P0016: CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1 SENSOR A)

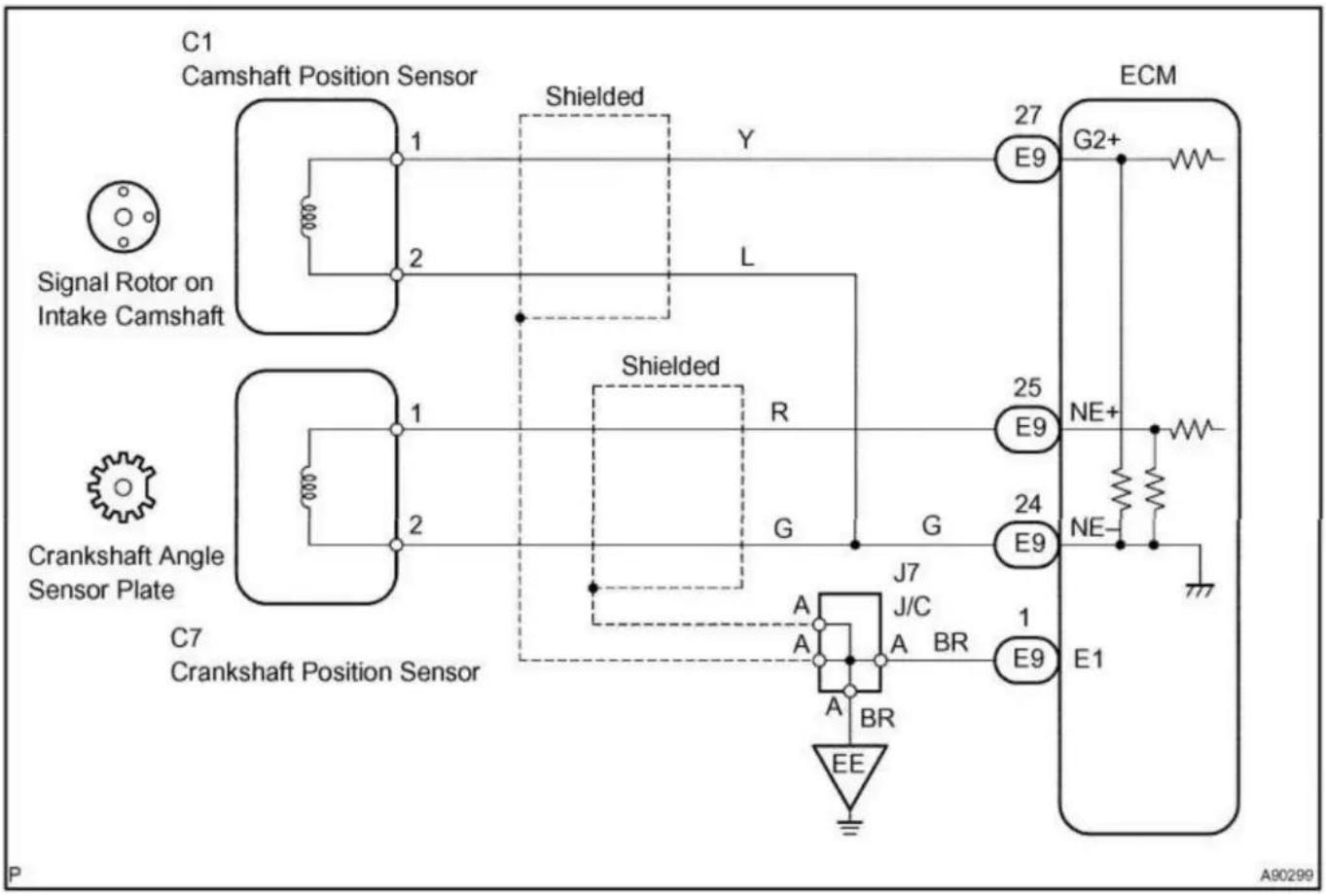
OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Advanced
Repair Cost	:	**$20-$600**
Can I Still Drive?	:	No

What Does The P0016 Code Mean?

The crankshaft position sensor (CKP) and Camshaft position sensor (CMP) work in harmony to control the spark/fuel delivery and timing. They both consist of a reluctor, or tone, ring which passes over a magnetic sensor, which generates a voltage, indicating position.

The crankshaft sensor is part of the primary ignition system and functions as the “trigger”. It detects the position of the crankshaft relays that information on to the PCM or the ignition module (depending on the vehicle) to control spark timing. The Camshaft position sensor detects the position of the camshafts and relays the information to the PCM. The PCM uses the CMP signal to identify the beginning of the injector sequence. What ties these two shafts and their sensors together is the timing belt or chain. The cam and crank should be precisely timed together. If the PCM detects that the Crank and Cam signals are out of time by a specific number of degrees, this P0016 code will set.



P0016 wiring diagram

What Are The Symptoms Of The P0016 Code?

Symptoms of a P0016 will or may include:

- Malfunction Indicator Lamp (MIL) illumination
- The engine may run but with reduced performance
- The engine may crank but not start
- The engine may exhibit a rattle near the harmonic balancer indicating the tone ring is damaged
- The engine may start and run, but poorly

What Are The Potential Causes Of The P0016 Code?

Causes may include:

- Timing chain stretched, or timing belt skipped a tooth due to wear
- Misalignment of timing belt/chain
- Tone ring on crankshaft slipped/broken
- Tone ring on camshaft slipped/broken

- Bad crank sensor
- Bad cam sensor
- Damaged wiring to crank/cam sensor
- Timing belt/chain tensioner damaged

How Can You Fix The P0016 Code?

- First, visually inspect the cam and crank sensors and their harnesses for damage. If you notice broken/frayed wires, repair and recheck.
- If you have access to a scope, check the cam and crank patterns. If a pattern is missing, suspect a bad sensor or a slipping tone ring. Remove the cam gear and the crankshaft harmonic balancer and inspect the tone rings for proper alignment and make sure they're not loose or damaged or that they haven't sheared the key that aligns them. If they are properly installed, replace the sensor.
- If the signal appears normal, then check the timing chain/belt for proper alignment. If it's misaligned, check for a damaged tensioner that may have allowed the chain/belt to slip a tooth or several teeth. Also check that the belt/chain isn't stretched. Repair and recheck.

Other crank sensor codes include P0017, P0018, P0019, P0335, P0336, P0337, P0338, P0339, P0385, P0386, P0387, P0388, and P0389.

Reference Sources

- Diagnostic Trouble Code (DTC) Charts and Descriptions for P0016 - Page 6.
- Technical Service Bulletin for P0016 - Volkswagen