
SwirlRepair Assembly Manual

Probably you have already completed the first steps of the disassembly as part of the problem diagnostics described on www.swirlrepair.com/Diagnose_en. Otherwise you would not know that (only) the swirl operating rod is defective. Still you find the directions below just in case:

! Important ! Always consider common safety guidelines for work on motor vehicles, for example:

- **let the engine cool down**
 - **disconnect the battery**
 - **keep safety distance when engine is running**
 - **wear eye protection**
1. Open the hood and pull off the engine cover.
If the cover's rubber mounts stay on the engine, pull them off and slide them sideways back into the attachments of the cover.
 2. Look into the area below the glow plugs. There you can see the four swirl flaps from the top (five on a five-cylinder engine) as well as the operating rod. The rod probably lies next to the swirls.
 3. Pull off the four glow plug connectors. Make sure you only pull on the connectors, not the cables.
Be Careful: The connectors are snapped on quite tightly, so when you pull they will pop off very suddenly – risk of hand injury.
 4. Take out the swirl operating rod. On some cars this can be done by hand, but on others it is easier to make a pair of hooks from thick wire, for example an old coat hanger.
 5. Mark the rod on the top left side with a marker, so you know up/down and left/right for later.

When you have the operating rod in your hands, the rod repair itself begins:

6. Remove the plastic bushings from the rod. If you have a bench vice and a small saw, clamp the rod in the vice, saw the bushings off along the short side of the rod and remove remains with side cutting pliers or nipper pliers. If you don't have bench vice and saw, simply use cutting pliers or nipper pliers to remove the plastic bushings. Knives are not recommended due to the risk of injury. Also remove remains in the 3mm holes of the rod, or drill the holes through to clean them.
Be Careful: The plastic material can burst.
7. If you have a five-cylinder engine, jump to step 8. Some engines have very limited space available at the third swirl flap from the left. Put one of the SwirlRepair bushings onto this swirl flap and check for the clearance of the bushing, especially the threaded pin and nut. If there is enough clearance jump to step 10. If not, continue with step 8.
8. At the operating rod's third swirl position from the left (note the mark you made before) drill a countersink into the hole from the top, so the countersunk bolt is just flush with the bar. Do this step by step, so the countersink will not end up being too deep. You can use a countersink drill or simply use a standard drill for this operation, e.g. 5.5mm.
9. Put the countersunk bolt through the hole, add some high strength threadlocker (e.g. Loctite 270) on the thread, mount the separate bushing that was supplied and tighten the bolt.
10. Now mount one bushing after the other. Put the threaded pins through the holes in the rod from the bottom (the mark helps), turn parallel with the rod, slide a lock washer over the threaded pin and secure it loosely with a nut.
11. When all four SwirlRepair bushings are loosely fitted, tighten them from the left to the right (so you don't forget one) with a 5.5mm spanner. When doing so, do not over-tighten the nuts. They are kept in place sufficiently by the lock washers and can break if over-tightened.

Now you „just“ need to re-mount the rod:

12. If possible, try to clean the area around the swirls a bit and to wipe off some of the tar-like oil-carbon-mix from the EGR. Best for this is some WD40, which also helps release deposits in the swirl bearings.
13. Use a long screwdriver to turn the swirls' ball joints to the same position as the third swirl from the left (approx. 10 o'clock - the actuator is on the back of the third swirl, so this one cannot be moved).
14. First put the operating rod back on all the swirls' ball joints (note your mark for left/right), and then (not before) firmly press it on to the joints - both most easily from the right to the left. This takes a bit of fiddling and probably also several tries.
The long screwdriver can help as a guide during this procedure, and so can the wire hooks.

Inside the SwirlRepair bushings there is a bit of grease, which can be squeezed out when attaching them to the ball joints. This is no problem at all.

15. Put the four glow plug connectors back on the corresponding glow plugs and make sure they snap firmly.

The swirl operating rod is now repaired. You may have to move the vehicle a bit until the change is noticed by the vehicle and error codes are deleted.

If you should have run on the emergency programme for some time and it should still be active, it may be necessary to have the particle filter cleaned. If so, this should be done ***as soon as possible***.

We hope that your swirls and the swirl actuator – as well as the rest of the vehicles and of course the SwirlRepair bushings – remain functional for a long time.

If you have any problems or questions, please do not hesitate to contact us on swirl@swirlrepair.com.

Drive Safely ☺