



repair manual

Compressor A/C Tesla

Tesla Model S (2012-2017)

1028398-00-E

Ajusa reference EVC00200



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general information



WARNING!

Electric vehicle propulsion

This vehicle works with high-voltage electricity which can present **risks of severe or even lethal damages**.



SAFETY PRECAUTIONS

When working with high-voltage circuits or components, make sure that the **following safety guidelines** are fulfilled:

Make sure all the staff working with the high-voltage systems of electric propulsion have been provided with **proper training** to conduct the necessary procedures.

Put up **high-voltage warning** signs to guarantee the staff safety in the work area.

Make sure that the staff who don't have proper training doesn't have access to any high-voltage circuits and components.

Always wear **insulation gloves** under the related local safety rules.

Insulate the high-voltage batteries ensemble.

Before working with the electric propulsion system, make sure that the recommended **waiting time after insulating** the high-voltage batteries ensemble has passed by.

Check that the **residual voltage**, which may be in the circuit, is under the recommended safety level.

Make sure that all **test equipment and tools** are suitable to be used in high-voltage circuits or components.

To **ease the identification**, the high-voltage cabling in the electric propulsion system can be covered by an orange insulation.

technical information



Characteristics

Compressor A/C: #20678255
Manufacturer: HANON SYSTEMS
Cooling Gas: R134a and R1234yf
Oil: POE(RB100EV)
Made in Korea
Product number: 1028398-00-E

Types of failure

In these electric vehicles, the **air conditioning compressor** needs to work continuously in order to cool the batteries ensemble. This can cause the compressor motor to overheat, even eroding or breaking its parts, such as the bearing, gaskets or seals, making a repair necessary. In this document we are going to explain how the repair of the compressor is conducted.

References

Ajusa Kit has the reference **EVC00100**
It fits in **Tesla Model S (2012-2017)**.

battery disconnection

Recommendations to connect and disconnect the battery in electric vehicles

Before getting started it is important to highlight that, in usual inspection and maintenance operations, as well as to disconnect the main battery of the vehicle it **is not necessary to disconnect** the batteries ensemble.

Disconnect the battery only when:

- Replacing the battery.
- In need to reset certain parameters of the vehicle.
- When the car is going to be parked for a long lapse of time, so that the battery doesn't get fully discharged.

Safety precautions

The batteries ensemble both in electric and hybrid vehicles work with **high voltage**.

- Any worker who doesn't have proper training mustn't have access to any high-voltage circuits and components.
- Always wear suitable personal protective equipment (PPE).

It is essential to put up the related signs to guarantee the safety both of the area and of the workers.

The **batteries ensemble** of the electric vehicle must be insulated at all times to prevent potential short circuits. To insulate and strip the batteries ensemble there are different special tools:

- Tool number 1076921-00-B. Insulation multimeter.
- Tool number 1130480-00-A. Cable for insulation multimeter.
- You must be sure that all the testing devices and equipment are compatible with high-voltage applications.

When the batteries are insulated, a recommended **waiting time must pass** by before proceeding to handling the electric propulsion system.

With the insulation multimeter you will check the residual voltage value in the circuit to be sure that such value is under the recommended value.

The high-voltage cabling in electric vehicles has an orange insulation. Knowing this feature, it is easy to identify it.

Disconnection/insulation of the electric vehicle batteries ensemble

1) Find the battery. For this step, it is advisable to **look it up in the vehicle's manual**, as the method to reach the battery differs from one vehicle to another.

In **figure 2** you can see the terminals to jump start.

It is highly advisable to connect the jumper's negative cable to a suitable earth point in the bodywork or the electric propulsion motor

Do not connect the jumper's cable directly to the battery's negative terminal. If you conduct this method, you will prevent the risk of damaging the battery's state sensor which may be located in the earth cable's terminal of the battery.

2) **Start the vehicle** and verify that the instrument cluster works properly and that it doesn't show any warning or failure.

3) to lower the driver's window fully and slightly lower the window in the passenger's seat as a safety measure.

4) Check that the gearbox is **neutral** and that the parking brake is activated.

5) Make sure that the power is not connected, and that the keys are not inside the vehicle. Make sure that all electric components **are off**.

6) First disconnect the earth cable in the battery.

7) Disconnect the First Responder Loop **figure 3** and wait for 2 minutes.

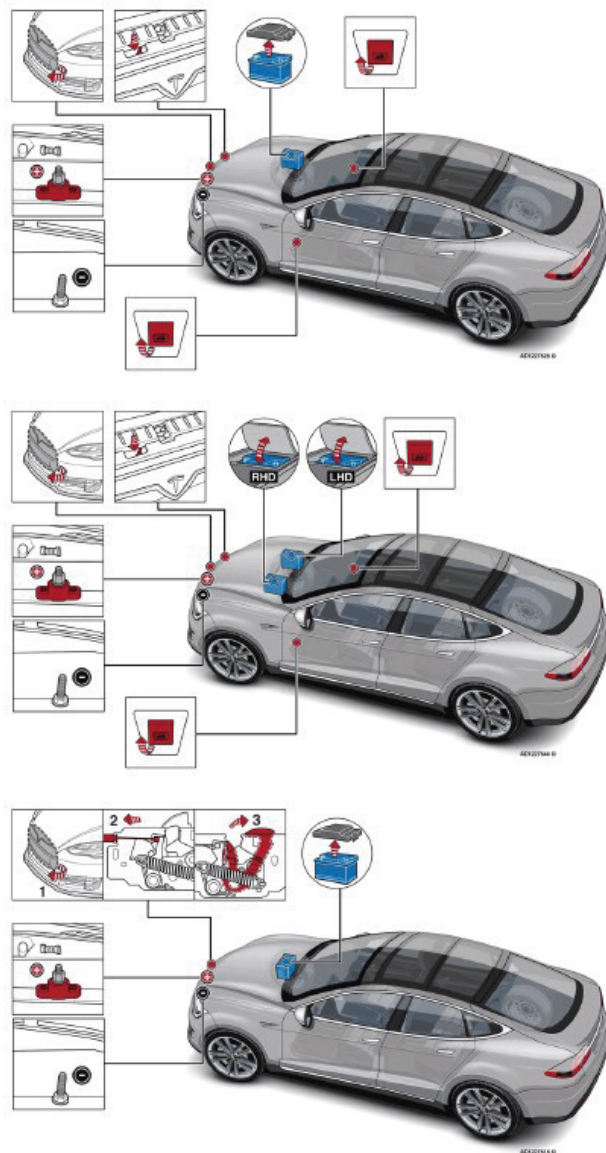


Figure 2. Batteries ensemble location

Connection of the batteries ensemble in the electric vehicle

1) Check that the power is not activated and that the keys are not inside the car.

2) Undo previous steps.

3) Connect the vehicle's main battery and check that everything works properly.

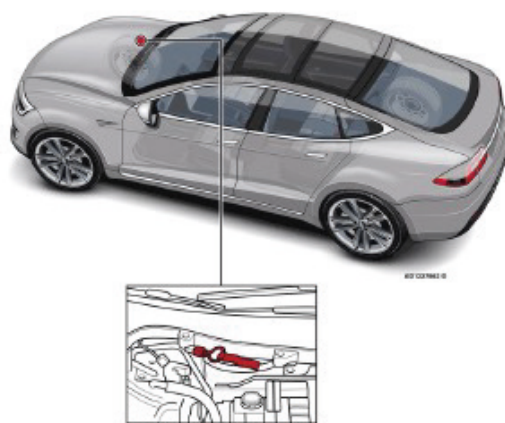


Figure 3. First Responder Loop

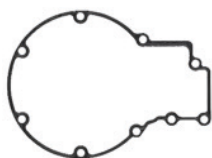
After connecting the battery

Electric window operators and sliding roof

- 1) Make sure that the door is **wide open**.
- 2) Roll up the window fully.
- 3) Activate manually the **open-door** fastener with a suitable tool (screwdriver).
- 4) Use the door's inner handle to disable the fastener.
- 5) Push the window switch to the automatic opening position.
- 6) If the **window lowers slightly**:
 - a. Conduct the calibration process of the electric window operators.
- 7) If the **window lowers fully**:
 - a. Make sure that the door is fully closed.
 - b. Place a spacer between the upper part of the window and the frame of the window.
 - c. Raise and hold the window switch. Make sure that the window lowers when touching the spacer. Repeat this procedure 14 times.
 - d. Conduct the calibration process of the electric window operators.
- 8) **Calibration process** of the electric window operator:
 - a. Push and hold the window switch to fully lower the window. Keep the switch activated for 2 seconds.
 - b. Raise and hold the window switch. Keep the switch activated for 5 seconds.
- 9) Check that the automatic opening and locking functions are **working properly**.

Note: The sliding roof can only be set up with a diagnosis equipment.

composition



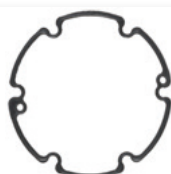
Inverter cover gasket¹
(1 unit)



Inverter-stator joining gasket²
(1 unit)



High pressure chamber outside gasket³
(1 unit)



Compression chamber gasket⁴
(1 unit)



Low pressure chamber gasket⁵
(1 unit)



Exhaust valve gasket⁶
(1 unit)



Oil seal⁷
(1 unit)



Impeller's fixed part flat gasket⁸
(1 unit)



Impeller's mobile part flat gasket⁹
(1 unit)



Electric plug gasket¹⁰
(1 unit)



Impeller movement gasket¹¹
(1 unit)

repair

As follows, we will show you in simple steps, the repair of this compressor. Before getting started with the repair, we must access the failure. In order to do that, we will disconnect the compressor with the **related precautions**, we will open it and we will clean it in order to begin to work.



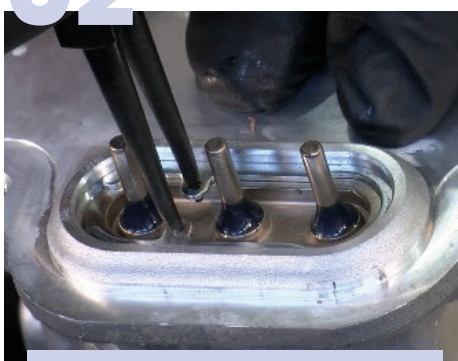
01



Three – phase electric plug

The first step will be assembling the electric plug. In order to do that, we will put the **electric plug gasket¹⁰** in its housing and we will put in the plug.

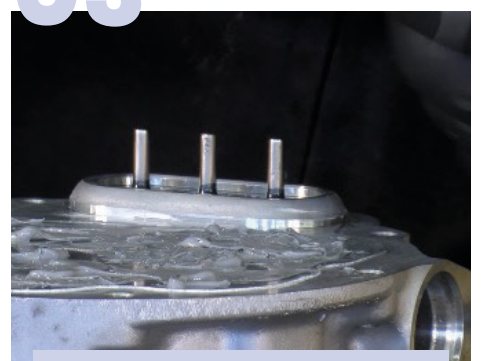
02



Safety clip

Once the electric plug is located, it is important to make sure that we put the safety clip.

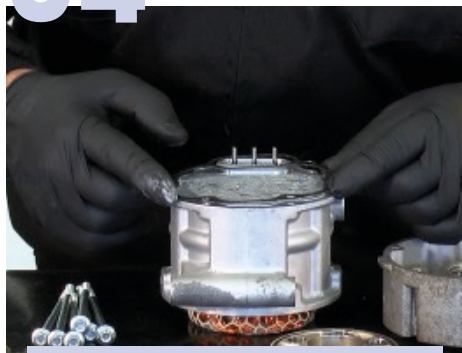
03



Heatsink compound

We apply the heatsink compound evenly all over the surface which will be in contact with electronics. This step is important because electronics need to remove a great quantity of temperature.

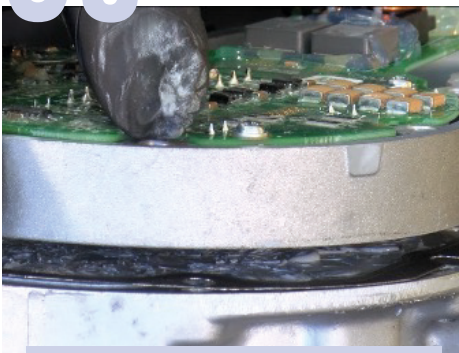
04



Gasket over the dissipation surface of the stator

The next step will be assembling the stator joining gasket with the inverter **Inverter-stator joining gasket²** over the dissipation surface.

05



Inverter assemble

Now we can place the inverter's electronics in its housing in the compressor's stator.

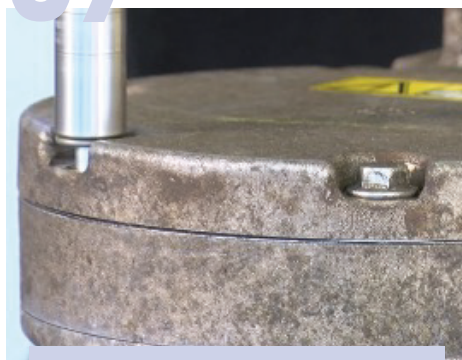
06



Inverter cover gasket assemble

Next, we will place the **Inverter's cover gasket¹** on its surface.

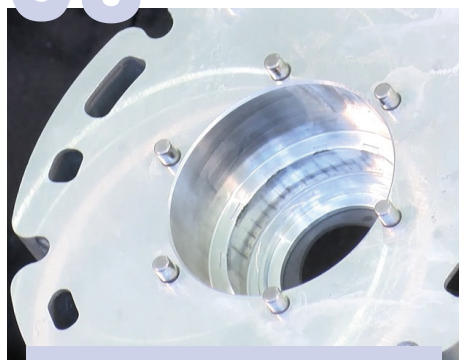
07



Inverter cover assemble

Now we can tighten both surfaces. We apply a tightening torque of 10 Nm.

08



Seal assemble

Then, we assemble carefully the **oil seal^{III}** on its housing, inside the rotor's cover, verifying that it fits perfectly.

09



Bearing assemble

It is located over the seal, with the help of a hydraulic press, we fit the bearing in the rotor's casing.

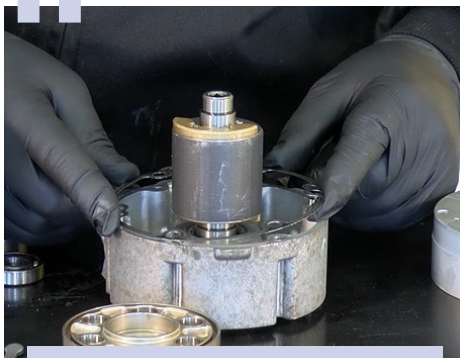
10



Rotor's assemble in its cover

Now we can place the rotor in its casing, we fit it in the bearing of the previous step, again with the help of a hydraulic press.

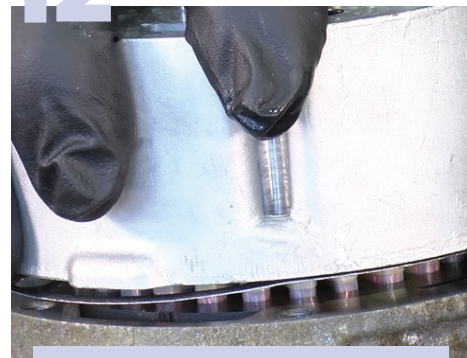
11



Low pressure chamber

The next step will be assembling the **low pressure chamber gasket⁶** over its surface.

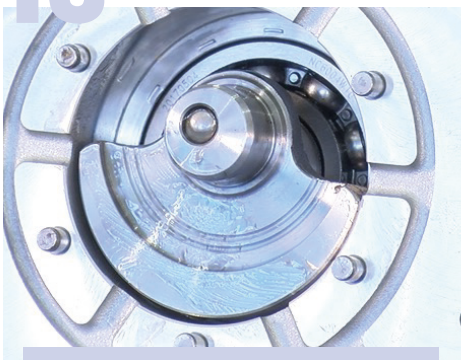
12



Rotor in the stator

With the rotor in its cover, we can fit it in the stator. In order to do that, we will lubricate the end of the rotor and we will put it in the stator.

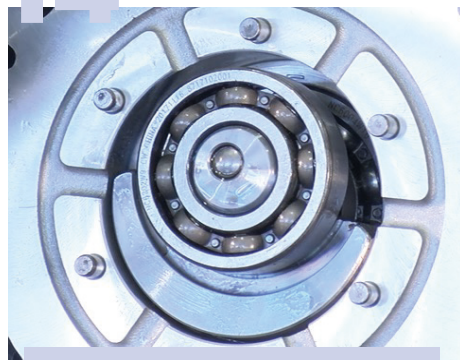
13



Eccentric cam

Then, we assemble the cam over the axis, in the outside part of the rotor's cover, lubricating a bit.

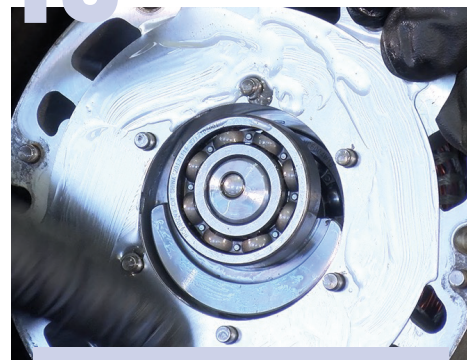
14



Assemble of the bearing over the cam

Now we can place the bearing over the eccentric cam. We will find help by lubricating the axis.

15



Impeller movement gasket

Next step will be placing the **impeller movement gasket⁸** on its surface, and we will apply a little bit of oil.

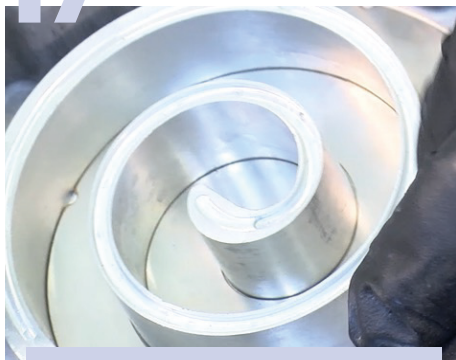
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Preparing the impeller's mobile part

Next step will be assembling the **impeller's mobile part flat gasket⁹** on its surface.

17



Preparing the impeller's fixed part

Next step will be assembling the **impeller's fixed part flat gasket⁸** on its surface.

18



Assemble the impeller

Once we have both parts already prepared, we place the mobile part over the fixed part, and over the mobile part we will place the sleeves.

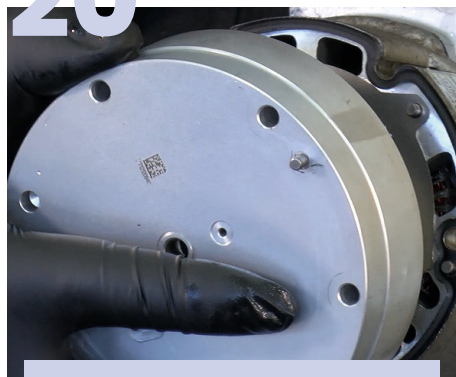
19



Compression chamber gasket

Before placing the impeller and closing the compressor, we will place the **compression chamber gasket⁴**, in order to make sure of the leaktightness of both surfaces.

20



Assemble the impeller ensemble in the compressor

Now we can fit the impeller ensemble with the rest of the compressor's block.

21



Exhaust valve

Next step will be assembling the exhaust valve. In order to do that, we grease the surface. We place the **exhaust valve gasket⁶** and we will tighten the valve with a tightening torque of 10 Nm.

22



Assemble the high pressure chamber outside gasket

It is time to place the **high pressure chamber outside gasket³** on the compressor's gas exhaust surface.

23



Assemble the compressor's cover

We conclude the repair by assembling the compressor's cover. In order to do that, we will tighten with a tightening torque of 10 Nm.



Final view of the assembly carried out

additional information

Do you know **which are the tools** you need to repair the motor of an electric vehicle? Do you know the **safety measures** to conduct this repair? Is it that you don't know where to start?

Visit the electric vehicle section on our website where we will give you the answers to all these doubts and much more.

You will be able to see the **safety measures video** as well as the **video tutorial** in which you'll see step by step the assembly of the Ajusa kit related to this vehicle.

Furthermore, you can contact our technical assistance department to solve any doubt.

Subscribe to our Youtube channel and learn everything you must know about mechanics.



Click here to see the **assembly video**:

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