

450 SEF RACING

450 SEF FACTORY

500 SEF RACING

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SHERCO

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FOREWORD

This manual is intended for qualified mechanics working in a properly equipped workshop. Performing the different operations requires sound knowledge of mechanics and SHERCO tools specific to 450/500 SEF engines.



TOOLS LIST FOR 450/500 SEF ENGINE

» 450/500 SEF

Tool reference	Description
10338	Top dead center timing screw
5749	Clutch removal tool ADLER
4753	Fret-type ignition unit
1822	Water pump bearing axis tool
1968	Water pump oil seal tool
R455	Engine support
5593	Primary drive locking tool
5774	Piston support
R462	Flywheel puller
10049	Crankshaft ring extractor
R450	Oil seal selector
R472	Applying tool for oil seal selector
5773	Special 450 spark plug wrench
5028	PUSH-IN TOOL Ø48
8561	Synerject injection diagnostic tool
7888	TOP CAP WRENCH 49 MM BLUE
7669	SEAL HAMMER 48 MM
7671	MEASURING CAM 500 ML
7670	INNER TUBE CLAMP 48 MM
R453	Selector shaft bearing assembly tool
R444	Oil seal selector
6267	Shunt for Keyless system

TECHNICAL SPECIFICATIONS

» Engine

Type	Single cylinder 4 stroke liquid cooled	
Displacement	449.4 cc	478.222 cc
Bore / Stroke	95X63.9 mm	98X63.4 mm
Compression ratio	12.30 : 1	11.60 : 1
Unleaded	gasoline with an octane rating of at least 95	
Distribution	4-valve, double overhead camshaft, chain drive	
Intake valve diameter	38mm	
Exhaust valve diameter	30.5	
Intake valve cold clearance	0.15-0.2mm	
Exhaust valve cold clearance	0.2-0.25mm	
Crankshaft bearings	2 roller bearings	
Piston	forged aluminum	
Lubrication	Full pressure lubrication with 2 trochoid pumps	
Motor oil	1 liter SAE 5w40 (Motul® 300V 4T OffRoad)	
Primary drive	25 : 68	
Gearbox :	6 speed	
1 st	13 : 32	
2 nd	16 : 29	
3 rd	19 : 27	
4 th	21 : 24	
5 th	23 : 22	
6 th	25 : 21	
Final drive	14 X 50	
Clutch	multi disc clutch in oil bath, hydraulically operated	
Start-up/battery	Electric 12V 4Ah / BATTERY LITHIUM BSLI-02 12.8V 2Ah	
Electronic injection	Synerject	

TECHNICAL SPECIFICATIONS

» Chassis

Frame	Semi-perimeter Cr Mo steel with aluminum subframe
Fork	KAYABA USD closed cartridge Ø 48mm (Factory) KAYABA USD open cartridge Ø 48mm (Rracing)
Rear suspension	KAYABA suspension with separate cylinder
Travel front/rear	330/330 mm
Front brake	Disc Ø 260mm (Factory/Racing)
Rear brake	Disc Ø 220mm (Factory/Racing)
Disc brakes	Wear limit : 2.7mm front and 3.6mm rear
Front tire	90/90-21"
Rear tire	140/80-18"
Pressure off-road front/rear	0.9 bar
Fuel tank capacity	9.7l with 1 liter of reserve
Steering angle	27.3°
Wheelbase	1490mm

FACTORY SETTINGS

» Fork

Original settings – Fork KAYABA USD Ø48 mm (FACTORY)

Compression	Comfort	20 clicks back
	Standard	12 clicks back
	Sport	8 clicks back
Rebound	Comfort	18 clicks back
	Standard	12 clicks back
	Sport	10 clicks back
Spring stiffness	Rider weight : 65-75 kg	4.2N/mm
	Rider weight : 75-85 kg	4.4N/mm (original)
	Rider weight : 85-95 kg	4.6N/mm
Type of oil/ Quantity of oil	01M	345cc

Original settings – Fork KAYABA USD Ø48 mm (RACING)

Compression	Comfort	18 clicks back
	Standard	14 clicks back
	Sport	12 clicks back
Rebound	Comfort	15 clicks back
	Standard	12 clicks back
	Sport	10 clicks back
Spring	Rider weight : 65-75 kg	4.2N/mm
	Rider weight : 75-85 kg	4.2N/m
	Rider weight : 85-95	4.6N/m
Fork oil	01M	670 CC

FACTORY SETTINGS

» Shock absorber

Racing Settings –KAYABA shock absorber

Low-speed compression	Comfort	20 clicks back
	Standard	14 clicks back
	Sport	12 clicks back
High-speed compression	Comfort	2.5 turns back
	Standard	1.5 turns back
	Sport	1 turn back
Rebound	Comfort	15 clicks back
	Standard	13 clicks back
	Sport	11 clicks back
Spring stiffness	Rider weight : 65-75 kg	48N/mm
	Rider weight : 75-85 kg	50N/mm (original)
	Rider weight : 85-95 kg	57N/mm
Type of oil		K2c

OPERATIONS REQUIRING THE REMOVAL, OR NOT, OF THE ENGINE

	Operation requiring the removal of the engine	Operation not requiring the removal of the engine
Crankshaft (including crankshaft repair kit)	•	
Complete transmission	•	
Crankshaft bearing	•	
Gearbox bearing	•	
Piston	•	
Cylinder	•	
Cylinder head	•	
Distribution		•
Ignition		•
Starter gears		•
Freewheel		•
Complete clutch		•
Water pump		•
Oil pump		•
Gear selector set		•

REMOVING/INSTALLING THE ENGINE

» Removing the engine

WARNING

To remove the engine, remove the swing arm pivot axis, which allows you to remove the whole rear wheel / swing arm set. In order to prevent the bike from tipping over, hold the frame using a jack.

- Empty (see the User Manual)
 - The engine oil
 - The coolant.
- Place the motorcycle on a stool.
- Remove the saddle.
- Disconnect the battery (see usermanual).
- Remove the tank along with its vents (refer to the user manual).
- Disconnect the entire harness connected to the engine (starter case, TPS, water temperature sensor, pencil coil and injector).
- Remove the springs of the exhaust pipe in order to remove it.
- Remove the pencil coil.
- Remove the throttle body.
- Remove the chain guard.
- Remove the secondary transmission line (quick release).
- Remove the clutch receiver.

WARNING

When the clutch receiver is removed, the piston is no longer supported. Hold the piston with a plastic clamp.

- Remove the water radiator hoses connected to the engine.
- Remove the left radiator.
- Remove the cylinder head frame mounting brackets.
- Remove the frame guards on both the right and left sides of the bike.
- Unscrew the swing arm pivot.
- Loosen the other two engine axes.
- Unscrew the swing arm pivot and pull the swing arm slightly backward.
- Remove the engine axes.
- Remove the engine through the left side by pivoting it.

NOTE :

Vous devriez avoir une aide extérieure pour cette étape, le poids étant conséquent. Assurez-vous de ne pas endommager les pattes de fixation moteur sur le cadre.

REMOVING/INSTALLING THE ENGINE

» Installing the engine in the frame

- Position the motor within the frame.
- Position the swing arm.
- Set the engine axes.
- **Tighten the motor axes to 40 Nm.**
- **Tighten the swing arm pivot to 100 Nm.**
- Set the frame guards and secure them with clamps.
- Put the right and left cylinder head supports. **Put red thread lock and tighten to 25 Nm.**
- Fit the left radiator and tighten to 10 Nm.
- Place the cooling hoses
- Make sure the engine is clean and place back the clutch receiver. **Tighten to 10 Nm.**
- Place the secondary chain and adjust the tension (see procedure on the user manual).
- Put the chain guard.
- Put the throttle body.
- Put the pencil coil.
- Put the exhaust pipe and secure it to the cylinder with its two springs.
- Reconnect the entire harness connected to the engine (starter case, TPS, water temperature sensor, pencil coil and injector).
- Reinstall the tank along with its vents (refer to the user manual).
- Reconnect the battery (refer to the user manual).

WARNING

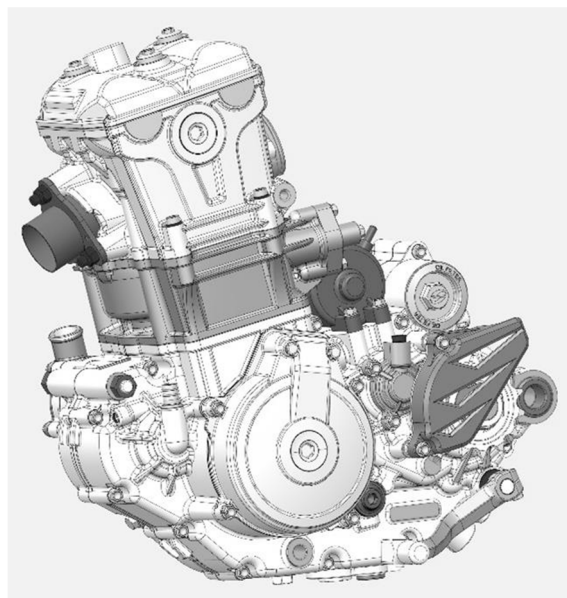
Before reconnecting, check that the ignition key/ the is in the «OFF» position.

- Place back the saddle.
- Fill coolant and engine oil (refer to the user manual).

REMOVING THE ENGINE

» Preparation

- Place the engine on the R455 engine support tool.
- Drain the engine oil (see user manual).
- Make sure to be in a clean environment before starting the dismantling of the engine.
- Remove the output shaft pinion.



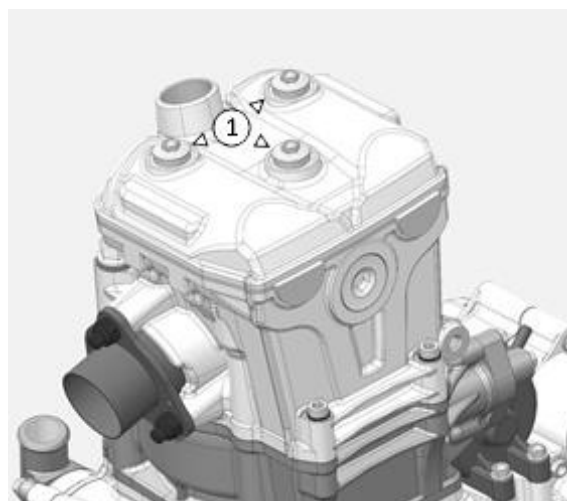
» Removing the cylinder head cover

- Remove the spark plug with the special spark plug tool 5773.
- Unscrew the 3 screws (1) and remove the cylinder head cover.

WARNING

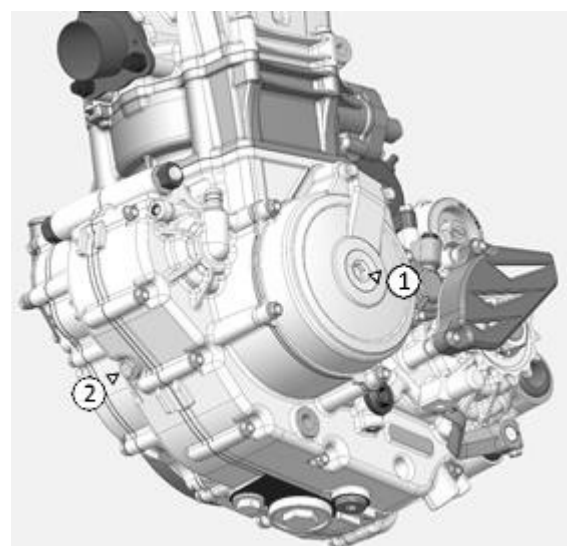
The screws have an o-ring.

- Remove the cylinder head cover gasket.



» Set the engine at top dead center

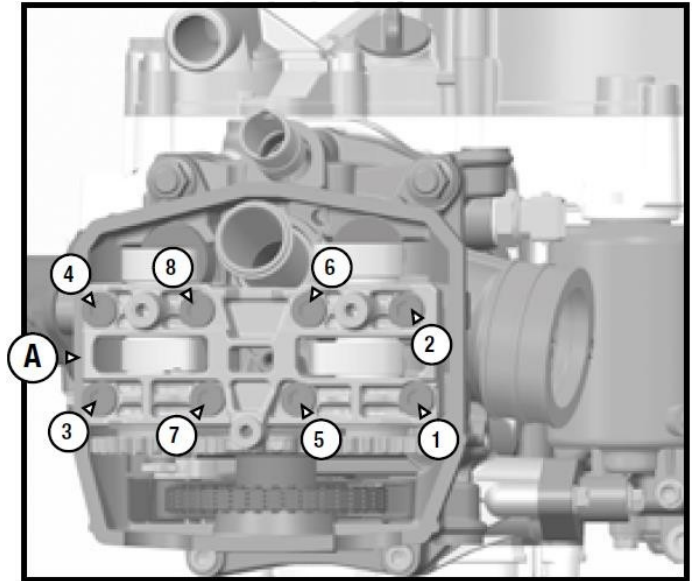
- Remove the ignition cover plug (1).
- Remove the timing control plug (2).
- Rotate the motor counterclockwise in order to align the center of the hole of the crankshaft with that of the crankshaft timing control, set the top dead center timing tool on (2) (Ref. 10338).



REMOVING THE ENGINE

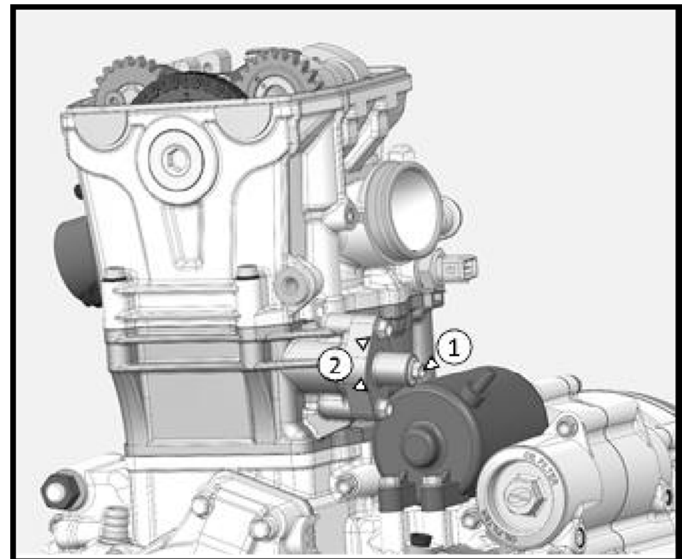
» Removing the camshafts

- Unscrew the eight screws from the shaft bearing cap cam following the order shown in the picture.
- Remove the bearing cap (A).
- Remove the camshafts.



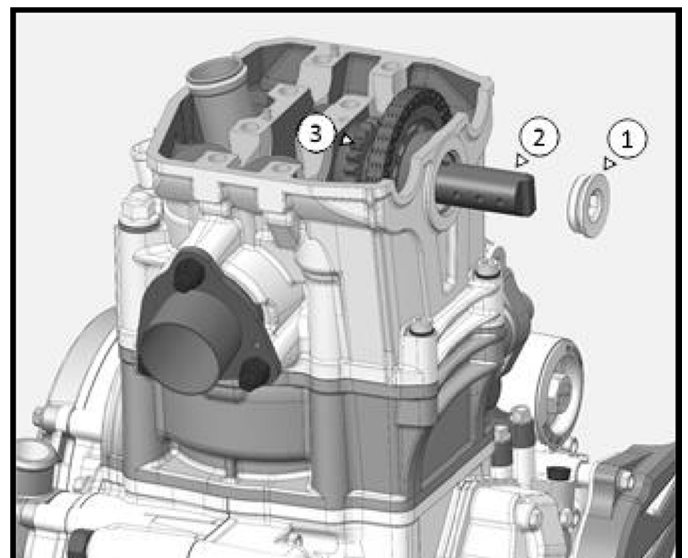
» Removing the distribution tensioner

- Unscrew the screw (1) and remove the spring.
- Unscrew the two screws (2).
- Remove the tensioner along with its gasket.



» Removing the drive chain

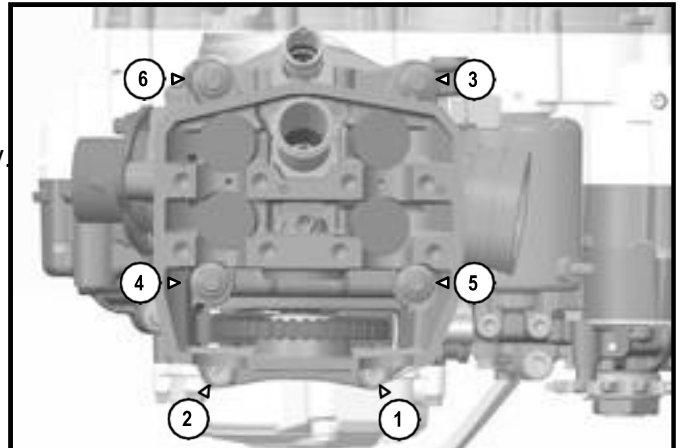
- Remove the cap (1) and then the shaft (2).
- Hold the pinion (3) and disengage the chain.
- Remove the pinion (3).
- Remove the timing tool from the top dead center position 10338.



REMOVING THE ENGINE

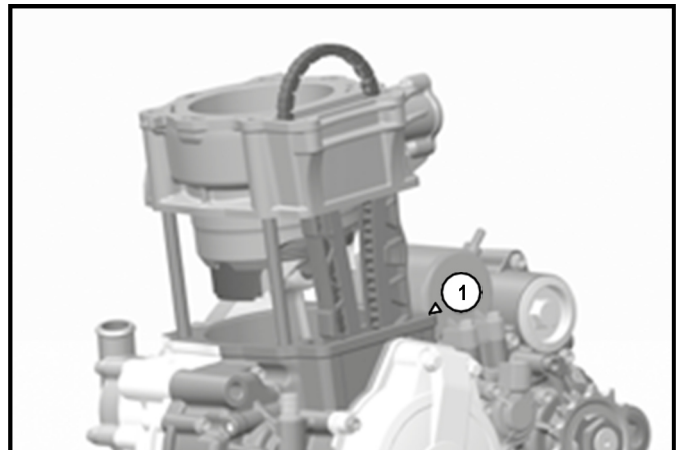
» Removing the cylinder head

- Unscrew the cylinder head bolts following the order indicated in the picture.
- Remove the cylinder head by pulling it vertically.
- Remove the cylinder head gasket with caution.



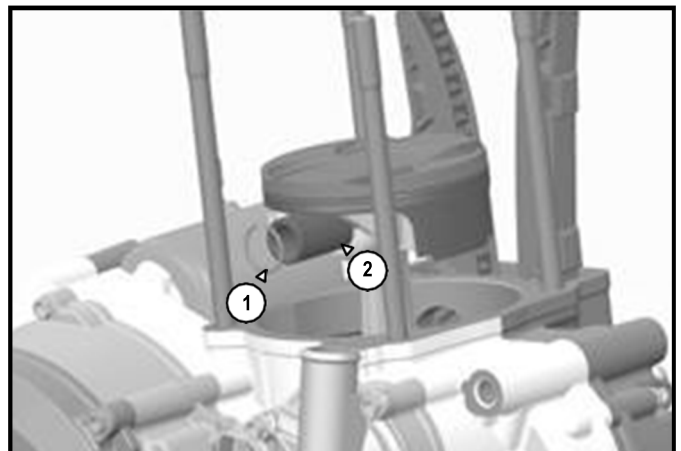
» Removing the cylinder

- Remove the cylinder by pulling it vertically.
- Remove the cylinder gasket (1) carefully.



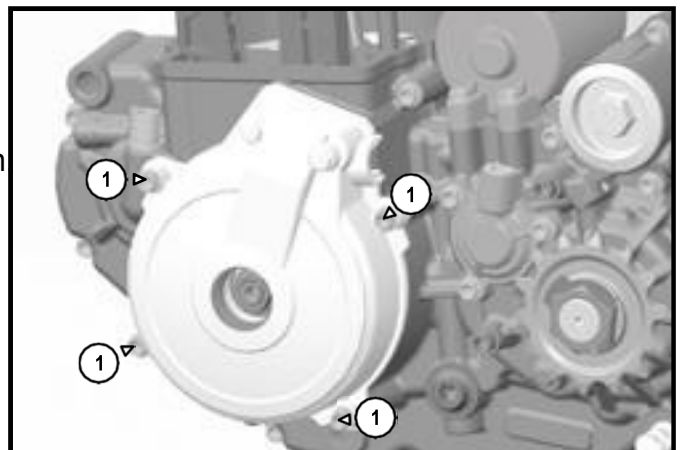
» Removing the piston

- Remove the securing clip (1) from the piston pin and remove the piston pin (2).
- Remove the piston.



» Removing the ignition cover

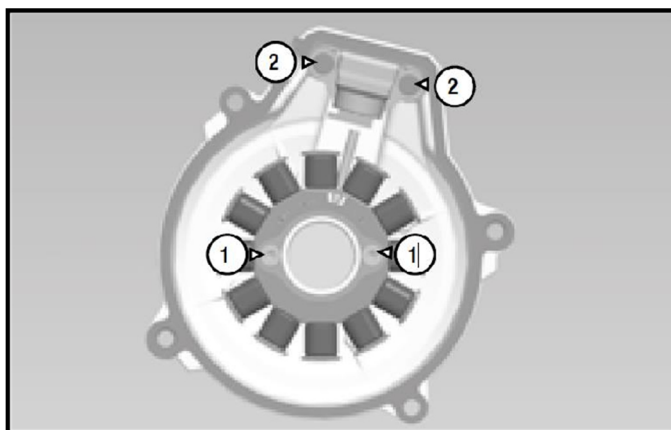
- Remove the 4 screws (1) and remove the ignition cover.
- Remove the ignition cover gasket with caution.



REMOVING THE ENGINE

» Changing the stator and the engine speed sensor

- Remove the 2 screws from the sensor (2) and the two screws from the stator (1).
- Set up the new parts.
- Reinstall the screws with red thread lock and tighten to 7 N.



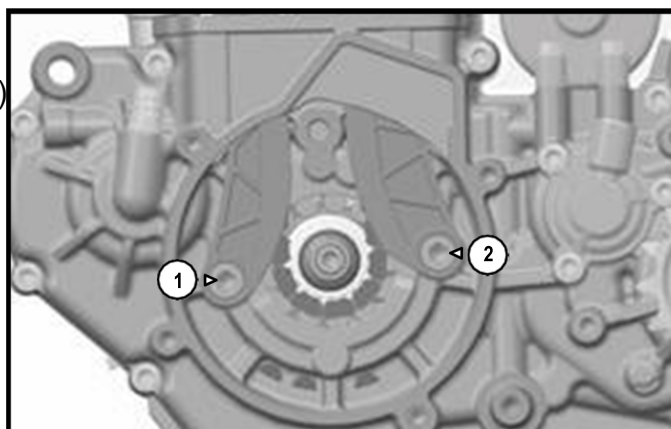
» Removing the rotor

- Use the rotor maintenance tool 4753.
- Unblock the central nut.
- Extract the flywheel with the flywheel extractor R462.



» Removing the drivechain

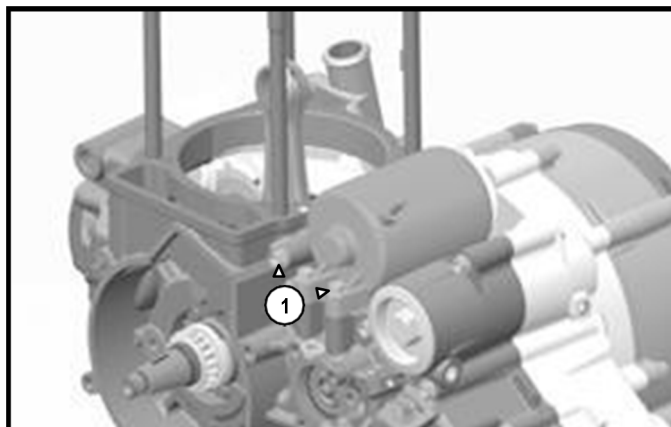
- Unscrew the drive chain guide plates (1) and (2)
- Remove the drive chain.



» Removing the electric starter

- Unscrew the two screws (1) and pull horizontally to the left.

Remove the oil filter, if not done yet.



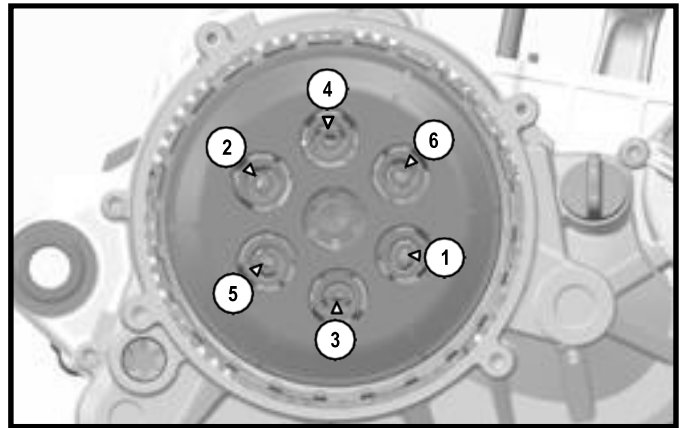
REMOVING THE ENGINE

» Removing the clutch

- Remove the clutch housing cover by unscrewing the 4 screws. Beware of the O-ring located on the rim of the cover.
- Set the TDC 10338 tool.

WARNING

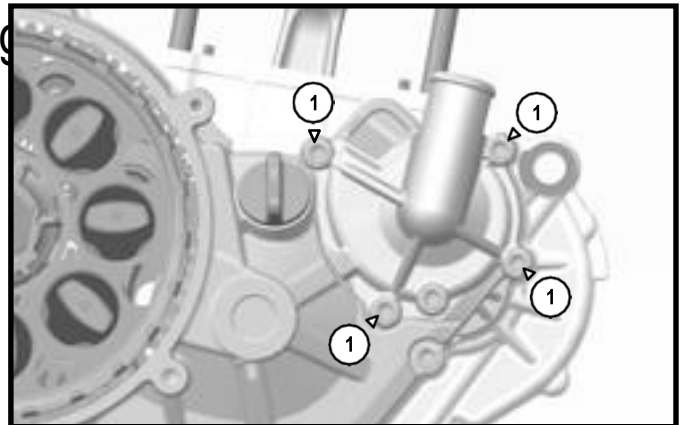
Do not use this tool for tightening or loosening with a torque value higher than 10 Nm.



- Remove the 6 screws from the pressure plate.
- Remove the friction and metal plates.
- Make sure the inner clutch hub can freely rotate.

» Removing the water pump housing

- Remove the screws (1) of the water pump housing. Beware of the O-ring located on the rim.



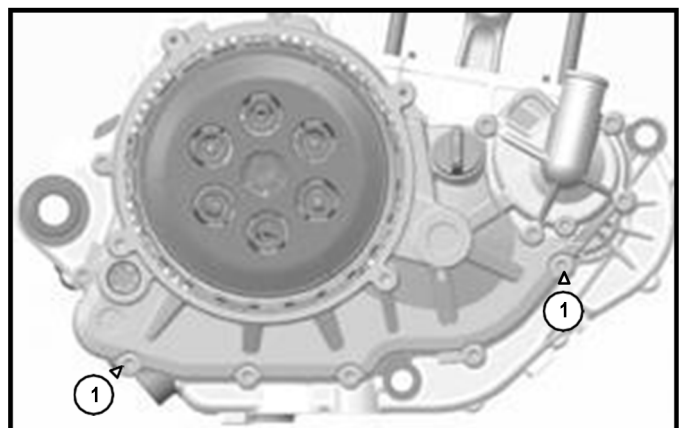
» Removing the clutch housing

- Dismount the 8 screws of the clutch housing.

WARNING

You need to identify the screws, 6 are 25 mm long, 2 are 30mm long (screw (1)).

- Remove the clutch housing and remove the seal carefully.



REMOVING THE ENGINE

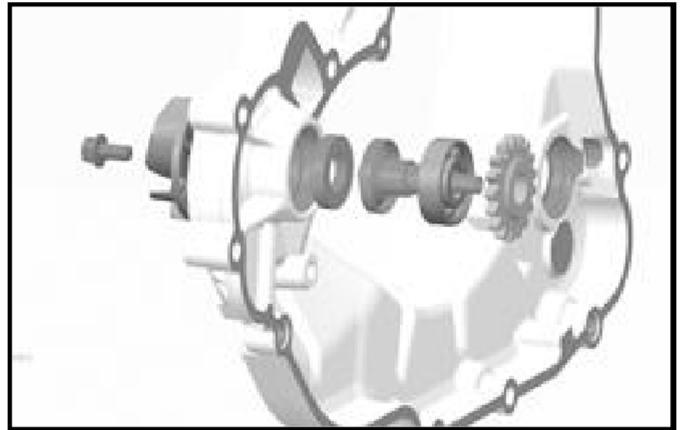
» Removing the water pump oil seal and the bearing

- Remove the water pump turbine with a 10 socket by unscrewing it while holding the drive pinion.
- Remove the water pump shaft. Both oil seals have been made accessible.

WARNING

The 2 seals are not identical nor interchangeable

- Disconnect the shaft from the water pump drive pinion.
- Remove the water pump bearing.

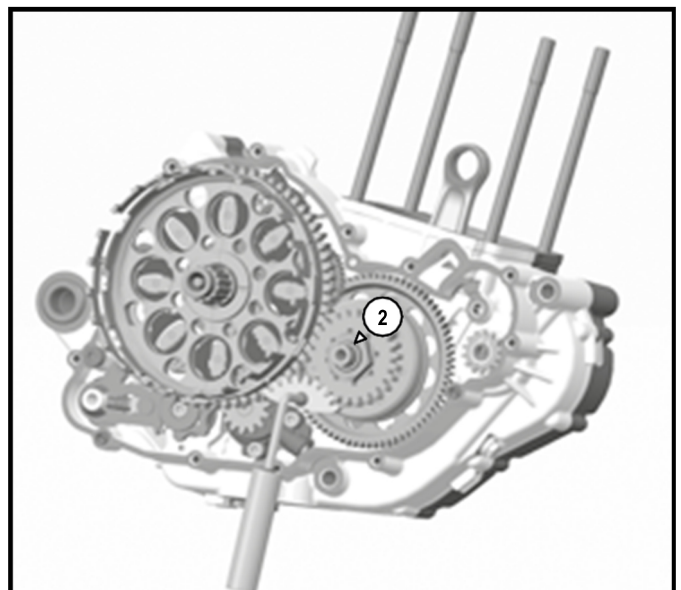
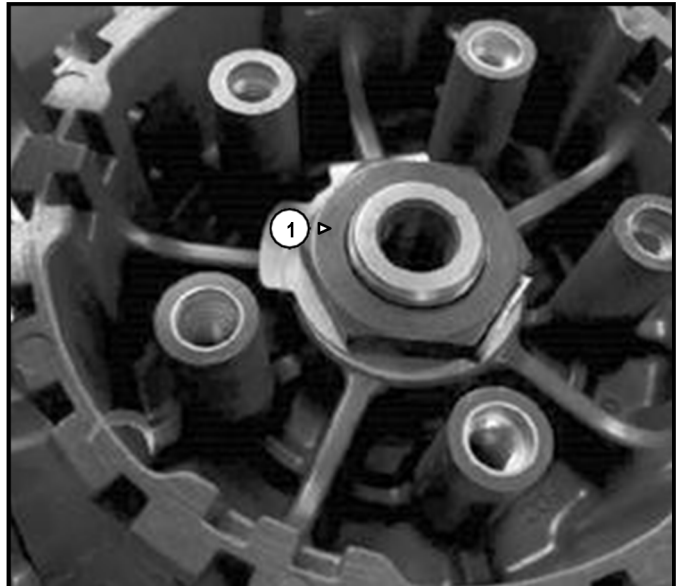


» Removing the clutch bellhousing

- Remove the finger follower from the clutch hub
- Flatten the safety tab.
- Block the clutch hub using the 5749 and unscrew the nut.
- Remove the hub, the notched washer and the bellhousing.
- Remove the drive pinion of the oil pump if it does not remain stuck to the bellhousing.
- Check the needle bearings and change them if necessary
- Visually check the clutch bellhousing.

WARNING

If you want to dismount the freewheel or the balancer shaft further on, block the primary drive with the tool 5593. Unlock the nut off the mass of the balancer shaft (2).



REMOVING THE ENGINE

» Removing the freewheel sprocket

WARNING

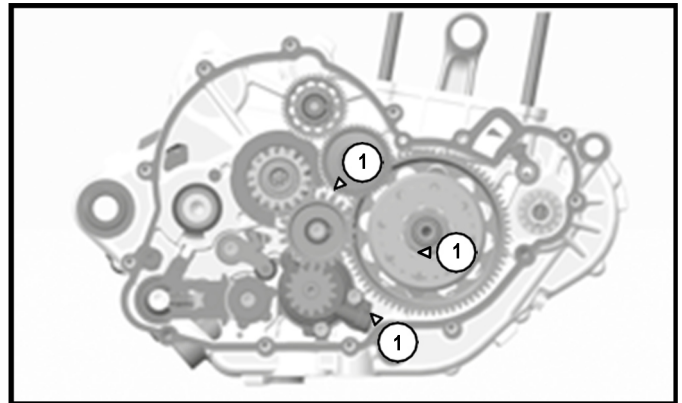
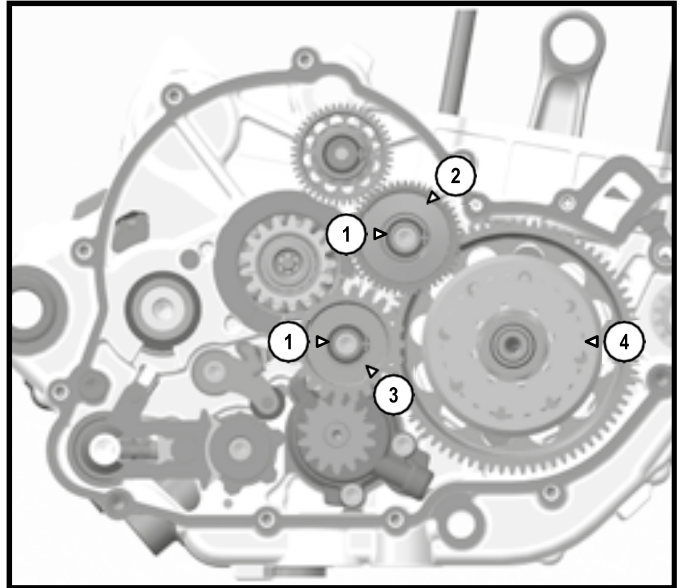
See previous paragraph for the unlocking of the balancer shaft nut.

- Remove the securing clip (1) and their washers.
- Remove the torque limiter (2).
- Remove the oil pump intermediate pinion (3).
- Unscrew the nut and remove the freewheel bellhousing (4) with a 2-arm puller.

WARNING

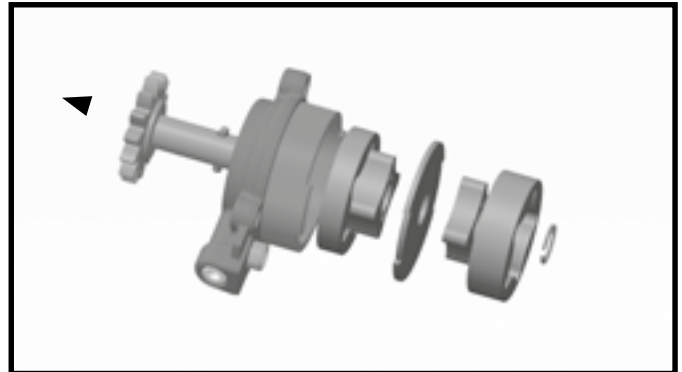
Do not damage the end of the crankshaft: oil passage, pin lubrication and lip sealing.

- Remove the freewheel sprocket.



» Removing the oil pump

- Remove the oil pump intermediate pinion.
- Remove the 3 screws (1).

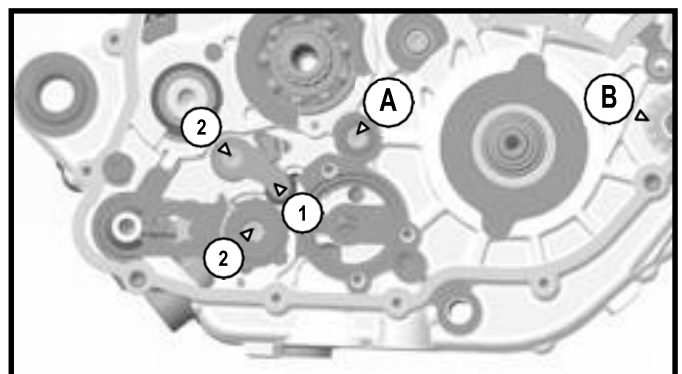


» Changing the oil pump

- Remove the securing clip in pin end condition and remove it.

WARNING

The pump to the left of the wall is 8mm thick and the one to the right is 12mm thick.



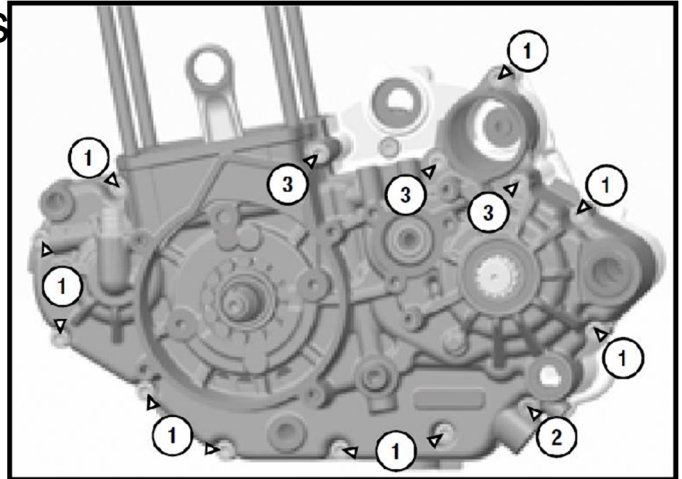
» Removing the index shim

- Keep the selection locking latch blocked (1)
- Pull on the scorpion and remove the selector shaft.
- Unblock the index shim and the locking latch with an Allen key (2).

REMOVING THE ENGINE

» Separating the central crankcases

- Remove the screw (A- p.19) with an Allen key.
- Remove the water pump drive pinion (B - p.19) by removing the securing clip. Beware of the needle that may fall
- Turn the housing over and remove the 14 screws of the central crankcase: (1) length 45 mm x 10; (2) length 55 mm x 1; (3) length 75 x 3.
- Separate the central crankcases.



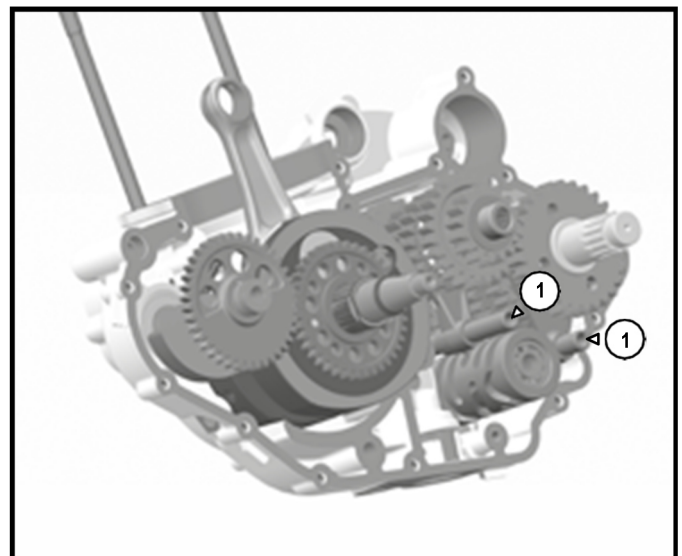
» Removing the gearbox

- Remove the two fork spindles (1).
- Remove the selection drum.

BEWARE

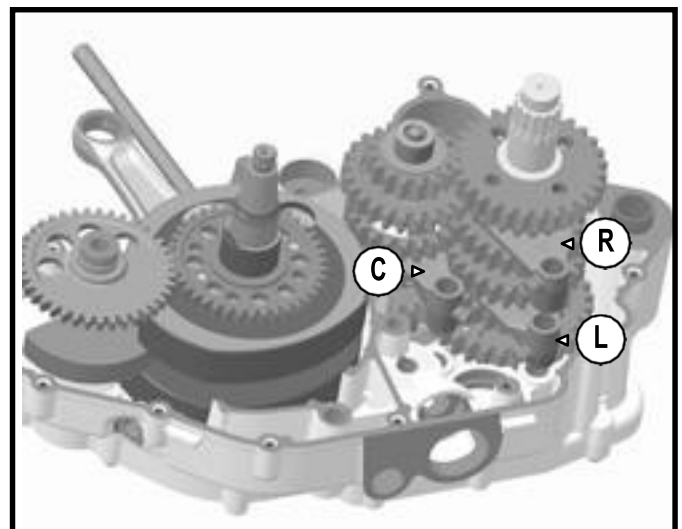
Of the small fork sockets.

- Remove the forks C, L and R.
- Remove the two gearbox shafts.



» Removing the crankshaft

- Remove the balancer shaft.
- Remove the crankshaft.



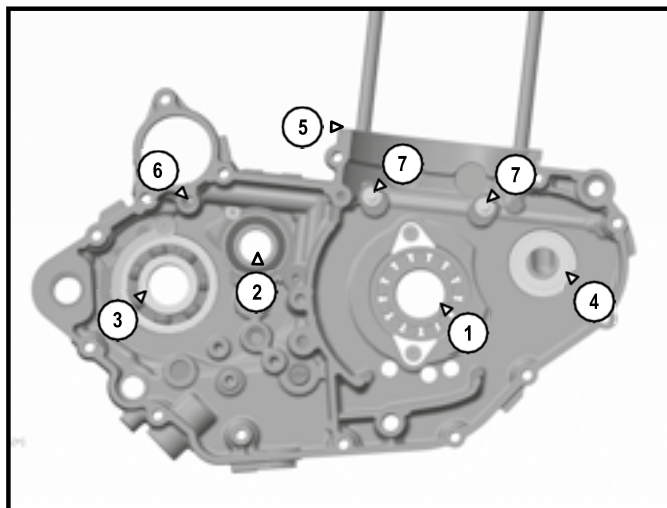
CHECKING INDIVIDUAL PARTS

» Controlling the central crankcases

- Check the general condition of the central crankcases for any possible damage or crack.
- Change the defective or worn crankcase set if necessary.
- Check the condition of the bearings. Change them if necessary.

» Left crankcase

- The crankshaft bearings (1), primary shaft (2) and secondary shaft (3) of the gearbox are held by some screws and/or plates.
- Balancer shaft bearing (4).
- Check the bearings, replace them if necessary.
- Remove the bearings.
- Check that their housing is clean and install the new bearings, hot crankcase at about 70 °C.
- Apply blue thread lock on the bearings of the retaining screws and **tighten them to 5 Nm**.
- Check that the top engine oil nozzle (5) and BV (6) is not clogged or damaged.

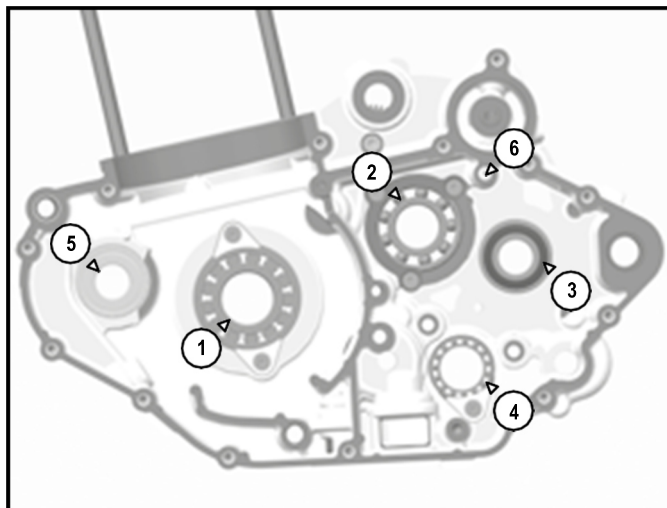


WARNING

The piston nozzles (7) are indexed and cannot be replaced. If damaged, replace the carters.

» Right crankcase

- The crankshaft bearings (1), primary shaft (2) and secondary shaft (3) and selection drum (4) are secured by screws and/or plates.
- Balancer shaft bearing (5).
- Check the bearings, replace them if necessary.
- Remove the bearings.
- Check that their housing is clean and reinstall the new bearings, hot crankcase at about 70 °C.
- Apply blue thread lock on the bearings of the retaining screws and **tighten them to 5 Nm**.
- Check that the oil nozzle (6) and (7) (external side) is not clogged.



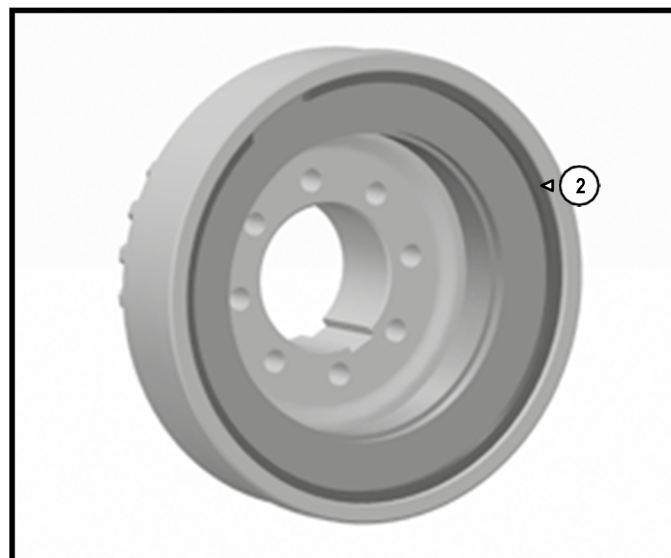
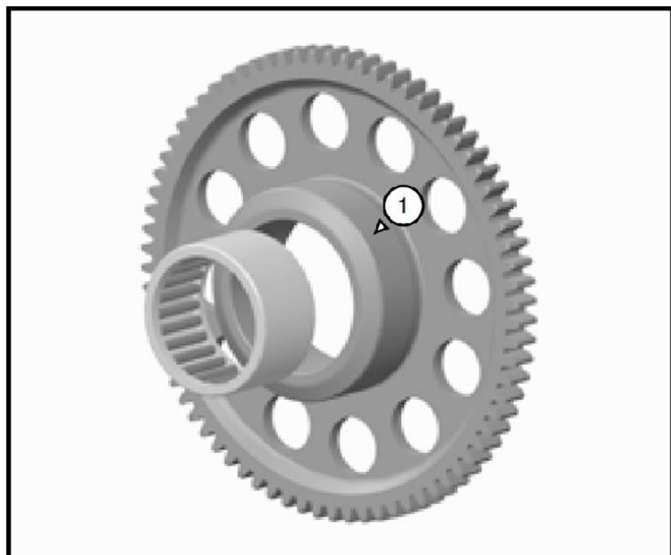
CHECKING INDIVIDUAL PARTS

›| Checking the freewheel sprocket bearing

- Visually check the needle bearing of the freewheel sprocket.
- Change it if necessary.
- Check the visual aspect of the rolling raceway of the freewheel sprocket (1).
- Change the pinion if necessary.
- Check the visual aspect of the freewheel, its clearance with your hand, as well as its capacity to freely rotate.
- Replace it if necessary; remove the outer securing clip (2) and remove the freewheel.

WARNING

Replacing the freewheel systematically involves replacing the freewheel sprocket and vice versa.



›| Changing the crankshaft bearings

- Change the corresponding bearings (outer rings) on the central crankcases.
- Pull out the distribution drive pinions with a 2-arm puller.
- Retrieve the inner rings of the crankshaft bearings by heating the R464 tool and the ring.

WARNING

The radial clearance of the bearings must be practically zero.

- To remove the drive pinion of the balancer shaft, tighten 2 screws 8x125 in the holes provided for this purpose.



CHECKING INDIVIDUAL PARTS

» Checking the crankshaft

Radial clearance of the connecting rod :

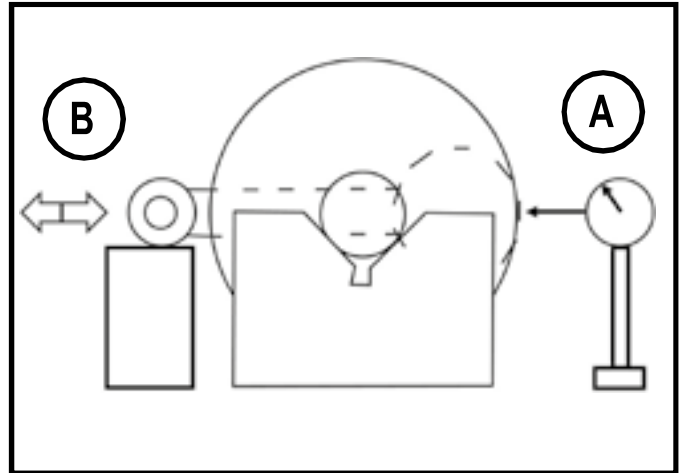
- Place the crankshaft on V-blocks and place a dial gauge [A] against the connecting rod.
- Push [B] the connecting rod to the gauge and then in the opposite direction. The difference between those two measurements is the radial clearance.

Radial clearance of the connecting rod :

Standard : 0.008 mm – 0.012 mm

Tolerated limit : 0.05mm

If the radial clearance exceeds the limit, the crankshaft must be replaced.



Lateral clearance of the connecting rod :

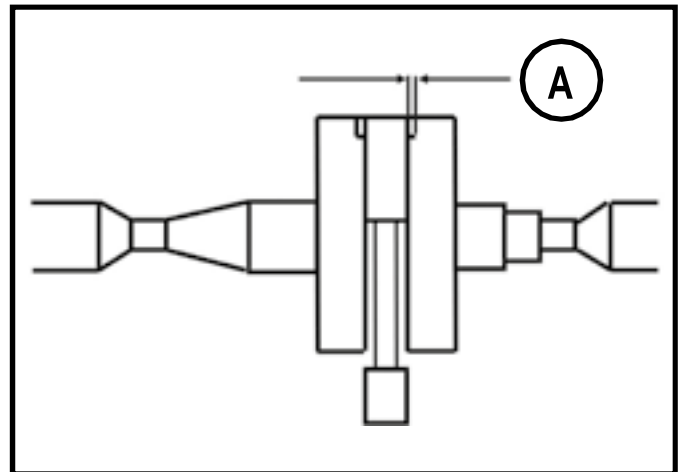
- Measure lateral clearance of the connecting rod [A].

Lateral clearance of the connecting rod :

Standard : 0.6 mm - 0.85mm

Tolerated limit : 1.1 mm

If the radial clearance exceeds the tolerated limit, replace the crankshaft.



Checking the runout :

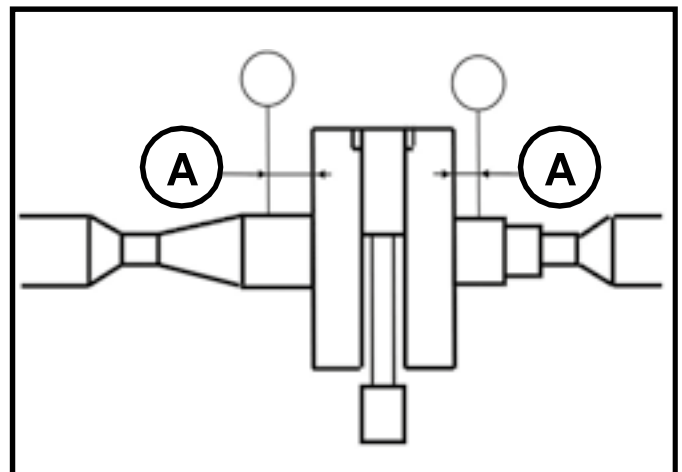
- Place the crankshaft on alignment devices or Vblocks, and place a gauge as shown in the image.
- Then slowly turn the crankshaft. The maximum difference between the measurements corresponds with the offset of the crankshaft.

Runout :

Standard : 0.02 mm maxi

Tolerated limit : 0.08 mm

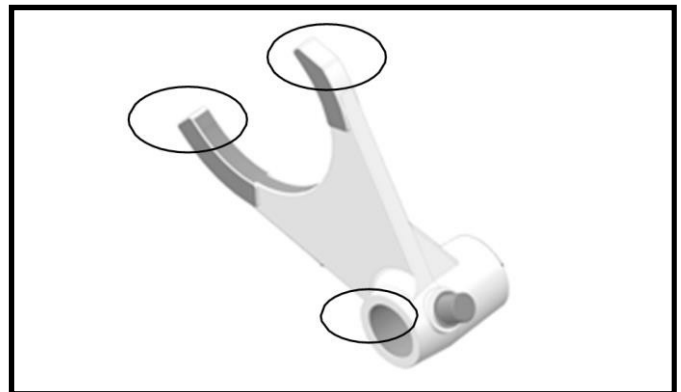
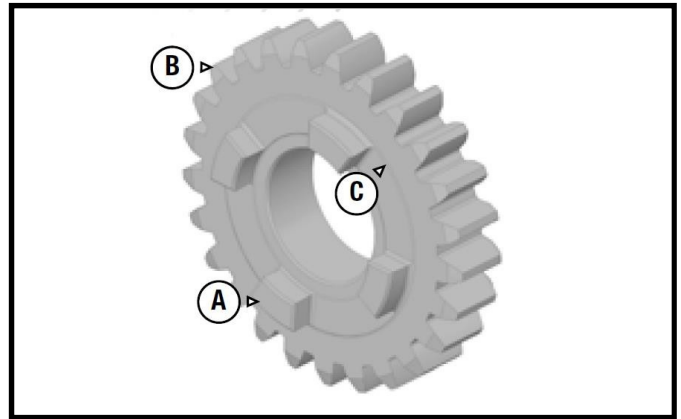
If the offset is not correct, replace the crankshaft and align it so to be within tolerated limits.



CHECKING INDIVIDUAL PARTS

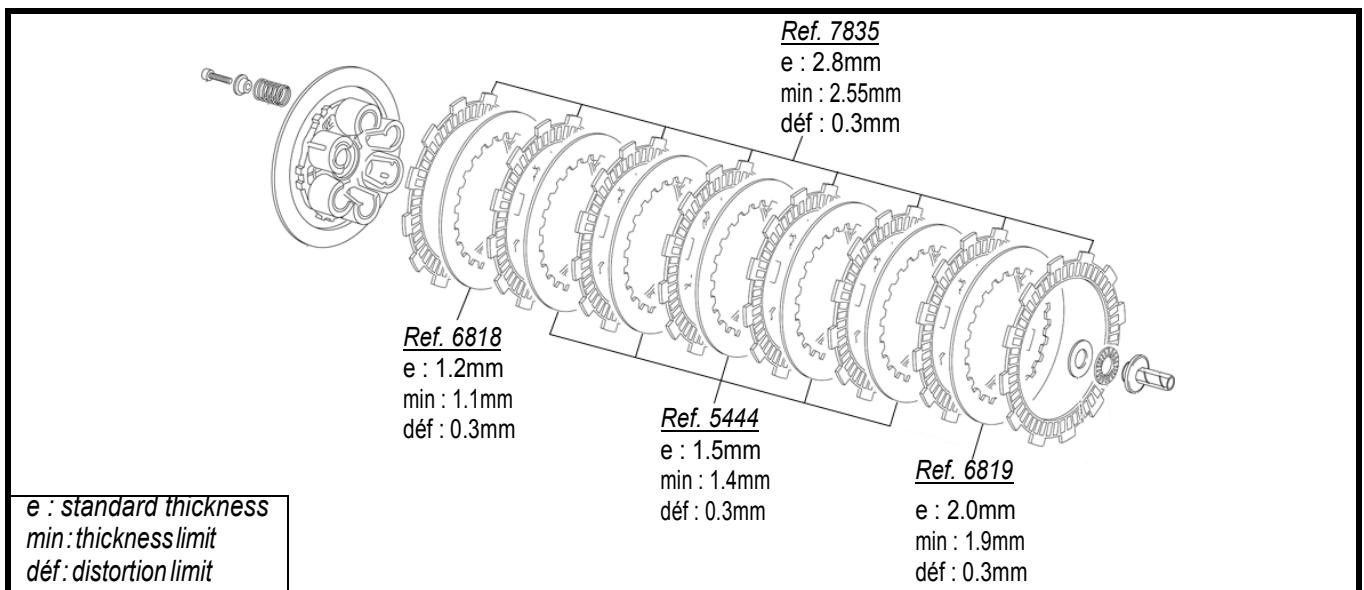
» Checking the gearbox

- Check all pinions
- By checking the coupling claws [A], the pinion teeth [B] and fork grooves [C]. In case of wear, damage, change the affected pinions.
- Check the condition of the gearshift forks.
 - Change the forks if necessary.
 - Control the selection drum, check if there are distortions, abnormal wear, if damage is found. Change the drum if necessary.



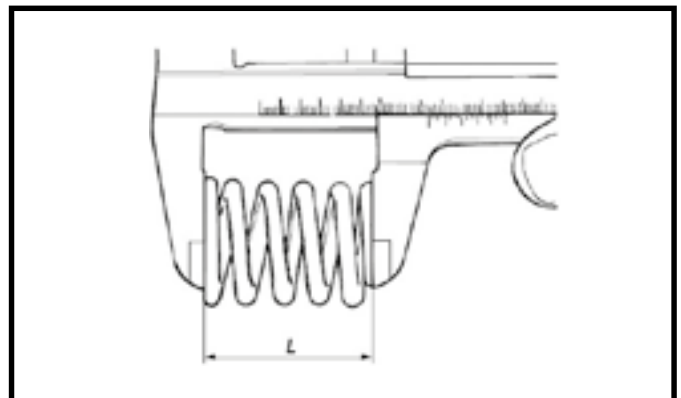
» Checking the clutch

Check metal and friction discs:



Checking the clutch springs :

Measure the free length of the springs.
Standard : 50.0mm
Limit : 49.0mm



CHECKING INDIVIDUAL PARTS

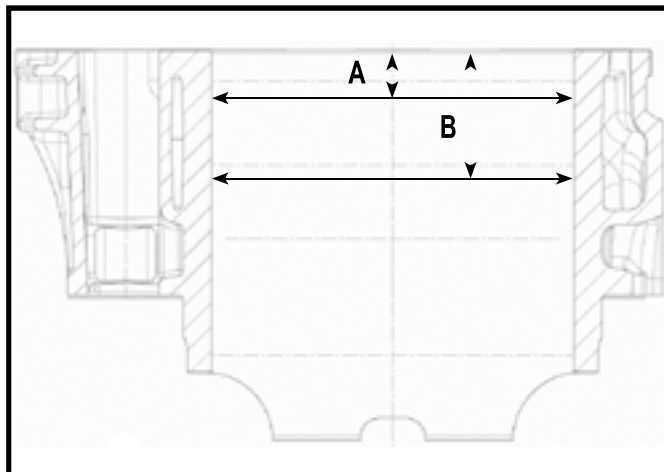
» Checking the top-engine

Inspection of cylinder wear :

Measure the inside diameter of the cylinder when the cylinder is cold

- Inspect the inside part of the cylinder for scratches or any other sign of abnormal wear. If the cylinder is damaged or severely worn, replace it.
- Since the cylinder does not wear out evenly in every direction, measure it from one side to the other and from bottom to top as shown.

If one measure of the internal diameter of the cylinder exceeds the service limit, replace the cylinder.



(A)=8 mm

(B)=30 mm

Standard 450 SEF :

Cylinder diameter (A) = 94.99 ± 0.012 mm

Cylinder diameter (B) = 94.982~94.995 mm

Conicity limit 0.05 mm

Ovalization 0.05 mm

Standard 500 SEF :

Cylinder diameter (A) = 97.990 ± 0.008 mm

Cylinder diameter (B) = 97.99~98.005 mm

Conicity limit 0.05 mm

Ovalization 0.05 mm

Piston/cylinder clearance

In order to define the clearance as accurately as possible, measure the diameter of the piston and the cylinder separately, and then calculate the difference between these two values. Measure the diameter of the piston according to the « Piston Wear » procedure.

Piston/cylinder clearance :

Standard 0.034~0.056 mm

Limit 0.11 mm

CHECKING INDIVIDUAL PARTS

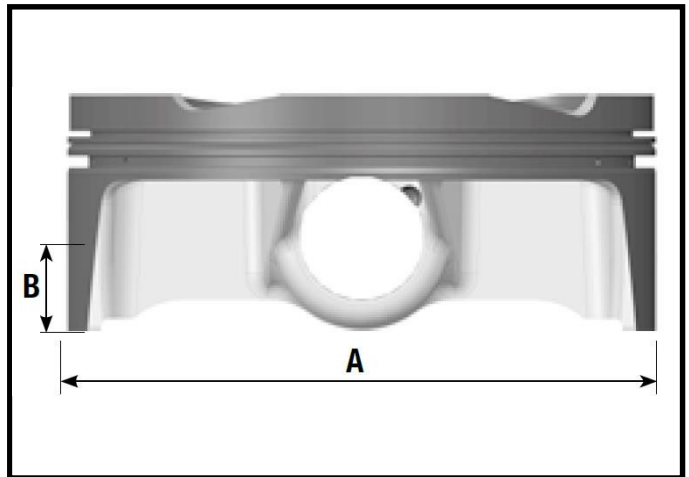
Piston wear :

- With the help of a micrometer, measure the outside diameter [A] of piston 15 mm [B] above the bottom of the piston and at a right angle in relation to the piston pin.

If the outside diameter of a piston is below the limit, replace it

Piston 450 SEF= 94.93 - 94.95

Piston 500 SEF= 97.93-97.95



Ring/ring groove clearance :

- Check the base of the ring in order to verify that the grooves do not show uneven wear.
- Once the rings are properly set in their grooves, perform several measurements with a thickness gauge to determine the ring/ring groove clearance.

Top ring: 0.020-0.065 mm
Limit 0.13 mm

Oil scraper ring : 0.020-0.055 mm
Limit 0.13 mm

End gap :

Top ring : 0.2-0.3 mm
Limit 0.5 mm

Inspection for wear of the connecting rod, piston pin, and piston :

- Visually control the installed securing clip. If it seems weakened or distorted, replace it. If the groove of the pinhole is excessively worn, replace the piston.
- Measure the diameter of the piston pin by means of a micrometer. If wherever along the line, the diameter of the piston pin happens to be inferior to the limit, replace the shaft.
- Measure the diameter of the two piston pinholes in the piston and the inner diameter of the connecting rod bushing. If one of the diameters of the holes measured on the piston is incorrect, change the piston.

If the diameter of the connecting rod bushing is incorrect, replace the connecting rod.

Diameter of the piston pin : 18.995-19.000 mm

Diameter of the piston pin hole : 19.004-19.009 mm

Inner diameter of the connecting rod bushing : 20.007-20.013 mm

CHECKING INDIVIDUAL PARTS

Cams wear :

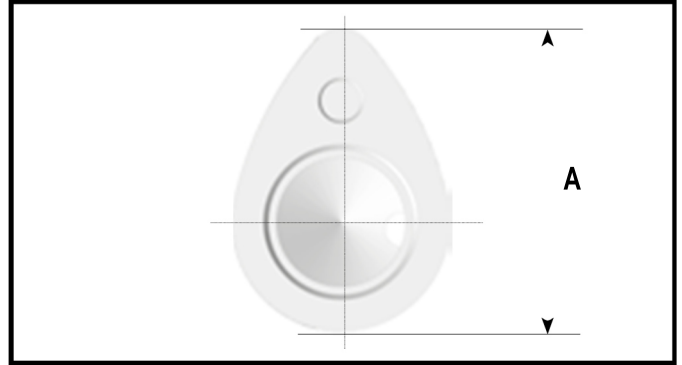
- Measure the height [A] of each cam by means of a micrometer.

If the cams are worn beyond the limit, replace the camshaft.

Cam height limit 450

Exhaust : 37.20 mm

Admission : 37.62 mm



Wear of the camshaft and camshaft bearings:

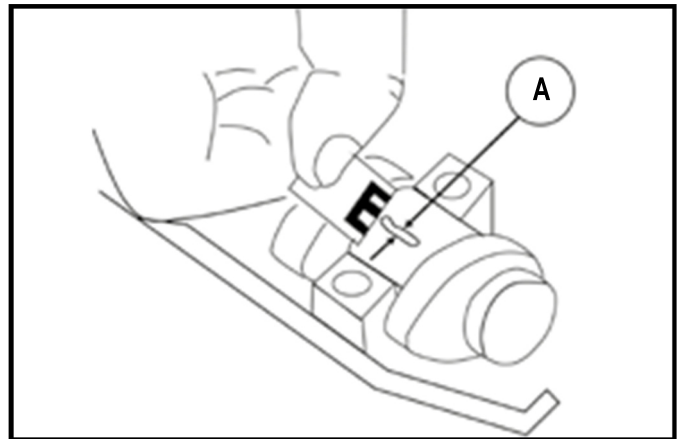
- Measure all clearances between the camshaft trunnion and the camshaft bearings by means of a plastic gauge [A]. Tighten the camshaft housing screws after coating their body and threading with engine oil.

Torque setting

Camshaft housing screws : 18 Nm.

If any clearance is above the limit, measure the diameter of each camshaft trunnion by means of a micrometer.

If the diameter of the camshaft pin is below the limit, replace the camshaft and measure the clearance again.

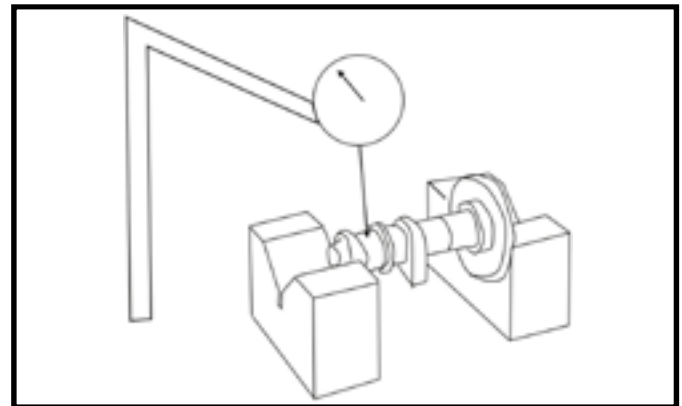


Diameter of the standard camshaft trunnion

Standard : 23.980 – 23.993 mm

Limit : 23.960 mm

If the clearance remains outside the service limit, replace the cylinder head.



Camshaft offset :

Measure the runout of the camshaft.

If it is out of specification, change de camshaft.

Runout : Less than 0.03 mm.

CHECKING INDIVIDUAL PARTS

» Checking the cylinder head

Cylinder head inspection for warping :

- Place a ground ruler [A] on the lower surface of the cylinder head at different positions, and measure the warping by inserting a thickness gauge between the straightedge and the gauge head. If the warping exceeds the tolerated limit, repair the adjusting surface. Replace the cylinder head if the adjusting surface is seriously damaged.

Warping of the cylinder head :

Limit = 0.05 mm

Valve/guide clearance :

Intake :

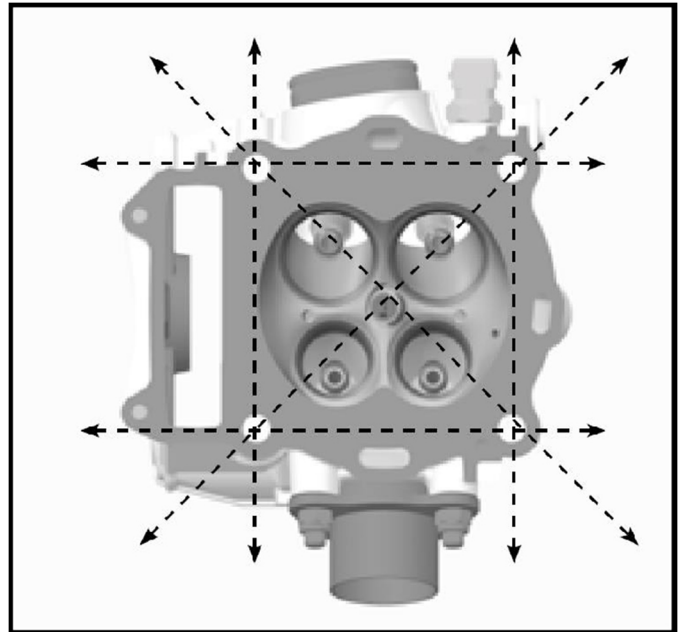
Minimum clearance : 0.02 mm

Maximum clearance : 0.045 mm

Exhaust :

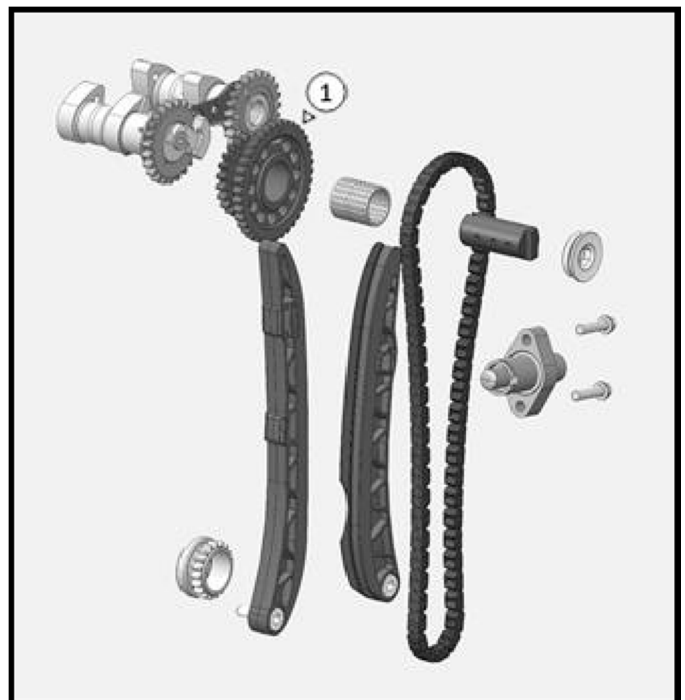
Minimum clearance : 0.04 mm

Maximum clearance : 0.065 mm



» Checking the distribution

- Clean all parts.
- Visually inspect the drive chain : check for any hard spot, resistance, or wear. If any, it must be changed.
- Visually inspect the distribution drive pinion. Change if necessary.
- Visually inspect distributions guide plates: change them if necessary.
- Visually inspect the pinion (1) ; replace if necessary.
- Check that the needle bearings fit tight when the pinion (1) is mounted on its axis.



» Installing the central crankcases

WARNING

During the installation process, replace all gaskets (joint paper, O-ring, etc.).

- Turn the crankshaft and the balancer shaft in the right crankcase by aligning the two marks.
- Fit the two gearboxes shafts.
- Put a roller on each fork.
- Put the shift forks in their respective sliding grooves.
- Insert the selection drum.
- Insert the forks in their respective drum grooves.
- Place the fork spindles.

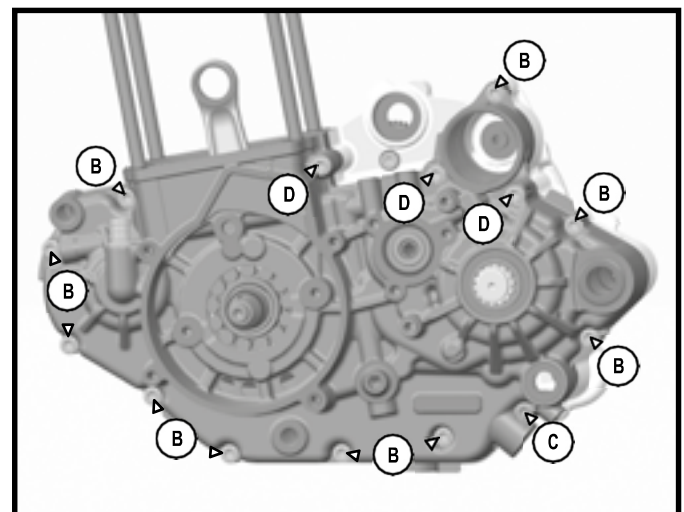
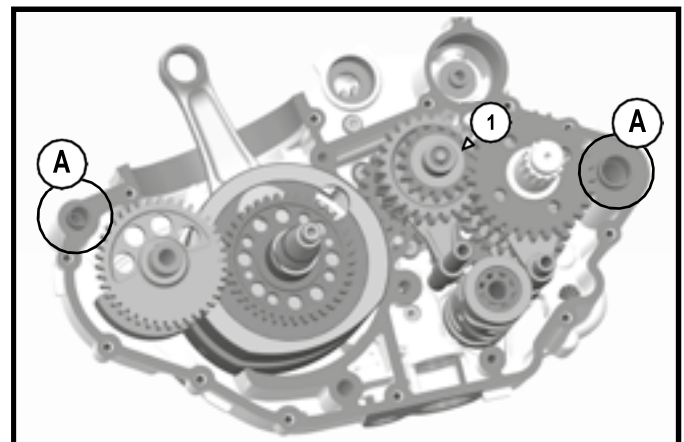
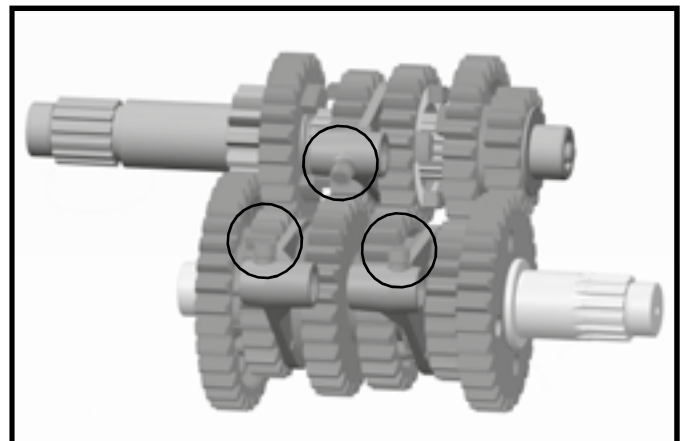
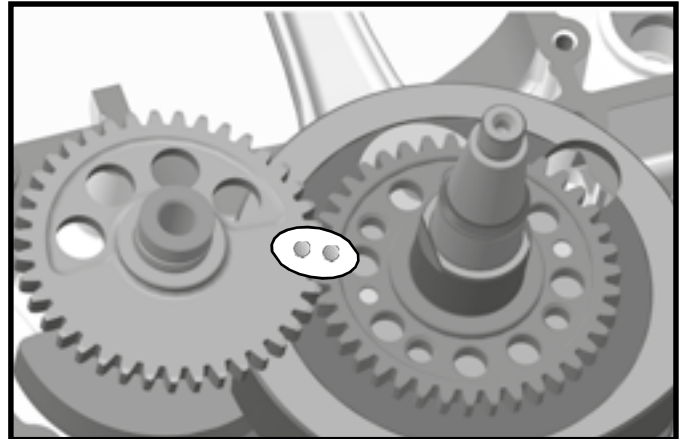
WARNING

Do not forget to oil the parts in friction or in rotation.

- Set up the two guide pins (A) and the washer (1) on the secondary shaft.
- Place the right crankcase on the preassembled parts.

- Put the 13 central crankcase screws and tighten. 10 screws (B) length 45 mm; 1 screw (C) length 55 mm; 3 screws (C) length (D) length 75 mm.

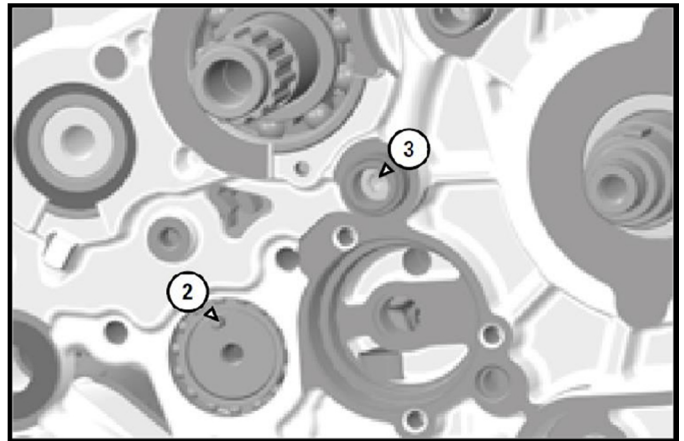
Tightening torque of the central crankcase screws : 10 Nm.



- Turn the crankcase over and tighten the screw (3)
Torque setting : 10 Nm.

- Pull the locking finger by placing back the spring properly.
- Hold the speed-locking lever locked.
- Do not forget the needle (2) on the drum.
- Mount the star and apply blue thread lock on the drum screw and tighten it.

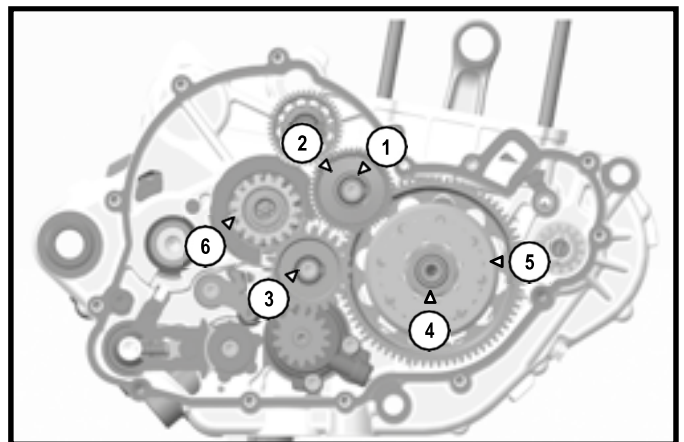
Specified torque of the drum screw: 10 Nm.



- Place back the shaft selector taking good care to slide the spring back to its slot.
- Fit the oil pump previously assembled and tighten the 3 retaining screws after applying medium thread lock.

Tightening torque of the oil pump housing screws: 10 Nm.

- Place the needle, the water pump drive pinion and its securing clip.
- Set the freewheel pinion and its needle bearing.
- Set up the freewheel and the assembled freewheel bellhousing (5) while properly indexing the crankshaft and its woodruff key.
- Remove all grease with a solvent from the primary shaft and from the crankshaft threading.
- Apply medium thread lock on the crankshaft
- Fit the washer and engage the nut (4).
- Place the oil pump intermediate gear.
- Place the securing clip (3) and its washer.
- Place the torque limiter (2).
- Place the securing clip (1) and the limiter shaft washer.
- Set the two needle bearings on the primary shaft.
- Place the pinion on the primary shaft and the clutch bellhousing. Be careful to align the notches on the pinion with the bellhousing.



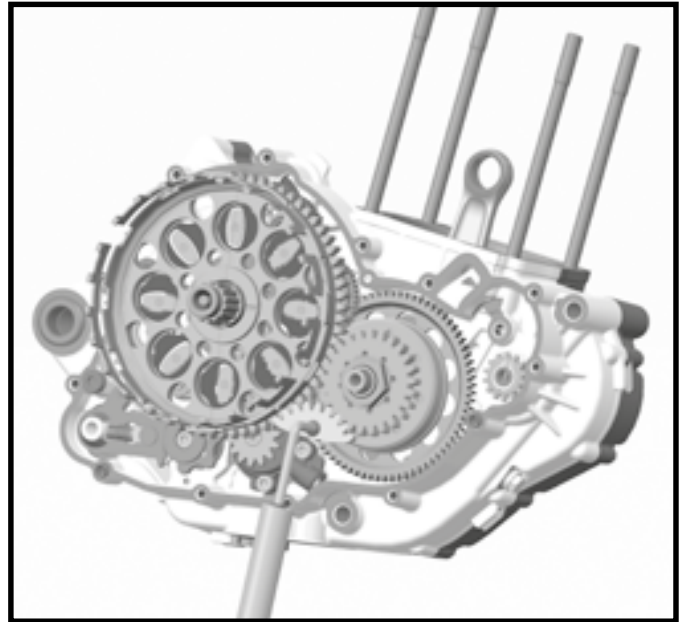
Put the grooved washer and the inner clutch hub.

- Using the 5593 tool, block the transmission and tighten the nut.

Specified torque of the crankshaft nut : 120Nm.

- Insert the safety washer and the nut.
- Using the 5749 tool, block the clutch nut and tighten.

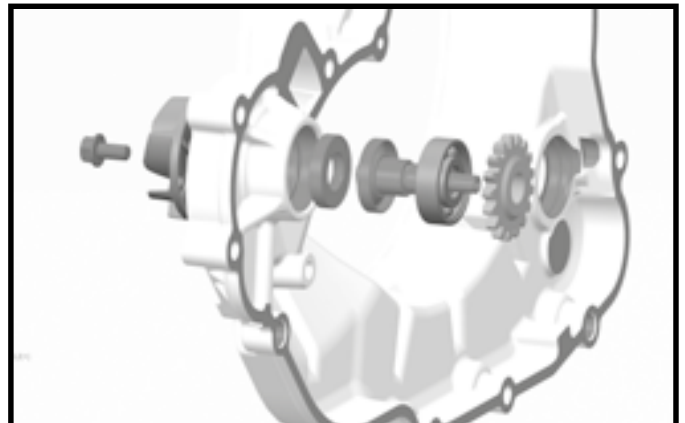
Specified torque of 100 Nm nut clutch.



» Installing the clutch housing

- Heat the housing to approximately 70 °C.
- Place the water pump on top of the clutch housing.
- Check the condition of the oil pan gasket and set it back.
- Reassemble the clutch housing and the 8 screws outside the water pump housing.

Tightening torque of the clutch housing: 10 Nm.

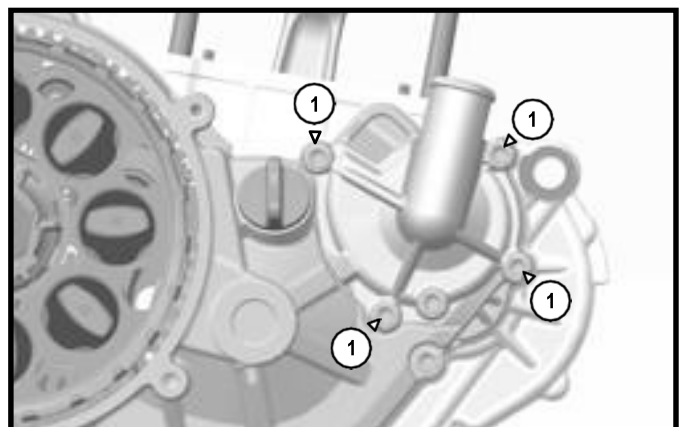


WARNING

*Make sure that the lubrication raceway of the crankshaft in the crankcase is clean.
Replace the crankshaft lip seal.*

» Installing the water pump housing

- Place the screws (1) of the water pump housing.
- Be careful to correctly position the O-ring located on the rim.



» Installing the clutch

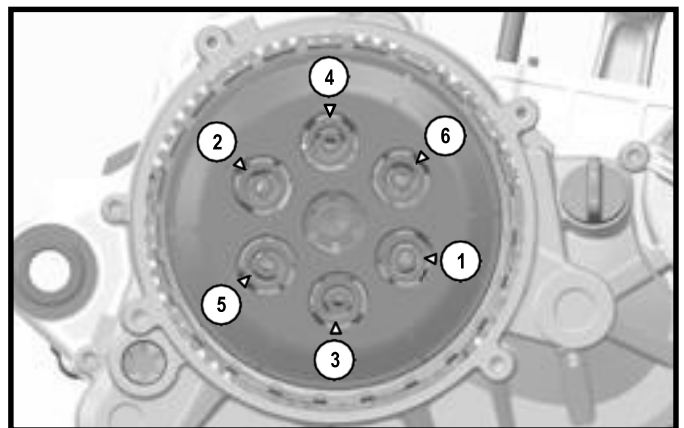
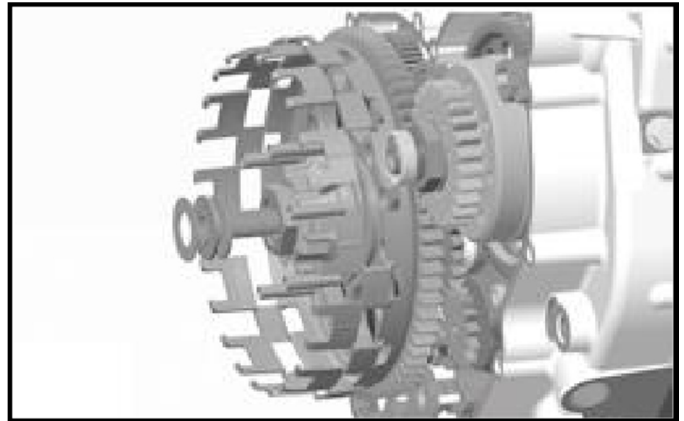
- Put the 8 friction discs and the 7 metal discs, starting with a friction disc.
- Install the finger follower and do not forget to install the stop and the washer.
- Put the pressure plate and the 6 screws following the order shown in the picture.
- Place the TDC 10338 tool.

WARNING

Do not use this tool for tightening or loosening at a torque value superior to 10 Nm.

- Place the clutch housing cover by tightening the 4 screws. The 4 screws are not the same length.
- Beware of the O-ring located on the rim of the lid.
- Remove the TDC 10338 tool.

Tightening torque of the plate screws : 10 Nm.



» Installing the electric starter

- Lubricate the starter O-ring.
- Fit the electric starter and tighten the 2 screws.

Tightening torque of the starter : 10 Nm.

» Setting the piston rings

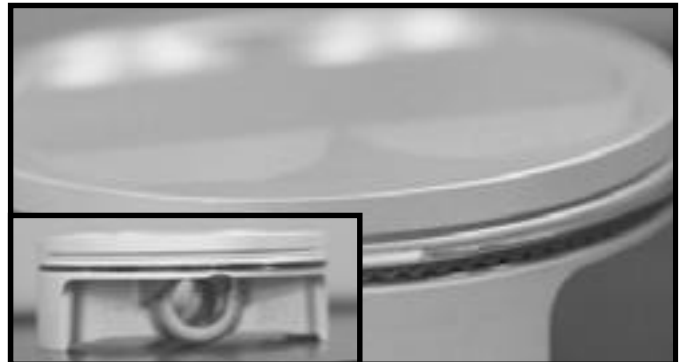
- Place the first rail. Pay attention to the position of the opening on the exhaust side.



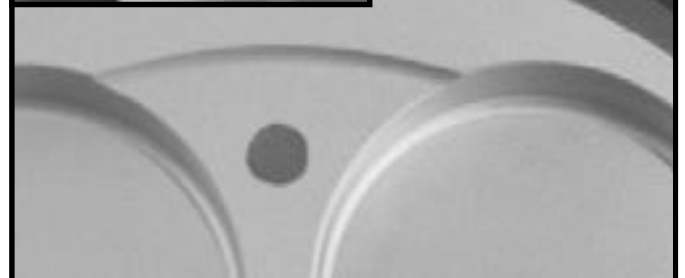
- Place the expander on the bottom groove (the widest). The opening should be placed in the middle. Please note that ripple ends must be oriented downwards.



- Place the rails below and above the expander within the groove. Make sure that the upper rail is on the intake side (opposite the first rail).



- Place the top ring in the upper groove. The opening should be on the exhaust side. Make sure that the ring is oriented upwards.



» Installing the piston

- Set the piston and piston rings.
- Lubricate the piston pin and place it.
- Set the piston pin-securing clip.

» Installing the cylinder

- Seal the joint between the left and right casing with sealing dough.
- Set the guide pins and a socket joint.
- Lubricate the piston skirt.
- Oil the cylinder.
- Fit the cylinder paying attention to the rings.
- Place the piston at TDC and the 10338 tool.

» Installing the cylinder head

- Set the guide pins and the cylinder head gasket.
- Set the washers and nuts.
- Screw the cylinder head in the order shown in the picture.

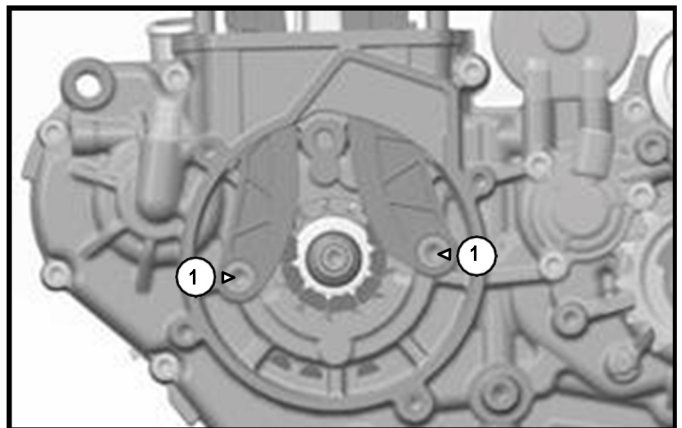
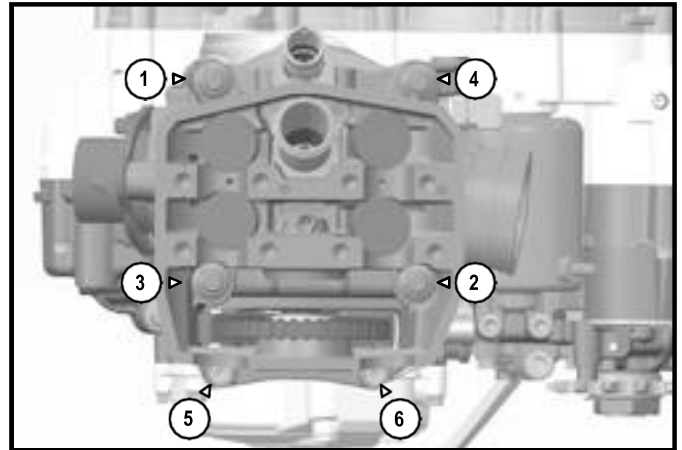
Pass 1

Tightening torque of nuts 1/2/3/4 : 30 Nm.

Pass 2

Tightening torque of nuts 1/2/3/4: 50Nm.

Tightening torque of screws 5/6: 10Nm.



» Installing the drive chain

- Set the 2 distribution guide plates going through the chain well.
- Fit the chain on the crankshaft pinion.
- Put the distribution upper pinion.

WARNING

Make sure that the mark is vertical to the cylinder, or that the FLANGE mark is aligned with the cylinder head gasket plane.

- Do not forget the two-needle housing of the pinion.
- Place back the axis (2) and then the cap (1) with its O-ring.

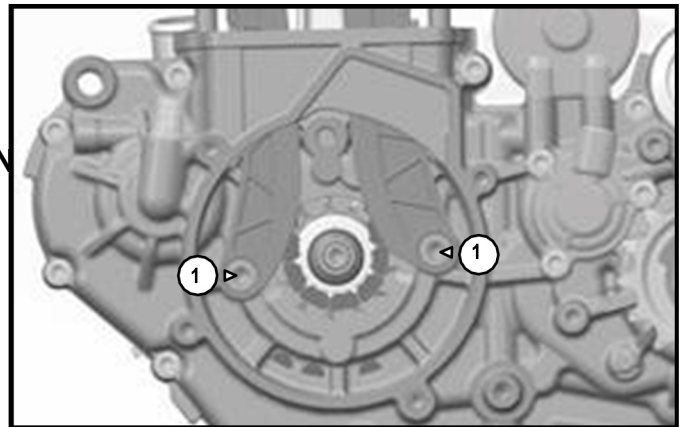
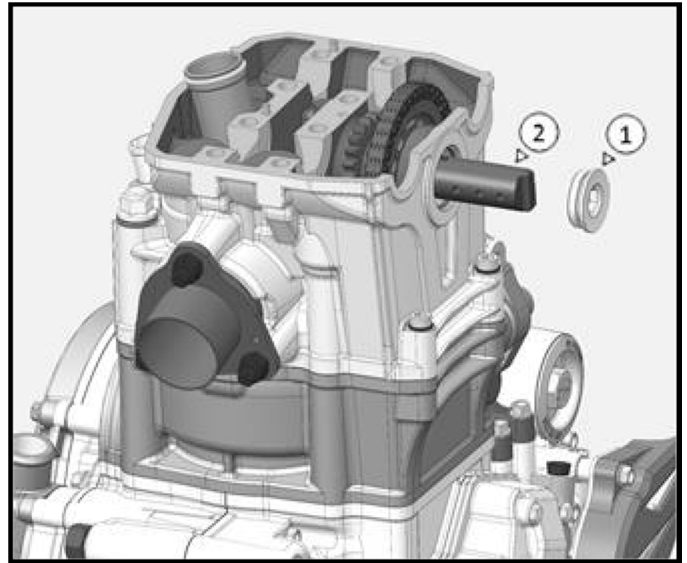
Tightening torque of the cap (1) : 20 Nm.

- Apply blue thread lock on the two screws (1).

Tightening torque of the plate screws (1) : 10 Nm.

- Put in the drive chain.

Tensioner tightening torque : 10 Nm.



» Installing the rotor

- Place the rotor.
- Use the 4753 rotor holding tool.
- Put medium Loctite and tighten the central nut.

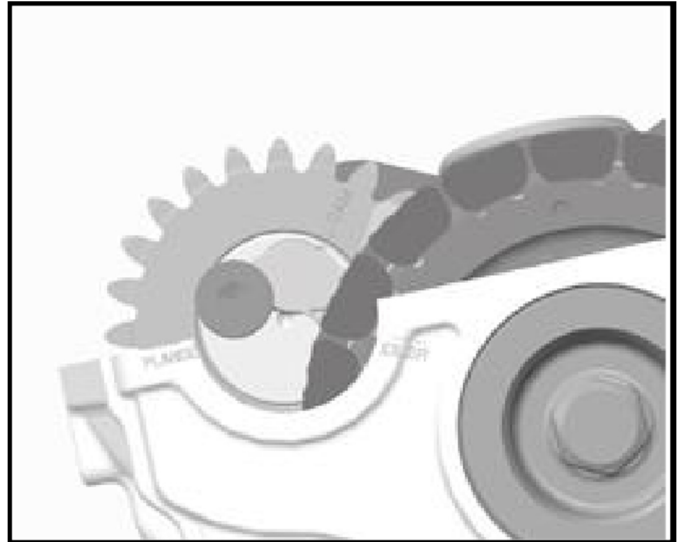
Tightening torque of the oil cap : 80 Nm.

» Installing the camshafts and setting the valve timing

- Clean and oil the bearings.
- Set the two camshafts and make sure that the visual marks «FLA» or «FLANGE» are aligned with the cylinder head gasket plane.
- Install the bearing cap (A).
- Screw the eight screws of the camshaft-bearing cap following the order shown in the picture.

Specified torque of the shaft bearing screws: 12 Nm.

- Remove the TDC 10338 tool.
- Using the ignition rotor, give the crankshaft at least one full turn and check the valve timing.



» Checking the valve clearance

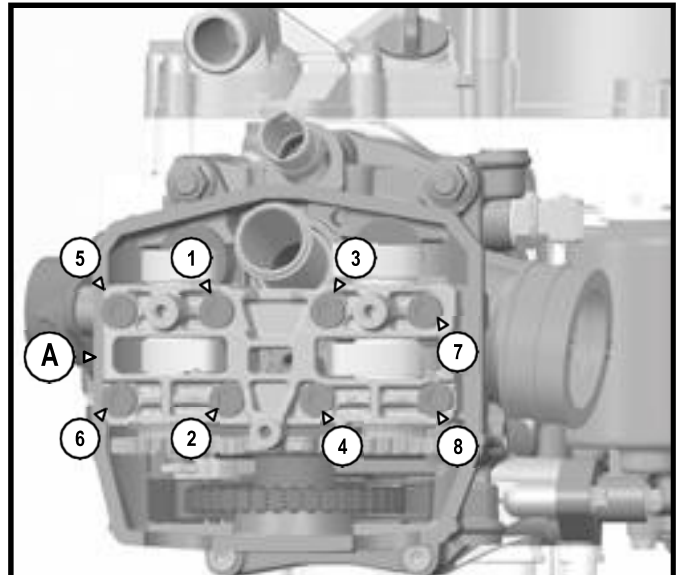
- Valve clearance must be checked when the engine is cold.
- With a shim set, measure the clearance between the bucket and the camshaft.

Valve clearance

Intake	0.15 – 0.20 mm
Exhaust	0.20 – 0.25 mm

- If clearances are not correct, change the pads after removing the distribution.
- Remove the cups.
- Measure the pad, replace it in order to obtain the needed clearance.

For existing pad thickness models refer to the spare parts catalog.



» Completing the engine assembly

- Clean the sealing surface of the cylinder head cover.
- Apply silicone sealant on both semi-circles.
- Fit the cylinder head cover gasket and cylinder head cover.
- Screw the cylinder head cover along with the O-rings of the 3 screws.

Tightening torque for screws cylinder head cover : 10 Nm.

- Applying copper grease on the threads of the spark plug.

Tightening torque of the spark plug : 16 Nm.

- Put in the TDC plug, tighten it to 15 Nm.

» Installing the ignition cover

- Set the guide pins.
- Fit the ignition cover gasket.
- Apply silicone dough on the wire guide.
- Put the 4 screws of the clutch housing.

Torque setting : 10 Nm.

- On the secondary shaft, put the O-ring, the spacer, the pinion and the washer.
- Apply red thread lock on the nut

Tighten to 100 Nm.

TIGHTENING TORQUE CHART

FRAME TORQUES			
Screw emergency stop button	M3	3Nm	
Spoke nut	M4	5Nm	
Battery screw	M4	7Nm	
Injection body cover screw	M4	3Nm	
Master cylinder cover screw	M4	7Nm	
T map sensor screw	M4	5Nm	
Odometer screw	M4	5Nm	Blue
Rear light screws	M4	1Nm	Blue
Frame protection screw	M4	2Nm	
Other frame screw	M5	7nm	
Air filter support nut	M5	10Nm	
Lever return plate	M5	7Nm	Blue
Actuator screw slows down	M5	8Nm	
Filter flap screw	M5	7Nm	Blue
TPS sensor screw	M5	8Nm	
Gas control screw	M5	10Nm	
Light switch screw	M5	7Nm	
Brake pedal end screw	M5	7Nm	Blue
Fork air bleed screw	M5	3Nm	
Regulator screw	M5	8Nm	Blue
Brake hose support screw	M5	7Nm	Blue
Injector support screw	M5	8Nm	Blue
Hand guard support screw	M5	10Nm	
Expansion tank screw	M5	10Nm	Blue
Other frame screw	M6	10Nm	
Starter cable nut	M6	7Nm	
Battery screw	M6	10Nm	
Screw Db killer	M6	10Nm	
Odometer support screw	M6	10Nm	Blue
Front mudguard screw	M6	12Nm	Blue
Chain guide screw	M6	12Nm	Blue
Skid plate bottom screw	M6	8Nm	Blue
Rear master cylinder screw	M6	8Nm	
Clutch master cylinder screw	M6	10Nm	
Front brake master cylinder screw	M6	10Nm	
Radiator side panel screw (Tank)	M6	3Nm	
Chain slider screw	M6	8nm	Blue
Chain guard screw	M6		
Fork protection screw	M6	8Nm	Blue
Chain sprocket protection screw	M6	12Nm	Blue
Brake pedal stop adjustment screw	M6	8Nm	
Brake pedal adjustment screw	M6	8Nm	
Starter relay terminal screw	M6	6Nm	
Selector screw	M6	12Nm	Blue
Screw Flap holder	M6	12Nm	Blue

TIGHTENING TORQUE CHART

FRAME TORQUES			
TPS sensor screw	M5	8Nm	
Gas control screw	M5	10Nm	
Light switch screw	M5	7Nm	
Brake pedal end screw	M5	7Nm	Blue
Fork air bleed screw	M5	3Nm	
Regulator screw	M5	8Nm	Blue
Brake hose support screw	M5	7Nm	Blue
Injector support screw	M5	8Nm	Blue
Hand guard support screw	M5	10Nm	
Expansion tank screw	M5	10Nm	Blue
Other frame screw	M6	10Nm	
Starter cable nut	M6	7Nm	
Battery screw	M6	10Nm	
Screw Db killer	M6	10Nm	
Odometer support screw	M6	10Nm	Blue
Front mudguard screw	M6	12Nm	Blue
Chain guide screw	M6	12Nm	Blue
Skid plate bottom screw	M6	8Nm	Blue
Rear master cylinder screw	M6	8Nm	
Clutch master cylinder screw	M6	10Nm	
Front brake master cylinder screw	M6	10Nm	
Radiator side panel screw (Tank)	M6	3Nm	
Chain slider screw	M6	8nm	Blue
Chain guard screw	M6		
Fork protection screw	M6	8Nm	Blue
Chain sprocket protection screw	M6	12Nm	Blue
Brake pedal stop adjustment screw	M6	8Nm	
Brake pedal adjustment screw	M6	8Nm	
Starter relay terminal screw	M6	6Nm	
Selector screw	M6	12Nm	Blue
Screw Flap holder	M6	12Nm	Blue
Seat lock screw	M6	10Nm	Blue
Other frame screw	M8	25Nm	
Valve nut	M8	8Nm	
Gripster nut	M8	12Nm	
Top nut rear sub frame	M8	25Nm	
Chain tensioner nut	M8	25Nm	
Handlebar flange screw	M8	20Nm	Cooper grease
Sprocket screw	M8	30Nm	
Steering stop screw	M8	25Nm	Blue
Brake disc screw	M8	35Nm	Red
Front brake calliper screw	M8	25Nm	Cooper grease
Frame chain guide screw	M8	25Nm	Blue
Bottom screw rear sub frame	M8	25Nm	Blue

FRAME TORQUES			
Fork leg screws	M8	20Nm	Cooper grease
Steering column clamp screw	M8	25Nm	Cooper grease
Front calliper bleed screw	M8	10Nm	
Roller chain screw	M8	25Nm	Blue
Cylinder head support screw	M8	30Nm	Blue
Lower triple clamp screw	M8	12Nm	Cooper grease
Upper triple clamp screw	M8	17Nm	Cooper grease
Engine axle	M10	60Nm	
Shock absorber foot axle	M10	50Nm	
Shock absorber upper axle	M10	50Nm	
Supporting nut	M10	25Nm	
Brake hose banjo screw	M10	25Nm	
Brake pedal screw	M10	25Nm	
Handlebar clamp screw	M10	40Nm	Red
Delta link axle	M12	50Nm	
H link axle	M12	50nm	
Frame link H axle	M12	50Nm	
Screw Lambda sensor	M12	30Nm	
Swing arm axle	M16	100Nm	
Front wheel axle nut	M20	50Nm	Cooper grease
Screw nut steering column	M20	30Nm	
Rear wheel nut	M24	100Nm	Grease
Hose guide screw	Parker	2Nm	
Headlight switch screw (Racing)	Parker	2nm	
Hand protector screws	Parker	3Nm	
Flap support screw	Parker	3Nm	
Fan screw	Auto-perforate	3nm	
Clamp		7Nm	

ENGINE TORQUES			
Engine speed sensor screw	M5	7Nm	Red
Stator screws	M5	7Nm	Red
Decompressor screw	M5	8Nm	Blue
Bearing lock plate screw	M5	8Nm	Blue
Oil collecting screw	M5	7Nm	Blue
Water pump impeller nut	M6	10Nm	Blue
Limiter shaft screw	M6	12Nm	Red
Starter pinion shaft screw	M6	12Nm	Red
Oil pump intermediate pinion shaft screw	M6	10Nm	Grease
Cylinder head cover screw	M6	10Nm	Grease
Clutch slave cylinder screw	M6	10Nm	Grease
Ignition casing screw	M6	10Nm	Grease
Clutch housing screw	M6	10Nm	Grease
Crankcase screws	M6	10Nm	Grease
Water pump cover screw	M6	10Nm	Grease
Electric starter screw	M6	10Nm	Grease
Camshaft guide plate screws	M6	10Nm	Blue
Locking finger screw selection	M6	10Nm	Blue
Oil pump cover screws	M6	10Nm	Blue
Selector star screw	M6	10Nm	Blue
External cylinder head screw	M6	10Nm	Blue
Timing tensioner shutter screw	M6	7Nm	
Distribution guide pad screw	M6	12Nm	Red
Timing tensioner pad screw	M6	12Nm	Red
Clutch spring screw	M6	10Nm	
Timing tensioner screw	M6	10Nm	Grease
Coolant drain screw	M6	7Nm	Grease
Exhaust pipe nut	M8	25Nm	
Exhaust pipe stud	M8	25Nm	
Selection shaft stop screw	M8	15Nm	Red
Camshaft bearing screw	M8	12Nm	Grease
Top dead centre manhole cap	M10	10Nm	Grease
Spark plugs	M10	15Nm	Cooper grease
Cylinder head nut	M10	1er passe 15Nm	Grease
		2eme passe 30Nm	
		3eme passe 50 Nm	
Cylinder stud	M10	25Nm	Blue
Ignition nut	M12	80Nm	Blue
Water temperature sensor	M12	20Nm	Yellow
Oil pressure regulator	M16	20Nm	Grease
Magnetic drain plug	M16	25Nm	Grease
Crankshaft compartment strainer	M18	25Nm	Grease
Clutch housing nut	M20	100Nm	Blue
Primary gear/crankshaft nut	M20	120Nm	Blue

ENGINE TORQUES			
Gearbox output sprocket nut	M20	100nm	
Water connection	M20	15Nm	Yellow
Oil filter cover screw	M24	15Nm	Grease
Valve shaft plug	M27	15Nm	Grease
Ignition housing plug	M27	15Nm	Grease
Oil suction strainer	M32	25Nm	Grease

CLEANING THE THROTTLEBODY

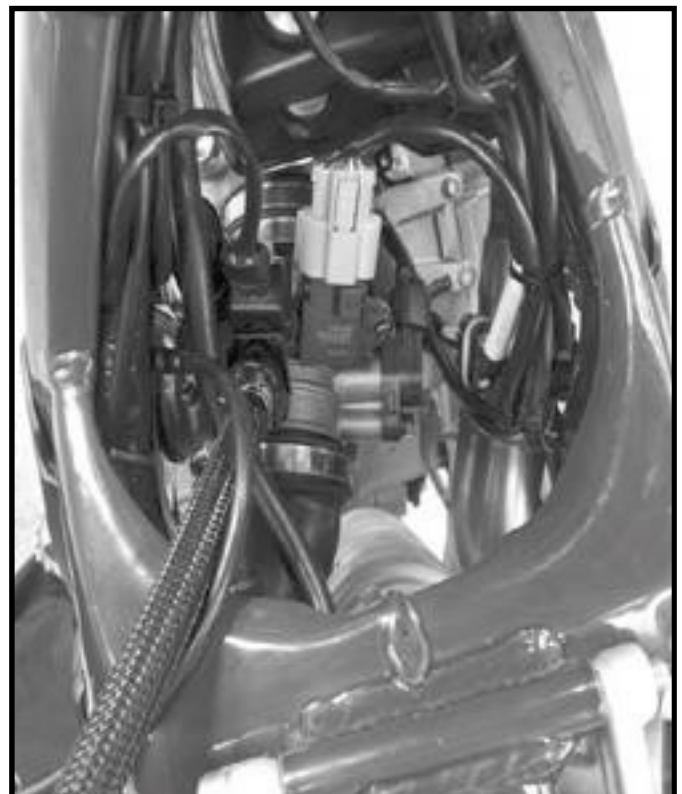
» Equipment

- Carburetor cleaner or Motul brand universal cleaner.
- Open-end wrench 8.
- Socket screwdriver 7.
- Hex key 2,5.



» Removing the throttle body

- Remove the seat.
- Remove the fuel tank.
- Remove the clamps of the throttle body.
- Remove the cover of the spreader.
- Remove the throttle cable.
- Remove the body.

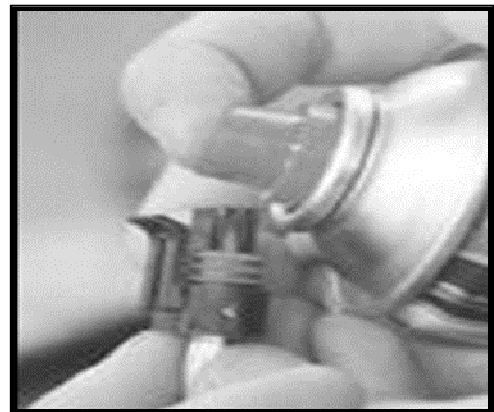


CLEANING THE THROTTLEBODY

- Unplug all connectors.
- Visually inspect.



- Clean with an universal cleaning solution.
- Blow.



» Cleaning the throttle body

- Clean the throttle body by means of a carburetor cleaner spray (Net Carbu).
- Be sure to clean the edge of the throttle valve on each side with the throttle fully opened.
- Clean the injector.
- Blow.



» Installing the throttle body

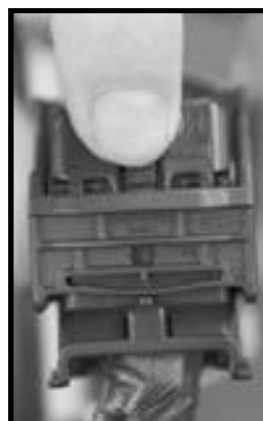
Reassemble the parts following the reverse order of that of the removal, put **special connector** grease inside the connections (power injector, GST, etc.).

If you remove the inlet sleeve, pay attention to the direction!

- Adjust the clearance of the throttle cable.



- Disconnect the computer connector. Visually inspect the connectors.
- Clean with carburetor or universal cleaner.
- Blow.



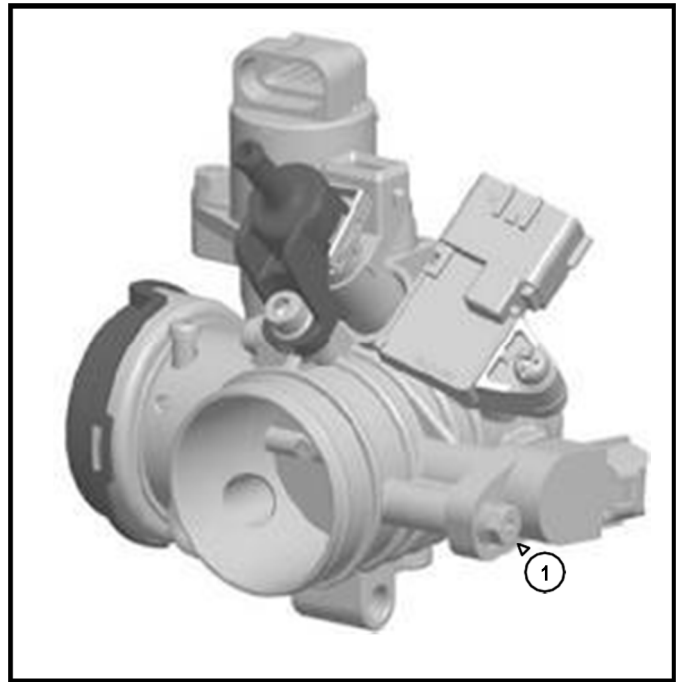
- Apply **special connector** grease.
- Reconnect.



The TPS of the throttle body monitors the position of the throttle. Its indexing is paramount to the proper functioning of the motorcycle.

If you replace it, follow this procedure.

- Unscrew the screw (1) and remove the TPS.
- Position the new TPS and the screw (1) without tightening it.
- Connect the motorcycle and run the Exxotest diagnostic software (see procedure below).



- Click on the Diagnostics menu logo



- Then click Sherco → M3C → Measuring parameters → Throttle position



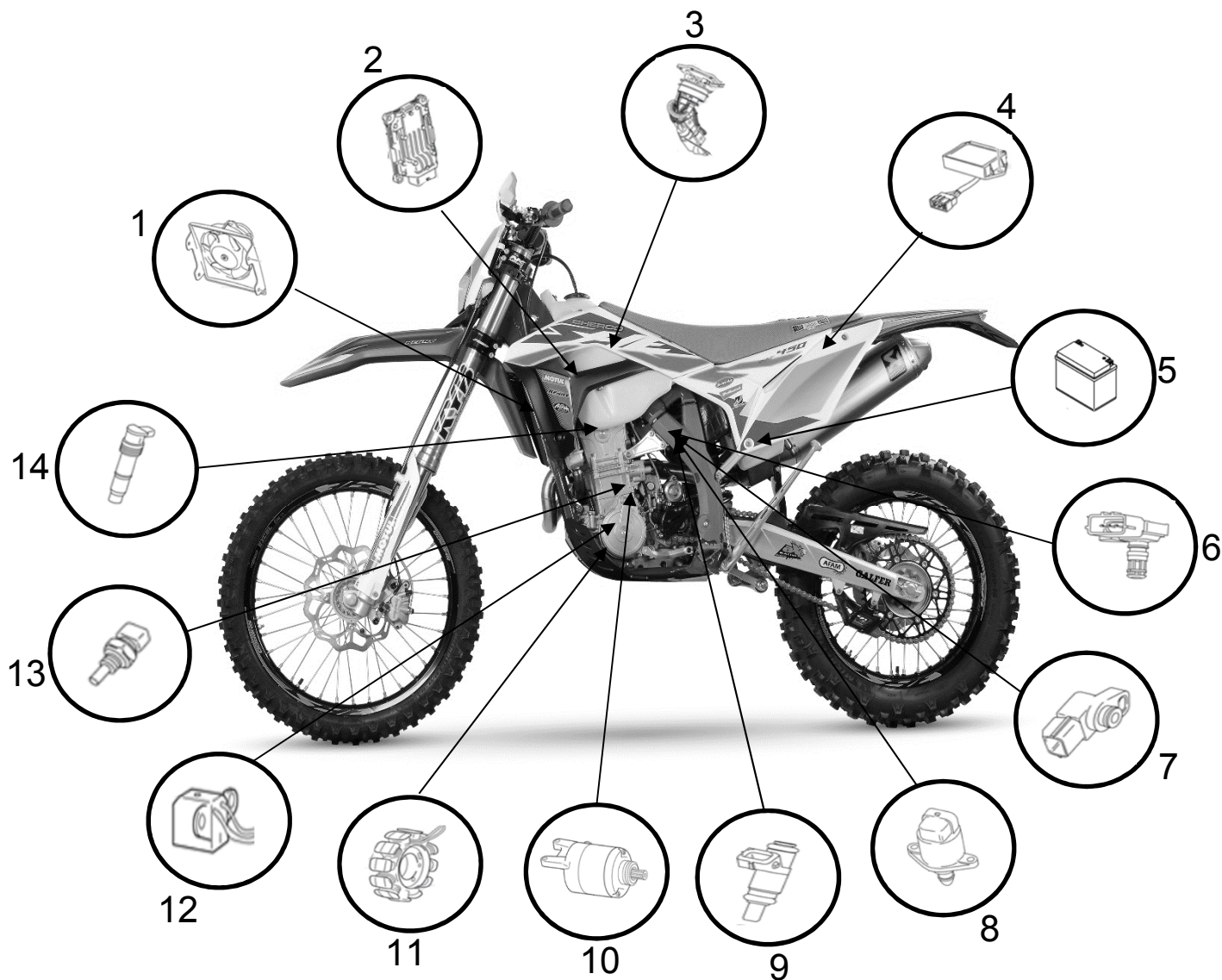
- Adjust the sensor position by rotating it (see picture) until the displayed value is set to 0.5v +/-0.05.

Once done, tighten the screw (1) to 4 Nm +/-0.7.



ELECTRICAL PART

Electrical components

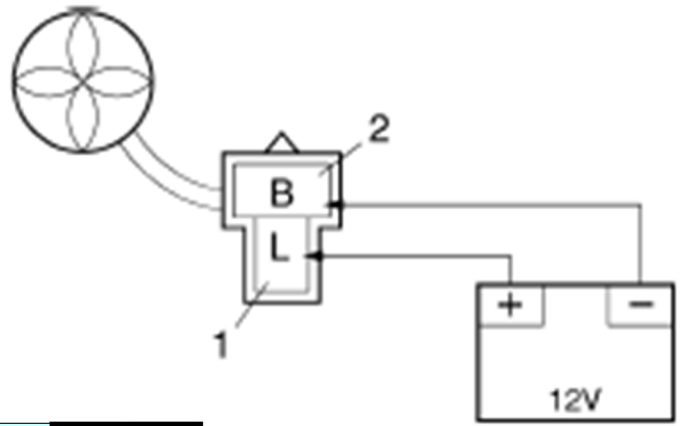


Position	Designation	Position	Designation
1	Fan	8	Stepper Motor
2	CDI	9	Injector
3	Fuel pump	10	Starter
4	Regulator	11	Alternator
5	Battery	12	Hall sensor
6	Map sensor	13	T° sensor
7	TPS sensor	14	Ignition coil

ELECTRICAL PART

1- Fan control

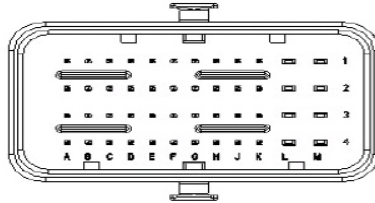
- Disconnect the fan wiring harness.
- Connect a 12V battery directly to the fan as shown on the diagram.
- Make sure the fan turns correctly without any hard point or unnatural noise.



2- CDI

1	VSENS	CAN_H	CAN_L	CPS -	CPS +	protecte d	protecte d	protecte d	protecte d	Main Relay	VBR	IGN
2	ACC_R protecte d	Rpm Gauge	Caniste Purge	TSW	protecte d	MAP	SCND2	protecte d	Stop SW	FAN Motor (optional)	Hege HEATE R	protecte d
3	ACC_R protecte d	MIL	SCND1	STF2	ground	TIA	TFS	VEH SPEED	protecte d	protecte d	FUEL pump	PGND
4	VBR	VBD	STF2	STF1	STF1	TCO	Hege sens	protecte d	Carto SW	protecte d	INJ (I)	PGND
A	B	C	D	E	F	G	H	J	K	L	M	

Green	Grounds
Red	Supplies
Yellow	Logic or Freq inputs
Orange	VR Freq inputs
Light Green	Freq outputs
Purple	Analog inputs
Light Yellow	Logic or Analog inputs
Light Blue	Communications lines
Light Cyan	1A outputs
Light Blue	ATM36 outputs
Dark Blue	Ignition



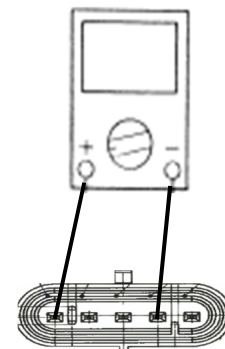
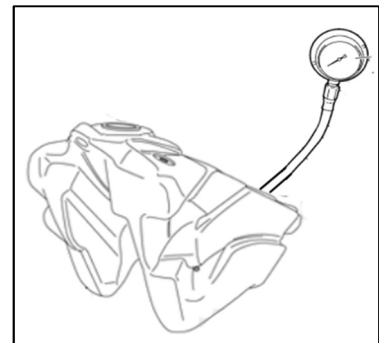
3- Fuel pump control

- Disconnect the fuel pump hose and connect the pressure measuring tool ref: **8691**.
- Pressurize the pump by operating the starter
- A constant pressure of **3 bars** must be measured.

Fuel pump supply control

- Connect a multimeter between the positive terminal of the pump (green wire) and the negative terminal of the pump (blue wire).

Supply voltage 12V



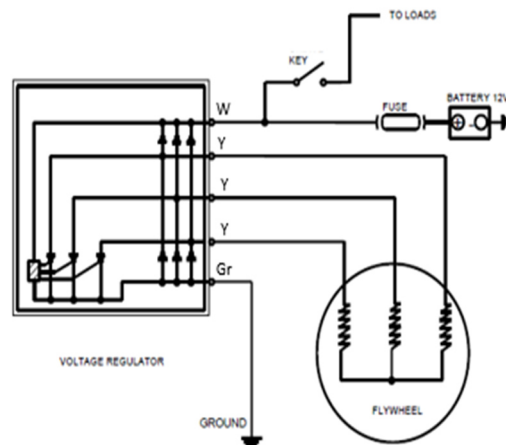
4- Voltage regulator control

- Voltage regulator :

On regulator output (White wire)
A 3500 Tr/min : 14.4V +/- 0.5V

- Diode bridge check :

Connect a multimeter between the positive (white wire) and each of the phase (yellow wire).
Resistance should be noted in a sense of measurement



5- Battery control

- Connect a multimeter to the + and the – terminals of the battery and check its voltage

Battery and check its voltage.

Value readings:

12.8V → Charged battery

12.7V or under → Charge battery

Under de 12V → Replace battery



KEYLESS System

The bike has a «keyless» system. It allows the bike to start without any key or ON/OFF switch. It automatically turns on and it turns off after 30 seconds of non use of the bike. Lithium-Ion batteries are far lighter than lead batteries, have a low self-discharge rate, and have more starting power at temperatures over 15 °C (60 °F). At low temperatures, however, the starting power of lithium-Ion batteries drops to below that of lead batteries.

Multiple starting attempts may be needed. Press the electric starter button for 5 seconds, and wait 30 seconds between attempts. The pauses are necessary so that the created heat can distribute through the lithium-Ion battery and the battery is not damaged.

If the charged lithium-Ion battery does not or only weakly turns over the electric starter when temperatures are below 15 °C (60 °F), then the battery is not faulty, but needs to be warmed up internally to increase its starting power (current output). The starting power increases as the battery warms up.

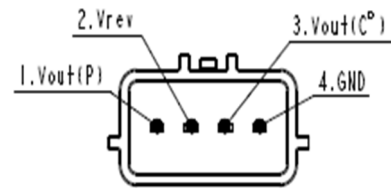
›| 6-Map sensor control

- Check the output voltage of the sensor.
- Connect the multimeter to the sensor (harness side) between terminal N°3 (positive) and terminal N°4 (negative).

Then, between terminal N°1 (positive) and terminal N°4 (negative).

Sensor output voltage :

Between 3 and 5 V



›| 7-TPS sensor control

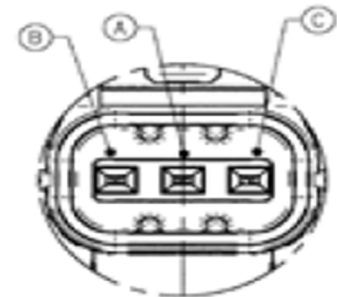
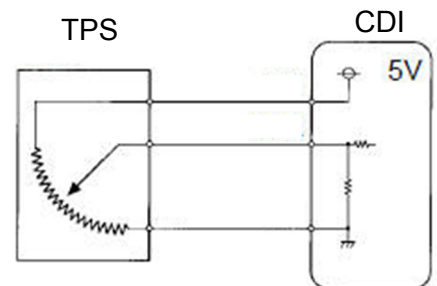
- Measurement of the output voltage of the TPS sensor.
- Connect a multimeter to the output terminals of the TPS sensor (Positive [B] – negative [A]) by keeping it in the fully closed position:

TPS sensor output voltage : 0.4V – 0.6V

- TPS sensor input voltage measurement.

Connect a multimeter to the input terminals of the TPS sensor (Positive [C] – negative [A]).

TPS sensor input voltage : 5V



- Measurement of the resistance TPS sensor:
- Remove the injection body and measure the resistance directly across the sensor.

• Butterfly closed :

- Between + (rouge) et – (noir): 5 +/- 20%
- Between signal (bleu) et – (noir): 1.25 à 1.55
- Between signal (bleu) et + (rouge): 5.3 +/- 20%

• Butterflu opened :

- Between + (rouge) et – (noir) : 5 +/- 20%
- Between signal (bleu) et – (noir) : 4.6 +/- 20%
- Between signal (bleu) et + (rouge) : 2.05 +/- 20%

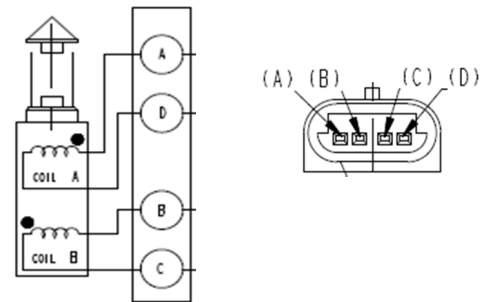


8- Stepper motor control

- Checking the stepper motor coils.
- Connect the multimeter to the sensor (harness side) between terminal N°A and terminal N°D.

Then, between the terminal N°B and terminal N°C.

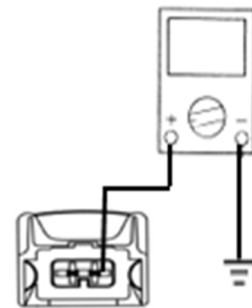
There must be continuity between the terminals ; if not, replace the motor.



9- Injector control

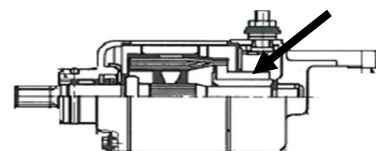
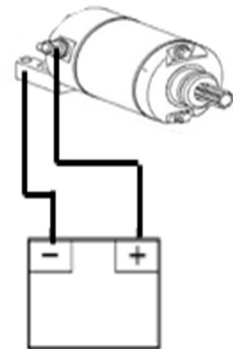
- Measure the input voltage of the injector.
- Connect a multimeter between the green supply wire and the earth.

Injector supply voltage : 12V



10- Starter control

- Remove the starter and position it in a vice
- Connect a battery directly to the starter (positive on the starter terminal, negative on the starter body) as shown on the diagram.
- In the event of abnormal operation, open the starter body to clean the contact between the carbon brushes and the starter track.



11- Alternator control

- Checking the resistance of the alternator windings.

Connect the multimeter between each phase of the alternator (yellow wire) and ground to measure the resistance.

Winding resistance: $0.44\Omega \pm 15\%$

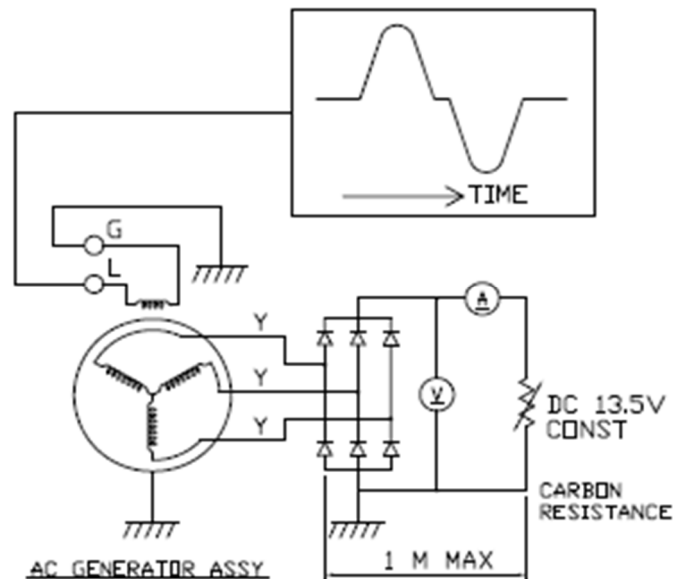
- Checking the alternator output voltage.

Connect the multimeter between each phase of the alternator (yellow wire) and ground (multimeter in alternating position)

Measure the output voltage.

At idle speed: $22V \pm 2V$

At 6000 R/min: $77V \pm 3V$



12- Hall sensor control (Crankshaft)

- Sensor resistance check.

Connect the multimeter between the blue and green wires of the sensor and measure the resistance.

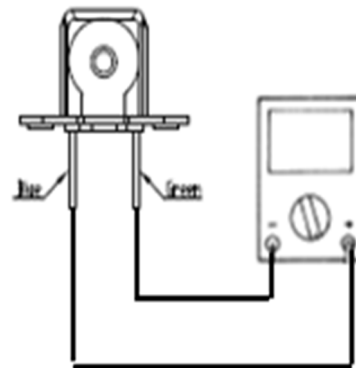
Sensor resistance: $120\Omega \pm 10\%$

- Check the output voltage of the sensor.

Connect the multimeter between the blue and the ground, and check the voltage.

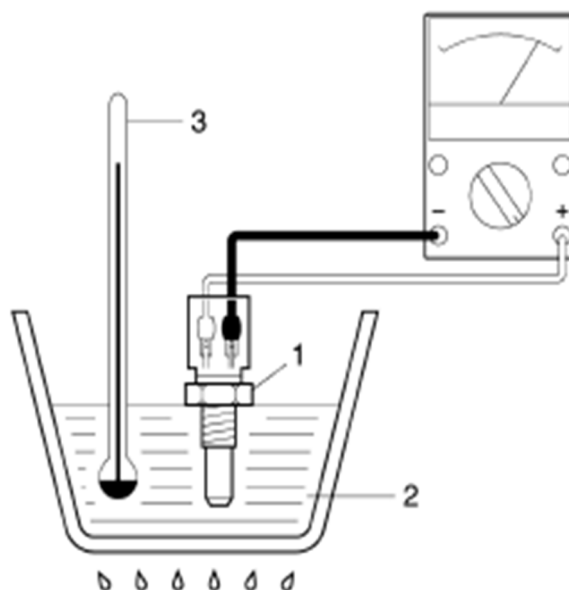
At 300 R/min: 1.7V minimum

At 10000 R/min: 120V maximum



13- Water sensor control

- Drain the coolant.
- Remove the temperature probe.
- Immerse the sensor 1 in a container filled with coolant 2.
- Immerse a thermometer 3 in the liquid to check its temperature.
- Heat the liquid slowly and check the resistance of the sensor using a multimeter connected as shown in the diagram depending on the temperature of the liquid, referring to the table below.

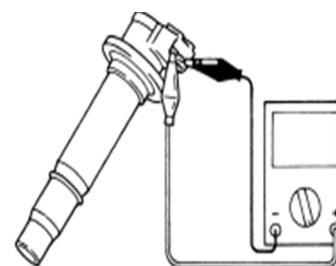


TEMPS (°C)	RESISTANCE (Ω)
25	3000
30	2415
40	1620
50	1081
60	748
70	528
80	379
90	278
100	206

14- Ignition coil control

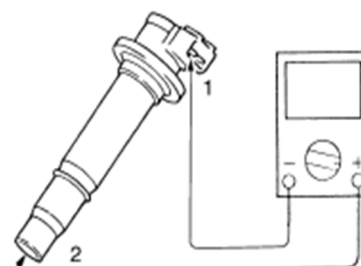
- Checking the resistance of the primary coil.
Connect the multimeter as shown in the diagram and measure the resistance.

Primary winding resistance :
Between 0.85 and 1.5 Ω



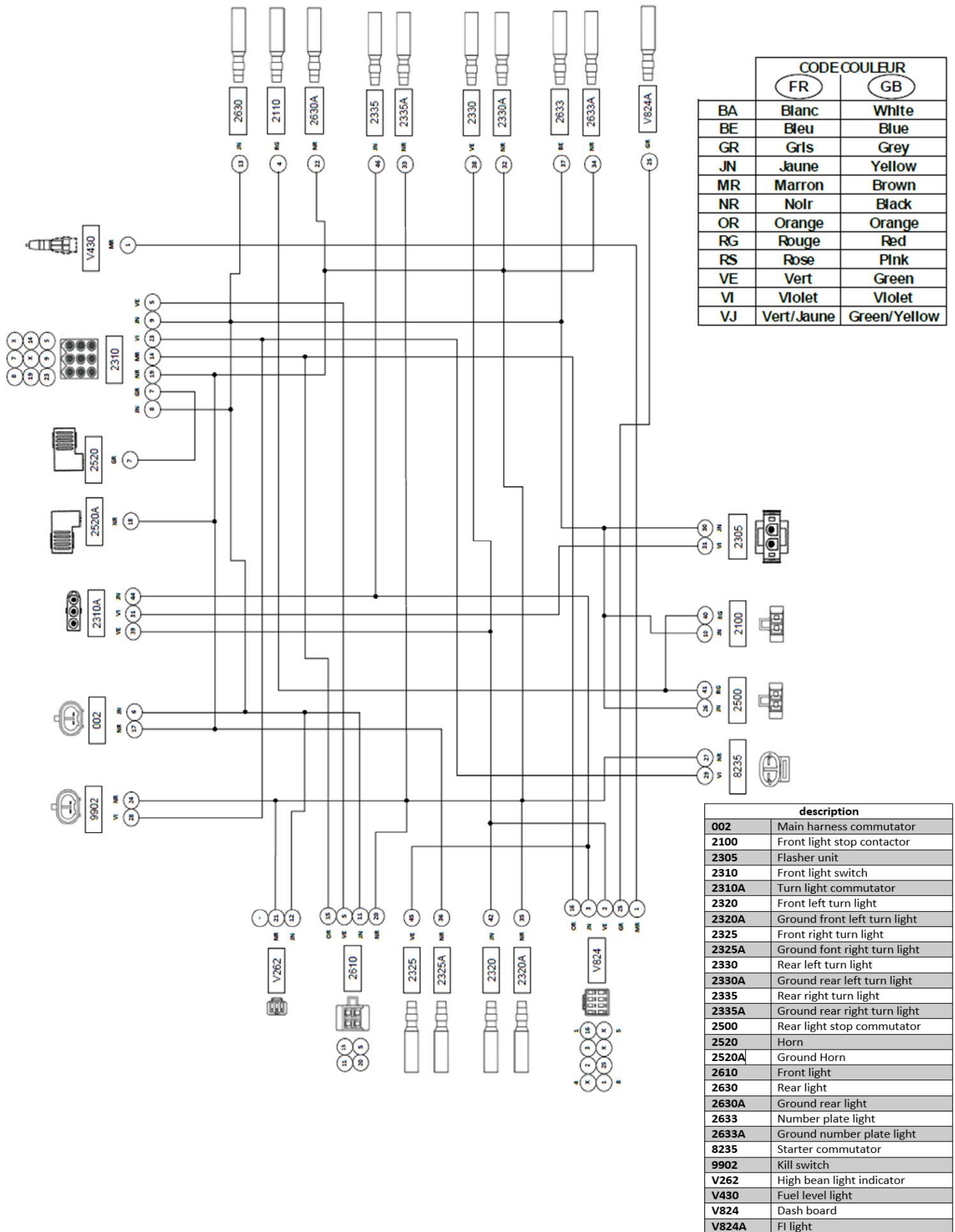
- Checking the resistance of the secondary coil.
Connect the multimeter as shown in the diagram and measure the resistance.

Secondary coil resistance :
Between 10 and 14 KΩ



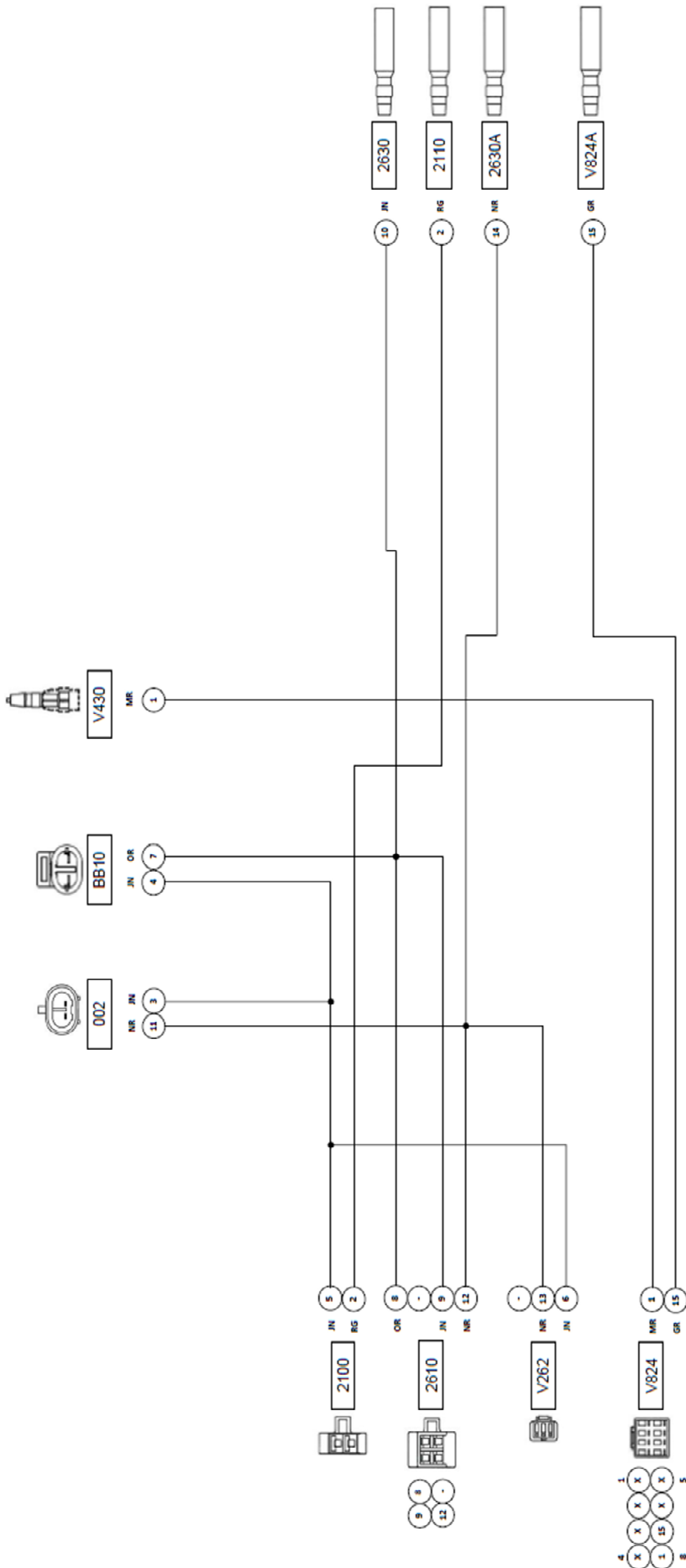
WIRING HARNESS

Homologated light wire harness (8145)



WIRING HARNESS

» Racing light wire harness (6845)

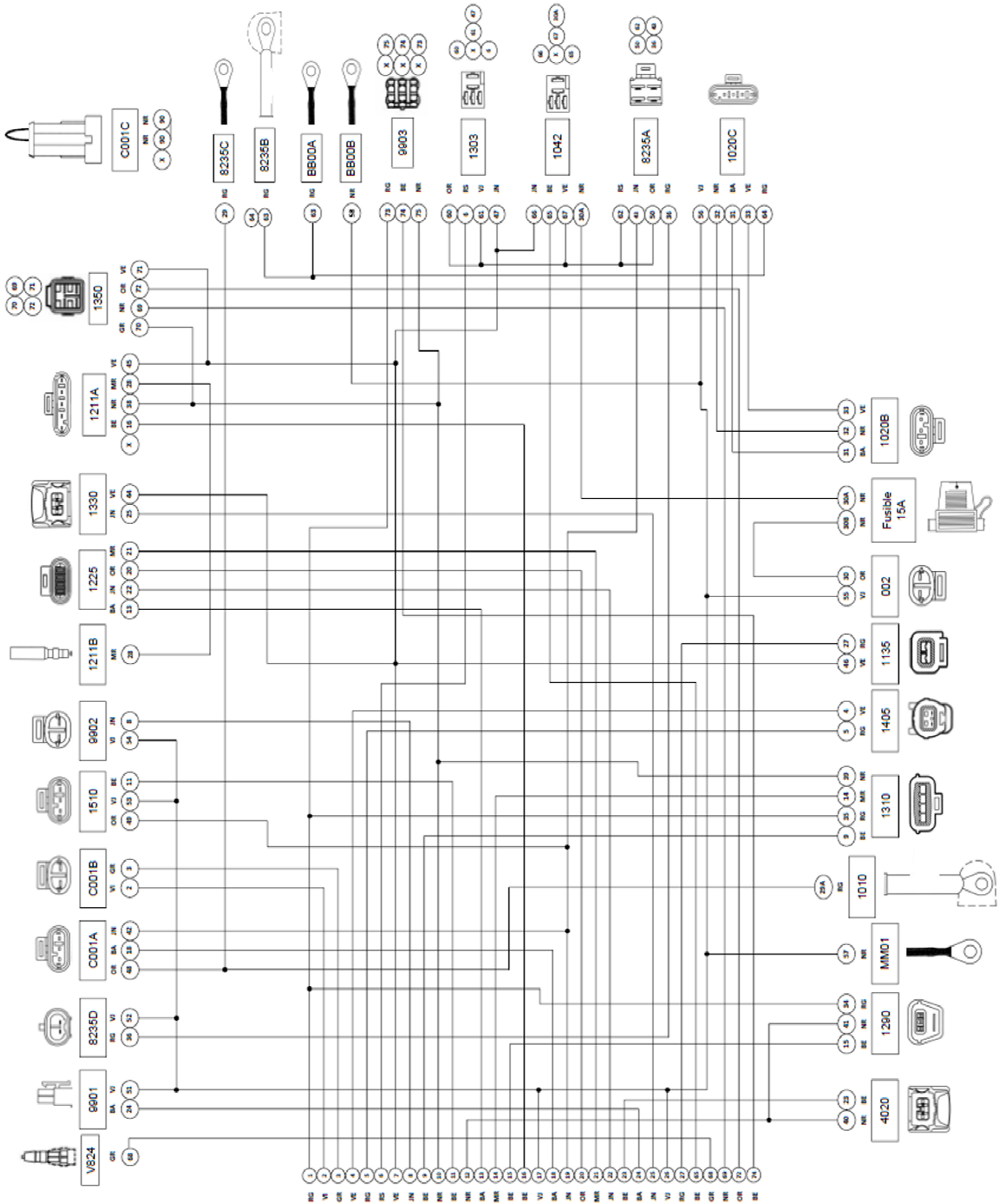


CODE COULEUR		
	FR	GB
BA	Blanc	White
BE	Bleu	Blue
GR	Gris	Grey
JN	Jaune	Yellow
MR	Marron	Brown
NR	Noir	Black
OR	Orange	Orange
RG	Rouge	Red
RS	Rose	Pink
VE	Vert	Green
VI	Violet	Violet
VJ	Vert/Jaune	Green/Yellow

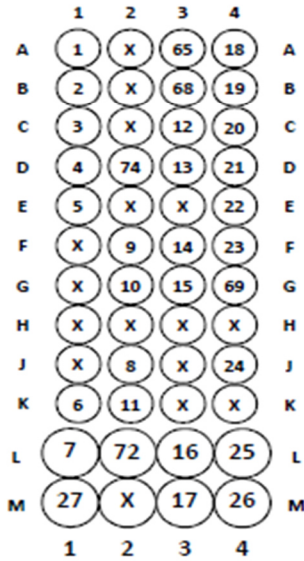
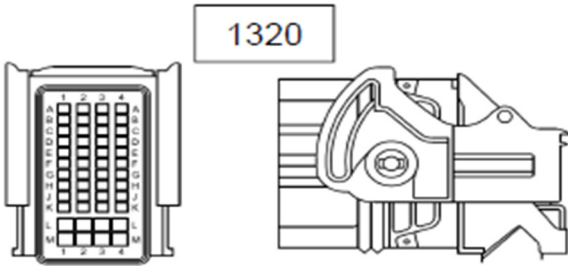
description	
002	Main harness commutator
2100	Front brake light contactor
2110	Stop rear light
2610	Front light
2630	Rear light
2630A	Ground light
Bb10	Light switch
V262	High beam light indicator
V430	Fuel level light
V824	Dash board
V824A	FI light

WIRING HARNESS

► Main wire harness (6781)



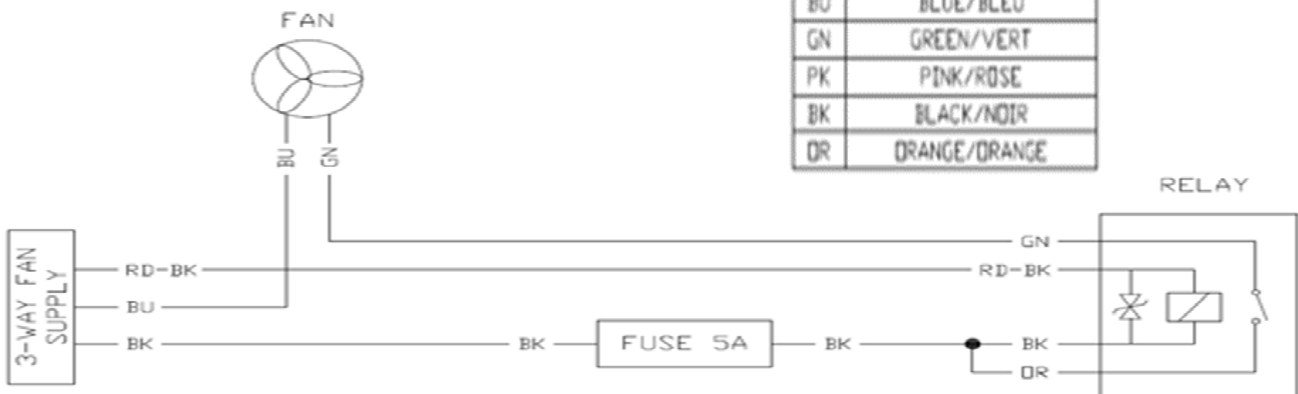
WIRING HARNESS



	CODE COULEUR	
	FR	GB
BA	Blanc	White
BE	Bleu	Blue
GR	Gris	Grey
JN	Jaune	Yellow
MR	Marron	Brown
NR	Noir	Black
OR	Orange	Orange
RG	Rouge	Red
RS	Rose	Pink
VE	Vert	Green
VI	Violet	Violet
VJ	Vert/Jaune	Green/Yellow

	Description
002	Light harness commutator
1010	Starter
1020B	Alternator
1020C	Regulator
1042	Light relay
1135	Ignition coil
1211A	Fuel pump
1211B	Fuel gauge
1225	Stepper
1290	TPS
1303	Ignition relay
1310	Air flow sensor
1320	ECU
1330	Injector
1350	Oxygen sensor
1405	TDC sensor
1510	Fan motor group
4020	Cooling sensor
8235A	Starter relay
8235B	Starter battery commutator
8235C	Ground starter commutator
8235D	Engine starter commutator
9901	Switch Map
9902	Kill switch
9903	Tilt Sensor
BB00A	Battery
C001A	Shunt
C001B	Diagnostic tool connector
C001C	Shunt
V824	FI light
Fusible	Fuse 15A
MM001	Ground

► Fan wire harness (3577)

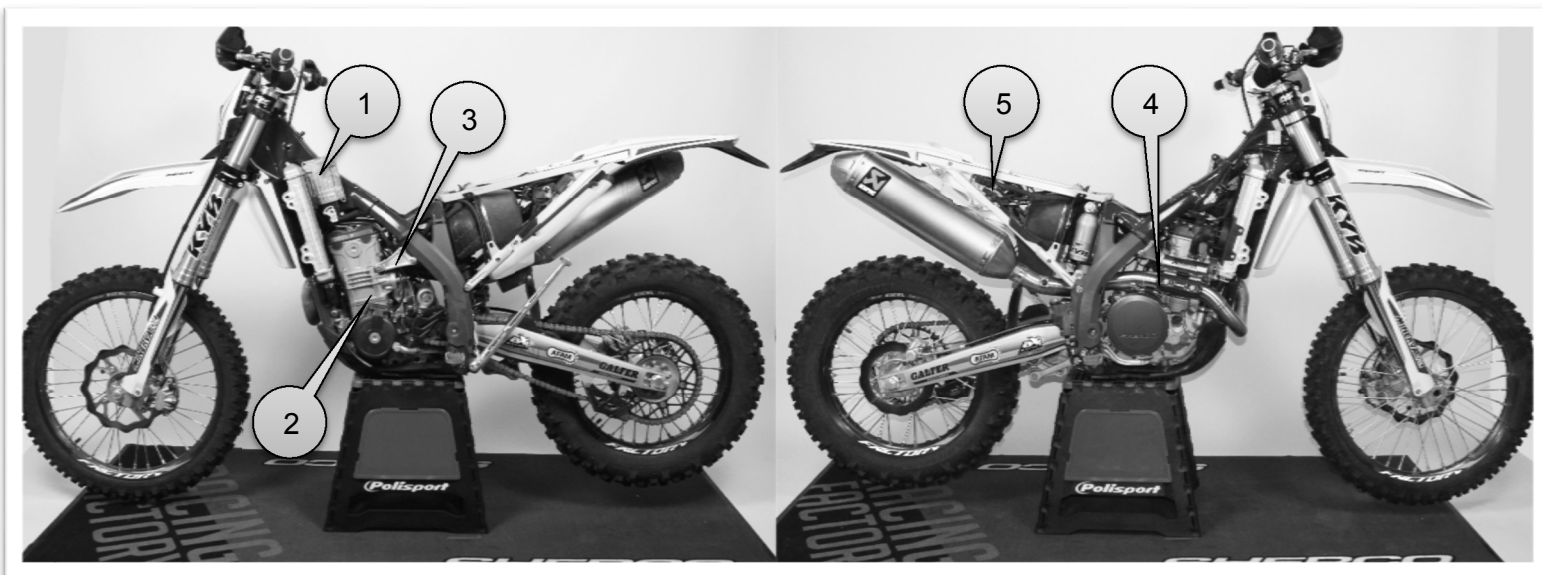


COLOR CODE	
RD	RED/ROUGE
BU	BLUE/BLEU
GN	GREEN/VERT
PK	PINK/ROSE
BK	BLACK/NOIR
OR	ORANGE/ORANGE

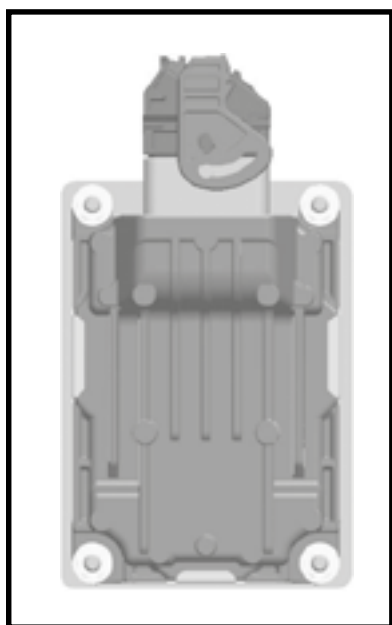
INJECTION DIAGNOSTIC TOOL SYNERJECT

» 1- Presentation of the SYNERJECT injection system

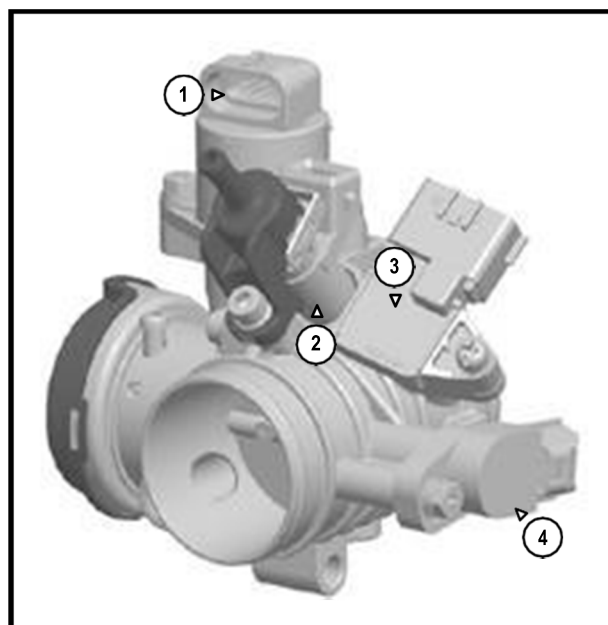
1.1- Your Sherco 450/500 is equipped with a Synerject injection system consisting of an M3C calculator, a Ø42 mm throttle body, an ignition and a specific wiring harness.



N°	Description	Location
1	Synerject M3C Calculator	Left side of the frame
2	Engine speed sensor (pick-up)	Upper part of the ignition cover
3	Synerject Ø42 mm throttle body	
4	Water temperature sensor	At the back of the cylinder head, on the right side
5	2-way sealed diagnostic connector (labeled "ECU")	At the rear side panel



SynerjectM3C Calculator



Synerject Ø42mm Throttle Body

N°	Description
①	Stepper motor (idle control and engine brake)
②	Injector
③	Temperature / pressure sensor (TMAP)
④	TPS : throttle position sensor

1.2- Exxodiag diagnostic description tool reference 4967

The diagnostic tool allows you to perform diagnostic operations, to update injection mapping and to verify certain information (serial number, operating hours, etc.).

1.3- Composition of the diagnostic tool

The case consists of a cable with a USB connector to MUX, a MUX device, a MUX cable to the motorcycle diagnostic connector, an installation CD, and a user manual.

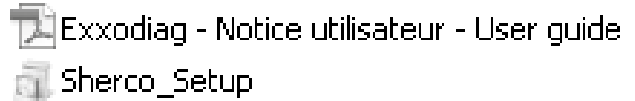
INJECTION DIAGNOSTIC TOOL SYNERJECT

1.4- Diagnostic tool installation

In case of problem during the installation, please contact EXXOTEST at +33 (0)4 50 02 34 34 or by mail to courrier@exxotest.com.

A- Software and drivers installation :

- Open the installation CD on your computer.
- Run « Sherco_Setup ».



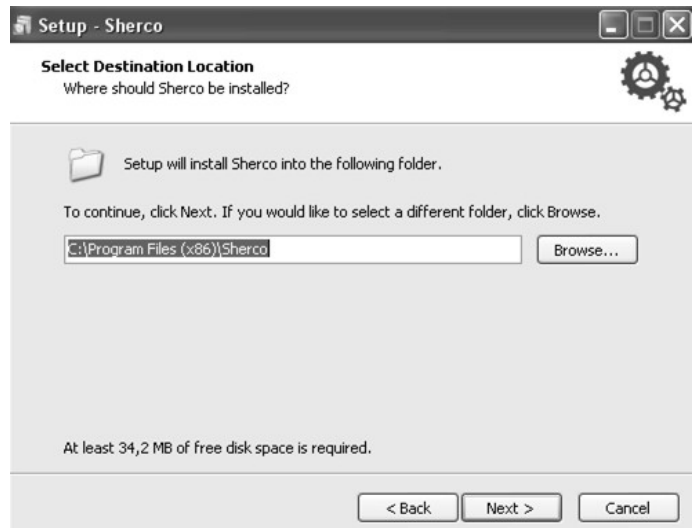
- Select the language.



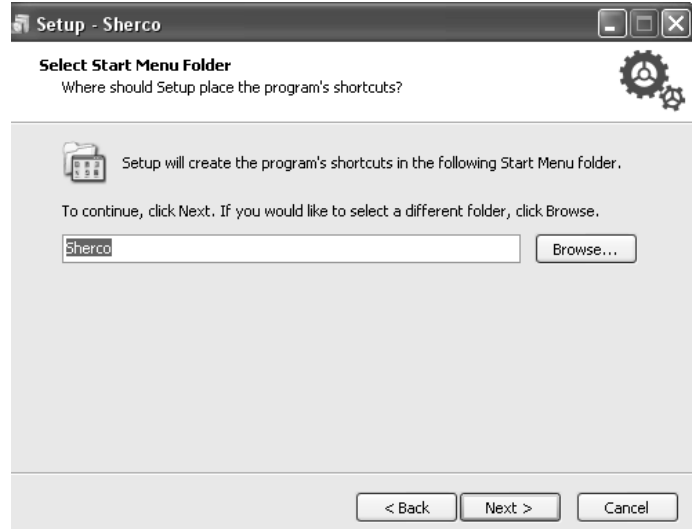
- Click on « Next ».



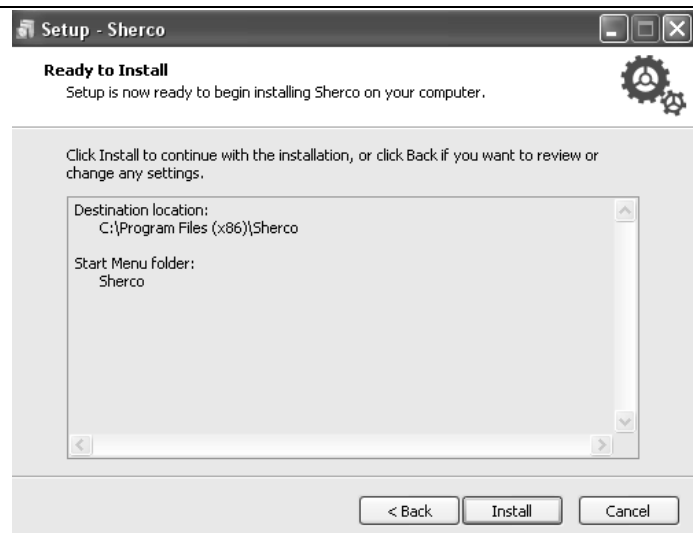
- Choose the installation folder.



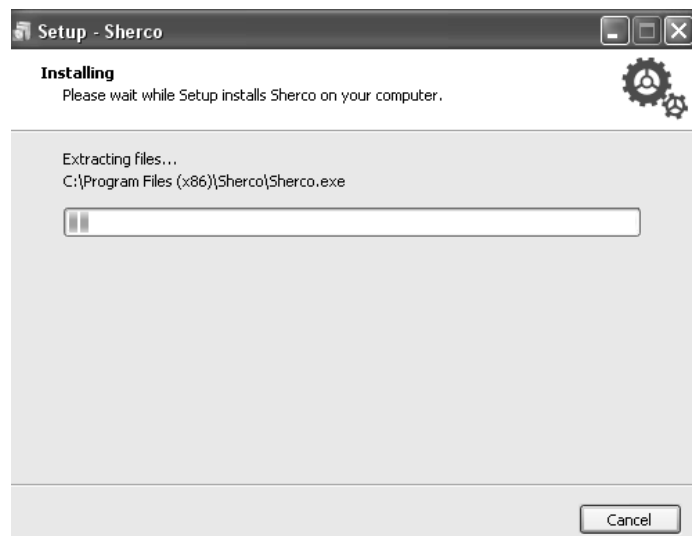
- Click on « Next ».



- Click on « Install ».



- Installation in progress.



INJECTION DIAGNOSTIC TOOL SYNERJECT

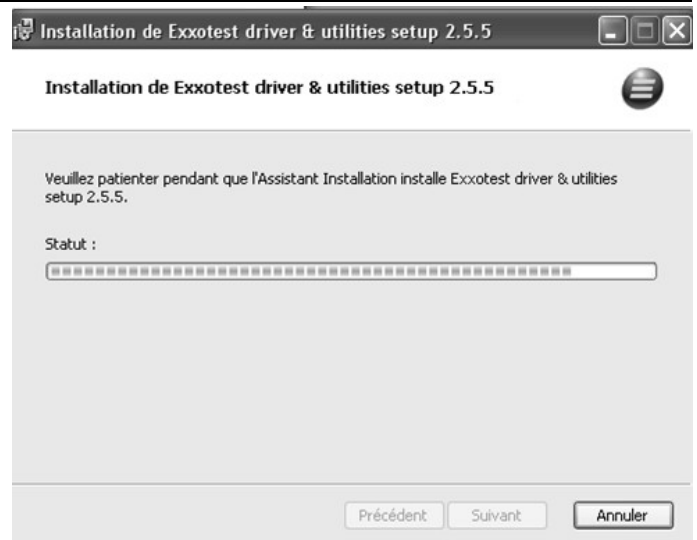
- Check the box « Start the driver installation » and click on « Finish ».



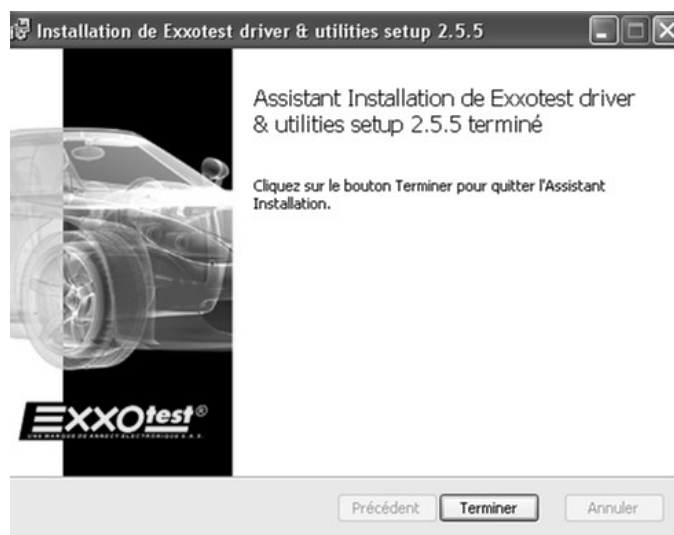
- The following window will open. Read the terms of the license agreement. Check the box « I accept the terms of the license agreement » and click on « Install ».



- Installation in progress.



- The following window will open. Click on « Finish ».



The installation is complete.

B- Connect the « MUXDIAG II » cable and its interface to a USB port on your computer.
Connect the cable to the diagnostic connector of the motorcycle.

Make sure the « MUXDIAG II » unit is properly powered by checking the LED :

- Solid blue: PC connection properly established.
- Flashing blue: communication with PC in progress.
- Blue off: no connection to the PC, or device in standby; it can also indicate a problem with the USB connector.
- Solid green: firmware issue.
- Flashing green (slow): firmware correctly run.
- Flashing green (fast): communication with PC in progress.
- Green off: no firmware.
- Solid red: correct power supply to the card.

- All LEDs OFF: the outlet is not powered on, or is off or USB in on standby mode.

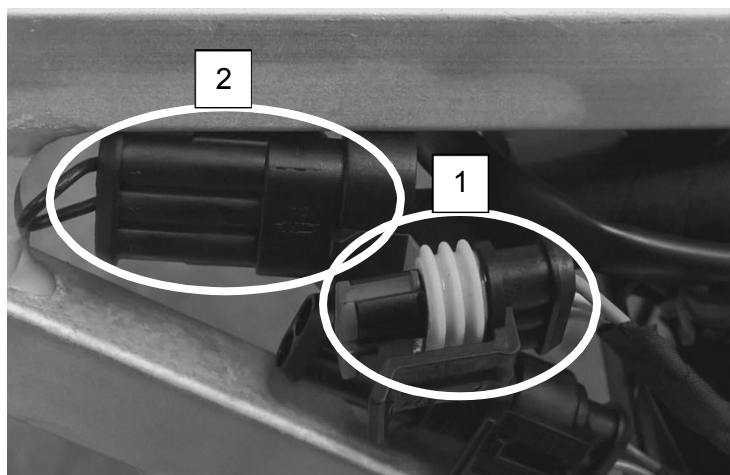
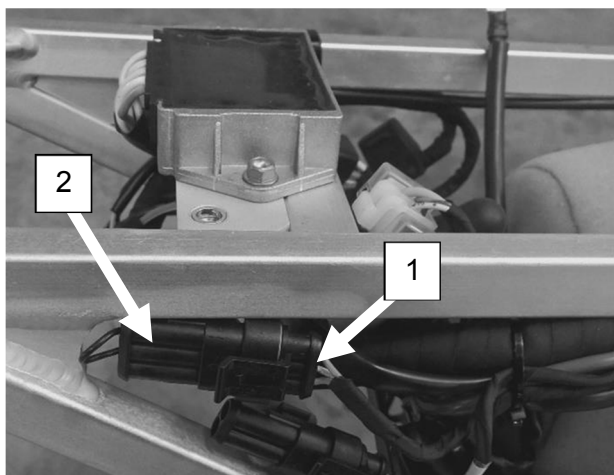
2- Software overview

2.1- Connection with Keyless system

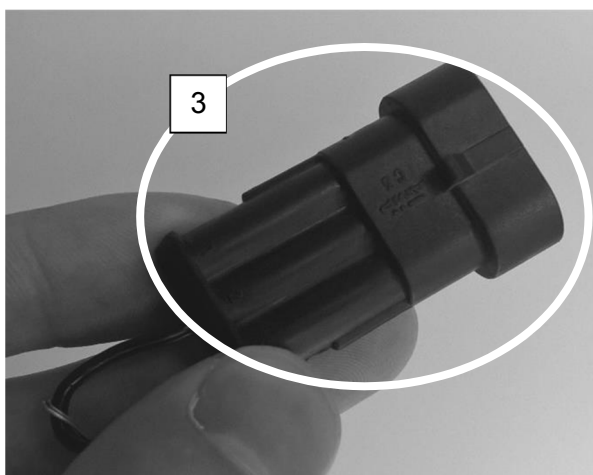
Sherco had a Keyless system on its motorcycles which allows the bike to switch on without any key and switch off automatically after 30seconds of non-use.

This last point blocks the diagnostic, this is why it is necessary to follow the steps down below before doing it.

1. Remove the plug (1) from the connector (2) (located on the rear sub frame – on the right part of the bike).



2. Take the shunt (3) (reference 6267) and connect the plug (1) into it.



3. You can now do the diagnostic by following the next explanations.

INJECTION DIAGNOSTIC TOOL SYNERJECT

Information : to set up the connection with the motorcycle, the motorcycle must be switched on (On). To navigate through the different menus, the USB cable with the «MUXDIAG II» device only may be connected to the computer..

Run the software using the icon



The following menu will come up :




2.2- Software settings : configuration menu





Configuration



In this menu, you can modify :

- The diagnostic plug. You can refresh the list by hitting the button.  The number must match the number of the « MUXDIAG II » device.
- The languages available in the software: English, French, Spanish, Portuguese, German, Italian (the installation CD provided may not include all languages). Update the software-> page 53).
- Set the unit system.

- Click  to return to the home screen.

- Click  to save the changes.

2.3- Update menu and synchronization



A- In this menu, you can update the diagnostic software tool :

- To determine whether an update is available, check that you have an Internet connection, and then click on the following icon




- If an update is available, the following window will come up:




- If no update is available, the following message will come up :



INJECTION DIAGNOSTIC TOOL SYNERJECT

- Click on  to start downloading the update.



- The following message will come up :
- Click on  to start installation.



- Resume the installation process -> page 46. It is not necessary to restart the installation of the drivers.

INJECTION DIAGNOSTIC TOOL SYNERJECT

B- Configuration of Internet access parameters

It may be necessary to set up a proxy server to access the Internet.

- Click on 

- Fill in the following settings if necessary.

Configuration of proxy settings

- None
 Use the following settings

Customized settings

Address / Port	<input type="text"/>	<input type="text"/>
User	<input type="text"/>	
Password	<input type="text"/>	

- Click on  to save your changes.

3- Using the software

Diagnostic menu and injection mapping update



General :

- Click on « Sherco ».

Choose vehicle



Sherco

- Click on « M3C ».

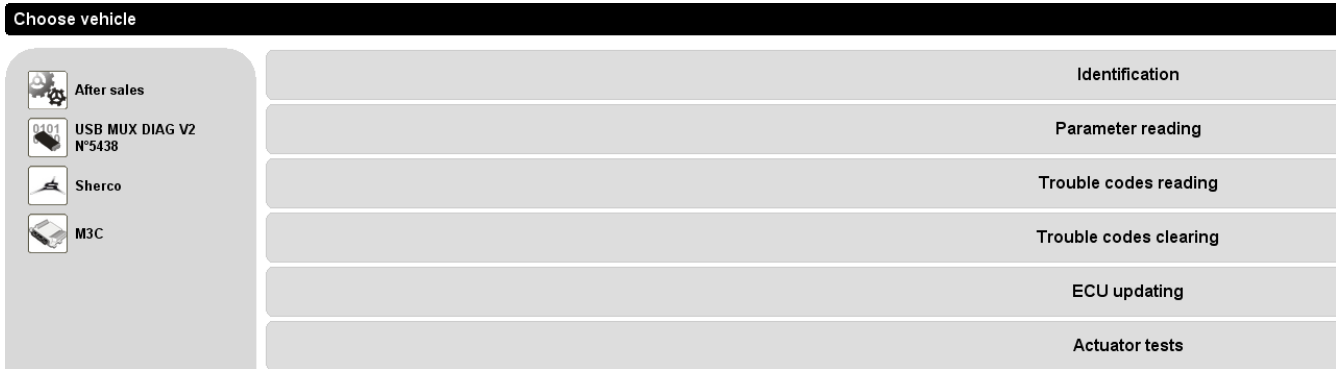
Choose ECU



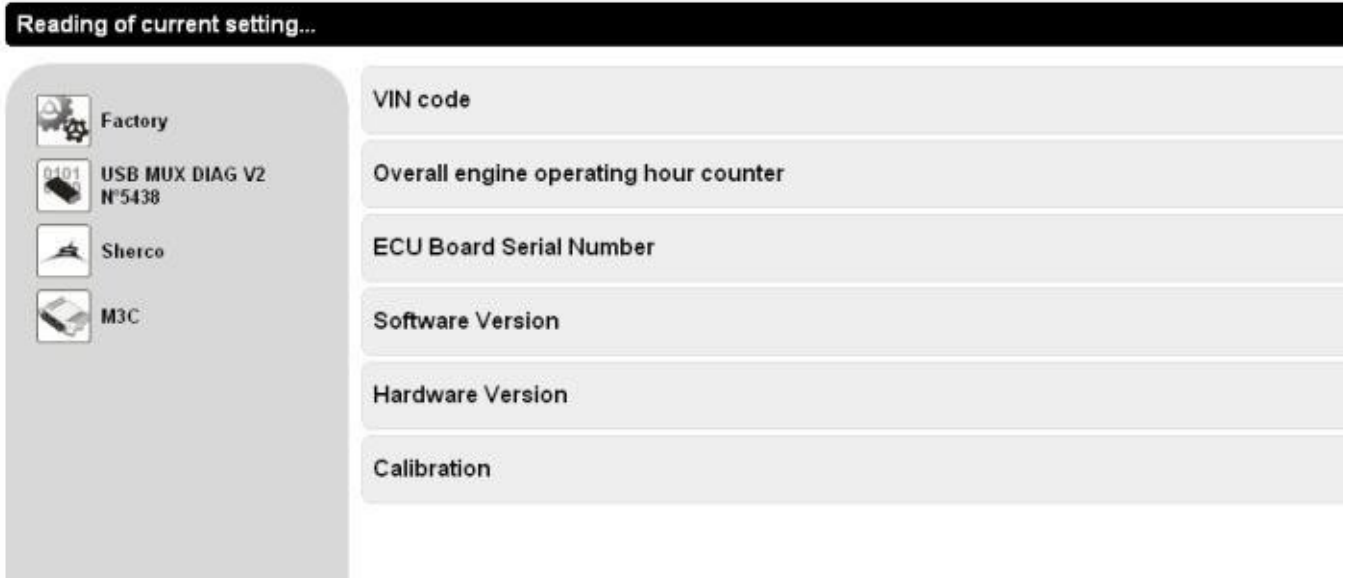
M3C

INJECTION DIAGNOSTIC TOOL SYNERJECT

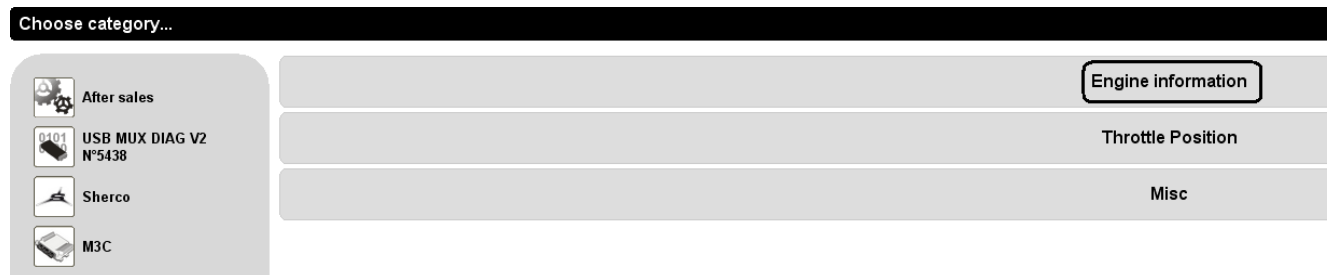
- You reach the following menu:



3.1- Identification : checking identification (serial number, vehicles operating hours calibration number).








3.2- Measuring the parameters : general parameters (speed, pressure, stepper, etc).



A- Engine information:

- The main values of the system appear :

Reading of current setting...

 After sales	RPM	0 tr/mn
 USB MUX DIAG V2 N°5453	Engine Temperature	31 °C
 Sherco	Battery Voltage	11.9 V
 M3C	Air temperature	28 °C
	Ambient pressure	1012 mb
	Stepper position	0
	Throttle position	0 %

Details :

- Stepper Position : valeur d'ouverture de la valve d'air (stepper)-> 35 < 50 < 75.
Too weak value : for example , valve leak/engine air intake.
Too high value : dirty injection body.

Information : correct value of the air valve: motor at 80 °C after being operated for 15 m and idle for 2 m.

- Throttle position : engine stopped value : 0%. Maximum opening : 100%.
If the value is not equal to 0% when the engine is off, it means that adaptation has not been made:
Reboot the system several times (Switch off ignition. Wait until the relay slap calculator makes a clacking sound. Switch the motorcycle back on). The step equals 0.5%.
- State Stop button: state of the emergency stop button. 0: disabled, 1: enabled.
- Engine status: ES (engine ready to start), ST (engine starts), IS (idle regime), PL (acceleration), PU (deceleration), PUC (cut injection deceleration).

B- Other values are displayed in the windows :

Throttle position :

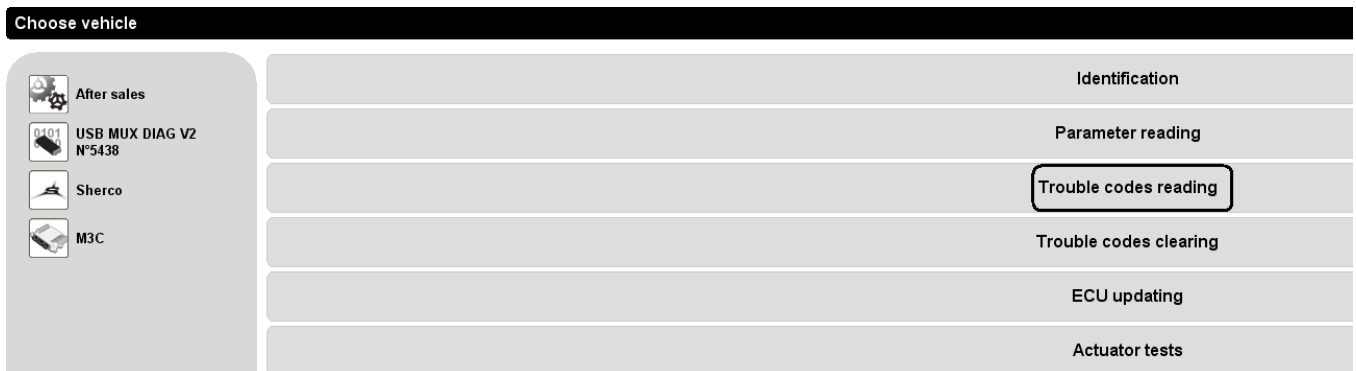
- Adaptation value to the minimum position of the throttle valve (V): $0.45 < 0.5$ (nominal value) < 0.55 .

Miscellaneous :

- Intake pressure (mb): pressure at the nozzle body measured by the TMAP sensor.
- State motor synchronization: recognition of the engine cycle.
0: not phase motor.
1: phased running motor.
- Adaptive on the whole idle speed controller (%): function not activated.

3.3- Error codes :

When you click on « Read the error codes », the system starts checking.



- If no error appears, exit the menu via the icon



INJECTION DIAGNOSTIC TOOL SYNERJECT

If errors occur :



Breakdown list...


After sales


0101 USB MUX DIAG V2
N°5438


Sherco


M3C


 Fugitive failure Permanent failure 


 Throttle Position Sensor (P0122)

 Electric fuel pump (P0231)

 Air pressure sensor (P0107)

 Intake air temperature sensor (P0113)

 Stepper motor (P1508)

 Cooling fan (P0485)

You can get the details of the error by clicking on the error displayed :


Details of breakdown code...

After sales

0101 USB MUX DIAG V2
N°5438

Sherco

M3C

 Throttle Position Sensor (P0122)

Short circuit to ground or overload

- Number of occurrence of present failure = 59
- RPM = 0 tr/mn
- Engine Temperature = -40 °C
- Battery voltage = 4.0 V
- Air Temperature = 29 °C
- Ambient pressure = 64 mb
- Applied Ignition angle = -29 °CRK
- Injection Time = 35 ms
- Engine state = ES
- Overall engine operating counter = 0 h
- Engine operating minute counter since last engine start = 237 min
- Throttle Position in degrees = 0 °TPS
- Intake manifold air pressure = 1360 mb
- Mass air flow = 40 mg/tdc
- Adaptive value of integral term of the idle speed controller = -50.00 %

- Record errors and exit the menu via the icon



Info :





- 1- Transient failure/permanent failure: a transient error becomes permanent after a variable number of engine cycles according to the component (injector, fuel pump, etc.). For a permanent error to disappear, wait 40 motor cycles without the issue reappearing.

- 2- Fan error: if there is no fan installed on the motorbike, there will always be a fan error alarm (P0485).

3.4- Clearing error codes :

A – If there is errors, go to the « Clearing Error Codes » menu.

Choose vehicle

 After sales	Identification
 USB MUX DIAG V2 N°5438	Parameter reading
 Sherco	Trouble codes reading
 M3C	Trouble codes clearing
	ECU updating
	Actuator tests







Clear all Diagnostic Trouble Codes ?

- Confirm deletion of error codes via the icon



The following tab is displayed :

Current service in execution...

-  After sales
-  USB MUX DIAG V2
N°5438
-  Sherco
-  M3C



Service in execution...

Information



Erasing of trouble codes successful.



- Confirm with the icon



B – Return to the « Reading error codes » menu :

Choose vehicle

-  After sales
-  USB MUX DIAG V2
N°5438
-  Sherco
-  M3C





Identification
Parameter reading
Trouble codes reading
Trouble codes clearing
ECU updating
Actuator tests


- Check that the errors detected are identical. Verify/change the defective parts. Verify the connections.

3.5- Actuators testing

In addition to reading the error codes, you can test certain components of the system:

Choose actuator test...

 After sales	Ignition coil
 USB MUX DIAG V2 N°5438	Injector
 Sherco	Fuel pump
 M3C	Cooling Fan
	Stepper motor



A – Ignition coil

When the ignition coil test is launched, the following message appears :

Warning previous to service launching...



No diag nor failure detection while engine is stopped.
Check that coil make a noise.



The system is not able to detect a motor coil failure when the engine is off. Whether the coil is defective or not, the test result will be the same. Therefore, verify that the coil emits a characteristic sound of a proper operation during the testing process.



B - Injector

Same type of test as for the coil. Check that the injector emits a clacking sound on activation.

C – Fuel Pump / Fan / Stepper

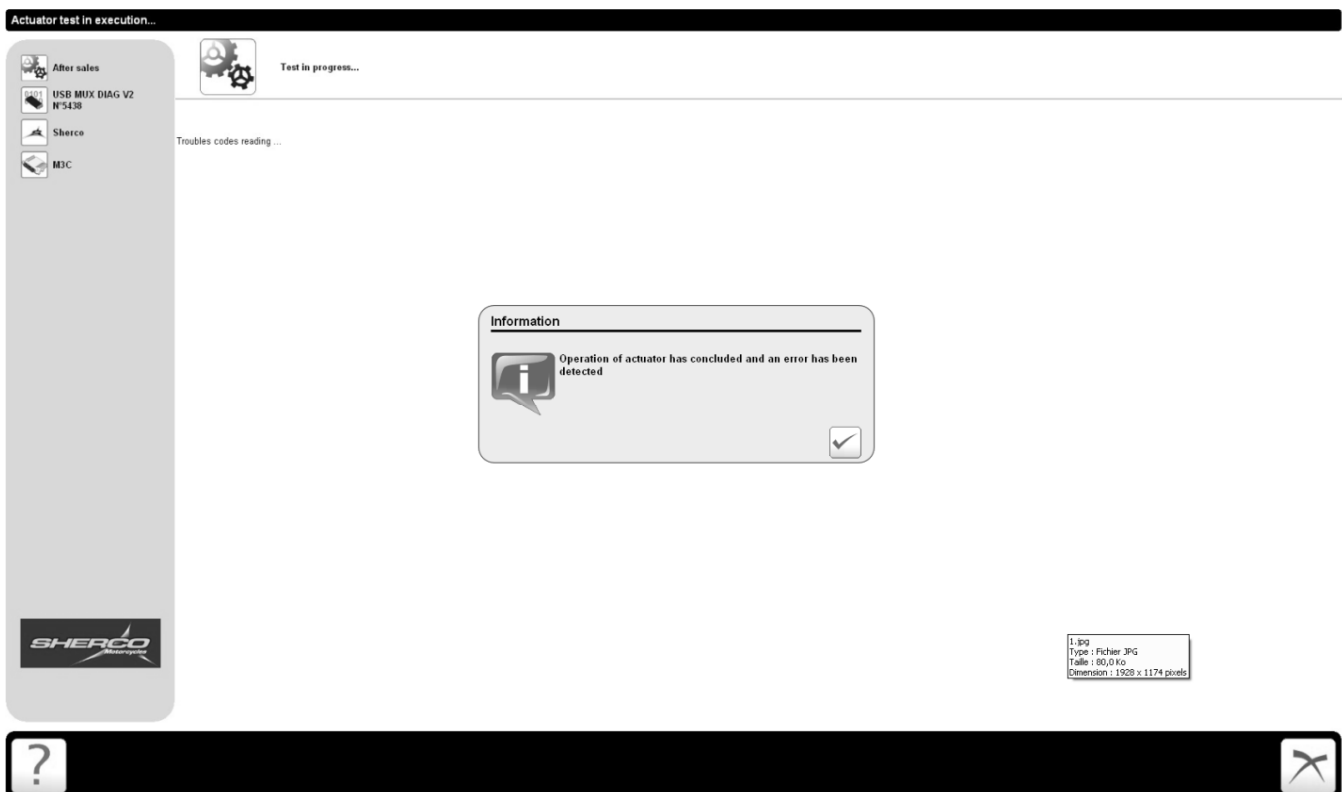
For the fuel pump, fan and stepper (air valve), it is a « standard » test, and the notification process of errors or proper operation is conventional.

INJECTION DIAGNOSTIC TOOL SYNERJECT

Example of proper operation stepper :



Stepper error :



If an error is notified, check/replace defective parts.

Information : the fan test makes sense only if a fan is installed on the bike.

3.6- Updating the calculator

With the diagnostic tool, it is possible to update the engine mapping (calibration). For a racing silencer for example, or because an update was proposed by the manufacturer.

These files will be available for free on sherconetwork.

In case of any doubt, contact technical support.

1 – Download the needed update (file : .mot).

ShercoNetwork → Information → Technical Information → Injection map

Pay attention to **the model year, the cylinder capacity, silencer type, etc.**

Date	Description	File	View
09/07/2019		2020 SHERCO_MANUEL_450_500_SEF-R-4T.pdf	DOWNLOAD
20/06/2019		2020 SHERCO_MANUEL_250_300_SER-2T.pdf	DOWNLOAD
20/06/2019		2020 SHERCO_MANUEL_250_300_SEF-R-4T.pdf	DOWNLOAD
20/06/2019		2020 SHERCO_MANUEL_125_SER-2T.pdf	DOWNLOAD
14/06/2019		SHERCO-WORKSHOP-MANUAL-125-SER-2T-2019-EN.pdf	DOWNLOAD
14/06/2019		SHERCO-MANUEL-ATELIER-125-SER-2T-2019-FR.pdf	DOWNLOAD
12/06/2019		504EU501 500 SEF 2020 STANDARD.mot	DOWNLOAD
12/06/2019		504EUR02 500 SEF AKRAPOVIC 2020.mot	DOWNLOAD
12/06/2019		454EU503 450 SEF 2020 STANDARD.mot	DOWNLOAD

2 – Turn On the motorbike .

3 – Click on Update calculator.

Choose vehicle

- After sales
- USB MUX DIAG V2 N°5438
- Sherco
- M3C

Identification

Parameter reading

Trouble codes reading

Trouble codes clearing

ECU updating

Actuator tests

INJECTION DIAGNOSTIC TOOL SYNERJECT



Update ECU now ?

Confirm with the icon



Select the calibration file (.mot) previously downloaded and click on Open.

4- The file is being updated.



Downloading ... (14.2%)

WARNING!

DO NOT TURN OFF THE MOTORCYCLE DURING THE DOWNLOAD OPERATION (FLASH),
DO NOT INTERRUPT THE SOFTWARE ABRUPTLY DURING THE FLASH.
RISK OF PERMANENT DAMAGE TO THE COMPUTER

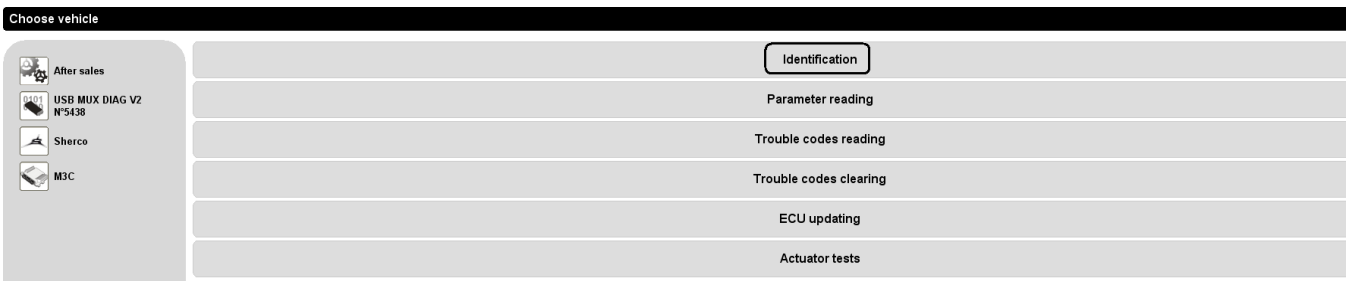
5 - Upon completion of the download, the fuel pump starts up and the following message appears:

INFORMATION : download successful

Confirm with the icon








6-Check the correct allocation of the calibration file by selecting « Identification ».



Check that the file name matches the downloaded file.

INJECTION DIAGNOSTIC TOOL SYNERJECT

Lecture des paramètres en cours...

 Usine	Numéro de série du véhicule (VIN)	BS630E3DB003296
 USB MUX DIAG V2 N°5453	Compteur temps d'utilisation moteur	0.0 h
 Sherco	N° de série du calculateur	2011980210
 M3C	Version logicielle	QR010010
	Version matérielle	S180037040Z9
	Calibration	25EUS01.





- Information:** the information on serial number and operating hours are not reset during a calibration update.
- 7-Put back the “shunt” on the connector in the air filter box to switch back on “keyless” mode.
 - 8-the ECU power latch will proceed during 20 s.
 - 9-wait 30 s until the ECU stop before starting the bike.
 - 10-start the bike, stop it and wait 30 s before to restart the bike.
 - 11-Switch on the bike and verify that the parameters of the motor are normal (idle, steeper opening, ect.)


3.7- Print screen function



When liaising with technical support, and in order to allow rapid identification of potential problems, you can attach to your message screen print files with the F10 key of your keyboard.

The «Identification» tab is definitely important for good communication (serial number of the bike, engine hours, calibration, etc.).

Reading of current setting...

 Factory	VIN code	VNBS430E32B001821
 USB MUX DIAG V2 N°5438	Overall engine operating hour counter	0.0 h
 Sherco	ECU Board Serial Number	2011929783
 M3C	Software Version	QR010010
	Hardware Version	S180037040Z9
	Calibration	25EUS01.



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