



repair manual

Tesla Model S · Tesla Model X

(2012 - 2021)

(2015 - 2021)

with motor code 1037000-20-A and 1037000-00-F
Ajusa reference EV001000



content

- 03** General information
- 04** Technical information
- 05** Battery disconnection
- 08** Composition
- 11** Repair
- 16** Additional information



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



Types of failure

Insulation failure.
Problems with the main bearing of
the rotor.

References

Ajusa kit is reference **EV001000**.

Rear-wheel drive unit motor - Small
drive unit (SDU) with OEM references OEM
1037000-20-A / 1037000-00-F

Fits in the following models **Tesla Model S**
(2012-2021) and **Model X** (2015-2021) with
the following denominations: 60D, 70D,
75D, 85D, 90D, 100D, and the performance
versions P85D, P90D y P100D

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 equipments 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) It is recommended to lower the driver's window fully and slightly lower the passenger's window 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 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.

Connection of the batteries ensemble in the electric vehicle

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

2) Undo previous steps.

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

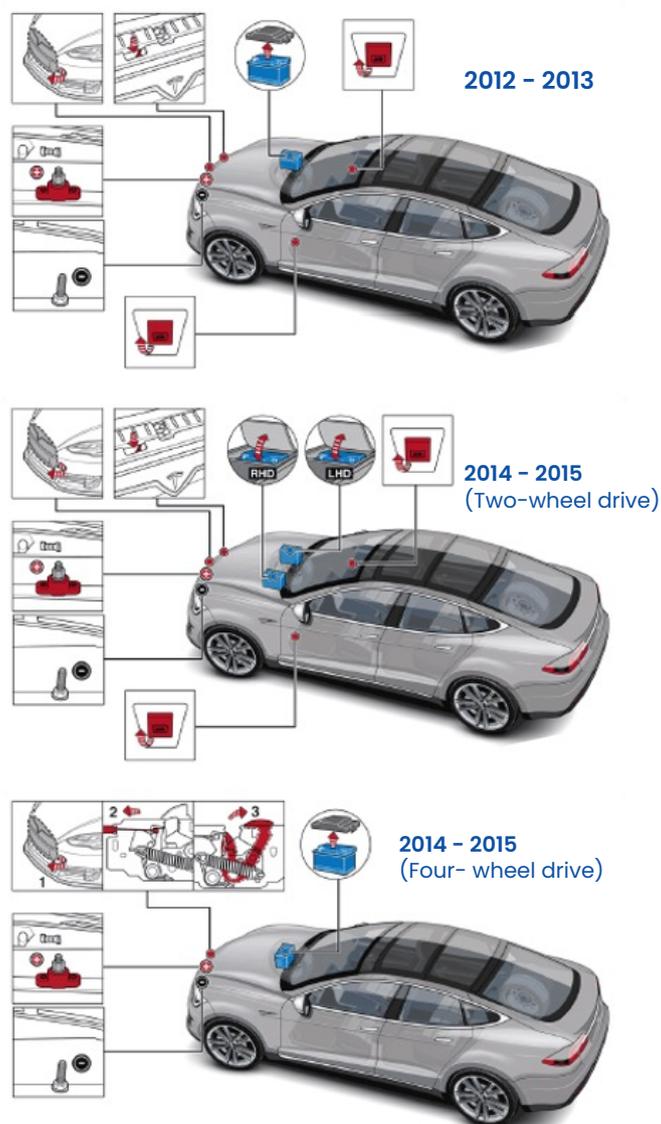


Figure 2. Batteries ensemble location.

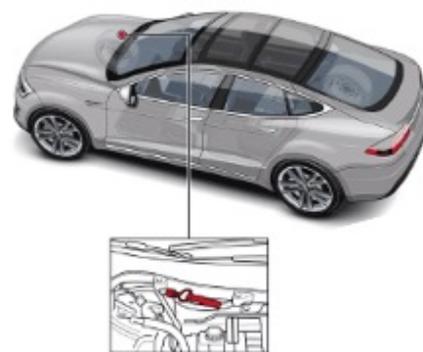


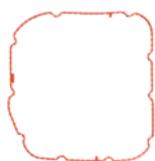
Figure 3. Service connector

After connecting the battery

Electric window operators and sliding roof

- 1) Make sure that the door is **widely 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 lows 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 work properly already.

composition



Inverter gasket¹
(1 unit)



Entry and drain of the coolant to the inverter gasket²
(2 units)



Encoder cover gasket³
(1 unit)



Stator phases feedthrough⁴
(3 units)



Oil cooler gasket⁵
(2 units)



Oil cooler gasket⁶
(1 unit)



Gearbox oil seal⁷
(2 units)



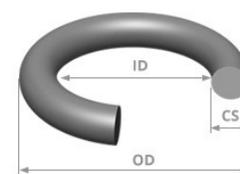
Rotor shaft bearing⁸
(1 unit)



Primary shaft bearing⁹
(1 unit)



O rings gaskets kit
(23 units)



	OD (mm)	ID (mm)	CS (mm)
Coolant nozzle to the cooler gasket¹⁰ (1 unit)	22,20	17,00	2,60
Oil pump filter gasket¹¹ (2 units)	19,50	15,50	2,00
Encoder gasket¹² (1 unit)	27,08	23,52	1,78
Phases cover gasket¹³ (3 units)	32,50	25,30	3,60
Temperature sensor gasket¹⁴ (1 unit)	14,60	10,90	1,85
Pump's body cover gasket with oil filter¹⁵ (1 unit)	32,00	29,00	1,50
Rotor sprinkler gasket¹⁶ (1 unit)	-	9,30	2,70
Pump nozzle gasket + metallic oil feed pipe¹⁷ (3 units)	17,70	12,50	2,60

Stator phases O rings¹⁸ (6 units)	-	14,50	3,50
Rotor oil feed pipe gasket¹⁹ (1 unit)	14,60	9,20	2,70
Rotor back cover gasket²⁰ (1 unit)	-	62,00	2,60
Level plug O-ring²² (2 units)	17,00	13,00	2,00

repair

The following shows the repair process of this Tesla rear motor.

01



Transfer gearbox

Open, clean and ready to work.

02



Pump nozzle gasket

We start by placing the **pump nozzle seal + metal grease tube¹⁷** tighten 10 Nm.

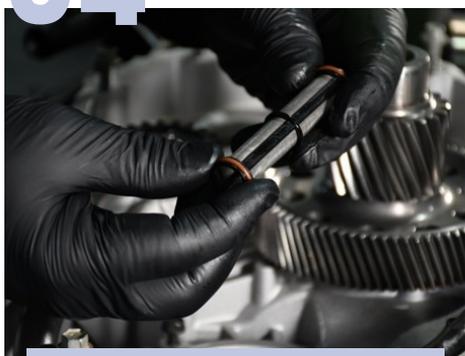
03



Pump body cover gasket with oil filter

We place the **pump body cover gasket with the oil filter¹⁵** in its corresponding housing.

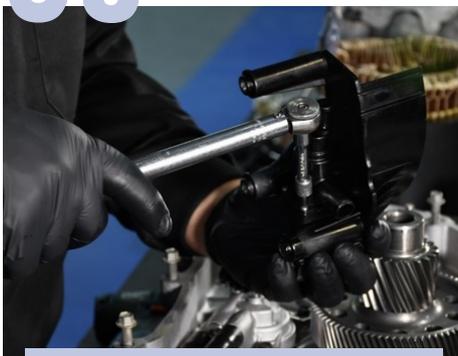
04



Oil pump filter with O rings

Next step will be assembling the **oil pump filter gaskets**¹¹.

05



Oil pump filter in its housing

We will proceed with a tightening torque of 4 Nm. Then, we will assemble the ensemble over the transfer gearbox. The tightening will be of 10 Nm.

06



Differential assembly

We lodge the differential in the transfer gearbox and proceed with as many 10Nm tightenings as needed.

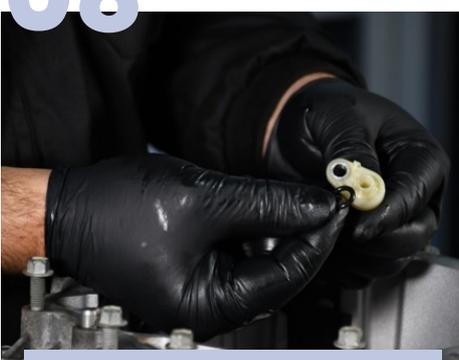
07



Oil feed pipe placement

We will proceed with the assembly of the oil feed pipe, where we will need to place the drain gasket and the **metallic oil feed pipe**¹⁷.

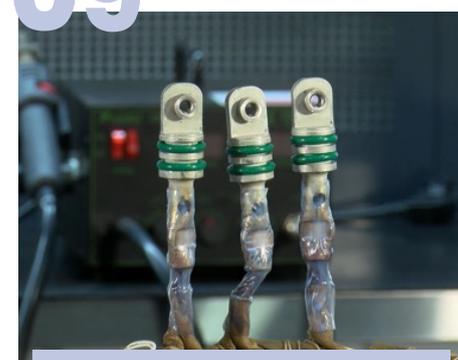
08



Oil sprinkler to the rotor gasket

Next step will be assembling the part responsible for lubricating the motor. In it, we will place the **sprinkler rotor gasket**¹⁶.

09



Stator phases

We will continue with the assembly of the **gear middle the stator phases O rings**¹⁸ which we will then place inside the transfer gearbox.

10



Heat inductor for mounting bearings

Before starting, make sure the work area is free from pollutants (especially metallic objects) Make sure you have the tools you need, apart from the personal protective equipment (gloves and glasses).

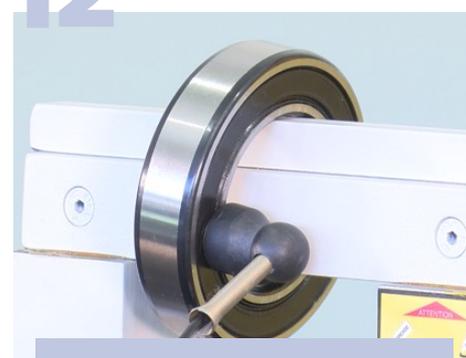
11



Bearing placement in heat inductor

We put the **rotor shaft bearing⁸** with the liner always trying that it fits with the inner diameter (if it is necessary we will use 2) Once it is in it, we will place it over the supports of the inductor previously greased.

12



Temperature tube placement

Next, we will place the temperature tube, always in the inner part of the **rotor shaft bearing⁸**. This way, the inductor will tell us when the bearing reaches the temperature we want, usually between 80 and 120°C

13



Heating

Once the temperature is reached, we switch off the station and disconnect the temperature tube. We take of the **rotor shaft bearing⁸** from its base and we are ready for placement.

14



Bearing assemble

Align properly the bearing with the axis. Heat should have dilated the material, the **rotor shaft bearing⁸** can be placed easily. Make sure that the rotor's axis has a good finish and that the rest of the parts do not show damages. Only parts fulfilling the required quality standards should be fitted.

15



Final appearance of the bearing.

16



Rotor seals

Following the same procedure, we will assemble the **primary shaft bearing**¹⁰ in their respective accommodation.

17



Rotor gaskets

Once the rotor is assembled, the next step will be placing the **rotor back cover gasket**²⁰ in the bearing's housing.

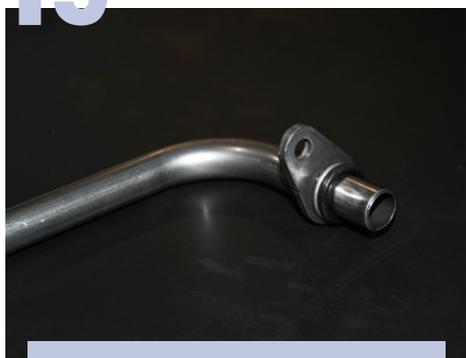
18



Ajulock

It is time to fix the screws of the rotor back cover. To guarantee they are properly fixed we will use the thread locker Ajulock. With a 25 Nm tightening.

19



Oil feed pipe

This pipe will be responsible for sprinkling oil to the back part of the rotor.

We will replace the O ring gasket or **rotor oil feed pipe gasket**¹⁹. The tightening will be of 10 Nm.

20



AjuseV

We still have to close the casing or wrapping. For this, we will use AjuseV, our silicon sealant exclusive for electric and hybrid vehicles, and we will finish with a tightening torque of 25 Nm.

21



Oil cooler

We continue by placing the **oil cooler gaskets**^{5y6}. As you can see in the image, these gaskets fit on the base of such cooler. The screws of this cooler will be tightened 10 Nm. The third **oil cooler gasket**⁶ will be placed in the transfer gearbox.

22



Gearbox seals

It is time to place the **gearbox oil seal⁶** two units, one per gear and with the help of a tool or special implement.

23



Temperature sensor

Then, we place the **temperature sensor gasket¹⁴** in the feedthrough to the sensor.

24



Transfer gearbox closing

It is time to close, and again we will apply AjusEV for a proper sealing of the transfer gearbox. We will finish this step applying a tightening torque to the screws of 25 Nm.

25



Stator phases

Once the second gear seal is placed, it is time to place the **stator phases feedthrough gasket⁴**. Once this is done, we will place its screws and we will apply a tightening of 8 Nm.

26



Rotor shaft circlip

Now we must place the circlip of the primary shaft, and then the trigger wheel.

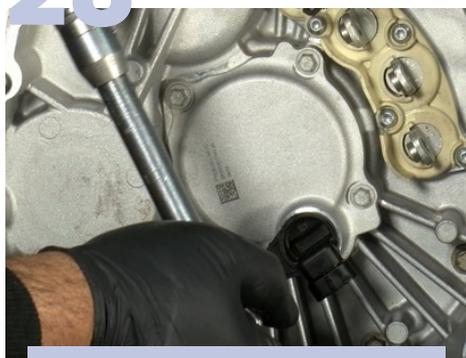
27



Encoder cover

It is time to place the **encoder gasket³** in the cover. We place it in its natural location and tighten 8 Nm.

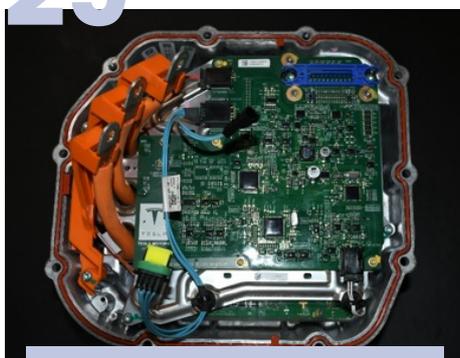
28



Encoder sensor

Once the cover is placed, we will place **encoder gasket¹²** and then tighten 8 Nm.

29



Inverter

It is time to place the **inverter gasket¹**. We shall conduct the related connections and place it back in its location. Tightening, 12,5 Nm.

30



Inverter cooling

Before finishing, we will place the pair entry and drain of the coolant to the **inverter gasket²** in its location, we will place the manifolds and apply a tightening of 8Nm.

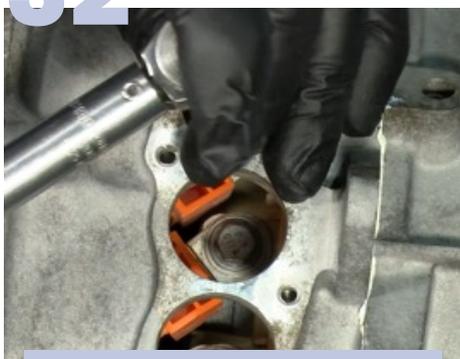
31



Motor coolant entry / drain

After the cooler, we will assemble in duplicate the **entry and drain of the coolant to motor gasket⁷** in the nozzles. Tightening will be of 10 Nm again.

32



Inverter connection

It is time to connect the inverter and the stator. Once the terminals have been connected, we must perform a tightening of 11,5 Nm.

33



Phases cover

Finally, we will place the **phases cover gaskets¹³** and perform a tightening of 8 Nm.



Engine · 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 watch the **assembly video**:

VIDEO