

Diagnostics of trouble code P0410 for Mercedes C230 Kompressor (W203), 2002.

I would like to share my experience in diagnostics of the error code P0410 (Secondary Air Injection Failure, i.e. the failure in the secondary air supply) at the Mercedes C230 Kompressor (Engine 111.981, 2.3L).

I am not a professional mechanic. All I'm going to present, I have found in various documents and the Internet and then applied it to my car. I could be wrong somehow. I hope that professionals will correct me.

I bought my Mercedes C230 Kompressor only six months ago and had never dealt with this brand before. At the purchase time, the initial diagnostics with OBD-II tool showed the problem with oxygen sensor, which was quickly resolved by its replacement, and the error code P0410. As I understood, error P0410 is a fairly common problem on the Mercedes C230 Kompressor. So I decided to share my research results in here.

A little of technical information.

Air Injection Reactor (A.I.R.) is the system designed to supply clean air directly into the exhaust manifold, bypassing the engine. It works for the first tens of seconds after the engine's cold start, when the catalytic converter is not warmed up and afterburning of exhaust gases in the converter is difficult. To improve this process and reduce emissions, more oxygen should be supplied to the converter, i.e. more air. As the heating of the catalyst, the need for additional oxygen disappears and the A.I.R. system is switched off. As of my car, I can say that this system works for about 30 seconds after a cold start.

Nowadays, probably all modern cars have A.I.R. systems in their engines. Some car models have air pumps driven by belt or electric. On the Mercedes C230 Kompressor role of an air pump performs the compressor with belt drive.

To determine fault in the A.I.R. system, we must follow the way, through which the air passes. All the diagnostics should be performed on a cold engine, and pretty quickly, because the working time of the A.I.R. system is limited.

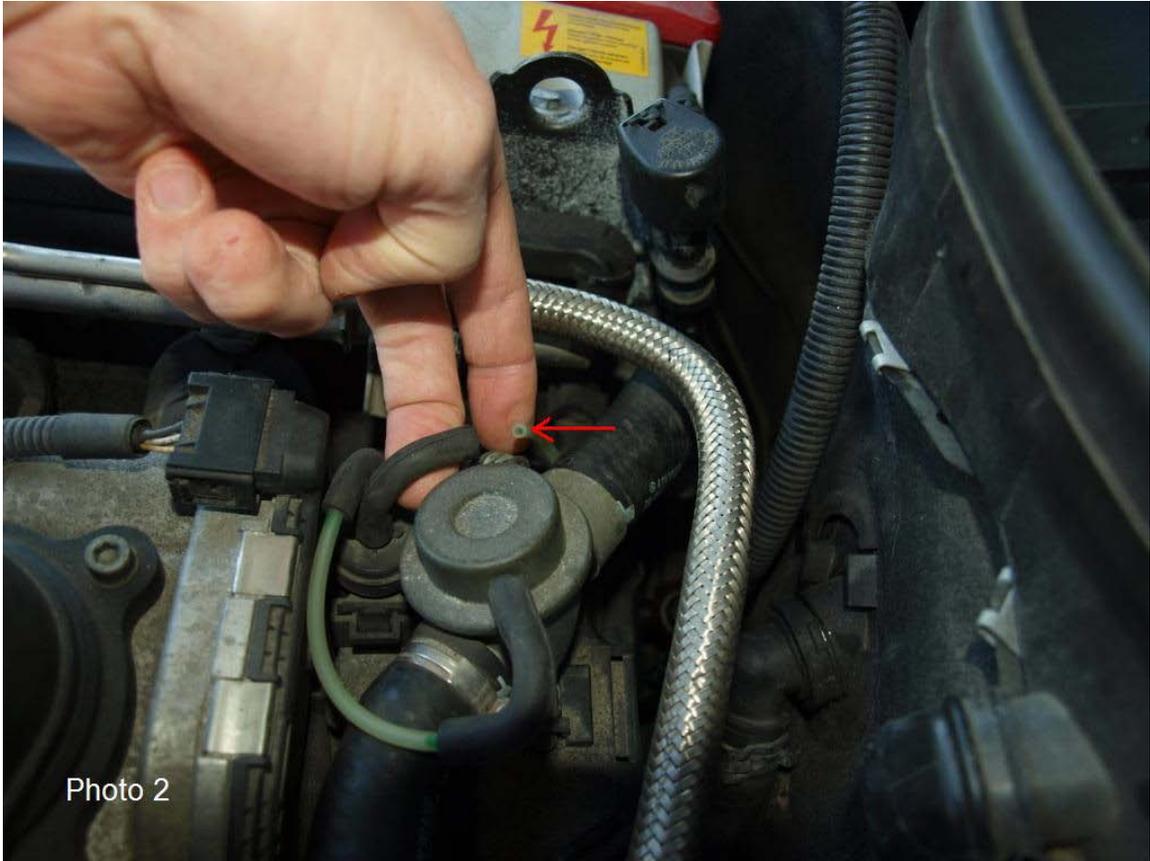
So, look for the air hose coming from the air's main stream. We find one (see Photo 1) and disconnect it. Start the engine and put her hand to the connection point (as in the photo).



- If there is airflow at the outlet pipe (and it should fill it easily) - this means that the compressor works properly, i.e. it pumps the air.
- If there is no air flow, then it clearly indicates the problem with the compressor.

Switch off the engine (until 30 seconds have not expired) and attach the hose back. Go to the next step, which will be a vacuum check valve.

Disconnect the thin inlet plastic pipe of the valve, as shown in Photo 2, and then turn on the engine. There should be a vacuum suction of air at the entrance of this thin pipe. That is, if you put a finger to the end of the pipe, it should stick.



- If the finger does not stick, it indicates that the plastic vacuum pipe is either damaged, or clogged or not connected. We must go through the entire length of this pipe and make sure it is undamaged and connected to the source of vacuum.
- If your finger sticks - this is normal. Attach the inlet pipe back to the valve and disconnect a similar plastic pipe from the valve outlet (see Photo 3).



Photo 3

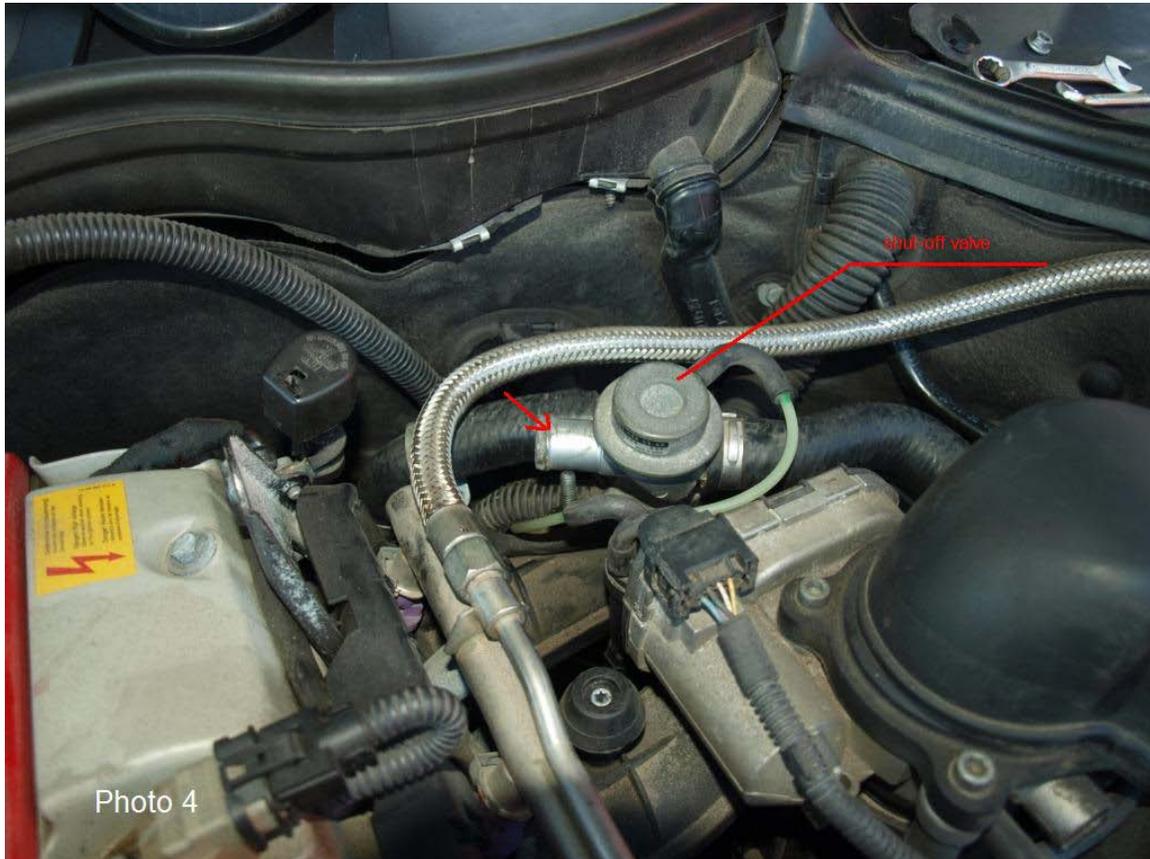
We need to check if there is vacuum suction on the output of the vacuum valve, i.e. finger should stick.

- If the vacuum at the outlet valve is not present and no finger sticks, you should check the voltage on the valve connector. If voltage is present, it indicates that the vacuum check valve is not working and should be replaced. If the voltage is, then you have to deal with the electrician and valves' control system.
- If there is vacuum at the outlet and finger sticks, then that's fine. Attach the outlet pipe back to the valve.

The next unit in the chain will be an air Shut-off valve (see Photo 4).

Disconnect the air hose from the output of the shut-off valve. Turn on the engine again and put the palm to the exit of shut-off valve (red arrow in Photo 4).

- If the air flow is present, then the shut-off valve is working properly.
- If there is no air coming out of, then the shut-off valve itself is faulty and must be replaced.



The next and last unit in the chain will be a check valve (see the look on Photo5). This valve, let's say, has one-way air conduction. It allows air to flow in the direction from the compressor to exhaust manifold, and not in the opposite direction.

Probably, the easiest way to check this valve - is to blow through it with your lips. Since this valve located in hard-to-reach spot, you may have to stretch out and lie down on the engine compartment, to bring to the valve's inlet to the lips.

The air should be blown through the valve easily. If you blow into the valve with goggle eyes and puffed cheeks and the air is barely coming through, then oh-oh, the valve is not working and needs to be replaced!

From what I could find on Internet, the carbonized check valve causes an error P0410. And that was in my case as well.

The lower part of the check valve has threading (see Photo 5), which is screwed into the brass pipe, which is coming to exhaust manifold. This brass pipe is firmly attached to the engine body in several places. The valve itself is in such an awkward place that it is very hard to hold it with hands or use some of the standard wrench. In addition, there is a risk to bend the brass pipe if you were lucky and managed to grab the valve and start rotating it. As myself, after many attempts, I realized the vainness of my efforts and decided to give my car into the professional mechanic's hands. For very reasonable amount of money, mechanic removed the valve together with brass pipe from the car and carefully, on the bench, replaced it.



Photo 5

Immediately after installing of a new check valve, the Check Engine light was not extinguished. Even after I cleared the code with OBD-II tool, it lightened back next day. Honestly, I was frustrated.

The meantime, I noticed that after replacing the valve and when I started the cold engine, within the same 30-seconds, the engine's RPM became very unstable i.e. "floated". Because at the time the car turned more than 110K km, I decided it is the time to replace the spark plugs. As soon as I replaced the plugs, oh miracle, the problem with "floating" RPM has disappeared, and soon the Check Engine light went off.

It is hard for me to explain how spark plugs related to the Secondary Air Injection system, however I drive my car for more than 3 months since that time and Check Engine light has never lightened back. So, I think this problem is resolved.

Generally saying, the method of diagnostics described above is applicable to many cars. You just need to find the right units of your car's Secondary Air Injection system. But it's not hard to do: find an air pump and keep track of air hoses coming from it.