P010F: MASS OR VOLUME AIR FLOW SENSOR A/B CORRELATION

OVERVIEW

Severity	:	High
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$50-$500**
Can I Still Drive?	:	**Yes** (Short-term only)

What Does The P010F Code Mean?

This generic powertrain diagnostic trouble code (DTC) typically applies to OBD-II equipped vehicles that have multiple air intakes or multiple throttle bodies. Makes of vehicles may include but are not limited to Lexus, Peugeot, Citroen, VW, Toyota, Audi, Dodge, Ram, Mercedes Benz, Chevrolet, etc.

When you encounter a stored code P010F, it means that the powertrain control module (PCM) has detected a malfunction with the mass air flow (MAF) or volume air flow (VAF) system.

The use of code P010F is limited to vehicles which are equipped with multiple throttle bodies or intake air inlet sources that require multiple MAF/VAF sensors. A P010F relates to a comparison between the separate MAF/VAF sensors.

A strong vacuum is created when the internal combustion engine is in operation. This vacuum draws in needed air to complete the combustion process. This air is regulated by the throttle plate (controlled by the driver) under acceleration and the idle air control (IAC) valve when the engine is at idle.

One of the most critical factors in the optimization of fuel efficiency and minimization of harmful exhaust emissions in mass produced automobiles is achieving a correct fuel to air ratio. The air entering the intake is measured, as you have probably guessed, using the MAF or VAF sensor/s.

Fuel delivery and ignition timing strategy is calculated (by the PCM) using data contrived from the MAF/VAF sensor/s. The air which passes through these devices is referred to as metered air. Air which is involuntarily introduced to the engine can contribute to excessively lean (too much air or not enough fuel) conditions and is called unmetered air.

Here is a brief explanation of the two types of air metering devices

The MAF sensor is used most commonly in domestic vehicles. It focuses on a thermal resistor that is suspended in the bore of the sensor so that air can flow directly across it. Hot wire type MAF sensors use voltage applied directly to a single resistor to monitor intake air.

As air flow increases, the temperature of the resistor decreases and the resistance level drops. These changes in resistance level result in variations of circuit voltage which the PCM receives as the degree of metered air that is being introduced to the engine intake for precise distribution to individual combustion chambers.

Cold wire MAF sensors use a similar system of metering intake air but utilize a pair of thermal resistors. One is positioned in a recessed area of the sensor housing and measures ambient air temperature only.

The second is positioned near the center of the bore where incoming air can flow across it, in varied degrees. The PCM compares the thermal voltage values of each of these resistors to determine how much metered air is being drawn into the intake.

The VAF is designed with a door or flap that is opened according to how much air is drawn into the intake. It is used primarily in imported vehicles. As intake air decreases, the spring loaded flap is closed.

The action of the door/flap actuates a potentiometer that transmits a data signal to the PCM. The PCM recognizes variations in potentiometer voltage as the degree of metered air being drawn into the engine and calculates engine drivability strategy accordingly.

When multiple MAF/VAF sensors are used in conjunction with each other, the PCM compares data between the two in order to ensure that a similar conclusion is derived.

If the degree of air flow or sensor voltage varies by more than a preprogrammed amount, a code P010F will be stored and a malfunction indicator lamp may be illuminated.

What Are The Symptoms Of The P010F Code?

Symptoms of a P010F trouble code may include:

- Diminished engine performance
- Decreased fuel efficiency

- Engine stall or hesitation upon acceleration
- Lean or rich exhaust codes
- No start condition

What Are The Potential Causes Of The P010F Code?

Possible causes for this code may include:

- Defective MAF/VAF sensor
- Open or shorted circuits in the MAF/VAF system
- Engine vacuum leaks (unmetered air)
- Split, cracked, or broken air inlet pipe

How Can You Fix The P010F Code?

A diagnostic scanner, a digital volt/ohmmeter (DVOM), and a reliable vehicle information source will be required to diagnose a code P010F.

Step 1

Begin with a careful visual inspection of MAF/VAF wiring and connectors.

- Focus on the sensor connector. I have found more failures in this area than any other.
- The connectors tend to become corroded and result in an open or erratic circuit.
- Follow manufacturer's specifications for removal of the corrosion if it is discovered.

Step 2

Connect the scanner to the vehicle diagnostic port and retrieve all stored codes and freeze frame data. Make a record of this information as it will prove helpful if this proves to be an intermittent code. Now clear the codes and test-drive the vehicle (if possible) to see if the code is reset.

Step 3

Frequently the heated element in MAF sensors will become contaminated with dust and other debris, causing a false data signal that could result in a stored code P010F. Following manufacturer's recommendations for cleaning the sensor element will rectify the situation in many cases. This is only applicable to vehicles equipped with MAF sensors (not VAF).

Step 4

If the code is immediately reset, use your DVOM and the vehicle information source to test the voltage and ground signals to the sensor, the sensor itself, and sensor circuits. Follow vehicle code flow charts until a solution is reached.

Additional diagnostic notes

- Make sure that the air filter element/s are clean and secure in their respective housings
- Repair all unmetered engine vacuum leaks before attempting to diagnose a code P010F
- Check technical service bulletins (TSB) for diagnostic help

Severity Description

The likelihood that major drivability and fuel efficiency issues will accompany a code P010F is great. Therefore it should be addressed with a certain degree of urgency.

Reference Sources

P010F: MAF Sensor A/B Correlation, OBD-Codes.