[**DTC Descriptors**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e3)

**DTC P0010**

Camshaft Position (CMP) Actuator Solenoid Control Circuit

**DTC P0011**

Camshaft Position (CMP) System Performance

[**Diagnostic Fault Information**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e30)

Perform the [Diagnostic System Check - Vehicle](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=72794&refDoc=1618996&from=sm) prior to using this diagnostic procedure.

| **Circuit** | **Short to Ground** | **High Resistance** | **Open** | **Short to Voltage** | **Signal Performance** |
| --- | --- | --- | --- | --- | --- |
| CMP Actuator Solenoid High Control | P0010 | P0010 | P0010 | P0010 | P0011 |
| CMP Actuator Solenoid Low Reference | — | P0010 | P0010 | — | — |

[**Circuit/System Description**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e187)

The camshaft position actuator is attached to the camshaft and is hydraulically operated in order to change the angle of the camshaft relative to crankshaft position (CKP) . The camshaft position (CMP) actuator solenoid is controlled by the engine control module (ECM). The ECM sends a pulse width modulated 12-volt signal to a CMP actuator solenoid. The solenoid controls the amount of engine oil flow to the CMP actuator by extending a pintle within the solenoid. The pintle acts against a spool valve in the CMP actuator mechanism which is attached to the front of the camshaft. As the spool valve is moved oil is directed to the CMP actuator, which rotates the camshaft. The CMP actuator can change the cam angle a maximum of 25 degrees.

[**Conditions for Running the DTC**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e196)

**P0010**

* The ignition is in Crank or Run.
* The system voltage is between 11–18 volts.

**P0011**

* DTCs P0010, P0016, P0335, P0336, P0340, or P0341 are not set.
* The system voltage is between 11–18 volts.
* The engine is running.
* The ECM has enabled the CMP actuator and commanded greater than 0 degrees.
* DTC P0011 runs continuously when the above conditions are met.

[**Conditions for Setting the DTC**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e257)

**P0010**

The ECM detects that the state of the driver and the state of the circuit do not match. The ECM will detect an open, short to ground, or a short to voltage on the high control circuit or an open on the low reference circuit for more than 6.25 seconds.

**P0011**

* The CMP angle from the ECM is stable. If the CMP angle varies more than 7.5♦cam degrees, then a stability timer of 2♦seconds must expire before evaluating fail condition.
* The difference between the desired CMP and the actual CMP angle is more than 8 degrees for 26 seconds during an 80 second sample.

[**Action Taken When the DTC Sets**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e291)

* DTC P0010 and P0011 are Type B DTCs.
* The CMP actuator is commanded to the home or parked position.

[**Conditions for Clearing the MIL/DTC**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e312)

DTC P0010 and P0011 are Type B DTCs.

[**Reference Information**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e321)

**Schematic Reference**

[Engine Controls Schematics](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=83682&refDoc=1618996&from=sm)

**Connector End View Reference**

* [Engine Control Module Connector End Views](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=145416&refDoc=1618996&from=sm)
* [Engine Controls Connector End Views](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=83685&refDoc=1618996&from=sm)

**Electrical Information Reference**

* [Circuit Testing](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=62194&refDoc=1618996&from=sm)
* [Connector Repairs](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=61973&refDoc=1618996&from=sm)
* [Testing for Intermittent Conditions and Poor Connections](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=62112&refDoc=1618996&from=sm)
* [Wiring Repairs](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=61965&refDoc=1618996&from=sm)

**DTC Type Reference**

* [Powertrain Diagnostic Trouble Code (DTC) Type Definitions](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=161179&refDoc=1618996&from=sm)
* [Diagnostic Trouble Code (DTC) Types](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=83677&refDoc=1618996&from=sm)

**Scan Tool Reference**

* [Scan Tool Data List](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=83688&refDoc=1618996&from=sm)
* [Scan Tool Data Definitions](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=83689&refDoc=1618996&from=sm)
* [Scan Tool Output Controls](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=83690&refDoc=1618996&from=sm)

**Description and Operation**

* [Camshaft Actuator System Description](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=143578&refDoc=1618996&from=sm)
* [Lubrication Description](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=81112&refDoc=1618996&from=sm)

[**Circuit/System Verification**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e487)

**Important:**The supply of clean pressurized engine oil to the CMP actuator is essential to CMP actuator performance.

1. Observe the engine oil level. The engine oil level should be within operating range. Refer to [Approximate Fluid Capacities](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=53252&refDoc=1618996&from=sm).
2. Ensure that the vehicle has the correct engine oil and is not old, burnt or contains additives. Refer to Checking Things Under the Hood in Service and Appearance Care within the Owner's Manual.
   * If the vehicle has the incorrect engine oil, is old, burnt, or contains additives then change the oil and filter.
3. Test the engine oil pressure for correct operation. Refer to [Oil Pressure Diagnosis and Testing](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=138558&refDoc=1618996&from=sm).
4. Allow the engine to reach operating temperature.
5. Set the parking brake and place the vehicle in park for automatic, or neutral for manual.
6. Observe the CMP variance parameter. The CMP Variance will rise for 1–2 seconds until the CMP Angle parameter matches the Desired CMP parameter. The CMP Variance should again return to 0 degrees.

**Important:**The engine will run rough and may require throttle input to keep running.

1. Command the CMP actuator to 20 degrees. The Desired CMP parameter should match the CMP Angle parameter.

[**Circuit/System Testing**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e572)

**Important:**You must complete the Circuit/System Verification before proceeding with Circuit/System Testing.

**P0010**

1. Ignition OFF, disconnect the CMP actuator solenoid harness connector at the CMP actuator solenoid.
2. Test for less than 1.0 ohm of resistance between the low reference circuit and ground.
   * If greater than 1.0 ohm, test the low reference for an open/high resistance. If the circuit tests normal replace the ECM.
3. Connect a test lamp between the high control circuit and the low reference circuit .
4. Ignition ON engine OFF.
5. Command the CMP actuator solenoid ON and OFF. The test lamp should turn ON and OFF when changing between commanded states.
   * If the test lamp is always ON, test the high control circuit for a short to voltage. If the circuit tests normal replace the ECM.
   * If test lamp is always OFF, test the control circuit for a short to ground, an open/high resistance. If the circuit tests normal replace the ECM.
6. If all circuits test normal, test or replace the CMP Actuator solenoid.

**P0011**

* Test for less than 1 ohm of resistance between the low reference circuit and ground.
  + If greater than 1 ohm, test the low reference for an open/high resistance. If the circuit tests normal replace the CMP Actuator solenoid.
* Test for less than 1 ohm of resistance on the high control circuit.
  + If greater than 1.0 ohm, test the high control circuit for an open/high resistance. If the circuit tests normal replace the CMP Actuator solenoid.
* Inspect the CMP actuator. Refer to [Camshaft Position Actuator Cleaning and Inspection](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=143328&refDoc=1618996&from=sm) and [Camshaft Position Actuator Magnet Cleaning and Inspection](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=143327&refDoc=1618996&from=sm).
* Inspect the engine timing components—Refer to [Camshaft Timing Chain and Sprocket Cleaning and Inspection](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=81050&refDoc=1618996&from=sm).

[**Component Testing**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e715)

**Static Test**

1. Ignition OFF, disconnect the CMP actuator solenoid harness connector at the CMP actuator solenoid.
2. Test for 4.8–5.2 ohms of resistance between the high control and the low reference of the CMP actuator solenoid.
   * If the resistance is not within the specified range, replace the CMP actuator solenoid.

**Dynamic Test**

**Important:**Do not allow the solenoid to be energized for more than 2 seconds.

1. Install fused jumper wire between the high control and 12 volts. Install a jumper wire between the low reference and momentarily connect to ground.
2. Point the CMP actuator solenoid towards a shop towel. Observe the operation of the solenoid immediately extends.
   * If the function does not perform as specified, replace the CMP actuator solenoid.

[**Repair Instructions**](https://gsi.ext.gm.com/gsi/showDoc.do?docSyskey=1618996&cellId=144876&pubObjSyskey=4709309&from=sm&pubCellSyskey=1820573&deliveryEffectiveDate=Aug+1%2C+2016#d50015e785)

Perform the [Diagnostic Repair Verification](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=143214&refDoc=1618996&from=sm) after completing the diagnostic procedure.

* [Control Module References](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=72864&refDoc=1618996&from=sm) for ECM replacement, setup and programming
* [Camshaft Position Actuator Magnet Replacement](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=144826&refDoc=1618996&from=sm)
* [Camshaft Timing Chain and Sprocket Cleaning and Inspection](https://gsi.ext.gm.com/gsi/cellHandler.do?cellId=81050&refDoc=1618996&from=sm) for timing chain, sprockets, CMP actuator filter screen, and CMP actuator replacement.