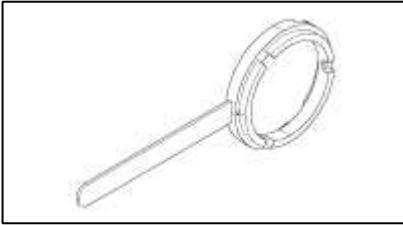


**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > General
Information > Special Service Tools**

Special Service Tools

Tool (Number and name)	Illustration	Use
09977-3R000 Disc & hub assembly bolt remover		Removal and installation of disc & hub assembly.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > General Information > Specifications

Specification

Air conditioner

Item		Specification
Compressor	Type	DV 13
	Oil type & Capacity	PAG OIL 120±10cc
	Displacement	130cc/rev
Condenser	Heat rejection	11,900 - 3% kcal/hr
A/C Pressure transducer	The method to measure the pressure	Voltage= 0.00878835 * P + 0.5
Expansion valve	Type	Block type
Refrigerant	Type	R-134a
	Capacity [g(oz.)]	420±25 (14.8±0.88)

Blower unit

Item		Specification
Fresh and recirculation	Operating method	Actuator
Blower	Type	Sirocco
	Speed step	1~4 speed (Manual)
	Speed control	Resistor (Manual)
Air filter	Type	Particle filter

Heater and evaporator unit

Item		Specification
Heater	Type	Pin & Tube type
	Heating capacity	4,650 ± 3% kcal/hr
	Mode operating method	Actuator
	Temperature operating method	Actuator
Evaporator	Temperature control type	Evaporator temperature sensor
	A/C ON/OFF [°C(°F)]	ON : 2.5±0.3 (36.5±0.5), OFF: 0.5±0.3 (32.9±0.5)

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > General Information > Troubleshooting

Troubleshooting

Problem Symptoms Table

Before replacing or repairing air conditioning components, first determine if the malfunction is due to the refrigerant charge, air flow or compressor.

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

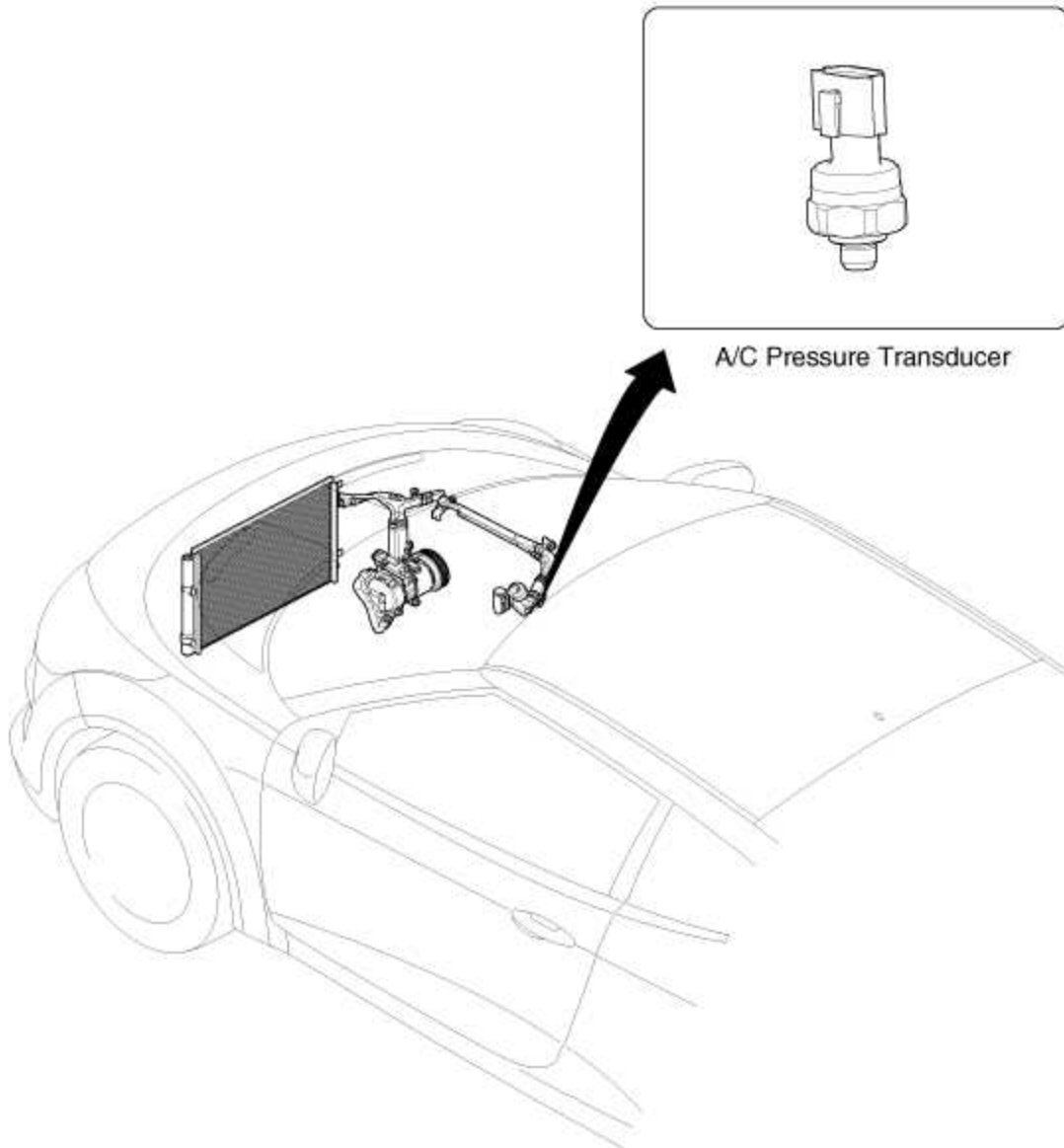
After correcting the malfunction, check the complete system to ensure that performance is satisfactory.

Symptom	Suspect Area
No blower operation	1. Blower fuse
	2. Blower motor
	3. Blower resistor
	4. Blower speed control knob
	5. Wire harness
No air temperature control	1. Engine coolant capacity
	2. Heater control assembly
	3. Temperature control knob
No compressor operation	1. Refrigerant capacity
	2. A/C Fuse
	3. Magnetic clutch
	4. Compressor
	5. A/C pressure transducer
	6. A/C switch
	7. Evaporator temperature sensor
	8. Wire harness
No cool comes out	1. Refrigerant capacity
	2. Refrigerant pressure
	3. Drive belt.
	4. Magnetic clutch.
	5. Compressor
	6. A/C pressure transducer

	7. Evaporator temperature sensor.
	8. A/C switch.
	9. Heater control assembly
	10. Wire harness
Insufficient cooling	1. Refrigerant capacity
	2. Drive belt
	3. Magnetic clutch
	4. Compressor
	5. Condenser
	6. Expansion valve
	7. Evaporator
	8. Refrigerant lines
	9. A/C pressure transducer
	10. Heater control assembly
No engine idle-up when A/C switch ON	1. Engine ECM
	2. Wire harness
No air inlet control	1. Heater control assembly
No mode control	1. Heater control assembly
	2. Mode actuator
No cooling fan operation	1. Cooling fan fuse
	2. Fan motor
	3. Engine ECM
	4. Wire harness

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > A/C Pressure Transducer > Components and Components Location

Component Location



VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > A/C Pressure Transducer > Description and Operation**Description**

A/C pressure transducer convert the pressure value of high pressure line into voltage value after measure it. By converted voltage value, engine ECU controls cooling fan by operating it high speed or low speed. Engine ECU stop the operation of compressor when the temperature of refrigerant line is so high or so low irregularly to optimize air conditioning system.

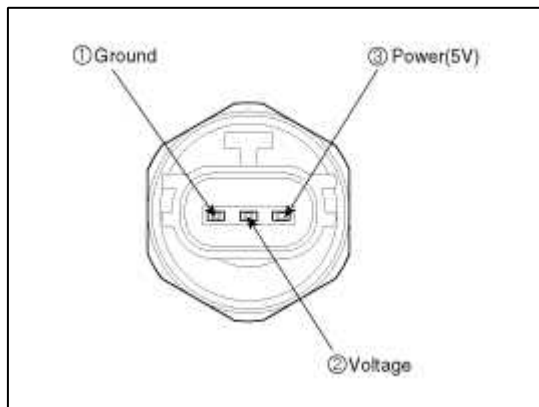
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2012-10-15

VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > A/C Pressure Transducer > Repair procedures

Inspection

1. Measure the pressure of high pressure line by measuring voltage output between NO.1 and NO.2 terminals.



2. Inspect the voltage value whether it is sufficient to be regular value or not.

$$\text{Voltage} = 0.00878835 * \text{Pressure} + 0.5$$

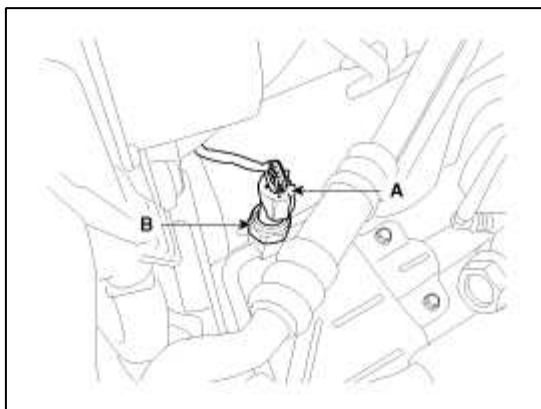
3. If the measured voltage value is not specification, replace the A/C pressure transducer.

Replacement

1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/charging station.
3. Remove the A/C pressure transducer (B) after disconnecting the connector (A).

Tightening torque:

10~12 N.m (1.02~1.22 kgf.m, 7.4~8.8 lb-ft)



CAUTION

Take care that liquid & suction pipe are not bent.

4. Installation is the reverse order of removal.

VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > Ambient Sensor > Description and Operation

Description

1. The ambient temperature sensor is located at the front of the condenser and detects ambient air temperature. It is a negative type thermistor; resistance will increase with lower temperature, and decrease with higher temperatures.
2. The sensor output will be displayed on the AVN.

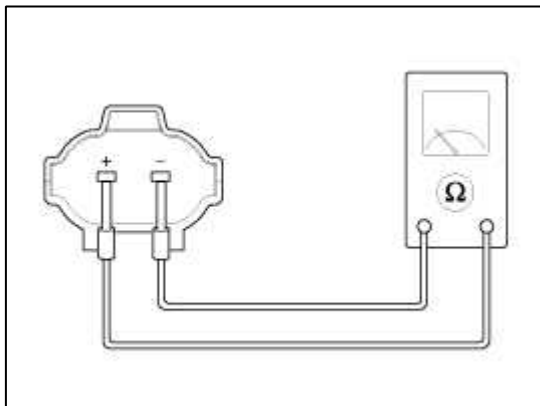
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10-15

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Ambient Sensor > Repair procedures

Inspection

1. Ignition "OFF"
2. Disconnect ambient temperature sensor.
3. Check the resistance of ambient temperature sensor between terminal "+" and "-" whether it is changed by changing of the ambient temperature.



Specification

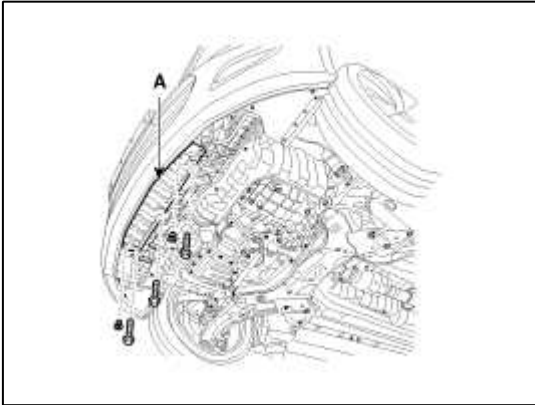
Ambient temperature [°C(°F)]	Resistance [kΩ]
-30(-22)	507± 3%
-20(-4)	284.5 ± 3%
-10(14)	164.2 ± 3%
0 (32)	97.5 ± 3%
10 (50)	59.6 ± 3%
20 (68)	37.46 ± 3%
30(86)	24.18 ± 3%
40(104)	16 ± 3%
50(122)	10.83 ± 3%

4. If the measured resistance is not specification, substitute with a known-good ambient temperature sensor and check for proper operation.

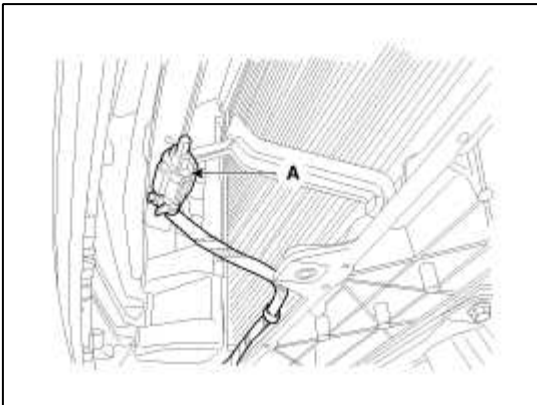
5. If the problem is corrected, replace the ambient temperature sensor.

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the engine room under cover (A).



3. Disconnect the connector and then remove the ambient temperature sensor (A).

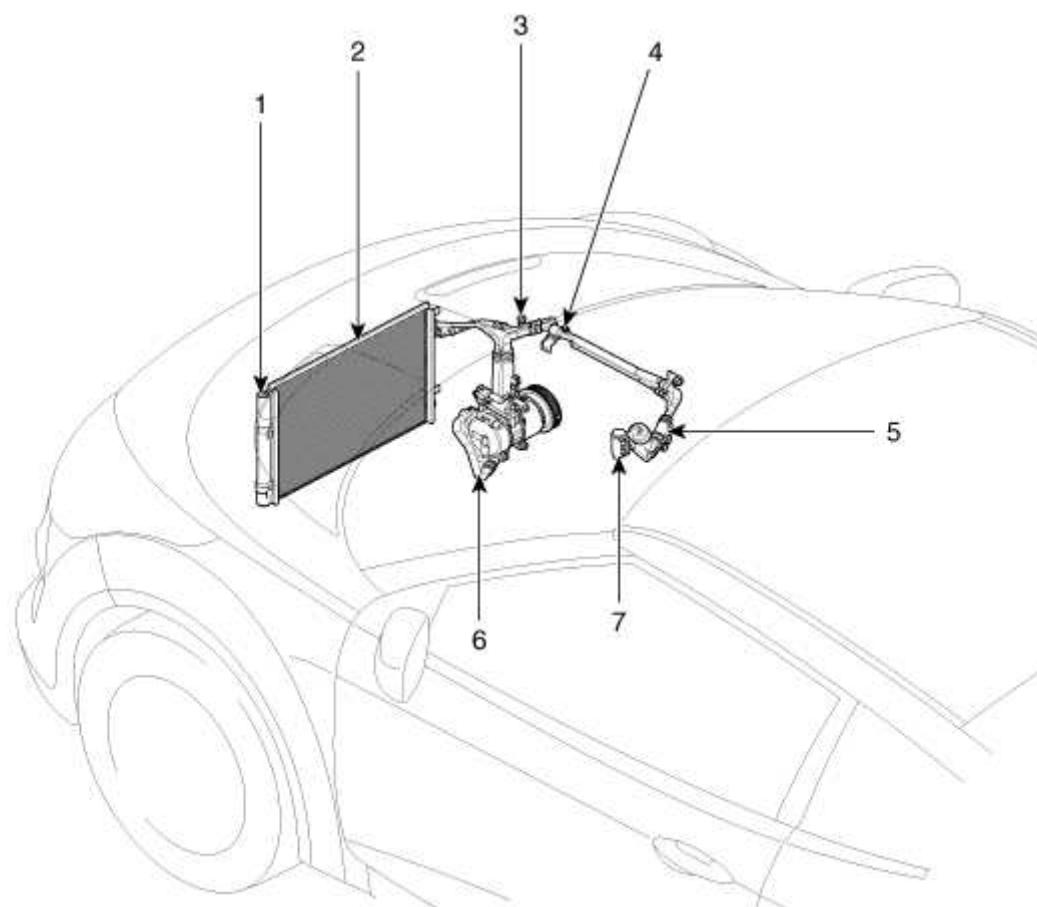


4. Installation is the reverse order of removal.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Components and Components Location

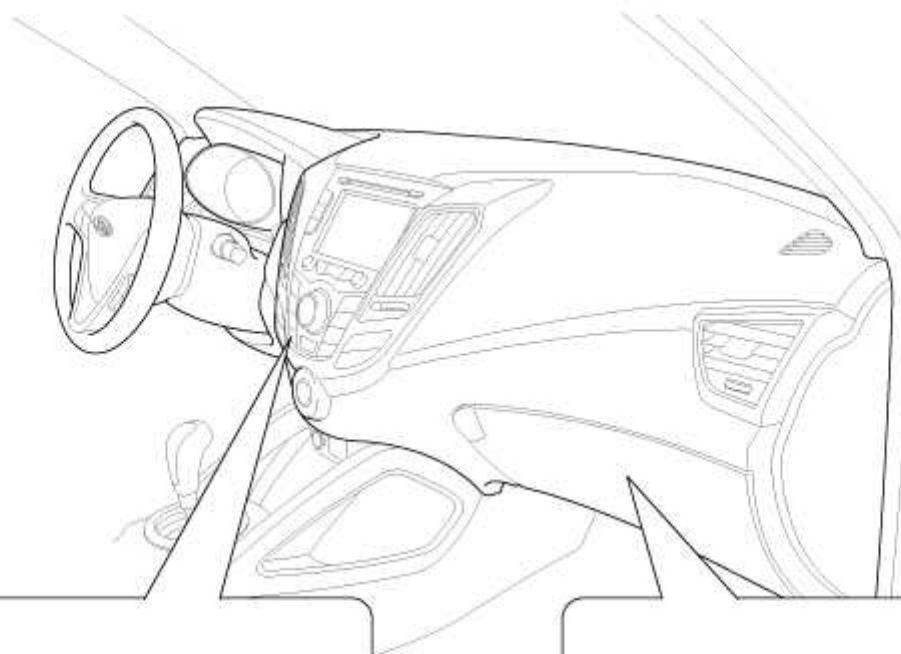
Component Location Index

Engine Room

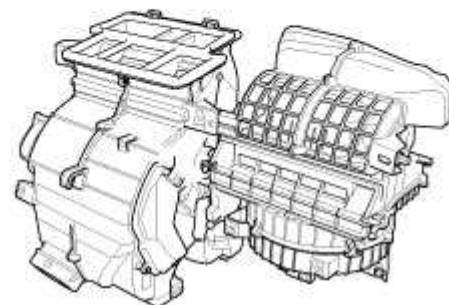


- | | |
|------------------------|----------------------------|
| 1. Receiver-drier | 5. A/C Pressure Transducer |
| 2. Condenser | 6. Compressor |
| 3. Service port (High) | 7. Expansion Valve |
| 4. Service port (Low) | |

Interior



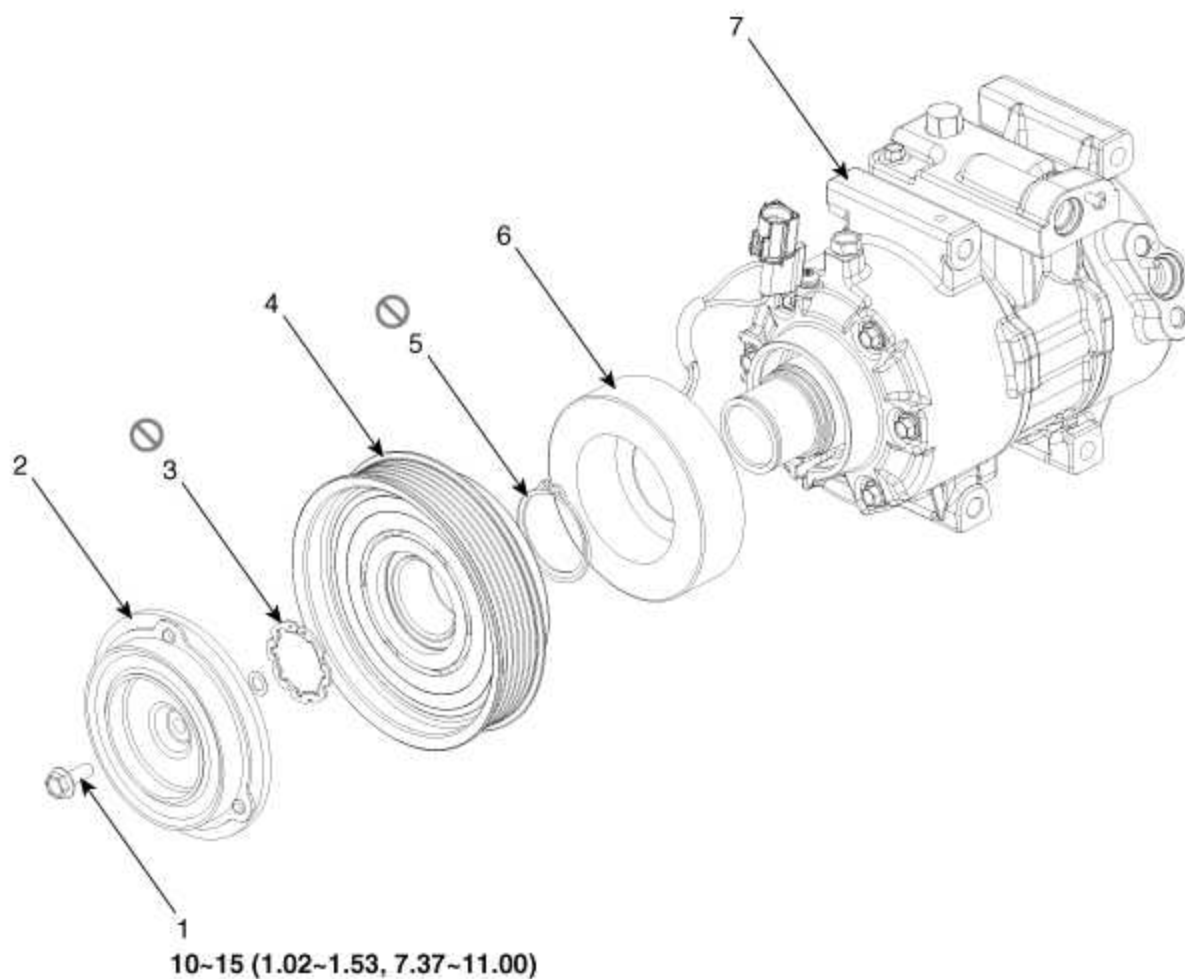
Heater & A/C controller



Heater & Blower unit

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Compressor > Components and Components Location

Components



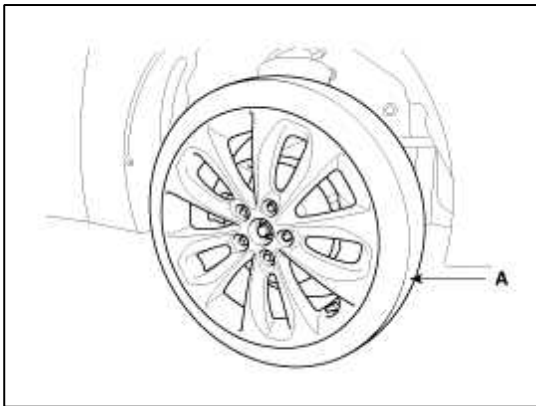
Torque : N.m(kgf.m, lb-ft)

1. Bolt	5. Retainer Ring (Field coil)
2. Disc & Hub Assembly	6. Field Coil
3. Retainer Ring (Pulley)	7. Compressor Assembly
4. Pulley	

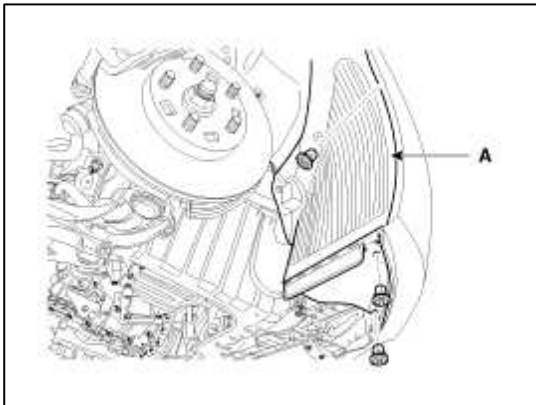
VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > Compressor > Repair procedures

Removal

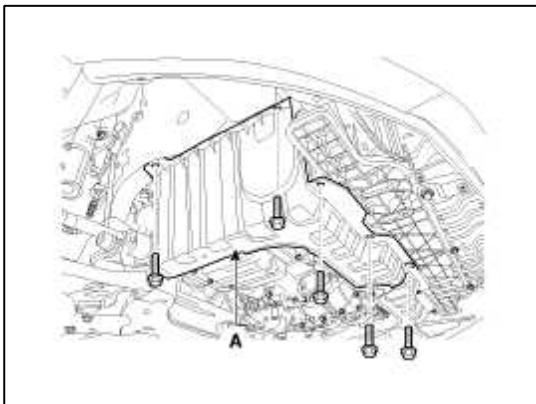
1. If the compressor is marginally operable, run the engine at idle speed, and let the air conditioning work for a few minutes, then shut the engine off.
2. Disconnect the negative cable from the battery.
3. Recover the refrigerant with a recovery/charging station.
4. Loosen the drive belt.
(Refer to EM group - "Drive Belt")
5. Remove the RH front tire (A).



6. Separate the front portion of the front wheel guard (A) from the wheel house.



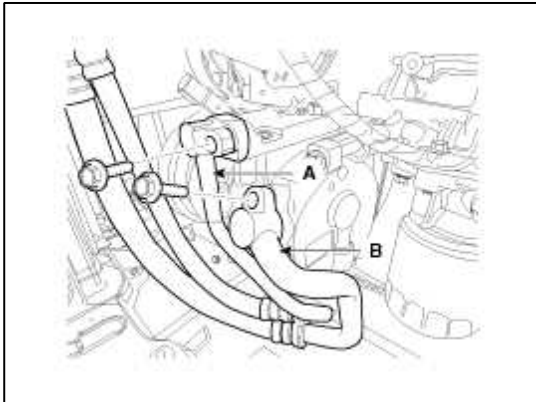
7. Remove the engine room RH side cover (A).



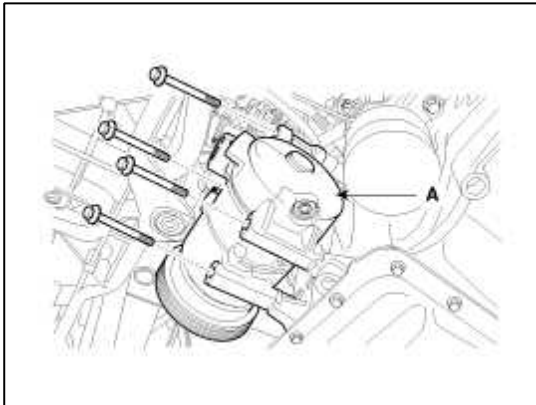
8. Remove the bolts, then disconnect the suction line (A) and discharge line (B) from the compressor. Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.

Tightening torque :

18.6~27.4N.m (1.9~2.8 kgf.m, 13.7~20.2 lbf.ft)



9. Disconnect the compressor clutch connector and then remove mounting bolts and the compressor (A).

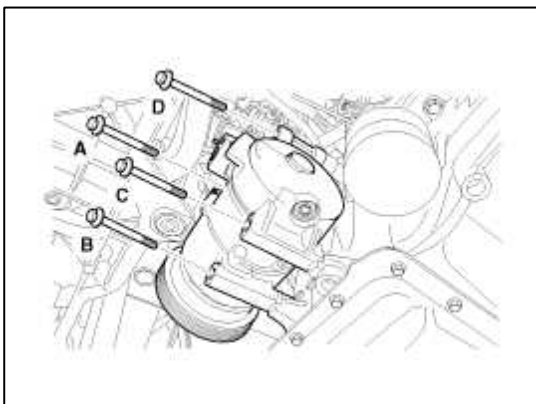


Installation

1. Make sure of the length of compressor mounting bolts, and then tighten it A→B→C→D order.

Tightening torque :

19.6~33.3N.m (2.0~3.4kgf.m, 14.5~24.6 lbf.ft)



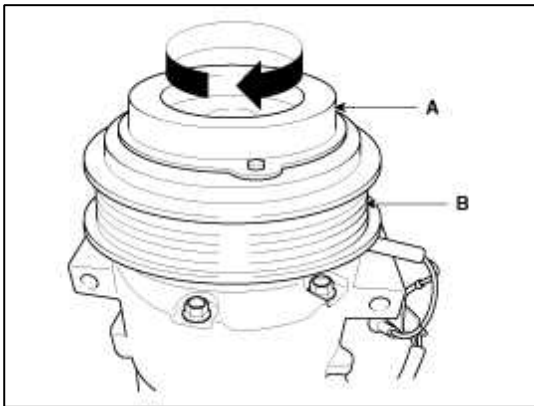
2. Install in the reverse order of removal.

NOTE

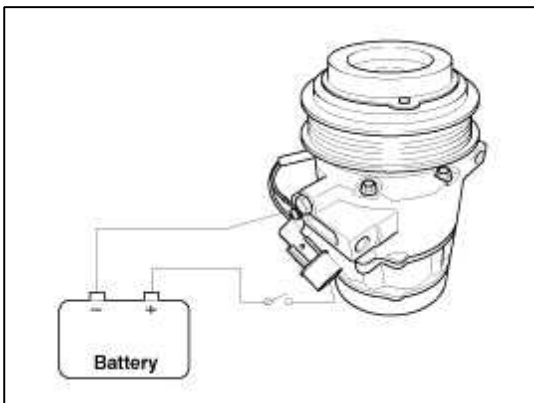
- If you're installing a new compressor, drain all the refrigerant oil from the removed compressor, and measure its volume, Subtract the volume of drained oil from 120cc (4.20 oz.) then the result is the amount of oil you should drain from the new compressor (through the suction fitting).
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
- To avoid contamination, do not return the oil to the container once dispensed, and never mix it with other refrigerant oils.
- Immediately after using the oil, replace the cap on the container and seal it to avoid moisture absorption.

Inspection

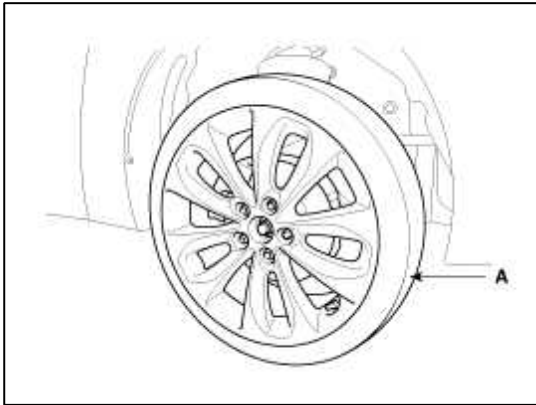
1. Check the plated parts of the disc & hub assembly (A) for color changes, peeling or other damage. If there is damage, replace the clutch set.
2. Check the pulley (B) bearing play and drag by rotating the pulley by hand. Replace the clutch set with a new one if it is noisy or has excessive play/drag.



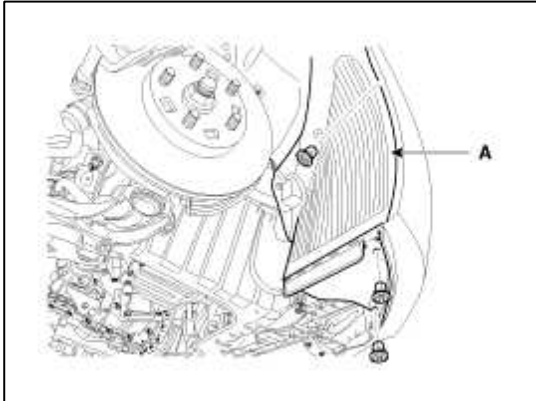
3. Check operation of the magnetic clutch. Connect the compressor side terminals to the battery (+) terminal and the ground battery (-) terminal to the compressor body. Check the magnetic clutch operating noise to determine the condition.
 - A. Do not spill the refrigerant oil on the vehicle; it may damage the paint; if the refrigerant oil contacts the paint, wash it off immediately.
 - B. Adjust the drive belt
 - C. Charge the system and test its performance.

**Disassembly**

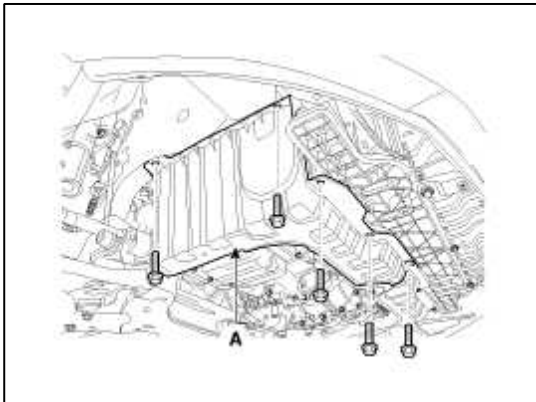
1. Remove the RH front tire (A).



2. Separate the front portion of the front wheel guard (A) from the wheel house.



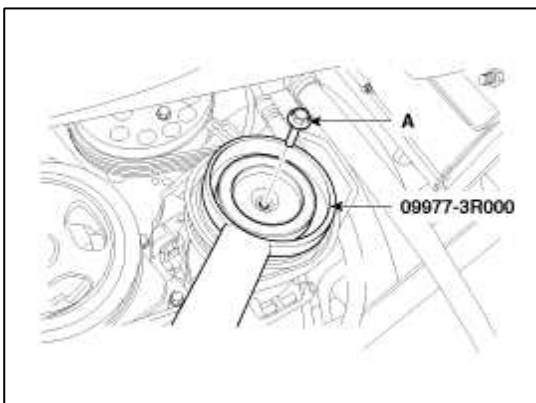
3. Remove the engine room RH side cover (A).



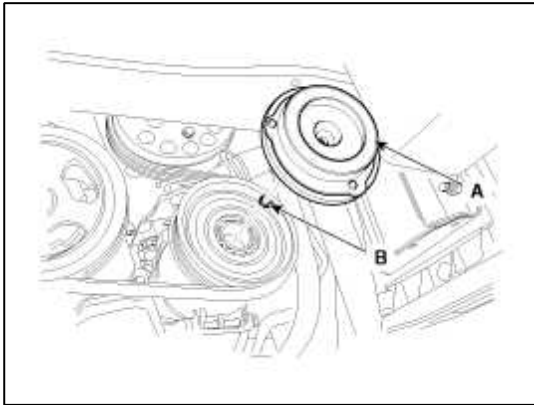
4. Remove the center bolt (A) while holding the disc & hub assembly with SST(09977-3R000).

Tightening torque :

10~15N.m (1.02~1.53kgf.m, 7.37~11lbf.ft)



5. Remove the disc & hub assembly (A) and shim (gap washer) (B), taking care not to lose the shims.



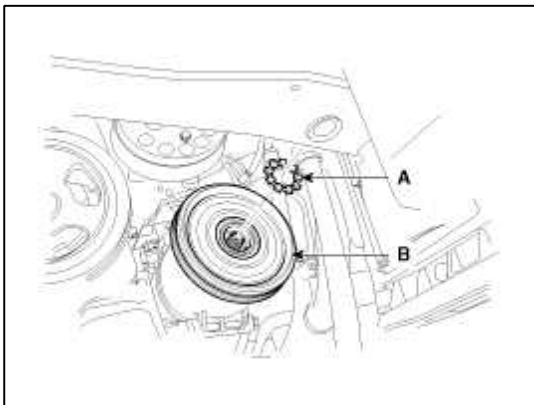
6. Loosen the drive belt.

(Refer to EM group - "Drive Belt")

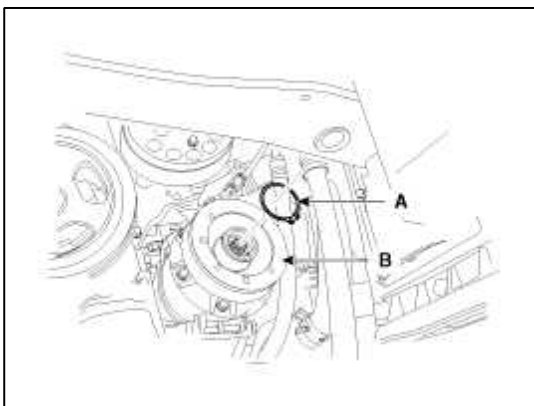
7. Disconnect the retainer ring (A) and then remove the pulley (B).

NOTE

- Be careful not to damage the pulley (B) and compressor during removal/installation.
- Once retainer ring (A) is removed, replace it with a new one.



8. Remove the retainer ring (A) and then remove the field coil (B). Be careful not to damage the coil and compressor.



9. Reassemble the compressor clutch in the reverse order of disassembly.

NOTE

- Clean the pulley and compressor sliding surfaces with non-petroleum solvent.
- Install new retainer rings, and make sure they are fully seated in the groove.
- Make sure that the pulley turns smoothly after its reassembled.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Compressor Oil > Repair procedures

Oil Specification

- 1. The HFC-134a system requires synthetic (PAG) compressor oil whereas the R-12 system requires mineral compressor oil. The two oils must never be mixed.
- 2. Compressor (PAG) oil varies according to compressor model. Be sure to use oil specified for the model of compressor.

Handling of Oil

- 1. The oil should be free from moisture, dust, metal powder, etc.
- 2. Do not mix with other oil.
- 3. The water content in the oil increases when exposed to the air. After use, seal oil from air immediately. (HFC-134a Compressor Oil absorbs moisture very easily.)
- 4. The compressor oil must be stored in steel containers, not in plastic containers.

Compressor Oil Check

The oil used to lubricate the compressor is circulating with the refrigerant.
Whenever replacing any component of the system or a large amount of gas leakage occurs, add oil to maintain the original amount of oil.

Oil total volume in system

PAG OIL : 120 ± 10cc

Oil Return Operation

There is close affinity between the oil and the refrigerant.
During normal operation, part of the oil recirculation with the refrigerant in the system. When checking the amount of oil in the system, or replacing any component of the system, the compressor must be run in advance for oil return operation. The procedure is as follows:

- 1. Open all the doors and the engine hood.
- 2. Start the engine and air conditioning switch to "ON" and set the blower motor control knob at its highest position.
- 3. Run the compressor for more than 20 minutes between 800 and 1,000 rpm in order to operate the system.
- 4. Stop the engine.

Replacement of Component Parts

When replacing the system component parts, supply the following amount of oil to the component parts to be installed.

Component parts to be installed	Amount of Oil
Evaporator	50 cc (1.70 fl.oz)
Condenser	30 cc (1.02 fl.oz)
Receiver/dryer	30 cc (1.02 fl.oz)
Refrigerant line (One piece)	10 cc (0.34 fl.oz)

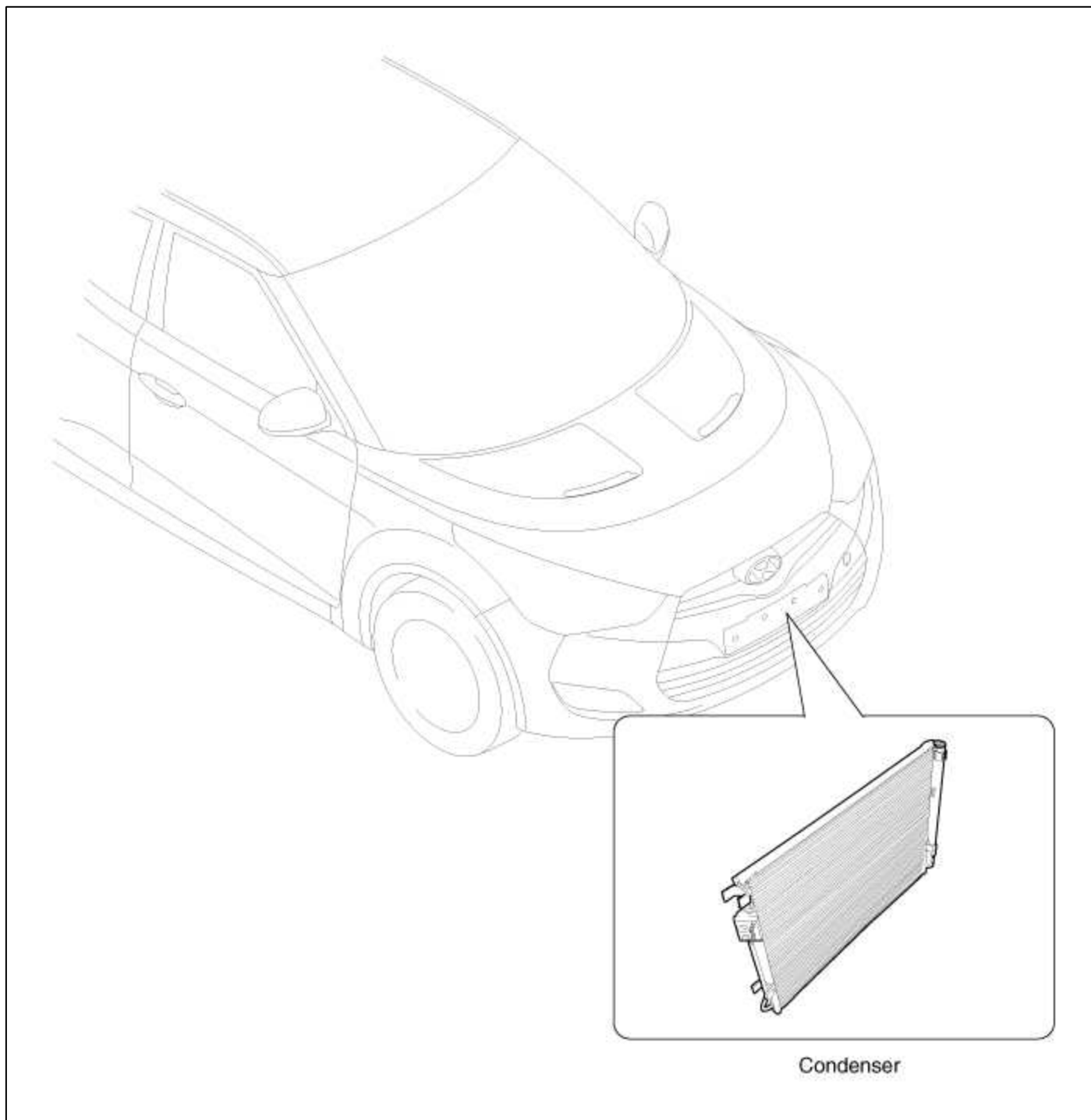
For compressor replacement, subtract the volume of oil drained from the removed compressor from the specified volume, and drain the calculated volume of oil from the new compressor:
The specified volume - volume of removed compressor = volume to drain from the new compressor.

NOTE

Even if no oil is drained from the removed compressor, don't drain more than 50cc from new compressor.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Condenser > Components and Components Location

Component Location



Condenser

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Condenser > Repair procedures

Inspection

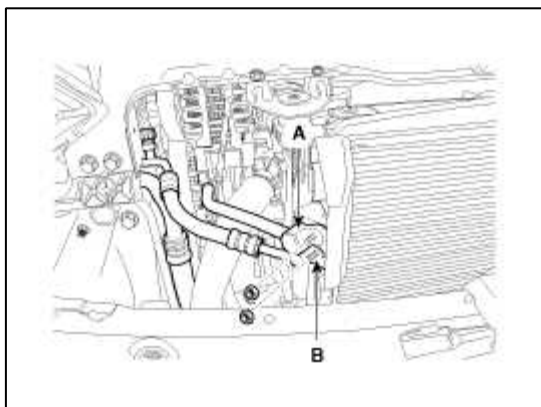
1. Check the condenser fins for clogging and damage. If clogged, clean them with water, and blow them with compressed air. If bent, gently bend them using a screwdriver or pliers.
2. Check the condenser connections for leakage, and repair or replace it, if required.

Replacement

1. Recover the refrigerant with a recovery/ recycling/ charging station.
2. Disconnect the negative (-) battery terminal.
3. Remove the front bumper assembly.
(Refer to BD group - "Front Bumper")
4. Remove the discharge line (A) and liquid line (B) from the condenser.

Tightening torque :

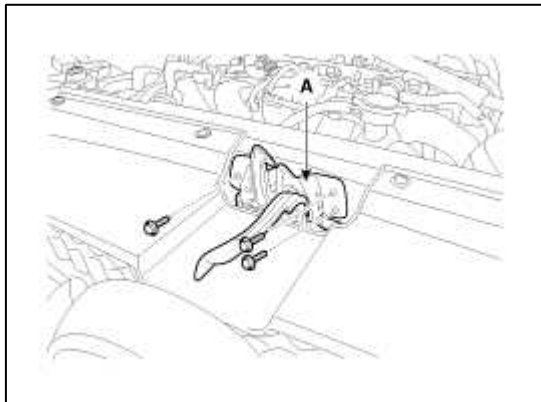
4.9~7.8N.m (0.5~0.8kgf.m, 3.6~5.8 lbf.ft)



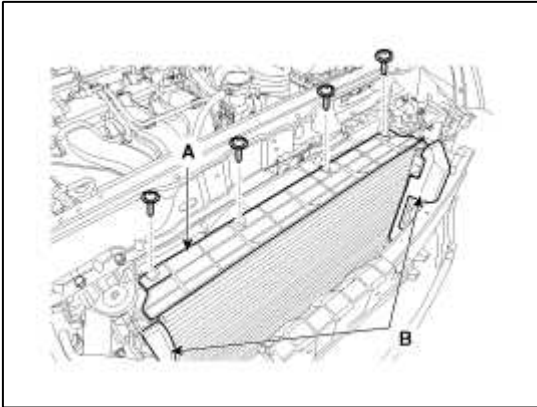
CAUTION

Cap the open fittings immediately to keep moisture or dirt out of the system.

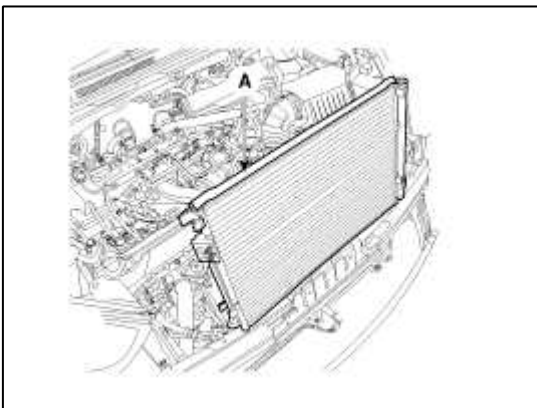
5. Remove the hood latch (A).



6. Remove the upper cover (A) and the air guards (B).



7. Remove the condenser (A) from radiator.



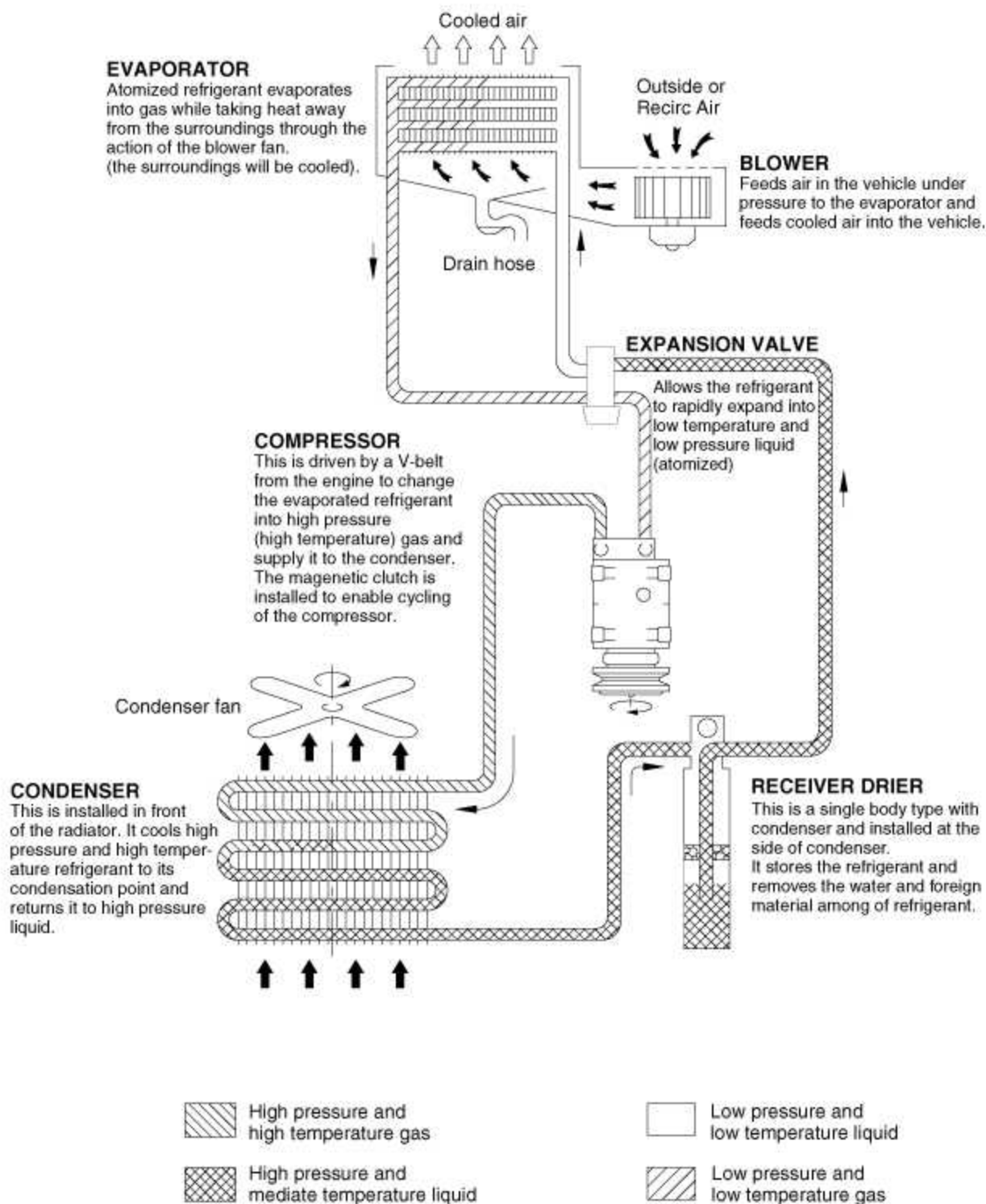
8. Install in the reverse order of removal, and note these items :

NOTE

- If you're installing a new condenser, add refrigerant oil (PAG OIL).
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
- Be careful not to damage the radiator and condenser fins when installing the condenser.
- Be sure to install the lower mount cushions of condenser securely into the holes.
- Charge the system, and test its performance.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > Description and Operation

Refrigeration Cycle



VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Evaporator Temperature Sensor > Description and Operation**Description**

The evaporator temperature sensor will detect the evaporator core temperature and interrupt compressor relay power in order to prevent evaporator freezing by excessive cooling

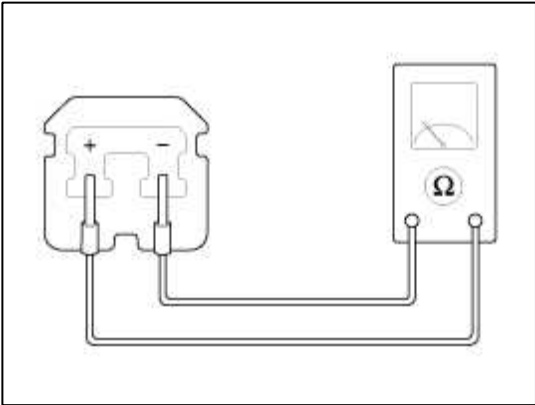
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10-15

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Evaporator Temperature Sensor > Repair procedures

Inspection

- 1. Ignition "OFF".
- 2. Remove the evaporator temperature sensor after disconnecting the connector.
- 3. Using the multi-tester, measure resistance between terminal "+" and "-" of evaporator temperature sensor.

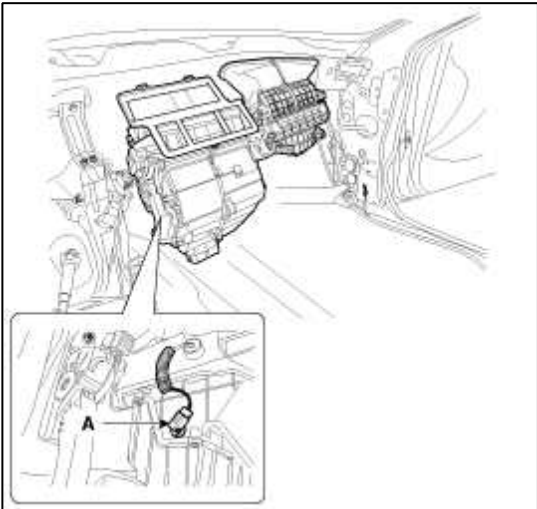


Specification

Evaporator core temperature[°C(°F)]	Resistance[kΩ]	Voltage[V]
-20 (-4)	13.59	2.88
-10 (14)	6.273	1.927
0 (32)	3.129	1.192
10 (50)	1.668	0.715
20 (68)	0.942	0.431
30 (86)	0.56	0.265
40 (104)	0.347	0.168
50 (122)	0.224	0.11

Replacement

- 1. Disconnect the negative (-) battery terminal.
- 2. Disconnect the evaporator temperature sensor connector.
- 3. Remove the evaporator temperature sensor (A), by pulling it after rotating 90° in a counterclockwise direction.



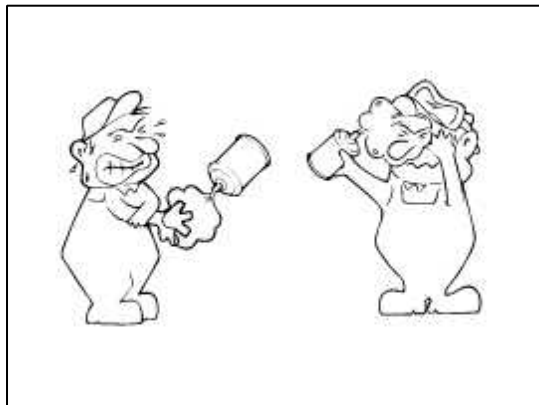
- 4. Installation is the reverse order of removal.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > General Safety Information and Caution

Instructions

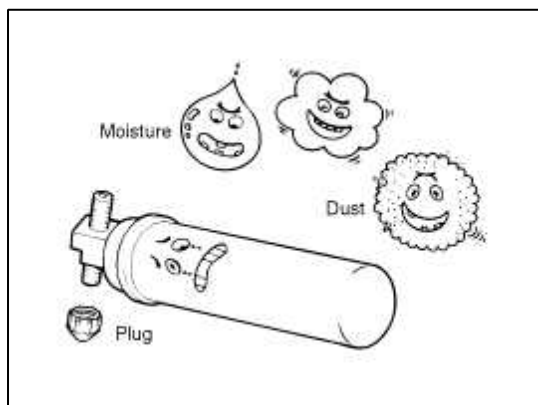
When Handling Refrigerant

1. R-134a liquid refrigerant is highly volatile. A drop on the skin of your hand could result in localized frostbite. When handling the refrigerant, be sure to wear gloves.
2. It is standard practice to wear goggles or glasses to protect your eyes, and gloves to protect your hands. If the refrigerant splashes into your eyes, wash them with clean water immediately.
3. The R-134a container is highly pressurized. Never leave it in a hot place, and check storage temperature is below 52°C (126°F).
4. An electronic leak detector should be used to check the system for refrigerant leakage. Bear in mind that the R-134a, upon coming into contact with flame, produces phosgene, a highly toxic gas.
5. Use only recommended lubricant for R-134a systems. If lubricants other than the recommended one used, system failure may occur.
6. PAG lubricant absorbs moisture from the atmosphere at a rapid rate, therefore the following precautions must be observed:
 - A. When removing refrigerant components from a vehicle, cap the components immediately to prevent entry of moisture.
 - B. When installing refrigerant components to a vehicle, do not remove the cap until just before connecting the components.
 - C. Complete the connection of all refrigerant tubes and hoses without delay to prevent the A/C system from taking on moisture.
 - D. Use the recommended lubricant from a sealed container only.
7. If an accidental discharge in the system occurs, ventilate the work area before resume of service.



When replacing parts ON A/C system

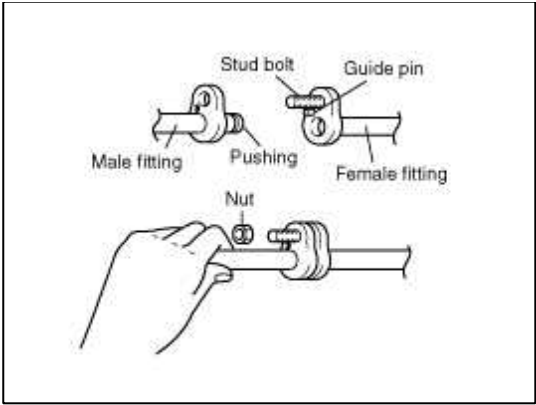
1. Never open or loosen a connection before discharging the system.
2. Seal the open fittings of components with a cap or plug immediately to prevent intrusion of moisture or dust.
3. Do not remove the sealing caps from a Replacement component until it is ready to be installed.
4. Before connecting an open fitting, always install a new sealing ring. Coat the fitting and seal with refrigerant oil before making the connection.



When Installing Connecting Parts

Flange With Guide Pin

Check the new O-ring for damage (use only the specified) and lubricate by using compressor oil. Tighten the nut to specified torque.



Size	Tightening torque [N.m (kg.m, lbf.ft)]	
	General bolt, nut	
	4T	7T
M6	5 - 6 (0.5 - 0.6, 3.6 - 4.3)	9 - 11 (0.9 - 1.1, 6.5 - 7.9)
M8	12 - 15 (1.2 - 1.5, 8.7 - 10.8)	20 - 25 (2.0 - 2.5, 14 - 18.0)
M10	25 - 30 (2.5 - 3.0, 18 - 21.6)	45 - 50 (4.5 - 5.0, 32 - 36.1)
Size	Flange bolt, nut	
	4T	7T
	4T	7T
M6	5 - 7 (0.5 - 0.7, 3.6 - 5.0)	8 - 12 (0.8 - 1.2, 5.8 - 8.6)
M8	10 - 15 (1.0 - 1.5, 7 - 10)	19 - 28 (1.9 - 2.8, 14 - 20)
M10	21 - 31 (2.1 - 3.1, 15 - 22)	39 - 60 (3.9 - 6.0, 28 - 43)

NOTE

- T means tensile intensity, which is stamped on the head of bolt only numeral.

Handling tubing and fittings

The internal parts of the refrigeration system will remain in a state of chemical stability as long as pure moisture-free refrigerant and refrigerant oil are used. Abnormal amounts of dirt, moisture or air can upset the chemical stability and cause problems or serious damage.

The Following precautions must be observed

1. When it is necessary to open the refrigeration system, have everything you will need to service the system ready so the system will not be left open any longer than necessary.
2. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture.
3. All lines and components in parts stock should be capped or sealed until they are ready to be used.
4. Never attempt to rebind formed lines to fit. Use the correct line for the installation you are servicing.
5. All tools, including the refrigerant dispensing manifold, the gauge set manifold and test hoses, should be kept clean and dry.

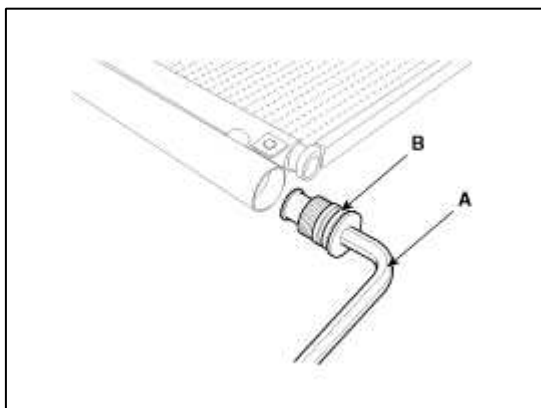
VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Receiver-Drier > Repair procedures

Replacement

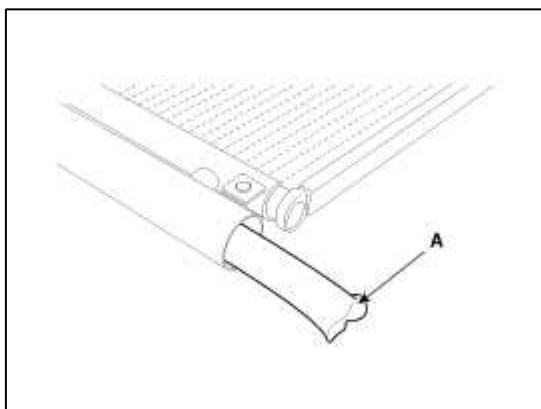
1. Remove the condenser, and then remove the bottom cap (B) with L wrench (A) from the condenser.

Tightening torque :

2.7~3.2N.m (0.28~0.33kgf.m, 2.0~2.4 lb-ft)



2. Remove the desiccant (A) from condenser using a long nose plier. Check for crumbled desiccant and clogged bottom cap filter.



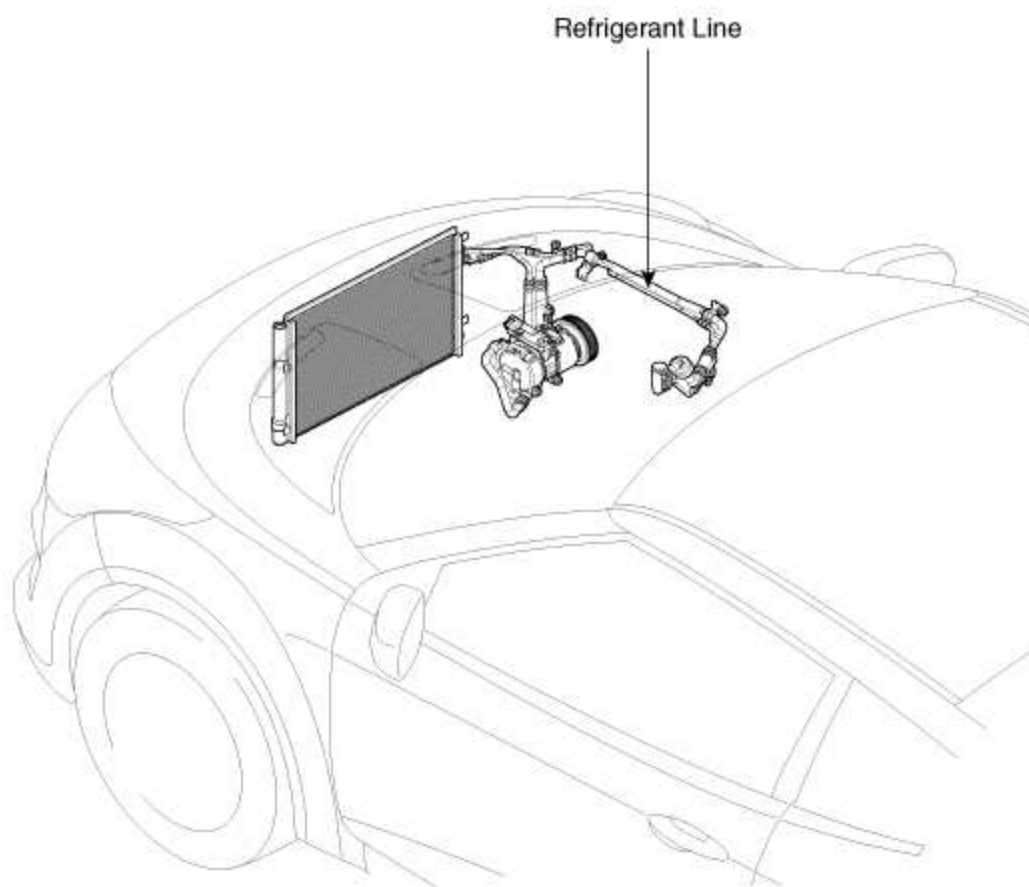
3. Apply air conditioning compressor oil along the O-rings and threads of the new bottom cap.
4. Insert the new desiccant into the receiver drier tank. The desiccant must be sealed in vacuum before it is exposed to air for use.
5. Install the new bottom cap to the condenser.

NOTE

- Always replace the desiccant and bottom cap at the same time.
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
- Be careful not to damage the radiator and condenser fins when installing the condenser.
- Be sure to install the lower mount cushions of condenser securely into the holes.
- Charge the system, and test its performance.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Air Conditioning System > Refrigerant line > Components and Components Location

Component Location



VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > Refrigerant line > Repair procedures

Replacement

1. Discharge refrigerant from refrigeration system.
2. Replace faulty tube or hose.

CAUTION

Cap the open fittings immediately to keep moisture or dirt out of the system.

3. Tighten joint of bolt or nut to specified torque.

CAUTION

Connections should not be torque tighter than the specified torque.

Part tightened	N.m	Kgf.m	lbf.ft
Condenser - Discharge hose	4.9~7.8	0.5~0.8	3.6~5.8
Condenser - Liquid tube			
Compressor - Discharge hose	18.6~27.4	1.9~2.8	13.7~20.2
Compressor - Suction hose			
Expansion valve - Evaporator	6.9~10.8	0.7~1.1	5.1~8.0

4. Evacuate air in refrigeration system and charge system with refrigerant.

Specified amount : 420 ± 25g (14.8±0.88 oz.)

5. Inspect for leakage of refrigerant.
Using a gas leak detector, check for leakage of refrigerant.
6. Inspect A/C operation.

VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air Conditioning > Air Conditioning System > Repair procedures

Refrigerant System Service Basics

Refrigerant Recovery

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

CAUTION

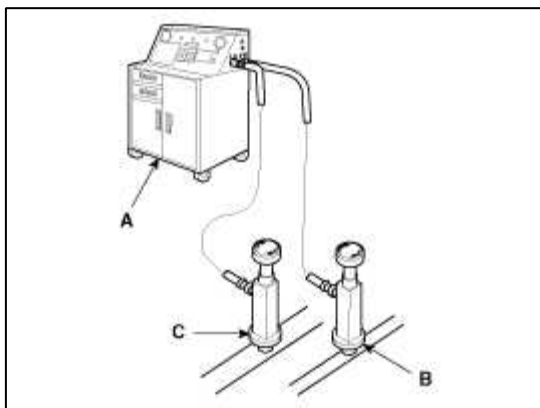
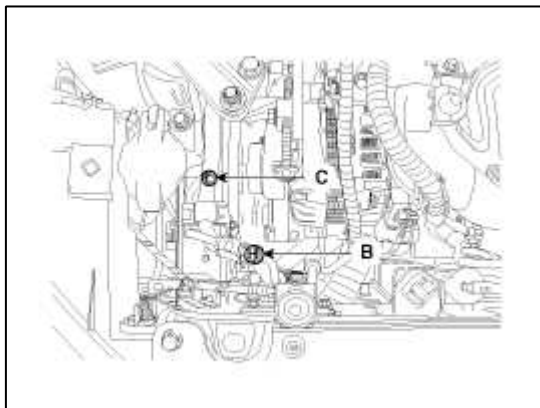
- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate work area before resume of service.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect an R-134a refrigerant

Recovery/Recycling/Charging System (A) to the high-pressure service port (B) and the low-pressure service port (C) as shown, following the equipment manufacturer's instructions.



2. Measure the amount of refrigerant oil removed from the A/C system after the recovery process is completed. Be sure to install the same amount of new refrigerant oil back into the A/C system before charging.

System Evacuation

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

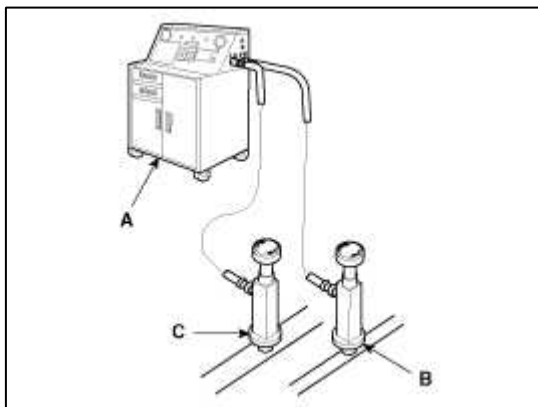
CAUTION

- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate work area before resume of service.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. When an A/C System has been opened to the atmosphere, such as during installation or repair, it must be evacuated using an R-134a refrigerant Recovery/Recycling/Charging System. (If the system has been open for several days, the receiver/dryer should be replaced, and the system should be evacuated for several hours.)
2. Connect an R-134a refrigerant Recovery/Recycling/Charging System (A) to the high-pressure service port (B) and the low-pressure service port (C) as shown, following the equipment manufacturer's instructions.



3. If the low-pressure does not reach more than 93.3 kPa (700 mmHg, 27.6 in.Hg) in 10 minutes, there is probably a leak in the system. Partially charge the system, and check for leaks (see Leak Test.).
4. Remove the low pressure valve from the low-pressure service port.

System Charging

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

CAUTION

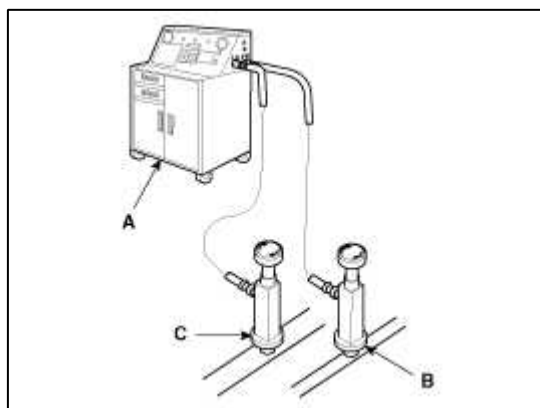
- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate work area before resume of service.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect an R-134a refrigerant

Recovery/Recycling/Charging System (A) to the high-pressure service port (B) as shown, following the equipment manufacturer's instructions.



2. Add the same amount of new refrigerant oil to system that was removed during recovery. Use only specified refrigerant oil. Charge the system with 14.8 ± 0.88 oz. (420 ± 25 g) of R-134a refrigerant. Do not overcharge the system the compressor will be damaged.

Refrigerant Leak Test

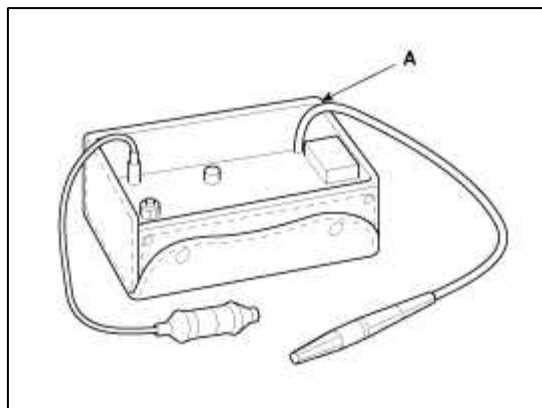
Always conduct a leak test with an electronic leak detector whenever leakage or refrigerant is suspected and when conducting service operations which are accompanied by disassembly or loosening or connection fittings.

NOTE

In order to use the leak detector properly, read the manual supplied by the manufacturer.

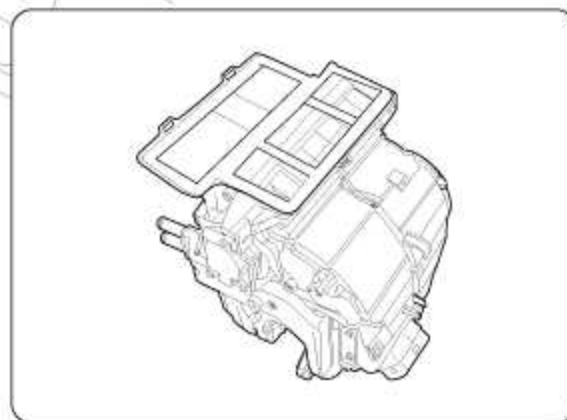
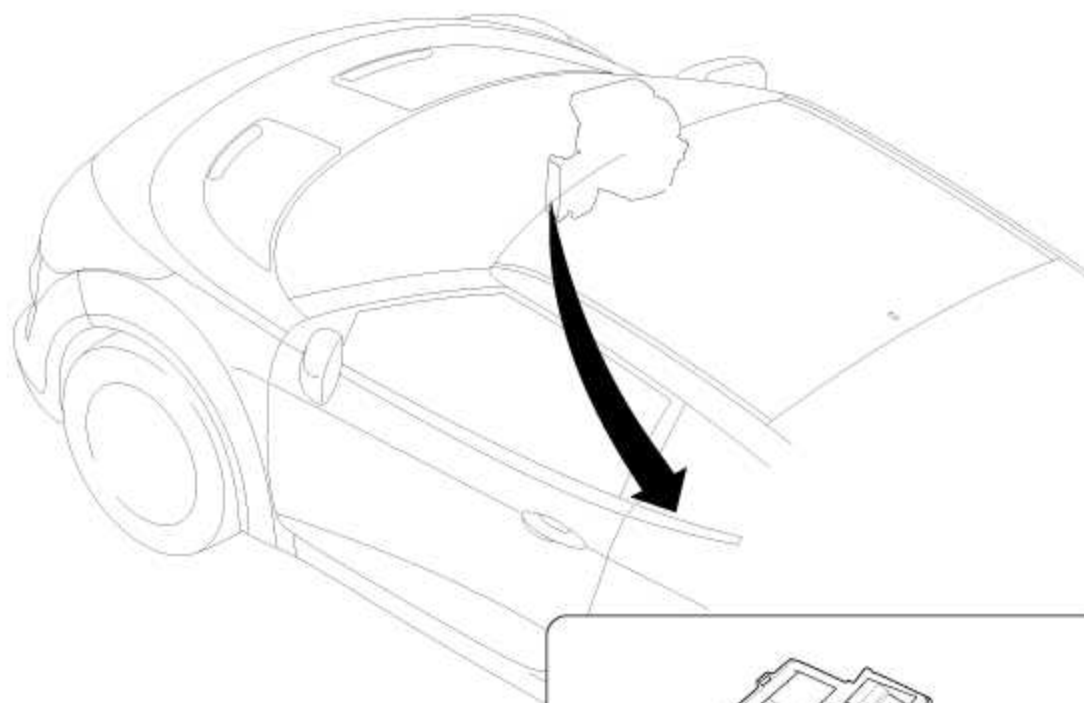
If a gas leak is detected, proceed as follows:

1. Check the torque on the connection fittings and, if too loose, tighten to the proper torque. Check for gas leakage with a leak detector (A).
2. If leakage continues even after the fitting has been tightened, discharge the refrigerant from the system, disconnect the fittings, and check their seating faces for damage. Always replace, even if the damage is slight.
3. Check the compressor oil and add oil if required.
4. Charge the system and recheck for gas leaks. If no leaks are found, evacuate and charge the system again.



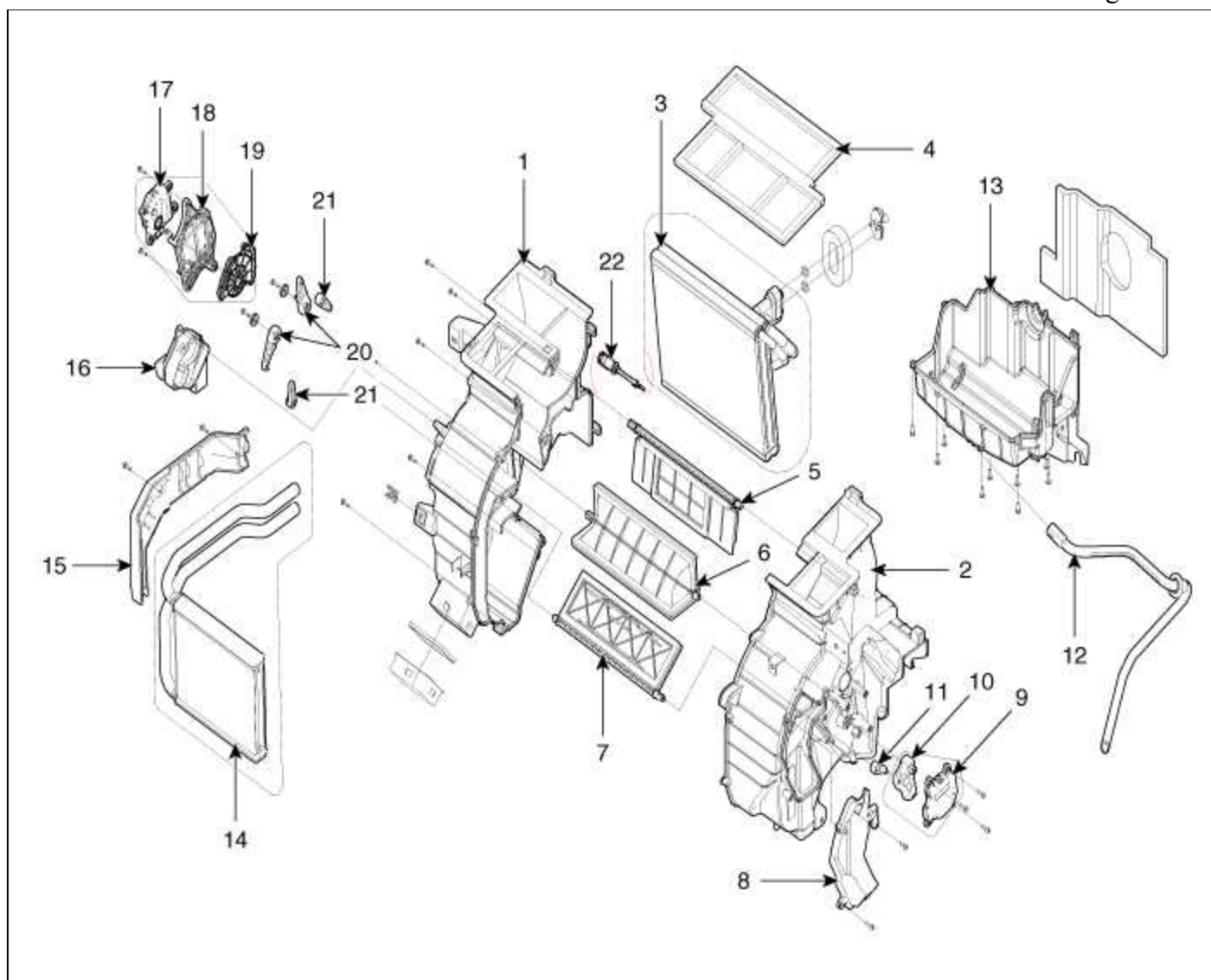
**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air
Conditioning > Heater > Heater Unit > Components and Components Location**

Component Location



Heater unit

Components



1. Heater Case [LH]	12. Drain Hose
2. Heater Case [RH]	13. Heater Lower Case
3. Evaporator Core	14. Heater Core
4. Duct Seal	15. Heater Core Cover
5. Vent/Def Door	16. Shower Duct [LH]
6. Foot Door	17. Mode Actuator
7. Temp Door	18. Mode Bracket
8. Shower Duct [RH]	19. Mode Cam
9. Temp Actuator	20. Sub Vent Cover
10. Temp Actuator Lever	21. Temp Door Lever
11. Temp Door Lever	22. Evaporator Temperature Sensor

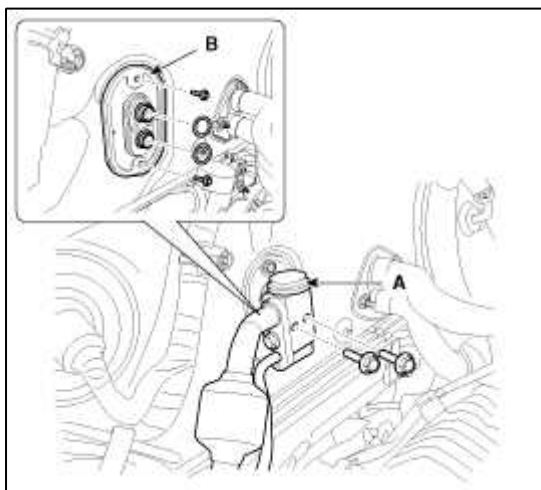
VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Heater > Heater Unit > Repair procedures

Replacement

1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/ recycling/ charging station.
3. When the engine is cool, drain the engine coolant from the radiator.
4. Remove the expansion valve (A) from the evaporator core and then remove the cover (B).

Tightening torque :

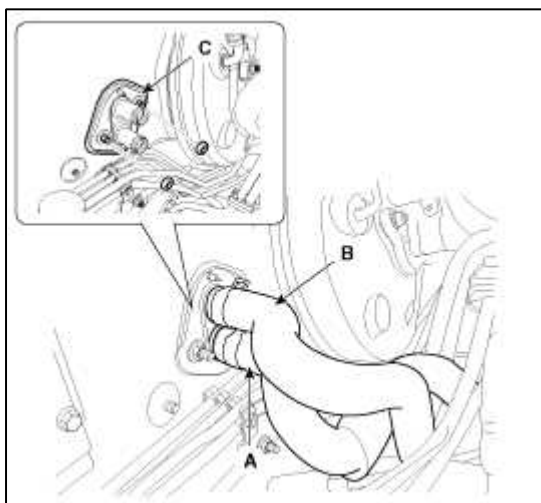
7.8 ~ 11.7 N.m (0.8 ~ 1.2 kgf.m, 5.7 ~ 8.6 lb-ft)



CAUTION

Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.

5. Disconnect the inlet (A) and outlet (B) heater hoses from the heater unit and then remove the cover (C).

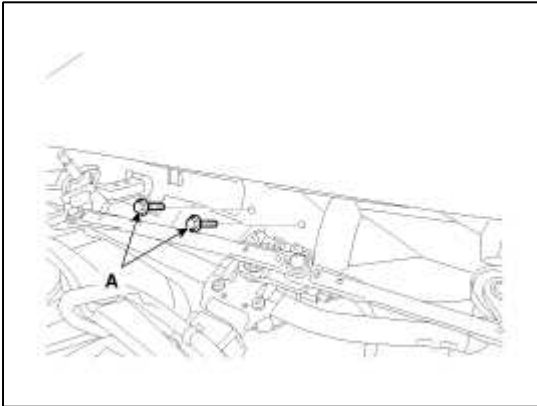


CAUTION

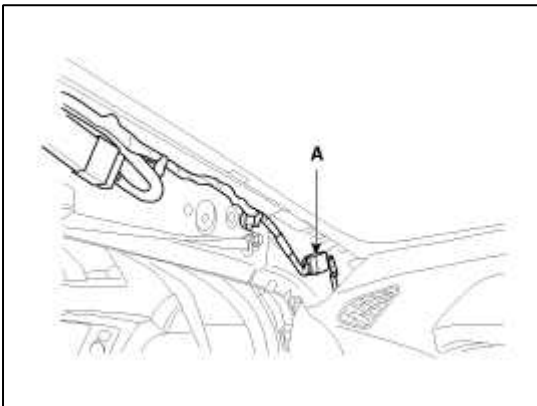
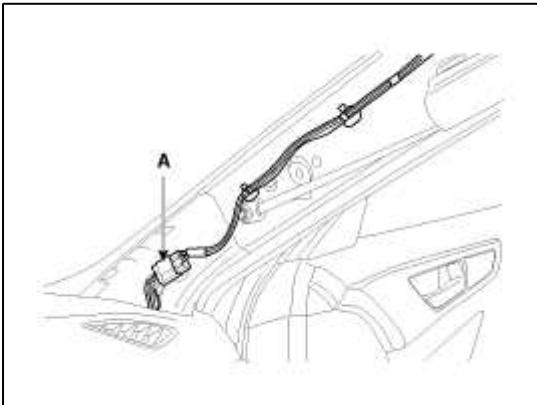
Engine coolant will run out when the hoses are disconnected; drain it into a clean drip pan. Be sure not to let coolant spill on electrical parts or painted surfaces. If any coolant spills, rinse it off immediately.

6. Remove the center console.
(Refer to BD group - "Center Console")
7. Remove the steering handle and column.
(Refer to ST group - "Steering Column")

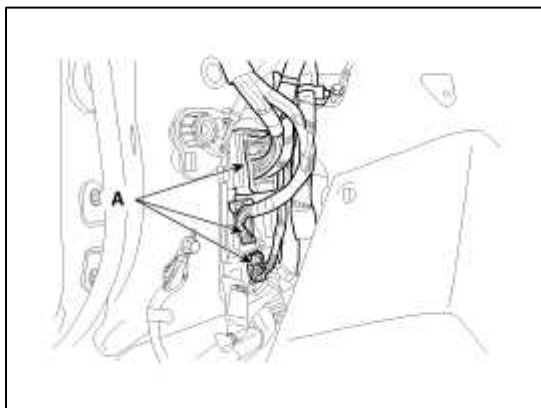
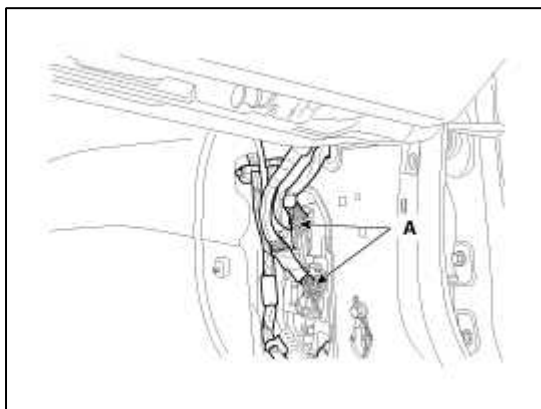
8. Remove the cowl top cover.
(Refer to BD group - "Cowl Top Cover")
9. Remove the photo sensor.
(Refer to HA group - "Photo Senosr")
10. Loosen the cowl cross member mounting bolts (A).



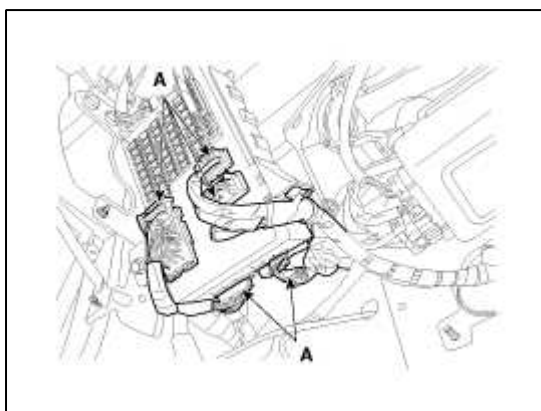
11. Remove the left & right front filler trim and than disconnect the connectors (A).



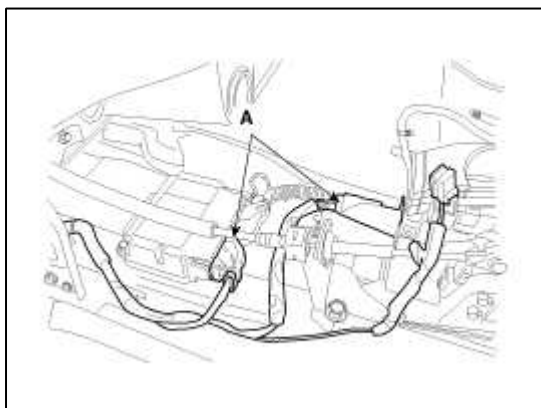
12. Disconnect the left & right multi box connectors (A).



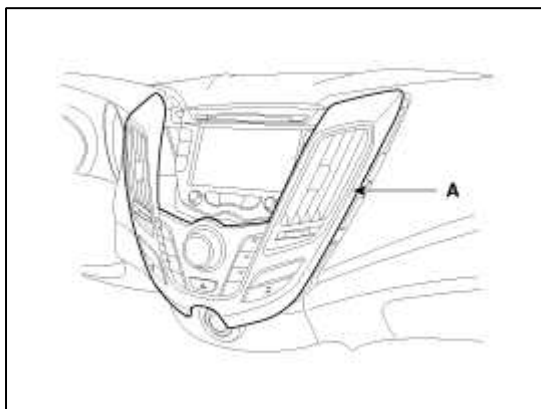
13. Disconnect the main fuse box connectors (A).



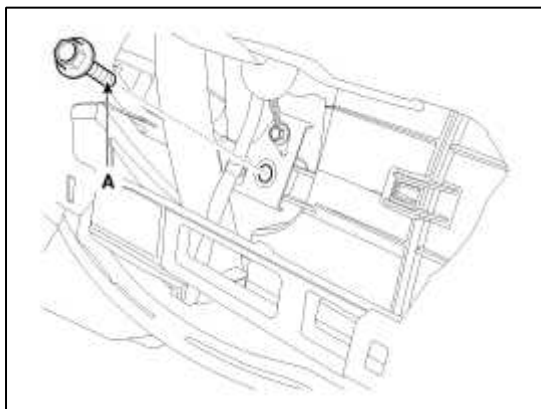
14. Disconnect the air bag connectors (A).



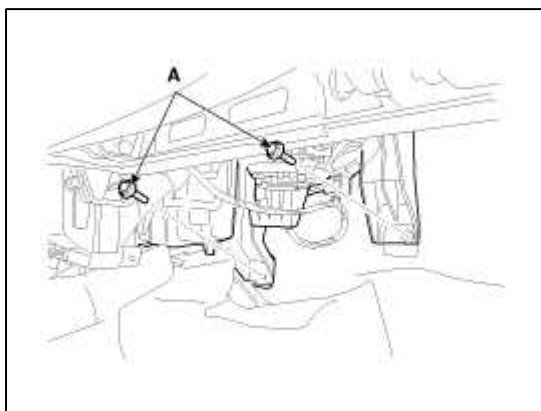
15. Remove the center facia panel (A).



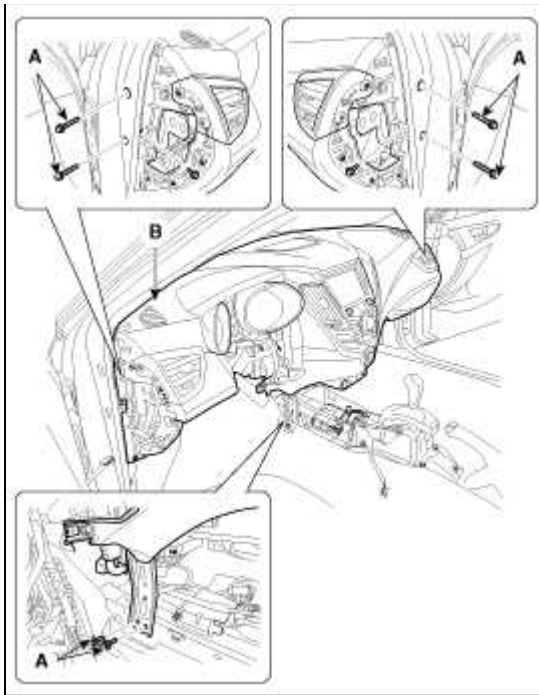
16. Loosen the heater & blower unit mounting bolt (A).



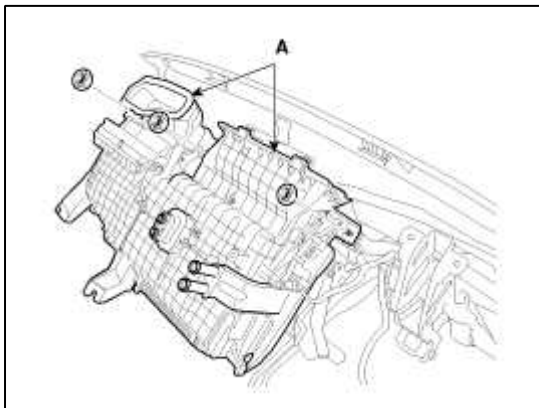
17. Loosen the heater & blower unit mounting bolts (A).



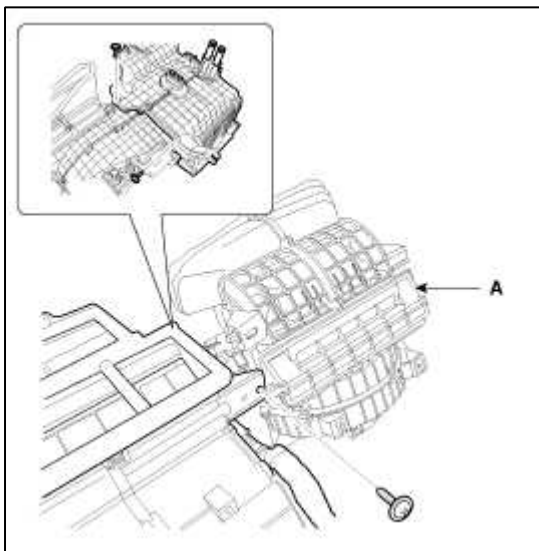
18. Loosen the cowl cross member mounting bolts (A) and then remove the crash pad and heater & blower unit assembly (B).



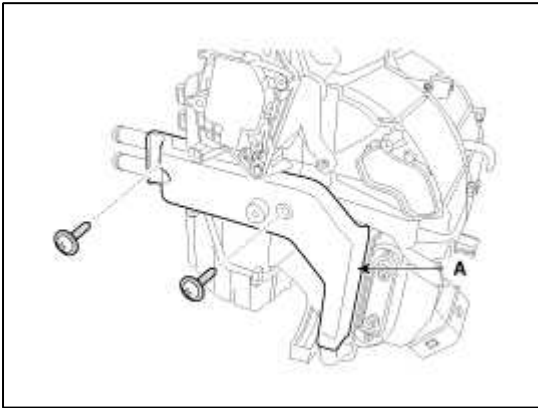
19. Disconnect the connectors and then remove the heater & blower unit (A) from the crash pad.



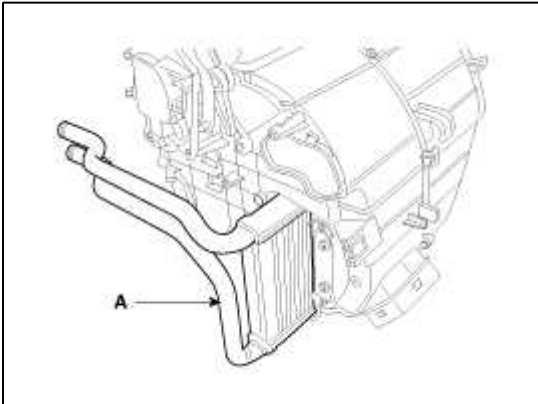
20. Remove the blower unit (A) from heater unit after loosening screws.



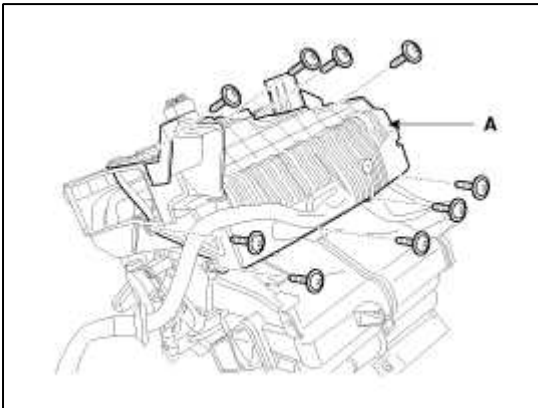
21. Loosen the mounting screws and then remove the heater core cover (A).



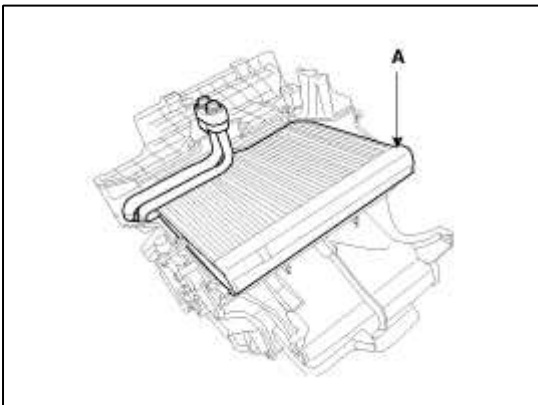
22. Disconnect the heater core (A) from heater unit.



23. Loosen the heater unit lower case mount screws and then remove the heater unit lower case (A).



24. Remove the evaporator core (A).



CAUTION

Be careful that the inlet and outlet pipe are not bent during heater core removal, and pull out the heater core.

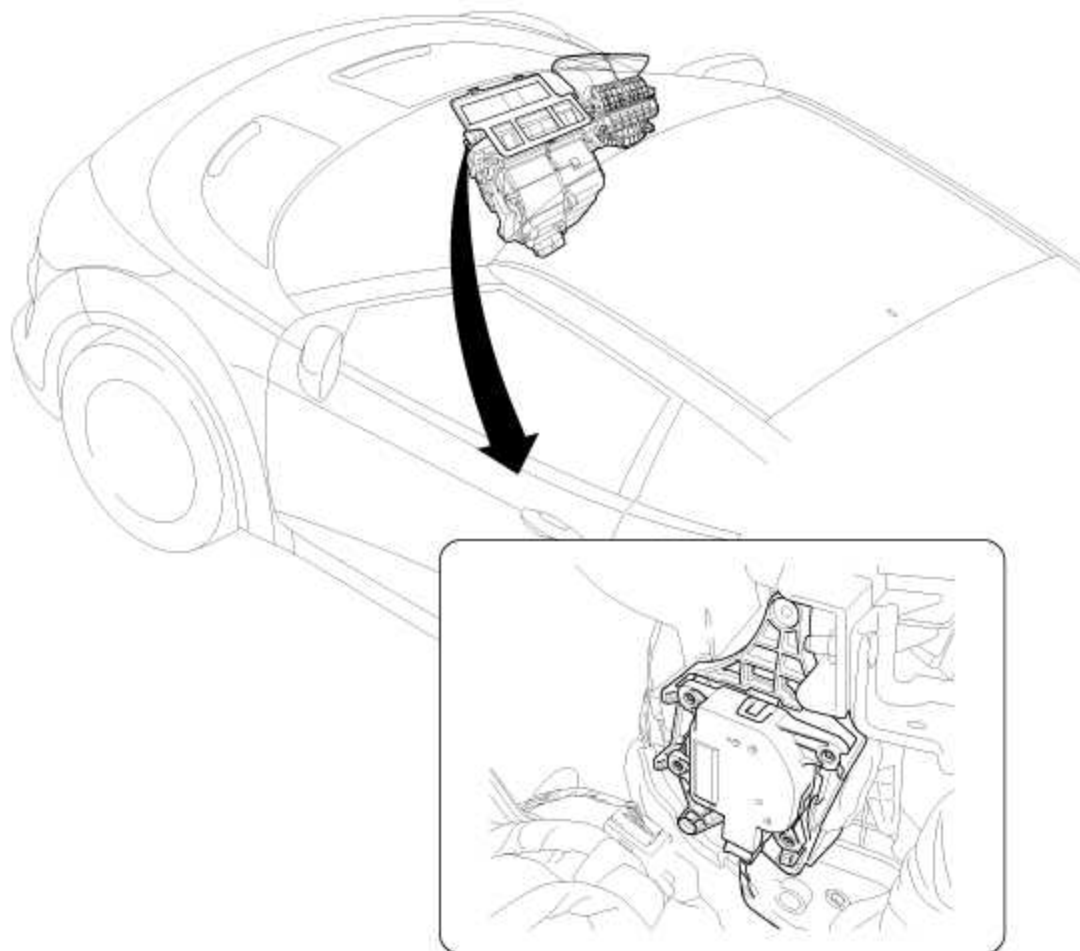
25. Installation is the reverse order of removal.

NOTE

- If you're installing a new evaporator, add refrigerant oil (PAG OIL).
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a to avoid leakage.
- Immediately after using the oil, replace the cap on the container, and seal it to avoid moisture absorption.
- Do not spill the refrigerant oil on the vehicle ; it may damage the paint ; if the refrigerant oil contacts the paint, wash it off immediately
- Apply sealant to the grommets.
- Make sure that there is no air leakage.
- Charge the system and test its performance.
- Do not interchange the inlet and outlet heater hoses and install the hose clamps securely.
- Refill the cooling system with engine coolant

**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air
Conditioning > Heater > Mode Control Actuator > Components and Components Location**

Component Location



Mode control actuator

**VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air
Conditioning > Heater > Mode Control Actuator > Description and Operation****Description**

The mode control actuator is located at the heater unit.

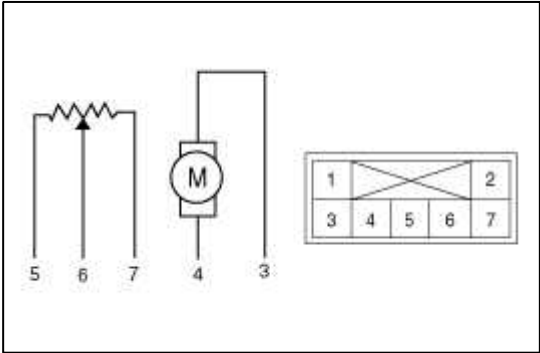
It adjusts position of mode door by operating mode control actuator based on signal of A/C control unit. Pressing mode select switch makes the mode control actuator shift in order of vent → B/L → floor → mix.

C:\Users\ej20\Desktop\velos13\1.6T\Heating, Ventilation, Air Conditioning\Heater\Mode Control
Actuator - Description and Operation.mht 2012-10-15

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Heater > Mode Control Actuator > Repair procedures

Inspection

- 1. Ignition "OFF"
- 2. Disconnect the connector of mode control actuator.
- 3. Verify that the mode control actuator operates to the defrost mode when connecting 12V to the terminal 3 and grounding terminal 4.
- 4. Verify that the mode control actuator operates to the vent mode when connecting in the reverse.



1. -	5. Sensor ground
2. -	6. Feedback signal
3. Defrost mode	7. Sensor (+5V)
4. Vent mode	

- 5. Check the voltage between terminals 6 and 5.

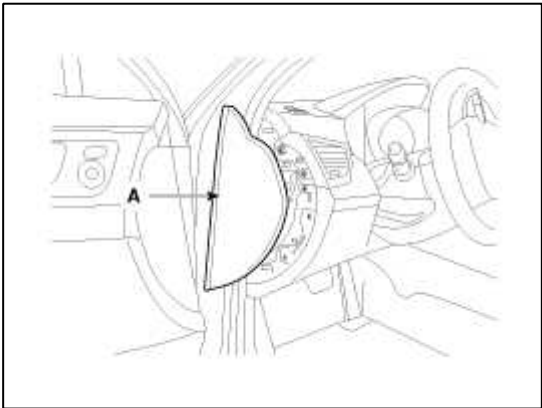
Door position	Voltage (6-5)	Error detecting
Vent	0.45 ± 0.15V	Low voltage : 0.1V or less
Bi-Level	1.4 ± 0.15V	
Floor	2.45 ± 0.15V	
Mix	3.5 ± 0.15V	
Defrost	4.55 ± 0.15V	High voltage : 4.9V or more

It will feedback current position of actuator to controls.

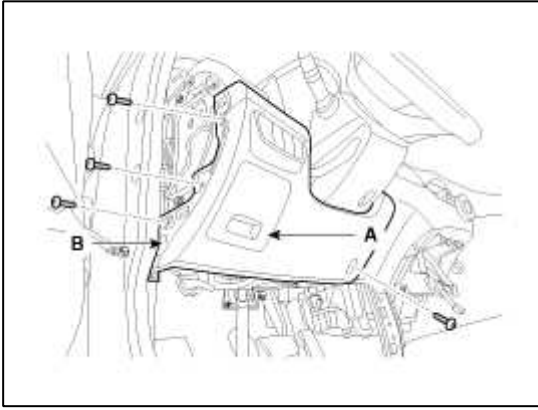
- 6. If the measured voltage is not specification, substitute with a known-good mode control actuator and check for proper operation.
- 7. If the problem is corrected, replace the mode control actuator.

Replacement

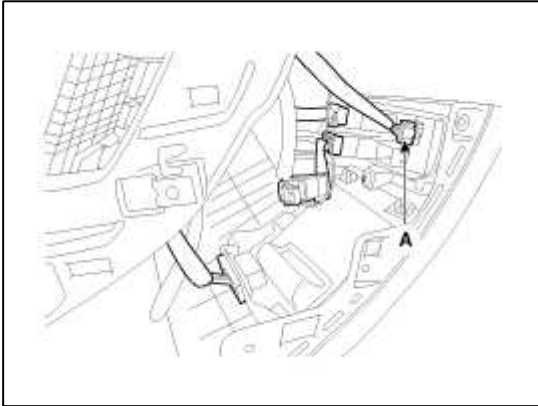
- 1. Disconnect the negative (-) battery terminal.
- 2. Remove the side cover (A).



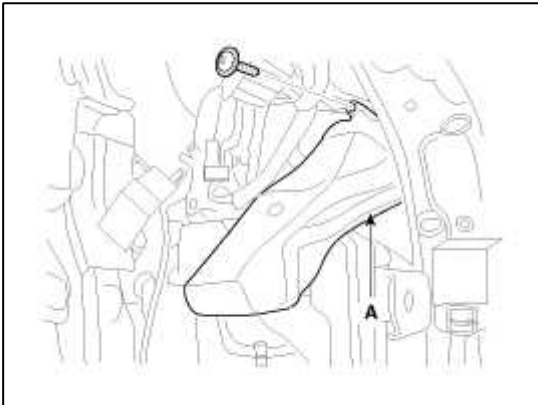
3. Remove the fuse box cover (A) and loosen the mounting screws and then remove the crash pad lower cover (B).



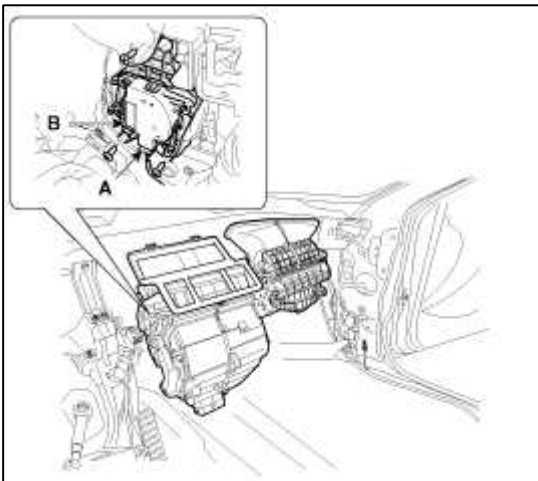
4. Disconnect the diagnosis connector (A).



5. Remove the shower duct (A).



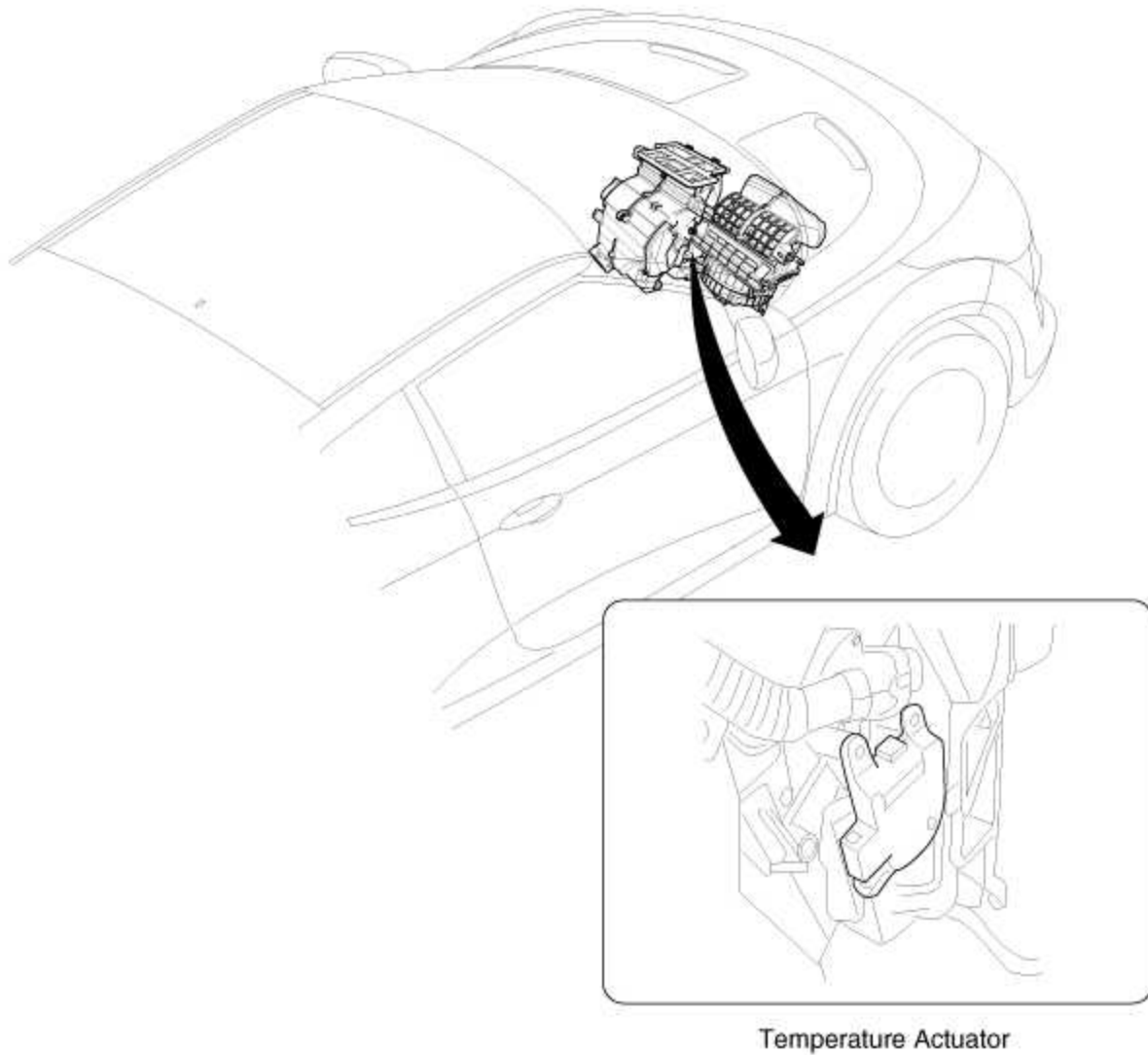
6. Disconnect the temperature control actuator connector (A) and loosen the mounting screws and then remove the temperature control actuator (B).



7. Installation is the reverse order of removal.

**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air
Conditioning > Heater > Temperature Control Actuator > Components and Components
Location**

Component Location



**VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air
Conditioning > Heater > Temperature Control Actuator > Description and Operation****Description**

Temperature control actuator is located at the heater unit. It regulates the temperature by the procedure as follows. Signal from control unit adjusts position of temperature door by operating temperature switch and then temperature will be regulated by the hot/cold air ratio decided by position of temperature door

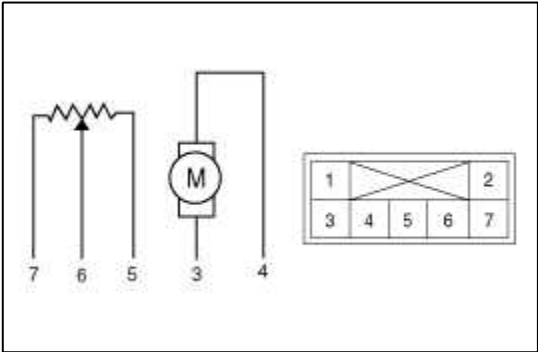
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Control Actuator - Description and Operation.mht

2012-
10-15

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Heater > Temperature Control Actuator > Repair procedures

Inspection

- 1. Ignition "OFF"
 - 2. Disconnect the connector of temperature control actuator.
 - 3. Verify that the temperature control actuator operates to the hot position when connecting 12V to the terminal 4 and grounding terminal 3
- Verify that the temperature control actuator operates to the cool position when connecting in the reverse.



1. -	5. Sensor (+5V)
2. -	6. Feedback signal
3. Cool position	7. Sensor ground
4. Hot position	

- 4. Check the voltage between terminals 6 and 7.

Specification

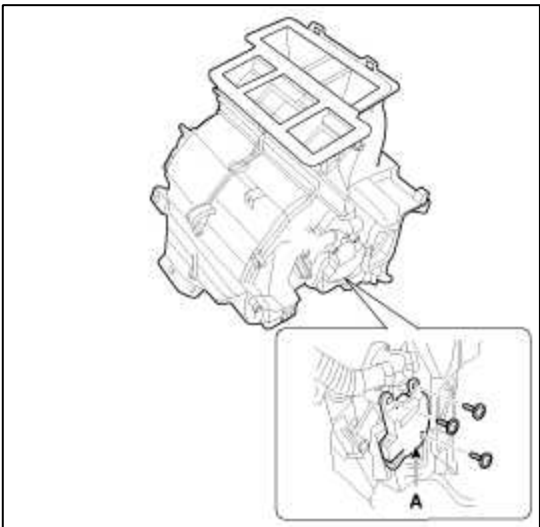
Door position	Voltage (6-7)	Error detecting
Max. cooling	0.45 ± 0.15V	Low voltage : 0.1V or less
Max. heating	4.55 ± 0.15V	High voltage : 4.9V or more

It will feedback current position of actuator to controls.

- 5. If the measured voltage is not specification, substitute with a known-good temperature control actuator and check for proper operation.
- 6. If the problem is corrected, replace the temperature control actuator.

Replacement

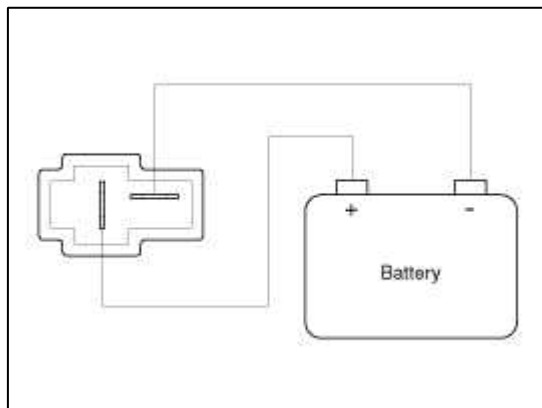
- 1. Disconnect the negative (-) battery terminal.
- 2. Remove the heater & blower unit.
(Refer to HA group - "Heater Unit")
- 3. Remove the heater unit from the blower unit.
(Refer to HA group - "Heater Unit")
- 4. Loosen the mounting screws and then remove the temperature control actuator (A).



VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Blower > Blower Motor > Repair procedures

Inspection

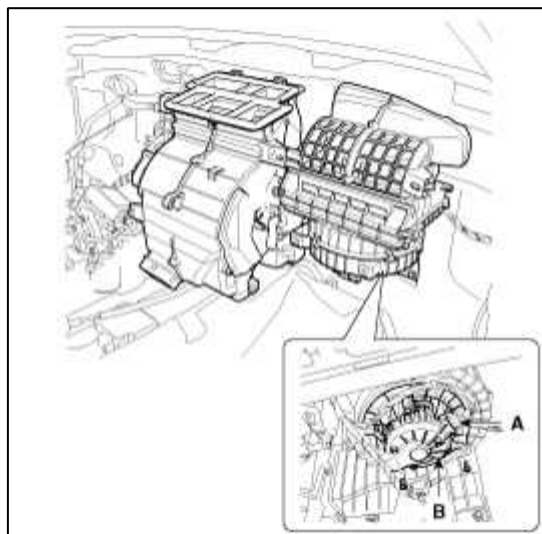
1. Connect the battery voltage and check the blower motor rotation.



2. If the blower motor voltage is not operated well, substitute with a known-good blower motor and check for proper operation.
3. If the problem is corrected, replace the blower motor.

Replacement

1. Disconnect the negative (-) battery terminal.
2. Disconnect the connector (A) of the blower motor.
3. Remove the blower motor (B) after loosening the mounting screws.

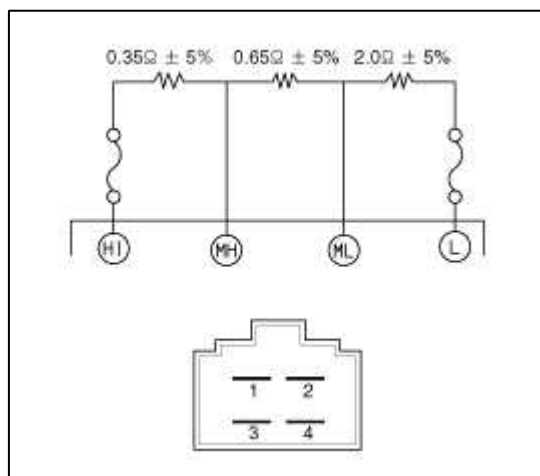


4. Installation is the reverse order of removal.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Blower > Blower Resistor > Repair procedures

Inspection

1. Measure terminal-to-terminal resistance of the blower resistor.
2. measured resistance is not within specification, the blower resistor must be replaced. (After removing the resistor)

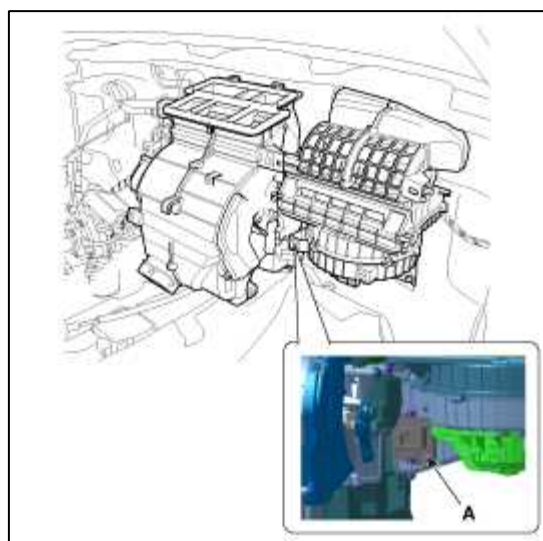


1. ML
2. MH

3. LO
4. HI

Replacement

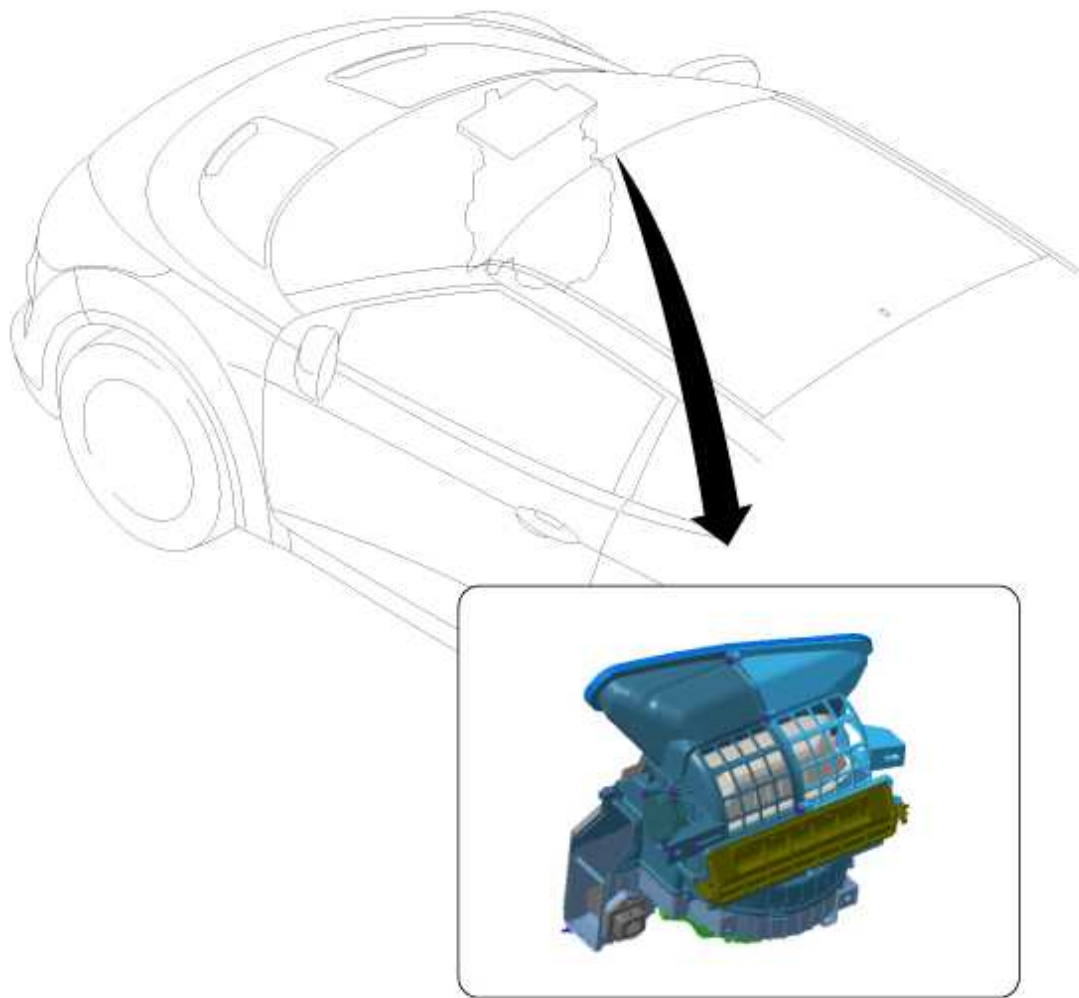
1. Disconnect the negative (-) battery terminal.
2. Disconnect the blower resistor connector and then remove the blower resistor (A) after loosening the mounting screws.



3. Installation is the reverse order of removal.

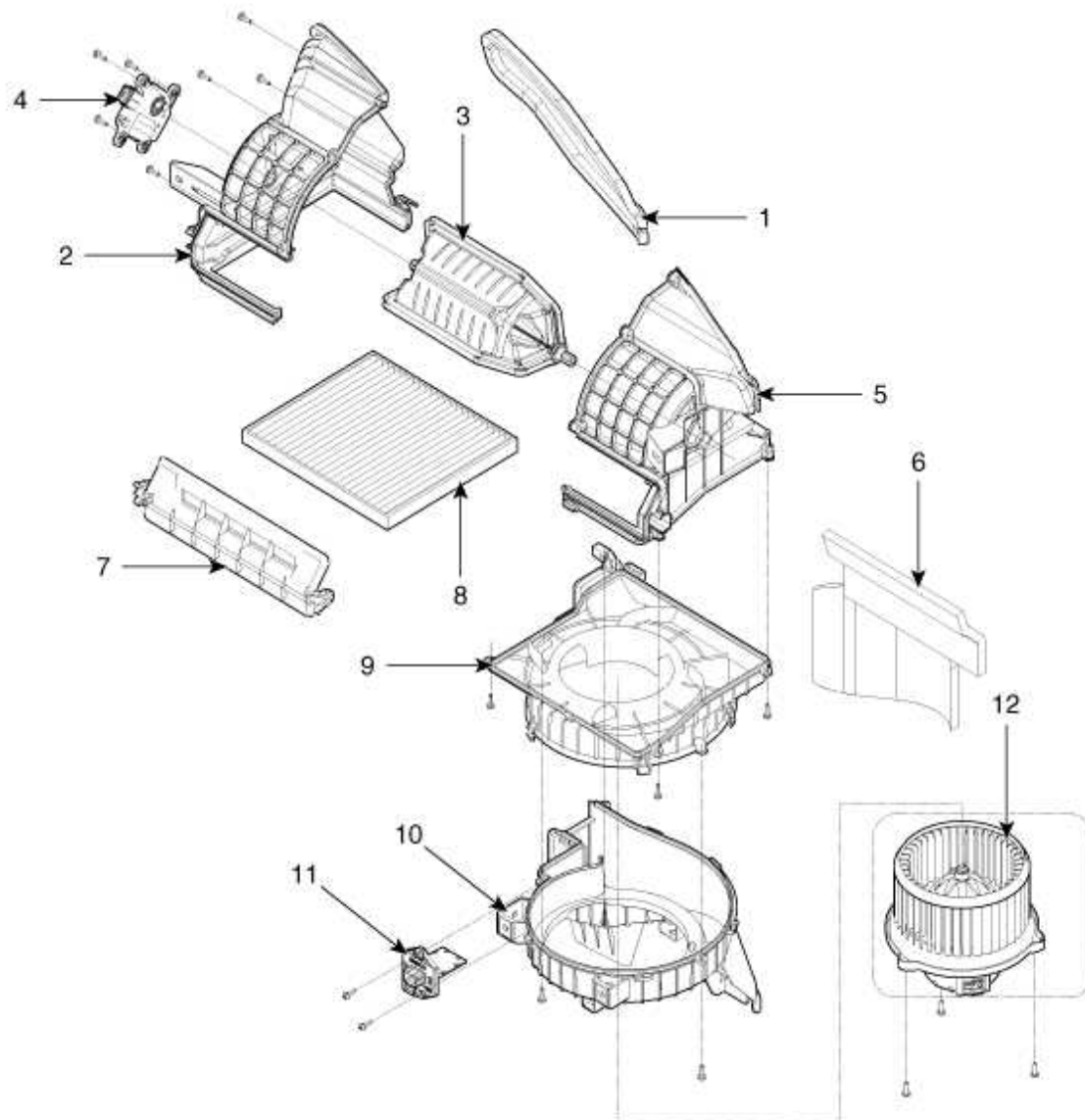
**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air
Conditioning > Blower > Blower Unit > Components and Components Location**

Component Location



Blower Unit

Components

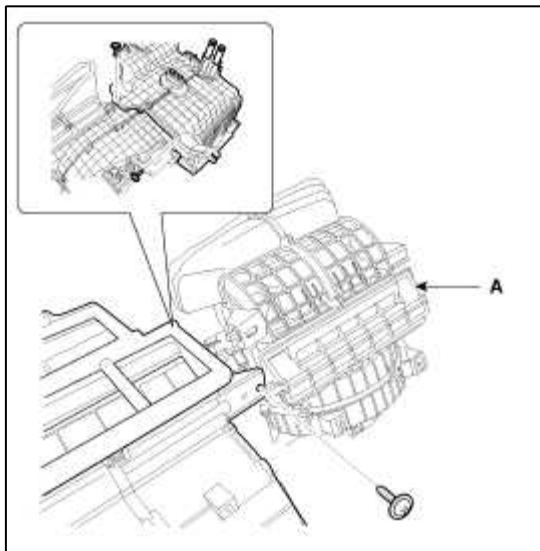


- | | |
|---------------------|-------------------------------------|
| 1. Blower Seal | 7. Climate Control Air Filter Cover |
| 2. Intake Case [LH] | 8. Climate Control Air Filter |
| 3. Intake Door | 9. Upper Blower Case |
| 4. Intake Actuator | 10. Lower Blower Case |
| 5. Intake Case [RH] | 11. Blower Resistor |
| 6. NVH Pad | 12. Blower Motor |

**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air
Conditioning > Blower > Blower Unit > Repair procedures**

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the heater & blower unit.
(Refer to HA group - "Heater Unit")
3. Remove the blower unit (A) from the heater unit after loosening a mounting screws.



NOTE

Make sure that there is no air leaking out of the blower and duct joints

4. Installation is the reverse order of removal.

**VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air
Conditioning > Blower > Climate Control Air Filter > Description and Operation****Description**

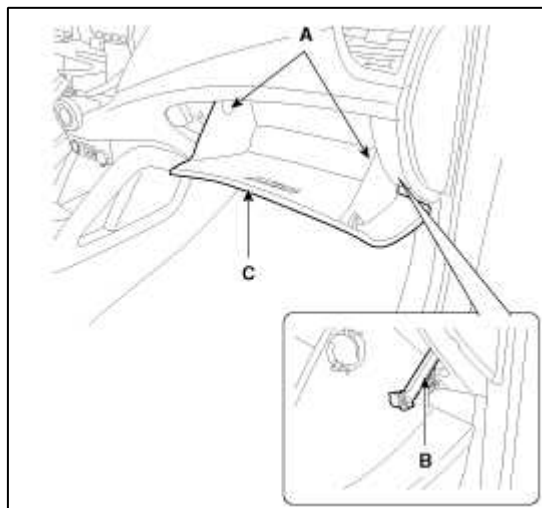
The particle filter eliminates foreign materials and odor. The particle filter includes odor filter as well as conventional dust filter to ensure comfortable interior environment.

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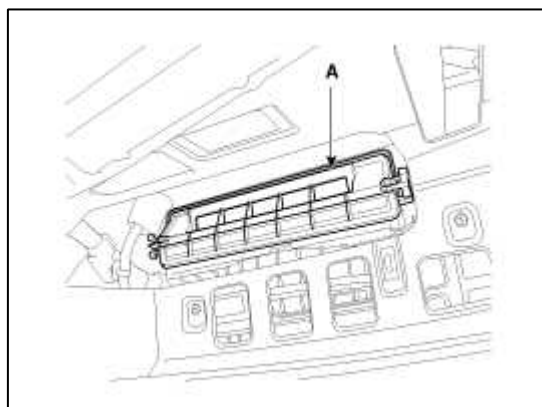
VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Blower > Climate Control Air Filter > Repair procedures

Replacement

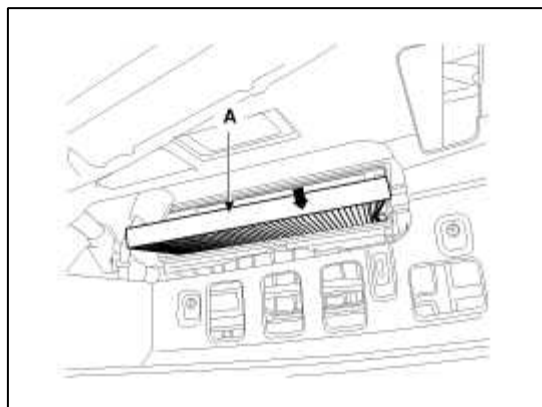
1. Remove the stopper (A) from the glove box (C) and then disconnect the glove box lift rod (B).



2. Remove the filter cover (A) with pushing the knob.



3. Replace the air filter (A) after making sure of the direction of air filter.



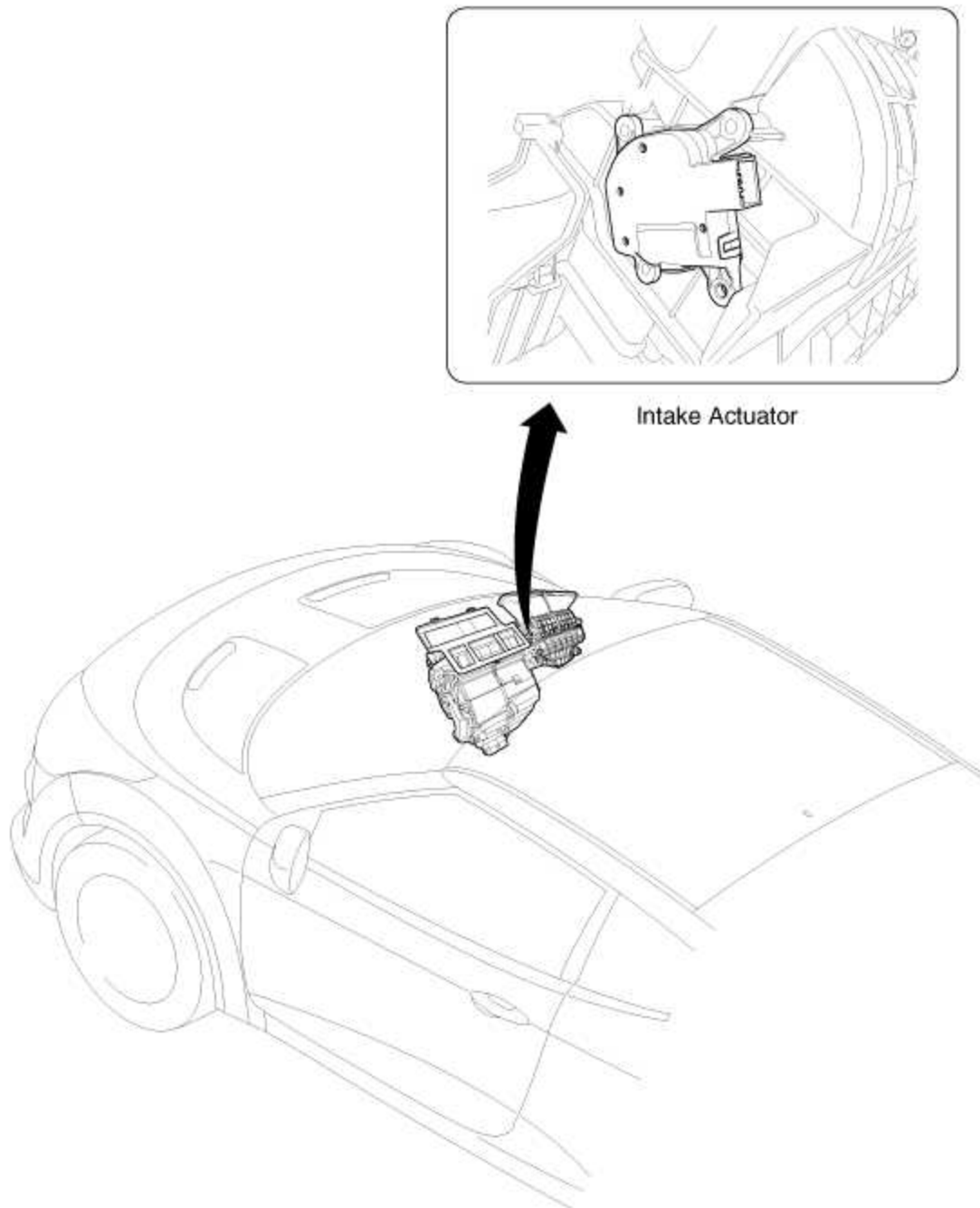
NOTE

In case of driving in an air-polluted area or rugged terrain, check and replace the air filter as frequently as possible.

4. Installation is the reverse order of removal.

**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air
Conditioning > Blower > Intake Actuator > Components and Components Location**

Component Location



**VELOSTER(FS) > 2013 > G 1.6 T-GDI > Heating, Ventilation, Air
Conditioning > Blower > Intake Actuator > Description and Operation**

Description

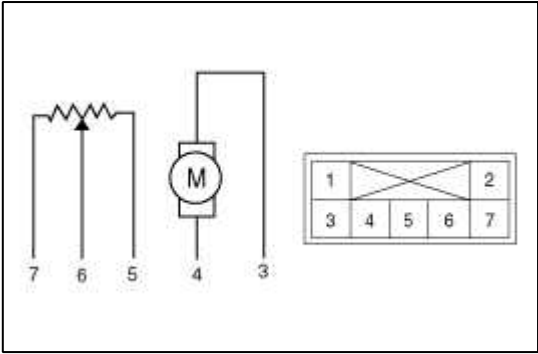
1. The intake actuator is located at the blower unit.
2. It regulates the intake door by signal from control unit.
3. Pressing the intake selection switch will shift between recirculation and fresh air modes.

C:\Users\ej20\Desktop\velos13\1.6T\Heating, Ventilation, Air Conditioning\Blower\Intake Actuator 2012-10-
- Description and Operation.mht 15

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Blower > Intake Actuator > Repair procedures

Inspection

- 1. Ignition "OFF"
- 2. Disconnect the intake actuator connector.
- 3. Verify that the actuator operates to the fresh position when connecting 12V to the terminal 3 and grounding terminal 4.
- 4. Verify that the intake actuator operates to the recirculation position when connecting in the reverse.



1. -	5. Sensor (+5V)
2. -	6. Feedback Signal
3. Fresh	7. Sensor Ground
4. Recirculation	

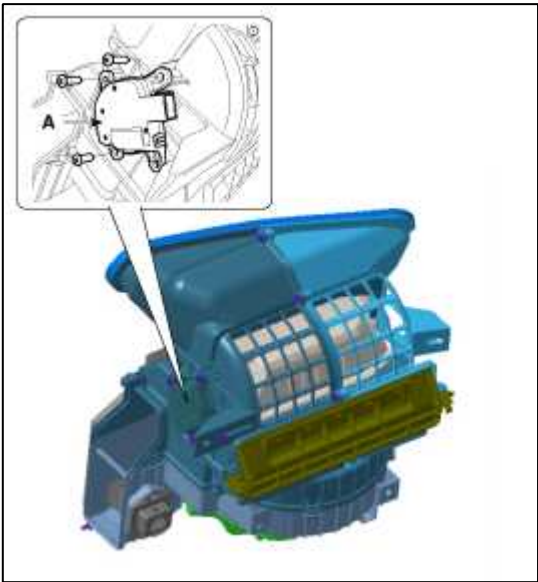
- 5. Check the voltage between terminals 6 and 7.

Door position	Voltage (6-7)	Error detecting
Recirculation	4.55 ± 0.15V	Low voltage : 4.9V or less
Fresh	0.45 ± 0.15V	High voltage : 0.1V or more

- 6. If the intake actuator is not operated well, substitute with a known-good intake actuator and check for proper operation.
- 7. If the problem is corrected, replace the intake actuator.

Replacement

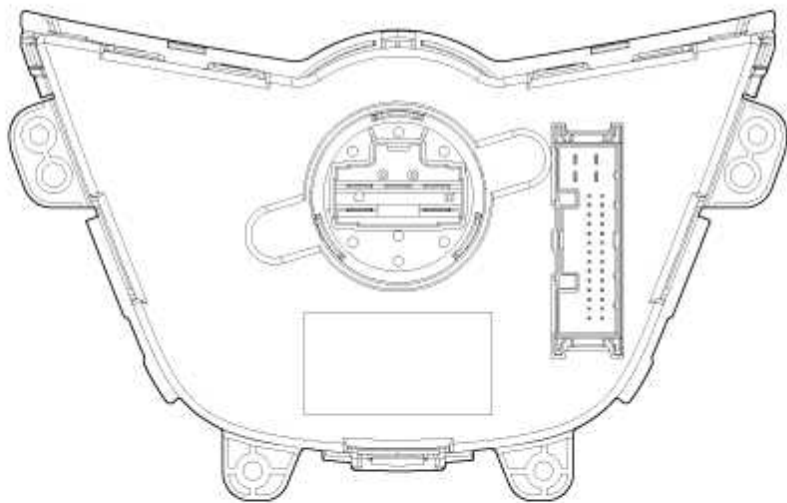
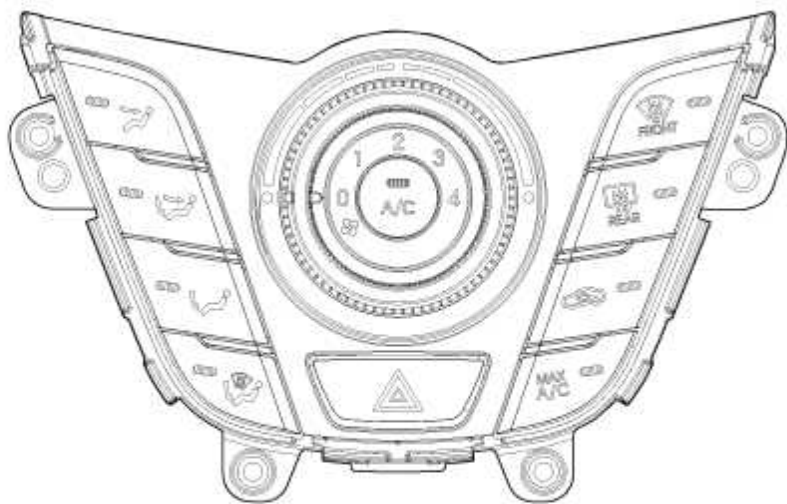
- 1. Disconnect the negative (-) battery terminal.
- 2. Remove the heater & blower unit.
(Refer to HA group - "Heater Unit")
- 3. Loosen the mounting screws and then remove the intake actuator (A).



- 4. Installation is the reverse order of removal.

VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air Conditioning > Controller > Heater & A/C Control Unit (Manual) > Components and Components Location

Components



A1	A2	A3
A4	A5	A6

B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16
B17	B18	B19	B20	B21	B22	B23	B24	B25	B26	B27	B28	B29	B30	B31	B32

Connector pin function

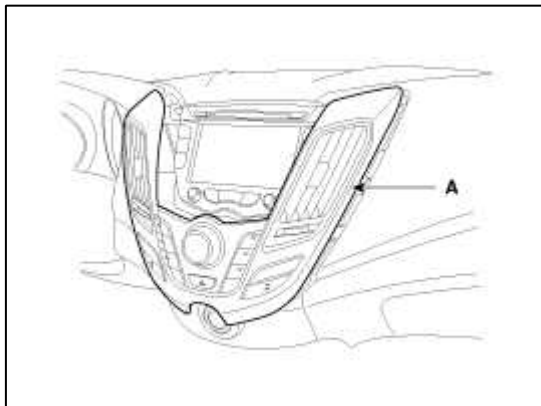
Connector	Pin No	Function	Connector	Pin No	Function
	1	High		1	Tail Lamp (ILL+)
	2	Middle High		2	Battery
	3	Middle Low		3	Mode Actuator (VENT)
	4	Low		4	Mode Actuator (DEF)
	5	-		5	Temp Actuator (COOL)

A	6	GND	B	6	Temp Actuator (WARM)
				7	Intake Actuator (FRE)
				8	Intake Actuator (REC)
				9	-
				10	Detent Out (+)
				11	Mode Actuator (F/B)
				12	Temp Actuator (F/B)
				13	Intake Actuator (F/B)
				14	Blower Motor Common (-)
				15	Blower F/B
				16	Rheostat (ILL -)
				17	IGN2
				18	Hazard Signal
				19	-
				20	-
				21	HTD (RR-DEF Indicator)
				22	A/C Select Signal (HIGH)
				23	A/C Output Signal (HIGH)
				24	RR DEF S/W
				25	Vref (+5V)
				26	Evaporator Sensor
				27	-
				28	-
				29	-
				30	Speed Signal
				31	Sensor GND
				32	GND

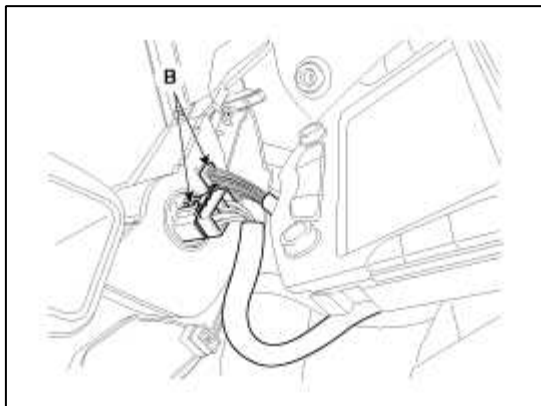
**VELOSTER(FS) >2013 > G 1.6 T-GDI > Heating,Ventilation, Air
Conditioning > Controller > Heater & A/C Control Unit (Manual) > Repair procedures**

Replacement

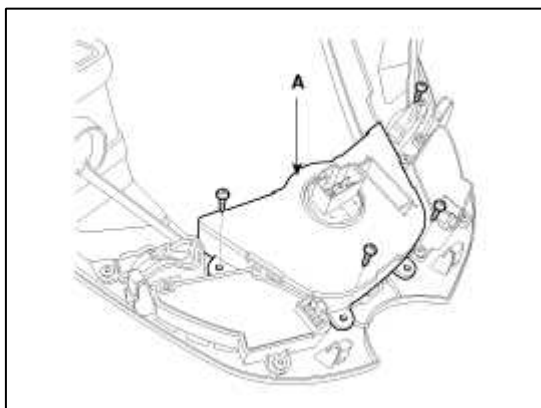
1. Disconnect the negative (-) battery terminal.
2. Using the screwdriver, remove the center fascia panel (A).



3. Disconnect the center fascia cover panel connectors (A).



4. After loosening the mounting screws, remove the controller (A).



5. Installation is the reverse order of removal.