

**Mitsubishi Evolution 4 to 9  
4G63 DOHC Engine**



**Dry Sump  
Installation Guide**

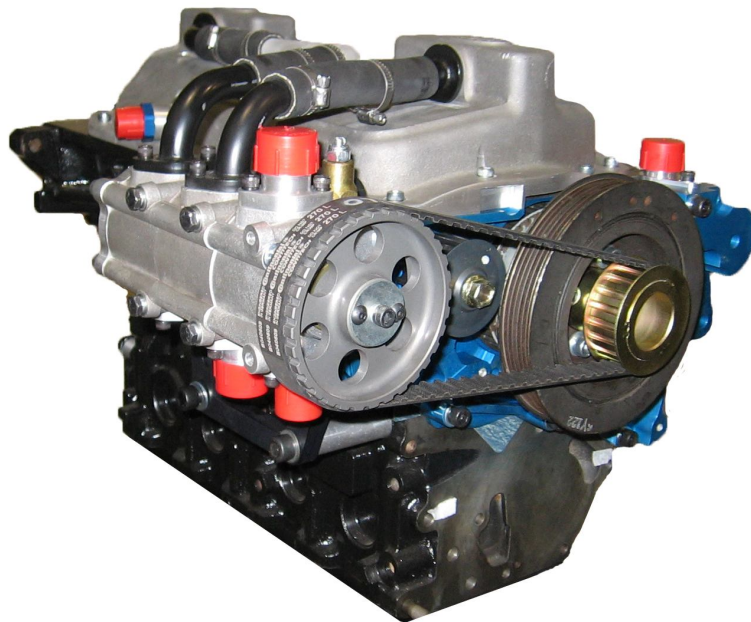
## Mitsubishi Evo 4G63 DOHC Dry Sump Kit Installation Guide

Thank you for purchasing the Pace Products dry sump kit for the Mitsubishi Evo.

The kit is designed for the 4G63 engine as fitted to the Mitsubishi Evo 4 through to 9, from standard tune engines to high power special installations.

It features a high strength cast aluminium sump, machined billet aluminium front cover and our well proven BG 3 stage oil pump. The pump is mounted externally to the engine and is bolted to the exhaust side of the engine block via a mounting bracket and is powered by a toothed rubber belt.

Our kit is a bolt on solution requiring no modifications of standard engine components.



The kit has been tested and developed using Automotive Performance Tuning's 700hp Mitsubishi Evo time attack car.

If you have any comments on this kit or would like additional information on the Pace Products range of kits and components please call 01440 760960 or email [info@paceproducts.co.uk](mailto:info@paceproducts.co.uk)

## Disclaimer

- No warranty is offered or inferred on this product.
- Fitment of this product may invalidate the manufactures' warranty, please check before.
- Please note there are some minor differences on later 4G63 engines, primarily effecting sump fitment. Whilst every effort has been made to accommodate these, **some modifications may be required to ensure correct fitment to your engine**. These depend on your engine variant and specification, particularly if using an aftermarket crankshaft cradle and con rod stud kit.
- These instructions are supplied as a guide only and should be used in conjunction with the manufactures workshop manual.
- This kit is NOT intended for road/daily driver cars.
- This kit should be installed by a professional mechanic.
- It is advisable that the kit should be fully inspected after every race/event.

## Things to know prior to installation

- This kit requires that both balancer/silent shafts are removed in the engine build and it is for this reason that we advise that this kit is fitted whilst the engine is out of the car.
- The air conditioning system must be removed as the kit utilises its mounting points.
- A remote oil filter, a dry sump tank/reservoir, hoses and oil cooler are NOT included in this kit; as each installation will vary depending on the cars modifications and intended use. Please consult Pace Products to be advised on a suitable system for your car.
- The oil tank can be located anywhere on the car but should be fitted as close to the pump as possible whilst still allowing access to tank for oil changes.
- Removal of the starter motor heat shield is required.
- Rubber lines, illustrated in some of the images have now been upgraded to braided lines.

## Items used from standard engine

- Oil pump drive pulley
- Crank shaft bolt
- Crank shaft pulley
- Ignition chopper disc
- Left balancer shaft drive pulley (crank mounted)

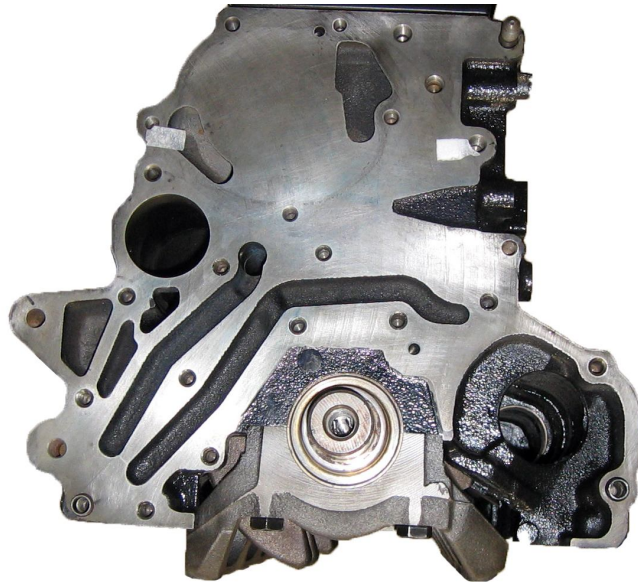
## Required items

- Crank shaft oil seal
- Oil pump gasket (Mitsubishi part No. UMD322521)
- Temperature sensor (M12X1.5 fitting)

## Fitting Instructions

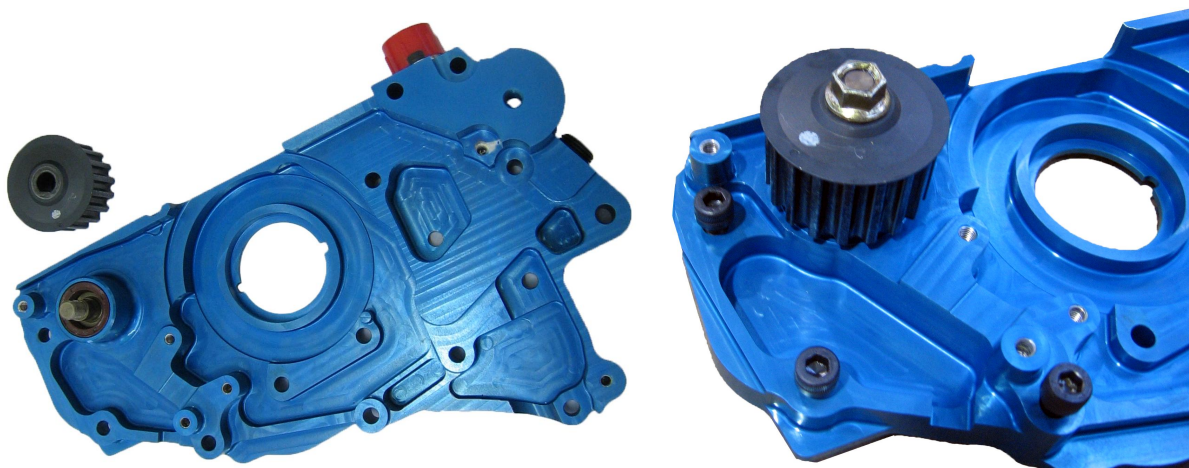
Remove the timing/cam belts, front case (oil pump/front oil seal housing), both balancer/silent shafts and the standard pressed steel oil pan in accordance with the factory workshop manual.

**Note: Rotate the balancer shaft bearings situated in the cylinder block to block off the oil galleries used to lubricate the balancer shaft.**



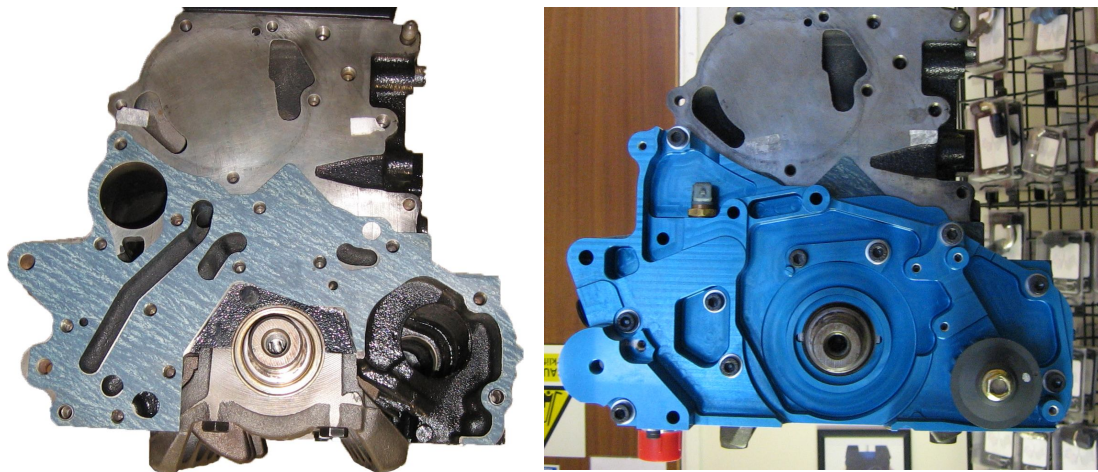
The cover comes ready assembled with only the following operations before it can be fitted to the cylinder block.

Secure the standard oil pump drive pulley to the front cover using the standard M10 nut (toque specification - 55Nm).



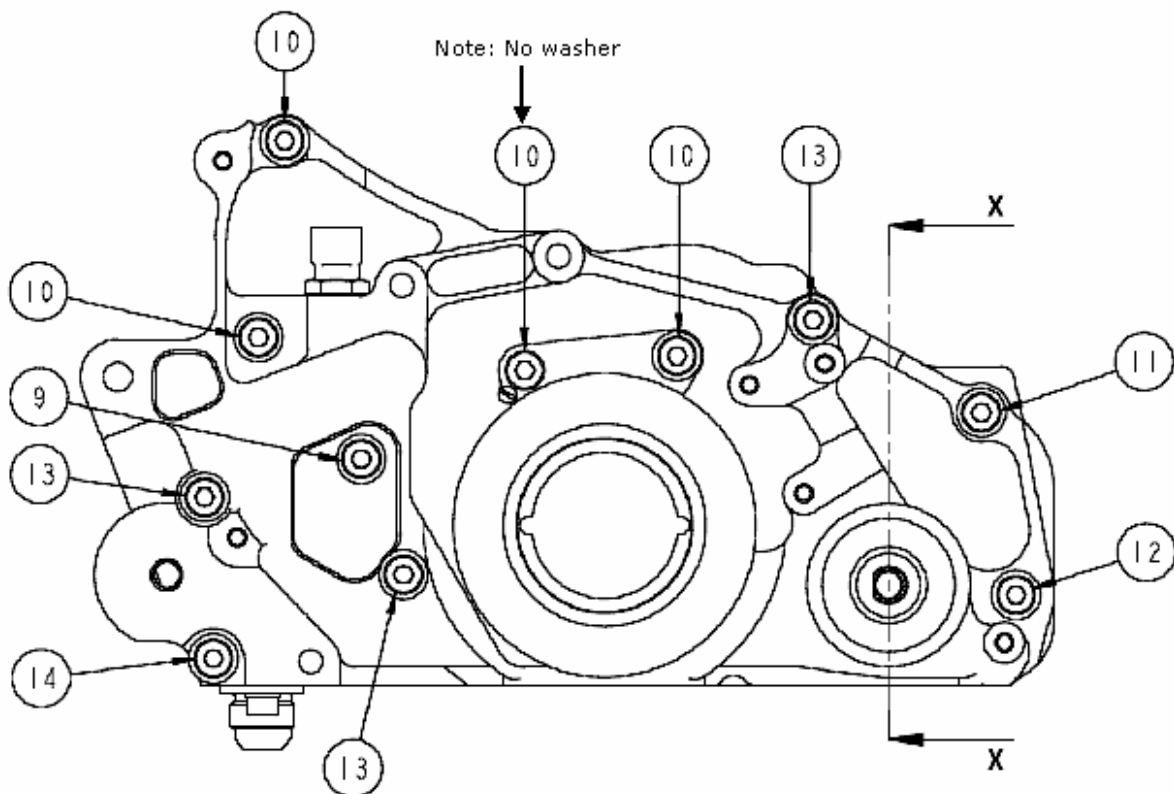
Install an oil temperature sensor (not included in the kit) and fix this to the front cover. If the sensor is not required or is being located elsewhere use a M12x1.5 plug in its place (toque specification - 18Nm).

Fit the front cover to the engine block using a new front cover gasket and the supplied M8 bolts and washers to fix the front cover to the cylinder block (torque specification - 24Nm).



**NOTE:** The bolts vary in length, see diagram below for bolt locations.

9	M6 X 20	1
10	M6 X 25	5
11	M6 X 30	1
12	M6 X 35	1
13	M6 X 40	3
14	M6 X 70	1



Clean both mating surfaces of the sump pan and cylinder block. Place the o-ring cord supplied in the o-ring groove on the sump, ensuring the ends are cleanly butted against each other use a small quantity of superglue to secure the ends together.



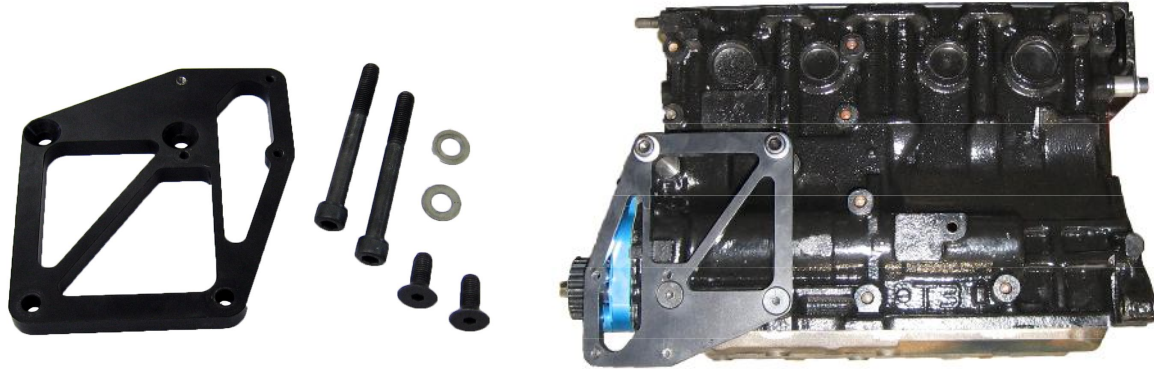
Using the M6 x 20mm bolts and M6 washers provided fasten the sump pan to the block (toque specification - 7Nm).

**Note that there is one M6 x 25mm its location is shown above.**



Pour a small amount of oil into each of the pump inlets to 'wet' the internals and rotate the pump clockwise.

Fit the pump mounting bracket to the side of the block using the bolts and spacers provided (toque specification - 41Nm). The bracket employs the air conditioning mounting points hence the air conditioning pump has to be discarded.



Fit the sections braided line to the dash fittings on the sump to the oil pump scavenge stages.

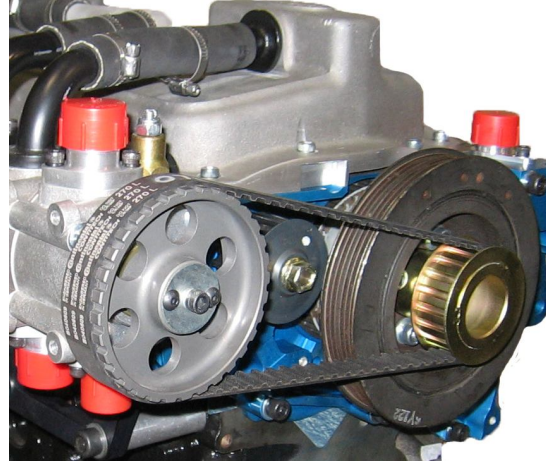
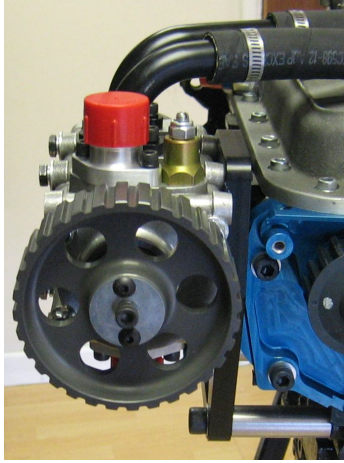
Install the pump to the bracket; do not tighten the bolts at this stage as shims will later be used to tension the belt.

Bolt the crank pulley supplied along with the standard crankshaft pulley, ignition chopper disc and left balancer shaft drive pulley to the crank shaft using the original bolt (toque specification - 120Nm).



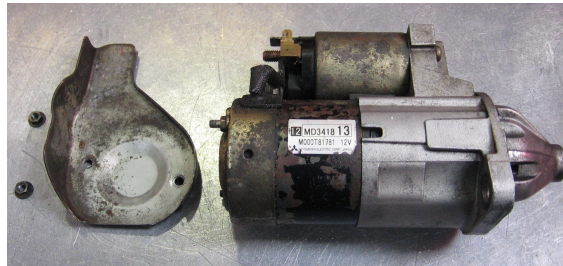
Insert the shims provided between the pump and bracket to tension the belt. The belt should have 5mm movement mid run.

Due to the tolerances for the belt and cylinder block different combinations of the shims may need to be used to obtain the correct tension. Once the correct tension is achieved tighten the pump mounting bolts (toque specification - 15Nm).



**Note: Lines from the sump to pump are not included in the kit.**

When refitting the starter motor removal of the heat shield is required. This is due to the tight clearances between crank shaft cradle and sump pan



## Oil tank

Find a suitable location for the oil tank. It is advised that the tank is as close to the oil pump and hose runs kept as short as possible. The tank should be a maximum of 150mm below the pump. The position of the dry sump tank also plays a crucial part in the system's performance. For example the further away from the engine it is mounted, the further the pump has to move the oil and when the oil is cold this can be very difficult.

There is an associated pressure loss of a fluid in a line over a given distance and more so, if the line has tight bends over its length. This means that the pump will require more power to drive to ensure the oil is delivered to and returned from the engine at the correct pressures. Keep in mind oil changes will require access the bottom of the tank.



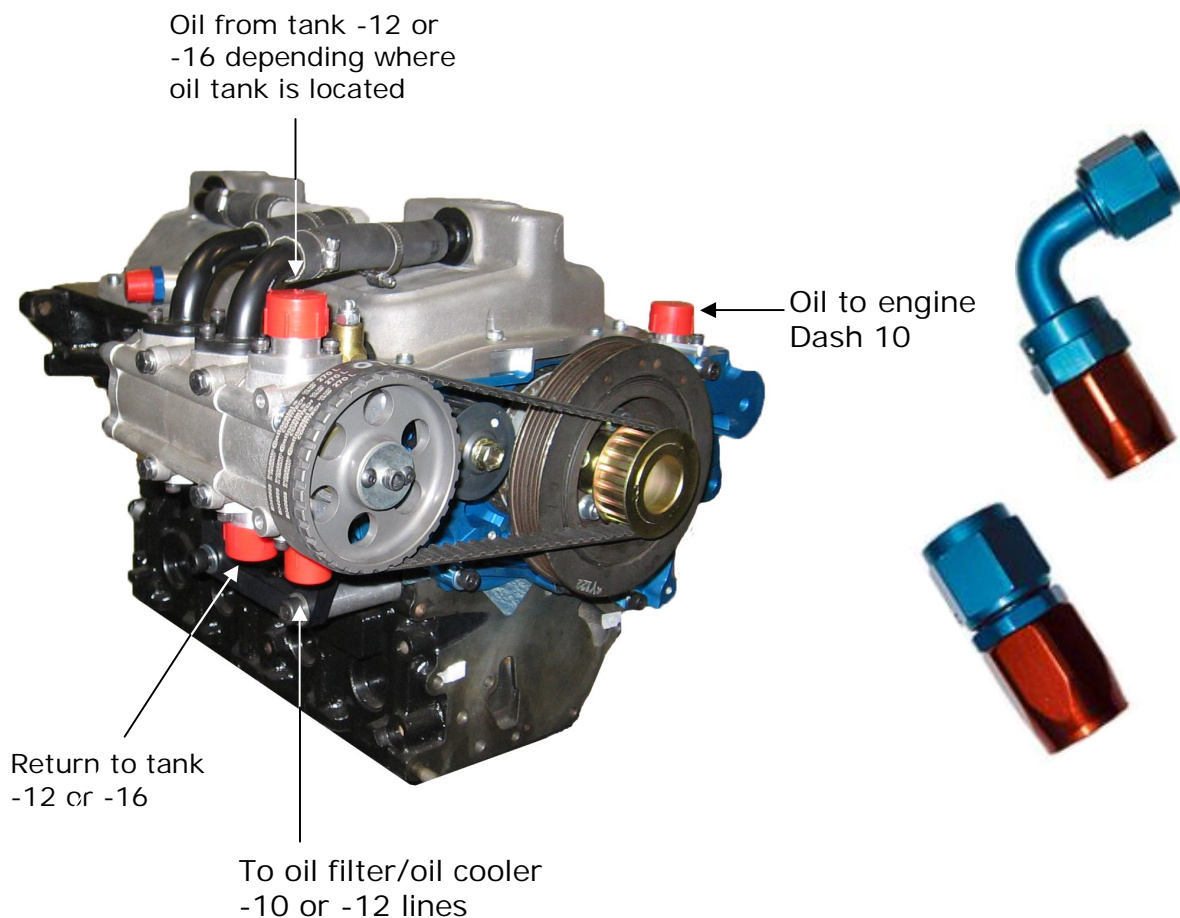


## Lines and Fitting Selection

Oil lines will need to be fabricated and the routing planned see **Schematic of a typical 3 stage dry sump kit** on page 14

The size of the lines plays a vital part in the systems performance. If the oil lines are too small the pressure loss will be large or worse still, they won't be able to flow the amount of oil required. Typically the return hose will be of a larger diameter than that of the tank outlet. This is to allow for the fact that the return hose will be flowing a mixture of air and oil from the scavenge pump, not just oil like the outlet hose.

For this system from the oil tank to the oil pump a -12 line is sufficient if the hose run is less than 1.5m otherwise a -16 line should be used for the pressure line. The scavenge lines should be a minimum of -12 however -16 is recommended.



High quality lines and fitting, which have been specifically designed for the use in transporting hot engine oil, should be used. Hose fittings should be the swept type, block style fittings should be avoided as these create a greater pressure loss, although due to their robust nature may have to be used in some applications.

## Oil Cooler Selection and Location

Where additional cooling of the oil is required a heat exchanger/cooler should be considered. The most common oil cooler style is the oil to air such as Mocal and Setrab. An alternative is the coolant to oil type, such as Laminova.

It is acceptable to fit the cooler in the pressure line from the pressure pump to engine, or the in scavenge line from pump to tank, but the position is often determined by the packaging constraints – where it will fit. If the cooler is located on the pressure line it gives the benefit of cooling better quality oil, less trapped air, but will introduce an additional pressure loss between the pump and engine and the pump will have to work harder (require more power to drive) to generate the same pressure. If the cooler is fitted on the scavenge line the fluid going through the cooler is the oil/air mix as discussed before and a larger cooler is often required.

Before starting the engine the system will need to be primed. Turn the pump clockwise by hand. This will draw the oil from the oil tank/reservoir to the pump, depending where the tank is situated and viscosity of the oil may take some time.

## Adjusting the pressure regulating valve (PRV)

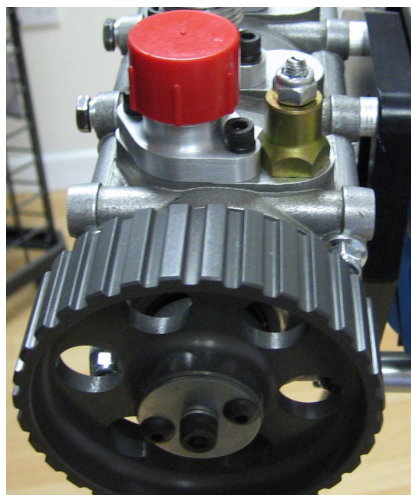
Start the engine and with a nominal setting on the pressure valve, check that the engine has sufficient pressure at idle. Monitor the oil level in the tank and top up to ensure that the level remains just below the baffle plate. Some oil will be returning from the scavenge line. DO NOT rev up the engine as you will get covered in oil as it returns with some velocity. When you are sure that there are no leaks, allow the engine to reach normal operating temperature. It is advisable to check all fittings are tight.

Spec point; 5 bar at 5000rpm.

Check the level in the tank and top up as necessary.

Refit the cap to the tank and then rev up the engine to your expected high RPM. Check the pressure at these revs and adjust as necessary.

Once you are satisfied with the pressure settings, tighten the lock nut whilst holding the adjusting screw in position.

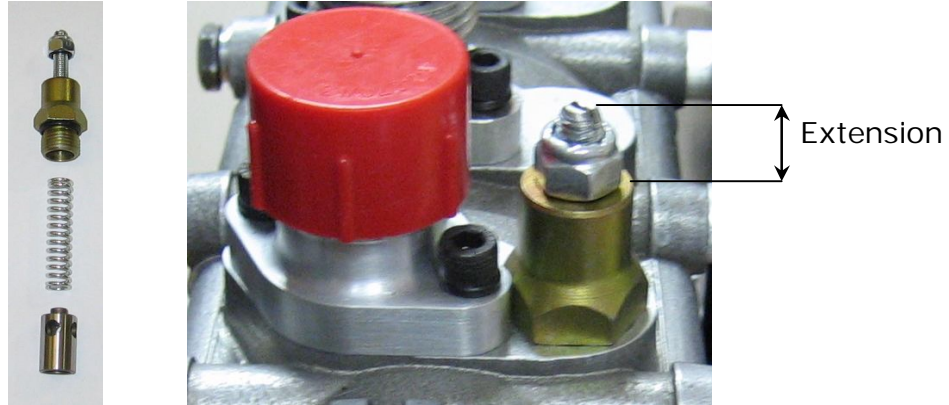


If the adjuster is screwed in beyond the maximum specified the spring will become coil bound and can result in the over-pressuring the lubrication circuit which can damage the pump. This is more likely to occur when the engine is started from cold and the oil is its most viscous/thickest. In extreme cases this pressure has enough force to blow the oil filter from the engine.

Note: Adjusting the PRV at engine idle will have no effect on oil pressure.

## Changing the PRV spring

The PRV spring can be changed to tailor the oil pressure to your engines specification. See table below for stage 4 spring specifications.

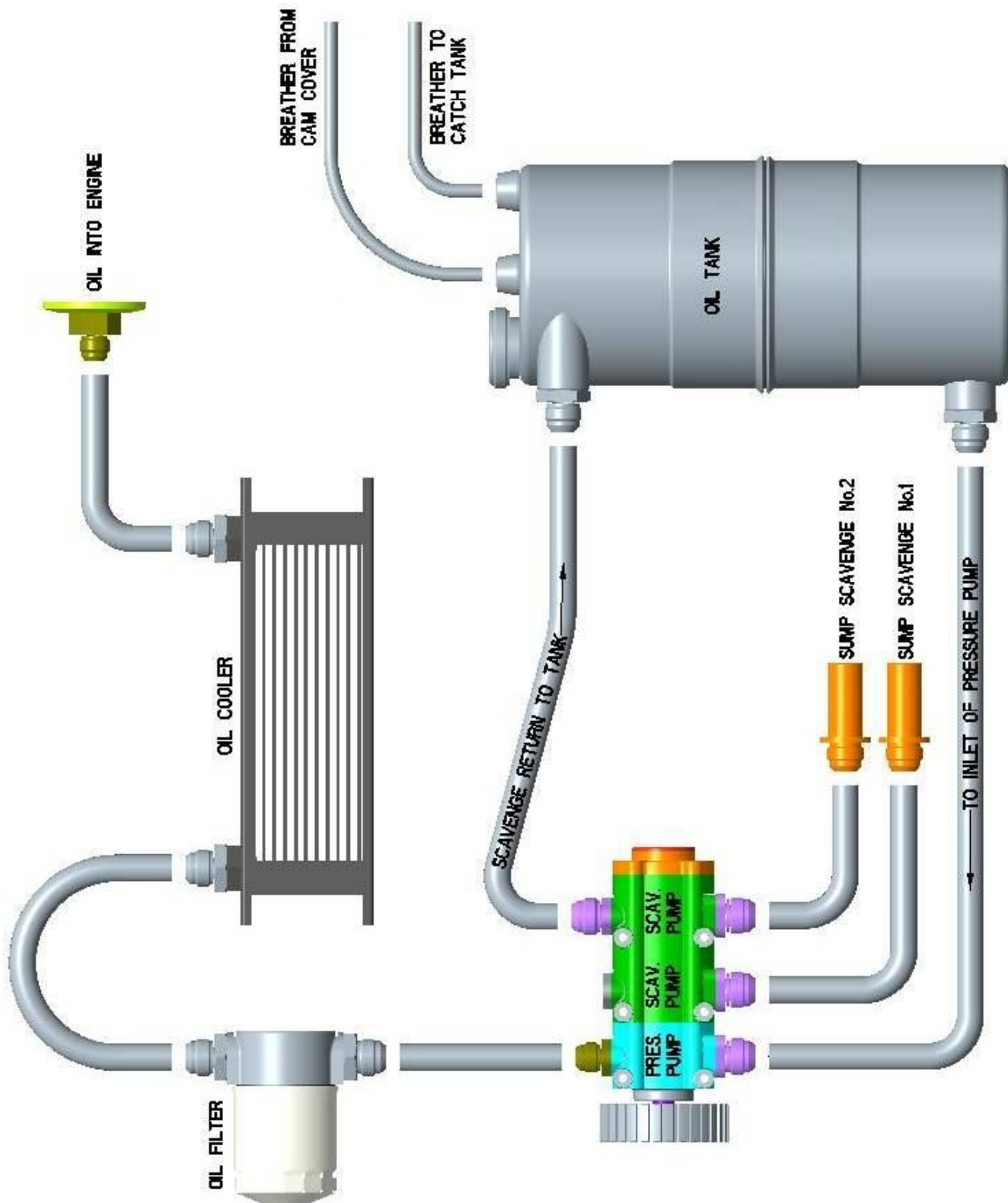


<b>Stage 4 spring</b>	Min. Cracking Pressure (kPa)	Max. Cracking Pressure (kPa)
Pressure (kPa)	295	690
Extension (mm)	25.8	17.1

(Cracking pressure is the pressure of which the PRV starts to operate)

To change the spring firstly remove the adjacent fitting using a 4mm alley key, then using a 19mm spanner remove the PRV housing.

**Note: take care removing the PRV housing as it is under pressure from the spring.**





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