

AIR CONDITIONER

6810-00/6810-01/6810-02/6810-06/6810-15/6810-20/6810-24/
6820-01/6820-18/6820-19/6820-24/6910-20/

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AIR CONDITIONER

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REMOVAL AND INSTALLATION

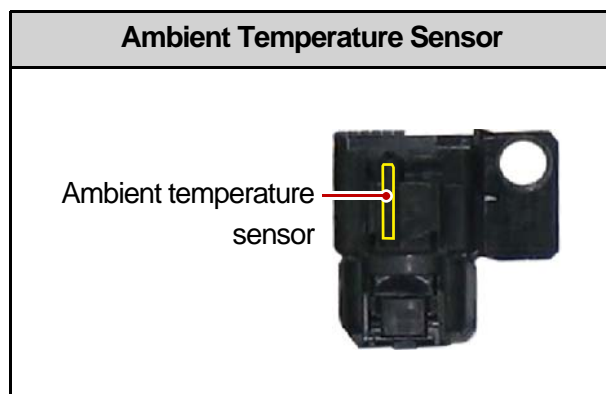
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AIR CONDITIONER**6810-01****OVERVIEW AND OPERATION PROCESS****1. SYSTEM LAYOUT AND COMPONENTS**

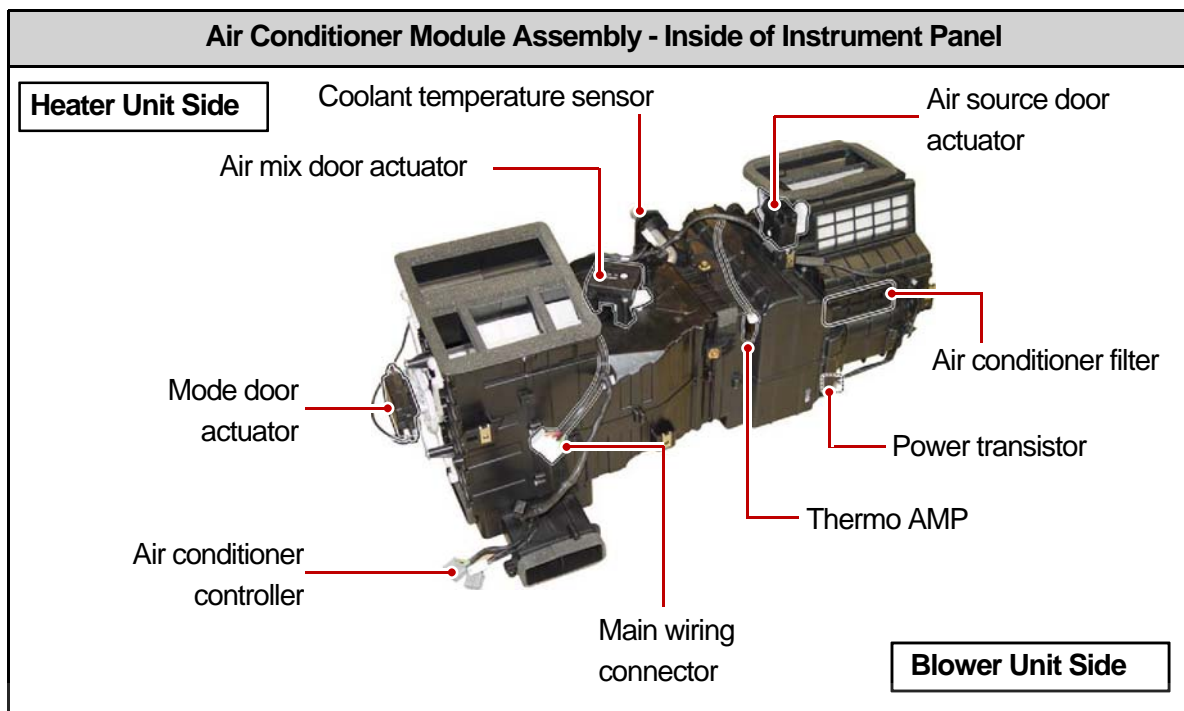
Type	Air Conditioner Controller
FATC	
Manual air conditioner	



It changes sun load coming through front windshield into current to input to FATC controller.



This sensor is installed at the front bottom of engine compartment.



Condenser

Installed in front of vehicle and condenses vapor refrigerant into low temperature and high pressure liquid refrigerant.



Receiver Drier (LH)



Absorbs moisture in the refrigerant and reserves refrigerant to supply smoothly.

Engine ECU (Passenger Footstep)



Detects A/C switch position, coolant temperature, engine condition and driving condition to control the air conditioner.

Coolant Temperature Sensor (On Engine)



A sensor that detects coolant temperature and transmits it to engine ECU.

Modification basis	
Application basis	
Allocated VIN	

2. VENTILATION SYSTEM

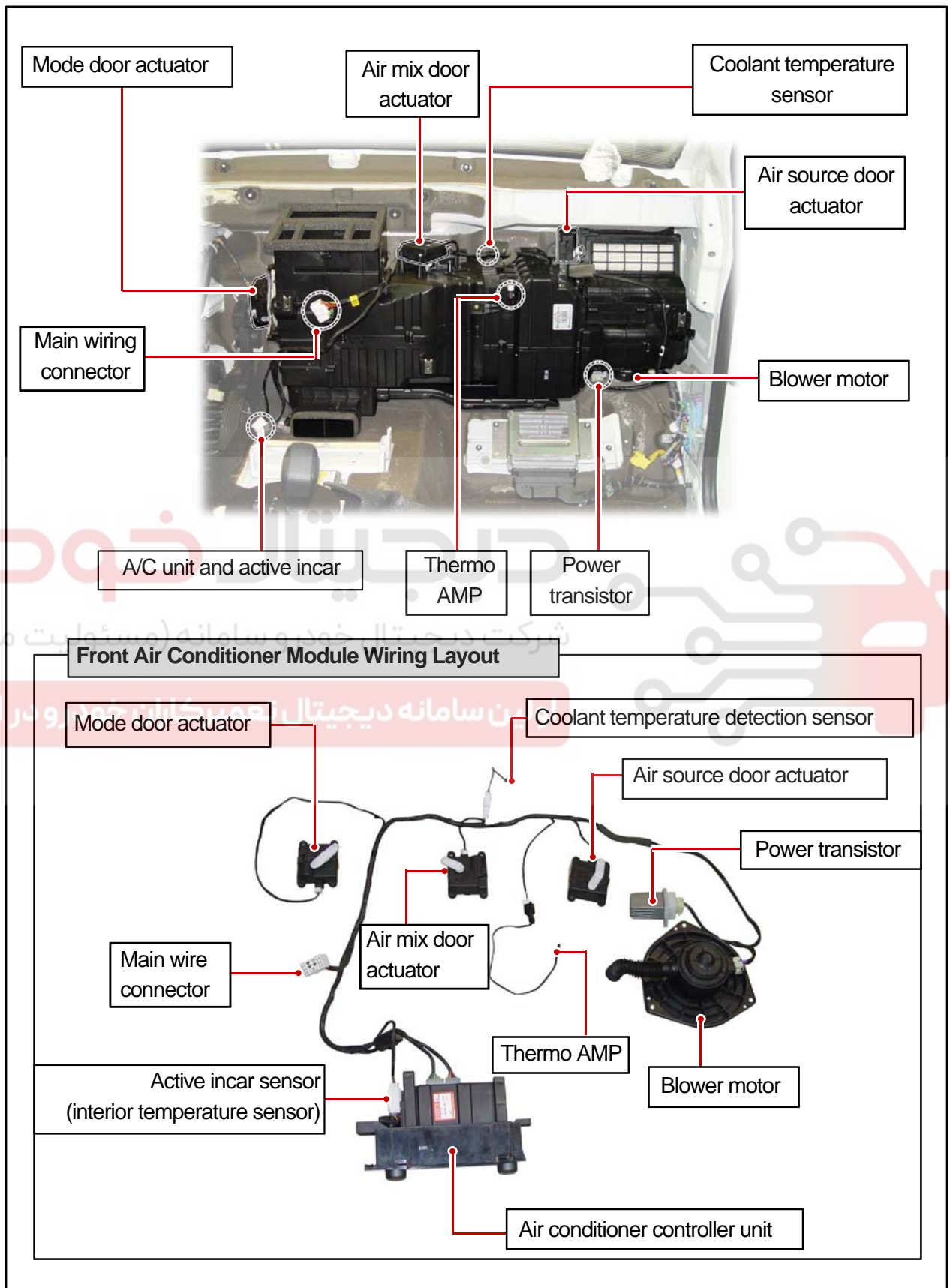
1) Locations of Vents



2) Air Duct



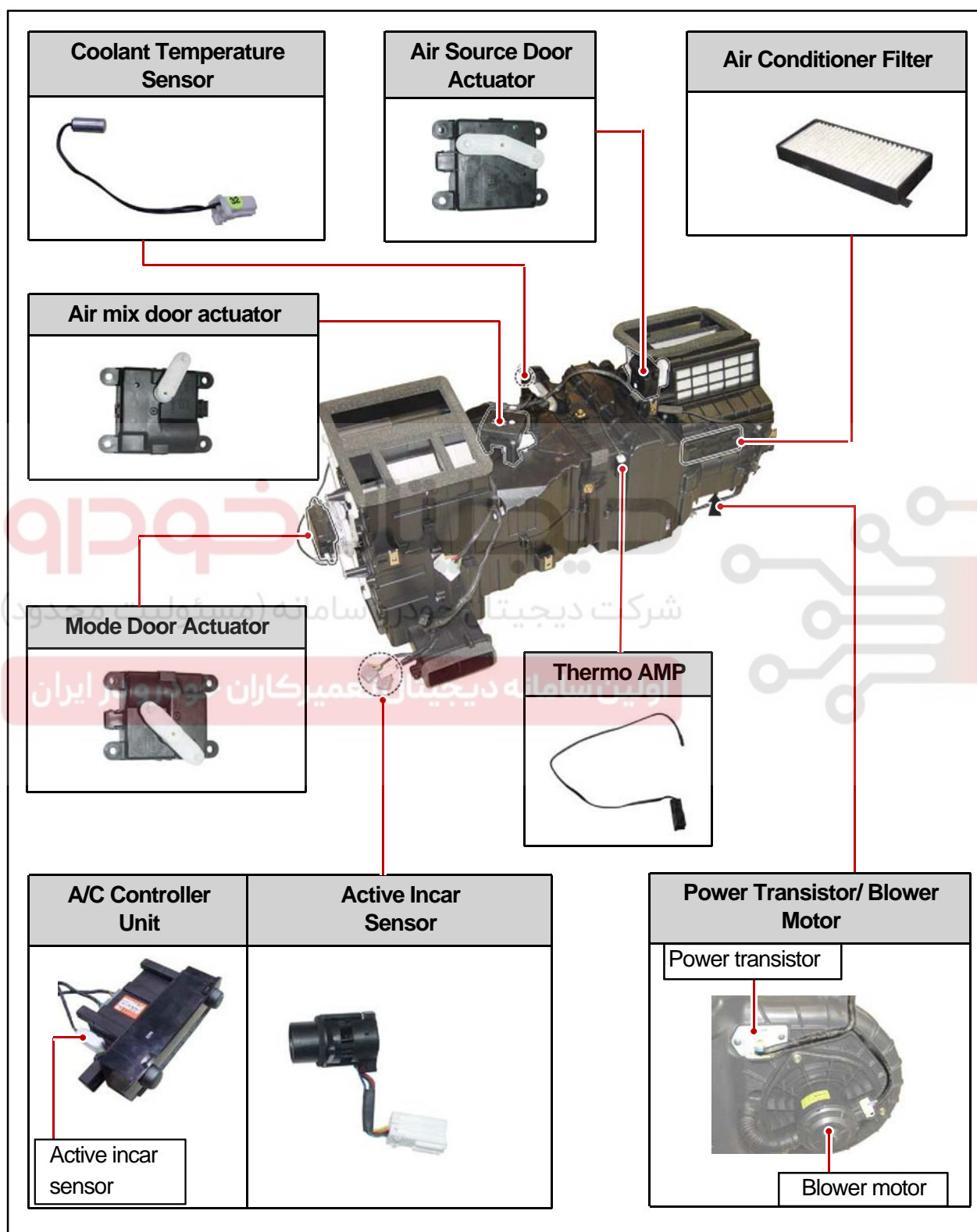
3) Air Duct Layout



Modification basis	
Application basis	
Allocated VIN	

3. AIR CONDITIONER MODULE AND SENSORS

1) Locations



2) Components



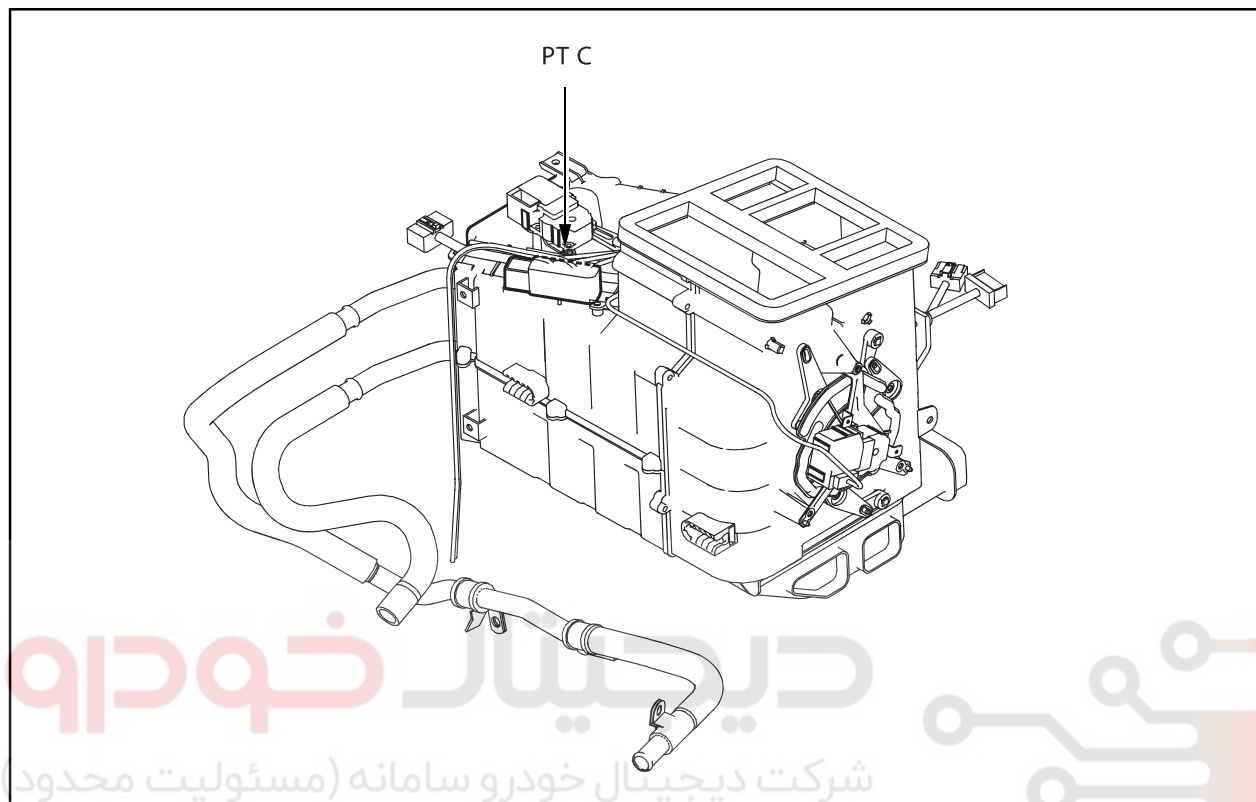
Modification basis	
Application basis	
Allocated VIN	

AIR CONDITIONER

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3) PTC Heater Layout

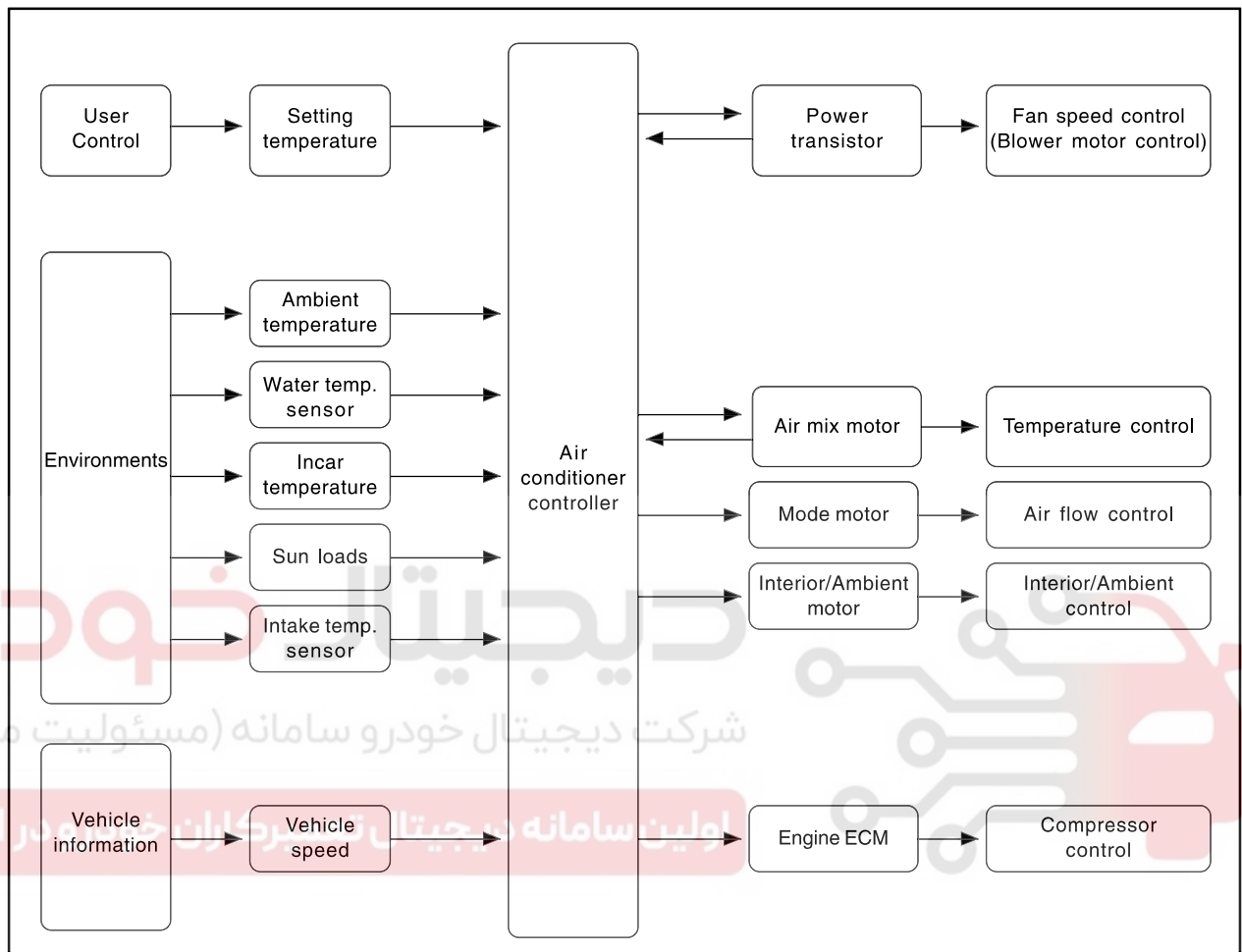
(1) PTC Heater Assembly Layout



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4. SYSTEM DIAGRAM

This figure shows the input and output system between FACT A/C components and A/C controller.



1) Air Conditioner Compressor Control by Engine ECU

In case of conventional vehicle models, the system turns ON/OFF the compressor switch according to refrigerant pressure, ambient temperature and condenser temperature to protect air conditioner circuits. However, for the vehicle equipped with DI engine, the engine ECU turns off air conditioner compressor as below in addition to above conditions.

1. Coolant temperature: below -20°C
2. Coolant temperature: over 115°C
3. For approx. 4 seconds after starting the engine
4. When engine speed is below 650 rpm
5. When engine speed is over 4,500 rpm
6. During abrupt acceleration for the vehicle equipped with manual transmission

Modification basis	
Application basis	
Allocated VIN	

Memo

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

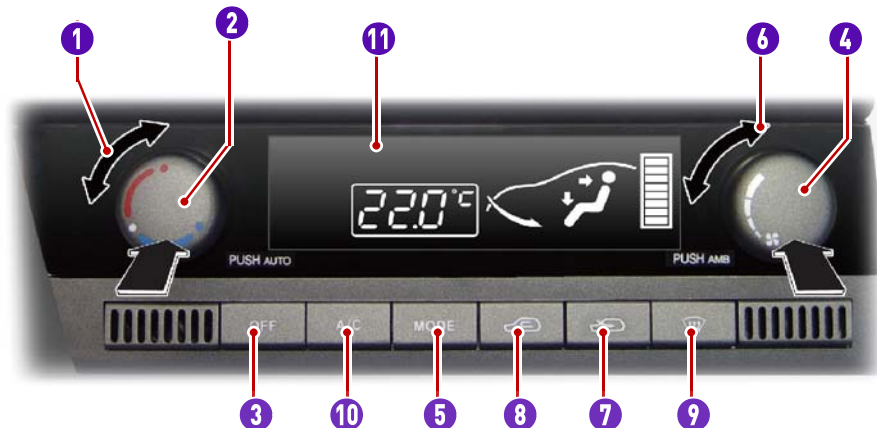
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CONFIGURATION AND FUNCTIONS

6810-20 AIR CONDITIONER CONTROLLER UNIT

1) Functions of Full Automatic Air Conditioner Controller



1. Temp SW	⇒	Temperature control: Air mix actuator mixes hot air with cool air to maintain the set temperature.
2. Auto SW	⇒	Auto control
3. OFF SW	⇒	System OFF (Air source indicator stays ON)
4. Amb SW	⇒	Displays ambient temperature ® Return to previous display after 5 seconds
5. Mode SW	⇒	Changed to Manual mode from Auto Mode
6. Blower SW	⇒	Fan speed control in 8 levels (33 levels in Auto mode)
7. Rec SW	⇒	Manual selection of Rec Mode (in Auto mode)
8. Fre SW	⇒	Manual selection of Fre Mode (in Auto mode)
9. Defroster SW	⇒	Manual selection of Def Mode (in Auto mode)
10. A/C SW	⇒	A/C ON (to Manual mode)
11. VFD(Display)	⇒	Displays A/C status

- Rec Mode: Recirculation Mode
- Fre Mode: Fresh Mode
- Def Mode: Defroster Mode

Modification basis	
Application basis	
Allocated VIN	

2) Functions of Full Automatic Air Conditioner Controller (II)

Temperature Control Switch and AUTO Button



When pressing the air conditioner AUTO mode and temperature control dial switch, the system operates in AUTO mode and can set the desired temperature (18 ~ 32°C) by rotating the switch. To get the desired temperature, the air conditioner controls compressor, door mode, air source door, air mix door and blower motor automatically.



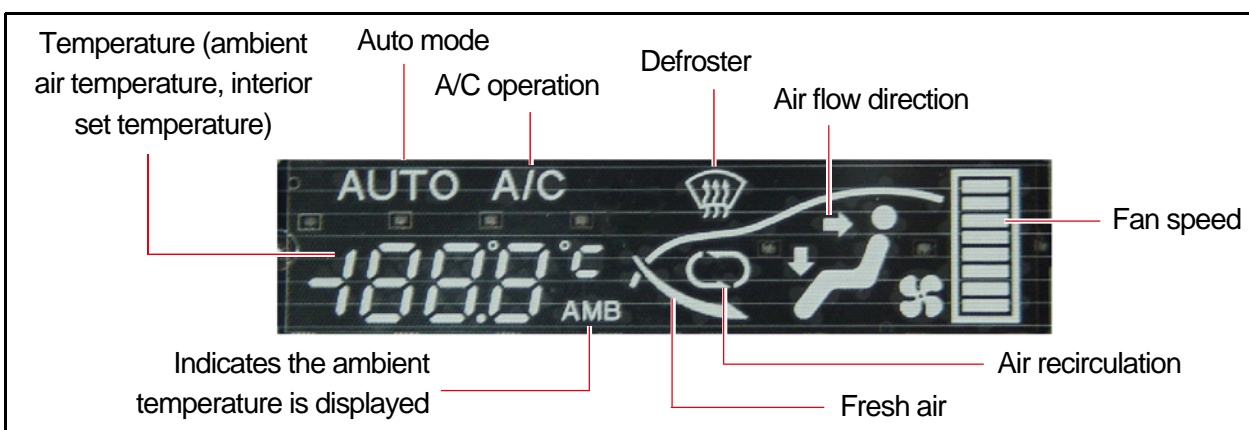
Active Incar Sensor (AI Sensor)

The AI sensor is installed on the air conditioner controller unit. It is a sensor that detects interior temperature.



Display Window (VFD)

Each switch mode appears as a symbol on the fluorescent display and malfunction of each sensor in air conditioner control system is also displayed.



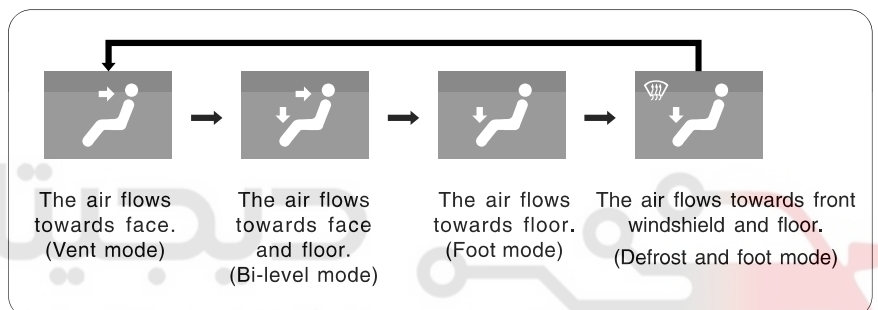
Fan Speed Control Switch and AMP Switch



- When controlling the fan speed by rotating this switch in AUTO mode, the mode is changed from AUTO to manual and the fan speed can be changed in 8 levels.
- When pressing this switch, the outside temperature measured by ambient temperature sensor comes on for 5 seconds and then returns back to preset temperature.

Mode Switch

- By depressing this switch, the airflow mode is changed.



A/C Switch:

When pressing this switch, the air conditioner operates in manual mode and A/C ON indicator comes on.

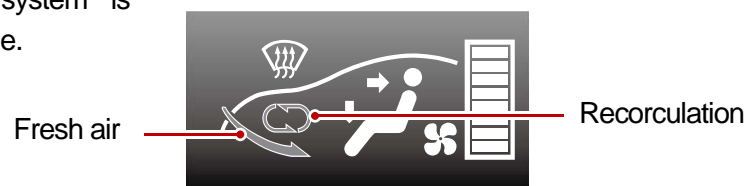
A/C [OFF] Switch

Recirculation Switch

When you press this switch, recirculation indicator comes on and the system is changed into the recirculation mode.

Air Intake Switch

By pressing the switch, air intake indicator comes on and the system is changed into the air intake mode.



Recirculation Switch

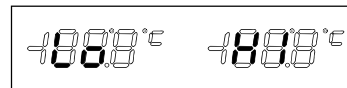
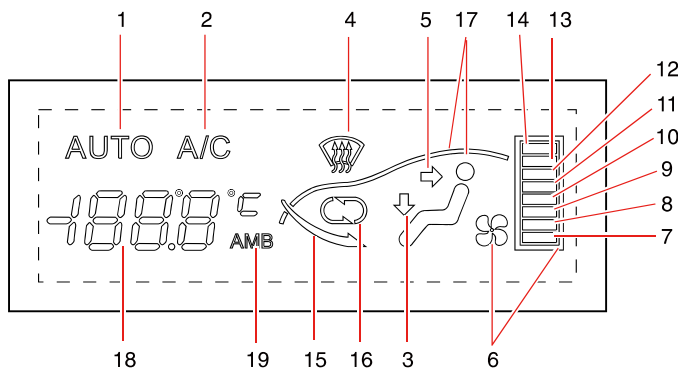


When pressing this switch, the airflow direction will be changed to windshield and door glasses, the air conditioner operates automatically and outside air comes in. At this moment, the defroster indicator, air conditioner indicator and fresh air mode indicator come on. When pressing the switch again, the air conditioner returns back to previous operation.

When pressing the AUTO switch, the defroster mode appears on the VFD until the coolant temperature reaches at a certain level.

Modification basis	
Application basis	
Allocated VIN	

3) Full Automatic Air Conditioner Controller Operation Table



If the temperature switch (dial) is set under 18.0°C, the display shows "Lo" and if it is set over 32.0°C, the display shows "Hi".

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
REC	-	-	-	-	-	○	-	-	-	-	-	-	-	-	×	○	○	○	×
FRE	-	-	-	-	-	○	-	-	-	-	-	-	-	-	○	×	○	○	×
FR/DEF	×	○	×	○	×	○	-	-	-	-	-	-	-	-	○	×	○	○	×
FAN speed 0	×	-	-	-	-	○	×	×	×	×	×	×	×	×	-	-	○	○	×
FAN speed 1	×	-	-	-	-	○	○	×	×	×	×	×	×	×	-	-	○	○	×
FAN speed 2	×	-	-	-	-	○	○	○	×	×	×	×	×	×	-	-	○	○	×
FAN speed 3	×	-	-	-	-	○	○	○	○	×	×	×	×	×	-	-	○	○	×
FAN speed 4	×	-	-	-	-	○	○	○	○	×	×	×	×	×	-	-	○	○	×
FAN speed 5	×	-	-	-	-	○	○	○	○	○	×	×	×	×	-	-	○	○	×
FAN speed 6	×	-	-	-	-	○	○	○	○	○	○	○	×	×	-	-	○	○	×
FAN speed 7	×	-	-	-	-	○	○	○	○	○	○	○	○	×	-	-	○	○	×
FAN speed 8	×	-	-	-	-	○	○	○	○	○	○	○	○	○	-	-	○	○	×
MODE VENT	×	-	×	×	○	○	-	-	-	-	-	-	-	-	-	-	○	○	×
MODE B/L	×	-	○	×	○	○	-	-	-	-	-	-	-	-	-	-	○	○	×
MODE FOOT	×	-	○	×	×	○	-	-	-	-	-	-	-	-	-	-	○	○	×
MODE D/F	×	-	○	○	×	○	-	-	-	-	-	-	-	-	-	-	○	○	×
AUTO (AUTO A/C)	○	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	○	○	×
A/C	×	○	-	-	-	○	○	-	-	-	-	-	-	-	-	-	-	-	×
AMB	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	○	○
OFF (IGN ON)	×	×	×	×	×	×	×	×	×	×	×	×	×	×	-	-	○	×	×
OFF (IGN OFF)	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
TEMPDIAL	-	-	-	-	-	○	-	-	-	-	-	-	-	-	-	-	○	○	-

4) Full Automatic Air Conditioner Operations

This section describes the main operations of full automatic air conditioner.

(1) Blower Motor Control

In AUTO mode, the blower motor automatically controls the fan in 33 levels according to the sensing conditions (e.g., ambient temperature and room temperature). In MANUAL mode, the blower motor controls the fan in 8 levels by the fan switch operation.

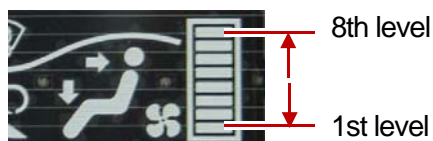
Fan control in AUTO mode (33 levels)

The blower fan is controlled in 33 levels according to the input data from sensors. The higher the lever is, the higher the output voltage increases (control voltage in 33rd stage: battery voltage).

Leve I	Contro I voltage	Leve I	Contro I voltage	Leve I	Contro I voltage	Leve I	Contro I voltage
OFF	0 V	9	6 V	18	8.25 V	27	10.5 V
1	4 V	10	6.25 V	19	8.5 V	28	10.75 V
2	4.25 V	11	6.5 V	20	8.75 V	29	11 V
3	4.5 V	12	6.75 V	21	9 V	30	11.25 V
4	4.75 V	13	7 V	22	9.25 V	31	11.5 V
5	5 V	14	7.25 V	23	9.5 V	32	11.75 V
6	5.25 V	15	7.5 V	24	9.75 V	33	VACC
7	5.5 V	16	7.75 V	25	10 V		
8	5.75 V	17	8 V	26	10.25 V		

Fan control in MANUAL mode (8 levels)

In Manual mode, the fan speed can be controlled in 8 levels using the dial.



Leve I	1	2	3	4	5	6	7	8
Contro I voltage	4 ~ 4.75 V	5 ~ 5.75 V	6 ~ 6.75 V	7 ~ 7.75 V	8 ~ 8.75 V	9 ~ 9.75 V	10 ~ 10.75 V	11 ~ Battery voltage

Modification basis	
Application basis	
Allocated VIN	

(2) Heating Start Control

In winter, when the engine coolant temperature is low or the hot wind has not been sufficiently generated, the airflow from the vent is not hot and so, not helpful to heating. The heating control is to restrain this airflow from releasing.

Thus, before the coolant temperature reaches 55°C, the blower motor is set to the first stage in Auto mode and the blower operating voltage increases by 0.075V/sec, following the increase of duct temperature. The air flow direction is in DEF mode (below 20°C), D/F mode (20°C~55°C) and AUTO mode (55°C). When the coolant temperature sensor is defective, the heating control function is cancelled after 500 seconds.

(3) Cooling Start Airflow Control

When the intake temperature sensor indicates over 35°C, the voltage value increases by 1 V/sec with delay from 3 seconds after the compressor starts its operation.

In the initial operation stage, the hot air is discharged to the windshield (DEF mode) for a specific period of time (approx. 5 seconds). This prevents the hot air from suddenly discharging to the front passengers.

(4) Amount of Sunload Compensation Control

The air flow is directed to "VENT" according to the amount of sunload. In "VENT" and "B/L" modes, the blower voltage increases within 2.5 V.

(5) DEF Mode Compensation Control

In "DEF" mode, the voltage increases 2 V compared to that in "AUTO" mode. The voltage after compensation should not exceed 7 V.

(6) Maximum Cooling/Heating Control

	LO	HI
Mode	Vent	Foot
Rec/Fresh air	Rec air	Fresh air
Air mix	Full cool	Full hot
Air conditioner	ON	OFF
Blower motor	HI	HI

(7) Ambient Air Temperature Display

When the AMB button is pressed, the ambient temperature is displayed for 5 seconds. When the vehicle stops while driving, the ambient temperature before stop is displayed.

(8) Recirculation/Fresh Air Control

- A. AUTO control: Fresh air, 20% of fresh air, Recirculated air
- B. MANUAL control: Fresh air, Recirculated air
- C. COMP OFF control: Fresh air (AUTO mode)
- D. PTC linked control: When PTC is activated, the recirculation door is fixed at 30% of fresh air position. When PTC is deactivated, it returns to previous mode.

(9) High Intake Air Temperature Delay Control

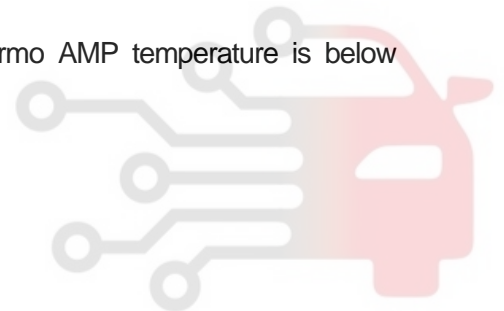
When the intake temperature sensor indicates over 35°C, the voltage value increases by 1 V/sec with delay from 3 seconds after the compressor starts its operation.

(10) COMP Control

- Ambient air temperature control: COMP OFF when the ambient temperature is below 0°C, COMP ON when it is over 2°C.
- Intake air temperature control: COMP OFF when the thermo AMP temperature is below 2°C, COMP ON when it is over 4°C.

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

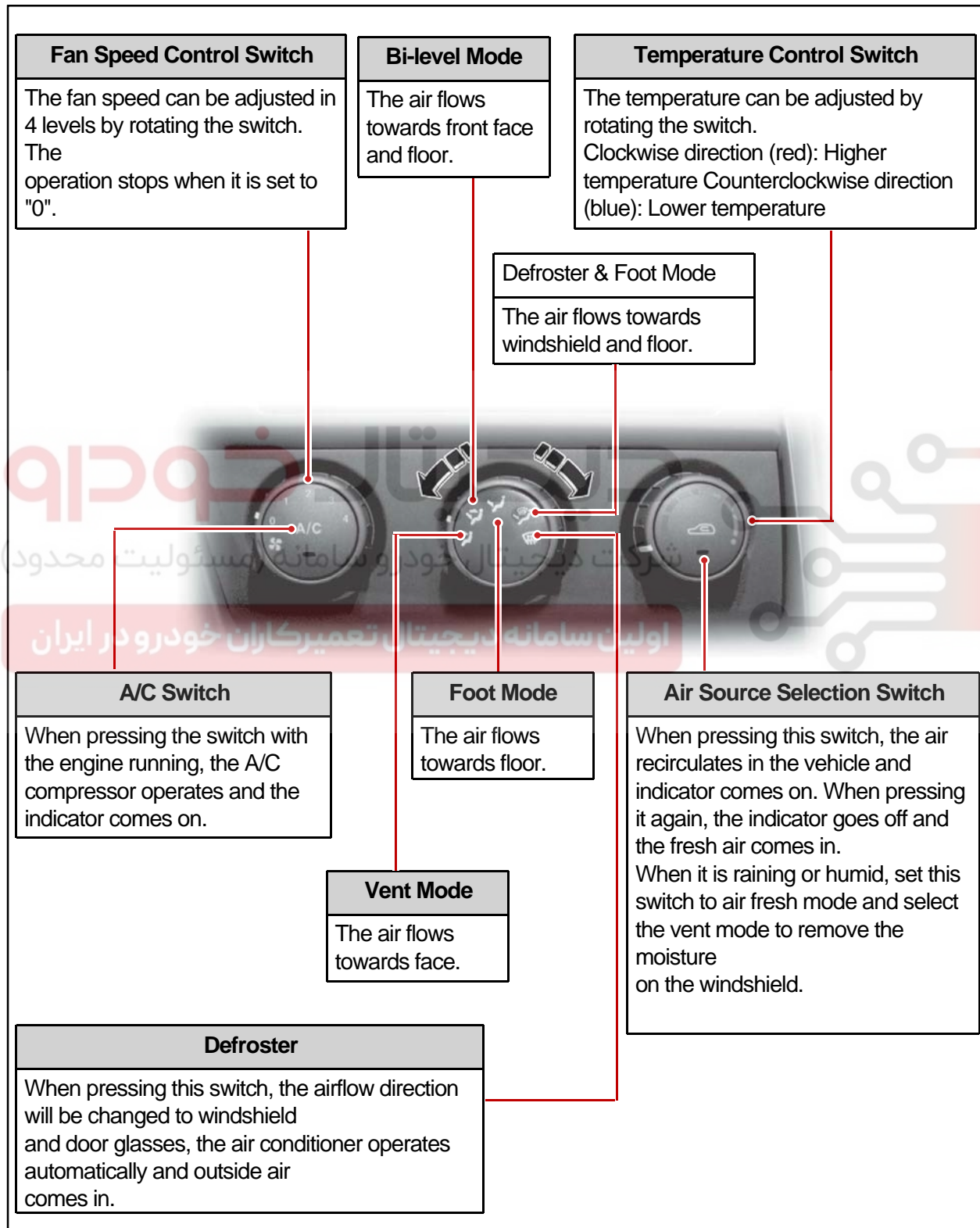
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Modification basis	
Application basis	
Allocated VIN	

5) Manual Air Conditioner Controller

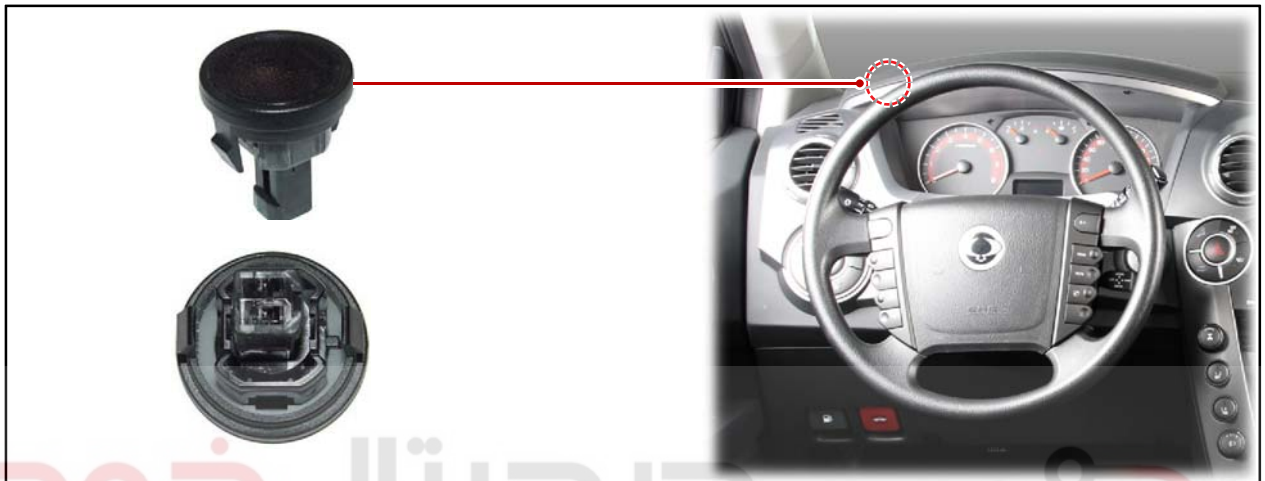
Manual air conditioner controller controls the fan speed, air distribution direction, air source selection and temperature control with motor actuators according to soft button and dial switch operations.



S.G.N.

0000-00 SUNSENSOR

It is installed on the upper left end of instrument panel. It is using characteristics that the amount of current changes according to amount of light on the photosensitive surface. Photo diode, which converts the changes in light intensity into electrical changes, detects the amount of light coming through windshield and changes it into current and then sends the signal to FATC controller.

**1) Inspection**

1. Remove the sun sensor and measure the current between terminals under sunlight.
2. Measure the current again under shade. It is in normal conditions if the measured value is less than the measured value under sunlight.
3. Turn the ignition switch to "ON" position.
4. Measure the voltage to the sun sensor from FATC connector. (approx. 2.5 V under sunlight and 4.8
5. V under shade.) If the voltage value cannot be measured, check the circuit for open. If the measured value is within the specified range, replace the FATC controller.

Modification basis	
Application basis	
Allocated VIN	

S.G.N.

6810-20 INCAR SENSOR ASSEMBLY

The AI sensor is installed at the driver side instrument panel undercover. It is a sensor that detects interior temperature.

1) Location**2) Functions****► Incar temperature sensor**

This sensor is a negative temperature coefficient (NTC) thermistor and detects the interior temperature with air coming from sensor hole and then sends the voltage value according to the changed resistance to FATC controller.

S.G.N.

6810-20

AMBIENT TEMPERATURE SENSOR

The ambient temperature sensor is installed in the front area of the engine compartment to detect the ambient temperature.



► Function

This sensor is a negative temperature coefficient (NTC) thermistor and detects the ambient temperature to send the voltage value according to the resistance change to the FATC.

► Inspection procedure

If there is any fault in the ambient temperature sensor, check as described below

- Remove the ambient temperature sensor and measure the resistance between the two terminals on the sensor connector. (Specification: $2.186 \text{ k}\Omega \pm 3\%$ at 25°C)
If the measured resistance is extremely high or low, replace the ambient temperature sensor.
- 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 ON position and measure the voltage between the pin no. 31 and 18 of the FATC connector. (Specification: approx. 1.7 V at 25°C)
 - If the voltage value cannot be measured, check the wiring for open circuit. If the measured value is within the specified range, replace the FATC.

Modification basis	
Application basis	
Allocated VIN	

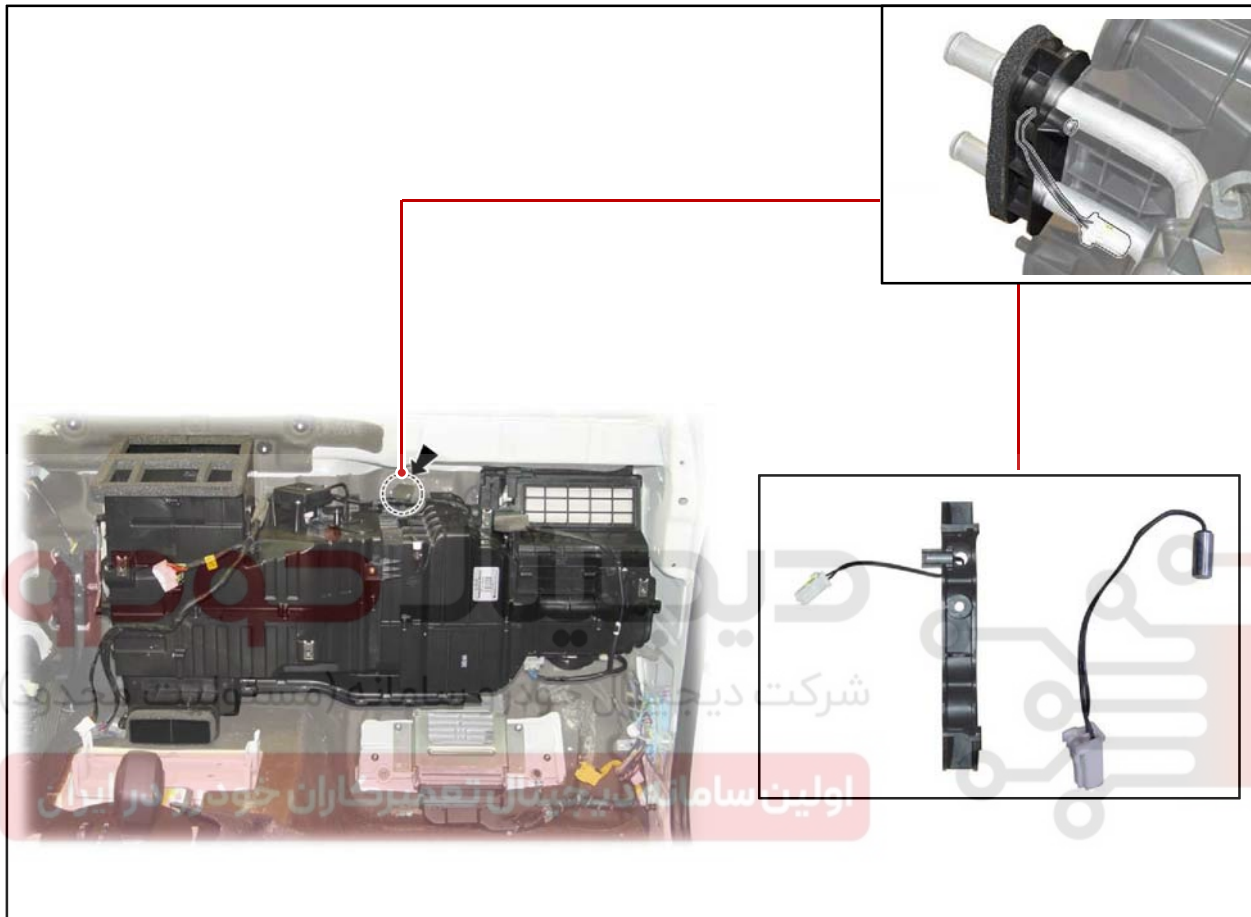
AIR CONDITIONER

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S.G.N.
6820-24

WATER TEMPERATURE SENSOR

The water temperature sensor is installed on top of the heater unit. It monitors the temperature in the duct and converts the temperature to the voltage value according to the changed resistance value (NTC value). Then, it transmits the voltage value to the FATC controller.



1) Inspection

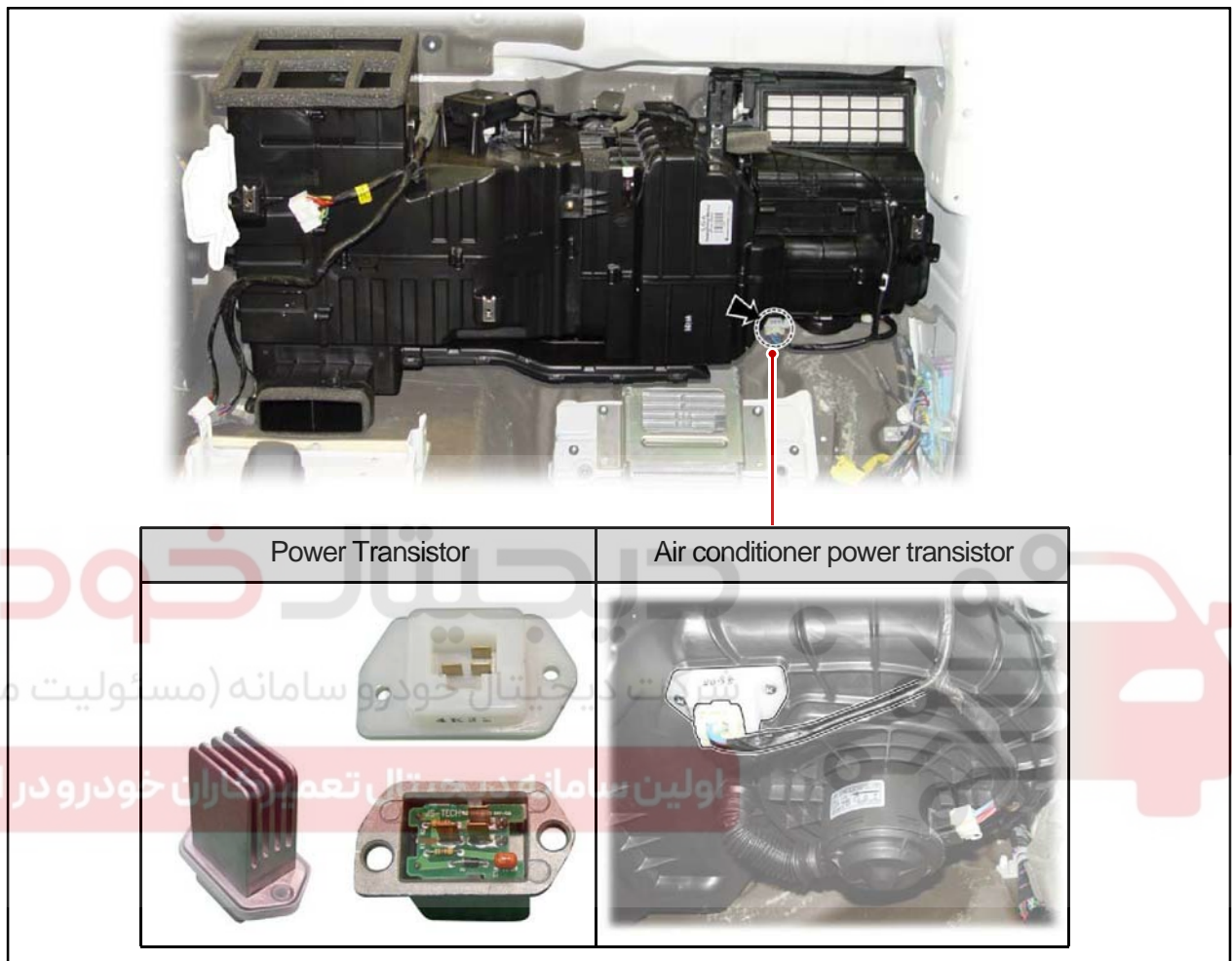
If the water temperature sensor defect code (DTC 3) is set, check as below.

- Remove the water temperature sensor and measure the resistance between terminals on the sensor connector.
(standard value: approx. 2.2 kΩ at 25°C)
In addition, if the resistance is extremely high or low, replace the sensor.
- 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 below.
- Turn the ignition switch to ON position and measure the voltage to water temperature sensor from the FATC controller connector. (standard value: approx. 2 V at 25°C)
- If the voltage value cannot be measured, check the circuit for open. If the measured value is within the specified range, replace the FATC controller.

S.G.N.
6810-06

POWER TRANSISTOR

The power transistor controls the fan speed. It controls the blower motor operating speed by changing the current value to the base of power transistor when receiving the fan control signal from FATC.



1) Inspection

If the power transistor defect code (DTC 6) appears, check as below.

- Turn the ignition switch to ON position.
- Measure the voltage between blower motor terminals while changing the fan speed from stage 1 to stage 8.
- The specified voltage value in each stage:

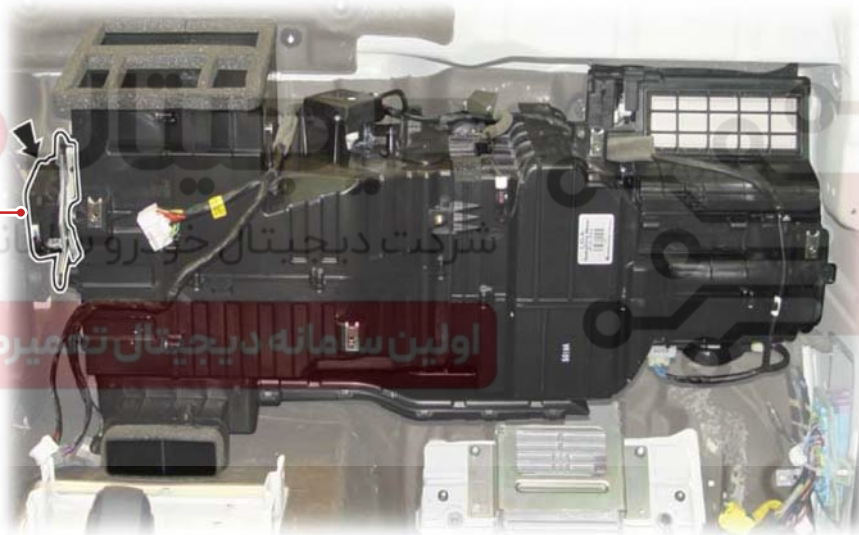
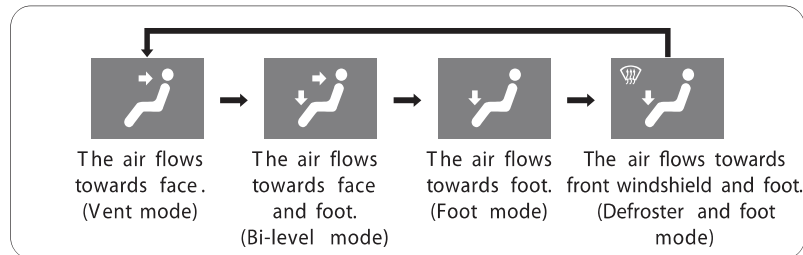
Stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8
Voltage (V)	4 ~ 4.75 V	5 ~ 5.75 V	6 ~ 6.75 V	7 ~ 7.75 V	8 ~ 8.75 V	9 ~ 9.75 V	10 ~ 10.75 V	11~Battery voltage

- If the voltage is out of specified value, check the circuit for open. If the circuit is in normal condition, replace the power transistor.

Modification basis	
Application basis	
Allocated VIN	

6810-02 MODE DOOR ACTUATOR

The mode door actuator is an actuator that closes, opens and adjusts the mode door for VENT, FOOT and DEF mode to change the air flow directions by FATC controller. Under the FATC controller AUTO mode, it stays on DEF mode until the engine coolant temperature reaches at normal operating level and the mode is changed as below when the MODE switch is pressed.



Location of mode door actuator



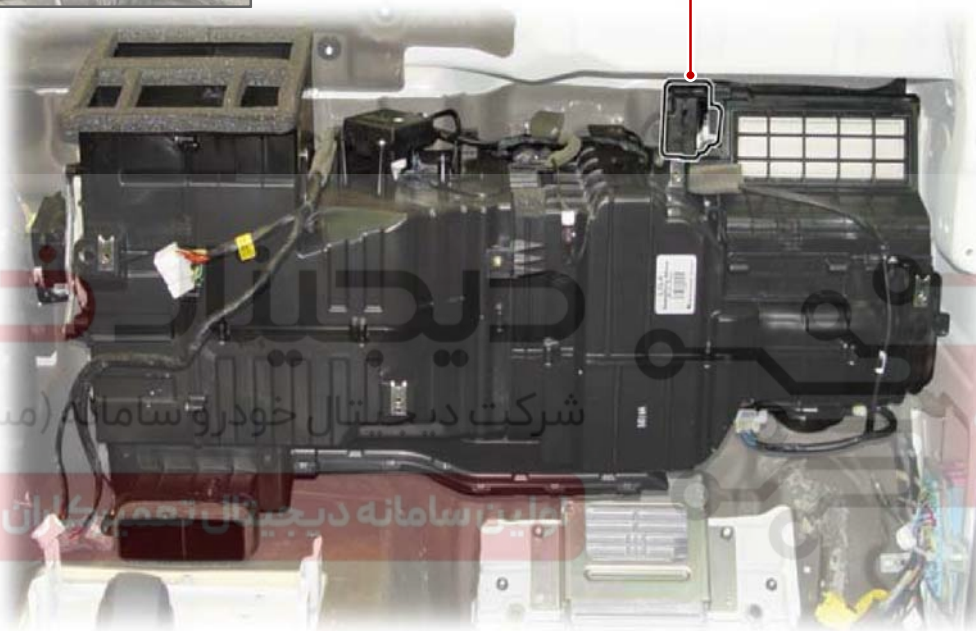
Mode door actuator



S.G.N.

6810-02 IN/EX - AIR DOOR ACTUATOR

The air source door actuator sets the intake door mode by operating air source door motor according to the control signal from FATC.

**IN/EX Air door actuator**

Modification basis	
Application basis	
Allocated VIN	

S.G.N.

6810-02 AIR MIX DOOR ACTUATOR

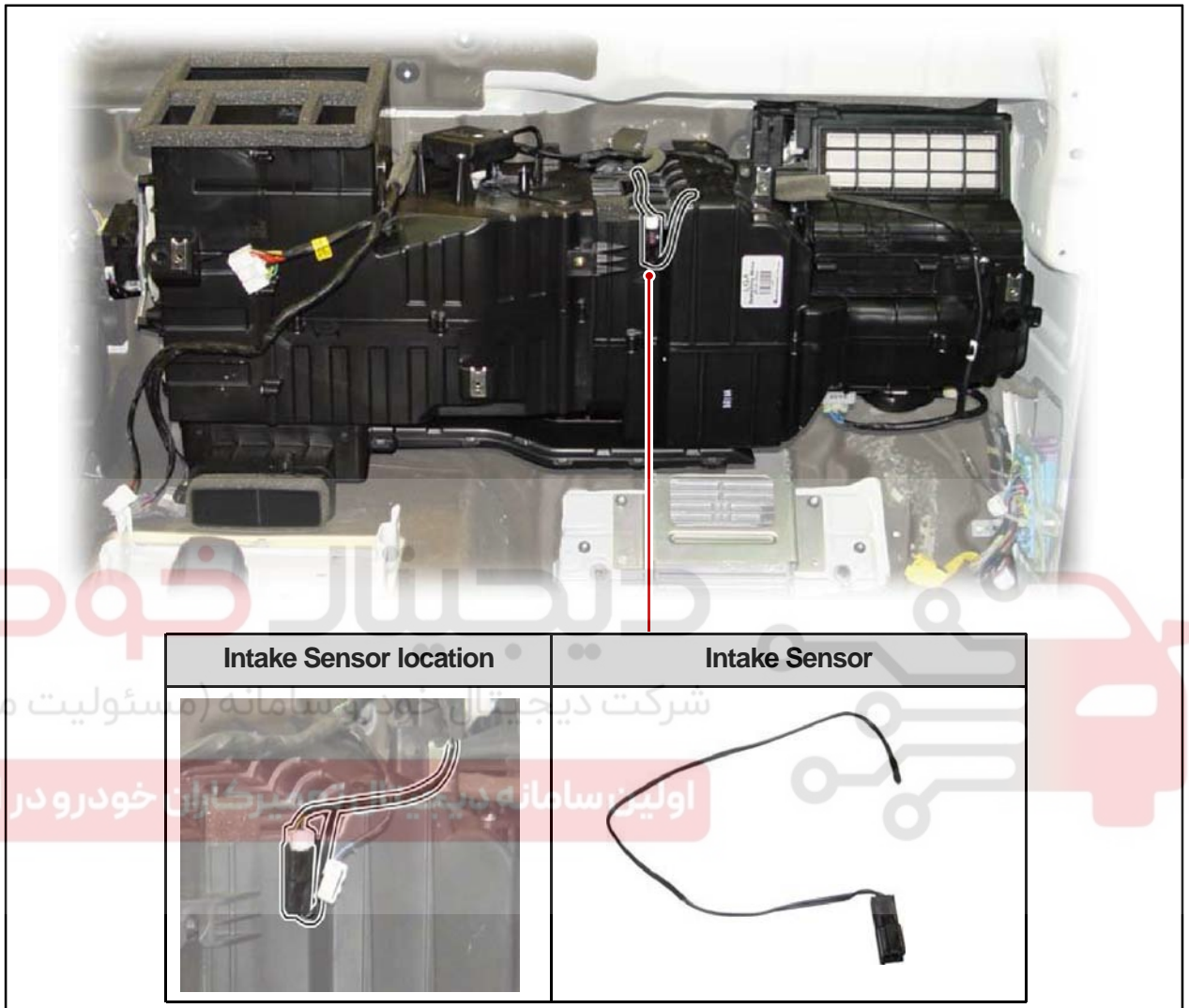
The air mix door actuator controls the discharging air temperature properly by closing/opening the damper according to the control signals from FATC.

**Air mix door actuator component**

S.G.N.

6810-24 THERMO AMP (INTAKE SENSOR)

The Intake sensor outputs the compressor ON or OFF signal to ECU to prevent evaporator from freezing. The sensing part of the intake sensor is the evaporator fin contact type.

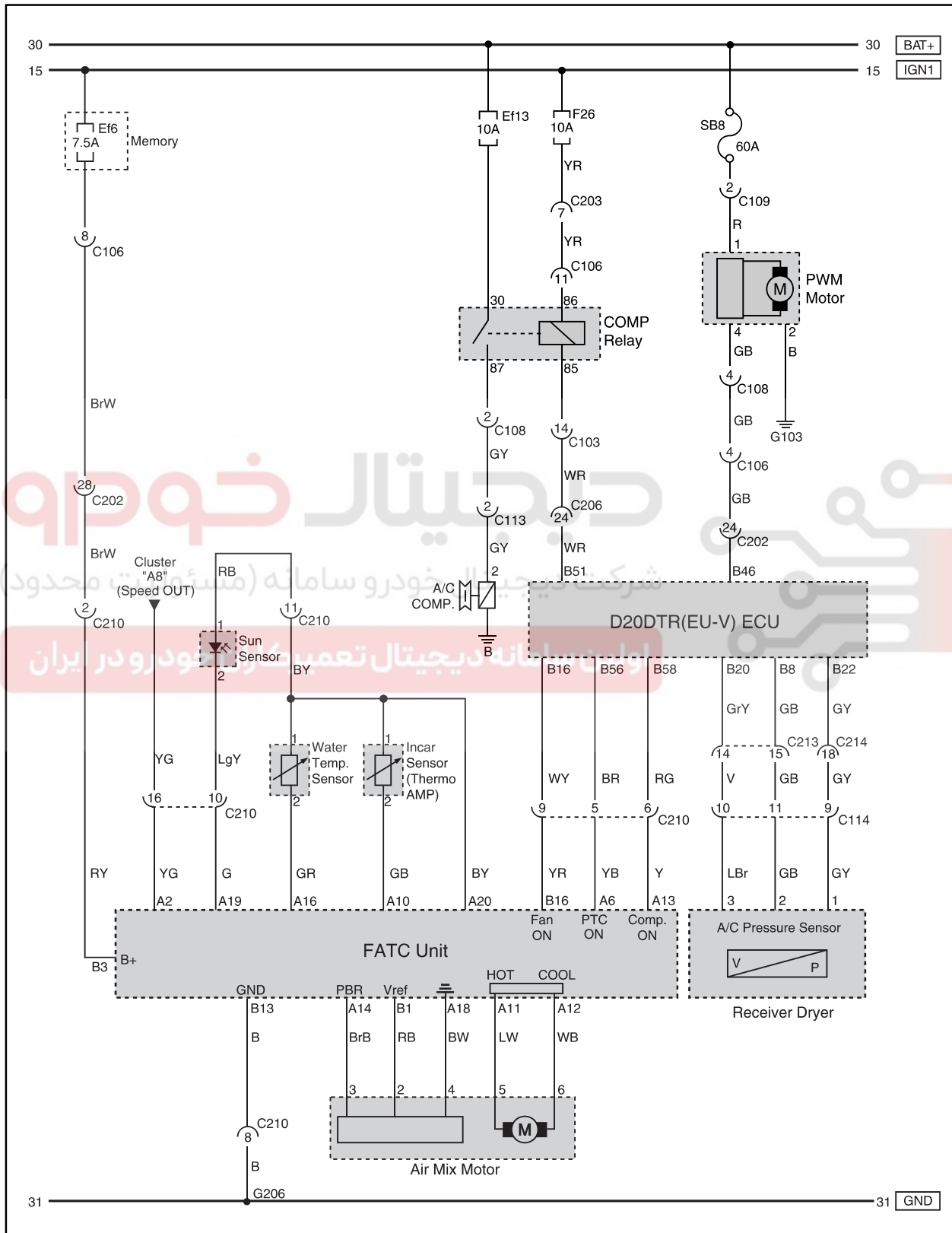
**1) Inspection**

If the air conditioner does not turn on, check as below.

- Remove the Intake sensor and measure the voltage between terminal No. 1 and 2 on the connector. Check whether the output voltages are normal (ON: approx. 12 V, off: 0 V).
- If the voltage value is out of the specified value, replace the Intake sensor. If the circuit is in normal condition, check as below.
- Turn the ignition switch to ON position and turn on the air conditioner by pressing the A/C button.
- And measure the voltage between terminal A12 and A11 on the FATC controller connector (standard: approx. 12 V).
- If the voltage value cannot be measured, check the circuit for open. If the measured value is not within the specified range, replace the intake sensor.

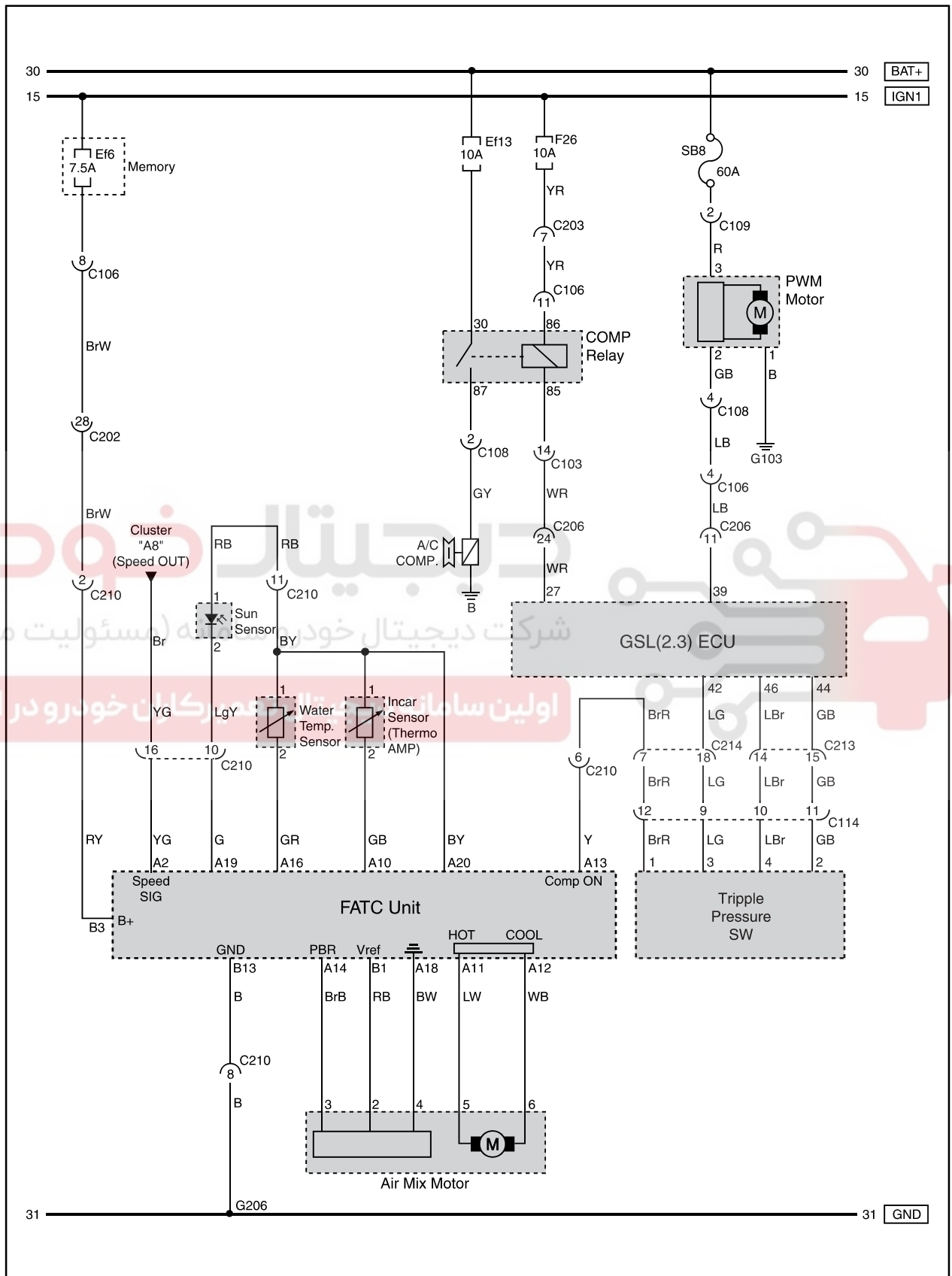
Modification basis	
Application basis	
Allocated VIN	

S.G.N.

6810-00 FATC (FULL AUTO TEMP. CONTROL) CIRCUIT**1) PWM Motor, Compressor, Air Mix Motor, Sun Sensor**

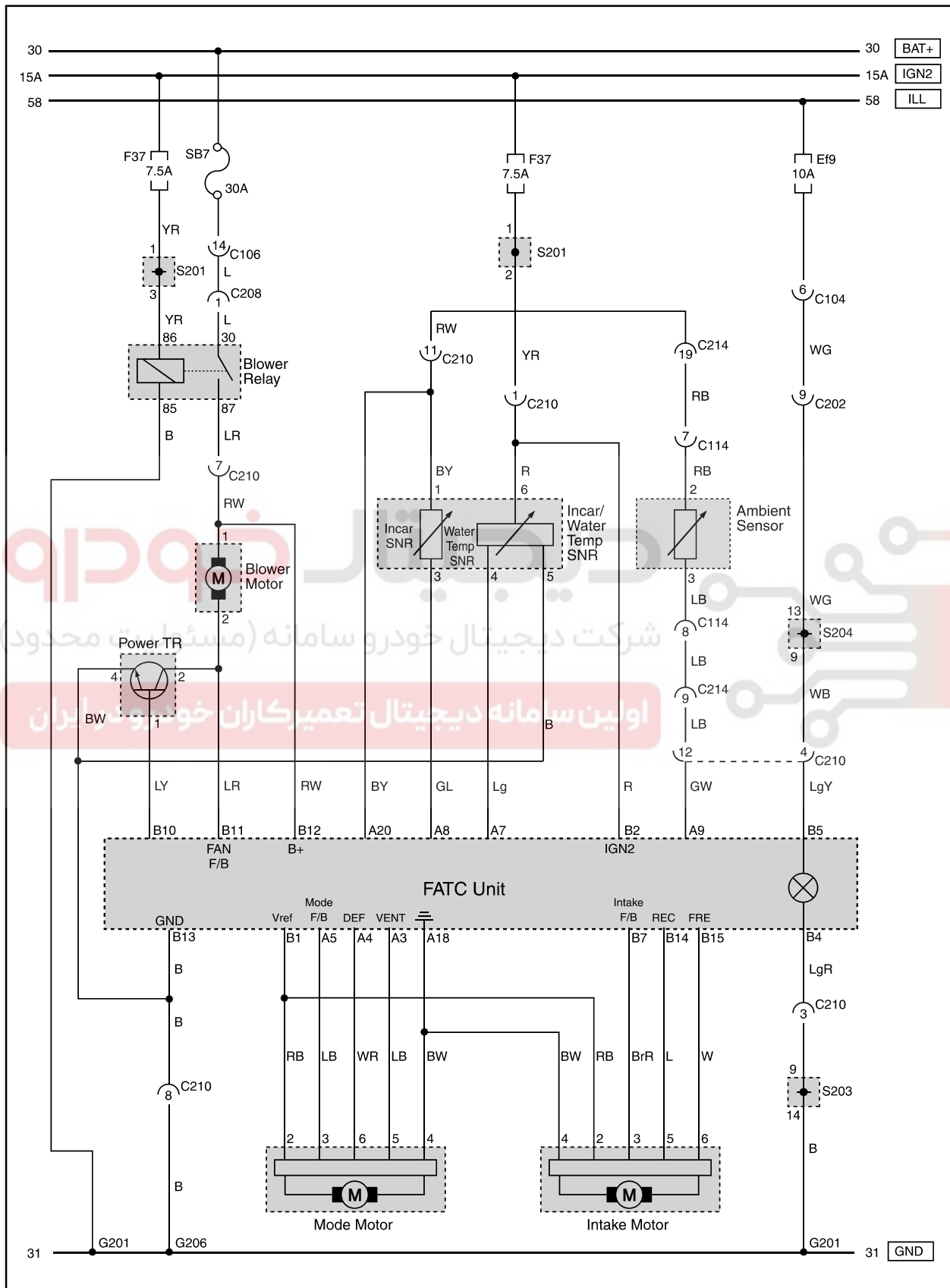
Modification basis	
Application basis	
Affected VIN	021 62 99 92 92

2) PWM Motor, Air Mix Motor(GSL 2.3)



Modification basis	
Application basis	
Allocated VIN	

3) Blower, Actuator (Mode, Intake), Ambi Sensor

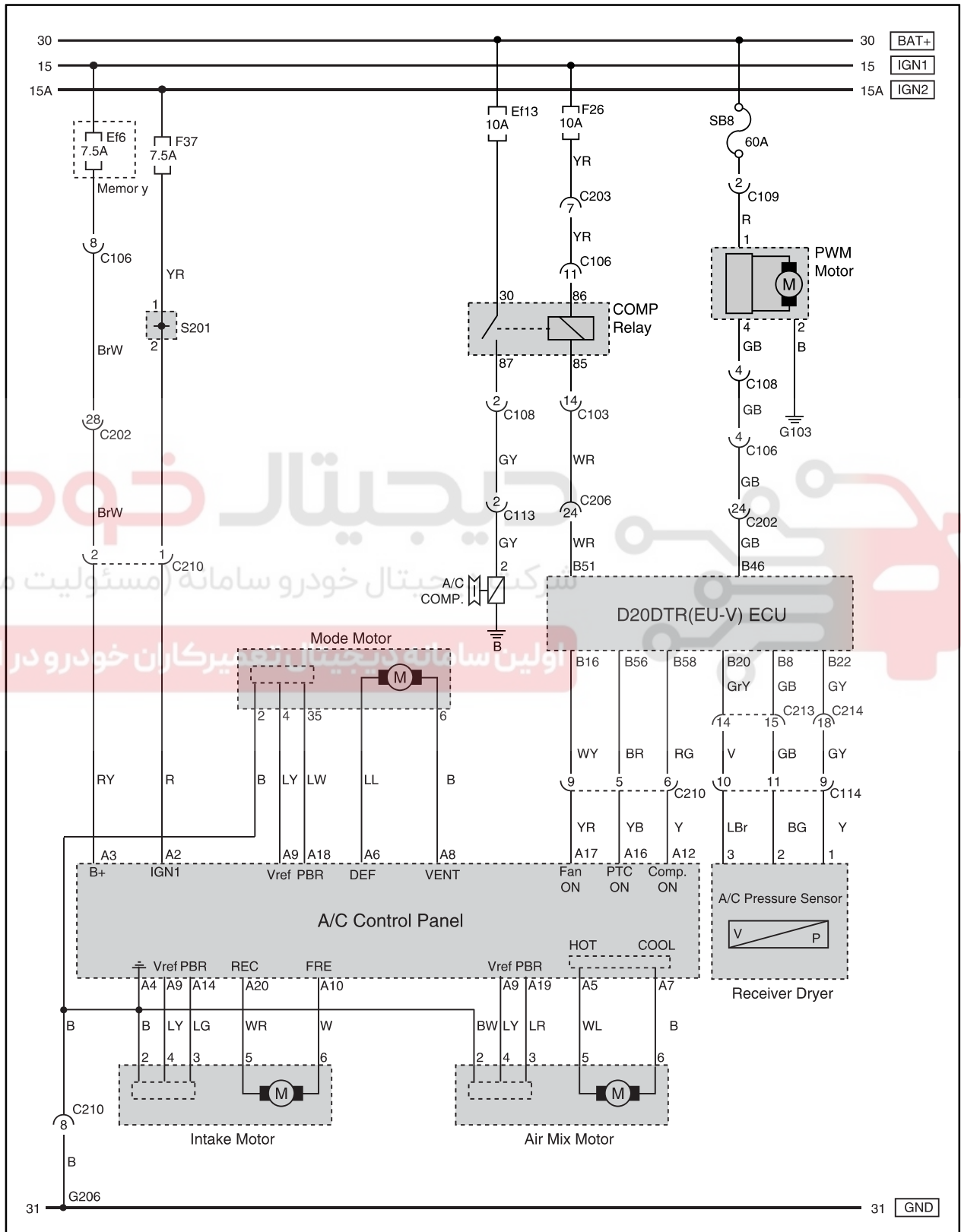


Modification basis	
Application basis	
Affected VIN	021 62 99 92 92

S.G.N.

6810-00 AIR-CON (MANUAL) CIRCUIT

1) PWM Motor, Compressor, Motor(Mode, Intake, Air Mix)

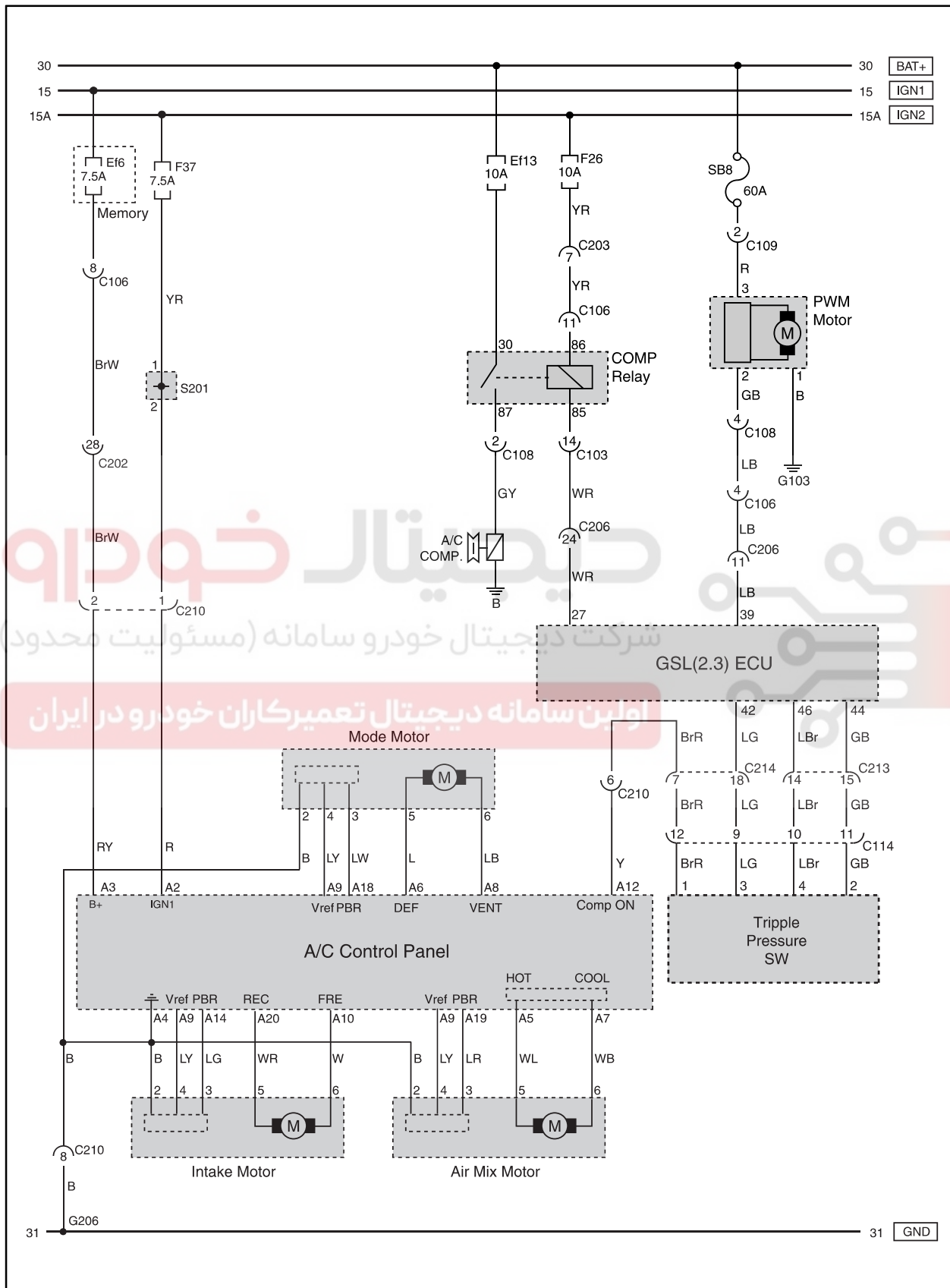


Modification basis	
Application basis	
Allocated VIN	

AIR CONDITIONER

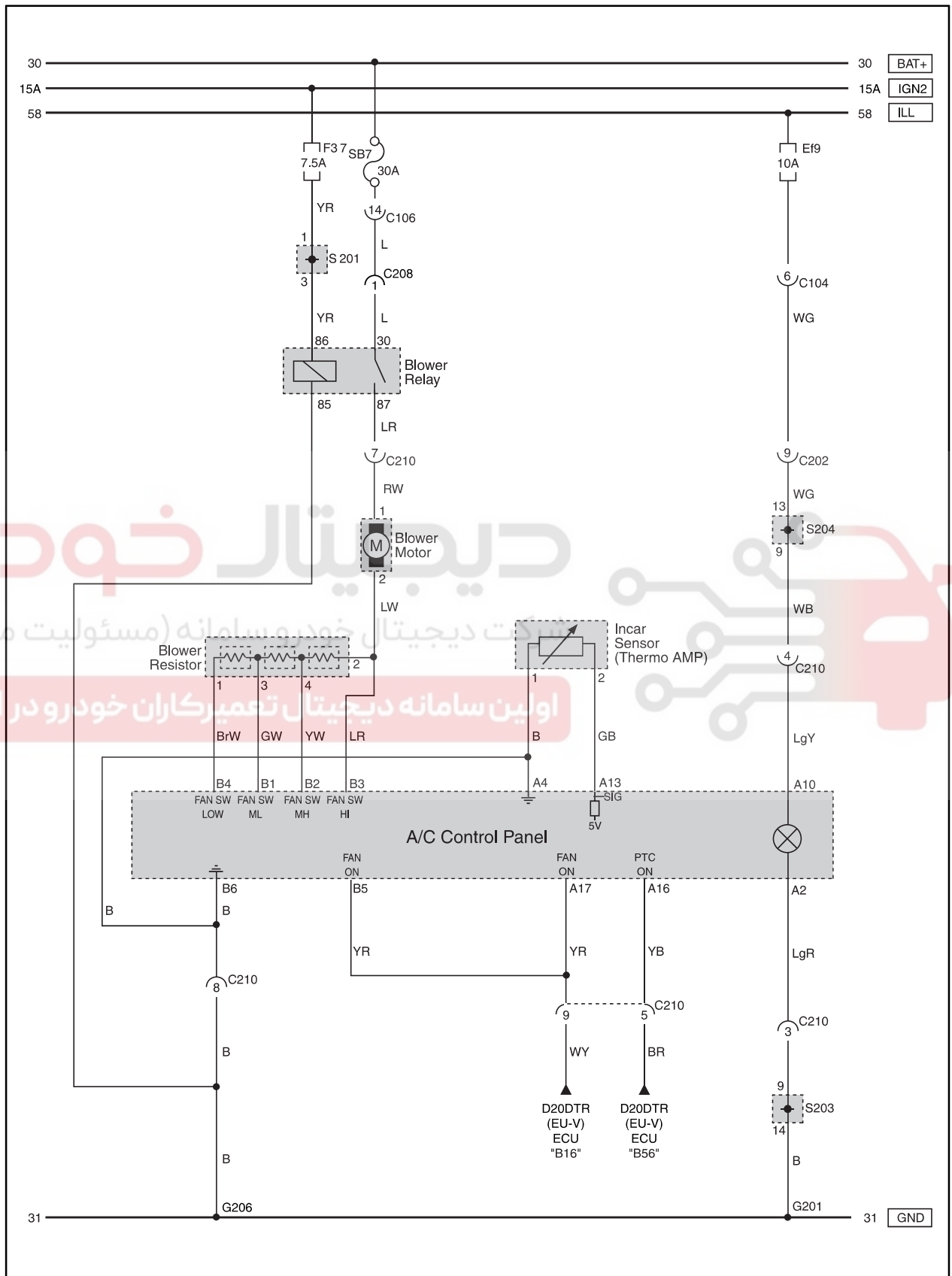
ACTYON 2013.11

2) PWM Motor, Motor(GSL 2.3)



Modification basis	
Application basis	
Affected VIN	021 62 99 92 92

3) Blower



Modification basis	
Application basis	
Allocated VIN	

S.G.N.

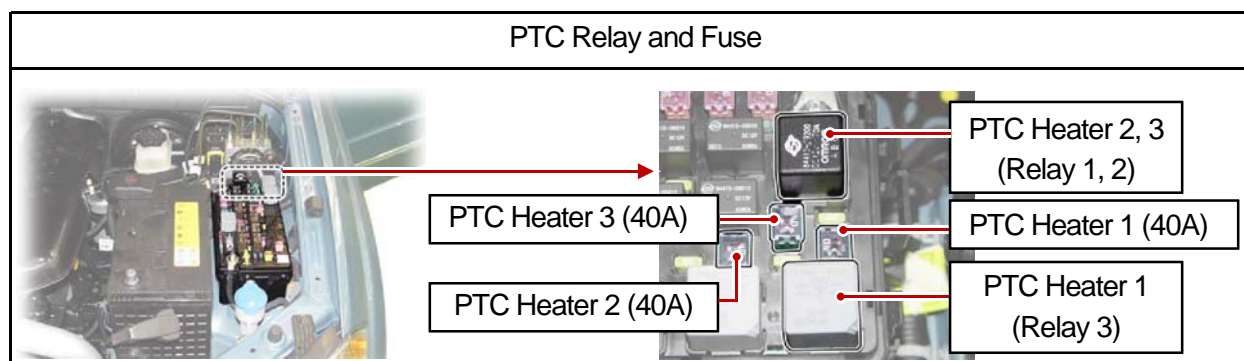
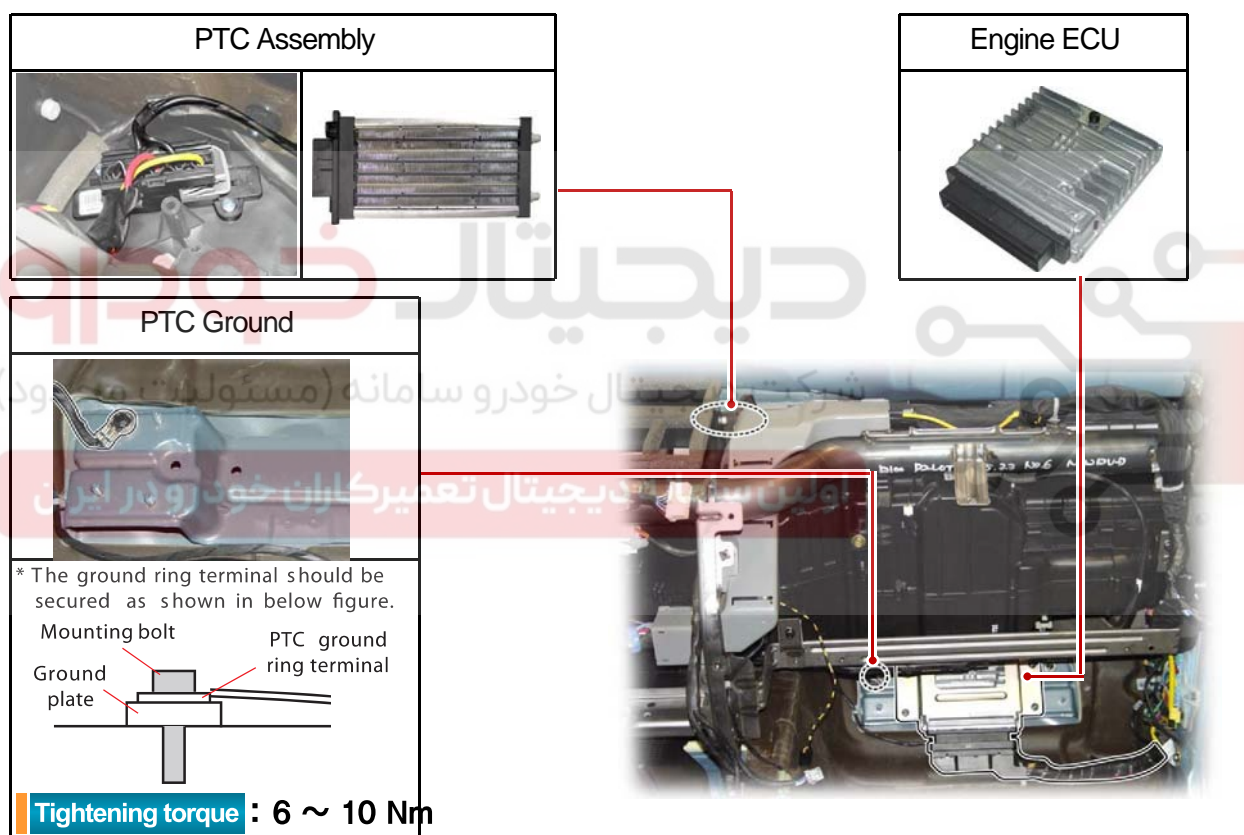
6810-15 PTC(POSITIVE TEMPERATURE COEFFICIENT)**1) Overview**

The supplementary electrical heater is installed in DI engine equipped vehicle as a basic equipment.

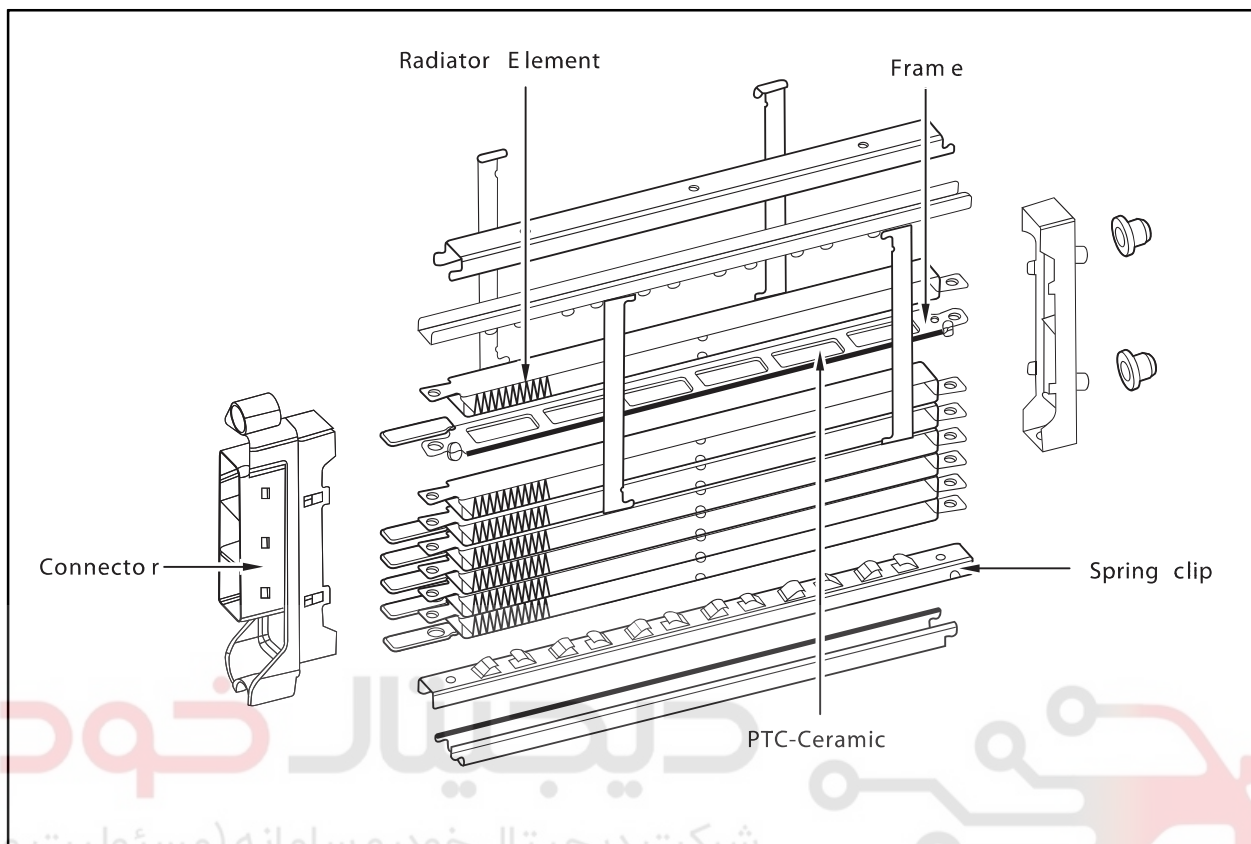
The PTC system is operated according to two temperature values measured at the coolant temperature sensor and HFM sensor.

This device is mounted in the heater air outlet and increase the temperature of air to the passenger compartment.

Because PTC system is heated by electrical power, high capacity alternator is required. PTC does not operate during engine cranking, while the battery voltage is lower than 11 V or during preheating process of glow plugs.



2) Components



3) Characteristics of PTC

	P.T.C Heater
Heating type	Air heating type
Element	Ceramic PTC (BaTiO ₃)
Advantages	<ol style="list-style-type: none"> 1. Stable output regardless of voltage changes 2. Block the overcurrent with switch effect of PTC element 3. High heating capacity in a moment 4. Excellent durability of heating element against high current
Heating efficiency	Superior
Weight	Approx. 500 g
Durability	Superior
Safety	Superior

Modification basis	
Application basis	
Allocated VIN	

4) PTC Operating Process

(1) PTC Operating (ON) Condition

The operating condition of PTC is controlled by two step.

Generally, ECU controls the power relay for PTC depending on the coolant temperature and ambient temperature sensor.

► 1st step (Initial PTC operating condition)

- When coolant temperature $< 15^{\circ}\text{C}$, PTC is operating (ON).
- When coolant temperature 15°C , the conditions for the 2nd step described below must be satisfied.

► 2nd step (Coolant temperature: 15°C)

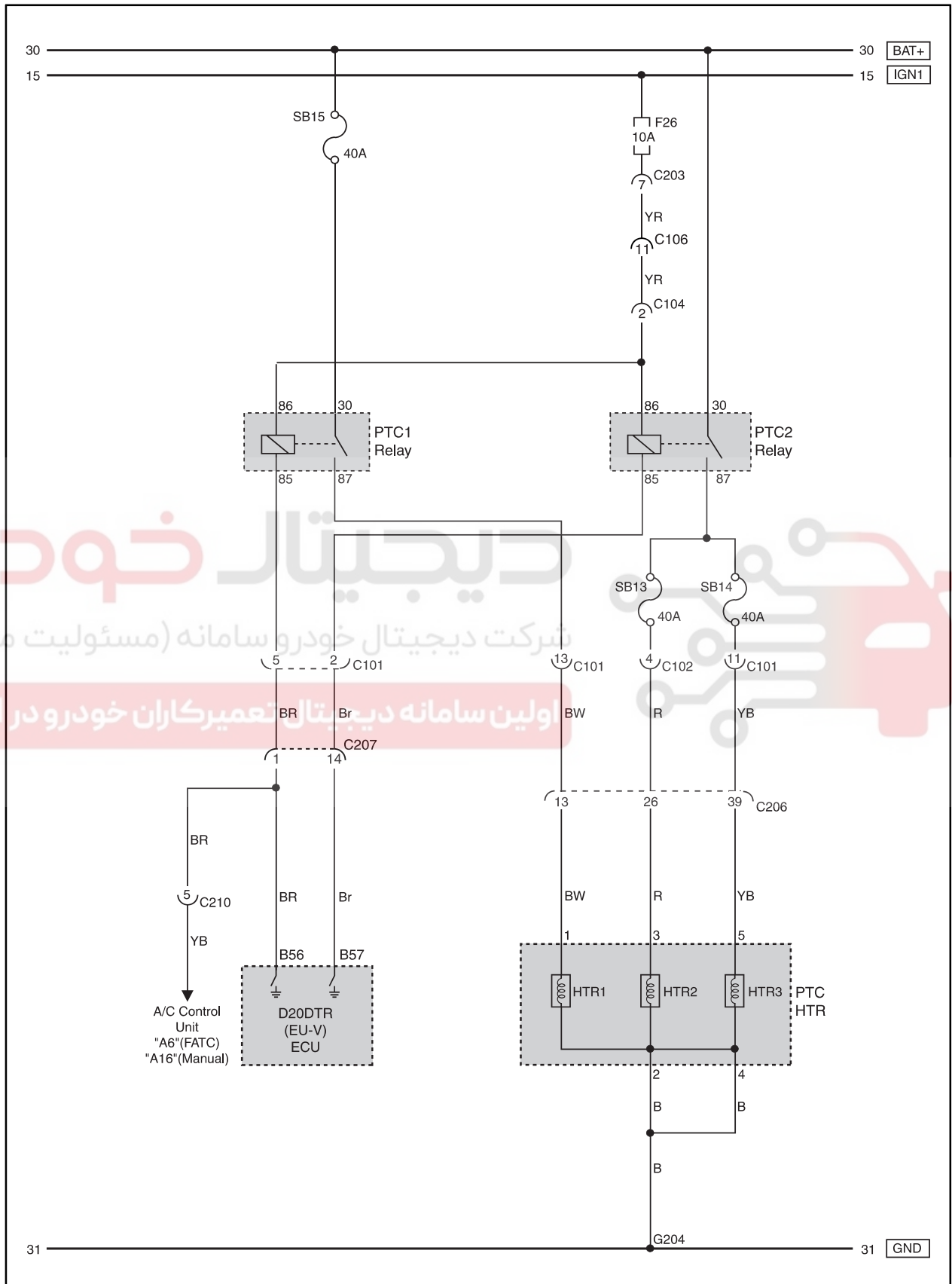
- When coolant temperature 65°C and ambient temperature -10°C , PTC operates (ON).
- When coolant temperature $65 \sim 60^{\circ}\text{C}$ and ambient temperature $-10^{\circ}\text{C} \sim 0^{\circ}\text{C}$, PTC operates (ON).
- When coolant temperature 60°C and ambient temperature $0^{\circ}\text{C} \sim 5^{\circ}\text{C}$, PTC operates (ON).

(2) PTC "OFF" Condition

- Air conditioner blower switch OFF
- Ambient temperature sensor error (wiring short or open)
- When engine cranking
- Battery voltage is lower than 11V
- When preheating the glow plug (Glow indicator "ON")



5) Electrical Wiring (Positive Temperature Coefficient)



Modification basis	
Application basis	
Allocated VIN	

REMOVAL AND INSTALLATION

S.G.N.
6810-20

SELF DIAGNOSIS

(ONLY FOR FATC A/C CONTROLLER)

1) Overview

The FATC controller has self diagnosis function that can diagnose the system by itself. Before checking each component, be sure to check the fault code by using self diagnosis function.

The diagnosis procedure in this vehicle has 6 steps by the temperature control switch (step 2~5) and the fan speed control switch (step 6).

Step 1: Check the vacuum fluorescent display (VFD) segments.

Step 2: Check the air mix door and sensors for defect.

Code	Malfunction	Remark	Code	Malfunction	Remark
0	VDF segments are OK		5	Defective sun sensor	
1	Defective ambient temperature sensor		6	Check air mix door	
2	Defective interior temperature sensor		7	-	
3	Defective water temperature sensor		8	-	
4	Defective intake sensor		9	-	

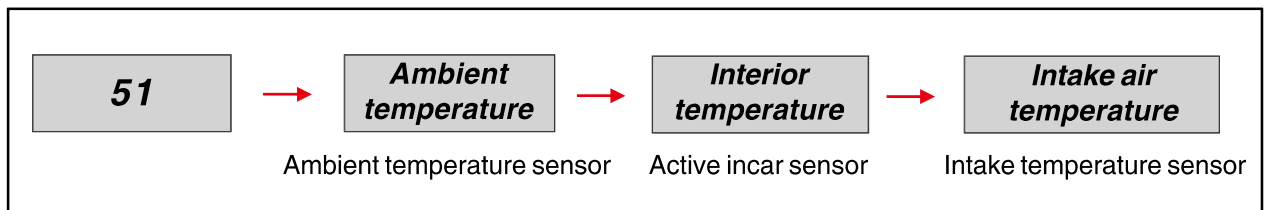
Step 3: Check the position and conditions of recirculation air door and mode door.

Code	Malfunction	Remark	Code	Malfunction	Remark
1	VENT		6	DEF	
2	B/L		7	FRE	
3	MIX COOL		8	20% FRE	
4	FOOT		9	REC	
5	D/F		0	All door OK	

Step 4: Check the position of actuator door, the fan speed and the compressor operation. When pressing the defroster switch after entering step 4, the mode is changed to 41 - 42 - 43 - 44 - 45 - 46 - 41 in turns.

Displayed Number	41	42	43	44	45	46
Mode door	VEN T	B/L	B/L	FOOT	D/F	DE F
Interior/Ambient door	RE C	RE C	20%FR E	FR E	FR E	FR E
Air mix door	F/COOL	F/COOL	F/HOT	F/HOT	F/HOT	F/HOT
Blower	4.5 V	10.5 V	8.5 V	8.5 V	8.5 V	MAX
Compresso r	ON	ON	OF F	OF F	ON	ON

Step 5: When pressing the defroster switch, the display shows the currently monitored temperature in turns as below:



Step 6: In this step, the temperature can be compensated within the range of -3°C to $+3^{\circ}\text{C}$ in the control process according to the temperature to air conditioner controller. The step 6 initiates when slightly rotating the fan speed switch (other than TEMP switch) in step 5.

2) Self Diagnosis

1. Starting Self Diagnosis

Turn the ignition switch to ON position and press OFF switch for more than 5 seconds within 10 seconds after turning the ignition switch to ON position.

2) Check LED segments on the vacuum fluorescent display (VFD).



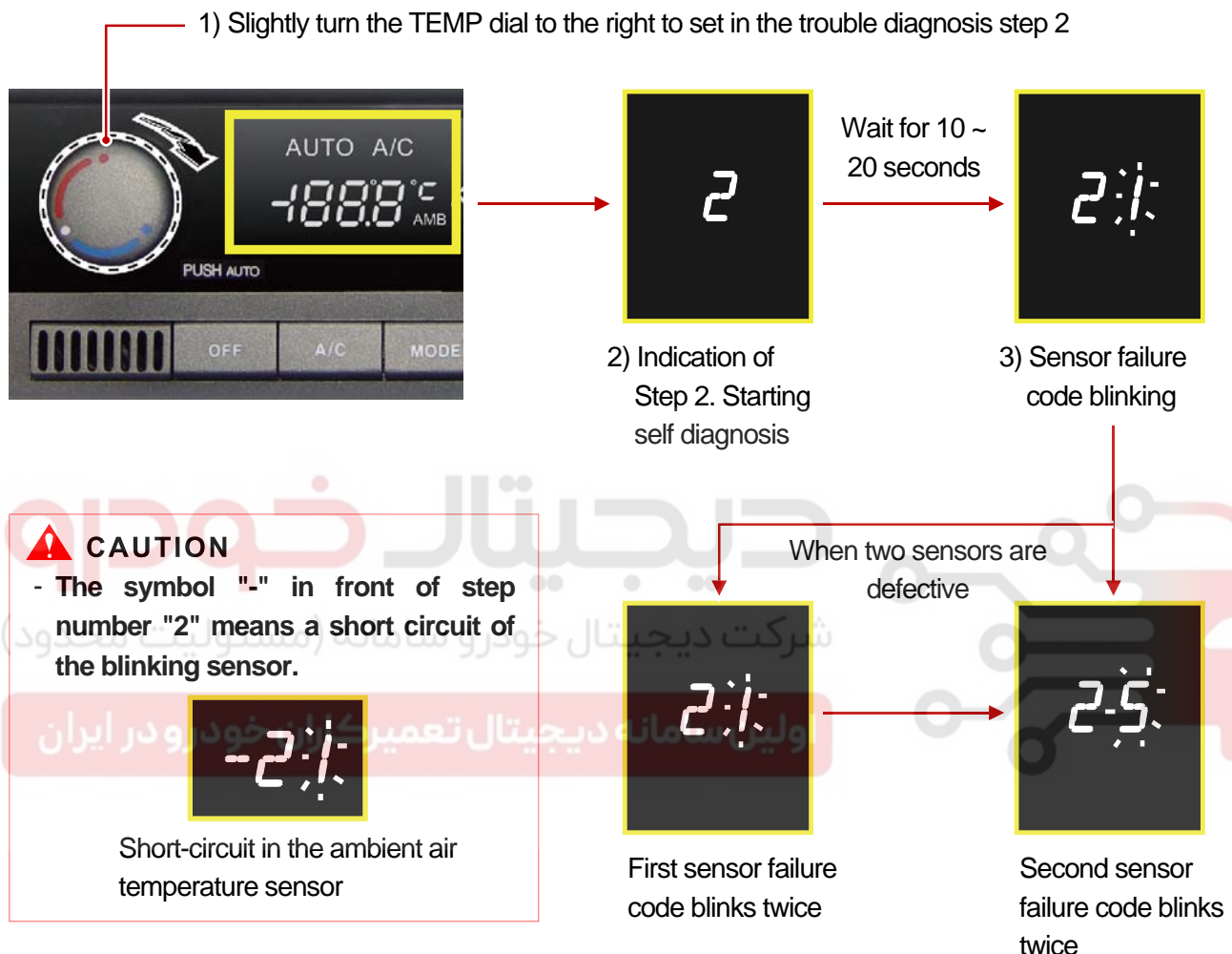
1) Press OFF switch for more than 5 seconds.

Modification basis	
Application basis	
Allocated VIN	

2. Set in Trouble Diagnosis Step 2

In this step, check the air mix door and sensors for defect.

Once the system starts diagnosis step 2, the digit "2" is displayed, implying step 2, on the display window and the trouble diagnosis for sensors is executed. If no failure exists, "20" is displayed. If any failure exists, the appropriate trouble code is displayed as below.



► Trouble Code

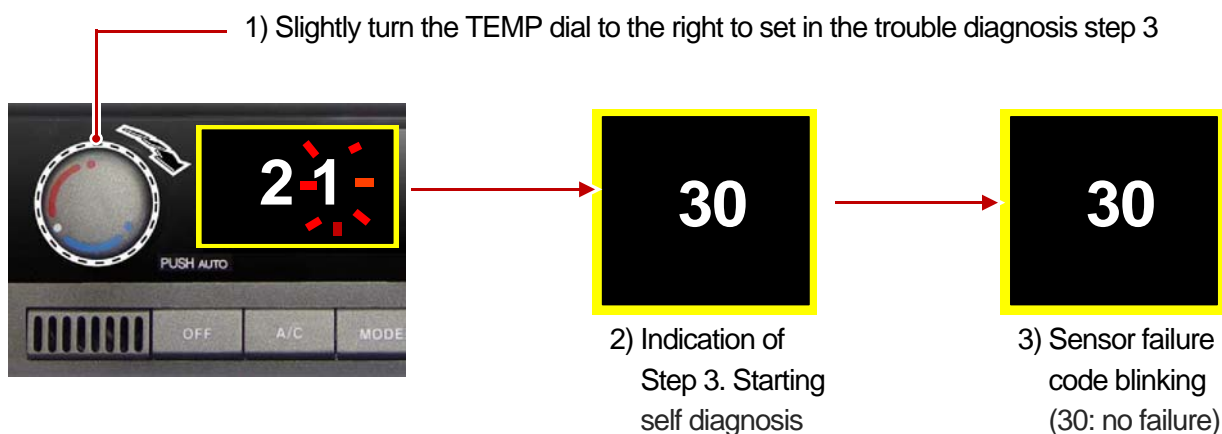
Code	Malfunction	Remark	Code	Malfunction	Remark
0	VDF segments are OK		5	Defective sun sensor	
1	Defective ambient temperature sensor		6	Check air mix door	
2	Defective interior temperature sensor		7	-	
3	Defective water temperature sensor		8	-	
4	Defective intake sensor		9	-	

3. Set in Trouble Diagnosis Step 3

In this step, check the position and conditions of recirculation air door and mode door.

Slightly turn the TEMP switch until "3" is displayed on the display window.

If no failure exists, "30" is displayed. If any failure exists, the appropriate trouble code is displayed.



► Trouble Code

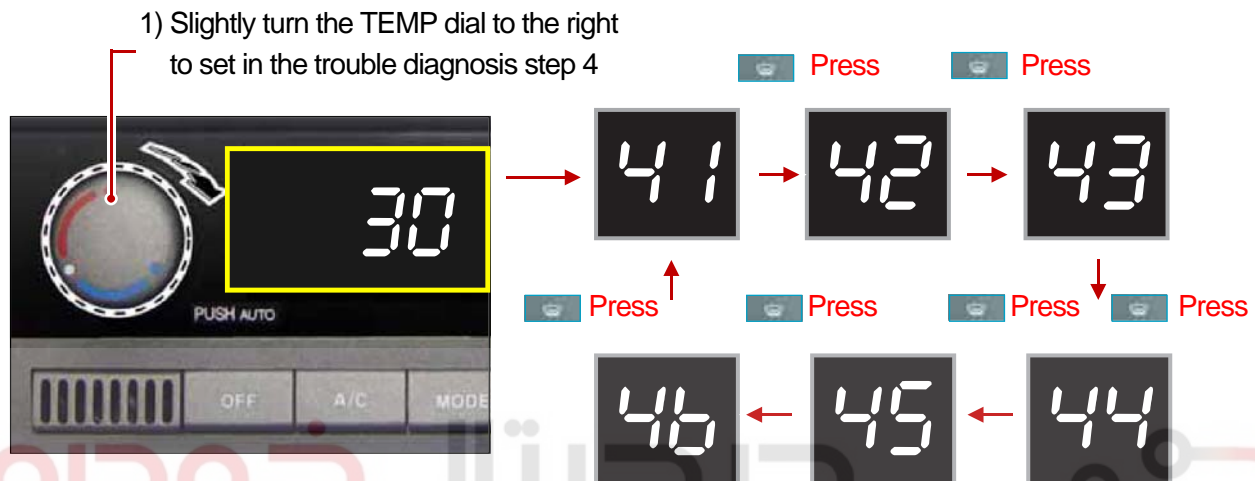
Code	Malfunction	Remark	Code	Malfunction	Remark
1	Defective VENT		6	DEF	
2	Defective B/L		7	FRE	
3	MIX COOL		8	20% FRE	
4	FOOT		9	REC	
5	D/F		0	All door OK	

Modification basis	
Application basis	
Allocated VIN	

4. Set in Trouble Diagnosis Step 4

In this step, check the position of actuator door, check the fan speed, and check the compressor operation.

Slightly turn the TEMP switch in step 3 until "41" is displayed on the display window. When pressing DEF switch, mode changes as shown below in turns to check each function.



The following is the function check in step 4 of the diagnosis. Check the function according to the following table.

The voltage for the blower in the table is the output voltage for the motor operation. The higher the voltage is, the faster the speed of the blower motor gets.

► Function Check

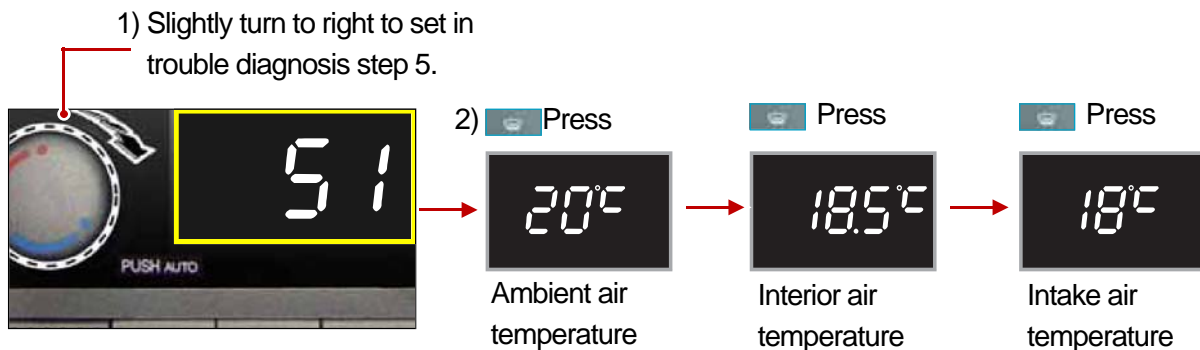
Displayed Number	41	42	43	44	45	46
Mode door	VEN T	B/L	B/L	FOOT	D/F	DE F
Interior/Ambient door	RE C	RE C	20%FR E	FR E	FR E	FR E
Air mix door	F/COOL	F/COOL	F/HOT	F/HOT	F/HOT	F/HOT
Blower	4.5 V	10.5 V	8.5 V	8.5 V	8.5 V	MAX
Compresso r	ON	ON	OF F	OF F	ON	ON

5. Set in Trouble Diagnosis Step 5

In this step, check the conditions of temperature related sensors.

Slightly turn the TEMP switch in step 4 until "51" is displayed on the display window.

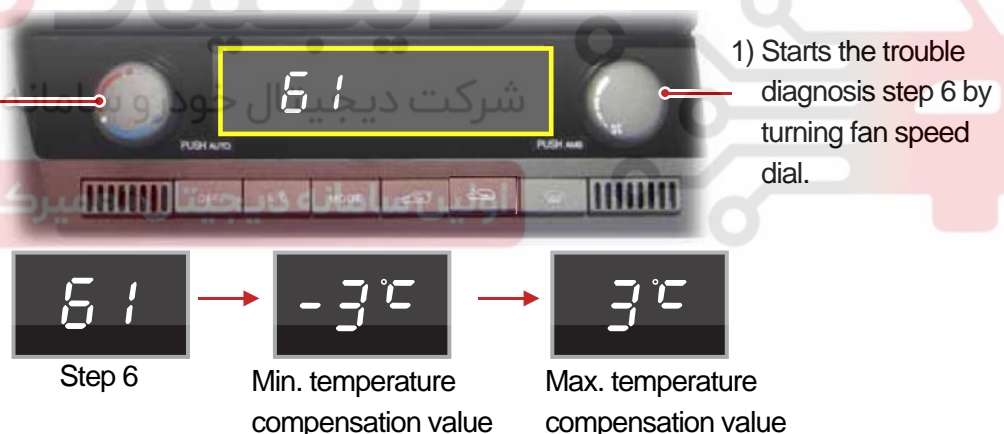
When pressing DEF switch  displayed temperature changes as shown below in turns.



6. Set in Trouble Diagnosis Step 6

In this step, the temperature can be compensated within the range of -3°C to 3°C in the control process according to the temperature to air conditioner controller. The step 6 initiates when slightly rotating the fan speed switch (other than TEMP switch) in step 5.

2) Compensates the temperature by turning TEMP dial.



7. Canceling the Trouble Diagnosis

Turn the AUTO switch ON or turn the ignition key OFF.

8. Symptoms when the A/C system is malfunctioning (initial self diagnosis)

- The display does not show the system malfunction even when a sensor is defective. Therefore, check the system in the diagnosis mode.



Modification basis	
Application basis	
Allocated VIN	

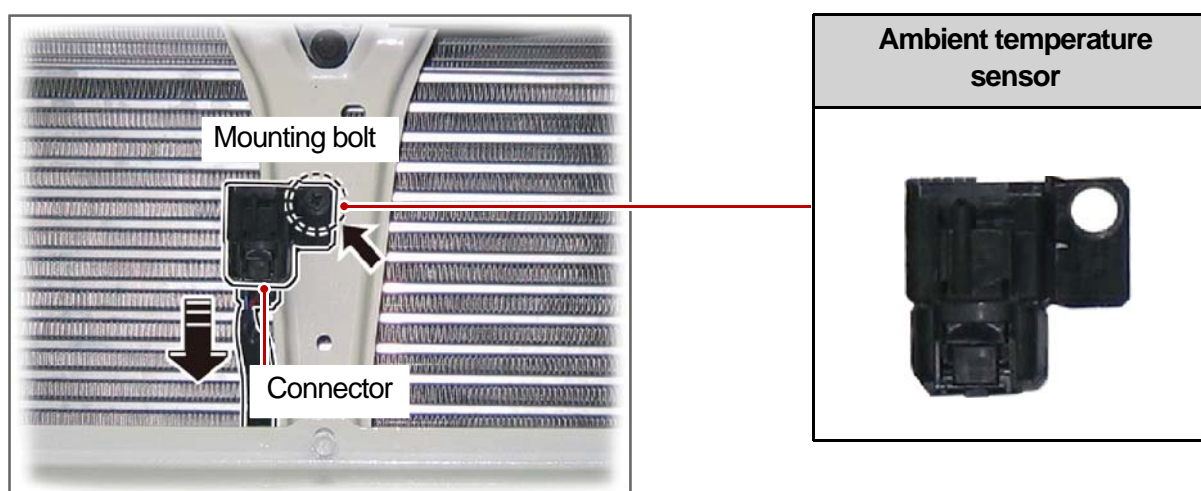
S.G.N.

6810-20 AMBIENT TEMPERATURE SENSOR

1. Disconnect the negative battery cable and remove headlamps.



2. Disconnect the ambient temperature sensor connector, unscrew the mounting bolt and remove the ambient temperature sensor assembly (Install in the reverse order of removal).



S.G.N.

6820-24

WATER TEMPERATURE SENSOR

Preceding work

1. Disconnect the negative battery cable and remove the instrument panel assembly.

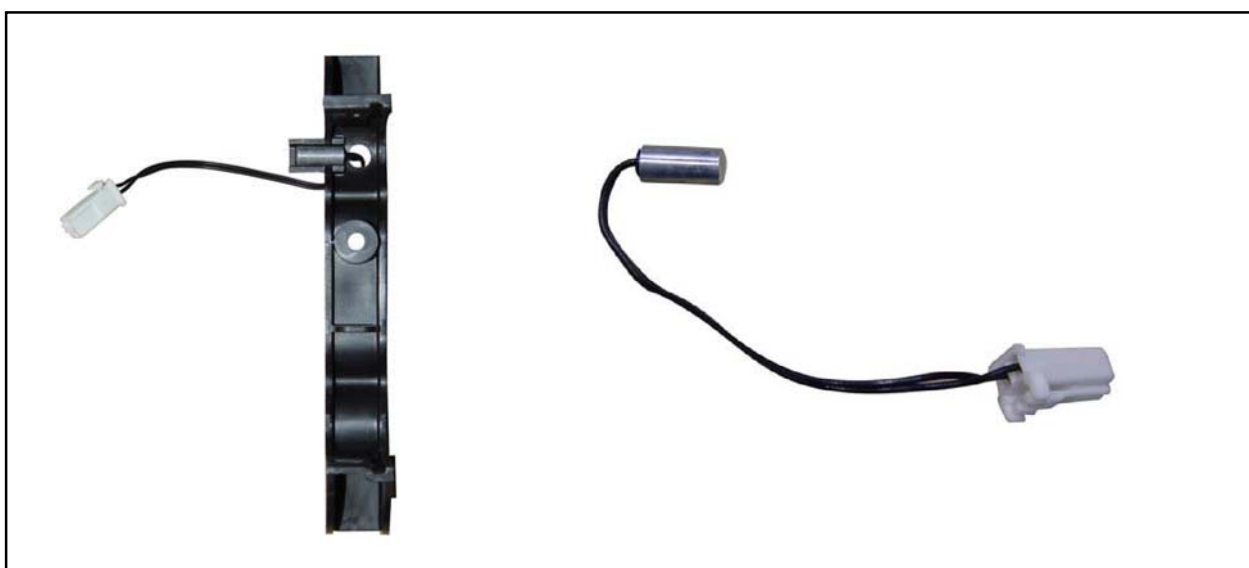
**NOTE**

The water temperature sensor should be removed after removing the air conditioner module assembly.

1. Disconnect the connector from the removed A/C module assembly and then remove the bracket screw on heater pipe.



2. Remove the heater pipe bracket from the heater pipe and separate the water temperature sensor from bracket.



Modification basis	
Application basis	
Allocated VIN	

AIR CONDITIONER

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S.G.N.

6810-06

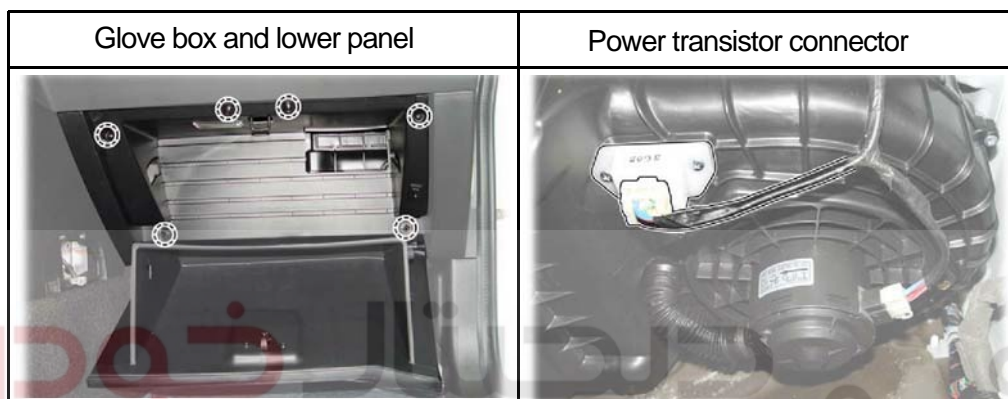
POWER TRANSISTOR

Preceding work

1. Disconnect the negative battery cable.

The power transistor should be removed after removing the lower instrument panel in front of passenger seat. (For removal and installation of the lower instrument panel, refer to the "Body" section.)

1. Remove the lower instrument panel in front of passenger seat and disconnect the power transistor connector.



2. Unscrew two mounting screws and remove the power transistor.



S.G.N.

6810-02

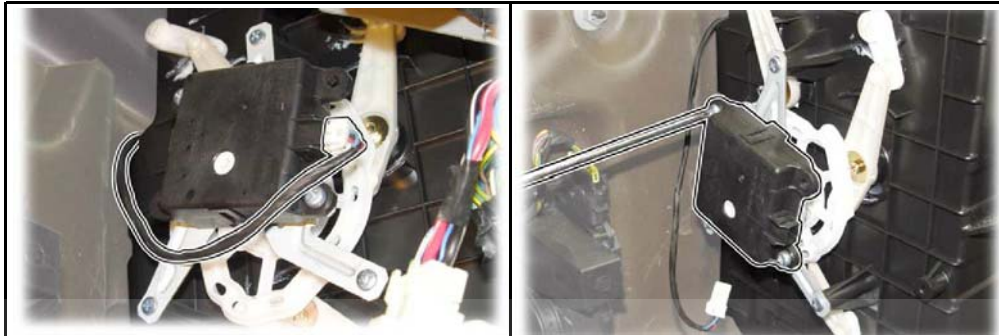
MODE DOOR ACTUATOR

Preceding work

1. Disconnect the negative battery cable.

First remove the driver side lower instrument panel in order to remove and install mode door actuator. For removal and installation of the panel, refer to "BODY" section.

1. Remove the lower instrument panel in front of driver seat. Disconnect the mode door actuator connector and remove two mounting screws.



2. Separate the mode door actuator and remove the mode door link assembly.

Face mode door lever

Windshield mode door lever

Foot mode door lever

Bi-level

Vent

Defroster and foot

Foot

CAUTION

- Make sure that the mode door link is mounted on the air conditioner module assembly correctly.

When installing, if the location of the mode door link is not correct, it may not operate properly.

Modification basis	
Application basis	
Allocated VIN	

AIR CONDITIONER

ACTYON 2013.11

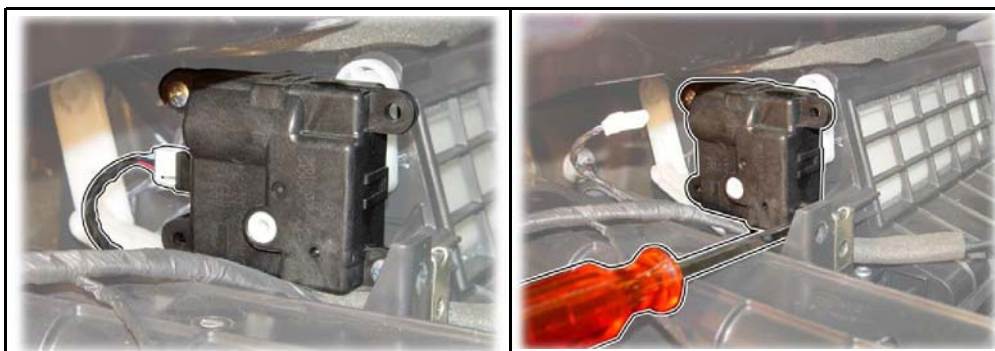
S.G.N.

6810-02

IN/EX-AIR DOOR ACTUATOR

Preceding work

1. Disconnect the negative battery cable and then remove the instrument panel assembly.
2. Remove the driver's instrument lower panel and then disconnect the connector of the air source door actuator.
3. Unscrew two mounting screws and remove the in/ex air door actuator.



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



S.G.N.

6810-02

AIR MIX DOOR ACTUATOR

Preceding work

1. Disconnect the battery negative cable and remove the instrument panel assembly.
With the instrument panel assembly removed as shown in the above figure,
2. disconnect the air mix door actuator connector and unscrew two mounting screws to remove the air mix door actuator.



دیجیتال خودرو

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Modification basis	
Application basis	
Affected VIN	

AIR CONDITIONER

ACTYON 2013.11

S.G.N.

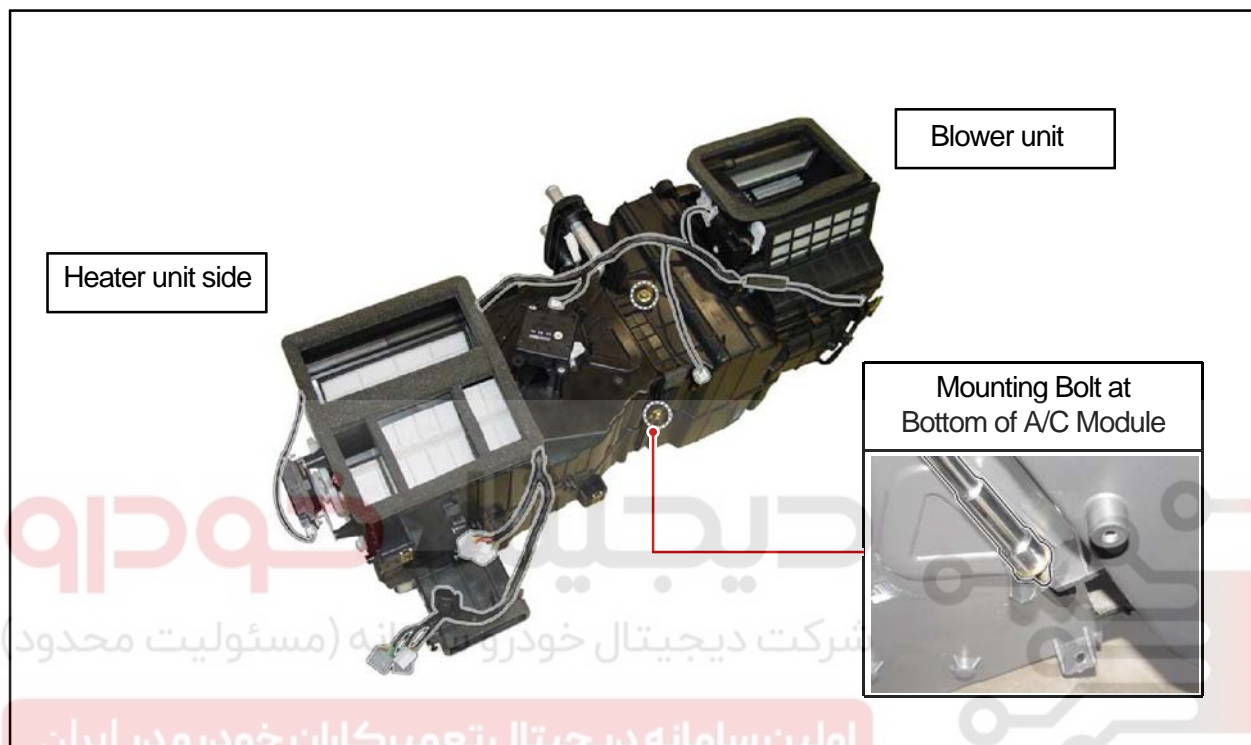
6810-24

THERMO AMP(INTAKE SENSOR)

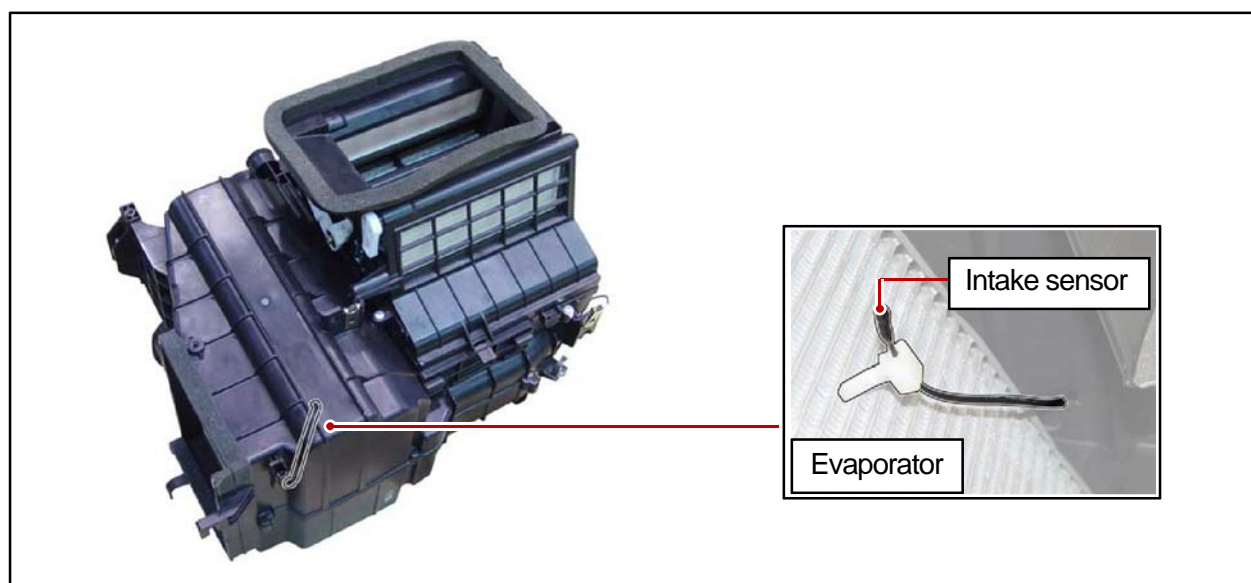
Preceding work

1. Disconnect the negative battery cable and remove the instrument panel assembly.

1. Remove the blower unit, three mounting bolts (10 mm) on the heater unit and the sensor wire of the air conditioner to remove the blower unit and the heater unit.



2. Separate the upper case and lower case of blower unit and remove the Intake sensor from the evaporator.



S.G.N.

6810-01

AIR CONDITONER MODULE ASSEMBLY

Preceding work

1. Disconnect the negative battery cable and remove the instrument panel assembly.

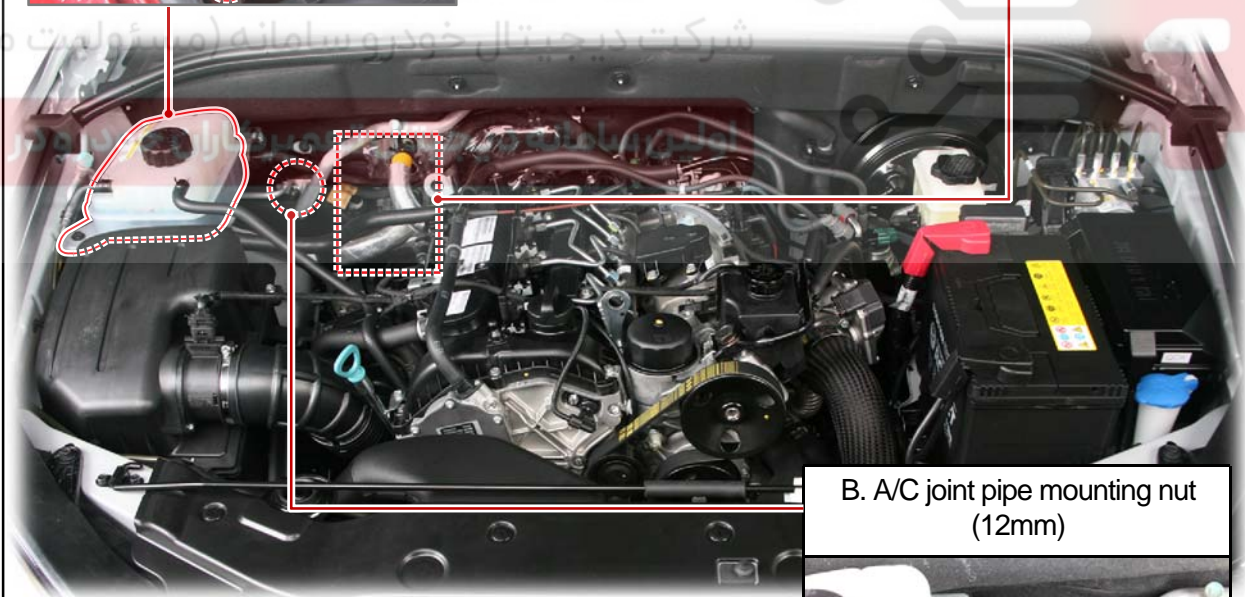
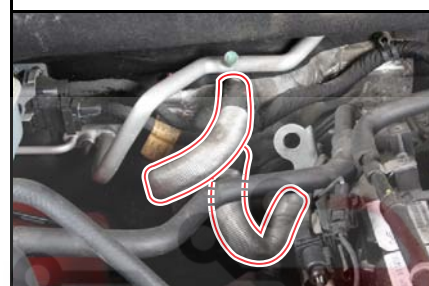
1. Collect the air conditioner refrigerant before removing the air conditioner module (dispose the wasted refrigerant to designated place).
2. Drain radiator coolant.

1. Disconnect the heater hose (A) from the engine compartment and remove the A/C high/low pressure pipe mounting nuts (B).

Remove the mounting nut and loosen the coolant reservoir.



A. Inner/outer heater hose and clamp



B. A/C joint pipe mounting nut (12mm)

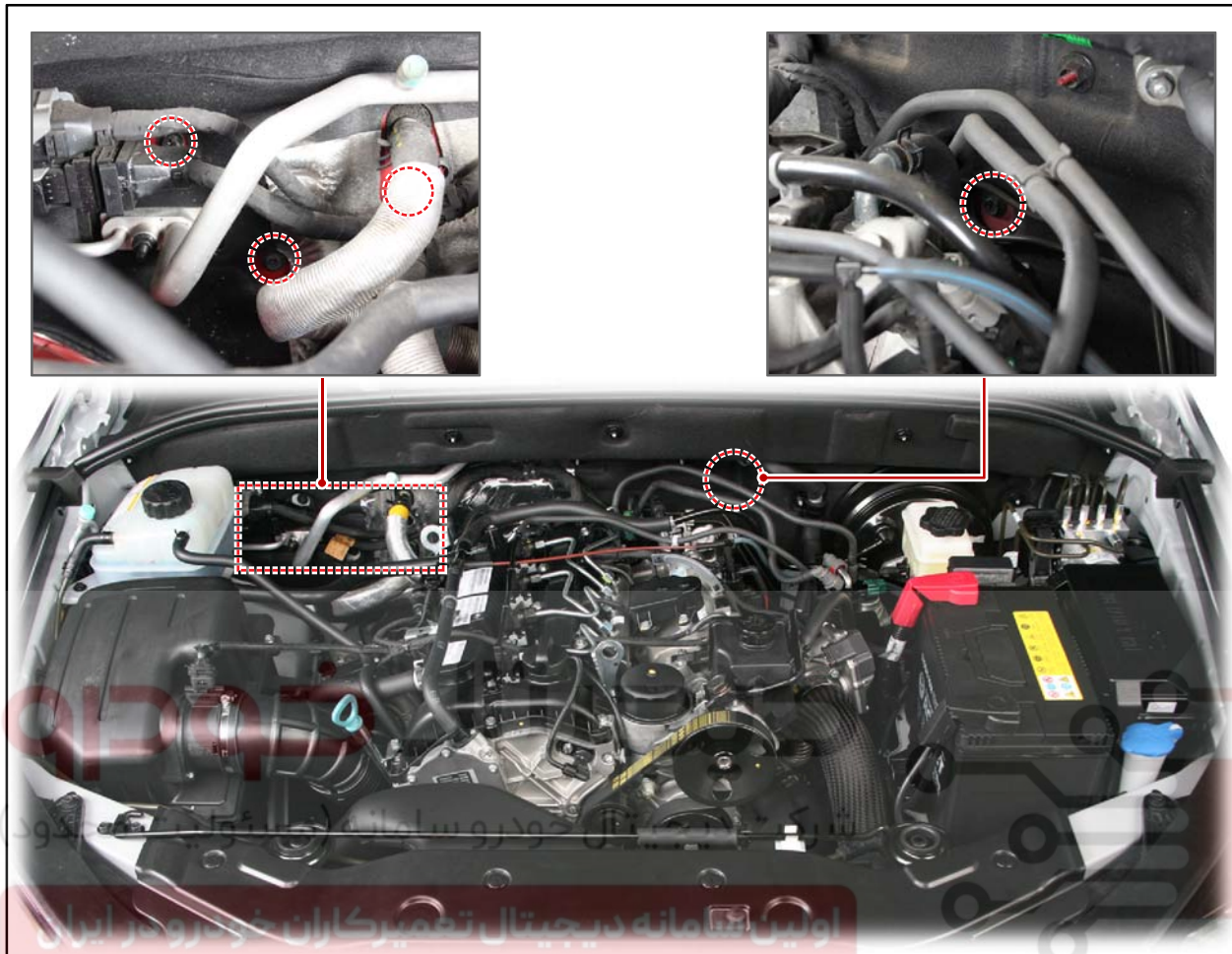


Modification basis	
Application basis	
Allocated VIN	

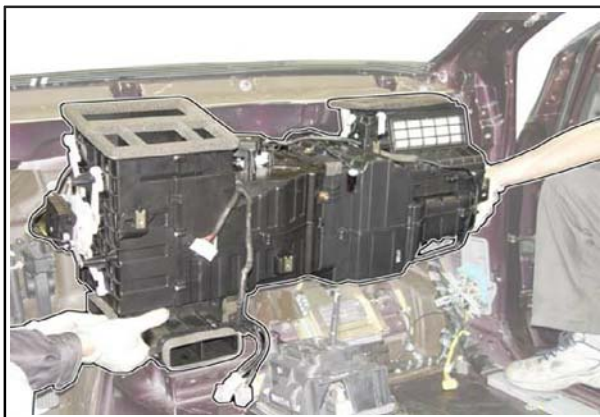
AIR CONDITIONER

ACTYON 2013.11

2. Unscrew four mounting screws on A/C module assembly (in engine compartment).

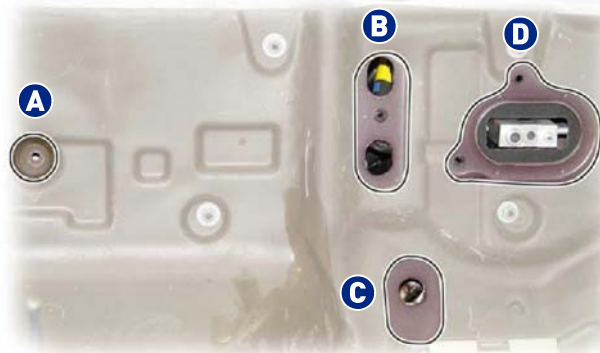


3. Carefully remove the A/C module assembly.

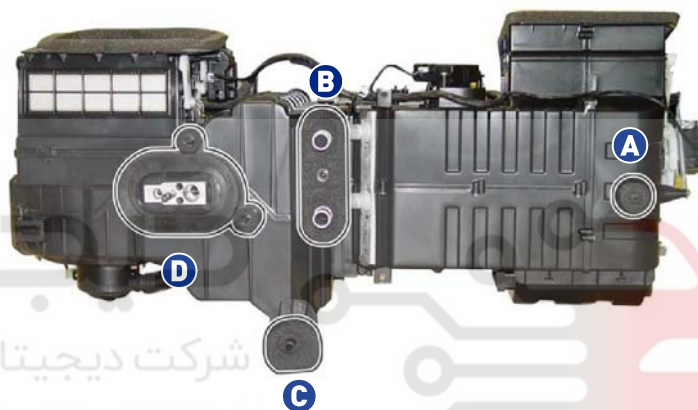


A/C Module Mounting Location

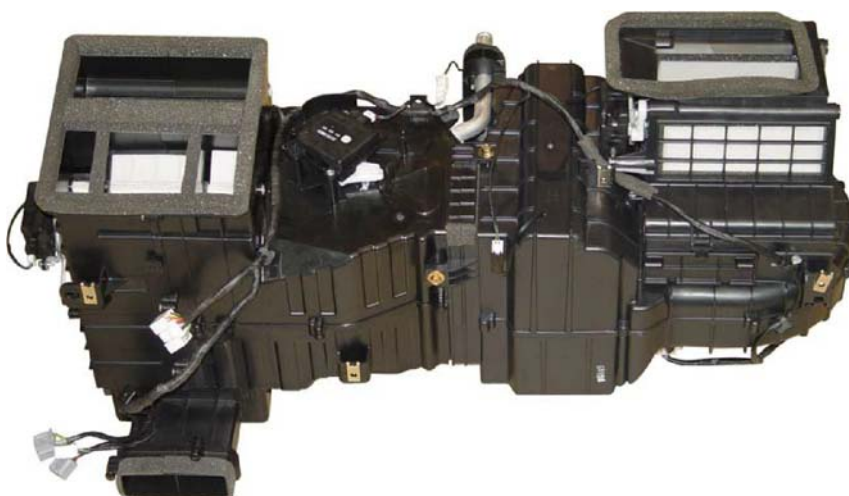
Mounting locations inside of vehicle



Mounting locations on backside of A/C module



Front View



Modification basis	
Application basis	
Allocated VIN	

S.G.N.

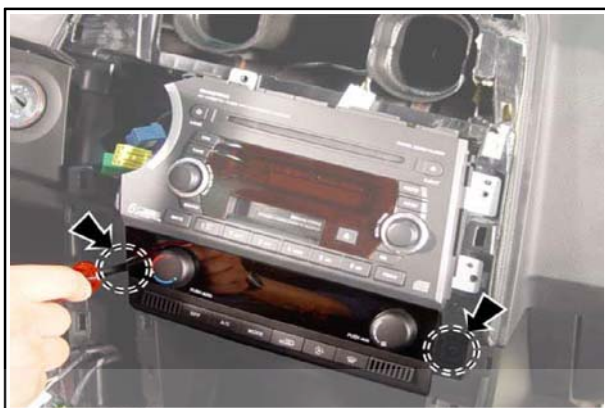
6810-20

A/C CONTROLLER SWITCH AND ACTIVE INCAR SENSOR

Preceding work

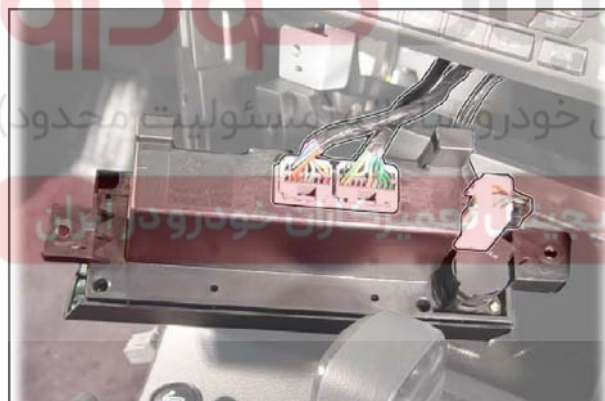
1. Disconnect the negative battery cable and remove the center fascia panel assembly.

1) Air Controller Switch Assembly

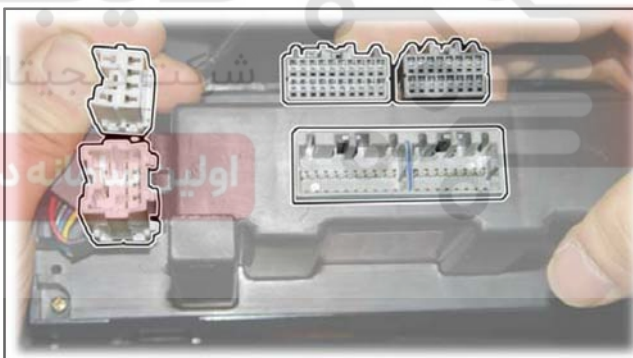


1. With the center fascia panel removed, unscrew two mounting screws from the A/C controller switch assembly.

2. Disconnect the connectors from the A/C controller switch assembly.



Connection Status



3. Remove the A/C controller switch assembly.

2) Active In-Car Sensor

Disconnect the sensor connector, unscrew two mounting screws, and remove the sensor from the air conditioner controller switch assembly.



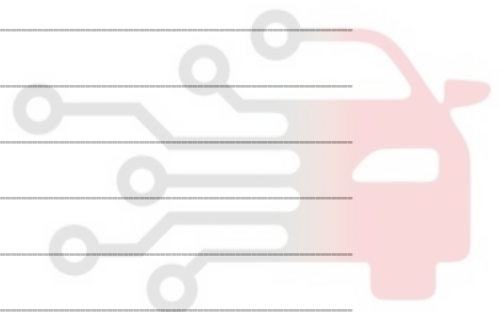
Modification basis	
Application basis	
Affected VIN	

Memo

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



S.G.N.

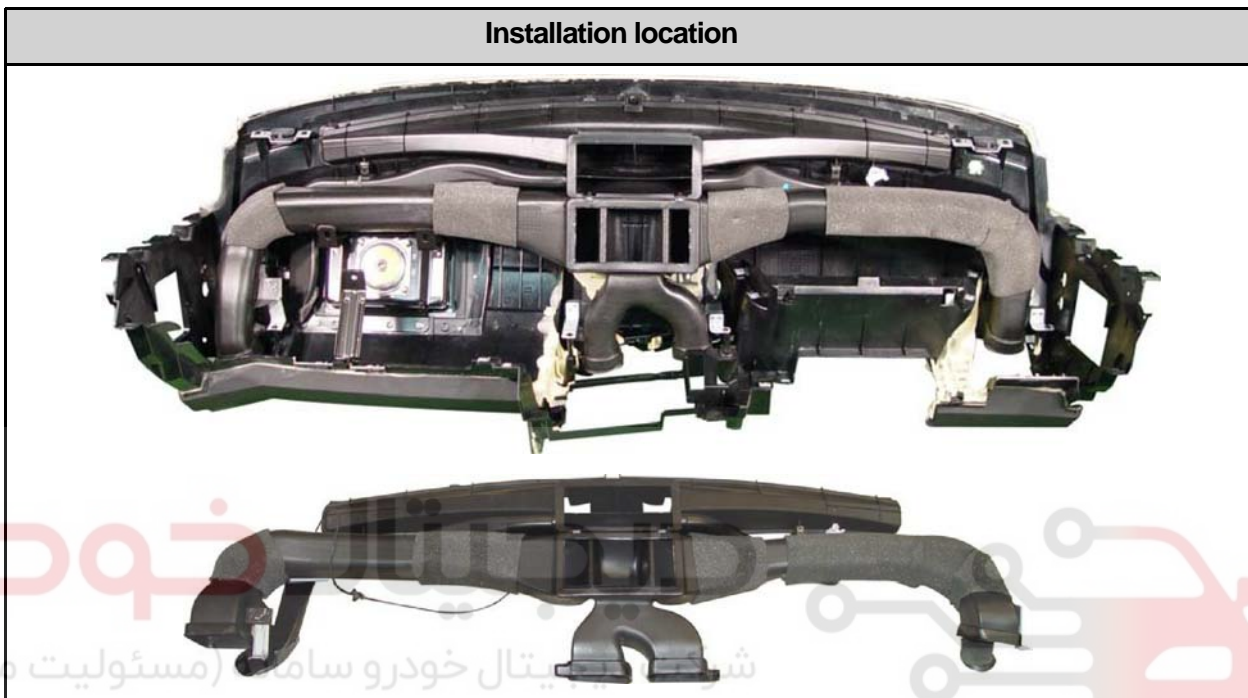
6810-01 AIR DUCT ASSEMBLY

1) Air Duct (On Instrument Panel)

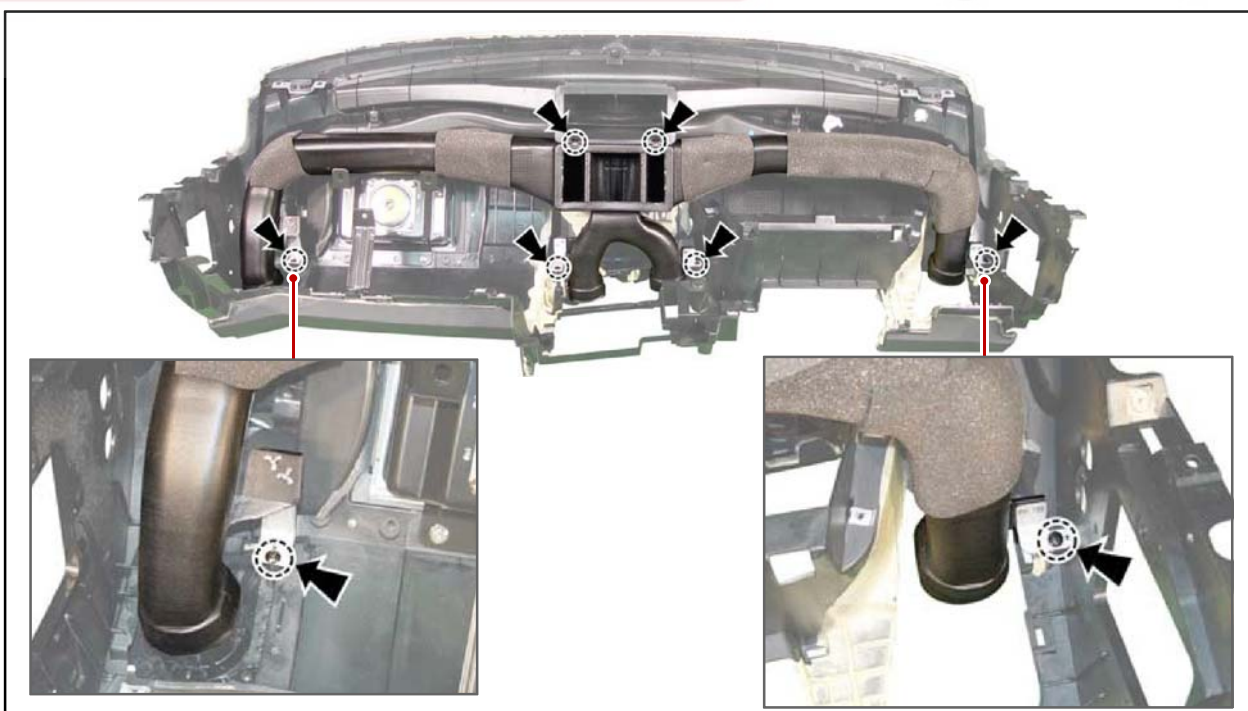
Preceding work

1. Disconnect the negative battery cable.
2. Remove the instrument panel assembly.

Installation location



1. Unscrew six mounting screws (one at each side and four in center area) and remove the front air duct.

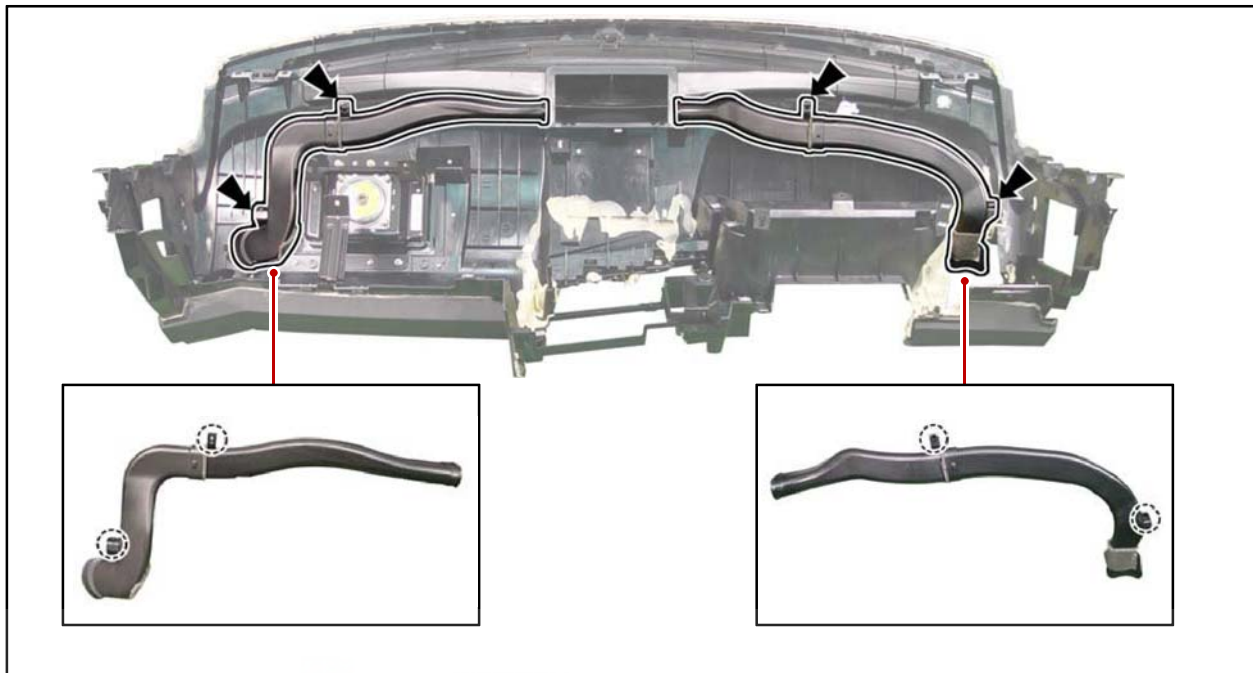


Modification basis	
Application basis	
Allocated VIN	

AIR CONDITIONER

ACTYON 2013.11

2. Unscrew two mounting screws (one at each side) and remove the left and right air ducts.



3. Unscrew two mounting screws (one at each side) and remove the upper air duct.



2) Floor Air Duct

Preceding work

1. Disconnect the negative battery cable and remove the center fascia panel and center lower panel.
2. Remove the center console assembly.

Unscrew two mounting screws from the center of the air duct (A/C module side) and two mounting screws from the lower side of the air duct and remove the floor air duct assembly.

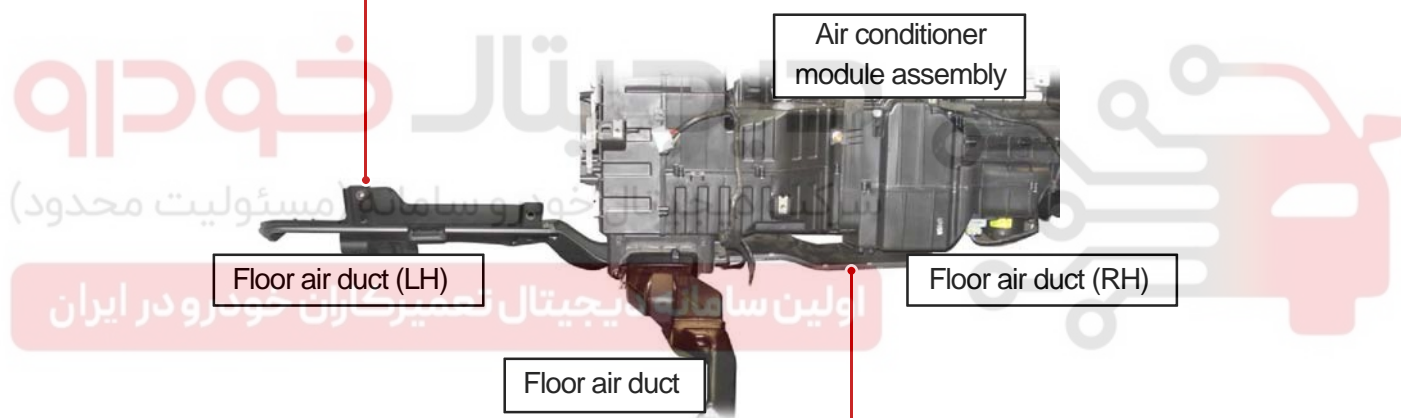


Modification basis	
Application basis	
Allocated VIN	

3) Front Floor Air Duct

The front lower air duct supplies air flow towards the lower side of driver and passenger seats and its removal/ installation procedure are slightly different.

1. Driver side lower air duct is installed behind the lower instrument panel. Remove it according to the procedures for removal of lower panel (refer to "Body" section).



2. Passenger side floor air duct is located under the air conditioner module.

4) Vent Grille Assembly

⚠ CAUTION

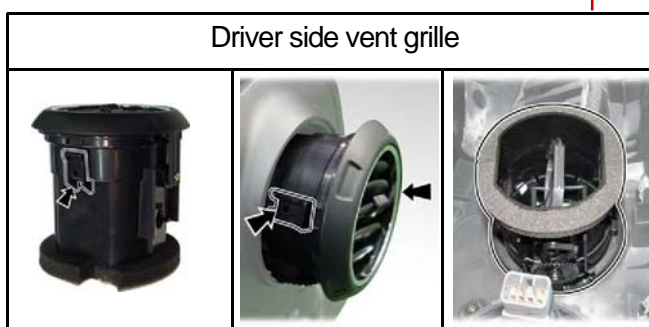
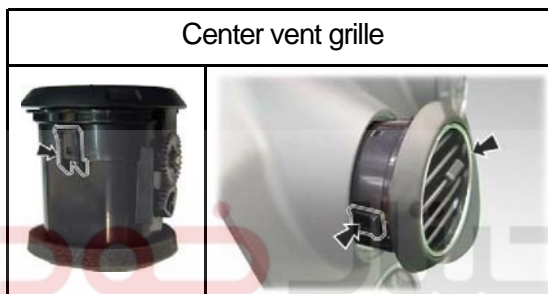
- Be careful not to damage other components when removing and installing vent grilles.
- The vent grille can be removed by pushing its mounting position without removing the instrument panel or related panels.

► Center Vent Grille

The center vent grilles are installed in the center fascia panel and the appearance is different from side vent grilles.

Removal and Installation

Remove the center vent grille by prying off on both sides using a flat screwdriver.



► Side Vent Grille (Driver Side)

The driver side vent grille is installed in the outside rearview mirror switch bezel assembly.

Removal and Installation Remove the driver side vent grille by prying off the left and the right sides using a flat screwdriver.

- The vent grilles for LH/RH are the same

Modification basis	
Application basis	
Allocated VIN	

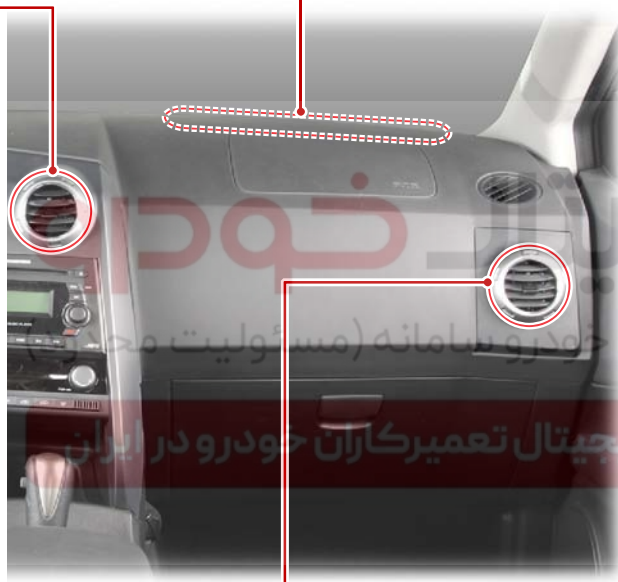
► Front Vent Grille (LH/RH)

For service on the front vent grille, remove the instrument panel and air duct first.



▷ Removal and Installation

Remove the air duct from the instrument panel. Unscrew two mounting screws while pushing the fixing hook on the vent grille and remove the vent grille through the front opening of the instrument panel.



► Side Vent Grille (Passenger Side)

The passenger's side vent grille is installed in the instrument panel and it is the same as the driver's.

▷ Removal and Installation



1. Separate the vent grilles at both sides using a flat screwdriver.



2. Remove the vent grille from the instrument panel.

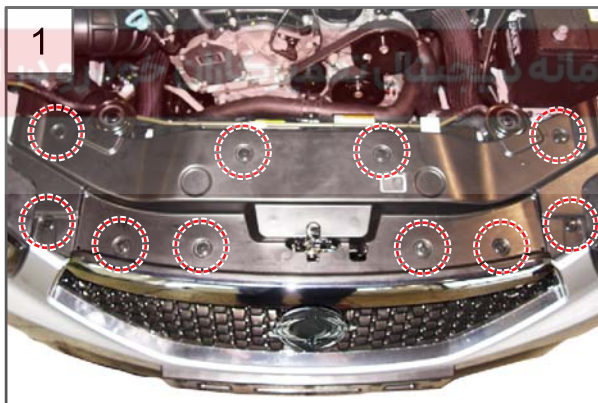
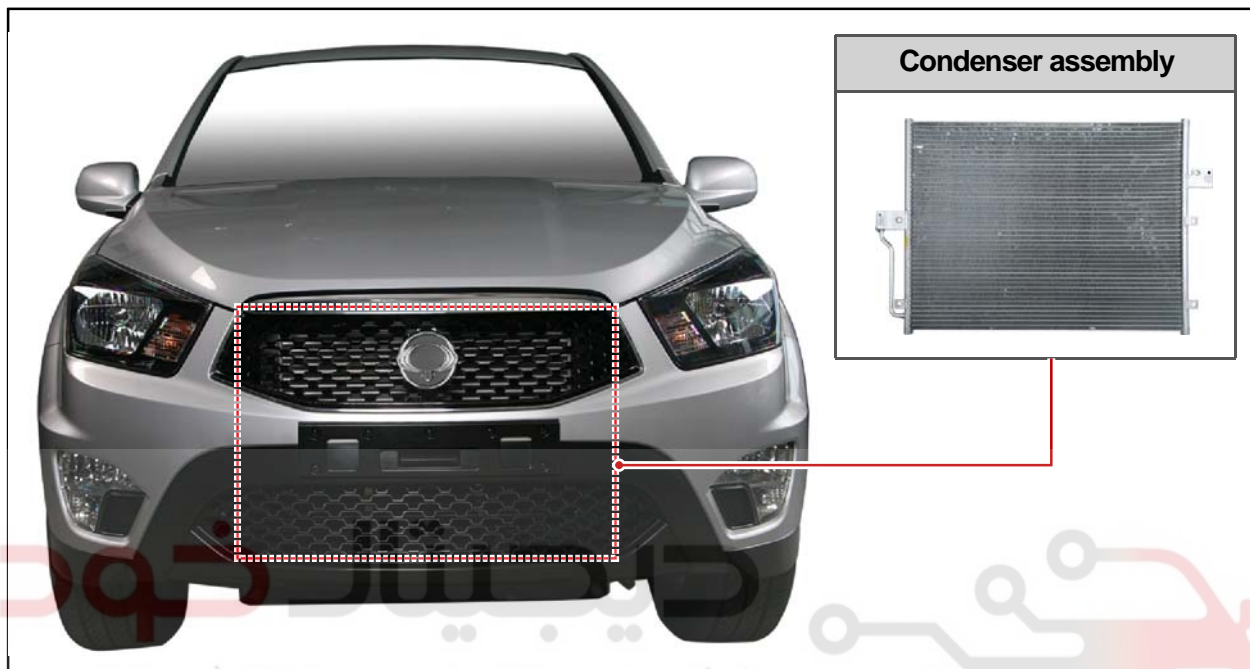
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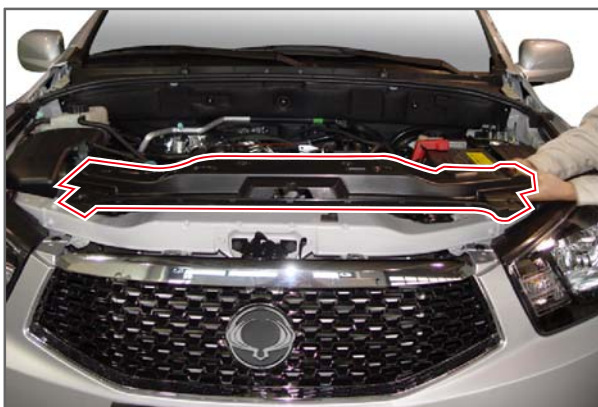
CONDENSER ASSEMBLY

Preceding work

- Disconnect the negative cable from the battery.
 - Drain the refrigerant before removing the A/C module assembly.
- Dispose the collected refrigerant as per local environmental guidelines.



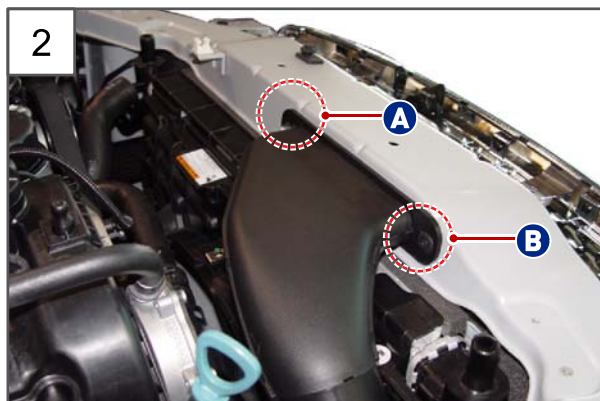
1. Remove the 10 screw rivets to remove the front end cover.



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2. Remove the mounting nut (A)(10 mm) and one mounting screw rivet(B)(1EA) to remove the snorkel assembly.



3. Remove the LH and RH side headlamps.



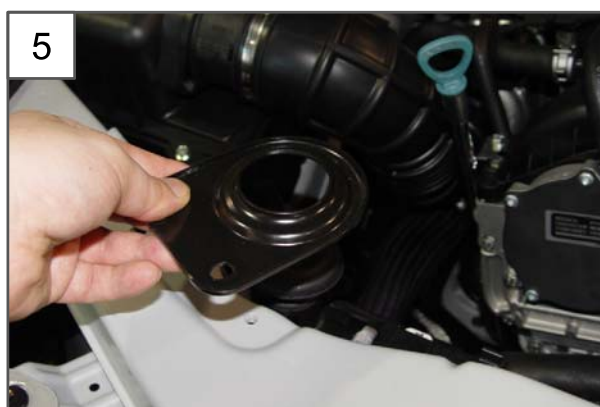
NOTE

Refer to "Headlamp" of "Electrical".

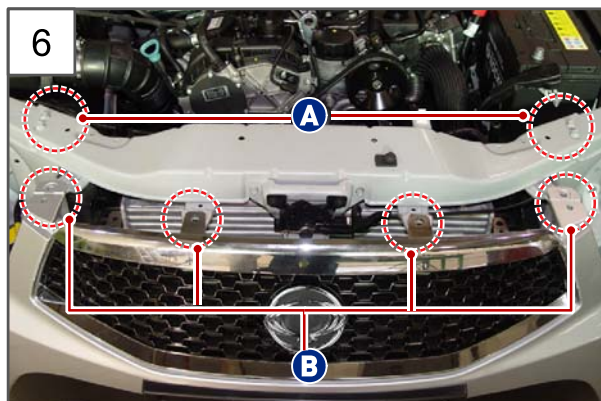


4. Unscrew the 4 mounting bolts (12 mm) for LH and RH side module upper mounting bracket.

Tightening torque 9.0 to 10.0Nm



5. Remove the LH and RH module upper mounting brackets.



6. Remove the the 6 mounting bolts (A, 12mm) for Front end upper member and 4 mounting screw rivets (B).

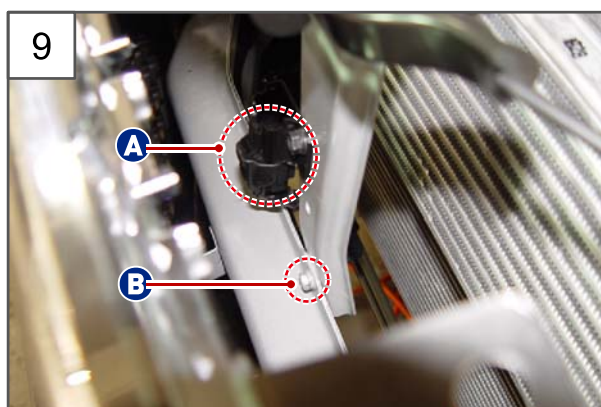
Tightening torque 9.0 to 10.0Nm



7. Lift out the front end upper member and disconnect the engine hood switch connector.



8. Remove the front end upper member.



9. Disconnect the ambient temperature sensor connector (A) and remove the mounting bolt (B, 10 mm).

Tightening torque 5.0 to 6.0Nm

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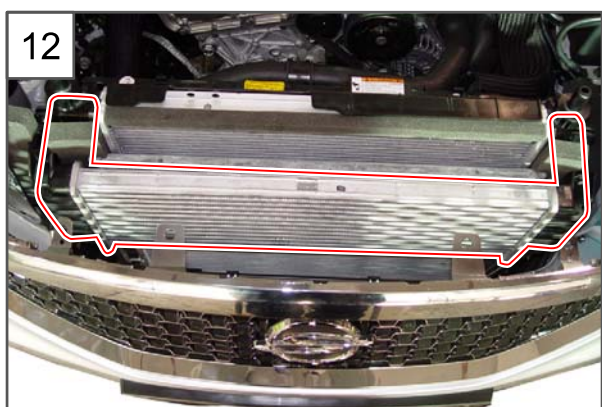


10.Remove the front center member assembly.



11.Disengage the spring clamps (7 mm) for the inter cooler outlet hose (B) and the hose between turbo charger and inter cooler (A). After that, remove those hoses from the inter cooler assembly.

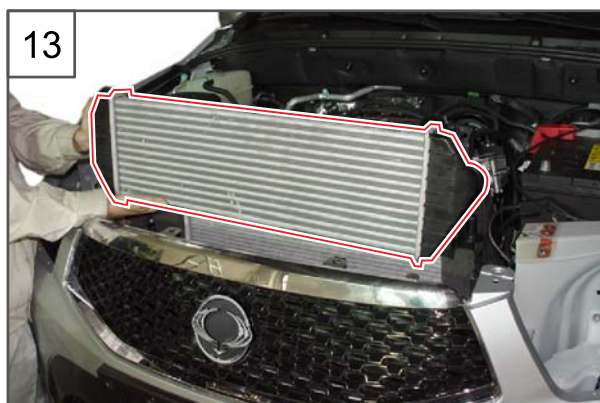
Tightening torque 5.0 to 6.0Nm



12.Remove the 4 inter cooler assembly mounting bolts (10 mm).

Tightening torque 5.0 to 6.0Nm



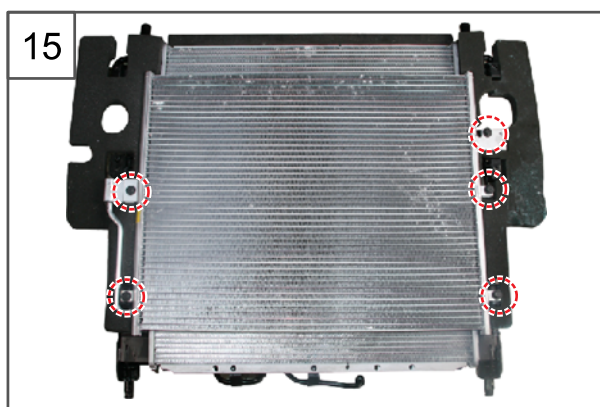
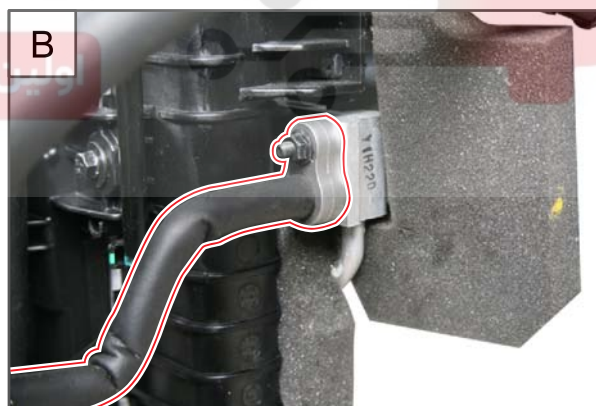


13.Remove the inter cooler assembly.



14.Disconnect the hose (A) between condenser and receiver drier and the hose (B) between A/C compressor and condenser.

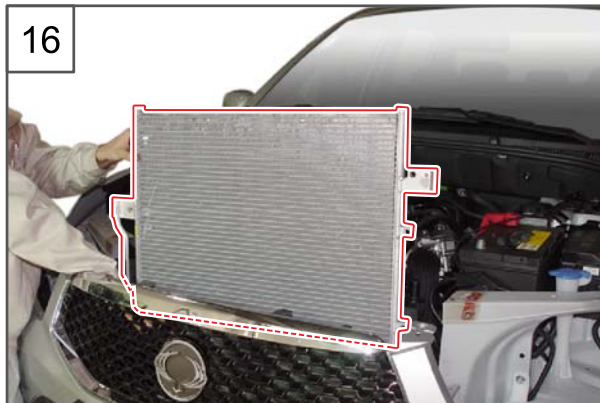
Tightening torque 7.0 to 10.0Nm



15.Remove the 5 A/C condenser mounting bolts (10 mm) from the radiator assembly.

Tightening torque 5.0 to 6.0Nm

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16.Remove the radiator assembly.



17.Install in the reverse order of removal.

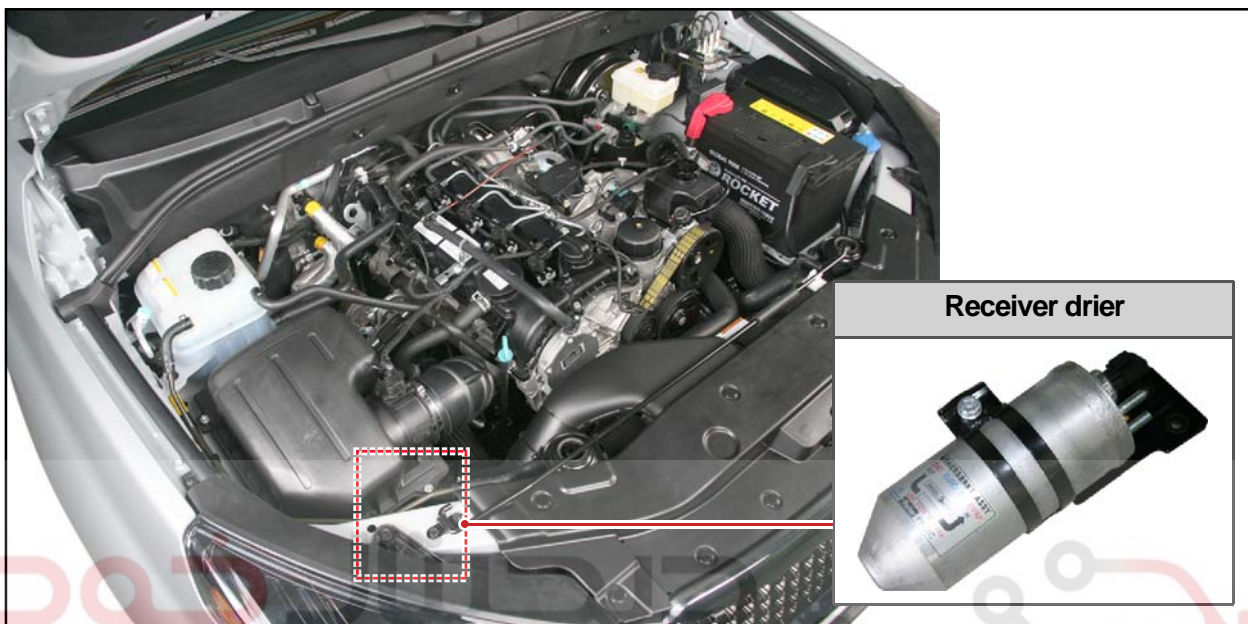


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6820-19 RECEIVER DRIER**Preceding work**

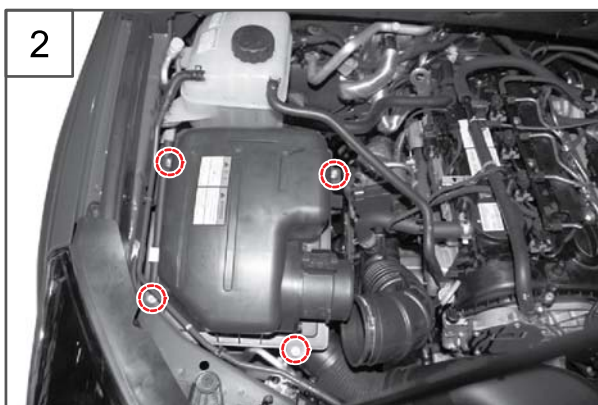
- Disconnect the negative cable from the battery.
- Drain the refrigerant before removing the A/C module assembly.
Dispose the collected refrigerant as per local environmental guidelines.

**Receiver drier**

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)



1. Disconnect the HFM sensor connector (A) and disengage the mounting clamp (B) to disconnect the air cleaner hose.

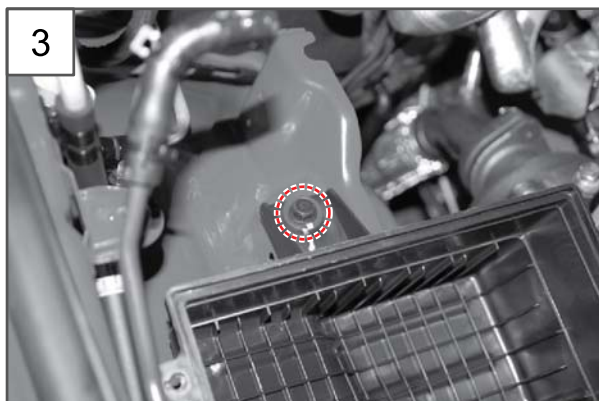


2. Unscrew the 4 mounting bolts (10 mm) on the intake air cleaner to remove the upper cover and air cleaner.

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3. Remove the lower mounting nut (10 mm) from the air cleaner assembly.



4. Disconnect the receiver drier connector.



5. Remove the mounting nuts for the liquid no. 2 and no. 3 pipes of the receiver drier.

CAUTION

Replace the O-ring with a new one.



6. Unscrew the receiver drier mounting bolts to remove the receiver drier assembly.



7. Install in the reverse order of removal.

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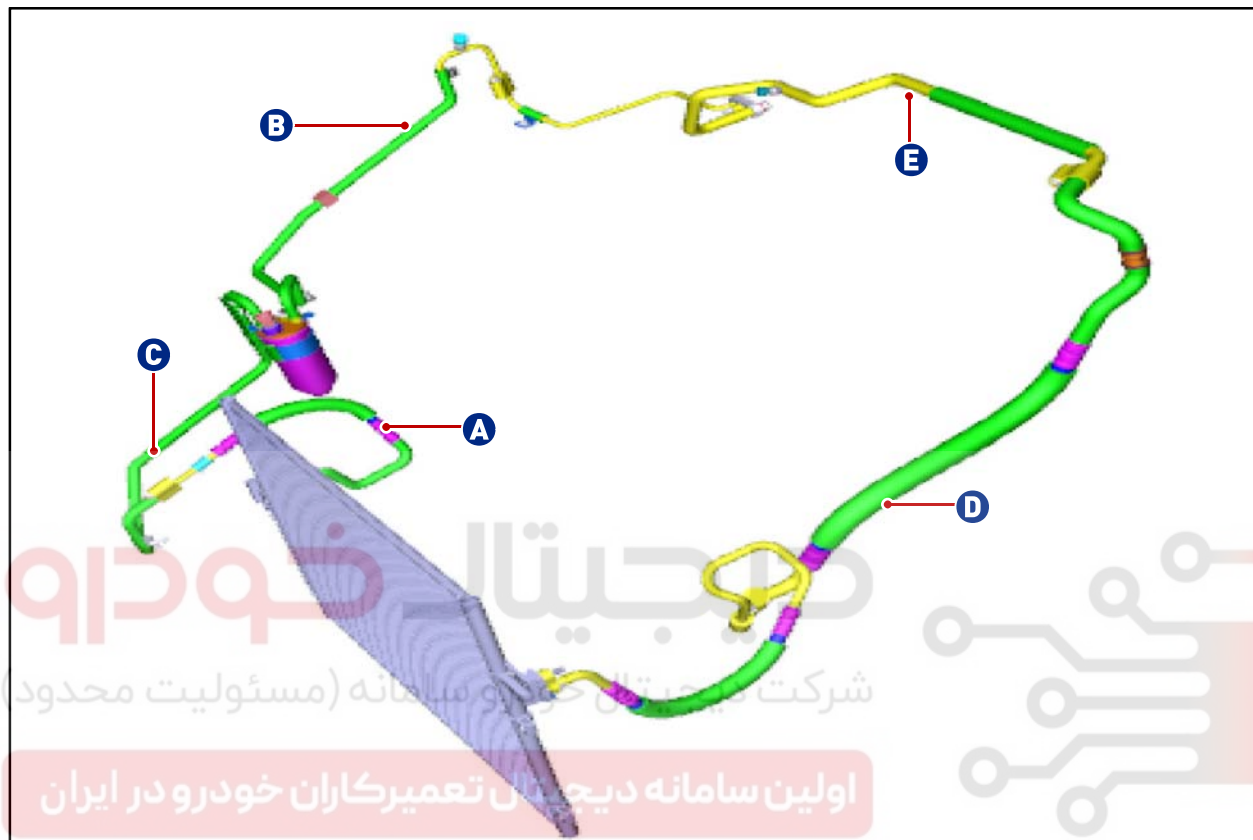
S.G.N.

6820-18

A/C HOSE AND PIPE

Preceding work

- Disconnect the negative cable from the battery.
- Drain the refrigerant before removing the A/C module assembly.
Dispose the collected refrigerant as per local environmental guidelines.



A. Liquid hose assembly



B. Liquid no.1 pipe



C. Liquid no.2 pipe



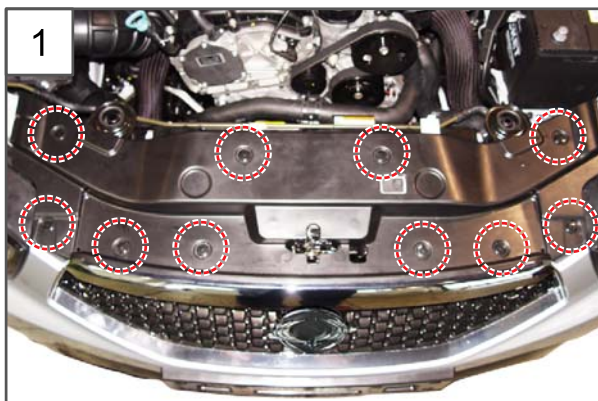
D. Suction and discharge hose



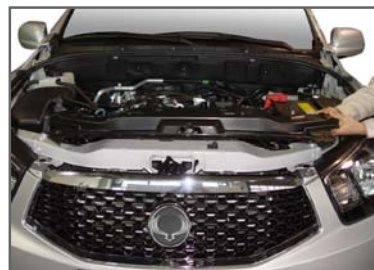
E. Joint pipe



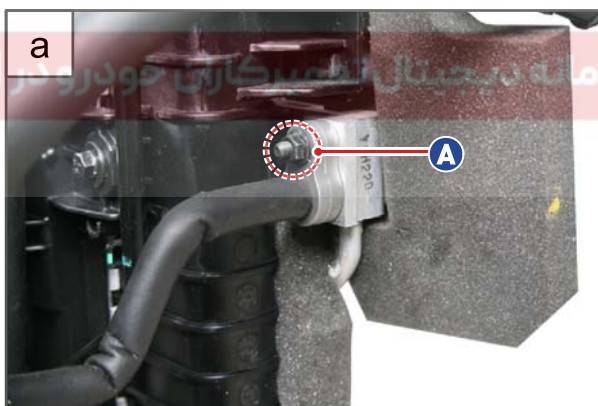
► Liquid hose assembly



1. Remove the 10 screw rivets to remove the front end cover.



2. Remove the liquid hose assembly from the location (A).

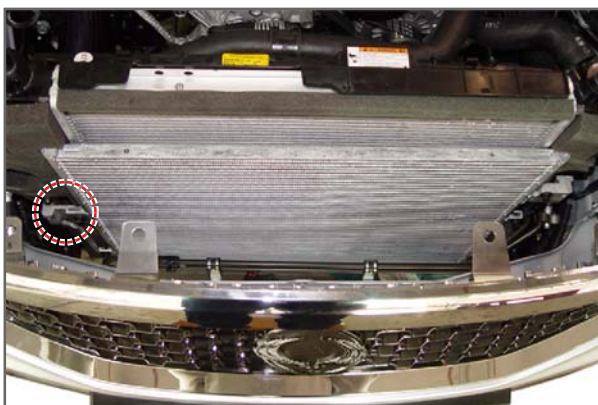


a. Remove the mounting nut (A) securing the liquid hose assembly to the condenser in the engine compartment.

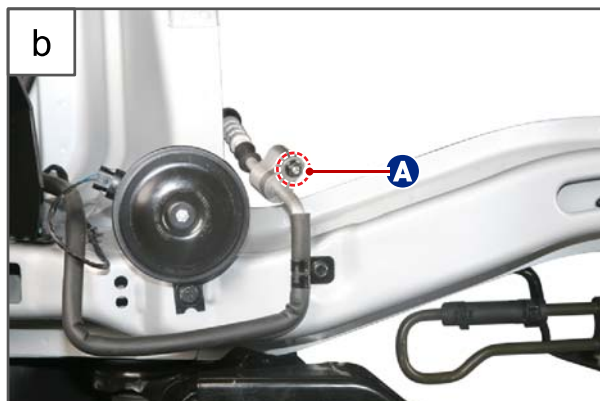
Tightening torque 7.0 to 10.0Nm

CAUTION

Replace the O-ring with a new one.



Modification basis	
Application basis	
Allocated VIN	



b. Remove the mounting nut (A) securing the liquid hose assembly to the liquid no. 1 pipe between the front bumper and condenser.

Tightening torque 7.0 to 10.0Nm



CAUTION

Replace the O-ring with a new one.



3. Install in the reverse order of removal.



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► Liquid no.1 pipe assembly



1. Remove the mounting nut (A) securing the liquid hose assembly to the liquid no. 1 pipe between the front bumper and condenser, and unscrew the bracket mounting bolt (B).

Tightening torque (A) 7.0 to 10.0Nm

Tightening torque (B) 7.0 to 10.0Nm

CAUTION

Replace the O-ring with a new one.



2. Remove the mounting nut for the liquid no. 1 pipe of the receiver drier.

Tightening torque 7.0 to 10.0Nm

CAUTION

Replace the O-ring with a new one.



3. Install in the reverse order of removal.

Modification basis	
Application basis	
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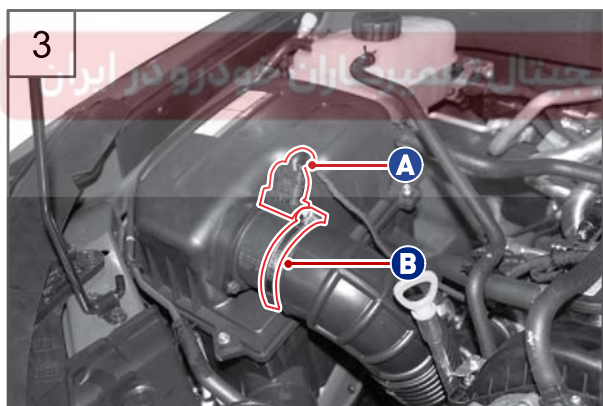
► Liquid no.2 pipe assembly



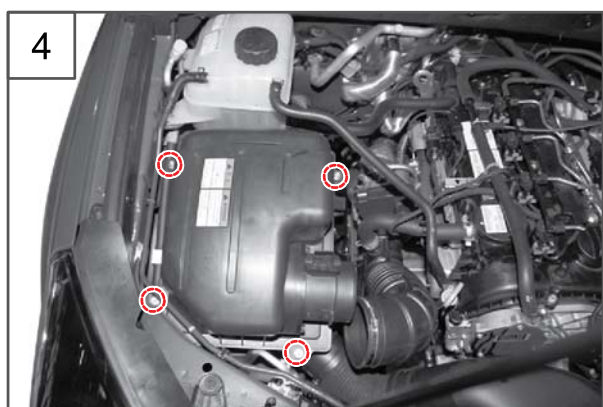
1. Disconnect the coolant reservoir hoses.



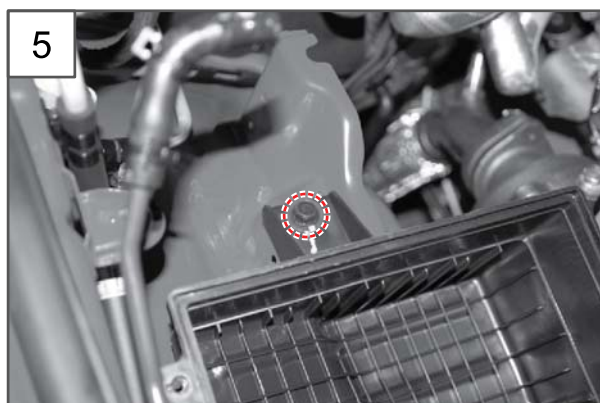
2. Unscrew the two mounting bolts (10 mm) on the coolant reservoir to remove the reservoir.



3. Disconnect the HFM sensor connector (A) and disengage the mounting clamp (B) to disconnect the air cleaner hose.



4. Unscrew the 4 mounting bolts (10 mm) on the intake air cleaner to remove the upper cover and air cleaner.



5. Remove the lower mounting nut (10 mm) from the air cleaner assembly.

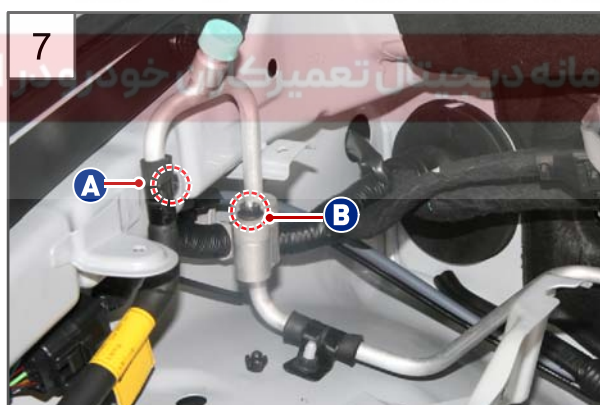


6. Remove the mounting nut (A) for the liquid no. 2 pipe.

Tightening torque (A) 7.0 to 10. Nm

CAUTION

Replace the O-ring with a new one.



7. Remove the mounting nut (A) securing the liquid no. 1 pipe to the joint pipe assembly and then the bracket mounting nut (B) for the liquid no. 2 pipe assembly.

Tightening torque (A) 7.0 to 10.0Nm

Tightening torque (B) 7.0 to 10.0Nm

CAUTION

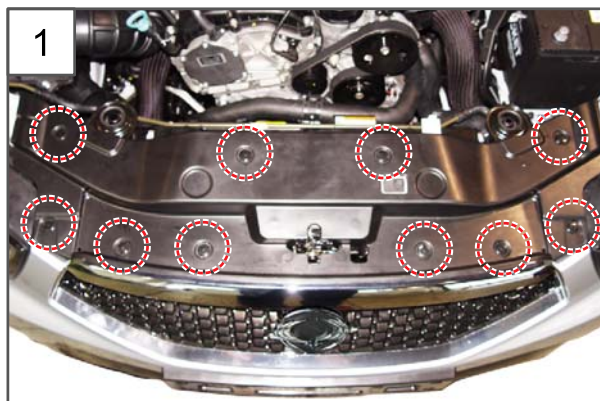
Replace the O-ring with a new one.



8. Install in the reverse order of removal.

Modification basis	
Application basis	
Allocated VIN	

► Suction and discharge hose assembly



1. Disconnect the coolant reservoir hoses.
Unscrew the 10 mounting screw rivets to remove the front end cover.



2. Remove the liquid hose assembly from the location (A).



3. Remove the condenser mounting nut (A) from the discharge hose.

Tightening torque 7.0 to 10.0Nm

CAUTION

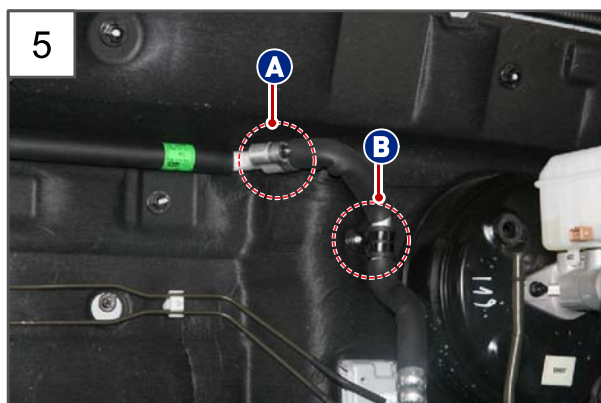
Replace the O-ring with a new one.



4. Remove the mounting nut (A) from the air compressor to remove the suction and discharge hose assembly.

CAUTION

Replace the O-ring with a new one.



5. Remove the mounting nut (A) securing the suction and discharge hose to the joint pipe assembly and then the bracket mounting nut (B) for the suction and discharge hose.

Tightening torque (A) 7.0 to 10.0Nm

Tightening torque (B) 7.0 to 10.0Nm

CAUTION

Replace the O-ring with a new one.



6. Install in the reverse order of removal.

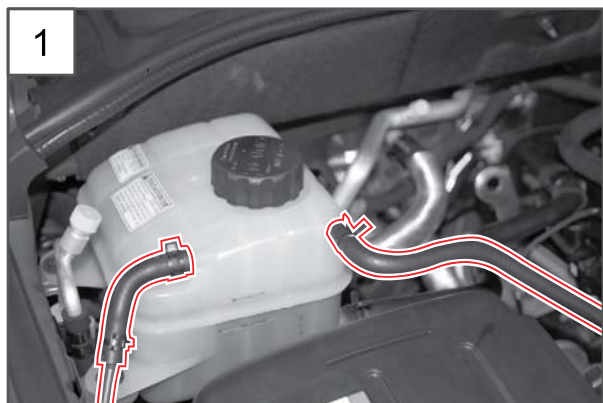
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Modification basis	
Application basis	
Allocated VIN	

► Joint pipe assembly



1. Disconnect the coolant reservoir hoses.



2. Unscrew the two mounting bolts (10 mm) on the coolant reservoir to remove the reservoir.

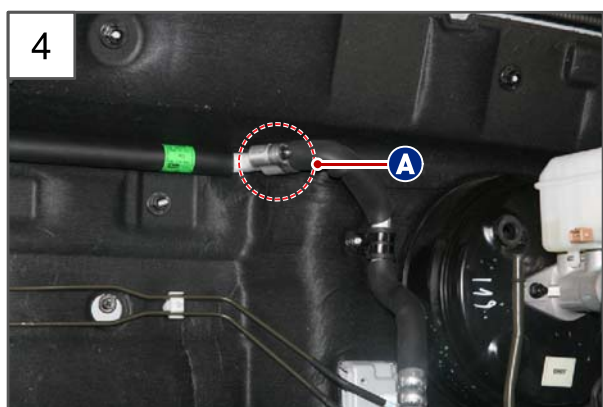


3. Remove the mounting nut (A) securing the liquid no. 1 pipe to the joint pipe assembly.

Tightening torque 7.0 to 10.0Nm

CAUTION

Replace the O-ring with a new one.



4 Remove the mounting nut (A) securing the suction and discharge hose to the joint pipe.

Tightening torque 7.0 to 10.0Nm

CAUTION

Replace the O-ring with a new one.



5. Remove the mounting nut (A) securing the joint pipe assembly to the expansion valve.

CAUTION

Replace the O-ring with a new one.



6. Install in the reverse order of removal.

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Affected VIN	

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AMBIENT TEMPERATURE SWITCH

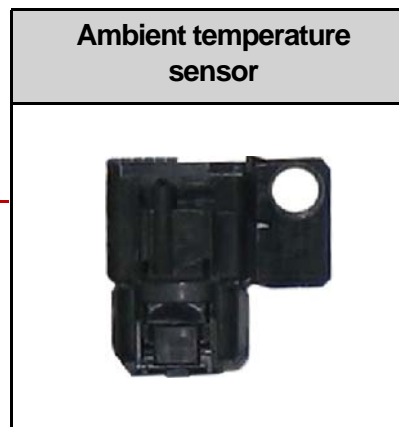
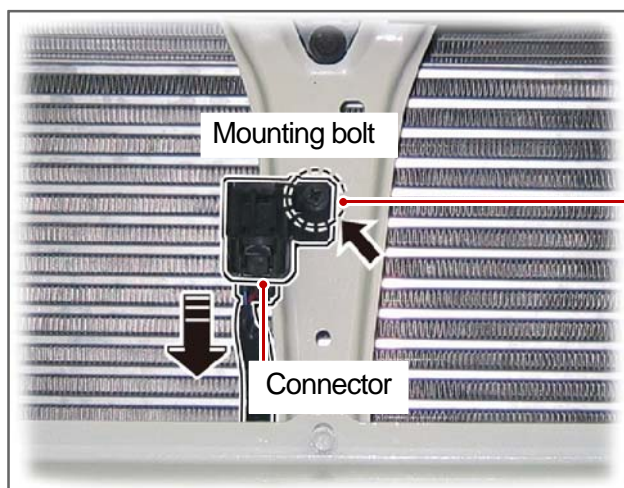
Preceding work

1. Disconnect the negative battery cable and remove the right headlamp.



- The ambient temperature switch should be removed or installed after removing the headlamp.

1. Remove the ambient temperature switch from holder.
Disconnect the connector while pushing the connector pin.



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6810-15 PTC

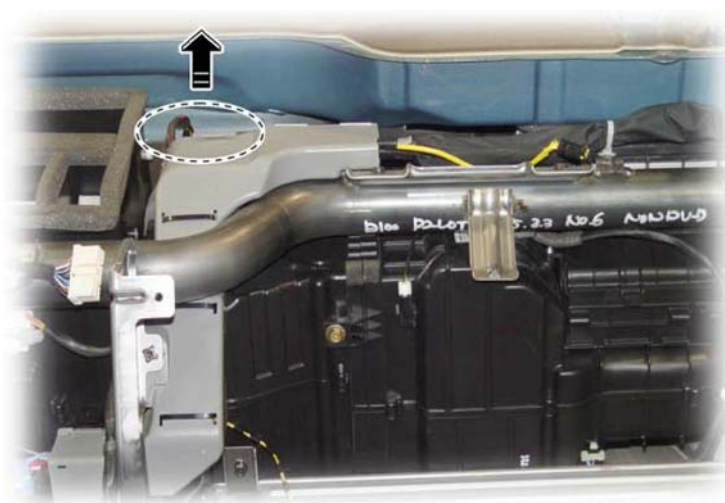
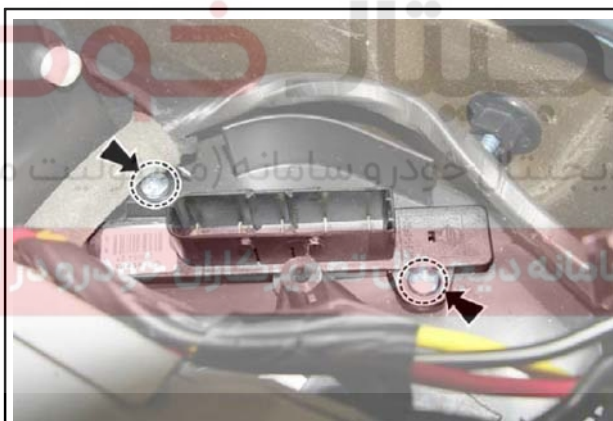
Preceding work

1. Disconnect the negative battery cable and the instrument panel assembly.



1. Disconnect the PTC connector while pulling out it (A) rearward.

2. Unscrew two mounting bolts and remove the PTC assembly from the A/C module assembly.



Modification basis	
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Memo

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