

DTC	P0116	Engine Coolant Temperature Circuit Range / Performance Problem
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DESCRIPTION

Refer to DTC P0115 (See page [ES-87](#)).

DTC No.	DTC Detection Conditions	Trouble Areas
P0116	Case 1: Engine Coolant Temperature (ECT) is between 35°C and 60°C (95°F and 140°F) when engine started, and conditions (a) and (b) are met (2 trip detection logic): (a) Vehicle driven at varying speeds (accelerated and decelerated) (b) ECT change is within 3°C (5.4°F) of initial ECT Case 2: ECT is more than 60°C (140°F) when engine started, and conditions (a) and (b) are met (6 trip detection logic): (a) Vehicle driven at varying speeds (accelerated and decelerated) (b) ECT measurements change is within 1°C (1.8°F) of initial ECT on 6 successive occasions	ECT sensor

MONITOR DESCRIPTION

The ECT sensor is used to monitor the ECT. The ECT sensor has a built-in thermistor with a resistance that varies according to the temperature of the engine coolant. When the ECT is low, the resistance of the thermistor increases. When the temperature is high, the resistance drops. These variations in the resistance are reflected in the voltage output from the ECT sensor.

The ECM monitors the sensor voltage and uses this value to calculate the ECT. If the sensor voltage output deviates from the normal operating range, the ECM interprets this deviation as a malfunction in the ECT sensor and sets the DTC.

Examples:

- Upon starting the engine, the ECT is between 35°C and 60°C (95°F and 140°F). If, after driving for 250 seconds, the ECT change is within 3°C (5.4°F) of the starting temperature, the DTC is set (2 trip detection logic).
- Upon starting the engine, the ECT is over 60°C (140°F). If, after driving for 250 seconds, the ECM change is within 1°C (1.8°F) of the starting temperature, the DTC is set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116: Engine coolant temperature sensor output stuck at low engine coolant temperature P0116: Engine coolant temperature sensor output stuck at high engine coolant temperature
Required Sensors/Components (Main)	Engine Coolant Temperature (ECT) sensor
Required Sensors/Components (Related)	Crankshaft position sensor, intake air temperature sensor and mass air flow meter
Frequency of Operation	Continuous
Duration	10 seconds or more
MIL Operation	2 driving cycles: ECT sensor output stuck at low engine coolant temperature
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS**Engine Coolant Temperature Sensor Output Stuck at Low Engine Coolant Temperature:**

The monitor will run whenever the following DTCs are not present	P0100, P0102, P0103 (MAF sensor)
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Battery voltage	10.5 V
Time after engine start	1 second
ECT at engine start	Less than 60°C (140°F)
IAT sensor circuit	Not detected
Soak time	0 second
Accumulated MAF	712 g or more (A/T), 765 g or more (M/T)
Engine	Running
Fuel cut	OFF
Difference between ECT at engine start and IAT	Less than 40°C (72°F)

Engine Coolant Temperature Sensor Output Stuck at High Engine Coolant Temperature:

The monitor will run whenever the following DTCs are not present	P0100, P0102, P0103 (MAF sensor)
Battery voltage	10.5 V
ECT at engine start	60°C (140°F) or more
Battery voltage	10.5 V or more
Engine	Running
Soak time	18000 seconds
Accumulated MAF	765 g or more (A/T), 1220 g or more (M/T)

*1: Vehicle is stopped for 20 seconds or more and accelerated to more than 43.5 mph (70 km/h) within 40 seconds.

*2: Following these steps: 1) vehicle is driven at 40.4 mph (65 km/h) or more for 30 seconds or more and the vehicle speed reaches 43.5 mph (70 km/h); 2) vehicle is decelerated from 40.4 mph (65 km/h) to 1.86 mph (3 km/h) or less within 35 seconds; and 3) vehicle is stopped for 10 seconds.

TYPICAL MALFUNCTION THRESHOLDS

Engine Coolant Temperature Sensor Output Stuck at Low Engine Coolant Temperature:

Variation of engine coolant temperature	Less than 3°C (5.4°F)
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Engine Coolant Temperature Sensor Output Stuck at High Engine Coolant Temperature:

Variation of engine coolant temperature	1°C (1.8°F) or less
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COMPONENT OPERATING RANGE

Engine coolant temperature	Varies with actual engine coolant temperature
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INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0117, P0118 or P0125 are set simultaneously with DTC P0116, the ECT sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using an intelligent tester or OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

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REPLACE ENGINE COOLANT TEMPERATURE SENSOR

- (a) Replace the engine coolant temperature sensor (See page [EM-93](#)).

NEXT

END

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