Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002AQOT
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: HEATING / AIR CONDITIONING: AIR CONDITIONING SYSTEM (for PHEV Model): P0EC971; A/C Low Pressure Magnetic Valve Actuator Stuck; 2023 - 2024 MY Prius Prime [03/2023 -]		

DTC	**P0EC971**	**A/C Low Pressure Magnetic Valve Actuator Stuck**

DESCRIPTION

The low pressure magnetic valve (No. 3 magnet valve assembly) is installed to the accumulator assembly.

The low pressure magnetic valve (No. 3 magnet valve assembly) is open when the ignition switch is turned off.

When the ignition switch is turned to ON, the low pressure magnetic valve (No. 3 magnet valve assembly) opens and closes according to heat pump air conditioning control.

During battery cooling, if the low pressure magnetic valve (No. 3 magnet valve assembly) is stuck open, the amount of refrigerant flowing to the battery is reduced and battery cooling functionality decreases.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	MEMORY	DTC OUTPUT FROM	PRIORITY	NOTE
P0EC971	A/C Low Pressure Magnetic Valve Actuator Stuck	Diagnosis condition: During battery cooling Malfunction status: Low pressure magnetic valve stuck open Detection time: Continuously for 5 minutes or more Trip: 2 trip detection logic	• Low pressure magnetic valve (No. 3 magnet valve assembly) • Heat pump ECU assembly	Come on	Memorized	Air Conditioner	B	SAE Code: P0EC9

HINT:

Battery cooling control can be performed from the Active Test of the hybrid battery system.

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MONITOR DESCRIPTION

During cooling battery cooling or battery cooling operations, when the compressor with motor assembly is normal but battery cooling functionality has decreased, the air conditioning amplifier assembly illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0EC9: A/C Low Pressure Magnetic Valve Actuator Stuck
Required Sensors/Components (Main)	Low pressure magnetic valve (No. 3 magnet valve assembly)
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	5 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever the following DTCs are not stored	B3A0A (A/C Refrigerant Expansion Valve Actuator Stuck/Open) B1385 (A/C Refrigerant Expansion Valve Actuator "B" Stuck/Open) P153A (A/C Refrigerant Temperature/Ambient Air Temperature Performance) P0531 (A/C Refrigerant Pressure Sensor "A" Circuit Range/Performance) P0531 (A/C Refrigerant Pressure Sensor "A" Circuit Range/Performance (Vcc)) P0532 (A/C Refrigerant Pressure Sensor "A" Circuit Low) P0533 (A/C Refrigerant Pressure Sensor "A" Circuit High) P0072 (Ambient Air Temperature Sensor Circuit "A" Low) P0073 (Ambient Air Temperature Sensor Circuit "A" High) P0EBD (A/C Refrigerant Temperature Sensor "A" Circuit High) P0EBE (A/C Refrigerant Temperature Sensor "A" Circuit Low) P2612 (A/C Refrigerant Distribution Valve "A" Control Circuit Low) P2613 (A/C Refrigerant Distribution Valve "A" Control Circuit High) B3A0C (A/C Refrigerant Expansion Valve Actuator Control Circuit Low) B3A0D (A/C Refrigerant Expansion Valve Actuator Control Circuit High) B1388 (A/C Refrigerant Expansion Valve Actuator "B" Control Circuit Low) B1389 (A/C Refrigerant Expansion Valve Actuator "B" Control Circuit High) U0111 (Lost Communication With Battery Energy Control Module "A") B14B0 (Lost Communication With Heat Pump Control Module) P0C43 (Hybrid/EV Battery Refrigerant temperature Sensor "A" Circuit Range/Performance) P0CD6 (Hybrid/EV Battery Refrigerant temperature Sensor "B" Circuit Range/Performance) P1B7A (Hybrid/EV Battery Refrigerant temperature Sensor "C" Circuit Range/Performance)

	P1B7F (Hybrid/EV Battery Refrigerant temperature Sensor "D" Circuit Range/Performance) P1B84 (Hybrid/EV Battery Pressure Sensor Range/Performance)
Battery voltage	11 V or higher
Refrigerant cycle	A/C cooling and battery cooling or Battery cooling

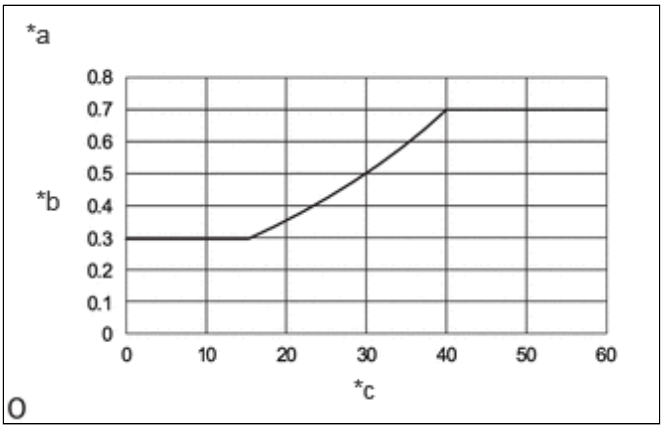
TYPICAL MALFUNCTION THRESHOLDS

A malfunction is detected if any of the following conditions apply.

Condition 1

Compressor target speed	3420 rpm or higher
Battery cooling refrigerant pressure sensor pressure versus ambient temperature	Standard in Table 1 or higher
Battery cooling refrigerant temperature sensor (outlet) (No. 1 traction battery cooler conductor) temperature	20 °C or higher

Table 1



*a	Refrigerant Pressure Map
*b	Refrigerant Pressure Criteria (MPa)
*c	Ambient Temperature Sensor Value (°C)

Condition 2

Battery cooling refrigerant temperature sensor (inlet) (No. 1 traction battery cooler tube) temperature	5°C or higher
Compressor actual speed	1000 rpm or higher
Compressor discharge gas pressure	2.5 MPa or less

Condition 3

Refrigerant cycle	A/C Cooling and Battery Cooling
Opening angle of battery cooling expansion valve (No. 1 traction battery cooler tube)	14 % or higher

Temperature of battery cooling refrigerant temperature sensor (outlet) (No. 1 traction battery cooler conductor)	20 °C or higher

Refrigerant Cycle	Battery Cooling
Opening angle of battery cooling expansion valve (No. 1 traction battery cooler tube)	3 % or higher
Temperature of battery cooling refrigerant temperature sensor (outlet) (No. 1 traction battery cooler conductor)	20 °C or higher

CONFIRMATION DRIVING PATTERN

HINT:

- After repair has been completed, clear the DTC and then check that the vehicle has returned to normal by performing the following All Readiness check procedure.

  Click here INFO
- When clearing the permanent DTCs, refer to the "CLEAR PERMANENT DTC" procedure.

  Click here INFO

1. Connect the GTS to the DLC3.
2. Turn the ignition switch to ON.
3. Turn the GTS on.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
5. Turn the ignition switch off and wait for at least 30 seconds.
6. Turn the ignition switch to ON (READY) [A].
7. Turn the GTS on.
8. Check that the following conditions are met and perform the Active Test according to the display on the GTS. [B]

   Enter the following menus: Powertrain / HV Battery / Active test / Hybrid/EV Battery Refrigerant Cooling Control.

   Condition

Ambient temperature	5 °C or higher
Operation time	10 minutes

   HINT:

   - In order to perform "Hybrid/EV Battery Refrigerant Cooling Control", the HV battery minimum temperature must be 20°C (68°F) and the refrigerant temperature must be 20°C (68°F) or higher.

     If the above conditions are not established, perform the "Hybrid/EV Battery Heater Relay" Active Test in an environment with an ambient temperature of 5°C (41°F) or higher and increase the HV battery temperature.

     The temperature will drop after the heater is stopped, so increase the values of "Hybrid/EV Battery Temperature 1 to 15, Hybrid/EV Battery Refrigerant Temperature (Duct Outlet 1)" in the Data List to 21°C (70°F) or higher.

     (At an ambient temperature of 5°C (41°F), "Hybrid/EV Battery Heater Relay" will need to be performed for approximately 10 hours.)
   - Perform this step with the A/C blower switch off.
9. Wait 5 minutes or more. [C]
10. Enter the following menus: Body Electrical / Air Conditioner / Trouble Codes [D].
11. Read the pending DTCs.

HINT:

- If a pending DTC is output, the system is malfunctioning.
- If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Body Electrical / Air Conditioner / Utility / All Readiness.
13. Input the DTC: P0EC971.
14. Check the DTC judgment result.

GTS DISPLAY	DESCRIPTION
NORMAL	◦ DTC judgment completed ◦ System normal
ABNORMAL	◦ DTC judgment completed ◦ System abnormal
INCOMPLETE	◦ DTC judgment not completed ◦ Perform driving pattern after confirming DTC enabling conditions

HINT:

- If the judgment result is NORMAL, the system is normal.
- If the judgment result is ABNORMAL, the system is malfunctioning.
- If the judgment result is INCOMPLETE, perform steps [B] through [D] again.
- [A] to [D]: Normal judgment procedure.

  The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.
- When clearing the permanent DTCs, do not disconnect the cable from the auxiliary battery terminal or attempt to clear the DTCs during this procedure, as doing so will clear the universal trip and normal judgment histories.

PROCEDURE

1.	**CHECK DTC (AIR CONDITIONING SYSTEM)**

(a) Check for DTCs.

Body Electrical > Air Conditioner > Trouble Codes

HINT:

Check even when the DTCs detected for temporary failures.

RESULT	PROCEED TO
P15017A is not output	A
P15017A is output	B

RELEVANT DTC	
P15017A	Hybrid/EV Battery Cooling Refrigerant Gas Fluid Leak or Seal Failure

B ▶ **GO TO DTC CHART (P15017A)**

A

2.	**CHECK DTC (AIR CONDITIONING SYSTEM)**

(a) Check for DTCs.

Body Electrical > Air Conditioner > Trouble Codes

HINT:

Check even when the DTCs detected for temporary failures.

RESULT	PROCEED TO
B138571 is not output	A
B138571 is output	B

RELEVANT DTC	
B138571	A/C Cooling Electric Expansion Valve Actuator Stuck

B **GO TO DTC CHART (B138571)**

A

3.	**CHECK DTC (HYBRID BATTERY CONTROL SYSTEM)**

(a) Check for DTCs.

Powertrain > HV Battery > Trouble Codes

HINT:

Check even when the DTCs detected for temporary failures.

RESULT	PROCEED TO
P1B831C is not output	A
P1B831C is output	B

RELEVANT DTC	
P1B831C	Hybrid/EV Battery Pack Refrigerant Pressure Sensor "A" Circuit Range/Performance Circuit Voltage Out of Range

B ▶ **GO TO DTC CHART (P1B831C)**

A

▼

4.	**INSPECT LOW PRESSURE MAGNETIC VALVE (NO. 3 MAGNET VALVE ASSEMBLY)**

Click here INFO

NG ▶ **REPLACE LOW PRESSURE MAGNETIC VALVE (NO. 3 MAGNET VALVE ASSEMBLY)**

OK

▼

5.	**CHECK DTC (HYBRID BATTERY CONTROL SYSTEM)**

(a) Check for DTCs.

Powertrain > HV Battery > Trouble Codes

HINT:

Check even when the DTCs detected for temporary failures.

RESULT	PROCEED TO
P19CF62 is not output	A
P19CF62 is output	B

RELEVANT DTC	
P19CF62	Hybrid/EV Battery Pack Coolant Temperature Sensor System Signal Compare Failure

B ▶ **GO TO DTC CHART (P19CF62)**

A

▼

6.	**CHECK DTC (HYBRID BATTERY CONTROL SYSTEM)**

(a) Check for DTCs.

Powertrain > HV Battery > Trouble Codes

HINT:

Check even when the DTCs detected for temporary failures.

RESULT	PROCEED TO
P0D1A71 is not output	A
P0D1A71 is output	B

RELEVANT DTC	
P0D1A71	Hybrid/EV Battery Pack Coolant Control Valve "B" Performance/Stuck Off Actuator Stuck

A ▶ **REPLACE HEAT PUMP ECU ASSEMBLY**

B ▶ **GO TO DTC CHART (P0D1A71)**