



P1091 · BMW

Pre-Catalyst Fuel Trim Too Rich Bank 1

P1091 on a BMW means the engine computer has detected that the pre-catalyst oxygen sensor on bank 1 is reporting a fuel mixture that is too rich, meaning there is more fuel than the computer's target ratio. The DME (Digital Motor Electronics) compares the pre-catalyst sensor signal against its expected value and sets this code when the rich condition persists beyond a calibrated threshold.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	BMW specific	Medium	Professional	Fuel and air metering and auxiliary emission controls

Symptoms you may notice

- Often no symptoms besides the warning light, especially if the rich condition is mild or intermittent.
- A noticeable drop in fuel economy as the engine consumes more fuel than necessary.
- Black sooty exhaust smoke or a strong fuel smell from the tailpipe in more severe cases.
- Rough idle or hesitation under acceleration when the rich mixture fouls spark plugs.
- Illumination of the check engine light, sometimes accompanied by a message in the iDrive display.
- Possible catalytic converter overheating symptoms such as a rotten egg smell if the rich condition is prolonged.

Common causes, most likely first

- 1 A leaking or stuck-open fuel injector on bank 1 delivering excess fuel into the cylinder.
- 2 A faulty mass air flow (MAF) sensor over-reporting airflow, causing the DME to inject too much fuel.
- 3 A contaminated or failed pre-catalyst oxygen sensor on bank 1 sending a false rich signal.
- 4 A stuck-open or leaking evaporative emissions purge valve allowing fuel vapor into the intake.
- 5 High fuel pressure from a failing fuel pump or a restricted fuel return line.
- 6 A dirty or failing intake air temperature sensor skewing the air density calculation.
- 7 Mechanical issues such as low compression or a worn camshaft lobe altering the air-fuel mixture on bank 1.



How to diagnose and fix it

- 1 Connect a scan tool and read live data for bank 1 fuel trims, MAF sensor readings, and pre-catalyst oxygen sensor voltage to confirm the rich condition.
- 2 Inspect the intake tract for leaks or restrictions and clean the MAF sensor with the correct aerosol cleaner before condemning it.
- 3 Check the evaporative emissions purge valve for sticking open by commanding it closed with the scan tool and observing fuel trim changes.
- 4 Perform a fuel pressure test and compare against BMW specifications for the engine, looking for excessive pressure.
- 5 Test each fuel injector on bank 1 for leakage or abnormal spray pattern, using a injector balance test or removing them for inspection.
- 6 Swap the pre-catalyst oxygen sensor from bank 1 to bank 2 if accessible, and see if the rich code follows the sensor to confirm a sensor fault.
- 7 After repairs, clear adaptations and take the vehicle on a drive cycle to verify fuel trims return to normal and the code does not reset.

Before you replace the catalytic converter

- A rich condition on bank 1 is frequently caused by a leaking injector that does not set a misfire code, so injector balance testing is essential before blaming the oxygen sensor.
- BMW's DME can set P1091 from a lazy pre-catalyst oxygen sensor that still switches but responds too slowly, which many technicians miss because the sensor looks fine on a basic voltmeter.
- A stuck-open purge valve is a common culprit on BMW inline-six engines and often sets P1091 alongside evap codes, so always check purge valve operation before replacing expensive sensors.
- Fuel trim readings on bank 1 can be skewed by a dirty MAF sensor that over-reports airflow; cleaning the sensor is a cheap first step that resolves many cases.
- This code does not always mean the catalytic converter is failing; a rich mixture can damage the converter over time, but replacing it without fixing the root cause will lead to repeat failure.

Can I keep driving with P1091?

You can drive the vehicle short distances to a repair shop, but avoid sustained high-speed driving or heavy loads because a rich mixture can overheat and damage the catalytic converter. If the check engine light is flashing or you notice black smoke and strong fuel smell, stop driving and have the vehicle towed.



Tools that help

- BMW-compatible scan tool with live data and bi-directional control
- Digital multimeter
- Fuel pressure gauge
- Injector balance tester or oscilloscope
- Aerosol MAF sensor cleaner
- Hand tools for intake and sensor removal

Reading P1091

P Powertrain: engine, transmission and emissions.

1 Manufacturer-specific code (BMW): its meaning depends on the make.

0 Fuel and air metering and auxiliary emission controls.

91 The exact fault within that area.

Often seen with

P1092 Tumble Generator Valve #2 LH Malfunction Stuck Open · **P1092** Pre-Catalyst Fuel Trim Too Lean Bank 2
 · **P0132** O2 Sensor Circuit High Voltage (Bank 1 Sensor 1) · **P0172** System Too Rich (Bank 1) · **P0175**
 System Too Rich (Bank 2) · **P0442** EVAP System Leak Detected (Small)

See it working

Watch the animated explainer [Fuel Trims Explained: Short-Term and Long-Term](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/bmw-p1091/>

