by ajusa
electric vehicle line

repair manual

Nissan Leaf ZE1

(2017)

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with motor code EM57

Ajusa reference EV001300

content

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

The Ajusa kit has the reference **EV001300**.

This datasheet corresponds to the Nissan Leaf ZE1 model with motor code EM57.

Specifications

Type: Permanent magnet synchronous electric motor.

Power: 80–160 kW depending on version and vehicle.

Torque: 254–340 Nm.

Rotational speed: 10.500–11.300 rpm.

Operating voltage: High voltage (≈360 V).

Cooling: Liquid-cooled.

Location: Front-wheel drive (FWD) in most applications.

EM57 motor compatibilities

100% electric vehicles

Model	Years	Note
Nissan Leaf ZE1	2017–2022 aprox.	Second generation of the Leaf.
Nissan Leaf AZE0	2013–2017	Updated version of the 1st generation Leaf (EM57 replaced the EM61).
Nissan e-NV200	2014–2017	EM57

e-POWER vehicles (series hybrids, where the electric motor drives the car)

Model	Years	Note
Nissan Note e-POWER (E12)	2016–2020	EM57 Motor coupled to a gasoline generator.
Nissan Note e-POWER (E13)	2020–2023	New generation, still with EM57.
Nissan Serena e-POWER	2018–2022	Series hybrid minivan with EM57.
Nissan Kicks e-POWER	2020–2023	Hybrid SUV in markets such as Asia and LatAm.
Nissan X-Trail e-POWER	2022–currently	Larger SUV, sometimes with AWD (e-4ORCE, 2 motors).
Nissan Qashqai e-POWER	2022–currently	Also uses EM57 as the main drive.

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:

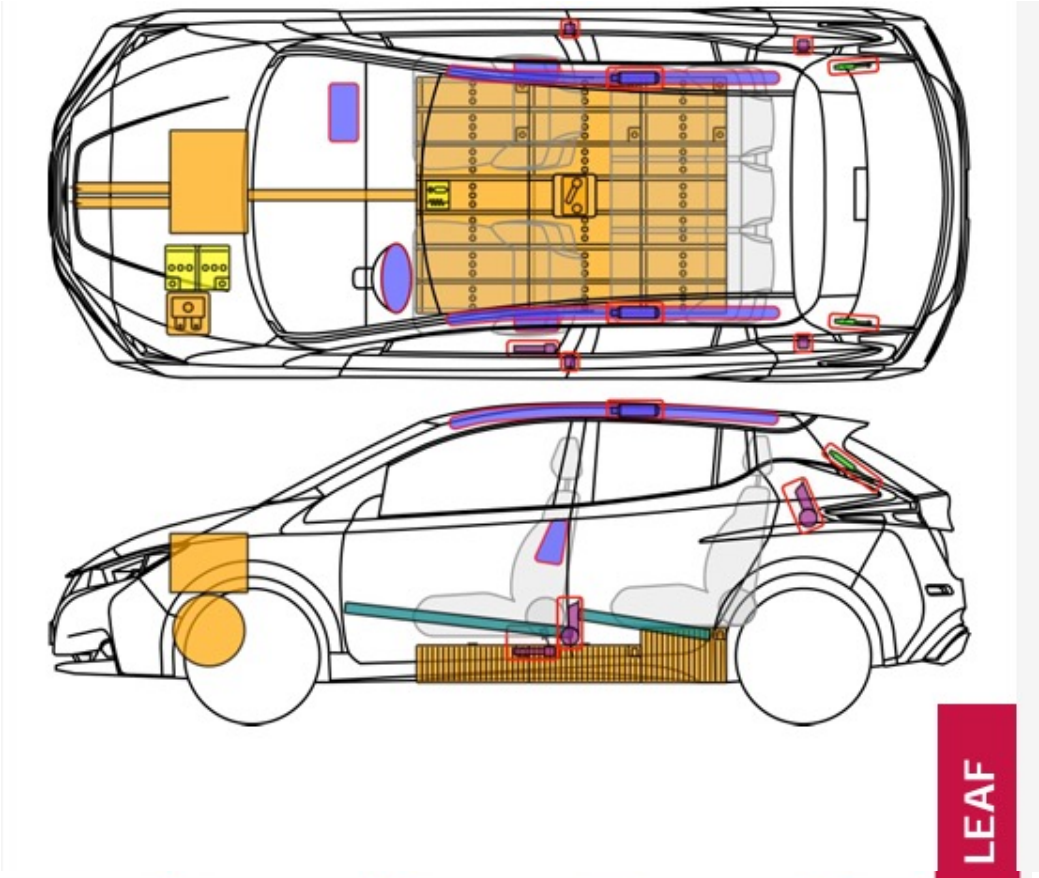
> Tool number 1076921-00-B. Insulation multimeter.
>
> Tool number 1130480-00-A. Cable for insulation multimeter.
>
> You must be sure that all the testing devices and equipments are compatible with high voltage applications.

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.

Component location



	Airbag		Gas generator		Seat belt pretensioners		SRS control module		Active pedestrian protection system
	Automatic rollover protection system		Gas shock absorber/preloaded spring		High resistance zone		Area that needs special attention		
	Low voltage battery		Ultra low voltage capacitor		Fuel tank		Gas tank		Safety cut-off key
	High voltage battery		High voltage wiring		High voltage battery high voltage selector		High voltage fuse box		High voltage super capacitor
	Gasoline/Ethanol Tank								

Disconnection/Isolation of the electric vehicle battery pack

Desactivation of the high voltage (HV) and the restraint system (SRS

Method 1

1) Check if the 'Ready' indicator on the instrument cluster **lights up**. Symbol:

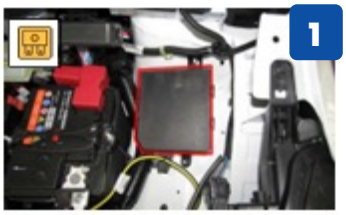
2) If the system is active, press the start/stop button once.

3) Disconnect the 12-volt battery. First, disconnect the negative battery cable.

WARNING
The restraint systems **are completely deactivated** after approximately 10 minutes!

Method 2

1) Locate and open the fuse box.



2) Remove the specified fuse from the fuse box.

3) Disconnect the 12-volt battery. First, disconnect the negative battery cable.

WARNING
The restraint systems **are completely deactivated** after approximately 10 minutes!

Method 3

1) Locate the emergency disconnect switch.

2) Lift the cover at the back (it is held with clips) and remove it. Unscrew the fastening screws of the lower cover (wrench size: 10 mm) and remove the cover.

3) Press the service/emergency disconnect switch as indicated.

4) Disconnect the 12-volt battery. First, disconnect the negative battery cable.

WARNING
If the 12V battery **cannot be disconnected**, the vehicle's restraint systems are still active!

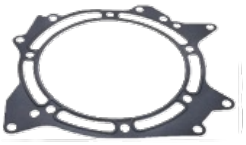
The restraint systems are completely deactivated after approximately 10 minutes!

composition

Three-phase connection bushing gasket inverter/stator[1]
(1 unit)

Rear gasket for stator connections[2]
(1 unit)

Encoder cover gasket[3]
(1 unit)



Stator gasket transmission side[4]
(1 unit)

Stator gasket encoder side[5]
(1 unit)

Three phase connection cover gasket[6]
(1 unit)

Inverter/PDM bushing gasket[7]
(1 unit)

Rotor bearing[8]
(2 units)

Grounding shaft oil seal[9]
(1 unit)

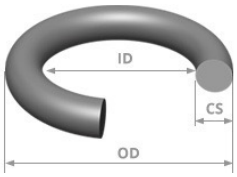
Primary shaft input oil seal[10]
(1 unit)

Right transmission oil seal[11]
(1 unit)

Left transmission oil seal[12]
(1 unit)

Rotor/stator cover oil seal[13]
(1 unit)

O-ring kit
(11 units)



Locking actuator gasket[14] (1 unit)	24,50	19,50	2,50
Inverter data connector gasket[15] (1 unit)	32,80	28,00	2,40
Encoder + temperature sensor connector gasket[16] (1 unit)	37,20	32,00	2,60
Rotor shaft gasket[17] (1 unit)	25,30	20,00	2,65
Stator cooling inlet/outlet nozzle gaskets[18] (2 units)	28,80	23,50	2,65
Inverter temperature sensor gasket[19] (1 unit)	17,00	12,00	2,50
Grounding cover gasket[20] (1 unit)	70,00	66,00	2,00
Drain fill and level plug washer[21] (3 units)	24,50	18,00	1,50

repair

The following shows the repair of this motor in a few simple steps.

01

Bearing assembly

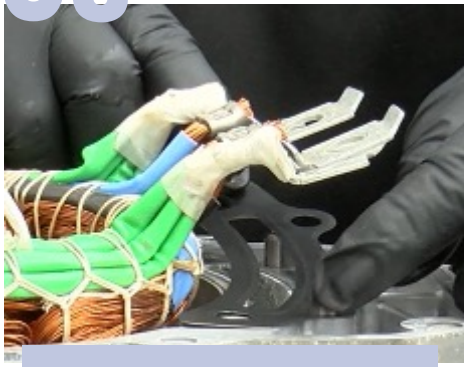
We begin the assembly by installing a new **rotor bearing**[8] in the stator cover. To facilitate the process, apply a thin layer of petroleum jelly on the gasket. Once in place, secure the retaining plate with a torque of 25 Nm.

02

Stator cover assembly

Next, we fit the stator cover onto the rotor, ensuring that the previously installed bearing is properly seated in its position.

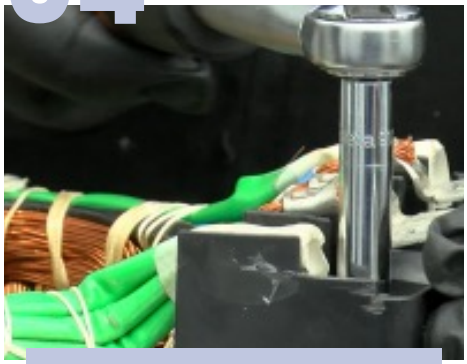
03



Stator connections

We install the **rear gasket for stator connections**[2] on the back of the stator and tighten its two screws to 55 Nm.

04



Winding terminals

We proceed to install the screws for the intermediate winding terminals, tightening them to 11 Nm.

05

Stator gasket

We install the stator **gasket encoder side**[5], and then assemble the rotor–stator cover unit. Tighten the screws to 55 Nm.

06

Encoder sensor

We install the impulse wheel on the rotor, tightening it to 30 Nm. Then we mount the encoder sensor, securing it with its screws at 10 Nm.

07

Encoder connector

We install the **encoder + temperature sensor connector gasket**[16]. Once in place, it is secured with a screw tightened to 8 Nm, and the corresponding wires are connected.

08

Encoder cover

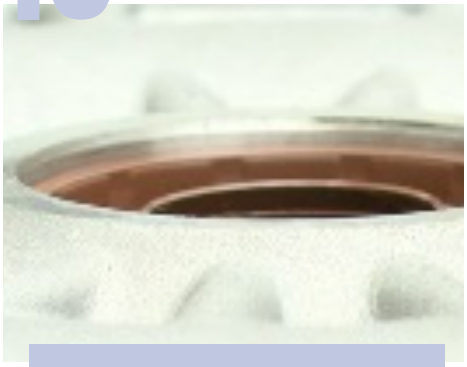
We place the **encoder cover gasket**[3] on its locating pins and install the encoder cover, applying a tightening torque of 10 Nm.

09

Second rotor bearing

We install the second bearing on the rotor using an induction heater to facilitate assembly. Once in place, we reinstall its O-ring.

10



Rotor gasket

Next, we will install the **rotor/stator cover oil seal**[13] making sure it is properly seated in its housing.

11

Stator cooling gasket

We place the **stator gasket transmission side**[4] over the locating pins and install the rear cover. Do not forget to place the adjusting washer on the bearing before applying a tightening torque of 55 Nm.

12

Input shaft

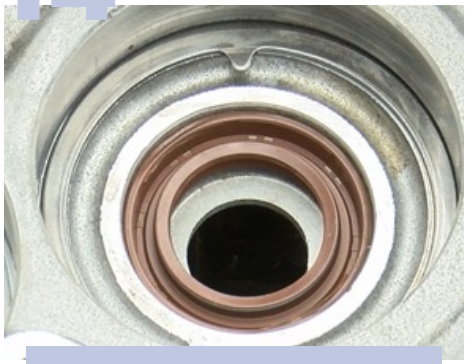
Next, we will install the **rotor shaft gasket**[17] maintain the gasket with the transfer case output shaft.

13

Cooling nozzles

We install the inlet and outlet nozzles of the stator cooling circuit, along with their respective **stator cooling inlet/outlet nozzle gaskets**[18] We apply grease to prevent damage during assembly and tighten to 15 Nm.

14



Grounding shaft

The ground shaft output seal is replaced using the **grounding shaft oil seal**[9] We ensure that it is correctly seated in the housing.

15

Transmission gasket

We install the side gaskets corresponding to both sides of the transmission **right transmission oil seal**[11] and **left transmission oil seal**[12].

16

Transmission case closure

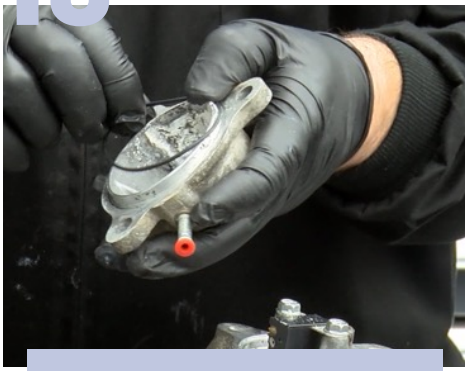
We apply a thin, continuous bead of AjusEV sealant on the mating surface and close the case, tightening the bolts to 40 Nm.

17

Grounding brush

We install the brush in its housing, ensuring good contact with the shaft. It is secured with a tightening torque of 10 Nm.

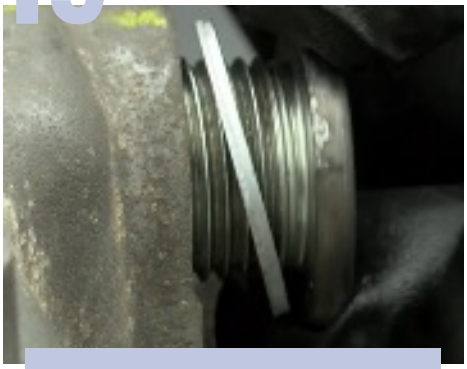
18



Grounding cover

We install the closing cover for the brush and the grounding shaft, using the **grounding cover gasket**[20] and applying a tightening torque of 15 Nm.

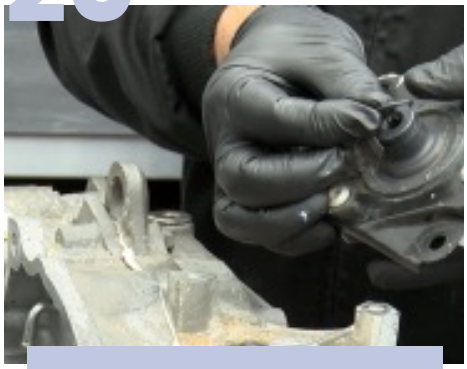
19



Filler plug

We install the corresponding washers on the filler, drain, and level plugs **drain fill and level plug washer**[21].

20



Transmission case lock

We install the **locking actuator gasket**[14] in the groove of the lock actuator. Once positioned, the actuator is inserted into its housing and tightened to 15 Nm.

21

Transfer case output gasket

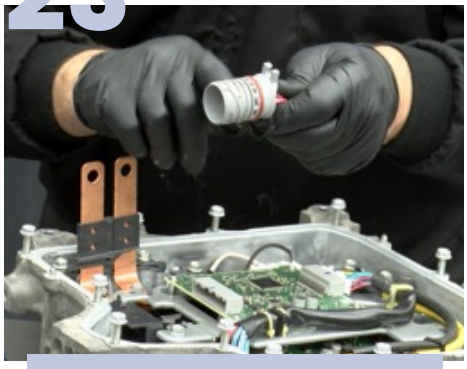
We install the **primary shaft input oil seal**[10] ensuring it is properly seated and avoiding pinching the lip during insertion of the output shaft.

22

Motor to transmission coupling

We align the rotor output shaft with the transfer case input shaft. Apply gentle pressure until both components engage. Tighten the connecting bolts to 60 Nm.

23



Data connector – inverter

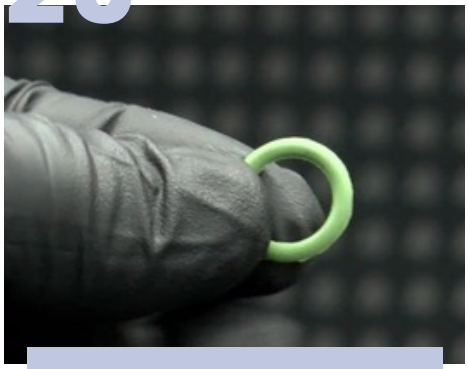
We install the **inverter data connector gasket**[15] on the inverter data connector. The connector is inserted through the designated hole and secured with its clip.

24

Inverter cover

We apply a uniform bead of AjusEV sealant on the mating surface of the cover. We close it with its bolts tightened to 11 Nm.

25



Inverter temperature sensor

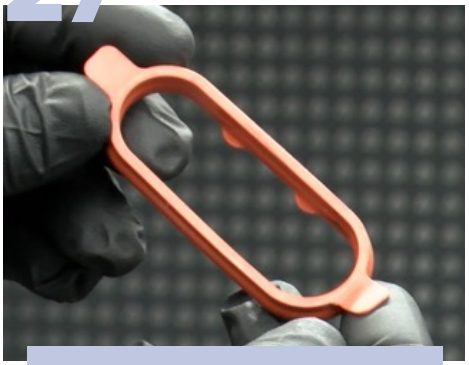
We install the **inverter temperature sensor gasket**[19] on the inverter temperature sensor and secure it with a tightening torque of 20 Nm.

26

Inverter coupling

Install the **three-phase connection bushing gasket inverter/stator**[1]. Position the inverter on the stator locating pins and lower it slowly to ensure proper seating. Tighten the bolts to a torque of 30 Nm.

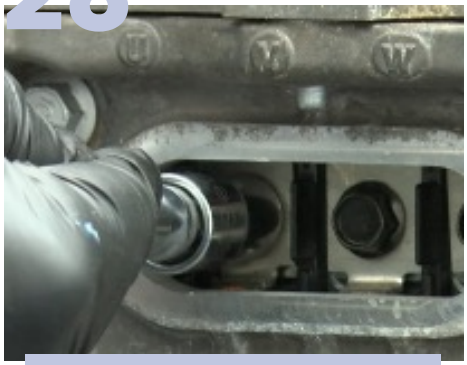
27



Transfer case output seal

Install the **Inverter/PDM bushing gasket**[7] feed-through gasket on the inverter input, preparing the assembly for the subsequent installation of the PDM, which connects the power terminals.

28



Three-phase connections

We proceed to place the stator terminals in their corresponding connections. Once correctly positioned, a tightening torque of 11 Nm will be applied.

29

Terminal cover

Finally, the three-phase terminal cover with the **three phase connection cover gasket**[6] is installed, securing it with a tightening torque of 8 Nm.

Motor · Final view of the completed assembly

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**:

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