



P02D2

Cylinder 4 Fuel Injector A Offset Learning At Min Limit

P02D2 indicates that the engine control module has learned a fuel injector offset correction for cylinder 4 that has reached its minimum allowable limit, meaning the injector is flowing more fuel than expected and the computer can no longer lean it out. The ECM monitors injector performance during deceleration fuel cut-off and stores this code when the learned offset cannot be reduced further.

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

Symptoms you may notice

- Illuminated check engine light, often with no other symptoms
- Rough idle or misfire sensation, especially when the engine is cold
- Slightly elevated fuel consumption due to over-fueling on cylinder 4
- Black soot on the spark plug from cylinder 4
- Occasional hesitation during light acceleration
- Failed emissions test due to rich exhaust

Common causes, most likely first

- 1 Clogged or restricted fuel injector causing abnormal spray pattern
- 2 Leaking fuel injector that delivers excess fuel
- 3 Carbon buildup on the injector tip affecting flow characteristics
- 4 Faulty fuel injector connector or damaged wiring to cylinder 4 injector
- 5 Low fuel pressure causing the ECM to max out injector offset learning
- 6 Contaminated fuel or fuel system deposits
- 7 Rarely, a failing engine control module injector driver



How to diagnose and fix it

- 1 Scan all modules for stored and pending codes, and record freeze-frame data for P02D2
- 2 Inspect the cylinder 4 fuel injector connector and wiring for corrosion, chafing, or loose pins
- 3 Perform a fuel pressure test to rule out low supply pressure
- 4 Run a fuel injector balance test or cylinder contribution test to compare injectors
- 5 Remove and inspect the cylinder 4 spark plug for rich-running signs such as black soot
- 6 Clean or replace the cylinder 4 fuel injector if tests confirm abnormal flow
- 7 Clear the code and perform a relearn drive cycle to verify the offset returns within limits

What the offset learning limit really means

- The ECM learns injector offset during deceleration fuel cut-off, so a code can set even when the engine runs smoothly and the driver notices nothing.
- A dirty injector often causes the offset to hit the minimum limit before any misfire code appears, making P02D2 an early warning of injector degradation.
- Low fuel pressure can mimic a faulty injector by forcing the ECM to command a longer pulse width, so always check pressure before replacing parts.
- Carbon buildup on the injector tip can change the spray pattern without completely blocking flow, leading to over-fueling that the ECM cannot correct.
- Replacing the injector without clearing adaptive learning may cause the new part to be rejected; a relearn drive cycle is required after repair.

Can I keep driving with P02D2?

You can usually continue driving to a repair shop, but avoid heavy acceleration and towing until the fault is diagnosed, as prolonged over-fueling can damage the catalytic converter and spark plugs.

Tools that help

- OBD-II scan tool with live data and bidirectional control
- Fuel pressure gauge
- Digital multimeter
- Injector balance tester or oscilloscope
- Basic hand tools for injector removal



Reading P02D2

- 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).
- D2** The exact fault within that area.

Often seen with

P0172 System Too Rich (Bank 1) · **P0175** System Too Rich (Bank 2) · **P02D1** Cylinder 3 Fuel Injector A Offset Learning At Max Limit · **P02D3** Cylinder 4 Fuel Injector A Offset Learning At Max Limit · **P0304** Cylinder 4 Misfire Detected

See it working

Watch the animated explainer [How a Rotary Engine Works: Wankel in X-Ray](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p02d2/>

