bolts in plastic parts = 1,9 Nm.

C.17 Cooling pumps

The coolant is circulated by two serial connected pumps.

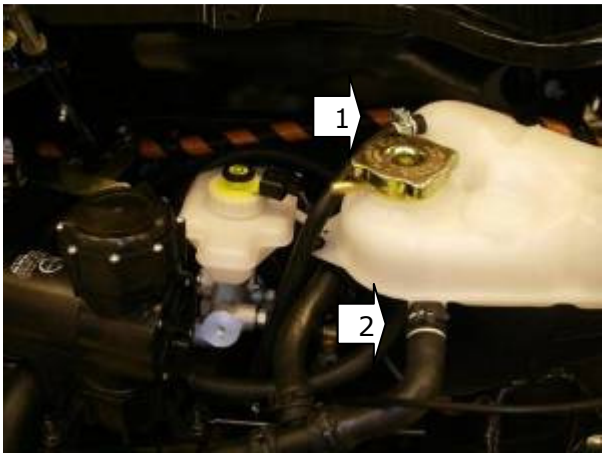
C.17.1 Disassembling

Make sure the charge cable is disconnected and the ignition off before the work is started.

- Drain the circuit of coolant. See section C.11.
- Disconnect the 12V battery.
- Loosen coolant hoses and connectors on the pumps.
- Pull the pumps out of the rubber sleeves.

C.17.2 Assembling

- Assemble in reverse order.
  Fill coolant and bleed the cooling system (see section C.11.2).



C.18 Reservoir

C.18.1 Disassembling

Make sure the charge cable is disconnected and the ignition off before the work is started.

- Open the hood.
- Loosen clamp on the hose (1), disconnect hose from reservoir.
- Squeeze clamp (2) and disconnect. Catch the coolant in a tray.
- Loosen the fasteners (three screws and clips). It could be appropriate to remove the headlamp to access one of the fasteners.

C.18.2 Assembling

- Install the reservoir.
- Fasten coolant hoses to the reservoir.
- Fill coolant.
- Bleed the circuit (see section C.11.2).
- Close the hood.