

Engine Tightening Torques

This page is designed to give you a full overview of all the tightening torque values and sequences you may come across when doing any work on your 1.8T. From head bolt tightening torques and sequences, clutch and flywheel torque settings or timing belts. We have them all.

Cylinder head and Valvetrain

This section gives details on head bolts/studs for tightening down the cylinder head to the block. We also have other torques such as the camshaft carrier caps, cam chain tensioner bolts, upper timing belt pulley

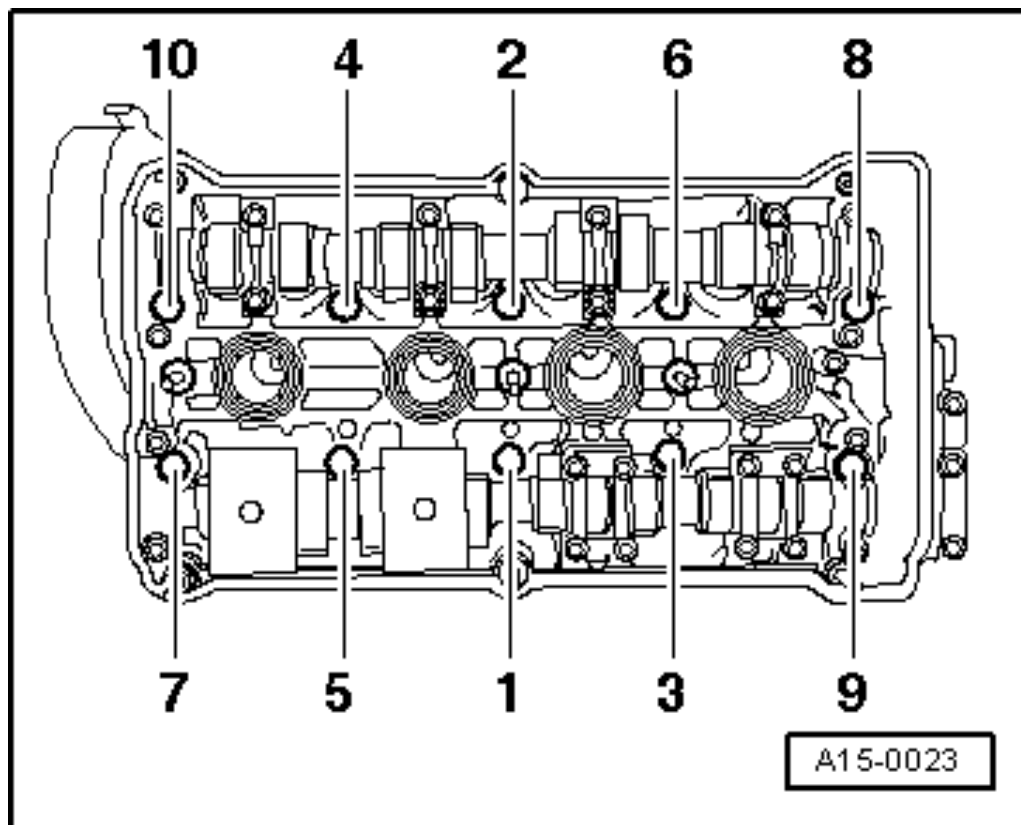
Head Bolts and Studs

Renew bolts: Yes

Stage 1 Tighten 40Nm

Stage 2 Tighten 90°

Stage 3 Tighten 90°



This is the tightening order for the 10 head bolts/studs.

Installation method for ARP head stud kits

Part Number: 204-4103 & 204-4104

1. Always verify the part number for your application with the part number on the box and the instruction sheet. This ensures the correct installation procedure for your specific application.
2. Clean and inspect all hardware before installation for defects, shipping damage, and proper fit, length, and dimension.
3. Clean all threads in the block for proper thread engagement and accurate torque readings. Use ARP Thread Chaser, part number 912-0003 (M10 X 1.5), if necessary.
4. If the cylinder head studs protrude into a water jacket, lubricate the block threads with ARP THREAD SEALER.
5. Screw studs into the block "HAND TIGHT ONLY." Loctite may be used if a permanent mounting of the studs is preferred, but fasteners must be torqued before the Loctite sets.
6. Install the cylinder head(s) and check for binding or misalignment.
7. Lubricate the stud threads, nuts, and washers with ARP ULTRA-TORQUE FASTENER ASSEMBLY LUBRICANT, then install the washers and nuts hand-tight. ARP recommends using ARP ULTRA-TORQUE over motor oil to avoid high friction and inconsistent clamping force.

Preload (Torque) Recommendations: Following the manufacturer's recommended torque sequence, tighten the nuts in three equal steps to 80 ft lbs with ARP ULTRA-TORQUE FASTENER ASSEMBLY LUBRICANT.

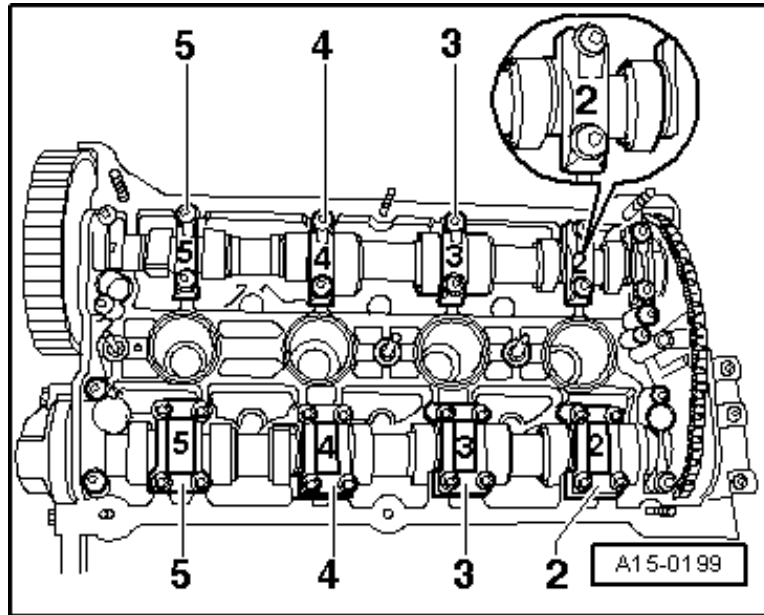
Camshaft Bearing Carrier Caps

When replacing the camshafts in the engine, it is important to ensure that the caps are correctly tightened up in sequence to allow the camshafts to seat home properly. Careful attention should also be paid to the orientation of the camshaft caps, as they have a small oilway inside of them which is designed to match up with the oilway on the cylinder head casting. The recommendation for installing the camshafts is that the lobes of the cams on **Cylinder 1** should point upwards. This removes any pressure on the cams from forcing the valves open.

Once the camshaft chain has been correctly set. (16 links/rollers between the notched markings on the camshaft. You should tighten the Camshaft tensioner down to a value of **10nm**. This should be done **PRIOR** before the camshaft carrier caps are installed.

The inlet and exhaust bearing caps are torqued to a value of **10Nm**. It is important to start with caps number 2 and 4 ensuring they are tightened diagonally and alternately to the required 10nm. Good practice is to do this in small incremental stages between caps and bolts until the torque value is reached. This ensures the cap is pulled up squarely during the tightening phase. Once caps 2 and 4 have been torqued down, the remaining caps can be tightened down to **10nm**. Further good practice is to go round every bolt again with the torque wrench to ensure all bolts are correctly torqued once all caps have been installed.

Remember the correct orientation of the oilways and the number of the caps shown below. These bolts can be re-used.



It is critical that the camshaft bearing caps are in the right locations

*The Timing chain tensioner bolts are also torqued up to **10Nm**. Ensure the 2 gaskets are fitted, including the half-moon gasket before fitting the tensioner. A small amount of sealant should also be used in the specified area to prevent oil leaks.*

Camshaft Timing Pulley Bolt

*The upper timing belt pulley is held on with a 16mm bolt to the exhaust camshaft. There are ARP upgrade options for this bolt as well as the OEM spec bolt. Please follow your ARP instructions for their recommended torque setting for this bolt.
The OEM torque value for this bolt is: **65Nm***

Camshaft Hall Sensor

*The camshaft hall sensor fits onto the intake camshaft at the front of the engine. This works in unison with the crankshaft sensor to ensure the engine is timed correctly and for various ECU functions. There are two different types of hall effect sensor plates for the 1.8T depending on which ECU type you are running.
The 2 bolts securing the sensor should be torqued to: **10Nm***

Rocker Cover

*The rocker cover is held on with a selection of 10mm nuts around the outside of the cover and a few bolts across next to the coilpacks. There are 2 gaskets that need to be fitted prior. There is a large rectangle one that seats around the outside on the studs from the head and a small one that sits over the top of the spark plug chambers to prevent oil ingress into the spark plug location.
The rocker cover bolts should be torqued to **10Nm***

Spark Plugs

It is important to properly torque the spark plugs into the head to avoid any potential damage to the fragile ceramic on the spark plug body.

*The recommended torque setting for the spark plugs is: **30Nm**.*

Please have a look at our Engine Tuning pages for advice on our recommended Spark plug type for various stages of tuning you are going for.

Crankshaft and Connecting Rods

This section will detail the bottom end torque figures such as the bearing caps, connecting rods, oil pump, flywheel and clutch as well as sump bolts and knock sensor bolts.

Crankshaft Bearing Caps

It is important to ensure that the bearing caps are installed with the correct bearing and clearance prior to tightening the bolts for the caps. The caps are also numbered 1 to 5, with number 1 bearing cap being installed closest to the timing belt and number 5 closest to the flywheel. Special attention should be paid to number 3 which houses the thrust washers for the crankshaft and number 4 which has an additional oilway and the bearing.

Renew bolts: Yes

Stage 1 Tighten 65Nm

Stage 2 Tighten 90°

Sender wheel

There is a sender wheel on the crankshaft for the timing pulses to be read by the crankshaft sensor. This wheel can only be installed in one orientation as the holes are offset.

Renew Bolts: Yes

Stage 1: 10Nm

Stage 2: Tighten 90°

Oil Pump and Pickup Pipe

The oil pump is a crucial part for supplying oil around the engine ensuring parts are properly lubricated.

*The bolts should be tightened to: **15Nm**. There is no requirement to renew these bolts.*

There is also a small chain tensioner that tensions the oil pump chain. This is bolted to the block. Take note of the little spring mechanism and how it sits against the block to ensure proper tension when installed.

*The bolt should be tightened to: **15Nm**.*

*There is no VW supplied torque settings for the oil pickup pipe, so if you are rebuilding your engine from fresh or even have the sump off, we **STRONGLY** recommend replacing the oil pickup and rubber O-ring whilst everything is off. The parts are only £10-15 so well worthwhile. We would recommend torquing the two bolts up to around 10-15nm or by feel by hand.*

Oil Squirters

The oil squirters feed oil to the base of the piston to provide cooling and are held onto the block casing with a pressure relief screw/bolt.

*These bolts should be torqued to: **27Nm**. There is no requirement to renew these bolts.*

Oil Sump

*The sump bolts are torqued to: **15Nm**.*

*A common mistake people make when installing the sump is to use excessive sealer, which when the sump is tightened, is squeezed out internally and ends up clogging the pick-up pipe causing oil starvation issues in the future. We recommend ensuring that both surfaces are thoroughly cleaned before installation. A **1-2mm** bead of sealer is all that is required around the faces of the sump. This stops excessive sealer from dropping inside the sump whilst providing enough to prevent oil leaks.*

Sump Plug

The sump plug consists of a bolt and a copper washer. When doing a oil change, it is strongly recommended to replace the copper washer each time it has been loosened. The bolt should ideally be changed, but you can get 2-3 changes before we'd recommend replacing the bolt as well for re-assurance.

*The sump plug bolt is torqued up to: **30Nm***

Oil Level Sensor

Some engines are equipped with a oil level sensor to alert the driver when the oil level is becoming too low. This sensor has a rubber seal and 3 bolts holding it to the sump.

*It is recommended to **renew** the rubber seal each time.*

*The torque setting for the bolts is: **10Nm***

Connecting Rods

*If you are ever re-installing the standard connecting rods, you will need to **renew** the nuts that hold the bearing cap on. These bolts should be torqued with some **oil lubrication** on the threads and the mating surfaces (don't forget your engine assembly lube on the bearings!).*

The torque setting for the bolts is:

Renew bolts: Yes

Stage 1: 30Nm

Stage 2: 90* (1/4 turn)

*If you are just tightening for measuring bearing clearances, then **30nm** will be enough for this initial assessment.*

Crankshaft Pulley Bolt

This is a big one to tighten up and will take some effort. It holds the timing belt gear onto the crankshaft. You may need some counter-hold tool or to put car in gear and have someone put their foot on the brake whilst you do the 90° part.

*It is recommended to **Renew** this bolt.*

Renew bolts: Yes

The torque setting for the bolts is:

Renew bolts: Yes

Stage 1: 90Nm

Stage 2: 90° (1/4 turn)

Installation method for ARP main stud kits

Part Number: 201-5001

- 1. To ensure proper thread engagement and accurate torque readings, clean all threads in the block. If necessary, chase the threads with ARP Thread Chaser, part number 912-0003 (M10 X 1.5).*
- 2. Clean and inspect all hardware prior to installation for any defects, shipping damage, and to ensure proper fit, length, and dimension.*
- 3. Screw the studs into the block "HAND TIGHT ONLY." Note: Loctite may be used if permanent mounting of the studs is preferred. However, fasteners must be torqued before the Loctite sets.*
- 4. Install the main caps and check for binding or misalignment.*
- 5. Lubricate the stud threads and nuts with ARP Ultra-Torque Fastener Assembly Lubricant. Then install the nuts onto the studs and tighten them hand tight. ARP recommends using ARP Ultra-Torque Fastener Assembly Lubricant instead of motor oil to avoid high friction and inconsistencies in clamping force.*

Preload (Torque) Recommendations *6. Follow the manufacturer's recommended torque sequence, tightening the nuts in three equal steps to 60 ft-lbs with ARP Ultra-Torque Fastener Assembly Lubricant.*

Footnote: *When changing from factory fasteners to high-strength fasteners, clamping force and tolerances will change. It may be necessary to check the main bearing bores for proper size and out-of-round condition after installing the studs and to align hone the cylinder block if necessary. Always align hone the main bores using the same fasteners and lubricant intended for final engine assembly at the recommended preload.*

Water Pump

There are 3 bolts that hold the water pump in place on the bolt. Also included is a rubber O-ring to seal it in to stop any water leaks. These bolts do not need renewing.

*The torque setting for the bolts is: **15Nm***

Harmonic Balancer

The harmonic balancer is a crucial part for dampening any crankshaft oscillations and helps ensure everything is running smoothly. It is held on with 4x 6mm Allen key bolts. Once these are loose, you may need to gently tap each side of the face: 12, 3, 6, 9pm to loosen it off the crank pulley.

*The torque setting for the bolts is: **25Nm***

Knock Sensor

*The knock sensors are a finely tuned microphone listening to the combustion cycle in the engine cylinder. They should be installed on a clean/rust-free surface. It is required to **renew** the bolts that hold the sensors to the block to ensure this connection is correct.*

Renew bolts: Yes

*The torque setting for the bolts is: **20Nm***

Engine Mount to Block

*This is for the large aluminium block that bolts directly to the block next to the timing belt. It has 3 bolts that hold it on. It is recommended to **renew** these bolts if the mount has been removed.*

Renew bolts: Yes

*The torque setting for the bolts is: **45Nm***

Thermostat Housing

The thermostat is housed inside a little plastic casing with a coolant pipe leading to the radiator, right next to the alternator.

*The torque setting for the bolts is: **15Nm***

Crank Sensor/Engine Speed Sensor

The crank sensor measures how fast the engine is turning over and is used by the ECU for a wide range of maps to assist it running. The sensor has a small rubber O-ring inside to prevent any oil leaks, so ensure that the sealing surfaces are clean and free from debris.

*The torque setting for the bolts is: **10Nm***

Oil Filter Housing

*The oil filter housing is held on with 4x bolts and a large metal formed gasket. It is recommended to **renew** the gasket **AND** the bolts upon re-installation.*

The torque setting for these bolts are:

Renew bolts: Yes

Renew Gasket: Yes

Stage 1: 15Nm

Stage 2: 90* (1/4 turn)