SERVICE STATION MANUAL

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SCARABEO 50 4T 4V

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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 50 4T 4V

- 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 VEHICLE PARTS WITH YOUR MOUTH: VEHICLE 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.

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.

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.

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

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

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.

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 VEHICLE IS USED CLOSE TO WATER OR ON DUSTY OR UNSURFACED ROADS, OR IF IT IS USED FOR SPORTS APPLICATION, HALVE THE SERVICE INTERVALS.

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 PLAY 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.

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 VEHICLE.
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.

ELECTRIC CONNECTORS

Electric connectors must be disconnected as described below; failure to comply with this procedure causes irreparable damage to both the connector and the wiring harness: Press the relative safety clips, if applicable.

CAUTION

DO NOT DISCONNECT CONNECTORS BY PULLING THE CABLES.

- Grip the 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 CONNECTORS CAN ONLY BE CONNECTED IN ONE DIRECTION: CONNECT THEM THE RIGHT WAY ROUND.

- Then connect the connectors, ensuring that they couple correctly (if fitted with the specific clips, you will hear them "click" into place).

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).

TIGHTENING TORQUES

CAUTION

DO NOT FORGET THAT TIGHTENING TORQUES OF ALL FASTENING ELEMENTS ON WHEELS, BRAKES, WHEEL SPINDLES 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 COM-

PROMISING THE VEHICLE'S MANOEUVRABILITY. THIS CAN LEAD TO FALLS, WITH THE RISK OF SERIOUS INJURY OR DEATH.

Vehicle identification

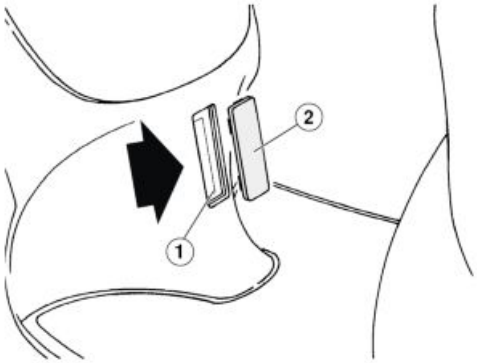
Quote the chassis number when purchasing spare parts.

NOTE

DO NOT OBLITERATE OR ALTER THE VEHICLE IDENTIFICATION NUMBERS. DOING SO IS CONSIDERED AN OFFENCE IN ALL COUNTRIES. FURTHERMORE, ALTERING THE IDENTIFICATION NUMBERS INVALIDATES THE WARRANTY.

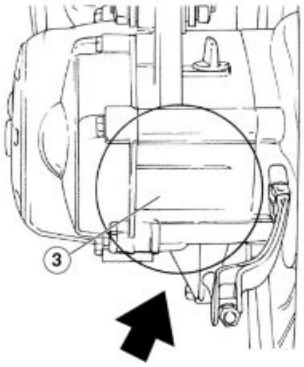
Chassis number

The chassis number «**1**» is marked on the chassis central bar. Remove the cover «**2**» to read it.



Engine number

The engine number «**3**» is marked near the lower support of the rear shock absorber.



Dimensions and mass

SIZES

Specification	Desc./Quantity
Max. length	1905 mm (75 in)
Max. width (to brake levers)	705 mm (27.7 in)
Max. height (to the rear-view mirrors)	1190 mm (46.9 in)
Saddle height	700 mm (27.6 in)
Wheelbase	1245 mm (49 in)
Minimum ground clearance	140 mm (5.5 in)
Kerb weight (in running order)	100 kg (220.5 lb)

Engine

ENGINE

Specification	Desc./Quantity
Engine model	C37AM
Type	4T, 4V

Specification	Desc./Quantity
Number of cylinders	Horizontal single-cylinder
Overall engine capacity	49.9 cm³ (3.04 cu.in)
Bore / stroke	39 mm / 41.8 mm
Compression ratio	11.5 up to 12:1
Standard carburettor	KEIHIN NCV20
Ignition	electric + kick starter
Clutch	centrifugal
Gearbox	continuous and automatic variator
Cooling	with forced air
Ignition type	CDI
Ignition advance	Variable from 0° to 28°
Spark plug	NGK ER9EH-N
Spark plug electrode gap	0.6 - 0.7 mm
Engine revs at idle speed	1,800 ± 100 rpm
Valve clearance (when cold)	intake 0.10 mm exhaust 0.15 mm

Transmission

TRANSMISSION

Specification	Desc./Quantity
Variator	continuous, automatic
Primary drive	V-belt
Secondary	gear reduction unit
Minimum ratio for continuos transmission	3.07
Maximum ratio for continuos transmission	0.87

Capacities

CAPACITY

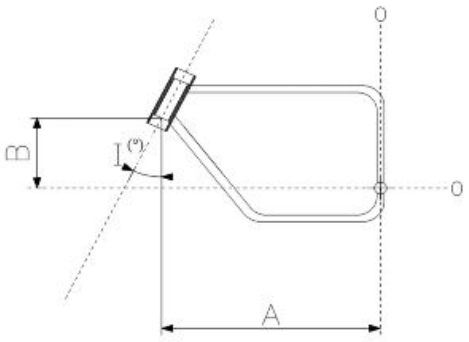
Specification	Desc./Quantity
Fuel (reserve included)	7 l (1.84 gal)
Fuel reserve	1 l (0.2 gal)
Transmission oil	100 cm³ (6.1 cu.in)
Engine oil (engine oil change and engine oil filter replacement)	850 cm³ (51.8 cu.in)
Seats	No. 1 (2 in countries where passenger transport is permitted)
Vehicle max. load (rider + passenger + luggage)	180 kg (396.8 lb)

Electrical system

ELECTRICAL SYSTEM

	Specification	Desc./Quantity
1	Battery	12V - 9 Ah
2	Fuse	7.5 A
3	(Permanent-magnet) alternator	13 V - 120 W
4	Low-/high-beam light bulb	12 V - 35 / 35 W
5	Turn indicators bulbs	12V - 10W
6	Rear tail light /stop light bulb	12 V - 5 / 21 W
7	Instrument panel light bulbs	12V - 1.2W
8	High-beam warning light	12V - 1.2W
9	Turn indicator warning light	12V - 3W

Frame and suspensions



CHASSIS AND SUSPENSIONS

Specification	Desc./Quantity
Size "A"	446 mm
Size "B"	471.5 mm
Steering rake angle	24°
Chassis type	split double cradle frame
Front suspension	Hydraulic action telescopic fork
Travel	89 mm (3.5 in)
Rear suspension	single hydraulic shock absorber
Travel	74 mm (2.9 in)

Brakes

BRAKES

Specification	Desc./Quantity
Front	Ø 220 mm (8.66 in) disc brake with hydraulic transmission
Rear	Ø140 mm (5.51 in) drum brake

Wheels and tyres

WHEEL RIMS

Specification	Desc./Quantity
Type	alloy
Front	1.60 x16"
Rear	1.85 x 16"

TYRES

Specification	Desc./Quantity
Front tyre	80 / 80 x 16" SAVA MC 26 CAPRI 46M REINF
Rear tyre	90 / 80 x 16" SAVA MC 26 CAPRI 52M REINF
Standard inflation pressure	Front: 190 kPa (1.9 bar / 27.55 psi) Rear: 220 kPa (2.2 bar / 31.9 psi)
Inflation pressure with passenger (in countries where passenger transport is permitted)	Front: 190 kPa (1.9 bar / 27.55 psi) Rear: 230 kPa (2.3 bar / 33.35 psi)

Tightening Torques

LINK ROD UNIT

Name	Torque in Nm
Nut fixing link rod to chassis - M10 (1)	42 Nm (30.98 lbf ft)
Nut fixing link rod to engine - M10 (1)	36 Nm (26.55 lbf ft)

FRAME ASSEMBLY

Name	Torque in Nm
Screw fixing shock absorber to chassis - M10x45 (1)	36 Nm (26.55 lbf ft)
Nut fixing passenger footrest supporting bracket to chassis - M8 (4)	25 Nm (18.44 lbf ft)
Horn fixing screw - M6x16 (1)	7 Nm (5.16 lbf ft)
Self-tapping screw fixing splash guard to chassis - 3.9x14 (2)	1 Nm (0.74 lbf ft)
Nut fixing fuel tank supporting rubber pads - M6 (2)	10 Nm (7.38 lbf ft)

STAND UNIT

Name	Torque in Nm
Nut fixing stand to engine - M10x130 (1)	35 Nm (25.81 lbf ft)

FRONT SUSPENSION UNIT

Name	Torque in Nm
Nut fixing pumping member to fork sleeve - M10 (1)	7 Nm (5.16 lbf ft)
Retainer screw tightening wheel pin fork clamp - M6 (1)	12 Nm (8.85 lbf ft)
Nut fixing steering series nut - M25 (1)	10 Nm (7.38 lbf ft)
Nut fixing steering series lock nut - M25 (1)	110 Nm (81.13 lbf ft)

HANDLEBAR AND CONTROLS UNIT

Name	Torque in Nm
Nut fixing mirror to handlebar - M8 (1)	10 Nm (7.38 lbf ft)
Screw fixing front brake pump clamp - M6 (2)	10 Nm (7.38 lbf ft)
Nut fixing handlebar screw - M10 (1)	42 Nm (30.98 lbf ft)

ENGINE UNIT

Name	Torque in Nm
Ignition spark plug	12.5 Nm (9.22 lbf ft)
Driven pulley shaft nut	42 Nm (30.98 lbf ft)
Head-cylinder passing nuts *	6.5 Nm (4.79 lbf ft) + 90° + 90° *
Rocking lever adjusting nuts	8 Nm (5.90 lbf ft)
Crankshaft pulley nut	19 Nm (14.01 lbf ft) + 90º
Clutch assembly nut	57.5 Nm (42.41 lbf ft)
Nut fixing filter box to engine - M6 (1)	7 Nm (5.16 lbf ft)
Flywheel nut	42 Nm (30.98 lbf ft)
Clamp fixing sleeve to carburettor - Diam. 25 (1)	1 Nm (0.74 lbf ft)
Gas curve retainer to carburettor (1)	1.5 Nm (1.11 lbf ft)
Engine oil drainage plug	26.5 Nm (19.55 lbf ft)
Engine oil pre-filter cap	26.5 Nm (19.55 lbf ft)
Screw fixing filter box to engine - M6x20 (1)	7 Nm (5.16 lbf ft)
Screw fixing starting lever - M6x25 (1)	12 Nm (8.85 lbf ft)
Screw fixing engine shock absorber - M10x25 (1)	36 Nm (26.55 lbf ft)
Screw fixing carburettor protection to engine - M6x16 (1)	5 Nm (3.69 lbf ft)
Screw fixing rear brake retention plate - M6x20 (1)	10 Nm (7.38 lbf ft) - Loctite 243
Crankcase half union screw	9 Nm (6.64 lbf ft)
Rear hub cover screws	12 Nm (8.85 lbf ft)
Hub oil drain screw	4 Nm (2.95 lbf ft)
Crankcase cooling cover screw	2 Nm (1.48 lbf ft)
Starting lever screw	12 Nm (8.85 lbf ft)
Transmission cover screws	12 Nm (8.85 lbf ft)
Starter motor screws	12 Nm (8.85 lbf ft)
Screws fixing cables to starter motor	2 Nm (1.47 lbf ft)
Carburettor/manifold clamp screw	1.4 Nm (1.03 lbf ft)
Intake manifold screw	8 Nm (5.9 lbf ft)

Name	Torque in Nm
Oil sump screws	9 Nm (6.64 lbf ft)
Screw fixing oil pump to crankcase	5.5 Nm (4.06 lbf ft)
Oil pump sprocket gear screw	9 Nm (6.64 lbf ft)
Oil decantation labyrinth plate screw	7.5 Nm (5.53 lbf ft)
Timing chain/oil pump compartment cover screw	4.5 Nm (3.32 lbf ft)
Oil pump shield screw	4.5 Nm (3.32 lbf ft)
Pick-up screws	3.5 Nm (2.58 lbf ft)
Stator screws	3.5 Nm (2.58 lbf ft)
Rocking lever axle and camshaft bearing screw	3.5 Nm (2.58 lbf ft)
Camshaft pulley screw	13 Nm (9.60 lbf ft)
Timing chain tensioner central screw	5.5 Nm (4.06 lbf ft)
Chain tensioner pad screw	6 Nm (4.43 lbf ft)
Screws fixing head and cylinder to crankcase	9 Nm (6.64 lbf ft)
Floating head cover screws	6.5 Nm (4.79 lbf ft)

* When assembling the new stud bolts, nut tightening involves 3 turns of 90° each, after the first locking at 6.5 Nm (4.79 lbf-ft), consequently: 6.5 Nm (4.79 lbf-ft) + 90° + 90° + 90° at crossed passages.

EXHAUST UNIT

Name	Torque in Nm
Screw fixing silencer to engine - M8x70 (2)	22.5 Nm (16.59 lbf ft)
Nut fixing silencer flange to cylinder - M6 (2)	10 Nm (7.38 lbf ft)
Screw fixing heat shield to silencer - M6x20 (3)	7 Nm (5.16 lbf ft)

FRONT WHEEL UNIT

Name	Torque in Nm
Wheel pin retainer - M12 (1)	35 Nm (25.81 lbf ft)
Brake disc retainer - M6 (5)	10 Nm (7.38 lbf ft) - Loctite 243

REAR WHEEL UNIT

Name	Torque in Nm
Rear wheel fixing nut - M16 (1)	112 Nm (82.61 lbf ft)

FRONT BRAKE UNIT

Name	Torque in Nm
Brake pump clamp retainer - M6 (2)	10 Nm (7.38 lbf ft)
Nut fixing brake pipe to front mudguard - M6 (1)	3 Nm (2.21 lbf ft)
Screw fixing front brake calliper to fork - M8x35 (2)	21 Nm (15.49 lbf ft) - Loctite 243

REAR BRAKE UNIT

Name	Torque in Nm
Screw fixing rear brake cable grommet to engine - M6x35 (1)	9 Nm (6.64 lbf ft)
Screw fixing rear brake cable clamp to engine - M6x35 (1)	9 Nm (6.64 lbf ft)

FRONT BODYWORK UNIT

Name	Torque in Nm
Legshield fixing screw - M5x12 (2)	3 Nm (2.21 lbf ft)
Internal shield self-tapping retainer - 3.9 x14 (6)	1 Nm (0.74 lbf ft)
Clip-on badge self-tapping retainer - 4.2x25 (1)	1 Nm (0.74 lbf ft)
Screw fixing front mudguard to fork - M5x12 (2)	5 Nm (3.69 lbf ft)
TCC screw fixing spoiler to handlebar - M8x75 (2)	1.2 Nm (0.88 lbf ft)

CENTRAL BODYWORK UNIT

Name	Torque in Nm
Screw fixing under-footrest to chassis - M5x9 (2)	3 Nm (2.21 lbf ft)
Screw fixing under-footrest to legshield - M5x12 (2)	3 Nm (2.21 lbf ft)
Internal shield fixing screw - M5x12 (1)	3 Nm (2.21 lbf ft)
Footrest self-tapping retainer - 5.5x20 (4)	3 Nm (2.21 lbf ft)
Footrest self-tapping retainer - 5.5x20 (2)	1 Nm (0.74 lbf ft)
Inspection cover fixing screw - M6x20 (2)	3 Nm (2.21 lbf ft)

Name	Torque in Nm
Glove-box net TBEI fixing screw - 2.9x12 (6)	0.5 Nm (0.37 lbf ft)

REAR BODYWORK UNIT

Name	Torque in Nm
Tail light fixing retainer to tail fairing - 5.5x20 (3)	2 Nm (1.47 lbf ft)
Luggage carrier fixing screw - M6x45 (3)	8 Nm (5.90 lbf ft)
Tail fairing self-tapping retainer - 3.9x14 (6)	1 Nm (0.74 lbf ft)
Nut fixing retroreflector to rear mudguard - M4 (6)	2 Nm (1.47 lbf ft)

SADDLE UNIT

Name	Torque in Nm
Nut fixing helmet compartment to chassis - M6 (2)	3 Nm (2.21 lbf ft)
helmet compartment hook self-tapping retainer - 4.2x25 (2)	1 Nm (0.74 lbf ft)
Saddle hinge self-tapping retainer - 3.9 x14 (4)	1 Nm (0.74 lbf ft)
Hinge cover fixing nut - M5 (2)	2 Nm (1.47 lbf ft)

HEAD/INSTRUMENT PANEL UNIT

Name	Torque in Nm
Turn indicator self-tapping retainer to front hand. cover - M5 (2)	1.5 Nm (1.11 lbf ft)
TBEI screw fixing instrument panel to rear hand. cover - 2.9x12 (4)	0.5 Nm (0.37 lbf ft)
TBEI screw fixing rear hand. cover to handlebar - 2.9x12 (3)	0.5 Nm (0.37 lbf ft)
TBEI screw fixing rear hand. cover to front handlebar cover - 2.9x12 (6)	0.5 Nm (0.37 lbf ft)

ELECTRICAL SYSTEM UNIT

Name	Torque in Nm
Battery compartment fixing screw - M5x12 (1)	5 Nm (3.69 lbf ft)
Battery compartment cover fixing screw - M5x12 (1)	3 Nm (2.21 lbf ft)
Ground lead fixing screw - M6x12 (1)	10 Nm (7.38 lbf ft)
Coil fixing screw - M5x20 (2)	3 Nm (2.21 lbf ft)
Nut fixing relay support to legshield - M5 (1)	2 Nm (1.47 lbf ft)
Voltage regulator fixing screw - M5x20 (2)	5 Nm (3.69 lbf ft)
Key switch fixing screw - M6x16 (1)	10 Nm (7.38 lbf ft)

TANK UNIT

Name	Torque in Nm
Screw fixing fuel cock to battery compartment - M5x16 (1)	5 Nm (3.69 lbf ft)
Clamp fixing fuel pipe to tank - Diam.16 (1)	3 Nm (2.21 lbf ft)
Screw fixing carburettor protection plate - M5x10 (2)	3 Nm (2.21 lbf ft)
Fuel cock fixing screw - M5x16 (1)	3 Nm (2.21 lbf ft)

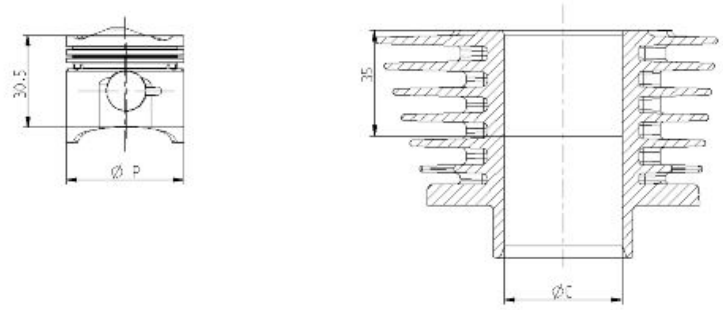
LOCK UNIT

Name	Torque in Nm
Nut fixing locks to helmet compartment - M6 (2)	5 Nm (3.69 lbf ft)
Nut fixing glove-box lid locks - M19x1 (1)	5 Nm (3.69 lbf ft)

Overhaul data

Assembly clearances

Cylinder - piston assy.



COUPLING BETWEEN PISTON AND CYLINDER

Name	Initials	Cylinder	Piston	Play on fitting
Cylinder	A	38.993 - 39.000	38.954 - 38.961	0.032 - 0.046
Cylinder	B	39.000 - 39.007	38.961 - 38.968	0.032 - 0.046
Piston	C	39.007 - 39.014	38.968 - 38.975	0.032 - 0.046
Piston	D	39.014 - 39.021	38.975 - 38.982	0.032 - 0.046
Cylinder 1st oversize	A1	39.193 - 39.200	39.154 - 39.161	0.032 - 0.046
Cylinder 1st oversize	B1	39.200 - 39.207	39.161 - 39.168	0.032 - 0.046
Piston 1st oversize	C1	39.207 - 39.214	39.168 - 39.175	0.032 - 0.046
Piston 1st oversize	D1	39.214 - 39.221	39.175 - 39.182	0.032 - 0.046
Cylinder 2nd oversize	A2	39.393 - 39.400	39.354 - 39.361	0.032 - 0.046
Cylinder 2nd oversize	B2	39.400 - 39.407	39.361 - 39.368	0.032 - 0.046
Piston 2nd oversize	C2	39.407 - 39.414	39.368 - 39.375	0.032 - 0.046
Piston 2nd oversize	D2	39.414 - 39.421	39.375 - 39.382	0.032 - 0.046
Cylinder 3rd oversize	A3	39.593 - 39.600	39.554 - 39.561	0.032 - 0.046
Cylinder 3rd oversize	B3	39.600 - 39.607	39.561 - 39.568	0.032 - 0.046
Piston 3rd oversize	C3	39.607 - 39.614	39.568 - 39.575	0.032 - 0.046
Piston 3rd oversize	D3	39.614 - 39.621	39.575 - 39.582	0.032 - 0.046

NOTE

THE PISTON MUST BE FITTED WITH THE ARROW FACING TOWARDS THE EXHAUST SIDE, THE PISTON RINGS MUST BE FITTED WITH THE REFERENCE «TOP» OR THE STAMPED MARK FACING UPWARDS.

- Check the pin outside diameter

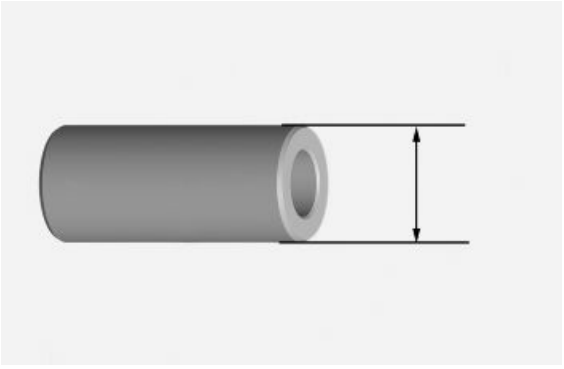
Characteristic

Pin outside diameter

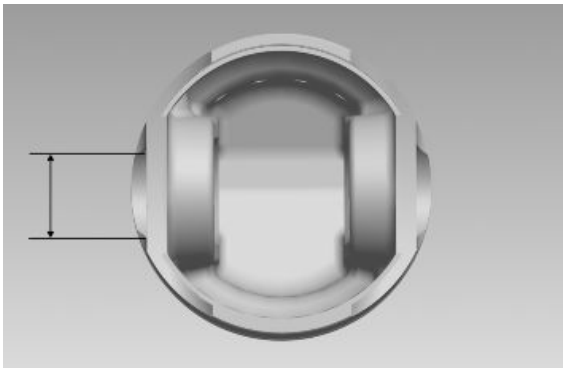
13 +0 -0.004 mm

Minimum diameter allowed: pin

12.990 mm



- Measure the diameter of the bearings on the piston.



Characteristic

Pin seat diameter

13 +0.005 +0.010 mm

- Calculate the pin - piston coupling clearance.

NOTE

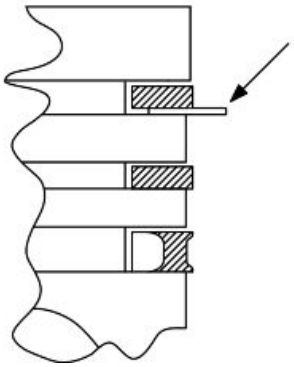
THE PIN HOUSINGS HAVE TWO LUBRICATION CHANNELS FOR THIS REASON MEASURE THE DIAMETER ACCORDING TO THE PISTON AXIS

Characteristic

Standard clearance

0.005 - 0.014 mm

- Carefully clean the sealing rings housings.
- Measure the sealing rings - pistons coupling clearance using suitable sensors, as shown in the diagram
- If clearances measured exceed the limits specified in the table below, the piston should be replaced by a new one.



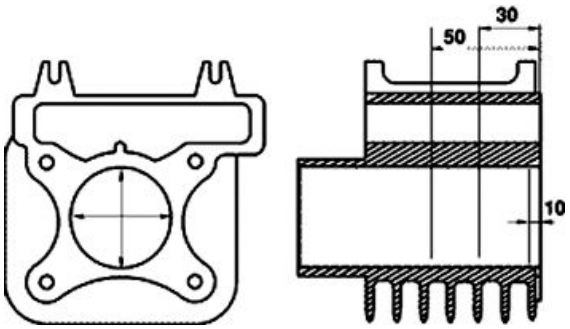
NOTE

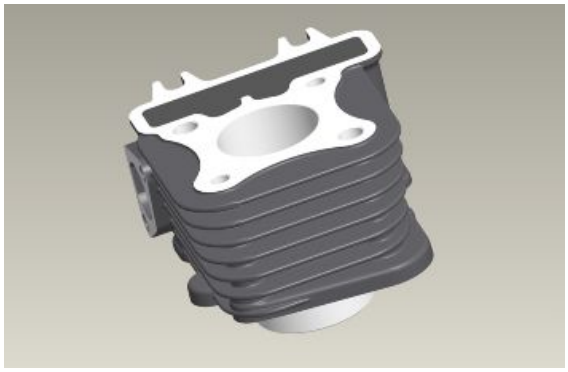
MEASURE CLEARANCE BY INSERTING THE BLADE OF THE FEELER GAUGE FROM THE 2nd SEALING RING SIDE.

Fitting clearance

1st compression ring - standard coupling clearance 0.03 - 0.065 mm **1st compression ring - maximum clearance allowed after use** 0.07 mm **2nd compression ring - standard coupling clearance** 0.02 - 0.055 mm **2nd compression ring - maximum clearance allowed after use** 0.06 mm **oil scraper - standard coupling clearance** 0.04 - 0.16 mm **oil scraper - maximum clearance allowed after use** 0.17 mm

- 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 distorted.
- Pistons and cylinders are classified according to their diameter. This coupling is carried out in pairs (A-A, B-B, C-C, D-D).





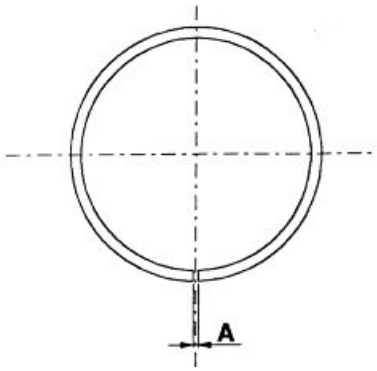
Characteristic

Maximum run-out allowed:

0.05 mm

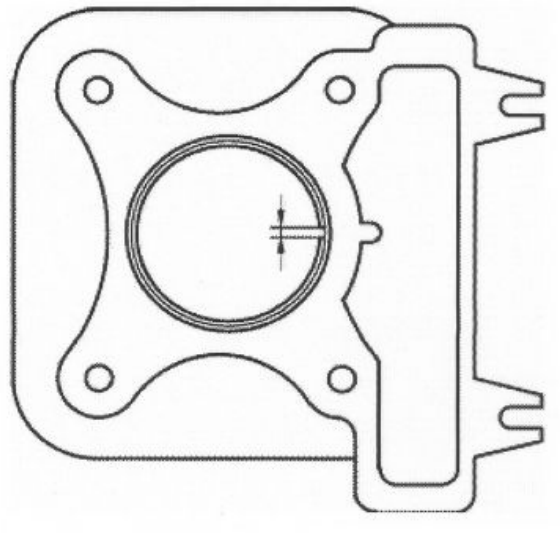
Piston rings

- Alternately fit the 3 sealing rings in the cylinder in the area where it keeps its original diameter. Using the piston, fit the rings perpendicularly to the cylinder axis.
- Measure the opening of the sealing rings using a feeler gauge, as shown in the figure.
- Replace the piston rings if values higher than those prescribed are measured.



NOTE

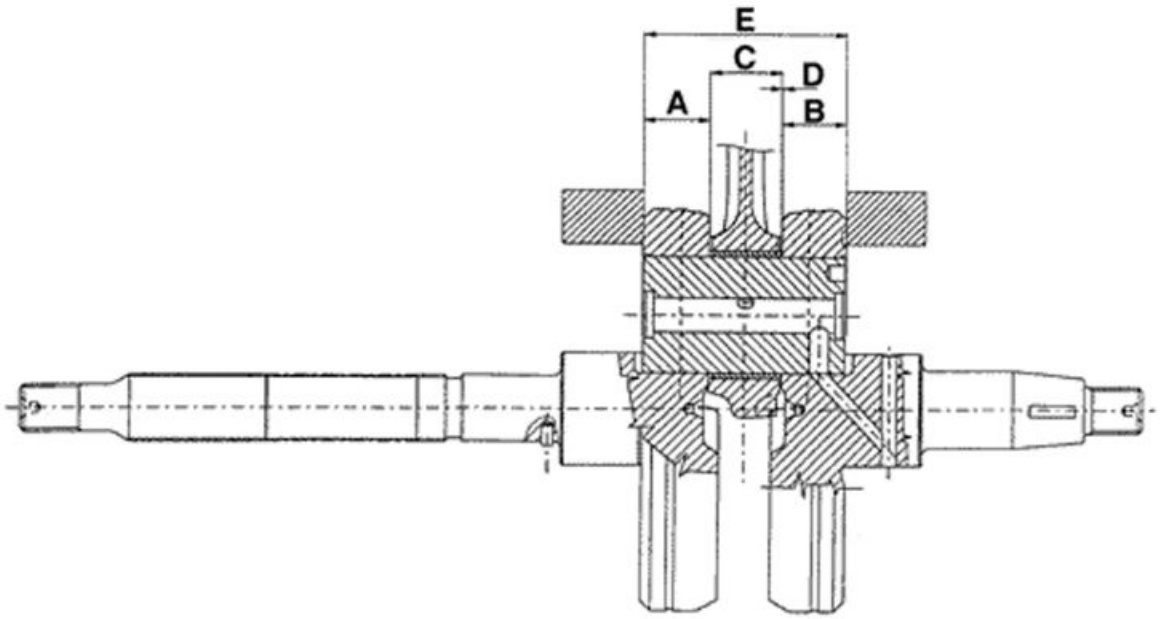
BEFORE REPLACING ONLY THE PISTON RINGS, MAKE SURE THAT COUPLING CLEARANCE BETWEEN THE SEAL RINGS AND ITS GROOVES, AND THAT BETWEEN THE PISTON AND THE CYLINDER ARE AS SPECIFIED. IN ANY CASE, NEW PISTON SEALING RINGS USED IN COMBINATION WITH A USED CYLINDER MAY HAVE DIFFERENT BEDDING CONDITIONS THAN THE STANDARD ONES.



SEALING RINGS

Name	Description	Dimensions	Initials	Quantity
1st Compression ring		39 x 1	A	0.08 - 0.20
2nd Compression ring		39 x 1	A	0.05 - 0.20
Oil scraper ring		39 x 2	A	0.20 - 0.70
1st Compression ring 1st Oversize		39.2 x 1	A	0.08 - 0.20
2nd Compression ring 1st Oversize		39.2 x 1	A	0.05 - 0.20
Oil scraper ring 1st Oversize		39.2 x 2	A	0.20 - 0.70
1st Compression ring 2nd Oversize		39.4 x 1	A	0.08 - 0.20
2nd Compression ring 2nd Oversize		39.4 x 1	A	0.05 - 0.20
Oil scraper ring 2nd Oversize		39.4 x 2	A	0.20 - 0.70
1st Compression ring 3rd Oversize		39.6 x 1	A	0.08 - 0.20
2nd Compression ring 3rd Oversize		39.6 x 1	A	0.05 - 0.20
Oil scraper ring 3rd Oversize		39.6 x 2	A	0.20 - 0.70

Crankcase - crankshaft - connecting rod



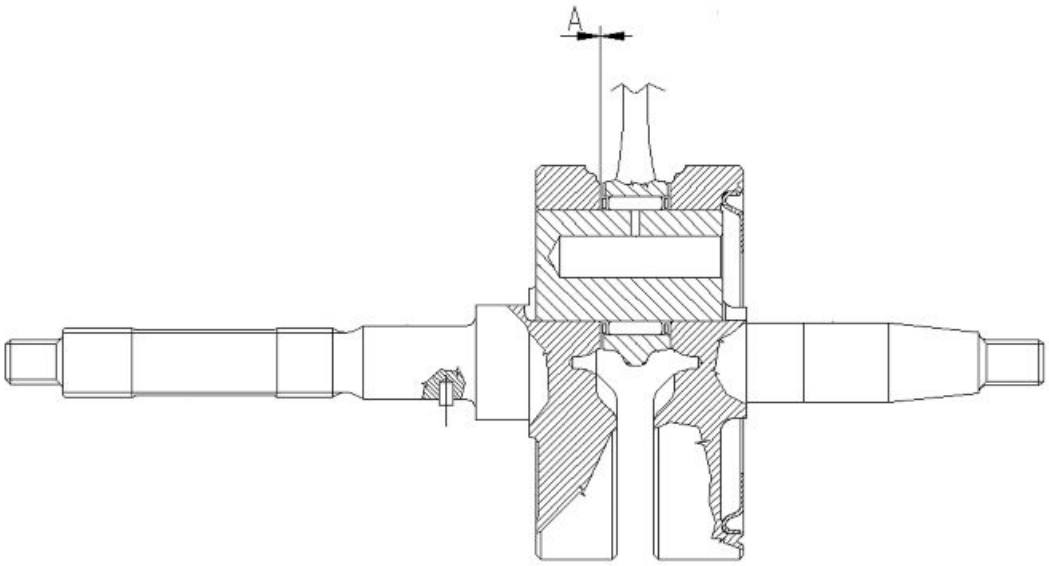
AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CRANKCASE

Name	Description	Dimensions	Initials	Quantity
Half shaft, transmission side		14 +0 -0,005	A	
Half shaft, flywheel side		16 +0 -0,005	B	
Connecting rod		14,8 +0,05 -0	C	
Spacer tool		45.00 / Fitting clearance D = 0.15 - 0.30	E	

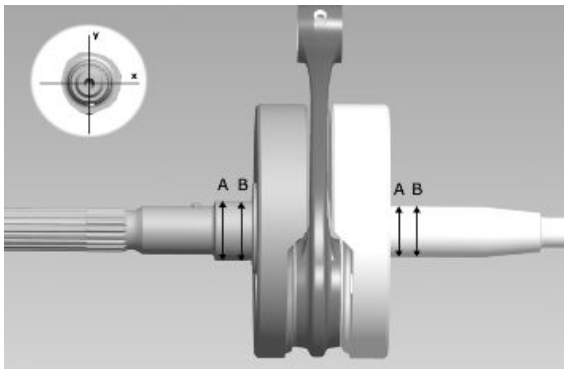
Characteristic

Clearance between crankshaft and connecting rod

A = 0.15 - 0.30 mm



Measure the bearings along X and Y axes



Characteristic

Crankshaft rolling surface, transmission side

20-0.012 -0.025 mm

Crankshaft rolling surface, flywheel side

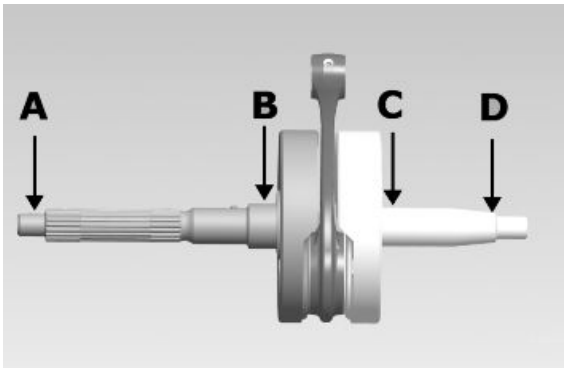
17 +0.007 0 mm

- Check that the crankshaft cone, the tab fitting, the oil seal flow, the knurling and the threaded shanks are in good working order.
- In case of failure, replace the crankshaft.

Specific tooling

020074Y Support base for checking crankshaft alignment

- Install the crankshaft on the support and measure the misalignment at the 4 points indicated in figure.



NOTE

IF VALUES OTHER THAN THOSE ALLOWED ARE DETECTED, TRY STRAIGHTENING THE CRANKSHAFT BY INSERTING A WOODEN WEDGE BETWEEN THE HALF SHAFTS OR BY CLOSING THEM WITH A VICE AS NEEDED. IF EVEN AFTER THIS OPERATION THE VALUES ARE NOT THOSE ADMITTED, REPLACE THE CRANKSHAFT.

Characteristic

Maximum off-line allowed - A

0.15 mm

Maximum off-line allowed - B

0.02 mm

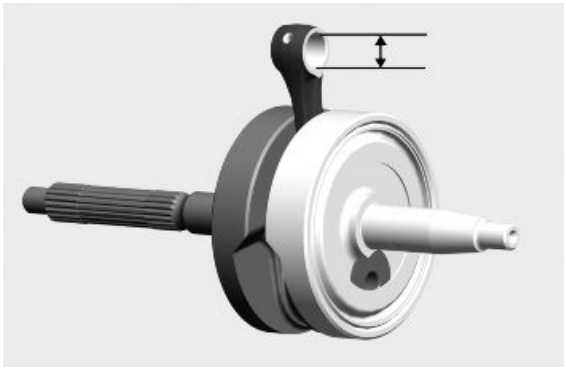
Maximum off-line allowed - C

0.02 mm

Maximum off-line allowed - D

0.10 mm

- Measure the inside diameter of the connecting rod small end using a bore meter.



NOTE

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

Characteristic

Connecting rod small end diameter

13 +0.015 + 0.025 mm

Max. diameter allowed: checking the connecting rod small end

13.030 mm

Calculate the coupling clearance between the pin and the connecting rod small end.

Characteristic

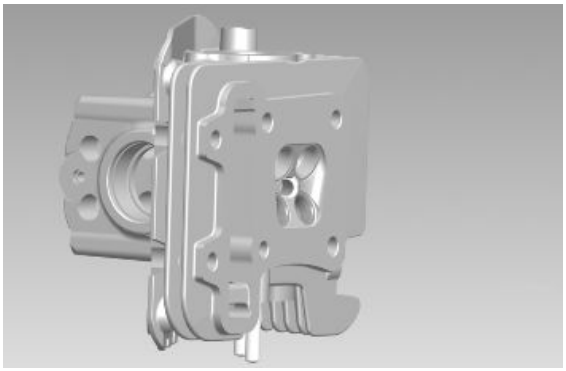
Pin - connecting rod clearance

0.015 - 0.029 mm

Cylinder head

Clean all the coupling surfaces thoroughly before servicing the head. Pay attention to the position of the springs and valves so as not to change the original position upon refitting them

- Using a trued bar, check that the head surface is not worn or distorted.
- Check that the camshaft and the rocking lever pin bearings are not worn.
- Check that the head cover surface, the intake manifold and exhaust manifold are not worn.
- In case of fault, replace the big end.

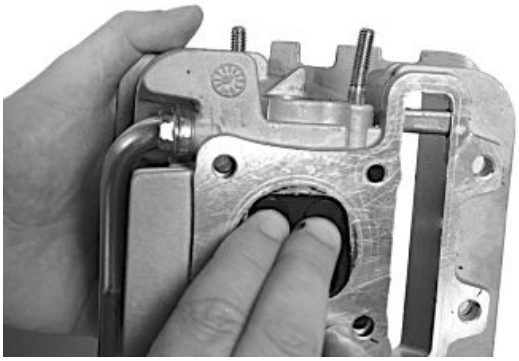


Characteristic

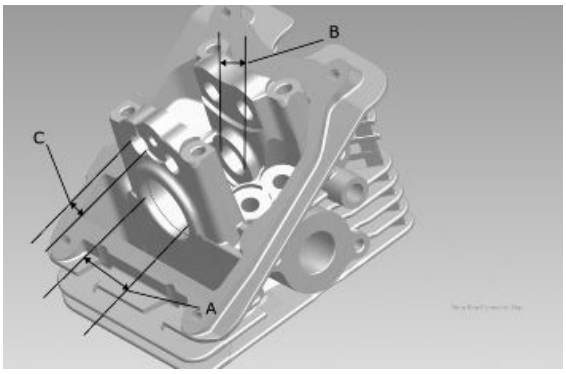
Maximum run-out allowed:

0.1 mm

- Fit the valves into the cylinder head.
- Alternatively test the intake and exhaust valves.
- The test should be carried out by filling the manifold with fuel and checking that the head does not ooze through the valves when they are just pressed by the fingers.



Measure the camshaft seat bearings and rocking lever support pins with a bore meter

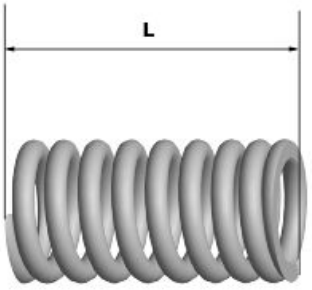


CHECKING THE HEAD

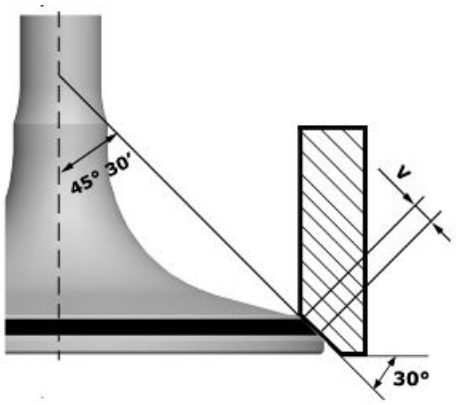
Specification	Desc./Quantity
Standard diameter (mm) A	Ø 32.015 - 32.025
Standard diameter (mm) B	Ø 16.0 - 16.018
Standard diameter (mm) C	Ø 11.0 - 11.018

Measure the unloaded spring length.

- Standard length: 31.3 mm
- Limit allowed after use: 29,3



- Remove any carbon deposits from the valve seats.
- Check the width of the mark on the valve seat «**V**» with Prussian blue.



Characteristic

Standard value:

1 - 1.3 mm

Limit allowed:

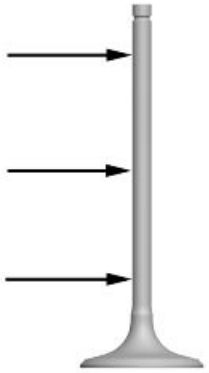
1.6 mm

- If the width of the mark on the valve seat is larger than the prescribed limits, true the seats with a 45° milling cutter and then grind.
- Replace the head in case of excessive wear or damage.

STANDARD LENGTH OF VALVE

Specification	Desc./Quantity
Intake: standard length	74.9 mm
Exhaust: standard length	74.35 mm

- Measure the diameter of the valve stem at the three positions indicated in the diagram.



STANDARD DIAMETER

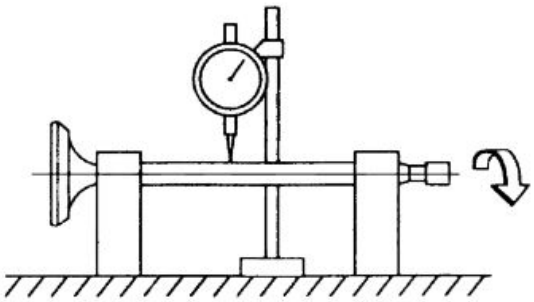
Specification	Desc./Quantity
Intake	3.970 - 3.985 mm
Exhaust	3.960 - 3.975 mm

MINIMUM DIAMETER ADMITTED

Specification	Desc./Quantity
Intake	3.958 mm
Exhaust	3.945 mm

- Calculate the clearance between the valve and its guide.

- Check the concentricity of the valve head by placing a dial gauge at right angles to the valve head and rotating it on the «**V**» shaped support.

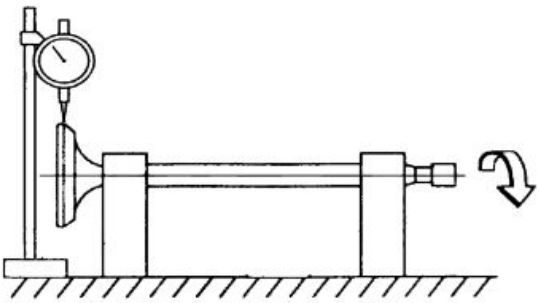


Characteristic

Limit allowed:

0.03 mm

- Check the deviation of the valve stem by resting it on a «**V**» shaped support and measuring the extent of the deformation using a dial gauge.

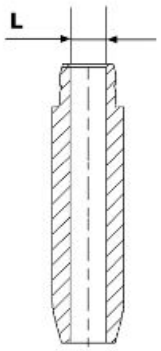


Characteristic

Limit value allowed:

0.1 mm

Measure the valve guides



VALVE GUIDE DIAMETER

Specification	Desc./Quantity
Valve guide	Standard diameter: 4 + 0.012 mm
Valve guide	Maximum diameter allowed: 4 + 0.022 mm

- After measuring the valve guide diameter and the valve stem diameter, check the clearance between guide and stem.

INTAKE

Specification	Desc./Quantity
Standard clearance	0.015 - 0.042 mm
Limit allowed	0.06 mm

EXHAUST

Specification	Desc./Quantity
Standard clearance	0.025 - 0.052 mm
Limit allowed	0.07 mm

- If no faults are found during the above checks, the same valves can be reused. For better sealing results, we recommend grinding the valve seats. Grind the valves gently with fine-grained lapping compound. Upon grinding, keep the cylinder head in horizontal position. This will prevent the lapping compound residues from penetrating between the valve stem and the guide (see figure).

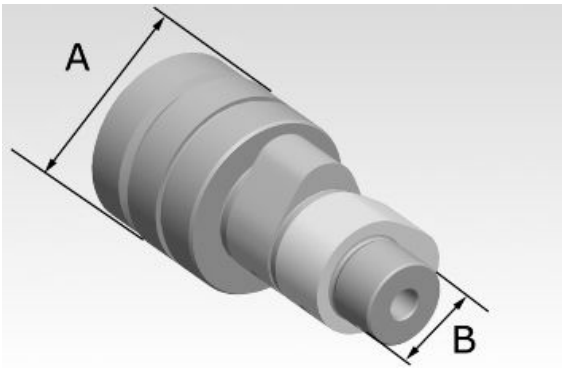
CAUTION

TO AVOID SCORING THE FAYING SURFACE, DO NOT ROTATE THE VALVE WHEN NO LAPPING COMPOUND IS LEFT. CAREFULLY WASH THE CYLINDER HEAD AND THE VALVES WITH A SUITABLE PRODUCT FOR THE TYPE OF LAPPING COMPOUND BEING USED.

CAUTION

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

- Check the camshaft bearings for signs of abnormal wear.



Characteristic

Standard diameter - Bearing A:

Ø 12+0.002

+0.010 mm **Standard diameter - Bearing B:**

Ø 16-0.015 -0.023 mm

Minimum diameter allowed - Bearing A:

Ø 11.98 mm

Minimum diameter allowed - Bearing B:

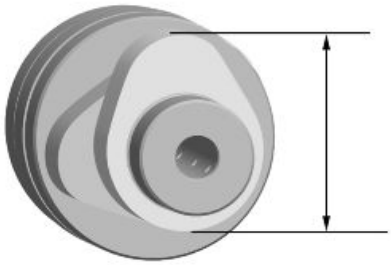
Ø 15.96 mm

- Using a gauge, measure the height of the cams.
- Check camshaft axial clearance

- If values measured are not within the specified limits or there are signs of excessive wear, replace the defective components with new ones.

NOTE

A BALL BEARING IS FITTED ON BEARING «A»; CONSEQUENTLY, BEARING «B» IS THE MOST IMPORTANT AS IT WORKS DIRECTLY ON THE ALUMINIUM OF THE HEAD



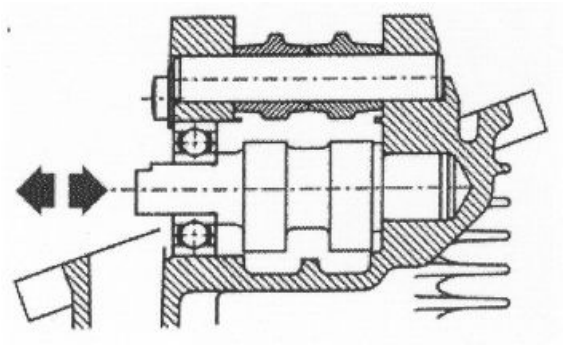
Characteristic

Standard height - Intake

24.397 mm

Standard height - Exhaust

23.996 mm



Fitting clearance

Maximum axial clearance allowed: 0.5 mm

- Check the outside diameter of the rocker pins
- Check there are no signs of wear or scoring on the rocker pins.
- Check the internal diameter of each rocker arm.
- Check that the pad in contact with the cam is not worn.

DIAMETER OF PINS AND ROCKING LEVERS

Specification	Desc./Quantity
Rocking lever inner diameter	11.015 - 11.035 mm
Rocking lever pin diameter	10.977 - 10.985 mm

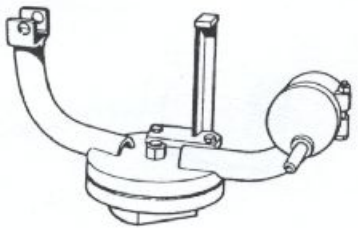
Products

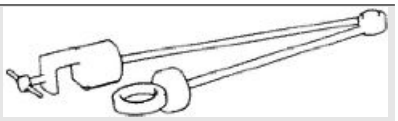
TABELLA PRODOTTI CONSIGLIATI

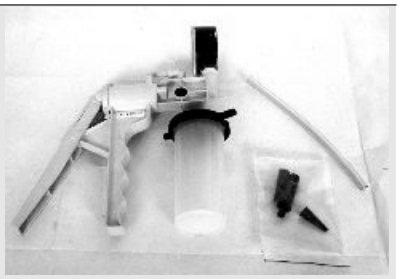
Product	Description	Specifications
AGIP CITY HI TEC 4T	Engine oil	SAE 5W/40, API SL, ACEA A3, JASO MA
AGIP GEAR SYNTH SAE 75W-90	Gearbox oil	API GL4, GL5
AGIP FORK 7.5W	Fork oil	-
AGIP GREASE SM2	Lithium grease with molybdenum for bearings and other points needing lubrication	NLGI 2
AGIP BRAKE 4	Brake fluid	FMVSS DOT4+
AGIP FILTER OIL	Oil for air filter sponge	-

INDEX OF TOPICS

TOOLS

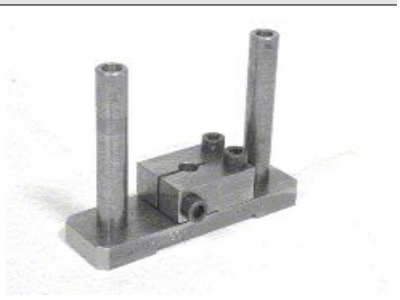
Stores code	Description	
001467Y008	Calliper to extract 17-mm diameter bearings	
001467Y029	Bell for 38-mm outside diameter bearings	
004499Y	Bearing extractor. Equipped with: 1 Bell, 2 Sleeve, 3 Screw, 6 Ring, 27 Half rings, 34 Half rings	
005095Y	Engine support	
008119Y009	Pipe for fitting the shafts and the axles	
020004Y	Punch to remove steering bearings from headstock	

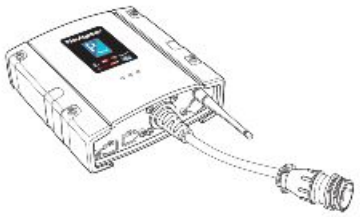
Stores code	Description	
020055Y	Wrench for steering tube ring nut	
020074Y	Tool to align crankshaft	
020150Y	Air heater support	
020151Y	Air heater	
020162Y	Flywheel extractor	
020171Y	Punch for driven pulley roller bearing	
020265Y	Bearing fitting base	

Stores code	Description	
020288Y	Fork for fitting the piston on the cylinder	
020291Y	Tool to fit/remove valves	
020306Y	Punch for fitting the valve seal rings	
020329Y	Vacuum pump Mity-Vac	
020330Y	Stroboscopic light for timing checking	
020331Y	Digital multimeter	

Stores code	Description	
020332Y	Digital rpm indicator	
020334Y	Multiple battery charger	
020335Y	Dial gauge magnetic support	
020340Y	Punch to fit flywheel and transmission oil seals	
020358Y	37 x 40 mm adaptor	
020359Y	42 x 47-mm adaptor	

Stores code	Description	
020360Y	52 x 55-mm adaptor	
020362Y	12 mm guide	
020363Y	20 mm guide	
020364Y	25-mm Guide	
020376Y	Adapter handle	
020431Y	Valve oil seal extractor	

Stores code	Description	
020432Y	Tool to fit the start-up sector spring	
020439Y	17 mm guide	
020444Y	Tool to fit/remove the pin	
020448Y	Tool for fitting the pin snap rings	
020449Y	Support to check piston position	
020450Y	Tool for fitting/removing the camshaft	
020451Y	Driving pulley lock wrench	
020452Y	Pipe to remove and refit the driven pulley shaft	

Stores code	Description	
020456Y	Ø24 mm adaptor	
020565Y	Flywheel lock calliper spanner	
020683Y	Valve pressing member	
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
Safety locks	I		I		I		I		I		I
Driving belt			R		R		R		R		R
Spark plug		I	R	I	R	I	R	I	R	I	R
Throttle control	A		A		A		A		A		A
Oil mesh filter		C	C	C	C	C	C	C	C	C	C
SAS filter			C								C
Air filter			C		C		C		C		C
Solenoid filter		C	C	C	C	C	C	C	C	C	C
Valve clearance	I		I		I		I		I		I
Electrical system and battery	I	I	I	I	I	I	I	I	I	I	I
Cooling system					C				C		
Brake fluid **	I	I	I	I	I	I	I	I	I	I	I
Brake control levers	L		L		L		L		L		L
Headlight aiming adjustment			A		A		A		A		A
Engine oil*	R	R	R	R	R	R	R	R	R	R	R
Hub oil	R	I	R	I	R	I	R	I	R	I	R
Vehicle road test	I	I	I	I	I	I	I	I	I	I	I
Tyre pressure and wear	I	I	I	I	I	I	I	I	I	I	I
Sliding blocks / Variable speed rollers		I	R	I	R	I	R	I	R	I	R
Brake pads	I	I	I	I	I	I	I	I	I	I	I
Odometer gear			L		L		L		L		L
Idle speed	A		A		A		A		A		A
Suspension			I		I		I		I		I
Steering	A		A		A		A		A		A
Transmissions			L		L		L		L		L
Fuel pipes ***	I		I		I		I		I		I

Carburettor

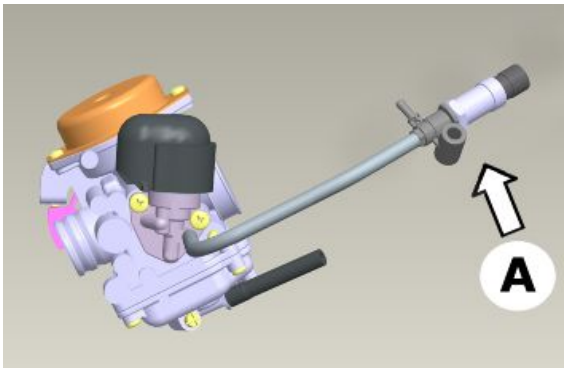
Solenoid valve

The carburettor features a solenoid valve **"A"** that, via an ECU, manages an extra flow of air.

It is connected to the carburettor via flexible pipes as shown in the figure.

The valve is placed under the helmet compartment as shown in the picture. Remove the rear central cover to reach it.

Pipe **"B"** is coupled to a filter placed inside the fuse box. The solenoid filter should be cleaned according to the kilometres travelled as indicated in the scheduled maintenance chart.



Idle speed adjustment

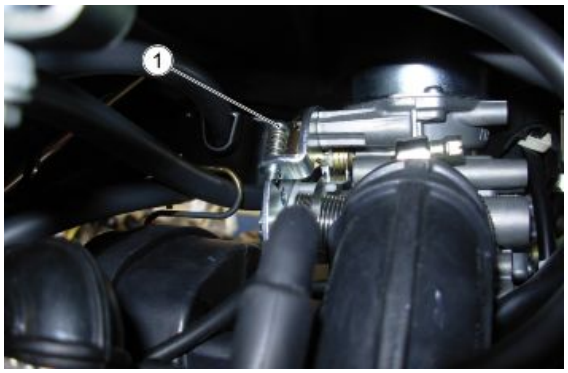
Check idle speed according to the indications in the maintenance table. To reach the set screw:

- Remove the rear central cover.

CAUTION

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

- Operate on the screw «1» until the preset idle speed is obtained.



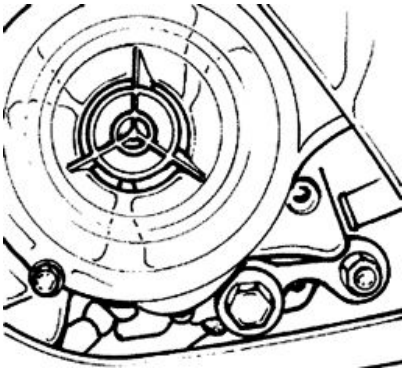
Characteristic

Engine revs at idle speed

1,800 ± 100 rpm

Checking the spark advance

The vehicle is fitted with a variable advance electronic device. There are two timing references on the flywheel cover in order to ensure a better precision when detecting the reference on the fan.



CAUTION

IF FLASH INDICATIONS ARE UNSTABLE AND THE RPM INDICATION DOES NOT CORRESPOND WITH REAL ENGINE SPEED VARIATION (FOR EXAMPLE, VALUES SHOWN ARE HALVED), INSTALL A 10 - 15 KΩ RESISTIVE CABLE CONNECTED IN SERIES TO AN HV CABLE. IF THE IRREGULAR READING CONTINUES AFTER THIS OPERATION, CHECK THE COMPONENTS OF THE IGNITION SYSTEM.

When the advance check is carried out with a stroboscopic gun, add 10° flywheel keying to the table below.

MAPPA ATTIVAZIONE SAS (DUTY CYCLE%)
SAS setup map (duty cycle%)

	N. 16 rpm values															
N. 8 temperature values (°C)		500	3000	3500	4000	4600	5000	5500	5900	6500	7000	7400	8000	8400	9000	9500	10000
	-20	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0
	+10	0	30	30	10	0	0	0	0	0	0	0	0	0	10	10	10
	+35	0	47.5	47.5	27.5	0	0	0	0	0	0	0	0	12	22	22	22
	+50	0	64	64	64	0	0	0	0	0	0	0	16	16	26	26	26
	+57.5	0	60	60	60	20	0	0	0	0	0	20	25	25	35	35	35
	+65	0	40	75	75	60	50	30	25	15	17.5	20.5	28	34	40	65	75
	+135	0	40	75	75	60	50	30	25	15	17.5	20.5	28	34	40	65	75

Spark plug

Check the spark plug according to the indications in the maintenance table. To reach it:

- Remove the rear central cover.

CAUTION

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

- Disconnect the cap.
- Clean off any trace of dirt from the spark plug base by blowing compressed air.
- Unscrew the spark plug and remove it from its seat, making sure no dust or dirt gets into the cylinder.
- Check that spark plug electrode and central porcelain insulator do not have carbon deposits or corrosion; if necessary, remove them.
- Use a feeler gauge to check the electrode gap and, if necessary, adjust it.
- Make sure the washer is in good conditions.
- Fit the washer and then finger tighten the spark plug.
- Tighten to the specified torque.

Characteristic

Spark plug electrode gap

0.7 -0.8 mm

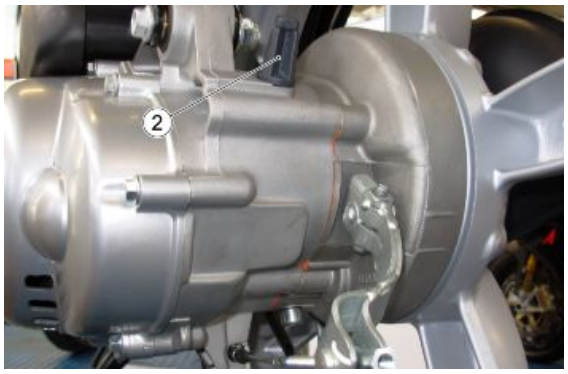
Locking torques (N*m)

Spark plug 12 - 14

Hub oil

Check

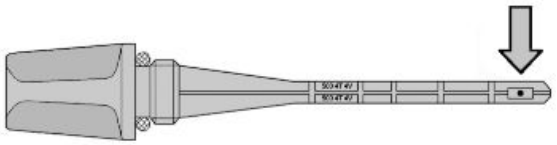
- Ride a few kilometres until the regular working temperature is reached, then stop the engine.
- Rest the vehicle on its stand.
- Remove the tap-dipstick «2» and clean it with a cloth.
- Reinsert the cap dipstick «2» into its housing and screw it again completely. Then pull it out again to check the oil level.



- The oil level is correct if it reaches the indicated mark.

CAUTION

RIDING THE VEHICLE WITH INSUFFICIENT LUBRICATION OR CONTAMINATED OR NOT RECOMMENDED LUBRICANTS ACCELERATES THE WEAR AND TEAR OF MOVING PARTS AND CAN CAUSE IRRETRIEVABLE DAMAGE.

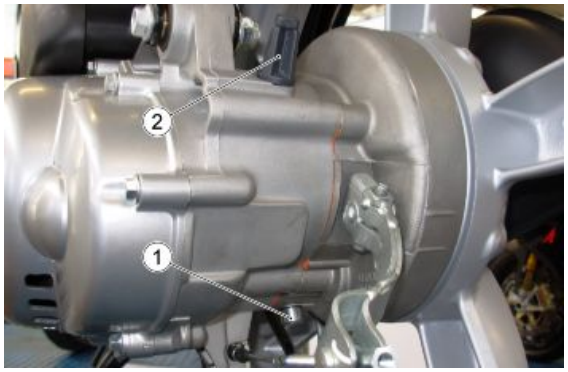


Replacement

To ensure long-lasting and optimal vehicle performance, change oil following the frequency indicated in the scheduled maintenance tables.

For change:

- Ride a few kilometres until the regular working temperature is reached, then stop the engine.
- Park the vehicle on its centre stand.
- Place a container with 200 cm³ minimum capacity under the drainage plug «1».
- Unscrew the filler cap «2» and the oil drainage plug «1».



- Let the oil drain off completely from the crankcase.
- Tighten drainage plug «1» and pour 100 cm³ of recommended oil.
- Check the hub oil level.
- Tighten the filler cap «2».

CAUTION

SCREW THE FILLER CAP AND THE DRAINAGE PLUG TIGHTLY AND MAKE SURE THAT OIL DOES NOT SEEP THROUGH.
CHECK REGULARLY THAT THERE ARE NO LEAKS IN THE CRANKCASE COVER GASKET.
RIDING THE VEHICLE WITH INSUFFICIENT LUBRICATION OR CONTAMINATED OR NOT RECOMMENDED LUBRICANTS ACCELERATES THE WEAR AND TEAR OF MOVING PARTS AND CAN CAUSE IRRETRIEVABLE DAMAGE.

Air filter

CAUTION

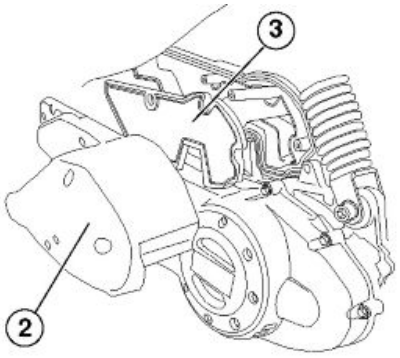
CLEAN AND CHECK THE AIR FILTER CONDITIONS MONTHLY OR FOLLOWING THE INDICATIONS IN THE SCHEDULED MAINTENANCE TABLES. THIS WILL DEPEND ON USE CONDITIONS.
IF THE VEHICLE IS USED ON DUSTY OR WET ROADS, CLEAN AND CHANGE THE FILTER MORE FREQUENTLY.

To clean the air filter, remove it from the vehicle.

Removing the air filter

- Park the vehicle on its centre stand.
- Undo and remove the six screws «1 ».

- Slide off the air filter cover «2».
- Slide off the filtering element «3».



Cleaning

CAUTION

DO NOT USE PETROL OR FLAMMABLE SOLVENTS TO CLEAN THE FILTERING ELEMENT TO AVOID RISK OF FIRE OR EXPLOSION.

- Wash the filtering element «3» with clean non-inflammable or high-volatility solvents and let it dry thoroughly.
- Apply a specific filter oil over all the surface.

Engine oil

Replacement

CAUTION

PARK THE VEHICLE ON SAFE AND LEVEL GROUND.

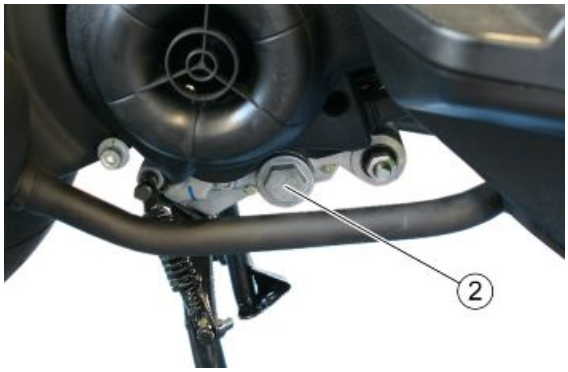
- Park the vehicle on its centre stand.

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 with + 850 cm³ capacity under the engine oil filter.

- Unscrew and remove the oil drainage plug «2» and then drain all the engine oil into the collecting container.
- Slide off the mesh filter and clean it.
- Insert the mesh filter.
- Screw and tighten the engine oil drainage plug «2».



- When refilling, add approx. 850 cm³ of engine oil through the fill opening.
- 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 the engine oil level again using the cap-dipstick «1» and top-up, if necessary, without exceeding the «MAX» level.

NOTE

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

Check

- Park the vehicle on its centre stand.

CAUTION

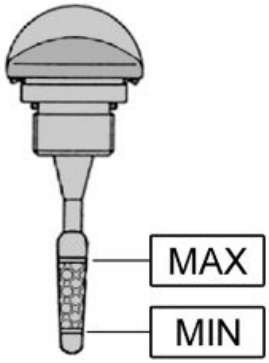
WAIT SOME MINUTES UNTIL THE ENGINE AND THE EXHAUST SYSTEM ARE COLD.

- Stop the engine and let it cool off so that the oil in the crankcase flows down and cools as well.

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.
- Screw the cap-dipstick «1» fully into its tube.
- Remove the cap-dipstick «1» again and read the level the oil reaches on the dipstick:



MAX = maximum level;

MIN = minimum level.

- The level is correct when it is close to the «MAX» level marked on the measuring dipstick.

CAUTION

IN ORDER TO AVOID DAMAGING THE ENGINE, OIL LEVEL MUST NEVER EXCEED THE «MAX» MARK OR FALL BELOW THE «MIN» MARK.

- Top-up if required.

TOP-UP

Do not exceed the «**MAX**» mark level when topping-up engine oil.

- Pour a small quantity of oil through the tube and wait about one minute so that the oil flows evenly into the crankcase.
- 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 cap-dipstick «1».

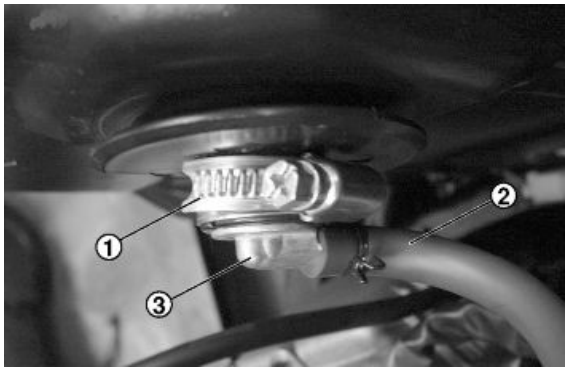
CAUTION

RIDING THE VEHICLE WITH INSUFFICIENT LUBRICATION OR CONTAMINATED OR NOT RECOMMENDED LUBRICANTS ACCELERATES THE WEAR AND TEAR OF MOVING PARTS AND CAN CAUSE IRRETRIEVABLE DAMAGE.

Fuel filter

Cleaning the fuel filter

- Empty the fuel tank.
- Unscrew the clamp «1».
- Remove the pipe «2».
- Slide off the petrol flange «3».
- Unscrew the filter «4» from the flange «3».



NOTE

BLOW THE FILTER WITH COMPRESSED AIR AND REFIT.

Transmissions

Check that the throttle grip works correctly

CAUTION

DO NOT USE THE VEHICLE IF THE THROTTLE GRIP CABLE IS DAMAGED, TWISTED OR COILED. THIS MAY INTERFERE WITH THE THROTTLE GRIP NORMAL OPERATION.
THE THROTTLE GRIP MAY GET LOCKED AND THIS MAY RESULT IN LOSS OF VEHICLE CONTROL.

Make sure the front fork rotation does not press the throttle grip and engage gears. Furthermore, make sure that the throttle grip goes back to idle position smoothly and automatically when released.

If this does not occur:

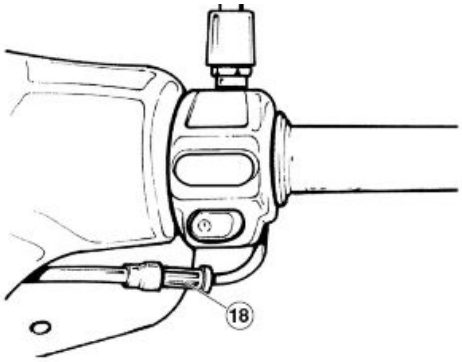
NOTE

USED THE SPECIFIC LUBRICANT AVAILABLE IN THE MARKET TO LUBRICATE THE COMPONENTS.

Check the position and lubrication of the following components:

- throttle grip cable sheath;
- throttle grip regulator «18»;
- cable terminals;
- throttle grip.

Check the throttle grip adjustment.



Throttle grip adjustment

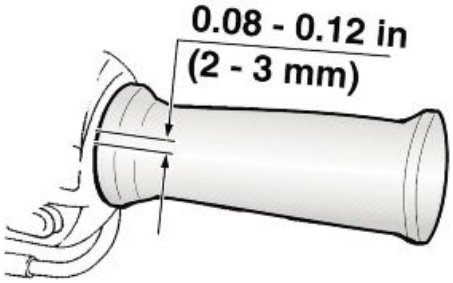
NOTE

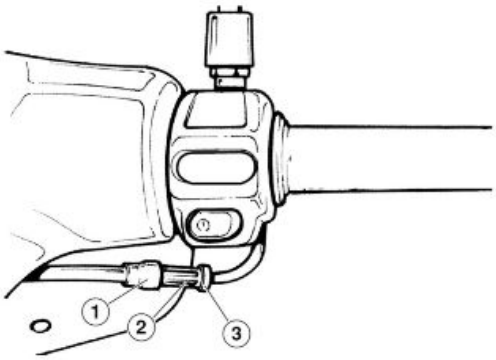
BEFORE CARRYING OUT ANY TYPE OF OPERATIONS, MAKE SURE THE THROTTLE GRIP WORKS PROPERLY.

The throttle grip cable backslash must be between 2 - 3 mm (0.08 - 0.12 in), measured at the throttle trim, see the drawing above.

To adjust the cable:

- Park the vehicle on its centre stand.
- Pull the rubber sheathing «1» back.
- Loosen the clamping nut «2».
- Turn regulator «3» so as to restore the specified value.
- After adjusting, tighten the closing nut «2» and check backlash again.
- Refit the rubber sheathing «1».



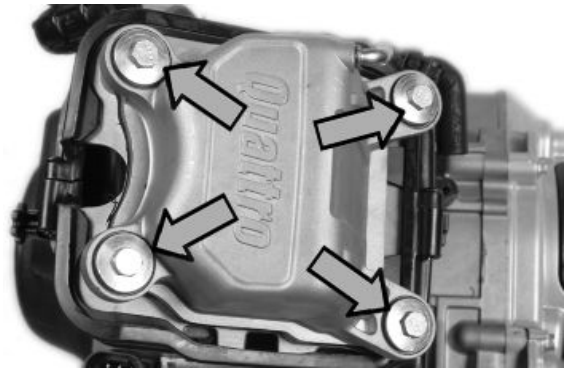


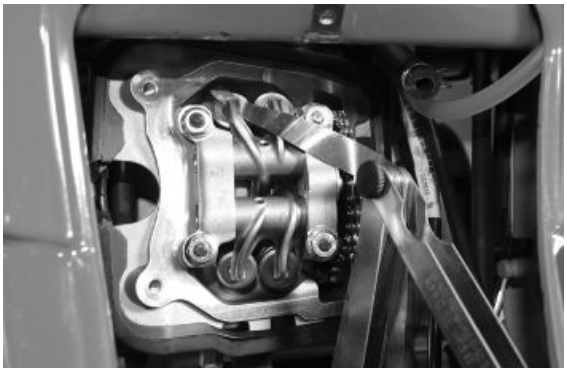
CAUTION

AFTER ADJUSTING THE THROTTLE GRIP, TURN THE HANDLEBAR FULLY TO THE LEFT AND THEN FULLY TO THE RIGHT WITH THE ENGINE AT IDLE SPEED.
CHECK THAT THE NOISE PRODUCED WITH THE ENGINE AT IDLE DOES NOT CHANGE WHILE CARRYING OUT THESE OPERATIONS. ALSO CHECK THAT THE THROTTLE GRIP CLOSES SMOOTHLY AND TOTALLY WHEN RELEASED.

Checking the valve clearance

- Remove the rear central cover
- Loosen and remove the 4 screws indicated in the figure and remove the tappet cover.
- To check valve clearance, centre the reference marks of the timing system point.
- Check that valve clearances are correct with a feeler gauge.
- If the valve clearance values, intake and exhaust respectively, differ from those indicated below, replace the calibrated pads in order to restore the correct valve clearance.





Characteristic

Intake (with cold engine)

0.10 mm

Exhaust (with cold engine)

0.15 mm

Braking system

CAUTION

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

Level check

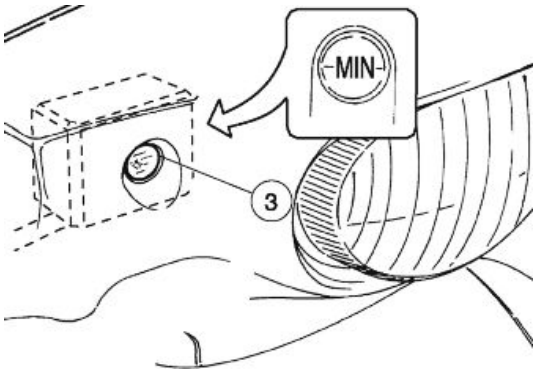
NOTE

CARRY OUT THESE OPERATIONS ONLY WITH THE VEHICLE ON A FLAT AND STABLE SURFACE, SUCH AS A GARAGE CONCRETE FLOOR.

- Park the vehicle on its centre stand.

MIN = minimum level.

- Turn the handlebar so that the fluid inside the brake reservoir reaches the "MIN' level reference mark stamped on the sight glass «3».



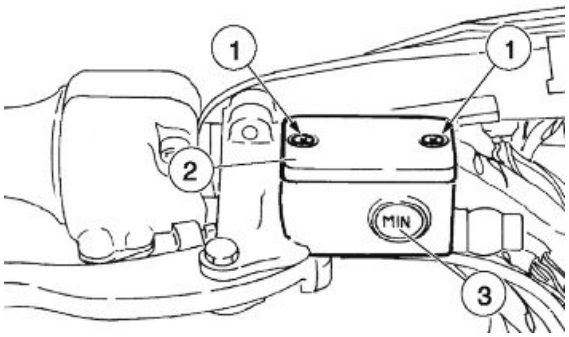
- Make sure that the fluid level in the reservoir is above the "MIN" reference mark stamped on the sight glass «3».

Top-up

- Remove the front handlebar cover.

CAUTION

TO REMOVE THE TWO SCREWS «1» FIXING THE RESERVOIR COVER «2», TURN THE HANDLEBAR SO THAT THE FLUID INSIDE THE BRAKE FLUID RESERVOIR IS AT THE "MIN" LEVEL REFERENCE MARK STAMPED ON THE SIGHT GLASS «3». IF THIS PROCEDURE IS NOT CARRIED OUT, THE BRAKE FLUID WILL SPILL OUT OF THE RESERVOIR.



- Turn the handlebar so that the fluid inside the reservoir reaches the "MIN" level reference mark stamped on the sight glass «3».

CAUTION

DO NOT OPERATE THE REAR BRAKE LEVER NOR TURN THE HANDLEBAR AFTER THE SCREWS «1» OR THE COVER «2» HAVE BEEN REMOVED. THIS WOULD CAUSE BRAKE FLUID TO SPLASH OR SPILL.

- Undo the two screws «1».
- Remove cover «2».
- Remove cover guide «4».

WARNING

AVOID PROLONGED AIR EXPOSURE OF THE BRAKE FLUID. BRAKE FLUID IS HYGROSCOPIC AND ABSORBS MOISTURE WHEN IN CONTACT WITH AIR. LEAVE THE BRAKE FLUID RESERVOIR OPEN ONLY FOR THE TIME NEEDED TO COMPLETE THE TOPPING UP PROCEDURE.

NOTE

TO AVOID SPILLING BRAKE FLUID WHILE TOPPING-UP, KEEP THE FLUID LEVEL IN THE RESERVOIR PARALLEL TO THE RESERVOIR EDGE AND DO NOT SHAKE THE VEHICLE.

- Remove the gasket «5».

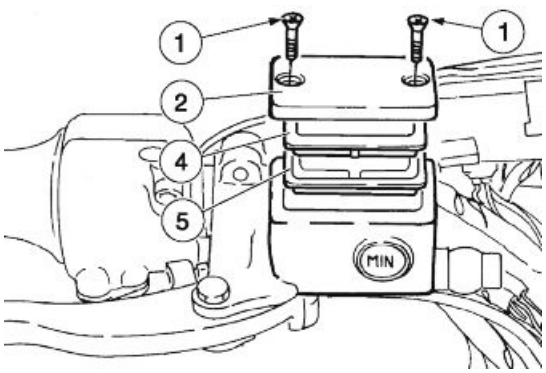
NOTE

TO REACH THE MAXIMUM LEVEL, TOP-UP UNTIL THE SIGHT GLASS IS FULLY COVERED BUT LEAVE A 5-6 MM (0.20-0.23 IN) MARGIN FROM THE RESERVOIR EDGE.

CAUTION

DO NOT EXCEED THE "MAX" LEVEL REFERENCE MARK WHEN TOPPING-UP. TOP-UP TO THE "MAX" LEVEL REFERENCE MARK ONLY WHEN NEW PADS ARE FITTED.

WARNING



NEVER FILL THE RESERVOIR UP TO THE "MAX" LEVEL REFERENCE MARK IF THE PADS ARE WORN; THIS WOULD CAUSE THE FLUID TO LEAK OUT FROM THE RESERVOIR WHEN THE NEW PADS ARE FITTED. USE ONLY THE RECOMMENDED PRODUCT, FROM CLEAN AND SEALED CONTAINERS. NEVER REUSE OLD BRAKE FLUID.

- Top-up the reservoir with brake fluid up to the "MAX" level.
- Refit gasket «5» correctly in its position.
- Refit cover guide «4» correctly in its position.
- Refit cover «2».
- Insert and tighten the two screws «1».
- Refit the front handlebar cover.

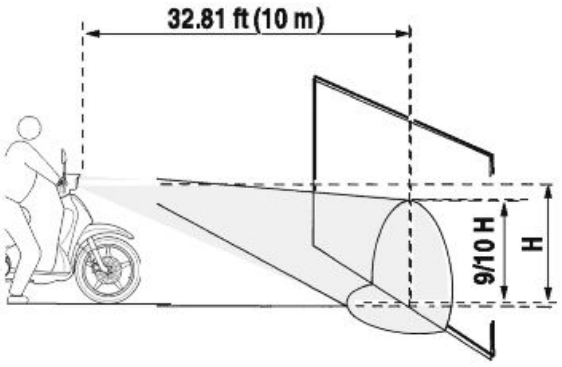
CAUTION

AFTER SERVICING BRAKES, ALWAYS CHECK THAT THEY OPERATE PROPERLY. EXCESSIVE BRAKE LEVER CLEARANCE OR POOR BRAKING PERFORMANCE MAY INDICATE THAT CIRCUIT NEEDS PURGING. THIS MAY ALSO BE DUE TO ANY OTHER PROBLEM IN THE BRAKING SYSTEM.

Headlight adjustment

CAUTION

NEVER USE THE VEHICLE IF THE HEADLAMPS DO NOT WORK PROPERLY.
NEVER USE THE VEHICLE IF THE HEADLAMPS ARE NOT CORRECTLY ADJUSTED; YOU MAY DAZZLE THE VEHICLE RIDING TOWARDS YOUR DIRECTION. THIS MAY ALSO REDUCE THE POSSIBILITY OF SEEING AN OBSTACLE AHEAD OF YOU ON THE ROAD WHEN RIDING AT NIGHT. IT IS ALWAYS ADVISABLE TO REDUCE SPEED WHEN RIDING AT NIGHT SO AS TO HAVE ENOUGH TIME TO AVOID POTENTIAL OBSTACLES AND TO ADAPT YOURSELF TO LOW VISIBILITY CONDITIONS RESULTING FROM DARKNESS.
FAILURE TO OBSERVE THESE RECOMMENDATIONS MAY CAUSE A CRASH INTO ANOTHER VEHICLE RESULTING IN SERIOUS INJURIES OR EVEN DEATH.



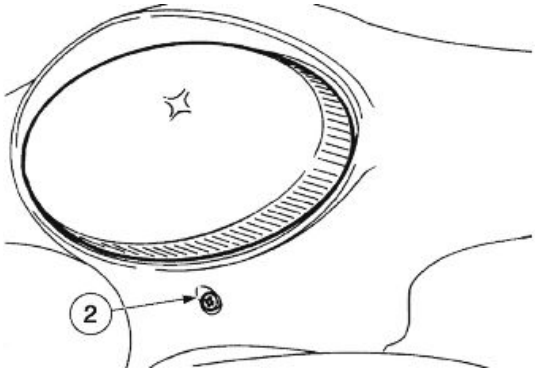
NOTE

THE PROCEDURE DESCRIBED HEREIN COMPLIES WITH THE ITALIAN STANDARDS REGARDING MAXIMUM HEIGHT OF THE LIGHT BEAM.
IF THE VEHICLE IS USED IN OTHER COUNTRIES, NATIONAL REGULATIONS MUST BE OBSERVED.

For a quick check on correct light beam direction, place the scooter on level ground, 10 m (32.81 ft) from a wall.

Turn on the low-beam light, sit on the scooter 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:



- Adjust screw «2» using a screwdriver.
- Turn the screwdriver clockwise to lift the light beam.
- Turn the screwdriver anticlockwise to lower the light beam.

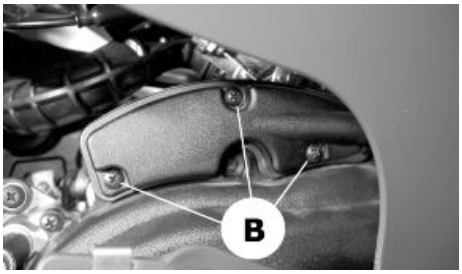
SAS filters inspection and cleaning

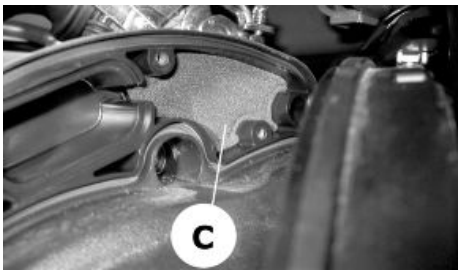
Loosen and remove the three screws «**B**», the cover of the secondary air housing and the filtering element made of sponge «**C**».

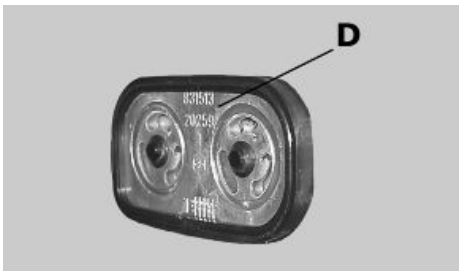
Wash the filter with water and neutral soap, then dry with a clean cloth and short blasts of compressed air.

While cleaning the filter, check the condition of the reed valve «**D**», and fit it back in place on the housing.

Before closing the cover of the SAS housing, check the good condition of the sealing O-ring; replace it, if damaged or deformed.



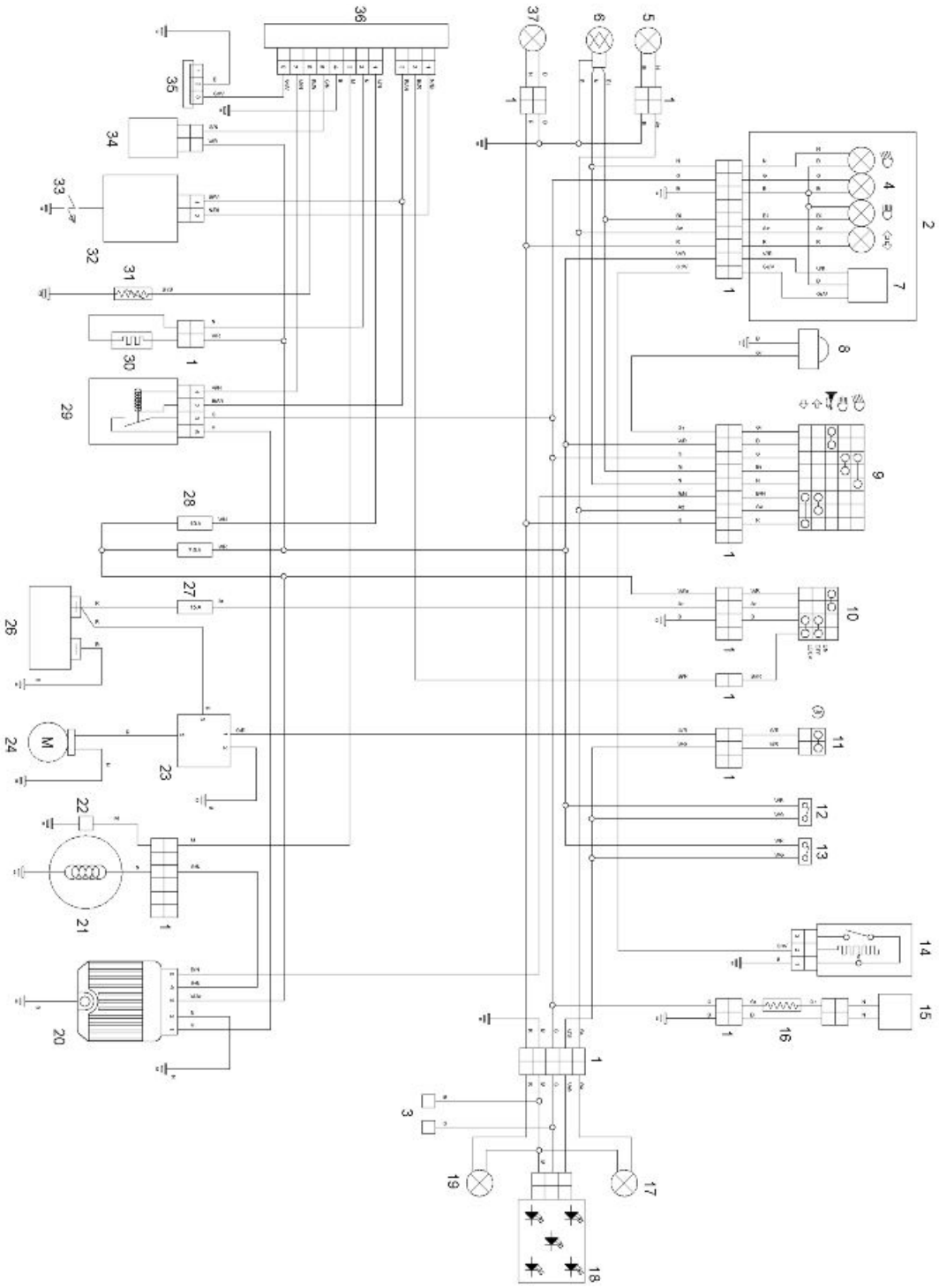




NOTE

The reed valve can be inserted in one direction only on the SAS housing

INDEX OF TOPICS



KEY:

1. Multiple connectors
2. Instrument panel
3. License plate lamp installation
4. Instrument panel lighting bulb
5. Front left turn indicator
6. High-/low-beam bulb

7. Fuel gauge
8. Horn
9. Left light switch
10. Key switch
11. Right light switch
12. Front stop switch
13. Rear stop switch
14. Fuel level sensor
15. Automatic starter
16. Resistor
17. Left rear turn indicator
18. Tail light assembly
19. Rear right turn indicator
20. Voltage regulator
21. Alternator
22. Pick-up
23. Start-up relay
24. STARTER MOTOR
25. -
26. Battery
27. Main fuses
28. Auxiliary fuses
29. Light logic relay
30. Carburettor heater
31. Engine temperature sensor
32. Coil
33. Spark plug
34. Secondary air
35. ECU Diagnosis
36. ECU
37. Front right turn indicator

CABLE COLOURS

Ar orange

Az sky blue

B blue

Bi white

G yellow

Gr grey

M brown

N black

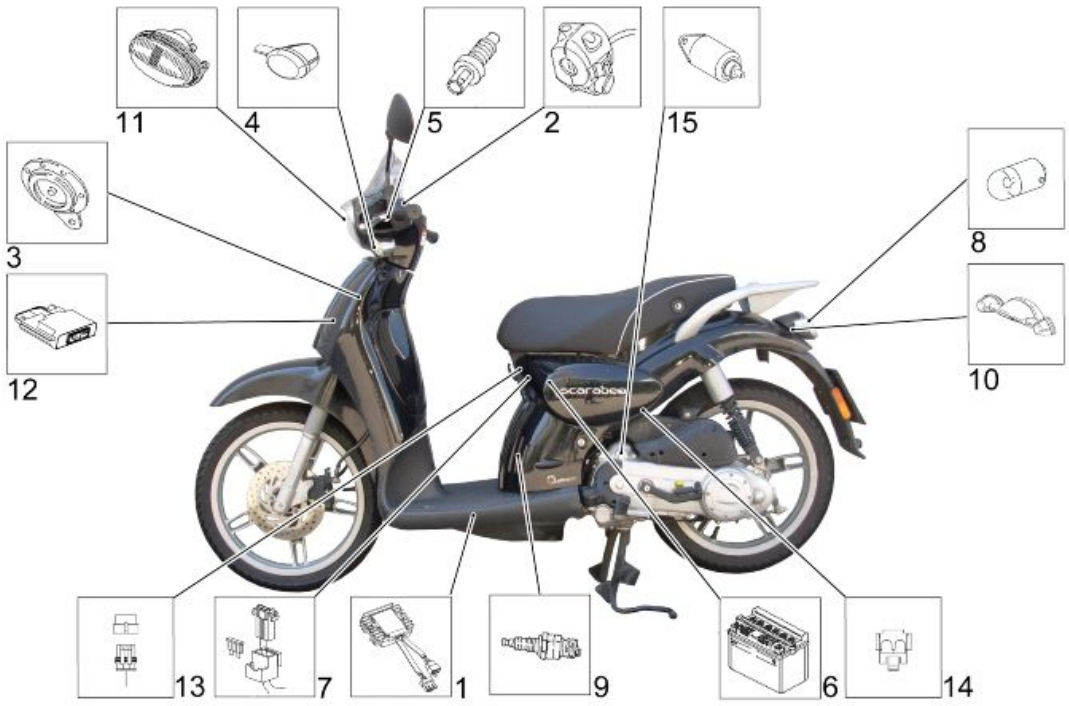
R red

V green

Vi purple

Ro pink

Components arrangement



KEY:

1. Voltage regulator

2. Left light switch

3. Horn

4. Left front turn indicator (RY10W 12V)

5 Rear brake stop light switch

6. Battery

7. Fuses

8. Left rear turn indicator bulb (RY10W 12V)

9. Spark plug

10. Rear tail/stop light bulb

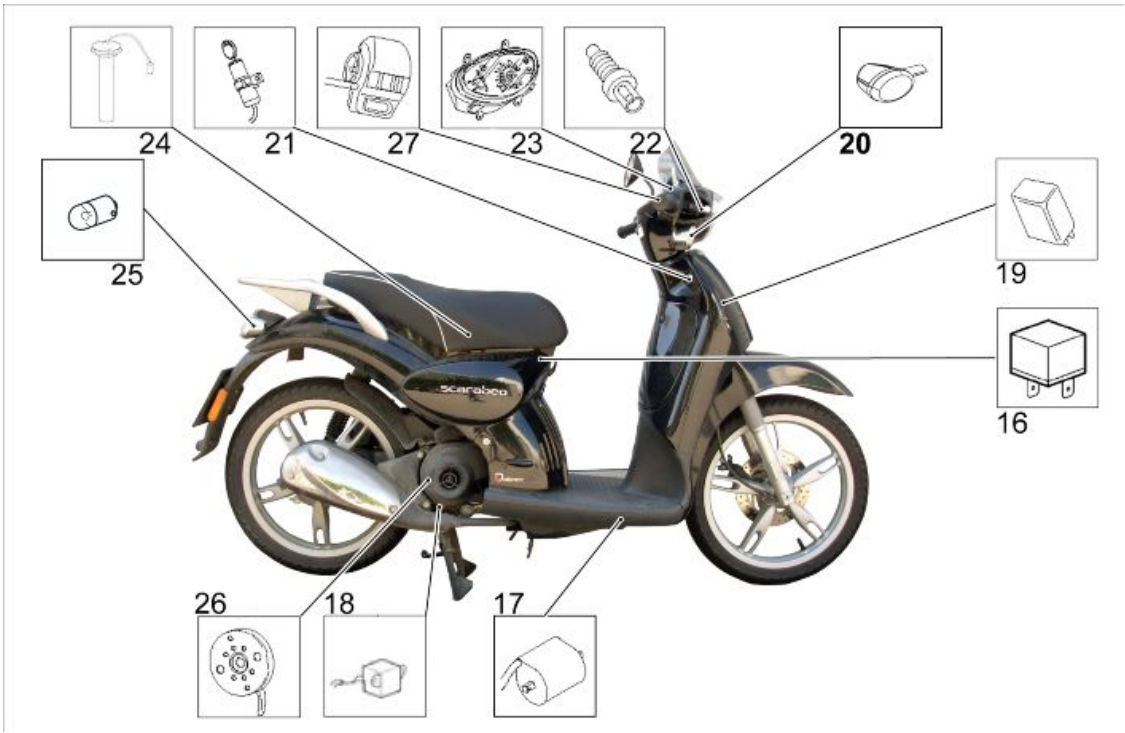
11. High-/low-beam bulb (35/35W 12V)

12. Control unit

13. Diagnostics socket

14. Solenoid

15. Starter motor



KEY:

16. Start-up relay

17. High voltage coil

18. Pick-up

19. Turn indicators

20. Right front turn indicator (RY10W 12V)

21. Key switch

22. Front brake stop light switch

23. Instrument panel

24. Fuel level sensor

25. Right rear turn indicator bulb (RY10W 12V)

26. Alternator

27. Right light switch

Ground points

Ground point on engine

- Remove the tail fairing to reach it.

Ground point on chassis

- Remove the footrests to reach it.

Electrical system installation

Motorcycle division

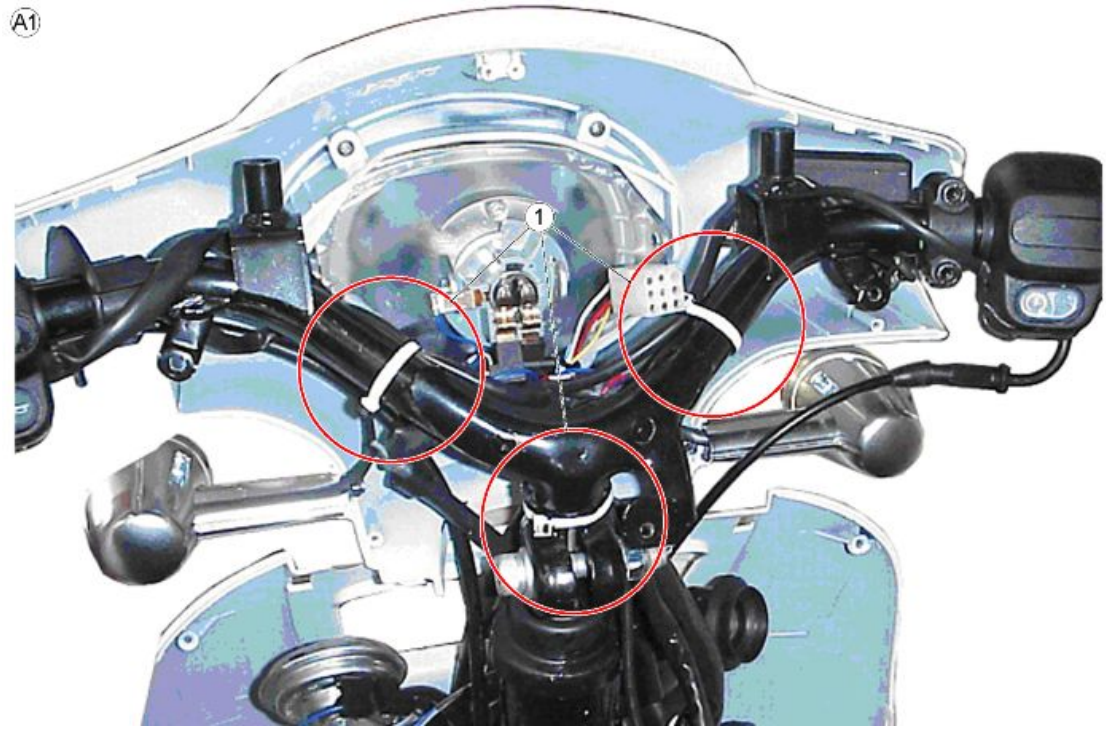
The wiring distribution is subdivided in two essential sections, as indicated in the figure.

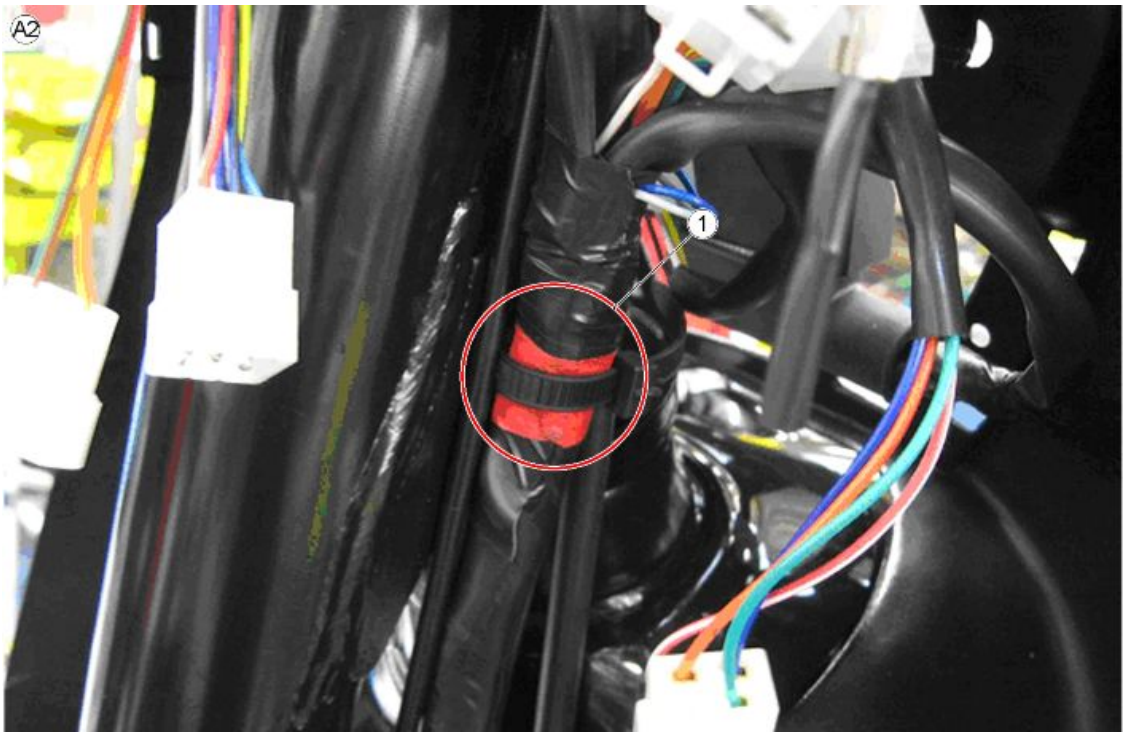
1. Front section
2. Rear section

Front side

A - Cable harness routing to the steering area

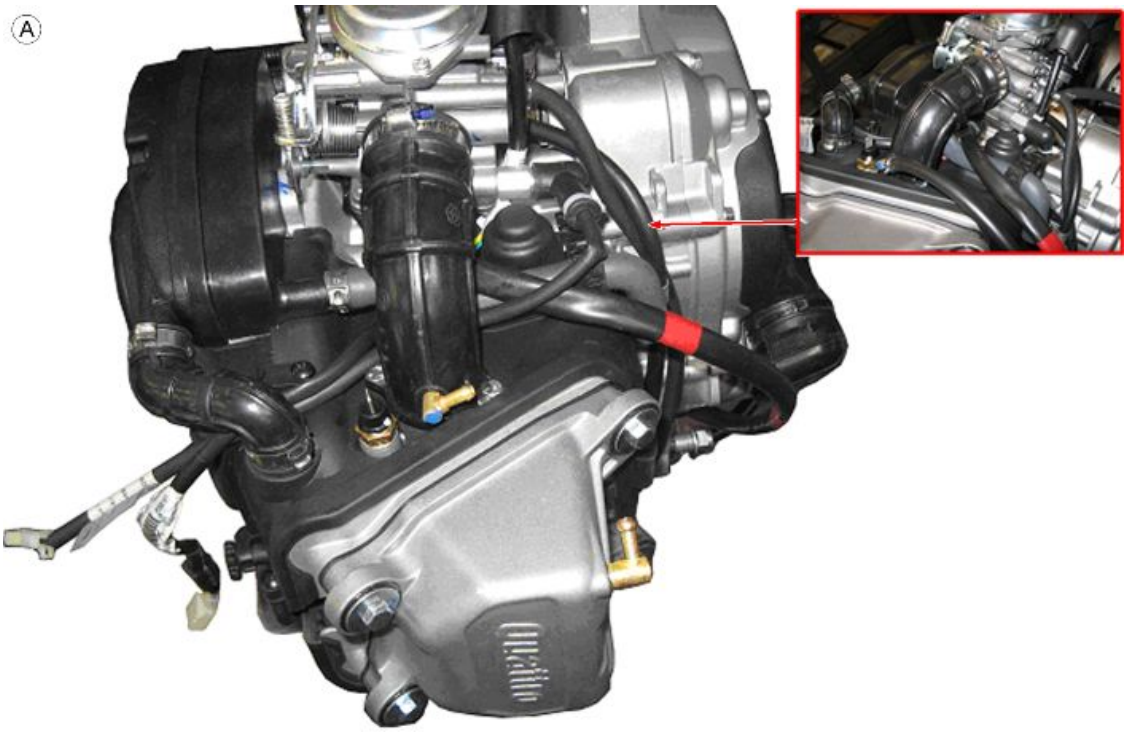
1 - Clamp





Back side

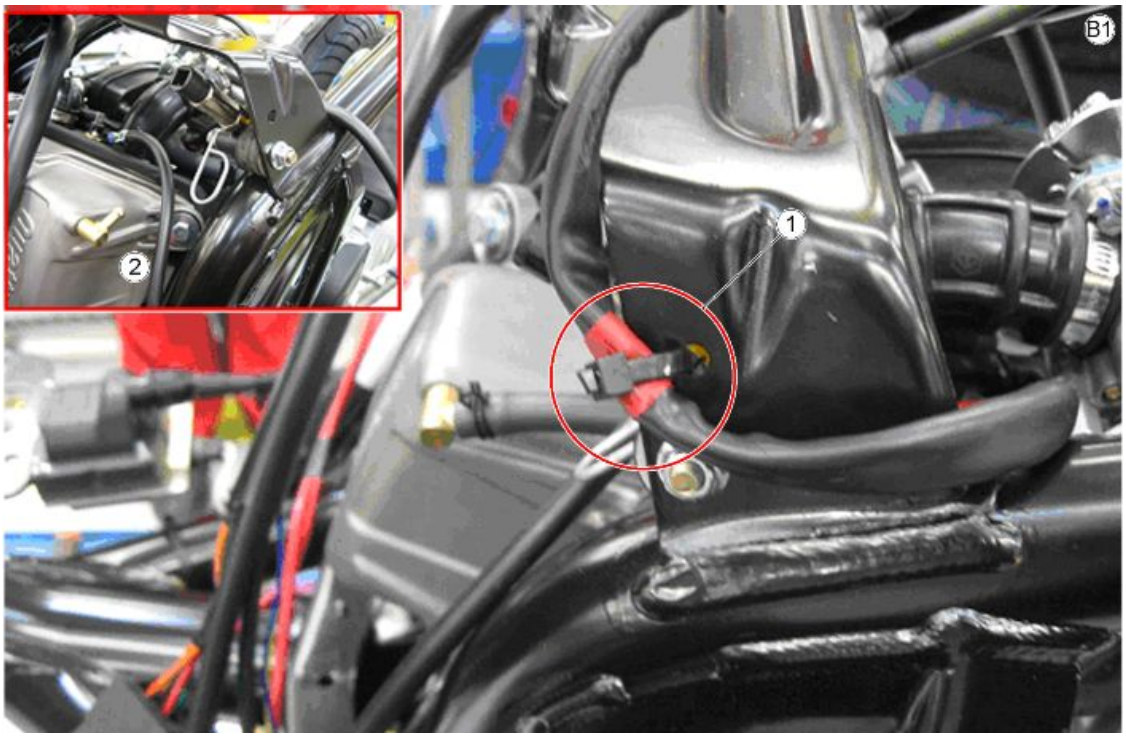
A - Cable harness routing to the engine



B - Cable harness routing to the chassis area

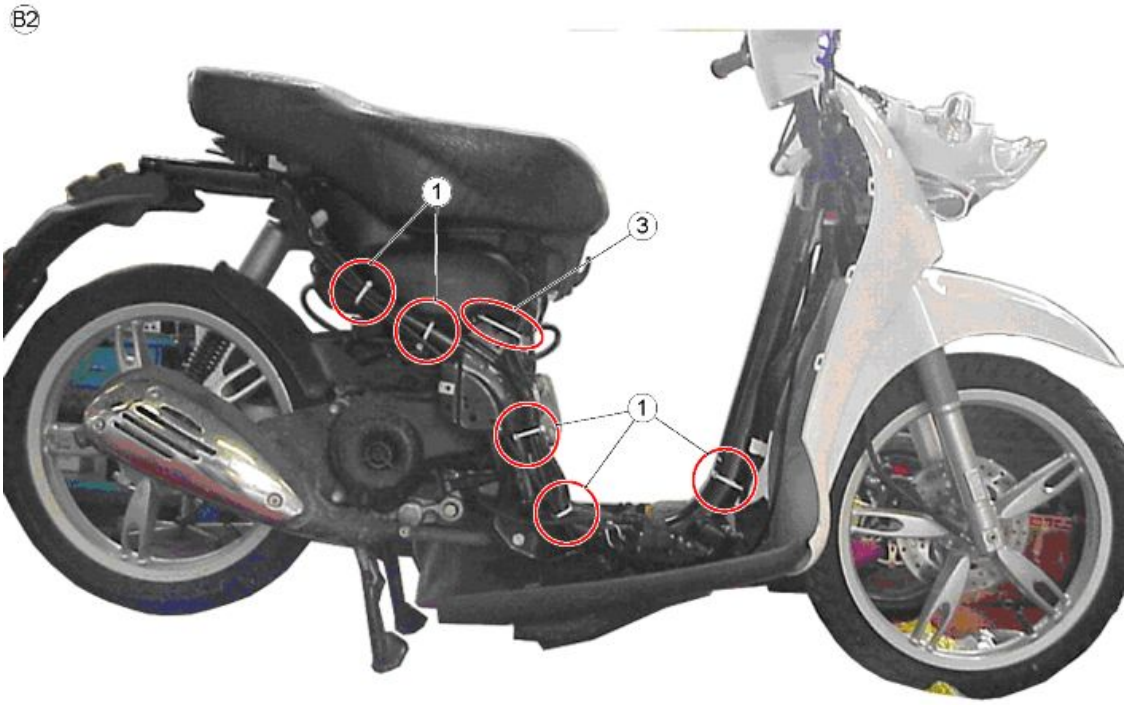
1 - Clamp

2 - Air solenoid positioning

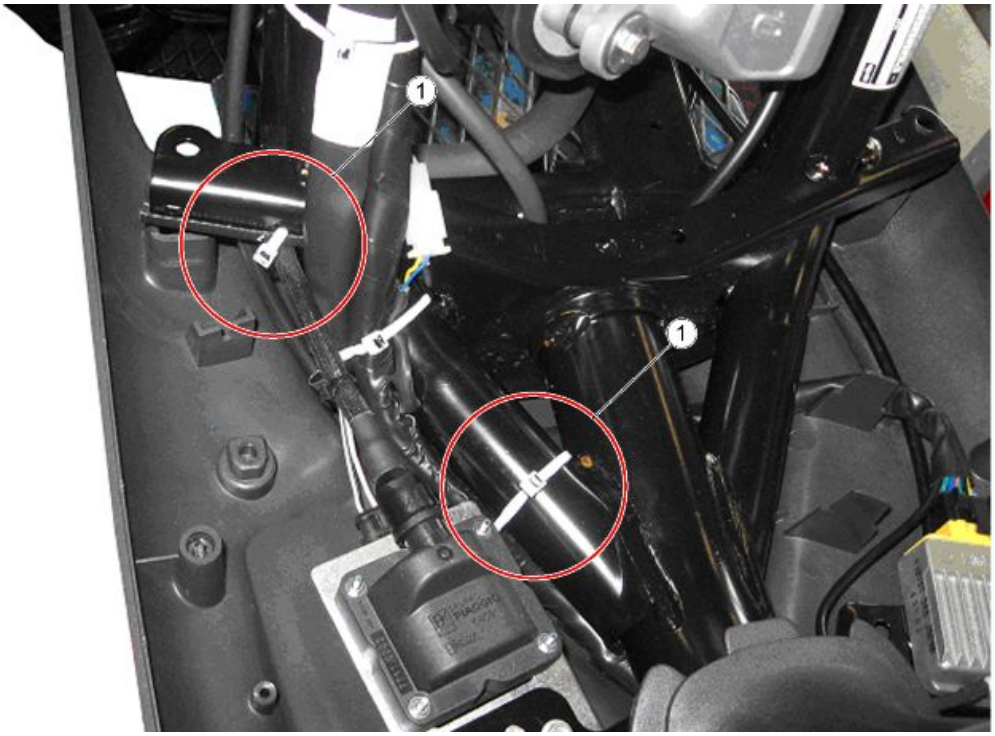


3 - Clamp (optional)

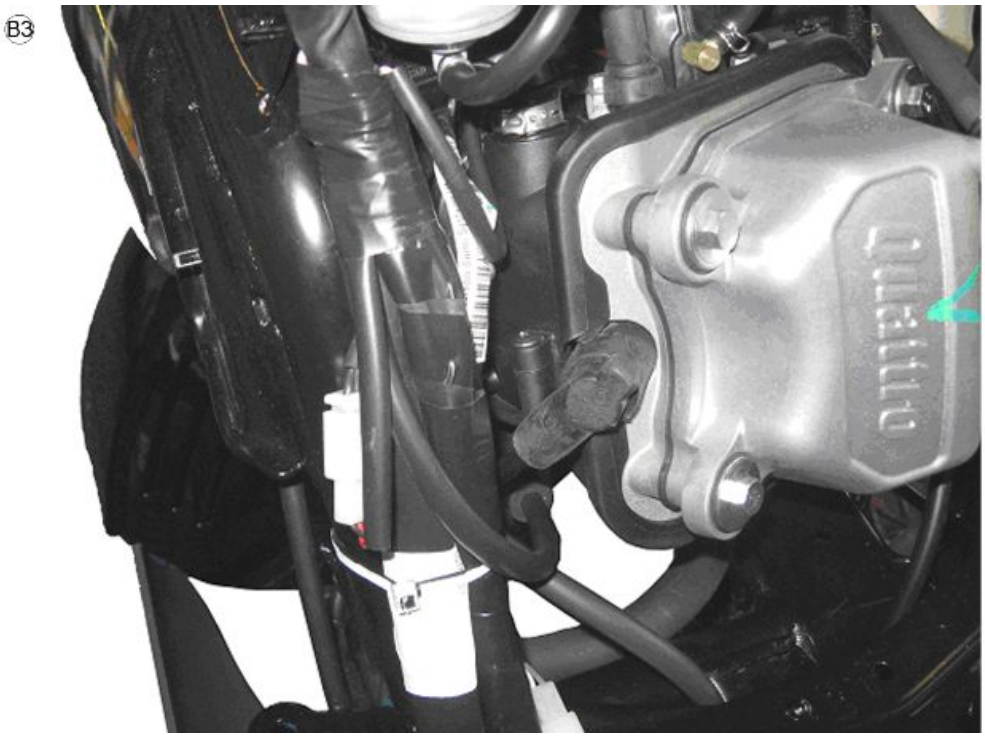
B2



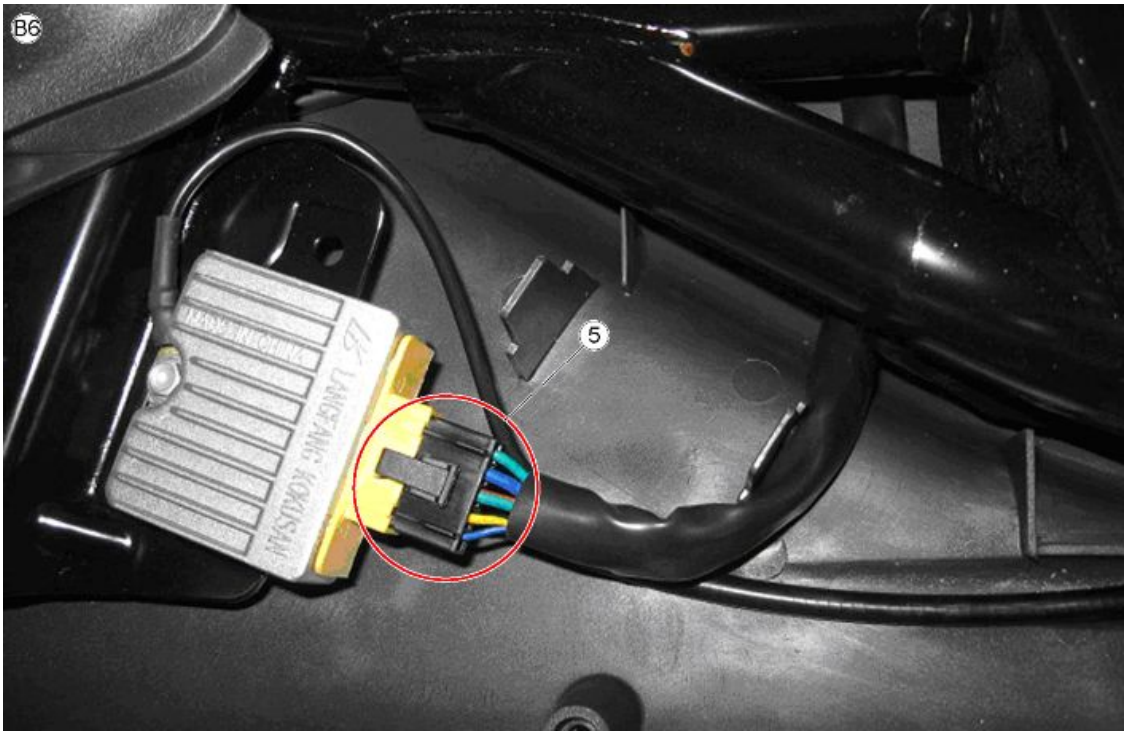
B3



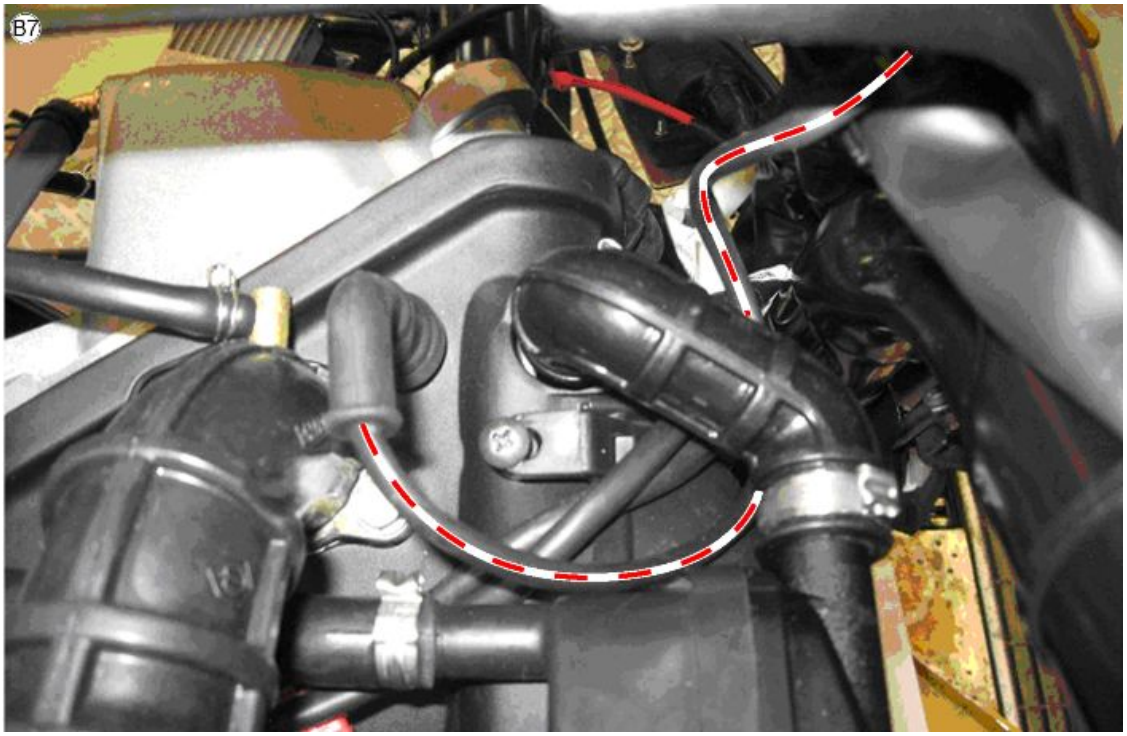
4 - Mudguard crest



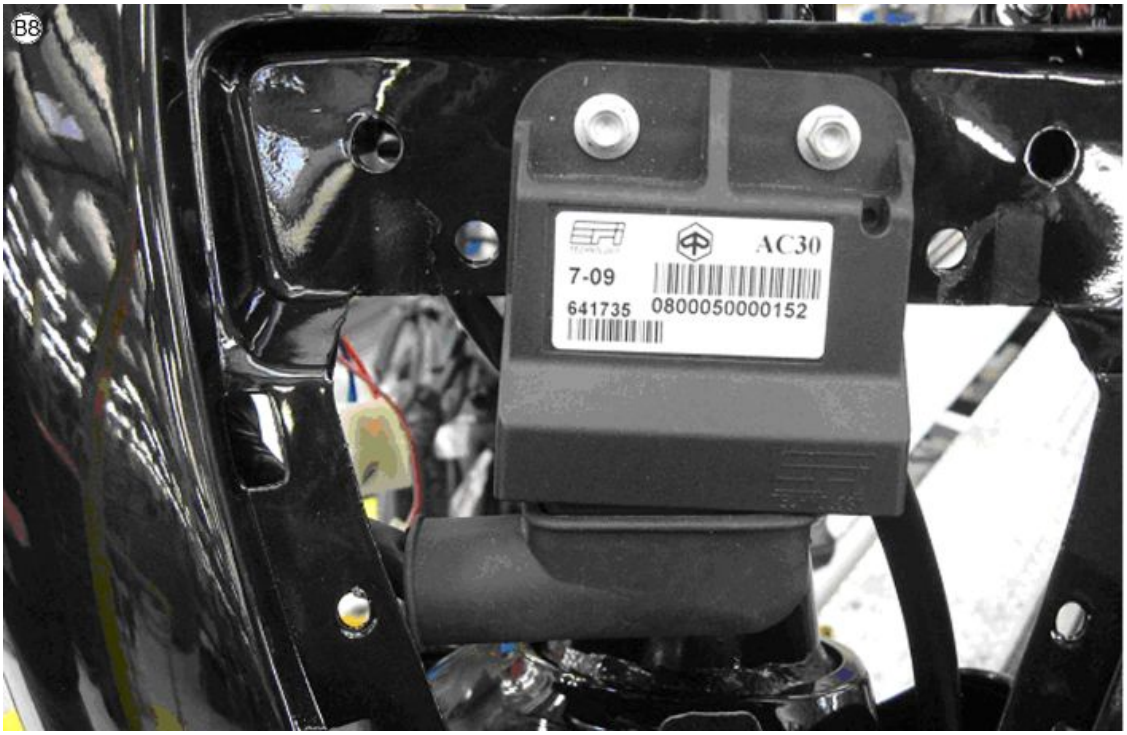
5 - **WARNING** Fit the connector completely until an end of stroke "click" is heard.



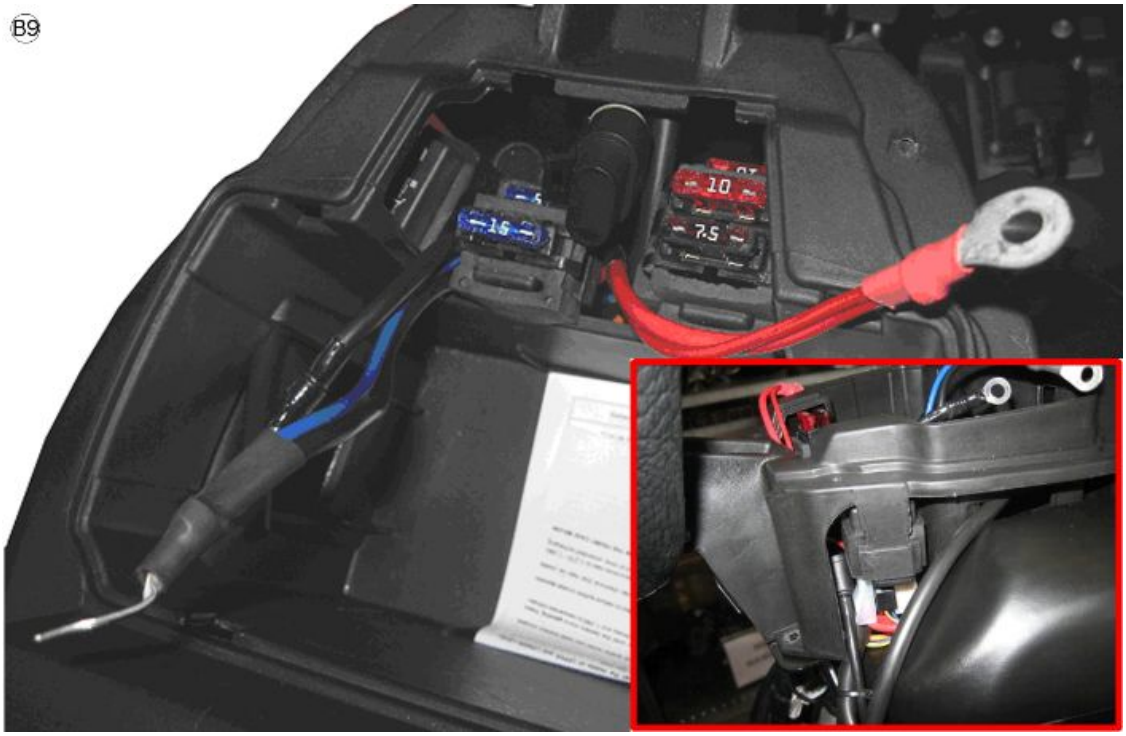
6 - Engine head temperature cable routing.

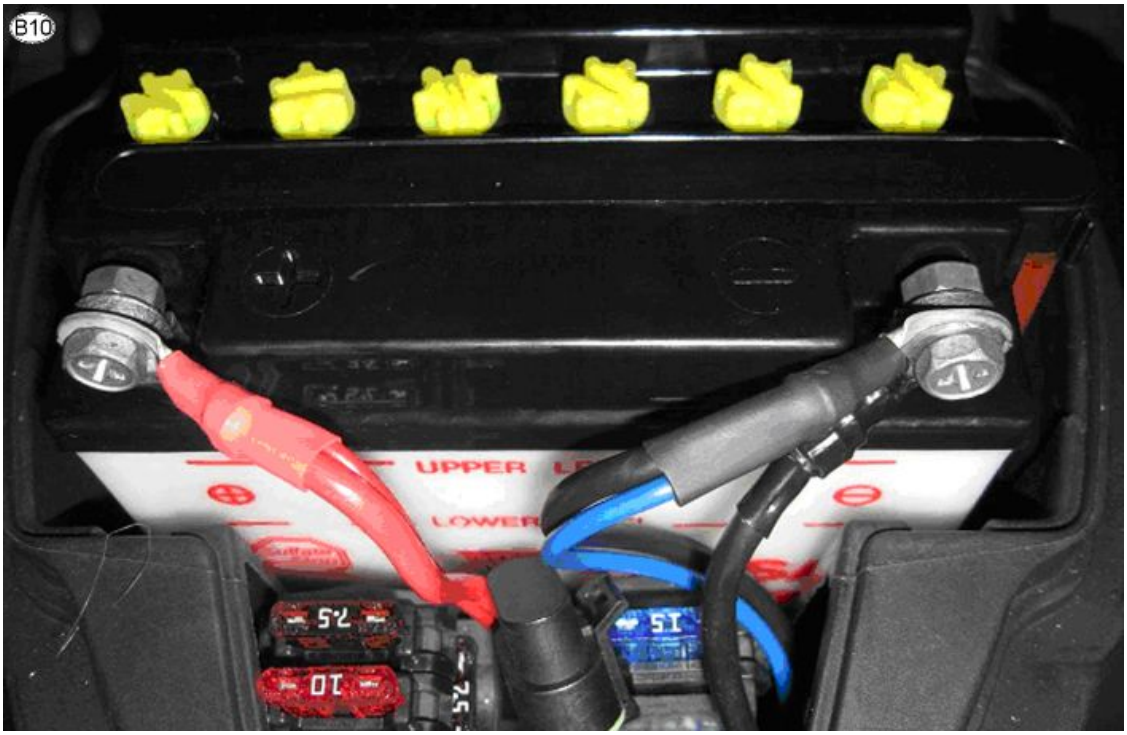


Correct fitting of the cap.

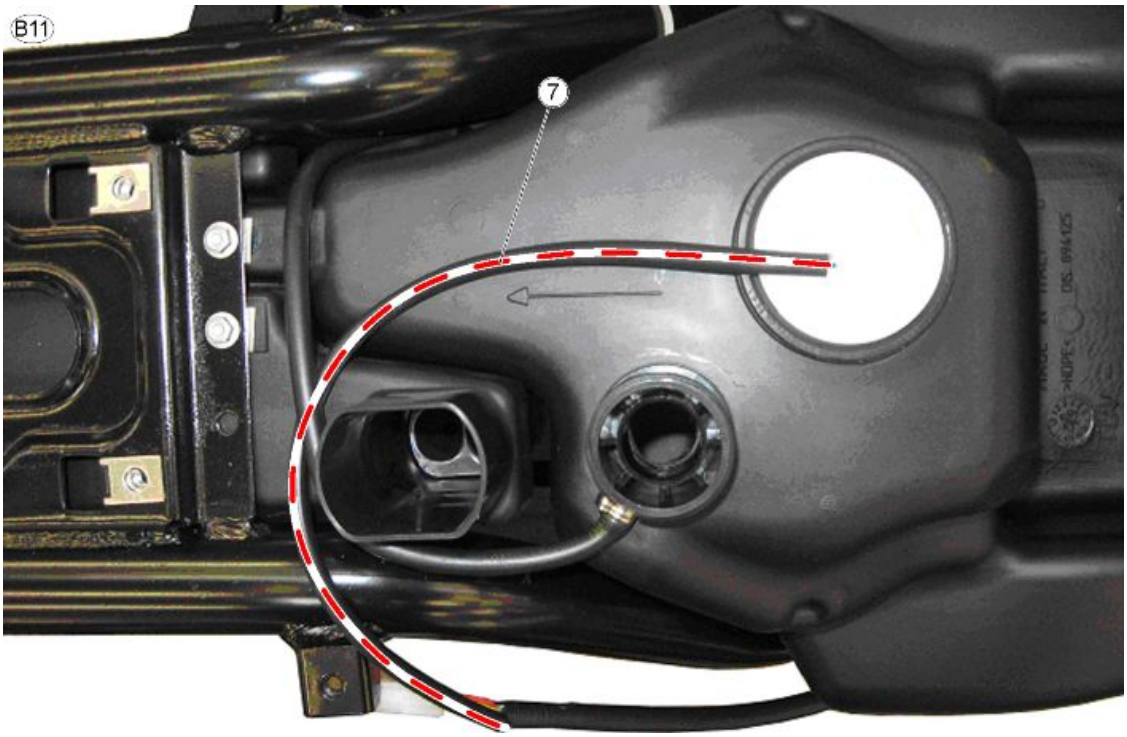


Layout of the relay and fuses.





7 - Fuel level cable routing

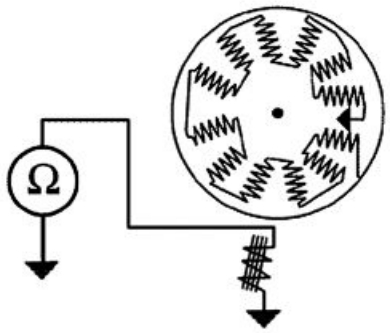


Checks and inspections

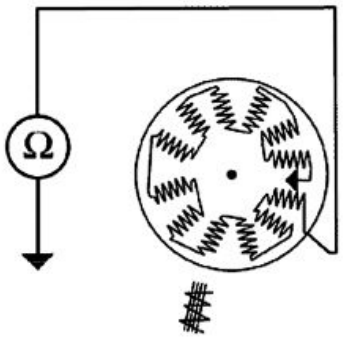
Ignition circuit

All the control operations of the system that require the disconnection of cables (checks of the connections and the devices making up the ignition circuit) must be done with the engine off: if this is not done, the control unit might be irretrievably damaged.

In case the cause of ignition failure or malfunction cannot be easily identified at sight, first of all replace the control unit by another one in operating conditions.
Remember that disconnection due to replacement of the central unit must be done with the engine off.
If after replacement the vehicle starts properly, the control unit is failing and must be replaced.



If the failure persists, check the alternator and the stator components as follows:
After a sight control of the electrical connections, use a specific tester to measure the stator winding and the pick-up (see table).
If checks on the loading coil and pick-up show failures, **replace the stator and the failing components.**
Disconnect the connector on the flywheel cover and measure the resistance between either contact and the earth.



Specific tooling

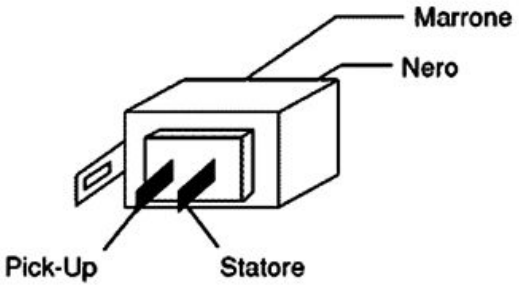
020331Y Digital multimeter

PICK-UP CHECK

	Specification	Desc./Quantity
1	1) Brown cable and ground	~ 170 Ω

STATOR WINDING CHECK

	Specification	Desc./Quantity
1	1) Black cable and ground	~ 1 Ω



No spark plug

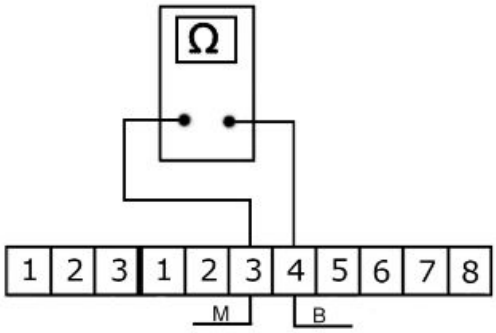
Once the lack of power to the spark plug has been detected and the LED indicates it can be ignited, follow this procedure:

- Pick-Up Check.

Disconnect the electronic starter connector and check continuity between terminal No. 3 (Brown) and terminal No. 4 (Blue).

The check includes the Pick-Up and its power line.

If a break in the circuit is found, check again the flywheel and the engine ground connectors. If non-conforming values are measured, replace the Pick-Up; otherwise, repair the cable harness.



Electric characteristic

Pick-up resistance

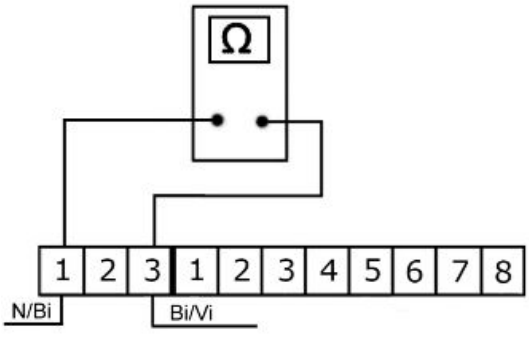
approximately 170 Ohm

HV primary coil check

Disconnect the electronic starter connector and check continuity between terminal No. 3 (White/ Purple) and terminal No. 1 (Black/White) (see figure).

If non-conforming values are measured, check again the HV primary coil directly on the positive and negative terminals.

If the values are correct, repair the cable harness or reset the connections; otherwise, replace the HV coil



Electric characteristic

HV primary coil resistance

0.5 - 0.6 ohm

- HV secondary coil check

Disconnect the spark plug cap from the HV cable and measure the resistance between the HV cable terminal and the HV coil negative terminal (see figure).

If non-conforming values are measured, replace the HV coil. To carry out a more complete diagnosis, check the peak voltage with the multimeter adaptor.

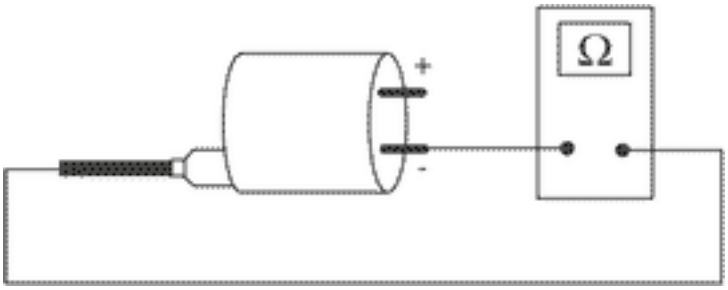
Specific tooling

020409Y Multimeter adaptor - Peak voltage detection

Electric characteristic

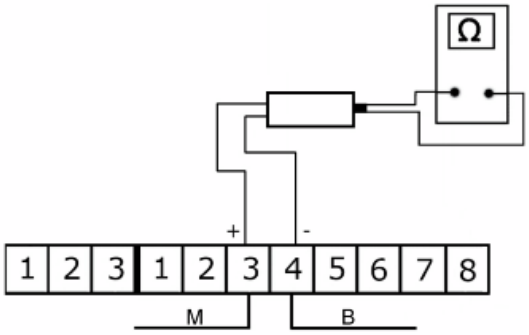
HV secondary coil resistance

3000 - 3600 ohm



- Pick-up

Disconnect the ECU connector and connect the positive terminal to connector No. 3 (Brown) and the negative terminal to connector No. 4 (Blue). Use the start-up system to run the engine and measure the voltage produced by the Pick-Up. Replace the Pick-Up if non-conforming values are measured.



NOTE

THE MULTIMETER MUST BE SELECTED TO DETECT CONTINUOUS VOLTAGE.

Electric characteristic

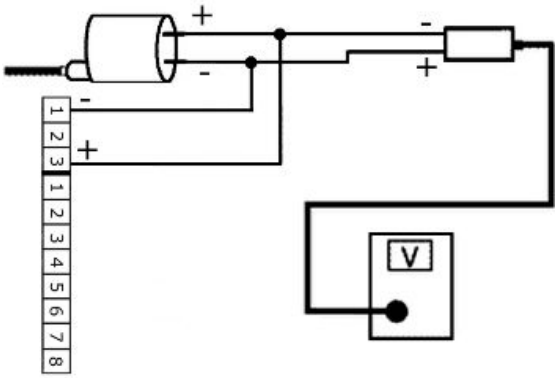
Pick-Up voltage value

Pick-Up voltage value: > 2 Volt

- HV coil

With the electronic starter and the HV coil connected to the system, measure the voltage of the coil primary during the start-up test with the voltage peak adaptor and by connecting the positive terminal to the ground lead and the negative terminal to the coil positive connector.

Replace the control unit if non-conforming values are measured.



THE POSITIVE TERMINAL OF THE HV COIL PRIMARY IS BLACK.

Electric characteristic

Coil voltage value - high voltage

Coil voltage value - high voltage: > 100 Volt

Stator check

- Using a tester, check the resistance between the brown-ground and black-ground terminal.

NOTE

THE VALUES ARE STATED AT AMBIENT TEMPERATURE. A CHECK WITH THE STATOR AT OPERATING TEMPERATURE MAY RESULT IN VALUES HIGHER THAN THOSE STATED.

Electric characteristic

Stator: Brown - ground

~ 170 Ω (Pick-Up)

Stator: Black - ground

~ 1 Ω (Stator)

Voltage regulator check

A malfunction in the voltage regulator may cause the following problems depending on the type of failure:

1) Bulbs burned out (regulator in short circuit).

2) Malfunction of the lighting system and the electric starter (regulator interrupted).

3) Battery not recharging.

4) Turn indicators not working.

The regulator is earthed through the electrical system, so the regulator body does not earth the circuits inside the regulator.

There must be insulation between each regulator terminal and the regulator body (use the tester to check electric resistance).

2) LIGHTS AND STARTER NOT WORKING

Gain access to the voltage regulator by removing the plastic cover on the legshield; start the engine and keep running it at idle speed.

Connect the tester positive probe to terminal No. 1 (Green) and the negative probe to terminal No. 2 (Black); check if there is voltage.

If there is voltage, check that the light remote control and its excitation line, coming from the electronic starter (Purple/Black PIN 7 - Brown PIN 3) work properly. Check the cable harness from the light switch to the remote control and whether the switch works properly.

If no voltage is detected, try connecting the negative probe directly to ground; if voltage is detected with this operation, check the ground wiring of the regulator; otherwise, replace the regulator because it is failing.

As a last check, measure the voltage supplied by the stator:

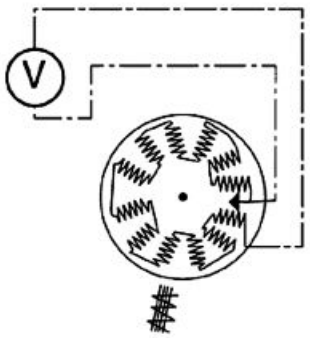
-Disconnect the regulator connector and place a tester to detect alternating voltage between the Yellow/Black cable (4) and the ground connection (see figure).

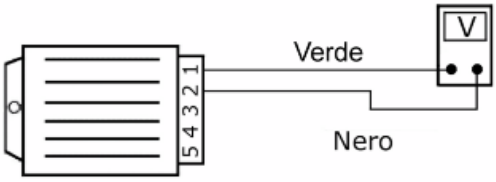
- Voltage supplied at 2000 rpm must be about 25 - 35V.

If no value is obtained even with this test, replace the regulator because it is obviously failing.

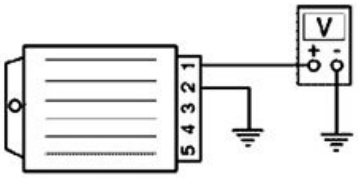
NOTE

TO MEASURE THE ABOVE VOLTAGE, USE AN ANALOGUE TESTER THAT CAN MEASURE ALTERNATING VOLTAGES AND KEEP THE ENGINE AT IDLE TO HAVE AN ALTERNATING VOLTAGE WITH A FREQUENCY AS CLOSE AS POSSIBLE TO 50HZ SO AS TO DETECT THE EFFICIENT VOLTAGE VALUE SUPPLIED BY THE REGULATOR (ABOUT 12V).

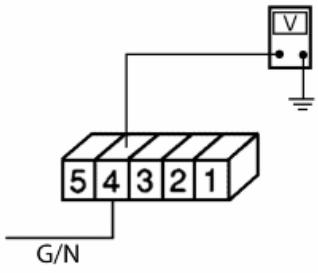




~ 12V a 1900÷2000 giri/min.



~ 12V a 1900÷2000 giri/min.



~ 25÷35V a 1900÷2000 giri/min.

Recharge system voltage check

3) BATTERY NOT RECHARGING

A failure in the direct current section of the voltage regulator may cause the following problems, depending on the type of failure:

a) Protection fuse blows due to overvoltage (regulator in short circuit) and consequently the battery fails to recharge.

b) Battery fails to recharge (regulator interrupted).

Maintenance operations

a) Protection fuse blows (regulator in short circuit).

Check that the cable harness going from the protection fuse to the key switch is not damaged, which may cause a short circuit to ground (thus preventing damaging the regulator).

Afterwards measure the resistance between contact 3 (Green/Orange) and contact 2 (Black) of the voltage regulator (with connector disconnected)

If the value measured is far from that indicated, replace the regulator because it is in short circuit.

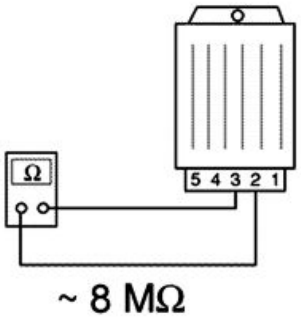
b) Battery fails to recharge (regulator interrupted).

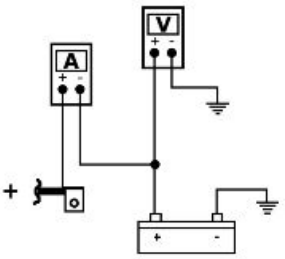
To check if there is any failure in the voltage regulator recharge section, first connect 2 testers to the battery (one to detect voltage and the other to detect current) as indicated in the second figure and follow the procedure below:

Start the engine (temporarily connect the red cable to the battery positive terminal in order to avoid damaging the device that measures current).

Check that there is 13V voltage minimum (battery charged) and a recharge current of 1,5 - 2A with the lighting system and the starter disabled. To disable the lighting system, remove the light remote control.

As the engine rpm increases, the current and the recharge voltage increase; with rpm over 4000





there must be a recharge current of about 4.5A; by enabling both the lighting system, the starter, the stop light and by supplying power to the horn, the current values ≥ 5A and a voltage value of 14 - 14,5V (regulator threshold voltage) can be detected.

If values other than those above are detected, replace the regulator; otherwise, check the cable harness and the connections.

Electric characteristic

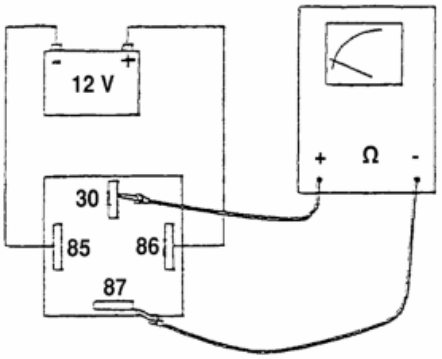
voltage regulator resistance

~ 8 MΩ

Start up system check

To check relay operation:

- Power supply with a voltage of 12 V and two male terminals (85 - 86).
- Using a tester (in ohmmeter function), check the circuit continuity between the other two terminals (87 - 30).



Electric characteristic

Correct value with the relay powered:

0 Ω

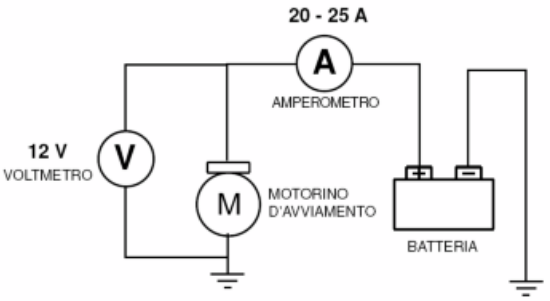
Correct value with the relay not powered:

∞ Ω

Power the motor directly with a direct voltage of 12 V.

The motor must turn and make the engine rotate using a 20 - 25 A current.

If the motor does not turn, check the brushes and remove them if required.



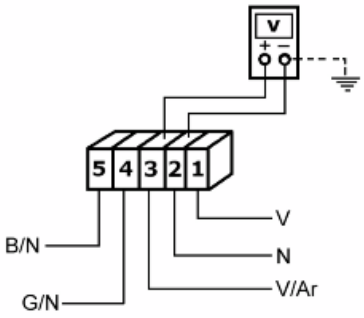
Turn signals system check

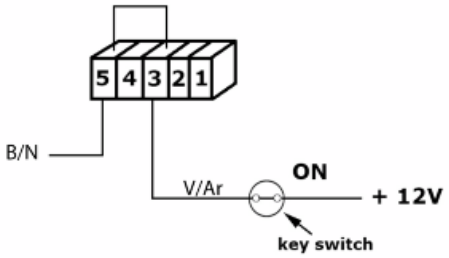
4) TURN INDICATORS NOT WORKING

If the turn indicators do not work, do the following:

- Remove the regulator connector and place the tester probes between terminal 3 (Green/Orange) and terminal 2 (Black).
- Turn the key switch to ON and check that there is voltage on battery. If no voltage is detected, repeat the test now between the orange cable and the ground lead. If there is no voltage even after this operation, check the cable harness and the contacts of the key switch and the battery. Conversely, if battery voltage is detected (black cable), check the regulator ground cable harness.
- If the above tests have positive results, jump contacts 5 (Blue/Back) and 3 (Green/Orange) on the connector, set the key switch to ON and turn the turn indicator switch to the left and right to see when the lights are steadily on (as they are directly powered by the battery).

If even after this operation the turn indicators fail to turn on, check that the cable harness is not damaged and the switch works properly; if these last two tests have a positive result, replace the regulator because it is certainly not functioning properly.





Specific tooling

020331Y Digital multimeter

Fuses

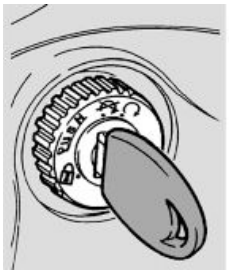
CAUTION

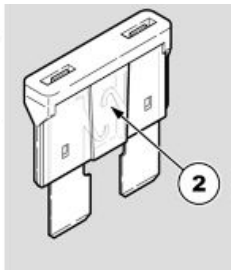
DO NOT REPAIR FAULTY FUSES.
NEVER USE FUSES OTHER THAN THE ONES SPECIFIED.
A SHORT CIRCUIT MAY DAMAGE THE ELECTRICAL SYSTEM OR EVEN CAUSE A FIRE.

NOTE

IF A SPARE FUSE IS USED, SUPPLY ANOTHER OF THE SAME TYPE IN THE CORRESPONDING FITTING.

To check:





- Set the ignition switch to «OFF» to avoid an accidental short circuit.
- Remove the battery cover.
- Extract one fuse at a time and check if filament «2 » is broken.
- Before replacing the fuse, find and solve, if possible, the reason that caused the problem.
- Then, replace the fuse, if damaged, with spare fuse <<3>> or with one of the same current rating.
- Refit the battery cover.

NOTE

IF A SPARE FUSE IS USED, SUPPLY ANOTHER OF THE SAME TYPE IN THE CORRESPONDING FITTING.

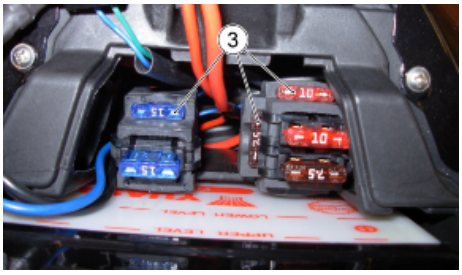
FUSE DISTRIBUTION

15A Fuse: main fuse.

10A Fuse: control unit

7.5A Fuse: all the electric loads, except for the light circuit fed with alternating current.

Checking the fuses is necessary whenever an electrical component fails to operate or is malfunctioning or when the engine does not start.



Sealed battery

Installing the sealed battery (without maintenance)

In case the vehicle fits a sealed battery, the maintenance is limited to the loading state and to an eventual recharge. This operations should be performed in the vehicle pre-delivery phase and every six months of open circuit storage. Therefore, in addition to pre-delivery it is necessary to check the load and carry on the eventual recharge before the vehicle storage and, afterwards, every 6 months.

INSTRUCTIONS FOR BATTERY REFRESH AFTER OPEN CIRCUIT STORAGE

1. **Voltage check**
2.
   - Before installing the battery on the vehicle, check the open circuit voltage with a standard tester.
   - If voltage is over 12.60V, the battery can be installed without any refresh.

- If voltage is below 12.60 V, a renewal recharge is required as explained in 2).

3. **Constant-voltage battery charge mode**

4.
- Constant-voltage charge equal to 14.40-14.70V
- Initial charge current equal to 0.3-0.5 of the battery rated capacity
- Charge time:
- 10 to 12 h recommended Minimum 6 h Maximum 24 h

5. **Constant-current battery charge mode**

6.
- Charge current equal to 1/10 of the battery rated capacity

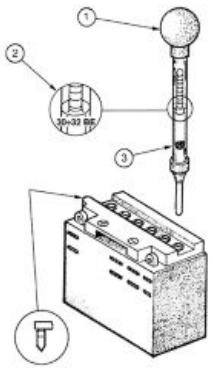
Dry-charge battery

Installing the dry charge battery (with maintenance)

WARNING

BATTERY ELECTROLYTE IS POISONOUS AS IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH YOUR EYES, SKIN AND CLOTHING. IF IT ACCIDENTALLY COMES INTO 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 MILK FOLLOWED BY MAGNESIUM MILK, BEATEN EGG OR VEGETABLE OIL. SEEK MEDICAL ATTENTION IMMEDIATELY.
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

- Remove the short closed tube and the caps, then pour sulphuric acid into the cells, using the type specified for batteries, with a specific gravity of 1.26, corresponding to 30° Bé, at a minimum temperature of 15°C until the upper level is reached.
- Leave to rest for at least 2 hours, then restore the level with sulphuric acid.
- Within the following 24 hours, recharge with the specific battery charger at an intensity of about 1/10 of the battery nominal capacity and until the acid density is about 1.27, corresponding to 31º Bé, and these values are stabilised.



- Once the charge is complete, level the acid (by adding distilled water). Close and clean carefully.
- Once the above operations have been performed, install the battery on the vehicle ensuring that it is connected properly.

1 Hold the tube upright

2 Inspect visually

3 The float must be freed

Electrolyte level check

The electrolyte level must be checked frequently and must reach the upper level. Only use distilled water to restore this level. If it is necessary to add water too frequently, check the vehicle electrical system: the battery works overcharged and is subject to quick wear.

Charge status check

After topping-up the electrolyte level, check its density using an appropriate densitometer.

With the battery charged, a density of 30-32 Bé, corresponding to a specific weight of 1.26-1.28, must be at a minimum temperature of 15° C.

A density reading below 20° Bé indicates that the battery is completely flat and must therefore be recharged.

If the vehicle is not be used for a certain time (1 month or more), the battery needs to be recharged periodically.

The battery runs down completely in about three months. Should the battery be fitted on a vehicle, be careful not to invert the connections, keeping in mind that the (**black**) ground wire marked (-) is connected to the - **negative** terminal while the other two **red** wires marked (+) are connected to the + **positive** terminal.

Battery recharge

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE CAPS OF EACH CELL. KEEP NAKED FLAMES OR SPARKS AWAY FROM THE BATTERY WHILE CHARGING.

First detach the negative terminal before removing the battery from the vehicle.

Normal bench charging must be performed using the special battery charger, setting the battery charge selector to the type of battery that requires recharging (that is, at a current equal to 1/10 of the battery rated capacity). Connections to the power supply source must be implemented by connecting corresponding poles (+ to + and - to -).

The battery should always be kept clean, especially its top side, and the terminals should be coated with petroleum jelly.

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.

CAUTION

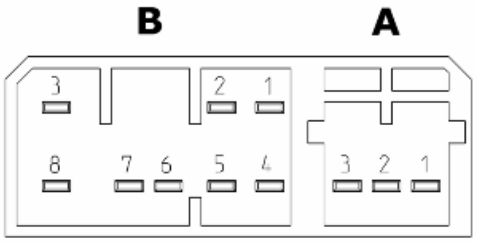
ORDINARY DRINKING WATER CONTAINS MINERAL SALTS THAT ARE HARMFUL TO THE BATTERY. CONSEQUENTLY, ONLY USE DISTILLED WATER.

CAUTION

TO ENSURE MAXIMUM PERFORMANCE, THE BATTERY MUST BE CHARGED BEFORE USE. INADEQUATE CHARGING OF THE BATTERY BEFORE BEING PUT INTO OPERATION SHORTENS BATTERY LIFE.

Connectors

ELECTRONIC STARTER



SECTION "A"

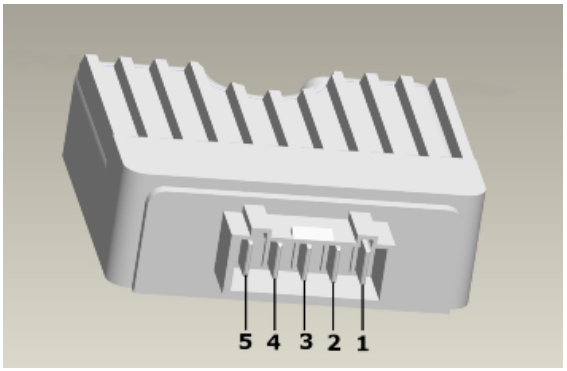
1. HV COIL CONTROL
2. KEY SWITCH CONTACTS TO GROUND
3. HV COIL POSITIVE

SECTION "B"

1. KEY POSITIVE
2. STARTER POWER SUPPLY
3. PICK-UP SIGNAL
4. GROUND
5. SOLENOID VALVE
6. NTC TEMPERATURE SENSOR
7. LIGHT REMOTE CONTROL
8. DIAGNOSIS SOCKET

Voltage regulator

1. LIGHTING SYSTEM POWER SUPPLY (alternating)
2. GROUND
3. BATTERY POSITIVE
4. FROM FLYWHEEL (alternating)
5. TURN INDICATORS



INDEX OF TOPICS

Exhaust assy. Removal

- Park the vehicle on its centre stand.

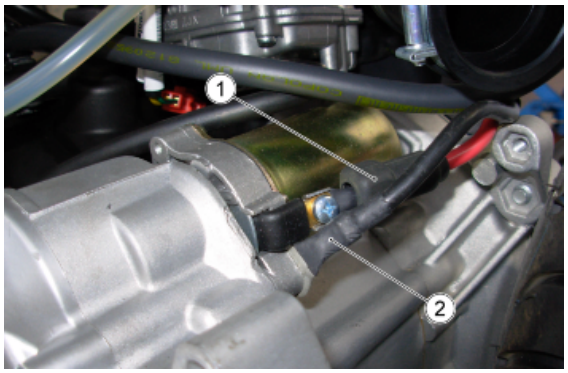
CAUTION

BEFORE CARRYING OUT THE FOLLOWING OPERATIONS, LET THE ENGINE AND THE SILENCER TO COOL OFF AT AMBIENT TEMPERATURE TO AVOID POTENTIAL BURNS.

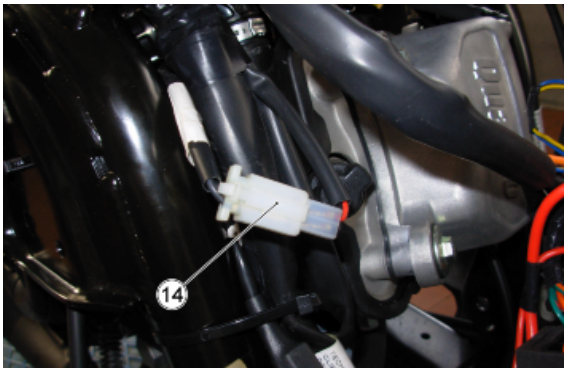
- Unscrew and remove the screws «1».
- Unscrew and remove the screws «2».
- Remove the silencer.

Removal of the engine from the vehicle

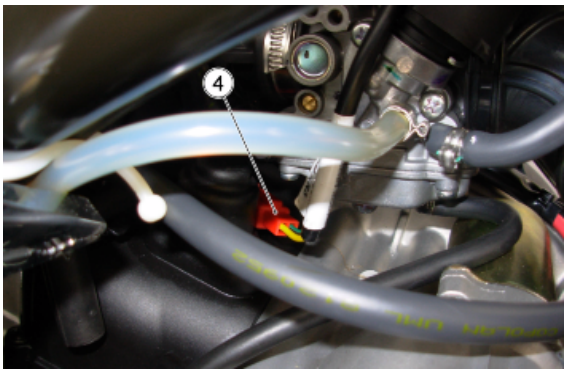
- Park the vehicle on its centre stand.
- Remove the tail fairing.
- Take out the spark plug tube.
- Remove the air filter housing and the splash guard.
- Disconnect the electrical connector «1» and the ground lead «2» from the starter motor and the alternator connector «3» and release the cable harnesses.



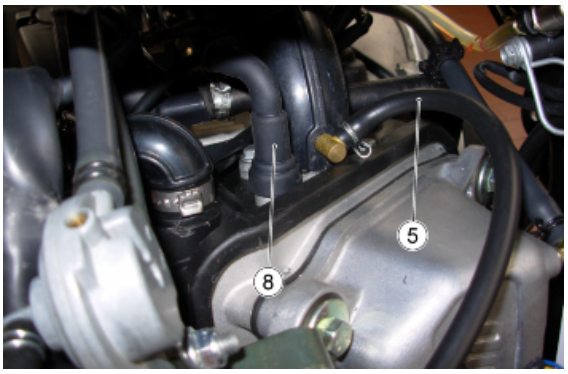
- Remove the anti-ice carburettor connector «14».



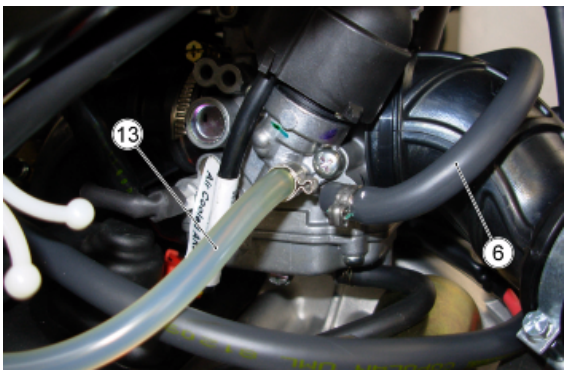
- Disconnect the engine starter connector «4» and release the cable harness.



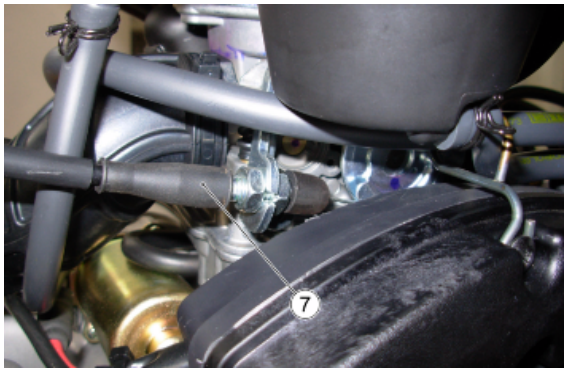
- Remove the vacuum pipe «5» and the engine head temperature sensor «8».



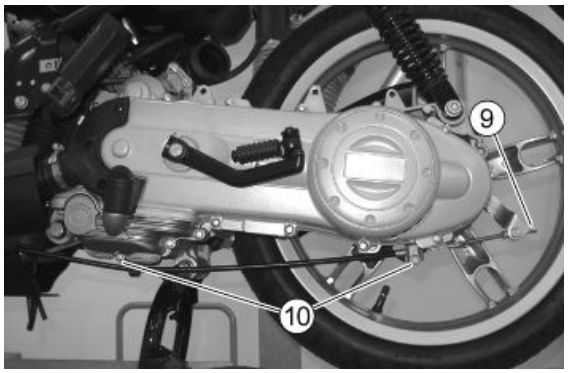
- Disconnect the fuel pipe «6» and the solenoid pipe «13» from the carburettor.



- Remove the throttle grip cable «7» from the carburettor by acting on the adjuster screws.



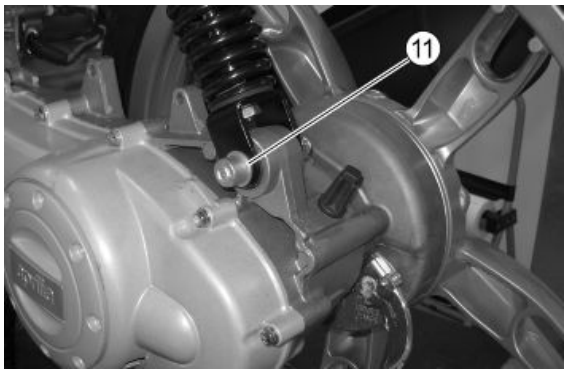
- Unscrew the rear brake set screw «9» and the two screws «10» and free the brake cable.



- Loosen and remove the lower screw «11» of the rear shock absorber with the washer.
- Turn the shock absorber and fix it to the chassis.

CAUTION

SUPPORT THE SCOOTER FIRMLY.



- Unscrew and remove the engine pivot-link rod nut «12» and the corresponding washer.

CAUTION

BEFORE REMOVING THE ENGINE FULCRUM - LINK ROD PIN, SUPPORT THE SCOOTER ADEQUATELY TO PREVENT IT FROM FALLING.

- Operating on the chassis, lift the vehicle rear part.
- Slide off the engine pivot-link rod nut with the relevant washer completely.
- Slide off the engine towards the back.

INDEX OF TOPICS

Automatic transmission

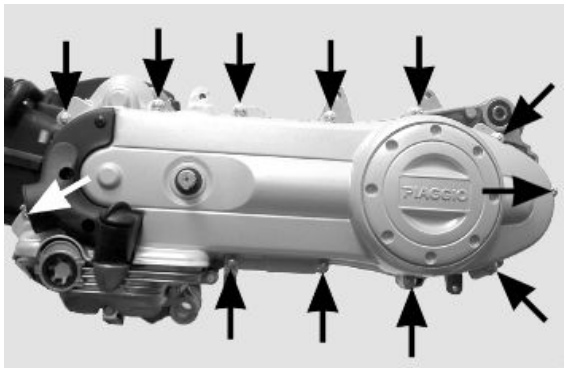
Transmission cover

- Remove the 12 fixing screws.
- Remove the oil filler plug and slide off the cover.

If this operation is carried out directly on the scooter, remove the transmission cooling sleeve and the air filter housing clamps.

NOTE

TO REMOVE THE COVER, USE A MALLET ON THE APPROPRIATE SUPPLEMENTS.

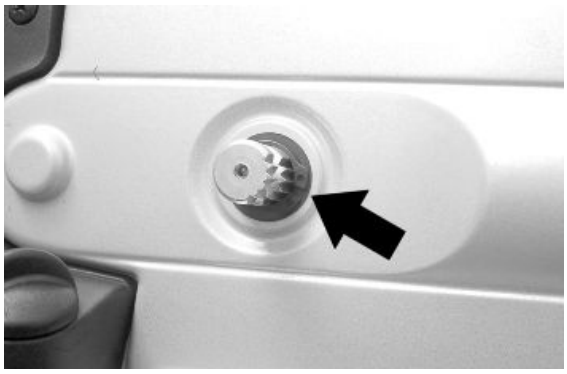


Kickstart

-To remove the start-up pinion push the starter lever to facilitate extracting the pinion.
- Remove the kick-starter screw and lever.
- Remove the Seeger ring and the washer indicated in the figure.
- Slide off the toothed sector.

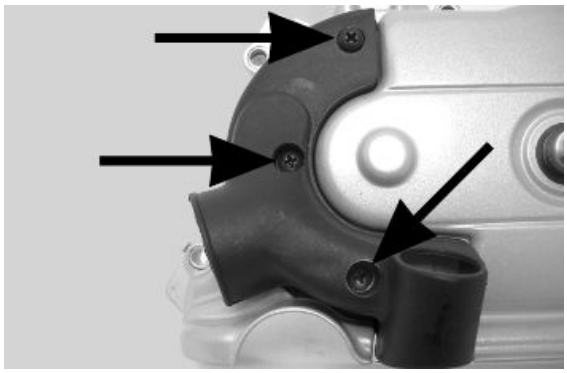
WARNING

THE SECTION KEEPS THE SPRING SET, BE CAREFUL SO AS NOT TO CAUSE ANY ACCIDENTS



Air duct

- To remove the intake throat on the transmission cover, just remove the three fixing screws indicated in the figure.

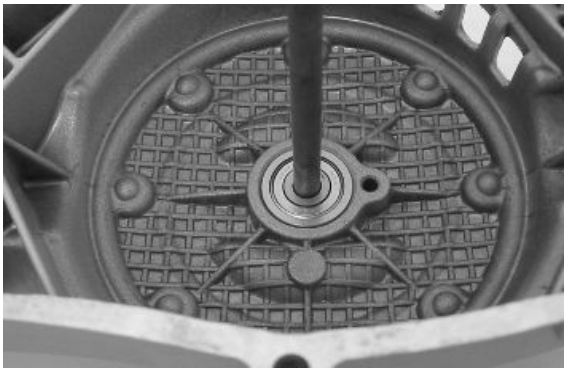


Removing the driven pulley shaft bearing

- Slightly heat the crankshaft from the inside to avoid damaging the coated surface. With the help of the driven pulley shaft or a pin of the same diameter to remove the bearing.

NOTE

IN CASE OF DIFFICULTY, USE A GENERAL EXTRACTOR FOR 8 MM INSIDE DIAMETERS.



Refitting the driven pulley shaft bearing

Refit the bearing with the aid of a bushing with the same diameter as the bearing external plate, after slightly heating the crankcase from the inside.

NOTE

ALWAYS REPLACE THE BEARING WITH A NEW ONE AT EVERY REFIT

CAUTION

WHEN REMOVING/REFITTING THE BEARING, TAKE CARE NOT TO DAMAGE THE COVER PAINTED SURFACE.

Removing the driven pulley

- Lock the clutch bell with the specific tool.
- Remove the nut, the clutch bell and the whole driven pulley assembly.

NOTE

THE ASSEMBLY CAN ALSO BE REMOVED EVEN IF THE DRIVING PULLEY IS MOUNTED.

Specific tooling

AP8140715 Half-rings

Inspecting the clutch drum

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

Characteristic

Clutch bell diameter/standard value

Ø 107+0.2 +0 mm

Clutch bell diameter/max. value allowed after use

Ø 107.5 mm

Eccentricity measured /max.

0.20 mm

Inspecting the clutch

- Check the thickness of the clutch mass friction material.
- The masses must exhibit no traces of lubricants; in that case, 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.
DIFFERENT CONDITIONS MAY CAUSE CLUTCH TEARING.

CAUTION

DO NOT USE TOOLS TO OPEN THE MASSES TO AVOID VARIATION IN THE RETURN SPRING LOAD.

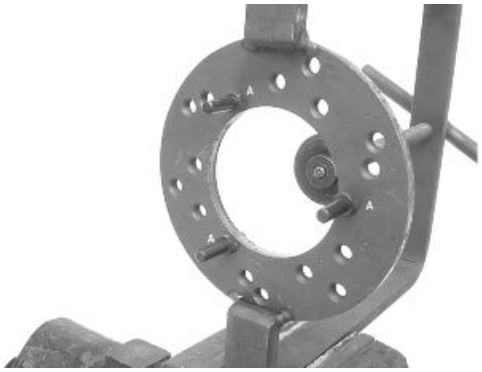
Characteristic

Check minimum thickness

1 mm

Removing the clutch

- Equip the tool with long pins screwed from outside into position «**A**», fit the driven pulley assembly to the tool and have the central screw make contact.



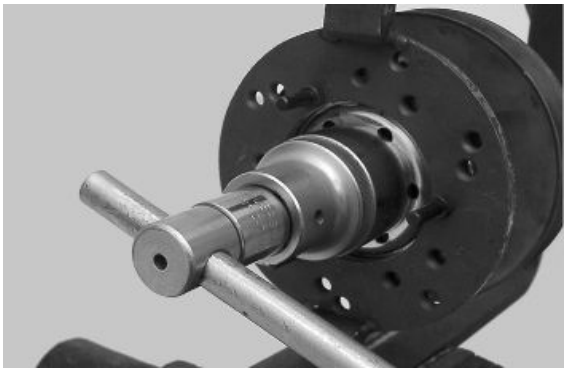
CAUTION

THE TOOL WILL GET DEFORMED IF THE CENTRAL SCREW IS TIGHTENED IN EXCESS.

- Use a 34 mm box-spanner to remove the clutch locking nut.
- Loosen the central screw by releasing the spring of the driven pulley assembly.
- Separate the components.

Specific tooling

020444Y Tool for fitting/removing the clutch on the driven pulley



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 roller bearing with the special extractor fitted on the lower side of the fixed half-pulley.

CAUTION

POSITION THE HOLDING EDGE OF THE EXTRACTION PLIERS BETWEEN THE END OF THE BEARING AND THE BUILT-IN SEALING RING.

Specific tooling

001467Y029 Bell for 38-mm outside diameter bearings

- Remove the ball bearing retaining circlip.
- Extract the ball bearing from the clutch housing side using the specific tool.

NOTE

PROPERLY SUPPORT THE HALF-PULLEY SO AS NOT TO DEFORM THE SLIDING SURFACE OF THE DRIVING BELT

Specific tooling

020376Y Adapter handle

020363Y 20 mm guide

Inspecting the driven fixed half-pulley

- Check that there are no signs of wear on the belt work surface. If there are, replace the half-pulley.
- Make sure the bearings do not show signs of abnormal wear.
- Measure the outside diameter of the pulley bushing.

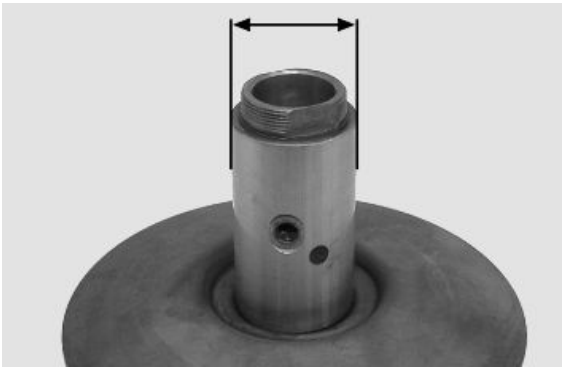
Characteristic

Fixed driven half-pulley/ Standard diameter

Ø 33.965 - 33.985 mm

Fixed driven half-pulley / Minimum diameter allowed after use

Ø 33.96 mm



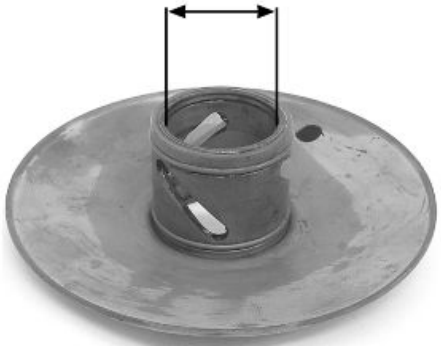
Inspecting the driven sliding half-pulley

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

Characteristic

Movable driven half-pulley/ Maximum diameter allowed

Ø 34.08 mm



- Check the belt faying surfaces.
- Fit the new oil seals and O-rings on the movable half-pulley.
- Fit the half-pulley on the bushing.

Recommended products

AGIP GREASE SM 2 Grease for C-ring of the tone wheel

Soap-based lithium grease with NLGI 2 molybdenum disulphide; ISO-L-XBCHB2, DIN KF2K-20

- 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.

Recommended products

AGIP GREASE SM 2 Grease for C-ring of the tone wheel

Soap-based lithium grease with NLGI 2 molybdenum disulphide; ISO-L-XBCHB2, DIN KF2K-20

Refitting the driven half-pulley bearing

- Fit a new ball bearing with the specific tool.
- Fit the ball bearing snap ring.
- Fit the new roller bearing with the words facing the outside.

CAUTION

PROPERLY SUPPORT THE HALF-PULLEY TO PREVENT DAMAGING THE THREADED END WHILE THE BEARINGS ARE BEING FITTED.

Specific tooling

020376Y Adapter handle

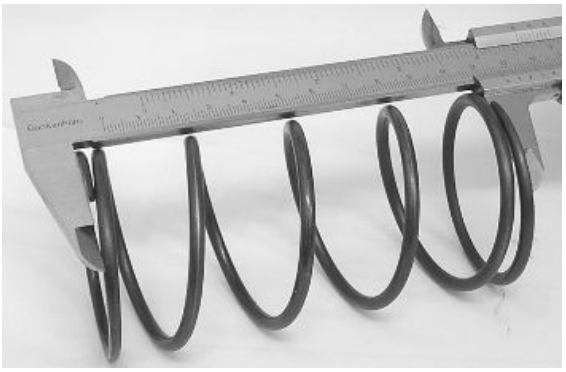
020456Y Ø24 mm adaptor

020362Y 12 mm guide

020171Y Punch for ø 17 mm roller bearing

Inspecting the clutch spring

- Check that the driven pulley supporting spring is not deformed
- Measure the unloaded spring length



Characteristic

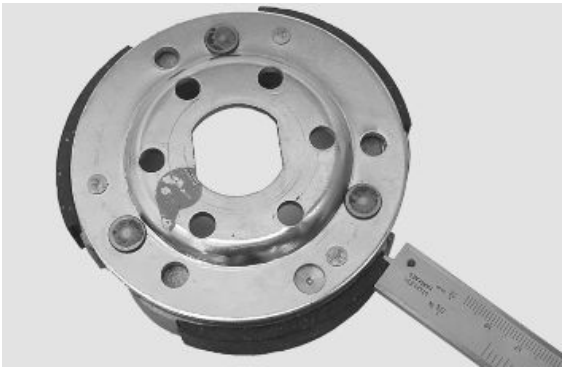
Standard length

118 mm

Minimum length allowed after use

XXXX

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



NOTE

UPON RUNNING-IN, THE MASSES MUST SHOW A CENTRAL FAYING SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER. DIFFERENT CONDITIONS MAY CAUSE CLUTCH TEARING.

CAUTION

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

Characteristic

Minimum thickness allowed:

1 mm

Refitting the clutch

- Pre-assemble the driven pulley unit with spring, sheath and clutch.
- Position the spring with the sheath
- Fit the components to the tool and preload the spring being careful not to damage the plastic sheath and the end of the threaded shank.

- Refit the clutch lock-nut and tighten to the prescribed torque.

CAUTION

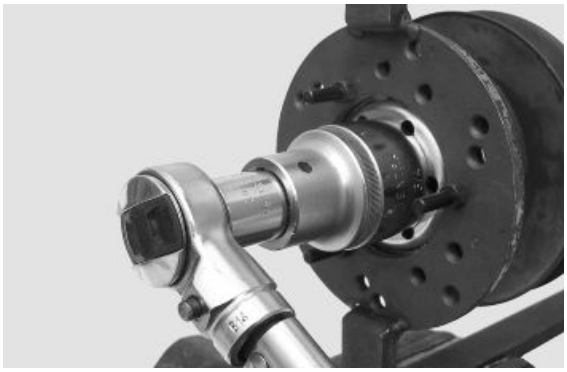
USE A BOX-SPANNER WITH SMALL CHAMFER SO AS NOT TO DAMAGE THE CLUTCH NUT.

CAUTION

POSITION THE NON-CHAMFERED SURFACE OF THE NUT IN CONTACT WITH THE CLUTCH

Locking torques (N*m)

Clutch nut **55 - 60**



Refitting the driven pulley

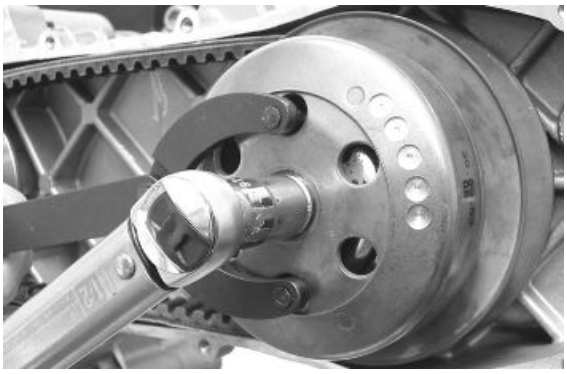
- Refit the driven pulley assembly, clutch bell and nut using the specific tool.

Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Driven pulley shaft nut **40 - 44 Nm**



Drive-belt

- Make sure the driving belt is not damaged and does not have cracks in the toothed grooves.
- Check belt for correct width.

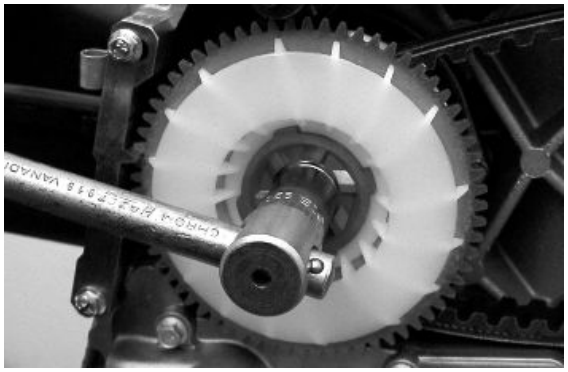
Characteristic

Driving belt/ Minimum width:

17.5 mm

Removing the driving pulley

- Lock the driving pulley using the specific tool.
- Remove the central nut plus the washer, remove the drive and the plastic fan.
- Remove the fixed half-pulley.



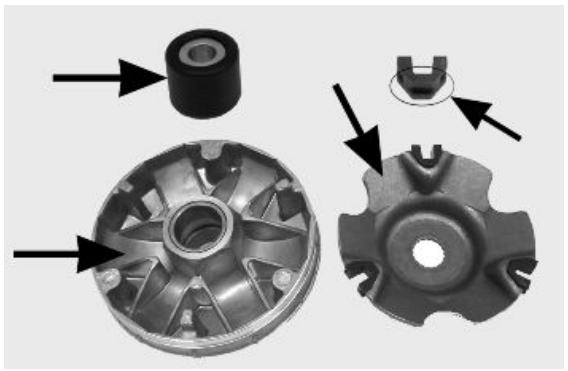
- Remove the belt, the limiting washer and slide off the movable half-pulley with its bushing, being careful that the rollers and supporting plate fitted loosely on it do not come off.

Specific tooling

020451Y starting sprocket lock

Inspecting the rollers case

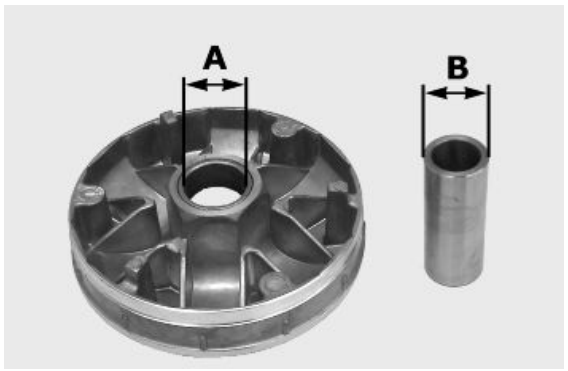
1) Check that the bushing and the sliding rings of the movable pulley do not show signs of scoring or deformation.
2) Check the roller running tracks on the contact pulley; there must be no signs of wear; check the state of the faying surface of the belt on the half-pulleys (movable and fixed).
3) Check that the rollers do not show signs of marked facets on the sliding surface and that the metal insert does not come protrude from the plastic shell borders.
4) Check the integrity of the sliding blocks of the contact plate.



- Check that the internal bushing shown in the figure does not show signs of abnormal wear and measure the inside diameter «**A**».
- Measure the outside diameter «**B**» of the pulley sliding bushing shown in the figure.

CAUTION

DO NOT LUBRICATE OR CLEAN THE BUSHING.



Characteristic

Driving pulley / Max. diameter

20.12 mm

Driving pulley/ Standard diameter:

20.021 mm

Driving pulley bushing/ Minimum diameter:

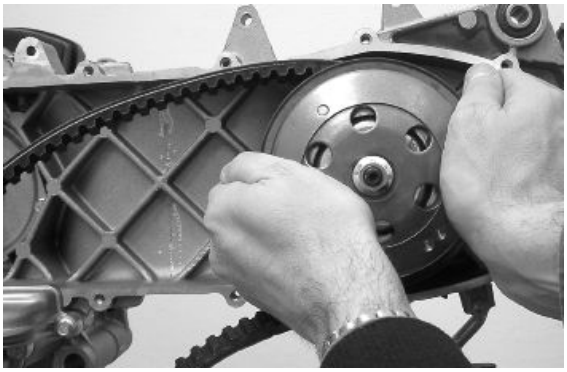
19.95 mm

Driving pulley bushing/ Standard diameter:

20 -0.020/-0.041 mm

Refitting the driving pulley

- Manually detach the movable driven half-pulley by pulling it towards the clutch unit; fit the belt observing the direction of rotation of the initial assembly.



NOTE

IT IS GOOD PRACTICE TO ALWAYS FIT THE BELT WITH THE WORDS FACING THE OUTSIDE UNLESS AN ASSEMBLY DIRECTION IS INDICATED.

- Refit the unit components (roller housing unit with bushing, limiting washer, fixed half-pulley, cooling fan, belt with drive, washer and nut).
- Tighten the lock nut to the prescribed torque so that the driving pulley does not rotate, using the specific tool.

NOTE

REPLACE THE NUT WITH A NEW ONE AT EVERY REFIT.

CAUTION

WHEN FIXING THE DRIVING PULLEY UNIT, THE BELT MUST BE FREE INSIDE IN ORDER TO AVOID A WRONG TIGHTENING THAT MAY RESULT IN SUBSEQUENT DAMAGE OF THE CRANKSHAFT KNURLING.

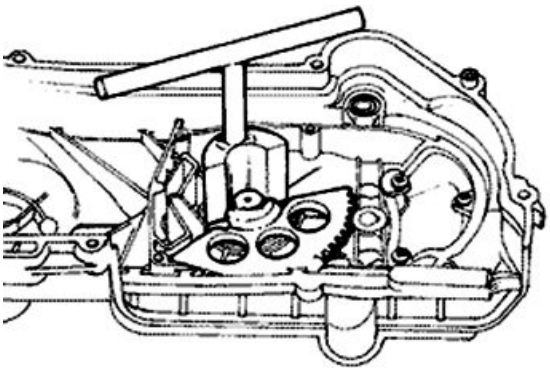
Specific tooling

020451Y starting sprocket lock

Locking torques (N*m)

Driving pulley nut **40 - 44**

Refitting the transmission cover



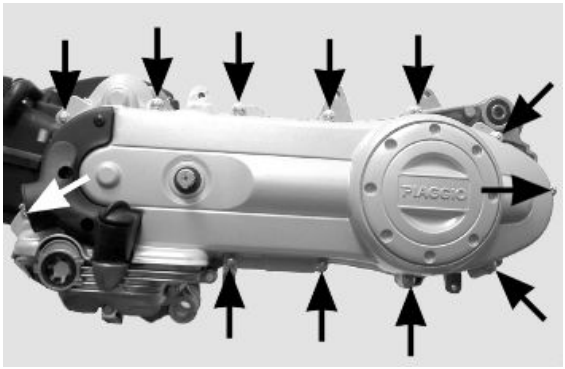
- Check the following for wear: toothed section, toothed section shaft, cover bushing, pinion shaft and its seating in the crankcase and the return spring.
- Replace the damaged components.
- Grease the spring.
- Remove the toothed sector by loading the spring with an appropriate tool.
- Refit the washer, the Seeger ring and the Kick-starter lever.

Recommended products

AGIP GREASE MU3 Driving gear odometer case grease

Lithium soap grease, NLGI 3 ISO-L-XBCHA3, DIN K3K-20

- Fit the pinion in its seating by pushing the start-up lever.
- Fit the inlet throat and tighten the 3 screws.



- Make sure the oil sump presents alignment dowels and sealing gaskets.
- Replace the cover by tightening the 12 screws to the prescribed torque.
- Refit the oil filling cap.

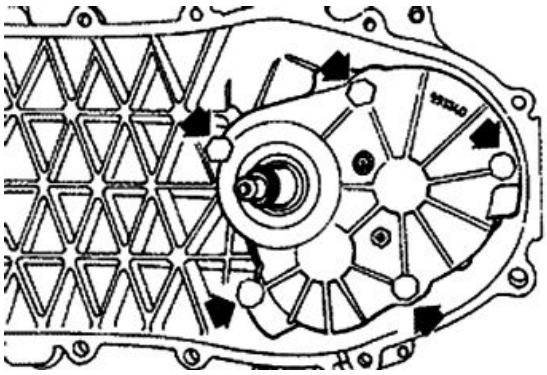
Locking torques (N*m)

Transmission cover screws **11 - 13 Nm**

End gear

Removing the hub cover

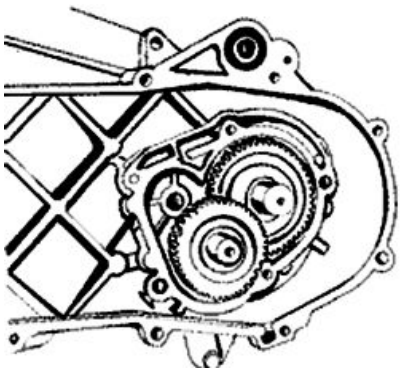
• Remove the transmission cover.
• Remove the clutch assembly
• Drain the rear hub oil.
• Remove the 5 screws indicated in the figure.
• Remove the hub cover together with the driven pulley shaft.



See also

Removing the wheel axle

- Remove the intermediate gear and the wheel axle together with the gear.
- Upon removing the intermediate gear pay attention to the respective shim washers.



Removing the wheel axle bearings

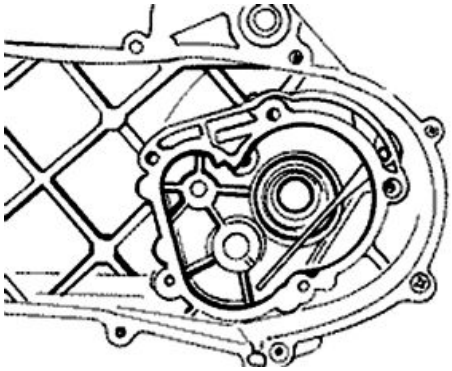
- Remove the oil seal and the Seeger ring.
- Using the appropriate punch, remove the bearing by pushing from the outside towards the inside of the gear compartment.

Specific tooling

020363Y 20 mm guide

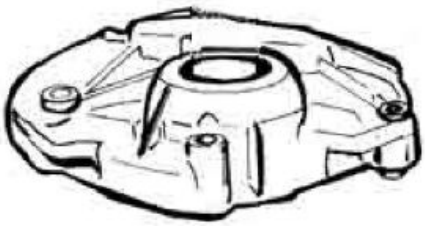
020376Y Adapter handle

020358Y 37 x 40 mm adaptor



Removing the driven pulley shaft bearing

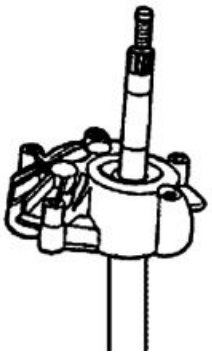
- Remove the Seeger ring inside the cover.
- Remove the oil seal from the outer side.
- Remove the two alignment dowels and position the cover on a surface.
- Position the specific tool on the bearing internal track and remove said bearing with the aid of a press.



Specific tooling

020452Y Pipe to remove and refit the driven pulley shaft

- Position the specific pipe on the internal track of the bearing and on the pulley shaft toothing side as indicated in the figure and expel the driven pulley shaft with the aid of a press.

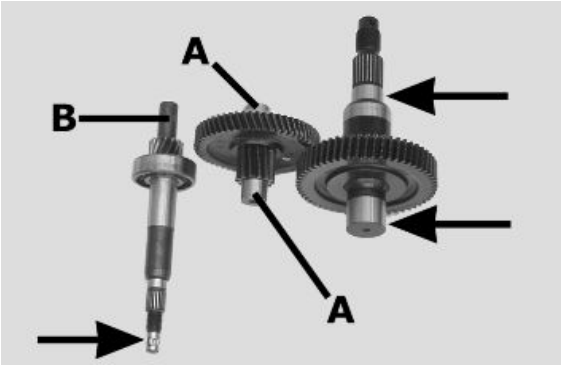


Specific tooling

020452Y Pipe to remove and refit the driven pulley shaft

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.
- Check capacity (A) of the transmission gear (wear, deformations, etc.)
- Check the pulley shaft seat: Superficial wear (B) may indicate irregularities in the crankcase seats or in the pulley shaft housing

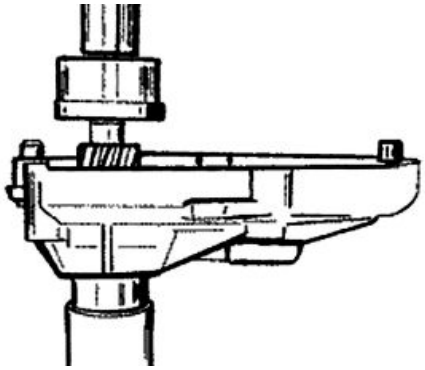


Inspecting the hub cover

- Check that the coupling surface is not dented or distorted.
- If faults are found, replace the hub cover.

Refitting the driven pulley shaft bearing

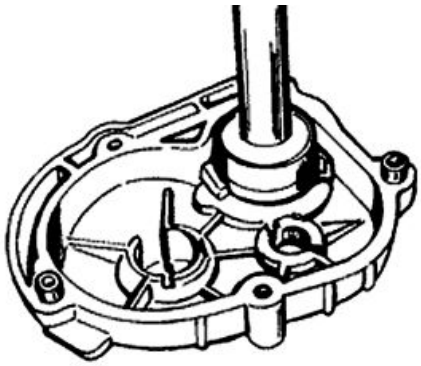
- Support the inner track of the bearing from the outside of the hub cover with the specific tool positioned under the press and insert the driven pulley shaft.
- Refit the oil seal flush with the cover.



Specific tooling

020452Y Pipe to remove and refit the driven pulley shaft

• Heat the hub cover and insert the bearing using the specific punch.
• Fit the circlip with the concave or radial part on the bearing side.



NOTE

FIT THE BALL BEARING WITH THE SHIELDING FACING THE OIL SEAL

Specific tooling

020151Y Air heater

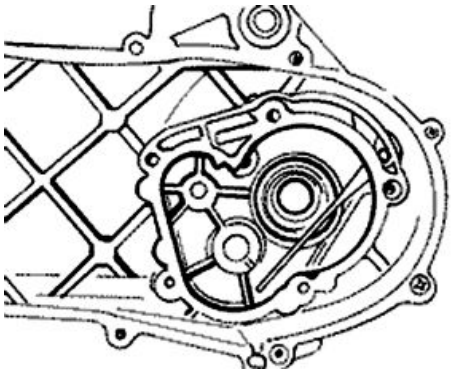
020376Y Adapter handle

020439Y 17 mm guide

020358Y 37 x 40 mm adaptor

Refitting the wheel axle bearing

- Heat the transmissionside crankcase half using a heat gun.
- After lubricating its outer plate, insert the bearing using the special adapter and with the aid of a mallet.
- Refit the Seeger ring and the oil seal using the 42 x 47 mm adapter and the handle.



Specific tooling

020151Y Air heater

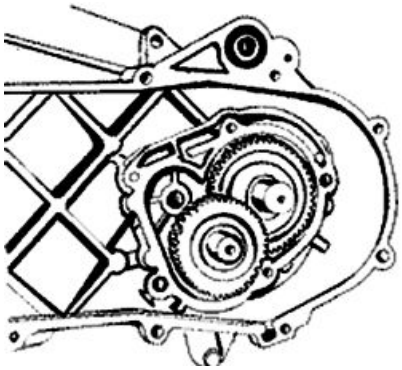
020376Y Adapter handle

020363Y 20 mm guide

020359Y 42 x 47-mm adaptor

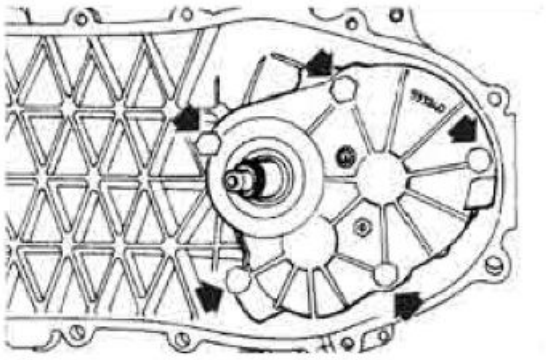
Refitting the ub cover

- Refit the whole wheel axle.
- Refit the intermediate gear paying attention to both shim washers.
- Apply LOCTITE 510 for surfaces to the hub cover and refit it together with the driven pulley shaft.
- Remove the 5 screws and tighten them to the prescribed torque.



NOTE

BEFORE APPLYING NEW SEALANT, WIPE OFF ANY REMAINING OLD SEALANT FROM THE FAYING SURFACES OF THE HUB COVER AND THE HALF CRANKCASE.



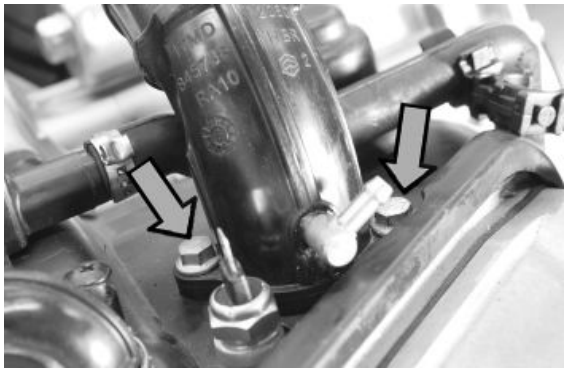
Locking torques (N*m)

Locking torque: 11 - 13 Nm

Flywheel cover

Cooling hood

- Remove the manifold and the carburettor by undoing the 2 fixing screws on the head
- Remove the fastening clamp of the secondary air pipe and disconnect the pipe
- Remove the 4 front coupling screws (1 of them is a knob) and the side fixing screws at the crankcase base.
- Remove the 4 side screws.
- Remove the 3 covers - Remove the cover sealing gaskets on the head
- For refitting, repeat the removal steps but in reverse order

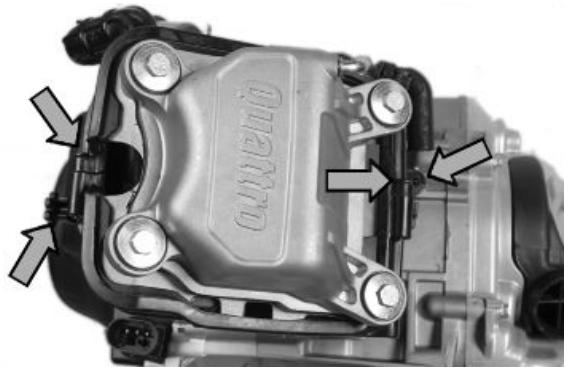


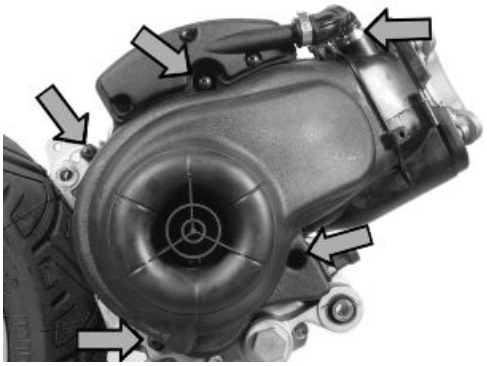
CAUTION

TAKE CARE TO CORRECTLY PLACE THE FLYWHEEL CONNECTOR.

NOTE

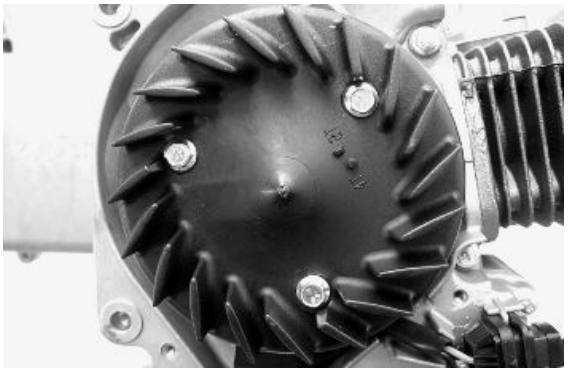
WHEN REFITTING THE COVER, PAY ATTENTION NOT TO DAMAGE THE STATOR ELECTRICAL CABLE HARNESS.





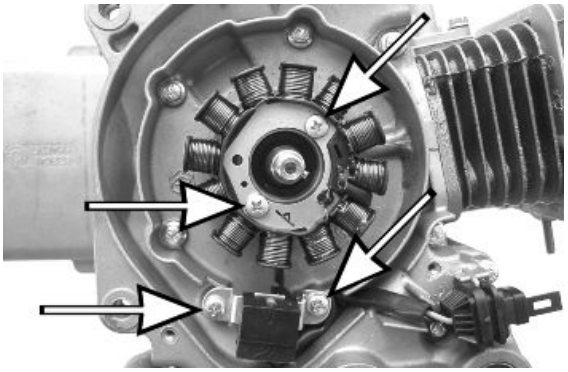
Cooling fan

- Remove the cooling fan by undoing the 3 screws that fix it to the rotor
- When refitting the fan, pay attention that the screw holes in the fan and the rotor coincide, then tighten the screws to the prescribed torque.



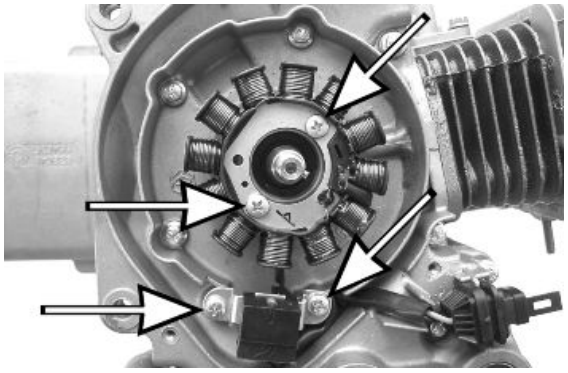
Removing the stator

- Remove the two Pick-Up screws and the 2 stator fixing screws shown in the figure.
- Remove the stator and its cable harness.



Refitting the stator

- Refit the stator and the flywheel carrying out the removal steps but in reverse order, tightening the retainers to the prescribed torque.



NOTE

THE PICK-UP WIRE MUST BE POSITIONED ADHERING TO THE FUSION TONGUE ON THE CRANKSHAFT IN SUCH A WAY AS TO AVOID BEING CRUSHED BY THE FAN COVER UNIT.

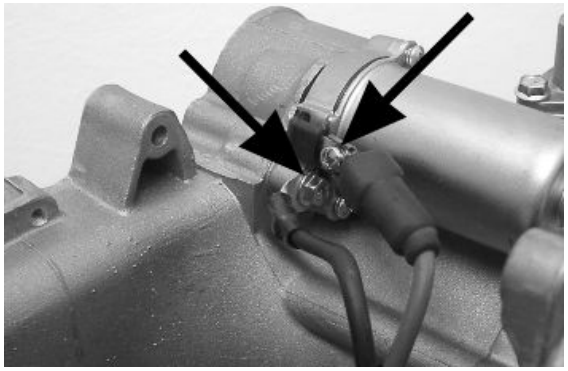
Locking torques (N*m)

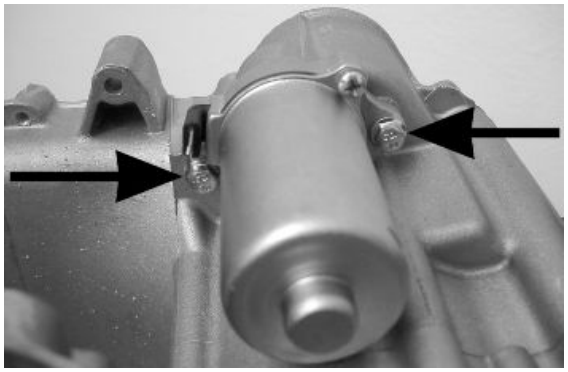
Pick-up screws 3 - 4 **Stator screws** 3 - 4

Flywheel and starting

Removing the starter motor

- Undo the two screws on the power positive contact and disconnect the cable
- Undo the 2 screws fixing the starter motor to the crankcase and collect the power cable harness.





Removing the flywheel magneto

- Lock the flywheel rotation using the calliper spanner.
- Remove the nut.

CAUTION

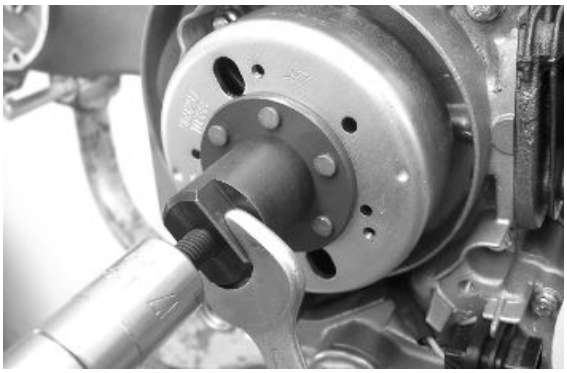
USING A CALLIPER SPANNER OTHER THAN THE ONE SUPPLIED COULD DAMAGE THE STATOR COILS.

- Take out the flywheel with the extractor.

Specific tooling

020565Y Flywheel lock calliper spanner

020162Y Flywheel extractor



Inspecting the flywheel components

- Check that the flywheel internal magnetos are in good conditions.
- Check that the flywheel riveted joints are correctly tightened.
- Check there are no deformations that may cause rubbing on the stator and the Pick-Up.
- Check that the stator winding, its ferromagnetic support and the pick-up are in good conditions.

Starter gear rim

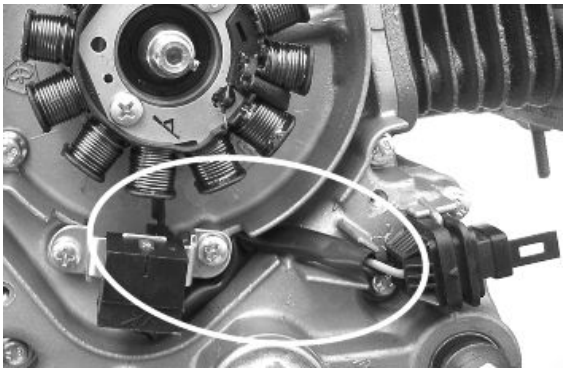
- Check the toothing is level and in good conditions

Intermediate gear

- Check that the keying toothing on the sprocket and the starter motor are in good conditions.
- Check that the Bendix opens and returns adequately.

Refitting the flywheel magneto

- Refit the stator and the pick-up being careful to thread the wirings through the appropriate crankcase couplings.
- Refit the flywheel on the crankshaft being careful to respect the keying, then lock rotation with the specific tool and tighten the nut to the prescribed torque.



NOTE

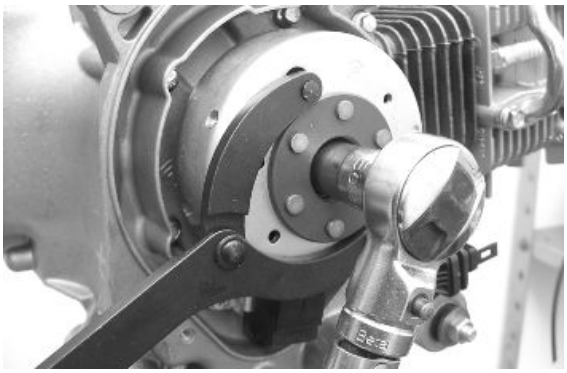
A VARIATION IN THE AIR GAP DISTANCE MAY RESULT IN A VARIATION IN THE IGNITION ADVANCE SUCH AS TO CAUSE PINKING, HEAD KNOCKING, ETC.

Specific tooling

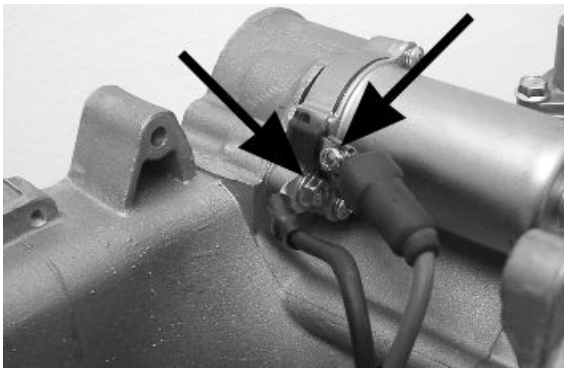
020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Flywheel nut **52 - 58**



Refitting the starter motor



- Install the starter motor in its position in the crankcase.
- Tighten the screw on the head side but do not lock it; screw the other screw fitting the (black) ground lead. Then tighten the 2 screws to the prescribed torque.
- Tighten the (red) positive lead fixing screw on the side contact.

NOTE

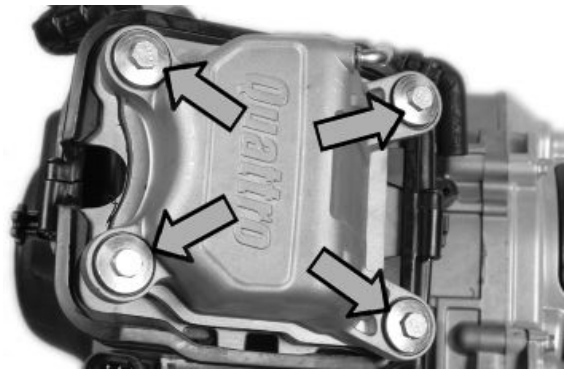
REFIT THE REMAINING PARTS AS DESCRIBED IN THE CHAPTERS ON CYLINDER HEAD, TIMING SYSTEM, LUBRICATION, FLYWHEEL AND TRANSMISSION.

Locking torques (N*m)

Starter motor screws **11 - 13**

Cylinder assy. and timing system

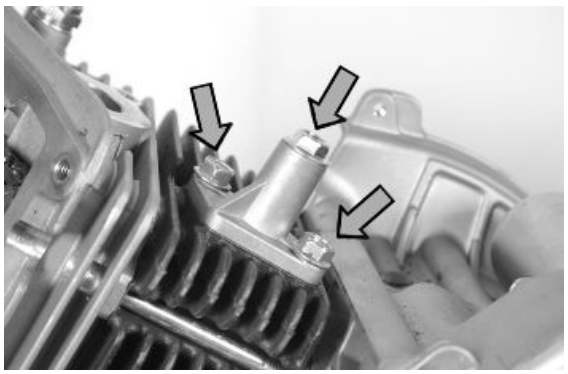
Removing the rocker-arms cover



- Remove the cooling covers
- Remove the 4 tappet cover retainers
- Remove the cover plus the O-Ring
- Remove the 3 screws and then remove the Blow-by cover
- Clean the nozzle labyrinth and the membrane (replace it, if required), then refit the unit to the cover.

Removing the timing system drive

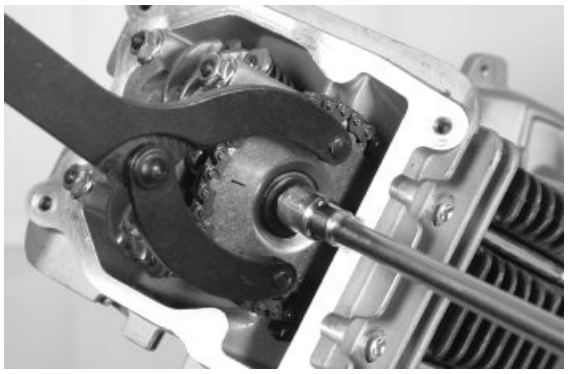
- First loosen the tensioner central screw and then remove it together with the spring.
- Unscrew the 2 retainers indicated in the figure and remove the chain tightener support being careful to collect the sealing gasket.



NOTE

SHOULD THE GASKET NOT BE IN GOOD CONDITIONS, CLEANING THE FAYING SURFACES THOROUGHLY TO AVOID ENGINE OIL LEAKS AND REPLACE THE GASKET

- Remove the driving pulley
- Remove the oil pump chain
- Remove the tappet cover
- Remove the central screw and the belleville washer indicated in the figure; lock the camshaft sprocket with the specific tool.



NOTE

TO FACILITATE REMOVING THE HEAD COMPONENTS, SET THE CRANKSHAFT TO THE TIMING POINT (TDC OF THE COMPRESSION END).

Specific tooling

020565Y Flywheel lock calliper spanner

- Remove the camshaft control pulley and the shim washer below.
- Remove the pinion of the crankshaft timing system control
- To remove the chain lower guiding pad, remove it from the head by pulling upwards

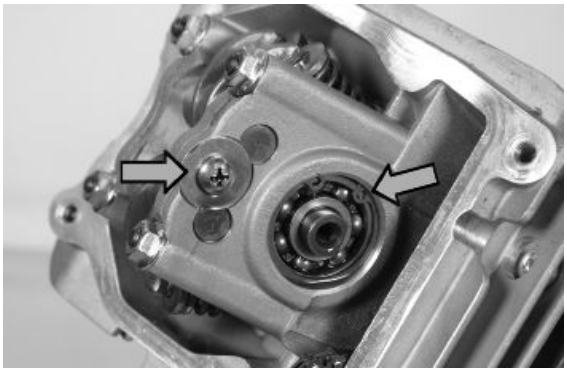
NOTE

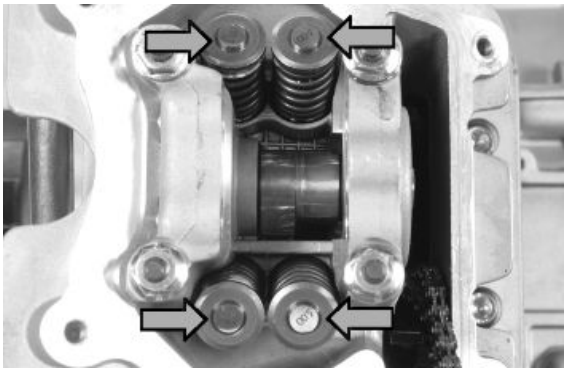
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE DIRECTION OF ROTATION IS MAINTAINED.

See also

Removing the cam shaft

- Remove the rocking lever pin clamping screw indicated in the figure.
- Remove the Seeger ring clamping the camshaft bearing.
- Remove the pins and the rocking levers.
- Remove the calibrated pads

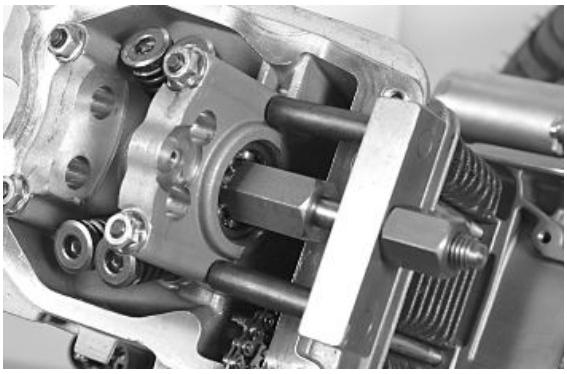




NOTE

MARK THE ROCKING LEVERS FITTING POSITION IN ORDER TO AVOID MISPLACING THE INTAKE AND EXHAUST ENDS.

- Remove the camshaft and the bearing using the specific tool shown in the figure.
- Take out the camshaft bearing with the aid of the specific tool, being careful to mount one screw on the camshaft in order to protect the camshaft thread.



NOTE

IF A BEARING DETACHES FROM THE CAMSHAFT, IT IS ESSENTIAL TO FIT A NEW BEARING.

Specific tooling

020450Y Tool for fitting/removing the camshaft

004499Y Shaft bearing extractor

004499Y001 Bell for bearing extractor

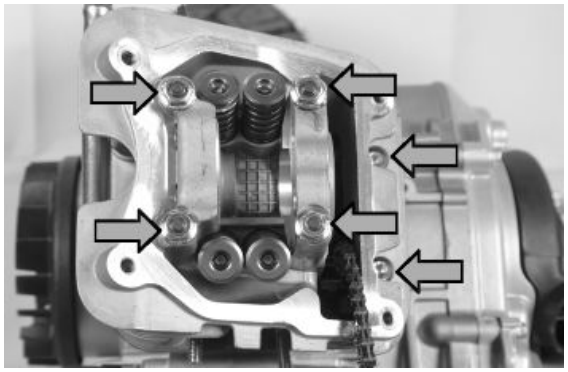
004499Y002 Screw for bearing extractor

004499Y006 Ring for bearing extractor

004499Y027 part for the bearing extractor

Removing the cylinder head

- Remove the cooling covers, timing system control, camshaft and rocking levers.
- Remove the spark plug.
- Remove the 2 side retainers indicated in the figure.
- Loosen the 4 head-cylinder fixing nuts in two or three stages and in a criss-cross sequence.
- Remove the head, the 2 alignment dowels and the gasket.

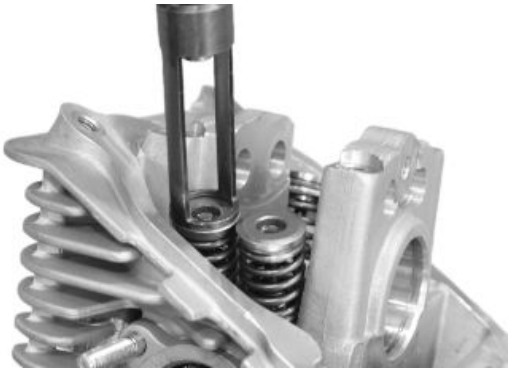


NOTE

IF NEEDED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS AND ROCKING LEVERS WITHOUT REMOVING THE DRIVING PULLEY UNIT. REMEMBER TO HOLD THE TIMING CHAIN WITH A PIECE OF METAL WIRE AND ADJUST THE CHAIN TIGHTENER UPON REFITTING.

Removing the valves

- Using the appropriate tool equipped with the component in the figure, remove the cotters, washers and springs of the valves.



- Remove the oil seals with the specific tool.

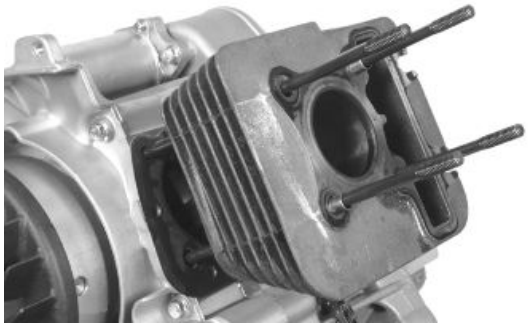
Specific tooling

020431Y Valve oil seal extractor

020382Y Tool for removing valve cotters fitted with part 012

Removing the cylinder - piston assy.

- Remove the cylinder paying attention to the 2 cylinder alignment dowels on the crankcase.
- Remove the gasket on the cylinder base.
- To avoid damaging the piston, keep it firm while removing the cylinder.



- Remove the 2 retainer rings, the pin and piston.
- Remove the 3 piston rings.

NOTE

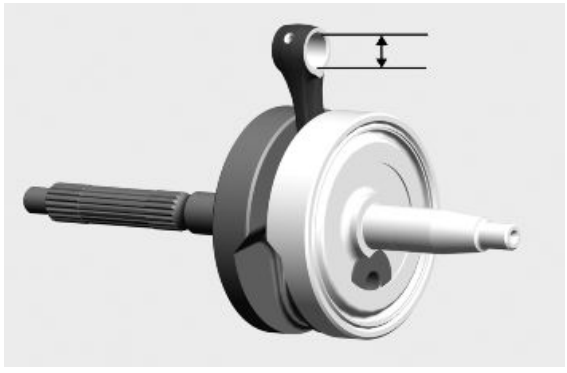
BE CAREFUL NOT TO DAMAGE THE PISTON RINGS WHEN REMOVING THEM.

Inspecting the small end

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

NOTE

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



Characteristic

Max. diameter allowed: checking the connecting rod small end

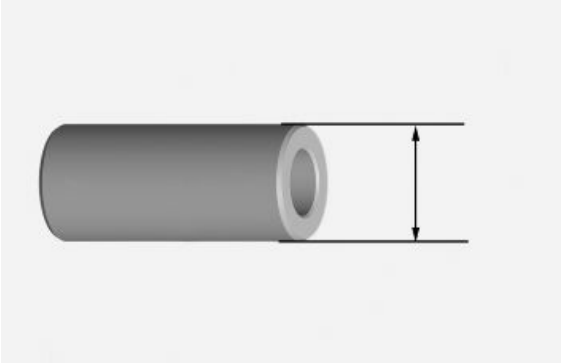
13.030 mm

Standard diameter: checking the connecting rod small end

13+0.025 +0.015 mm

Inspecting the wrist pin

- Check the pin outside diameter



Characteristic

Standard diameter: pin

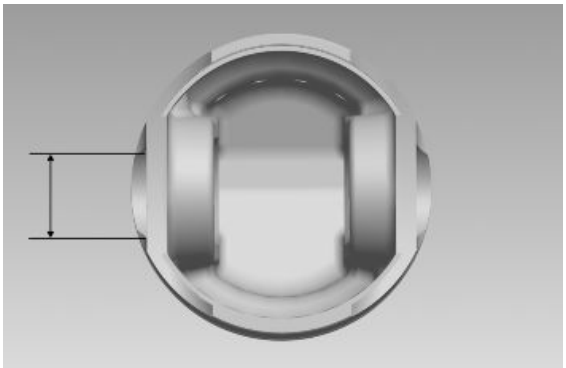
13-0 -0.004 mm

Minimum diameter allowed: pin

12.990 mm

Inspecting the piston

- Measure the diameter of the bearings on the piston.

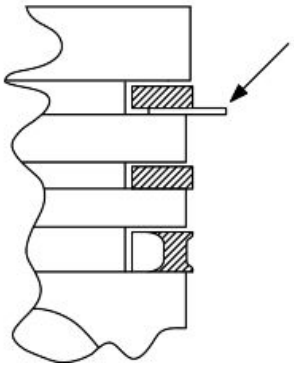


Characteristic

Pin seat diameter

13 +0.005 +0.010 mm

- Carefully clean the sealing rings housings.
- Measure the sealing rings - pistons coupling clearance using suitable sensors, as shown in the diagram
- If clearances measured exceed the limits specified in the table below, the piston should be replaced by a new one.



NOTE

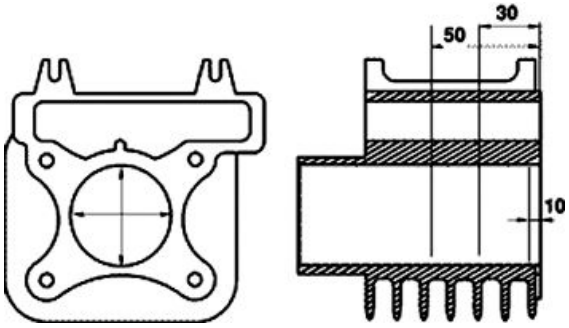
MEASURE CLEARANCE BY INSERTING THE BLADE OF THE FEELER GAUGE FROM THE 2nd SEALING RING SIDE.

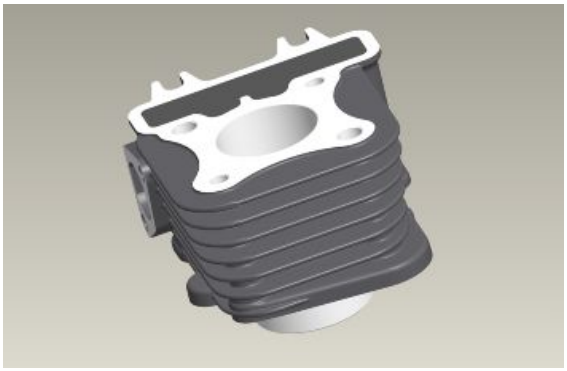
Fitting clearance

1st compression ring - standard coupling clearance 0.03 - 0.065 mm **1st compression ring - maximum clearance allowed after use** 0.07 mm **2nd compression ring - standard coupling clearance** 0.02 - 0.055 mm **2nd compression ring - maximum clearance allowed after use** 0.06 mm **oil scraper - standard coupling clearance** 0.04 - 0.16 mm **oil scraper - maximum clearance allowed after use** 0.17 mm

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 distorted.
- Pistons and cylinders are classified according to their diameter. This coupling is carried out in pairs (A-A, B-B, C-C, D-D).





Characteristic

Maximum run-out allowed:

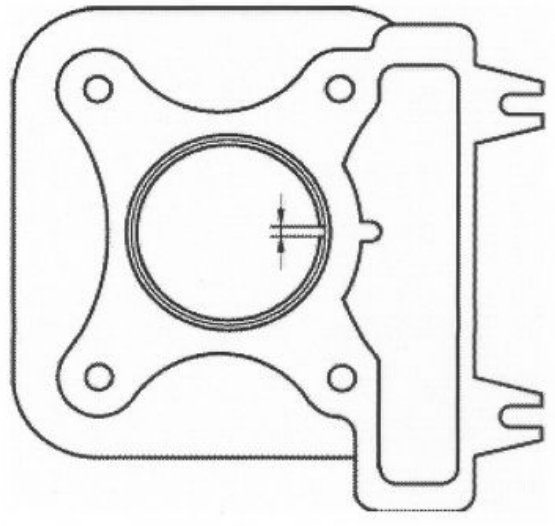
0.05 mm

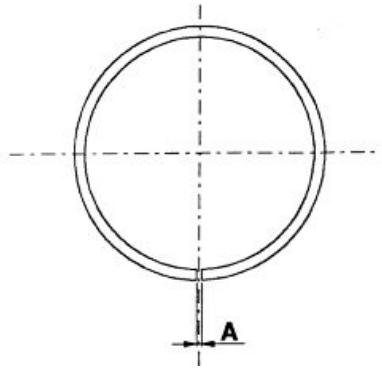
Inspecting the piston rings

- Alternately fit the 3 sealing rings in the cylinder in the area where it keeps its original diameter. Using the piston, fit the rings perpendicularly to the cylinder axis.
- Measure the opening of the sealing rings using a feeler gauge, as shown in the figure.
- Replace the piston rings if values higher than those prescribed are measured.

NOTE

BEFORE REPLACING ONLY THE PISTON RINGS, MAKE SURE THAT COUPLING CLEARANCE BETWEEN THE SEAL RINGS AND ITS GROOVES, AND THAT BETWEEN THE PISTON AND THE CYLINDER ARE AS SPECIFIED. IN ANY CASE, NEW PISTON SEALING RINGS USED IN COMBINATION WITH A USED CYLINDER MAY HAVE DIFFERENT BEDDING CONDITIONS THAN THE STANDARD ONES.





SEALING RINGS

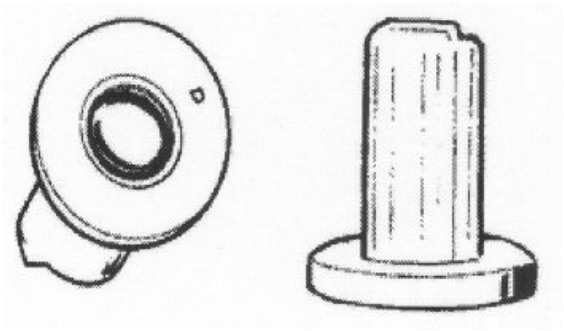
Name	Description	Dimensions	Initials	Quantity
1st Compression ring		39 x 1	A	0.08 - 0.20
2nd Compression ring		39 x 1	A	0.05 - 0.20
Oil scraper ring		39 x 2	A	0.20 - 0.70
1st Compression ring 1st Oversize		39.2 x 1	A	0.08 - 0.20
2nd Compression ring 1st Oversize		39.2 x 1	A	0.05 - 0.20
Oil scraper ring 1st Oversize		39.2 x 2	A	0.20 - 0.70
1st Compression ring 2nd Oversize		39.4 x 1	A	0.08 - 0.20
2nd Compression ring 2nd Oversize		39.4 x 1	A	0.05 - 0.20
Oil scraper ring 2nd Oversize		39.4 x 2	A	0.20 - 0.70
1st Compression ring 3rd Oversize		39.6 x 1	A	0.08 - 0.20
2nd Compression ring 3rd Oversize		39.6 x 1	A	0.05 - 0.20
Oil scraper ring 3rd Oversize		39.6 x 2	A	0.20 - 0.70

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

020448Y Tool for fitting the pin snap rings



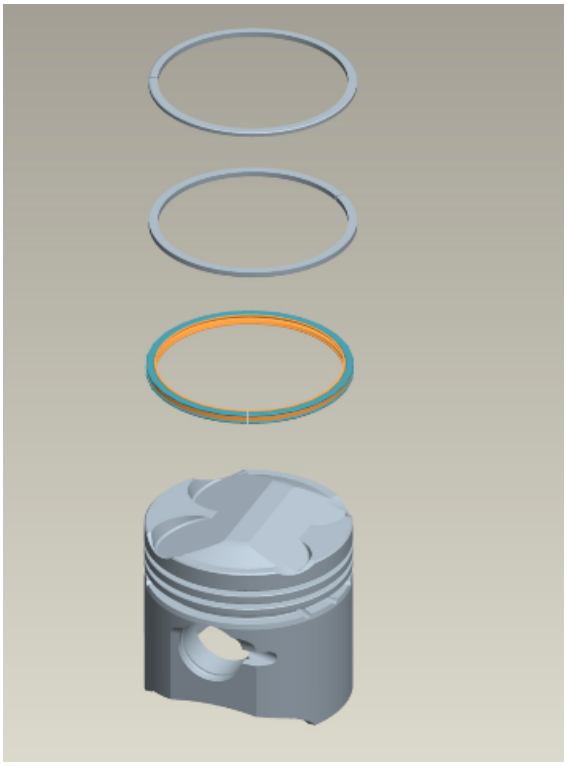
- With the opening in the position indicated on the tool, set the retainer ring into position in the tool with the punch.
- Rest the tool on the piston paying attention that the 90° chamfered side faces upwards as shown in the figure.
- Fit the pin snap ring using the pin.

CAUTION

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

Refitting the piston rings

- Fit the oil scraper ring starting from the spring, making sure that the spring ends do not overlap. Fit the two piston rings so that their openings and that of the oil scraper ring are never aligned.
- Fit the 2nd piston ring with the identification letter «**T**» facing the piston crown.
- Fit the 1st piston ring with the identification letter «**T**» facing the piston crown.
- Offset the piston ring openings by 120º as shown in the figure.
- Lubricate the components with engine oil.

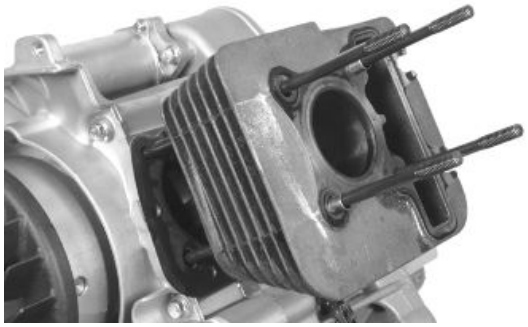


NOTE

TO OBTAIN A BETTER BEDDING THE 2 SEALING RINGS HAVE BEEN MADE WITH A CONICAL CONTACT SECTION WITH THE CYLINDER. FOR THIS REASON, IT IS IMPORTANT TO RESPECT THE INSTRUCTIONS TO FIT THE RINGS WITH THE "T" MARK FACING UPWARDS.

Refitting the cylinder

- Fit the cylinder base gasket.
- Fit the cylinder as shown in the figure.
- The piston can be kept out of the crankcase plane using the appropriate tool.



NOTE

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

Specific tooling

020288Y Fork for fitting the piston on the cylinder

Should the four cylinder stud bolts be replaced, in this kind of engine, it is necessary to tighten the head nuts strictly following the procedure below.

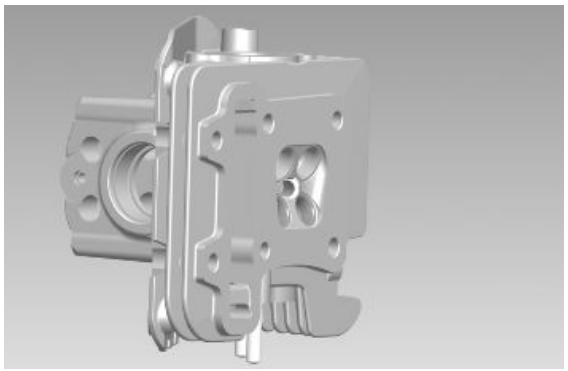
The procedure is different from that indicated in the vehicle manuals:

Head tightening nuts (only for stud bolt replacement) 6-7 N*m + 135° + 90°

The 45° rotation reduction of the wrench is necessary to avoid stud bolt stretching.

Inspecting the cylinder head

- Using a trued bar, check that the head surface is not worn or distorted.
- Check that the camshaft and the rocking lever pin bearings are not worn.
- Check that the head cover surface, the intake manifold and exhaust manifold are not worn.
- In case of fault, replace the big end.

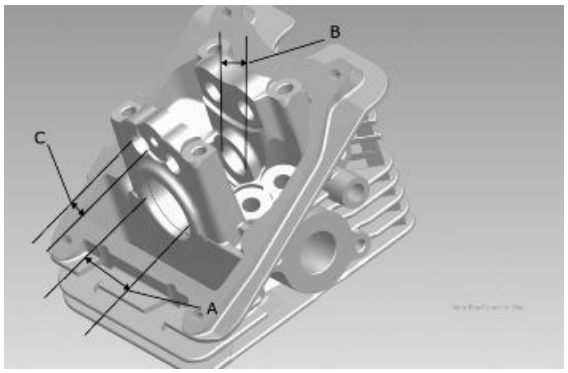


Characteristic

Maximum run-out allowed:

0.1 mm

Measure the camshaft seat bearings and rocking lever support pins with a bore meter

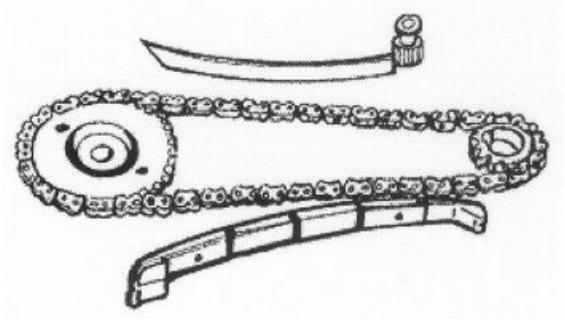


CHECKING THE HEAD

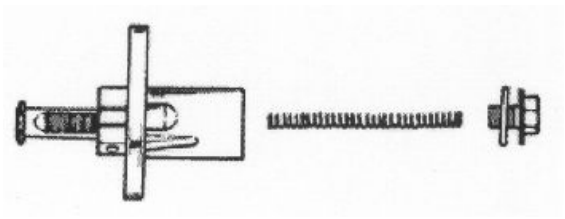
Specification	Desc./Quantity
Standard diameter (mm) A	Ø 32.015 - 32.025
Standard diameter (mm) B	Ø 16.0 - 16.018
Standard diameter (mm) C	Ø 11.0 - 11.018

Inspecting the timing system components

- Check that the guide slider and the tensioner pad are not excessively worn.
- Check that the chain unit, the camshaft control pulley and the pinion are not worn.
- If signs of wear are found, replace the parts; if wear has been found on the chain, pinion or pulley, replace the entire unit.



- Remove the central screw 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

- Remove any carbon deposits from the valve seats.
- Check the width of the mark on the valve seat «**V**» with Prussian blue.

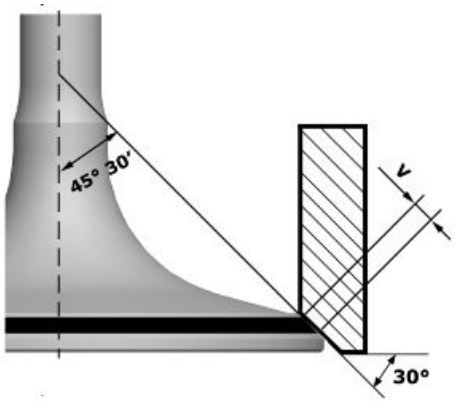
Characteristic

Standard value:

1 - 1.3 mm

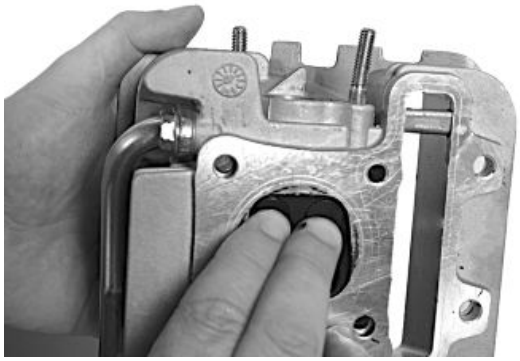
Limit allowed:

1.6 mm



- If the width of the mark on the valve seat is larger than the prescribed limits, true the seats with a 45° milling cutter and then grind.
- Replace the head in case of excessive wear or damage.

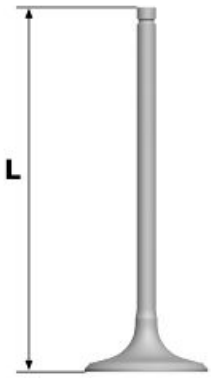
- Fit the valves into the cylinder head.
- Alternatively test the intake and exhaust valves.
- The test should be carried out by filling the manifold with fuel and checking that the head does not ooze through the valves when they are just pressed by the fingers.



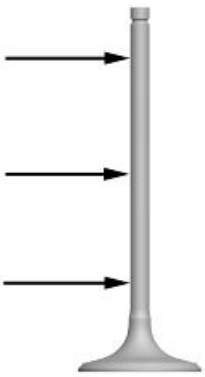
Inspecting the valves

STANDARD LENGTH OF VALVE

Specification	Desc./Quantity
Intake: standard length	74.9 mm
Exhaust: standard length	74.35 mm



- Measure the diameter of the valve stem at the three positions indicated in the diagram.



STANDARD DIAMETER

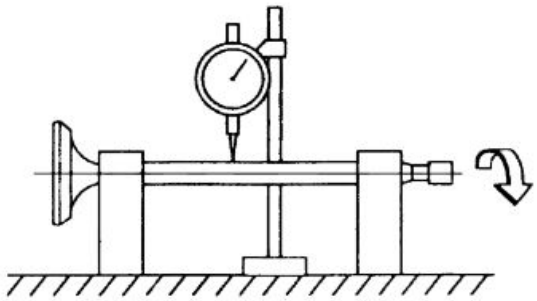
Specification	Desc./Quantity
Intake	3.970 - 3.985 mm
Exhaust	3.960 - 3.975 mm

MINIMUM DIAMETER ADMITTED

Specification	Desc./Quantity
Intake	3.958 mm
Exhaust	3.945 mm

- Calculate the clearance between the valve and its guide.

- Check the concentricity of the valve head by placing a dial gauge at right angles to the valve head and rotating it on the «**V**» shaped support.

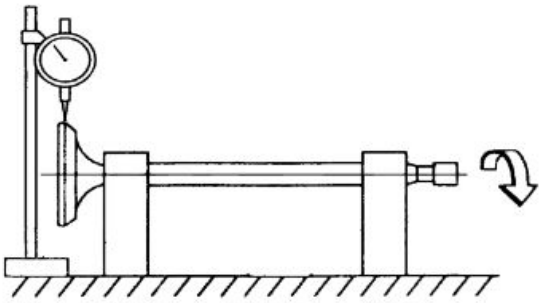


Characteristic

Limit allowed:

0.03 mm

- Check the deviation of the valve stem by resting it on a «**V**» shaped support and measuring the extent of the deformation using a dial gauge.



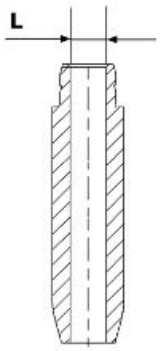
Characteristic

Limit value allowed:

0.1 mm

Inspecting the valve stem guide clearance

Measure the valve guides



VALVE GUIDE DIAMETER

Specification	Desc./Quantity
Valve guide	Standard diameter: 4 + 0.012 mm
Valve guide	Maximum diameter allowed: 4 + 0.022 mm

- After measuring the valve guide diameter and the valve stem diameter, check the clearance between guide and stem.

INTAKE

Specification	Desc./Quantity
Standard clearance	0.015 - 0.042 mm
Limit allowed	0.06 mm

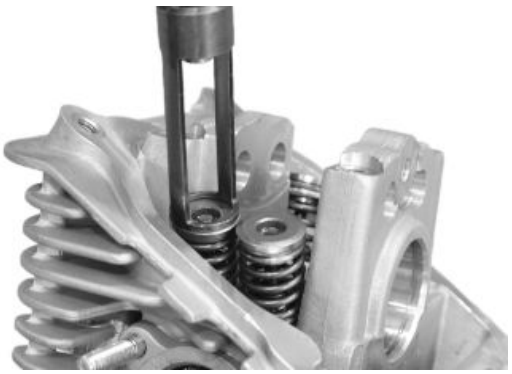
EXHAUST

Specification	Desc./Quantity
Standard clearance	0.025 - 0.052 mm
Limit allowed	0.07 mm

Refitting the valves

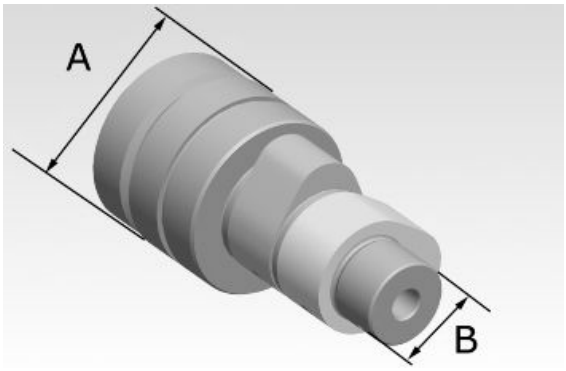
- Lubricate the valve guides with graphite grease.
- Place the valve springs lower washers on the head.
- Using the punch, alternately fit the 4 sealing rings.

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



Inspecting the cam shaft

- Check the camshaft bearings for signs of abnormal wear.



Characteristic

Standard diameter - Bearing A:

Ø 12+0.002

+0.010 mm **Standard diameter - Bearing B:**

Ø 16-0.015 -0.023 mm

Minimum diameter allowed - Bearing A:

Ø 11.98 mm

Minimum diameter allowed - Bearing B:

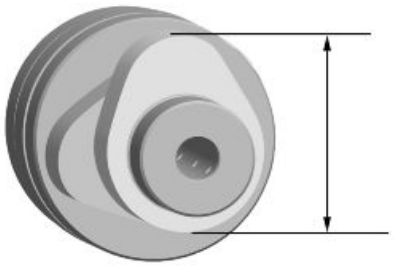
Ø 15.96 mm

- Using a gauge, measure the height of the cams.
- Check camshaft axial clearance

- If values measured are not within the specified limits or there are signs of excessive wear, replace the defective components with new ones.

NOTE

A BALL BEARING IS FITTED ON BEARING «A»; CONSEQUENTLY, BEARING «B» IS THE MOST IMPORTANT AS IT WORKS DIRECTLY ON THE ALUMINIUM OF THE HEAD



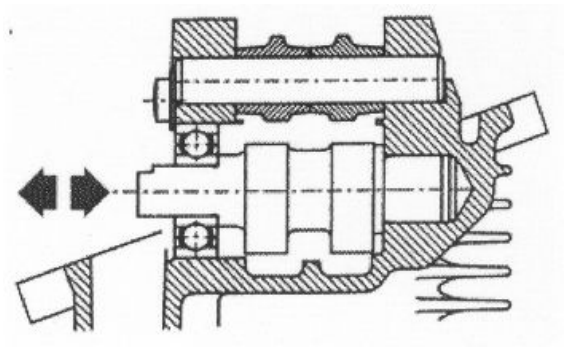
Characteristic

Standard height - Intake

24.397 mm

Standard height - Exhaust

23.996 mm



Fitting clearance

Maximum axial clearance allowed: 0.5 mm

- Check the outside diameter of the rocker pins
- Check there are no signs of wear or scoring on the rocker pins.
- Check the internal diameter of each rocker arm.
- Check that the pad in contact with the cam is not worn.

DIAMETER OF PINS AND ROCKING LEVERS

Specification	Desc./Quantity
Rocking lever inner diameter	11.015 - 11.035 mm
Rocking lever pin diameter	10.977 - 10.985 mm

Refitting the head and timing system components

- Rest the head steadily on a work table.
- Screw the tool to fit the camshaft fully down on the bearing inner track.
- Push it fully down into its seating together with the bearing with the aid of a mallet.
- Remove the tool.
- Fit the head gasket after cleaning the faying surface carefully.
- Fit the head in the cylinder stud bolts and tighten the 4 fixing nuts to the prescribed torque.

Specific tooling

020450Y Tool for fitting/removing the camshaft

- Fit the pins, intake rocker and exhaust rocker.
- Lubricate the 2 rocking levers through the holes.

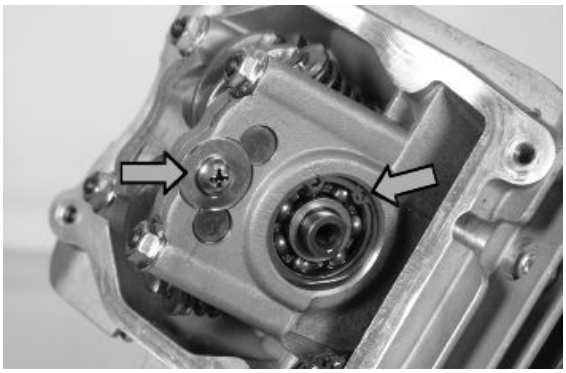
NOTE

WHEN REMOVING THE CAMSHAFT BEARING, IT IS ESSENTIAL TO REPLACE THE BEARING WITH A NEW ONE.

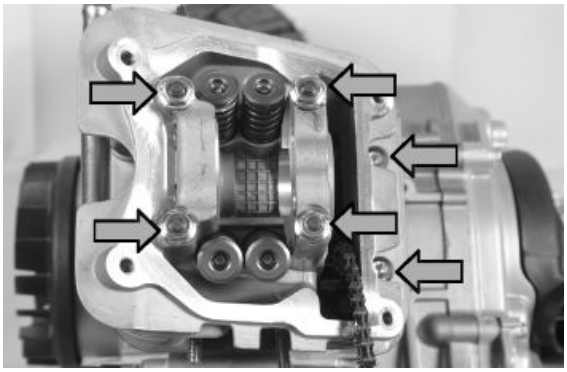
- Tighten the rocking lever pin clamping screw to the prescribed torque.
- Repositon the Seeger ring retaining the camshaft

Locking torques (N*m)

Rocking lever axle screw 3 - 4



- Finish the head tightening following the procedure below: screw the four head nuts to an initial torque at two crossed sequences. Afterwards, tighten the nuts with 2 turns of 90° each to be done at two crossed sequences.
- Finish the tightening of the head to the crankcase with the 2 side screws.



NOTE

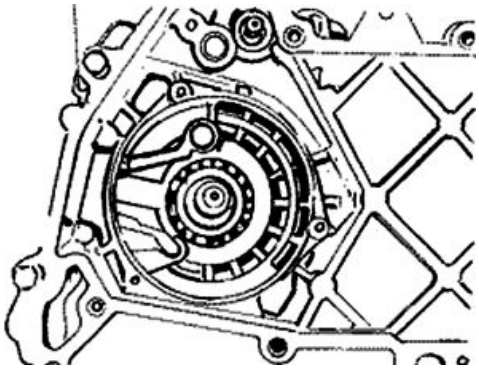
SHOULD THE CRANKCASE OR THE CYLINDER STUD BOLTS BE REPLACED, IT IS NECESSARY TO CARRY OUT AN INITIAL TIGHTENING PLUS OTHER 3 TURNS OF 90° EACH AT 3 CROSSED SEQUENCES

Locking torques (N*m)

Head-cylinder passing nuts: 6 - 7 +135° +90° Nm upon first assembly; upon refitting tighten again at 6 - 7 90° +90° Nm Head cover screws 8 - 10 Nm

Refitting the timing chain

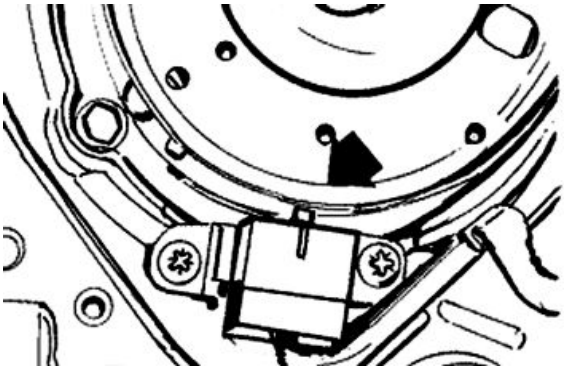
- Fit the timing chain sliders in their corresponding places, as well as the screw and the spacer as shown in the figure.
- Tighten to the prescribed torque and check the tensioner pad moves adequately.
- Fit the timing system pinion to the crankshaft with the chamfered side facing the insertion (towards the main bearing).
- Loop the timing chain around the sprocket on the crankshaft.



Locking torques (N*m)

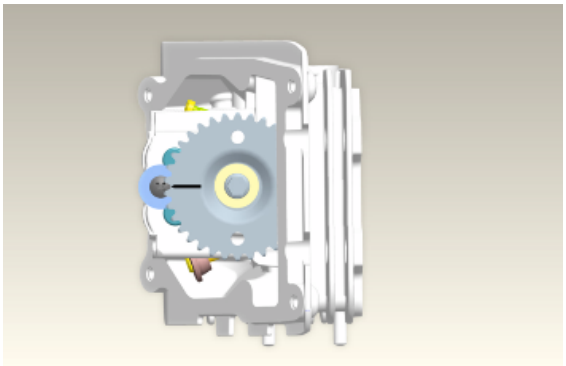
Chain tensioner pad screw 5 - 7 Nm

- Refit the spacer on the camshaft.
- Rotate the engine so that the piston is at top dead centre, using the reference marks on the flywheel and the crankcase.
- While doing so, fit the chain on the camshaft control pulley and make the reference notch coincide with the point on the head.
- Fit the pulley on the camshaft.
- Fit the belleville washer so that the outer rim touches the pulley.



- Draw the screw closer but without reaching its final locking point.

- Push the tensioner pad slightly to check the correct timing.



- Use the specific tool to lock the camshaft sprocket gear and tighten the screw.
- Adjust valve clearance.
- Replace the O-Ring on the tappet cover.
- Fit the tappet cover and lock it with the 4 fixing screws shown in the figure.

Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Camshaft pulley screw 12 - 14 Head cover screw 8 - 10 Nm

- Set the tensioner slider to its home position.
- Fit the chain tensioner on the cylinder using a new gasket, and tighten the 2 screws to the prescribed torque.
- Fit the spring with the central screw and tighten it to the prescribed torque.
- Fit the spark plug.

Locking torques (N*m)

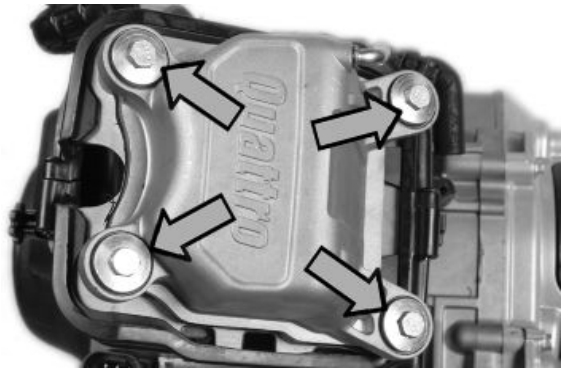
Timing chain tensioner screw 8 - 10 Nm Timing chain tensioner central screw 5 - 6 Ignition spark plug 10 - 15 Nm

Refitting the rocker-arms cover

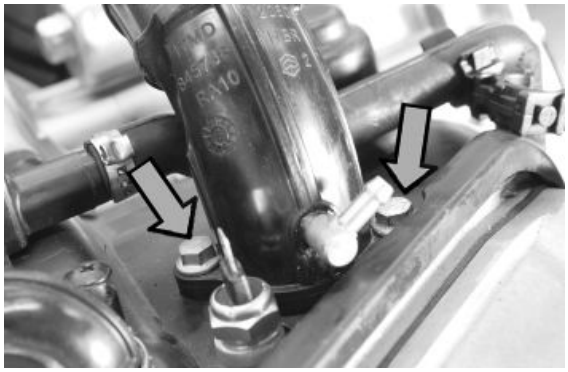
- Carry out the removal operations but in reverse order and tighten the four fixing screws to the prescribed torque.

NOTE

FIT A NEW O-RING ON THE TAPPET COVER



Refitting the intake manifold



- Fit the cover sealing gasket on the head.
- Fit the 2 covers.
- Fit the intake manifold and lock the 2 screws to the prescribed torque
- Fit the carburettor on the intake manifold and lock the clamp.
- Fit the secondary air pipe and fix it with the appropriate clamp.

NOTE

FIT THE CARBURETTOR THROUGH THE SUPPLEMENT ON THE MANIFOLD.

Locking torques (N*m)

Intake manifold screw 7 - 9 Nm

Crankcase - crankshaft

- First remove the following units:

Driving pulley Driven pulley

Final reduction greasing

Flywheel Oil pump plus stator

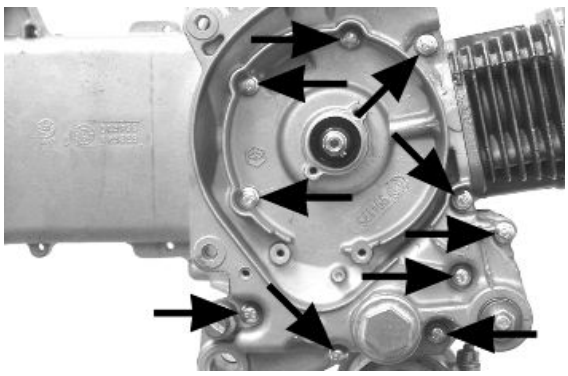
Cylinder-piston-head unit

Starter motor plus wire unit.

See also

Electric fan

Splitting the crankcase halves



- Remove the 10 crankshaft coupling screws.
- Detach the crankcase keeping the half crankshaft connected to the engine crankcase half on the transmission side.
- Remove the crankshaft.

CAUTION

THE CRANKSHAFT MIGHT ACCIDENTALLY FALL IF THIS RULE IS NOT OBSERVED.

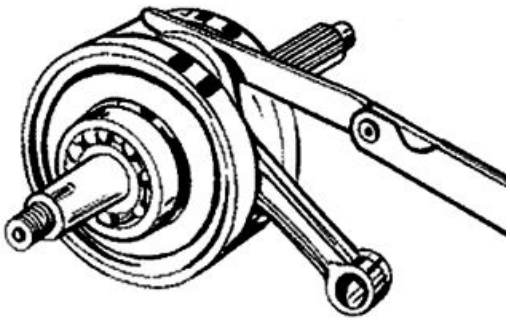
- Remove the flywheel side oil seal.

CAUTION

THE CENTRIFUGAL OIL FILTER IS ON THE FLYWHEEL SIDE HALF SHAFT. CONSEQUENTLY, DO NOT WASH WITH SOLVENTS OR BLOW COMPRESSED AIR SO THAT NO IMPURITIES LEAK

OUT. A CENTRIFUGAL OIL FILTER LIFE IS THE SAME AS THE ENGINE'S AND IS MAINTENANCE-FREE.

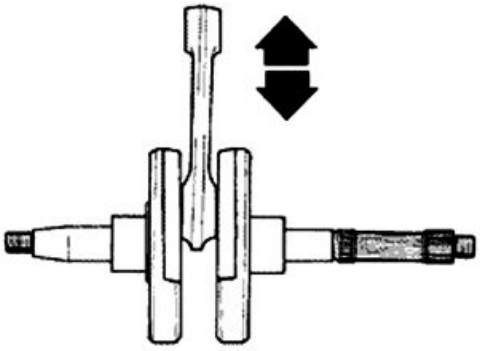
- Check the connecting rod axial clearance.



Fitting clearance

Connecting rod standard axial clearance 0.15 - 0.30 mm Connecting rod maximum axial clearance 0.5 mm

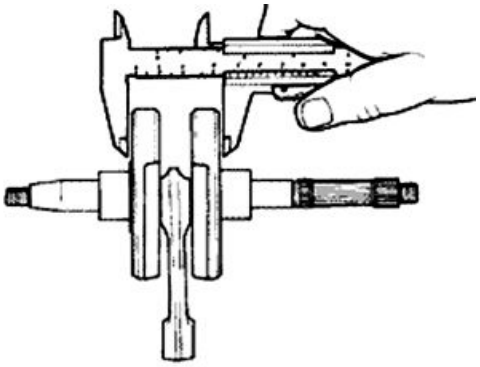
- Check the correct radial clearance of the connecting rod. Holding the crankshaft with your hands and, with a dial gauge fitted to the connecting rod small end, measure clearance by moving the connecting rod vertically as shown in the figure.



Fitting clearance

Connecting rod standard radial clearance 0.006 - 0.018 mm Connecting rod maximum radial clearance 0.25 mm

- Check that the half shaft surfaces are not scored and with the aid of a gauge measure the crankshaft width as shown in the figure.



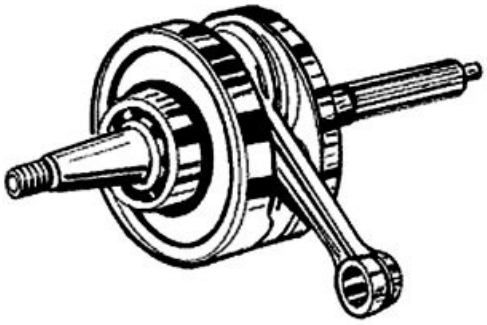
Characteristic

Standard measure

45 mm

Removing the crankshaft bearings

- Remove the flywheel side bearing fitted on the crankshaft using the specific tool.



Specific tooling

004499Y Shaft bearing extractor

004499Y001 Bell for bearing extractor

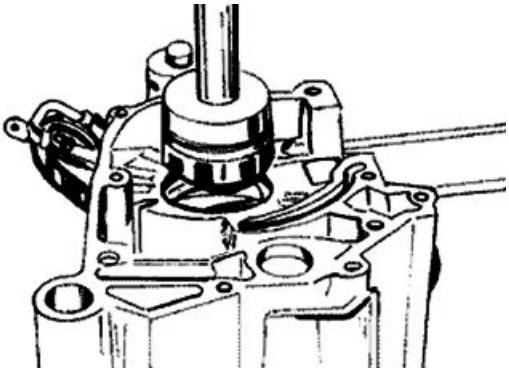
004499Y002 Screw for bearing extractor

004499Y006 Ring for bearing extractor

004499Y034 part for the bearing extractor

Refitting the crankshaft bearings

- Support the crankcase firmly on a surface and place it with the crankshaft axle in vertical position.
- Warm the crankcase at ~ 120° C with a thermal gun (and support).
- Fit the punch with guide and adaptor, place the bearing on the punch using grease (to keep it from falling).
- Fit the bearing on the crankcase; use a mallet but do so with extreme care so as not to damage the engine crankcase limit stop.



Specific tooling

020359Y 42 x 47-mm adaptor

020364Y 25-mm Guide

020376Y Adapter handle

020360Y 52 x 55-mm adaptor

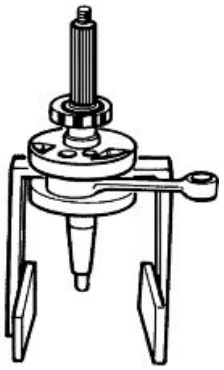
- Warm a new main bearing in an oil bath at 120°.
- Place the crankshaft on the support base and fit the bearing with the aid of an adequate pipe section, if necessary.

NOTE

USE A NEW BEARING WHEN REFITTING.

WARNING

THE CENTRIFUGAL OIL FILTER IS ON THE FLYWHEEL SIDE HALF SHAFT. CONSEQUENTLY, DO NOT WASH WITH SOLVENTS OR BLOW COMPRESSED AIR SO THAT NO IMPURITIES LEAK OUT.



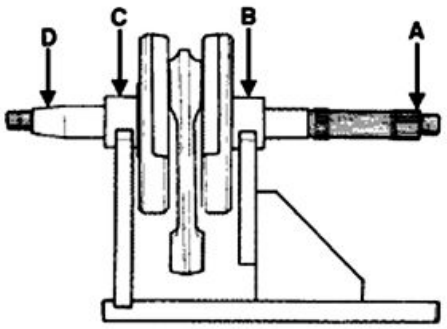
Specific tooling

020265Y Bearing fitting base

008119Y009 Pipe for fitting the shafts and the axles

Inspecting the crankshaft alignment

- Install the crankshaft on the support and measure the misalignment at the 4 points indicated in figure.



NOTE

IF VALUES OTHER THAN THOSE ALLOWED ARE DETECTED, TRY STRAIGHTENING THE CRANKSHAFT BY INSERTING A WOODEN WEDGE BETWEEN THE HALF SHAFTS OR BY CLOSING THEM WITH A VICE AS NEEDED. IF EVEN AFTER THIS OPERATION THE VALUES ARE NOT THOSE ADMITTED, REPLACE THE CRANKSHAFT.

Characteristic

Maximum off-line allowed - A

0.15 mm

Maximum off-line allowed - B

0.02 mm

Maximum off-line allowed - C

0.02 mm

Maximum off-line allowed - D

0.10 mm

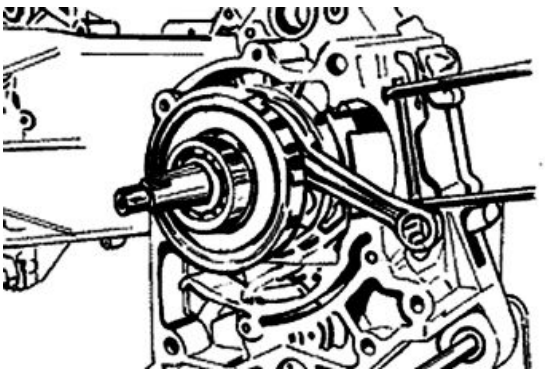
- Check that the crankshaft cone, the tab fitting, the oil seal flow, the knurling and the threaded shanks are in good working order.
- In case of failure, replace the crankshaft.

Specific tooling

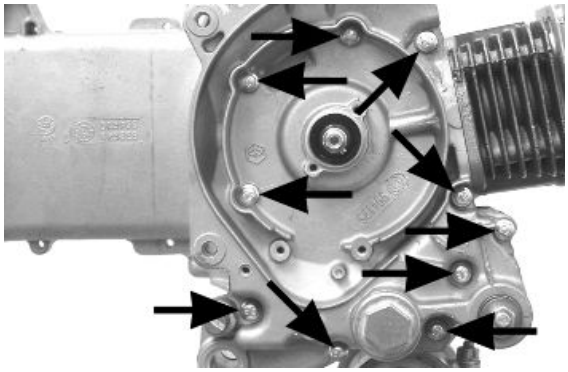
020074Y Support base for checking crankshaft alignment

Refitting the crankcase halves

- Be careful to place the two alignment dowels preferably on the crankcase halves on the flywheel side.
- Fit the crankshaft on the crankcase halves on the transmission side.



- Fit the gasket recommended for surfaces on the crankcase half on the transmission side after greasing the two faying surfaces carefully.
- Fit the crankcase half on the flywheel side.
- Fit the 10 screws and tighten them to the prescribed torque.



NOTE

WHEN FITTING THE CRANKCASE HALVES AND THE CRANKSHAFT, BE CAREFUL NOT TO DAMAGE THE SHAFT THREADED SHANKS.

Recommended products

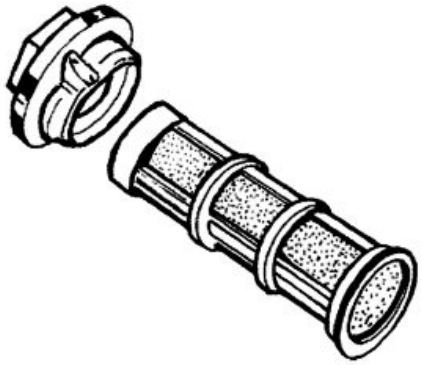
Loctite 510 Liquid sealant

Gasket

Locking torques (N*m)

Crankcase halves union screws: 8 - 10 Nm

- Fit a new O-Ring on the mesh oil filter and on the filler plug; lubricate.
- Fit the filter on the engine and lock the cap to the prescribed torque.



Locking torques (N*m)

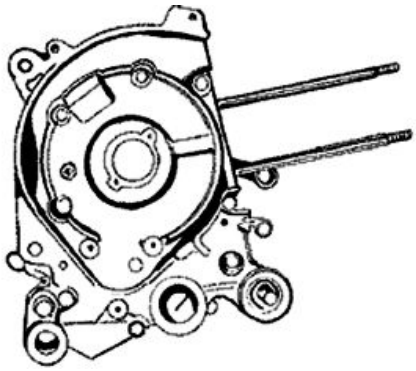
Engine oil pre-filter cap: 25 - 28 Nm

Lubrication

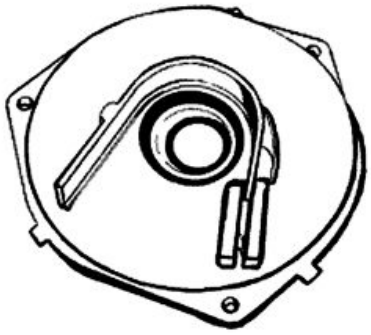
Crankshaft oil seals

Removal

- Take out the flywheel side oil seal from the crankcase being careful not to damage or score the crankcase.



- Check that the chain supporting pad is not worn.
- Otherwise, replace the pad or fit it in the reverse direction to use the other side.
- Any operation on the chain cover oil seal should be carried out placing the cover on the work table on the covering plate side of the oil pump chain.
- Remove the oil seal with a Ø 30 mm (Ø 32 mm Max.) tube section.

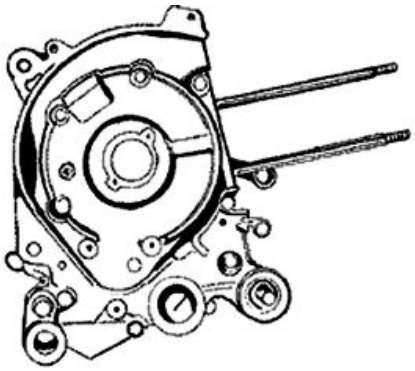


Refitting

- Apply engine oil on the oil seal and it seats on the crankcase.
- Operating from the outside and using the specific punch, place the oil seal fully down until it reaches the bottom of the seat in the crankcase.

NOTE

FAILURE TO USE THE SPECIFIC TOOL MAY RESULT IN AN INCORRECT DEPTH POSITION AND, AS A CONSEQUENCE, IN INADEQUATE OIL SEALING.



- Fit a new oil seal on the outer rim with the help of the specific tools indicated below.
- Fit a new O-ring and lubricate with grease.
- Install the cover on the engine crankcase, fit the three screws and place the cover in its seat.
- Tighten the 3 screws to the prescribed torque.

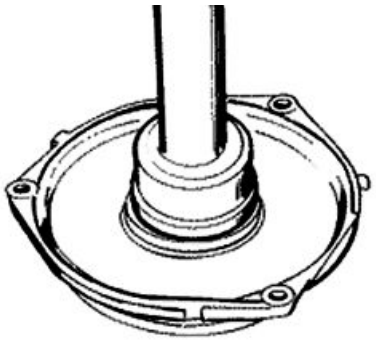
Specific tooling

020376Y Adapter handle

020358Y 37 x 40 mm adaptor

Locking torques (N*m)

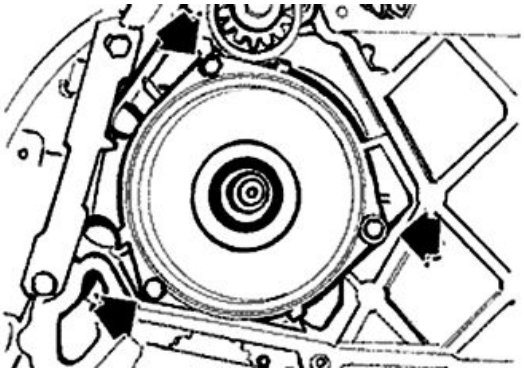
Timing chain/oil pump compartment cover screws 4 - 5 Nm



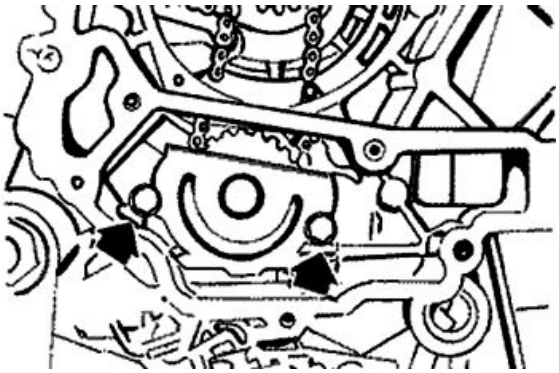
Oil pump

Removal

- Remove the chain compartment cover by undoing the 3 fixing screws indicated in the figure.
- Take out the cover using the appropriate fusion couplings on the cover with a pair of pliers

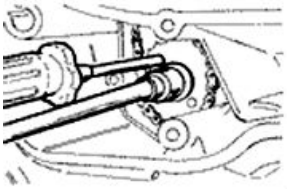


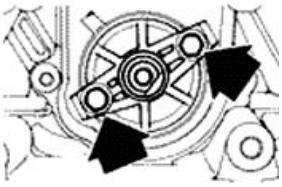
- Remove the cover of the pump control crown gear by undoing the 2 retainers indicated in the figure.
- Block the rotation of the oil pump control gear by inserting a screwdriver through one of the holes on the pump.



- Remove the central screw and the belleville washer
- Remove the chain and the sprocket gear.
- Remove the crankshaft control pinion
- Remove the oil pump by unscrewing the 2 retainers indicated in the figure.
- Remove the sealing gasket.

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

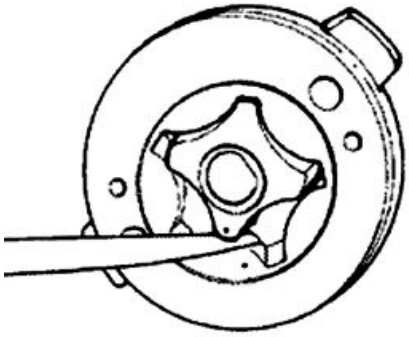




Inspection

- Remove the two screws and the oil pump cover.
- Remove the circlip fixing the inner rotor.
- Remove and wash the rotors thoroughly with degreasing solvent and compressed air.
- Reassemble the rotors in the pump body, keeping the 2 reference marks visible. Fit the retainer ring.

- Measure distance between rotors (inner rotor/ outer rotor) with a feeler gauge in the position shown in the picture.

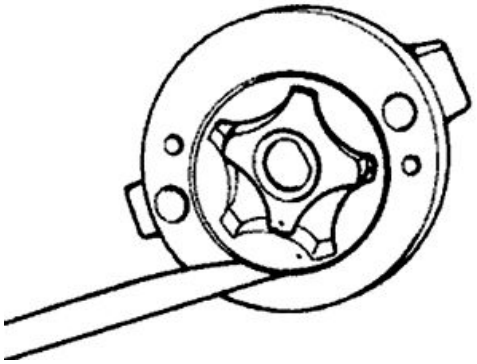


Characteristic

Limit clearance allowed 1

0.15 mm

- Measure the distance between the outer rotor and the pump body (see figure).



Characteristic

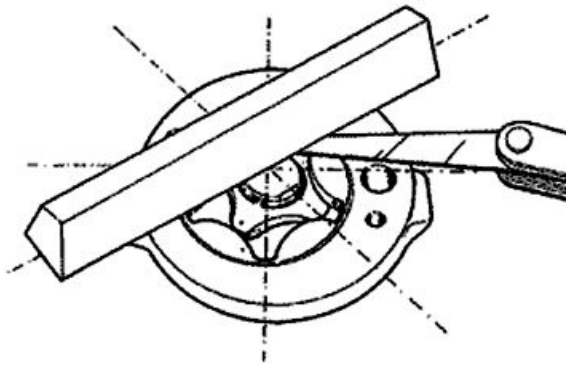
Limit clearance allowed 2

0.20 mm

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

NOTE

MAKE SURE THE TRUED BAR IS POSITIONED PROPERLY ON THE TWO POINTS ON THE PUMP BODY.



Characteristic

Limit clearance allowed 3

0.09 mm

Refitting

- Check there are no signs of wear on the oil pump shaft or body.
- Check there are no signs of wear or scoring on the oil pump cover.
- If non-conforming values or signs of wear are found, replace the faulty parts or the assembly.
- Fit the cover on the pump being careful to align the holes (2 on the cover and 2 on the pump body) fixing the oil pump on the crankcase.
- Fit the oil pump on the crankcase by tightening the two screws to the prescribed torque.

- Fit the pulley on the pump, the central screw to the specified torque and the belleville washer.
- Check that there is no seizing and/or friction during pulley movement.

NOTE

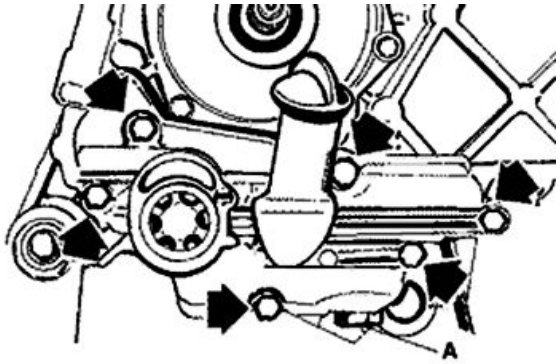
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER (CURVED) RIM TOUCHES THE PULLEY.

Locking torques (N*m)

Central screw 12 - 14 Nm **Cover screws** 0.7 - 0.9 Nm **Oil pump screws** 5 - 6

Removing the oil sump

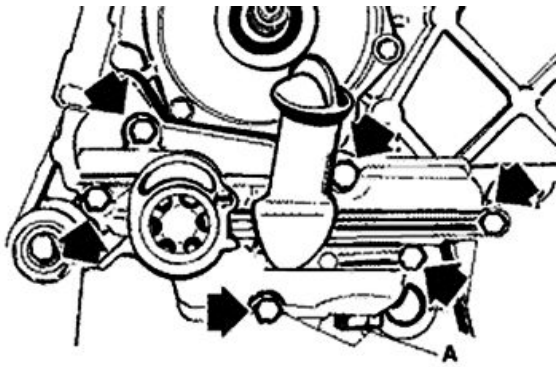
- Remove the oil filler plug, transmission cover, driving pulley unit with belt and pinion.
- Unscrew the oil drainage cap «**A**» shown in the figure and drain out all the oil from the sump.
- Remove the 6 screws shown in the figure.



Refitting the oil sump

- Clean and grease the faying surfaces.
- Apply LOCTITE 510 on the sump surface and tighten the 6 fixing screws to the prescribed torque.
- Refit the driving pulley unit, belt, pinion and transmission cover.

WHEN TESTING THE LUBRICATION SYSTEM, REFER TO THE "CRANKCASE AND CRANKSHAFT" CHAPTER REGARDING LUBRICATION OF THE CRANKSHAFT AND CONNECTING ROD.

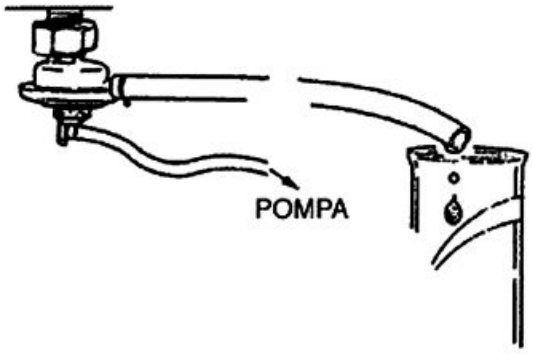


Locking torques (N*m)

Oil sump screws 8 - 10 Nm

Fuel supply

- Disconnect the fuel supply and the vacuum suction pipe from the carburettor.
- Check that there are no fuel leaks between the two tubes.
- Close the fuel outlet pipe.
- Using a MITIVAC pump, apply 0.1 vacuum bar on the cock.
- Make sure that the vacuum is kept stable and that there are no fuel leaks.
- Reconnect the vacuum pipe to the manifold.
- Place the fuel pipe with the outlet at the cock height.
- Turn the engine by using the starter motor for 5 seconds with the carburettor at idle.
- Measure the fuel by means of a graded burette.



NOTE

THE MEASUREMENT MAY BE DISTORTED BY THE INCORRECT NUMBER OF REVS OR BY THE WRONG POSITION OF THE TUBE. IN THIS CASE, THE TENDENCY IS TO OBTAIN A REDUCED FUEL CAPACITY. THE VACUUM INTAKE ON THE MANIFOLD HAS A SECTION INTENTIONALLY REDUCED FOR THE PURPOSE OF ENHANCING VACUUM PULSES, ENSURING A REGULAR COCK CAPACITY.

Specific tooling

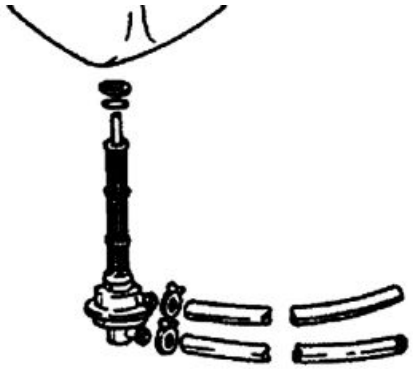
020329Y Vacuum pump Mity-Vac

Characteristic

Minimum capacity

20 cc

- Empty the fuel tank completely.
- Remove the petrol delivery pipe and the vacuum pipe.
- Loosen the clamp and remove the cock.
- Clean the tank and the cock filter with a specific solvent.
- Refit the cock making sure there is an O-Ring.
- Turn the cock to the direction it had before it was removed and block the clamp.

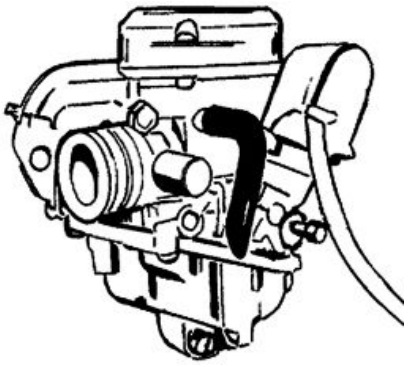


NOTE

THE FILTER CAN BE UNSCREWED FROM THE COCK TO MAKE FACILITATE CLEANING.

Removing the carburettor

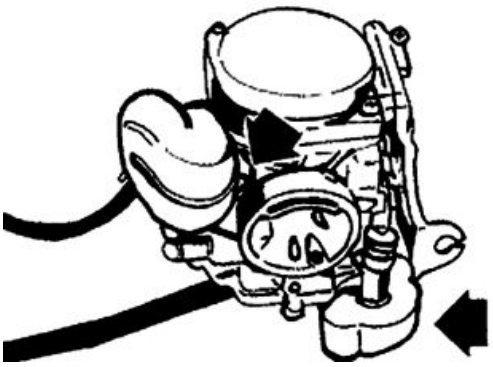
- To remove the carburettor from the engine, remove the two clamps anchoring the carburettor to the inlet manifold and the air intake sleeves to the filter.
- Remove the petrol supply pipe.
- Disconnect the starter connection.
- Remove the throttle grip cable with the sheath that connects the plate and the support.
- Slide off the carburettor.



- Remove the protection, bracket and the starter loosening the screw shown in the figure.

CAUTION

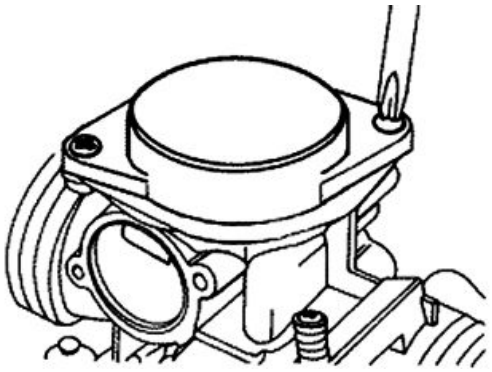
THE CARBURETTOR HAS AN ANTI-VIBRATION RUBBER BUFFER FITTED ON THE LOWER SUPPLEMENT OF THE ACCELERATING PUMP BODY. UPON REFITTING THE CARBURETTOR ON THE ENGINE, MAKE SURE THIS BUFFER IS PRESENT TO AVOID CHECKING IF THE PETROL IN THE FLOAT CHAMBER IS EMULSIFIED.



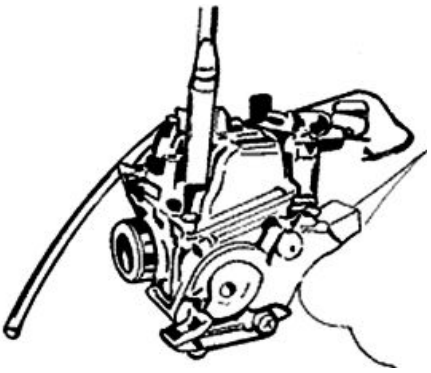
- Remove the 2 fixing screws shown in the figure, the vacuum chamber cover and the spring.
- Remove the vacuum valve and the diaphragm; the pin, the spring and the corresponding plastic guide.

WARNING

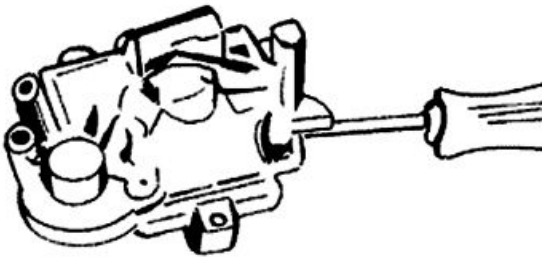
WHILE REMOVING THE COVER, PAY ATTENTION NOT TO RELEASE THE SPRING ACCIDENTALLY.



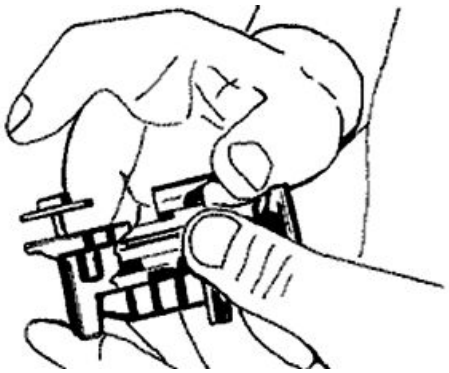
- Remove the 3 fixing screws and the float chamber with the corresponding gasket.



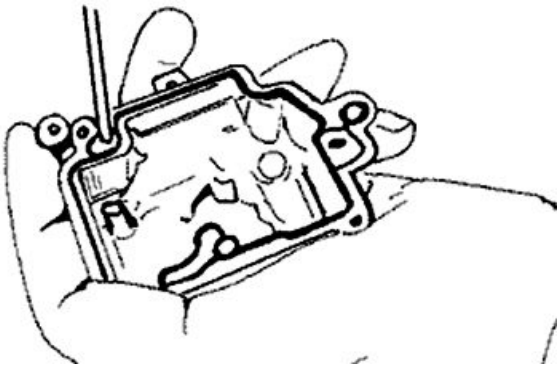
- Remove the float chamber components following the procedure below.
- Undo the 2 screws fixing the accelerating pump diaphragm cover.



- Remove the cover being careful with the spring below, then remove the spring, take out the rubber protection and the diaphragm together with the pipe O-Ring.



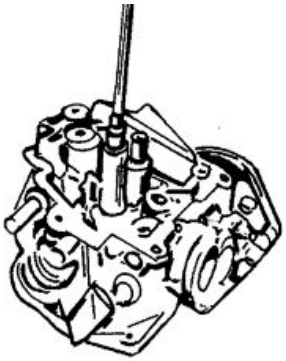
- Remove the accelerating pump jet and the ball spring.

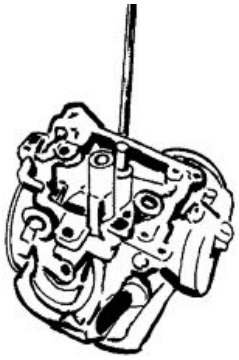


- Remove the screw shown in the figure fixing the float pin.
- Remove the float and the pin.

- Remove the maximum jet.
- Remove the diffuser.

- Remove the minimum jet.

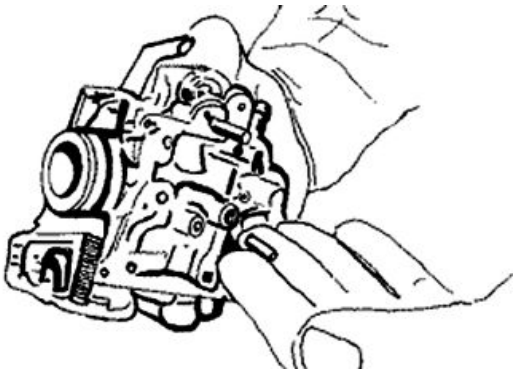




- Remove the sprayer tilting the carburettor body.

NOTE

THIS OPERATION IS NECESSARY TO AVOID LOSING SPRAYER PARTS WHEN CLEANING THE CARBURETTOR BODY. IF THE SPRAYER IS FORCED INTO ITS POSITION, DO NOT ATTEMPT TO REMOVE IT AS THIS WILL ONLY DAMAGE IT.



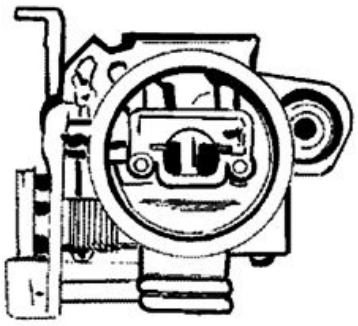
- Remove the idle flow screw with the O-ring and the spring.

CAUTION

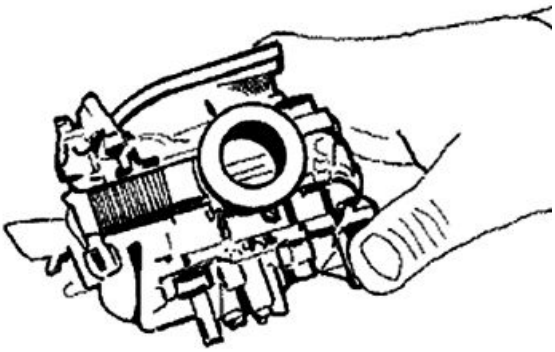
DO NOT TRY TO REMOVE PARTS EMBEDDED IN THE CARBURETTOR BODY SUCH AS: THE FUEL SUPPLY PIPE, THE PIN SEAT, THE STARTER JET, THROTTLE VALVE CONTROL SHAFT. DO NOT REMOVE THROTTLE-SHAFT CONNECTION SCREWS. THE FIXING SCREWS ARE CHAMFERED AFTER BEING FITTED AND REMOVING THEM DAMAGES THE SHAFT.

Refitting the carburettor

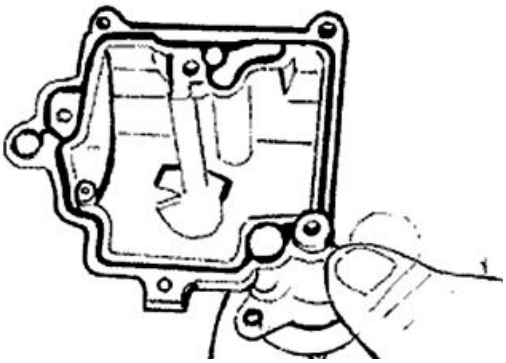
- Before refitting, wash the carburettor body accurately with a degreasing solvent and compressed air.
- Pay special attention to the fuel supply pipe and the pin seat.



- For the minimum circuit, make sure the following points are properly cleaned: air gauging, flow screw controlled outlet section, progression holes near the throttle valve.



- For the starter circuit, blow the connection pipe properly with the jet. This is necessary because the jet support hides other inaccessible internal calibrations.
- Blow the intake jet properly.
Its outlet section is extremely small and is oriented towards the throttle valve.

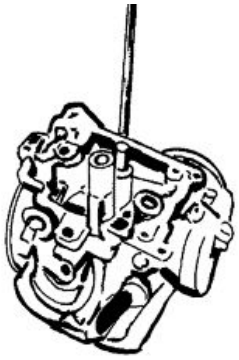


- Check that the carburettor body has the closing ball for the minimum circuit pipe.
- Check that the coupling surfaces with the float chamber and the diaphragm are not dented.
- Check that the pipe containing the vacuum is not scratched.
- Check that the throttle valve and the shaft do not show abnormal wear.
- Check that the pin seat does not show abnormal wear.
- Replace the carburettor in case of irregularities.

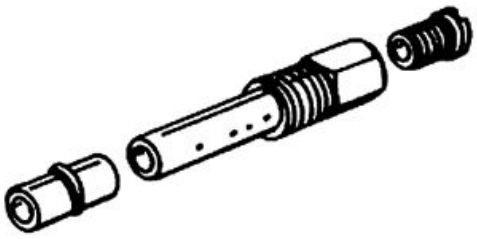
NOTE

TO AVOID DAMAGES, DO NOT INTRODUCE METAL OBJECTS IN THE ADJUSTED SECTIONS.

- Wash and blow the minimum jet properly and refit it.



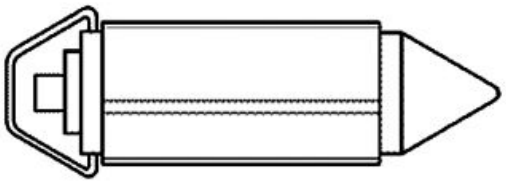
- Accurately wash and blow the components of the maximum circuit, the sprayer, the diffuser and the jet.
- Introduce the sprayer in the carburettor body with the cylindric part with the biggest diameter towards the diffuser.
- Fit the diffuser.
- Fit the maximum jet.



- Check that the tapered pin does not show signs of wear on the damped pin sealing surface and the return spring.
- Replace the pin if it is worn.
- Check that the float is not worn on the pin housing or on the plate in contact with the pin and that there are no fuel leaks on the carburettor.
- Replace it in case of faults.
- Fit the float together with the pin and rod in its position and lock it with the appropriate screw.

NOTE

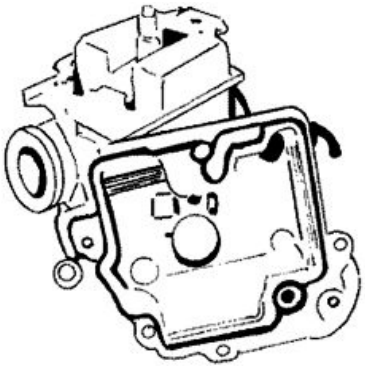
FIT THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY.



- Fit the ball in the corresponding accelerating pump.
- Fit the spring.
- Fit the accelerating pump jet.

WARNING

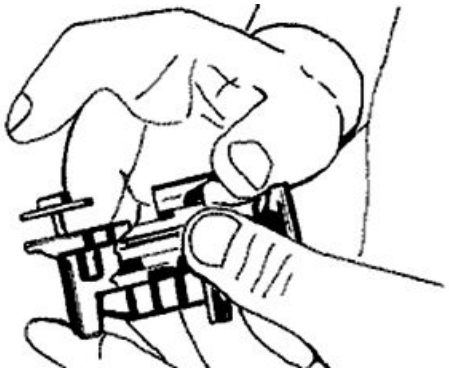
WHEN REFITTING, PAY SPECIAL ATTENTION TO THE COMPONENTS AS THEY ARE SMALL.



- Check the diaphragm is in good conditions and remove the remaining components of the accelerating pump following these steps:
- Fit the O-Ring in the pipe.
- Fit the diaphragm together with the pin and the corresponding spring.

NOTE

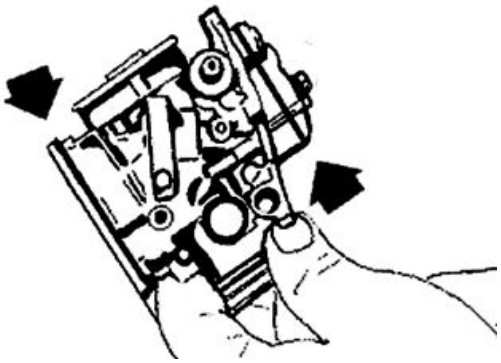
REPLACE THE DIAPHRAGM IF THERE ARE SIGNS OF UNDULATIONS, CRACKS OR EXCESSIVE HARDENING.



- Fit the accelerating pump diaphragm cover and tighten the 2 fixing screws making sure the spring below is correctly positioned.
- Fit the rubber bellows protecting the pin in the upper part of the accelerating pump.

Level check

- Tilt the carburettor so that the petrol supply needle valve is closed and the float weight does not affect it.
- Check that the diaphragm closing line and the float central line are parallel as shown in the figure.



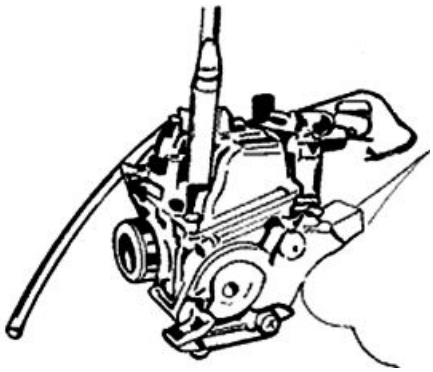
- Blow air into the float chamber and fit it as well as the corresponding gasket on the carburettor body with the 3 fixing screws.

NOTE

ALWAYS USE NEW RINGS AND GASKETS FOR REFITTING.

WARNING

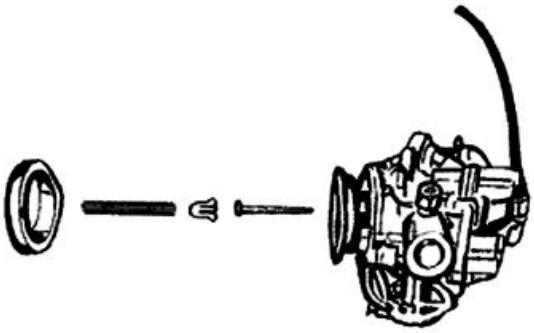
THE SCREW IN THE FLOAT CHAMBER BOTTOM IS A BLEED SCREW AND, CONSEQUENTLY, IT ONLY REQUIRES CLEANING.



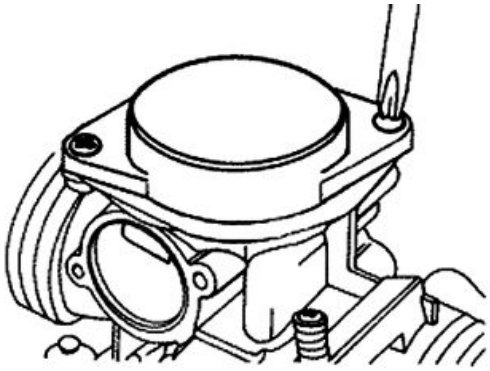
- Fit the diaphragm into the throttle valve.
- Fit the tapered pin together with the plastic support and the contrast spring into the throttle valve.

NOTE

PLACE THE SPRING PLASTIC SUPPORT WITH ITS TEETH FACING THE INNER SIDE OF THE DIAPHRAGM TO BE ABLE TO FIT THE LOWER END OF THE THROTTLE VALVE SPRING.

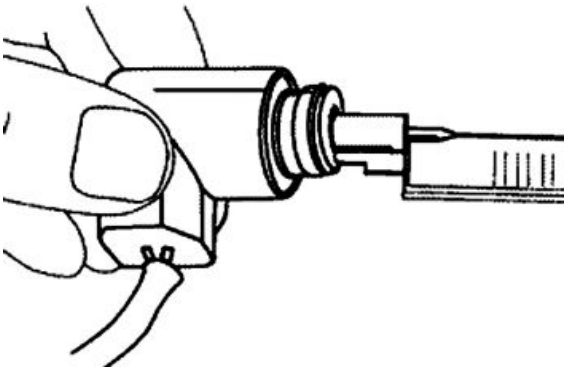


- Fit the vacuum chamber cover with the 2 fixing screws paying special attention to the spring.



Inspecting the automatic choke device

- Check that the automatic starter piston is not distorted or rusty.
- Check that the piston slides freely in its seat
- Check that the piston sealing O-Ring is not deformed.
- The starter must be more or less functional depending on the ambient temperature.
- Measure the piston protrusion as shown in the figure and check the corresponding value.
- Make sure that the starter is adjusted for the ambient temperature.



Characteristic

protrusion value

11.5 mm

ambient temperature

24° C

- The starter should be progressively disconnected by means of electrical heating.
- Check the starter resistance when adjusted to the ambient temperature.

Characteristic

ambient temperature

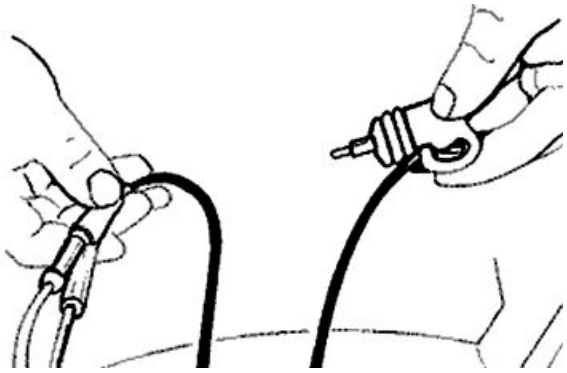
24° C

Electric characteristic

Automatic starter resistance

20 Ω ± 5 %

- Use battery to power the automatic starter and check that piston protrudes as much as possible.
- The correct warm up time depends on the ambient temperature.
- If protrusion, resistance or timing values are different from the ones prescribed, replace the starter.



Characteristic

Battery

12V - -9 Ah

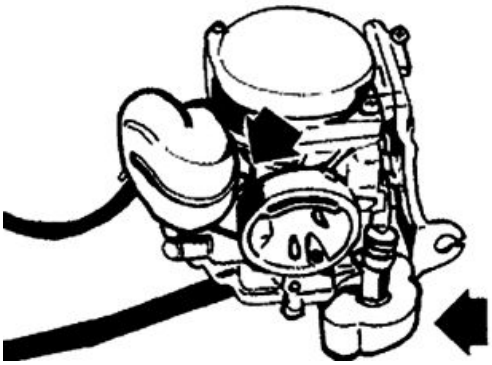
max. protrusion

15 mm

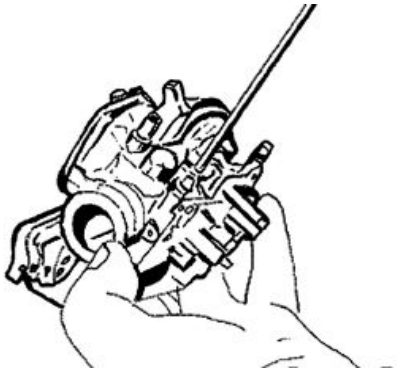
max. time

15 min

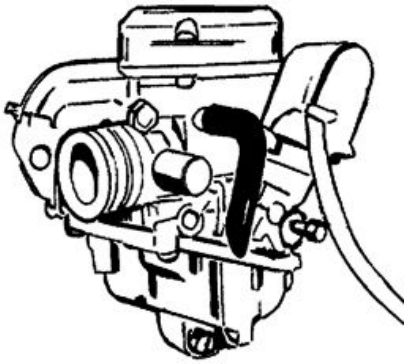
- Fit the starter, the support bracket and the protection with the screw shown in the figure.



- Fit rubber pipes for float chamber ventilation.
- Fit the O-Ring, the washer, the spring and the minimum flow screw in the corresponding seat.



- Refit the carburettor on the engine and connect again the throttle grip cable with the sheath and the support plate and the starter electrical connection.
- Reconnect the petrol supply pipe and tighten the 2 fixing screw clamps that fix the carburettor to the inlet manifold and the air inlet sleeve to the filter.



Adjusting the idle

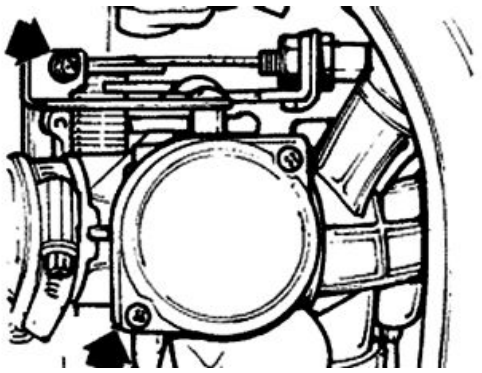
- The engine does not require frequent idle speed adjustments, but it is essential to strictly follow certain rules when adjusting the idle speed.
- Before adjusting the carburettor make sure that the lubrication requirements and valve clearance are met, timing is respected, the spark plug is in optimum conditions, the air filter is clean and sealed, and the exhaust system is sealed.

- Connect the multimeter thermometer to the sump, using a cap with oil expressly prepared for probes.
- Start the engine and before adjusting the idle speed, make sure that the oil temperature is between 70-80 °C

Specific tooling

020331Y Digital multimeter

- Using the rpm indicator of the analyser or a separate one, adjust the idle screw.



NOTE

THE WASTED SPARK IGNITION SYSTEM OFFERS REMARKABLE POWER. READINGS MAY NOT BE ACCURATE IF INADEQUATE RPM INDICATORS ARE USED.

Specific tooling

020332Y Digital rpm indicator

Characteristic

Engine revs at idle speed

1,800 ± 100 rpm

INDEX OF TOPICS

Front

Removing the front wheel

CAUTION

WHEN REMOVING OR REFITTING THE WHEEL, PAY SPECIAL ATTENTION NOT TO DAMAGE THE BRAKE CABLE, THE DISCS AND THE PADS. BEFORE CARRYING OUT THE FOLLOWING OPERATIONS, COOL DOWN THE ENGINE AND THE SILENCER TO AMBIENT TEMPERATURE TO AVOID POSSIBLE BURNS.

- Park the vehicle on its centre stand.
- Place a support under the vehicle so that the wheel can move freely and the vehicle does not fall.

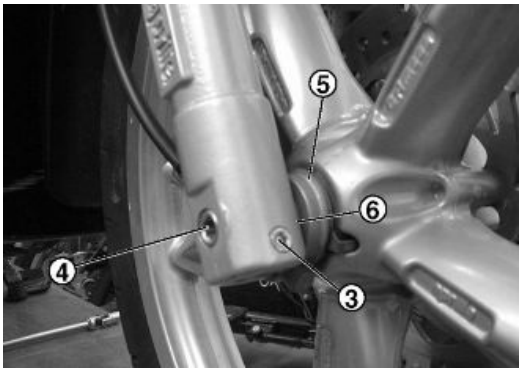
CAUTION

MAKE SURE THE SCOOTER IS STABLE AND FIRM.

- Loosen the axle fixing screw «3».

NOTE

OBSERVE THE SPEEDOMETER TRANSMISSION POSITION «5» AND THE WASHER POSITION «6» IN ORDER TO REFIT THEM CORRECTLY.



- Loosen axle «4» completely with the adequate spanner.
- Hold the front wheel and remove axle «4» manually.
- Remove the washer «6».

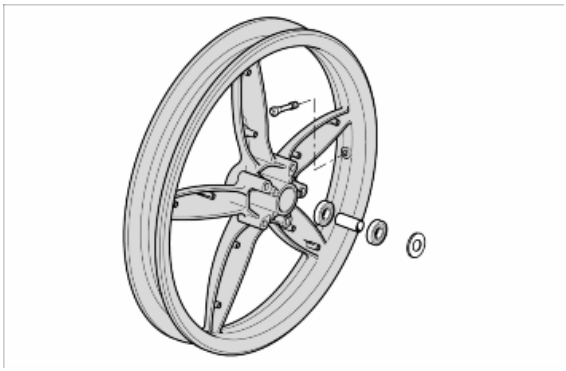
CAUTION

NEVER TOUCH THE FRONT BRAKE LEVER ONCE THE FRONT WHEEL IS REMOVED. DOING SO MAY CAUSE THE CALLIPER PISTONS TO COME OUT AND THE BRAKE FLUID TO SEEP THROUGH.

- Completely remove the wheel pulling it forwards.
- Disconnect the speedometer transmission «5».

Front wheel hub overhaul

- Remove the front wheel.
- Clean the two sides of the hub with a cloth.
- With the specific extractor, take out the two bearings.
- Collect the internal spacer.
- Carry out a thorough check of the bearings.
- Clean the inside of the hub thoroughly.
- Wash all the parts with detergent.

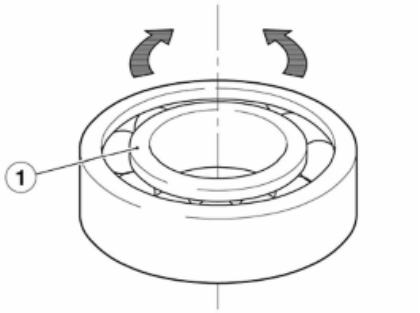


BEARINGS

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.

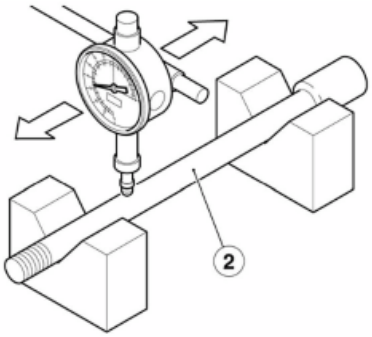


GASKETS

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

wheel spindle

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



Characteristic

Maximum eccentricity:

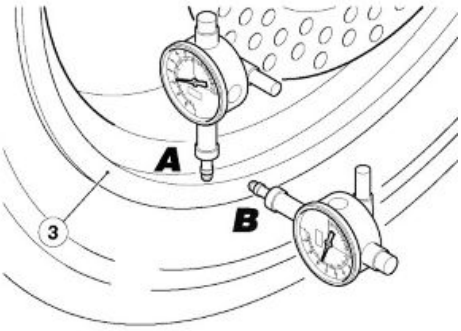
0.25 mm

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

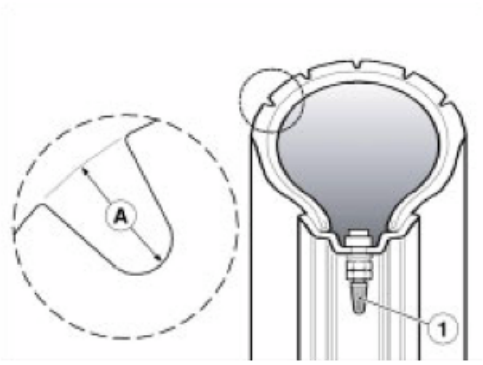
Maximum radial and axial eccentricity:

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.

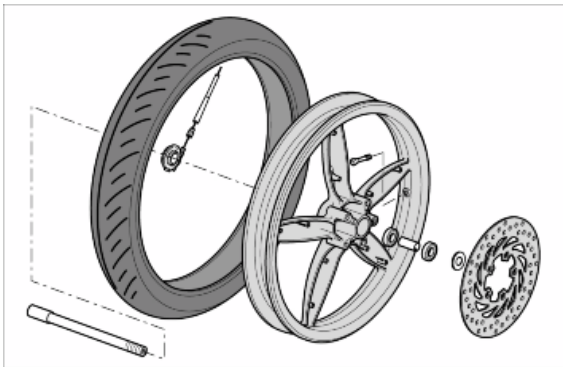


Refitting the front wheel

CAUTION

WHEN REMOVING OR REFITTING THE WHEEL, PAY SPECIAL ATTENTION NOT TO DAMAGE THE BRAKE CABLE, THE DISCS AND THE PADS. BEFORE CARRYING OUT THE FOLLOWING OPERATIONS, COOL DOWN THE ENGINE AND THE SILENCER TO AMBIENT TEMPERATURE TO AVOID POSSIBLE BURNS.

- Apply a thin layer of lubricating grease inside the speedometer transmission, in the external seats of the wheel hub and on the wheel axle.
- Place the wheel between the fork rods.
- Place the speedometer transmission by inserting the tongue in its seat on the wheel hub.

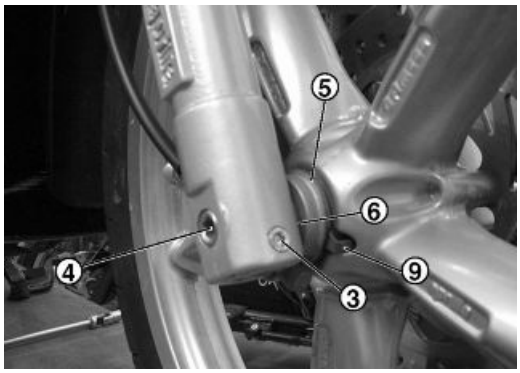


CAUTION

WHEN REFITTING THE WHEEL, PAY ATTENTION NOT TO DAMAGE THE BRAKE CABLE, THE DISCS AND THE PADS.

- Fit the wheel between the fork rods, carefully inserting the disc into the brake calliper.

- Turn the wheel until the holes on the axle and the bearings are not aligned.
- Fit the washer «6» between the speedometer transmission «5» and right fork rod.
- Push it completely into the axle «4» and tighten it with the appropriate tightening power.



Locking torques (N*m)

Front wheel spindle nut 35 Nm (25.81 ftlb)

- Tighten the axle fixing screws «3».

Locking torques (N*m)

Screw tightening power «3» 12 Nm (8.68 ftlb)

Front fork

Removal

CAUTION

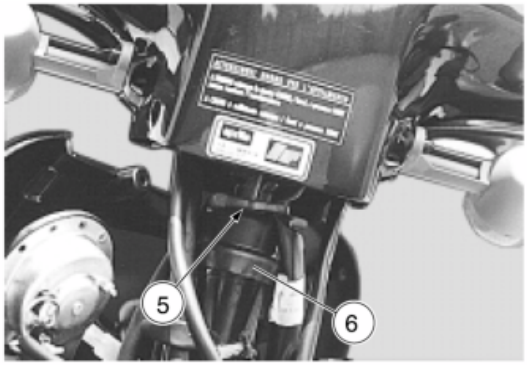
PLACE AN APPROPRIATE SUPPORT UNDER THE SCOOTER TO PREVENT IT FROM FALLING.

- Park the vehicle on its centre stand.
- Remove the wheel.

CAUTION

DO NOT FORCE THE CABLES, THE TUBES, THE WIRES OR THE ELECTRICAL CONNECTORS.

- Remove the handlebar completely.
- Hold the handlebar so that it does not put weight on the electrical wires and cables.
- Slide off and remove the rubber gasket «5».
- Unscrew and remove the tightening nut «6».
- Unscrew and remove the adjustment nut.
- Remove the fork from the steering tube.



CAUTION

WHEN REMOVING THE FORK, PAY ATTENTION TO COLLECT ALL THE BALLS OF THE FORK BEARINGS. THE BALLS ARE NOT CAGED AND THEY AUTOMATICALLY FALL WHEN THE FORK IS REMOVED.

Removing the sleeves

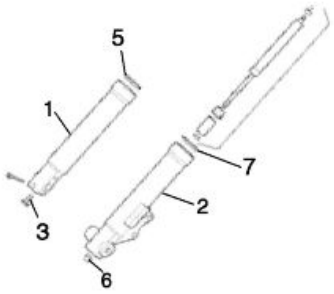
NOTE

THE SLEEVES CAN BE REMOVED FROM THE FORK, EVEN IF IT IS INSTALLED IN THE VEHICLE.

Remove the front wheel.

To remove the right sleeve from the fork:

- Remove the screw «3».



- Take out the sleeve.
- Check the sealing ring wear «5» and replace it, if necessary.

Locking torques (N*m)

Screw tightening power «3» 24 Nm (17.36 ftlb)

To remove the left sleeve from the fork:

- Remove the nut «6»
- Take out the sleeve.
- Check the sealing ring wear «7» and replace it, if necessary.

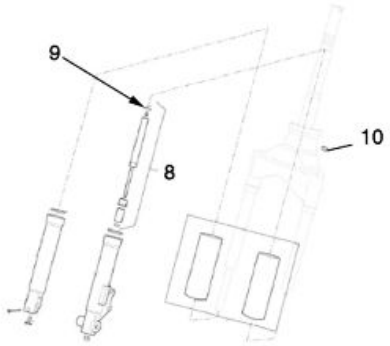
Locking torques (N*m)

Screws tightening power (6): 24 Nm (17.36 ftlb)

Removing the complete shock absorber

Only the left sleeve of the fork has a shock absorber «**8**».

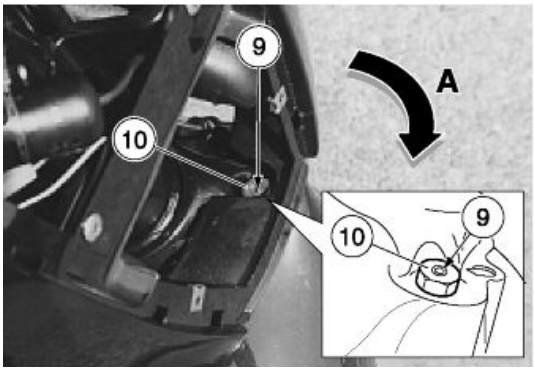
The shock absorber can be removed, also when the fork is fitted on the scooter.



- Remove the left sleeve of the fork.
- Remove the front case.
- Turn the handlebar completely clockwise (to the right).
- Prevent the screw «9» from rotating with a suitable wrench.
- Unscrew and remove the nut «10».
- Take out the entire shock absorber «8».

NOTE

UPON REFITTING PLACE THE NUT «10» CORRECTLY.



Steering bearing

Checking bearing clearance

To check the steering, it is necessary to:

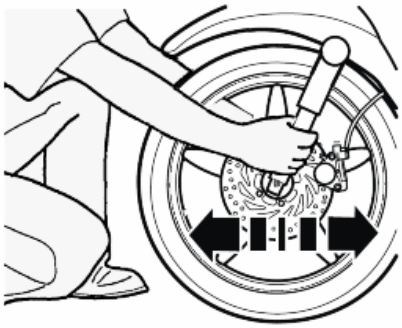
- Park the vehicle on its centre stand.
- Place the support under the scooter with a soft cloth between them so that the front wheel can move freely and the scooter does not fall.

CAUTION

MAKE SURE THE SCOOTER IS STABLE AND FIRM.

NOTE

WHEN CARRYING OUT THIS OPERATION, PAY ATTENTION NOT TO MISTAKE THE CENTRE STAND CLEARANCE WITH THAT OF THE FORK. REPEAT THIS TEST SEVERAL TIMES BEFORE DECIDING IF THE FORK HAS TO BE ADJUSTED.



- Hold the lower rods of the fork and pull the fork forwards and backwards, with the steering in forward position.
- There should be no clearance, neither forwards nor backwards. If there is some clearance, the fork bearings must be adjusted.

Adjusting bearing clearance

- - Remove the inside front shield.

CAUTION

PROCEED WITH CAUTION.
HANDLE PLASTIC AND PAINTED PARTS CAREFULLY TO AVOID SCRATCHING OR DAMAGING THEM.

- Remove the bushing «2».
- Through the hole «3», lock the screw «4» to prevent its rotation.

NOTE

THERE IS A GROOVE ON THE STEERING AXLE WHERE THE SCREW «4» RESTS. THIS KEEPS HANDLEBAR IN-CENTRE AND PREVENTS IT FROM COMING OUT.
DRAW THE SCREW «4» AWAY AS FAR AS POSSIBLE BEFORE LIFTING THE HANDLEBAR TO TAKE IT OUT.

Locking torques (N*m)

Nut tightening power «5» **50 Nm (36.17 ftlb)**

- Remove the nut «5»
- Pull the screw «4» as much as possible with respect to the tongues (the rear handlebar cover does not allow to remove it completely).
- Lift the handlebar a few centimetres.
- Remove the plastic gasket «6».
- Loosen the tightening nut «7» using an adequate open wrench.

CAUTION

DO NOT TIGHTEN THE ADJUSTMENT NUT «8» TOO MUCH BECAUSE IT MAY DAMAGE THE STEERING BEARINGS.

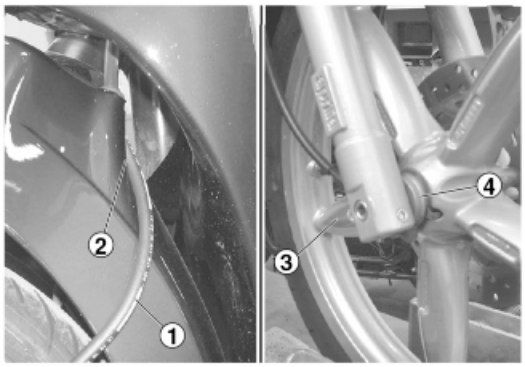
- Tighten the adjustment nut «8» but do not eliminate the bearings clearance completely.
- Check clearance as described above. Make sure the front fork can move all long its stroke, from left to right or vice versa, rotating freely and smoothly.
- Keep the adjustment nut «8» into position using an adequate wrench and tighten the tightening nut «7». Check bearing clearance again after tightening the nut to make sure the adjustment is still correct.

Removal

CAUTION

PLACE AN APPROPRIATE SUPPORT UNDER THE SCOOTER TO PREVENT IT FROM FALLING.

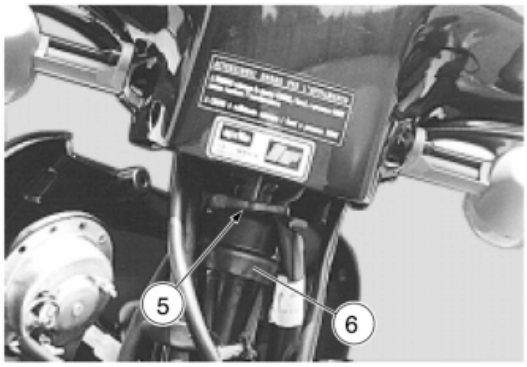
- Park the vehicle on its centre stand.
- Remove the wheel.



CAUTION

DO NOT FORCE THE CABLES, THE TUBES, THE WIRES OR THE ELECTRICAL CONNECTORS.

- Remove the handlebar completely.
- Hold the handlebar so that it does not put weight on the electrical wires and cables.
- Slide off and remove the rubber gasket «5».
- Unscrew and remove the tightening nut «6».
- Unscrew and remove the adjustment nut «7».



CAUTION

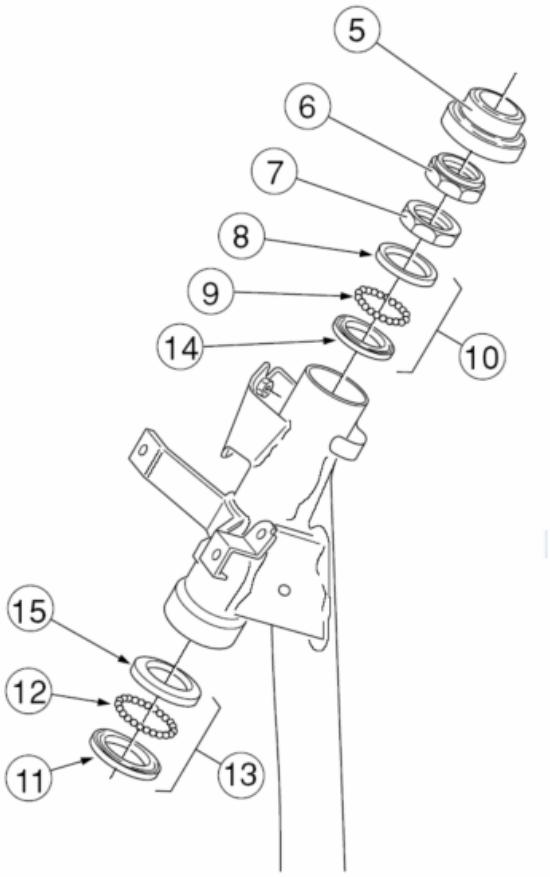
WHEN REMOVING THE FORK, PAY ATTENTION TO COLLECT ALL THE BALLS OF THE FORK BEARINGS. THE BALLS ARE NOT CAGED AND THEY AUTOMATICALLY FALL WHEN THE FORK IS REMOVED.

- Remove the fork from the steering tube.
- Remove the inside ring «8» and the balls «9» from the upper bearing «10».
- Remove the inside ring «11» and the balls «12» from the lower bearing «13».
- Wash all the bearing parts thoroughly, including the outside rings «14» and «15».
- Check all the parts for wear and remove them if necessary.
- Put a large quantity of grease on all the bearing parts, holding the balls in their position on the outside ring with the grease, before trying to fit the fork following the procedure above.

CAUTION

WHEN REFITTING, PAY ATTENTION TO THE AMOUNT OF BALLS TO BE FITTED.

- 21 BALLS «10» FOR THE UPPER BEARING «11».
- 25 BALLS «13» FOR THE LOWER BEARING «14».



Rear

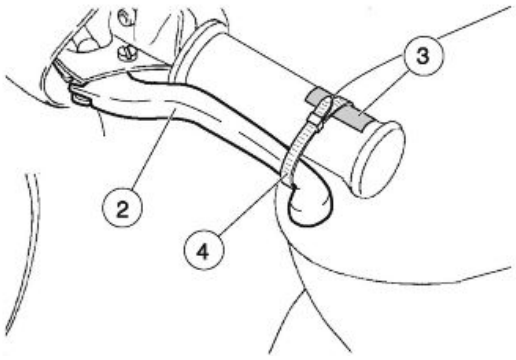
Removing the rear wheel

- Remove the silencer.
- Deflate the rear wheel completely.

NOTE

TO UNSCREW THE WHEEL NUT «1», IT IS NECESSARY TO LOCK THE WHEEL ROTATION.

- Pull the rear brake lever «2» completely, then place a small piece of cardboard «3» on the handle and keep the brake lever pulled by using a clamp «4».
- Remove the cover «5».
- Unscrew and remove nut «1» and the washer.
- Take out the wheel.

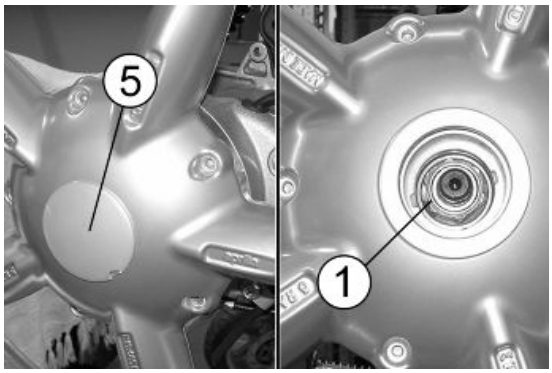


NOTE

WHEN REFITTING, USE A NUT FOR EACH NEW WHEEL. DO NOT REFIT THE SCOOTER WITH THE OLD NUT. THIS IS A SPECIAL TYPE OF NUT.

Locking torques (N*m)

Nut tightening power «1» 110 Nm (79.56 ftlb)



Swing-arm

Removal

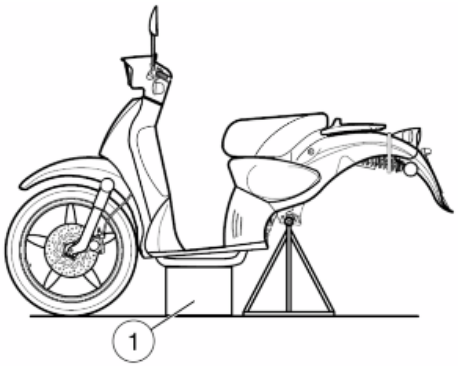
The worn or damaged bushings on the rubber insulator may cause an annoying vibration and an unsafe manoeuvrability. To check if the bushings are in good conditions, it is necessary to remove the engine support axle.

- Remove the lower shield.
- Remove the engine.

CAUTION

ONCE THE BUSHINGS ARE REMOVED, HOLD THE CHASSIS WITH A SUPPORT «1».

Place a support of suitable height under the chassis central part.



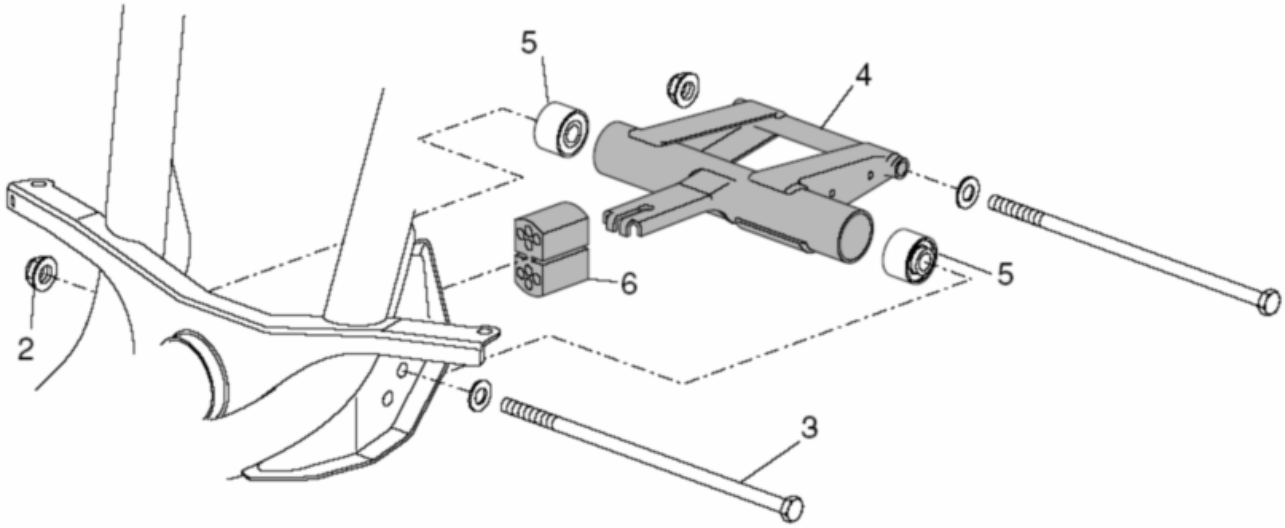
CAUTION

MAKE SURE THE SCOOTER IS STABLE AND FIRM.

- Remove the nut «2» and take out the tightening pin «3» fixing the chassis to the rod on the opposite side.
- Remove the inside rod «4».
- Check if the silent-block «5» and the buffer «6» are in good conditions, and replace them if damaged.

Locking torques (N*m)

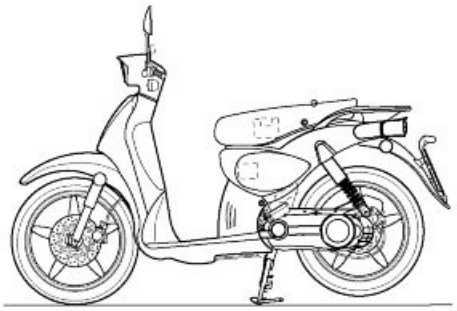
Frame-pin-rod locking torques 25 Nm (18.08 ftlb)

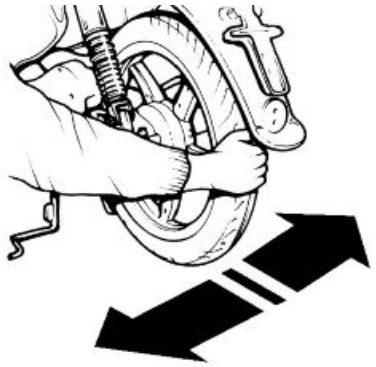


Overhaul

Periodically check the pin, fulcrum, engine and bearings clearance. To carry out these operations, proceed as follows:

- Park the vehicle on its centre stand.
- Hold the wheel firmly and try to move it perpendicularly into the stroke direction.
- If there is any clearance, check all the retainers that connect the support.





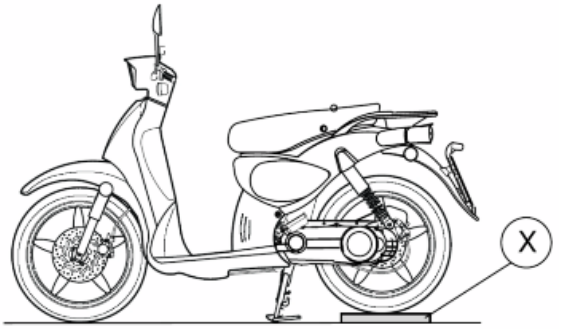
Shock absorbers

Removal

- Park the vehicle on its centre stand.

CAUTION

PLACE AN APPROPRIATE SPACER (X) UNDER THE REAR WHEEL TO PREVENT IT FROM FALLING AND DRAGGING THE AIR FILTER CONTAINER INTO THE CHASSIS.



- Remove the fairing rear part.

CAUTION

HOLD THE REAR PART OF THE FRAME TO PREVENT IF FROM FALLING WHILE REMOVING THE SHOCK ABSORBER.

- Remove the upper screw «1» and the washer.

Locking torques (N*m)

Upper screw tightening power 50 Nm (36.17 ftlb)

- Remove the lower screw «2» and the washer.

Locking torques (N*m)

Lower screw tightening power 25 Nm (18.08 ftlb)

- Remove the shock absorber «3».

Centre-stand

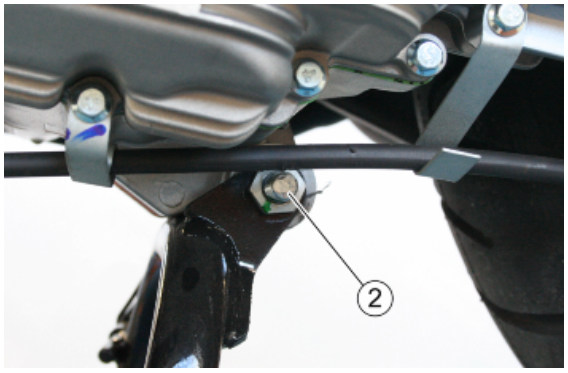
- Park the vehicle on its centre stand.
- Place a support under the vehicle so that it does not fall after the centre stand is removed.

CAUTION

MAKE SURE THE SCOOTER IS STABLE AND FIRM.

- Remove the two springs «1».

- Unscrew the nut «2» and slide off the pin.



- To refit, carry out the removal operations but in reverse order and tighten the nut to the prescribed torque.

Locking torques (N*m)

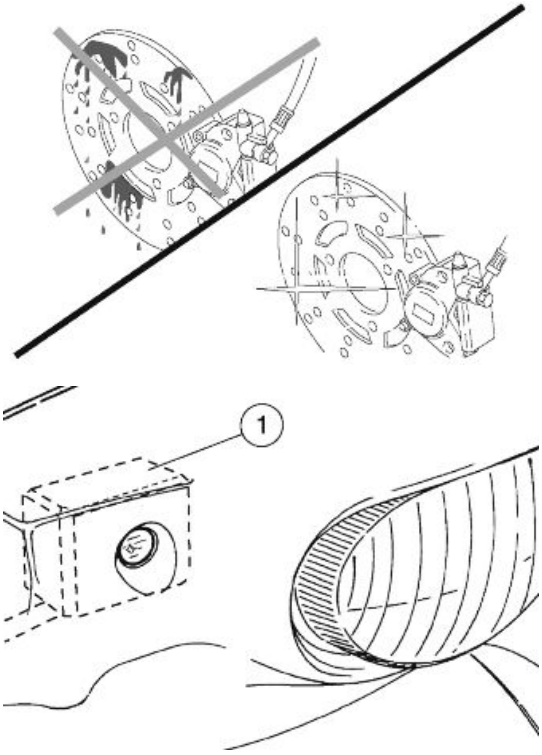
Central stand to chassis fixing screw 42.5

INDEX OF TOPICS

Interventions rules

When pads are worn, the brake fluid level in the reservoir decreases to automatically compensate pad wear.

The front brake fluid reservoir «**1**» is located on the end part to the right of the handlebar next to the front brake lever (under the upper handlebar cover).



CAUTION

NEVER USE THE SCOOTER IF THERE IS A FLUID LEAK ON ANY SYSTEM PART.

CAUTION

WHEN PADS ARE WORN, THE BRAKE FLUID LEVEL DECREASES PROGRESSIVELY TO COMPENSATE PAD WEAR.

If the fluid does not reach the **"MIN"** reference mark:

- Check brake pads for wear.

If there is no need to replace any pads/discs, check the braking system to determine the cause of the problem, by checking:

- if the brake cables are in good conditions. Mainly check if there are broken or cracked areas;
- the connections are properly tightened;
- the connections may exhibit leaks;
- the calliper and the reservoir may exhibit leaks;
- the bleed screw may exhibit leaks. If dripping is detected, tighten to the appropriate tightening torque;
- the fuel tank caps for possible leaks and the gaskets conditions.

After repairing the brake:

- Check and bleed the system.
- Top-up the reservoir with a proper brake fluid.

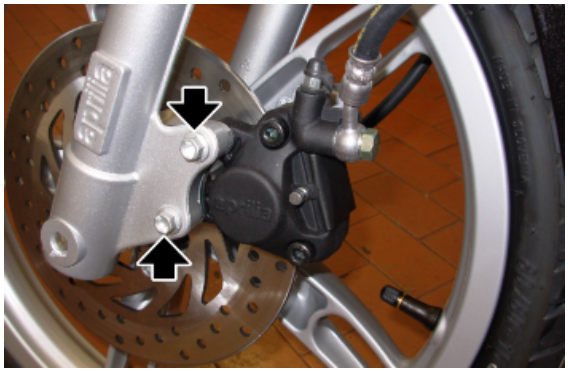
Front brake calliper

Removal

CAUTION

NEVER OPERATE THE FRONT BRAKE LEVER ONCE THE CALLIPER IS REMOVED SINCE THIS MAY CAUSE THE PISTONS TO COME OUT AND CALLIPER BRAKE FLUID TO LEAK.

- Undo the two screws indicated and remove the brake calliper.



CAUTION

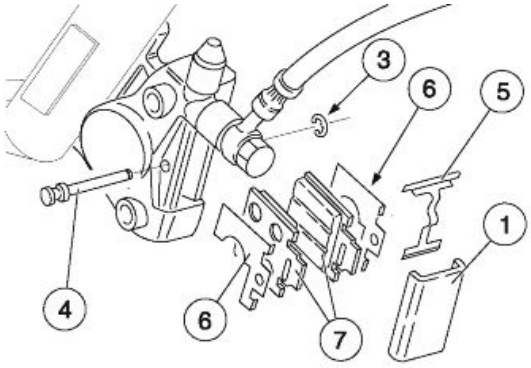
AFTER REFITTING, PULL THE FRONT BRAKE LEVER REPEATEDLY AND CHECK THAT THE BRAKING SYSTEM OPERATES CORRECTLY.

Front brake pads

Removal

Park the vehicle on its centre stand.

- Remove the brake calliper cover «1».
- Remove circlips «3».
- Remove cylinder «4».
- Remove the spring «5».



NOTE

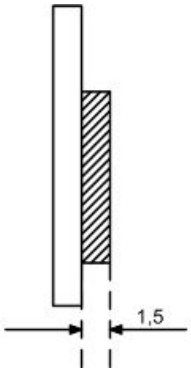
THE ANTI-FRICTION PLATES «6» COME OUT TOGETHER WITH THE PADS.

- Take out the pads«7» (together with the anti-friction plates) one at a time.

CAUTION

NEVER OPERATE THE BRAKE LEVER ONCE THE CALLIPER IS REMOVED. MAY CAUSE THE PISTONS TO COME OUT AND CALLIPER BRAKE FLUID TO LEAK. ALWAYS REPLACE BOTH PADS AND MAKE SURE THAT THEY ARE CORRECTLY POSITIONED IN THE CALLIPER.

- Check friction material for appropriate thickness. If thinner than the minimum value, replace it.



Characteristic

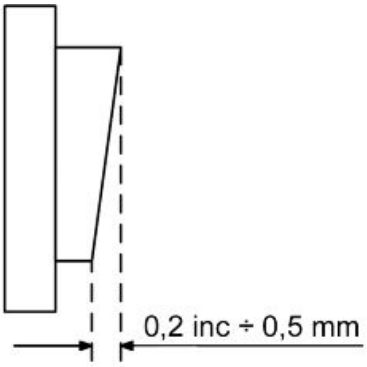
Friction material minimum thickness

1.5

- In case of uneven wear, replace the brake pads when the friction material thickness difference is 0.5 mm

CAUTION

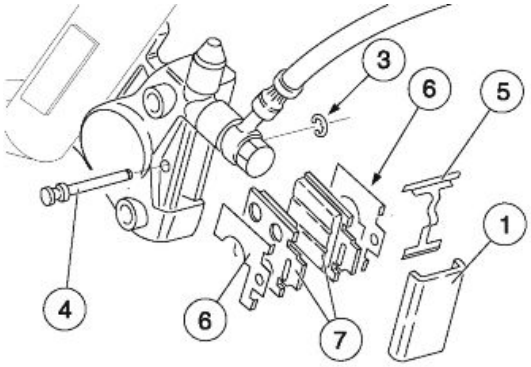
ALWAYS REPLACE BOTH PADS AND MAKE SURE THEY ARE CORRECTLY POSITIONED INSIDE THE CALLIPER.



- If the anti-friction plates «6» are worn, replace them.
- Fit two new pads «7» (together with the anti-friction plates).
- Insert the spring «5» correctly.
- Fit cylinder «4».
- Fit circlips «3».
- Fit the brake calliper cover «1».
- Check the brake fluid.

Refitting

- Fit two new pads «7» (together with the anti-friction plates «6»).
- Insert the spring «5» correctly.
- Fit cylinder «4».
- Fit circlips «3».
- Fit the brake calliper cover «1».
- Check the brake fluid.



Fill - Bleeding the braking system

NOTE

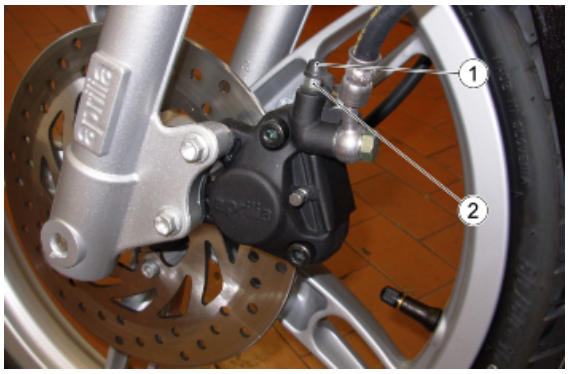
IF THERE IS AIR IN THE HYDRAULIC SYSTEM, THE WATER WILL ABSORB MOST OF THE POWER OF THE BRAKE MAIN CYLINDER AND THEREFORE, IT WILL REDUCE THE CALLIPER

PERFORMANCE WHEN BRAKING. THE PRESENCE OF AIR IS SIGNALLED BY THE 'SPONGINESS' OF THE BRAKE CONTROL AND POOR BRAKING EFFICIENCY.

CAUTION

CONSIDERING THE DANGER POSED FOR VEHICLE AND RIDER, IT IS STRICTLY NECESSARY TO BLEED THE HYDRAULIC SYSTEM AFTER REFITTING BRAKES AND CARRYING OUT REGULAR MAINTENANCE OPERATIONS.

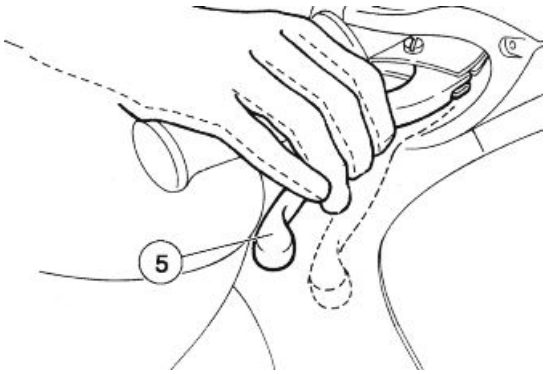
- Remove the protection cap «1» from the bleeder spout «2».
- Connect a glass pipe to the bleed plug «2».



CAUTION

DO NOT DIRT THE PADS OR THE DISC WITH BRAKE FLUID.

- Keep the free part of the glass tube in a clean container.
- Pull the brake lever «5» slowly to the end of the stroke two or three times. Then keep it completely pulled.



CAUTION

LOOSEN THE BLEED PLUG SPOUT «2» AND CHECK THE RESERVOIR BRAKE FLUID LEVEL «6». DO NOT EMPTY THE RESERVOIR COMPLETELY SINCE THIS MAY FURTHER CAUSE AIR TO ENTER THE BRAKING SYSTEM.

- Loosen the bleed plug spout «2» and check if there are bubbles in the glass tube.

CAUTION

BEFORE RELEASING THE BRAKE LEVER «5», CLOSE THE BLEED PLUG «2» TO PREVENT WATER FROM ENTERING THE BRAKE SYSTEM.

- When the brake fluid that comes out is homogeneous, without bubbles, it means air has successfully been eliminated from the system. Close the bleed plug «2» accurately, and tighten it correctly.

NOTE

REPEAT THE LAST TWO OPERATIONS UNTIL THE BUBBLES ARE TOTALLY ELIMINATED.

- Reposition the protection cap «1» on the bleeder spout «2».
- Check the brake fluid.

CAUTION

AFTER REFITTING, PULL THE BRAKE LEVER REPEATEDLY AND CHECK THAT THE BRAKING SYSTEM OPERATES CORRECTLY.

CAUTION

PAY ATTENTION TO THE DISC AND THE FRICTION MATERIAL MAKING SURE THEY ARE NOT DIRTY OR GREASED, SPECIALLY AFTER MAINTENANCE OPERATIONS OR INSPECTION.

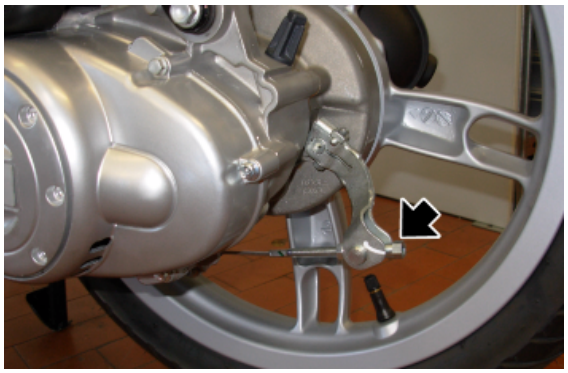
Rear drum brake

After removing the silencer and the rear wheel, operate as follows:

- Remove the shoe spring using the specific tool
- Remove the shoe with a lever
- Refit the new shoe by slightly hitting with the mallet.
- Fix the spring with the specific tool

Adjusting the drum brake:

- Adjust the measure point of the rear drum brake operating the set screw shown in the figure.
- With the brake lever released, the wheel should rotate freely.

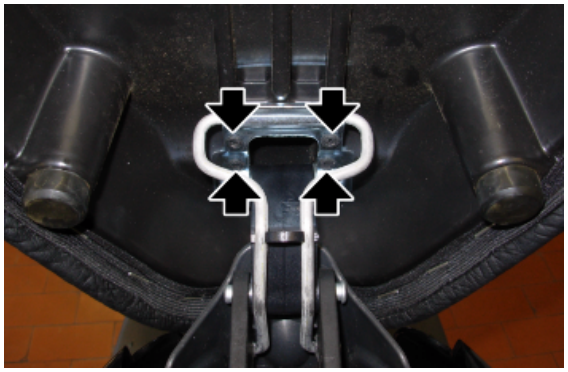


INDEX OF TOPICS

Seat

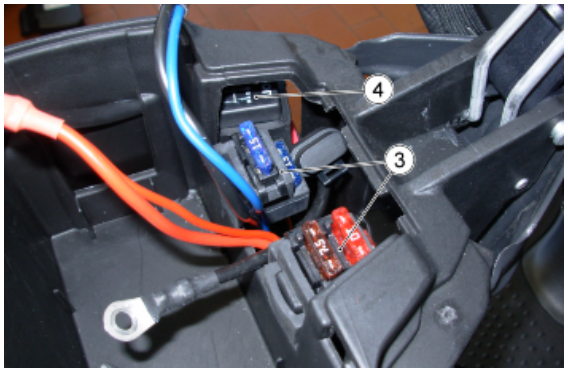
Saddle removal

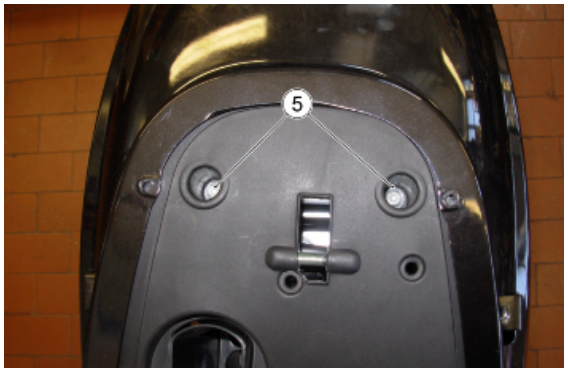
- Remove the pin and slide off the bolt.
- Undo and remove the 4 screws.

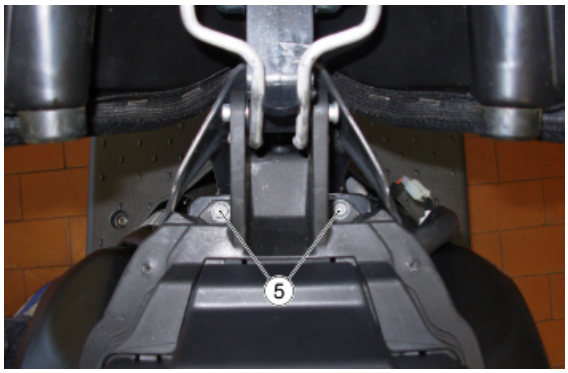


Removing the saddle support

- Remove the tail fairing.
- Remove the battery cover «1».
- Disconnect and remove the battery.
- Remove the fuse boxes «3» and the relay «4» from the supports.
- Unscrew and remove the four screws «5».
- Unscrew and remove fuel tank cap «6».
- Remove the fuel-collecting bucket tappet «7» passing it together with the drainage pipe «8», through the tank cover hole of the saddle support.







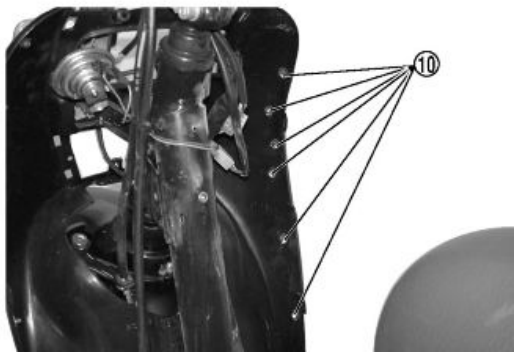
- Thread the cable harnesses together with fuse-holding locks through the slot located at the front part of the saddle support.
- Lift the saddle support rear part «9», slide it forwards and remove it.

Side fairings

After removing the internal legshield, remove the six clips «**10**» from both sides.

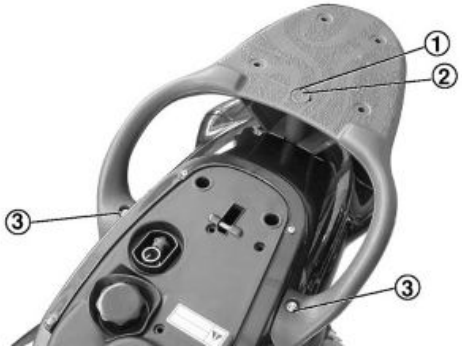
NOTE

TO REFIT THE BUMPERS, USE NEW CLIPS.



Rear rack

- Park the vehicle on its centre stand.
- Remove cover «1».
- Unscrew and remove the screw "2".
- Unscrew and remove the two screws «3».
- Remove the luggage rack.

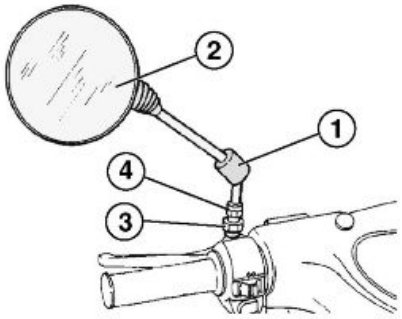


Driving mirrors

Removing the rear-view mirrors:

The following information refers to one rear view mirror but it applies to both.

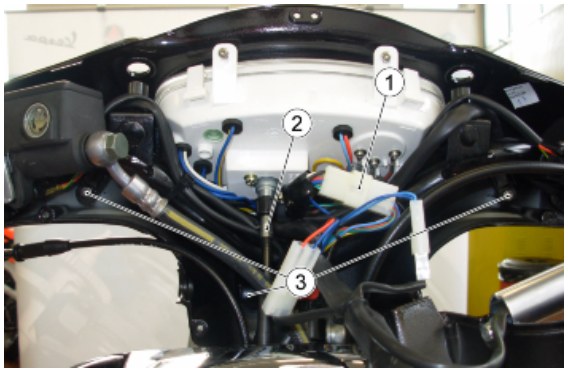
- Park the vehicle on its centre stand.
- Lift the rubber protection «1».



- Lock bolt «3» and unscrew the nut «4» completely.
- Remove the rear-view mirror «2».

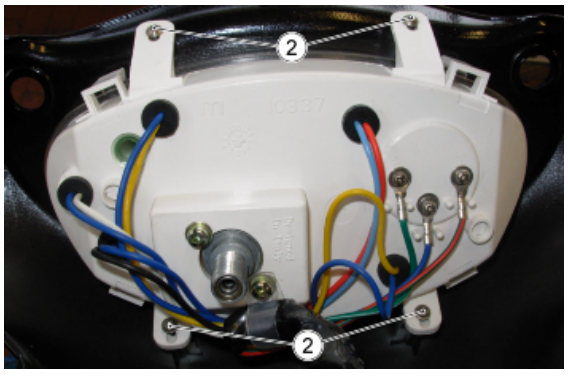
Rear handlebar cover

- Remove the front handlebar cover.
- Disconnect the instrument panel light/ warning light connector «1».
- Disconnect the speedometer/odometer cable «2».
- Loosen and remove the three screws «3».
- Remove the rear handlebar cover.

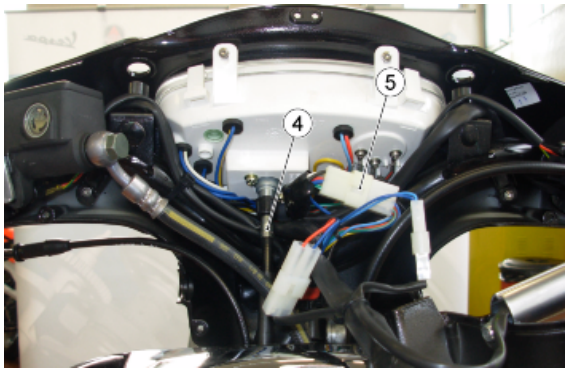


Instrument panel

- Remove the front handlebar cover.
- Loosen and remove the four screws «2 ».
- Remove the instrument panel partially.

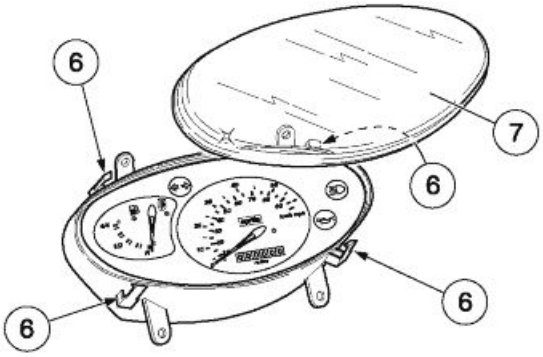


- Disconnect the speedometer/odometer cable «4» from the instrument panel.
- Disconnect the main connector «5».
- Remove the instrument panel.



Removing the instrument panel glass

- Remove the instrument panel.
- Push the four tabs «6» and remove the glass «7»



Front handlebar cover

Removal

- Park the vehicle on its centre stand.
- Remove the windshield.
- Remove the six screws «1».
- Release the both upper coupling tongues by pressing slightly the rear handlebar cover.
- Remove the front handlebar cover.

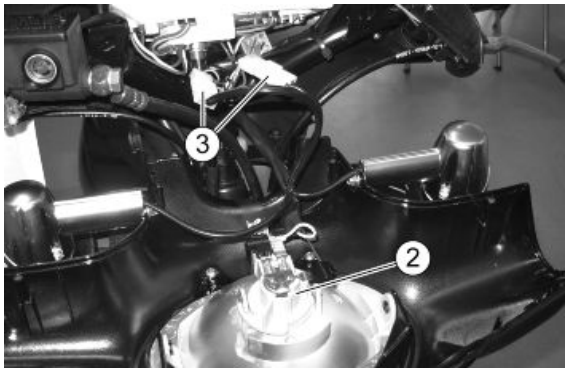
CAUTION

DO NOT FORCE THE HANDLEBAR COVER EXCESSIVELY TO AVOID BREAKING IT.

- Disconnect the front headlamp light connectors «2» and the two turn indicator connectors «3».

NOTE

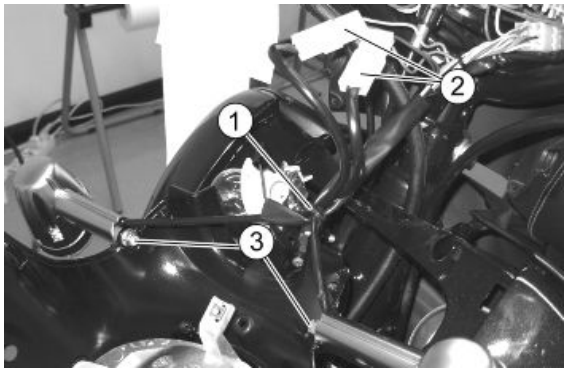
WHEN REFITTING, MAKE SURE THE TABS ARE CORRECTLY INSERTED.



Headlight assy.

REMOVING THE TURN INDICATORS

- Remove the front handlebar cover.
- Release clamp «1» and disconnect the connectors «2».
- Unscrew the nuts «3».

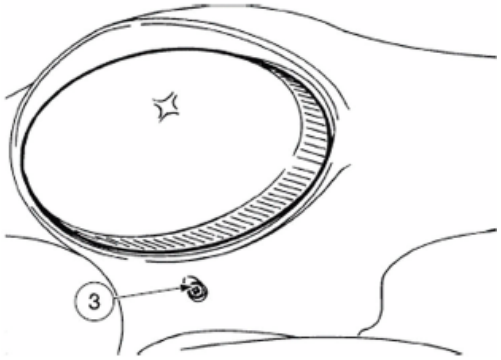


Removing the headlamp

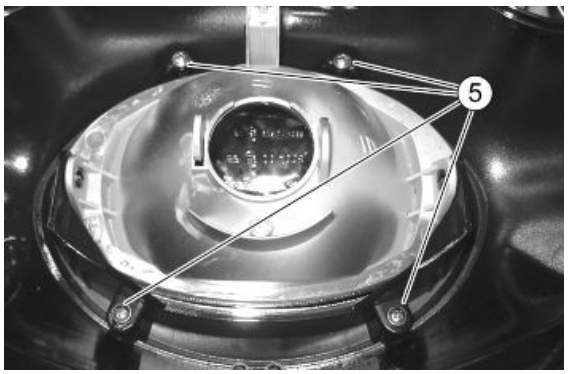
- Remove the front handlebar cover.
- Unscrew and remove the screw «3» and collect the rear spring.

NOTE

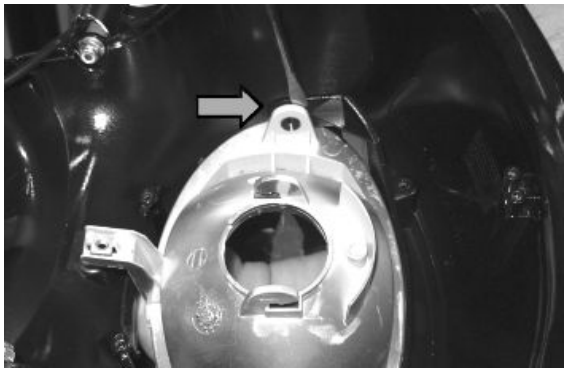
WHEN REFITTING, MAKE SURE THE LIGHT BEAM IS CORRECTLY ADJUSTED.



- Unscrew and remove the 4 screws «5» and remove the headlamp frame.

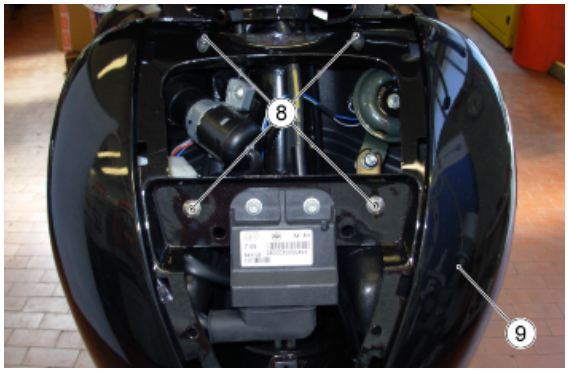


- Operating with caution, remove the two sealing fins and remove the headlamp from the front part.



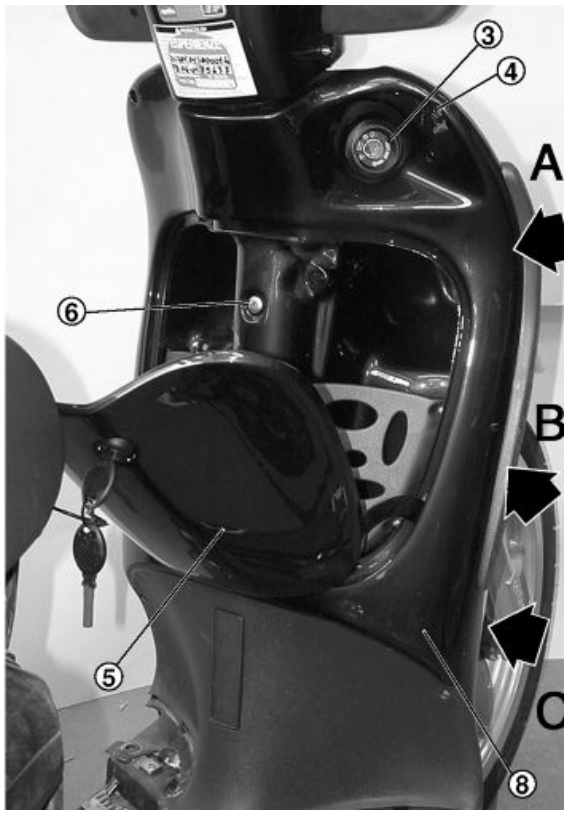
Legshield

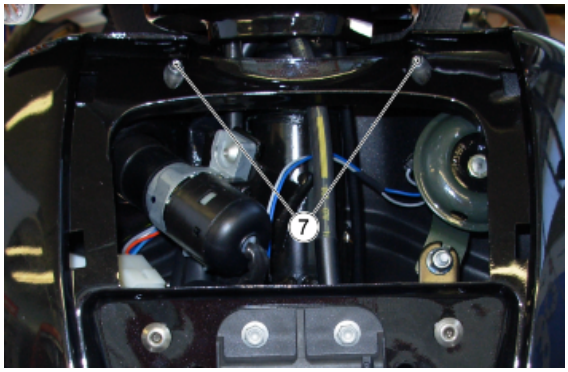
- Remove the fork.
- Remove the front central cover.
- Remove the control unit.
- Loosen and remove the four screws «8 ».
- Remove the front shield «9».



Knee-guard

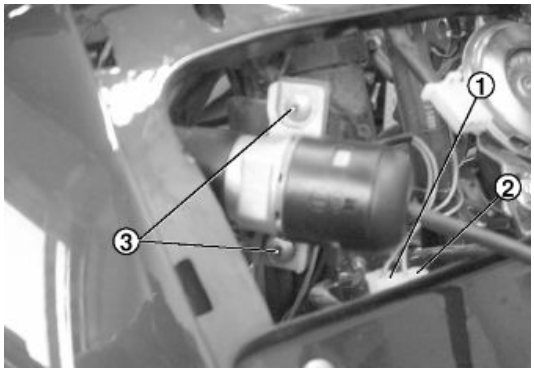
- Remove the footrest.
- Remove the rubber gasket «3» from the ignition switch.
- Loosen and remove screw «4» from both sides.
- Open the glove-box lid «5».
- Unscrew and remove the screw "6".
- Remove the front central cover.
- Unscrew and remove the two screws «7».
- Press the sides of the external leg-shield up to the arrows «A», «B», «C», and pull it.
- Remove the leg shield back plate «8».





Removing the ignition key-switch when on *off*

- Remove the front central cover.
- Disconnect the two electric connectors «1» and «2».
- Loosen and remove the two screws «3» (special).
- Remove the whole ignition lock.

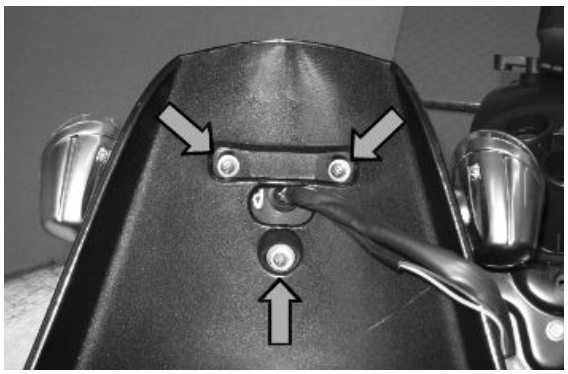


NOTE

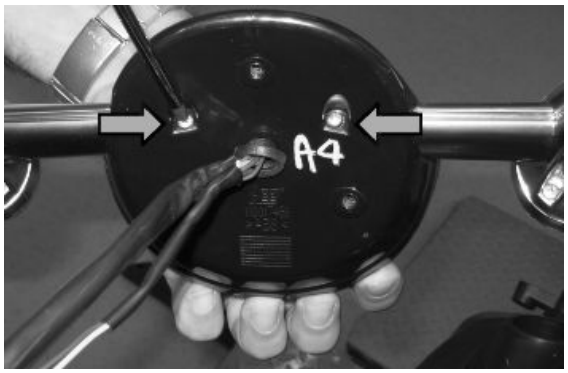
WHILE REFITTING, REPLACE THE SCREW «3» (OF SPECIAL TYPE) WITH A NEW ONE.

Taillight assy.

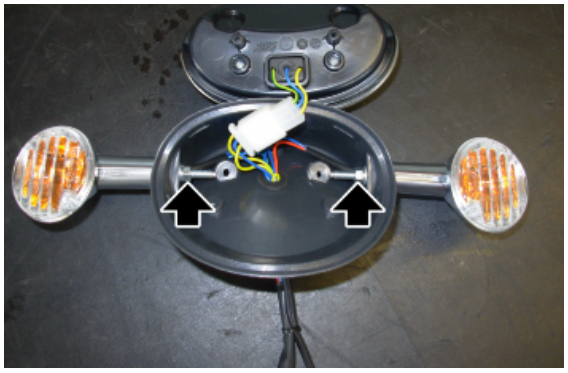
- Remove the tail fairing.
- Remove the three screws fastening the headlight assembly to the tail fairing.



- Remove the rear light unit.
- Remove the two screws located behind the headlight.



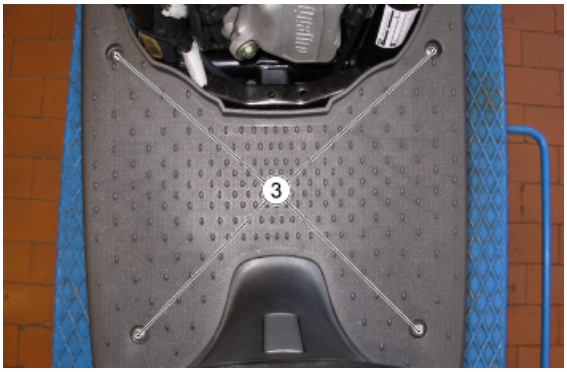
- Slide off the daylight running/stop LED lights.
- Remove the turn indicators by acting on the nuts indicated.



Footrest

Removal

- Remove the rear central cover.
- Loosen and remove the four screws «3 ».
- Loosen screw «4» from both sides of the lower cover.



- Slightly lift the footrest rear part and take it out from the internal shield base.

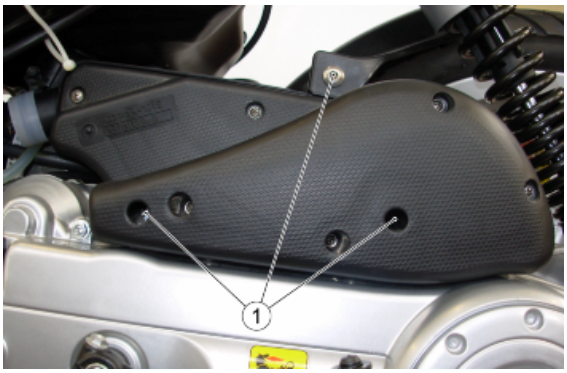
CAUTION

WHEN REFITTING, FIRST FIT THE CENTRAL AND THEN THE SIDE TABS.

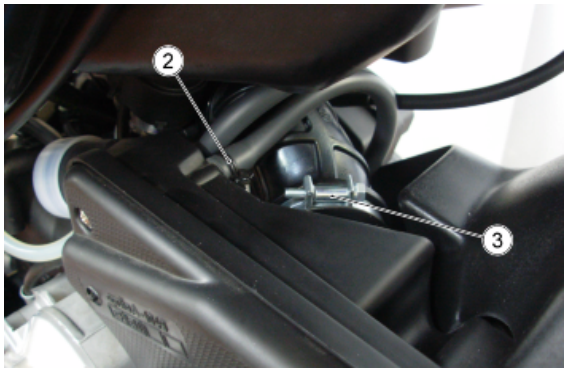
Air filter

Filter box removal

- Park the vehicle on its centre stand.
- Undo and remove the three screws «1».

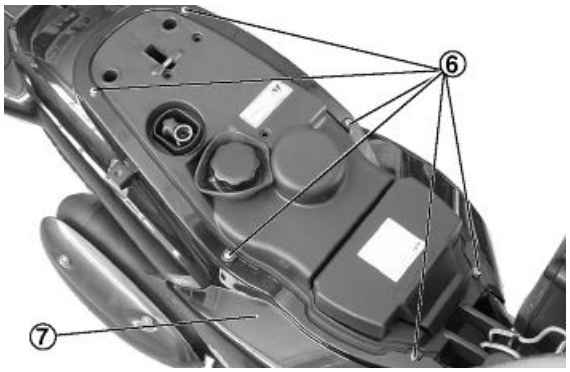


- Remove the clamp «2» and slide off the fuel pipe.
- Loosen the clamp «3» and slide off the sleeve from the filter box.
- Remove the entire air filter box.



Tail guard

- Remove the luggage rack.
- Remove the rear central cover.
- Undo and remove the six screws «6 ».
- Lift the tail fairing.
- Release the cable harnesses of rear light unit.



While refitting:

- Place the tail fairing on its seat.
- Connect the cable harnesses of rear light unit.

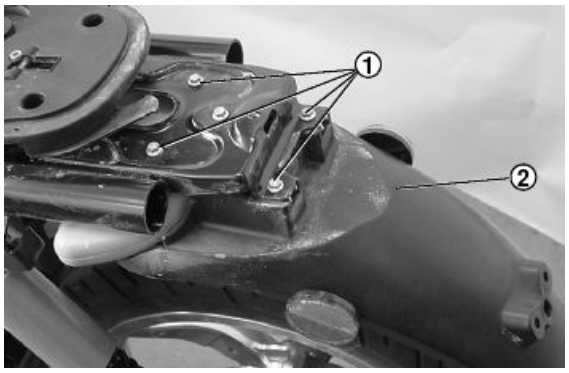
NOTE

TIGHTEN THE SIX SCREWS «6» COMPLETELY AFTER REFITTING THE LUGGAGE RACK.

- Insert the six screws «6» without tightening them completely.
- Refit the luggage rack.
- Tighten the six screws «6» completely.

Rear mudguard

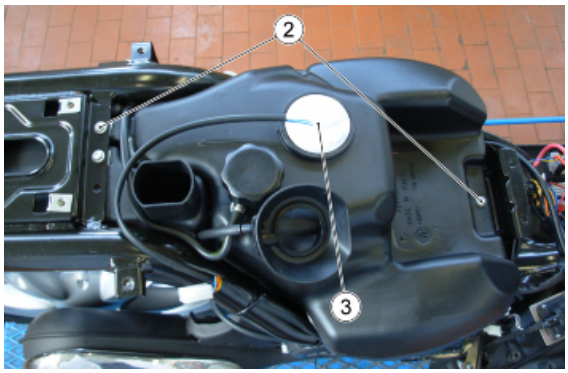
- Remove the tail fairing.
- Disconnect the cable harness of the license plate light.
- Unscrew the 4 screws «1».
- Remove the mudguard «2».



Fuel tank

Removing the fuel tank

- Empty the fuel tank.
- Remove the pipe «1».
- Undo the two screws «2».
- Disconnect the fuel level probe connector «3».
- Remove the tank by lifting it from the front and sliding it off towards the front of the vehicle.

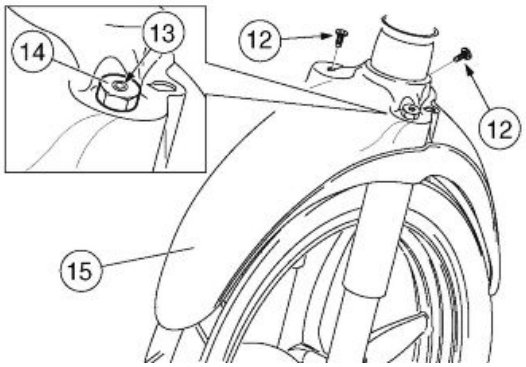


Front mudguard

- Remove the complete fork.
- Remove the two screws «12».
- With the aid of an Allen wrench, prevent the screw «13» from rotating.
- Remove the nut «14»

NOTE

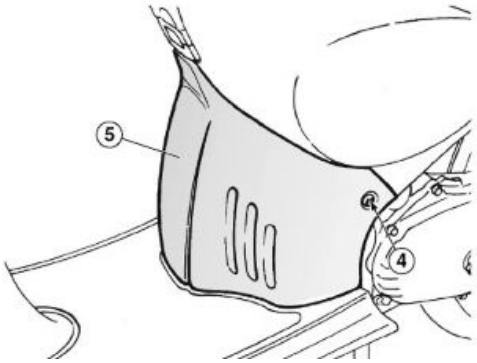
WHILE REFITTING, PLACE THE NUT «13» CORRECTLY.



- Remove the front mudguard «15».

Rear central cover

- Park the vehicle on its centre stand.
- Loosen and remove screw «4» and the relevant bushing from both sides.
- Remove the rear central cover «5».

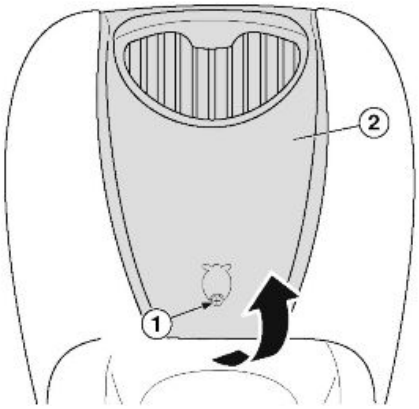


Front central cover

- Park the vehicle on its centre stand.
- Unscrew and remove the only screw 1.

CAUTION

PROCEED CAREFULLY.
DO NOT DAMAGE THE TABS AND/OR THEIR SEATS.



- Remove the front cover «2» by pulling it towards the scooter front part.

Flyscreen

- Remove the 2 screws indicated with spacers and rubber rings.

Pilot lights kit

Replace the instrument panel bulbs:

NOTE

BEFORE CHANGING A BULB, CHECK THE FUSES.

- Remove the front handlebar cover.

Replace the warning light bulbs:

- Turn indicators «1 », green
- Low-beam warning light «2», green
- High-beam light «3», blue

Take and replace the bulb with another of the same type.

Replace the dashboard lighting bulbs:

- Upper right lighted section «4»
- Lower left lighted section «5»

Take and replace the bulb with another of the same type.

NOTE

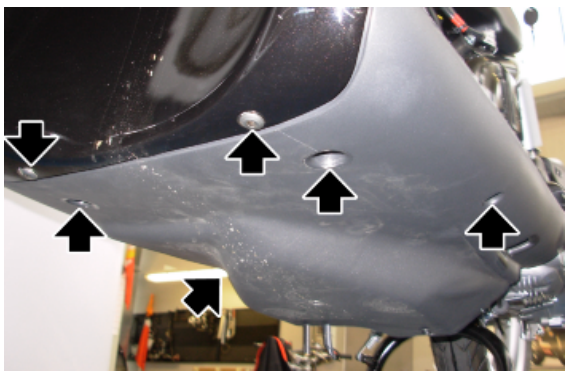
TAKE OUT THE BULB HOLDERS ONE AT A TIME TO AVOID PLACING THEM INCORRECTLY WHEN REFITTING.

Lower cover

- Park the vehicle on its centre stand.
- Remove the 6 screws indicated.
- Remove the lower cover.

NOTE

WHEN REFITTING, MAKE SURE THAT THE FRONT PART OF THE LOWER SHIELD IS CORRECTLY POSITIONED.



INDEX OF TOPICS

Carry out the listed checks before delivering the vehicle.

WARNING

BE EXTREMELY CAUTIOUS WHEN HANDLING FUEL.

Aesthetic inspection

- Paintwork
- Fitting of Plastic Parts
- Scratches
- Dirt

Tightening torques inspection

- Safety locks:

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 start-up
- 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 MEDICAL ATTENTION IMMEDIATELY.
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.