07 - Brake system

Service brake system

Technical specifications

General specifications

Name		Specification
Brake pedal height from the ground		21.3mm
Front brake disc	Standard thickness	11mm
	Wear limit thickness	2mm
Rear brake lining	Standard thickness	10.2mm
	Wear limit thickness	2mm
Front brake disc	Standard thickness	25mm
	Wear limit thickness	23mm
Rear brake disc	Standard thickness	10mm
	Wear limit thickness	8mm
Brake fluid model		DOT4
Amount of Brake fluid Filling		0.825L

Torque Specifications

Name	Torque range	
	Metric (Nm)	British (lb-ft)
Fixing blot of brake pedal	23	17
Fixing nut of brake pedal	23	17
Connecting bolt of front brake caliper and pipeline	45	33
Connecting bolt of rear brake caliper and pipeline	45	33
Connecting nut between the brake master cylinder and the vacuum booster	23	17
Connecting bolt of braketube and brake cylinder	16	12
Connecting nut between the vacuum booster and the body	23	17
Fixed bolt of brake caliper	Front: 95 , rear: 75	Front: 70 , rear: 55
Fixed bolt of brake caliper	27	20
Locknut of brake pipe of brake master cylinder	16	12

Precautions

Precautions

1. The brake performance seriously impacts the driving safety. Therefore, the good function of braking system shall always be maintained and the maintenance shall be performed if any problem is found.
2. Check the braking system regularly and perform maintenance to eliminate potentail safety problems.
3. Use the brake fluid recommended by Lifan and it should not be mixed with other types of brake fluid.
4. Do not use other liquid to replace the brake fluid so as to avoid the sub-assembly of hydraulic system from being damaged.
5. Because of the strong corrosive characteristics of brake fluid, when performing the maintenance for the braking system, avoid the skin and vehicle paint from being contacted with the fluid. Flush with a great deal of clean water if getting in contact with the fluid by accident.
6. During the repairing process, avoid the friction disc and braking wheel from being contacted with the oil. If failing the avoidance, clean it up with a piece of gauze.
7. When dismounting the piston of brake caliper, do not tread on the brake pedal so as to avoid the piston from getting out, which will result in the damage of piston dirt-proof boot.
8. During maintenance, clean the brake cylinder and brake friction disc thoroughly to minimize the damage caused by the particles in the air and other objects.
9. When performing the maintenance for the brake caliper, use clean brake fluid to wash all the parts of brake caliper.
10. Do not reuse the discharged brake fluid which shall be stored in a special sealed vessel.
11. During exhausting, observe the brake fluid level in the braking oiler. Add the fluid when it reaches the lowest scale.
12. Fill in the brake fluid. After finishing exhaust, check if the braking system leaks.If yes, timely eliminate the problem to ensure safty driving.

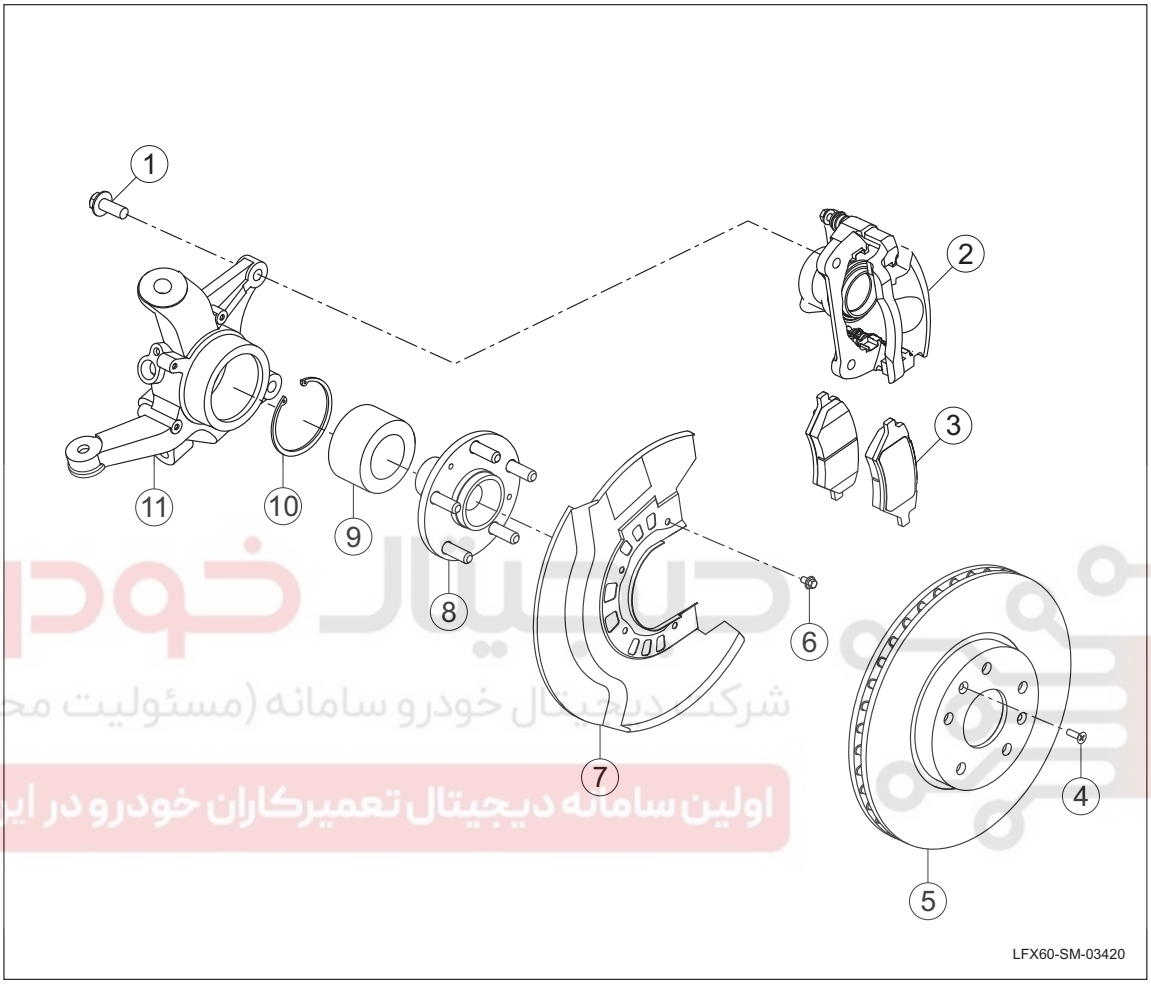
Preparation

General and special tools

Structure and installation location

Part exploded view

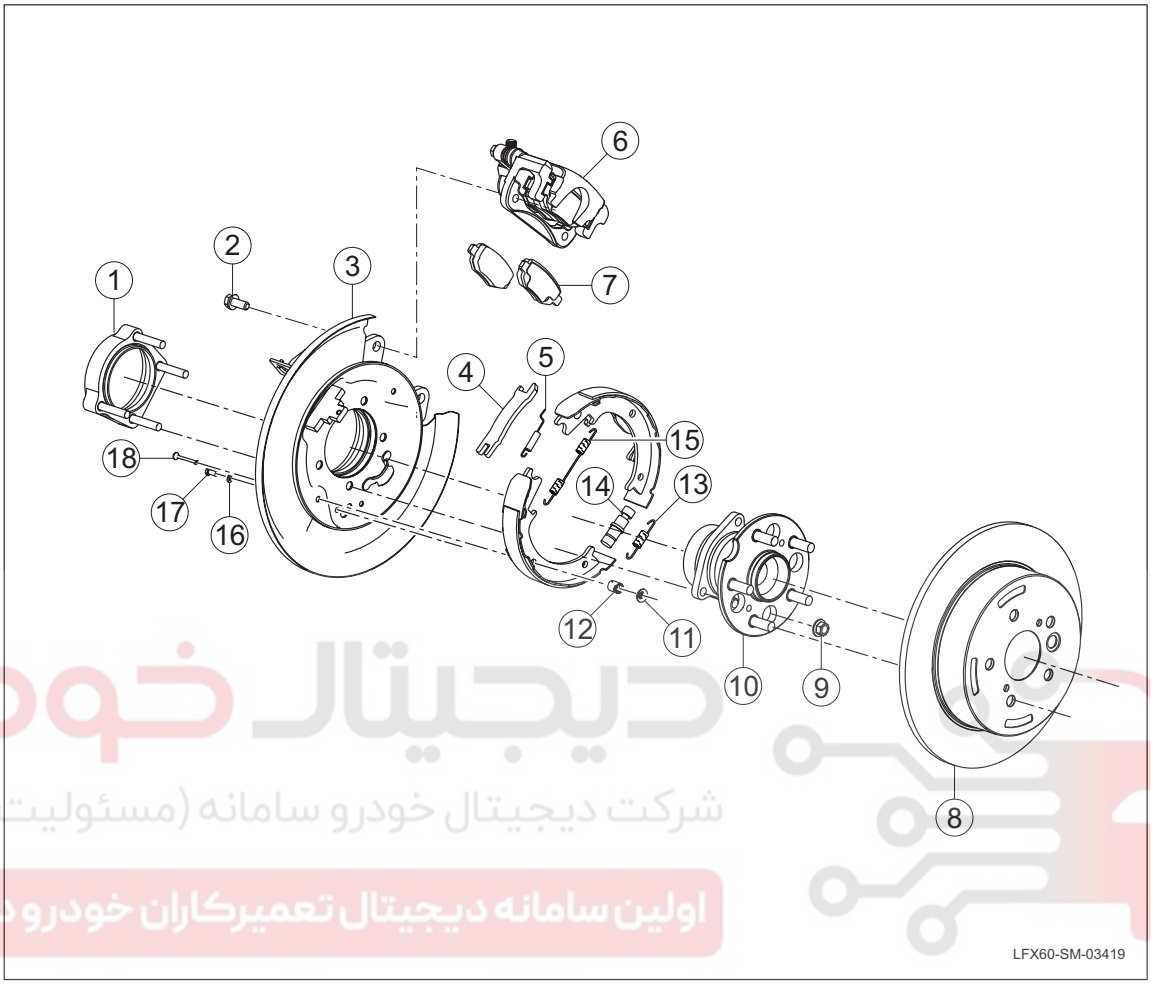
Front brake disc



No.	Part name
1	Hexagon flange bolt
2	Front brake caliper assembly
3	Front brake pad Kit
4	Cross slot sunk screw
5	Front brake disc
6	Hexagon flange bolt

No.	Part name
7	Front brake baseboard
8	Front wheel hub unit assembly
9	Front wheel hub bearing
10	Bearing retainer
11	Front steering knuckle

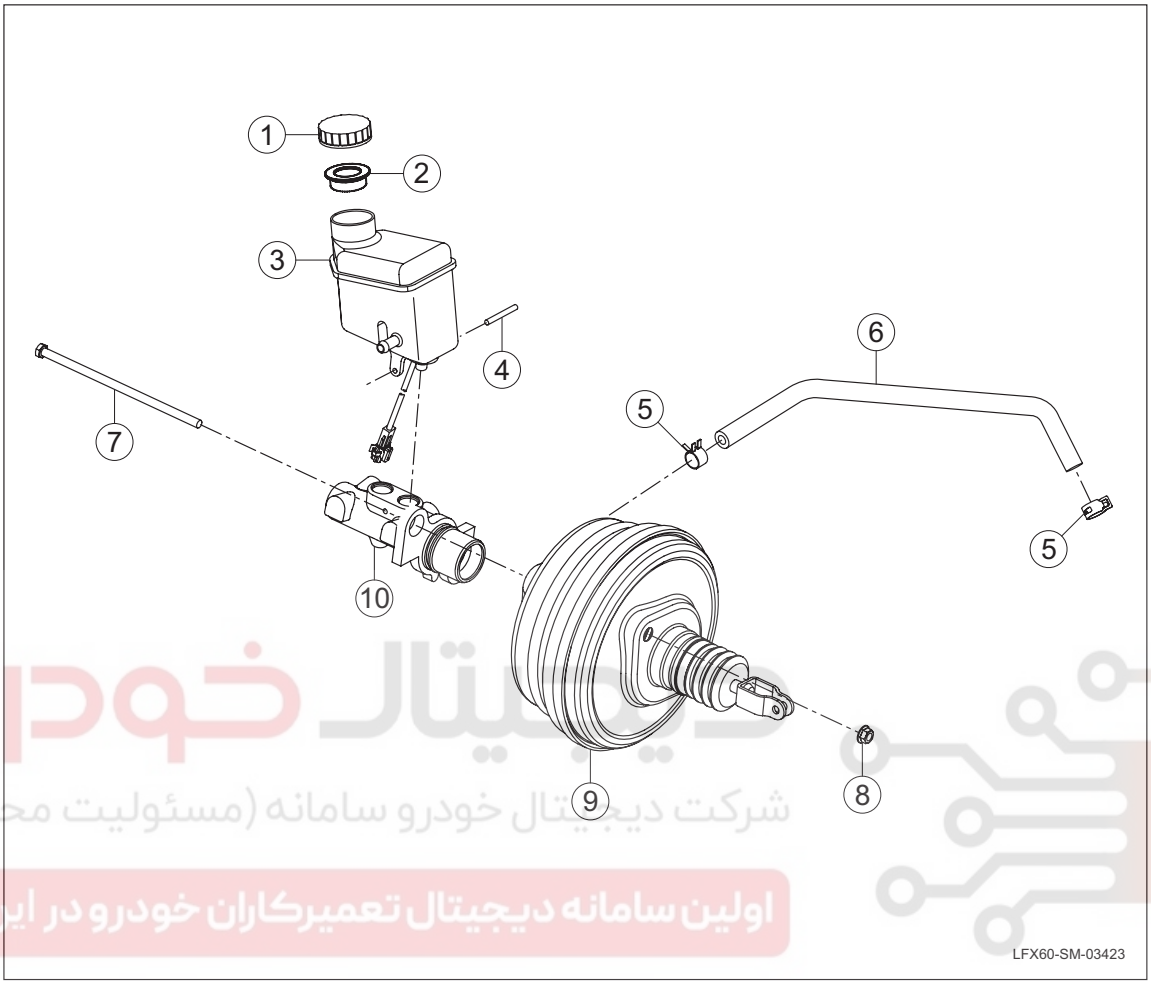
Rear brake disc



No.	Part name
1	Rear connecting seat assembly
2	Hexagon head bolt and taper elastic washer assembly
3	Rear brake baseboard assembly
4	Brake shoe support plate
5	Brake shoe return spring
6	Rear Brake Caliper assembly
7	Brake shoe assembly
8	Rear brake disc
9	Hex flange nut

No.	Part name
10	Rear hub
11	Baseboard fixing seat
12	Spring of baseboard fixing seat
13	Fixing spring of brake shoe adjusting pull rod
14	Brake shoe adjuster assembly
15	Upper tension spring of brake shoe
16	Plain washer
17	Hexagon head bolt
18	Fixing rod of baseboard

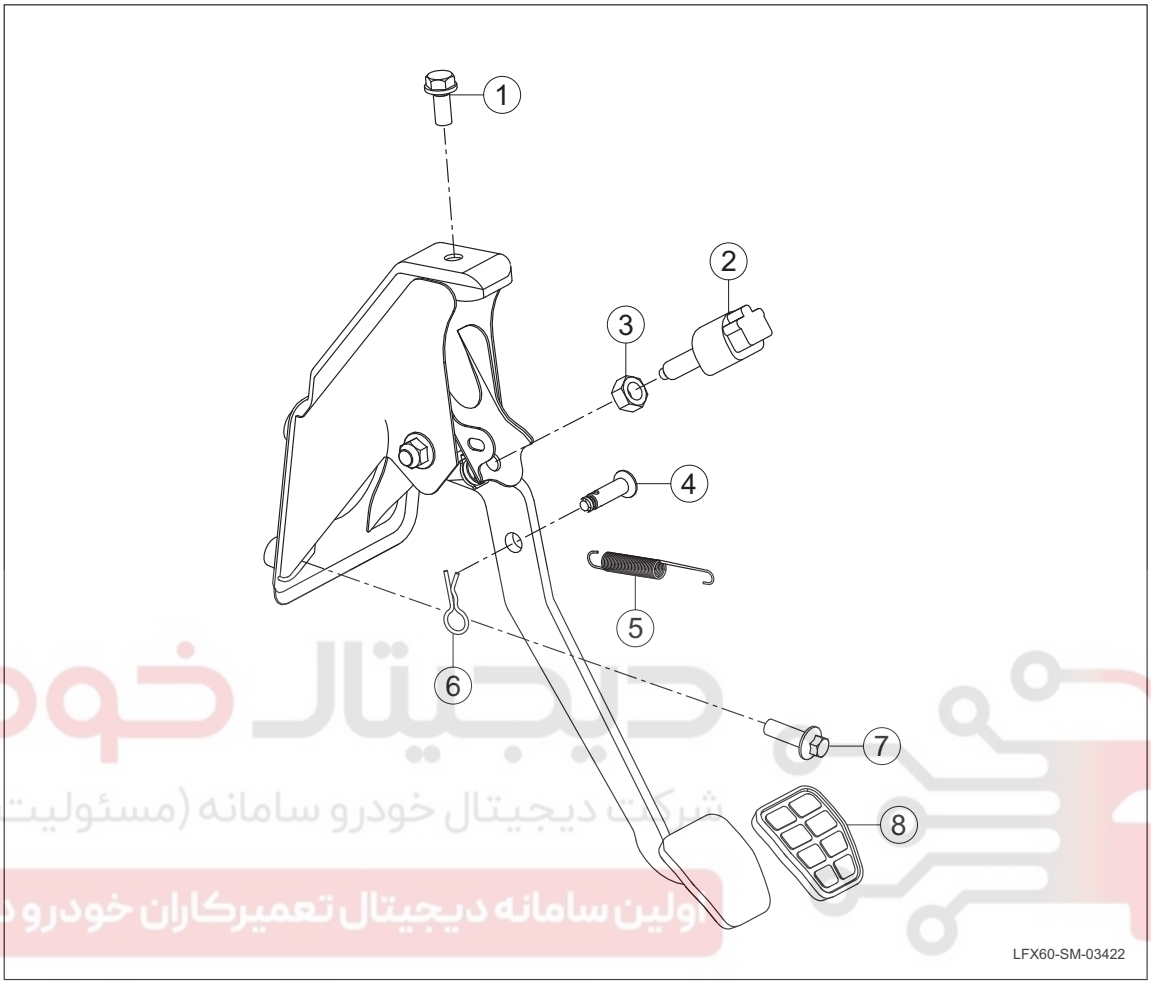
Brake master pump



No.	Part name
1	Assembly of brake oiler cap
2	Filter screen
3	Assembly of brake oiler
4	Connecting pin of brake oiler
5	Steel strip elastic hoop
6	Vacuum booster hose

No.	Part name
7	Tap bolt of vacuum booster
8	Hex flange nut
9	Vacuum booster
10	Kit of brake master pump with oiler assembly
11	Connecting nut of brake master pump

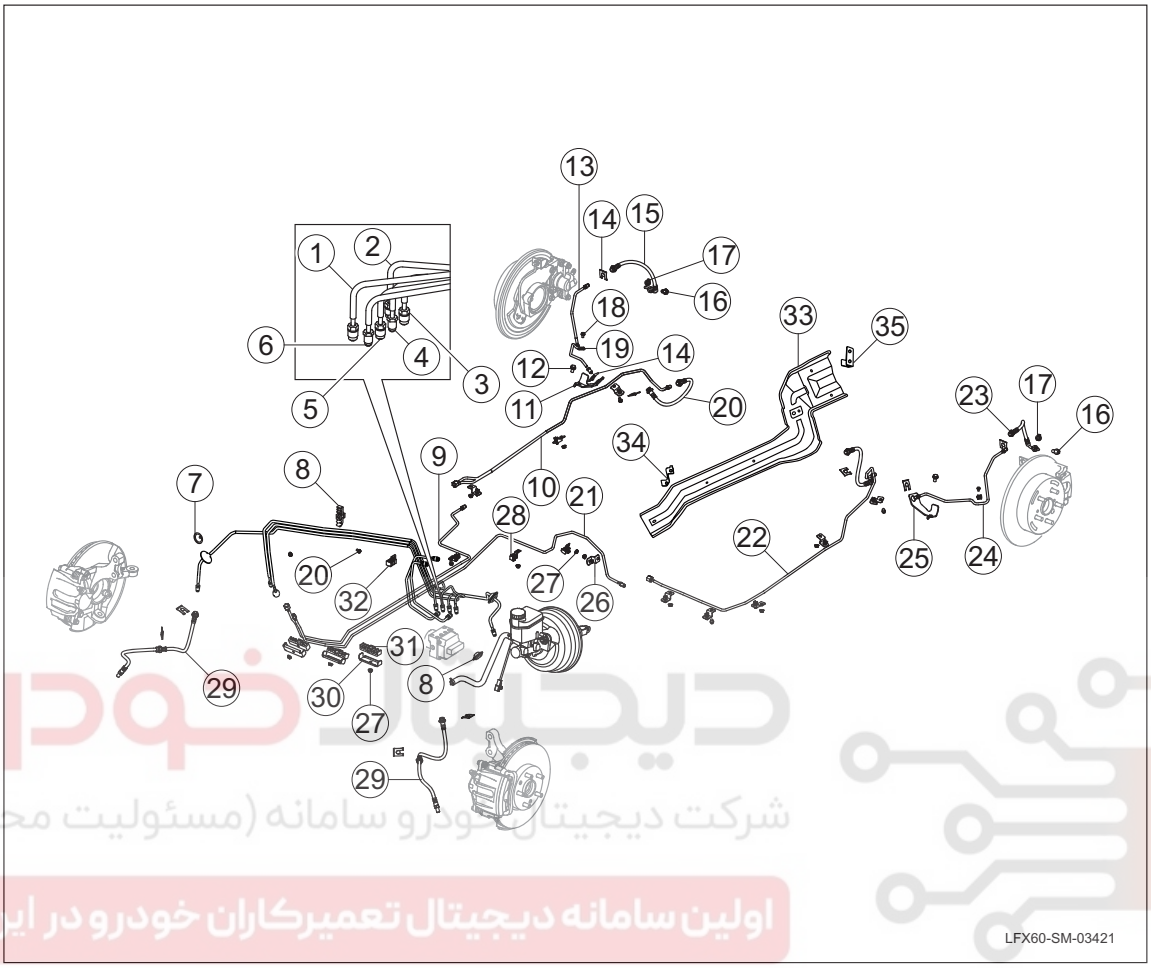
brake pedal



No.	Part name
1	Hexagon head bolt and taper elastic washer assembly
2	Brake pedal switch
3	Hex thin nut
4	Pin

No.	Part name
5	Return spring
6	Bolt
7	Hexagon flange bolt
8	brake pedal

Brake line



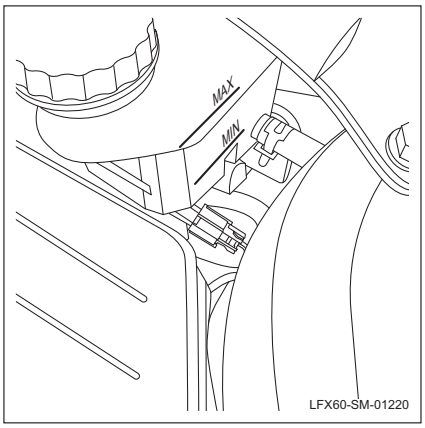
No.	Part name
1	Main flowline of brake master pump
2	Secondary flowline of brake master pump
3	Left front brake pipe I
4	Right rear brake pipe I
5	Left rear brake pipe I
6	Right front brake pipe I
7	Through hole rubber sleeve of front wheel brake tube
8	Five-hole pipe clamp
9	Right rear brake tube II
10	Right rear brake tube III
11	Brake pipe support
12	Hexagon head bolt and taper elastic washer assembly
13	Right rear brake tube IV
14	U type card
15	Right rear brake tube II
16	Hollow bolt
17	Copper gasket
18	Hexagon head bolt and taper elastic washer assembly

No.	Part name
19	Assembly III of brake tube fixing clip
20	Left rear brake hose assembly
21	Left rear brake tube II
22	Left rear brake tube III
23	Left rear brake tube assembly
24	Left rear brake tube IV
25	Brake tube fixing clip
26	Pipe clamp
27	Hex flange nut
28	Double pipe clamp
29	front brake tube
30	Stand for Assembly VIII of brake tube fixing clip
31	Pipe Clamp for assembly VIII of brake tube fixing clip
32	Six-hole pipe clamp
33	Fuel brake hose guard
34	Guard bracket II
35	Guard bracket I

General Inspection

General Inspection

Check the level of fluid reservoir



Check the brake fluid level which should be beween the MIN (mininum) and MAX (maximum) levels.

Note:

If the brake fluid level is low, check if there is any leakage and if the disc brake friction plate is worn excessively. If necessary, fill in new brake fluid to the fluid reservoir after repairing and replacing relevant parts.

Check the brake pad

1. Check the brake pad regularly and measure it. If exceeding the specification, replace the brake pad.
2. If it is necessary, must replace the disc brake pad according to the axle set.
3. Check if the friction surface of disc brake pad cracks, breaks or gets damaged.

Brake caliper inspection

1. Inspect the brake caliper shell for cracks, serious wear or damage; if any of above cases occurs, replace the brake caliper.
2. Check if the gasket ring of piston dirt-proof boot of brake caliper cracks, breaks,gets aged and is not properly installed in the brake caliper. Replace the brake caliper if there is any problem mentioned above.
3. Check if there is any brake fluid leakage around the gasket ring of piston dirt-proof boot of brake caliper and on the disc brake pad. If yes, replace the brake caliper.
4. Check if the brake caliper piston can get into the brake caliper cylinder smoothly and the stroke is complete. The movement of brake caliper piston in the brake caliper cylinder shall be smooth and even. If the brake caliper piston gets detained or is hard to reach the bottom, replace the brake caliper.

Inspection of Guide Vane of Brake Pad

1. Check if the guide vane of brake pad is missed, seriously corroded or bent.
2. If there is any problem mentioned above, replace the guide vane of disc brake pad to ensure the brake pad to slide smoothly along the guide vane of disc brake pad without being detained.

Inspection of Floating Pin of Brake Caliper

Check the floating pin of brake caliper to see if there are the following problems:

- Detained
- Stuck
- Jacket cracked or broken
- Jacket missed

If there is any problem mentioned above, replace the brake caliper and gasket ring of dirt-proof boot.

Inspection of Brake Disc Surface and Wearing

Clean the friction surface of brake disc with industrial alcohol or permissible equivalent brake detergent.

Check if there is any problem belwo on the friction surface of brake disc:

- Serious rusting and/or corrosive pitting
- Slight surface rusting
- Cracking and/or burt spot
- Serious color changing to blueing
- Depth scratch on friction surface of brake disc

If there is any or several problems mentioned above on the friction surface of brake disc, the surface of brake disc needs to be trimed or replaced.

Note:

Replace the brake packing block as well after the brake disc surface finishing or replacement.

Measurement of Brake Disc Thickness

1. Clean the brake disc friction surface with the industrial alcohol or the similar brake rinsing agent.

2. Measure and record the minimum thickness for 4 or more than 4 points evenly distributed along the brake disc circle with a micrometer. Make sure to measure only in the contacting area of brake pad surface and keep the same distance between the micrometer and outside edge of brake disc for each measurement.
3. If the brake dis thickness exceeds the specification, he surface of brake disc needs to be trimed or replaced.

ℹNote:

Replace the brake packing block as well after the brake disc surface finishing or replacement.

Measurement of End Runout after Brake Disk Assembled

ℹNote:

When the brake disc is dismouned from the hub/axle flange, remove the rust or filth on the hub/axle flange and the fitting surface of brake disc. Otherwise, it may result in excessive end runout after the brake disc assembled. Then the brake moves up and down

1. Dismount the brake disc.
2. Clean the brake disc friction surface with the industrial alcohol or the similar brake rinsing agent.
3. Install the brake disc on the hub/axle flange.
4. Install and tighten the grip nut.
5. Install the base of dial indicator on the knuckle and set up the measuring point of dial indicator to let it contact the friction surface of brake disc in 90° and keep it from the outside edge of brake disc about 13mm (metrics) or 0.5in (British system)
6. Rotate the brake disc until the reading on the dial indicator reaches minimum and turns the dial indicator to zero.
7. Rotate the brake disc until the reading on the dial indicator reaches maximum.
8. Mark and record the end runout.
9. Compare the end runout after the brake disc assembled with the specification.
10. If the end runout after the brake disc assembled exceeds the specification, check the bearing axial clearance and axle hub runout. If they are normal and the brake disc thickness is within the required range, trim the brake disc surface to ensure the proper flatness.

Inspection of Brake Booster Airightness

1. Switch off the engine, then tread the braking pedal once per 5s to let the vacuum pressure become the ambient pressure. Tread the braking pedal to the end to start the engine. When the vacuum pressure gets to the standard, confirm the clearance between the braking pedal and floor getting shortened.
2. Run the engine at idling for about 1 min. Stop the engine when vacuum occurs in the booster. Tread the braking pedal as usual to let the vacuum pressure become the ambient pressure. Confirm the distance between the braking pedal and floor getting increased slowly.
3. Tread the braking pedal when the engine is running and hold it to stop the engine. The pedal stroke should not have any chagne after treading the pedal for 30s.

Operating Principle

System overview

Front Disc Brake

The caliper of front disc brake is a single piston which is installed on the knuckle with two bolts. When treading the braking pedal, the caliper moves towards outside under the function of hydraulic pressure. The braking pressure forces the brake-block on the brake disc. The friction reduces the rotation of wheel to brake the vehicle. In the case of brake plate abrasion, the piston will further move to fill up the gap. When the brake pedal pressure and piston hydraulic pressure are released, the piston rubber sealing parts will restore the original shape to maintain the gap between the brake disc and brake plate as the original.

Front Disc Brake-block

Apply the mechanical output force from the hydraulic brake tongs to the brake disc friction surface.

Front brake disc

Use the mechanical output force produced on the disc surface by the disc brake-block to reduce the rotation of tire and wheel assembly to brake the vehicle.

Front Caliper

Receive the liquid pressure of the brake master cylinder and convert the liquid pressure into the mechanical output force to apply to the inside brake plate; when the master cylinder returns, the brake tongs piston will automatically return.

Front Caliper Stand

Fix the friction block of brake disc and caliper in the place to maintain a proper fitting position with the hydraulic caliper. When the mechanical output force acts on the brake-block, it makes the brake-block slide.

Front Disc Caliper Shaft Pin

Used to install the hydraulic caliper and fix the caliper in the place to keep a proper fitting position with the caliper stand. When the mechanical output forces acts, it makes the caliper slide in relation to the brake-block.

Rear Disc Brake

The caliper of rear disc brake is a single piston which is installed on the rear axle with two bolts. When treading the braking pedal, the caliper moves towards outside under the function of hydraulic pressure. The braking pressure forces the brake-block on the brake disc. The friction reduces the rotation of tire and wheel assembly to brake the vehicle. In the case of brake plate abrasion, the piston will further move to fill up the gap. When the brake pedal pressure and piston hydraulic pressure are released, the piston rubber sealing parts will restore the original shape to maintain the gap between the brake disc and brake plate as the original.

The mechanical output force from the hydraulic caliper piston acts on the internal brake-block. When the piston pushes the internal brake-block towards outside, the caliper housing pulls the external brake-block towards inside so as to evenly distribute the output force. The brake-block acts the output forces to the friction surfaces of disc to reduce the rotation of tire and wheel assembly. It is very important for evenly distributing the braking force that the brake-block guide vane and floating pin of caliper functions well.

Rear Disc Brake-block

Apply the mechanical output force from the hydraulic brake tongs to the brake disc friction surface.

Rear brake disc

Use the mechanical output force produced on the disc friction surface by the disc brake-block to reduce the rotation of tire and wheel assembly to brake the vehicle.

Rear Caliper

Receive the liquid pressure of the brake master cylinder and convert the liquid pressure into the mechanical output force to apply to the inside brake plate; when the master cylinder returns, the brake tongs piston will automatically return.

Rear Caliper and Caliper Stand

Used to fix the disc brake-block and caliper in the place to keep a proper fitting positon with the hydraulic caliper. When the mechanicl output force acts on the brake-block, it makes the brake-block slide.

Diagnostic Information and Procedures

Diagnosis Instructions

Before diagnosis, first understand and get familiar with the working principle of braking system. This is helpful to determine the correct procedures of diagnosis when the trouble occurs. More important, it is also helpful to determine if the status described by the client is normal operation.

Any diagnosis for the braking system shall start from the inspection for the braking system, then guide the maintenance personnel to take next logic procedure to perform diagnosis. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

Visual Inspection

ℹNote:

Before the diagnosis, ensure the brake system warning indicator lamp is normal.

1. Confirm the problem raised by the customer.
2. Check the evident mechanical faults and hydraulic faults.

Visual inspection table

Mechanical
• Tire pressure • Wheel and tire • Braking fluid level • Braking pipeline

3. Solve the problem finding before the next step inspection.
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 no problem is found through the visual check, confirm the fault and refer to the fault symptom list.

Cautions for Diagnosis

- Replacement for any part should be taken seriously as it may affect the function of braking system and cause dangers in driving. Standard parts made by Lifan shall be used.
- When performing the maintenance for the braking system, it is very critical to keep the parts and site clean.
- If there is any leakage of braking fluid, the assembly must be dismounted. If there is any abnormal problem, a new assembly must be used.
- When dismounting the braking assembly, seal the connecting position on the braking pipeline to avoid impurities such as dust, mud, etc. from getting into the pipeline.
- When dismounting or installing the braking pipeline, do not damage the braking pipeline or deform it.
- When installing the braking pipeline or braking hose, make sure not to twist or bent it.
- The braking hose must be kept far away from the absorber oil, grease, etc.
- After the braketube and brake hose are installed, make sure they do not interfere with other assembly.
- Do not allow the brake fluid to stick on the paint of vehicle body. If failing to do so, clean it immediately.

List of fault symptoms

Symptom	Possible Cause	Recommended Measures
Braking not even-off tracking	• Tire pattern and pressure not identical	• Replace the tire and adjust the tire pressure.
	• Brake tube and hose (twisted and/or deformed)	• Replace the brake tube and /or hose.
	• Brake-block (cracked, twisted or oil stained)	• Clean or replace the brake-block **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
	• Front brake disc abnormal worn and/or deformed	• Replace the front brake disc **Refer to: Replacement of front brake disc**
	• Rear brake disc abnormal worn and/or deformed.	• Replace the rear brake disc **Refer to: replacement of rear brake disc**
	• Caliper/wheel cylinder detained	• Repair or replace the brake wheel cylinder or caliper **Refer to: replacement of front brake caliper** **Refer to: replacement of rear brake caliper**
	• ABS control failure	• Repair the ABS control **Refer to: ABS warning lamp always on diagnosis flow**
	• Incorrect wheel alignment	• Perform wheel positioning inspection
Shaking when braking-vibrating	• Brake-block worn, broken or oil stained	• Replace the brake plate **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
	• Front brake disc abnormal worn, twisted, deformed,out-of-round	• Replace the front brake disc **Refer to: replacement of front brake disc**
	• Rear brake disc abnormal worn, twisted, deformed, out-of-round	• Replace the rear brake disc **Refer to: Replacement of rear brake disc**
	• Caliper bolt loose	• Tighten the caliper bolt
	• Caliper sliding resistance too big	• Replace the caliper if necessary **Refer to: replacement of front brake caliper** **Refer to: replacement of rear brake caliper**
	• Hub bolt loose or missing	• Tighten or replace the hub bolt
Braking pedal sunk rapidly	• Hydraulic system leaking	• Repair the leak, fill the brake fluid and bleed **Refer to: brake system bleed procedures**
	• There is air in the system.	• Fill the brake fluid and bleed **Refer to: brake system bleed procedures**
	• Gasket ring of master piston of brake master cylinder worn or cylinder body cracking	• Replace the brake master cylinder **Refer to: replacement of brake master cylinder**

Symptom	Possible Cause	Recommended Measures
Braking pedal position low or feeling soft	• Brake plate excessive wear	• Replace the brake plate **Refer to: replacement of front brake packing block** **Refer to: Replacement of rear brake packing block**
	• Vent on the oil tank cover blocked or getting dirty	• Clean the vent
	• There is air in the system.	• Fill the brake fluid and bleed **Refer to: brake system bleed procedures**
Braking locked when treading the brake slightly	• Brake-block not installed properly	• Reinstall the brake-block **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
	• ABS control failure	• Repair the ABS control **Refer to: ABS warning lamp always on diagnosis flow**
When treading the pedal and holding it, the pedal sinks slowly	• Leakage or air in the system	• Repair the leak, fill the brake fluid and bleed **Refer to: brake system bleed procedures**
	• Brake master cylinder in trouble	• Check the brake master cylinder. Replace it if it is in trouble **Refer to: replacement of brake master cylinder**
Brake pedal stroke oversize	• Brake plate excessive wear	• Replace with a new brake-block **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
	• Brake disc excessively worn	• Replace with a a new brake disc **Refer to: replacement of brake disc**
	• Braking clearance self-adjusting function abnormal	• Check the caliper return function. If necessary, replace the caliper assembly
Braking dragging	• Parking brake acting (hand brake not released fully)	• Release the hand brake
	• Caliper stuck	• Repair or replace the caliper **Refer to: replacement of front brake caliper** **Refer to: Replacement of rear brake caliper**
	• Brake-block detained	• Repair or replace the brake-block **Refer to: replacement of front brake packing block** **Refer to: Replacement of rear brake packing block**
	• Vacuum booster detained	• Adjust the push rod length of vacuum booster or replace the vacuum booster. **Refer to: replacement of vacuum booster**
	• Braking pedal free stroke (not sufficient)	
Braking boosting effect poor	• Engine induction system leaking	• Check the vacuum of induction system. Replace it if necessary.
	• Vacuum boosting hose leaking	**Refer to: inspection of vacuum booster**
	• Vacuum boosting hose check-valve failing	

Symptom	Possible Cause	Recommended Measures
Braking system noisy	• Brake-block (excessively worn, cracked, twisted, getting dirty, smooth)	• Replace the brake plate **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
	• Spring strip (loose or abnormal deformed)	• Replace the spring strip **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
	• Tap bolt of caliper stand (loose)	• Tighten or replace the fixing bolt
	• Tap bolt of caliper (loose)	• Tighten or replace the fixing bolt
	• Caliper shaft pin (worn seriously)	• Replace the caliper **Refer to: replacement of front brake caliper** **Refer to: replacement of rear brake caliper**
	• Front brake disc abnormal worn, out-of-round, cracked and/or twisted.	• Replace the front brake disc **Refer to: replacement of front brake disc**
	• Rear brake disc abnormal worn, out-of-round, cracked and/or twisted.	• Replace the rear brake disc **Refer to: replacement of rear brake disc**
	• Braking pedal return spring fatigue	• Replace the return spring. **Refer to: replacement of brake pedal**
	• Braking pedal push rod bent or deformed	• Replace the push rod. **Refer to: replacement of brake pedal**
	• Vacuum booster	• Check the vacuum booster.Replace it if necessary. **Refer to: inspection of vacuum booster**
	• Brake master cylinder	• Check the brake master cylinder. Replace it if necessary. **Refer to: replacement of brake master cylinder**

Diagnosis Procedures for Braking not even---off-tracking

Test condition	Details/results/measures
1. Road test vehicle	
	A. Perform a road test for the vehicle. B. Check if braking is off-tracking. Is there braking off-tracking? →**Yes** To step 2. →**No** The vehicle is normal.
2. Check the tread pattern and tire pressure.	
	A. Check if the tire pattern identical B. Check if the tire pressure is normal. Is it OK after checking? →**Yes** To step 3. →**No** Replace the tire or regulate the tire pressure.
3. Check the brake plate.	
	A. Check if the brake-block is worn abnormally. Is there abnormal wear or oil leak? →**Yes** Clean or replace the brake-block. **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block** →**No** To step 4.
4. Check the front brake disc.	
	A. Check the front brake disc for abnormal wear or torsional deformation. Is it OK after checking? →**No** Replace the front brake disc. **Refer to: replacement of front brake disc** →**Yes** To step 5.

Test condition	Details/results/measures
5. Check the rear brake disc.	
	A. Check the rear brake disc for abnormal wear or deformation. Is it OK after checking? →**No** Replace the rear brake disc. →**Yes** To step 6.
6. Check the brake tongs.	
	A. Check the brake tongs for seizing. Is it OK after checking? →**No** Repair or replace the brake tongs. **Refer to: replacement of front brake caliper** **Refer to: replacement of rear brake caliper** →**Yes** To step 7.
7. Check the braking pipeline.	
	A. Check if the brake tube and hose are twisted or deformed. Is it OK after checking? →**Yes** To step 8. →**No** Replace the brake tube and/or hose.
8. Check the ABS control	
	A. Check if the ABS control fails Is it OK after checking? →**Yes** To step 9. →**No** Check the ABS control **Refer to: ABS warning lamp always on diagnosis flow**
9. Check the wheel alignment.	
	A. Check whether the wheel alignment is normal. Is it OK after checking? →**No** Adjust the wheel positioning. **Refer to: Toe-in adjustment procedure** →**Yes** Confirm the repair is finished.

Diagnostic Procedures for Braking Shaking-Vibrating.

Test condition	Details/results/measures
1. Subject the vehicle to the road test.	
	A. Brake at 40~80km/h on a flat rod. B. Check if there is braking shaking-vibrating. Is there braking shaking-vibrating? →**Yes** To step 2. →**No** The vehicle is normal.
2. Check the brake plate.	
	A. Check if the brake-block is worn abnormally, broken or stained with oil. Is it OK after checking? →**Yes** To step 3. →**No** Replace the brake plate. **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
3. Check the front brake disc.	
	A. Check the front brake disc for abnormal wear or torsional deformation. Is it OK after checking? →**No** Replace the front brake disc. **Refer to: replacement of front brake disc** →**Yes** To step 4.
4. Check the rear brake disc.	
	A. Check the rear brake disc for abnormal wear or deformation. Is it OK after checking? →**No** Replace the rear brake disc. →**Yes** To step 5.

Test condition	Details/results/measures
5. Check the brake tongs.	
	A. Check if the caliper bolt is loose. B. Check if the sliding part is lack of lubrication. C. Check if the hub bolt is loose or missed. Is it OK after checking? →**No** Tighten the caliper bolt, lubricate the sliding part, tighten or replace the hub bolt. →**Yes** Confirm the repair is finished.

Diagnostic Procedures of Braking Pedal Sunk Rapidly

Test condition	Details/results/measures
1. Subject the vehicle to the road test.	
	A. Carry out the road test and depress the brake pedal. B. Check if the pedal braking force is normal Is the pedal braking force normal →**Yes** The vehicle is normal. →**No** To step 2.
2. Check the brake fluid level.	
	A. Check the level of brake fluid in the fluid tank. Is it OK after checking? →**Yes** To step 3. →**No** Check if the brake fluid tank or braking pipeline leaks.
3. Increase Pressure for Braking system	
	A. Rapidly tread the braking pedal for 5 times. Does the braking pedal height rises and maintains? →**Yes** Check the parking braking and adjust it if necessary. If the problem still exists, exhaust the braking system. **Refer to: brake system bleed procedures** →**No** To step 4.
4. Check the brake system for leak.	
	A. Test the braking pipeline status. Is the leak detected? →**Yes** Repair the leak part and replace the corresponding component if necessary. Add the brake fluid and exhaust →**No** To step 5.

Test condition	Details/results/measures
5. Perform the inspection for the bypass status of brake master cylinder	
	A. Test the bypass status. Is it OK after checking? →**No** Replace the brake master cylinder. **Refer to: replacement of brake master cylinder** →**Yes** Confirm the repair is finished.

Diagnostic Procedures for Braking Pedal Position Low or Feeling Soft

Test condition	Details/results/measures
1. Subject the vehicle to the road test.	
	A. Carry out the road test and depress the brake pedal. B. Check if the feeling for the braking pedal is soft. Is it OK after checking? →**Yes** The vehicle is normal. →**No** To step 2.
2. Check the brake fluid level.	
	A. Check the brake fluid level. Is it OK after checking? →**Yes** To step 3. →**No** Check if the braking system parts leak. Replace the broken parts, add brake fluid and exhaust.
3. Check the vent on the fluid tank cover.	
	A. Check if the vent on the fluid tank cover is blocked or gets dirty. Is the vent on the fluid tank cover blocked or dirty? →**Yes** Clean the fluid tank cover. →**No** To step 4.
4. Braking system exhausting	
	A. Braking system exhausting. **Refer to: brake system bleed procedures** →**No** Confirm the maintenance done.

Diagnostic Procedures for Braking locking when braking lightly

Test condition	Details/results/measures
1. Subject the vehicle to the road test.	
	A. Carry out the road test and depress the brake pedal. B. Check if the braking is locked. Is it OK after checking? →**Yes** The vehicle is normal. →**No** To step 2.
2. Check the tread pattern and tire pressure.	
	A. Check if the tire is excessively worn or the tire pressure is abnormal. Is it OK after checking? →**Yes** To step 3. →**No** Replace the tire or regulate the tire pressure.
3. Check the brake plate.	
	A. Check if the brake-block is installed properly,contaiminated by oil or excessively worn. Is there abnormal wear or oil leak? →**Yes** Clean or replace the brake-block. **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block** →**No** To step 4.
4. Check the ABS control system	
	A. Check if the ABS control fails. Is it OK after checking? →**No** Check the ABS control **Refer to: ABS warning lamp always on diagnosis flow** →**Yes** To step 5.

Test condition	Details/results/measures
5. Check the vacuum booster.	
	A. Check if the vacuum booster is normal. Is it OK after checking? →**No** Replace the vacuum booster. **Refer to: replacement of vacuum booster** →**Yes** To step 6.
6. Check the brake tongs.	
	A. Check the brake tongs for seizing. Is it OK after checking? →**No** Repair or replace the brake tongs. **Refer to: replacement of front brake caliper** **Refer to: replacement of rear brake caliper** →**Yes** Confirm the repair is finished.

Diagnostic Procedures for Pedal Sinking Slowly When Treading and Holding Pedal

Test condition	Details/results/measures
1. Check if the trouble phenomenon exists.	
	A. Check if the pedal sinks slowly when treading the braking pedal and holding it. Is it OK after checking? →**Yes** The vehicle is normal. →**No** To step 2.
2. Check the brake fluid level.	
	A. Check the brake fluid level. Is it OK after checking? →**Yes** To step 5. →**No** To step 3.
3. Check the brake system for leak.	
	A. Check if the brake and clutch system leak externally? Is the leak detected? →**Yes** Repair the leak part and replace the corresponding component if necessary. Add brake fluid and exhaust. →**No** To step 4.
4. Check if there is air in the braking system	
	A. Check if there is air in the braking system. Is there air in the braking system? →**Yes** Exhaust of the braking system **Refer to: brake system bleed procedures** →**No** To step 5.
5. Check the brake master cylinder.	
	A. Check if the brake master cylinder is normal Is it OK after checking? →**No** Replace the brake master cylinder. **Refer to: replacement of brake master cylinder** →**Yes** Confirm the repair is finished.

Diagnostic Procedures for Braking Dragging

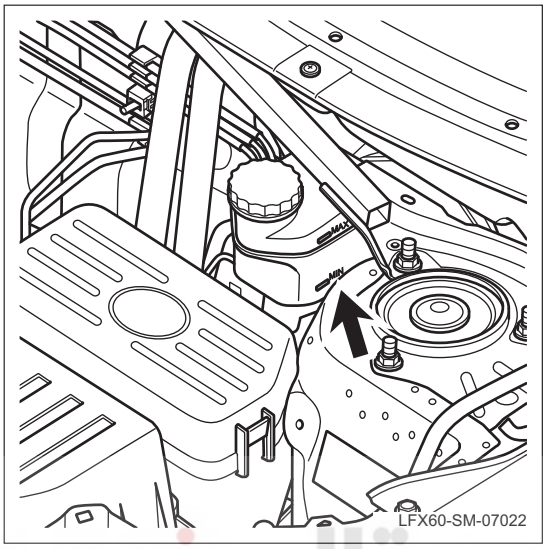
Test condition	Details/results/measures
1. Check the parking braking.	
	A. Release the parking braking handle and check if the parking braking is completely released. Is it OK after checking? →**Yes** To step 2. →**No** Check the parking braking system.
2. Check the brake tongs.	
	A. Check the brake tongs for seizing. Is it OK after checking? →**No** Repair or replace the brake tongs. **Refer to: replacement of front brake caliper** **Refer to: replacement of rear brake caliper** →**Yes** To step 3.
3. Check the brake plate.	
	A. Check if the brake-block detains. Is it OK after checking? →**Yes** To step 4. →**No** Replace the brake plate. **Refer to: replacement of front brake packing block** **Refer to: replacement of rear brake packing block**
4. Check the vacuum booster.	
	A. Check if the brake booster detains. Is it OK after checking? →**No** Replace the brake booster. **Refer to: replacement of vacuum booster** →**Yes** To step 5.

Test condition	Details/results/measures
5. Check the free stroke of braking pedal.	
	A. Check if the free stroke of braking pedal is normal. Is it OK after checking? →**No** Adjust the push rod length of vacuum booster. →**Yes** Confirm the repair is finished.

Removal and installation

Procedure for Braking System Exhaust

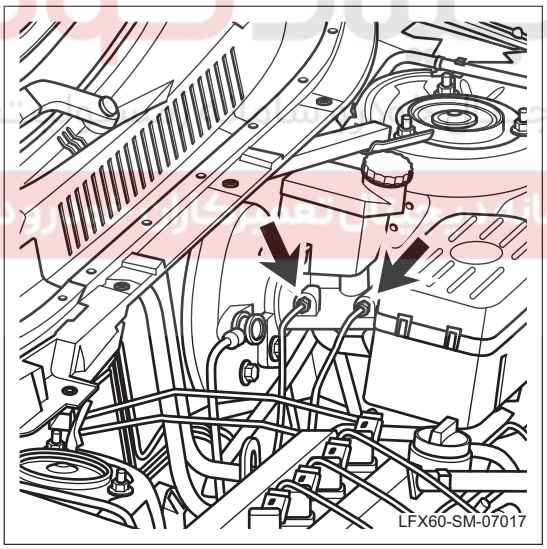
1. Exhaust



(a). Fill in brake fluid to the fluid tank.

Note:

- **If the braking system is repaired or suspecting there is air in the braking pipeline, need to exhaust the braking system.**
- **Before exhausting the brake, shift the gear change lever to the neutral position and pull up the parking brake.**
- **When exhausting the brake, fill in the brake fluid and keep the level between the MIN (minimum) and MAX (maximum) scales of fluid tank. If the brake fluid leaks to the paint surface, clean it immediately.**



(b). Exhausting the brake master cylinder.

Note:

- **If the brake master cylinder is re-installed or the fluid tank gets empty, exhaust the air in the master cylinder.**
- **To avoid the brake fluid from sticking, cover the paint surface with a piece of rag.**
- **The brake fluid is corrosive. Avoid it in direct contact with skin, eye, etc.**

(c). Disconnect the braking pipeline from the brake master cylinder.

(d). Tread the braking pedal slowly and hold it.

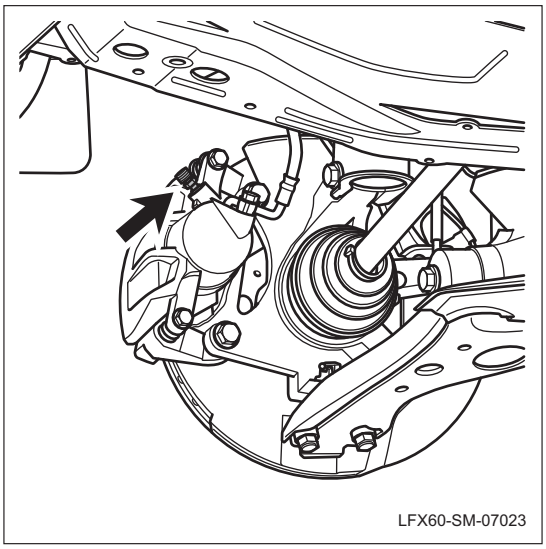
(e). Block the outlet with fingers and release the braking pedal.

Note:

When performing the procedure, wear the approved goggles and gloves to reduce the risk to personal injury.

(f). Repeat the above steps 3-4 times.

(g). Install the braking pipeline of brake master cylinder and tighten the nut.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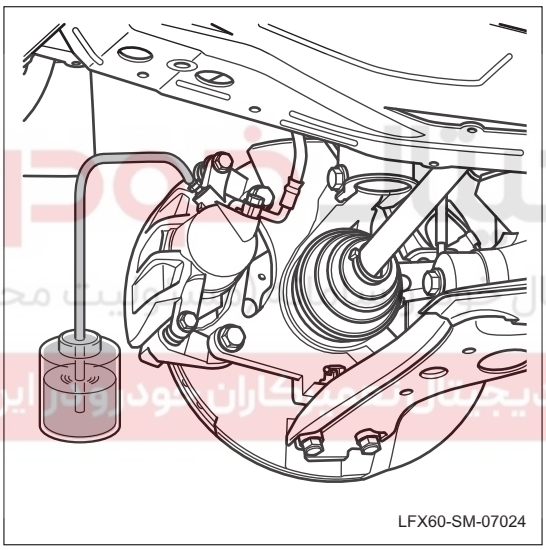
(h). Detach the dust cap of bleedscrew of brake cylinder.

Note:

Exhaust the air in the braking pipeline from the wheel farthest from the brake master cylinder.

(i). Connect the ethylene tube to the relief plug

(j). Tread the braking pedal several times and release the relief plug under the status of braking pedal treaded.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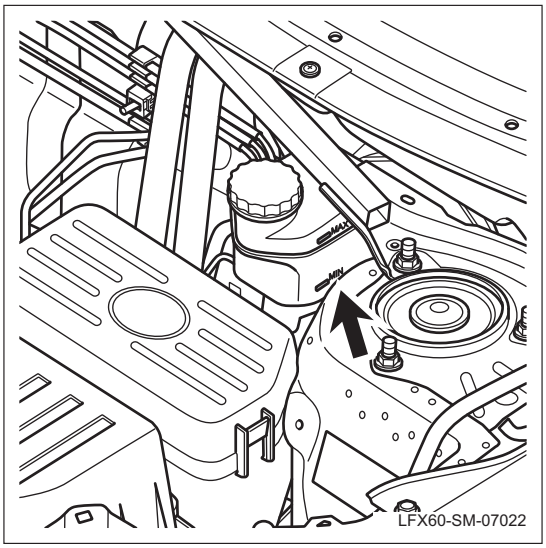
(k). No bubbles when the brake fluid flows out. Tighten the relief plug and release the braking pedal.

(l). Repeat the above steps (j) and (k) until exhaust all the air in the brake fluid.

(m). Completely tighten the relief plug.

(n). Repeat the above steps for each wheel to exhaust the air in each braking pipeline.



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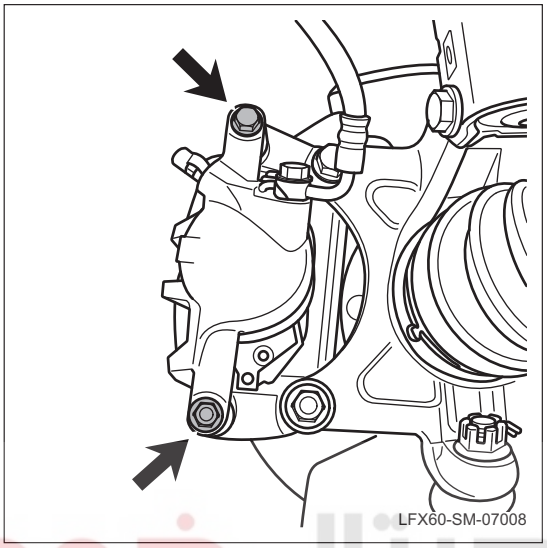
(o). Check the brake fluid level to ensure it is between the MIN (minimum) and MAX (maximum) scales.

Replacement of Front Brake Pad

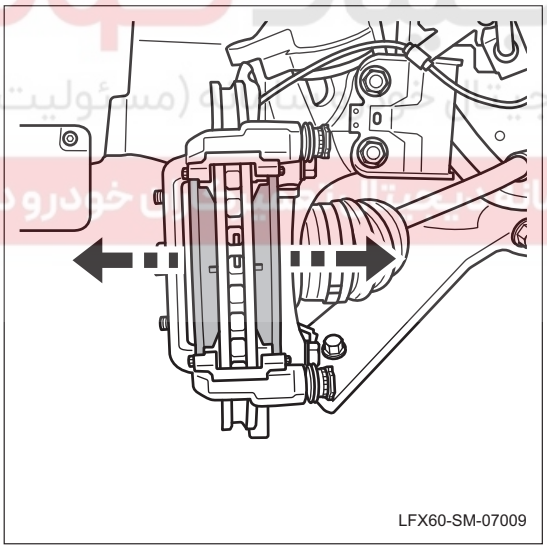
Removal

1. Dismount the front brake pad.

(a). Remove the wheel. **Refer to the replacement of wheel.**



(b). Dismount the tap bolt of front caliper.
(c). Detach the front caliper.
(d). Suspend the front caliper on the suitable position of carframe.



(e). Detach the brakeblock.

Installation

1. The installation sequence is reverse to the removal sequence.

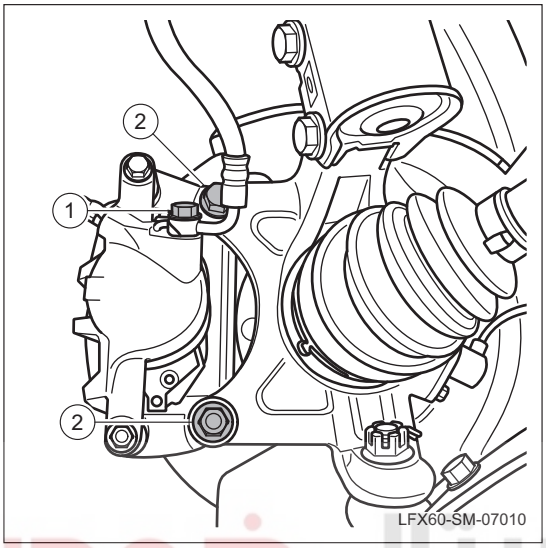
(a). Reset the caliper piston with a proper tool.
(b). After installation, tread the braking pedal more than two times with force.
(c). Check the brake fluid level and fill in the fluid if necessary.

Replacement of Front Caliper

Removal

1. Dismount the front caliper.

(a). Remove the wheel. **Refer to the replacement of wheel.**



(b). Dismount the connecting bolt 1 beween the brake tube and brake cylinder.

(c). Dismount the tap bolt 2 of front caliper.

(d). Detach the front caliper.

Note:

- **Seal the brake hose to prevent the oil lose and the ingress of dirt.**
- **If the brake fluid splashes onto the paint face, immediately rinse it with the cool water.**

Installation

1. Install the front caliper.

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

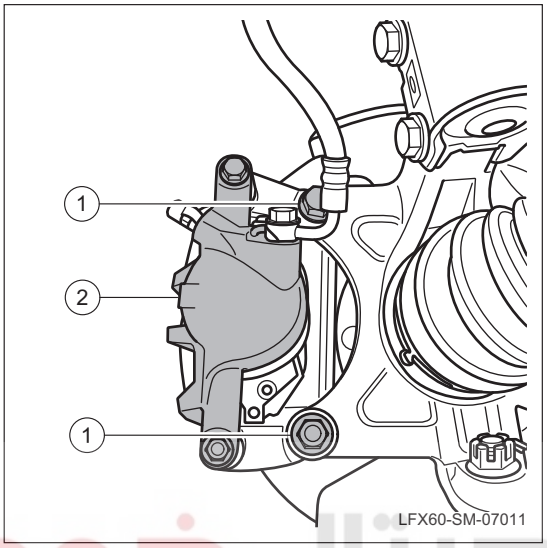
(b). Bleed the brake system. **Refer to the brake system bleed procedures.**

Replacement of Front Brake Disc

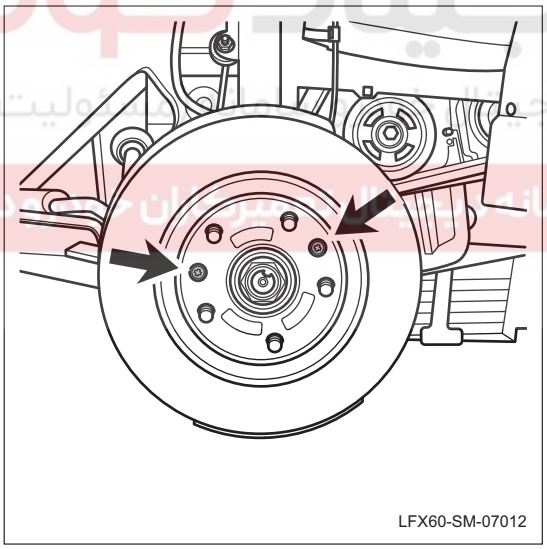
Removal

1. Dismount the front brake disc.

(a). Remove the wheel. **Refer to the replacement of wheel.**



(b). Dismount the tap bolt 1 of front caliper.
(c). Move away the front caliper 2



(d). Dismount the tap bolt of front brake disc.
(e). Detach the front brake disc.

Installation

1. Install the front brake disc.

(a). The installation sequence is the reverse of the disassembly order.
(b). Bleed the brake system. **Refer to the brake system bleed procedures.**

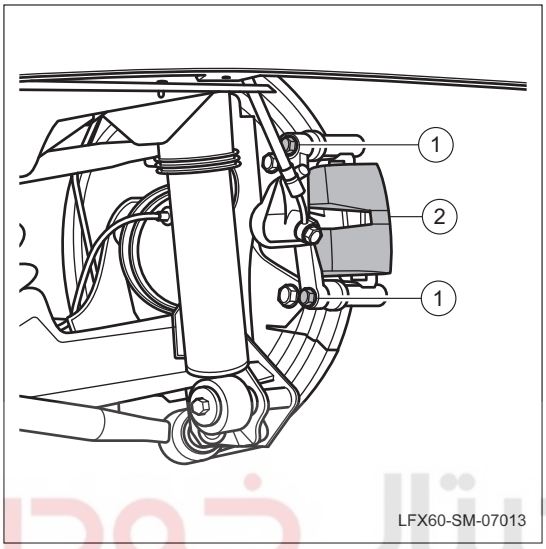
Replacement of rear brake packing block

Removal

1. Remove the rear brake packing block

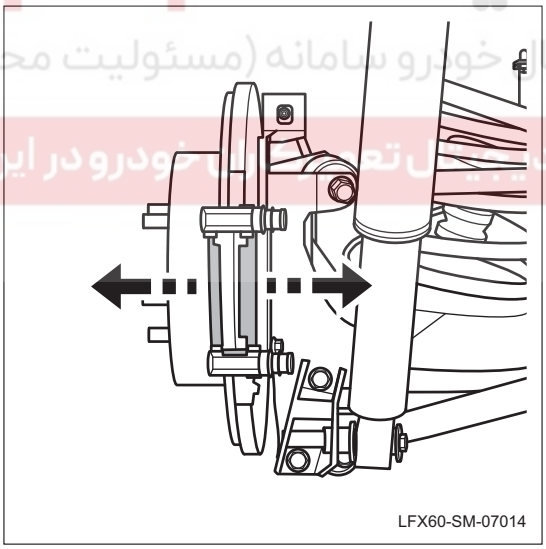
(a). Disconnect the battery negative cable.

(b). Remove the wheel. **Refer to the replacement of wheel.**



(c). Dismount the tap bolt 1 of rear caliper.

(d). Move away the rear caliper 2.



(e). Dismount the brake pad.

Installation

1. Install the rear brake pad.

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

(b). Reset the caliper piston with a proper tool

(c). Exhaust the braking system,**refer to procedure of Braking System Exhaust.**

Replacement of rear brake caliper

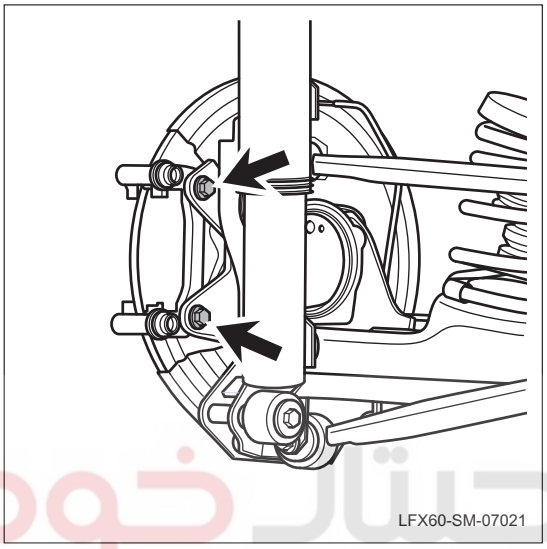
Removal

1. Remove the rear brake caliper.

(a). Disconnect the battery negative connector.

(b). Remove the wheel. **Refer to the replacement of wheel.**

(c). Dismount the rear brake pad,**refer to replacement of Rear Brake Pad.**



(d). Dismount the tap bolt of rear caliper and detach the caliper.

Installation

1. Install the rear caliper.

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

(b). Bleed the brake system. **Refer to the brake system bleed procedures.**

Replacement of rear brake disc

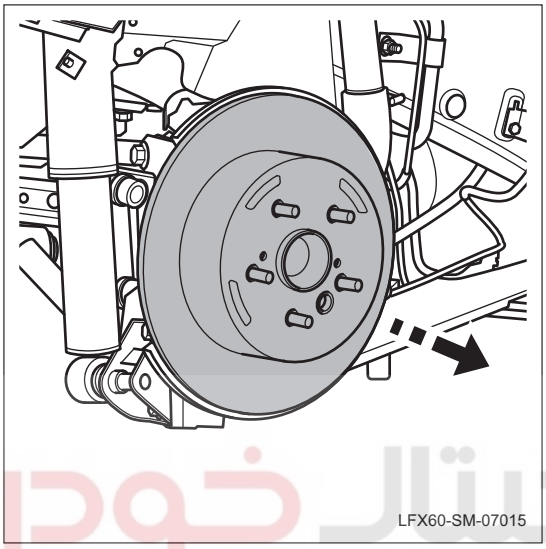
Removal

1. Dismount the rear brake disc.

(a). Remove the wheel. **Refer to the replacement of wheel.**

(b). Dismount the rear brake pad, **refer to replacement of Rear Brake Pad.**

(c). Dismount the rear caliper, **refer to replacement of Rear Caliper.**



(d). Detach the rear brake disc.

Installation

1. Install the rear brake disc.

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

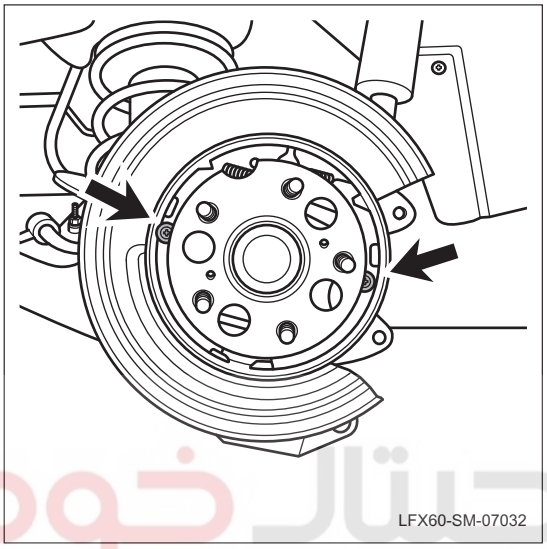
(b). Bleed the brake system. **Refer to the brake system bleed procedures.**

Replacement of Rear Brake Shoe

Removal

1. Dismount the rear brake shoe.

(a). Remove the wheel. **Refer to the replacement of wheel.**
(b). Dismount the rear caliper, **refer to replacement of Caliper.**
(c). Dismount the rear brake disc, **Refer to replacement of Rear Brake Disc.**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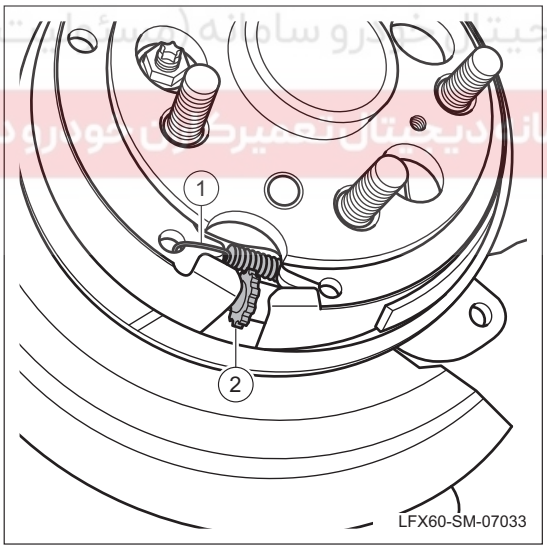
(d). Dismount the spring with a proper tool.
(e). Dismount the lower spring 1 of rear brake shoe.



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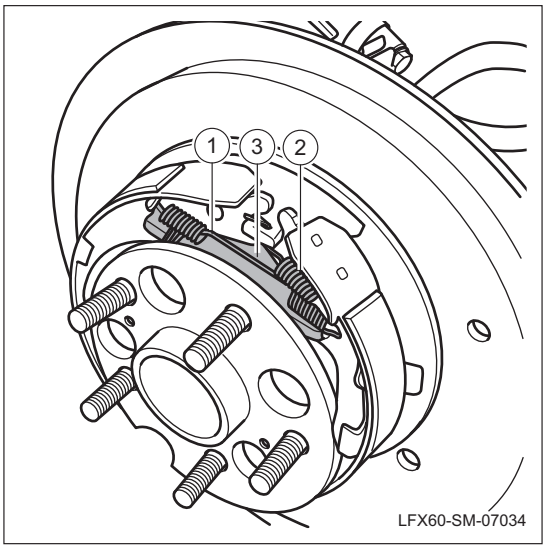
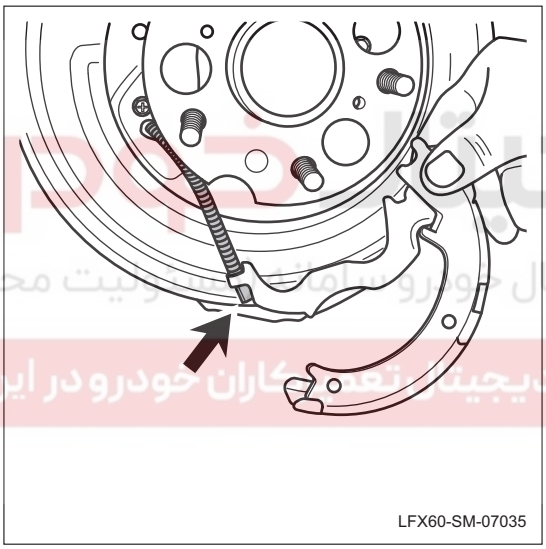
(f). Dismount the adjusting block 2 of rear brake shoe.



(g). Dismount the upper spring 1 of rear brake shoe.
(h). Dismount the upper spring 2 of rear brake shoe.
(i). Dismount the rear brake clearance adjuster 3.



(j). Dismount the rear brake cable.
(k). Detach the rear brake shoe plate.

Installation

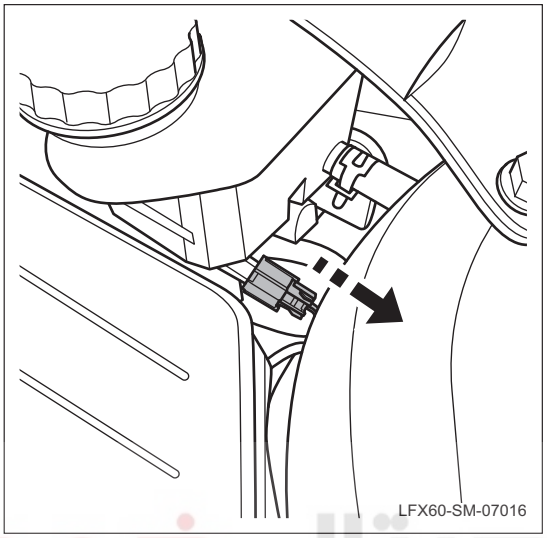
1. Install the rear brake shoe plate.
(a). The installation sequence is the reverse of the disassembly order.

Replacement of Brake Master Cylinder

Removal

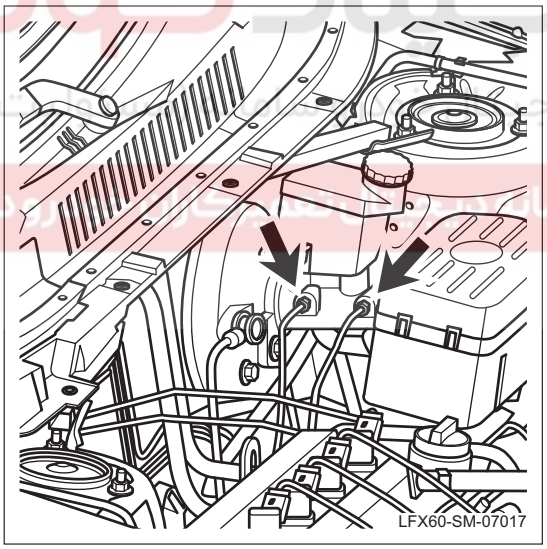
1. Dismount the brake master cylinder.

(a). Disconnect the battery negative connector.

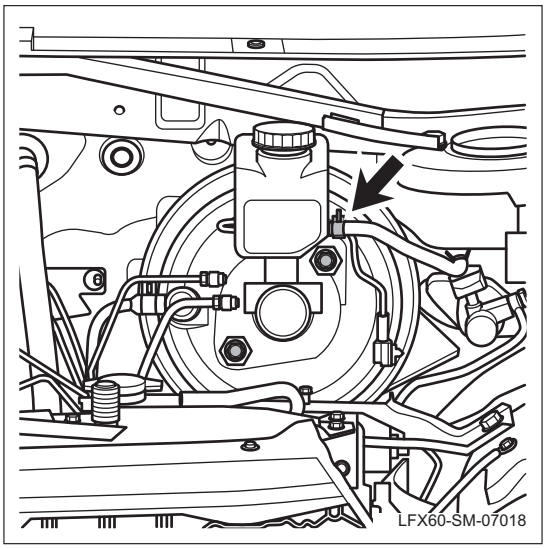


(b). Drain the brake fluid.

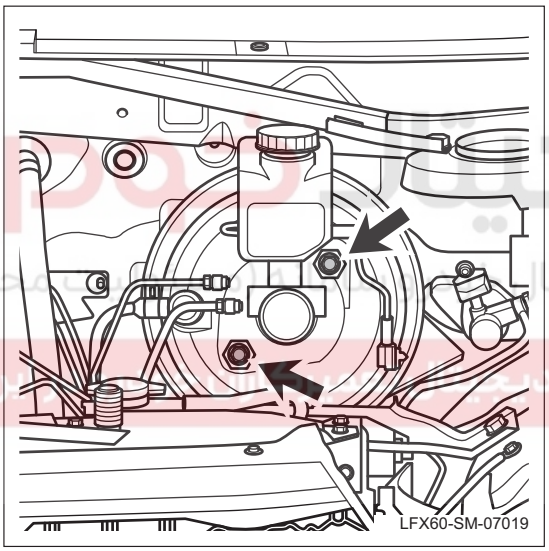
(c). Disconnect the harness connector of brake fluid level sensor.



(d). Dismount the brake tube nut of brake master cylinder and disconnect the brake tube.



(e). Dismount the bar clasp of oil inlet hose of clutch master cylinder and disconnect the hose.



(f). Dismount the tap bolt of brake master cylinder.
(g). Detach the brake master cylinder.

Installation

1. Install the brake master cylinder.
(a). The installation sequence is the reverse of the disassembly order.
(b). Bleed the brake system. **Refer to the brake system bleed procedures.**

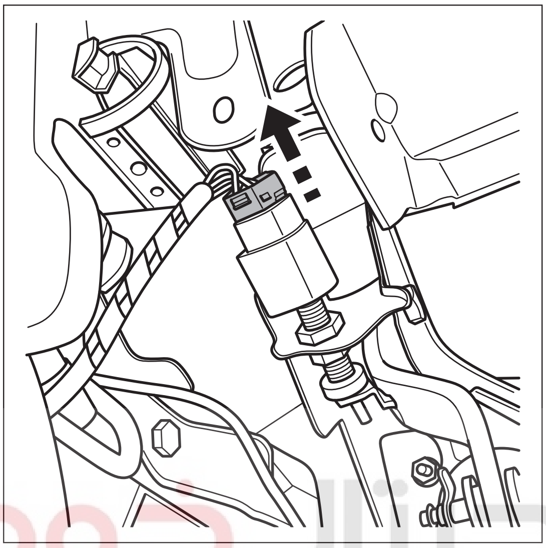
Replacement of Braking Pedal

Removal

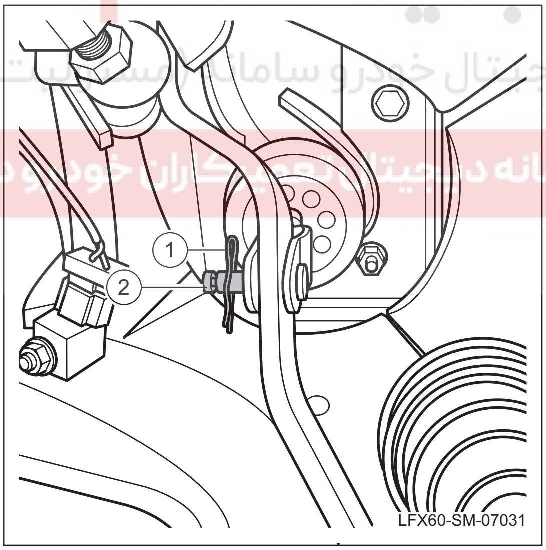
1. Dismount the braking pedal.

(a). Disconnect the battery negative connector.

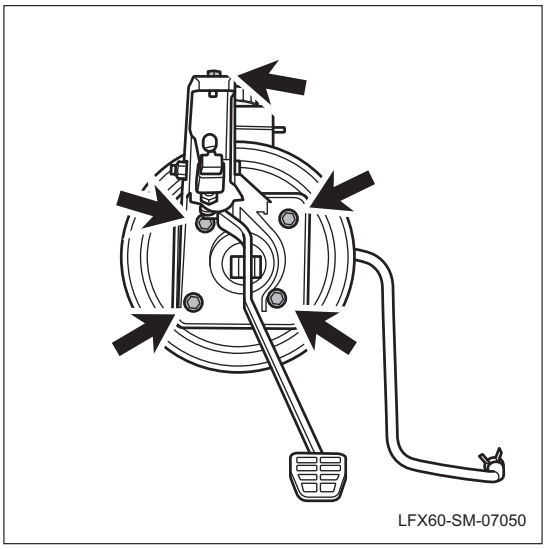
(b). Remove the dashboard lower left panel assembly. **Refer to the replacement of dashboard assembly.**



(c). Disconnect the harness plug of braking light switch.



(d). Dismount the pull rod pin 1 of braking pedal and detach the pull rod pin 2.



(e). Dismount the tap bolt and nut of braking pedal.
(f). Detach the braking pedal.

Installation

1. Install the braking pedal.
(a). The installation sequence is the reverse of the disassembly order.

Replacement of Vacuum Booster

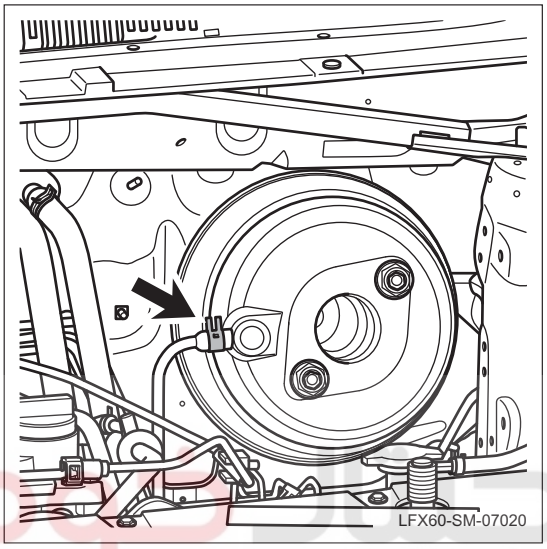
Removal

1. Dismount the vacuum booster.

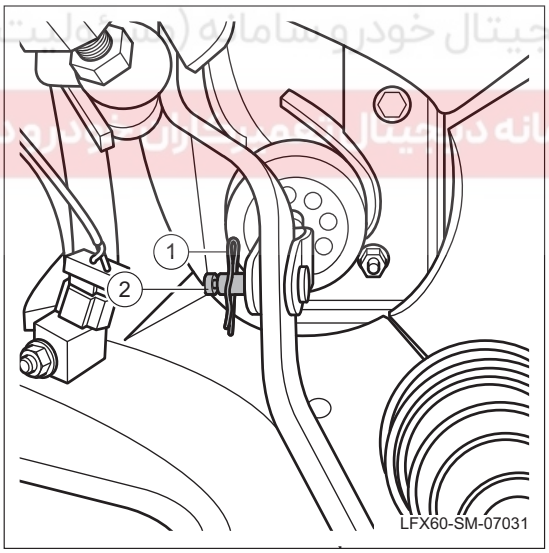
(a). Disconnect the battery negative connector.

(b). Dismount the left low shield assembly of dashboard, **refer to replacement of dashboard assembly**

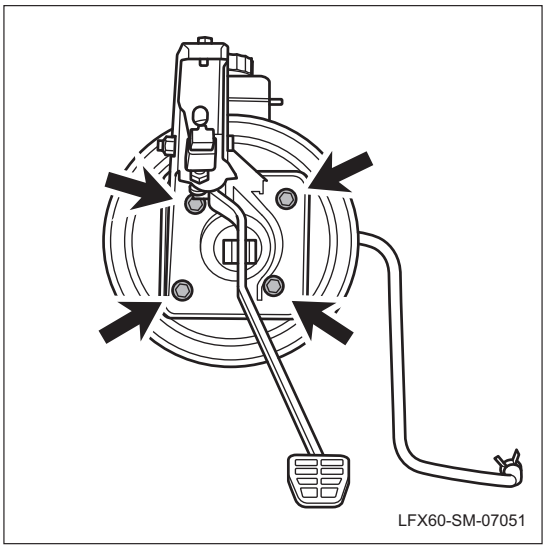
(c). Dismount the brake master cylinder, **refer to replacement of brake master cylinder.**



(d). Dismount the bar clasp of vacuum hose and detach the vacuum hose.



(e). Dismount the pull rod pin 1 of braking pedal and detach the pull rod pin 2.



(f). Dismount the tap bolt and nut of vacuum booster.
(g). Detach the vacuum booster.

Installation

1. Install the vacuum booster.
(a). The installation sequence is the reverse of the disassembly order.
(b). Bleed the brake system. **Refer to the brake system bleed procedures.**

07 - Brake system

Mechanical parking system

Technical specifications

Torque Specifications

Name	Torque range	
	Metric (Nm)	British (lb-ft)
Bolt for parking braking operating gear	23	17
Bolt for parking cable bracket	10	7

Precautions

Precautions

1. In case that the conventional brake is normal, check and adjust the parking brake.
2. After the parking brake system is repaired, its performance must be tested to ensure its safety and reliability.
3. Before checking the parking brake system, park the vehicle on a level ground and use triangular woods to block the wheels.
4. Do not re-use the removed snap buckles or tie strips.
5. The parking brake cable has a plastic sheath and is not need for regular lubrication.
6. Check regularly. Check once per 10000km driving.

- Check the parking brake for operation.
- Check the stroke of parking braking operating arm
- Check each connection for loosening.
- Check the parking brake system for normal function.

Preparation

General service tool

Structure and installation location

Part exploded view

Parking brake

No.	Part name
1	Hexagon flange bolt
2	Assembly of Parking Braking Operating Arm
3	Hexagon head bolt and taper elastic washer assembly
4	Right parking brake cable assembly
5	Left parking brake cable assembly

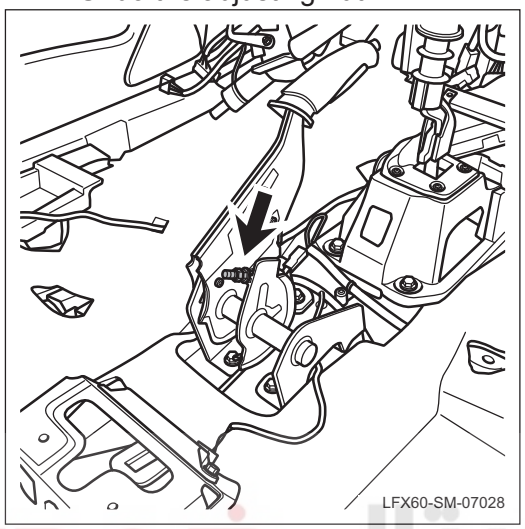
No.	Part name
6	Hexagon head bolt and taper elastic washer assembly
7	Fixing buckle of parking brake cable
8	Hexagon head bolt, spring washer and plain washer subassembly
9	Front assembly of parking brake cable
10	Hex flange nut

General Inspection

Adjustment of Parking Brake Cable

Note:
Before the diagnosis, ensure the brake system warning indicator lamp is normal.

1. Put down the parking brake handle.
2. Undo the adjusting nut.



3. Ignite and tread hard the braking pedal more than 5 times
4. Pull the parking cable 10 times with all strength, then adjust the cable.

Note:
Adjust to pull up the parking brake handle until the ratch sounds 5-7 times.

5. Tighten the adjusting nut.
6. Test to see if the parking brake is normal.

Operating Principle

System overview

Function description

The parking brake system can be used for long-term safe parking of the vehicle for and facilitate the start on the ramp; during the vehicle running, if the service brake system is faulty, the parking brake system can be used for emergency braking.

constituent part

The parking brake system consists of the parking brake pedal, cable, brakes and other devices.

Operating Principle

When applying the parking brake, pull the parking lever, to drive the cable to allow the brake to play the parking role.

Diagnostic Information and Procedures

Diagnosis Instructions

Before diagnosis, first understand and get familiar with the working principle of mechanical parking system. This is helpful to determine the correct procedures of diagnosis when the trouble occurs. More important, it is also helpful to determine if the status described by the client is normal operation.

Any diagnosis for the mechanical parking system shall start from the inspection for the mechanical parking system, then guide the maintenance personnel to take next logic procedure to perform diagnosis.Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

General equipment

Digital multimeter

Visual Inspection

1. Confirm the problem of the customer.
2. Visually check whether there is any obvious mechanical or electrical damage sign.

Visual inspection table

Mechanical	Electrical
• Parking brake handle • Parking brake cable • Parking brake shoe plate • Return Spring of Brake shoe	• Harness or plug • Parking brake switch

3. If the problem observed or pointed is obvious and the reason is already found, correct the reason first before going to the next step.
4. If for the problem, there are no obvious findings, then confirm the fault and refer to the symptom table.

List of fault symptoms

Symptom	Possible Cause	Recommended Measures
Parking brake not released (dragging)	• Parking brake cable too tight	• Adjust the parking brake cable **Refer to: adjustment of parking brake cable**
	• Rear shoe plate adjusting clearance too small	• Adjust the rear brake shoe plate. **Refer to: replacement of Parking Brake Cable**
	• Brake cable seizing	• Repair or replace the brake cable.
	• Rear brake plate detaining	• Repair or replace the rear brake shoe plate.
	• Rear brake plate return spring (fatigued and cracked)	• Replace the return spring of brake shoe plate. **Refer to: replacement of rear brake shoe plate**
Parking brake invalid,parking force poor	• Rear brake shoe plate excessively worn	• Replace the rear brake shoe plate. **Refer to: replacement of rear brake shoe plate**
	• Parking brake handle stroke too big	• Adjust the parking brake cable **Refer to: adjustment of parking brake cable**
	• Brake cable seizing	• Repair or replace the parking brake cable. **Refer to: adjustment of parking brake cable**
Parking brake indicator always on	• Harness or plug	**Refer to: diagnosis Procedures for Parking Brake Indicator Always On**
	• Parking brake switch	
	• Instrument cluster	
Ignition switch is ON and when vehicle is parked, the parking indicator is off	• Harness or connector	**Refer to: diagnosis Procedures for Parking Indicator Off When Ignition Switch On and Vehicle Parked**
	• Parking brake switch	
	• Instrument cluster	

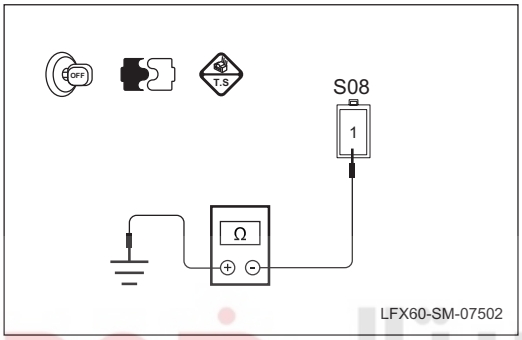
Diagnosis Procedure for Parking Brake Not Released (Dragging)

Test condition	Details/results/measures
1. Check the parking brake handle.	
	A. Check if the parking brake handle is fully released. Is the handle fully released? →**Yes** To step 2. →**No** Adjust the parking brake handle.
2. Check the brake cable.	
	A. Completely release the parking brake lever. B. Check if the parking brake cable detains, is too tight, etc. Is it OK after checking? →**Yes** To step 3. →**No** Adjust or replace the braking cable. **Refer to: adjustment of parking brake cable**
3. Check the rear brake shoe plate control gap.	
	A. Check the rear brake shoe plate retracting spring for falling or fracture. Is it OK after checking? →**Yes** Confirm the repair is finished. →**No** Replace the rear brake shoe plate retracting spring.
4. Check the return spring of rear braking shoe plate.	
	A. Check the rear brake shoe plate retracting spring for falling or fracture. Is it OK after checking? →**Yes** Confirm the repair is finished. →**No** Replace the rear brake shoe plate retracting spring.

Diagnosis Procedure for Parking Brake Invalid/Braking Force Poor

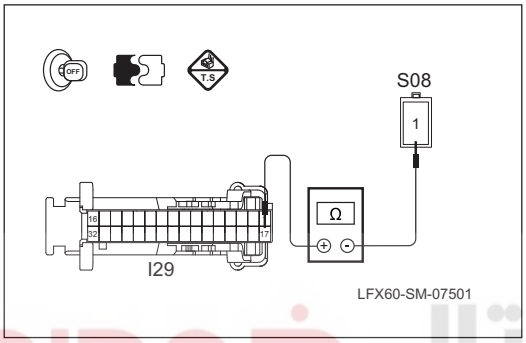
Test condition	Details/results/measures
1. Check the stroke of parking brake handle.	
	A. Check if the stroke of parking brake handle is normal. Is it OK after checking? →**Yes** To step 2. →**No** Adjust the stroke of parking brake handle. **Refer to: adjustment of parking brake cable**
2. Check the parking brake cable.	
	A. Check if the parking brake cable detains. Is it OK after checking? →**Yes** To step 3. →**No** Repair or replace the parking brake cable. **Refer to:Replacement of Parking Brake Cable**
3. Check the rear brake shoe plate control gap.	
	A. Completely release the parking brake lever. B. Check if the adjusting clearance of rear breaking shoe plate is too big. Is it OK after checking? →**No** To step 4. →**Yes** Re-adjust the clearance of braking shoe plate.
4. Check the rear braking shoe plate.	
	A. Check if the rear braking shoe plate is worn excessively. Is it OK after checking? →**Yes** Confirm the repair is finished. →**No** Replace the rear braking shoe plate. **Refer to: replacement of rear brake shoe plate**

Diagnosis Procedure for Parking Brake Indicator Always On

Test condition	Details/results/measures
1. Check the parking indicator lamp switch.	
	A. Check if the parking braking switch is off when releasing the parking brake handle. Is the switch closed? →**Yes** Repair, adjust or replace the parking brake switch. →**No** To step 2.
2. Check the parking brake switch line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the parking brake switch harness plug S08. D. Measure the resistance between No.1 terminal of harness plug S08 of parking braking switch and the reliable grounding with a multimeter. **Standard value: 10MΩ or higher** Is the resistance normal? →**Yes** To step 3. →**No** Repair the parking brake switch line fault and replace the harness if necessary.
3. Check the instrument cluster.	
	A. Replace the instrument cluster. **Refer to: replacement of instrument cluster** Confirm that the fault has been ruled out.

07

Diagnosis Procedures for Parking Indicator Off When Ignition Switch On and Vehicle Parked

Test condition	Details/results/measures
1. Check the parking indicator lamp switch.	
	A. Check if the parking braking switch is off when pulling up the parking brake handle. Is the switch closed? →**Yes** To step 2. →**No** Repair, adjust or replace the parking brake switch.
2. Check the parking brake switch line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the parking brake switch harness plug S08. D. Disconnect the instrument cluster harness plug I29. E. Measure the resistance between No.1 terminal of harness plug S08 of parking braking switch and No.17 termianl of harness plug I29 of combination instrument with a multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 3. →**No** Repair the parking brake switch line fault and replace the harness if necessary.
3. Check the instrument cluster.	
	A. Replace the instrument cluster. **Refer to: Replacement of instrument cluster** Confirm that the fault has been ruled out.

Removal and installation

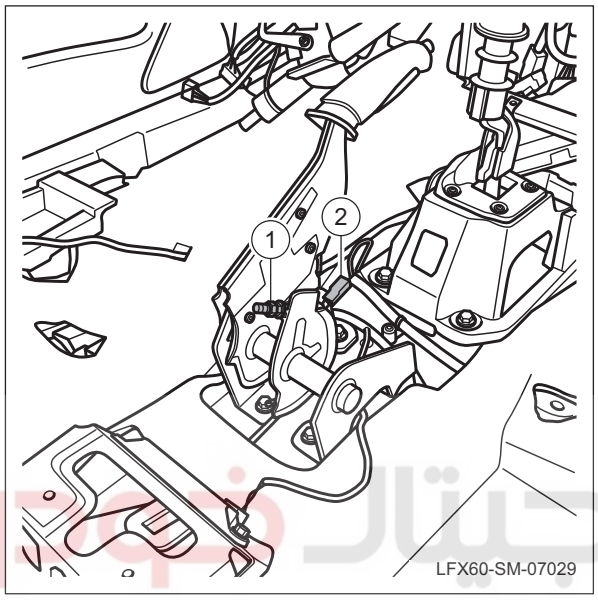
Replacement of Parking Brake Handle

Removal

1. Dismount the parking brake handle.

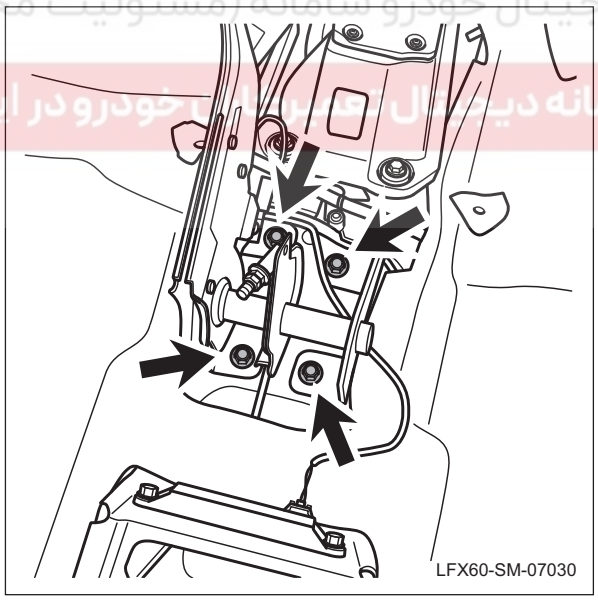
(a). Disconnect the battery negative connector.

(b). Remove the central desk. **Refer to the replacement of central desk assembly.**



(c). Dismount the adjusting nut 1 of parking brake cable.

(d). Diconnect the harness connector 2 of parking brake switch.



(e). Dismount the tap bolt of parking brake handle.

(f). Detach the parking brake handle.

Installation

1. Install the parking brake handle.

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

Replacement of parking braking cable

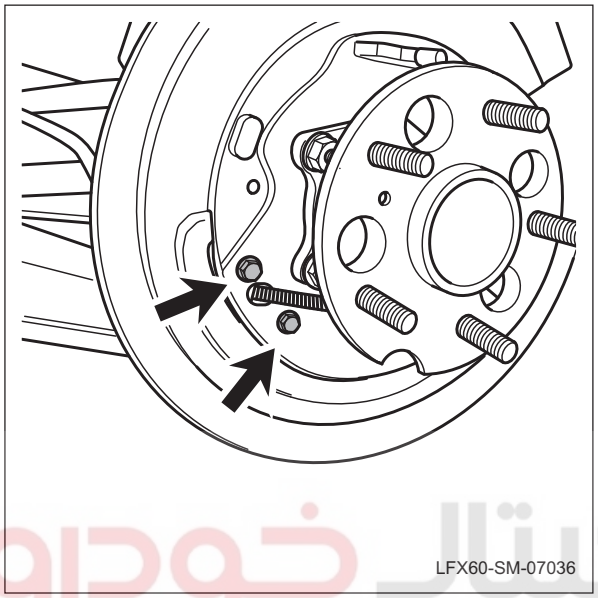
Removal

1. Dismount the parking braking cable.

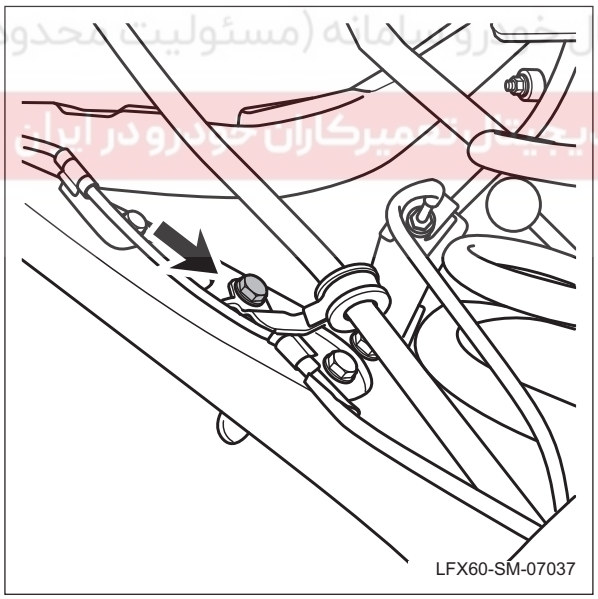
(a). Disconnect the battery negative connector.

(b). Lift the vehicle,**Reference: Vehicle Lifting and Supporting**

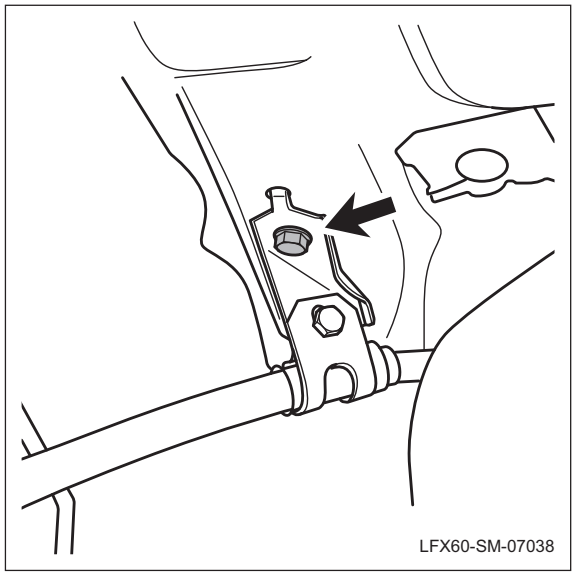
(c). Dismount the left and right rear braking shoes, **refer to replacement of Rear Braking Shoe**



(d). Dismount the tap bolts of left and right parking braking cables.

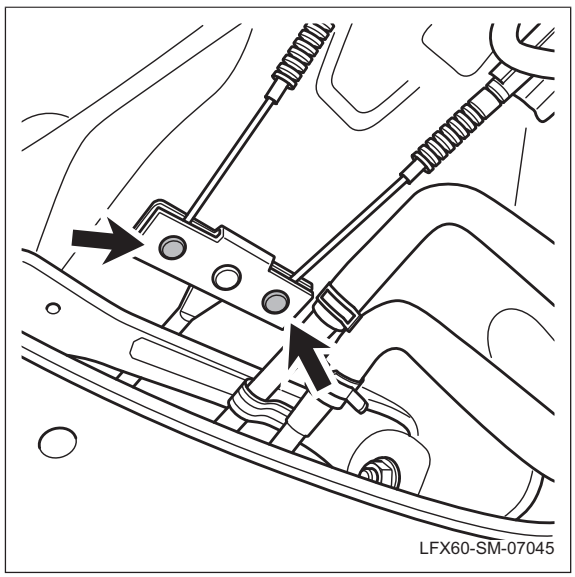


(e). Dismount the tap bolts of left and right parking braking cables.



(f). Dismount the tap bolt of bottom stand of parking braking cable.

(g). Dismount the bottom tap bolts of left and right parking braking cables.



(h). Release the parking brake handle.
(i). Detach the parking braking cable.

Installation

1. The installation sequence is reverse to the removal sequence.

(a). Adjust the parking cable,**Reference: Adjustment of Parking Cable**

07 - Brake system

ABS TCS EBD ESP brake system

Technical specifications

Torque Specifications

Name	Torque range	
	Metric (Nm)	British (lb-ft)
Tap bolt of ABS/ESP stand	23	17
Connection between brake tube and ABS/ESP control unit, Connecton between brake tube and pipe	16	12

Precautions

Precautions

1. When the vehicle is powered or the engine starts, there is a short time with the sound of “buzz”. This is the self-inspection of ABS/ESP system. It is a normal phenomenon.
2. Before performing the diagnosis for the ABS/ESP system, make sure the braking system is normal without any trouble.
3. There is sound generated when ABS/ESP system is normally working, which is mainly refl ected in following aspects:

- The sound generated by the actuation of the motor in ABS/ESP control unit, the solenoid and the oil Refl ux pump.
- The sound generated by rebounding of brake pedal.
- The sound generated from the impacting of suspension and body caused by emergency braking.

4. The following two cases show that ABS/ESP system detects a fault:

a. Switch on the ignition and the system self-inspection completes. The ABS/ESP warning lamp keeps on.

b. During driving, the ABS/ESP warnng lamp keeps on all the time.

⚠Warning:

At this point, the driver may make the common brake, but the braking force should be reduced as possible, to prevent the wheels from locking. After the alarm indicator is lit, the vehicle should be driven immediately carefully to the authorized service station for maintenance, in order to prevent the traffic accidents from more faults.

5. The maintenance for the ABS/ESP system must be performed by a mechanics who is specially trained and grasps the maintenance skills. The parts for replacement must be from the original factory.
6. Attentions shall be paid to the following points when connecting the harness of ABS/ESP electrical control unit and wheel speed sensor:

a. Before unplugging the harness of ABS/ESP electrical control unit and wheel speed sensor, put the ignition status of vehicle at OFF and disconnect the negative pole of storage battery.

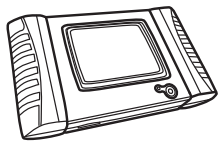
b. Make sure the connectors dry and clean to aviod any foreign object from getting into.

c. The connection for the harness of ABS/ESP electrical control unit must be installed in place along the horizontal and vertical directions.

7. When connecting the braking pipeline of ABS/ESP electrical control unit, make sure the connection correct. The ABS/ESP electrical control unit cannot judge if the braking pipeline is connected correctly. The incorrect connection may lead to serious accidents.
8. The ABS/ESP control unit can only be replaced entirely. It cannot be dismounted or replaced/exchanged partially. Lifan does not provide individual spare parts and guarantee for the disassembled ABS/ESP control unit. For dismounted or partially replaced/exchanged ABS/ESP control unit, Lifan is not responsible for any bad result. After the maintenance of ABS/ESP system, it must be tested to eliminate the trouble thoroughly before delivering it to the client.

Preparation

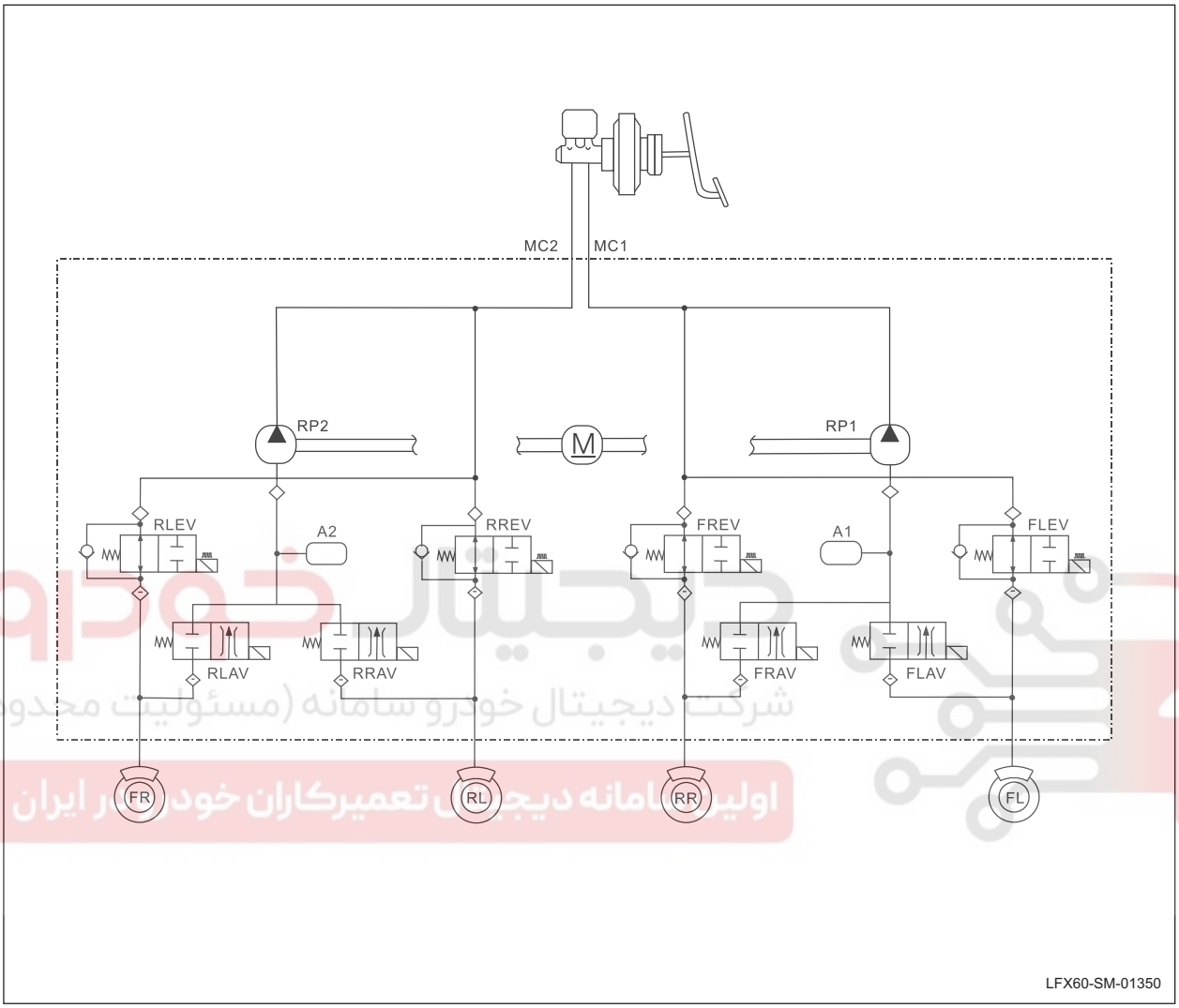
General and special tools

No.	Tool name	Tool drawing	Tooling code	Remarks
1	Vehicle diagnosis	 LFX60-SM-02802	-	Read system error code, data stream, etc.

Hydraulic schematic diagram

Hydraulic schematic diagram

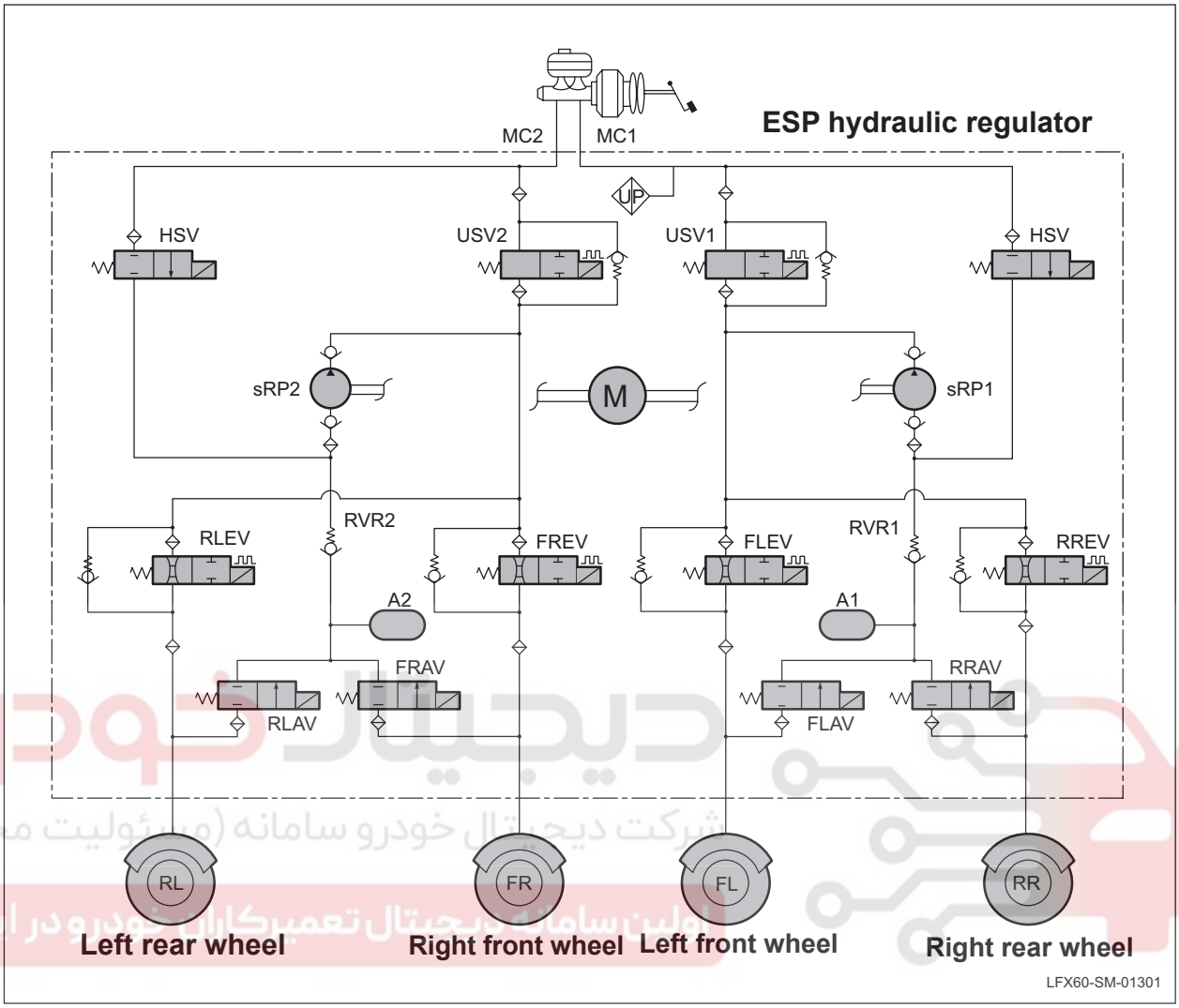
ABS Hydraulic schematic diagram



No.	Part name
MC1	Brake master cylinder first circuit
MC2	Brake master cylinder second circuit
M	Motor
RP1	Return pump 1
RP2	Return pump 2
A1	Accumulator 1
A2	Accumulator 2
FL	Left front wheel
FR	Right front wheel
R	Left rear wheel

No.	Part name
RR	Right rear wheel
FLEV	Front left wheel oil inlet valve
FLAV	Front left wheel oil outlet valve
FREV	Front right wheel oil inlet valve
FRAV	Front right wheel oil outlet valve
RLEV	Rear left wheel oil inlet valve
RLAV	Rear left wheel oil outlet valve
RREV	Rear right wheel oil inlet valve
RRA	Rear right wheel oil outlet valve

ESP Hydraulic schematic diagram



No.	Part name
MC	Master cylinder
HU	Hydraulic unit
HSV	high-pressure valves
USV	Loop control valve
M	Reflux pump motor

No.	Part name
sRP	Reflux pump
EV	Input valve
AV	Output valve
A	Accumulator
UP	Pressure sensor

General Inspection

Road Test

⚠Warning:
The mechanic for road test must be trained and has good driving skills.

Performing the road test is to compare the actual braking function of vehicle with the standard braking fucntion expected by the driver.The capability of correctly comparing and judging the braking function depends on the experience of mechanics. The mechanics must have ccomplete knowledge of working principles of braking system and been guided systematically so as to correctly compare and find the problems.

Confirm if the vehicle meets the following conditions before the road test.

- The tires are not worn excessively and the patterns of left and right tires are almost the same.
- The tire pressue is within the specified range.
- The wheel positioning is accurate.
- The brake fluid level is normal.
- The working indicator of braking system is normal and does not have any error code.

The road test must be performed on a dry, clean and relatively flat road. An experienced mechanics will select a route suitable for the braking diagnosis of road test. The surface of road shall be flat, not have gravel or rough. It is mainly because gravel and rough surface make the adhesions beween the tires and road surface are different. The arched road surface is not suitable too because the weight of vehicle body concentrates mostly on the two lower wheels. Once the route is determined and used often, the factor of road shall not be considered.

Before the road test, firstly understand the trouble described by the client. According to the description, the mechanics connects the possible reasons with the symptoms. Some of parts will be regarded as suspect reasons while the others will be eliminated. More important is to check or eliminate unsafe hidden problems before the road test according to the description of client. The description of client is also helpful to focus the problem on specific parts, speed or status and determine the method of road test.

The road test shall start from the inspection of general braking function. According to the description of client, check the braking under different speeds with different treading forces on the pedal. When determining the problem in the front or rear braking system, first use the pedal braking, then use the parking braking. If the symptoms (dragging, vibrating,bouncing rhythmically) only occur during parking braking, it means the problem is in the rear braking system.

During the road test, avoid the braking from locking. This does not mean the braking is valid. Powerful braking while keeping the wheels rotating can stop the vehicle in shorter distance than braking locking.

If the problem is obvious in the test, confirm the problem is the same as the description. If the problem is not obvious, use the information in the description, try to reproduce the status.

If the problem exisits, use the diagnosis list to define the problem in the specific sub-system and relevant status description. Use the described pheonomenon to shorten the list of possible reasons to specific parts or status.

Inspection of Hydraulic Leakage

ℹNote:
In normal situation, with the wearing of brake-block, the level of brake fluid descends gradually. If the brake-block wearing exceeds the specification, it will cause the brake fluid level too low. If the wearing of brake-block is within the specification and the level of brake fluid is too low, it means the system leaks.

ℹNote:
If the vehicle drives in the rain or in the snow, the leaked mark may be washed off because the brake fluid is water soluble.

Please check according to the method below.

a. Confirm if the brake fluid level is too low or descends too fast.
b. Check the appearance for the mark of brake fluid leakage.
c. Dismount the front wheel, refer to: replacement of Tire.
d. Check the leakage of front brake cylinder and the wearing of brake-block.
e. Discmount the brake master cylinder, refer to: replacement of Brake Master Cylinder.
f. Check the leakage of piston seal of brake master cylinder.
g. Repair the possible troubles above and exhaust the braking system.

Inspection of Braking Pedal Stroke Allowance

When feeling the stroke of braking pedal is too much or reaches the bottom during braking, check the braking pedal stroke allowance.

a. Put the transmission at idling, pull up the parking brake and run the engine at idling.
b. Tread the braking pedal 3-4 times lightly.
c. Keep 15s to compensate the vacuum of booster.

ℹNote:
Resistance increases and feel the pedal reaches the bottom.

d. Tread the braking pedal until it stops moving downward or the resistance does not increase.

e. Tread the braking pedal to increase the engine to 2,000rpm.

Note:

The increase in the vacuum of engine intake manifold makes the braking pedal descend (additioanl movement).

f. Release the accelerating pedal and observe the braking pedal descending when the engine speed reduces to idling.

Inspection of Vacuum Booster

a. Check if the brake fluid level is normal.
b. Put the transmission at idling, pull up the parking brake and run the engine (idling).
c. Switch off the engine, tread and release the braking pedal several times to eliminate the vacuum in the system. Then tread the braking pedal and hold it.
d. Start the engine. If the vacuum system acts, the braking pedal moves downward. If not feeling the pedal descending, the vacuum boosting system does not act.
e. Detach the vacuum hose at one side of vacuum booster. When the engine works at idling, the vacuum in the intake manifold acts in the end of hose vacuum booster. Feel it with the hands or measure it with a vacuum meter. If there is no vacuum or it is very small, check if the vacuum hose is blocked, sealed or leaks. Make sure all the unused outlets of vacuum tube are blocked, the joints are ok and the vacuum tube is normal. It means the vacuum in the intake manifold acts. Reconnect the vacuum hose to the vacuum booster and repeat Step (d). If still not feeling the braking pedal descending, replace the vacuum booster.
f. Run the engine for 10s at 1,000rpm. Switch off the engine for 10min. Tread the braking pedal hard. The feel for the braking pedal shall be the same as the engine works (boosting normal).
g. If the feel for the braking pedal is hard, check and confirm the check valve of vacuum hose is normal. If the trouble still exists when re-testing, replace the vacuum booster.
h. If the feel for the braking pedal is soft, exhaust the braking system.

Inspection of Brake Master Cylinder

Note:

Before diagnosis, make sure the brake fluid level and warning indicator work normally and there is no any error code in the braking system.

Normally, the earliest and most powerful method for any trouble in the braking system is the feel to the braking pedal. When diagnosing the trouble in the brake master cylinder, check the feel of braking pedal and use it as the evidance for the braking problem. Check the brake warning indicator flash and brake fluid level.

Normal situation

In general, the changes in the braking pedal feel or stroke indicate there may be problems in the braking system. However, the status below normal and it does not indicate the brake master cylinder may need to be repaired:

- New braking system design differs from the previous one. The force required for treading the braking pedal is relatively light.
- When the brake works normally, the brake fluid level shall descend. When the brake is released, the level rises.The total brake fluid does not change.
- The mastr cylinder is fixed on the housing of brake booster. There is marks of brake fluid.
- The brake fluid level height descends when the brake-block is worn.

Abnormal Situation

The changes in the braking pedal feel or stroke indicate there may be problems in the braking system. The status below is abnormal and it indicates the brake master cylinder may need to be repaired.

Symptom	Brake master cylinder
Tread the braking pedal. It rapidly descends.	• External leakage (cracking, joint, seal component)
Tread and keep the braking pedal. It slowly descends.	• External leakage • Internal leakage (seal components in the master cylinder aged)
Tread the braking pedal. It is too low or feels soft.	• Fuel feed hole or vent of storage tank blocked. • Air in the hydraulic system
The braking pedal returns too slow.	• Compensate opening blocked • Master cylinder spring broken (fatigued)
Tread the braking pedal slightly. Rear braking locked	• ABS system
Brake pedal stroke oversize	• Internal leakage

Bypass Status Test

Observe the level in the liquid storage kettle of brake master cylider. If the brake fluid level maintains no change after treading the braking pedal several times, measure the torque required for the wheel rotating backward when braking acts as follows

a. Lift the vehicle. **Reference: Vehicle Lifting and Supporting**

b. Tread the braking pedal with a force of 445N and hold it for about 15s. When the braking still acts, apply certain torque on the wheel. If any wheel rotates, replace the brake master cylinder.

Leakage not Due to Pressure

Any status when there is no oil in the liquid storage kettle of brake master cylinder may be caused by two kinds of leakage not due to pressure

Type 1: The liquid storage kettle cap of brake master cylinder may leak externally because of incorrect positions of the pad and cap.

Type 2: The gasket of brake fluid tank may leak externally. Install a new seal to prevent such kind of leakage.

Diagnostic Information and Procedures

Diagnosis Instructions

Before diagnosis, first understand and get familiar with the working principle of ABS/ESP system. This is helpful to determine the correct procedures of diagnosis when the trouble occurs. More important, it is also helpful to determine if the status described by the client is normal operation.

Any diagnosis for the ABS/ESP system shall start from the inspection for the ABS/ESP system, then guide the maintenance personnel to take next logic procedure to perform diagnosis. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

General equipment

Name
Diagnostic equipment of vehicle
Digital multimeter

Visual Inspection

Note:

Before the diagnosis, ensure the brake system warning indicator lamp is normal.

1. Confirm the problem raised by the customer.
2. Check the evident mechanical faults and hydraulic faults.

Visual inspection table

Mechanical	Electrical
• Wheel speed sensor	• Fuse • Line • ABS/SEP

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 no problem is found through the visual check, confirm the fault and refer to the fault symptom list.

List of fault symptoms

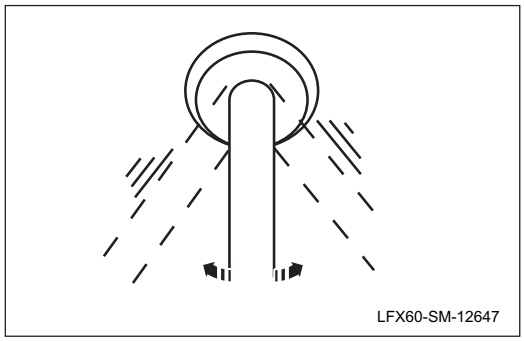
Symptom	Possible reasons	Recommended Measures
Intermittent fault	• Clear DTC	**Refer to: troubleshooting process for intermittent failure**
	• Carry out the simulation test	
	• Check and shake the harness, joint and terminal	
ABS warning lamp always on	• Harness plug	**Refer to: ABS warning lamp always on**
	• Wheel speed sensor	
	• ABS module	
	• Instrument cluster	
ABS function invalid	• Fuse	• Replace the fuse
	• Harness plug	• Check or replace the harness
	• Wheel speed sensor	• Replace the wheel speed sensor. **Refer to:Replacement of Wheel Speed Sensor**
	• ABS module	• Replace the ABS control module **Refer to:Replacement of ABS/ESP Control Module**

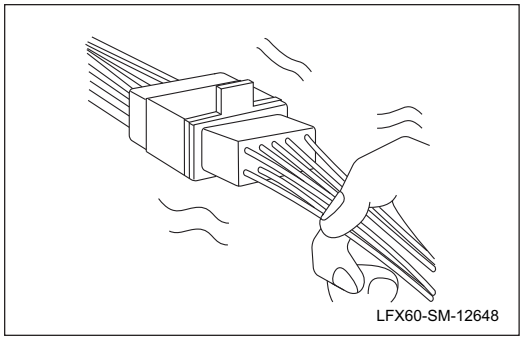
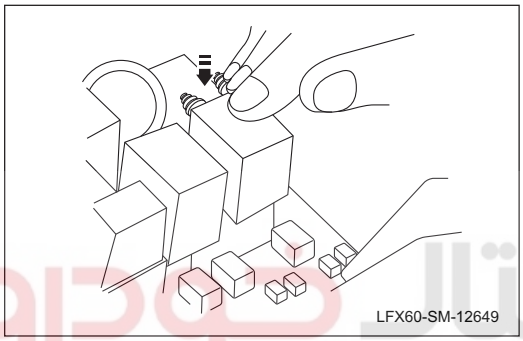
Intermittent fault diagnostic flow

Note:
- **Clear DTC.**
- **Carry out the simulation test.**
- **Check and shake the harness and harness plug.**

When the fault cannot be confirmed in DTC check, the fault may occur in use occasionally. At this point, check all the lines and parts which may cause the fault.In many cases, the basic inspection shown in the flow chart below can quickly and effectively locate the fault parts, in particular the loose contact of harness plug.

Fault definition: There is no the fault at present, but the history fault diagnosis code indicates that the fault has occurred. Or the customer reports this fault while the fault does not relate to the DTC and the fault symptom cannot be reproduced currently.

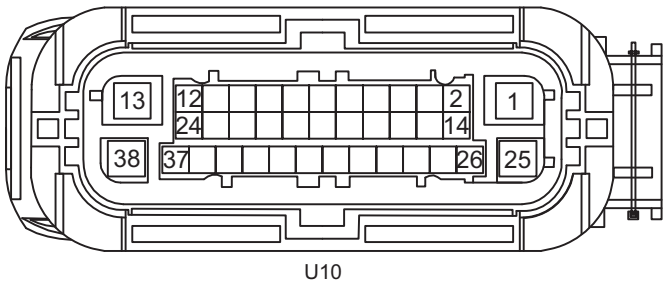
Test condition	Details/results/measures
1. Vibration method	
	A. If the fault occurs or the fault is more severe or the engine vibration occurs when the vehicle is running on the rough road, go to Step 2. **Note:** **Several causes can result in the vehicle or engine vibration fault. Check the following:** 1. The plug is not inserted in position. 2. There is no sufficient gap for the harness. 3. The harness layout passes across the bracket or moving parts. 4. The harness is arranged too near to the high temperature parts. 5. The wiring is incorrect, not clamped or the loose harness causes the wiring pinched between parts. 6. The plug joints, vibration parts and the harness passing positions should be checked as the key points. For example, the harness passing through the fire wall and bodywork plate.
2. Method of checking the switch plug or harness.	
 LFX60-SM-12647	A. Connect the diagnostic equipment to the diagnostic interface. B. Operate the ignition switch to turn the power to ON state (shut down the engine). C. Access the data flow of the switch you are checking. D. Turn on the switch manually. E. While monitoring the data stream, gently shake each plug or harness horizontally and horizontally. F. If the data stream value is instable, check whether the contact is loose.

Test condition	Details/results/measures
3. Method of checking the sensor plug or harness.	
 LFX60-SM-12648	A. Connect the diagnostic equipment to the diagnostic interface. B. Operate the ignition switch to turn the power to ON state (shut down the engine). C. Access the data flow of the switch you are checking. D. While monitoring the data stream, gently shake each plug or harness horizontally and horizontally. E. If the data stream value is instable, check whether the contact is loose.
4. Method of checking the actuator or relay.	
 LFX60-SM-12649	A. Connect the diagnostic equipment to the diagnostic interface. B. Operate the ignition switch to turn the power to ON state (shut down the engine). **Note:** **If the engine is started, perform the following steps during its operation in idling mode.** C. Prepare the output status control function well for the actuator or relay you are checking. D. After the output status control function is activated, use a finger to vibrate the actuator or relay 3s. If you hear an unstable "click" sound, check for any improper connection or improper installation of the actuator and/or relay. **Note:** **A strongly vibrating relay may cause the relay to be disconnected.**
5. Simulate the fault by the road test and read the data stream.	
	A. Connect the diagnostic equipment to the diagnostic interface. B. Simulate the fault by the road test and read the data stream. C. If the data stream value is instable or the malfunction occurs, repair or replace the parts.

Diagnostic Procedures for ABS Warning Lamp Always On

Test condition	Details/results/measures
1. General inspection.	
	A. Check if the ABS/ESP module harness plug is broken, in poor contact, aged, loose, etc. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Check if there is any error code in the ABS.	
	A. Connect the diagnostic equipment. B. Operate the ignition switch to turn the power to ON state. C. Enter into the ABS system and check if there is any error code in the system. Is there a trouble code? →**No** To step 3. →**Yes** Carry out the relevant fault diagnosis according to the DTC.
3. Check the vehicle communication system.	
	A. Check whether the vehicle communication system is normal. Is it OK after checking? →**Yes** To step 4. →**No** Check the communication system for fault.
4. Check the ABS control module.	
	A. Replace the ABS control module. **Refer to: replacement of ABS/ESP module** Is the fault solved? →**Yes** Replace the ABS control module →**No** To step 5.
5. Check the instrument cluster.	
	A. Replace the instrument cluster. **Refer to: replacement of instrument cluster** Confirm the fault is solved

Control module terminal list



U10

LFX60-SM-07516

Terminal No.	Wire diameter/color	Terminal description
U10-01	4.00 R	Power source
U10-02	0.30 P/G	Wheel speed signal output
U10-03	-	-
U10-04	0.50 Br/O	Right front wheel speed sensor signal
U10-05	-	-
U10-06	-	-
U10-07	-	-
U10-08	0.50 Br/Gr	Left front wheel speed sensor signal -
U10-09	-	-
U10-10	-	-
U10-11	-	-
U10-12	0.30 Y/R	ESP switching signal
U10-13	4.00 B	Grounding
U10-14	0.30 Bl/W	PCAN-L
U10-15	-	-
U10-16	0.50 Br/B	Right front wheel speed sensor signal +
U10-17	0.50 Br/W	Right rear wheel speed sensor signal +
U10-18	0.50 Br/G	Left rear wheel speed sensor signal -
U10-19	0.50 Br/Bl	Left front wheel speed sensor signal +
U10-20	0.50 O/W	Yaw rate sensor signal-
U10-21	-	-
U10-22	-	-

Terminal No.	Wire diameter/color	Terminal description
U10-23	-	-
U10-24	-	-
U10-25	2.50 BI/R	Power source
U10-26	0.30 BI/B	PCAN-H
U10-27	-	-
U10-28	0.50 R/W	Power source
U10-29	0.50 Br/Y	Right rear wheel speed sensor signal -
U10-30	0.50 BI/W	Brake signal input
U10-31	0.50 Br/P	Left rear wheel speed sensor signal +
U10-32	-	-
U10-33	0.50 O/B	Yaw rate sensor signal +
U10-34	-	-
U10-35	-	-
U10-36	-	-
U10-37	-	-
U10-38	2.50 B ,	Grounding

DTC list

DTC	DTC information
C190004	ECU voltage high
C190104	ECU voltage too low
C100004	ECU error (hardware, microcontroller error)
C101008	ECU error (common software problem)
C006B06	ABS/ESP abnormal control (too long control time etc.)
C003108	Front left wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)
C003200	Front left wheel speed sensor: signal line short to ground/open circuit: power line open circuit
C00A000	Front left wheel speed sensor power line short to ground
C00A100	Front left wheel speed sensor signal line short to battery
C00A900	Front left wheel speed sensor common error
C003408	Front right wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)
C003500	Front right wheel speed sensor: signal line short to ground/open circuit: power line open circuit
C00A200	Front right wheel speed sensor power line short to ground
C00A300	Front right wheel speed sensor signal line short to battery
C00AA00	Front right wheel speed sensor common error
C003708	Rear left wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)
C003800	Rear left wheel speed sensor: signal line short to ground/open circuit: power line open circuit
C00A400	Rear left wheel speed sensor power line short to ground
C00A500	Rear left wheel speed sensor signal line short to battery
C00AB00	Rear left wheel speed sensor common error
C003A08	Rear right wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)
C003B00	Rear right wheel speed sensor: signal line short to ground/open circuit: power line open circuit
C00A600	Rear right wheel speed sensor power line short to ground
C00A700	Rear right wheel speed sensor signal line short to battery
C00AC00	Rear right wheel speed sensor common error
C109904	General error of wheel speed sensor (sensor position exchanged, multiple sensor errors)
C004460	Pressure sensor error (signal)
C004510	Pressure sensor error (line)
C004008	Braking light switch error, not clear
C006108	Transverse acceleration sensor: signal error
C006208	Longitudinal acceleration sensor: signal

DTC	DTC information
C006308	Yaw rate sensor: signal error
C019604	Yaw rate sensor group variety error (hardware fault, temperature, range, internal error)
C00A800	Yaw rate sensor group variety calibrated or calibration failure
C006102	Lateral acceleration sensor of external yaw rate sensor cluster: signal error
C006202	Longitudinal acceleration sensor of external yaw rate sensor cluster: signal error
C006302	Yaw rate sensor of external yaw rate sensor cluster: signal error
U012308	Lose contact with yaw rate sensor module
U051308	Invalid data from yaw rate sensor module
U000500	CAN bus voltage high
U000700	CAN bus voltage too low
C100104	CAN hardware error
U000104	CAN bus close error
U100104	CAN passive error
C106600	Steering angle sensor calibrate error
C046008	Steering angle sensor error (signal)
U012604	Lose contact with steering angle sensor
U012608	SAS data broken (data length control, cyclic redundancy code verification, real-time counter error)
C001004	Valve error, front left inlet valve
C001104	Valve error, front left outlet valve
C001404	Valve error, front right inlet valve
C001504	Valve error, front right outlet valve
C001804	Valve error, front left inlet valve
C001904	Valve error, front left outlet valve
C001C04	Valve error, rear right inlet valve
C001D04	Valve error, rear right outlet valve
C000104	Valve error, USV1
C000204	Valve error, USV2
C000304	Valve error, HSV1
C000404	Valve error, HSV2
C109504	Valve relay error
C002004	Return pump error
C007208	General valve error (high temperature protection, invalid signal, hardware fault)
C104C04	PATA switch error

DTC	DTC information
C121208	Variable code error
C108C08	Reverse gear switch signal normally high/low
U015504	Lose contact with instrument
U042308	Data from IC invalid (the data length control, CRC, real time counter error)
U014004	Lose contact with BCM
U014008	BCM data invalid (the data length control, CRC, real time counter error)
U010004	Lose communication with EMS1
U030104	Lose communication with EMS2
U010008	EMS data broken (data length control, cyclic redundancy code verification, real-time counter error /EMS signal invalid)
U010104	Lose contact with TCU1
U030204	Lose contact with TCU2
U010108	TCU data broken (data length control, cyclic redundancy code verification, real-time counter error /EMS signal invalid)

DTC diagnosis flow index

DTC	Description	Diagnostic process
C003108	Front left wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)	Refer to: DTC C003108, C003200, C00A000, C00A100, C00A900, C003408, C003500, C00A200, C00A300, C00AA00, C003708, C003800, C00A400, C00A500, C00AB00, C003A08, C003B00, C00A600, C00A700, C00AC00, C109904
C003200	Front left wheel speed sensor: signal line short to ground/open circuit: power line open circuit	
C00A000	Front left wheel speed sensor power line short to ground	
C00A100	Front left wheel speed sensor signal line short to battery	
C00A900	Front left wheel speed sensor common error	
C003408	Front right wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)	
C003500	Front right wheel speed sensor: signal line short to ground/open circuit: power line open circuit	
C00A200	Front right wheel speed sensor power line short to ground	
C00A300	Front right wheel speed sensor signal line short to battery	
C00AA00	Front right wheel speed sensor common error	
C003708	Rear left wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)	
C003800	Rear left wheel speed sensor: signal line short to ground/ open circuit: power line open circuit	
C00A400	Rear left wheel speed sensor power line short to ground	
C00A500	Rear left wheel speed sensor signal line short to battery	
C00AB00	Rear left wheel speed sensor common error	
C003A08	Rear right wheel speed sensor signal error (off-limit, loss, disturbance, discontinuity)	
C003B00	Rear right wheel speed sensor: signal line short to ground/open circuit: power line open circuit	
C00A600	Rear right wheel speed sensor power line short to ground	
C00A700	Rear right wheel speed sensor signal line short to battery	
C00AC00	Rear right wheel speed sensor common error	
C004460	Pressure sensor error (signal)	Refer to: DTC C004460, C004510
C004510	Pressure sensor error (line)	
C00400	Braking light switch error, not clear	Refer to: DTC C0040

DTC	Description	Diagnostic process
C190004	ECU voltage high	**Refer to: DTC C190004, C190104**
C190104	ECU voltage too low	
C100004	ECU error (hardware, microcontroller error)	**Refer to: DTC C100004, C101008, C006B06**
C101008	ECU error (common software problem)	
C006B06	ABS/ESP abnormal control (too long control time etc.)	
C006108	Transverse acceleration sensor: signal error	**Refer to: DTC C006108, C006208**
C006208	Longitudinal acceleration sensor: signal error	
C006308	Yaw rate sensor:Signal error	**Refer to: DTC C006308, C019604, C00A800, C006102, C006202, C006302, U012308, U051308**
C019604	Yaw rate sensor group variety error (hardware fault, temperature, range, internal error)	
C00A800	Yaw rate sensor group variety calibrated or calibration failure	
C006102	Lateral acceleration sensor of external yaw rate sensor cluster: signal error	
C006202	Longitudinal acceleration sensor of external yaw rate sensor cluster: signal error	
C006302	Yaw rate sensor of external yaw rate sensor cluster: signal error	
U012308	Lose contact with yaw rate sensor module	
U051308	Invalid data from yaw rate sensor module	
U000500	CAN bus voltage high	**Refer to: DTC C100104, U000500, U000700, U000104, U100104**
U000700	CAN bus voltage too low	
C100104	CAN hardware error	
U000104	CAN bus close error	
U100104	CAN passive error	
C106600	Steering angle sensor calibrate error	**Refer to: DTC C106600, C046008, U012604, U012608**
C046008	Steering angle sensor error (signal)	
U012604	Lose contact with steering angle sensor	
U012608	SAS data broken (the data length control, CRC, real time counter error)	

DTC	Description	Diagnostic process
C001004	Valve error, front left inlet valve	Refer to: DTC C001004, C001104, C001404, C001504, C001804, C001904, C001C04, C001D04, C000104, C000204, C000304, C000404, C109504, C002004, C007208
C001104	Valve error, front left outlet valve	
C001404	Valve error, front right inlet valve	
C001504	Valve error, front right outlet valve	
C001804	Valve error, front left inlet valve	
C001904	Valve error, front left outlet valve	
C001C04	Valve error, rear right inlet valve	
C001D04	Valve error, rear right outlet valve	
C000104	Valve error, USV1	
C000204	Valve error, USV2	
C000304	Valve error, HSV1	
C000404	Valve error, HSV2	
C109504	Valve relay error	
C002004	Return pump error	
C007208	General valve error (high temperature protection, invalid signal, hardware fault)	
C104C04	PATA switch error	Refer to: DTC C104C04
C108C08	Reverse gear switch signal normally high/low	Refer to: DTC C108C08
C121208	Variable code error	Refer to: DTC C121208, U015504, U042308, U014004, U014008, U010004, U030104, U010008, U010104, U030204, U010108
U015504	Lose contact with instrument	
U042308	Data from IC invalid (the data length control, CRC, real time counter error)	
U014004	Lose contact with BCM	
U014008	BCM data invalid (the data length control, CRC, real time counter error)	
U010004	Lose communication with EMS1	
U030104	Lose communication with EMS2	
U010008	EMS data broken (data length control, cyclic redundancy code verification, real-time counter error /EMS signal invalid)	
U010104	Lose contact with TCU1	
U030204	Lose contact with TCU2	
U010108	TCU data broken (data length control, cyclic redundancy code verification, real-time counter error /EMS signal invalid)	

DTC C190004,C190104

DTC description

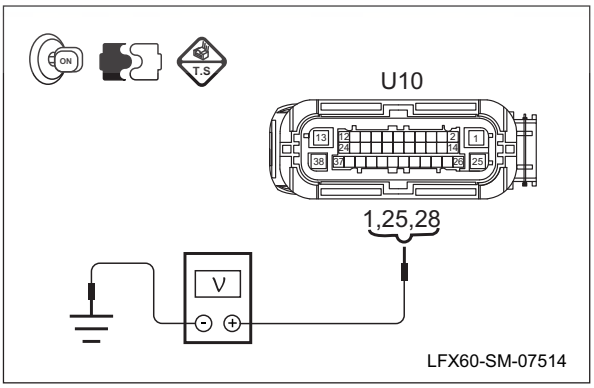
DTC	Description	Definition
C190004	• ECU voltage too high	• ECU working voltage abnormal
C190104	• ECU voltage too low	

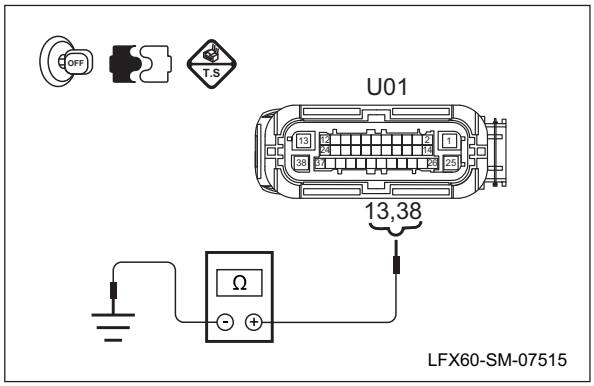
Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C190004	• Hardware and line	• Power supply voltage of hydraulic control unit higher than normal working range	• Charge system • ECU power line • ECU
C190104		• Power supply voltage of hydraulic control unit lower than normal working range	

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check if the relevant harness plugs are broken, in poor contact, aged, loose, etc. **Is** it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and clear BCM DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Check the power supply system of vehicle.	
	A. Check whether the power supply system of vehicle is normal. Is it OK after checking? →**Yes** To step 5. →**No** Check the power supply system for fault.
5. Check the ABS/ESP fuse.	
	A. Check the fuse SB08, FS21 and FS22. **Fuse rated capacity: SB08(40 A), FS21(25 A) and FS22(10A)** Is the fuse normal? →**Yes** To step 6. →**No** Replace the fuse.
6. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 7. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
7. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative cable. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 8. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
8. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C100004, C101008, C006B06

DTC description

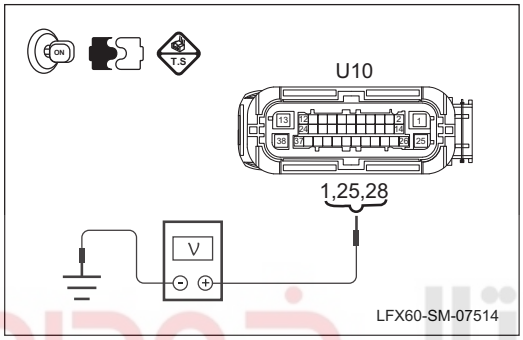
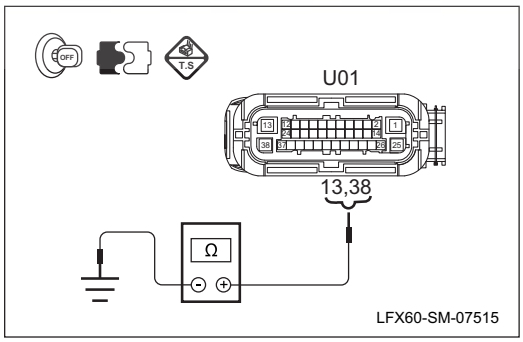
DTC	Description	Definition
C100004	• ECU error (hardware, microcontroller error)	• ECU error
C101008	• ECU error (common software problem)	
C006B06	• ABS/ESP abnormal control (too long control time etc.)	

Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C100004	• Hardware and line	• ECU error	• ECU power line • ECU
C101008			
C006B06			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnosis equipment to eliminate ABS error code. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 5. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
5. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative cable. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 6. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
6. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C003108, C003200, C00A000, C00A100, C00A900, C003408, C003500, C00A200, C00A300, C00AA00, C003708, C003800, C00A400, C00A500, C00AB00, C003A08, C003B00, C00A600, C00A700, C00AC00, C109904

DTC description

DTC	Description	Definition
C003108	• Left front wheel speed sensor signal error (exceeding the range, missed, interfered, discontinuous)	• Wheel speed sensor signal error
C003200	• Left front wheel speed sensor: signal circuit short/open to ground, power supply circuit open	• Wheel speed sensor line fault
C00A000	• Power supply circuit of left front wheel speed sensor short to ground	
C00A100	• Left front wheel speed sensor circuit short to the battery	
C00A900	• General error of left front wheel speed sensor	
C003408	• Right front wheel speed sensor signal error (exceeding the range, missed, interfered, discontinuous)	• Wheel speed sensor signal error
C003500	• Right front wheel speed sensor: signal circuit short/open to ground, power supply circuit open	• Wheel speed sensor circuit error
C00A200	• Power supply circuit of right front wheel speed sensor short to ground	
C00A300	• Right front wheel speed sensor circuit short to the battery	
C00AA00	• General error of right front wheel speed sensor	
C003708	• Left rear wheel speed sensor signal error (exceeding the range, missed, interfered, discontinuous)	• Wheel speed sensor signal error
C003800	• Left rear wheel speed sensor: signal circuit short/open to ground, power supply circuit open	• Wheel speed sensor line fault
C00A400	• Power supply circuit of left rear wheel speed sensor short to ground	
C00A500	• Left rear wheel speed sensor circuit short to the battery	
C00AB00	• General error of left front wheel speed sensor	
C003A08	• Right rear wheel speed sensor signal error (exceeding the range, missed, interfered, discontinuous)	• Wheel speed sensor signal error
C003B00	• Right rear wheel speed sensor: signal circuit short/open to ground, power supply circuit open	• Wheel speed sensor line fault
C00A600	• Power supply circuit of right rear wheel speed sensor short to ground	
C00A700	• Right rear wheel speed sensor circuit short to the battery	
C00AC00	• General error of right rear wheel speed sensor	
C109904	• Wheel speed sensor general error (sensor position exchanged, multiple sensor errors)	

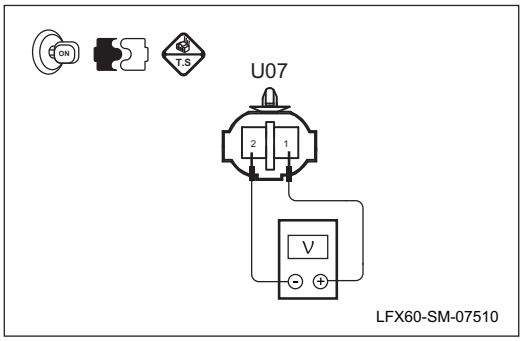
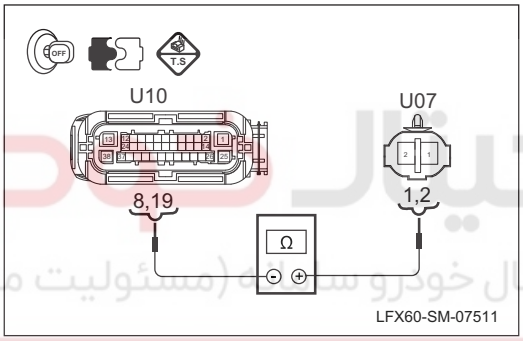
Possible reasons

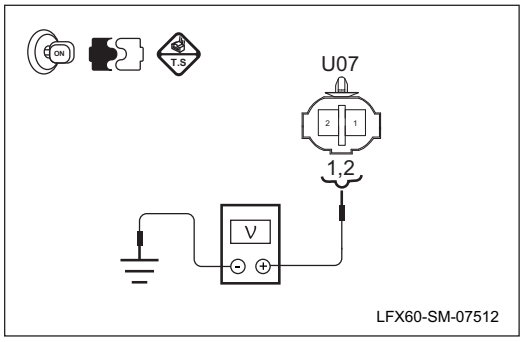
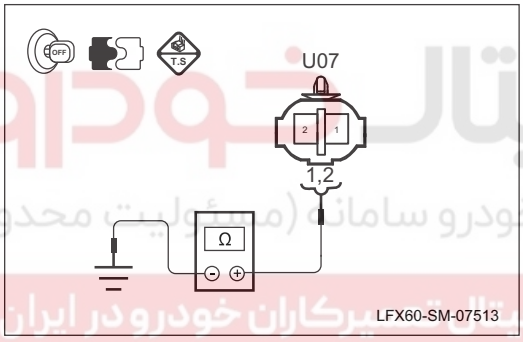
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C003108	• Hardware and line	• Exceed the maximum speed • No left front wheel speed signal in the monitoring time when the speed more than 43.2kph. • Accelerate from static to 12kph, left front wheel speed is missing. • Accelerate from static to 18kph, left front wheel speed is missing once • Interference in left front wheel speed and signal interference.	• Left front wheel speed sensor • Line
C003200		• Left front sensor signal circuit short to ground or circuit open	• Line
C00A000		• Left front wheel sensor signal circuit connecting to ground	
C00A100		• Left front wheel sensor signal circuit connecting to battery	
C00A900		• Left front wheel sensor circuit error (no exact reason found)	
C003408	• Circuit and hardware	• Exceed the maximum speed • No right front wheel speed signal in the monitoring time when the speed more than 43.2kph. • Accelerate from static to 12kph, right front wheel speed is missing. • Accelerate from static to 18kph, right front wheel speed is missing once • Interference in right front wheel speed and signal interference.	• Right front wheel speed sensor • Line
C003500		• Right front sensor signal circuit short to ground or circuit open	• Line
C00A200		• Right front wheel sensor signal circuit connecting to ground	
C00A300		• Right front wheel sensor signal circuit connecting to battery	
C00AA00		• Right front wheel sensor circuit error (no exact reason found)	

DTC	Check the strategy	Set the condition (control strategy)	Definition of Error
C003708	• Circuit and hardware	• Exceed the maximum speed • No left rear wheel speed signal in the monitoring time when the speed more than 43.2kph. • Accelerate from static to 12kph, left rear wheel speed is missing. • Accelerate from static to 12kph, left rear wheel speed is missing once • Interference in left rear wheel speed and signal interference.	• Left rear wheel speed sensor • Line
C003800		• Left rear sensor signal circuit short to ground or circuit open	• Line
C00A400		• Left rear wheel sensor signal circuit connecting to ground	
C00A500		• Left rear wheel sensor signal circuit connecting to battery	
C00AB00		• Left rear wheel sensor circuit error (no exact reason found)	
C003A08		• Exceed the maximum speed • No right rear wheel speed signal in the monitoring time when the speed more than 43.2kph. • Accelerate from static to 12kph, right rear wheel speed is missing. • Accelerate from static to 18kph, right rear wheel speed is missing once • Interference in right rear wheel speed and signal interference.	• Right rear wheel speed sensor • Line
C003B00	• Circuit and hardware	• Right rear sensor signal circuit short to ground or circuit open	• Line
C00A600		• Right rear wheel sensor signal circuit connecting to ground	
C00A700		• Right rear wheel sensor signal circuit connecting to battery	
C00AC00		• Right rear wheel sensor circuit error (no exact reason found)	
C109904		• Hardware error	• Wheel speed sensor

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check if the relevant harness plugs are broken, in poor contact, aged, loose, etc. Check if the wheel speed sensor is broken obviously. B. Check if the appearance of gear ring is broken, covered with dust and mud. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.

Test condition	Details/results/measures
4. Check the working voltage of left front wheel speed sensor (left front wheel for example).	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the front left wheel speed sensor U07. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between No.1 and 2 terminals of left front wheel speed sensor U07 with a multimeter. **Standard value: 4.5 ~ 5.5 V** Is the voltage normal? →**No** To step 5. →**Yes** Replace the left front wheel speed sensor. **Refer to: Replacement of Front Wheel Sensor**
5. Check the continuity of speed sensor signal circuit of left front wheel.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Left front wheel speed sensor U07 E. Measure the resistance between No.19 terminal of ABS/ESP harness plug U10 and No.1 terminal of left front wheel speed sensor U07 a multimeter. **Standard value: less than 5Ω** F. Measure the resistance between No.8 terminal of ABS/ESP harness plug U10 and No.2 terminal of left front wheel speed sensor U07 a multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 6. →**No** Check if there is an open circuit in the speed sensor signal circuit of left front wheel.If necessary, replace the harness.

Test condition	Details/results/measures
6. Check if there is a short circuit between the speed sensor signal circuit of left front wheel and power supply.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the front left wheel speed sensor U07. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between No.1 and 2 terminals of left front wheel speed sensor U07 and the reliable grounding with a multimeter. **Standard value: 0 V** Is the voltage normal? **→Yes** To step 7. **→No** Check if there is a short circuit between the speed sensor signal circuit of left front wheel and the power supply. If necessary, replace the harness.
7. Check if there is a short circuit between the speed sensor signal circuit of left front wheel and the grounding.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the front left wheel speed sensor U07. D. Measure the resistance between No.1 and 2 terminals of left front wheel speed sensor U07 and the reliable grounding with a multimeter. **Standard value: 10MΩ or higher** Is the resistance normal? **→Yes** To step 8. **→No** Check if there is a short circuit between the speed sensor signal circuit of left front wheel and the grounding. If necessary, replace the harness.
8. Check the ABS/ESP power line.	

Test condition	Details/results/measures
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 9. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
9. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative cable. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 10. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
10. Replace the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C004460, C004510

DTC description

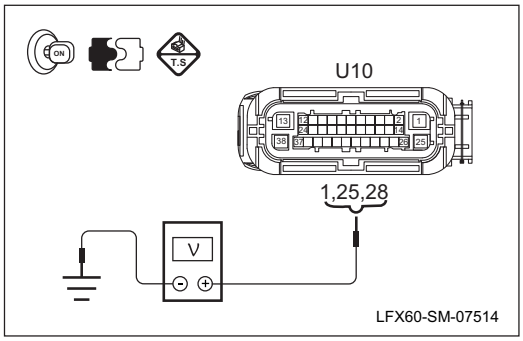
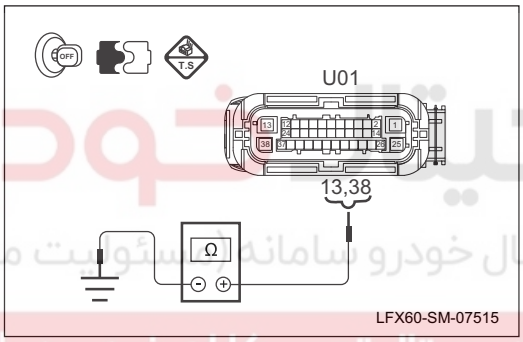
DTC	Description	Definition
C004460	• Pressure sensor error (signal)	• Pressure sensor • Line
C004510	• Pressure sensor error (circuit)	

Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C004460	• Hardware and circuit	• Pressure sensor defective	• Pressure sensor • Line
C004510		• Master cylinder circuit 1 of pressure sensor error	

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Fix the problem.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnosis equipment and enter the ESP diagnositic system to eliminate the error code. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.

Test condition	Details/results/measures
4. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 5. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
5. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative cable. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 6. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
6. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C004008

DTC description

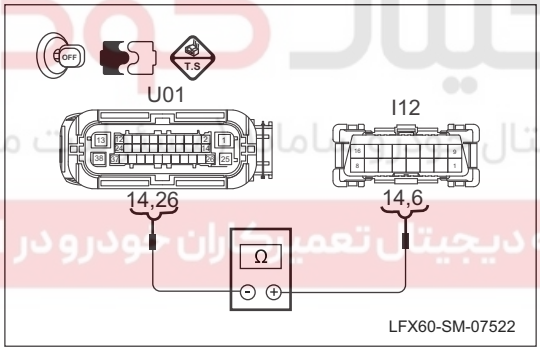
DTC	Description	Definition
C004008	• Braking light switch wrong: signal not clear	• Braking switch error

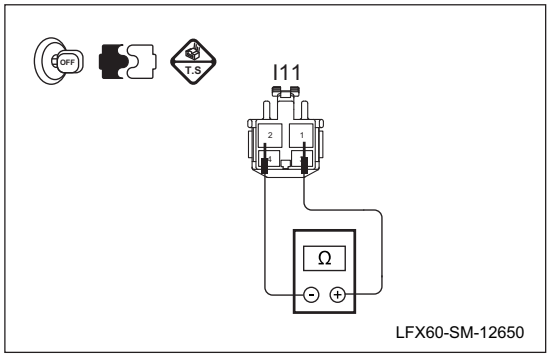
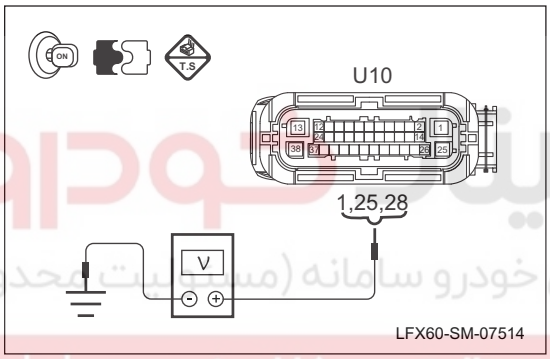
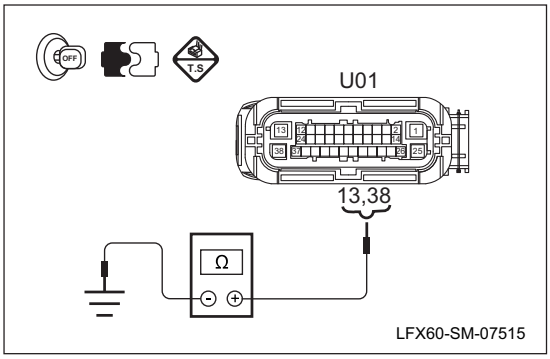
Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C004008	• Hardware and circuit	• Hardware and line • Pressure signal is set up without any hardware signal position. In the meanwhile no pump is working. • Pressure signal higher than threshold and no BLS hardware position • Air pedal treaded without active control, BLS signal position. • Too long time for braking light switch and throttle pedal setting up at the same time	• Line • Braking light switch • ABS/ESP module

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. B. Check if the clearance of braking light switch is within the normal range. Is it OK after checking? →**Yes** To step 2. →**No** Repair and replace the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnosis equipment and enter into ABS to eliminate the error code. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No.** System normal.
4. Check the fuse.	
	A. Check the stop lamp switch fuse FS10 and FS11. **Fuse rated capacity: FS10(10 A), FS11(15 A)** Is it OK after checking? →**Yes** To step 5. →**No** Replace the fuse.
5. Check the stop lamp switch power line.	
	A. Operate the start switch to set the power mode to the "OFF" state. B. Disconnect the battery negative connector. C. Disconnect the stop lamp switch harness plug I11. D. Connect the battery negative terminal. E. Measure the voltage between the brake switch harness plug I11 terminal 2 and fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 6. →**No** Check if there is any problem in the power supply circuit of braking light switch. If necessary, replace the harness.

Test condition	Details/results/measures
6. Check the stop lamp switch.	
	A. Operate the start switch to set the power mode to the "OFF" state. B. Disconnect the battery negative connector. C. Disconnect the stop lamp switch harness plug I11. D. Depress the brake pedal and measure the resistance between the brake switch terminal 1 and 2 with the multimeter. **Standard value: less than 1Ω** Is the resistance normal? **→Yes** To step 7. **→No** Replace the brake light switch. **Refer to: Replacement of Braking Light Switch**
7. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Start the switch to turn the power to ON mode. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? **→Yes** To step 8. **→No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
8. Check the grounding circuit of ABS/ESP control module	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative cable. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? **→Yes** To step 9. **→No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
9. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C006108, C006208

DTC description

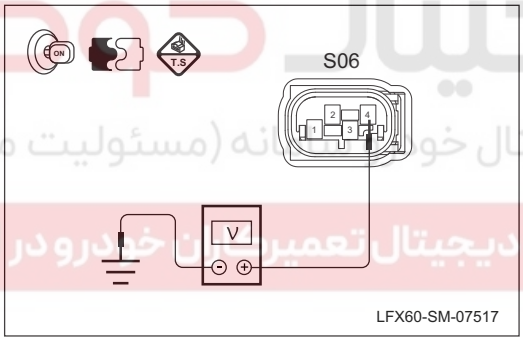
DTC	Description	Definition
C006108	• Transverse acceleration sensor: signal error	• Transverse acceleration sensor signal abnormal
C006208	• Longitudinal acceleration sensor: signal error	• Longitudinal acceleration sensor signal abnormal

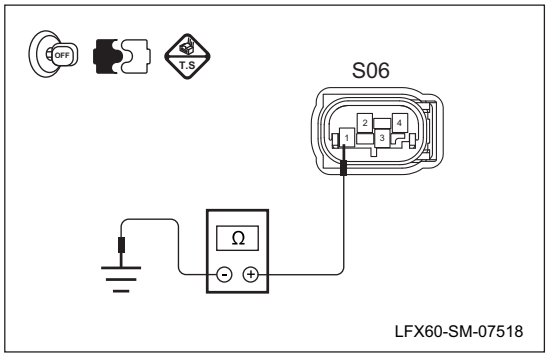
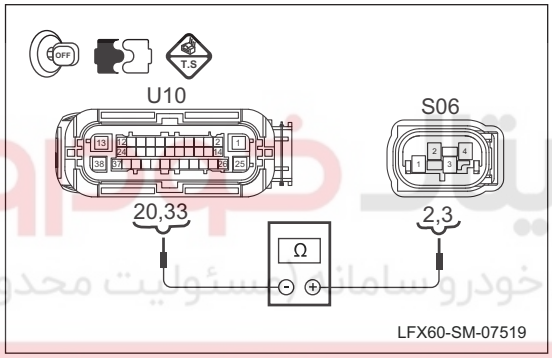
Possible reasons

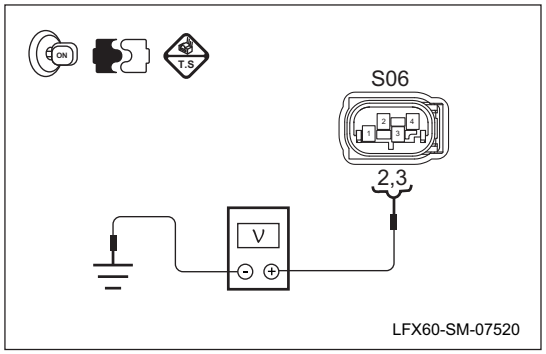
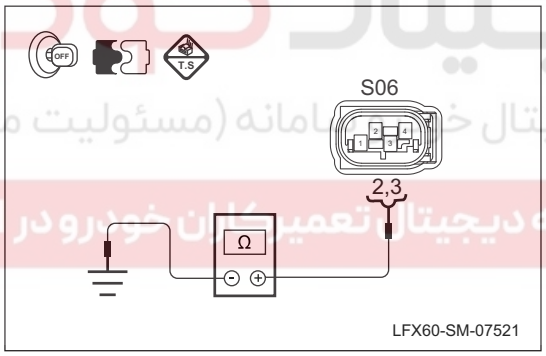
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C006108	• Hardware and line	• Transverse acceleration offset exceeding threshold (2.25m/s²)	• Line • Acceleration sensor • ABS/ESP control module
C006208		• Longitudinal acceleration offset exceeding threshold (2.25m/s²)	

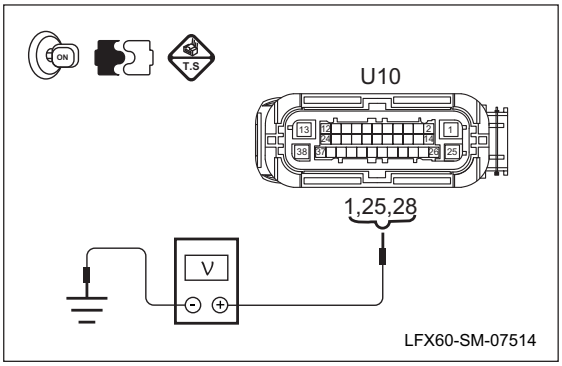
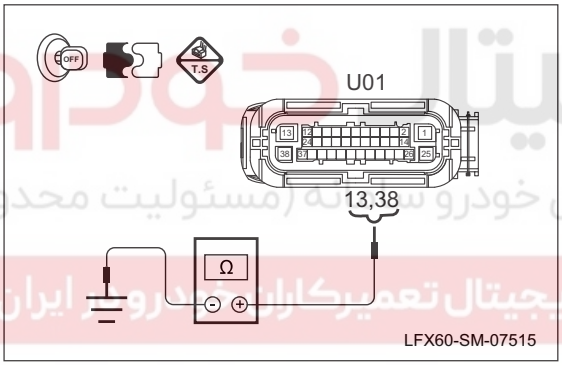
Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Check the sway sensor fuse.	
	A. Check the fuse FS22. **Fuse rated capacity: 10A** Is the fuse normal? →**Yes** To step 5. →**No** Replace the fuse.
5. Check the sway sensor power line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the sway sensor harness plug S06. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the sway sensor harness plug S06 terminal 4 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 6. →**No** Repair the sway sensor power line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
6. Check the sway sensor ground line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative cable. C. Disconnect the sway sensor harness plug S06. D. Measure the resistance between the sway sensor harness plug S06 terminal 1 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 7. →**No** Repair the sway sensor ground line open circuit fault and replace the harness if necessary.
7. Check the conductivity of sway sensor signal line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Disconnect the sway sensor harness plug S06. E. Measure the resistance between the ABS/ESP harness plug U10 terminal 20 and the sway sensor harness plug S06 terminal 2 with the multimeter. **Standard value: less than 5Ω** F. Measure the resistance between the ABS/ESP harness plug U10 terminal 33 and the sway sensor harness plug S06 terminal 3 with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 8. →**No** Repair the sway sensor signal line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
8. Check the sway sensor signal line and power for short circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the sway sensor harness plug S06. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the sway sensor harness plug S06 terminal 2, 3 and the fixed ground point with the multimeter. **Standard value: 0 V** Is the voltage normal? →**Yes** To step 9. →**No** Check if there is a short circuit between the sensor signal circuit and power supply. If necessary, replace the harness. Wire harness
9. Check the sway sensor signal line and ground for short circuit.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the sway sensor harness plug S06. D. Measure the resistance between the sway sensor harness plug S06 terminal 2, 3 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the voltage normal? →**Yes** To step 10. →**NO** Repair the sway sensor signal line and ground short circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
10. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 11. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
11. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 12. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
12. Check the sway sensor.	
	A. Replace the sway sensor. **Refer to: replacement of the sway sensor** Is the fault solved? →**Yes** Replace the sway sensor. →**No** To step 13.
13. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C006308, C019604, C00A800, C006102, C006202, C006302, U012308, U051308

DTC description

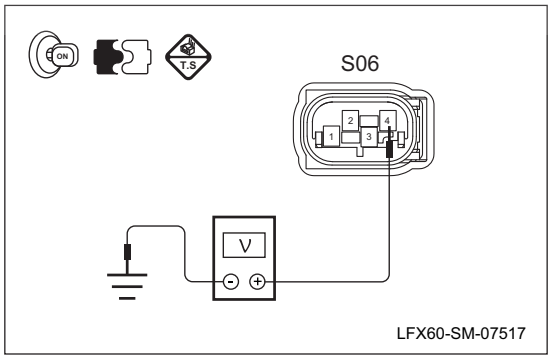
DTC	Description	Definition
C006308	• Yaw rate sensor:Signal error	• Signal error
C019604	• Yaw rate sensor group variety error (hardware fault, temperature, range, internal error)	
C00A800	• Yaw rate sensor group variety calibrated or calibration failure	• Sensor calibration error
C006102	• Lateral acceleration sensor of external yaw rate sensor cluster: signal error	• Signal error
C006202	• Longitudinal acceleration sensor of external yaw rate sensor cluster: signal error	
C006302	• Yaw rate sensor of external yaw rate sensor cluster: signal error	
U012308	• Lose contact with yaw rate sensor module	• Invalid signal
U051308	• Invalid data from yaw rate sensor module	

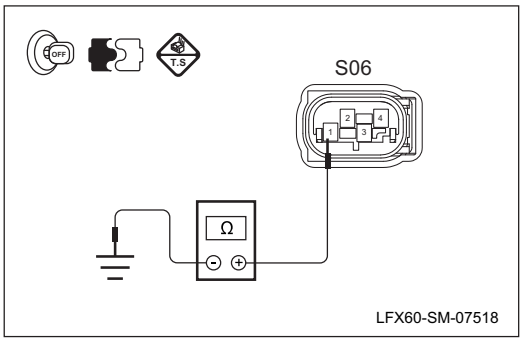
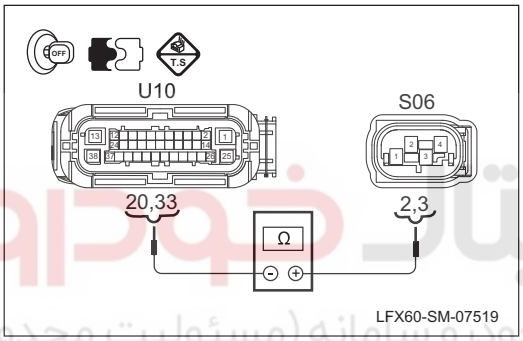
Possible reasons

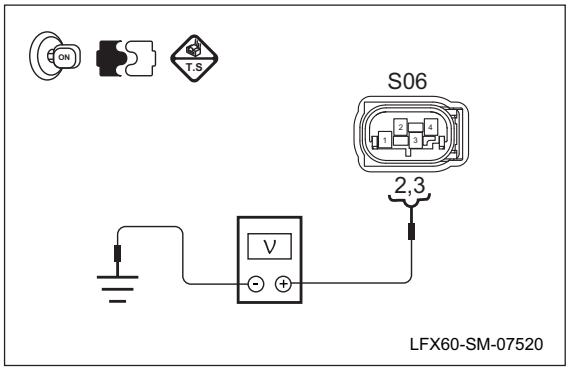
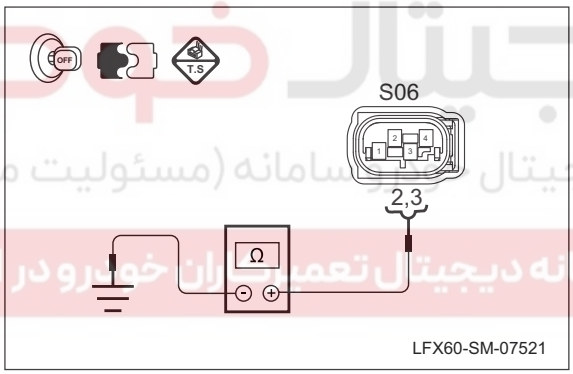
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C006308	• Hardware and line	• Yaw rate sensor absolute value more than 30°/s at prohibition • Yaw rate sensor absolute value more than 94.75°/s at any time • Comparing measured yaw rate and calculted yaw rate from other sensor signal, seems unauthentic	• Sensor • ABS/ESP module
C019604		• Yaw rate sensor receives demand information ID0 smaller than 4ms frequency from ECU	• Sensor • ABS/ESP module
C00A800		• Vehicle not at the level when calibrating, wrong hardware assembly, sensor offset error • When calibrating; Receiving 10 wrong longitudinal acceleration values	• Sensor • ABS/ESP module
C006102		• Lateral acceleration sensor invalid	• Sensor • ABS/ESP module
C006202		• Longitudinal acceleration sensor invalid	• Sensor • ABS/ESP module
C006302		• Yaw rate sensor invalid	• Sensor • ABS/ESP module
U012308		• Data not received	• Line • Sensor • ABS/ESP module
U051308		• Received data invalid	• Sensor • ABS/ESP module

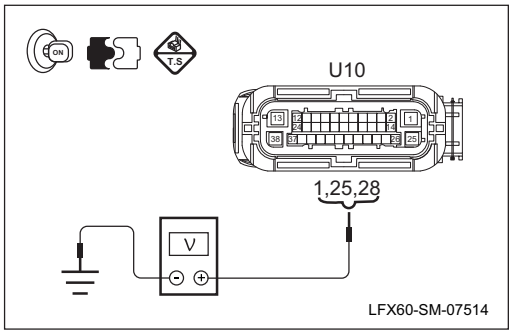
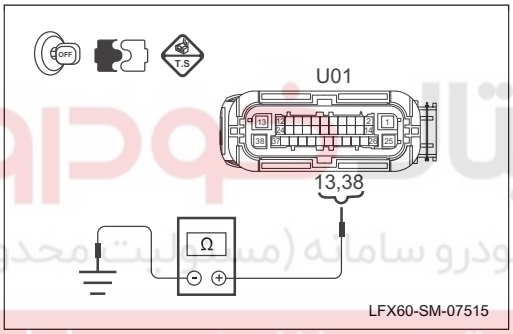
Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.

Test condition	Details/results/measures
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Check the sway sensor fuse.	
	A. Check the fuse FS22. **Fuse rated capacity: 10A** Is the fuse normal? →**Yes** To step 5. →**No** Replace the fuse.
5. Check the sway sensor power line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the sway sensor harness plug S06. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the sway sensor harness plug S06 terminal 4 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 6. →**No** Repair the sway sensor power line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
6. Check the sway sensor ground line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the sway sensor harness plug S06. D. Measure the resistance between the sway sensor harness plug S06 terminal 1 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is it OK after checking? **→Yes** To step 7. **→No** Repair the sway sensor ground line open circuit fault and replace the harness if necessary.
7. Check the conductivity of sway sensor signal line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative cable. C. Disconnect the ABS/ESP harness plug U10. D. Disconnect the sway sensor harness plug S06. E. Measure the resistance between the ABS/ESP harness plug U10 terminal 20 and the sway sensor harness plug S06 terminal 2 with the multimeter. **Standard value: less than 5Ω** F. Measure the resistance between the ABS/ESP harness plug U10 terminal 33 and the sway sensor harness plug S06 terminal 3 with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? **→Yes** To step 8. **→No** Repair the sway sensor signal line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
8. Check the sway sensor signal line and power for short circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the sway sensor harness plug S06. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the sway sensor harness plug S06 terminal 2, 3 and the fixed ground point with the multimeter. **Standard value: 0 V** Is the voltage normal? **→Yes** To step 9. **→No** Check if there is a short circuit between the Yaw rate sensor signal circuit and power supply. If necessary, replace the harness.
9. Check the sway sensor signal line and ground for short circuit.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the sway sensor harness plug S06. D. Measure the resistance between the sway sensor harness plug S06 terminal 2, 3 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the voltage normal? **→Yes** To step 10. **→No** Repair the sway sensor signal line and ground short circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
10. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 11. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
11. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative cable. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 12. →**No** Check if there is an open circuit in the ABS/ESP grounding circuit. If necessary, replace the harness.
12. Check the sway sensor.	
	A. Replace the sway sensor. **Refer to: replacement of the sway sensor** Is the fault solved? →**Yes** Replace the sway sensor. →**No** To step 13.
13. Replace the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C100104, U000500, U000700, U000104, U100104

DTC description

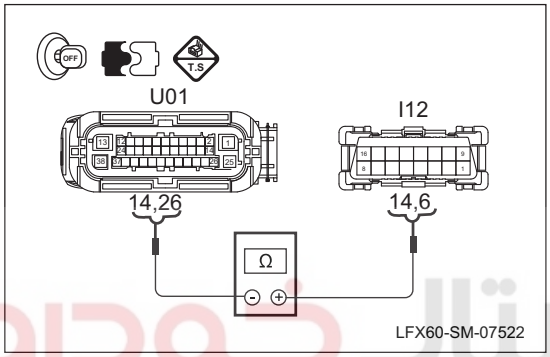
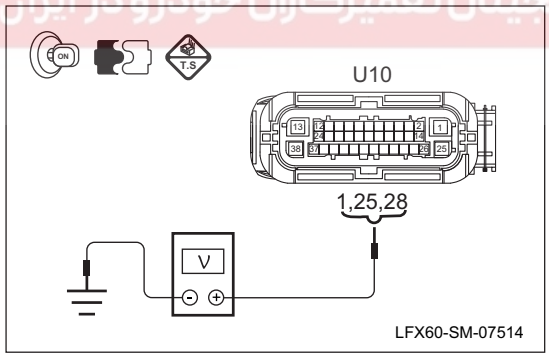
DTC	Description	Definition
C100104	• CAN hardware error	• CAN network communication circuit abnormal
U000500	• CAN bus voltage too high	
U000700	• CAN bus voltage too low	
U000104	• CAN bus off error	
U100104	• CAN passive error	

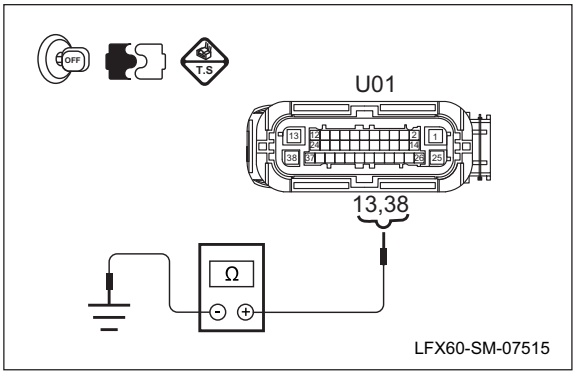
Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C100104	• Hardware and line	• CAN bus commnunication abnormal	• CAN bus • ABS/ESP module
U000500			
U000700			
U000104			
U100104			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →Yes To step 2. →No Repair the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →Yes To step 3. →No Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS / ESP to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Check the CAN bus.	
	A. Operate the ignition switch to turn the power to ON state. B. Disconnect the battery negative connector. C. Disconnect the plug U10 of ABS/ESP harness. D. Measure the resistance between No.6 and 14 terminals of diagnosis interface 112 and No.26 and 14 terminals of ABS/ESP harness plug with a multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 5. →**No** Check if there is a short circuit between the CAN bus and power supply. If necessary, replace the harness.
5. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal. E. Perform the ignition to let the power mode to “ON” F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 6. →**No** Check if there is an open circuit in the power supply circuit of ABS/ESP. If necessary, replace the harness.

Test condition	Details/results/measures
6. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? **→Yes** To step 7. **→No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
7. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

07

DTC C106600, C046008, U012604, U012608

DTC description

DTC	Description	Definition
C106600	• Steering angle sensor calibrate error	• Sensor calibration error
C046008	• Steering angle sensor error (signal)	• Sensor signal serror
U012604	• Lose contact with steering angle sensor	• Angle sensor not found.
U012608	• SAS data broken (the data length control, CRC, real time counter error)	• Data abnormal

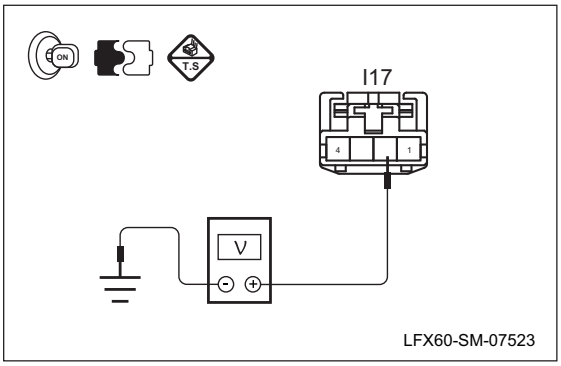
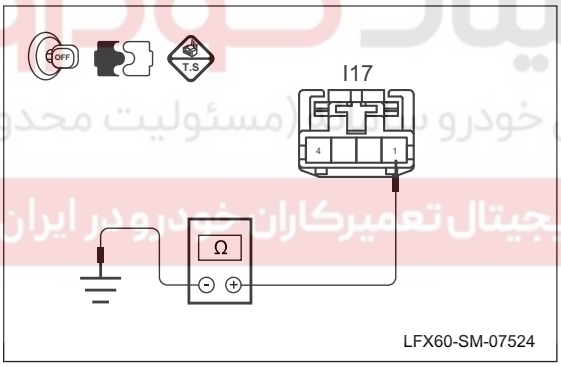
Possible reasons

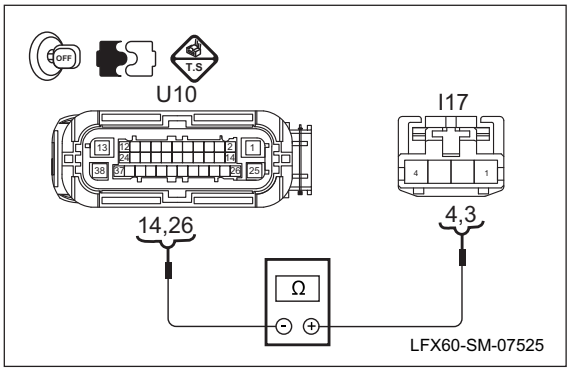
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C106600	• Hardware and line	• Received value from Calibration status signal of angle sensor is “not calibrated”	• ABS/ESP module
C046008		• Angle sensor offset exceeding limit(15°) • Unauthentic signal obliquity	• Sensor • ABS/ESP module
U012604		• CAN information from SAS not received by ESP.	• CAN bus • ABS/ESP module
U012608		• Angle sensor data broken and received by ESP. (the data length control, CRC, real time counter error)	• Sensor • ABS/ESP module

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.

Test condition	Details/results/measures
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS / ESP system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Calibrate the angle sensor.	
	A. Connect the diagnostic equipment. B. Calibrate the angle sensor. Is the system normal? →**Yes** Calibrate the angle sensor. →**No** To step 5.
5. Check the fuse of angle sensor.	
	A. Check the fuse FS22. **Fuse rated capacity: 10A** Is the fuse normal? →**Yes** To step 6. →**No** Replace the fuse.

Test condition	Details/results/measures
6. Check the power supply circuit of angle sensor.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the steering angle sensor harness plug I17. D. Connect the battery negative terminal. E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage beween No.2 termianl of angle sensor harness plug 117 and the reliable groudning with a multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? **→Yes** To step 7. **→No** Check if there is an open circuit problem in the angle sensor power supply circuit. If necessary, replace the harness.
7. Check the grounding circuit of angle sensor.	
	A. vOperate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the steering angle sensor harness plug I17. D. Measure the resistance beween No.1 termianl of angle sensor harness plug 117 and the reliable groudning with a multimeter. **Standard value: less than 5Ω** Is the resistance normal? **→Yes** To step 8. **→No** Check if there is an open circuit problem in the angle sensor grounding circuit. If necessary, replace the harness.

Test condition	Details/results/measures
8. Check the CAN circuit of angle sensor.	
	A. Operate the ignition switch to turn the power to OFF state.. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10 and the angle sensor harness plug 117. D. Measure the resistance beween No.14 termianl of ABS/ESP harness plug U10 and No.4 terminal of angle sensor harness plug 117 with a multimeter. **Standard value: less than 5Ω** E. Measure the resistance beween No.26 termianl of ABS/ESP harness plug U10 and No.3 terminal of angle sensor harness plug 117 with a multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 8. →**No** Check if there is an open circuit problem in the angle sensor signal circuit. If necessary, replace the harness.
8. Check the angle sensor.	
	A. Replace the angle sensor. **Refer to: Replacement of Angle Sensor** Is the fault solved? →**Yes** Replace the angle sensor. →**No** To step 9.
9. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to: replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C001004, C001104, C001404, C001504, C001804, C001904, C001C04, C001D04, C000104, C000204, C000304, C000404, C109504, C002004, C007208

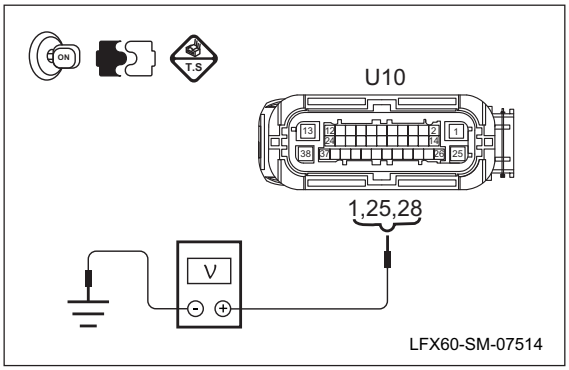
DTC description

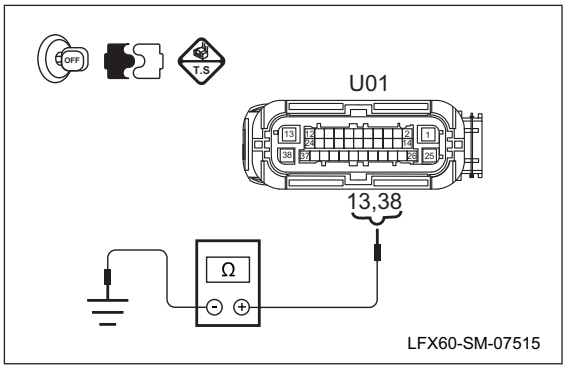
DTC	Description	Definition
C001004	• Valve error, front left inlet valve	• Feedback error of front left inlet valve
C001104	• Valve error, front left outlet valve	• Feedback error of front left outlet valve
C001404	• Valve error, front right inlet valve	• Feedback error of front right inlet valve
C001504	• Valve error, front right outlet valve	• Feedback error of front right outlet valve
C001804	• Valve error, front left inlet valve	• Feedback error of front left inlet valve
C001904	• Valve error, front left outlet valve	• Feedback error of front left outlet valve
C001C04	• Valve error, rear right inlet valve	• Feedback error of rear right inlet valve
C001D04	• Valve error, rear right outlet valve	• Feedback error of rear right outlet valve
C000104	• Valve error, USV1	• USV1 trouble feedback error
C000204	• Valve error, USV2	• USV2 trouble feedback error
C000304	• Valve error, HSV1	• HSV1 trouble feedback error
C000404	• Valve error, HSV2	• HSV2 trouble feedback error
C109504	• Valve relay error	• Relay error
C002004	• Return pump error	• Return pump error
C007208	• General valve error (Over temperature protection, signal invalid, hardware error)	• Valve error

Possible Cause

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C001004	• Hardware and line	• The left front inlet valve feedback by driven	• Line • ABS/ESP module
C001104		• The left front outlet valve feedback by driven	
C001404		• The right front inlet valve feedback by driven	
C001504		• The right front outlet valve feedback by driven	
C001804		• The left rear inlet valve feedback by driven	
C001904		• The left rear outlet valve feedback by driven	
C001C04		• The right rear inlet valve feedback by driven	
C001D04		• The right rear outlet valve feedback by driven	
C000104		• USV1 fault due to drive valve feedback	
C000204		• USV2 fault due to drive valve feedback	
C000304		• HSV1 fault due to drive valve feedback	
C000404		• HSV2 fault due to drive valve feedback	
C109504		• Relay relay does not switch on or Valve relay status displayed by valve relay status bit of MultiIC (multiple integrated circuits) is switched off	
C002004		• The drive line of internal motor relay interferes between uC (connecting cable) and ASIC (application specific integrated circuit) • Short circuit fault in the motor relay • Overload in the motor relay • Electrical fault in the motor circuit (eg motor interference, motor relay • Short circuit, ASIC (application specific integrated circuit) internal fault) • Damage to RFP due to over-temperature RFP (return pump) drive exceeds limits	
C007208		• Valve relay power supply circuit conversion resistance is too high, powerless power supply system, such as high current consumption or unstable supply voltage • The supply line of valve relay is interrupted. This may be due to a defective fuse bad or damage to the car cable, or the relay supply line is supplied with very appropriate low voltage • The activation time of valve exceeds the time permitted in the diagnostics	

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS / ESP to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 5. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
5. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: less than 5Ω** Is the resistance normal? →**Yes** To step 6. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
6. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to the replacement of ABS/ESP module** Confirm that the fault has been ruled out.

07

DTC C104C04

DTC description:

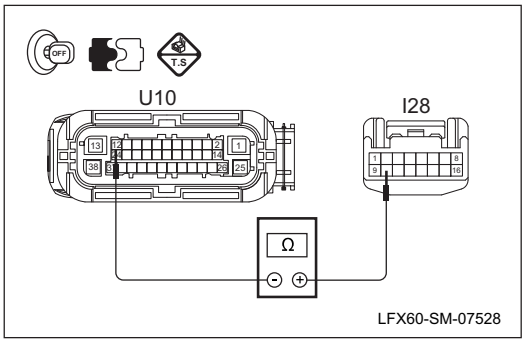
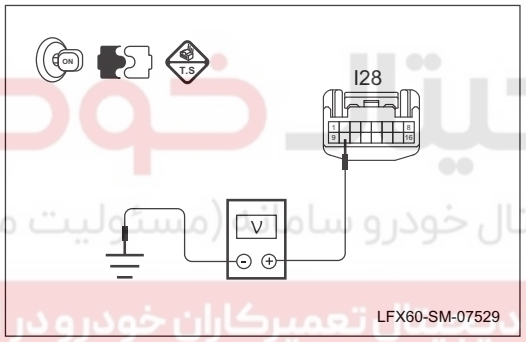
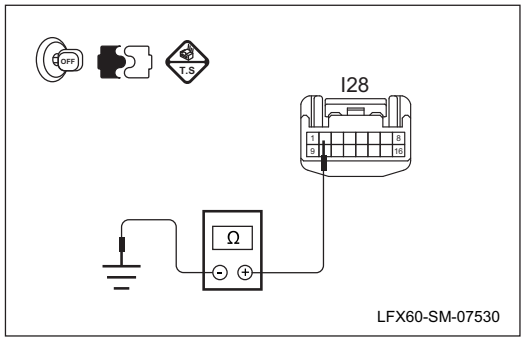
DTC	Description	Definition
C104C04	• PATA switch error	• Abnormal switch status

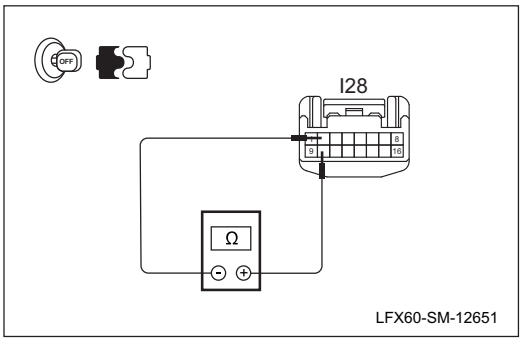
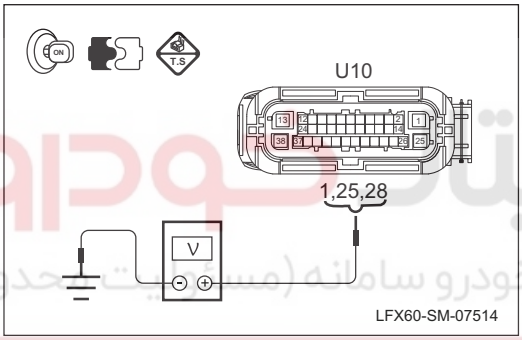
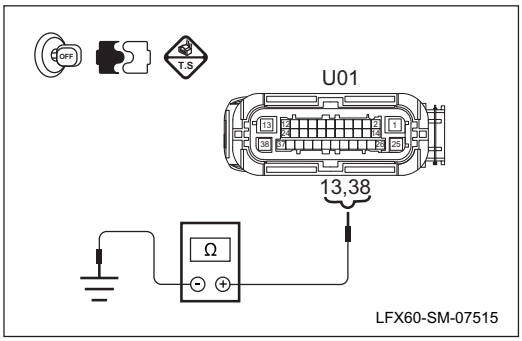
Possible Cause

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C104C04	• Hardware and line	• The PATA switch is pressed down for more than 10s	• Line • Dashboard switch • ABS/ESP module

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS /ESP system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.

Test condition	Details/results/measures
4. Check the continuity of the dashboard switch signal circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Disconnect the dashboard switch harness plug I28. E. Measure the resistance between the No. 12 terminal of the ABS / ESP harness plug U10 and the No. 10 terminal of the dashboard switch harness plug I28 with a multimeter. Standard value: Less than 5Ω Is it OK after checking? →Yes To step 5. →No Check the dashboard switch signal circuit for open circuit failure, and replace the wiring harness if necessary.
5. Check the dashboard switch signal circuit and power supply for short circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the dashboard switch harness plug I28. D. Connect the battery negative terminal E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between No. 10 terminal of the harness plug I28 of the dashboard switch and the reliable grounding with a multimeter. Standard value: 0 V Is it OK after checking? →Yes To step 6. →No Check the dashboard switch signal circuit and power supply for short circuit failure, and replace the wiring harness if necessary.
6. Check the dashboard switch ground line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the dashboard switch harness plug I28. D. Measure the resistance between No. 2 terminal of the harness plug I28 of the dashboard switch and the reliable grounding with a multimeter. Standard value: Less than1Ω Is it OK after checking? →Yes To step 7. →No Check the dashboard switch grounding circuit for open circuit failure, and replace the wiring harness if necessary.

Test condition	Details/results/measures
7. Check the dashboard switch.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the dashboard switch harness plug I28. D. Press down the dashboard switch, and measure the resistance between No. 2 and No. 10 terminal of the dashboard switch I28 with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 8. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
8. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is it OK after checking? →**Yes** To step 9. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
9. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 10. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
10. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to the replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C108C08

DTC description

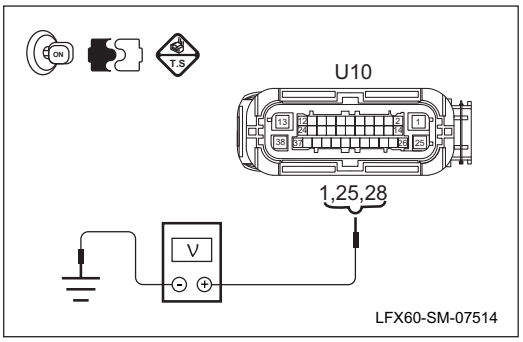
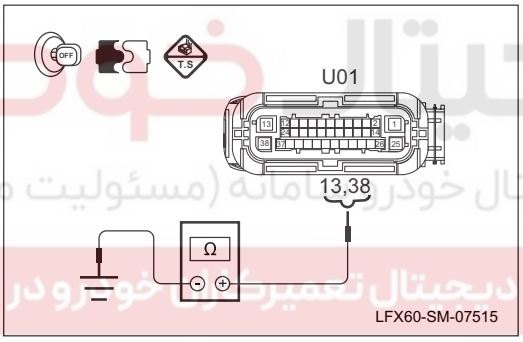
DTC	Description	Definition
C108C08	• Reverse switch signal is permanently high / low	• Abnormal reverse switch signal

Possible Cause

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C108C08	• Hardware and line	• The reverse signal displays "in use" for 20s at speeds greater than 40 km / d	• CAN line • Reverse switch • ABS/ESP module

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic tool to check if the ECM / TCU system has a fault in reverse switch signal. Does it exist? →**Yes** Jump to ECM / TCU system fault code diagnosis. →**No** To step 3.

Test condition	Details/results/measures
3. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the ABS/ESP harness plug U10 terminal 1, 25, 28 and the fixed ground point with the multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 4. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.
4. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: Less than 5Ω** Is it OK after checking? →**Yes** To step 5. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
5. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to the replacement of ABS/ESP module** Confirm that the fault has been ruled out.

DTC C121208, U015504, U042308, U014004, U014008, U010004, U030104, U010008, U010104, U030204, U010108

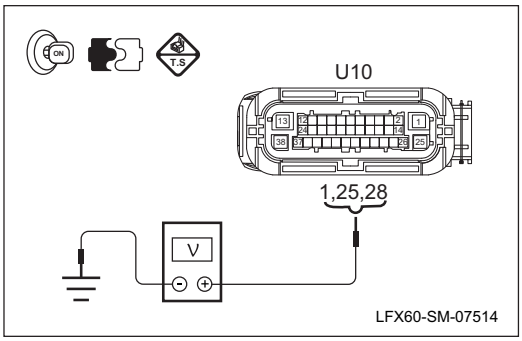
DTC description:

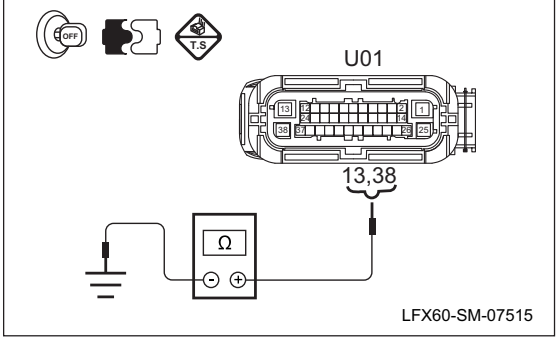
DTC	Description	Definition
C121208	• Incorrect variable code	• Module fault
U015504	• Lost contact with the dashboard	• Lost communication with the dashboard
U042308	• Data from IC invalid(the data length control, CRC, real time counter error)	• Invalid dashboard data received
U014004	• Lost contact with the BCM	• Lost communication with the BCM
U014008	• BCM data invalid (the data length control, CRC, real time counter error)	• Invalid BCM data received
U010004	• Lose contact with EMS1	• Lose communication with EMS1
U030104	• Lose contact with EMS2	• Lose communication with EMS2
U010008	• EMS data broken (data length control, cyclic redundancy code verification, real-time counter error /EMS signal invalid)	• EMS data broken
U010104	• Lose contact with TCU1	• Lose communication with TCU1
U030204	• Lose contact with TCU2	• Lose communication with TCU2
U010108	• TCU data broken(data length control, cyclic redundancy code verification, real-time counter error /TCU signal invalid)	• TCU data broken

Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
C121208	• Hardware and line	• (Electrically erasable read-only memory) is empty or invalid • (Electrically erasable read-only memory) has a problem	• Line • ABS/ESP module
U015504		• ESP does not receive CAN data from the dashboard	• CAN line • Dashboard • ABS/ESP module
U042308		• The data information of IC received by ESP is corrupted (the data length control, CRC, real time counter error)	
U014004		• SP does not receive CAN data from BCM (body control model)	• CAN line • BCM • ABS/ESP module
U014008		• The data information of BCM received by ESP is corrupted (the data length control, CRC, real time counter error)	
U010004		• CAN messages from EMS1 are not received by ESP	• CAN line • EMS1 • EMS2 • ABS/ESP module
U030104		• CAN messages from EMS2 are not received by ESP	
U010008		• The EMS information received by ESP is corrupted (data length control, cyclic redundancy check, real-time counter) or invalid EMS information received by ESP	
U010104		• CAN messages from TCU2 are not received by ESP	• CAN line • TCU • ABS/ESP module
U030204		• CAN messages from TCU2 are not received by ESP	
U010108		• The TCU information received by ESP is corrupted (data length control, cyclic redundancy check, real-time counter) or invalid TCU information received by ESP	

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the related harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the ABS /ESP to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To step 4. →**No** System normal.
4. Check the ABS/ESP power line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Connect the battery negative terminal E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between the No. 1, 25, 28 terminals of the ABS / ESP harness plug U10 and the reliable grounding with a multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 5. →**No** Repair the ABS/ESP power line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
5. Check the ground line of ABS/ESP control module.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ABS/ESP harness plug U10. D. Measure the resistance between the ABS/ESP harness plug U130 terminal 13, 38 and the fixed ground point with the multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 6. →**No** Repair the ABS/ESP ground line open circuit fault and replace the harness if necessary.
6. Check the vehicle communication system.	
	A. Check whether the vehicle communication system is normal. Is it OK after checking? →**Yes** To step 7. →**No** Check the communication system for fault.
7. Check the ABS/ESP control module.	
	A. Replace the ABS/ESP control module. **Refer to the replacement of ABS/ESP module** Confirm that the fault has been ruled out.

Removal and installation

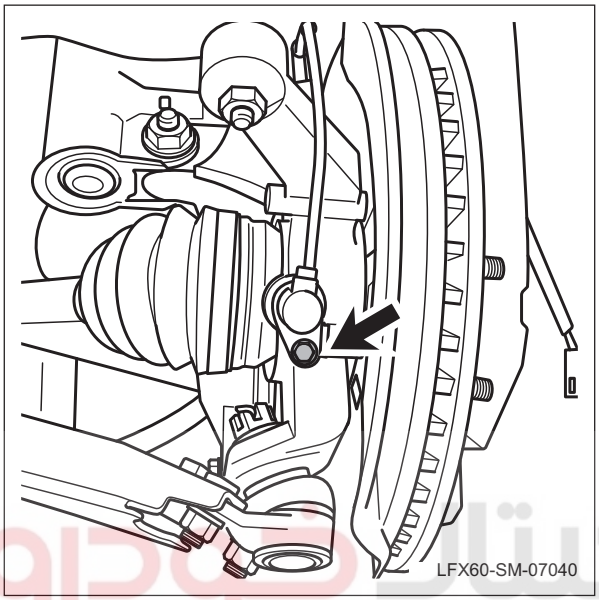
Replacement of front wheel speed sensor

1. Remove the front wheel speed sensor.

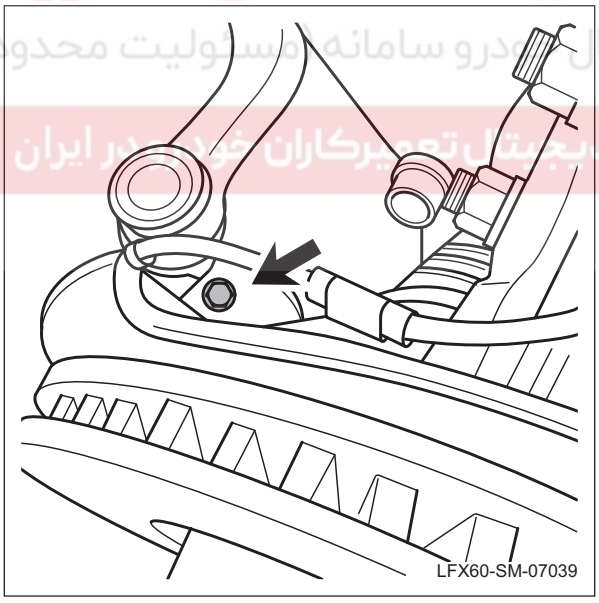
(a). Disconnect the battery negative connector.

(b). Lift the vehicle. **Refer to the vehicle lift and support.**

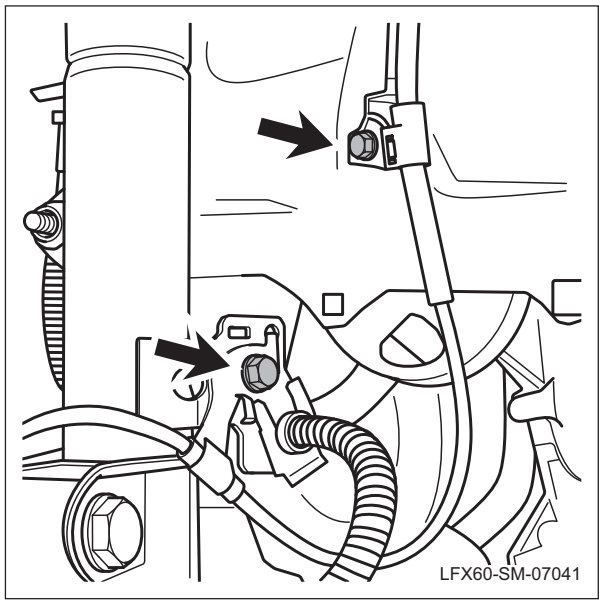
(c). Remove the front wheels, **refer to:Tire Replacement.**



(d). Remove the fixing bolts of the front wheel speed sensor.



(e). Remove the fixing bolts of the harness bracket for the front wheel speed sensor.



(f). Remove the fixing bolts of the harness bracket for the front wheel speed sensor.
(g). Remove the fender and disconnect the sensor connector.
(h). Take off the front wheel speed sensor.

Note:
Do not pull the wheel speed sensor wiring harness.

Installation

1. Install the front wheel speed sensor.

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

Note:

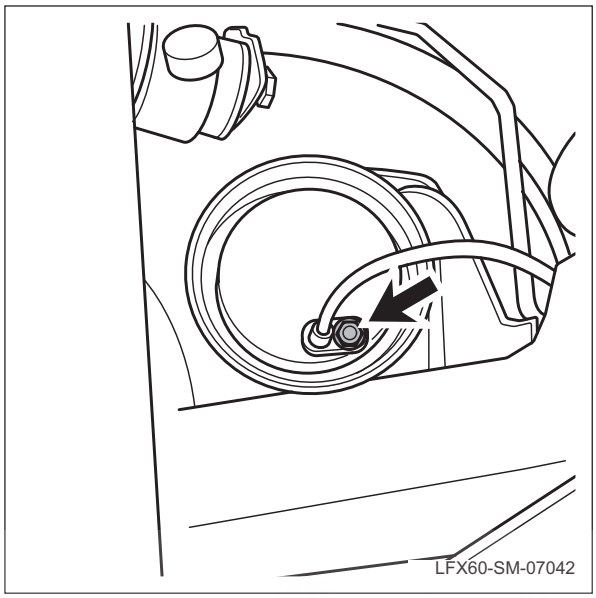
- **Before installation, clean the sensor mounting holes and the surfaces of the gear and brake disc.**
- **The harness should not be twisted after installation.**

Replacement of rear wheel speed sensor

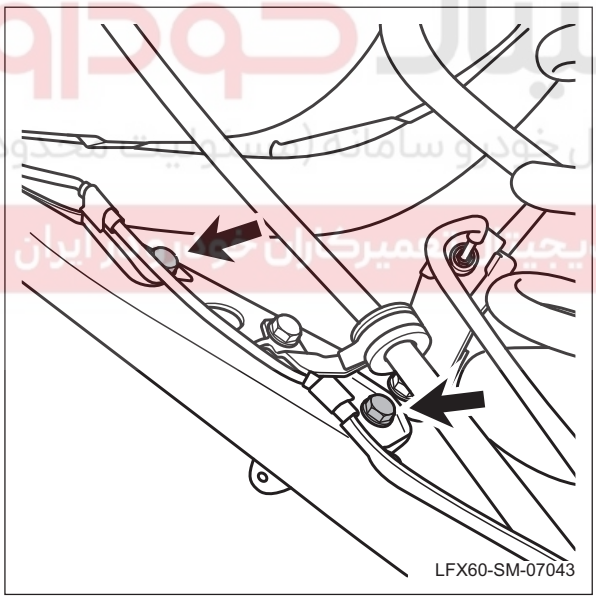
1. Remove the rear wheel speed sensor.

(a). Disconnect the battery negative connector.

(b). Remove the rear wheels, refer to:Tire Replacement.



(c). Remove the fixing bolts of the rear wheel speed sensor.



(d). Remove the fixing bolts of the harness bracket for the rear wheel speed sensor.

(e). Remove the C pillar lower decorative panel. Refer to the replacement of C pillar lower decorative panel.

(f). Disconnect the harness plug.of the rear wheel speed sensor

(g). Take off the rear wheel speed sensor.

Note:

Do not pull the wheel speed sensor wiring harness.

Installation

1. Install the rear wheel speed sensor.

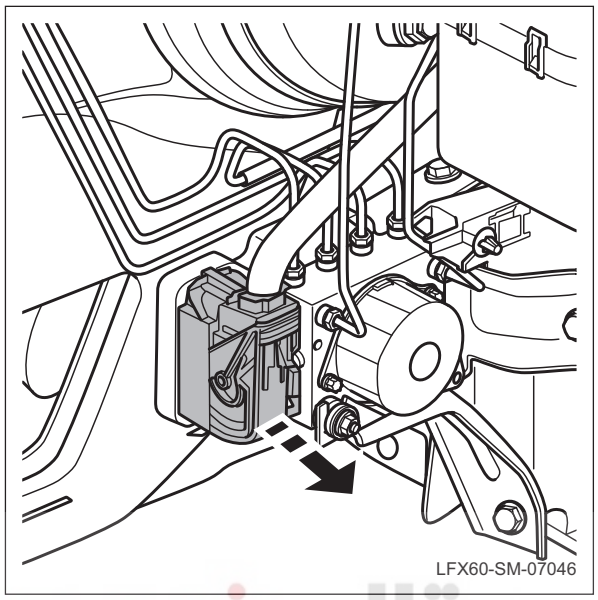
(a). The installation sequence is the reverse of the disassembly order.

ABS / ESP module assembly replacement

Removal

1. Remove the ABS / ESP module assembly.

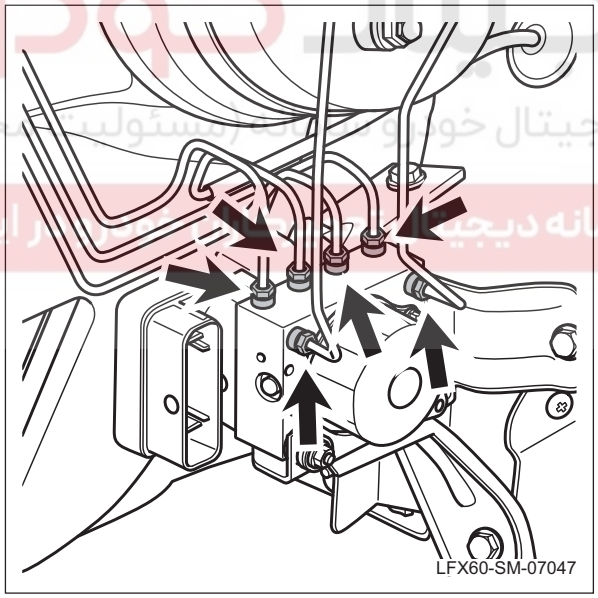
(a). Disconnect the battery negative connector.



(b). Disconnect the harness plug of the ABS / ESP module assembly.

ℹNote:

Fold up the clip of harness plug for the ABS / ESP module, and disconnect the harness plug of ABS / ESP module.

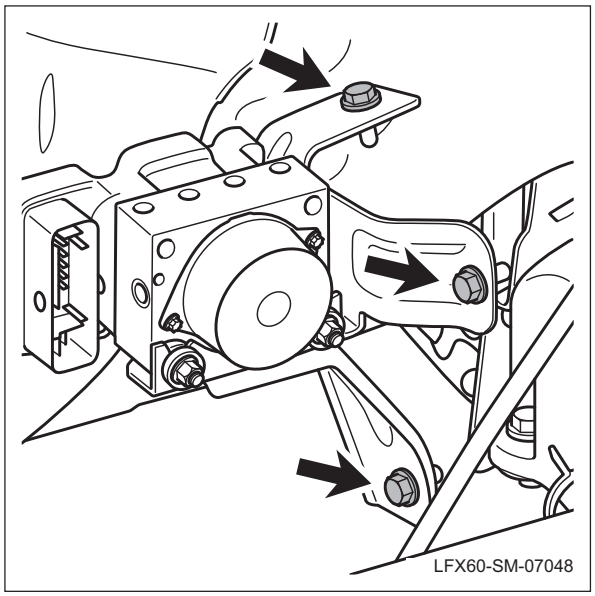


(c). Empty the brake fluid.

(d). Remove the brake tube and the ABS / ESP module assembly.

ℹNote:

- **Seal the brake hose to prevent the oil lose and the ingress of dirt.**
- **If the brake fluid splashes onto the paint face, immediately rinse it with the cool water.**



(e). Remove the fixing bolts of the bracket for ABS / ESP module assembly.
(f). Remove the ABS / ESP module assembly.

Installation

1. Install the ABS / ESP module assembly.
(a). The installation sequence is the reverse of the disassembly order.
(b). Brake system exhaust, refer to:Exhaust process of brake system.

Replacement of steering sensor

Removal

1. Remove the steering sensor.

(a). Remove the spiral cable assembly, **refer to the replacement of spiral cable assembly.**

(b). Remove the steering angle sensor.

Installation

1. Install the steering sensor.

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

Note:

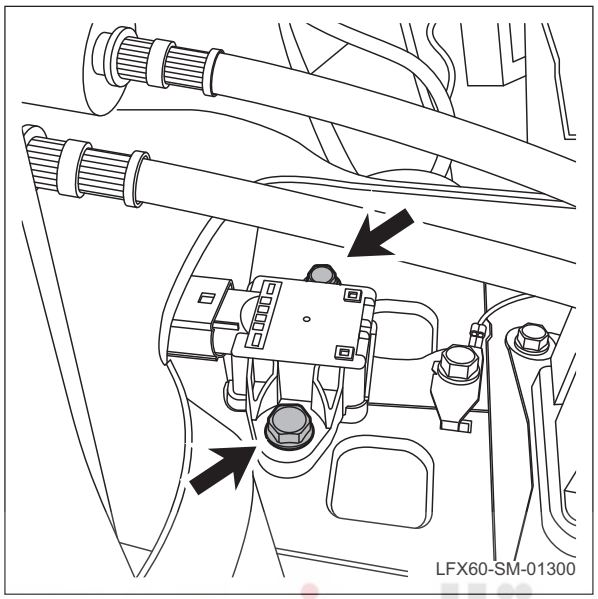
When disassembling and installing or replacing the steering angle sensor, perform the intermediate position adjustment for the steering angle sensor.

Replacement of yaw rate sensor

Removal

1. Remove the yaw rate sensor.

(a). Remove the front lower panel of the console, **refer to the replacement of the console assembly.**



(b). Disconnect the harness plug of the yaw rate sensor.

(c). Remove the mounting bolts of the yaw rate sensor.

(d). Take off the yaw rate sensor.

Installation

1. Install the yaw rate sensor.

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

08- Electric air conditioning system

Electric air conditioning system

Technical specifications

Torque Specifications

Name	Torque range	
	Metric (Nm)	British (lb-ft)
Air conditioning compressor mounting bolts	25	18

Components

Compressor model		WXH-106-AP
Condenser assembly	Type	Parallel-flow
	Specification D×H× W mm	625×397×16mm
	Heat exchanging capacity	≥ 4.5m / s Surface wind speed 13.1kW
Evaporator core	Type	Stack-up type
	Specification D×H× W mm	58×255×255
	Refrigeration capacity	Inlet air volume 423 m³/h, refrigerating capacity ≥ 4.2KW
Heater element	Type	Stack-up type
	Specification D×H× W mm	27×220×180
	Heat capacity	6L/h flow, with 350 m³/h air volume, the collected volume ≥ 4.5kW
Air flow adjustment		8 gear
Max air flow		Face cooling ≥ 423m³/h
		Feet heating ≥ 300 m³/h
Refrigerant	Type	R134a
	Filling volume	540g±20g
Lubricating oil	Type	PAG56
	Filling volume	120ml
A/C system	Max cooling power	At the compressure speed of 1800 rpm ≥ 4.8kW
	Temperature adjustment range	18℃ ~32

Precautions

Note:

Following precautions must be observed during inspection and repair of A/C system, otherwise may cause vehicle damaged and personal injury.

1. Special gloves and glasses must be used, because the refrigerant has extremely low freezing point and strong volatile, it can cause chilblain or blind if touch skin or eyes.
2. If the refrigerant is spilled onto skin or eyes, wash with clean water immediately, then seek medical treatment from hospital. Never touch hurt skin or eye with your hand or tissue.
3. Working related to refrigerant must be conducted in areas with good ventilation. Released refrigerant may cause oxygen deficit phenomena.
4. Working related to refrigerant must be conducted in clean atmosphere without damp and/or dust, which may flow into A/C system causing damage.
5. A leak detector should be prepared during working related to refrigerant. Leaking should be prevent, because leaked R134a may set off reaction with hot items causing noxious gas.
6. Only R134a should be used as refrigerant for this vehicle. Any other refrigerant has adverse effects on system components.
7. R134a refrigerant and R12 refrigerant are not compatible, so they can not be mixed even with very few amount
8. No kindling or flammable items should be exist in areas of working related to refrigerant. Spacial care must be taken to avoid the refrigerant container exposed in heat sources because this may cause explosion.
9. The R134a is stored with high pressure, thus the container should never be exposed in high temperature conditions. If necessary, c heck to ensure temperature of storage areas is below 52℃ .
10. Caps should be used to prevent water, dust etc. getting into components of A/C system. The caps should be removed before work, and reinstalled after work.
11. It is advisable to avoid any work related to A/C system in rainy days because moisture has extremely adverse impact on system.
12. After the air conditioner system is disassembled, the O-ring seal must be coated with refrigerant oil, especially on the bolt-type connection parts, and manual installation at first and then fixed with a special tool
13. In assembly of flanged connection, the nuts and bolts should be tightened with pipes pushed gently.
14. Operation requirement should be adhered to install A/C, any torque above specification or excessive force on O seals may cause leaking of refrigerant.
15. No hose may be twist.
16. Any components should be removed before the refrigerant is totally recovered. If not, internal pressure of system may push out refrigerant and oil, causing environmental pollution.
17. After replacement of A/C component, refrigeration oil should be added along with refrigerant .
18. Refrigerant R134a must be used for this vehicle.

- R134a refrigerants that all indicators such as ingredients, moisture content, impurities, and non-condensable gases are qualified must be used.
- The filling amount of refrigerant must strictly comply with the provisions of the vehicle factory, too much or too little will have bad influence on the cooling effect of air conditioner.
- Before filling the refrigerant, thoroughly check that if the sealing seals of each pipe joint are intact and the parts are leaked.
- Before the compressor can operate, it can be filled from the low pressure side and the high pressure side. After the compressor is running, it can only be filled slowly from the low pressure side.
- After the R134a refrigerant is added, it shall be checked for leak carefully with electronic leak detector.

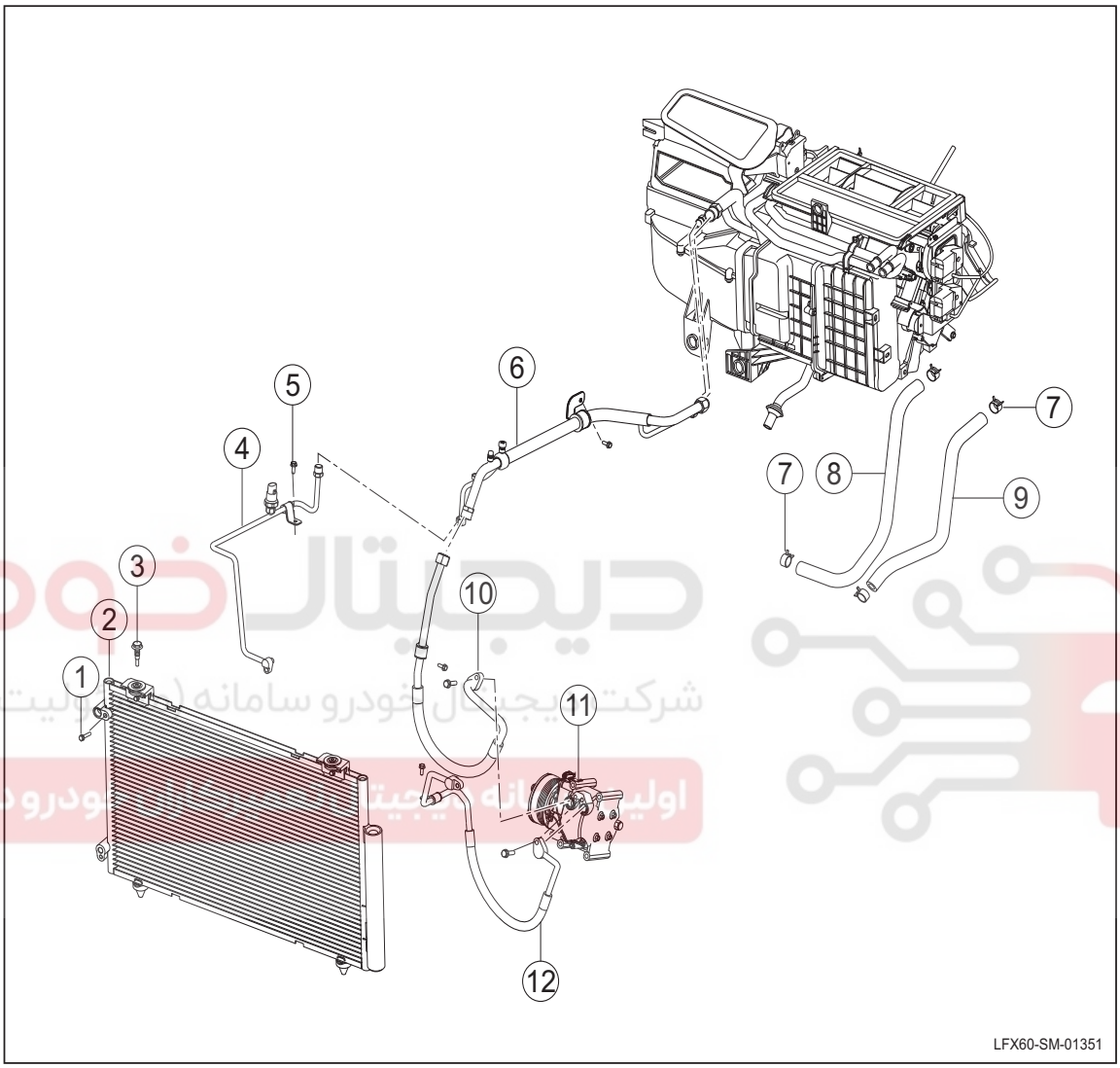
19. Add refrigerant oil properly.

- The type and grade of refrigerant oil of specified by the manufacturer must be used and different types and grades of refrigerant oil can not be mixed, otherwise the compressor will be damaged.
- Filling shall in strict accordance with the provisions of the amount, note that the refrigerant oil hinders heat transfer, excessive filling will seriously reduce the air conditioner effect; generally no need to fill refrigerant oil, for refrigerant oil has been filled by the manufacturers; when replacing parts (except for compressors), the same type of refrigerant oil shall be added properly.
- Since the refrigeration oil is highly easy to absorb water, shorten the air contact time so long as possible.
- The refrigerant oil should be filled from the compressor exhaust port before vacuumize.

Structure and installation location

Part exploded view

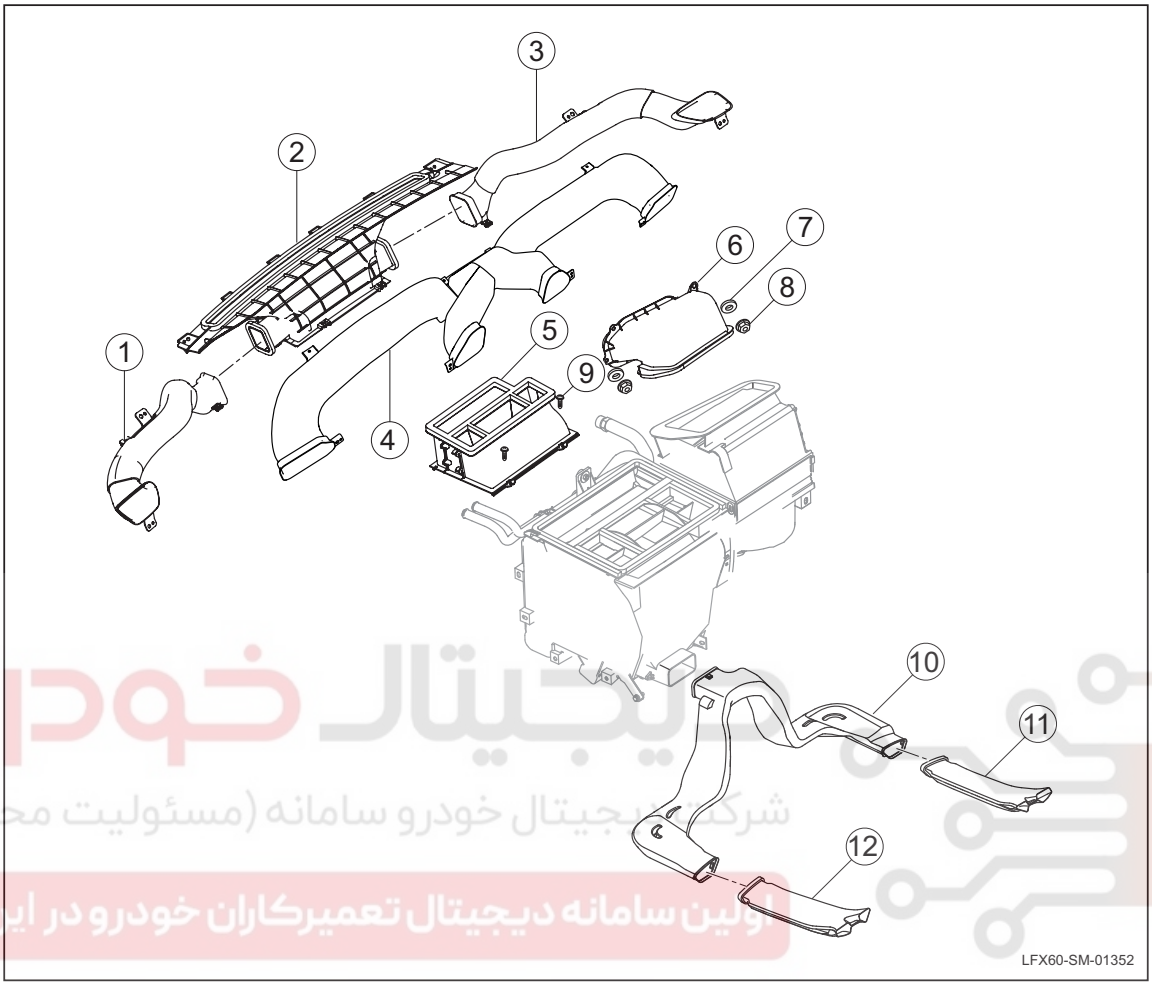
Air conditioner piping system



No.	Part name
1	Hexagon head bolt and taper elastic washer assembly
2	Condenser assembly
3	Condenser mounting bolts
4	High pressure pipe of A/C
5	Hexagonal bolts
6	High and low pressure coaxial tube

No.	Part name
7	Steel strip elastic clamp
8	Heater inlet pipe
9	Heater outlet pipe
10	Low pressure pipe of A/C
11	Compressor
12	Compressor exhaust pipe

Ventilation device



No.	Part name
1	Left defrost duct
2	Central defrost duct components
3	Right blowing face air duct assembly
4	Central blowing duct assembly
5	Central transition duct assembly
6	New air duct assembly
7	Plain washer

No.	Part name
8	Hexagon nuts M6
9	Cross recessed pan head tapping screws, large washer assembly
10	Rear feet blowing middle air duct
11	Rear feet blowing right wind fairing assembly
12	Rear feet blowing left wind fairing assembly

General Inspection

General equipment

Name
Digital multimeter
Refrigerant recovery and filling machine
Pressure gage
Thermometer
Electronic leak detector
UV leak detector
Sprayer

⚠Warning:

- **Before servicing the electrical system, disconnect the negative terminal of the battery, and welding or steam cleaning operations on or near the vehicle with air conditioner piping or components are prohibited.**
- **Do not use water, corrosive solvents or flammable and explosive solvents to clean the air conditioner system. It is recommended to use R-141b, heptane and other cleaning agents.**

The operating efficiency and service life of the air conditioner system depends on the chemical stability of the refrigeration system. Contaminants can change the stability of refrigerant and refrigerant oil when the refrigeration system is contaminated by foreign matter such as dust, air or moisture. And also affect the relationship between pressure and temperature, reduce efficiency, and may lead to corrosion and abnormal wear and tear of the system parts and components. Please check the air conditioner system as described below:

- Before disconnecting the plug, clean the plug and the oil around the plug to reduce the possibility of oil entering the system.
- Immediately after the pipe is disconnected, tighten the ends of the plug with a cap, stopper or tape to prevent oil, foreign matter and moisture from entering.
- Keep all tools clean and dry, including pressure gauge components and all parts for replacement.
- Add refrigerant oil with clean and dry conveyors and containers to ensure that the refrigerant oil is not contaminated.
- Operate as quickly as possible to shorten the time that the air conditioner system is exposed to the air.
- The air conditioner system must be re-emptied and refilled after exposure to air. All parts are dry and sealed before leaving the factory, and these sealed parts can only be opened at the time of installation. Before unpacking, all parts should be at room temperature, prevent moisture in the air from condensing into the parts inside the system, and re-seal all parts as soon as possible.

ℹNote:

- **Do not store the refrigerant at sun exposure or next to a heat sour e.**
- **The refrigerant can not be discharged directly into the atmosphere in any case.**
- **Refrigerants such as R-134a (tetrafluoroethane) and R-12 (dichlorodifluoromethane) are not mixable.**
- **The type and grade of refrigerant oil of specified by the compressor manufacturer must be used and different types and grades of refrigerant oil can not be mixed, otherwise the compressor will be damaged.**
- **Since the refrigeration oil is highly easy to absorb water, shorten the air contact time so long as possible.**

Refrigeration system testing

If you suspect a problem with the air conditioner system, check the following:

- Check the outer surface of the radiator and condenser core to ensure that the airflow is not blocked by dust, leaves or other foreign matter.
- Check the surface between the condenser and the radiator as well as all outer surfaces.
- Check that if the condenser core, hose and connecting pipe are blocked or kinked.
- Check the operation of the blower motor.
- Check all air conditioner lines for leak or blocking.
- Check that if the compressor clutch is slipping.
- Check the compressor belt tension.

Quick inspection for Refrigeration piping

⚠Warning:

In some cases, the refrigerant piping and air conditioner components may be extremely hot or extremely cold. When checking the refrigerant piping or air conditioner unit, care should be taken when touching is required. Failure to follow this statement can result in personal injury.

- The air conditioner piping from the compressor to the condenser should be hot.
- The air conditioner piping from the condenser to the expansion valve should be warm, but not as hot as the air conditioner piping described above.
- Determine the temperature difference between the condenser heat and the air outlet by measuring the temperature. Depending on the ambient temperature, the temperature difference should be greater than 20 °C. If

the temperature difference is less than 20 °C, check the condenser heat sink for foreign matter or damage, and if the radiator fan operation is normal.

- The air conditioner piping between the expansion valve and the evaporator should be cold from the installation point of expansion valve. Depending on the climate, the surface of the air conditioner piping may also freeze.
- The air conditioner piping between the evaporator and the compressor should be cold.
- Test the temperature of evaporator core output piping and prepare the following when measuring:
- Open all windows.
- Set the air distribution to the head outlet and open the air outlet for all vents.
- Turn on external circulation mode.
- Select the lowest blower switch setting.
- Select the lowest temperature setting.

Note:

The temperature measurement can not be performed using a non-contact thermometer because the surface temperature radiation can lead to incorrect measurements.

1. Connect the temperature sensor to the evaporator core output piping. The temperature sensor must be mounted as close as possible to the evaporator core, connecting the temperature sensor to the digital multimeter.
2. Start the engine and allow the engine to run idle for several minutes.
3. Turn on the air conditioner, after 3min, measure the surface temperature of the evaporator core output piping.
4. If the measured temperature is 4 °C or less, the air conditioner system is normal. If the temperature is too high, the cooling of air conditioner system is not enough, continue to the next inspection step.

Frequent failure of the refrigeration system and its causes:

• Poor or no cooling

The air conditioner piping or the drying bottle is blocked or hindered, by comparing the temperature of the air conditioner piping or the surface of the drying bottle to find out the blocked or hindered position. The place with temperature difference is the place blocked or hindered.

Note:

It is normal to have a temperature difference between the piping before and after the expansion valve. When the blocked or hindered place is found, check the relevant parts and replace the parts with new ones if necessary.

- The cooling performance is reduced (the compressor returns to normal after about 6 minutes of stopping)

This is due to the presence of moisture in the system, causing the expansion valve to freeze. In order to ensure that the moisture is completely removed from the refrigerant circuit, the time for evacuation must be extended to 2 to 3 hours and the drying bottle must be replaced with a new one.

Refrigeration system leak test

When you suspect that the system leaks the refrigerant, it should be tested for sure. The leak test should also be performed when the maintenance operation you are performing affects the piping or plugs. Leakage usually occurs at the refrigerant plug or interface. The cause of the leak usually includes the following faults:

- The mounting torque of the parts is not appropriate.
- The seal is damaged.
- Dust or fibers on O-rings.

There shall be appropriate pressure in the air conditioner system for leak detection, at least 340kPa. But compressed air is not allowed in the system; otherwise moisture, dust or other impurities of the air will increase the burden of desiccant or pollute the system. Leak check of refrigeration system uses the following methods.

Electronic leak detection

1. Use the electronic leak detector to inspect the entire piping of the refrigeration system carefully.

Note:

Electronic leak detectors are sensitive to front window glass washings, solvents and cleaning agents and certain vehicle adhesives. The surface must be wiped clean, to avoid incorrect reading. Make sure that all surfaces are dry so as not to damage the electronic leak detector.

1. Move at 25 ~ 50mm / s to detect each connection for one whole circle.
2. Within 6mm from the probe tip to the detection surface.
3. Do not block the air inlet.
4. If a leak is detected, the audible alarm will change from 1 ~ 2 per second to continuous alarm. Adjust the balance control; maintain the alarm sound to 1 to 2 sounds per second.
5. Even if a leak has been detected, all parts of the following must be tested:

• Evaporator inlet and outlet.

- Inlet and outlet of drying bottle.
- Condenser inlet and outlet.
- Brazing and welding parts.
- Damaged parts.
- Front and rear cover of compressor.
- All plugs and connectors.
- Test the high and low pressure service port / service valve.

Leak detection by fluorescent dye

Note:

- **Some vehicles have signs of refrigerant oil and refrigerant at the air conditioner pipe joints, which may be left for ease of installation of air conditioner piping and lubrication of spring lock interface of air conditioner piping. When the connector is suspected to leak, wipe the parts clean and use the R-134a Electronic Leak Detector to check for leaks.**
- **The leaks can be precisely positioned by the yellow-green light of the tracer. Since there may be more than one leak, normally each part should be checked.**

1. Add 7.4mm fluorescent tracer to the air conditioner refrigerant system.
2. After running the air conditioner system for 15min, turns off the engine.
3. Use an ultraviolet lamp to check all parts of the air conditioner system to determine the leak.
4. If a leak is found, recycle the refrigerant with the fluorescent tracer, repair or replace the leaked part, and refill the refrigerant with the fluorescent tracer into the air conditioner system.
5. Use oily solvents to remove traces of any fluorescent tracer on piping or components.
6. Run the air conditioner system for a few minutes and use the UV lamp again to check all parts of the air conditioner system and confirm the troubleshooting.

Leak detection by soap solution

For large leakage in the connection part of refrigerant piping, soapy water can be sprayed around the piping to see whether bubble is generated on the surface. This method is relatively simple and convenient, but the system microleakage can not be detected.

Leak detection by vacuum

1. Recycle the refrigerant and vacuumize the system (approx. 30 min).

Note:

If the air conditioner system is filled with refrigerant, then some of the refrigerant will remain in the refrigeration oil of the compressor. The remaining refrigerant will still evaporate and will cause a slight increase in the reading of the pressure gauge (up to 2 divisions) during the leak test, but this increase in pressure does not mean that the air conditioner system is leaking.

2. Turn off the manual valves for refrigerant on the high and low pressure gauge of the recycling and filling machine.
3. Observe the low pressure gauge on the refrigerant recycling and filling machine.

- If the reading on the gauge is increased by more than 2 kPa, it means that the system is leaked. You need to fill about 300g refrigerant for the leak check.
- If there is no leakage in the system, continue with the filling procedure.

Leak check for evaporator core

Evaporator core leakage is difficult to find, test the evaporator core according to the following procedures:

1. Set the blower speed to the maximum for at least 15 minutes.
2. Turn off the blower.
3. Wait for 10min.
4. Remove the blower speed regulation module.
5. Insert the leak detector probe as close as possible to the evaporator core, and a continuous alarm sound appears when the leak detector detects a leak.

Leak check for compressor shaft seal

1. Use the workshop compressed air to blow the rear and the compressor / front of pulley for at least 15s.
2. Wait for 1~2 min.
3. Detect at the front of the pulley. A continuous alarm sound appears when the leak detector detects a leak.

Refrigerant oil quality inspection

- Contrast method

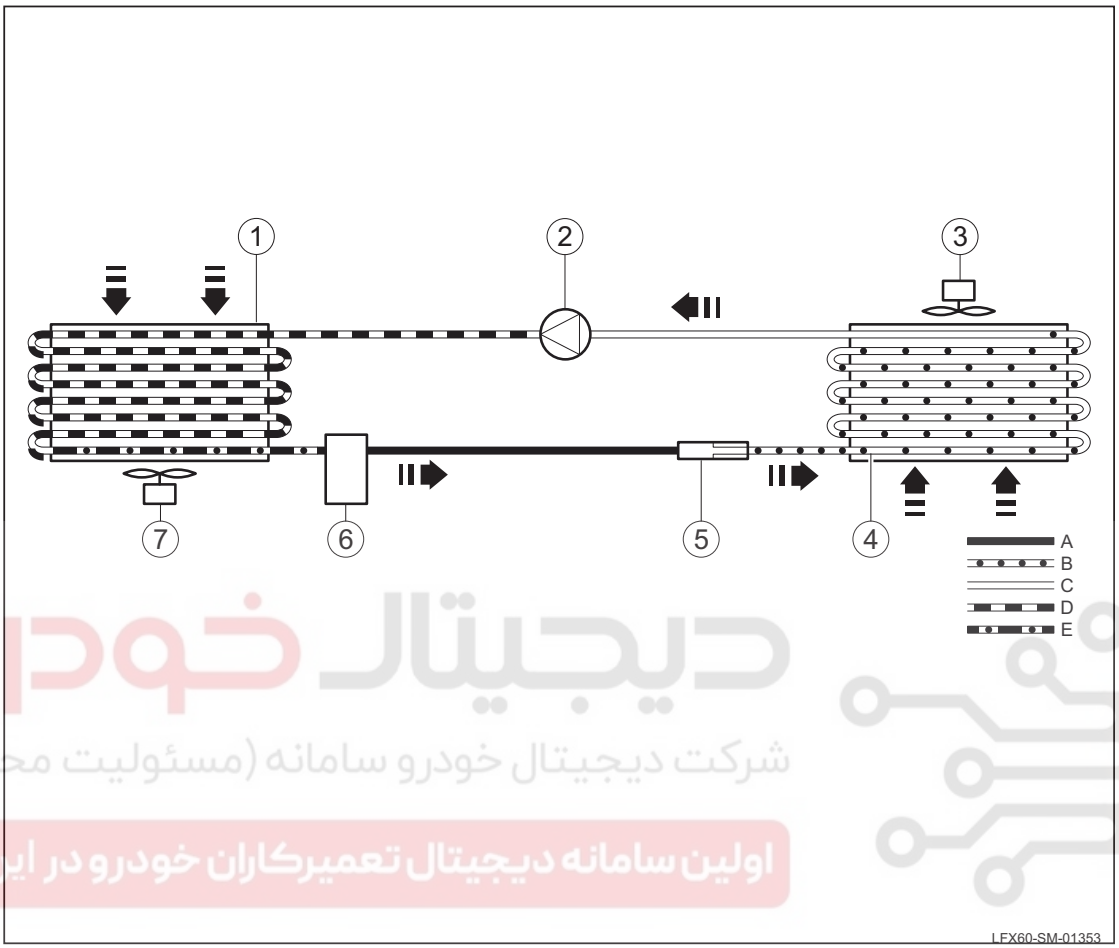
Take the standard refrigerant oil into the test tube as standard oil, and then take the refrigerant oil to be checked into a tube of the same size for comparison. If the color of the refrigerant oil to be checked is light yellow or orange, it can be used; if it has become dirty solution of red brown, it can not be used.

- Dropping method

Remove the refrigerant oil to be checked and drop it on a clean white sheet and observe the color of the oil droplets after a while. If the color is light and in uniform distribution, it means that there are no impurities in the oil, and it can be used; if the central part of the oil droplets has black spots, indicating that the oil has deteriorated, and it can not be used.

Air conditioner schematic

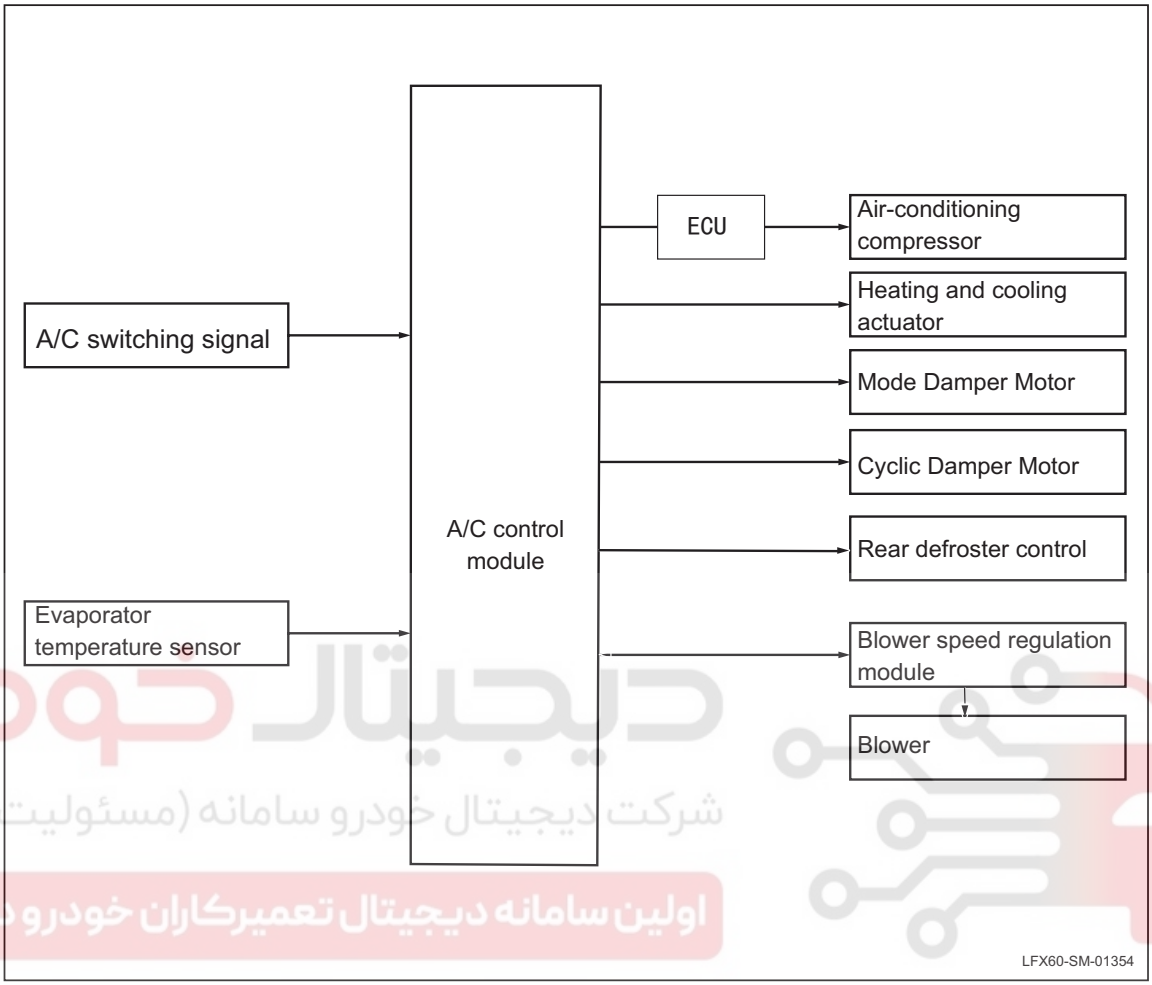
Refrigerating system



No.	Part name
1	Condenser
2	Compressor
3	Blower assembly
4	Evaporator assembly
5	Expansion Valve
6	Drying bottle

No.	Part name
7	Cooling fan
A	High pressure, medium temperature and liquid state
B	Low pressure, low temperature and liquid state
C	Low pressure, low temperature and gas state
D	High pressure, high temperature and gas state
E	High pressure, high temperature and gas-liquid mixing state

Air conditioner control



Operating Principle

System overview

The air conditioner system is designed for the vehicle to provide a comfortable ride environment regardless of the external weather conditions. The system controls the air entering the passenger compartment by performing the following functions:

- Cooling down
- Drying
- Heating
- Circulating

Fresh air from the air conditioner first get into the wind hood, then go through the air conditioner air filter, blower assembly, evaporator box assembly, warm water tank assembly, duct, and then reach the various outlet, into the space inside the vehicle. The air conditioner system consists of the following components:

- Cooling System
- Heater system
- Air distribution system
- Air-conditioning control system

The air conditioner system has the following characteristics:

- Filter the air into the car
- Provide a suitable temperature for the car
- Electricity ventilation
- Front windshield defrost

The driver can adjust the front air conditioner controller to achieve the following functions:

- Adjust the temperature inside the cab
- Blower speed
- Outflow mode
- Front windscreen defrost
- Rear windscreen defrost

Refrigerating system

The purpose of cooling is achieved by the heat absorption during the refrigerant transition from liquid to gas. The cooling process consists of the compression process, the cooling process (exothermic), the throttling process and the evaporation process (endothermic).

1. Compression process

The compressor draws the low temperature and low pressure gas at the outlet of the evaporator, compresses it into gas with high temperature and high pressure, and then feeds it into the condenser.

2. Cooling process (exothermic)

The high temperature and high pressure gas enters the condenser and exchanges heat with the air. The cooling fan blows the heat into the atmosphere and cools the refrigerant into liquid.

3. Throttle process

The liquid refrigerant with medium temperature and high pressure is throttled and depressurized by the expansion valve, to discharge the expansion device in a mist (fine droplets).

4. Evaporation process (endothermic)

The refrigerant mist throttled and depressurized by the expansion valve get into the evaporator to evaporate into a gas. Evaporation process absorbs the heat around and reduces the temperature inside the vehicle.

Compressor

The air conditioner compressor is driven pulley rotated by the compressor clutch, which is transmitted from the belt driven by the engine crankshaft. When the compressor clutch solenoid is not energized, the compressor pulley is free to rotate. The compressor pulley idles at this time, does not drive the compressor shaft. When the clutch coil is energized, the clutch disc and hub are pushed toward the pulley. The magnetic force locks the clutch disc and the pulley as one to drive the compressor shaft, and the compressor starts to operate.

Condenser, liquid storage drying bottle

The high-pressure high-temperature refrigerant vapor from the air-conditioning compressor flows into the condenser. The condenser is made of aluminum tubes and cooling fins which allow rapid heat transfer of the high-pressure high-temperature refrigerant vapor. The cooling fins condense the high-pressure high-temperature refrigerant vapor to high-pressure medium-temperature liquid by heat dissipation. The internal structure of the liquid storage drying bottle can ensure that when the high-pressure high-temperature gas-liquid mixed refrigerant enters, only the high-pressure medium-temperature liquid refrigerant exit the drying bottle. The drying solution has a desiccant that absorbs the moisture in the refrigeration system and the desiccant can not be reused.

Expansion throttle device

The expansion throttle device throttles and decompresses the high pressure liquid refrigerant from the condenser or the liquid storage drying bottle, to adjust and control the amount of the liquid refrigerant entering the evaporator, to accommodate the change in the cooling load. At the same time, to prevent the hydraulic phenomenon and abnormal overheating of the evaporator outlet steam.

Expansion valve is mainly composed of thin film and the valve shell, which is a neck expansion valve, which adjust the refrigerant flow according to the refrigerant pressure and temperature.

When the cooling requirement is low, the valve closes to reduce the amount of refrigerant.

When the cooling requirement is high, the valve will open slightly so that more refrigerant will

pass to the evaporator.

Evaporator

The evaporator is located on the refrigerant piping between the expansion throttle device and the compressor, and is used to vaporize the liquid refrigerant after throttling and depressurization, to absorb the heat of the outside air. The cold wind was blown into the compartment, to achieve the purpose of cooling.

The evaporator cools and dries the air, and its tilted mounting position provides good runoff and reduces condensate and odor residue.

Refrigerant R-134a, refrigerant oil

Vehicles use R-134a refrigerant, refrigerant R-134a is non-toxic, flame retardant, transparent, colorless liquefied gas. Refrigerants have the following effects in air conditioner systems:

- Absorb heat
- Transfer heat
- Release heat

The refrigerating oil acts as a lubricant in the operation of the compressor to reduce the degree of friction and wear during the operation of the compressor, thereby extending the service life of the compressor. The refrigerating oil acts as a sealing between the piston and the cylinder surface of the compressor, and the rotation between the rotating bearings, to prevent the refrigerant from leaking. Refrigerant oil is used for lubrication in the compressor between the moving parts, it can take away the heat generated during the operation, so that the moving parts maintain a low temperature, thereby enhancing the efficiency and the reliability of use of the compressor.

Be sure to follow the instructions and carry out the following repairs:

- Recycle of refrigerants
- Recycle of refrigerant oil
- Filling of refrigerant
- Filling of refrigerant oil

⚠Warning:

- The amount of refrigerant oil should not exceed the maximum amount of filling.
- The filling amount of the refrigerant should not exceed the maximum filling amount.
- In strict accordance with the standard filling procedure, it should be operated by professionals,Otherwise it may cause harm to the person.

AC pressure switch

Air conditioner pressure switch is a three-state pressure switch, for air conditioner pressure signal transmission.

Heating system

The heat generated by the engine is transfered through the warm water pipes into the warm water tank, which can provide the vehicle a suitable temperature in cold weather. When heating is needed, the driver simply adjust the temperature adjustment knob on the air conditioner controller to drive the temperature adjuster motor, which controls the cold / warm air throttle for temperature adjustment.

The heating system is mainly composed of heat exchangers, blowers and corresponding piping, and the heated air is controlled by the throttle to get into the passenger compartment.

Air distribution system

The air distribution system distributes the cold and hot air produced by the cooling and heating system, according to different situations and the requirements of the crew from the different outlet of the wind, so that the passenger compartment temperature and air velocity are kept in a certain range, to form a more comfortable environment. The air distribution system is mainly composed of an intake pipe, an air mixing pipe and a gas distribution pipe. The air conditioner filter is located on the right side of the HVAC assembly on the right side of the cab, to filter the dust in the air circulation.

HVAC assembly

HVAC assembly is located in the dashboard, includes the blower, blower motor speed control module, dust filter, heater core, evaporator, expansion valve, mixed throttle control motor and a variety of air deflection throttle , and ventilation duct.

Diagnostic Information and Procedures

Diagnosis Instructions

Before the diagnose of the electric air conditioner system, familiarize yourself with the working principle of the electric air conditioner system, and then start the electric air conditioner system diagnostics, which helps not only to determine the correct troubleshooting step in the event of a failure, and more importantly

It helps to determine the condition described by the customer is normal or not.

Any troubleshooting of the electric air conditioner system should take the electric air conditioner system check as a starting point and instruct the service personnel to take the next logical step, for troubleshooting. 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
Thermometer
Electronic leak detector
Pressure gage
Refrigerant recovery and filling machine

Visual Inspection

1. Confirm the problem of the customer.
2. Visually check whether there is any obvious mechanical or electrical damage sign.

Visual check table

Mechanical	Electrical
• Attachment belt • Refrigerant • Compressor • Expansion valve • Air conditioner piping • Condenser • Air conditioner filter • Air conditioner outlet pipe	• Fuse • Harness or plug • A/C pressure switch • A/C control panel • Blower speed control module • Blower • Cool and heat throttle motor • Mode throttle motor • New return throttle motor • Compressor

3. 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.
4. f for the problem, there are no obvious findings, then confirm the fault and refer to the symptom table.

List of fault symptoms

Symptom	Possible Cause	Recommended Measures
Water from air conditioner leak into the vehicle	• The drain-pipe of evaporator is blocked	• Clean the drain pipe
	• The drain-pipe of evaporator falls off	• Reinstall the evaporator drain pipe
	• The evaporator housing is damaged	• Replace the evaporator housing **Refer to: Replacement of HVAC**
Abnormal air conditioner pressure (both high and low pressure are high)	• The refrigeration system is mixed with air	• Vacuumize, refill the refrigerant
	• Refrigerant overcharged	• Recover the surplus refrigerant
	• Too many refrigerant lubricants	• Re-fill the refrigerant by standard procedure
	• Poor heat dissipation of condenser	• Clean the condenser surface or replace the condenser **Refer to: Replacement of condenser**
	• The cooling fan is operating abnormally	• Check the cooling fan
Abnormal air conditioner pressure (both high and low pressure are low)	• Refrigerant insufficient	• Check for refrigerant failure and refill the refrigerant
Abnormal air conditioner pressure (High pressure is normal, low pressure is high)	• Expansion valve failure	• Check or replace the expansion valve **Refer to: Replacement of expansion valve**
	• Refrigerant overcharged	• Recover the surplus refrigerant
	• Compressor fault	• Check and replace the compressor **Refer to: Replacement of compressor**
Abnormal air conditioner pressure (High pressure is normal, low pressure is low)	• Refrigerant insufficient	• Refill refrigerant
	• Expansion valve blocked by ice	• Replace the liquid storage drying bottle
	• Dirt on evaporator surface or internal blocking	• Clean or replace the evaporator • Refer to: **Replacement of the evaporator**
The evaporator is frozen	• Evaporator temperature sensor failure	• Check and replace the evaporator temperature sensor **Refer to: Replacement of evaporator temperature sensor**
	• The refrigerant is overfilled	• Recover the surplus refrigerant
	• The amount of air passing through the evaporator is insufficient	• Check that if the blower is operating properly and that the air conditioner filter is blocked
	• Expansion valve failure	• Check or replace the expansion valve **Refer to: Replacement of expansion valve.**

Symptom	Possible Cause	Recommended Measures
Air conditioner is not cooling (normal air volume)	• Refrigerant leaks, missing	• Check the refrigerant for leak and refill the refrigerant
	• The compressor belt slips and falls off	• Check the accessory belt
	• The compressor does not operate	**Refer to: Compressor out of operation diagnosis flow**
	• Temperature flap fault	• Check if the temperature throttle is jammed and the hybrid throttle is operating
	• The compressor is damaged	• Replace the compressor **Refer to: Replacement of compressor**
A/C refrigerating output insufficient	• Refrigerant leaks, not enough	**Refer to: A/C refrigerating output insufficient diagnosis flow**
	• A/C filter clogging	
	• The compressor belt slips	
	• Fan fan is operating abnormally	
	• Condenser dissipation abnormal	
	• Air conditioner piping is blocked	
	• Temperature flap fault	
	• Blower fault	
	• Compressor fault	
A/C refrigerating output insufficient	• Air in cooling system	**Refer to: A/C refrigerating output insufficient diagnosis flow**
	• Heater water pipe clogging	
	• Heater radiator surface dirty or inside clogging	
	• Blower fault	
	• Temperature mixing flap fault	
Lack of heating	• Air in cooling system	**Refer to: Diagnostic process for lack of heating**
	• Heater water pipe clogging	
	• Heater radiator surface dirty or inside clogging	
	• Blower fault	
	• Temperature mixing flap fault	
Compressor out of operation	• The refrigerant is completely leaked	**Refer to: Compressor out of operation diagnosis flow**
	• Compressor fuses	
	• Harness and plug	
	• Compressor relay	
	• A/C pressure switch	
	• Evaporator temperature sensor	
	• A/C control panel	
	• Compressor	
	• ECM	

Symptom	Possible Cause	Recommended Measures
Abnormal air volume	• Air duct blocked	• Clean the duct
	• Duct leaks	• Reinstall or replace the duct
	• A/C filter clogging	• Replace the air conditioner filter **Refer to:Replacement of air conditioner filter**
	• Blower fault	• Check or replace the blower **Refer to: Replacement of blower**
	• Air conditioner control panel failure	• Check or replace the air conditioner control panel **Refer to: Replacement of A/C control panel**
Blower out of operation	• Harness and plug	**Refer to:Diagnostic process for blower does not operate**
	• Blower fuses	
	• Blower relay	
	• Blower fault	
	• A/C control panel	

Diagnostic process for lack of cooling

Test condition	Details/results/measures
1. Check the outlet temperature of air conditioner dashboard.	
	A Start the engine at 2,000 rpm and measure the outlet air temperature of the air panel. Is the outlet temperature too high? →**Yes** After completing the following adjustment, measure again and check whether the system is normal. • Switch to internal circulation mode. • Move the vehicle is into the shade. • Adjust the cool and heat throttle to the lowest temperature. →**No** To step 2.
2. Check the air output of the A/C dashboard air outlet	
	A. Adjust the blower speed to the maximum. B. Check whether the air output of the A/C dashboard air outlet is too low. Is the air output too low? →**Yes** After completing the following adjustment, measure again and check whether the system is normal. • Check the A/C filter for clogging and replace it if necessary. • Check the blower. • Check the blower speed regulation module. • Check the air outlet line. →**No** To step 3.

Test condition	Details/results/measures
3. Check the refrigerant pressure.	
	A. Connect the A/C pressure test meter. B. start the engine, turn on the air conditioner. C. With engine speed of 2000rpm, measure the high and low pressure of the air conditioner system. **Standard value:** **High pressure 1.40 ~ 1.75 MPa** **Low pressure 0.25 ~ 0.35 MPa** Is it OK after checking? →**No** To step 4. →**Yes** Carry out the following adjustment or repair and check whether the system is normal. • If both the high and the low pressure of the air conditioner are high, check whether the piping of the refrigeration system is blocked. Check if the refrigerant is too much; drain too much refrigerant and refrigerant oil. Replace the expansion valve. • If the air conditioner pressure is high but the low pressure is low, clean and replace the blocked high pressure pipe; replace the expansion valve. • If the air conditioner pressure is low but the low pressure is high, add the refrigeration oil, repair or replace the compressor. • If both the air conditioner high pressure and low pressure are low, then repair, replace the leaked components of air conditioner system, according to the standard provisions for the filling of air conditioner refrigerant. • If the air conditioner pressure is low but low pressure is vacuum, replace the liquid storage drying bottle, replace the expansion valve, clean or replace the blocked low pressure pipe, extend the system vacuum time, fill the standard air conditioner refrigerant specified by manufacturer.
4. Check the operating status of the compressor.	
	A. Check the compressor belt for slipping. B. Check that if the compressor clutch is normal. C. Check that if the compressor working condition is normal. Is it OK after checking? →**Yes** To step 5. →**No** Carry out the following adjustment or repair and check whether the system is normal. • Check and adjust the compressor belt. • Check the compressor clutch coil. • Check the compressor control circuit. • Check the air conditioner pressure switch. • Check the evaporator temperature sensor. • Check the compressor. • Check the A/C control panel. • Check the ECM.

Test condition	Details/results/measures
5. Check the air conditioner cooling system.	
	A. Check the condenser for serious dirt. Is it OK after checking? →**Yes** To step 6. →**No** Clean the air conditioner condenser.
6. Check the engine cooling system.	
	A. Check the following parts of the engine cooling system. • Is the coolant missing? • Whether the thermostat is operating properly. • Operating status of the cooling fan. • Status of the radiator. • Status of the radiator windshield. Adjust and repair according to the check situation to, and confirm that the system is operating properly.

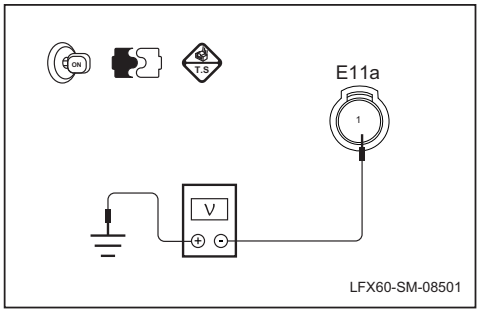
Diagnostic process for lack of heating

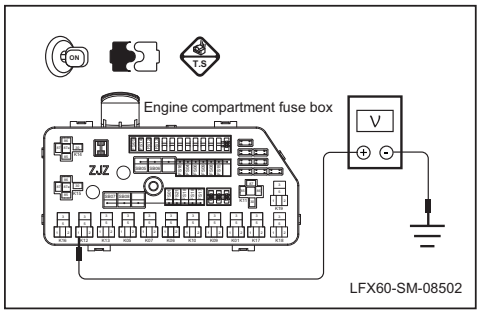
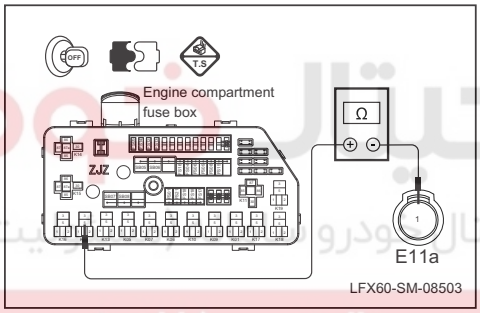
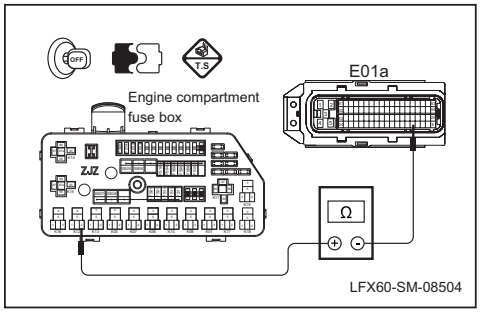
Test condition	Details/results/measures
1. Check the engine cooling system.	
	A. Check the temperature of engine coolant. B. Is the temperature of engine coolant at 82 °C? Is it OK after checking? →**Yes** To step 2. →**No** Make the following adjustments and repairs and confirm that the system is operating properly. • Extend the engine running time. • Check the cooling system for air. • Check that if the thermostat is operating properly. • Check if the warm water pipes are blocked.
2. Check the air output of the A/C dashboard air outlet	
	A. Adjust the blower speed to the maximum. B. Check whether the air output of the A/C dashboard air outlet is too low. Is the air output too low? →**Yes** After completing the following adjustment, measure again and check whether the system is normal. • Check the A/C filter for clogging and replace it if necessary. • Check the blower. • Check the blower speed regulation module. • Check the air outlet line. →**No** To step 3.
3. Check the temperature throttle.	
	A. Adjust the temperature to the highest. B. Check that if the temperature throttle is operating properly. Is it OK after checking? →**Yes** To step 4. →**No** Carry out the following adjustment and repair and check whether the system is normal. • Adjust the temperature throttle mechanism, • Check the temperature throttle mechanical actuator and the cool and heat throttle motor. • Check that if the duct is leaking or blocking. • Check the A/C control panel.

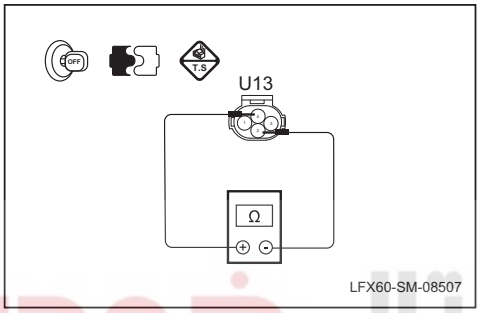
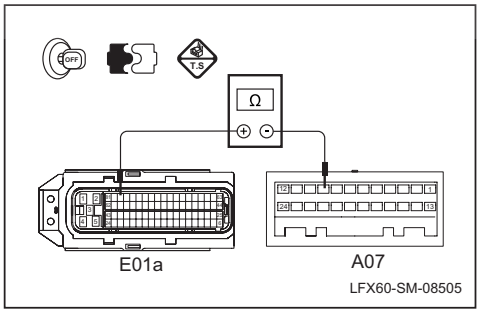
Test condition	Details/results/measures
4. Check the internal and external circulation throttle.	
	A. Adjust to internal circulation mode. B. Check whether the internal and external circulation throttle is operating properly. Is it OK after checking? →**No** To step 5. →**Yes** Carry out the following adjustment and repair and check whether the system is normal. • Adjust the internal and external circulation throttle mechanism, • Check the internal and external circulation throttle mechanical actuators and the internal and external circulation throttle motors.
5. Check the heating water tank.	
	A. Replace the heating water tank. **Refer to: Replacement of heating water tank** Confirm that the fault has been ruled out.

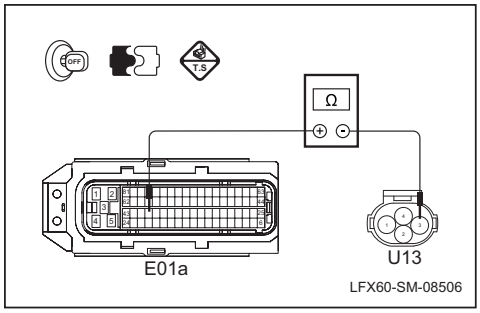
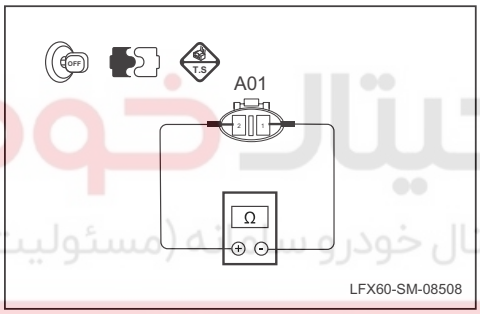
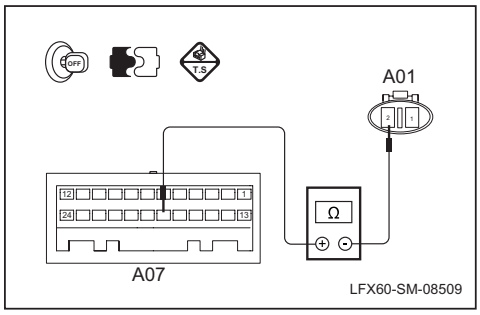
Compressor out of operation diagnosis flow

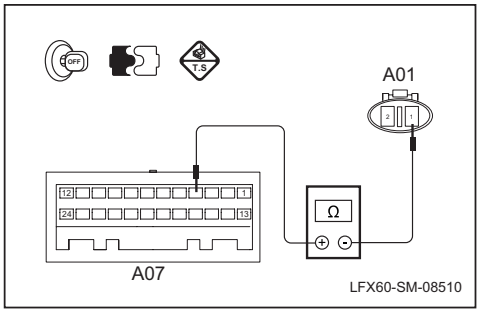
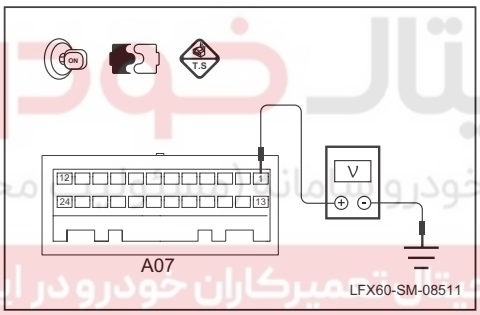
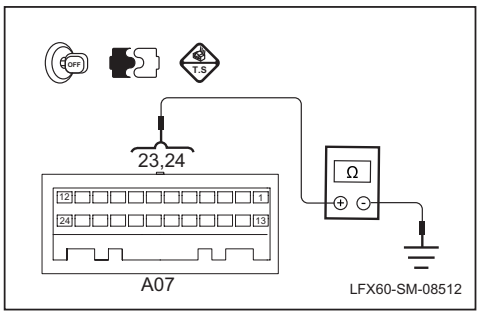
Test condition	Details/results/measures
1. General inspection.	
	A. Check if the compressor belt is off. B. Check the compressor harness plug for aging, shedding, damage and other abnormalities. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Check the engine DTC.	
	A. Read and see if there is a DTC in the engine control system by using automotive diagnostic equipment. Is there a DTC? →**Yes** **Refer to: Diagnostic trouble code (DTC) list. Perform DTC diagnostic procedure.** →**No** To step 3.
3. Input and output function test.	
	A. Start the engine. B. Press down the power key of the diagnostic device for the vehicle with a fault. C. Select the following items on the menu:Power System / Engine System (Delphi VVT ETC) / I/O Control Function Unit / Air Conditioner Clutch. Is the compressor operating properly? →**Yes** To step 10. →**No** To step 4.

Test condition	Details/results/measures
4. Check the compressor input voltage.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the harness plug E11a of the compressor. D. Connect the battery negative terminal E. Start the engine. F. Press down the power key of the diagnostic device for the vehicle with a fault. G. Select the following items on the menu:Power System / Engine System (Delphi VVT ETC) / I/O Control Function Unit / Air Conditioner Clutch. H. Measure the voltage between the No. 1 terminal of the harness plug E11a of the compressor and the reliable grounding with a multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** Replace the compressor. →**No** To step 5.
5. Check the compressor fuses.	
	A. Check the compressor fuses FS16. **Fuse rated capacity: 10 A** Is it OK after checking? →**Yes** To step 6. →**No** Replace the compressor fuse.
6. Check the air conditioning compressor relay.	
	A. Operate the ignition switch to turn the power to OFF state. B. Replace the K12 air conditioner compressor relay with a new one. C. Start the engine. D. Turn on the air conditioner and set the air conditioner in the cooling and running state. Check if the compressor is operating properly? →**Yes** Replace the air conditioner compressor relay. →**No** To step 7.

Test condition	Details/results/measures
7. Check the air conditioning compressor relay power supply line.	
	A. Operate the ignition switch to turn the power to OFF state. B. Remove the K12 air conditioner compressor relay. C. Operate the ignition switch to turn the power to ON state. D. Measure the voltage between No. 1, 3 terminals of the K12 air conditioner compressor relay of the front compartment electrical box and the reliable ground point with a multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 8. →**No** Check the air conditioner compressor relay power circuit for failure, and replace the front compartment electrical box as necessary.
8. Check the compressor input voltage circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Remove the K12 A/C compressor relay. D. Disconnect the harness plug E11a of the compressor. E. Measure the resistance between No. 5 terminal of K12 air conditioner compressor relay of the front compartment electrical box and No. 1 terminal of the compressor harness plug E11a with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 9. →**No** Check the compressor input voltage circuit for failure, and replace the front compartment electrical box as necessary.
9. Check the compressor relay control circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Remove the K12 A/C compressor relay. D. Disconnect the ECM harness connector E01a. E. Measure the resistance between the engine compartment fuse box K12 A/C compressor relay terminal 2 and the compressor harness plug E01a terminal 10 with the multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 21. →**No** Check the compressor relay control circuit for failure, and replace the front compartment electrical box as necessary.

Test condition	Details/results/measures
10. Check the refrigerant.	
	A. Connect the A/C pressure test meter. B. Check if the refrigerant leaks or is missing. Is it OK after checking? →**No** To step 11. →**Yes** Check the refrigerant for leak failure, refill the refrigerant. **Refer to: Recycling and filling procedures for air conditioner refrigerants**
11. Check the test pressure switch.	
	A. Fill the refrigerant by standard procedure. B. Operate the ignition switch to switch the power mode to "OFF". C. Disconnect the negative connector of the battery. D. Disconnect the A/C pressure switch harness plug U13. E. Measure the resistance between the No. 2 and No. 4 terminals of the air conditioner pressure switch U13 with a multimeter. **Standard value: Less than 5Ω** F. Measure the resistance between the No. 1 and No. 43 terminals of the air conditioner pressure switch U13 with a multimeter. **Standard value: 10MΩ or higher** Is it OK after checking? →**Yes** To step 12. →**No** Replace the air conditioner pressure switch. **Refer to: Replacement of air conditioner pressure switch**
12. Check the A/C switch feedback signal circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ECM harness connector E01a. D. Disconnect the A/C control panel harness plug A07. E. Measure the resistance between the No. 79 terminal of the ECM harness plug E01a and the No. 9 terminal of the harness plug A07 of the air conditioner control panel with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 13. →**No** Check the A/C switch feedback signal circuit for open circuit failure and replace the wiring harness if necessary.

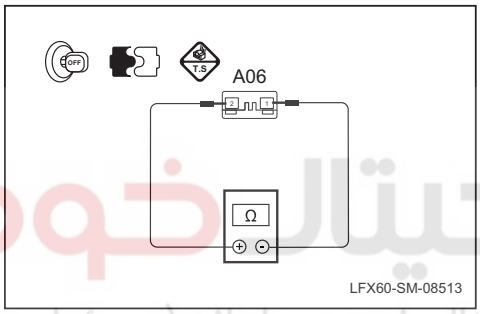
Test condition	Details/results/measures
13. Check the A / C switch signal circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the ECM harness connector E01a. D. Disconnect the A/C pressure switch harness plug U13. E. Measure the resistance between the No. 40 terminal of the ECM harness plug E01a and the No. 3 terminal of the harness plug U13 of the air conditioner pressure switch with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 14. →**No** Check the A/C switch signal circuit for open circuit failure and replace the wiring harness if necessary.
14. Check the evaporator temperature sensor.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the temperature harness plug A01a of evaporator. D. Measure the resistance between the No. 1 and No. 2 terminal of the evaporator temperature harness plug A01 with a multimeter. Is the resistance normal? →**Yes** To step 15. →**No** Replace the evaporator temperature sensor **Refer to: Replacement of evaporator temperature sensor**
15. Check the evaporator temperature sensor signal circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the evaporator temperature harness plug A01. D. Disconnect the A/C control panel harness plug A07. E. Measure the resistance between the evaporator temperature harness plug A01 terminal 2 and A/C control panel harness plug A07 terminal 18 with the multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 16. →**No** Check and repair the evaporator temperature sensor signal circuit.

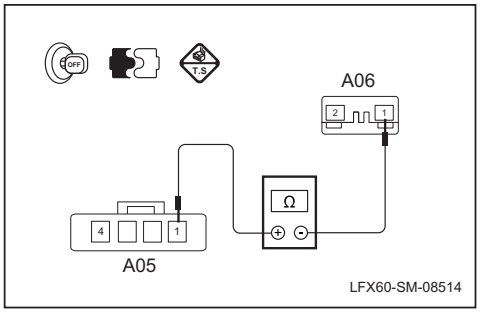
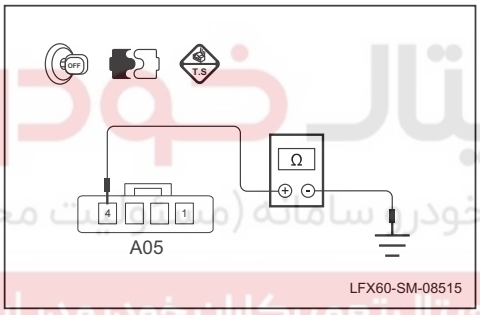
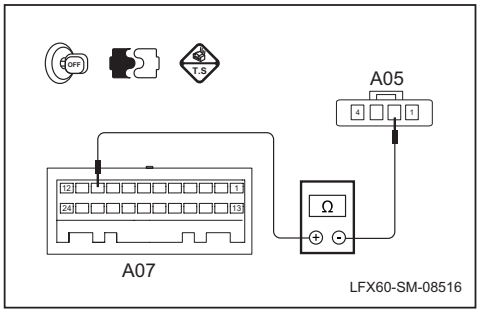
Test condition	Details/results/measures
16. Check the evaporator temperature sensor signal grounding circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the evaporator temperature harness plug A01. D. Disconnect the A/C control panel harness plug A07. E. Measure the resistance between the evaporator temperature harness plug A01 terminal 1 and A/C control panel harness plug A07 terminal 4 with the multimeter. **Standard value: Less than 5Ω** Are the resistance and the voltage normal? →**Yes** To step 17. →**No** Check the evaporator temperature sensor signal grounding circuit for failure, and replace the wiring harness if necessary.
17. Check the air conditioner control panel power supply circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the A/C control panel harness plug A07. D. Connect the battery negative terminal E. Operate the ignition switch to turn the power to ON state. F. Measure the voltage between No. 1 terminal of the harness plug A07 of the air conditioner control panel and the reliable grounding with a multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 18. →**No** Check the air conditioner control panel power supply circuit for failure and replace the wiring harness if necessary.
18. Check the air conditioner control panel grounding circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the A/C control panel harness plug A07. D. Measure the resistance between No. 23, 24 terminal of the harness plug A07 of the air conditioner control panel and the reliable grounding with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 19. →**No** Check the air conditioner control panel grounding circuit for failure and replace the wiring harness if necessary.

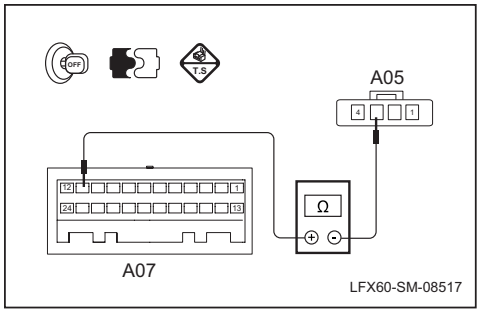
Test condition	Details/results/measures
19. Check the A/C control panel.	
	A. Replace the A/C control panel. **Refer to: Replacement of A/C control panel** Is the troubleshooting successful? →**Yes** Replace the air conditioner control panel. →**No** To step 20.
20. Check ECM.	
	A. Replace ECM. **Refer to: Replacement of ECM** Confirm that the fault has been ruled out.

Blower out of operation diagnosis flow

Test condition	Details/results/measures
1. General inspection.	
	A. Check the blower harness connector for aging, shedding, damage and other abnormalities. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Check the K18 blower fuses.	
	A. Check the blower fuse SB09. **Fuse rated capacity: 30 A** Is it OK after checking? →**Yes** To step 3. →**No** Replace the blower fuses.
3. Check the blower relay.	
	A. Operate the ignition switch to turn the power to OFF state. B. Replace the K18 blower relay with a new one. C. Operate the ignition switch to turn the power to ON state. D. Turn on the blower and check if the blower is operating properly Is the blower normal? →**Yes** Replace the K18 blower relay. →**No** To step 4.
4. Check the blower relay power supply circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Remove the K18 blower relay. C. Operate the ignition switch to turn the power to ON state. D. Measure the voltage between No. 1 and 3 terminals of the K18 blower relay of the dashboard electrical box and the reliable ground point with a multimeter. **Standard value: 11 ~ 14 V** Is the voltage normal? →**Yes** To step 5. →**No** Check the blower relay power circuit for failure, replace the dashboard electrical box as necessary.

Test condition	Details/results/measures
5. Check the blower relay control circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Remove the K18 blower relay. C. Measure the resistance between No. 2 terminal of the K18 blower relay of the dashboard electrical box and the reliable ground point with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? → **Yes** To step 6. → **No** Check the blower relay control circuit for failure and replace the wiring harness if necessary.
6. Check the blower.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the blower harness plug A06. D. When measured with a multimeter, the No. 1 and No. 2 terminals of the blower should be conducting. Is it OK after checking? →**Yes** To step 7. →**No** Replace the blower. **Refer to: Replacement of blower**
7. Check the blower input voltage circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Remove the K18 blower relay. D. Disconnect the harness plug A06 of the blower. E. Measure the resistance between the No. 5 terminal of the K18 blower relay of the dashboard electrical box and No. 2 of the harness plug A06 of the blower with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 8. →**No** Check the blower input voltage circuit for failure, and replace the dashboard electrical box as necessary.

Test condition	Details/results/measures
8. Check the blower grounding circuit.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the blower harness plug A06. D. Disconnect the harness plug A05 of blower speed control module. E. Measure the resistance between the No. 1 terminal of the harness plug A06 of blower and No. 1 terminal of the harness plug A05 of the blower speed control module with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 9. →**No** Check the blower input voltage circuit for failure and replace the wiring harness if necessary.
9. Check the grounding circuit of the blower speed control resistor.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the blower speed regulation module harness plug A05. D. Measure the resistance between No. 4 terminal of the harness plug A05 of the blower speed control module and the reliable grounding with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 10. →**No** Check the grounding circuit of the blower speed control resistor for failure and replace the wiring harness if necessary.
10. Check the control signal circuit of the blower speed control resistor.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the blower speed regulation module harness plug A05. D. Disconnect the A/C control panel harness plug A07. E. Measure the resistance between the No. 2 terminal of the harness plug A05 of blower speed control module and the No. 10 terminal of the air conditioner control panel A07 with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? →**Yes** To step 11. →**No** Repair the blower speed regulation resistance control signal line fault and replace the harness if necessary.

Test condition	Details/results/measures
11. Check the feedback signal circuit of the blower speed control resistor.	
	A. Operate the ignition switch to turn the power to OFF state. B. Disconnect the battery negative connector. C. Disconnect the blower speed regulation module harness plug A05. D. Disconnect the A/C control panel harness plug A07. E. Measure the resistance between the No. 3 terminal of the harness plug A05 of blower speed control module and the No. 11 terminal of the air conditioner control panel A07 with a multimeter. **Standard value: Less than 5Ω** Is the resistance normal? **→Yes** To step 12. **→No** Repair the blower speed regulation resistance control signal line fault and replace the harness if necessary.
12. Check the blower speed control resistor.	
	A. Replace the blower speed control resistor. **Refer to: Replacement of blower speed control resistor** Is the troubleshooting successful? **→Yes** Replace the blower speed regulation resistance. **→ No** To step 13.
13. Check the A/C control panel.	
	A. Replace the A/C control panel. **Refer to: Replacement of A/C control panel** Confirm that the fault has been ruled out.

08

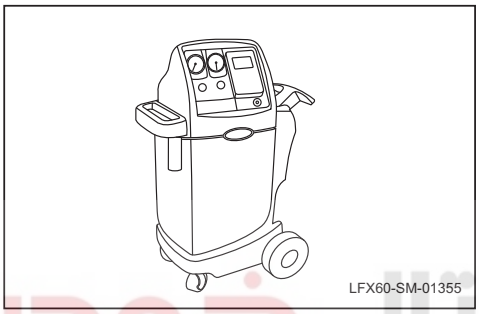
Removal and installation

Recycling and filling procedures for air conditioner refrigerants

Recycle

1. Recycle of the air conditioner refrigerants.

a. Refrigerant recycling and filling machine can complete the recovery, emptying and refilling procedures of air conditioning system with one connection. During recovery and emptying, the refrigerant is filtered to ensure that the refrigerant filled in the air conditioning system is clean and dry.



⚠Warning:

Refrigerant-related operations should be carried out in a well-ventilated environment without inhalation of refrigerant vapor. Avoid inhalation of vapor or mist of air conditioning refrigerant R-134a (tetrafluoroethane) and lubricating oil. Contact them will irritate the eyes, nose and throat. Works should be performed in a well-ventilated area.When removing R-134a from the air conditioning system, use a certified service facility (R-134a Recycling Equipment) that meets the requirements of SAE (American Society of Automotive Engineers) J 2210.If the system is accidentally discharged, the workspace must be ventilated before continuing maintenance..More information about health and safety is available from the refrigerant and lubricating oil manufacturers.

b. Connect the hose of high pressure side with quick connector to the high pressure side connector of the vehicle air conditioning system.

c. Open joint valve on the high pressure side.

d. Connect the hose of low pressure side with quick connector to the low pressure side connector of the vehicle air conditioning system.

e. Open joint valve on the low pressure side..

f. Check the the pressure gauge on the high pressure and low pressure side of the control panel on the refrigerant recycling and filling machine to ensure the air conditioning system pressure. If there is no pressure, there is no recyclable refrigerant in the system.

g. Open valves on the high pressure side and low pressure side.

h. Connect the refrigerant recycling and filling machine to appropriate power socket.

i. Turn on the main power switch.

j. Start the recycling process. Refer to the operation instructions supplied by the manufacturer and further learn about the use of refrigerant recovery and filling machine.

k. Check the low pressure side pressure gauge of control panel. If the air conditioning system pressure is kept at zero, the recovery is completed.

l. If the data indication of the low pressure side pressure gauge is not zero, then the system still has refrigerant in it. Recover the remaining refrigerant. Repeat this step until the system pressure remains at zero for 2 minutes.

Empty the refrigerants.

a. The refrigerant tank of Refrigerant Recycling and Filling Machine must be filled with sufficient amount of R-134a refrigerant for filling. Check the amount of refrigerant in the tank. If the refrigerant is less than 2 kg, add new refrigerant is to the refrigerant tank. Refer to the instructions of the Refrigerant Recycling and filing Machine for how to add the refrigerant. Check that the hoses of high pressure side and low pressure side are connected to the air conditioning system and open the valves of high pressure side and low pressure side on the control panel of the refrigerant recycling and filling machine.

b. Operate according to the operation procedure of the refrigerant recycling and filling machine, start the vacuum pump and start the empty program.

c. Check the system for leaks. Refer to the operation instructions supplied by the manufacturer and further learn about the use of refrigerant recovery and filling machine.

Lubricating oil filling, refilling of refrigeration system

ⓘNote:

It is necessary to replenish the lubricating oil discharged from the air conditioning system during the recovery of the refrigerant.

a. Use the lubricants used exclusively for the R-134a system.
b. Refer to the manufacturer's instruction manual for details on how to use the refrigerant recycling and filling machine and add the specified lubricating oil to the vehicle air conditioning system.
c. When the filled oil reaches the required level, close the valve.

Filling

1. Filling of the air conditioner refrigerants.
a. Open the low pressure side valve on the control panel.
b. Open the high pressure side valve on the control panel.
c. Refer to the manufacturer's instruction manual for details on how to use the refrigerant recycling and filling machine.
d. Fill the air conditioner with the specified amount of refrigerant, make sure that the unit of measurement is correct (ie kilograms, kilograms or pounds).
e. Start filling.
2. After the refrigerant filling is complete, do the following:
a. Close the valves of the high and low pressure side on the control panel of refrigerant recycling and filling machine, both valves should be closed.
b. Start the vehicle air conditioning system.
c. Keep the engine running until the readings of the pressure gauge on the high pressure side and the low pressure side is stable.
d. Compare the readings with the system specifications.
e. Check the outlet temperature of evaporator to ensure that the air conditioning system operates in accordance with system specifications.
f. Turn off the air conditioning system.
g. Disconnect the hoses of the high and low pressure side from the vehicle.
h. Perform the cleaning operation of the air conditioning hose according to the instructions of the refrigerant recycling and filling machine.

Replacement of the air conditioner control panel

Removal

1. **Remove the air conditioner control panel.**

(a). Remove the air conditioner control panel, **refer to the replacement of the dashboard assembly.**

Installation

1. **Install the air conditioner control panel.**

(a). Install the air conditioner control panel, **refer to the replacement of the dashboard assembly.**

Replacement of compressor

Removal

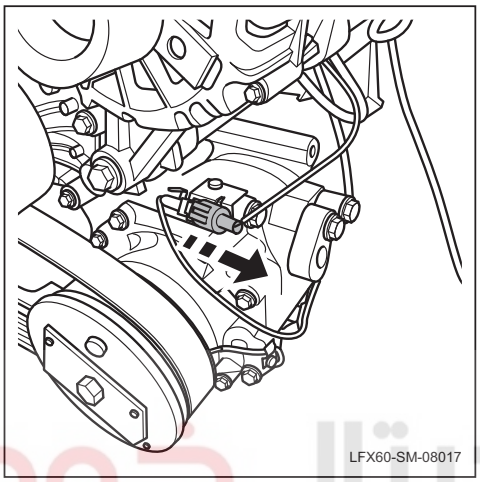
1. Remove the compressor to evaporator front section line.

(a). Recycle refrigerant, **refer to the recycling and filling procedures for air conditioner refrigerants**

(b). Disconnect the battery negative terminal .

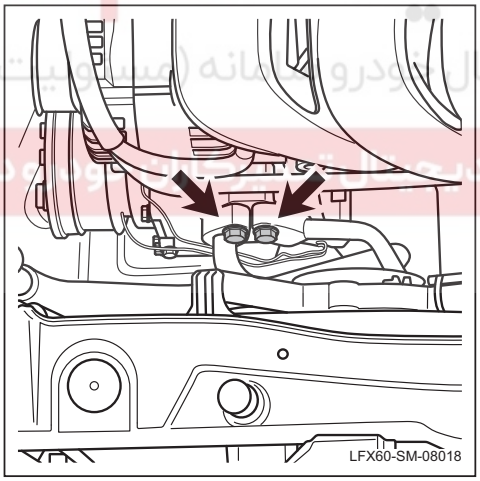
(c). Remove the compressor belt, **refer to the replacement of the compressor belt.**

(d). Lift the vehicle, **refer to:Lifting and support of the vehicle.**

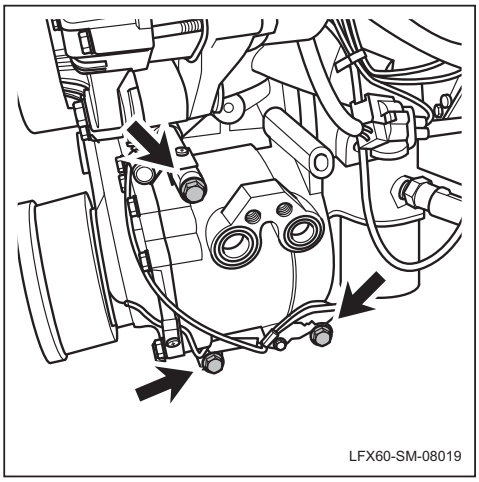


(e). Remove the bottom guard of the engine.

(f). Disconnect the harness plug of the compressor.



(g). Remove the fixing bolts of the air conditioner compressor piping.



(h). Remove the fixing bolts of the compressor.
(i). Take off the compressor.

Installation

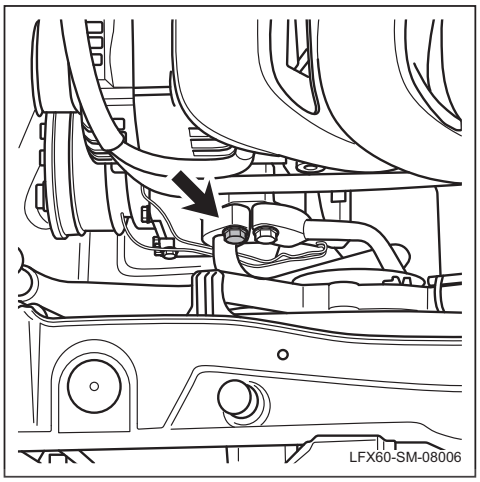
1. Install the compressor.
(a). The installation sequence is the reverse of the disassembly order.
(b). Fill the A/C refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**
(c). Check for refrigeration system leak.

Replacement of the front piping from compressor to evaporator

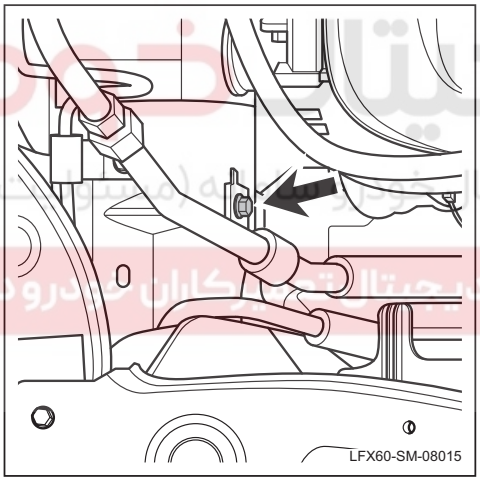
Removal

1. Remove the compressor to evaporator front section line.

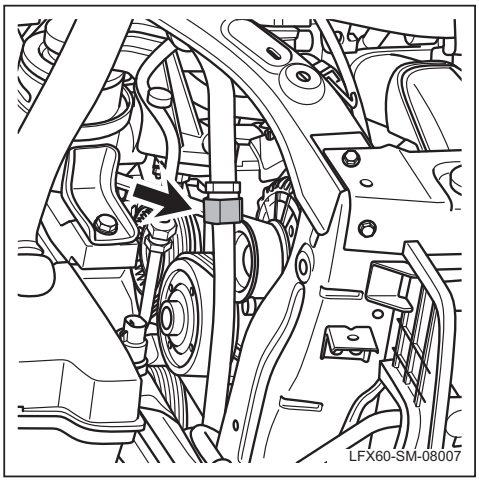
(a). Recover the refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**



(b). Remove the pipe fixing bolts on the compressor.



(c). Remove the fixing bolts of bracket for the air conditioner piping.



(d). Remove the lock nut of the compressor piping.
(e). Take off the front piping from compressor to evaporator.

Installation

1. Install the front piping from compressor to evaporator.
(a). The installation sequence is the reverse of the disassembly order.
(b). Fill the A/C refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**
(c). Check for refrigeration system leak.

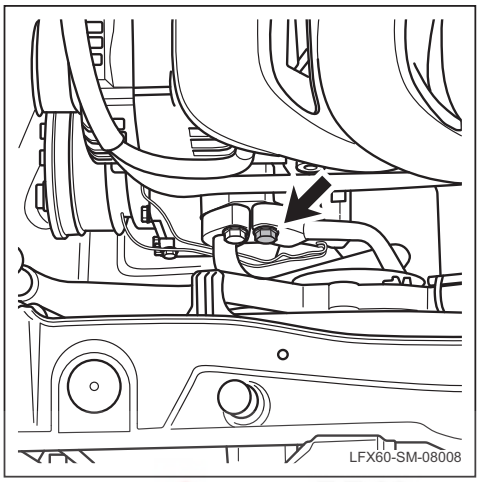
Replacement of the piping from compressor to condenser

Removal

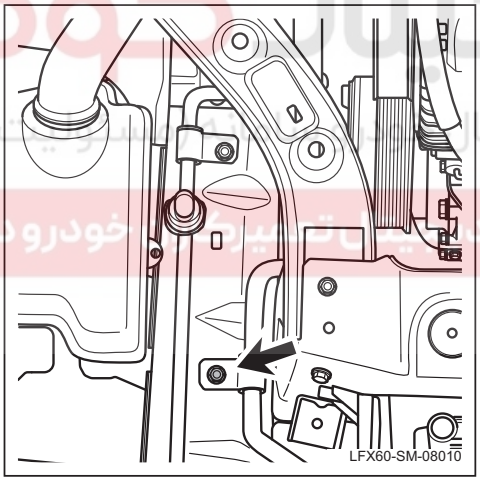
1. Remove the piping from compressor to condenser.

(a). Recover the refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**

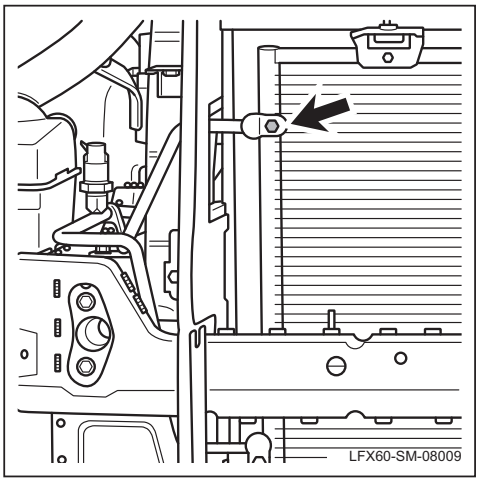
(b). Remove the front bumper and grid assembly. **Refer to the replacement of front bumper assembly.**



(c). Remove the pipe fixing bolts on the compressor.



(d). Remove the fixing bolts of bracket for the air conditioner piping.



(e). Remove the pipe fixing bolts on the condenser.
(f). Take off the piping from compressor to condenser.

Installation

1. Install the piping from compressor to condenser.
(a). The installation sequence is the reverse of the disassembly order.
(b). Fill the A/C refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**
(c). Check for refrigeration system leak.

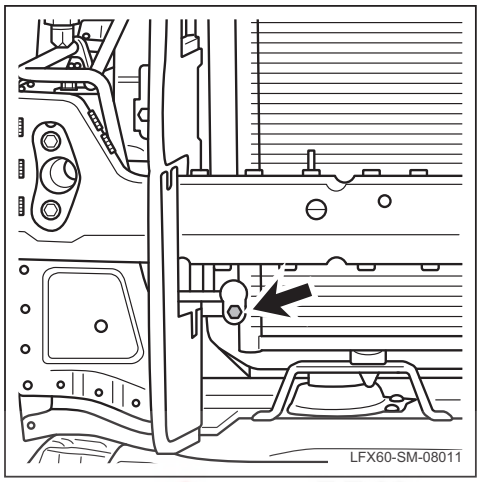
Replacement of the front piping from condenser to evaporator

Removal

1. Remove the front piping from condenser to evaporator

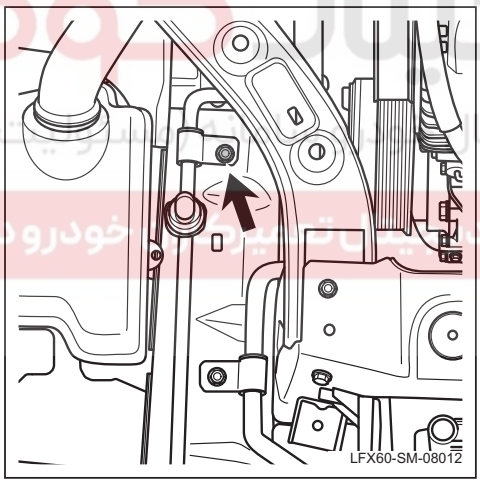
(a). Recover the refrigerant. Refer to the A/C refrigerant recovery and filling procedures.

(b). Remove the front bumper and grid assembly. Refer to the replacement of front bumper assembly.

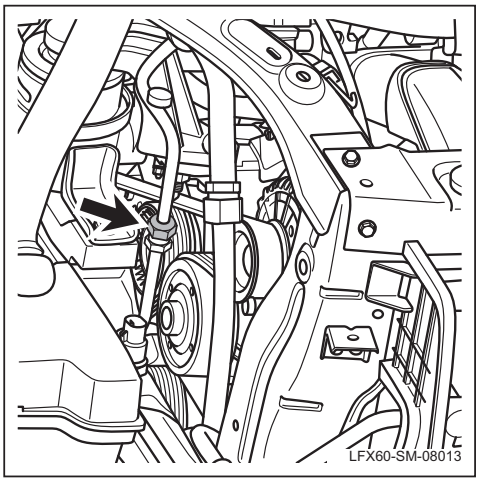


(c). Remove the pipe fixing bolts on the condenser.

(d). Disconnect the harness plug of air conditioner pressure switch.



(e). Remove the fixing bolts of bracket for the air conditioner piping.



(f). Remove the lock nut of air conditioner piping.
(g). Take off the front piping from condenser to evaporator

Installation

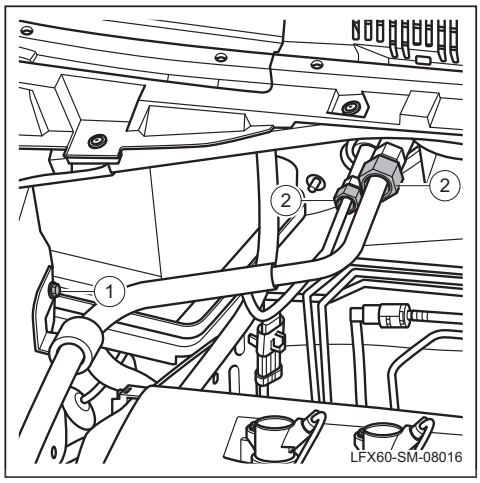
1. Install the condenser to evaporator front section line.
(a). The installation sequence is the reverse of the disassembly order.
(b). Fill the A/C refrigerant. Refer to the A/C refrigerant recovery and filling procedures.
(c). Check for refrigeration system leak.

Replacement of the front piping of evaporator

Removal

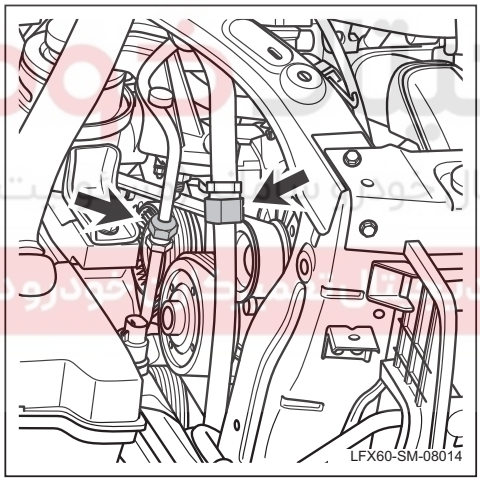
1. Remove the front piping of evaporator

(a). Recover the refrigerant. Refer to the A/C refrigerant recovery and filling procedures.



(b). Remove the fixing bolts 1 of bracket for the air conditioner piping.

(c). Remove the lock nut 2 of the front piping of evaporator



(d). Remove the lock nut of air conditioner piping.

(e). Take off the front piping of evaporator.

Installation

1. Install the condenser to evaporator front section line.

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

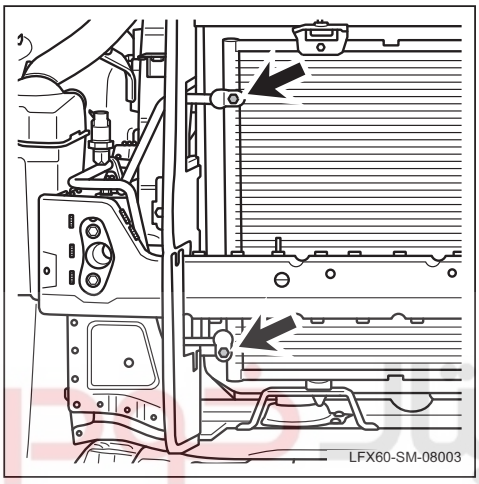
(b). Fill the A/C refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**

(c). Check for refrigeration system leak.

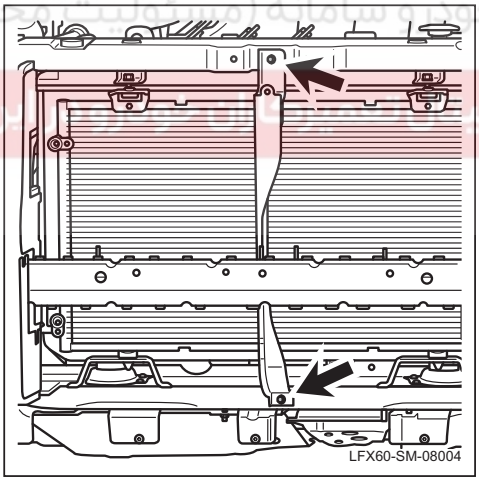
Replacement of condenser

Removal

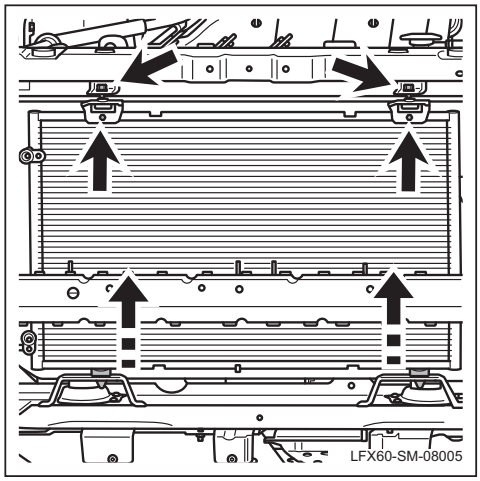
1. Remove the condenser.
(a). Disconnect the battery negative cable.
(b). Remove the front bumper. **Refer to the replacement of front bumper assembly.**
(c). Remove the hood lock, **refer to the replacemen of hood lock.**
(d). Remove the ambient temperature sensor, **refer to the replacement of ambient temperature sensor.**
(e). Recycle the refrigerant, **refer to the recycling and filling procedures for air conditioner refrigerants**



(f). Remove the fixing bolts of the condenser piping.



(g). Remove the lock nut of the front braket.



(h). Remove the fixing bolts of the condenser bracket.
(i). Take off the condenser assembly upwards.

Installation

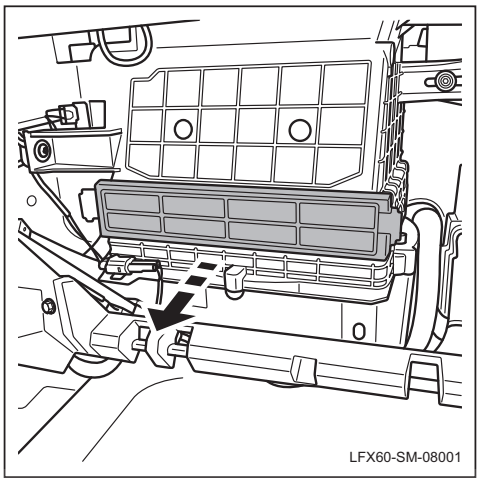
1. The installation sequence is reverse to the removal sequence.
(a). The installation sequence is the reverse of the disassembly order.
(b). Fill the A/C refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**
(c). Check for refrigeration system leak.

Replacement of air conditioner filter

Removal

1. Remove the air conditioner filter

(a). Remove the glovebox, **refer to the replacement of the dashboard assembly.**



(b). Remove the housing of air conditioning filter and take off the air conditioning filter.

Installation

1. Install the air conditioner filter

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

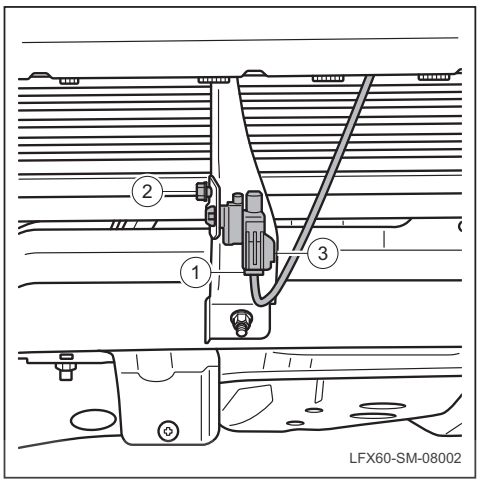
Replacement of ambient temperature sensor

Removal

1. Remove the ambient temperature sensor.

(a). Disconnect the battery negative connector.

(b). Remove the front bumper. Refer to the replacement of front bumper assembly.



(c). Disconnect the harness plug 1 of the ambient temperature sensor.

(d). Remove the fixing bolts 2 of bracket for ambient temperature sensor.

(e). Take off the ambient temperature sensor 3.

Installation

1. Install the ambient temperature sensor.

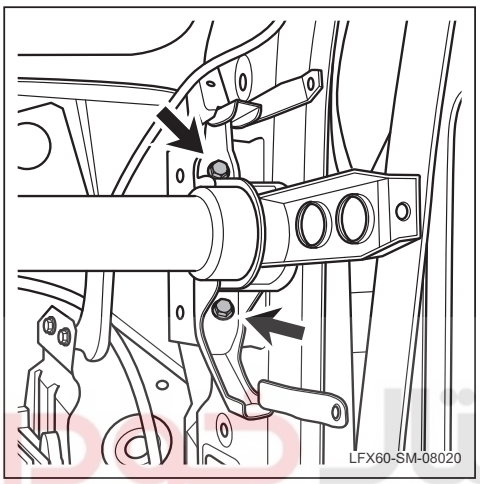
(a). The installation order is the reverse of the disassembly order.

Replacement of HVAC assembly

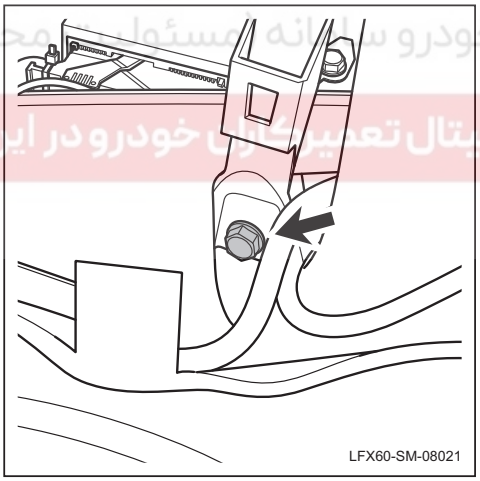
Removal

1. Remove the HVAC assembly.

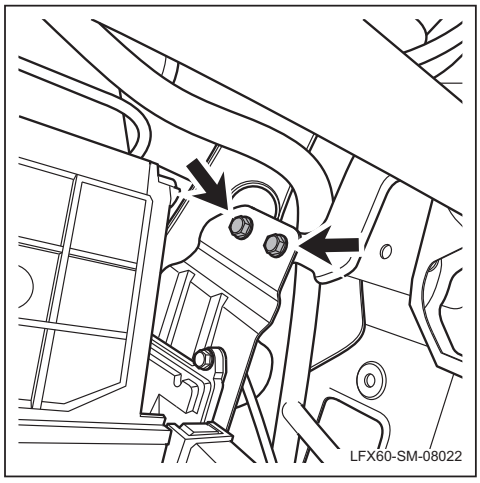
(a). Recover the refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**
(b). Recycling of engine coolant, **refer to the recycling and filling procedures for coolant.**
(c). Disconnect the battery negative terminal.
(d). Remove the console, **refer to the replacement of the console assembly.**
(e). Remove the dashboard, **refer to the replacement of the dashboard assembly.**
(f). Remove the front cover, **refer to the replacement of the front ventilation cover assembly.**



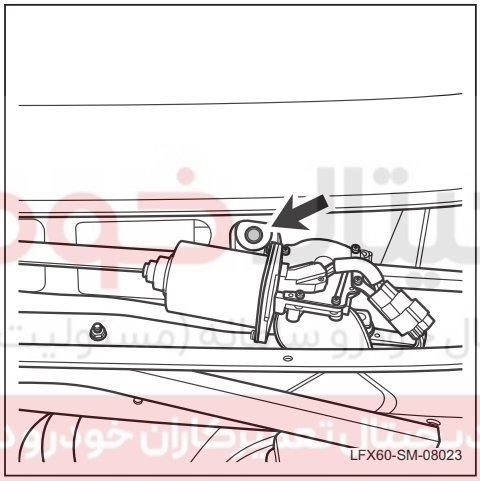
(g). Remove the left and right fixing bolts of dashboard pipe column beam.



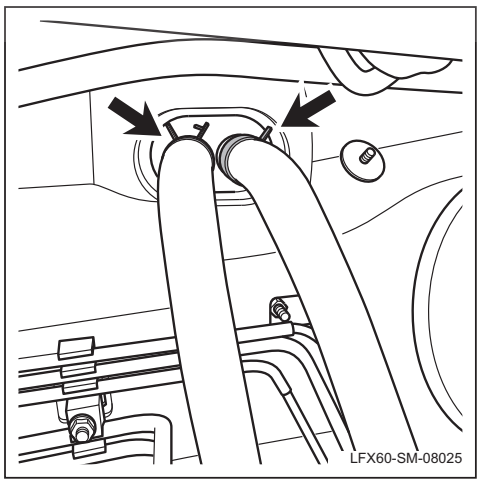
(h). Remove the lower fixing bolts of dashboard pipe column beam.



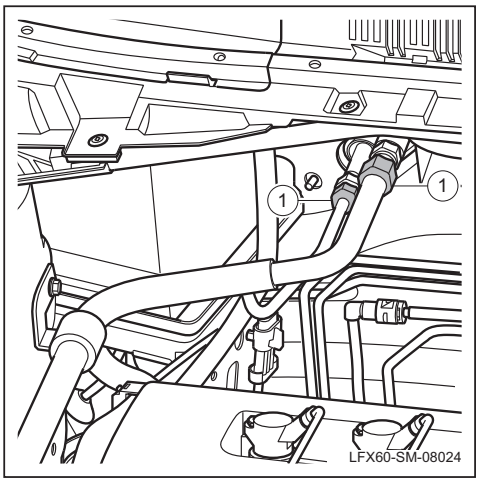
(i). Remove the fixing bolts of the ECU module bracket and the pipe beam.



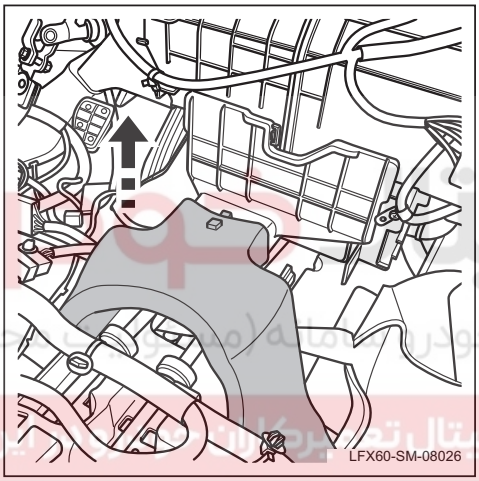
(j). Remove the front fixing bolts of dashboard pipe column beam.
(k). Disconnect the harness clip and harness plug of the dashboard pipe column beam.
(l). Take off the dashboard pipe column beam.



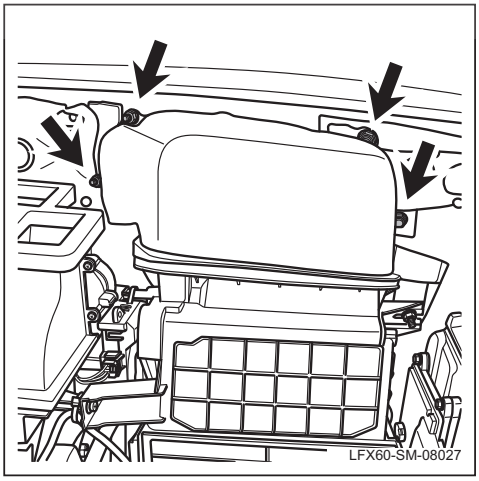
(m). Remove the clamp of heating water pipe.
(n). Remove the heating water pipes.



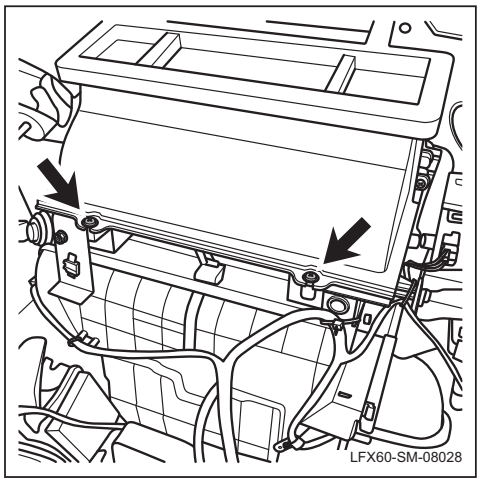
(o). Remove the lock nut 1 of air conditioner piping.
(p). Remove the air conditioner piping.



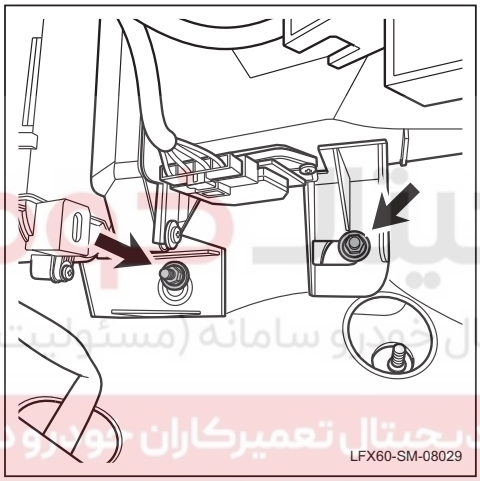
(q). Remove the floor duct.



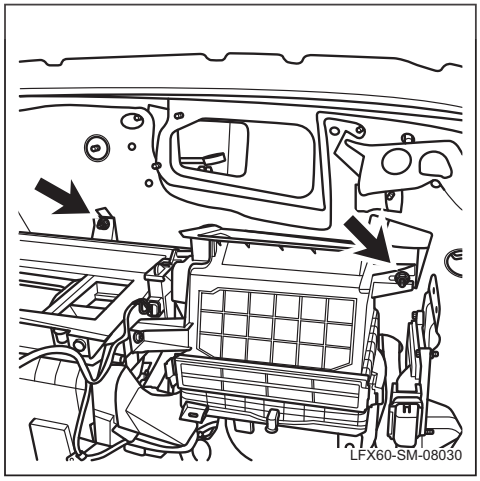
(r). Remove the fixing nut of HVAC assembly.



(s). Remove the fixing screws of the upper outlet of HVAC assembly and take it off.



(t). Remove the lower fixing nut of HVAC assembly.



(u). Remove the fixing nut of HVAC assembly.
(v). Take off the HVAC assembly.

Installation

1. **Install the evaporator assembly.**

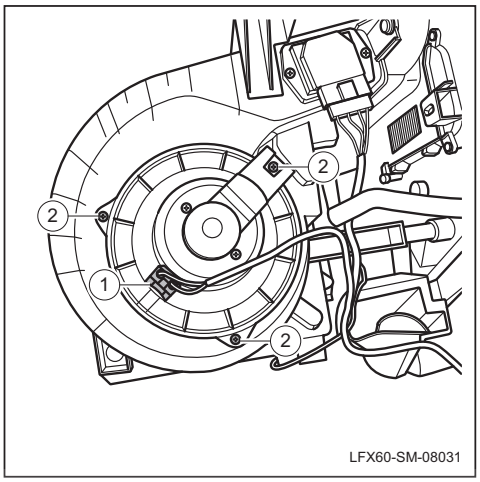
(a). The installation sequence is the reverse of the disassembly order.
(b). Fill the A/C refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**
(c). Check for refrigeration system leak.

Replacement of blower motor

Removal

1. Remove the blower motor.

(a). Disconnect the battery negative cable.



(b). Disconnect the harness connector 1 of blower motor.

(c). Remove the fixed screw 2 of the blower motor.

(d). Take off the blower motor.

Installation

1. Install the blower motor.

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

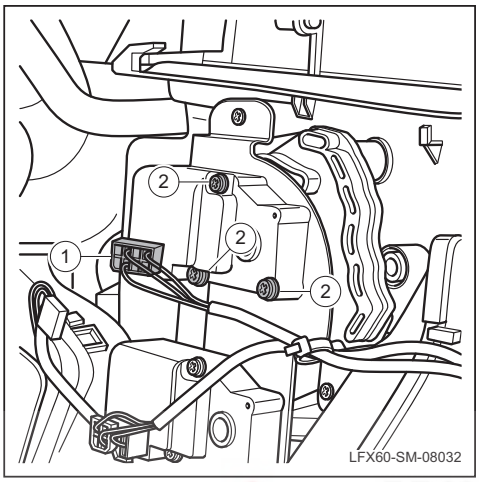
Replacement of mode throttle motor

Removal

1. Remove the mode throttle motor.

(a). Disconnect the battery negative connector.

(b). Remove the dashboard lower left panel assembly. Refer to the replacement of dashboard assembly.



(c). Disconnect the harness connector 1 of mode throttle motor.

(d). Remove the fixing screw 2 of mode throttle motor.

(e). Take off the mode throttle motor.

Installation

1. Install the mode throttle motor.

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

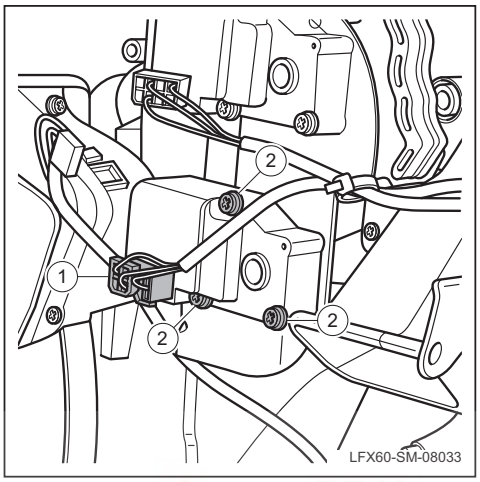
Replacement of cool and heat throttle motor

Removal

1. Remove the cool and heat throttle motor.

(a). Disconnect the battery negative connector.

(b). Remove the dashboard lower left panel assembly. **Refer to the replacement of dashboard assembly.**



(c). Disconnect the harness connector 1 of cool and heat throttle motor.

(d). Remove the fixing screw 2 of cool and heat throttle motor.

(e). Take off the cool and heat throttle motor.

Installation

1. Install the cool and heat throttle motor.

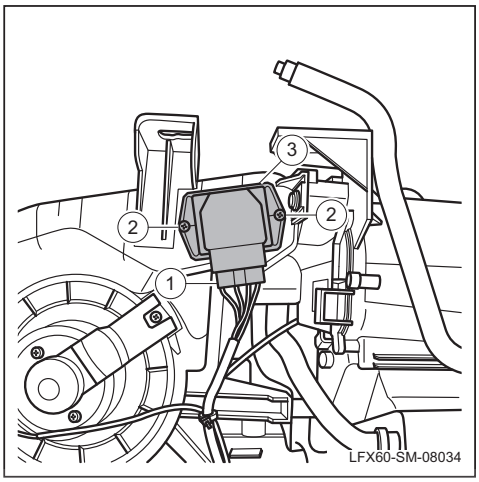
(a). The installation sequence is the reverse of the disassembly order.

Replacement of blower speed control module

Removal

1. Remove the blower speed regulation module.

(a). Disconnect the battery negative cable.



(b). Disconnect the harness plug 1 of blower speed control module.

(c). Remove the fixed screw 2 of the blower speed control module.

(d). Take off the blower speed control module

Installation

1. Install the blower speed control module

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

Replacement of new return throttle motor

Removal

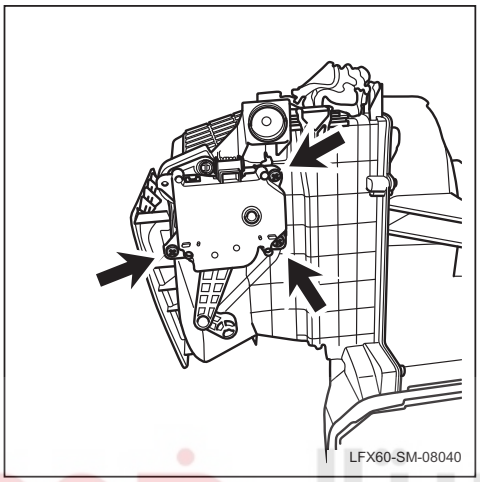
1. Remove the new return throttle motor.

(a). Disconnect the battery negative cable.

(b). Recover the refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**

(c). Recover the engine coolant. **Refer to engine coolant draining and filling procedures.**

(d). Remove the HVAC assembly. **Refer to the replacement of HVAC assembly.**



(e). Remove the blower tank and evaporator tank connecting bolt and separate them.

(f). Disconnect the harness connector 1 of new return throttle motor.

(g). Remove the fixing screw of the new return throttle motor.

(h). Take off the new return throttle motor.

08

Installation

1. Install the new return throttle motor.

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

(b). Install the HVAC assembly, **refer to the replacement of HVAC.**

(c). Fill the refrigerant, **refer to the A/C refrigerant recovery and filling procedures.**

(d). Fill the engine coolant, **refer to the engine coolant draining and filling procedures.**

(e). Connect the battery negative terminal

Replacement of heating water tank

Removal

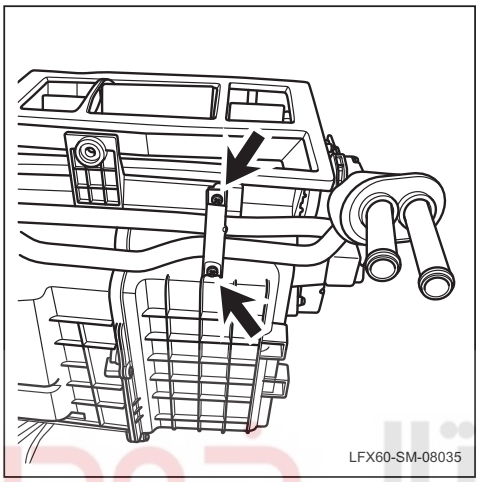
1. Remove the heating water tank

(a). Recover the refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**

(b). Recycling of engine coolant, **refer to the recycling and filling procedures for engine coolant.**

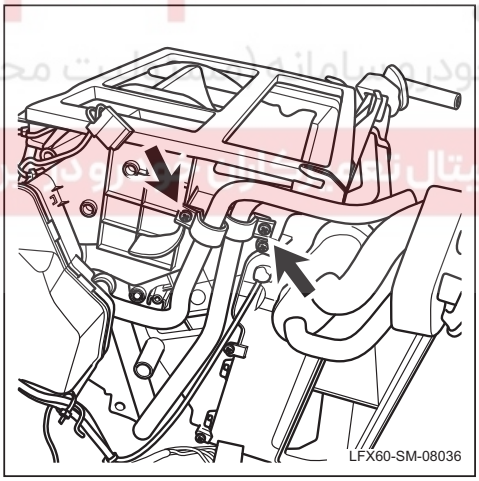
(c). Disconnect the battery negative terminal.

(d). Remove the HVAC assembly. **Refer to the replacement of HVAC assembly.**



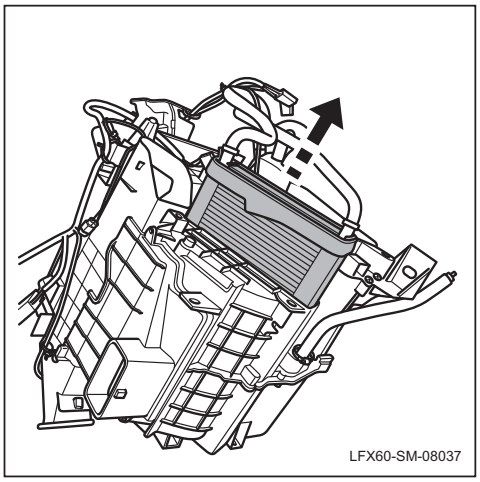
(e). Remove the blower tank and evaporator tank connecting bolt and separate them.

(f). Remove the fixing screw of heating water tank.



(g). Remove the fixing screw of heating water tank.

(h). Disconnect the harness snap and the fixing screw of HVAC assembly.



(i). Take off the heating water tank.

Installation

1. Install the heating water tank.

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

(b). Install the HVAC assembly, **refer to the replacement of HVAC.**

(c). Fill the refrigerant, **refer to the A/C refrigerant recovery and filling procedures.**

(d). Fill the engine coolant, **refer to the engine coolant draining and filling procedures.**

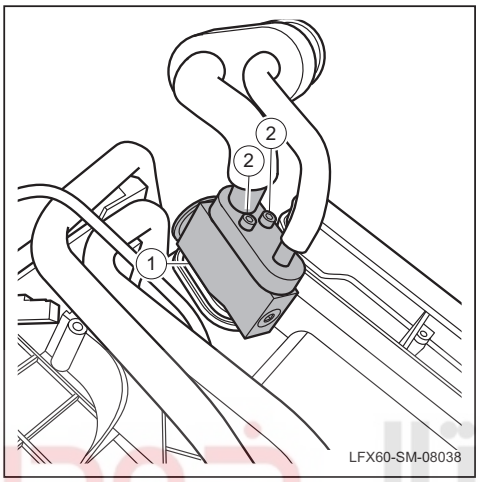
(e). Connect the battery negative terminal

Replacement of expansion valve

Removal

1. Remove the expansion valve.

(a). Disconnect the battery negative connector.
(b). Recover the refrigerant. **Refer to the A/C refrigerant recovery and filling procedures.**
(c). Recycling of engine coolant, **refer to the recycling and filling procedures for engine coolant.**
(d). Remove the HVAC assembly, **refer to the replacement of HVAC assembly.**



(e). Remove the fixing bolt 2 of expansion valve.
(f). Take off the expansion valve 1.

Installation

1. Install the expansion valve.

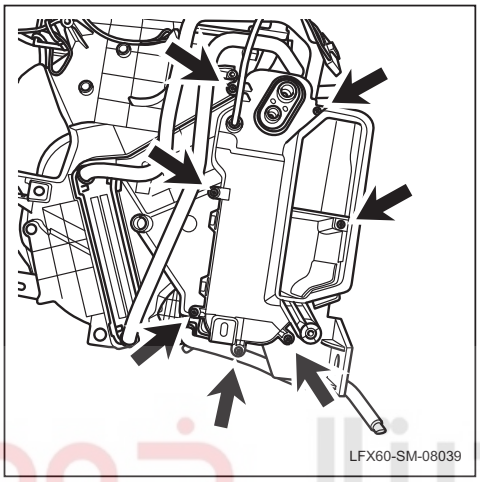
(a). The installation sequence is the reverse of the disassembly order.
(b). Install the HVAC assembly, **refer to the replacement of the HVAC assembly.**
(c). Filling of engine coolant, **refer to the recycling and filling procedures for engine coolant.**
(d). Refill refrigerant, **refer to the recycling and filling procedures for air conditioner refrigerants**
(e). Connect the battery negative terminal

Replacement of the evaporator

Removal

1. Remove the evaporator.

(a). Disconnect the battery negative connector.
(b). Recover the refrigerant, **refer to the A/C refrigerant recovery and filling procedures.**
(c). Recover the engine coolant, **refer to engine coolant draining and filling procedures.**
(d). Remove the HVAC assembly, **refer to the replacement of HVAC assembly.**
(e). Remove the expansion valve, **refer to the replacement of expansion valve.**


LFX60-SM-08039

(f). Remove the connecting bolts of the blower housing and the evaporator housing and separate them.
(g). Remove the fixing screw of evaporator upper cover.
(h). Take off the evaporator.

08

Installation

1. Install the evaporator.

(a). The installation sequence is the reverse of the disassembly order.
(b). Install the expansion valve, **refer to the replacement of expansion valve.**
(c). Install HVAC assembly, **refer to the replacement of HVAC assembly.**
(d). Fill the engine coolant,**refer to the engine coolant draining and filling procedures.**
(e). Refill refrigerant, **refer to the recycling and filling procedures for air conditioner refrigerants.**
(f). Connect the negative connector of the battery.

09 - safety protection device

Seatbelt

Technical specifications

Torque Specifications

Name	Torque range	
	Metric (Nm)	British (lb-ft)
Fixing bolt of the front seat belt height adjuster	45	33
Fixing bolts for front seat belt retractor / rear seat belt	45	33
Fixing bolts for back seat belt / rear seat belt retractor	45	33
Rear middle seat belt retractor	45	33

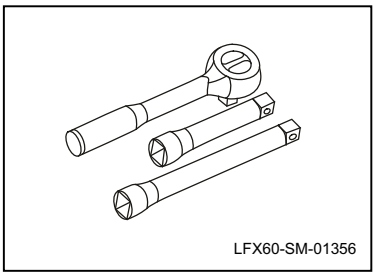
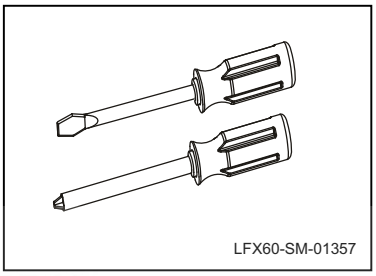
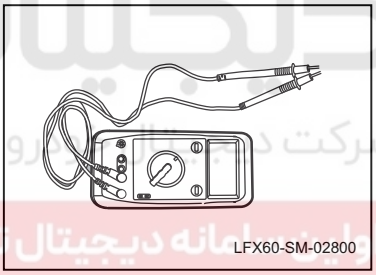
Precautions

Precautions

1. Change seatbelt with worn or split webbing and dysfunctional buckle.
2. After collision evolving tension on seatbelt, change the seatbelt, even there is no damage found on it.
3. It is forbidden to insert anything into the buckle. Never modify or remove the seatbelt.
4. Mild detergent should be used to clean dirty seatbelt. Corrosive detergent, dye and dry cleaning agent may impair strength of seatbelt seriously.
5. If the webbing of seatbelt is worn, split or floppy due to chemical or sunshine, it must be changed.
6. If metal joint of seatbelt deformed, distorted or rusted, it must be changed.
7. Performance requirement of the retractor: rewind freely in installed orientation.
8. Performance requirement of the adjuster: easy adjustment, hold webbing of seatbelt tightly and reliable.
9. Performance requirement of the buckle lock: obvious feeling of insertion and release, no self release. The system should not be failure.

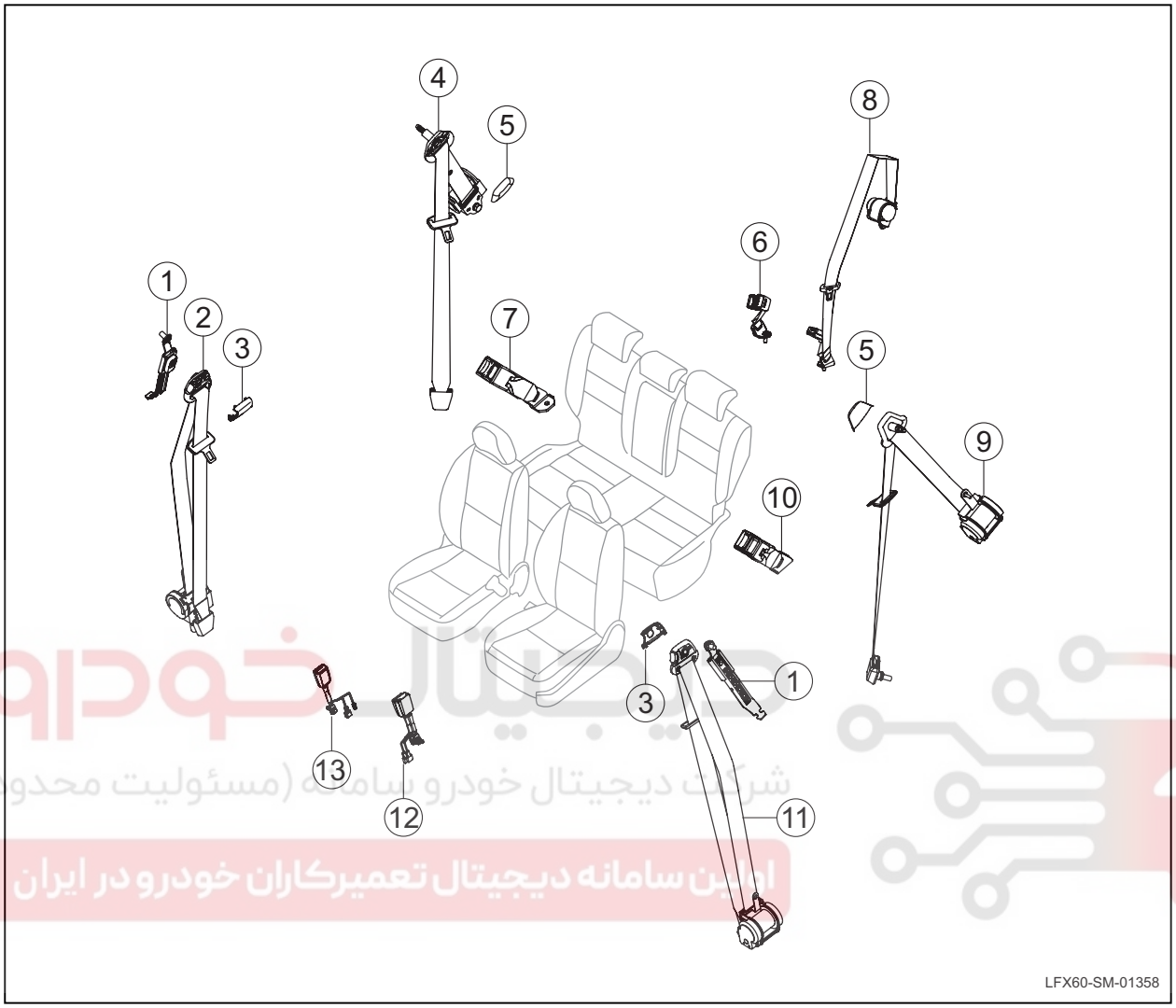
Preparation

General service tool

No.	Tool name	Tool drawing	Tooling code	Remarks
1	Fast wrench and hedger	 LFX60-SM-01356	-	Tighten or remove bolts and nuts
2	Screwdriver	 LFX60-SM-01357	-	To remove and install the screw and pry the snap ring etc.
3	Digital multimeter	 LFX60-SM-02800	-	Measure the voltage and resistance

Structure and installation location

Part exploded view



No.	Part name
1	Front seat belt height adjustment device
2	Right front seatbelt retractor
3	Front seat belt ring cover
4	Right rear seatbelt retractor
5	Rear seat belt ring cover
6	Rear middle lock
7	Right rear harness

No.	Part name
8	Rear middle retractor
9	Left rear seatbelt retractor
10	Left rear seatbelt buckle
11	Left front seatbelt retractor
12	Left front seatbelt buckle
13	Right front seatbelt buckle

General Inspection

Seat belt inspection

1. Contraction is not normal

If the seat belt does not retract properly, check that if the anchor cover and the mounting plate are properly installed and do not rub against the seat belt. If necessary, make sure that the seat belt does not rub against one end of the retractor cover groove. If necessary, adjust the retractor to place the seat belt in a central position by loosening the fixing bolt and retighten the bolt.

2. Simple test

When the vehicle is stationary and parked on a flat road surface, tightly grasp the seat belt and pulling it out quickly. The retractor must be locked within 25 cm to prevent more of the belt from coming out. In this test, any seat belt retractor from which the belt is pulled out can not be reused, and a new seat belt must be installed.

Seat belt buckle inspection

1. Insert the seat belt into the buckle and pull the seat belt firmly to make sure that the buckle does not release.
2. Remove the driver seat belt buckle, observe the seat belt warning light status on dashboard, and confirm the display is normal.

Front seat belt height adjuster inspection

1. Adjust the front seat belt height adjuster, seat belt height adjuster should be free to adjust, no jamming phenomenon.
2. Check that the seat belt height adjuster can be reliably adjusted in a position that does not slide.

Operating Principle

System overview

⚠Warning:
The vehicle is equipped with a safety device, such that failure to follow the correct operating procedures will lead to the following

- **The airbag unexpectedly deploys.**
- **The safety device is disabled when necessary.**

⚠Warning:
Strictly observe the following rules to prevent the above conditions:

- **Before proceeding, make sure that if you are servicing on the safety device parts, around them, or on their lines.**
- **If you are performing maintenance on a safety device assembly, around it, or on its line, remove the safety device.**

The seat belt is a safety protection device that protects the driver and the passenger, in conjunction with the airbag. The airbag cannot substitute the belt. The driver and passenger must always be fastened with the seat belt and adjust to the most appropriate condition according to the body.

Seatbelt

A three-point and crossing safety belt is used in all seats. The front seat belt retractor is mounted on the bottom of the B-pillar and incorporates a torsion bar load limiting device. This device consists of a (torsion bar) retractor rolling bar mounted on a pivot. Once the sensor locks the retractor slider and the preset load is activated, it will reverse and release additional seat belt.

Seat belt buckle

The seat belt buckle, together with the seat belt, forms a passenger protection device. The driver's seat belt buckle is internally integrated with a seat belt warning light switch. When the driver is not buckled up in the process of driving, the seat belt warning light on the dashboard will continue to light up, to remind the driver of the seat belt for the protection the driver's driving safety.

Seat belt height adjuster

The front seat belt is equipped with a seat belt height adjuster, and the occupant can adjust the seat belt height by adjusting the seat belt height adjuster according to the body shape. Make occupants more comfortable in the use of seat belts, but also better protect the safety of occupants.

Diagnostic Information and Procedures

Diagnosis Instructions

Before the diagnose of the seat belt system, familiarize yourself with the working principle of the seatbelt system, and then start the seat belt system diagnostics, which helps not only to determine the correct troubleshooting step in the event of a failure, and more importantly Any troubleshooting of the seat belt system should take the seat belt system check as a starting point and instruct the service personnel to take the next logical step to troubleshoot.

Determine the condition described by the customer is normal or not. Understanding and using the diagnostic flowchart correctly reduces diagnostic time and avoids misjudgment of components.

General equipment

Name
Diagnostic equipment of vehicle
Digital multimeter

Visual Inspection

1. Confirm the problem raised by the customer.
2. Check for evident mechanical and electrical faults.

Visual check table

Mechanical	Electrical
• Belt retractor • Belt buckle	• Fuse • Line • Harness connector • Instrument cluster • Occupant detecting sensor

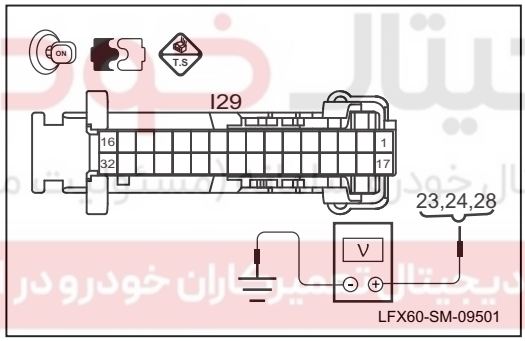
3. Solve the problem finding before the next step inspection.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If no problem is found through the visual check, confirm the fault and refer to the fault symptom list.

List of fault symptoms

If the fault occurs but the fault diagnosis code (DTC) is not stored in the control module and the fault can not be confirmed in the basic inspection, the fault diagnosis and troubleshooting should be performed according to the order listed in the table below.

Symptom	Possible point of failure	Recommended Measures
The seat belt can not be retracted	• Belt retractor	• Replace the belt assembly
The seat belt can not be locked	• Belt retractor	• Replace the belt assembly
Seat belt buckle out of function, buckle off	• Belt buckle	• Replace the seat belt buckle
The driver's seat belt warning light does not light up	• Line • Harness connector • Belt buckle • Instrument cluster	**Refer to: The diagnostic process for the driver's seat belt warning light does not light up**
The driver's seat belt safety warning light keeps on	• Line • Belt buckle • Instrument cluster	**Refer to: The diagnostic process for the driver's seat belt warning light keeps on**
The passenger's seat belt warning light does not light up	• Line • Harness connector • Belt buckle • Instrument cluster • Occupant detecting sensor	**Refer to: The diagnostic process for the passenger's seat belt warning light does not light up**
The passenger's seat belt safety warning light keeps on	• Line • Belt buckle • Instrument cluster • Occupant detecting sensor	**Refer to: The diagnostic process for the passenger's seat belt warning light keeps on**

The diagnostic process for the driver's seat belt warning light does not light up

Test condition	Details/results/measures
1. General inspection.	
	A. Check the instrument cluster harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Repair the fault position.
2. Check the instrument cluster fuse.	
	A. Check the instrument cluster fuse FS01, FS06, FS14. **Fuse rated capacity: FS01 (10A), FS06 (20A), FS14 (10A)** Is the system normal? →**Yes** To step 3. →**No** Replace the fuse of same model.
3. Check the instrument cluster power.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the instrument cluster harness plug I29. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the instrument cluster harness plug I29 terminal 23, 24 28 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? →**Yes** To step 4. →**No** Repair the instrument cluster power line open circuit fault and replace the harness if necessary.

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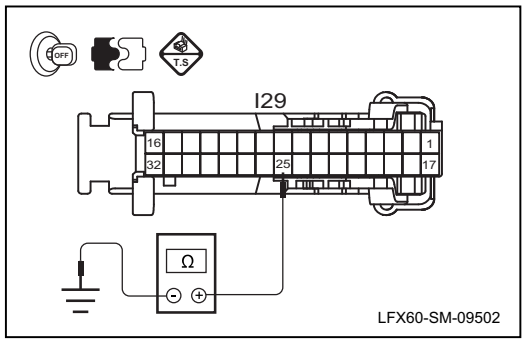
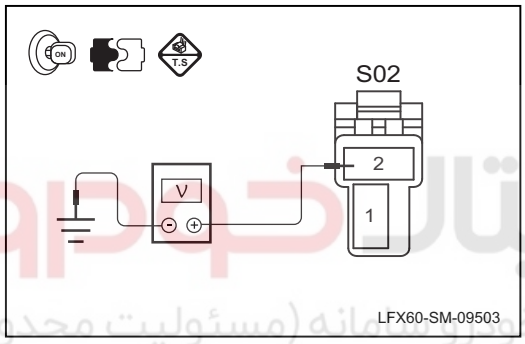
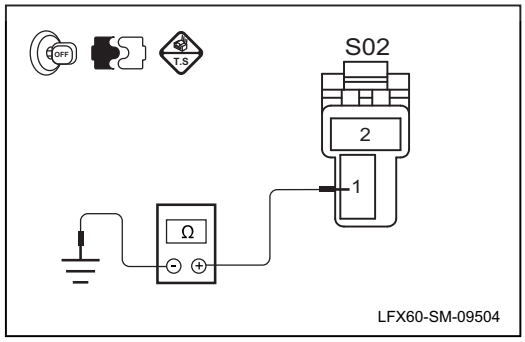
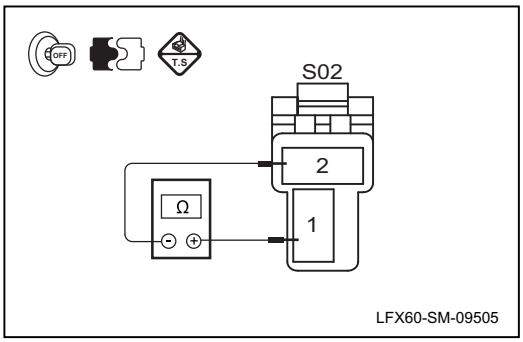
Test condition	Details/results/measures
4. Check the instrument cluster ground wire.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the instrument cluster harness plug I29. C. Measure the resistance between No. 25 terminal of the harness plug I29 of the instrument cluster and the reliable grounding with a multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? **→Yes** To step 5. **→No** Check the wiring harness between the No. 25 terminal of the harness plug I29 and the ground point for open circuit fault, and replace the wiring harness if necessary.
5. Check the power supply for driver's seat belt buckle.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the driver belt buckle harness plug S02. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the No. 1 terminal of the harness plug S02 of the driver's belt buckle and the ground point with a multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? **→Yes** To step 6. **→No** Check the circuits of the driver's belt buckle for open circuit fault, and replace the wiring harness if necessary.
6. Check the grounding circuit for driver's seat belt buckle.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the driver belt buckle harness plug S02. C. Measure the resistance between the No. 1 terminal of the harness plug S02 of the driver's belt buckle and the ground point with a multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? **→Yes** To step 7. **→No** Check the wiring harness between the No. 1 terminal of the harness plug S02 of the driver's belt buckle and the ground point for open circuit fault, and replace the wiring harness if necessary.

Test condition	Details/results/measures
7. Check the driver's belt buckle.	
	A. Operate start switch to switch the power mode to “OFF” state, disconnect the negative connector of the battery. B. Disconnect the harness plug S02 of the seat belt buckle. C. Measure the resistance between the No. 1 and No. 2 terminal of the harness plug S02 of the belt buckle with a multimeter. **Standard resistance: less than 1 Ω** Is it OK after checking? →**Yes** To step 8. →**No** Replace the belt buckle. Refer to the replacement of front belt buckle
8. Replace the instrument cluster.	
	A. Replace the instrument cluster. **Refer to the replacement of instrument cluster assembly** Verify that the system is operated normally.

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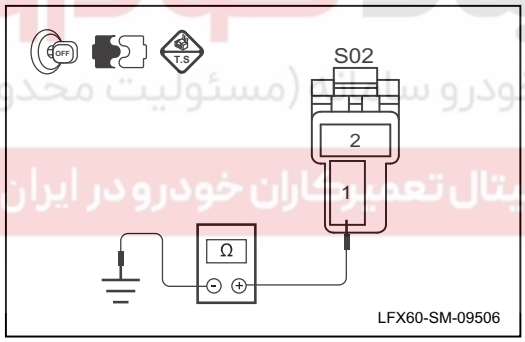
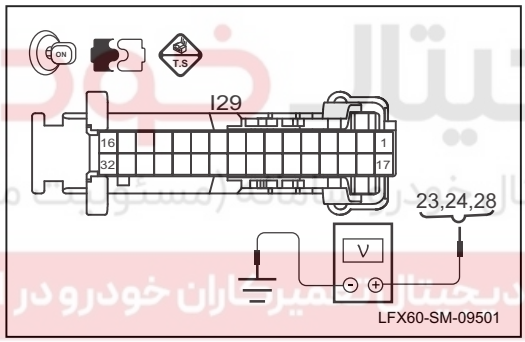
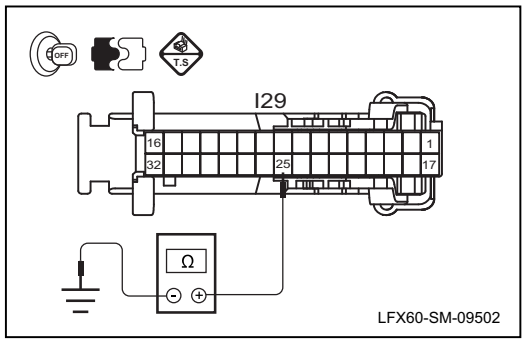
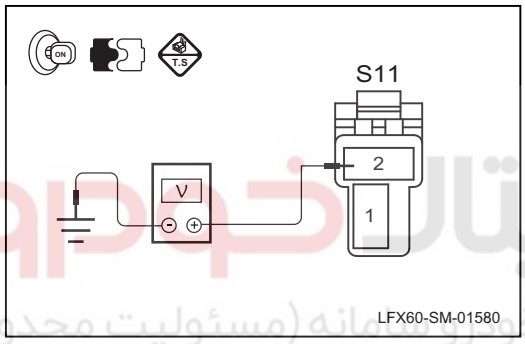
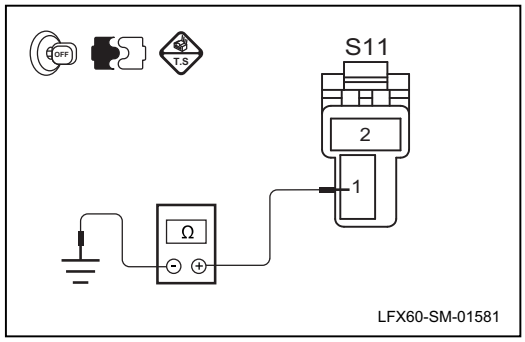
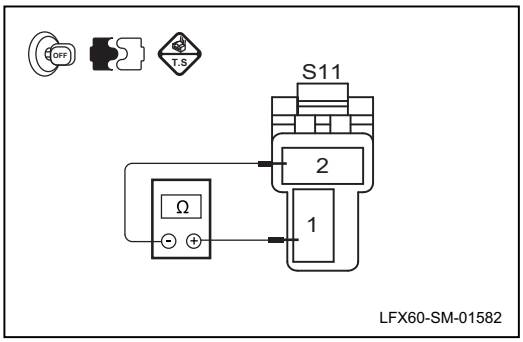
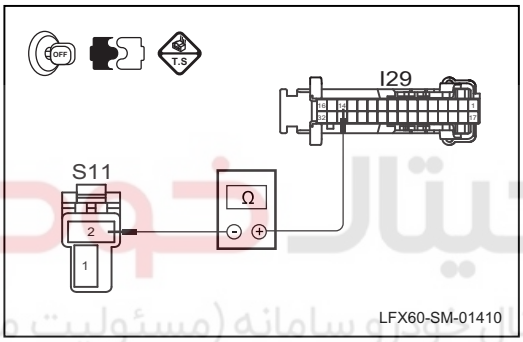
The diagnostic process for the driver's seat belt warning light keeps on

Test condition	Details/results/measures
1. Check if the driver's seat belt is buckled up.	
	A. Check whether the belt is correctly fastened. Is the belt correctly fastened? →**Yes** To step 2. →**No** Fasten the belt and test whether the system is normal.
2. Check the driver's belt buckle.	
	A. Operate the start switch to set the power mode to the "OFF" state. B. Disconnect the driver belt buckle harness plug S02. C. Operate start switch to switch the power mode to "ON" state, observe for whether the seat belt warning light is off. Does the belt warning lamp turn off? →**Yes** Replace the belt buckle. **Refer to the replacement of belt buckle** →**No** To step 3.
3. Check the signal cable of driver's seat belt warning light.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the driver belt buckle harness plug S02. C. Measure the resistance between the No. 1 terminal of the harness plug S02 of the driver's belt buckle and the reliable ground point with a multimeter. **Standard resistance: 10MΩ or higher** Is it OK after checking? →**Yes** To step 4. →**No** Check the wiring harness between the No. 1 terminal of the harness plug S02 of the driver's belt buckle and the ground point for short circuit fault, and replace the wiring harness if necessary.
4. Replace the instrument cluster.	
	A. Replace the instrument cluster. **Refer to the replacement of instrument cluster assembly** Verify that the system is operated normally.

The diagnostic process for the passenger's seat belt warning light does not light up

Test condition	Details/results/measures
1. General inspection.	
	A. Check the instrument cluster harness plugs for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To step 2. →**No** Examine and repair the fault location.
2. Check the instrument cluster fuse.	
	A. Check the instrument cluster fuse FS01, FS06, FS14. **Fuse rated capacity: FS01 (10A), FS06 (20A), FS14 (10A)** Is the system normal? →**Yes** To step 3. →**No** Replace the fuse of same model.
3. Check the instrument cluster power.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the instrument cluster harness plug I29. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the instrument cluster harness plug I29 terminal 23, 24 28 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? →**Yes** To step 4. →**No** Repair the instrument cluster power line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
4. Check the instrument cluster ground wire.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the instrument cluster harness plug I29. C. Measure the resistance between No. 25 terminal of the harness plug I29 of the instrument cluster and the reliable grounding. **Standard resistance: Less than 5 Ω** Is it OK after checking? **→Yes** To step 5. **→No** Check the wiring harness between the No. 25 terminal of the harness plug I29 and the ground point for open circuit fault, and replace the wiring harness if necessary.
5. Check the power supply for passenger's seat belt buckle.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the assistant driver belt buckle harness plug S11. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the No. 2 terminal of the harness plug S11 of the passenger's belt buckle and the ground point with a multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? **→Yes** To step 6. **→No** Check the circuits of the passenger's belt buckle for open circuit fault, and replace the wiring harness if necessary.
6. Check the grounding circuit for passenger's seat belt buckle.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the assistant driver belt buckle harness plug S11. C. Measure the resistance between the No. 1 terminal of the harness plug S11 of the passenger's belt buckle and the ground point with a multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? **→Yes** To step 7. **→No** Check the wiring harness between the No. 1 terminal and the ground point of the harness plug S11 of the passenger's belt buckle for open circuit fault, and replace the wiring harness if necessary.

Test condition	Details/results/measures
7. Check the assistant driver's belt buckle.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver belt buckle harness plug S11. C. Measure the resistance between the No.1 and No.2 terminal of the harness plug S11 of the passenger's belt buckle with a multimeter. **Standard resistance: less than 1 Ω** Is it OK after checking? **→Yes** To Step 8. **→No** Replace the belt buckle. Refer to: Replacement of front belt buckle
8. Check the circuit of occupant detection sensor.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver belt buckle harness plug S11. C. Disconnect the instrument cluster harness plug I29. D. Measure the voltage between the No.2 terminal of the harness plug S11 of the passenger's belt buckle and the No.14 of I29 with a multimeter. **Standard resistance:less than 5 Ω** Is it OK after checking? **→Yes** To Step 9. **→No** Check the wiring harness between the No.2 terminal of the harness plug S11 of the passenger's belt buckle and the instrument cluster for open circuit fault, and replace the wiring harness if necessary.
9. Check the occupant detecting sensor.	
	A. Check whether the occupant detecting signal is normal. **Standard value: less than 150Ω (with occupant detecting); if belt not fastened, signal lamp on; if belt fastened, signal lamp off.** **Standard value: more than 10kΩ (with occupant detecting), signal lamp off.** **Standard value: signal lamp off if no occupant detecting.** Is it OK after checking? **→Yes** To Step 10. **→No** Replace the occupant detecting sensor.

Test condition	Details/results/measures
10. Replace the instrument cluster.	
	A. Replace the instrument cluster. **Refer to: Replacement of instrument cluster assembly** Verify that the system is operated normally.

The diagnostic process for the passenger's seat belt warning light keeps on

Test condition	Details/results/measures
1. Check if the passenger's seat belt is buckled up.	
	A. Check whether the belt is correctly fastened. Is the belt correctly fastened? →**Yes** To Step 2. →**No** Fasten the belt and test whether the system is normal.
2. Check the assistant driver's belt buckle.	
	A. Operate the start switch to turn the power to OFF state. B. Disconnect the assistant driver belt buckle harness plug S11. C. Operate start switch to switch the power mode to "ON" state, observe for whether the seat belt warning light is off. Does the belt warning lamp turn off? →**Yes** Replace the belt buckle. **Refer to: Replacement of belt buckle** →**No** To Step 3.
3. Check the occupant detecting sensor.	
	A. Check whether the occupant detecting signal is normal. **Standard value: less than 150Ω (with occupant detecting); if belt not fastened, signal lamp on; if belt fastened, signal lamp off.** **Standard value: more than 10kΩ (with occupant detecting), signal lamp off.** **Standard value: signal lamp off if no occupant detecting.** Is it OK after checking? →**Yes** To Step 4. →**No** Replace the occupant detecting sensor.

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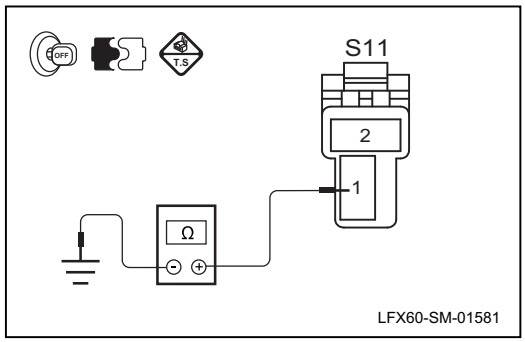
Test condition	Details/results/measures
4. Check the signal cable of passenger's seat belt warning light.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver belt buckle harness plug S11. C. Measure the resistance between the No.1 terminal of the harness plug S11 of the passenger's belt buckle and the reliable ground point with a multimeter. **Standard resistance: 10MΩ or higher** Is the resistance normal? **→Yes** To Step 5. **→No** Check the wiring harness between the No.1 terminal of the harness plug S11 of the passenger's belt buckle and the ground point for failure, and replace the wiring harness if necessary.
5. Replace the instrument cluster.	
	A. Replace the instrument cluster. **Refer to: Replacement of instrument cluster assembly** Verify that the system is operated normally.

Removal and Installation

Replacement of front seat belt buckle

Removal

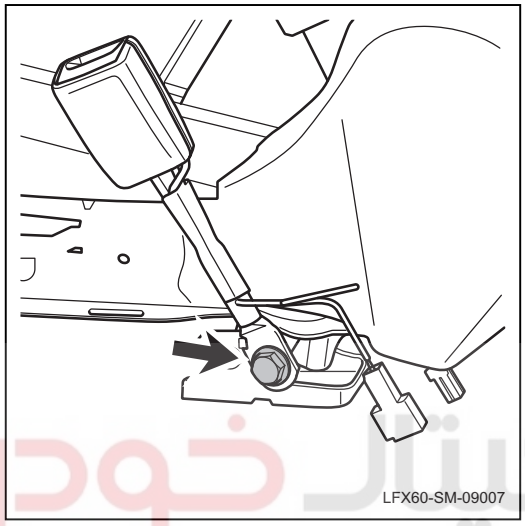
1. Remove the front seat belt buckle.

(a). Disconnect the battery negative connector.

Note:

Disconnect the battery negative terminal, wait for 90s at least and then continue operation.

(b). Remove the front seat assembly. **Refer to: Replacement of front row seat assembly.**



(c). Remove the fixing bolts of the front seat belt buckle.

(d). Take of the front seat belt buckle.

Installation

1. Install the front seat belt buckle.

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

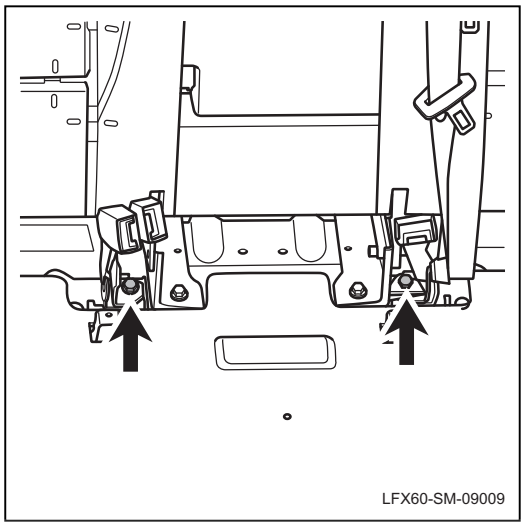
(b). Install the front seat assembly. **Refer to: Replacement of front row seat assembly.**

Replacement of rear seat belt buckle assembly

Removal

1. Remove the rear seat belt buckle assembly.

(a). Remove the rear seat cushion, **refer to:Replacement of the rear seat cushion.**



(b). Remove the fixing bolts of the rear seat belt buckle assembly.

(c). Take off the rear seat belt buckle assembly.

Installation

1. Install the rear seat belt buckle assembly.

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

Replacement of front seat belt assembly

Removal

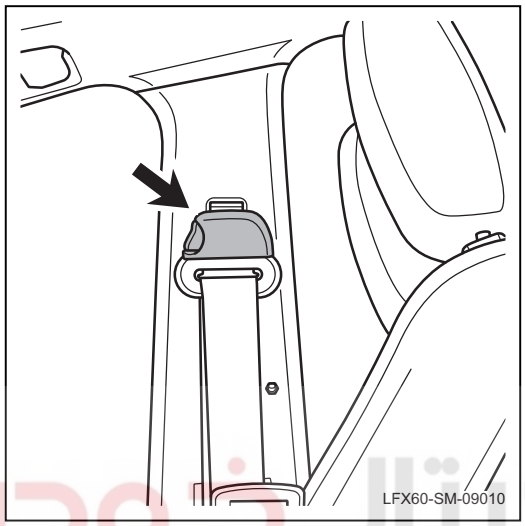
1. Remove the front seat belt assembly.

(a). Disconnect the battery negative connector.

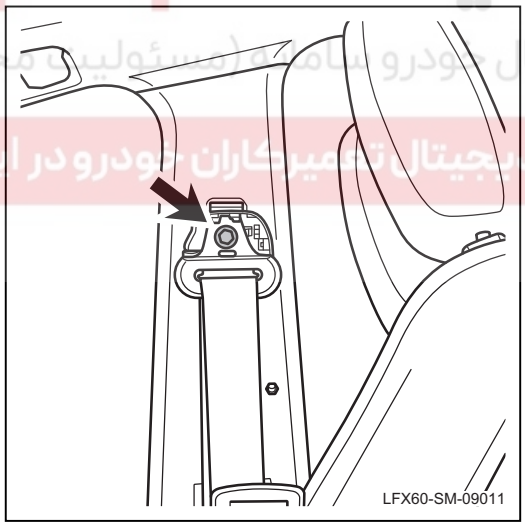
Note:

Disconnect the battery negative terminal, wait for 90s at least and then continue operation.

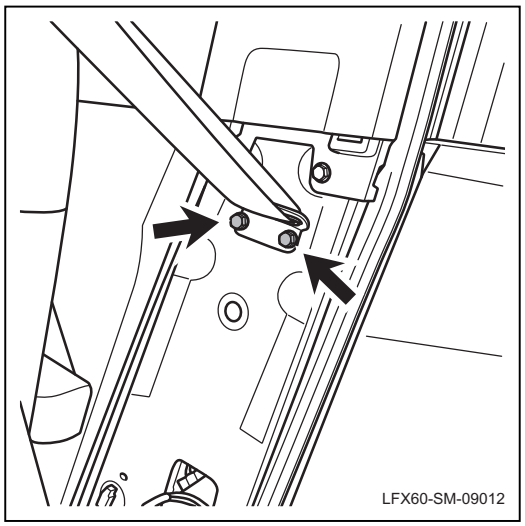
(b). Remove the B pillar lower decorative panel. **Refer to the replacement of B pillar lower decorative panel.**



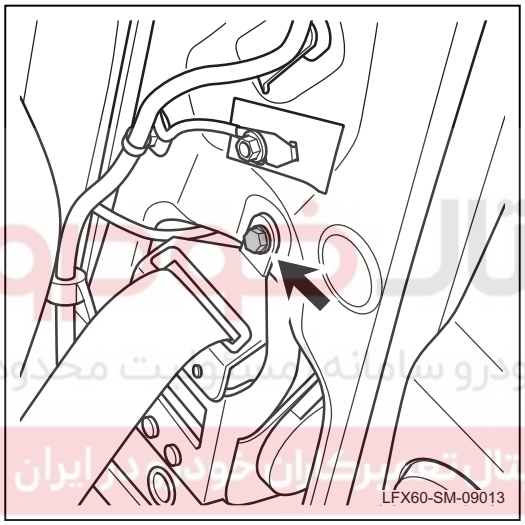
(c). Remove the trim cover of fixing bolts of the front seat belt assembly.



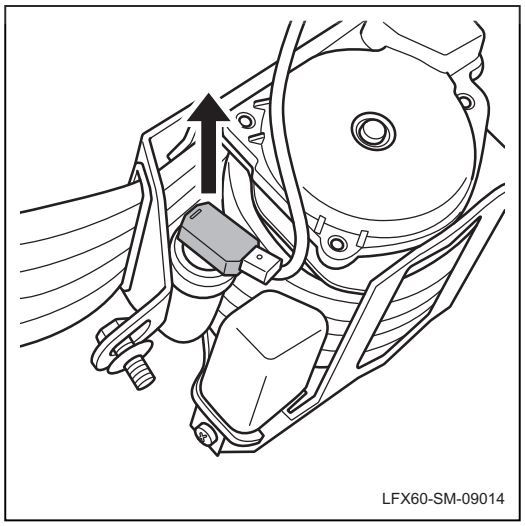
(d). Remove the fixing bolts of the front seat belt assembly.



(e). Remove the fixing bolts of stop collar for the front seat belt assembly.



(f). Remove the fixing bolts of the front seat belt assembly.



(g). Disconnect the harness plug of seat belt pretensioner.
(h). Take of the front seat belt assembly.

Installation

1. Install the front seat belt assembly.

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

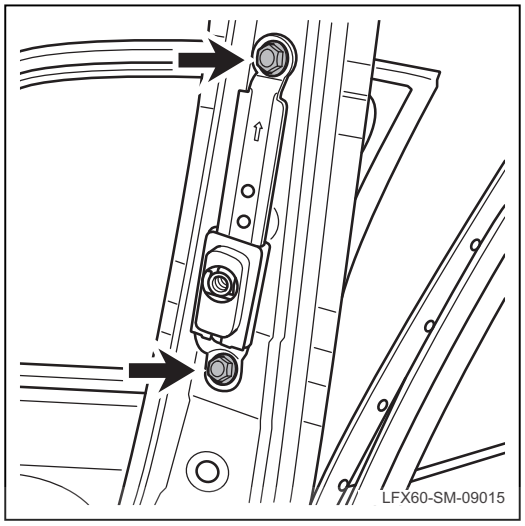
(b). Install the lower trim panel of B-pillar, **refer to:Replacement of the lower trim panel of B-pillar.**

Replacement of front seat belt adjuster

Removal

1. **Remove the front seat belt adjuster.**

(a). Remove the upper trim panel of B-pillar, **refer to:Replacement of the upper trim panel of B-pillar.**



(b). Remove the fixing bolts of the front seat belt adjuster.

(c). Take off the front seat belt adjuster.

Installation

1. **Install the front seat belt adjuster.**

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

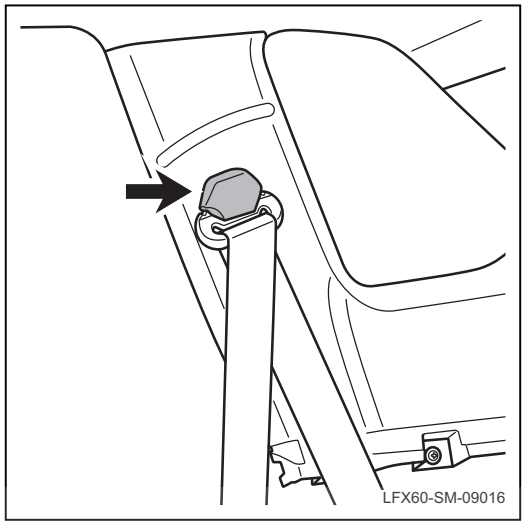
(b). Install the upper trim panel of B-pillar, **refer to:Replacement of the upper trim panel of B-pillar.**

Replacement of rear seat belt assembly

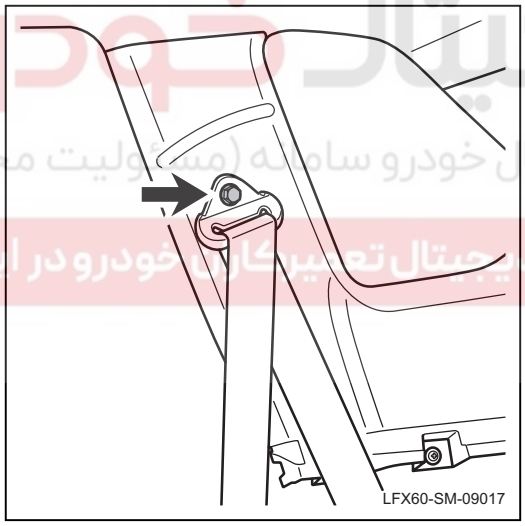
Removal

1. **Remove the rear seat belt assembly.**

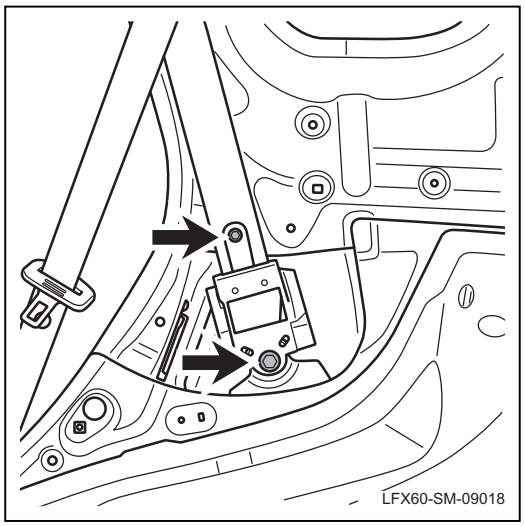
(a). Remove the C pillar lower decorative panel. **Refer to the replacement of C pillar lower decorative panel.**



(b). Remove the trim cover of fixing bolts of the seat belt.



(c). Remove the fixing bolts of the seat belt.



(d). Remove the fixing bolts of the seat belt retractor.
(e). Take of the rear seat belt assembly.

Installation

1. Install the rear seat belt assembly.
(a). The installation sequence is the reverse of the disassembly order.
(b). Remove the C pillar lower decorative panel. **Refer to the replacement of C pillar lower decorative panel.**

09 - Safety protection device

Airbag system

Technical specifications

Torque Specifications

Name	Torque range	
	Metric (Nm)	British(lb-ft)
Airbag ECU and floor connection bolts	9	7

Precautions

⚠Warning:

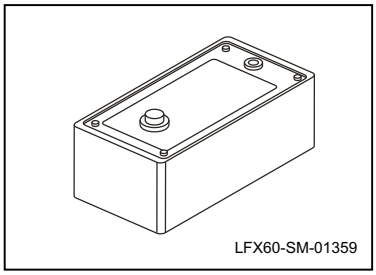
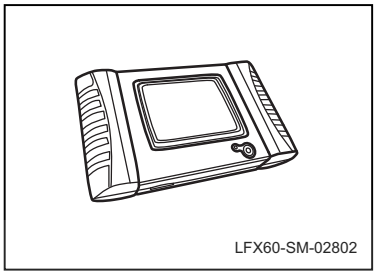
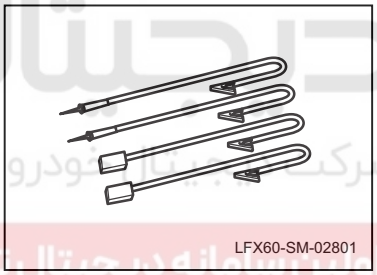
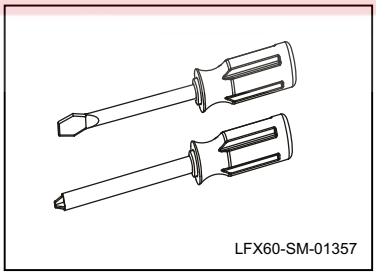
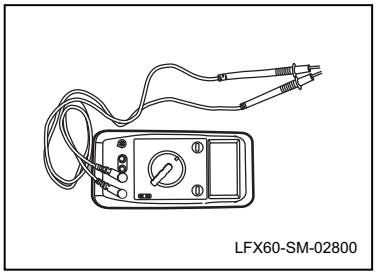
- Failure to follow the correct procedure may result in a sudden deployment of the airbag and even a serious accident. Meanwhile, any incorrect action on airbag system can cause malfunction of the system.
- It is important to make sure that the ignition switch is turned OFF and the battery is disconnected from the positive and negative poles for 90 seconds.(The safety system is equipped with a backup power supply, so if it is operated within 90s of the positive and negative poles of the battery is disconnected, may lead to the airbag to deploy suddenly).
- Do not expose the airbag assembly to hot air or open flames.

ℹNote:

- Because it is difficult to confirm the failure of the airbag system, the diagnostic trouble code (DTC) will be the most important source of information for troubleshooting. Examine DTC before disconnect the battery in troubleshooting of the airbag system.
- Even if the impact is very small, and the airbag assembly is not deployed, the speaker button assembly and the airbag electronic control unit (SRS ECU) should be checked.
- If an airbag electronic control unit (SRS ECU) may be impacted during maintenance, be sure to disconnect the connector of airbag electronic control unit (SRS ECU) first.
- Do not use airbag system parts removed from another vehicle. Always replace with new parts.
- Do not disassemble the speaker button assembly.
- If the horn button assembly falls on the ground or cracks, pits, or other defects on the housing, be sure to replace with new parts.
- For failure check of system circuit, digital multimeter with high impedance should be used.
- The information label is affixed to the parts of the airbag system, and the precautions on the label must be followed.
- When the negative connector of battery is disconnected, the memory of the electronic clock and audio system will be cleared. Record all necessary data before repair. Reset electronic clock and audio system after repair. Standby power supply other than the vehicle must not be used to keep data memory. The standby power supply will power airbag system, so that the airbag may deploy suddenly in repair.
- Do not disassemble or repair the driver's and front passenger's airbag module and airbag electronic control unit (SRS ECU) assembly for recycle or other reasons.
- The airbag ECU, airbag module, clock spring, etc.should be removed when the painting operation is likely to cause an impact due to overheating (above 93 °C).
- The connector of Airbag electronic control unit (SRS ECU) assembly , the connector between the airbag electronic control unit (SRSECU) assembly and clock spring , the connector between the clock spring and the driver airbag module and the connector between the front passenger airbag module and the airbag electronic control unit (SRS ECU) are equipped with a protective mechanism to prevent accidental deployment of the airbag. All requirements must be followed in repair of airbag system to avoid injury for sudden deployment and other parts.
- During the maintenance of the airbag system, the airbag module must be loaded immediately after removal from the transport equipment.If the work is terminated, the airbag module should be returned to the conveyor and the airbag module can not be placed in an unattended place.When storing the removed airbag module, place the deployment face of airbag up.
- Do not place the airbag assembly in a high temperature environment or open flame.
- • After the airbag system is repaired, do not rush to connect the airbag module to the circuit.The electrical inspection should be carried out before the airbag module can be accessed.
- When the airbag system is connected to the power supply, no person is allowed in the vehicle.
- After the airbag system is repaired, check that if the SRS warning light is working properly.
- The airbag has a certain service life.If airbag life is reached, airbag and label must be replaced.

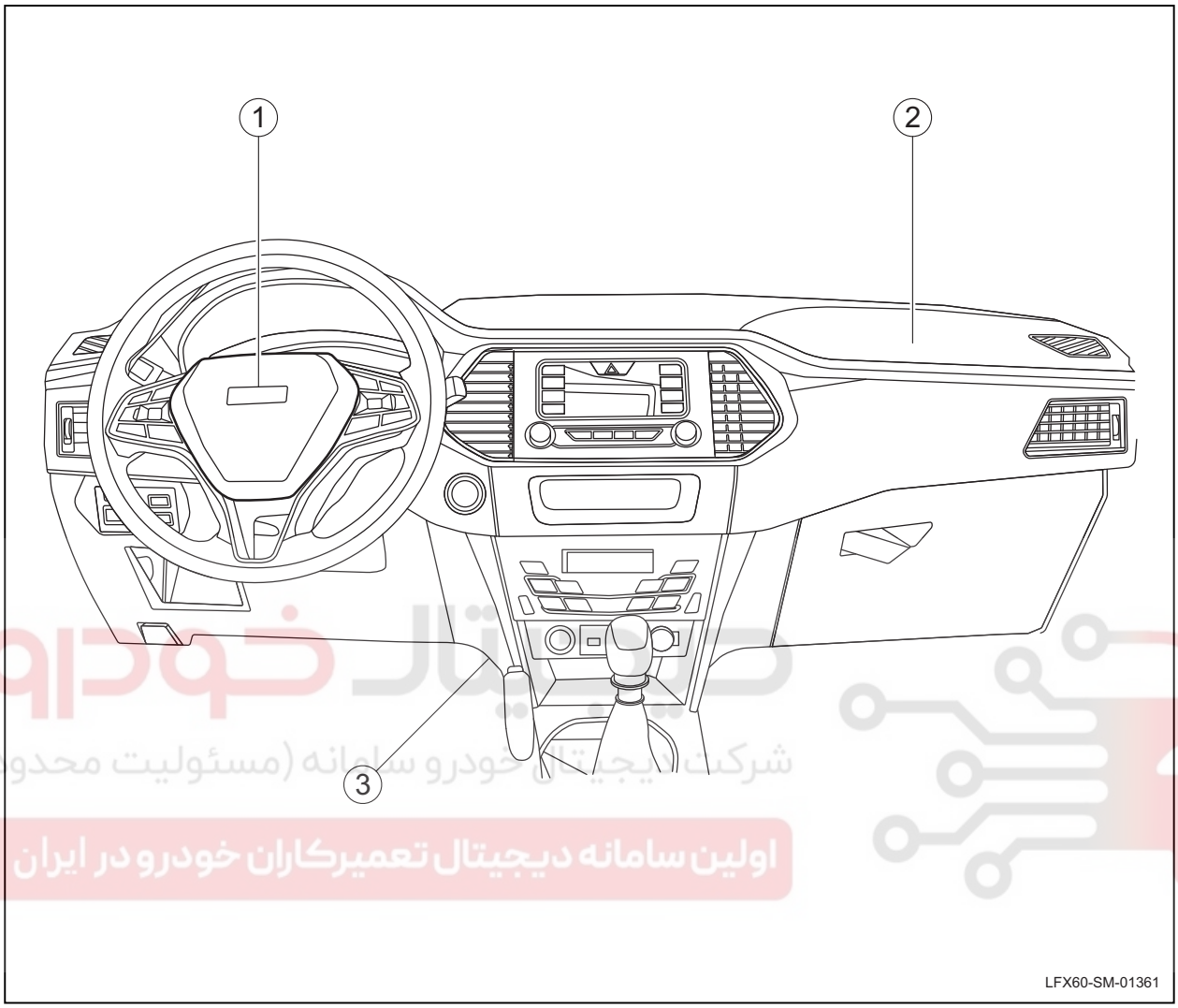
Preparation

General maintenance tools

No.	Tool name	Tool figure	Tool code	Remarks
1	Special tool for airbag firing	 LFX60-SM-01359	-	Firing the airbag
2	Diagnosis equipment	 LFX60-SM-02802	-	Fault diagnose of airbag system
3	Wiring group	 LFX60-SM-02801	-	Testing circuit
4	Screwdriver	 LFX60-SM-01357	-	To remove and install the screw and pry the snap ring etc.
5	Digital universal meter	 LFX60-SM-02800	-	Measure the voltage and resistance

Structure and installation location

Component Location Plan



No.	Part Name
1	Driver Airbag
2	Passenger safety

No.	Part Name
3	Airbag control unit

Operating Principle

System Overview

⚠Warning:

The vehicle is equipped with the airbag systems; any failure to follow the correct operating procedures will lead to the following cases:

- **The airbag unexpectedly deploys.**
- **The airbag system does not work if required.**

⚠Warning:

Strictly observe the following rules to prevent the above conditions:

- **Before working, confirm whether you are working on the airbag system component, around the airbag or on the line.**
- **Remove the airbag system if you are carrying out maintenance operations on the airbag system components, around them, or on their lines.**

The airbag system (SRS AIRBAG) is a safety protection device used in conjunction with seat belts. The airbag cannot substitute the belt. The driver and occupants must always be fastened with the seat belt and adjust to the most appropriate condition according to the body.

ⓘNote:

Strictly observe the following rules to prevent the above conditions:

The airbag system can not replace the seat belt function.Failure to wear a seat belt may cause serious personal injury when the airbag is detonated.The airbag system is designed to protect the driver and passengers when the vehicle is severely impacted. When there is any frontal vehicle collision to meet the airbag detonation conditions, the airbag ECU will send a signal to trigger the gas charging system of driver and copilot airbag. The gas charging system will produce a chemical reaction in an instant so as to fill gas into airbag and buffer the forward impaction speed of front-row driver and passengers, and prevent drivers and front-row passengers from hitting the steering wheel and the upper/lower instrument panel directly. At the same time, airbag ECU also sends signals to the seat belt pre-tightening device so as to tighten the seat belt backwards.

The airbag system consists of the following components:

- Combination instrument assembly
- Airbag control module
- Driver's airbag
- Passenger airbag

Airbag indicator

The airbag indicator is located in the dashboard assembly to inform the driver of the airbag system failure and to verify that the airbag control unit is communicating with the dashboard.When operate start switch to switch the power mode to "ON" state, make sure that the airbag indicator is on.If the indicator light remains on, it is not extinguished or flashes, you must check the failure of the entire airbag system.

⚠Warning:

If the airbag system is faulty, it may cause the airbag unable to deploy, or deploy the airbag when the collision does not reach the set severity.

Airbag control unit

⚠Warning:

- **The airbag control unit has a redundant power supply, and the airbag can still be deployed after the battery voltage is lost during the collision.**
- **Disconnect the negative connector of battery for more than 90s before servicing the airbag system to ensure safety.**
- **In order to prevent accidental deployment of the airbag and cause personal injury, the undeveloped airbag module shall not be disposed as conventional workshop waste. Safely discard the unexpanded airbag module by using the expansion program. If the sealed container is damaged during the scrapping process, some of the substances contained in the unexpanded module may cause serious illness or personal injury.**

The airbag control unit, which is a microprocessor, is the control center of the airbag system.When the vehicle is impacted, the airbag control unit compares the detected collision signal with the value in the memory. When the generated signal value exceeds the stored value, the airbag control unit issues an ignition command to each of the ignition circuits to deploy the airbag.When the airbag is deployed, the airbag control unit records the status of the airbag system and lights on the airbag indicator on the instrument cluster.After the vehicle is started, the airbag control unit will perform continuous diagnostic monitoring of the electrical components and circuits of the airbag system.If the airbag control unit detects a fault, a fault diagnosis code is stored and the airbag indicator light is illuminated to inform the driver the failure.

Driver airbag, passenger airbag

⚠Warning:
When transporting an unexpanded airbag module:

- **Do not carry wires or plugs on the airbag module.**
- **Make sure the airbag opening is not facing you or someone else.**

The driver airbag module includes a housing, an inflatable airbag, an ignition detonator, and a gas generating agent.When the vehicle is impacted in the front and the impact force is large enough, the airbag control unit will issue an ignition command to the ignition circuit to deploy the airbag.And then, the gas will rapidly expand the airbag.Once it is filled with gas, the airbag will discharge gas via the vent holes. All the harness connector terminal of airbag control unit (driver airbag, passenger airbag deployment circuit) has a short-circuit bar.When the plug is disconnected, the short-circuit bar will short the airbag inflatable module deploy circuit, to prevent the airbag from accidentally deploy during maintenance.

Clock Spring

⚠Warning:
Improper installation of the clock spring assembly can damage the internal spring coil of the clock spring, which may cause a coil failure, resulting in an airbag not working properly, thus resulting in personal injury.

The airbag clock spring is on the steering column and below the steering wheel.The clock spring can maintain a continuous electrical contact between the driver's airbag deployment circuit and the driver's airbag when the steering wheel is rotated.

Airbag harness system

The airbag system harness connects the airbag control unit, the inflatable module, the expansion circuit, and the data circuit through a waterproof plug.The harness of airbag system deploy circuit shall be yellow for identification. When repairing the harness of airbag system, follow the appropriate tests and circuit repair procedures in this manual.

Diagnostic Information and Procedures

Diagnosis Instructions

Before the diagnoses of the airbag system, read the system overview first.Understand and become familiar with the working principle of the airbag system, and then start the airbag system diagnosis, so that in the event of failure to help determine the correct fault diagnosis steps, more importantly, it also helps determine whether the situation described by the customer is normal operating.

Any troubleshooting of the airbag system should take the airbag system check as a starting point and instruct the service personnel to take the next logical step to troubleshoot. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

Visual Inspection

Note:

- **When storing unexpanded airbag modules, make sure that the airbag opening is not facing the surface of the loaded airbag module. "Airbag openings shall not point downward.Do not place any objects on the airbag module.There should be enough space around the airbag for the airbag to unfold unexpectedly. Otherwise, people will be injured."**
- **Do not immerse undeveloped airbag modules in water or expose them to other liquids.**
- **Do not deploy unexpanded airbag modules near fire or in high temperature areas to prevent the airbag from being accidentally unfolded and people from being injured.**

1. Confirm the problem raised by the customer.
2. Visually check whether there is any obvious mechanical or electrical damage sign.

Visual inspection table

Mechanical	Electric apparatus
• Steering wheel • Driver's seat • Dashboard assembly	• Fuse • Line • Driver's airbag • Passenger airbag • Clock spring • Airbag control module • Instrument cluster

3. Check the airbag system lines that are easy to observe or can be seen.

Wiring harness and fulcrum of the vibration should be the main parts thoroughly checked.If failure is caused by vibration, tt is advisable to gently vibrate the potentially defective parts with your fingers and check for malfunctions.

- Gently shake the plug in the vertical and horizontal directions.
- Gently shake the harness in the vertical and horizontal directions.

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 no problem is found through the visual check, confirm the fault and refer to the fault symptom list.

List of fault symptoms

Symptom	Possible Cause	Recommended Measures
Intermittent fault	• Clear DTC • Carry out the simulation test • Check and shake the harness, harness plug	**Refer to: Intermittent fault diagnostic flow**
The airbag indicator does not light up	• Fuse • Line fault • Instrument cluster • Airbag control module	**Refer to: The diagnostic process for the airbag indicator does not light up**
The airbag indicator always light up	• Fuse, circuit • There is a collision occurrence record • Performed non-canonical operations • The number of times recorded in the airbag control unit exceeds the specified number of collisions • Instrument cluster • Airbag control module • Airbag • Battery	**Refer to: The diagnostic process for the airbag indicator always light up**

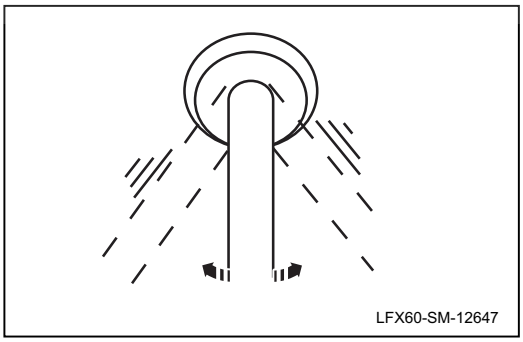
Troubleshooting process for intermittent failure

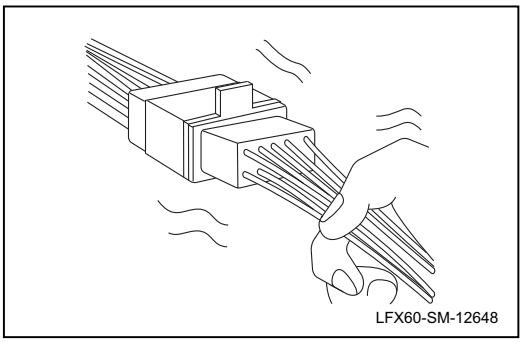
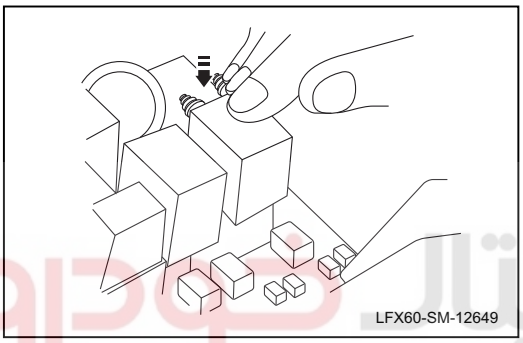
Note:

- **Clear DTC.**
- **Carry out the simulation test.**
- **Check and shake the harness and harness plug.**

If DTC examination cannot confirm the fault and the fault occurs occasionally during the use, In this case, confirm all the circuits and parts that may cause the fault. In many cases, the basic inspection shown in the flow chart below can quickly and effectively locate the fault parts, in particular the loose contact of harness plug.

Definition: the fault does not occur currently but the historical fault diagnosis records show that the fault ever occurred. Or the customer reports this fault while the fault does not relate to the DTC and the fault symptom cannot be reproduced currently.

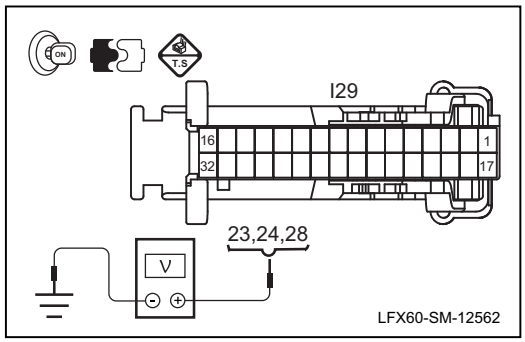
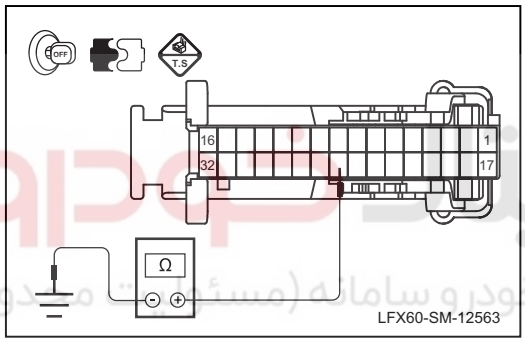
Test condition	Details/results/measures
1. Vibration method	
	A. If the fault occurs or the fault is more severe or the engine vibration occurs when the vehicle is running on the rough road, go to Step 2. **Note:** **Several causes can result in the vehicle or engine vibration fault. Check the following items:** B. The plug is not fully in place. C. The harness does not have enough clearance. D. The wiring harness is arranged across the bracket or moving part. E. The wiring harness is placed too close to the high temperature parts. F. Incorrect wiring, improperly tightened or loosened wiring will cause the wiring to be squeezed between the parts. G. The connection of the plug, the vibrating part, and the position through which the harness passes are important areas that need to be inspected, for example:the harness passes through the firewall and the body panel.
2. Inspection method for switch plug or harness	
 LFX60-SM-12647	A. Connect the diagnostic meter to the diagnostic interface (DLC). B. Operate the start switch to make the power mode to the ON State (shut down the engine). C. Access the data flow of the switch you are checking. D. Turn on the switch manually. E. While monitoring the data stream, gently shake each plug or harness horizontally and horizontally." F. If the data stream value is instable, check whether the contact is loose.

Test condition	Details/results/measures
3. Method of checking the sensor plug or harness.	
 LFX60-SM-12648	A. Connect the diagnostic meter to the diagnostic interface (DLC). B. Operate the start switch to turn the power to ON state (shut down the engine). C. Access the data flow of the switch you are checking. D. While monitoring the data stream, gently shake each plug or harness horizontally and horizontally. E. If the data flow is not stable, check whether the connection is bad.
4. Method of checking the actuator or relay.	
 LFX60-SM-12649	A. Connect the diagnostic meter to the diagnostic interface (DLC). B. Operate the start switch to turn the power to ON state (shut down the engine). **Note:** **"If the engine is started, perform the following steps during its operation in idling mode."** C. Prepare the output status control function for the actuator or relay being checking. D. After the output status control function is activated, use a finger to vibrate the actuator or relay 3s." If you hear an unstable "click" sound, check for any improper connection or improper installation of the actuator and/or relay. **Note:** **Strongly vibrating relay may cause the relay to be disconnected.**
5. Simulate the fault by the road test and read the data stream.	
	A. Connect the diagnostic meter to the diagnostic interface (DLC). B. Simulate the fault by the road test and read the data stream. C. If the data stream value is instable or the malfunction occurs, repair or replace the parts.

The diagnostic process for the airbag indicator does not light up

⚠Warning:
Before repairing the airbag system, disconnect the battery negative terminal more than 90s to ensure safety.

Test condition	Details/results/measures
1. General inspection.	
	A. Check the clock spring, instrument cluster harness plug and airbag module harness plug for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the abnormal part.
2. Check the trouble code.	
	A. Connect the diagnostic equipment. B. Operate the start switch to set the power mode to the "on" state. C. Access the instrument system and SRS system to check the system for DTC. Is there a trouble code? →**No** To Step 3. →**Yes** Carry out the relevant fault diagnosis according to the DTC.
3. Check the fuse.	
	A. Check the fuse FS23, FS24, FS30. **Fuses rated capacity are:5A, 10 A, 25 A.** Is the fuse normal? →**Yes** To Step 4. →**No** Check the fuse circuit, replace with fuses of different rated capacity

Test condition	Details/results/measures
4. Check the instrument cluster power line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the instrument cluster harness plug I29. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the instrument cluster harness plug I29 terminal 23, 24, 28 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is the voltage normal? →**Yes** To Step 5. →**No** Repair the instrument cluster power line fault and replace the harness if necessary.
5. Check the instrument cluster ground line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the instrument cluster harness plug I29. C. Measure the resistance between the instrument cluster harness plug I29 terminal 25 and the fixed ground point with the multimeter. **Standard resistance: less than 5 Ω** Is the resistance normal? →**Yes** To Step 6. →**No** Repair the instrument cluster ground line open circuit fault and replace the harness if necessary.
6. Check the communication system between the instrument cluster and SRS.	
	A. Check the communication system between the instrument cluster and SRS. Is the communication system normal? →**Yes** To Step 7. →**No** Repair the communication system fault between the instrument cluster and SRS and replace the harness if necessary.

Test condition	Details/results/measures
7. Replace the instrument cluster.	
	A. Replace the instrument cluster. **Refer to: Replacement of instrument cluster** Is the system normal? →**Yes** Fault solved. →**No** To Step 8.
8. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

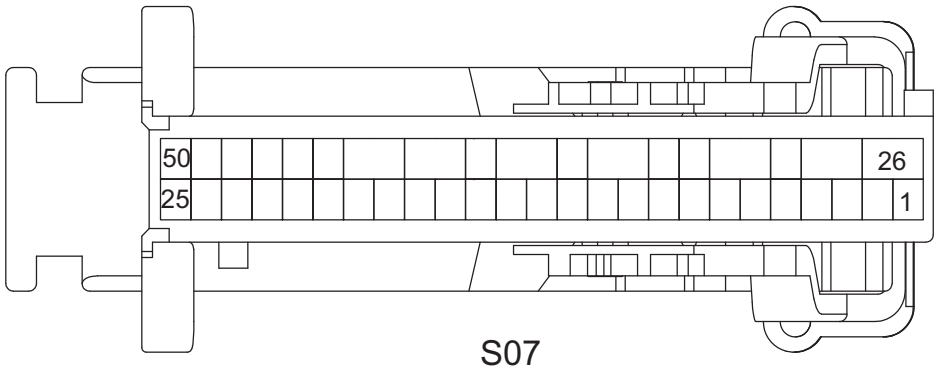
The diagnostic process for the airbag indicator always light up

⚠Warning:
Before repairing the airbag system, disconnect the battery negative terminal more than 90s to ensure safety.

Test condition	Details/results/measures
1. General inspection.	
	A. Check the clock spring, instrument cluster harness plug and airbag module harness plug for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the abnormal part.
2. Check the trouble code.	
	A. Connect the diagnostic equipment. B. Operate the start switch to set the power mode to the "on" state. C. Enter the airbag system and check the system for the presence of the fault code. Is there a trouble code? →**No** To Step 3. →**Yes** Carry out the relevant fault diagnosis according to the DTC.
3. Check the communication system between the instrument cluster and the airbag.	
	A. Check the communication system between the instrument cluster and the airbag. Is the communication system normal? →**Yes** To Step 4. →**No** Check communication system between the instrument cluster and the SRS for failure and repair, replace if necessary,
4. Replace the instrument cluster.	
	A. Replace the instrument cluster. **Refer to: Replacement of instrument cluster** Is the system normal? →**Yes** Fault solved. →**No** To Step 5.

Test condition	Details/results/measures
5. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module.** Verify that the system is operated normally.

Control module terminal list



S07

LFX60-SM-12677

Terminal number	Wire diameter/color	Terminal description
S07-01	0.50 G/Bl	Drive signal of Left warning seat belt is low
S07-02	0.50 B/Bl	Drive signal of Left warning seat belt is high
S07-03	0.50 Br	Drive signal of Right warning seat belt is high
S07-04	0.50 Bl	Drive signal of Right warning seat belt is low
S07-05	0.50 R/Y	Power source
S07-06	B	Grounding
S07-07	-	-
S07-08	-	-
S07-09	-	-
S07-10	0.50 Br	Drive signal of driver airbag is high
S07-11	0.50 V	Drive signal of driver airbag is low
S07-12	-	-
S07-13	0.50W	Drive signal of passenger airbag is low
S07-14	0.50 P	Drive signal of passenger airbag is high
S07-15	0.30 Bl/B	PCAN-H
S07-16	-	-
S07-17	-	-
S07-18	-	-
S07-19	-	-
S07-20	-	-
S07-21	-	-
S07-22	-	-

Terminal number	Wire diameter/color	Terminal description
S07-23	-	-
S07-24	-	-
S07-25	-	-
S07-26	-	-
S07-27	-	-
S07-28	-	-
S07-29	-	-
S07-30	-	-
S07-31	-	-
S07-32	-	-
S07-33	-	-
S07-34	0.30Br/O	Collision signal output
S07-35	-	-
S07-36	-	-
S07-37	-	-
S07-38	-	-
S07-39	-	-
S07-40	0.30 Bl/W	PCAN-L

DTC (DTC) List

Fault code (DTC)	Faultdescription
B111717	The voltage is too high
B111716	The voltage is too low
B10101B	High resistance of driver's airbag circuit
B10101A	Low resistance of driver's airbag circuit
B101011	Driver's airbag circuit short to ground
B101012	Driver's airbag circuit short to power
B10111B	High resistance of co-driver's airbag circuit
B10111A	Low resistance of co-driver's airbag circuit
B101111	Co-driver's airbag circuit short to ground.
B101112	Co-driver's airbag circuit short to power
B10121B	Driver's preloader resistance too high
B10121A	Driver's preloader resistance too low
B101211	Driver's airbag tensioner resistance circuit short to ground
B101212	Driver's airbag tensioner resistance circuit short to power
B10131B	Hi resistance circuit of co-driver's airbag tensioner
B10131A	Lo resistance circuit of co-driver's airbag tensioner
B101311	Co-driver's airbag tensioner short to ground
B101312	Co-driver's airbag tensioner short to power
B100049	Internal fault (replace ACU)
B105000	Frontal impact record (change the ACU)
B103414	Hard wire collision output channel 1 short to ground
B103412	Hard wire collision output channel 1 short to power
B103413	Hard wire collision output channel 2 short to ground
B103411	Hard wire collision output channel 2 short to power
B100100	Mismatch vehicle model
B105600	Continuous failure condition of watchdog
U007300	CAN bus off-line
U015500	IC signal loss

DTC diagnosis flow index

DTC	Description	Diagnostic process
B111717	The voltage is too high	**Refer to: DTC B111717, B111716**
B111716	The voltage is too low	
B10101B	High resistance of driver's airbag circuit	**Refer to: DTC B10101B, B10101A, B101011, B101012**
B10101A	Low resistance of driver's airbag circuit	
B101011	Driver's airbag circuit short to ground	
B101012	Driver's airbag circuit short to power	
B10111B	High resistance of co-driver's airbag circuit	**Refer to: DTC B10111B, B10111A, B101111, B101112**
B10111A	Low resistance of co-driver's airbag circuit	
B101111	Co-driver's airbag circuit short to ground.	
B101112	Co-driver's airbag circuit short to power	
B10121B	Driver's preloader resistance too high	**Refer to: DTC B10121B, B10121A, B101211, B101212**
B10121A	Driver's preloader resistance too low	
B101211	Driver's airbag tensioner resistance circuit short to ground	
B101212	Driver's airbag tensioner resistance circuit short to power	
B10131B	Hi resistance circuit of co-driver's airbag tensioner	**Refer to: DTC B10131B, B10131A, B101311, B101312**
B10131A	Lo resistance circuit of co-driver's airbag tensioner	
B101311	Co-driver's airbag tensioner short to ground	
B101312	Co-driver's airbag tensioner short to power	
B100049	Internal fault (replace ACU)	**Refer to: DTC B100049, B105000**
B105000	Frontal impact record (change the ACU)	
B103414	Hard wire collision output channel 1 short to ground	**Refer to: DTC B103414, B103412, B100100, B105600**
B103412	Hard wire collision output channel 1 short to power	
B100100	Mismatch vehicle model	
B105600	Continuous failure condition of watchdog	
U007300	CAN bus off-line	**Refer to: DTC U007300, U015500**
U01550	IC signal loss	

DTC B111717, B111716

DTC description

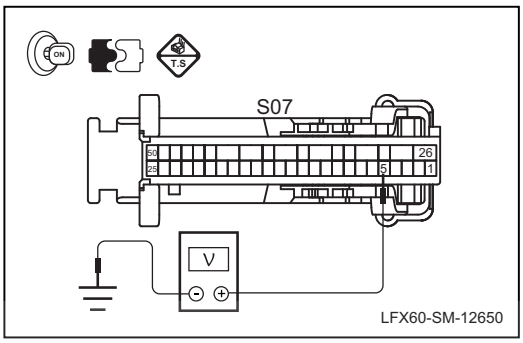
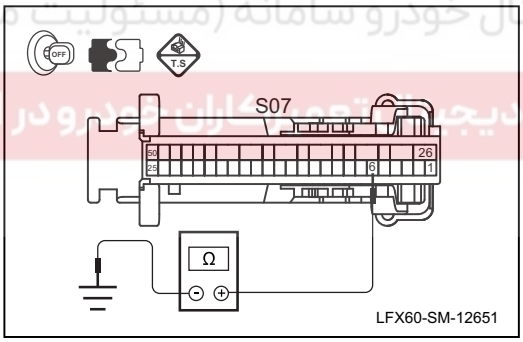
DTC	Description	Definition
B111717	The voltage is too high	• Airbag control unit monitors system operating voltage abnormal
B111716	The voltage is too low	

Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B111717	Line and check the hardware	Voltage exceeds 17 V and maintains 10s	• Charging system • Failure of airbag control unit and its circuit
B111716		Voltage less than 17V and maintains 10s	

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the airbag control unit harness plug for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.

Test condition	Details/results/measures
4. Check the power supply system of vehicle.	
	A. Check whether the power supply system of vehicle is normal. Is it OK after checking? →**Yes** To Step 5. →**No** Check the power supply system for fault.
5. Check the airbag control module power line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the airbag control module harness plug S07 terminal 5 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is the voltage normal? →**Yes** To Step 6. →**No** Repair the airbag control module power line open circuit fault and replace the harness if necessary.
6. Check the airbag control module ground line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between No.6 terminal of the harness plug S07 of the airbag control module and the reliable grounding. **Standard resistance: less than 5 Ω** Is the resistance normal? →**Yes** To Step 7. →**No** Check the airbag control module grounding circuit for open circuit failure, and replace if necessary. Harness.
7. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

DTC B10101B, B10101A, B101011, B101012

DTC description

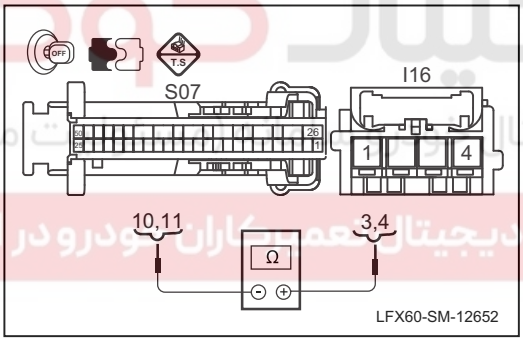
DTC	Description	Definition
B10101B	High resistance of driver's airbag circuit	• When the airbag control unit, based on the diagnostic current sent to the driver airbag power supply circuit, according to the situation of current changes in the circuit monitoring, compared to the stored preset standard value, set the fault code corresponding to the diagnostic results.
B10101A	Low resistance of driver's airbag circuit	
B101011	Driver's airbag circuit short to ground	
B101012	Driver's airbag circuit short to power	

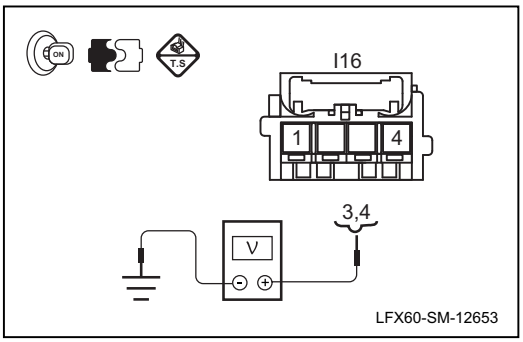
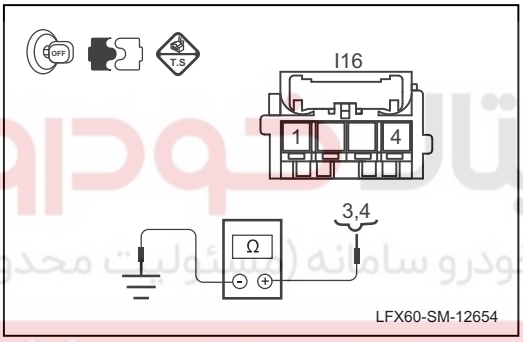
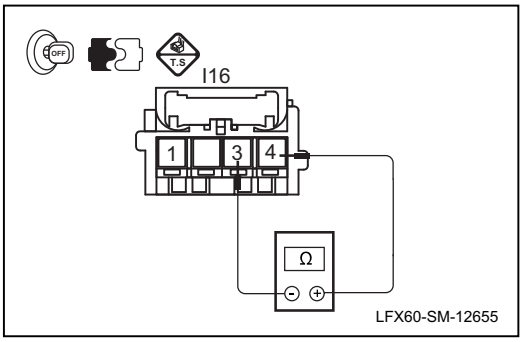
Possible reasons

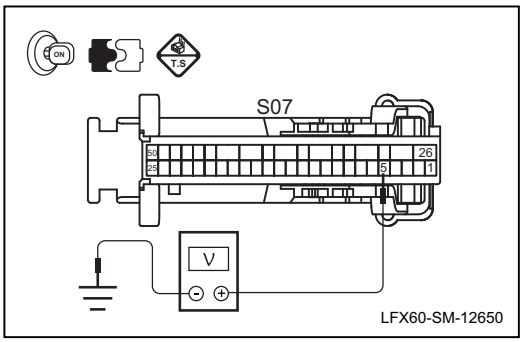
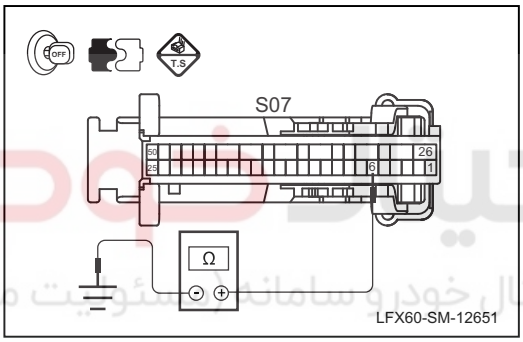
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B10101B	Line and check the hardware	• Line short to the ground or open circuit • Line short to power • Line short circuit	• Line fault • Clock spring • Driver airbag • Airbag control module
B10101A			
B101011			
B101012			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the airbag control unit and driver's side airbag harness plug for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic tool to check whether the system has any other related trouble code.Whether the Check is normal? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.
4. Check the clock spring.	
	A. Check that if the horn switch, multi-function steering wheel on the control button is normal, check the clock spring for signs of damage. Make sure the clock spring is normal? →**Yes** To Step 5. →**No** Clock failure, replace the clock spring. **Refer to: replacement of clock spring.**
5. Check the drive signal circuit of the driver's airbag for continuity.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the harness plug S07 of the airbag control module, and disconnect harness plug I16 of the driver's airbag. C. Measure the resistance between the No.11 terminal of the harness plug S07 of the airbag control module and the No.3 terminal of the harness plug I16 of the driver airbag. D. Measure the resistance between the No.10 terminal of the harness plug S07 of the airbag control module and the No.4 terminal of the harness plug I16 of the driver airbag. **Standard resistance: less than 1 Ω** Is the resistance normal? →**Yes** To Step 6. →**No** Check the drive signal circuit of the driver airbag for open circuit failure, replace the wiring harness if necessary.

Test condition	Details/results/measures
6. Check the drive signal circuit of the driver airbag and power supply for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the driver's airbag harness plug I16. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the No.3, 4 terminals of the harness plug I16 of the driver airbag and the reliable grounding with a multimeter. **Standard voltage: 0V** Is the voltage normal? **→Yes** To Step 7. **→No** Check the drive signal circuit of the driver airbag and power supply for short circuit failure, and replace the wiring harness if necessary.
7. Check the drive signal circuit of the driver airbag and grounding for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the driver's airbag harness plug I16. C. Measure the resistance between the No.3, 4 terminals of the harness plug I16 of the driver airbag and the reliable grounding with a multimeter. **Standard resistance:10MΩ or higher** Is the resistance normal? **→Yes** To Step 8. **→No** Check the drive signal circuit of the driver airbag and grounding for short circuit failure, and replace the wiring harness if necessary.
8. Check the drive signal circuits of the driver‘s side airbag for short circuit with each other.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the driver's airbag harness plug I16. C. Measure the resistance between the No.3 and No.4 terminals of the harness plug I16 of the driver airbag with a multimeter. **Standard resistance: 10MΩ or higher** Is it OK after checking? **→Yes** To Step 9. **→No** Check the drive signal circuits of the driver’s airbag for short circuit failure with each other, and replace the wiring harness if necessary.

Test condition	Details/results/measures
9. Check the airbag control module power line.	
 LFX60-SM-12650	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the airbag control module harness plug S07 terminal 5 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? **→Yes** To Step 10. **→No** Repair the airbag control module power line open circuit fault and replace the harness if necessary.
10. Check the airbag control module ground line.	
 LFX60-SM-12651	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between the airbag control module harness plug S07 terminal 6 and the fixed ground point with the multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? **→Yes** To Step 11. **→No** Repair the airbag control module ground line open circuit fault and replace the harness if necessary.
11. Replace the driver airbag.	
	A. Replace the driver's side airbag. **Refer to: Replacement of the driver airbag** Is it OK after checking? **→Yes** The fault is solved and the system is normal. **→No** To Step 12.
12. Replace the airbag control unit.	
	A. Replace the safety control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

DTC B10111B, B10111A, B101111, B101112

DTC description

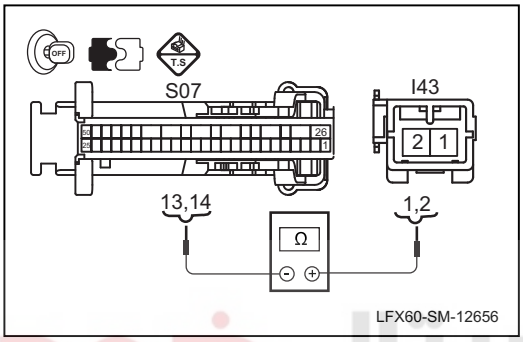
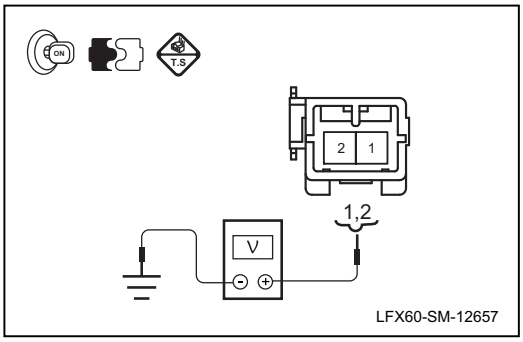
DTC	Description	Definition
B10111B	High resistance of co-driver's airbag circuit	• When the airbag control unit, based on the diagnostic current sent to the passenger airbag power supply circuit, according to the situation of current changes in the circuit monitoring, compared to the stored preset standard value, set the fault code corresponding to the diagnostic results.
B10111A	Low resistance of co-driver's airbag circuit	
B101111	Co-driver's airbag circuit short to ground.	
B101112	Co-driver's airbag circuit short to power	

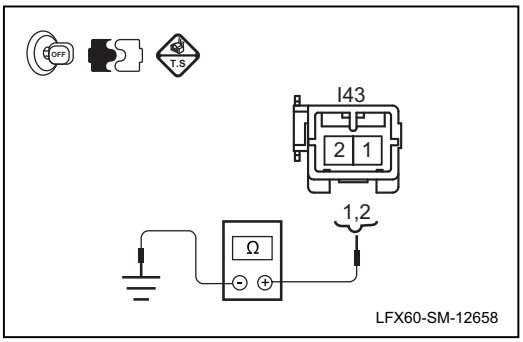
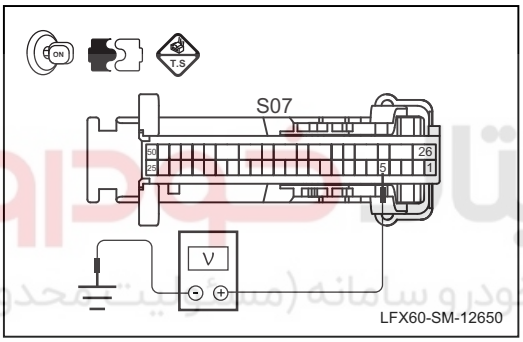
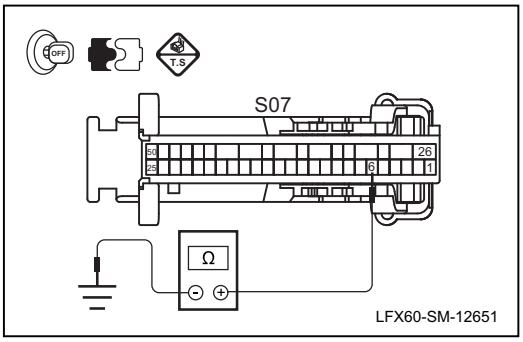
Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B10101B	Line and check the hardware	• Line short to the ground or open circuit • Line short to power • Line short circuit	• Line fault • Passenger airbag • Airbag control module
B10101A			
B101011			
B101012			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the airbag control unit and driver's side airbag harness plug for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.
4. Check the drive signal circuit of the passenger's airbag for continuity.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Disconnect the harness plug I43 of the passenger airbag. D. Measure the resistance between the No.14 terminal of the harness plug S07 of the airbag control module and the No.2 terminal of the harness plug I43 of the passenger airbag. E. Measure the resistance between the No.13 terminal of the harness plug S07 of the airbag control module and the No.1 terminal of the harness plug I43 of the passenger airbag. **Standard resistance: less than 5 Ω** Is it OK after checking? →**Yes** To Step 5. →**No** Check the drive signal circuit of the passenger airbag for open circuit failure, and replace the wiring harness if necessary.
5. Check the drive signal circuit of the passenger airbag and power supply for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver's airbag harness plug I43. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the No.1, 2 terminals of the harness plug I43 of the passenger airbag and the reliable grounding with a multimeter. **Standard voltage: 0 V** Is the voltage normal? →**Yes** To Step 6. →**No** Check the drive signal circuit of the passenger airbag and power supply for short circuit failure, and replace the wiring harness if necessary.

Test condition	Details/results/measures
6. Check the drive signal circuit of the passenger airbag and grounding for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver's airbag harness plug I43. C. Measure the resistance between the No.1, 2 terminals of the harness plug I43 of the passenger airbag and the reliable grounding with a multimeter. **Standard resistance: 10MΩ or higher** Is the resistance normal? **→Yes** To Step 7. **→No** Check the drive signal circuit of the driver airbag and grounding for short circuit failure, and replace the wiring harness if necessary.
7. Check the airbag control module power line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the airbag control module harness plug S07 terminal 5 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? **→Yes** To Step 8. **→No** Repair the airbag control module power line open circuit fault and replace the harness if necessary.
8. Check the airbag control module ground line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between the airbag control module harness plug S07 terminal 6 and the fixed ground point with the multimeter. **Standard resistance: less than 5 Ω** Is the resistance normal? **→Yes** To Step 9. **→No** Repair the airbag control module ground line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
9. Replace the passenger airbag.	
	A. Replace the driver's side airbag. **Refer to: Replacement of the passenger airbag** Is it OK after checking? →**Yes** The fault is solved and the system is normal. →**No** To Step 11.
10. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

DTC B10121B, B10121A, B101211, B101212

DTC description

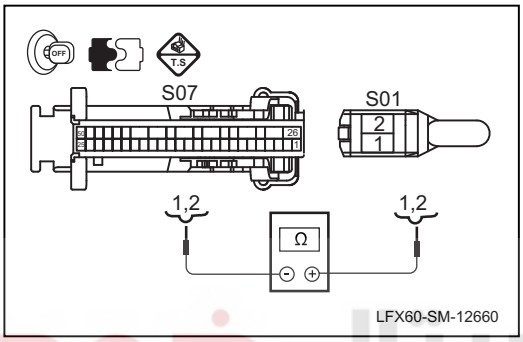
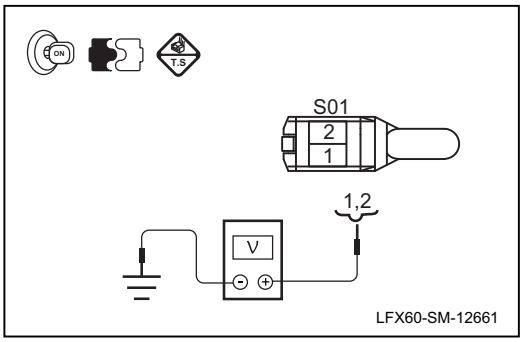
DTC	Description	Definition
B10121B	Driver's preloader resistance too high	• When the airbag control unit, based on the diagnostic current sent to the driver belt pretensioner power supply circuit, according to the situation of current changes in the circuit monitoring, compared to the stored preset standard value, set the fault code corresponding to the diagnostic results.
B10121A	Driver's preloader resistance too low	
B101211	Driver's airbag tensioner resistance circuit short to ground	
B101212	Driver's airbag tensioner resistance circuit short to power	

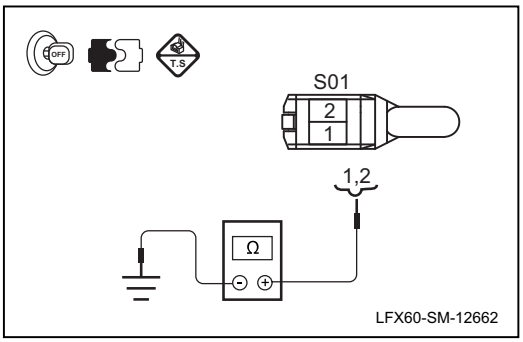
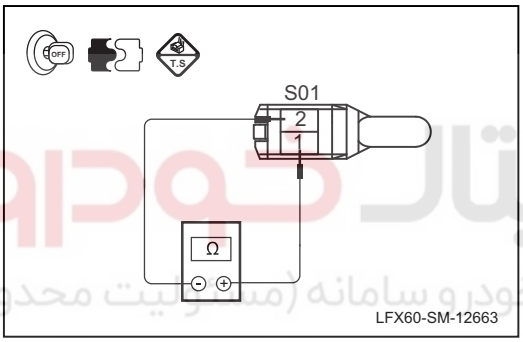
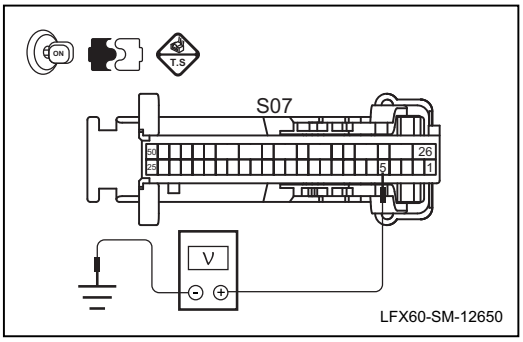
Possible reasons

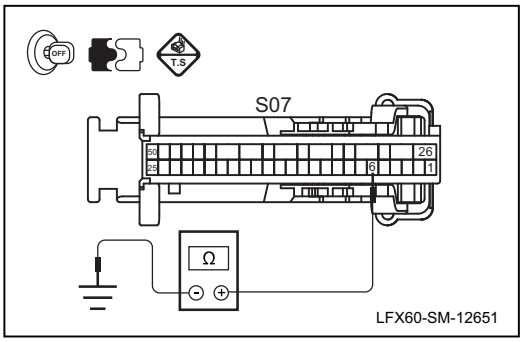
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B10121B	Line and check the hardware	• Line short to the ground or open circuit • Line short to power • Line short circuit	• Line fault • Driver's belt pretensioner • Airbag control module
B10121A			
B101211			
B101212			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the harness plug of the airbag control unit, and the driver's belt pretensioner for any signs of damage, poor contact, aging, loose and so on. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.
4. Check the signal circuit of the driver's belt pretensioner for continuity.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Disconnect of the harness plug S01 of the driver's belt pretensioner. D. Measure the resistance between the No.1 terminal of the harness plug S07 of the airbag control module and the No.1 terminal of the harness plug S01 of the driver's belt pretensioner. E. Measure the resistance between the No.2 terminal of the harness plug S07 of the airbag control module and the No.2 terminal of the harness plug S01 of the driver's belt pretensioner. **Standard resistance: less than 5 Ω** Is it OK after checking? →**Yes** To Step 5. →**No** Check the signal circuit of the driver's belt pretensioner for open circuit failure, and replace the wiring harness if necessary.
5. Check the drive signal circuit of the driver's belt pretensioner and power supply for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the driver's side preloader harness plug S01. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the No.1, 2 terminals of the harness plug S01 of the driver's belt pretensioner and the reliable grounding with a multimeter. **Standard voltage: 0V** Is the voltage normal? →**Yes** To Step 6. →**No** Check the drive signal circuit of the driver's belt pretensioner and power supply for short circuit failure, and replace the wiring harness if necessary.

Test condition	Details/results/measures
6. Check the drive signal circuit of the driver's belt pretensioner and grounding for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the driver's side preloader harness plug S01. C. Measure the resistance between the No.1, 2 terminals of the harness plug S01 of the driver's belt pretensioner and the reliable grounding with a multimeter. **Standard resistance: 10MΩ or higher** Is the resistance normal? **→Yes** To Step 7. **→No** Check the drive signal circuit of the driver's belt pretensioner and grounding for short circuit failure, and replace the wiring harness if necessary.
7. Check the drive signal circuit of the passenger's belt pretensioner and power supply for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the driver's side preloader harness plug S01. C. Measure the resistance between the No.1 and No.2 terminals of the harness plug S01 of the driver's belt pretensioner with a multimeter. **Standard resistance: 10MΩ or higher** Is the resistance check normal? **→Yes** To Step 8. **→No** Check the drive signal circuit of the driver's belt pretensioner for short circuit failure with each other, and replace the wiring harness if necessary.
8. Check the airbag control module power line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the airbag control module harness plug S07 terminal 5 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is the voltage normal? **→Yes** To Step 9. **→No** Repair the airbag control module power line open circuit fault and replace the harness if necessary.

Test condition	Details/results/measures
9. Check the airbag control module ground line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between the airbag control module harness plug S07 terminal 6 and the fixed ground point with the multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? →**Yes** To Step 10. →**No** Repair the airbag control module ground line open circuit fault and replace the harness if necessary.
10. Replace the driver's belt pretensioner	
	A. Replace the driver's belt pretensioner Is the system normal? →**Yes** The fault is solved and the system is normal. →**No** To Step 11.
11. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

DTC B10131B, B10131A, B101311, B101312

DTC description

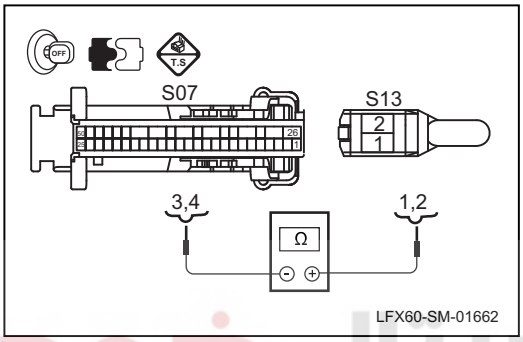
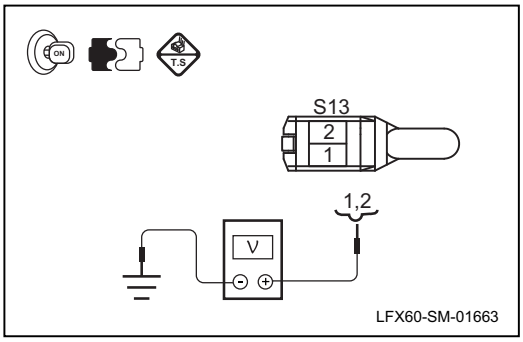
DTC	Description	Definition
B10131B	Hi resistance circuit of co-driver's airbag tensioner	• When the airbag control unit, based on the diagnostic current sent to the passenger belt pretensioner power supply circuit, according to the situation of current changes in the circuit monitoring, compared to the stored preset standard value, set the fault code corresponding to the diagnostic results.
B10131A	Lo resistance circuit of co-driver's airbag tensioner	
B101311	Co-driver's airbag tensioner short to ground	
B101312	Co-driver's airbag tensioner short to power	

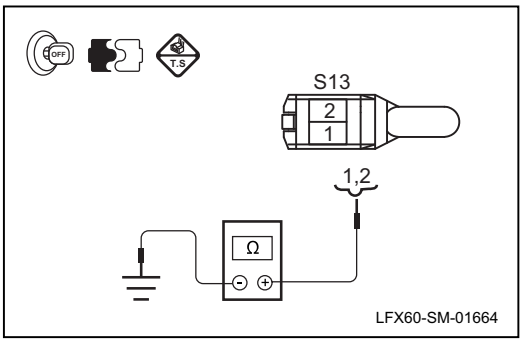
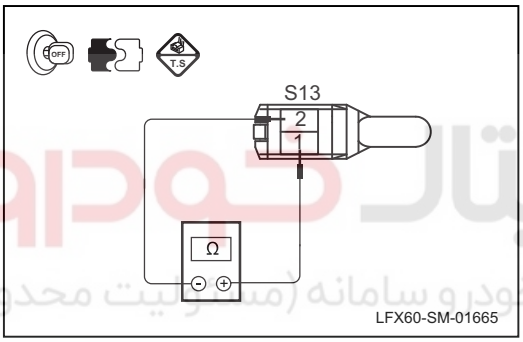
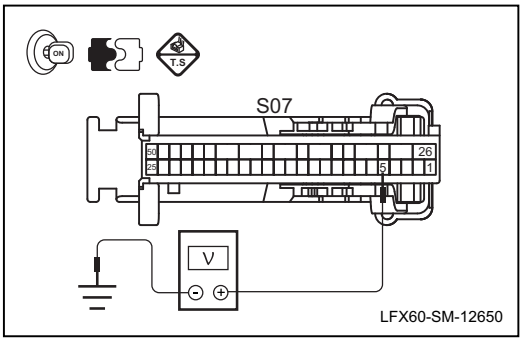
Possible reasons

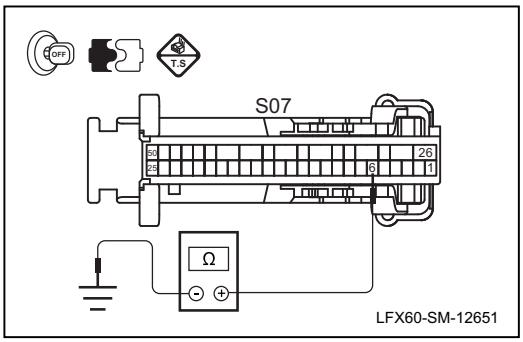
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B10131B	Line and check the hardware	• Line short to the ground or open circuit • Line short to power • Line short circuit	• Line fault • Passenger's belt pretensioner • Airbag control module
B10131A			
B101311			
B101312			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the harness plug of the airbag control unit, and the belt pretensioner on the passenger side for any signs of damage, poor contact, aging, loose and so on. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.
4. Check the signal circuit of the passenger's belt pretensioner for continuity.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the harness plug S07 of the airbag control module, and disconnect harness plug S13 of the passenger's belt pretensioner. C. Measure the resistance between the No.3 terminal of the harness plug S07 of the airbag control module and the No.2 terminal of the harness plug S13 of the passenger's belt pretensioner. D. Measure the resistance between the No.4 terminal of the harness plug S07 of the airbag control module and the No.1 terminal of the harness plug S13 of the passenger's belt pretensioner. **Standard resistance: less than 5 Ω** Is it OK after checking? →**Yes** To Step 5. →**No** Check the signal circuit of the passenger's belt pretensioner for open circuit failure, and replace the wiring harness if necessary.
5. Check the drive signal circuit of the passenger's belt pretensioner and power supply for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver's side preloader harness plug S13. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the No.1, 2 terminals of the harness plug S13 of the passenger's belt pretensioner and the reliable ground with a multimeter. **Standard voltage: 0V** Is it OK after checking? →**Yes** To Step 6. →**No** Check the drive signal circuit of the passenger's belt pretensioner and power supply for short circuit failure, and replace the wiring harness if necessary.

Test condition	Details/results/measures
6. Check the drive signal circuit of the passenger's belt pretensioner and grounding for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver's side preloader harness plug S13. C. Measure the resistance between the No.1, 2 terminals of the harness plug S13 of the passenger's belt pretensioner and the reliable ground with a multimeter. **Standard resistance: 10MΩ or higher** Is it OK after checking? **→Yes** To Step 7. **→No** Check the drive signal circuit of the passenger's belt pretensioner and grounding for short circuit failure, and replace if necessary.
7. Check the drive signal circuits of the passenger's belt pretensioner for short circuit with each other.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the assistant driver's side preloader harness plug S13. C. Measure the resistance between the No.1 and No.2 terminals of the harness plug S13 of the passenger's belt pretensioner with a multimeter. **Standard resistance: 10MΩ or higher** Is it OK after checking? **→Yes** To Step 8. **→No** Check the drive signal circuit of the passenger's belt pretensioner for short circuit failure with each other, and replace the wiring harness if necessary.
8. Check the airbag control module power line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the negative connector of the battery, start the switch so that the power mode is in "ON" state. D. Measure the voltage between No.5 terminal of the harness plug S07 of the airbag control module and the reliable grounding. **Standard voltage: 11 ~ 14 V** Is it OK after checking? **→Yes** To Step 9. **→No** Check the power supply circuit of the airbag control module circuit for open circuit failure, and replace the wiring harness if necessary.

Test condition	Details/results/measures
9. Check the airbag control module ground line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between the airbag control module harness plug S07 terminal 6 and the fixed ground point with the multimeter. **Standard resistance: less than 5Ω** Is it OK after checking? →**Yes** To Step 10. →**No** Repair the airbag control module ground line open circuit fault and replace the harness if necessary.
10. Replace the assistant driver's side preloader.	
	A. Replace the assistant driver's side preloader. Is the system normal? →**Yes** The fault is solved and the system is normal. →**No** To Step 11.
11. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

DTC B100049, B105000

DTC description

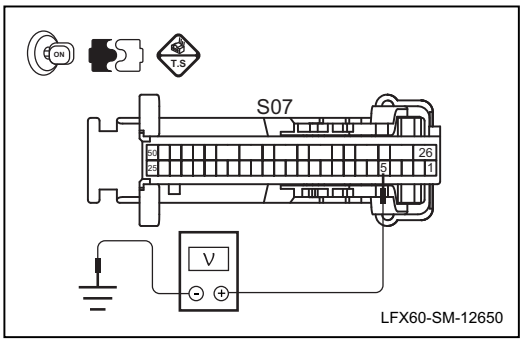
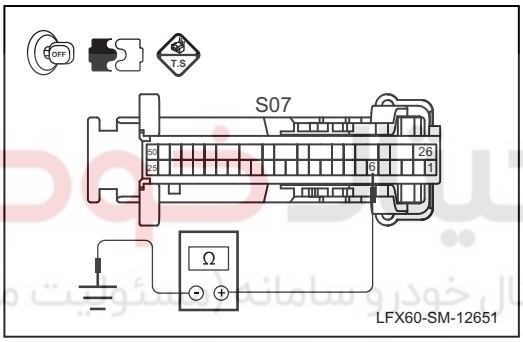
DTC	Description	Definition
B100049	Internal fault (replace ACU)	• ACU internal fault
B105000	Frontal impact record (replace ACU)	

Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B100049		• Internal fault	• Internal fault
B105000		• A collision has occurred	

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the airbag control unit harness plug for breakage, loose contact, aging or looseness. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.

Test condition	Details/results/measures
4. Check the airbag control module power line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the airbag control module harness plug S07 terminal 5 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? →**Yes** To Step 5. →**No** Repair the airbag control module power line open circuit fault and replace the harness if necessary.
5. Check the grounding circuit of the airbag control module	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between the airbag control module harness plug S07 terminal 6 and the fixed ground point with the multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? →**Yes** To Step 6. →**No** Repair the airbag control module ground line open circuit fault and replace the harness if necessary.
6. Replace the assistant driver's side preloader.	
	A. Replace the assistant driver's side preloader. Is the system normal? →**Yes** The fault is solved and the system is normal. →**No** To Step 7.
7. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module.** Verify that the system is operated normally.

DTC B103414, B103412, B100100, B105600

DTC description

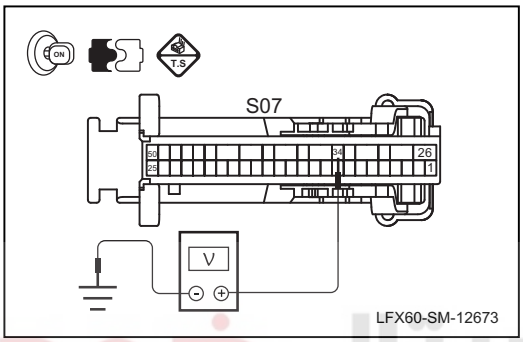
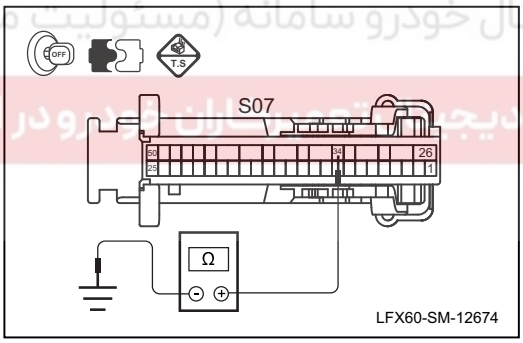
DTC	Description	Definition
B103414	Hard wire collision output channel 1 short to ground	• The system has detected a circuit fault
B103412	Hard wire collision output channel 1 short to power	
B100100	Mismatch vehicle model	
B105600	Continuous failure condition of watchdog	

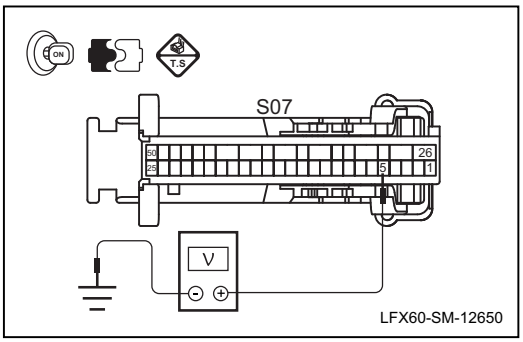
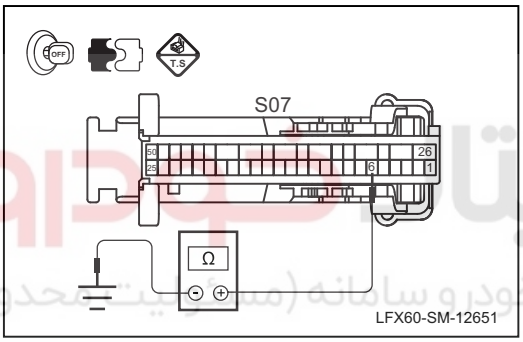
Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B10131B	Line and check the hardware	• Line short to the ground or open circuit • Line short to power • Line short circuit	• Line fault • Airbag control module
B10131A			
B101311			
B101312			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the harness plug of the airbag control unit, and the belt pretensioner on the passenger side for any signs of damage, poor contact, aging, loose and so on. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.

Test condition	Details/results/measures
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.
4. Check the airbag output signal circuit and power supply for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the voltage between No.34 terminal of the harness plug S07 of the airbag control module and the reliable grounding. **Standard voltage: 0V** Is it OK after checking? →**Yes** To Step 5. →**No** Check the airbag output signal circuit and power supply for failure, and replace the wiring harness if necessary.
5. Check the airbag output signal circuit and grounding for short circuit.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the resistance between No.34 terminal of the harness plug S07 of the airbag control module and the reliable grounding. **Standard resistance: 10MΩ or higher** Is it OK after checking? →**Yes** To Step 6. →**No** Check the airbag output signal circuit and grounding for short circuit failure, and replace the wiring harness if necessary.

Test condition	Details/results/measures
6. Check the airbag control module power line.	
 LFX60-SM-12650	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the airbag control module harness plug S07 terminal 5 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14 V** Is it OK after checking? →**Yes** To Step 7. →**No** Repair the airbag control module power line open circuit fault and replace the harness if necessary.
7. Check the airbag control module ground line.	
 LFX60-SM-12651	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between the airbag control module harness plug S07 terminal 6 and the fixed ground point with the multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? →**Yes** To Step 8. →**No** Repair the airbag control module ground line open circuit fault and replace the harness if necessary.
9. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

DTC U007300, U015500

DTC description

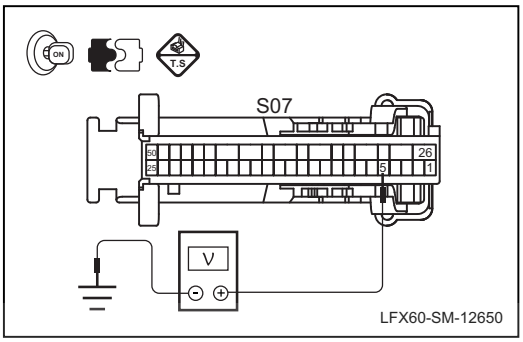
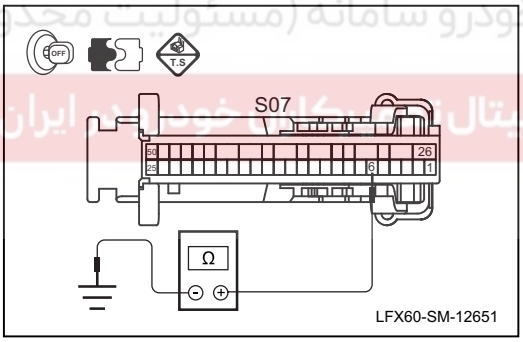
DTC	Description	Definition
U007300	CAN bus off-line	• Airbag control unit monitors system operating voltage abnormal
U015500	IC signal loss	

Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
U007300	Line and check the hardware	• The CAN bus is offline for more than 400 ms • The dashboard signal is lost for more than 200 ms	• CAN bus • Airbag control module
U015500			

Diagnostic process

Test condition	Details/results/measures
1. General inspection.	
	A. Check the harness plug of the airbag control unit for any signs of damage, poor contact, aging, loose and so on. Is it OK after checking? →**Yes** To Step 2. →**No** Repair the fault parts.
2. Read the DTC with the diagnostic meter.	
	A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →**Yes** To Step 3. →**No** Carry out the relevant fault diagnosis according to the DTCs.
3. Check whether the DTC can be cleared.	
	A. Connect the diagnostic meter and access the airbag system to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →**Yes** To Step 4. →**No** System normal.

Test condition	Details/results/measures
4. Check the vehicle communication system.	
	A. Check whether the vehicle communication system is normal. Is it OK after checking? →**Yes** To Step 5. →**No** Check the communication system for fault.
5. Check the airbag control module power line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Connect the battery negative terminal and operate the start switch to turn the power to ON state. D. Measure the voltage between the airbag control module harness plug S07 terminal 5 and the fixed ground point with the multimeter. **Standard voltage: 11 ~ 14V** Is it OK after checking? →**Yes** To Step 6. →**No** Repair the airbag control module power line open circuit fault and replace the harness if necessary.
6. Check the airbag control module ground line.	
	A. Operate the start switch to turn the power to OFF state and disconnect the battery negative terminal. B. Disconnect the airbag control module harness plug S07. C. Measure the resistance between the airbag control module harness plug S07 terminal 6 and the fixed ground point with the multimeter. **Standard resistance: less than 5 Ω** Is it OK after checking? →**Yes** To Step 7. →**No** Repair the airbag control module ground line open circuit fault and replace the harness if necessary.
7. Replace the airbag control unit.	
	A. Replace the airbag control unit. **Refer to: Replacement of airbag control module** Verify that the system is operated normally.

Removal and Installation

Replacement of the driver airbag

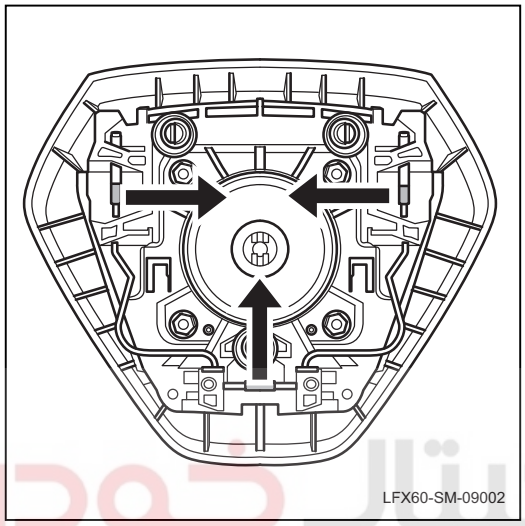
Removal

1. Remove the driver's airbag.

(a). Disconnect the battery negative connector.

Note:

Disconnect the battery negative terminal, wait for 90s at least and then continue operation.

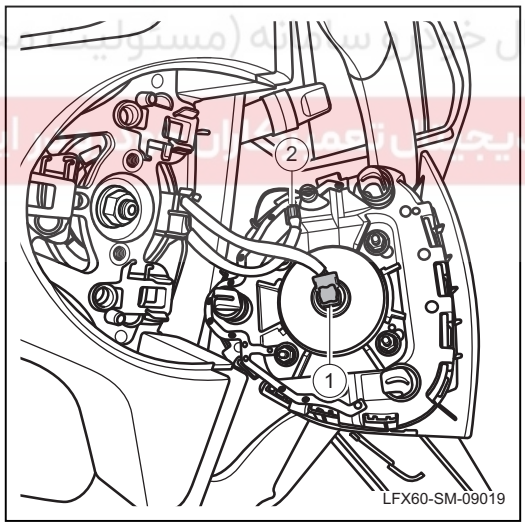


(b). Use the appropriate tool to pry the driver's airbag retainer in the direction of the arrow.

Note:

Use tape to wrap around the appropriate tool to avoid damage to the lower surface of the steering wheel.

(c). Turn over the driver airbag.



(d). Disconnect the harness plug 1 of the driver airbag.

(e). Disconnect the harness plug 2 of speaker.

Note:

Do not pull the harness of the driver's airbag.

(f). Take off the driver airbag assembly, and place in a safe position.

Note:

It is very dangerous to put airbag module facing down. Burst bladder can make the module bouncing, which may cause serious injury. Position the module facing up.

Installation

1. Install the driver airbag.

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

(b). Check and clear the airbag fault code.

Replacement of the passenger airbag

Removal

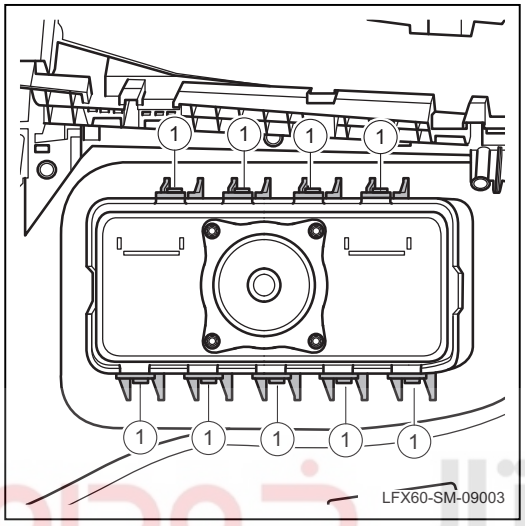
1. Remove the passenger airbag

(a). Disconnect the battery negative connector.

Note:

Disconnect the battery negative terminal, wait for 90s at least and then continue operation.

(b). Install the upper body of dashboard, **refer to:Replacement of the upper body of dashboard.**



(c). Gently pry the connection tab 1 of occupant airbag and dashboard.

Warning:

Disassemble of the front passenger airbag is not allowed.

(d). Take off the passenger airbag, and place in a safe position.

Note:

It is very dangerous to put airbag module facing down. Burst bladder can make the module bouncing, which may cause serious injury. Position the module facing up.

Installation

1. Install passenger airbag

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

(b). Remove the upper body of dashboard, **refer to:Replacement of the dashboard assembly.**

(c). Check and clear the airbag fault code.

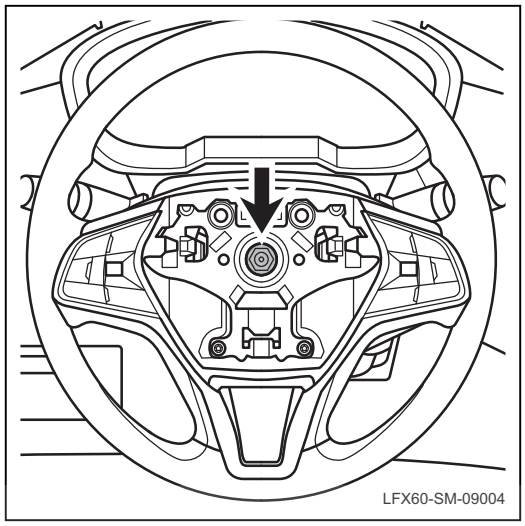
Replacement of multi-function steering wheel

Removal

1. Remove the multi-function steering wheel.

(a). Disconnect the battery negative connector.

(b). Remove the driver's airbag. **Refer to the replacement of driver's airbag.**



(c). Remove the lock nut of the multi-function steering wheel.

ℹNote:

Before pulling out the steering wheel, make assembly mark on the steering shaft and the steering wheel to ensure that the parts can be mounted to the original position during installation.

(d). Pull out the multi-function steering wheel.

Installation

1. Install the multi-function steering wheel.

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

(b). Install the driver airbag, **refer to:Replacement of the driver airbag.**

Replacement of clock spring

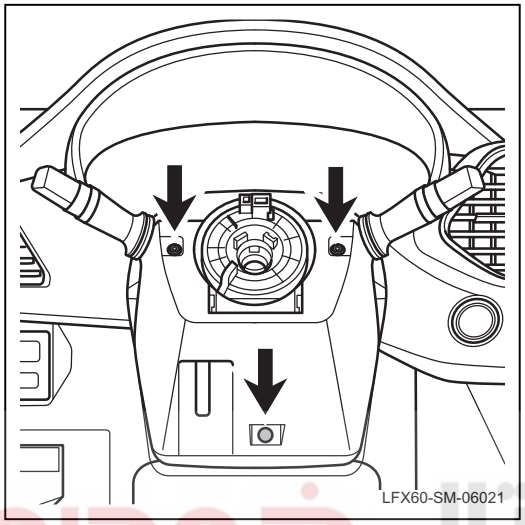
Removal

1. Remove the clockspring.

(a). Disconnect the battery negative connector.

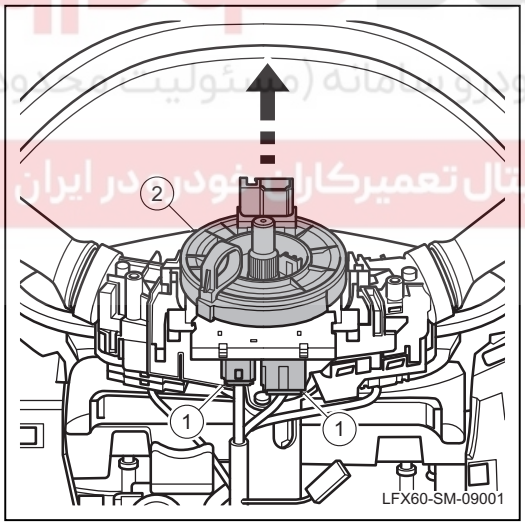
(b). Remove the driver's airbag. **Refer to the replacement of driver's airbag.**

(c). Remove the multi-function steering wheel, **refer to:Replacement of multi-function steering wheel.**



(d). Remove the multi-function steering wheel upper and lower shield fixing bolt.

(e). Take down the multi-function steering wheel upper and lower shield.



(f). Disconnect the harness plug 1 of clock spring.

(g). Separate the jaws of the clock spring, remove the clock spring 2.

Note:

Mark the clockspring or fix it with adhesive tape for reusing.

Installation

1. Install the clockspring.

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

(b). Install the multi-function steering wheel, **refer to:Replacement of multi-function steering wheel**

(c). Install the driver airbag, **refer to:Replacement of the driver airbag.**

Replacement of airbag control module

Removal

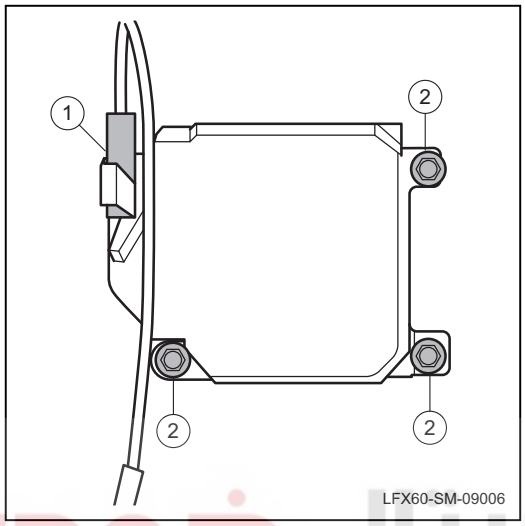
1. Remove the airbag control module.

(a). Disconnect the battery negative connector.

Note:

Disconnect the battery negative terminal, wait for 90s at least and then continue operation.

(b). Remove the sub-dashboard, **refer to:Replacement of sub-dashboard.**



(c). Disconnect the harness plug 1 of the airbag control module.

(d). Remove the fixing bolts 2 of the airbag control module.

(e). Take off the airbag control module.

Installation

1. Install the airbag control module.

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

Scrapped airbag

Scrapped

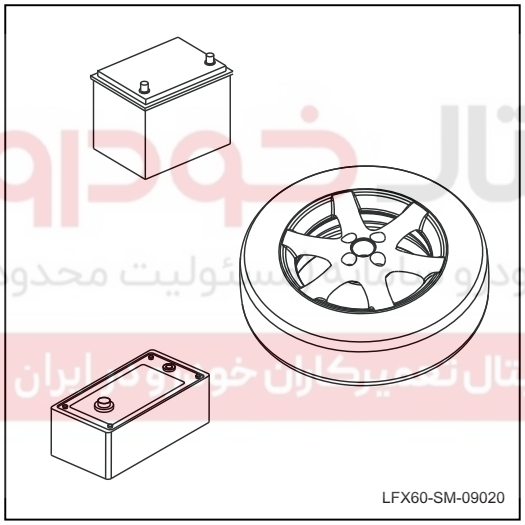
1. Scrapped airbag.

△Tips:

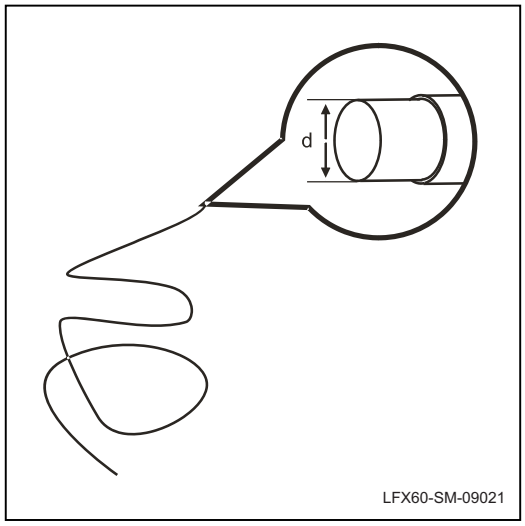
When dispose vehicle or airbag module, the discarded airbag should be fired, this can eliminate any risk of burning in certain circumstances. Please follow the steps below to detonate, if the abandoned driver airbag can not detonate by accident, please contact Lifan dealer maintenance department.

⚠Warning:

- **Never dispose driver's airbag module not fired.**
- **When detonating the airbag, a great explosion will occur.It is advisable to detonate at the outdoor without affecting nearby residents.**
- **The special tool for firing from Lifan should be used to fire discarded airbag. Operate this in a place far from the electrical interference.**
- **Any operation of firing should be conducted 10m away from airbag in firing operation.**
- **The airbag will be hot after fired. Wait for at least 30min before touching.**
- **Safety gloves and goggle should be worn to handle fired airbag.**
- **Do not splash the water onto the detonated airbag assembly.**
- **Clean your hand after operation.**



(a). Prepare the special tool for airbag firing
(b). Prepare a battery as power supply to fire airbag.
(c). Prepare a discarded wheel with rim and some discarded wheel without rim, and some cardboard boxes and weights.



(d). Prepare some discarded vehicle harness.

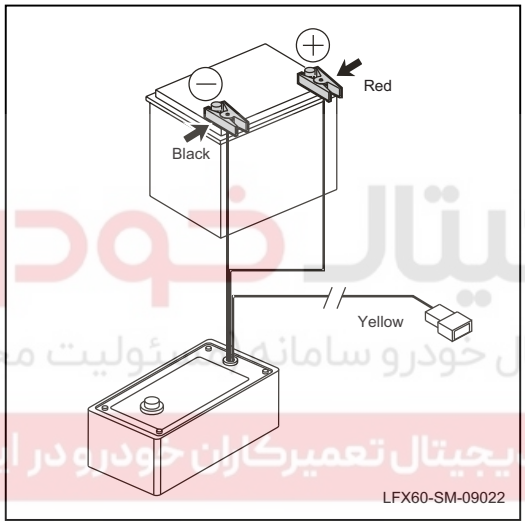
△**Tips:**

The diameter d of the bare portion of the wire harness should be > 1.3 mm to meet the requirement that the cross-sectional area of the bare portion of the wire harness is greater than 1.25 mm².

⚠**Warning:**

The harness are used to tie the airbag in firing operation. Thicker or thinner harness may break when the airbag burst. This is very dangerous, so the choice of bundled harness or equivalent must be reliable.

(e). Choose a suitable open area.

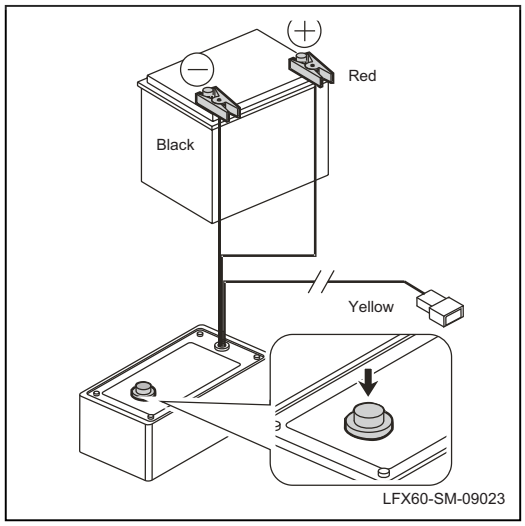


(f). Check the performance of the special tools for airbag detonation.

(g). Connect the special tools for airbag detonation to the battery.

△**Tips:**

Hold red clip of the special tool onto positive post of the battery, while black one onto negative. The yellow connector is for airbag module. Leave it alone in this step.

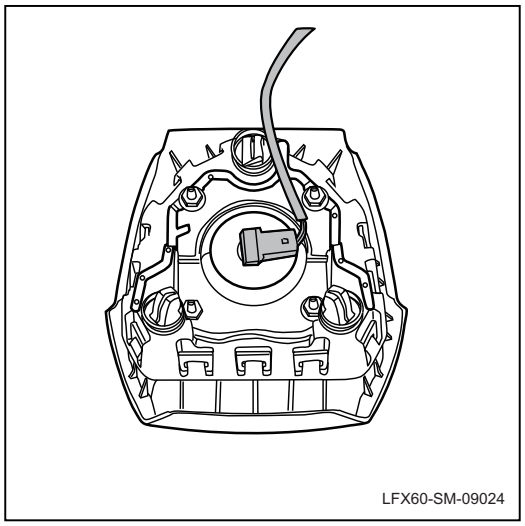


(h). Press down the activation switch of the special tools for airbag detonation to check that if the switch diode lamp is lit.

⚠**Warning:**

If the LED does not light, the special should not be used because of fault.

(g). Disconnect the special tools for airbag detonation from the battery.


LFX60-SM-09024

(j). Connect the driver airbag adapter to the driver's airbag module.


LFX60-SM-09025

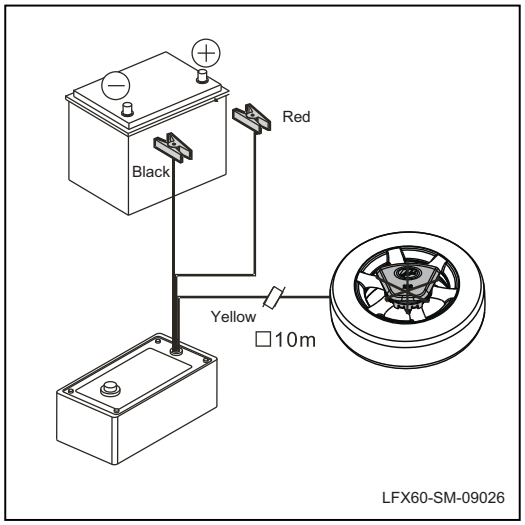
(k). Fix the driver's airbag with the harness to the prepared wheel.

△**Tips:**

Expansion of driver's airbag can damage wheel, thus discarded wheels should be used.

⚠**Warning:**

- **Make sue the airbag is bond tightly with harness or equivalent. It is very dangerous if the harness are break when the airbag bursts during firing.**
- **Make sure to bind the driver's airbag facing up. If the metal side of airbag faces up, it can cut the harness during burst of airbag, which can cause risk of flying airbag. This is very dangerous.**



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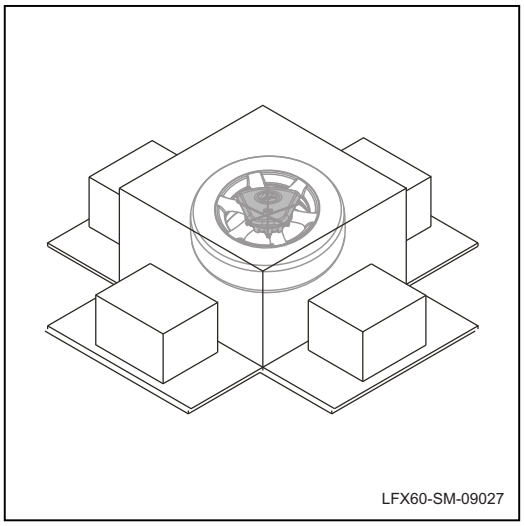
(l). Connect the driver airbag adapter to the yellow connector on the special tools for airbag detonation.

△**Tips:**

Leave the secondary latch of the cascade lock unengaged to avoid damage to connector and harness of the special tool. Make sure binding harness are loose than that of outside. The cascade lock and loose binding harness prevents excessive shock in burst of airbag, to protect harness of the special tool.

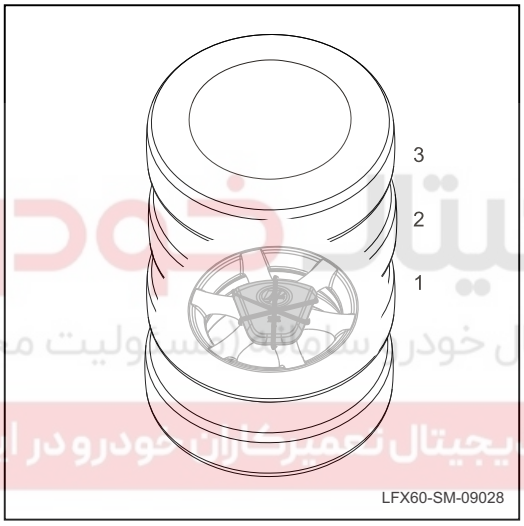
(m). Move the special tools for airbag detonation away for 10m from the bundled airbag.


LFX60-SM-09027

(n). Cover the bundled airbag module with a cardboard box or a used tire.

Cardboard cover method:

Cover the airbag module bond to wheel with a cardboard box bigger then wheel, put 190N weight on the box. As shown in the Figure.



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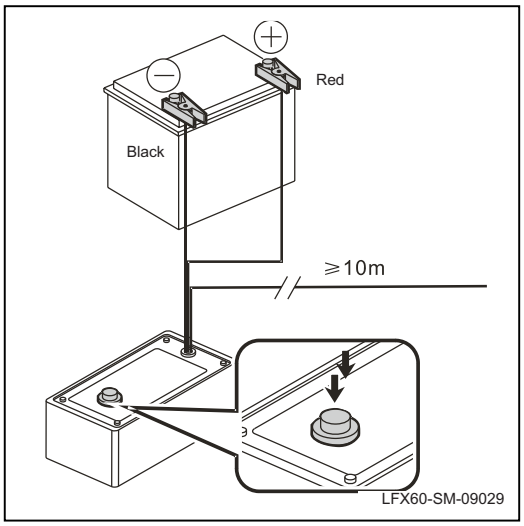
Tire cover method:

Cover the airbag module bond to wheel with at least three discarded wheel (without rim). As shown in the Figure.



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(o). Connect the red and black clamps of the special tools for the airbag detonation to the positive and negative terminals of the backup battery.

(p). Check to ensure that there is no person or animal within 10m distance to the bundled airbag.

(q). Press down the detonation switch to detonate the airbag.

(r). Remove the driver's airbag module from the steel ring.

(s). Put the driver's airbag in the plastic bag, tighten the pocket, handle the driver's airbag module as the disposal of the used parts.

⚠Warning:

- **The airbag will be hot after fired. Wait for at least 30min before touching.**
- **Safety gloves and goggle should be worn to handle fired airbag.**
- **Do not splash the water onto the detonated airbag assembly.**
- **Clean your hand after operation.**