

GENERIC · POWERTRAIN

P02D3

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P02D3

Cylinder 4 Fuel Injector A Offset Learning At Max Limit

P02D3 indicates that the engine control module (ECM) has learned a fuel injector correction value for cylinder 4 that has reached its maximum allowable limit. The computer is adding or subtracting as much fuel as it can for that injector and still cannot bring the air-fuel mixture back to the expected range, so it flags the offset learning as maxed out.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Professional	Fuel and air metering (injector circuits)

Symptoms you may notice

- Illuminated check engine light, often with no other noticeable symptoms
- Rough idle or a noticeable vibration that may be worse when the engine is cold
- Slight misfire or hesitation during acceleration, especially under light load
- Decreased fuel economy compared with normal driving
- Occasional hard starting or a stumble right after startup
- A faint fuel odor from the exhaust or around the engine bay in severe cases

Common causes, most likely first

- 1 Clogged, restricted, or failing fuel injector on cylinder 4
- 2 Vacuum leak near cylinder 4 intake port or intake manifold gasket
- 3 Low fuel pressure or volume from a weak fuel pump or restricted filter
- 4 Contaminated engine oil or fuel causing injector pintle deposits
- 5 Wiring or connector fault at the cylinder 4 injector circuit
- 6 Mechanical issue such as low compression or a worn camshaft lobe on cylinder 4
- 7 ECM software calibration issue or adaptive learning memory corruption



How to diagnose and fix it

- 1 Scan all modules and record freeze-frame data for P02D3 and any companion codes before clearing anything
- 2 Inspect the cylinder 4 injector connector and harness for corrosion, chafing, or loose pins
- 3 Measure fuel pressure and volume at the rail and compare with the manufacturer's specification
- 4 Perform a cylinder balance or injector cut-off test to confirm cylinder 4 contribution
- 5 Run a compression test and, if needed, a cylinder leak-down test on cylinder 4
- 6 Remove and flow-test or replace the cylinder 4 fuel injector, then clear adaptive learning
- 7 Relearn the injector offset values with a scan tool and verify the code does not return after a road test

What the offset learning limit really means

- A maxed-out offset does not automatically condemn the injector; a vacuum leak or low fuel pressure can force the ECM to the same limit.
- Many technicians replace the injector without checking fuel pressure first, then the code returns because the real cause was a weak pump.
- Adaptive learning can be skewed by a previous repair or a disconnected battery, so clearing and relearning before parts replacement is essential.
- Cylinder 4-specific codes often trace to a single intake runner gasket leak that affects only that cylinder at idle.
- A failing ignition coil or spark plug on cylinder 4 can mimic an injector offset problem by altering the oxygen sensor signal the ECM uses to learn.

Can I keep driving with P02D3?

You can usually drive the vehicle short distances to a repair shop, but avoid heavy acceleration, towing, or long highway trips until the fault is diagnosed. Continued driving with a maxed-out injector offset can lead to catalytic converter damage from unburned fuel.

Tools that help

- OBD-II scan tool with bidirectional control and live data
- Fuel pressure gauge and volume test kit
- Compression tester and cylinder leak-down tester
- Digital multimeter and back-probe kit
- Injector flow bench or injector cleaning equipment
- Factory service information for injector offset relearn procedure



Reading P02D3

- P** Powertrain: engine, transmission and emissions.
- 0** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
- 2** Fuel and air metering (injector circuits).
- D3** The exact fault within that area.

Often seen with

P0171 System Too Lean (Bank 1) · **P02D1** Cylinder 3 Fuel Injector A Offset Learning At Max Limit · **P02D2** Cylinder 4 Fuel Injector A Offset Learning At Min Limit · **P02D4** Cylinder 5 Fuel Injector A Offset Learning At Min Limit · **P0304** Cylinder 4 Misfire Detected

See it working

Watch the animated explainer [How a Wideband Air-Fuel Sensor Works](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p02d3/>

