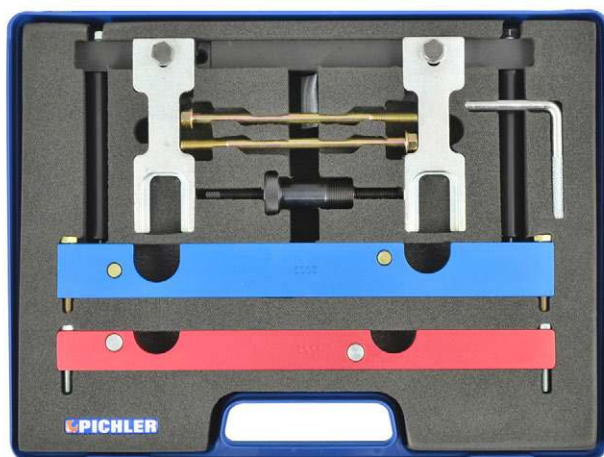
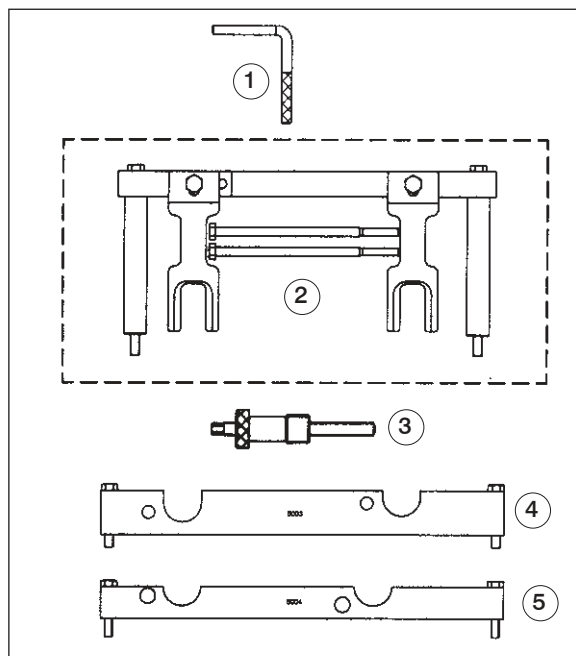


9431120

Petrol Engine Twin Camshaft Setting/Locking Tool Kit



IMPORTANT: Always refer to the vehicle manufacturer's service instructions, or proprietary manual, to establish the current procedures and data. Product Information Sets detail applications and use of the tools with any general instructions provided as a guide only.



Applications:

**BMW N51/N52/N52K (Valvetronic)
& N53/N54 (Direct Injection) 6 cylinder
Petrol engines in**

BMW

1 Series – E81/E82/E87

128i 130i 135iS

3 Series – E90/E91/E92/E93

323i 325i/xi 328i/xi
330i/xi 335i/xi

5 Series – E60/E61

523i/Li 525i/Li/xi 528i/xi
530i/Li/xi 535i/xi

6 Series – E63/E64

630i

7 Series – E65/E66

730i/Li

X3 – E83

2.5 & 3.0

X5 – E70

3.0

Z4 – E85/E86

2.5 & 3.0

N51, N52, N52K, N53, N54 engines

Kit contents/spares

Item	Part Number	Description
1	5001	Flywheel Locking Pin
2	5002	Camshaft Setting Assembly
3	4803	Chain Tensioner Pre-load Tool
4	5003	VANOS Alignment Plate (Blue)
5	5004	VANOS Alignment Plate (Red)
--		Case + Insert

This range of 2.5 and 3.0 BMW 6 cylinder, twin camshaft 16v. petrol engines, were launched in 2004 and are the most widely used engines in BMW 3 and 5 Series models.



There are 2 engine types within the range –

N51/N52/N52K are Valvetronic engines.

The Valvetronic layout incorporates a conventional inlet camshaft and a secondary eccentric shaft, with intermediate levers and followers, activated by a stepper motor. The stepper motor changes the phases of the eccentric shaft, altering the action of the inlet valves.

N53/N54 are direct injection engines.

These engines do not have the Valvetronic system.

All N51/N52/N53/N54 engines have VANOS variable valve timing units on both the inlet and exhaust camshafts.

IMPORTANT: If aluminium screws/bolts are released, they **MUST BE** replaced. Aluminium screws/bolts can be identified by blue paint mark on the bolt head.

9431120 Setting/Locking Tool Kit

Comprises: 5001 Flywheel Locking Pin
5002 Camshaft Setting Assembly
5003 VANOS Alignment Plate – N51/N52/N52K
5004 VANOS Alignment Plate – N53/N54
4803 Chain Tensioner Pre-Load Tool

For checking and adjusting valve timing, the timing positions for the camshafts are achieved using the 5002 Camshaft Setting Assembly and the 4803 Timing Chain Pre-Load Tool.

The crankshaft is locked at TDC (via the flywheel) using 5001 Locking Pin.

The VANOS Units are checked and adjusted with 5003 Alignment Plate (Blue) for N51/N52/N52K or 5004 Alignment Plate (Red) for N53/N54 engines.

Checking valve timing

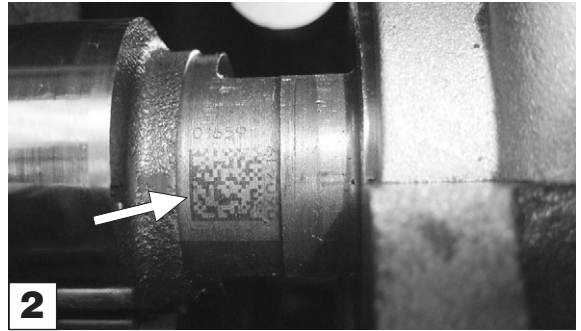
Remove the cylinder head cover.

Remove the splashguard.

Turn the crankshaft, in normal direction of engine rotation, to TDC No.1 cylinder (ignition), using a wrench on the crankshaft pulley centre bolt.

N51 / N52 / N52K engines

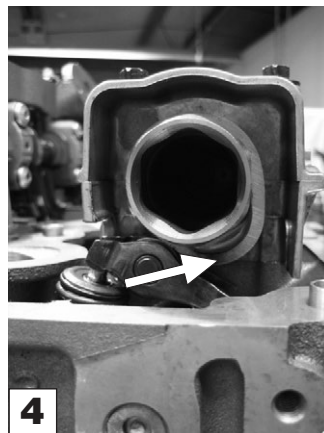
The timing position is correct when –



(1) the reference number / barcode can be viewed on top of the camshafts



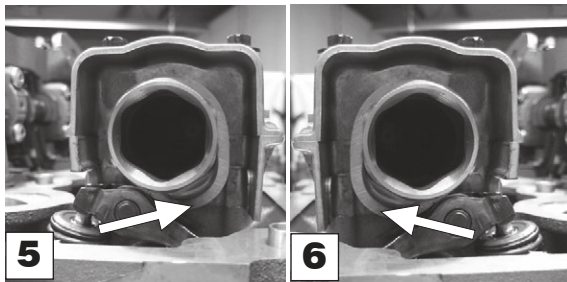
(2) the cam lobe of the 1st cylinder on the **INLET** camshaft points upwards, at an angle,



(3) the cam lobe of the 6th cylinder of the **EXHAUST** camshaft points downwards, at an angle, but with the roller cam follower not actuated by the cam lobe.

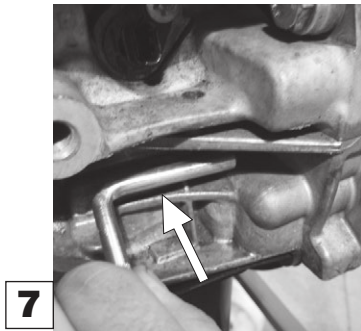
NOTE: The 'timing flats' on the camshafts will be vertical.

N53 / N54 engines



The timing position is correct when the cam lobes of the 6th cylinder on **both INLET and EXHAUST** camshafts point downwards, at an angle, but with the roller cam followers not actuated by the cam lobes.

NOTE: The 'timing flats' on the camshafts will be vertical. A mirror will be required to view these cam lobe positions when the engine is in the vehicle.

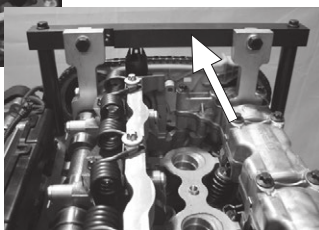
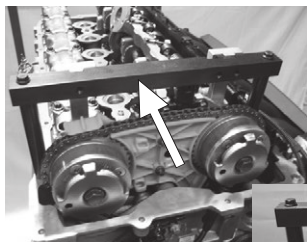


5001 Flywheel Locking Pin (all engines)

With the engine positioned at TDC No. 1 cylinder, insert 5001 Flywheel Locking Pin through the datum hole, which is located underneath the starter motor, and into the timing hole in the flywheel.

NOTE: The datum hole can be difficult to locate and may be constricted by dirt/corrosion.

IMPORTANT: On Automatic Transmissions – there is a much larger hole in the flywheel very near to the timing hole and checks are required to ensure that this hole has not been selected in error. With 5001 Locking Pin inserted, check that the engine will not rotate back and forth. Use a wrench on the crankshaft pulley bolt to rotate the engine.



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5002 Camshaft Setting Assembly (all engines)

The 5002 Camshaft Setting Assembly comprises a bridge section with two pillars, making a frame, which is bolted to the cylinder head in a position at the front of the camshafts.

IMPORTANT: There are 2 pairs of Assembly fixing bolts in the 5000 Kit. They are colour coded and dedicated to engine type.

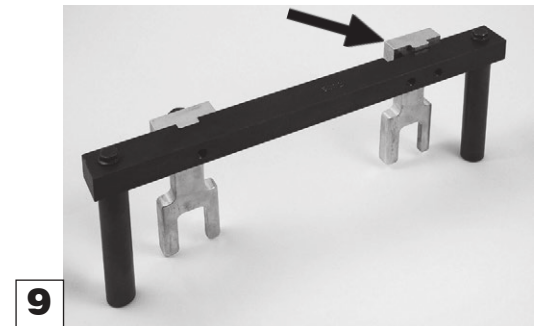
Gold colour bolts – for N51/N52/N52K engines

Silver colour bolts – for N53/N54 engines

WARNING: The threads are different sizes on the engines so ensure the appropriate pair of fixing bolts are used to secure the Camshaft Setting Assembly in place.

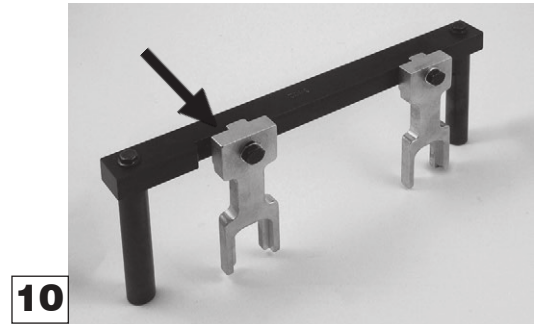
Attached to the Assembly frame are two 'forked' Retaining Plates. The 'forked' ends of these Plates locate on to the 'timing flats' on each camshaft to 'set' the camshafts in timed position.

One of the Retaining Plates is adjustable in height and to two positions on the bridge. This enables the Camshaft Setting Assembly to be used across this engine range.



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N51/N52/N52K engines – Position the Retaining Plates at the **widest** distance between Plates and the "adjustable" Plate at its **highest** setting above the top of the Bridge.



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N53/N54 engines – Position the Retaining Plates at the **narrowest** distance between Plates and with both Plates **level** with the top of the Bridge.

Configure the 5002 Assembly to suit the engine being worked on and fit the 'forked' ends of the Retaining Plates **fully** on to the 'timing flats' on the camshafts. The bases of the bridge pillars **must rest on the cylinder head**.

If the Camshaft Setting Assembly cannot be fitted fully on to the camshafts as described above, then it will be necessary to adjust the timing.

Adjusting timing

Check that the 5001 Flywheel Locking Pin is correctly inserted in the flywheel.

Fit 5002 Camshaft Setting Assembly on the 'timing flats' on the camshafts

NOTE: If 5002 cannot be installed, slight adjustment to the camshafts position may be achieved by rotating the camshafts using a spanner on the hexagon at the rear of the camshafts.

Ensure that the Retaining Plates are correctly mounted on to the bridge and that the complete Assembly is fixed to the cylinder head with the correct fixing bolts – refer to "5002 Camshaft Setting Assembly".

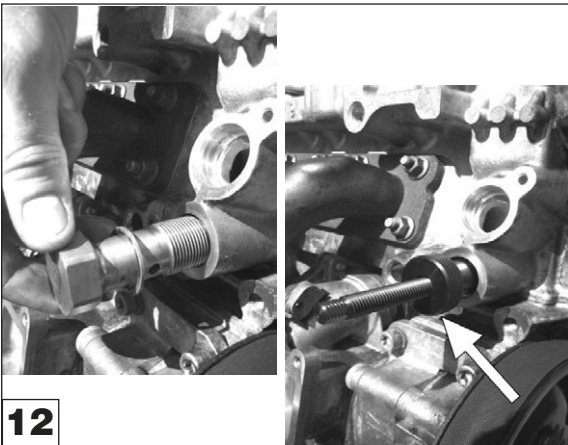


Slacken the centre bolts of the VANOS Units on the inlet and exhaust camshafts.

WARNING: These bolts are likely to be tight. It is recommended to counter-hold against camshaft rotation at the hexagon at the rear of the camshafts. It is advisable not to rely on the Flywheel Pin and Camshaft Setting Assembly to counter-hold when loosening these bolts.

Remove the old bolts and screw in new VANOS Unit bolts to finger-tight only, sufficient so there is no play or tilt on the units.

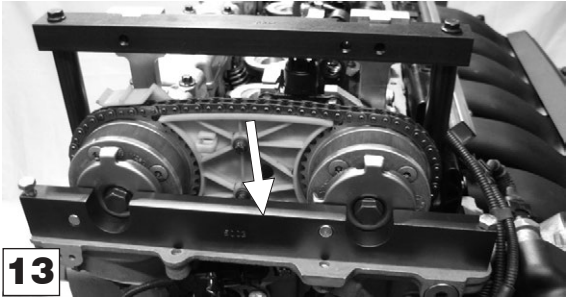
Ensure that 5002 Assembly is **fully located in to the 'timing flats'** and that both Pillars rest on the surface of the cylinder head.



4803 Timing Chain Tensioner Pre-Load Tool

Remove the timing chain tensioner, and in its place insert 4803 Tensioner Pre-Load Tool.

Screw in the adjusting screw of 4803, by hand, until it makes contact with the tensioner rail **but does not apply pressure.**



- 5003 VANOS Alignment Plate (Blue) – N51/N52/N52K engines
- 5004 VANOS Alignment Plate (Red) – N53/N54 engines

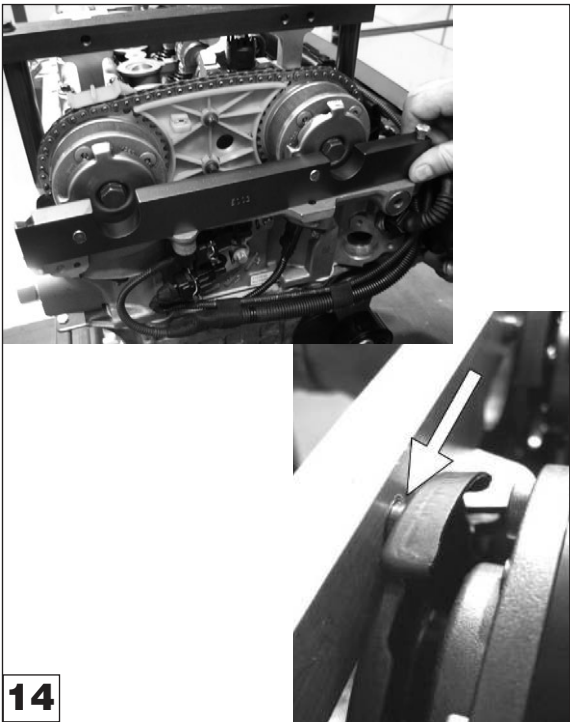
The 5000 Kit includes the two VANOS Alignment Plates required to cover this engine range.

IMPORTANT: The fixing screws of these VANOS Alignment Plates are colour coded and dedicated to engine type:

Gold colour bolts – for N51/N52/N52K engines

Silver colour bolts – for N53/N54 engines

WARNING: The threads are different sizes on the engines so ensure the appropriate pair of fixing bolts are used to secure the VANOS Alignment Plate in place.

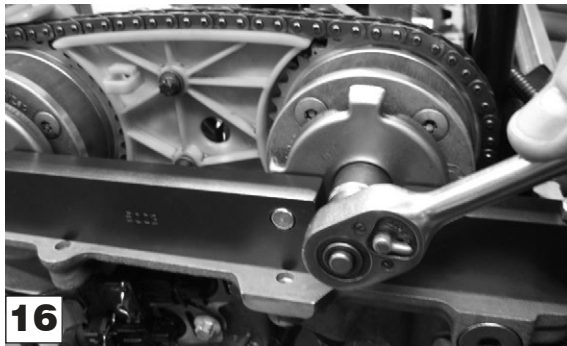


Fit the appropriate VANOS Alignment Plate to the front of the VANOS Units ensuring that the two location pins on the Plate enter into the holes in the VANOS Units and that the Alignment Plate **fits fully** on to the surface of the cylinder head.

Select the correct fixing bolts and screw in the two bolts – **refer to colour coding/engine type**. Tighten to secure the Alignment Plate to the cylinder head. Slacken the VANOS Unit bolts half turn and re-tighten to finger-tight.



Attach a suitable torque wrench to the adjusting screw of 4803. Turn to apply a pre-load to the tensioner rail of 0.6 Nm.



Tighten the bolt of the exhaust camshaft VANOS unit to the specified torque, followed by the bolt of the inlet VANOS Unit, again, to the specified torque – Torque 20Nm. + 180 degrees

Remove the VANOS Alignment Tool,

Unscrew the adjusting screw of 4803 and remove the Pre-Load Tool

IMPORTANT: Install the chain tensioner.

Remove **all** timing tools and turn the crankshaft twice (at the crankshaft pulley centre bolt), in normal direction of engine rotation, returning the TDC engine timing position, No.1 cylinder.

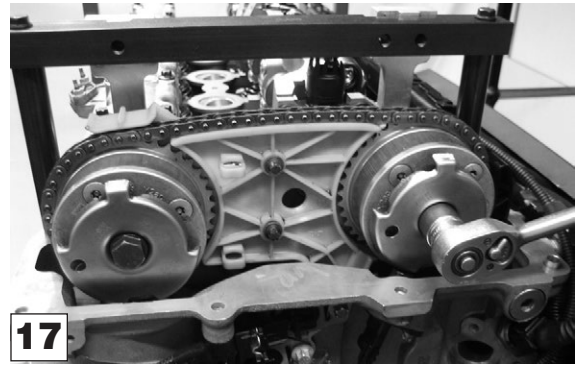
Insert the Flywheel Locking Pin and Camshaft Setting Assembly to check timing position, follow the procedure as described in “Checking valve timing”.

Removing, Installing and Replacing VANOS Units.

Initially follow the procedure detailed in ‘Checking valve timing’

Removal

With 5002 Camshaft Setting Assembly fitted on to the ‘timing flats’ on the camshafts, ensure that the Retaining Plates are correctly mounted on the bridge and that the complete Assembly is fixed to the cylinder head with the correct fixing bolts – refer to “5002 Camshaft Setting Assembly”.



Slacken the centre bolts of the VANOS Units on the inlet and exhaust camshafts.

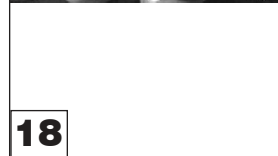
WARNING: These bolts are likely to be tight. It is recommended to counter-hold against camshaft rotation at the hexagons at the rear of the camshafts. Do NOT rely on the Flywheel Pin and Camshaft Setting Assembly to counter-hold when loosening these bolts.

Ensure that the 5001 Flywheel Locking Pin is fitted into the timing hole in the flywheel.

Fully remove the bolt of the VANOS Unit on the **exhaust** camshaft. Lift chain off the sprocket and feed out and remove the **complete** VANOS Unit.

Repeat this procedure on the VANOS Unit on the **inlet** camshaft.

NOTE: To assist removal of the Units, turn the sensor gear (front plate) cutout to the bottom position.



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Replacement

WARNING: It is important to note that the Inlet and exhaust VANOS Units are different. It is essential to keep the parts of Inlet Unit separate from the Exhaust Unit. Under no circumstances should the parts be mixed or parts from any other engine variant be used.

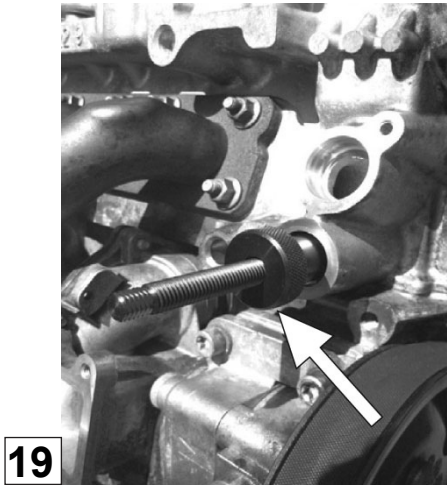
Inlet Unit part is marked “EIN / IN” and the Exhaust Unit part marked “AUS / EX”

Installation

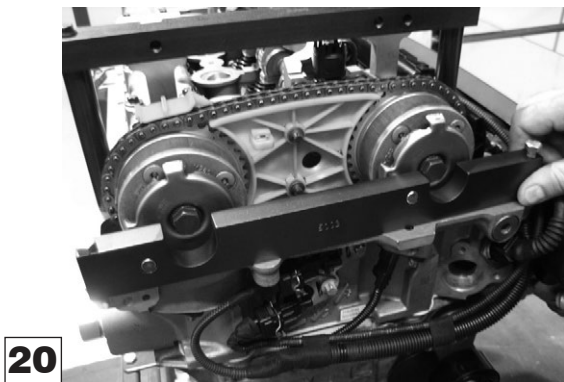
Assemble the VANOS Unit of the Inlet camshaft, including the sensor gear (front plate), and feed on to the inlet camshaft, fitting the chain onto the sprocket. Screw in a new bolt and tighten finger-tight only, so there is no play or tilting.

Assemble and install the Exhaust camshaft Unit and screw in a new bolt and tighten finger-tight only, so there is no play or tilting.

IMPORTANT: Press the chain rail, by hand, and ensure the timing chain is guided within the rail.

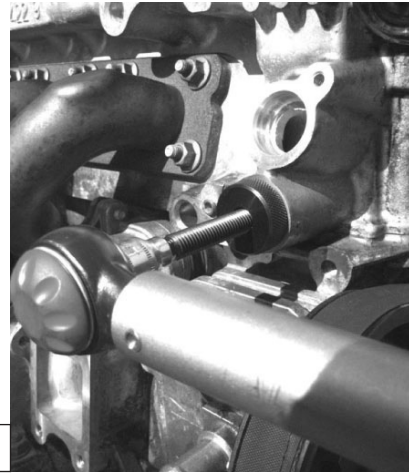


Insert 4803 Tensioner Pre-Load Tool and screw in the adjusting screw by hand, until it makes contact with the tensioner rail.

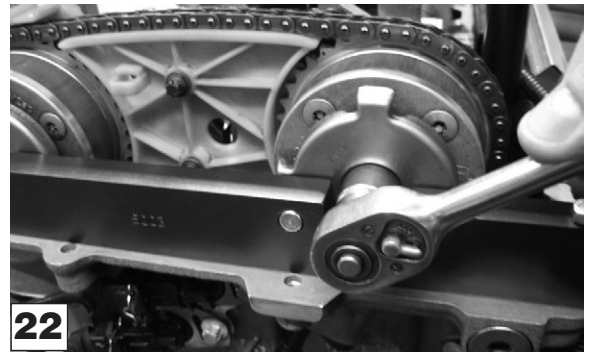


Fit 5003 or 5004 VANOS Alignment Tool, according to engine being worked on, to the front of the VANOS Units ensuring that its two location pins enter into the holes in the sensor gears and the Plate fits **fully** on to the surface of the cylinder head. Screw in the two bolts to secure the Alignment Plate to the cylinder head and tighten.

Unscrew the bolts of the VANOS Units half turn and then tighten to finger-tight, ensuring that there is no play or tilting of the VANOS units.



Attach a suitable torque wrench to the adjusting screw of 4803 and turn to pre-load the tensioner rail to 0.6 Nm.



Tighten the bolt of the **exhaust** camshaft VANOS unit to the specified torque, followed by the bolt of the **inlet** VANOS Unit, again, to the specified torque – Torque 20Nm. + 180 degrees.

Remove the VANOS Alignment Plate,

Unscrew the adjusting screw of 4803 and remove the Pre-Load Tool

IMPORTANT: Install the chain tensioner.

Remove **all** timing tools and turn the crankshaft twice (at crankshaft pulley centre bolt), in normal direction of engine rotation, returning the TDC engine timing position, No.1 cylinder.

Insert the Flywheel Locking Pin and Camshaft Setting Assembly to check timing position as described in “**Checking valve timing**”.