HYUNDAI Technical Service Bulletin	GROUP **HVAC**	NUMBER **17-HA-002**
	DATE **JUNE, 2017**	MODEL(S) **Multiple Models**

SUBJECT: EXTERNAL CONTROL VALVE (ECV) EQUIPPED VARIABLE A/C COMPRESSOR DIAGNOSIS PROCEDURE

This bulletin supersedes TSB 14-HA-001 with the latest updated diagnosis and kit information.

Description: This bulletin provides additional service procedures to assist the diagnosis of vehicles equipped with variable displacement A/C compressors that features an external control valve (ECV).

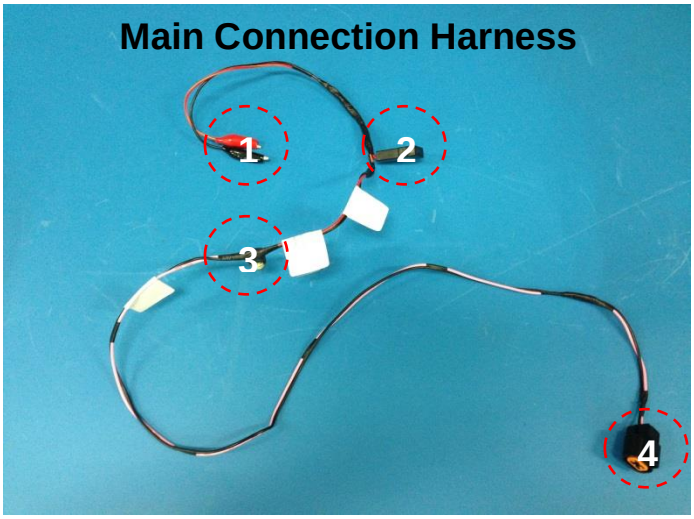
Refer to the applicable Shop Manual HVAC section of the vehicle, and then follow the procedures outlined in this bulletin whenever a vehicle with the following symptom(s) are being diagnosed:

- A/C does not get cold enough.
- The high and/or low sides are showing abnormal system pressure on the manifold gauge or GDS.
  - High side pressure should be greater than 130 PSI at idle (896kpa, 9.1kg/cm^2) with MAX A/C.

NOTICE

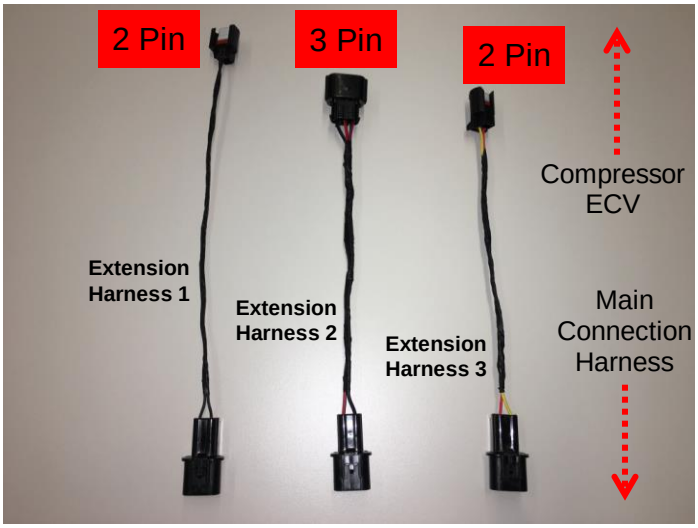
The A/C Compressor Diagnosis Kit applies only for vehicles equipped with an external control valve for the variable A/C compressor. Refer to next page for connection configuration information.

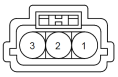
Part Name	A/C Compressor Diagnosis Kit
Part Number	00305 ACKIT TOOL (Order these tool kits through Bosch at **1-866-539-4248**)



Main Connection Harness Component Parts:

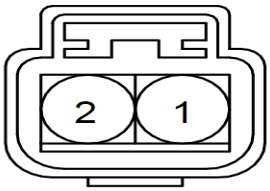
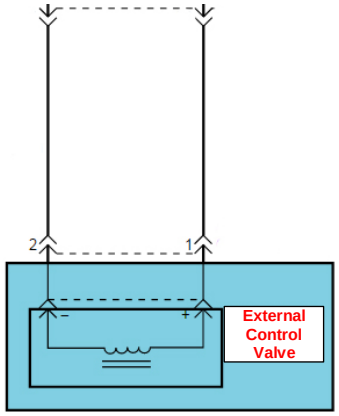
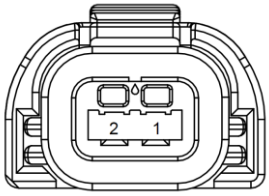
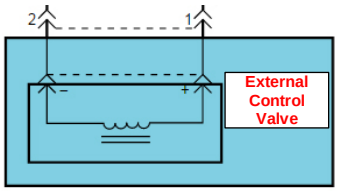
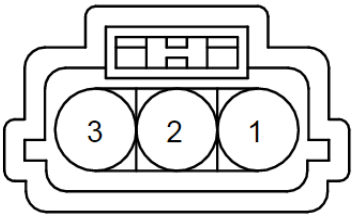
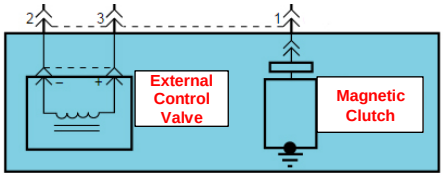
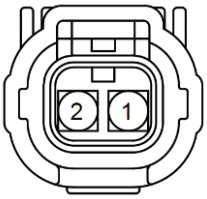
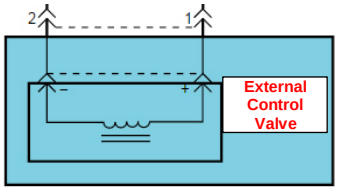
① Battery Terminal Connection Leads
② Protection Fuse (10A)
③ ON / OFF toggle switch
④ 2 Pin connector (female) for direct connection to the compressor or to Extension Harness 1, 2, and 3 (shown at right)



Extension Harnesses	Connector
Extension Harness 1 for 2 Pin	
Extension Harness 2 for 3 Pin	
Extension Harness 3 for 2 Pin	

Circulate To: General Manager, Service Manager, Parts Manager, Warranty Manager, Service Advisors, Technicians, Body Shop Manager, Fleet Repair

Connection Configurations:

Diagnosis Kit Connection Configuration	External Control Valve Connector	Comment
Main Connection Harness **(Direct connection to A/C compressor pigtail harness)**	**2 PIN** 	**For connection to the ECV pigtail harness of the A/C compressor** 
Main Connection Harness **+** **Extension Harness 1**	**2 PIN** 	**For direct connection to the ECV (not equipped with pigtail harness)** 
Main Connection Harness **+** **Extension Harness 2**	**3 PIN** 	**For use with ECV and magnetic clutch equipped A/C compressor** 
Main Connection Harness **+** **Extension Harness 3**	**2 PIN** 	**For direct connection to the ECV (not equipped with pigtail harness)** 

NOTICE

Connection configuration and type listed in the chart may be subject to change.

Warranty Information:
Normal warranty applies.

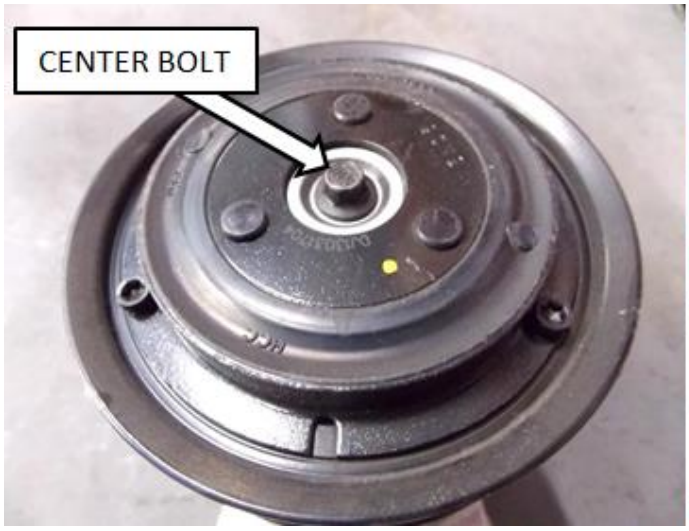
DIAGNOSIS PROCEDURE:

I. A/C Performance Test

1. Start the engine, set the blower speed to level 2, and select MAX A/C.
   - **MAX A/C:** A/C ON, Coldest Temperature Setting, Recirculated Air, and engine at idle speed.

2. Check system status related to the HVAC system and A/C compressor using the GDS.
   - The system status of all related components should be indicating ON.
   - If the GDS is showing the compressor status as OFF, then check the various wiring harness and connection points from the A/C Heater Control Unit to the A/C compressor.

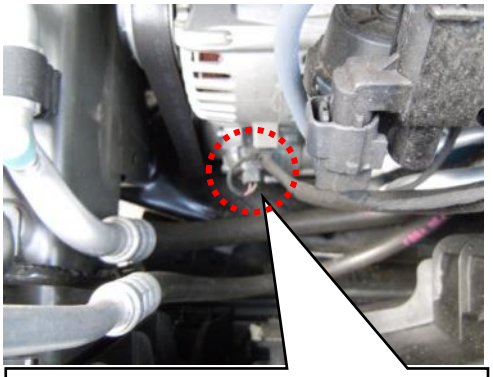
3. Check the A/C pressure using the GDS.
   - If the high side pressure is more than 130 PSI, then the A/C system is operating normally.
     - Specification: 130 PSI (896kpa, 9.1kg/cm^2)
   - **FOR CLUTCHLESS VARIABLE A/C COMPRESSORS ONLY:** If the high side pressure is below spec, inspect the limiter of the compressor pulley disc & hub assembly while rotating the engine.



   - If the <u>center bolt is stationary and not rotating with the pulley</u>, then it indicates that the torque limiter has sheared due to internal binding. **Replace the compressor.**
   - If the <u>center bolt in the pulley is rotating at the same speed as the pulley</u> (indicating a normally operating torque limiter and the compressor has not seized), then continue the diagnosis by **using the A/C Compressor Diagnosis Kit.**

II. Diagnosis Kit Connection

1. Disconnect the main vehicle wiring harness from the A/C compressor.



Main wiring harness connector

NOTICE

Turn the engine OFF before connecting the A/C Compressor Diagnosis Kit.

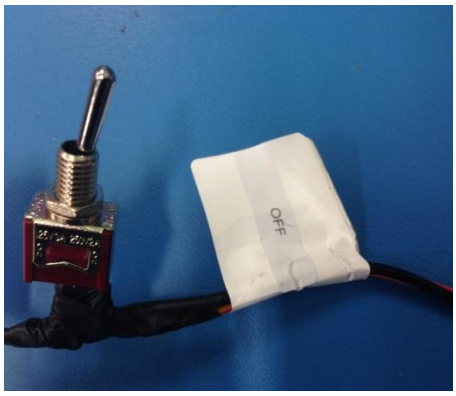
2. Connect the A/C Compressor Diagnosis Kit to the A/C compressor.
   - Compressors equipped with a pigtail harness from the ECV:
     - Connect to ECV pigtail harness using the Main Connection Harness of the kit.
   - Compressors not equipped with a pigtail harness from the ECV:
     - Connect using the applicable Extension Harness to connect directly to the ECV.

NOTICE

Refer to the Connector Configurations chart for the connector configuration and type. Connection configuration and type listed in the chart may be subject to change.

III. ECV Resistance Test

1. Connect the B+ Red and negative Black power lead clips of the diagnosis kit to a DVOM set to Ω.

		
Multimeter Probe Connection	Switch ON	Switch OFF

2. Turn the diagnosis kit switch to the ON position and check the ECV resistance using the DVOM.
   - Normal resistance: 10.1 ~ 11.1Ω when AMB temperature is 77°F.
   - Resistance may vary according to the engine compartment temperature.
     - Acceptable normal resistance range: (8 Ω ≤ ECV Resistance ≤ 14 Ω).

NOTICE

Replace the External Control Valve (ECV) if the resistance is either less than 8Ω or greater than 14Ω.

- **Refer to the applicable parts catalog for the latest service part number of the ECV.**
- **Do not replace the entire A/C compressor assembly for this condition.**

- **An ECV service part may not be available for some models with A/C compressors manufactured by certain suppliers (such as Denso). Until such service parts become available, replace the A/C compressor.**

3. Repeat the **A/C Performance Test** (started on page 3) after replacing the ECV.

IV. A/C Pressure Test

NOTICE

Before starting Step 1:
- ✓ **Turn the Engine OFF.**
- ✓ **Confirm that the diagnosis kit switch is in the OFF position.**

1. Connect the diagnosis kit to the vehicle battery terminals.
   - ➢ Connect the Red clip to B+ terminal.
   - ➢ Connect the Black clip to B- terminal.

2. Start the engine, set the blower speed to level 2, select MAX A/C, and engine at idle speed.
   - ➢ **MAX A/C:** A/C ON, Coldest Temperature Setting, and Recirculated Air

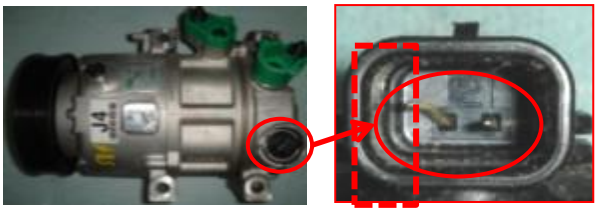
3. Turn the diagnosis kit switch to the ON position, and then check A/C pressure.
   - ➢ Specifications below are normal pressures when the ambient temperature is 77°F.
   - ➢ **Using manifold gauge:** Low side 20 ~ 40psi, High side 130 ~ 190psi
   - ➢ **Using GDS:** A/C pressure shown should read 130 PSI (896kpa, 9.1kg/cm^2) or more.

NOTICE

Do not run the A/C with the diagnosis kit switch in the ON position beyond 30 seconds. The evaporator core or expansion valve may freeze and alter pressure gauge readings.

4. If the pressure is normal using the diagnosis kit (even though it did not pass "Section I. A/C Performance Test"):
   - ➢ Check the various wiring harness and connection points from the A/C Heater Control Unit to the A/C compressor. Repair any damaged wiring or connections along the wiring harness.

5. If out of specification or erratic pressures are showing on the manifold gauge or the GDS:
   - ➢ Recharge the refrigerant and perform leak testing if refrigerant level is out of specification.
   - ➢ Check A/C line for blockage if there are no leaks found.
   - ➢ Check the radiator cooling fan for proper operation.
   - ➢ Repeat **A/C Pressure Test** to verify repair.



6. If the test results lead to out of spec compressor:
   - ➢ Check the **ECV pin for bent or poor contact** condition before replacing the compressor.
   - ➢ Replace the External Control Valve if no other faults are found and the compressor is not operational.
   - ❖ Refer to last bullet point in Page 5 regarding ECV service part availability.

NOTICE

To replace the External Control Valve, it is necessary to evacuate the A/C system and (if necessary) remove the compressor from the engine.

V. Record Results and Finalizing Repair

1. Record the diagnosis results on the repair order.
   - Document the measured ECV resistance, pressures, and the recovered refrigerant amount.

2. If a new A/C compressor is being installed, then perform a visual check of the ECV connections.
   - ECV connection and ECV pin contact condition
   - Repeat “Section I. A/C Performance Test” to verify system performance.

ECV connection check	Bent pin check	Control valve check