

Assembly instruction M54 SK+





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1. Reference on exploded view and parts lists

These installation instructions will be completed by the explosion views and part lists.
These documents can be downloaded from:

[CAD documentation](#)

Make yourself known with the parts lists and exploded views of the kit's scope of parts, while checking for completeness.

2. Notes before the conversion

Please follow the assembly instructions and the guide value for tightening torques exactly. When you are working on the engine, always pay attention to cleanliness and order.

It is recommended to read the entire installation documentation first.

In some cases, the conversion work is described using the vehicle E46 330i as an example. Other vehicles differ in detail. All significant differences are described in this manual.

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3. Guide values for tightening torques

These torques are valid for all bolted connections with bolts of property class 8.8.
Excluding screw connections with special torque instructions.

Standard values for ISO Metric - Standard thread

M5	6 Nm / 4,4 Lb.ft
M6	10 Nm / 7,4 Lb.ft
M8	25 Nm / 18,4 Lb.ft
M10	49 Nm / 36,1 Lb.ft
M12	86 Nm / 63,4 Lb.ft
ASA Oil supply screw compressor M10x1	14 Nm / 10,3 Lb.ft
Hose clamp Width 9 mm	3 Nm / 2,2 Lb.ft
Hose clamp Width 12 mm	6 Nm / 4,4 Lb.ft

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4. Software customization

It is essential to read the map out BEFORE starting the conversion and send it to support@infinitas-automotive.com. We need up to two working days to customize the ecu tune.

The software reflash is realized with two different flash tools. The tools differentiate between E46/E39/Z3 and E85/E86/E60, you will find the appropriate instructions afterwards.

Please note before reading out:

- Connect the vehicle to the charger.
- Check the battery status of your laptop.
- Check if the original BMW software is installed on the ECU of the vehicle. If not, you must inform us.
- Turn on the ignition of the vehicle, do not start.
- Turn of data displays or other retrofitted devices that access the CAN-bus.

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4.1 E46/E39/Z3

First steps

- Deactivate you antivirus software, also Windows Defender, otherwise "MS4XFlasher" will be deleted automatically.
- Download „MS4x Flasher“ from following link [MS4x_Flasher](#).
- Unzip and install „MS4x Flasher“.

Install the driver

- Connect the OBD cable to your laptop.
- Open the folder „Driver“.
- Open „OBD Setup“ and follow the instructions.
- If you are asked to run in compatibility mode, confirm.

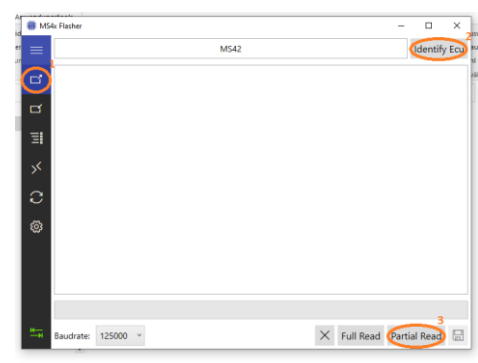


Activate MS4x Flasher

- Connect the OBD cable to your laptop
- Open „MS4x Flasher“ and follow the instructions for activation.
- Copy the license file into the same folder as „MS4x Flasher“.

Read ECU bin file

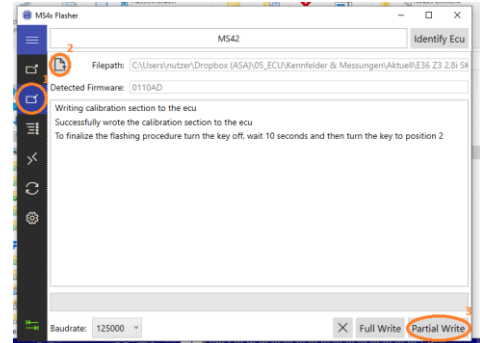
- Connect the OBD cable to your laptop and your vehicle.
- Click on „Identify ECU“.
- Click on „Full Read“, save the file as a backup for your ecu and send it to support@infinitas-automotive.com.



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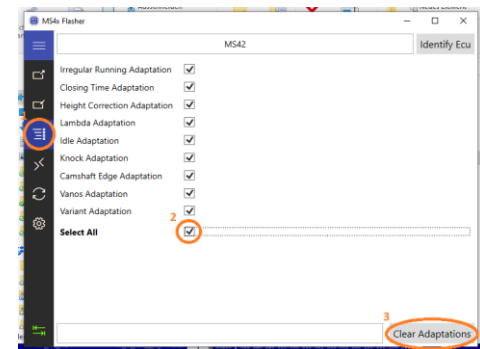
Write ECU data

- Connect the OBD cable to your laptop and your vehicle.
- Open „MS4x Flasher“.
- Click on „Write to ECU“ on the left side.
- Select the modified data that you have received from us.
- Choose „Full Write“.



Delete Adaptations

- Click on „Reset Adaptations“ on the left side.
- „Select All“.
- „Clear Adaptations“



You have customized the software now.

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4.2 E85/E86/E60

Installation

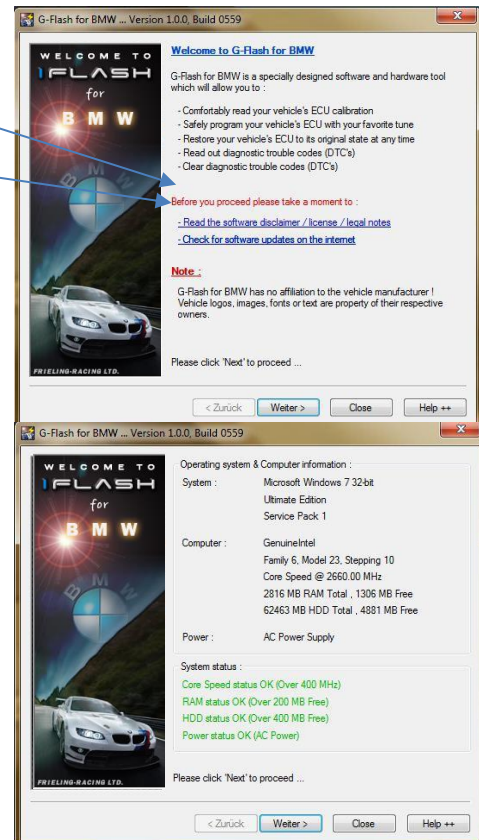
- Download [I-Flash](#).
- Install I-Flash on your laptop.
- Open I-Flash and confirm the license.
- Click on download Updates.
- Click on „Weiter“.

Check Laptop

- The software checks now automatically the system status of the laptop. If all dots light up green, the laptop can be used for the I-FLASH, if not, another laptop must be used.
- Click on „Weiter“.

Read out vehicle data

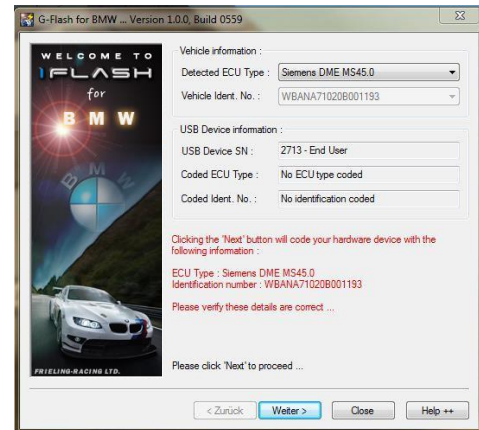
- Connect the OBD-cable to the OBD interface of your vehicle and your laptop
- Wait till Windows informed you, that the USB device has been recognized and is ready for use.
- Make sure that the ignition of the vehicle is on and that the connection is not interrupted.
- Click on “Weiter”.
- I-FLASH automatically identifies your vehicle to pair the vehicle with the cable.



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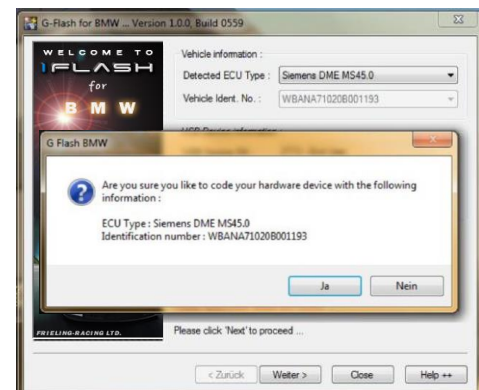
Check vehicle data

- The I-FLASH has read out your vehicle data. Please check them.
- Please click on "Weiter".



Encrypt I-FLASH

- In this window you will be asked the last time, if you want to pair this I-FLASH cable to this vehicle. You cannot use it for any other vehicle after that.
- To read out the map of this vehicle, please confirm with "Ja".



Main menu

- Now you are in the main menu.
- Under Read ECU-Memory you can read out the software of your vehicle.
- Under Program ECU-Memory you can write the modified map on your ECU.
- Under Diagnostics you can read the error memory of this vehicle and delete the adaptation data.
- Under Recover ECU Memory you can restore your original BMW map.



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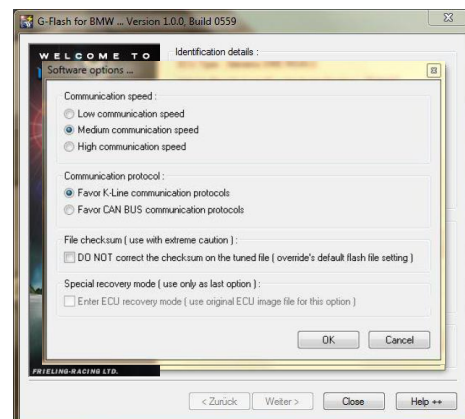
Read out map

- Click on “Read ECU Memory”.
- Click on “Calibration data only”.
- Confirm your selection with „OK“.



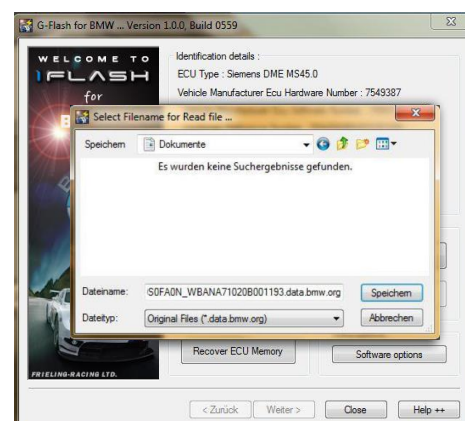
Software options

- In this window are the software options shown.
- Confirm them with „OK“.



Select storage location

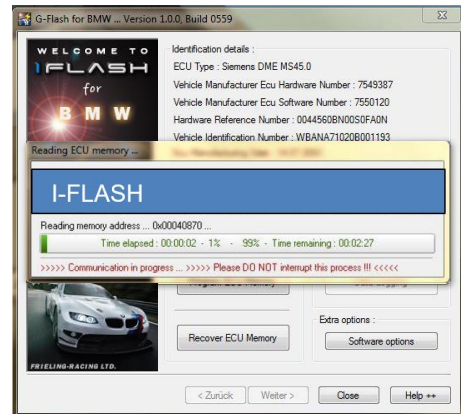
- Select a location for your map.
- Click on “Speichern”.



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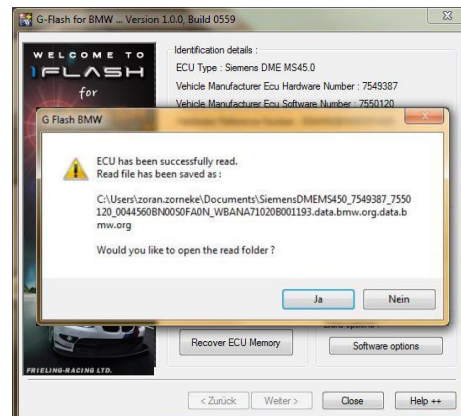
Do not disturb

- Now the map of your vehicle read out. Make sure that the transaction will not be interrupted.
- In this window the read out status is displayed, no matter how long it takes, do not interrupt it.



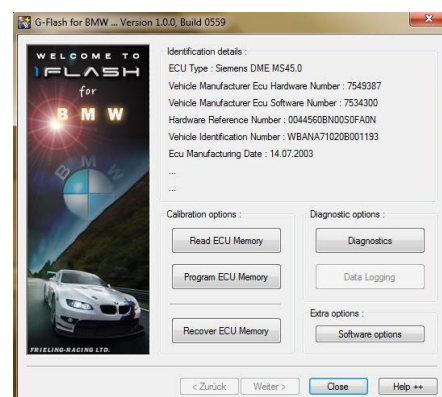
Open storage location

- In this window you will be asked if you want to open the storage location.
- Confirm with "Ja".
- Now send us this file to support@gp-infinitas.com.



Load modified map

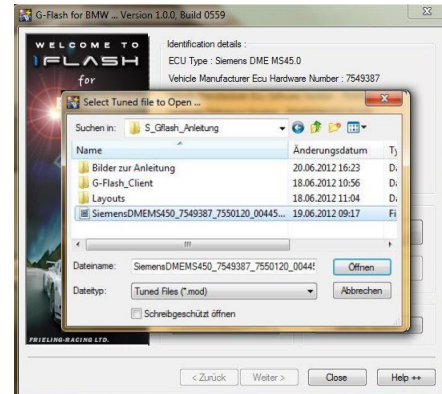
- Reconnect the I-FLASH to your laptop and your vehicle.
- Open the main menu.
- Now select "Program ECU Memory".



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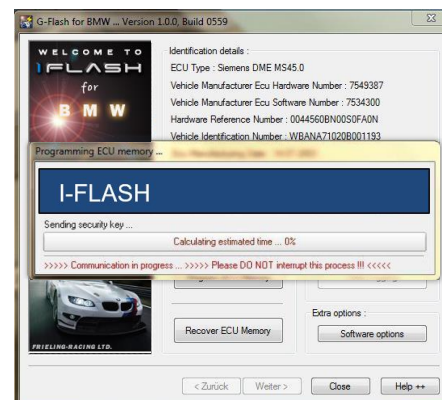
Select map

- Now select the modified map that you received from us.
- Confirm the programming with "Öffnen".



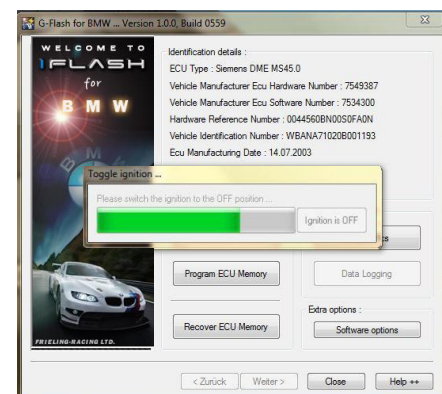
Do not disturb

- I-FLASH write now, make sure, that the transfer will not be interrupt.
- This window displays the upload status, no matter how long it takes, do not interrupt it.



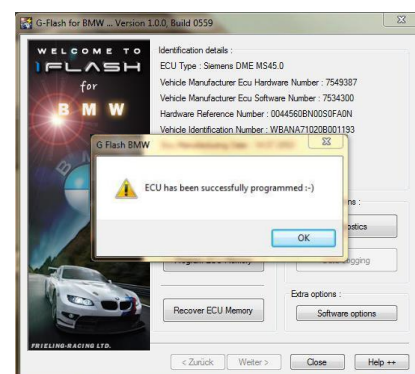
Security

- Here you are asked to switch off the ignition.
- Switch off the ignition and confirm with "Ignition is Off".
- Do not remove the I-FLASH cable.



Last steps

- Only if this message appears the programming was successful.
- Confirm the message and the switch ignition on again.
- Then select Diagnostics in the main menu.

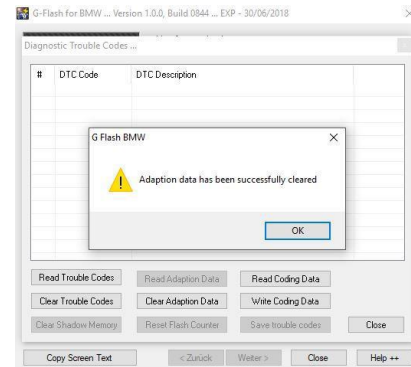


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Delete adaptation values

- Select „Clear Adaption Data“.
- Then confirm with „OK“.

You have customized the software now.



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5. Installation preparation

1. We recommend to clean your engine bay with a pressure washer before the installation.
2. Remove the the fuel rail cover (Figure 1, #8)

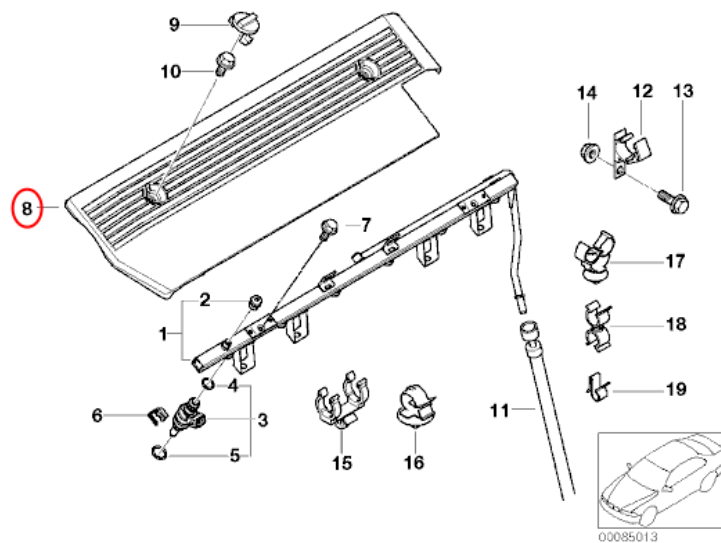


Figure 1

3. Disassemble intake (Figure 2, #12) and air filter box (Figure 2, #1). These components are no longer needed. Leave vacuum hose for fuel pressure regulator unconnected (E46/E39/Z3). It will be used later.

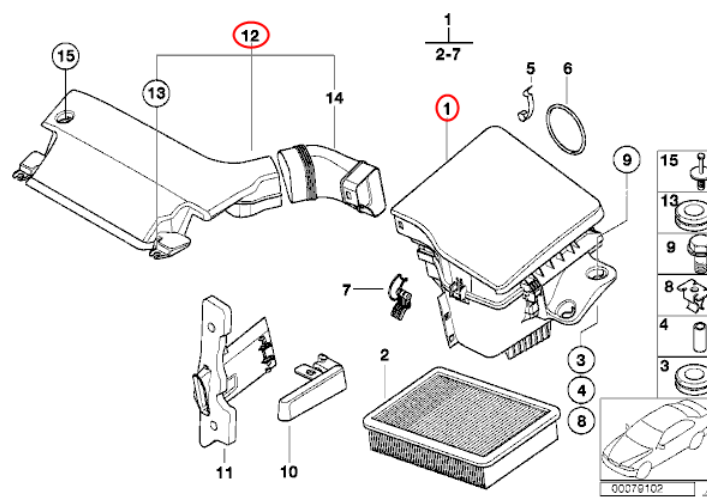


Figure 2

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4. Disassemble air mass sensor (Figure 2Figure 3, #1).
5. Only E85 (Z4) 3.0-liter:
 - a. Dismantle the built-in sound generator.
 - b. Close the opening to the interior with the supplied cap.
6. Disassembly Rubber hoses and hose clamps (Figure 3, #3&6). These Components are no longer needed. Pull off the vacuum hose for fuel pressure regulator plugged in Figure 3, #3. This is needed later in Figure 8.

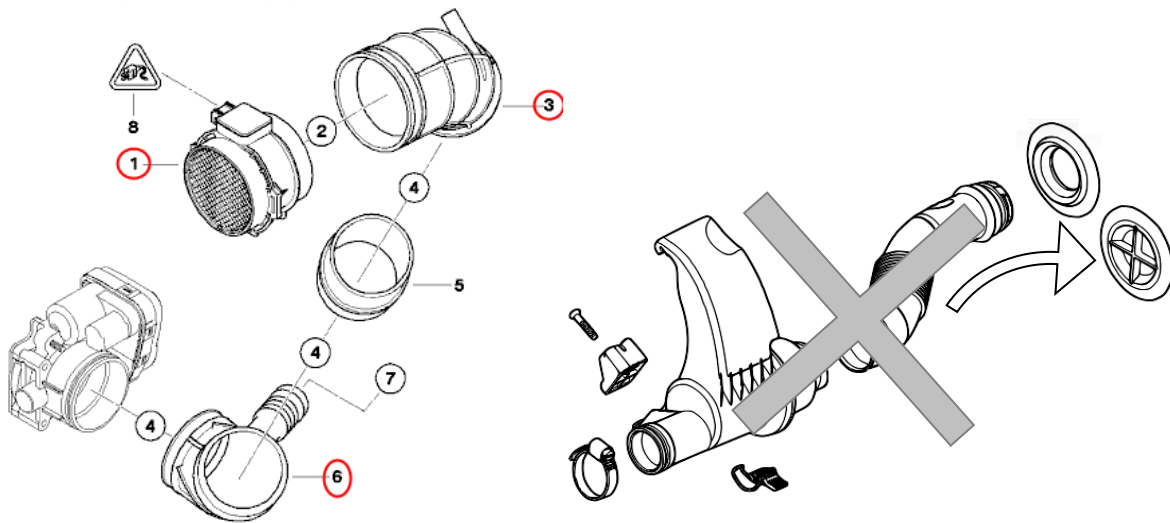


Figure 3

7. Unplug and dismantle DISA unit and idle air control valve (Figure 8, #7&8)



Make sure that the bolt of the DISA (Figure 8, #7) does not fall into the intake manifold

8. Unplug and remove throttle valve actuator.
9. Disassemble the air conditioning compressor belt.
10. Disassemble the belt for the auxiliary units. This belt is no longer needed.
11. Dismantle the underride protection (Figure 4, #1).
12. Disconnect electric fan and remove it (Figure 5, #1, 2 & 3).
13. Dismantle the power steering pump pulley (Figure 6, #4) (not Z4).

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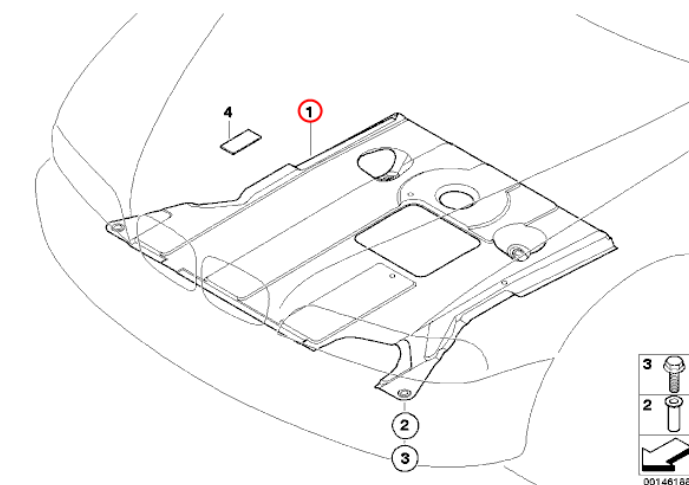


Figure 4

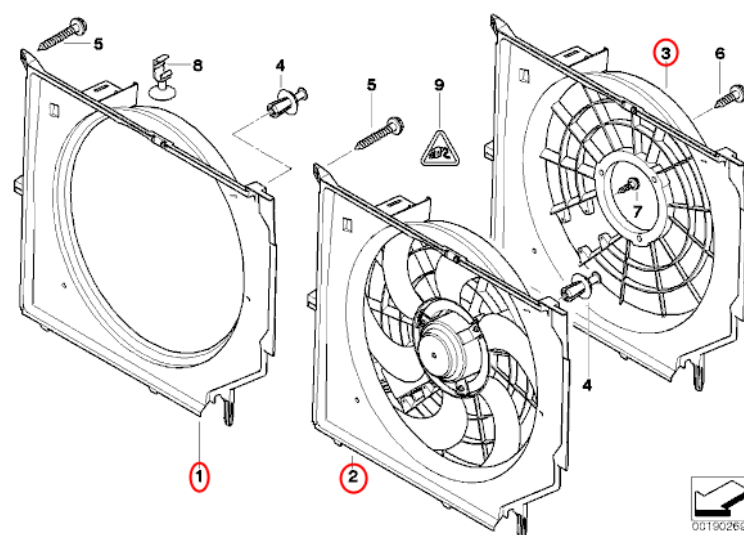


Figure 5

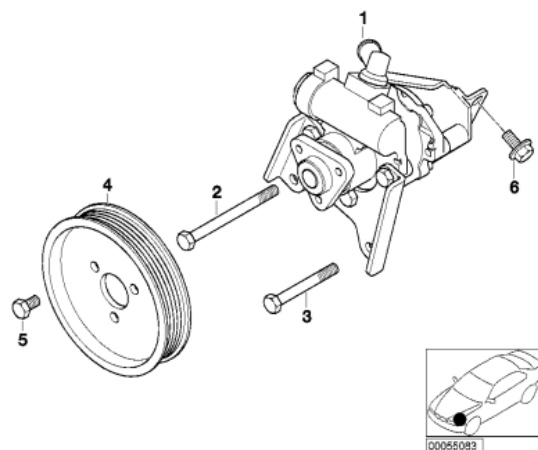


Figure 6

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14. **Dismantle both brackets of the power steering pump**, the front and the rear one (not on the Z4). BMW installed 3 different holders. The installation is the same for all 3 variants and the supplied bracket fits **ALL** available P/S pumps. In some cases, the oil line has to be bend a little bit.
15. Remove the idler pulley (Figure 7, #15,16 & 17).

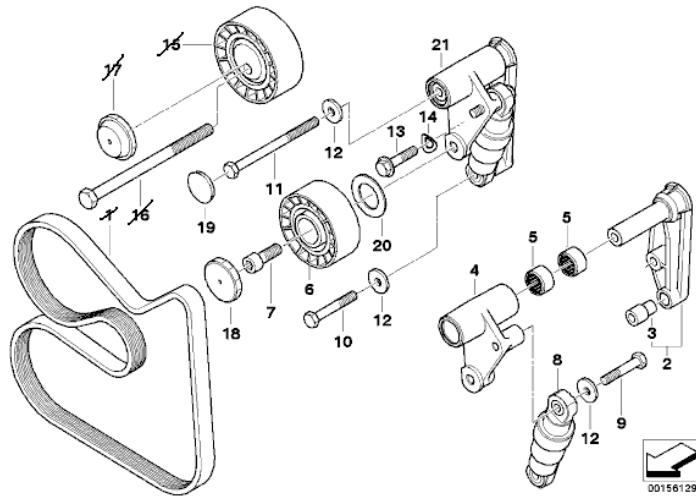


Figure 7

16. Remove the electrical connections from alternator, oil temperature sensor and oil pressure sensor .
17. Dismantle brake booster housing.
18. Remove the smaller plug with inside diameter 3.5mm from the intake manifold (Figure 8, #16). Connect the control hose for the fuel pressure regulator, which has been removed at step 7, to the manifold.

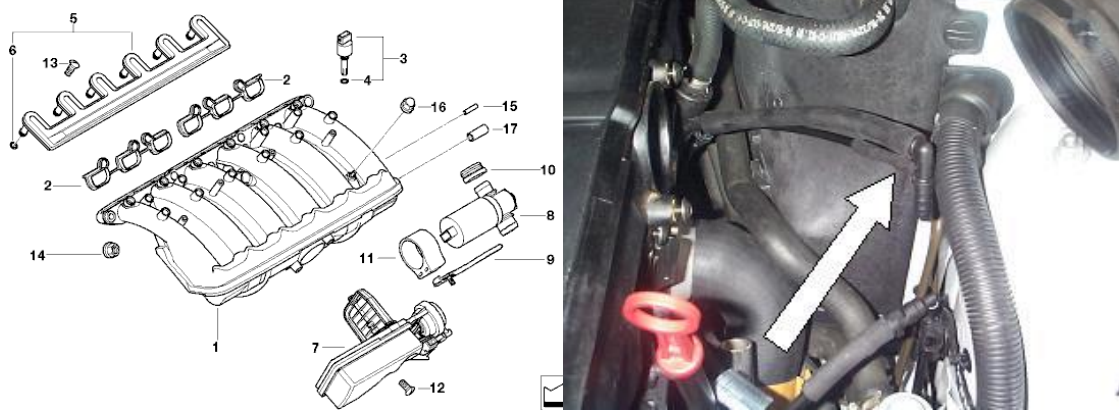


Figure 8

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19. Remove the hose (Figure 9, #7) from the intake manifold and close the air intake manifold with the added closing plugs (see P341-53-05 and Figure 10).
20. Remove the plastic hose for crankcase ventilation (Figure 9, #3) and cut it between the intake manifold and separator at the marked position in Figure 9 and Figure 10 while it is still.
21. Remove the connector on the oil separator by rotating it counter-clockwise while pulling it off (Figure 9 when removed). The other side of the shortened hose (Figure 9, #3) is not necessary anymore.

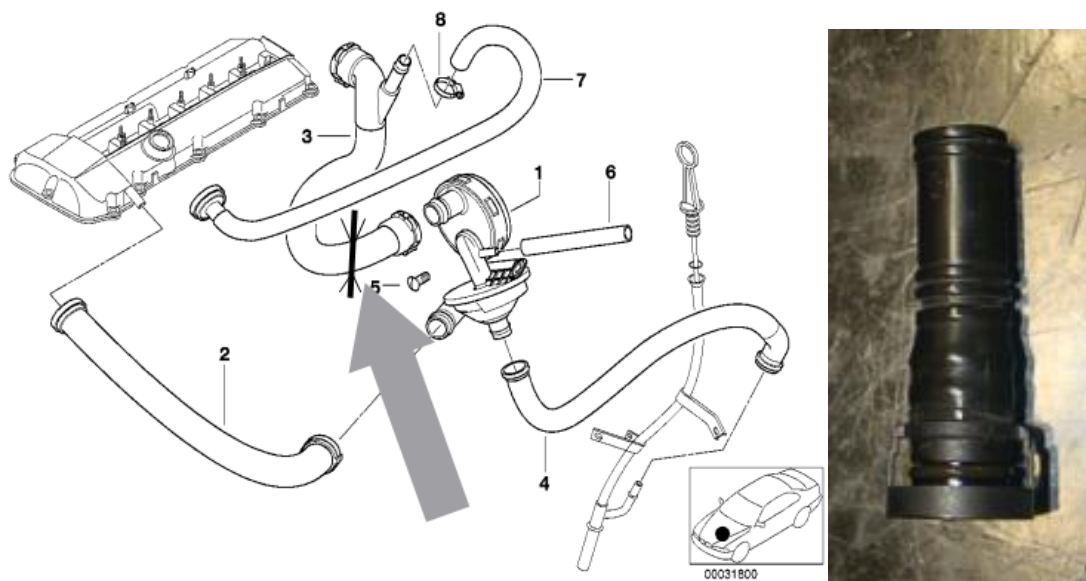


Figure 9

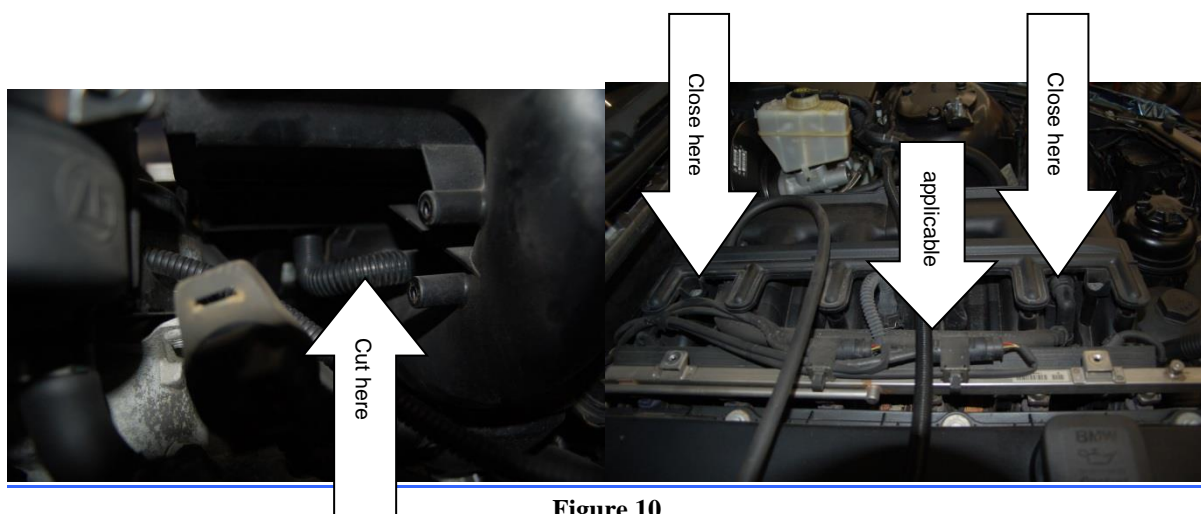


Figure 10

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22. Mount the crankcase ventilation hose P341-53-20 on the pipe from step 21 and fix it with one hose clamp. To simplify the assembly align the parts as shown in Figure 11.

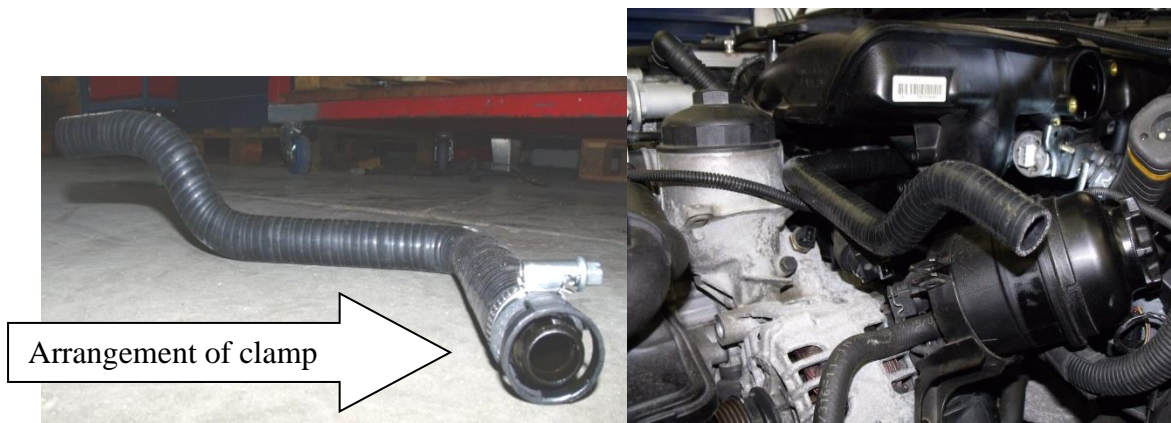


Figure 11

23. Cut P/S hose from oil cooler to reservoir in the middle of the hose (Figure 12). Catch the oil in a clean can and keep it to refill later.



Figure 12

24. Remove the cutted hose from the reservoir. This is no longer needed.
25. Use Hose P341-53-57 as a new P/S hose between the radiator hose and reservoir.

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26. Remove the holder of the fuel tank ventilation valve under the intake manifold.

Please take a look for a clean environment during the next steps. Dirt particles could be flushed into the compressor or the engine which could cause damages.



27. Dismount oil pressure sensor (Figure 13, #1) on the oil filter housing.

28. Remove the banjo bolt (Figure 13, #2).

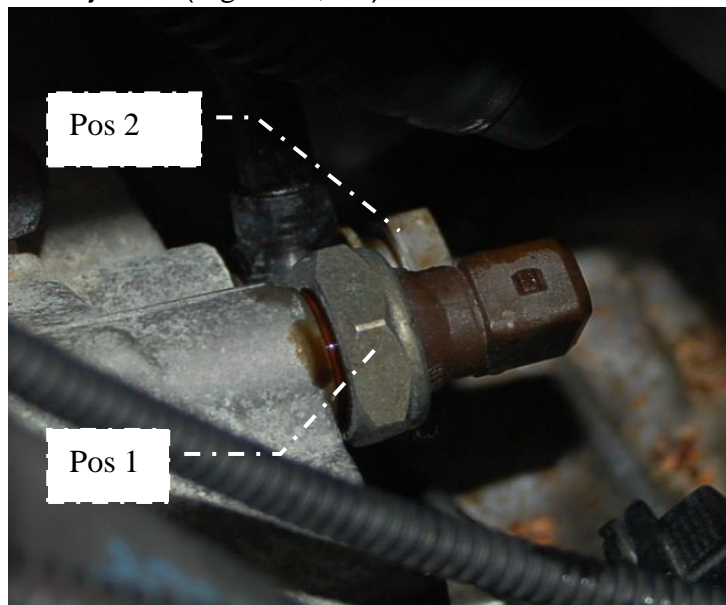


Figure 13

29. Fit the oil supply of the Vanos unit with the banjo bolt adapter (P341-53-40) in the rear thread (engine side) of the oil filter housing and install the pressure sensor into the adapter with the provided gaskets (Figure 14 left). Thereby observe the tightening torque of 20Nm.

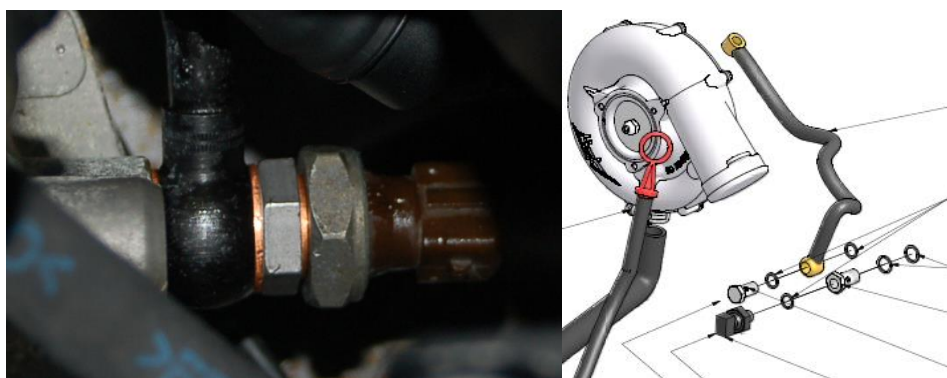


Figure 14

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30. Reconnect the electrical connector of the oil pressure switch with the extension cable (P341-71-12 / P341-70-05).
31. Mount the oil supply hose from the compressor (P4030 3716) into the front threat of the oil filter housing (where the oil pressure sensor was before), using the M12 banjo bolt and the gaskets. Thereby observe the tightening torque of 20Nm.
32. Remove the threaded bolt from the strut of the vehicle (only E46). Tape the strut to protect the area around the pin while cutting. Then seal the bare spot with paint pen in car color Figure 15.

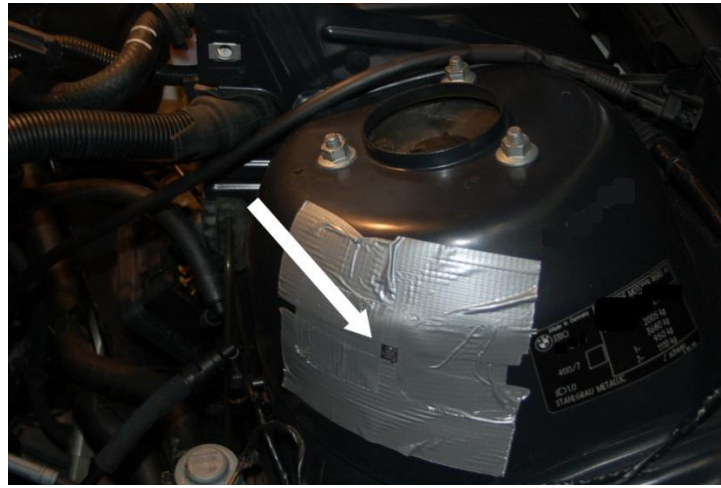


Figure 15

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33. Pull out the dipstick and then dismount the measuring tube. You can disconnected the hose from the dipstick (Figure 9, #4) to facilitate the dismantling.
34. Before cutting the dipstick tube check again if the oil dipstick was pulled out, otherwise you will cut it! Cut the tube like mentioned in drawing P341-53-07 (Figure 17). Remove all swarfs thoroughly after handling.
35. Replace the O-ring between oil pan and dipstick tube (Figure 16).



Figure 16

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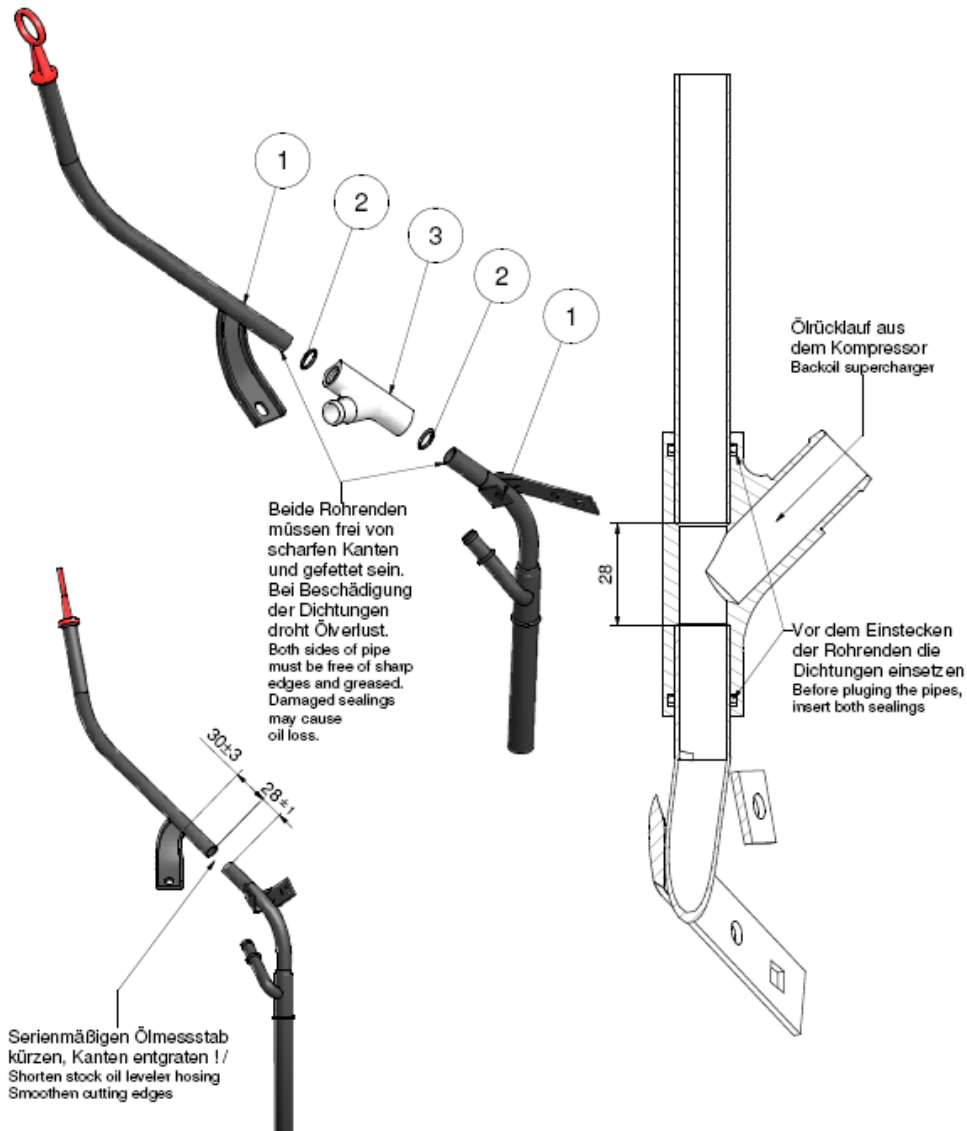


Figure 17

36. Add grease and put the parts together like shown in Figure 17. Do not install the dipstick in the engine at this moment.

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Caution: Do not mismatch the wire colors and pay attention to neat joints: A faulty electrical connection leads to malfunction.



37. Extension of the cable for the air mass meter (MAF):

- a. E85, E60:
 - Cut the cable in the middle
 - Put on shrink hoses
 - Soldering the cable
 - Heat the shrink hoses
- b. E46, Z3: Use the extension cable P341-72-01

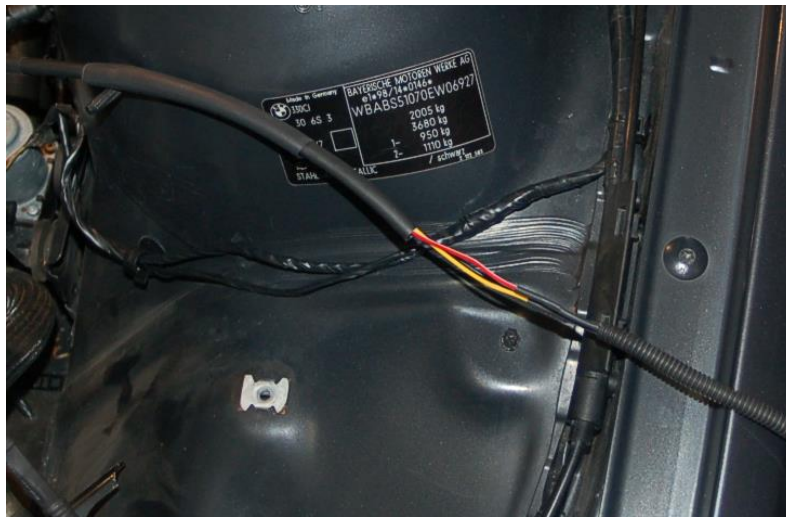


Figure 18

38. Extend the throttle cable according to drawing P4030 3090 (see LMM cable extension point a). Required on all vehicles.

39. Connect the alternator cable.

40. Plug in the oil pressure sensor cable with attached extension cable.

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6. Installation air routing after compressor

1. Remove the plug housing protection from the oil temperature sensor cable (Figure 19). This component is not necessary anymore.

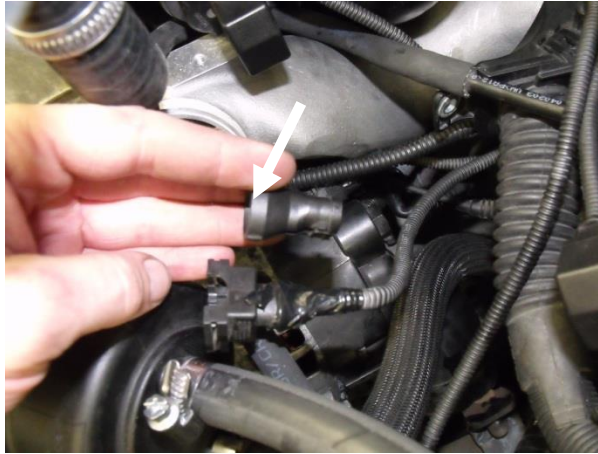


Figure 19

2. To install the charge pipe, remove the P/S reservoir (only E46).
3. Insert the gasket into the charge pipe.
4. Put on the sticker with the part number on the charge pipe and install the charge pipe.
5. Install the P/S reservoir.



Figure 20

6. Assemble the housing of the brake booster.
7. Install the idle air control valve and the DISA unit.
8. Mount the engine wiring harness.
9. Mount the dipstick.

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7. Installation belt drive compressor and oil supply

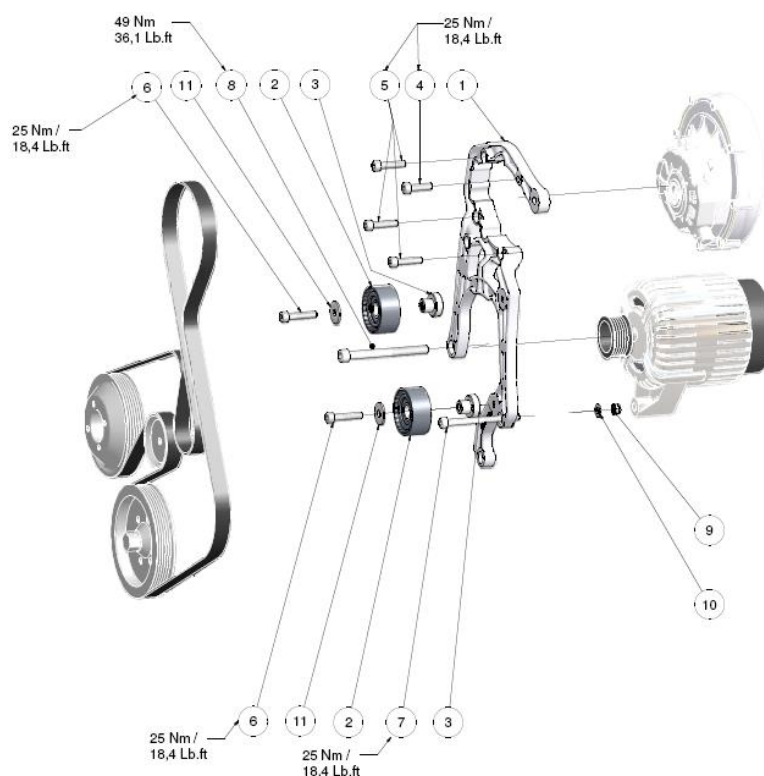


Figure 21

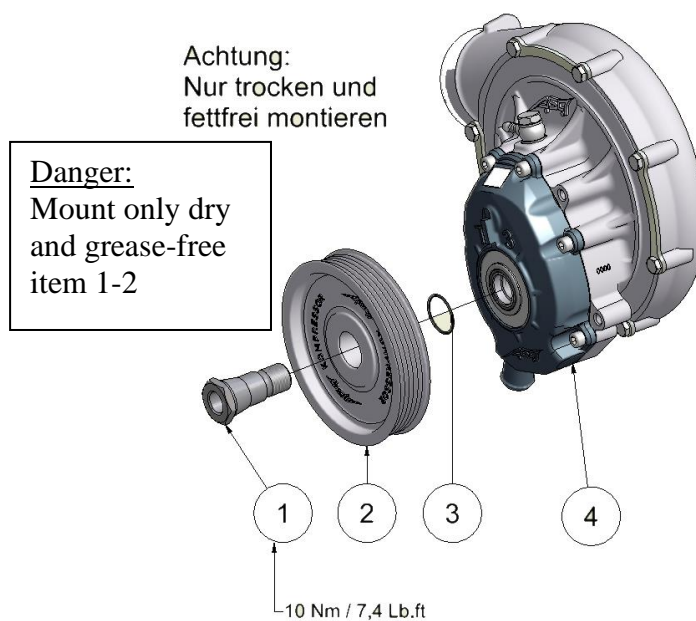


Figure 22

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1. Mount the upper idle roll (Figure 21, #2) on the base plate (Figure 21, #1) with 24Nm.
2. Mount the base plate to the engine in following order (first 2-3 threads engaged, then with tightening torque)
 - a) M10x120 (40Nm)
 - b) M8x75 (24 Nm) with P/S pump bracket P341-15-15
 - c) M8x110 (24 Nm)
3. Prepare compressor: Mount flange P341-24-15 with greased O-ring on the compressor. Note the angle of the flattening (Figure 23). The flattening points shows in the opposite direction than the pressure tube and is located at the bottom of the compressor.

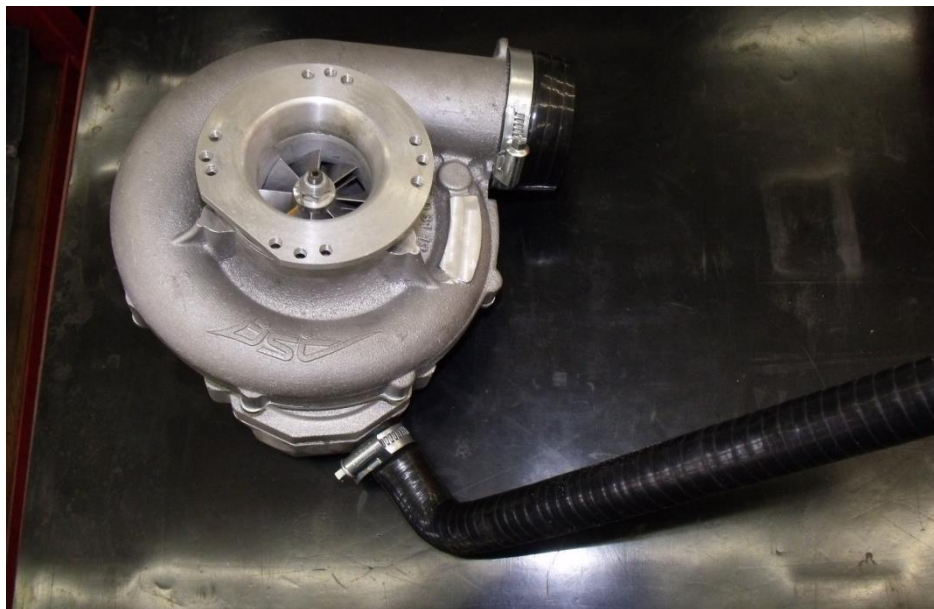


Figure 23

4. Mount oil return hose on the compressor with clamp.
5. Set up silicone hose P341-44-20 to compressor and attract.

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6. Install compressor on base plate in the engine bay. Attract M8 screws with 24 Nm.
7. Attach the oil return hose from the compressor to the return input of the dipstick tube (Figure 17) and secure it with a hose clamp. If necessary, shorten this hose a bit and make sure that it does not rub against other components. The hose between the compressor and oil pipe must also be constantly falling, otherwise, the engine oil can't drain from the compressor!
8. Mount the pulley to the compressor:
 - a) Insert O-ring (Figure 22, #3) with grease into the groove of the compressor shaft.
 - b) Insert the conical bolt (Figure 22, #1) into pulley (Figure 22, #2). The conical surfaces of the shaft and pulley must be clean, grease and oil free.
 - c) Attract the conical bolt into the thread by hand.
 - d) Hold the pulley with the belt down and tighten the conical bolt to 10 Nm. The connection is self-tightening on the first engine start and during operation.

**CAUTION: The pulley cannot be removed without a special tool.
The compressor will get damaged using an impact gun.**

9. Mount silicone hose P341-44-20 on the tube with hose clamps.
10. Mount the remaining screws on the base plate and the second pulley and tight them with a the defined torque (Guide values for tightening torques).
11. Only E46, E60 and Z3: Install the P/S pump pulley.
12. Assemble P341-44-16 on the oil filter housing (Figure 24) and the bracket of the P/S reservoir and supporting the base plate. If necessary, rotate the container so that the hoses are exposed on the reservoir. Make sure the hoses do not chafe or get crushed. First attract on the base plate and then on the oil filter case, only than the optimal position is guaranteed.

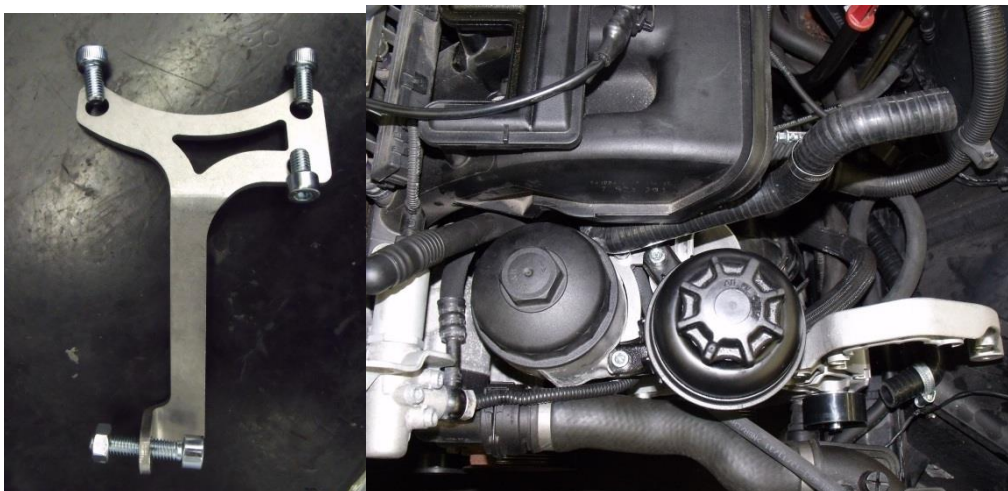


Figure 24

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13. Mount the oil feed line to the compressor. Pay attention to proper positioning of gaskets and cleanliness. Tightening torque of banjo bolt on compressor: 14Nm (Figure 25).

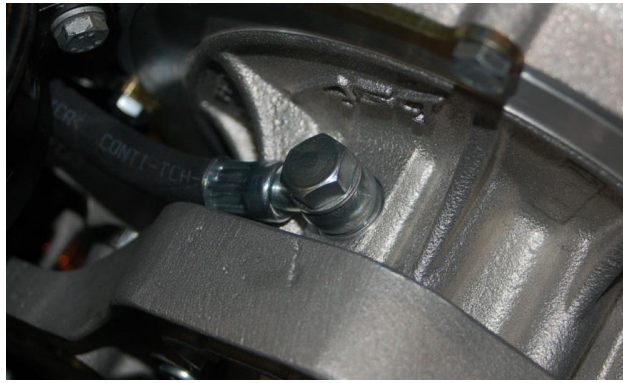


Figure 25

14. Install the belt. Pay attention to proper belt routing (Figure 26).

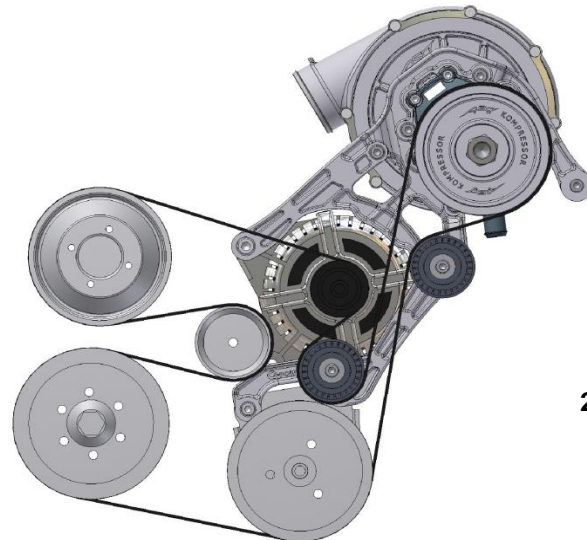


Figure 26

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8. Installation air routing before compressor

When installing into Z3, please follow the different instructions (P341-95-17).

1. Prepare the ejector pump (Figure 27, red arrow). Remove the hose (Figure 27, #3 & 6). These components can be dispensed.

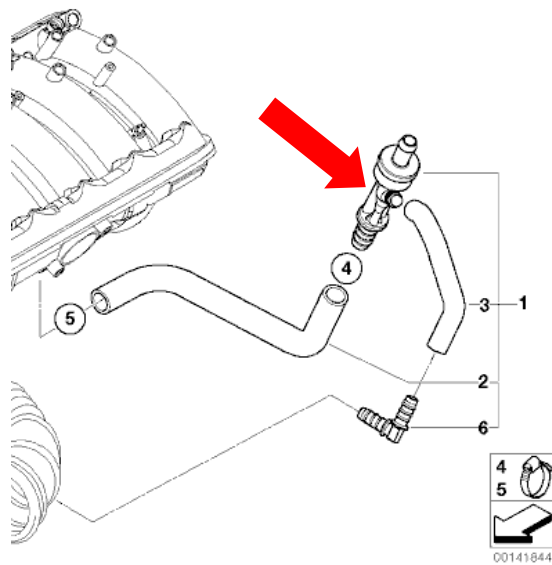


Figure 27

2. Connect the hose for the idle air control valve (Figure 28). Figure 28 #18 has to be installed at the idle air control valve. Figure 28 #16 is routed to the ejector nozzle (Figure 27 where #3 was connected).

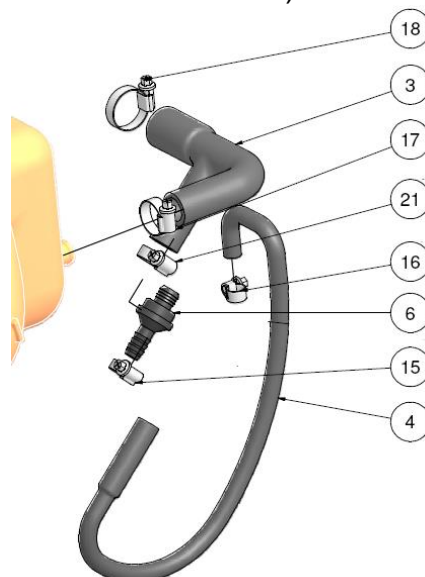


Figure 28

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3. Install the throttlebody on the compressor flange (Figure 29). Pay attention to a proper seating of the O-ring on the intake side of the throttlebody. Grease the O-ring very good!

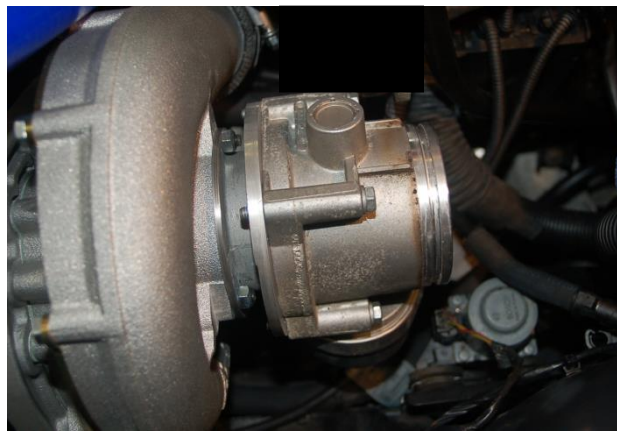


Figure 29

4. Attach the intake to the throttlebody. Install the bracket P341-24-18 on the intake with 6Nm and the compressor.
5. Mount the hose of the idle air actuator on the intake tube (Figure 28, #17)
6. Connect the crankcase breather tube (P341-53-20, Figure 11) to the intake pipe.
7. Mount the air filter and air mass sensor (maf) to the intake and attach with hose clamps. For B22 and B25 engines 2 adapters are provided to adapt the maf diameter.
8. Plug in the air mass sensor.
9. Mount all panels and the fan again.
10. Fill the power steering reservoir.

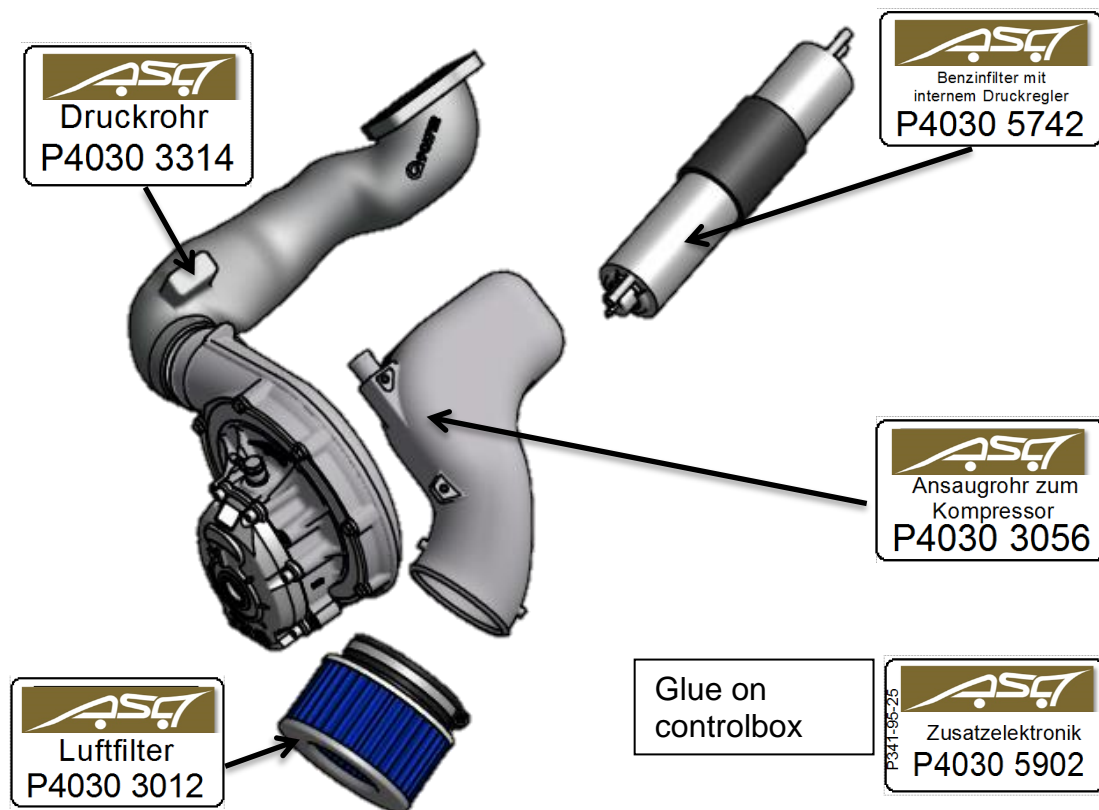
9. Fueling

Install the provided fuel injectors by manufacturers guideline.

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10. Marking of parts

According to the TÜV certificate the delivered stickers have to be put on the parts as shown.





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11. Checklist

After the conversion and the flash of the ecu tune, the engine can be started. Delay in starting the engine is caused by the work on the fuel system and disappears by itself.

If the engine doesn't run smooth, leaks or shows other abnormalities, turn it off and remove the cause.

To check the work you have done, please revise to the checklist:

Components:

- | | | |
|--|-----------------------------|-------------------------------|
| 1. Belt drive control, belt seated properly | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 2. Abrasive belt / belt drive detected | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 3. Has the belt tensioner enough tensioning | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 4. Air filter frees the belt drive | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 5. Engine control unit flashed with infinitas software | <input type="checkbox"/> ja | <input type="checkbox"/> nein |

Supplies:

- | | | |
|--|-----------------------------|-------------------------------|
| 6. Engine oil level checked | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 7. P/S oil level checked | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 8. Leaks under vehicle | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 9. Leaks of oil supply to the compressor | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 10. Leaks in the fuel system | <input type="checkbox"/> ja | <input type="checkbox"/> nein |

Optical:

- | | | |
|--|-----------------------------|-------------------------------|
| 11. Headlights adjusted or controlled | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 12. Trouble codes and adaptations tested and cleared | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| Sticker affixed (1x cap) | <input type="checkbox"/> ja | <input type="checkbox"/> nein |
| 13. Provided maintenance verification filled out | <input type="checkbox"/> ja | <input type="checkbox"/> nein |

Note for a trouble-free operation, the maintenance instructions for SK+ Systems. For questions or problems, please email at support@infinitas-automotive.com or phone 0049 8252-90 986 0.

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