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# WORKSHOP MANUAL

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**633338**

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**Vespa GT 125-200**

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# WORKSHOP MANUAL

## Vespa GT 125-200

The descriptions and illustrations given in this publication are not binding. While the basic specifications as described and illustrated in this manual remain unchanged, PIAGGIO-GILERA 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.

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# WORKSHOP MANUAL

## Vespa GT 125-200

This workshop manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. This manual is addressed to Piaggio service mechanics who are supposed to have a basic knowledge of mechanics principles and of vehicle fixing techniques and procedures. Any important changes made to the vehicles or to specific fixing operations will be promptly reported by updates to this manual. Nevertheless, no fixing work can be satisfactory if the necessary equipment and tools are unavailable. It is therefore advisable to read the sections of this manual relating to specific tools, along with the specific tool catalogue.

**N.B.** 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.



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## INDEX OF TOPICS

CHARACTERISTICS

CHAR

This section describes the general specifications of the vehicle.

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## Rules

This section describes general safety rules for any maintenance operations performed on the vehicle.

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## Safety rules

- If work can only be done on the vehicle with the engine running, make sure that the premises are well-ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.
  - The battery electrolyte contains sulphuric acid. Protect your eyes, clothes and skin. Sulphuric acid is highly corrosive; in the event of contact with your eyes or skin, rinse thoroughly with abundant water and seek immediate medical attention.
  - The battery produces hydrogen, a gas that can be highly explosive. Do not smoke and avoid sparks or flames near the battery, especially when charging it.
  - Fuel is highly flammable and it can be explosive given some conditions. Do not smoke in the working area, and avoid naked flames or sparks.
  - Clean the brake pads in a well-ventilated area, directing the jet of compressed air in such a way that you do not breathe in the dust produced by the wear of the friction material. Even though the latter contains no asbestos, inhaling dust is harmful.
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## Maintenance rules

- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.
  - Use only the appropriate tools designed for this vehicle.
  - Always use new gaskets, sealing rings and split pins upon refitting.
  - After removal, clean the components using non-flammable or low flash-point solvents. Lubricate all the work surfaces, except tapered couplings, before refitting these parts.
  - After refitting, make sure that all the components have been installed correctly and work properly.
  - For removal, overhaul and refit operations use only tools with metric measures. Metric bolts, nuts and screws are not interchangeable with coupling members with English sizes. Using unsuitable coupling members and tools may damage the scooter.
  - When carrying out maintenance operations on the vehicle that involve the electrical system, make sure the electric connections have been made properly, particularly the ground and battery connections.
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## Vehicle identification

Granturismo 125

**Chassis prefix:** ZAPM311000000 ÷ 1001

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**Engine prefix:** M311M1001

Granturismo 200

**Chassis prefix:** ZAPM312000000 ÷ 1001

**Engine prefix:** M312M1001



## Dimensions and mass

### MASS AND DIMENSIONS

Specification	Desc./Quantity
Total loadless weight	140 Kg
Width (to hand grips)	755 mm
Length	1940 mm
Wheelbase	1395 mm
Saddle height	800 mm



**Engine**

**DATA 125**

Specification	Desc./Quantity
Type	single-cylinder, four-stroke and four liquid-cooled valves
Timing system	single overhead camshaft chain driven on the left-hand side, 3-arm rocking levers set up with set screw
Bore 125	57 mm
Stroke	48.6 mm
Piston displacement 125	124,015 cm <sup>3</sup>
Compression ratio 125	12 ÷ 13 : 1
Walbro Carburettor 125	WVF-7G
Keihin Carburettor 125	CVK 30
Engine idle speed	1650 ± 50 rpm
CO value	3,8 ± 0,7 %
Air filter	sponge, impregnated with mixture (50% petrol and 50% oil)
Start-up system	electric starter motor (engine 200 cc with torque limiter)
Lubrication	with lobe pump (inside the crankcase) controlled by a chain and double filter: mesh and paper
Fuel supply	petrol, with vacuum pump and through carburettor
Max power (shaft) 125	11 kW (15 cv) at 9,700 rpm
Max speed 125	104 Km/h

**DATA 200**

Specification	Desc./Quantity
Type	single-cylinder, four-stroke and four liquid-cooled valves
Timing system	single overhead camshaft chain driven on the left-hand side, 3-arm rocking levers set up with set screw
Bore 200	72 mm
Stroke	48.6 mm
Piston displacement 200	197,775 cm <sup>3</sup>
Compression ratio 200	11 ÷ 12 : 1
Walbro Carburettor 200	WVF-7P
Keihin Carburettor 200	CVK 30
Engine idle speed	1650 ± 50 rpm
CO value	3,8 ± 0,7 %
Air filter	sponge, impregnated with mixture (50% petrol and 50% oil)
Start-up system	electric starter motor (engine 200 cc with torque limiter)
Lubrication	with lobe pump (inside the crankcase) controlled by a chain and double filter: mesh and paper
Fuel supply	petrol, with vacuum pump and through carburettor
Max power (shaft) 200	15.4 kW (21 cv) at 8,500 rpm
Max speed 200	125 Km/h



## Transmission

### TRANSMISSION

Specification	Desc./Quantity
Transmission	Automatic expandable pulley variator with torque server, V belt, automatic clutch, gear reduction unit and transmission housing with forced air circulation cooling

## Capacities

### CAPACITY

Specification	Desc./Quantity
Engine oil	~ 1000 cc (recommended oil: Selenia HI Scooter 4 Tech)
Fuel tank (including a ~ 2 l reserve)	~ 9.5 l
Rear hub	150 cc (recommended oil: TUTELA ZC 90)
Cooling system fluid	approx. 2.100 ÷ 2.150 l PARAFLU 11FE (Diluted)

## Electrical system

### ELECTRIC COMPONENTS 125

Specification	Desc./Quantity
Type of ignition	Electronic capacitive discharge ignition, with variable timing and separate HV coil
Variable spark advance (before T.D.C.) 125	from $10^\circ \pm 1^\circ$ to 2,000 rpm at $34^\circ \pm 1^\circ$ to 6,000 rpm
Spark plug 125	Champion RG 4 HC
Battery	12V/ 12 Ah
Fuses	N° 1 15A, N° 1 10A, N° 3 7,5A, N° 2 5A
Generator	alternating current

### ELECTRIC COMPONENTS 200

Specification	Desc./Quantity
Type of ignition	Electronic capacitive discharge ignition, with variable timing and separate HV coil
Variable ignition advance (before TDC) 200	from $10^\circ \pm 1^\circ$ at 2000 rpm to $32^\circ \pm 1^\circ$ at 6500 rpm
Spark plug 200	CHAMPION RG 6 YC
Battery	12V/ 12 Ah
Fuses	N° 1 15A, N° 1 10A, N° 3 7,5A, N° 2 5A
Generator	alternating current

## Frame and suspensions

### FRAME AND SUSPENSIONS

Specification	Desc./Quantity
Type	Unitised body made of stamped plate
Front suspension	Single arm suspension (cantilever wheel) fitted with a double-acting hydraulic shock absorber with coaxial spring
Front shock absorber axial travel	86.5 mm
Rear suspension	Engine with swinging fork articulated to frame by means of an arm with 2 degrees of freedom Pair of double-acting hydraulic shock absorbers and coaxial springs with preloading adjustment in 4 positions.
Rear shock absorber axial travel	89.5 mm

## Brakes

### BRAKES

Specification	Desc./Quantity
Front	Ø 220 disc brake and floating calliper with Ø 25 mm twin plungers and hydraulic control (lever on the far right end of the handlebar)
Rear	Ø 220 disc brake and calliper with two Ø 30 mm counteracting plungers and hydraulic control (lever on the far left end of the handlebar)

## Wheels and tyres

### WHEELS AND TYRES

Specification	Desc./Quantity
Front wheels - light alloy rims	3.00x12
Rear wheels - light alloy rims	3.00x12
Front tyres	120/70-12" Tubeless
Rear tyres	130/70-12" Tubeless

### TYRE PRESSURE

Specification	Desc./Quantity
Front tyre pressure (when cold)	1.8 bar
Rear tyre pressure (when cold)	2 bar
Tyre pressure (when cold) with passenger	2.2 bar

N.B.

**CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE. REGULATE PRESSURE ACCORDING TO THE WEIGHT OF THE RIDER AND ACCESSORIES**

## Carburettor

### 125cc Version

## Kehin

### KEHIN CARBURETTOR 125

Specification	Desc./Quantity
Depression carburettor	CVEK-30
Body stamping	CVEK
CUT-OFF device	Not present
Max. jet	98
Minimum jet	38
Max. air jet	150
Minimum air jet	130
Throttle valve spring	100 ÷ 160 g
Minimum mixture set screw initial opening	2 ± ¼
Tapered pin	NDVA
Tapered pin notches from top	Single-notch pin
Diffuser nozzle	Ø 5.0
Petrol inlet hole	-
Starter air jet	Ø 1.5
Starter diffuser nozzle	-
Starter jet	42
Diameter of starter pin	-
Starter device resistance	~ 20 Ω

Specification	Desc./Quantity
Venturi diffuser	Ø 29 (47x30.9)
Throttle valve	Ø 30.5
Diffuser maximum cone	-

**N.B.**

**\* THE IDENTIFICATION LETTER MAY VARY WITH EACH CARBURETTOR UPDATE.**

## Walbro

### WALBRO CARBURETTOR 125

Specification	Desc./Quantity
Depression type	WVF-7R*
Printing on the body	7R1
CUT-OFF device	Not. pres.
Max jet	103
Minimum jet	38
Max air jet	60
Minimum air jet	110
Throttle valve spring	100 g
Idle mixture adjustment screw initial opening	2 7/8 ± 1/2
Conical pin	653
Conical pin top notches	2
Diffuser nozzle	Ø 2.7
Gasoline inlet hole	Ø 1.5
Starter air jet	200
Starter diffuser jet	130
Starter jet	48
Starter pin diameter	Ø 1,78
Starter device resistance	~ 40 Ω
Venturi diffuser	Ø 29 (30.3x27)
Throttle valve	Ø 33
Choke maximum cone	Ø 48,0

**N.B.**

**\* THE IDENTIFICATION LETTER MAY VARY WITH EACH CARBURETTOR UPDATE.**

## 200cc Version

## Kehin

### KEHIN CARBURETTOR 200

Specification	Desc./Quantity
Depression type	CVEK 30
Body stamping	CVK
CUT-OFF device	Present
Max jet	92
Minimum jet	38
Max air jet	70
Minimum air jet	115
Gas valve spring	0,150 - 0,250 Kgf
Idle mixture adjustment screw initial opening	2 1/4 ± 1/4
Conical pin	NDAA
Conical pin top notches	Single notch pin
Diffuser nozzle	Ø 5.0
Fuel inlet hole	-
Starter air jet	Ø 1.5
Starter emulsifier jet	-
Starter jet	42
Starter pin diameter	-
Starter device resistance	~ 20 Ω

Specification	Desc./Quantity
Venturi choke	Ø 29 (47x30,9)
Throttle valve	Ø 30,5
Choke maximum cone	-

N.B.

THE IDENTIFICATION LETTER CAN VARY WITH EACH CARBURETTOR UPDATE

## Walbro

### WALBRO CARBURETTOR 200

Specification	Desc./Quantity
Depression type	WVF-7P*
Printing on the body	7P
CUT-OFF device	Present
Max jet	95
Minimum jet	33
Max air jet	120
Minimum air jet	55
Gas valve spring	120 gr
Idle mixture adjustment screw initial opening	2 ± 1/2
Conical pin	495
Conical pin top notches	2
Diffuser nozzle	Ø 2.7
Gasoline inlet hole	Ø 1.5
Starter air jet	200
Starter emulsifier jet	110
Starter nozzle	45
Starter pin diameter	Ø 1,78
Starter device resistance	~ 40 Ω
Venturi diffuser	Ø 29 (30.3x27)
Throttle valve	Ø 33
Choke maximum cone	Ø 48,0

N.B.

THE IDENTIFICATION LETTER CAN VARY WITH EACH CARBURETTOR UPDATE

## Tightening Torques

### STEERING ASSEMBLY

Name	Torque in Nm
Upper steering ring nut	30 ÷ 40
Lower steering ring nut	8 ÷ 10
Handlebar fixing screw	45 ÷ 50 (The two screws must be tightened to the prescribed torque after having done so with the rear wheel axle nut. Safety locks: see «Pre-delivery Operations» )
Fixing screws for handlebar control assembly U-bolts	7 ÷ 10

### FRAME ASSEMBLY

Name	Torque in Nm
Engine-swinging arm bolt	64 - 72
swinging arm bolt - body shell	76 ÷ 83
Engine and vehicle side swinging arm junction bolt	33 ÷ 41
Bolt of the Silent block support plate	42 ÷ 52
Centre stand bolt	25 - 30
Side stand fixing bolt	40 ÷ 45

### FRONT SUSPENSION

Name	Torque in Nm
Screw fixing the shock absorber to the shock absorber - calliper attachment plate	20 ÷ 27
Wheel axle nut	75 ÷ 90

Name	Torque in Nm
Wheel screw	20 ÷ 25
Screw fixing rear mudguard to steering	5 ÷ 6.5

### **FRONT BRAKE**

Name	Torque in Nm
Brake fluid pump-hose fitting	20 ÷ 25
Brake fluid hose-calliper fitting	20 ÷ 25
Screw fixing calliper to the shock absorber - calliper plate attachment	20 ÷ 25
Disc tightening screw	6 (Apply LOCTITE 242 threadlock, medium strength)
Oil bleed screw	12 - 16
Pad fastening pin	19.6 ÷ 24.5
Brake pump reservoir screws	15 ÷ 20

### **REAR SUSPENSION**

Name	Torque in Nm
Retainer for left shock absorber to crankcase support plate	20 ÷ 25
Shock absorber upper fitting	20 ÷ 25
Shock absorber lower fitting	33 ÷ 41
Rear wheel axle	104 ÷ 126
Screw fixing wheel to hub	20 ÷ 25
Screws for muffler - shock absorber support arm on engine	20 ÷ 25 (The two screws must be tightened to the prescribed torque after having done so with the rear wheel axle nut. Safety locks: see «Pre-delivery Operations» )

### **REAR BRAKE**

Name	Torque in Nm
Brake fluid pump-hose fitting	20 ÷ 25
Brake fluid pipe-calliper fitting	20 ÷ 25
Rear disc tightening bolt	11 ÷ 13
Oil bleed screw	12÷16
Calliper to engine tightening screw	20 ÷ 25
Brake pump reservoir screws	15 ÷ 20
Calliper coupling screws	30 ÷ 33

### **MUFFLER**

Name	Torque in Nm
Muffler heat guard clamping screw	5 - 6
Exhaust fumes inlet screw	13 ÷ 15
Screw for fixing muffler to the support arm	20 ÷ 25

### **LUBRICATION**

Name	Torque in Nm
Hub oil drainage plug	15 ÷ 17
Oil filter on crankcase fitting	27 ÷ 33
Engine oil drainage plug/mesh filter	24 ÷ 30
Oil filter	8 ÷ 10
Oil pump cover screws	7 ÷ 9
Screws fixing oil pump to crankcase	5 - 6
Oil pump control crown screw	10 ÷ 14
Oil pump cover plate screws	4 ÷ 6
Oil sump screws	10 ÷ 14
Minimum oil pressure sensor	12 ÷ 14

### **CYLINDER HEAD**

Name	Torque in Nm
Spark plug	12 ÷ 14
Head cover screws	6 ÷ 7
Nuts for head fastening to the cylinder	7± 1 + 180° (2x90°) (Fasten nuts in two crossed passes) (Before fitting the nuts, lubricate them with engine oil.)
Head fixing side screws	11 ÷ 13
Starter ground screw	7 ÷ 8.5

Name	Torque in Nm
Side screw M5 locking the washers on the camshaft (125 cc)	7 ÷ 8,5
Tappet set screw lock nut	6 ÷ 8
Inlet manifold screws	11 ÷ 13
Timing chain tensioner slider screw	10 ÷ 14
Start up mass bell screws (200 cc)	11 ÷ 15
Central screw M6 locking the washers on the camshaft (125 cc)	11 ÷ 15
Timing chain tensioner support screw	11 ÷ 13
Timing chain tensioner central screw	5 - 6
Camshaft retention plate screw	4 ÷ 6

### TRANSMISSION

Name	Torque in Nm
Belt support roller screw	11 ÷ 13
Clutch assembly nut on driven pulley	55 ÷ 60
Drive pulley nut	75 ÷ 83
Transmission cover screws	11 ÷ 13
Driven pulley shaft nut	54 ÷ 60
Rear hub cap screws	24 ÷ 27

### FLYWHEEL

Name	Torque in Nm
Flywheel cover fixing screws	5 - 6
Stator assembly screws	3 - 4 (Apply LOCTITE 242 medium-strength threadlock)
Flywheel nut	52 ÷ 58
Pick-Up clamping screws	3 ÷ 4

### CRANKCASE AND CRANKSHAFT

Name	Torque in Nm
Internal engine crankcase bulkhead (transmission-side half shaft) screws	4 ÷ 6
Engine-crankcase coupling screws	11 ÷ 13
Starter motor screws	11 ÷ 13
Crankcase timing cover screws	3.5 - 4.5 (Apply LOCTITE 242 medium-strength threadlock)

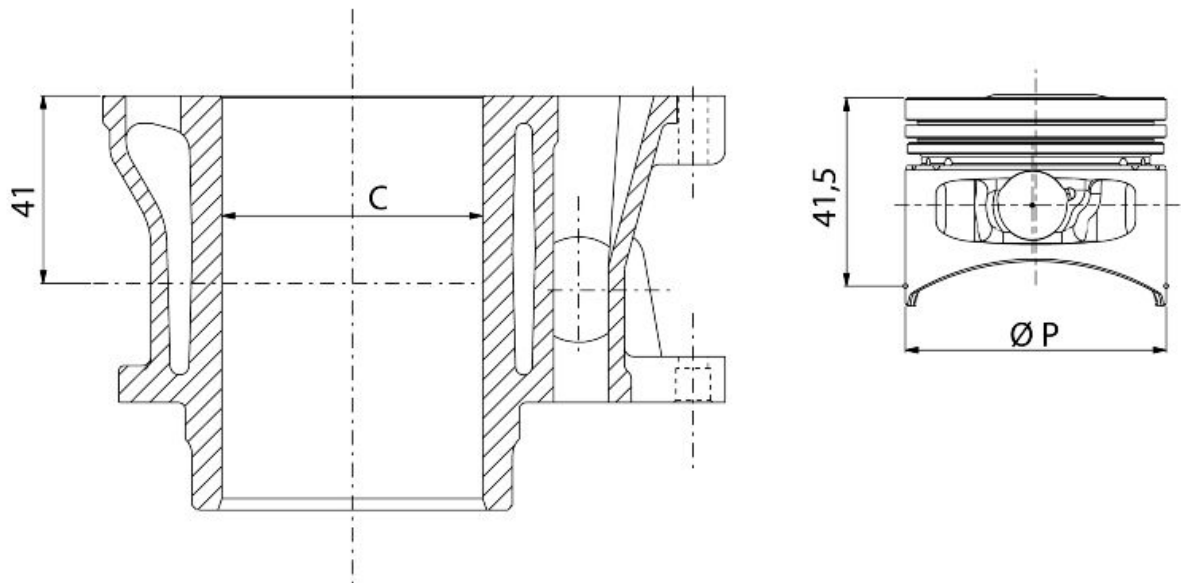
### COOLING

Name	Torque in Nm
Water pump rotor cover	3 ÷ 4
Screws of the water pump rotor driving link	3 ÷ 4
Thermostat cover screws	3 ÷ 4

## Overhaul data

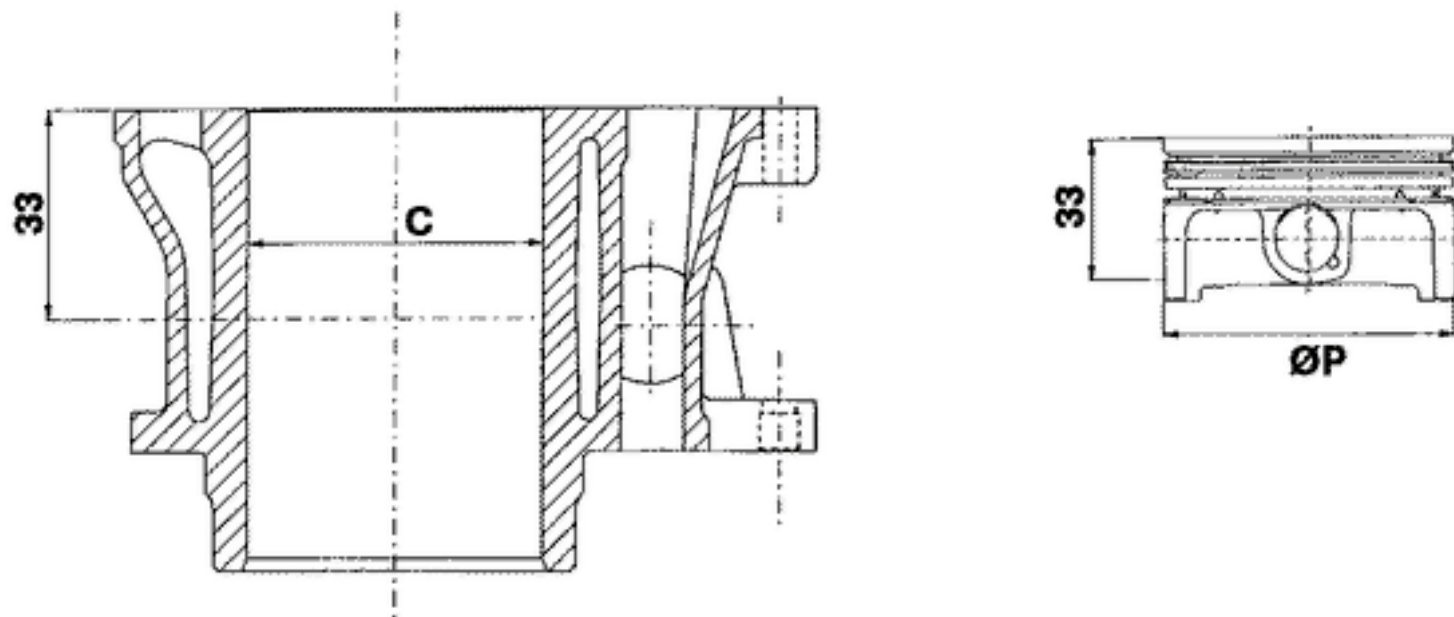
## Assembly clearances

Cylinder - piston assy.



**ENGINE 125 COUPLING CATEGORIES**

Name	Initials	Cylinder	Piston	Play on fitting
Cylinder	A	56.997 ÷ 57.004	56.945 ÷ 56.952	0.045 - 0.059
Cylinder	B	57.004 ÷ 57.011	56.952 ÷ 56.959	0.045 - 0.059
Piston	C	57.011 ÷ 57.018	56.959 ÷ 56.966	0.045 - 0.059
Piston	D	57.018 ÷ 57.025	56.966 ÷ 56.973	0.045 - 0.059
Cylinder 1st Oversize	A1	57.197 ÷ 57.204	57.145 ÷ 57.152	0.045 - 0.059
Cylinder 1st Oversize	B 1	57.204 ÷ 57.211	57.152 ÷ 57.159	0.045 - 0.059
Piston 1st Oversize	C 1	57.211 ÷ 57.218	57.159 ÷ 57.166	0.045 - 0.059
Piston 1st Oversize	D 1	57.218 ÷ 57.225	57.166 ÷ 57.173	0.045 - 0.059
Cylinder 2nd Oversize	A2	57.397 ÷ 57.404	57.345 ÷ 57.352	0.045 - 0.059
Cylinder 2nd Oversize	B 2	57.404 ÷ 57.411	57.352 ÷ 57.359	0.045 - 0.059
Piston 2nd Oversize	C 2	57.411 ÷ 57.418	57.359 ÷ 57.366	0.045 - 0.059
Piston 2nd Oversize	D 2	57.418 ÷ 57.425	57.366 ÷ 57.373	0.045 - 0.059
Cylinder 3rd Oversize	A 3	57.597 ÷ 57.604	57.545 ÷ 57.552	0.045 - 0.059
Cylinder 3rd Oversize	B 3	57.604 ÷ 57.611	57.552 ÷ 57.559	0.045 - 0.059
Piston 3rd Oversize	C 3	57.611 ÷ 57.618	57.559 ÷ 57.566	0.045 - 0.059
Piston 3rd Oversize	D 3	57.618 ÷ 57.625	57.566 ÷ 57.573	0.045 - 0.059



**ENGINE 200 COUPLING CATEGORIES**

Name	Initials	Cylinder	Piston	Play on fitting
Cylinder / piston	A	71.990 ÷ 71.997	71.953 ÷ 71.960	0.030 - 0.044
Cylinder / piston	B	71.997 ÷ 72.004	71.960 ÷ 71.967	0.030 - 0.044
Cylinder / piston	C	72.004 ÷ 72.011	71.967 ÷ 71.974	0.030 - 0.044
Cylinder / piston	D	72.011 ÷ 72.018	71.974 ÷ 71.981	0.030 - 0.044

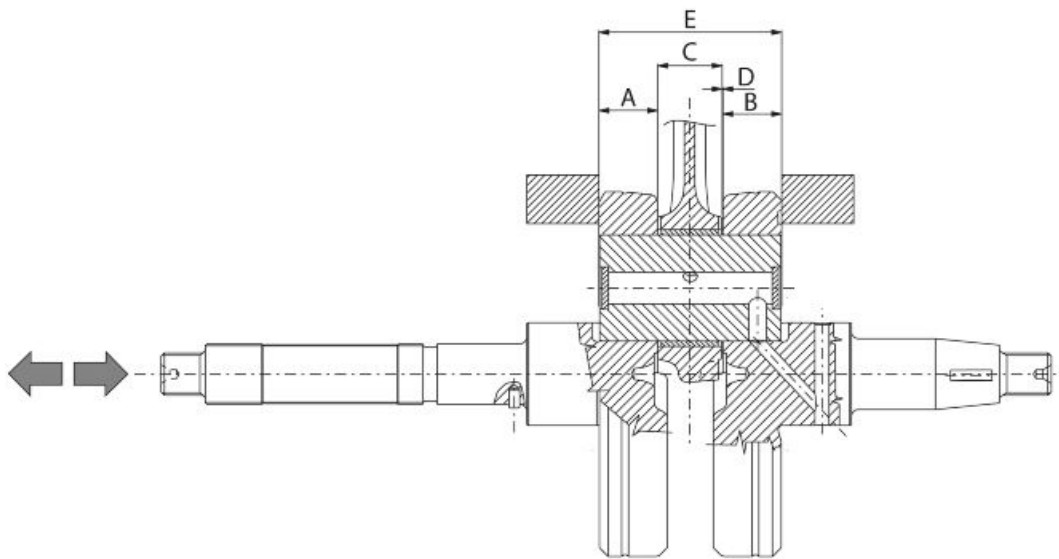
**Crankcase - crankshaft - connecting rod**

**CRANKSHAFT**

Titolo	Durata/Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Crankshaft		Crankshaft to crankcase axial clearance	

*Crankshaft to crankcase axial clearance*





**CRANKSHAFT/ CRANKCASE AXIAL CLEARANCE**

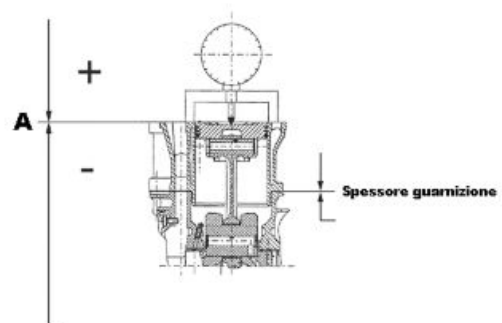
Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		16.6 +0-0.05	A	D = 0.20 - 0.50
Flywheel-side half-shaft		16.6 +0-0.05	B	D = 0.20 - 0.50
Connecting rod		18 -0.10 -0.15	C	D = 0.20 - 0.50
Spacer tool		51.4 +0.05	E	D = 0.20 - 0.50

**Slot packing system**

**Characteristic**

**Shimming system for limiting the compression ratio 125**

$Rc = 12 \div 13 : 1$



Measurement "A" to be taken is a value of piston protrusion. It indicates by how much the plane formed by the piston crown protrudes from the plane formed by the upper part of the cylinder. The further the piston protrudes from the cylinder, the bigger the base gasket to be used (to recover the compression ratio) and vice versa.

**N.B.**

**DISTANCE "A" MUST BE MEASURED WITHOUT ANY GASKET FITTED BETWEEN CRANKCASE AND CYLINDER**

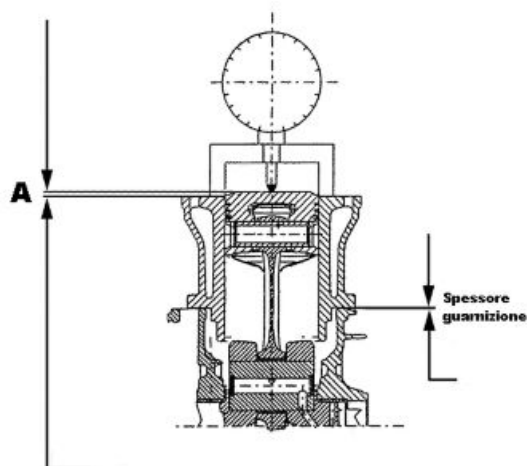
**THICKNESS 125**

Name	Measure A	Thickness
Gasket thickness 125	2,2 ÷ 2,4	0,4 ± 0,05
Gasket thickness 125	2,4 ÷ 2,6	0,6 ± 0,05

**Characteristic**

**Compression ratio, 200 models**

Cr: 11 ÷ 12 :1



Measurement "A" to be taken is a value of piston re-entry, it indicates by how much the plane formed by the piston crown falls below the plane formed by the top of the cylinder. The further the piston falls inside the cylinder, the less the base gasket to be applied (to recover the compression ratio) and vice versa.

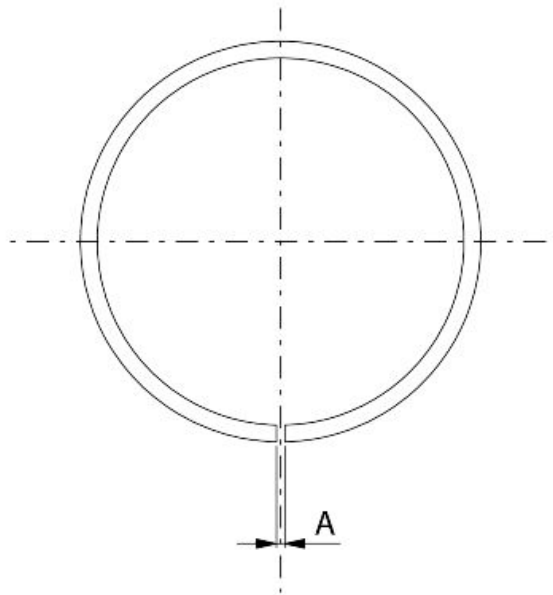
**N.B.**

**MEASUREMENT "A" MUST BE TAKEN WITHOUT ANY GASKET FITTED BETWEEN THE CRANK-CASE AND CYLINDER AND AFTER RESETTING THE GAUGE, EQUIPPED WITH A SUPPORT, ON A GROUND PLANE**

**THICKNESS 200**

Name	Measure A	Thickness
Gasket thickness 200	1,7 ÷ 1,6	0,4 ± 0,05
Gasket thickness 200	1,6 ÷ 1,4	0,6 ± 0,05
Gasket thickness 200	1,4 ÷ 1,3	0,8 ± 0,05

Oversizes



**ENGINE 125 OVERSIZE**

Name	Description	Dimensions	Initials	Quantity
Compression ring		57 x 1	A	0.15 ÷ 0.30
Oil scraper ring		57 x 1	A	0.10 ÷ 0.30
Oil scraper ring		57 x 2.5	A	0.15 ÷ 0.35
Compression ring 1st oversize		57.2 x 1	A	0.15 ÷ 0.30
Oil scraper ring 1st Oversize		57.2 x 1	A	0.10 ÷ 0.30
Oil scraper ring 1st Oversize		57.2 x 2.5	A	0.15 ÷ 0.35
Compression ring 2nd Oversize		57.4 x 1	A	0.15 ÷ 0.30
Oil scraper ring 2nd Oversize		57.4 x 1	A	0.10 ÷ 0.30
Oil scraper ring 2nd Oversize		57.4 x 2.5	A	0.15 ÷ 0.35
Compression ring 3rd Oversize		57.6 x 1	A	0.15 ÷ 0.30
Oil scraper ring 3rd Oversize		57.6 x 1	A	
Oil scraper ring 3rd Oversize		57.6 x 2.5	A	0.15 ÷ 0.35

**ENGINE 200 OVERSIZE**

Name	Description	Dimensions	Initials	Quantity
Oil scraper ring		72 x 2.5	A	0.20 ÷ 0.40
Oil scraper ring		72 x 1	A	0.20 ÷ 0.40
Compression ring		72 x 1.5	A	0.15 ÷ 0.30

## Products

### RECOMMENDED PRODUCTS

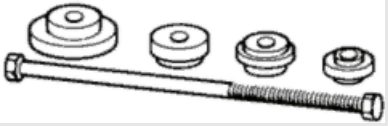



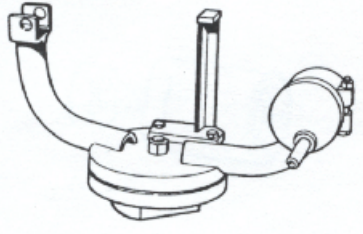

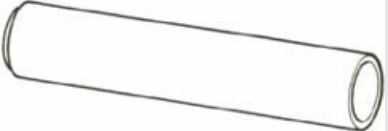
<b>Product</b>	<b>Description</b>	<b>Specifications</b>
AGIP ROTRA 80W-90	Rear hub oil	SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP GP 330	Calcium complex soap-based grease with NLGI 2; ISO-L-XBCIB2	Grease (brake control levers, throttle grip)
AGIP CITY HI TEC 4T	Four-stroke engine oil	Lubricating oil for flexible shafts (throttle control)
AGIP BRAKE 4	Brake fluid	FMVSS DOT 4 Synthetic fluid
AGIP PERMANENT PLUS	Coolant	Monoethylene glycol antifreeze fluid, CU-NA NC 956-16
MONTBLANC MOLYBDENUM GREASE	Grease for driven pulley shaft adjusting ring and movable driven pulley housing	Grease with molybdenum disulphide
AGIP GREASE PV2	Grease for the steering bearings, pin seats and swinging arm	White anhydrous-calcium based grease to protect roller bearings; temperature range between -20 C and +120 C; NLGI 2; ISO-L-XBCIB2.

## INDEX OF TOPICS

TOOLING

TOOL

**APPROPRIATE TOOLS**

Stores code	Description	
001330Y	Tool for fitting steering seats	
001467Y009	Driver for OD 42-mm bearings	
001467Y017	Bell for bearings, OD 39 mm	
001467Y014	Pliers to extract ø 15-mm bearings	
005095Y	Engine support	
002465Y	Pliers for circlips	
006029Y	Punch for fitting fifth wheel seat on steering tube	

Stores code	Description
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008564Y

Flywheel extractor



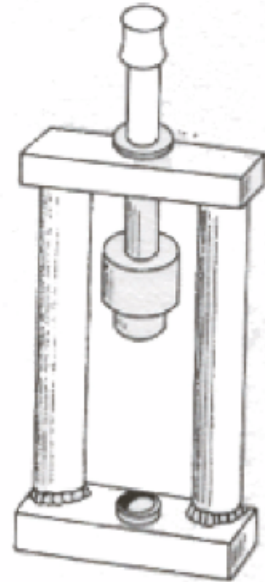
020004Y

Punch for removing fifth wheels from headstock



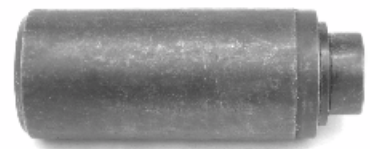
020021Y

Front suspension service tool



020036Y

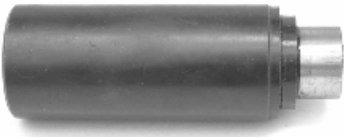





Punch



020037Y

Punch



Stores code	Description	
020038Y	Punch	
020055Y	Wrench for steering tube ring nut	
020074Y	Support base for checking crankshaft alignment	
020150Y	Air heater support	
020151Y	Air heater	
020193Y	Oil pressure gauge	
020262Y	Crankcase splitting strip	



Stores code	Description	
020263Y	Sheath for driven pulley fitting	
020287Y	Clamp to assemble piston on cylinder	
020306Y	Punch for assembling valve seal rings	
020319Y	Immobilizer check tester	
020329Y	MityVac vacuum-operated pump	
020330Y	Stroboscopic light to check timing	

**Stores code**

**Description**

020331Y

Digital multimeter



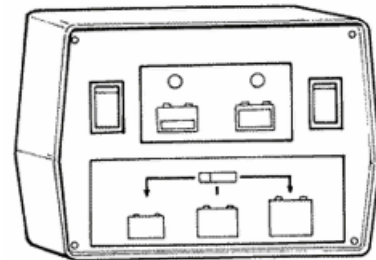
020332Y

Digital rev counter



020333Y

Single battery charger



020334Y

Multiple battery charger



Stores code	Description
020335Y	Magnetic support for dial gauge



020357Y	32 x 35 mm adaptor
020359Y	42x47-mm adaptor



020360Y	Adaptor 52 x 55 mm	
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020363Y	20 mm guide
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020364Y	25-mm guide	
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Stores code	Description
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020365Y

22 mm guide



020368Y

driving pulley lock wrench



020375Y

Adaptor 28 x 30 mm



020376Y

Adaptor handle



020382Y

Valve cutters equipped with part 012 removal tool



020382Y011

adapter for valve removal tool



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Stores code	Description
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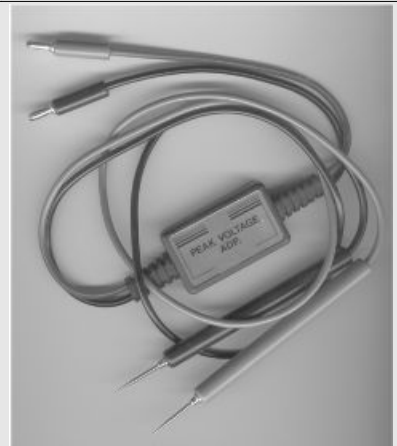
020393Y

Piston fitting band



020409Y

Multimeter adaptor - Peak voltage detection



020412Y

15 mm guide



020414Y



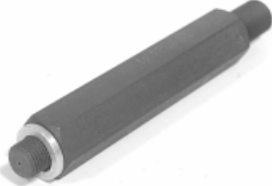
28-mm guide








020423Y

driven pulley lock wrench



Stores code	Description	
020424Y	Driven pulley roller casing fitting punch	
020425Y	Punch for flywheel-side oil seal	
020426Y	Piston fitting fork	
020430Y	Pin lock fitting tool	
020431Y	Valve oil seal extractor	
020434Y	Oil pressure control fitting	

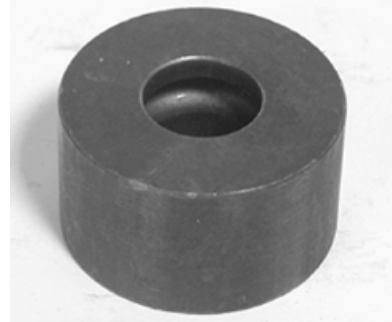
Stores code	Description	
020439Y	17 mm guide	
020440Y	Water pump service tool	
020441Y	26 x 28 mm adaptor	
020442Y	Pulley lock wrench	
020444Y	Tool for fitting/ removing the driven pulley clutch	

Stores code	Description
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020455Y	10-mm guide
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020456Y	Ø 24 mm adaptor
020477Y	Adaptor 37 mm



020483Y	30 mm guide
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020488Y	Pin stops fitting tool (200 cm³ engines)
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020489Y	Hub cover support stud bolt set
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**Stores code****Description**

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020565Y

Flywheel lock calliper spanner



494929Y

Exhaust fumes analyser



# INDEX OF TOPICS

**MAINTENANCE**

**MAIN**

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**Maintenance chart**
**EVERY 2 YEARS****Action**

Secondary air filter (external / internal) - Clean
Coolant - change
Brake fluid - change

**EVERY 3,000 KM**

10'

**Action**

Engine oil - level check/ top-up
----------------------------------

**AT 1000 KM OR 4 MONTHS**

70'

**Action**

Hub oil level - Check / Replace
Idle speed (*) - adjustment
Throttle lever - adjustment
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Safety locks - check
Electrical system and battery - check
Vehicle and brake test - road test

*Safety locks: see Before delivery chapter.**(\*) See rules***AT 6000 KM OR 12 MONTHS**

130'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Valve clearance - check
Valve clearance 200 - check
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

**AT 12000 KM OR 24 MONTHS AND AT 60000 KM**

135'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement

**Action**

Driving belt - Check / Replacement
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment check
Tyre pressure and wear - check
Vehicle and brake test - road test

*Safety locks: see Before delivery chapter.*

*(\*) See rules*

**AT 18000 KM AND AT 54000 KM (125)**

100'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Radiator - external cleaning/ check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

**AT 18000 KM AND AT 54000 KM (200)**

140'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Valve play 200 - recording
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Radiator - external cleaning/ check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

**AT 24000 KM AND AT 48000 KM (125)**

190'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Valve clearance - check
Idle speed (*) - adjustment

**Action**

Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment check
Tyre pressure and wear - check
Vehicle and brake test - road test

*Safety locks: see Before delivery chapter.*

(\*) See rules

**AT 24000 KM AND AT 48000 KM (200)**

150'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Valve clearance - check
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment check
Tyre pressure and wear - check
Vehicle and brake test - road test

*Safety locks: see Before delivery chapter.*

(\*) See rules

**AT 30000 KM AT 42000 KM AND AT 66000 KM**

90'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

**AT 36000 KM (125)**

205'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Valve clearance - adjustment
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment check
Tyre pressure and wear - check
Vehicle and brake test - road test

*Safety locks: see Before delivery chapter.*

(\*) See rules

**AT 36000 KM (200)**

245'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Valve play 200 - recording
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment check
Tyre pressure and wear - check
Vehicle and brake test - road test

*Safety locks: see Before delivery chapter.*

(\*) See rules

**AT 72000 KM**

260'

**Action**

Engine oil - replacement
Hub oil level - Check / Replace
Spark plug / electrode gap - check / replacement
Air filter - cleaning
Engine oil - change
Valve clearance - check
Valve play 200 - recording
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - Check / Replacement
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Electrical system and battery - check
Headlight - adjustment check
Tyre pressure and wear - check
Vehicle and brake test - road test

Safety locks: see Before delivery chapter.

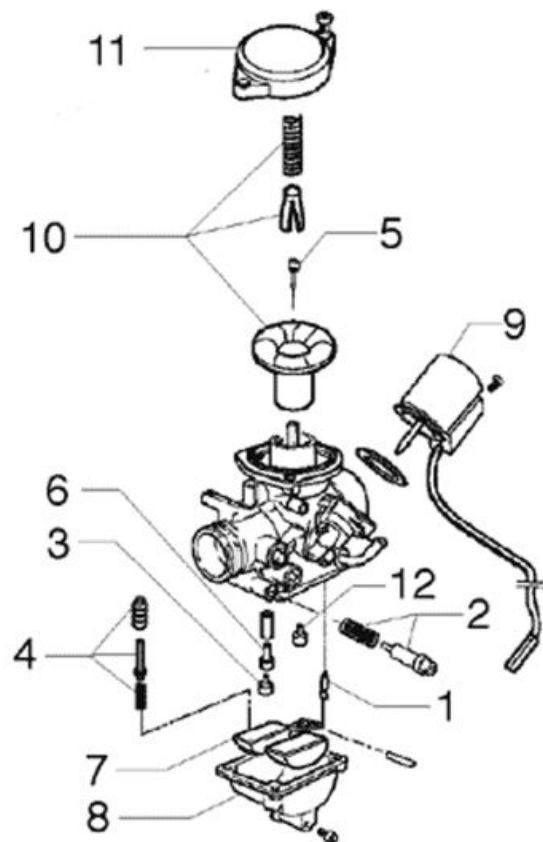
(\*) See rules

**Carburettor**

- Disassemble the carburettor in its parts, wash all of them with solvent, dry all body grooves with compressed air to ensure adequate cleaning.
- Check carefully that the parts are in good condition.
- The throttle valve should move freely in the chamber. Replace it in case of excessive clearance due to wear.
- If there are wear marks in the chamber causing inadequate tightness or a free valve slide (even if it is new), replace the carburettor.
- It is advisable to replace the gaskets at every refit

**WARNING**

**PETROL IS HIGHLY EXPLOSIVE ALWAYS REPLACE THE GASKETS TO AVOID PETROL LEAKS**



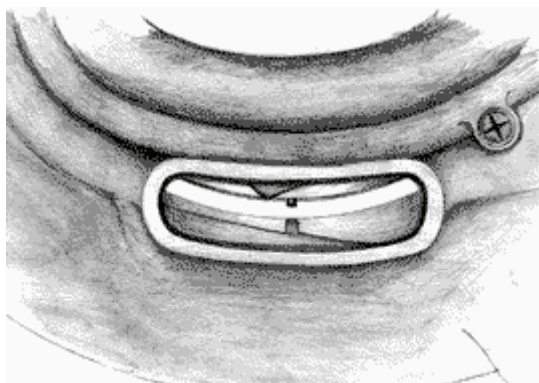
1. Diaphragm cover

2. Gas valve spring
3. Tapered pin support
4. Tapered pin spring
5. Tapered pin
6. Throttle valve diaphragm
7. Automatic starter
8. Idle speed adjustment screw
9. Accelerating pump rocking lever
10. Idle mixture adjustment screw
11. Float pin
12. Acceleration pump unit
13. Float
14. Tank
15. Minimum jet
16. Maximum jet
17. Diffuser
18. Tank drainage screw.

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## Checking the spark advance

- To check ignition advance, use the stroboscopic light with induction pincers connected to the spark plug power wire.
- Connect the induction pincers being careful to respect the proper polarity (the arrow stamped on the pincers must be pointing at the spark plug).
- Place the light selector in central position (1 spark = 1 crankshaft revolution as in 2 T engines).
- Start the engine and check that the light works properly and the rpm indicator can read also the high rpm (e.g. 8000 rpm).
- If flash unsteadiness or revolution reading error is detected (e.g. half values), increase the resistive load on the spark plug power line (10 ÷ 15 K $\Omega$  in series to AT cable).
- Remove the plastic cover from the slot on the fly-wheel cover.





- Operating on the flash corrector displacement of the bulb, make the reference on the flywheel cover coincide with level on the water pump drive. Read the advance degrees indicated by the stroboscopic light.
- Check that the advance degrees corresponds with the rotation rpm as indicated in the table.
- If there are anomalies, check the Pick-Up and the control unit power supply (positive-negative), replace the control unit if necessary.
- The brand new control unit prevents that the engine rotation exceeds 2000 rpm.
- The programmed control unit allows the engine to rotate within the prescribed limits.

**Characteristic**

**Check ignition advance 125**

10° ± 1° at 2000 rpm - 34° ± 1° at 6000 rpm

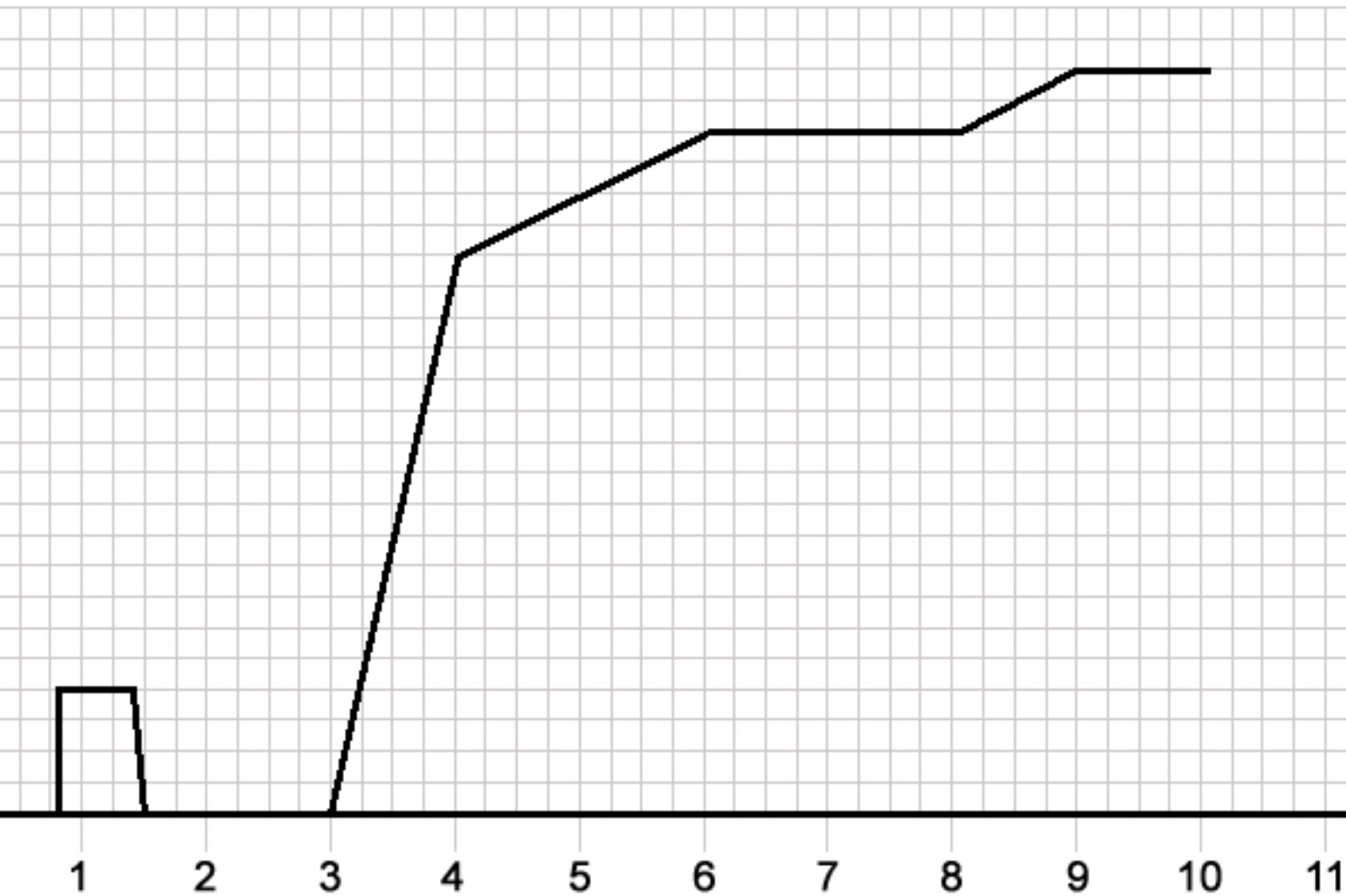
**variable ignition advance (before T.D.C.) 200**

10°±1 at 2000 rpm - 32°±1 at 6500 rpm

**Spark advance variation**

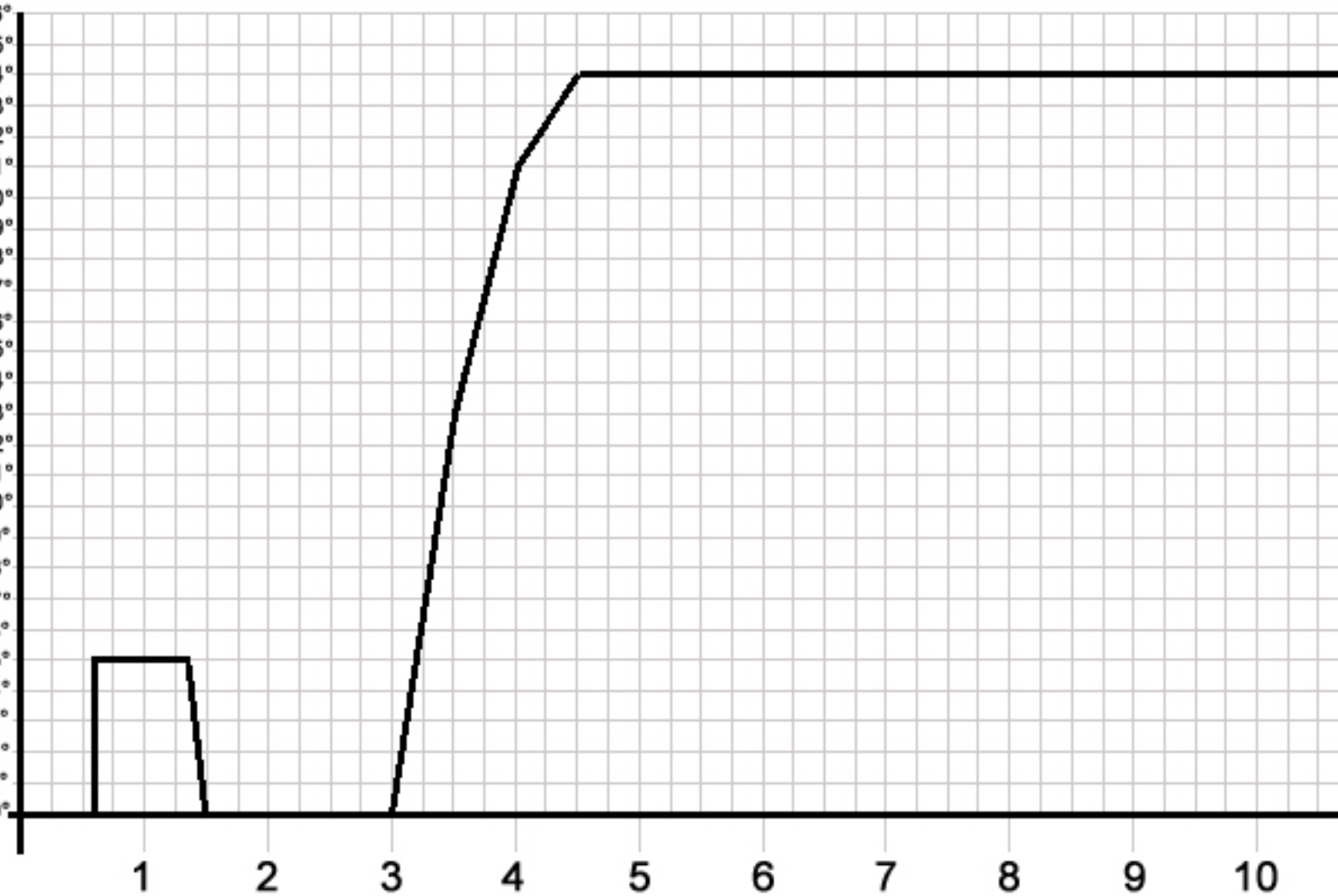
**VERSION 200**

Specification	Desc./Quantity
Spark elimination	First threshold : 1 spark on 7 Second threshold : 2 sparks on 3
Version 200 : Operation threshold	First threshold : 9900 ±50 Second threshold : 10100 ±50
Version 200 : Reactivation threshold	First threshold : 9800 ±50 Second threshold: 10000 ±50



**VERSION 125**

Specification	Desc./Quantity
Operation threshold	First threshold : 10700 ±50 Second threshold : 11000 ±50
Reactivation threshold	First threshold : 10600±50 Second threshold : 10900±50
Spark elimination	First threshold : 1 spark on 7 Second threshold : 2 sparks on 3



## Spark plug

- Rest the vehicle on the central stand.
- Open the saddle and extract the helmet compartment
- Disconnect the spark plug H.V. cable cap.
- Unscrew the spark plug, using the spanners supplied.
- Inspect the spark plug, the insulator's integrity, too worn or sooty electrodes, sealing washer state, and measure the distance between the electrodes using the special thickness gauge.



- Adjust the distance, if required, by bending the side electrode carefully. In case of irregularity, replace the spark plug with one of the recommended type.
- Insert the spark plug with the proper inclination, and screw it thoroughly by hand, then tighten it using the special wrench.
- Insert the cap over the spark plug thoroughly and proceed to re-assembly

**CAUTION**

THE SPARK PLUG MUST BE REMOVED WHEN THE MOTOR IS COLD. THE SPARK PLUG MUST BE REPLACED EVERY 12,000 KM. THE USE OF NON CONFORMING IGNITION CONTROL UNITS OR SPARK PLUGS OTHER THAN THOSE PRESCRIBED CAN SERIOUSLY DAMAGE THE ENGINE.

**Characteristic****Spark plug 125**

Champion RG 4 HC

**Spark plug 200**

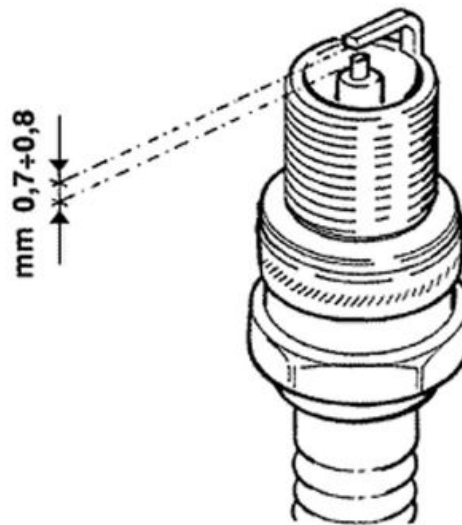
CHAMPION RG 6 YC

**Electrode gap**

0.7-0.8 mm

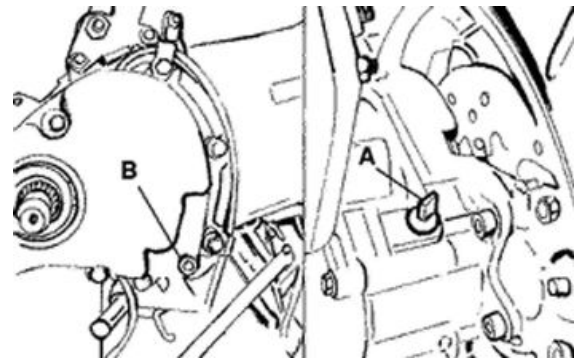
**Locking torques (N\*m)**

Spark plug 12 ÷ 14

**Hub oil****Check**

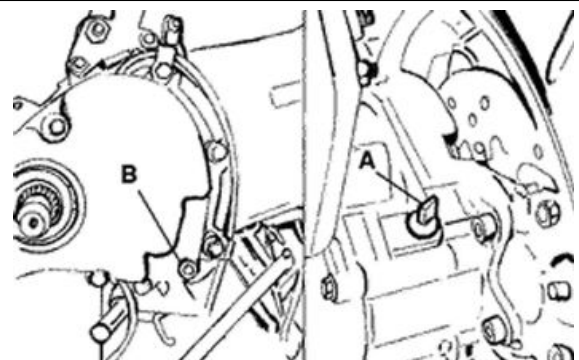
- Stand the vehicle on its centre stand on flat ground;
- Remove the oil dipstick "A", dry it with a clean cloth and put it back into its hole **tightening it completely**;
- Take out the dipstick checking that the oil level reaches the dipstick lower notch; if the level is under the MAX. mark, it needs to be filled with the right amount of hub oil.
- Screw up the oil dipstick again and make sure it is locked properly into place.





## Replacement

- Remove the oil cap «A».
- Unscrew the oil drainage cap "B" and drain out all the oil.
- Screw in the drainage cap again and fill the hub with the prescribed oil.



### Recommended products

#### AGIP ROTRA 80W-90 Rear hub oil

SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications

### Characteristic

#### Rear hub oil

Capacity ~ 150 cm<sup>3</sup>

### Locking torques (N\*m)

Hub oil drainage screw 15 ÷ 17 Nm

## Air filter

### Cleaning (Every 12,000 km):

- Wash with water and car shampoo.
- Dry with short blasts of compressed air and a clean cloth.
- Soak with a 50% mixture of gasoline and oil.
- Drip dry the filtering element and then squeeze it with your hands without wringing.
- Refit the filtering element.

### CAUTION

**NEVER RUN THE ENGINE WITHOUT THE AIR FILTER, THIS WILL RESULT IN AN EXCESSIVE CYLINDER AND PISTON WEAR AND ALSO IN CARBURETTOR DAMAGE.**

### CAUTION

**WHEN TRAVELLING ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE OFTEN THAN SHOWN IN THE SCHEDULED MAINTENANCE CHART.**

### Recommended products

**AGIP FILTER OIL Oil for air filter sponge**

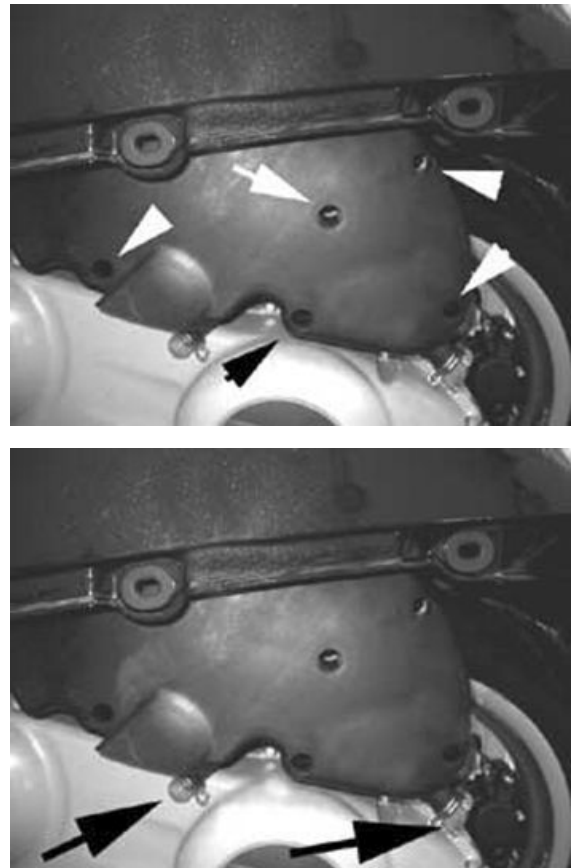
Mineral oil with specific additives for increased adhesiveness

- Remove the left side panel.
- Remove the air cleaner cover after unscrewing the 9 fixing screws.
- Take out the filtering element.
- Replace the air filter with a new one.

**N.B.**

EVERY 6,000 KM CHECK THE AIR FILTER AND IF REQUIRED, CLEAN IT WITH COMPRESSED AIR. THE AIR JET MUST BE DIRECTED FROM THE INSIDE TO THE OUTSIDE OF THE FILTER (I.E. OPPOSITE TO THE SENSE THE AIR FLOWS AT REGULAR ENGINE RUNNING). EVERY 6,000 KM, UPON SERVICING, REMOVE THE RETAINER AND RUBBER COVER UNDER THE FILTER HOUSING AS SHOWN IN THE FIGURE AND DRAIN ALL POSSIBLE OIL DEPOSITS.





## Engine oil

In 4T engines, the engine oil is used to lubricate the distribution elements, the bench bearings and the thermal group. **An insufficient quantity of oil can cause serious damage to the engine.**

In all 4T engines, the deterioration of the oil characteristics, or a certain consumption should be considered normal, especially if during the run-in period. Consumption levels in particular can be influenced by the conditions of use (e.g.: oil consumption increases when driving at "full throttle").

## Replacement

Replace oil and filter every 6,000 km. The engine must be drained by running off the oil from drainage cap "B" of the flywheel side mesh pre-filter; furthermore to facilitate oil drainage, loosen the cap/dipstick "A". Once all the oil has drained through the drainage hole, unscrew the oil cartridge filter "C" and remove it.

Make sure the pre-filter and discharge tap O-rings are in good condition.



Lubricate them and refit the gauze filter and oil drainage tap, screwing them up to the specified torque.

Refit the new cartridge filter being careful to lubricate the O-ring before fitting it.

Change the engine oil.

Since a certain quantity of oil still remains in the circuit, oil must be filled from cap "A". Then start up the scooter, leave it running for a few minutes and switch it off: after five minutes check the level and if necessary top up without exceeding the **MAX** level. The cartridge filter must be replaced every time the oil is changed. Use new oil of the recommended type for topping up and changing purposes.

**N.B.**

**THE ENGINE MUST BE HOT WHEN THE OIL IS CHANGED.**

### Recommended products

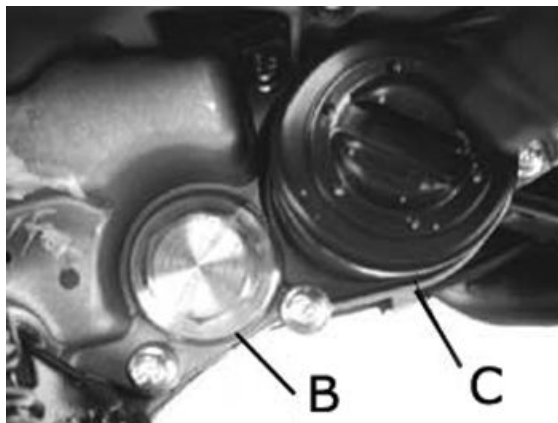
#### AGIP CITY HI TEC 4T Engine oil

SAE 5W-40 Synthetic oil that exceed the requirements of API SL, ACEA A3, JASO MA specifications

### Characteristic

#### Engine oil top-up

600 ÷ 650 cc



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## Check

This operation must be carried out with the engine cold and following the procedure below:

1. Place the vehicle on its centre stand and on flat ground.
2. Undo cap/dipstick "A", dry it off with a clean cloth and replace it, **screwing down completely**.
3. Remove the cap/dipstick again and check that the level is between the min and max. marks; top up if necessary.

The MAX level mark indicates a quantity of around 1100 cc of oil in the engine. If the check is carried out after the vehicle has been used, and therefore with a hot engine, the level line will be lower; in order to carry out a correct check it is necessary to wait at least 10 minutes after the engine has been stopped, so as to get the correct level.



### Oil top up

The oil should be topped up after having checked the level and in any case by adding oil **without ever exceeding the MAX. level.**

The restoration level between the **MIN** and **MAX** levels implies a quantity of oil of **approx. 400 cc.**



### Oil pressure warning light

The vehicle is equipped with a warning light on the instrument panel that lights up when the key is turned to the «ON» position. However, this light should switch off once the engine has been started.

**If the light turns on during braking, at idling speed or while turning a corner, it is necessary to check the oil level and the lubrication system.**

### Checking the ignition timing

-Remove the 4 fixing screws and move away from the engine the flywheel cover fitted with a water pump and cooling manifolds.

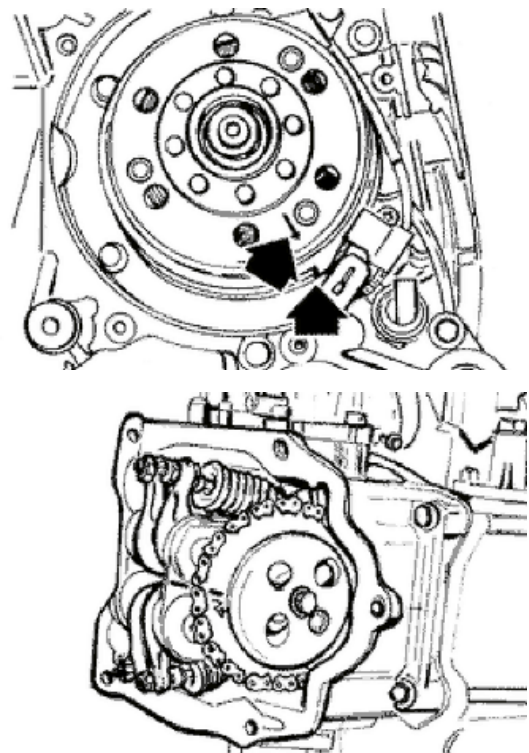
-Rotate the flywheel until the reference matches the crankcase operation end as shown in the figure (TDC). Make sure that the 4V reference point on the camshaft control pulley is aligned with the reference point on the head as shown in the second figure. If the reference mark is opposite the indicator on the head, make the crankshaft turn once more.

-The TDC reference mark is repeated also between the flywheel cooling fan and the flywheel cover.

To use this reference mark, remove the spark plug and turn the engine in the opposite direction to the normal direction using a calliper spanner applied to the camshaft command pulley casing.

**N.B.**

**TIME THE TIMING SYSTEM UNIT IF IT IS NOT IN PHASE.**



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## Cooling system

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### Introduction of the engine coolant.

The fluid level inspection should be carried out every 6,000 km when the motor is cold, following the methods indicated below:

Place the scooter on its centre stand and on flat ground.

- Undo the screw shown in the figure and remove the expansion tank cap on RHS.
- Top up if the fluid level is near or below the MIN level edge. The liquid level must always be between the MIN and MAX level.
- The coolant consists of an ethylene glycol and corrosion inhibitor based 50% de-ionised water-antifreeze solution mix.

#### CAUTION

**DO NOT EXCEED THE MAX. LEVEL WHEN FILLING SO AS TO AVOID THE COOLANT ESCAPING FROM THE EXPANSION TANK WHEN THE vehicle IS IN USE.**



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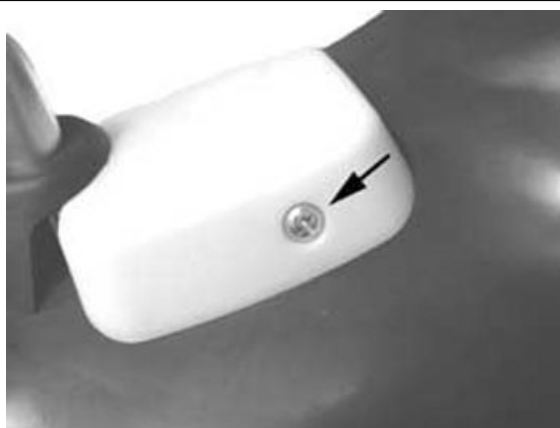
## Braking system

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### Level check

The brake fluid tanks for the front and rear brakes are located on the pumps under the handlebar cover. Proceed as follows:

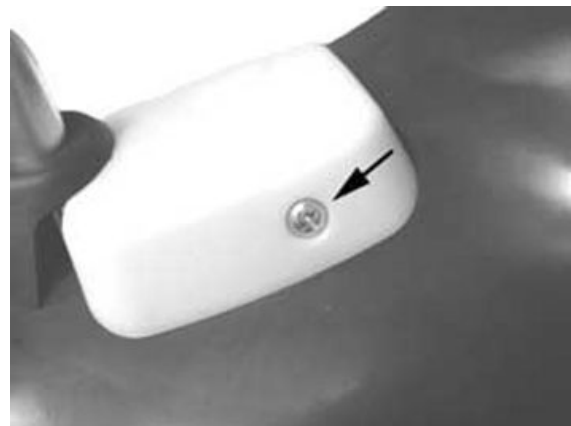
- Remove the brake pump cover
- Rest the vehicle on its centre stand with the handlebars perfectly horizontal;
- Check the fluid level through the sight glass as shown in the figure. A certain lowering of the level is caused by wear on the pads.





## Top-up

- Position the vehicle on a flat surface and on the centre stand
- Remove the brake pump cover as indicated in the photo



- Check the brake fluid level through the sight glass on the pump as shown in the photograph
- If the level is below the minimum, fill using the two screws shown in the figure



- Remove the gasket and fill with DOT 4 until the spyglass is completely covered

For refitting purposes carry out the operations in the reverse order from the removal operation and respect the tightening torque of the tank cover screws.

**CAUTION**

AVOID CONTACT OF THE BRAKE FLUID WITH YOUR EYES, SKIN, AND CLOTHING. IN CASE OF ACCIDENTAL CONTACT, WASH WITH WATER.

**CAUTION**

THE BRAKING CIRCUIT FLUID IS HIGHLY CORROSIVE. THEREFORE, WHEN TOPPING IT UP, AVOID LETTING IT COME INTO CONTACT WITH THE PAINTED PARTS OF THE VEHICLE. THE BRAKING CIRCUIT FLUID IS HYGROSCOPIC, THAT IS, IT ABSORBS HUMIDITY FROM THE SURROUNDING AIR. IF MOISTURE CONTAINED IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, THIS WILL RESULT IN INEFFICIENT BRAKING.

**CAUTION**

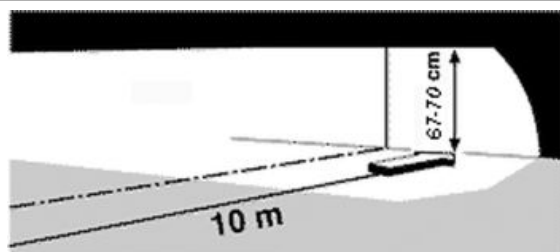
NEVER USE BRAKE FLUID COMING FROM OPEN OR PARTIALLY USED CONTAINERS. UNDER NORMAL CLIMATIC CONDITIONS, BRAKE FLUID MUST BE CHANGED EVERY 20,000 KM OR ANYWAY EVERY 2 YEARS.

**Locking torques (N\*m)**

Brake pump reservoir screws  $15 \div 20$

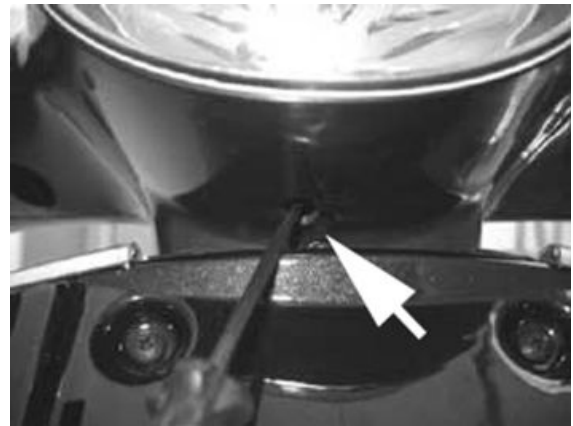
**Headlight adjustment**

- Position the unloaded vehicle, in running conditions and with the tyres inflated to the prescribed pressure, onto a flat surface 10 m away from a white screen in a half-lit room, and make sure the vehicle longitudinal axis is perpendicular to the screen.



- Draw a horizontal line on the screen at a height of  $67 \div 70$  cm from the ground.
- Remove the front radiator grille working on the screw indicated in the photograph
- Switch on the low-beam headlight and check that the horizontal borderline between the projected light beam and the dark area is not higher than the horizontal line drawn on the screen. To remove the headlight, act on the screw indicated in the figure.





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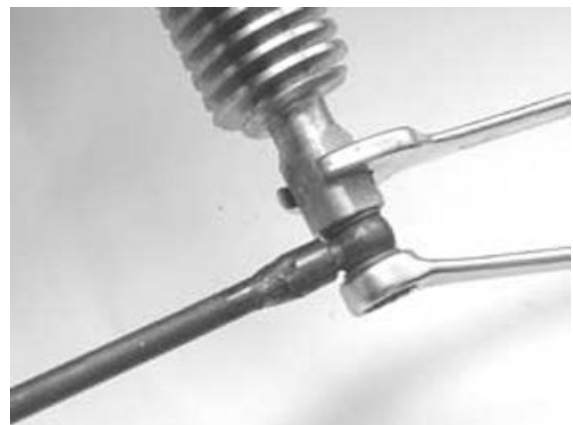
## CO check

Remove the side, then remove the transmission side cooling air inlet so as to easily reach the flow adjustment screw

- Remove the gas cap on the exhaust pipe.
- Using the original washer, install the exhaust gas collection Kit union.



- Suitably orientate the components.
- Close the gas outlet terminal of the tool.
- Start the engine and let it warm until the electric fan starts.
- Stop the engine.



- Disconnect the SAS check valve vacuum pipe from the «T» branch shown in the figure.
- Close the branch using a cap or a pipe portion with conical cap.
- Connect the Mitivac vacuum pump to the control pipe and to the SAS valve.



- Start the vacuum up to - 0.6 - 0.8 Bar so as to close the valve and cut off the SAS system.



Remove the exhaust gas collection Kit closing cap and connect the analyser properly pre-heated.

Check the conditions displayed by the analyser and the engine rpm and adjust the **CO value at  $3.8 \pm 0.7$  at  $1,650 \pm 50$  rpm**

**N.B.**

**CHECK THAT THE RESULT IS OBTAINED WITH THE GAS VALVE IN THE CLOSEST POSITION. ALSO CHECK THAT THE CARBURETION ADJUSTMENT IS OBTAINED WITH THE FLOW SCREW OPEN BY 2 TO 4 TURNS.**

**IF NOT, CHECK THE FUEL LEVEL ADJUSTMENT IN THE BASIN AND CHECK THE FUEL CIRCUIT. IN CASE OF UNSTEADY CO, CHECK THE CARBURETTOR CLEANING, THE FEEDING SYSTEM EFFICIENCY AND THE VACUUM SEALS.**

**IN CASE OF UNBURNT HYDROCARBONS (HC) > OF 1,000 P.P.M., CHECK THE IGNITION SYSTEM, THE TIMING, THE VALVE CLEARANCE AND THE DRAINAGE VALVE SEAL.**

### Specific tooling

020329Y MityVac vacuum-operated pump

020332Y Digital rev counter

494929Y Exhaust fumes analyser

## SAS filters inspection and cleaning

the SAS for leader engines 125 cm<sup>3</sup> - 200 cm<sup>3</sup> Euro 2 operates in a similar manner to the SAS for 2T engines.

The differences are the following:

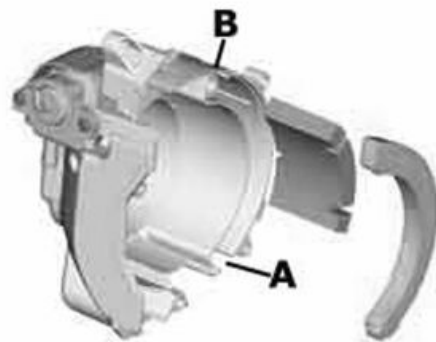
instead of entering through the muffler as for 2T engine, the secondary air enters directly in the discharge pipe on the head.

The 2T reed valve has a diaphragm. The unit, indicated by an arrow in the figure, has a cut-off connected to the depression intake on the inlet manifold that cuts the air inlet in deceleration, to avoid explosions in the muffler.



### System description:

Air is drawn through the opening "A", goes through the first filter and is channelled through the opening "B"

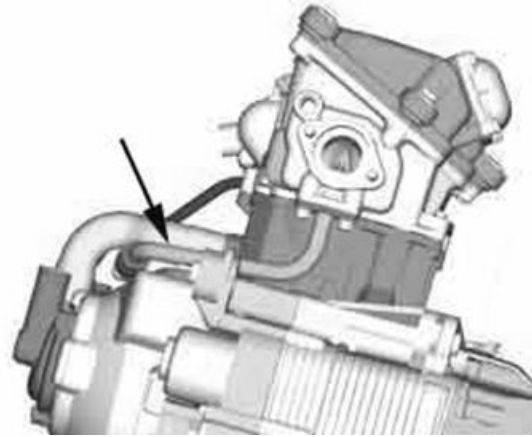


Air gets to the second filter "B" through the opening indicated in the figure.

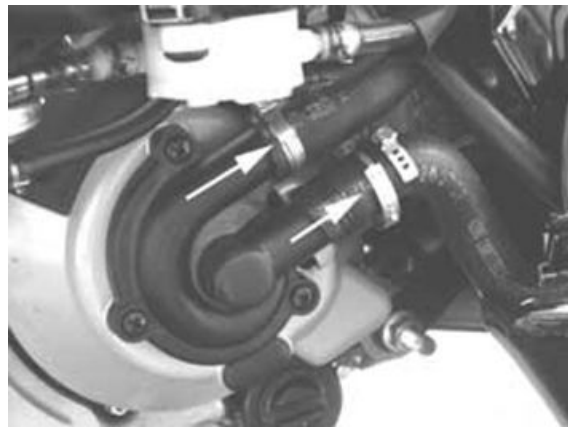
Now, the filtered air enters the diaphragm device, and then is channelled to the head.



The air passes through a rigid pipe connected to the head and reaches a discharge joint in order to supply oxygen to the unburned gases before the catalytic converter, thus favouring an improved re-action of the catalytic converter.



- Remove the muffler.
- Remove the right-hand side fairing
- Remove the coolant inlet and outlet couplings from the pump cover. Then, drain the system



- Remove the upper clamp of the SAS valve connection coupling to the drainage as indicated in the photograph





- 
- Remove the 2 fixing screws, the gasket and the pipe connecting the SAS valve to the head. Then remove the pipe.



- 
- Release the electrical cable from the flywheel cover clamp as indicated in the photograph



- 
- Disconnect the depression pipe from the SAS valve



- Remove the pump support bracket and fuel filter.
- Remove the flywheel cover together with the SAS valve acting on the 4 hexagonal-head screws as indicated in the photograph



- Remove the SAS valve two fixing screws and remove the SAS valve together with the O-ring from the support



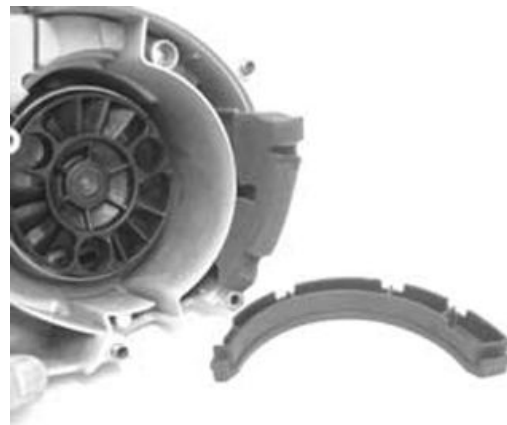
- Remove the plastic support together with the gasket



- Check that the SAS valve plastic support is not dented or distorted
- Check that the gasket is in good conditions
- Carefully clean the inside and outside filters. Replace them if damaged or abnormally distorted.
- Make sure the coupling connecting the secondary air to the head is not dented, overheated or distorted. If there is, replace it.
- Check that the metal pipe does not have any dents

**CAUTION**

**INADEQUATE TIGHTNESS BETWEEN THE SAS VALVE AND ITS SUPPORT INCREASES NOISE IN THE SAS SYSTEM.**



To refit, follow the removal procedure in reverse order being careful to respect the direction of the rubber coupling connecting the SAS valve and the discharge system

## INDEX OF TOPICS

TROUBLESHOOTING

TROUBL

This section makes it possible to find what solutions to apply when troubleshooting.  
For each failure, a list of the possible causes and pertaining operations is given.

## Engine

### Poor performance

#### POOR PERFORMANCE

Possible Cause	Operation
The carburettor is dirty; fuel pump or vacuum valve damaged	Remove, wash with solvent and dry with compressed air or replace
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Muffler obstructed	Replace
Air filter blocked or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Automatic starter failure	Check: mechanical movement, electric connection and fuel supply, replace if required.
Oil level exceeds maximum	Check for causes and fill to reach the correct level
Lack of compression: parts, cylinder and valves worn	Replace the worn parts
Transmission belt worn	Replace
Inefficient automatic transmission	Check the rollers and the pulley movement, replace the damaged parts and lubricate the driven pulley moveable guide with Montblanc Molybdenum Grease
Clutch slipping	Check the clutch system and/or the bell and replace if necessary
Carburettor nozzles clogged	Dismantle, wash with solvent and dry with compressed air

### Rear wheel spins at idle

#### REAR WHEEL TURNING WITH IDLE ENGINE

Possible Cause	Operation
Idling rpms too high	Adjust the engine idle speed and the CO%, if necessary.
Clutch fault	Check the springs / clutch masses
Intake coupling cracked or clamps incorrectly tightened	Replace the intake coupling and check the clamps are tightened

### Starting difficulties

#### DIFFICULT STARTING

Possible Cause	Operation
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Rpm too low at start-up or engine and start-up system damaged	Check the starter motor, the system and the torque limiter
Incorrect valve sealing or valve adjustment - Engine flooded.	Inspect the head and/or restore the correct clearance Try starting-up with the throttle fully open. If the engine fails to start, remove the spark plug, dry it and before refitting, make the motor turn so as to expel the fuel excess taking care to connect the cap to the spark plug, and this in turn to the ground. If the fuel tank is empty, refuel and start up.
Automatic starter failure	Check: mechanical movement, electric connection and fuel supply, replace if required.
Air filter blocked or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Se-

Possible Cause	Operation
	lenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
The carburettor is dirty; fuel pump or vacuum valve damaged	Remove, wash with solvent and dry with compressed air or replace
Battery flat	Check the charge of the battery, if there are any sulphur marks, replace and use the new battery following the instructions shown in the chapter
Intake coupling cracked or clamps incorrectly tightened	Replace the intake coupling and check the clamps are tightened
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Carburettor nozzles clogged	Dismantle, wash with solvent and dry with compressed air

## Excessive oil consumption/Exhaust smoke

### EXCESSIVE CONSUMPTION

Possible Cause	Operation
Wrong valve adjustment	Adjust the valve clearance properly
Overheated valves	Remove the head and the valves, grind or replace the valves
Misshapen/worn valve seats	Replace the head assembly
Worn cylinder, Worn or broken piston rings	Replace the piston cylinder assembly or piston rings
Worn or broken piston rings or piston rings that have not been fitted properly	Replace the piston cylinder unit or just the piston rings
Oil leaks from the couplings or from the gaskets	Check and replace the gaskets or restore the coupling seal
Worn valve oil guard	Replace the valve oil guard
Worn valve guides	Check and replace the head unit if required

## Insufficient lubrication pressure

### POOR LUBRICATION PRESSURE

Possible Cause	Operation
By-Pass remains open	Check the By-Pass and replace if required. Carefully clean the By-Pass area.
Oil pump with excessive clearance	Perform the dimensional checks on the oil pump components
Oil filter too dirty	Replace the cartridge filter
Oil level too low	Restore the level using the recommended oil type (Selenia HI Scooter 4 Tech)

## Engine tends to cut-off at full throttle

### THE MOTOR TENDS TO STOP AT MAXIMUM THROTTLE

Possible Cause	Operation
Level in tank too low	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.
Tank breather hole obstructed	Restore the proper tank aeration
Fuel supply pipes choked or clogged	Restore the adequate fuel supply
Maximum nozzle dirty - lean mixture	Wash the nozzle with solvent and dry with compressed air
Water in the carburettor	Empty the tank through the appropriate bleed nipple.
Incorrect float level	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.
Faulty fuel supply	Check or replace the fuel pump, and check the vacuum intake and the pipe sealing

## Engine tends to cut-off at idle

### THE ENGINE TENDS TO STOP AT IDLE

Possible Cause	Operation
Air calibrated holes in carburettor blocked	Dismantle, wash with solvent and dry with compressed air
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Level in chamber too high	Restore the level of the float chamber bending on the float the thrusting reed of the petrol inlet pin so as to have the float parallel to the float chamber level, with the carburettor inverted.
The starter remains on	Check the electric connection, fuel supply and mechanical movement. Replace if required.
Air filter blocked or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Incorrect timing	Time the system and check the timing system components
Cut off device failure	Check that the following parts work properly: valve; diaphragm; spring; and that the air calibration elements are clean; check if the sponge filter is clean too
Incorrect idle adjustment	Adjust using the rpm indicator
Pressure too low at the end of compression	Check the thermal group seals and replace worn components
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
The starter remains on	Check: electric wiring, circuit not interrupted, mechanical movement and power supply; replace if necessary
Minimum nozzle dirty	Wash the nozzle with solvent and dry with compressed air

## High fuel consumption

### HIGH CONSUMPTION

Possible Cause	Operation
Loose nozzles	Check the maximum and minimum nozzles are adequately fixed in their fittings
Fuel pump failure	Check the low-pressure duct sealing
Starter inefficient	Check: electric wiring, circuit continuity, mechanical sliding and power supply
Air filter obstructed or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Incorrect float level	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.

## Transmission and brakes

## Clutch grabbing or performing inadequately

### IRREGULAR CLUTCH PERFORMANCE OR SLIPPAGE

Possible Cause	Operation
Faulty clutch	Check that there is no grease on the masses. Check that the clutch mass contact surface with the casing is mainly in the centre with equivalent characteristics on the three masses. Check that the clutch casing is not scored or worn in an anomalous way

## Insufficient braking

### INEFFICIENT BRAKING SYSTEM

Possible Cause	Operation
Inefficient braking system	Check the pad wear (1.5 min). Check that the brake discs are not worn, scored or warped. Check the correct level of fluid in the pumps and change brake fluid if necessary. Check there is no air in the circuits; if necessary, bleed the air. Check that the front brake calliper moves in axis with the disc.
Fluid leakage in hydraulic braking system	Failing elastic fittings, plunger or brake pump seals, replace
Brake disc slack or distorted	Check the brake disc screws are locked; measure the axial shift of the disc with a dial gauge and with wheel mounted on the scooter.

## Brakes overheating

### BRAKES OVERHEATING

Possible Cause	Operation
Defective sliding of pistons	Check calliper and replace any damaged part.
Brake disc slack or distorted	Check the brake disc screws are locked; use a dial gauge and a wheel mounted on the vehicle to measure the axial shift of the disc.
Clogged compensation holes on the pump	Clean carefully and blast with compressed air
Swollen or stuck rubber gaskets	Replace gaskets.

## Electrical system

### Battery

#### BATTERY

Possible Cause	Operation
Battery	This is the device in the system that requires the most frequent attention and the most thorough maintenance. If the vehicle is not used for some time (1 month or more) the battery needs to be recharged periodically. The battery runs down completely in the course of 3 months. If the battery is fitted on a motorcycle, be careful not to invert the connections, keeping in mind that the black ground wire is connected to the negative terminal while the red wire is connected to the terminal marked+.

## Turn signal lights malfunction

### TURN INDICATOR NOT WORKING

Possible Cause	Operation
Electronic ignition device failure	With the key switch set to "ON" jump the contacts 1 (Blue - Black) and 5 (Red/Blue) on the control unit connector. If by operating the turn indicator control the lights are not steadily on, replace the control unit; otherwise, check the cable harness and the switch.

## Steering and suspensions



## Heavy steering

### STEERING HARDENING

Possible Cause	Operation
Steering hardening	Check the tightening of the top and bottom ring nuts. If irregularities in turning the steering continue even after making the above adjustments, check the seats on which the ball bearings rotate: replace them if they are recessed or if the balls are flattened.

## Excessive steering play

### EXCESSIVE STEERING CLEARANCE

Possible Cause	Operation
Torque not conforming	Check the tightening of the top and bottom ring nuts. If irregularities in turning the steering continue even after making the above adjustments, check the seats on which the ball bearings rotate: replace them if they are recessed or if the balls are flattened.

## Noisy suspension

### NOISY SUSPENSION

Possible Cause	Operation
Malfunctions in the suspension system	If the front suspension is noisy, check: the efficiency of the front shock absorbers; the condition of the ball bearings and relevant lock-nuts, the limit switch rubber buffers and the movement bushings. In conclusion, check the tightening torque of the wheel hub, the brake calliper, the shock absorber disk in the attachment to the hub and the steering tube.

## Suspension oil leakage

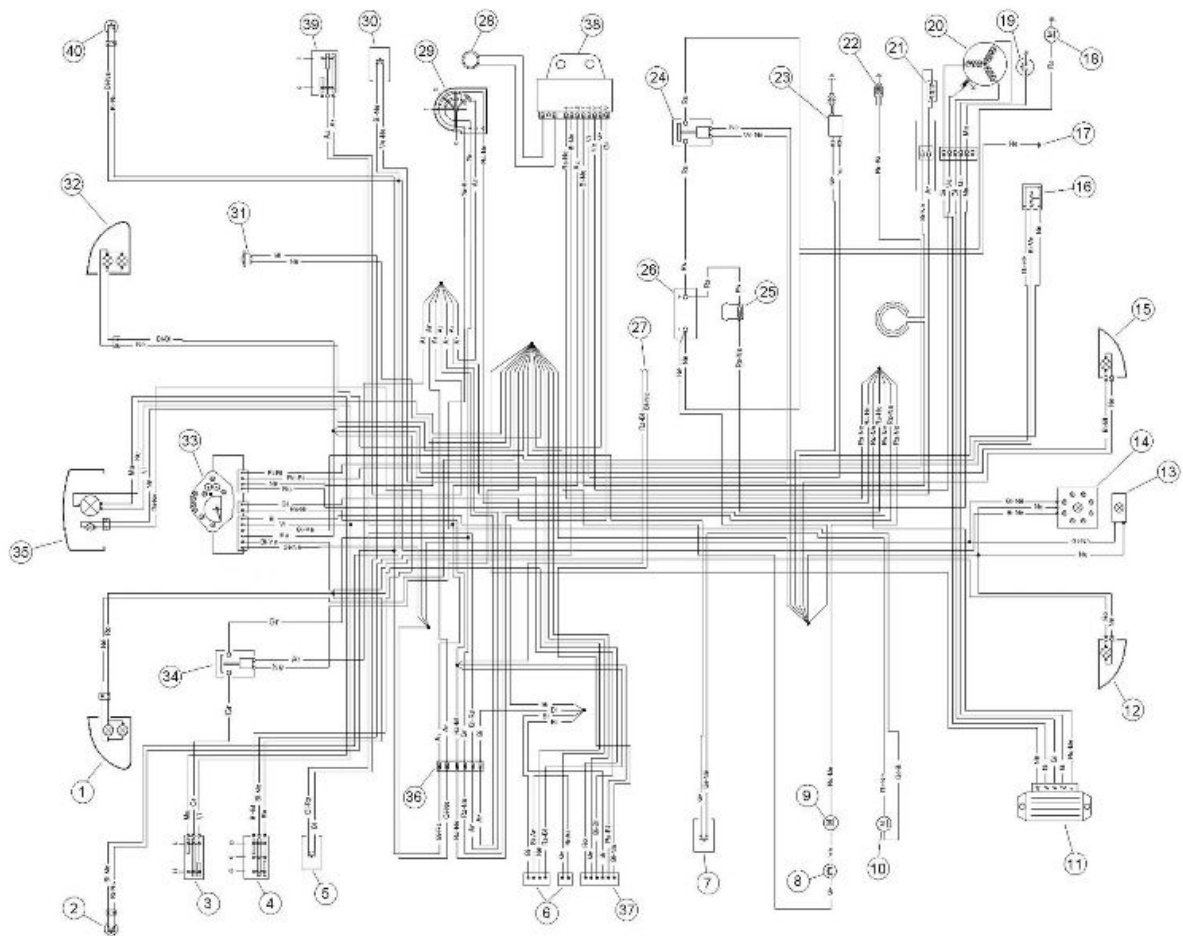
### OIL LEAKAGE FROM SUSPENSION

Possible Cause	Operation
Seal fault or breakage	Replace the shock absorber Check the condition of wear of the steering covers and the adjustments.

## INDEX OF TOPICS

ELECTRICAL SYSTEM

ELE SYS



**ELECTRICAL SYSTEM**

Specification	Desc./Quantity	
1	Front left-hand direction indicator with 2 bulbs	
2	Rear stop light switch	
3	Light switch	
4	Turn indicator switch	
5	Horn button	
6	Intercom fitting	
7	Saddle opening button	
8	Thermal switch	
9	Electric fan	
10	Saddle opening actuator	
11	Voltage regulator	
12	Rear left-hand direction indicator with bulb	
13	Number plate light with bulb	
14	Complete tail light with position light with 8 stop bulbs	
15	Rear right-hand direction indicator with bulb	
16	Fuel level sender	
17	Engine earth	
18	Starter motor	
19	Oil pressure sensor	
20	Flywheel magneto	
21	Automatic starter	
22	Thermistor	
23	HV coil	
24	Starter remote control	
25	Fuse holder with 2 fuses	
26	Battery	12V - 4Ah
27	Anti-theft alarm fitting	
28	Immobilizer aerial	

	Specification	Desc./Quantity
29	Key switch	
30	Starter button	
31	Horn	
32	Front right-hand direction indicator with 2 bulbs	
33	Instrument group with 9 bulbs, warning lights, fuel reserve warning light, oil pressure warning light, upper beam indicator, RH flashing light indicator, LH flashing light indicator, LED for immobilizer, 3 bulbs for instrument illumination	
34	Remote control switch	
35	Complete right or left-hand asymmetric headlight with bulb for headlight and 1 bulb for position	
36	Fuse holder box	
37	Anti-theft alarm fitting	
38	Electronic ignition device	
39	Engine stop switch	
40	Front brake stop button	

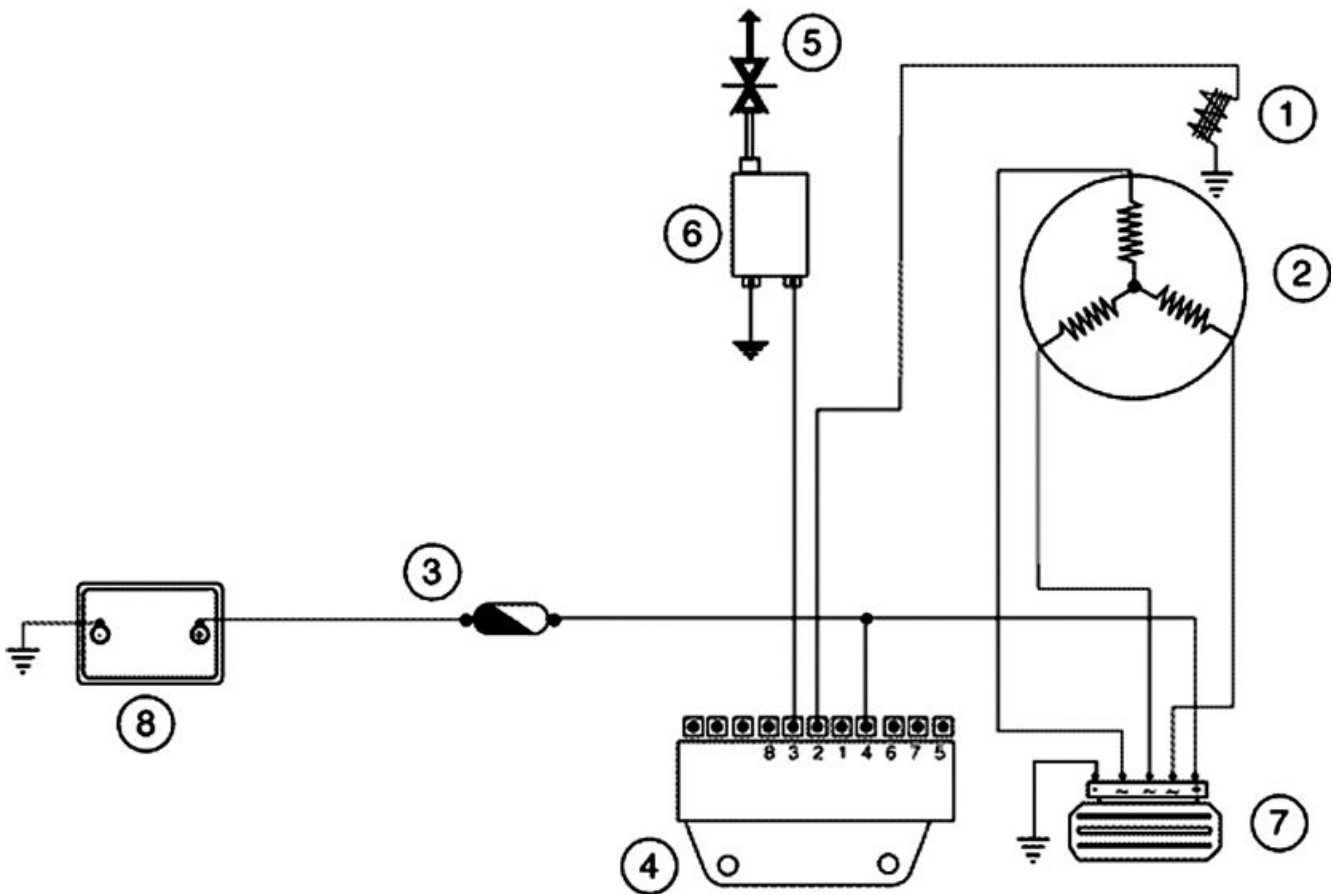
**Key**

**Ar:** Orange **Az:** Sky blue **Bi:** White **Bl:** Blue **Gi:** Yellow **Gr:** Grey

**Ma:** Brown **Ne:** Black **Ro:** Pink **Rs:** Red **Ve:** Green **Vi:** Purple

**Conceptual diagrams**

**Ignition**



**IGNITION**

	Specification	Desc./Quantity
1	Pick - up	
2	Magneto flywheel	
3	Fuse 15A (No. 7)	
4	Electronic ignition device	
5	Spark plug	
6	HV coil	
7	Voltage regulator	
8	Battery	12V-12Ah

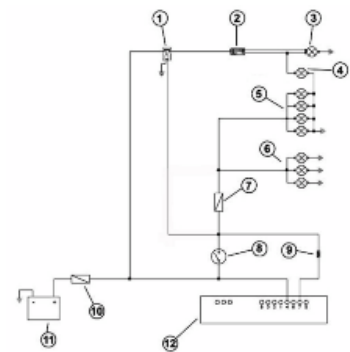
**H.T. coil**

This is to inform you that, starting from frame no. ZAPM3120000022142, a protective cap has been introduced for the H.T. coil cable; this is aimed at preventing the cable from rubbing against other components.

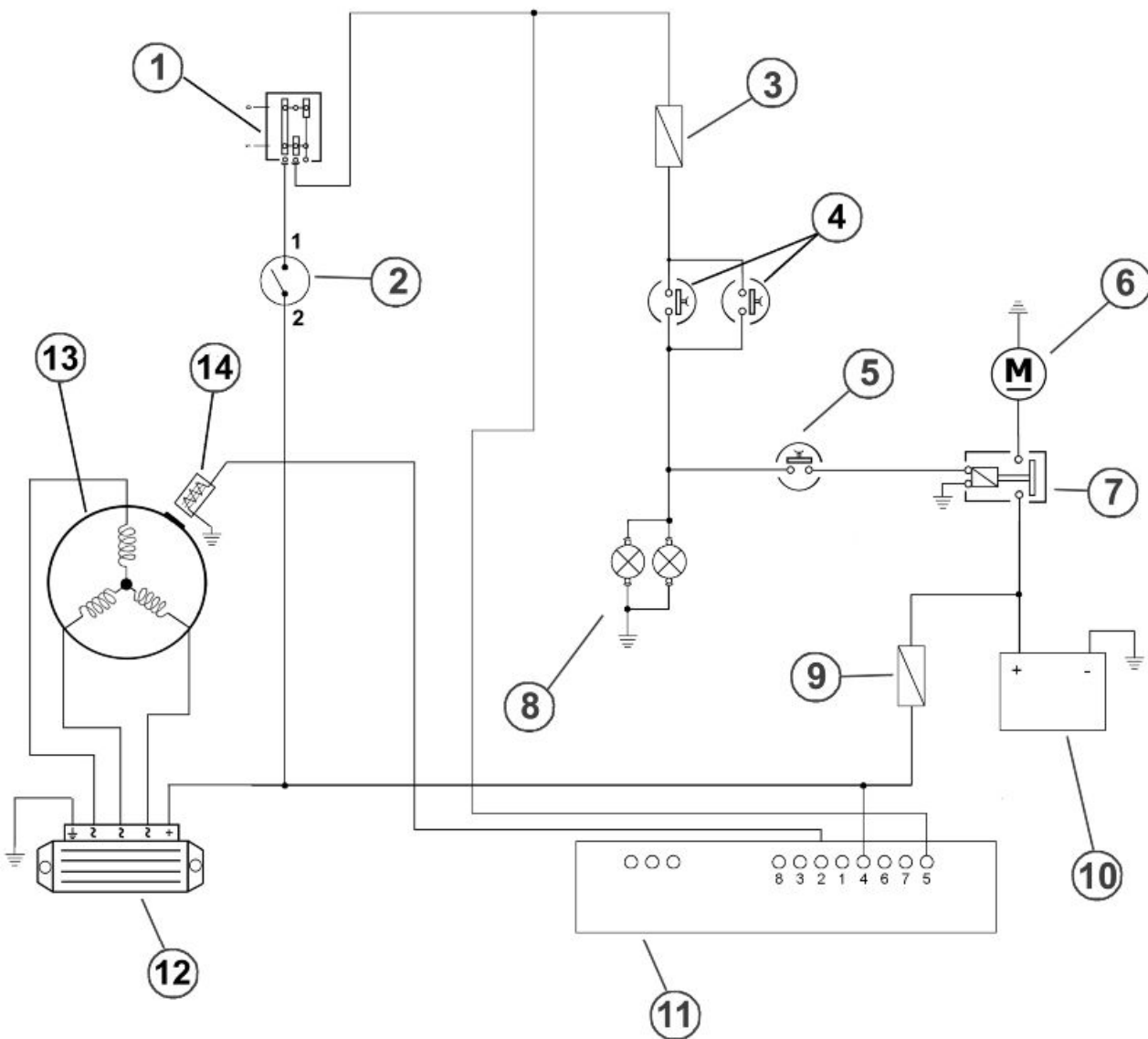
**Headlights and automatic starter section**

**HEADLIGHTS AND AUTOMATIC STARTER**

	Specification	Desc./Quantity
1	Remote control switch	
2	Light switch	
3	Dipped beam/upper bulb	12V-55/60W
4	Upper beam indicator	12V-1,2W
5	No. 3 bulbs for instrument lighting + side/taillights indicator	12V-2W
6	No. 3 number plate position bulbs	12V - 5W
7	Fuse	8A
8	Key switch contacts	
9	Automatic starter	
10	Fuse	15A
11	Battery	12V-12Ah
12	Electronic ignition device	



**Battery recharge and starting**



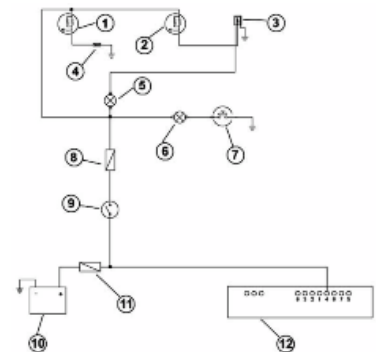
**BATTERY RECHARGE AND START-UP**

	Specification	Desc./Quantity
1	Engine stop switch	
2	Key switch contacts	
3	Fuse	5A
4	Stop button	
5	Start up button	
6	Starter motor	
7	Remote starter switch	
8	No. 8 bulbs for stop light	12V-2,3W
9	Fuse	15 A
10	Electronic ignition	
11	Battery	12V-12Ah
12	Electronic ignition device	
13	Voltage regulator	
14	Magneto flywheel	
15	Pick - up	

**Level indicators and enable signals section**

**LEVEL INDICATORS AND ENABLE SIGNALS**

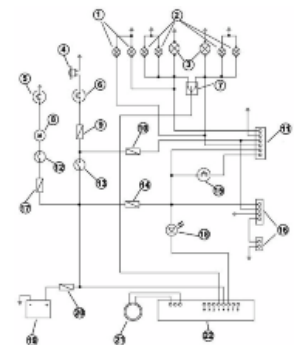
Specification	Desc./Quantity
1	Cooling fluid temperature indicator
2	Fuel gauge
3	Fuel level sender
4	Thermistor
5	Fuel indicator 12V - 1.2W
6	Low oil pressure warning light 12V - 2W
7	Oil pressure sensor
8	Fuse 7,5A
9	Key switch contacts
10	Battery 12V-12Ah
11	Fuse 15A
12	Electronic ignition device



**Turn signal lights**

**DIRECTION INDICATORS**

Specification	Desc./Quantity
1	Direction indicators 12V- 2W
2	4 Turn indicator bulbs 12V-10W
3	No. 2 rear flashing light bulbs 12V - 10W
4	Horn 12V
5	Saddle opening button
6	Horn button
7	Turn indicator switch
8	Saddle opening actuator
9	7.5A
10	Fuse 7,5A
11	Anti-theft alarm fitting
12	Key switch contacts
13	Key switch contacts
14	Fuse 7.5 A
15	Anti-theft alarm fitting
16	Intercom fitting
17	Fuse 10A
18	Immobilizer LED
19	Battery 12V-12Ah
20	Fuse 15A
21	Immobilizer aerial
22	Electronic ignition device



**Checks and inspections**

This section is devoted to the checks on the electrical system components.

## Immobiliser

The electronic ignition system is realised with direct current power supply and is equipped with immobilizer antitheft device built in the control unit.

The ignition system is made up of:

- control unit
- immobilizer antenna
- master and service key with built-in transponder
- H.V. coil
- diagnostic LED

The diagnostic LED also has the function of deterrent flashing. This function is obtained every time the key switch is set to «OFF» or if the emergency stop switch is set to «OFF» and it stays on for 48 hours to avoid discharging the battery.

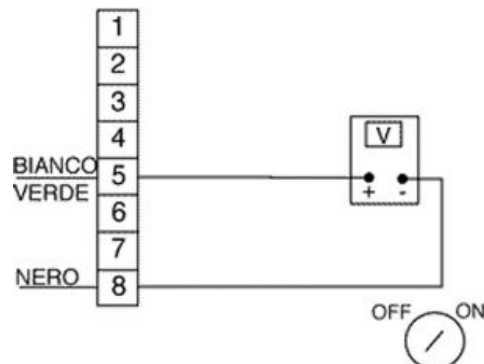
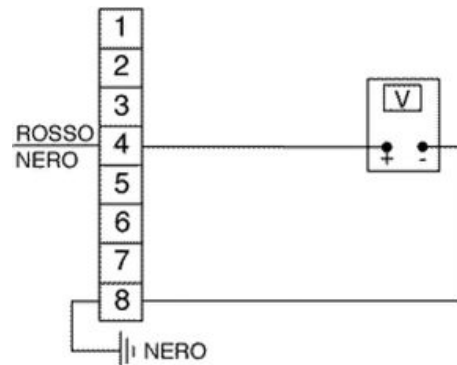
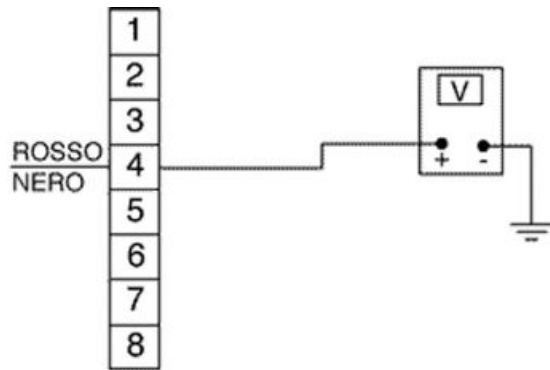
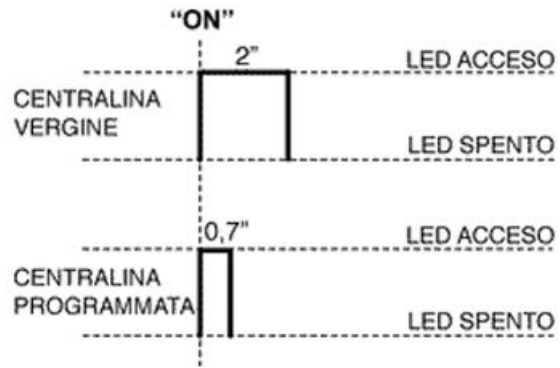
When the key switch is set to «ON» the deterrent flash stops and there is a confirmation flash of the switching to «ON».

This flash lasts according to the control unit programming (see figure). If the led stays off even when switching to «ON», proceed to the following checks:

- battery voltage presence
- main fuse 15A (No 7) efficiency

If the led remains off, check the control unit power supply as follows:

- Disconnect the control unit connector and check the following conditions:
- Presence of battery voltage between terminal no. 4 (Red/Black) and earth
- Presence of battery voltage between terminal no. 4 (Red/Black) and no. 8 (Negative) as shown in the figure.
- Presence of battery voltage between terminal no. 5 and no. 8 with the key switch set to «ON», the side stand raised and the emergency stop switch set to «RUN».





If no faults are found, replace the control unit; otherwise, check the wiring and the following components:

- Engine stop remote control switch;
- Emergency stop switch;
- Side stand switch;
- Key switch contacts.

## Virgin circuit

When the ignition system is not coded, it allows the engine operation but with a limit of 2,000 rpm; miss is evident when trying to accelerate

To code the system, besides having the side stand raised and the emergency stop switch set to «RUN» it is necessary to use the MASTER (brown) and SERVICE keys (black) as follows:

- Insert the MASTER key, set to «ON» and keep this position for 2 seconds (limit values: 1 - 3 seconds).
- Alternately introduce all black keys available switching each key to «ON» for 2 seconds.
- Insert the MASTER key again and set to «ON» for 2 seconds.

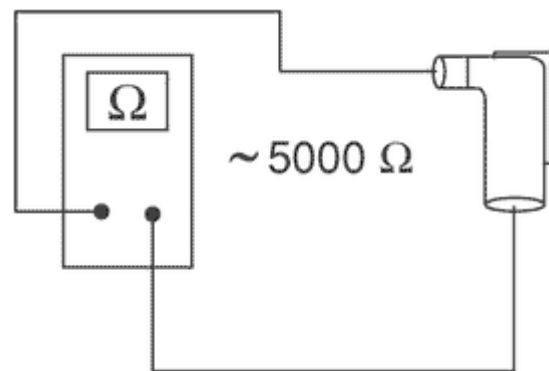
The maximum time to change keys is of 10 seconds.

Three service keys (Black coloured) can be programmed within the same storage operation.

Sequence and times must be respected; otherwise, repeat the procedures from the beginning.

Once the control unit has been coded, an inseparable matching between control unit and the transponder of the MASTER key is created. This matching allows performing further service key storage in case of loss, replacement, etc.

Each storage deletes the former one. In case of loss of the service key storage, carefully check the



high voltage system shielding: In any case it is advisable to use resistive spark plugs.

### Characteristic

#### Shielded cap resistance

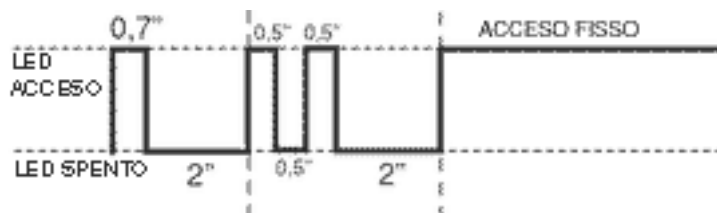
~ 5000  $\Omega$ .

## Diagnostic codes

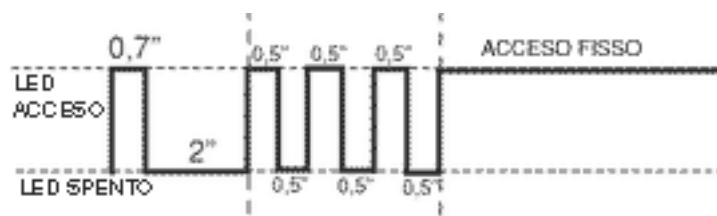
The flash indicating the switching to "ON" can be followed by a phase of programmed failure warnings. That is, the led is off for 2 seconds, and then diagnosis codes are transmitted with 0.5-second flashes. After the failure code indication, a steadily on LED signals that ignition is disabled; see the table:

**2-FLASH CODE** - Example with programmed control unit, no transponder and/or malfunctioning aerial.

#### Ignition disabled-Vehicle immobilised



**3-FLASH CODE** - Example with programmed control unit, aerial working properly and unknown transponder code. **Ignition disabled-Vehicle immobilised**



## Diagnostic code - 2 flashes

Diagnosis code: 2-flashes

When the 2-flash code is detected, carry out the following checks:

- Check if the failure continues after changing key (MASTER key included). If the failure persists with any key, disconnect the aerial connector from the control unit and check the aerial continuity with the 020331Y multimeter.

If non-conforming values are measured, replace the aerial.

If no failures are found in the aerial, replace the control unit.

#### CAUTION

**BEFORE PROGRAMMING THE NEW ELECTRONIC CONTROL UNIT CHECK THAT NO FAILURE CODE IS INDICATED. THIS IS NECESSARY TO AVOID SPOILING A NEW CONTROL UNIT**

### Electric characteristic

#### immobilizer aerial

~ 7 ÷ 9 Ohm

## Diagnostic code - 3 flashes

If the 3-flash code is detected, check if the failure occurs when the MASTER key is inserted into the key switch.

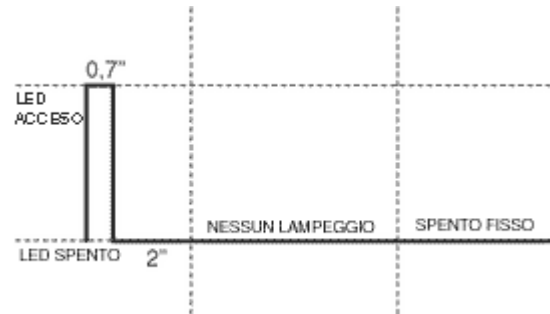
- If the failure disappears when the MASTER key is used, encode the service keys (Blue) again.
- If the failure persists, it means that the MASTER key and the control unit are not linked; in this case, replace the control unit and then encode the keys.

The immobilizer system is efficient when, after switching over to "ON", only a 0.7-second flash is detected (see diagram).

In this case, the engine can be started.

Example with programmed control unit, transponder, programmed key and aerial working properly.

**Ignition is enabled (regular conditions of use)**



## Ignition circuit

Once the immobilizer system is enabled, the HV coil and the signals from the Pick-Up will produce a spark in the spark plug.

The battery provides the basic power supply. The system is adjusted so that the start-up system immediately detects an eventual battery voltage drop, but this is practically irrelevant for the ignition system.

The Pick-Up is connected to the control unit by a single cable; then, for the ground circuit, the control unit is connected to the Pick-Up by the chassis and the engine ground lead.

To avoid disturbances in the ignition system during start-up, it is very important that the engine-chassis ground connection bonding is efficient.

## 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 control unit connector and check that the cable between terminal No. 2 (Green) and terminal No. 8 (Black) is not interrupted. Check the Pick-Up and its power line:

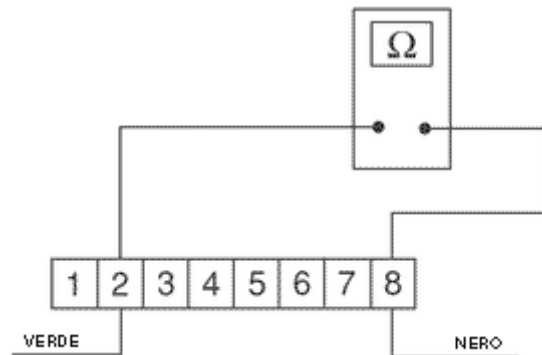
## Electric characteristic

### Pick-up resistance value

Pick-up resistance value:  $105 \div 124$  Ohm

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

In case conforming values are measured, try replacing the control unit (without programming) and make sure the failure has been solved by checking sparks are produced in the spark plug; only then program the control unit.

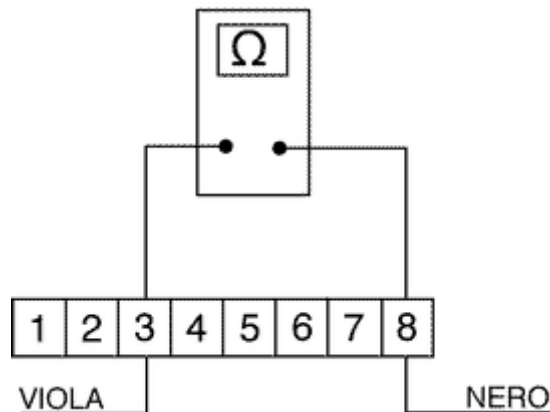


### - HV coil primary check

Disconnect the control unit connector and check that the cable between terminal No. 3 and terminal No. 8 is not interrupted (see figure).

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

If non-conforming values are measured, repair the cables or replace the HV coil.



### N.B.

THE MULTIMETER MUST BE SELECTED TO DETECT CONTINUOUS VOLTAGE.

## Electric characteristic

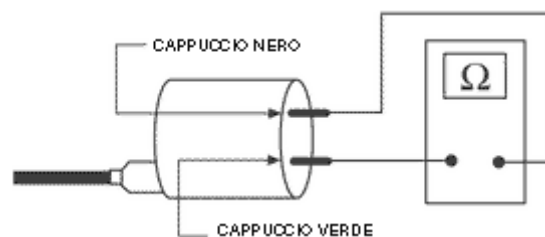
### Resistance value:

$0.4 \div 0.5$  Ohm

### - HV coil secondary 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****Resistance value:**

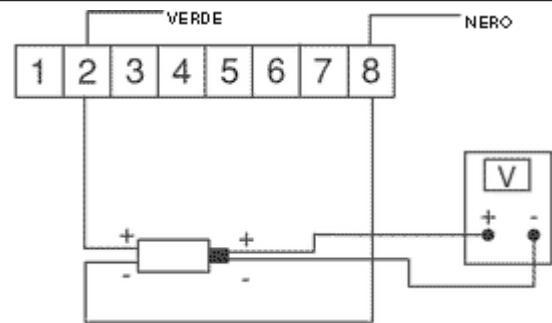
~ 3000 ± 300 Ohm

**- Pick-Up**

Disconnect the control unit connector and connect the positive wire to connector No. 2 and the negative wire to connector No. 8 (see figure).

Use the start-up system to run the engine and measure the voltage produced by the Pick-Up.

Replace Pick-Up if non-conforming values are measured.

**N.B.**

THE MULTIMETER MUST BE SELECTED TO DETECT CONTINUOUS VOLTAGE.

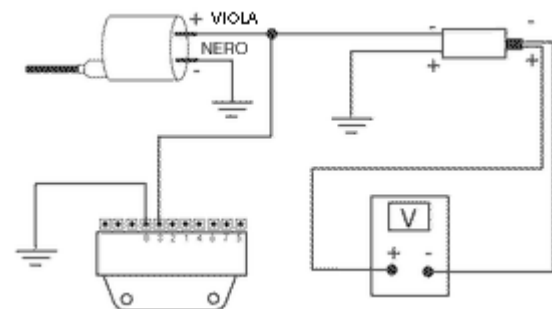
**Electric characteristic****Resistance value:**

&gt; 2 Volt

**- HV coil**

With the control unit and HV coil connected, measure the voltage of the coil primary during the start-up test with the voltage peak adaptor and connecting the positive terminal to the ground one and the negative to the coil positive connector.

If non-conforming values are measured, replace the control unit.

**N.B.**

THE PLASTIC CAP OF THE POSITIVE TERMINAL ON THE HV COIL PRIMARY IS BLACK AND THE NEGATIVE TERMINAL ONE IS GREEN.

**Electric characteristic****Resistance value:**

&gt; 100 Volt

**Battery recharge circuit**

The recharge system is provided with a three phase alternator with permanent flywheel.

The alternator is directly connected to the voltage regulator.

In turn, the latter is directly connected to earth and to the battery positive passing through the 15A safety fuse.

This system therefore requires no connection to the key switch.

The three- phase generator provides good recharge power and at low revs a good compromise is achieved between generated power and idle stability.

For this reason, it is very important that the idle speed is adjusted as prescribed.

### Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

## Stator check

Disconnect the connector from the voltage regulator and check there is continuity between any yellow cable and the other two cables.

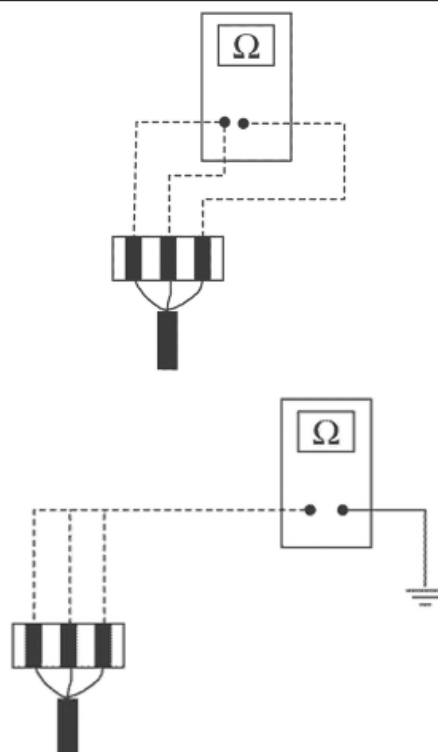
### Electric characteristic

Ohm value:

0.7 ÷ 0.9 Ohm

Also check that all yellow cables are insulated from the ground connection.

If non-conforming values are detected, repeat the checks directly to the stator. In case of further repetitions of incorrect values replace the stator or repair the wiring.



- With a tester, check the circuit between connections 5-3 and 5-1 is not interrupted.

- Check the earth isolation on the three phases of stators 5-earth, 3-earth, 1-earth.

Stage indicative resistance: 0.7 - 0.9  $\Omega$

Minimum oil pressure switch check

- With a tester, check the circuit between connections 4 and ground (with engine off) is not interrupted.

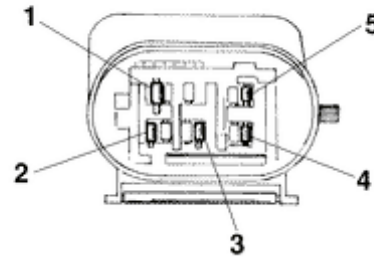
Pick-Up check

- Check that there is a resistance of about 105  $\div$  124  $\Omega$  at 20° C between connection 2 and ground.

- In case of values different from the ones stated, replace the defective parts.

**N.B.**

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



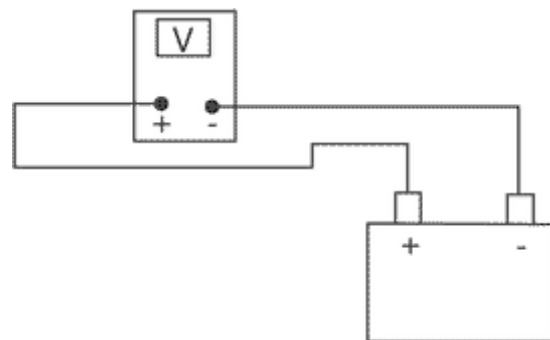
## Voltage regulator check

With a perfectly charged battery and lights off, measure voltage at the battery poles with a high running engine.

The voltage should not exceed 15.2 Volt.

In case higher voltages are detected, replace the regulator.

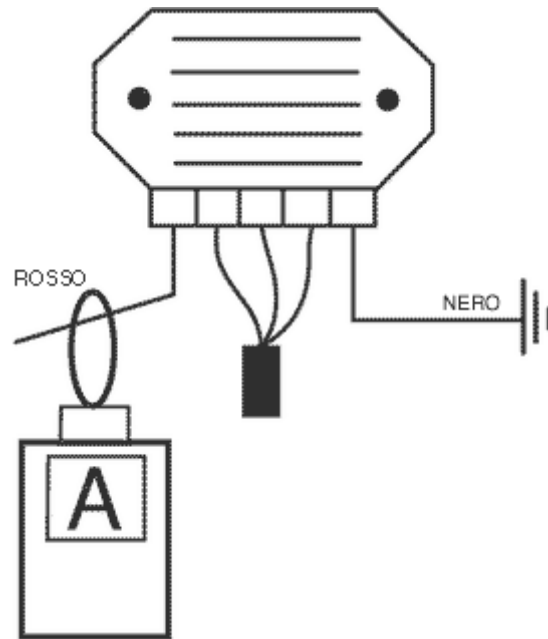
In case of voltage values lower than 14 Volt, check the stator and the corresponding cable harness.



## Recharge system voltage check

Connect an ammeter induction clamp to the voltage regulator positive terminal, measure the battery voltage and turning on the vehicles lights with engine off, wait for the voltage to set at about 12 V. Start the engine and measure the current generated by the system with lights on and a high running engine.

In case the generated current value is lower than 10A, repeat the test using a new regulator and/ stator alternatively.



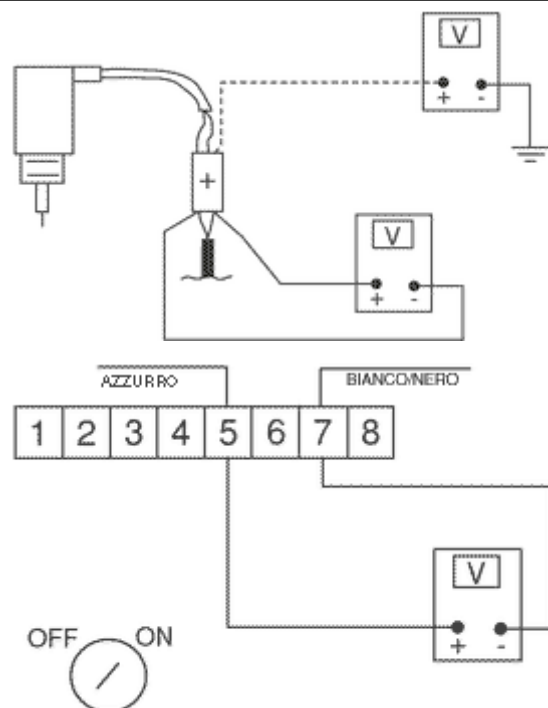
## Choke Inspection

For the component resistive and functional check, see the engine section. As regards its power supply, keep the system connector connected and check the presence of battery voltage at the two terminals with engine running (see figure).

If there is no voltage, connect the multimeter negative terminal to earth and the positive terminal to the orange wire of the automatic starter device; with key switch set to «ON» check the presence of battery voltage; in case of negative result, check the wiring to the key switch and the functionality of the 15° fuse (N° 8). If voltage is present, repeat the check from the ignition control unit connector.

After disconnecting the starter, start the engine and keep it idle then check the presence of voltage connecting the multimeter with positive terminal to the terminal no. 5 (light blue) and negative to terminal no. 7 (white-black) (see figure).

If there is no voltage, replace the control unit after checking the integrity of the fuses; otherwise,

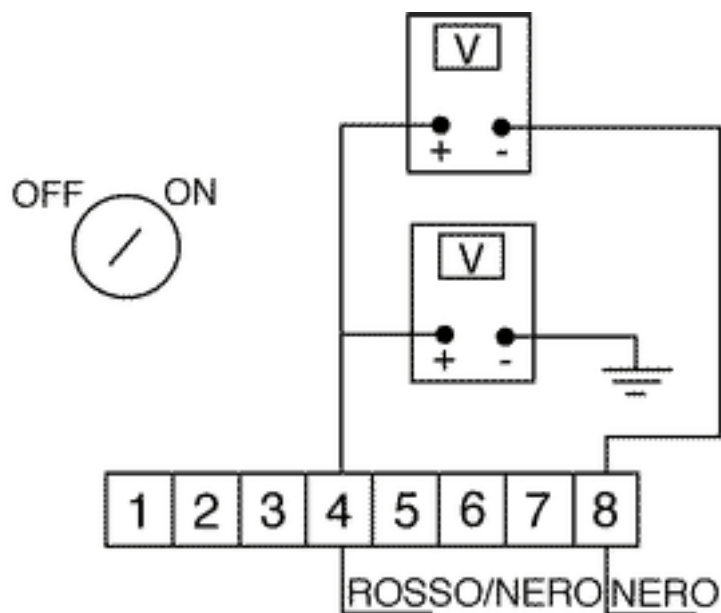




check the wiring between starter and control unit,  
or finally, as last option replace the starter.

## Turn signals system check

- If the turn indicators do not work, proceed as follows:
- Disconnect the control unit connector and check that there is battery voltage between terminal No.4 (Red/Black) and the ground lead.
- Check that the same happens between terminal No. 4 and terminal No. 8 (Black).
- Repeat the check between terminal No. 5 (Sky blue) and terminal No. 8 (Black) with the key switch set to "ON", with the emergency switch set to "RUN".



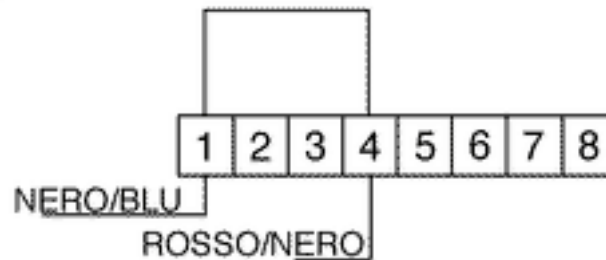
If no voltage is detected, check the cable harness, the connections and make sure the 15A main fuse is in good conditions; otherwise, proceed as follows:

- Jump terminals No.1 (Black/Blue) and No. 4 (Red/Black) (see figure), and set the turn indicator switch alternately to the left and to the right and check that the lights turn on.

If they do, replace the control unit because it is faulty.

If they do not turn on, check the control unit-turn indicator switch connection cable harness; then, repeat the test.

If the cable harness is in good conditions and the turn indicators still do not turn on, replace the turn indicator switch because it is faulty.



## Fuses

The electrical system is equipped with:

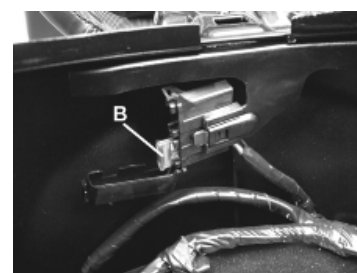
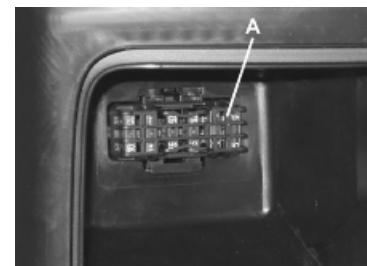
1. six protection fuses «**A**» located in the glove compartment to the left
2. one 15A fuse «**B**» located under the helmet compartment under the saddle hinge latch.

The chart shows the position and characteristics of the fuses in the vehicle.

### CAUTION



**BEFORE REPLACING THE BLOWN FUSE, SEARCH AND SOLVE THE PROBLEM THAT CAUSED IT TO BLOW. NEVER TRY TO REPLACE A BLOWN FUSE WITH A FUSE OF A DIFFERENT RATING THAN THAT SPECIFIED OR USING OTHER MATERIAL (FOR EXAMPLE, A PIECE OF ELECTRICAL WIRE).**



### FUSES

	Specification	Desc./Quantity
1	Rear side/taillight, number plate holder, instrument lighting and instrument light indicator.	<b>Order on terminal holder: 1</b> <b>Fuse: 5A</b> <b>Protected circuits:</b> Rear side/taillight, number plate holder, instrument lighting and instrument light indicator.
2	Stop light bulb, remote control start switch enable signal	<b>Order on terminal holder: 2</b> <b>Fuse: 5A</b> <b>Protected circuits:</b> Stop light bulb, remote control start switch enable signal
3	Intercom fitting, antitheft fitting, water temperature indicator, fuel reserve indicator, oil pressure indicator and fuel reserve light	<b>Order on terminal holder: 3</b> <b>Fuse: 7,5A</b> <b>Protected circuits:</b> Intercom fitting, antitheft fitting,

Specification	Desc./Quantity
	water temperature indicator, fuel reserve indicator, oil pressure indicator and fuel reserve light
4      Horn	<b>Order on terminal holder: 4</b> <b>Fuse: 7,5A</b> <b>Protected circuits: Horn</b>
5      Intercom fitting, antitheft fitting, immobilizer led	<b>Order on terminal holder: 5</b> <b>Fuse: 7,5A</b> <b>Protected circuits: Intercom fitting, antitheft fitting, immobilizer led</b>
6      Electric saddle opener, dipped/full headlights, full headlight indication light	<b>Order on terminal holder: 6</b> <b>Fuse: 10A</b> <b>Protected circuits: Electric saddle opener, dipped/full headlights, full headlight indication light</b>
7      General	<b>Order on terminal holder: 7</b> <b>Fuse: 15A</b> <b>Protected circuits: General</b>

**Dashboard**

- A = Digital clock with calendar
- B = Cooling liquid temperature gauge
- C = Right turn indicator warning light
- D = Fuel gauge
- E = Headlight warning light
- F = High-beam warning light
- G = Low oil pressure warning light
- H = Low fuel warning light
- I = Speedometer
- L = Odometer
- M = Left turn indicator warning light
- N = Antitheft device LED (immobilizer)



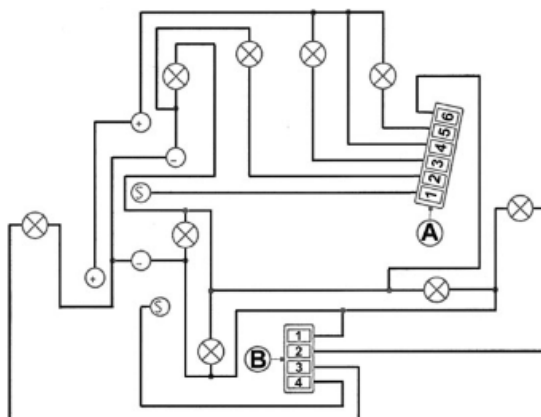
**A**

Specification	Desc./Quantity
1	Fuel gauge signal
2	High-beam warning light
3	Oil warning light
4	Fuel supply (+)
5	Low fuel warning light
6	Lighting

**B**

Specification	Desc./Quantity
1	Ground lead
2	Left turn indicator

	Specification	Desc./Quantity
3	Right turn indicator	
4	Temperature signal	



## Dry-charge battery

### Battery recharge

Normal bench charging must be carried out using the special (single or multiple) battery charger, setting the battery charge selector to the type of battery that needs recharging (i.e., 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 -).

#### WARNING

**BEFORE RECHARGING THE BATTERY, REMOVE THE CAPS OF EACH CELL.  
KEEP THE BATTERY AWAY FROM NAKED FLAMES OR SPARKS WHILE IT IS CHARGED.  
FIRST DETACH THE NEGATIVE LEAD BEFORE REMOVING THE BATTERY FROM THE VEHICLE.**

### Specific tooling

**020333Y Single battery charger**

**020334Y Multiple battery charger**

### Charging status check

After topping-up the electrolyte level, check the density using special densimeter

When the battery is charged, you should detect a density of 30 to 32 Bé corresponding to a specific weight of 1.26 to 1.28 at a temperature of no lower than 15° C.

A density reading of less than 20° Bé indicates that the battery is completely flat and it must therefore be recharged.

If the scooter is not used for a given time (1 month or more) it will be necessary to periodically recharge the battery.

The battery runs down completely in the course of three months. If it is necessary to refit the battery in the vehicle, be careful not to reverse the connections, remembering that the ground wire (**black**) marked (-) must be connected to the **-negative** clamp while the other two red wires marked (+) must be connected to the clamp marked with the **+positive** sign.

---

### Battery cleaning

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

#### CAUTION

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

#### CAUTION

**DRINKING WATER CONTAINS MINERALS THAT CAN BE EXTREMELY HARMFUL TO THE BATTERY: USE DISTILLED WATER ONLY.**

#### CAUTION

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

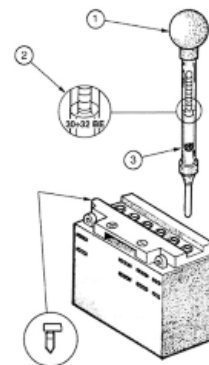
---

### Checking the electrolyte level

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's electrical system: the battery works overcharged and is subject to quick wear.

---

- 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.
- Allow to stand for at least 2 hours, then top up the level with sulphuric acid.
- Within the following 24 hours, recharge with the specific (single) or (multiple) battery charger at an intensity approx. to 1/10 of the battery rated capacity and until the acid density is approximately 1.27, corresponding to 31° Bé, and these values are stabilised.
- After charging, level the acid (**adding distilled water**). Close and clean carefully.
- Once the above operations have been performed, install the battery in the vehicle ensuring that it is wired up properly.



### Specific tooling

**020333Y Single battery charger**

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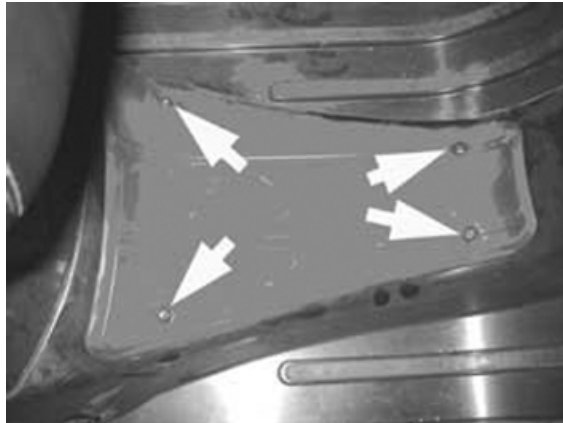
**020334Y Multiple battery charger**

- 1 Hold the vertical tube
- 2 Look at the level
- 3 The float must be freed

---

**Battery installation**

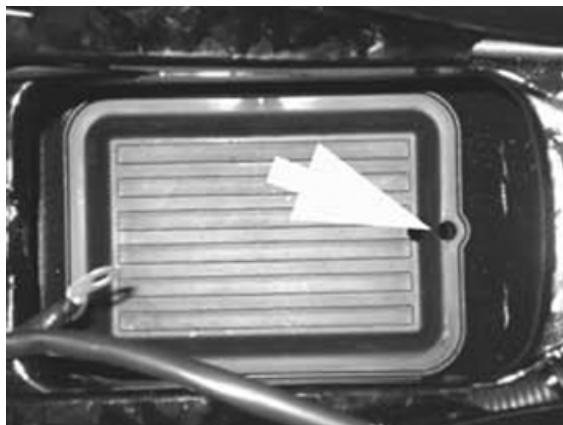
- Remove the battery cover after undoing the 4 screws shown in the photograph.



- Remove the strap fastening the battery



- Insert the battery breather pipe through the hole shown in the photograph.



- Fit the battery as shown in the photograph.

**N.B.**

**IN ORDER TO FIT THE CABLES ON THE BATTERY TERMINALS CORRECTLY, REST THE LOWER END OF THE TERMINAL SIDE OF THE BATTERY ON THE EDGE OF THE BATTERY WELL.**



- Using the screwdriver, tighten up the battery terminal cables as far as they will go, placing the special Grover washer between the screw head and the cable terminal.

**N.B.**

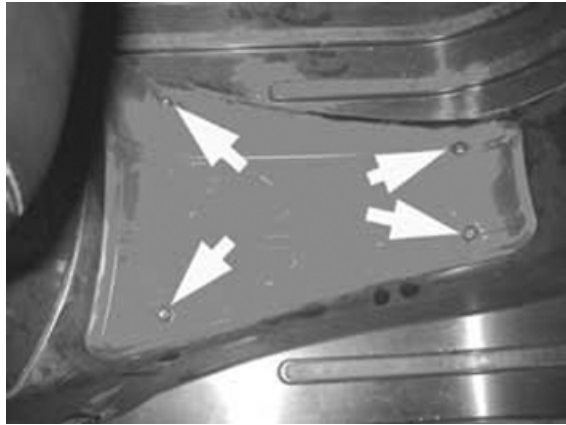
**DO NOT USE WRENCHES TO TIGHTEN UP THE SCREWS FOR FIXING THE TERMINALS TO THE BATTERY TERMINALS**



- Mount permanently the battery in the battery chamber
- Refit the strap fastening the battery



- Refit the battery cover





## INDEX OF TOPICS

ENGINE FROM VEHICLE

ENG VE

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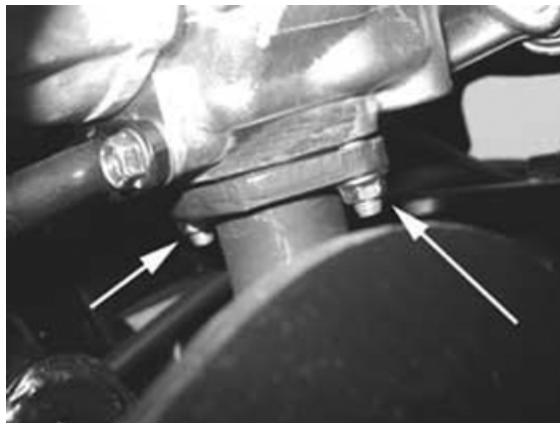
This section describes the operations to be carried out when removing the engine from the vehicle.

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## Exhaust assy. Removal

---

- Undo the two exhaust manifold fixings on the head.



- Undo the three screws that fix the muffler to the support arm.
- Remove the full muffler unit.



---

## Removal of the engine from the vehicle

-Carry out the removal operations but in reverse order and respect the locking torques indicated in the Characteristics Chapter.

Check that there is a small clearance when the valve is in abutment against the set screw.

-Check the engine oil level and if necessary top it up with the recommended type.

- Top-up the cooling circuit.

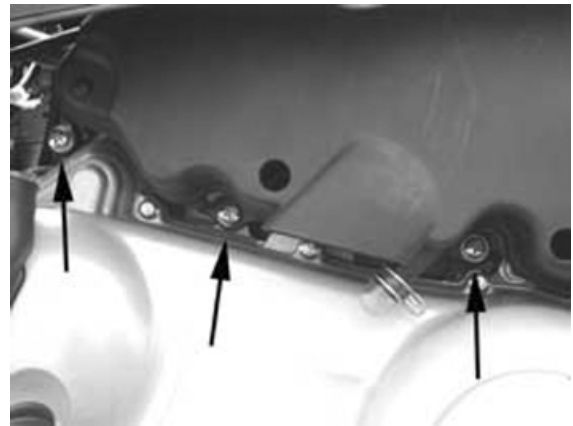
- Check the functioning of the accelerator and the electrical devices.

### CAUTION

**PAY PARTICULAR ATTENTION TO POSITIONING THE THROTTLE CONTROL TRANSMISSION PROPERLY.**

---

- Disconnect the battery
  - Remove the helmet compartment
  - Remove the side fairings
- Remove the full muffler assembly.
- Remove the air cleaner housing acting on the 3 screws indicated in the picture, by removing the clamp from the blow-by pipe and disconnecting the bellow connection to the carburettor acting on the clamp as indicated in the photograph



**CAUTION**



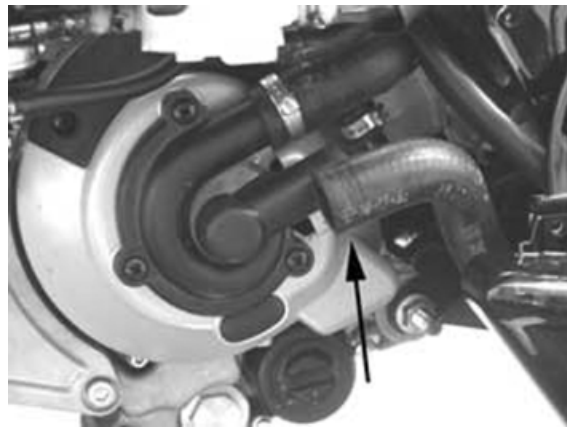
**THIS OPERATION MUST BE CARRIED OUT WHEN THE ENGINE IS COLD.**



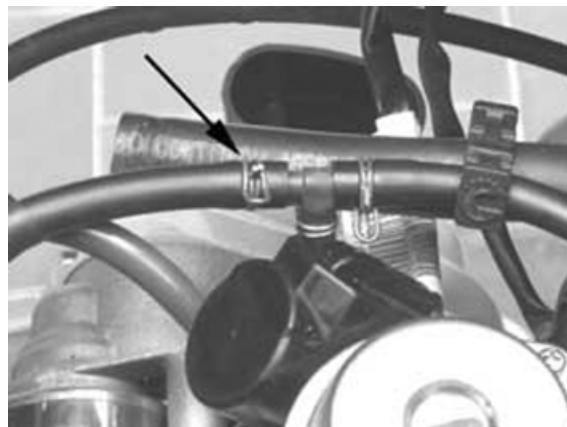
- Remove the air intake manifold on the transmission housing acting on the two screws indicated in the photograph and remove the plastic clip



- Remove the coolant inlet pipe to the pump as indicated in the photograph.



- Remove the fuel valve vacuum intake pipe from "T" joint indicated in the photograph

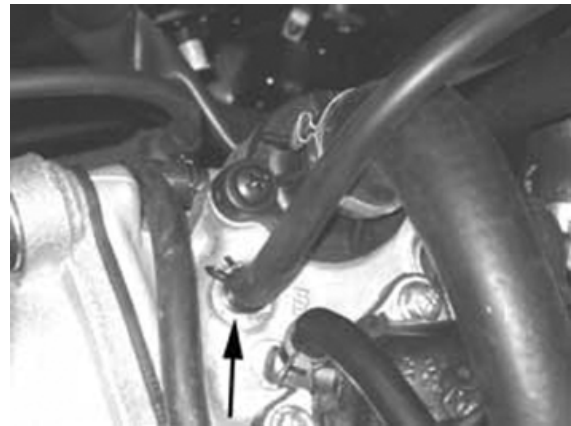


- Remove the fuel supply pipe from the carburettor

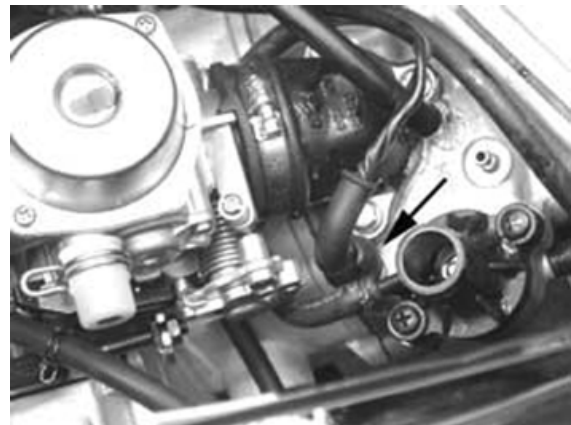


- Remove the coolant outlet pipe from the engine and the bleed pipe indicated in the photograph

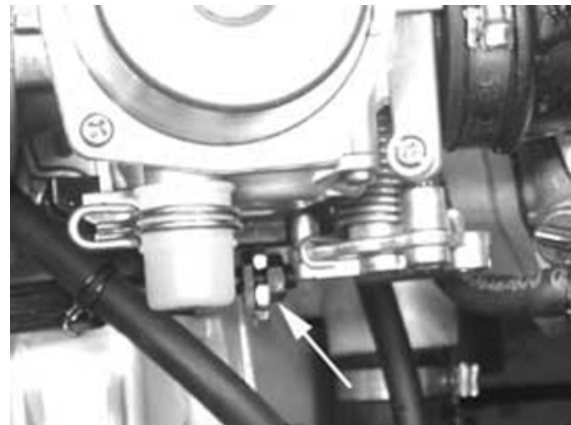




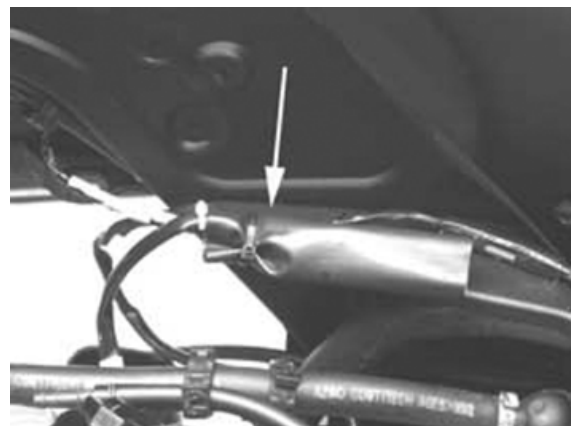
- Remove the spark plug cap
- Remove the coolant temperature sensor connector indicated in the photo



- Remove the throttle control cable from the carburettor acting on the nut shown in the photo

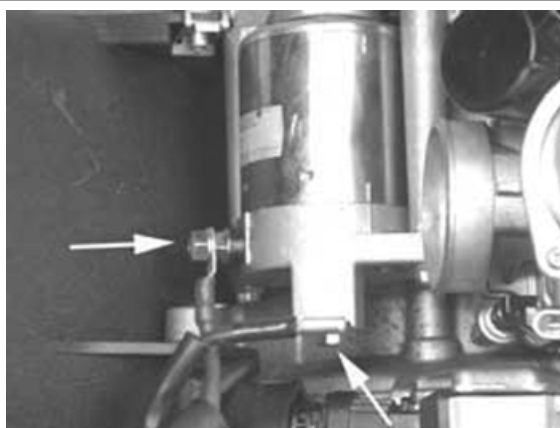


- Remove the automatic starter connector from the system located inside the protection sheath shown in the photo

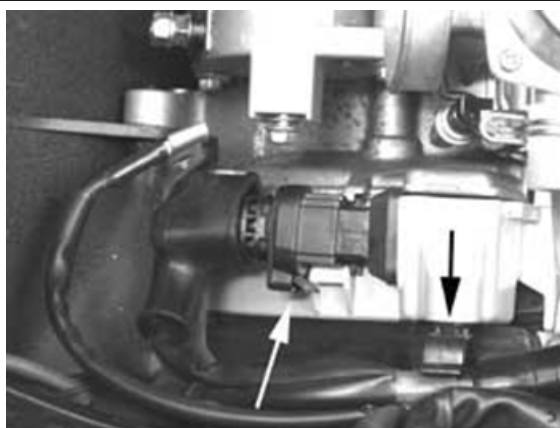




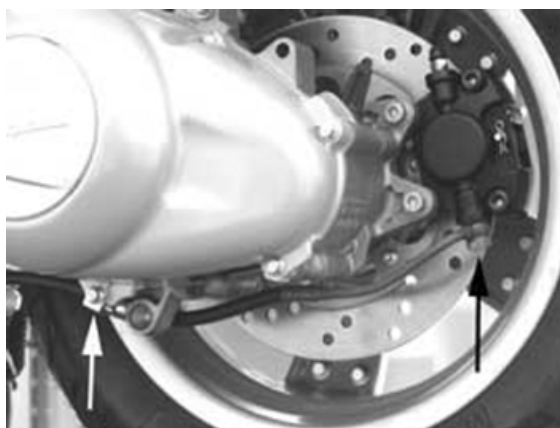
- Remove the positive and negative wires from the starter motor as shown in the photograph



- Remove the connector from the flywheel wiring shown in the photograph.
- Remove the cable from the retainer clamp on the flywheel cover



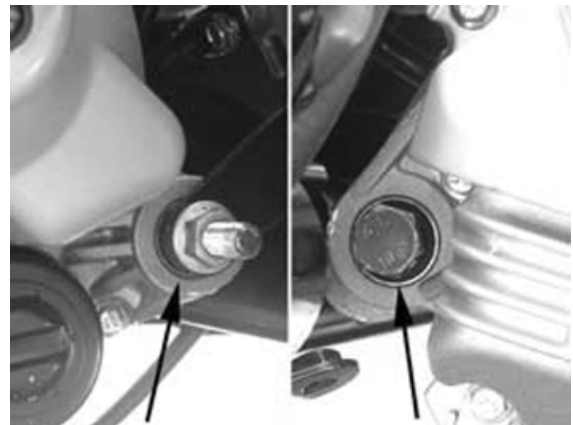
- Remove the rear shock absorbers.
- Remove the hydraulic piping from the rear caliper by undoing the screw indicated in the photograph. Then remove the retainers fixing the piping to the engine crankcase, indicated in the photograph.





- Use a jack to support the vehicle properly. Remove the engine-swinging arm fixing pin by acting on the nut and the head of the pin indicated in the photograph

- The engine is now free.



# INDEX OF TOPICS

ENGINE

ENG



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

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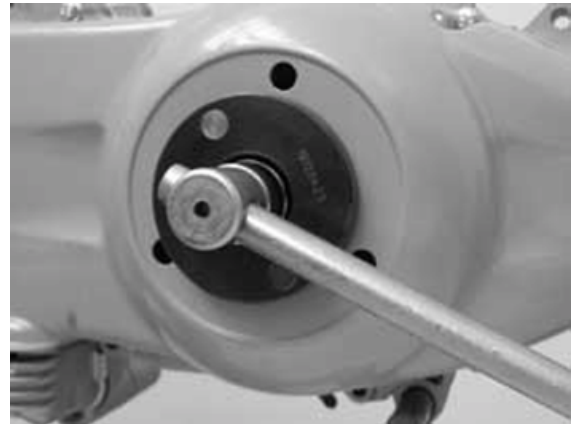
## **Automatic transmission**

---

### **Transmission cover**

---

- To remove the transmission cover it is necessary to remove the plastic cover first, by inserting a screwdriver in the slotted holes. Using the clutch bell lock wrench shown in the figure, remove the driven pulley shaft locking nut and washer.



#### **Specific tooling**

**020423Y driven pulley lock wrench**

- Remove the cap/dipstick from the engine oil filling hole.

- Remove the ten screws.

- Remove the transmission cover.

If this operation is carried out directly on the vehicle, remove the cooling air supply coupling of the transmission housing.



---

### **Air duct**

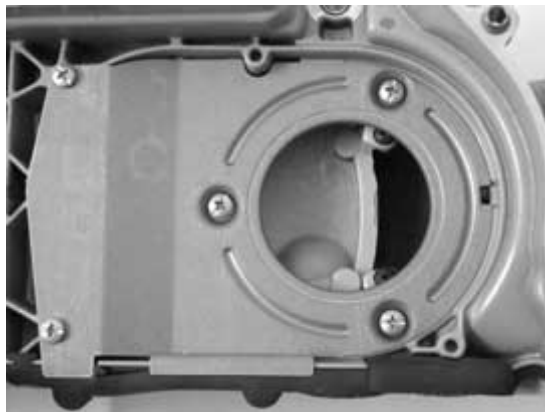
---

Version 125

- Remove the 4 screws and the housing.



- 
- Remove the five screws on two different levels as well as the small casing.



- 
- To remove the intake throat on the transmission cover, just remove the 2 fixing screws indicated in the figure.



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## Removing the driven pulley shaft bearing

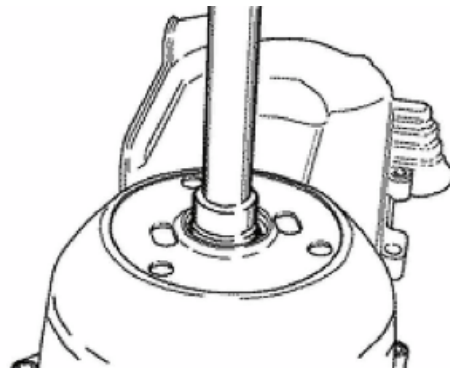
- 
- Remove the clip from the inside of the cover.
  - Remove the bearing from the crankcase by means of:

### Specific tooling

**020376Y Adaptor handle**

**020375Y Adaptor 28 x 30 mm**

**020412Y 15 mm guide**



## Refitting the driven pulley shaft bearing

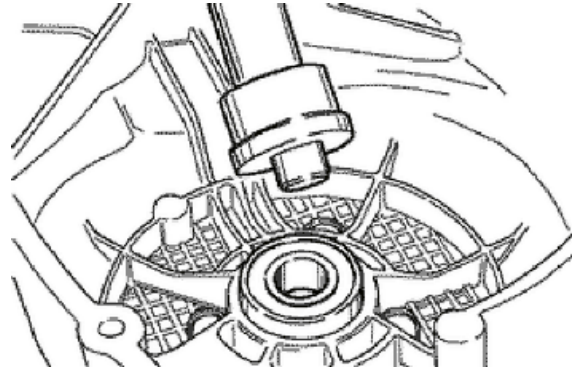
- Slightly heat the crankcase from the inside so as not to damage the painted surface.
- Insert the bearing in its seat.
- Refit the seeger ring.

### CAUTION

USE AN APPROPRIATE REST SURFACE TO AVOID DAMAGING THE COVER PAINT.

### N.B.

ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REFITTING.



### Specific tooling

020376Y Adaptor handle

020357Y 32 x 35 mm adaptor

020412Y 15 mm guide

## Baffle roller

## Metallic roller

## Removal

### Belt support roller (200 cm<sup>3</sup> models only)

- Check that the roller does not show signs of wear and that it turns freely.
- Remove the special fixing screw and the roller together with the bearing.



## Refitting

- Heat the roller and insert the bearing using the specific punch:

### Specific tools:

### Specific tooling

020455Y 10-mm guide



- Refit the roller with the special screw.
- Tighten to the specified torque.
- Refit the intake throat with the O-ring, the sump sealing gasket and the fan housing.

### Locking torques (N\*m)

**Anti-flapping roller 12 - 16**

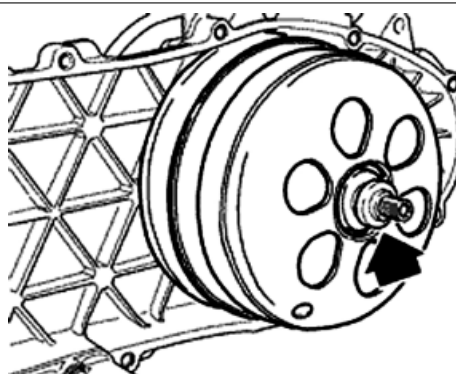


## Removing the driven pulley

- Remove the spacer, the clutch bell and the whole driven pulley unit.

### N.B.

THE UNIT CAN ALSO BE REMOVED WITH THE DRIVING PULLEY MOUNTED.



## Inspecting the clutch drum

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

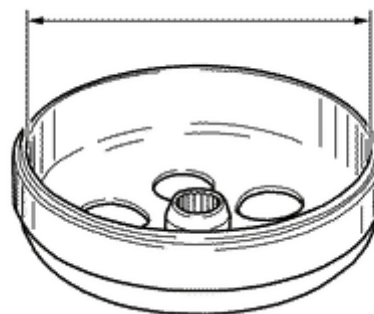
### Characteristic

#### Max. value clutch bell

Max. value:  $\varnothing$  134.5 mm

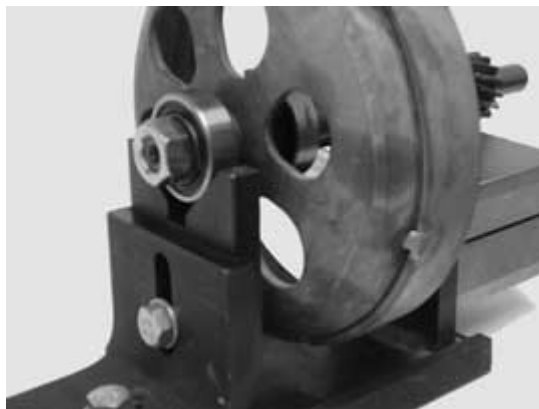
#### Clutch bell standard value

Standard value:  $\varnothing$  134 - 134.2 mm



### Checking the bell working surface eccentricity

- Install the bell on a driven pulley shaft using 2 bearings (inner diameter 15 and 17 mm).
- Lock with the original spacer and nut.
- Place the bell/shaft assembly on the support to check the crankshaft alignment.



- Using a feeler pin gauge and the magnetic base, measure the bell eccentricity.
- Repeat the measurement in 3 positions (Central, internal, external).
- If faults are found, replace the bell.

### Specific tooling

**020074Y Support base for checking crankshaft alignment**

**020335Y Magnetic support for dial gauge**

### Characteristic

**clutch bell inspection: Limit eccentricity.**

Admissible limit eccentricity: 0.15 mm



## Removing the clutch

### Clutch removal (125 cm<sup>3</sup> H2O)

Fit the driven pulley spring compressor specific tool with medium length pins screwed in position **F** from the tool internal side.

- Insert the adapter ring 8 in the pins.
- Assemble the driven pulley unit on the tool introducing the rivets heads in the adapter ring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to loosen/tighten the clutch nut.
- Use the special 46x55 wrench component n°9 to remove the nut fixing the clutch in place.
- Separate the driven pulley components (Clutch, fan and spring with plastic fitting).

### CAUTION

**THE TOOL MUST BE FIRMLY FIXED IN THE CLAMP AND THE CENTRAL SCREW MUST BE BROUGHT INTO CONTACT WITH THE TOOL. EXCESSIVE TORQUE CAN CAUSE THE SPECIFIC TOOL TO BUCKLE.**

### Specific tooling

**020444Y009 46x55 Wrench**

**020444Y010 adapter ring**



- Fit the special driven pulley spring compressor tool with the medium-length pins in position "C" screwed up from the inner side of the tool.
- Introduce the adapter ring 11 with the chamfering facing the inside of the tool.
- Fit the driven pulley unit on the tool with the insertion of the 3 pins in the ventilation holes in the mass holder support.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to loosen/tighten the clutch nut.
- Use the special 46x55 wrench component 9 to remove the nut fixing the clutch in place.
- Separate the driven pulley into its components (Clutch and spring with its plastic holder)

**CAUTION**

THE TOOL MUST BE FIRMLY FIXED IN THE CLAMP AND THE CENTRAL SCREW MUST BE BROUGHT INTO CONTACT WITH THE TOOL. EXCESSIVE TORQUE CAN CAUSE THE SPECIFIC TOOL TO BUCKLE.

**Specific tooling**

**020444Y009 46x55 Wrench**

**020444Y011 adapter ring**

**Inspecting the clutch**

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

**N.B.**

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

**CAUTION**

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

**Characteristic****Check minimum thickness**

1 mm

## Pin retaining collar

- Simultaneously turn and pull the collar manually to remove it.

**N.B.**

**USE TWO SCREWDRIVERS IF YOU HAVE DIFFICULTY.**

**N.B.**

**BE CAREFUL NOT TO PUSH THE SCREW DRIVERS IN TOO FAR TO AVOID DAMAGE THAT COULD ENDANGER THE O-RING SEAL.**



- Remove the four torque server pins and pull the pulley halves apart.



## Removing the driven half-pulley bearing

- Check there are no signs of wear and/or noisiness; - Replace with a new one if there are.
- Remove the retaining ring using two flat blade screwdrivers.
- Support the pulley bushing adequately from the threaded side using a wooden surface.
- Using a hammer and pin, knock the ball bearing out as shown in the figure.



- Support the pulley properly using the bell as shown in the figure.

### Specific tooling

**001467Y035 Belle for OD 47-mm bearings**

- Remove the roller bearing using the modular punch.

### Specific tooling

**020376Y Adaptor handle**

**020456Y Ø 24 mm adaptor**

**020363Y 20 mm guide**



## Inspecting the driven fixed half-pulley

Version 125

- Measure the outer diameter of the pulley bushing.
- Check the contact surface with the belt to make sure there are no flaws.

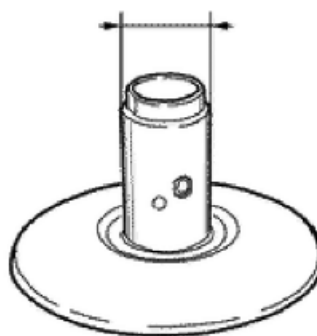
### Characteristic

#### Half-pulley standard diameter

Standard diameter: Ø 40.985 mm

#### Half-pulley minimum diameter

Minimum admissible diameter Ø 40.96 mm



- Measure the outer diameter of the pulley bushing.
- Check the contact surface with the belt to make sure there are no flaws.
- Check the riveted joints are functional.
- Check the evenness of the belt contact surface.

### Characteristic

#### Half-pulley minimum diameter

Minimum admissible diameter Ø 40.96 mm

#### Half-pulley standard diameter

Standard diameter: Ø 40.985 mm

### Wear limit

0.3 mm







## Inspecting the driven sliding half-pulley

125 - 200 version

- Remove the two internal grommets and the two O-rings.
- Measure the movable half-pulley bushing inside diameter.

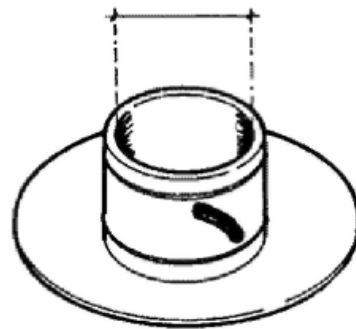
### Characteristic

#### Movable driven half-pulley max. diameter

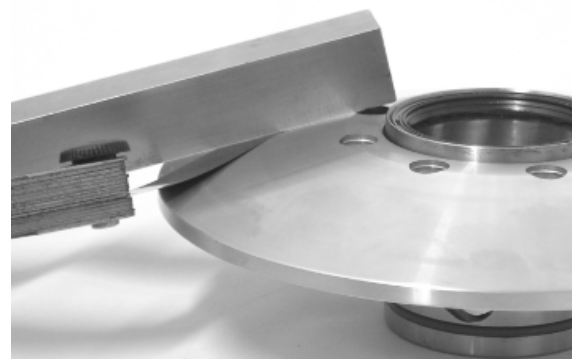
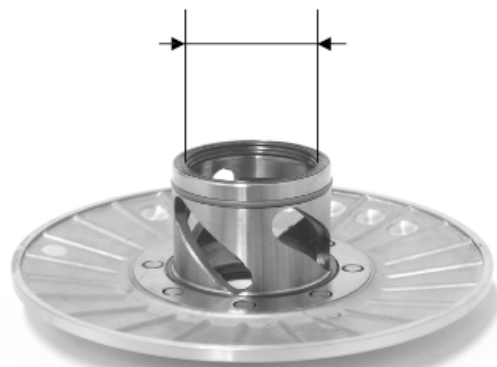
Max. diameter admitted:  $\varnothing$  41.08 mm

#### Movable driven half-pulley standard diameter

Standard diameter:  $\varnothing$  41.000 ÷ 41.035 mm



- Remove the two internal grommets and the two O-rings.
- Measure the movable half-pulley bushing inside diameter.
- Check that the faying surface with the belt is not abnormally worn.
- Check the riveted joints are functional.
- Check the evenness of the belt faying surface.



### **MOVABLE DRIVEN HALF-PULLEY DIMENSIONS**

<b>Specification</b>	<b>Desc./Quantity</b>
Wear limit	0.3 mm
standard diameter	Diameter 41.000 - 41.035 mm
maximum allowable diameter	Ø 41.08 mm

- Remove the belt and slide the movable half-pulley with the relevant bush, taking care of the falling free assembled rollers.
- Remove the return rollers plate with the relative guide pads.

### **Refitting the driven half-pulley bearing**

- Support the pulley bushing adequately from the threaded side using a wooden surface.
- Fit a new roller sleeve as in the figure.
- For the fitting of the new ball bearing, follow the example in the figure using a modular punch.

Fit the snap ring

**WARNING**

**N.B.**

**FIT THE BALL BEARING WITH THE VISIBLE SHIELD**

#### **Specific tooling**

**020376Y Adaptor handle**

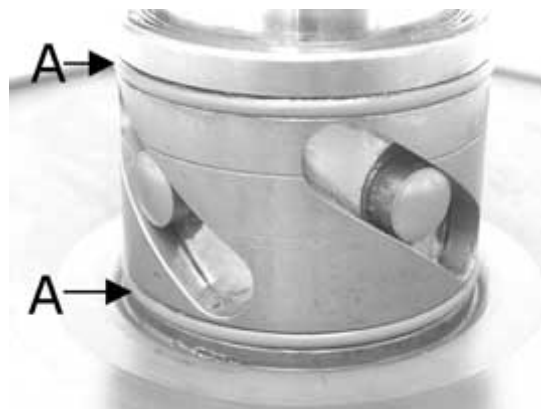
**020375Y Adaptor 28 x 30 mm**

**020424Y Driven pulley roller casing fitting punch**

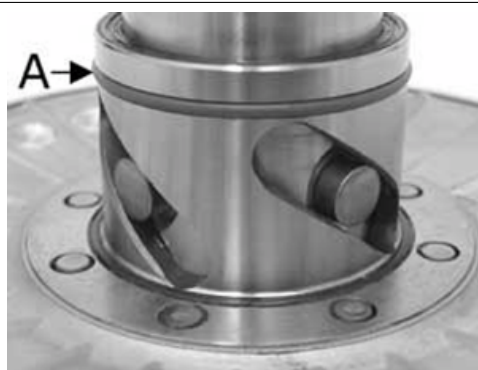


## Refitting the driven pulley

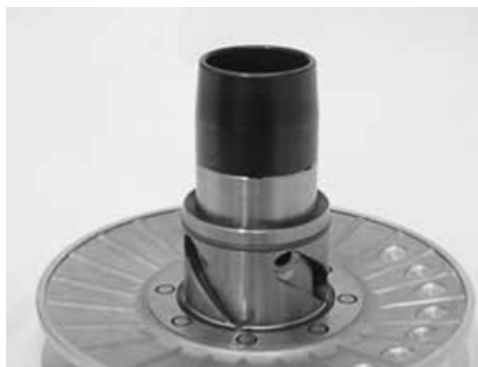
- Insert the new oil guards and O-rings on the movable half-pulley.
- Lightly grease the O-rings «A» shown in the figure.



- Insert the new oil guards and O-rings on the movable half-pulley.
- Lightly grease the O-rings (A) shown in the figure.



- Fit the half-pulley over the bushing using the appropriate tool
- Check that the pins are not worn and proceed to refitting them in their slots.
- Refit the torque server closure collar.



Using a curved-spout grease gun, lubricate the driven pulley assembly with approximately 6 g of grease. Apply the grease through one of the holes in the bushing until it comes out through the hole on the opposite side. This operation is necessary to avoid the presence of grease beyond the O-rings.

### N.B.

**THE TORQUE SERVER CAN BE GREASED WHETHER WITH BEARINGS FITTED OR WHEN THEY ARE BEING REPLACED; UNDERTAKING THE OPERATION WHEN THE BEARINGS ARE BEING SERVICED MIGHT BE EASIER.**



**Specific tooling****020263Y Sheath for driven pulley fitting****Recommended products****AGIP GREASE SM 2 Grease for the tone wheel revolving ring**

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

**Inspecting the clutch spring**

- Measure the free length of the mobile driven half-pulley spring.

**Characteristic****Standard length (125)**

106 mm

**limit after use (125)**

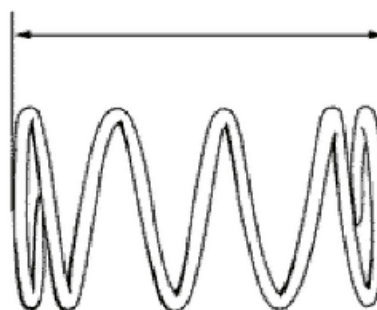
101 mm

**Standard length (200 - 250)**

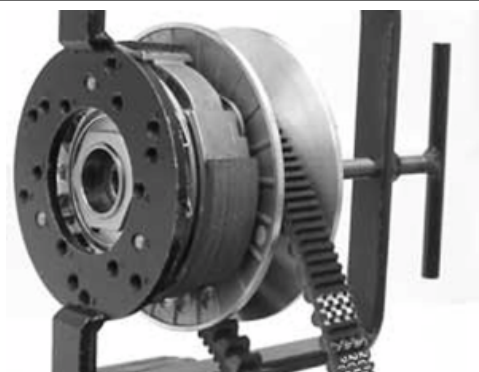
123 mm

**Limit after use (200 - 250)**

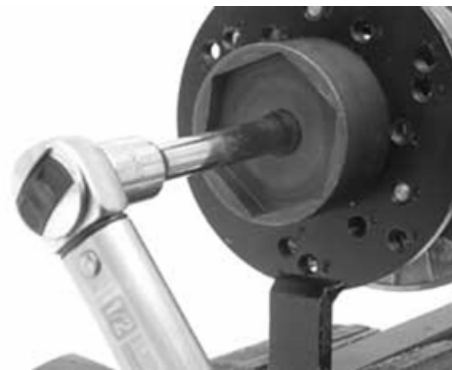
118 mm

**Refitting the clutch**

- Support the driven pulley spring compressor appropriate tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position "C" on the inside.
- Introduce the adapter ring 11 with the chamfering facing upwards.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with its plastic holder in contact with the clutch.
- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.



- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch fixing nut and tighten it to the prescribed torque using the special 46x55 wrench.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Preload the clutch return spring with a traction/rotation combined action and place the belt in the smaller diameter rolling position.
- Remove the driven pulley /belt unit from the tool.



**N.B.**

**DURING THE SPRING PRELOADING PHASE, BE CAREFUL NOT TO DAMAGE THE PLASTIC SPRING STOP AND THE BUSHING THREADING.**

**N.B.**

**FOR DESIGN REASONS, THE NUT IS SLIGHTLY ASYMMETRIC; THE FLATTEST SURFACE SHOULD BE MOUNTED IN CONTACT WITH THE CLUTCH.**

## **Specific tooling**

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

**020444Y011 adapter ring**

**020444Y009 46x55 Wrench**

## **Locking torques (N\*m)**

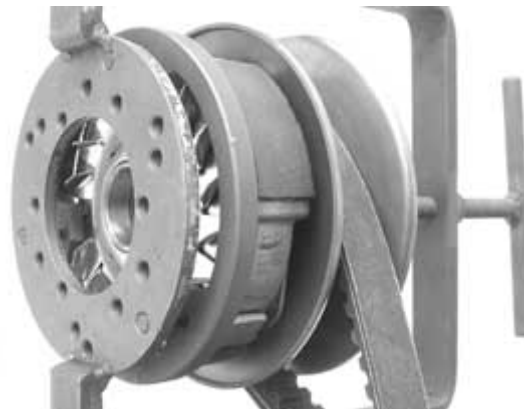
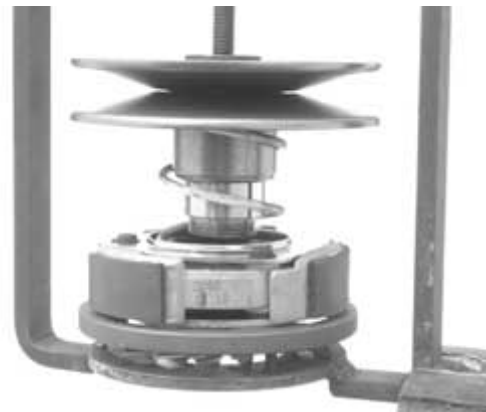
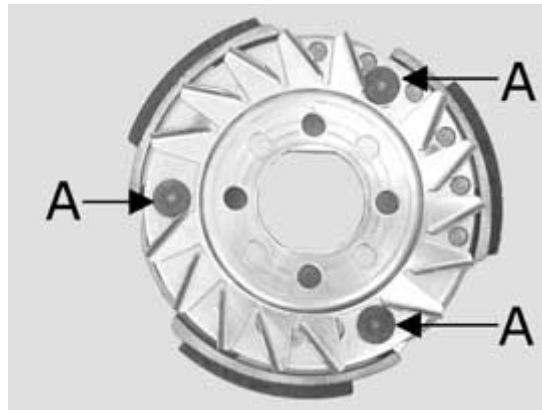
**Nut locking clutch unit on pulley 55 ÷ 60 Nm**

## Version 125

- Support the driven pulley spring compressor appropriate tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position «F» on the inside.
- Insert the adapter ring 8 in the pins.
- Preassemble the cooling fan to the clutch in such a way that the keying facets are aligned and the 3 pin heads (A) of the mass axis can be seen in full.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with its plastic holder in contact with the clutch.
- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch lock nut and tighten it to the specified torque using the specific 46x55 spanner.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Preload the clutch return spring with a traction/rotation combined action until it reaches the pulleys maximum opening and place the belt on the minimum rolling diameter.
- Remove the driven pulley /belt unit from the tool.

**N.B.**

**FOR DESIGN REASONS, THE NUT IS SLIGHTLY ASYMMETRIC; THE FLATTEST SURFACE SHOULD BE MOUNTED IN CONTACT WITH THE CLUTCH.**



N.B.

DURING THE SPRING PRELOADING PHASE, BE CAREFUL NOT TO DAMAGE THE PLASTIC SPRING STOP AND THE BUSHING THREADING.

N.B.

AN EXCESSIVE QUANTITY CAN DAMAGE THE CLUTCH OPERATION.

### Specific tooling

020444Y011 adapter ring

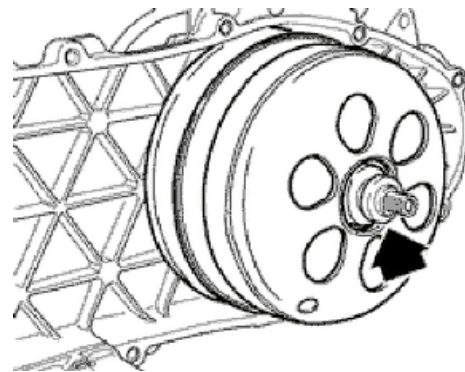
020444Y009 46x55 Wrench

### Locking torques (N\*m)

Clutch unit nut on driven pulley 55 ÷ 60

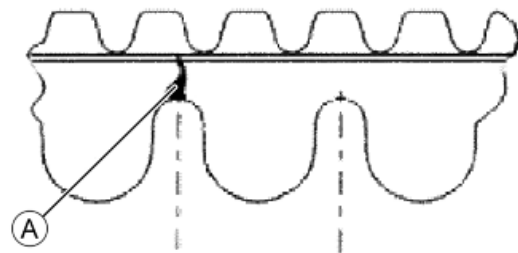
## Refitting the driven pulley

- Reassemble the clutch bell and spacer.



## Drive-belt

During the wear checks foreseen in the scheduled maintenance services at 6,000 km; 18,000 km; etc., check that the rim bottom of the toothing does not show signs of incisions or cracking (see figure): The rim bottom of the tooth must not have incisions or cracking; if it does, change the belt.



- Check that the driving belt is not damaged.
- Check the belt width.

**Characteristic**

**125 4T driving belt - standard width:**

**22.5 ± 0.2 mm**

**125 4T driving belt - minimum width:**

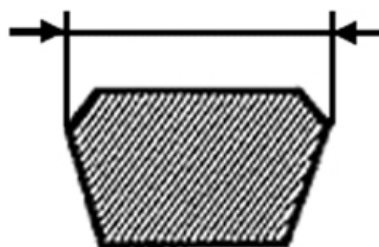
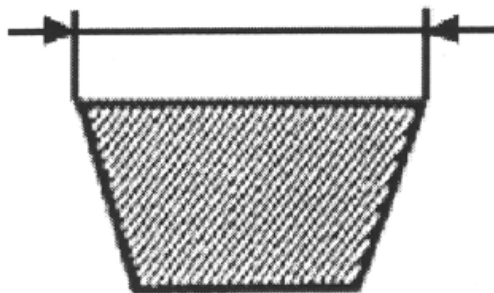
**21.5 mm**

**Driving belt standard width**

**20.5 ± 0.2 mm**

**Driving belt minimum width**

**19.5 mm**



## Removing the driving pulley

**Driving pulley removal**

- With the appropriate tool placed into the internal slots, remove the nut with the built-in Belleville washer.

**Appropriate tools:**

**Specific tooling**

**020442Y Pulley lock wrench**



- Remove the entire start-up crown unit with the torque limiter.

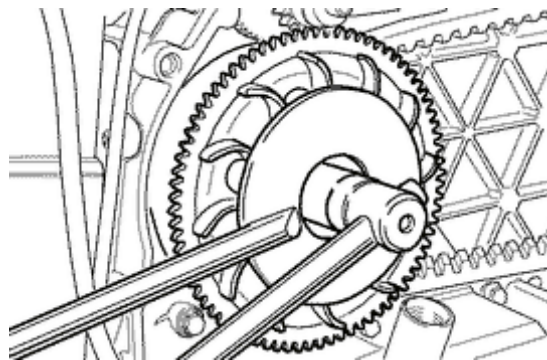
- Remove the fixed driving half-pulley together with the O-ring and the steel washer touching the bushing.





**Driving pulley removal (125)**

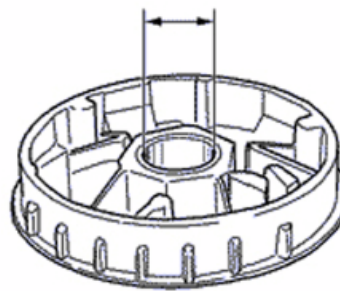
- With the appropriate tool, remove the nut with the built-in Belleville washer, the drive common to the kick-starter version, and the steel washer.
- Remove the fixed driving half-pulley.
- Remove the steel washer separating from the bushing.

**Appropriate tools:****Specific tooling**

**020368Y driving pulley lock wrench**

**Inspecting the rollers case**

- Check that the internal bushing shown in the figure is not abnormally worn and measure inner diameter A.
- Measure the pulley sliding bushing outside diameter shown in the figure.
- Check that the rollers are not damaged or worn.
- Check the guide shoes for the variator back-plate are not worn.
- Check the wear of the roller housings and of the belt contact surfaces on both pulley halves.
- Check that stationary driving pulley does not show signs of abnormal wear on the grooved edge and on the surface in contact with the belt.
- Check that the O-ring is not pushed out of shape.

**CAUTION**

**DO NOT LUBRICATE OR CLEAN SINTERED BUSHINGS**

**Characteristic**

**roller (200): Minimum diameter allowed**

Ø 20 mm

**roller (125): Minimum diameter allowed**

Ø 18.5 mm

**Sliding bushing: Minimum admissible diameter**

Ø 25.95 mm

**Movable driving half-pulley bushing: Maximum allowable diameter**



Ø 26.12 mm

**roller (200): Standard Diameter**

Diameter 20.5 - 20.7 mm

**roller (125): Standard Diameter**

Ø 18.9 ÷ 19.1 mm

**Sliding bushing: Standard Diameter**

Ø 25.959 ÷ 25.98 mm

**Movable driving half-pulley bushing: Standard Diameter**

26.000 - 26.021 mm



---

## Refitting the driving pulley

- Correctly reassemble the previously removed Bendix back to its position.
- Fit the steel shim washer in contact with the bushing and the fixed driving pulley together with the O-ring on the outside of the fan blades.
- Fit the entire start-up crown assembly with the torque limiter.
- Fit the torque limiter on the crankshaft so as to guarantee the references on the start-up crown and the fixed driving half-pulley are aligned. In case this is not possible, choose the closest position to the references.
- Failure to do this may affect the cooling fan performance



The lock wrench operates on the start-up crown.

- If the torque limiter is worn, the failure can be detected when locking the nut on the crankshaft.
- The torque limiter cannot be serviced.
- In case of failures, replace the start-up crown and the limiter.



### Specific tooling

**020442Y Pulley lock wrench**

### Recommended products

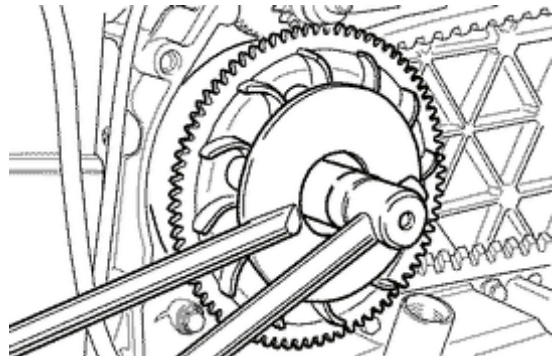
**Loctite "Super Rapido" Loctite "Super Rapido" 243**

Apply Loctite "Super Rapido" 243 on the threads and screw the nut with washer to the prescribed torque.

### Locking torques (N\*m)

**Drive pulley nut 75 ÷ 83**

- Correctly refit the previously removed Bendix back to its position.
- Reassemble the parts of the unit (internal lining, fixed half-pulley, external lining, drive and nut), spread Loctite 243 Quick Set threadlock on the thread and tighten the nut to the prescribed torque.
- Avoid the half-pulley rotation with the appropriate stop key tool..
- Rotate the engine manually until the belt is slightly taut.



### CAUTION

**IT IS EXTREMELY IMPORTANT THAT THE BELT IS PERFECTLY FREE WHEN THE FIXED DRIVING HALF-PULLEY IS ASSEMBLED. THIS IS TO AVOID CARRYING OUT A WRONG TIGHTENING OF THE DRIVING HALF-PULLEY.**

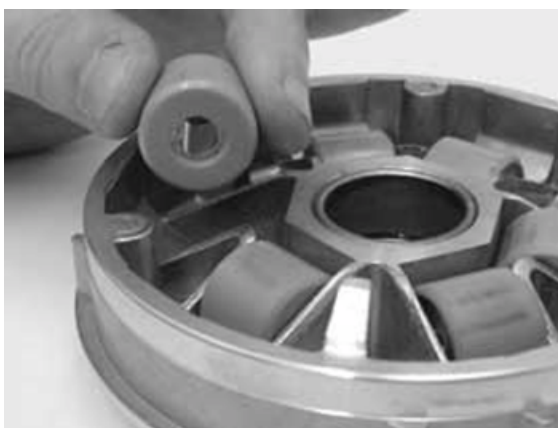
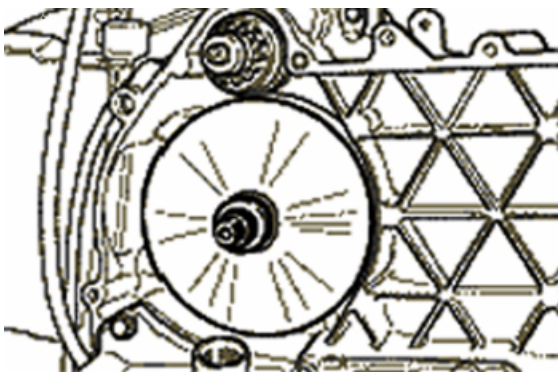
### Specific tooling

**020368Y driving pulley lock wrench**

### Locking torques (N\*m)

**Drive pulley nut 75 ÷ 83**

- Preassemble the movable half-pulley with the roller contrast plate by putting the rollers in their housings with the larger support surface touching the pulley according to the direction of rotation.
- Check that the roller contact plate does not have flaws and is not damaged on the grooved edge.
- Mount the complete bushing unit on the driving shaft.
- Fit the driven pulley/Clutch/belt unit on the engine.



## Refitting the transmission cover

- Check the presence of the 2 centring dowels and the correct installation of the sealing gasket for the oil sump on the transmission cover.
- Replace the cover tightening the 10 screws at the specified torque.
- Refit the oil loading cap/bar.
- refit the steel washer and the driven pulley nut.
- Tighten the nut to the prescribed torque using the lock wrench and the torque wrench tools.
- Replace the plastic cover.



## Specific tooling

020423Y driven pulley lock wrench

## Locking torques (N\*m)

Transmission cover screws 11 ÷ 13 Driven pulley shaft nut 54 ÷ 60

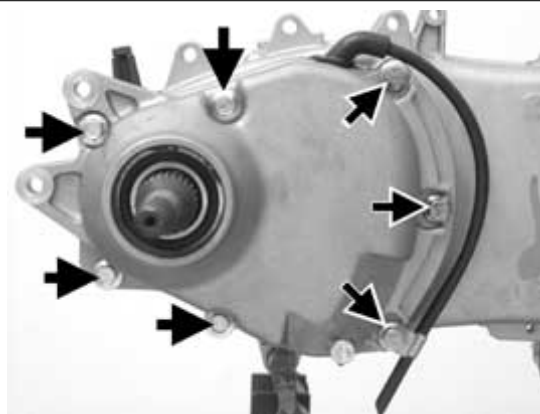
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## End gear

---

### Removing the hub cover

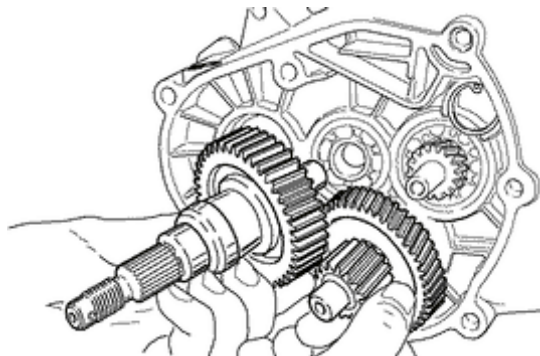
- Empty the rear hub through the oil drainage plug.
- Remove the 7 flanged screws indicated in the figure.
- Remove the hub cover and its gasket.



---

### Removing the wheel axle

- Remove the wheel axis complete with gear.
- Remove the intermediate gear.



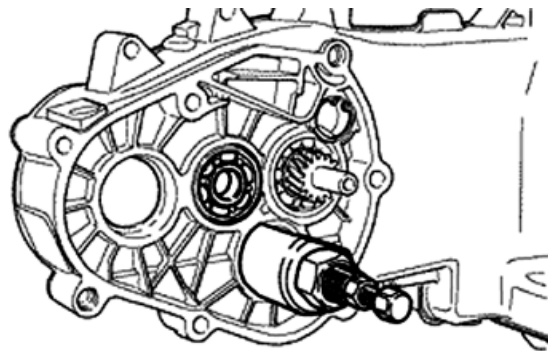
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## Removing the hub bearings

- Check the state of the bearings being examined (wear, clearance and noisiness). If faults are detected, do the following.
- Use the specific bearing extractor to remove the three 15 mm bearings (2 in the crankcase and 1 in the hub cover).

### Specific tooling

001467Y013 Pliers to extract  $\varnothing$  15-mm bearings



---

## Removing the wheel axle bearings

Hold up the hub cover and take out the bearing.

### Specific tooling

020376Y Adaptor handle

020477Y Adaptor 37 mm

020483Y 30 mm guide



With the appropriate tools, remove the oil seal as shown in the figure.

### Specific tooling

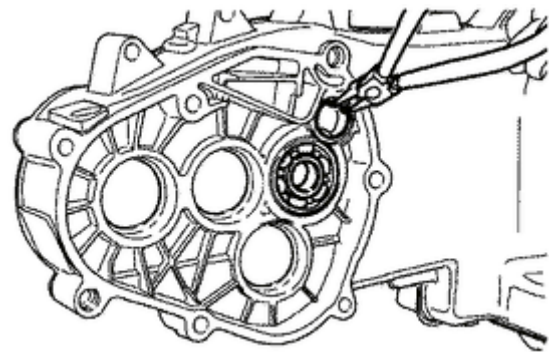
020359Y 42x47-mm adaptor



## Removing the driven pulley shaft bearing

When removing the driven pulley shaft, the corresponding bearing and oil seal, remove the transmission cover and the clutch group as explained above.

- Extract the driven pulley shaft from its bearing.
- Remove the oil guard using a screwdriver, working from inside the bearing and being careful not to damage the housing, make it come out of the belt transmission side.
- Remove the seeger ring shown in the figure



With the sectional punch, remove the driven pulley shaft bearing.

### Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020363Y 20 mm guide



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## Inspecting the hub shaft

- Check the three shafts for wear or distortion of the toothed surfaces, the bearing housings, and the oil seal housings.
- In case of anomalies, replace the damaged components.



---

## Inspecting the hub cover

- Check that the fitting surface is not dented or distorted.
- Check the bearing bearings.
- In case of anomalies, replace the damaged components.

---

## Refitting the wheel axle bearing

- Support the hub cover on a wooden surface.
- Heat the cover crankcase with special heat gun.
  - Fit the wheel shaft bearing with a modular punch as shown in the figure.

### Specific tooling

**020150Y Air heater support**

**020151Y Air heater**

**020376Y Adaptor handle**

**020360Y Adaptor 52 x 55 mm**

**020483Y 30 mm guide**

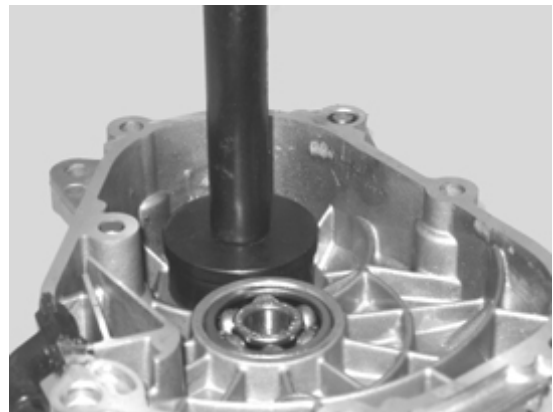
Assemble the seeger ring.





- Fit the oil guard with seal lip towards the inside of the hub and place it flush with the internal surface by means of the appropriate tool used from the 52 mm side.

The 52 mm side of the adapter must be turned towards the bearing.

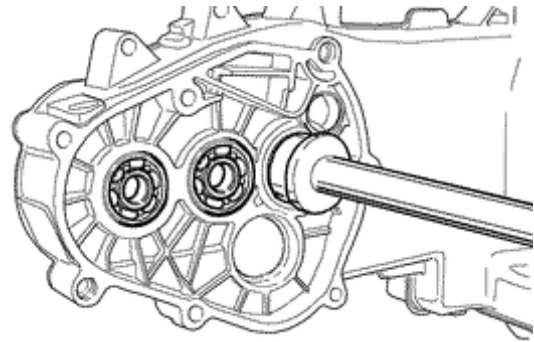


## Refitting the hub cover bearings

For the fitting of the hub box bearings the engine crankcase and the cover must be heated with the special heat gun.

- The three 15 mm bearings must be fitted using the appropriate tools.

- The 42-mm side of the adapter must be turned towards the bearing.



### Specific tooling

**020150Y** Air heater support

**020151Y** Air heater

**020376Y** Adaptor handle

**020359Y** 42x47-mm adaptor

**020412Y** 15 mm guide



**N.B.**

**TO FIT THE BEARING ON THE COVER, SUPPORT THE COVER WITH THE STUD BOLT SET.**

- Refit the driven pulley shaft bearing with a modular punch as shown in the figure.

**N.B.**

IF THE BEARING HAS AN ASYMMETRICAL BALL RETAINER, PLACE IT SO THAT THE BALLS ARE VISIBLE FROM THE HUB INNER SIDE.

**Specific tooling**

020376Y Adaptor handle

020359Y 42x47-mm adaptor

020363Y 20 mm guide

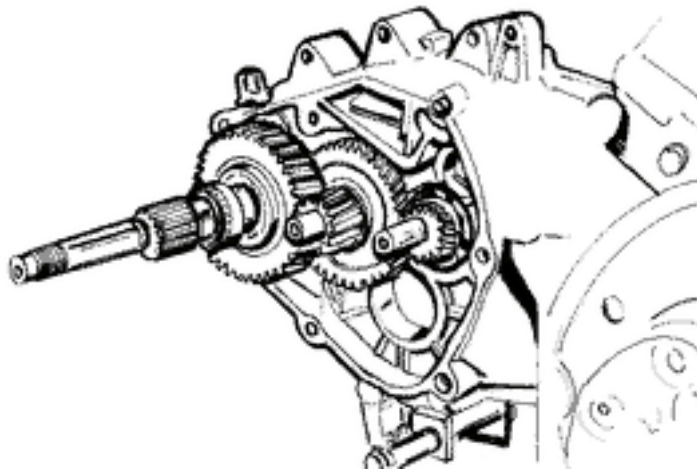
**N.B.**

WHEN FITTING THE BEARINGS ON THE ENGINE CRANKCASE, SUPPORT THE CRANKCASE PREFERABLY ON A SURFACE TO ALLOW THE BEARINGS TO BE DRIVEN VERTICALLY.

- Refit the seeger ring with the opening facing the bearing and fit a new oil guard flush with the crankcase from the pulley side.

## Refitting the hub bearings

- Install the three shafts in the engine crankcase as shown in the figure.

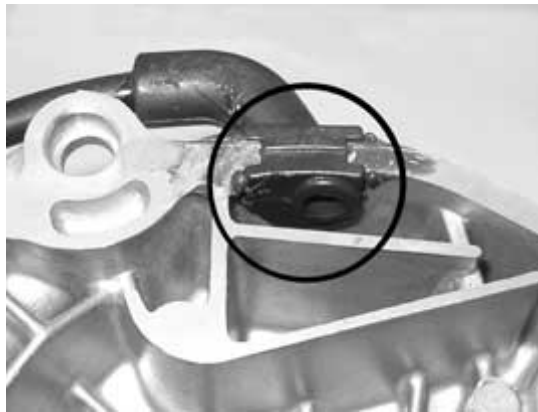


## Refitting the hub cover

- Fit a new gasket together with the centring dowels.
- Seal the gasket of the breather pipe using black silicone sealant.
- Fit the gearbox cover, making sure the breather pipe is in the correct position.
- Place the 3 shortest screws, identifiable by their different colour, as shown in the figure.
- Fasten the breather pipe support bracket with the lower short screw.
- Assemble the remaining 4 screws and tighten the 7 screws to the prescribed torque.

**Locking torques (N\*m)**

Rear hub cover screws 24 ÷ 27



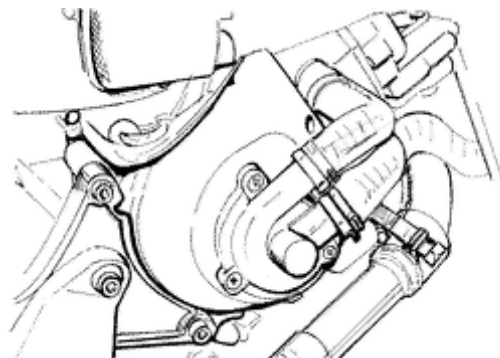
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## Flywheel cover

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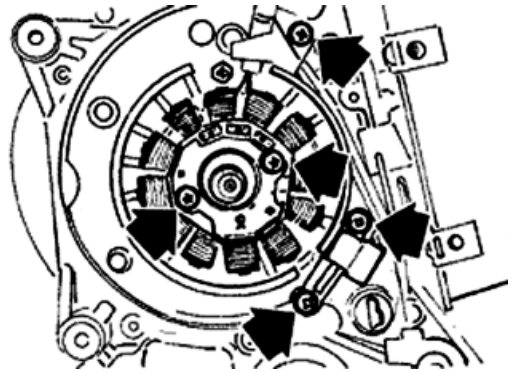
### Removing the hub cover

- Remove the two clamps, the two couplings and empty the cooling system.
- Remove the 4 retainers and the flywheel cover



## Removing the stator

- Remove the electric terminal of the minimum oil pressure switch.
- Remove the two Pick-Up screws and the one for the wiring harness bracket as well as the two stator fixing screws shown in the figure.
- Remove the stator and its wiring.



## Refitting the stator

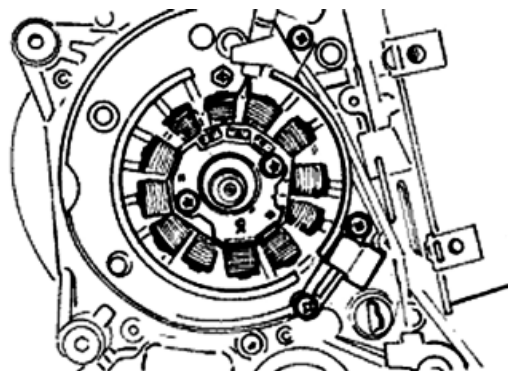
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the specified torque.
- Place the cable harness as shown in the figure.
- Stator screws and Pick-Up

### N.B.

THE PICK-UP WIRE SHOULD BE POSITIONED BETWEEN THE UPPER SCREW AND THE REFERENCE PIN AS SHOWN IN THE DETAIL DRAWING.

### Locking torques (N\*m)

Stator assembly screws (°) 3 ÷ 4



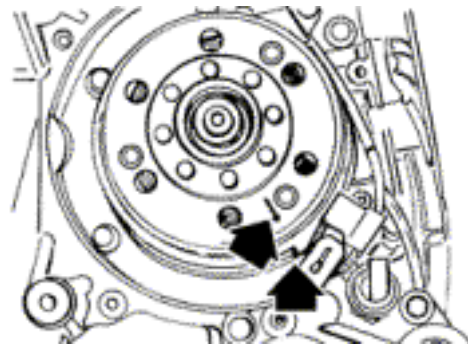
## Refitting the flywheel cover

- Place the flywheel with the top dead centre mark aligned with the crankcase.
- Place the flywheel cover by aligning the reference marks of the drive and the crankcase cover.
- Reassemble the cover on the engine, placing the three connectors in the drive for the water pump.
- Carry out the steps in the reverse order from the dismantling procedure.



### CAUTION

TAKE CARE TO CORRECTLY POSITION THE FLYWHEEL CONNECTOR. MAKE SURE THE CENTRING DOWELS ARE PRESENT.



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### Flywheel and starting

- Check the integrity of the internal plastic parts of the flywheel and the Pick-Up control plate.

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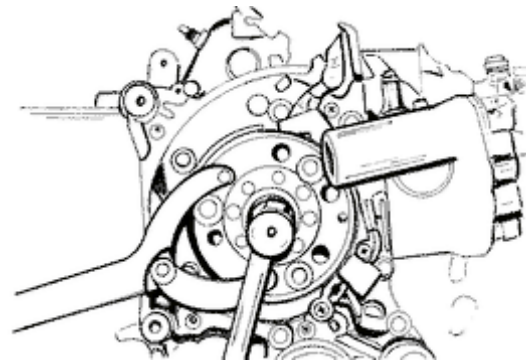
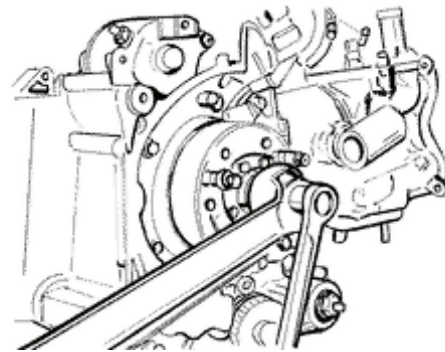
### Removing the flywheel magneto

- Lock the rotation of the Flywheel with the calliper spanner tool.
- Remove the nut.
- Take out the flywheel.

**CAUTION**

THE USE OF A CALLIPER SPANNER OTHER THAN THE ONE SUPPLIED COULD DAMAGE THE STATOR COILS  
N.B.

THE FLYWHEEL OF THE 200 CM<sup>3</sup> MODELS FEATURES ENHANCED INERTIAL MASS.



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### Inspecting the flywheel components

- Check the integrity of the internal plastic parts of the flywheel and the Pick-Up control plate.

## Refitting the flywheel magneto

- Fit the flywheel being careful to insert the key properly.
- Lock the flywheel nut to the prescribed torque
- Check that the Pick-Up air gap is between  $0.34 \div 0.76$  mm.

The air gap cannot be modified when assembling the Pick-Up.

Different values result from deformations visible on the Pick-Up support.

**N.B.**

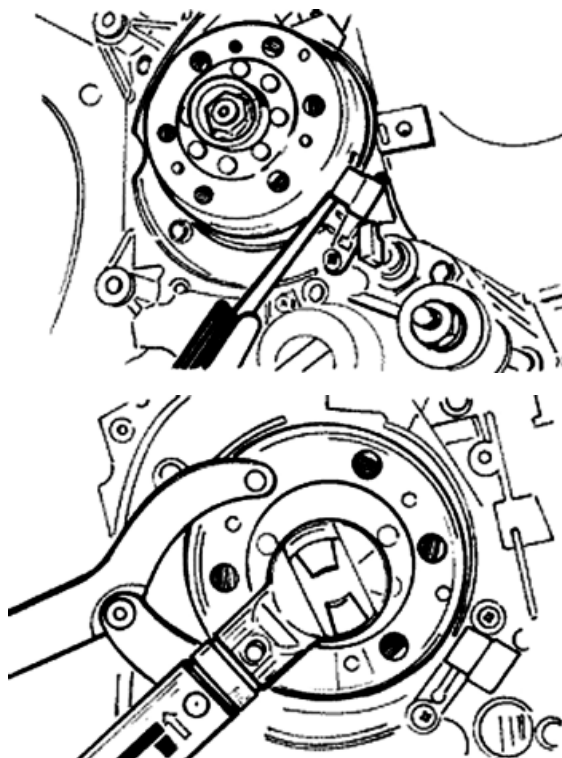
A VARIATION IN THE AIR GAP DISTANCE MODIFIES THE IGNITION SYSTEM IDLE SPEED

### Specific tooling

020565Y Flywheel lock calliper spanner

### Locking torques (N\*m)

Flywheel nut  $54 \div 60$

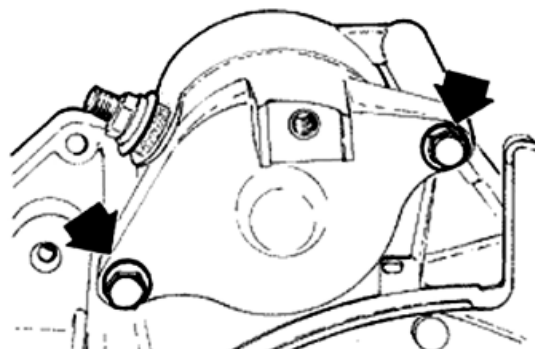


## Refitting the starter motor

- Fit a new O-ring on the starter motor and lubricate it.
- Fit the starter on the crankcase, locking the two screws to the prescribed torque.

### Locking torques (N\*m)

Starter motor screws  $11 \div 13$



## Cylinder assy. and timing system

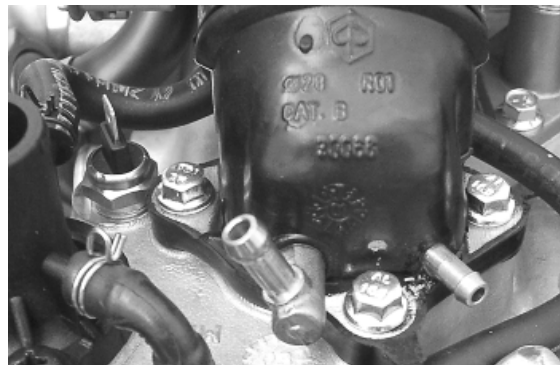
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## Removing the intake manifold

- Remove the flywheel cover completely as described in the flywheel cover section.
- Loosen the 3 screws and remove the intake manifold.

**N.B.**

**TAMPERPROOF SCREWS ARE SUPPLIED WITH 125 CC MODELS.**



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## Removing the rocker-arms cover

- Remove the 5 screws indicated in the figure



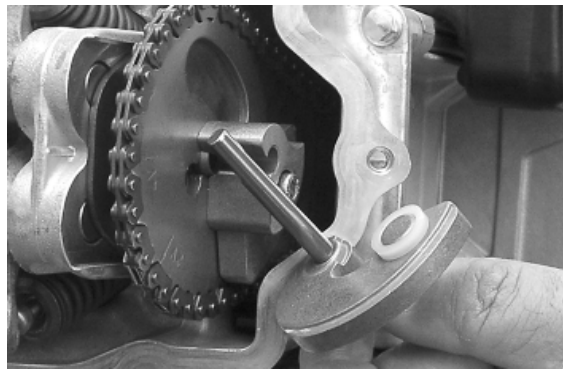
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## Removing the timing system drive

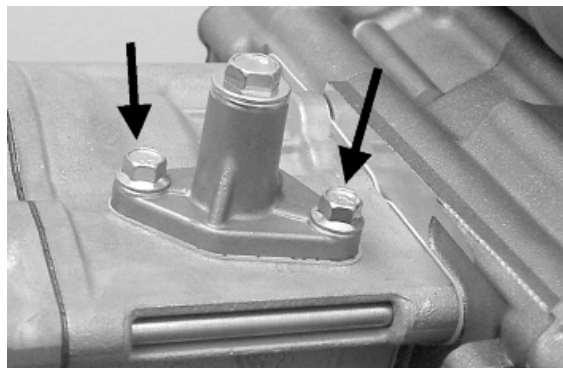
- Remove the parts listed below first: transmission cover, drive pulley with belt, oil sump with spring and by-pass piston, oil pump pulley cover, O-ring on the crankshaft and the sprocket wheel separation washer.
- Remove the tappet cover.
- Remove the central screw fastener and the automatic valve-lifter retaining cover, as shown in the figure.



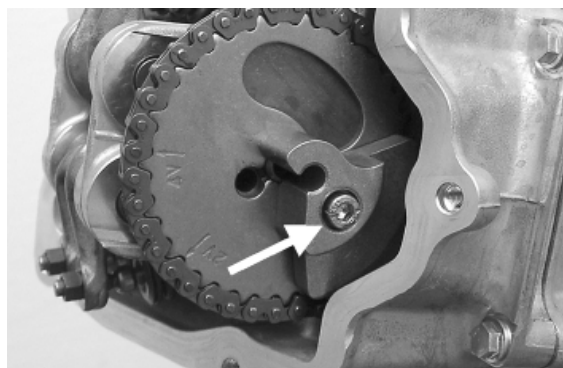
- Remove the return spring of the automatic valve lifter unit and the automatic valve lifter unit and its end of stroke washer.



- Loosen the central screw on the tensioner first.
- Remove the two fixings shown in the figure.
- Remove the tensioner with its gasket.



- Remove the internal hex screw and the counterweight shown in the figure.



- Remove the camshaft control pulley with its washer.

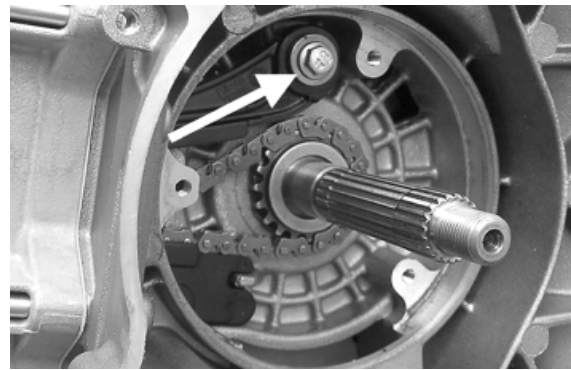




- Remove the command sprocket wheel and the timing chain.

- Remove the screws indicated in the figure, the spacer bar and the tensioner slider.

The chain tensioning pad must be removed from the transmission side. As regards the lower chain guide pad, it may only be removed after the head has been removed.



**N.B.**

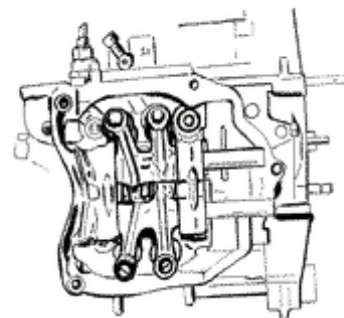
**IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.**

### Removing the cam shaft

- Remove the two screws and the cam shaft retainer shown in the diagram.

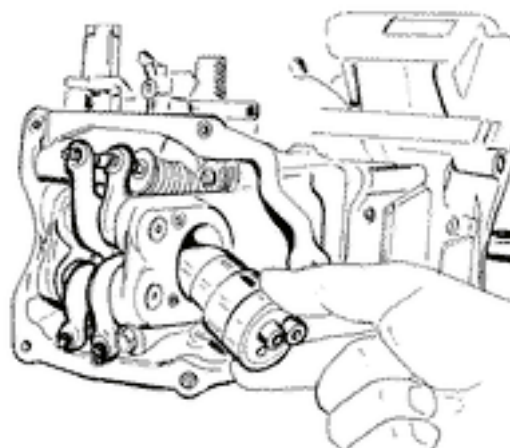
- Remove the cam shaft.

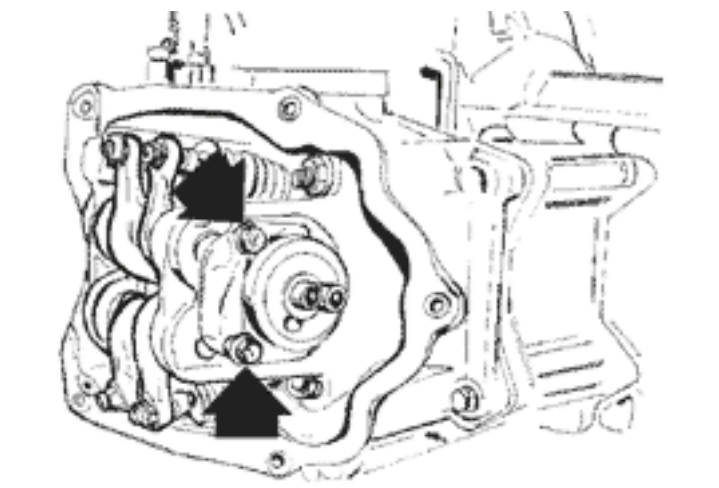
- Remove the pins and the rocker arms from the flywheel side holes.



**N.B.**

**IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKING LEVERS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.**



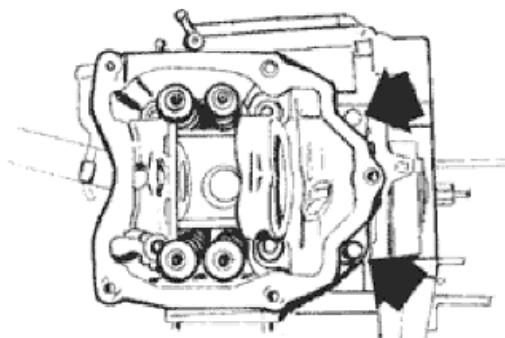


## Removing the cylinder head

- Remove the spark plug.
- Remove the 2 side fixings shown in the figure.
- Loosen the 4 head-cylinder fastening nuts in two or three stages and in criss-cross fashion.
- Remove the head, the two centring dowels and the gasket.

### N.B.

IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKING LEVERS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.



## Removing the valves

- Using the appropriate tool fitted with an adaptor, remove the cotters, caps, springs and valves.
- Remove the oil guards with the appropriate tool.
- Remove the lower spring supports.

### CAUTION

REPLACE THE VALVES IN SUCH A WAY AS TO RECOGNISE THEIR ORIGINAL POSITION ON THE HEAD.

### Specific tooling

020382Y011 adapter for valve removal tool

020382Y Valve cotters equipped with part 012 removal tool

020306Y Punch for assembling valve seal rings





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### Removing the cylinder - piston assy.

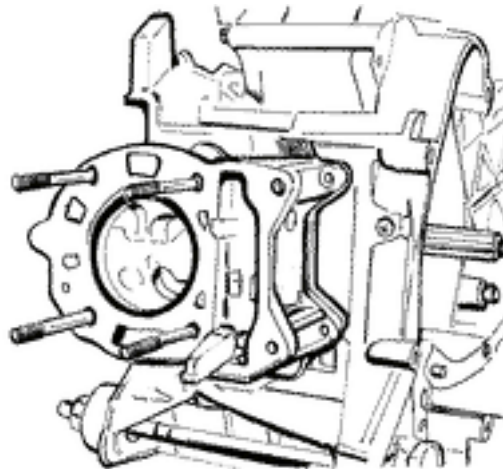
- Remove the chain guide pad.
- Pull out the cylinder.
- Remove the cylinder base gasket.
- Remove the two stop rings, the wrist pin and the piston.
- Remove the piston seals.

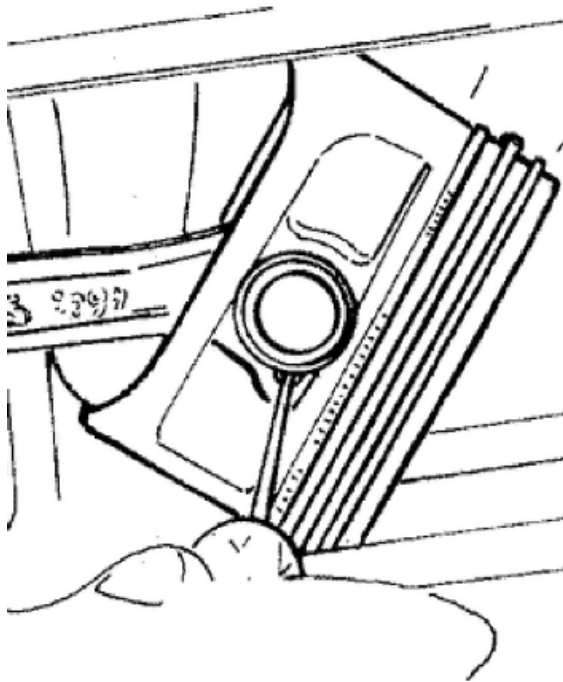
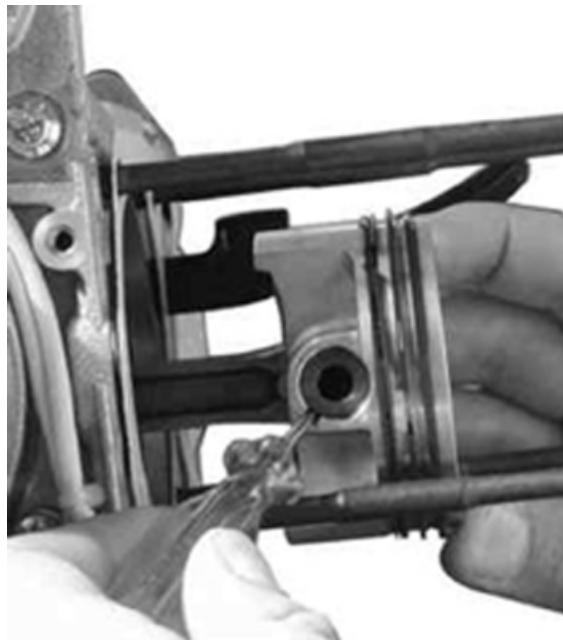
**CAUTION**

**TO AVOID DAMAGING THE PISTON, SUPPORT IT WHILE REMOVING THE CYLINDER.**

**N.B.**

**BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL.**





## Inspecting the small end

- Measure the internal diameter of the small end using an internal micrometer.

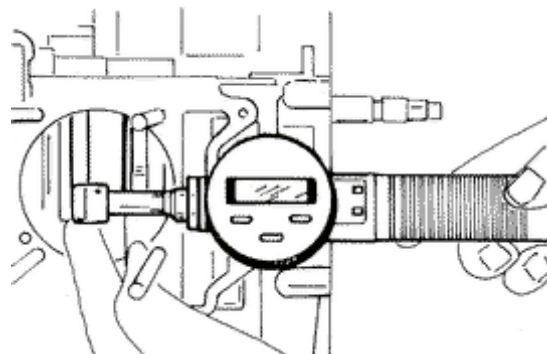
### N.B.

REPLACE THE CRANKSHAFT IF THE DIAMETER OF THE ROD SMALL END EXCEEDS THE STANDARD DIAMETER OR IT SHOWS SIGNS OF WEAR OR OVERHEATING.

### Characteristic

**Rod small end check-up: Maximum diameter**  
15.030 mm

**Rod small end check-up: Standard diameter**  
15 +0.015+0.025 mm



## Inspecting the wrist pin

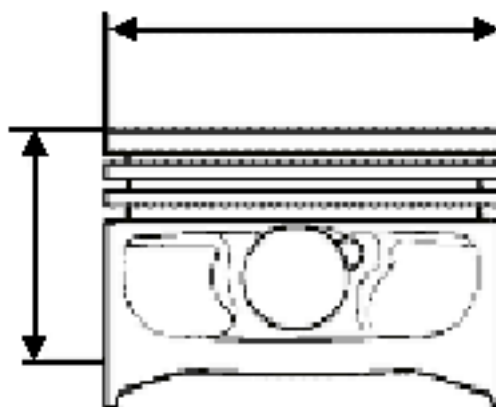
- Check the pin outside diameter.
- Calculate the coupling clearance between pin and connecting rod end.
- Measure the capacity diameter on the piston.
- Calculate the coupling clearance between pin and piston.
- Measure the piston outside diameter according to a direction orthogonal to the pin axis.
- Take the measurement in the position shown in the figure.

125 cc: 41.1 mm (from top) 200 cc: 5 mm (from base)

- Using a bore gauge, measure the cylinder inside diameter according to the directions shown in the figure at three different heights.
- Check that the head matching surface exhibits no deformations or wear.

Maximum admissible out of plane: 0,05 mm

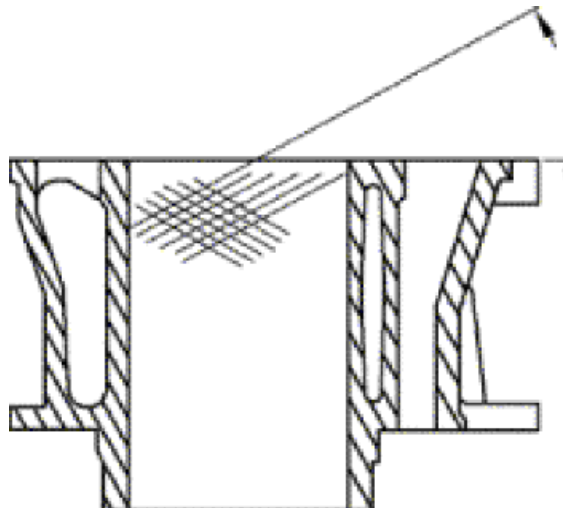
- Pistons and cylinders are classified into categories based on their diameter. Coupling is made in pairs (A-A, B-B, C-C, D-D).
- The cylinder adjustment operation must be carried out with a finishing complying with the original angle.



- The cylinder surface must exhibit a roughness of 0.9 micron.
- This is required for ensuring a good settling of the sealing rings, thereby ensuring a low oil consumption and excellent performance.

For engine 125 cc

- There are uprated pistons for the cylinder adjustment, divided into three categories 1°, 2°, 3° equal to 0.2-0.4-0.6 mm of uprating. These are classified in the 4 categories A-A, B-B, C-C, D-D.



**N.B.**

THE PIN HOUSINGS HAVE 2 LUBRICATION CHANNELS. FOR THIS REASON MEASUREMENT OF THE DIAMETER MUST BE CARRIED OUT ACCORDING TO THE AXIS OF THE PISTON.

**Characteristic**

**Piston pin diameter: Standard diameter: 200 - 250 cc**

68,990 ÷ 69,018

**Pin diameter Standard diameter: 125 cc**

56.997 ÷ 57.025

**Piston pin diameter: Piston 200 - 250**

68,933 ÷ 68,961 mm

**piston diameter**

56.945 ÷ 56.973 mm

**Pin diameter: Standard clearance**

0.015 ÷ 0.029 mm

**Pin diameter Standard diameter**

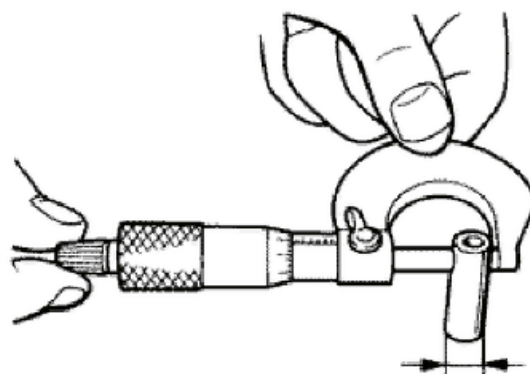
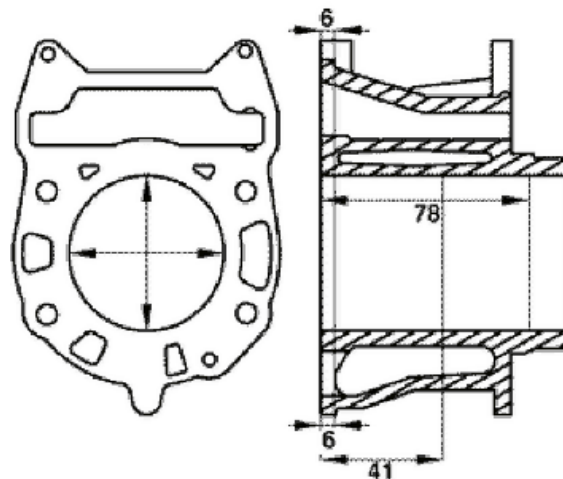
14.996 - 15.000 mm

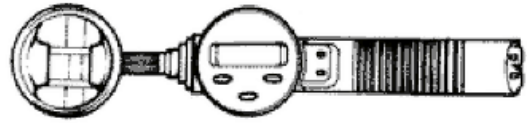
**Wrist pin seat on the piston: Standard diameter**

15.001 ÷ 15.006 mm

**Diameter of the wrist pin seat on the piston: Standard clearance**

0.001 ÷ 0.010 mm



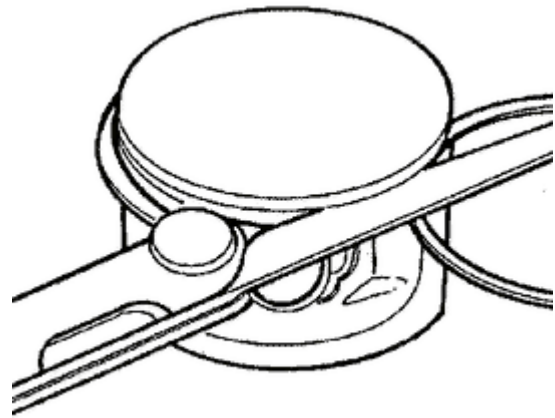


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**Inspecting the piston**

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- Carefully clean the seal housings.
- Measure the coupling clearance between the seal rings and the grooves using suitable sensors, as shown in the diagram.
- If the clearance is greater than that indicated in the table, replace the piston.

**125 cc**

## Inspecting the piston rings

- Alternately insert the three sealing rings into the cylinder, in the area where it retains its original diameter. Using the piston, insert the rings perpendicularly to the cylinder axis.
- Measure the opening (see figure) of the sealing rings using a feeler gauge.
- If any measurements are greater than specified, replace the piston rings.

**N.B.**

**BEFORE REPLACING ONLY THE PISTON RINGS, ENSURE THAT THE CLEARANCE BETWEEN THE PISTON RINGS AND THE PISTON RING GROOVES, AND BETWEEN THE PISTON AND THE CYLINDER, IS AS SPECIFIED. IN ANY CASE, NEW PISTON RINGS USED IN COMBINATION WITH A USED CYLINDER MAY HAVE DIFFERENT BEDDING CONDITIONS THAN THE STANDARD.**



## Removing the piston

- Install piston and wrist pin onto the connecting rod, aligning the piston arrow the arrow facing towards the exhaust.
  - Fit the pin stop ring onto the appropriate tool.
  - With opening in the position indicated on the tool
- S = left  
D = right
- Place the wrist pin stop ring into position using a punch
  - Fit the wrist pin stop using the plug as shown in the figure

**CAUTION**

**USING A HAMMER MIGHT DAMAGE THE STOPS' HOUSING.**

**N.B.**

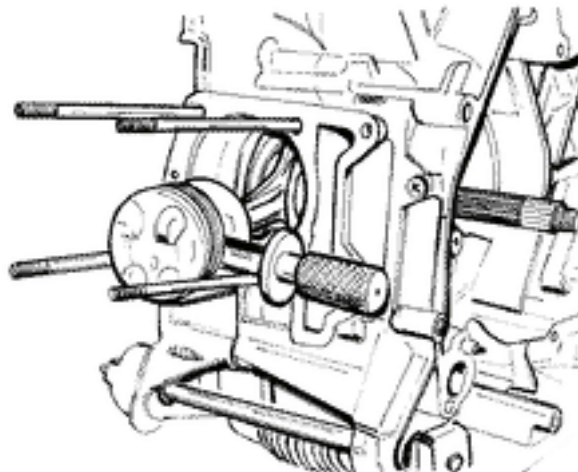
**THE TOOL FOR INSTALLING THE STOP RINGS MUST BE USED MANUALLY.**

### Specific tooling

**020430Y Pin lock fitting tool**

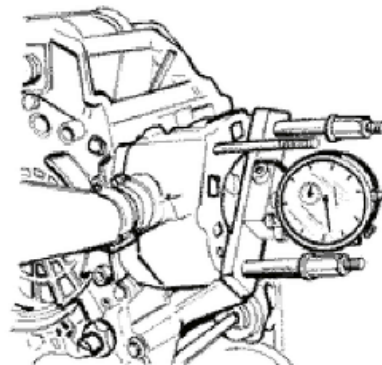
**020454Y Tool for fitting piston pin stops (200 - 250)**





## Choosing the gasket

- Provisionally fit the piston into the cylinder, without any base gasket.
- Assemble a dial gauge on the specific tool Support to check piston position 020428Y
- Set the dial gauge to zero placing the tool on a contrasting surface. Keeping the zero position, assemble the tool on the cylinder and lock it with 2 supplied nuts as shown in the figure.
- Rotate the crankshaft until TDC (the inverted point of the dial gauge rotation)
- Position the dial gauge on the piston as shown in the figure and measure how much the piston protrudes.
- By means of the table shown in the specifications chapter identify the cylinder base gasket thickness to be used for refitting. Correctly identify the cylin-



der base gasket thickness to keep the correct compression ratio.

- Remove the specific tool and the cylinder.

**N.B.**

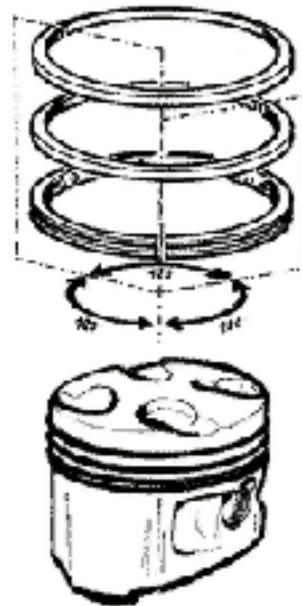
**PISTON PROTRUSION IS MEASURED IN 125 ENGINES WHILE INTRODUCTION IS MEASURED IN 200 ENGINES.**

**See also**

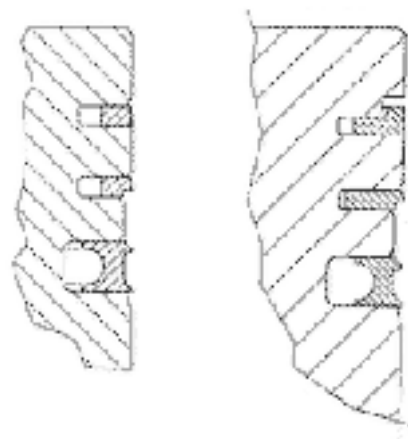
[Slot packing system](#)

## Refitting the piston rings

- Place the oil scraper spring on the piston.
- Refit the oil scraper ring with the join of spring ends on the opposite side from the ring gap and the word 'TOP' towards the crown of the piston. The chamfered side of the oil scraper ring should always be facing the piston crown.
- Fit the middle piston ring with the identification letter facing the crown of the piston. In any case, the step must be facing opposite the piston top.
- Fit the top piston ring with the word 'TOP' or the reference mark facing the crown of the piston.
- Offset the piston ring gaps on the three rings by 120° to each other as shown in the figure.
- Lubricate the components with engine oil.
- The 200 engine takes the 1st segment with L section.



**125**



**N.B.**

**THE TWO PISTON RINGS ARE MADE WITH A TAPERED CYLINDRICAL CONTACT CROSS-SECTION. THIS IS TO ACHIEVE A BETTER BEDDING.**

## Refitting the cylinder

- Insert the cylinder base gasket with the thickness determined above.
- Using the fork support and the piston ring retaining band, refit the cylinder as shown in the figure.

N.B.

**BEFORE FITTING THE CYLINDER, CAREFULLY BLOW OUT THE LUBRICATION DUCT AND OIL THE CYLINDER BARREL.**

### Specific tooling

**020393Y Piston fitting band**

**020287Y Clamp to assemble piston on cylinder**



## Inspecting the cylinder head

- Using a trued bar and feeler gauge check that the cylinder head surface is not worn or distorted.

Maximum allowable run-out: 0.05 mm

- Check that the camshaft and the rocker pin capacities exhibit no wear.

- Check that the cylinder head cover surface, the intake manifold and the exhaust manifold are not worn.



### Characteristic

#### bearing «A»

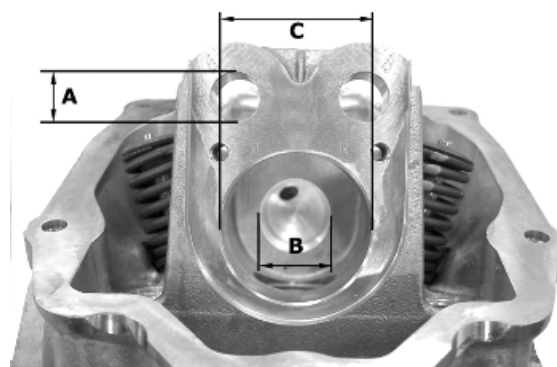
Ø 12.000 - 12.018 mm

#### bearing «B»

Ø 20.000 ÷ 20.021 mm

#### bearing «C»

Ø 37.000 - 37.025 mm

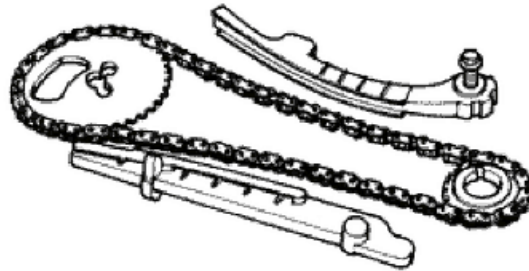


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## Inspecting the timing system components

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- Check that the guide shoe and the tensioner shoe are not worn out.
- Ensure that the camshaft control pulley chain assembly and the sprocket wheel are not worn.
- If you encounter wear, replace the parts or, if the chain, sprocket wheel and pulley are worn replace the whole assembly.
- Remove the centre screw with the washer and the tensioner spring. Check that the one-way mechanism is not worn.
- Check the condition of the tensioner spring.
- If examples of wear are found, replace the whole assembly.

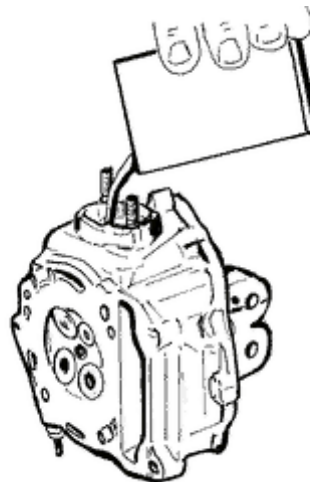


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## Inspecting the valve sealings

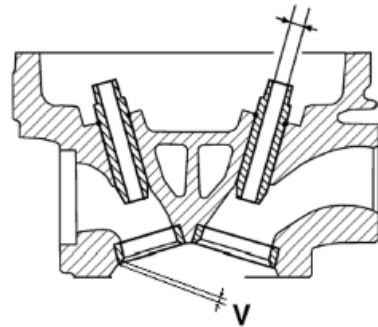
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- Insert the valves into the cylinder head.
- Alternatively check the intake and exhaust valves.
- The test is carried out by filling the manifold with petrol and checking that the head does not ooze through the valves when these are just pressed with the fingers.



## Inspecting the valve housings

- Check the width of the imprint on the valve seat «V» wear limit max. 1.6 mm.
- Remove any carbon formation from the valve guides.
- Measure the inside diameter of each valve guide.
- Take the measurement at three different heights in the rocker arm push direction.
- If the width of the impression on the valve seat or the diameter of the valve guide exceed the specified limits, replace the cylinder head.



### Characteristic

#### Valve seat wear Intake guide

limit accepted: 5.022

#### Valve seat wear Exhaust guide

Standard diameter: 5.000 ÷ 5.012 mm

#### Valve seat wear Exhaust guide

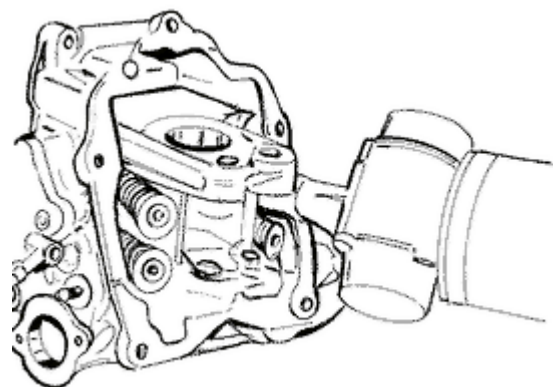
Accepted limit 5.022

#### Valve seat wear Exhaust guide

Standard diameter: 5.000 ÷ 5.012 mm

## Inspecting the valves

- Measure the diameter of the valve stems in the three positions indicated in the diagram.
- Calculate the clearance between valve and valve guide.
- Check that there are no signs of wear on the surface of contact with the articulated register terminal.
- If the checks above give no failures, you can use the same valves. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. During the grinding, keep the cylinder head with the valve axes in a 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 KEEP ROTATING 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.

**N.B.**

DO NOT CHANGE THE POSITIONS THE VALVES ARE FITTED IN

**Characteristic****Valve check standard length**

Outlet: 94.4 mm

**Valve check standard length**

Inlet: 94.6 mm

**Valve check Maximum admissible clearance**

Outlet: 0.072 mm

**Valve check Maximum admissible clearance**

Inlet: 0.062 mm

**Valve check standard clearance**

Outlet: 0.025 ÷ 0.052 mm

**Valve check standard clearance**

Inlet: 0.013 ÷ 0.040 mm

**Valve check Minimum admissible diameter**

Outlet: 4.95 mm

**Valve check Minimum admissible diameter**

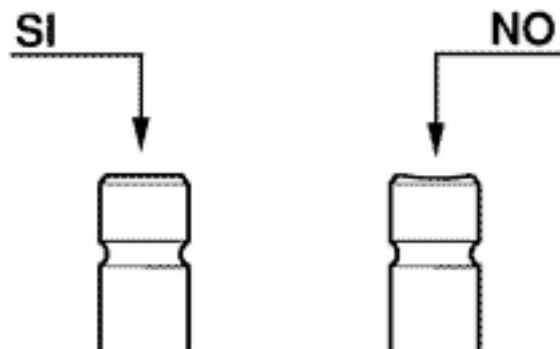
Inlet: 4.96 mm

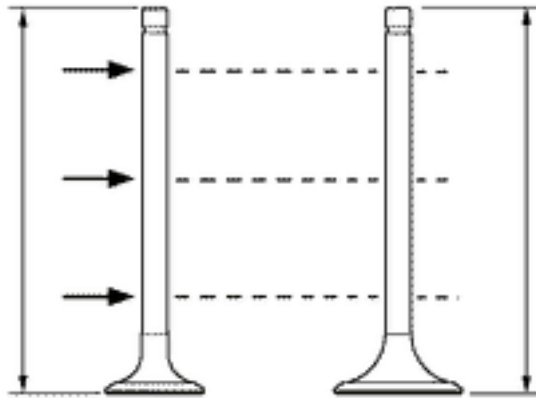
**Valve check Standard diameter:**

Inlet: 4.972 ÷ 4.987 mm

**Valve check Standard diameter:**

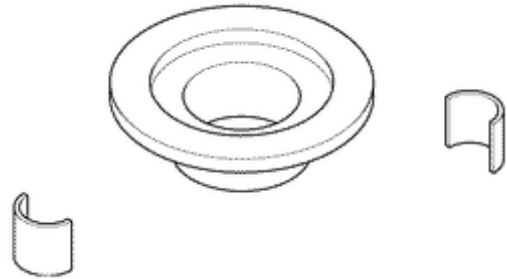
Outlet: 4.96 ÷ 4.975 mm





### Inspecting the springs and half-cones

- Check that the upper spring caps and the cotter halves show no signs of abnormal wear.



### Refitting the valves

- Lubricate the valve guides with engine oil.
- Place the valve spring supports on the head.
- Using the special punch, fit the four valve seals.
- Fit the valves, the springs and the caps. Using the appropriate tool with adapter, compress the springs and insert the cotters in their seats.

**N.B.**

**DO NOT CHANGE THE VALVE FITTING POSITION. FIT THE VALVE SPRINGS WITH THE REFERENCE COLOUR ON COTTER SIDE (TURNS WITH GREATER PITCH).**

#### Specific tooling

**020306Y Punch for assembling valve seal rings**

**020382Y Valve cotters equipped with part 012 removal tool**

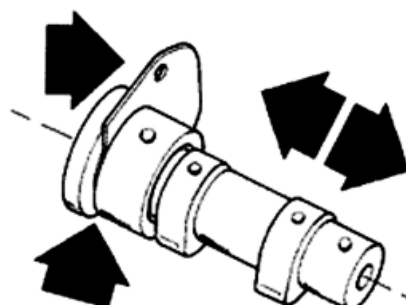
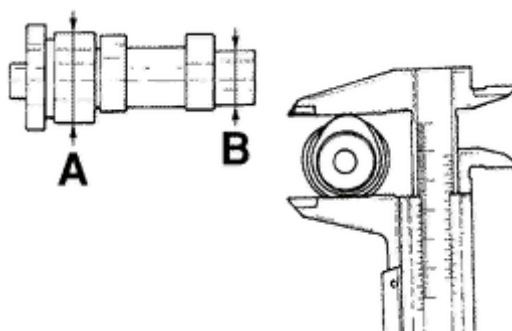
**020382Y011 adapter for valve removal tool**





## Inspecting the cam shaft

- Inspect the cam shaft for signs of abnormal wear on the cams.
  - Check the cam height.
  - Check there is no wear on the cam shaft retaining plate and its associated groove on the cam shaft.
  - If any of the above dimensions are outside the specified limits, or there are signs of excessive wear, replace the defective components with new ones.
  - Check there are no signs of wear on the automatic valve-lifter cam, or the end-of stroke roller, or the rubber buffer on the automatic valve-lifter retaining cover.
  - Check that the valve lifting spring has not yielded.
  - Replace any defective or worn components.
  - Check the rocker pins do not show signs of wear or scoring.
  - Measure the internal diameter of each rocker arm.
- Check there are no signs of wear on the pad from contact with the cam and on the jointed adjustment plate.



### Characteristic

**Internal rocker arm diameter: Standard diameter**

Diameter 12.000 - 12.011 mm

**Rocking lever pin diameter: Standard diameter**

Diameter 11.977 - 11.985 mm



**Cam shaft check: Maximum admissible axial clearance**

0.42 mm

**Cam shaft check: Standard axial clearance:**

0.11 - 0.41 mm

**Cam shaft check: Standard height**

Outlet: 29.209 mm

**Cam shaft check: Standard height**

Inlet: 30.285 mm

**Cam shaft check: Minimum admissible diameter**

Bearing B diameter: 19.950 mm

**Cam shaft check: Minimum admissible diameter**

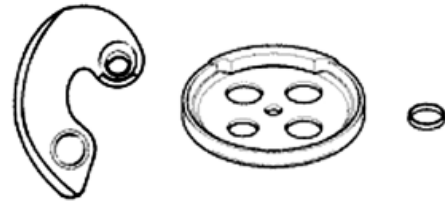
Bearing A Ø: 36.94 mm

**Cam shaft check: Standard diameter**

Bearing B diameter: 19.959 ÷ 19.98 mm

**Cam shaft check: Standard diameter**

Bearing A Ø: 36.95 ÷ 36.975 mm




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**Refitting the head and timing system components**


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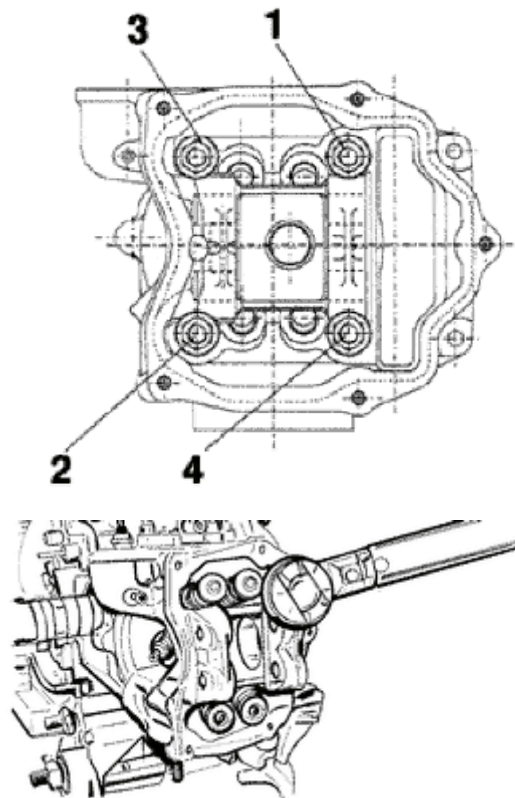
- Fit the timing chain guide pad.
- Insert the centring dowel between the cylinder head to the cylinder, fit the cylinder head gasket and the cylinder head.
- Lubricate the stud bolt threading.
- Tighten up the nuts to a pre-torque of  $7 \pm 1$  N·m
- Rotate by a  $180^\circ$  angle (2 rotations of  $90^\circ$  each)
- To carry out the operations described above, follow the tightening sequence in the figure.
- Fit the two screws on the outside of the timing chain side and tighten them to the specified torque.

**N.B.**

**BEFORE INSTALLING THE HEAD, MAKE SURE THAT THE LUBRICATION CHANNEL IS CLEAN USING A COMPRESSED AIR JET.**

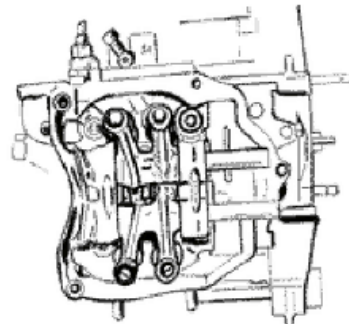
**Locking torques (N\*m)**

**Timing chain tensioner support screw 11 ÷ 13**



Assemble the lower timing chain sprocket wheel on the crankshaft, with the chamfer facing the insertion side.

- Loop the timing chain around the sprocket on the crankshaft.
- Fit the chain tensioner slider from the cylinder head side.
- Fit the spacer and the screw fastener.
- Tighten the screws to the prescribed torque.

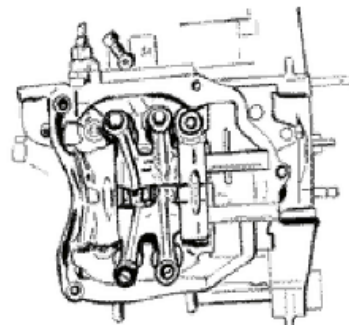


### Locking torques (N\*m)

**Slider screw 10 ÷ 14 Nm**

Fit the pins and rocking levers.

- Lubricate the two rocking levers through the holes at the top.
- Lubricate the 2 bearings and insert the cam shaft in the cylinder head with the cams corresponding to the rockers.



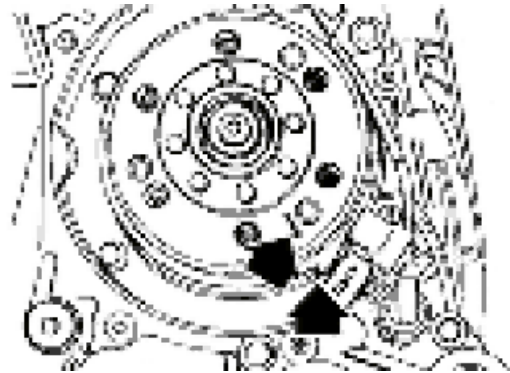
- Insert the retention plate and tighten the two screws shown in the figure to the prescribed torque.

### Locking torques (N\*m)

**Plate screws 4 ÷ 6 Nm**

Insert the spacer on the cam shaft.

- Rotate the engine so that the piston is at top dead centre, using the reference marks on the flywheel and the crankcase.
- Holding this position insert the chain on the cam-shaft control pulley.
- Insert the pulley on the cam shaft while keeping the reference **4V** in correspondence with the reference mark on the head.
- Assemble the counterweight with the corresponding fixing screw and tighten to the prescribed torque.



### Locking torques (N\*m)

**Counterweight screw 7 ÷ 8.5**

Fit the end-of stroke ring on the valve-lifting mass and fit the automatic valve-lifting cam to the camshaft.

**N.B.**

**LUBRICATE WITH GREASE THE END-OF-STROKE RING IN ORDER TO AVOID ACCIDENTAL LEAKS THAT MAY FALL INTO THE ENGINE. ASSEMBLE THE AUTOMATIC VALVE-LIFTER RETURN SPRING. DURING THIS OPERATION THE SPRING MUST BE LOADED AT APPROXIMATELY 180°.**

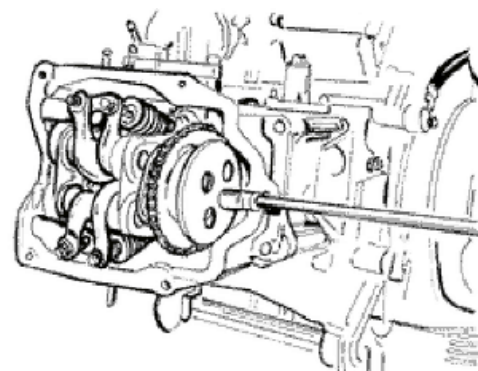


Assemble the limiting bell using the counterweight fixing screw as a reference.

- Tighten the clamping screw to the prescribed torque.

### Locking torques (N\*m)

**Limiting bell screw 11 ÷ 15 Nm**



Set the tensioner cursor to the rest position.

- Fit the chain tensioner on the cylinder, using a new gasket, and tight the two screws to the prescribed torque.

Insert the chain tensioning screw, together with the spring and washer, tightening it to the prescribed torque.



### Locking torques (N\*m)

**Tensioner screws 11 ÷ 13 Tensioner cover 5 ÷ 6 Nm**

Adjust valve clearance

- Fit the spark plug.

Electrode distance 0.8 mm

### Locking torques (N\*m)

**Spark plug 12 ÷ 14**

Refit the cylinder head cover, tightening the 5 screws to the prescribed torque. Make sure the gasket is positioned properly.

Remove the flywheel cover completely as already described in the flywheel chapter.

- Reassemble the oil pump control, the chain compartment cover, the by-pass and the oil sump as described in the lubrication chapter.

- Reassemble the driving pulley, the belt and the transmission cover as described in the transmission chapter.

### Locking torques (N\*m)

**Tappet cover screws 6 - 7 Nm**

#### **TIMING SYSTEM COMPONENTS ASSEMBLY**

<b>Name</b>	<b>Torque in Nm</b>
Tappet cover screws	6 - 7 Nm
Spark plug	12 ÷ 14
Tensioner cover	5 ÷ 6 Nm
Tensioner screws	11 ÷ 13
Limiting bell screw	11 ÷ 15 Nm
Counterweight screw	7 ÷ 8.5
Plate screws	4 ÷ 6 Nm
Slider screw	10 ÷ 14 Nm

## Refitting the rocker-arms cover

- Refit the cylinder head cover, tightening the 5 clamping screws to the prescribed torque.
- Make sure the gasket is positioned properly.

### Locking torques (N\*m)

Tappet cover screws 6 - 7 Nm

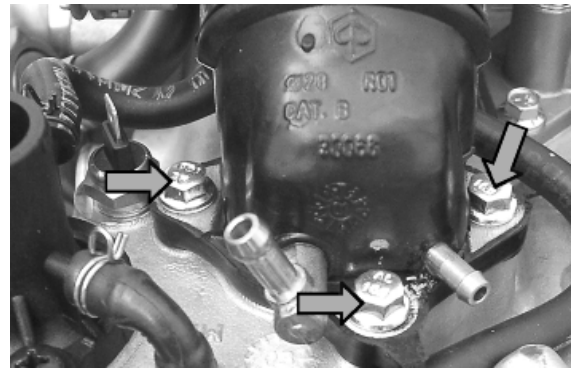


## Refitting the intake manifold

Fit the intake manifold and do up the three screws.

N.B.

USE COMMERCIALY AVAILABLE INSERTS AND INSERT HOLDERS FOR THE SPECIAL SCREWS FOR 125 CM<sup>3</sup> MODELS.



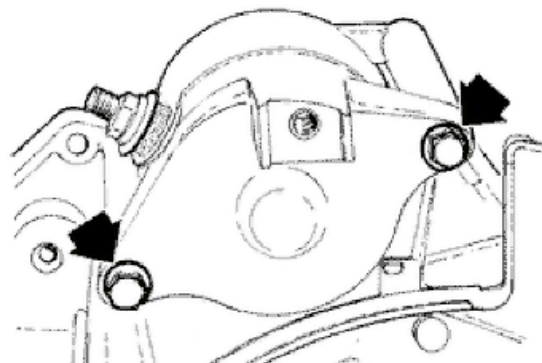
## Crankcase - crankshaft

### Splitting the crankcase halves

First remove the following units:

transmission cover, driving pulley, driven pulley and belt, rear hub cover, gears, bearings and oil seals as described in the **transmission** chapter.

- Remove the oil sump, the by-pass, the chain compartment cover and the oil pump as in the **lubrication** chapter.



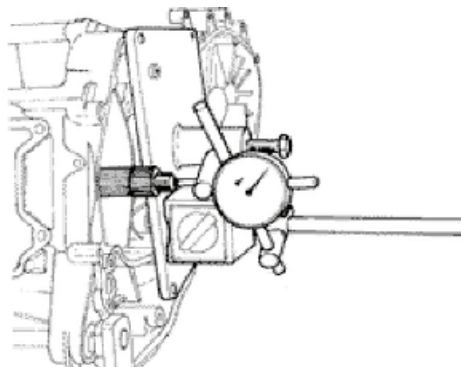
- Remove the flywheel cover together with the water pump, the flywheel and the stator as described in the **magneto flywheel** chapter.
- Remove the oil filter and the oil pressure switch.
- Remove the cylinder/piston/head unit as described in the **cylinder head timing system** chapter.

- Remove the two retainers indicated in the figure and the starter motor.

Before opening the engine crankcase, it is advisable to check axial clearance of the crankshaft. To do this, use a plate and a support with appropriate tool dial gauge.

Higher clearances are signs of wear on the supporting surfaces of the crankshaft casing.

Standard clearance:  $0.15 \div 0.40$  mm



Remove the 11 crankcase coupling screws.

- Split the crankcases while keeping the driving shaft inserted on one of the 2 half-crankcases.

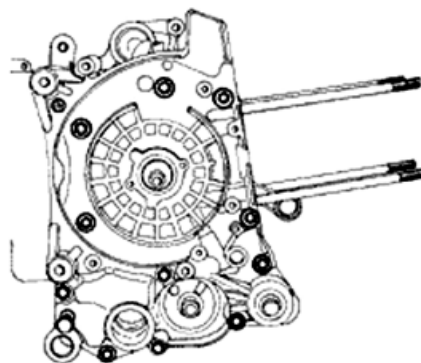
Remove the driving shaft.

**N.B.**

The crankshaft of the 200 cm<sup>3</sup> version has two steel shim washers. Take note of their fitting position.

**CAUTION**

**KEEP THE CRANKSHAFT IN ONE OF THE TWO HALVES OF THE CRANKCASE WHEN SEPARATING IT. IF YOU FAIL TO DO THIS, THE CRANKSHAFT MIGHT ACCIDENTALLY FALL.**

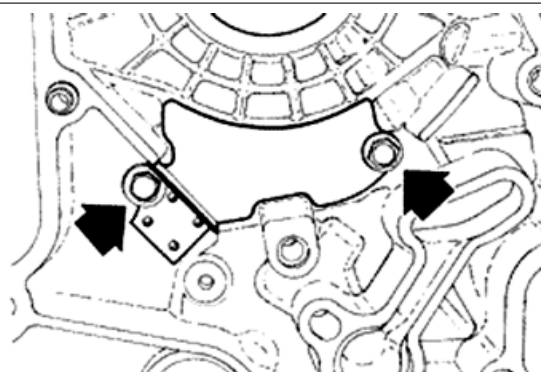


- Remove the coupling gasket of the crankcase halves.

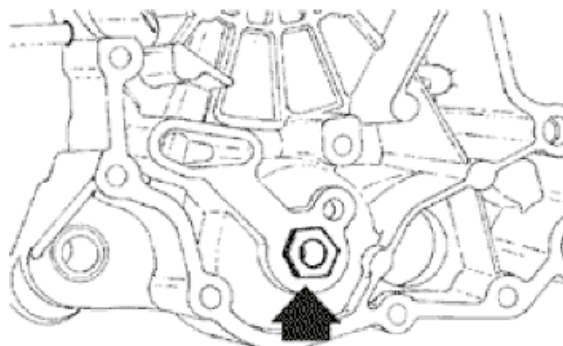
- Remove the two screws and the internal cover shown in the diagram.

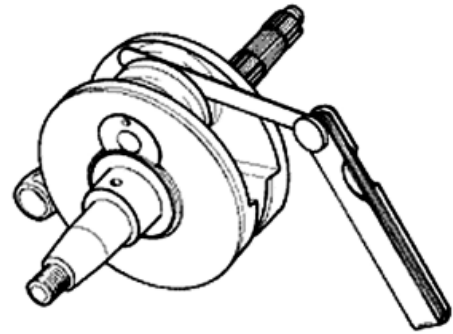
**CAUTION**

**WHILE OPENING THE CRANKCASES AND REMOVING THE DRIVING SHAFT, CHECK THAT THE THREADED SHAFT ENDS DO NOT INTERFERE WITH THE MAIN BUSHINGS. FAILURE TO OBSERVE THIS PRECAUTION CAN DAMAGE THE MAIN BUSHINGS.**



- Remove the oil guard on the flywheel side.
- Remove the oil filter fitting shown in the diagram



**Fitting clearance****Connecting rod axial clearance 0.20 - 0.50**

Check the radial clearance on the connecting rod.

Standard clearance: 0.036 ÷ 0.054 mm

-Check the surfaces that limit the axial free-play are not scored and measure the width of the crankshaft between these surfaces, as shown in the diagram.

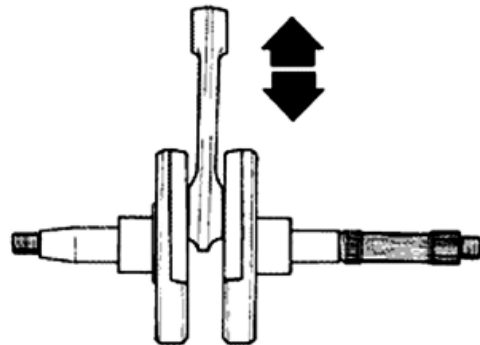
Standard dimensions:

55.75 ÷ 55.90 mm (125 cc)

51.40 ÷ 51.45 mm (200 cc)

**N.B.**

**WHEN MEASURING THE WIDTH OF THE CRANKSHAFT, MAKE SURE THAT THE MEASUREMENTS ARE NOT MODIFIED BY THE RADIUS OF FITTINGS WITH THE CRANKSHAFT BEARINGS.**



The crankshaft can be reused when the width is within the standard values and the surfaces show no signs of scoring.

Shim washers (only 200 cc)

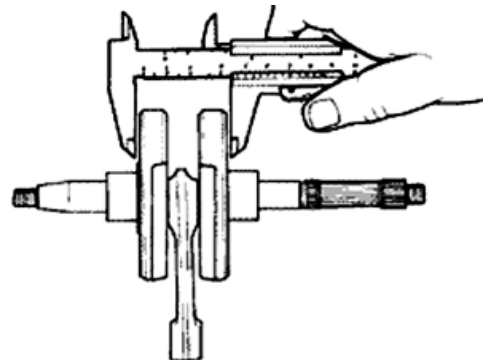
- Check the thickness of the shim washers.

Standard thickness: 2.175 ÷ 2.225 mm

- Check that the shim washers are not stripped.

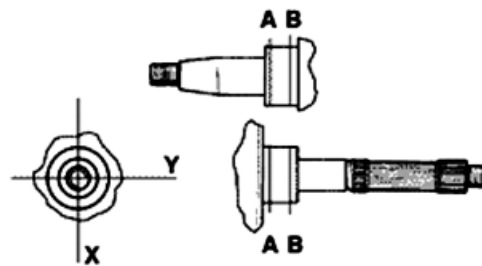
**N.B.**

**IN CASE OF NEW UTILISATION, MAINTAIN THE FIRST FITTING POSITION.**



If the axial clearance between crankshaft and crankcase exceeds the standard and the crankshaft does not have any defect, the problem must be due to either excessive wear or wrong machining on the engine crankcase.

Check the diameters of both the driving shaft ends according to the axes and planes shown in the figure. Half-shafts are classified into two categories, Cat. 1 and Cat. 2. The table is shown below.



**Characteristic**

**Standard diameter (125 - 200) Cat. 2**

29.004 ÷ 29.010

**Cat. 1 - Standard diameter (125-200) evo**

28.994 ÷ 29.000

**STANDARD DIAMETER**

Specification	Desc./Quantity
Standard diameter (125 - 200) Cat. 2	29.004 ÷ 29.010
Cat. 1 - Standard diameter (125-200) evo	28.994 ÷ 29.000

**Inspecting the crankshaft alignment**

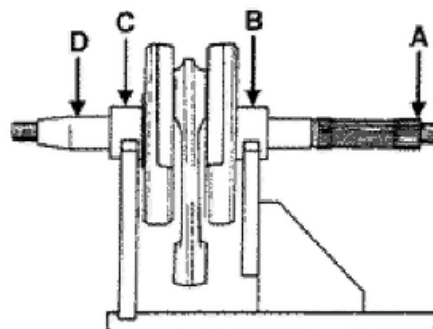
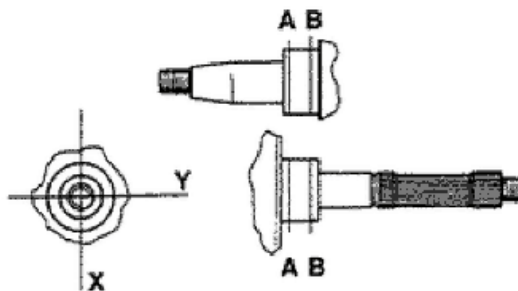
Measure the capacity of both axes X-Y

**Specific tooling**

020074Y Support base for checking crankshaft alignment

**CRANKSHAFT ALIGNMENT**

Titolo	Durata/Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Crankshaft alignment			





To install the drive shaft on the support and to measure the misalignment in the 4 points indicated in figure.

- Check that the driving shaft cone, the tab seat, the oil seal capacity, the toothed gear and the threaded tangs are in good working order.
- In case of failures, replace the crankshaft.

The connecting rod head bushings cannot be replaced. For the same reason, the connecting rod may not be replaced and, when cleaning the crankshaft, be very careful that no impurities get in through the shaft's lubrication holes.

In order to prevent damaging the connecting rod bushings, do not attempt cleaning the lubrication duct with compressed air.

- Make sure that the 2 caps on the crankpin are properly fitted.
- A wrong installation of a cap can seriously affect the bushing lubrication pressure.

**N.B.**

**THE MAIN BEARINGS ARE NOT GRINDABLE**

### Specific tooling

**020074Y Support base for checking crankshaft alignment**

### Characteristic

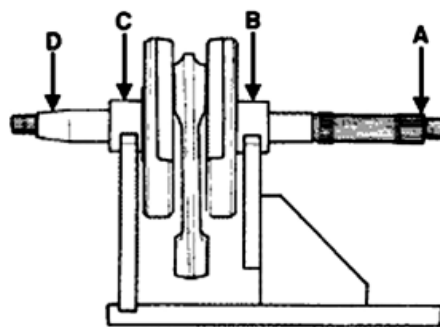
#### Off-line maximum admitted

**A** = 0.15 mm

**B** = 0.01 mm

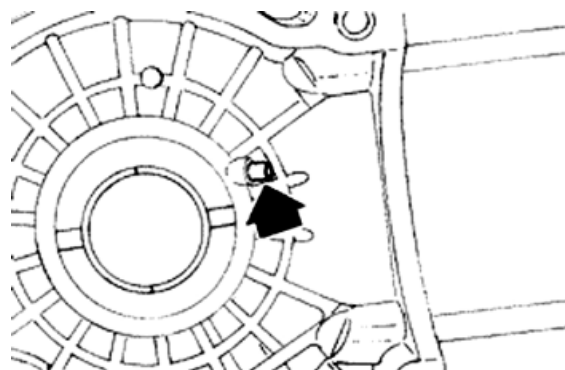
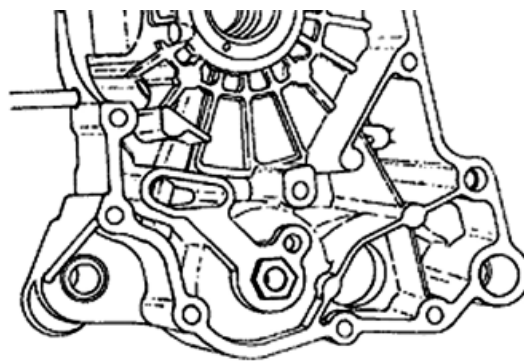
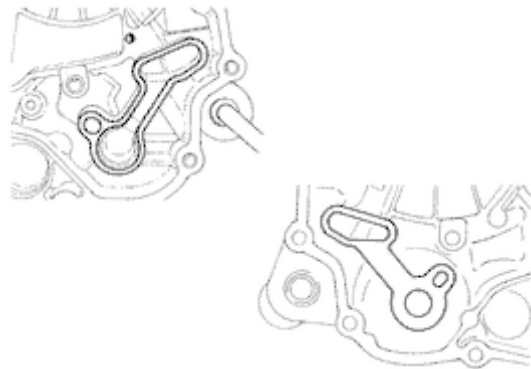
**C** = 0.01 mm

**D** = 0.10 mm



## Inspecting the crankcase halves

- Before proceeding to check the crankcase halves, thoroughly clean all surfaces and oil ducts.
- On the transmission-side crankcase half, take particular care when handling the oil pump compartment and the oil ducts, the by-pass duct, the main bushings and the cooling jet on the transmission side (see diagram).
- Take particular care, also, that there are no signs wear in the oil by-pass valve housing (see Chapter Lubrication), as this could prevent a good seal in the valve, which regulates the oil pressure.
- On the flywheel side crankcase half, take particular care cleaning the oil ducts for the main bushings, the oil duct for the jet that lubricates the cylinder head and the oil drainage duct at the flywheel side oil seal.
- Inspect the coupling surfaces on the crankcase halves for scratches or deformation, taking particular care with the cylinder/crankcase surfaces and the crankcase halves surfaces.
- Defects in the crankcase coupling gasket between the crankcase halves or the mating surfaces shown in the diagram, could cause a drop in the oil pressure lubricating the main bearings and connection rod.
- Check the main bearing seats that limit axial clearance in the crankshaft show no signs of wear. The dimension between these seats is measured by way of the procedure described previously for measuring the crankshaft axial clearance and dimensions.



### N.B.

**THE JET IS FED THROUGH THE MAIN BUSHINGS. PROPER OPERATION OF THIS COMPONENT IMPROVES THE PISTON TOP COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAK CAN CONSIDERABLY DECREASE THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRESSURE.**

### N.B.

THE HEAD LUBRICATION CHANNEL IS PROVIDED WITH A SHUTTER JET; THIS GIVES A "LOW PRESSURE" HEAD LUBRICATION; THIS CHOICE WAS MADE TO REDUCE THE OIL TEMPERATURE IN THE SUMP. THE JET CLOGGING IMPAIRS THE HEAD LUBRICATION AND THE TIMING MECHANISMS. A JET FAILURE CAUSES A DECREASE OF THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRESSURE.

## Inspecting the crankshaft plain bearings

- T

o obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure (3,2 bar) and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.

- The main bushings are comprised of two half-bearings, one with holes and channels for lubrication whereas the other is solid.

- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposite the cylinder.

- To prevent obstructions in the oil feeding channels, the matching surface of the two half-bearings must be perfectly perpendicular to the cylinder axis, as shown in the figure.

- The oil feeding channel section is also affected by the bushings driving depth compared with the crankshaft axial clearance of the limiting surface.

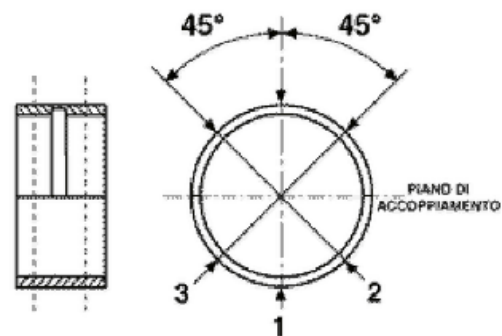
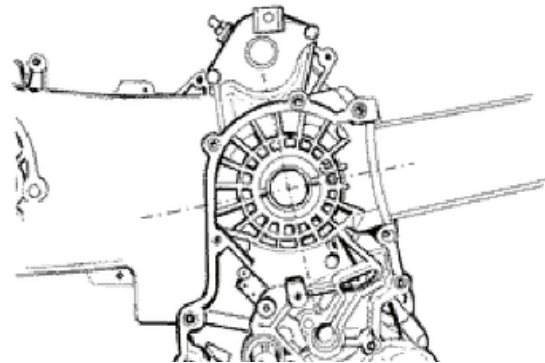
- Check the inside diameter of the main bushings in the three directions indicated in the diagram.

- Repeat the measurements for the other bushing half. see diagram.

- There are three crankcase versions: with RED main bushings, with BLUE main bushings and with YELLOW main bushings.

- There is only one type of main bushing housing hole in the crankcase

The standard bushing diameter after driving is variable on the basis of a coupling selection.



- The bushing housings in the crankcase are available in two categories, Cat. 1 and Cat. 2, as are the crankshafts.

- The main bushings are available in three thickness categories, identified by colour markings, as shown in the table below.

TYPE		IDENTIFICATION		
A		RED		
B		BLUE		
C		YELLOW		
	<b>Type "A" -</b>	<b>Type "B" -</b>	<b>Type "C" -</b>	
	<b>RED</b>	<b>BLUE</b>	<b>YELLOW</b>	
<b>Crankshaft</b>	1.970 ÷	1.9703 ÷	1.976 ÷	
<b>half-bearing</b>	1.973	1.976	1.979	
<b>Bushing category</b>	<b>Crankcase halves category</b>	<b>Internal bushing diameter after fitting</b>	<b>Possible fitting</b>	
<b>A</b>	1	29.025 ÷ 29.040	Original	
<b>B</b>	1	29.019 ÷ 29.034	Original and	
	2	29.028 ÷ 29.043	spare	
<b>C</b>	2	29.022 ÷ 29.037	Original	

Match the shaft with two category 1 crank webs with the category 1 crankcase (or cat. 2 with cat. 2) Furthermore a spare crankcase cannot be matched with a crankshaft with mixed categories. The spare crankshaft has half shafts of the same category.

<b>Crankcase halves</b>	<b>Engine half shaft</b>	<b>Bushing</b>
<b>Cat. 1</b>	Cat. 1	B
<b>Cat. 2</b>	Cat. 2	B
<b>Cat. 1</b>	Cat. 2	A
<b>Cat. 2</b>	Cat. 1	C

**N.B.**  
**TO KEEP THIS POSITION OF THE BUSHINGS ON THE CRANKCASE, FITTING IS FORCED ON STEEL RINGS INSERTED IN THE CASTING OF BOTH CRANKCASE HALVES.**

**N.B.**  
**DO NOT TAKE THE MEASUREMENT ON THE TWO HALF-SHELL COUPLING SURFACE SINCE THE ENDS ARE RE-**

LIEVED TO ALLOW BENDING DURING THE DRIVING OPERATION.

N.B.

CRANKCASES FOR REPLACEMENTS ARE SELECTED WITH CRANKCASE HALVES OF THE SAME CATEGORY AND ARE FITTED WITH CATEGORY B BUSHINGS (BLUE)

## Characteristic

### Standard driving depth

1.35 ÷ 1.6

### Diameter of crankcase without bushing

32.953 ÷ 32.963

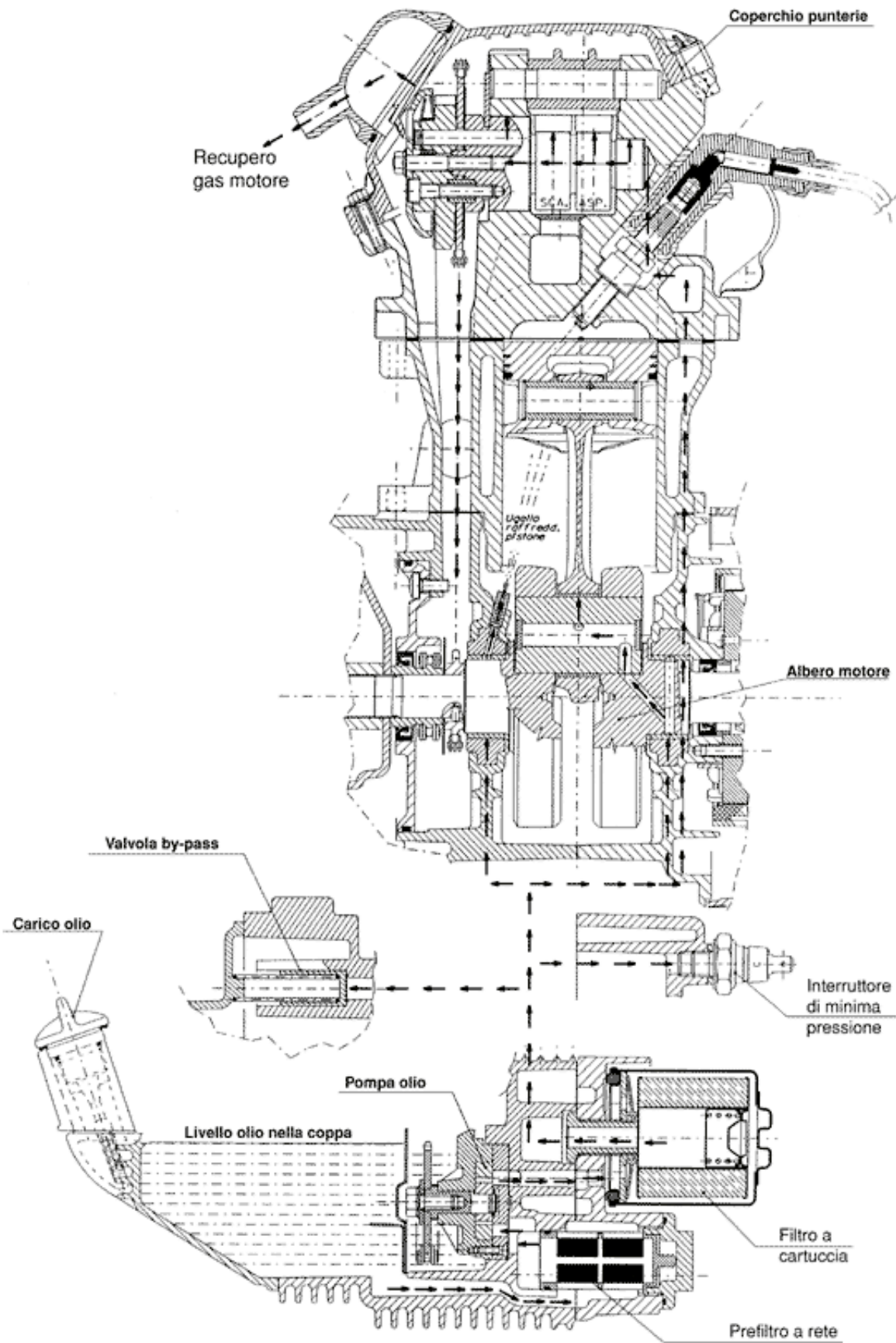
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## Lubrication

---

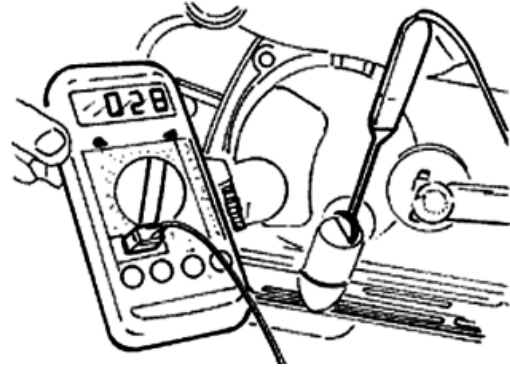
## Conceptual diagrams

LUBRICATION CIRCUIT



## Oil pressure check

- After removing the flywheel cover as described in the "Flywheel" chapter, remove the electric connexion of the minimum oil pressure switch and then remove the switch.
- With the engine idling at 1650 rpm and the oil temperature at  $\sim 90^{\circ}\text{C}$ , check that the oil pressure is between  $0.5 \div 1.2$  atm.
- With the engine idling at 6000 rpm and the oil temperature at  $\sim 90^{\circ}\text{C}$ , check that the oil pressure is between  $3.2 \div 4.2$  atm.
- Remove the appropriate tools once the measurement is complete, refit the oil pressure switch and washer, tightening it to the specified torque and fit the fan cover.
- If the oil pressure is not within the specified limits, in the following order, check: the oil filter, the oil by-pass valve, the oil pump and the crankshaft seals.

**N.B.**

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

### Characteristic

#### Oil pressure

Minimum pressure admitted at 6000 rpm: 3.2 atm.

#### Locking torques (N\*m)

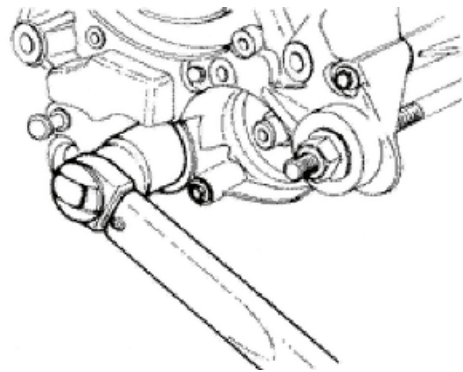
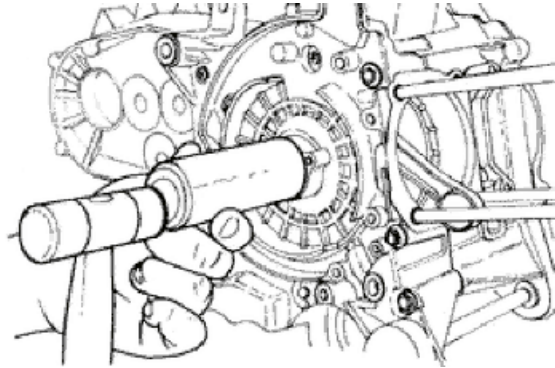
Minimum oil pressure sensor  $12 \div 14$



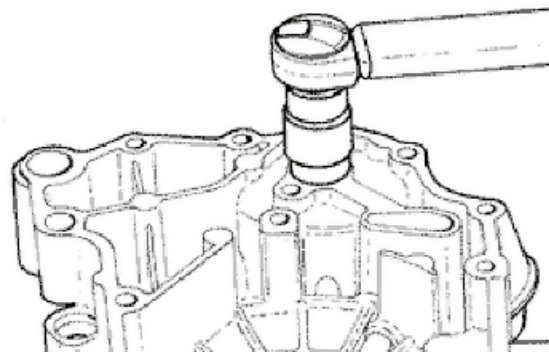
## Crankshaft oil seals

### Refitting

- Fit the internal bulkhead by locking the two screws to the prescribed torque.
  - Fit the oil filter fitting and tighten it to the specified torque.
  - Place a new gasket on one of the crankcase halves, preferably on the transmission side, together with the locating dowels.
  - Lubricate the main bushings and insert the crankshaft in the transmission side crankcase half.
  - Reassemble the two crankcase halves.
- For the 200 models reposition the shim washers as in the original fitting.



- Fit the 11 screws and tighten them to the prescribed torque.
  - Lubricate the flywheel oil seal.
  - Using the appropriate tool, assemble the oil seal.
  - Fit a new O-ring on the pre-filter and lubricate it.
  - Insert the filter on the engine with the relative cap.
- Tighten to the specified torque.



#### N.B.

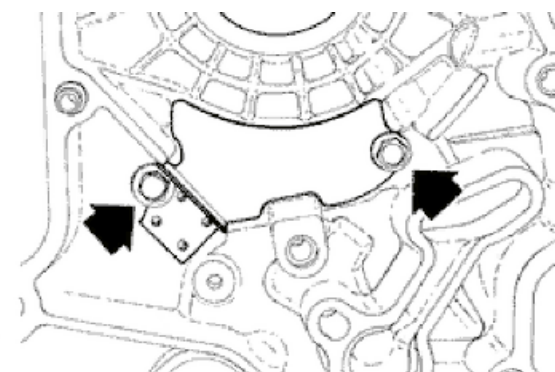
FAILURE TO USE THE SPECIFIC TOOL CAN RESULT IN AN INCORRECT DEPTH POSITION AND AS A CONSEQUENCE IN INADEQUATE OIL SEALING.

#### Specific tooling

020425Y Punch for flywheel-side oil seal

#### Locking torques (N\*m)

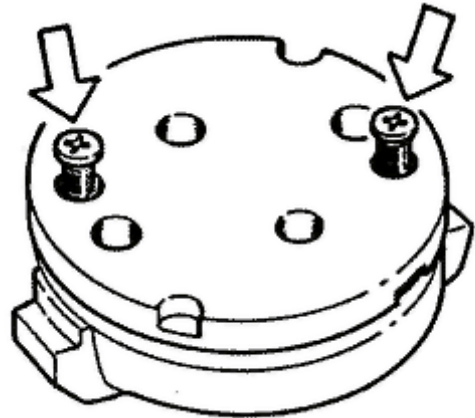
Internal engine crankcase bulkhead (transmission-side half shaft) screws  $4 \div 6$  Oil filter on crankcase fitting  $27 \div 33$  Engine-crankcase coupling screws  $11 \div 13$  Engine oil drainage plug/mesh filter  $24 \div 30$





## Oil pump

- Check there are no signs of wear on the oil pump shaft or body.
- Check there are no signs of scoring or wear on the oil pump cover.
- If you detect non-conforming measurements or scoring, replace the faulty parts or the unit.
- Fit the pump cover in the position that permits the crankcase fixing screws to be aligned.
- Make sure the gasket is positioned properly and refit the pump on the engine crankcase. The pump can only be fitted in one position.
- Tighten the screws to the prescribed torque.
- Fit the sprocket wheel with a new O-ring.
- Fit the chain.
- Fit the central screw and the belleville washer. Tighten to the prescribed torque.
- Fit the oil pump cover by tightening the two screws to the prescribed torque.



### N.B.

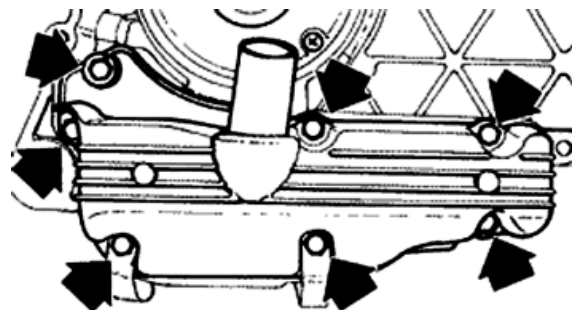
**FIT THE BELLEVILLE WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.**

### Locking torques (N\*m)

**Screws fixing oil pump to crankcase 5 - 6 Oil pump control crown screw 10 ÷ 14 Oil pump cover screws 0.7 ÷ 0.9**

## Removing the oil sump

- Remove the oil filler plug, the transmission cover, the complete driving pulley assembly with belt and the sprocket wheel, as described in the "Transmission" chapter.
- Drain the oil as described previously.
- Remove the seven screws, shown in the diagram, and the two rear brake fluid pipe fixing brackets.
- Remove the screw, the by-pass piston, the gasket and centring dowels shown in the figure.



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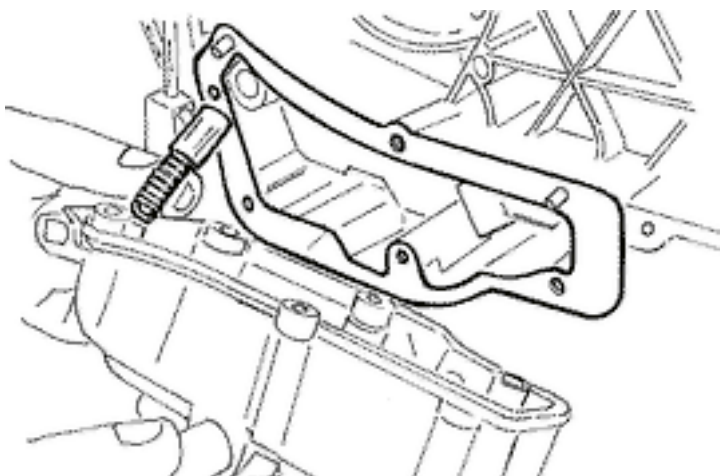
## Inspecting the by-pass valve

- Check the unloaded spring length.
- Check that the small piston is not scored.
- Ensure that it slides freely on the crankcase and that it guarantees a good seal.
- If not, eliminate any impurities or replace defective parts.

### Characteristic

#### By-pass check up: Standard length

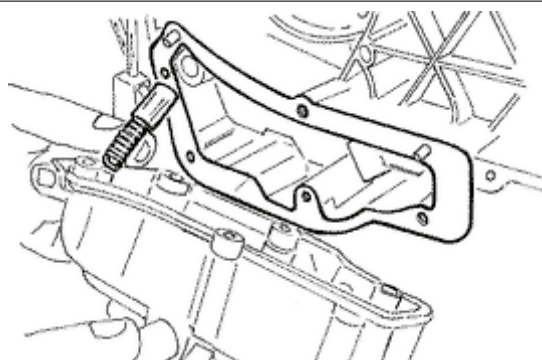
54.2 mm



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## Refitting the oil sump

- Refit the by-pass valve plunger in its housing.
- Insert the pressure-regulating spring.
- Fit a new sump seal.
- Refit the two centring dowels.
- Refit the sump, taking care to locate the spring in the appropriate recess machined into the inside of the sump.
- Refit the rear brake cable brackets and the screws in the reverse order from which they were removed.
- Tighten the screws to the prescribed torque.
- Refit the drive pulley assembly, the drive belt, the sprocket wheel and the transmission cover, as described in the "Transmissions" chapter.



- When testing the lubrication system, refer to chapter "Crankcase and Crankshaft", regarding lubrication of the crankshaft and connecting rod

### Locking torques (N\*m)

Oil sump screws 10 ÷ 14

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## SAS valve

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### Inspecting the one-way valve

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- Remove the SAS valve.
- Provisionally assemble the rubber coupling of the SAS valve outlet to ensure tightness.
- Connect the MITYVAC vacuum pump to the rubber coupling as shown in the photograph.
- Set the pump to the low-pressure position (VACUUM).
- Operate the pump slowly.
- Check that the one way valve allows the air to pass through causing a slight vibration.
- Switch the pump to pressure mode (PRESSURE).
- Operate the pump slowly and check if there is an increase of pressure. A small leakage is considered to be normal.



If anomalies are detected, replace the pump.

**N.B.**

**A MALFUNCTIONING ONE-WAY VALVE CAN RESULT IN RUBBER COUPLING AND FILTER OVERHEATING**

**N.B.**

**ABSENCE OF VIBRATION INDICATES INEFFICIENT SEALING**

### Specific tooling

**020329Y MityVac vacuum-operated pump**

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## Inspecting the cut-off

- Remove the SAS valve.
- Connect the MITYVAC pump in low-pressure mode (VACUUM) to the CUT-OFF valve vacuum intake.
- Apply a vacuum value higher than 0.5 BAR.
- Check that this value is kept all the time.
- If a worn seal is detected, replace it.
- With a "T" bypass and flexible rubber hoses make a parallel connection between the rubber coupling and the vacuum intake of the CUT-OFF valve.
- Connect the bypass to the MITYVAC pump.
- Set the pump set to the low-pressure mode (VACUUM).
- Using a pair of long flat pliers, choke the rubber hose next to the valve.
- Operate the pump until vacuum is higher than 0.5 BAR.
- Release the hose and check how the vacuum reacts.
- Under normal functioning conditions the vacuum undergoes a slight fall and then readjusts. There follows a slow and continuous loss of depression up to approximately 0.4 BAR. At this point the valve opens and the depression is suddenly set to zero.

Lack of tightness or the fact that the valve opens at different vacuum values should be regarded as anomalies. In this case, replace it.

### N.B.

**LACK OF TIGHTNESS IN THE CUT-OFF VALVE RESULTS IN EXHAUST NOISE (EXPLOSIONS IN THE MUFFLER). INCORRECT CUT-OFF VALVE CALIBRATION CAN RESULT IN CATALYTIC CONVERTER MALFUNCTIONING**

### N.B.

**A FAULTY CUT-OFF VALVE DIAPHRAGM, BESIDES JEOPARDISING THE CORRECT OPERATION OF THE CUT-OFF VALVE, ALSO DAMAGES IDLE FUNCTIONING**

## Specific tooling

**020329Y MityVac vacuum-operated pump**

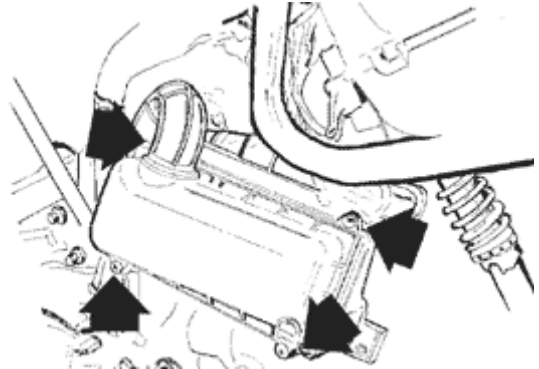


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## Fuel supply

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- To clean the filtering element proceed as follows: remove the 4 filter cover fixing screws indicated in the figure; remove the cover and take out the paper filtering element, clean with compressed air and refit.
- Make sure the filtering element is in the correct position.
- Check that the air passage sections are not damaged or deformed.
- Check the correct sealing of the coupling between the filter housing and the cover.

**N.B.**

**FAILURE TO OBSERVE THESE INSTRUCTIONS MAY RESULT IN WRONG VACUUM INSIDE THE FILTER HOUSING, WHICH IN TURN MAY PRODUCE VARIATIONS IN CARBURETION.**

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## Removing the carburettor

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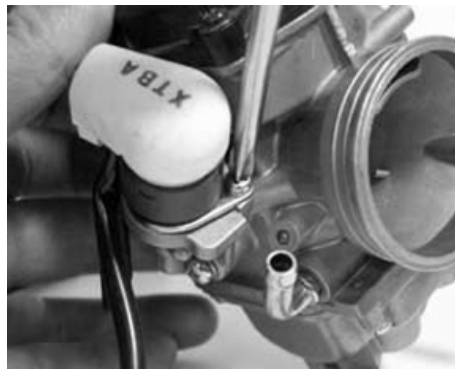
### Kehin

- To detach the carburettor from the engine, it is necessary to move the air filter and remove the transmission throttle control, the automatic starter connection, the clamps anchoring the carburettor to the filter housing and to the inlet manifold, the air delivery pipe to the diaphragm, and the intake fitting.
- Take out the carburettor and rotate it so as to remove the screw with the water joint and the pipes.

**N.B.**

**THIS LAST OPERATION IS NECESSARY SO AS NO TO EMPTY THE COOLING SYSTEM.**

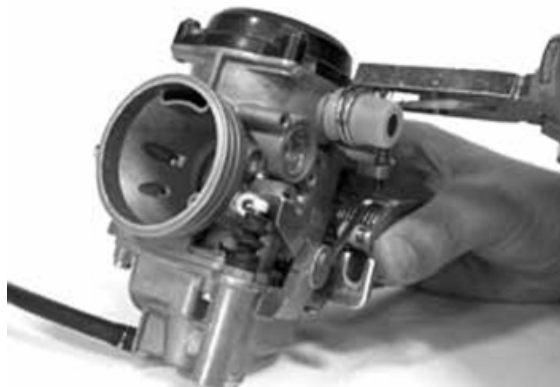
- 
- Remove the protection, the bracket and the starter acting on the screw shown in the figure.



- 
- Remove the 2 screws and the starter support with the gasket.



- 
- Remove the clamp and cover with the airing filter of the diaphragm chamber.



- 
- Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.

**WARNING**

**DURING THE REMOVAL OF THE CARBURETTOR COVER TAKE SPECIAL CARE NOT TO RELEASE THE SPRING ACCIDENTALLY.**

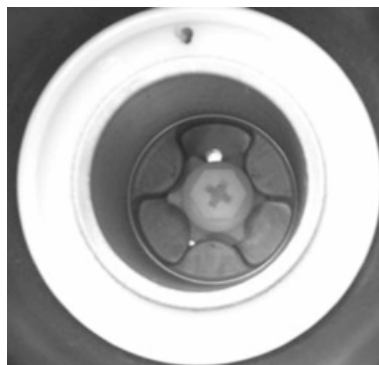




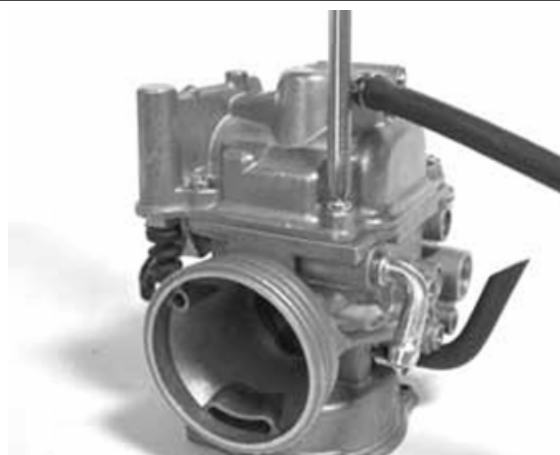
- Remove the vacuum valve together with the diaphragm.



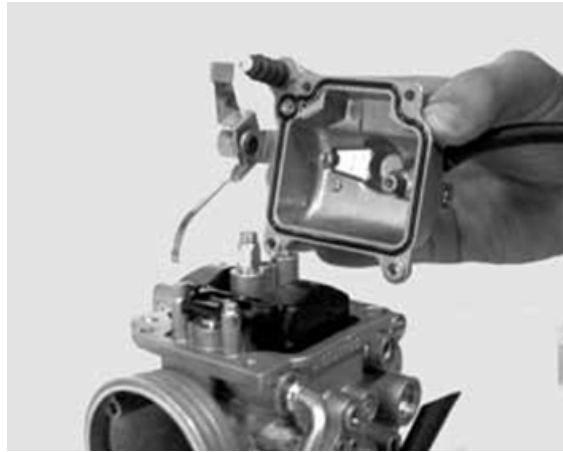
- Unscrew the bayonet joint 1/8 of a turn and remove, take out the spring and vacuum valve needle



- Remove the 4 screws indicated in the figure.



- Remove the chamber with the accelerating pump, its control and gasket.



- Remove the oil pump seal.
- Remove the intake and outlet valves of the intake pump from the tank

**N.B.**

**CAUTION, THE ACCELERATION PUMP VALVES ARE MADE UP OF NOZZLES, SPRING AND BALL.**

**N.B.**

**AVOID REMOVING THE PISTON OF THE PUMP AND ITS CONTROL.**



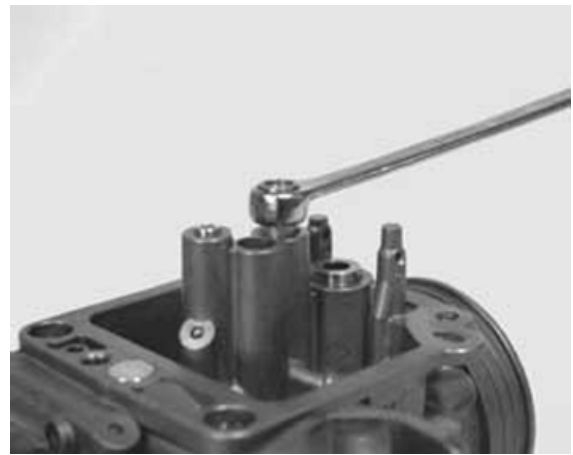
Adequately support the carburettor and using a rod and hammer remove the float pin acting from the throttle control side.

- Remove the float and the plunger.
- Remove the maximum nozzle

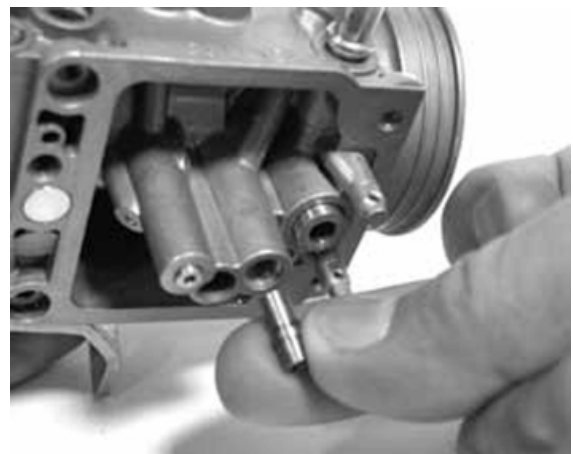




-Remove the maximum nozzle.



-Remove diffuser.

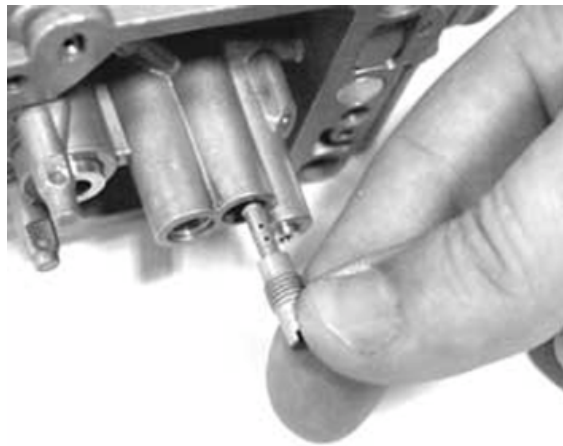


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- Remove the sprayer.

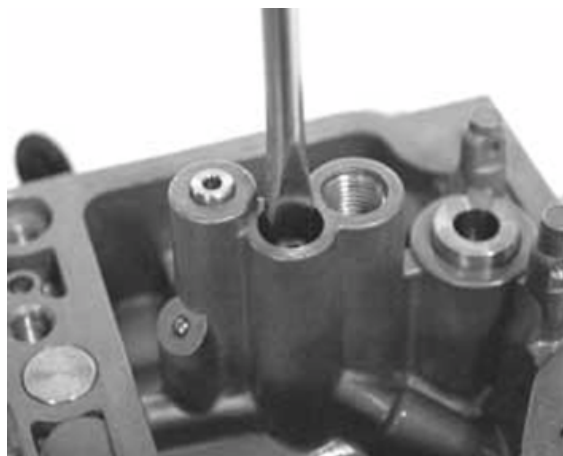
**N.B.**

WHEN CLEANING THE CARBURETTOR BODY REMOVE THE SPRAYER TO AVOID LOSING PARTS. IF THE SPRAYER IS FORCED IN ITS HOUSING DO NOT ATTEMPT TO REMOVE IT AS THIS WILL ONLY DAMAGE IT.



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-Remove the minimum nozzle.

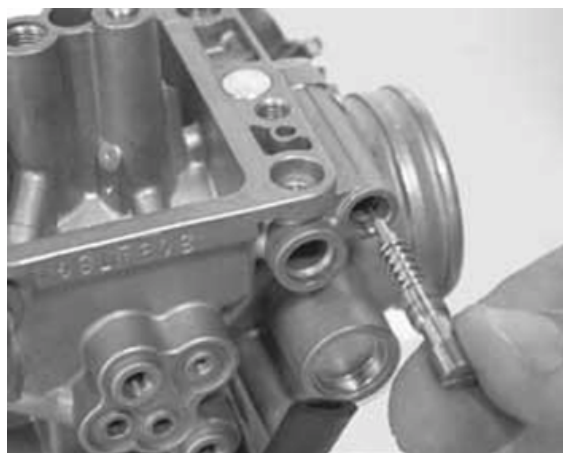


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- Remove the minimum flow set screw and the spring.

**CAUTION**

DO NOT ATTEMPT REMOVING PARTS EMBEDDED IN THE CARBURETTOR BODY SUCH AS: FUEL SUPPLY PIPE, PLUNGER HOUSING, STARTER NOZZLE, PIT COVER FOR PROGRESSIONS AND INLET NOZZLE, MINIMUM AND MAXIMUM AIR GAUGE, THROTTLE VALVE CONTROL SHAFT. DO NOT REMOVE THROTTLE-SHAFT CONNECTION SCREWS. THE FIXING SCREWS ARE CAULKED AFTER ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.



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## Walbro

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To detach the carburettor from the engine, it is necessary to move the air filter and remove the transmission throttle control, the automatic starter connexion, the clamps anchoring the carburettor to the filter housing and to the inlet manifold, the air delivery pipe to the diaphragm, and the intake fitting.

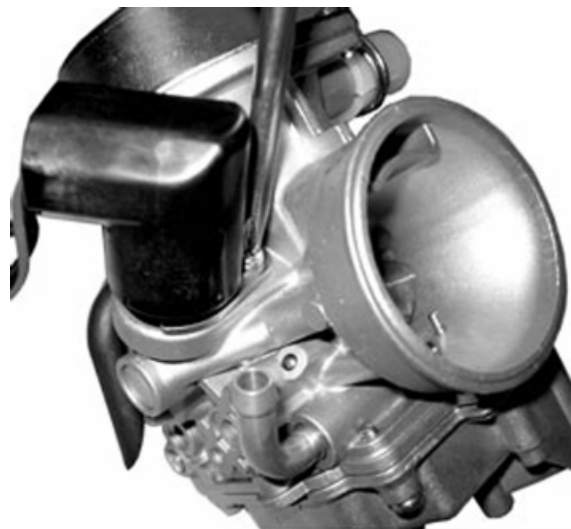
- Take out the carburettor and rotate it so as to remove the screw with the water joint and the pipes

**N.B.**

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



Remove the protection, the bracket and the starter acting on the screw shown in the figure.



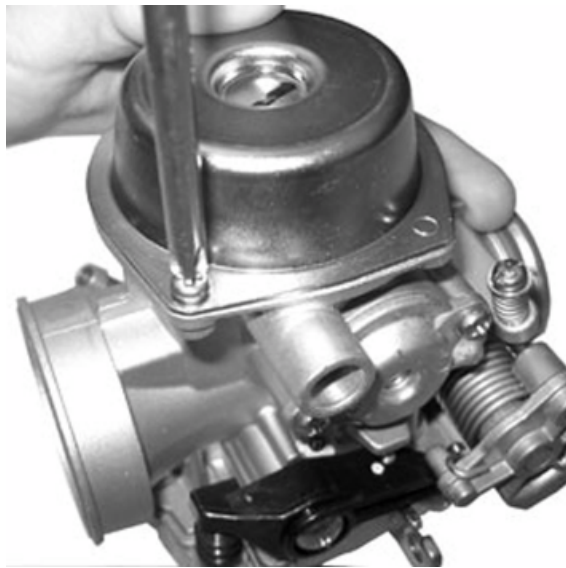
Remove the clamp and cover with the airing filter of the diaphragm chamber.



Remove the 4 fixing screws indicated in the figure and the vacuum chamber cover.

**N.B.**

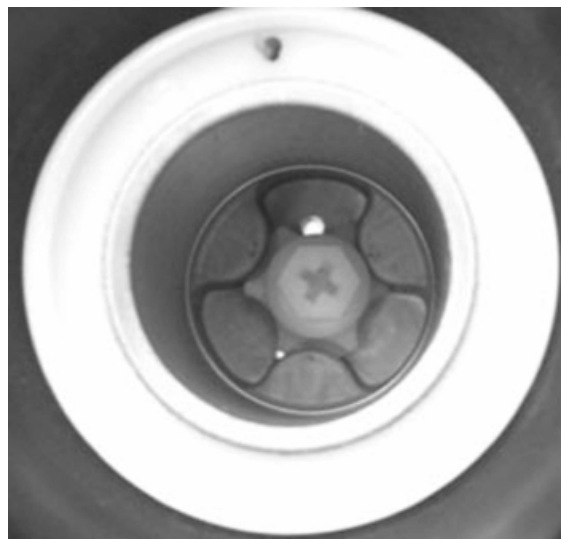
**DURING THE REMOVAL OF THE COVER TAKE SPECIAL CARE NOT TO RELEASE THE SPRING ACCIDENTALLY.**



Remove the vacuum valve together with the diaphragm.



Unscrew the bayonet joint 1/8 of a turn, remove it, take out the spring and vacuum valve plunger



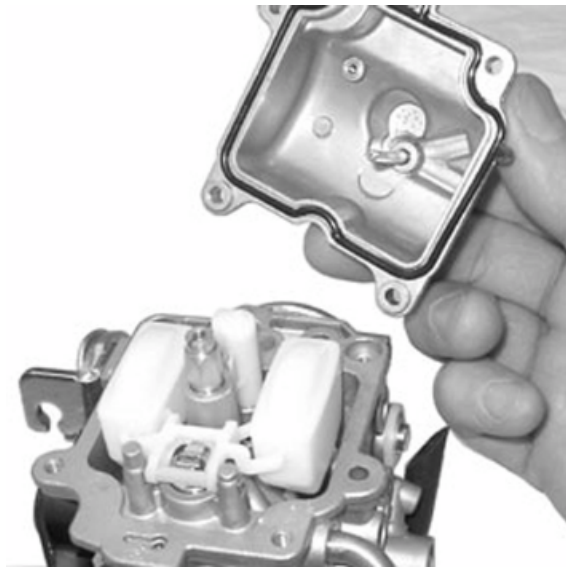
Remove the 4 screws shown in the figure.



Remove the tank with the intake pump, its control and gasket.



Remove the acceleration pump piston with the ring nut, the hood, the O-Ring and the spring from the tank as shown in the figure.



Adequately support the carburettor and using a rod and hammer remove the float pin acting from the throttle control side.

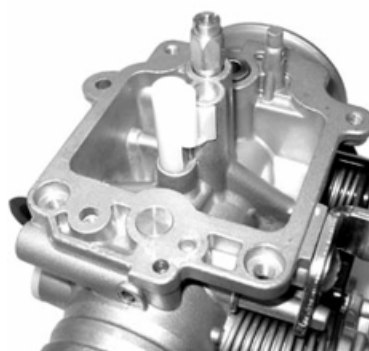
Remove the float and the plunger.



Remove the cover of the duct from the carburettor to the starter nozzle as shown in the figure.



- Remove the maximum nozzle.
- Remove diffuser.



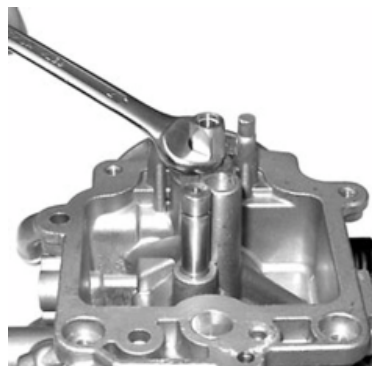
Remove the sprayer.

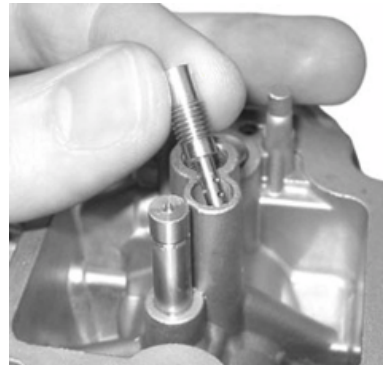
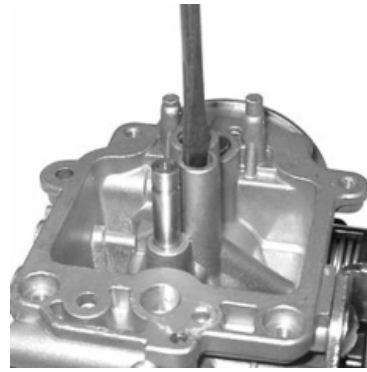
**N.B.**

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



- Remove the minimum nozzle.





Remove the minimum flow screw with the O-ring, the washer and the spring.

-Remove the 2 fixing screws, the cover, the spring, and the cut-off device diaphragm.

**CAUTION**

DO NOT ATTEMPT REMOVING PARTS EMBEDDED IN THE CARBURETTOR BODY SUCH AS: FUEL SUPPLY PIPE, PLUNGER HOUSING, STARTER NOZZLE, PIT COVER FOR PROGRESSIONS AND INLET NOZZLE, MINIMUM AND MAXIMUM AIR GAUGE, THROTTLE VALVE CONTROL SHAFT. DO NOT REMOVE THROTTLE-SHAFT CONNECTION SCREWS. THE FIXING SCREWS ARE CAULKED AFTER THE ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.



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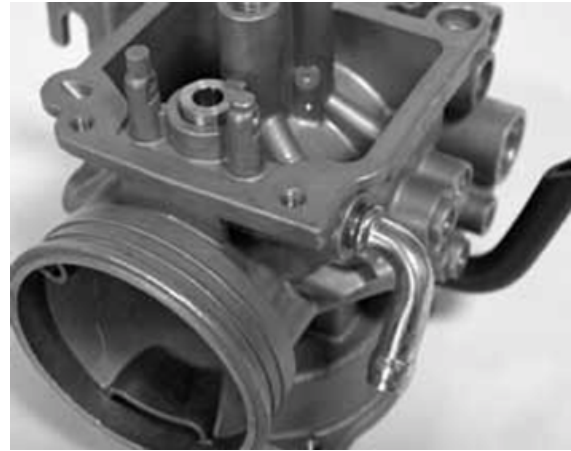
## Refitting the carburettor

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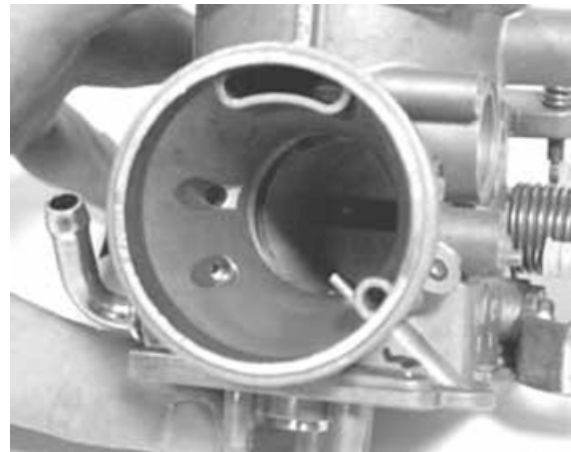


## Kehin

- Before refitting, wash the carburettor body accurately with petrol and compressed air.
- Pay special attention to the fuel supply pipe and the plunger seat.



- For maximum circuit, check the air adjustment is correct as shown in the figure.



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



- For the starter circuit, blow the connection pipe properly with the jet. This is necessary because the nozzle support hides other inaccessible internal calibrations.
- Blow the intake nozzle properly.

### N.B.

**THE ACCELERATION NOZZLE OUTLET IS EXTREMELY SMALL AND IS ORIENTED TO THE THROTTLE VALVE. NOZZLE INCORRECT ORIENTATION RESULTS IN INADEQUATE SPRAYING.**

- Check that there are 5 closing ball joints for the operating pipes on the carburettor body.

- Check that the coupling surfaces, the tank and the diaphragm are not dented.
- Check that the depression valve housing pipe is not scratched.
- Check that the throttle valve and the shaft do not show abnormal wear.
- Check that the plunger seat does not show abnormal wear.
- Replace the carburettor in case of irregularities.
- Check that the return spring of the accelerating pump rocking lever is not deformed by over-stretching.

**N.B.**

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

- Wash and blow the minimum nozzle properly and reassemble it.



- Properly wash and blow the components of the sprayer maximum circuit, the diffuser and the nozzle.
- Introduce the sprayer in the carburettor body with the shortest cylindrical part directed to the diffuser.
- Assemble the diffuser making sure the sprayer is being adequately inserted and lock it.
- Assemble the maximum nozzle.



- Check that the tapered pin does not show signs of wear on the sealing surfaces of the shock absorber pin and the return clamp.
- Replace the rod if worn out.



- Check that the float is not worn on the pin housing or on the contact plate with the plunger and that there are no fuel infiltration.
- Replace it in case of anomalies.

- Introduce the float with the rod on the fuel feeding tube side.

**N.B.**

**INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY**

- Remove the drainage screw from the tank, wash and blow it properly and make sure the acceleration pump pipes are clean.

- Operate the acceleration pump piston repeatedly and blow with compressed air.

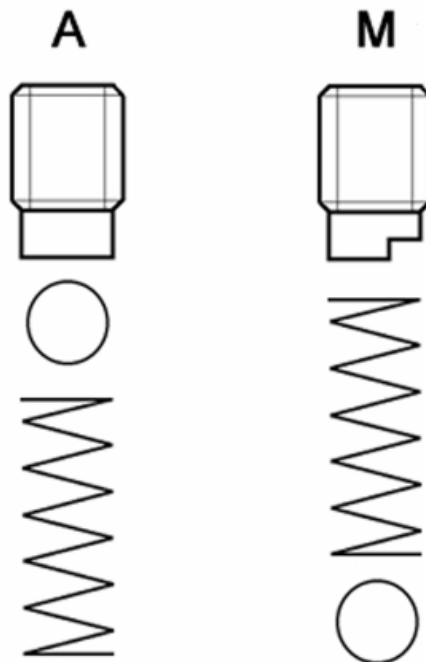
- Reassemble the acceleration pump valves following this order:

**INTAKE VALVE (A)**

- Spring
- Ball
- Nozzle

**IN VALVE (M)**

- Ball
- Spring
- Nozzle



**N.B.**

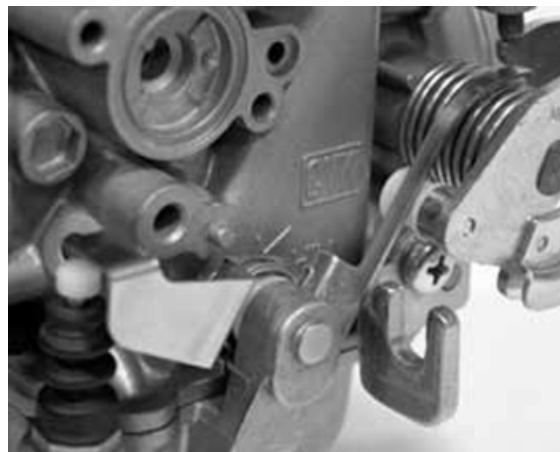
**THE IN VALVE NOZZLE, CORRESPONDING TO THE ACCELERATION PUMP, IS MILLED.**

-Check the screw tightness introducing a small amount of fuel in the tank.

- Assemble a new gasket on the tank.

- Assemble the tank on the carburettor body fastening the 4 screws.

- Check that the control roller is free to rotate in its own seat.



**N.B.**

**MAKE SURE THE TANK GASKET IS CORRECTLY INTRODUCED**

**N.B.**

**AVOID DEFORMING THE ACCELERATION PUMP CONTROL ROCKING LEVER.**

- Wash and blow the flow screw properly.

- Check that screw is not deformed and/or rusty.

- Assemble the spring on the screw.

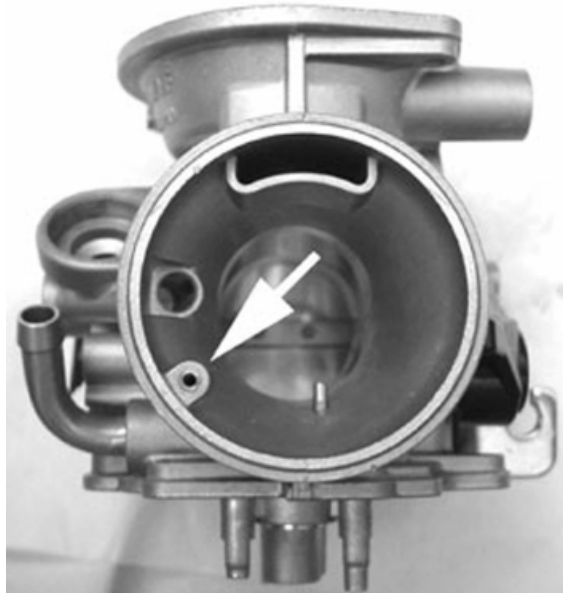
- Screw the flow screw on the carburettor body.



- The screw final position should be determined by an exhaust fume analysis.
- Adjust the carburettor by turning the screw twice from the close position.

## Walbro

- Before refitting, wash the carburettor body accurately with petrol and compressed air.
- Pay special attention to the fuel supply pipe and the plunger seat.



- For maximum circuit, check the air adjustment is correct as shown in the figure.
- Carefully clean the air holes indicated in the figure.



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

**N.B.**

**THE MINIMUM AIR IS CONTROLLED BY TWO ADJUSTMENTS. THE CUT-OFF ONE IS INDICATED DIRECTLY IN THE CARBURETTOR BODY.**

- For the starter circuit, blow the connection pipe properly with the jet. This is necessary because the nozzle support hides other inaccessible internal calibrations.

- Blow the intake nozzle properly.

**N.B.**

**THE ACCELERATION NOZZLE OUTLET IS EXTREMELY SMALL AND IS ORIENTED TO THE THROTTLE VALVE. NOZZLE INCORRECT ORIENTATION RESULTS IN INADEQUATE SPRAYING.**



- Check that there are 5 closing ball joints for the operating pipes on the carburettor body.
- Check that the coupling surfaces, the tank and the diaphragm are not dented.
- Check that the depression valve housing pipe is not scratched.
- Check that the throttle valve and the shaft do not show abnormal wear.
- Check that the plunger seat does not show abnormal wear.
- Replace the carburettor in case of irregularities.

**N.B.**

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

- Wash and blow the minimum nozzle properly and reassemble it.

- Properly wash and blow the components of the sprayer maximum circuit, the diffuser and the nozzle.

- Introduce the sprayer in the carburettor body with the shortest cylindric part directed to the diffuser.

- Assemble the diffuser making sure the sprayer is being adequately inserted and lock it.

- Assemble the maximum nozzle.

- Check that the tapered pin does not show signs of wear on the sealing surfaces of the shock absorber pin and the return clamp.

- Replace the rod if worn out.

- Check that the float is not worn on the pin housing or on the contact plate with the plunger and that there are no fuel infiltration.

- Replace it in case of anomalies.

- Assemble the float with the plunger introducing the pin on the carburettor feeding tube side.

**N.B.**

**INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY**



---

## Level check

---

### Kehin

---

- Place the carburettor inclined as shown in the figure.



- Check that the float reference is parallel to the tank coupling surface
  - If different positions are detected, change the plunger control metal plate direction to obtain the position described above.
- 

### Walbro

- Make sure the float coupling surface is parallel to the tank surface with the carburettor in inverted position.
- If different positions are detected, change the plunger control metal plate direction to obtain the position described above.
- If the plate gets deformed, make sure it remains parallel to the float pin.

**N.B.**

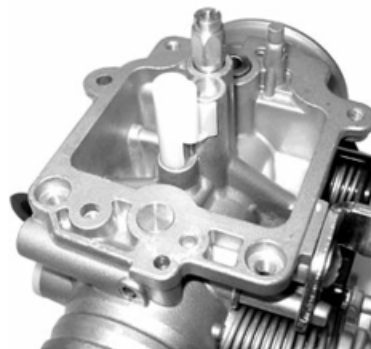
**WITH INVERTED CARBURETTOR, THE FLOAT WEIGHT SHOULD NOT EXCEED THE TAPERED PIN SPRING THRUST. OTHERWISE, CHECK THAT THE FLOAT IS NOT HEAVY DUE TO FUEL INFILTRATION. REPLACE THE FLOAT AND THE TAPERED PIN, IF NECESSARY.**

---

- Wash and blow the carburettor duct cover properly and introduce it in the starter nozzle.

**N.B.**

**INCORRECT ASSEMBLY OF CARBURETTOR DUCT COVER ON THE STARTER NOZZLE CAUSES A NEGATIVE COLD START-UP SITUATION: THE STARTER NOZZLE TAKES UP THE OLD FUEL FROM THE BOTTOM OF THE TANK.**



- Remove the drainage screw from the tank, wash and blow the tank properly and make sure the acceleration pump intake and supply valve are clean.
- Being the valves unidirectional, blow them carefully with compressed air, at the inner side of the tank for the intake valve and at the pump piston housing for the supply valve.
- Check that there are no signs of wear in the acceleration pump piston and its corresponding seat in the tank.
- In case of wear, replace the defective parts.
- Check that the acceleration pump piston contrast spring is not worn.
- Assemble a new O-Ring and a new bellows gasket. Reassemble the piston unit on the tank.
- Assemble a new O-Ring on the tank drainage screw and lock it.



- Check the screw tightness introducing a small amount of fuel in the tank.
- Assemble a new gasket on the tank.
- Assemble the tank on the carburetor body fastening the 4 screws.



- Wash and blow the flow screw properly and assemble a new O-Ring.
- Preassemble the components on the screw as follows: spring, washer and O-ring.
- Screw the flow screw on the carburetor body.
- The screw final position should be determined by an exhaust fumes analysis.



- Prepare the carburettor for adjustment by rotating the screw 3 turns from the close position.

- Check that the rocking lever control of the accelerating pump does not show abnormal wear.

- Check that the end of stroke screw of the rocking lever protrudes 3.2 mm.



Check that the return spring of the rocking lever is not loaded.

- Preassemble the spring and rocking lever as shown in the figure.

- Assemble the rocking lever on the carburettor keeping the throttle valve open.

- Lock the fixing screw of the rocking lever.

- Make sure that the mechanism works correctly.



## Inspecting the valve and needle

### Kehin

- Check that the tapered pin of the vacuum valve does not show wear.

- Check that the depression valve does not show threads on the external surfaces.

- Check that the vacuum intake hole is not clogged.

- Check that the diaphragm is not damaged or has hardened, otherwise replacement the whole valve.

- Insert the tapered pin into the vacuum valve housing.

- Reassemble the vacuum valve on the carburettor body taking care that the tapered pin is inserted into the sprayer.





**N.B.**

**THE VALVE CAN BE INSERTED IN ONLY ONE POSSIBLE POSITION.**



- Reassemble the spring with the pin lock.
- Remove the cover of the vacuum chamber being careful to correctly insert the spring in its place on the cover.
- Tighten the screws.



- Wash and blow dry the filter sponge of the ambient pressure intake.



- 
- Reassemble the filter with its clamp.



- 
- Wash and blow dry the starter support.  
Assemble a new gasket on the carburettor body and tighten the 2 fixing screws.



---

## Walbro

- 
- Check that the pin does not show signs of wear and that the lock is in the 3rd of the 3 notches.
  - Check that the valve does not show threads around its external diameter.
  - Check that the 2 vacuum supply holes are not clogged.

**N.B.**

**THE 2 VACUUM SUPPLY HOLES ARE OF DIFFERENT DIAMETERS.**



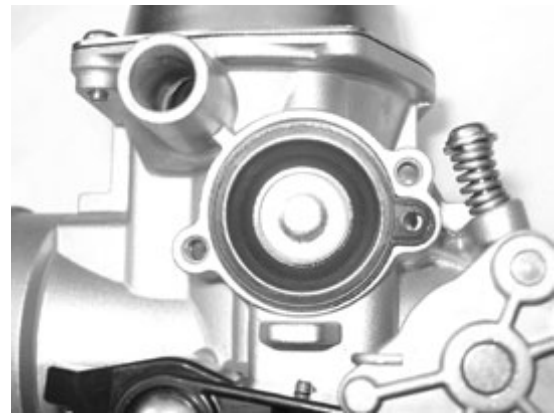
- Check that the diaphragm is not worn or has hardened.  
If it does, replace it.
- Refit the tapered pin on the vacuum valve.
- Make sure the spring is in the correct position on the plunger and inserted in its housing.
- Assemble the coupling by rotating it 1/8 of a turn.



- Reassemble the vacuum gas valve on the carburettor body being careful that the tapered pin is inserted into the sprayer.
- Time the vacuum valve rotation inserting the diaphragm tab in its place.

When the diaphragm is correctly assembled to the valve, the main vacuum supply hole is positioned axially with the diffuser, on the throttle valve side.

- Refit the spring on the valve.
- Refit the vacuum chamber cover matching the reference mark with the orientation of the diaphragm.
- Tighten the screws to the prescribed torque.
- Check the cut-off valve correct functioning. -
- Check that the diaphragm is not worn or has hardened. Check the free length of the spring.



### Characteristic

#### Walbro: Standard length of cut-off spring

24 mm

- Reassemble the diaphragm and the metal pin placed on the valve.
- Reassemble the spring and the cover. The vacuum intake should be facing upwards.

## Inspecting the automatic choke device

- Check that the piston of the automatic starter is not deformed or rusty.
- Check that the piston slides freely from the seat to the support.
- Check that the sealing gasket of the piston is not deformed.
- The starter must be more or less functional depending on the ambient temperature.
- Measure the protrusion of the piston as shown in the figure and check the corresponding value.
- Make sure that the starter is adjusted for the ambient temperature.
- The starter should disconnect progressively by means of electrical heating.
- Check the starter resistance when adjusted to the ambient temperature.

With a 12V battery 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.
- Assemble the starter to the carburettor being careful to position the O-Ring correctly, insert the plate with the machined side contacting the starter, tighten the 2 fixing screws.
- Position the starter as shown in the figure.
- Assemble the protection casing.

### Characteristic

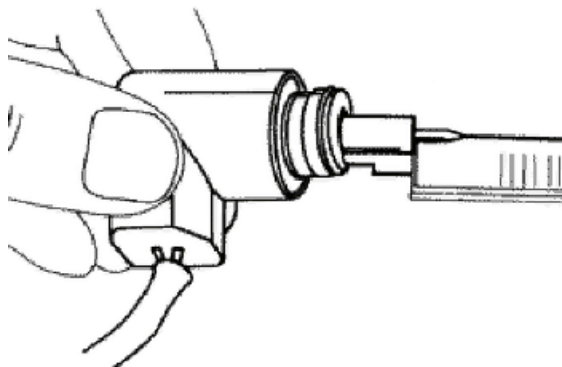
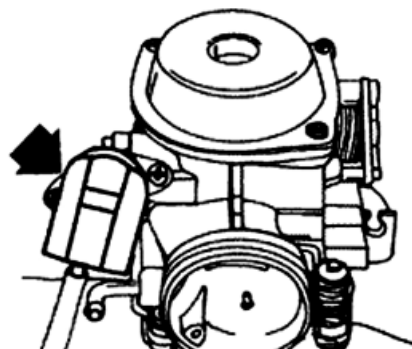
#### Check the auto starter: Protrusion Value for Walbro

12.5 ÷ 13 mm at approx. 20°C

#### Check the automatic starter: maximum protrusion

18.5 ÷ 19 mm

#### Check the automatic starter: Max. time:



5 min

### Electric characteristic

#### Check the automatic starter: Resistance

around 30  $\Omega$

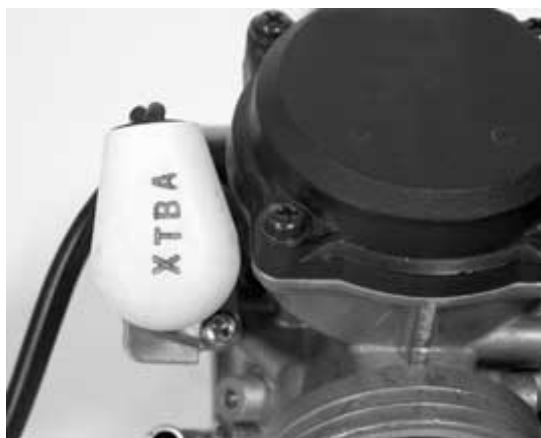
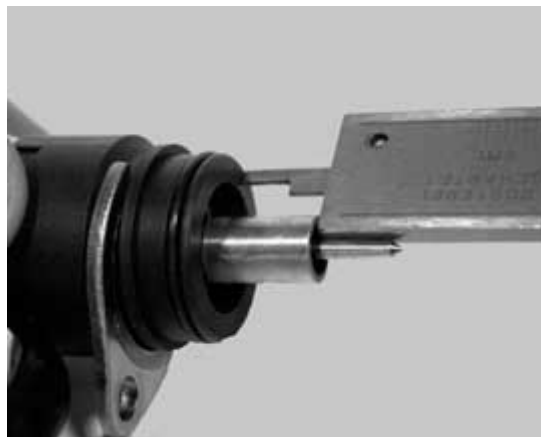
## Kehin

- Check that the automatic starter piston is not deformed or rusty.
- Check that the piston slides freely from the seat to the support.
- Check that the piston sealing gasket is not deformed.
- The starter must be more or less functional depending on the ambient temperature.
- Measure the protrusion of the piston as shown in the figure and check its corresponding value.
- Make sure that the starter is adjusted for the ambient temperature.
- The starter should disconnect progressively by means of electrical heating.
- Check the starter resistance when adjusted to the ambient temperature.

With a 12V battery power the automatic starter and check that the 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.
- Assemble the starter to the carburettor being careful to position the O-Ring correctly, insert the plate with the machined side contacting the starter, tighten the fixing screws.
- Position the starter as shown in the figure.
- Assemble the protection casing.

**N.B.**



TO CARRY OUT THIS CHECK PAY SPECIAL ATTENTION NOT TO GENERATE SHORT CIRCUITS USE A CABLE SECTION WITH A TERMINAL SUITABLE TO BE CONNECTED TO THE STARTER.

### Characteristic

**Check the automatic starter: Kehin: Protrusion value**

XX ÷ XX mm at approx. 20°C

**Check the automatic starter: Kehin maximum protrusion**

XXX ÷ XXX mm

**Check the automatic starter: Keihin maximum time**

5 min



## Walbro

- Check that the automatic starter piston is not deformed or rusty.
- Check that the piston slides freely from the seat to the support.
- Check that the piston sealing gasket is not deformed.
- The starter must be more or less functional depending on the ambient temperature.
- Measure the protrusion of the piston as shown in the figure and check its corresponding value.
- Make sure that the starter is adjusted for the ambient temperature.
- The starter should disconnect progressively by means of electrical heating.
- Check the starter resistance when adjusted to the ambient temperature (20 - 25° C).

With a 12V battery power the automatic starter and check that the 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****Check the auto starter: Protrusion Value for Walbro**

12.5 ÷ 13 mm at approx. 20°C

**Check the automatic starter: Walbro maximum protrusion**

18.5 ÷ 19 mm

**Check the automatic starter: Walbro max. time**

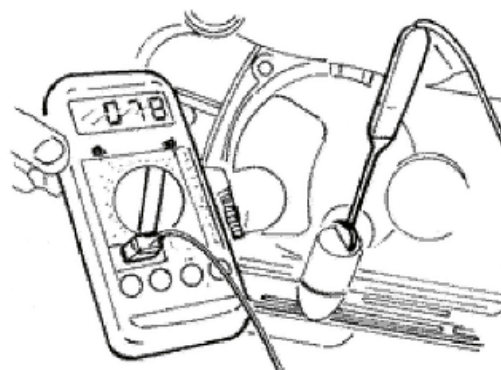
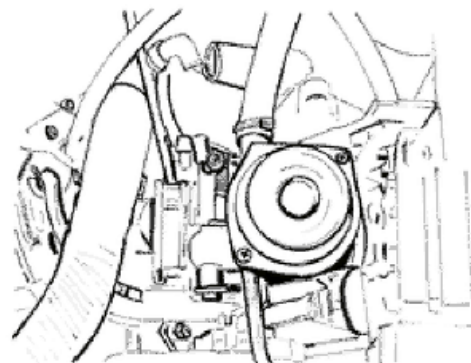
5 min

**Electric characteristic****Walbro Resistance**

approx. 40 Ω

**Adjusting the idle**

- The engine does not need frequent idle adjustments, however it is very important to make any adjustments fully respecting some standards.
- Before adjusting the carburettor make sure to respect the lubrication requirements, valve clearance, and complying timing, spark plug should be in optimum conditions, air filter clean and sealed, and the exhaust system tight.
- Warm up the engine by running it at least 5 minutes at approximately 50 kph.
- Connect the vehicle to the exhaust fumes analyser inserting the probe into a sealed extension pipe placed at the muffler exit end.
- Connect a millimetre thermometer (020331y) on the sump, using a cover with oil expressly prepared for probes.
- Start the motor and before adjusting the idle speed make sure that the oil temperature is between 70 ÷ 80°C.
- Using the rpm indicator or any other instrument (020332y), adjust the idle screw to obtain 1600 rpm ÷ 1700 rpm
- Adjust the flow screw until the carbon monoxide (CO) percentage is 3.1 ÷ 4.5%, when the screw is



loosened the CO value rises (rich mix). Tightening the screw decreases the CO (lean mix).

- If the adjustment of the flow screw causes a rpm increase readjust the revs again and if necessary, the flow screw to reach stable values.

- When the oil temperature, the numbers of revs and the percentage of carbon monoxide are respected the idle carburetion is considered correct.

From the analyser we can draw further information:

- carbon dioxide percentages (CO<sub>2</sub>), the percentage of carbon dioxide has an inverted course compared to the percentage of (CO), values over 12.5% are considered correct. Non complying values indicate lack of tightness in the exhaust system.

- Unburned hydrocarbons (HC) are measured in parts per million (PPM). The HC value decreases while the rpm increases; with the engine at idle it is normal to detect 200 ÷ 400 PPM, these emission values are deemed normal for an engine with a diagram of distribution for motorcycles. Higher values can cause loss of engine blows as the mixture is too lean (low CO), ignition failure or, incorrect timing or a clogged or unsealed exhaust valve.

- If it were difficult to ???? adjustment CO check accurately:

- That the carburettor is clean
- That the automatic starter is efficient
- Tapered pin housing efficiency
- Tank level adjustments

**N.B.**

**THE EXTENSION TUBE IS INDISPENSABLE SO AS NOT TO SEND POLLUTED EXHAUST FUMES TO THE AMBIENT OXYGEN. IT IS INDISPENSABLE TO USE AN EXHAUST FUMES ANALYSER PREVIOUSLY HEATED AND PREPARED TO GUARANTEE THE RESET OF THE READING OF GASES AND THE CORRECT GAS CAPACITY. FAILURE TO RESPECT THESE REGULATIONS RESULTS IN INACCURATE READINGS.**

**N.B.**

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





CORRECT COUPLING OF THE RPM INDICATOR WILL BE INDICATED WHEN IT CAN READ RPM OVER 6000 ÷ 8000

## **Characteristic**

**Idle adjustment: Pipe sizes**

Ø 40 mm

**Idle adjustment: length**

500 ÷ 600 mm

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## INDEX OF TOPICS

**S**SUSPENSIONS

**SUSP**

---

This section is devoted to operations that can be carried out on the suspension.

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## Front

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### Removing the front wheel

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- Remove the 5 fixing screws indicated in the photograph.

**Locking torques (N\*m)**

**Wheel fixing screw 20 ÷ 25**

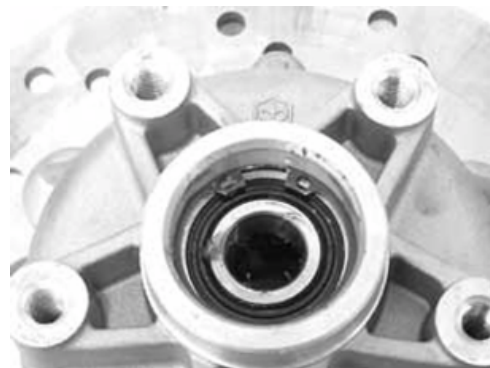


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### Front wheel hub overhaul

---

- Remove the ball bearing check seeger ring indicated in the photograph



Extract the ball bearing using the specific tool

**Specific tooling**

**001467Y014 Pliers to extract ø 15-mm bearings**

**001467Y017 Bell for bearings, OD 39 mm**



- Remove the oil seal on the roller bearing side using a screwdriver.



- Remove the roller bearing using the specific tool

### Specific tooling

**020376Y Adaptor handle**

**020456Y Ø 24 mm adaptor**

**020363Y 20 mm guide**



- Heat the roller bearing seat with a heat gun
- Use the specific tool to introduce and push the bearing until it stops, with the shielded side facing out
- Refit the ball bearing check seeger ring

### Specific tooling

**020151Y Air heater**

**020376Y Adaptor handle**

**020359Y 42x47-mm adaptor**

**020412Y 15 mm guide**



- Use the specific tool to fit and push the roller casing until it stops
- Refit the oil seal on the roller bearing side
- Lubricate the area between the roller bearing and the ball bearing

### Specific tooling

**020038Y Punch**

### Recommended products

**AGIP GREASE MU3 Grease for odometer transmission gear case**



Soap-based lithium grease with NLGI 3; ISO-L-  
XBCHA3, DIN K3K-20

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## Refitting the front wheel

- To refit, carry out the removal operations but in reverse order and comply with the specified locking torque.

### Locking torques (N\*m)

Wheel fixing screw 20 ÷ 25

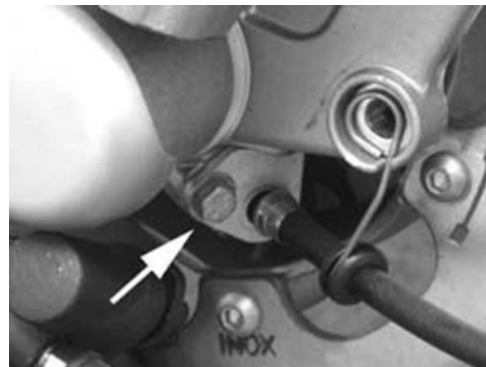
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## Steering column

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### Removal

- Remove the front wheel
- Remove the brake calliper
- Loosen the screw fixing the odometer cable plate and take out the cable.

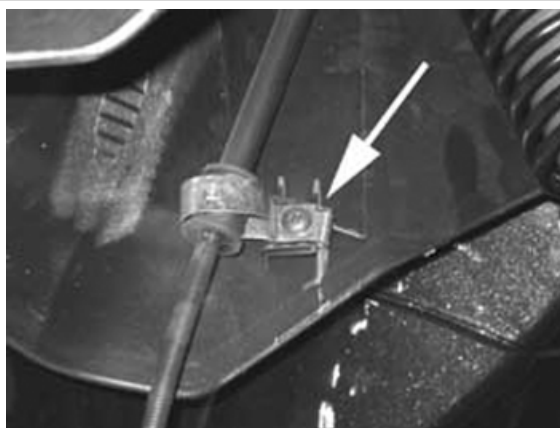


- Remove the suspension arm housing by unscrewing the three screws indicated in the photograph.





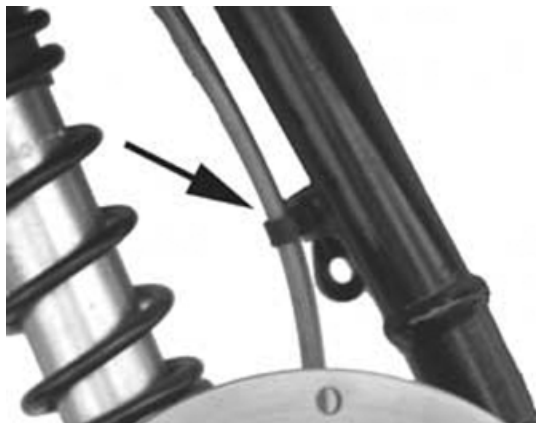
- Remove the retainer fixing the odometer cable to the mudguard indicated in the photograph



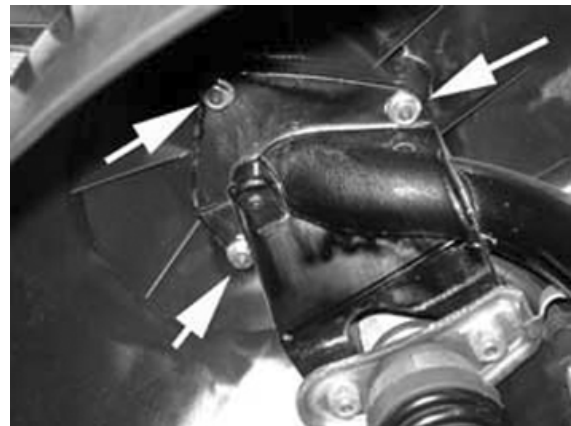
- Remove the retainer fixing the brake piping to the front shock absorber upper plate



- Remove the retainer fixing the brake piping to the suspension arm



- Pre-loosen the 3 nuts fixing the mudguard to the suspension



- Remove the rear handlebar cover.
- Remove the screw fixing the handlebar to the steering tube
- Tilt the handlebar towards the shield back plate being careful not to scratch the plastic parts



- Remove the steering tube ring nut cover



- Use a specific tool to remove the counter-ring nut, the spacer washer and the ring nut of the upper disk of the fifth wheel fitting
- Slide off the steering tube and remove permanently the mudguard from the suspension

### Specific tooling

**020055Y Wrench for steering tube ring nut**



To refit, carry out the removal operations but in reverse order; grease the fifth wheel fittings and tighten to the prescribed torques.

### Locking torques (N\*m)

Upper ring nut 30 ÷ 40 Nm Lower ring nut 30 ÷ 40 Nm Handlebar to steering tube 45 ÷ 50

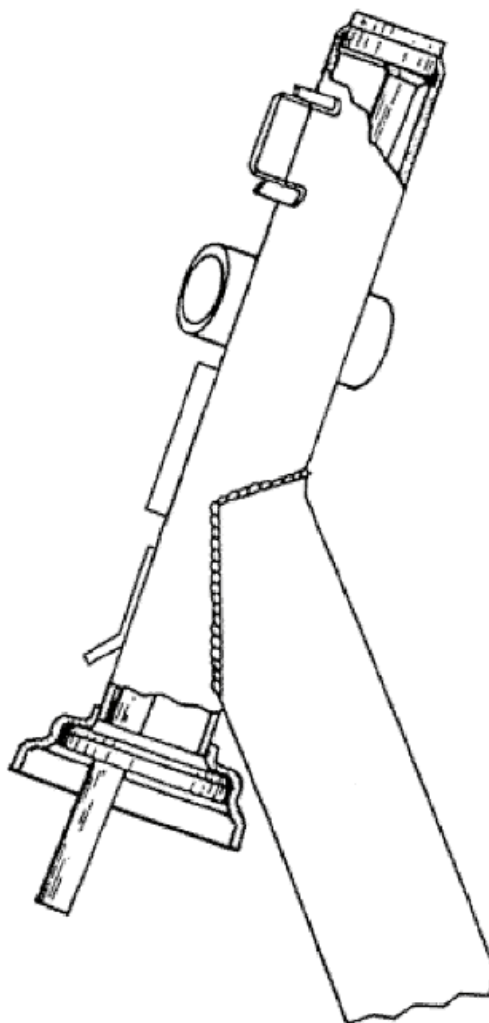
## Overhaul

Carry out this operation only if strictly necessary and in any case remove and replace the old part with a new one.

- Remove the steering tube
- Use a special tool remove the upper disk of the fifth wheel fitting seat on the headstock by operating from the lower part of the headstock as indicated in the photograph. Afterwards remove the lower disk of the fifth wheel operating from the upper part

### Specific tooling

**020004Y Punch for removing fifth wheels from headstock**





- Remove the fifth wheel fitting and the dust guard on the steering tube as shown in figure, using the specific tool. Proceed giving a few taps with the mallet.

### Specific tooling

**020004Y Punch for removing fifth wheels from headstock**



- Refit the fifth wheel fitting and the dust guard on the steering tube until they stop, using the specific tool.

### Specific tooling

**006029Y Punch for fitting fifth wheel seat on steering tube**



- Use the specific tool to fit the fifth wheel fitting on the headstock as indicated in the figure

### Specific tooling

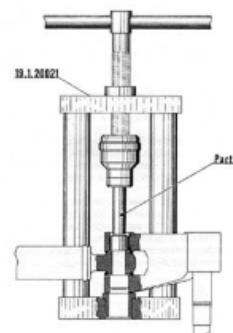
**020037Y Punch**



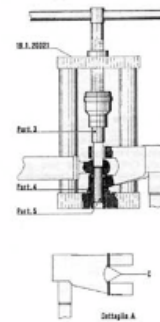
- Remove the steering tube  
 - Remove the attachment bracket  
 - Use the specific tool with the part 1 and operate the handgrip until removing temporarily the pin and the Nadella opposite the tool thrusting direction.  
 - To extract the second Nadella, use the tool with the part 2, instead of part 1, on opposite side to the one indicated in the figure.

### Specific tooling

**020021Y Front suspension service tool**



- Fit both dust guard rings «C» on the swinging hub as shown in the detail drawing «A».
- Connect the swinging hub to the steering tube with the guiding pin, part 5.
- Use the specific tool fitted with part 3 on the stem and part 4 on the tool base.
- Lubricate the pin with recommended grease and insert it temporarily on the swinging hub, move the tool handgrip until part 3 is fully inserted on the steering tube.
- Once the pin has been fitted, insert the two spacers part 17 slightly hitting with a mallet (see next figure).

**CAUTION**

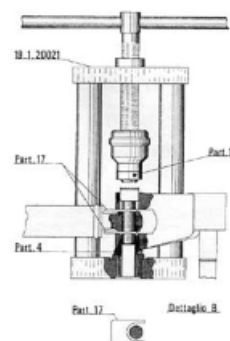
USE NEW ROLLER CASINGS, PIN, SEALING RINGS AND DUST GUARDS FOR REFITTING.

**Specific tooling****020021Y Front suspension service tool****Recommended products****AGIP GREASE PV2 Grease for the steering bearings, pin seats and swinging arm**

Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2 of the swinging arm

To fit sealing rings, roller casings and wedging washers proceed as follows

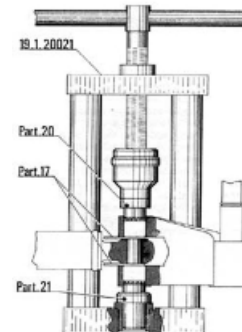
- Lubricate the sealing rings with mineral oil and half-fill the roller casings with recommended grease.
- Insert the sealing ring on the pin and the roller bushing with wedging washers at the same time.
- Remove the specific tool and then the part 5 (guide) partially ejected in the previous assembly stage; part 4 must be always fitted.
- Replace part 3 with part 16 on the stem.
- Push, from the handgrip, the wedging washer - roller casing - sealing ring unit, placing part 16 until it stops on the swinging hub
- Repeat the operation described above using the tool fitted with part 16 and part 22\* instead of part



4 on the stem, on the side opposite the one shown in the figure to refit the second wedging washer - roller casing - sealing ring unit.

To position roller casings on the pin (pin end in contact with the internal bottom of the roller casings) proceed as follows:

- Use the tool with part 20 and 21 fitted to the stem as indicated in the figure.
- Push the two roller casings with the handgrip until their bottoms make contact with the pin end.
- Use the specific tool fitted with parts 3 and 4 as indicated for fitting the spin and push with the handgrip until the washer is wedged in the swinging hub.
- Remove the spacers, part 17; fill with recommended grease the area between the steering tube and the swinging hub, and place the dust guard rings in that place.



### Recommended products

#### **AGIP GREASE PV2 Grease for the steering bearings, pin seats and swinging arm**

Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2 of the swinging arm

Carry out this operation only if strictly necessary and in any case remove and replace the old part with a new one.

- Remove the steering tube
- Use a special tool remove the upper disk of the fifth wheel fitting seat on the headstock by operating from the lower part of the headstock as indicated in the photograph. Afterwards remove the lower disk of the fifth wheel operating from the upper part



### Specific tooling

#### **020004Y Punch for removing fifth wheels from headstock**

- Remove the fifth wheel fitting and the dust guard on the steering tube as shown in figure, using the specific tool. Proceed giving a few taps with the mallet.

### Specific tooling

**020004Y Punch for removing fifth wheels from headstock**



- Refit the fifth wheel fitting and the dust guard on the steering tube until they stop, using the specific tool.

### Specific tooling

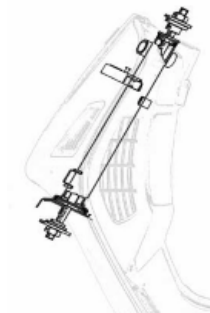
**006029Y Punch for fitting fifth wheel seat on steering tube**



- Use the specific tool to fit the fifth wheel fitting on the headstock as indicated in the figure

### Specific tooling

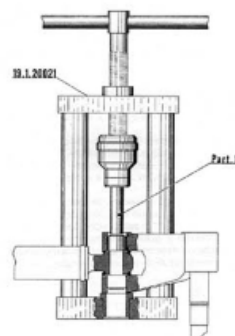
**020037Y Punch**



- Remove the steering tube
- Remove the attachment bracket
- Use the specific tool with the part 1 and operate the handgrip until removing temporarily the pin and the Nadella opposite the tool thrusting direction.
- To extract the second Nadella, use the tool with the part 2, instead of part 1, on opposite side to the one indicated in the figure.

### Specific tooling

**020021Y Front suspension service tool**



---

## Refitting

To refit, carry out the removal operations but in reverse order; grease the fifth wheel fittings and tighten at the specified locking torques

### Locking torques (N\*m)

Handlebar to steering tube 45 ÷ 50 Upper steering ring nut 30 ÷ 40 Lower steering ring nut 8 ÷ 10

---

## Front shock absorber

---

### Removal

- Remove the steering tube
- Remove the shock absorber lower clamps
- Remove the shock absorber upper clamps



---

### Refitting

To refit, carry out the removal operations in reverse order, observing the prescribed tightening torques.

### Locking torques (N\*m)

shock absorber lower clamp 20 - 27 shock absorber upper clamp 20 ÷ 30

---

## Shock-absorber - calliper bracket

- Remove the front wheel hub with the brake disc
- Remove the front shock absorber lower clamps



- 
- Remove the bracket locking seeger ring
  - Unscrew the bracket



- 
- Before refitting the bracket in the wheel axle, place the O-ring as shown in the photograph so that it is correctly placed after fitting the bracket.
  - Refit the washer and the Seeger ring.
  - Refit the lower screws fixing the shock absorber to the bracket and tighten at the prescribed torque



### Locking torques (N\*m)

Lower shock absorber clamp 20 ÷ 27

---

## Overhaul

- 
- The bracket for the shock absorber -calliper attachment has two roller bearings separated one from the other as shown in the photograph



- 
- Remove the two roller bearings from the bracket with the specific tool operating on the shock absorber attachment side as shown in the photograph



### Specific tooling

020376Y Adaptor handle

020441Y 26 x 28 mm adaptor

020365Y 22 mm guide

- Remove the oil seal on the wheel hub side with the screwdriver as shown in the photograph



- Suitably hold the brake calliper - shock absorber attachment bracket
- Fit a new oil seal and move it until it stops using the specific tool

**Specific tooling**

**020376Y Adaptor handle**

**020360Y Adaptor 52 x 55 mm**



- Assemble a new roller bearing on the shock absorber side and move it until it stops using the specific tool

**Specific tooling**

**020036Y Punch**



- Suitably hold the brake calliper - shock absorber attachment bracket
- Assemble a new roller bearing on the wheel hub side and move it until it stops using the specific tool

**Specific tooling**

**020037Y Punch**



**Rear**

---

## Removing the rear wheel

- Remove the bracket supporting the rear shock absorber and the muffler;
- Remove the rear wheel by unscrewing the 5 screws indicated in the photograph



---

## Refitting the rear wheel

To refit, carry out the removal operations but in reverse order, observing the prescribed torques.

### Locking torques (N\*m)

Wheel fixing screws: 20 - 25

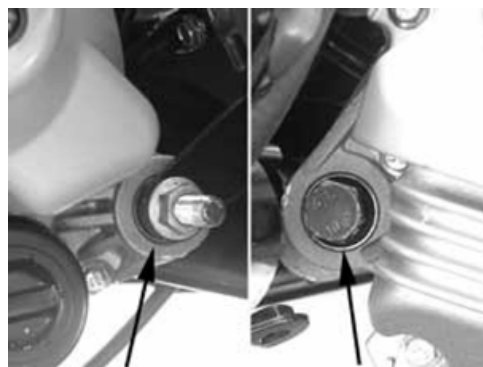
---

## Swing-arm

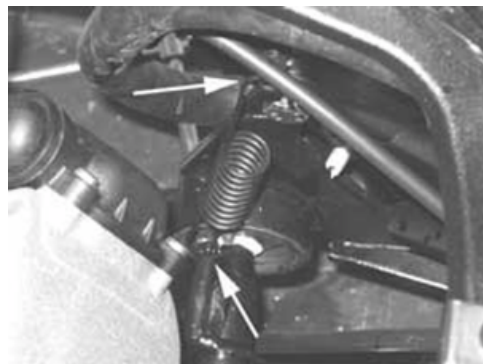
---

### Removal

- Place the scooter on its centre stand;
- Remove the engine housing
- Remove the swinging arm/engine fitting shown in the photo
- Move the engine back

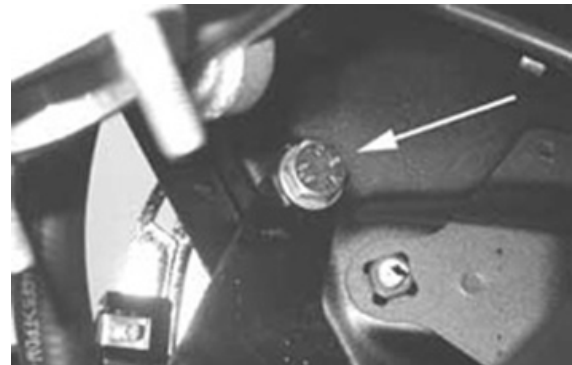
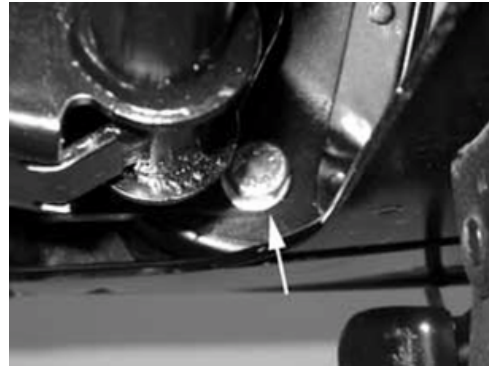


- remove the spring anchoring the swinging arm to the frame as shown in the photo





- Remove the two screws fixing the buffer support bracket to the frame



- Remove the left and right caps located under the footrest to reach the pin fixing the swinging arm to the body.
- Remove the pin. Then remove the swinging arm.



- Check the entire swinging arm assembly.
- Check all the centring bushing components and silent block rubber buffers.
- Replace the work components that cause excessive clearance on the rear suspension.



## Overhaul

- Check there is no sticking in the movement of the connection of the swinging arm on the engine side to the swinging arm on the frame side.
- Check the axial clearance between the two swinging arms using a feeler thickness gauge

### Characteristic

#### Standard clearance

0.40 ÷ 0.60 mm

#### Allowable limit after use:

1.5 mm



- To check the clearance on the frame-side arm, mount the retainer using the pin fixing the swinging arm to the frame and two adaptor rings of the appropriate tool 020229Y. Alternatively use two washers with inner diameter for 12-mm pins, min. outer diameter: 30 mm: min. thickness: 4 mm.



- Check there is no sticking in the rotation.
- Check the axial clearance of the swinging arm on the frame side

### Characteristic

#### Standard clearance

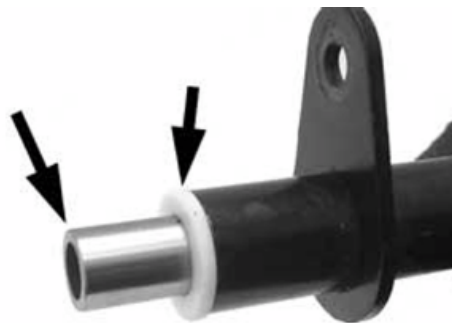
0.40 ÷ 0.60 mm

#### Allowable limit after use:

1.5 mm



- Separate the swinging arm on the engine side from the vehicle side arm.
- Remove the plastic bushings and the internal spacer shown in the photo.



- Using a suitable pin remove the roller casings as shown in the photographs



- Using an appropriate tool plant new roller casings, being careful to position the bearings with the O-rings facing outwards

### Specific tooling

020244Y 15 mm diameter punch

020115Y Ø 18 punch

### Characteristic

**Length of the swinging arm tube on the engine side:**

L 175.3 + 0.3 0

**Length of the internal swinging arm spacer on the engine side:**

L 183 + 0.3 0

**Engine side swinging arm plastic bushing shim:**

3.5 ± 0.05 mm

**Frame-side swinging arm plastic bushing shim:**

3.5 ± 0.05 mm

**Length of the internal swinging arm spacer on the frame side:**

290 ± 0.1 mm



**Length of the swinging arm tube on the frame side:**

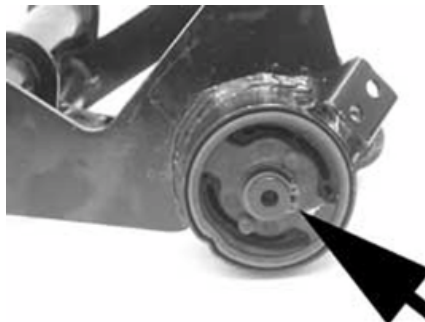
283 ± 0.1 mm

- Lubricate roller casings and the plastic bushings with grease
- Insert the spacers
- Assemble the two arms with the relative bolt in the position shown in the photograph
- Adjust the bolt as shown in the photograph
- Position the frame side swinging arm with the most protruding part pointing towards the silent block side as shown in the photograph

**Recommended products****AGIP GREASE PV2 Grease for the steering bearings, pin seats and swinging arm**

Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2 of the swinging arm

- Make sure the silent bloc is not broken. If there is, replace it.
- Remove the seeger ring shown in the photograph



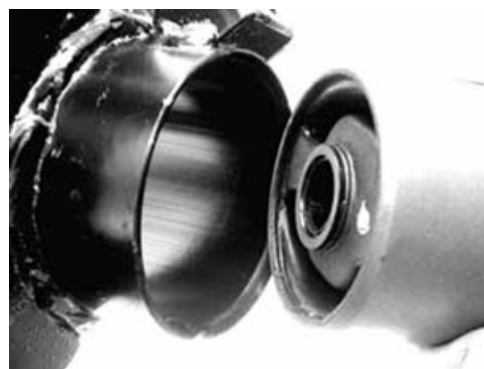
- Remove the full silent bloc bracket
- Undo the silent bloc ring shown in the photograph



- Hold the full silent bloc bracket in the clamp
- Using the appropriate tool, remove the silent bloc from the bracket from the side corresponding to the inside of the vehicle. This is to guarantee the tool is centred properly on the support



- Install a new silent bloc, making sure it aligns properly with the reference tooth.
- Fit the silent blocs, making sure the chamfered part of the silent bloc matches the chamfered part of the bracket



- Using the appropriate tool, fit the silent bloc as shown in the photo



## Refitting

- To refit, perform the removal operations in reverse.
- Grease the bearings and the rolling parts with the recommended grease.

-Complete the fitting by tightening the nuts on the relative bolts to the proper tightening torque.

### Locking torques (N\*m)

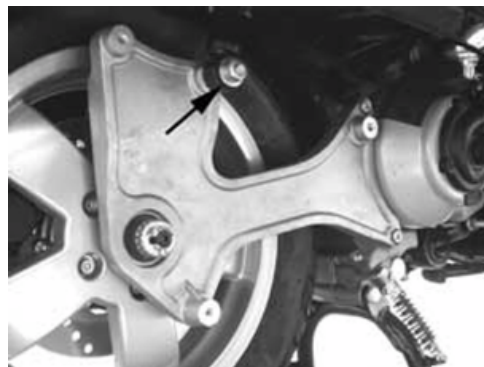
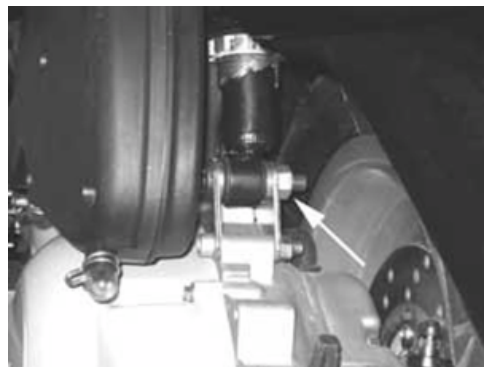
Engine and vehicle side swinging arm junction bolt 33 ÷ 41 Nm Swinging arm pin - Engine 64 - 72 Body shell - Swinging arm pin 76 ÷ 83 Screw fixing the silent-block support plate to the body 42 ÷ 52

## Shock absorbers

### Removal

Proceed as follows:

- place the scooter on its centre stand;
- remove the luggage rack
- lift the engine a little with a jack so as to free the two shock absorbers;
- remove the muffler assembly;
- undo the shock absorber spring assembly clamping screw from the support fixed to the engine on the one side and from that fixed to the muffler on the other;
- unscrew the two upper nuts (one on each side) fixing the shock absorber spring assembly to the frame and remove the shock absorbers.



### Refitting

To refit, carry out the above removal operations in reverse order, observing the prescribed torques.

### Locking torques (N\*m)

---

Lower shock absorber clamping screw 33 ÷ 41 Nm Upper shock absorber fixing screws 20 ÷ 25 Nm

---

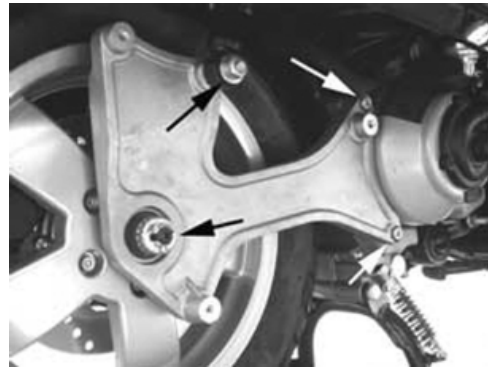
## Exhaust bracket

---

### Removal

Remove the full muffler unit.

- Remove the two fixing screws of the bracket to the engine crankcase
- Remove the split pin, the cover and the fixing nut of the rear wheel axle and its spacer
- Remove the shock absorber lower clamp



### Refitting

- The refitting procedure is in the reverse order of the removal operation being careful to respect the torques indicated and the spacer assembly layout as shown in the photo.

#### Locking torques (N\*m)

Bracket fixing screws to the engine crankcase: 20 ÷ 25 Lower shock absorber clamp 33 ÷ 41  
Wheel axle clamping 104 ÷ 126

---

## Centre-stand

### REMOVAL

- Use a jack to support the vehicle properly.
- Remove the two return springs from the centre stand.
- Undo the nut shown in the figure.
- Remove the bolt from the right side.
- Remove the centre stand.

### FITTING

- On refitting tighten the nut to the specified torque.

#### Locking torques (N\*m)

Centre stand fixing bolt 25 ÷ 30 Nm

---



## Side stand

### REMOVAL

- Uncouple the centre stand return spring;  
Remove the screw shown in the photograph

### FITTING

To refit, carry out the removal operations in reverse order and comply with the specified torque.

### Locking torques (N\*m)

**Side stand fastening bolt 40 - 45 Nm**

---





## INDEX OF TOPICS

**B**RAKING SYSTEM

**BRAK SYS**

This section è is devoted to the description of the braking system components.

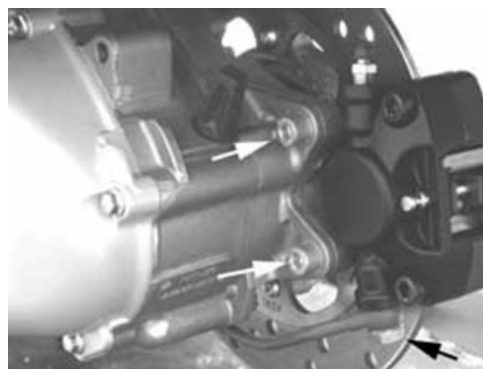
## Rear brake calliper

### Removal

- Remove the rear wheel.
- Remove the pad retention pin snap ring.
- Using a pin partially remove the brake pad retention pin.
- Remove the screws fixing the brake calliper to the crankcase then remove the brake calliper complete with pipe.
- Complete the extraction of the pad retention pin, the spring and the pads.

#### N.B.

**SHOULD THE BRAKE CALLIPER BE REPLACED OR SERVICED, BEFORE REMOVING THE FITTINGS FIXING THE CALLIPER TO THE SUPPORT BRACKET, LOOSEN THE OIL HOSE FITTING AFTER HAVING EMPTIED THE SYSTEM OF THE CIRCUIT BEING EXAMINED.**



### Overhaul

- Remove the rear brake calliper.
- Suitably hold the brake calliper in a clamp
- Remove the two calliper coupling screws as shown in the photo
- Remove the two pistons from the calliper body with the aid of short blasts of compressed air through the brake fluid holes
- Remove the dust ring and the O-ring of each half calliper.
- Remove the O-rings in the half calliper.

#### N.B.

**WHEN REMOVING THE O-RINGS, BE CAREFUL NOT TO SCRATCH THE HALF CALLIPER SEATS**





- Check that the pistons and their seats show no scratches.
- Wash and blow all the components carefully
- Fit the O-rings and new dust guards
- Refit the pistons in their seats being careful to lubricate with brake fluid
- Re-couple the half callipers and lock the two screws at the specified torque



### Locking torques (N\*m)

Calliper coupling screw 22 ÷ 27



## Refitting

- Insert the brake pads in the calliper.
- Insert the pad fixing pin and the retention screw being careful to position the terminals of it pointing towards the bleed screw as shown in the photo.
- Insert the clip on the pad fixing pin

**N.B.**

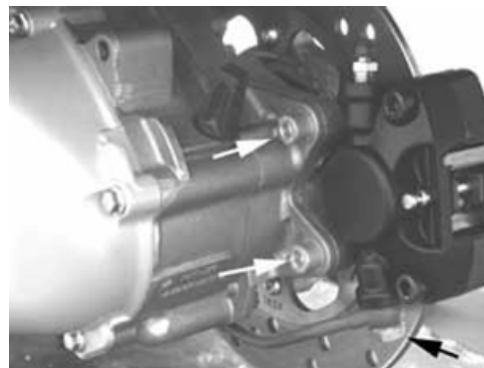
**FAILURE TO RESPECT THE PAD POSITIONING REQUIREMENTS WITH RESPECT TO THE DIRECTION OF ROTATION COULD COMPROMISE PROPER BRAKE FUNCTIONING AND NOISELESSNESS.**



- 
- Keep the brake pads in contact with the pistons and insert the calliper in the brake disc.
  - Fix the calliper to the crankcase with the two screws with elastic washer at the prescribed torque as shown in the photograph



- 
- Fix the brake pipe joint to the calliper and tighten at the prescribed torque
  - Bleed the system and refit the rear wheel



### Locking torques (N\*m)

**Brake calliper support clamping 20 ÷ 25 Nm**

**Brake pipe connection 20 to 25 N\*m**



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## Front brake calliper

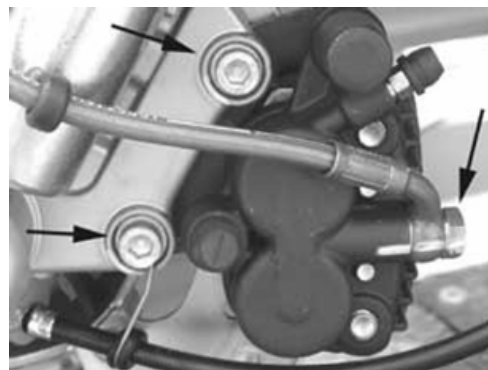
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## Removal

- Remove the front wheel
- Pre-loosen the two fixing pins of the brake pads
- Remove the two front brake calliper devices fastening them to the support as shown in the photograph.

### N.B.

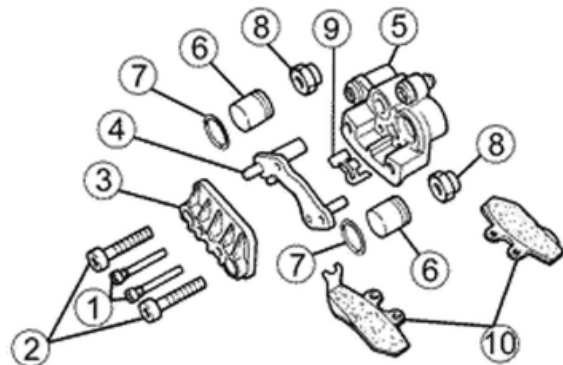
**WHEN A PROCEDURE IS PLANNED INCLUDING THE SERVICE OR REPLACEMENT OF THE CALLIPER, FIRST LOOSEN THE FITTING CONNECTING THE PIPE TO THE BRAKE CALLIPER**



## Overhaul

Proceed as follows:

- 1) remove the two male hexagonal screws (1) and take out the two pads (10);
- 2) remove the two male hexagonal screws (2) and remove the reaction plate (3);
- 3) take out the fixed plate (4) from the guide;
- 4) remove the internal elements from the floating body (5) with the help of short blows of compressed air through the brake fluid pipe in order to facilitate the expulsion of pistons (6).
- 5) Check:
  - that the plates and the body are whole and in good condition;
  - that the cylinder and the floating body of the calliper do not show signs of scratches or erosion, otherwise replace the entire calliper;
  - that the guides of the fixed plate are not scratched or eroded, otherwise replace the entire plate;



- that the brake pad check spring works properly.

**CAUTION**

**ALL THE INTERNAL COMPONENTS MUST BE REPLACED EVERY TIME THE CALLIPER IS SERVICED.**

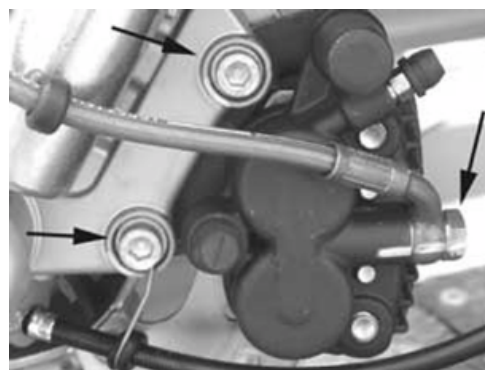
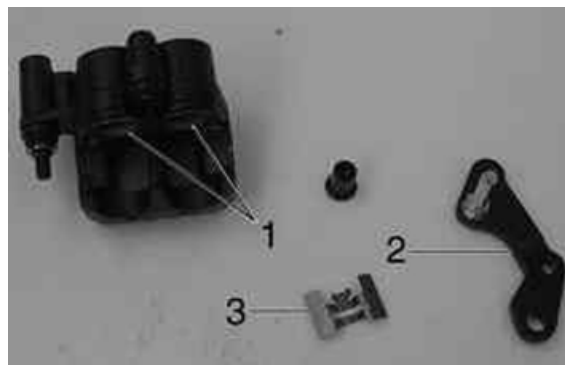
**The brake pad check spring**

1. pad fixing screws
2. reaction plate fixing screws
3. reaction plate
4. fixed plate
5. floating body
6. piston
7. piston sealing rings
8. guide protection rubbers
9. brake pad check spring
10. pads

**Refitting**

Insert the following on the front brake body:

- The sealing rings and the pistons (1).
- Refit the plate (2).
- Arrange the pad holding clamp (3).
- Refit the pads and bleed air.
- Place the calliper on the disk and lock it to the support by tightening the bolts at the prescribed torque.
- Lock the pipe joint to the calliper at the prescribed torque.
- Follow the same procedure for the rear brake caliper.

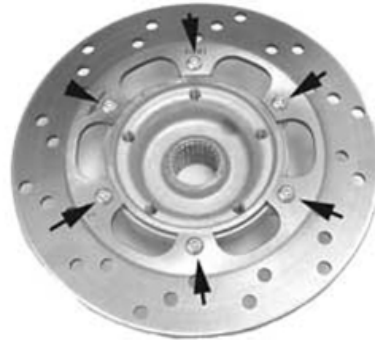
**Locking torques (N\*m)**

**Screws fixing the front calliper to the support: 20 ÷ 25 Nm**  
**Screw fixing the oil connection to the calliper: 20 ÷ 25 Nm**

**Rear brake disc**

## Removal

- Remove the rear brake calliper.
- Remove the brake disc and the hub from the wheel axle
- To remove the brake disc from the hub, hold the unit firmly with a vice and operate on the 5 fixing screws indicated in the photograph



## Refitting

- To reassemble the brake disc on the hub, carry out the removal operations in the reverse order arranging the brake disc on the hub on the side opposite the wheel keying
- Follow the direction of rotation shown by the arrow and tighten to the prescribed torque.
- Fit the hub unit
- disc in the wheel axle

### Locking torques (N\*m)

Disk to the hub 11 ÷ 13

## Disc Inspection

- Remove the rear brake calliper.
- Check the disc thickness with a micrometer

### Characteristic

#### Minimum thickness allowed after use:

3.5 mm

#### Standard thickness:

4 +0.2-0.2 mm

- Repeat the measurement at no fewer than six points on the disc.
- Check the regular nature of the rotation of the brake disc assembly using the appropriate tool fixed onto the brake calliper as shown in the photo.
- In order to be able to anchor the appropriate tool properly use a metal plate with M8 threaded hole and fix it to one of the two rear brake calliper attachment points.
- Suitably fix the flange to the wheel axle with the original nut and spacer and a  $\text{Æ}$  17 mm bearing.

#### N.B.

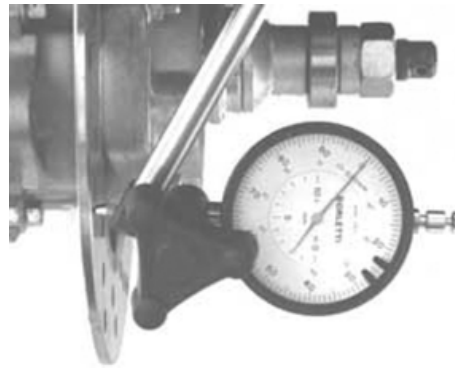
**SO AS NOT TO GET A DISTORTED READING, CAUSE THE DRIVEN PULLEY SHAFT TO TURN IN ORDER TO ROTATE THE DISC.**

### Specific tooling

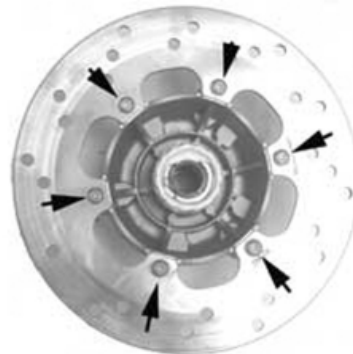
**020335Y Magnetic support for dial gauge****Characteristic****Max. deviation allowed:**

0.1 mm

- If you detect incorrect values, replace the disc. If the anomaly persists, replace the hub.

**Front brake disc****Removal**

- Remove the front wheel
- Remove the front brake calliper
- Remove the hub and the disc operating on the wheel axle nut
- Hold the hub and the disc firmly and remove the brake disc undoing the six screws indicated in the photograph





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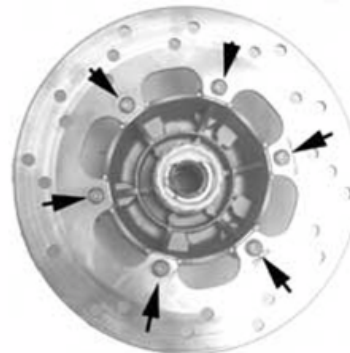
## Refitting

---

- Carry out the operations in the reverse order from the removal being careful to respect the direction of disc rotation shown by the arrow printed on it
- Tighten the six screws to the specified torque.

### Locking torques (N\*m)

**Brake disc screws:** 6 +0.5 -1 Nm



---

## Disc Inspection

---

- Remove the front wheel
- Use a micrometer to check the disc thickness as shown in the photograph
- Repeat the measurement in at least 6 points on the disk
- Remove the front brake calliper
- In order to secure the appropriate tool adequately use a metal plate with M8 threaded hole and fix it to one of the two front brake calliper attachment points
- Place the dial gauge on the disk outer edge
- Make the wheel hub turn and check the disk deviation



### Specific tooling

**020335Y Magnetic support for dial gauge**

### Characteristic

**Standard thickness:**

4 +0.2-0.2 mm

**Max. deviation allowed:**

0.1 mm

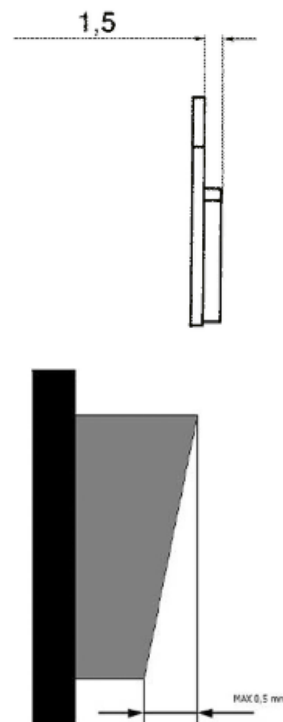
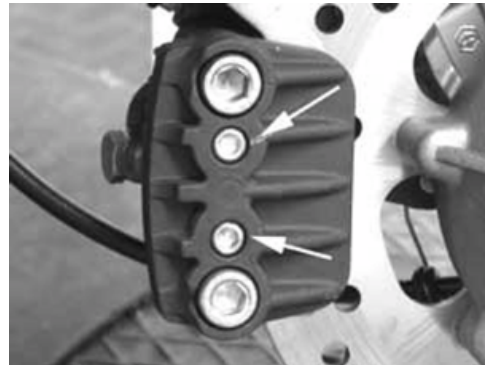
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## Front brake pads

---

## Removal

- Remove the front wheel
- Pre-loosen the two fixing pins of the brake pads
- Remove the brake calliper
- Remove permanently the two pad fixing screws
- Check that there are no flaws or warping. If there is, replace it.
- Check the thickness of the friction material is more than 1.5 mm. If it is not , replace it
- The replacement must be made with greater residual thickness if the pad has not worn evenly. A 0.5 mm thickness difference in the residual friction material is permitted



## Refitting

To fit, proceed as follows:

- Insert the two pads in the callipers.

- Screw the two pad lock pins to the correct torque, and apply the recommended product.
- Fit the calliper on its support, tightening the two screws to the prescribed torque.

**N.B.**

**IF IT IS NOT POSSIBLE TO CORRECTLY POSITION THE CALLIPER ON THE DISC DURING FITTING, GENTLY EXPAND THE PADS.**

**Recommended products**

**Loctite 243 Medium strength threadlock**

Loctite 243 medium-strength threadlock

**Locking torques (N\*m)**

**Screw tightening calliper to the support 20 ÷ 25 Pad fastening pin 19.6 ÷ 24.5**

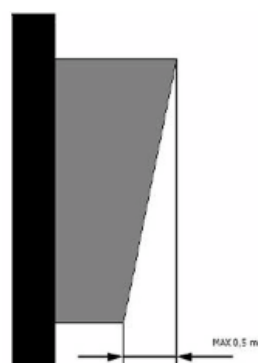
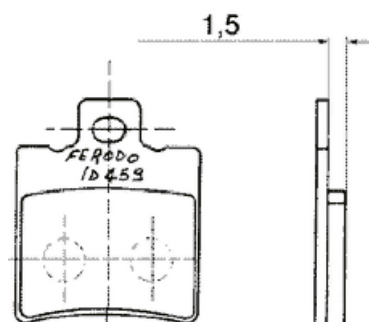
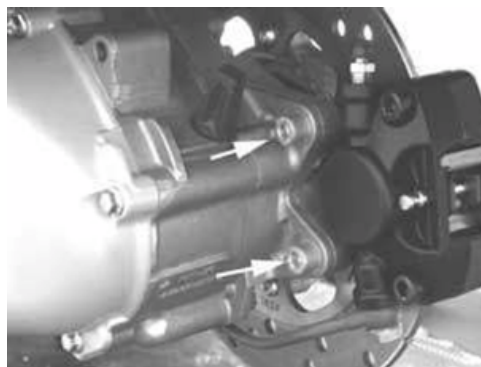
---

**Rear brake pads**


---

**Removal**

- Remove the rear brake calliper.
- Remove the brake pad and check there are no faults or warping. If there is, replace it.
- Check the thickness of the friction material is more than 1.5 mm. If it is not, replace it
- The replacement must be made with greater residual thickness if the pad has not worn evenly. A 0.5 mm thickness difference in the residual friction material is permitted



**See also**[Removal](#)**Refitting**

- Insert the brake pads
- Insert the fixing pin being careful to position the clip with the ends towards the bleed screw as in the photo.
- Insert the clip on the pin
- Fix the rear brake calliper to the bracket and tighten the two screws to the specified torque.

**Locking torques (N\*m)****Rear brake calliper tightening screw 20 ÷ 25 Nm****Fill****Front**

- Remove the rubber hood from the bleed screw.
- Insert a rubber pipe in the bleed screw to permit the brake fluid to be recovered.
- With the left-hand brake lever, load the system and bring it up to the required pressure.
- Keeping the left-hand brake lever pulled, loosen the bleed screw to permit the air in the system to escape. Then tighten the bleed screw
- Repeat the operation until only brake fluid comes out of the rubber pipe.
- Remove the fluid recovery pipe and refit the rubber hood over the bleed screw.
- Top up the brake fluid to the right level in the tank.



If necessary, bleeding can be done using a special vacuum pump

**N.B.**

**DURING THE BLEEDING OPERATIONS, MAKE SURE THE BRAKE FLUID DOES NOT COME INTO CONTACT WITH THE BODYWORK SO AS NOT TO DAMAGE IT. FURTHERMORE, DURING THE**

**BLEEDING OPERATIONS REGARDING THE BRAKE CALLIPERS, MAKE SURE THE BRAKE FLUID DOES NOT COME INTO CONTACT WITH THE DISC BRAKES AND WITH THE BRAKE PADS. FAILURE TO COMPLY WITH THIS NORM WILL ENDANGER THE PROPER WORKING AND EFFICIENCY OF THE BRAKING SYSTEM**

### Specific tooling

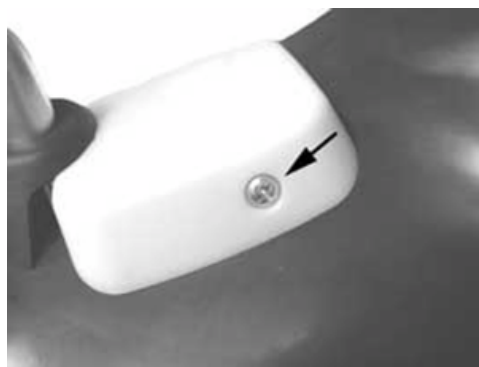
020329Y MityVac vacuum-operated pump

### Locking torques (N\*m)

System bleed calliper fitting: 20 ÷ 25 Nm

## Brake fluid level check

- Position the vehicle on a flat surface and on the centre stand
- Remove the brake pump cover as indicated in the photo



- Use the appropriate spyglass on the pump to check the level of the brake fluid, as shown in the photograph



- If the level is below the minimum, fill using the two screws shown in the figure
- Remove the gasket and fill with DOT 4 until the spyglass is completely covered



#### CAUTION



**AVOID CONTACT OF THE BRAKE FLUID WITH YOUR EYES, SKIN, AND CLOTHING. IN CASE OF ACCIDENTAL CONTACT, WASH WITH WATER.**

#### CAUTION



**THE BRAKING CIRCUIT FLUID IS HIGHLY CORROSIVE. THEREFORE, WHEN TOPPING IT UP, AVOID LETTING IT COME INTO CONTACT WITH THE PAINTED PARTS OF THE VEHICLE. THE BRAKING CIRCUIT FLUID IS HYGRO-**

SCOPIC, THAT IS, IT ABSORBS HUMIDITY FROM THE SURROUNDING AIR. IF MOISTURE CONTAINED IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, THIS WILL RESULT IN INEFFICIENT BRAKING.

#### CAUTION

THE BRAKE FLUID IS HYGROSCOPIC, THAT IS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF THE LEVEL OF HUMIDITY IN THE BRAKE FLUID EXCEEDS A GIVEN VALUE, BRAKING EFFICIENCY WILL BE REDUCED.

### Locking torques (N\*m)

**Float chamber screws** 15 ÷ 20 Nm

Never use brake liquid in open or partially used containers.

Under standard climatic conditions, replace coolant as indicated in the scheduled maintenance table.

For refitting purposes carry out the removal operations but in reverse order and respect the tightening torques of the tank cover screws.



### Locking torques (N\*m)

**Brake pump reservoir screws** 1.5 ÷ 2

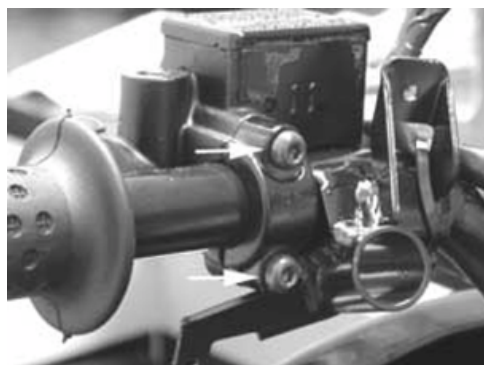
## Front brake pump

### Removal

- Remove the rear handlebar cover.
- Remove the two screws fixing the brake pump to the handlebar indicated in the photograph
- Remove the oil pipe joint from the pump
- Remove the connector to the stop light switch

#### **BRAKE PUMP TECHNICAL DATA:**

Specification	Desc./Quantity
Pump right piston diameter	Ø 12.7
Pump left piston diameter	Ø 11





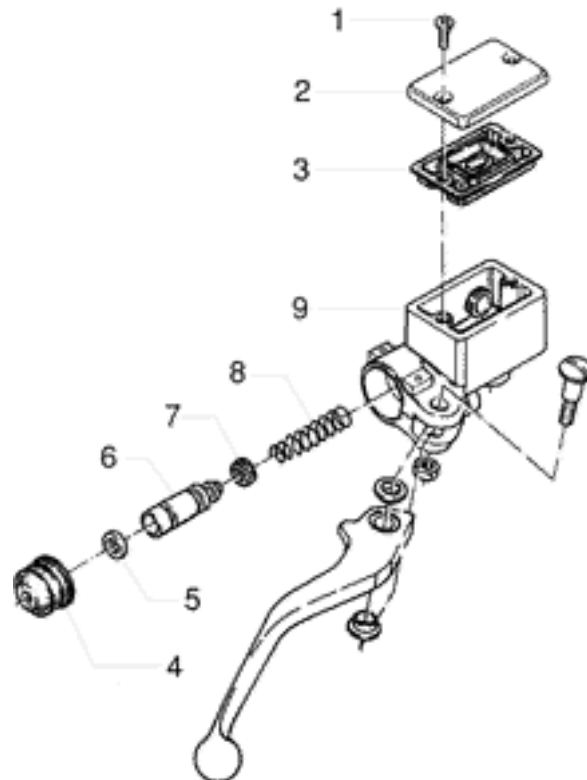
## Overhaul

Proceed as follows:

- 1) Remove the brake lever by loosening the retaining screw; open the cover (2) and take out the diaphragm (3);
- 2) remove the cap (4) and take out the internal parts in order;
- 3) Check that:
  - The body of the pump shows no signs of internal damage or corrosion;
  - The plunger shows no sign of damage or abnormal wear;
  - The plunger return spring is in good condition.

### CAUTION

**ALL THE SEALS AND GASKETS MUST BE REPLACED EVERY TIME THE PUMP IS SERVICED.**



1. Reservoir cap screw
2. Reservoir cap.

3. Diaphragm.
  4. Bellows.
  5. Sealing ring
  6. Piston.
  7. Gasket.
  8. Spring.
  9. Reservoir
- 

## Refitting

To refit, carry out the removal operations but in reverse order, observing the specified torques.

### Locking torques (N\*m)

**Oil pipe joint to the pump: 20 - 25 Brake pump fixing screws to the handle bar: 7 ÷ 10 Nm**

---



## INDEX OF TOPICS

COOLING SYSTEM

COOL SYS

## Water pump - overhaul

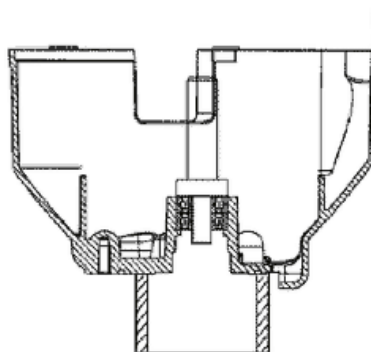
### Water pump assembly

With a hot air gun heat the inner side of the flywheel cover.

**AVOID OVERHEATING AS THIS MAY ALTER THE PAINTED SURFACE.**

#### Specific tooling

**020151Y Air heater**



- Place the flywheel cover on the ring base following the same procedure as for removal.
- Place the two bearings on the specific punch.

**N.B.**

#### USE A NEW BEARING WHEN REFITTING

- Use grease to keep the bearings on the appropriate tool.
- Use a plastic mallet to insert the bearings on the housing up to the stop.

- Assembly the ceramic ring and the corresponding rubber gasket. The ceramic ring chamfering should always face towards the gasket.

- Lubricate the rubber gasket and insert the unit on the flywheel cover.

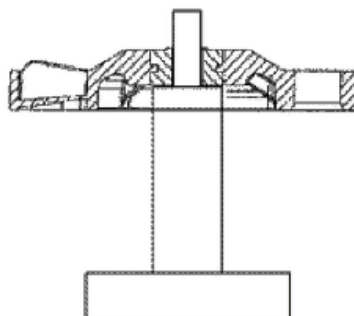
Use the punch of the appropriate tool manually if necessary.

**ALWAYS USE NEW CERAMIC RING AND GASKETS. ASSEMBLING THE CERAMIC SEALING RING IN A MANNER OTHER THAN MANUALLY MAY DAMAGE THE RING.**

#### Specific tooling

**020440Y Water pump service tool**

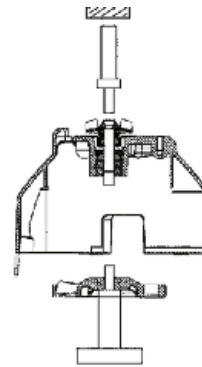
- Insert the drive on the guide pin of the support base which is part of the appropriate tool. Check that the convex part faces upwards.



- Insert the flywheel cover with bearings on the appropriate tool.
- Insert the shaft together with the mechanical gas-kets on the bearings.
- With the appropriate punch and socket, insert the shaft in the bearings and the drive until the end of stroke of the appropriate tool cannot be seen.

**N.B.**

**CENTRE THE PUNCH CORRECTLY ON THE ROTOR. PUSH THE SHAFT IN AND CHECK THAT THE FLYWHEEL COVER ROTATES SMOOTHLY. FAILURE TO RESPECT THIS PROCEDURE DAMAGES THE DRIVE.**



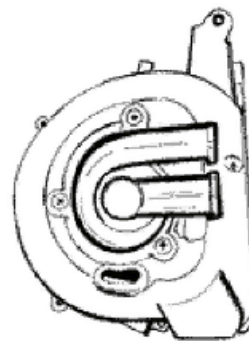
- Reassemble the rotor cover with a new O-Ring.
- Tighten the 3 fixing screws to the torque below:

**N.B.**

**DO NOT LUBRICATE THE O-RING. FAILURE TO RESPECT THIS RULE RESULTS IN RING DISTORTION.**

**Locking torques (N\*m)**

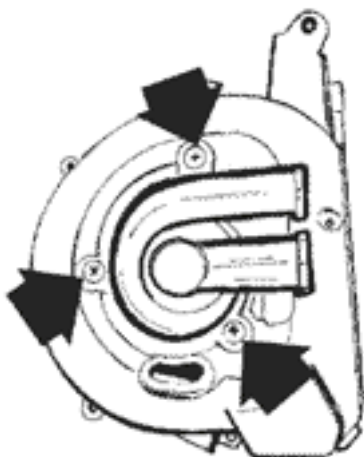
**Water pump cover screws 3 ÷ 4**

**Component check**

- Check that the rotor does not show abnormal wear or dents;
- Check that the rotor shaft is not rusty;
- Check that there is no rust on the bearing seats or the ceramic seal;
- Check that the drive does not show dents and that it is perfectly integral with the steel hub.

**Removal**

- Check the water pump if noise in the bearings or liquid leaking from the drainage hole inside the cover is detected.
- Remove the flywheel cover together with the water pump from the engine.
- Remove the rotor cover by unscrewing the 3 retainers indicated in the figure.



-Place the flywheel cover on the ring base which is part of the tool

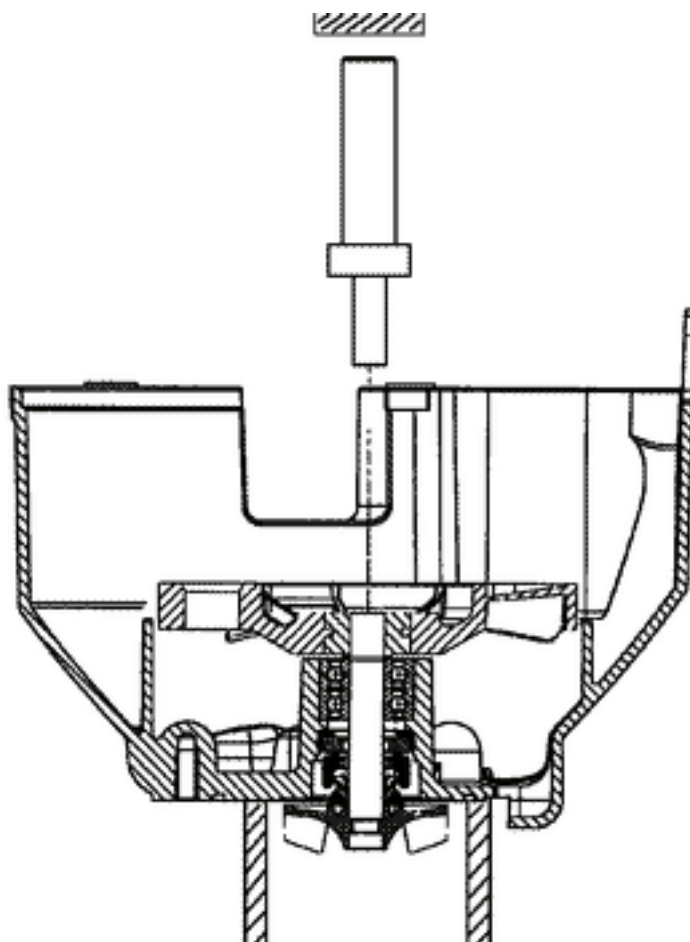
N.B.

**TO AVOID DAMAGING THE COVER SURFACE THAT SEALS THE COOLANT, USE THE RING BASE WITH THE ACCURATELY MACHINED SURFACE FACING THE FLYWHEEL COVER.**

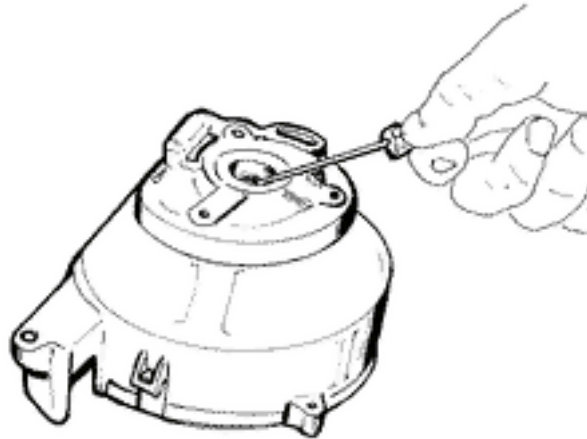
### Specific tooling

#### 020440Y Water pump service tool

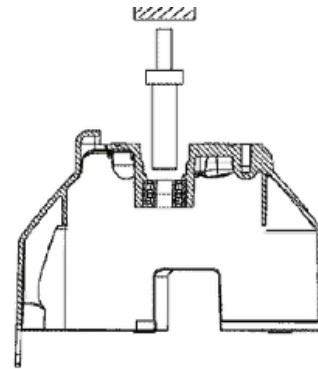
-With an appropriate socket and punch, forming part of the specific tool 020440y, extract the shaft together with the rotor from the drive and the bearings.



- Use a screwdriver to remove the static part of the ceramic seal from the flywheel cover.



- Place the flywheel cover below the socket making sure it is perfectly levelled.
- Use the punch in the inverted position to extract the two ball bearings.



### Water pump ceramic seal

Our Leader, Quasar, and Master liquid cooled engines are equipped with water pumps fitted with the ceramic seal in the subject. This component is intended to guarantee the leak tightness of the coolant in relation to the pump shaft. The seal achieved via two special ceramics, a static one and a spinning one, kept in contact by the thrust of a spring, coaxially mounted onto the pump shaft. The efficiency of this system is guaranteed by the accurate machining and cleaning of the components as they are fitted; in any case, ceramic seals are subjected to a running in period. During this period (1,000 ± 1,500 km), there may be small leaks through draining holes, which remain visible on the aluminium crankcase. This phenomenon is particularly visible there where the hole is more exposed (Quasar and Master). In such cases we recommend cleaning the casing in order to be able to check again for leaks after a distance of more than 1500 km. If leaks continue or in the event of real losses, the ceramic seal should be replaced. For these operations, observe the tools and instructions given in the relevant service station manuals.

Note: The ceramic seal may be overhauled according to the following couplings:

- Coupling "A": seal ring no. 485084 with ceramic seal no. 486216
- Coupling "B": seal ring no. 841329 with ceramic seal no. 841330

The couplings above may be selected according to their availability, as they are interchangeable.

---

## Check

---

1) Look to see that the thermostat is not damaged.

2) Fill a metal container with approx. 1 litre of water.

Immerse the thermostat, and keep it in the centre of the container.

Immerse the multimeter temperature probe, and keep it close to the thermostat.

Heat up the container using the thermal gun.

Check the temperature when the thermostat starts to open:

Heat up until the thermostat is completely open.

3) Replace the thermostat if it is not working properly.



### CAUTION

TO EXECUTE THE TEST CORRECTLY, MAKE SURE NEITHER THE THERMOSTAT NOR THE THERMOMETER TOUCHES THE CONTAINER.

### Specific tooling

020331Y Digital multimeter

020151Y Air heater

### Characteristic

Thermostat check: Opening start temperature

69.5 ÷ 72.5°C

---

# INDEX OF TOPICS

**CHASSIS**

**CHAS**

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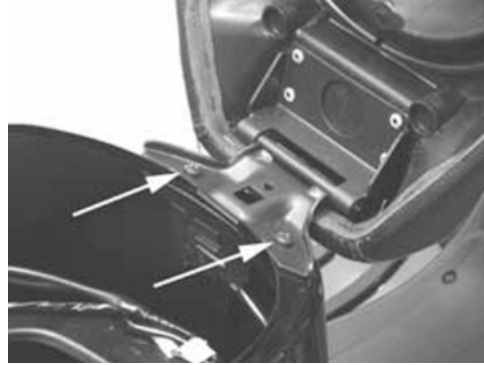
This section è is devoted to the operations that can be carried out on the vehicle's bodywork.

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## Seat

---

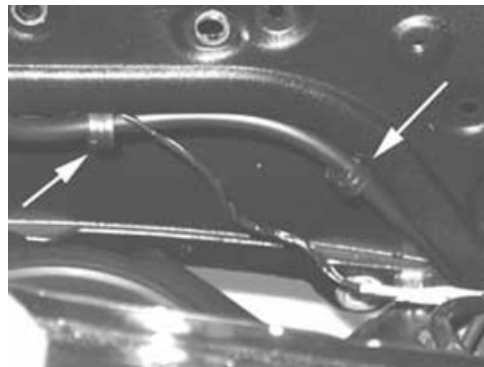
- Remove the helmet compartment
- Remove the two screws shown in the photograph
- Remove the saddle



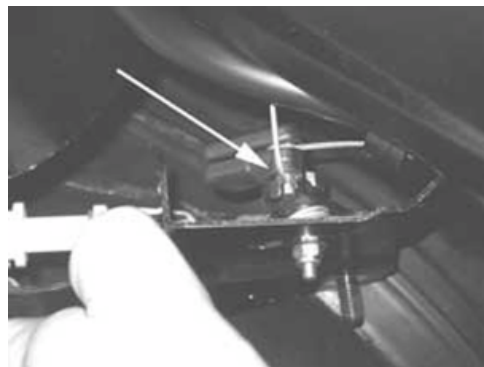
- 
- Remove the helmet compartment
  - Remove the 2 nuts indicated in the photograph



- 
- Free the electric cables from the retaining clamps indicated in the photograph

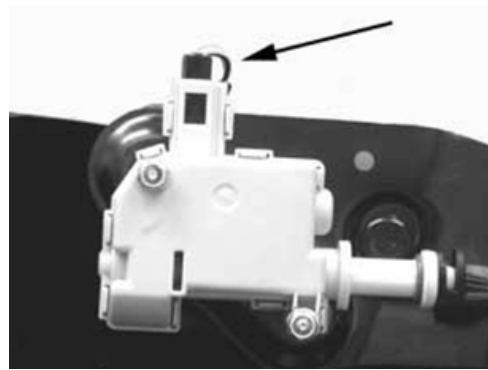


- 
- Remove the saddle opening transmission cable
  - Remove the saddle manual opening transmission cable.

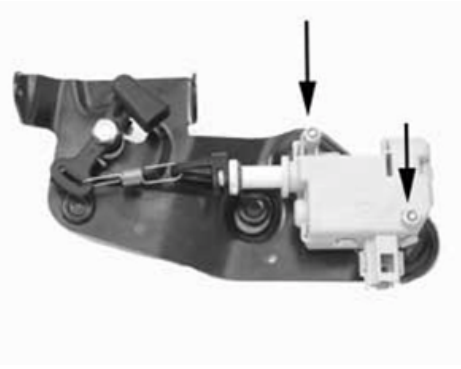




- Remove the electric connector from the saddle opening actuator

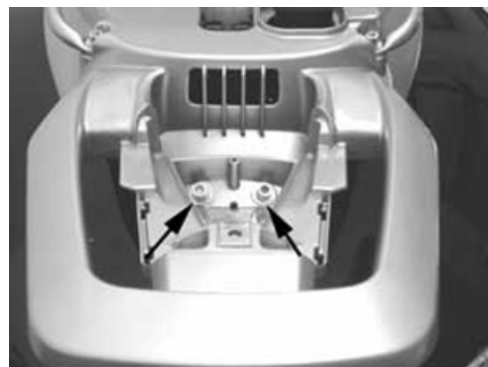


- Remove the two screws shown in the photograph
- Remove the clip from the transmission
- Remove the actuator from the supporting bracket



## Rear rack

- Remove the helmet compartment
- Undo the two screws shown in the figure and remove the luggage rack cover.
- Undo the six screws shown in the figure, remove the passenger handgrips and the luggage racks





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## Rear handlebar cover

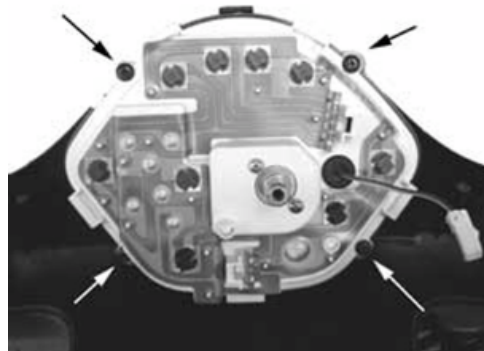
- Remove the front handlebar cover
- Undo the 4 screws indicated in the photograph
- Disconnect the odometer cable
- After disconnecting the wiring remove the rear handlebar.



---

## Instrument panel

- Remove the rear handlebar cover;
- Remove the four screws indicated in the figure
- Remove the instrument panel.



---

## Front handlebar cover

---

- Remove the front grille
- Remove the front screw indicated in the figure



- 
- Undo the 2 screws indicated in the figure;
  - Remove the front handlebar cover
  - Disconnect the front headlamp connectors



---

## Headlight assy.

---

- Operate the screw indicated in the figure to remove the front turn indicator



## Knee-guard

- Remove the rear handlebar cover.
- Remove the two screws indicated in the photograph and located on the shield under the grille



- Remove the expansion tank cover and then its cap
- Remove the central screw inside the glove-box, indicated in the photograph

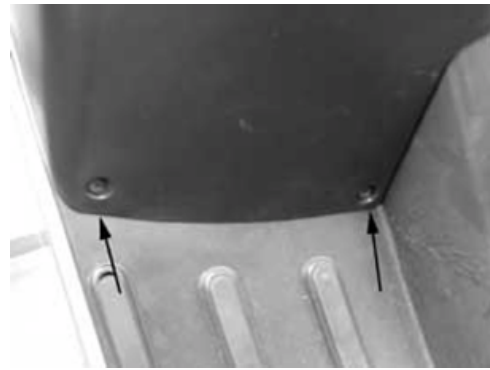


- Remove the two screws indicated in the photograph and located below the expansion tank cover and the left cover respectively



- Remove the shield back plate lower screws, to the right and left side of the shield back plate, as indicated in the photograph





- Remove the electric saddle opening switch, the fuse box and the manual saddle opening cable as shown in the photograph



### Removing the ignition key-switch when on \*off\*

- Remove the shield back plate.
- Remove the immobilizer aerial as shown in the figure.



- Detach the electrical wiring.
- Remove the ignition key-switch, by removing the spring retainer shown in the figure.





- Lightly push the master-cylinder and extract the lock from the notch shown in the figure.
- Hence extract the master-cylinder complete with the key-switch.
- For the reassembly proceed in the reverse order.

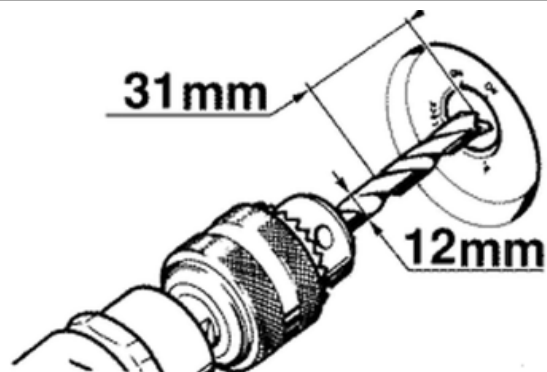


### Removing the ignition key-switch when on \*lock\*

In position "Lock", it is not possible to access the cylinder retaining spring. The spring must then be removed as shown in the figure, allowing the lock spring to be pressed out.

**N.B.**

**FOR REASSEMBLY FROM THIS POSITION, RELEASE THE STEERING WHEEL AND SET THE LOCK BODY (INSIDE AND OUTSIDE PART) TO "OFF". THEN, PROCEED AS DESCRIBED IN PARAGRAPH REMOVAL, LOCK IN OFF POSITION.**

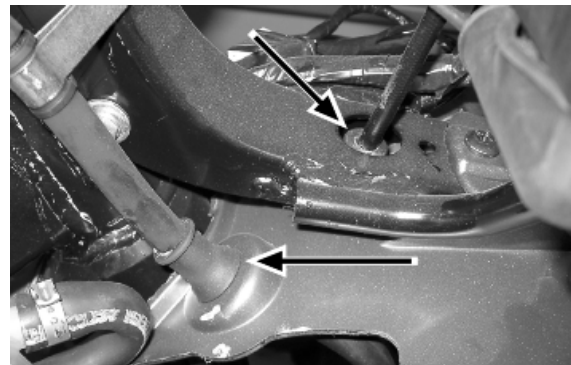
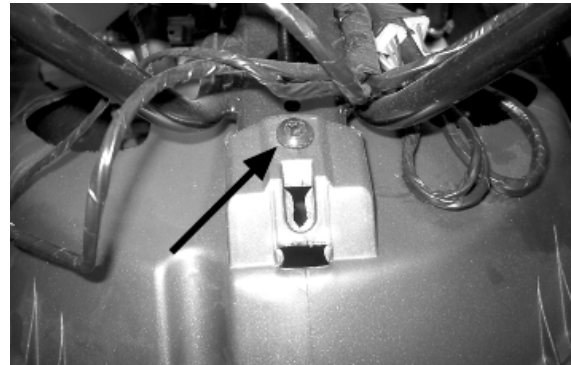


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## Front wheel housing

---

- Remove the front fork;
- Unscrew the central stud of the wheel well at the frame;
- Disconnect the brake pipe to the pump and pull it out;;
- Remove the odometer transmission..



---

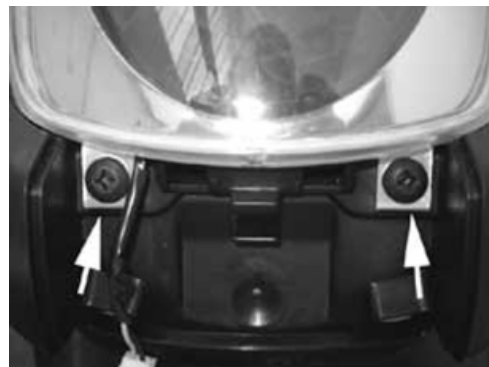
## Taillight assy.

---

- Operate the screw indicated in the figure to remove the rear turn indicator



- Remove the two screws fixing the license plate light shown in the figure
- Loosen the two fixing screws and remove the rear light unit.



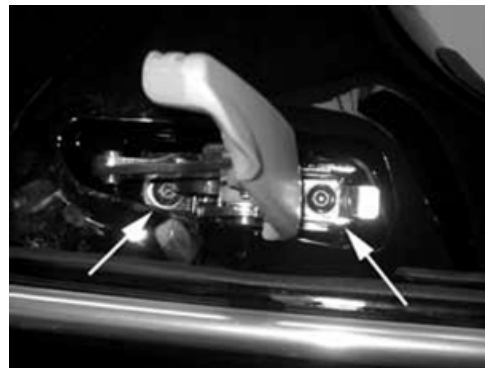


## Footrest

- Remove the shield back plate
- Remove the battery compartment cover
- Remove the side fairings
- Remove the central screw located under the battery compartment cover as indicated in the figure



- Remove the passenger footrests undoing the two screws indicated in the figure



- Remove the right and left screws fixing the footrest indicated in the figure





- 
- Remove the right and left lower covers as shown in the figure



- 
- Remove the screws under the non-slip rubber mat of the footrest as indicated in the photograph



---

## Side fairings

- 
- Remove side fairings, right and left, by undoing the 2 screws shown in the figure



---

## Rear mudguard

- 
- Remove the air filter
  - Remove the screw indicated in the photograph
  - Remove the mudguard



## Helmet bay

- Lift the saddle and remove the helmet compartment

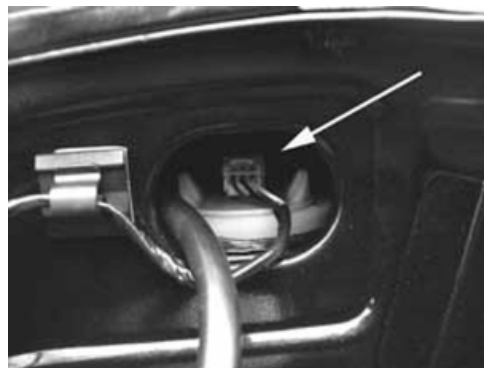


## Fuel tank

- Remove the helmet compartment
- Remove the side fairings
- Remove the muffler
- Remove the luggage rack
- Remove the shock absorber upper clamps
- Remove the two screws, indicated in the figure, that fix the tank to the body



- Remove the connector from the fuel gauge
- Remove the screw indicated in the figure that fixes the tank to the body after removing the rear headlight assembly
- Remove the straps retaining the pipes to the fuel valve as shown in the figure



- Remove the two turn indicators
  - Use a jack to lift the body so that there is enough space between the vehicle rear side and the engine to slide off the tank
- To refit, perform the steps in the reverse direction to disassembly

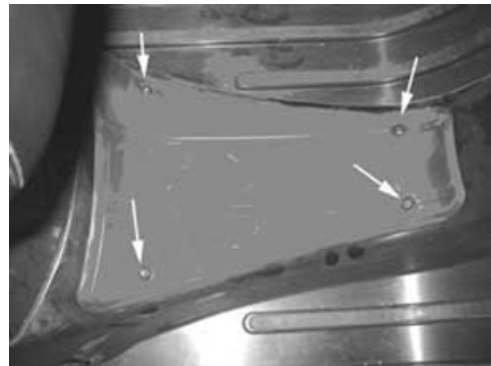




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### Rear central cover

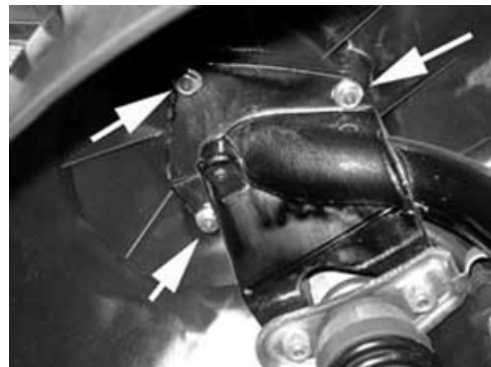
- Remove the four screws indicated in the figure



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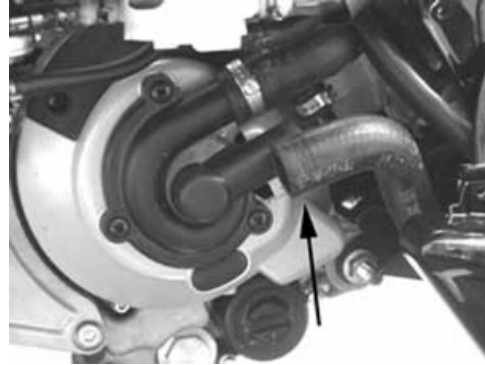
### Front mudguard

- First remove the steering tube and uncouple the front brake pipes from the calliper in order to remove the front mudguard
- Remove the three mudguard-steering tube clamps indicated in the figure



## Radiator fan

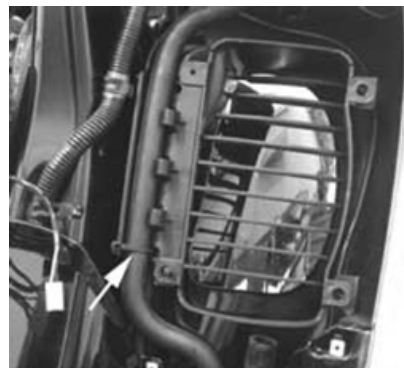
- In order to carry out any operation on the radiator unit, flow out the coolant in the coolant delivery pipe in the pump, indicated in the photograph.



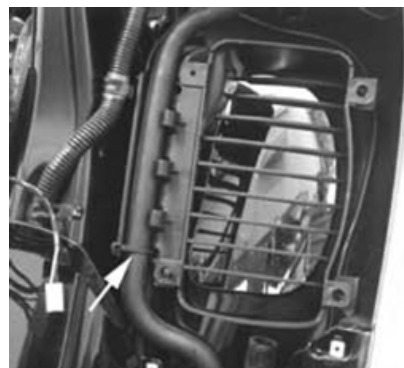
- Remove the shield back plate;  
- Remove the coolant feed and return hoses from the right radiator;  
- Unscrew the 4 screws fixing the radiator to the body;  
- Detach the radiator



- Detach the pipe from the plastic duct by removing the plastic clip shown in the photograph. Then remove the duct.



- The same procedure also applies to the left radiator for which it is necessary to remove the electrical fan first by undoing the 3 screws indicated in the photograph.



To refit, perform the removal operations but in reverse order being careful when positioning the new clips for the fluid hoses and when filling the cooling system.

## Front central cover

---

- Remove the "PIAGGIO" clip-on badge
- Unscrew the screw indicated in the figure
- Remove the grille



## INDEX OF TOPICS

**P**RE-DELIVERY

**P**RE DE

Carry out the listed tests before delivering the vehicle.

Warning- be very careful when handling fuel.

## Aesthetic inspection

### Appearance check:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

## Tightening torques inspection

- Safety Locks • Cover retaining screws

### SAFETY LOCKS

Name	Torque in Nm
Shock absorber upper fixing: rear	20 to 25 N•m
Shock absorber bottom fixing: rear	33 to 41 N•m
Left shock absorber lower support bolts	20 ÷ 25
Front wheel axle nut	75 ÷ 90
Rear wheel axle nut	104 ÷ 126
Rear brake disc bolts	11 ÷ 13
swinging arm bolt - chassis	76 ÷ 83 Nm
Engine swinging arm bolt	64 ÷ 72 Nm
Handlebar clamping bolts	45 ÷ 50 Nm
Upper steering ring nut	30 ÷ 40
Lower steering ring nut	8 ÷ 10

## Electrical system

- Main switch
- Lights: high beams, low beams, side/taillights (front and rear) and relevant warning lights
  - Regulating the headlights according to the regulations currently in force
- Front and rear stop light buttons and relative light • Turn indicators and relative telltales
- Instrument lighting
- instruments: fuel and temperature indicator
- Instrument panel lights
- Horn
- Electrical start up
- Engine stop by emergency stop switch and side stand
- Electrical saddle opening button

### 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

**WHEN INSTALLING THE BATTERY, ATTACH THE POSITIVE LEAD FIRST AND THEN THE NEGATIVE LEAD.**

**WARNING**

**BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH EYES, SKIN AND CLOTHING.**

**IN CASE OF CONTACT WITH EYES OR SKIN, RINSE WITH ABUNDANT WATER FOR ABOUT 15 MINUTES AND SEEK MEDICAL ATTENTION AT ONCE.**

**IF IT IS SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.**

**BATTERIES PRODUCE EXPLOSIVE GAS; KEEP THEM AWAY FROM NAKED FLAMES, SPARKS AND CIGARETTES. IF THE BATTERY IS CHARGED IN A CLOSED PLACE, TAKE CARE TO ENSURE ADEQUATE VENTILATION. ALWAYS PROTECT YOUR EYES WHEN WORKING CLOSE TO 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

**Level check:**

- Hydraulic brake system liquid level.
  - Rear hub oil level
  - Engine coolant level
  - Engine oil level
- 

## Road test

**Test ride**

- Cold start
  - Instrument operations
  - Response to the throttle control
  - Stability on acceleration and braking
  - Rear and front brake efficiency
  - Rear and front suspension efficiency
  - Abnormal noise
- 

## Static test

**Static control after the test ride:**

- Hot engine restart
  - Starter operation
  - Minimum seal (turning the handlebar)
  - Uniform steering rotation
  - Possible losses
-



- Electrical radiator fan operation

**CAUTION**

**CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.**

**CAUTION**

**NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.**

---

## Functional inspection

Functional check up:

- Hydraulic braking system: lever travel
  - Clutch: proper functioning check
  - Engine: proper general functioning and no abnormal noise check
  - Other: papers check, frame and engine number check, tools and equipment, licence plate fitting, lock check, tyre pressure check, rear-view mirror and any accessory fitting
-

## INDEX OF TOPICS

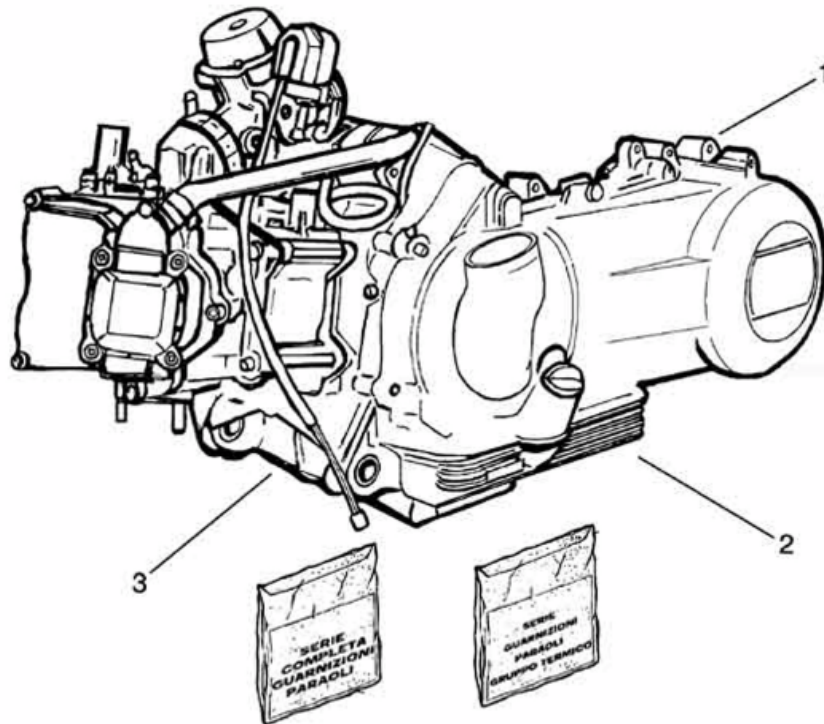
TIME

TIME

This section is devoted to the time necessary to carry out repairs.

For each operation, the description, code and time envisages are specified.

## Engine



### ENGINE

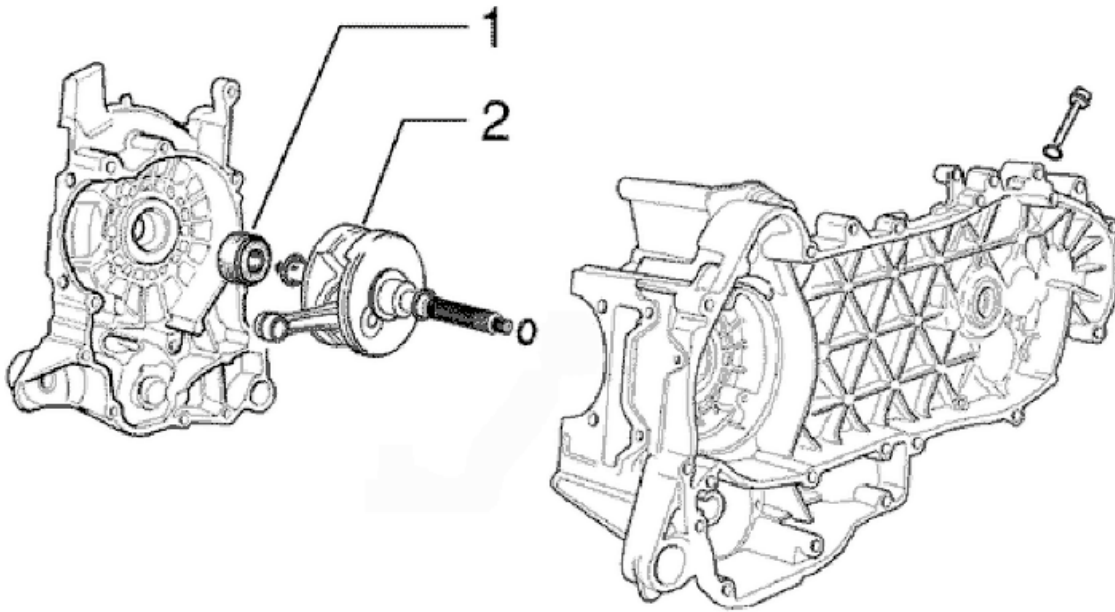
	Code	Action	Duration
1	001001	Engine from frame - Removal and re-fit.	
2	003064	Engine oil - Change	
3	003057	Engine retainer - Tighten nuts	

## Crankcase

### CRANKCASE

	Code	Action	Duration
1	001153	Crankcase halves gasket - Replacement	
2	001133	Engine crankcase- Replacement	

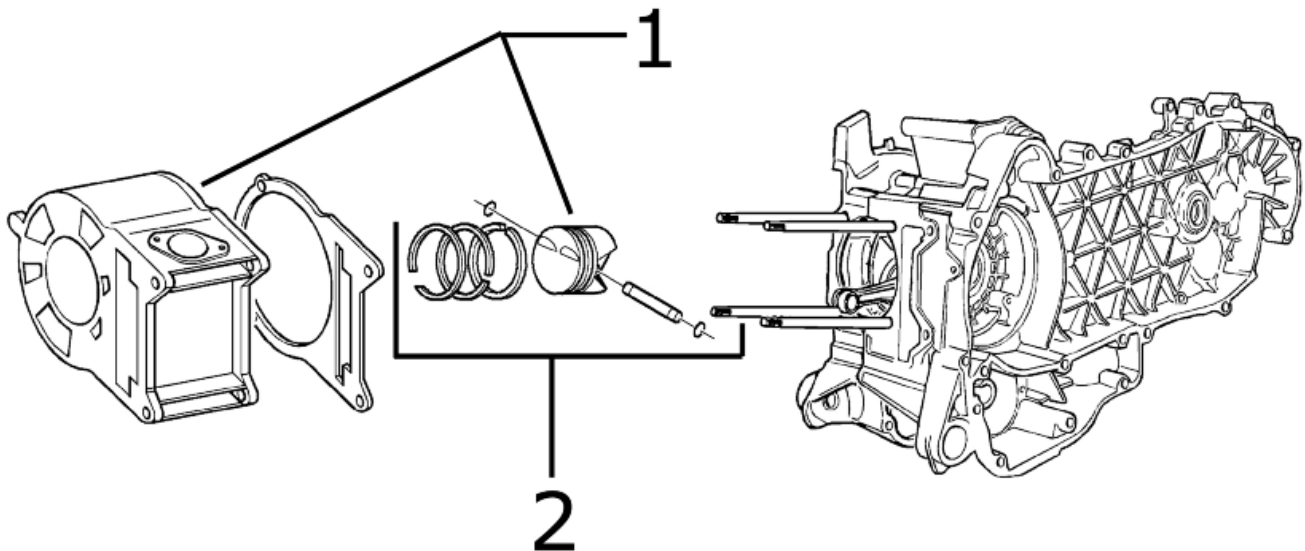
## Crankshaft



### CRANKSHAFT

	Code	Action	Duration
1	001099	Oil seal, flywheel side - Replacement	
2	001117	Crankshaft - Replacement	

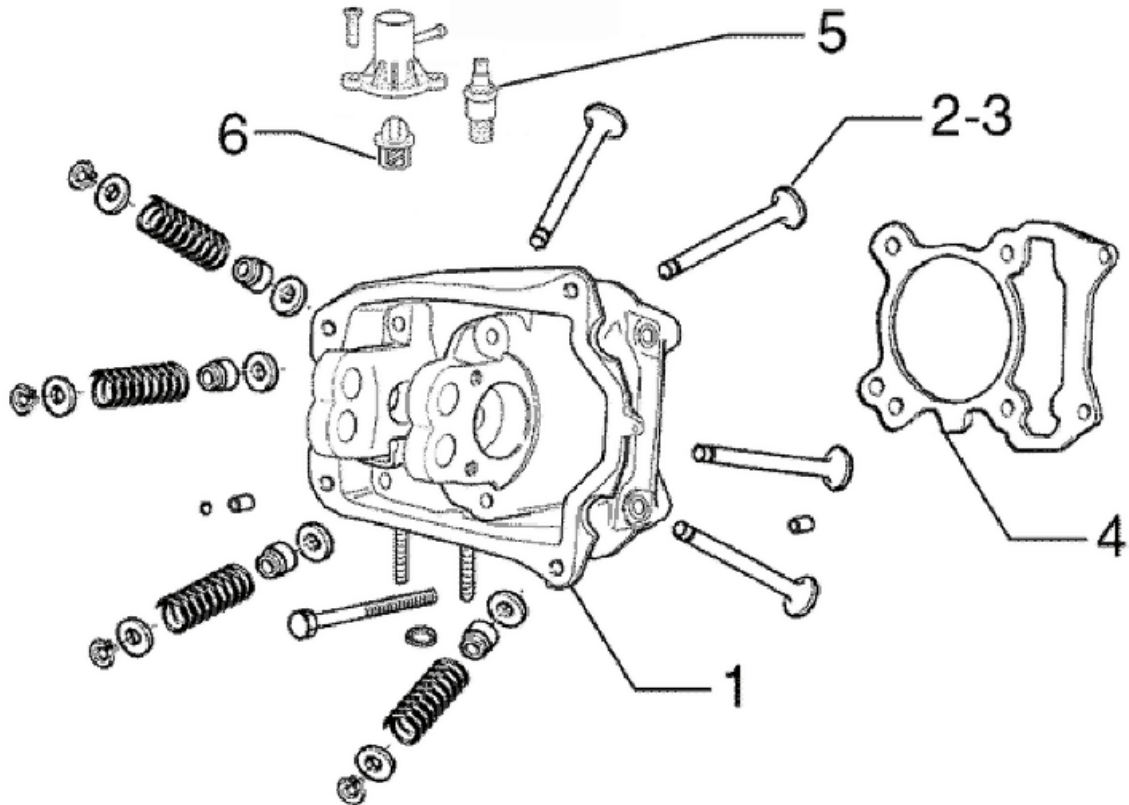
## Cylinder assy.



**CYLINDER- PISTON**

	Code	Action	Duration
1	001002	Cylinder-Piston - Replacement	
2	001154	Pin-ring-piston assembly - Service	

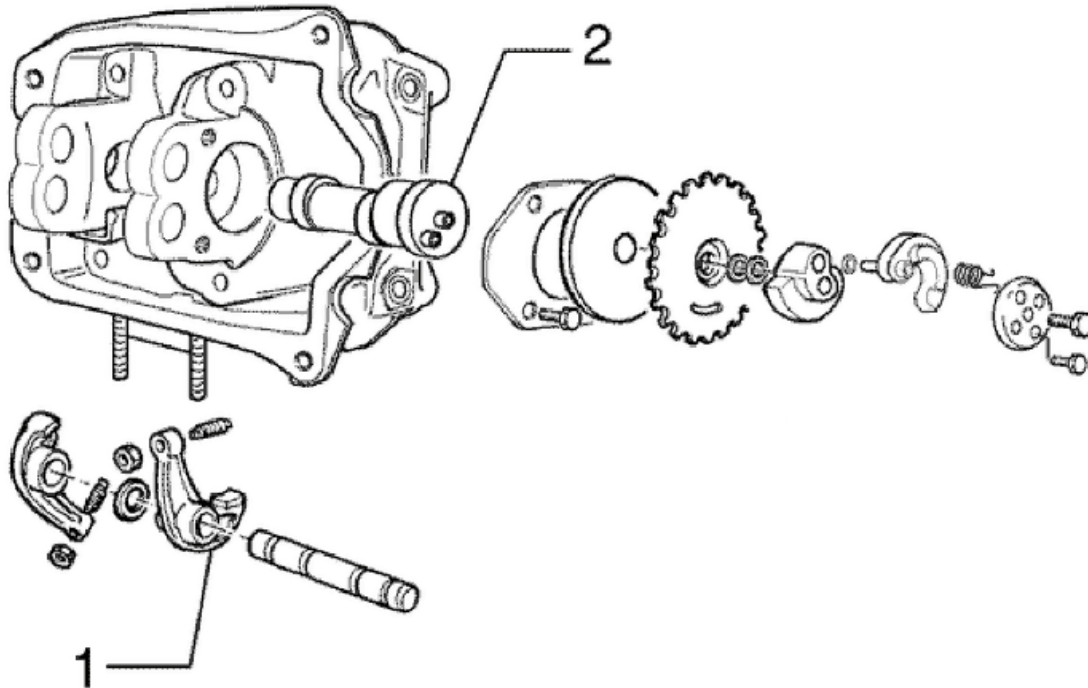
**Cylinder head assy.**



**VALVE HEAD**

	Code	Action	Duration
1	001126	Head - Replacement	
2	001045	Valves - Replacement	
3	001049	Valves - Adjustment	
4	001056	Head gasket - Replacement	
5	001083	Thermistor - Replacement	
6	001057	Thermostat - Replacement	

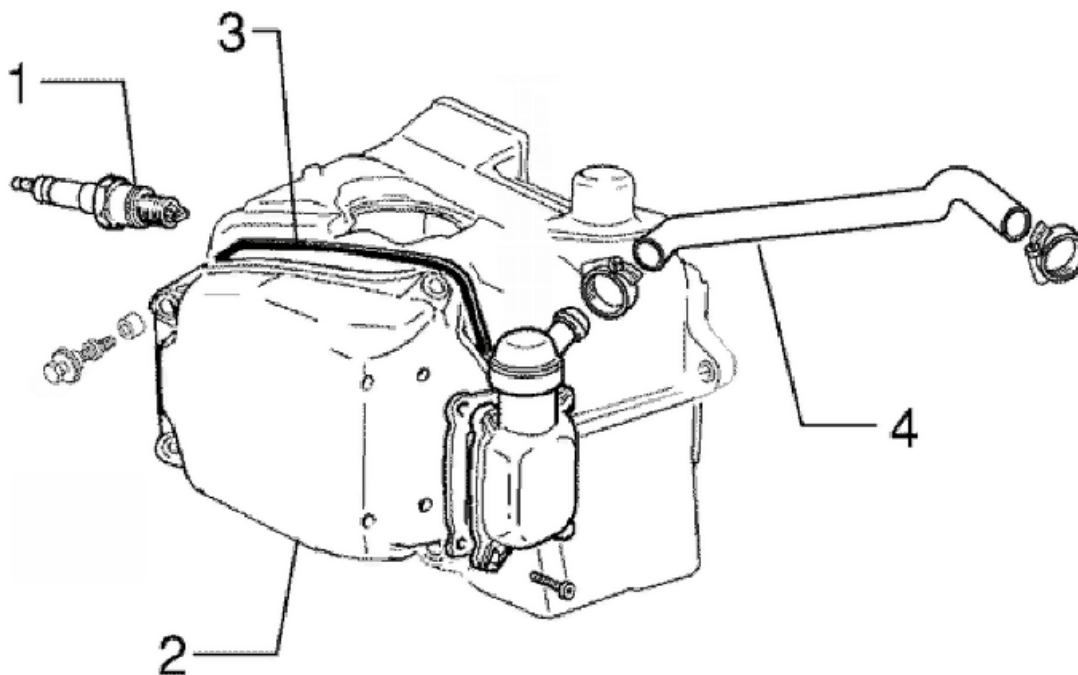
**Rocker arms support assy.**



**CAMSHAFT**

	Code	Action	Duration
1	001148	Rocking lever valve - Replacement	
2	001044	Camshaft - Replacement	

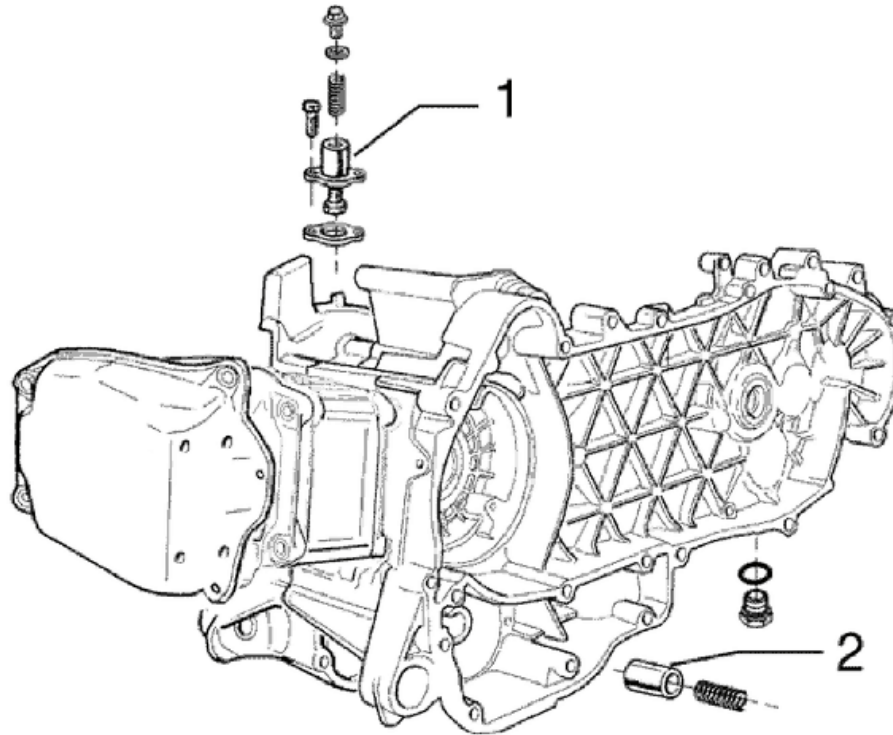
**Cylinder head cover**



**HEAD COVER**

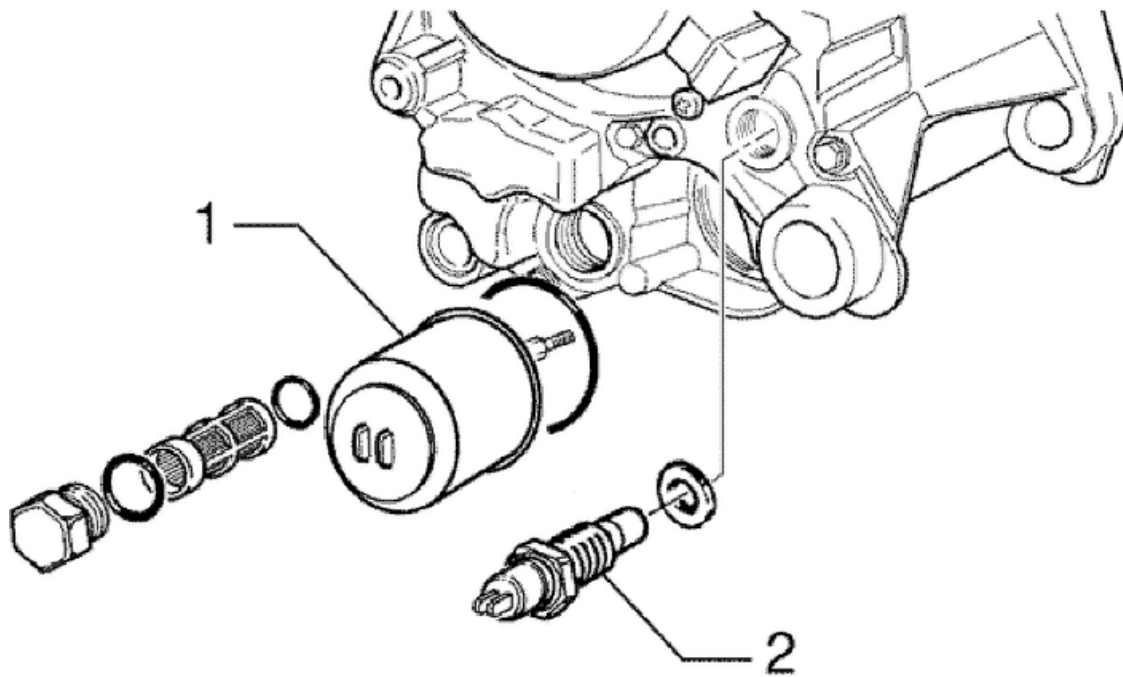
	Code	Action	Duration
1	001093	Spark plug - Replacement	
2	001089	Head cover - Replacement	
3	001088	Head cover gasket - Replacement	
4	001074	Oil vapour recovery pipe - Replacement	

**Chain tensioner**

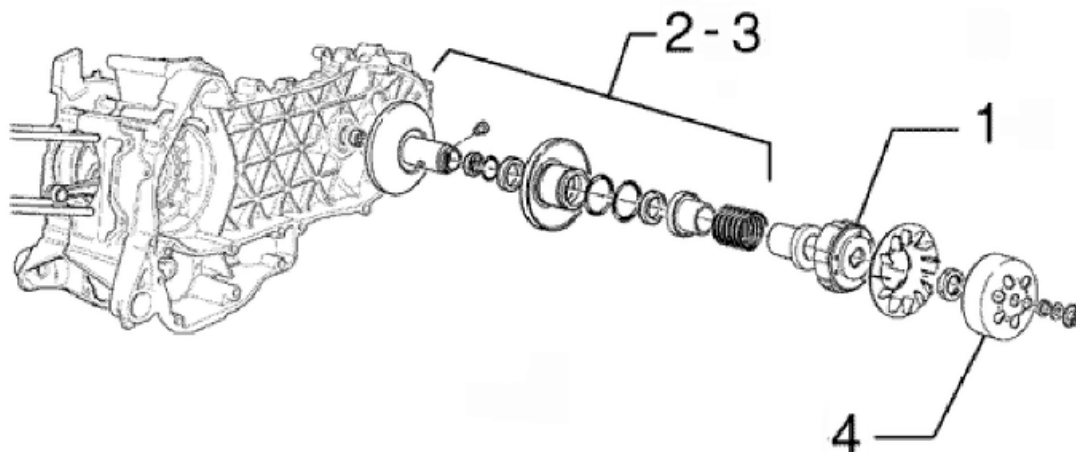


**CHAIN TIGHTENER**

	Code	Action	Duration
1	001129	Chain tightener - Overhaul and replacement	
2	001124	Lubrication by-pass - Replacement	

**Oil filter****OIL FILTER**

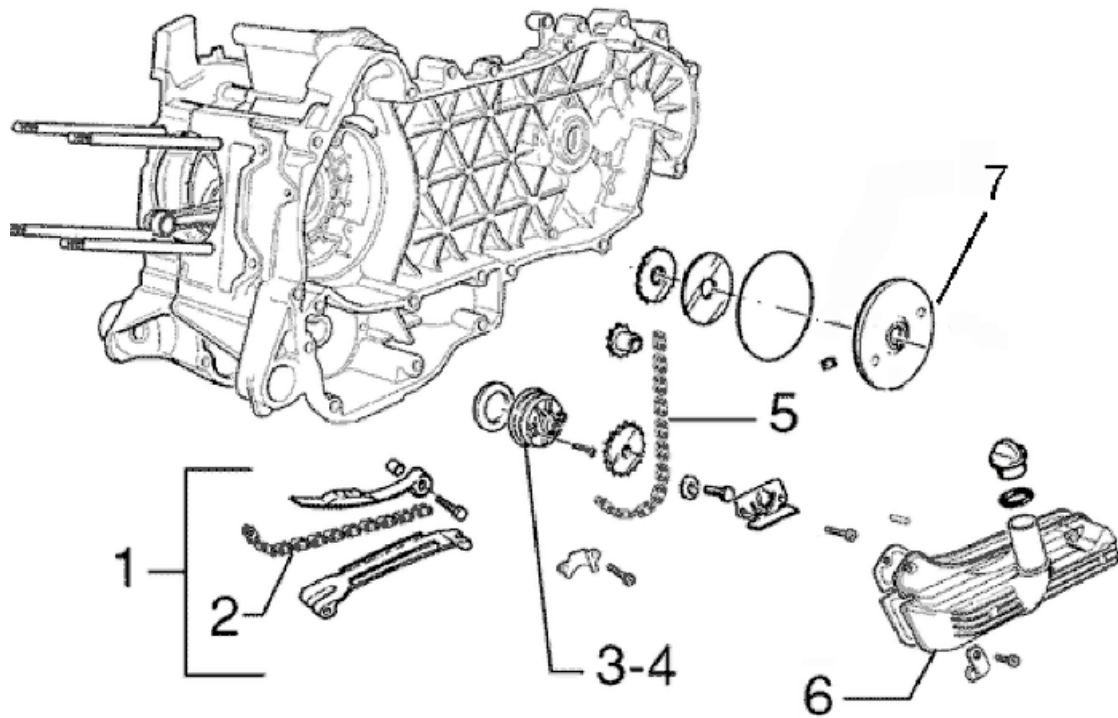
	Code	Action	Duration
1	001123	Oil filter - Replacement	
2	001160	Oil pressure sensor - Replacement	

**Driven pulley****DRIVEN PULLEY**

	Code	Action	Duration
1	001022	Clutch - Replacement	
2	001012	Driven pulley - Service	
3	001110	Driven pulley - Replacement	
4	001155	Clutch bell - Replacement	

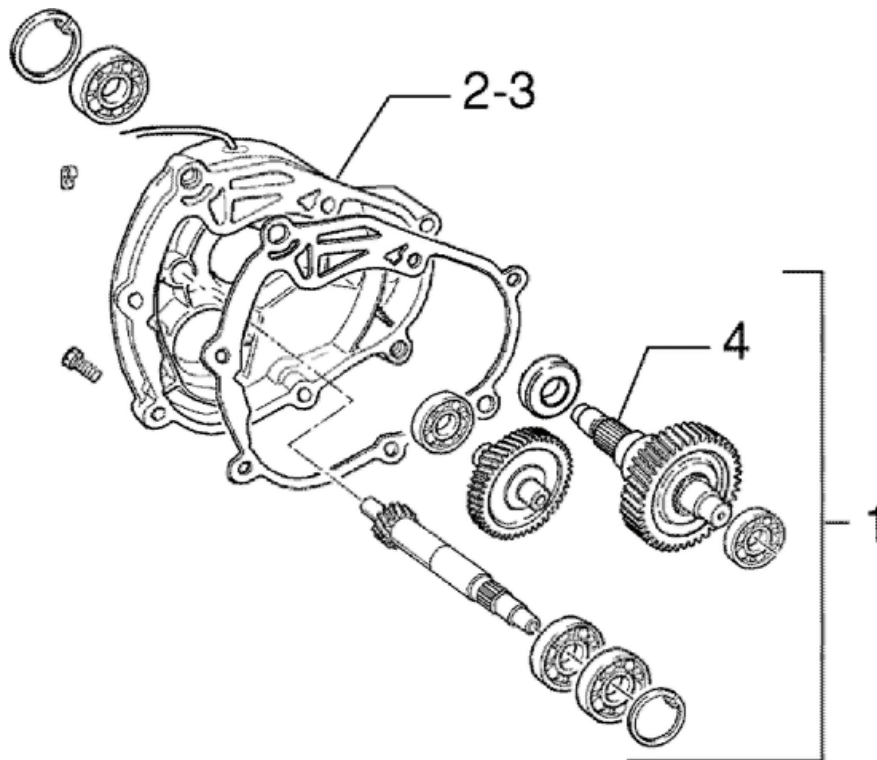


Oil pump



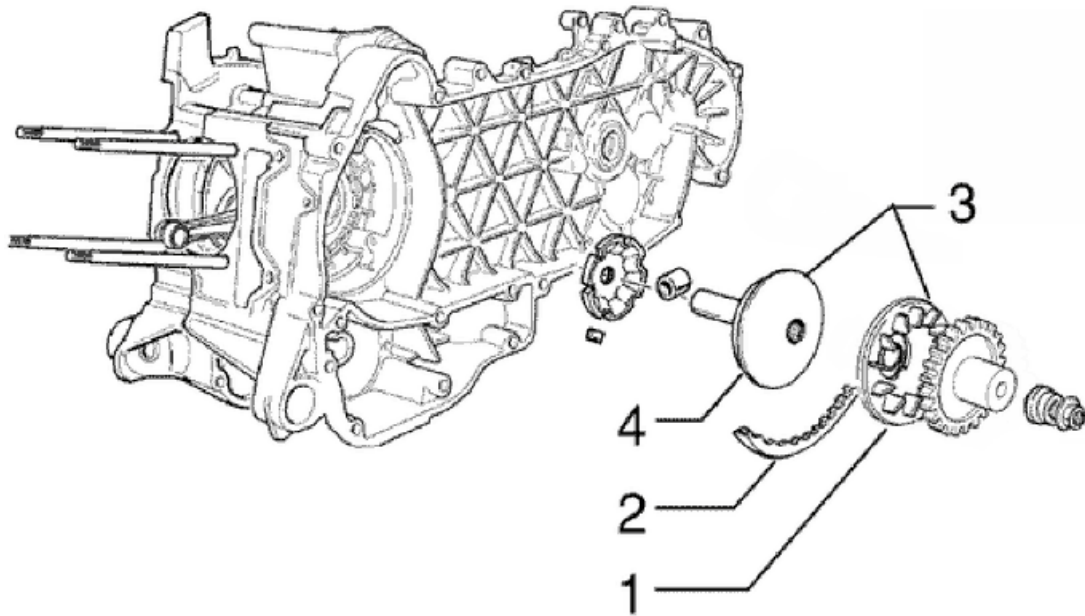
**OIL SUMP PUMP**

	Code	Action	Duration
1	001125	Chain guide pads - Replacement	
2	001051	Belt/Timing chain - Change	
3	001042	Oil pump - Service	
4	001112	Oil pump - change	
5	001122	Oil pump chain - Replacement	
6	001130	Oil sump - Replacement	
7	001172	Chain cover flap - change	

**Final gear assy.****FINAL REDUCTION**

	<b>Code</b>	<b>Action</b>	<b>Duration</b>
1	001010	Reduction gear - Replacement	
2	003065	Gear box oil - Replacement	
3	001156	Geared reduction unit cover - Replacement	
4	004125	Rear wheel axle - Replacement	

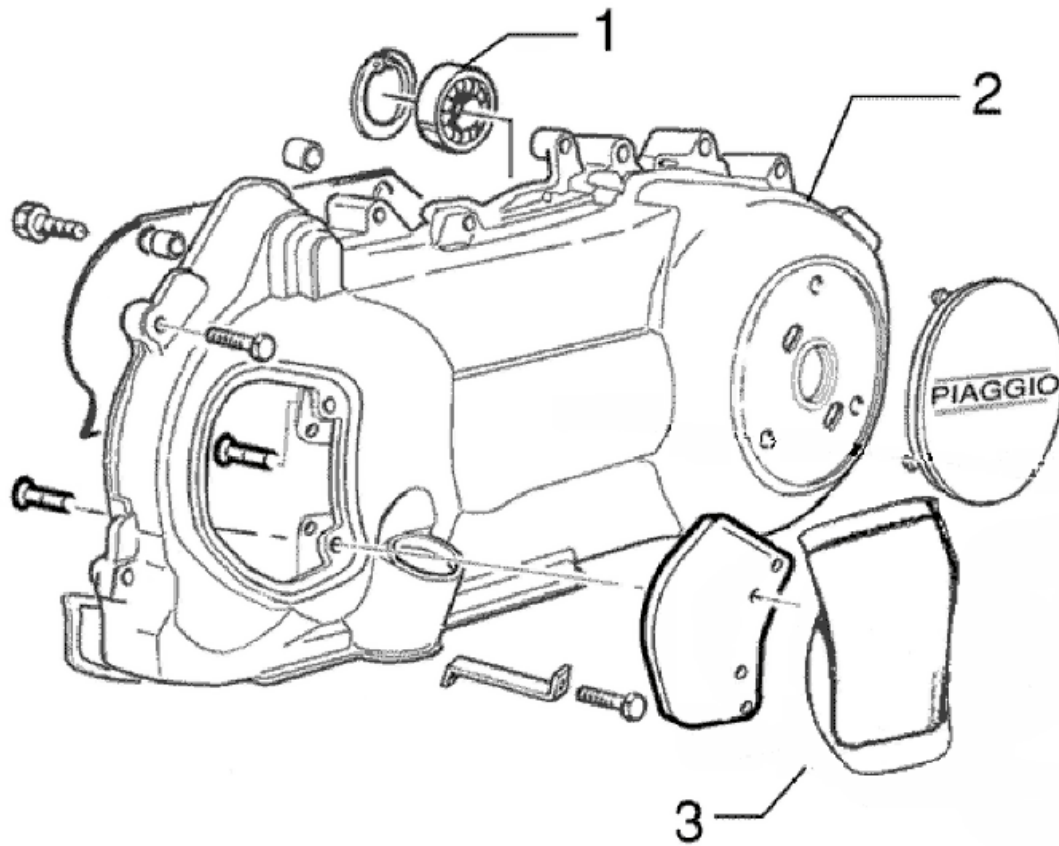
Driving pulley



**DRIVING PULLEY**

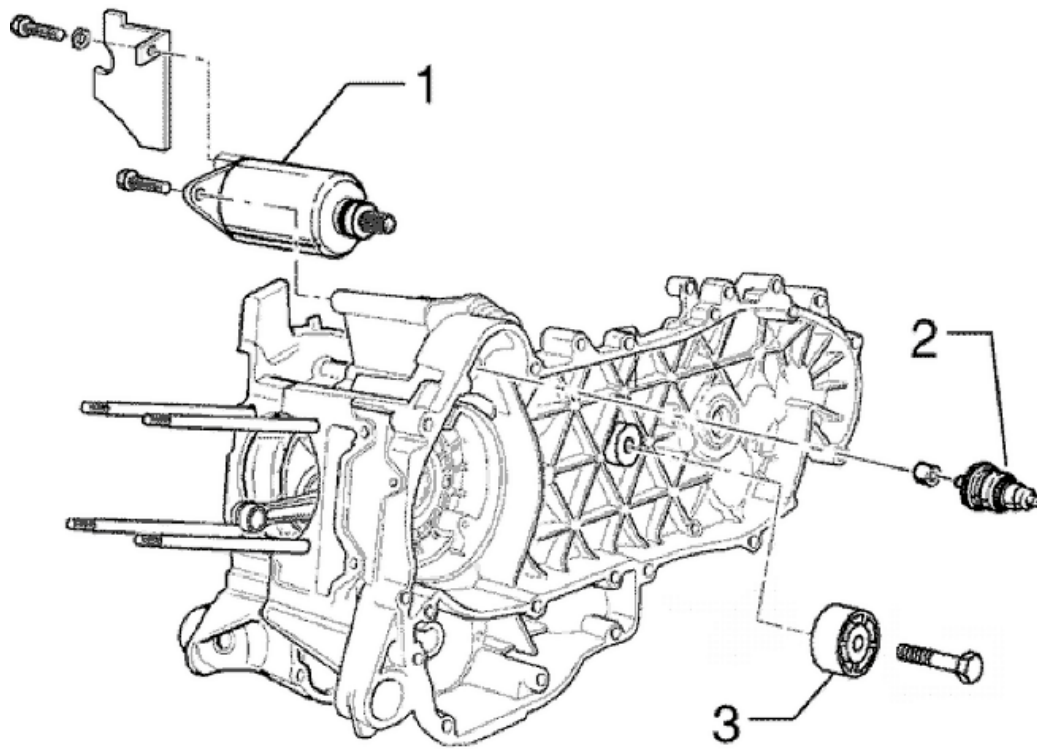
	Code	Action	Duration
1	001086	Driving half-pulley - Replacement	
2	001011	Driving belt - Replacement	
3	001066	Driving pulley - Removal and refitting	
4	001006	rear-view pulley - Service	

## Transmission cover

**TRANSMISSION COVER**

	<b>Code</b>	<b>Action</b>	<b>Duration</b>
1	001135	Transmission cover bearing - Replacement	
2	001096	Transmission crankcase cover - Replacement	
3	001131	Transmission air intake - Replacement	

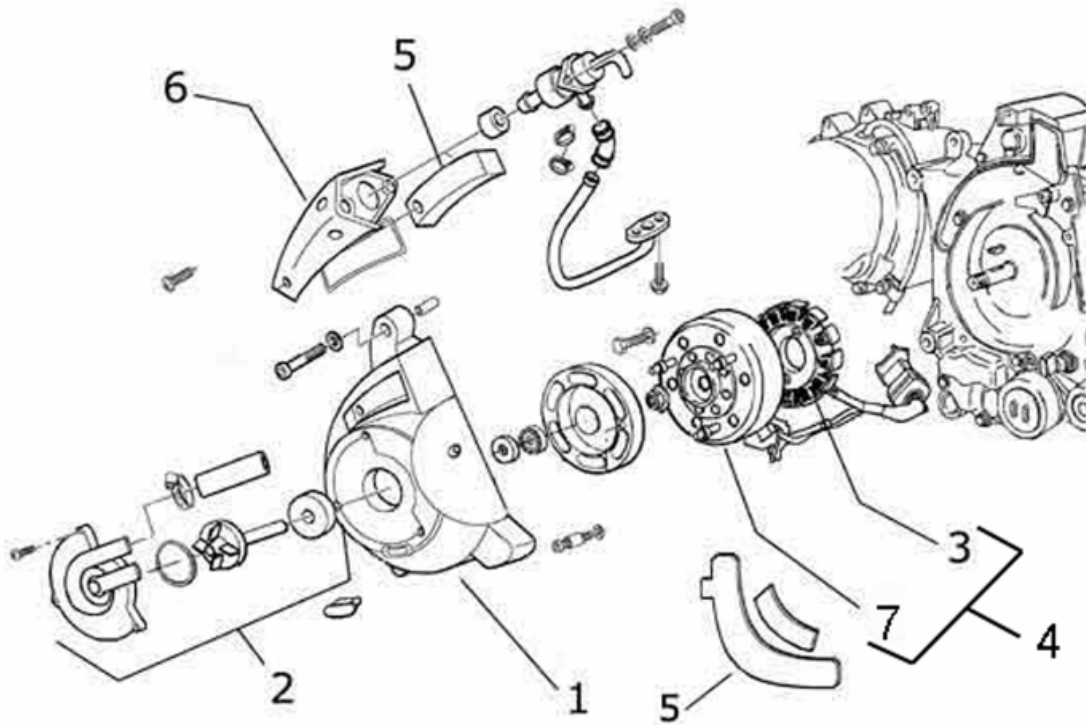
**Starter motor**



**ELECTRICAL START UP**

	<b>Code</b>	<b>Action</b>	<b>Duration</b>
1	001020	Starter motor - Replacement	
2	001017	Start-up pinion - Replacement	
3	001141	Belt anti-flapping roller - Replacement	

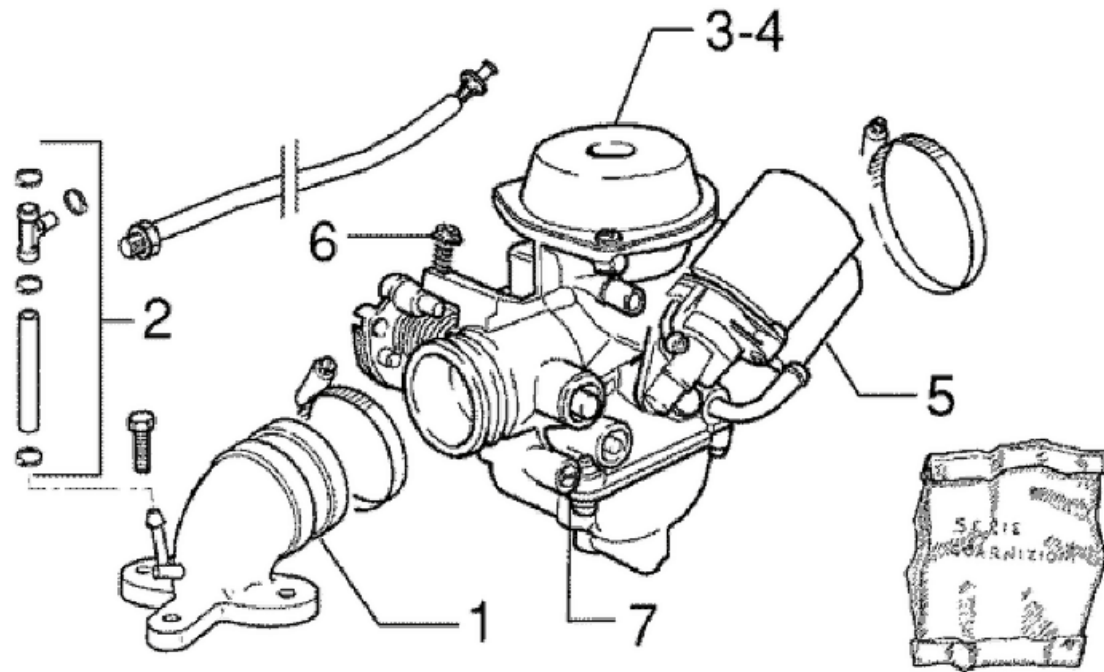
## Flywheel magneto



### MAGNETO FLYWHEEL

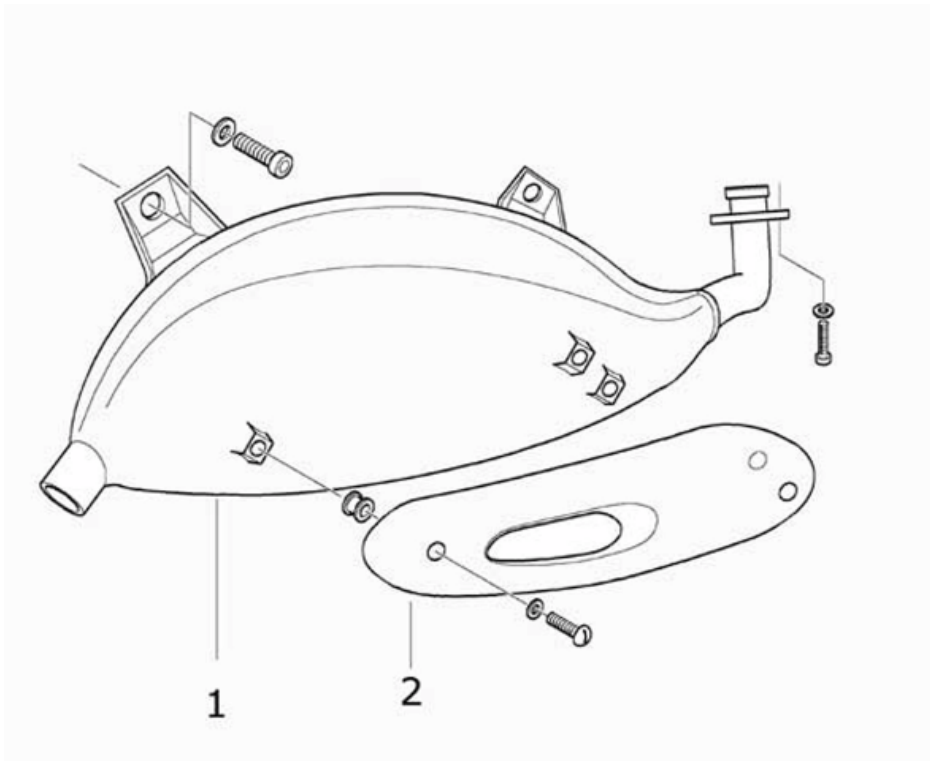
	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001113	Water pump / Pump rotor - Replacement	
3	001067	Stator - Removal and Refitting	
4	001058	Complete flywheel - Replacement	
5	001161	Secondary air filter - Replacement	
6	001162	Secondary air filter box - Replacement	
7	001173	Rotor - Replacement	

Carburettor



**CARBURETTOR**

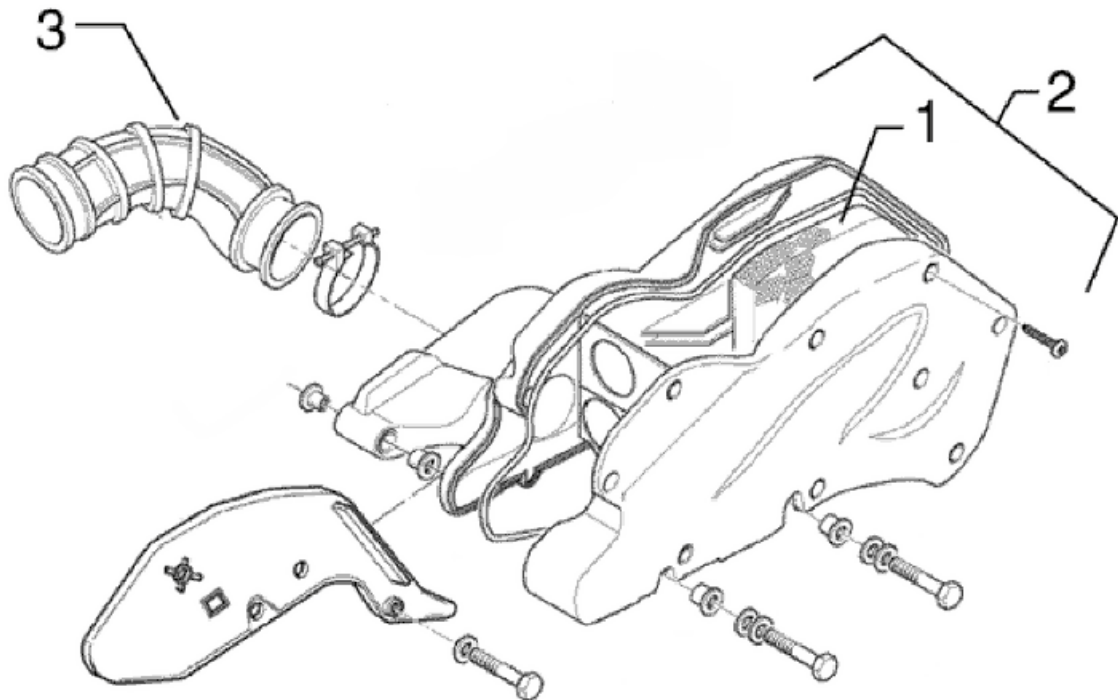
	Code	Action	Duration
1	001013	Intake manifold - Replacement	
2	007020	Carburettor heating tubing - replacement	
3	001008	Carburettor - Inspection	
4	001063	Carburettor - Replacement	
5	001081	Automatic choke - Replacement	
6	003058	Carburettor - Adjustment	
7	001136	Exhaust emissions - Adjustment	

**Exhaust pipe****MUFFLER**

	<b>Code</b>	<b>Action</b>	<b>Duration</b>
1	001009	Muffler - Replacement	
2	001095	Muffler guard - Replacement	



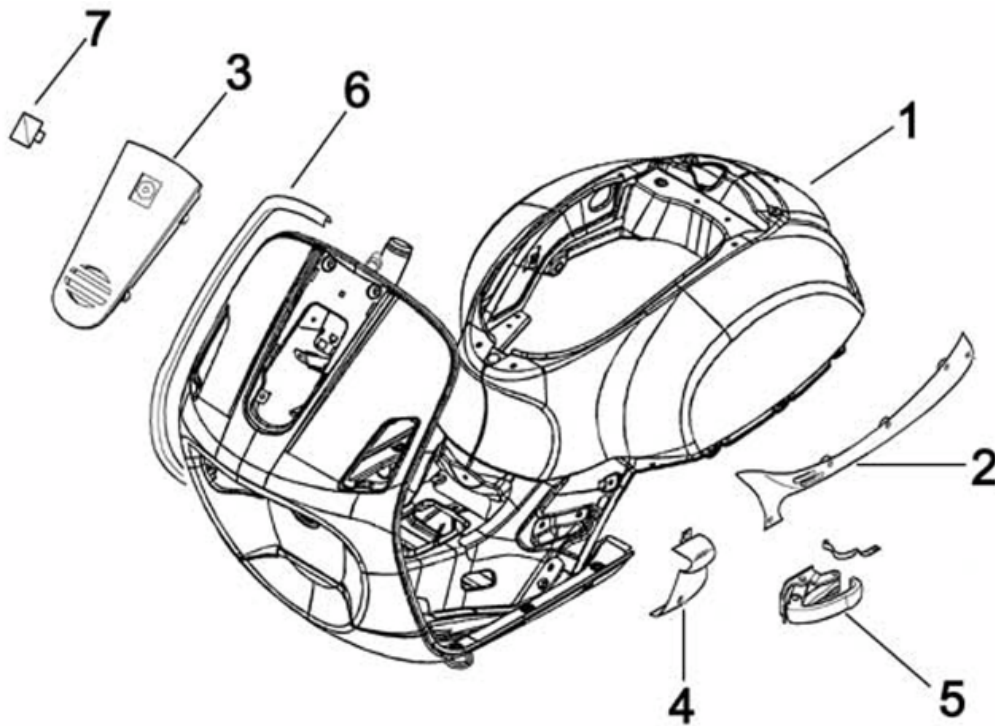
**Air cleaner**



**AIR CLEANER**

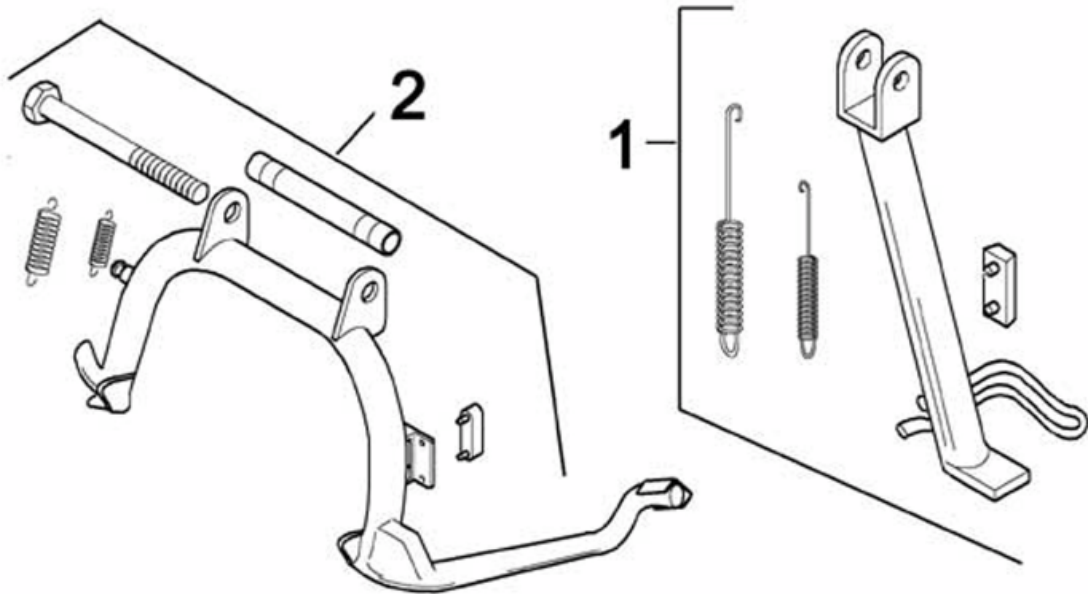
	<b>Code</b>	<b>Action</b>	<b>Duration</b>
1	001015	Air filter box - Replacement	
2	001014	Air filter - Replacement / cleaning	
3	004122	Air cleaner/ carburettor union - Replacement	

## Frame

**CHASSIS**

	Code	Action	Duration
1	004001	Chassis - Replacement	
2	004085	Fairing (1) - Replacement	
3	004149	Shield central cover - Replacement	
4	004053	Spoiler - Replacement	
5	004015	Footrest - Removal and Refitting	
6	004023	Shield rim - Replacement	
7	004159	Plates / Stickers - Replacement	

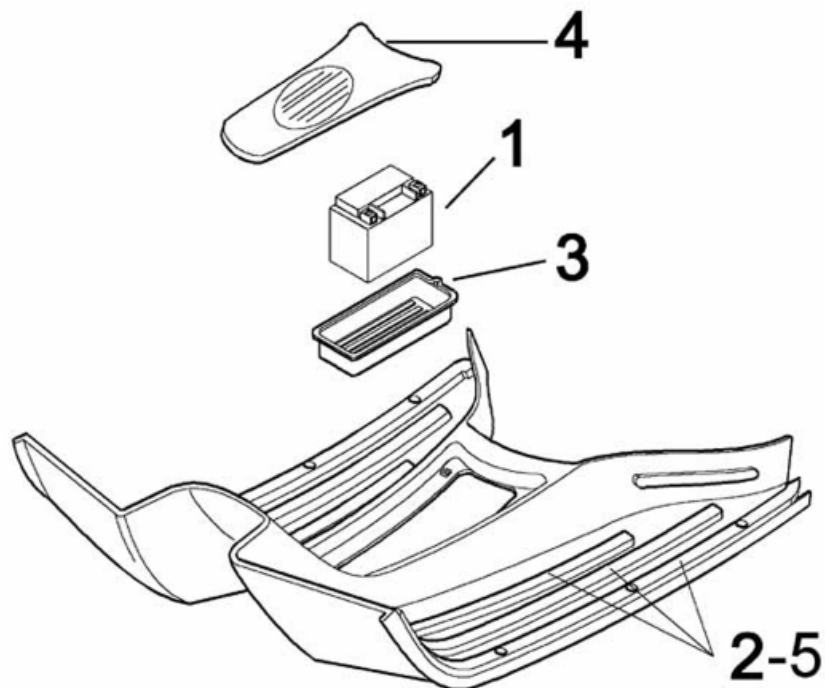
Centre-stand



**STAND**

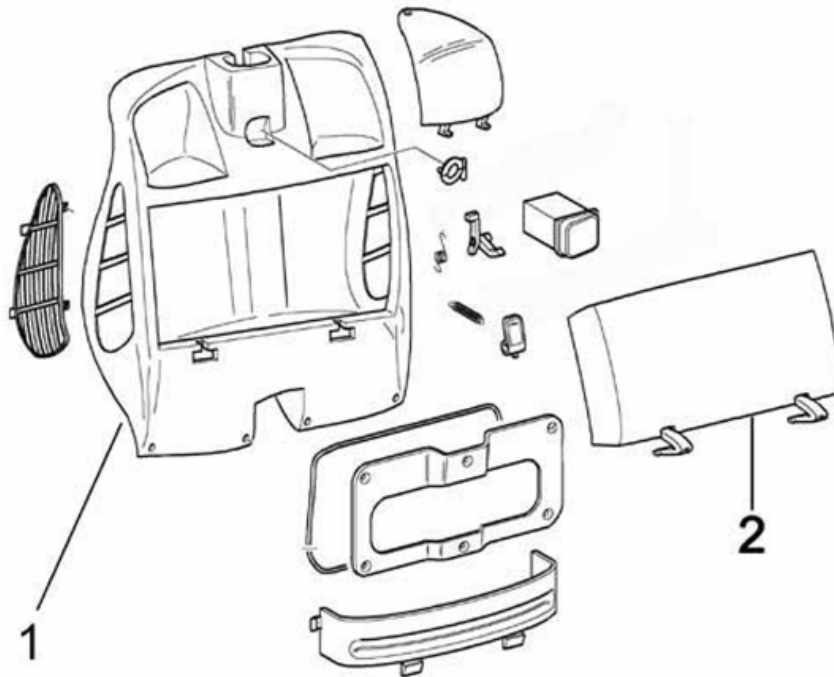
	Code	Action	Duration
1	004102	Side stand - Replacement	
2	004004	Stand - Replacement	

Footrests



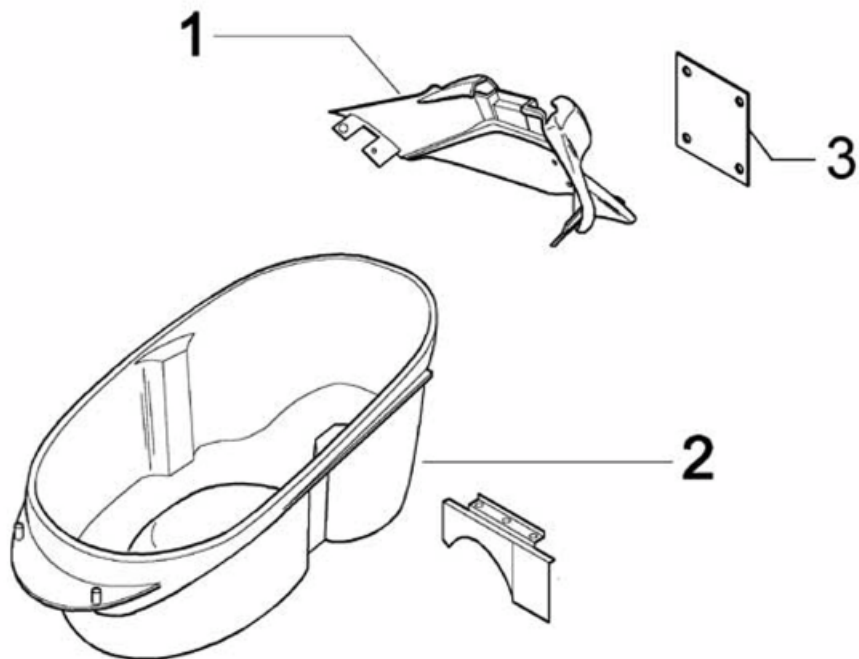
**MATS AND COVERS**

	Code	Action	Duration
1	005007	Battery - Replacement	
2	004079	Footrest - replacement	
3	004071	Battery compartment - replacement	
4	005046	Battery cover - change	
5	004078	Front/rear footrest rubber - Replacement	

**Rear cover****REAR SHIELD**

	Code	Action	Duration
1	004083	Glove box - Replacement	
2	004081	Glove box door - Replacement	

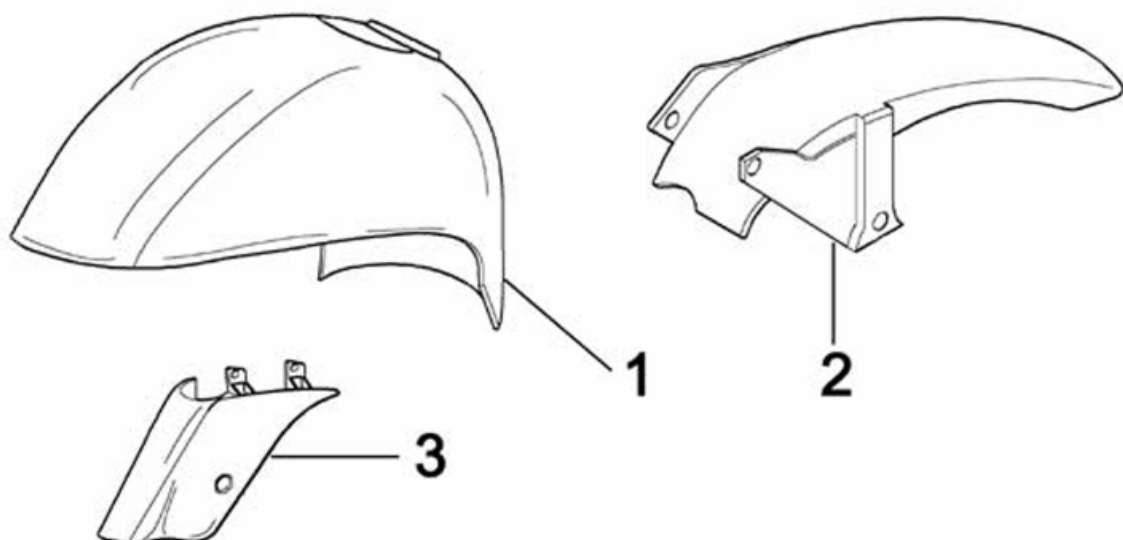
**Underseat compartment**



**HELMET COMPARTMENT**

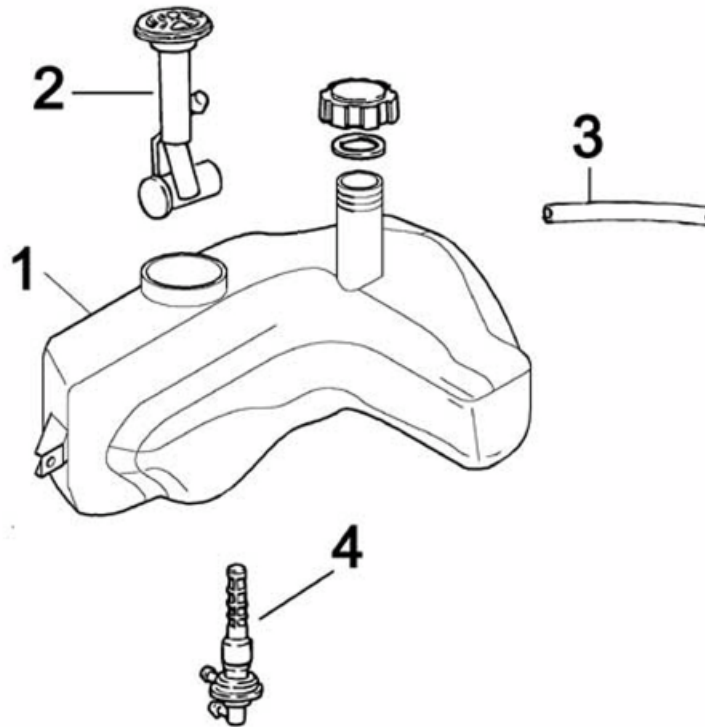
	Code	Action	Duration
1	004136	License plate support - Replacement	
2	004016	Helmet compartment - Removal and Refitting	
3	005048	Licence plate holder - Replacement	

**Mudguard**



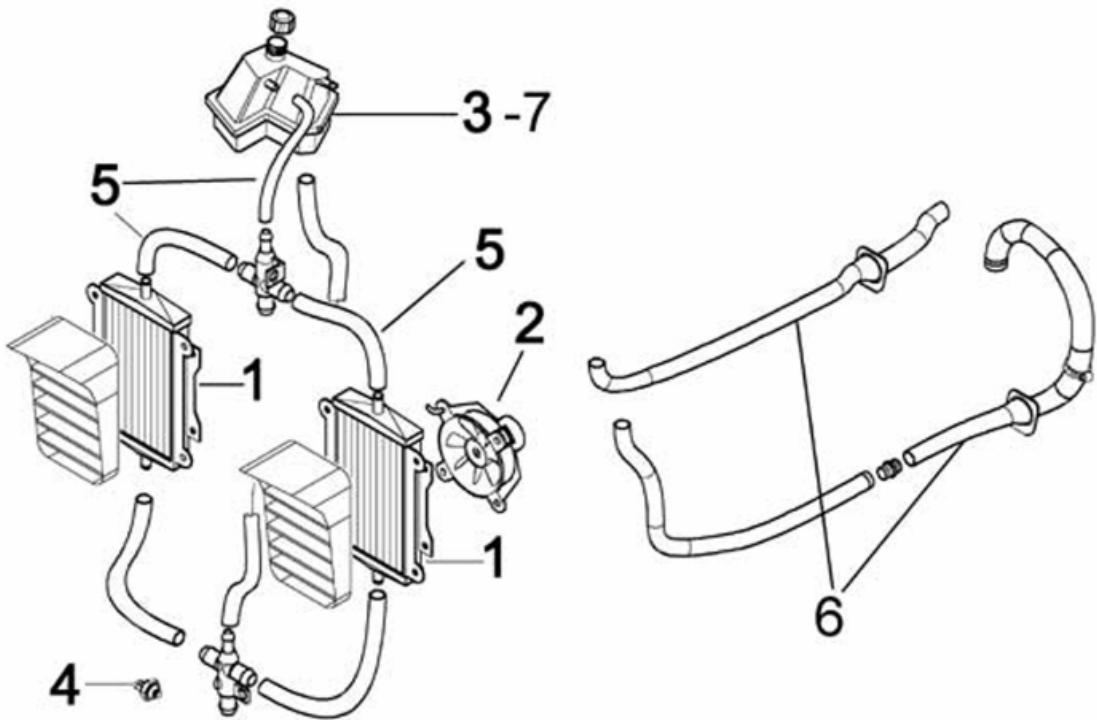
**MUDGUARDS**

	Code	Action	Duration
1	004002	Front mudguard - Replacement	
2	004009	Rear mudguard - Replacement	
3	003044	Shock absorber cover - Replacement	

**Fuel tank****FUEL TANK**

	Code	Action	Duration
1	004005	Fuel tank - Replacement	
2	005010	Tank float - Replacement	
3	004109	Fuel tank breather - Replacement	
4	004007	Fuel valve - Replacement	

Expansion tank



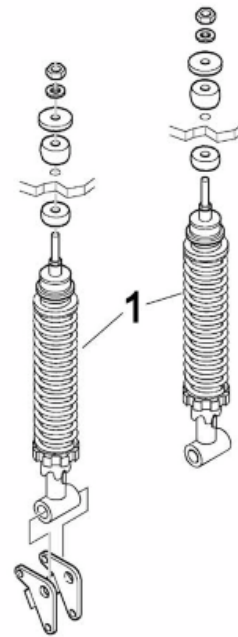
**EXPANSION TANK**

	Code	Action	Duration
1	007002	Water cooling radiator - Replacement	
2	007016	Fan complete with support - Replacement	
3	007001	Expansion tank - Replacement	
4	007014	Radiator thermal switch - Replacement	
5	007013	Expansion tank / radiator connecting hose - Replacement	
6	007003	Delivery line and coolant return - Replacement	
7	001052	Coolant and air bleed - Replacement	

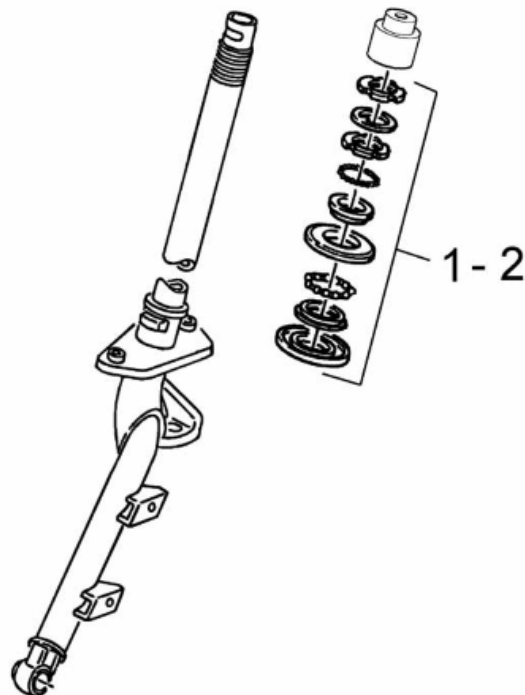
## Rear shock-absorber

### REAR SHOCK ABSORBER

	Code	Action	Duration
1	003007	Rear shock absorber - Removal and Refitting	



## Steering column bearings

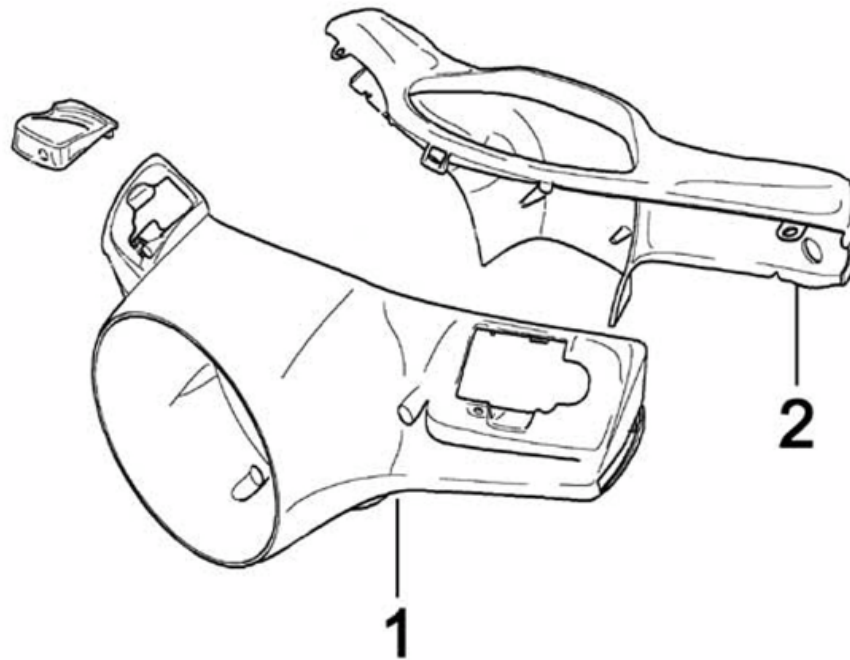




**STEERING FIFTH WHEELS**

	Code	Action	Duration
1	003002	Steering fifth wheel - Replacement	
2	003073	Steering clearance - Adjustment	

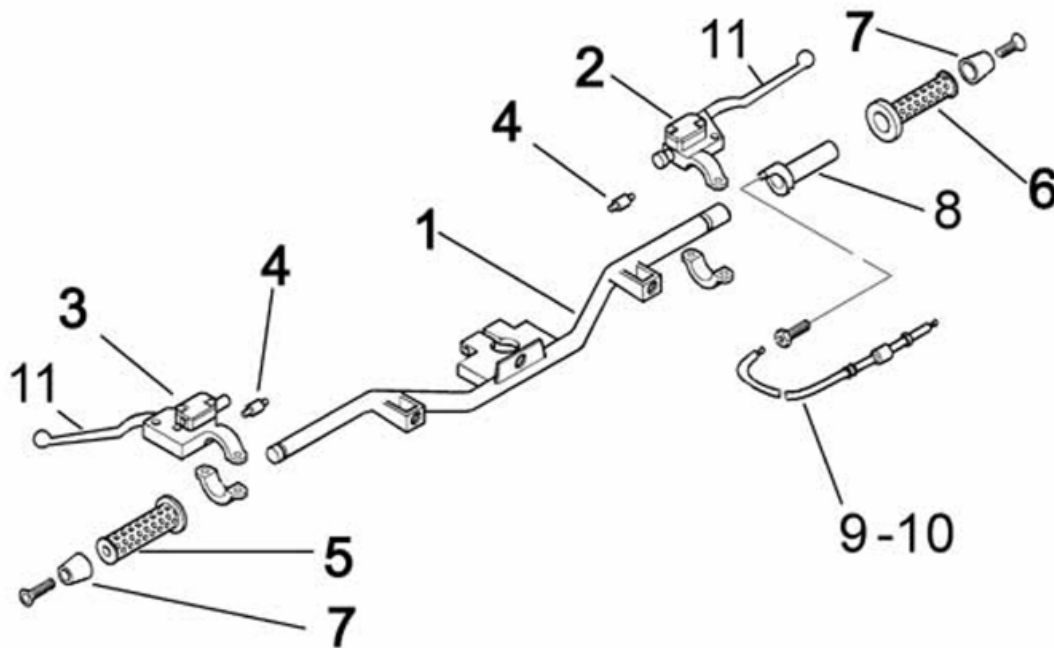
**Handlebar covers**



**HANDLEBAR COVERS**

	Code	Action	Duration
1	004018	Front handlebar covers - Replacement	
2	004019	Rear handlebar cover - Replacement	

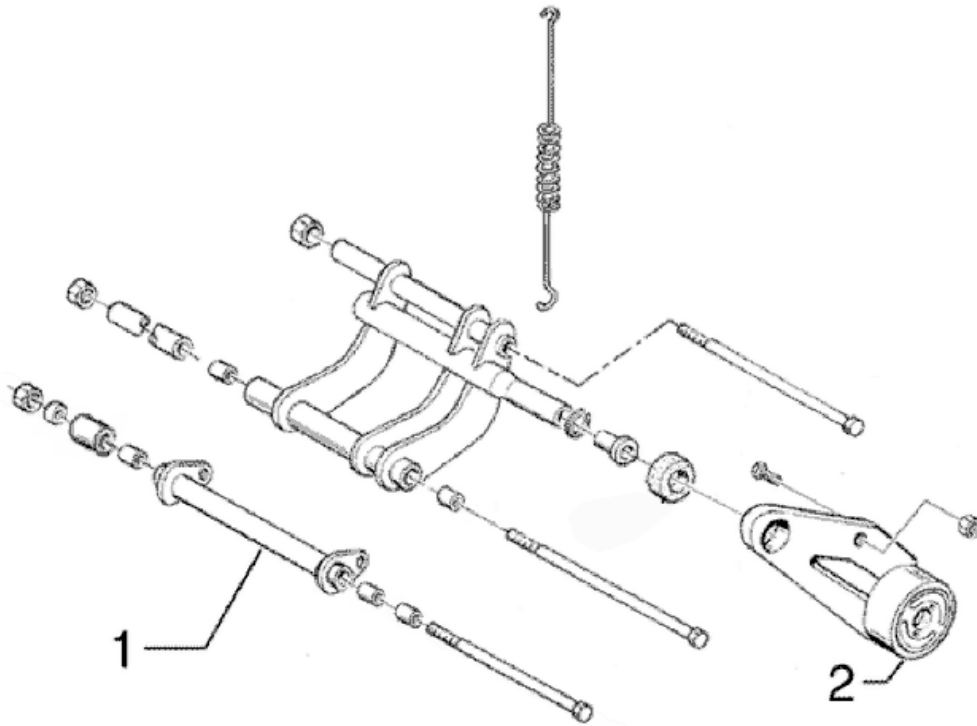
## Handlebar components



### HANDLEBAR COMPONENTS

	Code	Action	Duration
1	003001	Handlebar - Removal and refitting	
2	002067	Rear brake pump - Replacement	
3	002024	Front brake pump - Removal and refitting	
4	005017	Stop switch - Replacement	
5	002059	Right-hand knob - Replacement	
6	002071	Left hand grip - Replacement	
7	003059	Counterweight - Replacement	
8	002060	Throttle grip - Replacement	
9	002063	Throttle control transmission - Replacement	
10	003061	Accelerator transmission - Adjustment	
11	002037	Brake or clutch lever - Replacement	

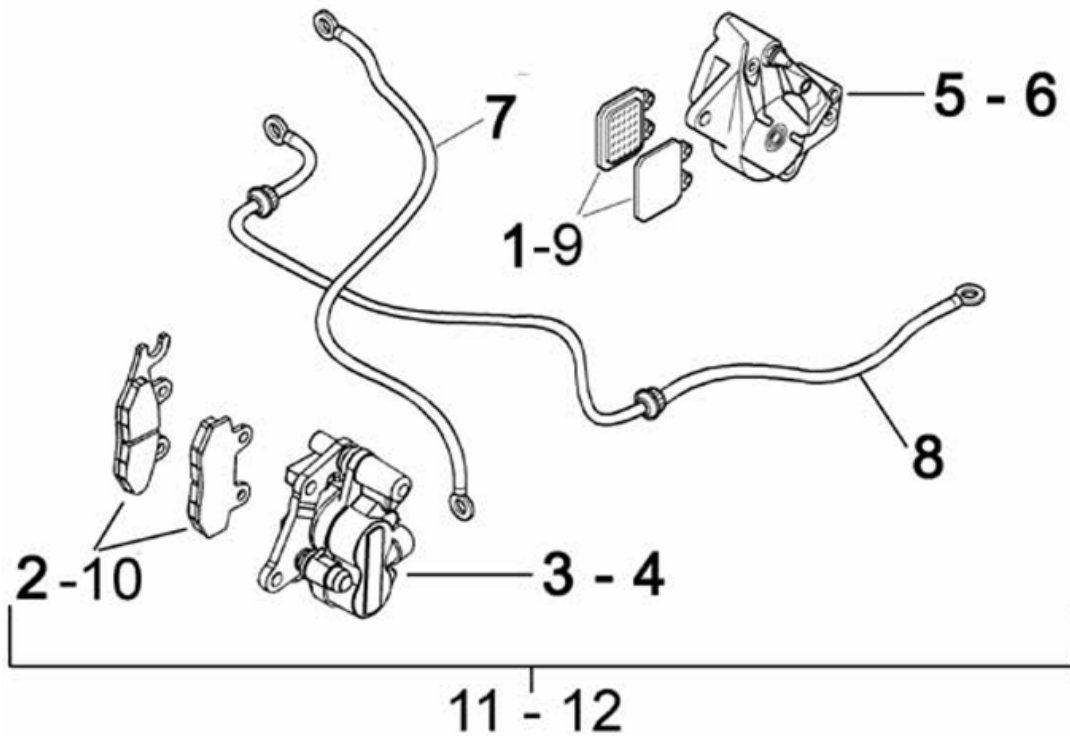
Swing-arm



**SWINGING ARM**

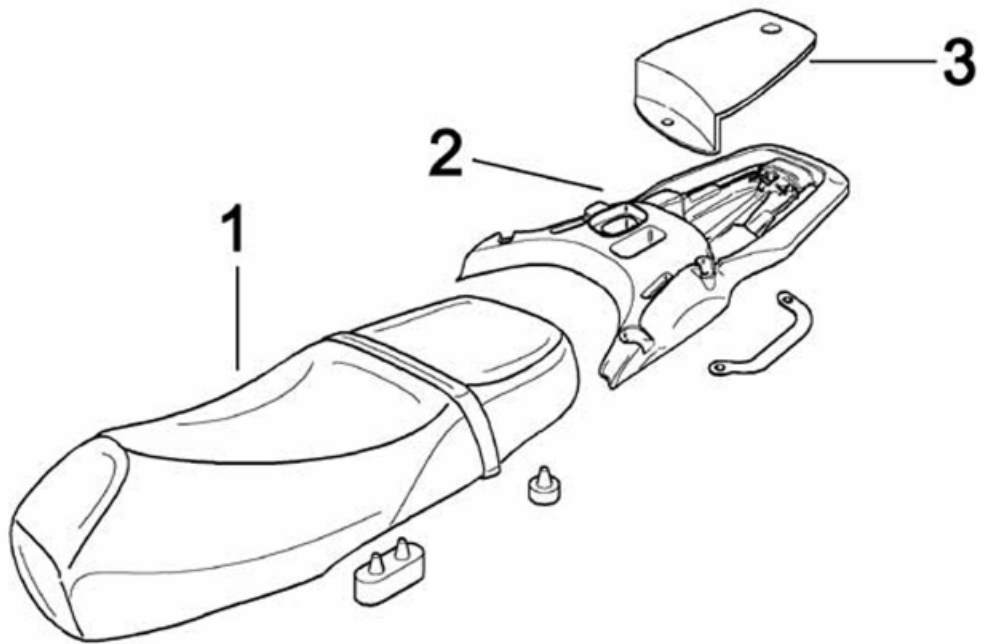
	Code	Action	Duration
1	001072	Swinging arm - Engine-chassis connection - Replacement	
2	004058	Silent block - Replacement	

## Brake hoses

**CALLIPER BRAKE PIPING**

	Code	Action	Duration
1	003071	Rear brake pads/shoes - Check for wear	
2	003070	Front brake pads / Shoes - Check wear	
3	002040	Front brake calliper - Check	
4	002048	Rear brake calliper - Replacement	
5	002068	Rear brake calliper - Check	
6	002021	Front brake piping - Replacement	
7	002020	Rear brake pipes - Removal and re-fitting	
8	002007	Front brake pads/shoes - Remov. and Refit.	
9	002002	Rear brake pad/s shoes - removal and refitting	
10	002047	Front brake fluid and air bleeding system - Replacement	
11	002080	Rear brake oil bleeding system - Replacement	

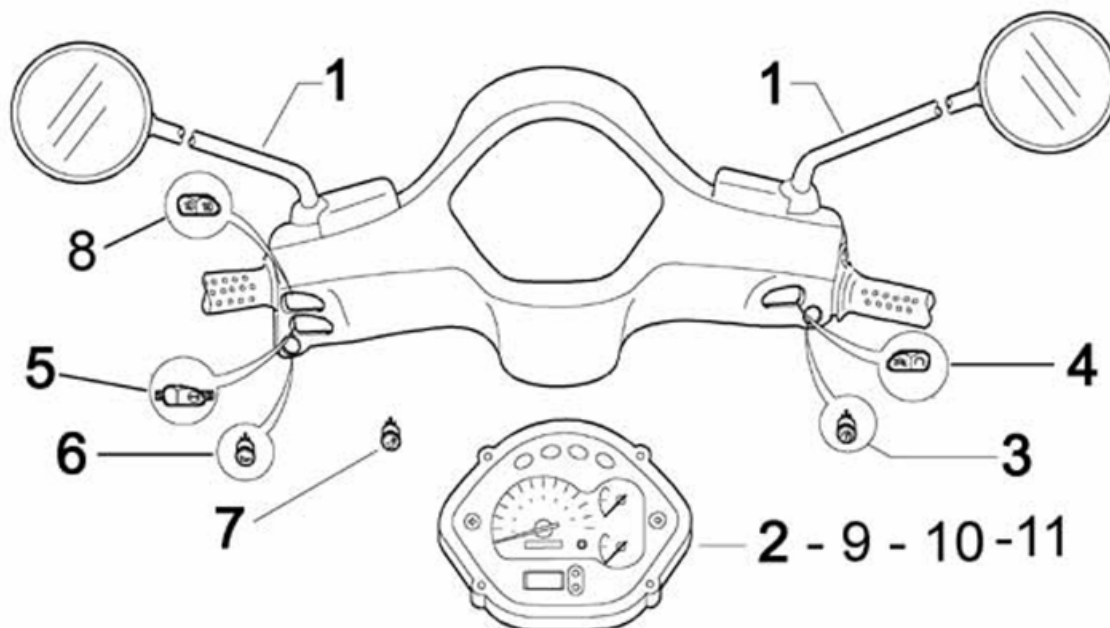
Seat



**SADDLE**

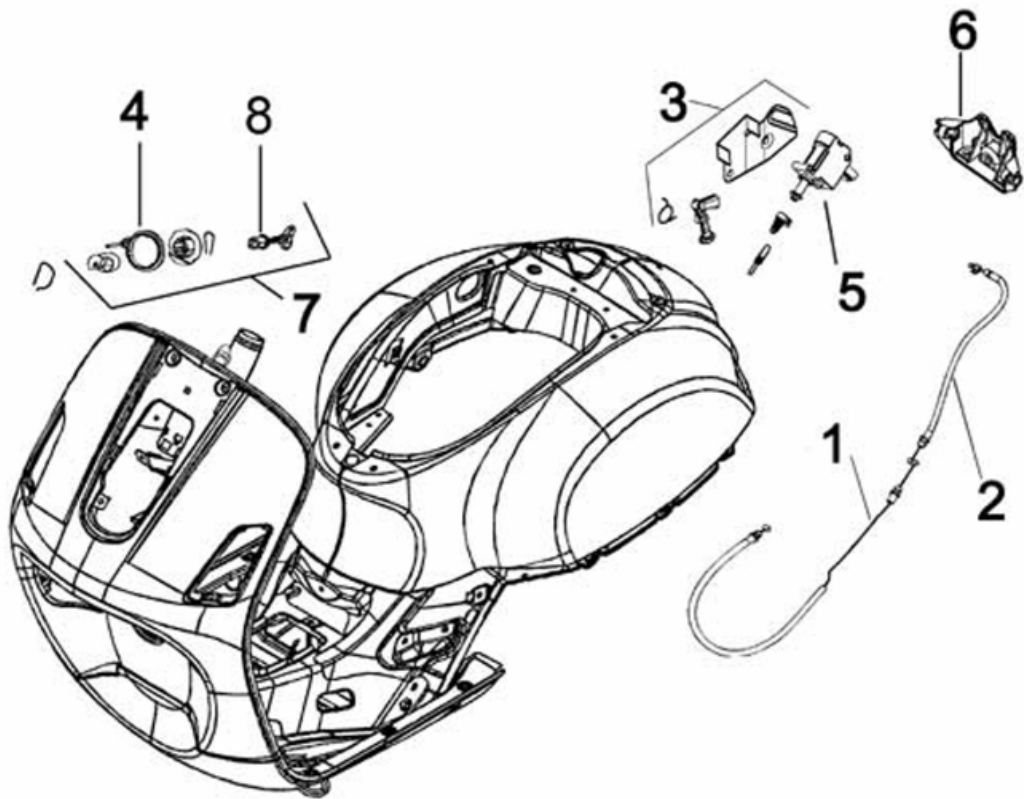
	Code	Action	Duration
1	004136	License plate support - Replacement	
2	004016	Helmet compartment - Removal and Refitting	
3	005048	Licence plate holder - Replacement	

## Instrument panel

**INSTRUMENT PANEL**

	Code	Action	Duration
1	004066	Driving mirror - Replacement	
2	005014	Odometer - Replacement	
3	005041	Starter button - Replacement	
4	005077	Emergency stop switch - Replacement	
5	005006	Light switch or turn indicators - Replacement	
6	005040	Horn button - Replacement	
7	005121	Saddle opening button - Replacement	
8	005039	Headlight switch - Replacement	
9	005078	Odometer glass - Replacement	
10	005038	Instrument panel warning light bulbs - Replacement	
11	005076	Clock / Cell - Replacement	

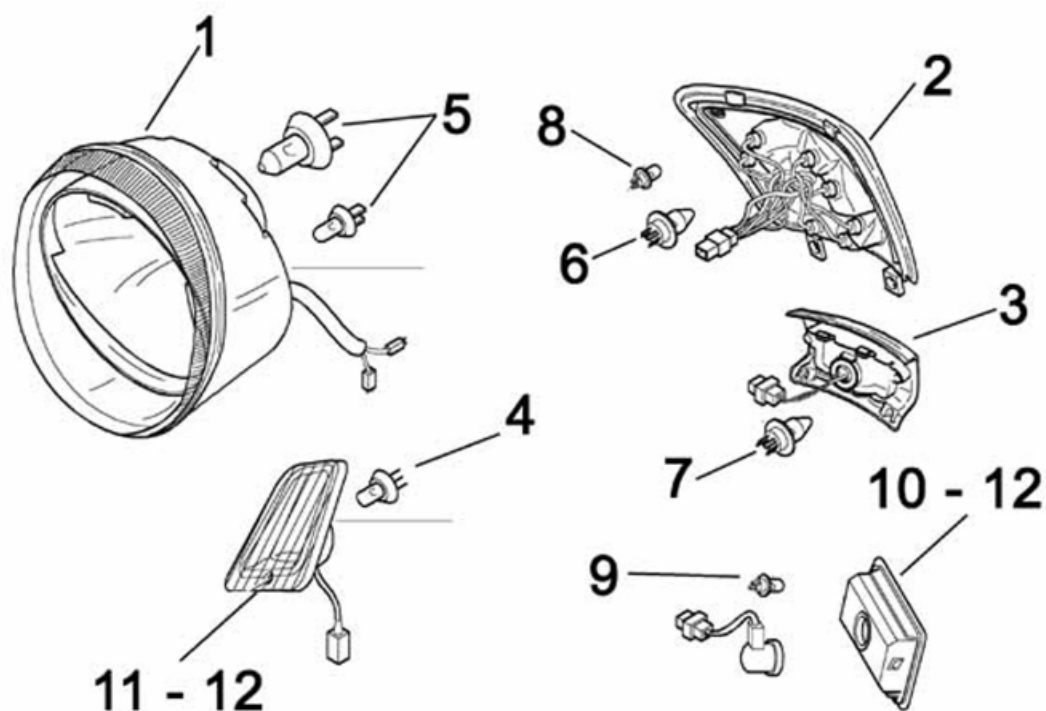
Locks



**LOCKS**

	Code	Action	Duration
1	002083	Saddle opening transmission - Replacement	
2	002092	Transmission splitter/ hook transmission - Replacement	
3	004158	Saddle opening splitter - Replacement	
4	005072	Immobilizer aerial - Replacement	
5	005099	Electric saddle opening device - Replacement	
6	004054	Saddle lock catch - Replacement	
7	004010	Anti-theft lock - Replacement	
8	005016	Key switch - Replacement	

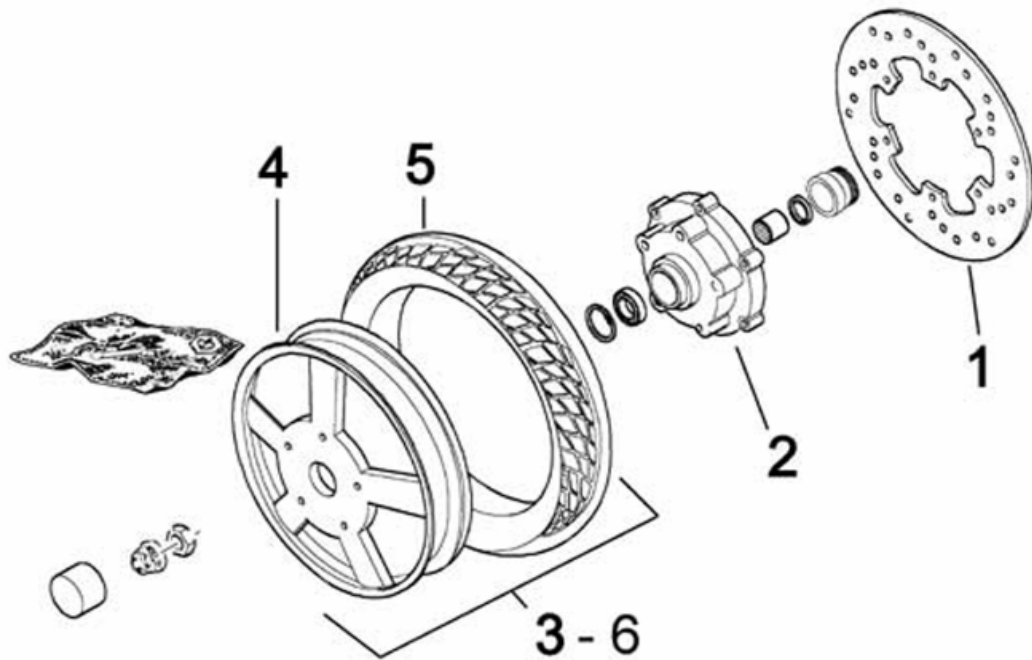
## Turn signal lights

**TURN INDICATOR LIGHTS**

	Code	Action	Duration
1	005002	Front headlamp - Replacement	
2	005005	Taillight - Replacement	
3	005032	Licence plate light glass - Replacement	
4	005067	Front turn indicator bulb - Replacement	
5	005008	Front headlamp bulbs - Replacement	
6	005066	Rear light bulbs - Replacement	
7	005031	Licence plate light bulb - Replacement	
8	005090	Stop light bulb - Replacement	
9	005068	Rear turn indicator bulb - Replacement	
10	005022	Rear turn indicators - Replacement	
11	005012	Front turn indicator - Replacement	
12	005091	Turn indicator glass - Replacement	



Front wheel



**FRONT WHEEL**

	Code	Action	Duration
1	002041	Brake disc - Replacement	
2	003033	Front wheel hub- Replacement	
3	004123	Front wheel - Replacement	
4	003037	Front wheel rim- Replacement	
5	003047	Front tyre - replace	
6	003063	Tyre pressure - Check	

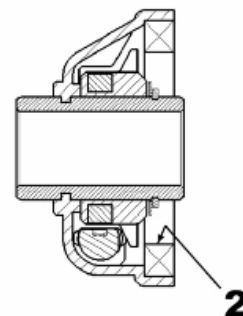
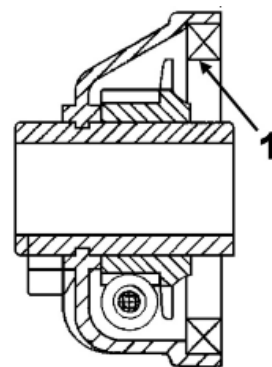
**Grease tone wheel or drive**

Please take note that the code has been introduced:

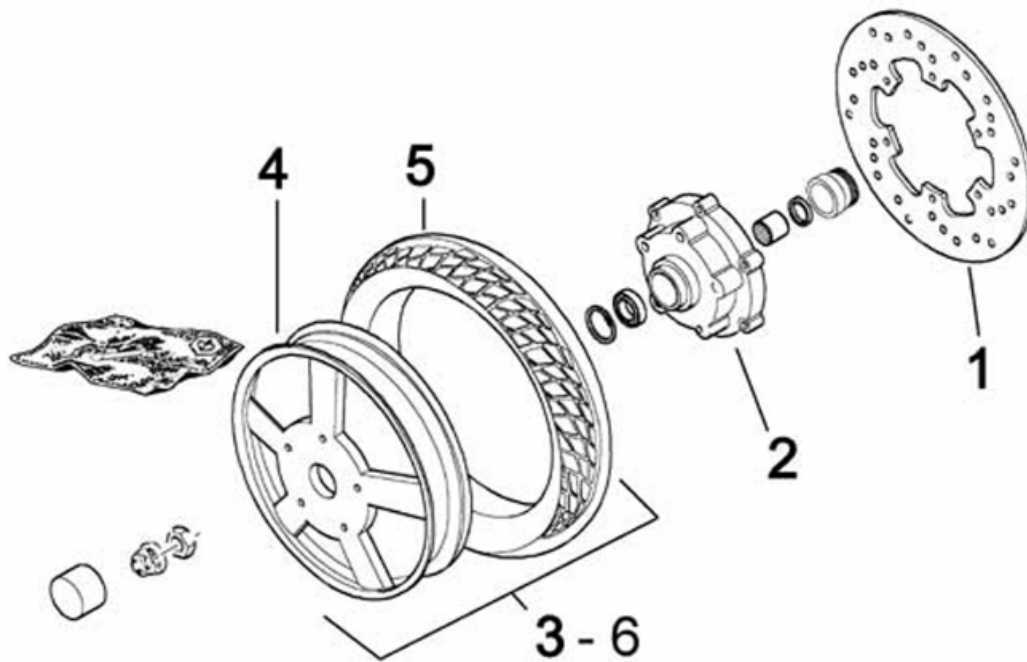
900001 - Tone wheel / drive greasing - 15'.

Never mistake the codes 002011 (movement sensor replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTE-LA MRM 2 (soap-based lithium grease with Molybdenum disulphide).

In the following points we indicate with an arrow the area to be greased (1 - Drive, 2 - Tone wheel)

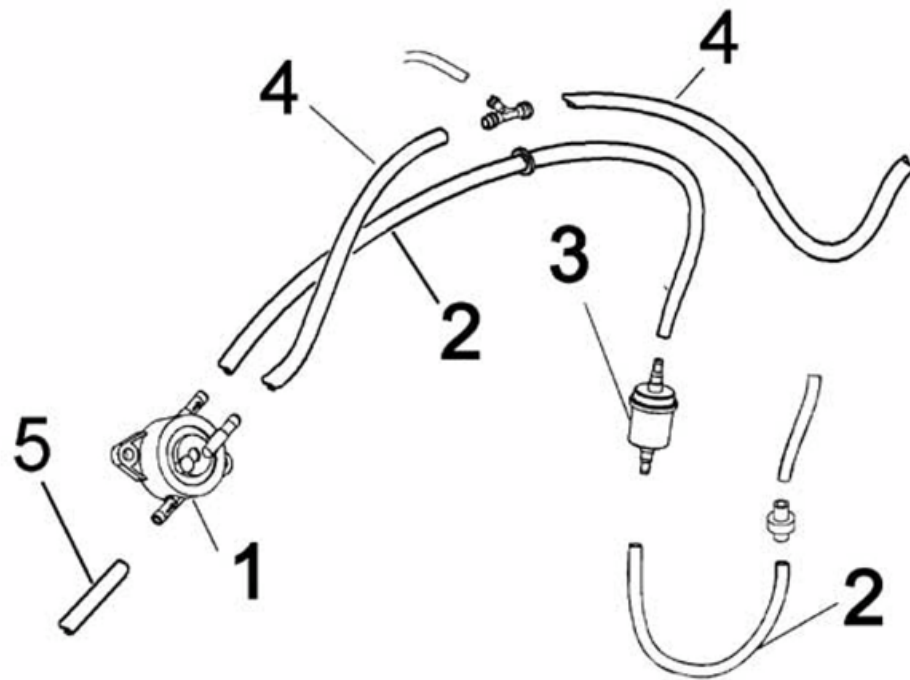


## Rear wheel

**REAR WHEEL**

	Code	Action	Duration
1	001016	Rear wheel - Replacement	
2	004126	Rear wheel tyre - Replacement	
3	001071	Front wheel rim - Removal and refitting	
4	002070	Rear brake disc - Replacement	
5	003077	muffler/rear shock absorber support arm - Service	
6	002028	Rear wheel hub - Replacement	
7	003063	Tyre pressure - Check	

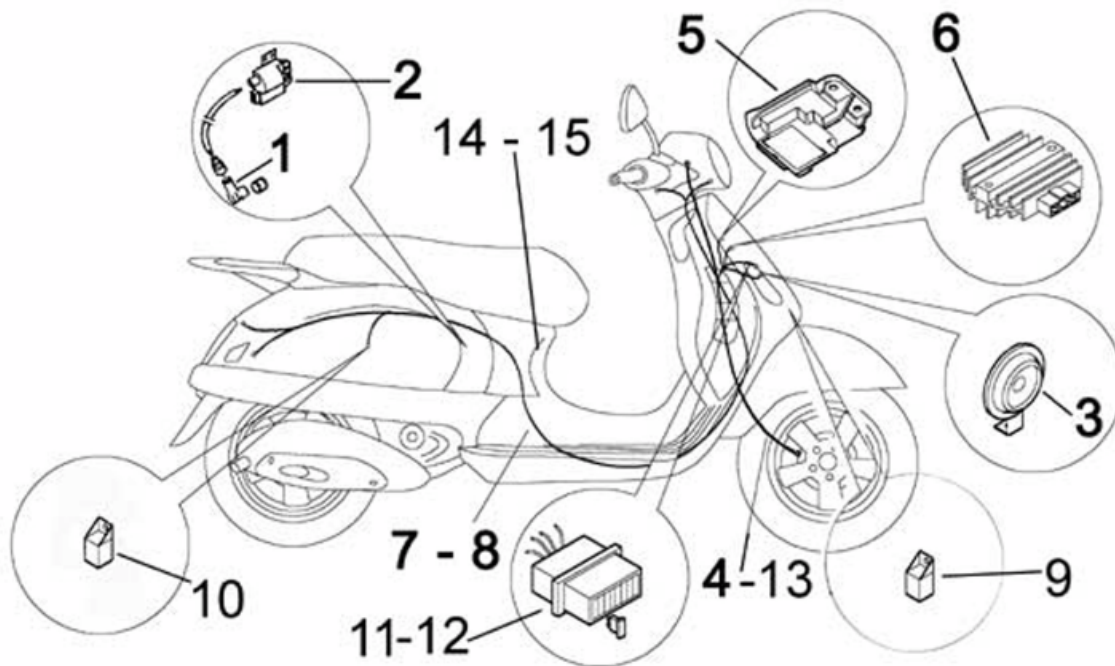
Fuel pump



**FUEL PUMP**

	Code	Action	Duration
1	004073	Fuel pump - Replacement	
2	004089	Tank / petrol pump pipe - Replacement	
3	004072	Fuel filter - Replacement	
4	004086	Petrol pump depression tube - Replacement	
5	004086	Petrol pump depression tube - Replacement	

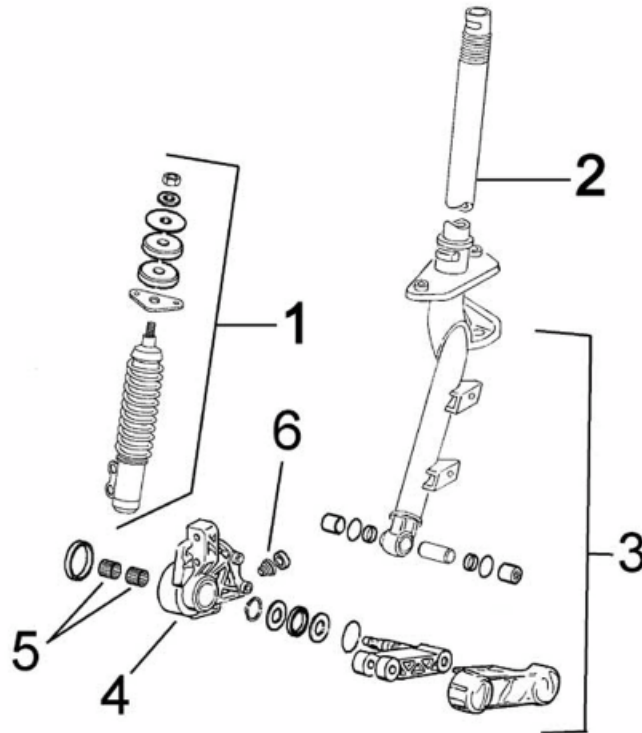
## Electric devices



### ELECTRIC DEVICES

	Code	Action	Duration
1	001094	Spark plug cap - Replacement	
2	001069	HV coil - Replacement	
3	005003	Horn - Replacement	
4	002049	Odometer cable - Replacement	
5	001023	Control unit - Replacement	
6	005009	Voltage regulator - Replacement	
7	005001	Electrical system - Removal and re-fitting	
8	005114	Electrical system - Service	
9	005035	Headlight remote control - Replacement	
10	005011	Start-up remote control switch - Replacement	
11	005054	Fuse holder - Replacement	
12	005019	Fuse terminal block - Replacement	
13	002051	Odometer transmission assembly - Replacement	
14	005024	Battery fuse - Replacement	
15	002025	Brake piping - Replacement	

Front suspension



**FRONT SUSPENSION**

	Code	Action	Duration
1	003011	Front shock absorber - Removal and Refitting	
2	003045	Steering tube - Replacement	
3	003010	Front suspension - Service	
4	003035	Shock absorber support and brake calliper - Replacement	
5	003034	Front wheel hub bearing - Replacement	
6	001064	Odometer reel - Replacement	

## **A**

Air filter: 45

## **B**

Battery: 64, 70, 77, 84, 86

Brake: 218, 220, 222, 224, 225, 227, 229, 230, 284

Brake fluid: 229

## **C**

Carburettor: 10, 39, 165, 176, 271

## **E**

Engine oil: 47

## **F**

Fuel: 63, 165, 250, 278, 291

Fuses: 82

## **H**

Headlight: 52, 243

Hub oil: 44

## **I**

Identification: 6

Instrument panel: 242, 286

## **M**

Maintenance: 6, 35

## **O**

Oil filter: 264

## **S**

Saddle:

Shock absorbers: 214

Spark plug: 43, 75

Stand: 216

Start-up:

## **T**

Tank: 250, 278, 279

Transmission: 9, 63, 97, 116, 268

Tyre pressure:

Tyres: 10