2CV Sensor Flange & Gauge Kit

Components

Sensor Flange

The flange is mounted between the original filter housing and the oil filter and is make from a solid billet of aluminium. The flange has two holes on its outer edge set approximately 45 degrees apart to allow the fittings for capillary type oil pressure and temperature gauges, or for mounting the senders for electrical gauges. The flange is provided with two M10 threads and is sealed to the filter housing by an integral rubber sealing ring.

Seals/Nut/Adapter

A combination nut/adapter is screwed onto the standard filter tube to firmly hold the sensor flange to the housing. The tightening of the combined nut/adapter seals the flange to the filter housing, the filters own sealing ring provides the seal on the filter side.

Filter

The kit contains a Mahle or Knecht filter, reference OC47, which adds approximately 0.25 litres of oil to the circuit. Replacement filters can be sourced wherever you wish and are largely a matter of personal choice, but care should be taken to ensure that any filter used is capable of handling the very high pressures of an A-Series engine and that it also has the necessary non-return and bypass valves. Replacement Mahle or Knecht filters are available from 2cvstuff.com should you require them. Service intervals are exactly as standard; it is recommended that you change the filter every 3,000 miles, but the quality of the filter will allow you to observe the 6,000 mile interval recommended by Citroen if you wish.

Gauges

The kit contains one temperature gauge and sender, the gauge reads to 120 degrees centigrade. A 7 bar pressure gauge and its sender are also included.

Mounting Considerations

The sensor flange is approximately 25mm wide and combined with the extra length of the filter this can cause the canister to rub against the inner wing panel. The panel should be bent back out of the way slightly to accommodate the assembly. You should however always check that you have sufficient room for the flange, filter and any sensors or pipes as the assembly may interfere with the chassis rails, brake ducting or body panels. Particular care should be taken when fitting to modified or kit cars.

Tools & Materials Required*

To fit the sensor flange on its own:
Spanner or socket for removing the triangular wing panels - 8mm
Spanner or socket for removing the wing bolts - 19mm
Spanner or socket for removing the rocker covers – 12mm
Oil filter wrench to remove the old oil filter
Suitable spanner, deep socket or adjustable spanner to tighten the adapter/nut.
Small quantity of semi-permanent threadlock
Oil to top up level

To carry out an oil change at the same time:
Spanner or socket to remove sump plug – 21mm.
12mm spanner or socket to for rocker covers.
Approximately 3 litres of fresh oil
A new sump plug washer

Additional tasks:
Ring spanner to hold the rocker assembly while clearances are adjusted – 10mm
Flat blade screwdriver for adjusting valve clearances
Set of feeler gauges
Torque wrench

***Tools required will depend on what you want to do while the bodywork is off. The first eight items above are the minimum required to fit the sensor flange. If you are combining this with an oil change you will also need items 9-11. If you are going to take the opportunity to check the valve clearances and re-torque the heads you will require everything on the list.**

Instructions for installing the Adapter Flange

When

The best time to fit the assembly is when you are doing an oil change as removing the filter will cause a lot of oil to be lost anyway.

Step 1 - Oil Change/Basic Preparation

1. Read the instructions from start to finish.
2. Take the car for a 10 minute run to warm up the oil a bit.
3. Place a catch can under the sump plug and remove the sump plug (21mm socket). Leave the old oil* draining and proceed with the rest of the instructions.
4. Remove the triangular panels between the front wings and the bonnet on the driver's side (3 x 8mm bolts). Look out for any earth wires for the front indicators that may be installed and remember how they are connected.
5. Remove the front drivers wing (4 x 19mm nuts). Again, look out for any earth wires that may be present for the indicators.
6. (Optional) Remove the rocker covers. The rocker covers contain quite a bit of (old) oil and it is strongly recommended that you get rid of that too. You will need to remove both wings for this and remember to place a drip tray under the rocker covers to catch the oil.
7. (Even more optional) While you have the rocker covers off why not do the valve clearances and re-torque the heads as well. Instructions for this operation are available on request if required.
8. This is a great opportunity to clean all that old oil from the engine and bay. A power washer is ideal – if you don't have one borrow one from the neighbours. If there is lots of it caked on you might have to apply some degreaser to loosen it off. If you leave it all in there it will be much more difficult to spot any leaks.
9. Remove the oil filter. This is located on the right hand (drivers) side of the car just below and behind the RH cylinder. Again, remember to put something underneath to catch the old oil.

Step 2 – Rebuild

1. Trial fit the installation. Place the combined adapter/nut into the center of flange. Offer this whole assembly up to the filter housing. The female thread on the adapter/nut screws over the standard oil filter mounting tube.
2. Check the fit of the sensors and cables that are going to be installed. The sensors are mounted hanging down from the housing (directions are given as if you are looking directly at the assembly) with the oil pressure sensor on the left and the temp sensor on the right. Think about how you are going to route the cable to the sensors.
3. Once you are satisfied that you understand how everything fits dismantle everything ready for final re-assembly.
4. In order to make things as easy as possible you will find it easier to mount the sensors onto the flange prior to installing the flange onto the engine. If you inspect the flange you will see that there are two holes approximately 45 degrees apart on the radial surface to mount the sensors into. The oil pressure sender (the large one) should be mounted in the left hand hole as you view the sender from the side that the filter seals to and the temperature sender in the other.
5. The holes in the flange are ever so slightly tapered and resistance will increase as the senders are screwed into them. Be careful not to screw them in very hard as damage could occur. You can use some PTFE (Plumbers) tape or semi-permanent thread lock

to ensure that the joints do not leak if you wish. Remember that there can be as much as 200psi at the filter housing and any leaks are potentially highly damaging.

6. Once the sensors are installed spread a thin layer of threadlock onto the female thread of the adapter/nut that you will be screwing over the standard filter thread and a thin layer of oil onto the seal at the back of the sensor flange.
7. Place the adapter/nut into the sensor flange and then screw the whole assembly onto the threaded filter mounting. Screw the adapter up until the seal on the back comes into contact with the filter housing and make sure that the sensors are facing downwards.
8. Hold the sensor flange so that it cannot rotate and then tighten the whole assembly up fully. It doesn't have to be done up incredibly hard but the seal needs to be compressed on the back.
9. Put a small amount of engine oil on the seal of your new filter (see above) and screw the filter onto the exposed thread of the adapter tube. Tighten against the face of the adapter flange. 'Good' hand tight is enough.
10. Top up the oil level to maximum, remove one of the coil terminals and crank the engine over on the starter until the oil light goes out.
11. Top up the oil level again, start the car and let it run for approximately 1 minute. Check carefully for signs of any leakage around the sensors and the flange and if any leakage is present then stop the engine and solve the problem. After the minute stop the engine, check the oil and top up if necessary.
12. To fully test the installation restart the car and let it warm up gently. You should be constantly checking for oil leaks around the sensors and flange, but you might as well ensure that the pushrod tube seals and rocker covers seal properly too. Fix any leaks immediately.
13. Run the cabling for the gauges as given on the individual instruction sheets and mount the gauges in a suitable location in the car.
14. Check the operation of your gauges – see below for instructions on what to expect and on how to interpret the readings.

*** Important Note**

Old oil is dangerous stuff and can cause irritation to the skin. Wear gloves, or at least make sure it does not get on your skin. Always dispose of it in a responsible manner as it is highly dangerous to the environment. Most Local Councils have a purpose designed disposal site at their recycling (skip) centres. Be responsible, USE THEM.

Installation notes:

Cables

Electrical:
When running the cables from the senders back to the gauge/s make sure that you install a grommet whenever the cables pass through a hole. Also, don't forget to install a fuse of the correct rating in the circuit feeding the gauges.

Routing:
An easy route for the cables back to the cabin is along the front chassis rails and up the bulkhead. If you intend to run the cables this way, please remember to allow some slack in the cables, as the engine will rock in the chassis due to torque reaction.
Cables should be run in a tidy way, away from any strong heat sources and moving parts. Cable ties or (insulated) 'P' clips are the best method of securing them.

Appendix A – Pressure & Temperature Readings

Observations & Recommendations

All readings quoted are taken with an otherwise standard 602cc M28/1 engine (8.50CR) which has covered approximately 80,000 miles. Vehicle is fitted with Sensor Flange, Adapter Tube, OC47 Mahle/Knecht filter and SPA Design dual gauge. One bar equals approximately 14.5 pounds per square inch.

	Summer	Winter
Oil Used (mineral)	15w50	15w40
Max Pressure Reached*1	10bar	12bar
Normal maximum	7-8bar	8-9bar
Normal Maximum running over 3000rpm	5-6bar	6-7bar
Min Pressure Reached*2	1.5bar	2bar
Maximum Temperatures	102.30 C	85.40 C
Warm up Time (to 50 Deg C)	< 5 miles	< 8 miles
Warm up Time (to 70 Deg C)	<10 miles	<15miles

*1 Maximum is an instantaneous reading which only lasts for a split second on initial startup.
*2 You could see pressures below 1.5 Bar if the idle is set low (around 800rpm) and the oil is warm (+70 deg) - this is perfectly OK. Anything below 1.25 bar should be viewed with suspicion. With the idle set at 900 rpm or more you should not see much less than 1.5 Bar. Under normal running conditions the lowest pressure recorded should rarely be much less than 3 Bar.

Pressure varies in direct proportion to temperature – the hotter the oil the lower the pressure. Engine revolutions play a significant part in the engine's temperature – the higher the revs the higher the temperature.

In winter temperature can struggle to get much into the 70's unless revs are high and is unlikely to get there at all with the muff off (muff increases temperature by 10-15 degrees). It is important to note that oil needs to get to 70 DegC to reach its 'self-cleaning' temperature, but you should remember that the temperature in the sump will be approximately 10 degrees C higher than you are measuring at the filter housing.

Performance of the car improves when oil temperature rises above the mid 70's – I assume that this is due to the engine clearances being optimised.

In summer the temperature gets into the early 80's easily in the UK, and into the 90's if traveling fast, or loaded. In temperatures over 30 degrees the temperature goes over 90 degrees pretty easily and into the early 100's if traveling fast or loaded.

Conclusions:

The larger filter is worthwhile in every way. No real downside in winter and the engine temperature drops by a worthwhile amount in the higher ambient temperatures of the summer.

1.5 Bar is as low as I feel comfortable with in any conditions (at idle). At least 3 Bar should show when running.

100 degrees Centigrade is (probably) as hot as you should allow the car to get (peak temperatures at the engine bearings may be 20-30 degrees higher than this).

15w40, 15w50, semi synthetic, fully synthetic – none of these seem to make much difference. Use cheap 15w40 or 15w50 and change it every 3,000 miles. 20w50 is too thick in my opinion unless you live in a desert.

If the temperature goes over 95 DegC back off a bit, certainly back off if the temp gauge gets to 100 DegC (very unlikely in UK).

The key to all this is temperature control and the influences on this are ambient temperatures, revs and load carried.

Modify your speed to ensure that the temperature stays between 75 and 95 degrees during normal operation.

Do not rev hard until at least 50 DegC is reached.