

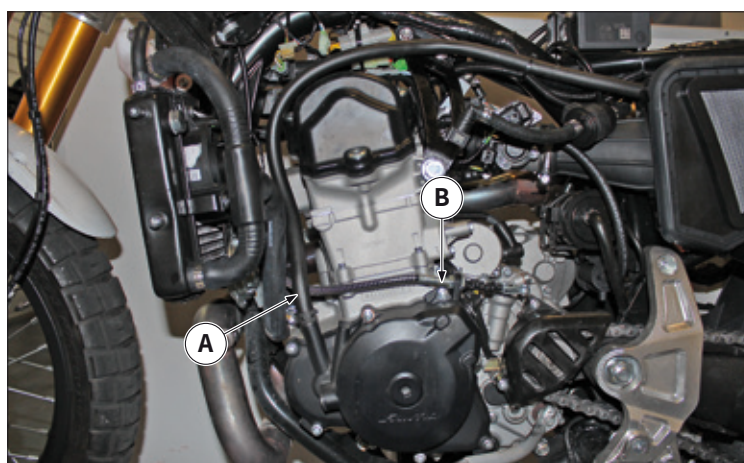
### 13.1 COMPLETE ENGINE REMOVAL

**⚠ Position the vehicle on a central stand and support its rear weight with straps and hoist.**

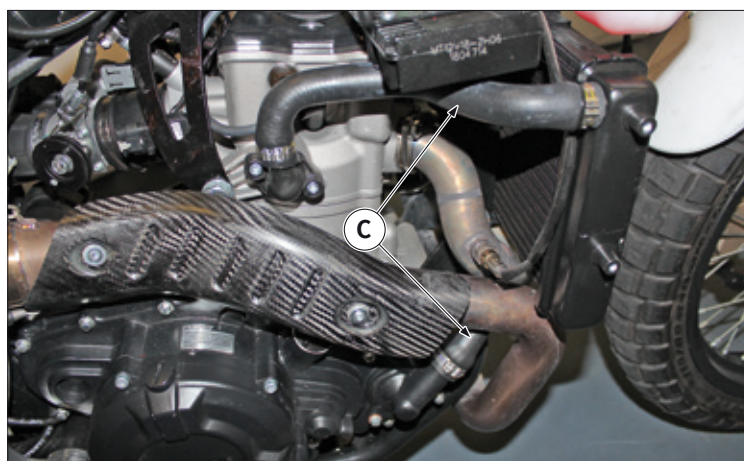
Remove:

- Saddle, refer to "12.1 Seat removal" a pagina 122“;
- Tank, refer to "12.8 Fuel tank removal" a pagina 128“;
- Exhaust system, refer to "12.20 Exhaust system removal" a pagina 160“;
- Chain, refer to "12.14 Chain removal" a pagina 143“;
- Conveyors, refer to "12.7 Underbody and conveyors removal" a pagina 127“;
- Coil and tube, refer to "10.8.1 Ignition coil removal" on page 93
- Regulator with bracket, refer to "13.1 Complete engine removal" on page 170
- Side panel, refer to "12.5 Side panel removal" a pagina 126“;
- Radiator, refer to "12.21.2 Radiator removal" a pagina 161“;
- Throttle body, refer to "13.9.2 Throttle body removal" a pagina 202“.
- Canister filter, refer to "13.10.1 Filter removal" on page 204
- Fuel injector, refer to "13.9.1 Injector removal" on page 201

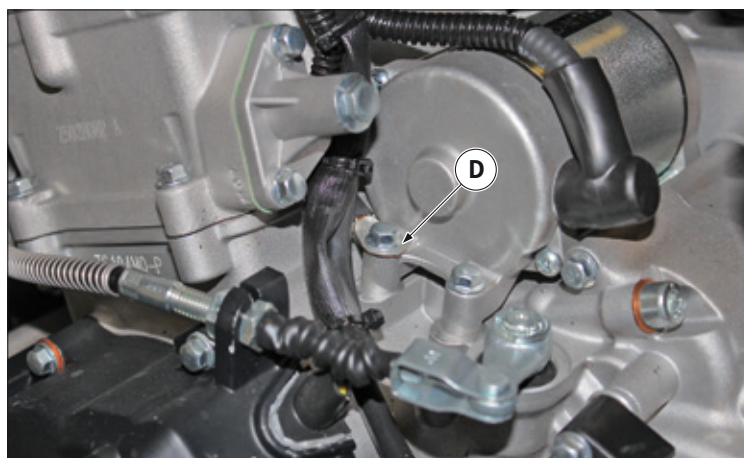
Remove the air tube "A" and the clutch cable "B".

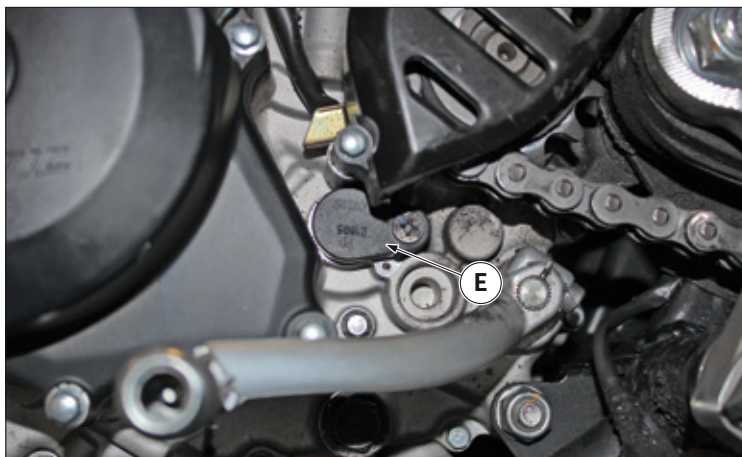


Remove the two cooling system pipes "C".

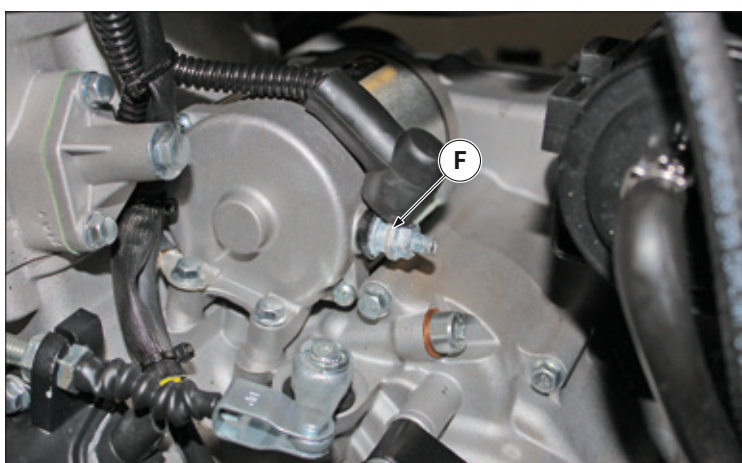


Remove the engine ground cable "D".

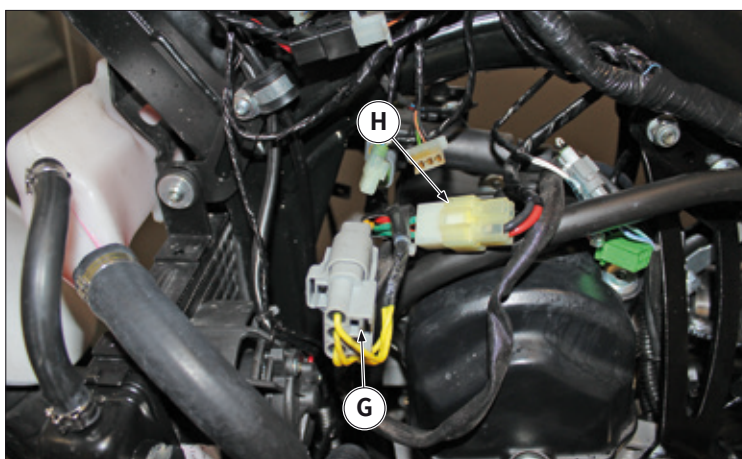




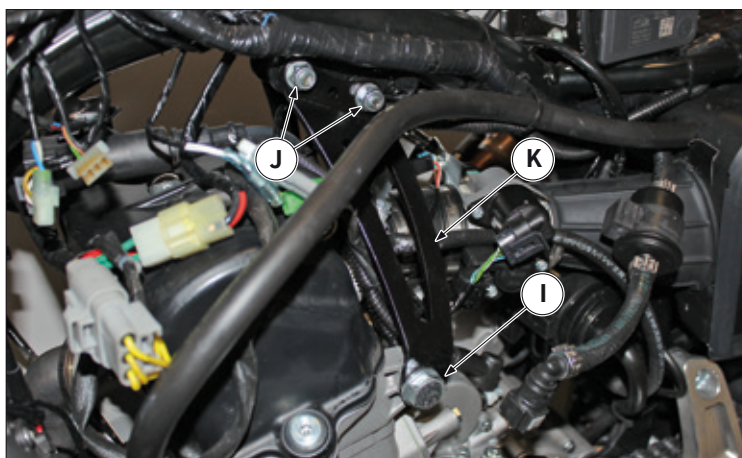
Remove the neutral sensor “E”.



Remove the starter motor cable “F”.

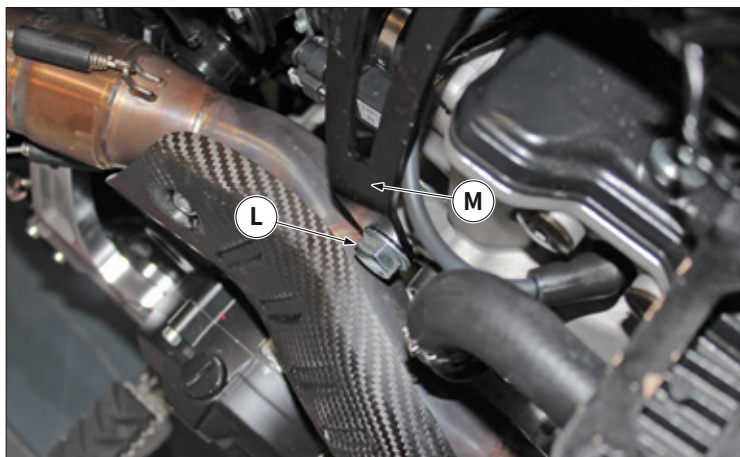


Remove the pick up “G” and alternator “H” connectors.



Remove the screw “I” and the connections “J”, then remove the bracket “K”.





Remove the screw "L" and the bracket "M".

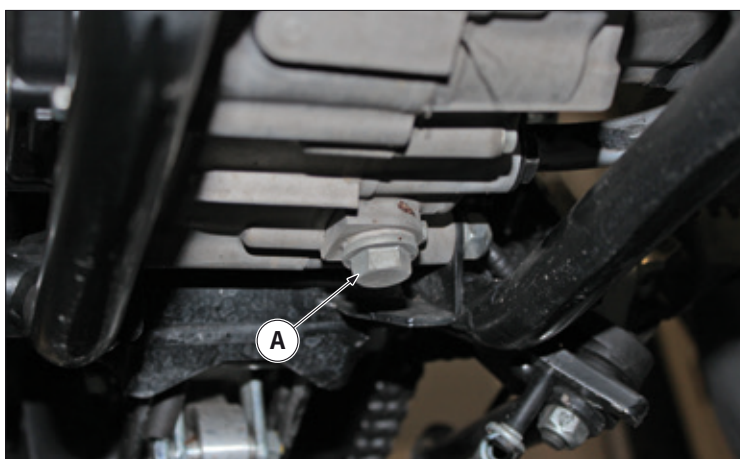


Remove the three engine connections "N" and the swingarm pivot "O".

Remove the engine from the vehicle.

-  **Tightening torques:**
- M10 screws: 50 Nm (5.0 m•kg, 36 ft•lb)
  - M8 screws: 27 Nm (2.7 m•kg, 20 ft•lb)

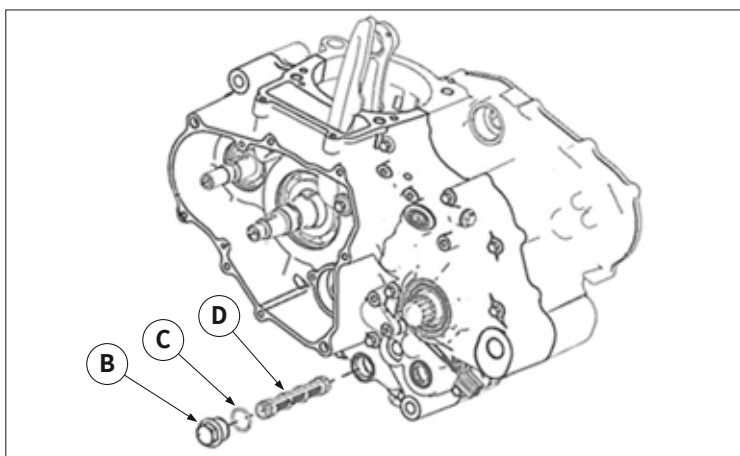
 **Proceed in the reverse order for reassembling.**



## 13.2 ENGINE OIL AND ENGINE OIL FILTERS CHANGE

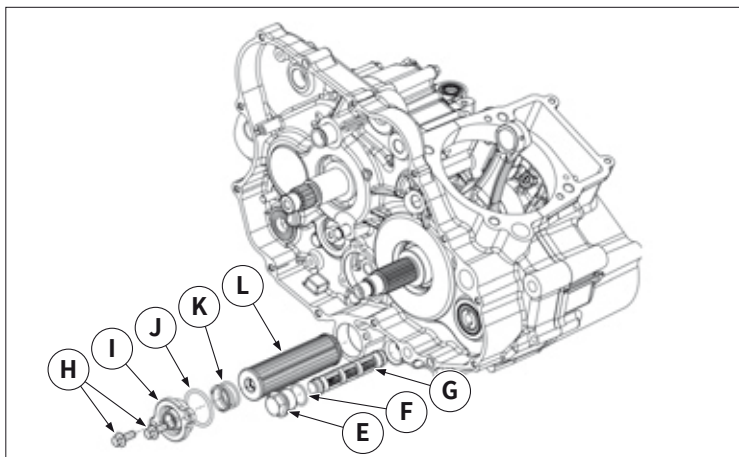
 **Place the motorcycle in vertical and upright position.**

Remove the oil drain bolt M16 "A" at the bottom of engine.



Remove the bolt M20 "B" and the gasket "C" from the primary filter on the left side of the engine, then remove the primary filter "D".

 **The primary filter is made of metal.**



Remove the bolt M20 “E” and the gasket “F” from the primary filter on the right side of the engine, then remove the primary filter “G”.

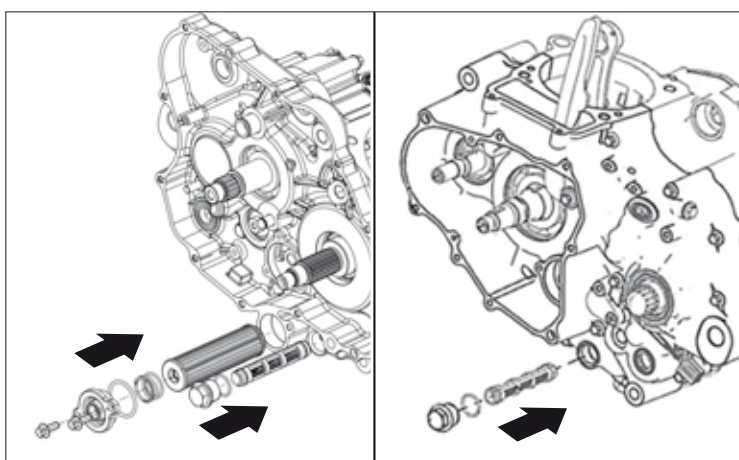
**i The primary filter is made of metal.**

Remove the two bolts M5 “H”, the cap “I” and the gasket “J” from the thin filter on the right side of the engine, then remove the spring “K” and the thin filter “L”.

**i The thin filter is made of paper.**

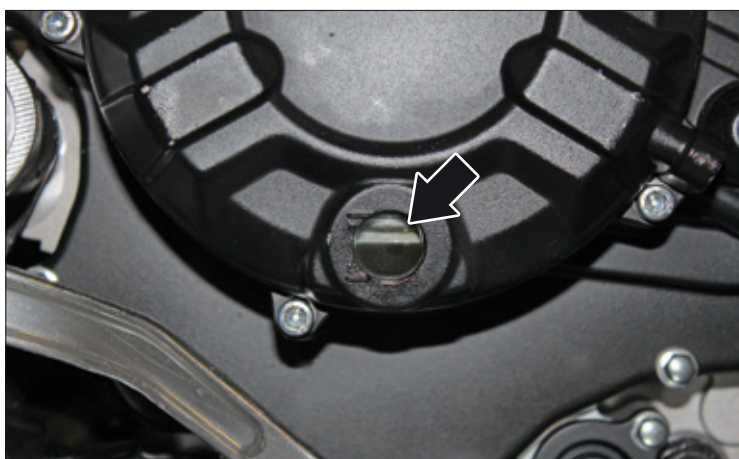
Drain the oil for 5 minutes or wait until there is no more oil.

At the same time, clean the primary filter and prepare a new thin filter.



Install all components previously removed in the sequence in which they were disassembled.

**i Install the filter with the black plastic facing inward.**



Measure 1500-1600 ml of oil with the measuring glass and fill the motor from the filling opening with the oil contained in the glass using a funnel before closing the oil cap.

During filling, observe the oil scale on the access hole.



### 13.3 ENGINE OIL VOLUME

Put in neutral and start the engine letting it run for 2 minutes before stopping it.

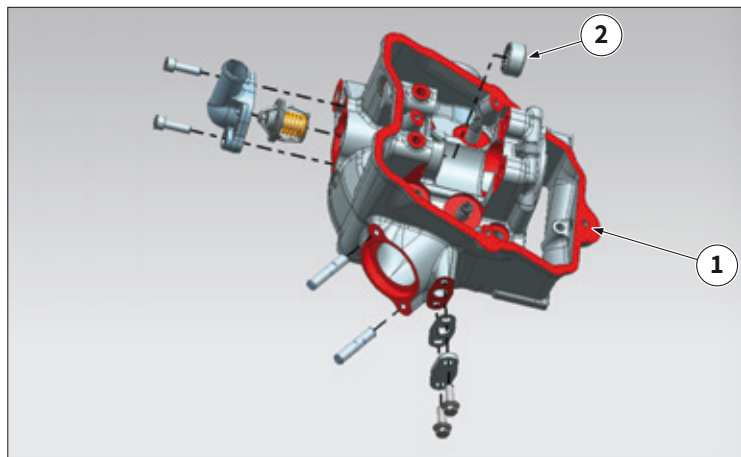
Place the vehicle vertically.

Keep the vehicle stationary for 5 minutes.

Observe if the oil level is between H-L.

If so, it means there is sufficient engine oil.





## 13.4 CYLINDER HEAD AND VALVE

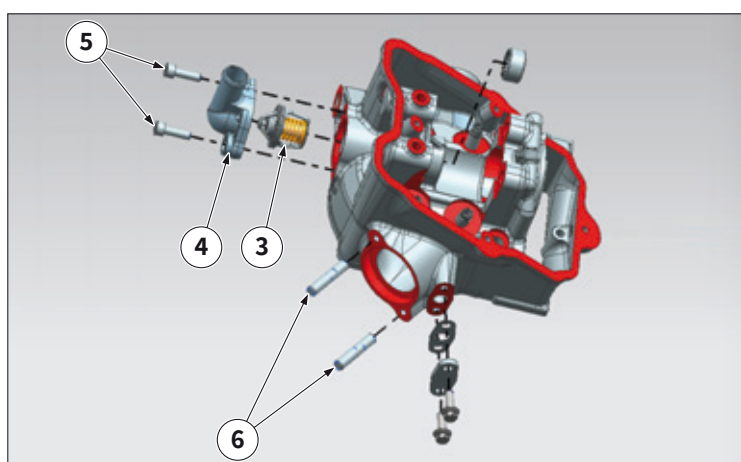
### 13.4.1 Cylinder head components assembling

Check that there are no aluminium residues or dents on the sealing surface of the head "1".

**i Use compressed air to clean the surfaces.**

Apply a small amount of oil on the surface of the needle bearing "2" and install it in the respective hole in the cylinder head using a specific tool.

**⚠ The bearing must be flush with the hole.**

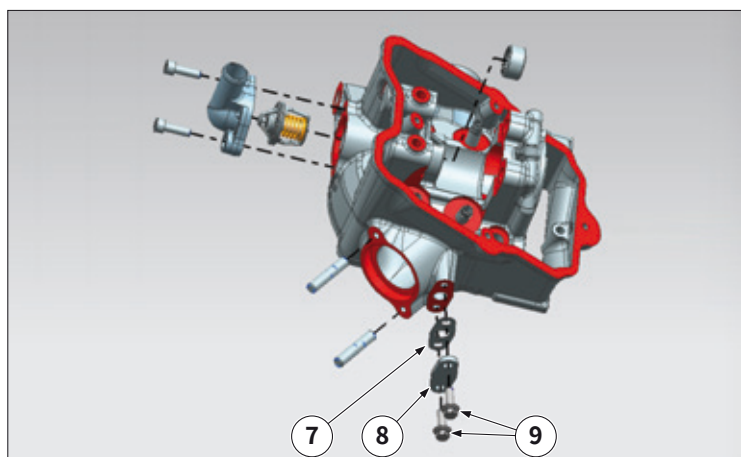


Install the thermostat "3" with the related cover "4" on the cylinder head, insert the two screws "5" M6x20 and tighten to the prescribed torque.

**Tightening torques:**  
Thermostat cover fastening screws: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

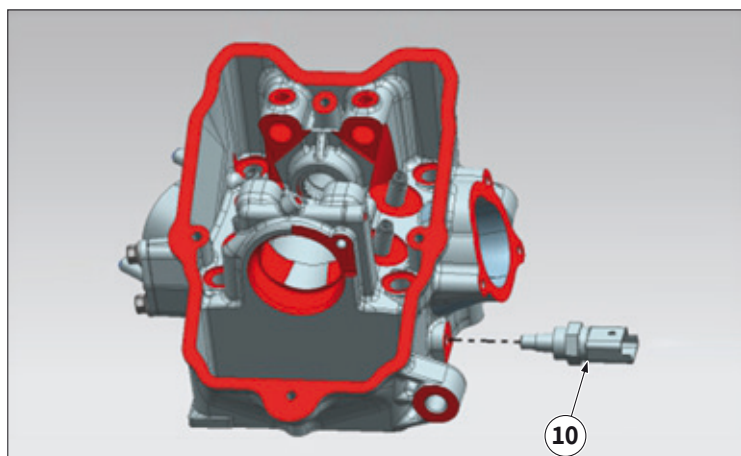
Take the two drain stud bolts "6" M8x40, apply the recommended product on the first 3 ~ 4 threads and install them in the respective seats of the cylinder head, tightening to the prescribed torque.

**Tightening torques:**  
Exhaust pipe stud bolts: 12 ~ 18 Nm (1.2 ~ 1.8 m·kgf, 8.9 ~ 13.3 ft·lbf)



Take the two bolts "9" M6x16, insert them in the secondary air intake cover "8" and in the related gasket "7", install the assembly so assembled on the exhaust manifold of the cylinder head and tighten to the prescribed torque.

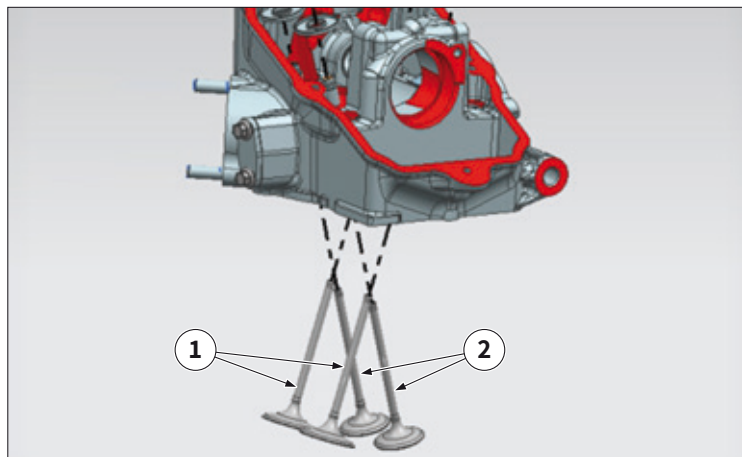
**Tightening torques:**  
Secondary air intake cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Take the temperature sensor "10" and apply a suitable quantity of recommended product on the threaded part, then install the sensor in the related seat on the cylinder head and tighten to the prescribed torque.

**♻ Recommended product: Loctite® 263 / SANVO.**

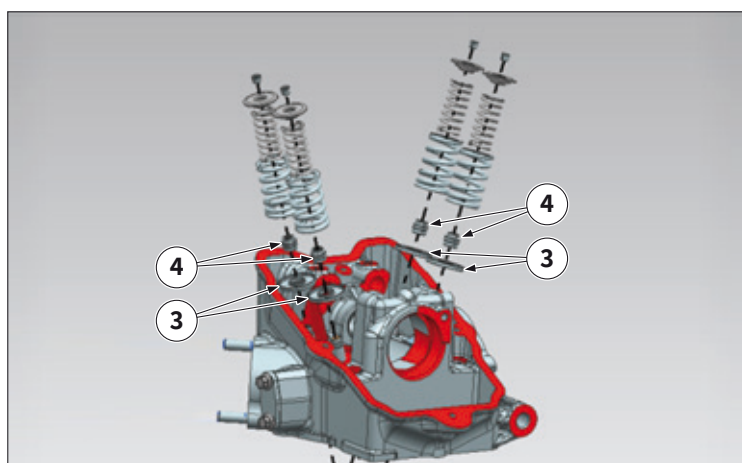
**Tightening torques:**  
Temperature sensor: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Check the cleanliness of each component.

Position the cylinder head horizontally, with the combustion chamber facing upwards.

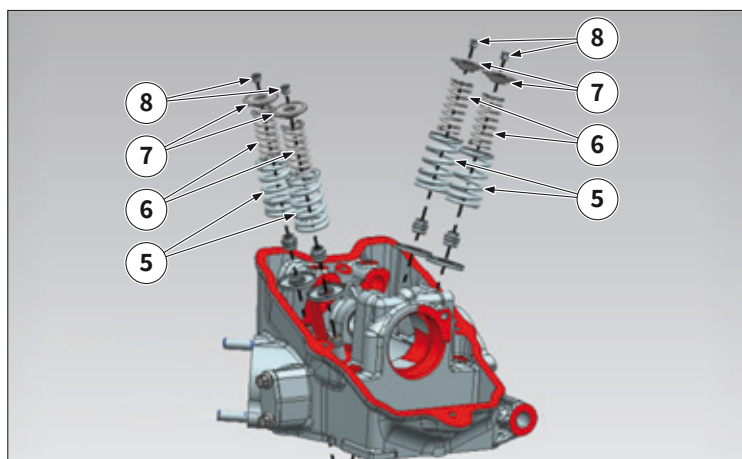
Apply an adequate quantity of oil on the stems of the intake valves "1" and drain valves "2", then install the valves in the respective seats of the cylinder head.



Turn the cylinder head horizontally, with the combustion chamber facing downwards.

Fit the four lower seats "3" of the valve springs and the four oil seal covers "4" on the valve stems.

**⚠ Apply a small amount of oil on the sealing caps.**

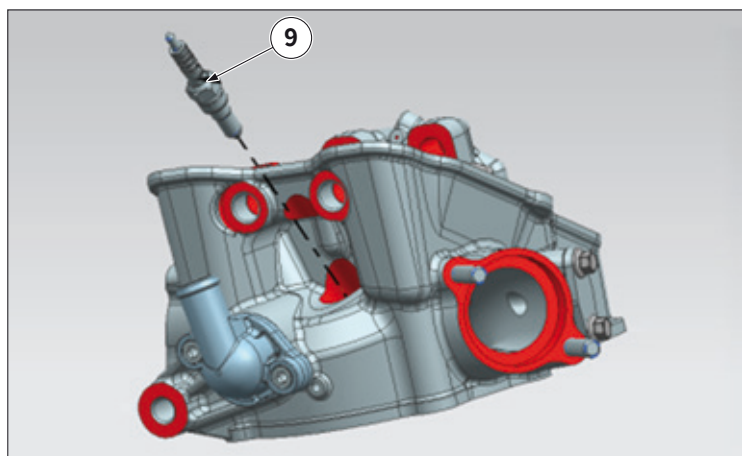


Fit the four internal springs "6", the four external springs "5" and the four upper seats "7" of the springs.

**⚠ Position the internal and external springs with the marking facing upwards.**

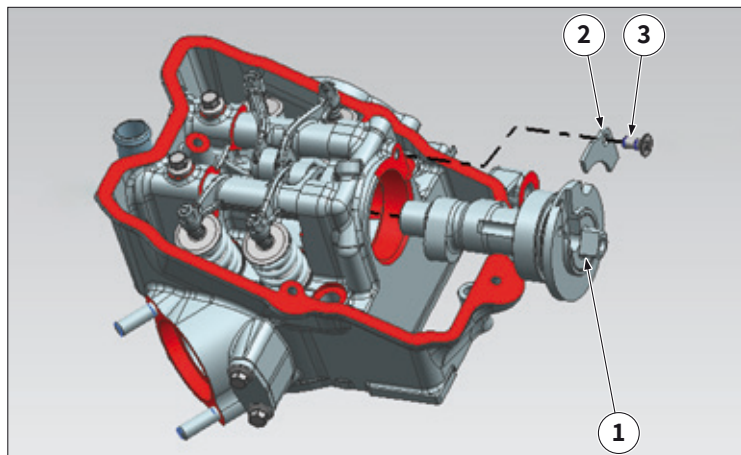
**i The internal and external springs must appear with the upper coils more separated than the lower ones.**

Install the clamps "8" for locking the valves on the upper seats, lock the clamps in the respective slots using a specific tool.



Screw the spark plug "9" into its hole for 3 ~ 4 threads by hand, then tighten to the prescribed torque.

**🔧 Tightening torques:**  
**Spark plug: 8 ~ 10 Nm (0.8 ~ 1.0 m·kgf, 5.4 ~ 7.4 ft·lbf)**




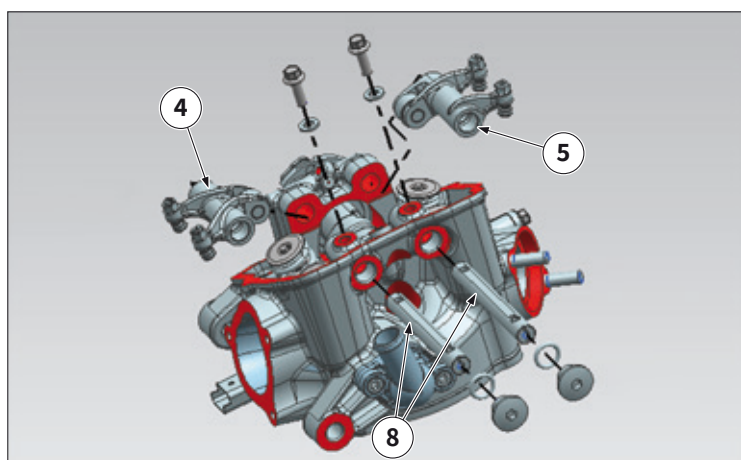
### 13.4.2 Camshaft and rocker arms components assembling

Check the cleanliness of each component.

Take the camshaft "1", apply grease to the shaft surface, then insert the camshaft into the respective hole in the head.

Fit the locking plate "2" of the camshaft, insert the screw "3" M6X12 and tighten it to the prescribed torque.

 **Tightening torques:**  
Camshaft plate fastening screw: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Take the intake rocker arm "4", install it in its seat and fit the respective shaft "8".

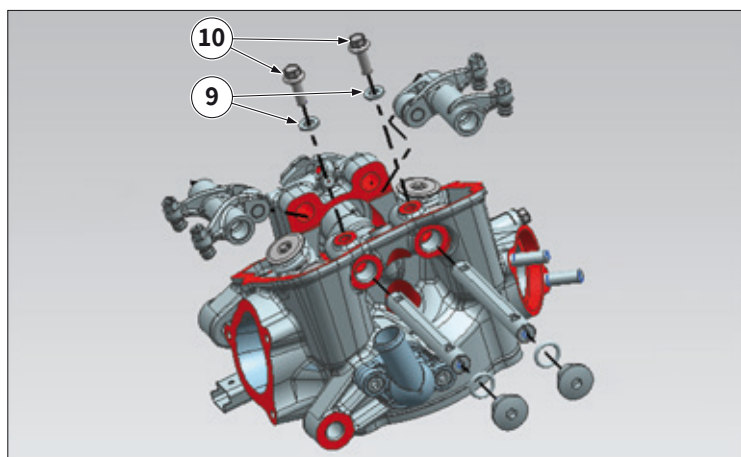
 **Apply an adequate amount of oil on the surface of the shaft.**

 **Insert the shaft with the flat side facing up.**

Take the exhaust rocker arm "5", install it in its seat and fit the respective shaft "8".


 **Apply an adequate amount of oil on the surface of the shaft.**

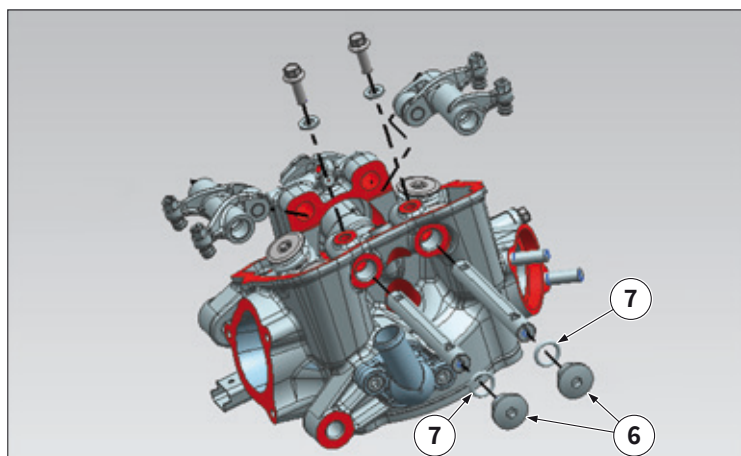
 **Insert the shaft with the flat side facing up.**




Use a slotted screwdriver to rotate the shafts of the intake and exhaust rocker arms, in order to align the threaded holes of the shafts with those on the head.

Insert the two bolts "10" M14x1 with the related washers "9" Ø6.5x1.5xØ12 in the holes just aligned and tighten to the prescribed torque.

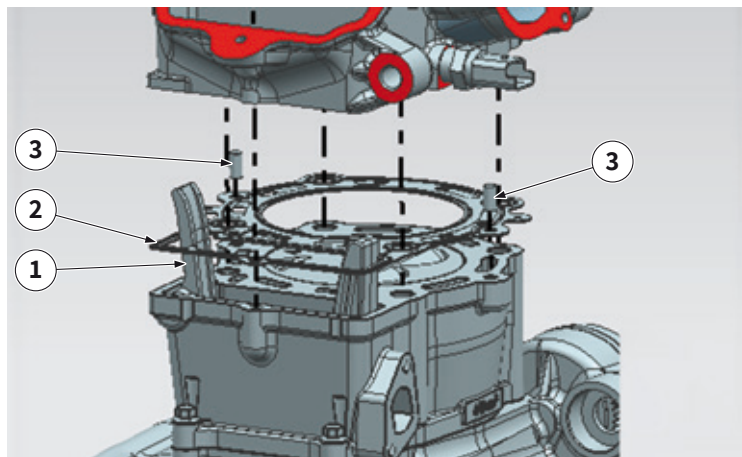
 **Tightening torques:**  
Rocker arms shafts fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



Insert the two bolts "6" M14x1 locking the shafts with the related fluorine rubber O-rings "7" Ø11.8x2.6 in the respective holes in the head and tighten to the prescribed torque.

 **Tightening torques:**  
Rocker arms shafts locking bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

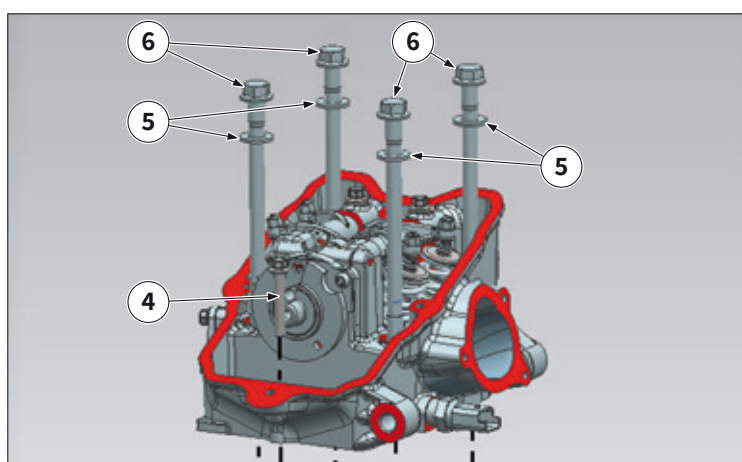





### 13.4.3 Cylinder head assembling

Fit the guide plate "1" of the chain, the two bushes "3" Ø6x12 and the gasket "2" of the head on the cylinder.


Install the cylinder head on the cylinder block.

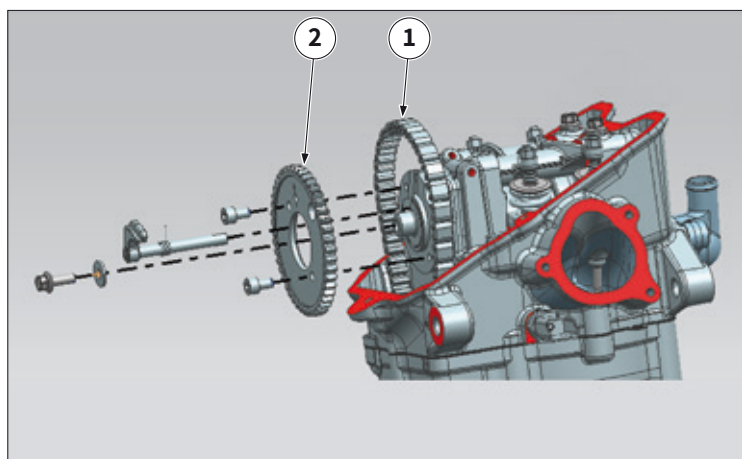


Fit the four stud bolts "6" M10x152 with the related washers "5" Ø10.5x2xØ20 in the respective holes in the head, tighten to the prescribed torque.

 **Tightening torques:**  
Cylinder head fastening stud bolts: 55 ~ 60 Nm (5.5 ~ 6.0 m·kgf, 40.6 ~ 44.3 ft·lbf)

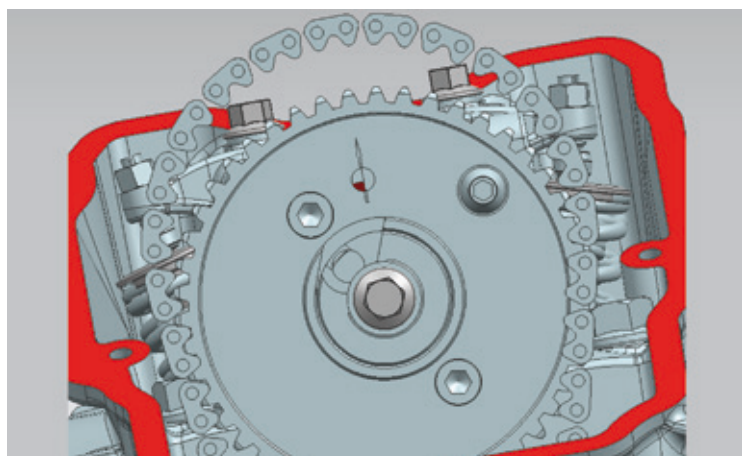
Insert the bolt "4" M6x40 into the respective hole in the head, screw in and tighten to the prescribed torque.

 **Tightening torques:**  
Cylinder head fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



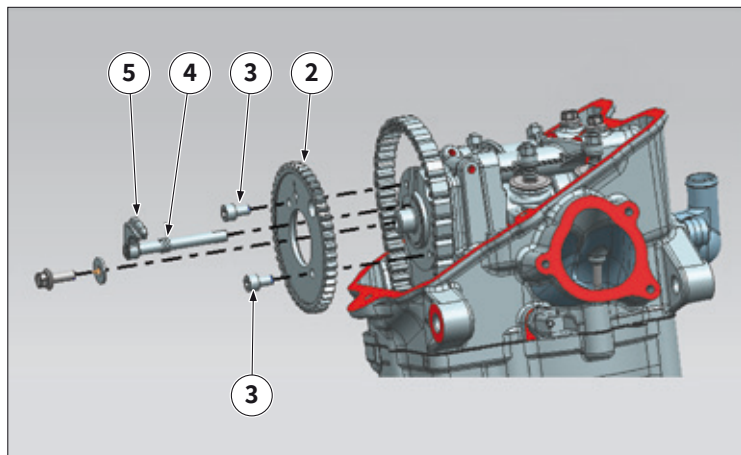
### 13.4.4 Timing pinion assembly and valve clearance adjustment

Fit chain "1" on sprocket "2".



Fit the pinion on the camshaft, aligning the pinion arrow with the marking on the head.



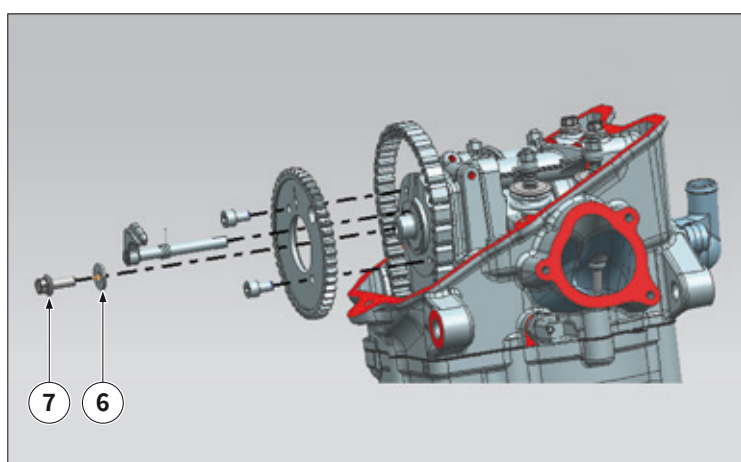


Take the two bolts “3” M6x10 and screw them onto the pinion, tightening to the prescribed torque.

**Tightening torques:**  
Camshaft pinion fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

Fit the pressure relief valve “5” with the return spring “4” on the camshaft, through the pinion “2”.

⚠ Turn the pressure relief valve and check its normal return.



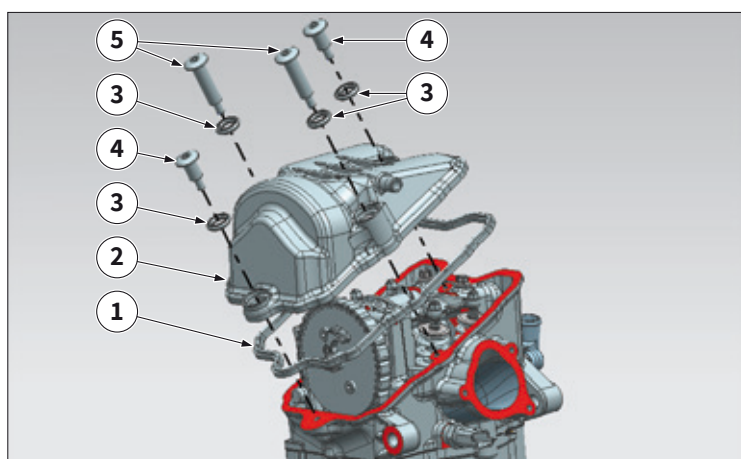
Insert the bolt “7” M6x16 with the related washer “6” Ø6.5x1.5xØ18 in the respective hole and tighten to the prescribed torque.

**Tightening torques:**  
Pressure relief valve fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)

Check the correct assembly of the timing chain and adjust the intake and exhaust valve clearance.

✂ Intake valve clearance: 0.06 ± 0.01

✂ Exhaust valve clearance: 0.07 ± 0.01

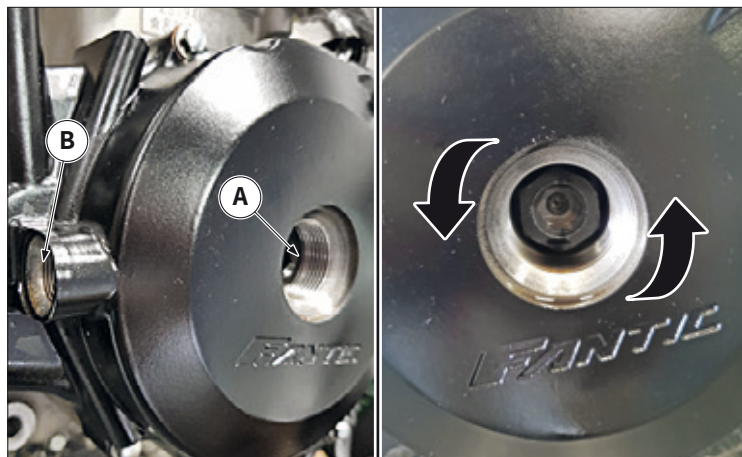


### 13.4.5 Cylinder head cover assembling

Position the gasket “1” and the four washers “3” on the head cover “2”.

Install the cover on the head and fasten it with the two bolts “4” M6x29.7 and the two bolts “5” M6x50.7, tightening to the prescribed torque.

**Tightening torques:**  
Cylinder head cover fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



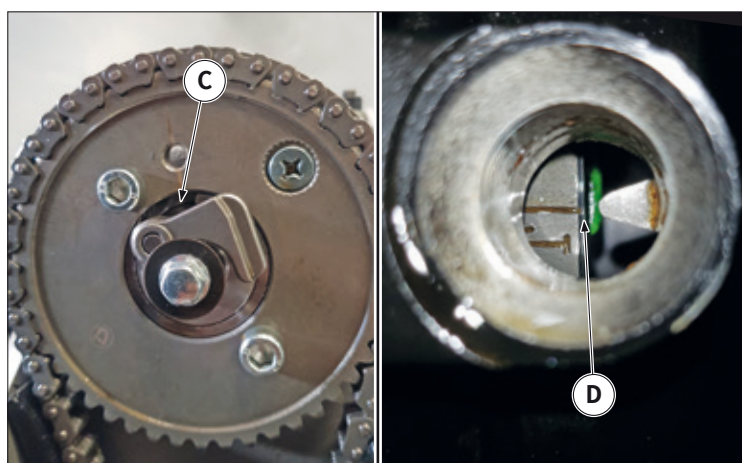
### 13.4.6 Tappet check and adjustment

**⚠ The following procedure must be performed with cold engine.**

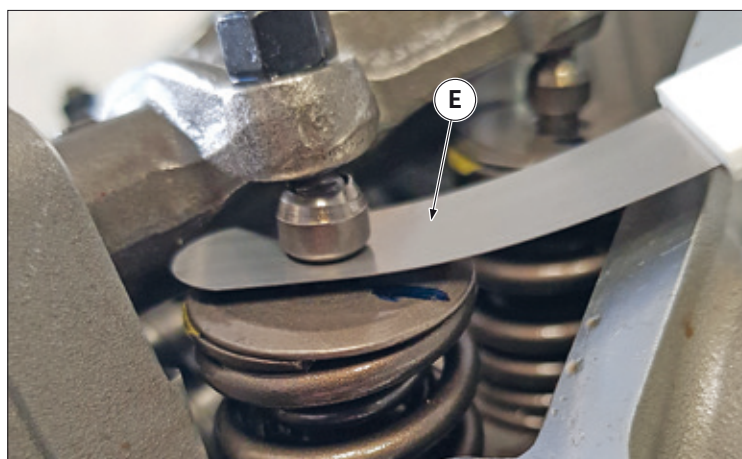
Remove:

- Spark plug, refer to “10.8.2 Spark plug removal” on page 93
- Remove the tappet cover.

Remove the two caps “A” and “B” on the ignition cover. Insert the special key inside the seat of the cap “A” and turn it anticlockwise.



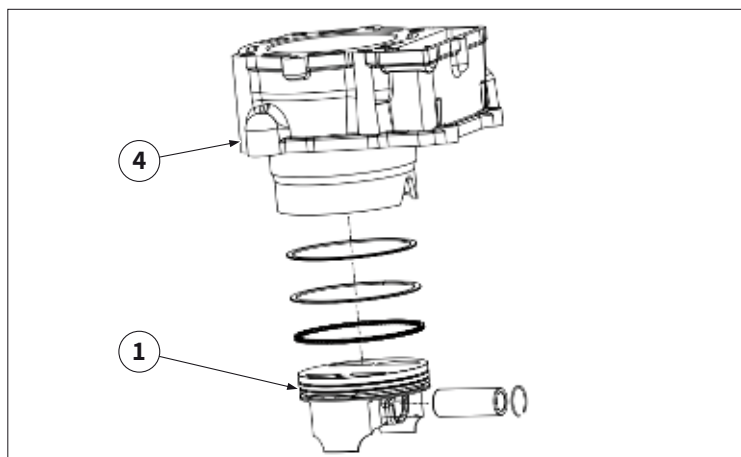
Rotate the engine until the top dead center is reached by positioning the elements “C” and “D” as shown in the figure.



Insert the thickness gauge “E” and adjust with the correct value.

**✂ Tappet adjustment shim:**  
**0.10 mm (0.003 in) ~ 0.15 mm (0.005 in)**





## 13.5 CYLINDER AND PISTON

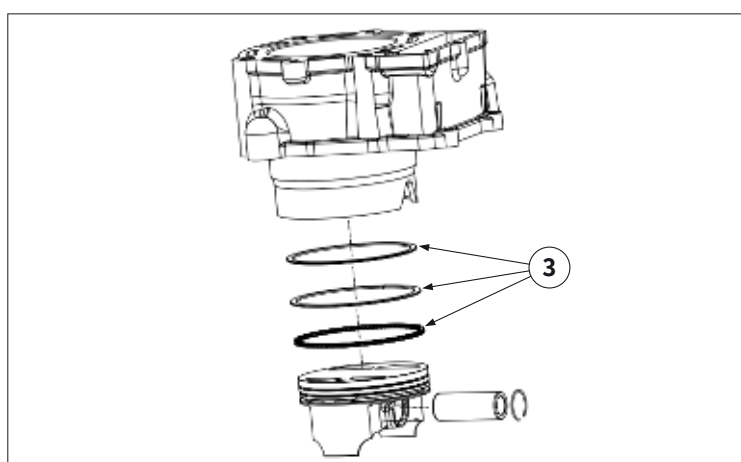
### 13.5.1 Piston assembly components assembling

Check that there are no dents or scratches on the cylinder "4".

**⚠ The cavity from the cylinder must be well cleaned and with no dust or rust.**

The surface of piston "1" must be smooth and free of obvious scratches, dents or burrs.

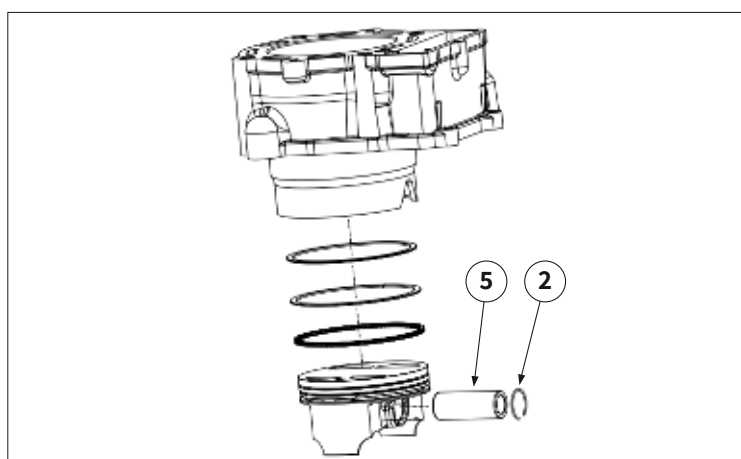
**⚠ The piston cavity must be well cleaned.**



Install the first segment, the second segment and the scraper ring "3" in the respective seats of the piston.

**⚠ The first and second segments must be installed with the identification marks facing upwards.**

**⚠ The segments must rotate freely and without jamming.**



Fit the retaining ring "2" in the groove of the piston, then insert the pin "5".

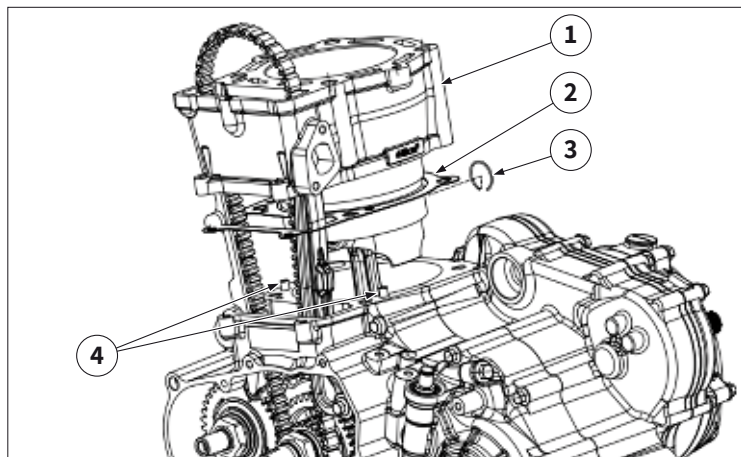
**⚠ After assembly, the retaining ring must be completely assembled in its groove.**

**⚠ The ring opening must be approximately 90° offset to the groove opening.**

Apply a small amount of oil on the piston surface, on the piston rings and on the cylinder liner.

Install the piston assembly in the cylinder.

**⚠ After assembly, the piston rings openings must be offset 180° and facing in the intake and exhaust direction.**



### 13.5.2 Piston and cylinder block installation

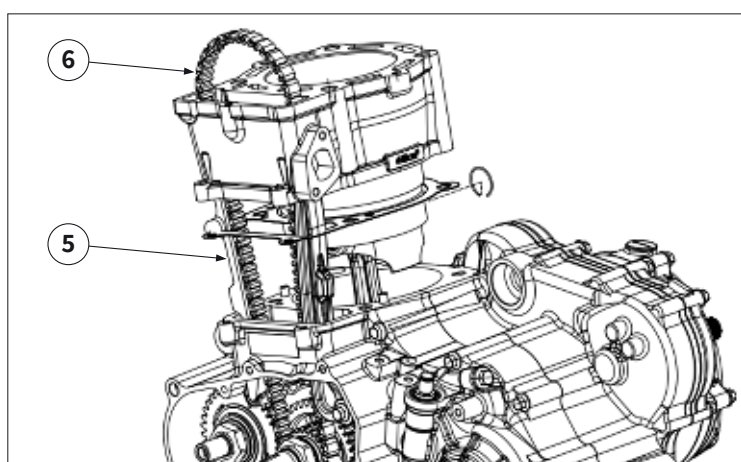
Fit the two pins "4" Ø6x12 in the respective holes of the crankcase cylinder mating surface.

Fit the cylinder gasket "2".

Install the piston and cylinder assembly "1" on the smaller end of the connecting rod, then install the piston pin and the retaining ring "3".

Finally, install the cylinder.

**⚠ The retaining ring opening and the related groove must be offset by about 90°.**



Insert the timing chain "6" on the crankshaft pinion.

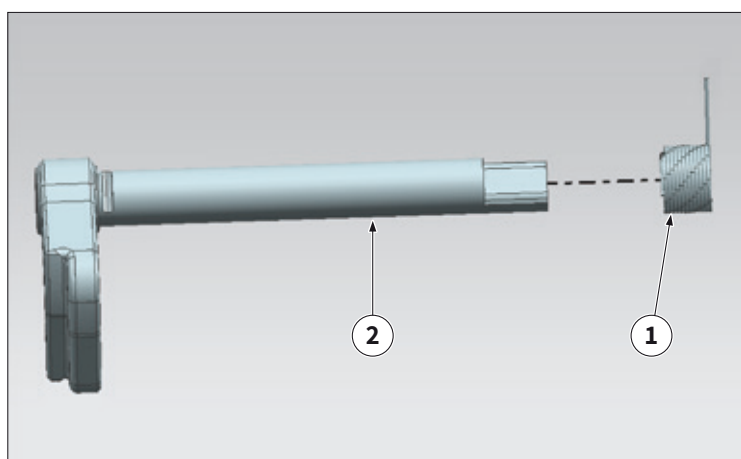
Position the guide plate "5" of the chain in the left half-crankcase half and in the respective cylinder seat.

Fit the chain tensioner plate bushing in the respective hole in the plate.

Take a bolt M6x105, apply the recommended product on the first 3 ~ 4 threads, then position and fix the chain tensioner plate tightening to the prescribed torque.

**♻ Recommended product: Loctite® 263.**

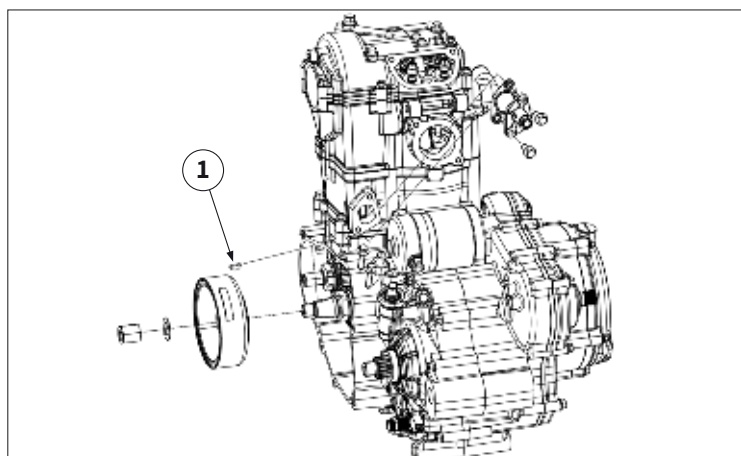
**🔧 Tightening torques:**  
Chain tensioner plate fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



### 13.5.3 Assemble the components of the pressure relief valve

Check the cleanliness of the valve assembly and the absence of impurities or burrs.

Fit the return spring "1" of the valve in the respective groove of the spindle "2".



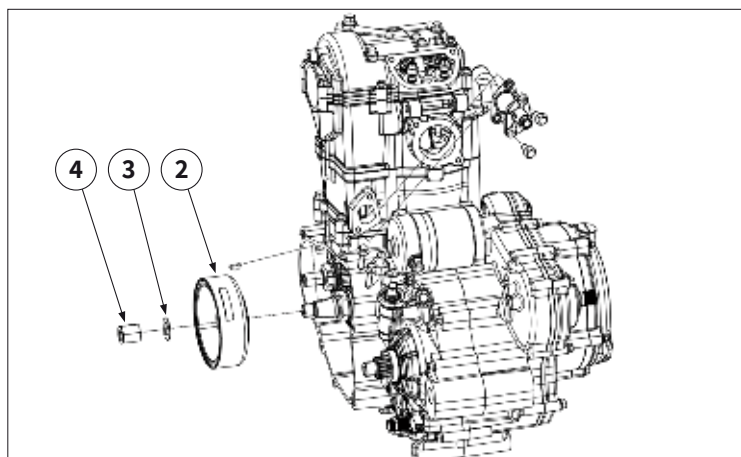
### 13.5.4 Assemble the components of the pressure relief valve

Check the cleanliness of all components.

Install a new magnetic key "1" in the groove in the crankshaft.

Clean the flywheel installing seat and the flywheel itself with a cloth and alcohol.






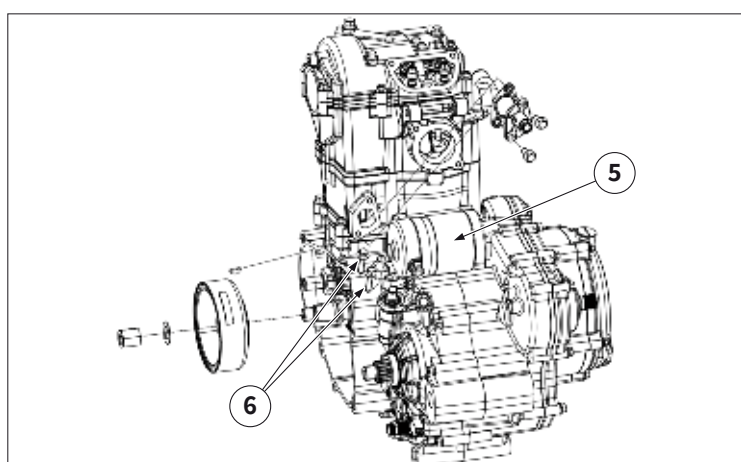
Install the flywheel “2” with the washer “3” Ø15.2x1.5xØ25 on the crankshaft, apply the recommended product on the first 3 ~ 4 threads of the flywheel closing nut “4” and screw it onto the shaft.

Tighten to the specified torque, then loosen the nut and repeat the tightening in pairs.

Then repeat the timing of the timing system.

 **Recommended product: Loctite® 263.**

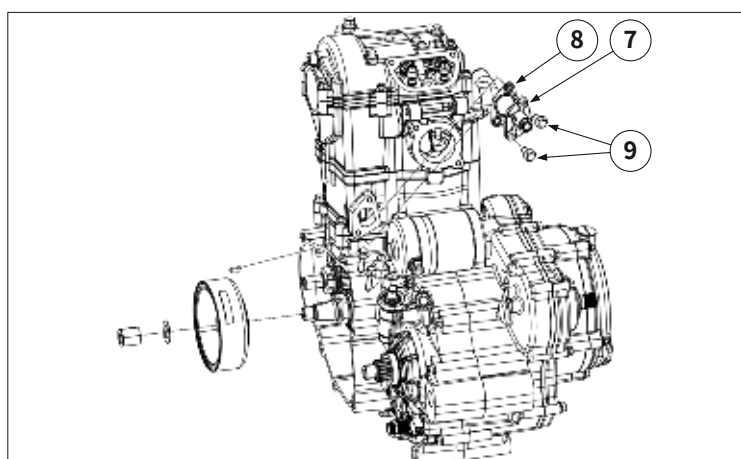
 **Tightening torques:**  
**Engine flywheel fastening nut: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)**



Install the starter motor “5”, applying an adequate quantity of oil to the related O-ring, in the respective seat.

Secure it with the two bolts “6” M6x25 and tighten to the prescribed torque.

 **Tightening torques:**  
**Starter motor fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Take the tensioner “7” with the related gasket “8” and install it in the respective cylinder seat.

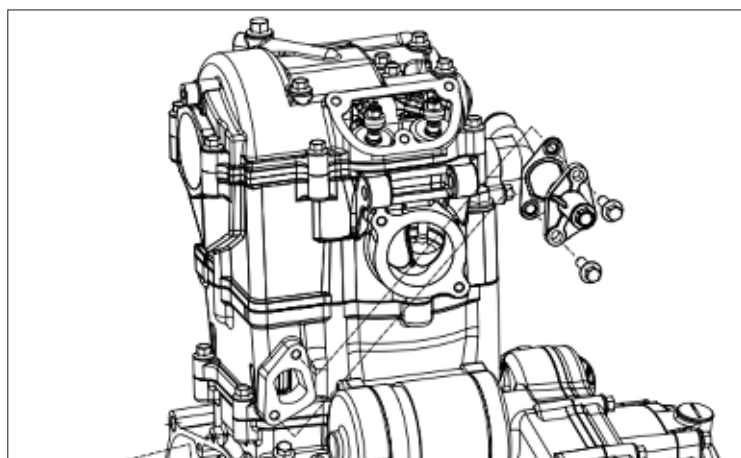
Take a bolt “9” M6x20, apply the recommended product on the first 3 ~ 4 threads and screw it into the upper hole of the tensioner.

Take a bolt “9” M6x20 and screw it into the lower hole of the tensioner.

Tighten the two bolts to the specified torque.

 **Recommended product: Loctite® 263 / SANVO.**

 **Tightening torques:**  
**Chain tensioner fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**




Install the tensioner spring into the tensioner.

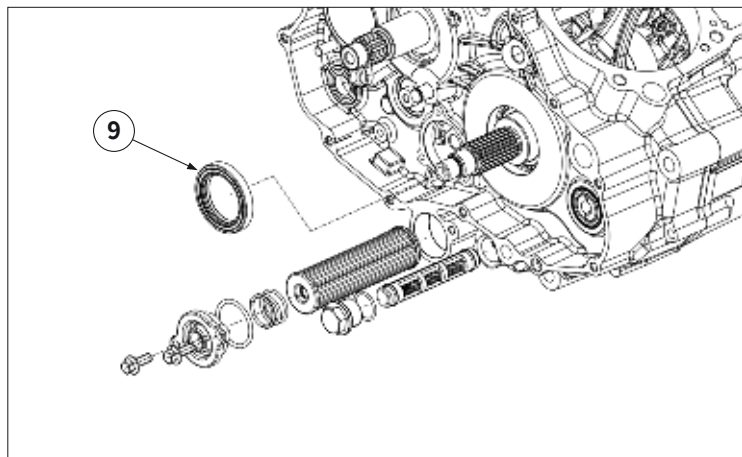
Insert the tensioner bolt with the related washer into the tensioner and tighten to the prescribed torque.

 **Tightening torques:**  
**Chain tensioner spring fastening bolt: 5 ~ 7 Nm (0.5 ~ 0.7 m·kgf, 3.7 ~ 5.2 ft·lbf)**

Check that the timing point is visible through the positioning hole on the camshaft.

Insert a M8x12 bolt with a Ø8.5x1.2xØ15 washer in the respective hole of the head cover and tighten to the prescribed torque.

 **Tightening torques:**  
**Phasing inspection hole cap: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



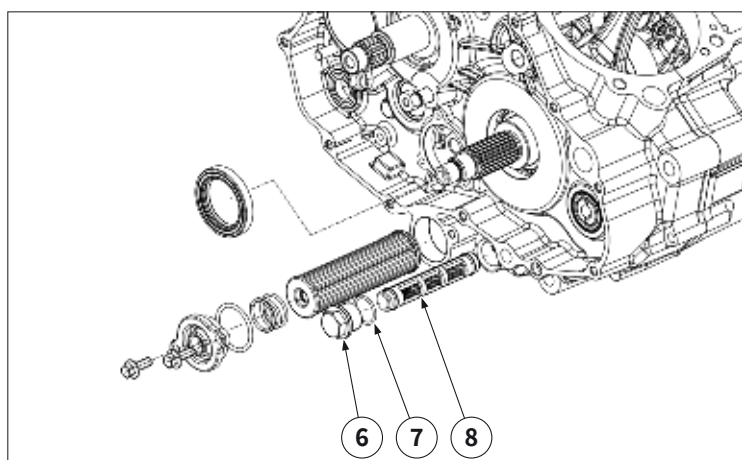
### 13.6 CLUTCH, DRIVE WHEEL, FREE WHEEL, OIL PUMP AND GEARBOX

#### 13.6.1 Thin filter and primary filter assembling

Apply a small amount of oil on the surface of the oil seal “9” Ø35xØ50x7.

Fit the oil seal in the respective hole on the crankshaft.

**⚠ The oil seal must be flush with the hole.**

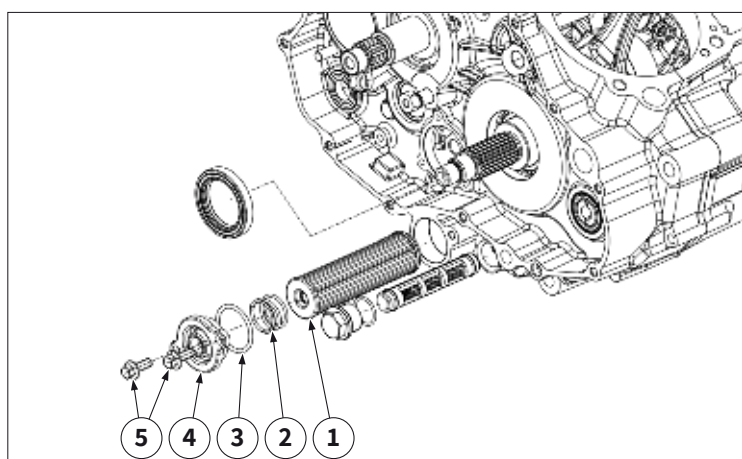


Apply a small amount of engine oil to the oil filter O-ring “8” and insert it into the appropriate hole.

Insert the O-ring “7” inside the filter cap “6”.

Apply an adequate amount of Vaseline to the inside of the filter cap, install the cap and tighten to the prescribed torque.

**⚡ Tightening torques:**  
**Primary oil filter cap: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Assemble the thin filter “1” in the appropriate hole in the right half-crankcase.

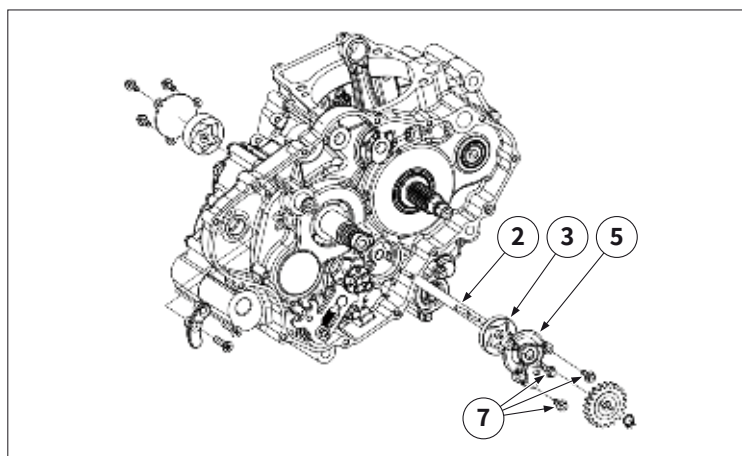
**⚠ The thin filter fitting end must face towards the left half-crankcase.**

Fit the spring “2” of the thin filter.

Insert the O-ring “3” in the respective groove of the thin filter cap “4”.

Fit the cap with the two bolts “5” M6x16 and tighten to the prescribed torque.

**⚡ Tightening torques:**  
**Thin oil filter cap fastening bolts: 9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)**



#### 13.6.2 Oil pump assembling

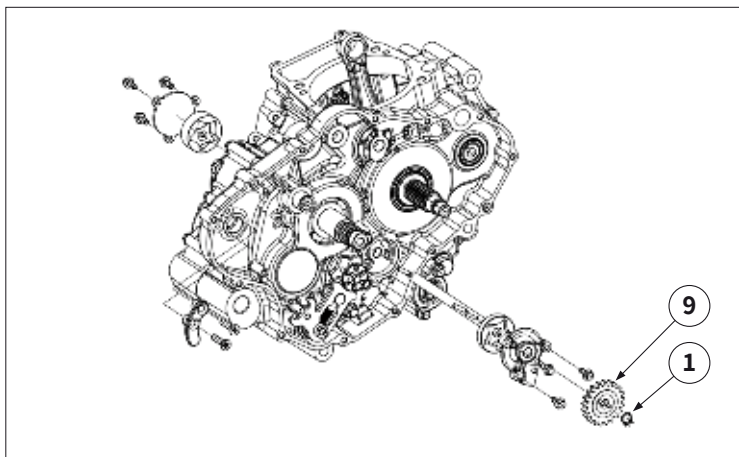
Fit the shaft “2” of the oil pump, with the end that is provided with the two holes facing towards the right half-crankcase, in the respective hole of the right half-crankcase.

Insert a pin in the second hole of the shaft, then install the 8 mm rotor assembly “3” in the respective hole, with the side of the identification marking facing the right half-crankcase.

Fit the right cover “5” of the oil pump with the three bolts “7” M5x18, tightening to the prescribed torque.

**⚡ Tightening torques:**  
**Oil pump right cover fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)**

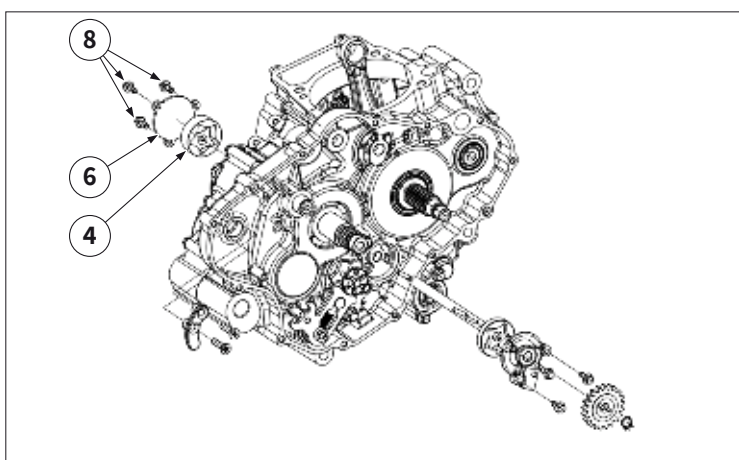




Fit a pin in the shaft of the oil pump, then install the wheel "9" on the shaft and finally the retaining ring "1".

**⚠ Once the oil pump is assembled, lubricate with an adequate amount of oil.**

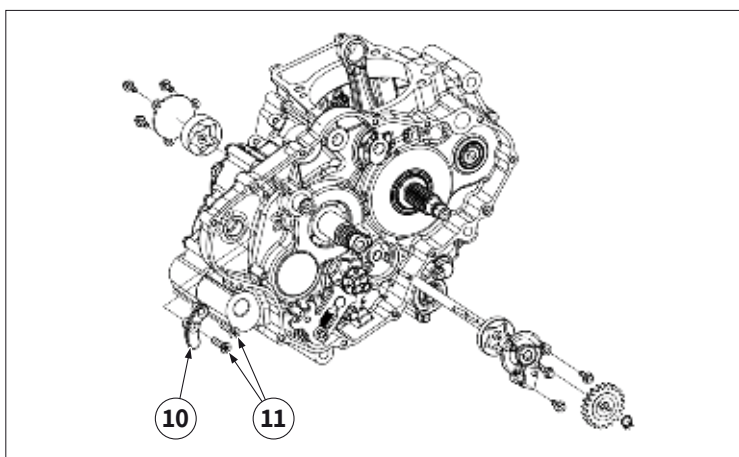
Rotate the oil pump and check its correct rotation, which must be free and without jamming.



Insert a pin into the oil pump shaft on the left side, then install the 14 mm rotor assembly "4" in the respective hole, with the side of the identification mark facing the left half-crankcase.

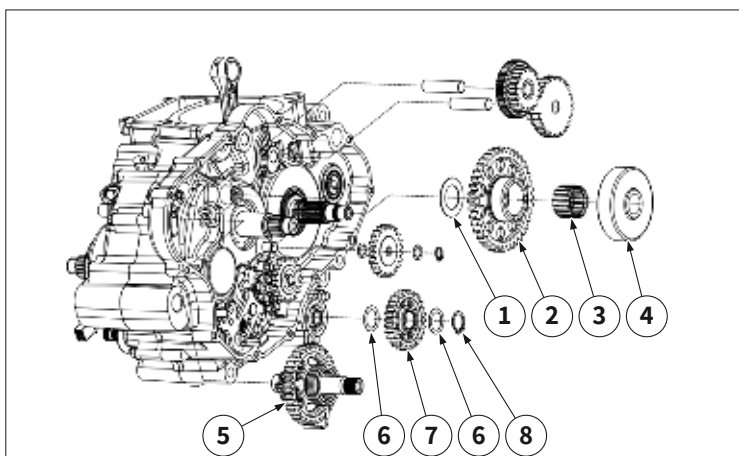
Fit the oil pump left cover "6" with the three bolts "8" M5x12, tightening to the prescribed torque.

**🔧 Tightening torques:**  
Oil pump left cover fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)



Insert the starter shaft "10" in the respective hole of the right half-crankcase and fasten it with the two bolts "11" M6x25, tightening to the prescribed torque.

**🔧 Tightening torques:**  
Starter shaft fastening screws: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)



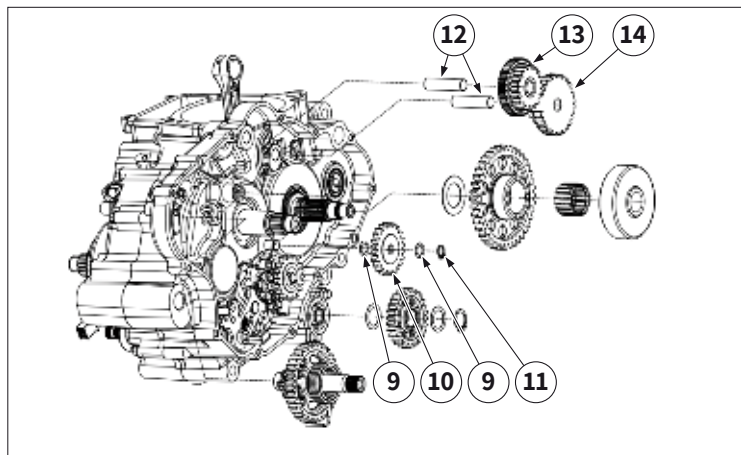
### 13.6.3 Starter system installation

Fit the starter shaft assembly "5" in the respective hole of the right half-crankcase.

Fit a washer "6" Ø18.5x0.5xØ26 and the gear "7", then insert a second washer "6" and finally the retaining ring "8".

Fit the washer "1" Ø25x2xØ40 on the crankshaft, then position the large gear "2", the needle bearing "3" and the clutch housing "4".

**⚠ Apply an adequate amount of oil on the needle bearing.**

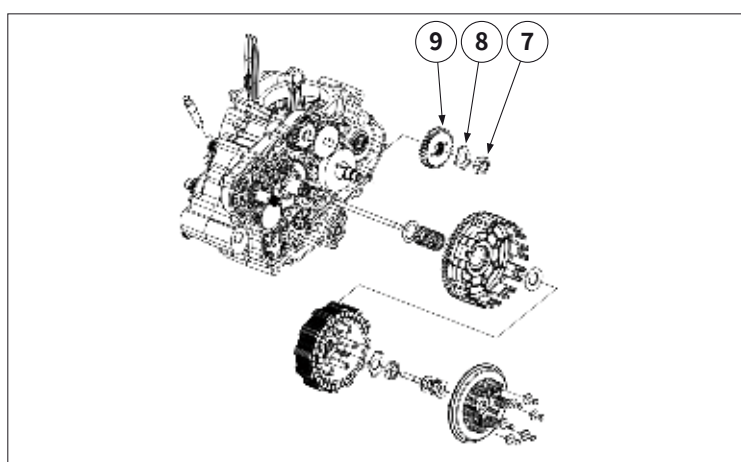


Fit a washer "9" Ø10.2x0.5xØ15 and the gear "10" of the oil pump, then insert a second washer "9" and finally the retaining ring "11".

Rotate the retaining ring to check its correct assembly.

Apply a small amount of oil on the two shafts "12" and insert them in the respective holes of the double gears.

Fit the clutch gear "13" and the gear "14" on the respective shafts.



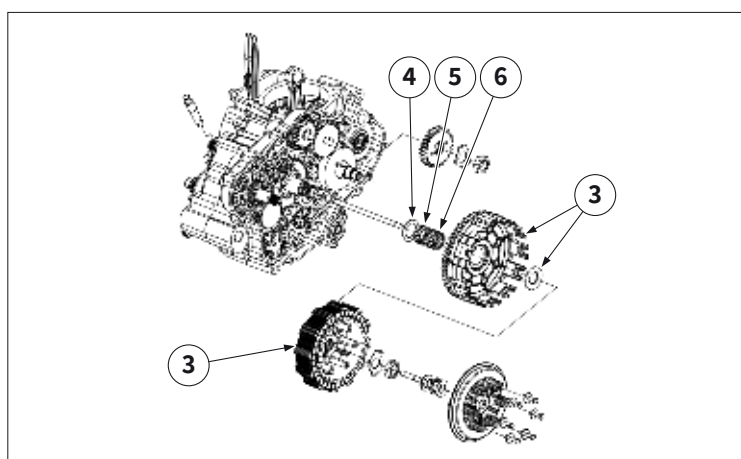
### 13.6.4 Clutch and main transmission installation

Fit the driving gear "9" with a washer "8" on the crankshaft, then take a nut "7" M18x1 and apply the recommended product on the first 3 ~ 4 threads of the nut.

Insert the nut on the crankshaft and tighten to the prescribed torque.

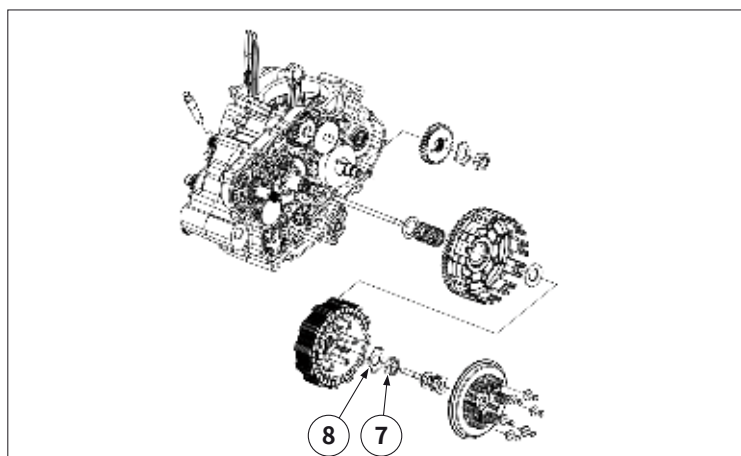
 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
Crankshaft locking nut: 115 ~ 125 Nm (11.5 ~ 12.5 m·kgf, 84.8 ~ 92.2 ft·lbf)



Assemble in sequence the washer "4", the needle bearings "5" (K25x29x13) and "6" (K25x29x17), the clutch housing "3", the grooved washer and the central bushing on the primary shaft.

Insert the driving and driven discs into the central bushing.



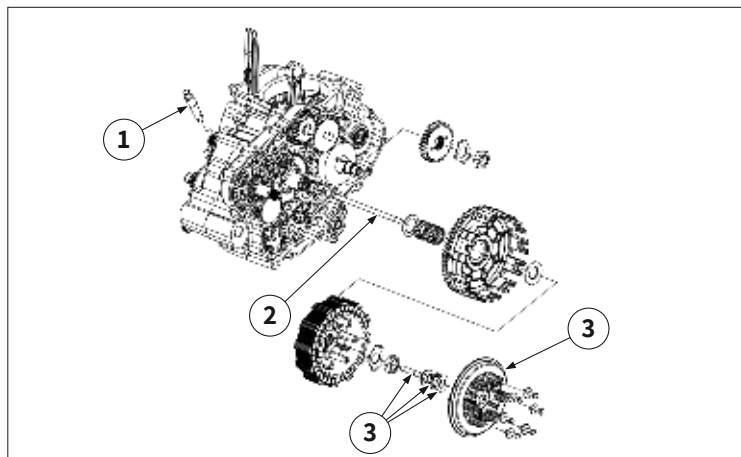
Fit a washer "8", then take a nut "7" M18x1 and apply the recommended product on the first 3 ~ 4 threads of the nut.

Insert the nut on the primary shaft and tighten to the prescribed torque.

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
Primary shaft locking nut: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)


 **Apply an adequate amount of oil on the needle bearings.**



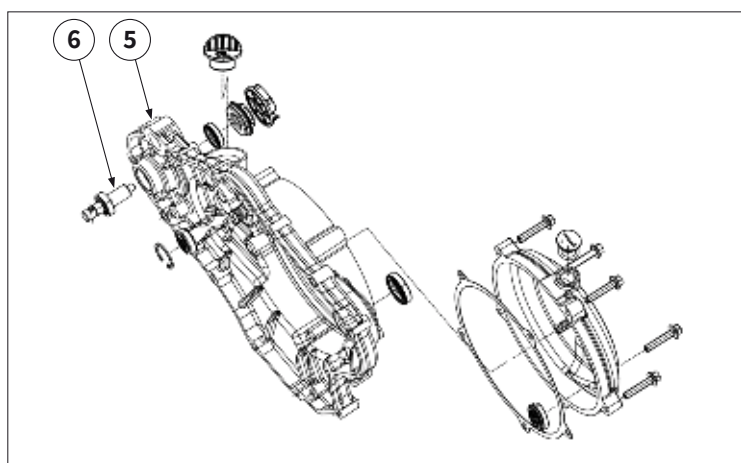
Insert the thrust pin “2” of the clutch into the hole in the primary shaft.

Take the upper clutch pin “3”, insert the bearing and the washer, then fit the upper pin in the hole of the primary shaft.

Rotate the release lever “1” of the clutch so as to have the upper pin in the lowest possible position, then fit the thrust disk, the six springs with the related washers and finally the six M5x25 bolts, tightening to the prescribed torque.

 **Tightening torques:**  
Clutch thrust plate fastening bolts: 8 ~ 10 Nm (0.8 ~ 1.0 m·kgf, 5.4 ~ 7.4 ft·lbf)

 **Check that the upper pin of the clutch rotates freely.**

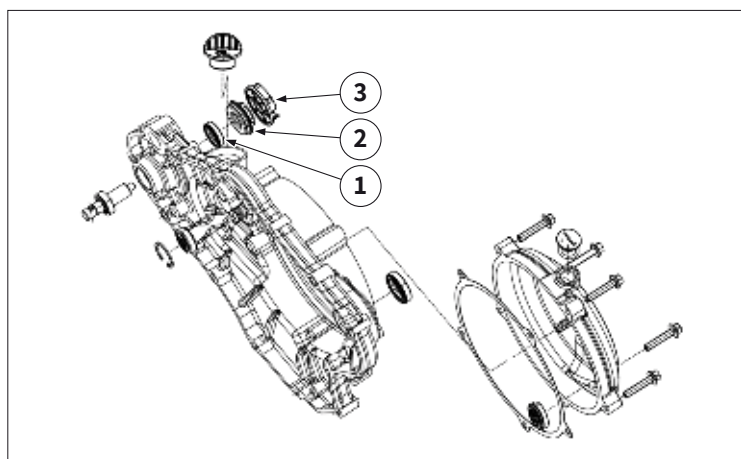


### 13.6.5 Right cover and right decorative cover components assembling

Check that the inner surface of the cover “5” is clean and free of dents.


Apply a small amount of oil into the hole in the water pump shaft bearing.

Fit the assembly “6” of the water pump shaft using a specific tool.




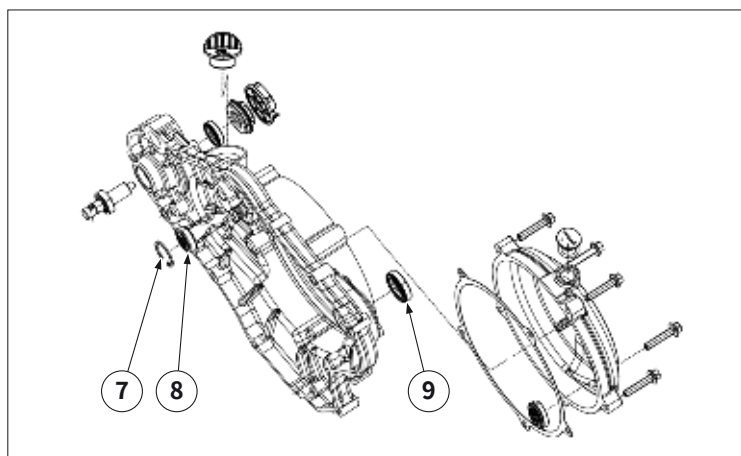
Apply a small amount of oil on the oil seal “1” and in the hole of the water pump shaft, then insert the oil seal and fit it fully down using a specific tool.

Fit the hydraulic seal assembly “2” using a specific tool.

 **The end of the hydraulic seal assembly must be flush with the grooved surface of the water pump shaft.**

Install the impeller “3” of the water pump on the shaft, tightening it to the prescribed torque.

 **Tightening torques:**  
Water pump impeller: 2 ~ 4 Nm (0.2 ~ 0.4 m·kgf, 1.5 ~ 3.0 ft·lbf)



Apply a small amount of oil in the hole of the starter shaft oil seal, then insert the oil seal “9” and fit it fully down using a specific tool.

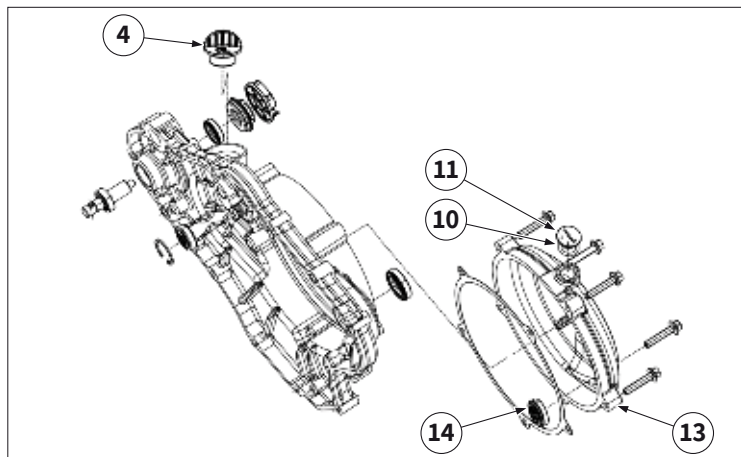
Apply a small amount of oil in the hole in the crankshaft oil seal.

Insert the oil seal “8” with the identification mark side facing outwards and fit it fully down using a specific tool.

 **The oil seal end is marked as “TCV”.**

Insert the retaining ring “7” in the groove of the crankshaft hole.





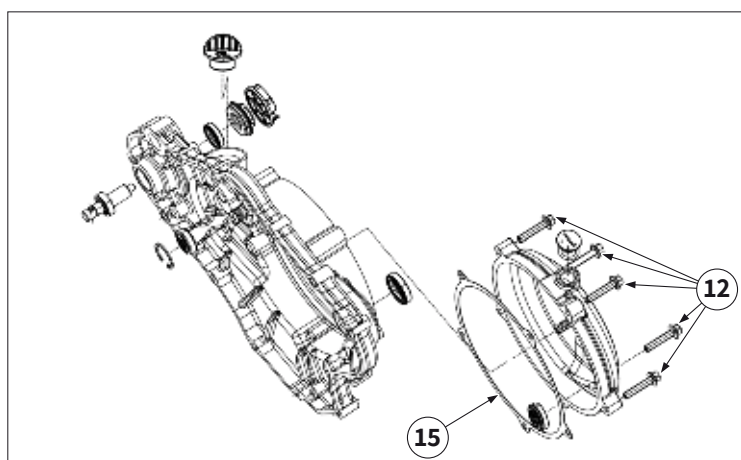
Fit the oil cap “4” in the related hole in the right cover.

Place the oil inspection window “14” in the respective hole of the decorative cover “13” and fit it fully down using a specific tool.

Apply a small amount of oil in the installation hole of the small inspection cap.

Insert the O-ring “10” in the small inspection cap “11”, then fit the cap tightening to the prescribed torque.

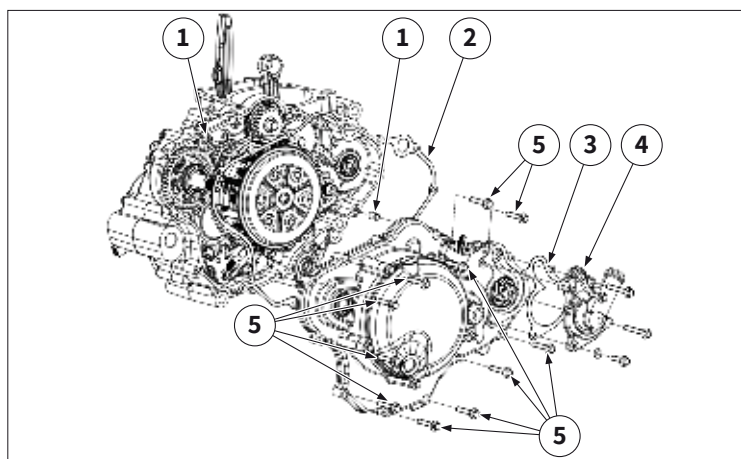
**Tightening torques:**  
**Small inspection cap on the right cover: 4 ~ 6 Nm (0.4 ~ 0.6 m·kgf, 3.0 ~ 4.4 ft·lbf)**



Fit the gasket “15” on the decorative cover.

Install the decorative cover on the right cover with the five bolts “12” M6x30, tightening to the prescribed torque.

**Tightening torques:**  
**Right cover decorative cover fastening bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



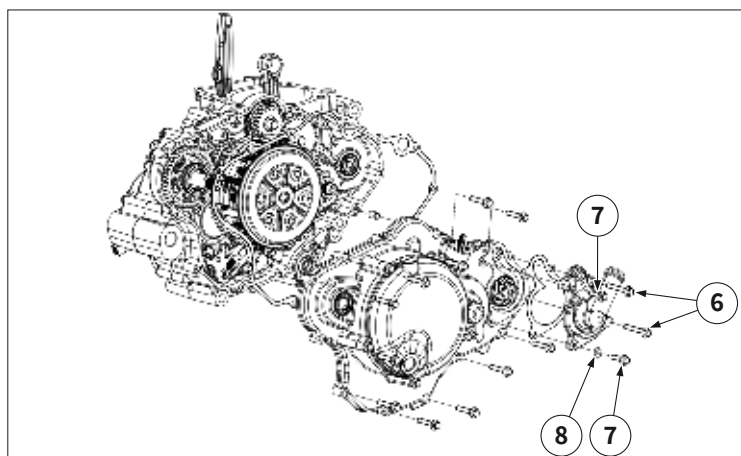
### 13.6.6 Right cover and water pump cover installation

Install the two pins “1” Ø9x13 and the gasket “2” of the right cover on the right half-crankcase, then install the right cover on the right half-crankcase.

Assemble the gasket “3” and the cover “4” of the water pump.

Insert the eleven bolts “5” M6x35 in the respective holes of the right cover and tighten to the prescribed torque.

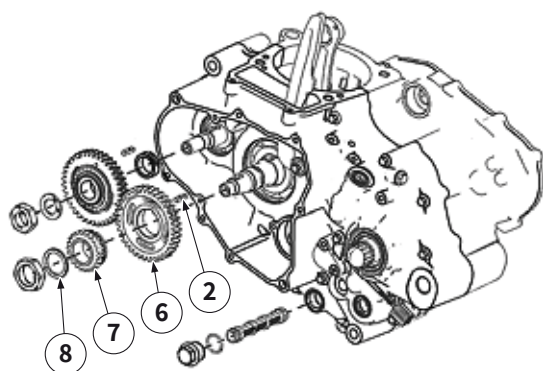
**Tightening torques:**  
**Right cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Insert a bolt “7” M6x25 with the washer “8” Ø6.5x1.5xØ12 into the drain hole of the water pump cover, tightening it to the prescribed torque.

Insert the two bolts “6” M6x45 and a bolt “7” M6x25 in the respective holes of the water pump cover, tightening to the prescribed torque.

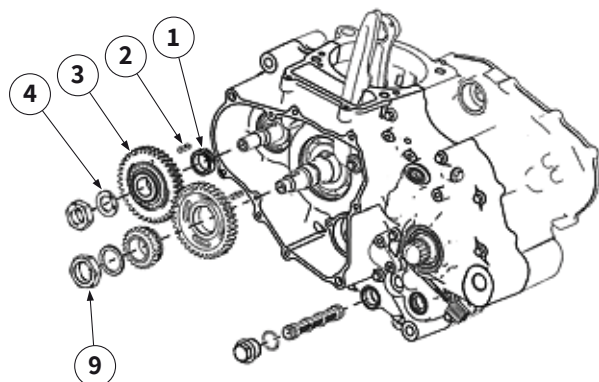
**Tightening torques:**  
**Water pump cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



### 13.7 GENERATOR, DRIVE WHEEL AND DRIVEN WHEEL BALANCING

#### 13.7.1 Drive wheel, driven wheel and oil filter installation

Install a flat wrench “2” 4x4x16 in the respective seat on the crankshaft, fit the driving wheel “6”, the gear wheel “7” and the washer “8” Ø24.2x2.5xØ32.



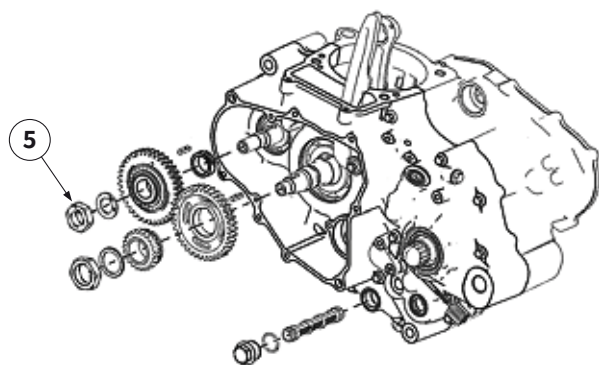
Apply the recommended product on the first 3 ~ 4 threads of the locking nut “9” M24x1, install the nut with the larger side face down, tighten to the prescribed torque and mark the nut in blue.

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Crankshaft fastening nut: 115 ~ 125 Nm (11.5 ~ 12.5 m·kgf, 84.8 ~ 92.2 ft·lbf)**

Install the bushing “1” on the countershaft, then fit a flat key “2” 4x4x16 in the respective seat on the countershaft.

Fit the driven wheel “3” with the washer “4” Ø16.5x2xØ27.



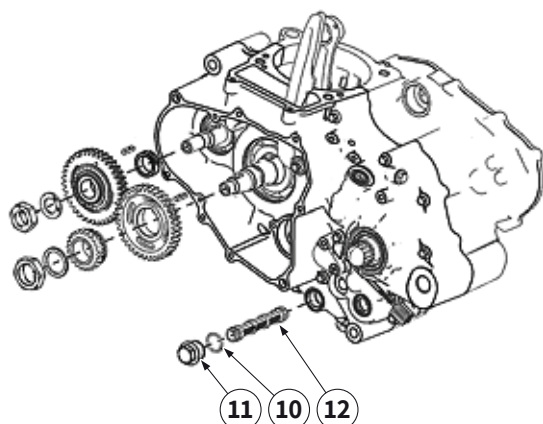
Apply the recommended product on the first 3 ~ 4 threads of the locking nut “5” M16x1, install the nut, tighten it to the prescribed torque and mark the nut in blue.

 **Align the reference markings of the driven wheel and the driving wheel.**

 **The markings must be facing upwards.**

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Countershaft locking nut: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)**

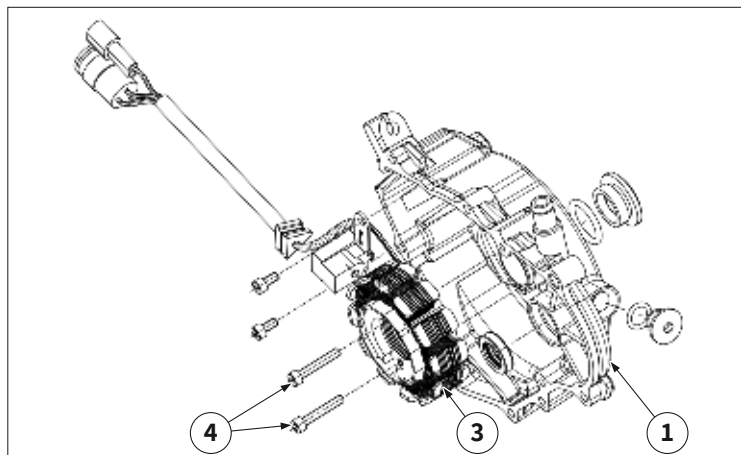


Apply a small amount of engine oil to the oil filter O-ring “12” and insert it into the appropriate hole.

Insert the O-ring “10” inside the filter cap “11”.

Apply an adequate amount of Vaseline to the inside of the filter cap, install the cap and tighten to the prescribed torque.

 **Tightening torques:**  
**Primary oil filter cap: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



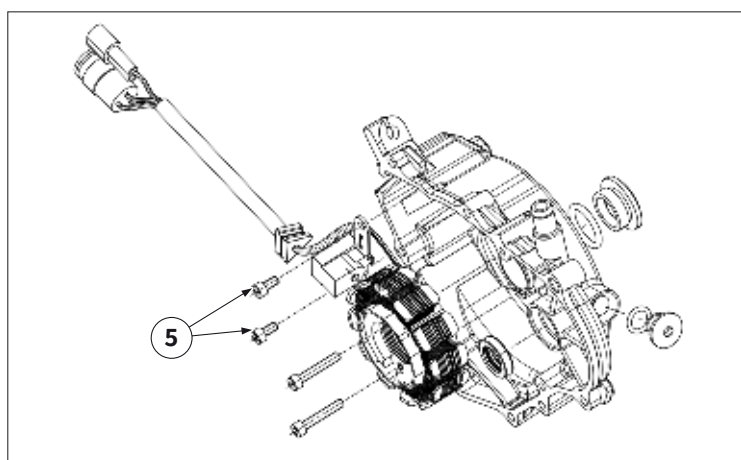
### 13.7.2 Left cover components assembling

Check that there are no aluminium residues or dents on the sealing surface of the cover "1".

Position the stator "3", apply the recommended product on the first 3 ~ 5 threads of the two bolts "4" M5x30 and insert them in the respective holes, tightening to the prescribed torque.


 **Recommended product: Loctite® 263.**

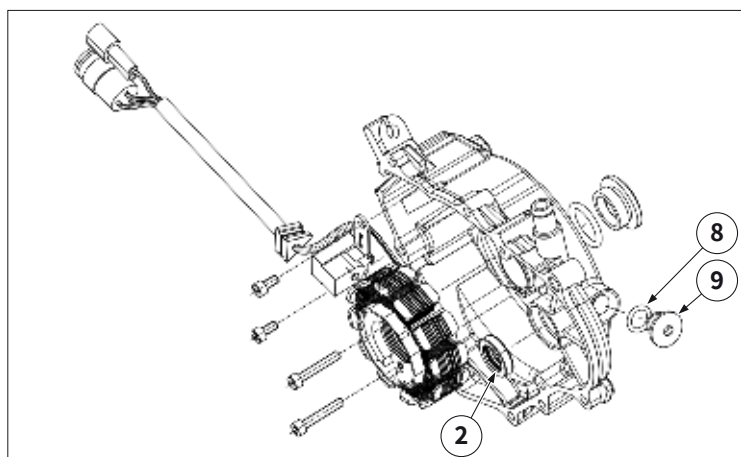
 **Tightening torques:**  
**Rotor fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)**



Apply the recommended product on the first 3 ~ 5 threads of the two bolts "5" M5x10 and insert them in the respective holes, tightening to the prescribed torque.

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Stator fastening bolts: 7 ~ 9 Nm (0.7 ~ 0.9 m·kgf, 5.2 ~ 6.6 ft·lbf)**

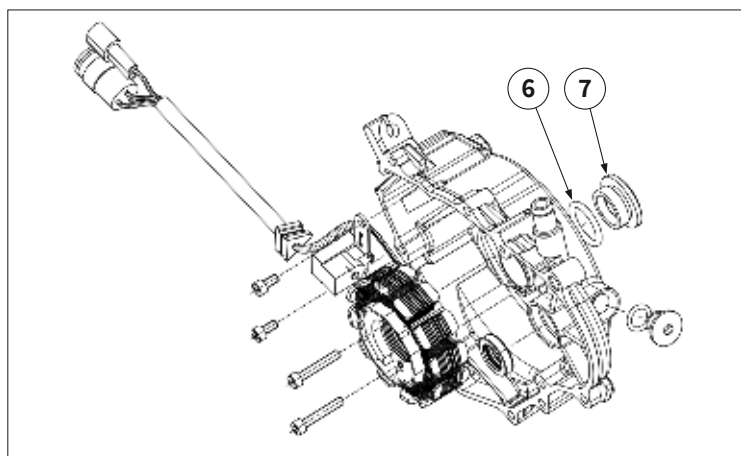


Apply a small amount of oil in the hole of the oil seal "2", then fit the oil seal using a specific tool.

 **The oil seal must be flush with the hole.**


Fit the O-ring "8" on the cap "9" and screw the cap into the respective hole, tightening it to the prescribed torque.

 **Tightening torques:**  
**Small generator inspection cap: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)**

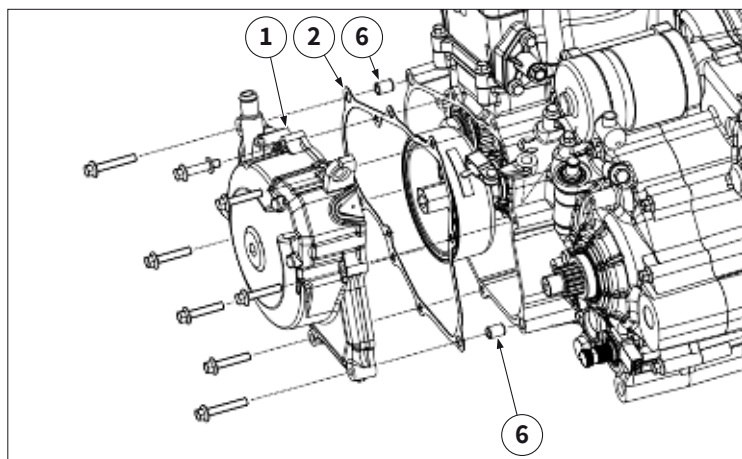


Fit the O-ring "6" on the large inspection cap "7" and screw the cap into the respective hole, tightening it to the prescribed torque.

 **Tightening torques:**  
**Large generator inspection cap: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)**

 **To check the correct assembling of the flywheel-stator assembly it is necessary to connect the stator connector to the flywheel inspection device and make sure that there is no short circuit to ground.**





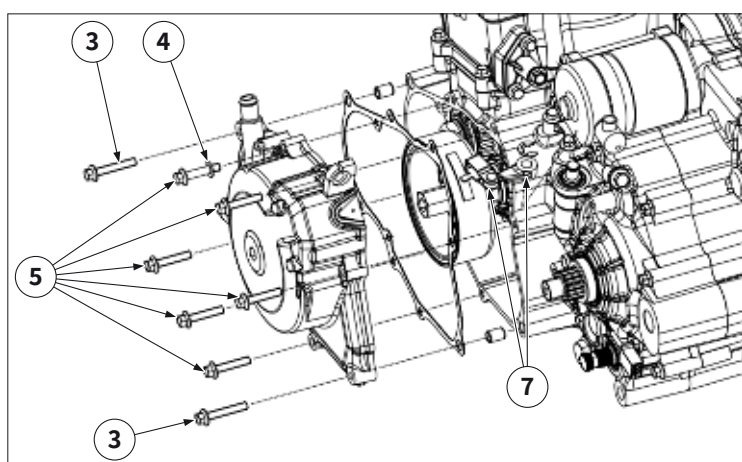
### 13.7.3 Left cover installation

Fit the two pins "6" Ø9x13 in the respective holes of the left half-crankcase half and position the gasket "2" of the left cover centering the pin holes.

Apply a suitable amount of the recommended product on the sealing surface of the flywheel, then position the cover "1" making sure that the flywheel fits into its seat on the cover.

**Recommended product: SANVO.**

**The recommended product must not exceed in way to compromise the aesthetic appearance.**

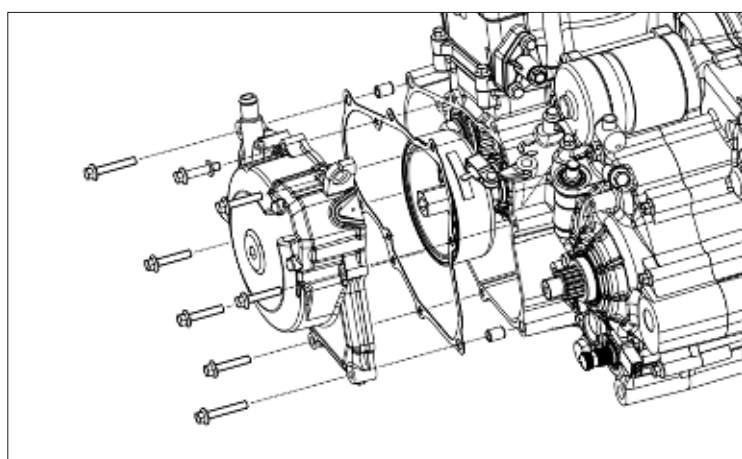


Insert the two bolts "3" M6x35 in the respective holes in the cover.

Apply a suitable amount of recommended product on the thread of one of the six bolts "5" M6x30, then insert the bolt with the washer "4" Ø6.5x1.5xØ12 in the respective hole on the cover. Insert the other five bolts "5" M6x30 and tighten all of them to the prescribed torque.

**Tightening torques:**  
**Left cover bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

Install the arm "7" of the clutch release lever on the lever itself and lock it inserting the collar into the groove



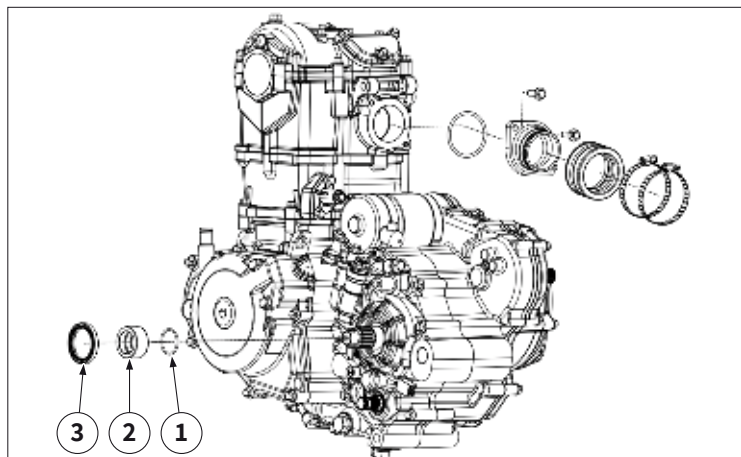
Check the clutch stroke using the specific tool.

**Clutch stroke: 45 ± 5 mm**

**To check the force value of the clutch release shaft, the engine must be positioned with the left cover facing upwards. Connect the clutch cable to the external clutch release lever, fasten it through the appropriate hole on the left cover, eliminate the idle stroke, pull the cable until reaching a lever rotation equal to 25° and measure the force value.**

**Lide clutch: 310 ± 30 N**

**FCC Clutch: 260 ± 30 N**

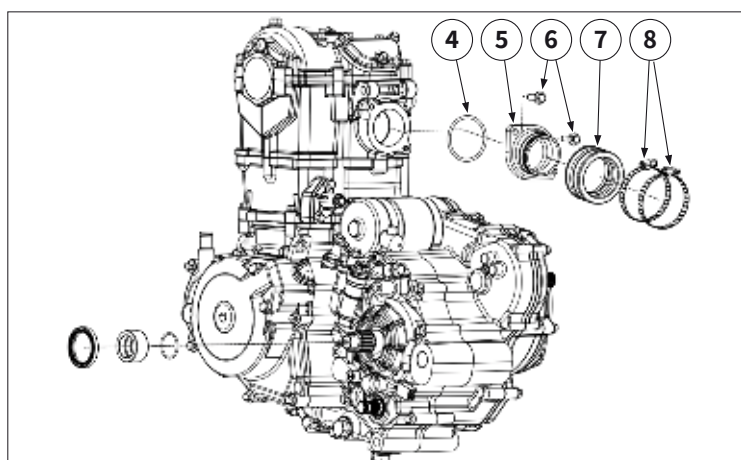


### 13.7.4 Output shaft bushing and suction pipe installation

Insert the O-ring "1"  $\varnothing 25 \times 2$  into the groove of the output shaft and apply an adequate amount of oil.

Insert the bushing "2" of the output shaft and fit it fully down.

Apply an adequate amount of oil in the hole of the output shaft oil seal, then install the oil seal "3"  $\varnothing 35 \times \varnothing 45 \times 6$  on the output shaft using a specific tool.

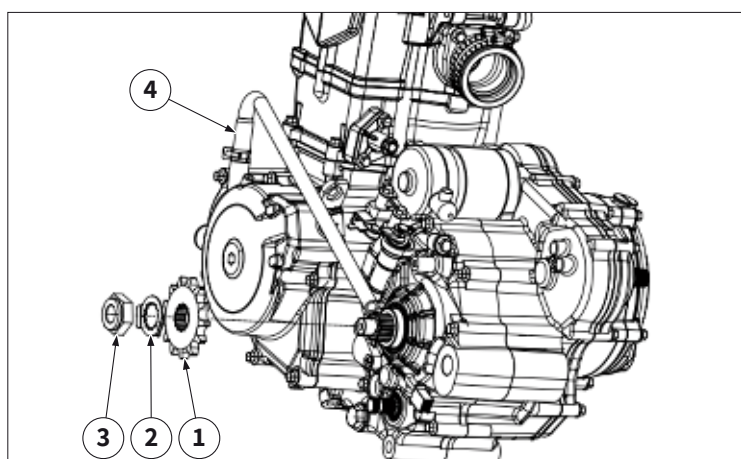


Position the O-ring "4"  $\varnothing 45 \times 3$  of the intake pipe in the related groove, then install the pipe "5" and fasten it with the two bolts "6" M6x20, tightening to the prescribed torque.

 **Tightening torques:**  
**Intake flange bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

Fit one end of the sleeve "7" on the intake pipe, position the two clamps "8" and tighten the respective screws to the prescribed torque.

 **Tightening torques:**  
**Air intake sleeve clamps: 5 ~ 7 Nm (0.5 ~ 0.7 m·kgf, 3.7 ~ 5.2 ft·lbf)**




### 13.7.5 Installation of the rim and breather pipe

Position the rim "1" in the external groove of the wheel axle.

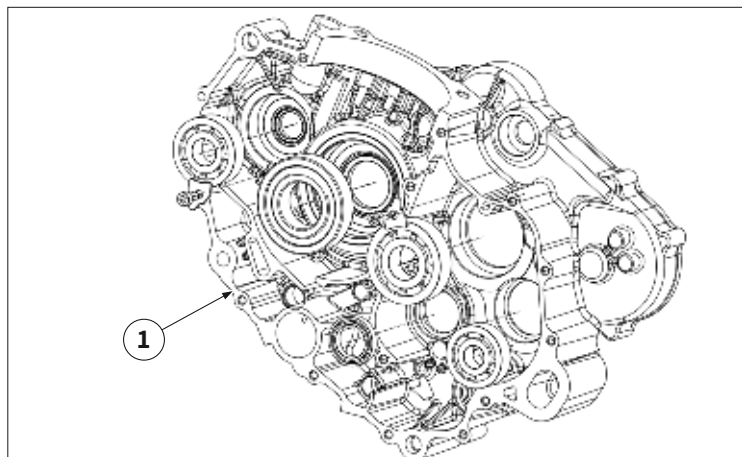
Fit the washer "2" in the internal groove.

Apply the recommended product on the first 3 ~ 4 threads of the locking nut "3" M16x1 that locks the rim, screw it onto the wheel axle and tighten to the prescribed torque.

 **Recommended product: Loctite® 263.**

 **Tightening torques:**  
**Rim locking nu: 85 ~ 90 Nm (8.5 ~ 9.0 m·kgf, 62.7 ~ 66.4 ft·lbf)**

Place the vent tube "4" in the related hole and close the fastening clip.

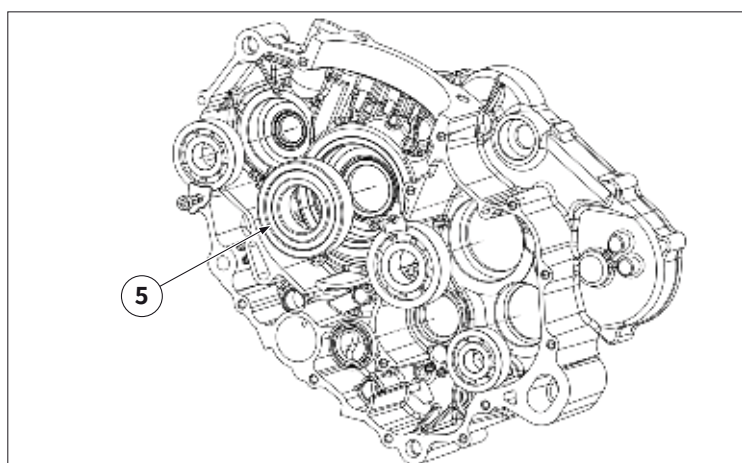


## 13.8 CRANKCASE, CRANKSHAFT, TRANSMISSION AND COMPENSATING SHAFT

### 13.8.1 Right half-crankcase components assembling

Check the cleanliness and integrity of the mating surface of the half-crankcase "1", check that there are no aluminium residues, colour variations or scratches.

Position the half-crankcase "1" with the mating surface facing upwards and apply a small amount of oil in the bearing housings.

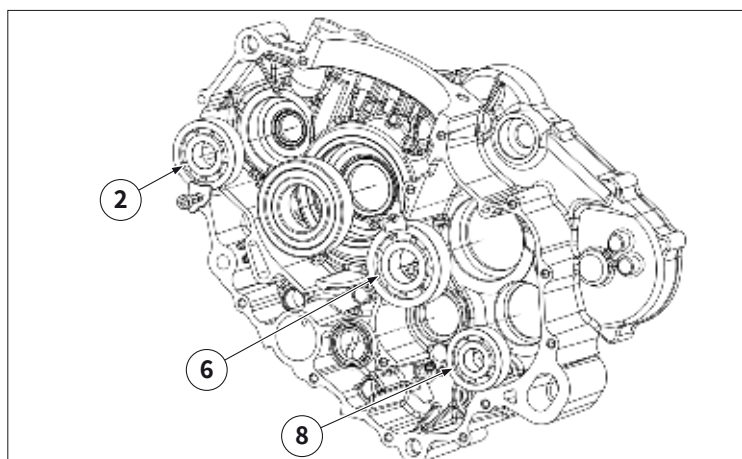


Insert the outer ring of the bearing "5" of the crankshaft\* and fit fully down using a specific tool.

Insert the inner ring and fit it fully down.

 **Bearing protrusion: 37.55 ~ 37.75 mm**

 **The inner ring and the outer ring of the bearing must match.**



Insert the bearing "2" of the countershaft (\*) and fit it fully down using a specific tool.

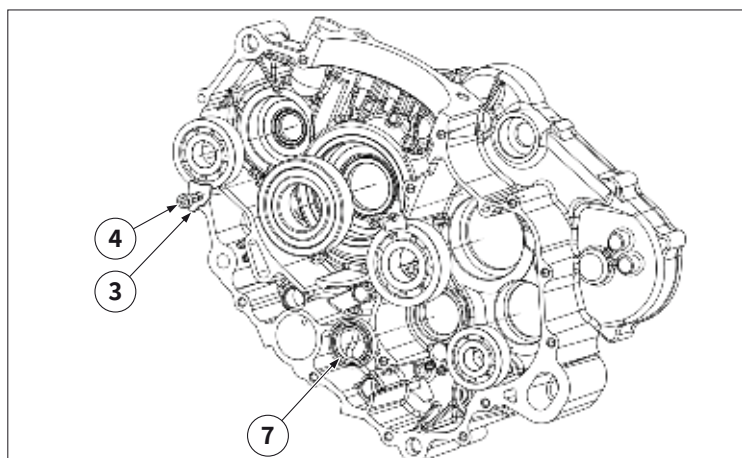
 **Bearing protrusion: 40 ~ 40.2 mm**

Insert the bearing "6" of the primary shaft (\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 53.5 ~ 53.7 mm**

Insert the bearing "8" of the auxiliary shaft (\*\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 54.6 ~ 54.8 mm**




Insert the bearing "7" of the gearshift drum (\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 45.5 ~ 45.7 mm**

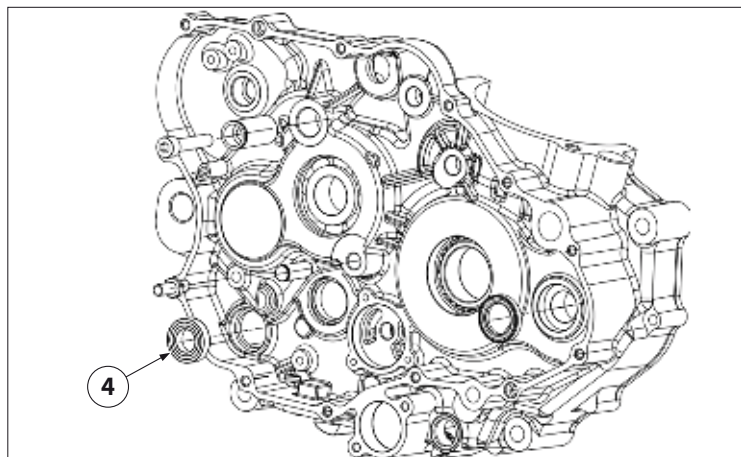
Fit the two deflectors "3" in their respective seats near the bearings of the primary shaft and of the countershaft.

Insert the two screws "4" M6x12 in the two deflectors.

Tighten to the specified torque and mark the head of the screws.

 **Tightening torques:**  
**Deflector fastening screws: 9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)**



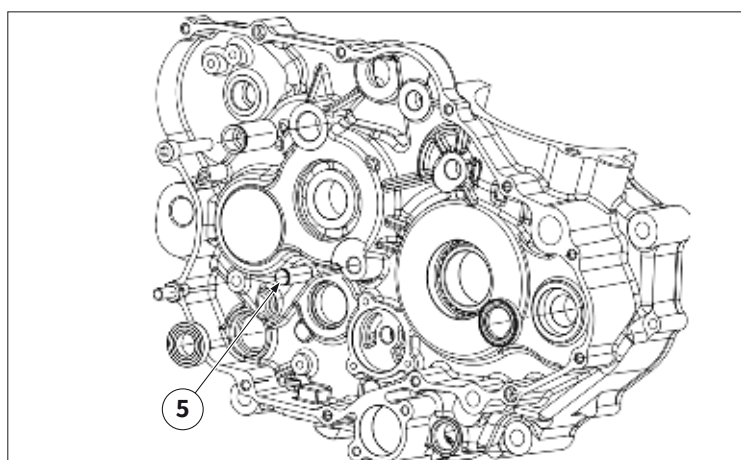


Turn the half-crankcase 180°, so as to have the mating surface facing downwards.

Apply a small amount of oil in the bearing housing and oil seal housing.

Insert the bearing “4” of the secondary shaft and fit it fully down using a specific tool.

 **Bearing protrusion: 23.5 ~ 23.7 mm**



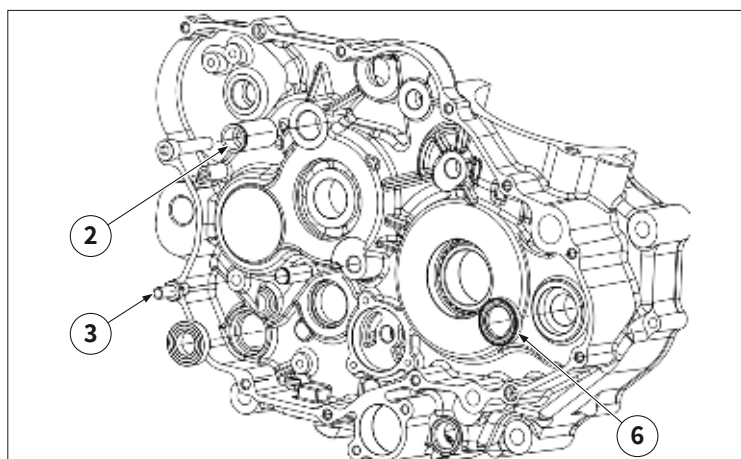
Apply a small amount of the recommended product on the oil pump shaft “5”.

Place the shaft in the hole and fit it fully down.

 **Clean up spills of recommended product.**

 **Recommended product: Loctite® 648.**

 **Bearing protrusion: 11.2 ~ 11.5 mm**



Place the starter shaft “2” in the dedicated hole and fit it fully down.

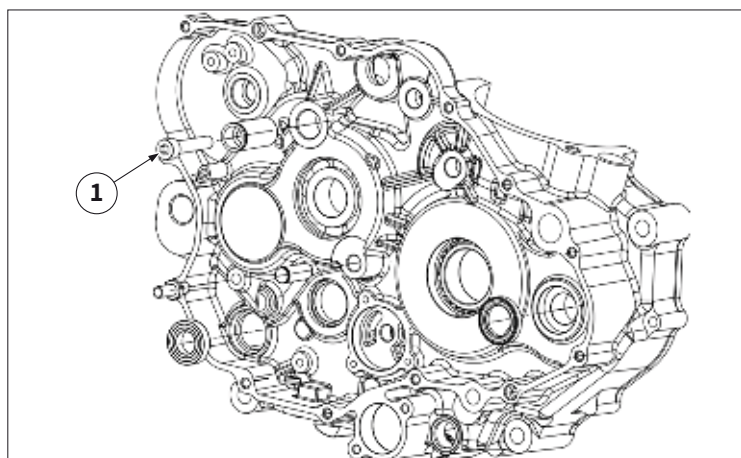
 **Bearing protrusion: 15.4 ~ 15.7 mm**

Place the fluorine rubber oil seal “6” in the hole of the countershaft and fit it fully down using a specific tool.

 **The oil seal must be flush with the hole.**

Insert the bolt “3” of the secondary shaft into the respective threaded hole and tighten to the prescribed torque.

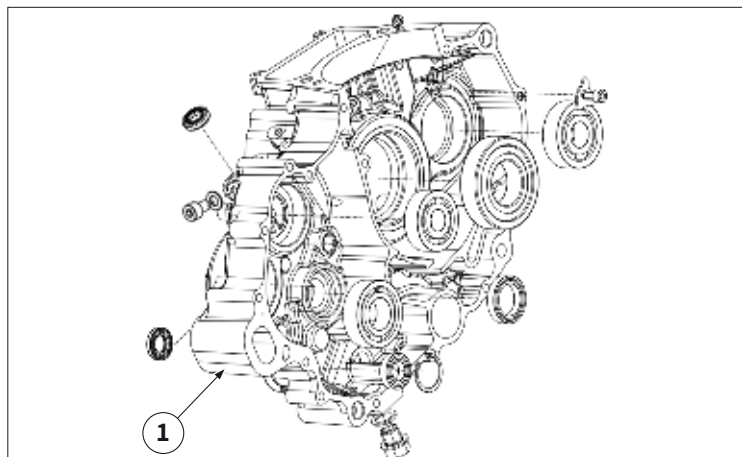
 **Tightening torques:**  
**Secondary shaft bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Insert the bolt “1” M8x40 into the threaded hole of the starter shaft and tighten to the prescribed torque.

 **Tightening torques:**  
**Starter shaft bolt: 18 ~ 20 Nm (1.8 ~ 2.0 m·kgf, 13.3 ~ 14.8 ft·lbf)**

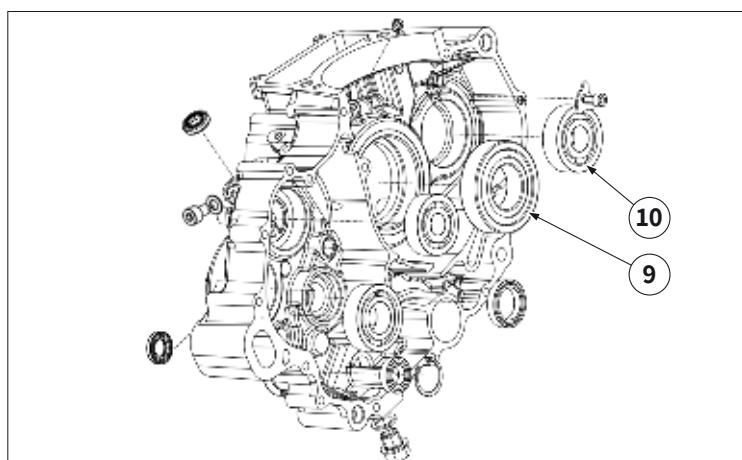
 **(\*)**: with the identification mark facing upwards  
**(\*\*)**: with the identification mark facing downwards



### 13.8.2 Left half-crankcase components assembling

Check the cleanliness and integrity of the mating surface of the half-crankcase "1", check that there are no aluminium residues, colour variations or scratches.

Position the half-crankcase with the mating surface facing upwards and apply a small amount of oil in the bearing housings.



Insert the outer ring of the bearing "9" of the crankshaft\* and fit fully down using a specific tool.

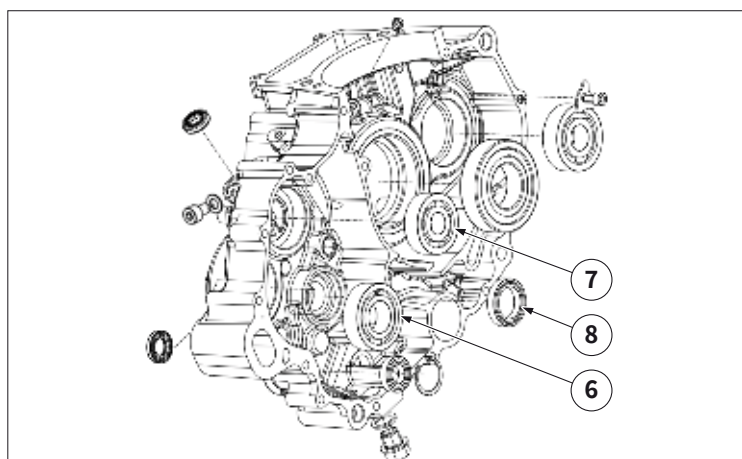
Insert the inner ring and fit it fully down.

 **Bearing protrusion: 37.55 ~ 37.75 mm**

 **The inner ring and the outer ring of the bearing must match.**

Insert the bearing "10" of the countershaft (\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 40 ~ 40.2 mm**



Insert the bearing "7" of the primary shaft (\*) and fit it fully down using a specific tool.

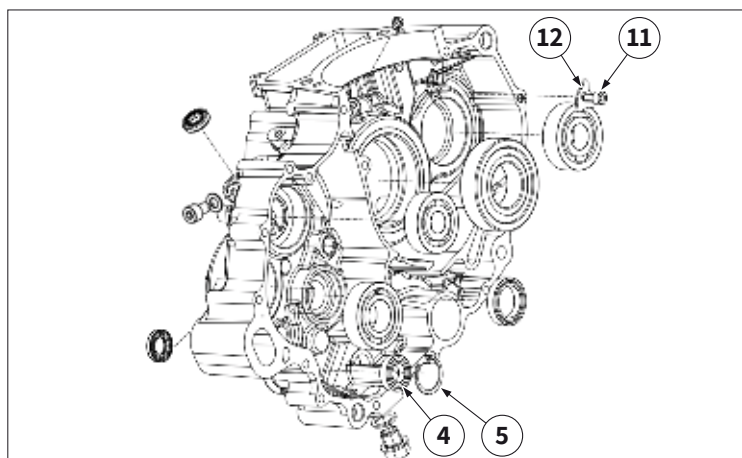
 **Bearing protrusion: 51.6 ~ 51.8 mm**

Insert the bearing "6" of the auxiliary shaft (\*\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 55.5 ~ 55.7 mm**

Insert the bearing "8" of the gearshift drum (\*) and fit it fully down using a specific tool.

 **Bearing protrusion: 42.5 ~ 42.7 mm**



Insert the bearing "4" of the secondary shaft and fit it fully down using a specific tool.

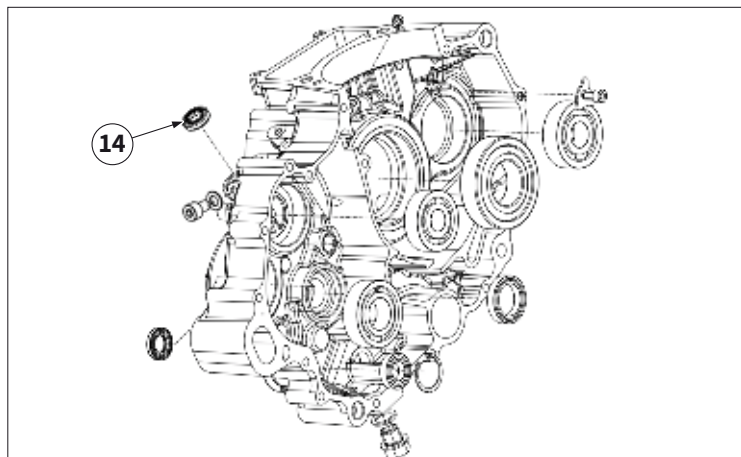
 **Bearing protrusion: 46.5 ~ 46.7 mm**

Install the deflector "12" in the respective seat near the countershaft bearing.

Insert the bolt "11" M6x12 in the deflector and tighten to the prescribed torque.

 **Tightening torques:**  
**Deflector fastening screw: 9 ~ 11 Nm (0.9 ~ 1.1 m·kgf, 6.6 ~ 8.1 ft·lbf)**

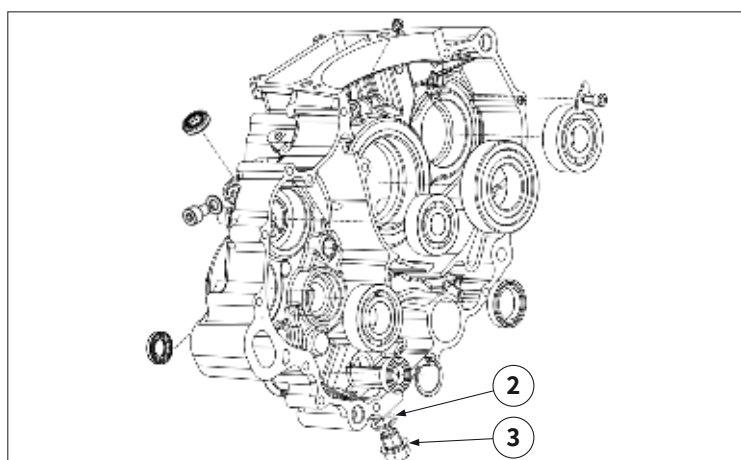
Insert the retaining ring "5" in the respective groove of the secondary shaft hole.



Position the oil seal “14” Ø14xØ22x5 in the hole of the clutch release lever and fit fully down using a specific tool.

Take the clutch release lever and insert the larger end into the respective hole with the oil seal.

**⚠ The oil seal must be flush with the hole.**



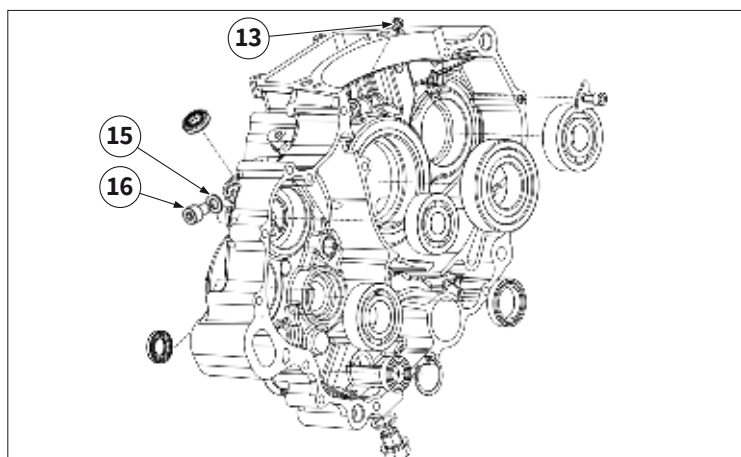
Place the gasket “2” Ø16.5x2xØ23 on the drain bolt “3” M16x1.5.

Apply the recommended product on the first 3 ~ 4 threads of the bolt, insert it in its seat and tighten it to the prescribed torque.

**♻ Recommended product: SANVO.**

**🔧 Tightening torques:**  
Oil drain bolt: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)

**⚠ The quantity of product applied must be suitable so that it leaks out after tightening.**



Insert the engine oil nozzle “13” into the respective hole and tighten to the prescribed torque.

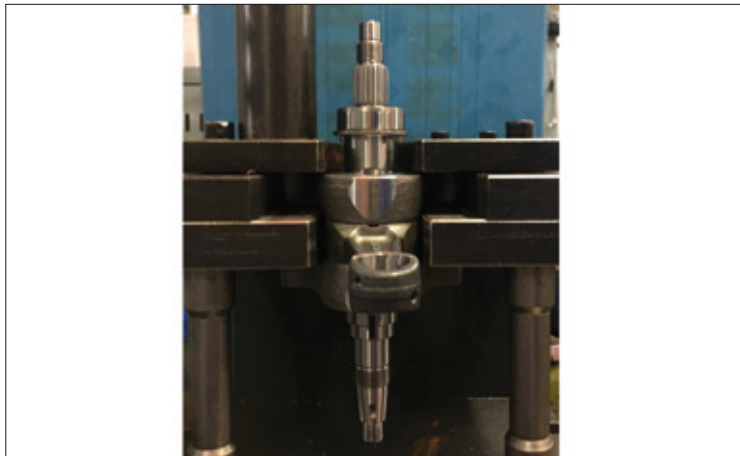
**🔧 Tightening torques:**  
Engine oil nozzle: 2 ~ 4 Nm (0.2 ~ 0.4 m·kgf, 1.5 ~ 3.0 ft·lbf)

Insert the bolt “16” M8x12 with the gasket “15” Ø8.5x1.2xØ15 in the respective hole and tighten to the prescribed torque.

**🔧 Tightening torques:**  
Inspection bolt on left crankcase: 24 ~ 27 Nm (2.4 ~ 2.7 m·kgf, 17.7 ~ 19.9 ft·lbf)

**ⓘ (\*)**: with the identification mark facing upwards  
**(\*\*)**: with the identification mark facing downwards.





### 13.8.3 Crankshaft bearing inner ring assembling

Position the inner ring of the crankshaft bearing on the right arm of the crankshaft and fit it fully down.

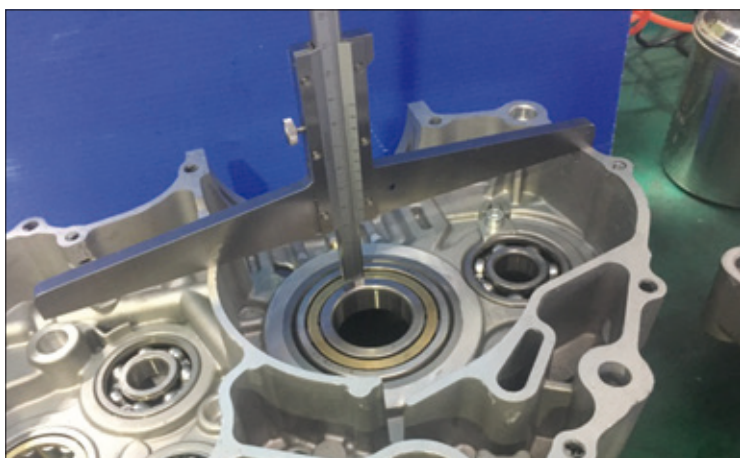
Apply a small amount of engine oil to the inner ring of the bearing.



Install the crankshaft on the right half-crankcase to check that the shaft assembly is correct.



Measure the distance between the mating surface of the right half-crankcase and the end of the left crankshaft arm with a gauge for height and note down the measurement (indicated by the letter "A").



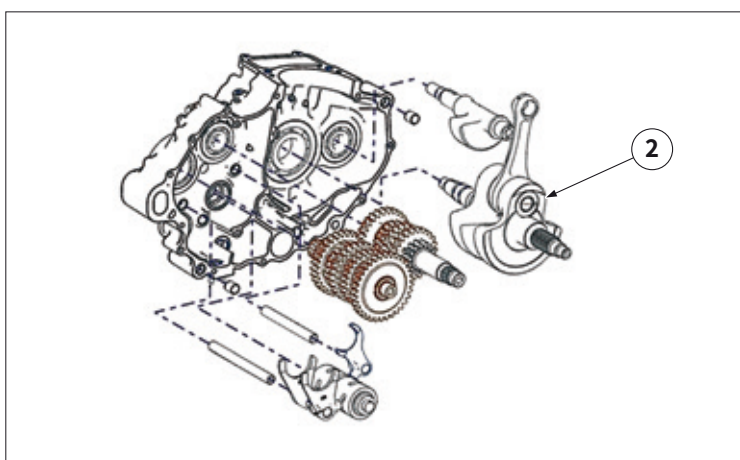
Measure the distance between the inner ring of the crankshaft bearing of the left half-crankcase and the mating surface of the left half-crankcase with a depth gauge and note down the measurement (indicated by the letter "B").



Based on the measured values “A” and “B”, obtain the crankshaft clearance from “13.8.7 Crankshaft clearance values reference table” on page <OV>.

If the clearance is less than 0.35 mm, take the inner ring of the left half-crankcase and insert it on the left arm of the crankshaft, fitting it fully down.

If the clearance is greater than 0.35 mm, fit a clearance adjustment gasket Ø35x0.2xØ50 on the left arm of the crankshaft, then take the inner ring of the left half-crankcase and insert it on the left arm of the crankshaft, fitting it fully down using a tool specific.

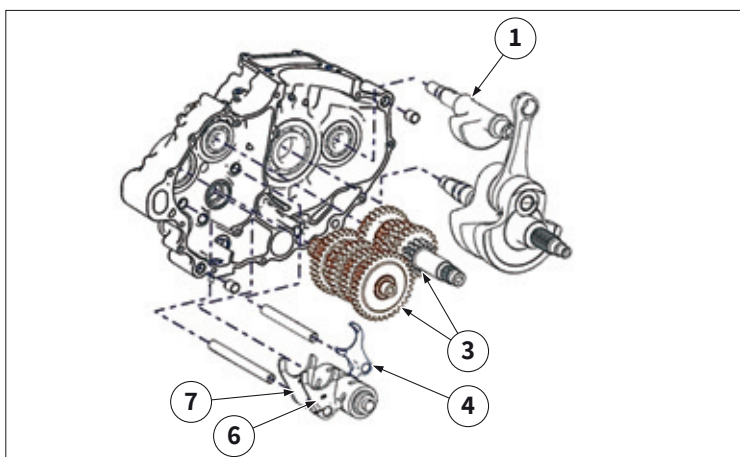


### 13.8.4 Primary shaft, auxiliary shaft and crankshaft installation

Check the cleanliness of the mating surface of the left half-crankcase, if necessary clean it with alcohol for industrial use.

Position the crankshaft “2” in the respective hole of the left half-crankcase and fit it fully down.

Inject engine oil into the hole in the right arm, blow compressed air into the hole until the oil starts to come out of the larger end of the crankshaft.



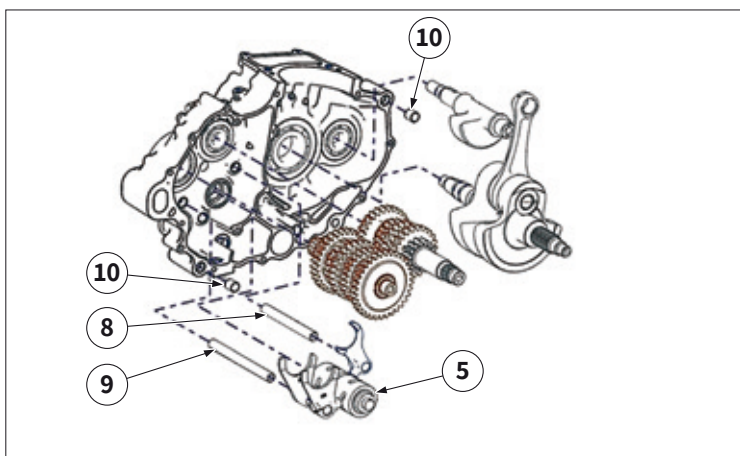
Insert the countershaft “1” in the respective hole with the left half-crankcase bearing.

Insert the primary and auxiliary shafts assembly “3” in the respective holes with bearings of the left half-crankcase.

Insert the fork of the right gearshift “6” of the auxiliary shaft into the related groove.

Insert the fork of the left gearshift “7” of the auxiliary shaft into the related groove.

Insert the fork of the gearbox “4” of the primary shaft into the related groove.



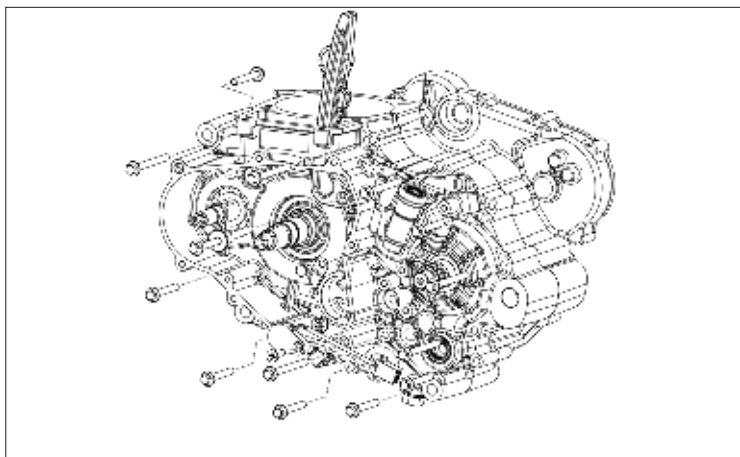
Insert the gearshift drum “5”, with the cylindrical pin facing upwards, in the respective hole of the left half-crankcase.

Insert the gearshift forks in the respective grooves of the drum.

Insert the shafts of the gearshift forks “8” and “9” in the respective holes of the left half-crankcase, passing them through the forks.

Insert the two pins “10” Ø13x14 in the respective holes of the left half-crankcase.

Rotate the primary and auxiliary shafts and verify their correct rotation, which must be free and without jamming.

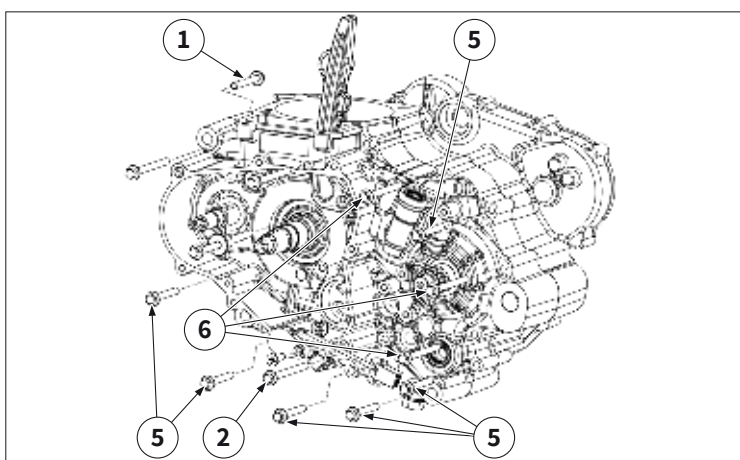


### 13.8.5 Half-crankcase coupling and gear sensor installation

Check the cleanliness of the mating surface of the right half-crankcase, if necessary clean it with alcohol for industrial use. Position the right half-crankcase with the mating surface facing upwards and align the centering pins, then apply the recommended product on the mating surface.

 **Recommended product: Tonsan 1569.**

 **The sealant must be applied evenly, without interruption.**




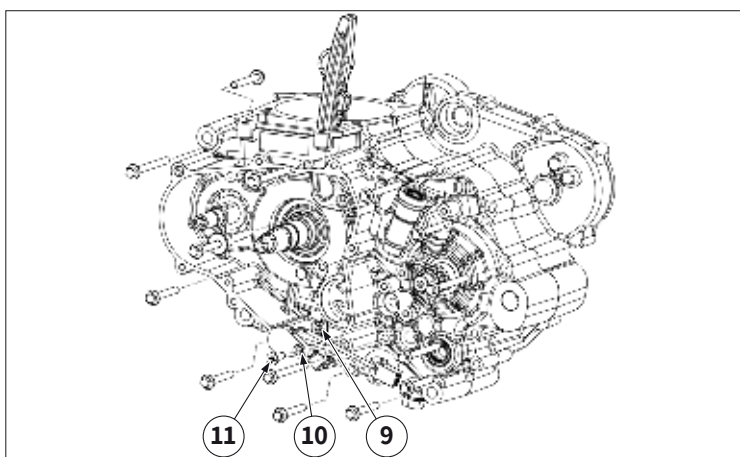
Couple the left half-crankcase half on the right half-crankcase.

Apply the recommended product on the first 3 ~ 4 threads of the six bolts "5" M6x45, the three bolts "6" M6x65, the three bolts "2" M6x70 and the bolt "1" M6x40.

Insert the bolts in the respective holes and tighten to the prescribed torque.


 **Recommended product: Loctite® 263.**

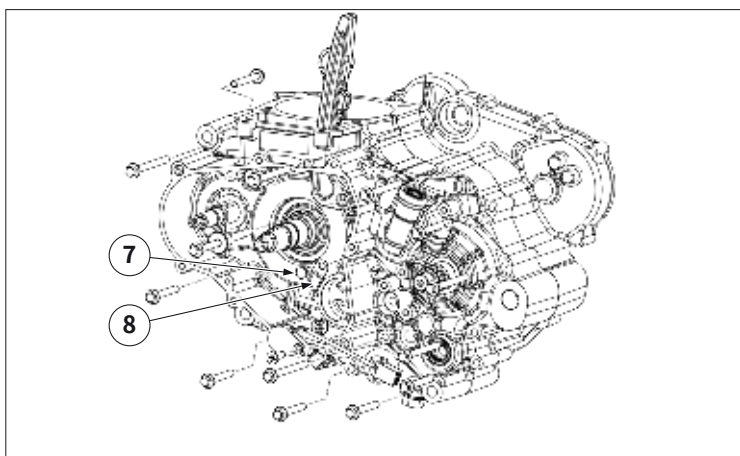
 **Tightening torques:**  
**Half-crankcase coupling bolts: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Position the contact "9" of the gear sensor in the respective groove of the gearshift drum.

Apply a small amount of vaseline in the gear sensor installation hole, then install the sensor "10" in its respective seat on the right half-crankcase and secure it with the bolt "11" M6x20, tightening it to the prescribed torque.

 **Tightening torques:**  
**Gear sensor fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**

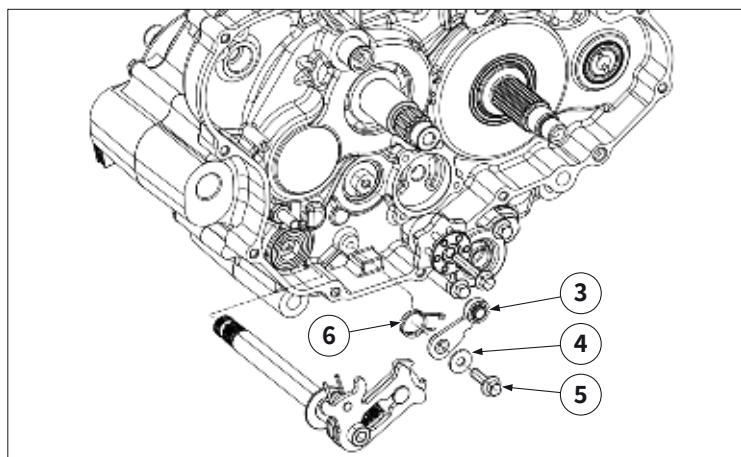


Position the sensor wiring under the fastening plate "8".

Fasten the plate on the right half-crankcase with the bolt "7" M6x12, tightening it to the prescribed torque.

 **Tightening torques:**  
**Bolt for fastening the plate on right half-crankcase: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**





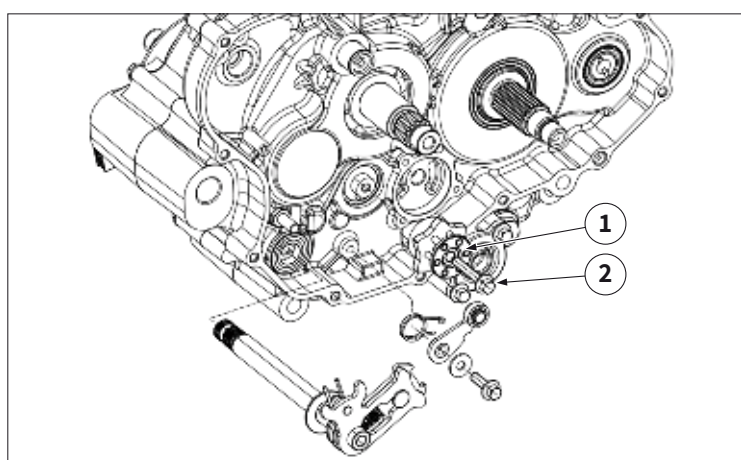
### 13.8.6 Install the gearshift drum

Insert the spring "6" on the plate "3" in the appropriate seat, install the plate with the washer "4" Ø6.5x1.5xØ18 and the bolt "5" M6x20, tightening to the prescribed torque.



#### Tightening torques:

**Gearshift drum fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Install the plate "1" on the gearshift drum.

Apply the recommended product on the first 3 ~ 4 threads of the bolt "2" M6x35, insert it into the hole in the plate and tighten to the prescribed torque.



**Recommended product: Loctite® 263.**

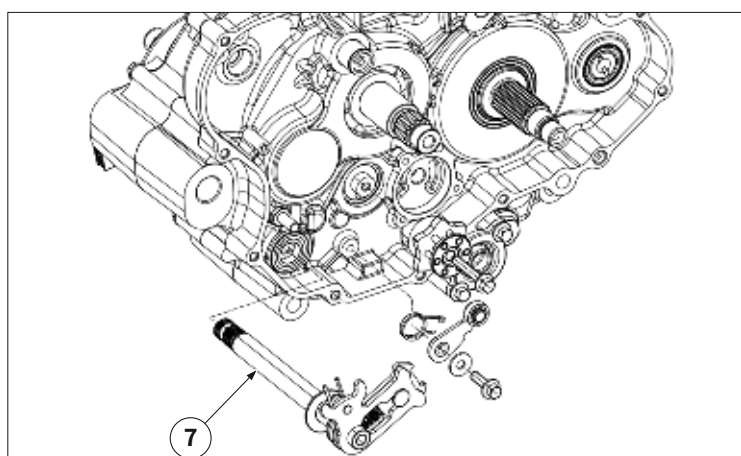


**Align the holes in the plate with those in the gearshift drum.**



#### Tightening torques:

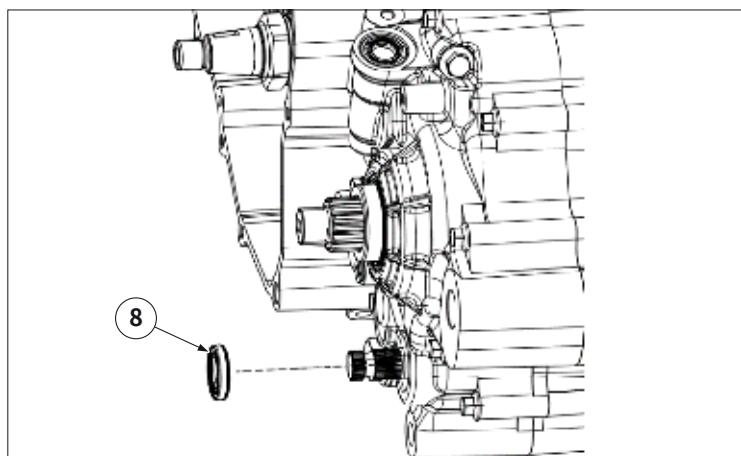
**Gearshift drum plate fastening bolt: 11 ~ 13 Nm (1.1 ~ 1.3 m·kgf, 8.1 ~ 9.6 ft·lbf)**



Install the drive shaft "7" in the respective seat.



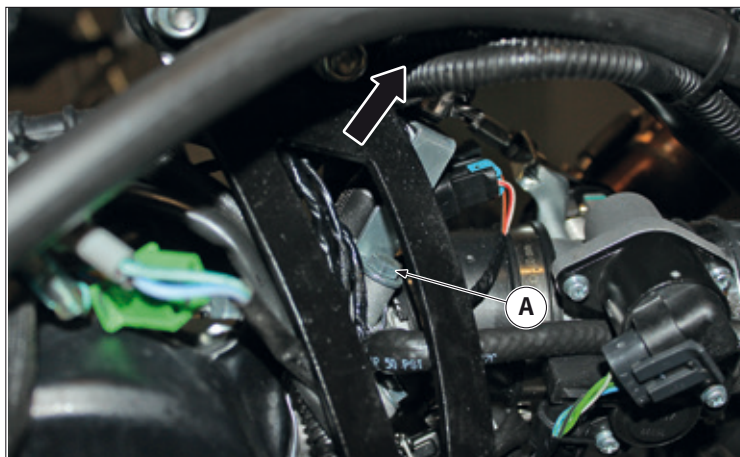
**The return spring of the drive shaft must be hooked to the related bolt of the right half-crankcase.**



Install the oil seal "8" in fluorine rubber Ø15xØ25x5 in the respective hole of the left half-crankcase.

**13.8.7 Crankshaft clearance values reference table**

CRANKSHAFT CLEARANCE																						
		Distance between the inner ring of the crankshaft bearing of the left half-crankcase and the mating surface of the left half-crankcase (B)																				
		37.55	37.56	37.57	37.58	37.59	37.6	37.61	37.62	37.63	37.64	37.65	37.66	37.67	37.68	37.69	37.7	37.71	37.72	37.73	37.74	37.75
Distance between the mating surface of the right half-crankcase and the end of the left arm of the crankshaft (A)	37.5	0.05	0.06	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25
	37.49	0.06	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26
	37.48	0.07	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27
	37.47	0.08	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28
	37.46	0.09	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29
	37.45	0.1	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3
	37.44	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31
	37.43	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32
	37.42	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33
	37.41	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34
	37.4	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35
	37.39	0.16	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36
	37.38	0.17	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37
	37.37	0.18	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38
	37.36	0.19	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39
	37.35	0.2	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4
	37.34	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41
	37.33	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42
	37.32	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43
	37.31	0.24	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44
	37.3	0.25	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45
	37.29	0.26	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46
	37.28	0.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47
	37.27	0.28	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48
	37.26	0.29	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49
	37.25	0.3	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5
37.24	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	
37.23	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	
37.22	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	0.53	
37.21	0.34	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	0.53	0.54	
37.2	0.35	0.36	0.37	0.38	0.39	0.4	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.5	0.51	0.52	0.53	0.54	0.55	

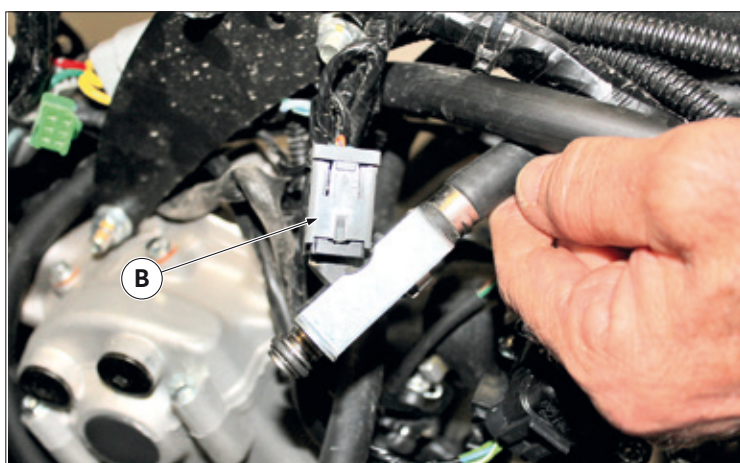


## 13.9 ELECTRONIC INJECTION REMOVAL

### 13.9.1 Injector removal

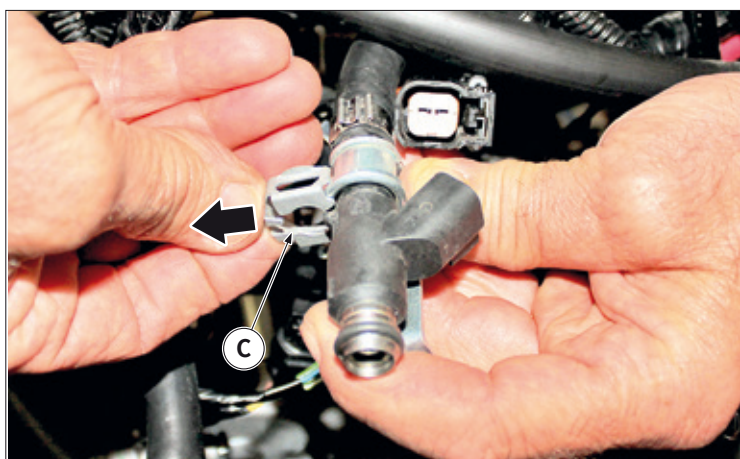
Remove:

- Tank, refer to “12.8 Fuel tank removal” on page 127.
- Remove the fastening screw “A” and disconnect the fuel injector from the flange on the engine.

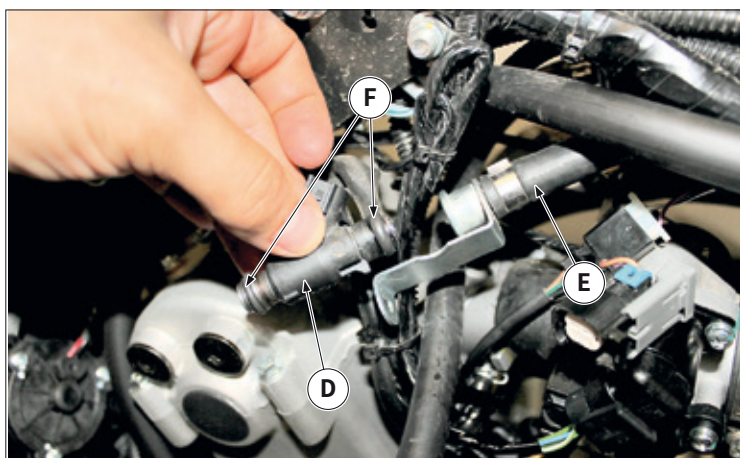


Disconnect the fuel injector connector “B”.

**⚠ There may be fuel residues inside the injector and its hose.**



Release the retaining clip “C” from the injector.

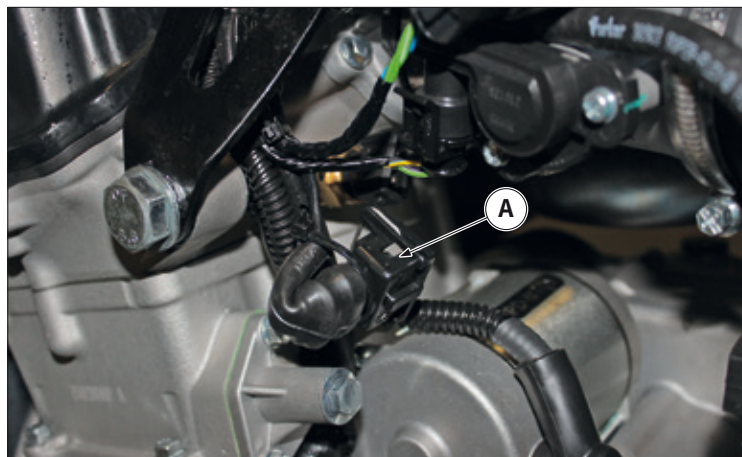


Remove the fuel injector “D” from the fuel pipe “E”.

**i Proceed in the reverse order for reassembling.**

**⚠ Replace the O-rings . “F ”every time the fuel injector is disassembled.**



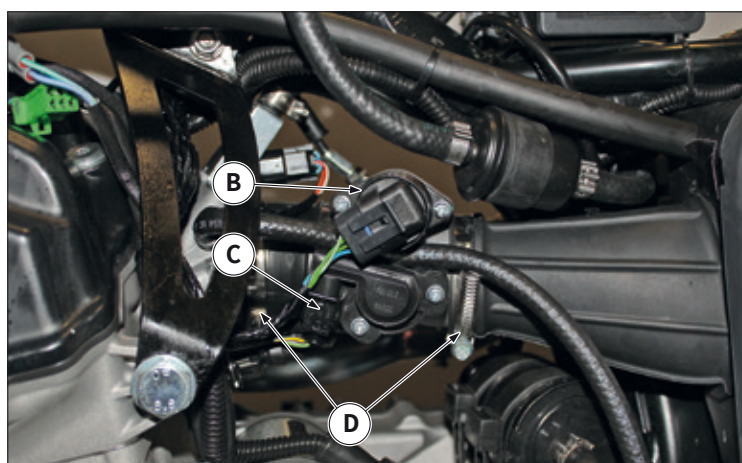


### 13.9.2 Throttle body removal

Remove:

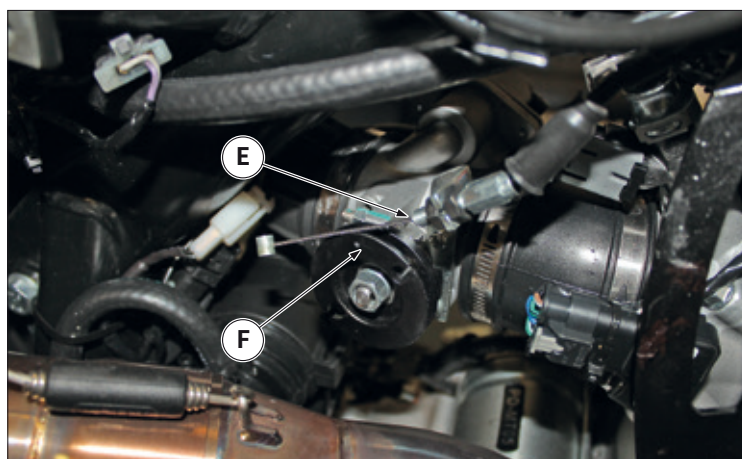
- Tank, refer to “12.8 Fuel tank removal” on page 127.

Disconnect the connector “A” of the water temperature sensor.

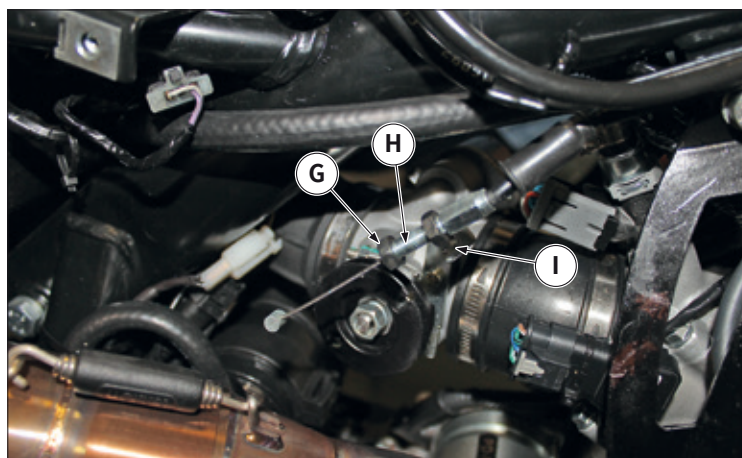


Disconnect the stepper motor connector “B” and the TPS sensor connector “C”.

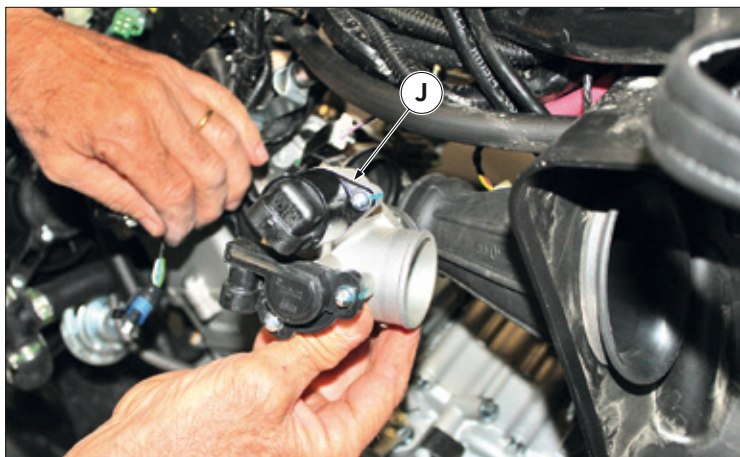
Loosen the metal clamps “D”.



Remove the throttle cable pin “E” from the throttle body coupling “F”.

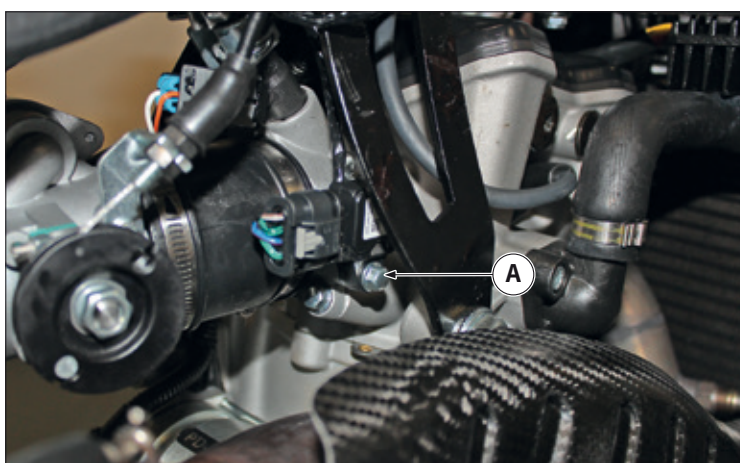


Completely unscrew the fastening nut “G” of the accelerator cable.  
Release the throttle cable “H” from the throttle body bracket “I”.



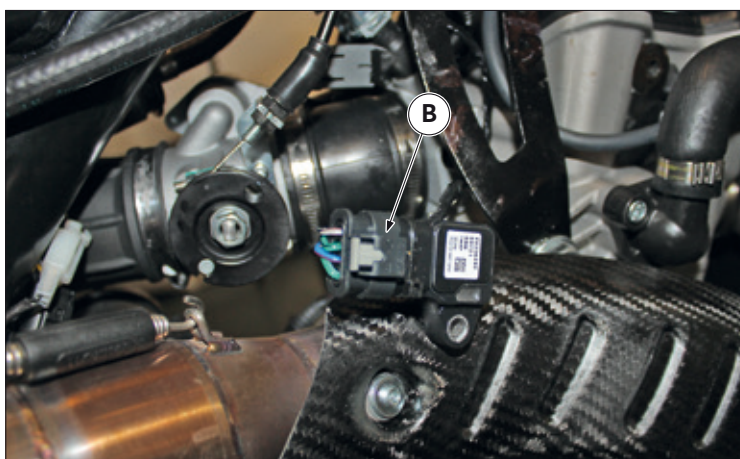
Remove the throttle body “J” from the manifolds.

**i** Proceed in the reverse order for reassembling.



### 13.9.3 MAP sensor removal

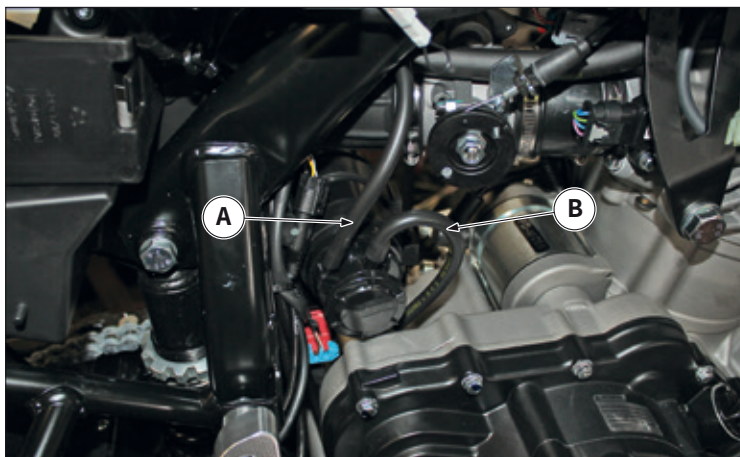
Remove the screw “A” and disconnect the MAP sensor from its seat on the engine.



Disconnect the connector “B” and the retaining bracket “C” from the MAP sensor.

**i** Proceed in the reverse order for reassembling.

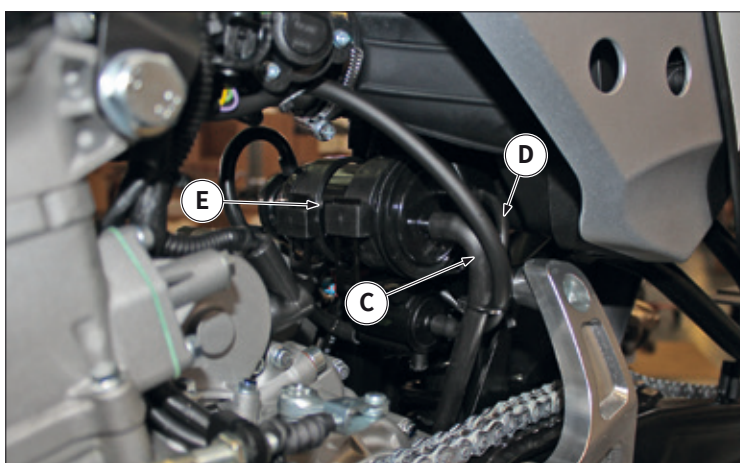




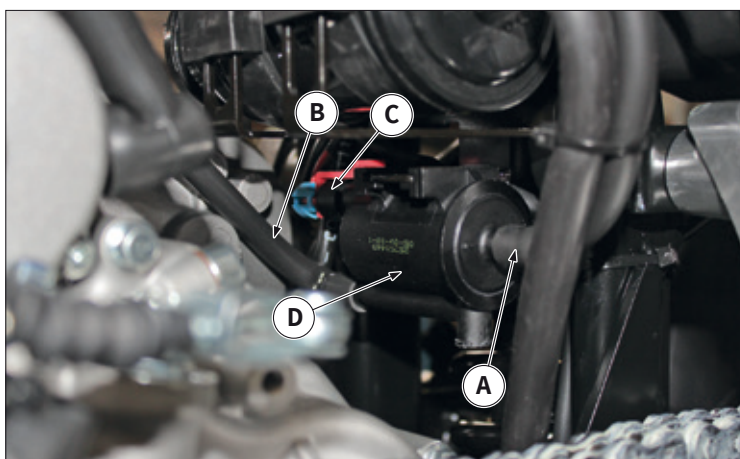
### 13.10 FILTER CANISTER REMOVAL

#### 13.10.1 Filter removal

Remove the tube "A" from the "TANK" coupling.  
 Remove the tube "B" from the "PURGE" coupling.



Remove the tube "C" from the "AIR" coupling.  
 Remove the tube "D" from the "DRAIN" coupling.  
 Lift and remove the canister filter "E".



#### 13.10.2 Solenoid valve removal

Remove the tube "A" from the "CAN" coupling.  
 Remove the tube "B".  
 Disconnect and remove the tube "C" and remove the solenoid valve "D".