



## 12- Electrical system

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# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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Roof



## Roof

### Technical specifications

#### General specifications

Name	Specification	
Normal operating voltage	12V	13V
Operating voltage range	9~16V	9~15V
Operating environment temperature	-30 °C ~ 85 °C	-30 °C ~ 90 °C

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12



## Operating Principle

### System overview

If your vehicle is equipped with a sunroof, you can open, close, or tilt the sunroof with the sunroof control switch on the roof. The sunroof can only be operated when the ignition switch is in "ON" position.

#### ⚠ Warning:

**Do not operate the sunroof during driving process, otherwise the vehicle may be loss of control due to driver attention transfer, resulting in traffic accidents, with property damage or person injury or even death.**

The sunroof system consists of the following components:

- Skylight switch
- Skylight motor
- Sunroof frame assembly

### Power window function logic description

#### Remote control window closing function

When BCM/PEPS controller receives the remote control locking high-frequency signal for more than 2s sent from the remote control key, if all remote control window closing conditions are met, BCM/PEPS controller will perform the window and sunroof closing function. (all configurations are provided with the sunroof closing function, without need of diagnosis opening function.)

Remote control window closing function conditions (and):

1. The ignition switch is in OFF position;
2. The remote control key ID is legal;
3. The key insertion signal is withdraw;
4. Receive the remote control locking signal for more than 2s.

Remote window closing operation stop conditions (or):

1. During closing process, receive a remote control locking signal;
2. During closing process, receive a remote control unlocking (door) signal;
3. During closing process, receive a remote control trunk unlocking signal;
4. During closing process, the left front door lock status signal is switched from vain to the low level (unlocking);
5. During closing process, the ignition switch is in non-OFF position.

The remote control window close stop function executes the action:

Do not perform the corresponding unlocking and locking function, perform the window closing stop function; the sunroof will be closed continuously.

During the remote control window closing process, PEPS will outputs the high level signal (continuous 2s) to the sunroof controller.



## Diagnosis Information and Procedures

### Diagnosis Instructions

Before the sunroof system troubleshooting, must familiarize and understand its working principle, and then perform its diagnosis, which helps to determine the correct troubleshooting steps in case of a fault, and more importantly, to determine whether the situation described by the user is normal. In any sunroof system fault diagnosis, must first inspect it, and guide the maintenance staff to take the next logical steps for fault diagnosis. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

### General equipment

Digital multimeter
Diagnostic equipment of vehicle

### Visual inspection

1. Confirm the problem raised by the customer.
2. Check for the evident mechanical or electrical damage trace.

### Visual inspection table

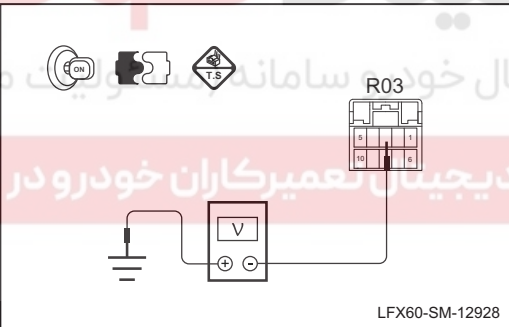
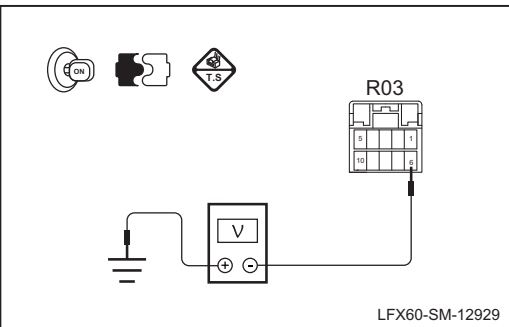
Electrical
<ul style="list-style-type: none"> <li>• Fuse</li> <li>• Harness or plug</li> <li>• Dashboard fuse box</li> <li>• Skylight switch</li> <li>• Skylight motor</li> <li>• PEPS ECU/BCM</li> </ul>

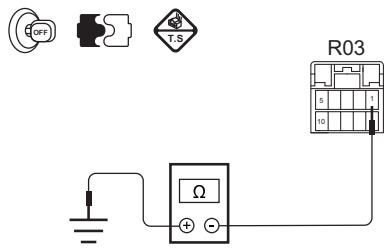

3. Check the system lines easy to see or can be seen.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If for the problem, there are no obvious findings, then confirm the fault and refer to the symptom table.


**Fault symptoms table**

Symptom	Possible cause	Recommended measure
The sunroof can not be opened	• Skylight mechanical seizing	<b>Refer to: Diagnosis procedure about that the sunroof can not be opened</b>
	• Fuse	
	• Harness or plug	
	• Dashboard fuse box	
	• Skylight switch	
	• Skylight motor	
	• PEPS ECU/BCM	
The opened sunroof can not be closed	• Skylight mechanical seizing	<b>Refer to: Diagnosis procedure about that the opened sunroof can not be closed</b>
	• Skylight switch	
	• Skylight motor	
The sunroof is leaked	• Seal strips	• Repair or replace the seal strips
	• The drain tube is disconnected	• Reinstall the sunroof drain tube
	• The sunroof is stuck and can not be closed completely	• Inspect and repair the sunroof
The sunroof sends an abnormal sound	• There is a foreign matter in the sunroof chute	• Clean up the foreign matter and lubricate the chute
	• Skylight motor	• Replace the sunroof motor <b>Refer to: Replacement of skylight motor</b>

## Diagnosis procedure about the skylight can not be opened

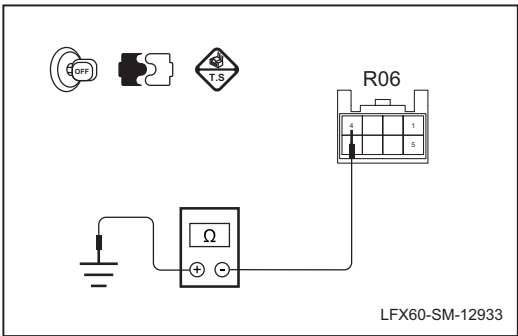
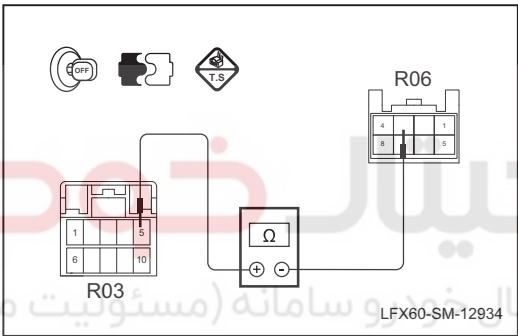
Test condition	Details/results/measures
1. General inspection.	<p>A. Inspect whether the sunroof is installed properly and whether there is mechanical jam.</p> <p>B. Inspect the sunroof motor and sunroof switch wiring harness connector for loosening, aging, falling off and other abnormalities.</p> <p>Is it OK after checking?</p> <p>→ <b>Yes</b> To step 2.</p> <p>→ <b>No</b> Repair the fault position.</p>
2. Check the fuse.	<p>A. Inspect the sunroof motor fuses FS10 and FS29.</p> <p><b>Fuse rated capacity: FS10 (10A), FS29 (15 A)</b></p> <p>Is it OK after checking?</p> <p>→ <b>Yes</b> To step 3.</p> <p>→ <b>No</b> Replace the fuse.</p>
3. Inspect the sunroof motor power supply.	<div style="display: flex;"> <div style="flex: 1;">  <p>LFX60-SM-12928</p> </div> <div style="flex: 1;"> <p>A. Operate the ignition switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the skylight motor harness plug R03.</p> <p>D. Connect the battery negative terminal.</p> <p>E. Operate the ignition switch to turn the power to ON state.</p> <p>F. Measure the voltage between Terminal 3 of the sunroof motor wiring harness connector R03 and the reliable grounding point with a multimeter.</p> <p><b>Standard value: 11 ~ 14 V</b></p> </div> </div> <div style="display: flex;"> <div style="flex: 1;">  <p>LFX60-SM-12929</p> </div> <div style="flex: 1;"> <p>G. Measure the voltage between skylight motor harness plug R03 terminal 6 and fixed ground point with the multimeter.</p> <p><b>Standard value: 11 ~ 14 V</b></p> <p>Is the voltage is OK?</p> <p>→ <b>Yes</b> To step 4.</p> <p>→ <b>No</b> Inspect and repair the sunroof motor power line fault; if necessary, replace the dashboard wiring box.</p> </div> </div>

Test condition	Details/results/measures
4. Inspect the sunroof motor grounding point.	
 <p>LFX60-SM-12930</p>	<p>A. Operate the ignition switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the skylight motor harness plug R03.</p> <p>D. Measure the resistance between Terminal 1 of the sunroof motor wiring harness connector R03 and the reliable grounding point with a multimeter.</p> <p><b>Standard value: Less than 5Ω</b></p> <p>E. Measure the voltage between skylight motor harness plug R03 terminal 2 and fixed ground point with the multimeter.</p> <p><b>Standard value: Less than 5Ω</b></p> <p>Is the resistance normal?</p> <p>→<b>Yes</b> To step 5.</p> <p>→<b>No</b> Inspect and repair the sunroof motor grounding point fault; if necessary, replace the wiring harness.</p>
 <p>LFX60-SM-12932</p>	<p>A. Operate the ignition switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the skylight motor harness plug R03.</p> <p>D. Disconnect the PEPS ECU harness plug I24.</p> <p>E. Measure the resistance between Terminal 9 of the sunroof motor wiring harness connector R03 and Terminal 6 of PEPS ECU wiring harness connector I24 with a multimeter.</p> <p><b>Standard value: Less than 5Ω</b></p> <p>Is the resistance normal?</p> <p>→<b>Yes</b> To step 6.</p> <p>→<b>No</b> Inspect and repair the sunroof control signal line fault; if necessary, replace the wiring harness.</p>



## Roof



Test condition	Details/results/measures
6. Inspect the sunroof switch control grounding point.	
	<p>A. Operate the ignition switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the front dome lamp harness plug R06.</p> <p>D. Measure the resistance between Terminal 4 of the front dome lamp wiring harness connector R06 and the reliable grounding point with a multimeter.</p> <p><b>Standard value: Less than 5Ω</b></p> <p>Is the resistance normal?</p> <p>→<b>Yes</b> To step 7.</p> <p>→<b>No</b> Inspect and repair the sunroof switch control grounding point fault; if necessary, replace the wiring harness.</p>
7. Inspect the sunroof opening signal line.	
	<p>A. Operate the ignition switch to turn the power to OFF state.</p> <p>B. Disconnect the battery negative connector.</p> <p>C. Disconnect the front dome lamp harness plug R06.</p> <p>D. Disconnect the sunroof motor wiring harness connector R03.</p> <p>E. Measure the resistance between Terminal 3 of the front dome lamp wiring harness connector R06 and Terminal 5 of the sunroof motor wiring harness connector R03 with a multimeter.</p> <p><b>Standard value: Less than 5Ω</b></p> <p>Is the resistance normal?</p> <p>→<b>Yes</b> To step 8.</p> <p>→<b>No</b> Inspect and repair the sunroof opening signal line fault; if necessary, replace the wiring harness.</p>
8. Check the skylight switch.	
	<p>A. Replace the sunroof switch.</p> <p><b>Refer to: Replacement of Sunroof Switch</b></p> <p>Is the troubleshooting successful?</p> <p>→<b>Yes</b> Replace the sunroof switch.</p> <p>→<b>No</b> To step 9.</p>



Test condition	Details/results/measures
9. Inspect the sunroof motor.	
	A. Replace the sunroof motor. <b>Refer to: Replace the sunroof motor.</b> Is the troubleshooting successful? → <b>Yes</b> Replace the sunroof motor. → <b>No</b> To step 10.
10. Inspect PEPS control unit.	
	A. Replace the PEPS control unit. <b>Refer to: Replacement of PEPS control unit</b> Confirm that troubleshooting is completed.

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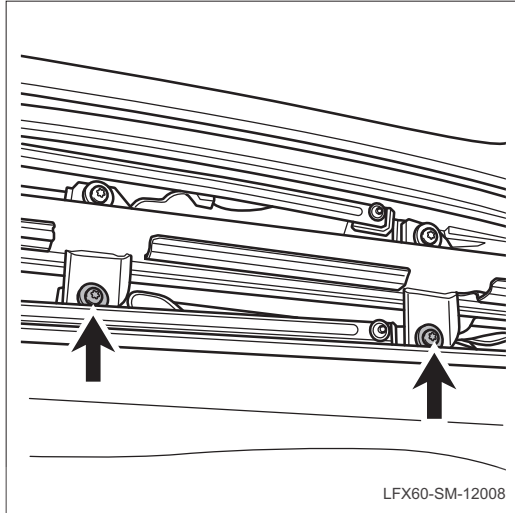
## Removal and Installation

### Replacement of the sunroof glass assembly

#### Removal

#### 1. Remove the sunroof glass assembly.

(a). Open the sunvisor.



(b). Remove the sunroof glass assembly fixing bolts.

△ **Tips:**

**The fixing bolts on both sides can be removed with the same method.**

(c). Remove the sunroof glass assembly.

#### Installation

#### 1. Install the sunroof glass assembly.

(a). The installation sequence is the reverse of the disassembly order.

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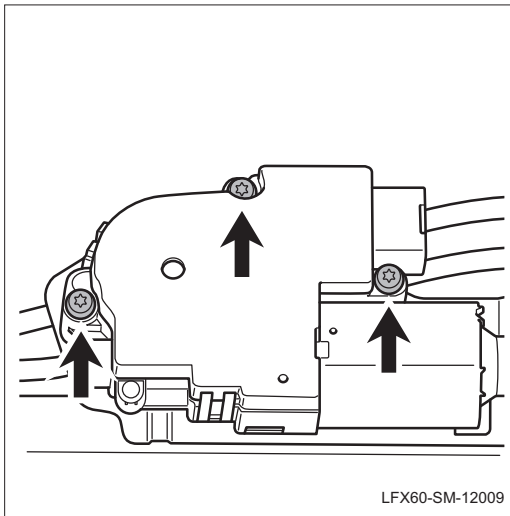
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## Replacement of the sunroof motor

### Removal

#### 1. Remove the sunroof motor.

(a). Remove the top cover trim; refer to: **Replacement of Top Cover Trim.**



- (b). Disconnect the sunroof motor wiring harness connector.
- (c). Remove the sunroof motor fixing bolts.
- (d). Remove the sunroof motor.

### Installation

#### 1. Install the sunroof motor.

(a). The installation sequence is the reverse of the disassembly order.



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