AIR CONDITIONING SYSTEM

1480-01/6810-00/6810-01/6810-02/6810-03/6810-05/6810-06/6810-12/
6810-13/6810-15/6810-20/6810-23/6810-24/6810-25/6810-30/6820-00/
6820-01/6830-00/6830-01/8520-14/8520-18/

GENERAL INFORMATION

OVERVIEW AND OPERATING PROCESS

CONFIGURATION AND FUNCTIONS

REMOVAL AND INSTALLATION

AIR CONDITIONER SYSTEM

6810-00

GENERAL INFORMATION

1. SPECIFICATIONS

Item	Category		Specification
Heater	Core size (mm²)		178 x 166 x 29
	Capacity (kcal/h)		8,168 (9,500W)
Evaporator	Core size (mm²)		216 x 199 x 48
	Capacity (kcal/h)		4,815 (5,500W)
Blower motor	Supply power (W)		240 + 10% Max (at 12 V)
	Fan speed (rpm)		3,500+200/-100 (Rec. Mode: 450㎥/h)
Condenser	Core size (mm²)		500 x 425 x 12
	Capacity (kcal/h)		12,500
	Capacity of receiver drier		250 cc
Compressor	Capacity		130 cc/rev
	Diameter of pulley		Ø110
	Max. continuous speed		8,000 rpm
	Voltage		DC 12V
	Current consumption		3.4A
Heater & A/C control assembly	Rated voltage		DC 13.5V
	Operating voltage		DC 9 V ~ 16 V
	Operating temperature		-30 to 80°C
	Max. current consumption		2.5A
	Dark current		1.1mA
	Button switch	Type	Push type (self-return)
		Operating force	2.54±0.5 N
	Fan speed switch	Type	Dial type
		Rotation angle	DATC : 360° / MTC : 140°

Modification basis	
Application basis	
Affected VIN	

Item	Category		Specification
PTC (D16DTF)	Supply power		1 kW
Refrigerant	EU	Specification	R-1234yf
		Capacity	500 ± 30g
	GEN	Specification	R-134a
		Capacity	500 ± 30g

NOTE

Check the coolant specification before adding or replacing the coolant.

LABEL-A/CON (EU)	LABEL-A/CON (General)
	

WARNING

- If you sleep while the air conditioner or heater is on, with all windows closed, you may suffocate to death.
- Continued operation in the recirculation mode may cause the interior to become stuffy and windows to fog. Use the recirculation mode for a short period of time.
- If exhaust gas comes in, there is danger of carbon monoxide poisoning. Use the recirculation mode for a short period of time when driving through an area of smoke or fumes. Be sure to switch back to fresh air mode after passing through an area of smoke or fumes.
- If you sleep while operating the air conditioner or heater with all the windows closed, you may suffocate to death due to lack of ventilation. When you operate the air conditioner or heater, ventilate frequently.
- Never leave a child or a handicapped person alone in the vehicle with the air conditioner or heater on in hot or cold weather. The child or handicapped person can be in serious danger by the heat and lack of oxygen.
- The coolant is flammable which can cause the fire by the gas leakage or static, so be very careful when handling the coolant (R-1234yf).

Modification basis	
Application basis	
Affected VIN	

OVERVIEW AND OPERATING PROCESS

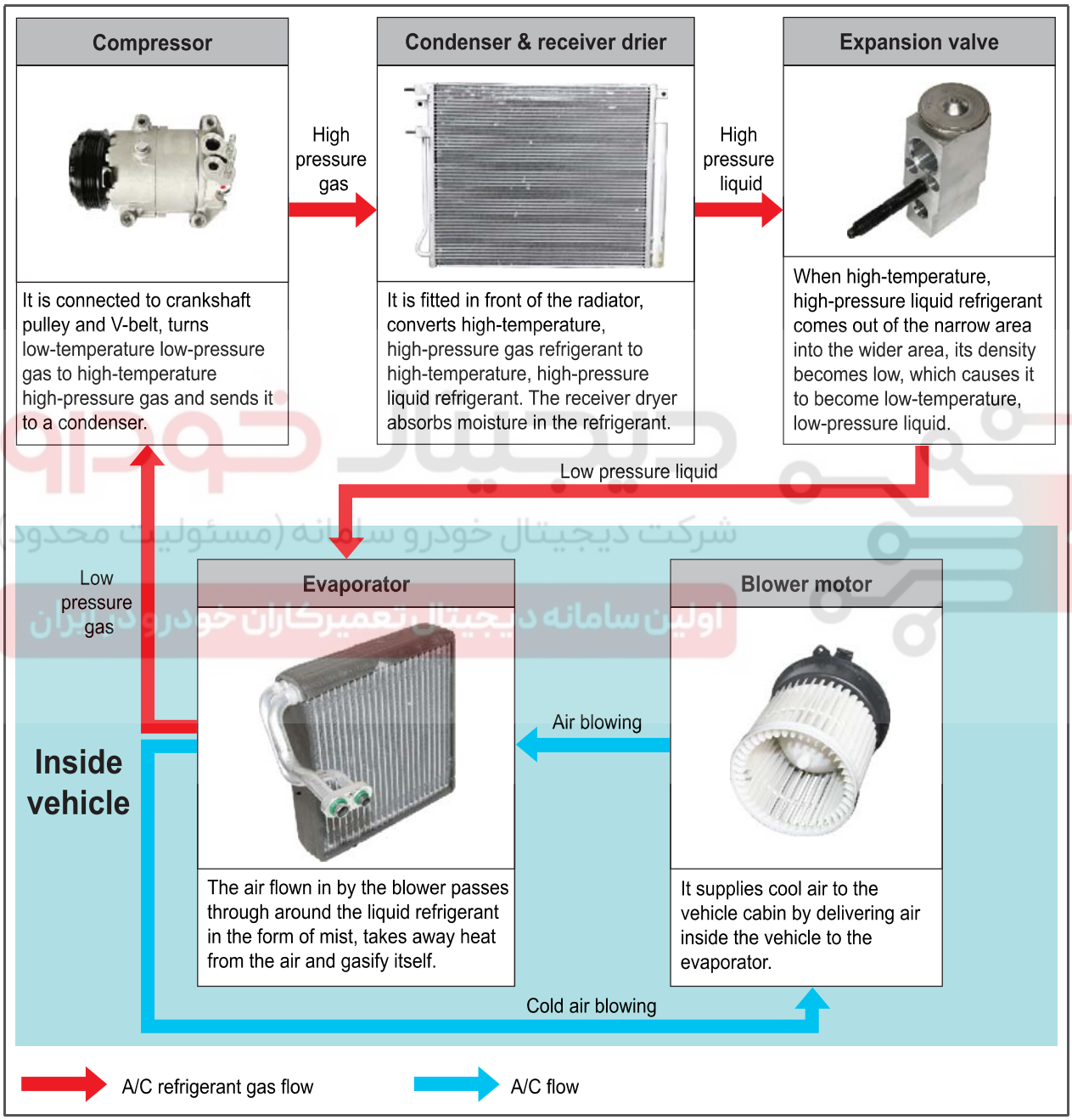
1. OVERVIEW

The climate system in the vehicle is an air regulating system which keeps the indoor air pleasant through the heating, ventilation and air conditioning systems. The air conditioning systems fall in to two categories; DATC (Dual Automatic Temperature Control), which is a temperature control device which receives signals from various sensors (ambient temperature sensor, water temperature sensor, sun-load sensor, AMP sensor) and control switches to control the blower motor and all kinds of actuator (mode door actuator, mix door actuator, air source door actuator) through MICOM in the DATC, therefore, the interior temperature of the vehicle is kept to the temperature which is set by a driver and MTC (Manual Temperature Control), which controls all the actuator and blower motor by the driver.

Modification basis	
Application basis	
Affected VIN	

1) Overview For A/C System

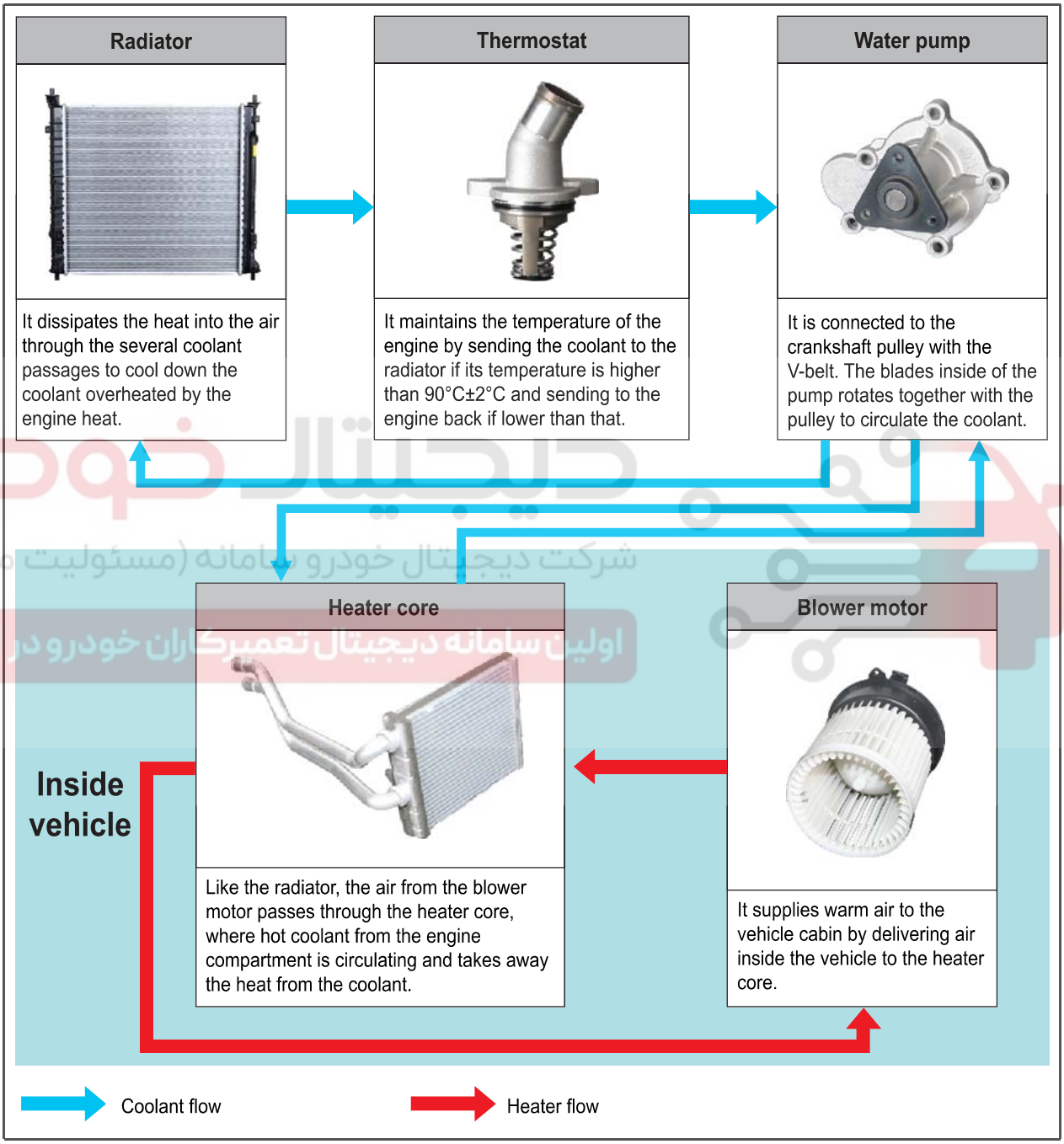
The A/C system circulates a refrigerant by using a compressor (compression), a condenser (condensation), an expansion valve (expansion), and an evaporator (evaporation), and cools air in the interior of the vehicle by using an evaporative latent heat of the refrigerant. The HVAC (Heating, Ventilation and Air Conditioning) unit delivers heating, ventilation and air conditioning (temperature/humidity control) functions to maintain the indoor air comfort.



Modification basis	
Application basis	
Affected VIN	

2) Overview For Heater System

The air passing through the heater core absorbs heat from the engine coolant heated by combustion heat of the engine, thereby the heater delivers warm air into the cabin. The HVAC (Heating, Ventilation and Air Conditioning) unit delivers heating, ventilation and air conditioning (temperature/humidity control) functions to maintain the indoor air comfort.



Modification basis	
Application basis	
Affected VIN	

2. LAYOUT

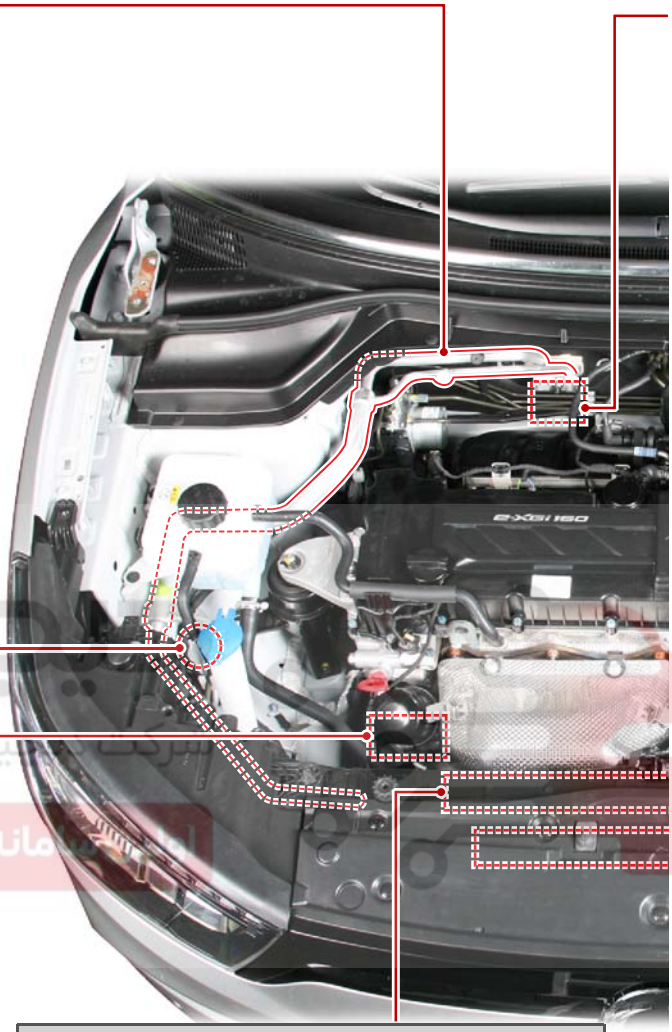
1) Exterior Layout

Liquid and suction pipe

The high/low-pressure A/C refrigerant flows through this pipe. It is fitted with the pressure sensor.

Refrigerant pressure sensor

It is mounted to the latter part of the right headlamp. It converts the A/C refrigerant pressure to voltage value and sends it to the engine ECU.



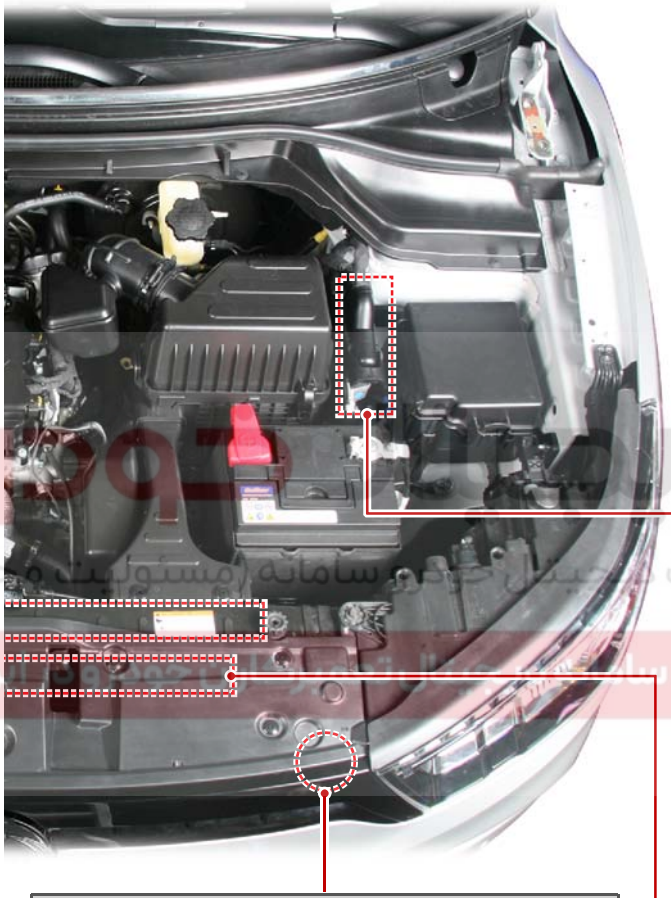
A/C Compressor

It is installed to the left side of the engine assembly, compresses the low-temperature and low-pressure coolant and converts it to the high-temperature and high-pressure coolant. Then, it sends the coolant to the A/C condenser.

Electric fan

It cools down the A/C condenser to speed up the compression for the refrigerant in the condenser.

Modification basis	
Application basis	
Affected VIN	



Expansion valve

It is mounted to the inlet of the evaporator core and supplies the appropriate quantity of refrigerant to the evaporator.

Engine ECU

It controls the A/C compressor and electric fan according to the signal from the A/C control panel.

Ambient temperature sensor

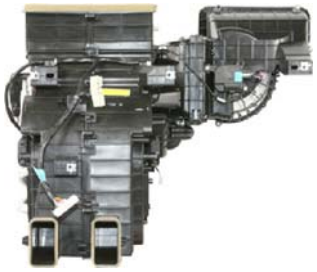
It is mounted to the front section of the vehicle and detects the ambient temperature to send the voltage value according to the resistance change to the heater and A/C control assembly.

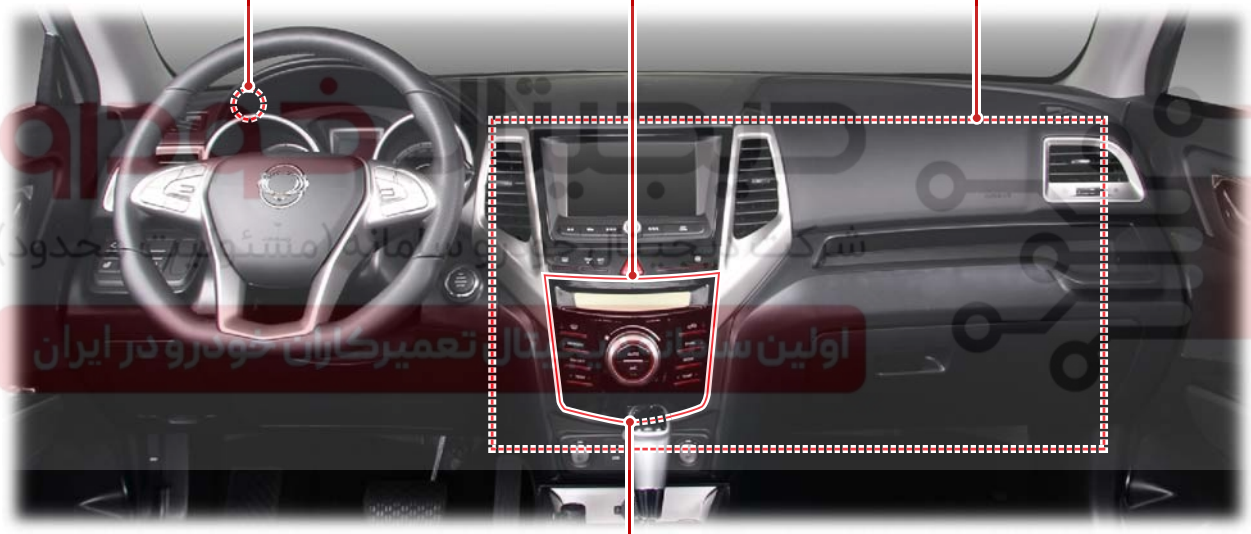
A/C condenser & receiver drier

It is installed in front of vehicle and condenses vapor refrigerant into low temperature and high pressure liquid refrigerant. The receiver drier is built in it.

Modification basis	
Application basis	
Affected VIN	

2) Interior Layout

Sun load sensor	In-car sensor	Air conditioner module
		
It is mounted to the upper left-hand of the instrument panel and detects the sun-load enters to the interior through the windshield glass with a photo diode.	It is mounted to the rear of the heater and A/C control panel (with DATC) and detects the interior air temperature drawn through the senor inlet.	It is mounted to inside of the instrument panel and has the evaporator core, heater core and corresponding actuator and different sensors.

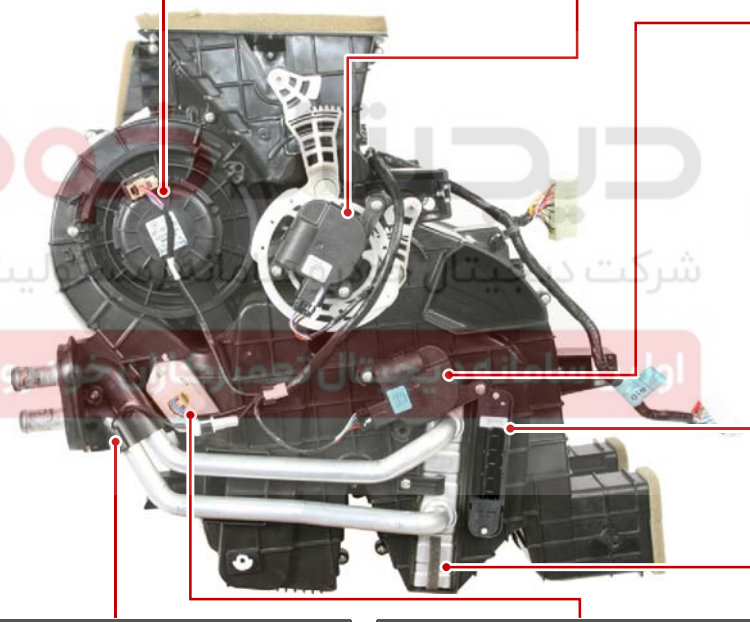


Heater & A/C control assy	
With DATC	With MTC
	
It falls in to two categories; DATC (Dual Automatic Temperature Control) and MTC (Manual Temperature Control), which controls the air conditioning system's operation.	

Modification basis	
Application basis	
Affected VIN	

3) Air Conditioner Module Layout

Blower motor	Mode actuator	Driver's temp actuator
		
It is mounted to the rear top of the air conditioner module and sends the air inside of the vehicle.	It controls the air outlet damper to the five directions according to the control command from the heater and A/C control assembly.	It changes the air mix door opening according to the control command from the heater and A/C control assembly to adjust the driver side discharge air temperature.



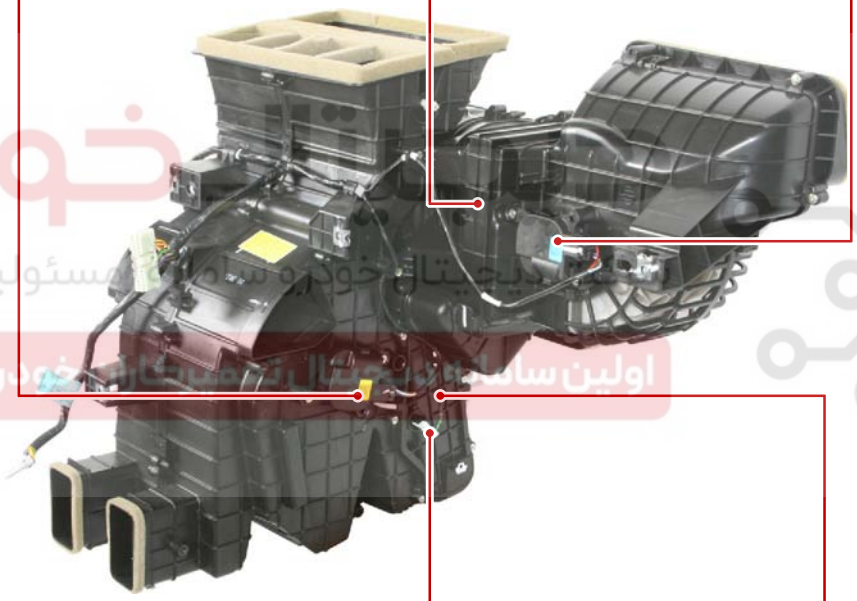
PTC heater (D16DTF)

It is mounted to the heater air outlet in the heater module and warms the air from the heater to the air vent.

Water temperature sensor	MOS module	Heater core
		
It is mounted to the heater pipe part and detects the coolant temperature.	It controls the rotation speed of the blower motor by receiving the fan speed control signal from the heater and A/C control assembly.	It is mounted to the left-hand of the air conditioner module and heats the indoor using the heat of the engine coolant.

Modification basis	
Application basis	
Affected VIN	

Passenger's temp actuator	A/C filter	Intake actuator
		
It changes the air mix door opening according to the control command from the heater and A/C control assembly to adjust the front passenger side discharge air temperature.	It is fitted on the right-hand side of the blower motor and filters the air entering the blower motor.	It changes the air source selection mode according to the control command from the heater and A/C control assembly.



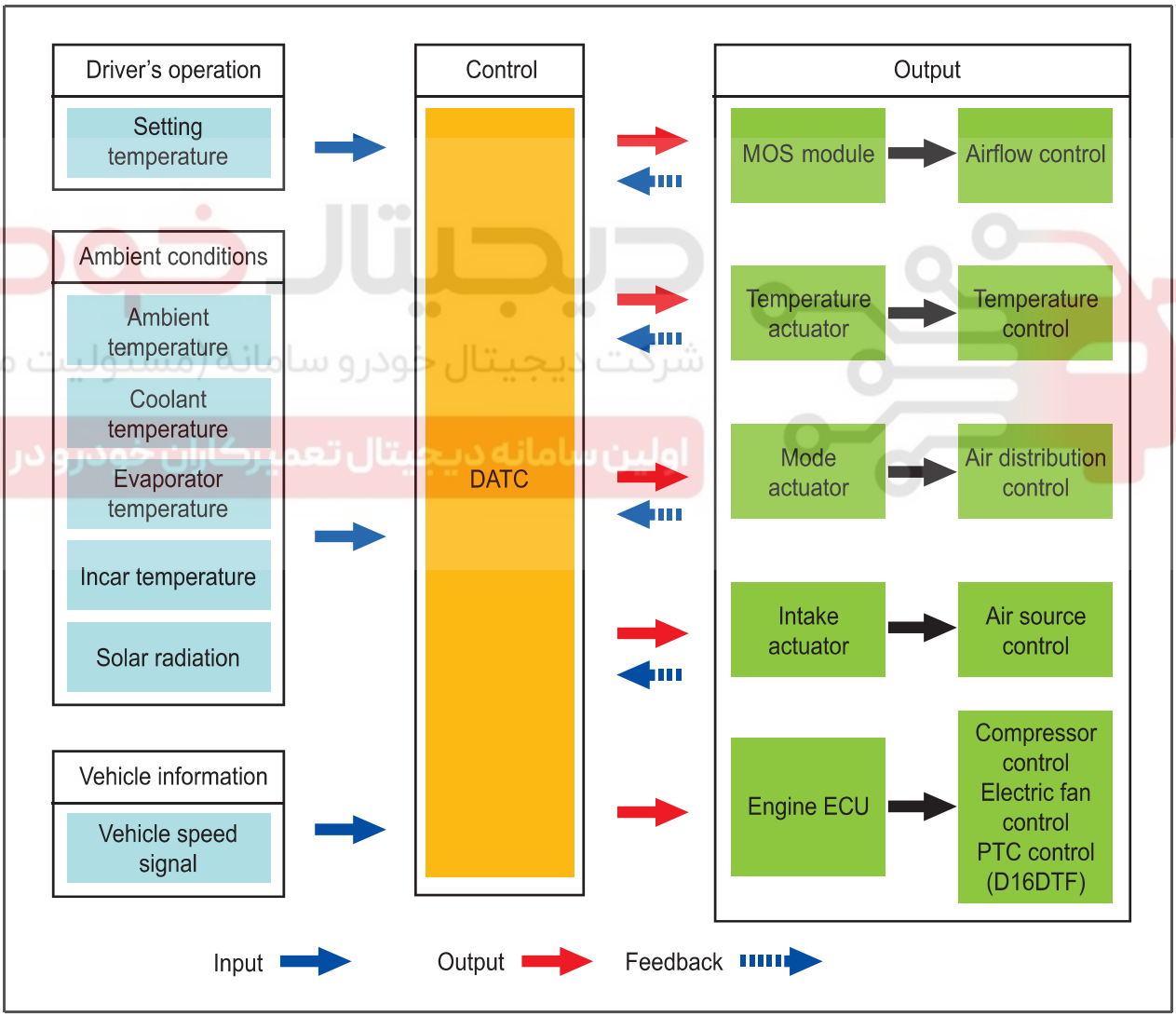
Intake sensor	Evaporator core
	
It is mounted to the side of evaporator core and detects the temperature of the evaporator core.	It cools the surrounding air by passing through the low-temperature and low-pressure refrigerant sprayed from the expansion valve.

Modification basis	
Application basis	
Affected VIN	

3. DATC SYSTEM OPERATION PROCESS

1) Input/Output Elements

DATC (Dual Automatic Temperature Control) is a temperature control device which receives signals from various sensors (interior temperature sensor, ambient temperature sensor, water temperature sensor, sun-load sensor) and control switches to control the blower motor and all kinds of actuator (mode door actuator, mix door actuator, air source door actuator) through MICOM in the DATC, therefore, the interior temperature of the vehicle is kept to the temperature which is set by a driver. The driver can check the status of A/C through the LCD display of the A/C control assembly. The fan speed and the temperature are adjusted automatically by the input values from different sensors to keep indoor air fresh. If the DATC system has any defect, the self-diagnosis is used for the system to make it easier to detect the fault.

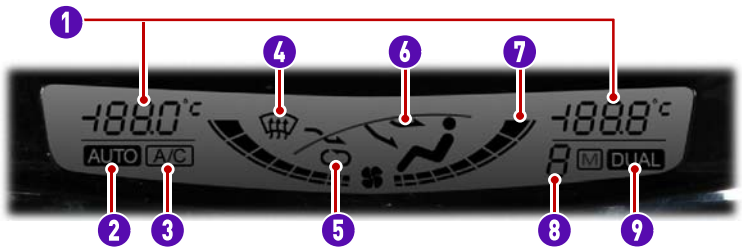


Modification basis	
Application basis	
Affected VIN	

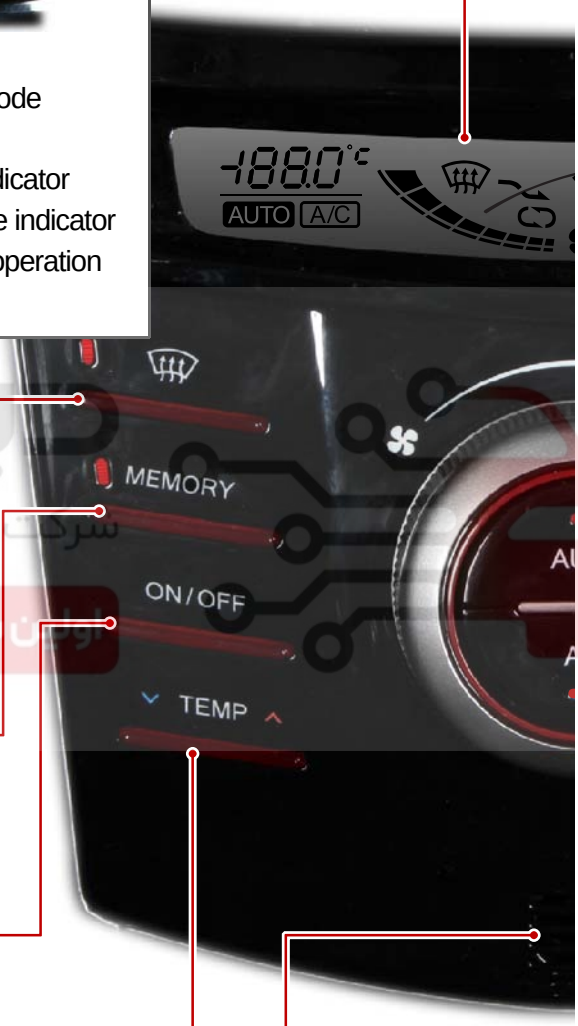
2) Function

(1) Function of heater and A/C control assembly with DATC

LCD display



1. Indoor set temperature indicator (Driver side, passenger side)
2. AUTO mode operation indicator
3. A/C operation indicator
4. Defroster mode indicator
5. Fresh air/recirculation mode indicator
6. Vent & foot mode indicator
7. Fan speed indicator
8. Memory mode indicator
9. DUAL mode operation indicator



Defroster switch

This is used to remove the condensation from the windshield. When you press the switch, the indicator comes on and the air distribution is changed towards the windshield at the same time, then the air conditioner starts to operate. When you press the switch again, the indicator goes off and the air distribution returns to the previous status.

Memory selector switch

If you press this switch, the indicator comes on and the LCD display shows current memory. There are 3 patterns in total.

ON/OFF switch

You can press this switch to turn on/off the DATC. The DATC starts at the status it was at before the power was switched off.

Driver side temperature control switch

With dual mode on, the driver can press this switch to the left or right to lower or raise the heater and A/C temperature for driver side. With dual mode off, the driver can use the driver side temperature control switch to adjust the temperature of both driver and front passenger sides.

Indoor temperature sensing part

The in-car sensor is mounted to the rear of the DATC and detects the interior air temperature drawn through the air inlet.

Modification basis	
Application basis	
Affected VIN	

AUTO mode switch

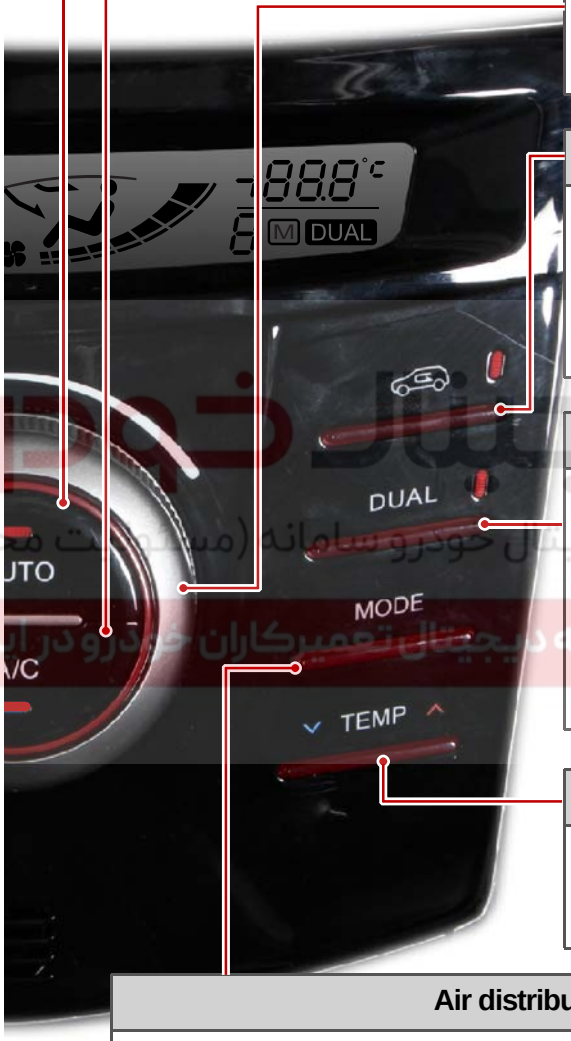
When pressing this switch, "AUTO" is shown on the LCD display and the fan speed and air distribution mode are adjusted automatically to keep interior temperature to the set temperature.

A/C switch

When the switch is pressed, the indicator comes on and the air conditioner starts at the same time. Pressing the switch again gets the indicator lamp go off and the air conditioner stop at the same time.

Fan speed dial

Turn the dial to the left or right to adjust the fan speed in 8 steps and the fan speed can be checked through the LCD display. Turning the dial to the left or right at AUTO mode deactivates the AUTO mode.



Air source selection switch

When the switch is pressed, the indicator comes on and the mode is switched to the recirculation mode at the same time. When pressed again, the indicator goes out and switched to the fresh air mode at the same time. Each mode is shown on the LCD display.

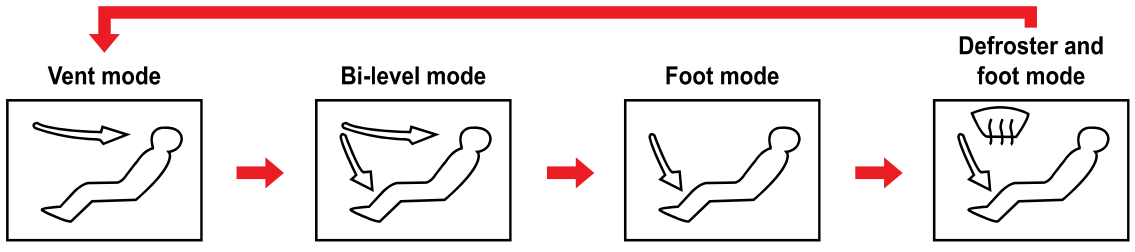
Dual mode switch

When this switch is pressed, the indicator comes on and at the same time the driver can control the heater or A/C temperature for driver and passenger sides independently. When this switch is pressed again, the indicator goes off and at the same time the driver can control the heater or A/C temperature for the both driver and passenger sides.

Passenger side temperature control switch

With dual mode on, the driver can press this switch to the left or right to lower or raise the heater and A/C temperature for passenger side.

Air distribution switch (switches in order)



The air flows towards the face

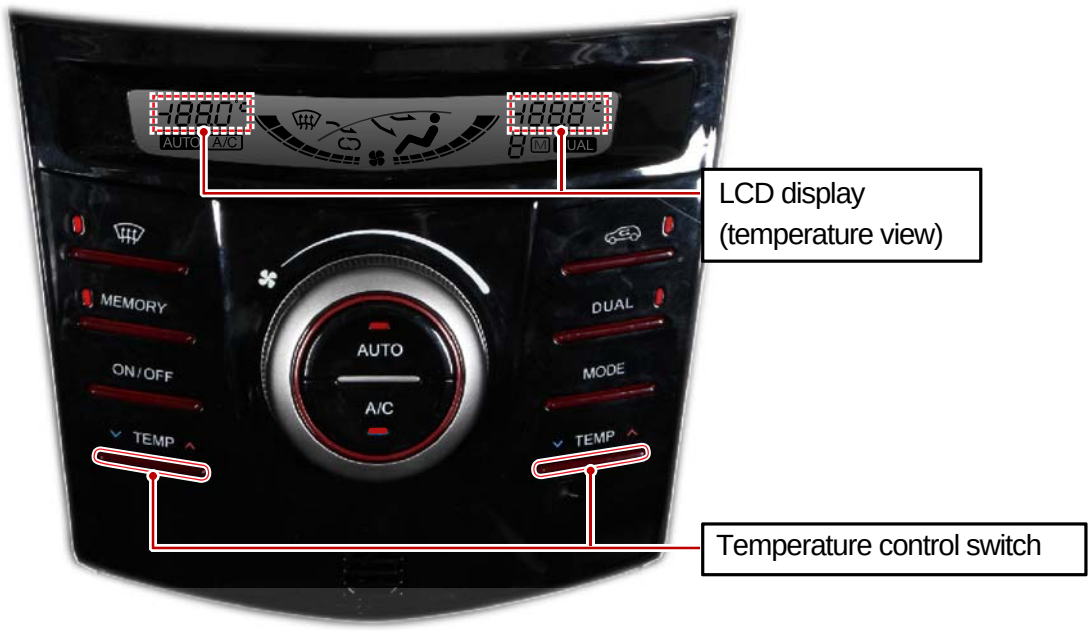
The air flows towards the face and floor

The air flows towards the floor

The air flows towards the windshield and floor

Modification basis	
Application basis	
Affected VIN	

(2) Temperature control



The blowing air temperature is controlled by the temp actuator and the set temperature can be checked via the LCD display.

▶ Manual control

The discharge air temperature is controlled by the temperature control switch. The driver can select one of the 31 levels.

▶ Auto control

When pressing the AUTO switch, "AUTO" is shown on the display and the fan speed and air distribution mode are adjusted automatically to keep interior temperature to the set temperature. In full AUTO mode, the FATC receives various signals such as the indoor temperature, ambient temperature, engine coolant temperature, sunlight, from different sensors to control the A/C compressor, mode actuator, intake actuator, temp actuator, blower motors, etc. to keep indoor environments fresh.

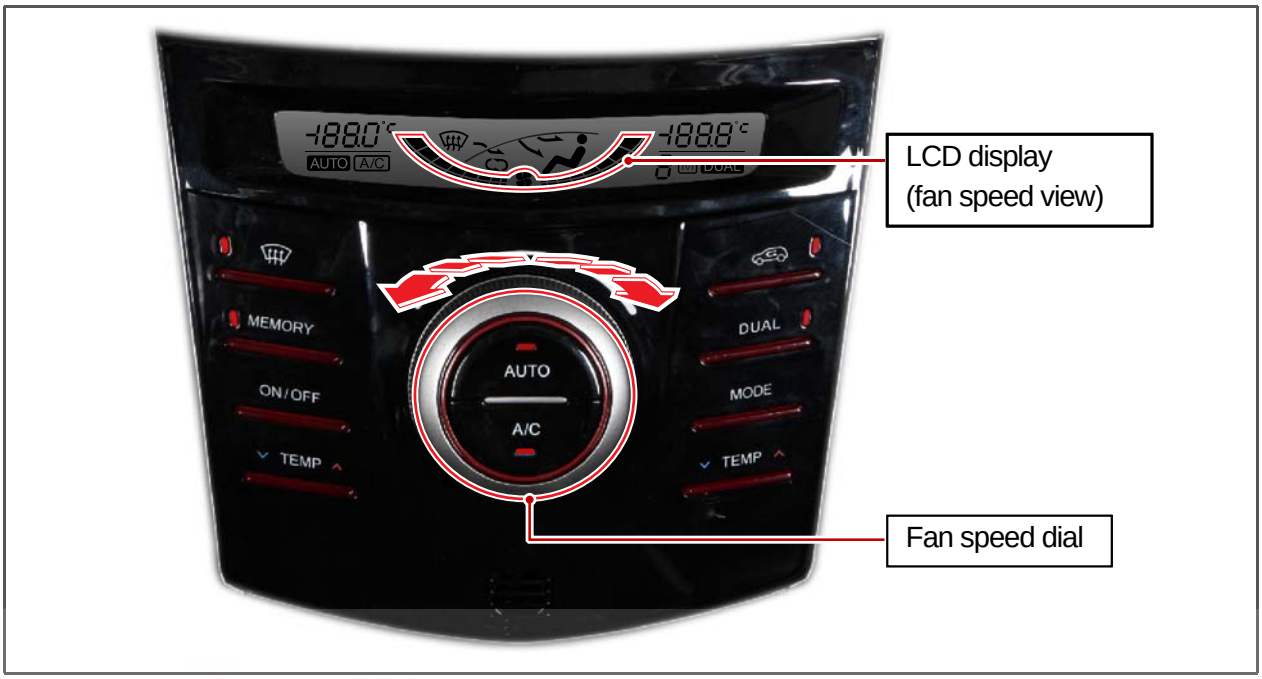
▶ Max. cooling/heating control (AUTO mode)

If the temperature is set to the lowest level (Lo) or highest level (Hi), the system will go into the maximum cooling or maximum heating mode regardless of the sensor signals.

Set Temperature	A/C Compressor	Air outlet (mode)	Air inlet	Blower Voltage	Temp actuator
LO	ON	Vent	Recirculation	10.5 V	Max. cooling position
When the lever is in HI position,	OFF	Footwell	Fresh air	10.5 V	Max. heating position

Modification basis	
Application basis	
Affected VIN	

(3) Blower control



In AUTO mode, the blower motor is controlled automatically according to the set temperature and the blower motor speed can also be controlled manually. The fan speed can be checked via the LCD display.

▶ Manual control

Blower step	Blower motor voltage (V)
1	3.6
2	5.0
3	6.0
4	7.0
5	8.0
6	9.0
7	10.5
8	VIGN

Turn the fan speed dial to control the blower motor manually. The fan speed increments by 1 level per revolution of the dial. (allowance: ±0.5 V)

▶ Auto control

In AUTO mode, the fan speed is automatically controlled depending on the set temperature and surrounding environment and the blower motor operates steplessly.

▶ Control for defrosting

When the defrost mode is selected with the blower dial in AUTO position, the blower motor voltage is increased by 1.0V compared to the AUTO control voltage for a certain amount of time.

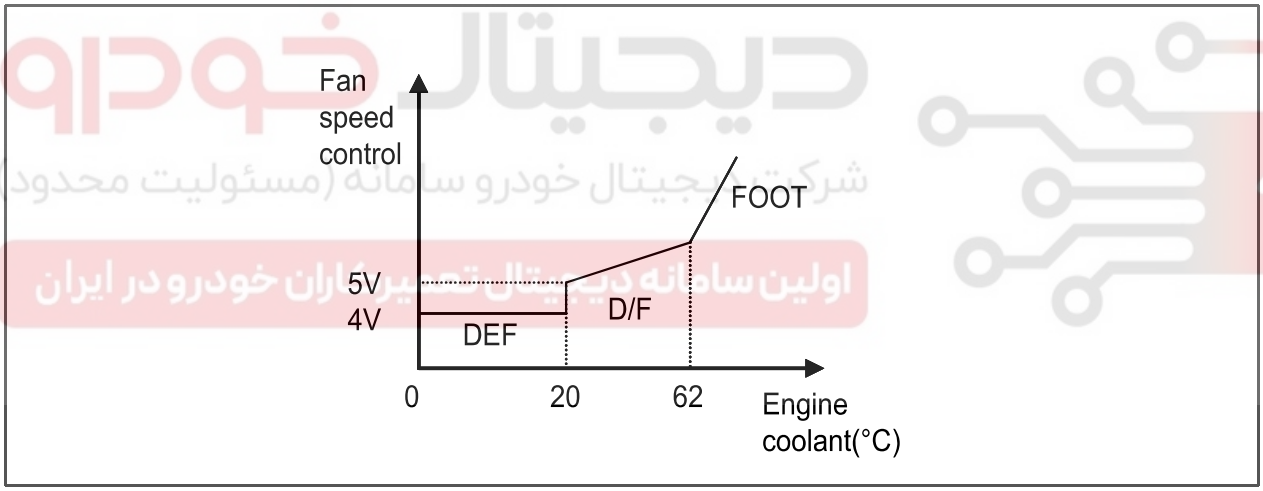
▶ Sun load compensation control

The system increases the fan speed by adding up 3 V of voltage in direct sunlight.

▶ Initial fan speed control for cooling/heating

- Cooling start control
  When the intake temperature sensor indicates over 35°C, the driver might feel uncomfortable by the air flow from the vent. Therefore, at the initial operation stage, the hot air is discharged to the windshield (DEF mode) for about 4 seconds.

- Heating start control
  When the engine coolant temperature is low or the wind temperature is not warmed up sufficiently, the driver might feel uncomfortable by the air flow from the vent. Therefore, the fan speed is set to the 1st stage and the cool air is sent to the windshield until the coolant temperature increases to the proper level (DEF mode). As the engine coolant temperature goes up, the mode is changed to Defrost & Foot mode or AUTO mode to increase the speed of blower motor. This control is cancelled when the output value of the water temperature sensor is approximately 62℃. However, the control time must not exceed 10 minutes.



Modification basis	
Application basis	
Affected VIN	

(4) Air source control

The air source selection is made by the intake actuator. The driver can see the air source mode through the switch's indicator and the LCD display.

▶ Manual control

Press the air source selection switch to control the air source selection door manually. The air source mode is switched between the fresh air and recirculation alternatively each time the switch is pressed.

▶ Auto control

In auto mode, the basic setting for the air source is fresh air. When the ambient temperature is high during cooling, the air source is changed from fresh air to recirculation to lower the temperature.

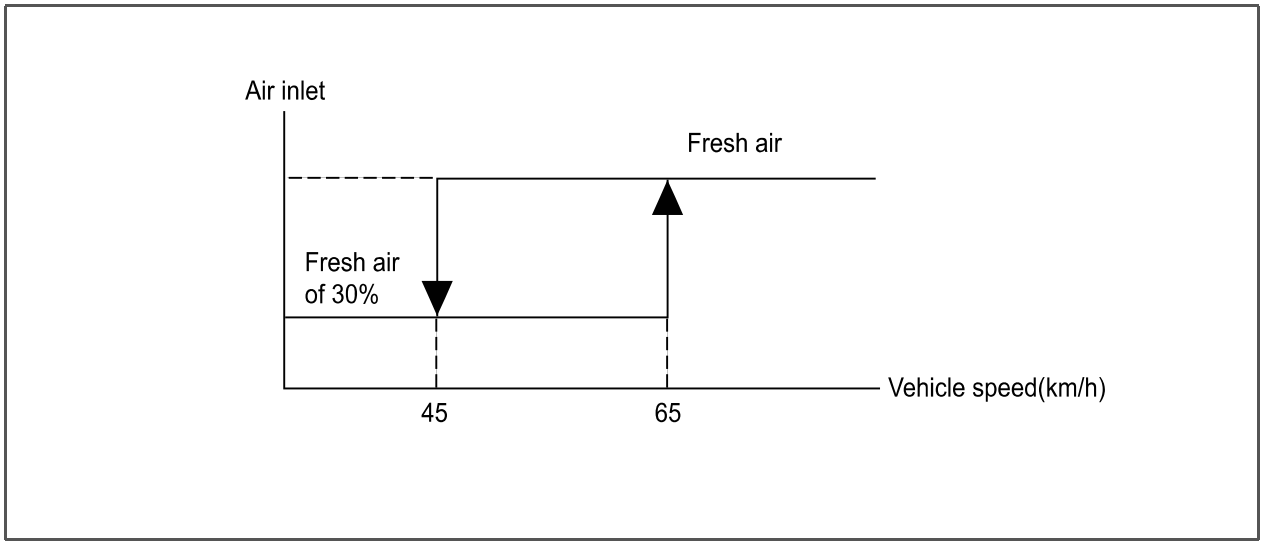
▶ Control by vehicle speed (heating)

The air source selection is controlled in accordance with the vehicle speed while driving. Operating conditions and control process are as follows:

- AUTO mode
- When the vehicle speed is 45 km/h or lower in fresh air mode, the air source door is open 30% of its maximum opening. If the vehicle speed is 65 km/h or more, then the air source door is completely open.

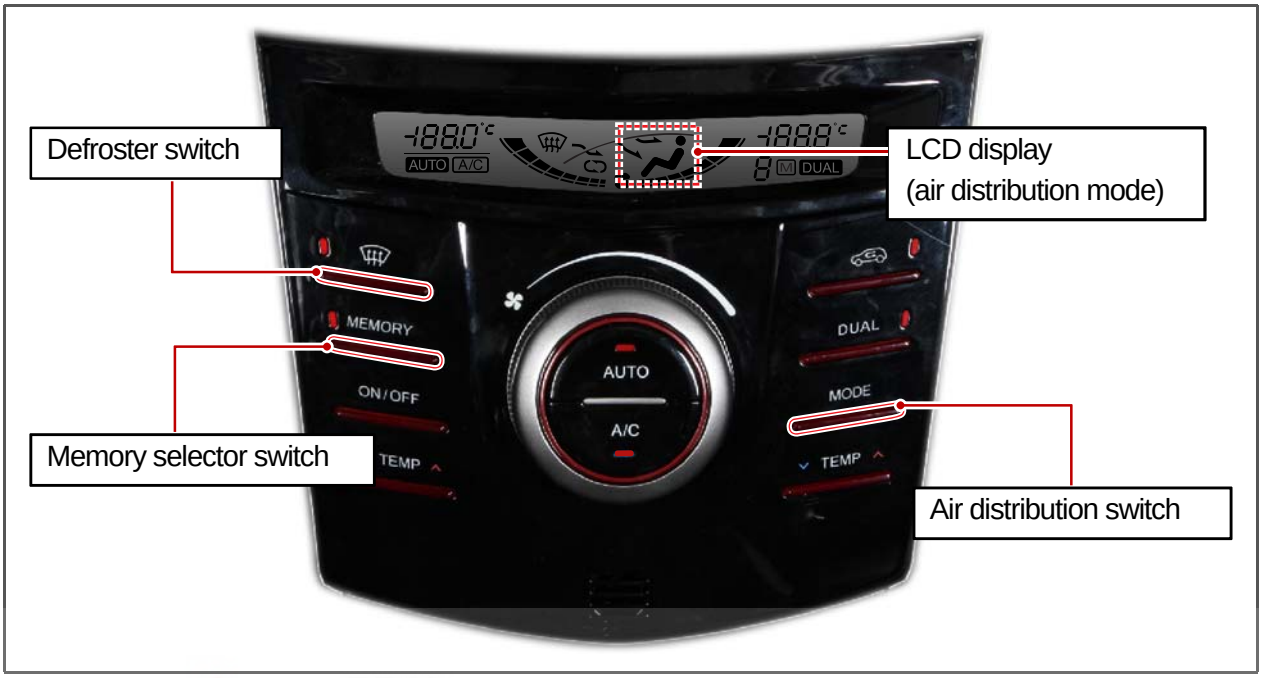
NOTE

However, the ambient temperature should be 0℃ or less, coolant temperature 62℃ or less and the electric fan 5V or higher.



Modification basis	
Application basis	
Affected VIN	

(5) Air distribution control



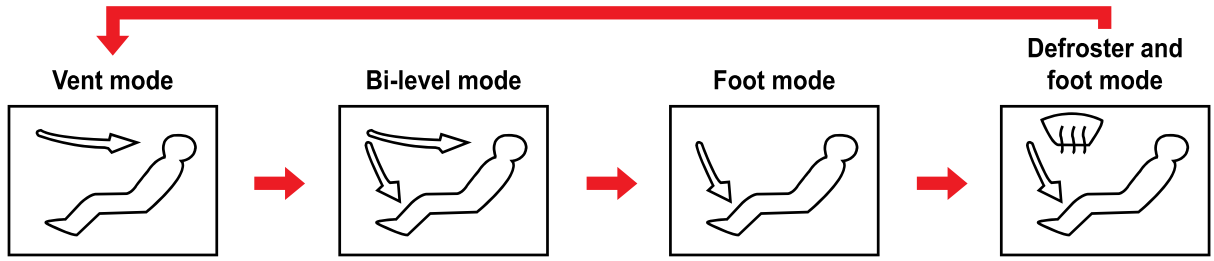
The air distribution is changed by the mode actuator and the LCD display and the indicator of the defroster switch shows which air distribution modes is selected.

▶ Manual control

The driver can select one of 5 air distribution mode using the air distribution switch and defroster switch.

- Defroster switch: When this switch is pressed, the defroster mode (A/C ON, fresh air mode, fan speed of 1 level or above) is activated. Pressing the switch again returns the unit to the previous status.
- Air distribution switch: The mode is switched in the following order each time the switch is pressed: Vent mode→Bi-level mode→Foot mode→Defroster & Foot mode.

Air distribution switch (switches in order)



The air flows towards the face

The air flows towards the face and floor

The air flows towards the floor

The air flows towards the windshield and floor

Modification basis	
Application basis	
Affected VIN	

- Memory selector switch: You can select the memory each time the switch is pressed. Up to 3 memories can be stored in the unit.

Examples of items that can be memorized are:

Memory	Memory item						
	Driver side temp.	Passenger side temp.	A/C	Air distribution	Air source selection	Fan speed	Dual
1	22°C	22°C	OFF	Bi-level	Fresh air	Level 2	OFF
2	25°C	23°C	ON	Front view	Recirculation	Level 4	ON
3	30°C	28°C	OFF	Footwell	Fresh air	Level 8	ON

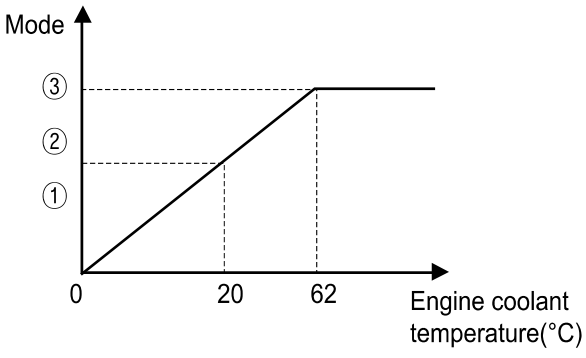
NOTE

How to store memory

- Display the control status to memory and press the memory button for 1.5 seconds to enter the memory mode. (If this happens, memory selector switch indicator and the memory number on the LCD display blink.)
- After entering the memory mode, press the memory selector switch within 1.5 seconds to select the number to memorize. If no operation is made within 1.5 seconds, the selected memory number will be memorized.
(When the memory setting is completed, the memory selector switch indicator and the memory number on the LCD display blink.)

▶ **Auto control**

The air flow mode is controlled automatically in accordance with the vehicle indoor conditions.
But it is controlled as described below during initial driving (after overnight parking) in cold weather:



Modification basis	
Application basis	
Affected VIN	

(6) A/C control

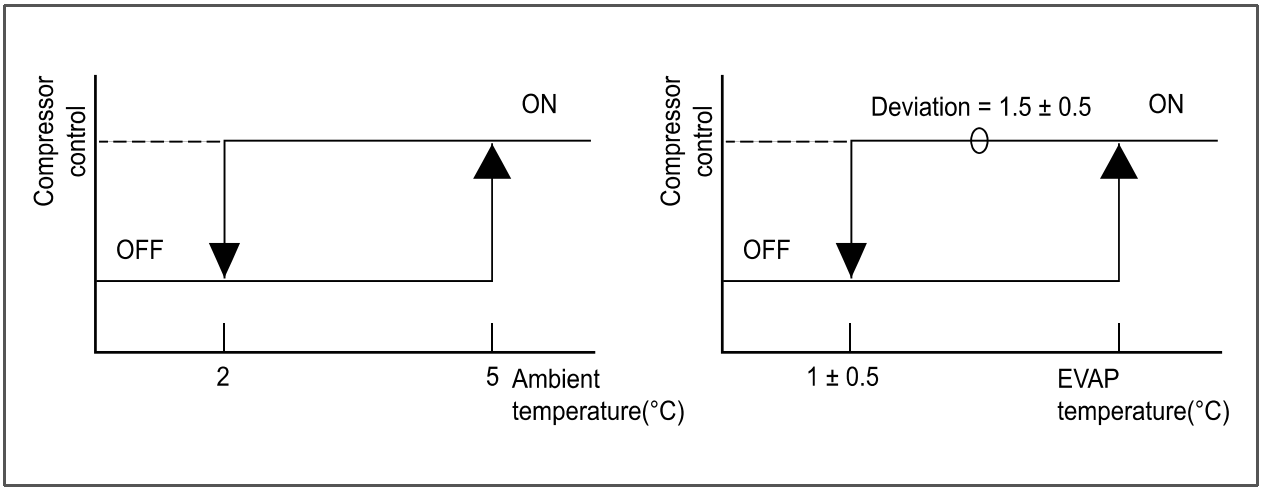
The air conditioner is controlled by the A/C compressor of the engine ECU according to the signal from the heater and A/C control assembly. The driver can see the air conditioner operation through the LCD display and the indicator of the A/C switch.

▶ Manual control

Pressing the A/C switch or selecting defrost mode turns on the A/C.

▶ Auto control

The A/C is controlled in accordance with the indoor temperature and ambient temperature.
If the intake sensor detects the freezing of the evaporator or the ambient temperature is low (2℃ or below) in winter, the compressor is turned off to protect the A/C compressor.



Modification basis	
Application basis	
Affected VIN	

(7) Self-diagnosis

The DATC has a self-diagnosis function that can diagnose the system by itself. If this system is defective, the LCD display shows the diagnostic trouble code (DTC) to inform a driver of defects on the device such as a sensor or actuator. The driver can see the each sensor data on the air conditioning system after entering self-diagnosis mode. Before checking each component, be sure to check the default code by using self diagnosis function.

▶ Diagnostic trouble code

Code	Defective part
00	Normal
21	Ambient temperature sensor
22	In-car sensor
23	Water temperature sensor
24	Intake sensor
26	Driver side temp door (control)
29	Passenger side temp door (control)
31	Mode door (vent)
32	Mode door (bi-level)
34	Mode door (foot)
35	Mode door (defroster & foot)
36	Mode door (defroster)
37	Intake door (fresh air)
38	Intake door (1/3)
39	Intake door (recirculation)

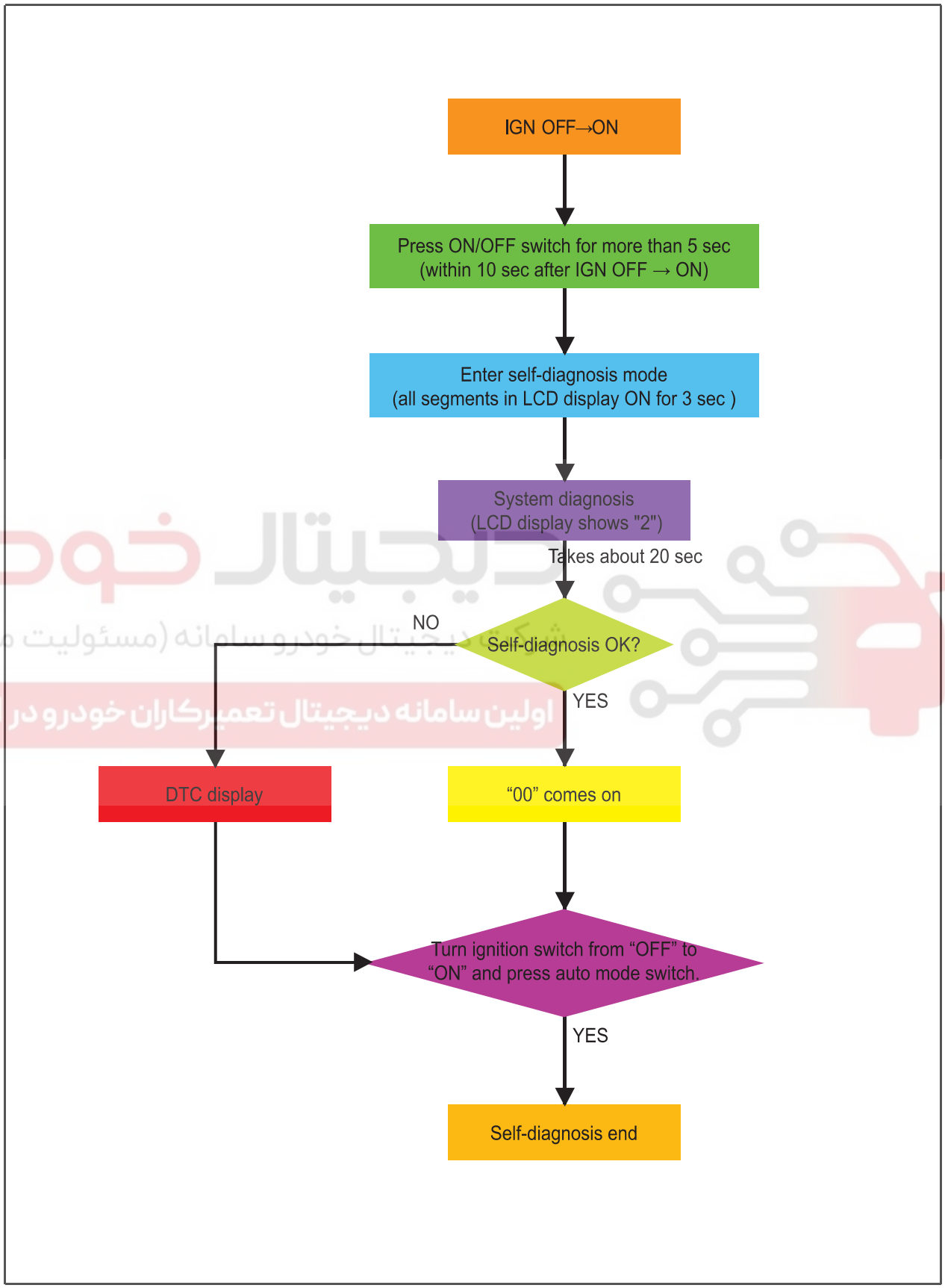
Diagnostic trouble code
Open circuit in sensor  Diagnostic trouble code

NOTE

The diagnostic trouble code (DTC) flashes twice and is displayed repeatedly in order as long as a separate operation is not performed.

Modification basis	
Application basis	
Affected VIN	

▶ **How to enter self-diagnosis (step 1)**



1. If the ON/OFF switch of the FATC is pressed for more than 5 seconds within 10 seconds after turning the ignition key from the "OFF" position to the "ON" position, all the segments in LCD display comes on for 3 seconds.

2. The LCD display shows "2" and starts to check the sensor and actuator in the air conditioning system automatically.

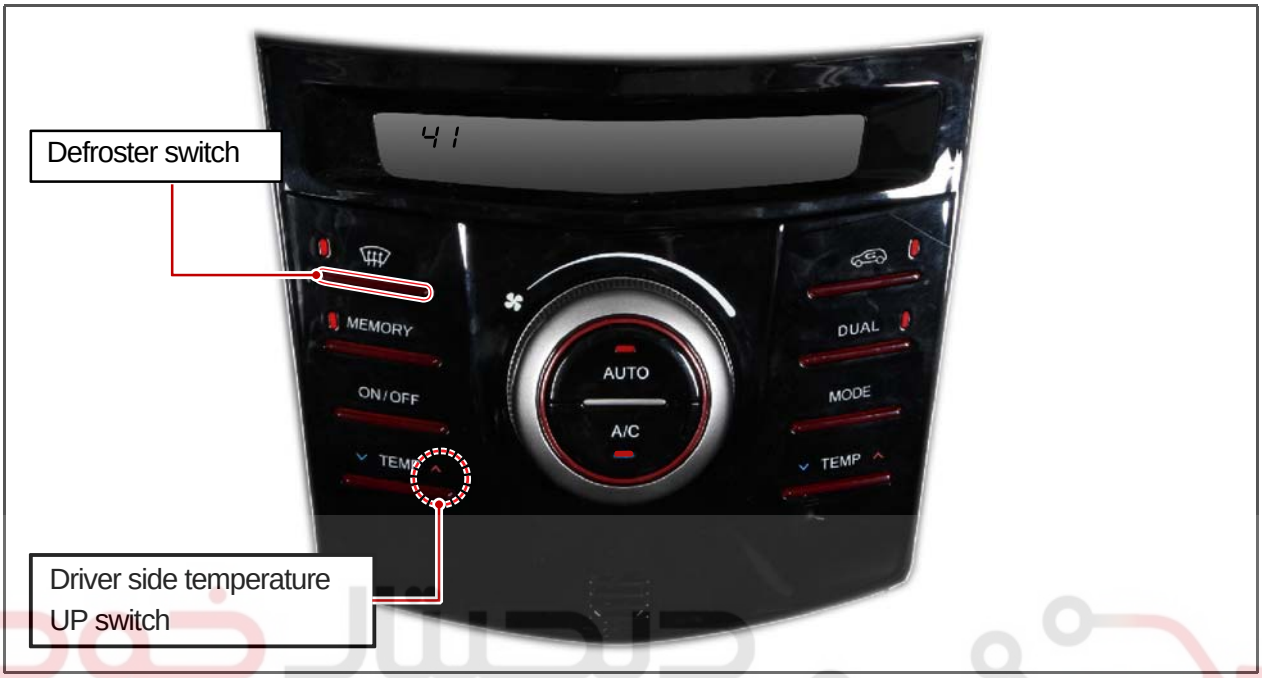
3. After about 20 seconds, the LCD display shows whether there is fault. ("00" for normal)

4. The self diagnosis ends when turning the ignition key from the "OFF" position to the "ON" position or pressing the AUTO mode switch.

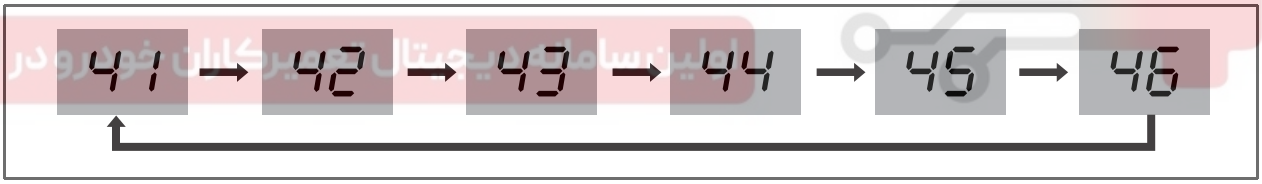
Modification basis	
Application basis	
Affected VIN	

▶ Check each door position, blower speed and compressor condition (step 2)

1. When you press the driver side temperature control UP switch at any time after entering the self-diagnosis mode (step 1), you can enter this mode. The LCD displays "41".



2. Check if the number on the LCD display changes each time you press the defroster switch and following items are changed as follows:



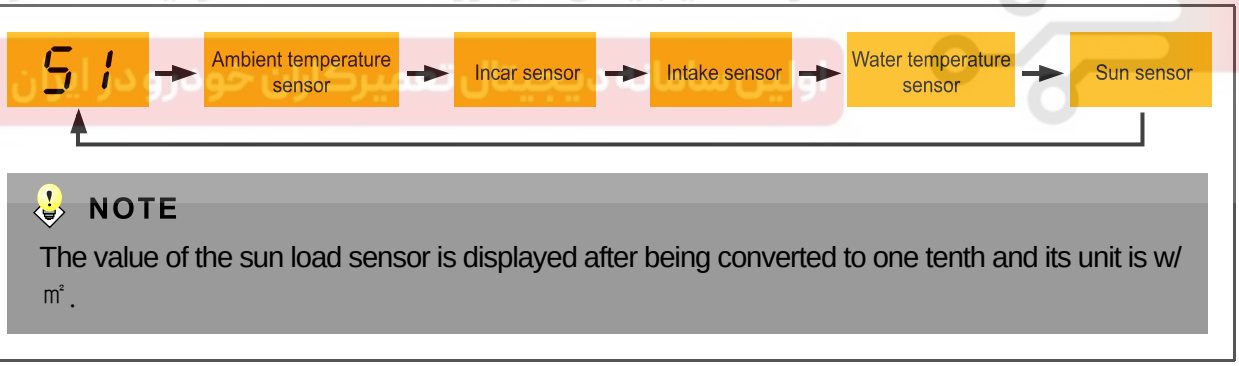
Display number	41	42	43	44	45	46
Air distribution door	Vent mode (Front)	Bi-level	Bi-level	Footwell	Defroster and footwell	Defrost
Air source door	Recirculation	Recirculation	Fresh air of 20%	Fresh air	Fresh air	Fresh air
Temperature control door	Cooling	Cooling	Heater	Heater	Heater	Heater
Blower fan	4.5V	10.5V	8.5V	8.5V	8.5V	MAX
Compressor condition	ON	ON	OFF	OFF	ON	ON

3. When you press the driver side temperature control DOWN switch, the unit returns to the status at which self-diagnosis mode is activated.

▶ **Sensor data check (step 3)**

1. When you press the driver side temperature control UP switch after entering step 2, you can enter this mode. The LCD displays "51".

2. The values for each sensor are shown in sequence each time the defroster switch is pressed.



NOTE

The value of the sun load sensor is displayed after being converted to one tenth and its unit is w/㎡.

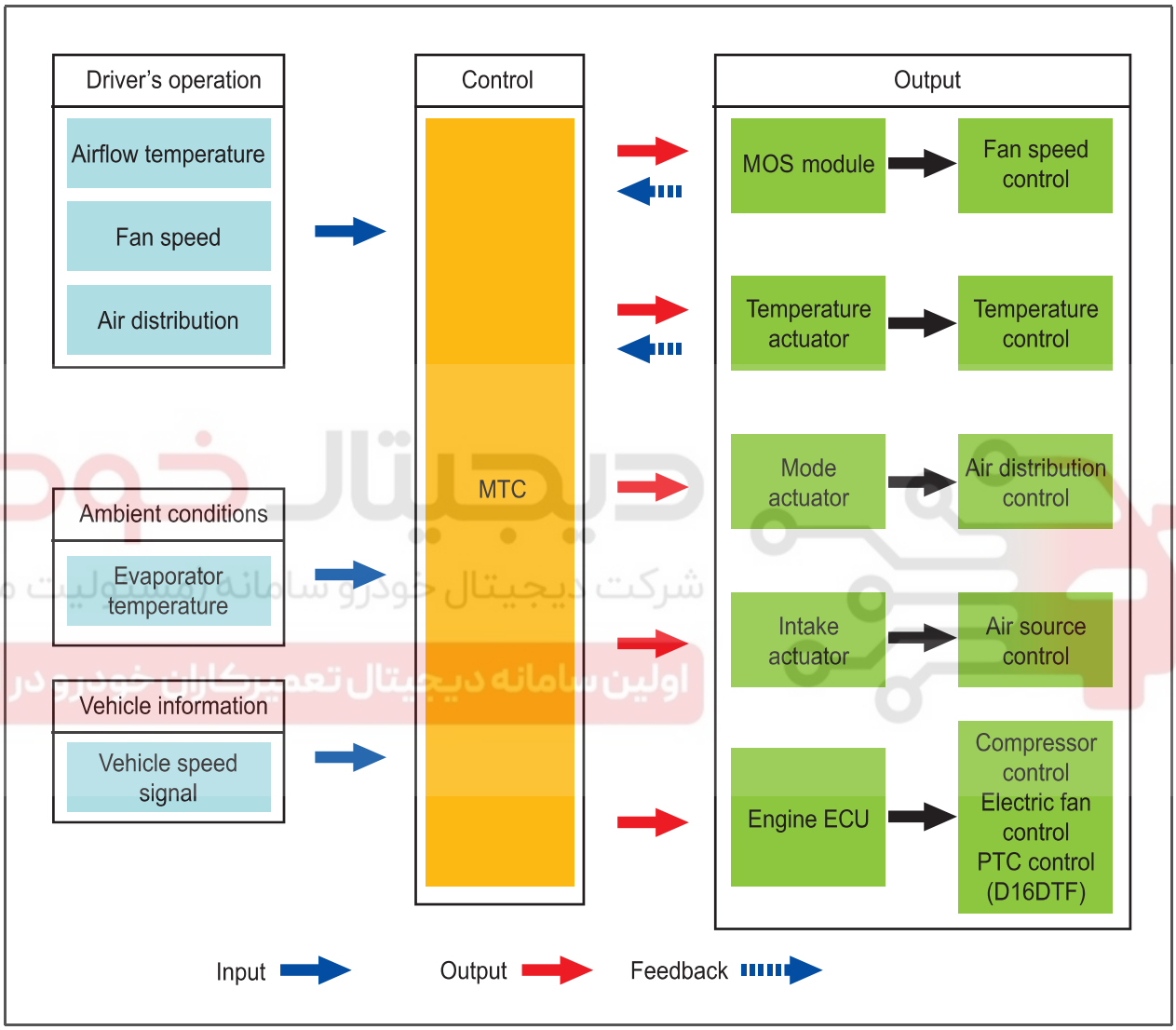
3. When you press the driver side temperature control DOWN switch, the unit returns to the previous step (step 2).
4. Conditions for exiting self-diagnosis
   - Restarting or turning ignition key off to on
   - Pressing AUTO mode switch

Modification basis	
Application basis	
Affected VIN	

4. MTC SYSTEM OPERATION PROCESS

1) Input/Output Factors

The MTC (Manual Temperature Control) system controls all the actuator and blower motor by the driver. The heater and A/C control assembly with MTC has the dials and switches with the indicators so that the driver can know the air conditioning system's operation.



Modification basis	
Application basis	
Affected VIN	

2) Function

(1) Function of heater and A/C control assembly with MTC

Temperature indicator

When you set the temperature using the temperature control button, you can set the approximate temperature while looking at the indicator.

Defroster switch

This is used to remove the condensation from the windshield. When you press the switch, the indicator comes on and the air distribution is changed towards the windshield at the same time, then the air conditioner starts to operate.

Recirculation mode switch

If the switch is pressed, the indicator comes on and at the same time the system switches to recirculation mode. At the same time, the fresh air indicator goes off and fresh air mode is deactivated.

Vent (face) mode switch

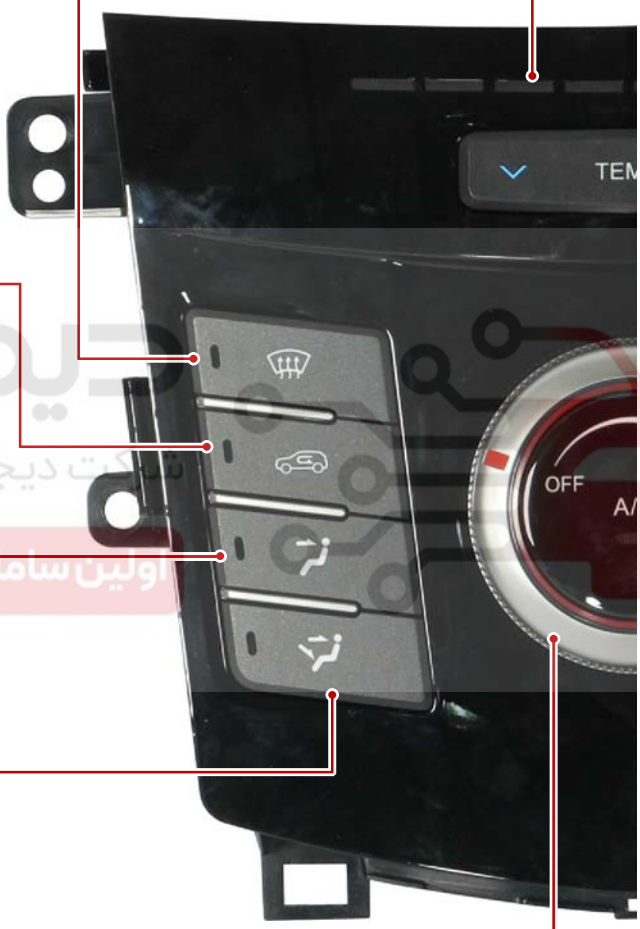
If the switch is pressed, the indicator comes on while the air flows to the upper part of the body.

Bi-level mode switch

If the switch is pressed, the indicator comes on while the air flows to the upper part of the body and footwell.

Fan speed dial

You can control the fan speed in 7 stages (excepting OFF) by turning the dial to the left/right. In OFF mode, the A/C does not work. (not system off, but blower fan OFF)



Modification basis	
Application basis	
Affected VIN	

Temperature control switch

You can turn the dial to the left or right to adjust the set temperature. There are 8 ranges in total.

MAX A/C control switch

This is designed for increasing driver comfort. When the switch is pressed, the indicator comes on and at the same time the air conditioner starts in vent (face) mode for air distribution, maximum cooling for setting temperature and recirculation mode for air source selection.

Fresh air mode switch

If the switch is pressed, the indicator comes on and at the same time the system switches to fresh air mode. At the same time, the recirculation indicator goes off and recirculation mode is deactivated.

Defroster & foot mode switch

When the switch is pressed, the indicator comes on and at the same time the air comes from the windshield and footwell vents and the fresh air mode is activated.

Foot mode switch

If the switch is pressed, the indicator comes on and at the same time the air comes from the footwell vent.

A/C switch

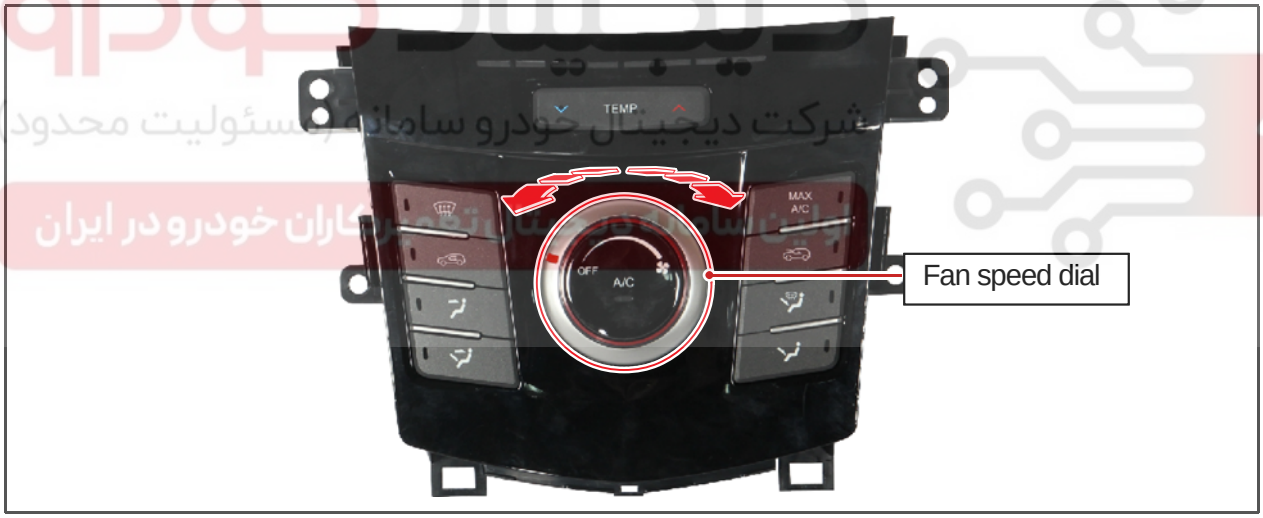
When the switch is pressed, the indicator comes on and the air conditioner starts at the same time. Pressing the switch again gets the indicator lamp go off and the air conditioner stop at the same time.

Modification basis	
Application basis	
Affected VIN	

(2) Temperature control

The temp actuator controls the temperature of air discharged depending on the temperature control dial operation by the driver. The driver can select one of the 8 levels.

(3) Blower control



Blower step	Blower motor voltage (V)
1	3.6
2	5.0
3	6.0
4	7.5
5	9.0
6	10.5
7	VIGN

The fan speed increments or decrements by 1 level per revolution of the fan speed dial clockwise/anti-clockwise. (Unladen: ±0.5 V)

Modification basis	
Application basis	
Affected VIN	

(4) Air source control

When pressing the air source selection switch, the air source mode is changed via the intake actuator's operation. The air source mode is switched between the fresh air and recirculation alternatively each time the switch is pressed.

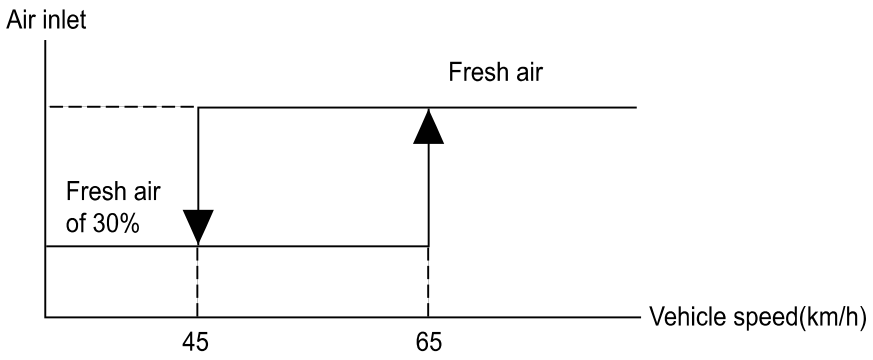
▶ Control by vehicle speed

The air source selection is controlled in accordance with the vehicle speed while driving. Operating conditions and control process are as follows:

- When the PTC heater operates at fresh air mode
- When the vehicle speed is 45 km/h or lower in fresh air mode, the air source door is open 30% of its maximum opening. If the vehicle speed is 65 km/h or more, then the air source door is completely open.

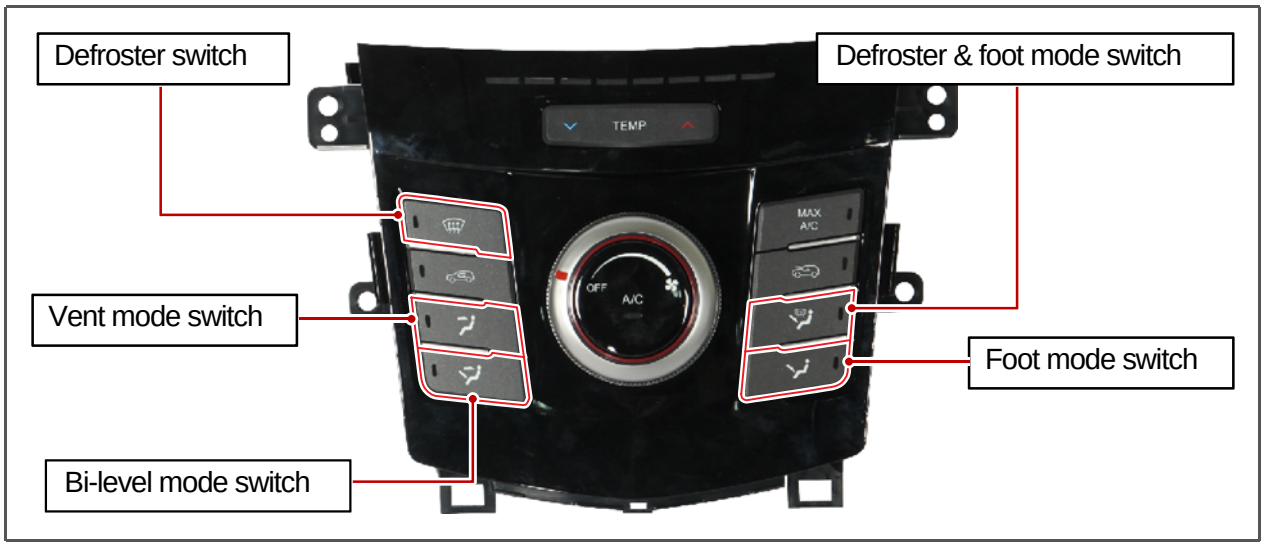
NOTE

However, the electronic fan should be more than 5V.



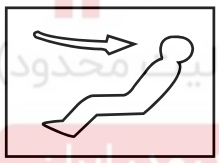
Modification basis	
Application basis	
Affected VIN	

(5) Air distribution control



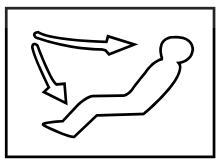
The driver can select one of 5 air distribution modes using the 5 air distribution switches at both sides of the MTC. The selected air distribution mode is changed by the mode actuator and acknowledged by the indicator for each switch coming on

▶ Vent mode



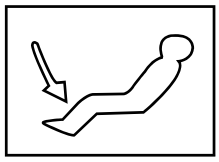
If the vent mode switch is pressed, the indicator comes on while the air flows to the upper part of the body.

▶ Bi-level mode



If the bi-level mode switch is pressed, the indicator comes on while the air flows to the footwell and upper part of the body.

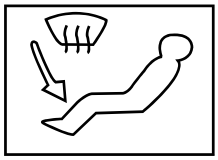
▶ Foot mode



If the foot mode switch is pressed, the indicator comes on while the air flows to the footwell.

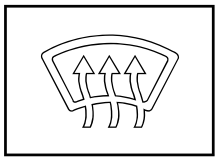
Modification basis	
Application basis	
Affected VIN	

▶ Defroster & foot mode



If the defroster & foot mode switch is pressed, the indicator comes on while the air comes from the footwell and the windshield vents and the fresh air mode is activated.

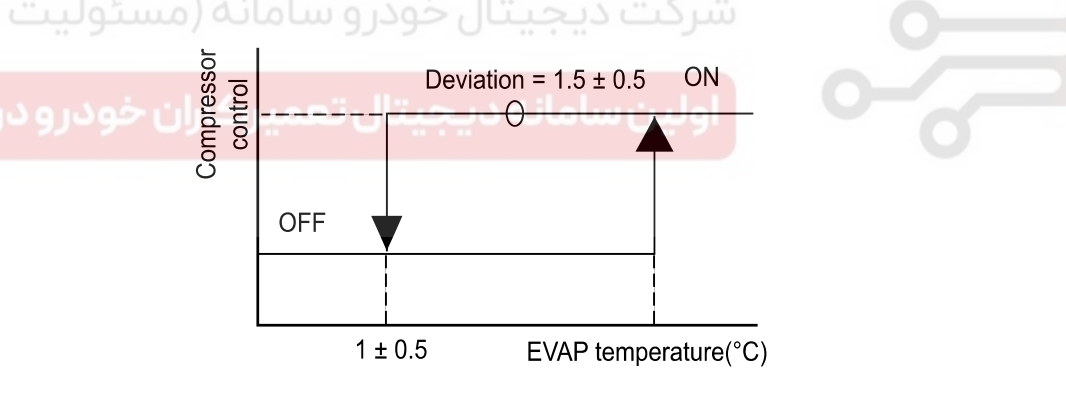
▶ Defroster mode



This is used to remove the condensation from the windshield. When you press the switch, the indicator comes on and the air distribution is changed to the windshield at the same time, then the air conditioner starts to operate.

(6) A/C control

The air conditioner is operated at the defroster mode and MAX air conditioner mode and when the A/C switch is turned to "ON" position. It is controlled by the A/C compressor of the engine ECU according to the signal from the heater and A/C control assembly. The driver can see that the A/C has been activated when an indicator lamps at the A/C switch and MAX A/C switch comes on. If the intake sensor detects the freezing of the evaporator core, it stops the air conditioner by turning off the compressor.



▶ MAX A/C control

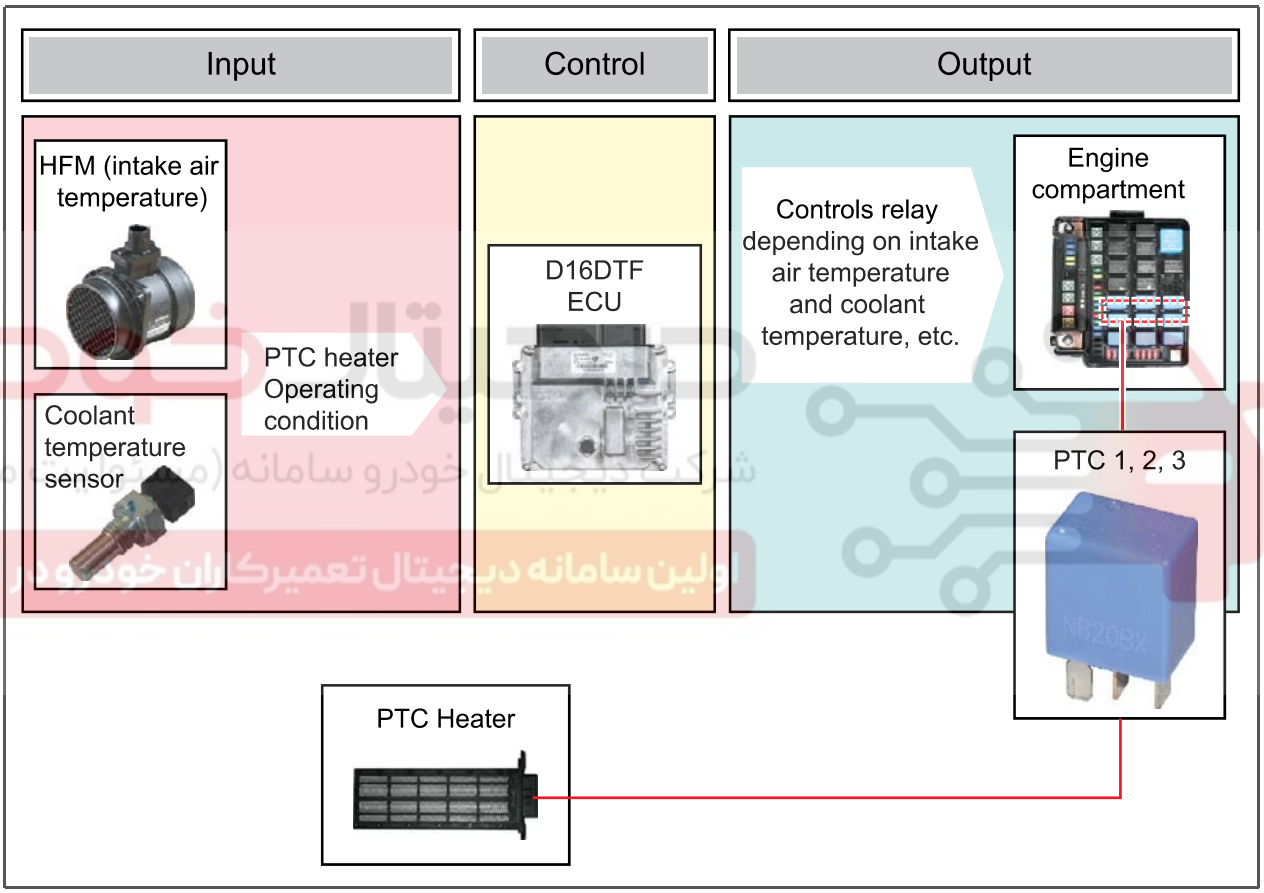
This is designed for increasing driver comfort. When the switch is pressed, the indicator comes on and at the same time the air conditioner starts in maximum cooling for setting temperature, face vent for air distribution and recirculation mode for air source selection. And fan speed depends on the driver's choice.

Modification basis	
Application basis	
Affected VIN	

5. PTC HEATER OPERATION PROCESS (D16DTF)

The engine ECU controls the PTC (Positive Temperature Coefficient) heater system by adjusting the power supplied to the PTC system according to the two measured temperature values from the engine coolant temperature sensor and HFM sensor. This system is mounted to the heater air outlet in the air condition system module and heats the air which flows to the passenger room. Since the PTC system is heated by the electrical power, the electric load and alternator capacity is greater than the conventional one. The PTC is not operated when a) the engine is cranking, b) the battery voltage is below 11 V, c) the glow plug is being preheated.

1) PTC Heater Input/Output Factors

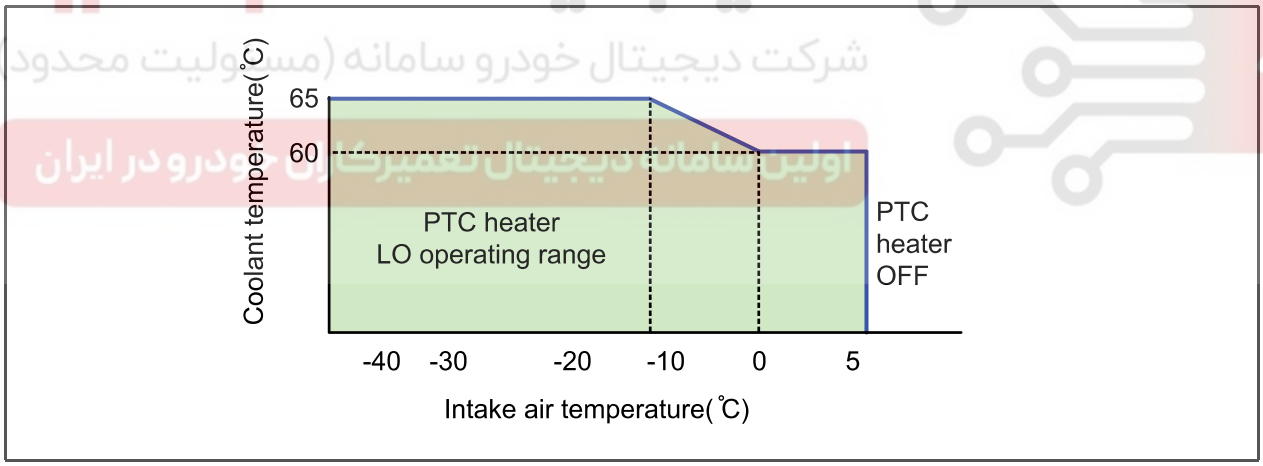


The ceramic PTC features that the resistance rises quickly in a certain temperature range. The PTC heater has 3 circuits with power of 330 W. While only 1 circuit in the PTC heater is connected during PTC1 operation, 2 circuits are connected during PTC2 or PTC3 operation.
The PTC heater operates as follows: temperature rises above specified level→resistance increases→current decreases→calorific value decreases→temperature drops→resistance increases→current increases→temperature rises.

2) Control Condition For PTC Heater

Operation	Operating condition	PTC heater status
HI mode operation (PTC2, 3)	- Coolant temperature < 15℃	PTC heater operates in "HIGH" mode if operating conditions are met
LO mode operation (PTC1)	- Coolant temperature 15℃ ≤ 65℃ and intake temperature ≤ −10℃ - Coolant temperature 15℃ < 65 ~ 60℃ and intake temperature < −10℃ ~ 0℃ - Coolant temperature 15℃ ≤ 65℃ and intake temperature ≤ 0℃ ~ 5℃	PTC heater operates in "LOW" mode if operating conditions are met
Conditions for deactivating	- Air conditioner blower switch OFF - When the ambient temperature sensor is faulty (short or open circuit in the wiring) - Engine is cranking - Battery voltage is 11 V or less - Glow plug is being preheated (Glow indicator comes on)	

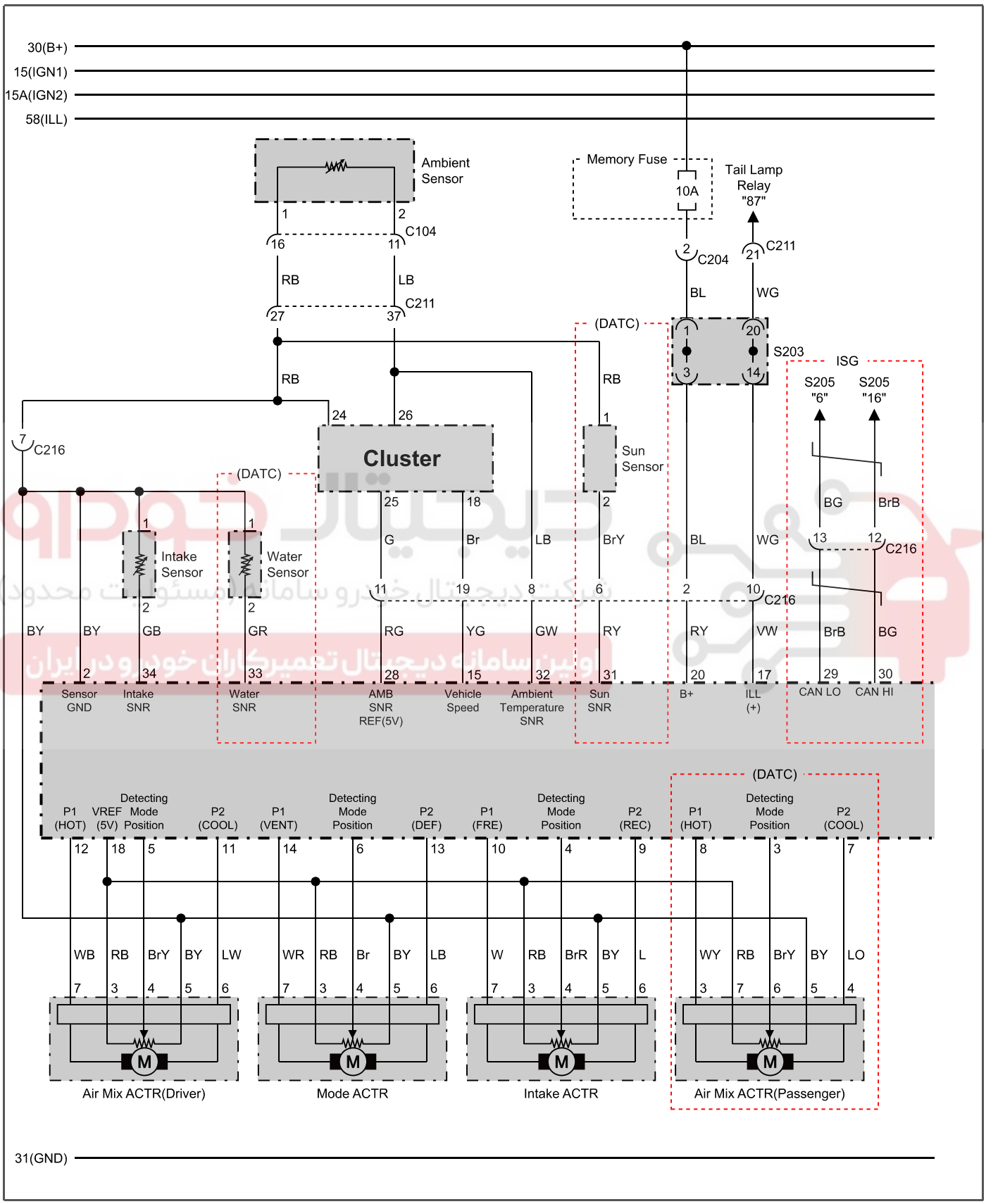
▶ **Conditions for PTC heater "LOW" operation mode (2nd step)**



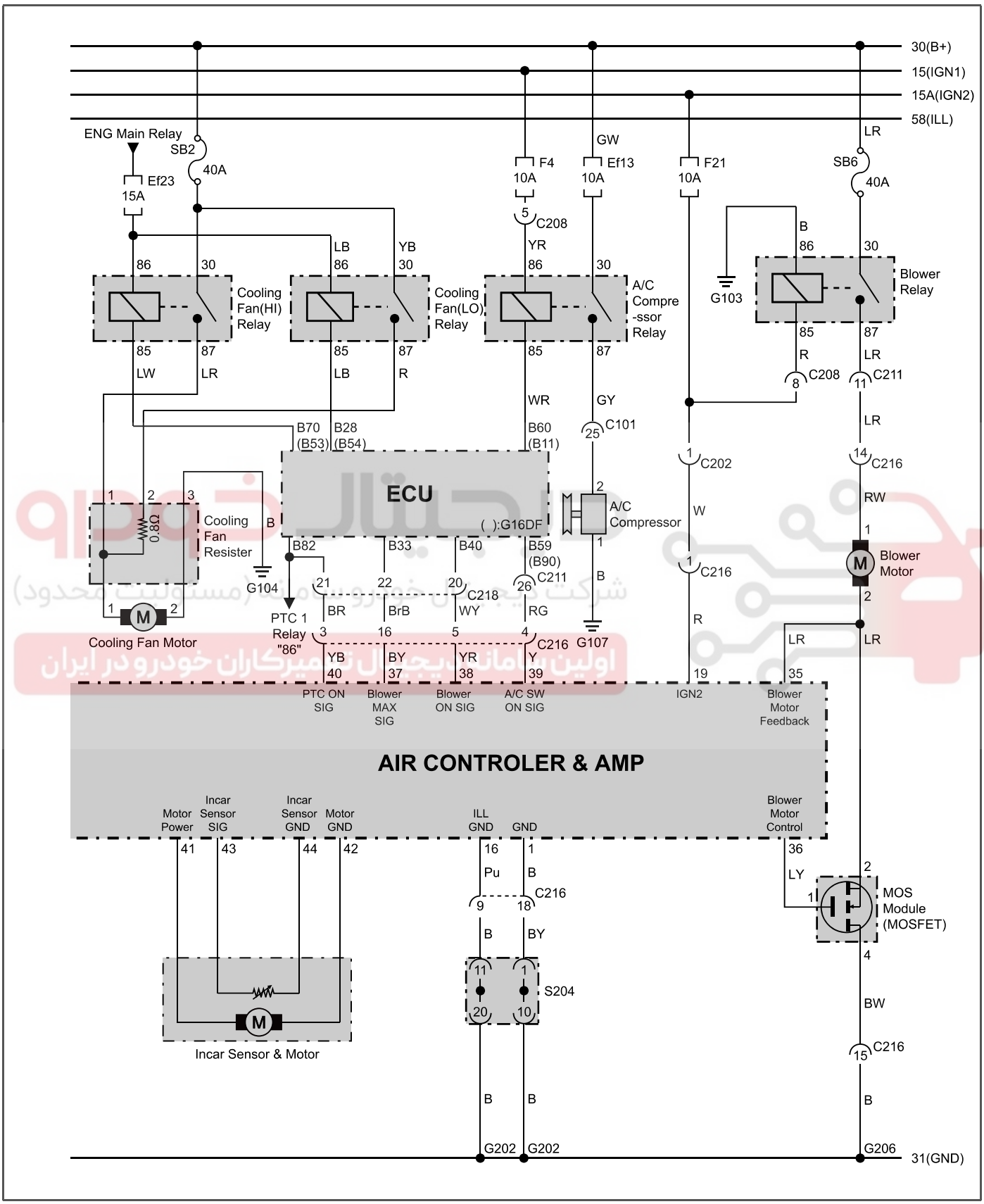
Modification basis	
Application basis	
Affected VIN	

Memo

6. CIRCUIT DIAGRAM



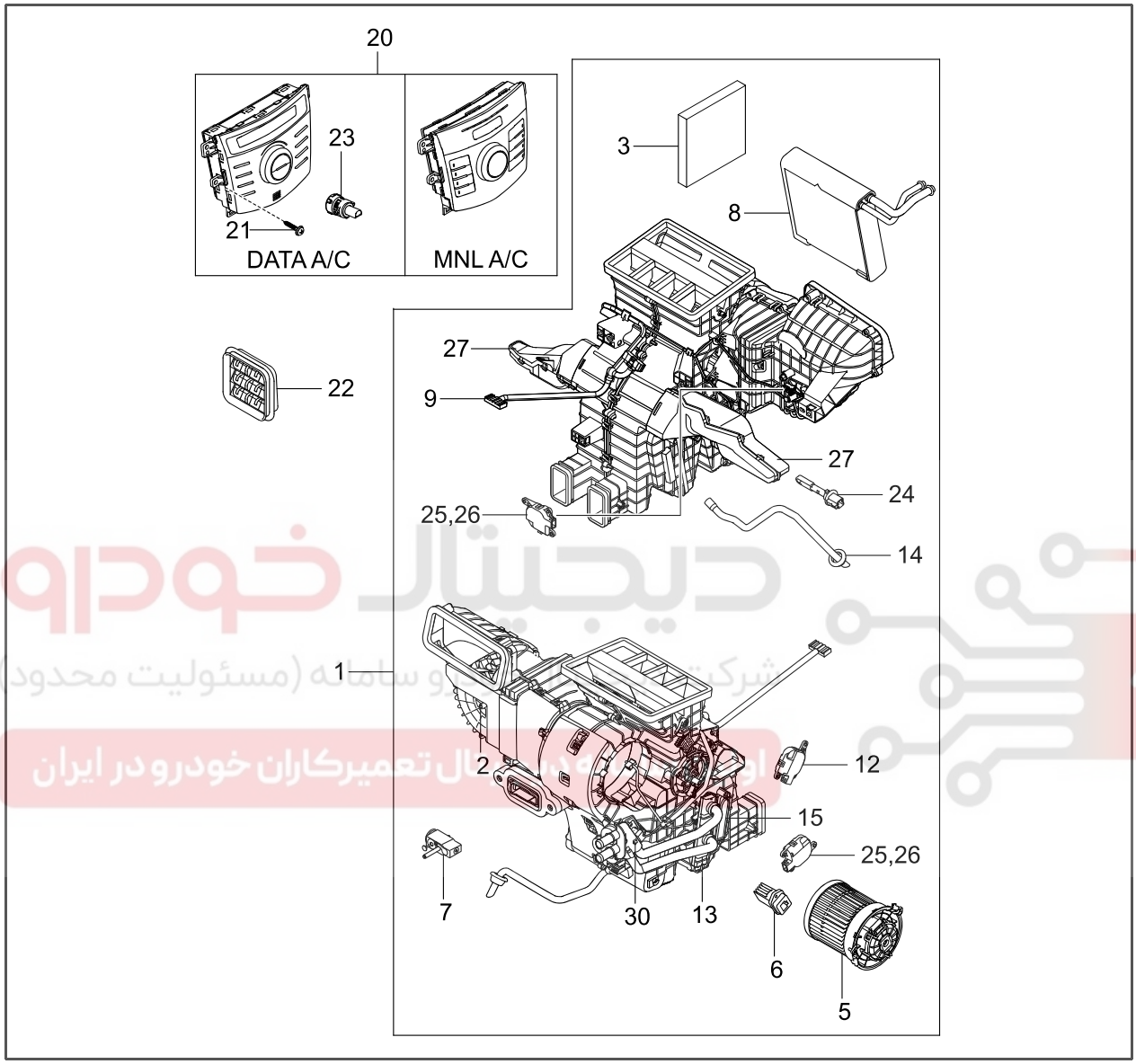
Modification basis	
Application basis	
Affected VIN	



Modification basis	
Application basis	
Affected VIN	

CONFIGURATION AND FUNCTIONS

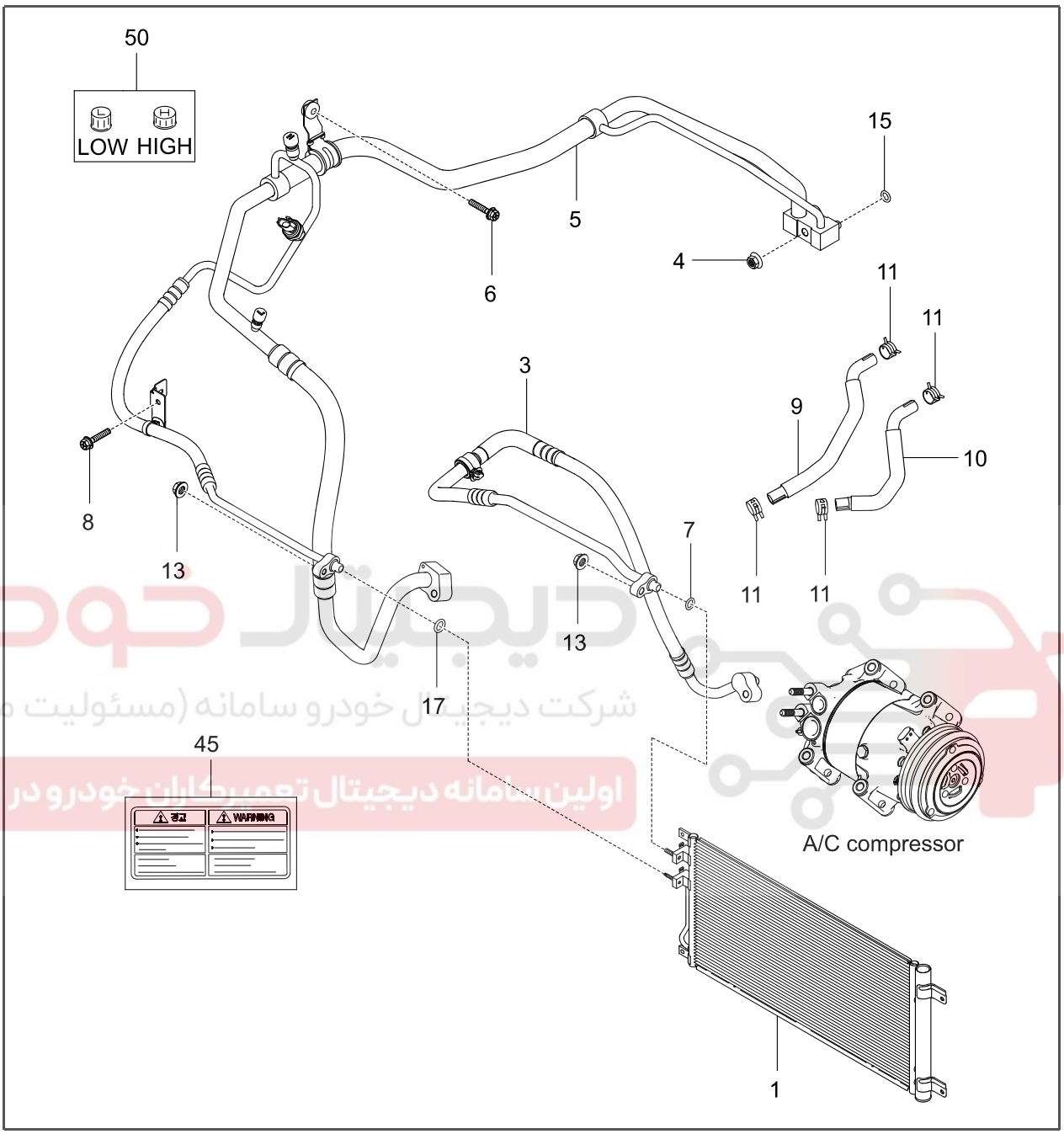
S.G.N. 6810-00 AIR CONDITIONER MODULE COMPONENTS



1. Heater & evaporator module
2. Intake assy
3. Air filter
5. Blower motor assy
6. MOS module
7. Expansion valve assy
8. Evaporator core
9. Heater & evaporator wiring assy
12. Mode actuator assembly
13. Heater core
14. Drain hose assembly
15. PTC heater
20. Heater & A/C control assy
21. Screw
22. Ventilation insert assy
23. In-car sensor
25. INTAKE ACTUATOR
26. Driver's temp actuator
27. Foot duct
30. Water temperature sensor

Modification basis	
Application basis	
Affected VIN	

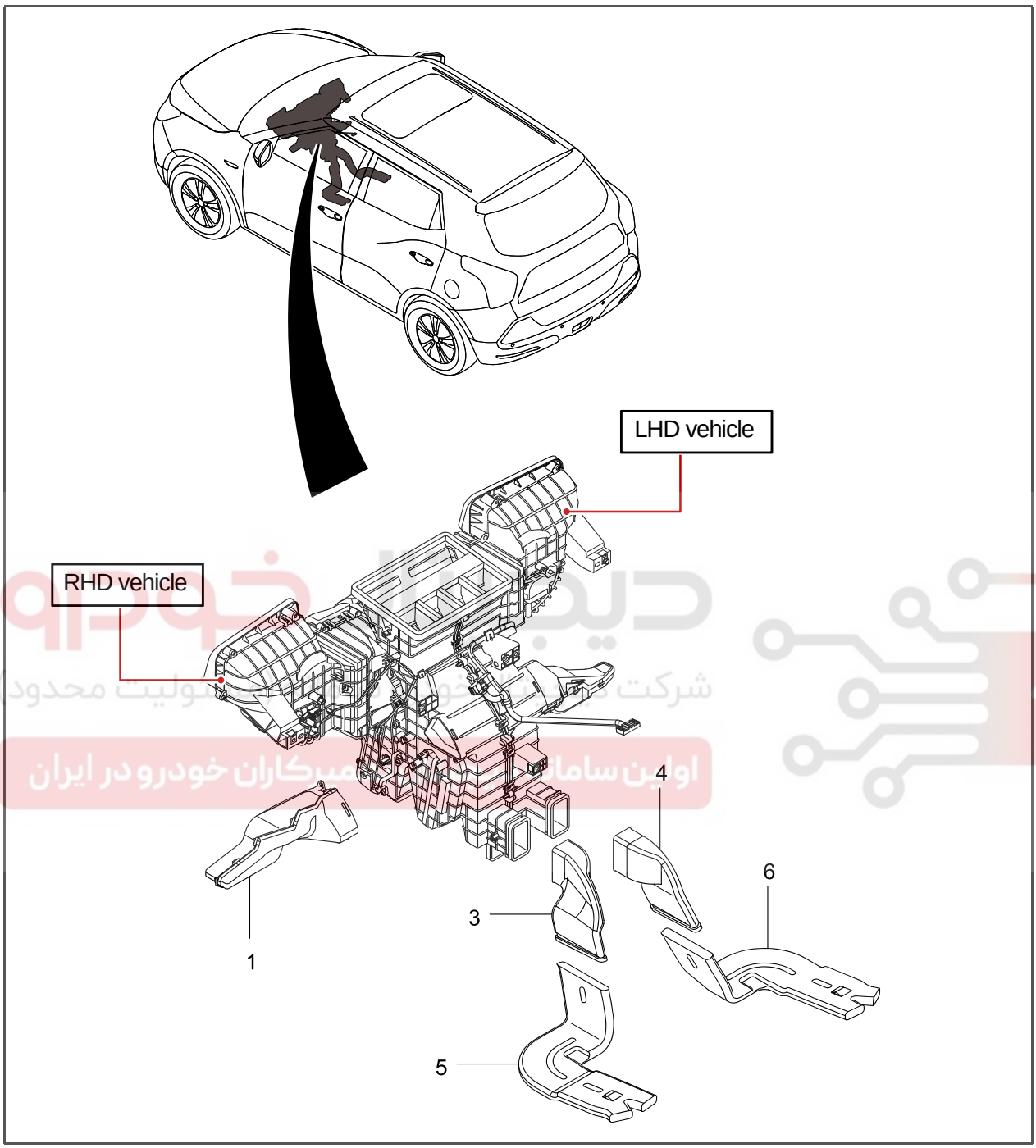
S.G.N.
6820-00 AIR CONDITIONER HOSE AND PIPE



1. Condenser assy
3. Discharge hose assy
4. Nut
5. Liquid & suction hose assy
6. Screw
7. O-ring
8. Screw
9. Heater inlet hose assy
10. Heater outlet hose assy
11. Lamp
13. Nut
15. O-ring
17. O-ring
45. A/C label
50. A/C low/high pressure charge valve cover

Modification basis	
Application basis	
Affected VIN	

S.G.N.
6830-00 AIR DISTRIBUTOR



1. Foot duct
3. Rear heating No. 1 LH duct assembly
4. Rear heating No. 1 RH duct assembly
5. Rear heating No. 2 LH duct assembly
6. Rear heating No. 2 RH duct assembly

Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-20

HEATER AND A/C CONTROL ASSEMBLY

1) Overview

The heater and A/C control assembly falls in to two categories; DATC (Dual Automatic Temperature Control) and MTC (Manual Temperature Control), which controls the air conditioning system's operation.

2) Mounting Location & Components

Heater & A/C control assy	
With DATC	With MTC
	

Modification basis	
Application basis	
Affected VIN	

Heater & A/C control assembly (with DATC)

1. LCD display
2. Fan speed dial
3. Defroster switch
4. Memory selector switch
5. ON/OFF switch
6. Driver side temperature control switch
7. A/C switch
8. AUTO mode switch
9. Air source selection switch
10. Dual mode switch
11. Air distribution switch
12. Passenger side temperature control switch
13. Indoor temperature sensing part

Modification basis	
Application basis	
Affected VIN	

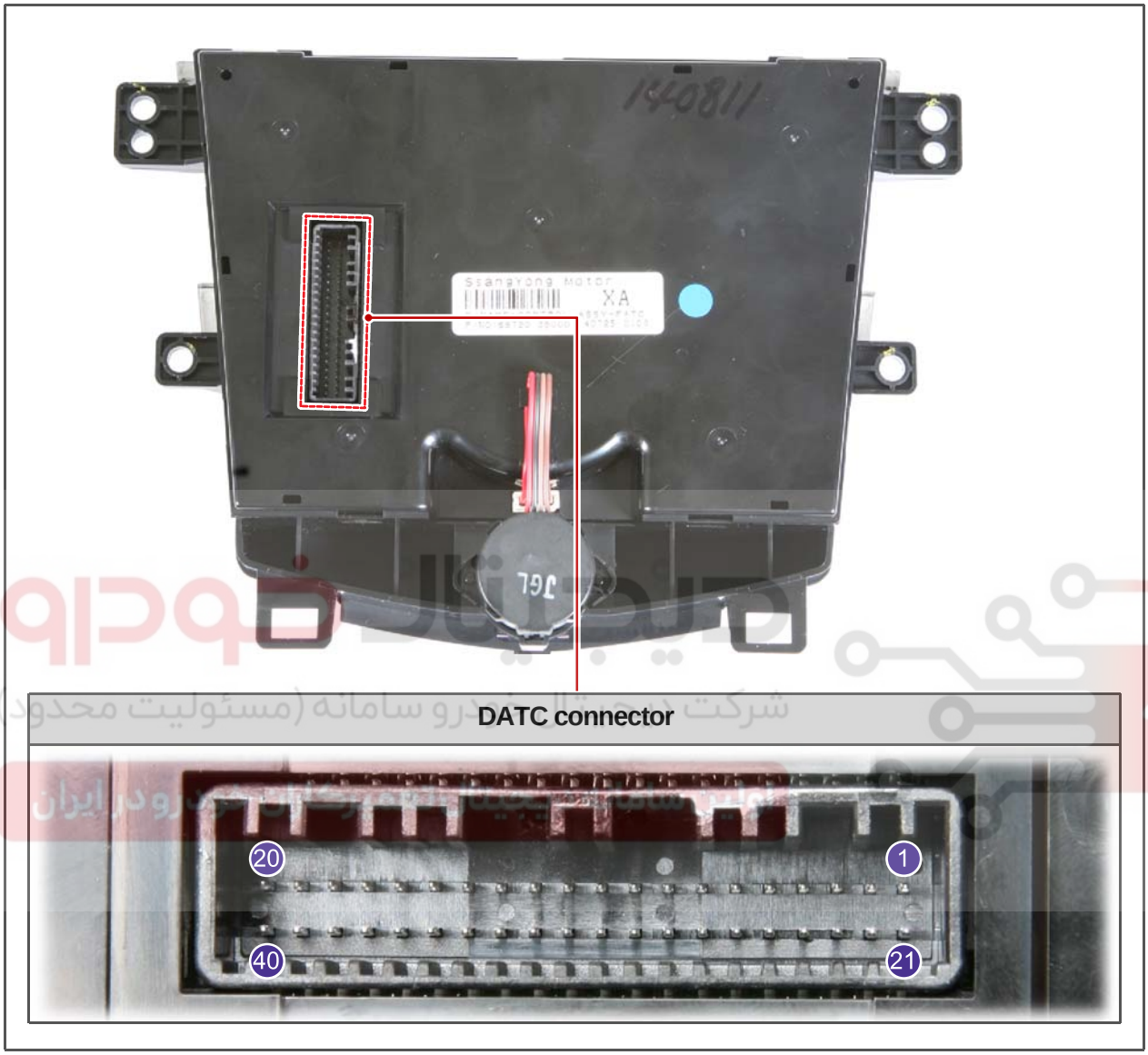
Heater & A/C control assembly (with MTC)

1. Temperature indicator
2. Temperature Control Switch
3. Defroster switch
4. Recirculation mode switch
5. Vent (face) mode switch
6. Bi-level mode switch
7. Fan speed dial
8. MAX A/C control switch
9. Fresh air mode switch
10. Defroster & foot mode switch
11. Foot mode switch
12. A/C switch

Modification basis	
Application basis	
Affected VIN	

3) Heater & A/C Control Assembly Connector

(1) With DATC



Modification basis	
Application basis	
Affected VIN	

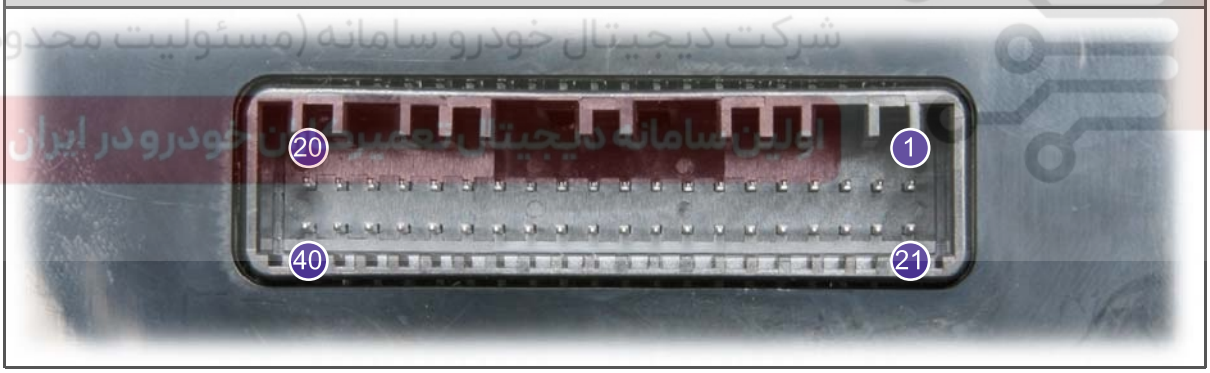
▶ **DATC connector**

Pin No.	Function
1	Ground
2	Sensor ground
3	Detecting passenger's air mix position
4	Detecting intake position
5	Detecting driver's air mix position
6	Detecting mode position
7	Passenger's air mix (P2_COOL)
8	Passenger's air mix (P1_HOT)
9	Intake (P2_RECIRC)
10	Intake (P1_FRESH)
11	Driver's air mix (P2_COOL)
12	Driver's air mix (P1_HOT)
13	Mode (P2_DEF)
14	Mode (P1_VENT)
15	Vehicle speed
16	Illumination ground
17	Illumination voltage
18	Actuator REF (5 V)
19	IGN2
20	B+

Pin No.	Function
21	-
22	-
23	-
24	-
25	-
26	-
27	-
28	Amb. temp. sensor REF(5 V)
29	CAN-Low
30	CAN-High
31	Sun-load sensor signal
32	Ambient temperature sensor signal
33	Water temperature sensor signal
34	Intake sensor signal
35	Blower motor feedback
36	Blower motor control
37	Max. blower speed signal (D16DTF)
38	Blower ON signal (D16DTF)
39	A/C compressor ON signal
40	PTC ON signal (D16DTF)

(2) With MTC

MTC connector



Modification basis	
Application basis	
Affected VIN	

▶ **MTC connector**

Pin No.	Function
1	Ground
2	Sensor ground
3	-
4	Detecting intake position
5	Detecting air mix position
6	Detecting mode position
7	-
8	-
9	Intake (P2_RECIRC)
10	Intake (P1_FRESH)
11	Air mix (P2_COOL)
12	Air mix (P1_HOT)
13	Mode (P2_DEF)
14	Mode (P1_VENT)
15	Vehicle speed
16	Illumination ground
17	Illumination voltage
18	Actuator REF (5 V)
19	IGN2
20	B+

Pin No.	Function
21	-
22	-
23	-
24	-
25	-
26	-
27	-
28	Amb. temp. sensor REF (5 V)
29	CAN-Low
30	CAN-High
31	-
32	Ambient temperature sensor signal
33	-
34	Intake sensor signal
35	Blower motor feedback
36	Blower motor control
37	Max. blower speed signal (D16DTF)
38	Blower ON signal (D16DTF)
39	A/C compressor ON signal
40	PTC ON signal (D16DTF)

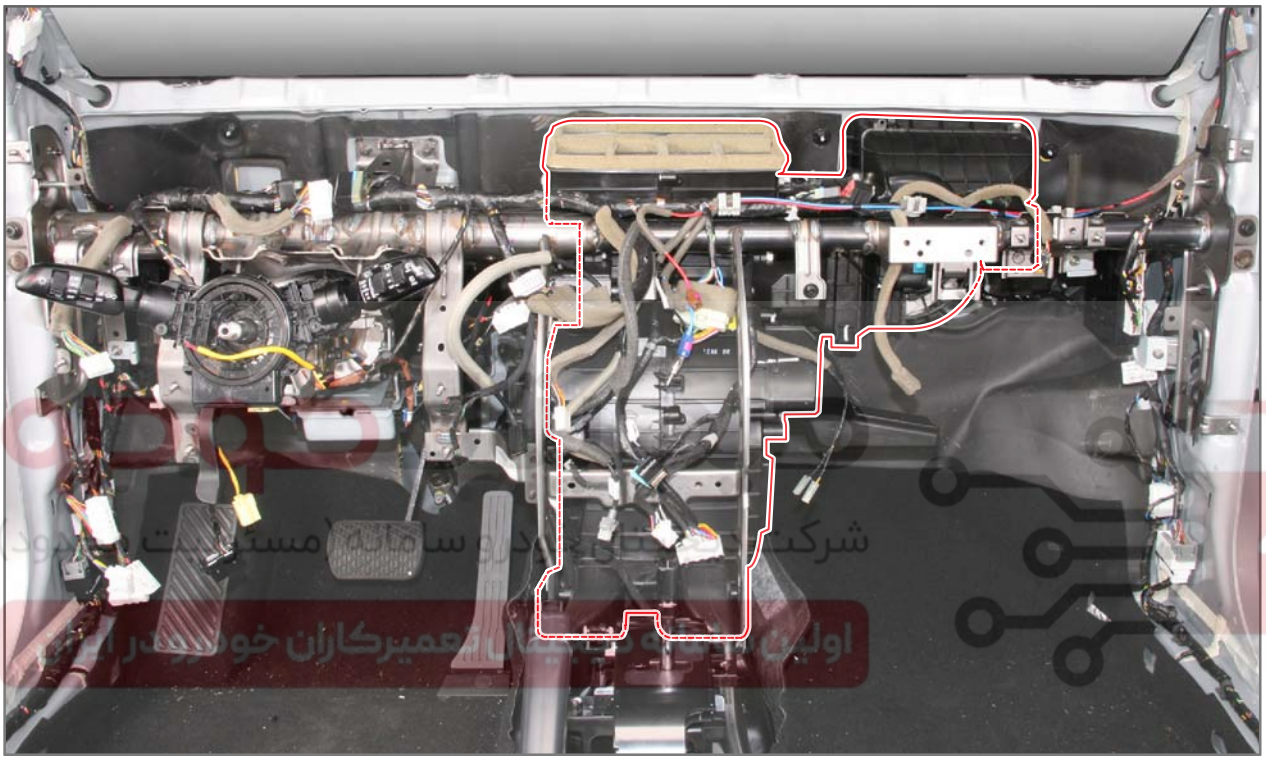
S.G.N. 6830-01

AIR CONDITIONDER MODULE

1) Overview

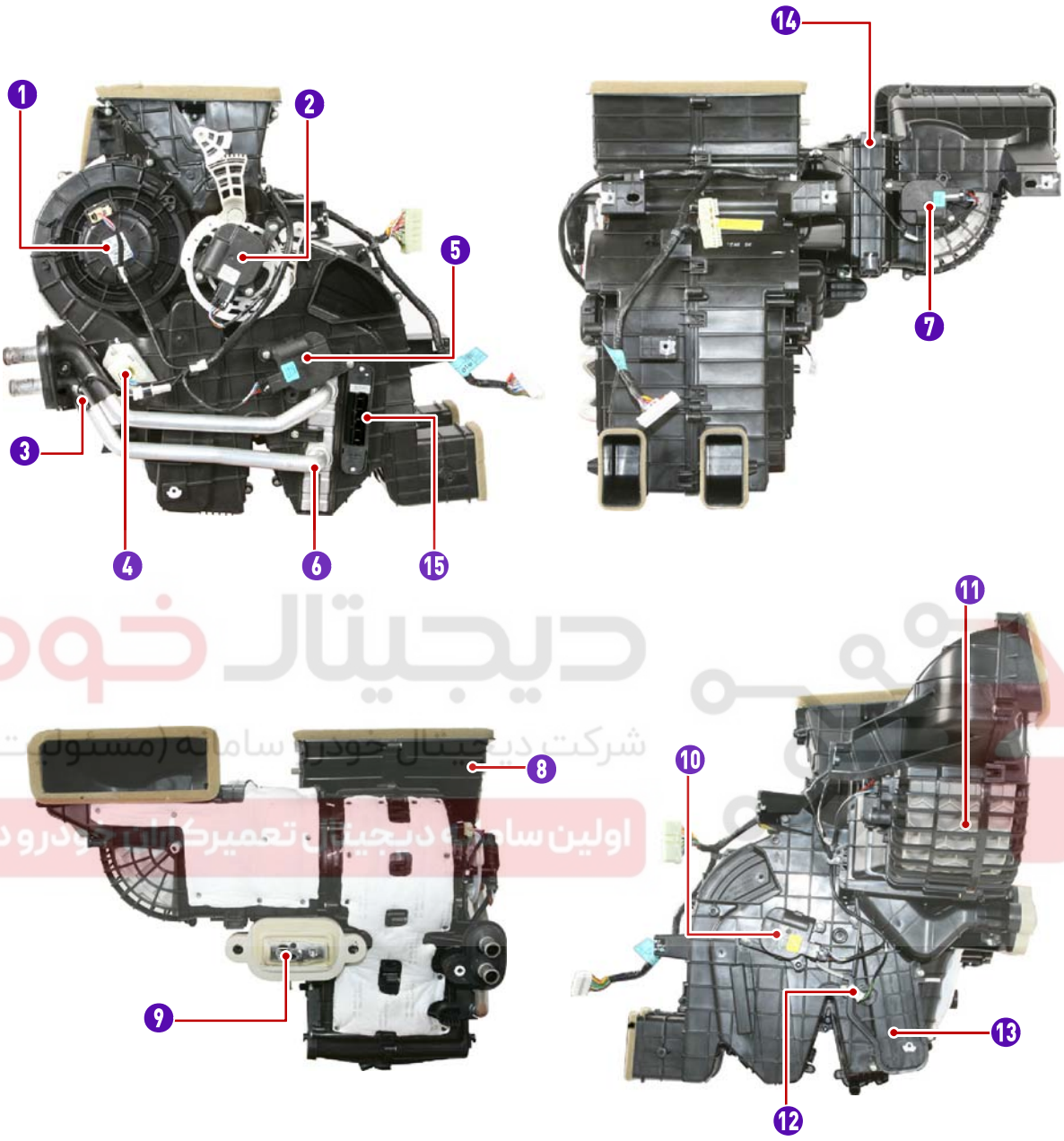
The air conditioner module is mounted to inside of the instrument panel and has the evaporator core, heater core and corresponding actuator and different sensors.

2) Mounting Location & Components



Modification basis	
Application basis	
Affected VIN	

Air conditionder module



1. Blower motor
2. Mode actuator
3. Water temperature sensor
4. MOS module
5. Driver's temp actuator
6. Heater core
7. Intake actuator
8. Mode door
9. Expansion valve
10. Passenger's temp actuator
11. Air source door
12. Intake sensor
13. Evaporator core
14. A/C filter
15. PTC heater (D16DTF)

Modification basis	
Application basis	
Affected VIN	

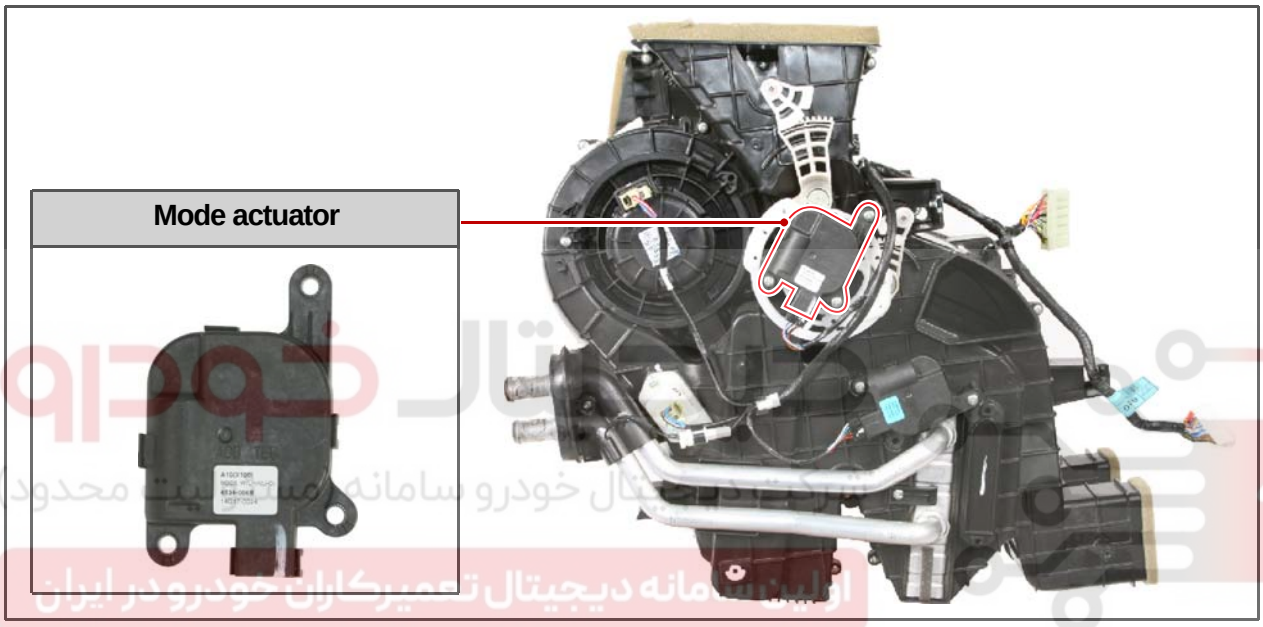
S.G.N. 6810-12

MODE ACTUATOR

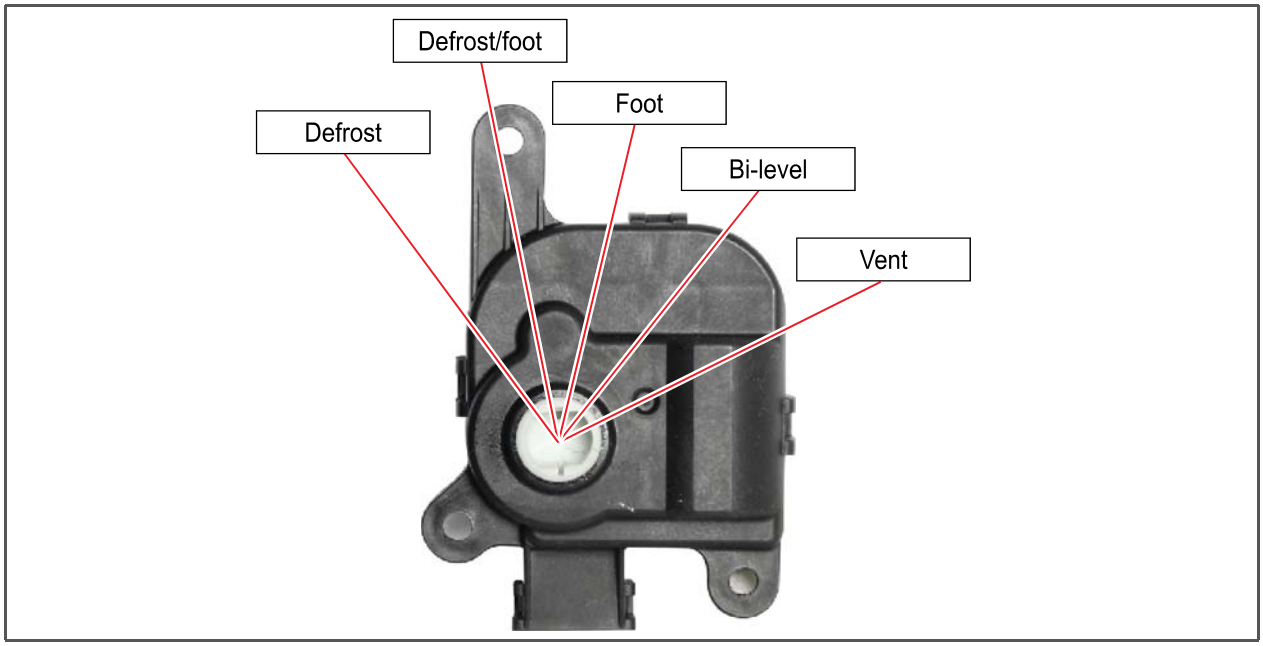
1) Overview

The mode actuator is mounted on the top of the LH temp actuator of the heater and evaporator assembly. It controls the vent damper according to the control command from the heater and A/C control assembly to control the air distribution mode such as vent, bi-level, foot, defroster/foot or defroster.

2) Mounting Location & Components

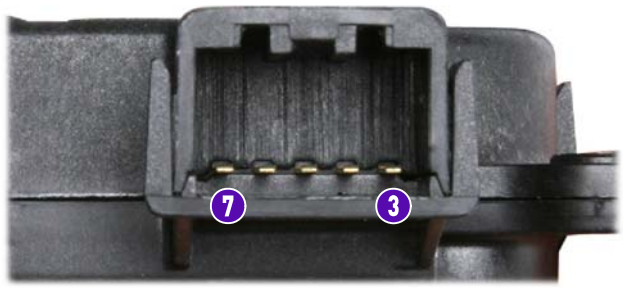
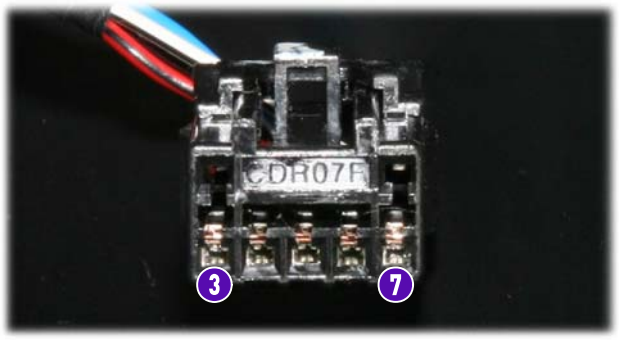


▶ **Mode actuator operation position**



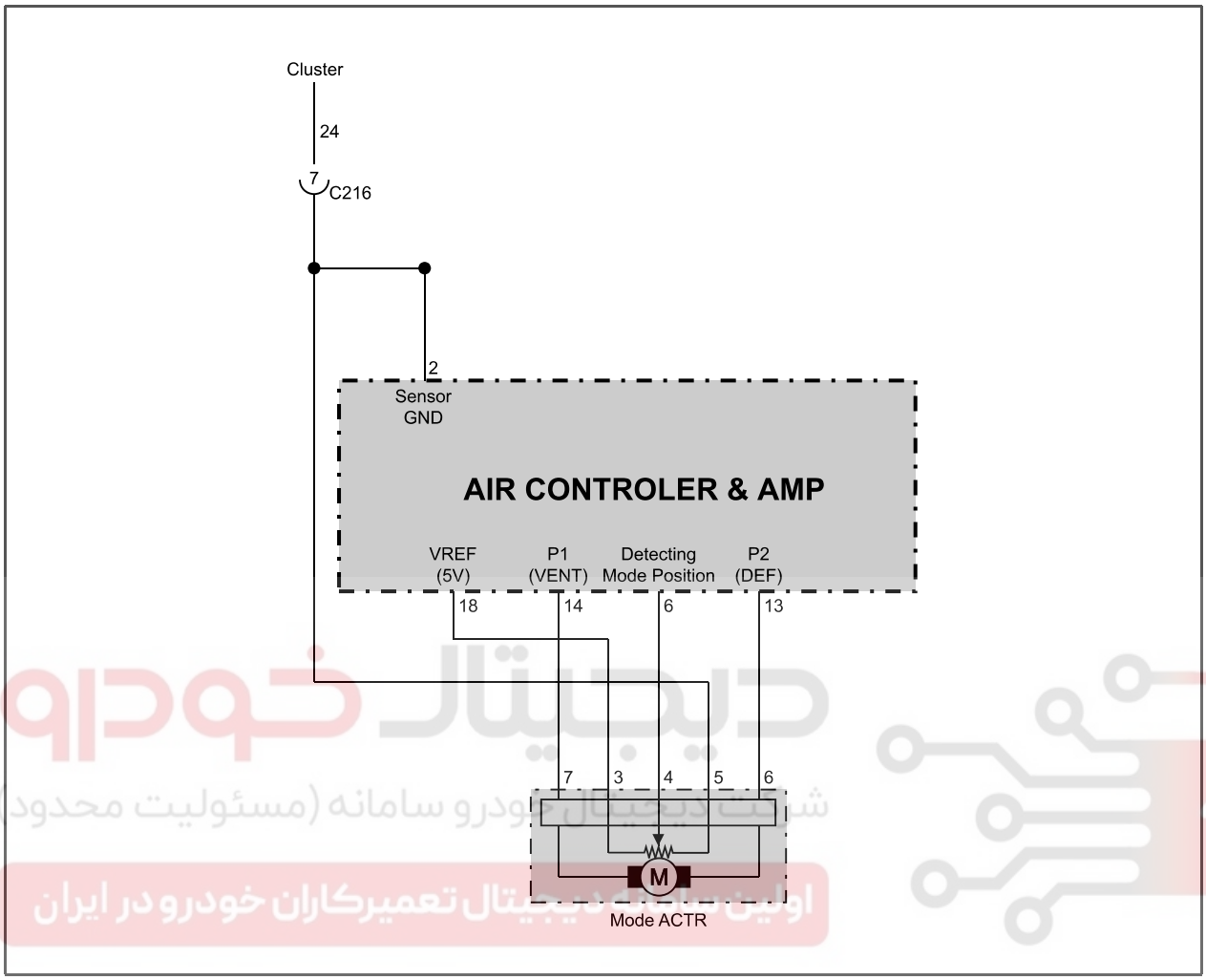
Modification basis	
Application basis	
Affected VIN	

3) Mode Actuator Connector

To actuator	To wiring
	

Pin No.	Function
3	Reference voltage (5 V)
4	Detecting position
5	Sensor ground
6	P2 (DEF)
7	P1 (Vent)

4) Circuit Diagram



NOTE

How to check mode actuator

a. Turn the ignition switch to the "ON" position. Then, check the operation position of the actuators by modes while changing the mode.
b. If the operating position is not correct, check the wiring for open circuit.
c. If the wiring is intact, replace the mode actuator assembly.

Modification basis	
Application basis	
Affected VIN	

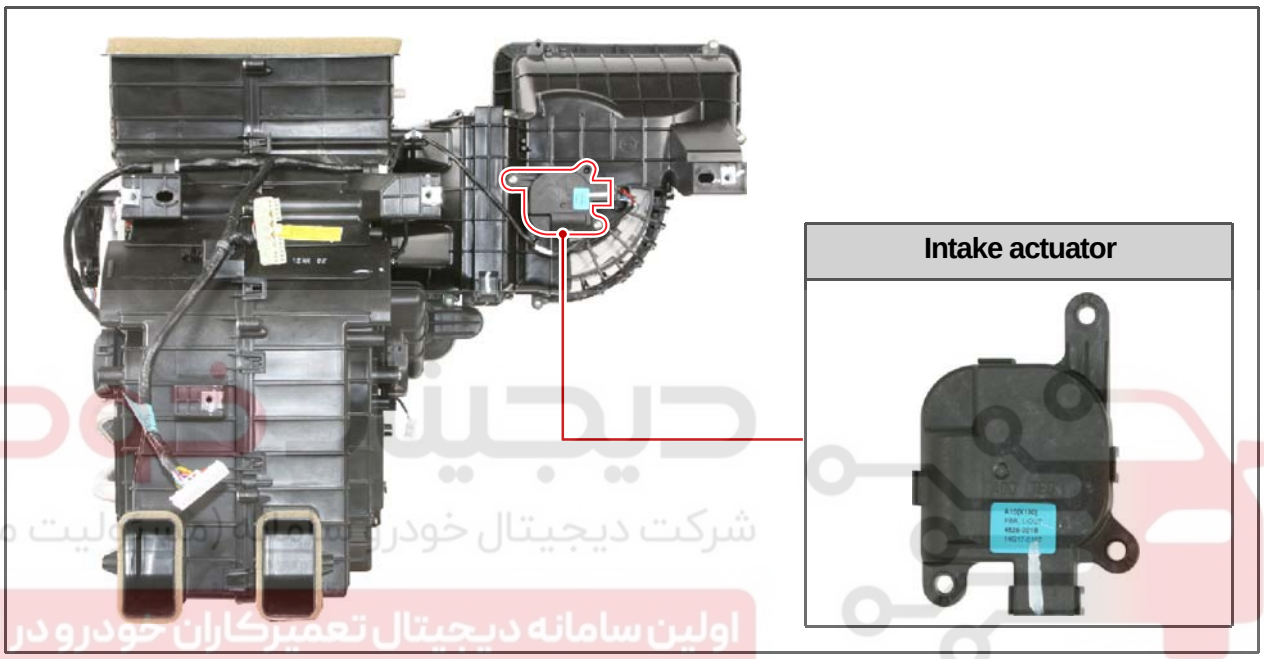
S.G.N. 6810-02

INTAKE ACTUATOR

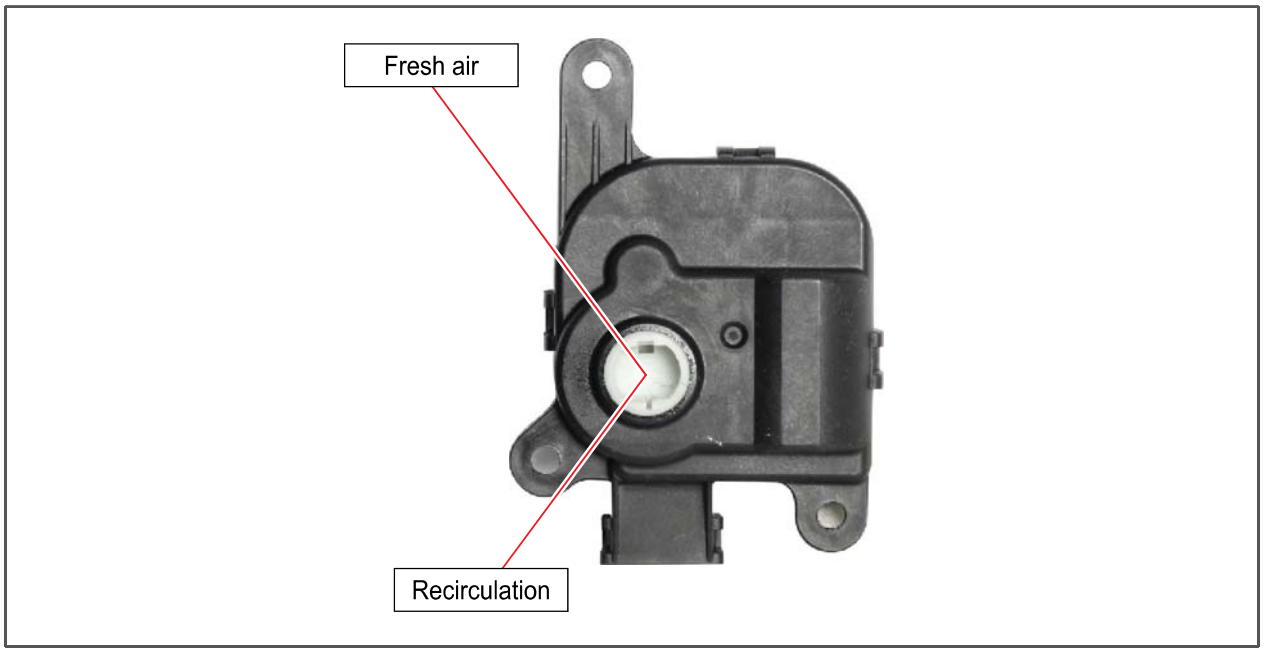
1) Overview

The intake actuator is mounted to the right-hand of the blower assembly and changes the air source selection mode according to the control command from the heater and A/C control assembly.

2) Mounting Location & Components

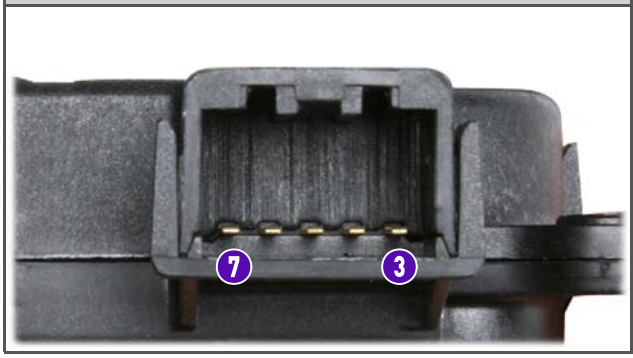
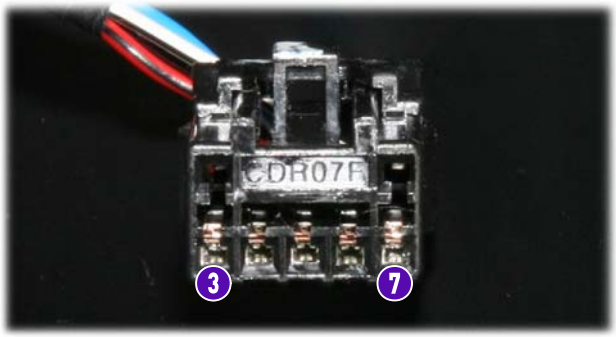


▶ **Intake actuator operation position**



Modification basis	
Application basis	
Affected VIN	

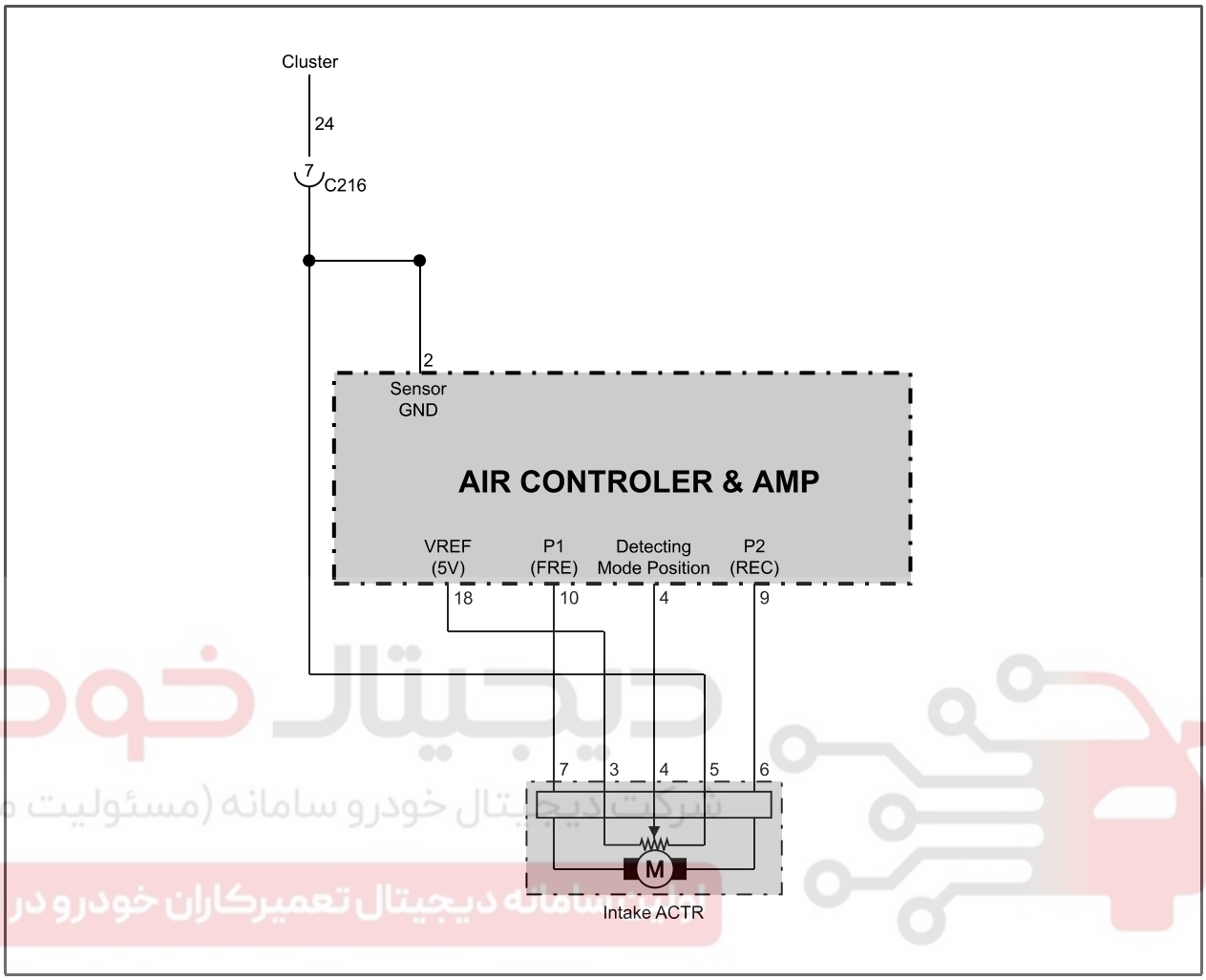
3) Connector

To actuator	To wiring
	

Pin No.	Function
3	Reference voltage (5 V)
4	Detecting position
5	Sensor ground
6	P2 (recirculation)
7	P1 (fresh air)

Modification basis	
Application basis	
Affected VIN	

4) Circuit Diagram



NOTE

How to check

a. Turn the ignition switch to the "ON" position. Then, check the operation position of the actuator each time the mode is changed.
b. If the operating position is not correct, check the wiring for open circuit.
c. If the wiring is intact, replace the intake actuator.

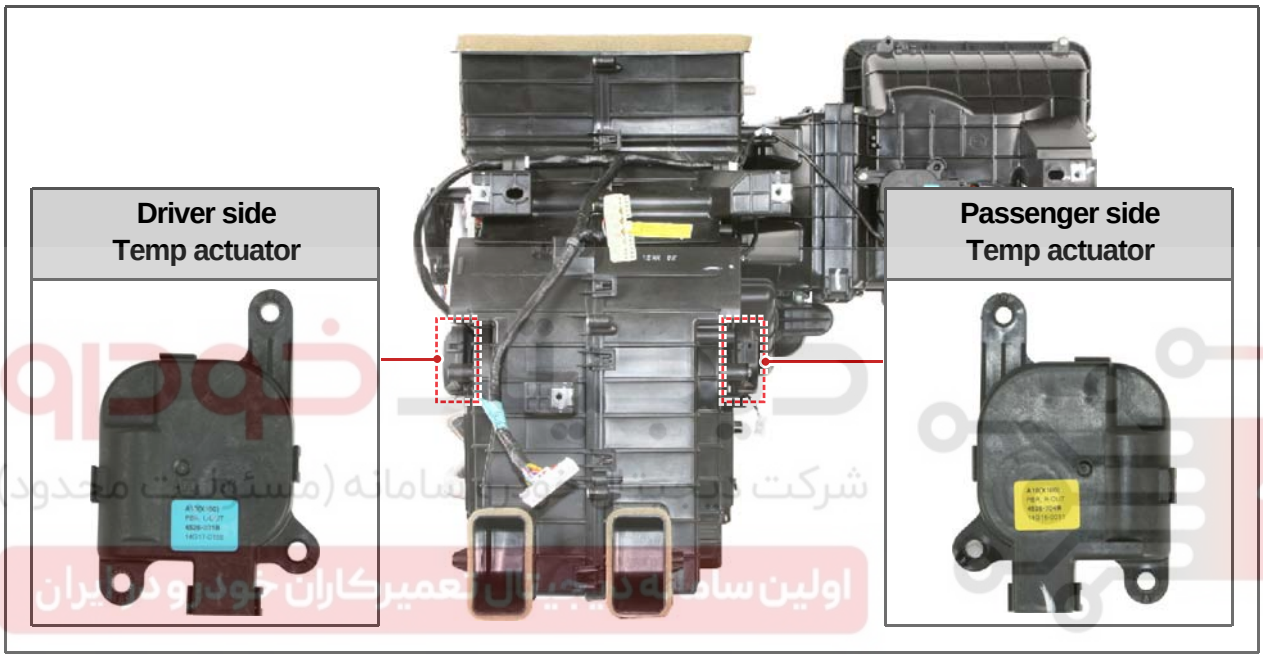
S.G.N. 6810-25

TEMP ACTUATOR

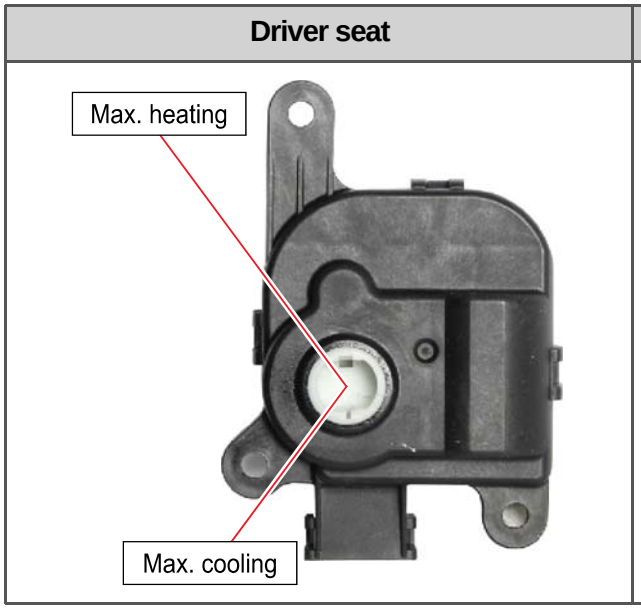
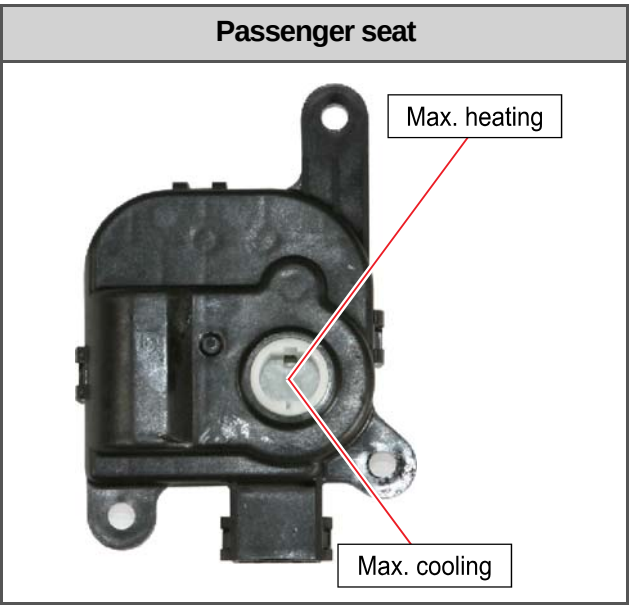
1) Overview

The driver's temp actuator is fitted on the bottom of the LH mode actuator of the heater and evaporator assembly and passenger's temp actuator is fitted on the opposite position, that is, right-hand side of the heater and evaporator. It changes the motor position according to the control command from the heater and A/C control assembly to adjust the outlet air temperature.

2) Mounting Location & Components



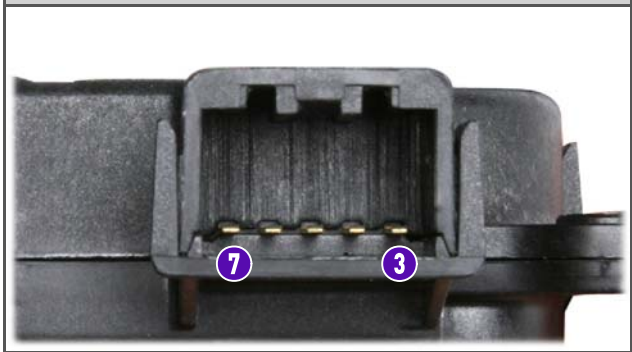
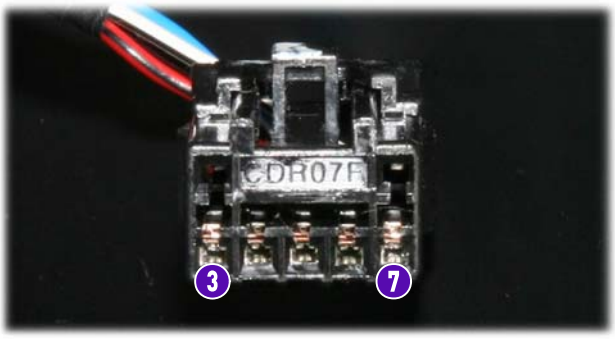
▶ **Operating range**

Driver seat	Passenger seat
	

Modification basis	
Application basis	
Affected VIN	

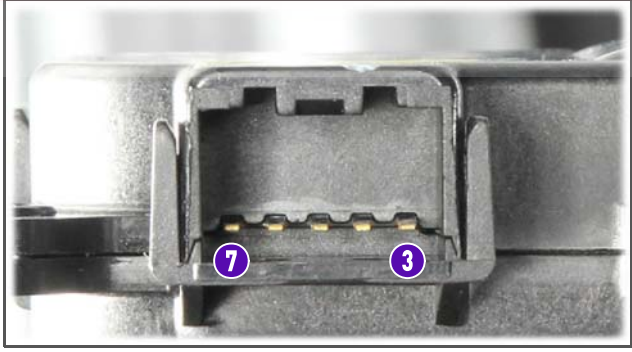
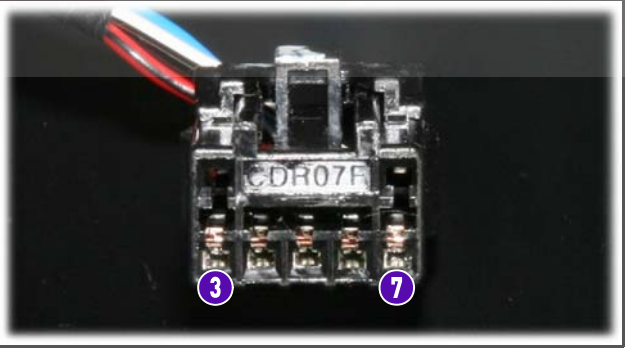
3) Temp Actuator Connector

▶ **Driver seat**

To actuator	To wiring
	

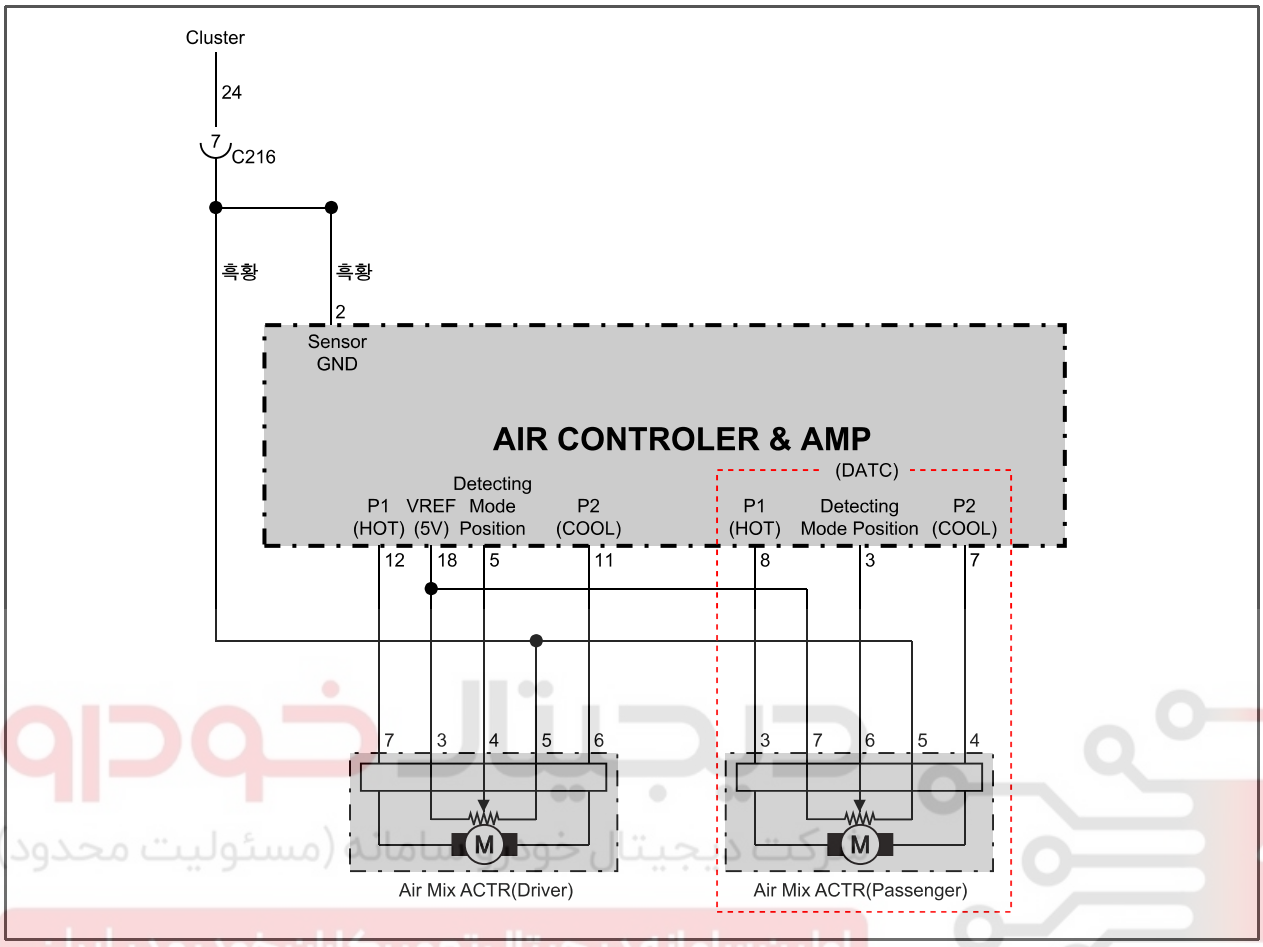
Pin No.	Function
3	Reference voltage (5 V)
4	Detecting position
5	Sensor ground
6	P2 (COOL)
7	P1 (HOT)

▶ **Passenger seat**

To actuator	To wiring
	

Pin No.	Function
3	P1 (HOT)
4	P2 (COOL)
5	Sensor ground
6	Detecting position
7	Reference voltage (5 V)

4) Circuit Diagram



NOTE

How to check

a. Turn the ignition switch to the "ON" position. Then, check the operation position of the actuator while changing the set temperature of the air conditioning system.
b. If the operating position is not correct, check the wiring for open circuit.
c. If the wiring is intact, replace the temp actuator.

Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-23

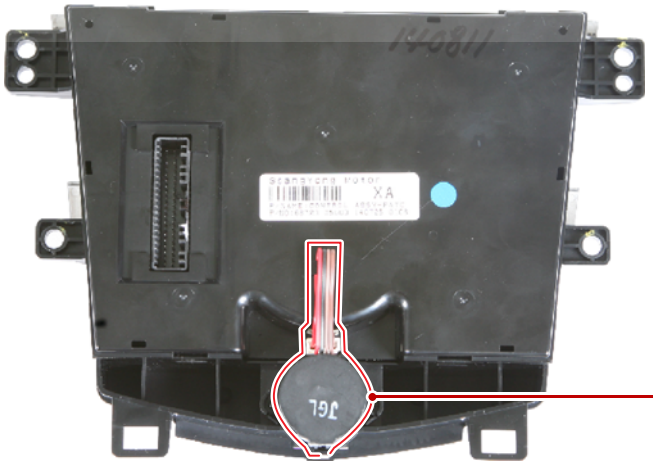
IN-CAR SENSOR

1) Overview

The in-car sensor is a negative temperature coefficient (NTC) thermistor, and mounted to the rear of the heater and A/C control assembly (with DATC). It detects the air temperature drawn through the indoor temperature sensing part at front section of the heater and A/C control assembly and sends the voltage value according to the changed resistance to the DATC.

2) Mounting Location & Components

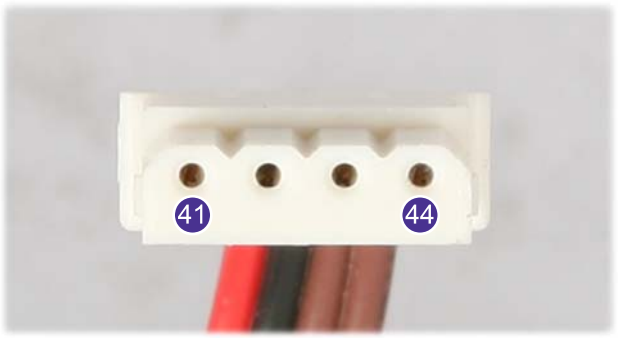
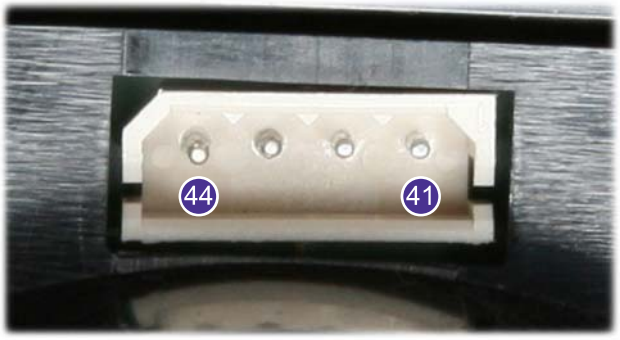
Indoor temperature sensing part



In-car sensor

Modification basis	
Application basis	
Affected VIN	

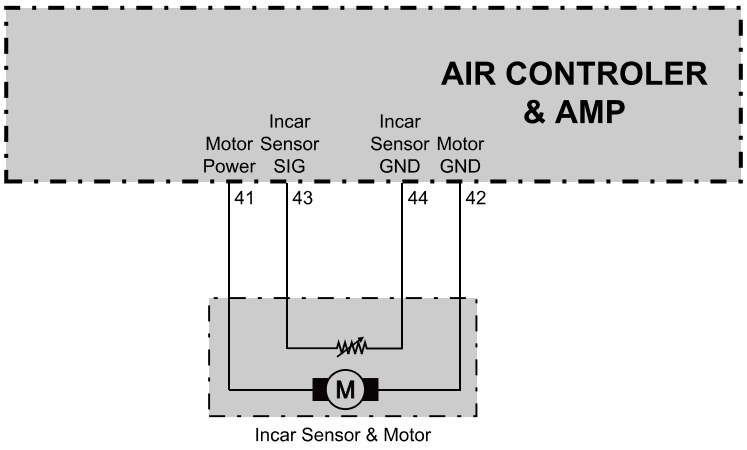
3) In-car Sensor Connector

To sensor	To DATC
	

Pin No.	Function
41	Motor power
42	Motor ground
43	Indoor air temperature sensor signal
44	Sensor ground -

Modification basis	
Application basis	
Affected VIN	

4) Circuit Diagram



NOTE

How to check in-car sensor

a. Remove the in-car sensor and measure the resistances at both ends of the sensor connector. If the measured resistance is extremely high or low, replace the in-car sensor. (Specified value: 2.186 kΩ ± 3% at 25℃)

b. If the resistance value of the sensor is normal, check the following:

- Turn the ignition switch to ON position and measure the voltage between the terminals No. 43 and No. 44 of the in-car sensor connector (to DATC). (Measured voltage: approx. 2.5 V at 25℃)
- If the voltage cannot be measured, check the wiring for open circuit. If the result is as specified, replace the heater and A/C control assembly.

Modification basis	
Application basis	
Affected VIN	

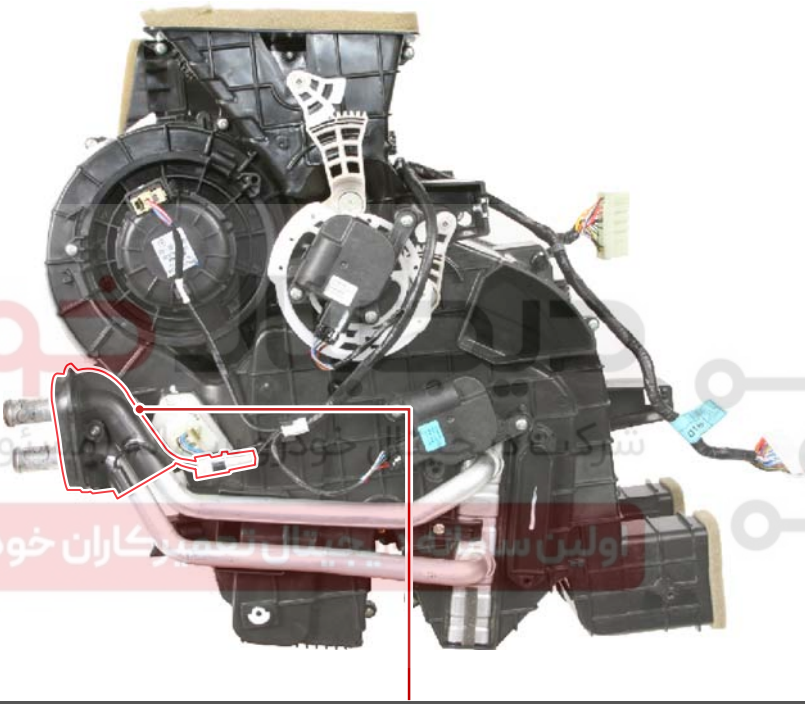
S.G.N. 6810-30

WATER TEMPERATURE SENSOR

1) Overview

This sensor is a negative temperature coefficient (NTC) thermistor, and mounted to the left heater pipe cover of the heater and evaporator assembly. It detects the coolant temperature to send the voltage value
according to the resistance change to the heater and A/C control assembly (with DATC).

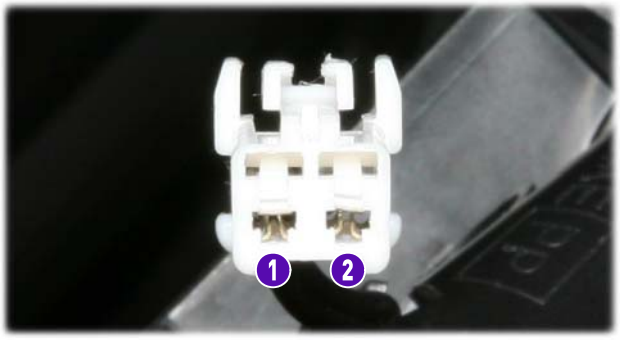
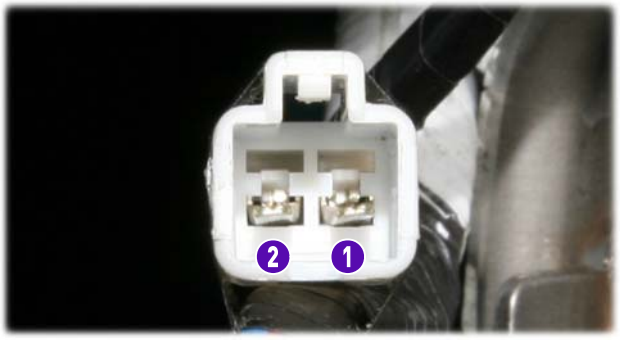
2) Mounting Location & Components



Water temperature sensor	
Courtesy lens fitted	**Component**
	

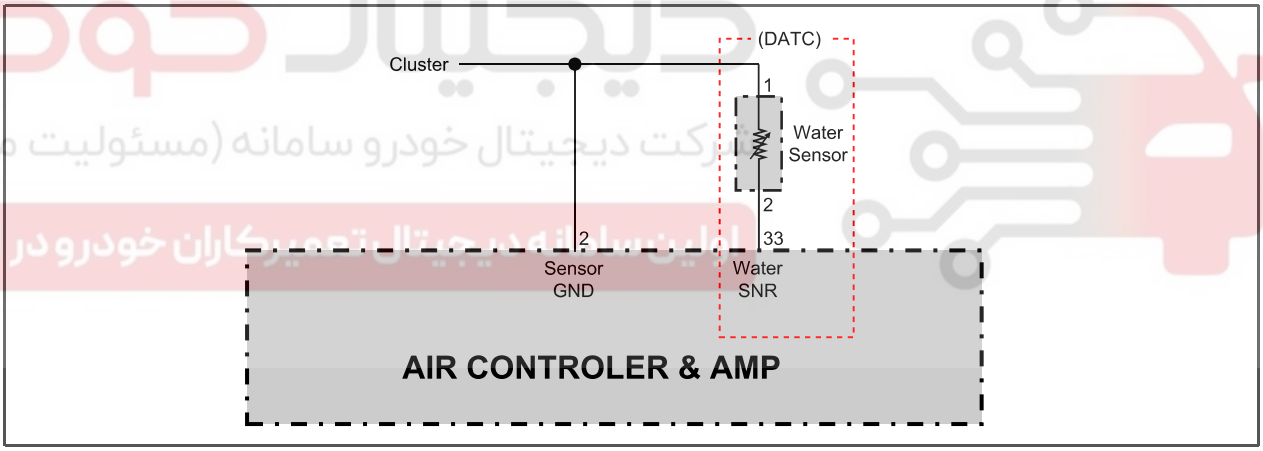
Modification basis	
Application basis	
Affected VIN	

3) Water Temperature Sensor Connector

To sensor	To wiring
	

Pin No.	Function
1	Sensor ground -
2	Water temperature sensor signal

4) Circuit Diagram



NOTE

How to check water temperature sensor

a. Remove the water temperature sensor and measure the resistances at both ends of the sensor connector. If the measured resistance is extremely high or low, replace the water temperature sensor. (Specified value: 2.186 kΩ ± 3% at 25℃)

b. If the measured value is out of the specified range, replace the water temperature sensor. If the measured value is within the specified range, check as described below:

- Turn the ignition switch to the "ON" position and measure the voltage between the terminal No. 33 and the terminal No. 1 of the DATC connector. (Measured voltage: approx. 2.5 V at 25 If the voltage cannot be measured, check the wiring for open circuit. If the result is as specified,
- replace the heater and A/C control assembly.

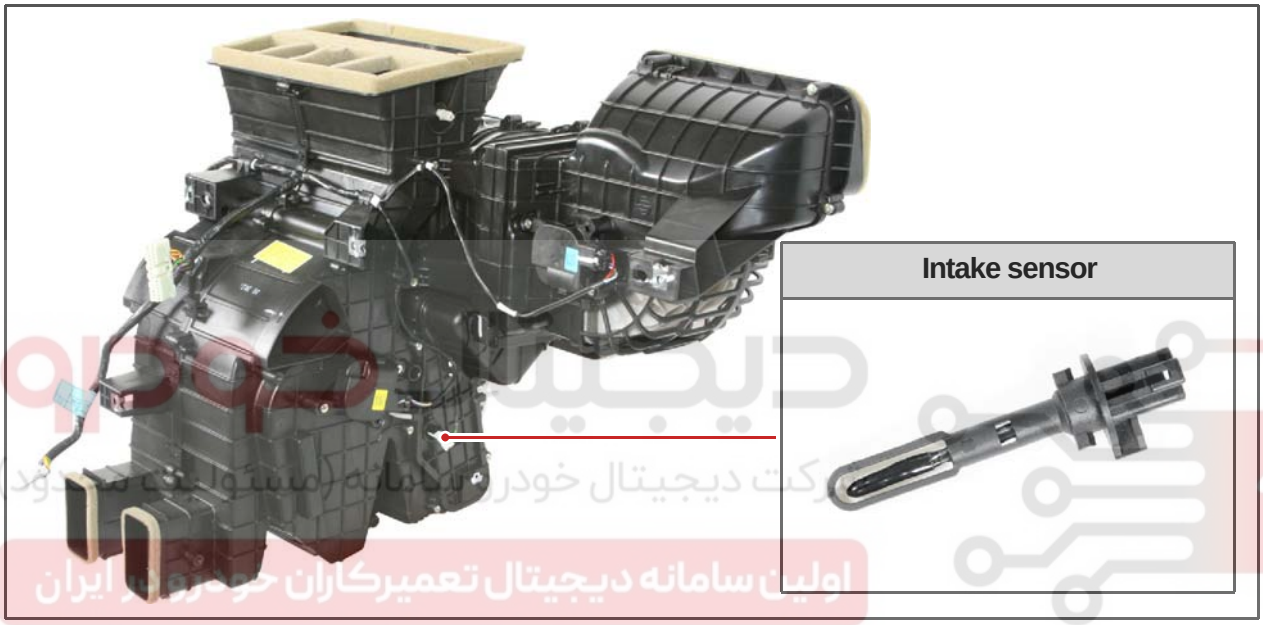
S.G.N. 6810-24

INTAKE SENSOR

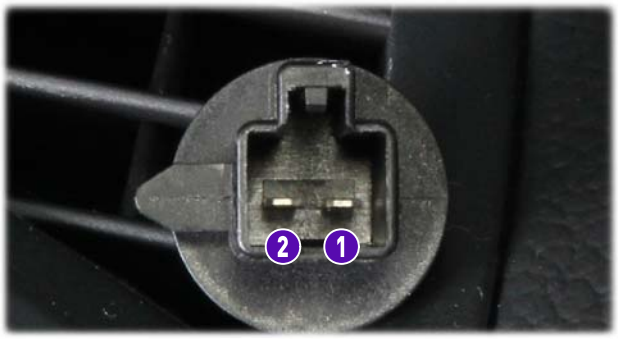
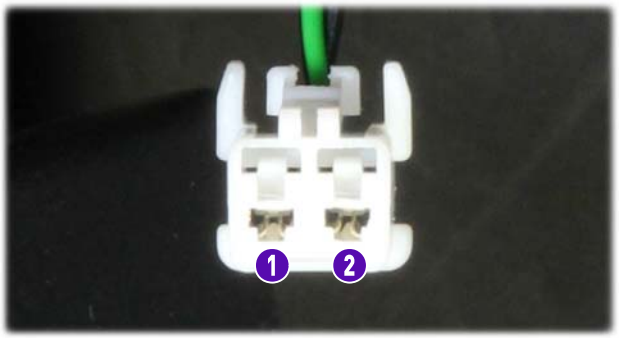
1) Overview

The intake sensor is a negative temperature coefficient (NTC) thermistor, and mounted to the side of the evaporator core in the heater and evaporator assembly. This is used to detect the temperature of the evaporator core to output the voltage value to the heater and A/C control assembly depending on the resistance changes and prevent the evaporator core from being freezing.

2) Mounting Location & Components



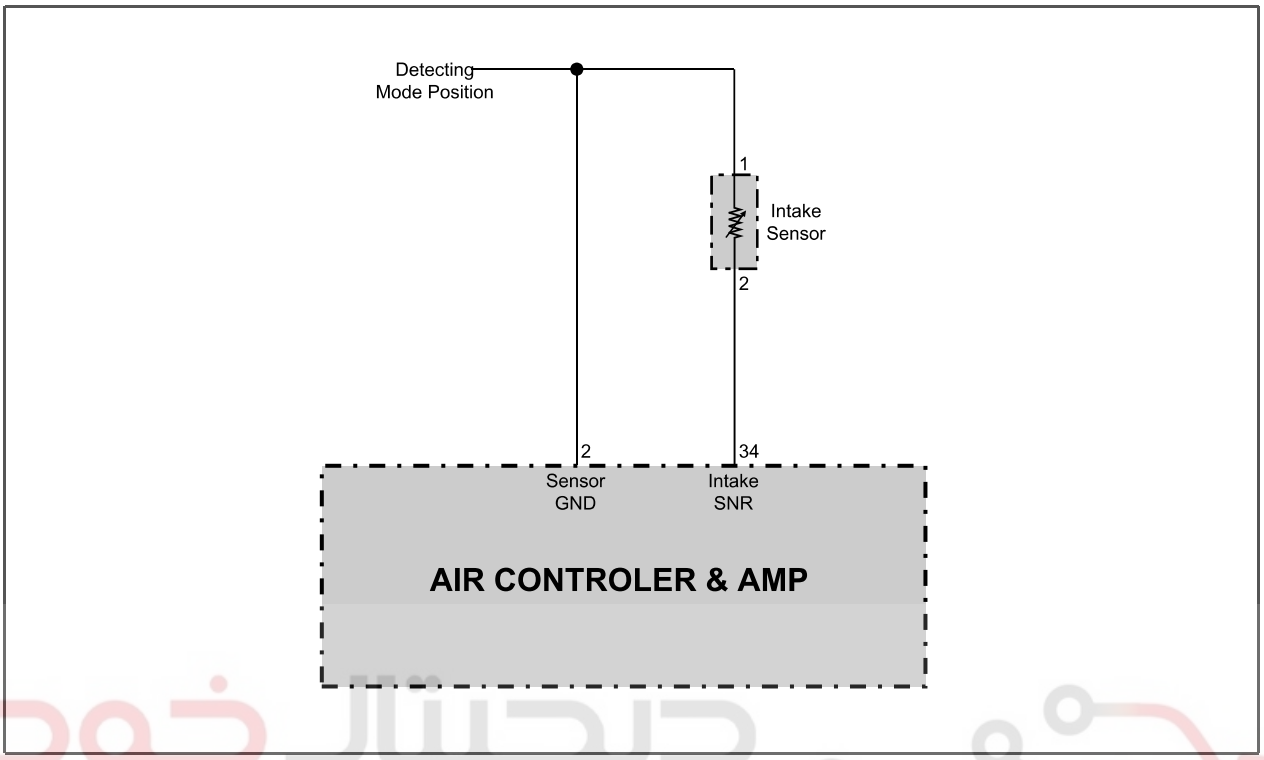
3) Connector

To sensor	To wiring
	

Pin No.	Function
1	Sensor ground -
2	Intake sensor signal

Modification basis	
Application basis	
Affected VIN	

4) Circuit Diagram



NOTE

How to check intake sensor

a. Remove the intake sensor and measure the resistances at both ends of the sensor connector. If the measured resistance is extremely high or low, replace the intake sensor. (Specified value: 8 kΩ ± 1% at 1℃)

b. If the measured value is out of the specified range, replace the intake sensor. If the measured value is within the specified range, check as described below:

- Turn the ignition switch to the "ON" position and measure the voltage between the terminal No. 34 and the terminal No. 1 of the DATC connector. (Measured voltage: approx. 2.4V at 1℃ If the voltage cannot be measured, check the wiring for open circuit. If the result is as specified,
- replace the heater and A/C control assembly.

Modification basis	
Application basis	
Affected VIN	

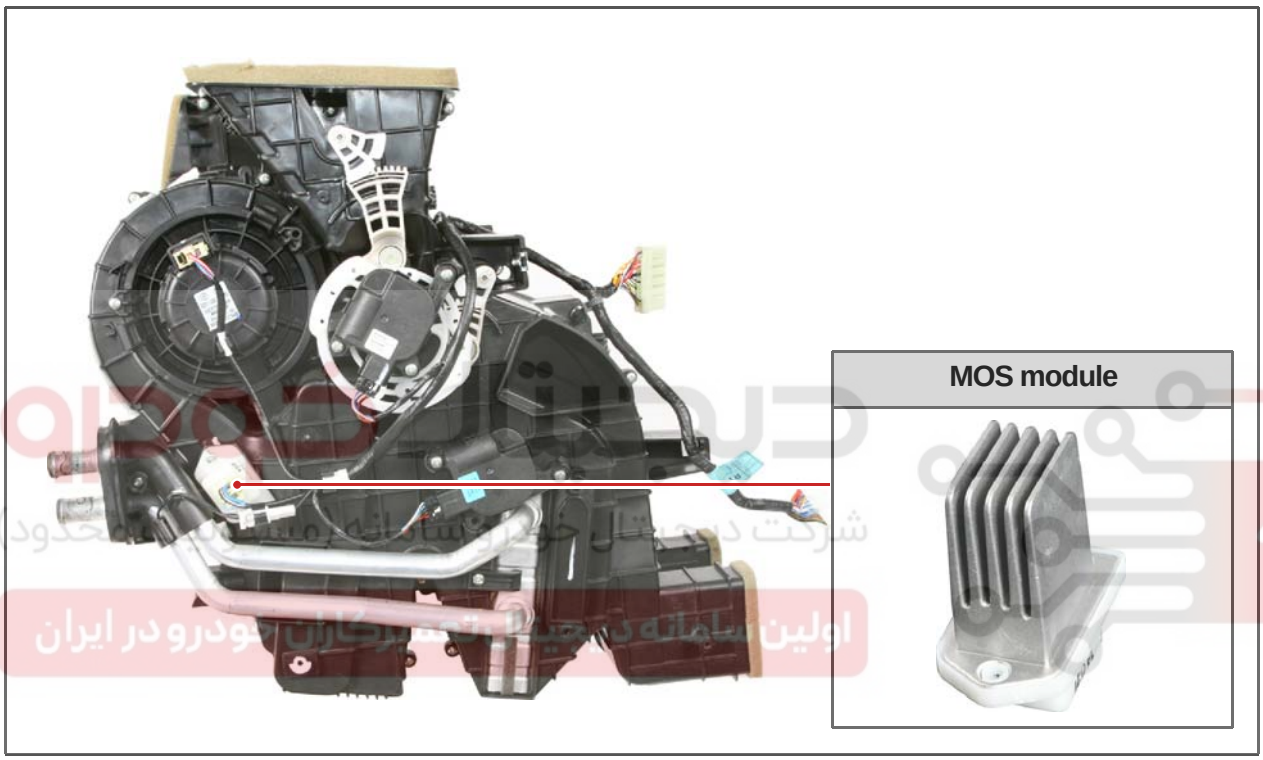
S.G.N. 6810-06

MOS MODULE

1) Overview

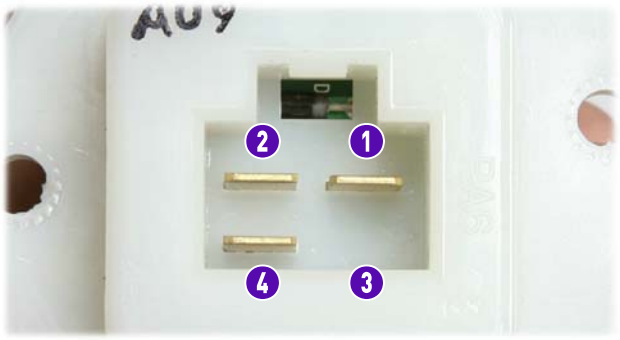
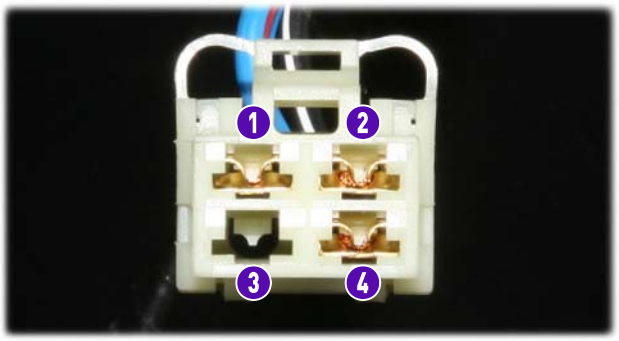
The MOS module is mounted at the bottom of the blower assembly and controls the fan speed. It receives the fan speed control signal from the heater and A/C control assembly to control the rotation speed of the blower motor by adjusting the current applied to the base of the MOS module.

2) Mounting Location & Components



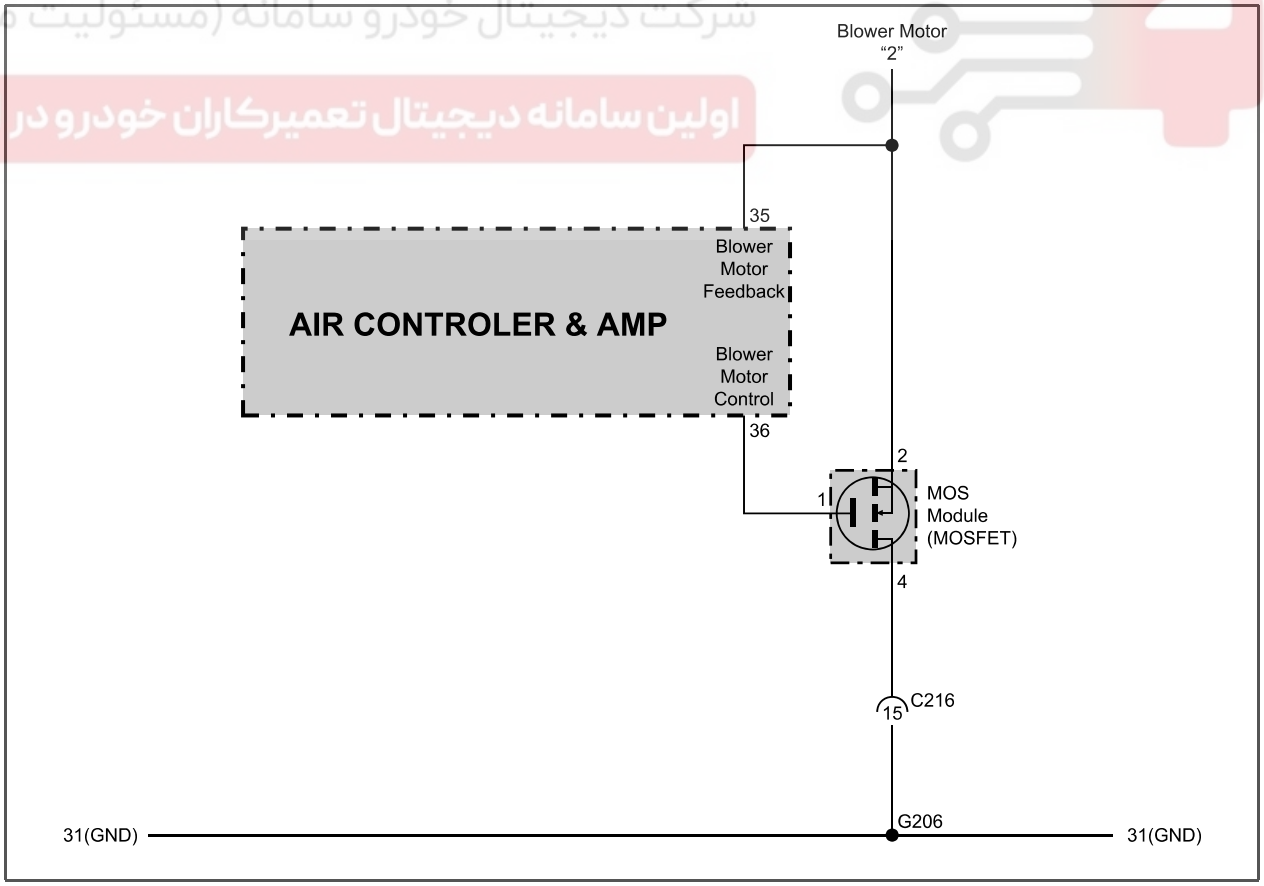
Modification basis	
Application basis	
Affected VIN	

3) MOS Module Connector

To module	To wiring
	

Pin No.	Function
1	Fan speed control
2	Blower feedback
3	-
4	Ground -

4) Circuit Diagram



Modification basis	
Application basis	
Affected VIN	

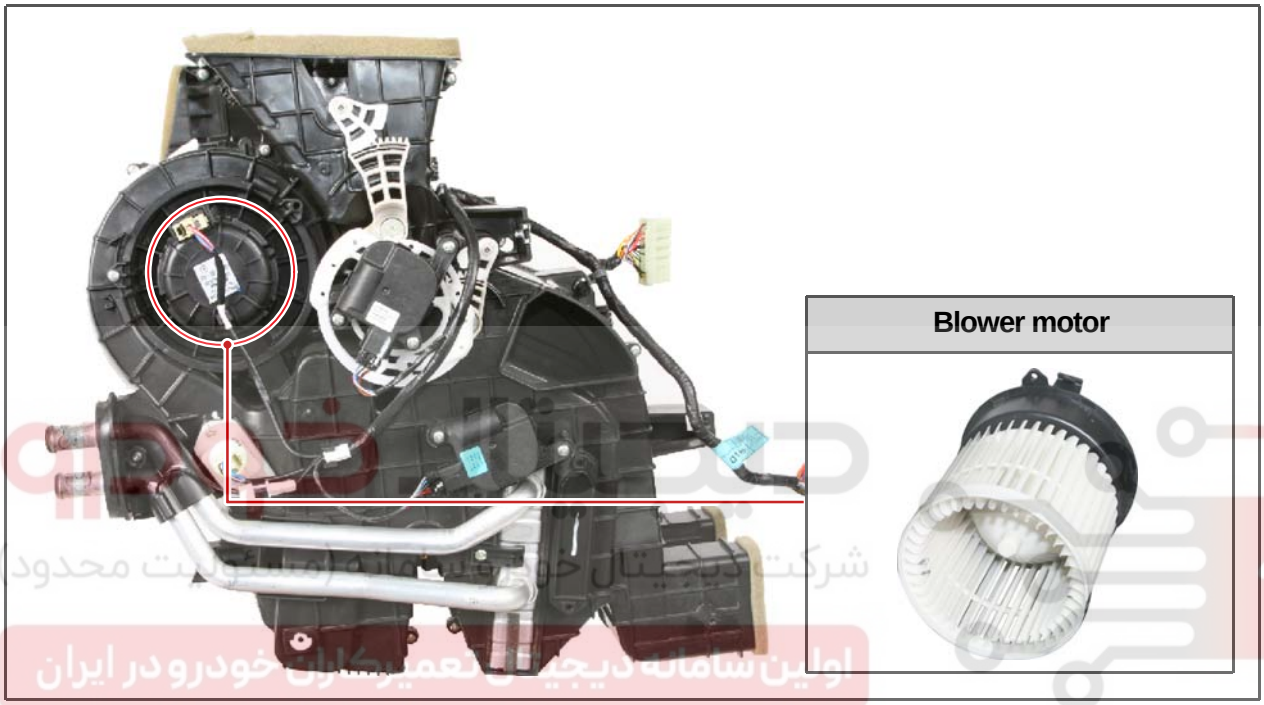
S.G.N. 6810-05

BLOWER MOTOR

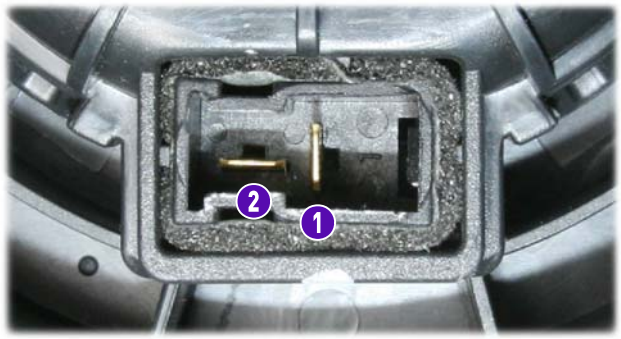
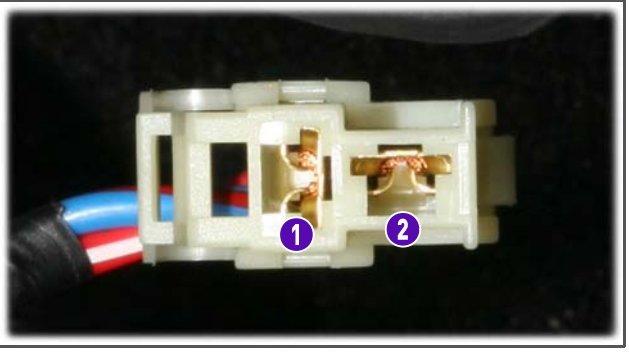
1) Overview

It is fitted on the rear top of the air conditioning module and controls the MOS module to adjust the fan speed step by step.

2) Mounting Location & Components



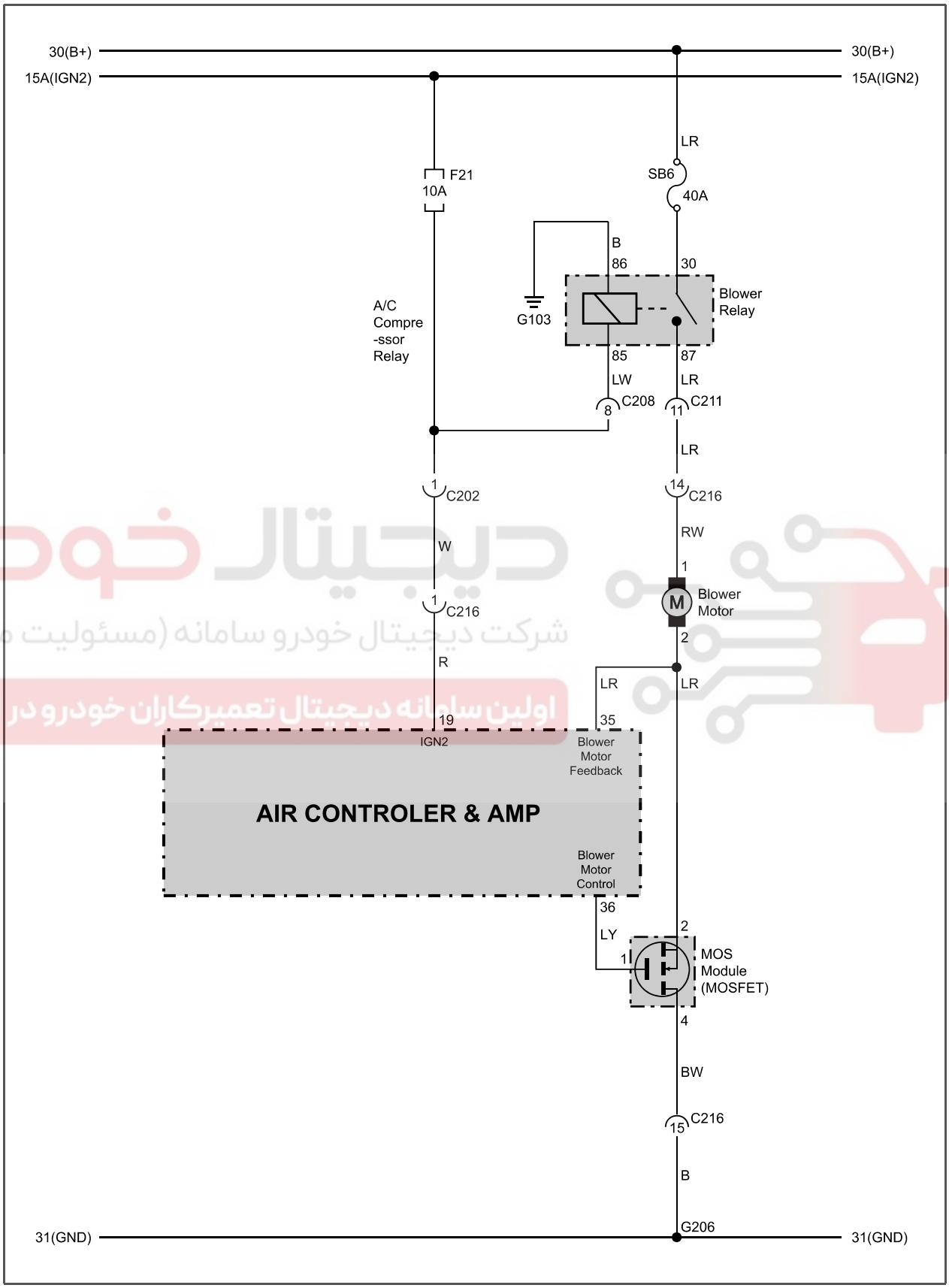
3) Blower Motor Connector

To motor	To wiring
	

Pin No.	Function
1	B+
2	Blower feedback

Modification basis	
Application basis	
Affected VIN	

4) Circuit Diagram



Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-03

A/C FILTER

1) Overview

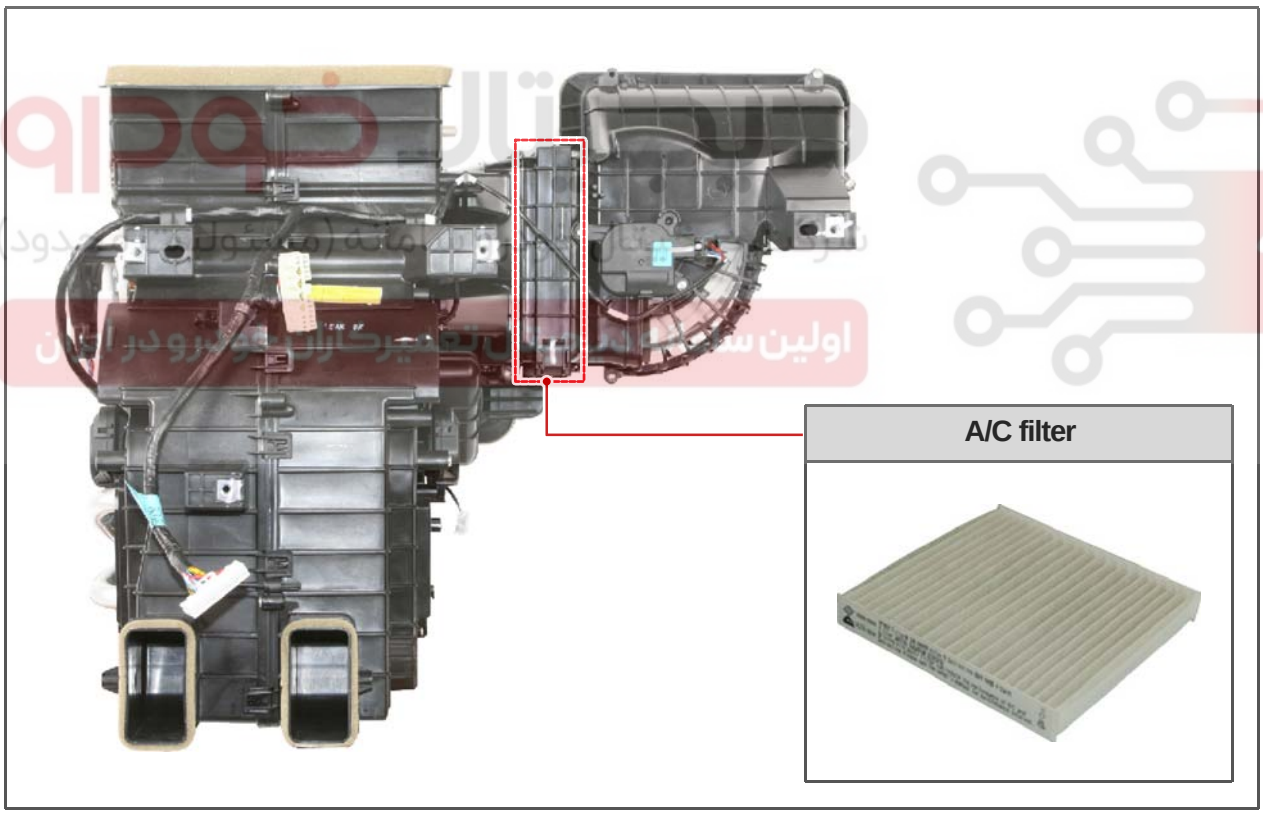
The A/C filter is fitted on the right-hand side of the blower motor and filters the air before it enters the blower motor. The A/C filter is in one-piece to reduce the resistance of the coming and going air and optimize the filtering effect.

NOTE

Change interval

- Replace at every 10.000km of driving.
- If the vehicle is driven under severe conditions such as dusty road, unpaved road, and excessive A/C and heater operation, shorten the replacement interval.

2) Mounting Location and Components



NOTE

How to check

- Remove the A/C air filter to check the filter for contamination and clogging by foreign materials.
- Replace the filter as necessary even within the replacement interval.

Modification basis	
Application basis	
Affected VIN	

S.G.N. 8520-18

SUN LOAD SENSOR

1) Overview

The sun load sensor is mounted to the left-hand of the driver's instrument panel. The photo diode, which converts the changes in light intensity into the electrical changes, detects the amount of light coming through windshield and changes it into the current and then sends the signal to the heater and A/C control assembly (with DATC).

NOTE

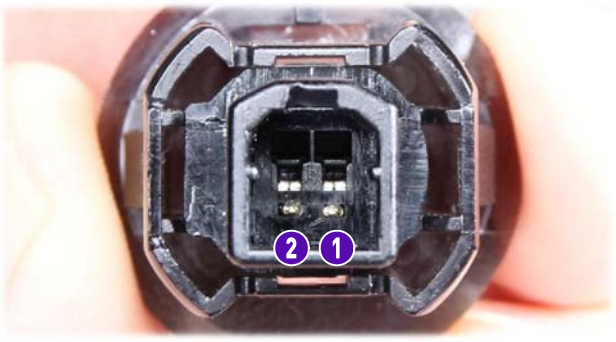
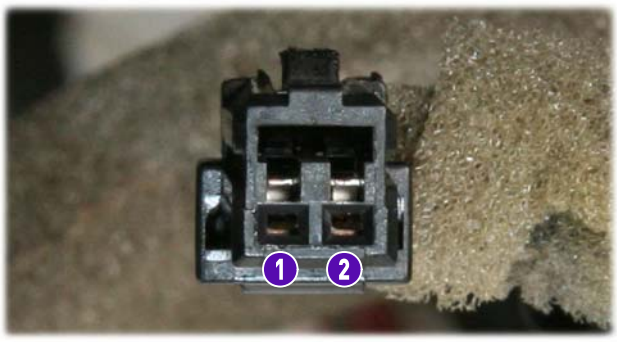
Photo diode

It uses the characteristic that the current is changed according to the amount of light on the photosensitive surface.

2) Mounting Location & Components

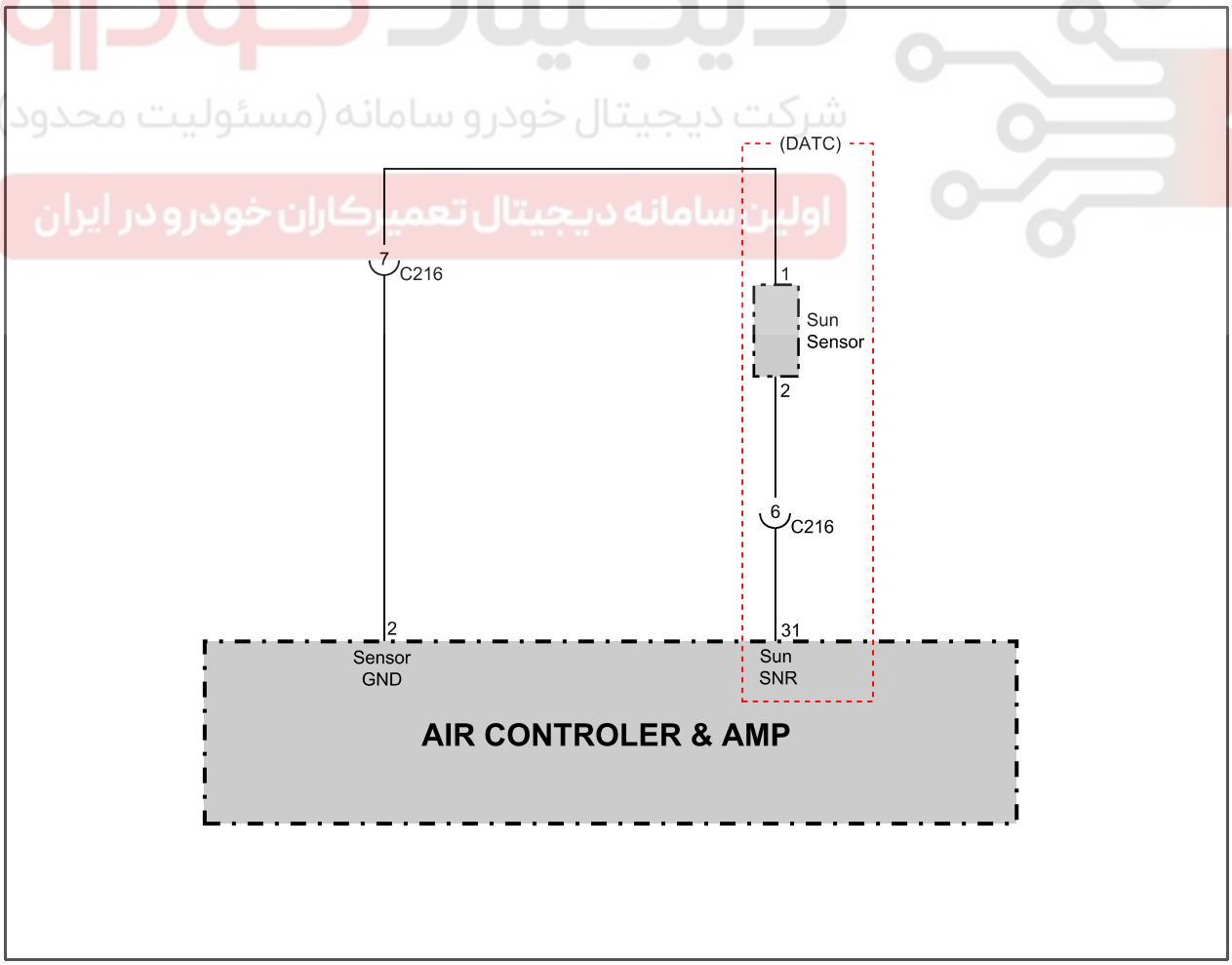
Modification basis	
Application basis	
Affected VIN	

3) Connector

To sensor	To wiring
	

Pin No.	Function
1	Sensor ground -
2	Sun-load sensor signal

4) Circuit Diagram



Modification basis	
Application basis	
Affected VIN	

NOTE

How to check sun load sensor

a. Remove the sun-load sensor and measure the current between the terminals with the sensor exposed to direct sunlight.
b. Measure the current again under shade. It is normal if the measured value is less than the measured value in direct sunlight. Check the followings:
   - Turn the ignition switch to the "ON" position and measure the voltage between the terminal No. 31 and the terminal No. 1 of the DATC connector.
     (Measured voltage: (approx. 0.4 V under sunlight and approx. 1.0 V under shade)
   - If the voltage cannot be measured, check the wiring for open circuit. If the result is as specified, replace the heater and A/C control assembly.

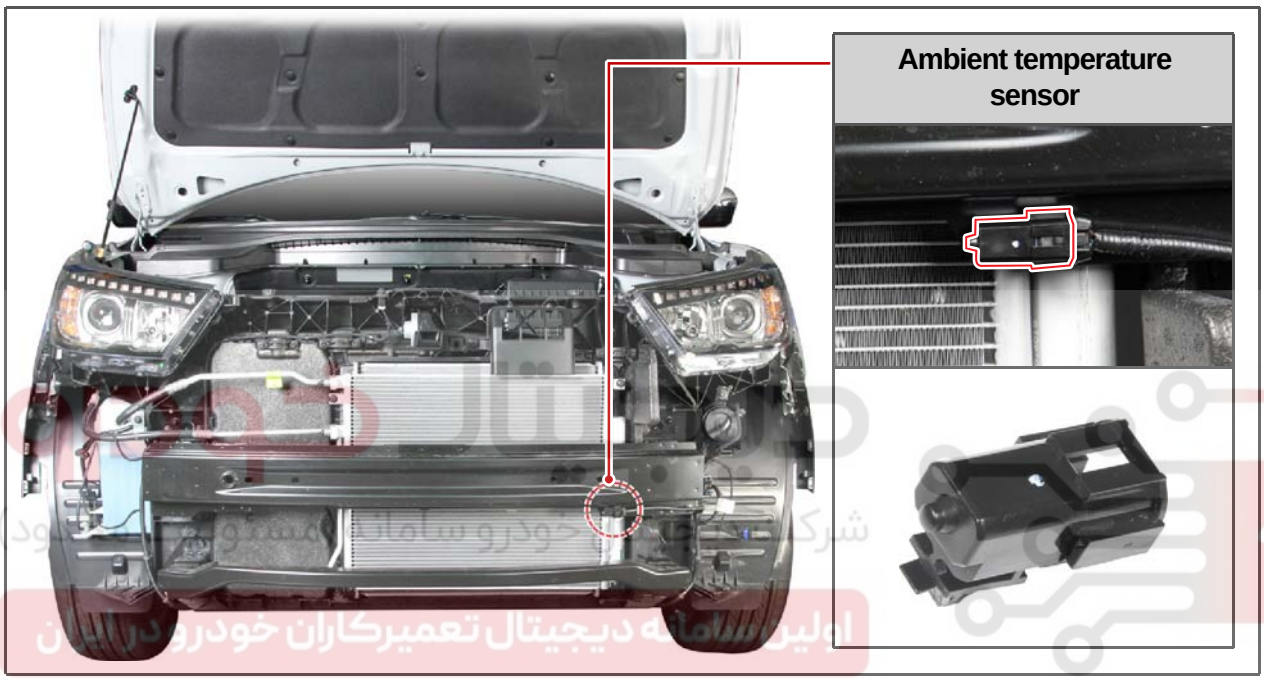
Modification basis	
Application basis	
Affected VIN	

S.G.N.
8520-14 AMBIENT TEMPERATURE SENSOR

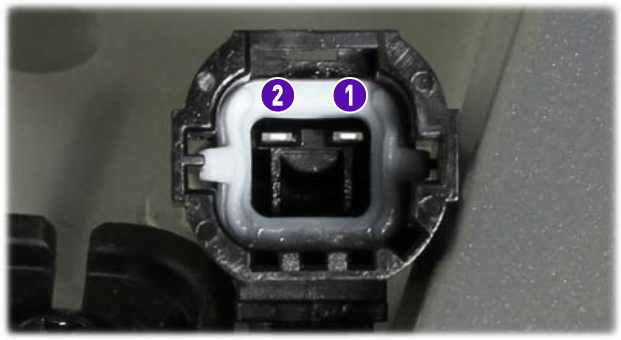
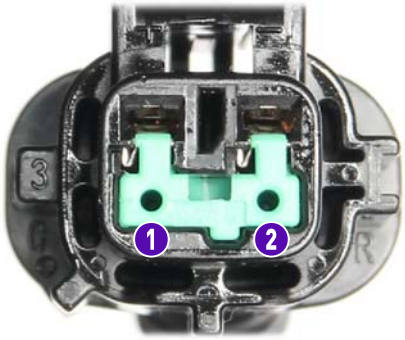
1) Overview

The ambient temperature sensor is fitted on the front bumper inner rail and consists of a negative temperature coefficient (NTC) thermistor. It detects the ambient temperature to send the voltage value according to the resistance change to the heater and A/C control assembly.

2) Mounting Location & Components



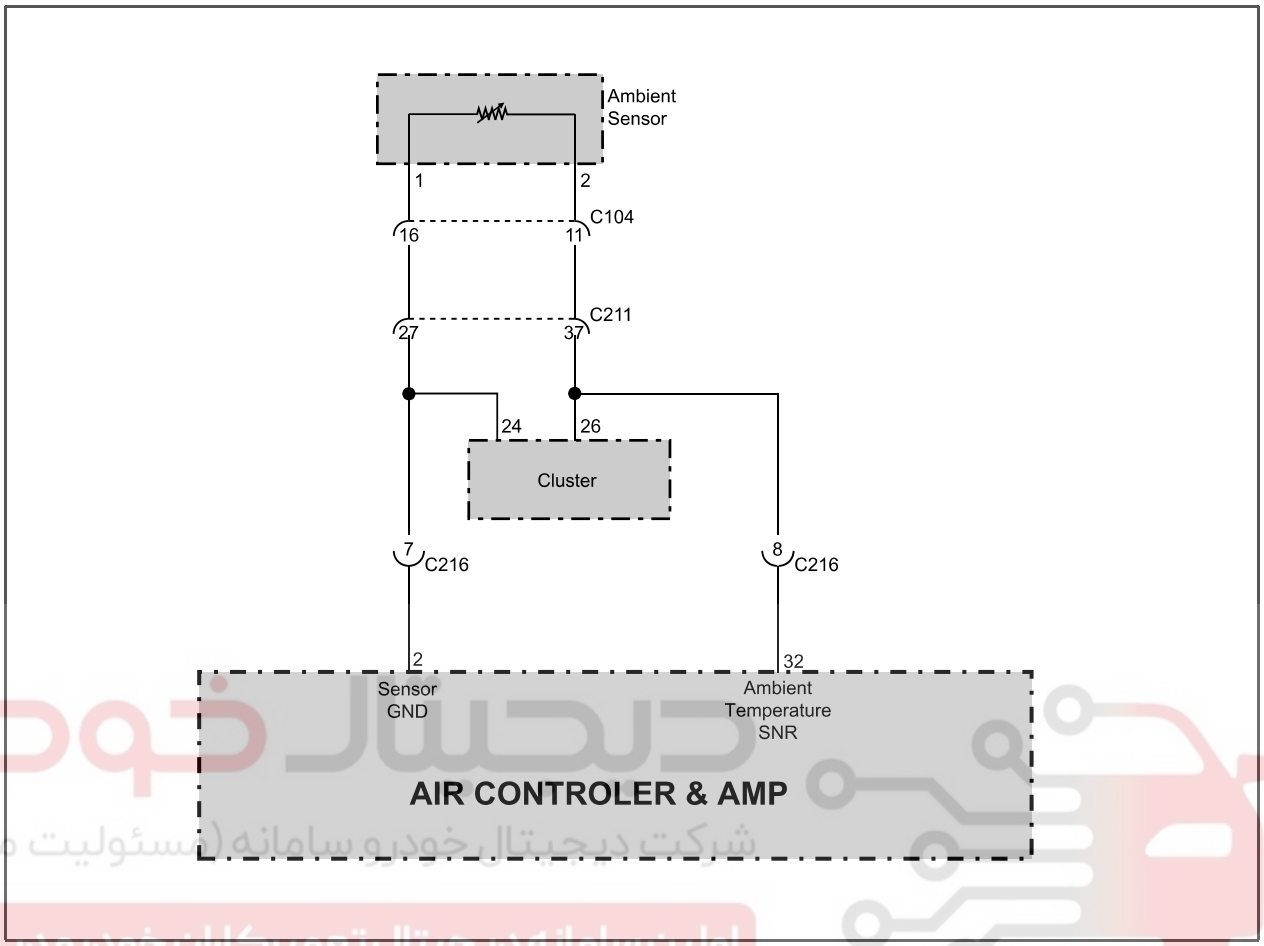
3) Ambient Temperature Sensor Connector

To sensor	To wiring
	

Pin No.	Function
1	Sensor ground -
2	Ambient temperature sensor signal

Modification basis	
Application basis	
Affected VIN	

4) Circuit Diagram



NOTE

How to check ambient temperature sensor

a. Remove the ambient temperature sensor and measure the resistances at both ends of the sensor connector. If the measured resistance is extremely high or low, replace the ambient temperature sensor. (Specified value: 2.186 kΩ ± 3% at 25℃)

b. If the measured value is out of the specified range, replace the ambient temperature sensor. If the measured value is within the specified range, check as described below:

- Turn the ignition switch to the "ON" position and measure the voltage between the terminal No. 32 and the terminal No. 1 of the DATC connector. (Measured voltage: approx. 2.5 V at 25℃) If the voltage cannot be measured, check the wiring for open circuit. If the result is as specified,
- replace the heater and A/C control assembly.

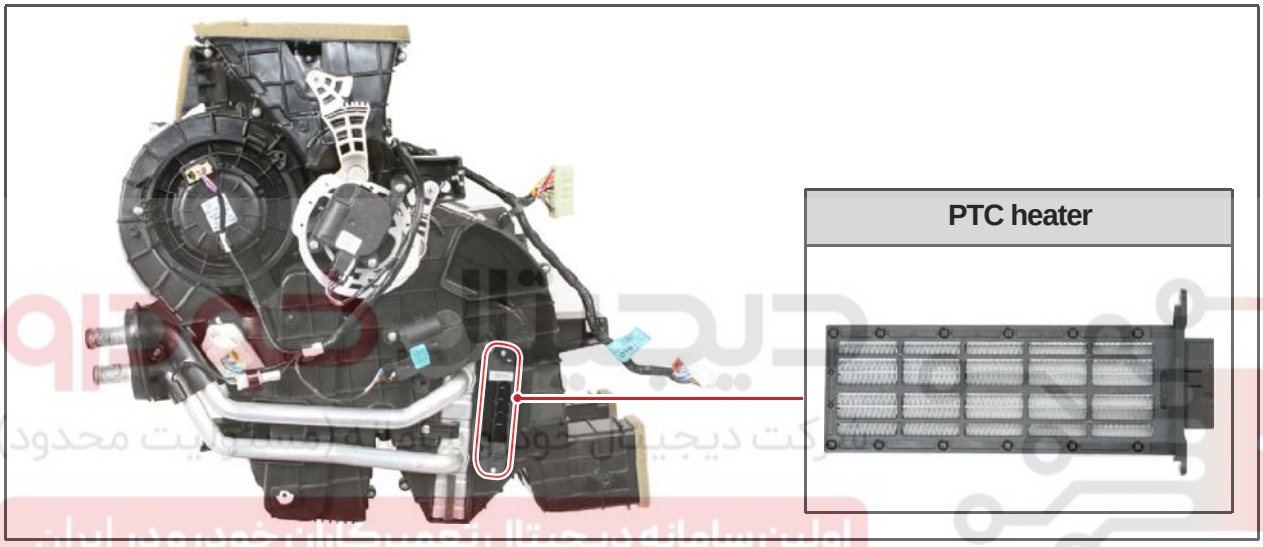
S.G.N. 6810-15

PTC HEATER (D16DTF)

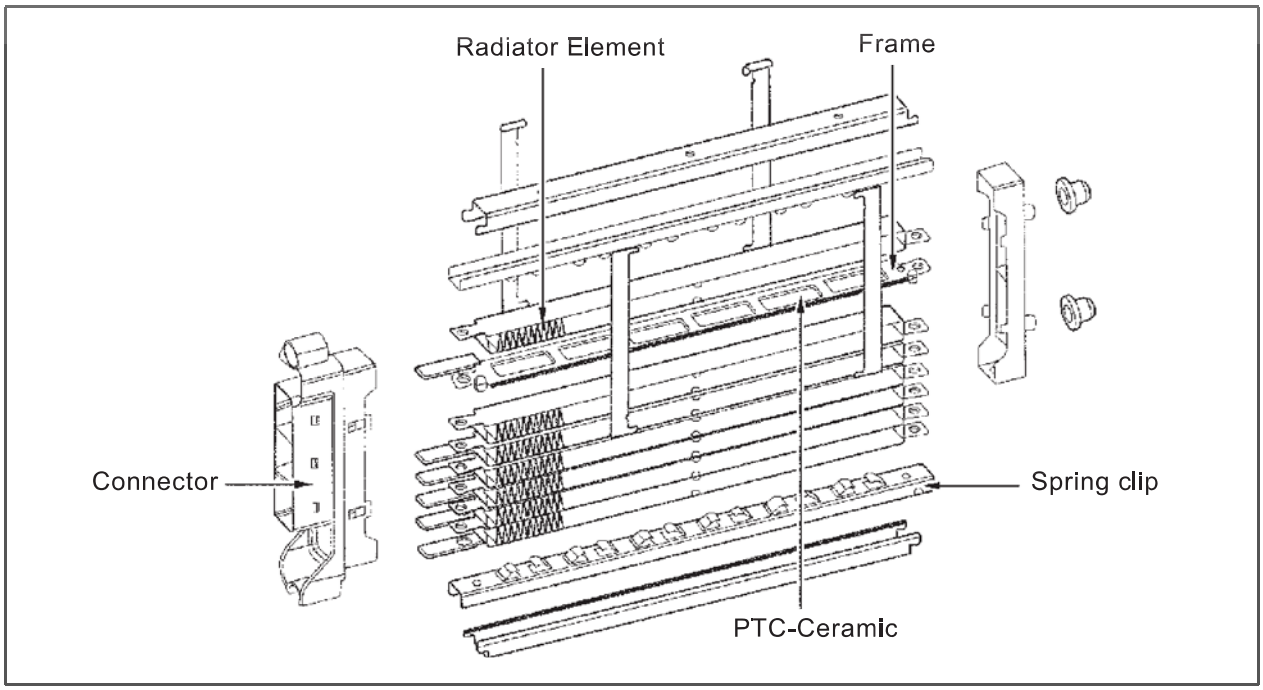
1) Overview

The PTC (Positive Temperature Coefficient) heater is mounted to the heater air outlet of the air conditioner module. This is used to assist the heating until the engine coolant temperature reaches to normal range when operating the heater with the vehicle cold. Since the PTC system is heated by the electrical power, the electric load and alternator capacity is greater than the conventional one. The PTC is not operated when a) the engine is cranking, b) the battery voltage is below 11 V, c) the glow plug is being preheated.

2) Mounting Location & Components

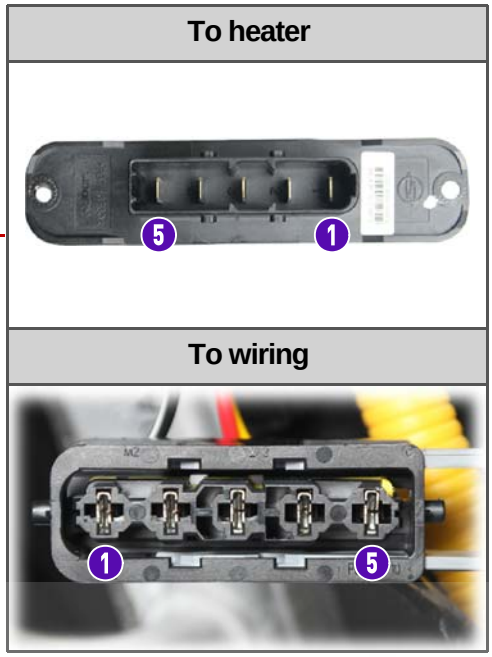


▶ **Exploded view**



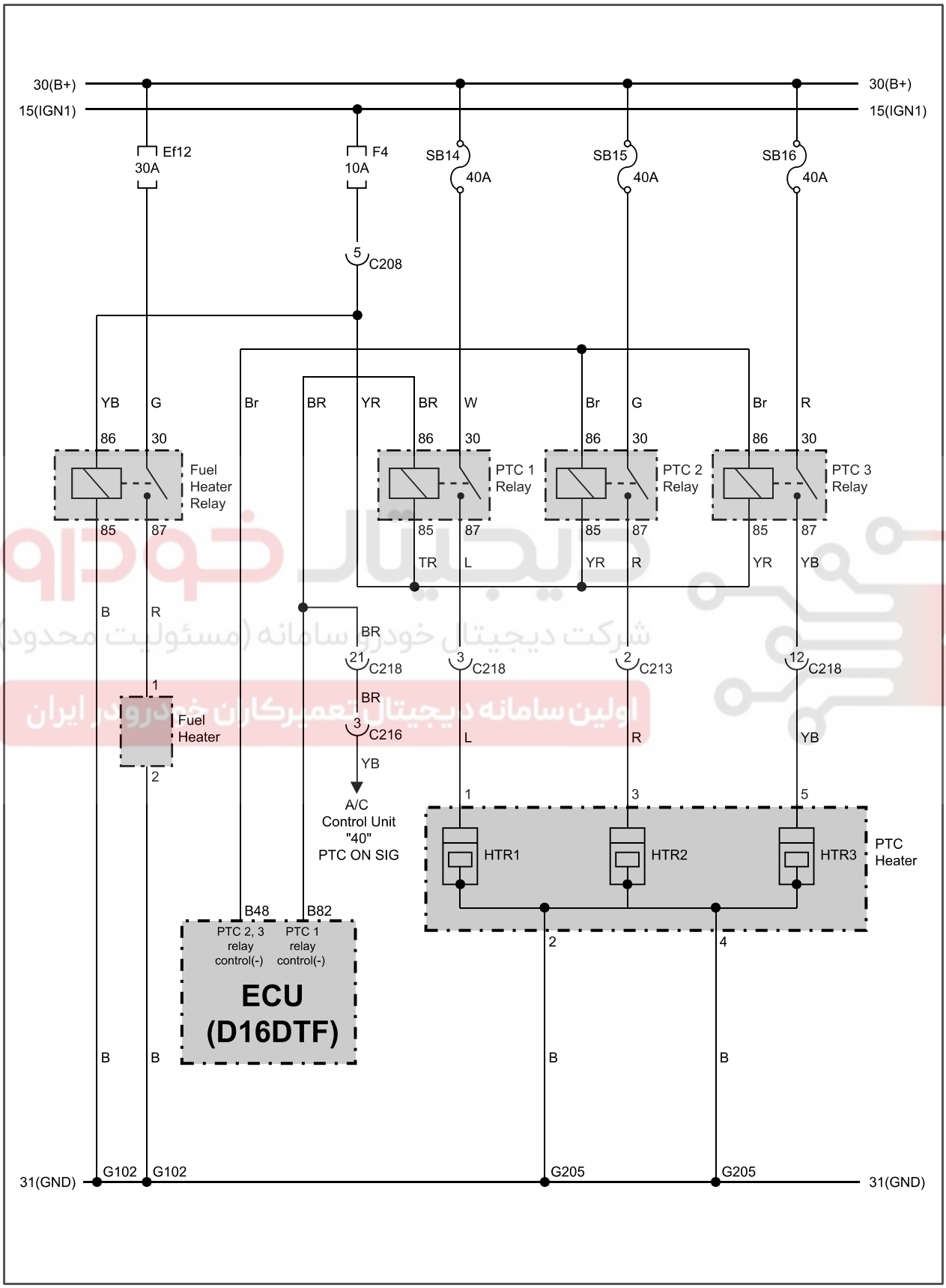
Modification basis	
Application basis	
Affected VIN	

3) PTC Heater Connector



Pin No.	Function
1	Heater 1
2	Ground -
3	Heater 2
4	Ground -
5	Heater 3

4) Circuit Diagram



Modification basis	
Application basis	
Affected VIN	

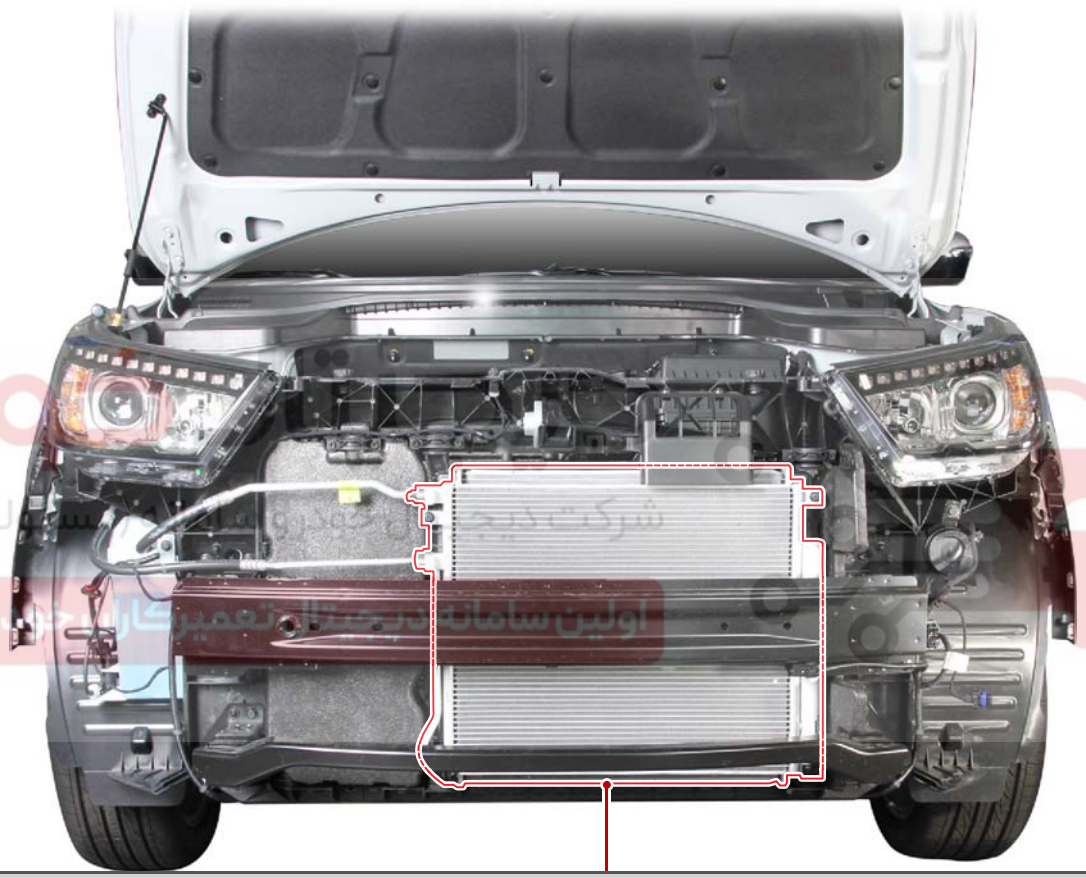
S.G.N. 6820-01

A/C CONDENSER

1) Overview

The A/C condenser is mounted in front of the front radiator and condenses vapor refrigerant into low temperature and high pressure liquid refrigerant. It has the built-in receiver drier, absorbs moisture in the refrigerant and reserves refrigerant to supply smoothly.

2) Mounting Location and Components



A/C condenser

Modification basis	
Application basis	
Affected VIN	

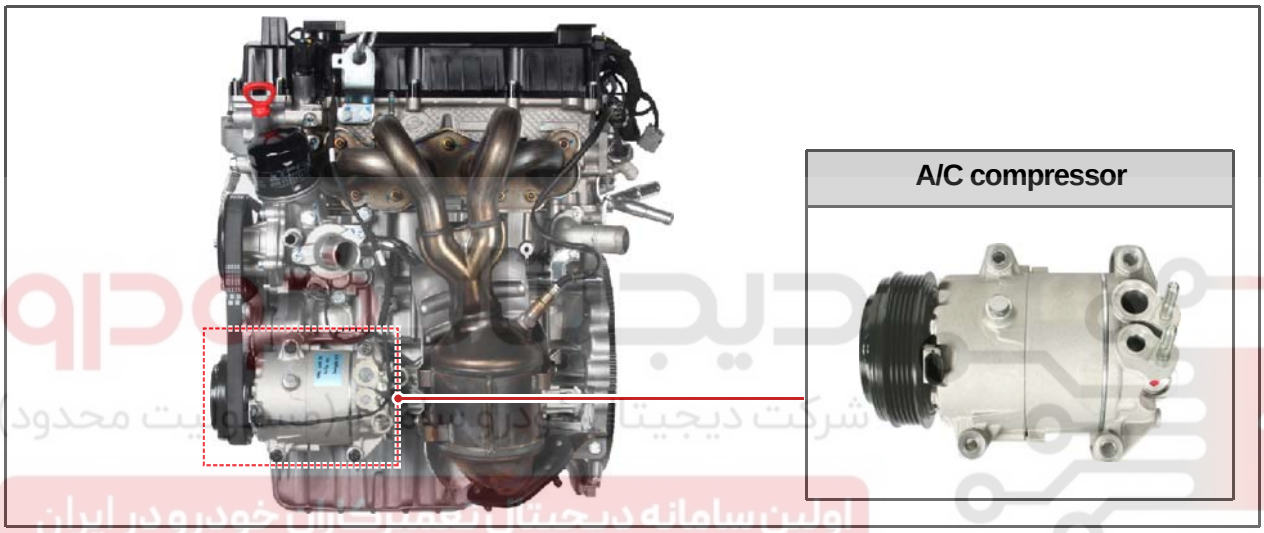
S.G.N. 1480-01

A/C COMPRESSOR

1) Overview

The A/C compressor, which is installed to the left side of the engine assembly, compresses the low-temperature and low-pressure coolant and converts it to the high-temperature and high-pressure coolant. Then, it sends the coolant to the A/C condenser. If the A/C operates, power is supplied to the magnetic clutch in the pulley and the driving force is transferred by the fan belt to compress the refrigerant. The engine ECU deactivates the A/C compressor in order to protect the A/C system in the event of A/C system overload.

2) Mounting Location & Components



NOTE

Conditions for deactivating

- Refrigerant pressure in A/C refrigerant pressure sensor is:
  * Below 2.0 kg/cm²: OFF and rises to 2.4 kg/cm² or higher: starts again
  * Above 32 kg/cm²: OFF and falls to 26 kg/cm² or lower: starts again
- Coolant temperature: OFF at 118°C or higher (starts again at 111°C or lower)
- Off for approx. 5 seconds after engine start
- Off for 4 seconds during abrupt acceleration
- Engine rpm: off at 400 rpm or less (starts again at 600 rpm or above)
- Off for 4 seconds when intake air negative pressure is higher than −0.2 kg/cm²
- Off at ambient temperature of 2°C or less (starts again at 5°C or higher) − controlled by DATC
- Off at evaporator temperature of 1°C or less (starts again at approx. 2.5°C or higher) − controlled by DATC
- When driving forwards uphill with gradient of 15% or higher or stationary (D or 1st gear engaged)
  When driving backwards downhill with gradient of 15% or higher or stationary (R gear engaged)
-

Modification basis	
Application basis	
Affected VIN	

REMOVAL AND INSTALLATION

S.G.N. 6810-20 HEATER AND A/C CONTROL ASSEMBLY

Preceding work - Disconnect the negative battery cable.

1. Remove the center fascia LH panel from the bottom using a hand remover.
   (The same method applies to the RH panel.)

CAUTION

Take care not to damage the fixing clips (5 off) when removing the center fascia LH panel.

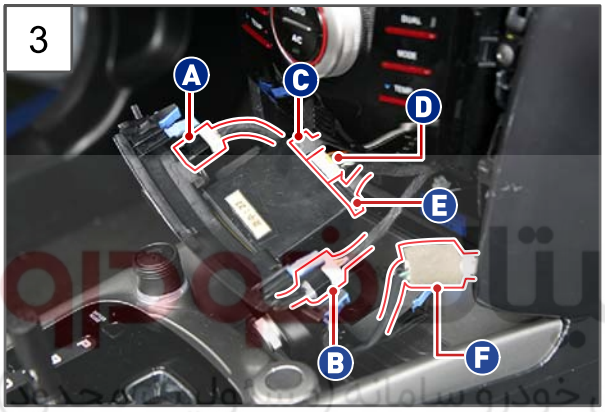
Front view	Rear view
	

Modification basis	
Application basis	
Affected VIN	

2

2. Prise off the center fascia front seat warmer switch assembly panel using a remover.

3



3. Disconnect the connectors at the rear of the front seat warmer switch assembly panel.

(A) Driver seat warmer & ventilation switch connector
(B) Passenger seat warmer switch connector
(C) USB connector
(D) AUX connector
(E) HDMI connector
(F) IP center lower mood lamp connector

4

4. Remove the front seat warmer switch assembly panel.

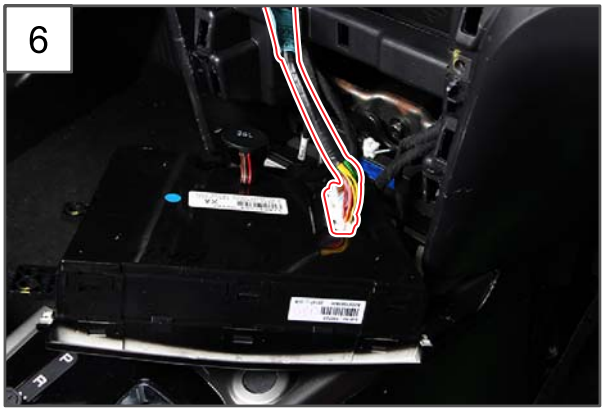
Fixing clips (6 off)

5

5. Unscrew the 4 mounting screws for the heater and A/C control assembly.

Modification basis	
Application basis	
Affected VIN	

6



6. Disconnect the heater and A/C control assembly connector (A) at the rear of the heat and A/C control assembly by prising it off.

7

7. Remove the heater and A/C control assembly.

8

8. Install in the reverse order of removal.

NOTE

Remove and install the heater and A/C control assembly with FATC and one with MTC in the same way.

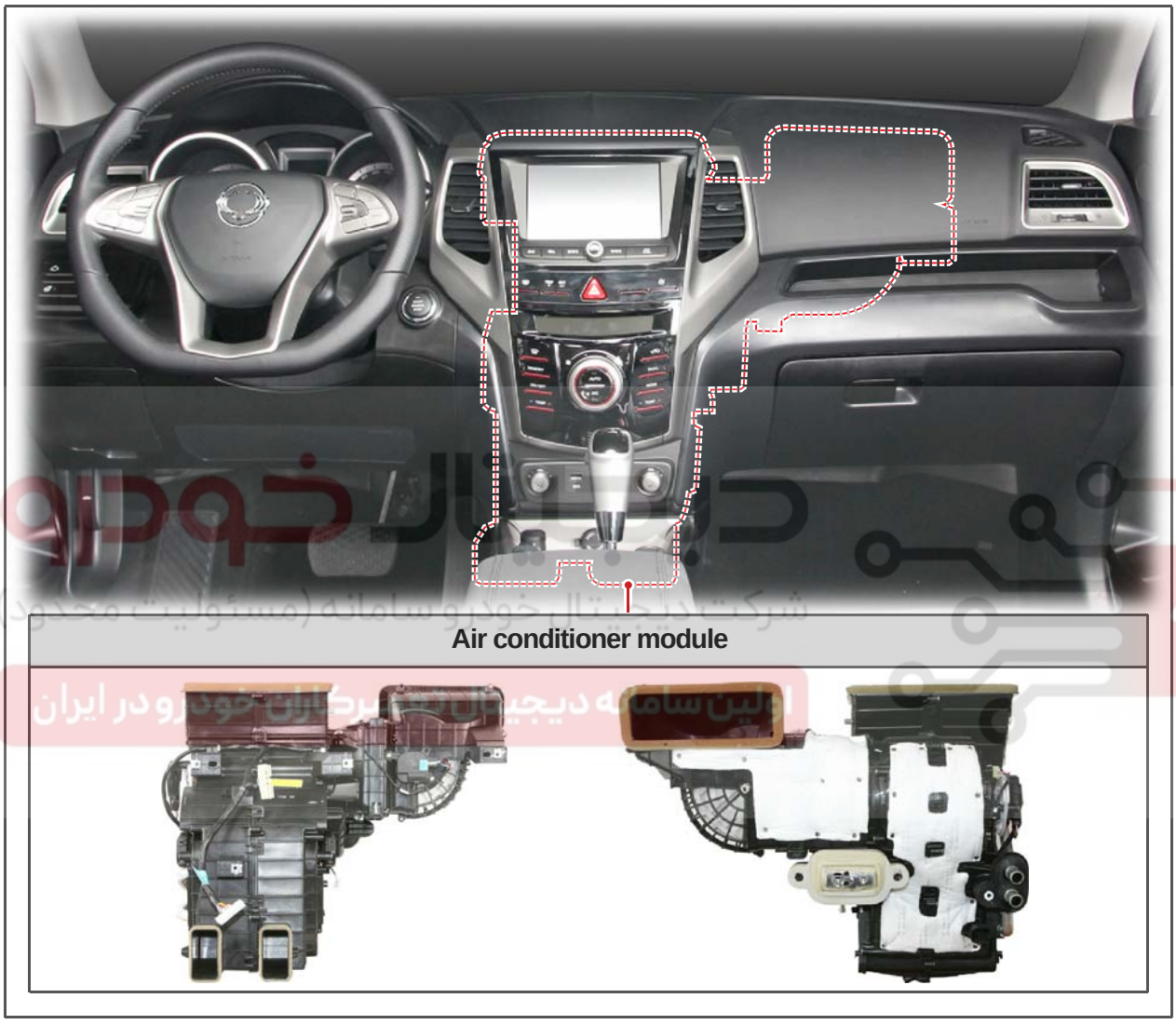
Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-01

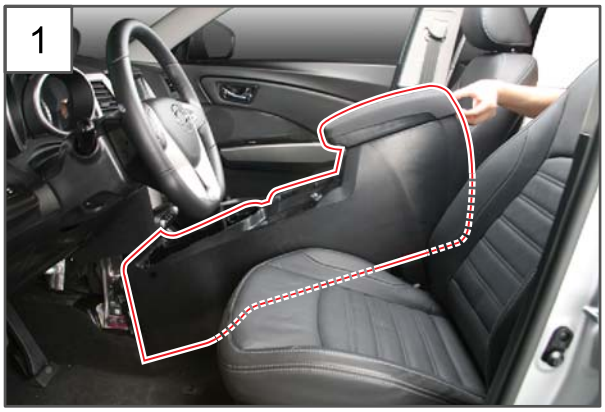
AIR CONDITIONER MODULE

Preceding work

- Disconnect the negative battery cable.
- Drain the A/C refrigerant in a suitable container. The collected refrigerant should be disposed of at designated disposal sites.
- Drain the coolant from the radiator.



Air conditioner module



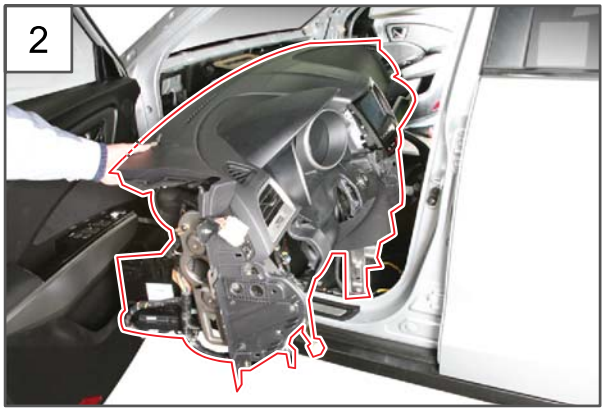
1. Remove the front console.

NOTE

Refer to "FRONT CONSOLE ASSEMBLY" under "REMOVAL AND INSTALLATION" in "BODY INTERIOR" chapter.

Modification basis	
Application basis	
Affected VIN	

2

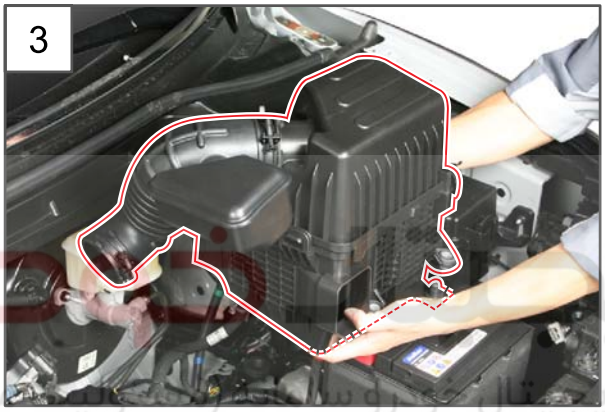


2. Remove the instrument panel and frame.

NOTE

Refer to "INSTRUMENT PANEL AND FRAME" under "REMOVEAL AND INSTALLATION" in "BODY INTERIOR" chapter.

3

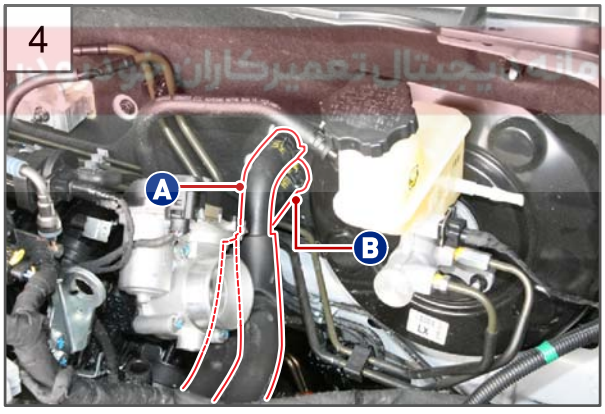


3. Remove the air cleaner assembly.

NOTE

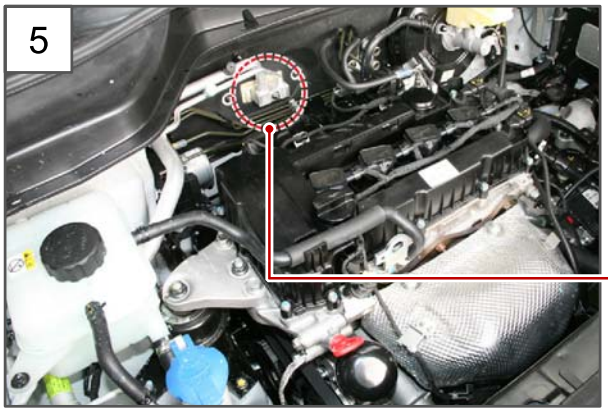
See "AIR CLEANER ASSEMBLY" under "REMOVAL AND INSTALLATION" in "G16DF ENGINE INTAKE SYSTEM

4



4. Remove the heater upper hose (A) and heater lower hose (B) from the heater core.

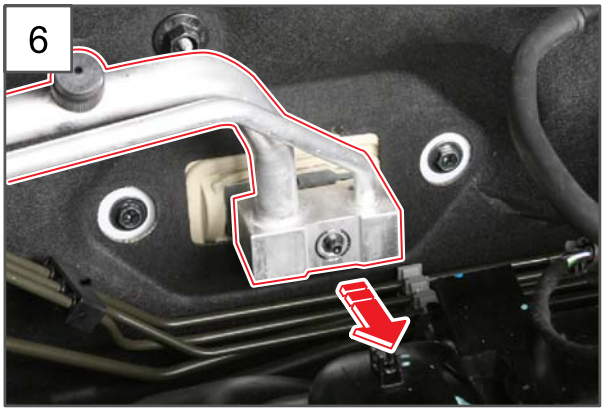
5



5. Unscrew a A/C pipe mounting nut (12 mm) from the expansion valve.

Modification basis	
Application basis	
Affected VIN	

6

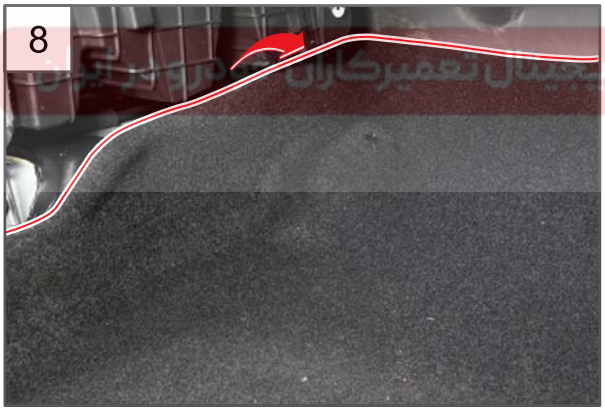


6. Remove the A/C pipe from the expansion valve to the arrow direction.

7

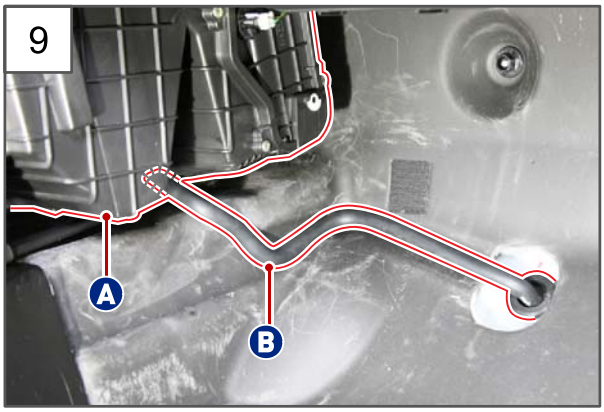
7. Unscrew the 3 mounting screw bolts (10 mm) for the air conditioner module.

8



8. Bend some of the passenger carpet over.

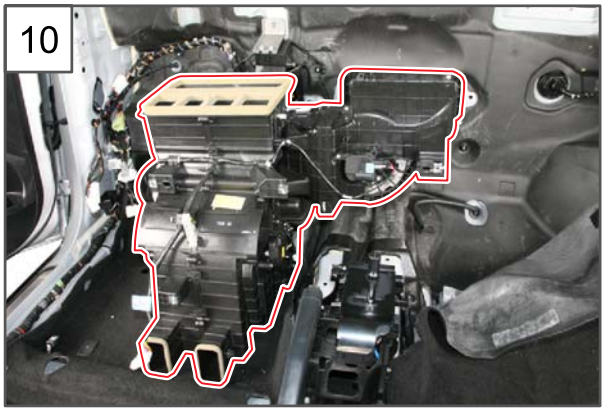
9



9. Remove the A/C water drain hose (B) from the evaporator (A).

Modification basis	
Application basis	
Affected VIN	

10

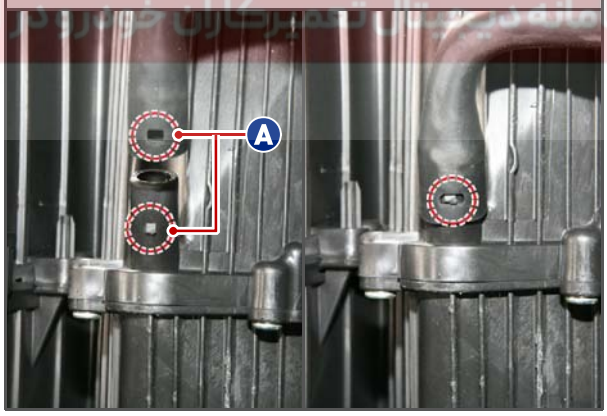


10.Remove the air conditioner module.

11

1. Install in the reverse order of removal.

Cautions for installation



- Make sure that the grooves (A) are aligned when connecting the A/C water drain hose to the evaporator case.

Modification basis	
Application basis	
Affected VIN	

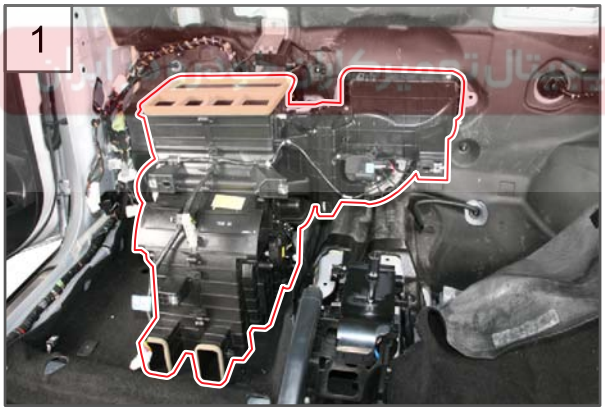
S.G.N. 6810-13

HEATER CORE

Preceding work

- Disconnect the negative battery cable.
- Drain the A/C refrigerant in a suitable container. The collected refrigerant should be disposed of at designated disposal sites.
- Drain the coolant from the radiator.

1

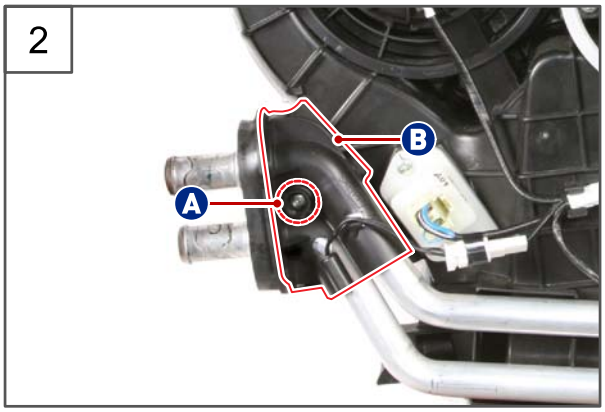


1. Remove the air conditioner module.

NOTE

Refer to "AIR CONDITIONER MODULE" under "REMOVAL AND INSTALLATION" in "AIR CONDITIONING SYSTEM" chapter.

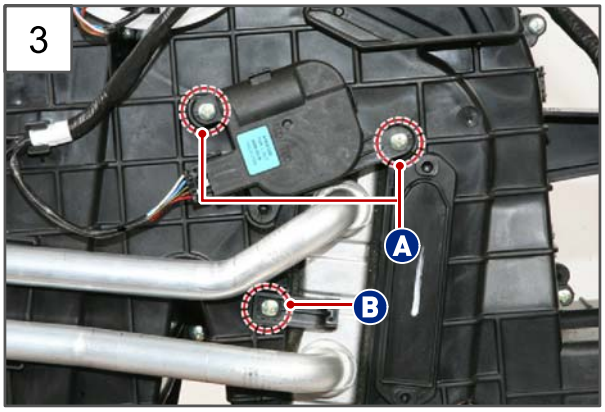
2



2. Unscrew the one heater pipe cover mounting screw (A) and remove the heater pipe cover (B).

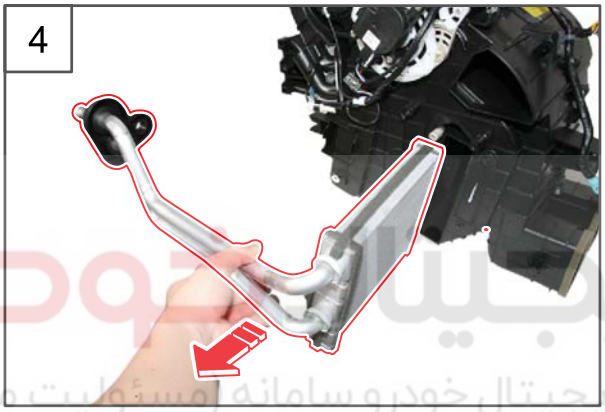
Modification basis	
Application basis	
Affected VIN	

3



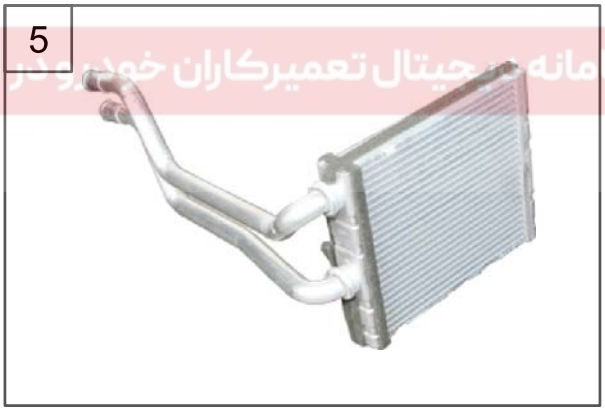
3. Unscrew the 2 driver's temp actuator mounting screws (A) and mounting screw (B) for the heater core mounting bracket and remove the driver's temp actuator and heater core mounting bracket.

4



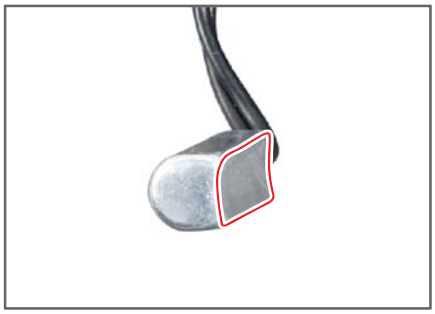
4. Pull out the heater core to the arrow direction.

5



5. Install in the reverse order of removal.

Cautions for installation



Make sure that the concave part of the water temperature sensor is pressed against the heater core pipe when fitting it.

S.G.N.
6810-12 MODE ACTUATOR

Preceding work - Disconnect the negative battery cable.

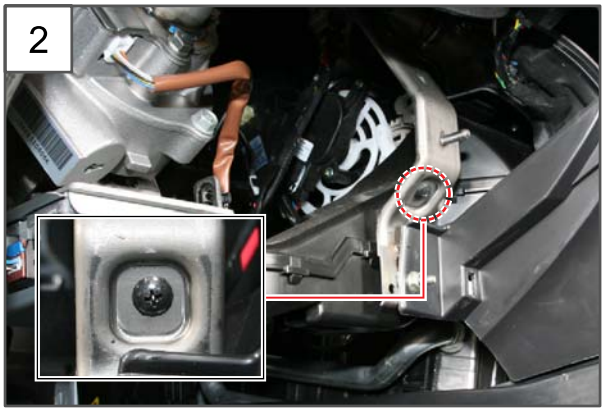
1

1. Remove the driver's knee airbag.

NOTE

Refer to "DRIVER KNEE AIR BAG" under "REMOVAL AND INSTALLATION" in "AIR BAG SYSTEM" chapter.

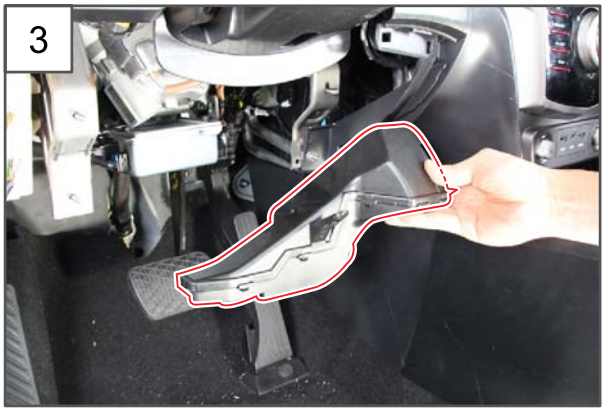
2



2. Unscrew the one mounting screw for the driver foot duct.

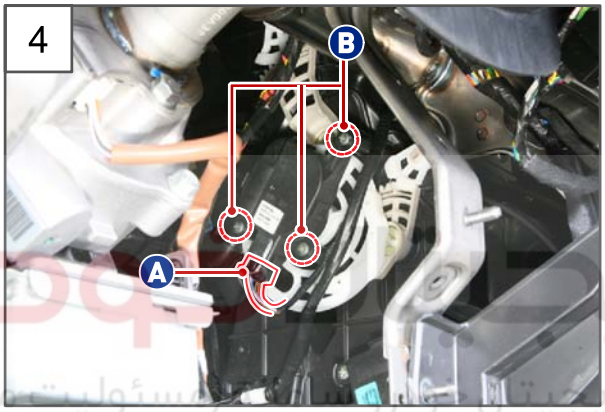
Modification basis	
Application basis	
Affected VIN	

3



3. Remove the driver foot lamp.

4



4. Disconnect the mode actuator connector (A) and unscrew the 3 mounting screws (B).

5

5. Remove the mode actuator.

6

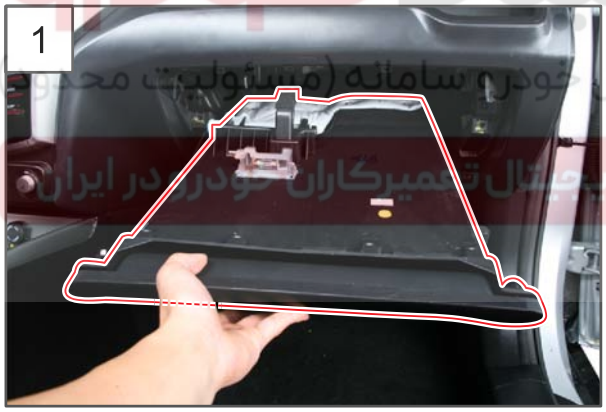
6. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

S.G.N.
6810-02 INTAKE ACTUATOR

Preceding work - Disconnect the negative battery cable.

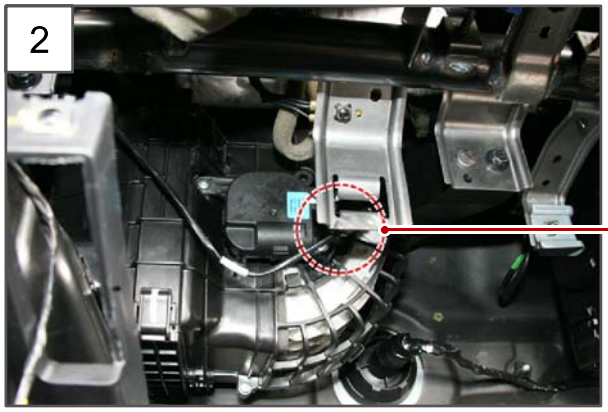
1



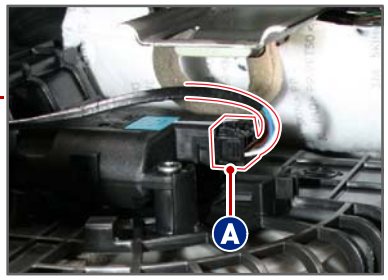
1. Remove the glove box assembly.

NOTE
Refer to "GLOVE BOX ASSEMBLY" under "REMOVAL AND INSTALLATION" in "BODY INTERIOR".

2

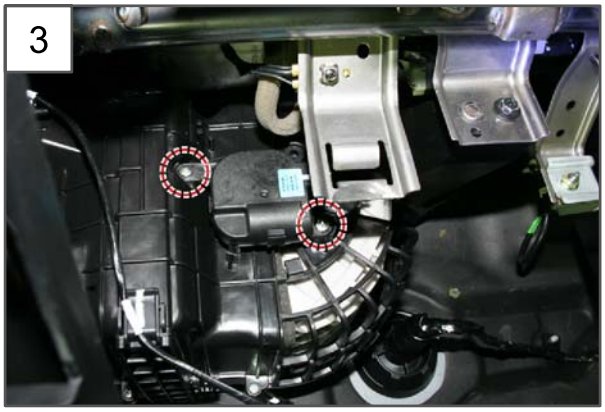


2. Disconnect the intake actuator connector (A).



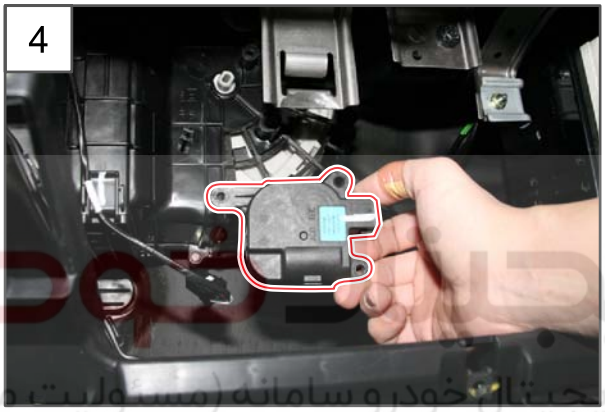
Modification basis	
Application basis	
Affected VIN	

3



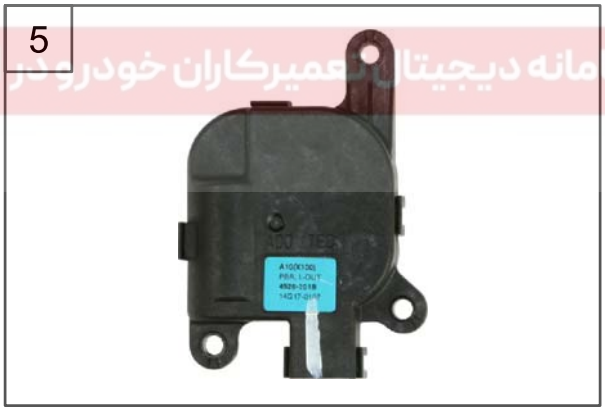
3. Unscrew the 2 intake actuator mounting screws.

4



4. Remove the intake actuator.

5



5. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

S.G.N.
6810-25 TEMP ACTUATOR

Preceding work - Disconnect the negative battery cable.

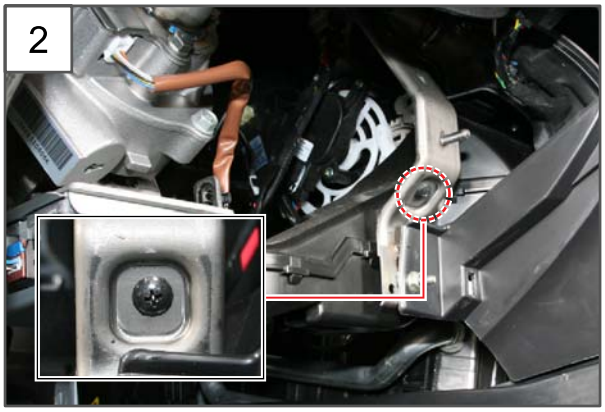
1

1. Remove the driver's knee airbag.

NOTE

Refer to "DRIVER KNEE AIR BAG" under "REMOVAL AND INSTALLATION" in "AIR BAG SYSTEM" chapter.

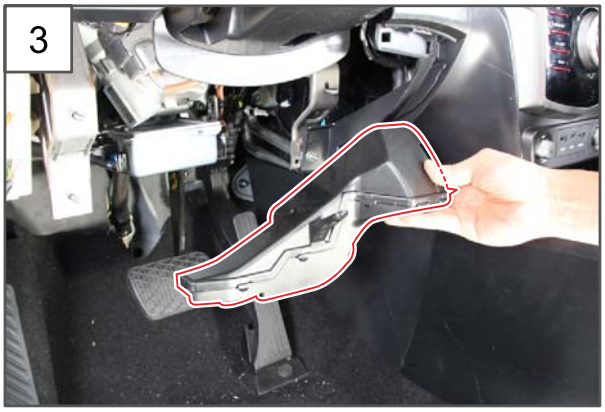
2



2. Unscrew the one mounting screw for the driver foot duct.

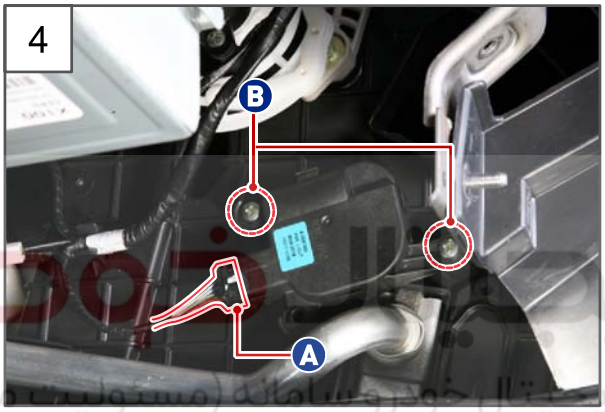
Modification basis	
Application basis	
Affected VIN	

3



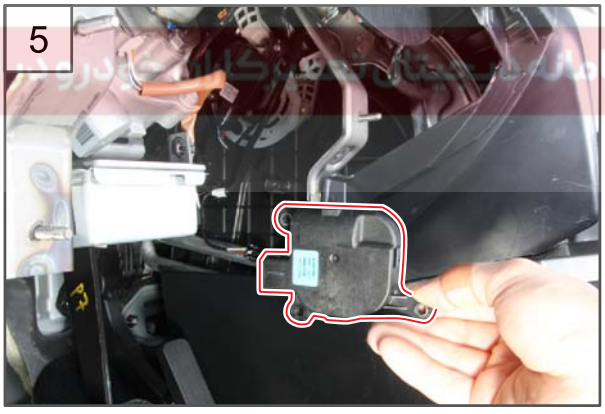
3. Remove the driver foot lamp.

4



4. Disconnect the driver's temp actuator connector (A) and unscrew the 2 mounting screws (B).

5

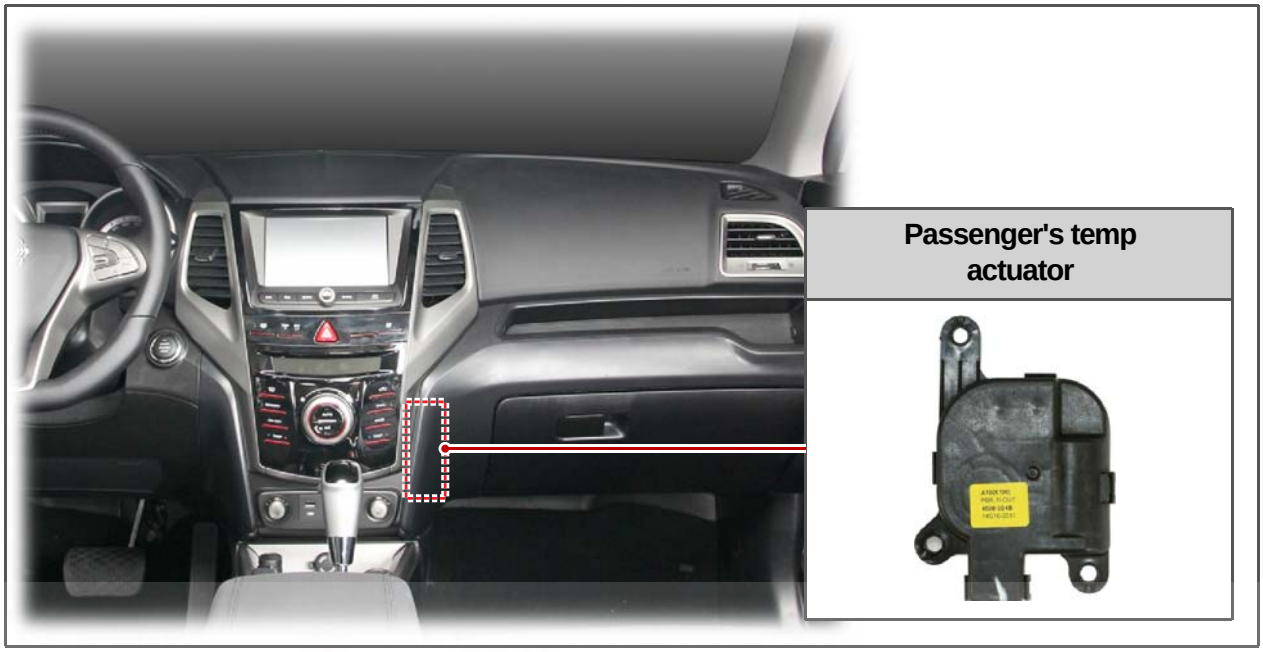


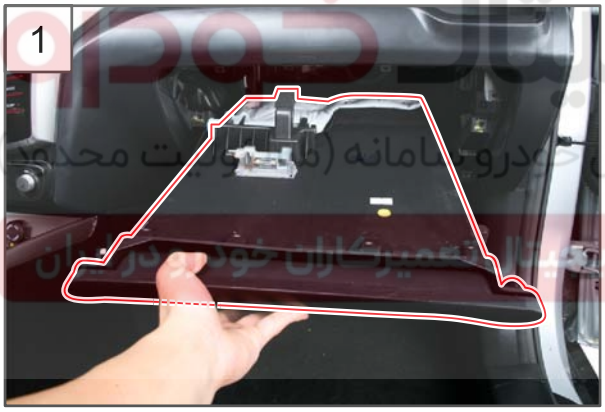
5. Remove the driver's temp actuator.

6

6. Install in the reverse order of removal.

▶ Passenger's temp actuator

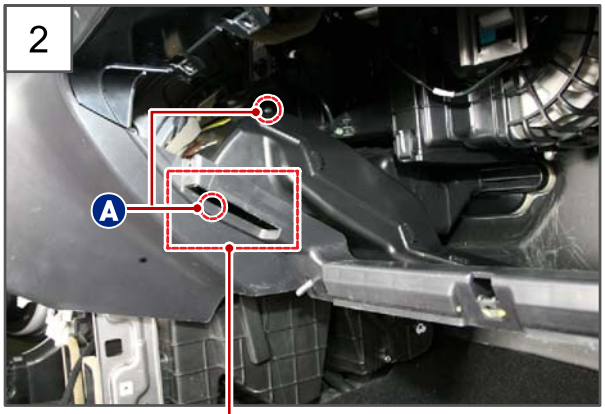




1. Remove the glove box assembly.

NOTE

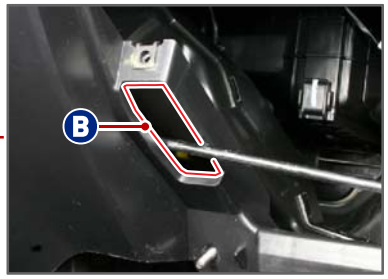
Refer to "GLOVE BOX ASSEMBLY" under "REMOVAL AND INSTALLATION" in "BODY INTERIOR".



2. Unscrew the 2 mounting screws for the passenger foot duct.

NOTE

Unscrew the passenger foot duct lower mounting screw through the instrument panel hole (B) as shown in the picture.

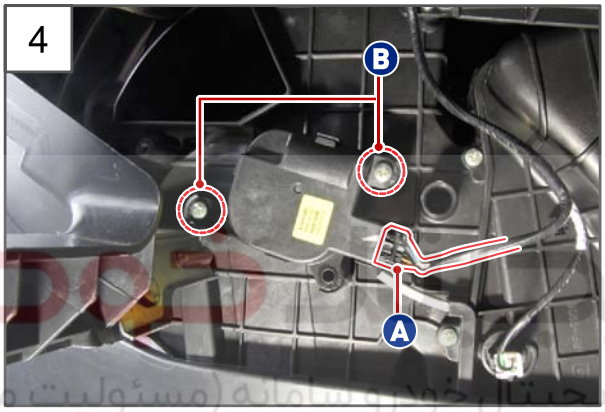


Modification basis	
Application basis	
Affected VIN	

3

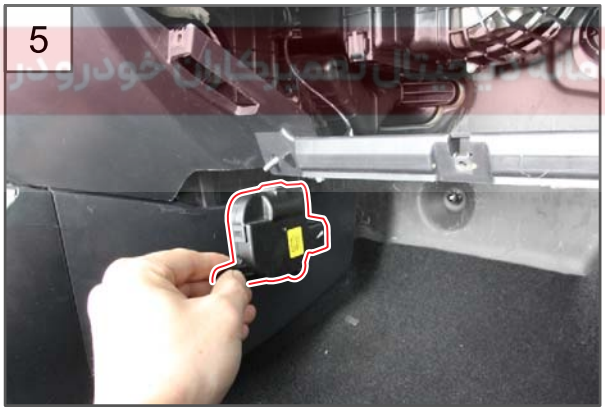
3. Remove the passenger foot lamp.

4



4. Disconnect the passenger's temp actuator connector (A) and unscrew the 2 mounting screws (B).

5



5. Remove the passenger's temp actuator.

6

6. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

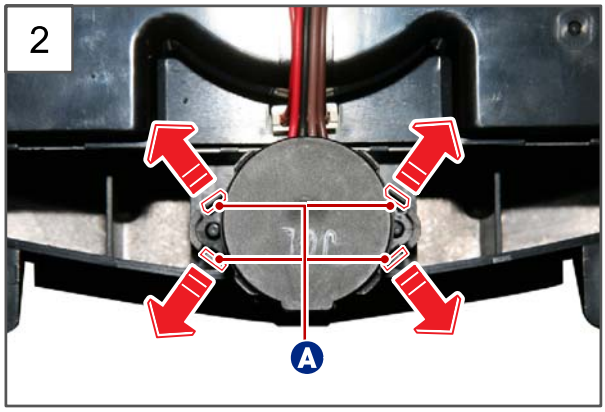
S.G.N.
6810-23 IN-CAR SENSOR

Preceding work - Disconnect the negative battery cable.

1. Remove the heater and A/C control assembly.

NOTE

Refer to "HEATER AND A/C CONTROL ASSEMBLY" under "REMOVAL AND INSTALLATION" in "ELECTRICLAL SYSTEM".



2. Remove the in-car sensor by pushing the in-car sensor mounting part (A) to the arrow direction at the rear of the heater and A/C control assembly.

Modification basis	
Application basis	
Affected VIN	

3. Disconnect the in-car sensor connector.

4. Remove the in-car sensor.

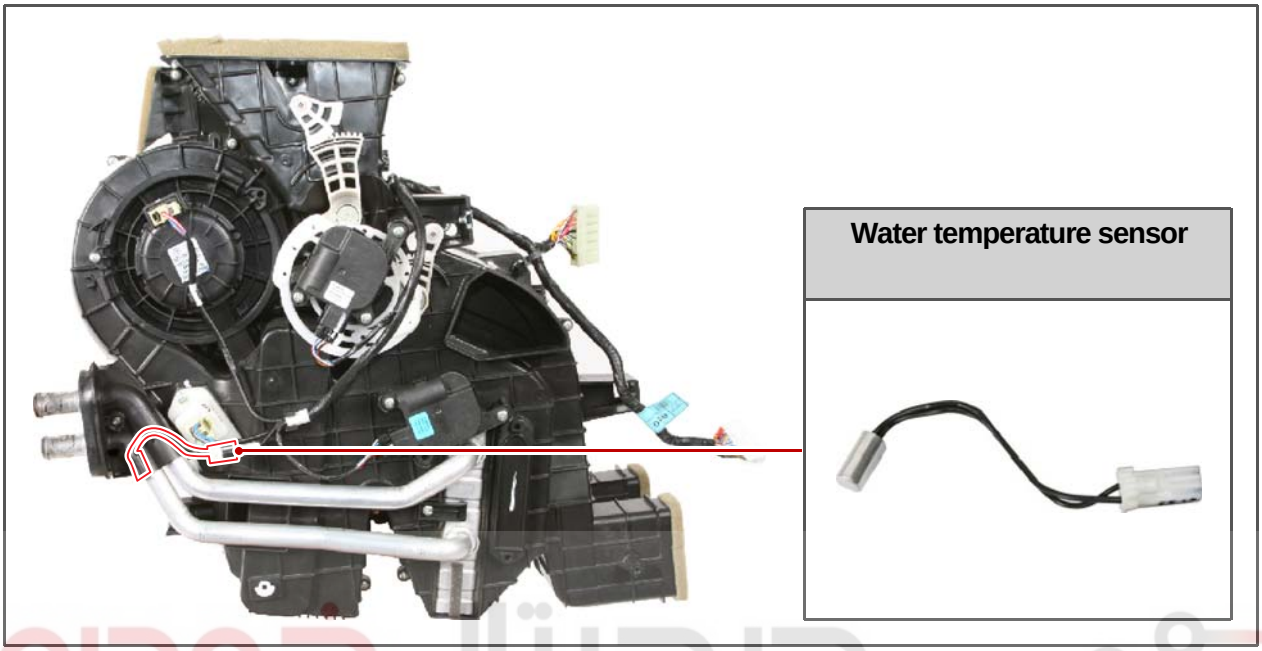
5. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-30

WATER TEMPERATURE SENSOR

Preceding work - Disconnect the negative battery cable.



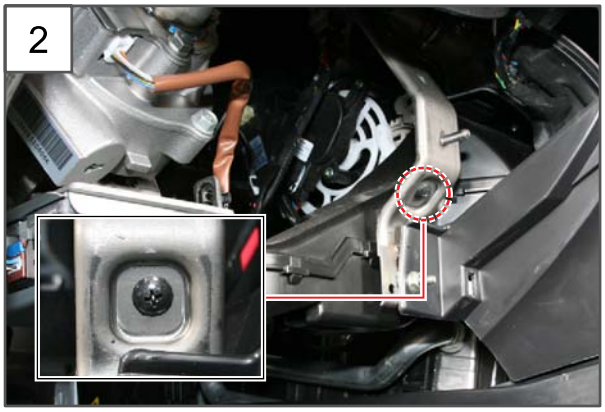
1

1. Remove the driver's knee airbag.

NOTE

Refer to "DRIVER KNEE AIR BAG" under "REMOVAL AND INSTALLATION" in "AIR BAG SYSTEM" chapter.

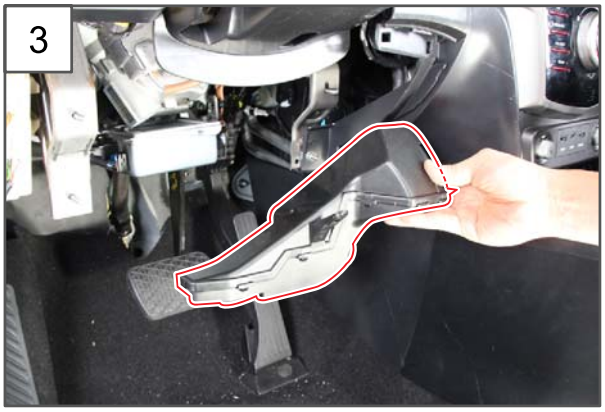
2



2. Unscrew the one mounting screw for the driver foot duct.

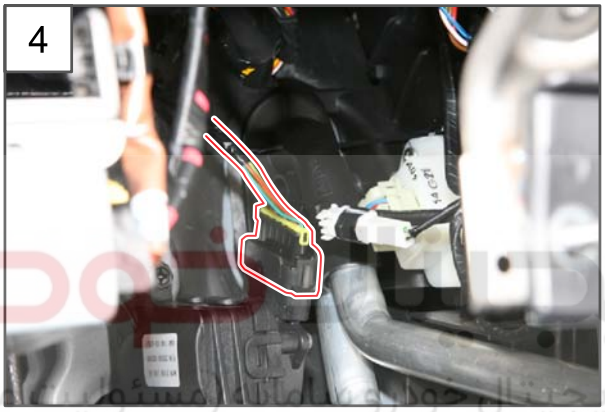
Modification basis	
Application basis	
Affected VIN	

3



3. Remove the driver foot lamp.

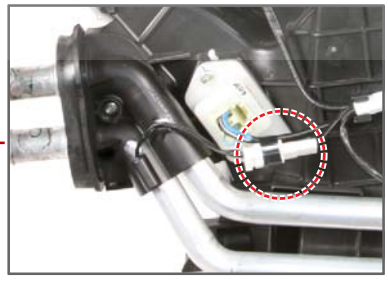
4



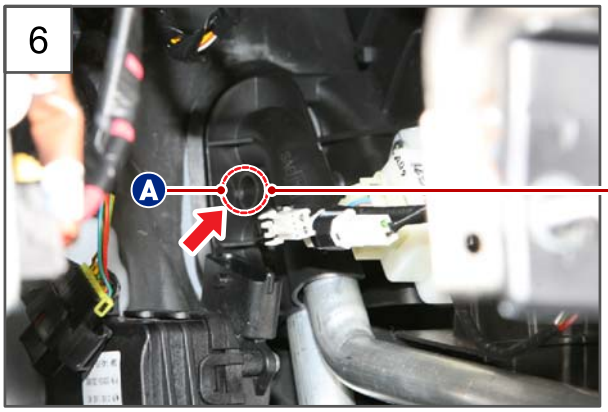
4. Disconnect the accelerator pedal position sensor connector.

5

5. Disconnect the water temperature sensor connector.



6

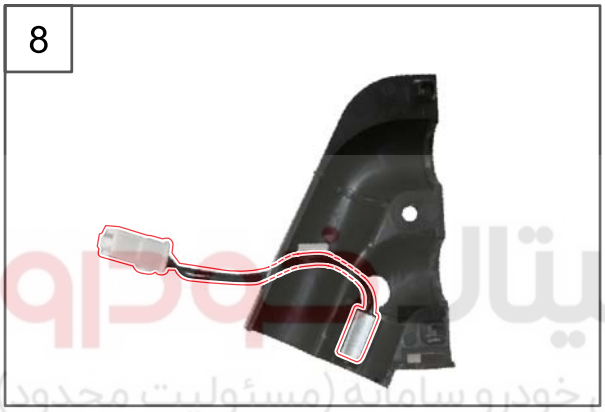


6. Unscrew the one heater pipe cover mounting screw (A).

7

7. Remove the heater pipe cover.

8

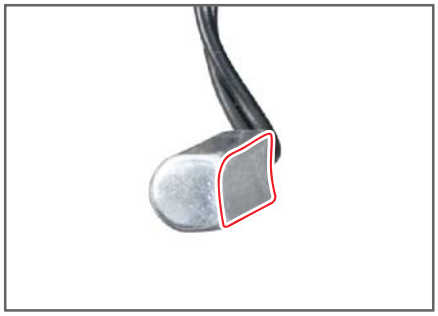


8. Remove the water temperature sensor from the heater pipe cover.

9

9. Install in the reverse order of removal.

Cautions for installation



Make sure that the concave part of the water temperature sensor is pressed against the heater core pipe when fitting it.

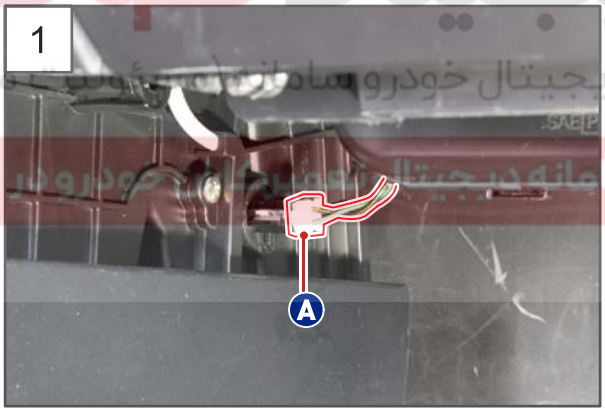
Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-24

INTAKE SENSOR

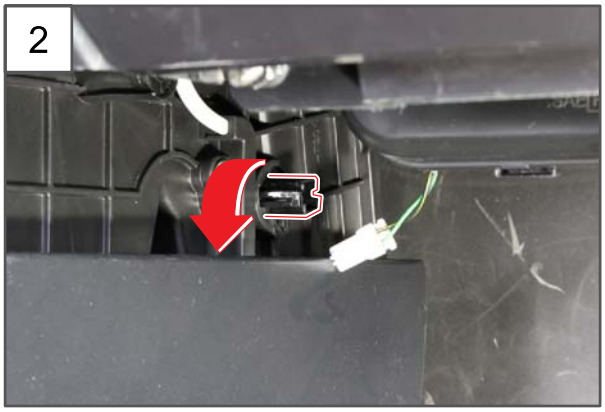
Preceding work - Disconnect the negative battery cable.

1



1. Disconnect the intake sensor connector (A) on right bottom of the air conditioner module.

2



2. Turn the intake sensor 90˚ anti-clockwise to unlock it.

Modification basis	
Application basis	
Affected VIN	

3

3. Remove the intake sensor.

4

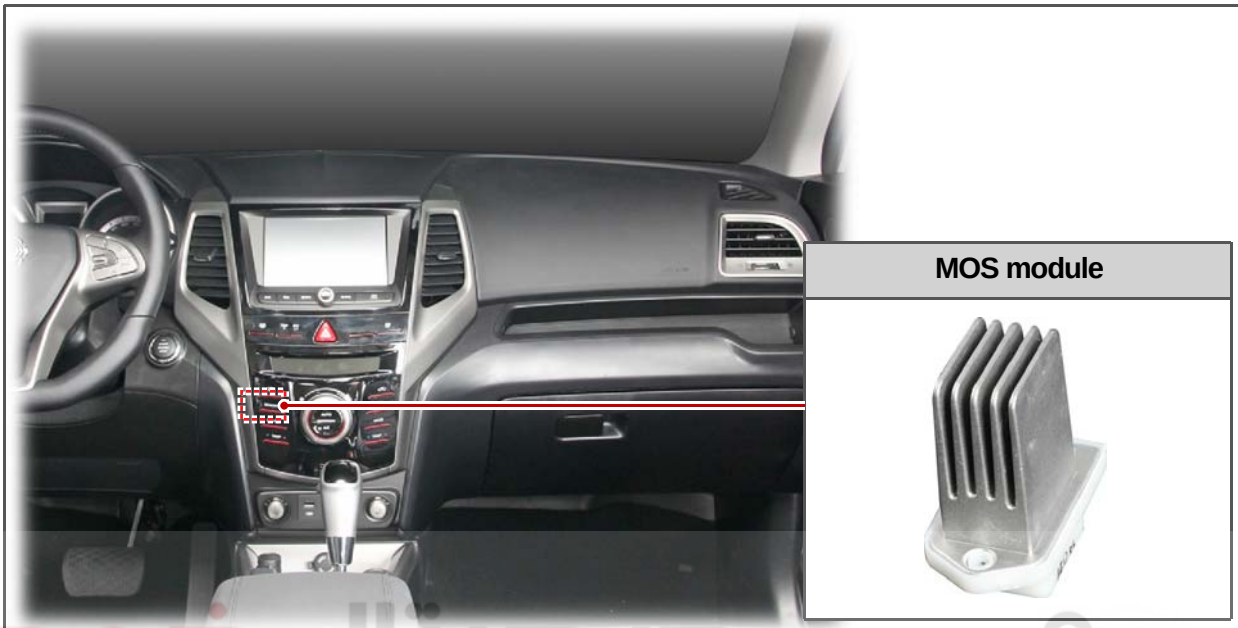
4. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-06

MOS MODULE

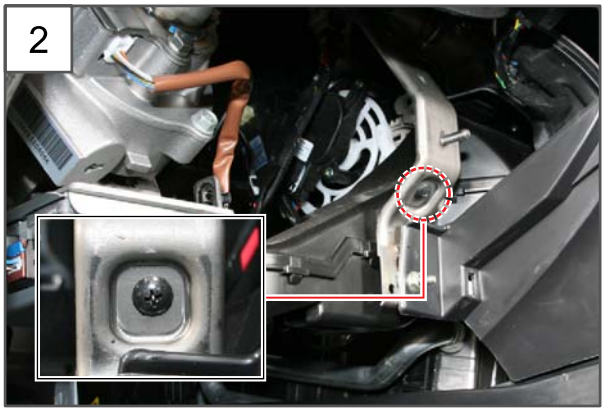
Preceding work - Disconnect the negative battery cable.



1. Remove the driver's knee airbag.

NOTE

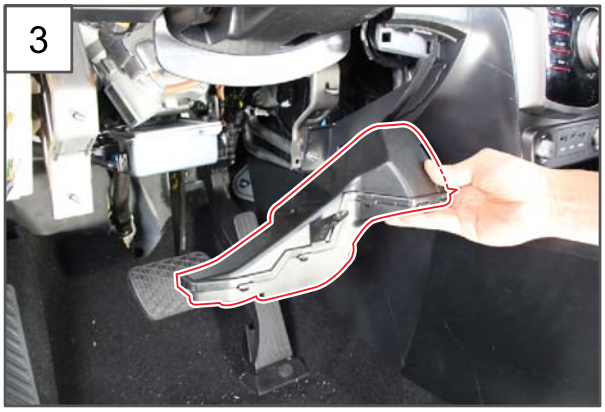
Refer to "DRIVER KNEE AIR BAG" under "REMOVAL AND INSTALLATION" in "AIR BAG SYSTEM" chapter.



2. Unscrew the one mounting screw for the driver foot duct.

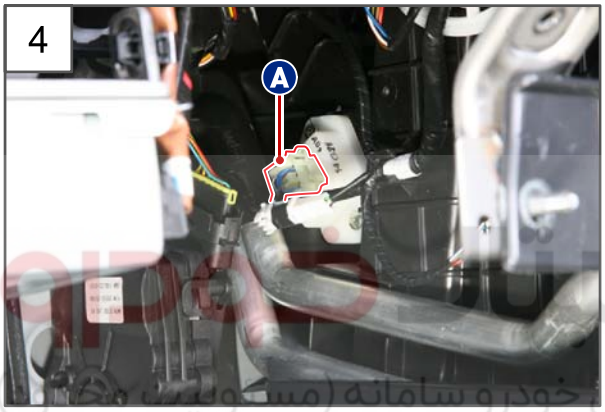
Modification basis	
Application basis	
Affected VIN	

3



3. Remove the driver foot lamp.

4



4. Disconnect the MOS module connector (A) which is located on the upper part of the accelerator pedal.

5

5. Unscrew the 2 MOS module mounting screws and remove the MOS module.

6

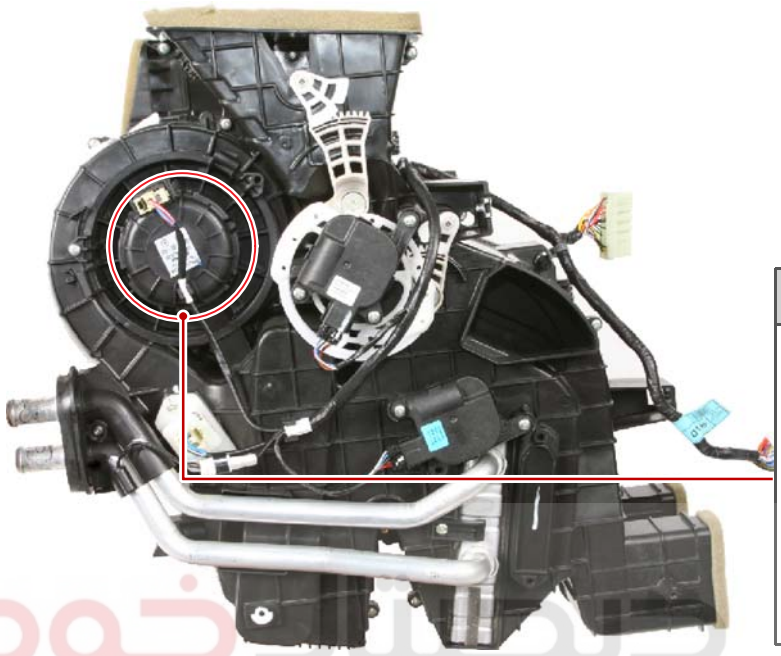
6. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

S.G.N. 6810-05

BLOWER MOTOR

Preceding work - Disconnect the negative battery cable.



Blower motor

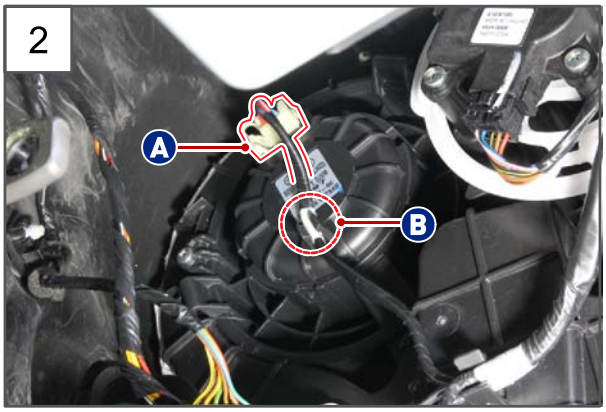
1

1. Remove the brake pedal.

NOTE

See "BRAKE PEDAL" under "REMOVAL AND INSTALLATION" in "BRAKE SYSTEM".

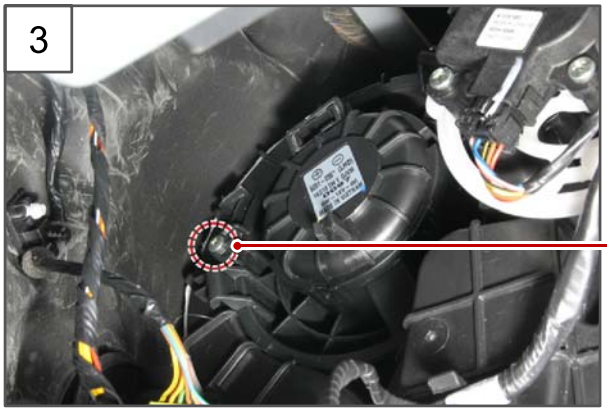
2



2. Disconnect the connector (A) for the blower motor fitted on the driver's side top of the air conditioner module and remove the wiring from the wiring mounting bracket (B).

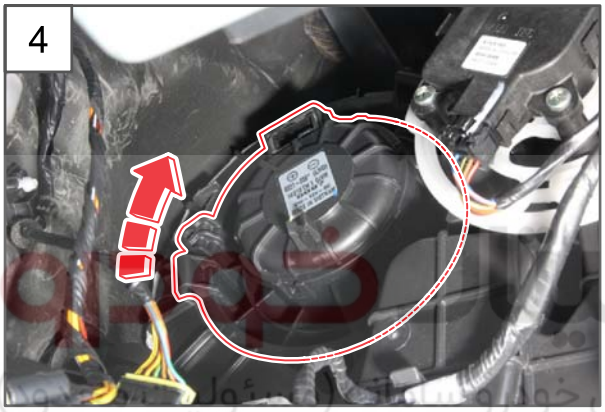
Modification basis	
Application basis	
Affected VIN	

3

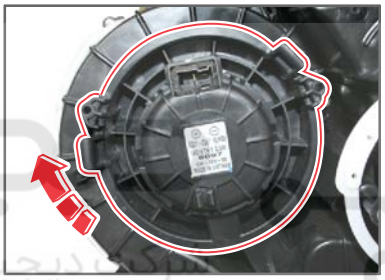


3. Unscrew the one blower motor mounting screw.

4



4. Turn the blower motor clockwise to disengage it.



5

5. Remove the blower motor.

6

6. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

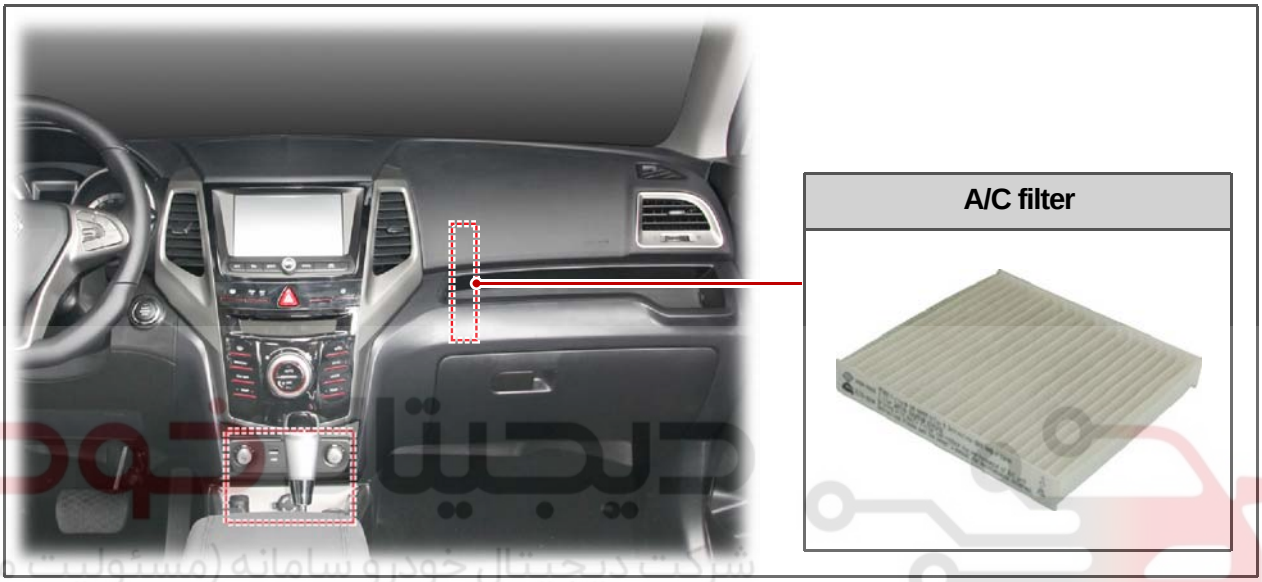
S.G.N. 6810-03

AIR CONDITIONER FILTER

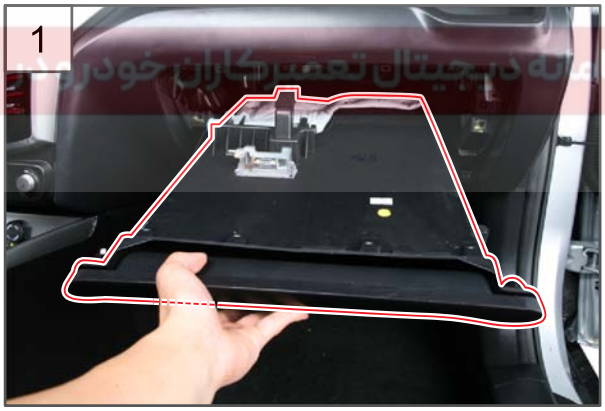
NOTE

A/C filter change interval

- Same interval with the engine oil.
- If the vehicle is driven under severe conditions such as dusty road, unpaved road, and excessive A/C and heater operation, shorten the replacement interval.



1

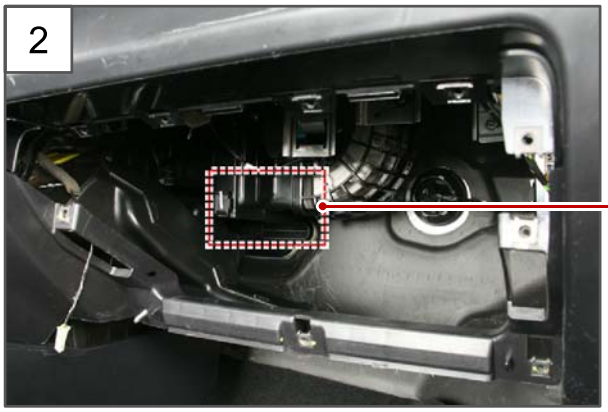


1. Remove the glove box assembly.

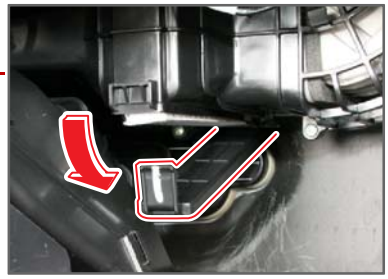
NOTE

Refer to "GLOVE BOX ASSEMBLY" under "REMOVAL AND INSTALLATION" in "BODY INTERIOR".

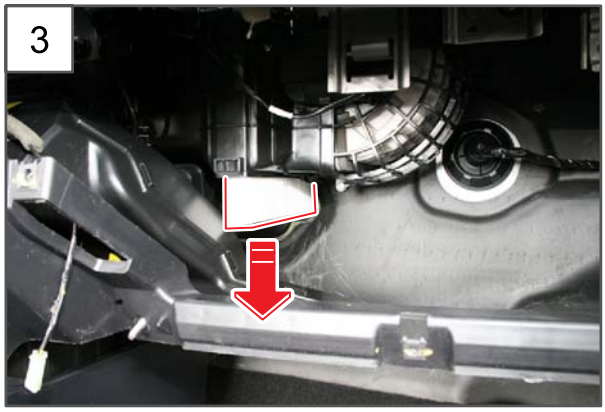
2



2. Disconnect and detach the A/C filter cover to the arrow direction.



3



3. Remove the A/C filter.

4

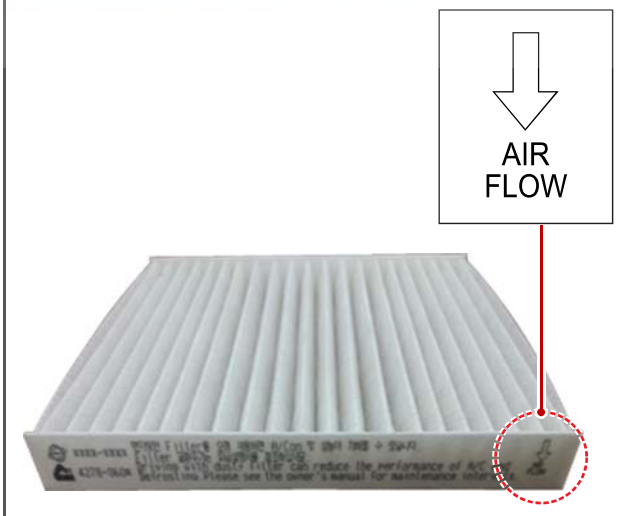
4. Install in the reverse order of removal.

NOTE

How to check A/C filter

- Remove the A/C filter to check the filter for contamination and clogging by foreign materials.
- Replace the filter as a new one if necessary even within the replacement interval.

Cautions for installation



When fitting the A/C filter, make sure that the letters printed on the A/C filter is facing downwards and the arrow indicating air flow on the one side of the A/C filter points towards the blower motor (driver side).

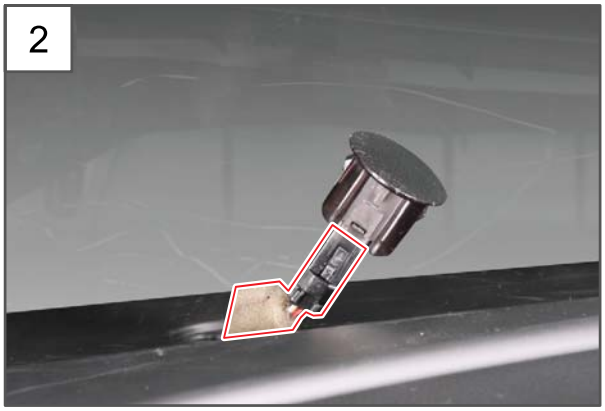
Modification basis	
Application basis	
Affected VIN	

S.G.N. 8520-18

SUN LOAD SENSOR

Preceding work - Disconnect the negative battery cable.

1. Remove the sun load sensor from the instrument panel using a flat-bladed screwdriver.



2. Disconnect the sun load sensor connector and remove the sun load sensor.

3. Install in the reverse order of removal.

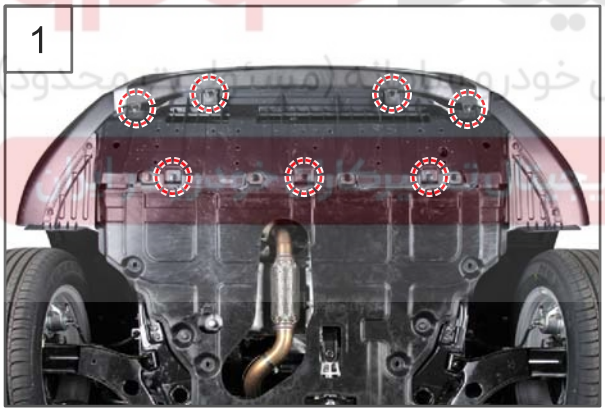
Modification basis	
Application basis	
Affected VIN	

S.G.N. 8520-14

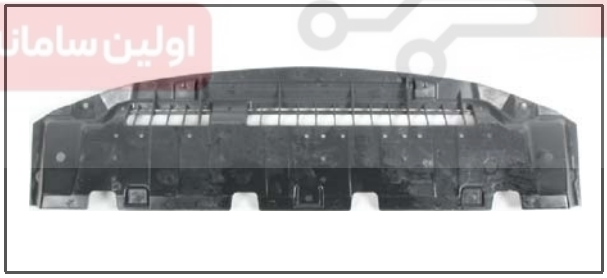
AMBIENT TEMPERATURE SENSOR

Preceding work - Disconnect the negative battery cable.

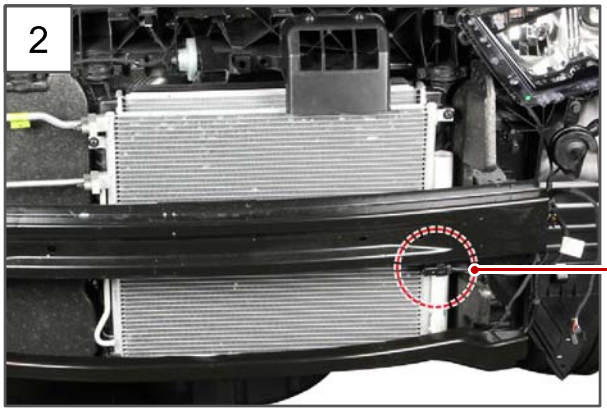
1



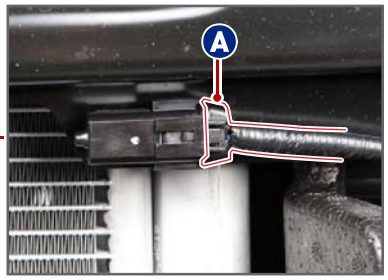
1. Remove the 7 mounting screw rivets for the front under cover to remove the front under cover.



2



2. Disconnect the ambient temperature sensor connector (A) fitted on the front of the condenser.



Modification basis	
Application basis	
Affected VIN	

3

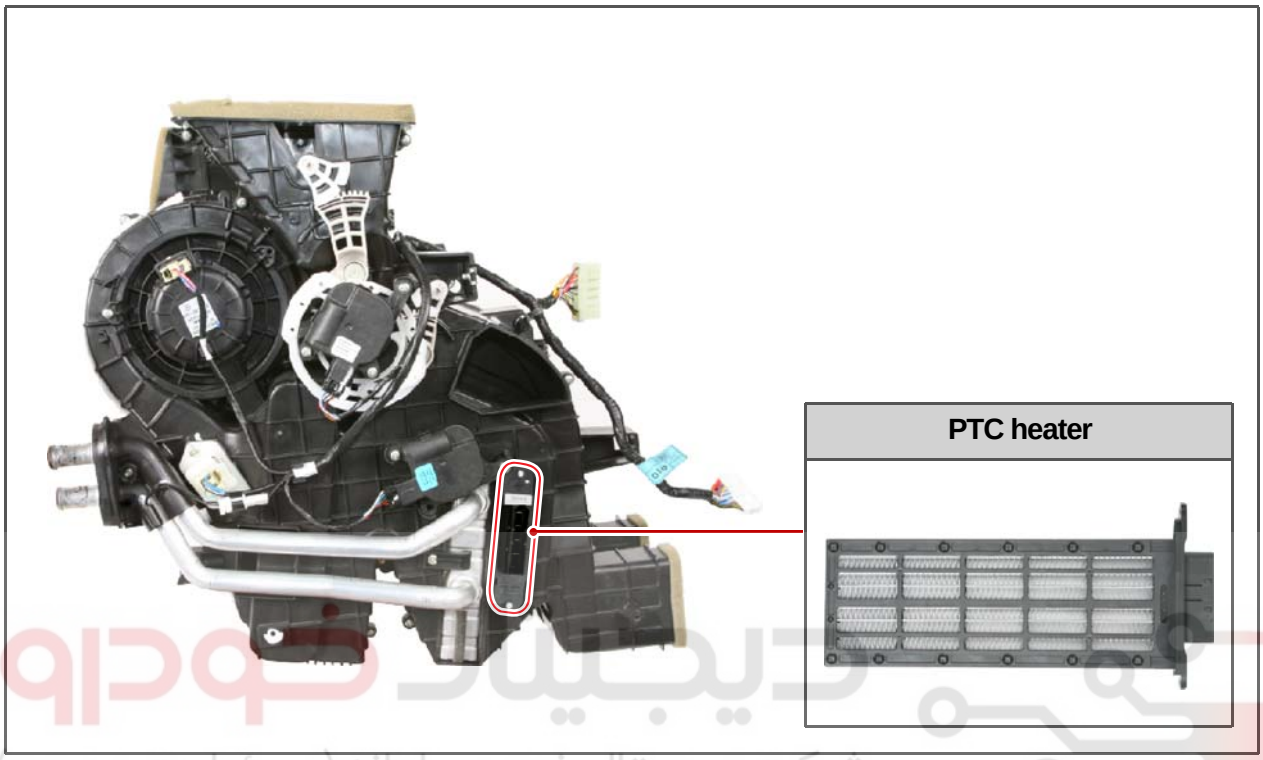
3. Remove the ambient temperature sensor.

4

4. Install in the reverse order of removal.

S.G.N. 6810-15 PTC HEATER (D16DTF)

Preceding work - Disconnect the negative battery cable.



1. Detach the LH front end console cover to the arrow direction.

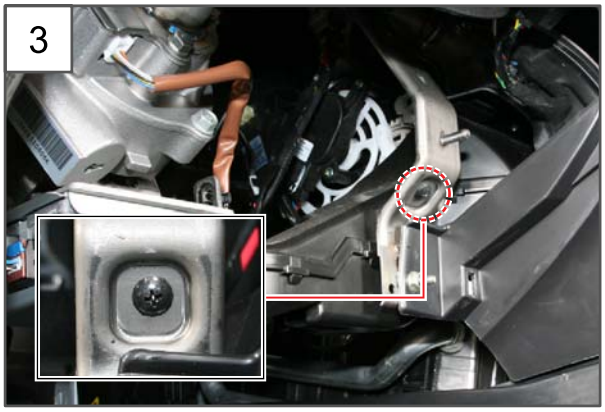
2. Remove the driver's knee airbag.

NOTE

Refer to "DRIVER KNEE AIR BAG" under "REMOVAL AND INSTALLATION" subsection of "AIR BAG SYSTEM" section in "BODY" chapter.

Modification basis	
Application basis	
Affected VIN	

3

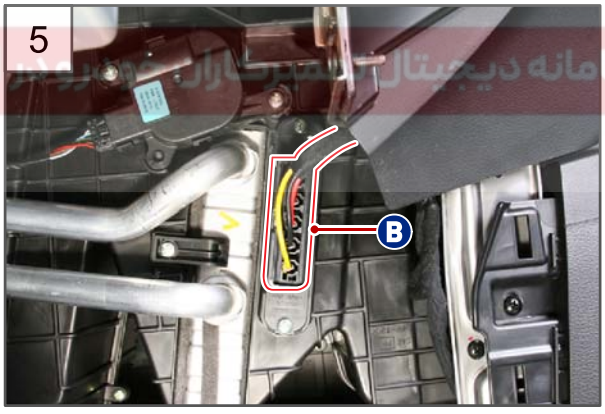


3. Unscrew the one mounting screw for the driver foot duct.

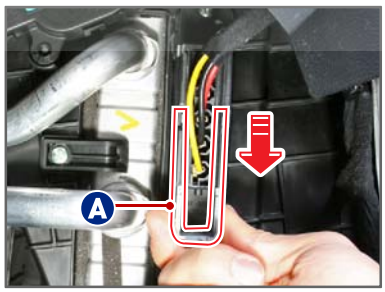
4

4. Remove the driver foot lamp.

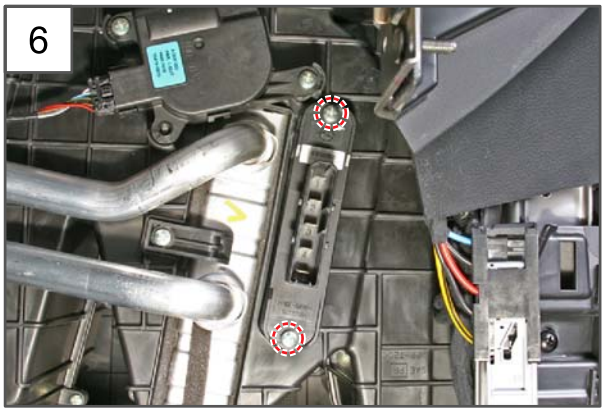
5



5. Pull out the locking part (A) in the direction of the arrow to disconnect the PTC heater connector (B).



6



6. Unscrew the 2 mounting screws for the PTC heater.

Modification basis	
Application basis	
Affected VIN	

7

7. Remove the PTC heater from the A/C module as shown in the picture.

8

8. Install in the reverse order of removal.

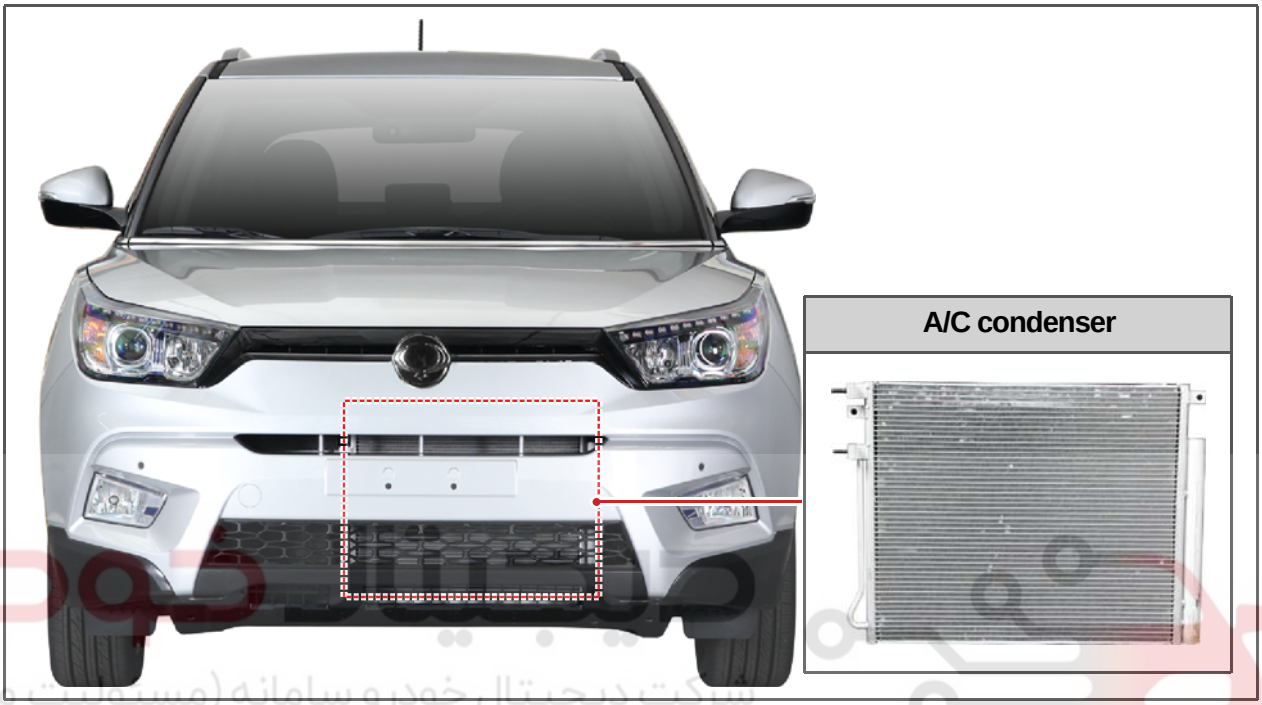
Modification basis	
Application basis	
Affected VIN	

S.G.N. 6820-01

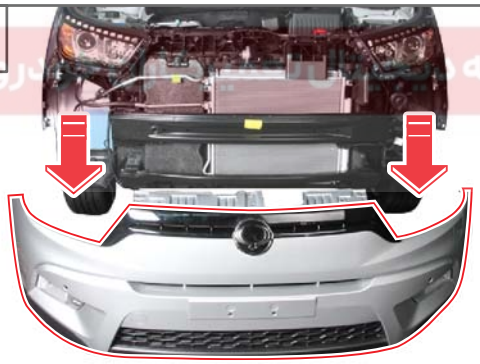
A/C CONDENSER

Preceding work

- Disconnect the negative battery cable.
- Drain the A/C refrigerant in a suitable container. The collected refrigerant should be disposed of at designated disposal sites.



1

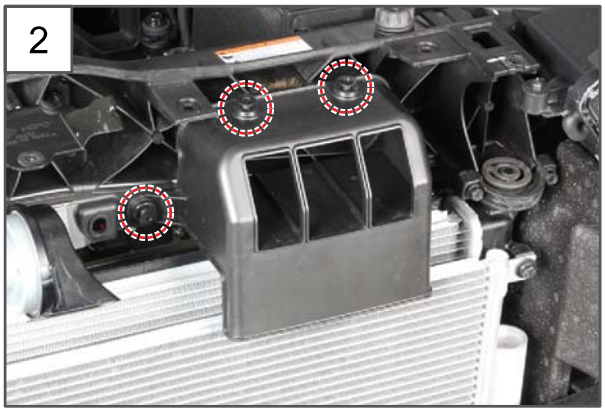


1. Remove the front bumper assembly.

NOTE

See "FRONT BUMPER ASSEMBLY" under "REMOVAL AND INSTALLATION" in "BODY EXTERIOR".

2



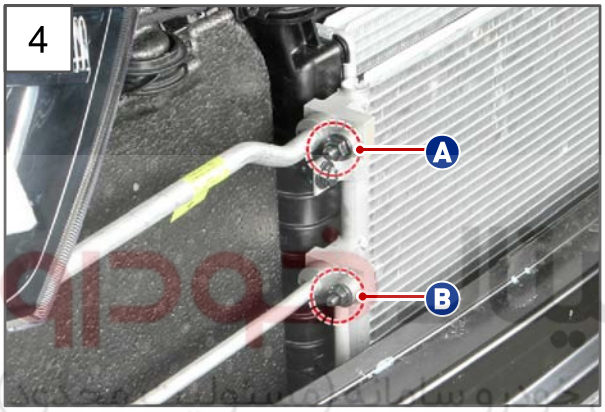
2. Undo the 3 water protector mounting screw rivets.

Modification basis	
Application basis	
Affected VIN	

3

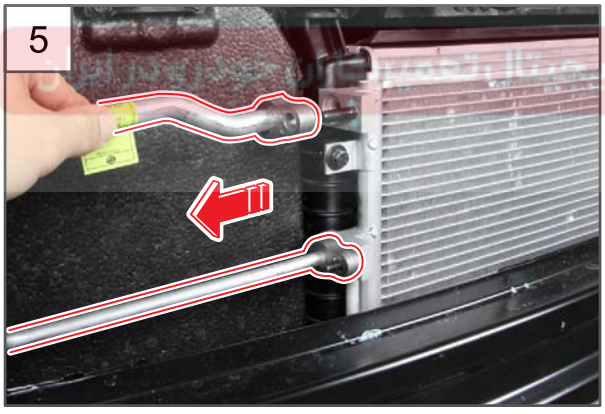
3. Remove the water protector.

4



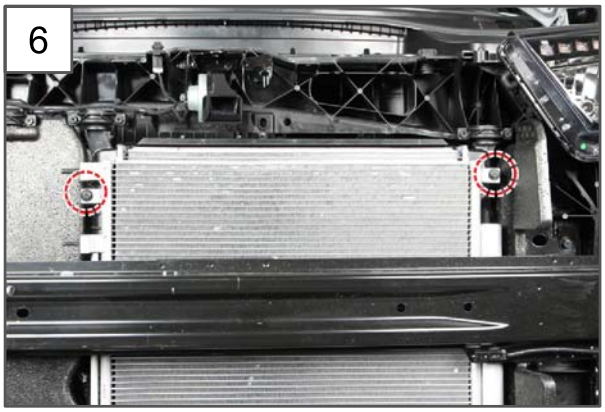
4. Unscrew the one discharge and suction hose mounting nut (A, 12 mm) and (B, 10 mm).

5



5. Disconnect the discharge and suction hose from the condenser.

6

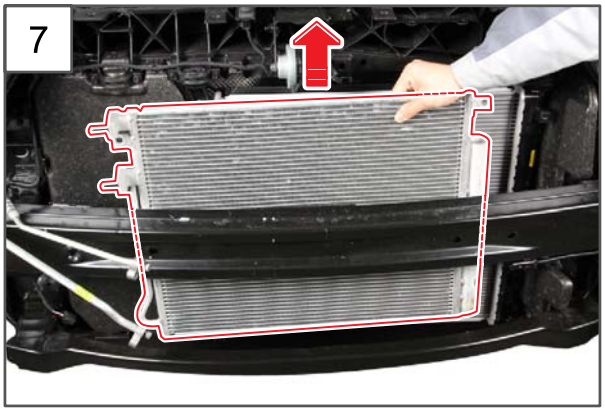


6. Unscrew the 2 condenser mounting bolts (10 mm).

Tightening torque 10 ± 1.0Nm

Modification basis	
Application basis	
Affected VIN	

7



7. Remove the condenser.

CAUTION

Make sure that the condenser is not deformed or damaged due to the interference with the surrounding components.

8

8. Install in the reverse order of removal.

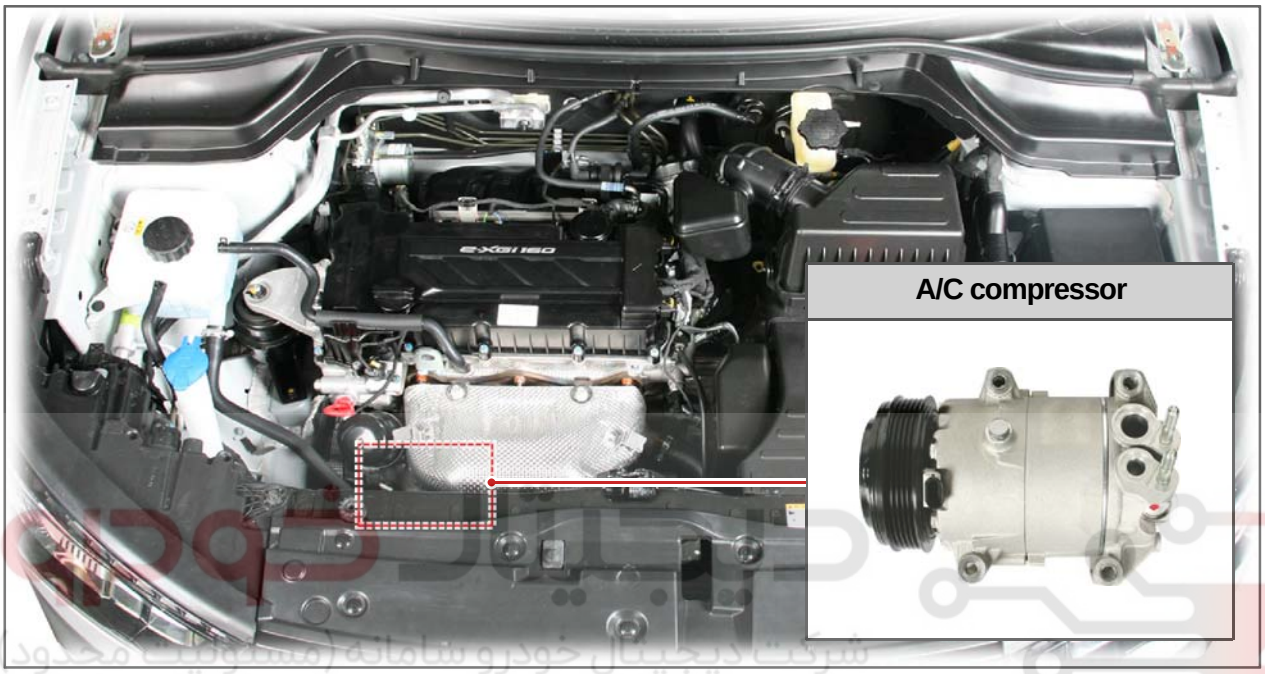
Modification basis	
Application basis	
Affected VIN	

S.G.N. 1480-01

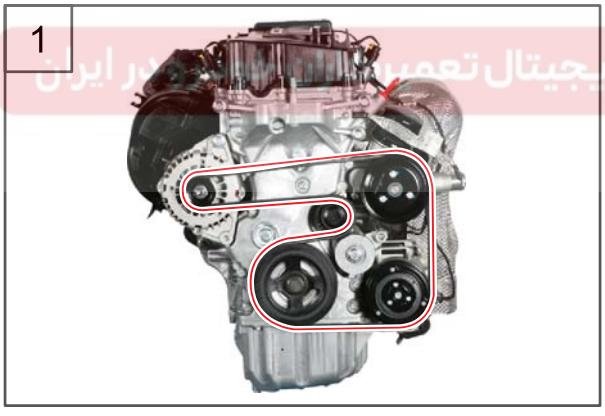
A/C COMPRESSOR

Preceding work

- Disconnect the negative battery cable.
- Drain the A/C refrigerant in a suitable container. The collected refrigerant should be disposed of at designated disposal sites.
- Remove the under cover under the vehicle.



1

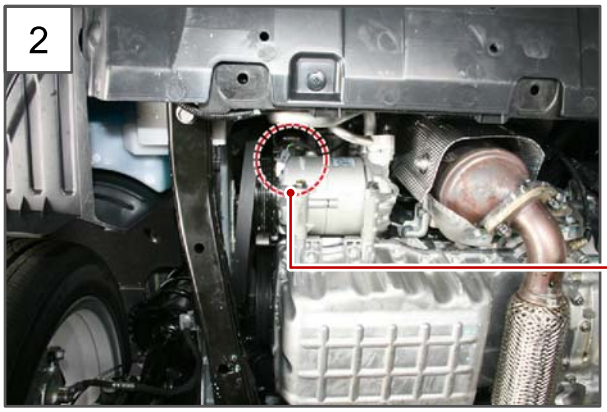


1. Remove the fan belt from the vehicle.

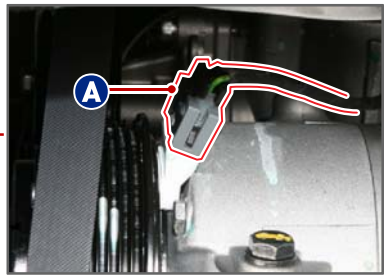
NOTE

Refer to "FAN BELT" under "REMOVAL AND INSTALLATION" in "ENGINE ASSEMBLY" chapter.

2



2. Disconnect the A/C compressor connector (A) which is located on the back side of the A/C compressor pulley.



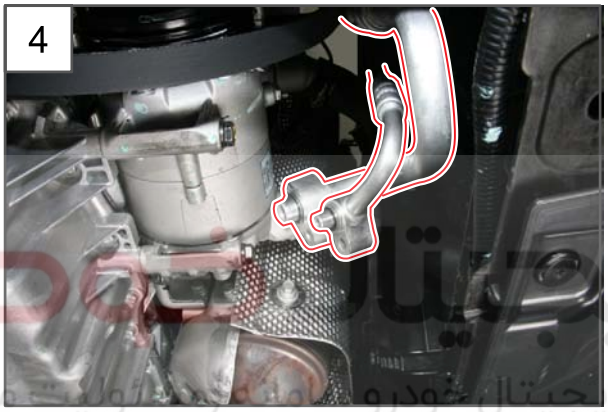
Modification basis	
Application basis	
Affected VIN	

3

3. Unscrew the 2 mounting nuts (12 mm) for the discharge and suction hose fitted on the back side of the A/C compressor.

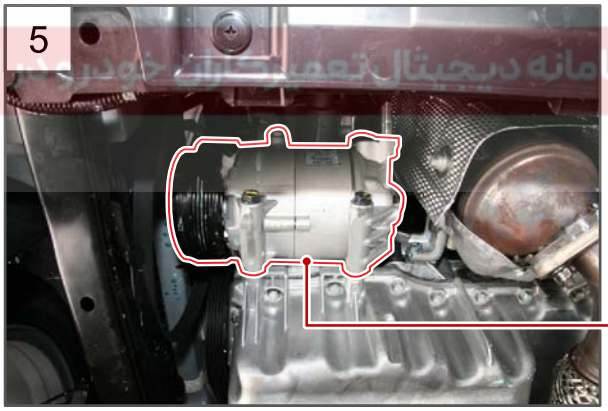
Tightening torque 11.8 ~ 16.7Nm

4



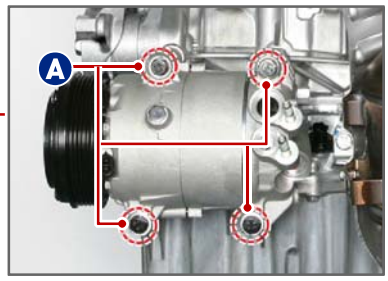
4. Disconnect the discharge and suction hose from the A/C compressor.

5



5. Unscrew the 4 A/C compressor mounting bolts (A, 13 mm) to remove the A/C compressor.

Tightening torque 19.7 ~ 24.5Nm



6

6. Install in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

Memo