



## 12- Electrical system

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TPMS (tire pressure monitoring system)



## TPMS (tire pressure monitoring system)

### Technical specifications

#### General specifications

##### Tire pressure receiver

Name	Specification
Rated voltage	12V
Operating voltage	(7.8 ~ 16)V
Receiving frequency	433.92Mhz±60khz
Receiver sensitivity	> -105 dBm
Operating current	≤50mA
Quiescent current	≤ 50μA
Operating temperature	(-40 ~ 85) °C
Storage temperature	(-40 ~ 90) °C

##### Tire pressure monitoring sensor

Transmission	Frequency	433.92MHz±40KHz
	Baud rate	(4800±48) bps
	Modulation mode	FSK
Receiving	Frequency	125kHz ± 5kHz
	Baud rate	3900 bps
	Modulation mode	ASK
Transmission power		(4 ~ 6 dBm)
Operating voltage		2.1V ~ 3.6V, Lithium manganese battery power supply
RF transmission current		≤14mA
Quiescent current		≤ 2.5μA
Pressure measurement range		(100 ~ 450) kPa (absolute pressure)
Pressure error (with the battery voltage of 2.1V ~ 3.6V)		±17.5kPa (-40 °C ~ 0 °C) ±7kPa (0 °C ~ 50 °C) ±9kPa (50 °C ~ 70 °C) ±17.5kPa (70 °C ~ 125 °C)
Temperature measurement range		(-40 ~ 125) °C
Temperature error (Battery voltage is 2.1V ~ 3.6V)		±5 °C, (-40 ~ -20) °C ±3 °C, (-20 ~ 70) °C ±5 °C, (70 ~ 125) °C



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High pressure alarm	$\geq P\_Max$
Low pressure alarm	$\leq P\_Min$
Air leakage alarm	Measure the pressure once every 4s; if the the measured pressure is decreased in continuous 5 times and the cumulative decreased value exceeds 30kPa, the air leakage alarm will be sent.
High temperature alarm	$\geq 75\text{ }^{\circ}\text{C}$
Operating temperature	$-40 \sim 105\text{ }^{\circ}\text{C}$
Storage temperature	$-40 \sim 125\text{ }^{\circ}\text{C}$
Operating humidity	(0 ~ 90)%
Battery service life	$\geq 9$ years or 100,000 km
Battery voltage measurement range	2.1V ~ 3.6V
Battery voltage measurement accuracy	$\pm 0.1\text{V}$
Weight	$\leq 35\text{g}$

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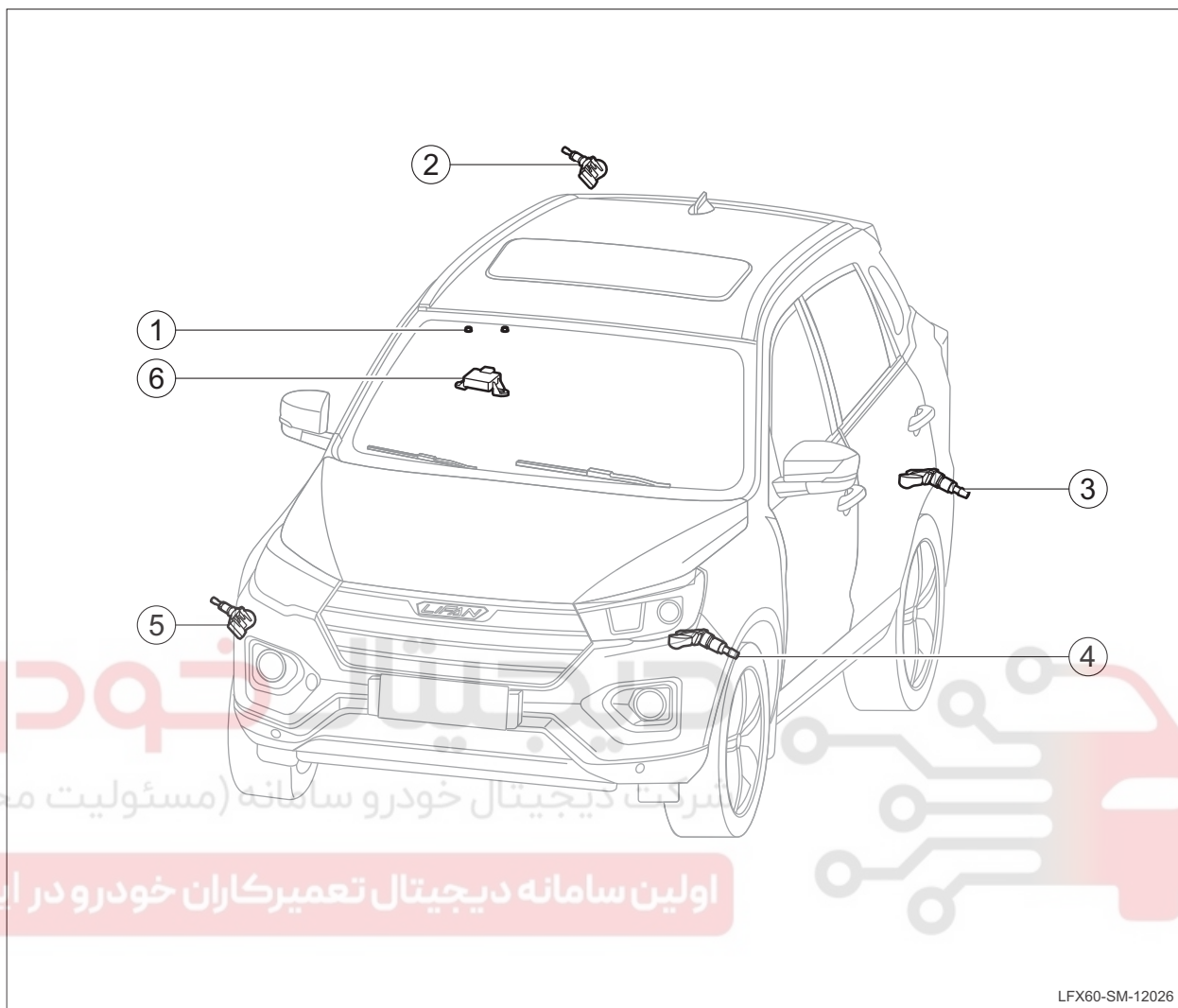


TPMS (tire pressure monitoring system)



## Structure and installation location

### Component Location Plan



LFX60-SM-12026

No.	Part name
1	Tire pressure receiver fixing nut
2	Right rear TPMS
3	Left rear TPMS

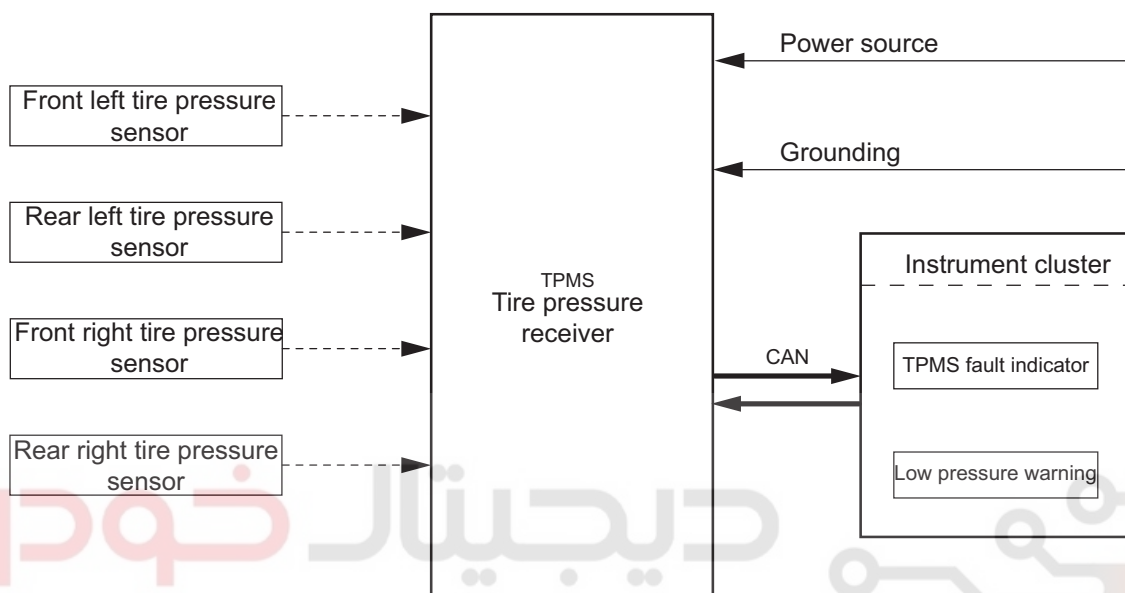
No.	Part name
4	Left front TPMS
5	Right front TPMS
6	Tire pressure receiver

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## Electrical Schematic Diagram

### Electrical Schematic Diagram



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LFX60-SM-12025

## General Inspection

### Code learning/ tire pressure matching

#### Matching instructions

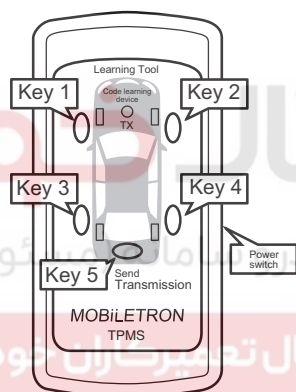
After the ignition switch is turned on or the engine is running (at the speed of less than 3km/h), when the tire pressure receiver receives the tire pressure matching indication signal "IC\_TPMS MatchIndication = 1" via CAN bus, it will enter the matching mode. After completion of the matching, the tire pressure receiver will exit the matching mode and enter the operating mode. The matching process will be completed within 5min. If the power switch is switched to ACC/OFF status or the matching is not completed within 5min, the tire pressure receiver will exit the matching mode and return to the status before the matching.

#### Code learning steps

reception is not received; when the circular LED is turned off, repeat Step 1.

Step 3: Repeat Steps 1 and 2, until the square LEDs near the buttons 1 ~ 4 are all turned on, which indicates that the sensor data are received.

Step 4: Set the receiver under the code learning mode, and place it on the position within 20cm near the tire pressure receiver, press the button 5 to send the data, the square LED will flash continuously, and the data will be sent completely after 15s; the code learning process is completed.



LFX60-SM-12024

Key 1: Learn the front left tire transmission module
Key 2: Learn the front right tire transmission module
Key 3: Learn the rear left tire transmission module
Key 4: Learn the rear right tire transmission module
Key 5: Send each tire sensor ID code after completion 4 times of the code learning

Step 1: Place the code learning device on the position within about 10cm near the tire valve, press the corresponding tire position button; during the triggering process, circular LED will flash continuously.

Step 2: That the square LED near the button is turned on indicates that the tire is received, otherwise it indicates that the tire is not



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## Operating Principle

### System overview

#### Tire pressure receiver

The tire pressure receiver may receive the high frequency signals transmitted periodically from TPMS, which contains the pressure, temperature and acceleration information of the tire at which TPMS is installed. after receiving and processing the high-frequency signals, the tire pressure receiver can send information to the instrument via CAN bus for display.

The tire pressure receiver shall have a power-off memory function for the tire pressure information, that is, when it is switched from IG OFF to IG ON, if it does not receive data from TPMS, it should send the tire pressure data before power-off, until it can normally receive the latest data transmitted from TPMS.

If the tire pressure or temperature information received by the tire pressure receiver is abnormal or TPMS fails, it should send the corresponding alarm message to the instrument via CAN bus for display. When there is a tire pressure alarm, the icon on the instrument corresponding to the tire will be turned on, when there is a fault alarm, the yellow tire pressure fault alarm indicator will be turned on.

Alarm priority level settings: Sensor fault > Tire pressure alarm; when the both alarms occur at the same time, the latter can be processed after the sensor fault is repaired.

#### Component description

##### TPMS status description

The sensor has a 24h continuous monitoring function, mainly including driving mode, parking mode, alarm mode, low speed driving mode, code learning mode (matching)/low frequency triggering mode.

##### Mode storage:

When the battery is powered on, the sensor will be initialized immediately and enter into this mode, waiting for installing into the tire and receiving the pressure; when the monitoring pressure is  $\geq 35\text{kPa}$ , the sensor will enter the parking mode.

##### Parking mode:

When the sensor monitors that the vehicle is parked for more than 15min, it will enter the parking mode.

##### Driving mode:

When sensor monitors the vehicle under the running status (with the speed of  $\geq 20\text{km/h}$ ), it will enter the driving mode.

##### Low speed driving mode:

Under driving mode, when it monitors that the speed is  $\leq 20\text{km/h}$  after parking, it will enter the low speed driving mode.

If it monitors that the vehicle is in the running status again within 15min, it will immediately return to the driving mode.

If it monitors that the vehicle is parked after 15min, it will enter the parking mode.

If only it returns to the driving mode and enters the low speed driving mode, it will count again for 15 min.

##### Alarm mode:

The sensor monitors the abnormalities, such as, pressure, temperature, low voltage, and sensor faults.

##### Matching mode:

Trig the sensor with a code learning trigger, to allow the receiver to learn the sensor information or status.





## Diagnosis information and procedures

### Diagnosis Instructions

Before TPMS system troubleshooting, must understand and familiarize its working principle, and then perform its diagnosis, so as to determine the correct fault diagnosis procedure in case of fault, and more importantly, to determine whether the situations described by the user are normal.

For any TPMS system fault diagnosis, must inspect it firstly, and then guide the maintenance staff to take the next logical steps for fault diagnosis. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

### General equipment

Name
Diagnostic equipment of vehicle
Digital multimeter

### Visual Inspection

1. Confirm the problem raised by the customer.
2. Check for the evident mechanical or electrical damage trace and collision deformation trace through the visual check.

### Visual inspection table

Mechanical	Electrical
<ul style="list-style-type: none"> <li>• TPMS</li> </ul>	<ul style="list-style-type: none"> <li>• Fuse</li> <li>• Line and wiring harness connectors</li> <li>• TPMS control unit</li> </ul>

3. Solve the detected problems 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.



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### Fault symptoms table

Symptom	Possible Cause	Recommended measure
Intermittent fault	<ul style="list-style-type: none"> <li>• Clear DTC</li> <li>• Carry out the simulation test</li> <li>• Check and shake the harness, joint and terminal</li> </ul>	<b>Refer to: Intermittent fault diagnostic flow</b>
The tire pressure monitoring system (TPMS) indicator can not be turned off	<ul style="list-style-type: none"> <li>• Instrument cluster</li> <li>• TPMS control unit</li> <li>• TPMS has a fault code</li> </ul>	<b>Refer to: Diagnosis procedure about the tire pressure monitoring system (TPMS) indicator can not be turned off</b>
The tire pressure monitoring system (TPMS) indicator can not be turned on when the tire pressure is too low	<ul style="list-style-type: none"> <li>• Instrument cluster</li> <li>• TPMS control unit</li> </ul>	<b>Refer to: Diagnosis flow for tire pressure severely insufficient and tire pressure monitoring system instrument cluster (TPMS) indicator lamp not on</b>

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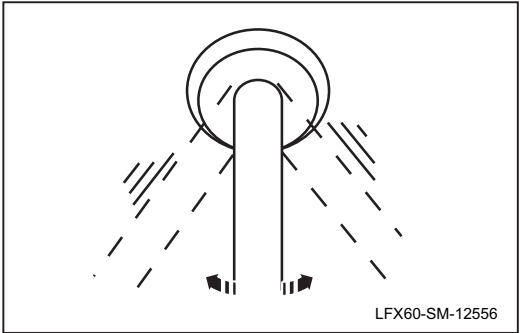
## Intermittent fault diagnostic flow

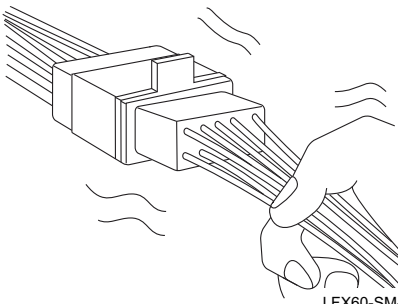
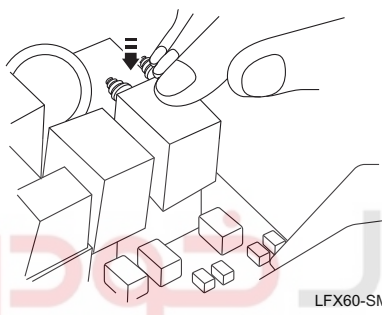

### ① Note:

- Clear DTC.
- Carry out the simulation test.
- Inspect and shake the wiring harness, connectors and terminals.

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.

When the fault can not 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 faults, especially for bad wiring harness contact, can be quickly and effectively monitored with the basic inspection shown in the following flowchart.

Test condition	Details/results/measures
1. General inspection.	<p>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.</p> <p>① Note: There are several reasons that may cause electrical faults due to vibrations of the vehicle or engine. Check the following:</p> <ol style="list-style-type: none"> <li>1.The plug is not inserted in position.</li> <li>2.There is no sufficient gap for the harness.</li> <li>3.The harness layout passes across the bracket or moving parts.</li> <li>4.The harness is arranged too near to the high temperature parts.</li> <li>5.The wiring is incorrect, not clamped or the loose harness causes the wiring pinched between parts.</li> <li>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.</li> </ol>
2. Wiring harness connector inspection method.	<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>A. Connect the diagnostic meter to the diagnostic interface (DLC).</p> <p>B. Operate the start switch to turn the power to ON state (shut down the engine).</p> <p>C. Access the data flow of the switch you are checking.</p> <p>D. While monitoring the data stream, gently shake each plug or harness horizontally and vertically.</p> <p>E. If the data stream value is instable, check whether the contact is loose.</p> </div> </div>

Test condition	Details/results/measures
3. Check the wiper cluster switch power line.	
 <p>LFX60-SM-12557</p>	<p>A. Connect the diagnostic meter to the diagnostic interface (DLC).</p> <p>B. Operate the start switch to set the power mode under ON status (do not start the engine).</p> <p><b>Note:</b> If the engine is started, perform the following steps during its operation in idling mode.</p> <p>C. Access the data flow of the switch you are checking.</p> <p>D. While monitoring the data stream, gently shake each plug or harness horizontally and vertically. If the data flow is not stable, check whether the connection is bad.</p>
4. Method of checking the actuator or relay.	
 <p>LFX60-SM-12558</p>	<p>A. Connect the diagnostic meter to the diagnostic interface (DLC).</p> <p>B. Operate the start switch to set the power mode under ON status (do not start the engine).</p> <p><b>Note:</b> If the engine is started, perform the following steps during its operation in idling mode.</p> <p>C. Prepare the output status control function well for the actuator or relay you are checking.</p> <p>D. After the output status control function is activated, use a finger to vibrate the actuator or relay 3s.</p> <p>E. If you hear an unstable "click" sound, check for any improper connection or improper installation of the actuator and/or relay.</p> <p><b>Note:</b> A strongly vibrating relay may cause the relay to be disconnected.</p>
5. Sprinkling method	
 <p>LFX60-SM-12559</p>	<p>If the fault occurs only at high humidity or rainy/snowy weather, the following procedure should be performed: The temperature and humidity are changed indirectly by water spray on the front of the radiator.</p> <p>If the vehicle is likely to leak, this may damage the control module. In a leakage inspection in a vehicle, must take special protective measures.</p> <p>A. If the sensor or switch is inspected, connect the diagnosis instrument to the diagnosis interface DLC.</p> <p>B. Operate the start switch to set the power mode under ON status (do not start the engine).</p> <p><b>Note:</b> If the engine is started, perform the following steps during its operation in idling mode.</p> <p>C. If you want to check the sensor or switch, access the sensor or switch data stream.</p> <p>D. If you want to check the switch, manually turn it on.</p> <p>E. Spray water on the car, or drive the car through the car wash.</p> <p>F. If the data flow is unstable or malfunctioning, repair or replace parts if necessary.</p>

TPMS (tire pressure monitoring system)



### Diagnosis procedure about the tire pressure monitoring system (TPMS) indicator can not be turned off

Test condition	Details/results/measures
1. Read the TPMS DTC.	
	A. Connect the diagnostic equipment. B. Operate the start switch to turn the power to ON state. C. Read TPMS system fault code on the diagnosis instrument. Is there TPMS DTC? → <b>Yes</b> Carry out the relevant fault diagnosis according to the DTCs. → <b>No</b> To step 2.
2. Test the instrument cluster TPMS indicator lamp.	
	A. Connect the diagnostic equipment. B. Operate the start switch to turn the power to ON state. C. Read the combination instrument on the instrument cluster and perform the self-test operation. Is the TPMS indicator lamp normal? → <b>Yes</b> To step 3. → <b>No</b> Replace the instrument cluster. <b>Refer to: Replacement of instrument cluster assembly</b>
3. Replace the TPMS control unit.	
	A. Replace the TPMS control unit. <b>Refer to: Replacement of TPMS control unit</b> Confirm the system is normal.



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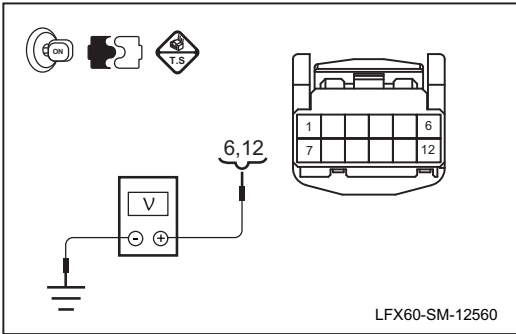
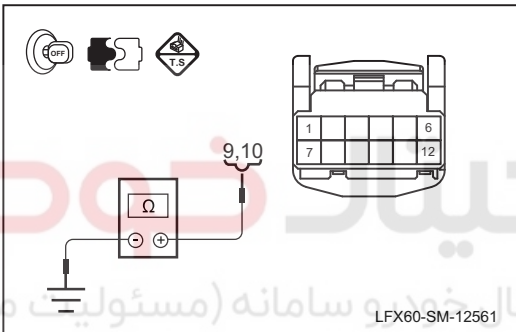
TPMS (tire pressure monitoring system)

### Diagnosis flow for tire pressure severely insufficient and tire pressure monitoring system instrument cluster (TPMS) indicator lamp not on

Test condition	Details/results/measures
1. Inspect TPMS system fuse.	
	<p>A. Check the TPMS fuse FS23, FS24.  <b>The fuse rated capacity is 5 A and 10A respectively</b>            Is it OK after checking?            →<b>Yes</b>            To step 2.            →<b>No</b>            Replace the TPMS system fuse.</p>
2. Read the TPMS DTC.	
	<p>A. Connect the diagnostic equipment.            B. Operate the start switch to turn the power to ON state.            C. Read TPMS system fault code.            Is there TPMS DTC?            →<b>Yes</b>            Carry out the relevant fault diagnosis according to the DTCs.            →<b>No</b>            To step 3.</p>
3. Test the instrument cluster TPMS indicator lamp.	
	<p>A. Connect the diagnostic equipment.            B. Operate the start switch to turn the power to ON state.            C. Perform the self-test operation on the instrument cluster.            Is the TPMS indicator lamp normal?            →<b>Yes</b>            To step 4.            →<b>No</b>            Replace the instrument cluster.  <b>Refer to: Replacement of instrument cluster assembly</b></p>

TPMS (tire pressure monitoring system)



Test condition	Details/results/measures
4. Inspect TPMS control unit power line.	
	<p>A. Operate the start switch to set the power mode under ON status (do not start the engine) and disconnect the negative battery cable.</p> <p>B. Disconnect the TPMS harness plug S12.</p> <p>C. Measure the voltage between Terminals 12 and 6 of TPMS wiring harness connector S12 and the reliable grounding point.</p> <p><b>Standard value: 11 ~ 14 V</b></p> <p>Is the measurement normal?</p> <p>→ <b>Yes</b> To step 5.</p> <p>→ <b>No</b> Inspect and repair TPMS control unit power line open circuit fault; if necessary, replace the wiring harness.</p>
5. Inspect TPMS control unit grounding line.	
	<p>A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable.</p> <p>B. Disconnect the TPMS harness plug.</p> <p>C. Measure the resistance between Terminals 9 and 10 of TPMS wiring harness connector S12 and the reliable grounding point.</p> <p><b>Standard value: Less than 5Ω</b></p> <p>Is the measurement normal?</p> <p>→ <b>Yes</b> To step 6.</p> <p>→ <b>No</b> Inspect and repair TPMS control unit open circuit fault; if necessary, replace the wiring harness.</p>
6. Replace the TPMS control unit.	
	<p>A. Replace the TPMS control unit.</p> <p><b>Refer to: Replacement of TPMS control unit</b></p> <p>Confirm the system is normal.</p>

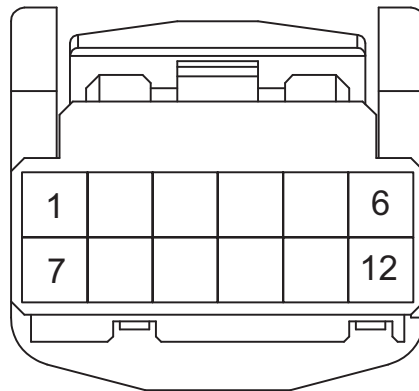




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### Control module terminal list



S12

LFX60-SM-12675

Terminal No.	Wire diameter/color	Terminal description
S01-01	0.30 BI/B	PCAN-H
S01-02	0.30BI/W	PCAN-L
S01-03		
S01-04		
S01-05		
S01-06	0.30 R/BI	IG power supply
S01-07	-	-
S01-08	-	-
S01-09	0.30 B	Signal GND
S01-10	0.30 B	Power ground
S01-11	-	-
S01-12	0.30 R/W	Battery power supply



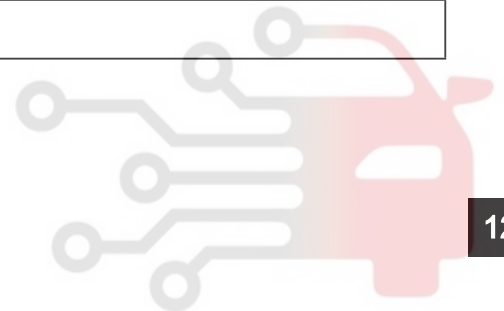
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**DTC list**

DTC	DTC information
B12DF	The voltage is too high
B12E0	The voltage is too low
B12EC	Front left tire pressure information update fail
B12EC	Front left tire pressure sensor fault
B12ED	Front right tire pressure information update fail
B12ED	Front right tire pressure sensor fault
B12EE	Rear left tire pressure information update fail
B12EE	Rear left tire pressure sensor fault
B12EF	Rear right tire pressure information update fail
B12EF	Rear right tire pressure sensor fault
U0027	Instrument vehicle speed message loss
U0028	Bus disconnection fault

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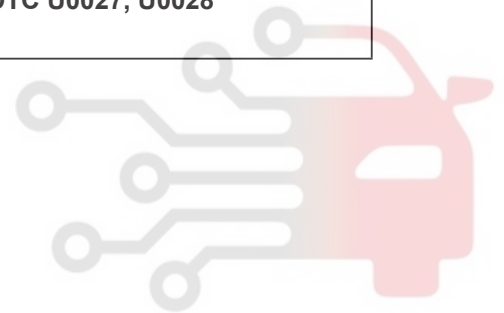
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### DTC diagnosis flow index

DTC	Description	Diagnostic process
B12DF	The voltage is too high	Refer to: DTC B12DF, B12E0
B12E0	The voltage is too low	
B12EC	Front left tire pressure information update fail	Refer to: DTC B12DF, B12E0, B12EC, B12ED, B12ED, B12EE, B12EE, B12EF, B12EF
B12ED	Front right tire pressure information update fail	
B12EE	Rear left tire pressure information update fail	
B12EF	Rear right tire pressure information update fail	
B12EC	Front left tire pressure sensor fault	
B12ED	Front right tire pressure sensor fault	
B12EE	Rear left tire pressure sensor fault	
B12EF	Rear right tire pressure sensor fault	
U0027	Instrument vehicle speed message loss	Refer to: DTC U0027, U0028
U0028	Bus disconnection fault	

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TPMS (tire pressure monitoring system)

**DTC B111717, B111716****DTC description**

DTC	Description	Definition
B12DF	The voltage is too high	TPMS control unit monitors the system operating voltage abnormality
B12E0	The voltage is too low	

**Possible reasons**

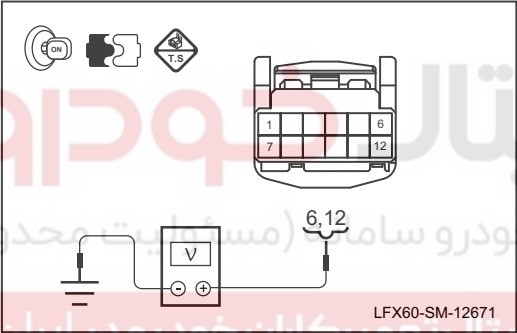
DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B12DF	Check the hardware and line	Voltage > 17 V within continuous 10s	<ul style="list-style-type: none"> <li>• Charging system</li> <li>• TPMS control unit and line fault</li> </ul>
B12E0		Voltage < 9 V within continuous 10s	

**Diagnostic process**

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

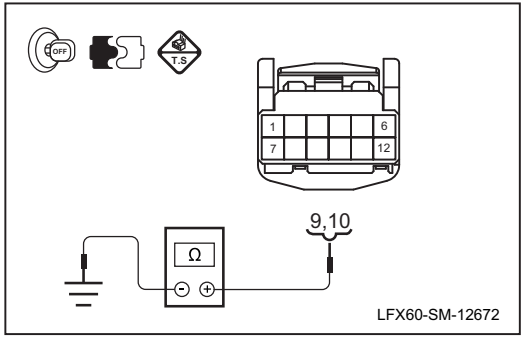


TPMS (tire pressure monitoring system)

Test condition	Details/results/measures
4. Check the power supply system of vehicle.	
	<p>A. Check whether the power supply system of vehicle is normal. Is it OK after checking? →<b>Yes</b> To step 5. →<b>No</b> Check the power supply system for fault.</p>
5. Check the TPMS fuse.	
	<p>A. Check the TPMS fuse FS23, FS24. <b>The fuse rated capacity is 5 A and 10A respectively</b> Is it OK after checking? →<b>Yes</b> To step 6. →<b>No</b> Replace the TPMS system fuse.</p>
6. Check the TPMS power line.	
	<p>A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the TPMS harness plug S12. C. Connect the negative battery cable and operate the start switch to set the power mode under ON status. D. Measure the voltage between the TPMS control module harness plug S12 terminal 6, 12 and the fixed ground point. <b>Standard value: 11 ~ 14 V</b> Is it OK after checking? →<b>Yes</b> To step 7. →<b>No</b> Repair the TPMS control module power line open circuit fault and replace the harness if necessary.</p>

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Test condition	Details/results/measures
7. Check the TPMS control module ground line.	
	<p>A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable.</p> <p>B. Disconnect the TPMS control module harness plug S12.</p> <p>C. Measure the resistance between the TPMS control module harness plug S12 terminal 9, 10 and the fixed ground point.  <b>Standard value: Less than 5Ω</b>          Is it OK after checking?          → <b>Yes</b>          To step 8.          → <b>No</b>          Repair the TPMS control module ground line open circuit fault and replace the harness if necessary.</p>
8. Replace the TPMS control unit.	
	<p>A. Replace the TPMS control unit.  <b>Refer to: Replacement of TPMS control unit</b>          Confirm the system is normal.</p>

# دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران





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TPMS (tire pressure monitoring system)

## DTC B12DF, B12E0, B12EC, B12EC, B12ED, B12ED, B12EE, B12EE, B12EF, B12EF

### DTC description

DTC	Description	Definition
B12EC	Front left tire pressure information update fail	<ul style="list-style-type: none"> <li>The tire pressure information update fails</li> <li>TPMS monitors that the pressure sensor has failed more than 15 times</li> </ul>
B12ED	Front right tire pressure information update fail	
B12EE	Rear left tire pressure information update fail	
B12EF	Rear right tire pressure information update fail	
B12EC	Front left tire pressure sensor fault	
B12ED	Front right tire pressure sensor fault	
B12EE	Rear left tire pressure sensor fault	
B12EF	Rear right tire pressure sensor fault	

### Possible reasons

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B12EC	Hadware inspection	TPMS does not receive TPMS feedback signal within 10min	<ul style="list-style-type: none"><li>• TPMS</li><li>• TPMS control unit</li></ul>
B12ED			
B12EE			
B12EF			
B12EC		TPMS monitors that TPMS has failed more than 15 times	
B12ED			
B12EE			
B12EF			

### 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? → <b>Yes</b> To step 2. → <b>No</b> Repair the fault position.
2. Read the DTC with the diagnostic meter.	

TPMS (tire pressure monitoring system)



Test condition	Details/results/measures
	<p>A. Connect the diagnostic meter and check the system for the other relevant DTCs. Is it OK after checking? →<b>Yes</b> To step 3. →<b>No</b> Carry out the relevant fault diagnosis according to the DTCs.</p>
3. Check whether the DTC can be cleared.	
	<p>A. Connect the diagnostic meter and access the TPMS to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? →<b>Yes</b> To step 4. →<b>No</b> System normal.</p>
4. Check the fuse.	
	<p>A. Check the fuse: FS23, FS24. <b>The fuse rated capacity is 5A, 10A.</b> Is the fuse normal? →<b>Yes</b> To step 5. →<b>No</b> Repair the fuse line and replace the fuse of rated capacity.</p>
5. Check the TPMS power line.	
	<p>A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable. B. Disconnect the TPMS harness plug S12. C. Connect the battery negative cable and operate the start switch to turn the power to ON state. D. Measure the voltage between the TPMS control module harness plug S12 terminal 6, 12 and the fixed ground point. <b>Standard value: 11 ~ 14 V</b> Is it OK after checking? →<b>Yes</b> To step 6. →<b>No</b> Repair the TPMS control module power line open circuit fault and replace the harness if necessary.</p>
6. Check the TPMS control module ground line.	



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Test condition	Details/results/measures
	<p>A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable.</p> <p>B. Disconnect the TPMS control module harness plug S12.</p> <p>C. Measure the resistance between the TPMS control module harness plug S12 terminal 9, 10 and the fixed ground point.</p> <p><b>Standard value: Less than 5Ω</b></p> <p>Is it OK after checking?</p> <p>→<b>Yes</b></p> <p>To step 7.</p> <p>→<b>No</b></p> <p>Repair the TPMS control module ground line open circuit fault and replace the harness if necessary.</p>
7. Replace TPMS.	
	<p>A. Replace TPMS.</p> <p><b>Refer to: Replacement of TPMS Sensor</b></p> <p>Inspect whether it is normal?</p> <p>→<b>Yes</b></p> <p>The fault is solved and the system is normal.</p> <p>→<b>No</b></p> <p>To step 8.</p>
8. Replace the TPMS control unit.	
	<p>A. Replace the TPMS control unit.</p> <p><b>Refer to: Replacement of TPMS control unit</b></p> <p>Confirm the system is normal.</p>

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TPMS (tire pressure monitoring system)

**DTC U0027, U0028****DTC description**

DTC	Description	Definition
U0027	Instrument vehicle speed message loss	• Network transmission abnormality
U0028	Bus disconnection fault	

**Possible reasons**

DTC	Check the strategy	Set the condition (control strategy)	Define the fault location
B12DF	Check the hardware and line	The speed signal has been lost more than 50 times	• CAN bus fault • TPMS control unit and line fault
B12E0		The bus is off more than 3 times	

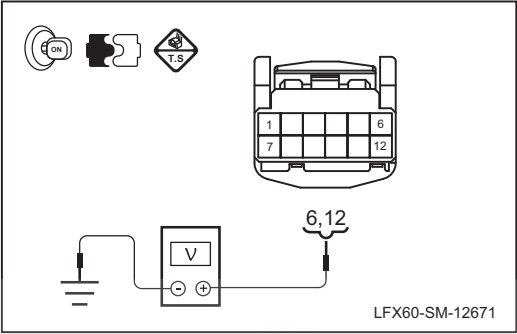
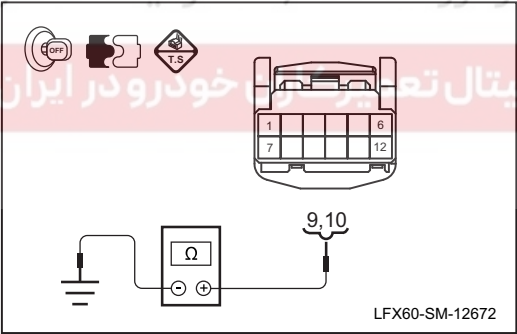
**Diagnostic process**

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? → <b>Yes</b> To step 2. → <b>No</b> 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? → <b>Yes</b> To step 3. → <b>No</b> 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 TPMS to clear DTC. B. Start the engine and check whether the DTC occurs again. Does DTC occur? → <b>Yes</b> To step 4. → <b>No</b> System normal.



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Test condition	Details/results/measures
4. Check whether the vehicle communication system is normal.	
	<p>A. Check whether the vehicle communication system is normal.  <b>Refer to: CAN Network Integrity Inspection</b>            Is it OK after checking?            → <b>Yes</b>            To step 5.            Check the communication system for fault.</p>
5. Check the TPMS power line.	
	<p>A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable.            B. Disconnect the TPMS harness plug S12.            C. Connect the battery negative cable and operate the start switch to turn the power to ON state.            D. Measure the voltage between the TPMS control module harness plug S12 terminal 6, 12 and the fixed ground point.  <b>Standard value: 11 ~ 14 V</b>            Is it OK after checking?            → <b>Yes</b>            To step 6.            → <b>No</b>            Repair the TPMS control module power line open circuit fault and replace the harness if necessary.</p>
6. Check the TPMS control module ground line.	
	<p>A. Operate the start switch to turn the power to OFF state and disconnect the battery negative cable.            B. Disconnect the TPMS control module harness plug S12.            C. Measure the resistance between the TPMS control module harness plug S12 terminal 9, 10 and the fixed ground point.  <b>Standard value: Less than 5Ω</b>            Is it OK after checking?            → <b>Yes</b>            To step 7.            → <b>No</b>            Repair the TPMS control module ground line open circuit fault and replace the harness if necessary.</p>
7. Replace the TPMS control unit.	
	<p>A. Replace the TPMS control unit.  <b>Refer to: Replacement of TPMS control unit</b>            Confirm the system is normal.</p>

TPMS (tire pressure monitoring system)



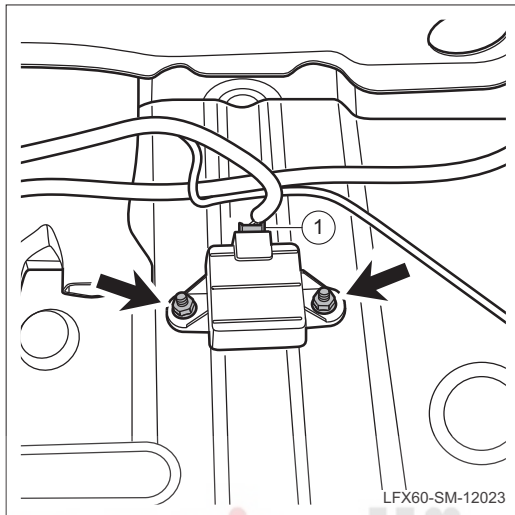
## Removal and installation

### Replacement of TPMS control unit

#### Removal

#### 1. Remove TPMS control unit.

- (a). Disconnect the battery negative connector.
- (b). Remove the passenger seat; **refer to: Replacement of Front Seats.**



- (c). Partially open the floor carpet.
- (d). Disconnect TPMS control unit wiring harness connector 1.
- (e). Remove TPMS control unit fixing nut 2.
- (f). Remove TPMS control unit.

#### Installation

#### 1. Install TPMS control unit.

- (a). The installation sequence is the reverse of the disassembly order.
- (a). Connect the battery negative terminal.

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TPMS (tire pressure monitoring system)

## Replacement of TPMS

### Removal

#### 1. Remove TPMS.

- Disconnect the battery negative connector.
- Remove the wheel. Refer to the replacement of tire.
- Remove TPMS.

### Installation

#### 1. Install TPMS.

- The installation sequence is the reverse of the disassembly order.
- Connect the battery negative terminal.
- Tire pressure monitoring sensor ID learning.

#### **Note:**

To ensure that the sensor seal rubber and rim installation, must ensure the tire seal.

# دیجیتال خودرو

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