31 9518 cylinder kit
ø 60 aluminium

art. 31 9518	APRILIA	Habana 125cc
	ITALJET	Torpedo 125cc
	PIAGGIO	Hexagon Lx4 125cc, Liberty 125cc, Vespa Et4 125cc

We thank you for having chosen our developing systems. We would like to specify here that the scooters fitted with this conversion system are intended solely for use in closed-circuit sports and races.
For road use of your converted vehicle, you must proceed with having the vehicle type-approved once again, unless there is no conflict with the current legislation of the purchaser's country.
The new Malossi cylinder kits for Maxi Scooters represent the height of technological resources applied at the industrial level for the production of cylinder kits for 4T engines.
These new cylinder kits ensure absolute reliability and endurance over time, while also guaranteeing high torque and power at all rotation speeds of your maxi scooter.
Malossi cylinder kits have been designed and produced to give you maximum riding ease under all conditions of use, even the most extreme conditions.
In addition, we would like to note that to achieve optimal performance, the vehicle must be in perfect condition, including all mechanical parts, and the assembly instructions must be followed with meticulous care.

Technical data

CYLINDER

Bore: Ø 60 mm; Stroke: 48,6 mm; Displacement: 137,5; Compression ratio: 1:11,5.

- Material
  Primary aluminum alloy with a high content of hardened and tempered silicon, cylinder liner with silicon carbide coating in a galvanic nickel die and crossed smoothing with two diamond passages with very limited tolerances.
- Machining
  On machine tools with high precision numerical control
- Cylinder-piston connection with an allowance of 0.05 mm
- Recalculated and upgraded heat exchange surfaces

PISTON

- Ultra compact with 3 rings
- Material
  Special aluminum alloy with a high silicon content, low thermal expansion and a tin facing on the sliding surfaces
- Machining on machine tools with numerical control
- Lightened and reinforced
- Upgraded heat exchange surfaces

SEGMENTS

- Special segments with high sliding ease and very high mechanical resistance
- A.C. compression in chromium-plated S10 spheroidal cast-iron, three-piece scraper ring made of chromium-plated special alloy steel
  Scraper ring in chromium-plated S10 spheroidal cast iron
  2nd three-piece scraper ring made of chromium-plated steel alloy

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ASSEMBLY INSTRUCTIONS

PRELIMINARY PROCEDURES

Clean the entire vehicle thoroughly and the entire engine in particular.

ENGINE DISASSEMBLY

- Disconnect the battery.
- Disconnect all cables making up the electrical system that go to the engine and the starting motor.
- Disassemble the complete exhaust unit.
- Remove the air filter housing.
- Disassemble the fuel system from the cylinder head, leaving it connected to the frame.
- Disconnect the rear braking system
  1) If the rear brake is a shoe and drum brake, it suffices to remove the control cable
  2) For hydraulic or mixed (parking brake) rear braking systems , the complete brake caliper
     must be removed, while keeping it connected to the vehicle's hydraulic system.

Remove the rear wheel and the screws or studs fastening the engine to the frame and rear shock absorber.
At this point, you have released the engine from the vehicle and we advise you to position it on a work bench that is very clean and ready for the next procedures or to clamp it in a vice.

CYLINDER KIT DISASSEMBLY

- Carefully clean the entire engine and especially the area of the cylinder block and head. Use suitable cleaning detergents and carefully dry all parts.
- Drain all of the oil out of the engine.
- Completely disassemble the air conveyor.
- Remove the cover from the head. Be careful not to damage the seals.
- Remove the screws that connect the oil radiator to the motor head and the cylinder.
- Disconnect the two small oil infeed and outfeed tubes from the motor. Pay attention to the exact position of the copper washers: they have to be reassembled in their original position.
- Remove the spark plug.
- Loosen but do not remove the screw that connects the crown gear to the camshaft.
- Loosen the central nut on the gearing chain tightener.
- Remove the chain tightener unit by unscrewing the two screws that connect it to the original cylinder.
- Remove the crown gear attached to the camshaft.
- Remove outside screw M6 (chain side) that connects the cylinder to the motor casing.
- Remove outside screw M6 (chain side) that connects the head to the cylinder.
- Unscrew the four nuts M8 on the central stud bolts on the camshaft support.
- Remove the equalizer support group and camshaft, the head and the cylinder.
- Remove the piston and the pin. Be very careful that nothing falls into the motor base.
- As an extra precaution to prevent foreign matter from entering the crankshaft block, it is best to close the block with a clean cloth.

ENGINE HEAD

If the scooter does not have much mileage, we recommend you perform the valve tightness test in any case, following the instructions found in the section entitled "Valve tightness test".
If the scooter has registered a lot of mileage, it is advisable to disassemble the valves and check

to ensure that there is not excessive clearance between the valve stem and the guides, that the valves are not bent or present unevenness or a worn head. Even if only one of these conditions is found to exist, we advise you to replace both components, as well as the valve return springs, if the latter are not in perfect condition.
Consult the "Useful suggestions".
In the event of valve guide replacement for both assembly and disassembly, the head must be heated prior to the procedure with a blower or electric hot plate. After replacement of the guides, re-condition the valve seats with a specific milling machine in order to restore it, then grind the valve with abrasive paste and remove any remaining deposits and abrasive paste from the head and all head components. Wash and degrease thoroughly. Then refit the valves as they were originally fitted and proceed with the tightness test as described in the section entitled "Valve tightness test".
Use a sheet of no. 1000 sandpaper and resting it against a perfectly level surface plate, clean the head on the cylinder support base. Clean the entire head thoroughly.

Inserting the cylinder
The cylinder should freely enter the engine casing and follow the instructions below to avoid serious problems.

Re-assembly preparation
- Clean the engine casing in the cylinder support base thoroughly, removing any residue from the original gasket.

Prior to starting to assemble the Malossi kit, take the cylinder, wash it and degrease it. Then mount the basic gasket on the engine casing and insert the respective truing bushes. Drop the cylinder along the cylinder unit locking stud bolts and without forcing it, fit the cylinder in the engine block. Check to ensure that there are no rough parts inside the engine casing preventing passage of the cylinder steering shaft or other minor problems preventing free entry of the cylinder flush with the engine casing. In the event of significant blocked entry, we advise you to remove useless or damaging parts.
Once this phase has been completed, slide off the cylinder and start assembly according to the instructions.

CYLINDER KIT ASSEMBLY
- Clean the new piston thoroughly and blow it with compressed air. Ensure that there is no foreign matter blocking the small exhaust holes in the slot found on the scraper ring segment.
- Fit one of the two spin locks in the piston, ensuring that it is perfectly inserted in its seat.
- Insert the piston on the connecting rod and fasten it with the new spin lock. It must be oiled prior to this procedure.
- Insert the second spin lock, ensuring that it is perfectly inserted in its seat.
- Insert the small scraper ring segment spring (5) in the respective slot found on the piston. Insert the lower reed (4) and then the upper reed (3), which make up the scraper ring segment.
- Fit the second segment with the word TOP facing the upper part of the piston as indicated in Figure 1.
- Insert the first compression segment with the opening displaced with respect to the second segment.
- Position the segments as indicated in Figure 1.

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Using the special segment gripper pliers, insert the new Malossi cylinder after it has been oiled. A hook serving to lift the chain itself should advance towards the chain passage found in the cylinder. Then the cylinder is dropped down to the engine block, ensuring that there is nothing blocking the cylinder from resting perfectly on the base of the engine casing.

- Fit the chain guide shoe, checking to ensure that it is perfectly positioned in its seat.
- Mount the new head gasket and the two truing bushes.
- Insert the head on the stud bolts and use one hook to extract the gearing chain from the upper circular cover on the head.
- Tighten the four stud bolt cap nuts proceeding crosswise and with the tightening torque indicated in the table entitled "Assembly data".
- Insert the two lateral M6 screws fastening the head to the block and tighten them at the tightening torque indicated in the table entitled "Assembly data".
- Assemble the cooling fan air conveyor.
- Bring the crankshaft to top dead center by inserting a T wrench in the central hole of the air conveyor. To check the exact position of top dead center you have to align the longest blade of the cooling fan with the notch on the air conveyor near the initials T.D.C. (fig. 2).
- Assemble the gearing chain on the crown gear and insert it on the camshaft, aligning the reference line with the notch on the equalizer group.
- To insert the crown gear on the camshaft with the gearing chain installed, manually push the top chain tightener plate (which otherwise blocks assembly of the crown gear) down toward the motor base.
- Tension the gearing chain manually from the chain tightener assembly opening and check to ensure that the crown gear is aligned with the reference on the head. If necessary, shift the gearing chain by one tooth more or one less on the crown gear.
  Be careful to check often to ensure that the crankshaft is not moving during the timing of the camshaft from the position indicated by the two reference marks aligned as shown in Figure 2.
- Fit the original chain tightener and tighten the central nut on it, compressing the spring that regulates the gearing chain tension.
- Screw the central M10 screw with its respective punched washer on the camshaft, thereby locking the crown gear into its seat. Tighten the central M10 screw with the tightening torque indicated in the table entitled "Assembly data".
- Using a socket wrench with a T-shaped handle, and intervening on the nut found on the crankshaft and that fastens the variator unit, have the engine complete 4-5 complete revolutions and bring it back to the top dead center. Align the references shown in Figure 2 and check to ensure that the gearing chain crown gear has remained aligned with the reference mark as indicated in Figure 3.
  Should the crankshaft become blocked during the rotation, do not attempt to force it under any circumstances. Check the timing of the timing system, which evidently was not performed properly. Then repeat the timing process and follow the procedure indicated above meticulously.
- After having checked to ensure that the crankshaft is at the top dead center (fig. 2), check and if necessary correct the exhaust and intake valve for the proper clearance. The valve clearance is specified in the table entitled "Assembly data".
  For valve clearance adjustment, you need a feeler gauge and some adjusting screws found on the equalizers.
- Refit the camshaft cover, but check the O-Ring and replace it if it is damaged.
- Remount the two valve covers, but check the gaskets in this case as well.
- Put in the engine the amount of oil indicated in the table entitled "Assembly data", using the type of oil recommended by the manufacturer of the vehicle.

- Check the spark plug and if necessary, re-adjust the distance of the electrodes or replace it with one of the types indicated in the table entitled "Assembly data".
- Re-mount the engine on the vehicle and reconnect all connections as they were originally.

AIR FILTER BOX

Remove the cover of the original filter box.
Check that the filter box has two ø 8 holes or one ø 10 hole (see figure).
If there is no hole, drill one ø 10 hole as shown in the figure.
Check that the filter is in good condition; if not, replace it. Clean the air filter frequently with compressed air and washing it with a 50% oil gasoline mixture.

MAINTENANCE

For breaking in and maintenance, follow the instructions found in the "Vehicle use and maintenance" manual meticulously.

ASSEMBLY DATA

- Tightening torque for M8 cap nuts of the stud bolts	28÷30 Nm (2,8÷3,0 kgm)
- Tightening torque for M6 lateral nuts fastening the head	12÷14 Nm (1,2÷1,4 kgm)
- Tightening torque for M10 screws, crown gear and camshaft	12÷14 Nm (1,2÷1,4 kgm)
- Total engine oil capacity	0,85 liters
Type: see original "Use and maintenance" manual	
- Sparkplug - type/manufacturer	RG 4 HC/Champion
Electrode distance	0,6 ~ 0,7 mm
- Valve clearance	exhaust: 0,15 mm - intake: 0,15 mm

VALVE TIGHTNESS TEST

Intake and exhaust: perform the tests one after the other.
Pour gasoline into the pipeline until it is filled. Use a compressed air gun to blow along the head of the particular valve and check whether air bubbles appear inside the pipeline.
If so, the valve must be disassembled and grinding performed even if this procedure has already been carried out. It may also be necessary to repeat the procedure as many times as needed until the air bubbles no longer appear. When performing the test, check to ensure that the oil seal on the guide is not leaking fuel. If there is leakage, replace it with a new one.

USEFUL SUGGESTIONS

We advise you to grind in the exhaust and intake valves whenever the head is disassembled. Grinding must be carried out using the specific tool and a satisfactory fine abrasive paste designed for grinding valves.
To improve the performance of the engine, it is advisable to perform a perfect jointing and finishing of the intake and exhaust lines.
The best intake line is a line tending to narrow slightly from the carburetor valve on to the intake valve with a maximum cam angle of 2°. At the same time, it should not have any protuberances of any type (edges, expansions or abrupt narrow points). Thus, the jointing must be carried out perfectly.
The best exhaust line diverts slightly starting from the exhaust valve (with a maximum opening angle of 2°). No protuberances of any type are present. Therefore, it is perfectly jointed in all sections up to the exhaust silencer. In this case as well, there must not be any abrupt reductions in passage or increases in the passage sections.

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GENERAL WARNINGS

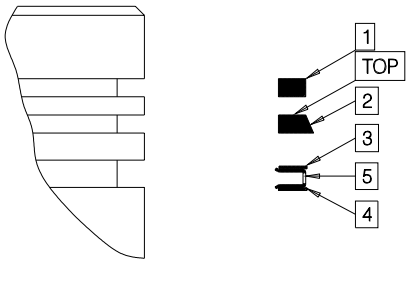
Each time the cylinder kit is disassembled, replace the head and cylinder base gaskets with new ones, in order to ensure perfect tightness.
Never expect a perfect performance from the engine without having first reached the optimal operative temperature. Keep the engine lubrication system, the oil level and the quality of the lubricating oil under control.

WARRANTY

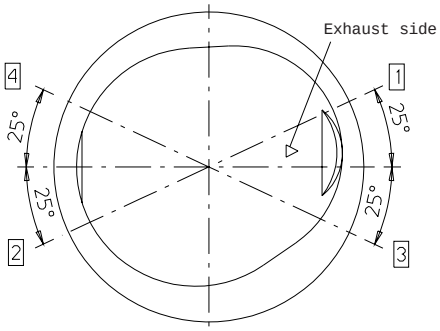
The conversion components are guaranteed to be free of manufacturing defects.
Parts held to be defective may be returned to us carriage free only upon authorization from us. The warranty does not cover damages from cylinder kit seizure, nor any resulting damages. We decline any and all responsibility originating from improper use of our products.

We hope that the above instructions are sufficiently clear and in the event that any point discussed is not clear enough, you can write to us or call us during business hours. In addition, we would like to thank you now for any comments or suggestions you may want to send us.
Malossi would like to take this opportunity to congratulate you once again on your purchase.
Have fun and GOOD LUCK! ... and we do hope to hear from you again.
For a complete view of Malossi products for your vehicle, ask your dealer for the Malossi Catalogue and any updated literature that may be available.
The descriptions found in this publication are not considered to be binding. Malossi reserves the right to make any changes deemed necessary and declines any responsibility for any typographical or printing errors. This publication replaces and renders invalid any and all previous publications.

fig. 1

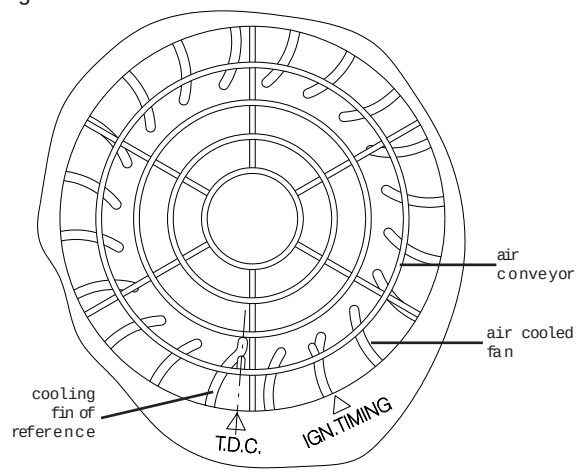


SEGMENT CLOSURE POSITIONS



1 2 3 4 Positions of the closure line for the respective segments

fig. 2



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