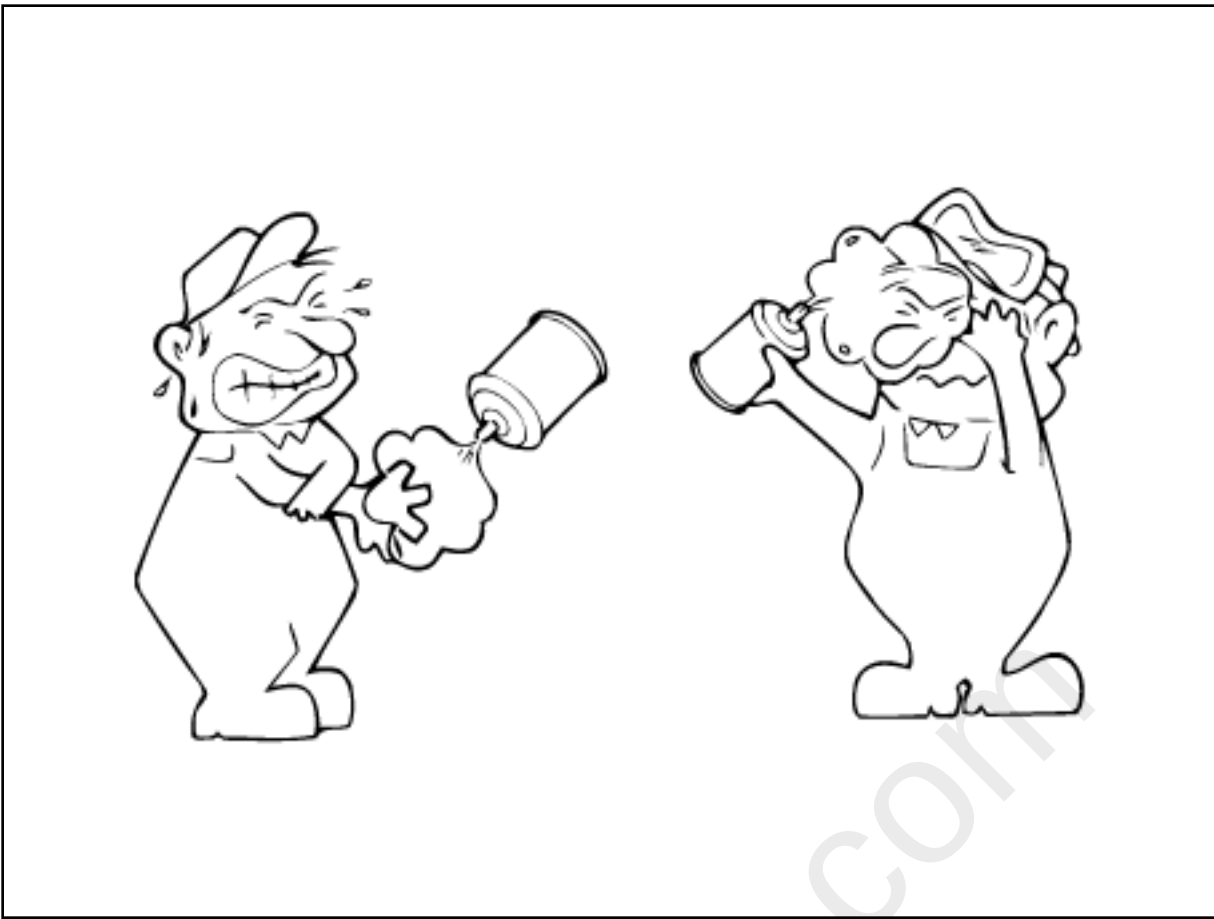


Instructions (R-134a)

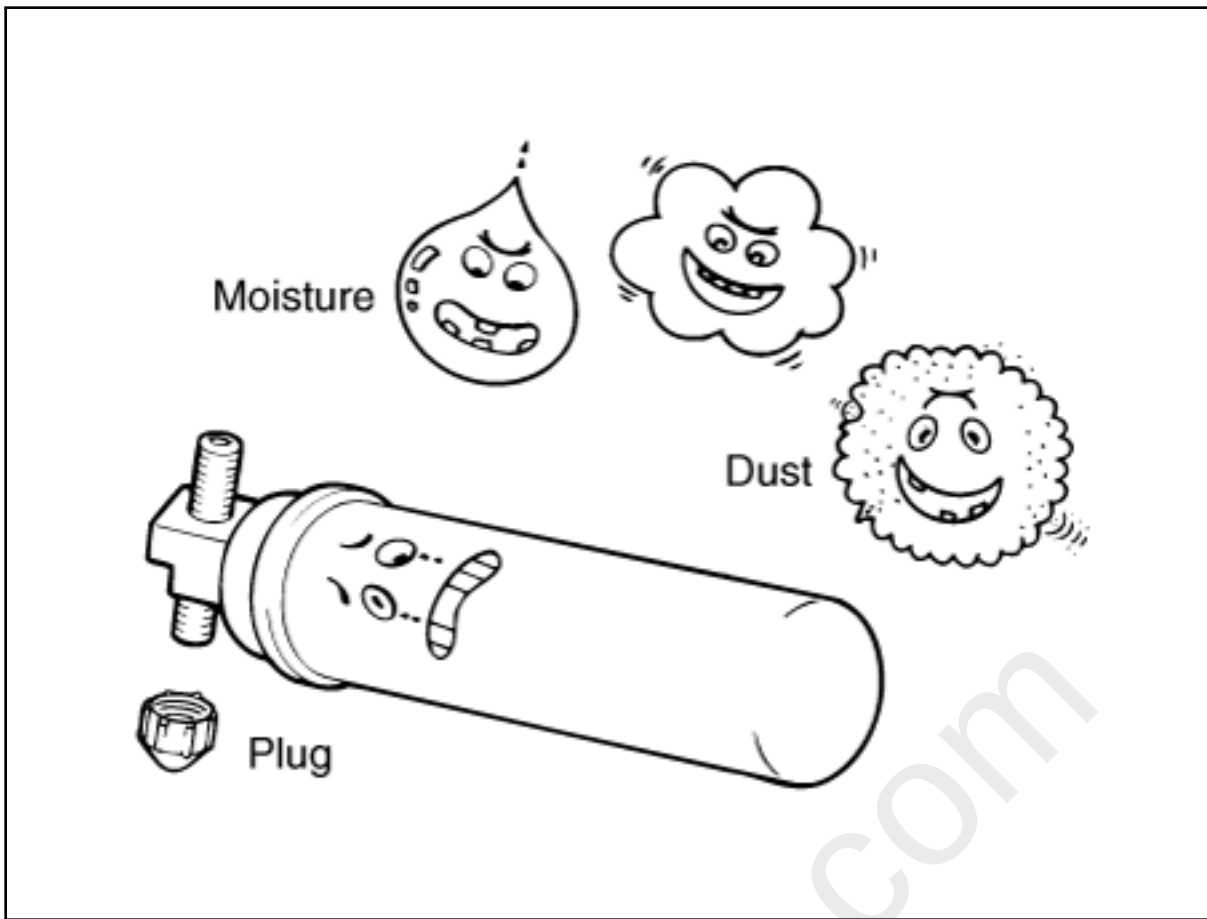
When Handling Refrigerant

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 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 if 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:
 - When removing refrigerant components from a vehicle, cap the components immediately to prevent entry of moisture.
 - When installing refrigerant components to a vehicle, do not remove the cap until just before connecting the components.
 - Complete the connection of all refrigerant tubes and hoses without delay to prevent the A/C system from taking on moisture.
 - 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

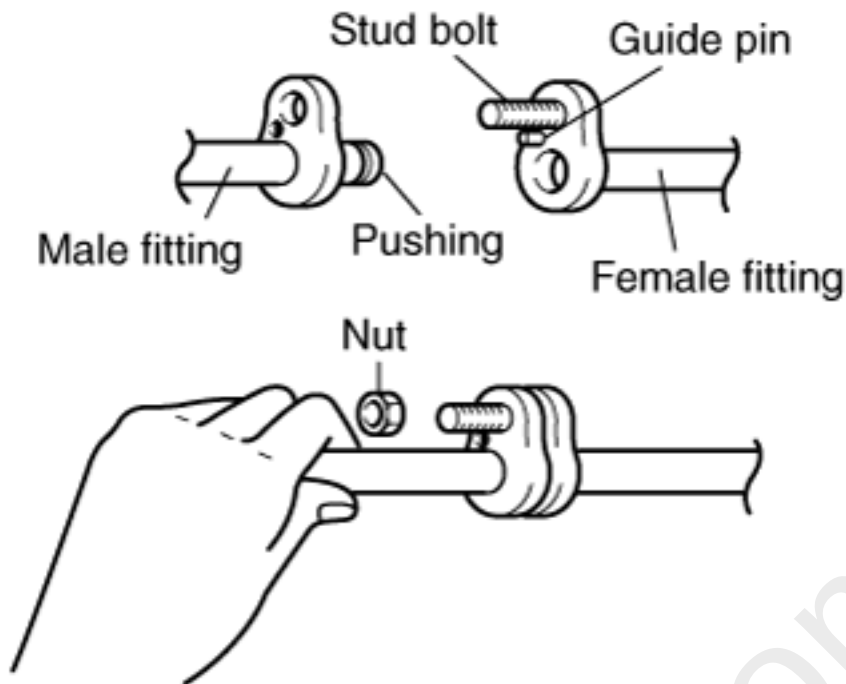
1. Never open or loosen a connection before discharging the system.
2. Seal the open fittings of components with a cap or plug immediately to prevent intrusion of moisture or dust.
3. Do not remove the sealing caps from a replacement component until it is ready to be installed.
4. Before connecting an 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 the specified torque.



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 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 refrigerant dispensing manifold, gauge set manifold and test hoses, should be kept clean and dry.

Instructions (R-
1234yf)



- The R-1234yf liquid refrigerant is a flammable gas. The gas reduces oxygen available for breathing and causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating.
- Inhalation may cause central nervous system effects and may cause drowsiness and dizziness.
- Ingestion may cause gastrointestinal discomfort. It may cause skin irritation, eye irritation and respiratory tract irritation. Do not breathe vapour. Avoid contact with skin, eyes and clothing.



In case of emergency, the following precautions must be observed; First aider needs to protect himself. Take off all contaminated clothing immediately.

- Inhalation : Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician.
- Skin contact : After contact with skin, wash immediately with plenty of water. Rapid evaporation of the liquid may cause frostbite. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Call a physician. Wash contaminated clothing before re-use.
- Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. Call a physician.
- Ingestion : Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. If conscious, drink plenty of water. Never give anything by mouth to an unconscious person. Call a physician immediately.



When handling refrigerant, the following precautions must be observed :

- Handle with care.
- Wear personal protective equipment.
- Do not breathe vapour.
- Avoid contact with skin, eyes and clothing.
- Ensure that eyewash stations and safety showers are close to the workstation location.
- Use only in well-ventilated areas.
- Protect from sunlight and do not expose to temperatures exceeding 52°C (125°F).
- Follow all standard safety precautions for handling and use of compressed gas cylinders.
- Use authorized cylinders only.
- Protect cylinders from physical damage.
- Do not puncture or drop cylinders, expose them to open flame or excessive heat.
- Do not remove screw cap until immediately ready for use.
- Always replace cap after use.
- Container is hazardous when empty.

- Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits.
- Keep product and empty container away from heat and sources of ignition.
- Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
- Take measures to prevent the build up of electrostatic charge.
- Electrical equipment should be protected to the appropriate standard.
- Use explosion-proof equipment.
- No sparking tools should be used.
- No smoking.



- When storing the refrigerant, the following precautions must be observed :
- Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 52°C (125°F). Do not pierce or burn, even after use.
- Keep containers tightly closed in a dry, cool and well-ventilated place.
- Keep away from heat and sources of ignition.
- Storage rooms must be properly ventilated.
- Ensure adequate ventilation, especially in confined areas.
- Protect cylinders from physical damage.
- Store away from incompatible substances.
- Store in original container.



- Un-controlled release of R-1234yf refrigerant in the work area may result in high concentrations of R-1234yf that can be flammable. Servicing of R-1234yf systems shall only be done in well ventilated work areas.
- When servicing, maintaining or repairing A/C systems using flammable refrigerants (mildly flammable or higher) the work place shall meet all applicable national, regional or local regulations for work place safety as related to high pressure or flammable gases.



- Avoid breathing any refrigerant vapor and lubricant mist. To remove refrigerant from a A/C system, use service equipment designed for recovery and removal that is certified to meet the requirements of the appropriate SAE Standards.
- Do not increase pressure, in any R-134a, or R-1234yf mobile A/C system with shop air or another refrigerant such as HCFC-22 (R-22) for leak checking, due to potential chemical reactions, flammability of air/R-134a at elevated pressure, contamination of the system, and possible structural damage to the system.
- To prevent an accumulation of refrigerant in case of a major refrigerant leak, open vehicle windows and doors when charging an A/C system
- To prevent accidental release of refrigerant and minimize safety concerns, the installation of any refrigerant service equipment to the vehicle shall only be done with the engine off and after the refrigerant high side pressure has been reduced (approximately 2 to 3 min).



- The proper handling procedures should be followed for all refrigerants as designated by the refrigerant manufacturer's Material Safety Data Sheet (MSDS).
- Service personnel shall be aware of the high pressure relief valve location when servicing the vehicle. Service personnel shall not be under the vehicle when charging the refrigerant system due to potential sudden release of the high pressure relief valve.

When Handling Refrigerant

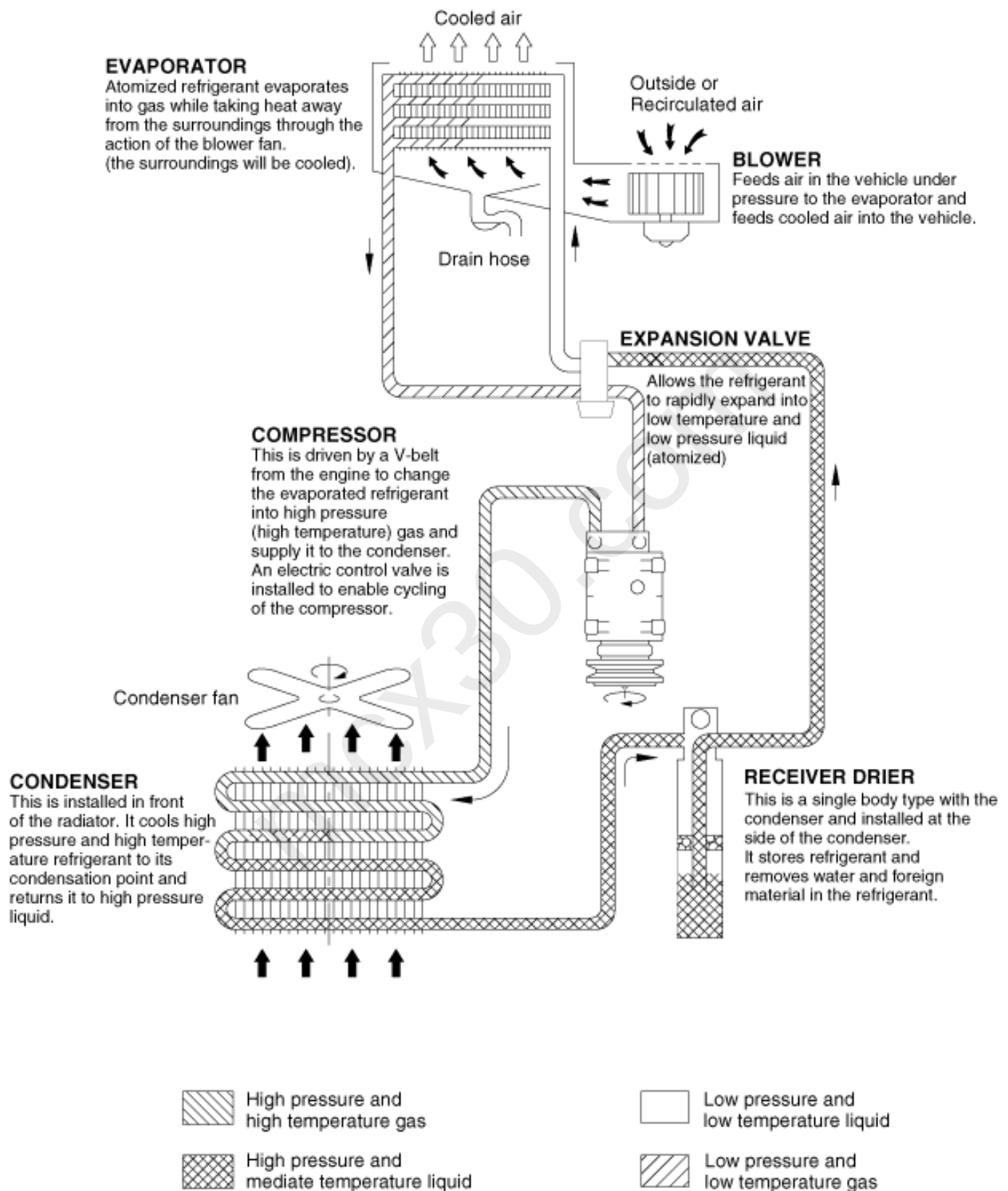


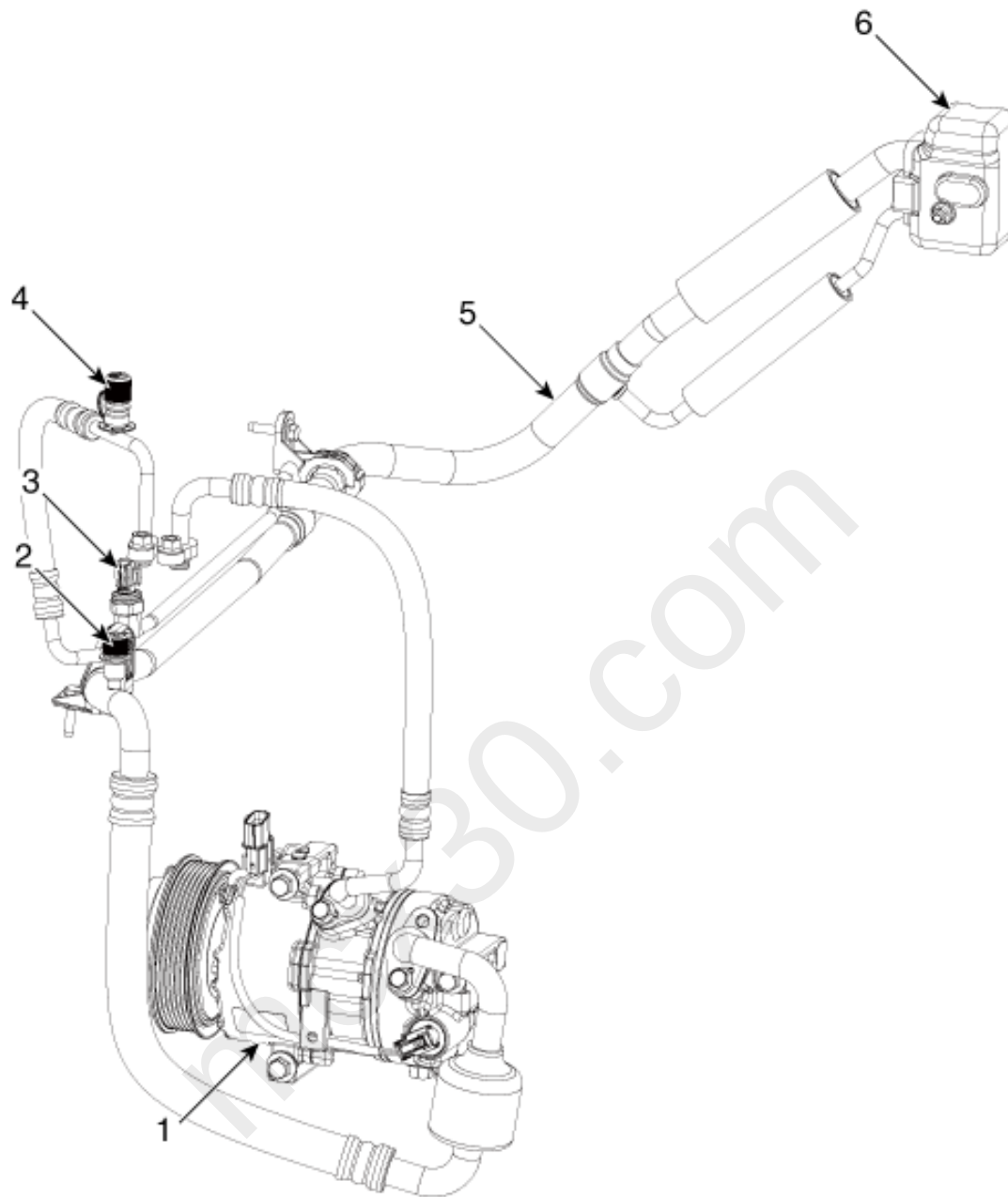
- Some of the practices, techniques and procedures, as well as the information, tools and equipment which have been commonly used in mobile air conditioning system diagnosis and service of R-12 and R-134a are different for A/C systems using R-1234yf. Modifications and adjustments have to be made based on the individual characteristics of each refrigerant. No technician may perform service or repair on a mobile air conditioning system using R-1234yf without being trained for the refrigerant being handled. Under the SAE Standard J2845 the refrigerant system should only be serviced by trained and certified technicians to insure proper and safe operation.
- Service technicians should always wear proper personal protective equipment while handling/ servicing systems that contain any refrigerant.
- Service technicians shall read and follow the appropriate Material Safety Data Sheets (MSDS), which provide information on safety and the proper personal protective equipment to use.
 - All contact with liquid or gaseous refrigerant shall be avoided.
 - Goggles with side protection and gloves (insulated against heat loss and impermeable to refrigerant) shall be worn while working with the refrigerant circuit.
 - Exposure of the skin to refrigerant may result in frostbite, in which case rub affected area with lukewarm water. A physician shall be consulted immediately regarding the affected skin areas.

- A physician shall be consulted immediately in the event of complaints following exposure to high refrigerant concentrations. Complaint symptoms may include: increased breathing rate, breathlessness, headache, accelerated pulse, dizziness.
- Avoid breathing A/C refrigerant and lubricant vapor or mist. To remove refrigerant from the A/C system, use service equipment designed for recovery of that refrigerant which is certified to meet the requirements of the appropriate SAE Standards.

1. R-1234yf 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-1234yf container is highly pressurized. Never leave it in a hot place, and check storage temperature is below 52°C (125°F).
4. An electronic leak detector should be used to check the system for refrigerant leakage. Bear in mind that the R-1234yf, upon coming into contact with flame, produces phosgene, a highly toxic gas.
5. Use only recommended lubricant for R-1234yf 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 :
 - When removing refrigerant components from a vehicle, cap the components immediately to prevent entry of moisture.
 - When installing refrigerant components to a vehicle, do not remove the cap until just before connecting the components.
 - Complete the connection of all refrigerant tubes and hoses without delay to prevent the A/C system from taking on moisture.
 - 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.
8. Clean all dirt, grease and debris from and around connection joints before servicing and disassembly of refrigerant connections.

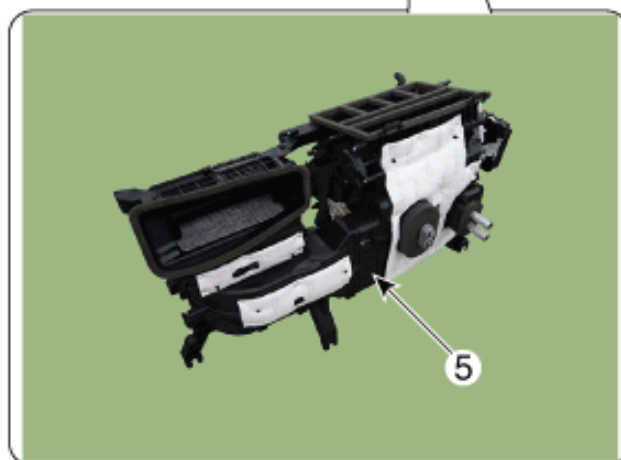
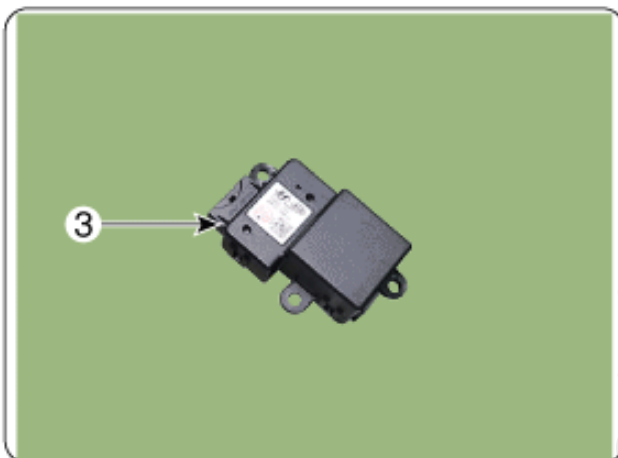
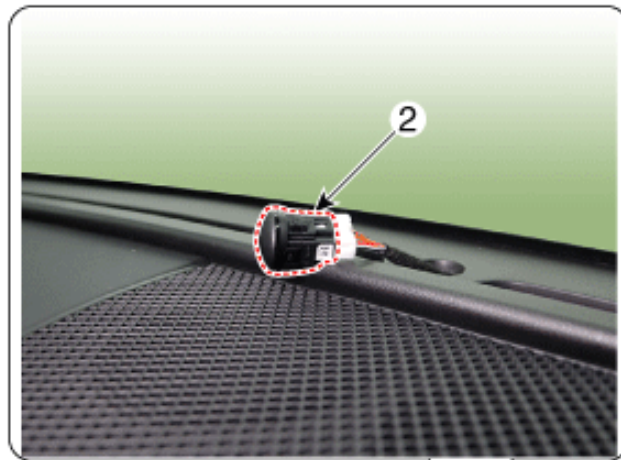
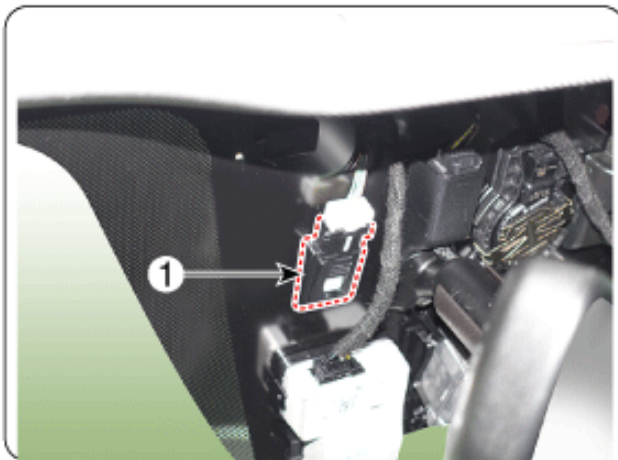
Refrigeration Cycle





- 1. Compressor
- 2. Service port (Low pressure)
- 3. A/C pressure transducer (APT)

- 4. Service port (High pressure)
- 5. Suction & Liquid pipe assembly
- 6. Expansion valve cover



1. Auto defogging sensor
2. Photo sensor
3. PM sensor

4. Heater & A/C control unit
5. Heater & Blower unit

Refrigerant System Service Basics (R-134a)

Refrigerant Recovery

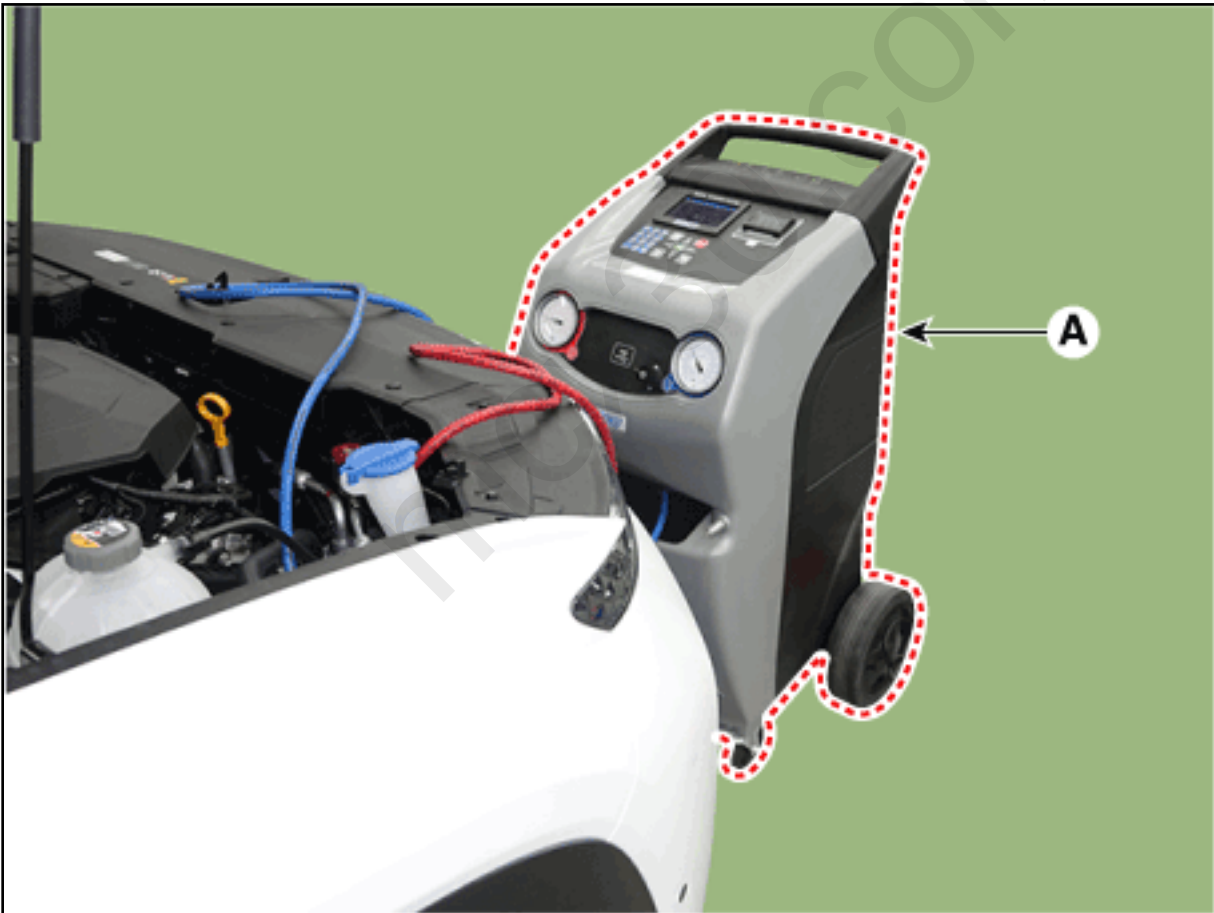
Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a(R-134a) from the air conditioning system.

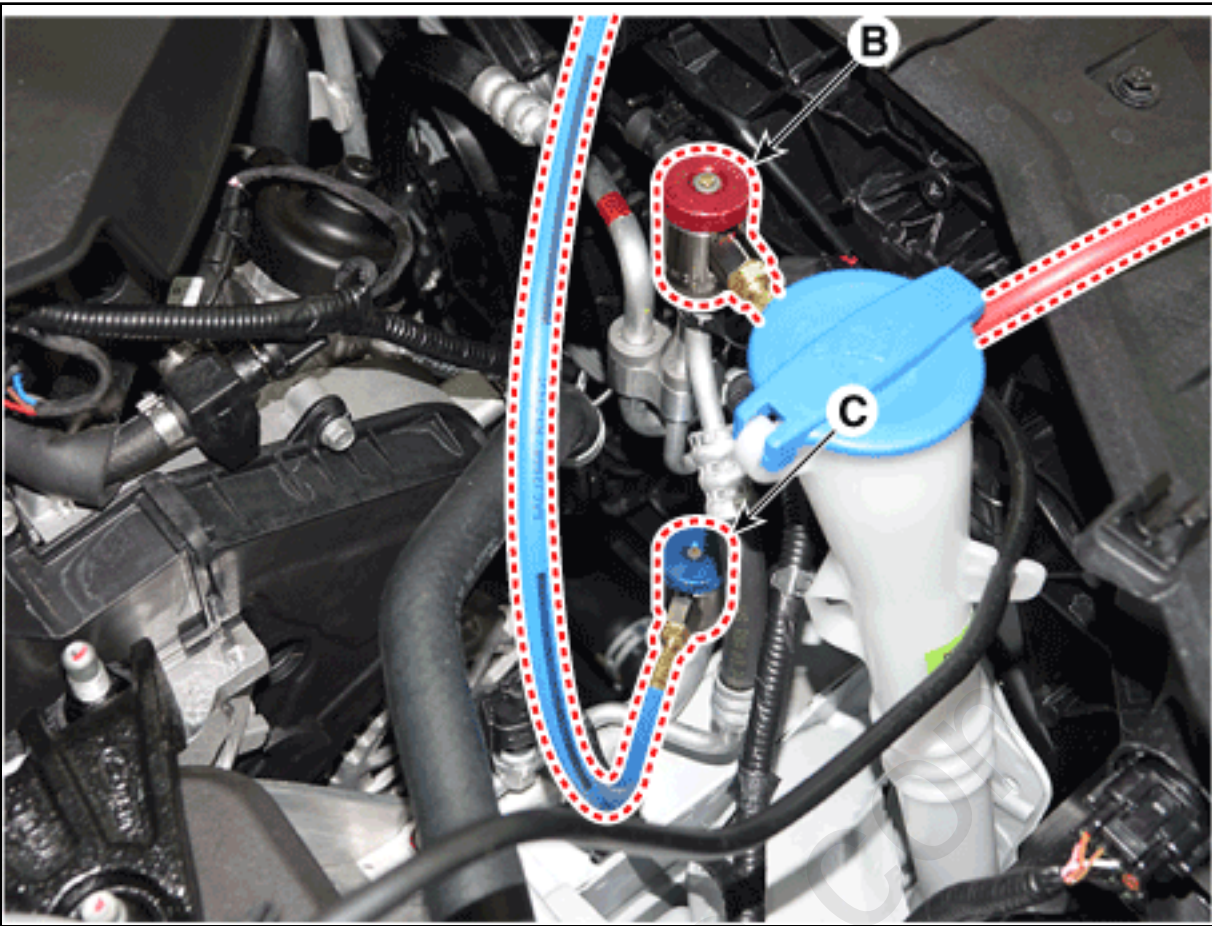


- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate the 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





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.



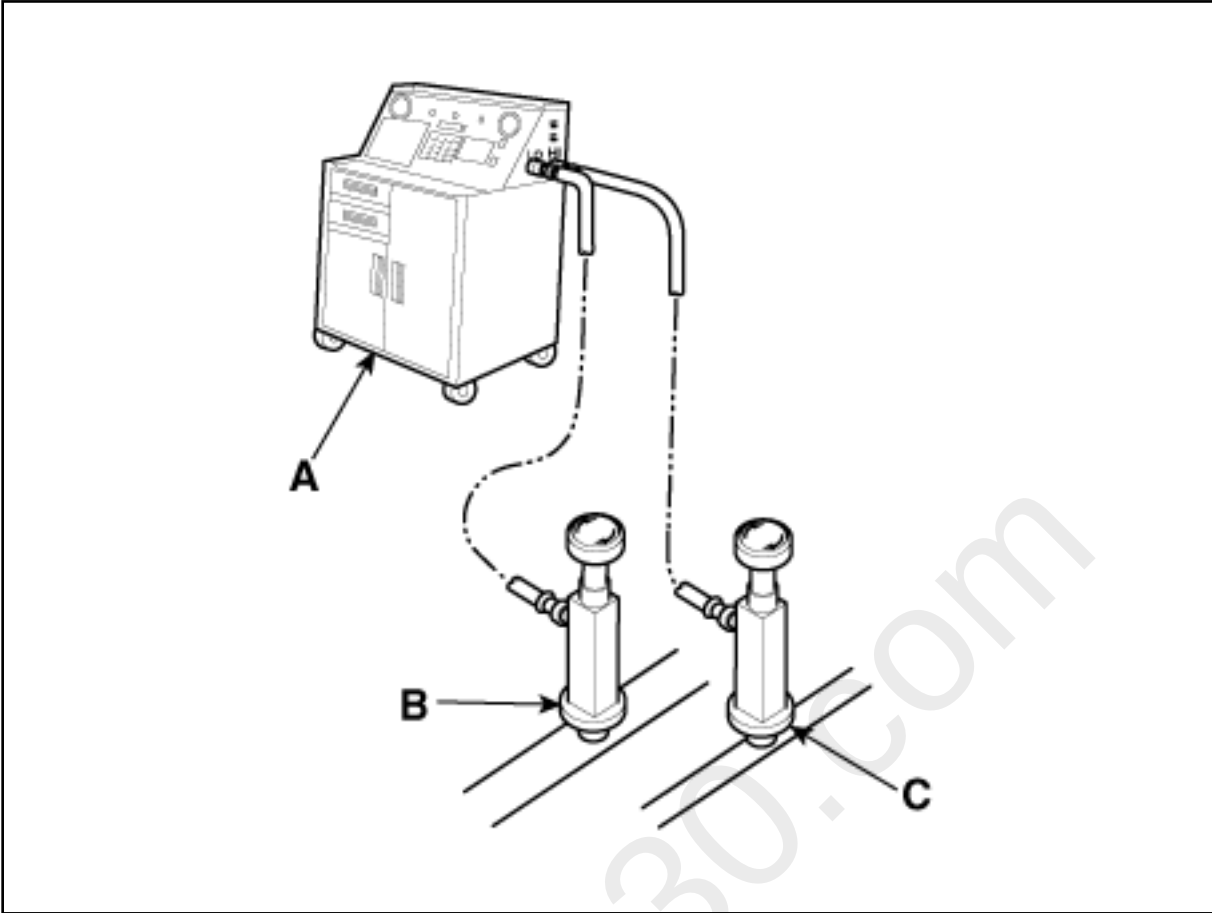
- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate the 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 a R-134a refrigerant Recovery/Recycling/Charging system. (If the system has been open for several days, the receiver/drier should be replaced, and the system should be evacuated for several hours.)

2. Connect a 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 Refrigerant 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.

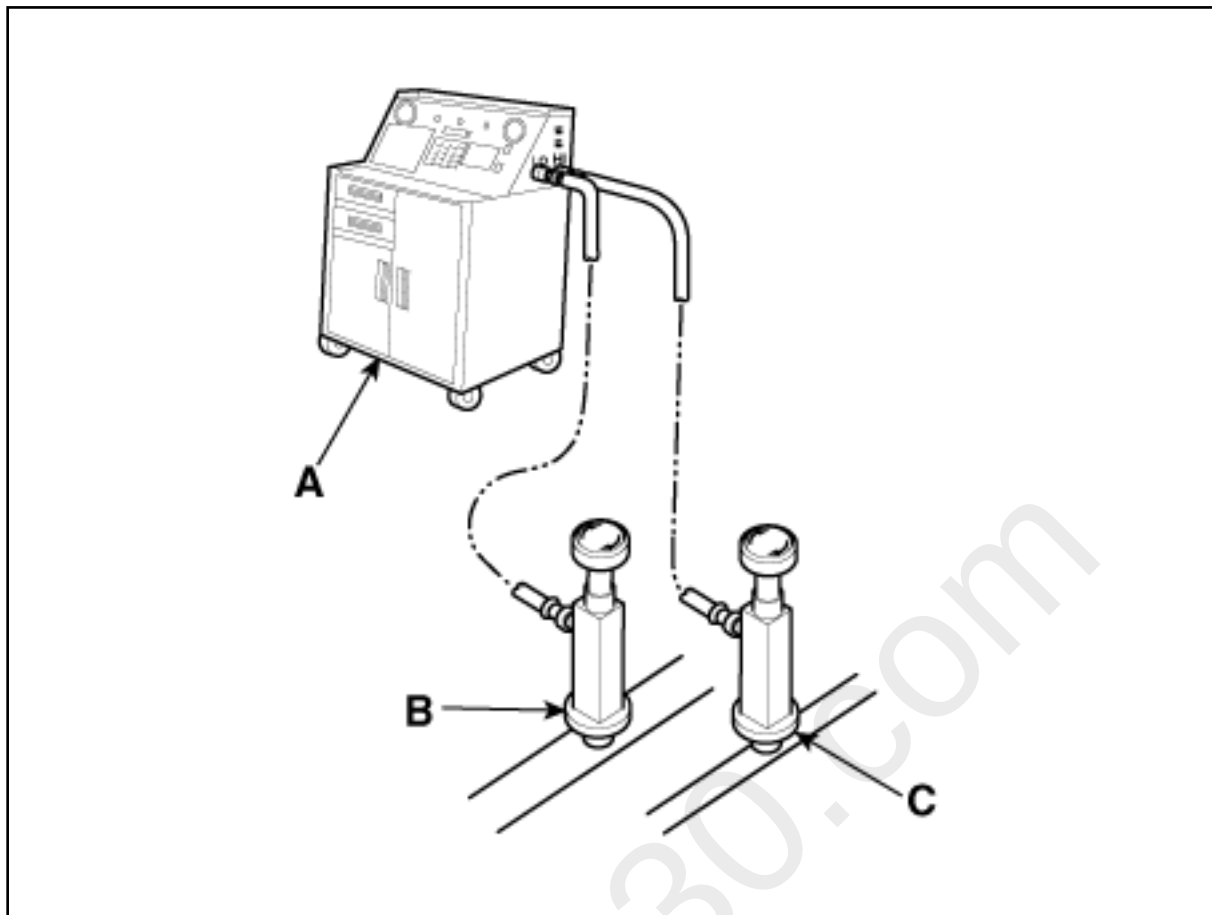


- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

If accidental system discharge occurs, ventilate the work area before resume of service. Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect a 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 the system that was removed during recovery. Use only specified refrigerant oil. Charge the system with [Single front only : $600 \pm 25\text{g}$ ($19.29 \pm 0.88\text{oz}$)] 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.

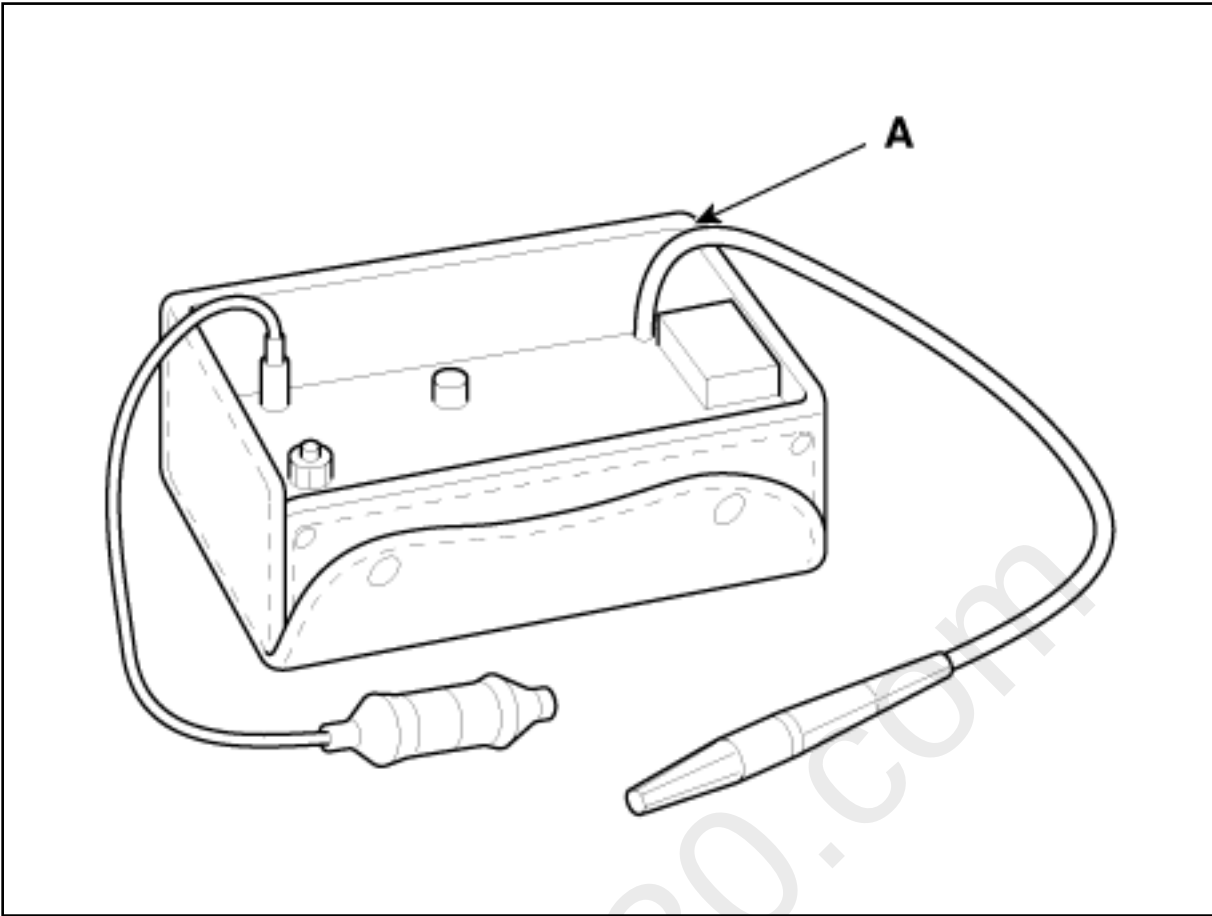


In order to use the leak detector properly, read the manual supplied by the manufacturer.

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.



Refrigerant System Service Basics (R-1234yf)

Refrigerant Identification

- Do not mix HFO-1234yf (R-1234yf) in the vehicle with other refrigerant, such as R-12, R-134a and etc.
- Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE standards to recover and recycle R-1234yf from the air conditioning system. Do not use service equipment for the other refrigerant, such as R-12, R-134a and etc.
- Verify what refrigerant is in the system if there is concern that the system has been tampered with in any way and check the type and quantity of refrigerant that shall be in the A/C system and potential issues arising from accidental or intentional mixing of refrigerants.
- Using an SAE certified refrigerant identification device is recommended to prevent improper recovery and the resulting further spread of contaminated refrigerant, which could potentially damage other A/C systems and service equipment. Contaminated refrigerant (blend of more than one refrigerant or non-system refrigerant) in recovery/recycling equipment could lead to the potential contamination of more refrigerant.

- Certain types of electronic leak detection devices (heated diode or corona discharge) as well as motors, switches, and controls on recovery and recycling machines, could generate sparks that could serve as ignition sources in the presence of refrigerants classified as flammable (A2 or A3) by ASHRAE standard 34 2006.
- It is possible that the mixing of refrigerants in a A/C system can result in higher-than-expected system pressures, system and component damage, diagnostic errors and/or other potential hazards to people and environment.
- In case other refrigerant is mixed, recover the contaminated refrigerant in the A/C system and dispose it in accordance with all applicable national, regional or local regulations. Clean inside the A/C system using the specialized detergent and recharge new refrigerant.

Refrigerant Recovery

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE standards to remove HFO-1234yf (R-1234yf) from the air conditioning system.

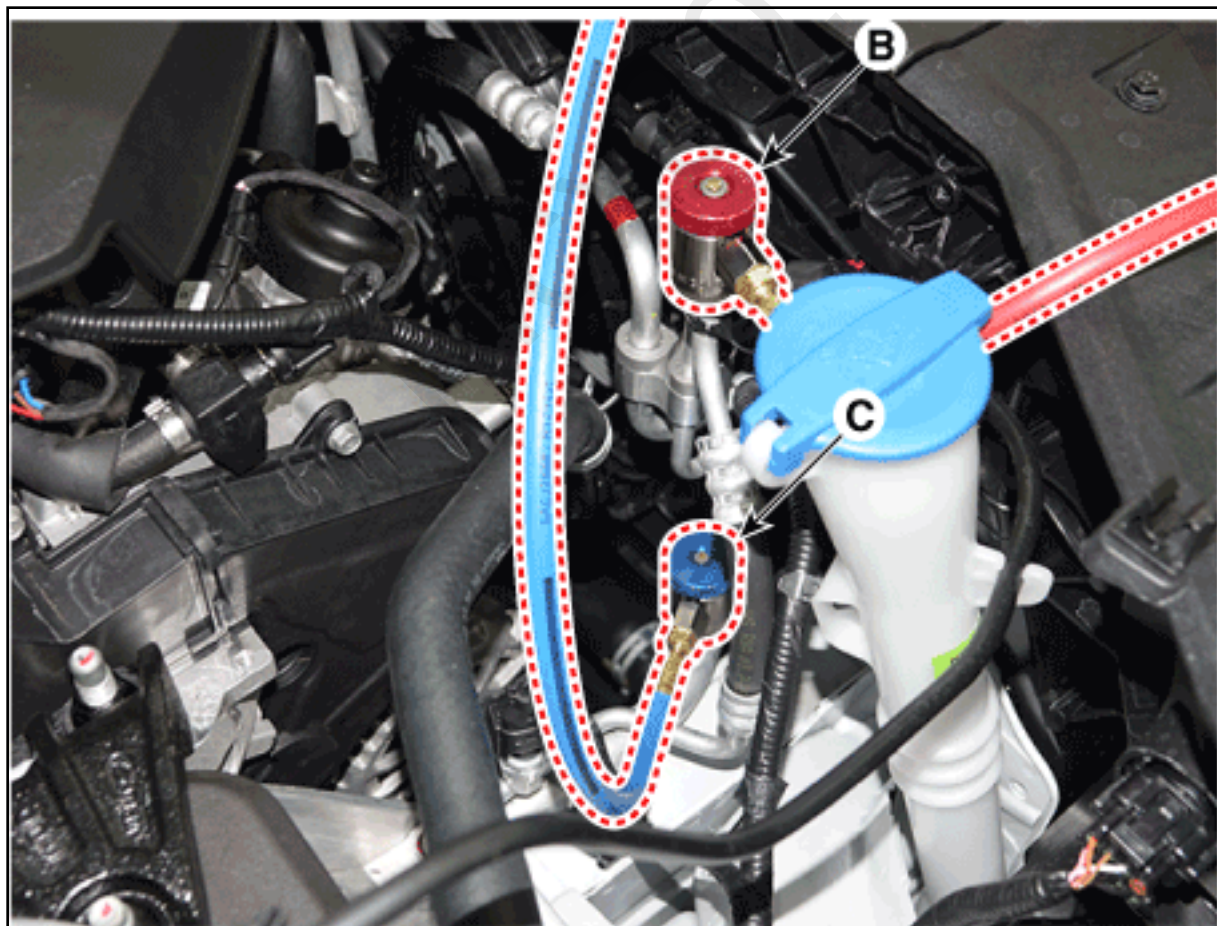
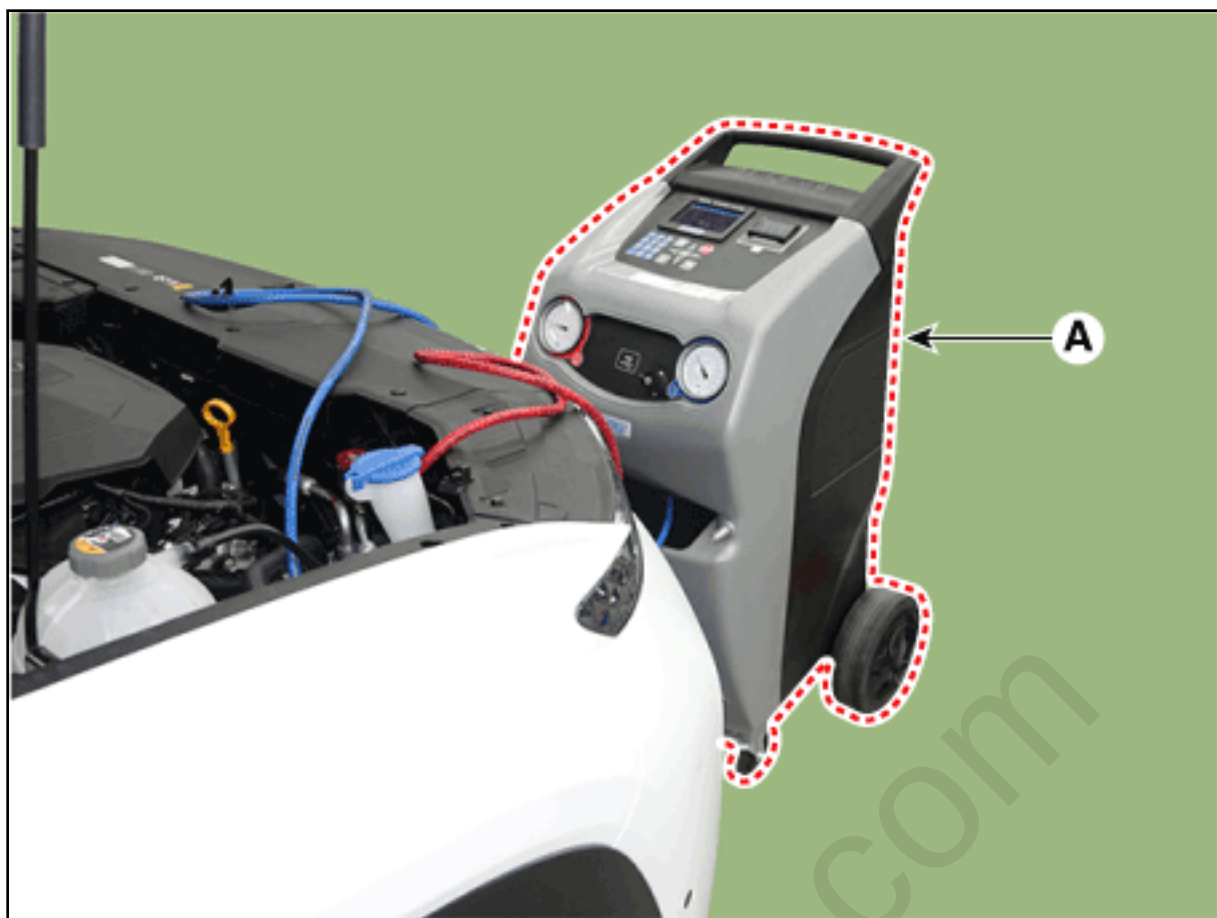


- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

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-1234yf 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



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 standards to remove HFO-1234yf (R-1234yf) from the air conditioning system.

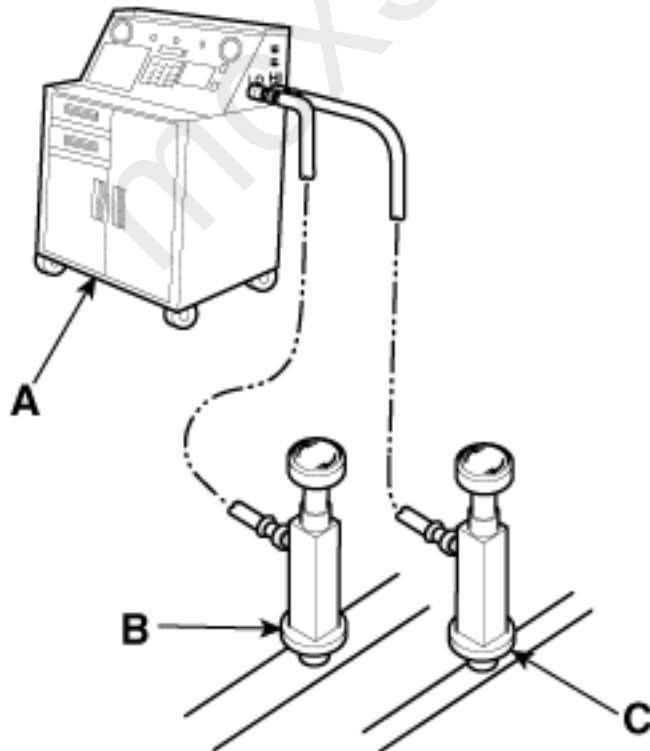


- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

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-1234yf 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-1234yf 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 87.7 kPa (658 mmHg, 25.9 in.Hg) in 5 minutes, there is probably a leak in the system. Partially charge the system, and check for leaks (see "Refrigerant 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 standards to remove HFO-1234yf (R-1234yf) from the air conditioning system.



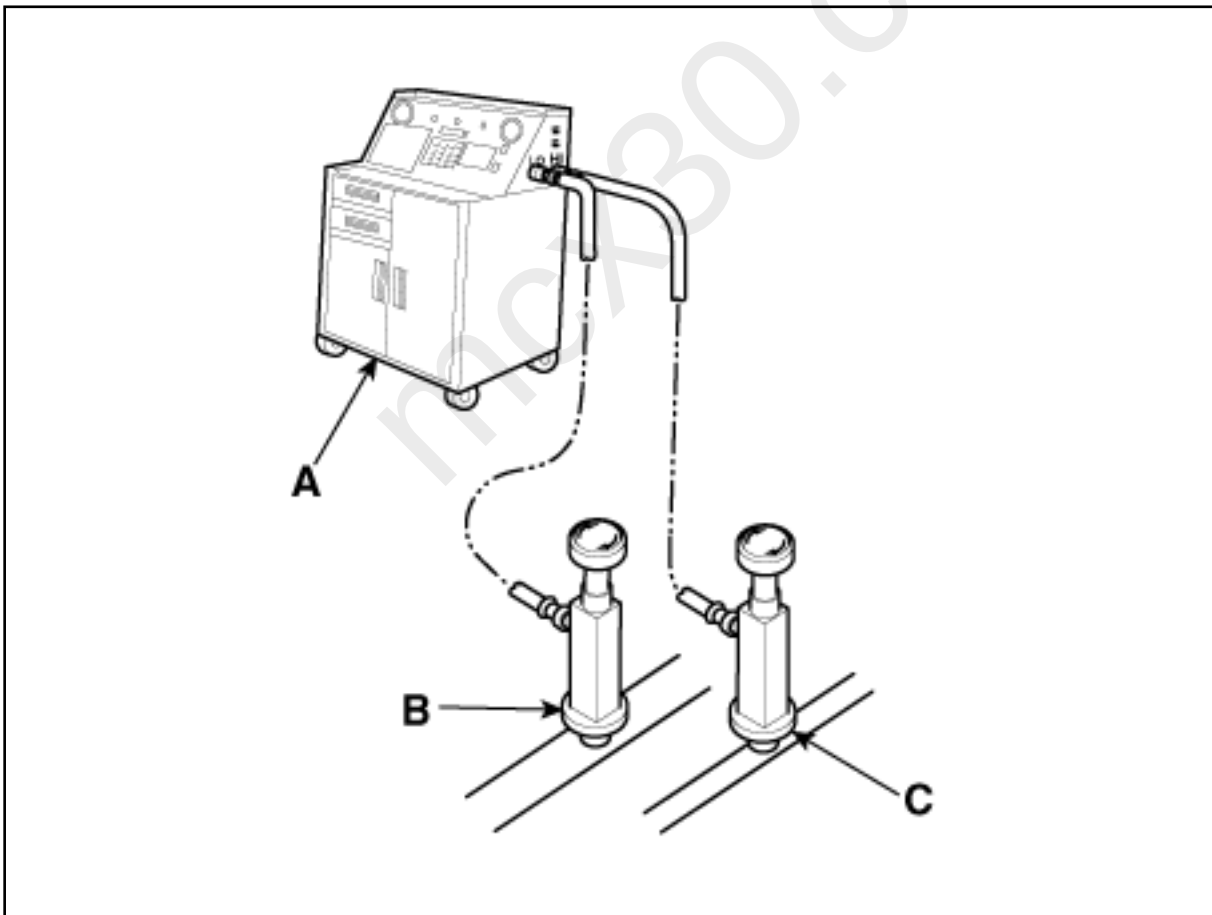
- Air conditioning refrigerant or lubricant vapor can irritate your eyes, nose, or throat.
- Be careful when connecting service equipment.
- Do not breathe refrigerant or vapor.

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-1234yf 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 the system that was removed during recovery. Use only specified refrigerant oil. Charge the system with $[550 \pm 25\text{g} (17.68 \pm 0.88\text{oz})]$ R-1234yf 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.



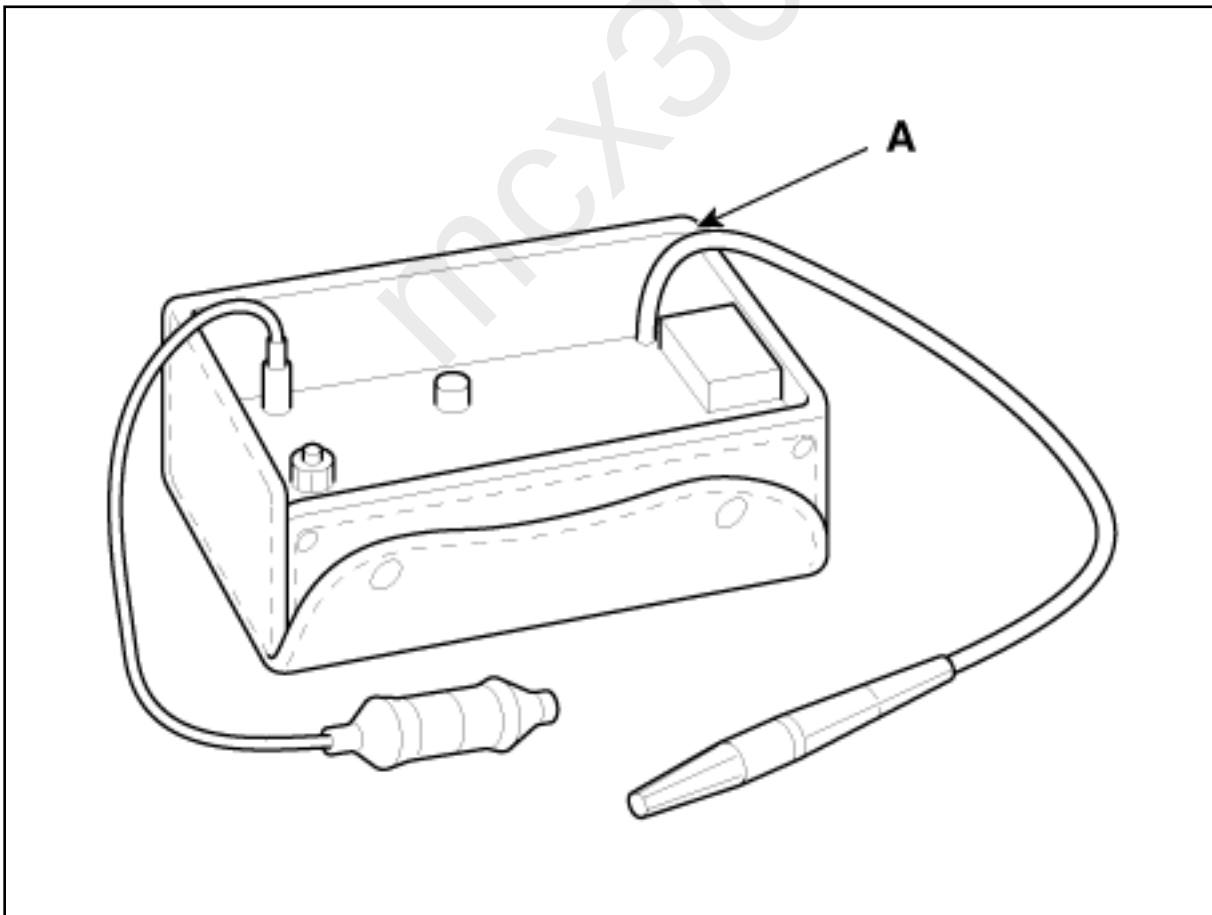
- In order to use the leak detector properly, read the manual supplied by the manufacturer.



- Use only leak detection devices certified to SAE standards for use with R-1234yf. Certain leak detection devices (heated diode or corona discharge) could serve as ignition sources in the presence of hydrocarbons or other flammable refrigerants.

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.



Oil Specification

1. The R-134a or R-1234yf 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 air. After use, seal oil from air immediately. (R-134a or R-1234yf 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 circulates 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 :

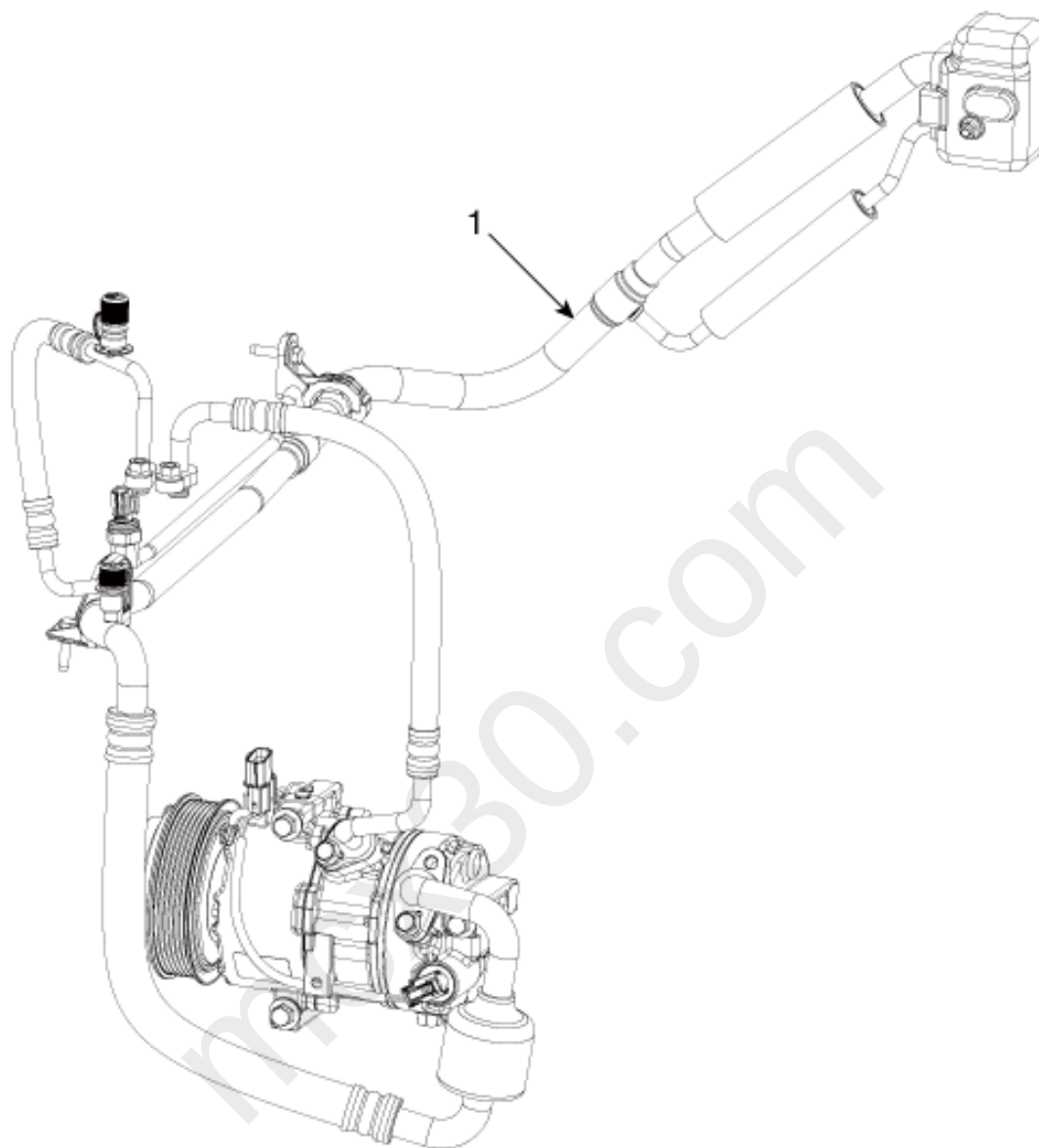
PAG 30 : $120 \pm 10\text{cc}$ ($3.85 \pm 0.3\text{ oz.}$)

Oil Return Operation

There is close affinity between the oil and refrigerant.

During normal operation, part of the oil recirculates 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 run in advance for oil return operation. The procedure is as follows :

1. Open all the doors and 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.



1. Suction & Liquid Pipe Assembly

Replacement

1. If a compressor is available, the air conditioner is operated for a few minutes in the engine idle state and then the engine is stopped.
2. Disconnect the negative (-) battery terminal.
3. Recover the refrigerant with a recovery/charging station.
(Refer to Air conditioning System - "Repair procedures")
4. Remove the engine cover.
(Refer to Engine Mechanical System - "Engine Cover")
5. Loosen the mounting nut and separate the expansion valve cover (A).

Tightening torque :

7.8 - 11.8 N.m (0.8 - 1.2 kgf.m, 5.8 - 8.7 lb-ft)



6. Loosen the mounting bolts and separate the expansion valve (A) from evaporator core.

Tightening torque :

21.6 - 32.4 N.m (2.2 - 3.3 kgf.m, 15.9 - 23.9 lb-ft)



7. Loosen the mounting nuts and separate the suction line (A), discharge line (B).

Tightening torque :

19.6 - 23.5 N.m (2.0 - 2.4 kgf.m, 14.5 - 17.4 lb-ft)



8. Disconnect the APT sensor connector (A).



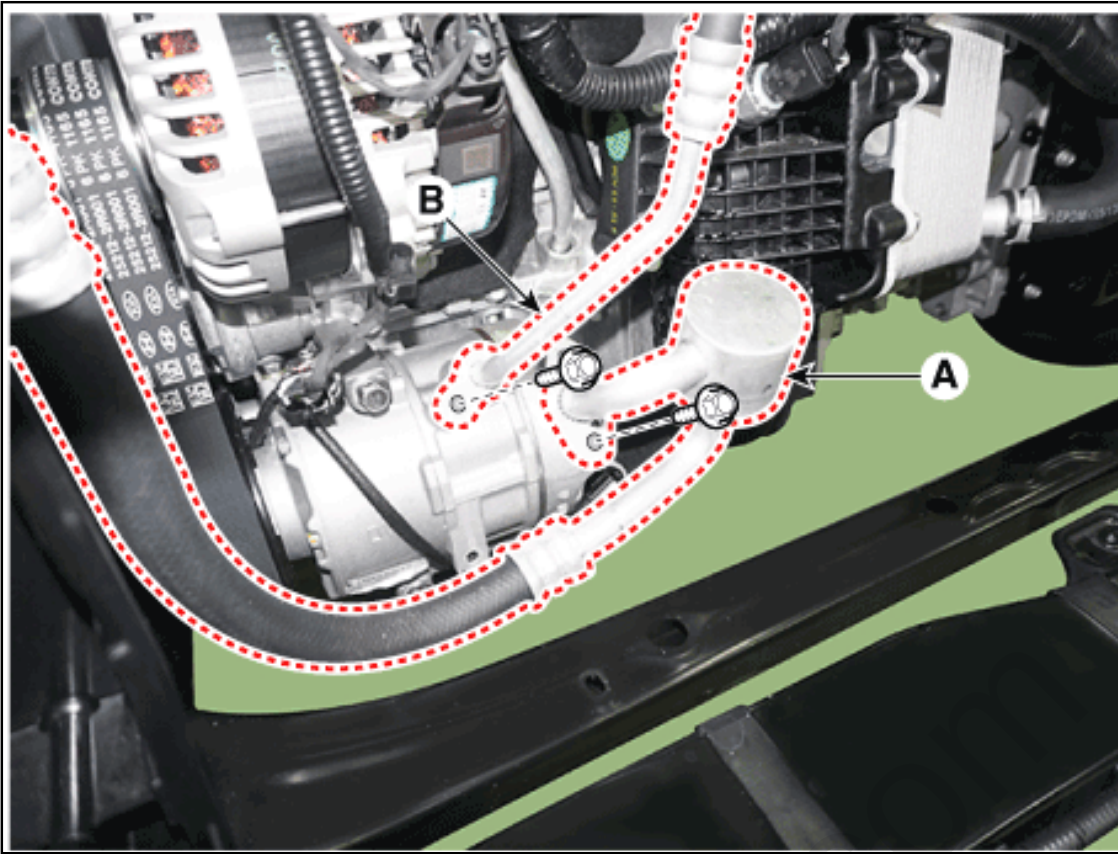
9. Remove the engine room under cover.
(Refer to Engine Mechanical System - "Engine Room Under Cover")
10. Remove the engine mounting bracket.
(Refer to Engine Mechanical System - "Engine Mounting")
11. Separate the compressor suction line (A) and discharge line (B) connection nuts and disconnect the line.

Tightening torque :

21.6 - 32.4 N.m (2.2 - 3.3 kgf.m, 15.9 - 23.9 lb-ft)



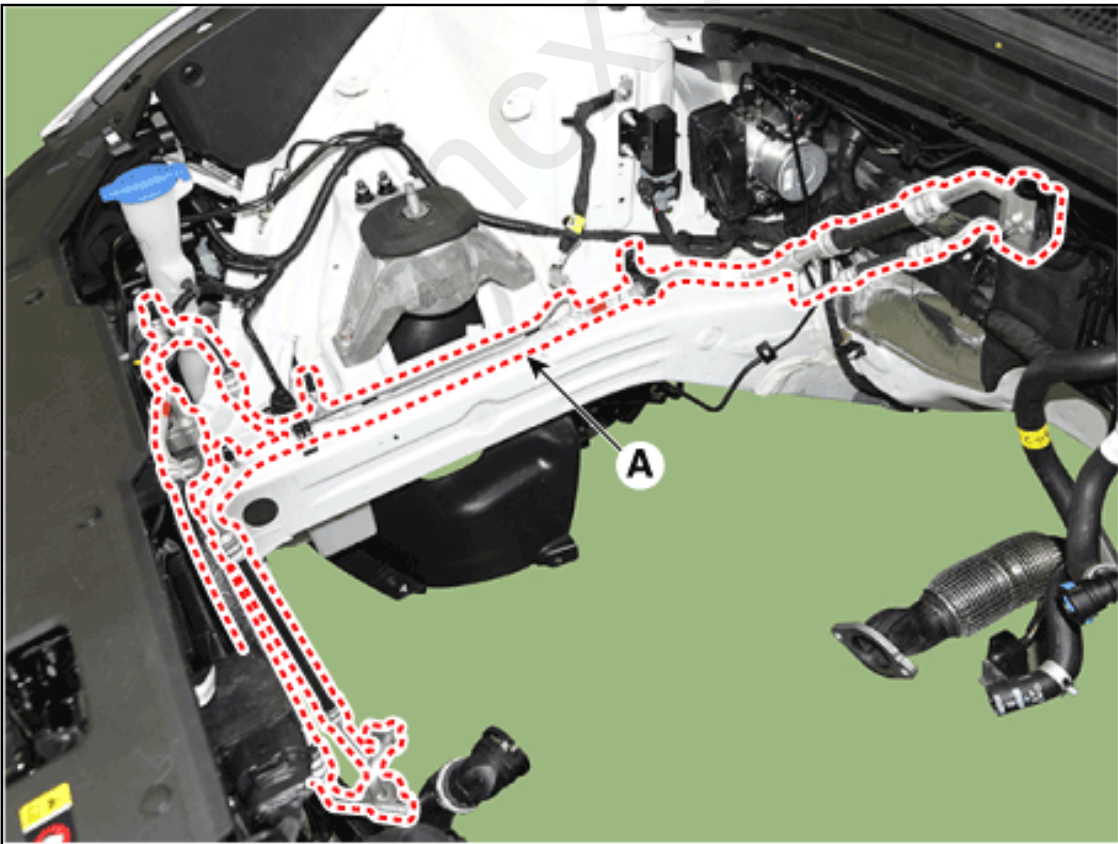
- Be careful not to damage the parts located under the vehicle (floor under cover, fuel filter, fuel tank and canister) when raising the vehicle using the lift.
(Refer to General Information - "Lift and Support Points")



12. Loosen the mounting bolt and remove the Front suction & Liquid pipe assembly (A).

Tightening torque :

7.8 - 11.8 N.m (0.8 - 1.2 kgf.m, 5.8 - 8.7 lb-ft)



13. Install in the reverse order of removal.



- Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.
- Tighten the bolt or nut joint to the specified torque.
- Using a gas leak detector, check for refrigerant leakage.
- Evacuate air in the refrigeration system and charge system with refrigerant.

Capacity :

R-1234yf : $550 \pm 25\text{g}$ ($17.7 \pm 0.88\text{oz}$)

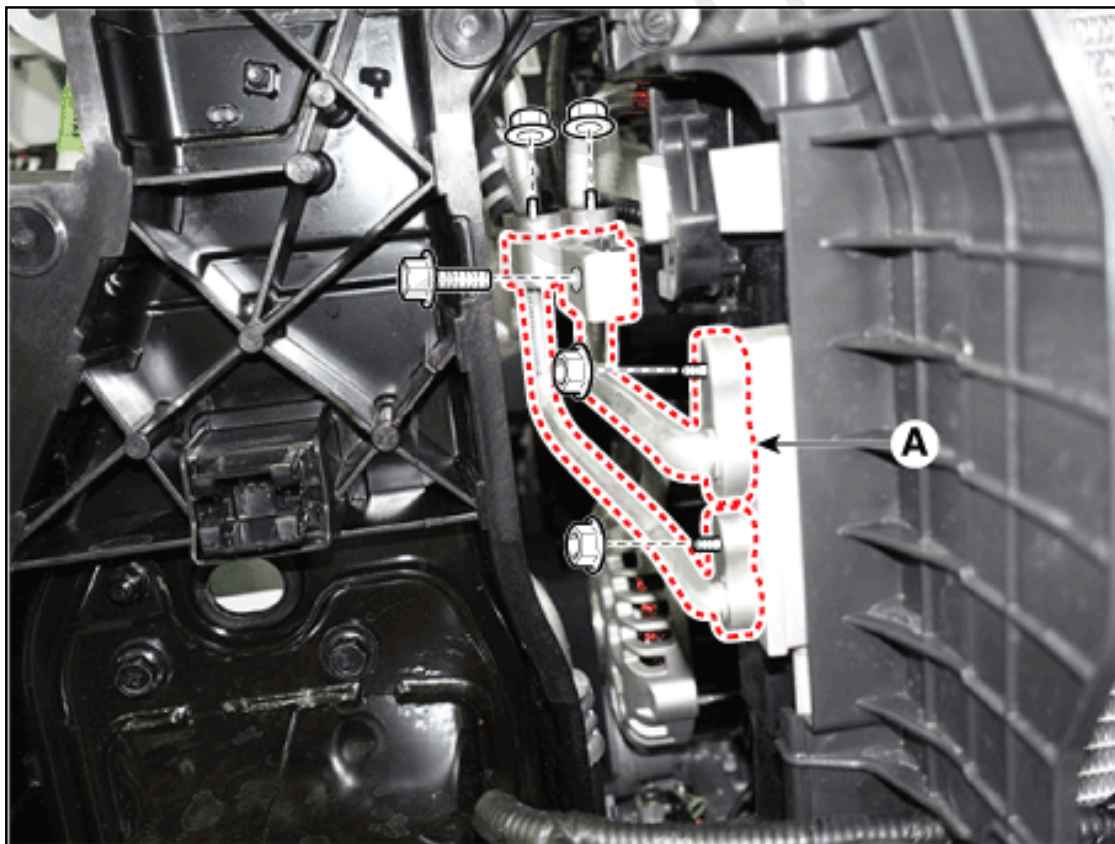
R-134a : $600 \pm 25\text{g}$ ($19.29 \pm 0.88\text{oz}$)

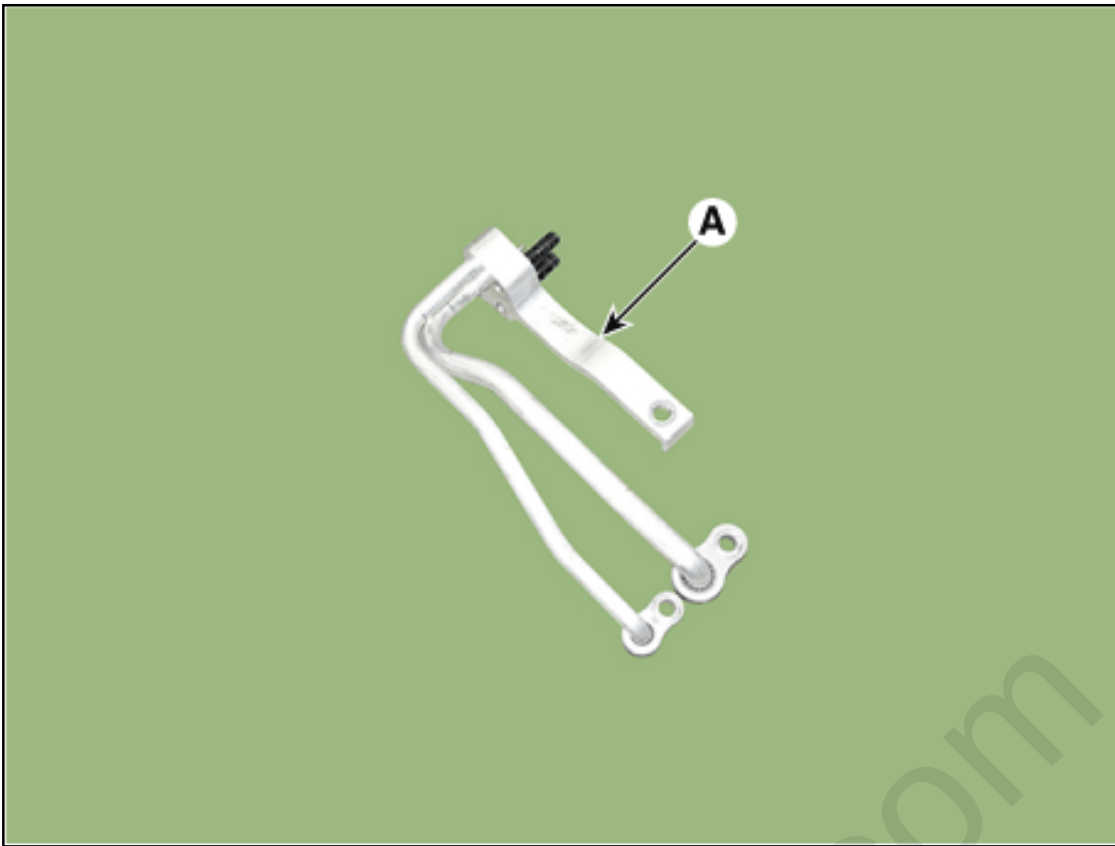
[Refrigerant Line (Condenser)]

1. Remove the front bumper assembly.
(Refer to Body (Interior and Exterior) - "Front Bumper Assembly")
2. Recover the refrigerant with a recovery/charging station.
(Refer to Air conditioning System - "Repair procedures")
3. Loosen the mounting nuts, and then disconnect the liquid line (A) from the condenser.

Tightening torque :

7.8 - 11.8 N.m (0.8 - 1.2 kgf.m, 5.8 - 8.7 lb-ft)





4. Install in the reverse order of removal.



- Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.
- Tighten the bolt or nut joint to the specified torque.
- Using a gas leak detector, check for refrigerant leakage.
- Evacuate air in the refrigeration system and charge system with refrigerant.

Capacity :

R-1234yf : $550 \pm 25\text{g}$ ($17.7 \pm 0.88\text{oz}$)

R-134a : $600 \pm 25\text{g}$ ($19.29 \pm 0.88\text{oz}$)

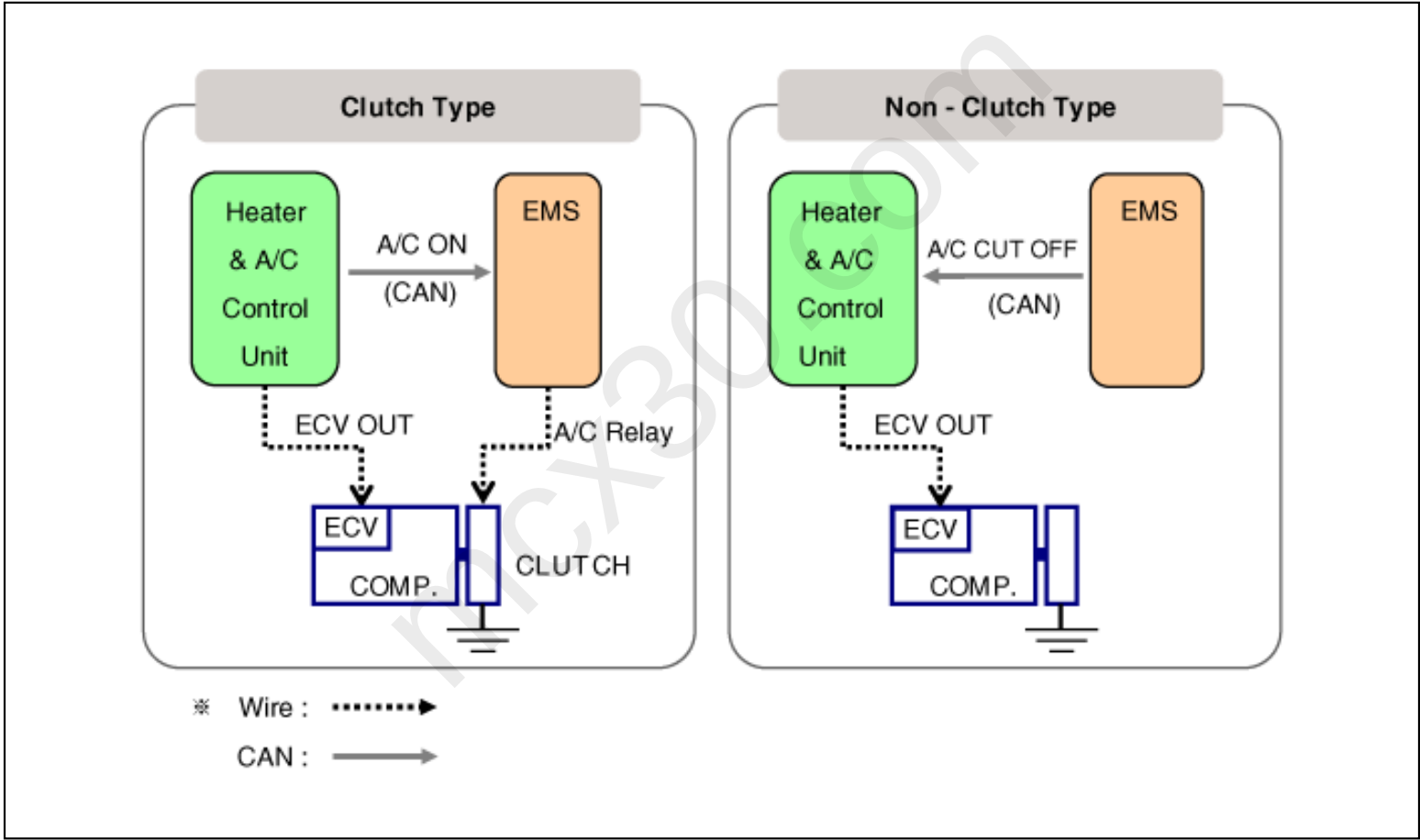
Description

The compressor is the power unit of the A/C system.
It is located on the side of engine block and driven by a V-belt of the engine.
The compressor changes low pressure and low temperature refrigerant gas into high pressure and high temperature refrigerant gas.

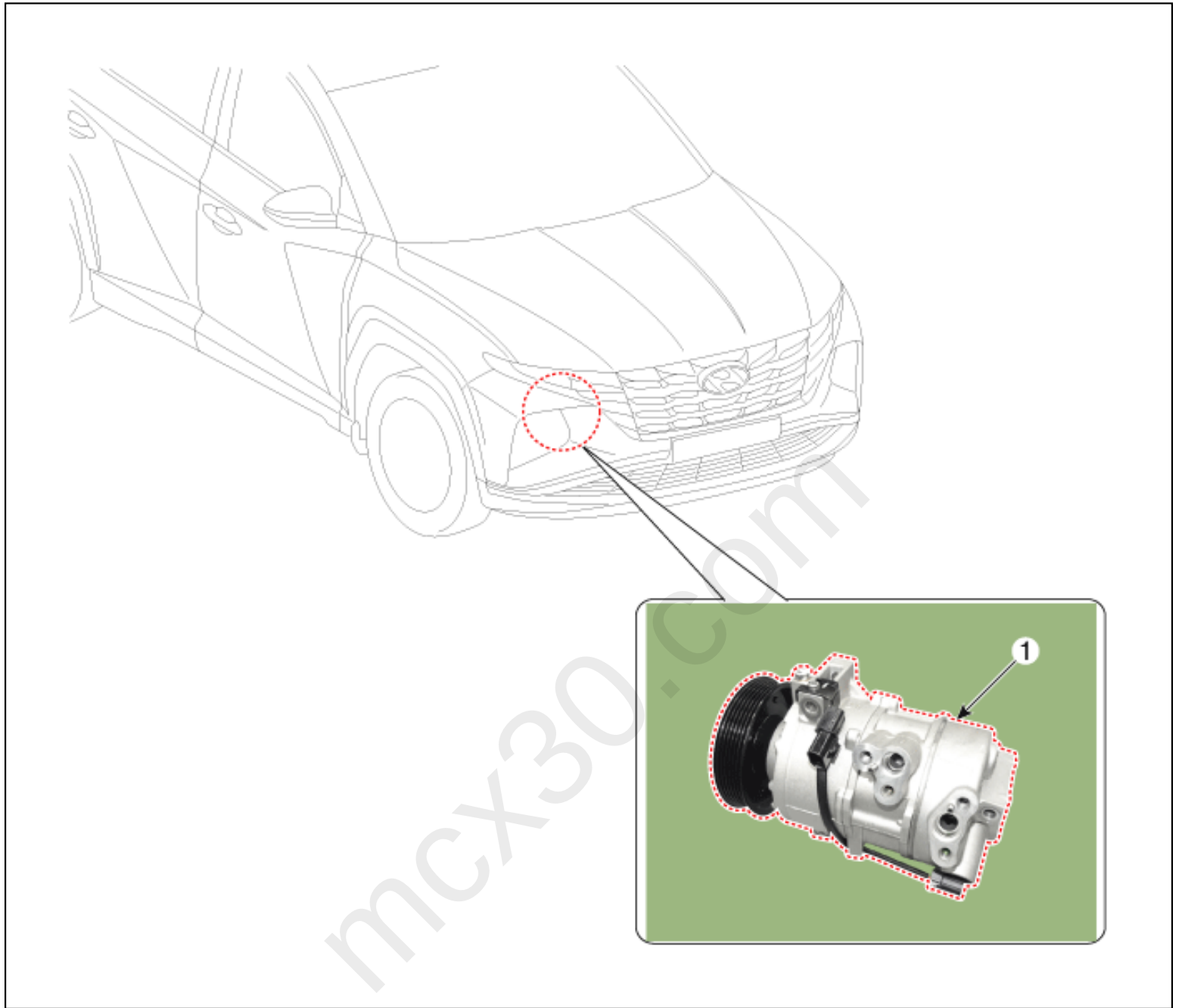
Variable Swash Plate Compressor

The compressor has a swash plate that rotates to reciprocate pistons, which compress refrigerant.
The variable swash plate compressor controls the swash plate angle to change the refrigerant displacement. It achieves precise cooling capability control in accordance with vehicle interior and driving conditions.
The internally controlled variable swash plate compressor changes the swash plate angle by a MCV (Mechanical Control Valve) in accordance with fluctuation of a suction pressure.
The externally controlled variable swash plate compressor changes the swash plate angle by an ECV (Electric Control Valve) in accordance with an electrical signal from the heater & A/C control unit.
This enables stable temperature control and improved driving sensation.

ECV Control Diagram

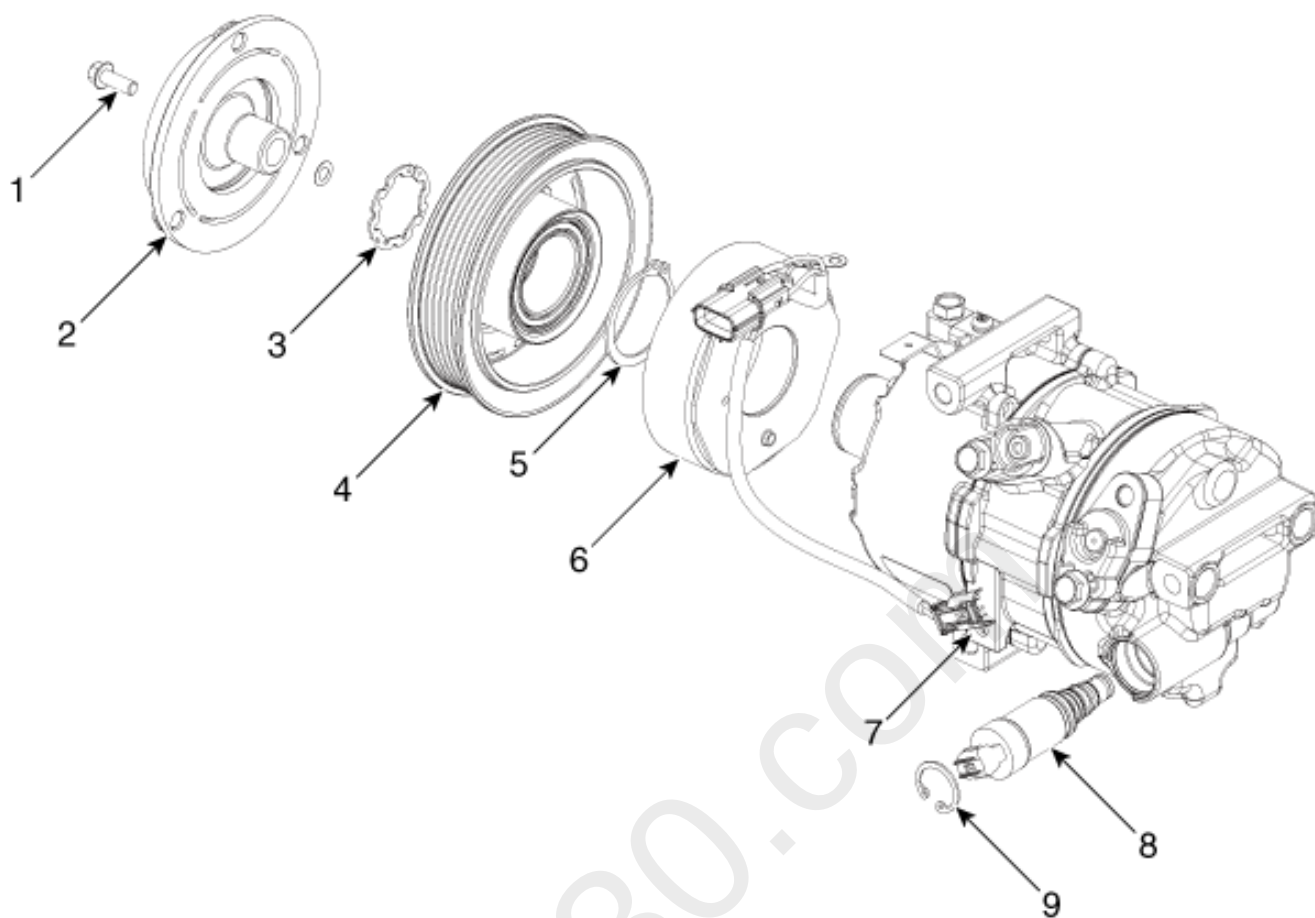


Components



1. Compressor

Components



1. Clutch bolt
2. Disc & Hub assembly
3. Snap ring (Rotor)
4. Pulley

5. Snap Ring (Stator)
6. Clutch spacer
7. Compressor
8. Electric Control Valve (ECV)
9. Electric Control Valve (ECV) snap ring

Removal

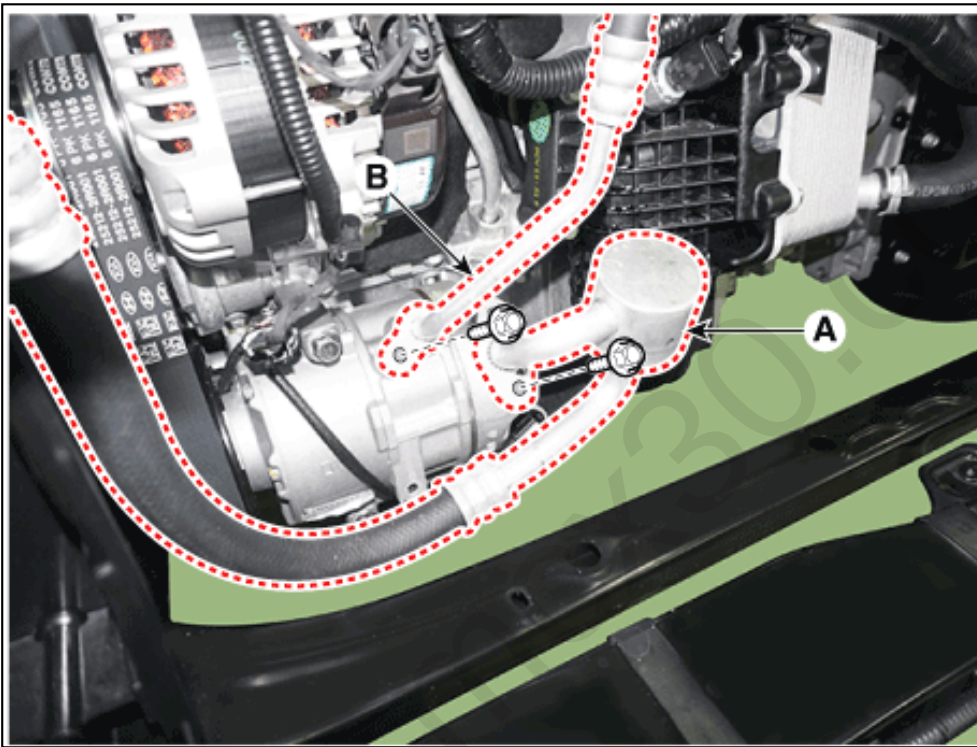
1. If a compressor is available, the air conditioner is operated for a few minutes in the engine idle state and then the engine is stopped.
2. Disconnect the negative (-) battery terminal.
3. Recover the refrigerant with a recovery/charging station.
(Refer to Air conditioning System - "Repair procedures")
4. Remove the engine room under cover.
(Refer to Engine Mechanical System - "Engine Room Under Cover")
5. Loosen the mounting nuts and separate the suction line (A), discharge line (B).

Tightening torque :

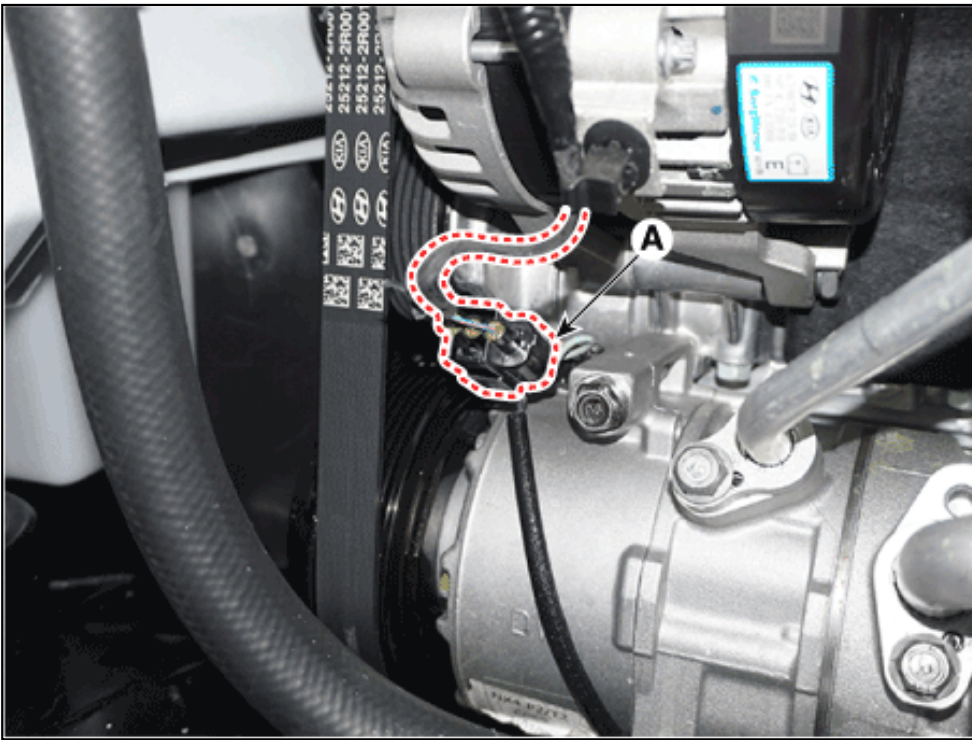
21.6 - 32.4 N.m (2.2 - 3.3 kgf.m, 15.9 - 23.9 lb-ft)



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



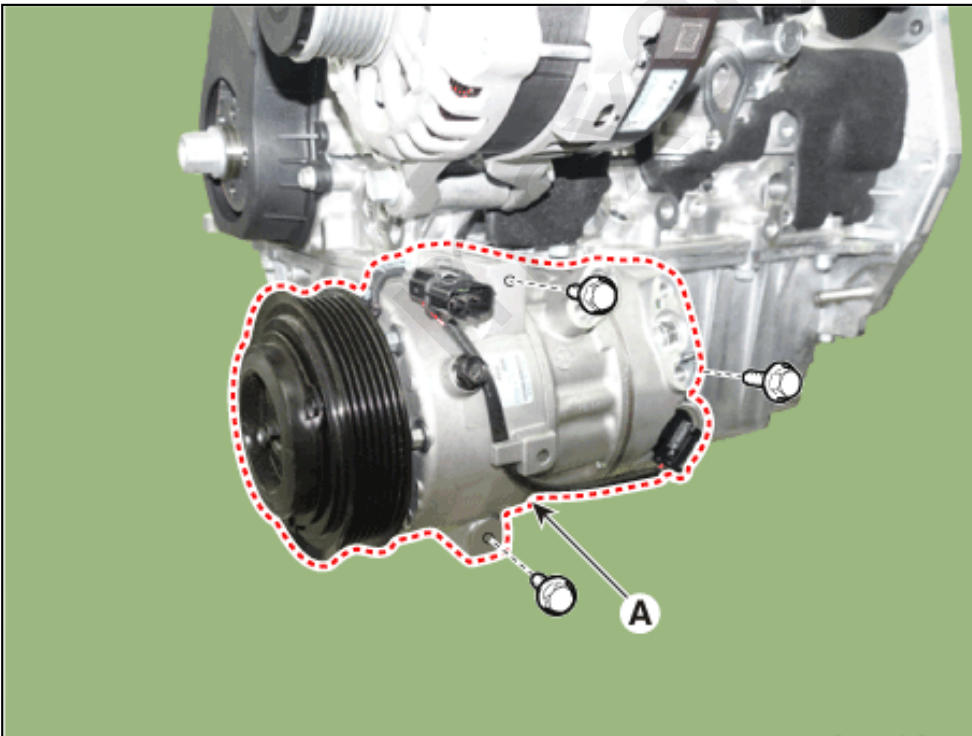
6. Press the lock pin and separate the ECV connector (A).



7. Loosen the drive belt.
(Refer to Engine Mechanical System - "Drive Belt")
8. Loosen the mounting bolts and remove the compressor assembly (A).

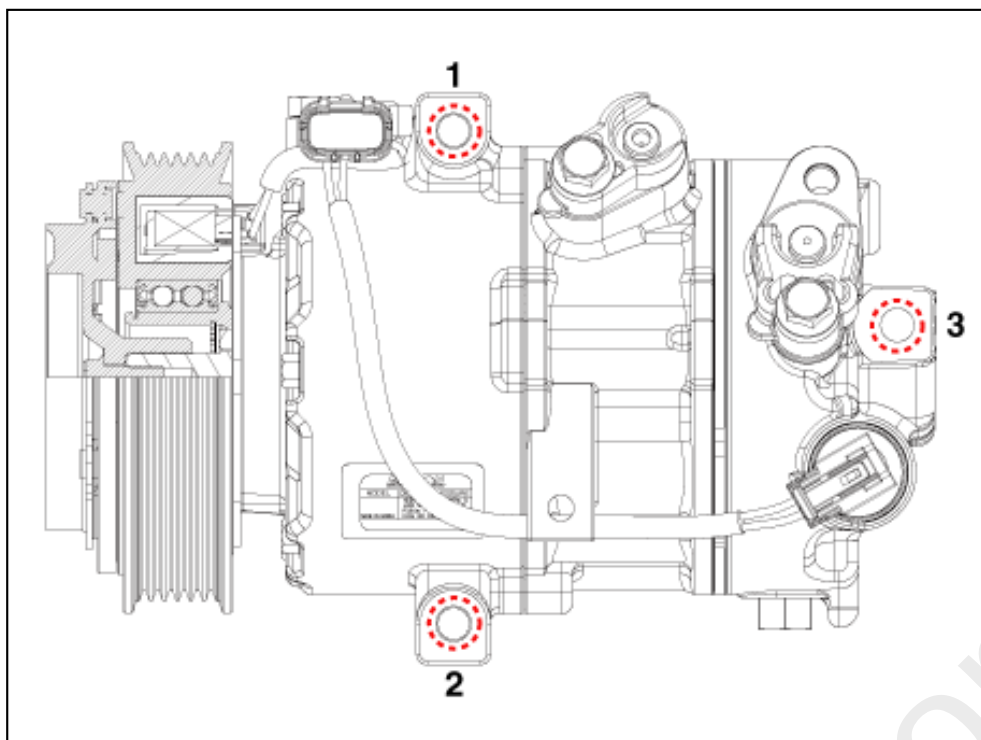
Tightening torque :

20.0 - 33.0 N.m (2.04 - 3.36 kgf.m, 14.8 - 24.3 lb-ft)



Installation

1. Make sure that the compressor (A) mounting bolt of the correct length is screwed in. Tighten the mounting bolts in the specified tightening order.

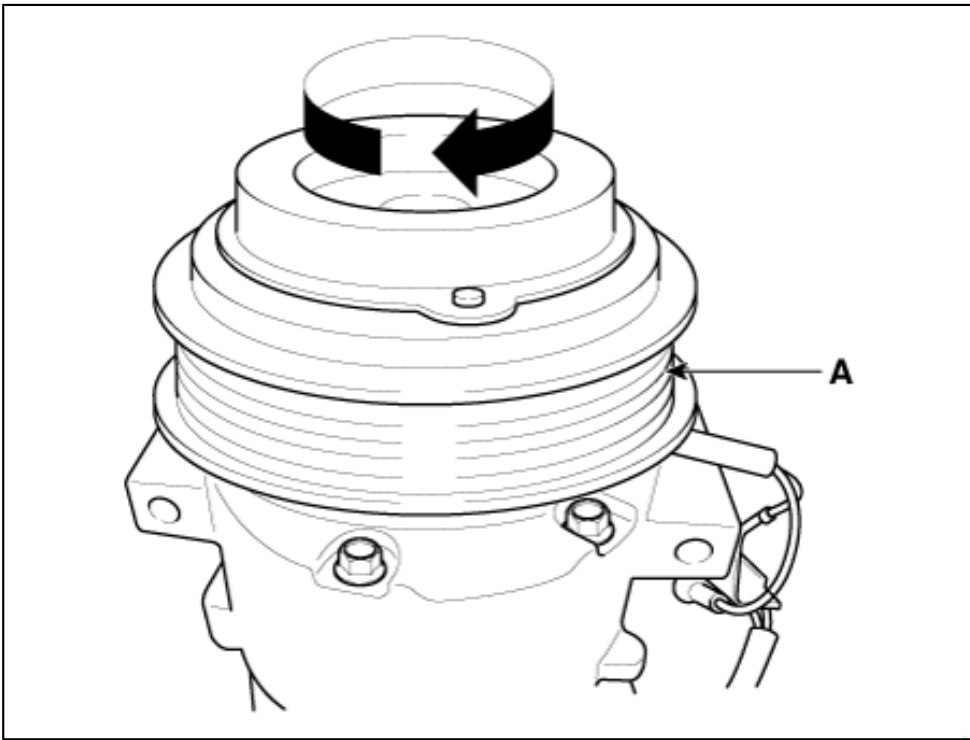


2. Install in the reverse order of removal.

- If you install a new compressor, drain all the refrigerant oil from the removed compressor and measure its volume. Subtract the volume of drained oil from the original capacity. The result is the amount of oil/compressor 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, R-1234yf 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 pulley (A) bearing play and drag by rotating the pulley by hand. Replace the pulley with a new one if it is noisy or has excessive play/drag.



External Control Valve Compressor Inspection (GDS)

Compressor type: Fixed type compressor, External control valve, Internal control valve.

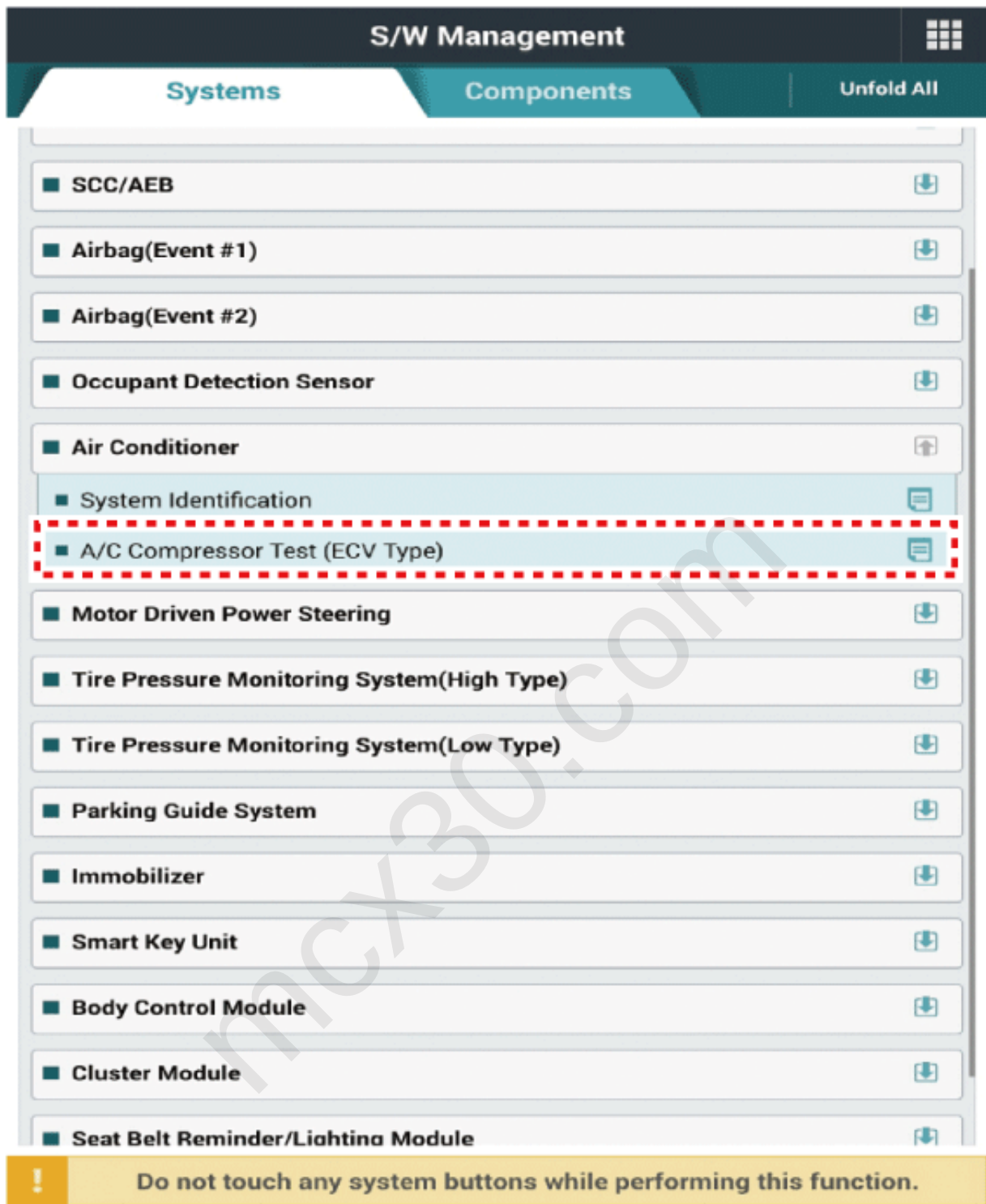
In cases of fixed type and internal control valve, it is possible to inspect compressor's operation with clutch noise.

When it comes to External control valve, however, it cannot be checked in this way because it doesn't have a clutch.

So, ECV should be inspected with GDS as below.

1. Connect GDS to the vehicle and select 'Aircon Compressor Test(ECV type)'

[ECV1]



2. Make the vehicle ready as the GDS instruction on the monitor. (Turn off A/C 'switch' only)

S/W Management



• A/C Compressor Test (ECV Type)

Purpose	To check the air conditioning system status.
Enable Condition	1. Engine Idle(No load) 2. A/C Switch : OFF 3. Airflow setting : Blower Step 1 4. HVAC Temperature set to low (Coldest) 5. HVAC air circulation set to "Recirculation" 6. HVAC Vent Mode: Panel/Face Level
Concerned Component	A/C Control Module
Concerned DTC	-
Fail Safe	-
Etc	-

OK



Do not touch any system buttons while performing this function.

3. Check if other DTC codes are found before inspect ECV compressor. If so, solve that problems first. If not, press 'OK' button to continue.



Do not continue inspection if these DTC codes are found: B1241, B1242, B1672, B1685, B1686, B1687

S/W Management

A/C Compressor Test (ECV Type)

Information

No VIN information.

Please enter the vehicle VIN information when choosing.

To continue, press the **OK** button.

OK

Cancel

!

Do not touch any system buttons while performing this function.

4. Start inspection

S/W Management

■ A/C Compressor Test (ECV Type)

Test Preparation

Test Conditions

ECV Test

Test Completed

● [Test Preparation]

The following conditions must be met before beginning ECV Test:

- 1.Engine Status: Idling(No Engine Load)
- 2.A/C Switch : OFF
- 3.HVAC Blower Set to low (1)
- 4.HVAC Temperature set to low (Coldest)
- 5.HVAC air circulation set to "Recirculation"
- 6.HVAC Vent Mode: Panel/Face Level
- 7.Testing Time: 4 Minutes
- 8.During ECV Test, if condenser fan does not operate after one (1) minute, stop ECV Test immediately.
- 9.Do not operate any other functions during the ECV Test
- 10.Press **[OK]** start the inspection.

OK

Cancel

 Do not touch any system buttons while performing this function.

S/W Management

■ A/C Compressor Test (ECV Type)

Test Preparation

Test Conditions

ECV Test

Test Completed

● [Test Conditions]

Fault codes were found.

Due to related fault codes may not be progressing normally.

Press **[OK]** button to continue.

OK

Cancel

!

Do not touch any system buttons while performing this function.



Check if condenser fan is operating when condition is changed to 'ECV running'



Relief valve will operate if condenser fan doesn't work due to overpressure in the compressor. It helps the air conditioning system to relieve by releasing refrigerant and oil (lost if relieved).

※ Refill refrigerant and oil after operation of relief valve

※ Noise occurred when relief valve is in operation

5. Check the result of inspection.
[ECV7]

S/W Management

A/C Compressor Test (ECV Type)

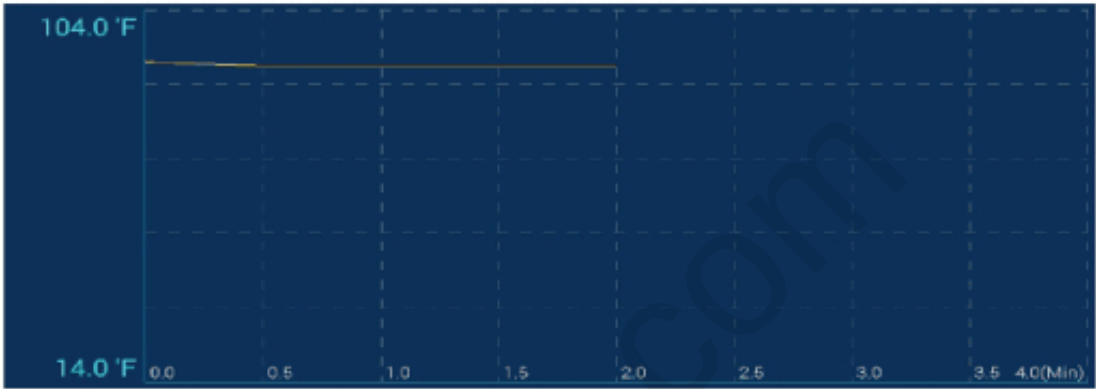
Test Preparation

Test Conditions

ECV Test

Test Completed

[ECV performance TEST]



The value on this graph is updated every 30 seconds.

	ECV Running	Result
Evaporator Temperature	90.5 °F	
Ambient Air Temperature	64.4 °F	

Cancel

!

Do not touch any system buttons while performing this function.

[ECV8]

S/W Management

■ A/C Compressor Test (ECV Type)

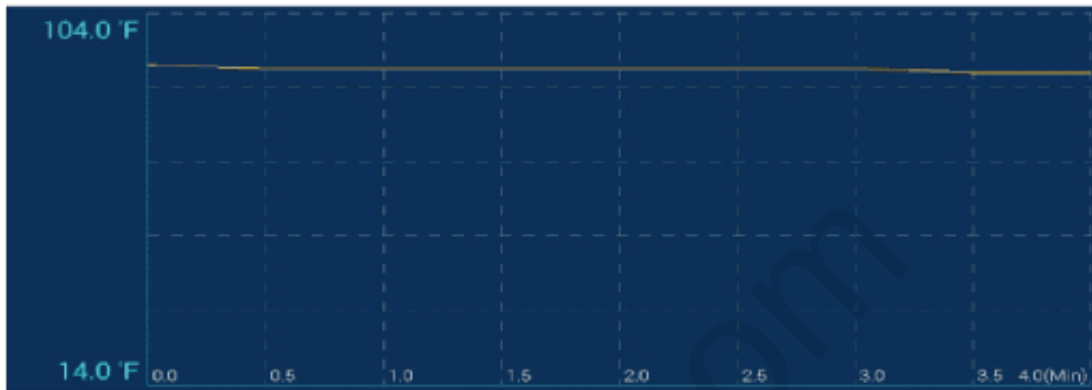
Test Preparation

Test Conditions

ECV Test

Test Completed

● [ECV performance TEST]



■ ECV TEST RESULT

	ECV Test Completed	Result
Evaporator Temperature	89.6 °F	Check
Ambient Air Temperature	64.4 °F	

OK

Check

Cancel



Do not touch any system buttons while performing this function.

6. If the result shows "Check", click "Check" and follow the instruction.

S/W Management

A/C Compressor Test (ECV Type)

The inspection procedure for "Check" result from diagnosis test

ECV: External Control Valve

1 ECV connector of compressor inspection

Check list

- Check the connectors for looseness and pin status
- Measure a resistance of ECV(10~11Ω)



Maintenance method
: Replace ECV or Compressor

2 Refrigerant amount and filter inspection

Check list

- Refer to the shop manual (Refrigerant amount)
- Check the air conditioner filter



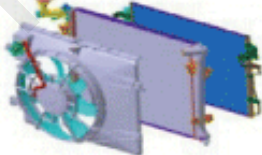
<Contamination filter> <Normal filter>

Maintenance method
: Check the refrigerant amount and Replace the filter of air conditioner

3 Condenser and cooling fan inspection

Check list

- Check the condenser for contamination
- Operate the cooling fan



Maintenance method
: Remove contamination on condenser and repair the component related cooling fan

Prev

!

Do not touch any system buttons while performing this function.

7. Inspect ECV again from the first step.

Disassembly

1. Remove the front tire [RH].

(Refer to Suspension System - "Wheel")

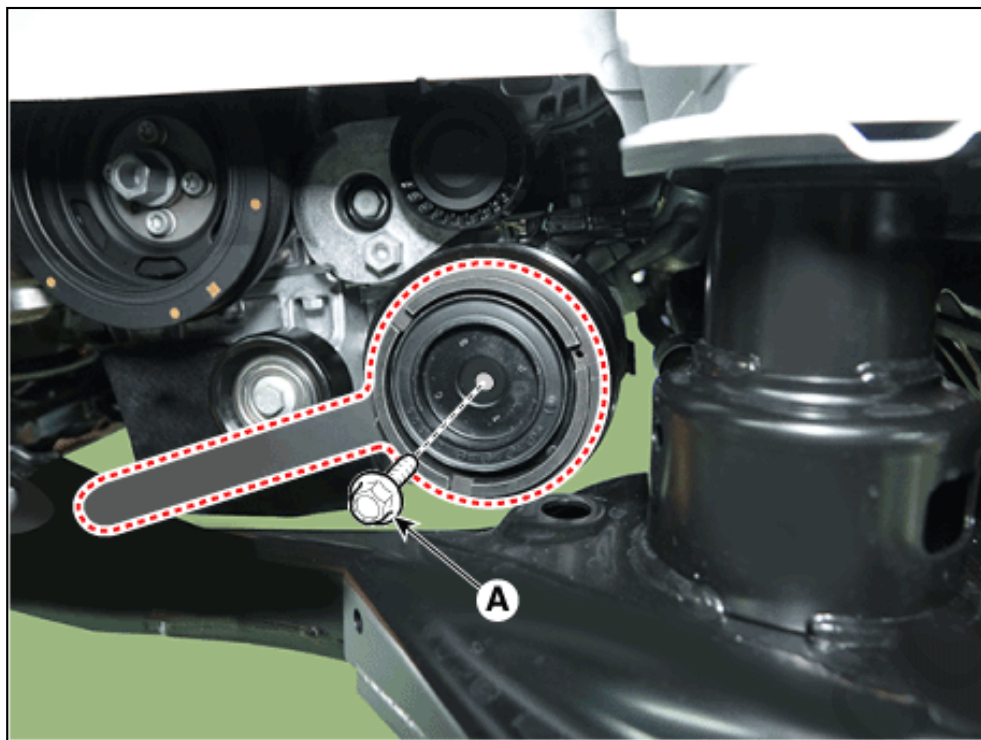
2. Loosen the drive belt.

(Refer to Engine Mechanical System - "Drive Belt")

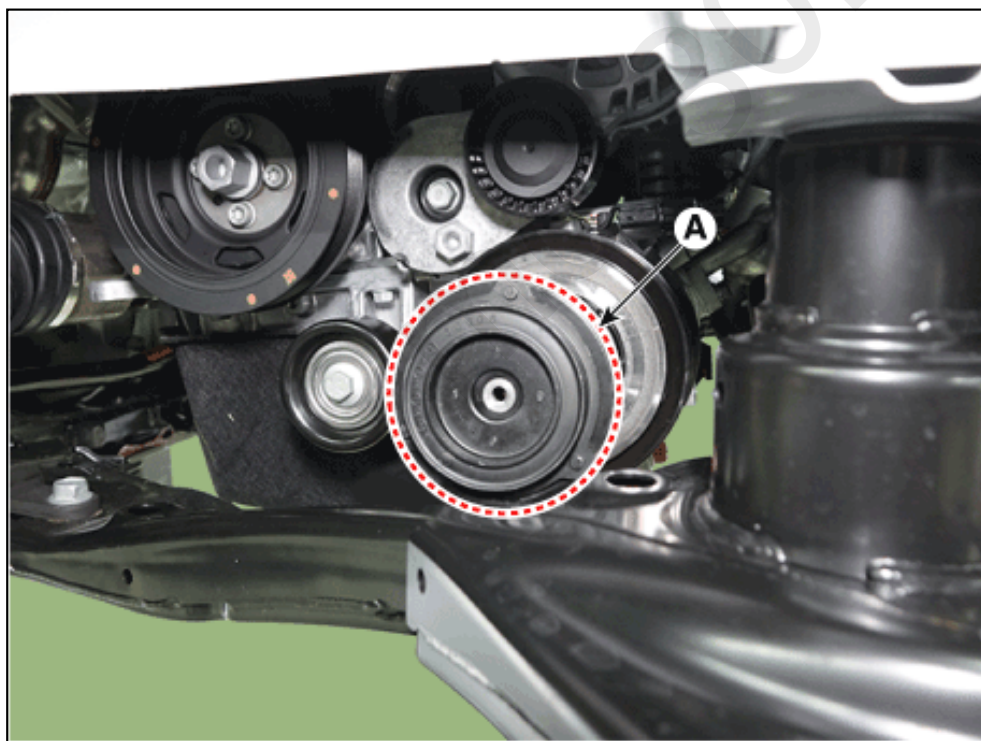
3. Remove the clutch bolt (A) while holding the pulley with a clutch bolt remover (09977-3R000).

Tightening torque :

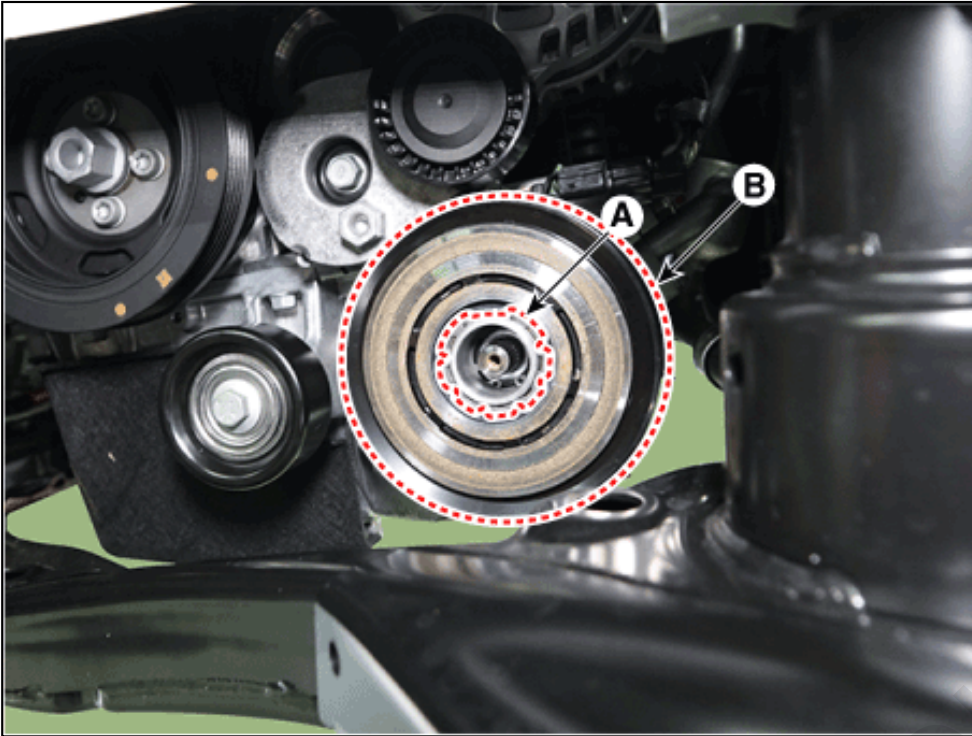
15.0 - 21.0 N.m (1.53 - 2.14 kgf.m, 11.1 - 15.5 lb-ft)



4. Remove the Disc & Hub assembly (A).



5. Remove the pulley (B) after removing the snap ring (A) with a snap ring plier.



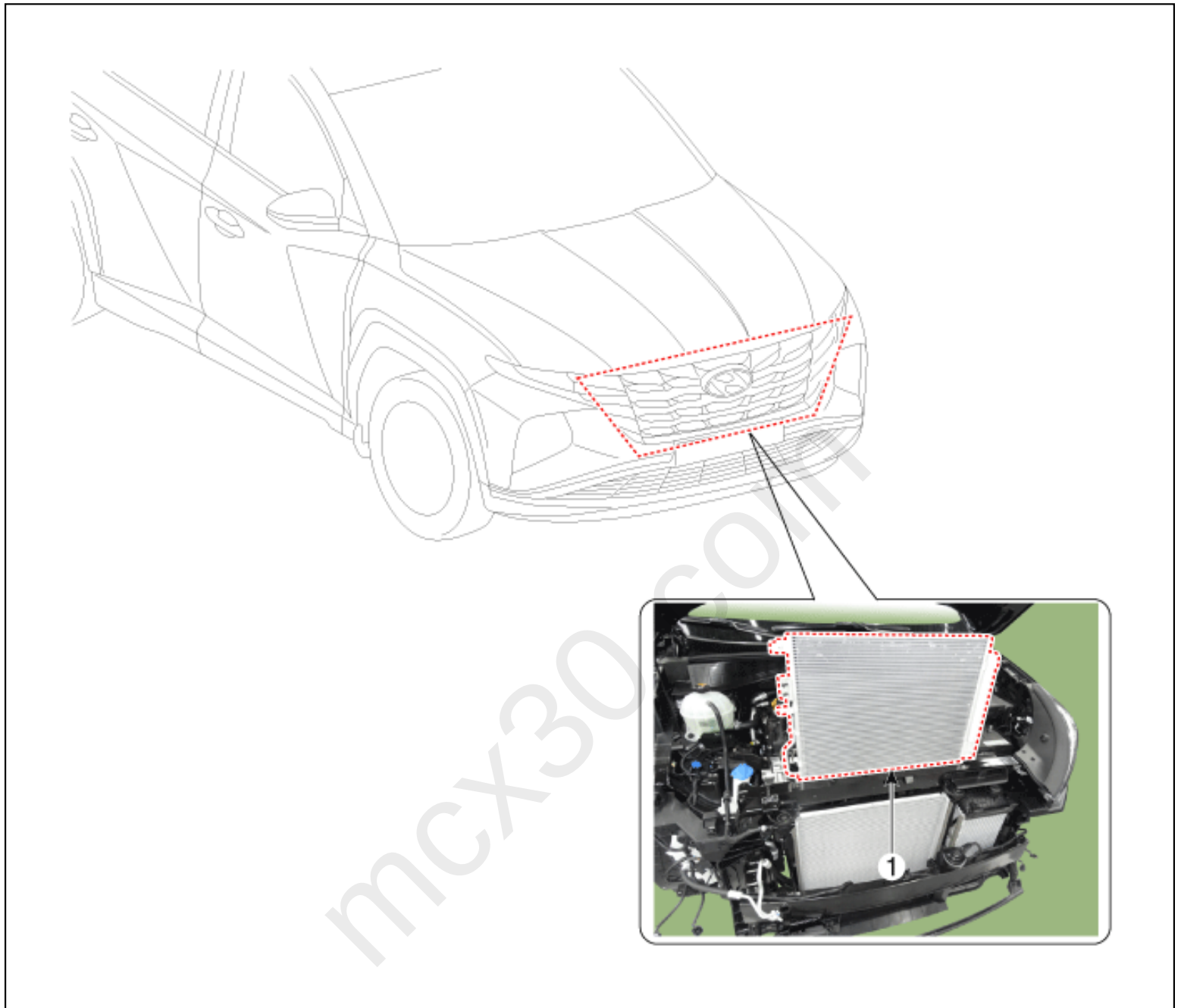
- Be careful not to damage the pulley and compressor during disassembly/reassembly.
- Once the snap ring is removed, replace it with a new one.

6. Reassemble in the reverse order of disassembly.



- Clean the pulley and compressor sliding surfaces with non-petroleum solvent.
- Install a new snap ring, and make sure they are fully seated in the groove.
- Make sure that the pulley turns smoothly after reassembly.

Components
Location



1. Condensor

Inspection

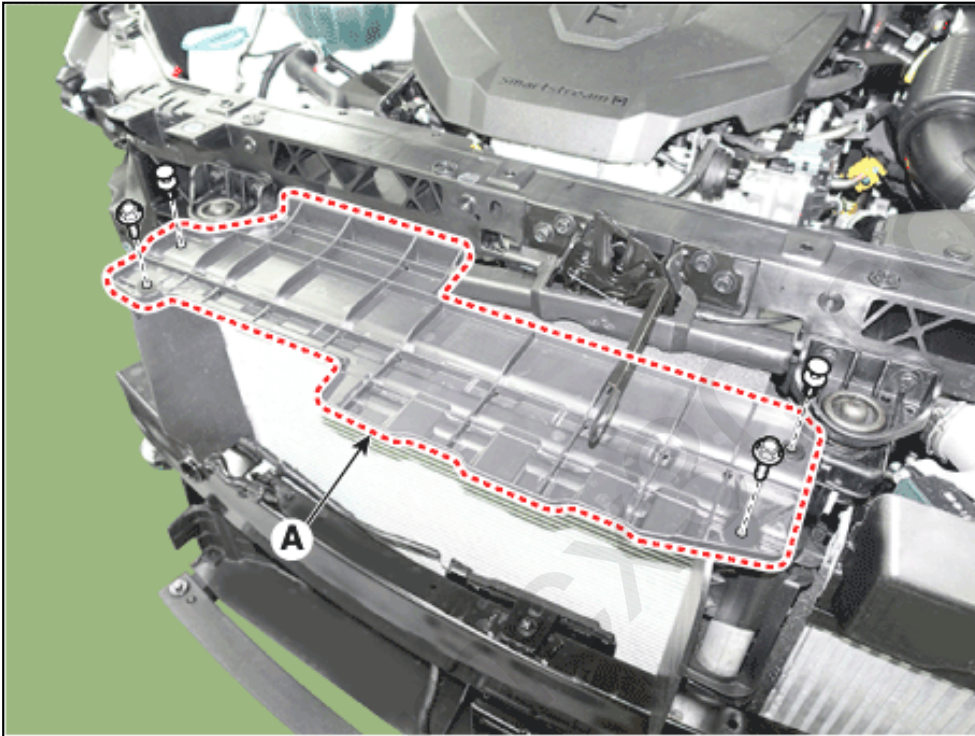
1. Check the condenser fins for clogging and damage. If clogged, clean them with water, and blow them with compressed air. If bent, gently bend them using a screwdriver or pliers.
2. Check the condenser connections for leakage, and repair or replace it, if required.

Replacement

1. Recover the refrigerant with a recovery/recycling/charging station.
(Refer to Air conditioning System - "Repair procedures")
2. Disconnect the negative (-) battery terminal.
3. Remove the front bumper assembly.
(Refer to Body - "Front Bumper Assembly")
4. Loosen the mounting bolts and clips, remove the radiator upper guard (A).

Tightening torque :

3.9 - 5.9 N.m (0.8 - 1.2 kgf.m, 2.9 - 4.3 lb-ft)

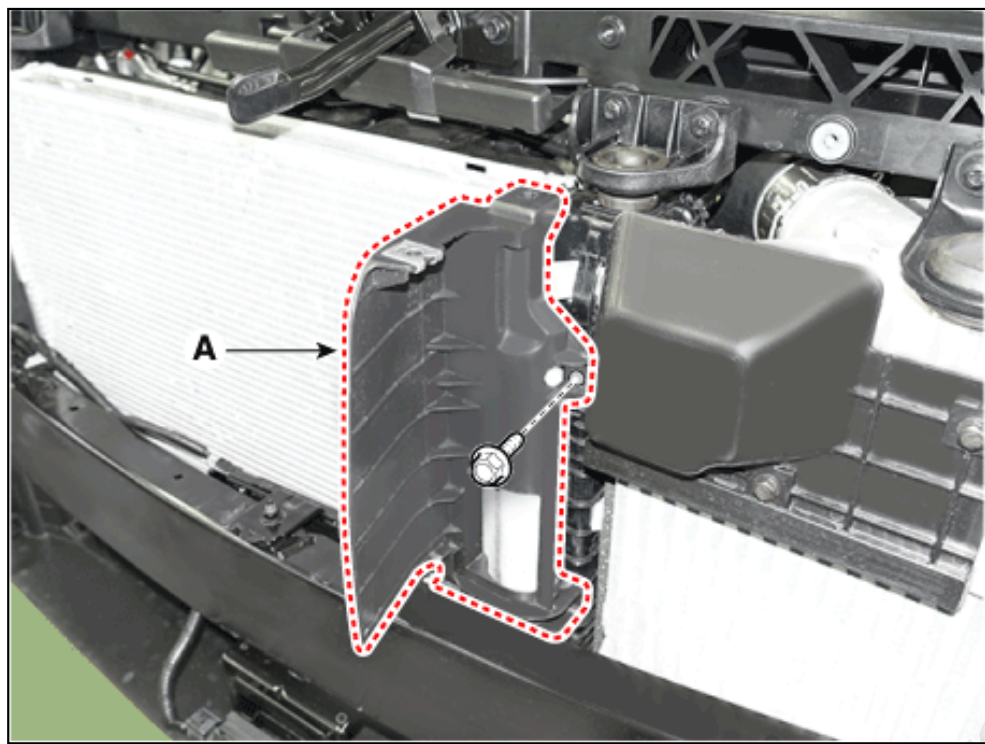


5. Loosen the mounting bolt, remove the upper air guard (A).

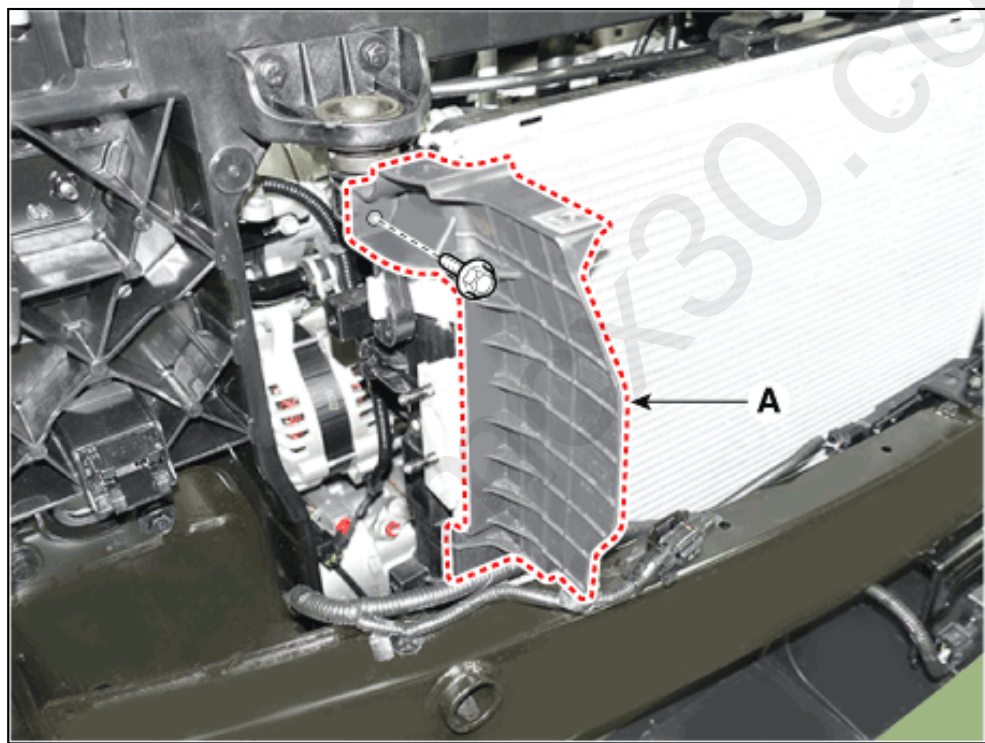
Tightening torque :

3.9 - 5.9 N.m (0.8 - 1.2 kgf.m, 2.9 - 4.3 lb-ft)

[LH]



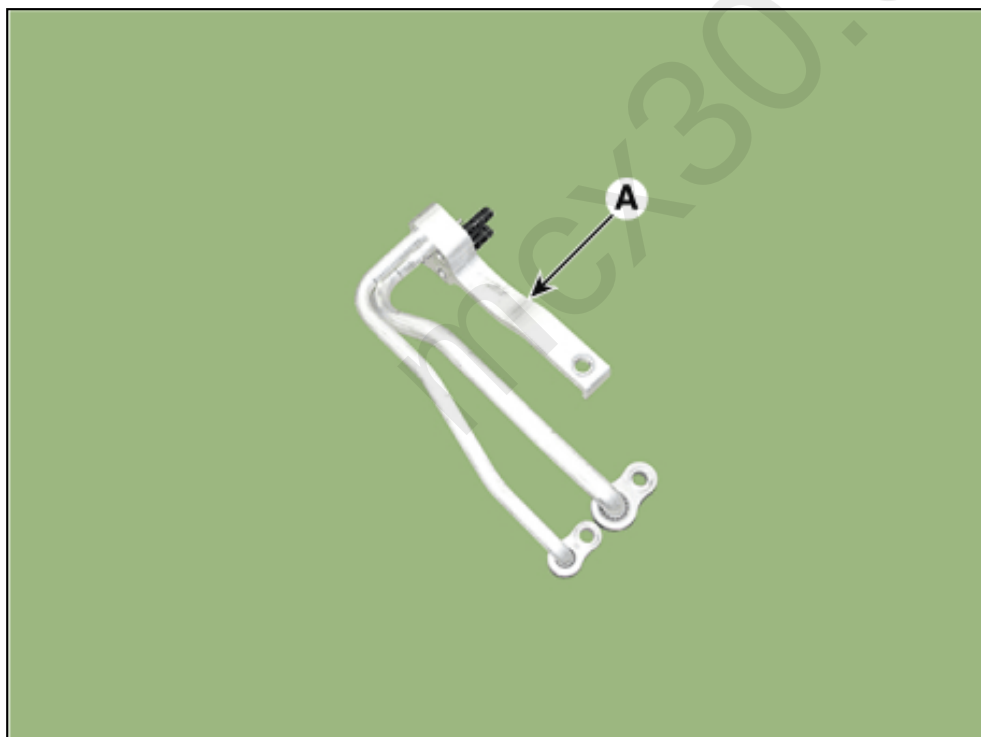
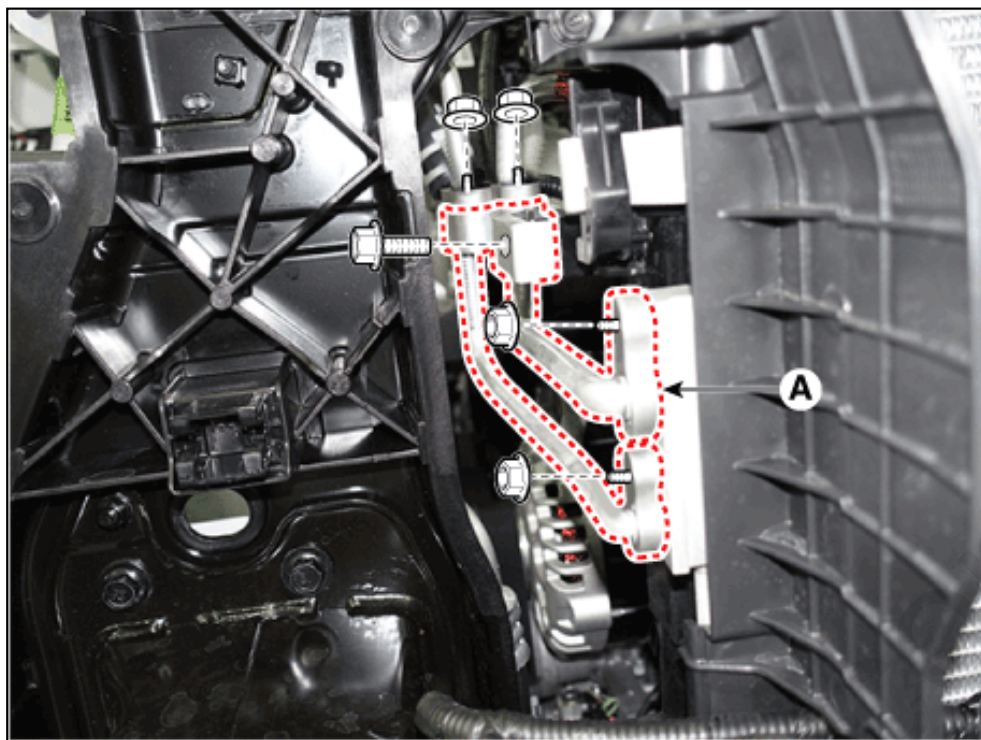
[RH]



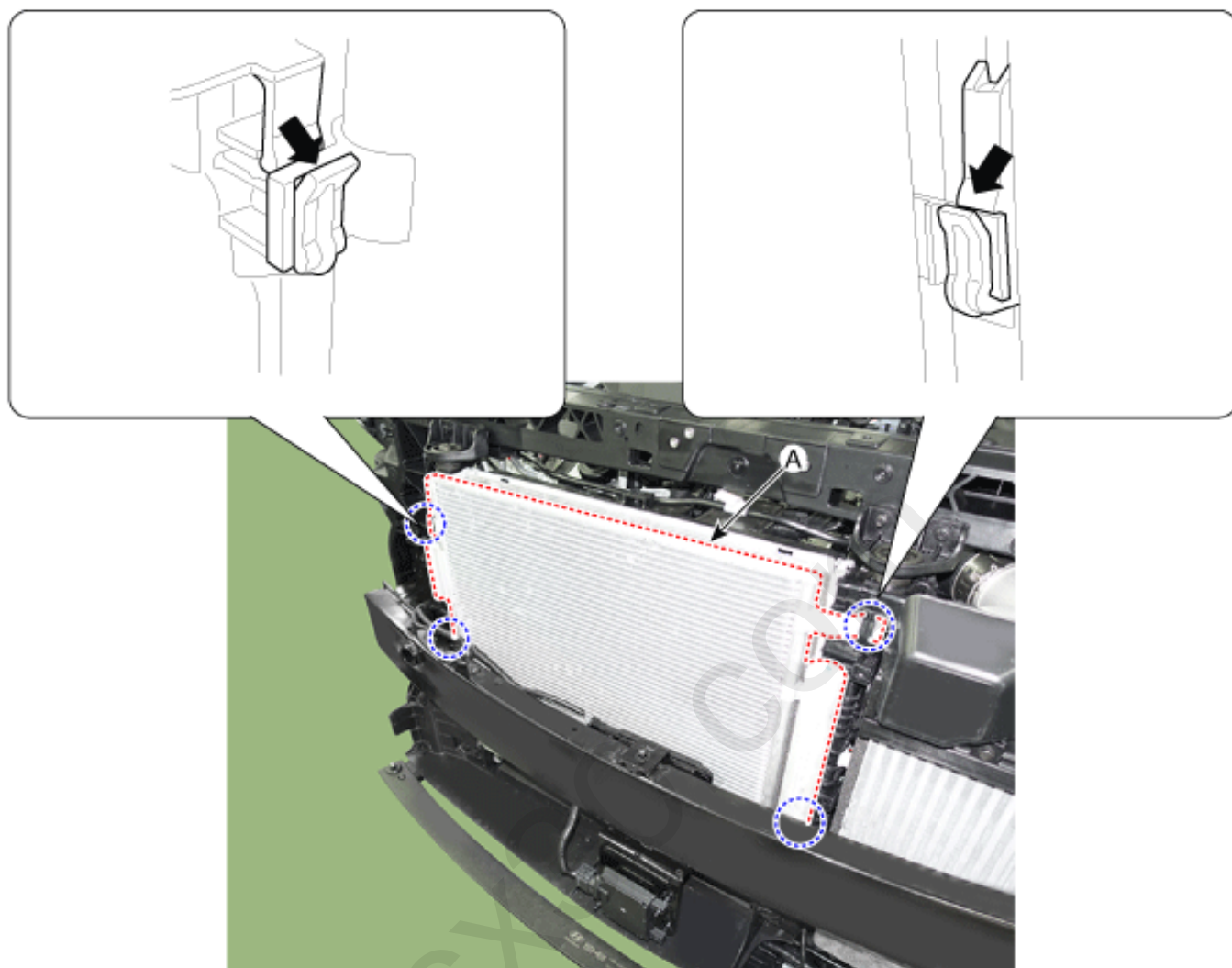
6. Loosen the mounting nuts and separate liquid line (A).

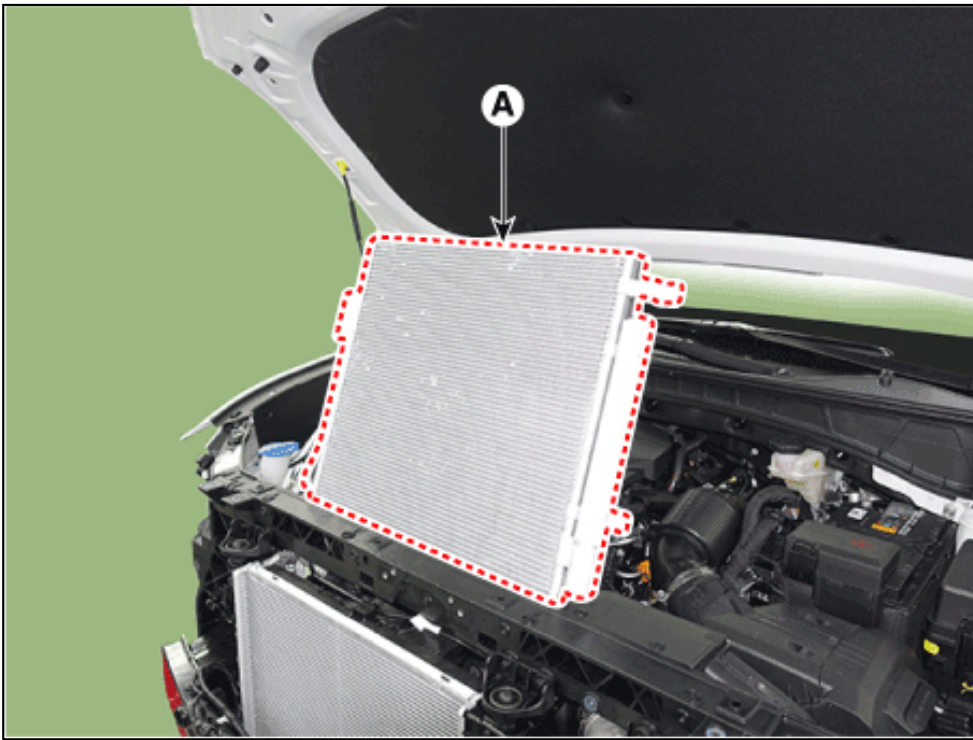
Tightening torque :

7.8 - 11.8 N.m (0.8 - 1.2 kgf.m, 5.8 - 8.7 lb-ft)



7. Press the lock pin and remove the condenser assembly (A) from radiator assembly.





8. Install in the reverse order of removal.



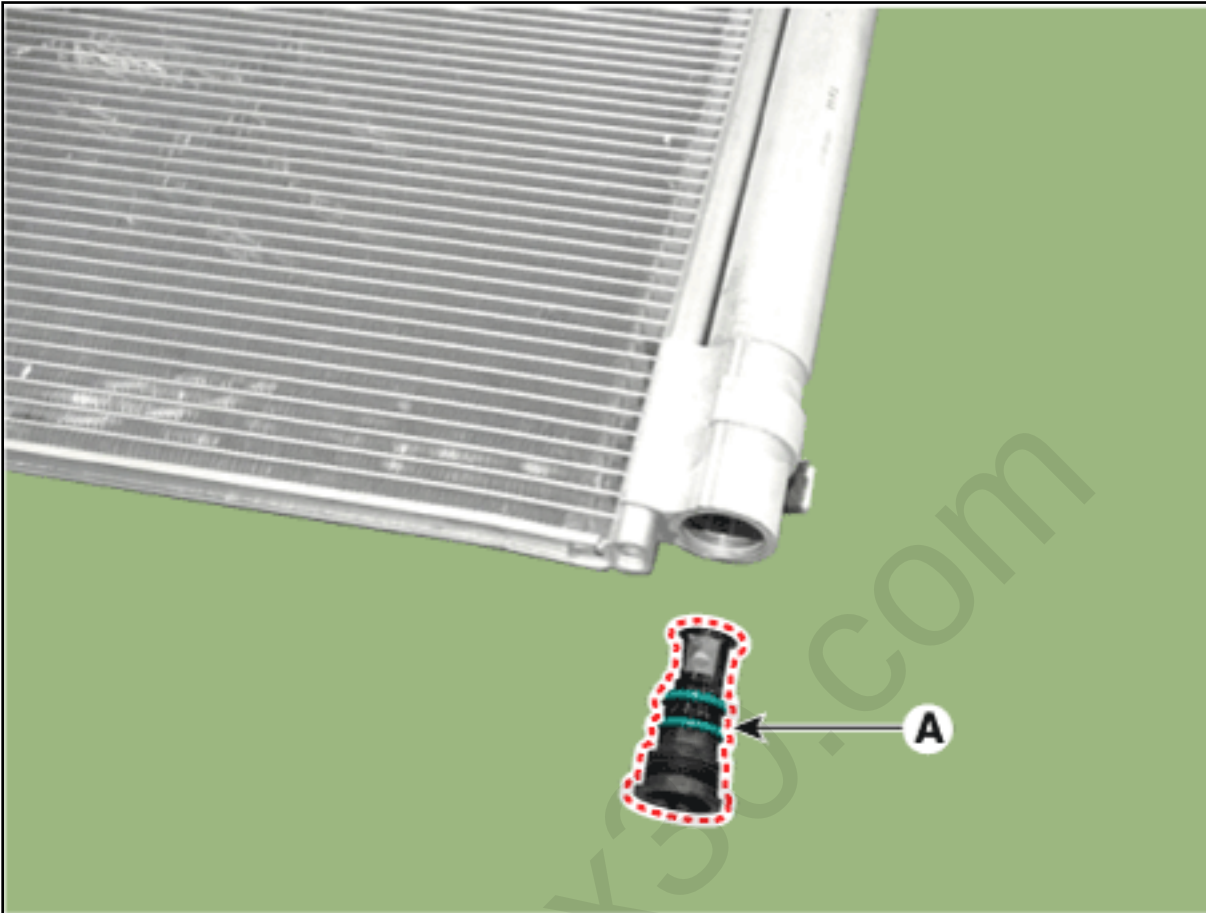
- If you're installing a new condenser, add refrigerant oil.
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a or R-1234yf to avoid leakage.
- Be careful not to damage the radiator and condenser fins when installing the condenser.
- Charge the system, and test its performance.

Replacement

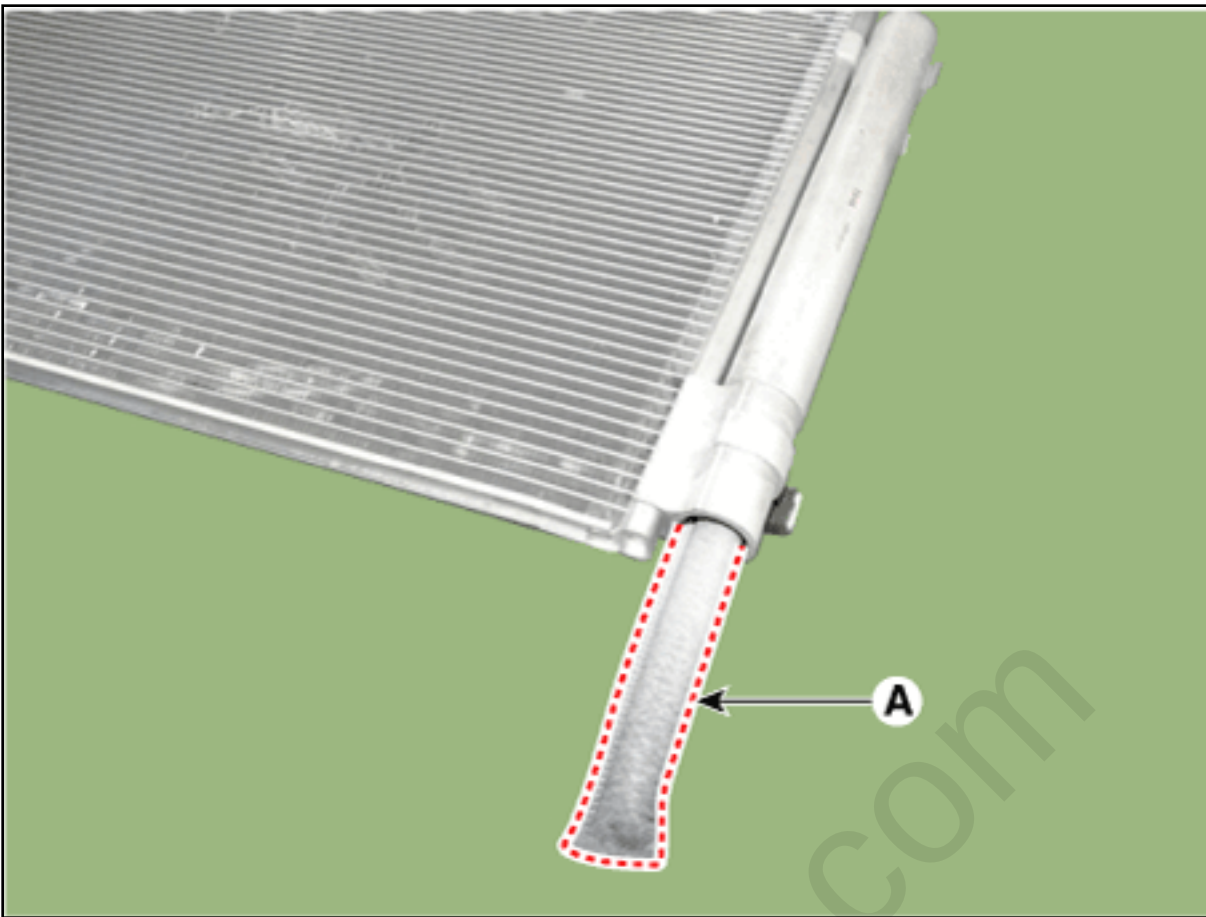
1. Remove the condensor.

(Refer to Air conditioning System - "Condensor")

2. Using a Lwrench, remove the cap (A) on the bottom of the receiver-drier.



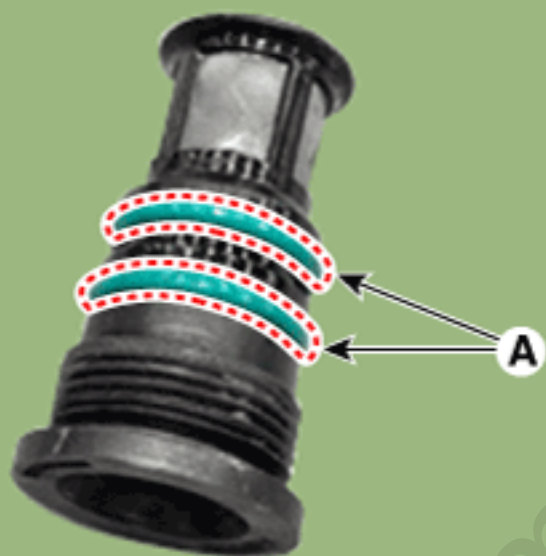
3. Remove the receiver-drier (A) from condenser using a long nose plier. Check for crumbled receiver-drier and clogged bottom cap filter.



4. Install in the reverse order of removal.



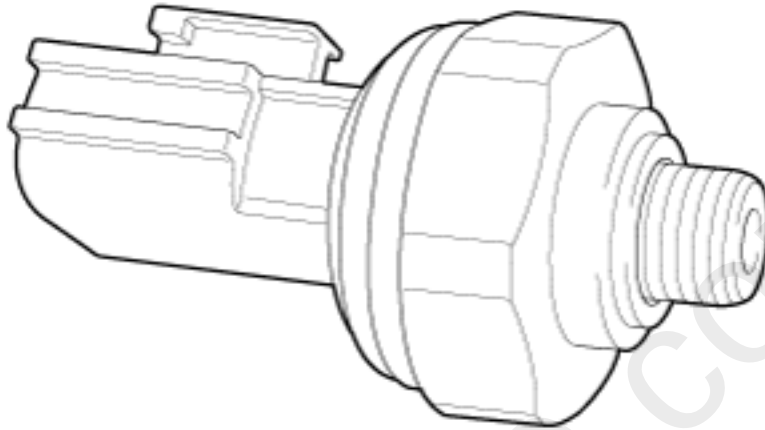
- Always replace the receiver-drier and bottom cap at the same time.
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them. Be sure to use the right O-rings for R-134a or R-1234yf to avoid leakage.
- Be careful not to damage the radiator and condenser fins when installing the condenser.
- Charge the system, and test its performance.



mcx30.com

Description

The A/C Pressure Transducer (APT) converts the pressure value of high pressure line into voltage value after measuring it. By converted voltage value, engine ECU controls the cooling fan by operating it high speed or low speed. Engine ECU stops the operation of the compressor when the temperature of refrigerant line is very high or very low irregularly to optimize air conditioning system.



Inspection



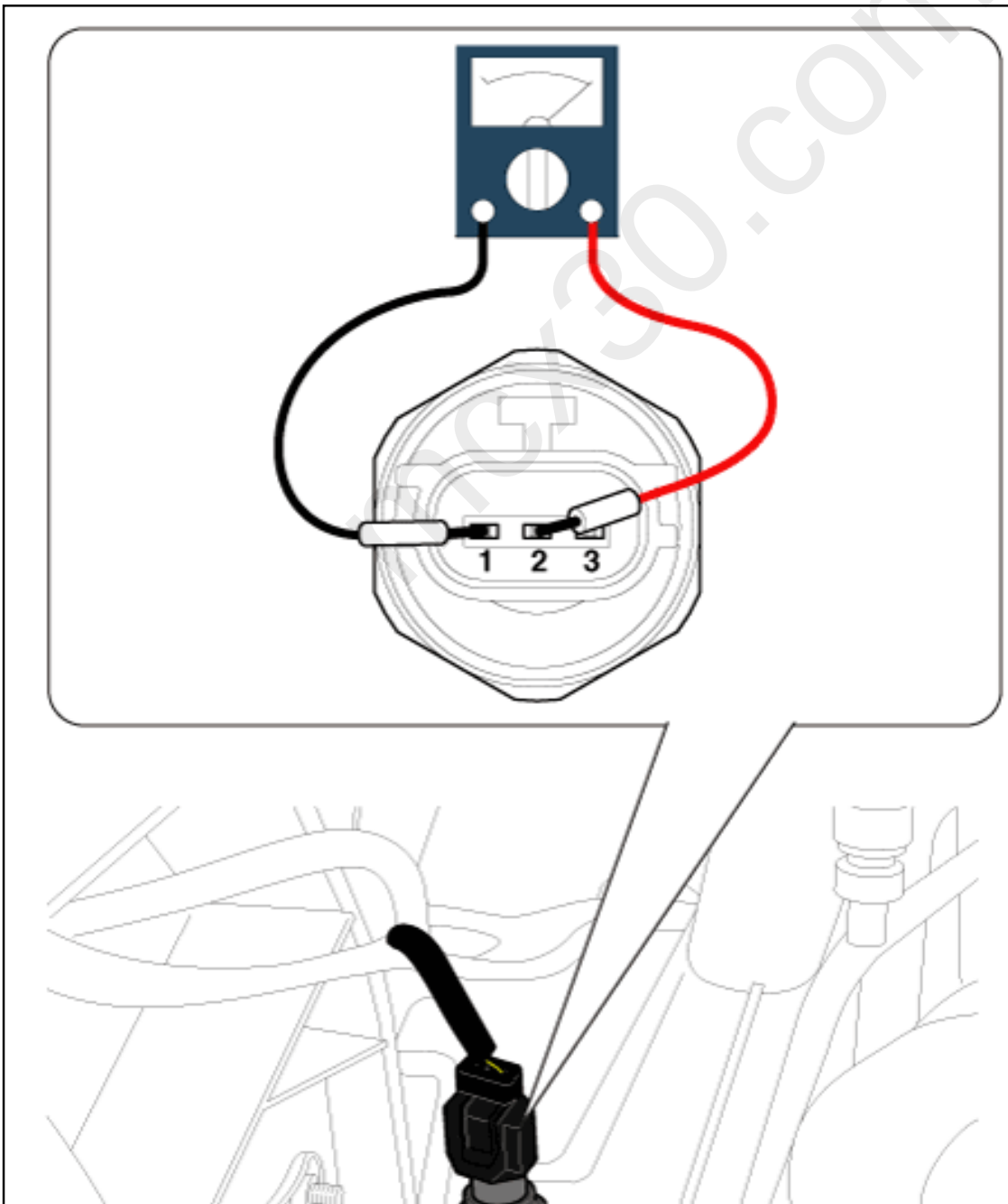
- Before measuring the pressure of the refrigerant line, check whether the refrigerant amount is charged in accordance with the specified charging amount.

(Refer to Heating, Ventilation, Air Conditioning - "Specifications")

1. Turn the ignition switch OFF.
2. Install the refrigerant recovery/recycling/charging system.
(Refer to Air Conditioning System - "Repair procedures")
3. Turn ON the ignition switch, put into operation the air conditioner.
4. Calculate the reference voltage of the Recovery/Recycle/Recharge machine high pressure value using the formula below.

$$\text{Reference voltage (V)} = 0.0088 * \text{pressure(psi)} + 0.37$$

5. Measure the sensor output voltage between terminal "1" and "2".



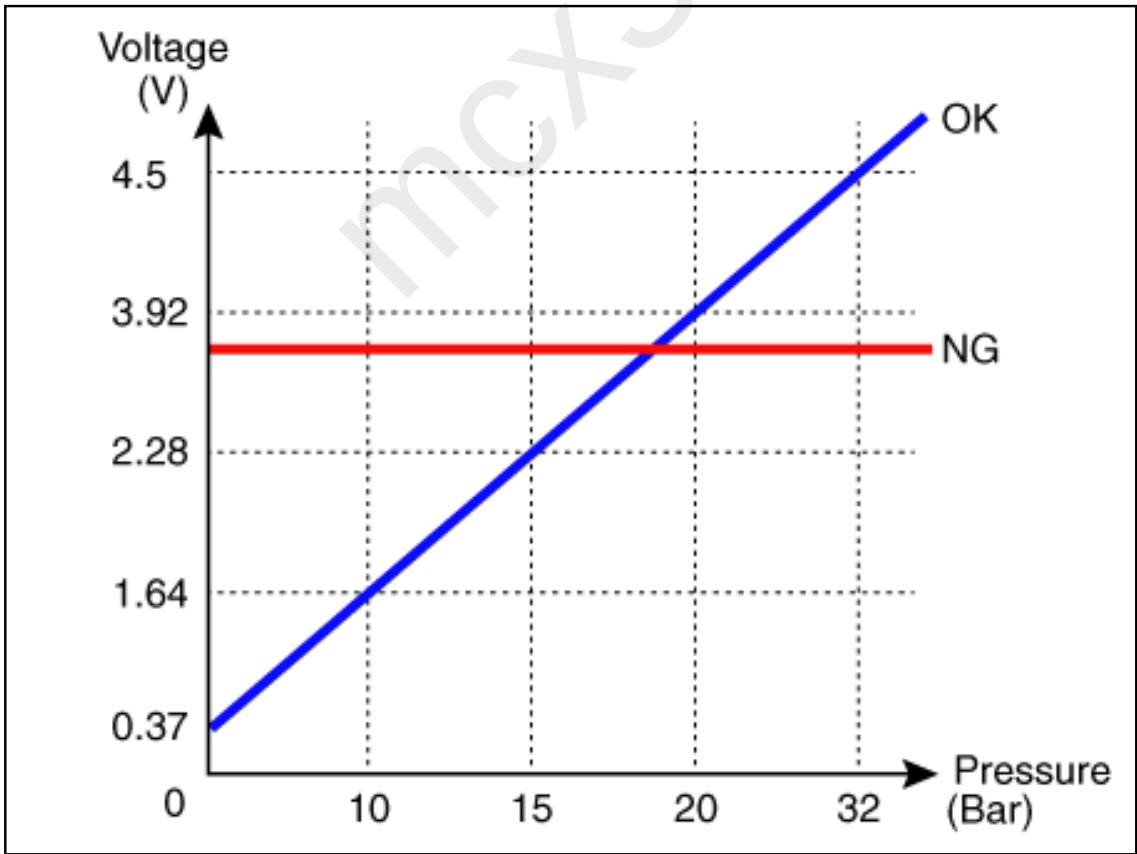


Pin No	Function
1	Ground
2	Voltage
3	Power (+5V)

6. If the reference voltage value and the sensor output voltage value are close to each other, the air conditioner pressure transducer is normal.
7. If 0V is output or the reference voltage value and sensor output voltage value are not close to each other, replace the air conditioner pressure transducer.



- Check if the output voltage changes when the high pressure value of the refrigerant line changes.



Replacement

1. Disconnect the negative (-) battery terminal.
2. Recover the refrigerant with a recovery/charging station.
(Refer to Air conditioning System - "Repair procedures")
3. Disconnect the A/C pressure transducer connector (A).



4. Remove the A/C pressure transducer (A).

Tightening torque :

9.8 - 11.8 N.m (1.0 - 1.2 kgf.m, 7.2 - 8.7 lb-ft)



5. Install in the reverse order of removal.



- When installing, replace it with a new O-ring.

Description

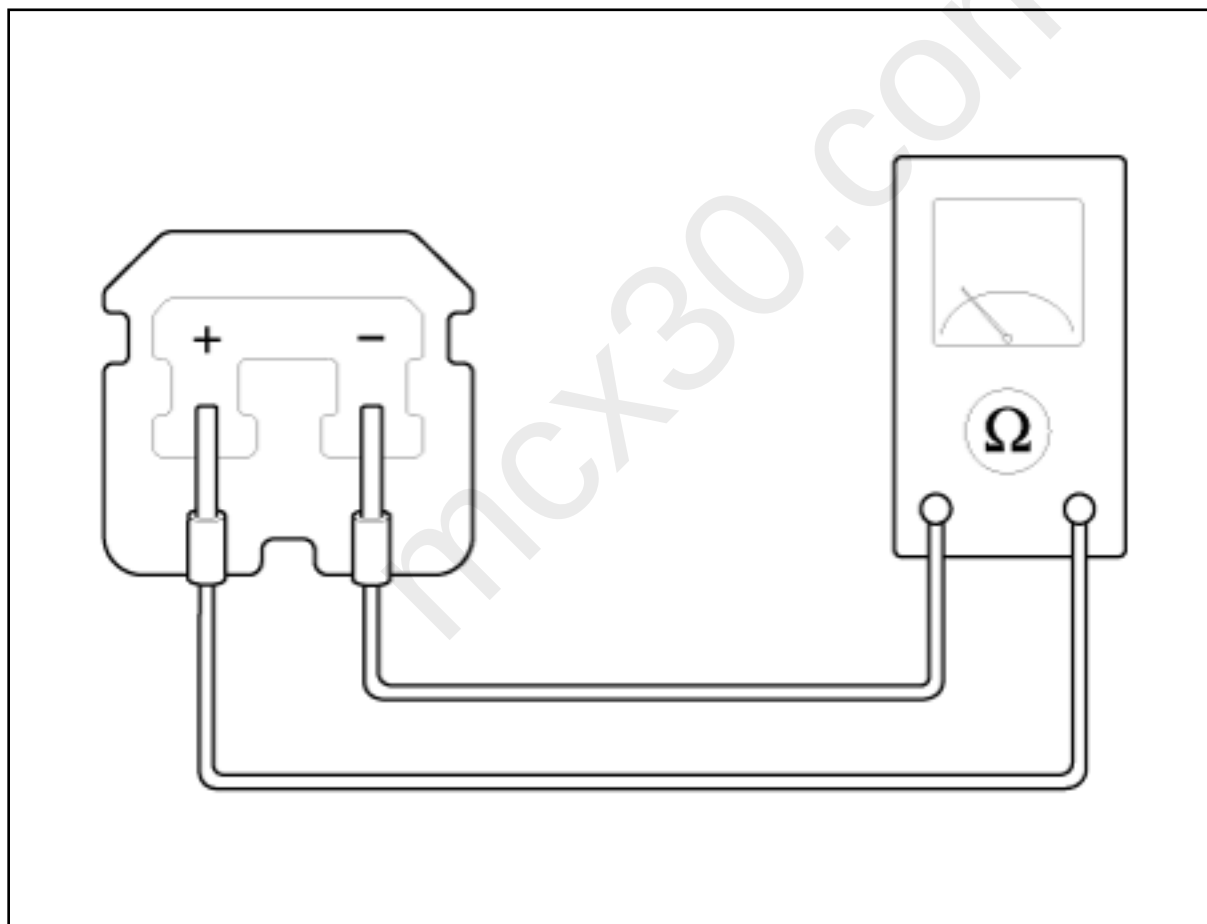
The evaporator temperature sensor will detect the evaporator core temperature and interrupt compressor relay power in order to prevent evaporator from freezing by excessive cooling.



Inspection

1. Turn the ignition switch ON.
2. Turn the A/C switch ON.
3. Measure resistance between terminal "+" and "-" of the evaporator temperature sensor.

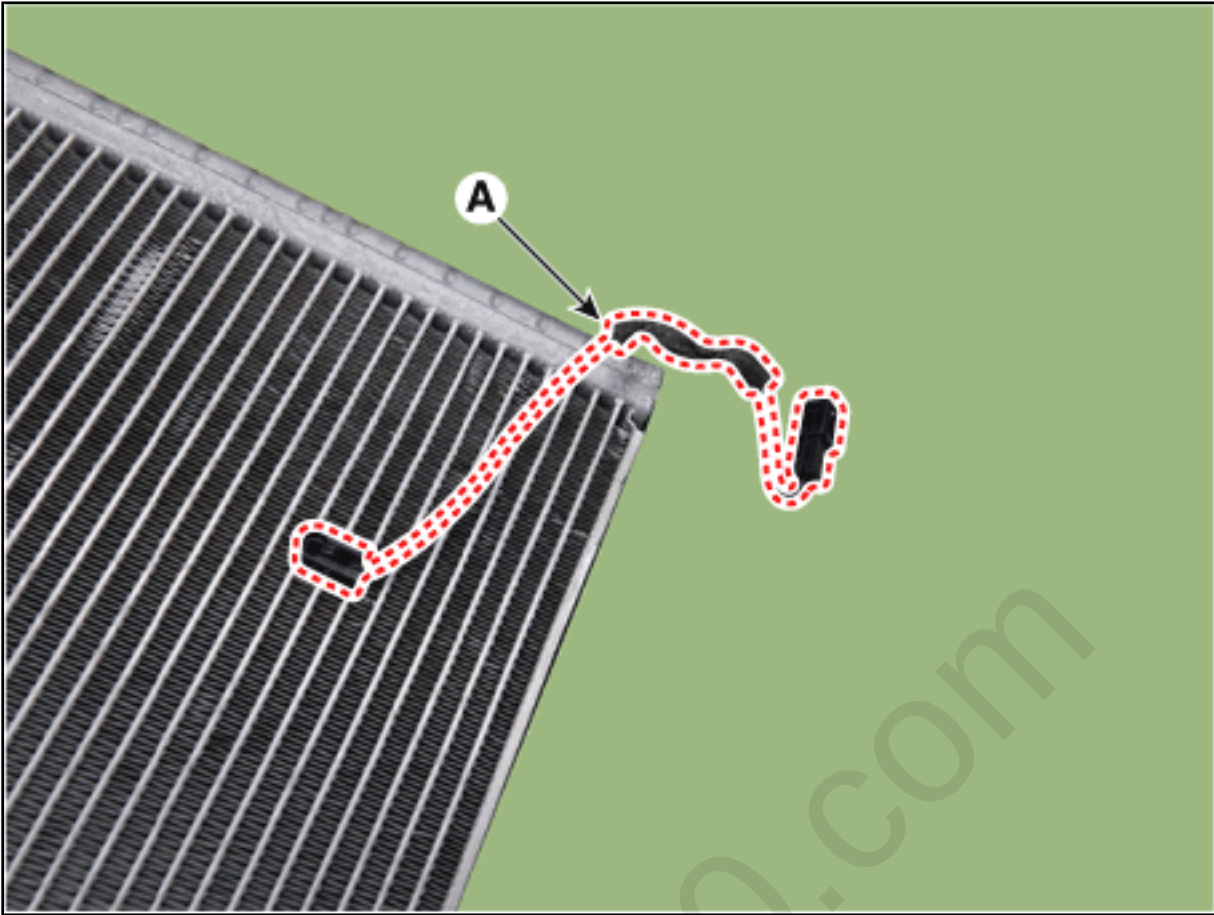
Temperature[°C(°F)]	Resistance (kΩ)	Voltage (V)
-10(14)	17.93	3.21
0(32)	11.36	2.66
10(50)	7.4	2.13
20(68)	4.94	1.66
30(86)	3.37	1.26
40(104)	2.35	0.95



Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the evaporator core.
(Refer to Heater - "Evaporator Core")

3. Separate the evaporator temperature sensor (A) from the evaporator core.



4. Install in the reverse order of removal.

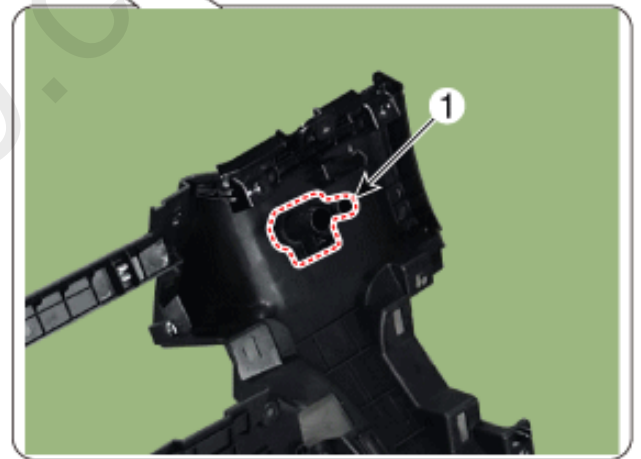
Description

The In-car air temperature sensor is built in the heater & A/C control unit.

The sensor consists of a thermistor that measures the inside temperature. The signal decided by the resistance value that changes in accordance with perceived inside temperature, is delivered to heater control unit, and according to this signal, the control unit regulates in-car temperature to intended value.

mcx30.com

Components
Location



1. In-car sensor

Replacement

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad center panel.
(Refer to Body (Interior and Exterior) - "Crash Pad Center Panel")
3. Using a screwdriver or remover, remove the in-car sensor (A).



4. Install in the reverse order of removal.



- Replace any damaged clips (pin-type retainers).
- Make sure that each of the assembly components operates properly.

Description

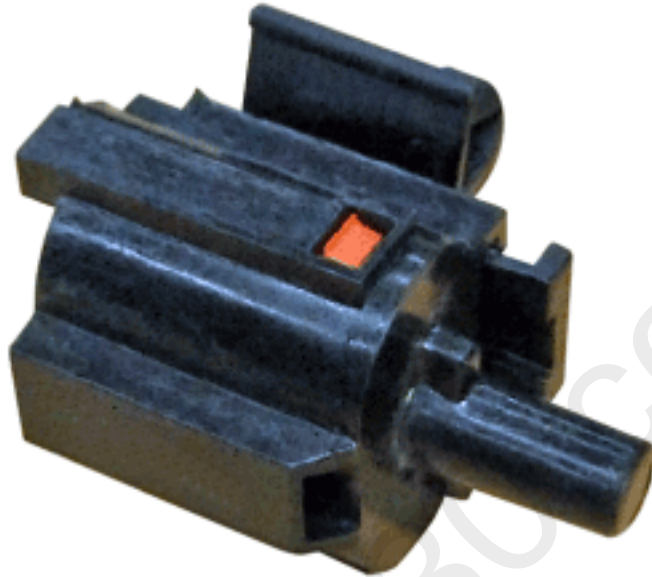
1. The photo sensor is located at the center of the defrost nozzles.
2. The photo sensor contains a photovoltaic (sensitive to sunlight) diode. The solar radiation received by its light receiving portion, generates an electromotive force in proportion to the amount of radiation received which is transferred to the automatic temperature control module so that the solar radiation compensation will be performed.

mcx30.com

Description

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 temperature.

The sensor output will be used for discharge temperature control, temperature regulation door control, blower motor level control, mix mode control and in-car humidity control.



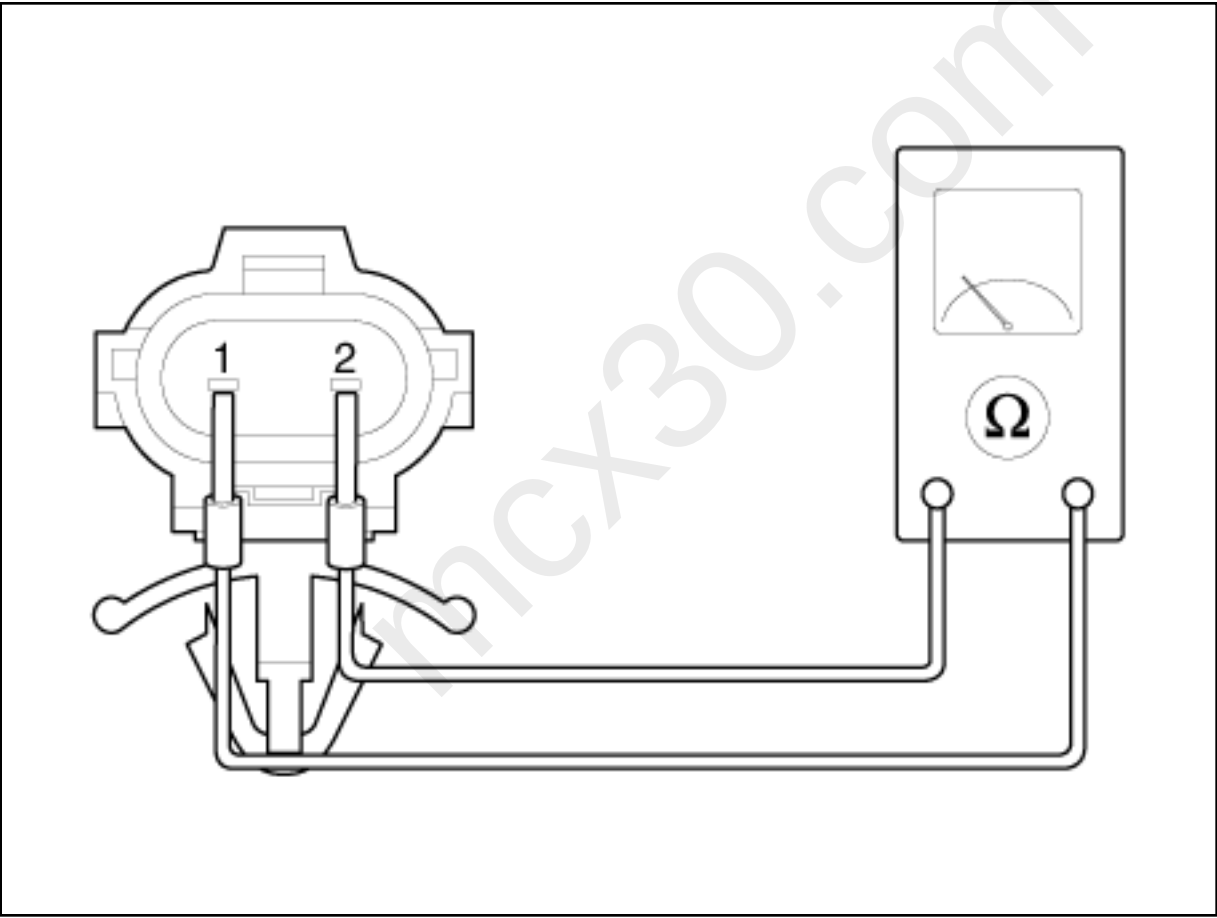
- If the ambient temperature is below 1.0°C (33.8°F), the A/C compressor will stop.
- The compressor will operate manually.

Inspection

- 1. Check the resistance of the ambient temperature sensor between terminals 1 and 2 whether it changes by changing the ambient temperature.

Specification

Ambient temperature [°C (°F)]	Resistance between terminals 1 and 2 (kΩ ± 3%)
-10(14)	164.2
0(32)	97.5
10(50)	59.6
20(68)	37.46



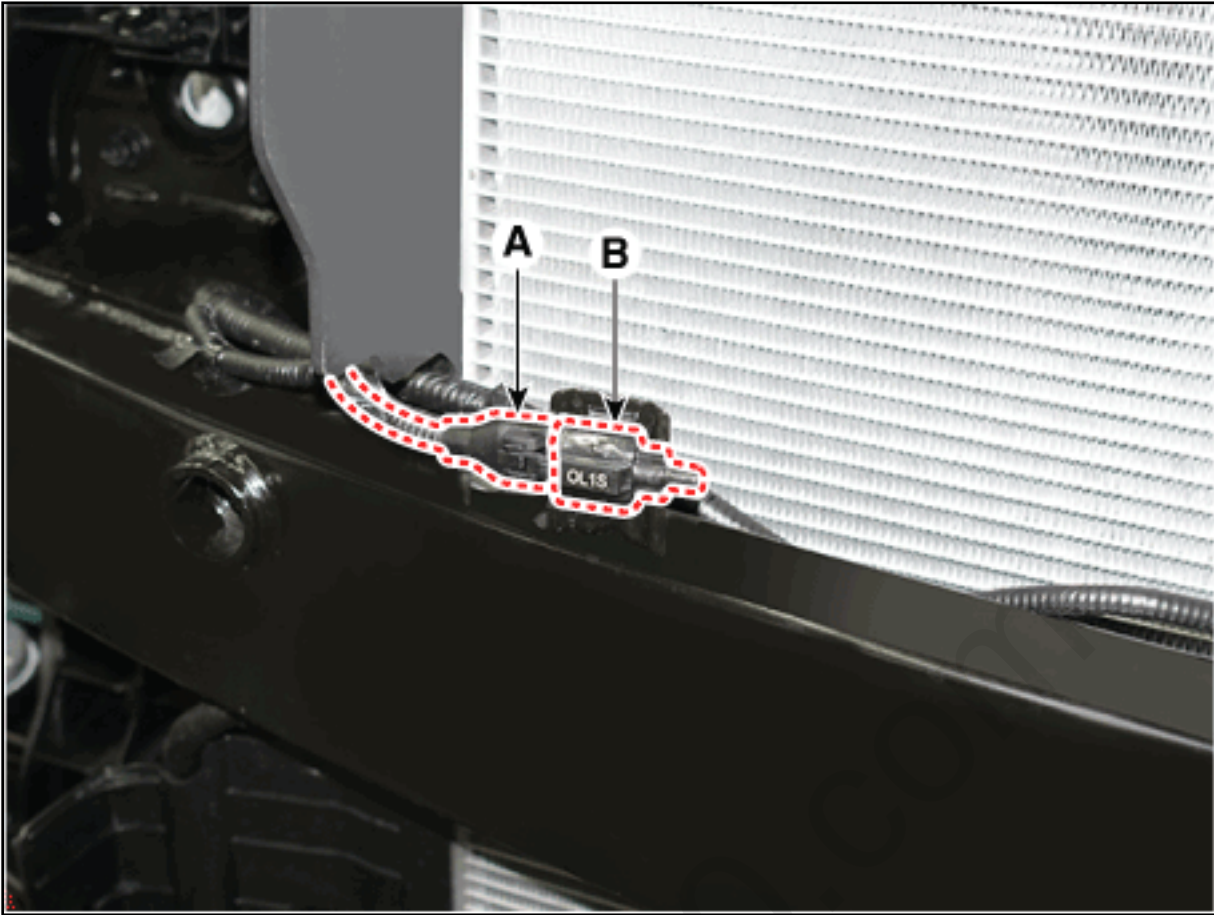
1. Ambient Sensor (+)

2. Sensor ground

Replacement

- 1. Disconnect the negative (-) battery terminal.
- 2. Remove the front bumper assembly.
(Refer to Body - "Front Bumper Assembly")

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



4. Install in the reverse order of removal.

Description

The auto defogging sensor is installed on the front window glass. The sensor judges and sends signal if moisture occurs to blow out wind for defogging. The air conditioner control module receives signal from the sensor and restrains moisture and eliminate defog by controlling the intake actuator, A/C, auto defogging actuator, blower motor rpm, and mode actuator.

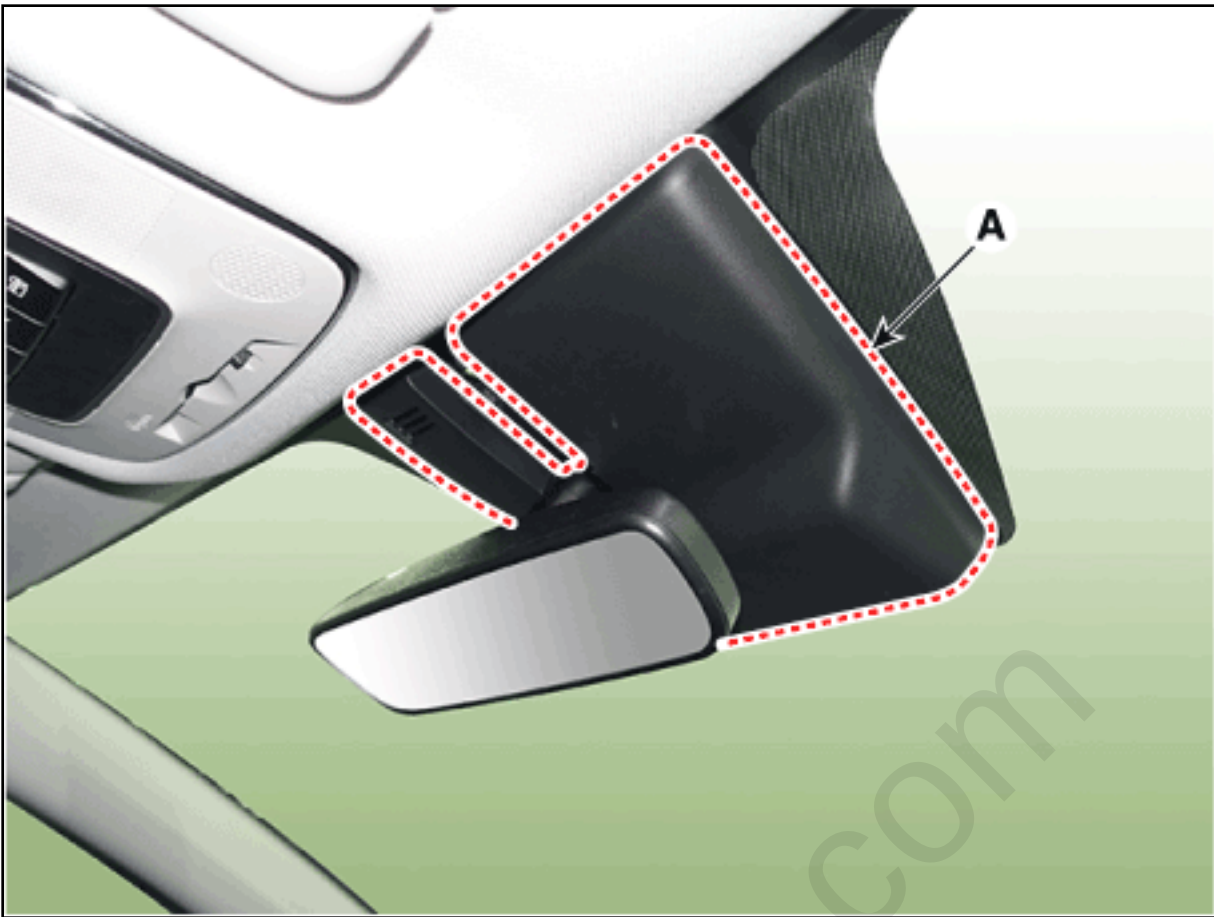
mcx30.com

Replacement

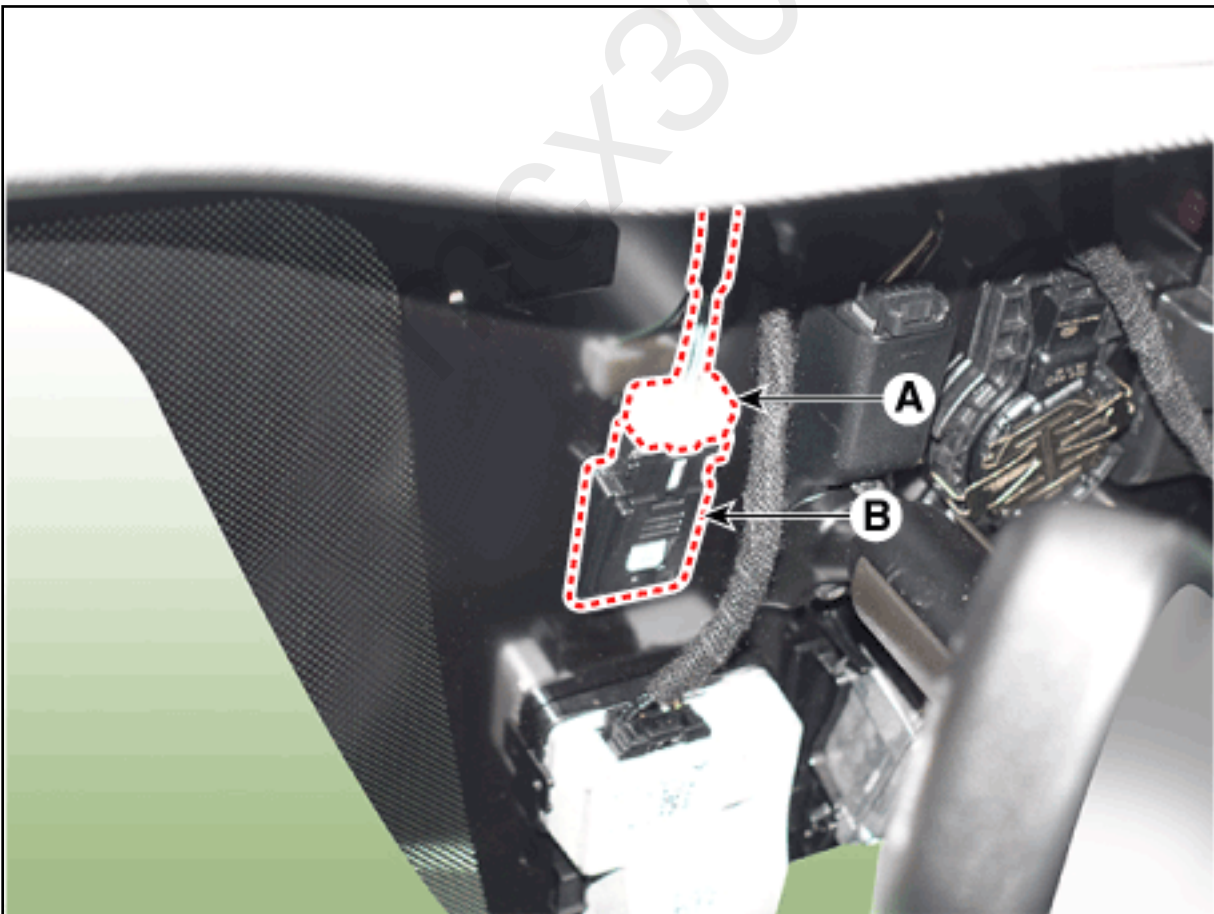
1. Disconnect the negative (-) battery terminal.
2. Remove the inside rear view mirror cover (A).



3. Remove the rain sensor cover (A).



4. Separate the auto defogging sensor connector (A) and remove the auto defogging sensor (B).



5. Install in the reverse order of removal.

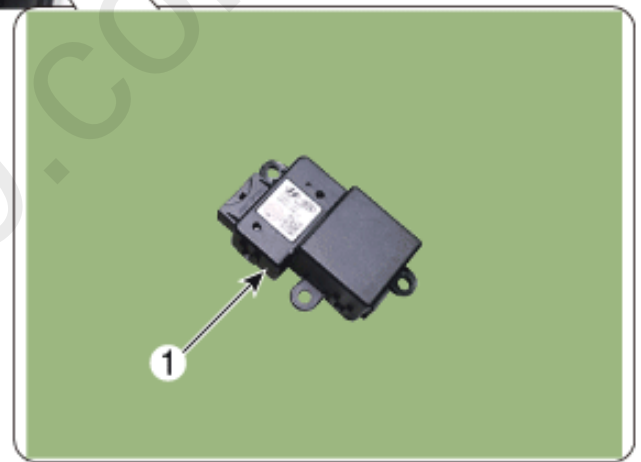
mcx30.com

Description

Monitor the air quality inside the vehicle in real time (PM sensor) and display the status on the screen. Automatically operate when fine dust concentration is high (Condition: Bet mode + A/C ON + 3rd speed or higher)

mcx30.com

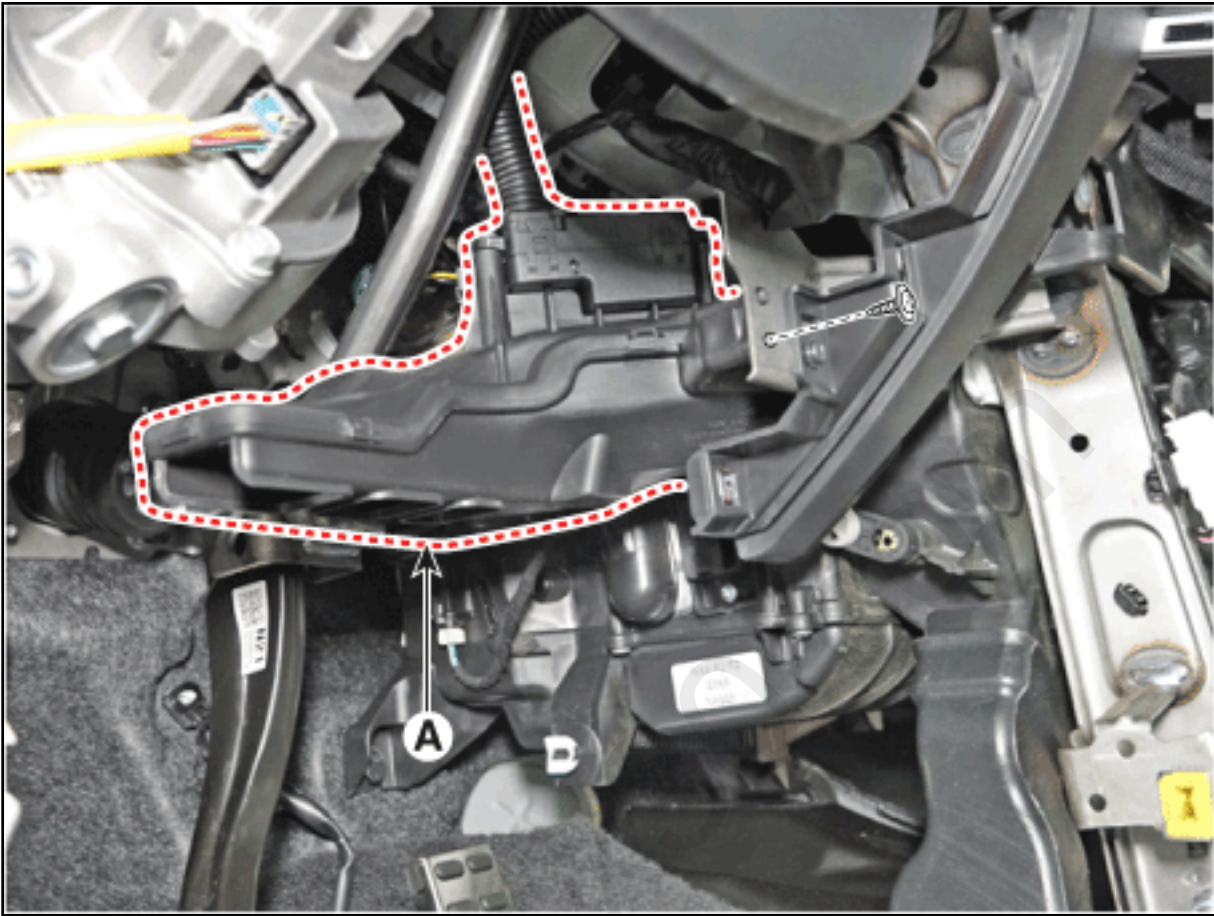
Components
Location



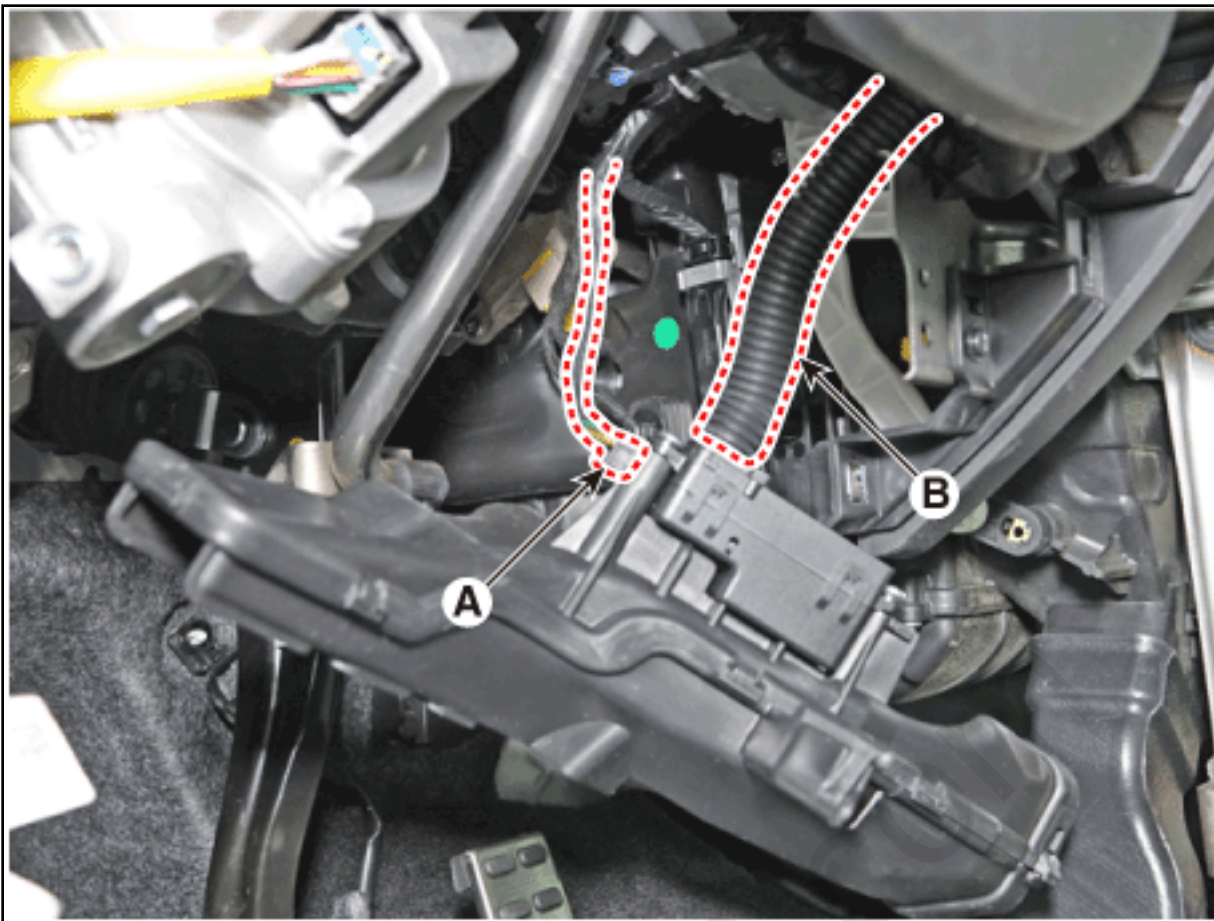
1. PM sensor

Replacement

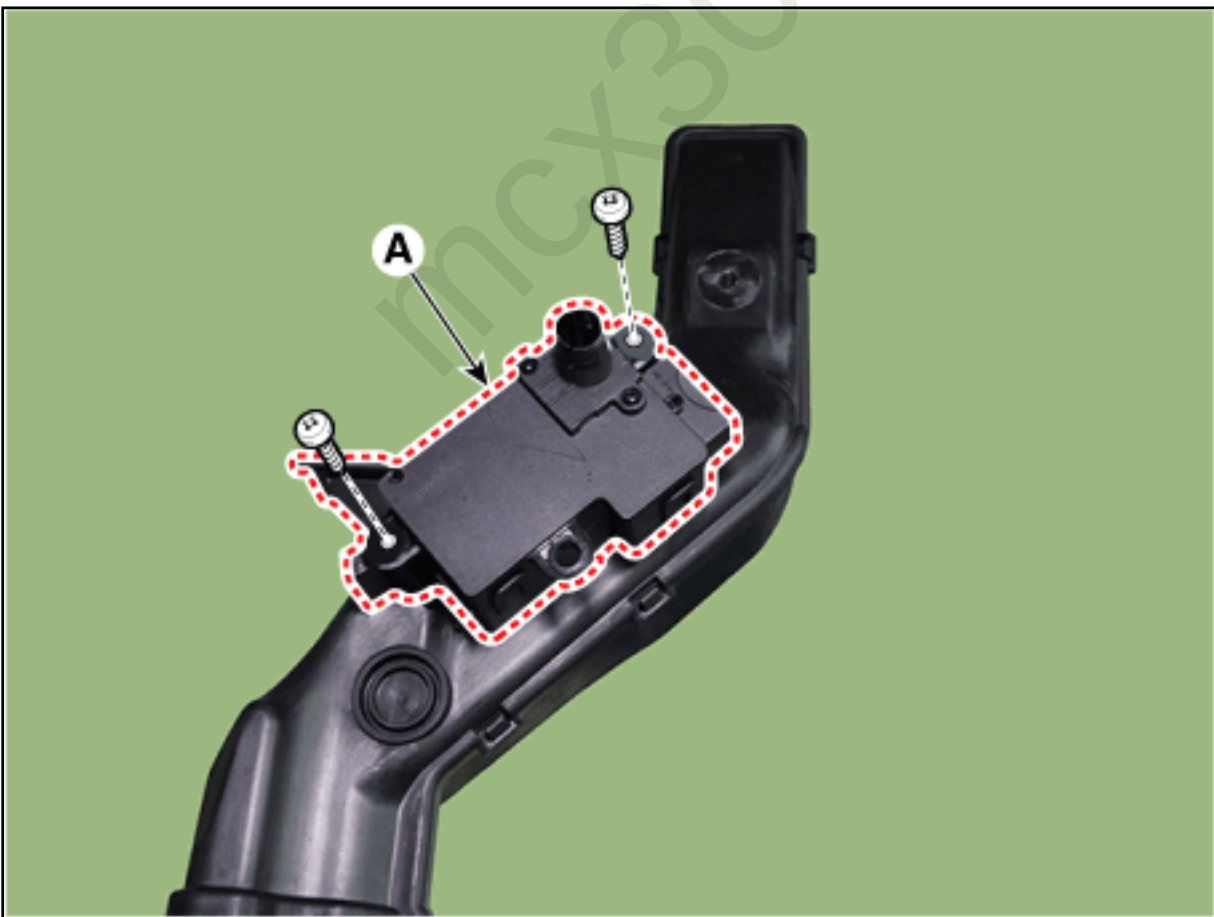
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
(Refer to Body (Interior and Exterior) - "Crash Pad Lower Panel")
3. Loosen the mounting screw, remove the shower duct (A).



4. Disconnect the PM sensor connector (A) and hose (B).



5. Loosen the mounting screw, remove the PM sensor (A).



6. Install in the reverse order of removal.



- Replace any damaged clips (or retainers or fasteners).
- Make sure that each of the assembly components operates properly.

mcx30.com