

VOLKSWAGEN · POWERTRAIN

P1397

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P1397 · Volkswagen

Engine Speed Wheel Adaptation At Limit

P1397 on Volkswagen vehicles means the engine control module (ECM) has detected that the adaptation value for the engine speed (crankshaft) signal has reached its maximum allowed limit. The ECM compares the crankshaft position sensor signal against the camshaft position sensor signal and adjusts for timing chain stretch or sensor misalignment, but the required correction is now outside the programmed range.

SYSTEM

Powertrain

CODE TYPE

Volkswagen
specific

SEVERITY

Medium

FIX DIFFICULTY

Professional

AREA

Ignition system
and misfire

Symptoms you may notice

- Illuminated check engine light, often with no other noticeable symptoms
- Rough idle or slight misfire at idle
- Extended cranking before the engine starts
- Intermittent stalling when coming to a stop
- Reduced engine performance or limp mode in some cases
- Poor fuel economy or increased emissions

Common causes, most likely first

- 1 Worn or stretched timing chain or timing belt
- 2 Faulty crankshaft position sensor or damaged reluctor wheel
- 3 Faulty camshaft position sensor or contaminated sensor tip
- 4 Incorrectly installed timing belt or chain (off by one tooth)
- 5 Oil sludge or debris on the crankshaft or camshaft sensor
- 6 Wiring harness damage or poor connector contact at either sensor
- 7 ECM software issue requiring adaptation reset or update

How to diagnose and fix it

- 1 Scan all modules for stored and pending codes, and record freeze-frame data for P1397
- 2 Inspect the crankshaft and camshaft sensor connectors and wiring for corrosion or damage
- 3 Remove and clean the crankshaft and camshaft sensors, checking for metal debris
- 4 Verify timing marks align correctly and check for timing chain stretch with a timing light or oscilloscope
- 5 Perform an adaptation reset or relearn procedure for the engine speed signal using a factory scan tool
- 6 Replace the crankshaft position sensor if signal is erratic or missing
- 7 Replace the timing chain or belt and associated tensioners if stretch is confirmed



Adaptation limit points to timing chain stretch

- A stretched timing chain on Volkswagen engines often sets P1397 before any misfire code appears, so the chain should be measured even if the engine runs smoothly.
- The adaptation limit can be reached by a dirty crankshaft sensor reluctor wheel, which is frequently overlooked when the timing components are within specification.
- After replacing the crankshaft sensor or timing components, the ECM adaptation must be reset with a factory-level scan tool or the code will return immediately.
- P1397 can be set by a weak battery or voltage drop during cranking, which corrupts the adaptation learning process without any mechanical fault.
- Do not replace the ECM based solely on P1397; verify the sensor signals with an oscilloscope and confirm timing alignment first.

Can I keep driving with P1397?

You can usually drive the vehicle short distances to a repair shop, but avoid hard acceleration and prolonged driving because a stretched timing chain can jump teeth and cause severe engine damage. If the engine runs roughly or stalls, stop driving and arrange a tow.

Tools that help

- OBD-II scan tool with Volkswagen-specific software
- Oscilloscope for crankshaft and camshaft signal analysis
- Timing light or timing chain stretch gauge
- Digital multimeter for wiring and sensor testing
- Factory service information for timing mark alignment

Reading P1397

P	Powertrain: engine, transmission and emissions.
1	Manufacturer-specific code (Volkswagen): its meaning depends on the make.
3	Ignition system and misfire.
97	The exact fault within that area.

Often seen with

P1396 Engine Speed Sensor Missing Tooth · **P1396** Variable Valve Timing Solenoid B Circuit · **P1396** Wheel Speed Sensor 2 G-Sensor Circuit Performance · **P1396** Glow Plug Monitor Fault Bank 2 · **P1396** Wheel Speed Sensor 2, G-Sensor Circuit Performance · **P1396** Crankshaft Position Sensor Segment Timing Plausibility · **P0016** Crankshaft/Camshaft Position Correlation (Bank 1 Sensor A) · **P0017** Crankshaft/Camshaft Position Correlation (Bank 1 Sensor B) · **P0335** Crankshaft Position Sensor A Circuit Malfunction · **P0340** Camshaft Position Sensor A Circuit Malfunction (Bank 1)



See it working

Watch the animated explainer [How a Catalytic Converter Works: 3D Cutaway](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/volkswagen-p1397/>

