

GENERIC · POWERTRAIN

P0502

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P0502

Vehicle Speed Sensor Low Input

P0502 means the powertrain control module (PCM) is seeing a vehicle speed signal that is lower than expected for the current operating conditions, or no usable signal at all from the vehicle speed sensor (VSS). The PCM compares this input against engine load, throttle position, and transmission output speed to determine that the speed signal is implausible or absent.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Intermediate	Vehicle speed, idle control and auxiliary inputs

Symptoms you may notice

- The speedometer may read zero or fluctuate erratically while the vehicle is moving.
- The transmission may shift harshly, late, or refuse to shift out of first gear because shift scheduling depends on vehicle speed.
- The anti-lock brake system (ABS) warning light and traction control light may illuminate because those systems share the speed signal.
- Cruise control may stop working or disengage on its own.
- The engine may idle poorly or stall when coming to a stop if the PCM cannot determine vehicle speed for idle control.
- Often no symptoms besides the warning light, especially on vehicles where the ABS module generates the speed signal independently.

Common causes, most likely first

- A faulty vehicle speed sensor (VSS) that has failed internally or is contaminated with metal debris.
- Damaged, corroded, or disconnected wiring and connectors between the VSS and the PCM or ABS module.
- A damaged or missing tone ring (reluctor wheel) on the transmission output shaft or wheel hub that the sensor reads.
- A PCM or ABS module that is not processing or communicating the speed signal correctly.
- Incorrect tire size or a mismatched final drive ratio that makes the calculated speed fall outside the expected range.
- A transmission output shaft problem, such as a worn bearing or slipping clutch, that causes actual output speed to differ from engine speed.



How to diagnose and fix it

- 1 Scan all modules for stored codes and freeze-frame data to confirm P0502 is active and see what vehicle speed the PCM reported when the fault set.
- 2 Inspect the VSS and its connector for physical damage, corrosion, or loose pins, and check the sensor mounting and air gap.
- 3 Use a scan tool to view live vehicle speed data while driving; compare it to a GPS or known speed to verify the signal is missing or erratic.
- 4 Check the VSS wiring harness for continuity, shorts to ground, and shorts to power between the sensor and the PCM or ABS module.
- 5 Remove the VSS and inspect the tone ring for missing teeth, cracks, or heavy metallic debris buildup.
- 6 Test the VSS output with a multimeter or oscilloscope; a good sensor should produce a clean alternating current (AC) voltage or square wave that rises with speed.
- 7 If the sensor, wiring, and tone ring test good, diagnose the PCM or ABS module communication and replace only after confirming the module is at fault.

Speed signal sources vary by vehicle

- Many modern vehicles do not use a dedicated transmission VSS; the ABS module calculates vehicle speed from the wheel speed sensors and broadcasts it over the controller area network (CAN) bus, so a P0502 can be set by a bad wheel speed sensor or ABS module rather than a transmission sensor.
- A common misdiagnosis is replacing the VSS when the real problem is a damaged tone ring or a wiring harness rubbed through near a heat source or moving suspension component.
- Aftermarket tire sizes or gear ratio changes can set P0502 because the PCM's expected speed calculation no longer matches the actual signal, even though every component is functioning.
- The speed signal feeds the speedometer, odometer, cruise control, transmission shift strategy, and idle control, so a single fault can produce symptoms that seem unrelated to vehicle speed.
- On some vehicles, a failing ignition switch or a poor ground can cause intermittent speed sensor codes that disappear when the circuit is loaded differently, so voltage drop testing is essential.

Can I keep driving with P0502?

You can usually drive short distances to a repair shop, but avoid highway speeds and heavy traffic because the transmission may shift unpredictably and the speedometer may be inaccurate. If the vehicle enters limp mode or refuses to shift, stop driving and have it towed.



Tools that help

- OBD-II scan tool with live data and freeze-frame capability
- Digital multimeter
- Oscilloscope (for waveform testing of the speed sensor)
- Jack and jack stands or a lift for accessing the sensor and wiring
- Wiring diagram and connector pinout for the specific vehicle
- Basic hand tools for sensor removal and inspection

Reading P0502

P	Powertrain: engine, transmission and emissions.
0	Generic (SAE) code: it means the same thing on every OBD-II vehicle.
5	Vehicle speed, idle control and auxiliary inputs.
02	The exact fault within that area.

Often seen with

C0035 Left Front Wheel Speed Sensor Circuit Range/Performance · **P0500** Vehicle Speed Sensor Malfunction
 · **P0501** Vehicle Speed Sensor Range/Performance · **P0503** Vehicle Speed Sensor Intermittent/Erratic/High ·
P0720 Output Speed Sensor Circuit Malfunction

See it working

Watch the animated explainer [How a Starter Motor Works: Pre-Engaged Starter](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p0502/>

