P02A3: CYLINDER 3 FUEL TRIM AT MIN LIMIT

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$260-$850**
Can I Still Drive?	:	No

What Does The P02A3 Code Mean?

A stored P02A3 code means that the powertrain control module (PCM) has detected an extremely rich condition in a specific engine cylinder, in this case it's cylinder #3.

The PCM utilizes the fuel trim system to increase or decrease fuel delivery as required. Input signals from the oxygen sensors provide the PCM with the data required to adjust fuel trim.

The PCM uses variations in fuel injector pulse width modulation to effect air/fuel ratio changes.

Short term fuel trim is calculated constantly by the PCM. It fluctuates rapidly and is one of the key factors in calculating long term fuel trim.

Every vehicle has minimum and maximum fuel trim percentage parameters programmed into the PCM. The parameters for short term fuel trim are much broader than the parameter specifications for long term fuel trim.

Small variations in fuel trim, typically measured in positive or negative percentage, are normal and will not cause a code P02A3 to be stored.

Maximum fuel trim parameters (positive or negative) are normally in the twenty-five-percent range. Once this maximum threshold has been exceeded, a code of this type will be stored.

When the engine is functioning at optimum efficiency and there is little need to increase or

decrease the amount of fuel delivered to each cylinder, fuel trim should reflect between zero and ten percent.

When lean exhaust conditions are detected by the PCM, fuel must be increased and fuel trim will reflect a positive percentage. If the exhaust is too rich, the engine needs less fuel and fuel trim should reflect a negative percentage.

OBD-II vehicles will need to establish a pattern for long term fuel trim strategy and this will require multiple ignition cycles.

What Are The Symptoms Of The P02A3 Code?

Symptoms of a P02A3 trouble code may include:

- Diminished engine performance
- Reduced fuel efficiency
- Delayed engine startup
- The presence of stored rich exhaust codes
- Misfire codes may also be stored

What Are The Potential Causes Of The P02A3 Code?

Causes for this P02A3 fuel trim code may include:

- Defective fuel injector
- Bad fuel pressure regulator
- Faulty oxygen sensor
- Mass air flow (MAF) or Manifold Air Pressure (MAP) sensor failure

How Can You Fix The P02A3 Code?

If there are MAF or MAP related codes present, diagnose and repair those before attempting to diagnose this P02A3 code.

I would begin my diagnosis with a general inspection of the fuel injection rail area.

My focus would be on the fuel pressure regulator and the vacuum source for the fuel pressure regulator (if applicable). I would check the regulator for signs of leakage. If there is gas on the inside or ooutside of the regulator, suspect that it has failed.

If no obvious mechanical issues are discovered in the engine bay, there are several tools that will be required to continue your diagnosis:

- A diagnostic scanner

- A digital volt/ohmmeter (DVOM)
- A fuel pressure gauge with adapters
- A reliable vehicle information source

Next, I would connect the scanner to the vehicle diagnostic port. I would retrieve all stored codes and freeze frame data, then write it all down for later use. Now, I would clear the codes and test-drive the vehicle to see if any are reset.

Access the scanner data stream and observe oxygen sensor operation in order to see if a rich exhaust condition actually exists. I like to narrow the data stream to include only pertinent data. This yields a faster data response time and a more accurate reading.

Step 1

Use the fuel pressure gauge to test fuel pressure and compare it with manufacturer's specifications. If fuel pressure is within specs, proceed to Step 2. If fuel pressure is above maximum specifications, use the DVOM to test fuel pressure regulator circuits, as well as the regulator itself (if it is electronic). Disconnect all related controllers from the circuit before using the DVOM to test resistance and/or continuity with the DVOM. Controller damage may occur if it is not disconnected.

Repair or replace system circuits or components which do not comply with manufacturer's specifications. If the fuel pressure regulator is actuated using engine vacuum, it should be replaced if fuel pressure is excessive.

Step 2

Access the injector connector (for the injector in question) and use the DVOM (or a noid lamp if available) to test for injector voltage and a ground pulse (the latter from the PCM). If no ground pulse is discovered at the injector connector or if the ground is constant (with the engine running), proceed to Step 3.

If voltage and a ground pulse are present, reconnect the injector and use a stethoscope (or some other listening device) and listen to it with the engine running.

An audible clicking sound should be repeated in regular intervals. If the sound is not present, or if it is intermittent, suspect that the injector for the cylinder in question has failed or is clogged. Either condition will likely warrant replacement of the injector.

Step 3

Most modern fuel injection systems provide a constant supply of battery voltage to each fuel injector, with the PCM supplying a ground pulse at the appropriate instant, to complete the circuit and result in a spray of fuel to the cylinder. Use the DVOM to test for injector pulse at the PCM

connector.

If there is no ground pulse (or a constant ground) at the PCM connector, with no other codes present, suspect a defective PCM or a PCM programming error.

Note: Use caution when testing/replacing high pressure fuel system components.

Severity Description

The P02A3 should be classified as severe because a rich fuel condition may lead to numerous drivability issues and catalytic converter damage.

Reference Sources

P02A3: Cylinder 3 Fuel Trim at Min Limit, OBD-Codes.