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SERVICE STATION MANUAL

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SCARABEO 125 i.e. - 200 i.e.

SERVICE STATION MANUAL

SCARABEO 125 i.e. - 200 i.e.

THE VALUE OF SERVICE

Due to the continuous technical updates and specific mechanic training programs for aprilia products, only **aprilia Official Network** mechanics know this vehicle fully and have the special tools necessary to carry out maintenance and repair operations correctly.

The reliability of the vehicle also depends on its mechanical state. Checking the vehicle before riding, its regular maintenance and using only **Original aprilia Spare Parts** are essential!

For information about the nearest **Official Dealer and/or Service Centre**, consult the Yellow Pages or search directly from the map on our Official Website:

www.aprilia.com

Only by requesting aprilia Original Spare Parts can you be sure of purchasing products that were developed and tested together with the actual vehicle itself. All aprilia Original Spare Parts undergo quality control procedures to guarantee reliability and durability.

The descriptions and illustrations given in this publication are not binding; While the basic characteristics as described and illustrated in this booklet remain unchanged, aprilia reserves the right, at any time and without being required to update this publication beforehand, to make any changes to components, parts or accessories, which it considers necessary to improve the product or which are required for manufacturing or construction reasons.

Not all versions/models shown in this publication are available in all Countries. The availability of individual versions/models should be confirmed with the official aprilia sales network.

SERVICE STATION MANUAL
SCARABEO 125 i.e. - 200 i.e.

- This manual provides the main information to carry out regular maintenance operations on your vehicle.
- This manual is intended to aprilia Dealers and their qualified mechanics; several concepts have been deliberately omitted as they are considered unnecessary. As it is not possible to include complete mechanical notions in this manual, users should have basic mechanical knowledge or minimum knowledge about the procedures involved when repairing scooters. Without this knowledge, repairing or checking the vehicle may be inefficient or even dangerous. As the vehicle repair and check procedures are not described in detail, be extremely cautious so as not to damage components or injure individuals. In order to optimise customer satisfaction when using our vehicles, aprilia s.p.a. commits itself to continually improve its products and the relative documentation. The main technical modifications and changes in repair procedures are communicated to all aprilia Sales Outlets and its International Subsidiaries. These changes will be introduced in the subsequent editions of the manual. In case of need or further queries on repair and check procedures, consult aprilia CUSTOMER DEPARTMENT, which will be prepared to provide any information on the subject and any further communications on updates and technical changes related to the vehicle.

NOTE Provides key information to make the procedure easier to understand and carry out.

CAUTION Refers to specific procedures to carry out for preventing damages to the vehicle.

WARNING Refers to specific procedures to carry out to prevent injuries to the repairer.

Personal safety Failure to completely observe these instructions will result in serious risk of personal injury.

Safeguarding the environment Sections marked with this symbol indicate the correct use of the vehicle to prevent damaging the environment.

Vehicle intactness The incomplete or non-observance of these regulations leads to the risk of serious damage to the vehicle and sometimes even the invalidity of the guarantee.

INDEX OF TOPICS

INDEX OF TOPICS

Rules

Safety rules

GENERAL PRECAUTIONS AND INFORMATION

When repairing, dismantling and reassembling the vehicle, follow the recommendations given below carefully.

CAUTION

USE OF NAKED FLAMES IS FORBIDDEN DURING ALL TYPES OF OPERATION. BEFORE STARTING ANY MAINTENANCE OPERATION OR INSPECTION ON THE VEHICLE, SWITCH OFF THE ENGINE AND REMOVE THE KEY. WAIT UNTIL THE ENGINE AND THE EXHAUST SYSTEM ARE COLD, IF POSSIBLE, RAISE THE VEHICLE USING A SUITABLE TOOL ON FIRM AND LEVEL GROUND. TO AVOID BURNS PAY SPECIAL CARE WITH HOT ENGINE AND EXHAUST SYSTEM PARTS.
DO NOT HOLD ANY MECHANICAL OR OTHER MOTORCYCLE PARTS WITH YOUR MOUTH: MOTORCYCLE COMPONENT ARE NOT EDIBLE, ON THE CONTRARY SOME OF THEM ARE HARMFUL AND EVEN TOXIC.

CARBON MONOXIDE

If you need to keep the engine running in order to carry out any procedure, please ensure that you do so in an open or very well ventilated area.

Never let the engine run in an enclosed area.

If you do work in an enclosed area, make sure to use a smoke-extraction system.

CAUTION

EXHAUST EMISSIONS CONTAIN CARBON MONOXIDE, A POISONOUS GAS WHICH CAN CAUSE LOSS OF CONSCIOUSNESS AND EVEN DEATH.

FUEL

CAUTION

FUEL USED TO DRIVE EXPLOSION ENGINES IS HIGHLY FLAMMABLE AND CAN BECOME EXPLOSIVE UNDER SPECIFIC CONDITIONS.
IT IS THEREFORE RECOMMENDED TO CARRY OUT REFUELLING AND MAINTENANCE PROCEDURES IN A VENTILATED AREA WITH THE ENGINE SWITCHED OFF.
DO NOT SMOKE DURING REFUELLING AND NEAR FUEL VAPOURS, AVOIDING ANY CONTACT WITH NAKED FLAMES, SPARKS OR OTHER SOURCES WHICH MAY CAUSE THEM TO IGNITE OR EXPLODE.

CAUTION

DO NOT DISPOSE OF FUEL INTO THE ENVIRONMENT.

CAUTION

KEEP OUT OF THE REACH OF CHILDREN.

HIGH-TEMPERATURE COMPONENTS

The engine and the components of the exhaust system can get very hot and remain hot for some time even after the engine has been switched off.

Before handling these components, make sure that you are wearing insulating gloves or wait until the engine and the exhaust system have cooled down.

TRANSMISSION OIL AND USED FORK OIL

CAUTION

IT IS ADVISABLE TO WEAR LATEX GLOVES WHEN CARRYING OUT SERVICE WORK.
THE TRANSMISSION OIL MAY CAUSE SKIN DAMAGE IF HANDLED FREQUENTLY AND FOR LONG PERIODS.
WASH YOUR HANDS CAREFULLY AFTER HANDLING OIL.
HAND THE OIL OVER TO OR HAVE IT COLLECTED BY THE NEAREST USED OIL RECYCLING COMPANY OR THE SUPPLIER.
IT IS ADVISABLE TO WEAR LATEX GLOVES WHEN CARRYING OUT SERVICE WORK.

CAUTION

DO NOT DISPOSE OF OIL INTO THE ENVIRONMENT.

CAUTION

KEEP OUT OF THE REACH OF CHILDREN.

BRAKE FLUID

CAUTION

THE BRAKE FLUID MAY DAMAGE PAINTED, PVC OR RUBBER SURFACES. WHEN SERVICING THE BRAKE SYSTEM, PROTECT THESE COMPONENTS WITH A CLEAN CLOTH.
ALWAYS WEAR PROTECTIVE GOGGLES WHEN SERVICING THE BRAKE SYSTEM.
THE BRAKE FLUID IS EXTREMELY DANGEROUS TO THE EYES.
IN THE EVENT OF ACCIDENTAL CONTACT WITH THE EYES, RINSE THEM IMMEDIATELY WITH ABUNDANT COLD, CLEAN WATER AND SEEK MEDICAL ADVICE.

CAUTION

KEEP OUT OF THE REACH OF CHILDREN.

HYDROGEN GAS AND BATTERY ELECTROLYTE

CAUTION

THE BATTERY ELECTROLYTE IS TOXIC, CORROSIVE AND AS IT CONTAINS SULPHURIC ACID, IT CAN CAUSE BURNS WHEN IN CONTACT WITH THE SKIN.
WHEN HANDLING THE BATTERY ELECTROLYTE, WEAR TIGHT-FITTING GLOVES AND PROTECTIVE APPAREL.
IF THE ELECTROLYTIC FLUID GETS INTO CONTACT WITH THE SKIN, WASH WITH ABUNDANT COOL WATER.
IT IS PARTICULARLY IMPORTANT TO PROTECT THE EYES BECAUSE EVEN TINY AMOUNTS OF BATTERY ACID MAY CAUSE BLINDNESS. IF IT COMES INTO CONTACT WITH THE EYES,

RINSE THEM CAREFULLY WITH WATER FOR FIFTEEN MINUTES, THEN SEE AN EYE SPECIALIST AS SOON AS POSSIBLE.
IF IT IS ACCIDENTALLY SWALLOWED, DRINK LARGE QUANTITIES OF WATER OR MILK, FOLLOWED BY MILK OF MAGNESIA OR VEGETAL OIL, AND SEEK MEDICAL ADVICE IMMEDIATELY.
THE BATTERY RELEASES EXPLOSIVE GASES. KEEP IT AWAY OF FLAMES, SPARKS, CIGARETTES OR ANY OTHER HEAT SOURCE.
ENSURE ADEQUATE VENTILATION WHEN SERVICING OR RECHARGING THE BATTERY.

CAUTION

KEEP OUT OF THE REACH OF CHILDREN.

CAUTION

THE BATTERY LIQUID IS CORROSIVE.
DO NOT POUR OR SPILL IT, PARTICULARLY ON PLASTIC COMPONENTS.
ENSURE THAT THE ELECTROLYTIC ACID IS COMPATIBLE WITH THE BATTERY TO BE ACTIVATED.

Maintenance rules

GENERAL PRECAUTIONS AND INFORMATION

When repairing, dismantling and reassembling the vehicle, follow the recommendations given below carefully.

CAUTION

UNLESS OTHERWISE INDICATED, REFIT THE UNIT FOLLOWING THE REMOVAL STEPS BUT IN REVERSE ORDER. THE POSSIBLE OVERLAPPING OF OPERATIONS REFERRED TO IN THE OTHER CHAPTERS MUST BE CARRIED OUT LOGICALLY, AVOIDING ANY UNNECESSARY REMOVAL OF COMPONENTS. DO NOT POLISH MATT PAINTWORK WITH ABRASIVE PASTES.
NEVER USE FUEL AS SOLVENT FOR CLEANING THE MOTORCYCLE.
DO NOT USE ALCOHOL, PETROL OR SOLVENTS TO CLEAN RUBBER AND PLASTIC PARTS AND THE SADDLE. USE ONLY WATER AND NEUTRAL SOAP INSTEAD.
DISCONNECT THE NEGATIVE CABLE (-) OF THE BATTERY IF YOU INTEND TO CARRY OUT ELECTRICAL WELDING WORK.

BEFORE REMOVING COMPONENTS

- Before disassembling components, remove dirt, mud, dust and foreign bodies from the vehicle.
- Use the special tools designed for this vehicle, as required.

COMPONENTS REMOVAL

- Do not loosen and/or tighten screws and nuts using pliers or any other tools than the specific wrench.
- Mark the positions on all connection joints (pipes, cables, etc.) before separating them, and identify them with different distinctive symbols.
- Each component needs to be clearly marked to enable identification during reassembly.
- Clean and wash the dismantled components carefully using a low-flammability detergent.

- Keep coupled parts together since they have "adjusted" to each other due to normal wear and tear.
- Some components must be used together or replaced altogether.
- Keep away from heat sources.

REASSEMBLING COMPONENTS

CAUTION

NEVER REUSE A CIRCLIP; IF A CIRCLIP HAS BEEN REMOVED, IT MUST BE REPLACED WITH A NEW ONE. WHEN INSTALLING A CIRCLIP, ENSURE THAT ITS ENDS ARE NOT STRETCHED MORE THAN IS NECESSARY TO FIT IT ONTO THE SHAFT.
AFTER INSTALLING THE CIRCLIP, CHECK THAT IT IS FULLY AND CLEANLY INSTALLED IN ITS SEAT.
DO NOT USED COMPRESSED AIR TO CLEAN BEARINGS.

NOTE

BEARINGS MUST ROTATE FREELY, WITHOUT JAMMING AND/OR NOISE, OTHERWISE, THEY NEED TO BE REPLACED.

- Use only ORIGINAL Aprilia SPARE PARTS.
- Comply with lubricant and consumables usage guidelines.
- Lubricate parts (whenever possible) before reassembling them.
- When tightening nuts and screws, start either from the components with the largest diameter or from the innermost components, proceeding diagonally. Tighten nuts and screws in successive steps before applying the tightening torque.
- Always replace self-locking nuts, washers, sealing rings, circlips, O-rings (OR), cotter pins and screws with new parts if the thread is damaged.
- When assembling the bearings, make sure to lubricate them well.
- Check that each component is assembled correctly.
- After a repair or routine maintenance, carry out pre-ride checks and test the vehicle on private grounds or in an area with low traffic.
- Clean all mating surfaces, oil seal rims and gaskets before refitting. Smear a thin layer of lithium-based grease on the oil seal rims. Reassemble the oil seal and the bearings with the brand or lot number facing outward (visible side).

ELECTRIC CONNECTORS

Electric connectors must be disconnected as described below as non-compliance with the procedure so described causes irreparable damage to both the connector and the cable harness: Press the relevant safety hooks, if any.

CAUTION

DO NOT DISCONNECT CONNECTORS BY PULLING THE CABLES.

- Grip the two connectors and disconnect them by pulling them in opposite directions.

- In presence of dirt, rust, humidity etc., clean the connector's internal parts carefully, using a pressurised air jet.
- Ensure that the cables are correctly fastened to the internal connector terminals.

NOTE

THE TWO CONNECTORS CONNECT ONLY FROM ONE SIDE; CONNECT THEM THE RIGHT WAY ROUND.

- Then fit the two connectors making sure that they couple correctly (if the relevant hooks are provided, you will hear them "click" into place).

TIGHTENING TORQUES

CAUTION

DO NOT FORGET THAT TIGHTENING TORQUES OF ALL FASTENING ELEMENTS ON WHEELS, BRAKES, WHEEL AXLES AND OTHER SUSPENSION COMPONENTS PLAY A KEY ROLE IN ENSURING THE VEHICLE'S SAFETY AND MUST COMPLY WITH SPECIFIED VALUES.
CHECK THE TIGHTENING TORQUES OF FASTENING PARTS ON A REGULAR BASIS AND ALWAYS USE A TORQUE WRENCH TO REASSEMBLE THESE COMPONENTS.
IF THESE RECOMMENDATIONS ARE NOT COMPLIED WITH, ONE OF THE COMPONENTS MAY BECOME LOOSE AND EVEN DETACHED, THUS BLOCKING A WHEEL, OR OTHERWISE COMPROMISING THE VEHICLE'S MANOEUVRABILITY. THIS CAN LEAD TO FALLS, WITH THE RISK OF SERIOUS INJURY OR DEATH.

BRAKE FLUID

CAUTION

DO NOT USE FLUIDS OTHER THAN THOSE PRESCRIBED AND DO NOT MIX DIFFERENT LIQUIDS WHEN TOPPING UP IN ORDER NOT TO DAMAGE THE BRAKE SYSTEM.
DO NOT USE BRAKE FLUID TAKEN FROM OLD CONTAINERS OR FROM CONTAINERS THAT HAVE BEEN OPEN FOR A PROLONGED TIME.
SUDDEN CHANGES IN THE CLEARANCE OR ELASTIC RESISTANCE IN THE BRAKE LEVERS ARE DUE TO FAULTS IN THE HYDRAULIC CIRCUIT.
MAKE ESPECIALLY SURE THAT BRAKE DISCS AND THE FRICTION MATERIAL ARE NOT SMEARED OR GREASY, PARTICULARLY AFTER CARRYING OUT MAINTENANCE AND INSPECTION OPERATIONS.
CHECK THAT BRAKE WIRES ARE NOT TWISTED OR WORN.
ENSURE THAT WATER OR DUST DO NOT INGRESS INADVERTENTLY INTO THE CIRCUIT.
IT IS ADVISABLE TO WEAR LATEX GLOVES WHEN SERVICING THE HYDRAULIC CIRCUIT.

DISC BRAKE

CAUTION

ANY OIL OR OTHER LIQUIDS ON A DISC WILL SOIL THE BRAKE PADS.
SOILED PADS MUST BE REMOVED AND REPLACED. A SOILED DISC OR A DISC WITH TRACES OF OIL MUST BE CLEANED WITH A TOP QUALITY DEGREASING AGENT.
IF THE MOTORCYCLE IS USED CLOSE TO WATER OR ON DUSTY OR UNSURFACED ROADS, OR IF IT IS USED FOR SPORTS APPLICATION, HALVE THE SERVICE INTERVALS.

COOLANT

Coolant liquid solution is 50% water and 50% antifreeze. This is the ideal mixture for most operating temperatures and provides good corrosion protection.

This solution is also suited to the warm season, as it is less prone to evaporative loss and will reduce the need for top-ups.

Thus, mineral salt deposits formed in the radiator by evaporated water are also minimised and the efficiency of the cooling system is not affected.

When the temperature drops below zero degrees centigrade, check the cooling system frequently and add more antifreeze if needed (up to 60% max.).

Use distilled water in the coolant mixture to avoid damaging the engine.

Depending on the freezing temperature of the coolant mixture you wish to achieve, add the percentage of coolant indicated in the following table to the water:

FREEZING POINT C° (-°F)

Specification	Desc./Quantity
-20° (-4)	Coolant 35% by volume
-30° (-22)	Coolant 45% by volume
-40° (-40)	Coolant 55% by volume

NOTE

THE DIFFERENT ANTIFREEZE LIQUIDS HAVE DIFFERENT CHARACTERISTICS. THE DEGREE OF PROTECTION GUARANTEED CAN BE FOUND ON THE LABEL OF THE PRODUCT.

CAUTION

USE ONLY ANTIFREEZE AND CORROSION INHIBITORS WITHOUT NITRITE THAT ENSURE A PROTECTION OF AT LEAST -35°C (-31°F).

TYRES

CAUTION

CHANGING, REPAIR, MAINTENANCE AND BALANCING ARE IMPORTANT OPERATIONS THAT ARE CARRIED OUT BY QUALIFIED PERSONNEL USING SUITABLE TOOLS.
THE NEW TYRES MAY BE COVERED WITH A THIN LAYER OF PROTECTIVE COATING THAT IS SLIPPERY. DRIVE CAREFULLY FOR THE FIRST FEW KILOMETRES (MILES).
NEVER USE RUBBER TREATMENT AGENTS OF ANY KIND ON THE TYRES.
IN PARTICULAR ENSURE THAT THE TYRES DO NOT COME INTO CONTACT WITH LIQUID FUEL THAT WOULD CAUSE A RAPID DETERIORATION OF THE RUBBER.
A TYRE THAT HAS BEEN IN CONTACT WITH OIL OR PETROL MUST BE REPLACED AND NOT SIMPLY CLEANED.
DO NOT FIT TYRES WITH INNER TUBES ON WHEEL RIMS FOR TUBELESS TYRES AND VICE VERSA.

Vehicle identification

These numbers are necessary for vehicle registration.

NOTE

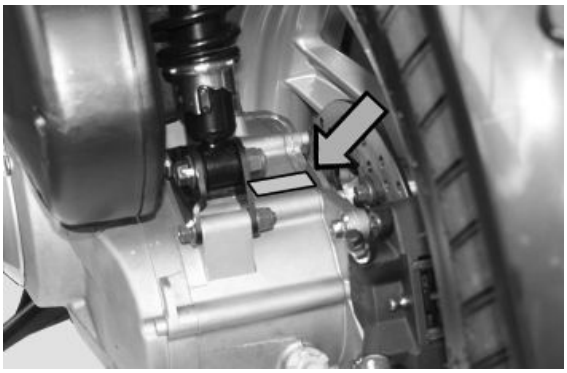
ALTERING IDENTIFICATION NUMBERS CAN BE SERIOUSLY PUNISHED BY LAW, PARTICULARLY MODIFYING THE CHASSIS NUMBER WILL IMMEDIATELY INVALIDATE THE WARRANTY.

CHASSIS NUMBER

The chassis number is stamped on the front frame; to read it, open the glove-box and remove the protection cover.

Engine number

The engine number is stamped on the rear side, next to the left shock absorber.



Dimensions and mass

WEIGHT AND DIMENSIONS

Specification	Desc./Quantity
Max. length	2040 mm
Max. width	720 mm
Max. height (to windshield)	1372 mm
Saddle height	810 mm
Wheelbase	1391 mm
Minimum ground clearance	145 mm
Weight in running order (kerb weight)	154 kg

Engine

ENGINE TECHNICAL DATA

Specification	Desc./Quantity
Engine model	BB01 (125) CB01 (200)
Engine type	Single-cylinder, 4-stroke, 4 valves, wet sump forced lubrication system, double overhead camshaft.
Overall engine capacity	124.2 cm³ (125) 180.8 cm³ (200)
Bore/stroke	58 mm x 47 mm (125) 63 mm x 58 mm (200)
Compression ratio	12.0 ± 0.5 : 1 (125) 11.6 ± 0.5 : 1 (200)
Valve clearance	Intake: 0.10 to 0.15 Exhaust: 0.20 - 0.25
Ignition	starter
Idle speed	1900 ± 100 rpm (125) 1800 ± 100 rpm (200)
Clutch	Automatic centrifugal dry clutch

Specification	Desc./Quantity
Gearbox	automatic
Cooling	Forced-circulation air cooling driven by a centrifugal pump
Fuel system	Electronic injection.
Throttle body diffuser	Ø 32 mm
Fuel	Premium unleaded petrol, minimum octane rating of 95 (NORM) and 85 (NOMM)
Ignition type	Electronic
Standard spark plug	NGK PMR9B

Transmission

TRANSMISSION

Specification	Desc./Quantity
Transmission (125 - 200)	CVT with belt + final reduction unit
CVT ratio (125)	2.9 : 1 - 0.89 : 1
CVT ratio (200)	2.4 : 1 - 0.86 : 1
Gear ratio (125)	14 / 66 x 23 / 58
Gear ratio (200)	14 / 66 x 27 / 54
Variator	continuous, automatic
Primary drive	V-belt
Secondary	With gears
Engine/wheel total ratio (125)	minimum: 34.5 maximum: 10.7
Engine/wheel total ratio (200)	minimum: 22.5 maximum: 8.1
Variable speed rollers (125)	- minimum diameter: 18.50 mm (0.73 in) - standard diameter: 19.0 ± 0.1 mm (0.748 ± 0.004 in)
Variable speed rollers (200)	- minimum diameter: 20.1 mm (0.79 in) - standard diameter: 20.6 ± 0.1 mm (0.81 ± 0.004 in)
Pulley sliding bushing (125 - 200)	- minimum diameter: 25.95 mm (1.022 in) - standard diameter: 26.00 (-0.02/-0.041) mm (1.0236 (-0.0008/ + 0.0016 in))
Movable pulley bushing (125 - 200)	- maximum diameter: 26.121 mm (1.028 in) - standard diameter: 26.000 (+0/0.121) mm (0.8661 (+0/+ 0.0047 in))
Driving belt width (125 - 200)	- minimum: 21.0 mm (0.827 in) - standard: 22.0 +/- 0.2 mm (0.8661 +/- 0.0079 in)

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil (Engine oil change and engine oil filter replacement)	1000 cm³
Transmission oil	200 cm³
Coolant	1.15 l (50% water + 50% ethylene glycol antifreeze fluid)
Depth of fork oil level from the rim - without spring - fork included	80 mm
Seats	2
Vehicle max. load (rider + passenger + luggage)	210 kg

Electrical system

ELECTRICAL SYSTEM

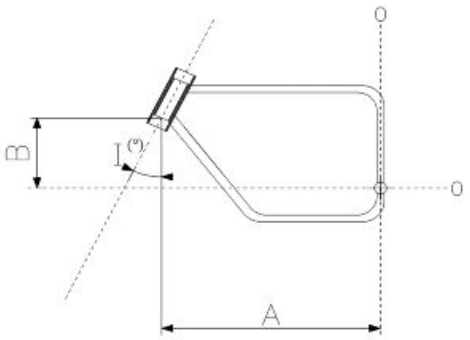
Specification	Desc./Quantity
Battery	12V - 10 Ah
fuses	20 - 15 - 15 - 15 A
(Permanent-magnet) Alternator	12 V - 330W at 8000 rpm

BULBS/WARNING LIGHTS

	Specification	Desc./Quantity
1	High-/low-beam bulb	12 V 60/55 W H4
2	Tail light bulb	12V - 5W
3	Front and rear turn indicator bulbs	12V - 10 W (RY amber bulb)
4	License plate light bulb	12V - 5W
5	Rear daylight running light /stop light bulb	12V - 5/21W
6	Instrument panel lighting bulb (*)	LED
7	Turn indicator warning light (*)	LED
8	High-beam warning light (*)	LED
9	Low fuel warning light (*)	LED
10	Engine oil pressure warning light (*)	LED
11	Electronic fuel injection check warning light (*)	LED

(*) Cannot be replaced

Frame and suspensions



CHASSIS AND SUSPENSION

Specification	Desc./Quantity
Size "A"	538.4 mm
Size "B"	439.3 mm
Steering rake angle	26.30°
Chassis type	High-strength steel tubular chassis, single spar at the front, superimposed double cradle at the rear.
Front suspension	Hydraulic action telescopic fork
Front suspension travel	104 mm
Rear suspension	hydraulic double-acting shock absorber and adjustable preloading
Rear suspension travel	80 mm

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 260 mm disc brake with hydraulic transmission
Rear brake	Ø 220-mm disc brake with hydraulic transmission

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Wheel Rims	made of light alloy

Specification	Desc./Quantity
Front wheel rim	2.50 x 16"
Rear wheel rim	3.00 x 16"
Tyres	Without inner tube (Tubeless)
Front tyre	100/80 - 16" 50 P
Rear tyre	120/80 - 16" 60 P
Front tyre standard inflation pressure	200 kPa (2.0 bar)
Rear tyre standard inflation pressure	200 kPa (2.0 bar)
Front tyre standard inflation pressure with passenger	210 kPa (2.1 bar)
Rear tyre standard inflation pressure with passenger	220 kPa (2.2 bar)

Tightening Torques

FRONT BODYWORK UNIT

Name	Torque in Nm
M6 screw fixing wheel housing to chassis and radiator support	6 (4.44 lbf ft)
M6 screw fixing front mudguard to fork	10 (7.4 lbf ft)
M5 screw fixing front mudguard to stem cover	4 (2.96 lbf ft)
M8 screw fixing of mudguard support to fork stems	25 (18.5 lbf ft)
Screw fixing bumpers to front shield fairings	1 (0.74 lbf ft)
Screw fixing chrome-plated moulding to internal shield	1 (0.74 lbf ft)
Screw fixing front shield fairings to shield fairing, lower section	2 (1.48 lbf ft)
Screw fixing wheel housing to front shield fairing	2 (1.48 lbf ft)
Screw fixing internal shield cover, internal section	1 (0.74 lbf ft)
Radiator grille to case fixing screw	1 (0.74 lbf ft)
Case to internal shield fixing screw	2 (1.48 lbf ft)
M5 screw fixing case to wheel housing	4 (2.96 lbf ft)

CENTRAL BODYWORK UNIT

Name	Torque in Nm
Footrests to chassis fixing screw	4 (2.96 lbf ft)
M6 screw fixing battery access to footrest	4 (2.96 lbf ft)
Footrest to under-footrest fixing screw	1 (0.74 lbf ft)
Screw fixing under-footrest to rear lower side footrest	1 (0.74 lbf ft)
M5 screw fixing engine head access	4 (2.96 lbf ft)
Screw fixing engine head access, top side	1 (0.74 lbf ft)
Screw fixing side stand access to under-footrest	1 (0.74 lbf ft)
M6 screw fixing screw saddle lock to glove-box	5 (3.7 lbf ft)
M6 screw fixing glove-box to chassis	5 (3.7 lbf ft)
Screw fixing footrests to left and right tail fairing	1 (0.74 lbf ft)
Carburettor access fixing screw	1 (0.74 lbf ft)
Screw fixing right and left shield fairings to internal shield	2 (1.48 lbf ft)
Screw fixing glove-box lock to internal shield	1 (0.74 lbf ft)
M6 nut fixing saddle hinge to saddle	6 (4.44 lbf ft)
M5 screws fixing saddle hinge to saddle	4 (2.96 lbf ft)
Glove-box lid fixing screw	1 (0.74 lbf ft)
Screw fixing glove-box lid to internal shield	1 (0.74 lbf ft)

REAR BODYWORK UNIT

Name	Torque in Nm
M6 screw fixing license plate holder to rear mudguard	5 (3.7 lbf ft)
Screw fixing tail fairing to helmet compartment, top and front	1 (0.74 lbf ft)
Taillight to tail fairing fixing screw	1 (0.74 lbf ft)
Rear passenger grab handle M8 fixing screw	25 (18.5 lbf ft)
Passenger grab handle cover fixing screw	1 (0.74 lbf ft)
M6 screw fixing rear mudguard to rear frame	5 (3.7 lbf ft)
M6 screw fixing rear mudguard to tail fairing	4 (2.96 lbf ft)
Screw fixing lower closure to Left and right side tail fairing	1 (0.74 lbf ft)
Screw fixing license plate light to rear mudguard	1 (0.74 lbf ft)
M5 screw fixing rear mudguard to silencer supporting plate	6 (4.44 lbf ft)

HEAD INSTRUMENT PANEL UNIT

Name	Torque in Nm
Screw fixing instrument panel to headlamp panel, top section	1 (0.74 lbf ft)
Screw fixing instrument panel to headlamp panel, bottom section	2 (1.48 lbf ft)
Screw fixing instrument panel to headlamp panel, bottom section, close to indicators	1 (0.74 lbf ft)
Instrument panel support fixing screw	1 (0.74 lbf ft)
Screw fixing instrument panel support to instrument panel	1 (0.74 lbf ft)
Screw fixing indicators cover to headlamp panel	1 (0.74 lbf ft)
Headlamp to headlamp panel fixing screw	1 (0.74 lbf ft)
Headlamp panel to handlebar fixing screw	1 (0.74 lbf ft)
M5 screw fixing left and right light switch	2 (1.48 lbf ft)

FRAME ASSEMBLY

Name	Torque in Nm
M8 screw fixing curved support behind licence plate holder	25 (18.5 lbf ft)

HANDLEBAR UNIT

Name	Torque in Nm
M10 screw fixing handlebar	52 (38.48 lbf ft)
M8 safety screw for handlebar	20 (14.8 lbf ft)

ENGINE LINK ROD UNIT

Name	Torque in Nm
M10 screw fixing connecting rod to engine	50 (37 lbf ft)
M10 screw fixing connecting rod to timing buffer	50 (37 lbf ft)
M12 pin fixing connecting rod to chassis	60 (44.4 lbf ft)
M12 pin fixing single connecting rod to double connecting rod	60 (44.4 lbf ft)

STAND UNIT

Name	Torque in Nm
M10 screw fixing stand to stand support	50 (37 lbf ft)
M8 screw fixing screw stand support to engine	25 (18.5 lbf ft)

BRAKING SYSTEM UNIT

Name	Torque in Nm
M8 screw fixing front brake calliper	25 (18.5 lbf ft)
M8 screw fixing rear brake calliper	25 (18.5 lbf ft)
M6 screw fixing front brake pump to handlebar	10 (7.4 lbf ft)
Screw fixing the rear brake pump to the handlebar	10 (7.4 lbf ft)
M8 screws fixing front brake disc	25 (18.44 lbf ft) + Loctite 243
M8 screws fixing rear brake disc	25 (18.44 lbf ft) + Loctite 243

EXHAUST SYSTEM UNIT

Name	Torque in Nm
M8 nut fixing nut exhaust manifold to engine	15 (11.1 lbf ft)
M10 screw fixing screw silencer clamp to exhaust manifold	17 (12.58 lbf ft)
M8 screw fixing silencer to plate	25 (18.5 lbf ft)
Lambda probe	50 (36.88 lbf ft)

COOLING SYSTEM UNIT

Name	Torque in Nm
M6 fixing screw for radiator (on plastic)	6 (4.44 lbf ft)
Coolant piping clamp retainers	3 (2.22 lbf ft)
Screw fixing the electric fan to the radiator	1.5 (1.11 lbf ft)
M6 screw fixing expansion tank	4 (2.96 lbf ft)

Name	Torque in Nm
Thermal switch retainer	20 (14.8 lbf ft)

ELECTRICAL SYSTEM UNIT

Name	Torque in Nm
M6 screw fixing ignition key lock	10 (7.4 lbf ft)
M5 screw fixing screw HV coil to chassis	5 (3.7 lbf ft)
M8 fixing screw for horn	20 (14.8 lbf ft)
M6 fixing screw for voltage regulator	10 (7.4 lbf ft)
M6 fixing nut for start-up relay cables	6 (4.44 lbf ft)
M5 screws fixing fall sensor	4 (2.96 lbf ft)
M8 screw fixing fall sensor support	25 (18.5 lbf ft)
M6 screw fixing coil support	10 (7.4 lbf ft)
M3 screw fixing coil	2 (1.48 lbf ft)

FUEL TANK UNIT

Name	Torque in Nm
M6 screw fixing tank to chassis	10 (7.4 lbf ft)
Ring nut fixing fuel pump	22 (16.23 lbf ft)

REAR SUSPENSION UNIT

Name	Torque in Nm
M8 upper screw fixing shock absorber	25 (18.5 lbf ft)
M10 lower screw fixing shock absorber	50 (37 lbf ft)
M8 screw fixing shock absorber lower support to engine	25 (18.5 lbf ft)

REAR WHEEL UNIT

Name	Torque in Nm
M14 fixing nut for rear wheel	110 (81.4 lbf ft)

FRONT SUSPENSION UNIT

Name	Torque in Nm
Steering nut	15 (11.1 lbf ft) unscrew ¼ of a turn
Steering lock nut	110 (81.4 lbf ft)
M6 screw fixing front wheel axle clamp	10 (7.4 lbf ft)

FRONT WHEEL UNIT

Name	Torque in Nm
Wheel axle fixing screw	50 (37 lbf ft)

ENGINE UNIT

Name	Torque in Nm
Intake manifold EI fixing screws - M6x20 (3)	10 Nm (7.38 lbf ft)
Oil filter cover EI fixing screws - M6x20 (2)	10 Nm (7.38 lbf ft)
Oil pump housing EI fixing screws - M6x25 (2)	10 Nm (7.38 lbf ft) - Loctite 243
Head fixing screw - M8x166 (4)	25 Nm + 90° (18.44 lbf ft + 90°)
Thermostat cover EI fixing screws - M6x20 (2)	10 Nm (7.38 lbf ft)
Head fixing screw (chain side) - M6x130 (2)	11 Nm (8.11 lbf ft)
Drainage fixing screw stud - M8x40 (2)	12 Nm (8.85 lbf ft)
Camshaft support EI fixing screws - M6x40 (8)	10 Nm (7.38 lbf ft)
Valve cover EI fixing screws - M6 (4)	10 Nm (7.38 lbf ft)
Chain tensioner retainer - M6x16 (2)	12 Nm (8.85 lbf ft)
Chain tensioner guide pad fulcrum fixing screws - M6 (1)	10 Nm (7.38 lbf ft) Loct. 243
Transmission gear timing fixing screw - M8x20x1 (2)	27 Nm (19.91 lbf ft) - Loctite 243
Transmission oil drainage plug - M12x1.5 (1)	25 Nm (18.44 lbf ft)
Right side crankcase oil drainage plug - M18x1.5 (1)	35 Nm (25.81 lbf ft)
Overpressure valve cap - M18x1.5 (1)	35 Nm (25.81 lbf ft)
Transmission oil filler cap - M14 x 1.5	-
Oil level cap - M16x1.5 (1)	-

Name	Torque in Nm
Crankcase fixing screws - M6x50 (2)	11 Nm (8.11 lbf ft)
Crankcase fixing screws - M6x70 (1)	11 Nm (8.11 lbf ft)
Ignition cover fixing screws - M6x110 (5)	11 Nm (8.11 lbf ft)
Ignition cover fixing screws - M6x140 (1)	11 Nm (8.11 lbf ft)
Ignition cover fixing screws - M6x170 (1)	11 Nm (8.11 lbf ft)
Ignition cover EI screws - M6x25 (1)	11 Nm (8.11 lbf ft)
Crankshaft timing hole cap EI screws - M8x14 (1)	15 Nm (11.06 lbf ft)
Oil pump plate EI screws - M5x12 (4)	6 Nm (4.42 lbf ft) - Loctite 243
Water pump housing EI fixing screws - M5x18 (3)	6 Nm (4.42 lbf ft)
Cover fixing screws CVT (125 cm³) - M6x35 (12)	10 Nm (7.38 lbf ft)
Cover fixing screws CVT (180 cm³) - M6x35 (11)	10 Nm (7.38 lbf ft)
Transmission cover EI fixing screws - M6x30 (8)	10 Nm (7.38 lbf ft)
Freewheel housing EI fixing screws - M8x20 (3)	25 Nm (18.44 lbf ft) - Loctite 243
Starter motor EI fixing screws - M6x25 (2)	10 Nm (7.38 lbf ft)
Stator EI fixing screws - M6x25 (3)	10 Nm (7.38 lbf ft) - Loctite 243
Rotor TEF fixing screw - M8x25 (1)	25 Nm (18.44 lbf ft) - Loctite 243
Rear CVT pulley fixing flanged nut - M12x1 (1)	60 Nm (44.25 lbf ft) - Loctite 243
Front CVT pulley fixing flanged nut - M12x1 (1)	75 Nm (55.32 lbf ft) - Loct. 243
Pick-up EI fixing screws	6 Nm (4.42 lbf ft)
Stator cable bracket fixing screw - M5x8 (1)	4 Nm (2.95 lbf ft) - Loctite 243
Fuel injector fixing screw - M6x16 (1)	8 Nm (5.90 lbf ft)
Chain tensioning cover - M8 (1)	6 Nm (4.43 lbf ft)
Spark plug (1)	10 Nm (7.38 lbf ft)
Oil pressure switch TE screws - M10x1 (1)	10 Nm (7.38 lbf ft)
Thermistor fixing screws - M12x1.5	22 Nm (16.23 lbf ft)
Screw fixing the silencer plate to the engine	25 (18.5 lbf ft)
M6 screw fixing filter casing to engine	8 (5.92 lbf ft)
Sleeve clamp retainer in the throttle body	2 Nm (1.47 lbf ft)
Sleeve clamp on filter casing retainer	2 (1.48 lbf ft)
Water pump rotor	2 Nm (1.47 lbf ft)
Variator cover switch plate (125)	10 Nm (7.38 lbf ft)

Overhaul data

Assembly clearances

Cylinder - piston assy.

CYLINDER - PISTON COUPLING CLEARANCE 125 CM³

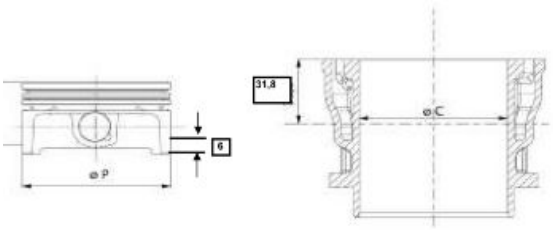
Coupling categories with cast-iron cylinder

NAME	ABBREVIATION	CYLINDER		PISTON		FITTING CLEARANCE	
		min	max	min	max	min	max
Cylinder/Piston	M	58,010	58,017	57,963	57,970	0,040	0,054
Cylinder/Piston	N	58,017	58,024	57,970	57,977	0,040	0,054
Cylinder/Piston	O	58,024	58,031	57,977	57,984	0,040	0,054
Cylinder/Piston	P	58,031	58,038	57,984	57,991	0,040	0,054

CYLINDER - PISTON COUPLING CLEARANCE 200 CM³

Coupling categories with cast-iron cylinder

NAME	ABBREVIATION	CYLINDER		PISTON		FITTING CLEARANCE	
		min	max	min	max	min	max
Cylinder/Piston	M	63,010	63,017	62,958	62,965	0,045	0,059
Cylinder/Piston	N	63,017	63,024	62,965	62,972	0,045	0,059
Cylinder/Piston	O	63,024	63,031	62,972	62,979	0,045	0,059
Cylinder/Piston	P	63,031	63,038	62,979	62,986	0,045	0,059



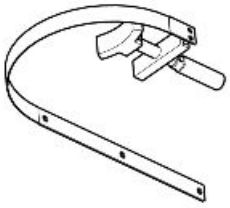
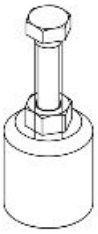
Products

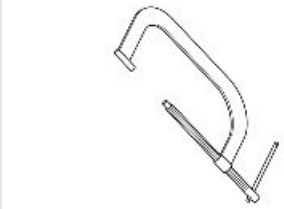
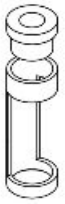
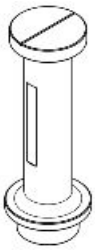
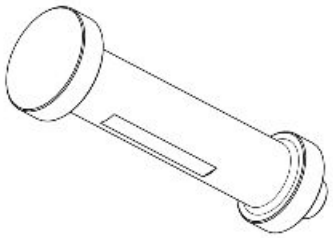
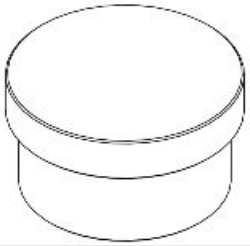
RECOMMENDED PRODUCTS TABLE

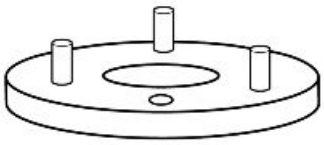
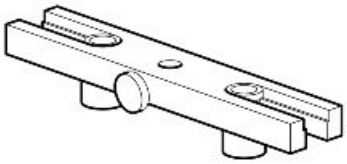
Product	Description	Specifications
AGIP TEC 4T, SAE 10W-40	Engine oil	10W-40
AGIP GEAR SYNTH SAE 75W-90	Gearbox oil	API GL4, GL5
AGIP FORK 7.5W	Fork oil	
AGIP GREASE SM2	Lithium grease with molybdenum for bearings and other points needing lubrication	NLGI 2
AGIP BRAKE 4	Brake fluid	FMVSS DOT4+
AGIP PERMANENT SPEZIAL	Coolant	Ready mixed biodegradable coolant with "long life" technology and characteristics (red). Freezing protection up to -40°C. Compliant with CUNA 956-16 standard.
AGIP FILTER OIL	Oil for air filter sponge	-
NEUTRAL GREASE OR PETROLEUM JELLY	BATTERY POLES	-

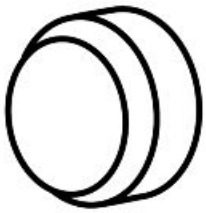
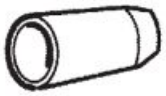
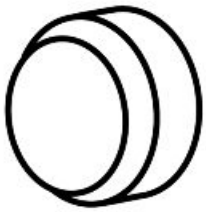
INDEX OF TOPICS

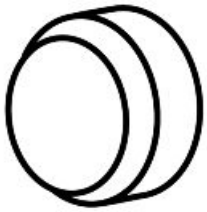
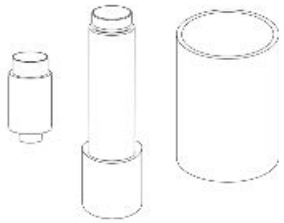
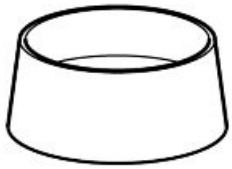
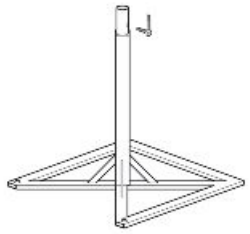
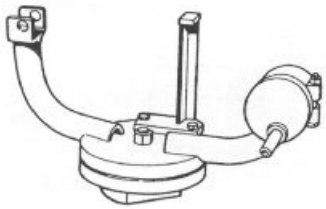
TOOLS

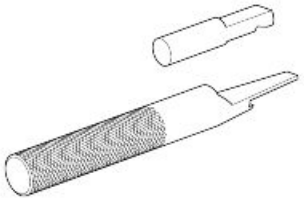
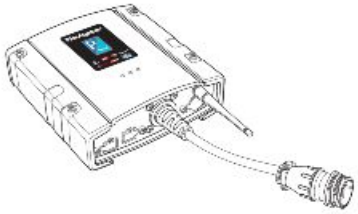
Stores code	Description	
020708Y	Adaptor for engine support	
AP8140535	driving pulley lock wrench	
020702Y	Main shaft bearing punch (15 x 42 x 13) on transmission cover	
020700Y	Water seal punch	
AP8140838	Flywheel rotor locking	
020707Y	Flywheel extractor	

Stores code	Description	
AP8140179	Valve spring compressor	
AP9100838	Tool for valve pressure plate	
020705Y	Piston seeger ring fitting	
020701Y	Punch for bushings	
020703Y	Clutch shaft support bearing punch (15x35x11) on crankcase cover	
0240880	Threaded bolt for locking crankshaft at TDC	
020704Y	Extractor for bushings	

Stores code	Description	
AP8140259	Tool for fitting/ removing the driven pulley clutch	
AP8140665	Adapter for clutch assembly removal	
AP8140266	Comparator door	
020074Y	Support base for checking crankshaft alignment	
020359Y	42 x 47-mm adaptor	
020360Y	52 x 55-mm adaptor	

Stores code	Description	
020364Y	25 mm Adaptor	
020376Y	Adapter handle	
020439Y	Shaft 2 oil seal punch 17 mm	
020455Y	10-mm guide for oil seal on water pump shaft	
020456Y	24 mm punch	
020335Y	Magnetic mounting for dial gauge	

Stores code	Description	
020375Y	28x30 mm punch	
AP8140662	Punch for roller casing	
AP8140664	Guide to mount the movable driven pulley	
AP8140187	Engine support stand	
002095Y	Engine support	
020331Y	Digital multimeter	

Stores code	Description	
AP0277512	Fitting buffer	
AP8104517	Belt removal kit	
AP8140196+AP8140578	Plurigas (AP8140196 in Italian, AP8140578 in English)	
020680Y	TXB Navigator	

INDEX OF TOPICS

Maintenance chart

ROUTINE MAINTENANCE TABLE

I: INSPECT AND CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY
C: CLEAN, R: REPLACE, A: ADJUST, L: LUBRICATE
** Check level every 3,000 km*
*** Replace every 2 years*
**** Replace every 4 years*

km x 1,000	1	6	12	18	24	30	36	42	48	54	60
Driven pulley roller casing			L		L		L		L		L
Safety fasteners	I		I		I		I		I		I
Plastic bushing in variator cover			R		R		R		R		R
Clutch bell		C	C	C	C	C	C	C	C	C	C
Spark plug			R		R		R		R		R
Driving belt			R		R		R		R		R
Throttle control	A		A		A		A		A		A
Air filter		C	C	C	C	C	C	C	C	C	C
Transmission cover air duct filter			I		I		I		I		I
Engine oil filter	R		R		R		R		R		R
Valve clearance			A		A		A		A		A
Braking systems	I	I	I	I	I	I	I	I	I	I	I
Electrical system and battery	I		I		I		I		I		I
Brake fluid **	I		I		I		I		I		I
Coolant level**	I		I		I		I		I		I
Hub oil	R		I		R		I		R		I
Engine oil*	R	I	R	I	R	I	R	I	R	I	R
Headlight aiming adjustment			A		A		A		A		A
Sliding blocks / variable speed rollers			R		R		R		R		R
Vehicle road test	I		I		I		I		I		I
Variator front movable half-pulley			I		I		I		I		I
Radiator			C				C				C
Wheels/tyres	I	I	I	I	I	I	I	I	I	I	I
Suspension			I		I		I		I		I
Steering	I		I		I		I		I		I
Transmission			L		L		L		L		L
Fuel pipes ***	I		I		I		I		I		I

Spark plug

- Lift the saddle.
- Unscrew and remove the two screws «3» (one at each side).
- Unscrew and remove the two screws «4» (one at each side).

CAUTION

PROCEED WITH CAUTION.
DO NOT DAMAGE THE LOWER FIXING TABS AND/OR THEIR CORRESPONDING SLOTS.
HANDLE THE PLASTIC AND PAINTED COMPONENTS WITH CARE, DO NOT SCRATCH OR SPOIL THEM.

- Pull and slide off the front inspection cover «5».

NOTE

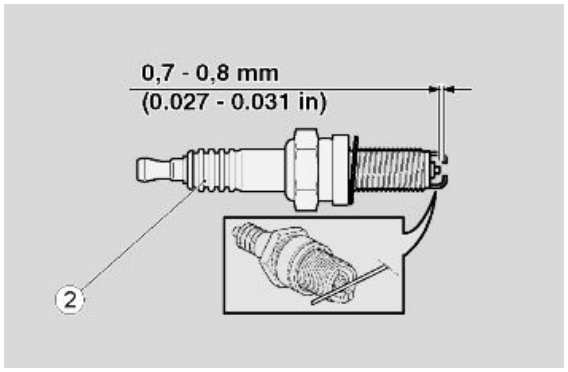
UPON REFITTING, INSERT THE FITTING TABS CORRECTLY IN THEIR SLOTS.

For removal and cleaning:

CAUTION

BEFORE CARRYING OUT THE FOLLOWING OPERATIONS AND IN ORDER TO AVOID BURNS, LEAVE ENGINE AND SILENCER TO COOL OFF TO AMBIENT TEMPERATURE.

- Remove the tube «1» of the spark plug «2».
- Clean off any trace of dirt from the spark plug base. Then unscrew it using the spanner supplied in the toolkit and remove it from its fitting, being careful not to let dust or any other substance come into the cylinder.
- Check that the spark plug electrode and centre porcelain are free of carbon deposits or signs of corrosion. If necessary, clean using suitable spark plug cleaners, a wire and/or metal brush.
- Blow with a strong air blast to avoid removed dirt getting into the engine. Replace the spark plug if there are cracks on the spark plug insulating material, corroded electrodes or several deposits.
- Check the electrode gap with a feeler gauge. This gap should be 0.7 - 0.8 mm; adjust it if necessary by carefully bending the ground electrode.
- Make sure the washer is in good conditions. Once the washer is fitted, manually screw the spark plug to avoid damaging the thread.
- Tighten using the spanner supplied in the toolkit, make the spark plug complete 1/2 of a turn to press the washer.



CAUTION

TIGHTEN THE SPARK PLUG CORRECTLY. OTHERWISE, THE ENGINE MAY OVERHEAT AND GET IRRETRIEVABLE DAMAGED.

USE ONLY THE RECOMMENDED TYPE OF SPARK PLUG, OTHERWISE, ENGINE DURATION AND PERFORMANCE COULD BE COMPROMISED.

Characteristic

Standard spark plug

NGK PMR9B

Spark plug electrode gap

0.7 - 0.8 mm

Locking torques (N*m)

Spark plug (1) 10 Nm (7.38 lbf ft)

- Refit the spark plug tube «1» securely, so that it will not get detached when exposed to engine vibrations.
- Refit the central inspection cover «5».

Hub oil

Check

NOTE

USE RECOMMENDED OIL ONLY. REFER TO THE RECOMMENDED PRODUCTS TABLE.

- Park the vehicle on firm and level ground.
- Park the vehicle on its centre stand.

To check hub oil level, drain off the crankcase and measure the oil level in a suitable container.

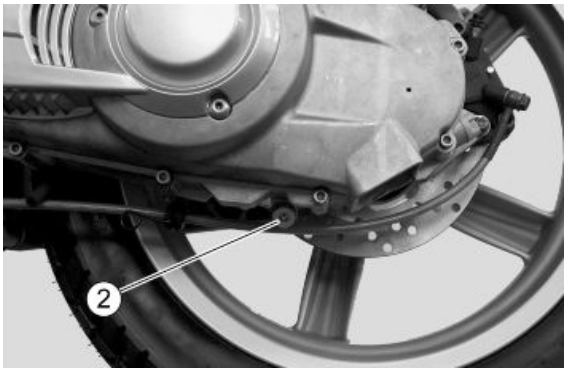
Proceed as follows:

- Unscrew and remove the plug «1».

NOTE

GET A COLLECTING CONTAINER BEFORE CARRYING OUT THESE OPERATIONS.

- Undo and remove the drain screw «2».



- Check that the quantity is within the specified limits (SEE TECHNICAL DATA), top-up with the necessary quantity if required
- Tighten the drain screw «2».
- Fill the oil crankcase.
- Screw the plug «1».

CAUTION

DO NOT RIDE THE MOTORCYCLE WITH INSUFFICIENT LUBRICATION OR WITH CONTAMINATED OR INCORRECT LUBRICANTS AS THIS ACCELERATES THE WEAR AND TEAR OF THE MOVING PARTS AND CAN CAUSE IRRETRIEVABLE DAMAGE.

Replacement

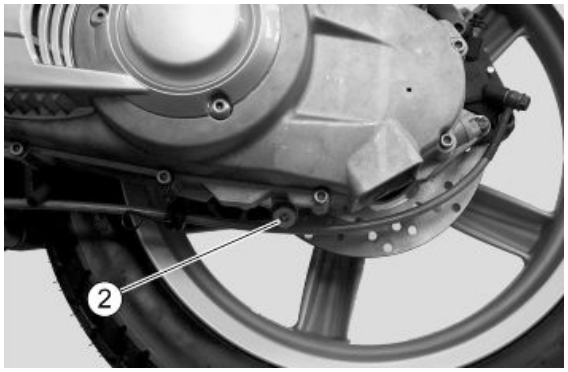
- Park the vehicle on firm and level ground.
- Park the vehicle on its centre stand.

CAUTION

WAIT SOME MINUTES UNTIL THE ENGINE AND THE EXHAUST SYSTEM ARE COLD.

- Unscrew and extract the plug «1».

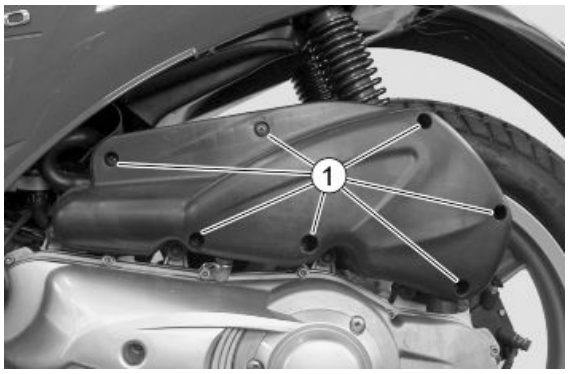
- Place a collecting container with 200 cm³ (12.21 cu.in) capacity under the drain screw «2».
- Undo and remove the drain screw.
- After having drained off the transmission oil, screw and tighten the drain screw «2».



- Pour approx. 200 cm³ (12.21 cu.in) transmission oil through the fill opening.
- Screw and tighten the plug «1».

Air filter

Remove the cover in order to clean the filtering element.



Removal

- Park the vehicle on its centre stand.
- Unscrew and remove the seven screws «1».

- Remove the filter box cover together with the filtering element.
- Check the filtering element, and replace it if necessary.

Cleaning

CAUTION

USE COMPRESSED AIR ONLY.
CLEAN THE FILTERING ELEMENT WITH A JET OF COMPRESSED AIR.

Engine oil

Replacement

CAUTION

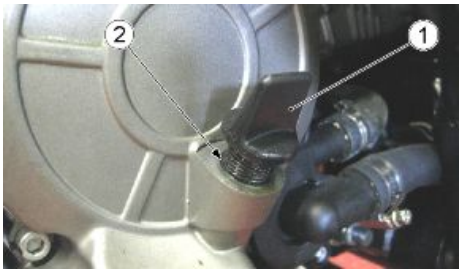
PARK THE MOTORCYCLE ON SAFE AND LEVEL GROUND.

- Park the vehicle on its centre stand.

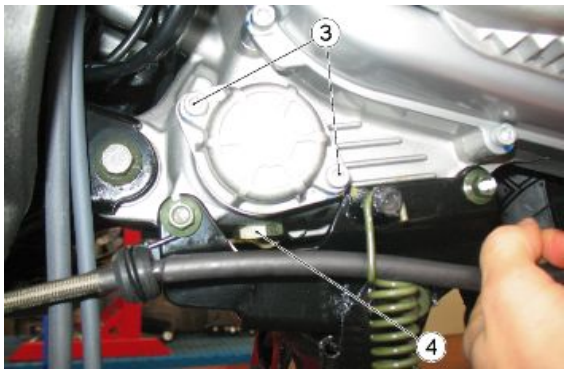
CAUTION

WAIT SOME MINUTES UNTIL THE ENGINE AND THE EXHAUST SYSTEM ARE COLD.

- Stop the engine and let it cool off so that the oil in the crankcase flows down and cools as well.
- Unscrew and pull out the measuring cap-dipstick «1».



- Place a collecting container under the oil drainage plug «4».
- Unscrew and remove the oil drainage plug «4» and then drain all the engine oil into the collecting container.
- Remove the cover by undoing the 2 screws «3» and slide off the engine oil filter.
- Fit a new oil filter and the cover tightening the two screws «3».
- Screw and tighten the engine oil drainage plug «4».



CAUTION

UPON REFITTING THE OIL FILTER COVER PAY ATTENTION NOT TO DAMAGE THE O-RING.

- Pour approx. 950 cm³ (58 cu.in) engine oil through the fill opening «2».
- Screw and tighten the measuring cap-dipstick «1».
- Start the engine and let it run for several minutes. Stop the engine and let it cool down.
- Check engine oil level again.

Check

- Rest the vehicle on its centre stand.

CAUTION

PARK THE MOTORCYCLE ON SAFE AND LEVEL GROUND.

CAUTION

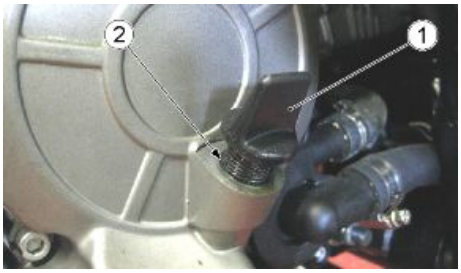
THE ENGINE AND THE EXHAUST SYSTEM COMPONENTS CAN GET VERY HOT AND REMAIN SO FOR SOME TIME EVEN AFTER THE ENGINE IS TURNED OFF. WEAR INSULATING GLOVES BEFORE HANDLING THESE PARTS OR WAIT UNTIL THE ENGINE AND THE EXHAUST SYSTEM COOL DOWN.

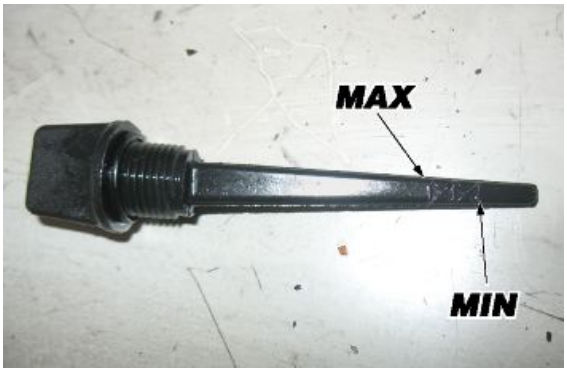
- Stop the engine and let it cool down. This will allow the oil to settle into the crankcase and cool down.

NOTE

FAILURE TO FOLLOW THESE OPERATIONS MAY RESULT IN AN INCORRECT READING OF THE ENGINE OIL LEVEL.

- Unscrew and pull out the measuring cap-dipstick «1».
- Clean the area in contact with oil with a clean cloth.
- Place without screwing the cap-dipstick «1» into its tube «2».
- Remove the cap-dipstick «1» again and read the level the oil reaches on the dipstick.
- The level is correct when it is close to the MAX level marked on the measuring dipstick.





- Top-up if required.

TOP-UP

- Pour a small quantity of oil through the tube «2» and wait approximately five minutes so that the oil flows evenly into the crankshaft.
- Check the oil level and top-up, if required.
- Top-up with small quantities of oil, until the recommended level is reached.
- At the end of the operation, screw and tighten the tap-dipstick «1».

CAUTION

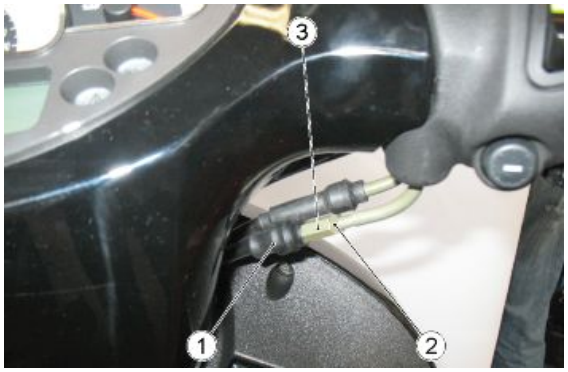
DO NOT RIDE THE MOTORCYCLE WITH INSUFFICIENT LUBRICATION OR WITH CONTAMINATED OR INCORRECT LUBRICANTS AS THIS ACCELERATES THE WEAR AND TEAR OF THE MOVING PARTS AND CAN CAUSE IRRETRIEVABLE DAMAGE.

Transmissions

Throttle grip adjustment

The empty travel of the throttle grip should be 2-3 mm (0.08-0.12 in), measured at the throttle trim.

If this is not so, proceed as follows:



- Park the vehicle on its centre stand.
- Slide off the protection cover «1».
- Loosen the lock nut «2».
- Turn the set screw (3) so as to obtain the specified value.
- After the adjustment, tighten the lock nut (2) and check the empty travel again.
- Refit the protection cover «1».

CAUTION

AFTER ADJUSTING, CHECK THAT MOVING THE HANDLE-BAR DOES NOT MODIFY THE ENGINE IDLE SPEED AND THAT ONCE RELEASED, THE THROTTLE GRIP HOMES SMOOTHLY AND AUTOMATICALLY.

Cooling system

Level check

CAUTION

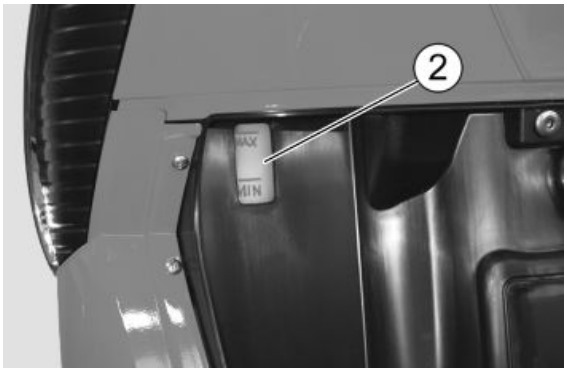
WAIT FOR THE ENGINE TO COOL DOWN BEFORE CHECKING OR TOPPING-UP THE COOLANT LEVEL.

- Shut off the engine and wait until it cools off.

CAUTION

PARK THE MOTORCYCLE ON SAFE AND LEVEL GROUND.

- Open the glove-box.
- Make sure that the coolant level in the expansion tank «2» is between the «MIN» and «MAX» reference marks.



MIN = minimum level.

MAX = maximum level.

Otherwise, top-up.

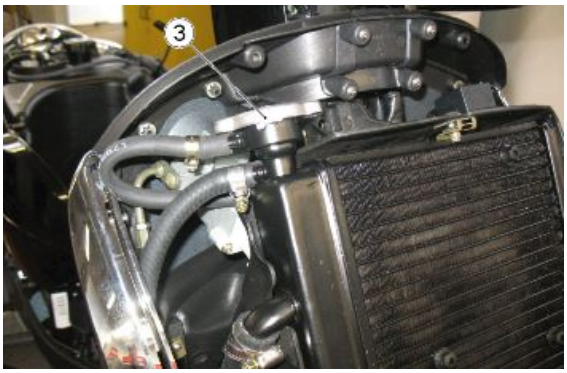
RADIATOR LEVEL CHECK:

- Remove the legshield.

CAUTION

WAIT FOR THE ENGINE TO COOL DOWN BEFORE CHECKING OR TOPPING-UP COOLANT LEVEL.

- Loosen (turning it anticlockwise) but do not remove the radiator cap «3».
- Wait for some seconds so that possible pressure may be purged.
- Remove the radiator cap «3».
- Check that the there is coolant in the radiator; top-up if required.

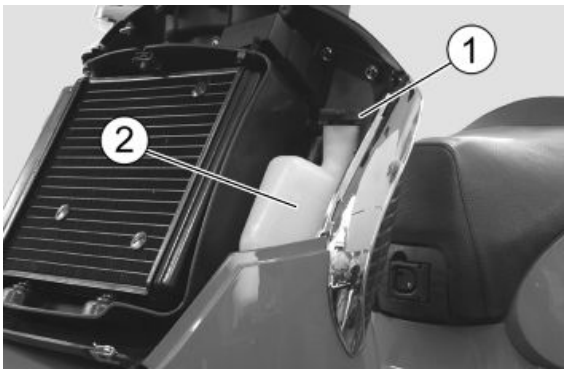


Top-up

CAUTION

WAIT FOR THE ENGINE TO COOL DOWN BEFORE CHECKING OR TOPPING-UP THE COOLANT LEVEL.

- Remove the front shield.
- Remove the snap-on cover «1» from the expansion tank «2».



CAUTION

DO NOT ADD ADDITIVES OR ANY OTHER SUBSTANCE TO THE COOLANT.

- Top-up with coolant until the fluid level is near the "MAX" reference mark.

- Do not exceed this level. Otherwise, the coolant will spill out when the engine is running.
- Refit the filler cap «1».

CAUTION

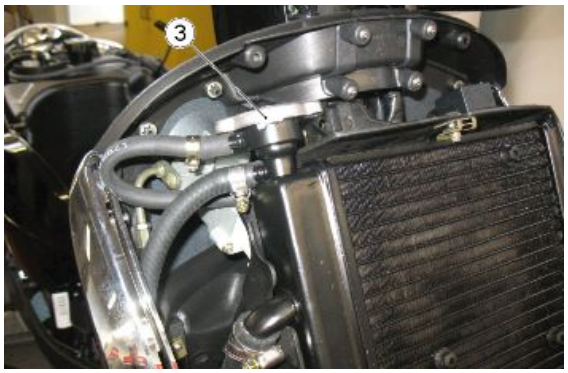
IF THERE IS AN EXCESSIVE CONSUMPTION OF COOLANT OR WHEN THE EXPANSION TANK REMAINS EMPTY, CHECK THAT THERE ARE NO LEAKS IN THE CIRCUIT.

RADIATOR LEVEL TOP-UP:

CAUTION

WAIT FOR THE ENGINE TO COOL DOWN BEFORE CHECKING OR TOPPING-UP COOLANT LEVEL.

- Loosen (turning it anticlockwise) but do not remove the radiator cap «3».
- Wait for some seconds so that possible pressure may be purged.
- Remove the radiator cap «3».
- Top-up with coolant.



Braking system

CAUTION

CONSIDERING THE DANGER FOR VEHICLE AND RIDER, IT IS STRICTLY NECESSARY, AFTER REFITTING BRAKES AND RESTORING THE BREAKING SYSTEM TO ITS REGULAR USE CONDITIONS, THAT THE HYDRAULIC CIRCUIT BE AIR PURGED.

NOTE

THIS VEHICLE IS FITTED WITH A BRAKING SYSTEM COMPRISING:

- A FRONT DISC BRAKE;
- A REAR DISC BRAKE.

Operating the right brake lever exerts pressure on the front brake calliper.

Operating the left brake lever exerts pressure on the front and rear brake callipers.

Level check

- Park the vehicle on its centre stand.
- Turn the handlebar so that the fluid in the brake fluid reservoir is parallel to the «MIN» reference mark indicated on the sight glass «1».
- Check that the level in the reservoir is over the reference «MIN» indicated on the sight glass «1».

MIN = minimum level.

If the fluid does not reach at least the «**MIN**» reference mark:

CAUTION

BRAKE LEVEL DECREASES GRADUALLY AS BRAKE PADS WEAR DOWN.

• Check brake pads and disc for wear. If the pads and/or the disc do not need replacing, top-up the fluid.

Top-up

- Undo the four screws «4» to remove the brake pump cover «5».

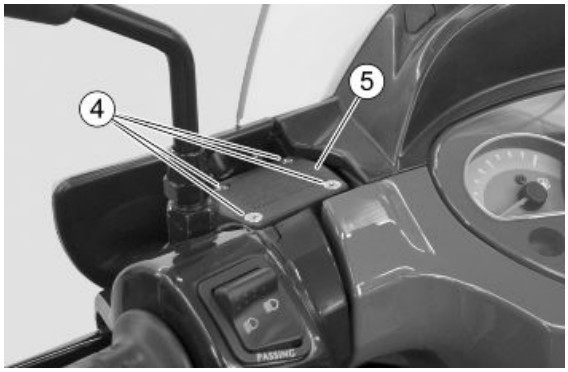
CAUTION

RISK OF BRAKE FLUID SPILLS. DO NOT PULL THE FRONT BRAKE LEVER WHEN THE SCREWS ARE LOOSE OR, MAINLY, WHEN THE BRAKE FLUID RESERVOIR COVER HAS BEEN REMOVED. PLACE A CLOTH UNDER THE BRAKE FLUID RESERVOIR TO PROTECT IT FROM ANY FLUID SPLASHES.

CAUTION

TOP-UP TO MAXIMUM LEVEL MARK ONLY WHEN BRAKE PADS ARE NEW. BRAKE FLUID LEVEL DECREASES GRADUALLY AS BRAKE PADS WEAR OUT.
WHEN TOPPING-UP, DO NOT EXCEED THE MAXIMUM LEVEL MARK WHEN BRAKE PADS ARE WORN AS YOU RISK SPILLING FLUID WHEN CHANGING THE BRAKE PADS.

- Top-up.



System check

NOTE

THE FOLLOWING INFORMATION REFERS TO ONE BRAKING CIRCUIT BUT APPLIES TO BOTH.

To carry out a quick pad check:

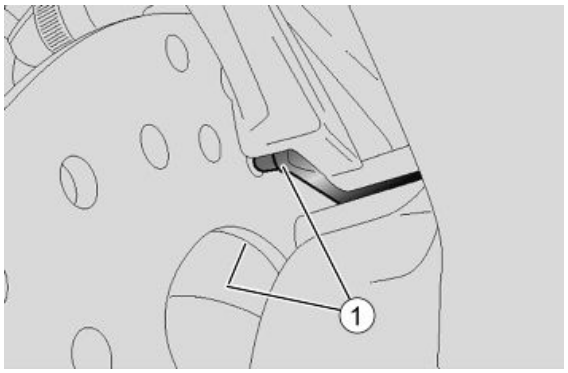
- Park the vehicle on its centre stand.
- Visually check the brake disc and pads, as indicated below.

Front brake callipers

From the front bottom side for both pads.

Rear brake calliper

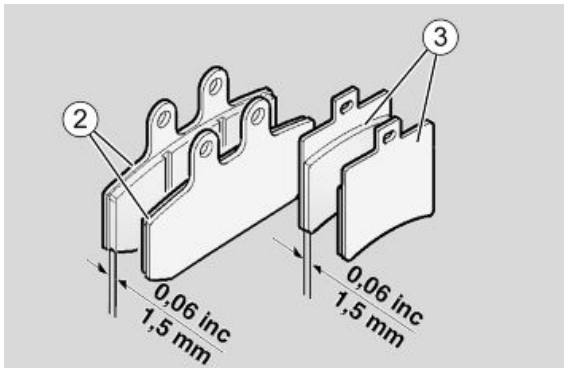
From the back bottom side for both pads «**1**».



- Replace both pads if the friction material thickness (even in only one pad) is reduced to about 1.5 mm.

Front pads "**2**".

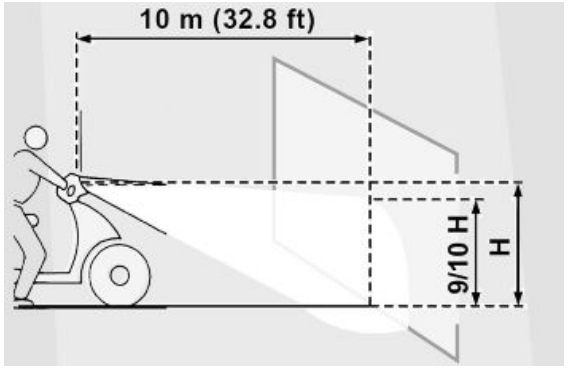
Rear pads "**3**".



Headlight adjustment

EU - For a quick inspection of the correct aiming of the front light beam:

- Place the vehicle 10 m (32.8 ft) from a vertical wall and make sure the ground is level.
- Turn on the low beam light, sit on the vehicle and check that the light beam projected to the wall is a little below the headlight horizontal straight line (about 9/10 of the total height).

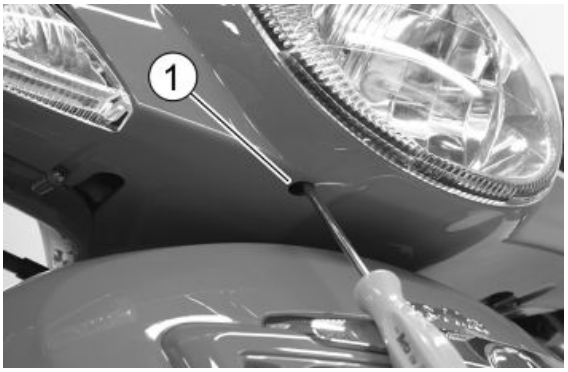


To adjust the light beam:

• Use a screwdriver to operate on the specific screw «**1**» located below the rear handlebar cover.

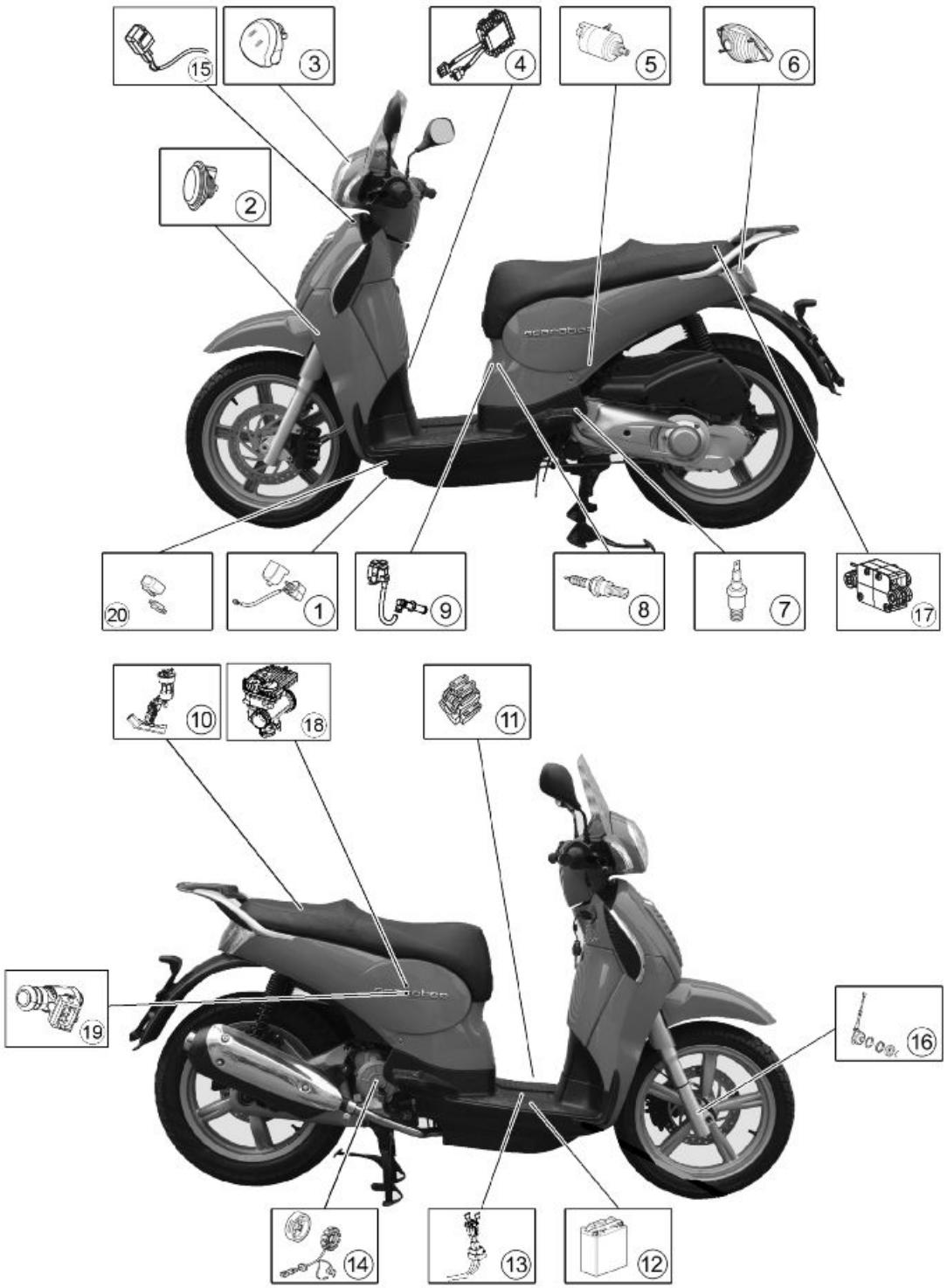
TIGHTEN the screw (clockwise) to lower the light beam.

UNDO the screw (anticlockwise) to raise the light beam.



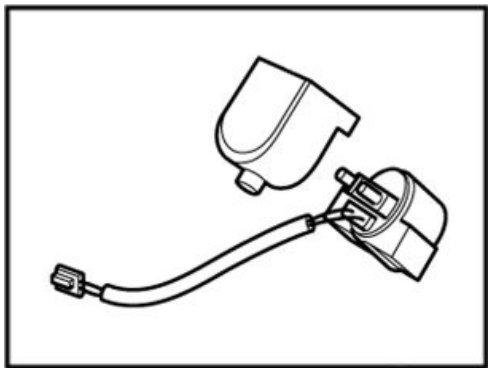
INDEX OF TOPICS

Components arrangement



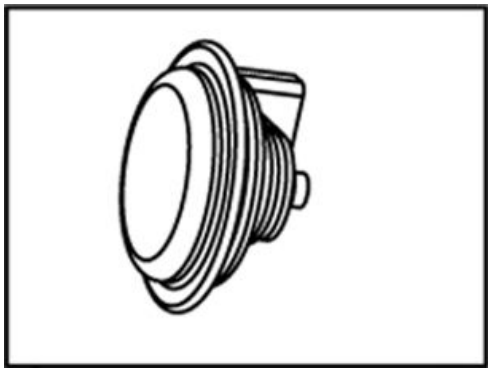
1. Start-up relay

- Start-up relay resistance, powered: 0 Ohm
- Start-up relay resistance, not powered: infinite



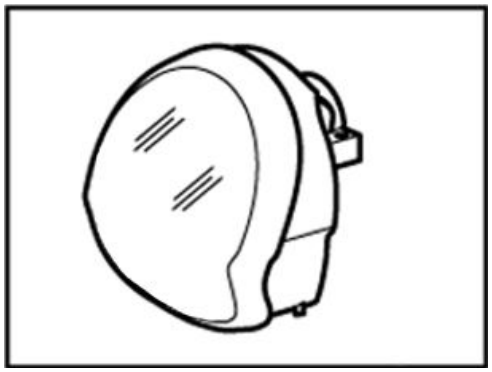
2. Horn

- Voltage with horn activated: battery voltage
- Voltage with horn deactivated: 0 V



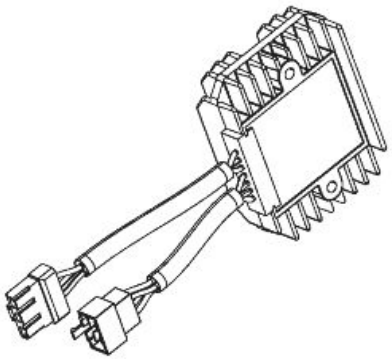
3. Headlamp

- Front tail light: 12V - 5W
- High-/low-beam lights: 12V - 55W/12V - 60W H4
- Front turn indicator light: 12V - 10 W (RY amber bulb)



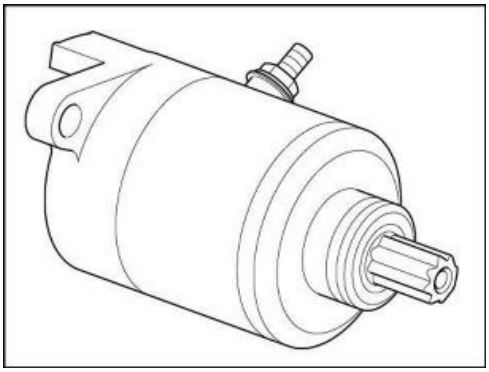
4. Voltage regulator

- Recharging voltage: 13 - 15 V
- No-load voltage at terminals: 45 V



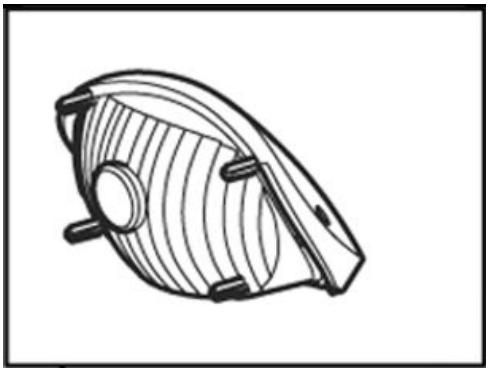
5. STARTER MOTOR

- Relay voltage powered: battery voltage
- Resistance: 0.5 Ohm

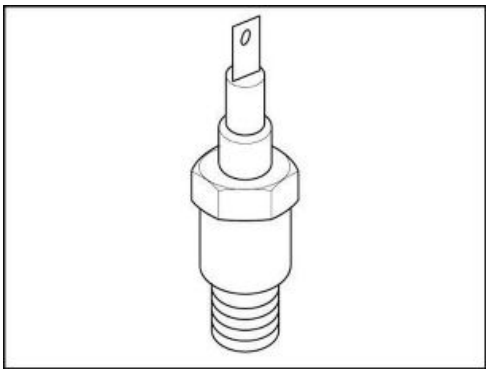


6. Taillight

- Rear tail light/stop light: 12V - 5W/21W
- Rear turn indicator light: 12V - 10 W (RY amber bulb)
- License plate light: 12V - 5W



7. Engine H2O temperature sensor



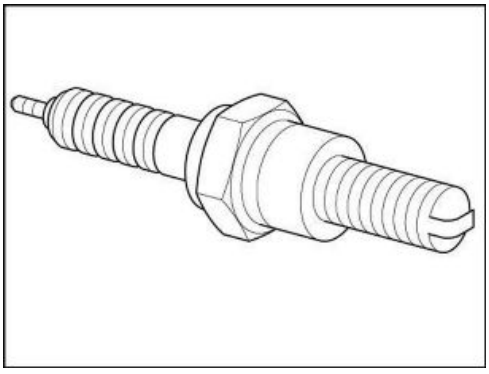
COOLANT TEMPERATURE °C / RESISTANCE VALUE OHM

Characteristic	Injection contact values	Instrument panel contact values
50°	807	820
120°	105	80.6

8. Spark plug

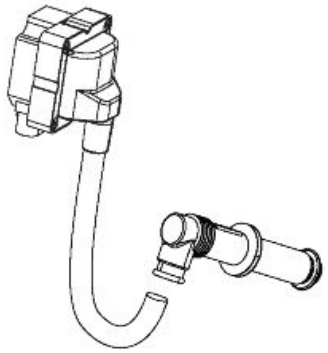
Standard: NGK CR9EB

Alternatively: NGK PMR9B



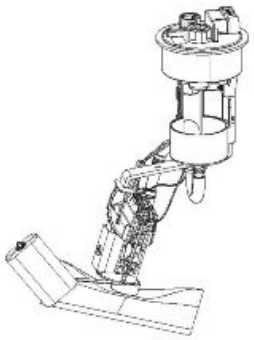
9. HV coil

- Coil primary resistance: 0.5 Ohm
- Coil secondary resistance: 3.1 KOhm



10. Fuel Level Sensor

Fuel level sensor operation check (removed from the vehicle).



RESISTANCE BETWEEN THE CABLES (COLOUR - OHM) - CORRECT INDICATION

	Specification	Desc./Quantity
1	Grey/Green - Brown (14 Ohm)	| [4/4 ± 5%]
2	Grey/Green - Brown (306 Ohm)	| [0 ± 5%]
3	Grey/Green - Brown (176 Ohm)	| [Warning light on]

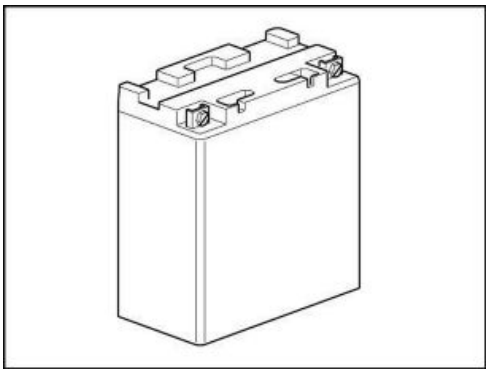
11. Main fuses

- 20A fuse: direct positive (voltage regulator, instrument panel, ignition switch, plug socket fuse, electric fan relay and ECU power supply).
- 15A fuse: plug socket power supply.
- 20A fuse: spare part.

12. Battery

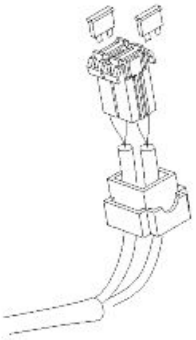
12V - 10 Ah

XTX12-BS YUASA



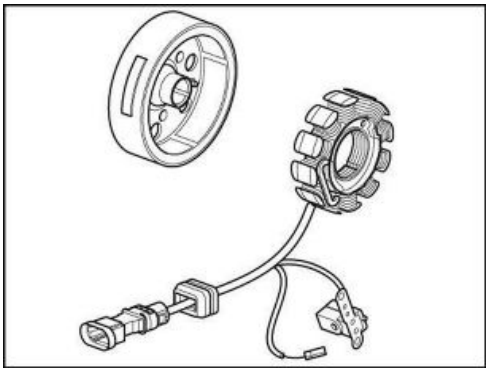
13. Auxiliary fuses

- 15A fuse: from ignition switch to all light loads, license plate light, blinkers and horn.
- 15A fuse: ignition /injection and start-up power supply.
- 15A fuse: spare part.



14. Generator

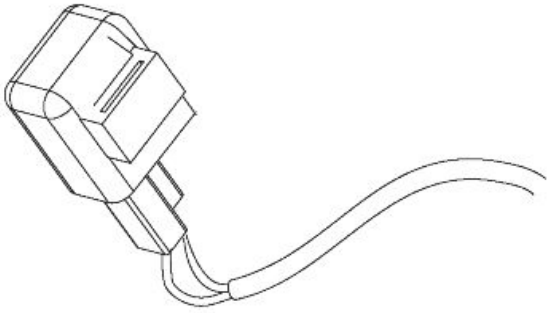
- Permanent magnet: battery voltage 12 V - 300 W at 6000 rpm.
- Rated power: 300 W
- Resistance value: 0.36 - 0.44 Ohm
- Resistance between the cables and the stator support: endless
- Pick-up electric resistance: 129 +/-10% ohm



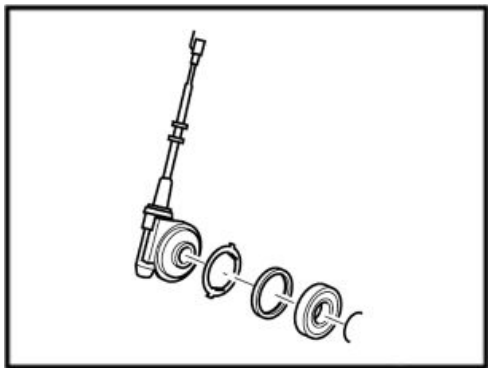
15. Turn indicators

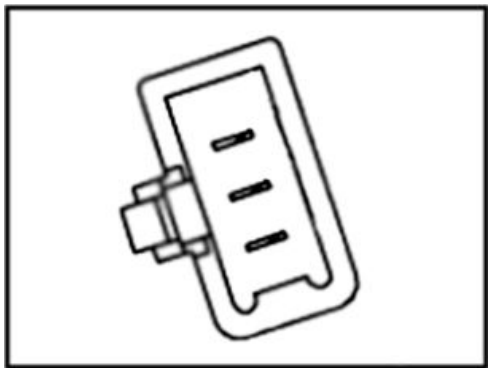
12.8 V

2x10W+3.4W



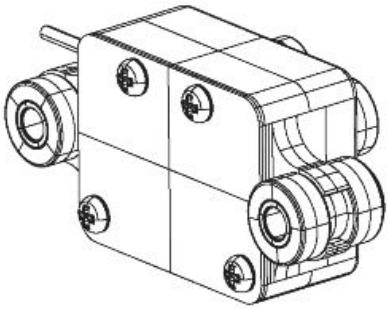
16. Speed sensor



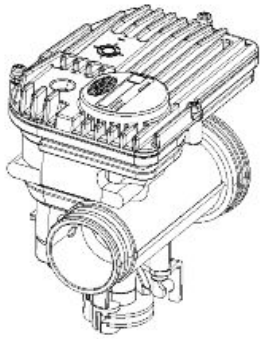


17. Fall sensor

- Horizontal position: 61.9 KOhm
- oblique position > 45°: 0 Hom

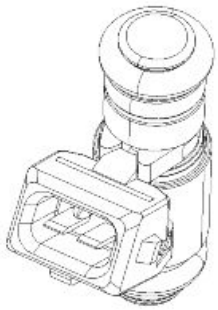


18. Control unit / throttle body



19. Injector

Electric resistance at ambient temperature: 14,5 Ohm



20. Relay

- Fan
- Injection
- Lights

Electrical system installation

Motorcycle division

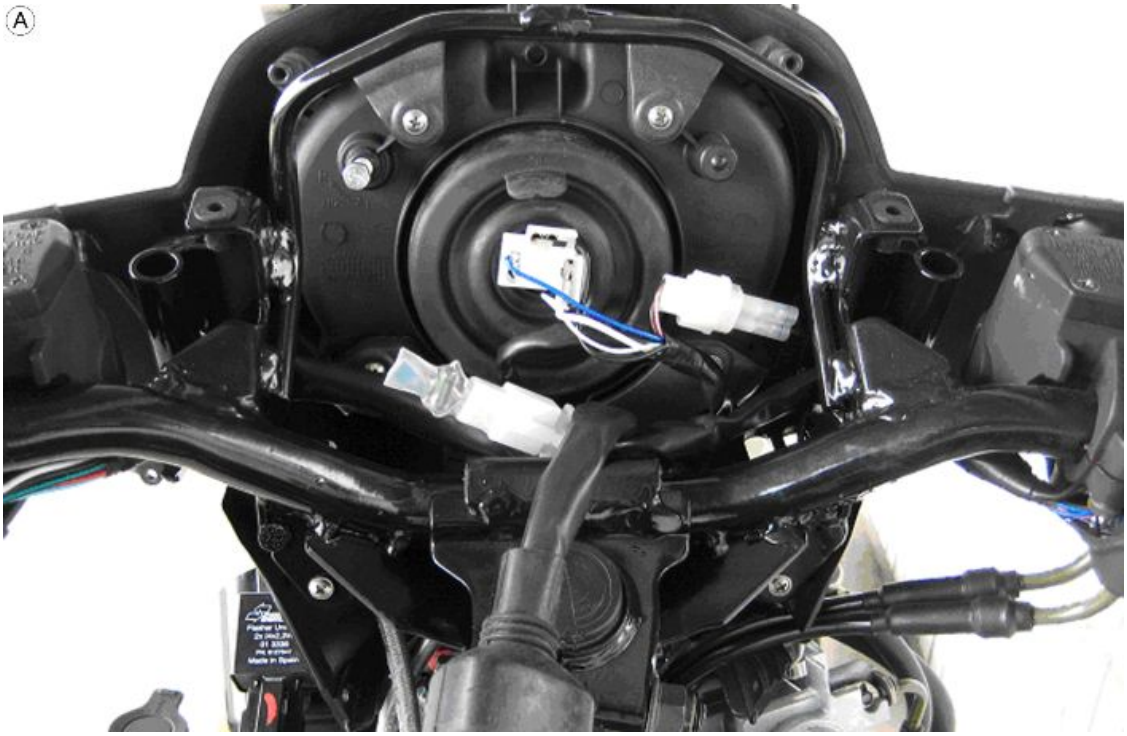
The wiring timing is subdivided in two essential sections, as indicated in the figure.

1. Front section

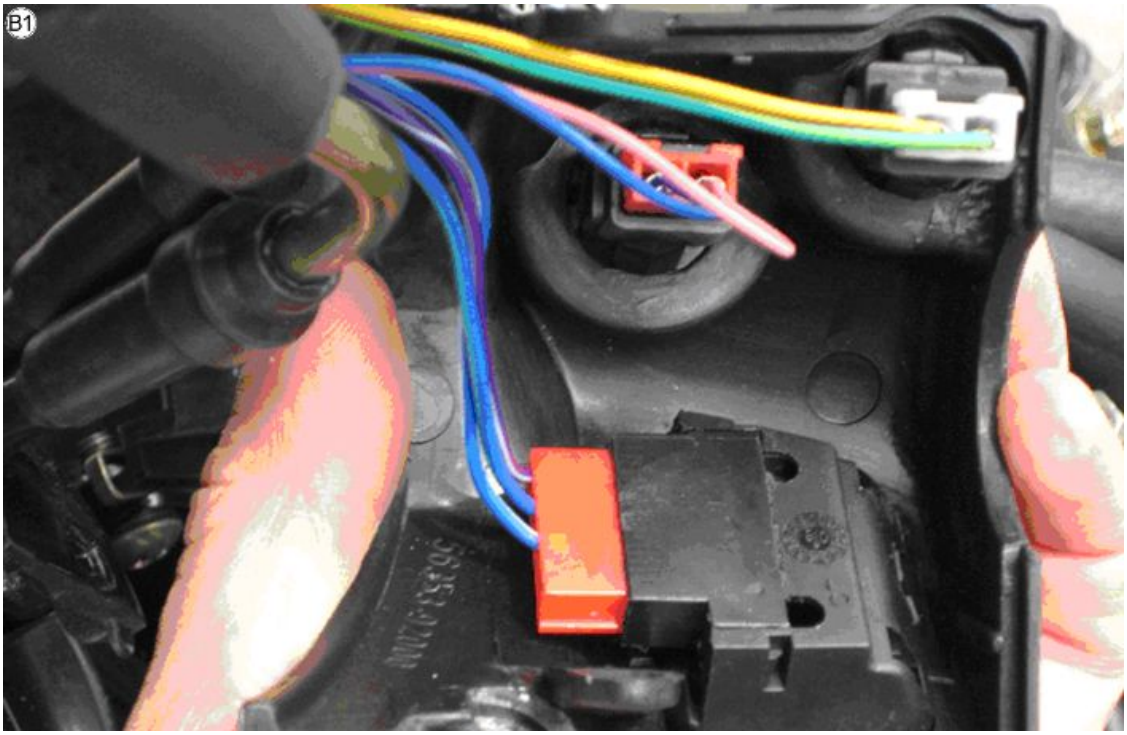
2. Rear section

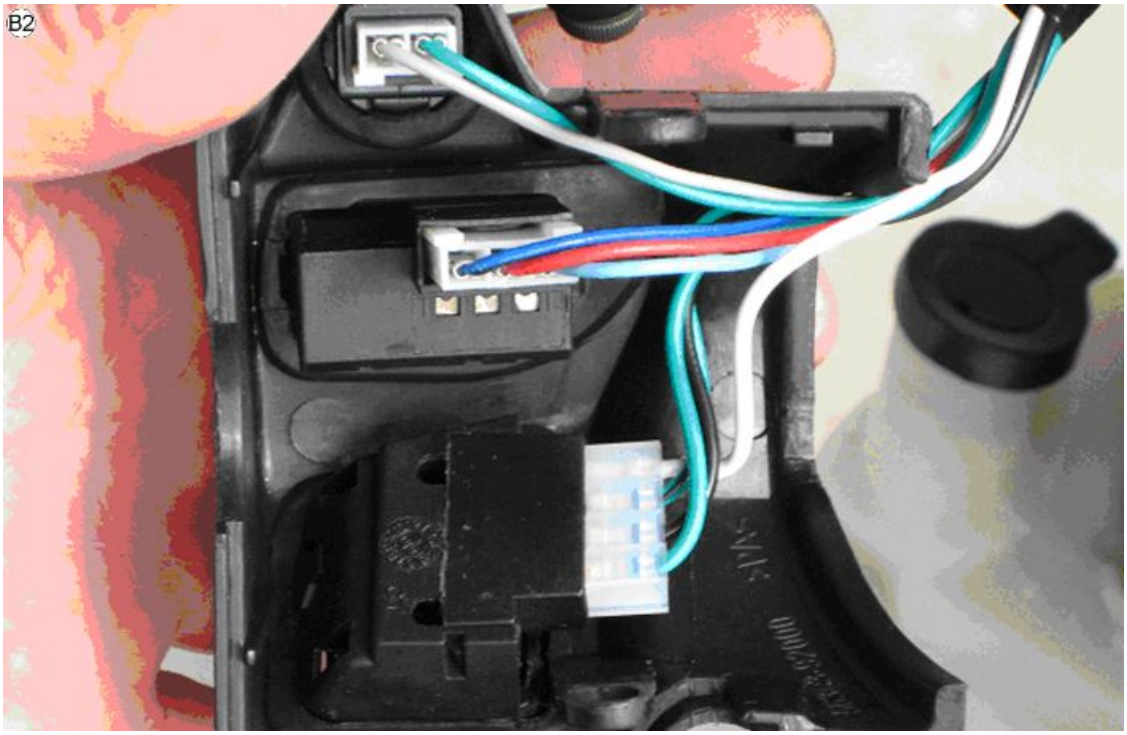
Front side

A - Front headlamp



B - Handlebar





C - Steering

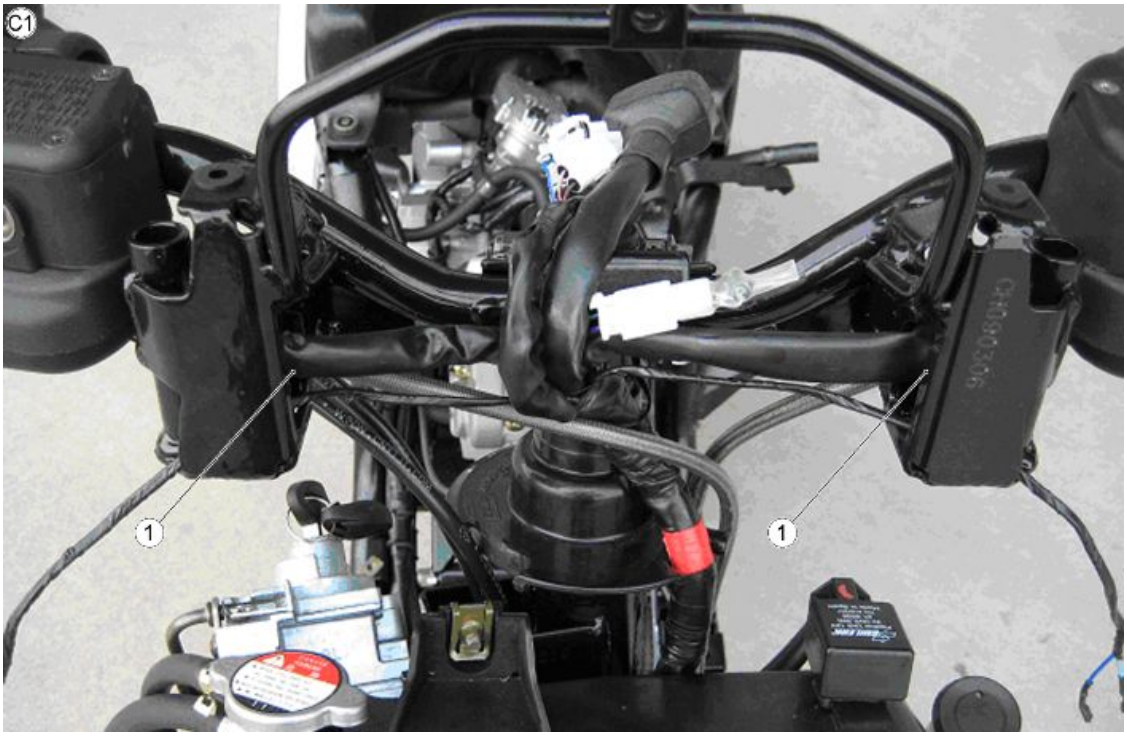
1 - Passage of the cable harnesses through the openings in the handlebar.

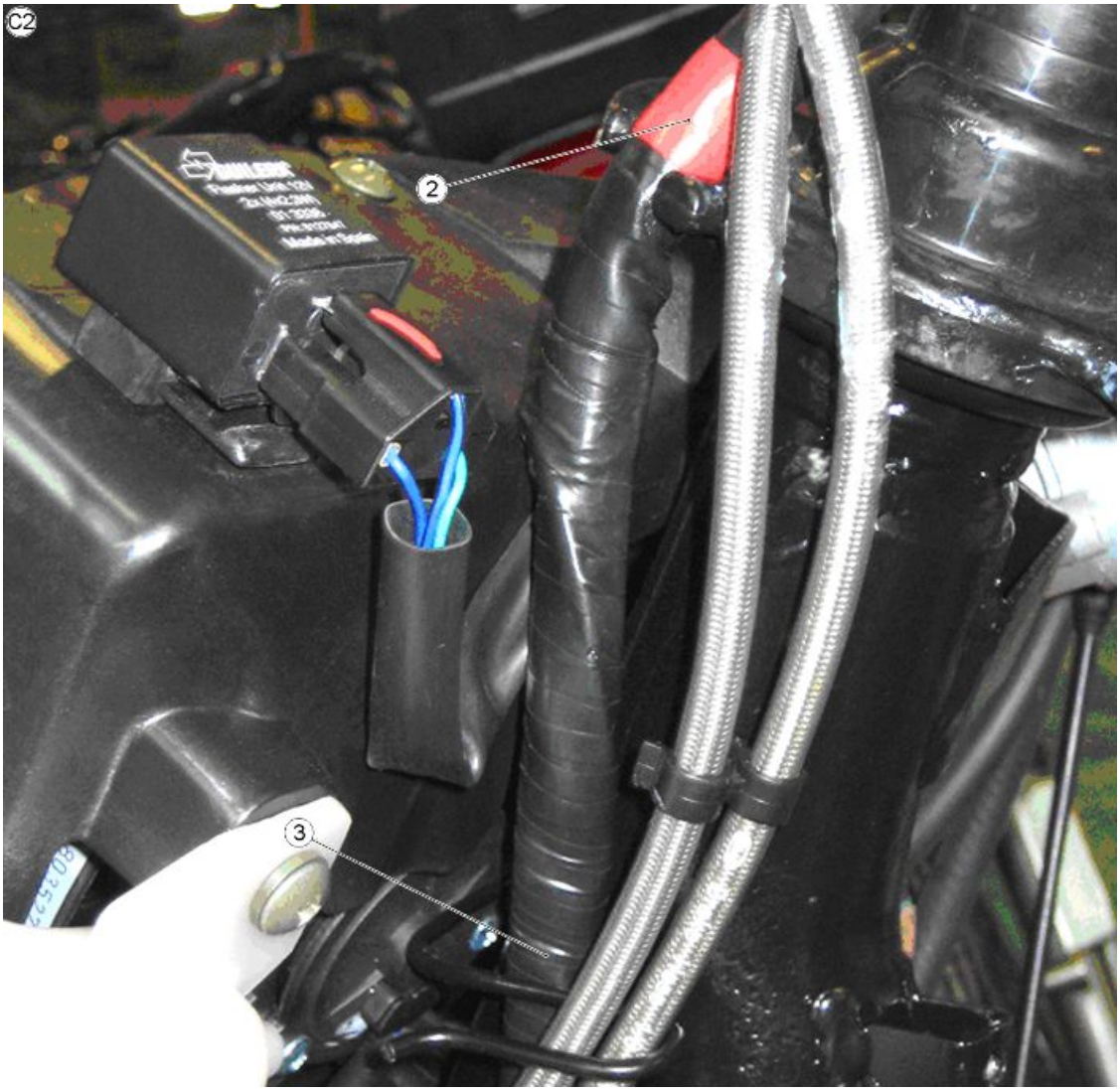
2 - The red strap on the cable harness must be aligned with the cable grommet.

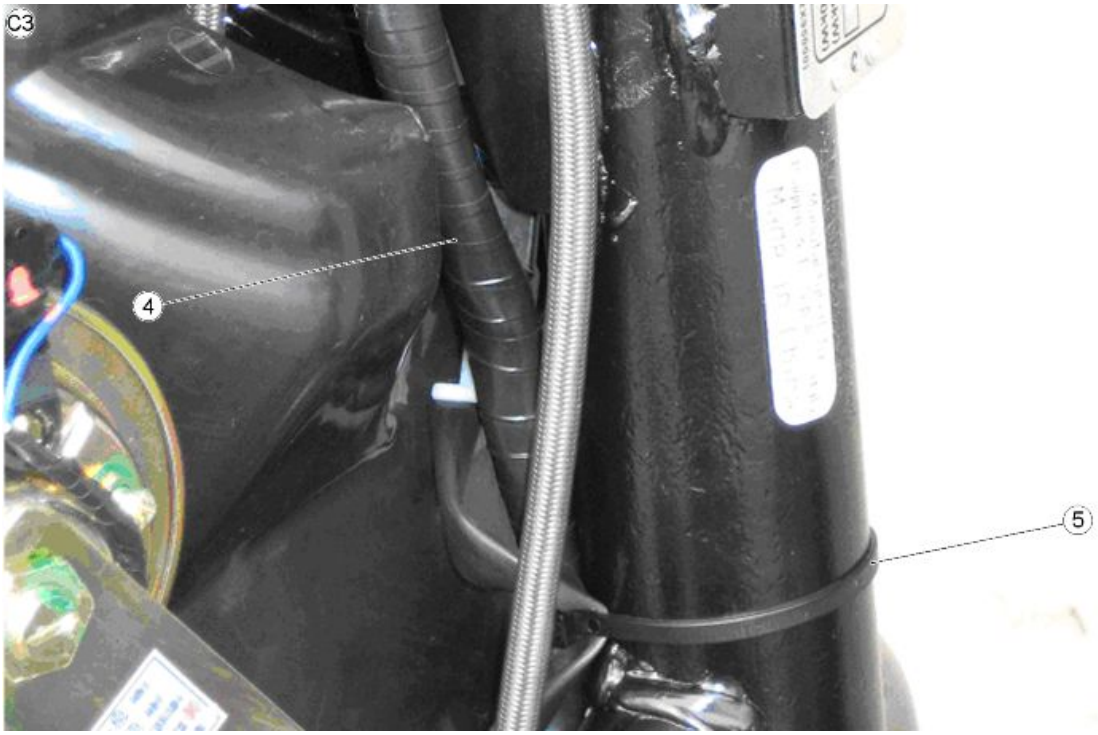
3 - The main cable harness must pass behind the metal cable grommet.

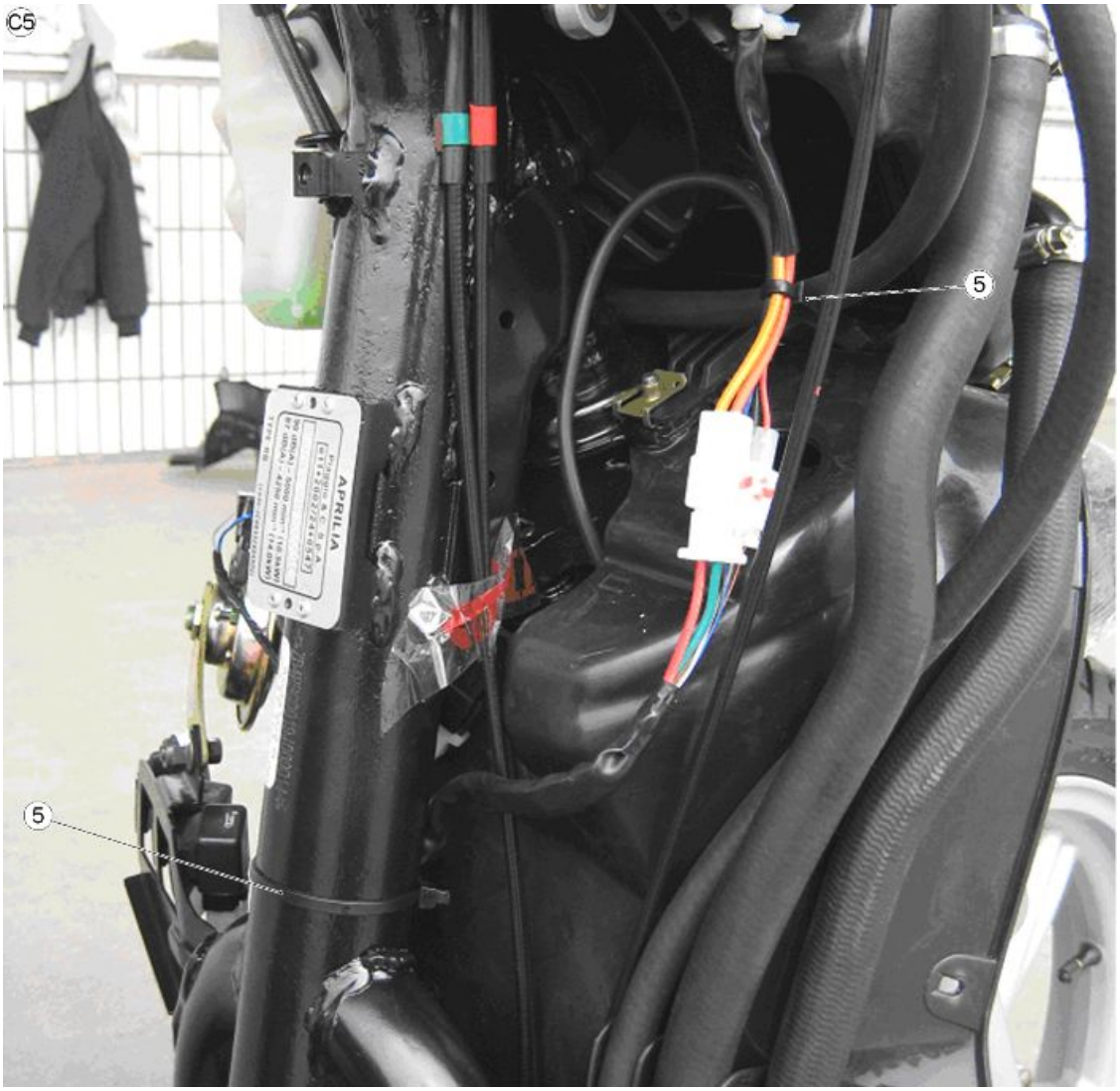
4 - The fan connector must be placed behind the steering.

5 - Plastic clamp




C2
2
3


C3
4
5

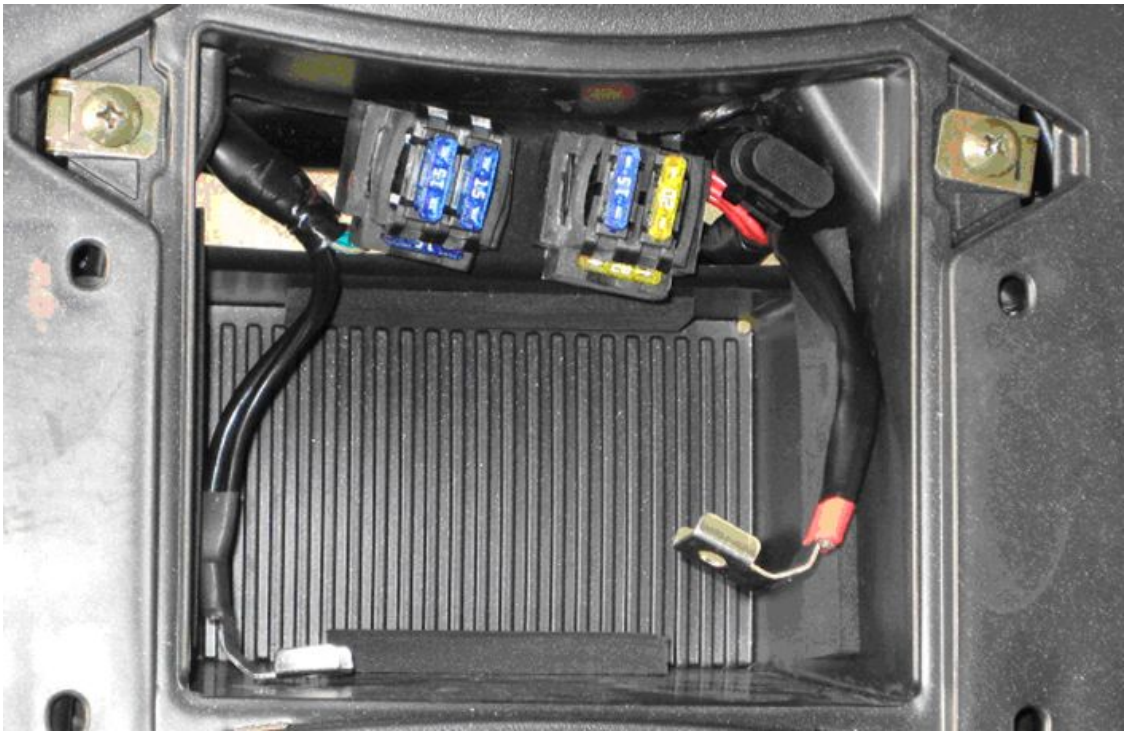


D - Footrest

6 - Battery negative clamp.

7 - Diagnostic connector.

8 - Battery positive clamp



E - Speed sensor

9 - The cable grommet ring must be inserted in the seat provided on the mudguard.

10 - The cable harness must pass through the metal ring and the pipe must be in the central position

Back side

A - Footrest

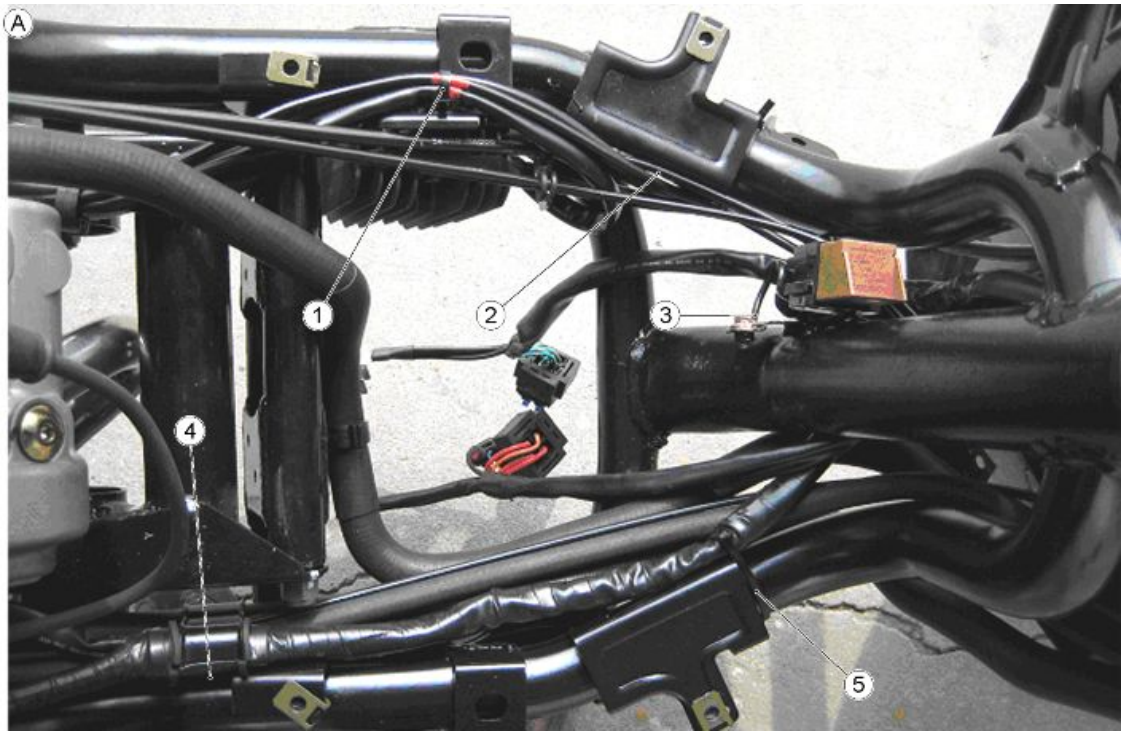
1 - All three parts of the cable harnesses in red straps must be fixed to the chassis with clamp.

2 - All three cable harnesses must pass through the throttle grip cables.

3 - The horn terminal must be fixed to the ground on the chassis.

4 - The cable harness must be aligned with the retainer.

5 - Plastic clamp



B - Engine

6 - Plastic clamp.

7 - The engine cable harness must pass under the water pipe.

8 - Check the correct connection of the control unit.

9 - The cable harness must be fixed with a clamp.

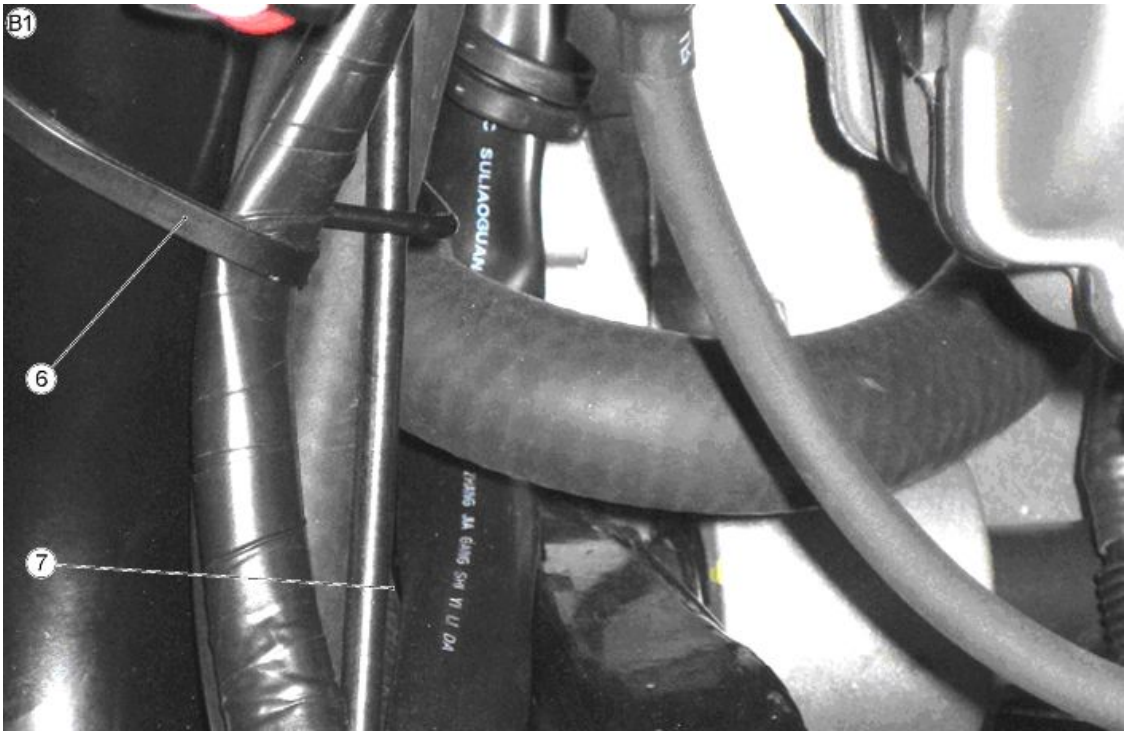
10 - The rear cable harness must pass through the metal ring.

11 - The ground lead must be fixed to the starter motor screw.

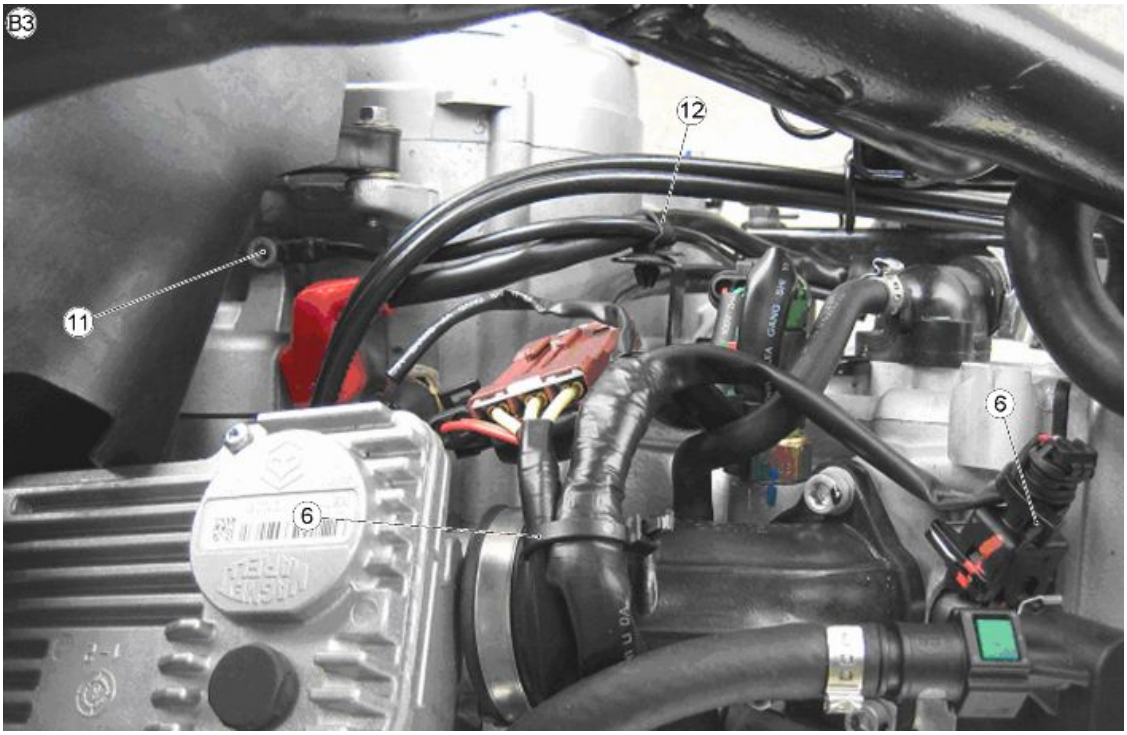
12 - Plastic clamp with locking system.

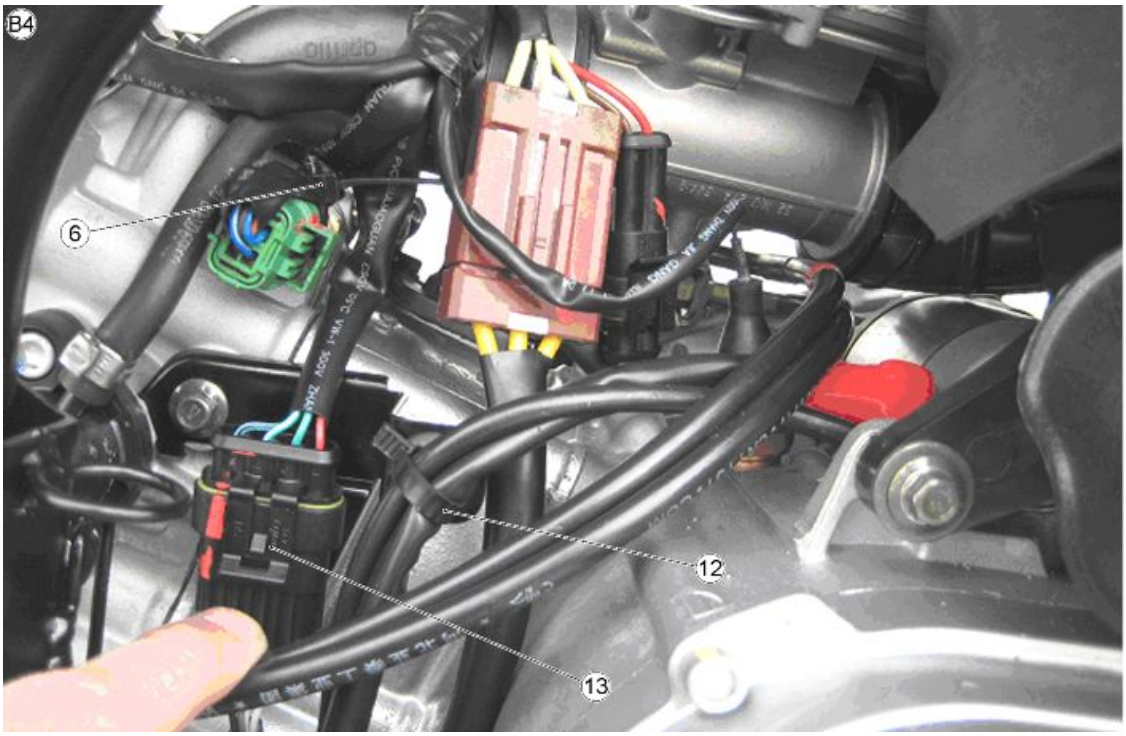
13 - The lambda probe connector must be fixed with a clamp to the engine.

14 - The cable harnesses of the starter motor and alternator must pass through the clamps.


B1
6
7


B2
8
9
10
6
9


B3
12
11
6
6


B4
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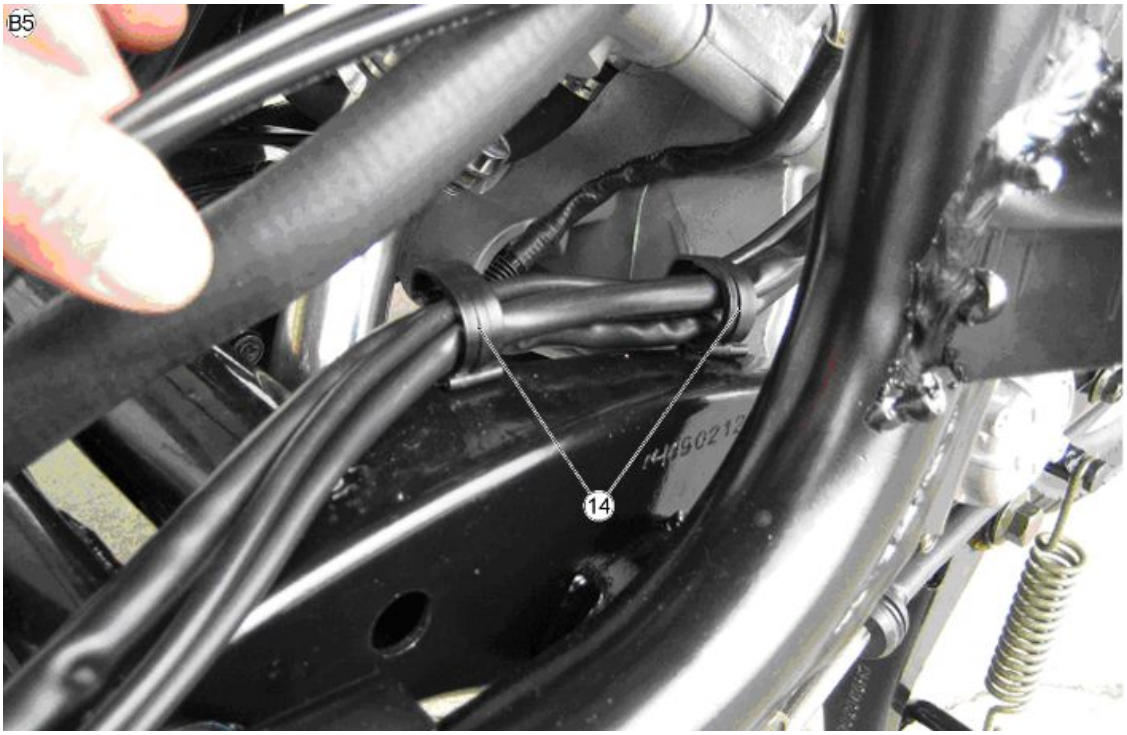
12
13



C - Right side

15 - Plastic clamp.

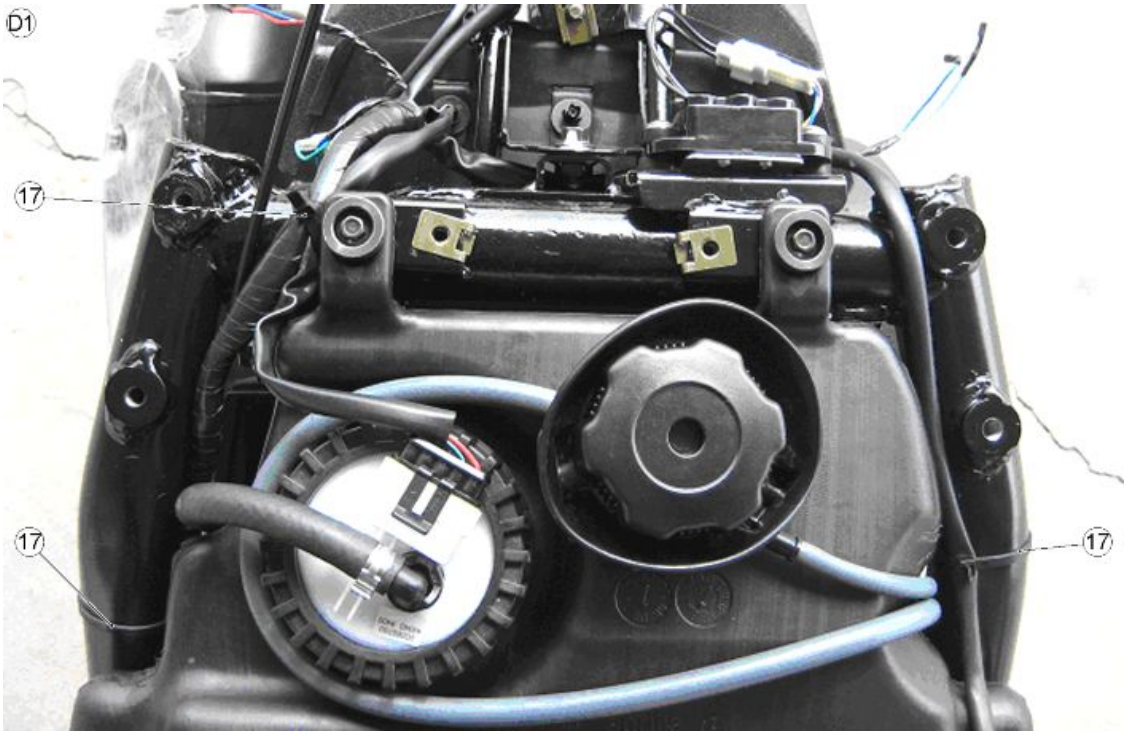
16 - The rear cable harness must pass through the metal ring.

D - Rear cable harness

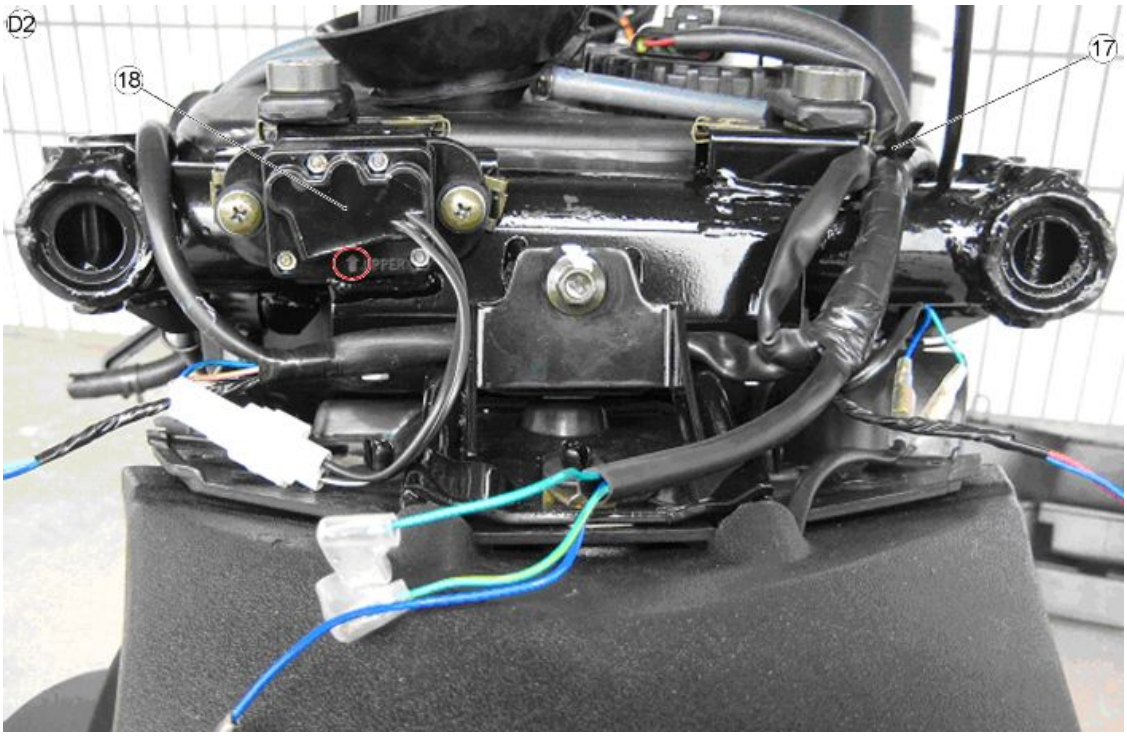
17 - Plastic clamp.

18 - Fit the fall sensor with the arrow facing up.

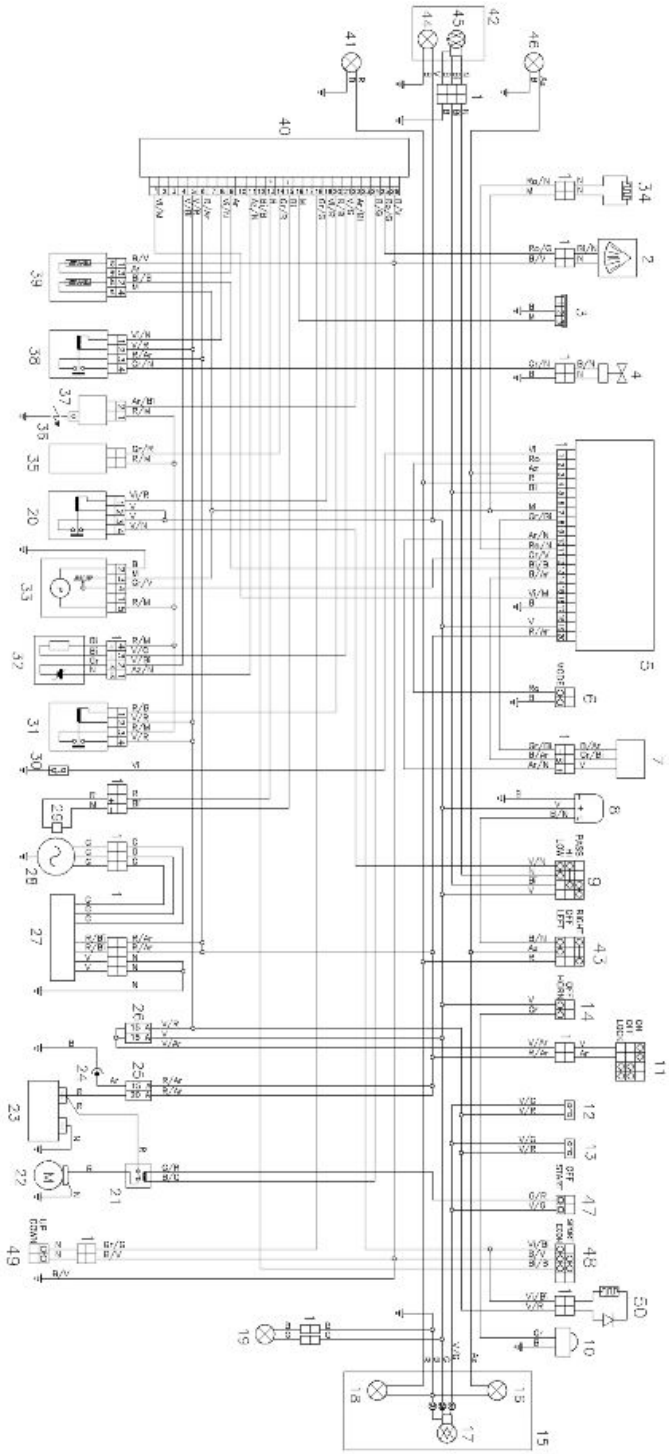
D1



D2



Conceptual diagrams



KEY:

1. Multiple connectors
2. Fall sensor
3. ECU diagnosis
4. Electric fan

5. Instrument panel
6. "MODE" button
7. Speed sensor
8. Turn indicators
9. Light switch
10. Horn
11. Ignition key
12. Front stop
13. Rear stop
14. horn button
15. Taillight
16. Left rear turn indicator
17. Rear daylight running light /stop light bulb
18. Rear right turn indicator
19. License plate light
20. Light relay
21. Start-up relay
22. STARTER MOTOR
23. Battery
24. Plug socket
25. Main fuses
26. Auxiliary fuses
27. Voltage regulator
28. Alternator
29. Pick-up
30. Engine oil pressure sensor
31. Injection relay
32. Lambda probe
33. Fuel pump unit
34. Ambient air temperature sensor
35. Fuel injector
36. Spark plug
37. Coil
38. Fan relay
39. Water Temperature Sensor
40. Injection ECU
41. Front right turn indicator
42. Headlamp

43.Turn indicator switch
44.Headlamp position light
45.Low-/high-beam headlight bulb
46.Front left turn indicator
47.Starter button
48.Mapping switch
49.Side stand switch (optional equipment)
50.Diode and resistance

Colour key:

Ar Orange
Az Sky blue
B Blue
Bi White
G Yellow
Gr Grey
M Brown
N Black
R Red
Ro Pink
V Green
Vi Purple

Checks and inspections

Dashboard

Km or miles selection

Pressing MODE button quickly, select the function of the battery voltage measurement. Hold down MODE button for more than 10 seconds to shift from km to mile reading for the trip counter.
There will be no instrument panel indication for the first 5 seconds pressing the MODE button; for the next 5 seconds the legend of the unit of measurement (km or miles) currently in use must flash at a frequency of 1Hz. If the button is released before 10 seconds elapse, the unit of measurement does not vary.

Data check function

SERVICE

When the vehicle is started and right after the initial check, if there are less than 300 km (200 mi) left to the next Service, the specific icon flashes for 5 seconds. Once the Service mileage has been reached, the icon remains steadily on until Service is reset.
The warning light can be zero set even if the mileage is lower, up to 300 km (200 mi), compared with the Service. During the 300 km (200 mi) before the service warning light lights up, the light flashes 5 times at each key "ON".
The light should turn on first at 1000 km (625 mi). Following times are strictly at 10000 km (6215 mi), 20000 km (12430 mi), etc.

RESET

Hold the MODE button down.

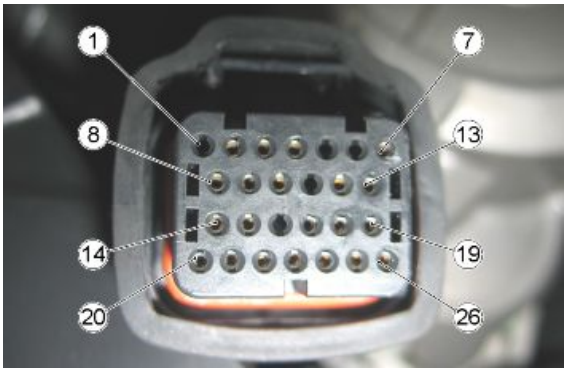
Turn the key to "**ON**" and wait 10 seconds.
During this operation the service icon flashes at a 1 Hz frequency.

Connectors

ECU

KEY:

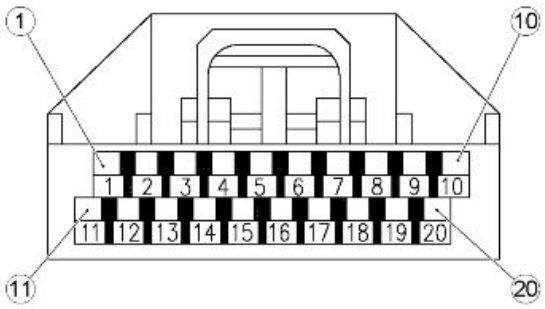
1. Injection warning light LED
2. -
3. -
4. Lambda probe "S"
5. Live
6. Battery supply
7. -
8. Electric fan relay
9. Water Temperature Sensor
10. -
11. Lambda probe "S+"
12. Engine stop
13. Engine speed sensor positive



14.Injector
15.Engine speed sensor negative
16.K line diagnosis
17.-
18.Side stand
19.Light relay
20.Injection load relay
21.Lambda probe heater
22.Coil
23.Double mapping switch
24.Start-up enabling
25.Rollover protection switch
26.Injection ground

Dashboard

KEY:



1. Oil warning light
2. "MODE" button
3. Left turn indicator input
4. Right turn indicator input
5. High-beam light input
6. -
7. Sensors ground
8. Speed sensor ground
9. -
10. Speed sensor power supply
11. External temperature sensor input
12. Fuel level sensor input
13. Water temperature sensor input
14. Speed sensor input
15. -
16. Injector
17. General ground
18. -
19. + Live
20. + Battery

INDEX OF TOPICS

Exhaust assy. Removal

EXHAUST SILENCER REMOVAL

- Park the vehicle on its centre stand.

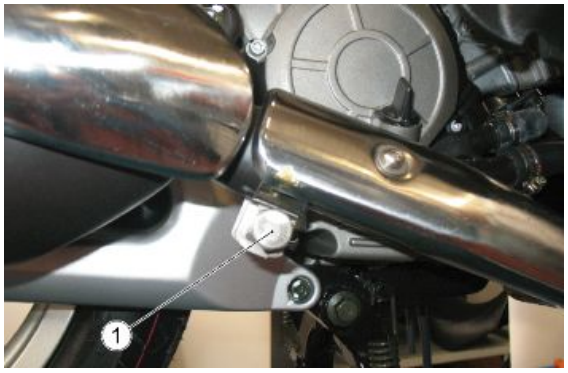
CAUTION

ALLOW ENGINE AND EXHAUST SILENCER TO COOL OFF COMPLETELY.

CAUTION

EACH TIME THE EXHAUST SYSTEM IS REMOVED, REPLACE THE CONNECTING INTERNAL GRAPHITE SLEEVE OF THE SILENCER TO THE EXHAUST PIPE.

- Loosen the clamp «1» fixing the exhaust silencer to the manifold.
- Undo and remove the three fixing screws «2».
- Remove the exhaust silencer.



Locking torques (N*m)

M10 screw fixing screw silencer clamp to exhaust manifold 17 (12.58 lbf ft) M8 screw fixing silencer to plate 25 (18.5 lbf ft)

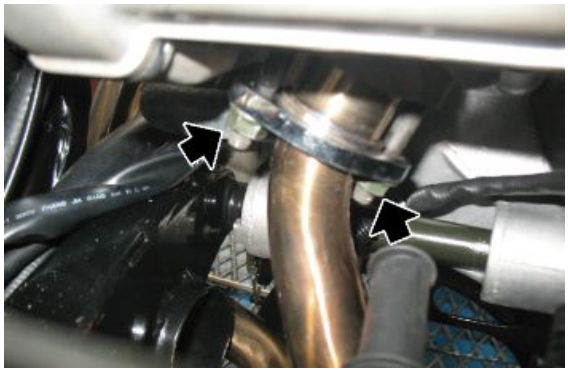
EXHAUST SYSTEM REMOVAL

- Park the vehicle on its centre stand.
- Remove the engine inspection cover.
- Disconnect the lambda probe connector.

CAUTION

ALLOW ENGINE AND EXHAUST SILENCER TO COOL OFF COMPLETELY.

- Unscrew and remove the two nuts on the head exhaust stud bolts.
- Retrieve the washers.



- Undo and remove the three fixing screws «2».
- Remove the exhaust system.

Locking torques (N*m)

M8 screw fixing silencer to plate 25 (18.5 lbf ft)

Removal of the engine from the vehicle

Before removing the engine from the chassis, wash it and cut off coolant supply.

CAUTION

BEFORE CARRYING OUT THE OPERATIONS BELOW, BEAR IN MIND THAT THE ENGINE MUST BE REMOVED FROM THE CHASSIS TOWARDS THE BOTTOM; AFTERWARDS ARRANGE AND POSITION THE NECESSARY TOOLS.

CAUTION

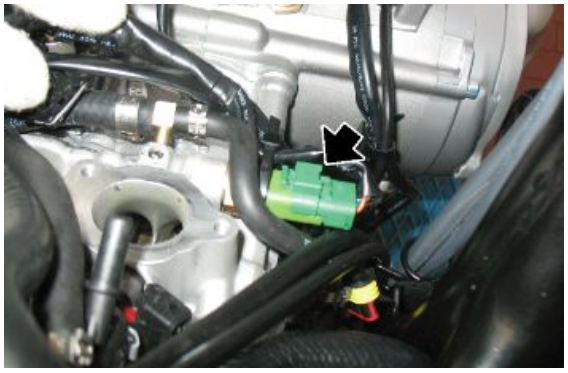
MARK THE CABLES, SLEEVES, PIPES, ETC. TO AVOID INCORRECT REFITTING.

The procedure to remove the engine from the chassis is described below sequentially:

- Remove the exhaust silencer.
- Remove the air filter box.
- Remove the helmet compartment.
- Remove the throttle body but keep it connected to the throttle grip cables.
- Drain off the cooling system.
- Remove the rear brake calliper releasing the cable grommet pipes on the engine.

- Disconnect the starter motor connections.

- Disconnect the water temperature sensor connector.

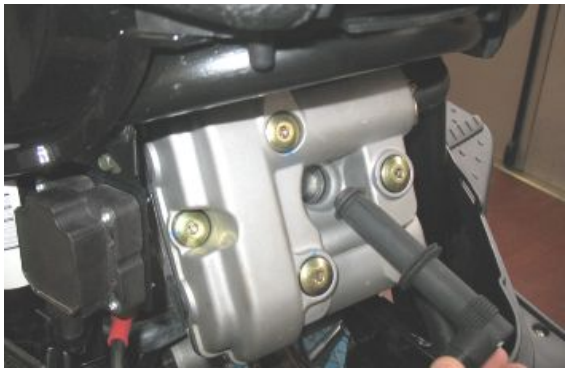


- Disconnect the oil pressure sensor connector.

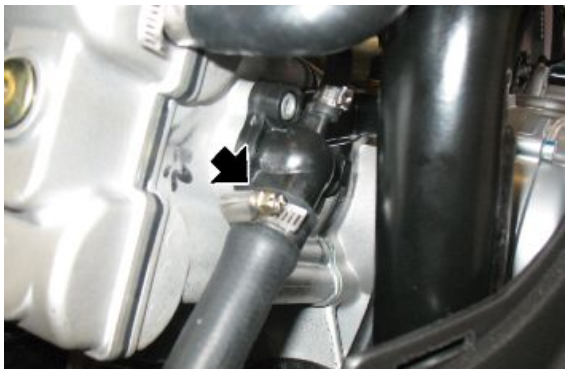
- Disconnect the connectors of the flywheel pick up and voltage regulator.

- Disconnect the lambda probe connector.

- Disconnect the spark plug tube.



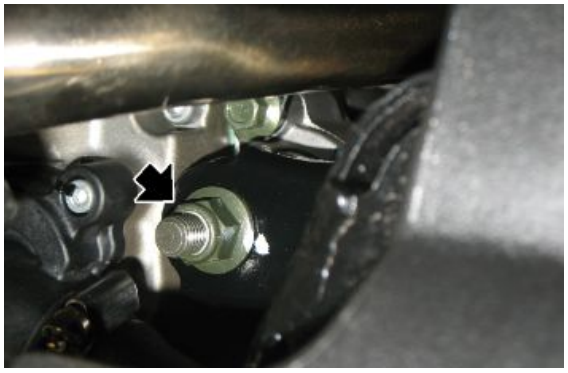
- Loosen the clamp and disconnect the pipe from the thermostatic valve.



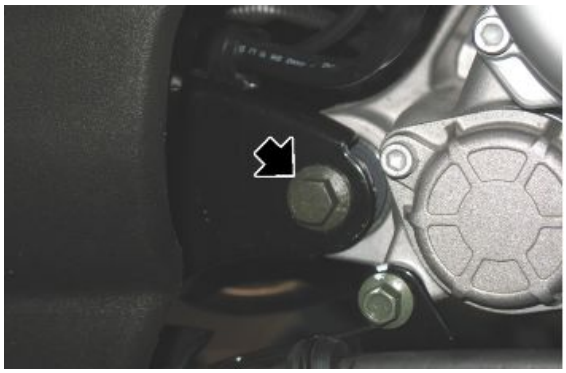
- Loosen the clamp and disconnect the bleed pipe from the thermostatic valve to the radiator.
- Release the pipes and cable harnesses of any fastening clamp to the chassis.
- Fasten the belts to the chassis rear section.
- Lift the hoist arm until the belts are taut.

- Operating from both sides, undo and remove the shock absorber lower fixing screw and collect the nut.

- Operating on the right side, undo and remove the engine fixing nut.



- Operating on the left side, slide off the engine pin and collect the spacers.
- Slide off the chassis from the engine.
- The engine remains on the bearing resting on the rear wheel and centre stand.



- To refit the engine, carry out the removal steps but in reverse order.

INDEX OF TOPICS

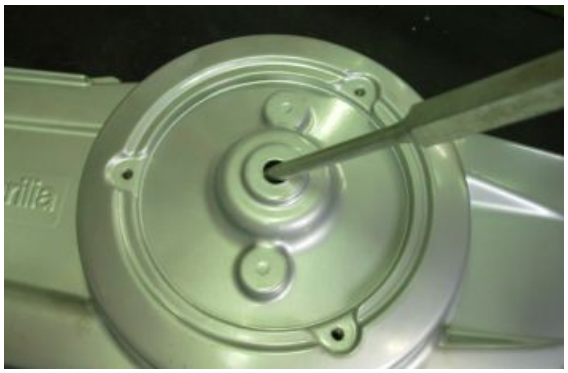
This section describes the operations to be carried out on the engine and the tools required.

Automatic transmission

Transmission cover

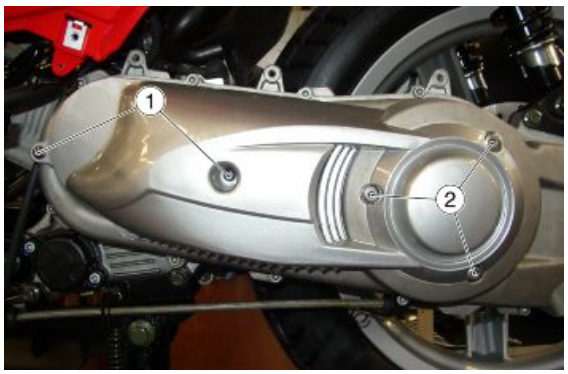
- Remove the air duct.
- Undo and remove the twelve external screws of the cover.
- Remove the transmission cover.

- Remove the bushing from the supporting bearing of the driven pulley shaft on the transmission cover by placing a screwdriver in the slot on the transmission cover.



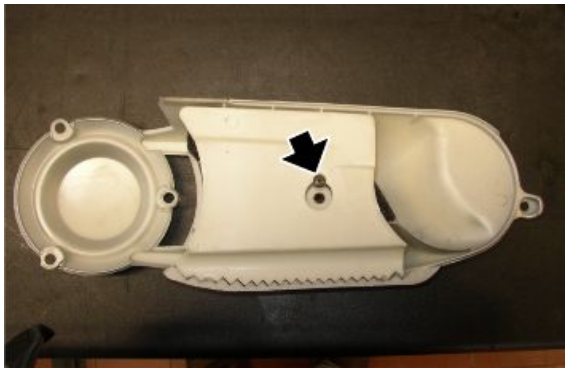
Air duct

- Unscrew and remove the two screws (1).
- Undo and remove the three screws (2).
- Remove the air duct.



Air duct filter

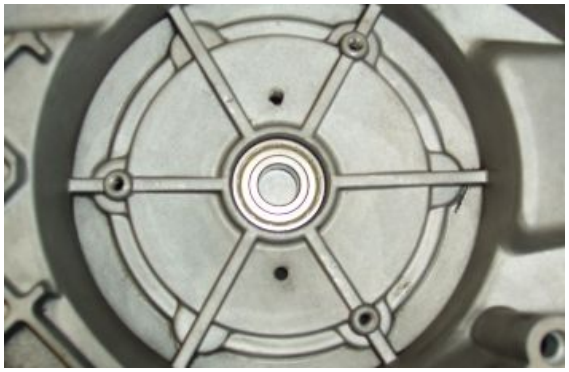
- Remove the air duct.
- Undo and remove the screw of the air-box cover.



- Remove the air-box cover.
- Remove the air filter.
- Proceed to clean or replace the air filter.

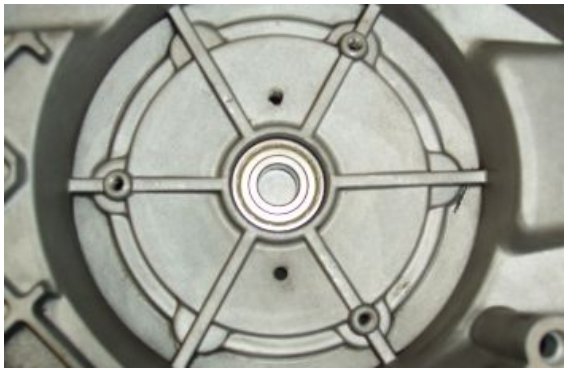
Removing the driven pulley shaft bearing

- Remove the transmission cover.
- Remove the bearing using the specific extractor.



Refitting the driven pulley shaft bearing

- Slightly heat the crankcase from the inside so as not to damage the coated surface.
- Insert the bearing in its housing.



CAUTION

REST THE COVER ON A SUITABLE SURFACE TO AVOID DAMAGING THE COVER COAT.

NOTE

ALWAYS REPLACE THE BEARING WITH A NEW ONE AT EVERY REFIT

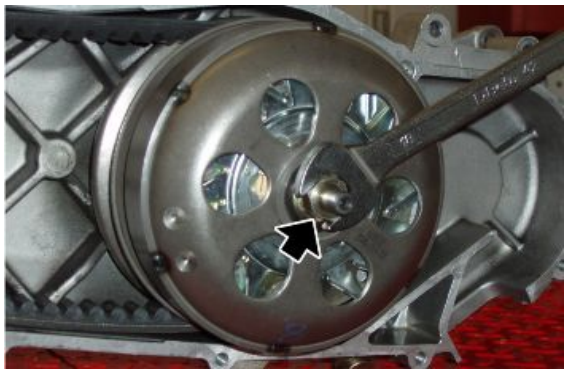
Specific tooling

020703Y Clutch shaft support bearing punch (15x35x11) on crankcase cover

Removing the driven pulley

- Remove the transmission cover.
- Remove the fixed driving half-pulley.

- Lock the clutch bell with a calliper spanner.
- Unscrew and remove the clutch nut.
- Remove the clutch bell.



- Remove the driven pulley and the driving belt.

CAUTION

CLEAN THE CLUTCH BELL AS INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

Inspecting the clutch drum

- Make sure that the clutch bell is not worn or damaged.

- Measure the clutch bell inside diameter.

Characteristic

Clutch bell max. value

Max. value: Ø 135 mm

Clutch bell standard value

Standard value: Ø 134 to 134.2 mm

Checking the bell working surface eccentricity

- Fit the bell on a driven pulley shaft with 2 bearings (inside diameter: 15 and 17 mm).

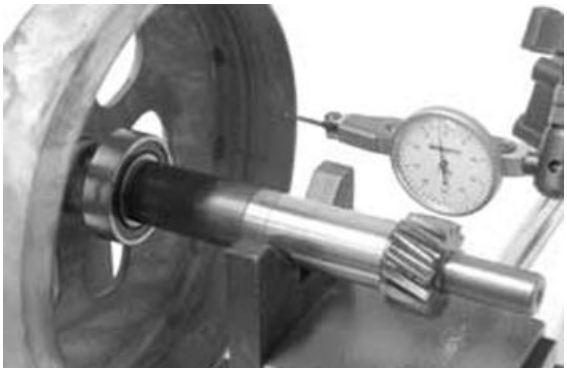
- Lock with the original spacer and nut.

- Place the bell/shaft assembly on the support to check the crankshaft alignment.

- Using a dial gauge and the magnetic base, measure the bell eccentricity.

- Repeat the measurement at 3 positions (Central, internal, external).

- In case of faults, replace the bell.



Specific tooling

020074Y Support base for checking crankshaft alignment

020335Y Magnetic mounting for dial gauge

Characteristic

clutch bell check: Limit eccentricity.

Admissible limit eccentricity: 0.15 mm

Inspecting the clutch

- Check the thickness of the clutch mass friction material.
- The masses must not show traces of lubricants; otherwise, check the driven pulley unit seals.

NOTE

UPON RUNNING-IN, THE MASSES MUST EXHIBIT A CENTRAL FAYING SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER.
VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.

CAUTION

DO NOT OPEN THE MASSES USING TOOLS TO PREVENT A VARIATION IN THE RETURN SPRING LOAD.

Characteristic

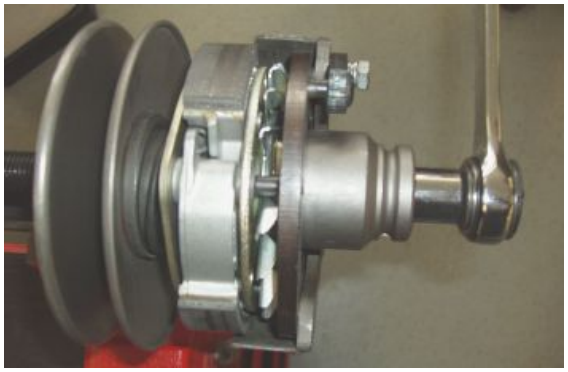
Check minimum thickness

1 mm

Removing the clutch

Fit the special driven pulley spring compressor tool:

- Fit the driven pulley assembly on the tool by inserting the three pins in the ventilation holes in the ground holder support.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Use the special multipurpose wrench to remove the nut fixing the clutch.
- Disassemble the driven pulley into its components (Clutch and spring with plastic fitting).



CAUTION

THE TOOL MUST BE FIRMLY FIXED IN THE VICE AND THE CENTRAL SCREW MUST TOUCH THE TOOL. EXCESSIVE TORQUE MAY DEFORM THE SPECIFIC TOOL.

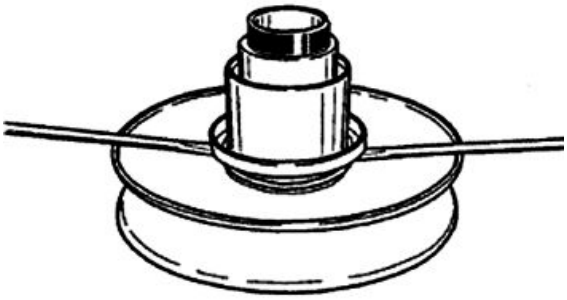
Specific tooling

AP8140259 Universal tool for clutch assemblies

AP8140665 Adapter for clutch assembly removal

Pin retaining collar

- Remove the collar with the aid of 2 screwdrivers.
- Remove the 3 guide pins and the movable half-pulley.

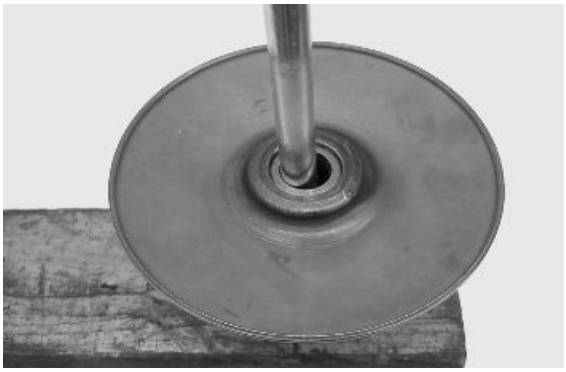


Removing the driven half-pulley bearing

- Remove the retainer ring using two flat blade screwdrivers.
- Using a hammer and pin, knock the ball bearing out as shown in the figure.
- Remove the bearing and the rollers with the specific extractor.

NOTE

REST THE HALF-PULLEY ON A WOODEN SURFACE TO AVOID DAMAGING ITS THREADED BUSHING. ALSO DO THIS UPON REMOVAL.



Specific tooling

020375Y 28 x30 mm Punch

020376Y Adapter handle

020439Y 17-mm guide for oil seal

Inspecting the driven fixed half-pulley

- Measure the inside diameter of the pulley bushing.

Characteristic

Minimum diameter admitted

Ø 40.96 mm

Standard diameter

Ø 40.965 mm

Inspecting the driven sliding half-pulley

- Remove the 2 inner sealing rings and the 2 O-rings.
- Measure the inside diameter of the movable half-pulley bushing.

Characteristic

Minimum diameter allowed:

Ø 41.08 mm

Standard diameter

Ø 41.035 mm

Refitting the driven half-pulley bearing

- Fit the new roller bearing using the specific punch, fit the bearing with the label facing outward and insert it completely up to the punch stop on the half-pulley.

NOTE

REST THE HALF-PULLEY ON A WOODEN SURFACE TO AVOID DAMAGING ITS THREADED BUSHING. ALSO DO THIS UPON REMOVAL.

Specific tooling

AP8140662 Punch for roller casing

- To assemble the new ball bearing, insert it fully down in its seat with the specific punch and finally fit the seeger ring.

Specific tooling

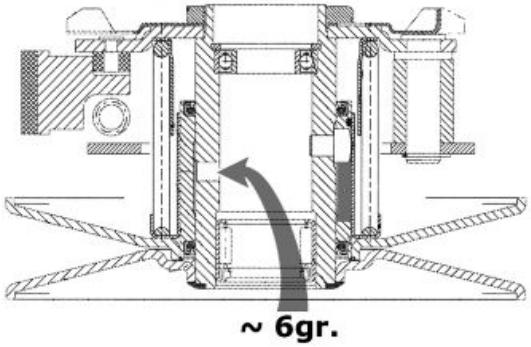
020375Y 28 x30 mm Punch

020376Y Adapter handle

020439Y 17-mm guide for oil seal

Refitting the driven pulley

- Check that the faying surfaces of the 2 half-pulleys and the belt do not show any signs of wear, scoring or grease.
- Insert the new oil seals and O-rings on the movable half-pulley.
- Fit the half-pulley on the bushing with the appropriate protection sheath.
- Make sure the pins and collar are not worn, refit the pins and the collar.
- Using a curved-spout grease gun, lubricate the driven pulley unit with approximately 6 g of grease. Apply the grease through one of the holes in the bushing until grease comes out through the hole on the opposite side. This procedure is necessary to prevent the presence of grease beyond the O-rings.



Specific tooling

AP8140664 Guide to mount the movable driven pulley

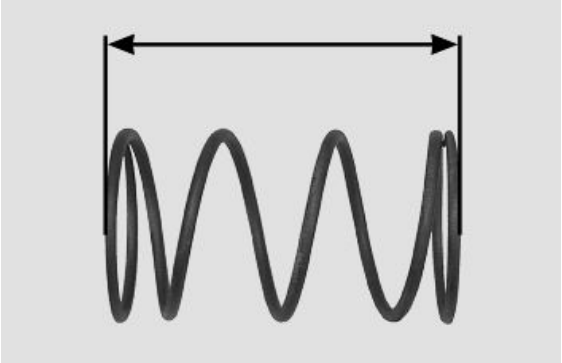
Recommended products

AGIP GREASE SM2 Lithium grease with molybdenum for bearings and other points needing lubrication

NLGI 2

Inspecting the clutch spring

- Measure the length of the movable driven half-pulley spring, when unloaded.



Characteristic

Standard length:

(125 cm³) 112.7 mm

(200 cm³) 122.7 mm

Limit after use:

(125 cm³) 108 mm

(200 cm³) 118 mm

Refitting the clutch

- Assemble the spring, clutch and driven pulley.
- Fit the clutch body on the appropriate tool with the adaptor
- Insert the lever pin in the hole of the adaptor ring.
- Tighten the fixing nut to the prescribed torque.

NOTE

WHEN PRELOADING THE SPRING, BE CAREFUL NOT TO DAMAGE THE PLASTIC STOP OF THE SPRING AND THE BUSHING THREADING.

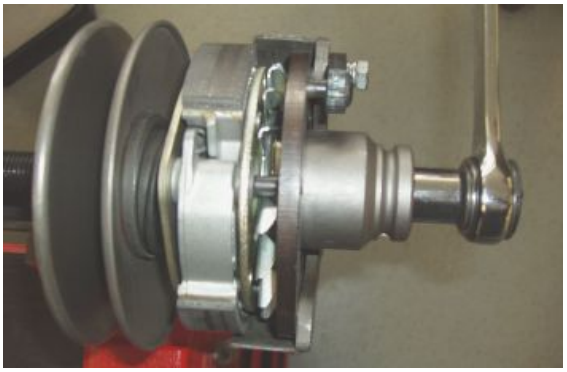
NOTE

FOR DESIGN REASONS, THE NUT IS SLIGHTLY ASYMMETRIC; THE FLATTEST SURFACE SHOULD BE MOUNTED CONTACTING THE CLUTCH.

Specific tooling

AP8140259 Universal tool for clutch assemblies

AP8140665 Adapter for clutch assembly removal



Locking torques (N*m)

Rear CVT pulley fixing flanged nut - M12x1 (1)
60 Nm (44.25 lbf ft) - Loctite 243

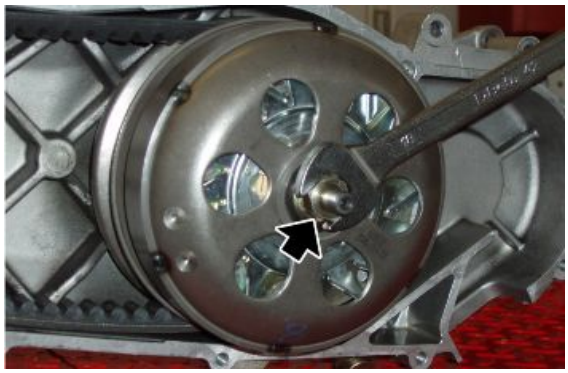
Refitting the driven pulley

- Place the driven pulley assembly in its position.
- Open the driven pulley and insert the belt according to the correct direction of rotation.
- Fit the driven pulley plus the belt in their position.

- Fit the clutch bell.
- Lock the clutch bell.
- Tighten the clutch nut.

Locking torques (N*m)

Rear CVT pulley fixing flanged nut - M12x1 (1)
60 Nm (44.25 lbf ft) - Loctite 243



Drive-belt

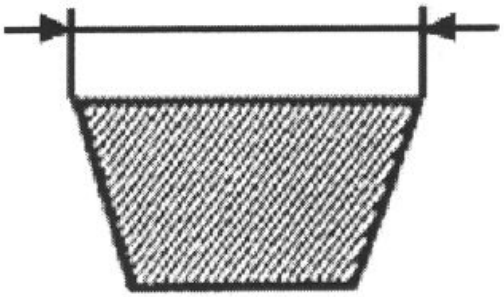
- Make sure that the driving belt is not damaged.
- Check belt for correct width.

Characteristic

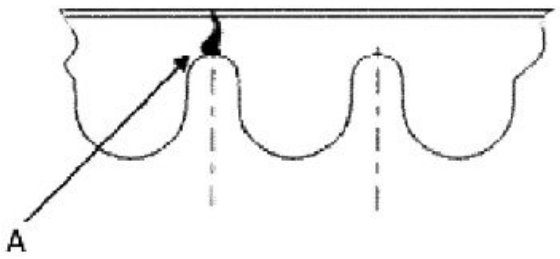
Driving belt width (125 - 200)

- minimum: 21.0 mm (0.827 in)

- standard: 22.0 +/- 0.2 mm (0.8661 +/- 0.0079 in)

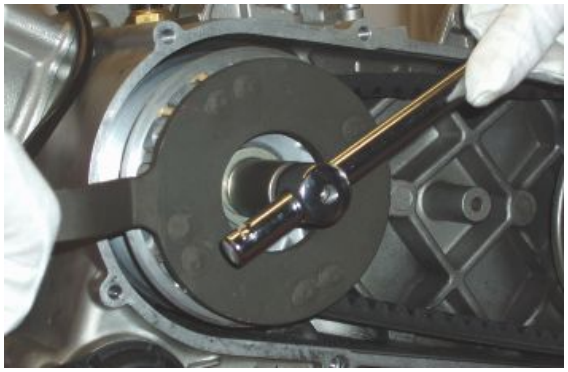


During the wear checks foreseen in the scheduled maintenance services, check that the rim bottom of the toothing does not show signs of incisions or cracking (see figure): the rim bottom of the tooth must not have incisions or cracking; if it does, change the belt.



Removing the driving pulley

- Remove the transmission cover.
- Unscrew the fixing nut with the specific tool.



Specific tooling

AP8140535 driving pulley lock wrench

- Remove the fixing nut and collect the washer.

- Remove the fixed driving half-pulley.

- Remove the spacer.

125 cm³ 1.5 mm

200 cm³ 1.8 mm

- Detach the driving belt.
- Remove the bushing.

- Remove the movable half-pulley, take care that the free rollers fitted on it do not come off.

- Remove the support plate and the relative guide sliders.

- Remove the spacer.

Inspecting the rollers case

- Check that the internal bushing shown in the figure is not abnormally worn and measure its inside diameter.
- Measure the outside diameter of the pulley sliding bushing shown in the figure.
- Check that the rollers are not damaged or worn.
- Check that the guide sliders for the roller contrast plate are not worn.
- Check that the roller housings or the surfaces in contact with the belt on both half-pulleys are not worn.
- Check that fixed driving pulley does not show signs of abnormal wear on the grooved edge and on the surface in contact with the belt.

CAUTION

DO NOT LUBRICATE OR CLEAN SINTERED BUSHINGS

Characteristic

Movable pulley bushing (125 - 200)

- maximum diameter: 26.121 mm (1.028 in)

- standard diameter: 26.000 (+0/0.121) mm (0.8661 (+0/+ 0.0047 in))

Pulley sliding bushing (125 - 200)

- minimum diameter: 25.95 mm (1.022 in)

- standard diameter: 26.00 (-0.02/-0.041) mm (1.0236 (-0.0008/ + 0.0016 in))

VARIABLE SPEED ROLLER

- minimum diameter (125): 18.50 mm (0.73 in)

- minimum diameter (200): 20.1 mm (0.79 in)
- standard diameter (125): 19.0 +/- 0.1 mm (0.748 +/- 0.004 in)
- standard diameter (200): 20.6 +/- 0.1 mm (0.811 +/- 0.004 in)

Refitting the driving pulley

- Install the spacer.

- Preassemble the movable half-pulley with the roller contrast plate by placing the rollers in their housings with the larger support surface touching the pulley according to the direction of rotation.
- Check that the roller contact plate does not show flaws or is damaged on the grooved edge.
- Fit the entire bushing assembly on the crank-shaft.
- Fit the driven pulley/Clutch/belt assembly to the engine.

- Fit the driving belt.
- Install the spacer.

- Fit the fixed driving half-pulley.

WHEN FITTING THE FIXED DRIVING HALF-PULLEY, IT MUST BE TOTALLY FREE SO THAT IT IS NOT INCORRECTLY TAUTENED.

- Fit the washer and tighten the nut.

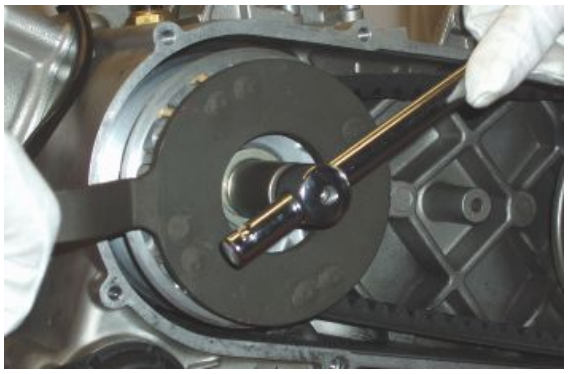
CAUTION

CHECK THAT THE WASHER IS ADEQUATELY FITTED BEFORE TIGHTENING THE NUT.

NOTE

REPLACE THE NUT WITH A NEW ONE AT EVERY REFIT

- Prevent fixed driving half-pulley rotation using the specific tool. Tighten the fixing nut to the prescribed torque.



Specific tooling

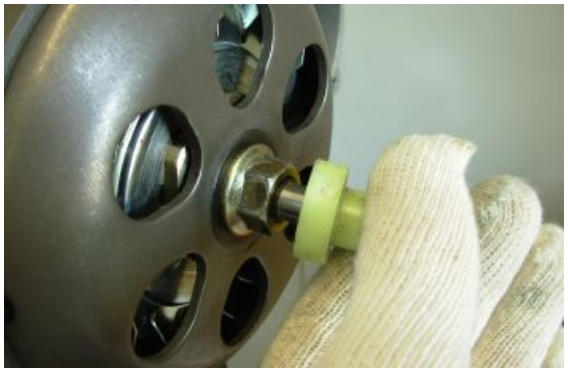
AP8140535 driving pulley lock wrench

Locking torques (N*m)

Front CVT pulley fixing flanged nut - M12x1 (1) 80 Nm (59 lbf ft) - Loctite 243

Refitting the transmission cover

- Fit the bushing to the shaft and add the nut hexagon.



- Fit the transmission cover and press it until it stops.
- Operating diagonally, tighten the cover external screws (11 screws for 200 cm³ - 12 screws for 125 cm³).
- Fit the air duct.

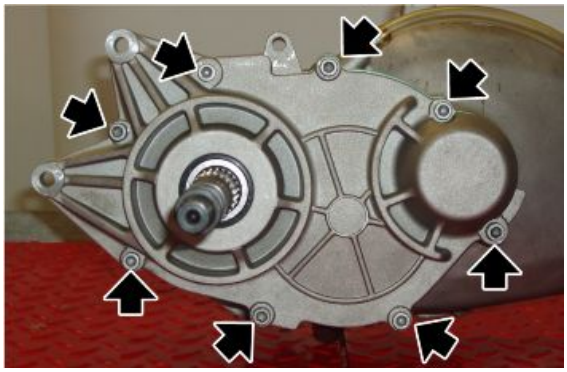
Locking torques (N*m)

CVT cover EI fixing screws - M6x35 10 Nm (7.38 lbf ft)

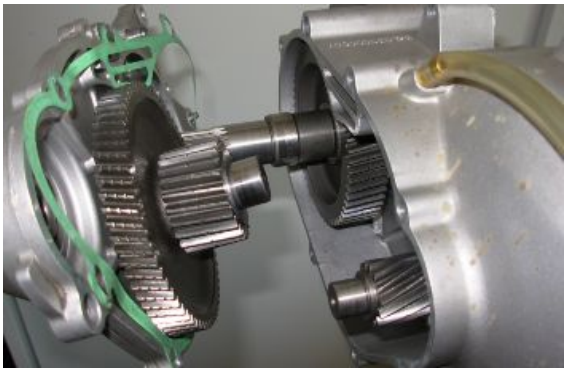
End gear

Removing the hub cover

- Drain the rear hub oil through the oil drainage plug located at the bottom of the crankcase.
- Remove the eight screws shown in the figure.



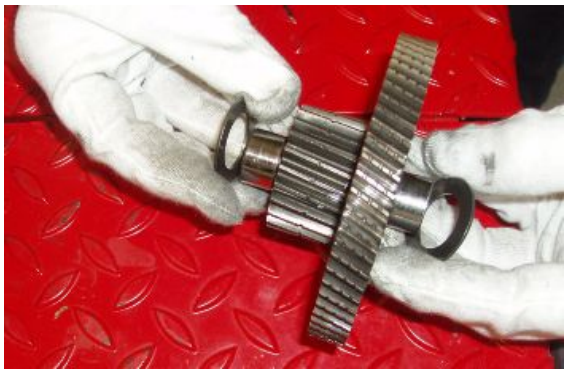
- Remove the hub cover and the relevant gasket.



Removing the wheel axle

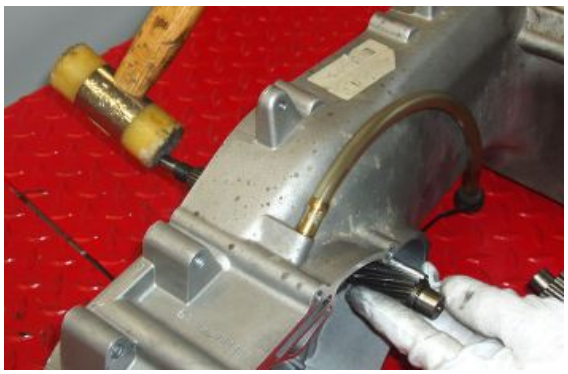
- Remove the hub cover.
- Remove the intermediate gear.

- Remove the two shim washers from the intermediate gear.



- Remove the wheel axle with the gear.

- Extract the driven pulley shaft from the bearing.



See also

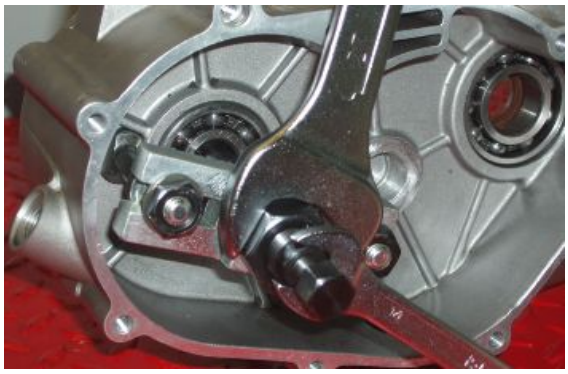
Removing the hub cover

Removing the hub bearings

- Check the status of the bearings being examined (wear, clearance and noise).

Removing the wheel axle bearings

- Warm up the crankcase.
- Remove the bearing using the specific extractor.

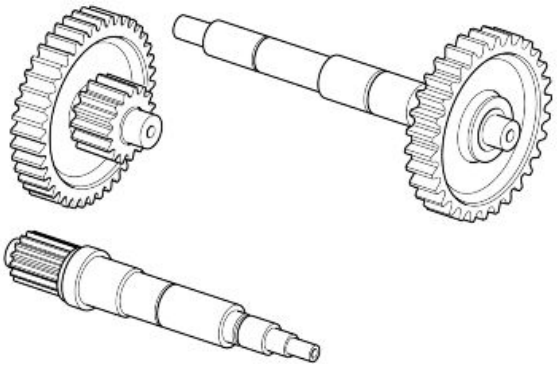


Removing the driven pulley shaft bearing

- Remove the driven pulley shaft.
- Remove the oil seal using a screwdriver; working from inside the bearing and being careful not to damage the housing, make it come out on the belt transmission side.
- Remove the bearing using the specific extractor.

Inspecting the hub shaft

- Check the three shafts for wear or distortions on the toothed surfaces, on the bearing housings and the oil seal positions.
- In faults are found, replace the damaged parts.



Inspecting the hub cover

- Check that the coupling surfaces are not dented or distorted.
- Check the capacity of both the bearings and the wheel oil seal.
- In case of faults, replace the damaged parts.

Refitting the driven pulley shaft bearing

- Heat the parts with the specific heat gun.
- Refit the bearing using the specific tool.

Specific tooling

020702Y Main shaft bearing punch (15 x 42 x 13) on transmission cover

- Fit a new oil seal on the transmission side of the belt, using the specific tool.
- Insert the driven pulley shaft.

Specific tooling

020376Y Adapter handle

020359Y 42 x 47-mm adaptor

020364Y 25 mm Adaptor

Refitting the wheel axle bearing

- Heat up the crankcase using the thermal gun.
- Place the wheel axle bearing on the crankcase and fit it correctly using the specific tool.

Specific tooling

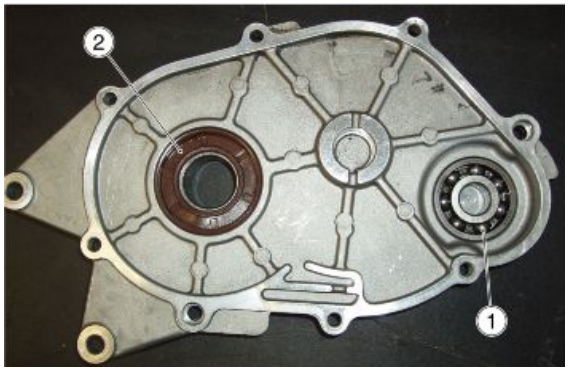
020376Y Adapter handle

020359Y 42 x 47-mm adaptor

020439Y Shaft 2 oil seal punch 17 mm

Refitting the hub cover bearings

- In order to fit the hub housing bearings, the parts must be heated with the specific heat gun.
- Fit the bearing in its position (1) on the cover of the hub housing on the driven pulley shaft, using the specific tool.



Specific tooling

020702Y Main shaft bearing punch (15 x 42 x 13) on transmission cover

- Fit the bearing in its position (2) on the cover of the hub housing on the driven pulley shaft, using the specific tool.
- Fit a new oil seal in the position (2), using the specific tool.

Specific tooling

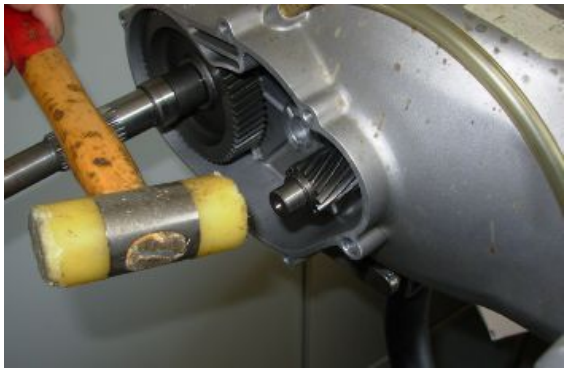
020376Y Adapter handle

020360Y 52 x 55-mm adaptor

020364Y 25 mm Adaptor

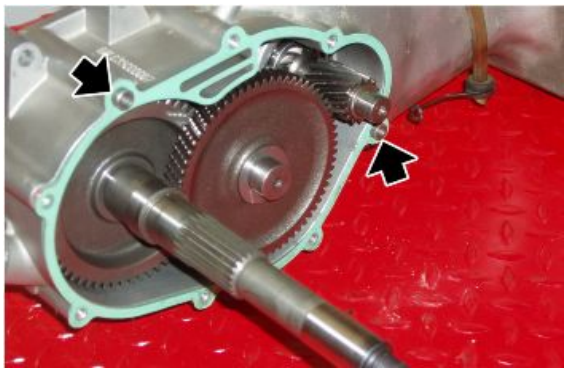
Refitting the hub bearings

- Assemble the 3 shafts in the engine crankcase as shown in the figure.



Refitting the ub cover

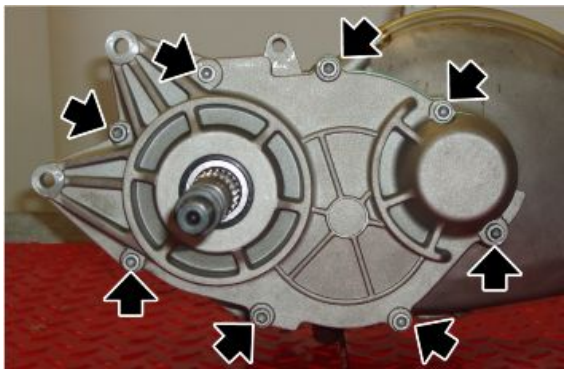
- Fit a new gasket.
- Check that the two alignment dowels are adequately positioned.
- Place the hub cover.



- Tighten the eight screws operating diagonally.
- Fill with hub oil.

Locking torques (N*m)

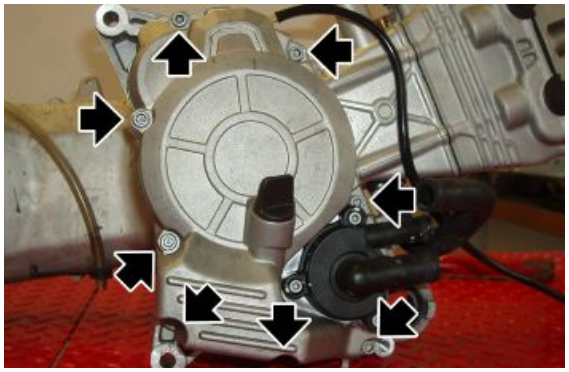
Transmission cover EI fixing screws - M6x30 (8) 10 Nm (7.38 lbf ft)



Flywheel cover

Removing the hub cover

- Detach the water pipe.
- Undo and remove the eight screws.



- Remove the flywheel cover.

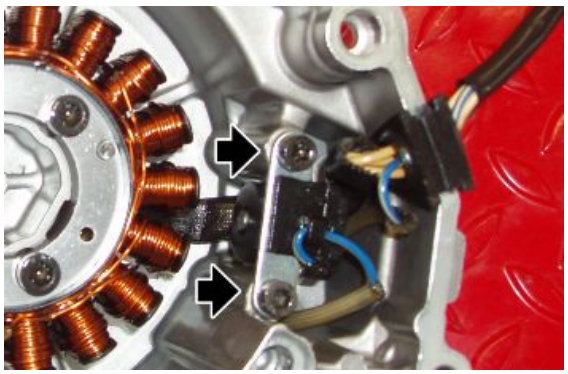
- Remove the gasket.

WARNING

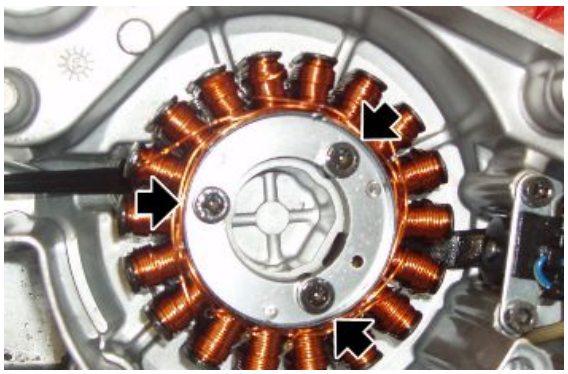
UPON REFITTING, REPLACE THE GASKET WITH A NEW ONE OF SIMILAR TYPE. FOLLOW THE REMOVAL STEPS BUT IN REVERSE ORDER.

Removing the stator

- Remove the flywheel cover.
- Undo and remove the two pick-up screws.



- Undo and remove the three screws fixing the stator and remove it together with the wiring.

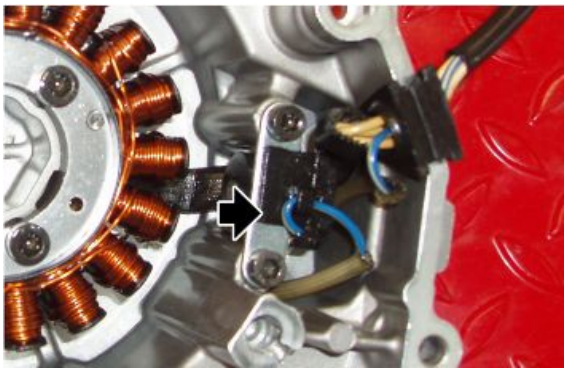


See also

Removing the hub cover

Refitting the stator

- Install the stator following the removal steps but in reverse order.
- Place the pick-up cable as indicated.



WARNING

FIT THE PICK-UP FIXING PLATE WITH THE SENSOR FACING THE STATOR.

- Refit the stator and the flywheel carrying out the removal steps but in reverse order; tighten the retainers to the specified torque.

Locking torques (N*m)

Stator EI fixing screws - M6x25 (3) 10 Nm (7.38 lbf ft) - Loctite 243

See also

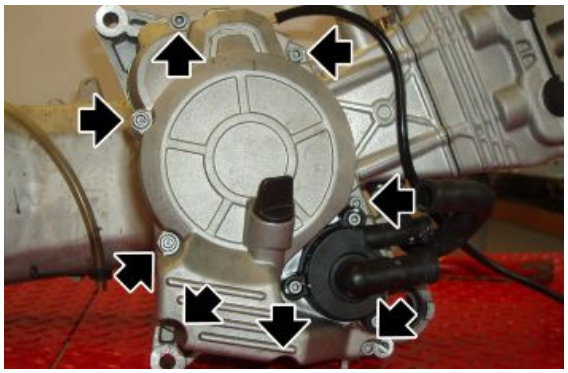
Removing the hub cover

Refitting the flywheel cover

- Place the oil pump shaft in the direction indicated by the reference arrow of the internal plate.

- Place the water pump shaft with its grooves facing the reference point on the cover.

- Refit the cover on the engine taking care the centring pins are adequately positioned.

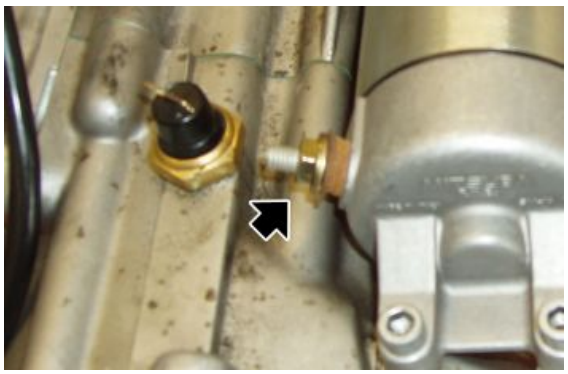


Locking torques (N*m)

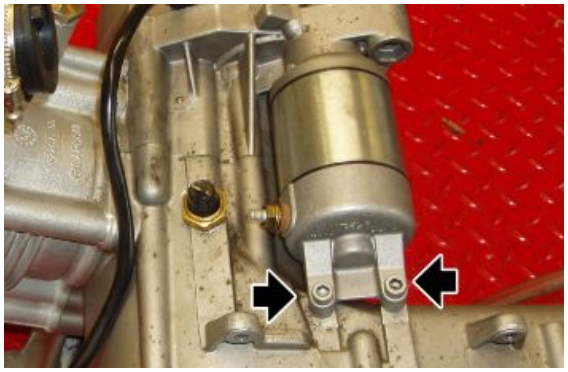
Ignition cover fixing screws - M6x110 (5) 11 Nm (8.11 lbf ft) **Ignition cover fixing screws - M6x140 (1)** 11 Nm (8.11 lbf ft) **Ignition cover fixing screws - M6x170 (1)** 11 Nm (8.11 lbf ft) **Ignition cover EI screws - M6x25 (1)** 11 Nm (8.11 lbf ft)

Removing the starter motor

- Unscrew and remove the nut.
- Remove the power cable.



- Unscrew and remove the two screws.



- Remove the starter motor by sliding it off from one side.

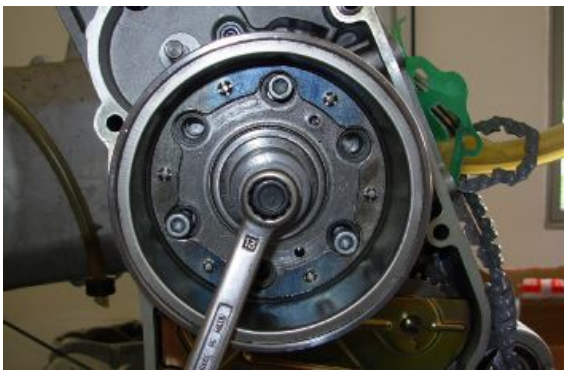
Removing the flywheel magneto

- Remove the flywheel cover.
- Lock the crankshaft with the specific special tool.

Specific tooling

0240880 Threaded bolt for locking crankshaft at TDC

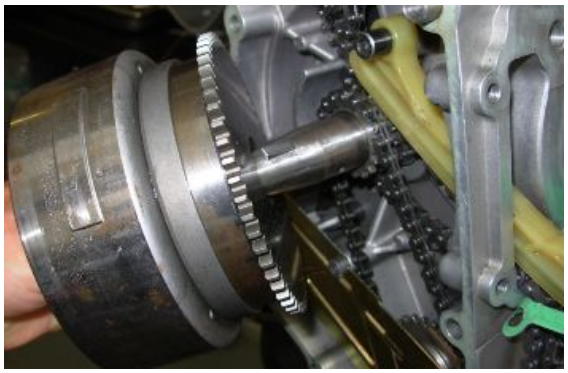
- Undo and remove the screw.
- Collect the washer.



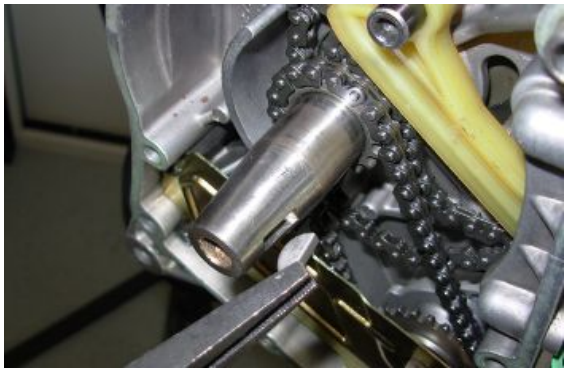
- Extract the flywheel using the specific tool.

Specific tooling

020707Y Flywheel extractor



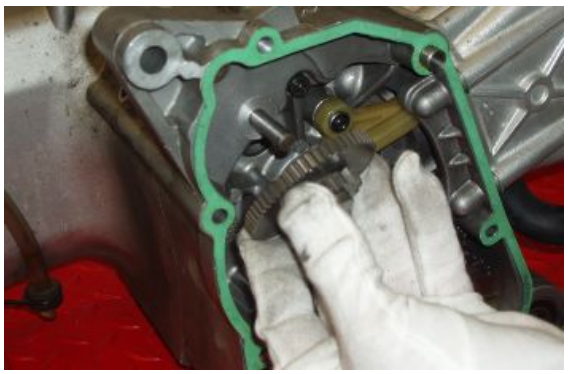
- Remove the cotter.



Intermediate gear

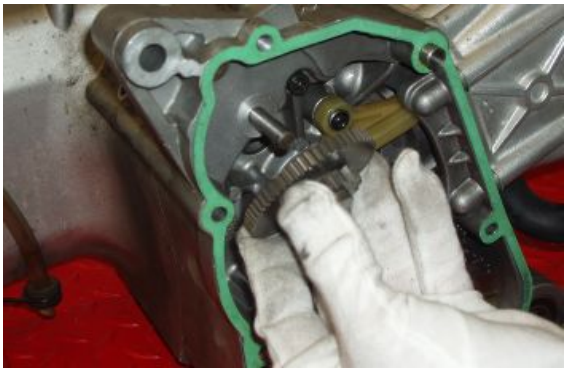
FITTING

- Fit the intermediate gear.



REMOVAL

- Remove the flywheel, the cotter and the freewheel.
- Slide off the intermediate gear.

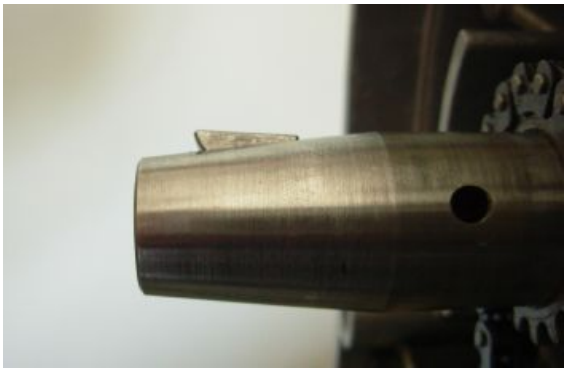


See also

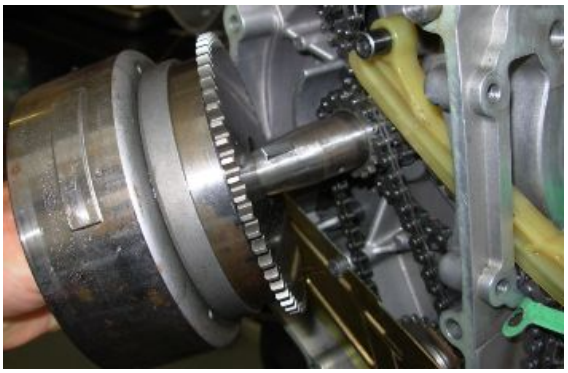
Removing the flywheel magneto

Refitting the free wheel

- Fit the cotter in its seat, be careful to position it as indicated in the photo-graph.

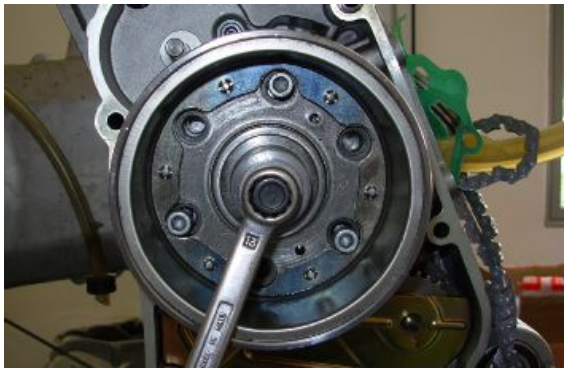


- Fit the gear plus the pre-assembled freewheel, carefully check the coupling with the crankshaft by means of the cotter.



Refitting the flywheel magneto

- Fit the flywheel paying attention to insert the cotter adequately.
- Lock the flywheel nut to the prescribed torque.



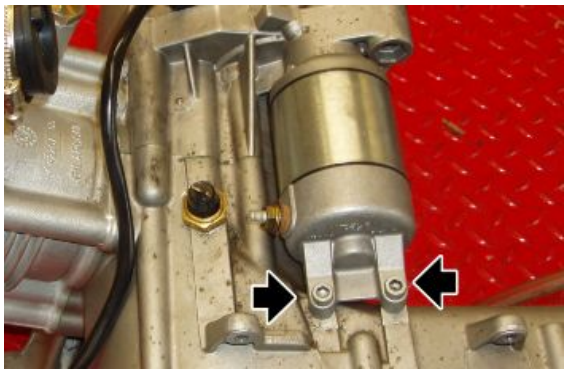
Locking torques (N*m)

Rotor TEF fixing screw - M8x25 (1) 25 Nm (18.44 lbf ft) - Loctite 243

Refitting the starter motor

- If the O-ring is damaged, fit a new one on the starter motor and lubricate it.

- Fit the starter motor on the crankcase and tighten the 2 screws.



CAUTION

ADEQUATELY COUPLE THE MOTOR GEAR WITH THE STARTER DOUBLE GEAR.

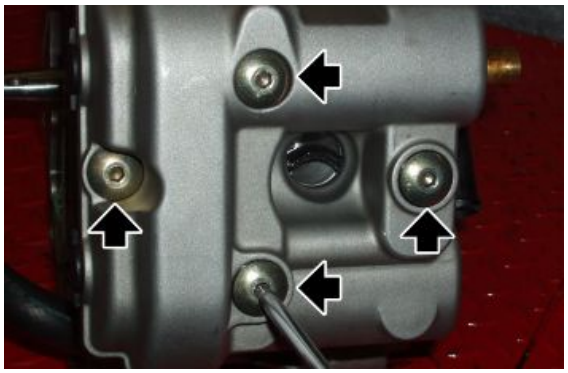
Locking torques (N*m)

Starter motor EI fixing screws - M6x25 (2) 10 Nm (7.38 lbf ft)

Cylinder assy. and timing system

Removing the rocker-arms cover

- Undo and remove the four screws.
- Remove the tappet cover.



Removing the timing system drive

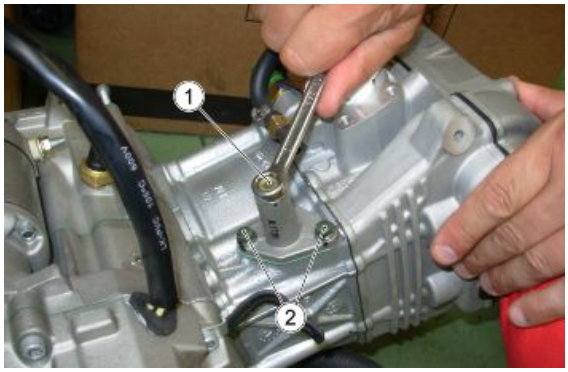
- Remove the tappet cover.
- Remove the flywheel.
- Rotate the crankshaft until the front cylinder piston reaches the top dead centre (TDC).
- Undo and remove the screw on the crankcase and screw the specific tool to prevent crankshaft rotation.

Specific tooling

0240880 Threaded bolt for locking crankshaft at TDC

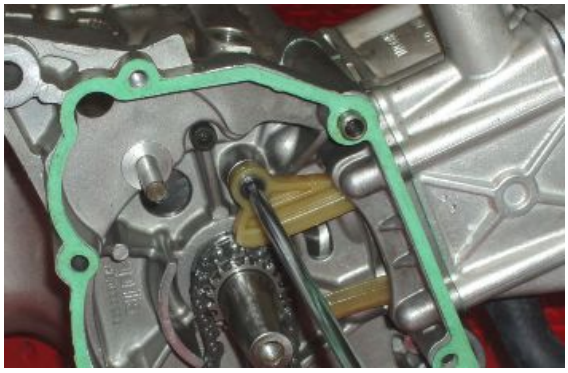
- Get two Ø 6.3 mm (0.25 in) pins.
- Place the pins in their positions on the overhead camshafts.

- Undo and remove the screw (1) and collect the spring.
- Remove the screws (2) and take out the chain tensioner with relevant gasket.



- Remove the internal plate.
- Remove the oil pump and the relevant chain.
- Unscrew and remove the screw.
- Remove the tensioner slider.
- Remove the timing chain.

IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE DIRECTION OF ROTATION IS MAINTAINED.



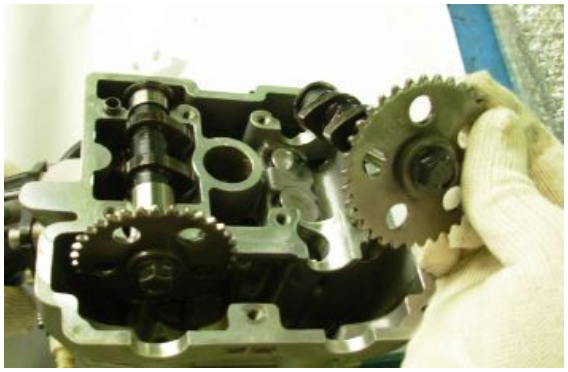
See also

Removing the rocker-arms cover
Removing the flywheel magneto

Removing the cam shaft

- Remove the timing system control.
- Remove the chain tensioner.
- Undo and remove the eight screws.
- Remove the cam tower cap.

- Remove both camshafts.

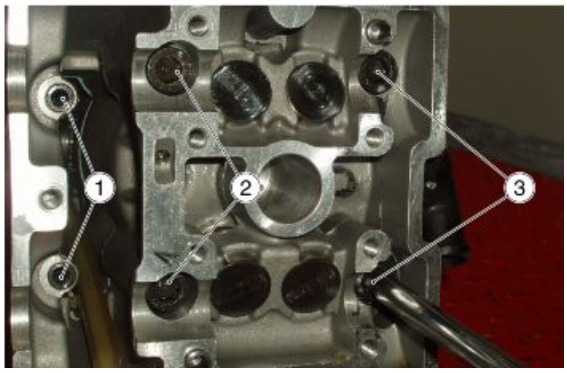


See also

Removing the timing system drive

Removing the cylinder head

- Remove the camshafts.
- Undo and remove the two side screws (1).
- Loosen the screws (2- 3) operating diagonally.
- Undo and remove both central short screws (2) and collect the washers.
- Undo and remove both central long screws (3) and collect the washers.



- Remove the head.
- Collect the lower chain slider.

See also

Removing the cam shaft

Removing the valves

- Remove the head.
- Place the head on supporting surface.
- Number the valves and their bucket tappets in order to position them correctly upon refitting.

- Remove the valve bucket tappets.

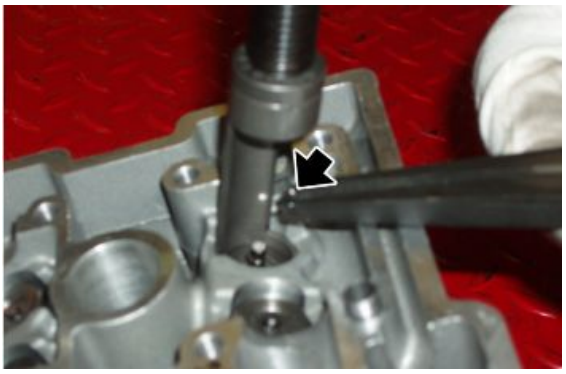
- Compress the valve spring using the specific tool.

Specific tooling

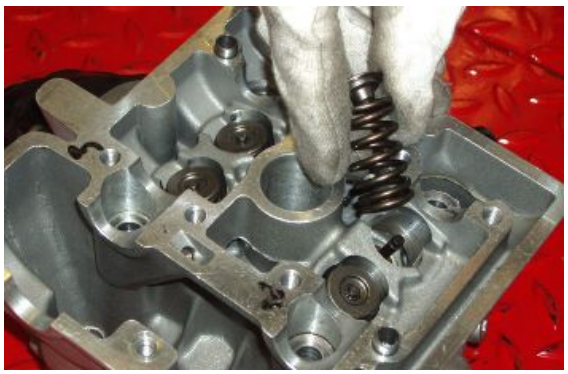
AP8140179 Valve spring compressor

AP9100838 Tool for valve pressure plate

- Remove both cotter pins.



- Release the valve springs.
- Remove the cap and the valve spring.



- Remove the valves.

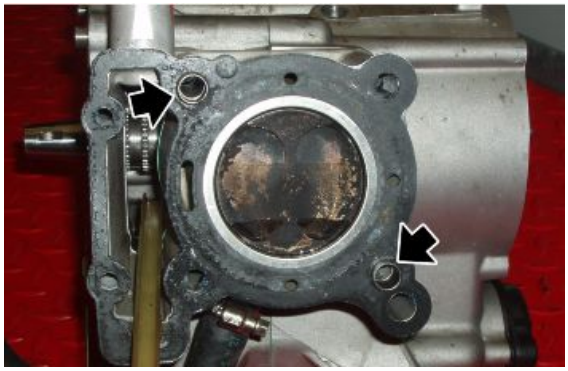
- Remove the oil seals with a pair of pliers.

See also

Removing the cylinder head

Removing the cylinder - piston assy.

- Remove the head.
- Remove the water delivery sleeve.
- Remove the two dowels and the gasket between the cylinder and the head.



- Slide off the cylinder.
- Remove the gasket between the cylinder and the crankcase.

CAUTION

TO AVOID DAMAGING THE PISTON, KEEP IT FIRM WHILE REMOVING THE CYLINDER.

- Remove the retainer rings from the pin.

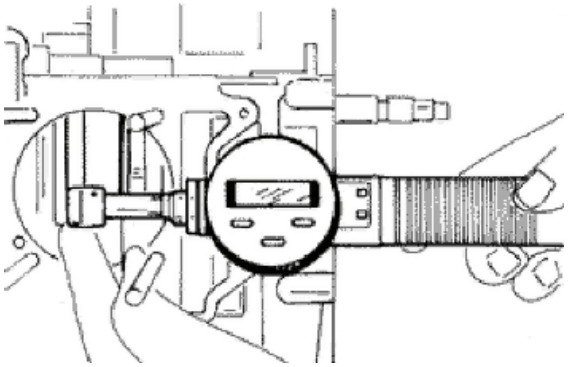
- Slide off the pin.
- Remove the piston.
- Remove the three piston rings.

See also

Removing the cylinder head

Inspecting the small end

- Measure the inside diameter of the connecting rod small end using a specific micrometer.



NOTE

IF THE DIAMETER OF THE CONNECTING ROD SMALL END EXCEEDS THE MAXIMUM DIAMETER ALLOWED, SHOWS SIGNS OF WEAR OR OVERHEATING REPLACE THE CRANKSHAFT AS DESCRIBED IN THE "CRANKCASE AND CRANKSHAFT" CHAPTER".

Characteristic

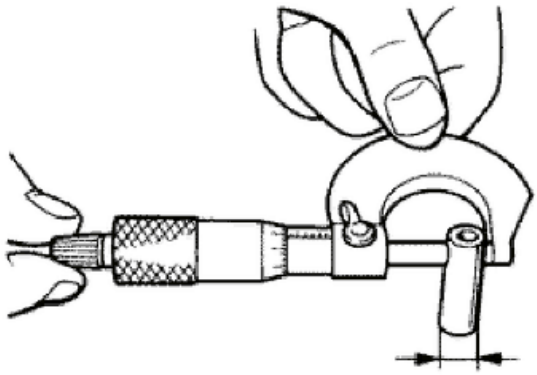
Connecting rod small end (125 - 200)

Maximum diameter: 15.023 mm (0.591 in)

Standard diameter: 15.010 - 15.018 mm (0.5910 - 0.5912 in)

Inspecting the wrist pin

- Check the pin outside diameter.



Characteristic

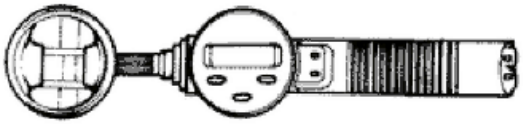
Pin (125 - 200)

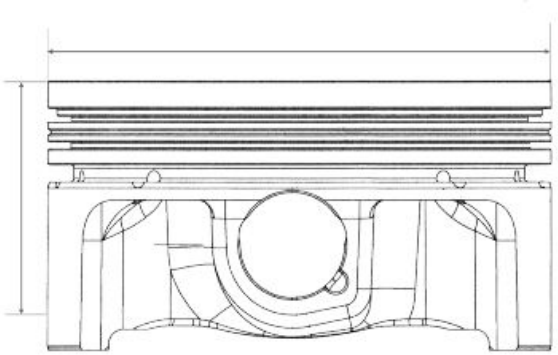
Minimum diameter: 14.995 mm (0.590 in)

Standard diameter: 15.0000 +0/-0.0030 mm (0.00012 in)

Inspecting the piston

- Measure the pin seat diameter on the piston.
- Calculate the pin - piston coupling clearance.
- Measure the piston outside diameter, perpendicular to the pin axis.
- Take the measurement at 6 mm (0.24 in) from the base, at the position shown in the figure.
- Carefully clean the sealing rings housings.
- Measure the sealing rings - grooves coupling clearance using suitable sensors, as shown in the diagram
- If clearances measured exceed the limits specified in the table, the piston should be replaced by a new one.





NOTE

MEASURE CLEARANCE BY INSERTING THE BLADE OF THE FEELER GAUGE FROM THE 2nd SEALING RING SIDE.

Characteristic

Piston / cylinder (125/200)

Piston pin hole - standard: 15.003 - 15.008 mm (0.5907 - 0.5908 in)

Maximum piston / cylinder coupling clearance after use (125/200)

- top ring: 0.075 mm (0.0029 in)
- middle ring: 0.065 mm (0.0025 in)
- oil scraper: 0.25 mm (0.0098 in)

Standard piston / cylinder coupling clearance (125/200)

- top ring: +0.03 / 0.062 mm (0.0012 / 0.0024 in)
- middle ring: +0.02 / 0.052 mm (0.0008 / 0.0020 in)
- oil scraper: +0.01 / 0.19 mm (0.0004 / 0.007480 in)

Inspecting the cylinder

- Using a bore meter, measure the cylinder inside diameter at three different points according to the directions shown in the figure.
- Check that the coupling surface with the head is not worn or misshapen.

CAUTION

THE MARKING IS LOCATED ON THE PISTON CROWN.

Characteristic

Maximum run-out allowed:

0.05 mm

CYLINDER - PISTON COUPLING CLEARANCE 125 CM³

Coupling categories with cast-iron cylinder

NAME	ABBREVIATION	CYLINDER		PISTON		FITTING CLEARANCE	
		min	max	min	max	min	max
Cylinder/Piston	M	58,010	58,017	57,963	57,970	0,040	0,054
Cylinder/Piston	N	58,017	58,024	57,970	57,977	0,040	0,054
Cylinder/Piston	O	58,024	58,031	57,977	57,984	0,040	0,054
Cylinder/Piston	P	58,031	58,038	57,984	57,991	0,040	0,054

CYLINDER - PISTON COUPLING CLEARANCE 200 CM³

Coupling categories with cast-iron cylinder

NAME	ABBREVIATION	CYLINDER		PISTON		FITTING CLEARANCE	
		min	max	min	max	min	max
Cylinder/Piston	M	63,010	63,017	62,958	62,965	0,045	0,059
Cylinder/Piston	N	63,017	63,024	62,965	62,972	0,045	0,059
Cylinder/Piston	O	63,024	63,031	62,972	62,979	0,045	0,059
Cylinder/Piston	P	63,031	63,038	62,979	62,986	0,045	0,059

Inspecting the piston rings

SEALING RINGS (125 / 200)

Specification	Desc./Quantity
Compression ring (top)	0.2 / 0.35 mm (0.0079 / 0.014 in)
Compression ring (middle)	0.2 / 0.35 mm (0.0079 / 0.014 in)
Oil scraper ring	0.2 / 0.7 mm (0.0079 / 0.027 in)
Top ring maximum value	0.45 mm (0.18 in)
Middle ring maximum value	0.45 mm (0.18 in)

Removing the piston

- Install piston and pin onto the connecting rod, with the piston arrow aligned facing the exhaust.
- Fit the pin retainer ring on the appropriate tool.

Specific tooling

020705Y Piston seeger ring fitting

- With the opening in the position indicated on the tool, set the retainer ring into position with the punch.
- Fit the pin stop ring using the plug as shown in the figure.

NOTE

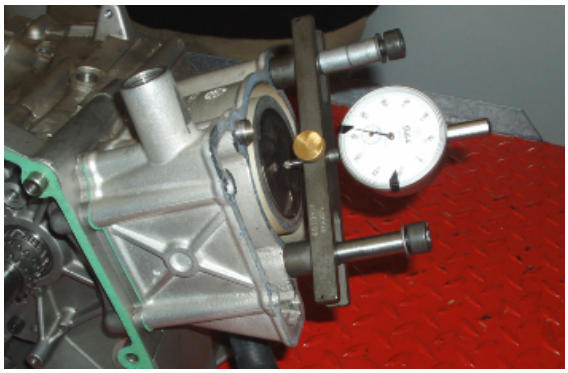
THE TOOL FOR INSTALLING THE RETAINER RINGS MUST BE USED MANUALLY.

CAUTION

USING A MALLET TO SET THE RINGS IN POSITION MAY DAMAGE THE RING SEATS.

Choosing the gasket

- Temporarily, fit the piston to the cylinder, without base or head gasket.
- Fit a dial gauge on the specific tool.
- Zero set the dial gauge on the cylinder top surface and fit it on the two adjacent stud bolts.
- Remove the dial gauge and refit it on the two stud bolts on the opposite angles. Now measure again.



Specific tooling

AP8140266 Comparator door

- Rotate the crankshaft up to the TDC (the reversal point of the dial gauge rotation).
- Lock the crankshaft at TDC using the specific tool.
- Calculate the difference between the two measurements: using the chart below, identify the thickness of the cylinder base gasket to be used upon refitting. By correctly identifying the cylinder base gasket thickness, an adequate compression ratio can be maintained
- Remove the specific tool and the cylinder.

Specific tooling

0240880 Threaded bolt for locking crankshaft at TDC

Characteristic

Compression ratio (125)

12: 1

Compression ratio (200)

11.6: 1

BASE GASKET SELECTION (125)

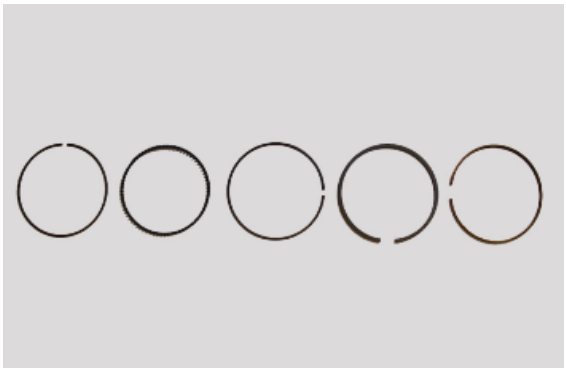
Specification	Desc./Quantity
Size measured: (1.05) - (1.20) mm ((0.041) - (0.047) in)	Gasket: 0.3 mm (0.012 in)
Size measured: (1.20) - (140) mm ((0.047) - (0.055) in)	Gasket: 0.4 mm (0.016 in)
Size measured: (1.40) - (1.55) mm ((0.055) - (0.061) in)	Gasket: 0.5 mm (0.019 in)

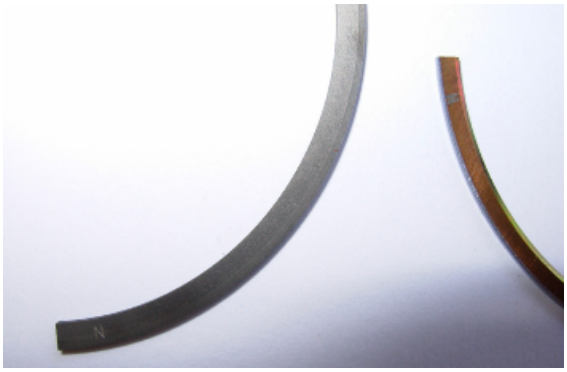
BASE GASKET SELECTION (200)

Specification	Desc./Quantity
Size measured: (-1.35) - (-1.20) mm ((-0.053) - (-0.047) in)	Gasket: 0.3 mm (0.012 in)
Size measured: (-1.20) - (-1.00) mm ((-0.047) - (-0.039) in)	Gasket: 0.4 mm (0.016 in)
Size measured: (-1.00) - (-0.85) mm ((-0.039) - (-0.033) in)	Gasket: 0.5 mm (0.019 in)

Refitting the piston rings

- Place the oil scraper spring on the piston.
- Fit the oil scraper ring keeping the gap opposed to the spring union.
- Fit the middle piston ring with the identification letter T facing the piston crown. In any case, the tapered side of the ring must be facing opposite the piston crown.
- Fit the top piston ring with the identification letter T facing the piston crown.
- Offset the piston ring gaps on the three rings by 90º as shown in the figure.
- Lubricate the components with engine oil.





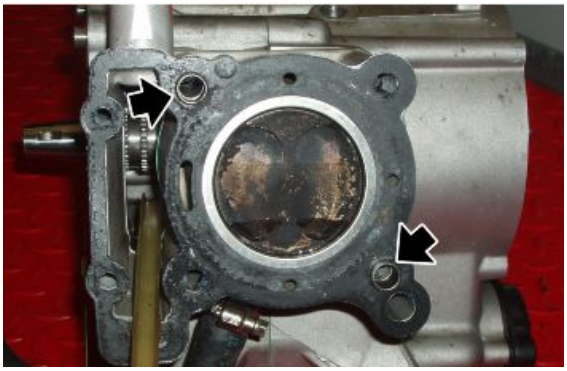
Refitting the cylinder

- Fit a new cylinder base gasket of the chosen thickness.
- Refit the cylinder as indicated in the figure.

NOTE

BEFORE FITTING THE CYLINDER, CAREFULLY BLOW AIR INTO THE LUBRICATION DUCT AND LUBRICATE THE CYLINDER LINER.

- Fit a new gasket between the cylinder and the head.
- Place the two dowels.
- Install the head.

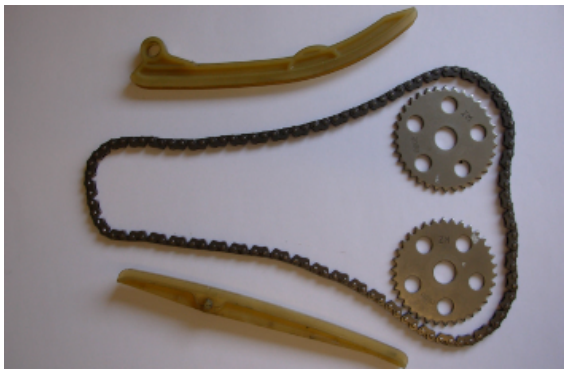


Inspecting the cylinder head

- Using a trued bar, check that the head surface is not worn or distorted.
- Check that the camshaft bushings are not worn.
- Check that the head cover surface, the intake manifold and the exhaust manifold are not worn.

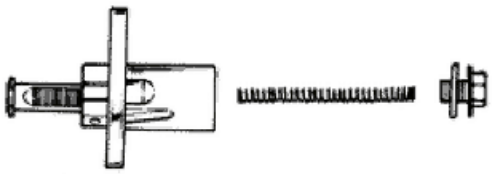
Inspecting the timing system components

- Check that the guide slider and the tensioner pad are not excessively worn.
- Check that the chain assembly, the camshaft driving pulleys and the sprocket wheel are not worn.
- Replace the parts if signs of wear are found.



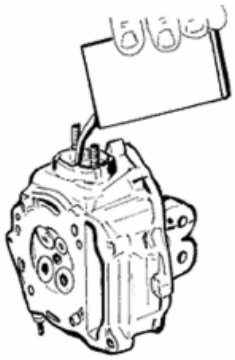
CHAIN TENSIONER

- Remove the central screw with the washer and the tensioner spring. Check that the one-way mechanism is not worn.
- Check the condition of the tensioner spring.
- If signs of wear are found, replace the whole assembly.

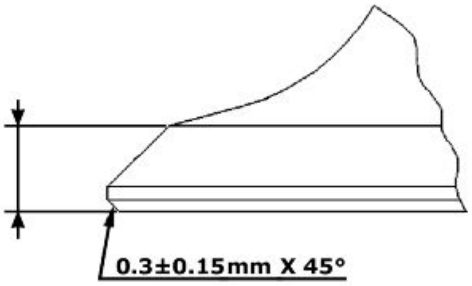


Inspecting the valve sealings

- Fit the valves into the cylinder head.
- Alternatively test the intake and exhaust valves.
- This test should be carried out by filling the manifold with petrol and checking that the head does not excessively ooze through the valves.



- Measure the sealing surface width on the valve seats.



VALVE SEALING SURFACE

Specification	Desc./Quantity
Intake valve - sealing surface (125)	2.30 +/- 0.15 mm (0.0905 +/- 0.0059 in)
Intake valve - sealing surface (200)	1.97 +/- 0.15 mm (1.0776 +/- 0.0059 in)
Exhaust valve - sealing surface (125/200)	2.95 +/- 0.15 mm (0.1161 +/- 0.0059 in)
Valve chamfering (all valves)	0.2 +/- 0.1 mm x 45° (0.0079 +/- 0.0039 in x 45°)

Inspecting the valve housings

- Remove any carbon deposits from the valve guides.
- Measure the inside diameter of each valve guide.
- Measure according to the thrust direction at three different heights.

Characteristic

Intake guide - standard diameter

4.012 mm (0.1579 in)

Intake guide: Wear limit

4.020 mm (0.1582 in)

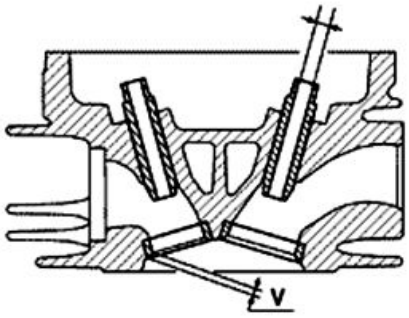
Discharge guide - standard diameter

4.012 mm (0.1579 in)

Discharge guide: Wear limit

4.020 mm (0.1582 in)

- Replace the head if the values corresponding to the width of the mark on the valve seat or the valve guide diameter exceed the specified limits.
- Check the width of the mark on the valve seat «V».



Characteristic

Wear limit for the width of the mark on the valve seat "V"

- Intake (125): 1.6 mm (0.0630 in)
- Exhaust (125): 1.8 mm (0.0708 in)
- Intake (200): 1.6 mm (0.0630 in)
- Exhaust (200): 2.0 mm (0.0787 in)

Inspecting the valves

- Measure the width of the sealing surface on the valve seats and on the valves themselves.
- If the sealing surface on the valve is wider than the specified limit, damaged in one or more points or curved, replace the valve with a new one.

CAUTION

DO NOT CHANGE THE VALVE FITTING POSITION (RH - LH).

Characteristic

Minimum diameter allowed - Intake

3.96 mm (0.1559 in)

Minimum diameter allowed - Exhaust:

3.95 mm (0.1555 in)

Standard clearance - Intake:

0.015/0.042 mm (0.00059/ 0.0016 in)

Standard clearance - Exhaust:

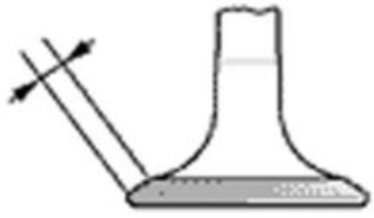
0.025/0.052 mm (0.00098/ 0.00204 in)

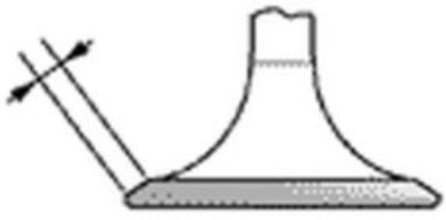
Maximum clearance admitted - Intake:

0.060 mm (0.0023 in)

Maximum clearance admitted - Exhaust:

0.070 mm (0.0027 in)





- Remove the head cover.
- Cause the engine to reach the top dead centre and lock it at that position using the specific tool.

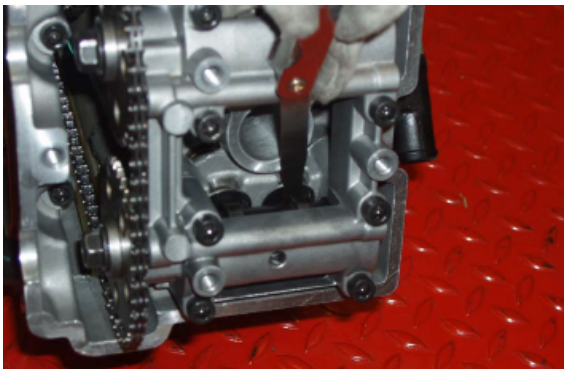
NOTE

FOR AN EASY REFIT, MARK TWO REFERENCES ON THE TIMING CHAIN AND THE GEARS OF THE TIMING SYSTEM IN THE COUPLING AREA.

Specific tooling

0240880 Threaded bolt for locking crankshaft at TDC

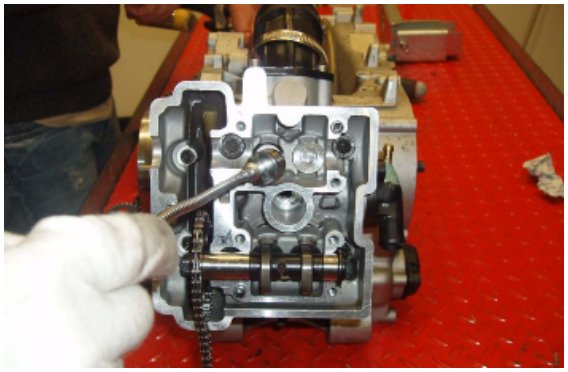
- Use a feeler gauge to check clearance on the four valves.
- If the values measured differ from the values specified, record the difference between MAXIMUM ALLOWED CLEARANCE e CLEARANCE MEASURED.



- Remove the chain tensioner.
- Undo and remove the eight screws and remove the cam tower.

- Remove the timing chain and the gears of the camshaft of the valves in question.

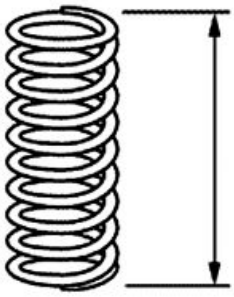
- Remove the bucket tappet of the valve in question and read the calibration value for that bowl, found inside the bucket tappet itself.
- Replace the bucket tappet with new one of a size suitable to restore the correct clearance.



- Fit the camshaft, the gears and the chain in their correct positions, using the references marked when these parts were removed.
- Fit the cam tower and tighten the eight screws to the prescribed torque.
- Fit the chain tensioner.
- Use two Ø 6.3 mm (0.248 in) timing pins to check the camshafts are correctly timed.
- Check for correct valve clearance.
- Fit the head cover.

Inspecting the springs and half-cones

- Check that the spring upper supporting caps and the cotters show no signs of abnormal wear.
- Check the unloaded spring length.



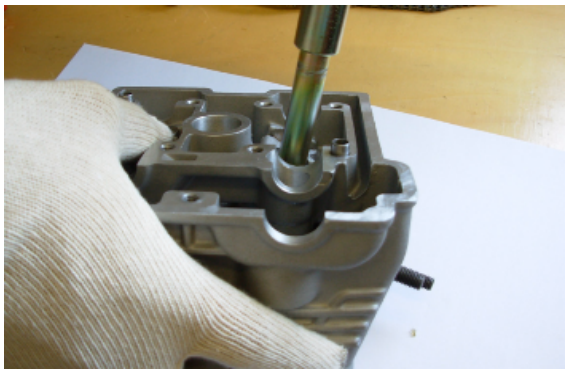
Characteristic

Valve spring length:

33.24 +/- 0.25 mm (1.3086 +/-0.0098 in)

Refitting the valves

- Lubricate the valve guides with engine oil.
- Place the two oil seals on the head using a punch.



Specific tooling

AP0277512 Fitting buffer

- Fit the valves, the springs and the caps. Using the appropriate tool, compress the springs and fit the cotters in their seats.

Specific tooling

AP9100838 Tool for valve pressure plate

AP8140179 Valve spring compressor

Inspecting the cam shaft

- Check the camshaft bearings for signs of abnormal wear.

Characteristic

Standard diameter - Bearing A

19.980 - 19.959 mm (0.7866 - 0.7858 in)

Minimum diameter allowed - Bearing A

19.95 mm (0.7854 in)

Intake cam height (125/200)

31.488 mm (1.23968 in)

Exhaust cam height (125/200)

30.864 mm (1.21511 in)

- Check that the holes used for timing and their shoulders are not worn.
- If values measured are not within the specified limits or there are signs of wear, replace the defective components with new ones.

Characteristic

Maximum axial clearance allowed:

0.4 mm (0.0157 in)

Refitting the head and timing system components

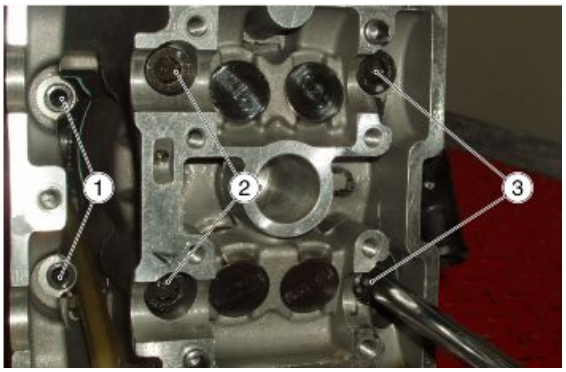
- Screw the specific tool so that the crankshaft does not rotate at TDC.

Specific tooling

0240880 Threaded bolt for locking crankshaft at TDC

- Fit the chain guide slider onto the cylinder.
- Fit the head gasket and the alignment dowels
- Fit the head.

- Screw but do not tighten both central long screws (3) and position the washers.
- Screw but do not tighten both central long screws (2) and position the washers.
- Screw but do not tighten the two side short screws (1).



NOTE

BEFORE INSTALLING THE HEAD, MAKE SURE THAT THE LUBRICATION CHANNEL IS CLEAN AS WELL AS THE REST OF THE ASSEMBLY; USE A JET OF COMPRESSED AIR FOR CLEANING.

- Tighten the four central screws (2 - 3) crosswise.

Locking torques (N*m)

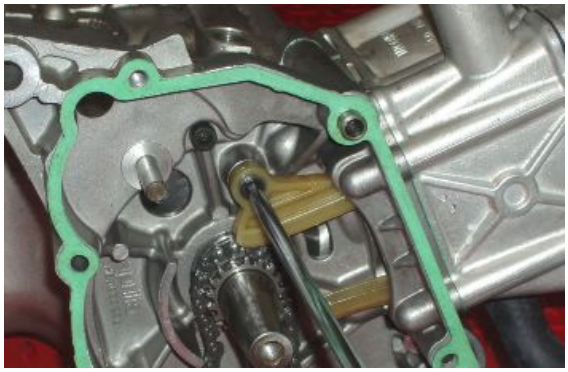
Head EI fixing screws - M8x166 (4) 25 Nm + 90° (18.44 lbf ft + 90°)

- Lastly, tighten the two side screws (1).

Locking torques (N*m)

Head EI fixing screws (chain side) - M6x130 (2) 11 Nm (8.11 lbf ft)

- Insert the timing control chain on the crankshaft.
- Insert the chain tensioner pad of the head and lock it with the fixing screw.



Locking torques (N*m)

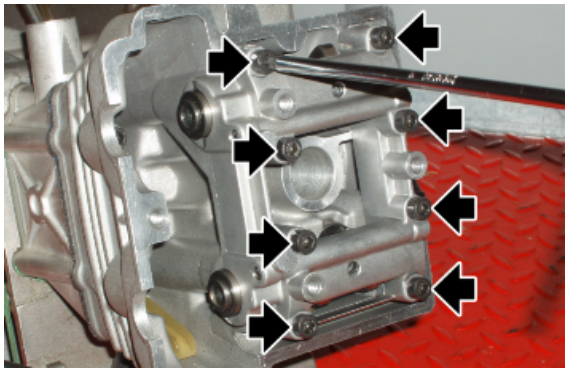
Chain tensioner guide slider EI fixing screws - M6 (1) 10 Nm (7.38 lbf ft) - Loctite 243

- Insert the camshafts in their seats on the head, remember to position the camshaft marked with the letter (A) on the intake side and the camshaft marked with the letter (S) on the exhaust side.

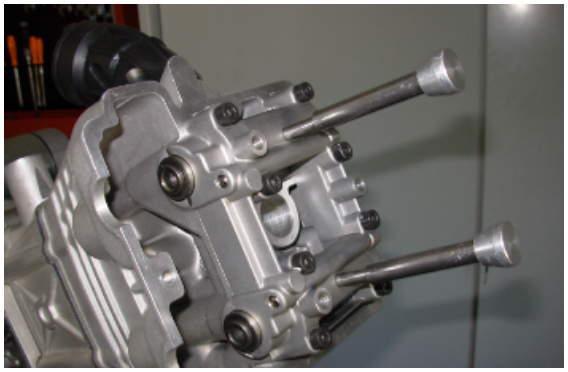
WARNING

POSITION THE CAMS OF BOTH SHAFTS FACING OUTWARDS.

- Position the cam tower cap.
- Screw but do not and tighten the eight screws.



- Get two Ø 6.3 mm (0.25 in) pins.
- Place the pins in their positions on the overhead camshafts.

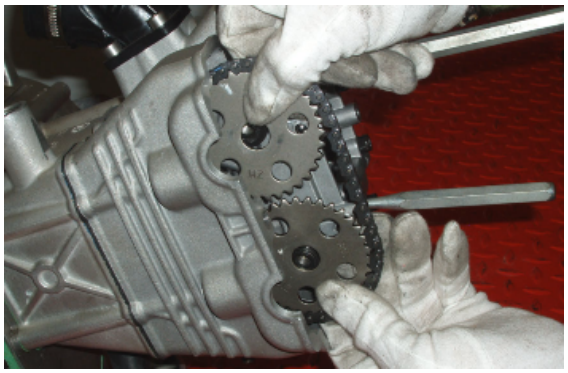


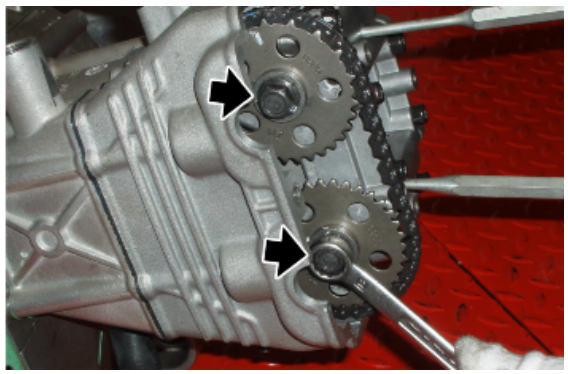
- Tighten the eight screws of the cam tower cap crosswise.

Locking torques (N*m)

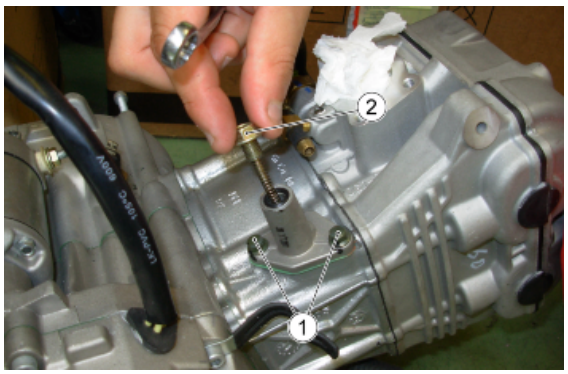
Camshaft support EI fixing screws - M6x40 (8) 10 Nm (7.38 lbf ft)

- Place the camshaft gears on the chain, be careful not to invert the original direction of rotation.
- Keep the camshafts locked with the pins and screw but do not tighten the screws fixing the gears using Loctite 243.





- Fit the chain tensioner on the cylinder using a new gasket, and tighten the two screws (1) to the prescribed torque.
- Insert the spring with the central screw (2) and o-ring, and tighten the cap to the prescribed torque.



Locking torques (N*m)

Chain tensioner retainer - M6x16 (2) 12 Nm (8.85 lbf ft) Chain tensioning cover - M8 (1) 6 Nm (4.43 lbf ft)

- Tighten the screws fixing the camshaft gears to the prescribed torque.

- Remove the pins on the camshafts.
- Remove the special crankshaft locking tool.
- Tighten the screw on the crankcase.
- Check the valve clearance and adjust it if required.
- Refit the tappet cover.

Specific tooling

0240880 Threaded bolt for locking crankshaft at TDC

Locking torques (N*m)

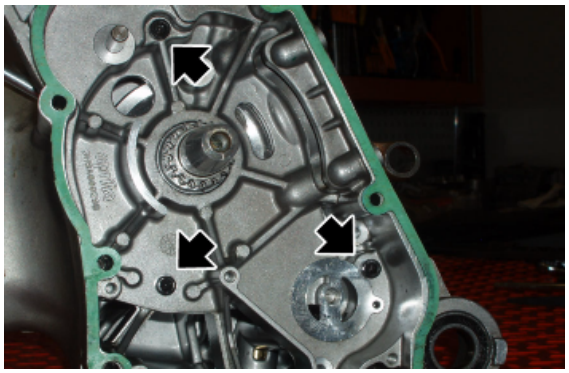
Transmission gear timing fixing screw - M8x20x1 (2) 27 Nm (19.91 lbf ft) - Loctite 243

Crankcase - crankshaft

Splitting the crankcase halves

- Before opening the crankcase, drain out all engine oil, remove the driving pulley, the starter motor, the flywheel, the freewheel and the intermediate gear.
- Remove the thermal group.
- Remove the oil pump.

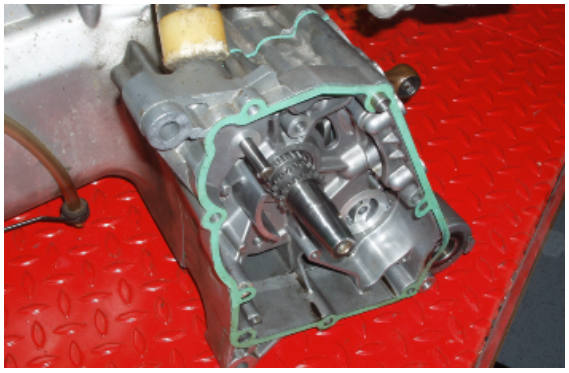
- Unscrew and remove the three screws.



- Separate the crankcase halves by giving short taps with a rubber hammer.

CAUTION

PAY ATTENTION THAT THE TOOTHING OF BOTH THE TIMING CHAIN GEARS AND THE OIL PUMP GEARS DO NOT DAMAGE THE BUSHING.



Removing the crankshaft

- Slide off the crankshaft from the fly-wheel side by giving short taps with a rubber hammer.

See also

Removing the flywheel magneto

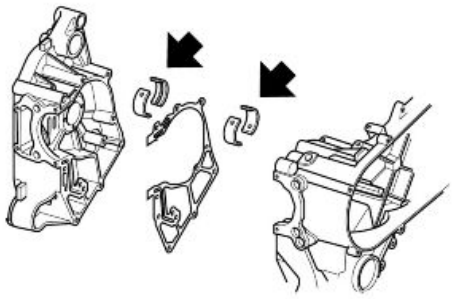
Intermediate gear

Removing the crankshaft bearings

- Remove the main bushing oil seal.
- Using the suitable special tool, remove the main bushings.

Specific tooling

020704Y Extractor for bushings



Refitting the crankshaft bearings

- Using the suitable tool, fit the new bushings on both crankcase halves.

Use bushings:

- blue

This coupling almost always meets the diametral clearance specifications

It should be checked that the diametral clearance is between 0.02 - 0.06 mm for both sides.

If this condition is not fulfilled, the bushing should be replaced with another of a different thickness.

These are the thickness for the half-bearings:

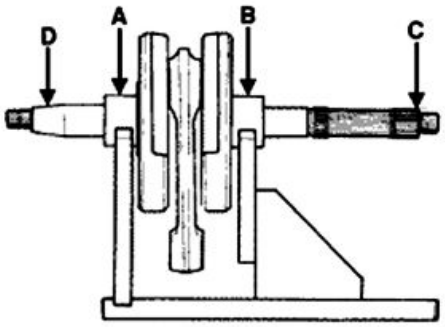
- red type: 2.005 - 2.010
- blue type: 2.010 - 2.015

yellow type: 2.015 - 2.020

Specific tooling

020701Y Punch for bushings

Inspecting the crankshaft alignment



- Install the crankshaft on the support and measure the misalignment at the two points indicated in the figure.
- Check that the crankshaft cone, the tab fitting, the oil seal flow, the knurling and the threaded tangs are in good working order.
- In case of failure, replace the crankshaft.
- The crankshaft spare part has a sole code (there are no different types to select from).
- It should be checked that the diametral clearance is between 0.02 mm (0.00079 in) and 0.06 mm (0.0024 in) for both sides.
- If this condition is not fulfilled, the half-bearings should be replaced.

The big end bushings cannot be replaced. Therefore, the connecting rod cannot be replaced either. When cleaning the crankshaft, be very careful that no impurities get in through the shaft lubrication hole.
In order to prevent damaging the connecting rod bushings, do not attempt cleaning the lubrication duct with compressed air.

- The wrong installation of a buffer can seriously affect the bushing lubrication pressure.

NOTE
CRANKCASE BEARINGS ARE NOT GRINDABLE.

Specific tooling

020074Y Support base for checking crankshaft alignment

Characteristic

Maximum off-line allowed:

A = 0.01 mm

B = 0.01 mm
C = 0.10 mm
D = 0.06 mm

Inspecting the crankcase halves

- Before checking the crankcase halves, thoroughly clean all the surfaces and the oil pipes.
- For the crankcase half on the transmission side, take particular care when handling the housing and hoses for the oil pump, the duct with the by-pass valve and the main bushings.
- As already described in the lubrication chapter, it is especially important that the by-pass valve housing shows no wear that may impair the proper sealing of the lubrication pressure adjustment ball.
- <DIV class=CNT_SUMMARY title="Testo Breve (<4000 car.)">Check that the surfaces are free from dents or deformations, with special attention to both the crankcase coupling and the cylinder-crankcase surfaces.
- <DIV class=CNT_SUMMARY title="Testo Breve (<4000 car.)">Defects in the crankcase coupling gasket or the surfaces indicated in the figure can cause a drop in the oil pressure and affect the lubrication pressure for the main bushings and the connecting rod.
- <DIV class=CNT_SUMMARY title="Testo Breve (<4000 car.)">Check that the surfaces that limit crankshaft axial clearance show no signs of wear. To measure and check sizes follow the procedure described previously for checking crankshaft axial clearance and dimensions.

Inspecting the crankshaft plain bearings

- In order to correctly lubricate the bushings, it is necessary to have both optimal lubricating pressure and a good oil flow rate; this implies that the bushings must be positioned correctly so as not to obstruct the oil supply ducts.
- The main bushings comprise two half-bearings. The two half-bearings for the left crankcase bushing (variator side) are plain with holes. The two half-bearings for the right crankcase bushing (flywheel side) have holes and a central groove.
- The oil supplying channel section is also influenced by the depth to which the bushings are driven compared with the crankshaft axial clearance of the limiting surface.

CAUTION

THE MAIN BUSHINGS SHOULD BE FITTED WITH THE COUPLING AREA FOR BOTH HALF-BUSHINGS PARALLEL TO THE CYLINDER SUPPORTING SURFACE AND WITH THE HOLES OF THE LUBRICATION GROOVE PERFECTLY CENTRED.

- Measure the bushings diameter at the 3 positions indicated in the figure.
- Bushings are divided into 3 categories according to their thickness.

RED TYPE: 2.005 - 2.010

BLUE TYPE: 2.010 - 2.015

YELLOW TYPE: 2.015 - 2.020

NOTE

DO NOT TAKE THE MEASUREMENT ON THE TWO HALF-SHELLS COUPLING SURFACE SINCE THE ENDS ARE RELIEVED TO ALLOW BENDING DURING THE DRIVING OPERATION.

Characteristic

Ideal lubrication pressure

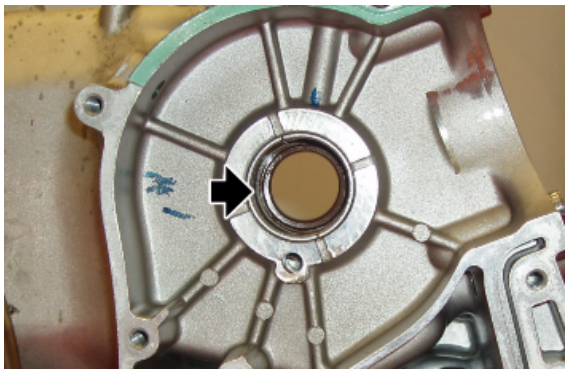
4 atm

Driving depth

0.5 +/-0.1 mm from internal stop

Refitting the crankshaft

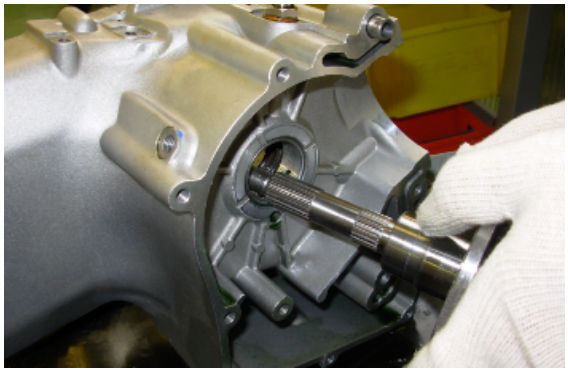
- Using the suitable special tool, fit the main bushings.
- Fit the new oil seal using a commercially available punch.



Specific tooling

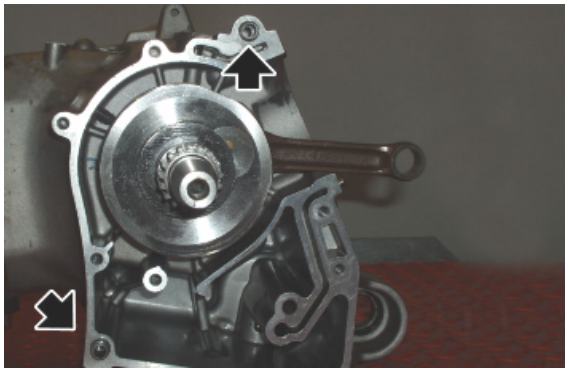
020701Y Punch for bushings

- Fit the crankshaft operating from the variator side.

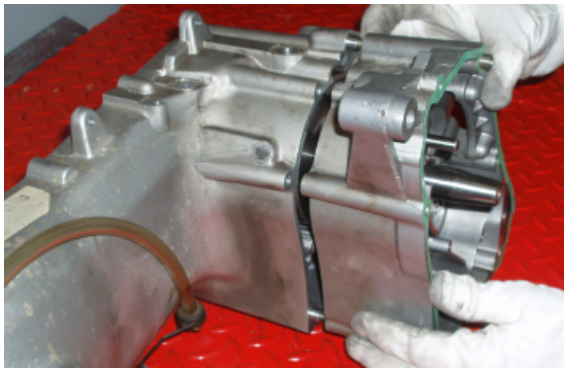


Refitting the crankcase halves

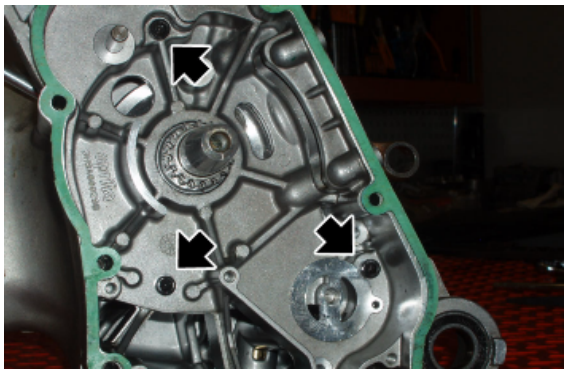
- Fit the crankshaft.
- Place the two dowels and a new gasket between both crankcase halves.



- Place the crankshaft half by giving short taps with a rubber hammer.



- Tighten the three screws to the prescribed torque.
- Trim the gasket protruding from the cylinder plane.



Locking torques (N*m)

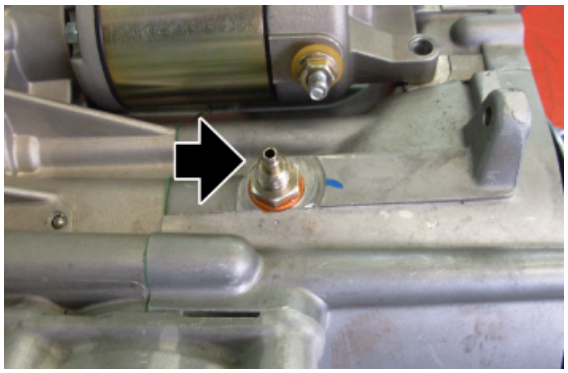
Crankcase EI fixing screws - M6x70 (1) 11 Nm (8.11 lbf ft) Crankcase EI fixing screws - M6x50 (2) 11 Nm (8.11 lbf ft)

See also

Refitting the crankshaft

Oil pressure check

- Disconnect the electrical connection of the minimum oil pressure switch and then remove the switch.
- Check that the oil pressure reading is 1.8 atm minimum with engine idling at 1700 +/- 100 rpm and oil at the required temperature (wait for at least one electric ventilation).
- Check that the oil pressure reading is between 3.5 and 6.5 atm with engine idling at 6000 rpm and oil at the required temperature.
- Remove the specific tools on the engine once the measurement is complete. Refit the oil pressure switch and washer, tightening it to the prescribed torque, and fit the flywheel cover.
- If oil pressure reading are not within the specified limits, check in the following order: the oil filter, the



oil by-pass valve, the oil pump and the crankshaft seals.

NOTE

THIS CHECK MUST BE CARRIED OUT WITH OIL AT THE CORRECT LEVEL AND WITH AN OIL FILTER IN GOOD CONDITION.

Characteristic

Oil pressure

Minimum pressure admitted at 6000 rpm: 3.5 atm.

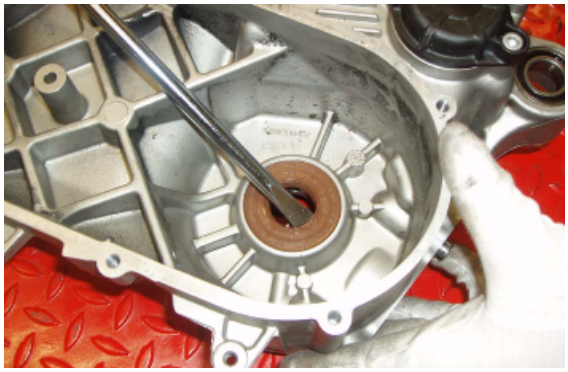
Crankshaft oil seals

Removal

- Remove the crankshaft.
- Remove the main bushing oil seal working from the transmission side.

CAUTION

BE CAREFUL NOT TO DAMAGE THE SEAT OF THE MAIN BUSHING OIL SEAL.



Refitting

- Thoroughly clean the seat of the oil seal.
- Fit the new main bushing oil seal using a commercially available punch of suitable size.

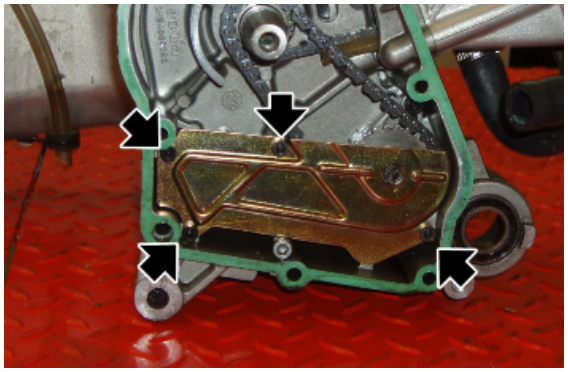
CAUTION

PREPARE THE NEW OIL SEAL BY LUBRICATING ITS SEALING LIP. DO NOT LUBRICATE THE KEYING SURFACE ON THE ENGINE CRANKCASE

Oil pump

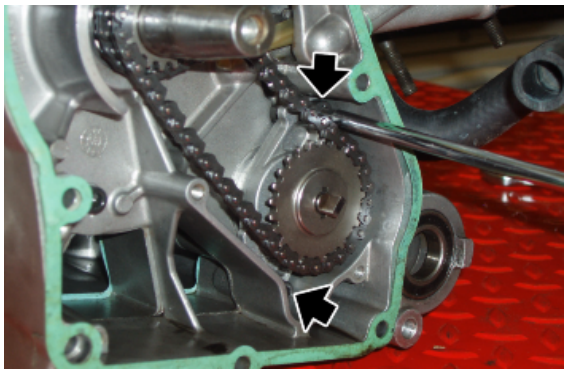
Removal

- Drain the engine oil.
- Remove the flywheel cover.
- Remove the flywheel.
- Undo and remove the four screws and remove the plate.



- Unscrew and remove the two screws.
- Slide off the gears, the oil pump and the chain.

IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE DIRECTION OF ROTATION IS MAINTAINED.



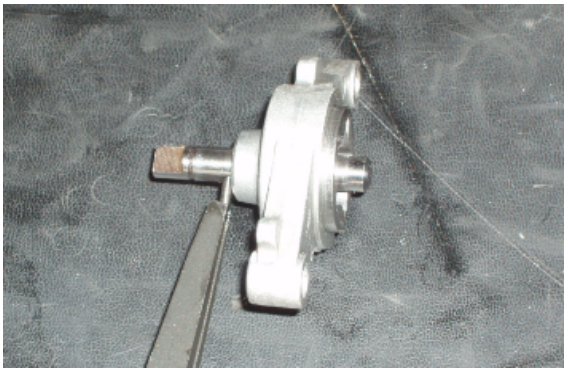
See also

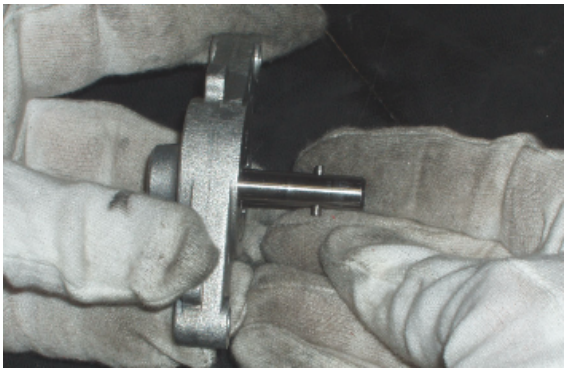
Removing the flywheel magneto

Inspection

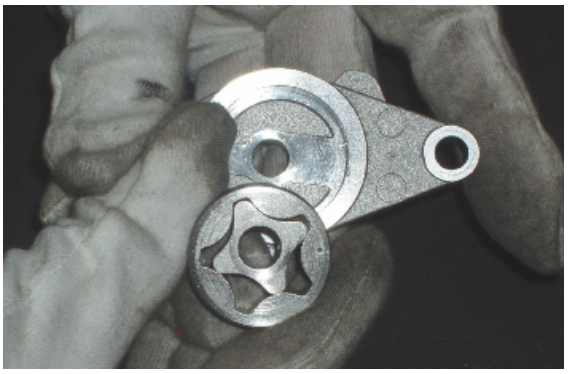
- Remove the oil pump.
- Remove the seeger ring and slide off the gears from the oil pump.

- Remove the external driving pin from the oil pump shaft.
- Detach the shaft and remove the second external driving pin as well.





- Take out the shaft and collect the components.

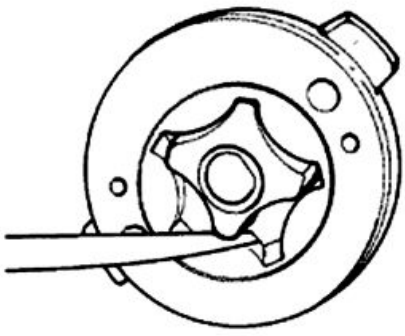


- Measure distance between rotors with a feeler gauge at the position shown in the picture.

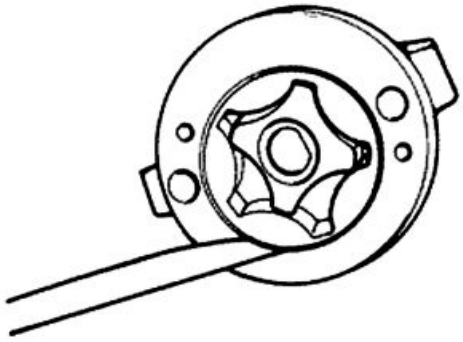
Characteristic

Limit clearance allowed:

0.12 mm



Measure the distance between the outer rotor and the pump body.

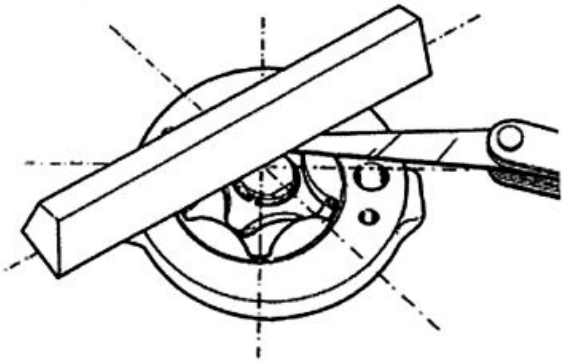


Characteristic

limit clearance allowed:

0.18 mm

Check the rotor axial clearance using a trued bar as reference plane, as shown in the figure.



Characteristic

Limit value allowed:

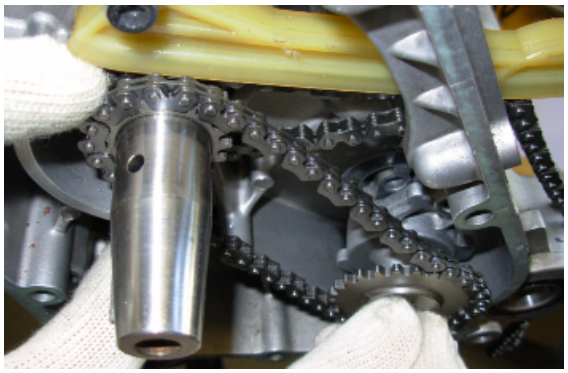
0.09 mm

See also

Removal

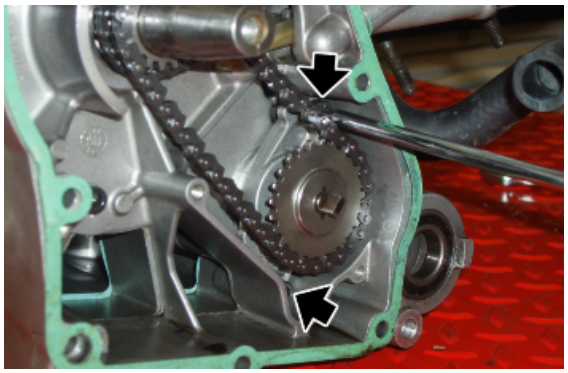
Refitting

- Preassemble the entire oil unit, the chain (observing the direction of rotation marked when fitting) and the crankshaft driving gear.
- Insert the oil pump spindle in its position and fit the oil pump in its housing.
- Tighten the two screws with Loctite 243.

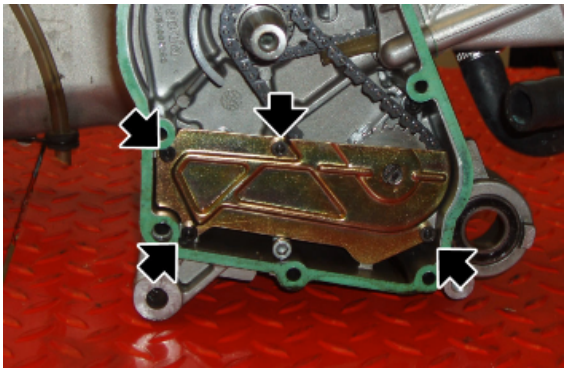


Locking torques (N*m)

Oil pump housing EI fixing screws - M6x25 (2)
10 Nm (7.38 lbf ft) - Loctite 243



- Place the plate and tighten the four screws with Loctite 243
- Fit the flywheel and tighten the nut with Loctite 243
- Refit the flywheel cover.



Locking torques (N*m)

Oil pump plate EI screws - M5x12 (4) 6 Nm (4.42 lbf ft) - Loctite 243

INDEX OF TOPICS

MIU injection system

This is an integrated ignition and injection system.

Injection is indirect in the manifold through an electro-injector.

Injection and ignition are timed on the 4-stroke cycle using a tone wheel keyed onto the crankshaft (24-2 teeth) and a reluctant variation (pick-up) sensor.

Carburetion and ignition are managed on the basis of the engine revs and throttle valve opening. Further corrections are made according to the following parameters:

- Coolant temperature
- Intake air temperature
- Lambda probe value

The system implements an idle supply correction with cold engine through a Stepper motor on a by-pass circuit of the throttle valve. The electronic control unit manages the Stepper motor and the injector opening time, thereby ensuring idle steadiness and proper carburetion.

In all conditions of use, carburetion is controlled by modifying the injector opening time.

Fuel delivery pressure is kept constant based on the ambient pressure.

The **fuel supply circuit** consists of:

- Fuel pump
- Fuel filter
- Injector
- Pressure regulator

Pump, filter and regulator are placed into the fuel tank using a single support.

The injector is connected by two pipes provided with fast-release fittings. This results in a continuous circulation, thereby avoiding the risk of fuel boiling. The pressure regulator is at the end of the circuit.

The fuel pump is controlled by the MIU control unit; therefore the vehicle's safety is enhanced.

The **ignition circuit** consists of:

- HV coil
- HV cable
- Shielded cap
- MIU control unit
- Spark plug

The MIU control unit manages the ignition with the best advance ensuring 4-stroke timing (ignition only in the compression stroke) at the same time.

The MIU injection-ignition system controls engine functions by means of a pre-set program.

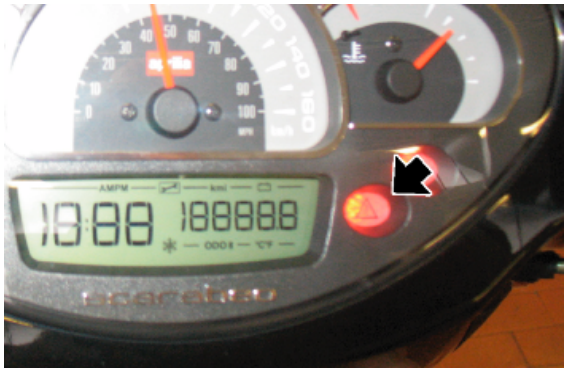
Should any input signals fail, an acceptable working order of the engine is ensured to allow the user to reach a service station.

Obviously, this cannot happen when the rev counter signal is missing, or when the failure concerns the control circuits:

- Fuel pump

- HV coil
- Injector

Failures are detected and restored by the diagnostic tester.
In any case, when the fault is no longer present, data storage is automatically wiped clean after 16 cycles of use (cold starting, running at regular engine temperature, stop).
The diagnostic tester is also required for adjusting idle speed carburetion.



Specific tooling

AP8140595 Axone + battery charger (230V 50Hz)

AP8202311 Axone + battery charger (110V 60Hz)

020680Y TXB Navigator

Failures are detected and restored by the diagnostic tester.
In any case, when the fault is no longer present, data storage is automatically wiped clean after 16 cycles of use (cold starting, running at regular engine temperature, stop).
The diagnostic tester is also required for adjusting idle speed carburetion.

Specific tooling

AP8140595 Axone + battery charger (230V 50Hz)

AP8202311 Axone + battery charger (110V 60Hz)

The MIU control unit power supply is further controlled by the emergency switch to further enhance vehicle safety.

Precautions

Troubleshooting tips

1 A failure of the MIU system is more likely to be due to the connections rather than the components. Before searching the MIU system for failures, check:

A: Power supply

a. Battery voltage

b. Blown fuse

c. Solenoids

d. Connectors

B: Chassis ground connection

C: Fuel system

a. Broken fuel pump

b. Dirty fuel filter

D: Ignition system

a. Faulty spark plug

b. Broken coil

c. Broken shielded cap

E: Intake circuit

a. Dirty air filter

b. Clogged by-pass circuit

c. Faulty stepper motor

F: Others

a. Not correctly adjusted timing system

b. Not correct idle carburetion

c. Not correctly reset throttle valve position sensor

2 MIU system failure may be caused by loose connectors. Make sure that all connections are properly implemented.

Check the connectors as follows:

A check that the terminals are not bent.

B check that the connectors have been properly connected.

C see whether the malfunction can be fixed by slightly shaking the connector.

3 Check the entire system carefully before replacing the MIU control unit. If the fault is still present after the MIU control unit is replaced, install the original control unit again and check whether the fault occurs again.

4 Use a multimeter with an internal resistance over 10 K W /V when troubleshooting. Instruments that are not suitable may damage the MIU control unit. Instruments must be used with definitions over 0.1 V and 0.5 W , the precision must be greater than 2%.

Hand-held computer menu

PALMTOP COMPUTER MENU SYMBOLS

1. ISO

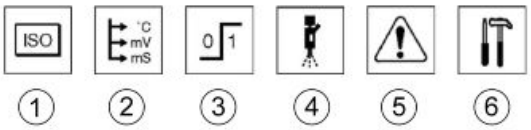
2. Engine parameter reading

3. Device status (in general, values are ON - OFF)

4. Devices activation

5. Errors display

6. Adjustable parameters/Fixed parameters



ISO

Specification	Desc./Quantity
Aprilia hardware (XXXXXX000)	This is the mapping code with the numbers inverted. If there are only zeros, this means that the central unit is blank (no mapping): the suitable mapping should be remotely reloaded (see the note related to the mapping parameter)
Aprilia software	Not relevant field
Service number (XX)	
ENGINE	Engine capacity
Produced (dd/mm/yy)	Electronic control unit production date
Mapping (XXXXXX)	Indicates the code of the configuration present on the control unit
Programming date (dd/mm/yy)	Date of last mapping downloading: day/month/year
Person in charge of last programming (XXXXX)	Identification code of the PC or Axone that has loaded the last mapping. In this 5.0.2 version, the code displayed is not right: in order to view it correctly, go to the ISO screen page that is displayed when selecting RESETTING

ENGINE PARAMETER READING

Specification	Desc./Quantity
Water temperature (°C)	Detected by the sensor placed on the engine
Air temperature (°C)	Temperature measured when entering the engine (sensor in the throttle body). Caution! the instrument panel temperature is read by a different sensor
Engine revs (rpm)	Measured by the crankshaft rpm detection sensor
Target idle revs (1600 rpm)	Target revs saved to the electronic control unit memory (they vary according to engine temperature)
Ignition advance	Ignition advance in relation to TDC
TPS Trimmer	
Idle motor (50 steps)	Idle motor position, example value measured with warm engine
Battery voltage (V)	Voltage measured at battery leads
Number of engine strokes in which more than a tooth have been lost since the beginning of the trip (0/1)	Shows 1 if it detects that more than one tooth is missing in the sprocket
Number of engine strokes in which one single tooth has been lost since the beginning of the trip (0/1)	Shows 1 if it detects that one tooth is missing in the sprocket
Difference between actual and target steps (steps)	Difference between target steps and actual steps of the idle motor
Lambda sensor correction (1)	Value that must be close to 1 when the control unit is using the lambda probe signal to keep the stoichiometric combustion
Lambda probe (100-900 mV)	Lambda probe signal voltage, fixed value if the circuit is interrupted
Injection time (ms)	Injector activation time
Atmospheric pressure (760 mmHg)	Air atmospheric pressure (for mapping adjustment)
Partial load self-adjustment (mg/cc)	Parameter for lambda probe self-adjustment for partial loads
Value adaptability at idle (mg/cc)	Parameter for lambda probe self-adjustment at idle speed
Gain value adaptability (%)	Parameter for lambda probe self-adjustment at full load

DEVICE STATUS

Specification	Desc./Quantity
Engine status (Off/running)	Engine off or running
Rpm sensor (Synchronised/Not synchron.)	Synchronised if the control unit detects a correct synchronisation (by means of the crankshaft rpm detection sensor
Idle/full load (on/off)	ON if idle functioning
Active lambda probe (on/off)	ON if the control unit is using the lambda probe signal to keep the stoichiometric combustion

ADJUSTABLE PARAMETERS

Specification	Desc./Quantity
Throttle position self-acquisition	Just press the ENTER button to save the throttle closed position
Self-adjustable parameters reset	Lambda probe self-adaptability parameters reset (if a new engine, a new lambda probe or a new injector is installed)

DEVICES ACTIVATION

Specification	Desc./Quantity
Error clearing	Press "enter" to transfer errors from the memory (MEM) to the historical record (STO). The next time Axone is connected to the ECU, the errors in the historical record (STO) will no longer be displayed
Fuel pump	The device is activated: if it is not correctly activated, this will be immediately shown in the Axone screen page
Coil	The device is activated: if it is not correctly activated, this will be immediately shown in the Axone screen page
Injectors	The device is activated: if it is not correctly activated, this will be immediately shown in the Axone screen page
Electric fan	The device is activated: if it is not correctly activated, this will be immediately shown in the Axone screen page
Idle motor	The device is activated: if it is not correctly activated, this will be immediately shown in the Axone screen page

ERRORS DISPLAY

Specification	Desc./Quantity
Throttle	If the throttle position sensor signal is interrupted
Pressure	If the atmospheric pressure sensor signal is interrupted
Lambda probe	Displayed if the probe signal circuit is interrupted
Water temperature	Sensor, circuit or relevant connectors interrupted
Air temperature (°C)	Sensor, circuit or relevant connectors interrupted
Battery voltage	
Injector	Sensor, circuit or relevant connectors interrupted
Coil	Sensor, circuit or relevant connectors interrupted
Idle motor	Sensor, circuit or relevant connectors interrupted
Fuel pump relay	
Electric fan	Sensor, circuit or relevant connectors interrupted
Self-adjustable parameters	
RAM memory	Control unit internal error
ROM memory	Control unit internal error
EEPROM	Control unit internal error
Microprocessor	Control unit internal error
Rpm sensor	If the crankshaft rpm detection sensor is disconnected, this error is not shown

The adjustable parameters screen page is used:

• to align the throttle position sensor.

Throttle position sensor alignment

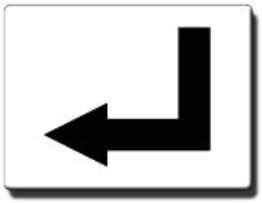
Align the throttle position sensor if the throttle body and/or the control unit should be replaced.

• Select the function: "throttle position self-acquisition".

• Make sure the left throttle is fully in.

• Press the "ENTER" key.

• Turn the key to "OFF" and leave it for at least 30 seconds.



Troubleshooting procedure

Engine does not start

ENGINE DOES NOT START EVEN IF PULLED

Possible Cause	Operation
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor
Fuel system	Fuel present in the tank Fuel pump activation Fuel pressure (low) Injector flow (low)
Power to the spark plug	Spark plug Shielded cap HV Coil (secondary insulation)
Parameter reliability	Coolant temperature Distribution timing adjustment - injection start Intake air temperature

Starting difficulties

ENGINE START-UP PROBLEMS

Possible Cause	Operation
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor Air temperature Coolant temperature
Start-up speed	Starter motor and solenoid BATTERY Ground connections
Power to the spark plug	Spark plug Shielded cap HV coil Engine speed timing sensor Ignition advance
Fuel system	Fuel pressure (low) Injector flow (low) Injector seal (poor)

Possible Cause	Operation
Correctness of the parameters	Coolant temperature Intake air temperature Stepper throttle valve position (steps and actual opening) Cleaning the auxiliary air pipe and air filter efficiency throttle valve

Engine stops at idle

ENGINE DOES NOT HOLD IDLING/ IDLING IS UNSTABLE/ IDLING TOO LOW

Possible Cause	Operation
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor Air temperature Coolant temperature
Ignition efficiency	Spark plug Ignition timing
Correctness of the parameters	Throttle valve position sensor Stepper Coolant temperature sensor Intake air temperature sensor
Intake system cleaning	Air filter Diffuser and throttle valve Supplementary air pipe and Stepper
Intake system seal (seepage)	Intake manifold - head Throttle body - manifold Intake sleeve Filter housing
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector flow

Engine does not rev down

ENGINE DOES NOT RETURN TO IDLING/IDLING TOO HIGH

Possible Cause	Operation
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor Air temperature Coolant temperature
Ignition efficiency	Ignition timing
Correctness of the parameters	Throttle valve position sensor Stepper Coolant temperature sensor Intake air temperature sensor
Intake system seal (seepage)	Intake manifold - head Throttle body - manifold Intake sleeve Filter housing
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector flow

Exhaust backfires in deceleration

EXHAUST BACKFIRING WHEN DECELERATING

Possible Cause	Operation
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor Air temperature Coolant temperature Lambda Probe
Correctness of the parameters	Throttle valve position sensor Stepper Coolant temperature sensor Intake air temperature sensor
Intake system seal (seepage)	Intake manifold - head Throttle body - manifold Intake sleeve Filter housing
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector flow
Exhaust system seal (seepage)	Manifold - head Manifold - silencer Silencer welding

Engine revs irregularly

REGULAR ENGINE PROGRESS WITH VALVE SLIGHTLY OPEN

Possible Cause	Operation
Intake system cleaning	Air filter Diffuser and throttle valve Supplementary air pipe and Stepper
Intake system seal	Intake sleeve Filter housing
Ignition system	Spark plug wear check
Parameter reliability	Throttle valve position signal Coolant temperature signal Intake air temperature signal Ignition advance
TPS reset successful	TPS reset successful
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor Air temperature Coolant temperature Lambda Probe

Poor performance at full throttle

POOR ENGINE PERFORMANCE AT FULL POWER/ IRREGULAR ENGINE PROGRESS ON ACCELERATION

Possible Cause	Operation
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor Air temperature Coolant temperature

Possible Cause	Operation
	Lambda Probe
Power to spark plug	Spark plug Shielded cap HV Cable HV Coil
Intake system	Air filter Filter housing (seal) Intake sleeve (seal)
Parameter reliability	Throttle valve position signal Coolant temperature signal Intake air temperature signal Ignition advance
Fuel system	Fuel level in the tank Fuel pressure Fuel filter Injector flow

Engine knocking

PRESENCE OF KNOCKING (COMBUSTION SHOCKS)

Possible Cause	Operation
Faults detected by self-diagnosis	Pump relay HV coil Injector Engine speed timing sensor Air temperature Coolant temperature Lambda Probe
Ignition efficiency	Spark plug
Parameter reliability	Throttle valve position signal Coolant temperature signal Intake air temperature signal Ignition advance
Intake system seal	Intake sleeve Filter housing
TPS reset successful	TPS reset successful
Fuel system	Fuel pressure Fuel filter Injector flow Fuel quality
Selecting the thickness for the cylinder base gasket	Selecting the thickness for the cylinder base gasket

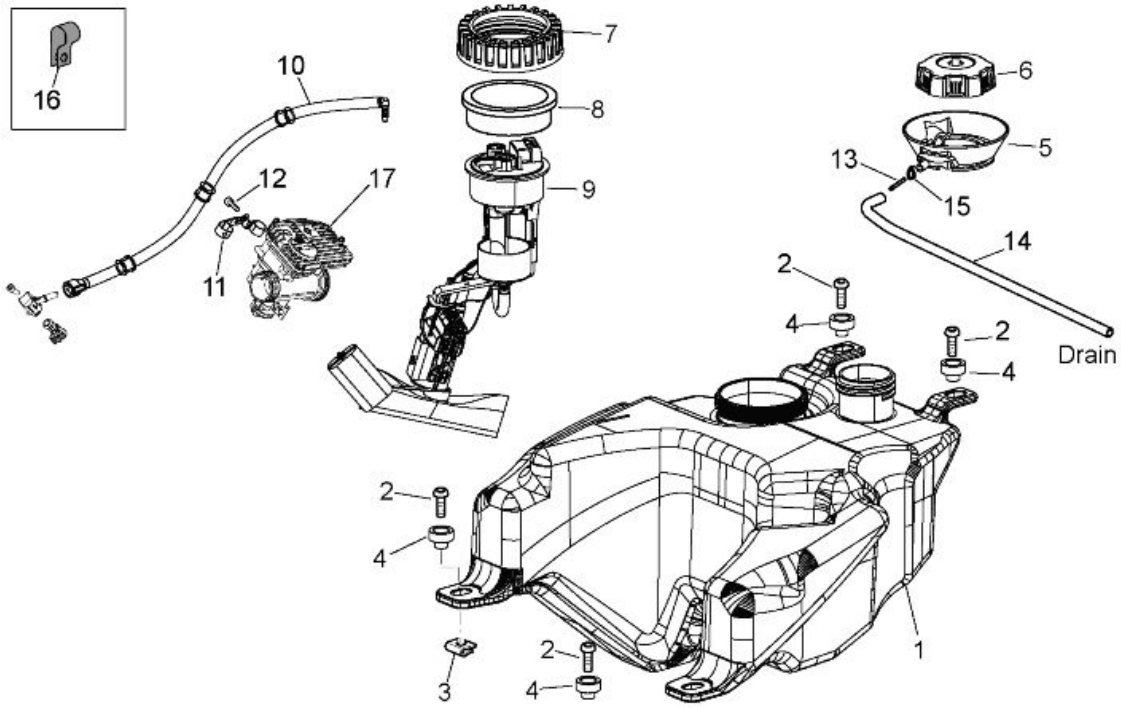
Fuel supply system

The fuel system circuit includes the electric pump, the filter, the pressure regulator, electro-injector and pipes.

The electrical pump is located in the tank from which the fuel is pumped and sent to the injector through the filter.

The pressure is controlled by the pressure regulator situated in the pump assembly in the tank.

Circuit diagram



key:

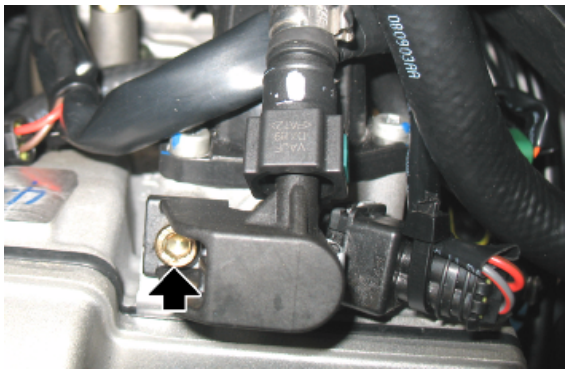
1. Fuel tank
2. TBEI screw
3. Clip M6
4. Bushing
5. Fuel collecting rubber ring
6. Fuel cap
7. Fuel pump ring nut
8. Fuel pump gasket
9. Fuel pump
10. Complete fuel pipe
11. Supporting plate
12. Screw
13. Joint
14. Fuel pipe
15. Clamp
16. Wiring clip
17. Throttle body / Control unit

Removing the injector

- Remove the helmet compartment.

- Disconnect the fast-release fitting of the fuel.
- Disconnect the fuel injector connector.

- Undo and remove the screw.

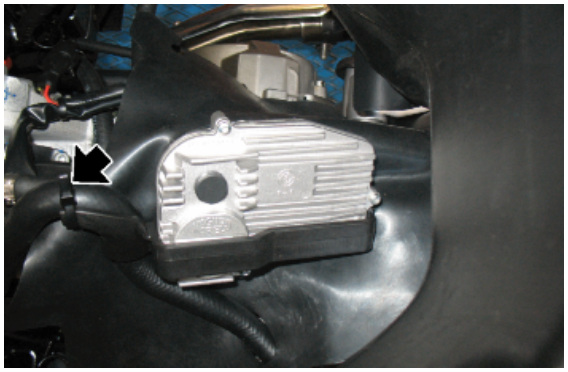


Refitting the injector

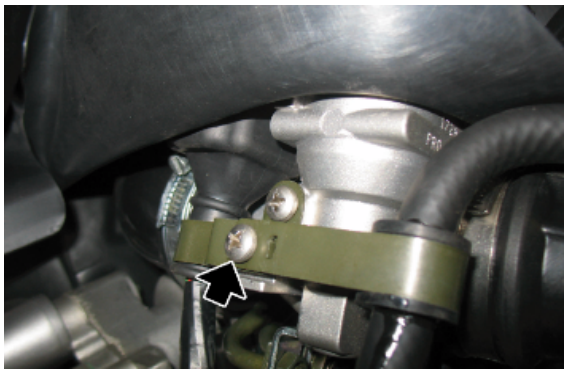
For refitting, follow the operations in reverse order observing the tightening torque.

Removing the butterfly valve

- Remove the helmet compartment.
- Cut the clamp.
- Release the control unit fixing lever.



- Undo and remove the cable grommet fixing screw.
- Open the cable grommet fins.

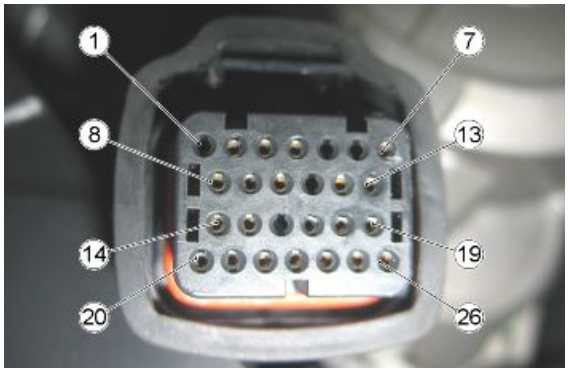


- Disconnect the fast-release fitting of the fuel.
- Disconnect the fuel injector connector.

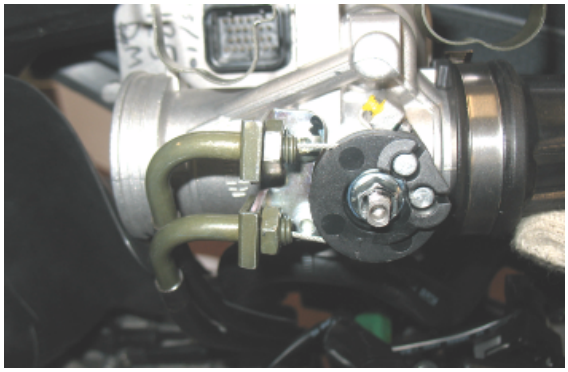
- Undo and remove the three screws fixing the manifold to the cylinder head.

- Loosen the clamp fixing the throttle body manifold to the air filter box.

- Remove the MIU control unit connector

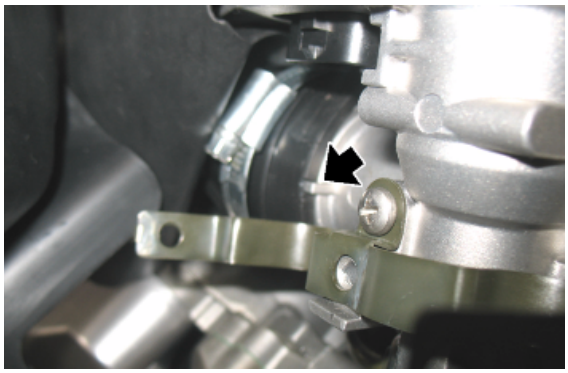


- Disconnect the throttle grip cables from the throttle body.
- Remove the throttle body.



Refitting the butterfly valve

To refit, carry out the removal operations but in reverse order, making sure to correctly fit the sleeve seat in the throttle body fin, as shown in the photograph.



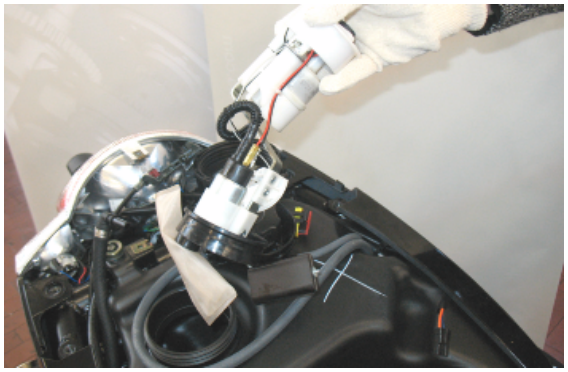
Fuel pump and filter check

FUEL PUMP REMOVAL

- Remove the helmet compartment.
- Disconnect the fuel pump connector.

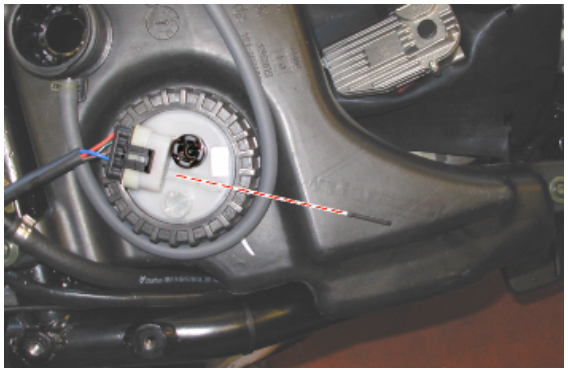
- Disconnect the fuel pipe.

- Unscrew the ring nut.
- Remove the fuel pump together with rubber gasket from the tank.



FUEL PUMP INSTALLATION

- Insert the fuel pump together with plastic gasket in the tank.
- Align the reference on the pump with the one on the fuel tank.

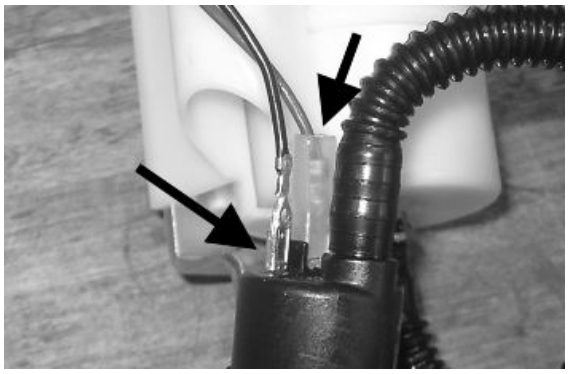


WRONG POSITIONING OF THE FUEL PUMP MAY CAUSE THE BLOCK OF THE FUEL LEVEL SENSOR.

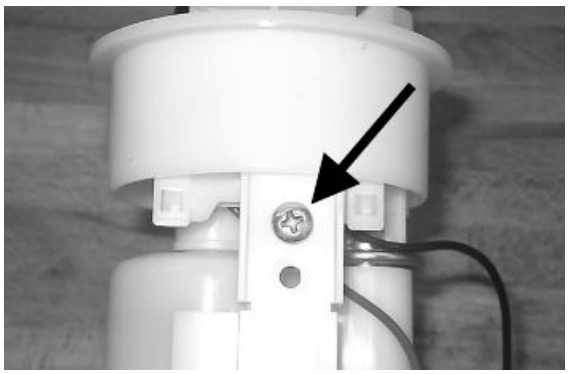
- Tighten the ring nut of the fuel pump.
- Connect fuel pump pipe and connector.

Fuel filter check

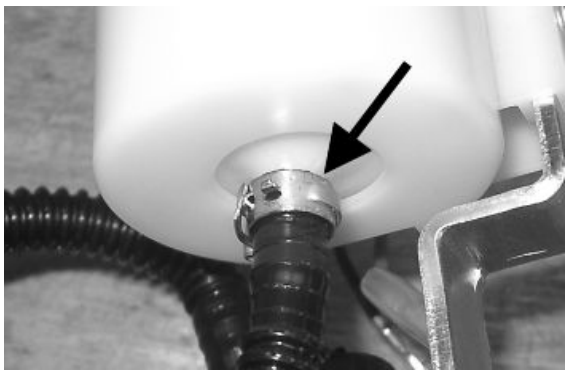
Disconnect the terminals of the electrical pump



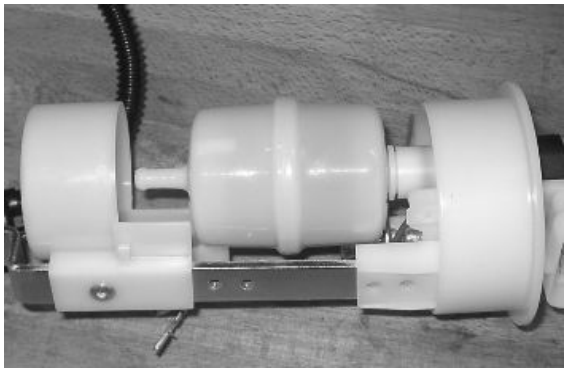
Remove the screw indicated in the photograph



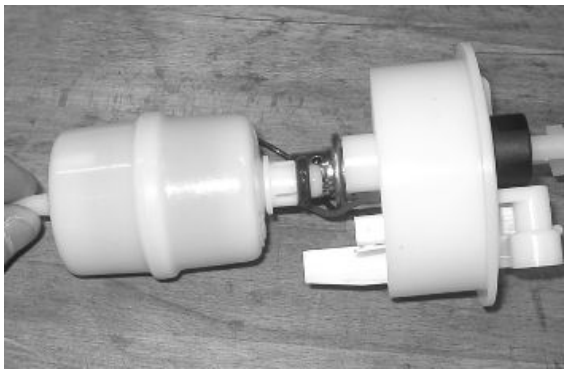
Remove the clamp fixing the piping to the filter shown in the photograph



Separate the lower part of the pump support as shown in the photograph.



Remove the filter from the pump support



Zeroing the throttle

Throttle valve position signal reset (TPS reset)

The MIU control unit is supplied with throttle valve position sensor and is pre-calibrated.

Pre-calibration entails regulating the minimum opening of the throttle valve to obtain a specific air flow under pre-set reference conditions.

Pre-calibration ensures optimal air flow for the control of the idle speed.

This regulation must not be tampered with in any way whatsoever.

The injection system will complete the management of the idling through the Stepper and the variation of the ignition advance.

After the pre-calibration the throttle body has an open valve with a variable angle depending on the tolerances of the machining of the pipe and the valve itself.

The valve position sensor can also have various fitting positions. For these reasons the mVs of the sensor with the valve at idle can vary from one throttle body to another.

To obtain the optimum carburetion, especially at small openings of the throttle valve, it is essential to match the throttle body with the control unit following the procedure known as TPS resetting.

With this operation we inform the control unit, as a starting point, of the mV value corresponding to the pre-calibrated position.

To reset, proceed as follows.

Connect the Axone following the specific instructions.

Shift to «**ON**».

Press the + and - keys go to the adjustable parameters screen page and select «**TPS RESET**» parameter.

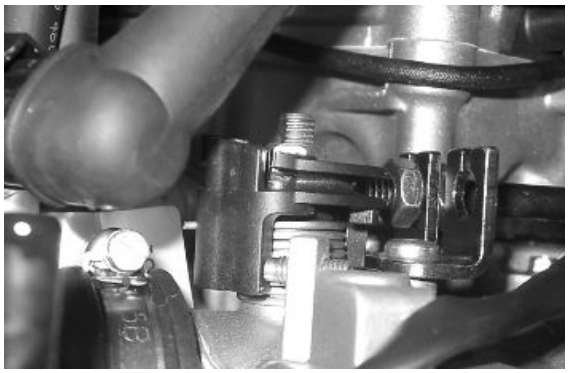
Specific tooling

AP8140595 Axone + battery charger (230V 50Hz)

AP8202311 Axone + battery charger (110V 60Hz)

020680Y TXB Navigator

Make sure that the throttle valve control is in contact with the stop screw.



Guaranteeing that this position will be kept, give the confirmation for the TPS reset procedure.

Reset should be performed in the following cases:

- on first fitting.

- if the injection control unit is replaced.

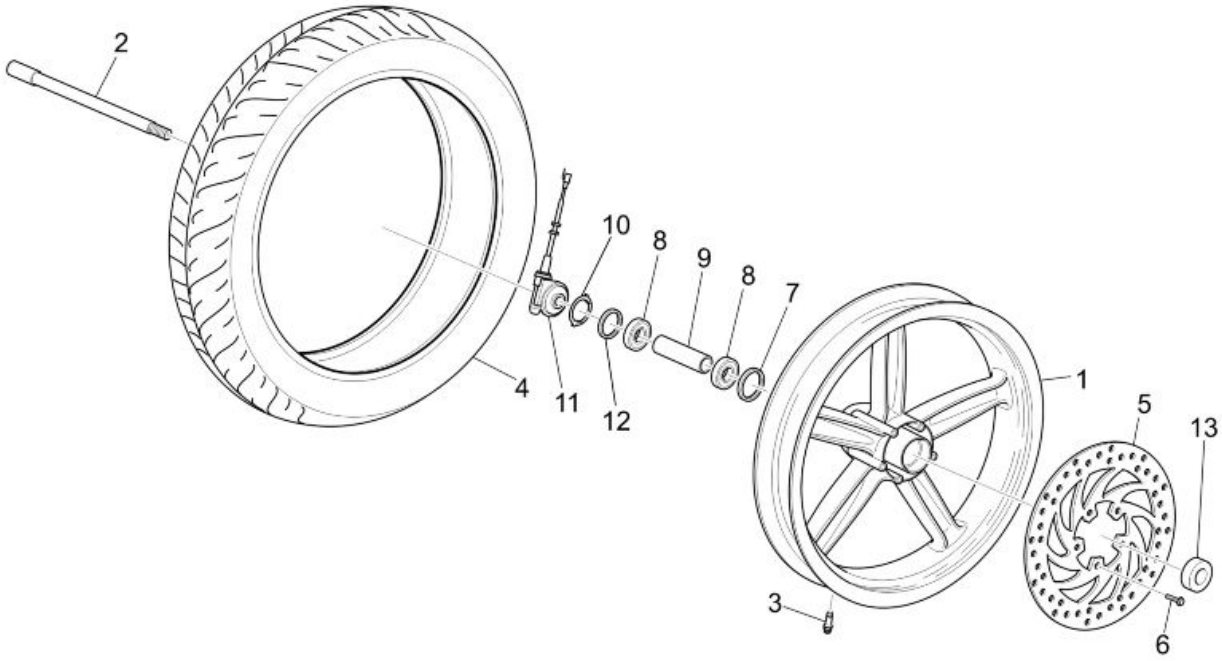
NOTE

THE TPS RESETTING PROCEDURE MUST NOT BE CARRIED OUT WITH A USED THROTTLE BODY BECAUSE POSSIBLE VALVE WEAR AND STOP WEAR FOR THE MINIMUM OPENING MAKE THE AIR FLOW DIFFERENT FROM THAT OF THE PRE-CALIBRATION.

INDEX OF TOPICS

Front

Removing the front wheel



key:

1. Grey front wheel

2. Front wheel axle

3. Tubeless valve

4. Front tyre

5. Front brake disc

6. TE flanged screw M8x30

7. Sealing ring

8. Bearing

9. Spacer

10. Oil seal

11. Odometer gear

12. Pulling element

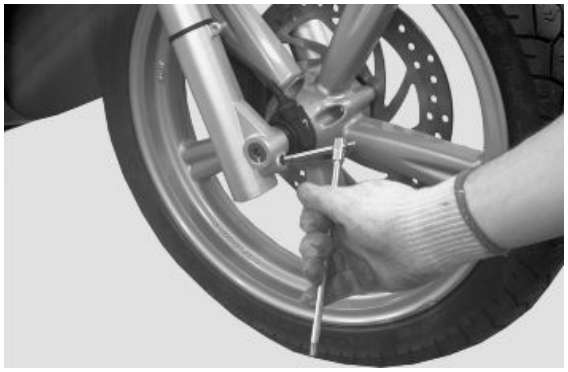
13. Spacer

CAUTION

SET THE SUPPORT UNDER THE VEHICLE IN SUCH A WAY THAT THE FRONT WHEEL HAS FREE SPACE TO MOVE AND THE VEHICLE IS FIRMLY SECURED FROM FALLING.

Park the vehicle on its centre stand.

- Place a support under the chassis.
- Loosen the pin locking screw.



CAUTION

UPON REMOVING/REFITTING, PAY ATTENTION NOT TO DAMAGE THE BRAKE HOSES, DISCS AND PADS.

CAUTION

DO NOT ACTUATE NEITHER BRAKE LEVER AFTER REMOVING THE WHEEL. OTHERWISE, THE CALLIPER PLUNGERS COULD GO OUT OF THEIR SEAT, RESULTING IN BRAKE FLUID LEAKAGE.

Locking torques (N*m)

M6 screw fixing front wheel axle clamp 10 (7.4 lbf ft)

- Unscrew and remove the wheel axle.

Locking torques (N*m)

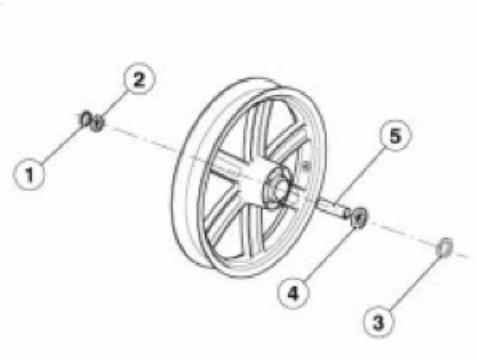
Wheel axle fixing screw 50 (37 lbf ft)

- Remove the wheel being careful with the odometer movement sensor «1».

- Collect the spacer.

Front wheel hub overhaul

- Remove the front wheel.
- Clean the two sides of the hub with a cloth.
- Remove the right oil seal «1».
- Remove the right bearing «2» with a suitable extractor.
- Remove the left oil seal «3».
- Remove the left bearing «4» with a suitable extractor.
- Carry out a thorough check of the bearings.
- Collect the internal spacer «5».
- Clean the inside of the hub thoroughly.
- Wash all the parts with clean detergent.



CAUTION

UPON REFITTING, USE A BUFFER WITH A DIAMETER EQUAL TO THE EXTERNAL RING OF THE BEARINGS TO INSERT THE BEARINGS. DO NOT HIT THE BALLS AND/OR THE INTERNAL RING. MAKE SURE THE FOLLOWING COMPONENTS ARE FITTED PERFECTLY IN:

- THE LEFT BEARING «4» ON THE HUB;
- THE SPACER «5» ON THE LEFT BEARING «4»;
- THE RIGHT BEARING «2» ON THE SPACER «5»;

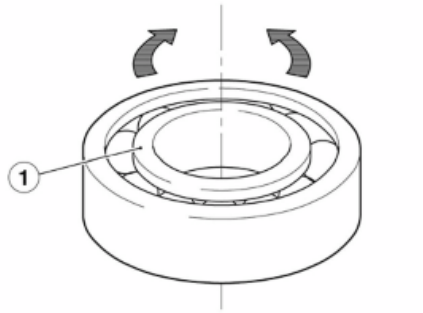
BEARINGS

Manually rotate the internal ring «**1**» which must turn smoothly, without obstacles and/or noise.

There must be no axial clearance. The bearings presenting these problems must be replaced.

CAUTION

CHECK THAT ALL THE PARTS ARE IN GOOD CONDITIONS, SPECIALLY THE ONES BELOW.



GASKETS

Check that the gaskets are in good conditions; replace them if they show signs of damage or excessive wear.

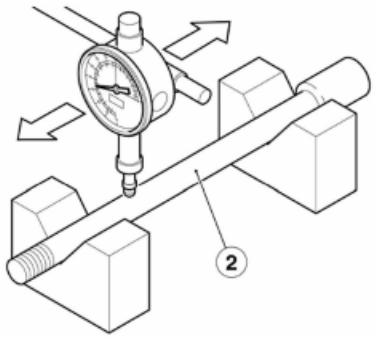
WHEEL AXLE

Using a dial gauge, check the wheel pin «**2**» eccentricity. Replace the pin «**2**» if the eccentricity exceeds the limit value.

Characteristic

Maximum eccentricity:

0.25 mm



WHEEL RIM

Using a dial gauge, check that the radial eccentricity «**A**» and the axial eccentricity «**B**» of the wheel rim «**3**» do not exceed the limit value.

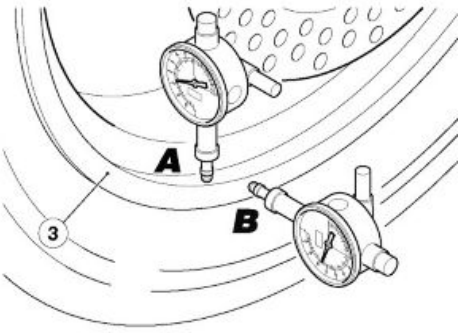
An excessive eccentricity is usually caused by worn or damaged bearings.

Replace the wheel rim «**3**» if, after the bearings are replaced, the value is not within the specified limit.

Characteristic

Maximum radial and axial eccentricity:

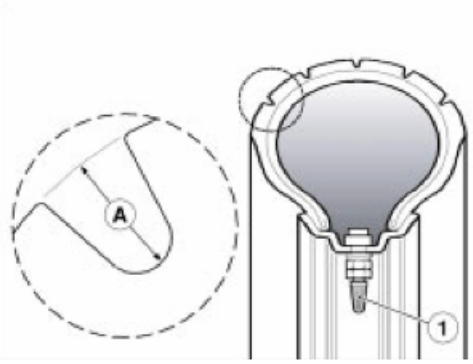
2 mm



Check the tyre conditions.

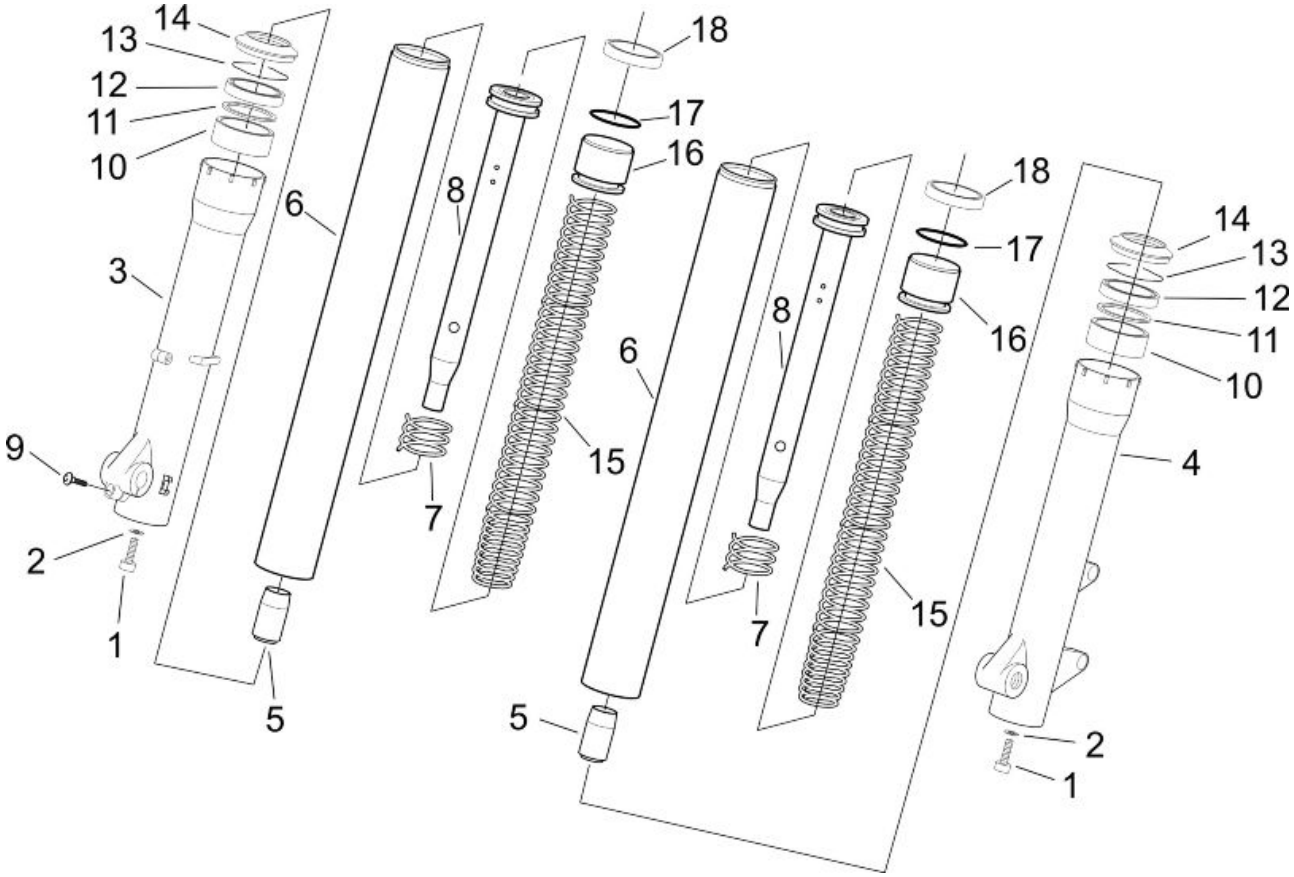
CAUTION

CHECK TYRE TREAD FOR WEAR. BADLY WORN TYRES COMPROMISE TRACTION AND VEHICLE HANDLING. REPLACE TYRES WHEN WORN OR IF THERE IS A PUNCTURE BIGGER THAN 5 MM IN THE TREAD. SOME TYRE TYPES HOMOLOGATED FOR THIS VEHICLE FEATURE WEAR INDICATORS. CHECK THAT THE INFLATION VALVES «1» HAVE THEIR CAPS FITTED IN ORDER TO AVOID UNEXPECTED FLAT TYRES.
BALANCE THE WHEEL AFTER A TYRE IS MENDED.



Front fork

Front fork diagram



key:

1. M10x30 screw

2. Sealing washer

3. Right sleeve

4. Left sleeve

5. Bottom buffer

6. Stem

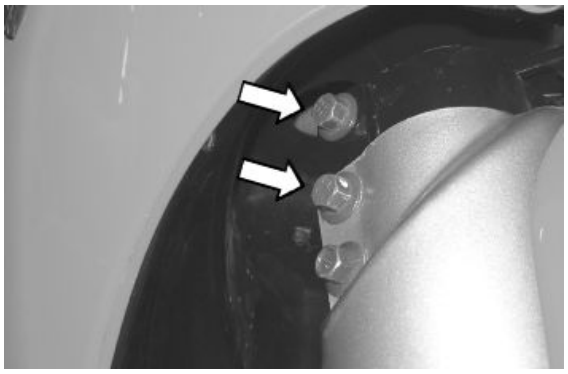
7. Counter spring

8. Pumping rod
9. Screw
10. Sliding bushing
11. Oil seal washer
12. Oil seal
13. Retainer ring
14. Dust gaiter
15. Spring
16. Cap
17. O-ring
18. Cap

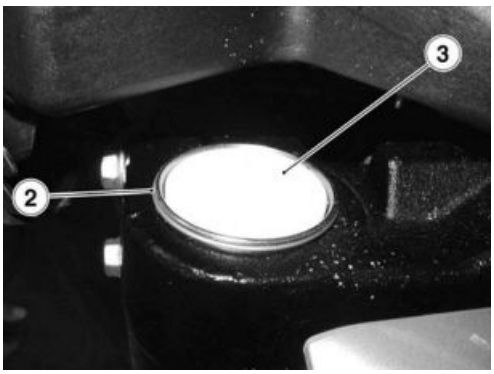
Removal

- Hold the front part of the vehicle with a belt and a hoist.
- Remove the front wheel.

- Loosen the two upper screws fixing the fork stem.

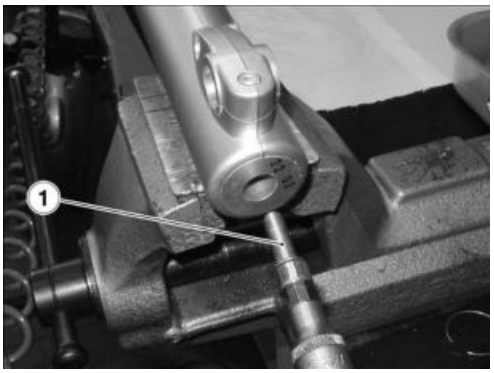


- Remove the upper retainer «2».
- Remove the wheel holder stem «3» by pulling it from the below.



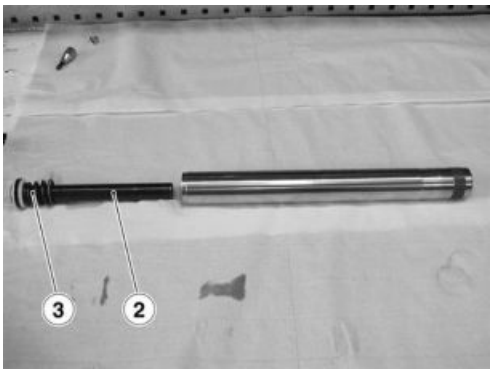
FORK REMOVAL

- Drain off the oil.
- Place the stem in a vice fitted with protection shoes (aluminium).
- Unscrew and remove the lower screw «1» and collect the washer.



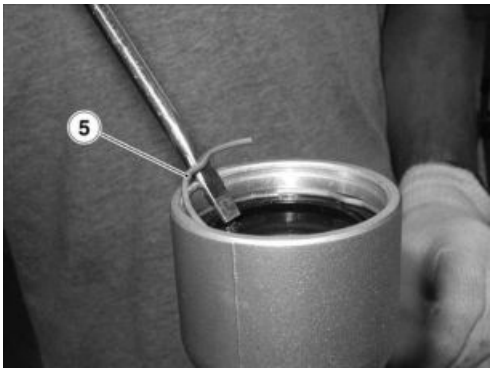
- Slide off the stem from the sleeve and collect the bushing.

- Slide off the pumping member pin «2» from the stem and collect the spring «3».

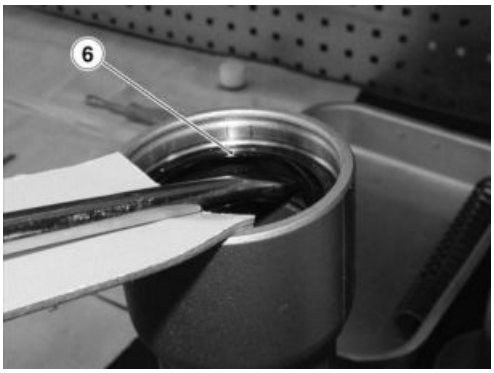


- Slide off the dust guard «4» from the sleeve.

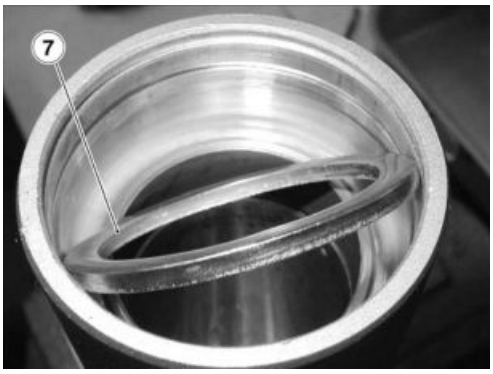
- Slide off the retainer ring «5» from the sleeve.



- Slide off the oil seal «6» from the sleeve.



- Slide off the washer 7» from the sleeve.



- Slide off the bushing 8» from the sleeve.

Oil emptying

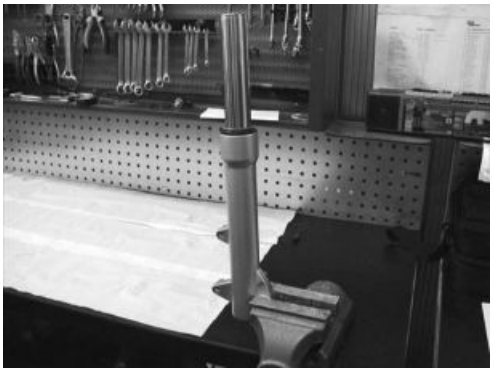
NOTE

BEFORE CARRYING OUT THE FOLLOWING OPERATIONS GET A CONTAINER WITH SUITABLE CAPACITY TO COLLECT THE OIL.

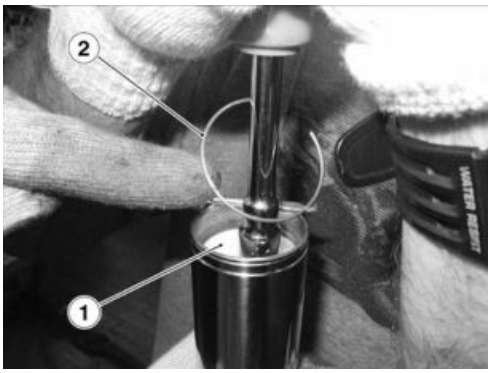
- Place the sleeve in a vice.

CAUTION

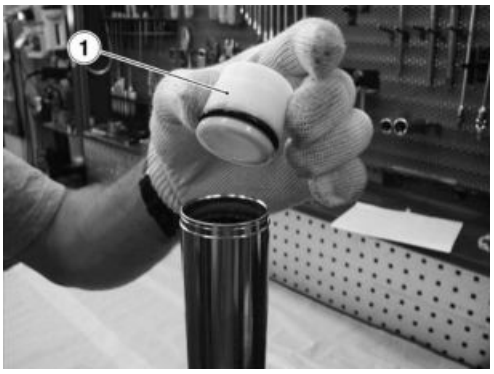
THE WHEEL HOLDER STEM SLEEVE UNIT CONTAINS OIL. DO NOT TURN IT OVER OR TILT IT TOO MUCH WHEN REMOVING IT.



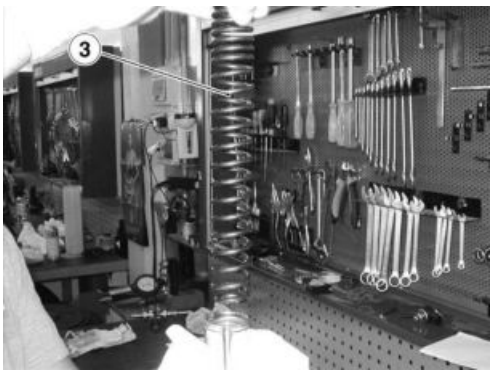
- Lower the cover «1» until the seeger ring can be removed «2».
- Remove the seeger ring «2».



- Remove the cap «1» together with the O-ring.



- Remove the spring«3» and wait some minutes so that the oil deposited on it drips off.



- Drain off the oil into the collecting container by pumping it out with the stem.

Overhaul

Wheel holder stem

- Check the sliding surface for scorings and/or scratches. These scorings can be eliminated by rubbing them with wet sandpaper (dowel 1).
- If the scorings are deep, replace the stem.
- Use a dial gauge to check that the stem bending is below the limit value.
- If over the value, replace the stem.

CAUTION

A BENT STEM SHOULD NEVER BE STRAIGHTENED BECAUSE ITS STRUCTURE WOULD BE WEAKENED AND USING THE VEHICLE MAY BECOME DANGEROUS.

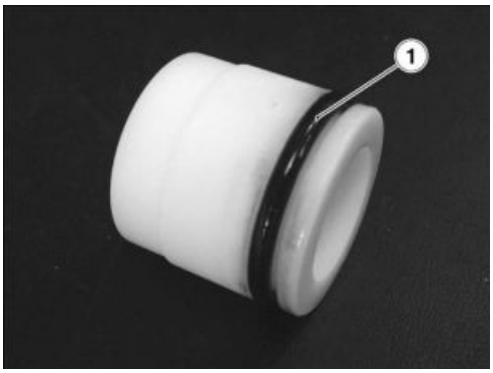
Characteristic

Bending limit:

0.2 mm

Sleeve

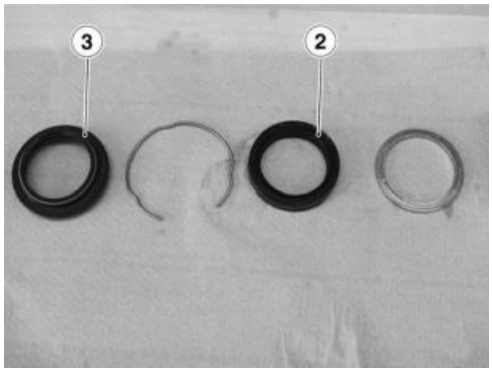
- Check that there are no damages and/or cracks; otherwise, replace it.
- If there are signs of excessive wear or damage, replace the affected component.



Replace the following components with new ones:

- O-ring gasket on the cap «**1**»;

- oil seal «**2**»;
- dust gaiter «**3**».



Refitting

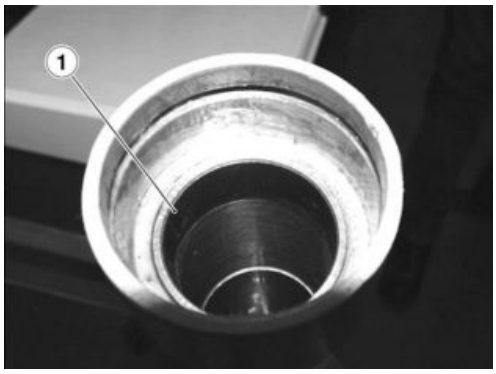
- Place the sleeve in the vice fitted with protection jaws (aluminium).
- Place the spacer «1».

CAUTION

BE EXTREMELY CAREFUL SO THAT NO FOREIGN BODIES GET INTO THE SLEEVE OR THE WHEEL HOLDER STEM.

NOTE

SPREAD A THIN LAYER OF FORK OIL ON GASKETS AND BUSHINGS BEFORE REFITTING THEM.



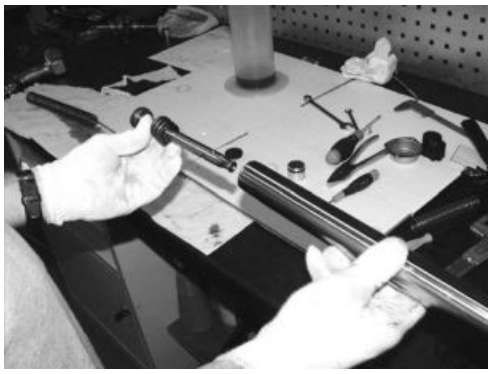
- Insert the washer.

- Insert the oil seal.

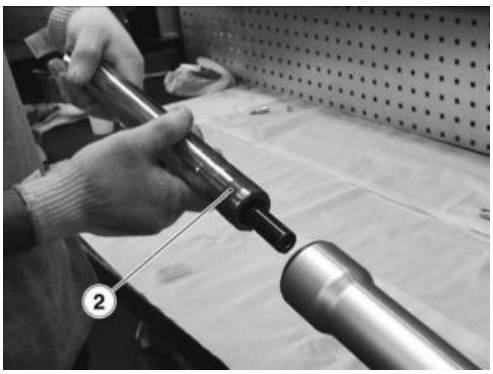
- Fit the retainer ring.

- Fit the dust gaiter.

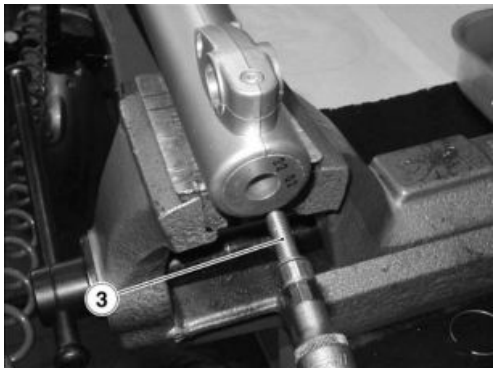
- Insert the pumping member pin and the spring in the stem.



- Insert the stem together with the bushing «2» in the sleeve.

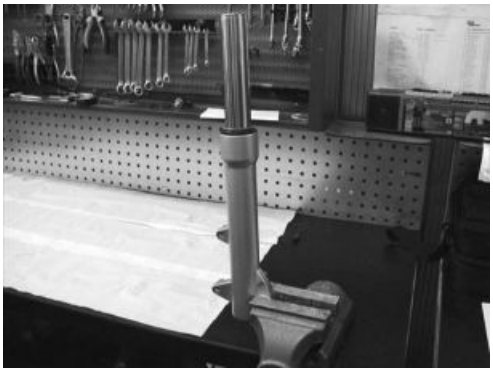


- Tighten the lower screw «3» with washer.
- Fill with oil.



OIL FILLING

- Place the wheel holder stem sleeve unit in a vice fitted with protection shoes (aluminium).



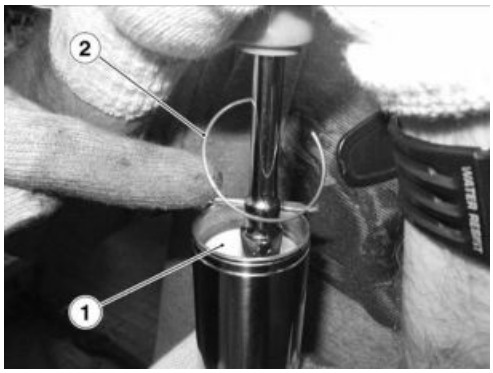
- Pour fork oil into the wheel holder stem sleeve unit.

CAUTION
NEVER REUSE OIL.

- Fit the spring.

- Fit the cap «1» together with the O-ring.

- Lower the cover «1» until the seeger ring can be insert «2».
- Fit the seeger ring «2».



Steering bearing

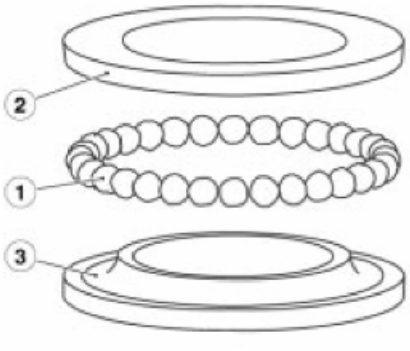
Check that the ball contact area «**1**» on the rotating seat «**2**» and on the fixed seat «**3**» is not damaged or too worn. Replace the whole bearing if necessary.

CAUTION

CHECK THAT THE COMPONENTS ARE IN GOOD CONDITIONS.

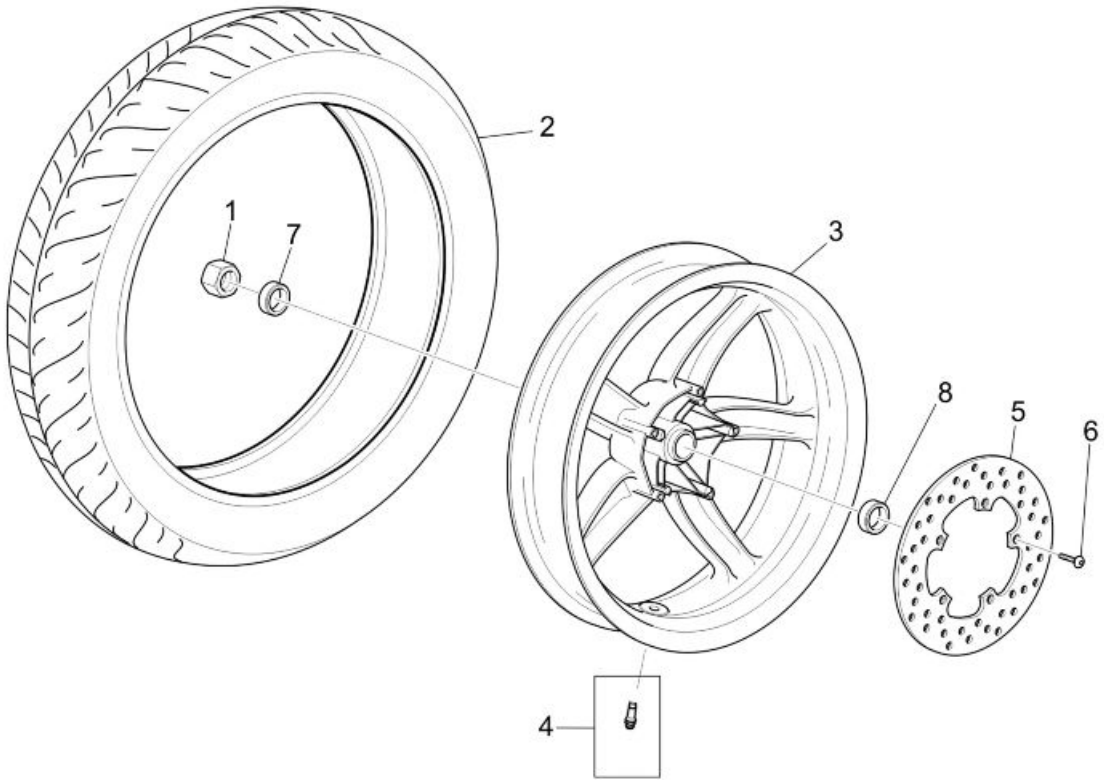
CAUTION

APPLY GREASE ON BALL CONTACT AREAS ON BOTH SEATS «2» AND «3».



Rear

Removing the rear wheel



key:

1. Rear wheel nut

2. Rear tyre 120/80-16"

3. Grey rear wheel

4. Tubeless valve

5. Brake disc

6. Screw M8x30

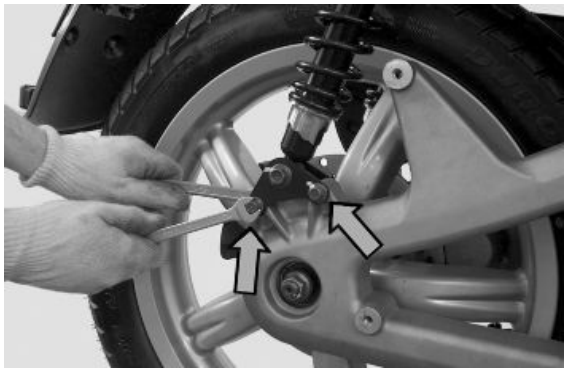
7. Outside spacer

8. Int. spacer

The procedure to remove the rear wheel is described below sequentially:

- Remove the silencer.
- Remove the rear brake calliper.

- Unscrew and remove the two bolts fixing the right shock absorber and collect the nuts.



- With the help of a second operator, operate the rear brake; unscrew and remove the rear nut fixing the plate, and collect the spacer.

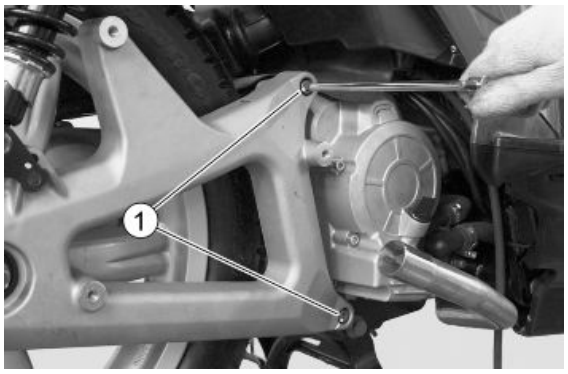
Locking torques (N*m)

M14 fixing nut for rear wheel **110 (81.4 lbf ft)**

- Unscrew and remove the two front bolts «1» fixing the plate and collect the nuts and the washers.
- Remove the right suspension plate.

Locking torques (N*m)

Screw fixing the silencer plate to the engine **25 (18.5 lbf ft)**



- Collect the wheel spacer.
- Remove the entire rear wheel together with the brake disc.

CAUTION

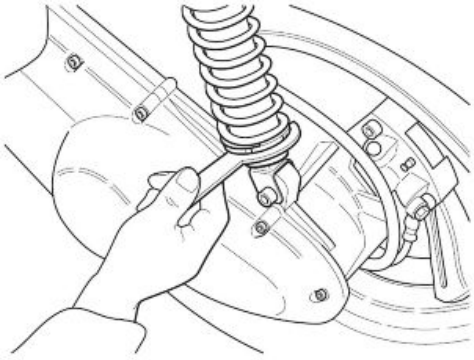
DO NOT ACTUATE ON THE REAR BRAKE LEVER AFTER REMOVING THE WHEEL, OTHERWISE THE CALLIPER PLUNGER COULD GO OUT OF ITS SEAT, RESULTING IN BRAKE FLUID LEAKAGE.

Shock absorbers

Rear suspension check

Check that the shock absorbers do not leak.

Check the tightening of all the elements and the correct operation of the rear suspension joints.



Removal

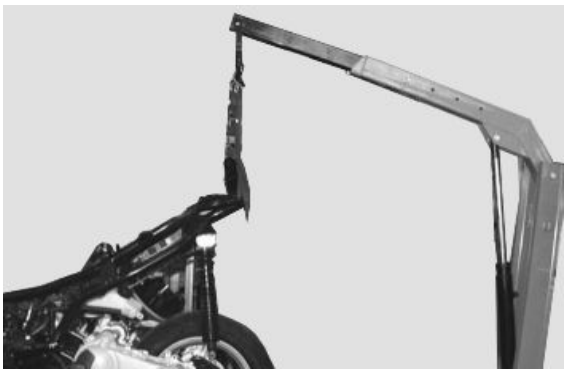
To remove the shock absorbers, proceed as follows:

- Remove the tail fairings.

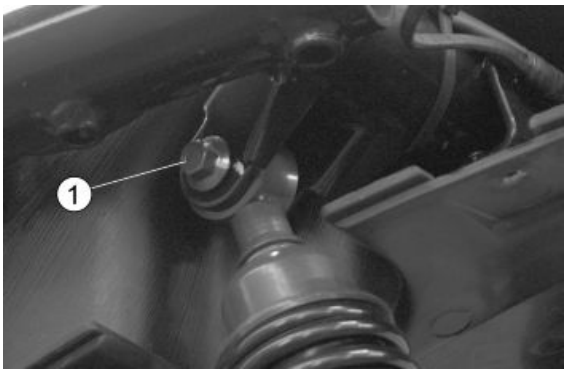
NOTE

GET A HOIST AND BELTS FOR LIFTING.

- Fasten the belts to the chassis rear section.
- Lift the hoist arm until the belts are taut.



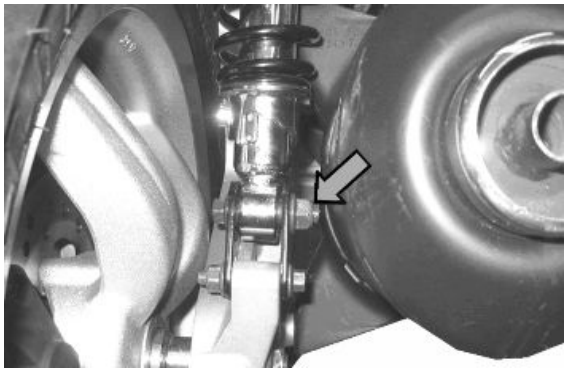
- Working from both sides of the vehicle, undo the upper screw «1» fixing the shock absorbers.



Locking torques (N*m)

M8 upper screw fixing shock absorber 25 (18.5 lbf ft)

- Working from both sides of the vehicle, undo the lower screw fixing the shock absorbers.
- Remove the shock absorbers.



Locking torques (N*m)

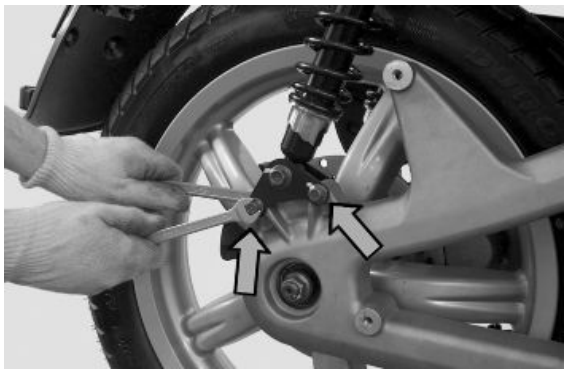
M10 lower screw fixing shock absorber 50 (37 lbf ft)

Exhaust bracket

To remove the silencer plate, proceed as follows:

- Remove the silencer.

- Unscrew and remove the two bolts fixing the right shock absorber and collect the nuts.

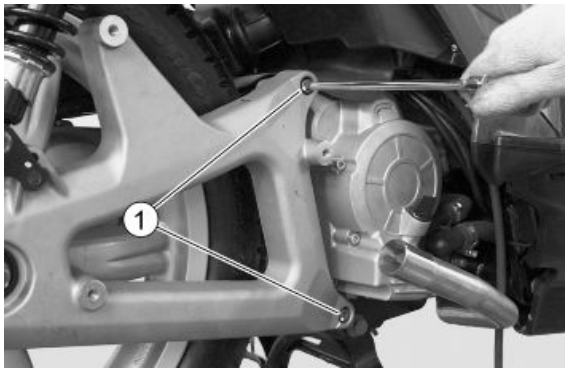


- With the help of a second operator, operate the rear brake; unscrew and remove the rear nut fixing the plate, and collect the spacer.

Locking torques (N*m)

M14 fixing nut for rear wheel 110 (81.4 lbf ft)

- Unscrew and remove the two front bolts «1» fixing the plate and collect the nuts and the washers.
- Remove the right suspension plate.



Locking torques (N*m)

Screw fixing the silencer plate to the engine 25 (18.5 lbf ft)

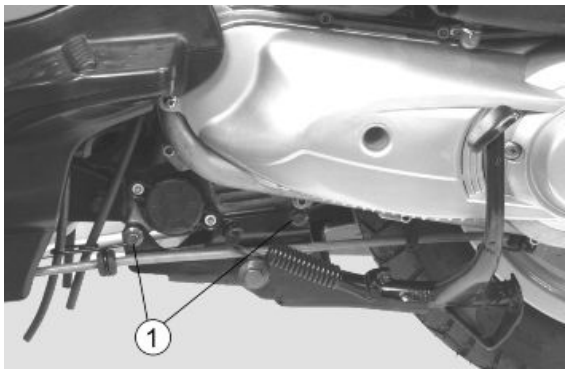
Centre-stand

CAUTION

ALLOW ENGINE AND EXHAUST SILENCER TO COOL OFF.
SECURE THE vehicle SO THAT IT IS POSSIBLE TO OPERATE IN TOTAL SAFETY AND WITHOUT THE SIDE STAND.

To remove the centre stand together with its support, proceed as follows:

- Make sure the vehicle is still supported, without the help of the centre stand.
- Undo and remove the two screws «1» from both sides.
- Remove the centre stand together with its support.

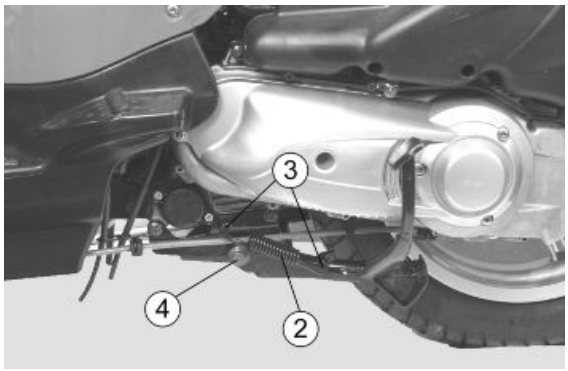


Locking torques (N*m)

M8 screw fixing screw stand support to engine 25 (18.5 lbf ft)

To remove the centre stand from its support, proceed as follows:

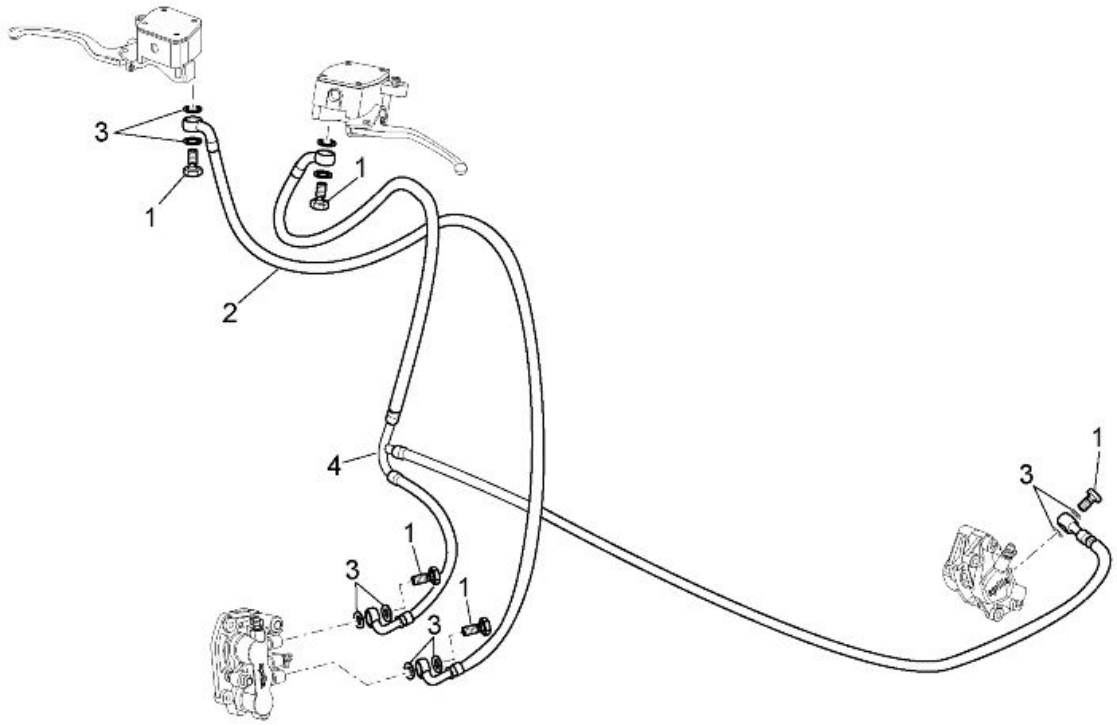
- Make sure the vehicle is still supported, without the help of the centre stand.
- Remove the springs «2» from the spring linking pins «3» from both sides.
- Undo and remove the screw «4» from both sides.
- Remove the stand.



Locking torques (N*m)

M10 screw fixing stand to stand support 50 (37 lbf ft)

INDEX OF TOPICS



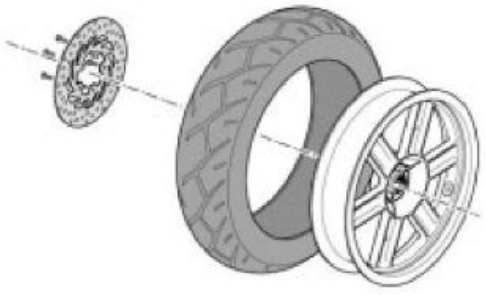
key:

1. Oil pipe screw
2. Front brake pipe
3. Washer
4. Rear brake pipe

Rear brake disc

Removal

- Remove the rear wheel.
- Undo and remove the five brake disc screws.
- Remove the brake disc.



CAUTION

UPON REFITTING, APPLY THE RECOMMENDED PRODUCT ON THE BRAKE DISC SCREW THREADS.

Recommended products

LOCTITE® 243 Loctite adhesive to assemble cylindrical pieces

Loctite adhesive to assemble cylindrical pieces

Disc Inspection

- Carry out a visual inspection of brake disc surface. Replace the disc if scored or deteriorated.
- Check the brake disc for wear by measuring the minimum thickness with a micrometer at different points. Replace the disc if the minimum thickness, even at a single point of the disc, is less than the minimum value.

CAUTION

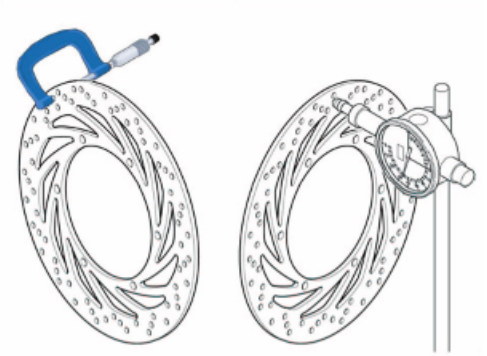
OPERATIONS TO BE CARRIED OUT WITH BRAKE DISC FITTED ON THE WHEEL.

Characteristic

Minimum value for brake disc thickness:

3.6 mm

- Using a dial gauge, check that disc oscillation does not exceed the tolerance; otherwise, replace it.



Characteristic

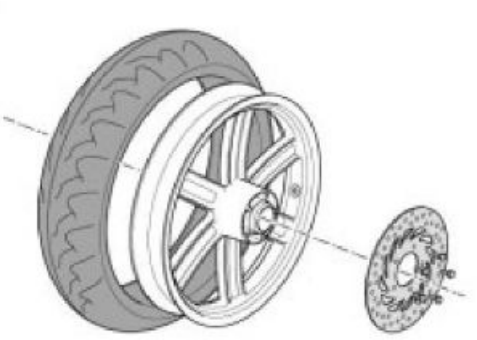
Brake disc oscillation tolerance:

0.3 mm

Front brake disc

Removal

- Remove the front wheel.
- Undo and remove the five brake disc screws.
- Remove the brake disc.



NOTE

TIGHTEN ALL THE SCREWS MANUALLY WORKING DIAGONALLY

CAUTION

UPON REFITTING, APPLY THE RECOMMENDED PRODUCT ON THE BRAKE DISC SCREW THREADS.

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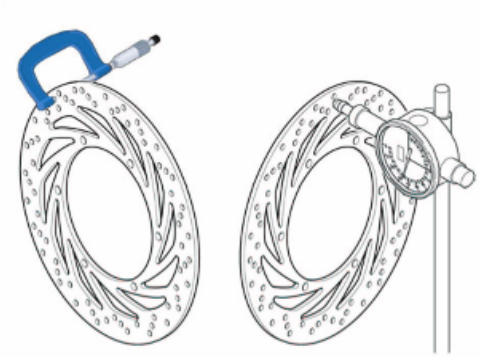


Characteristic

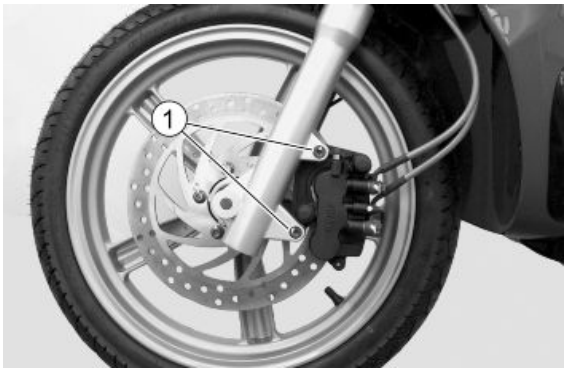
Brake disc oscillation tolerance:

0.3 mm

Front brake pads

Removal

- Remove the front brake calliper by unscrewing the two bolts «1».



Locking torques (N*m)

M8 screw fixing front brake calliper **25 (18.5 lbf ft)**

- Unscrew and remove the threaded cap «2».

- Unscrew and remove the pad check pin.
- Slide the pads off their seats.

CAUTION

AFTER REMOVING THE PADS, DO NOT OPERATE THE BRAKE LEVER; OTHERWISE, THE CALLIPER PLUNGER COULD GO OUT OF ITS SEAT RESULTING IN BRAKE FLUID LEAKAGE.

CAUTION

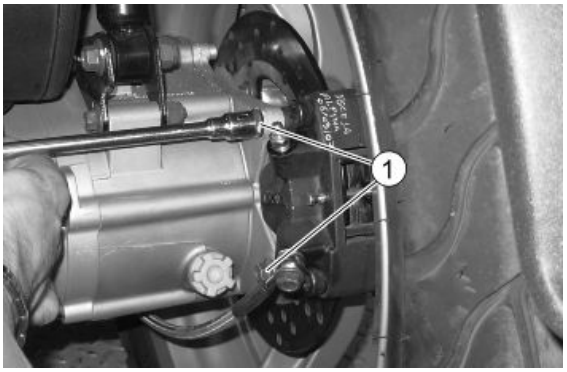
ALWAYS REPLACE BOTH PADS AND MAKE SURE THEY ARE CORRECTLY POSITIONED INSIDE THE CALLIPER.

To refit, follow the steps but in reverse order.

Rear brake pads

Removal

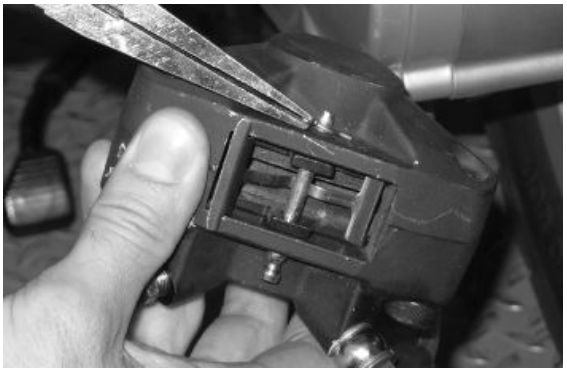
- Remove the rear brake calliper by unscrewing the two bolts «1».



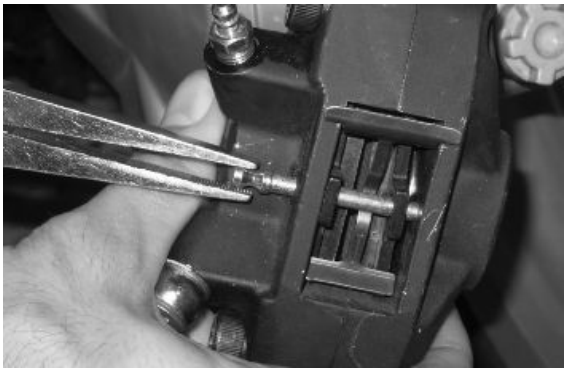
Locking torques (N*m)

M8 screw fixing rear brake calliper 25 (18.5 lbf ft)

- Remove the Seeger ring.



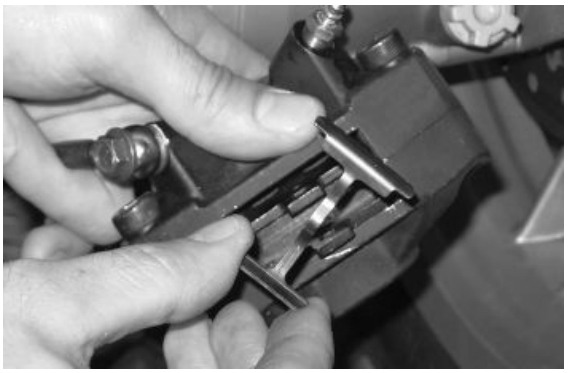
- Slide off the pin.



- Remove the spring.

CAUTION

THE ARROW STAMPED ON THE SPRING MUST ALWAYS BE TURNED IN THE RIDING DIRECTION.



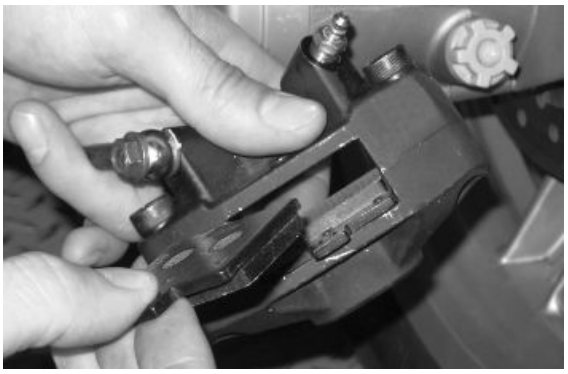
- Slide off the brake pads.
- Insert the two new brake pads.
- Fit the spring.
- Refit the pin.
- Insert the Seeger ring.

CAUTION

AFTER REMOVING THE PADS, DO NOT OPERATE THE BRAKE LEVER; OTHERWISE, THE CALLIPER PLUNGER COULD GO OUT OF ITS SEAT RESULTING IN BRAKE FLUID LEAKAGE.

CAUTION

ALWAYS REPLACE BOTH PADS AND MAKE SURE THEY ARE CORRECTLY POSITIONED INSIDE THE CALLIPER.



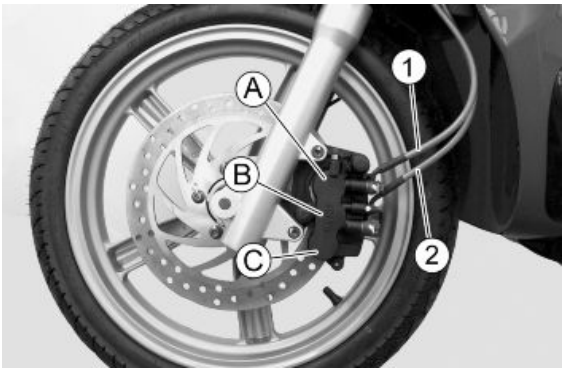
Fill - Bleeding the braking system

Rear - combined

CAUTION

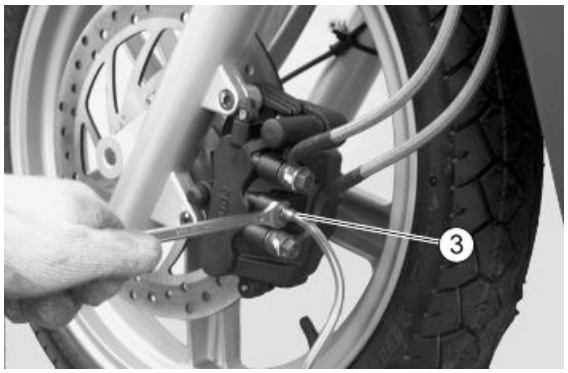
CONSIDERING THE DANGER FOR VEHICLE AND RIDER, IT IS STRICTLY NECESSARY, AFTER REFITTING BRAKES AND RESTORING THE BRAKING SYSTEM TO THE REGULAR USE CONDITIONS, THAT THE HYDRAULIC CIRCUIT BE AIR PURGED.

Actuating on the (front) right brake lever, through the brake pipe «**1**», exerts a pressure on the plungers «**A**» and «**C**» on the front brake calliper. Actuating on the (rear) left brake lever, through the brake pipe «**2**», exerts a pressure on the plunger «**B**» of the front brake calliper and on the rear brake calliper.



Front brake

- Remove the rubber protection cover of the bleeding valve «3».
- Insert a transparent plastic pipe in the bleeding valve «3» of the front brake calliper and insert the other end of this pipe into a container to collect the fluid.
- Quickly press and release the front brake lever several times and then keep it fully pressed.
- Loosen the bleeding valve 1/4 of a turn so that the brake fluid flows into the container. This will release tension on the brake lever and will make it go to the end of stroke.
- Repeat the operation until the fluid draining into the container is air-bubble free.

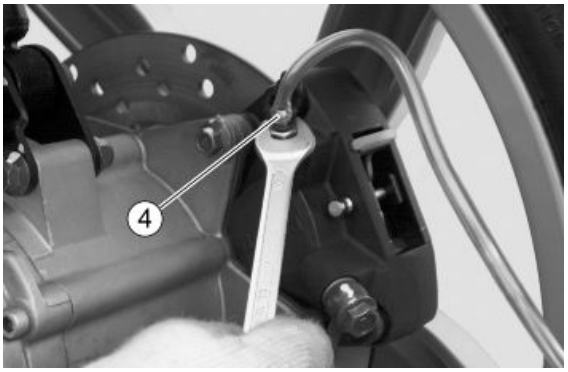


NOTE

WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.

- Screw the bleeding valve and remove the pipe.
- Top-up the reservoir until the correct brake fluid level is obtained.
- Refit the rubber protection cover.

REAR BRAKE



- Remove the rubber protection cover of the bleeding valve «4».
- Insert a transparent plastic pipe in the bleeding valve «4» of the rear brake calliper and insert the other end of this pipe into a container to collect the fluid.
- Quickly press and release the rear brake lever several times and then keep it fully pressed.
- Loosen the bleeding valve 1/4 of a turn so that the brake fluid flows into the container. This will release tension on the brake lever and will make it go to the end of stroke.
- Repeat the operation until the fluid draining into the container is air-bubble free.

NOTE

WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.

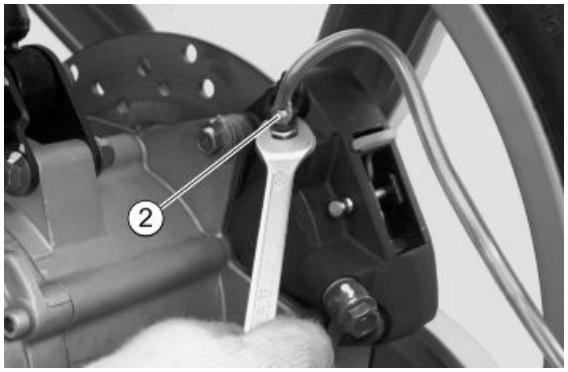
- Screw the bleeding valve and remove the pipe.
- Top-up the reservoir until the correct brake fluid level is obtained.
- Refit the rubber protection cover.

BRAKE FLUID CHANGE

- Remove the rubber protection cover.
- Insert a transparent plastic pipe on the bleeding valve «1-2» of the calliper and insert the other end of the pipe into a container to collect the fluid.
- Loosen the bleeding valve «1-2» approximately one turn.

NOTE

CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR. OTHERWISE, IT WILL BE NECESSARY TO PURGE THE AIR AT THE END OF THE OPERATION.



- Check that the fluid flows out of the reservoir and, before the reservoir is drained off, close the bleeding valve «1-2».
- Top-up the reservoir.
- Loosen the bleeding valve «1-2» approximately half a turn again.
- Check the fluid coming from the pipe and when the fluid changes colour (from dark to light), tighten the bleeding valve «1-2» and remove the pipe.
- Refit the rubber protection cover.
- Top-up the oil in the reservoir up to the correct level.

Front

- Remove the rubber protection cover of the bleeding valve «1».
- Insert a transparent plastic pipe in the bleeding valve «1» of the front brake calliper and insert the other end of this pipe into a container to collect the fluid.
- Quickly press and release the brake lever of the specific brake calliper several times and then keep it fully pressed.
- Loosen the bleeding valve «1» of 1\4 of a turn so that the brake fluid flows into the container. This will release tension on the brake lever and will make it go to the end of the stroke.
- Repeat the operation until the fluid draining into the container is air-bubble free.

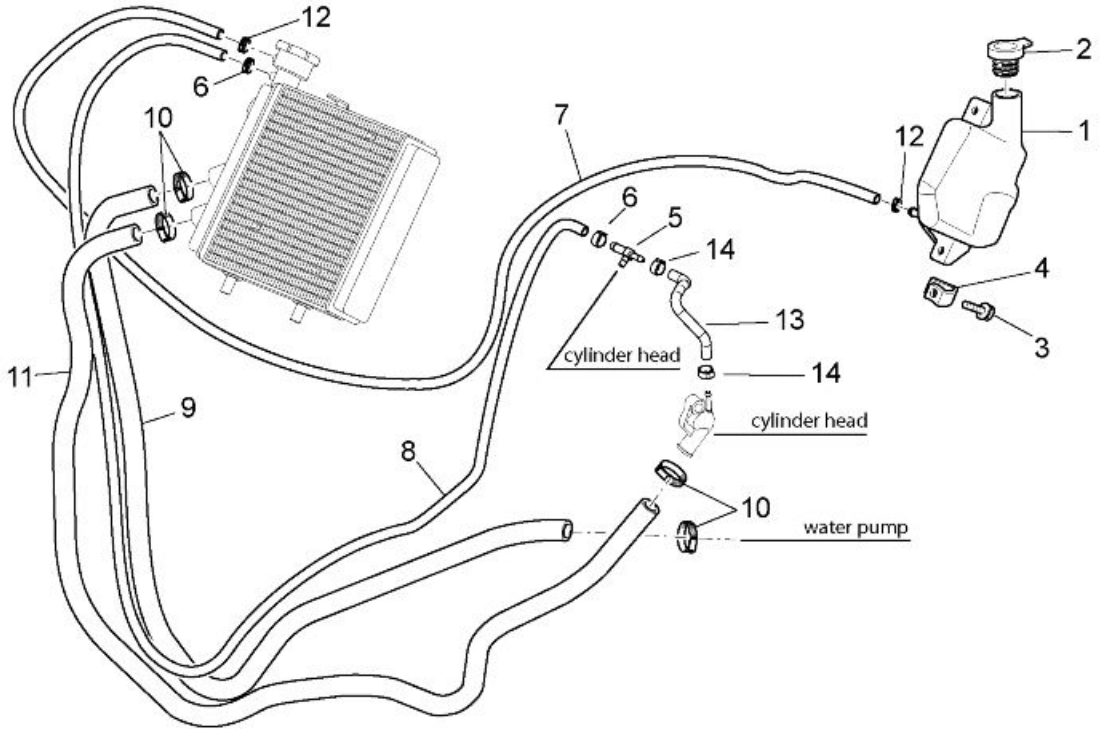
NOTE

WHILE PURGING THE HYDRAULIC SYSTEM, FILL THE RESERVOIR WITH THE NECESSARY QUANTITY OF BRAKE FLUID. CHECK THAT, DURING THE OPERATION, THERE IS ALWAYS BRAKE FLUID IN THE RESERVOIR.

- Tighten the bleeding valve «1» and remove the pipe.
- Top-up the oil in the front brake reservoir up to the correct level.
- Refit the rubber protection cover.

INDEX OF TOPICS

Circuit diagram



key:

1. Expansion tank

2. Expansion tank cap

3. TBEI screw

4. Clip M6

5. Breather pipe

6. Clamp

7. Radiator-exp. tank pipe

8. Breather pipe

9. Head-radiator pipe

10. Clamp

11. Pump-radiator pipe

12. Clamp

13. Breather pipe

14. Clamp

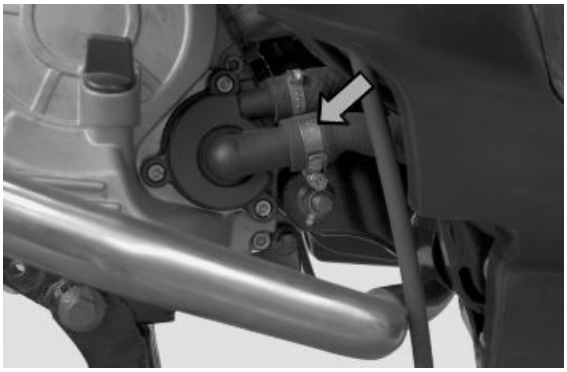
Coolant replacement

Emptying

NOTE

USE A CONTAINER OF ADEQUATE CAPACITY TO COLLECT THE FLUID THAT MAY LEAK DURING OPERATION.

- Remove the legshield.
- Loosen the clamp.
- Slide off the pipe.
- Drain off the system.



NOTE

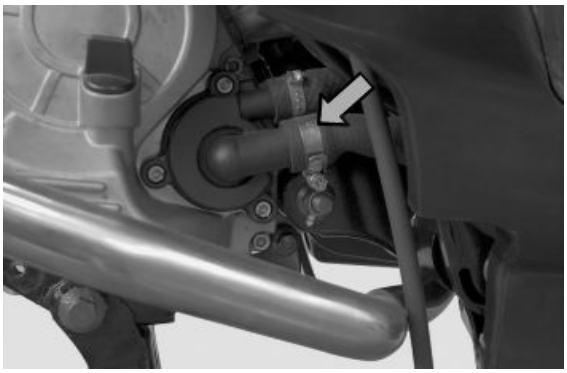
REMOVE THE EXPANSION TANK CAP TO FACILITATE COOLANT DRAINAGE.

WARNING

SHOULD THE CIRCUIT BE FULLY EMPTIED, LIFT THE FRONT WHEEL AT LEAST 55 cm (21.65 in) FROM THE GROUND.

Filling

- Reposition the coolant delivery pipe and tighten with a clamp.
- Top-up the expansion tank with coolant until the fluid level reaches the "MAX" reference mark.
- Top-up the radiator with coolant until it is full and close the snap-on cover.
- Set the vehicle into motion and let the engine idle until the fan switches on.
- Shut off the engine and let it cool down for 12 hours.
- Check the level at both the expansion tank and the radiator; fill up to the correct level if required.
- Refit the front shield.



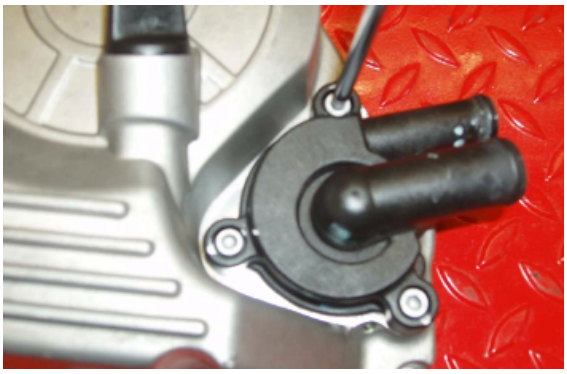
Locking torques (N*m)

Coolant piping clamp retainers 3 (2.22 lbf ft)

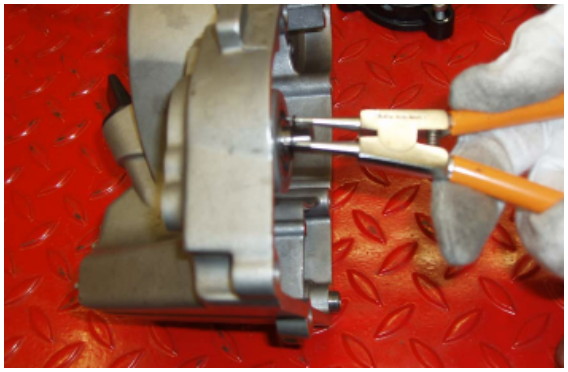
Water pump - overhaul

WATER PUMP REMOVAL

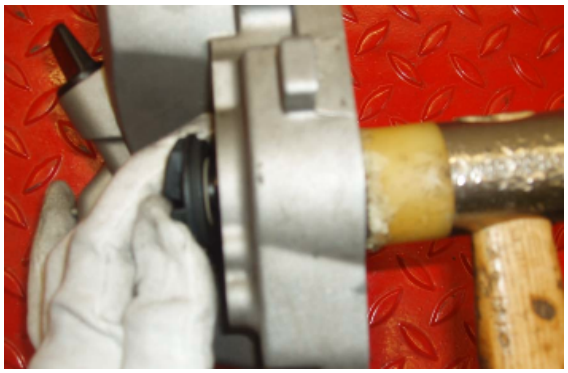
- Before removing the pump, empty the cooling system, drain off the engine oil and remove the flywheel crankcase.
- Undo and remove the three screws and remove the water pump cover.



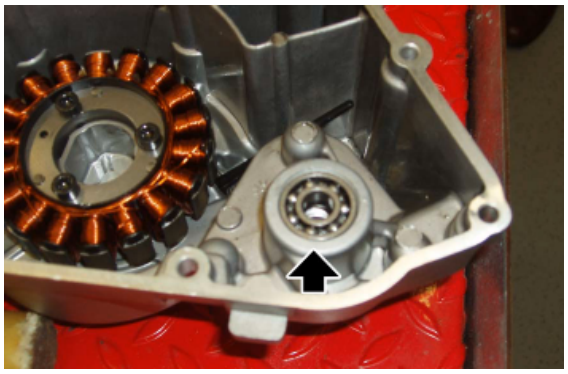
- Working from the flywheel cover internal side, remove the safety ring.



- Working from the flywheel cover internal side, remove the shaft of the pump together with the rotor using a rubber mallet.



- Working from the flywheel cover internal side and using an extractor, remove the water pump bearing.



- Working from the flywheel cover internal side and being careful not to damage the seat, remove the oil seal.

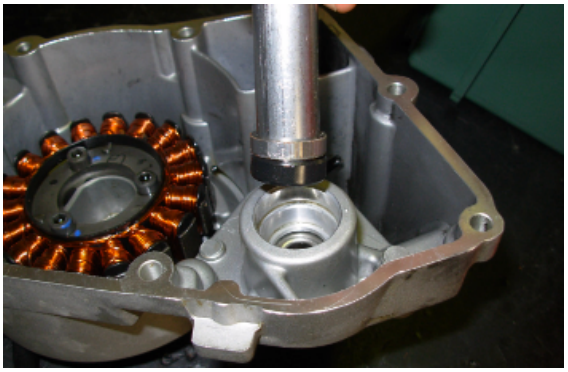
WATER PUMP CHECK

COMPONENTS Check that the water pump housing cover, the water pump housing, the rotor and the seal are not damaged or excessively worn. Replace them if they are. Check that the intake and delivery pipes are not damaged or excessively worn. Replace them if they are.

GASKETS Check that the O-ring is in good conditions; replace it if damaged or worn.

BEARINGS Manually rotate the internal ring which must turn smoothly, without obstacles and/or noise. There must be no axial clearance. The bearings presenting these problems must be replaced.

WATER PUMP REFITTING



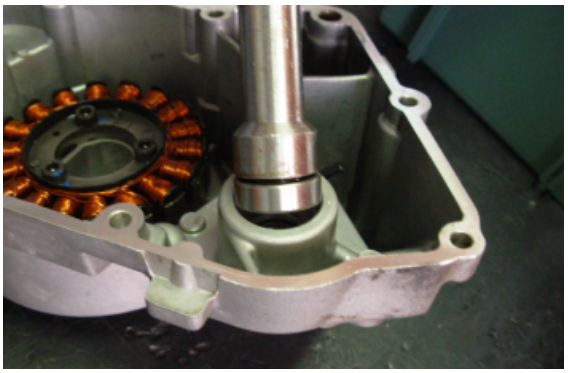
- Fit the oil seal working from the fly-wheel cover internal side and using the specific special tool.

Specific tooling

020376Y Adapter handle

020456Y 24 mm Ø punch

020455Y 10-mm guide for oil seal on water pump shaft



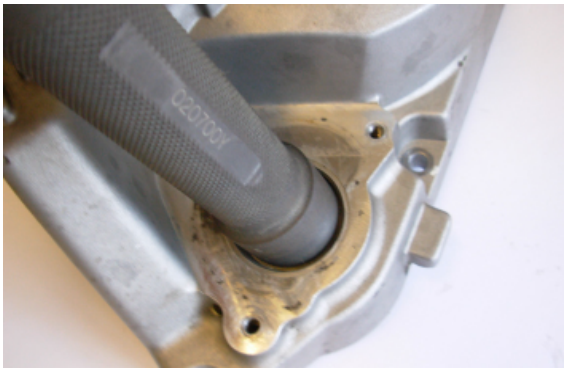
- Fit the bearing working from the fly-wheel cover internal side and using the specific special tool.

Specific tooling

020376Y Adapter handle

020456Y 24 mm Ø punch

020455Y 10-mm guide for oil seal on water pump shaft



- Working from the flywheel cover external side, fit the contacting seal using the specific special tool.

Specific tooling

020700Y Water seal punch

- Once a small quantity of Loctite 603 is applied on the bearing inner track, fit the pump shaft together with the rotor, working from the cover external side.

CAUTION

MAKE SURE NO LOCTITE COMES INTO CONTACT WITH THE BALLS

- Working from the flywheel cover internal side, lock every element with the safety ring.
- Fit the water pump cover and tighten the 3 screws at 6 Nm.

See also

Top-up
Level check
Refitting the flywheel cover

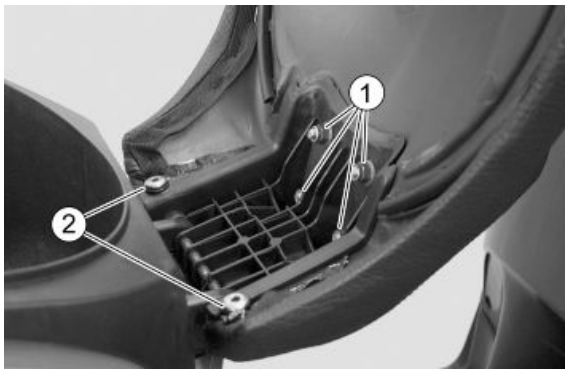
INDEX OF TOPICS

Seat

It is necessary to lift the saddle before removing it.

Insert the key in the key lock and turn it clockwise until a click is heard.

- Lift the saddle.
- Unscrew the four nuts «1».
- Undo the two screws «2».
- Remove the saddle.

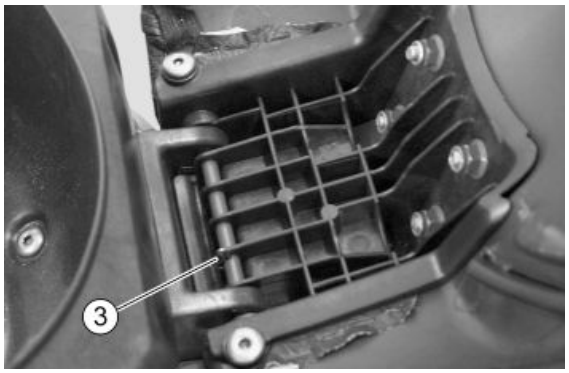


Locking torques (N*m)

M6 nut fixing saddle hinge to saddle 6 (4.44 lbf ft) Saddle to saddle hinge M6 fixing screw 4

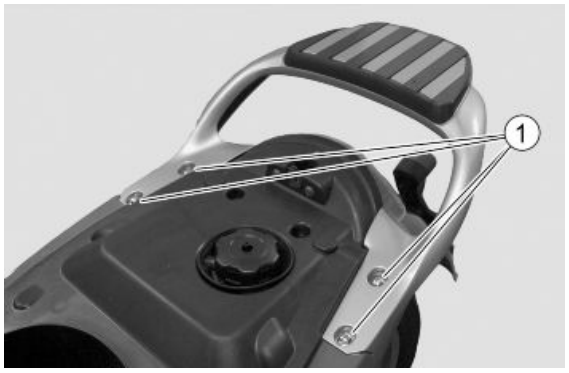
To remove the hinge from the saddle, proceed as follows:

- Remove the saddle.
- Remove the cotter pin «3» and slide off the pin.



Rear rack

- Unscrew and remove the four screws «1».
- Remove the luggage rack.



CAUTION

HOLD THE LUGGAGE RACK WHILE UNDOING THE SCREWS.

Locking torques (N*m)

Rear passenger grab handle M8 fixing screw 25 (18.5 lbf ft)

Driving mirrors

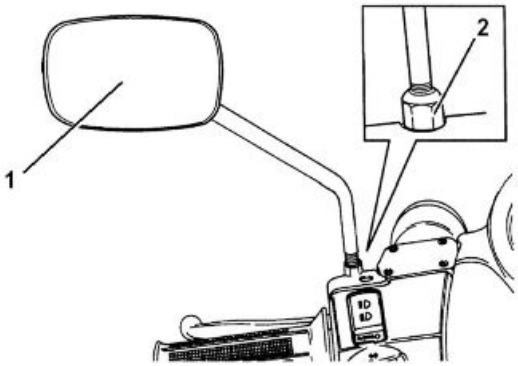
Park the vehicle on its centre stand.

NOTE

THE REAR-VIEW MIRRORS ARE THREADED:
RIGHT (LEFT REAR-VIEW MIRROR);
LEFT (RIGHT REAR-VIEW MIRROR).

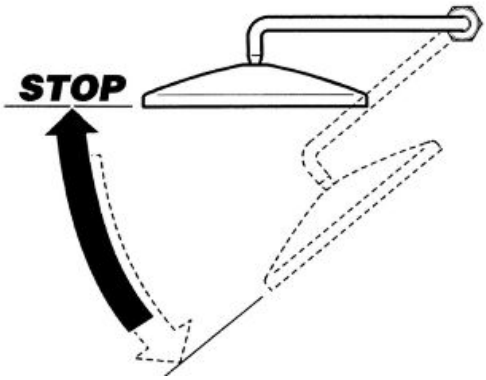
In case of accidental shock, the rear-view mirror will turn inwards, reducing the vehicle width. To set the rear-view mirror back in place, turn it in the opposite direction as far as it will go; If necessary, actuate on the nut «**2**».

Unscrew and remove the rear-view mirror «**1**» (anticlockwise for the left rear-view mirror, clockwise for the right one).



CAUTION

HOLD THE REAR-VIEW MIRROR "1" TO AVOID DROPPING IT BY ACCIDENT.



When refitting the bulb:

Screw the rear-view mirror «**1**» at least three turns (clockwise for the left rear-view mirror, anticlockwise for the right one).

Set the rear-view mirror «**1**» in order to achieve the best view angle.

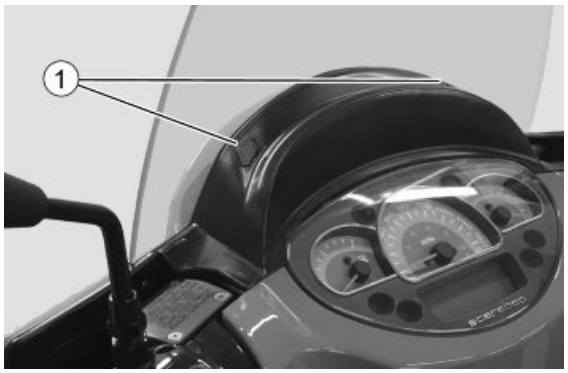
Lock the rear-view mirror «**1**» in position acting on the lock nut «**2**» (clockwise for the left nut, anticlockwise for the right one).

NOTE

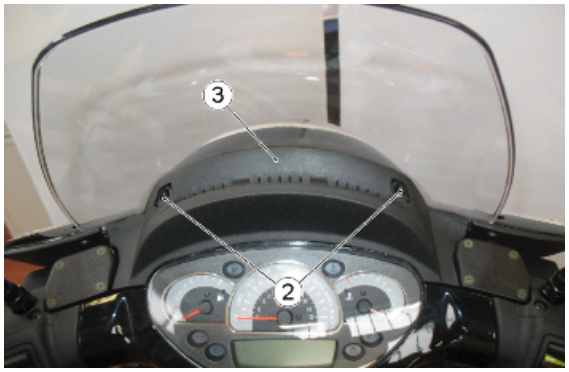
THE RIGHT LOCK NUT HAS A SCORING TO DISTINGUISH IT FROM THE LEFT ONE.

Instrument panel

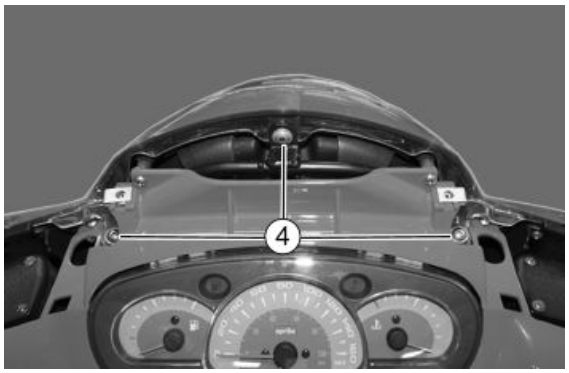
- Use a screwdriver to remove the caps «1».



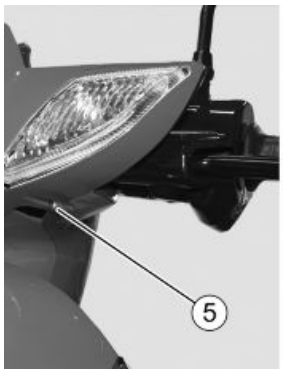
- Undo the two screws «2» and remove the upper frame «3».

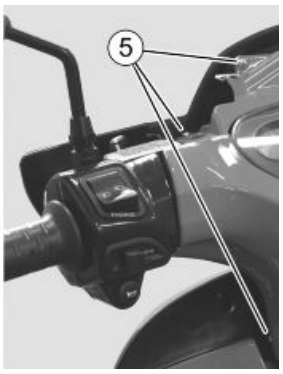


- Undo the three screws «4 and remove the windshield.

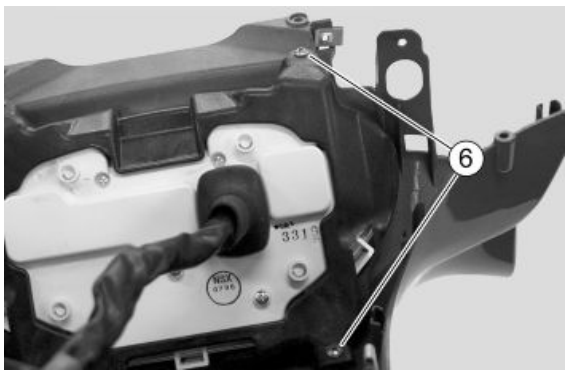


- Working from both sides, undo the eight screws «5» and remove the rear handle cover.

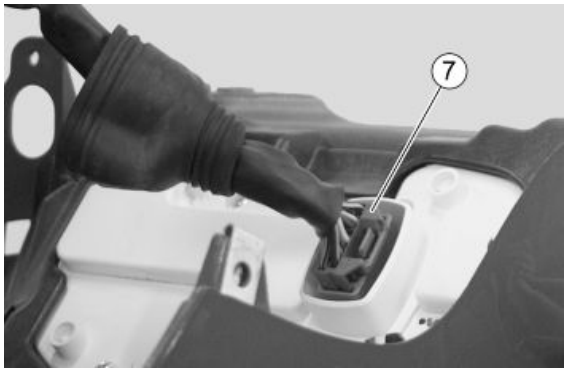




- Undo the two screws «6» from both sides and release the instrument panel from the rear handle cover.

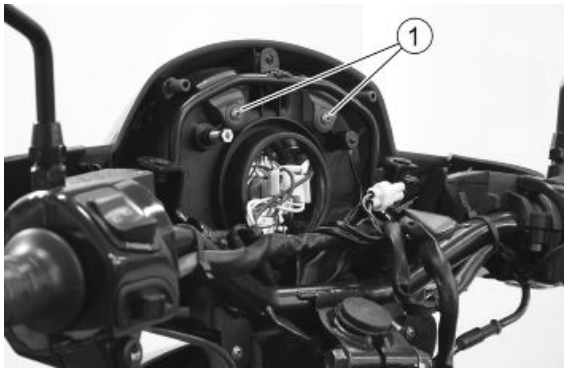


- Remove the rubber protection and disconnect the connector of the instrument panel unit «7».

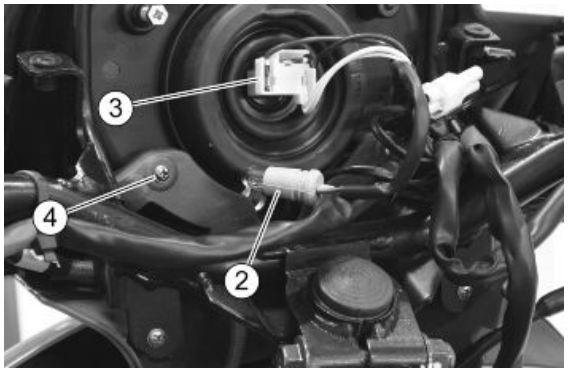


Headlight assy.

- Remove the instrument panel.
- Undo and remove the two screws «1».



- Slide off the bulb holder of the tail light «2», release the connector of the low-beam headlight bulb «3», undo and remove the screw «4» from both sides.
- Remove the headlamp; be careful not to damage it.



Legshield

- Unscrew and remove the four screws «1».

- Undo and remove the two screws «2».
- Slightly lift the shield front section and remove it by sliding it off from the tongues.

CAUTION

PROCEED WITH CAUTION.
DO NOT DAMAGE THE TABS AND/OR THEIR CORRESPONDING SLOTS.
HANDLE PLASTIC AND PAINTED COMPONENTS WITH CARE, DO NOT SCRATCH OR SPOIL THEM.

NOTE

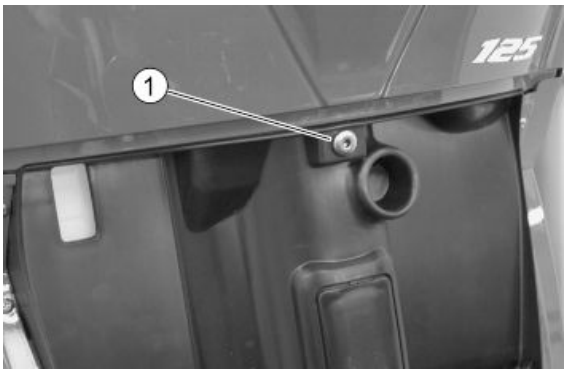
UPON REFITTING, INSERT THE FITTING TABS CORRECTLY IN THEIR SLOTS.

Knee-guard

To remove the leg shield back plate, proceed as follows:

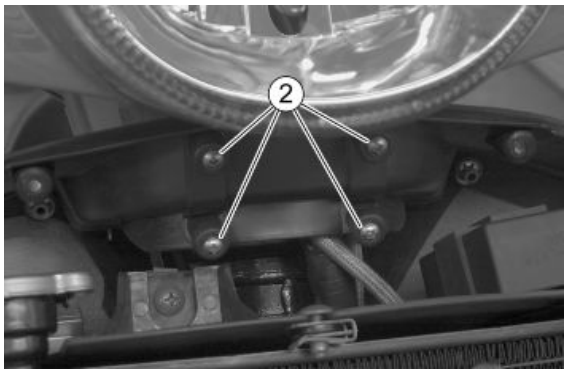
- Remove the legshield.
- Remove the front side fairings.
- Open the glove-box.

- Undo and remove the central screw «1».



- Turn the ring nut of the starter switch clockwise and slide it off from that switch.

- Undo and remove the four screws «2».



- Remove the leg shield back plate.

Footrest

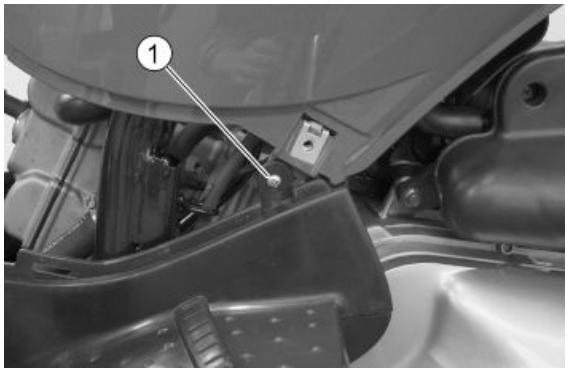
To remove the footrest, proceed as follows:

NOTE

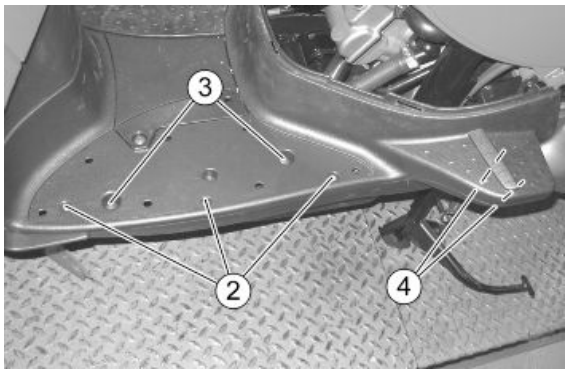
THE FOLLOWING OPERATIONS REFER TO ONE SIDE OF THE VEHICLE, BUT APPLY TO BOTH.

- Remove the leg shield back plate.
- Remove the spark plug inspection cover.
- Remove the mats.

- Undo and remove the screw «1» from both sides.



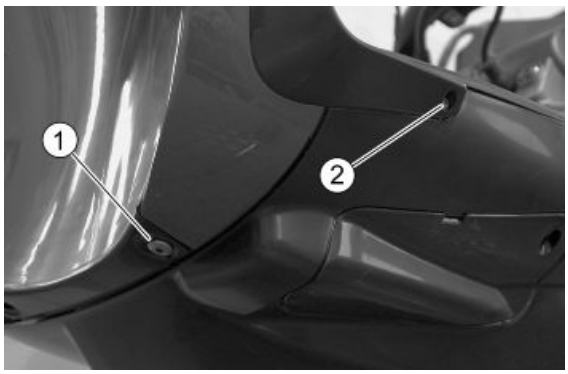
- Undo and remove the three screws «2» and the two screws «3» from both sides.
- Undo and remove the two screws «4» located at the bottom of the footrest, from both sides.
- Slide off the footrest.

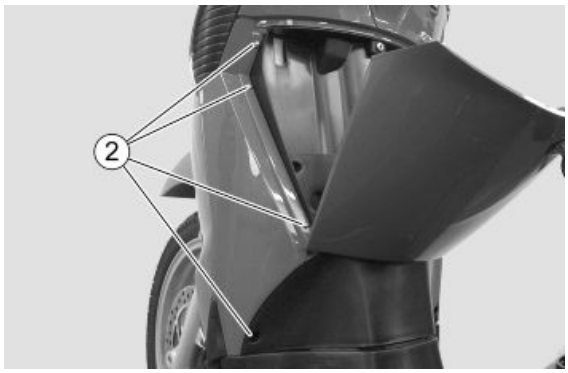


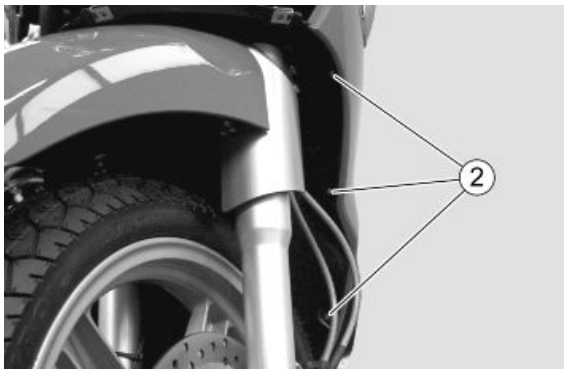
Side fairings

To remove the front side fairings, proceed as follows:

- Open the glove-box.
- Working from both sides, undo the screw «1» and the eight screws «2».







- Remove the fairing by releasing it from its fixing tongues.

CAUTION

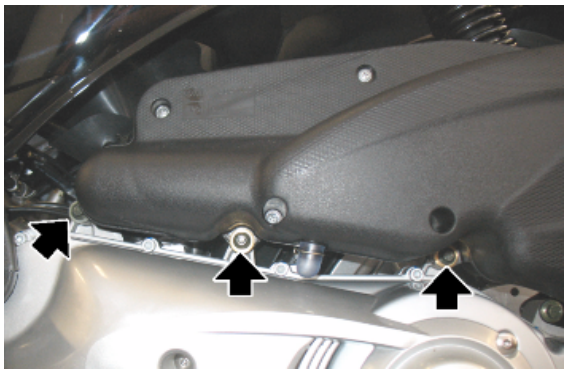
PROCEED WITH CAUTION.
DO NOT DAMAGE THE TABS AND/OR THEIR CORRESPONDING SLOTS.
HANDLE PLASTIC AND PAINTED COMPONENTS WITH CARE, DO NOT SCRATCH OR SPOIL THEM.

NOTE

UPON REFITTING, INSERT THE FITTING TABS CORRECTLY IN THEIR SLOTS.

Air filter

- Operating from the left side, undo and remove the fixing screws and collect the washers.



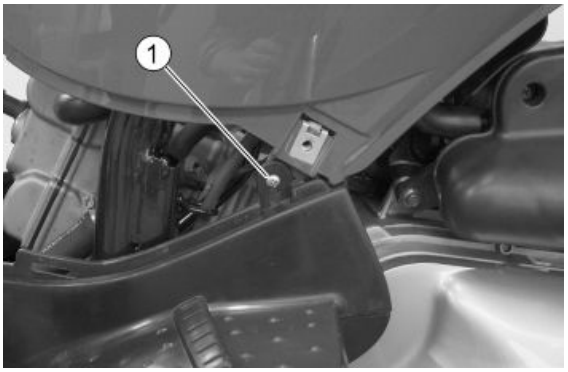
- Loosen the clamp fixing the throttle body manifold to the air filter box.

- Remove the air filter box and disconnect the oil vapour recovery pipe.
- Remove the air filter box.

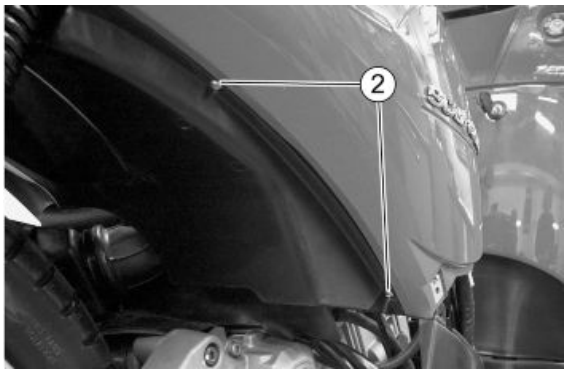
Tail guard

- Park the vehicle on its centre stand.
- Remove the rear luggage carrier.
- Remove the helmet compartment.

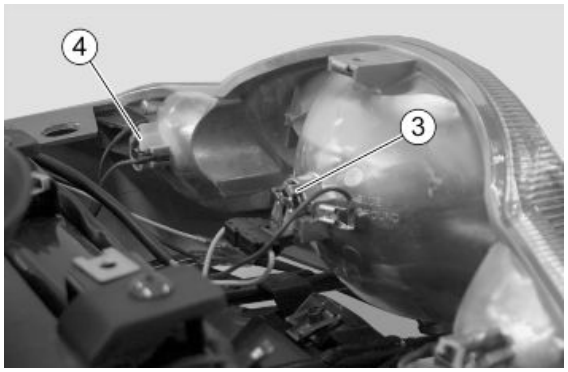
- Working from both sides undo and remove the screw «1».



- Undo and remove the five screws «2», two on the right side and three on the left side of the vehicle.



- Disconnect the taillight connector «3» and the connector «4» of the rear indicator arrows.

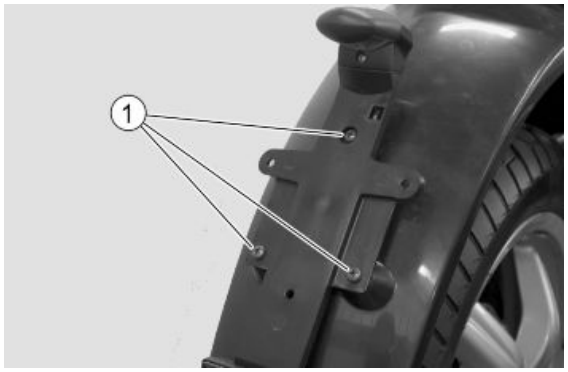


- Remove the tail fairing together with the taillight.

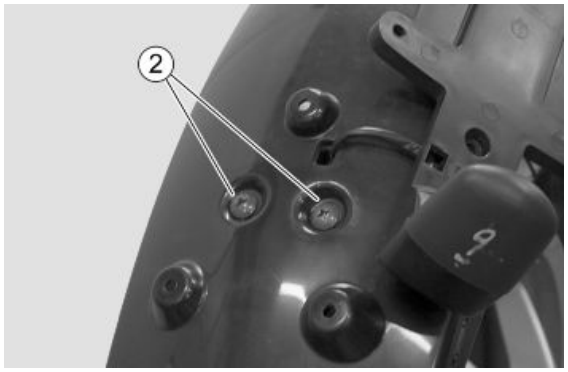
Rear mudguard

To remove the rear mudguard, proceed as follows:

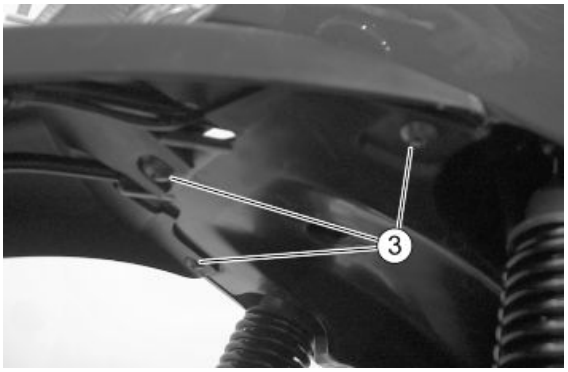
- To remove the license plate holder, undo the three screws «1» and collect the nuts.



- Undo and remove the two screws «2» and collect the nuts.



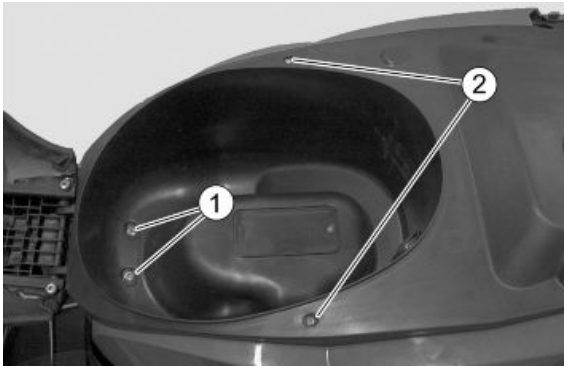
- Undo and remove the three screws «3».
- Disconnect the connector of the license plate holder light and remove the mudguard.



Helmet bay

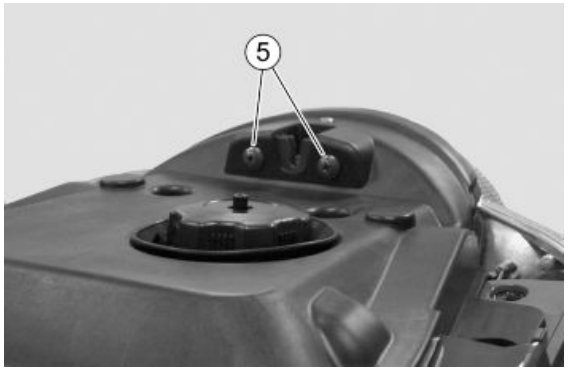
- Lift the saddle.
- Remove the rear luggage carrier.
- Remove the spark plug inspection cover.
- Unscrew and remove the fuel tank cap.

- Undo and remove the two screws «1» and the two screws «2».
- Remove the two screws «6».

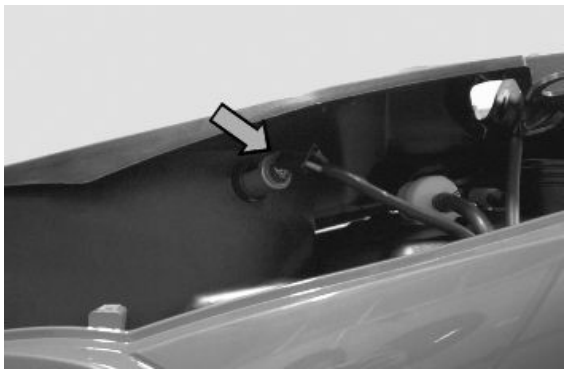


- Undo and remove the two screws «3» and the screw «4».

- Release the saddle lock by undoing the two screws «5».



- Disconnect the connector of the plug socket on the vehicle left side.



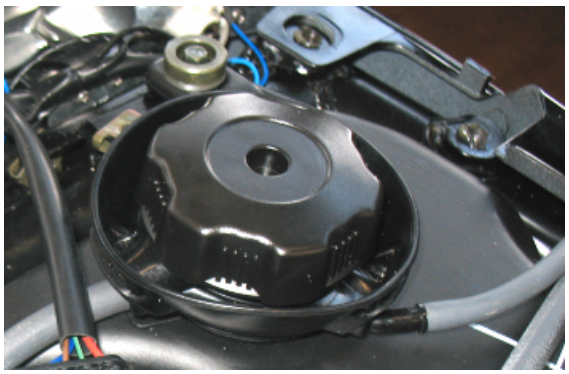
- Remove the helmet compartment together with the saddle by detaching it from the rubber protection.

Fuel tank

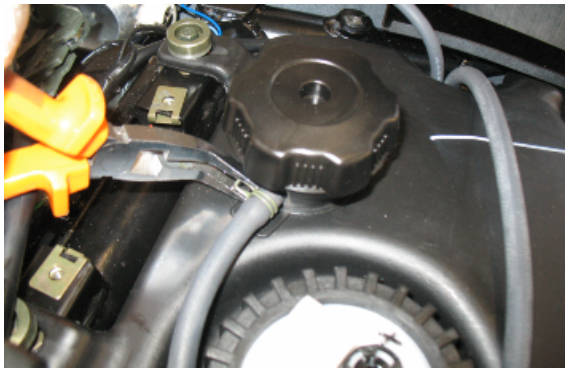
- Remove the helmet compartment.
- Disconnect the fuel pump connector.

- Disconnect the fuel pipe.

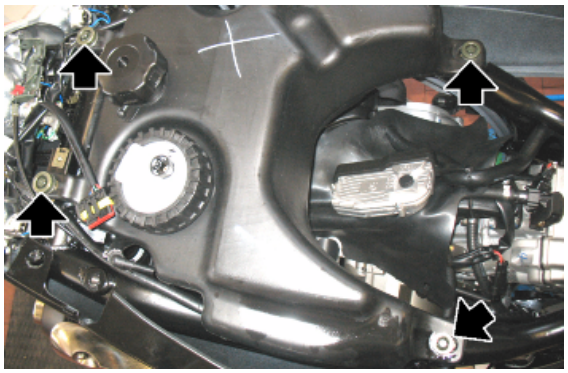
- Remove the gasket from the fuel tank cap.



- Release the clamp and disconnect the fuel breather pipe.



- Undo and remove the four fuel tank fixing screws, collecting the spacers.

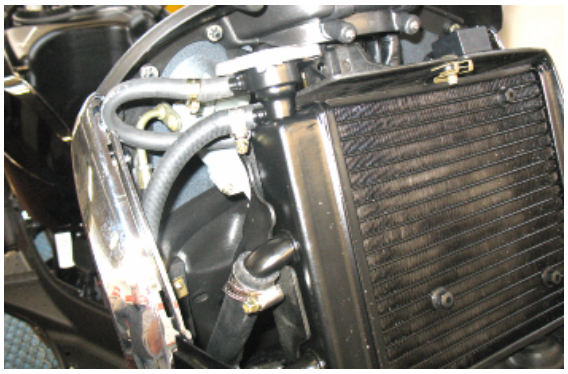


- Remove the fuel tank.

Radiator fan

To remove the radiator, proceed as follows:

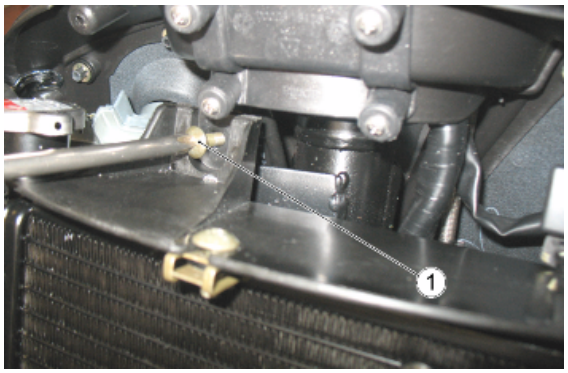
- Empty the cooling system (SEE COOLANT CHANGE).
- Disconnect the pipes from the radiator.



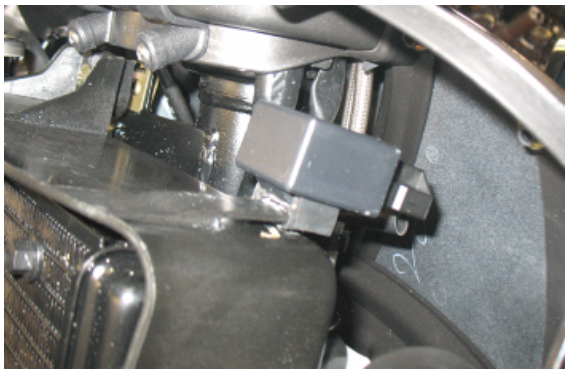
- Undo and remove the screw «1» fixing the radiator.

Locking torques (N*m)

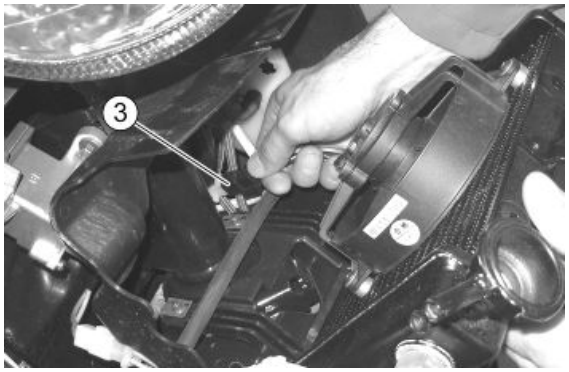
M6 fixing screw for radiator (on plastic) 6 (4.44 lbf ft)



- Remove the blinker devices.



- Detach and lift the radiator to release it from its seat.
- Disconnect the electric fan connector «3».
- Remove the radiator with the expansion tank.



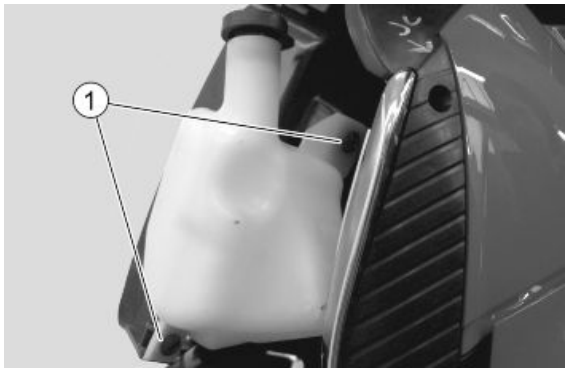
Expansion tank

- Empty the cooling system (SEE COOLANT CHANGE).
- Remove the front shield.
- Remove the front side fairings.
- Remove the leg shield back plate.

- Undo and remove the two screws «1».
- Release the expansion tank from the pipe.

Locking torques (N*m)

M6 screw fixing expansion tank 4 (2.96 lbf ft)



INDEX OF TOPICS

Carry out the listed checks before delivering the motorcycle.

WARNING

HANDLE FUEL WITH CARE.

Aesthetic inspection

- Paintwork
- Fitting of Plastic Parts
- Scratches
- Dirt

Tightening torques inspection

- Safety fasteners:

front and rear suspension unit

front and rear brake calliper retainer unit

front and rear wheel unit

engine - chassis retainers

steering assembly

- Plastic parts fixing screws

Electrical system

- Main switch
- Headlamps: high beam lights, low beam lights, tail lights (front and rear) and their warning lights
- Headlight adjustment according to regulations in force
- Front and rear stop light switches and their bulbs
- Turn indicators and their warning lights
- Instrument panel lights
- Instrument panel: fuel and temperature indicator (if present)
- Instrument panel warning lights
- Horn
- Electric starter
- Engine stop via emergency stop switch and side stand
- Saddle electric opening switch (if present)

- Through the diagnosis tool, check that the last mapping version is present in the control unit/s and, if required, program the control unit/s again: consult the technical service website to know about available upgrades and details regarding the operation.

CAUTION

TO ENSURE MAXIMUM PERFORMANCE, THE BATTERY MUST BE CHARGED BEFORE USE. INADEQUATE CHARGING OF THE BATTERY WITH A LOW LEVEL OF ELECTROLYTE BEFORE IT IS FIRST USED SHORTENS BATTERY LIFE.

CAUTION

UPON INSTALLING THE BATTERY, ATTACH THE POSITIVE LEAD FIRST AND THEN THE NEGATIVE ONE, AND PERFORM THE REVERSE OPERATION UPON REMOVAL.

WARNING

THE BATTERY ELECTROLYTE IS POISONOUS AS IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH YOUR EYES, SKIN AND CLOTHING.
IN CASE OF CONTACT WITH YOUR EYES OR SKIN, WASH WITH ABUNDANT WATER FOR APPROX. 15 MIN. AND SEEK MEDICAL ATTENTION IMMEDIATELY.
IF ACCIDENTALLY SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.
BATTERIES PRODUCE EXPLOSIVE GASES; KEEP CLEAR OF NAKED FLAMES, SPARKS OR CIGARETTES. VENTILATE THE AREA WHEN RECHARGING INDOORS. ALWAYS WEAR EYE PROTECTION WHEN WORKING IN THE PROXIMITY OF BATTERIES.
KEEP OUT OF THE REACH OF CHILDREN.

CAUTION

NEVER USE FUSES WITH A CAPACITY HIGHER THAN THE RECOMMENDED CAPACITY. USING A FUSE OF UNSUITABLE RATING MAY SERIOUSLY DAMAGE THE VEHICLE OR EVEN CAUSE A FIRE.

Levels check

- Hydraulic braking system fluid level
- Rear hub oil level
- Engine coolant level (if present)
- Engine oil level
- Mixer oil level (if present)

Road test

- Cold start
- Instrument panel operation
- Response to throttle control
- Stability when accelerating and braking

- Front and rear brake efficiency
- Front and rear suspension efficiency
- Abnormal noise

Static test

Static check after test drive:

- Restarting when warmed up
- Starter operation (if present)
- Minimum holding (turning the handlebar)
- Uniform turning of the steering
- Possible leaks
- Radiator electric fan operation (if present)

Functional inspection

- Hydraulic braking system
- Brake levers stroke
- Clutch - Check for correct operation
- Engine - Check for correct general operation and absence of abnormal noise
- Other
- Documentation check:
- Chassis and engine numbers check
- Supplied tools check
- License plate fitting
- Locks checking
- Tyre pressure check
- Installation of mirrors and any possible accessories

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES AS TYRES MAY BURST.

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

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