



SERVICE STATION MANUAL

665018 (EN)



Beverly Tourer 125



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SERVICE STATION MANUAL

Beverly Tourer 125

This service station manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. It is assumed that the user of this manual for maintaining and repairing Piaggio vehicles has a basic knowledge of mechanical principles and vehicle repair technique procedures. Any significant changes to vehicle characteristics or to specific repair operations will be communicated by updates to this manual. Nevertheless, completely satisfactory work cannot be carried out without the necessary equipment and tools. It is therefore advisable to read the sections of this manual relating to appropriate tools, along with the appropriate 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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CHARACTERISTICS

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Rules

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

Safety rules

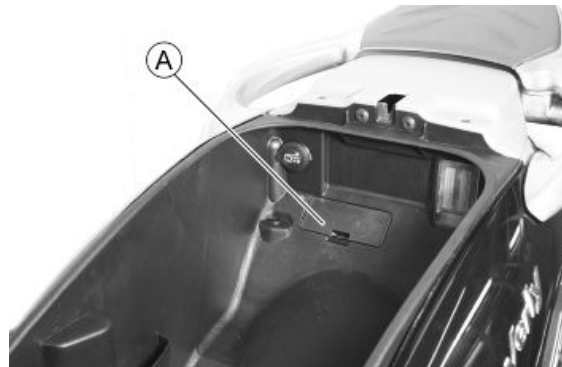
- If work can only be done on the vehicle with the engine running, make sure that the premises are well-ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.
 - The battery electrolyte contains sulphuric acid. Protect your eyes, clothes 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.
-

Maintenance rules

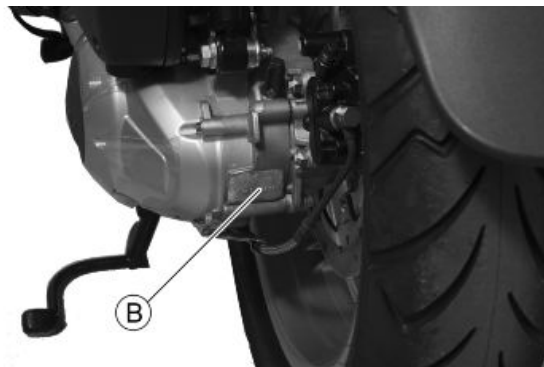
- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.
 - Use only the appropriate tools designed for this vehicle.
 - Always use new gaskets, sealing rings and split pins upon refitting.
 - After removal, clean 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.
-

Vehicle identification

To read the chassis prefix, lift the saddle and remove the lid «A».



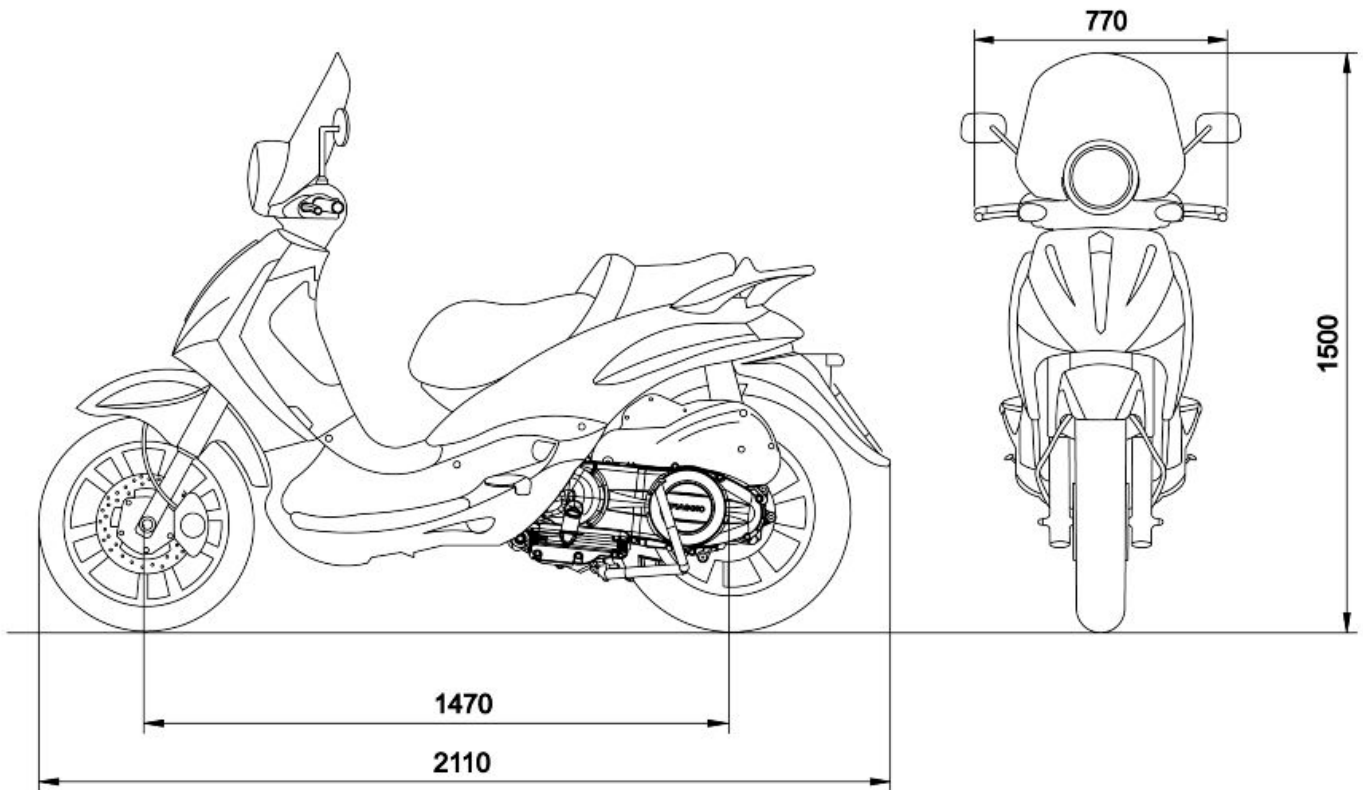
The engine prefix «B» is stamped near the rear left shock absorber lower support.



VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Chassis prefix	M28801
Engine prefix	M288M

Dimensions and mass



VEHICLE EARTHING

Specification	Desc./Quantity
Kerb weight	163 kg ± 5 kg
Maximum weight allowed	350 kg

Engine

ENGINE

Specification	Desc./Quantity
Type	Single-cylinder, 4-stroke
Cubic capacity	124 cm ³
Bore x stroke	57 x 48.6 mm
Compression ratio	12 ± 0.5: 1
Engine idle speed	1650 ± 100 rpm
Timing system	4 valves, single overhead camshaft, chain-driven.
Valve clearance	Inlet: 0.10 mm Outlet: 0.15 mm
Max. Power	11 kW at 9,750 rpm
MAX. torque	12 Nm at 8,000 rpm
Lubrication	Engine lubrication with lobe pump (inside crankcase) controlled by a chain with double filter: mesh and paper.
Lubrication pressure	4 bar
Minimum lubrication pressure (100° C)	0.8 bar
Fuel supply	KEIHIN CVEK 30 carburettor and electrical fuel pump.
Cooling	Forced-circulation coolant system.
Fuel	Unleaded petrol (95 RON)
Exhaust muffler	absorption-type exhaust muffler with catalytic converter.

Specification	Desc./Quantity
Emission regulations	EURO 3

Transmission

TRANSMISSION

Specification	Desc./Quantity
Transmission	Automatic expandable pulley variator with torque server, V-belt, self-ventilating dry automatic centrifugal clutch and transmission housing with forced-circulation air cooling.
Final reduction	Gear reduction unit in oil bath.

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil	1.10 l
Transmission oil	250 cm ³
Cooling system fluid	1.75 l
Fuel tank (reserve)	~ 10 l (2 l)
Fork oil (quantity per stem)	133 cm ³

Electrical system

ELECTRICAL SYSTEM

Specification	Desc./Quantity
Start-up	Electric
Ignition	Capacitive discharge ignition, with variable advance and separate HV coil.
Ignition advance	10° ± 1° at 2,000 rpm
Spark plug	CHAMPION RG4HC
Alternative spark plug	NGK CR8EB
Battery	Sealed, 12 V / 10 Ah
Generator	Alternating current

Frame and suspensions

FRAME AND SUSPENSIONS

Specification	Desc./Quantity
Chassis	Tubular and sheet steel.
Front suspension	Hydraulic telescopic fork with Ø 35 mm stem
Front suspension travel	104 mm
Rear suspension	Two double-acting shock absorbers, adjustable to four positions at preloading.
Rear suspension travel	90 mm

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 260-mm disc brake with hydraulic control activated by handlebar right lever.

Specification	Desc./Quantity
Rear brake	Ø 260-mm disc brake with hydraulic control activated by handlebar left lever.

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Wheel rim type	Light alloy rims.
Front rim	16 x 3.50"
Rear rim	16 x 3.50"
Front tyre	Tubeless, 110/70 - 16" 52P
Rear tyre	Tubeless, 140/70 - 16" 65P
Front tyre pressure (with passenger)	2 bar (-)
Rear tyre pressure (with passenger)	2.5 bar (-)

N.B.

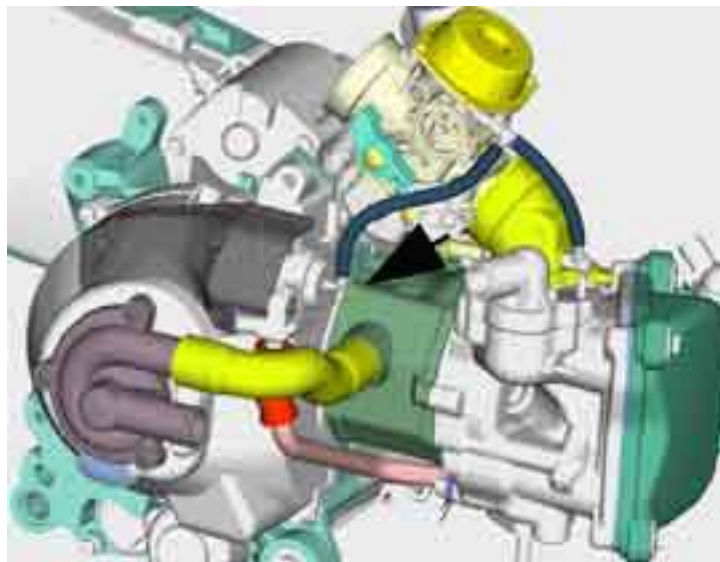
CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE. REGULATE PRESSURE ACCORDING TO THE WEIGHT OF THE RIDER AND ACCESSORIES

Secondary air

The SAS for 125cc leader engines operates in a similar manner to the SAS for 2T engines.

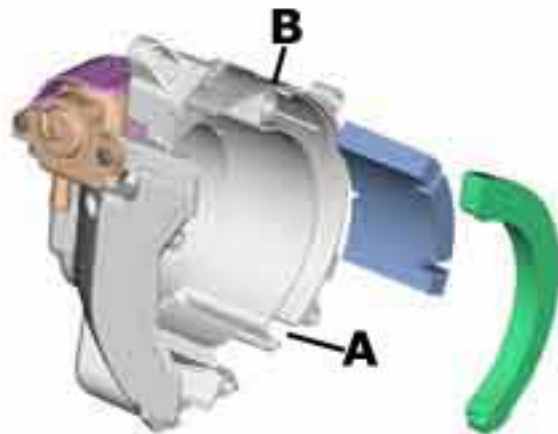
The differences are the following:

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.

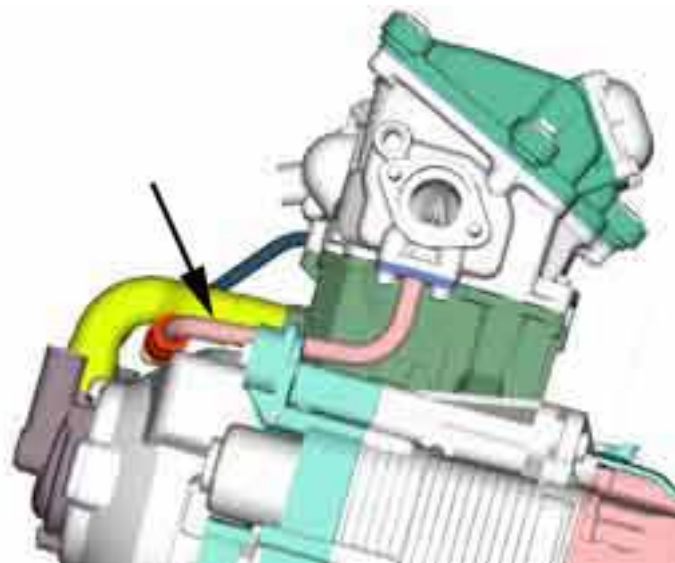
Air is drawn through the opening «A», goes through the first filter and is channelled through the opening «B».



Air gets to the second filter «B» through the opening shown 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 reaction of the catalytic converter.



Carburettor

125cc Version

Kehin

KEIHIN CARBURETTOR

Specification	Desc./Quantity
Type	Depression carburettor
Model	CVK 30
Body stamping	CVK
Tapered pin stamping	304D
CUT-OFF device	Not present
Diffuser	Ø 29
Maximum jet	105
Minimum jet	35
Max. air jet	70
Minimum air jet	130
Throttle valve spring	100 ÷ 160 g
Minimum mixture set screw initial opening	2
Tapered pin	Ø 2.45
Diffuser nozzle	Ø 2.8
Starter air jet	Ø 1.5
Starter jet	42
Starter device resistance	~ 20 Ω
Starter pin travel	10

Tightening Torques

STEERING

Name	Torque in Nm
Steering tube upper ring nut	40 ÷ 45
Steering tube lower ring nut	14 ÷ 17
Handlebar fixing screw	45 ÷ 50
Fixing screws for handlebar control assembly U-bolts	7 ÷ 10

FRAME ASSEMBLY

Name	Torque in Nm
Engine-swinging arm bolt	64 - 72
Chassis-swinging arm pin nut	64 - 72
Spacer locking threaded bushing	13 ÷ 17
Spacer locking threaded bushing lock nut	90 ÷ 110
Frame arm-engine arm coupling pin nut	33 ÷ 41
Bolt of the Silent block support plate	64 - 72
Centre stand bolt	32 ÷ 40
Side stand fixing bolt	40 ÷ 45
Side stand switch screw	5 ÷ 7

FRONT SUSPENSION

Name	Torque in Nm
Fork locking screws cap	15 ÷ 30
Hydraulic rod fixing screw	25 ÷ 35*
Stem support clamp tightening screws	20 ÷ 25
Front wheel axle nut	45 ÷ 50
Safety screw on fork leg	6 ÷ 7
front mudguard to plate fixing screw	4.5 ÷ 7
Fixing screw for mudguard plate to fork	9 ÷ 11

* Loctite 243

REAR SUSPENSION

Name	Torque in Nm
Left lower shock absorber support bolt	20 ÷ 25
Upper shock absorber clamp	33 ÷ 41
Lower shock absorber clamp	33 ÷ 41
Rear wheel axle nut	104 ÷ 126
Fixing screw for wheel rim to hub	34 ÷ 38
Muffler support arm to engine screws (*)	20 ÷ 25

* Loctite 243

FRONT BRAKE

Name	Torque in Nm
Brake fluid pump-hose fitting	16 ÷ 20
Brake fluid pipe-calliper fitting	16 ÷ 20
Calliper to fork tightening screw	20 ÷ 25
Brake disc screws	8 ÷ 10
Oil bleed screw	12 - 16
Pad fastening pin	19.6 ÷ 24.5

REAR BRAKE

Name	Torque in Nm
Hydraulic line fixing screw	16 ÷ 20
Pipe - brake calliper union	20 ÷ 25
Brake disc fixing screws	11 ÷ 13
Oil bleed screw	12 - 16
Screw tightening calliper to the support	42 ÷ 52
Screw fixing rear brake calliper support to engine	20 ÷ 25
Pad fastening pin	19.6 ÷ 24.5

MUFFLER

Name	Torque in Nm
Screw fixing manifold to muffler	15.5 ÷ 18.5
Muffler heat guard fixing screw	5 - 6
Exhaust fumes inlet screw	22 ÷ 26
Screw fixing muffler support arm to crankcase	33 ÷ 41
Nuts fixing muffler to support arm	27 ÷ 30
Nut fixing muffler to cylinder head	16 ÷ 18

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	4 ÷ 6
Oil pump cover screws	0.7 ÷ 0.9
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
Nuts fixing head to cylinder (1) (^)	9 ÷ 11 + 180°
Head fixing side screws	11 ÷ 12
Starter ground screw	7 ÷ 8.5
M5 side screw locking washers on camshaft	7 ÷ 8.5
Tappet set screw lock nut	6 ÷ 8
Timing chain tensioner slider screw	10 ÷ 14
Starter ground support screw	11 ÷ 15
M6 central screw locking washers on camshaft	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 unit nut on driven pulley	45 ÷ 50
Drive pulley nut	75 ÷ 83
Transmission cover screws	11 ÷ 13
Driven pulley shaft nut	54 ÷ 60
Rear hub cover screws	24 ÷ 27

FLYWHEEL

Name	Torque in Nm
Flywheel cover fixing screws	5 - 6
Stator assembly screws (°)	3 ÷ 4
Flywheel nut	52 ÷ 58
Pick-Up clamping screws	3 ÷ 4
Screw fixing freewheel to flywheel	13 ÷ 15

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 system cover screws (°)	3.5 ÷ 4.5

COOLING

Name	Torque in Nm
Water pump rotor cover	3 ÷ 4
Screws for water pump rotor driving link	3 ÷ 4
Thermostat cover screws	3 ÷ 4
Bleed screw:	3

(°) Apply LOCTITE 242 medium-strength threadlock

(*) 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".

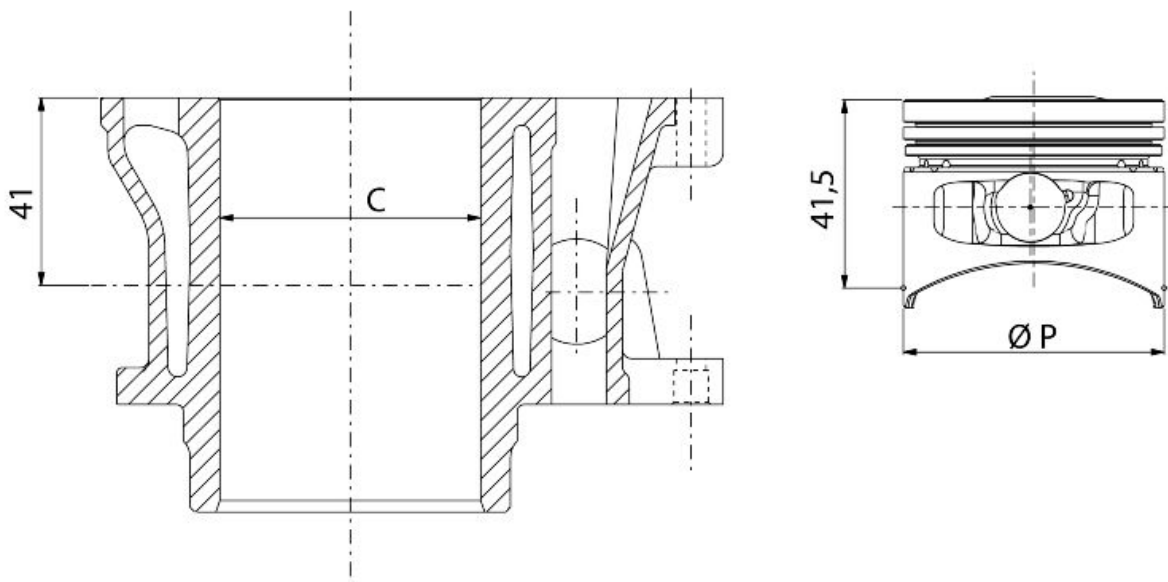
(^) Fasten the nuts in two crossed passes.

(1) Before fitting the nuts lubricate them with engine oil

Overhaul data

Assembly clearances

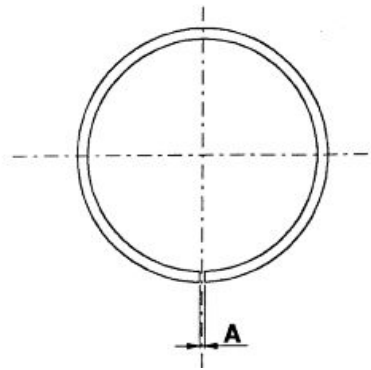
Cylinder - piston assy.



ENGINE 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

Piston rings



ENGINE SEALING RINGS

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

Crankcase - crankshaft - connecting rod

CRANKSHAFT HALF-BEARINGS

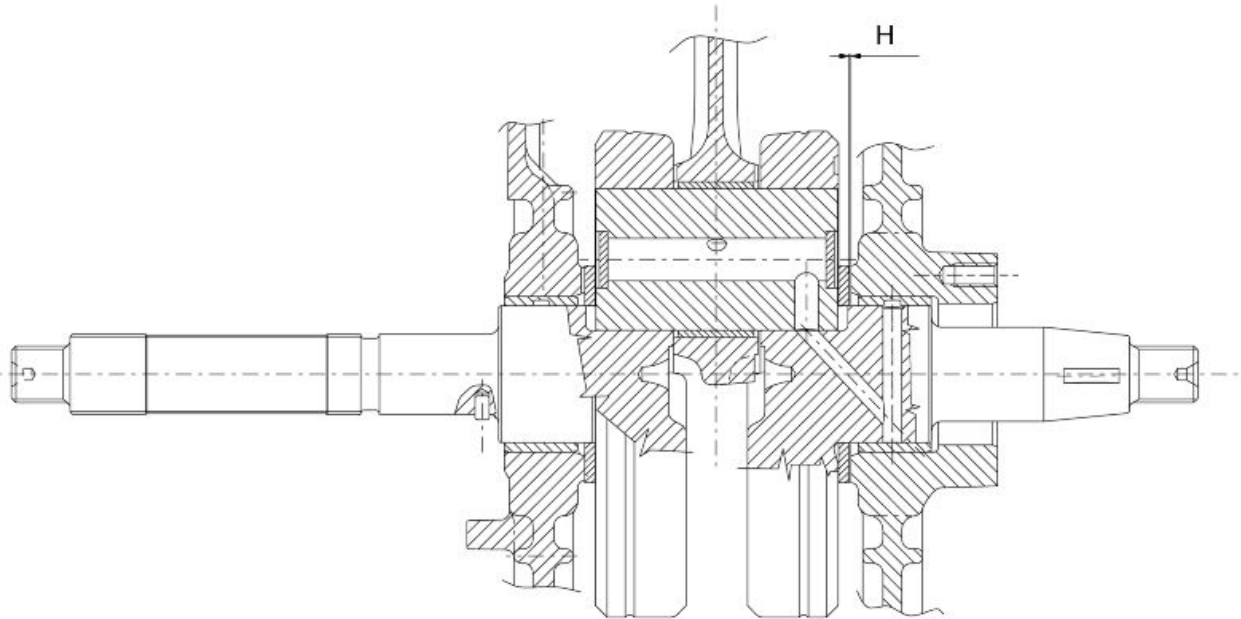
Name	Description	Dimensions	Initials	Quantity
Crankshaft half-bearing			Category B - blue	1.973 ÷ 1.976
Crankshaft half-bearing			Type C - yellow	1.976 ÷ 1.979
Crankshaft half-bearing			Category E - green	1.979 ÷ 1.982

CRANKCASE - CRANKSHAFT COUPLINGS

Name	Description	Dimensions	Initials	Quantity
Crankshaft category 1 - Crankcase category 1			E - E	
Crankshaft category 1 - Crankcase category 2			C - C	
Crankshaft class 2 - Crankcase class 1			C - C	
Crankshaft category 2 - Crankcase category 2			B - B	

CRANKSHAFT - CRANKCASE

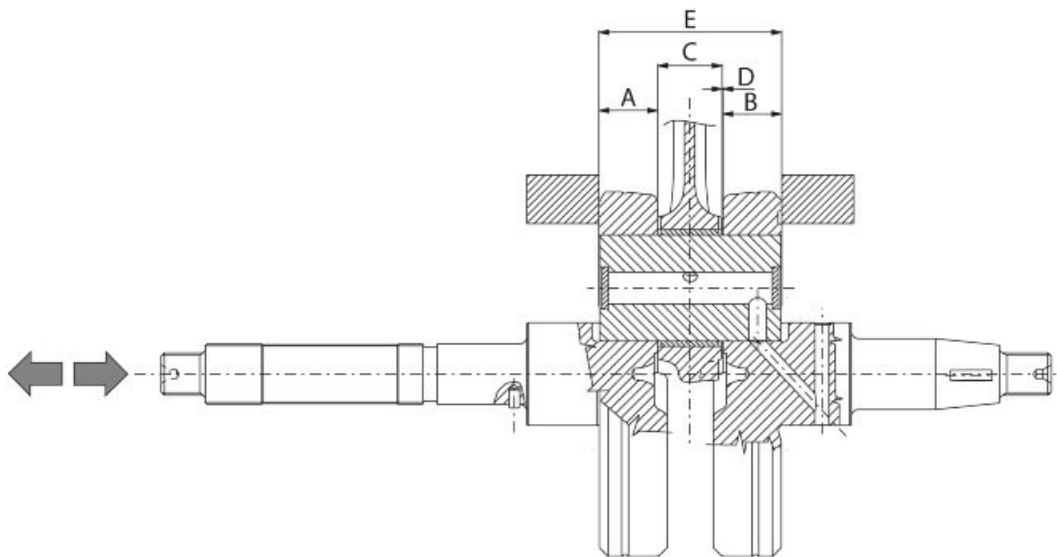
Name	Description	Dimensions	Initials	Quantity
Crankshaft			Category 1	28.998 ÷ 29.004
Crankshaft			Class 2	29.004 ÷ 29.010
Crankcase			Category 1	32.959 ÷ 32.965
Crankcase			Class 2	32.953 ÷ 32.959



Fitting clearances

Crankshaft/crankcase axial clearance (H):

0.15 ÷ 0.40 mm (when cold)



AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD

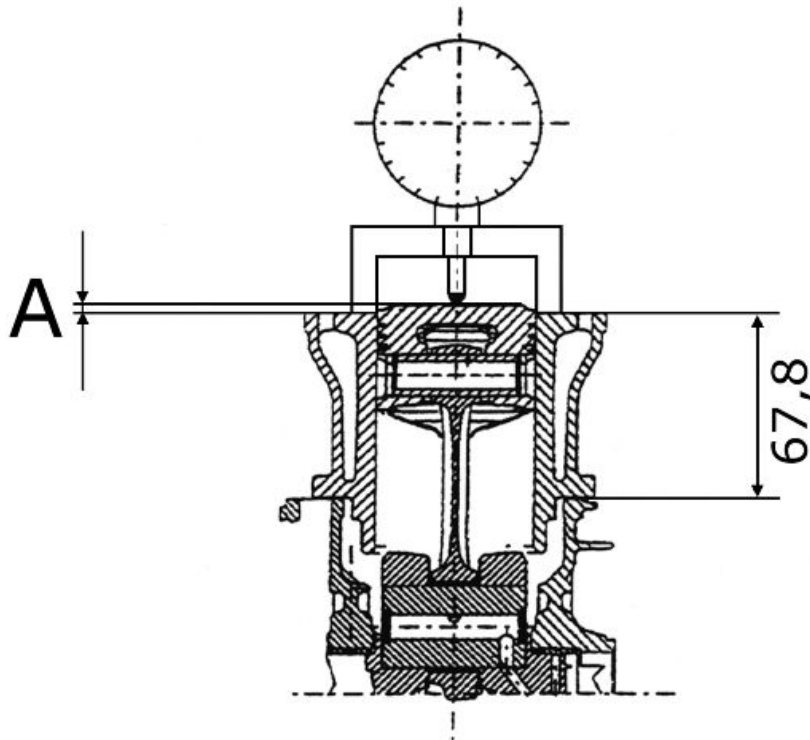
Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		16.6 +0-0.05	A	D = 0.20 - 0.50
Flywheel-side half-shaft		16.6 +0-0.05	B	D = 0.20 - 0.50
Connecting rod		18 -0.10 -0.15	C	D = 0.20 - 0.50
Spacer tool		51.4 +0.05	E	D = 0.20 - 0.50

Slot packing system

Characteristic

Compression ratio

12 ± 0.5: 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 thicker the base gasket to be used (to restore the compression ratio) and vice versa.

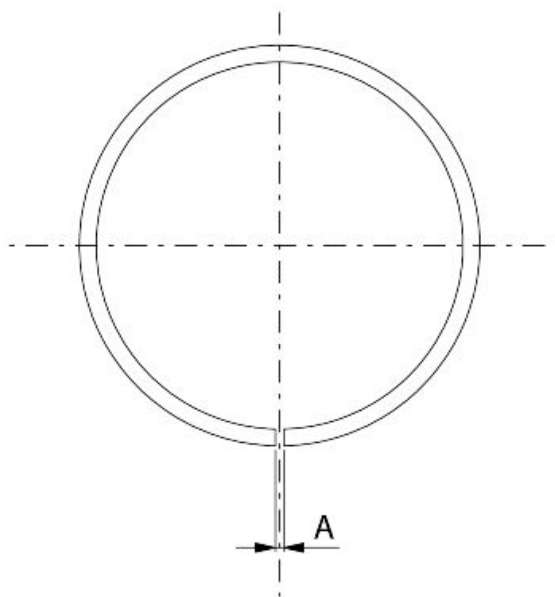
N.B.

NO GASKETS AND SEALS SHOULD BE ASSEMBLED BETWEEN THE CRANKCASE AND CYLINDER AND THE DIAL GAUGE EQUIPPED WITH SUPPORT SHOULD BE SET TO ZERO FOR MEASUREMENT «A» TO BE TAKEN WITH THE PISTON AT TOP DEAD CENTRE POSITION AND ON A RECTIFIED PLANE.

MODELS WITH METAL HEAD GASKET (0.3)

Name	Measure A	Thickness
Shimming - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.4	1.40 ÷ 1.65	0.4 ± 0.05
Shimming - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.6	1.65 ÷ 1.90	0.6 ± 0.05

Oversizes



OVERSIZES

Name	Description	Dimensions	Initials	Quantity
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

Products

RECOMMENDED PRODUCTS TABLE

Product	Description	Specifications
AGIP ROTRA 80W-90	Rear hub oil	SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications
AGIP CITY HI TEC 4T	Oil to lubricate flexible transmissions (throttle control)	Oil for 4-stroke engines
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP GP 330	Grease for brake levers, throttle	White calcium complex soap-based spray grease with NLGI 2; ISO-L-XBCIB2

Product	Description	Specifications
AGIP CITY HI TEC 4T	Engine oil	SAE 5W-40, API SL, ACEA A3, JASO MA Synthetic oil
AGIP BRAKE 4	Brake fluid	FMVSS DOT 4 Synthetic fluid
AGIP PERMANENT SPEZIAL	coolant	Monoethylene glycol-based antifreeze fluid, CUNA NC 956-16

UNIT OF MEASUREMENT - CONVERSION - ENGLISH SYSTEM AND INTERNATIONAL SYSTEM (IS).

Specification	Desc./Quantity
1 Inch (in)	25.4 Millimetres (mm)
1 Foot (ft)	0.305 Meter (m)
1 Mile (mi)	1.609 Kilometre (km)
1 US Gallon (US gal)	3.785 Litre (l)
1 Pound (lb)	0.454 Kilogram (Kg)
1 Cubic inch (in ³)	16.4 Cubic centimetres (cm ³)
1 Foot pound (ft lb)	1.356 Newton meter (Nm)
1 Miles per hour (mi/h)	1.602 Kilometres per hour (km/h)
1 Pound per square inch (PSI)	0.069 (bar)
1 Fahrenheit (°F)	32+(9/5) Celsius (°C)

INDEX OF TOPICS

TOOLING

TOOL

SPECIFIC TOOLS

Stores code	Description	
020151Y	Air heater	
020331Y	Digital multimeter	
020648Y	Single battery charger	
001467Y014	Pliers to extract ø 15-mm bearings	
020412Y	15 mm guide	

Stores code	Description
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020335Y

Magnetic support for dial gauge



020565Y

Flywheel lock calliper spanner



020439Y

17 mm guide



020359Y



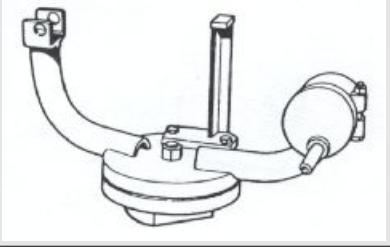



42x47-mm adaptor





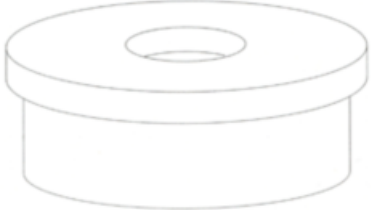



020363Y

20 mm guide



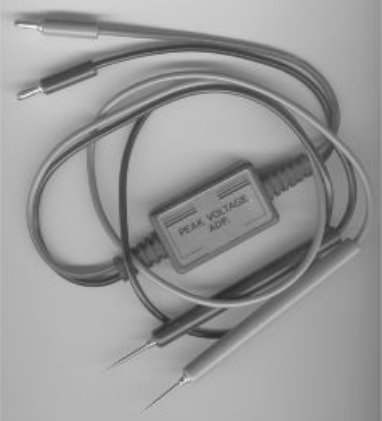
Stores code	Description	
020459Y	Punch for fitting bearing on steering tube	
020458Y	Puller for lower bearing on steering tube	
005095Y	Engine support	
008564Y	Flywheel extractor	
020434Y	Oil pressure control fitting	
020382Y011	adapter for valve removal tool	






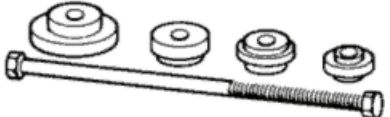
Stores code	Description	
020424Y	Driven pulley roller casing fitting punch	
020431Y	Valve oil seal extractor	
020193Y	Oil pressure gauge	
020306Y	Punch for assembling valve seal rings	
020360Y	Adaptor 52 x 55 mm	
020364Y	25-mm guide	

Stores code	Description	
020375Y	Adaptor 28 x 30 mm	
020376Y	Adaptor handle	
020444Y	Tool for fitting/ removing the driven pulley clutch	
020330Y	Stroboscopic light to check timing	
001467Y035	Belle for OD 47-mm bearings	
020368Y	driving pulley lock wrench	


Stores code	Description	
020319Y	Immobilizer check tester	
020287Y	Clamp to assemble piston on cylinder	
020263Y	Sheath for driven pulley fitting	
020262Y	Crankcase splitting strip	
020430Y	Pin lock fitting tool	
020428Y	Piston position check support	

Stores code	Description	
020426Y	Piston fitting fork	
020425Y	Punch for flywheel-side oil seal	
020423Y	driven pulley lock wrench	
020414Y	28-mm guide	
020393Y	Piston fitting band	
020382Y	Valve cotters equipped with part 012 re- moval tool	

Stores code	Description	
020455Y	10-mm guide	
020442Y	Pulley lock wrench	
020440Y	Water pump service tool	
020329Y	MityVac vacuum-operated pump	
020357Y	32 x 35 mm adaptor	
020409Y	Multimeter adaptor - Peak voltage detection	

Stores code	Description	
020456Y	Ø 24 mm adaptor	
020332Y	Digital rev counter	
020074Y	Support base for checking crankshaft alignment	
020055Y	Wrench for steering tube ring nut	
002465Y	Pliers for circlips	
001330Y	Tool for fitting steering seats	

Stores code	Description	
020454Y	Tool for fitting piston pin stops (200 - 250)	
020622Y	Transmission-side oil guard punch	
020444Y011	adapter ring	
020444Y009	46x55 Wrench	
001467Y	Extractor for bearings for holes	
001467Y013	Pliers to extract ø 15-mm bearings	

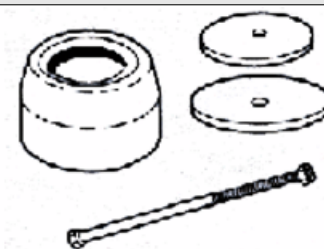
Stores code	Description	
020444Y010	adapter ring	


020244Y 15 mm diameter punch



020115Y	Ø 18 punch	
---------	------------	---

020271Y Tool for removing-fitting silent bloc



020627Y	Flywheel lock wrench	
---------	----------------------	---

020467Y Flywheel extractor



Stores code

020626Y

Description

Driving pulley lock wrench



INDEX OF TOPICS

MAINTENANCE

MAIN

Maintenance chart

MAINTENANCE TABLE

● Replacement

■ Check

* Check level every 3,000 km

** Replace every 2 years

Clean the external filter of the Secondary Air System (SAS) every 2 years

km x 1,000	1	6	12	18	24	30	36	42	48	54	60	66	72
Driven pulley roller casing (greasing)			■		■		■		■		■		■
Safety locks	■		■		■		■		■		■		■
Ignition spark plug		■	●	■	●	■	●	■	●	■	●	■	●
Driving belt		■	●	■	●	■	●	■	●	■	●	■	●
Throttle control - (adjustment)	■		■		■		■		■		■		■
Air filter		■	■	■	■	■	■	■	■	■	■	■	■
Oil filter		●	●	●	●	●	●	●	●	●	●	●	●
Valve clearance		■		■		■		■		■		■	
Electrical system and battery	■	■	■	■	■	■	■	■	■	■	■	■	■
Brake control lever (greasing)	■		■		■		■		■		■		■
Coolant level **		■	■	■	■	■	■	■	■	■	■	■	■
Brake fluid level **	■	■	■	■	■	■	■	■	■	■	■	■	■
Engine oil *	●	●	●	●	●	●	●	●	●	●	●	●	●
Hub oil	●	■	■	■	■	■	■	■	■	■	■	■	■
Headlight aiming adjustment			■		■		■		■		■		■
Brake pads	■	■	■	■	■	■	■	■	■	■	■	■	■
Sliding blocks / variable speed rollers		■	●	■	●	■	●	■	●	■	●	■	●
Tyre pressure and wear	■	■	■	■	■	■	■	■	■	■	■	■	■
Vehicle road test	■	■	■	■	■	■	■	■	■	■	■	■	■
Radiator (external cleaning)				■			■			■			■
Idle speed	■		■		■		■		■		■		■
Suspensions			■		■		■		■		■		■
Steering	■		■		■		■		■		■		■
Transmission			■		■		■		■		■		■

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

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 turn 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 KΩ in series to HV wire).
- Remove the plastic cover from the slot on the flywheel 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.



Characteristic Ignition advance

10° ± 1° at 2,000 rpm

- Make sure the advance degrees match the rotation rpm.
- If failures are found, 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.

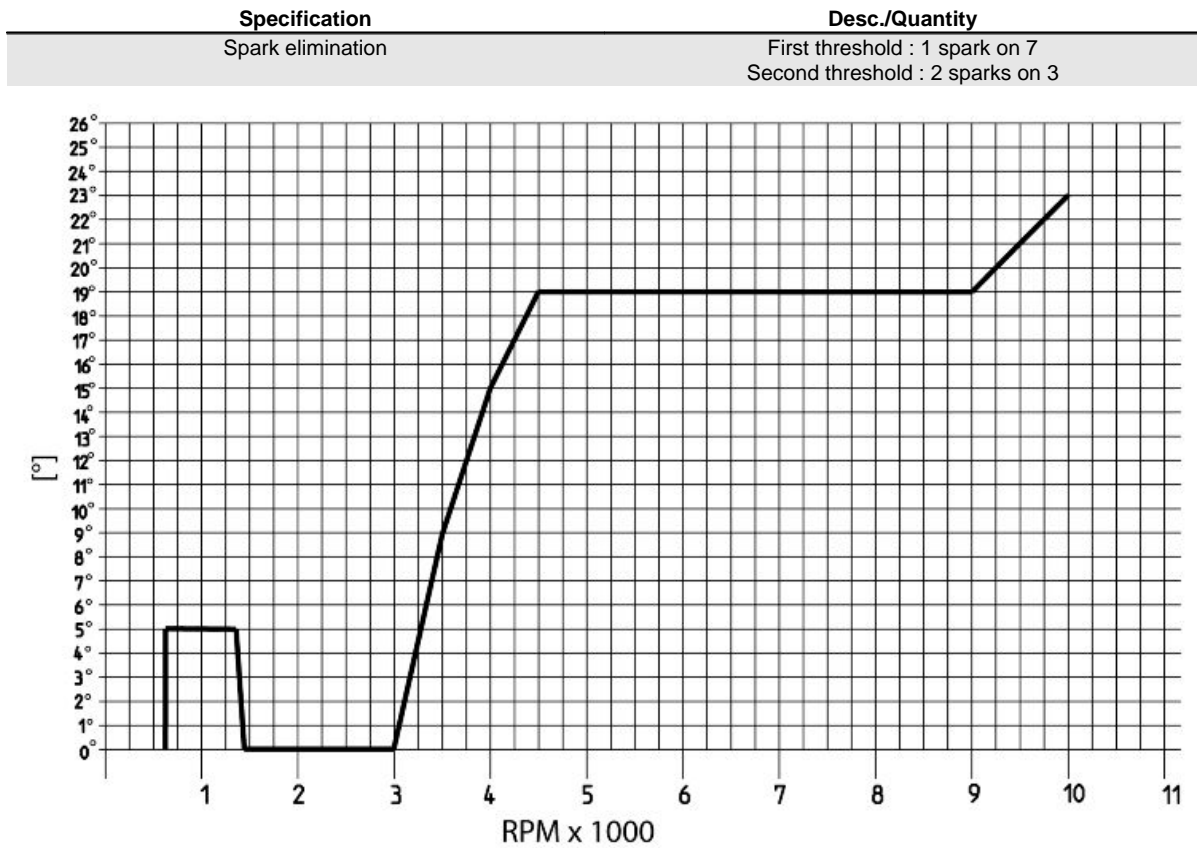
Specific tooling

020330Y Stroboscopic light to check timing

Spark advance variation

REVOLUTION LIMITER

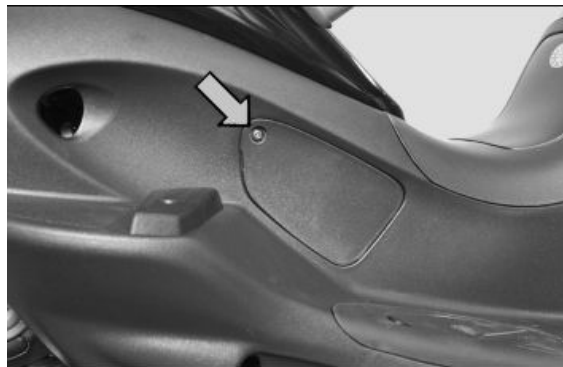
Specification	Desc./Quantity
Operation threshold	First threshold : 10700 ±50 Second threshold : 11000 ±50
Reactivation threshold	First threshold : 10600±50 Second threshold : 10900±50



Spark plug

To service the spark plug the engine must be cold; proceed as follows:

- Remove the spark plug inspection lid placed on the right side of the vehicle by undoing the specified screw.



- Remove the spark plug cap.
- Remove the spark plug with the supplied wrench.
- Examine it carefully and replace it if the insulator is chipped or cracked.
- Measure electrode gap with a thickness gauge and, if necessary, adjust the gap by carefully bending the outer electrode forward or away.
- Make sure the sealing washer is in good conditions.



- Fit the spark plug, screw it manually and lock it to the prescribed torque with a spark plug spanner.
- Refit the spark plug inspection lid.

CAUTION

THE SPARK PLUG MUST BE REMOVED WHEN THE ENGINE IS COLD. REPLACE THE SPARK PLUG AS INDICATED IN THE SCHEDULED MAINTENANCE TABLE. USING NON-COMPLYING IGNITION CONTROL UNITS OR SPARK PLUGS OTHER THAN THOSE PRESCRIBED MAY SERIOUSLY DAMAGE THE ENGINE.

Characteristic**Spark plug**

CHAMPION RG4HC

Alternative spark plug

NGK CR8EB

Electrode gap

0.7-0.8 mm

Locking torques (N*m)

Spark plug 12 ÷ 14

Hub oil

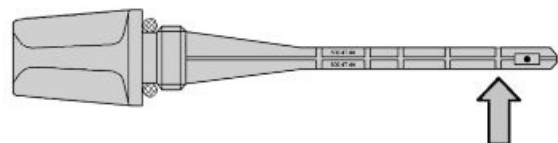
Check

To check the rear hub oil level, proceed as follows:

- Park the vehicle on level ground and rest it on its centre stand.
- Unscrew the oil dipstick «A», dry it with a clean cloth and reinsert it, **by screwing it in completely**.
- Pull out the dipstick and check that the oil level is above the indicated notch. If the oil level is below the notch, refill the hub with the adequate amount of oil.
- Screw the dipstick back in.

**N.B.**

THE REFERENCE MARKS ON THE HUB OIL LEVEL DIPSTICK, EXCEPT FOR THE ONE INDICATING THE "MAX" LEVEL, REFER TO OTHER MODELS BY THE MANUFACTURER AND HAVE NO SPECIFIC FUNCTION FOR THIS MODEL.

**Recommended products**

AGIP ROTRA 80W-90 rear oil hub

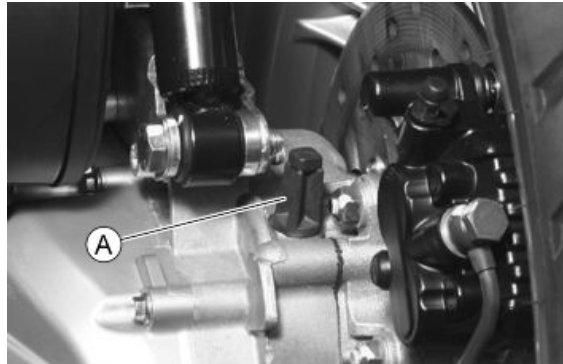
SAE 80W/90 Oil that exceeds the requirements of
API GL3 specifications

Characteristic**Transmission oil**

250 cm³

Replacement

- Remove the oil filler plug «A».



- Unscrew the oil drainage cap "B" and drain out all the oil.
- Screw in the drainage plug again and fill the hub with the recommended oil.

**Recommended products****AGIP ROTRA 80W-90 Rear hub oil**

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

Characteristic**Transmission oil**

150 cm³

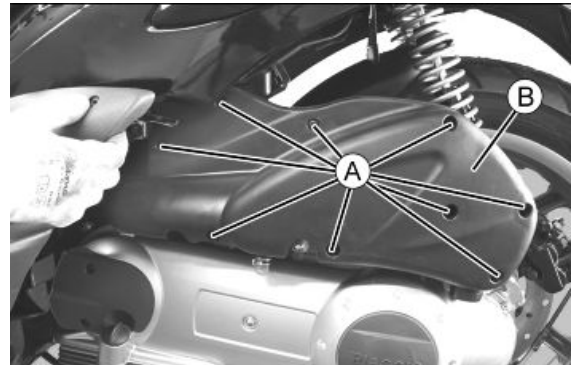
Locking torques (N*m)

Hub oil drainage plug 15 ÷ 17

Air filter

To access the air filter:

- Undo the nine screws «A».
- Remove the air-box cover «B»



Cleaning:

- Wash the sponge with water and mild soap.
- Dry it with a clean cloth and short blasts of compressed air.
- Soak it in a mixture of 50% petrol and 50% specified oil.
- Gently squeeze the filtering element with your hands but do not wring it; allow it to drip dry and then refit.



CAUTION



IF THE VEHICLE IS USED ON DUSTY ROADS, IT IS NECESSARY TO SERVICE THE AIR FILTER MORE OFTEN TO AVOID DAMAGING THE ENGINE.

Recommended products

AGIP FILTER OIL Oil for air filter sponge

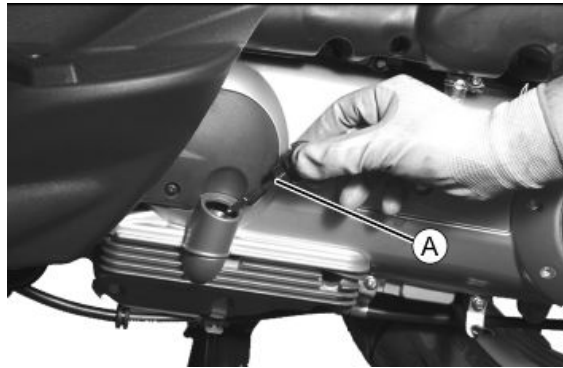
Mineral oil with specific additives for increased adhesiveness

Engine oil

Replacement

Change oil and replace filter as indicated in the scheduled maintenance table.

- In order to facilitate oil drainage, unscrew the cap/dipstick «A».



- Unscrew the mesh pre-filter drainage plug «B» on the flywheel side and let the oil drain off.

- Once all the oil has drained through the drainage hole, unscrew and remove the oil cartridge filter «C».



Make sure the pre-filter and drainage plug O-rings are in good conditions. Lubricate them and refit the mesh filter and oil drainage plug, screwing them up to the specified torque.

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

Add the recommended engine oil through plug «A». Then start up the vehicle, let it run for a few minutes and shut 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.

N.B.

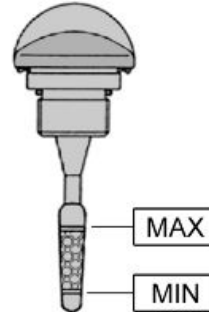
THE ENGINE MUST BE HOT WHEN THE OIL IS CHANGED.

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



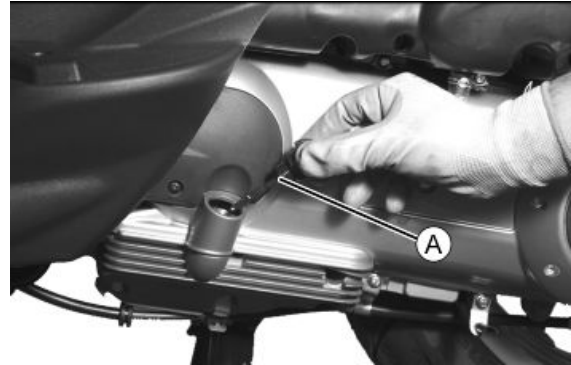
Engine oil

1.1 l

Check

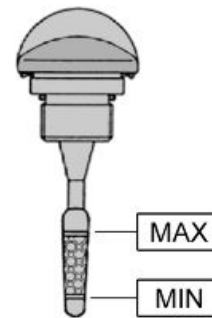
This operation **must be carried out with the engine cold** and following the procedure below:

- Place the vehicle on its centre stand and on flat ground.
- Make sure the adjustment of the rear suspension is set to the minimum preloading position.
- Unscrew the cap/dipstick «A», dry it with a clean cloth and reinsert it, **by screwing it in completely**.



- Remove the cap/dipstick «A» again and check that the level is between the **MAX** and **MIN** marks. top-up, if required.

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, 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 exceeding the **MAX** level indicated on the cap/ dipstick. Restoring the level from **MIN** to **MAX** requires approximately 400 cm³ of oil.

Engine oil filter

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.

Make sure the pre-filter and drainage plug O-rings are in good conditions. Lubricate them and refit the mesh filter and oil drainage plug, 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.

Recommended products

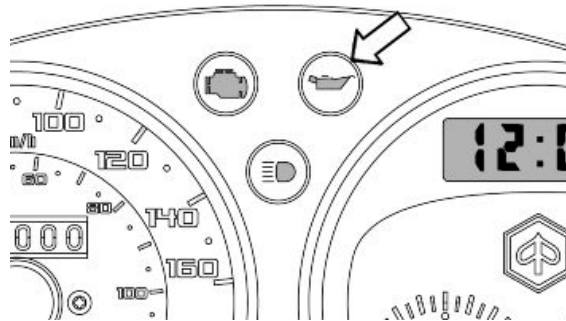
AGIP CITY HI TEC 4T Engine oil

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

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.

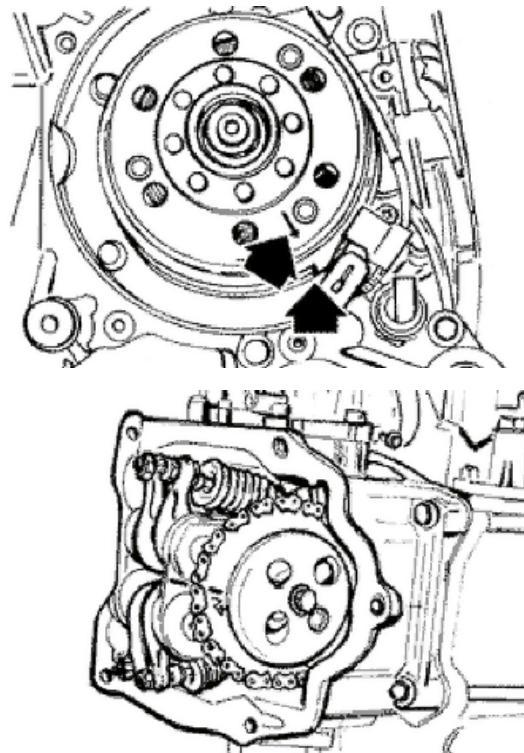
-Rotate the flywheel until the reference matches the crankcase operation end as shown in the figure (TDC). Make sure that the 4V reference point on the camshaft control pulley is aligned with the reference point on the head as shown in the second figure. If the reference mark is opposite the indicator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

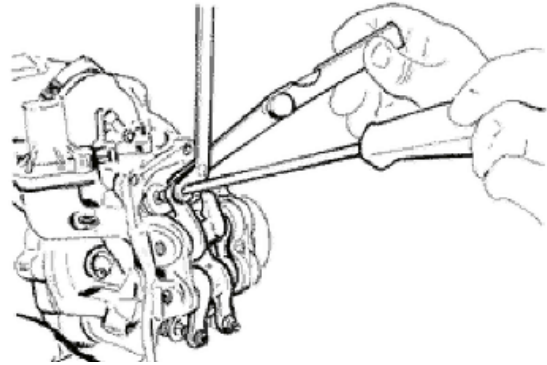
N.B.

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



Checking the valve clearance

- To check valve clearance, centre the reference marks of the timing system.
- Use a thickness gauge to check that the clearance between the valve and the set screw corresponds with the indicated values. When the valve clearance values, intake and drainage respectively, are different from the ones indicated below, adjust them by loosening the lock nut and operate on the register with a screwdriver as shown in the figure.



Characteristic

Valve clearance

Inlet: 0.10 mm (when cold)

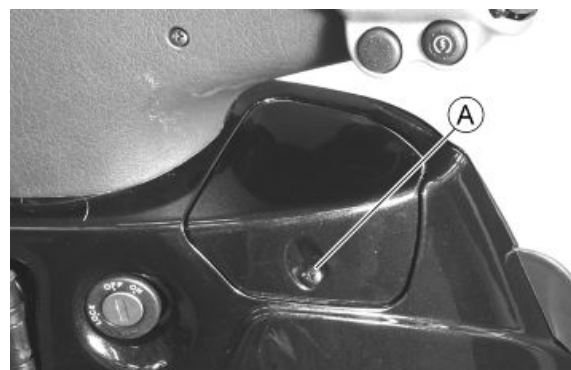
Outlet: 0.15 mm (when cold)

Cooling system

Level check

Check coolant when the engine is cold and as indicated in the scheduled maintenance tables, following the steps below.

- Set the vehicle upright on the stand and remove the cover by undoing screw «A».

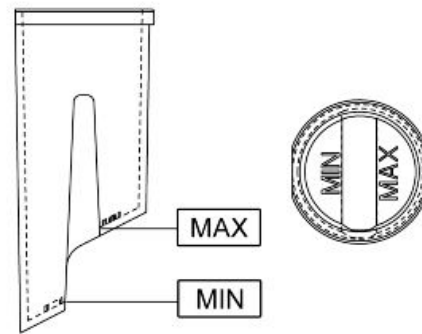


- Remove the expansion tank cover «B» by turning it anticlockwise.



- Look inside the expansion tank and check that the level is between **MIN** and **MAX**. Top up if the coolant is below the **MIN** level.

If the level is not correct, proceed to top-up when the engine is cold. If it is necessary to top up the coolant frequently, or if the expansion tank is completely dry, you should look for the cause in the cooling system.



WARNING



TO AVOID THE RISK OF SCALDING, DO NOT UNSCREW THE EXPANSION TANK COVER WHILE THE ENGINE IS STILL HOT.

WARNING



IN ORDER TO AVOID HARMFUL FLUID LEAKS WHILE RIDING, IT IS IMPORTANT TO MAKE SURE THAT THE LEVEL DOES NOT EXCEED THE REFERENCE TONGUE TOO MUCH.

IN ORDER TO GUARANTEE THE PROPER FUNCTION OF THE ENGINE, IT IS NECESSARY TO KEEP THE RADIATOR GRILLE CLEAN.

Recommended products

AGIP PERMANENT SPEZIAL coolant

Monoethylene glycol-based antifreeze fluid, CU-NA NC 956-16

Braking system

Level check

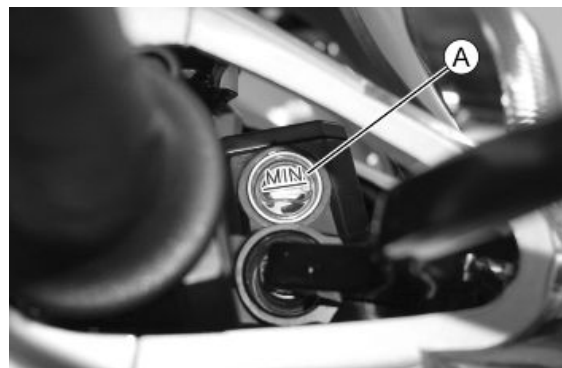
The front and rear brake fluid reservoirs are both positioned on the handlebars. Proceed as follows:

- Rest the vehicle onto the centre stand, with the handlebar centred.

- Check the fluid level through the sight glass

«A».

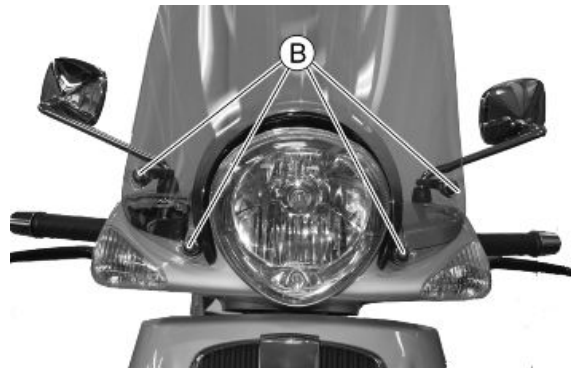
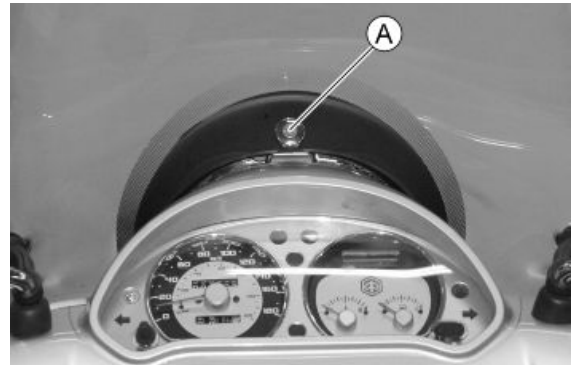
A certain lowering of the level is caused by wear on the pads.



Top-up

Proceed as follows:

- Undo the five screws «A» and remove the wind-shield.



- Undo the screw «B», then remove cover «C» in order to get access to the reservoir cap below.



- Loosen the two fixing screws «D» and remove cover «E». Top-up the brake fluid level using only the prescribed brake fluid and without exceeding the maximum level.

Under normal climatic conditions, replace fluid as indicated in the scheduled maintenance tables.

CAUTION

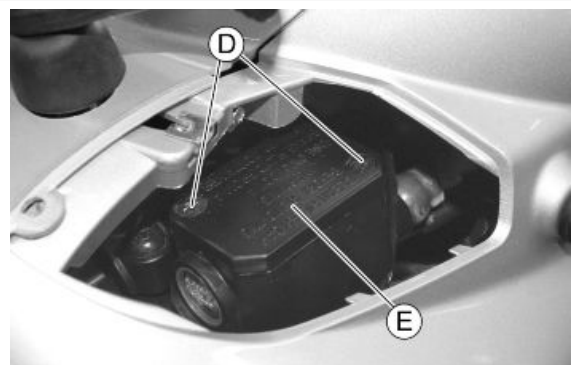
BRAKING CIRCUIT FLUID IS HIGHLY CORROSIVE; MAKE SURE THAT IT DOES NOT COME INTO CONTACT WITH THE PAINTWORK.

CAUTION

ONLY USE DOT 4-CLASSIFIED BRAKE FLUID.

WARNING

THE BRAKE FLUID IS HAZARDOUS: IN CASE OF ACCIDENTAL CONTACT, WASH OFF WITH WATER.



WARNING

THE BRAKING CIRCUIT LIQUID IS HYGROSCOPIC, AND ABSORBS THE HUMIDITY OF SURROUNDING AIR. IF THE HUMIDITY IN THE BRAKING FLUID EXCEEDS A CERTAIN VALUE, IT WILL LEAD TO INEFFICIENT BRAKING. NEVER USE BRAKING FLUID KEPT IN CONTAINERS THAT HAVE ALREADY BEEN OPENED, OR PARTIALLY USED.

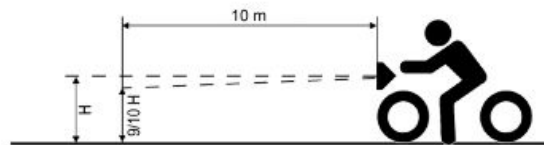
Recommended products**AGIP BRAKE 4 Brake fluid**

FMVSS DOT 4 Synthetic fluid

Headlight adjustment

Proceed as follows:

- Position the unloaded vehicle, in running order and with the tyres inflated to the prescribed pressure, onto a flat surface, 10 m away from a half-lit white screen; make sure the vehicle axis is perpendicular to the screen;
- Turn on the headlight and check that the border of the projected light beam on the screen is not higher than $\frac{9}{10}$ or lower than $\frac{7}{10}$ of the height from the ground to the centre of vehicle headlamp;
- Otherwise, adjust the headlight.

**N.B.**

THE ABOVE PROCEDURE COMPLIES WITH THE EUROPEAN STANDARDS REGARDING MAXIMUM AND MINIMUM HEIGHT OF LIGHT BEAMS. REFER TO THE STATUTORY REGULATIONS IN FORCE IN EVERY COUNTRY WHERE THE vehicle IS USED.

To adjust light beams:

- Undo the five screws indicated and remove the windshield.





- Operate on the screw indicated in order to aim the light in the desired way.



SAS filters inspection and cleaning

- Remove the flywheel cover.
- Remove the two screws fixing the SAS valve as shown in the figure and remove the SAS valve and the O-ring from the support



- Remove the plastic support and the gasket as shown in the photograph



- 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

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

CAUTION

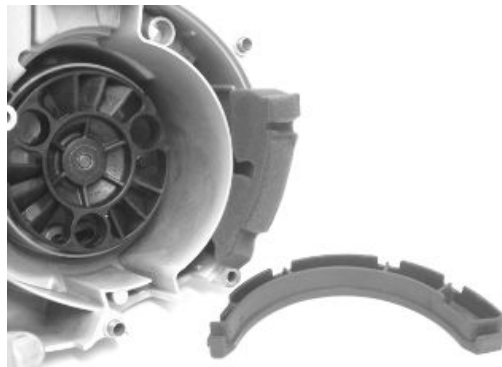
INADEQUATE TIGHTNESS BETWEEN THE SAS VALVE AND ITS SUPPORT INCREASES NOISE IN THE SAS SYSTEM.

CAUTION

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

CAUTION

NEVER RUN THE ENGINE WITHOUT THE SECONDARY AIR FILTER



INDEX OF TOPICS

TROUBLESHOOTING

TROUBL

Engine

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
The carburettor is dirty; fuel pump damaged	Remove, wash with solvent and dry with compressed air or replace. Check the pump control device.
Excess of encrustations in the combustion chamber	Descale the cylinder, the piston, the head and the valves
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Muffler obstructed	Replace
Air filter blocked or dirty.	Remove the sponge, wash with water and car shampoo, then soak it in a mixture of 50% petrol and 50% specific oil. Press with your hand without squeezing, allow it to drip dry and refit.
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, the pulley movement and make sure the drive belt is in good conditions; replace the damaged parts and lubricate the moveable driven pulley with specific grease.
Clutch slipping	Check the clutch system and/or the bell and replace if necessary
Overheated valves	Remove the head and the valves, grind or replace the valves
Wrong valve adjustment	Adjust the valve clearance properly
Valve seat distorted	Replace the head assembly
Defective floating valve	Check the proper sliding of the float and the functioning of the valve

Rear wheel spins at idle

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.	Remove the sponge, wash with water and car shampoo, then soak it in a mixture of 50% petrol and 50% specific oil. Press with your hand without squeezing, allow it to drip dry and refit.
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

Possible Cause	Operation
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
Fuel pump fault	Check the pump control device

Excessive oil consumption/Exhaust smoke

EXCESSIVE OIL CONSUMPTION/SMOKEY EXHAUST

Possible Cause	Operation
Worn valve guides	Check and replace the head unit if required
Worn valve oil guard	Replace the valve oil guard
Oil leaks from the couplings or from the gaskets	Check and replace the gaskets or restore the coupling seal
Worn or broken piston rings or piston rings that have not been fitted properly	Replace the piston cylinder unit or just the piston rings

Insufficient lubrication pressure

LOW 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 adding the recommended oil type

Engine tends to cut-off at full throttle

ENGINE STOP FULL THROTTLE

Possible Cause	Operation
Faulty fuel supply	Check and, if necessary, replace the pump and check the pipe for correct sealing.
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.
Water in the carburettor	Empty the tank through the appropriate bleed nipple.
Maximum nozzle dirty - lean mixture	Wash the nozzle with solvent and dry with compressed air

Engine tends to cut-off at idle

ENGINE STOP IDLING

Possible Cause	Operation
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

Excessive exhaust noise

EXCESSIVE EXHAUST NOISE

Possible Cause	Operation
Secondary air device cut-off valve not working	Replace the secondary air device
Depression intake pipe of the secondary air device disconnected or dented	Replace the pipe
Reed valve of the secondary air device does not close correctly and wears out the rubber coupling between the device and the head pipe	Replace the device and the coupling

High fuel consumption

HIGH FUEL CONSUMPTION

Possible Cause	Operation
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.
Loose nozzles	Check the maximum and minimum nozzles are adequately fixed in their fittings
Starter inefficient	Check: electric wiring, circuit continuity, mechanical sliding and power supply
Air filter blocked or dirty.	Remove the sponge, wash with water and car shampoo, then soak it in a mixture of 50% petrol and 50% specific oil. Press with your hand without squeezing, allow it to drip dry and refit.

SAS malfunctions

ANOMALIES IN THE SECONDARY AIR DEVICE

Possible Cause	Operation
Secondary air device cut-off valve not working	Replace the secondary air device
Depression intake pipe of the secondary air device disconnected or dented	Replace the pipe
Reed valve of the secondary air device does not close correctly and wears out the rubber coupling between the device and the head pipe	Replace the device and the coupling

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

INSUFFICIENT BRAKING

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

Brakes overheating

BRAKES OVERHEATING

Possible Cause	Operation
Rubber gaskets swollen or stuck	Replace the components.
Compensation holes on the pump clogged	Clean carefully and blast with compressed air
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.
Defective piston sliding	Check calliper and replace any damaged part.

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+.

Steering and suspensions

Rear wheel

REAR WHEEL ROTATES WITH ENGINE AT IDLE

Possible Cause	Operation
Idling rpm too high	Adjust the engine idle speed.
Clutch fault	Check the springs / clutch masses

Controls

STEERING CONTROLS AND SUSPENSIONS

Possible Cause	Operation
Torque not conforming	Check the tightening of the top and bottom ring nuts. If irregularities continue in turning the steering even after making the above adjustments, check the rotation seats and the steering fifth wheels.
Steering hardening	Check the tightening of the top and bottom ring nuts. If irregularities continue in turning the steering even after making the above adjustments, check the rotation seats and the steering fifth wheels.
Malfunctions in the suspension system	If the front suspension is noisy, check: locking torques, head-stock components, inspect forks.
Seal fault or breakage	Replace the shock absorber

INDEX OF TOPICS

ELECTRICAL SYSTEM

ELE SYS

Components arrangement

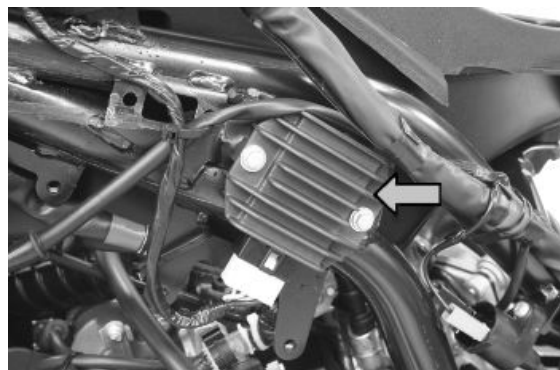


1. Voltage regulator: remove the right side fairing to reach it.

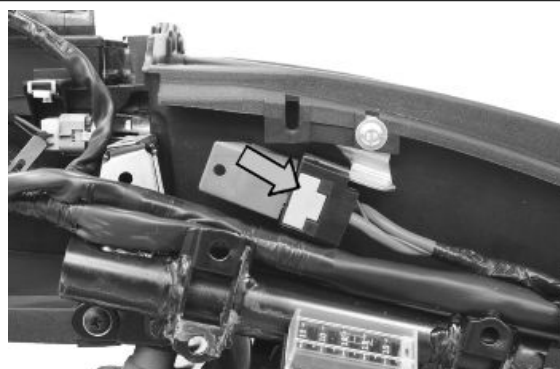
Electric characteristic

Control voltage

14÷15 V to 1500÷12000 rpm



2. Start-up remote control switch: remove the right side fairing to reach it.



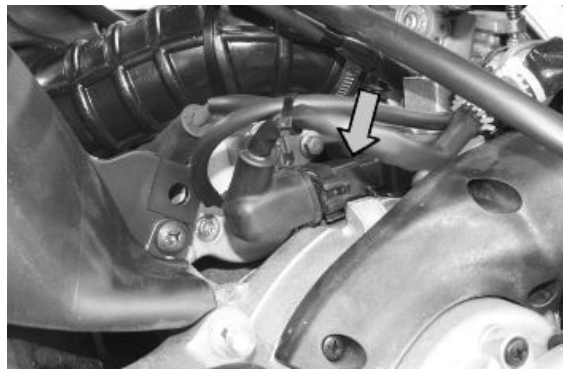
3. Primary fuses: remove the right side cover to reach them.



4. Fuel electric pump control device: remove the right side fairing to reach it.



5. Stator: remove the right side fairing to reach the connector.



6. HV coil: remove the right side fairing to reach it.

Electric characteristic

HV coil resistance primary value:

~ 0.5 Ω

HV coil resistance secondary value:

~ 2.88 K Ω



7. Spark plug: remove the cover on the vehicle right side to reach it.



8. Fuel electric pump: remove the right footrest to reach it.



9. Horn: remove the right footrest to reach it.



10. Electric fan: remove the shield back plate to reach it.



11. Electronic ignition device: remove the front shield to reach it.



12. Immobilizer aerial: remove the shield back plate to reach it.



13. Key switch: remove the front shield to reach it.

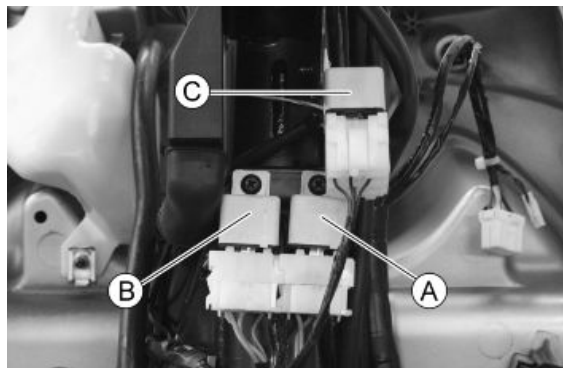


14. Remote control switches: remove the front shield to reach them.

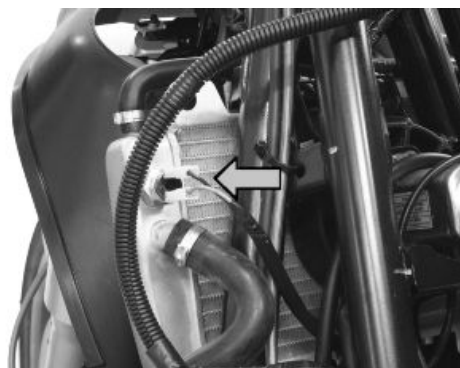
A. Light remote control

B. Engine stop remote control

C. Immobilizer remote control



15. Thermoswitch: remove the shield back plate to reach it.



16. Auxiliary fuses: located in the front glove-box.



17. Fuel level transmitter: remove the central cover to reach it.

Electric characteristic

Resistance value when the tank is full

$\leq 7 \Omega$

Resistance value when the tank is empty

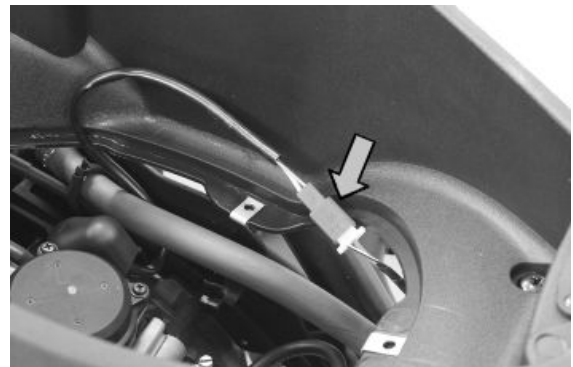
$90 + 13/-3 \Omega$



18. Stand switch: remove the left footrest to reach it.



19. Automatic starter: to reach the connector, remove the inspection cover in the helmet compartment and release it from its retainer.



20. Saddle opening actuator: remove the left side panel to reach it.



21. Battery: remove the battery cover located in the helmet compartment to reach it.

Characteristic

Battery

12V-12Ah



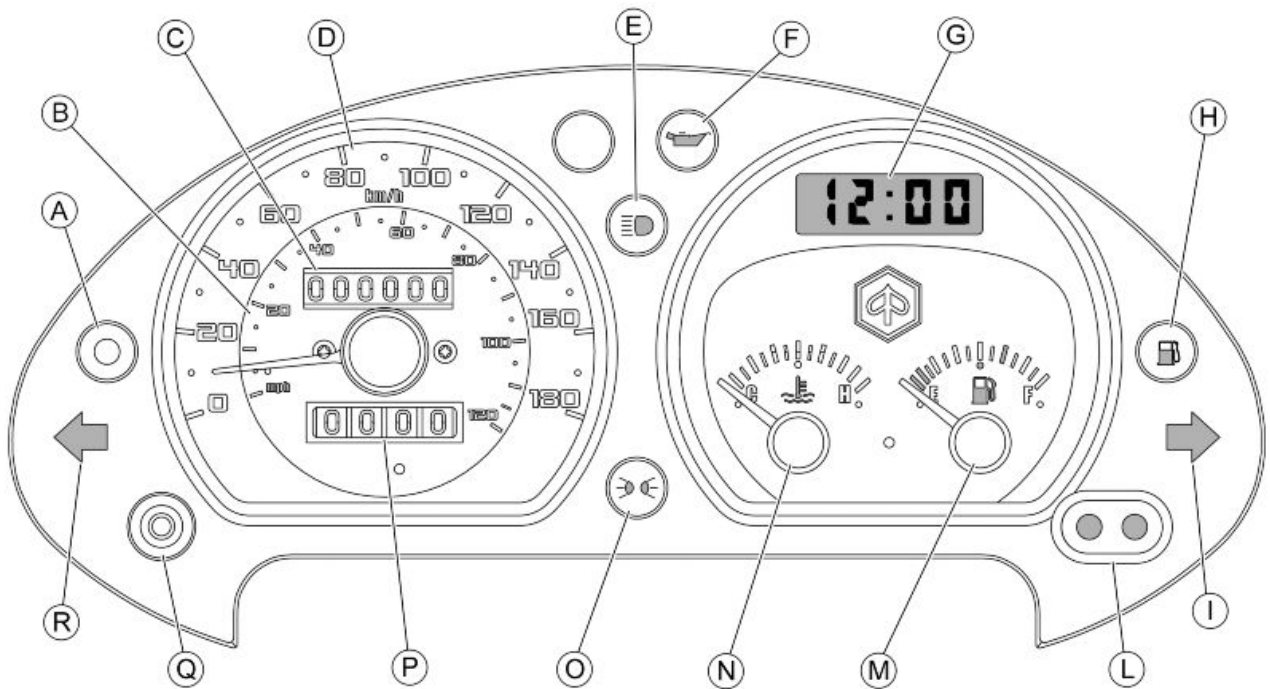
22. Plug socket: located in the helmet compartment.



23. Thermistor: remove the inspection cover located in the helmet compartment to reach it.



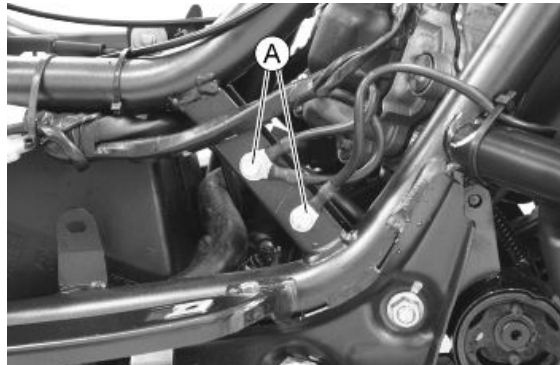
Instrument panel



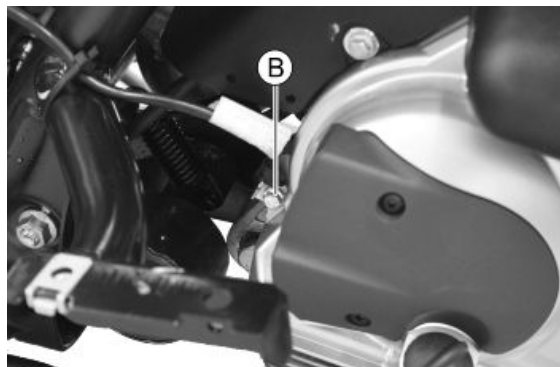
- A** = Immobilizer LED
- B** = Speedometer (mph)
- C** = Total Odometer
- D** = Speedometer (km/h)
- E** = High-beam warning light
- F** = Oil pressure warning light
- G** = Digital clock
- H** = Low fuel warning light
- I** = Right turn indicator warning light
- L** = Clock controls
- M** = Fuel gauge
- N** = Water temperature gauge
- O** = Headlight warning light
- P** = Trip odometer
- Q** = Odometer reset button
- R** = Left turn indicator warning light

Ground points

A. Ground points on the chassis: remove the left footrest to reach them.



B. Ground point on the engine: remove the left footrest to reach it.



Checks and inspections

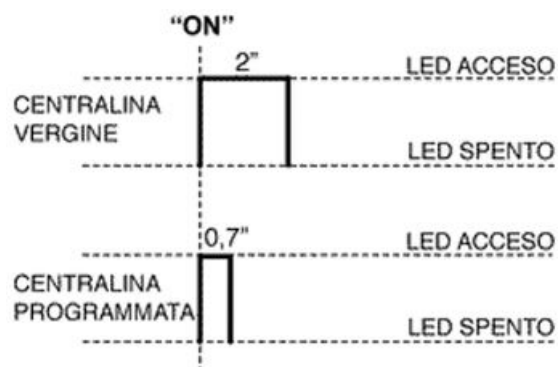
Immobiliser

The electric ignition system is fed with direct current and is protected by an antitheft immobilizer integrated to the control unit.

The ignition system consists of:

- electronic control unit
- immobilizer aerial
- master and service keys with built-in transponder
- H.V. coil
- diagnosis LED

The diagnosis LED also works as a blinking light to deter theft. This function is activated every time the key switch is set to «OFF», when the side stand is lowered or the engine emergency cut-off switch is set to «OFF». It remains activated for 48 hours in order not to affect the battery charge.



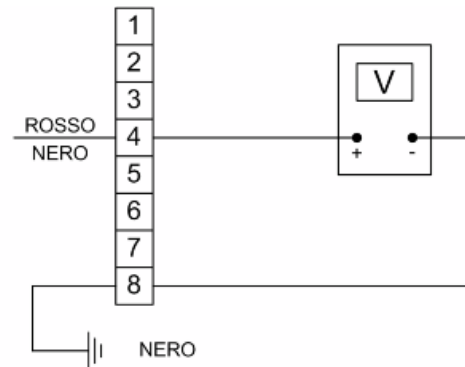
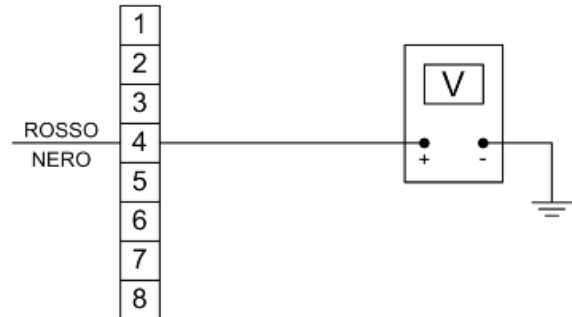
When the ignition switch is turned to «**ON**», the deterring blinker function is deactivated. Subsequently, a flash confirms the switching to «**ON**». The duration of the flash depends on the electronic control unit program (see figure).

In case the LED turns off and remains so even when switching over to «**ON**», check if:

- the battery is charged
- the 4A fuse (No. 5) is in working order.

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

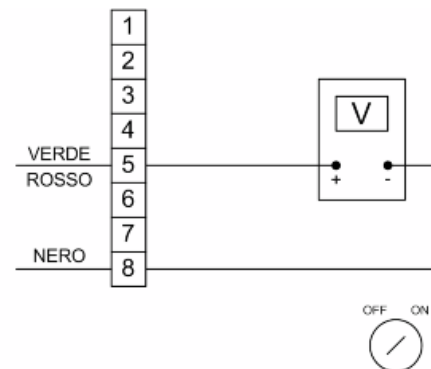
- Disconnect the control unit connector and check if:
 - There is battery voltage between terminal No. 4 (Red/Black) and the ground lead
 - There is battery voltage between the terminal No. 4 (Red/Black) and the terminal No. 8 (Black) as shown in the figure.



- There is battery voltage between the terminals No. 5 and No. 8 with the key switch set to «**ON**», the side stand folded up and the emergency cut-off 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;
- Emergency cut-off switch;
- Side stand contacts;
- Key switch contacts.



Virgin circuit

If the ignition system has not been programmed, the engine can be started but it will run limited to 2000 rpm. When trying to accelerate, some evident loss of power may be felt.

The MASTER and SERVICE keys must be used to code the system as follows:

- Insert the MASTER key, turn it to «ON» and keep it in that position for 2 seconds (limit values: 1 ÷ 3 seconds).
- Alternately insert all the available black keys, setting each of them to «ON» for 2 seconds.
- Insert the MASTER key again and turn it to «ON» for 2 seconds.

The maximum time to change keys is 10 seconds. A maximum of 7 service keys can be programmed at one time.

Sequence and times must be strictly observed or it will be necessary to repeat the procedure from the start.

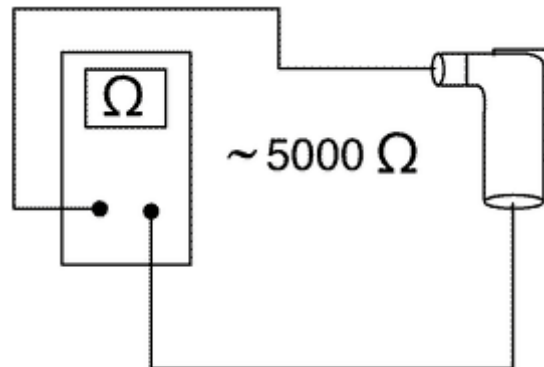
Once the control unit has been programmed, the control unit is inseparably matched with the MASTER key transponder.

This matching allows programming further service keys in case of loss, replacement, etc. Each new time new data is programmed the previously stored one is deleted.

If a service key setting is lost, it is essential to carefully check the efficiency of the high voltage system:

Shielded cap resistance ~ 5000 Ω .

In any case it is advisable to use resistive spark plugs.



Diagnostic codes

The Immobilizer system is tested each time the key switch is turned from «OFF» to «ON». During this diagnosis phase a number of control unit statuses can be identified and various light codes displayed. Regardless of the code transmitted, if at the end of the diagnosis the led remains off permanently, the ignition is enabled. If, however, the led remains on permanently, it means the ignition is inhibited:

1. Previously unused control unit - key inserted:

a single 2 second flash is displayed, after which the LED remains off permanently. The keys can be stored to memory, the vehicle can be started but with a limitation imposed on the number of revs.

2. Previously unused control unit - transponder absent or cannot be used:

The LED is permanently ON; in this condition, no operations are possible, including starting of the vehicle.

3. Programmed control unit - the service key in

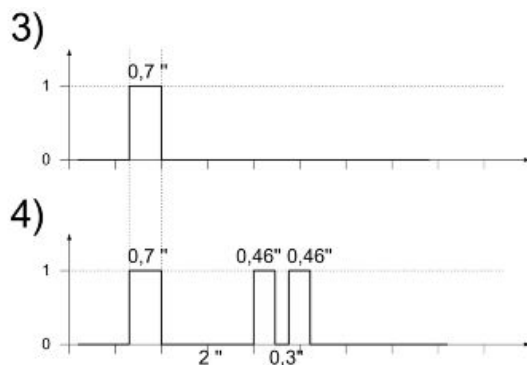
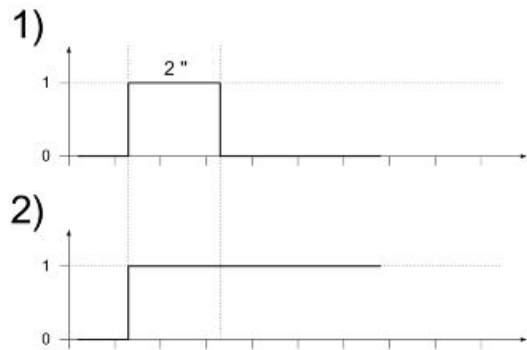
(normal condition of use): a single 0.7-second flash is displayed, after which the LED remains off steadily. The engine can be started.

4. Programmed control unit - Master key in:

a 0.7 sec. flash is displayed followed by the LED remaining off for 2 sec. and then by short 0.46 sec. flashes the same number of times as there are keys stored in the memory including the Master key. When the diagnosis has been completed, the LED remains permanently OFF. The engine can be started.

5. Programmed control unit - fault detected: a light code is displayed according to the fault detected, after which the LED remains on permanently. The engine cannot be started. The codes that can be transmitted are:

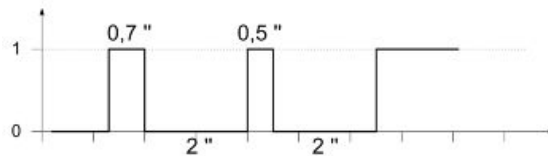
- 1-flash code
- 2-flash code



- 3-flash code

Diagnostic code - 1 flash

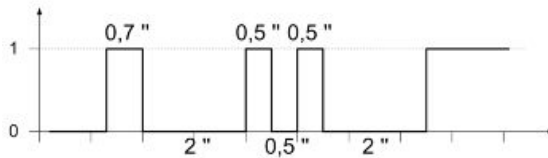
The one-flash code indicates a system where the serial line is not present or is not detected. Check the Immobilizer aerial wiring and change it if necessary.



Diagnostic code - 2 flashes

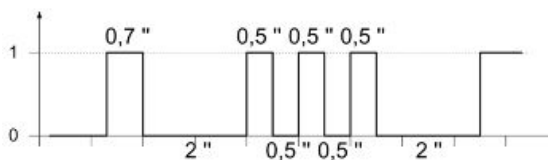
A two-flash code shows a system where the control unit does not show the transponder signal. This might depend on the inefficiency of the immobiliser aerial or the transponder.

Turn the switch to «ON» using several keys: if the code is repeated even with the Master key, check the aerial wiring and change it if necessary. If this is not the case, replace the defective key and/or reprogram the control unit.



Diagnostic code - 3 flashes

A three-flash code indicates a system where the control unit does not recognise the key. Turn the switch to «ON» using several keys: if the error code is repeated even with the Master key, replace the control unit. If this is not the case, perform a reprogramming.



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

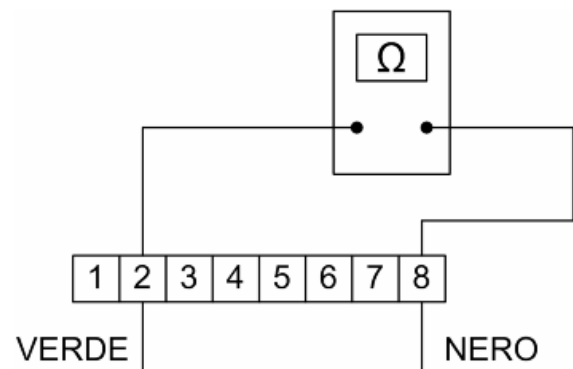
WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

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 the resistance value between terminal No. 2 (Green) and terminal No. 8 (Black). Check the Pick-Up and its power line:



Electric characteristic

Pick-up resistance value

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

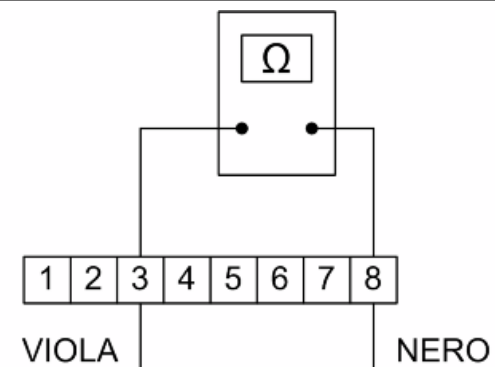
If a break in the circuit is found, check again the flywheel and the engine ground connectors (see engine manual). If non-conforming values are measured, replace the Pick-Up; otherwise, repair the cable harness.

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 primary coil directly on the positive and negative terminals. If non-conforming values

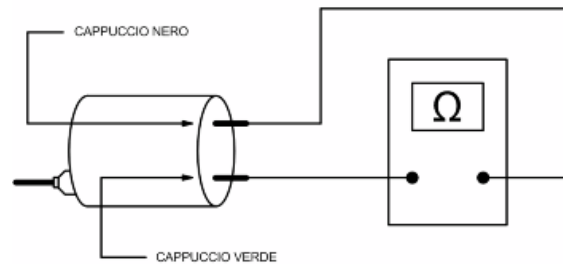


are measured, repair the cable harness or else replace the HV coil.

Electric characteristic

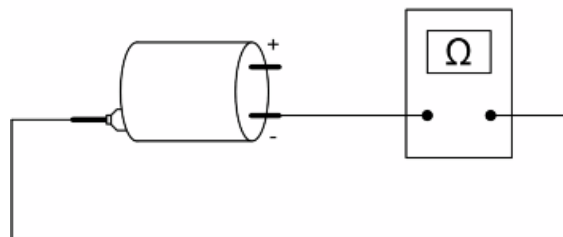
HV coil resistance primary value:

~ 0.5 Ω



HV coil secondary check

Disconnect the spark plug cap from the HV cable and measure the resistance between the HV cable end 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.



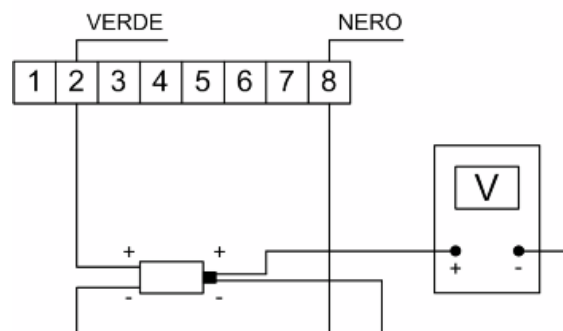
Electric characteristic

HV coil resistance secondary value:

~ 2.88 K Ω

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).
- The multimeter end of a scale should be 200V. Use the start-up system to run the engine and measure the voltage produced by the Pick-Up.
- Replace the Pick-Up if non-conforming values are measured.



N.B.

THE MULTIMETER MUST BE SELECTED TO DETECT CONTINUOUS VOLTAGE.

Specific tooling

020409Y Multimeter adaptor - Peak voltage detection

Electric characteristic

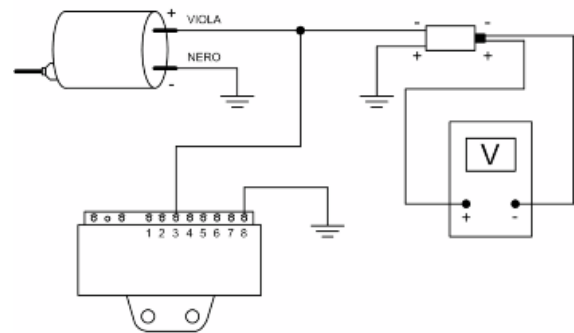
Voltage value

> 5 Volt

H.V. 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

High voltage coil voltage value

High voltage coil voltage value: > 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.

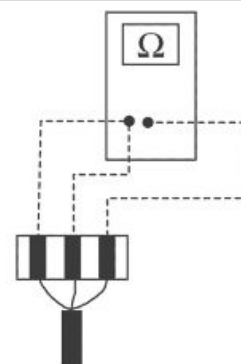
Stator check

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

Electric characteristic

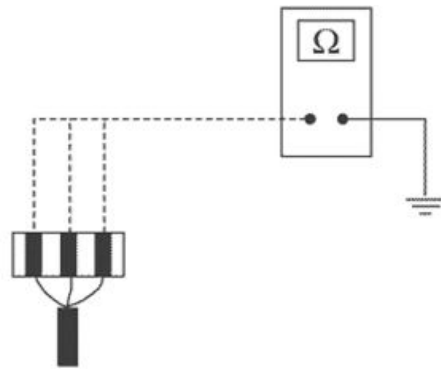
Resistance value

~ 0.6 Ω



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.



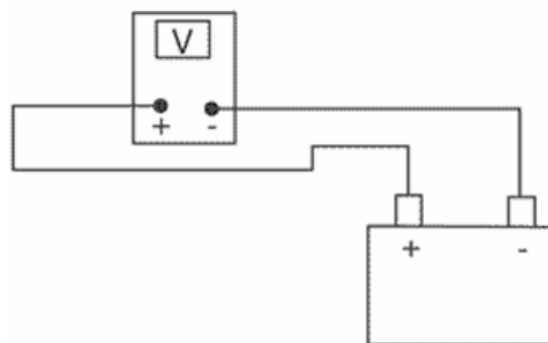
Voltage regulator check

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

Voltage should not exceed 15 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.



Electric characteristic

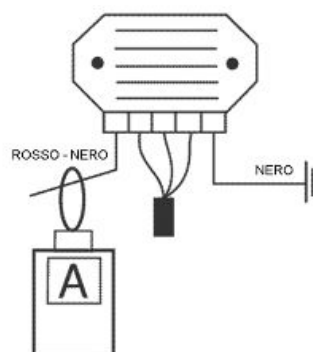
Control voltage

14÷15 V to 1500÷12000 rpm

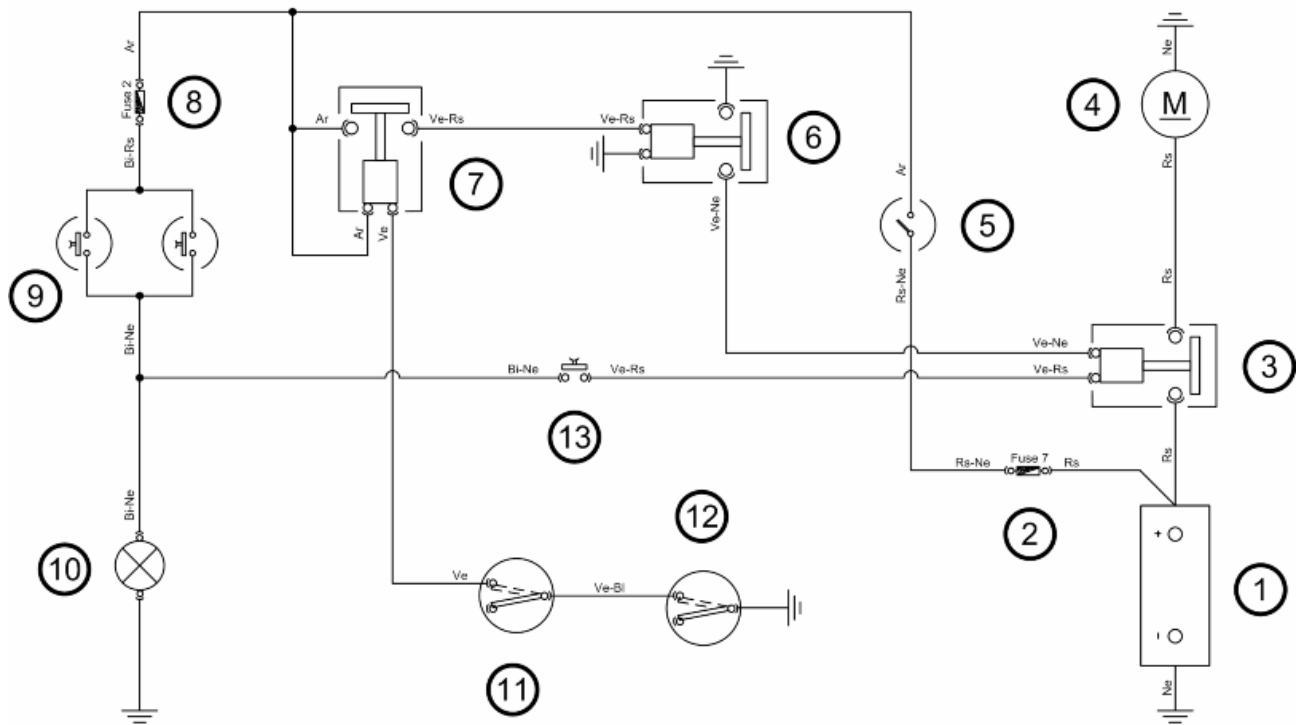
Recharge system voltage check

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.



Starter motor



KEY

1. Battery
2. Fuse No. 7
3. Start-up remote control
4. Starter motor
5. Key switch contacts
6. Immobiliser remote control
7. Engine stop remote control
8. Fuse No. 2
9. Stop button
10. Stop light bulb
11. Engine stop switch
12. Stand switch
13. Starter button

WARNING

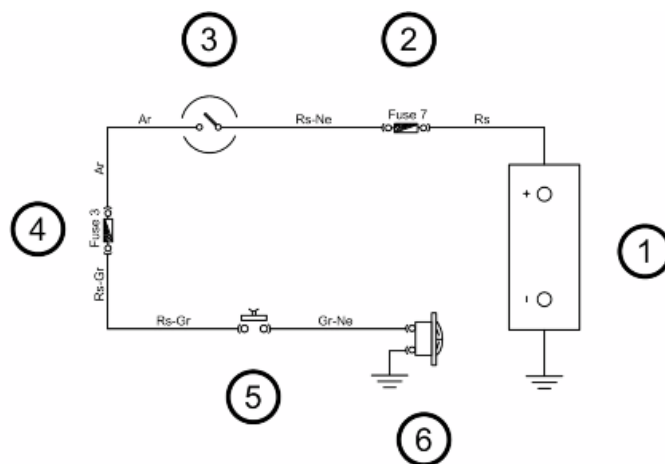
ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

If it does not work:

- 1) Check that the Red cable between the battery and the start-up remote control switch, and the latter and the starter motor are not interrupted.

- 2) Check the start-up remote control switch, the immobilizer remote control and the engine stop remote control.
- 3) Check the contacts of the key switch, the starter button, the stop buttons, the stand switch and the engine stop switch.
- 4) Check that fuse No. 2 and 7 operate properly.
- 5) If none of these components is damaged, check wiring for continuity.

Horn control



KEY

1. Battery
2. Fuse No. 7
3. Key switch contacts
4. Fuse No. 3
5. Horn button
6. Horn

WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

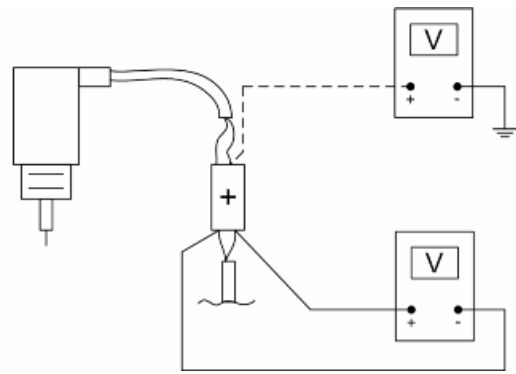
If the horn does not work:

- 1) Check that fuse No. 3 and 7 operate properly.
- 2) Check the key switch and horn button contacts.
- 3) If the components are not damaged, check wiring for continuity.

Choke Inspection

Refer to the engine section to check the resistance and operating conditions of the component. As regards voltage supply, keep the connector connected to the system and check that the two terminals receive battery voltage **with the engine on** (see figure).

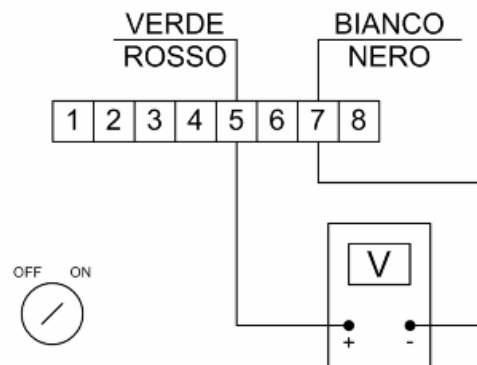
If no voltage is detected, connect the multimeter negative lead to the ground connection and the positive lead to the automatic starter White-Black cable; with the key switch set to «ON» check whether there is battery voltage; if there is no voltage, check the wiring connections to the key switch and that the 15A fuse (No. 7) works properly.



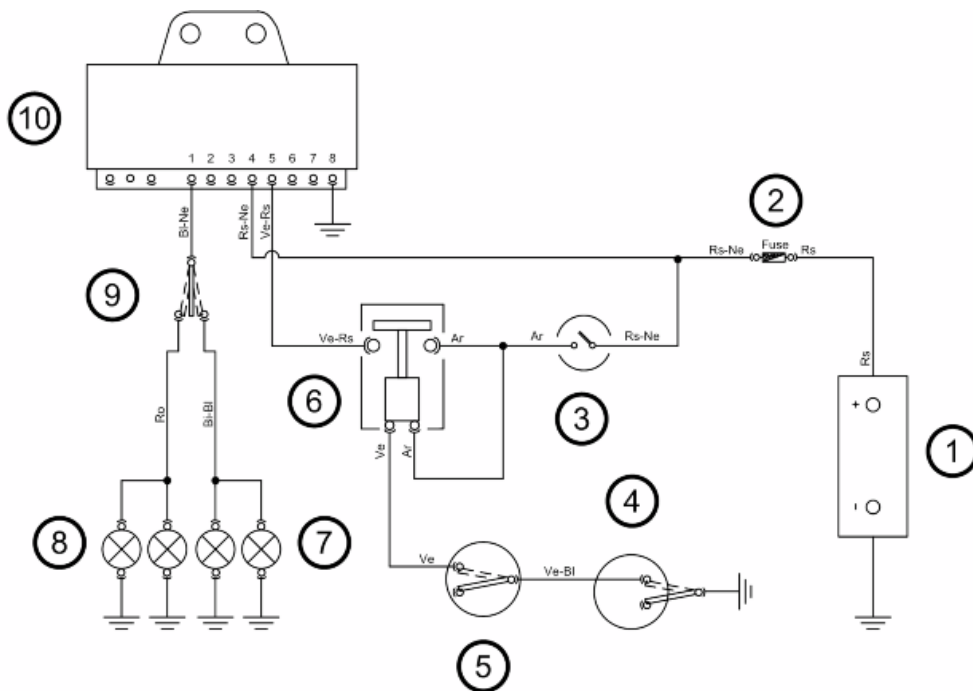
If there is voltage, check again the ignition control unit connector.

After disconnecting the starter, start up the engine and keep it at idle speed; then check whether there is voltage connecting the multimeter positive lead to terminal No. 5 (Green-Red), and the negative one to terminal No. 7 (White-Black) (see figure).

If there is no voltage, replace the control unit after making sure that the fuses are not blown; otherwise, check the cable harness between the starter and the control unit and, as a last resource, replace the starter.



Turn signals system check



KEY

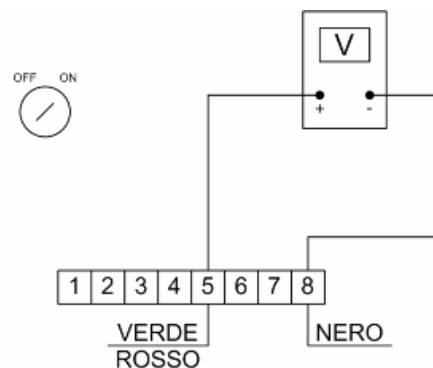
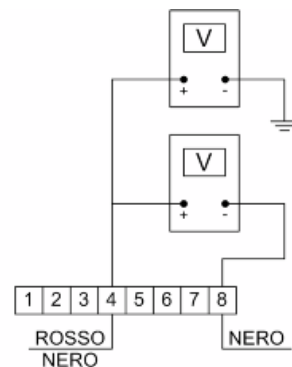
1. Battery
2. Fuse No. 7
3. Key switch contacts
4. Stand switch
5. Engine stop switch
6. Engine stop remote control
7. Right turn indicator bulbs
8. Left turn indicator bulbs
9. Turn indicator switch
10. Electronic ignition device

WARNING

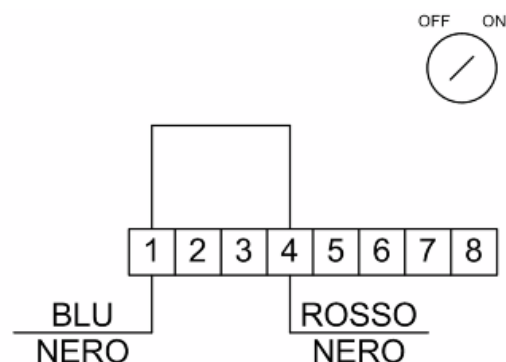
ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

If turn indicators do not work:

- 1) Check that bulbs operate properly.
- 2) Disconnect the control unit connector and check if there is voltage between:
 - terminal No. 4 and ground lead.
 - terminal No. 4 and No. 8
 - terminal No. 5 and No. 8 with the key switch set to «ON», side stand up and engine stop switch set to «RUN».
- 3) If no voltage is detected, check the fuse No. 7, the engine stop remote control, the key switch contacts, engine stop switch and stand switch.
- 4) If the components are not damaged, check wiring for continuity.



- 5) Jump terminals No. 1 and No. 4 and turn the turn indicator switch alternately to the left and to the right and check if the lights turn on.
- 6) If they do not turn on, check the turn indicator switch contacts and wiring continuity.



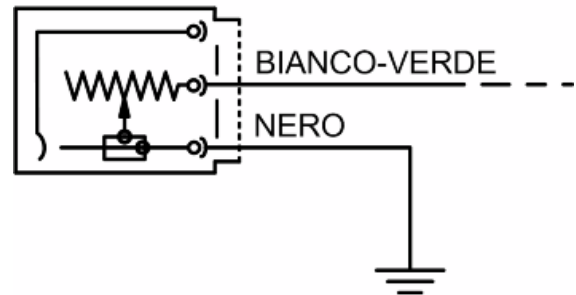
level indicators

WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

If faults are detected:

- 1) With a multimeter, check resistance values between the White-Green cable and the Black cable of the fuel level transmitter by moving the arm with the float.
- 2) If the transmitter operates correctly but the indication on the instrument panel is not exact, check that the cable harnesses between them are not interrupted.



Electric characteristic

Resistance value when the tank is full

$\leq 7 \Omega$

Resistance value when the tank is empty

$90 +13/-3 \Omega$

Lights list

LIST OF BULBS

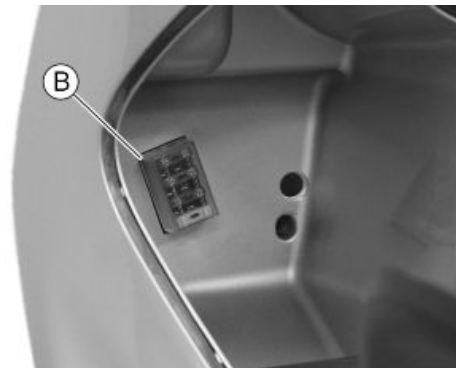
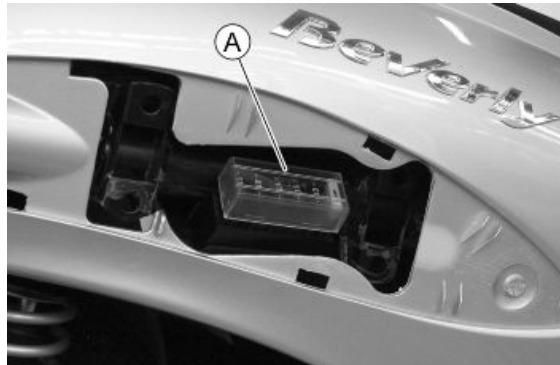
	Specification	Desc./Quantity
1	High-/low-beam bulb	Type: Halogen (H4) Quantity: 1 Power: 12V - 55/60W
2	Front tail light bulb	Type: Incandescent (W 2.1 x 9.5 d) Quantity: 1 Power: 12V - 5W
3	Front turn indicator bulbs	Type: Incandescent (BAU 15 S) Quantity: 2 Power: 12V - 10W
4	Rear turn indicator bulbs	Type: Incandescent (BAU 15 S) Quantity: 2 Power: 12V - 10W
5	Rear tail light bulb	Type: Incandescent (W 2.1 x 9.5 d) Quantity: 1 Power: 12V - 3W
6	Stop light bulb	Type: Incandescent (BAU 15 S) Quantity: 1 Power: 12V - 10W
7	Instrument panel light bulbs	Type: Incandescent (W2 x 4.6 d) Quantity: 1 Power: 12V - 1.2W
8	Helmet compartment light bulb	Type: Incandescent (SV 8.5) Quantity: 1 Power: 12V - 5W
9	License plate light bulb	Type: Incandescent (W2.1 x 9.5 d) Quantity: 1 Power: 12V - 5W

Fuses

The electrical system is equipped with:

1. Four protection fuses «A» plus two fuses not used located inside the right side fairing;
2. Four protection fuses «B» located inside the glove-box on the left upper part of the compartment.

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



CAUTION

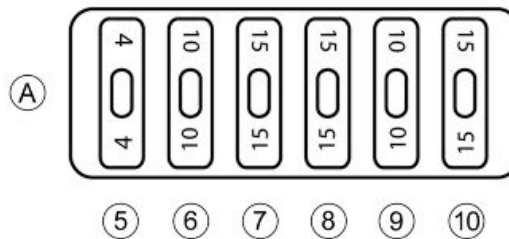
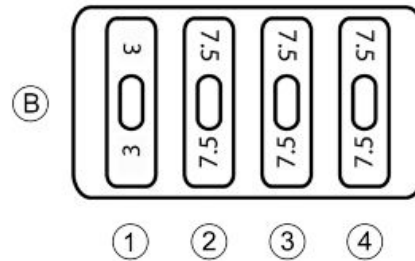


BEFORE REPLACING A BLOWN FUSE, FIND AND SOLVE THE FAILURE THAT CAUSED IT TO BLOW. NEVER TRY TO REPLACE THE FUSE WITH ANY OTHER MATERIAL (E.G., A PIECE OF ELECTRIC WIRE).

CAUTION



MODIFICATIONS OR REPAIRS TO THE ELECTRICAL SYSTEM, PERFORMED INCORRECTLY OR WITHOUT STRICT ATTENTION TO THE TECHNICAL SPECIFICATIONS OF THE SYSTEM, CAN CAUSE ERRORS IN FUNCTIONING AND RISK OF FIRE.



FUSES

	Specification	Desc./Quantity
1	Fuse No. 1	Capacity: 3A Protected circuits: Fuel electric pump control device.
2	Fuse No. 2	Fuse No. 2 Capacity: 7.5 A

	Specification	Desc./Quantity
3	Fuse No. 3	Protected circuits: Stop light, start-up circuit Fuse No. 3 Capacity: 7.5 A Protected circuits: Horn, high-beam light - "Passing" mode, instrument panel
4	Fuse No. 4	Fuse No. 4 Capacity: 7.5 A Protected circuits: Tail lights, license plate light, instrument panel lighting
5	Fuse No. 5	Fuse No. 5 Capacity: 4A Protected circuits: Immobilizer clock
6	Fuse No. 6	Fuse No. 6 Capacity: 10 A Protected circuits: High-beam light, low-beam light, fuse No. 4
7	Fuse No. 7	Fuse No. 7 Capacity: 15A Protected circuits: Battery recharge circuit, electric fan, electronic ignition device Live: Fuses 1-2-3, light remote control, starter, engine stop relay, immobilizer relay, start-up, electronic ignition device.
8	Fuse No. 8	Fuse No. 8 Capacity: 15A Protected circuits: Plug socket, helmet compartment light.

Sealed battery

If the vehicle is provided with a sealed battery, the only maintenance required is the check of its charge and recharging, if necessary.

These operations should be carried out before delivering the vehicle, and on a six-month basis while the vehicle is stored in open circuit.

Besides, upon pre-delivery it is therefore necessary to check the battery charge and recharge it, if required, before storing the vehicle and, afterwards, every six months.

INSTRUCTIONS FOR THE BATTERY REFRESH AFTER OPEN-CIRCUIT STORAGE

1) Voltage check

Before installing the battery on the vehicle, check the open circuit voltage with a regular tester.

- If voltage exceeds 12.60 V, the battery can be installed without any renewal recharge.
- If voltage is below 12.60 V, a renewal recharge is required as explained in 2).

2) Constant voltage battery charge mode

- Constant voltage charge equal to 14.40 ÷ 14.70V
- Initial charge voltage equal to 0.3 ÷ 0.5 for Nominal capacity
- Charge time:

10 to 12 h recommended

Minimum 6 h

Maximum 24 h

3) Constant current battery charge mode

- Charge current equal to 1/10 of the nominal capacity of the battery
- Charge time: 5 h

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.

CHARGE THE BATTERY BEFORE USE TO ENSURE OPTIMUM PERFORMANCE. INADEQUATE CHARGING OF THE BATTERY WITH A LOW ELECTROLYTE LEVEL BEFORE IT IS FIRST USED SHORTENS THE LIFE OF THE BATTERY.

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 THREE MONTHS. IF IT IS NECESSARY TO REFIT THE BATTERY IN THE VEHICLE, BE CAREFUL NOT TO REVERSE THE CONNECTIONS TAKING INTO ACCOUNT THAT THE GROUND WIRE (BLACK) MARKED (-) MUST BE CONNECTED TO THE - NEGATIVE TERMINAL WHILE THE OTHER TWO RED WIRES MARKED (+) MUST BE CONNECTED TO THE TERMINAL MARKED WITH THE + POSITIVE SIGN

WARNING

WHEN THE BATTERY IS REALLY FLAT (WELL BELOW 12.6V) IT MIGHT OCCUR THAT 5 HOURS OF RECHARGING ARE NOT ENOUGH TO ACHIEVE OPTIMAL PERFORMANCE.

GIVEN THESE CONDITIONS IT IS HOWEVER ESSENTIAL NOT TO EXCEED 8 HOURS OF CONTINUOUS RECHARGING SO AS NOT TO DAMAGE THE BATTERY ITSELF.

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

Normal bench charging must be performed using the specific battery charger, setting the selector to the type of battery that requires 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 -).

Dry-charge battery

WARNING

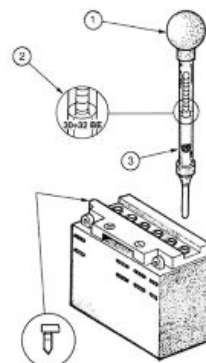
THE BATTERY ELECTROLYTE IS POISONOUS AS IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH THE EYES, THE SKIN AND CLOTHING. IF COMING INTO CONTACT WITH EYES OR SKIN, WASH ABUNDANTLY WITH WATER FOR APPROX. 15 MIN. AND SEEK IMMEDIATE MEDICAL ATTENTION.

IN THE EVENT OF ACCIDENTAL INGESTION OF THE LIQUID, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR MILK, MAGNESIUM MILK, BATTERED EGG OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.

THE BATTERIES PRODUCE EXPLOSIVE GAS; KEEP CLEAR OF NAKED FLAMES, SPARKS OR CIGARETTES; VENTILATE THE AREA WHEN RECHARGING INDOORS.

ALWAYS WEAR EYE PROTECTION WHEN WORKING IN THE PROXIMITY OF BATTERIES. KEEP OUT OF REACH OF CHILDREN

- Remove the short closed tube and the caps, then pour sulphuric acid into the cells using the type specified for batteries with a specific gravity of 1.26, corresponding to 30 Bé at a minimum temperature of 15°C until the upper level is reached.
- Allow to stand for at least 2 hours, then top up the level with sulphuric acid.



- Within 24 hours, recharge using the special battery charger (single) or (multiple) at an intensity of about 1/10 of the battery nominal capacity and until the acid gravity is about 1.27, corresponding to 31 Bé and such values become steady.
- After charging, top up the acid (adding **distilled water**). Close and clean carefully.
- After carrying out the operations above, install the battery on the scooter, observing the connections described in point 3) of paragraph "**Battery recharge**".

1 Keep the pipe in vertical position

2 Inspect visually

3 The float must be freed

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.

Charging status check

After topping-up the electrolyte level, check its density using special density gauge.

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. When refitting the battery onto the scooter pay attention not to invert the cables, bearing in mind that the earth (**black**) wire marked with a (-) must be connected to the **negative** terminal whilst the other two **red** wires, marked with a (+) must be attached to the **positive**, + terminal.

Battery recharge

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE PLUGS OF EACH CELL. KEEP SPARKS AND NAKED FLAMES AWAY FROM THE BATTERY WHILE RECHARGING.

Remove the battery from the vehicle removing the negative clamp first.

Normal bench charging must be performed using the special battery charger (single) or (multiple), setting the battery charge selector to the type of battery that requires 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 -).

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 THE RECOMMENDED CAPACITY. USING A FUSE OF UNSUITABLE RATING MAY SERIOUSLY DAMAGE THE VEHICLE OR EVEN CAUSE A FIRE.

CAUTION

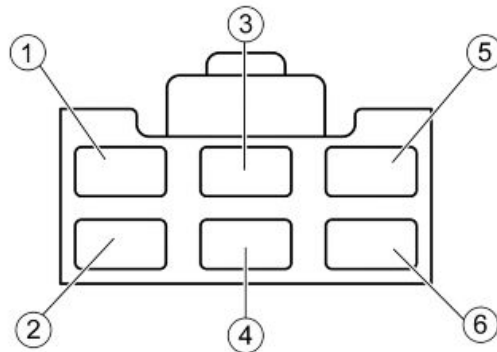
ORDINARY AND DRINKING WATER CONTAINS MINERAL SALTS THAT ARE HARMFUL FOR THE BATTERY. FOR THIS REASON, YOU MUST ONLY USE DISTILLED WATER.

CAUTION

CHARGE THE BATTERY BEFORE USE TO ENSURE OPTIMUM PERFORMANCE. FAILURE TO CHARGE THE BATTERY ADEQUATELY BEFORE BEING PUT INTO OPERATION WILL LEAD TO A PREMATURE FAILURE OF THE BATTERY.

Pump electrics check

Connect the tester positive probe to pin 4 of the connector of the fuel pump control device, and the negative probe to pin 3, making sure there is battery voltage as indicated in the table.



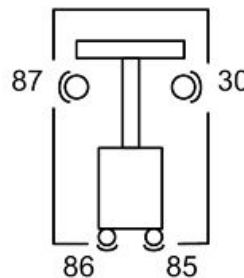
PUMP SUPPLY

Specification	Desc./Quantity
Key set to «KEY ON»	Supply to the pump for 13 seconds
Engine revs from 0 to 200 rpm	Always «OFF»
Engine revs from 200 to 1200 rpm	Always «ON»
Engine revs from 1200 to 2000 rpm	0.2 seconds «ON» 9 seconds «OFF»
Engine rpm] 2000 r.p.m.	Always «ON»

Remote controls check

To check the operation of a remote control:

- 1) Check that, given regular conditions, there is no continuity between terminals 87 and 30.
- 2) Apply a 12V voltage to power terminals 86 and 85 of the remote control.
- 3) With the remote control fed, check that there is continuity between terminals 87 and 30.



4) If these conditions are not met, the remote control is surely damaged and, therefore, it should be replaced.

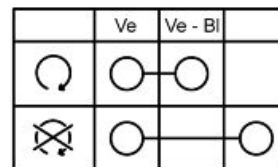
Switches check

To check buttons and switches, check that, according to their position, the continuity of contacts is correct as indicated in the following charts.

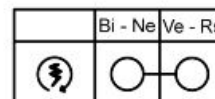
KEY

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

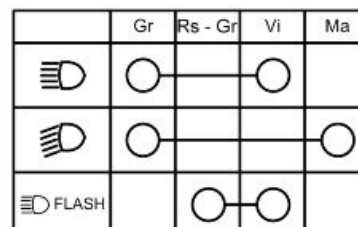
ENGINE STOP SWITCH



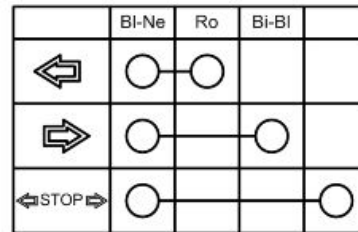
STARTER BUTTON



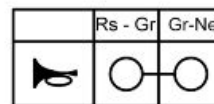
LIGHT SWITCH



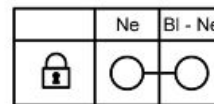
TURN INDICATOR SWITCH



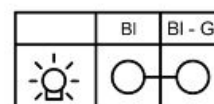
HORN BUTTON



BUTTON FOR SADDLE ELECTRIC OPENING



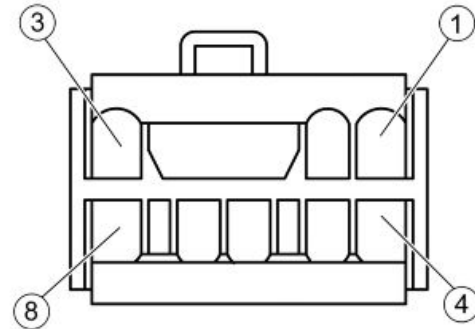
HELMET COMPARTMENT LIGHT SWITCH



Connectors

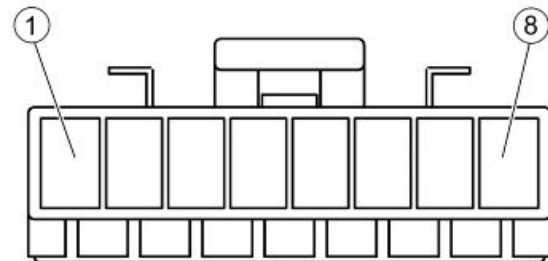
ELECTRONIC IGNITION DEVICE CONNECTOR

1. Turn indicator switch (Blue-Black)
2. Pick-up (Green)
3. HV coil (Purple)
4. Battery powered (Red-Black)
5. Live power supply (Green-Red)
6. Immobilizer LED (Yellow)
7. Automatic starter (White-Black)
8. Ground (Black)



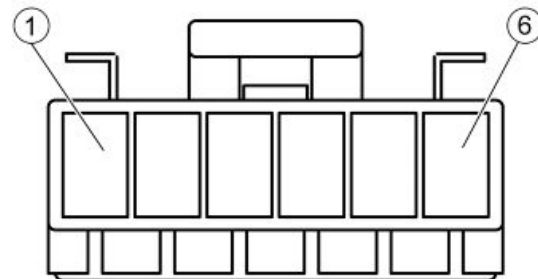
INSTRUMENT PANEL CONNECTOR «A»

1. Left turn indicator warning light (Pink)
2. Immobilizer (Yellow)
3. Battery powered (Red-Blue)
4. Coolant temperature gauge (Pink-Yellow)
5. Not connected
6. Fuel level transmitter (White-Green)
7. Right turn indicator warning light (White-Blue)
8. Low fuel warning light (Yellow-Green)



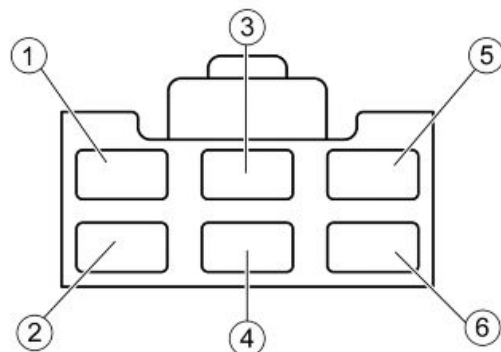
INSTRUMENT PANEL CONNECTOR «B»

1. High-beam warning light (Purple)
2. Ground (Black)
3. Oil pressure warning light (Brown)
4. Not connected
5. Live power supply (Red-Grey)
6. Instrument panel lighting (Yellow-Black)



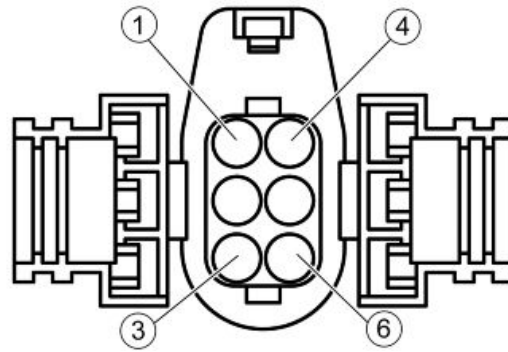
VOLTAGE REGULATOR CONNECTOR

1. +Battery (Red-Black)
2. Magneto flywheel (Yellow)
3. Not connected
4. Magneto flywheel (Yellow)
5. Ground (Black)
6. Magneto flywheel (Yellow)



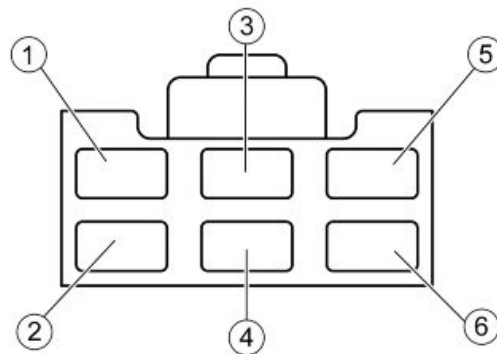
MAGNETO FLYWHEEL - PICK-UP CONNECTOR

1. Voltage regulator (Yellow)
2. Not connected
3. Voltage regulator (Yellow)
4. Oil pressure sensor (Brown)
5. Voltage regulator (Yellow)
6. Pick-up (Green)



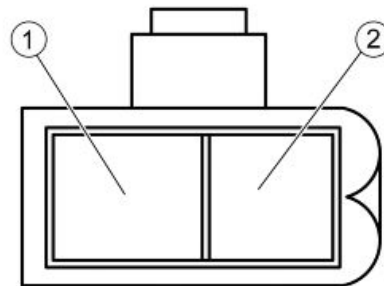
FUEL ELECTRIC PUMP CONTROL DEVICE CONNECTOR

1. Live power supply (Orange-Blue)
2. Not connected
3. Electric fuel pump negative (White-Black)
4. Electric fuel pump positive (Blue-Black)
5. Ground (Black)
6. Electronic ignition device (Purple)



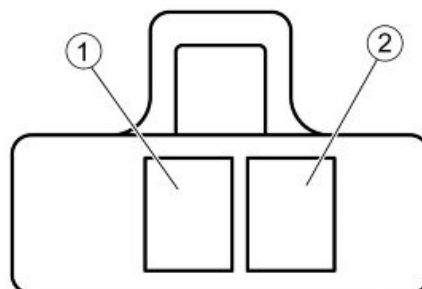
FUEL ELECTRIC PUMP CONNECTOR

1. Fuel electric pump control device negative (White-Black)
2. Fuel electric pump control device positive (Blue-Black)



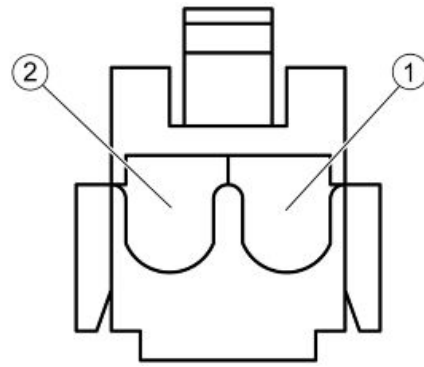
AUTOMATIC STARTER CONNECTOR

1. Live power supply (Orange)
2. Electronic ignition device negative (White-Black)



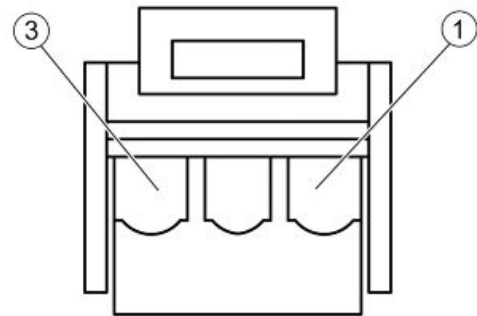
ELECTRIC FAN CONNECTOR

- 1. Thermoswitch (Green)
- 2. Battery powered (Red-Black)



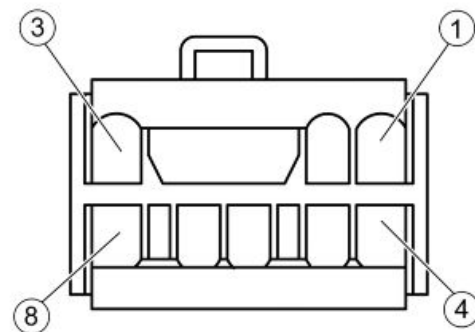
FUEL LEVEL TRANSMITTER CONNECTOR

- 1. Fuel level indicator (White-Green)
- 2. Ground (Black)
- 3. Low fuel warning light (Yellow-Green)



ANTITHEFT DEVICE PRE-INSTALLATION CONNECTOR

- 1. LHS Turn indicator bulbs (Pink)
- 2. RHS Turn indicator bulbs (White-Blue)
- 3. Ground (Black)
- 4. Battery powered (Red-Blue)
- 5. Live power supply (Red-Grey)
- 6. Helmet compartment light (Blue-Yellow)
- 7. Not connected
- 8. Not connected



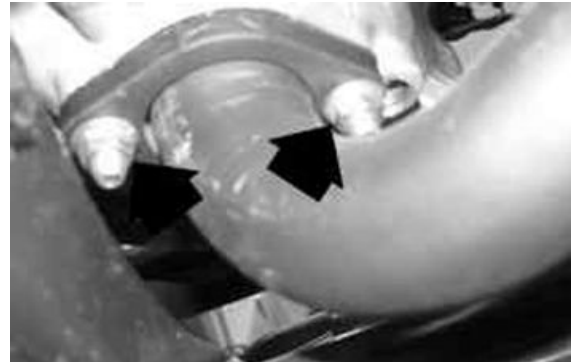
INDEX OF TOPICS

ENGINE FROM VEHICLE

ENG VE

Exhaust assy. Removal

- Undo the two exhaust manifold fixings on the head.



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



To refit, carry out the removal operations in reverse order, observing the prescribed tightening torques.

Locking torques (N*m)

Nuts fixing muffler to support arm 27 ÷ 30 Nut fixing muffler to cylinder head 16 ÷ 18

Removal of the engine from the vehicle

CAUTION



SUPPORT THE SCOOTER ADEQUATELY.

CAUTION

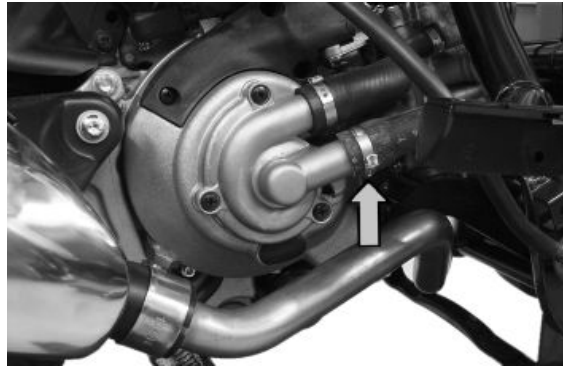


CARRY OUT THESE OPERATIONS WHEN THE ENGINE IS COLD.

WARNING

BE VERY CAREFUL WHEN HANDLING FUEL.

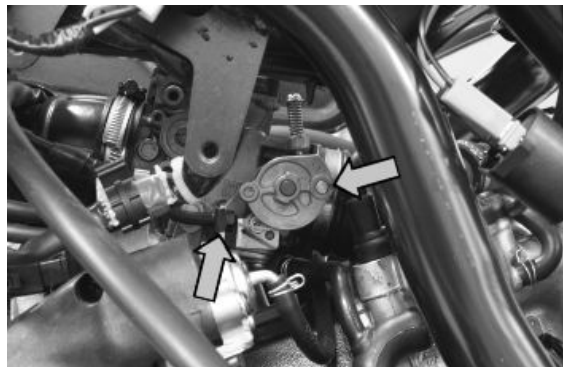
- Disconnect the battery.
- Remove the saddle, the side fairings and the footrests.
- Get a container of suitable capacity, remove the intake pipes and drain off the cooling system.



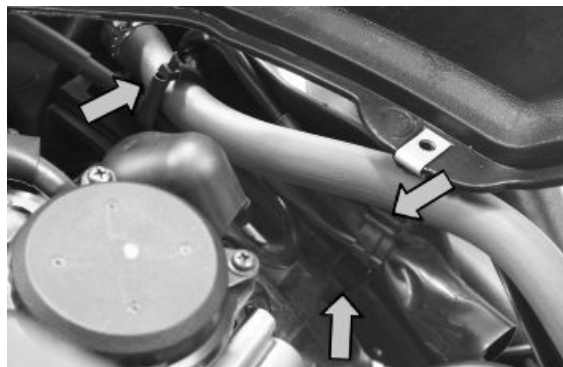
- Remove the rear wheel.
- Remove the left shock absorber lower retainer.
- Remove the rear brake calliper, release the pipes from the four retainers on the engine crankcase.



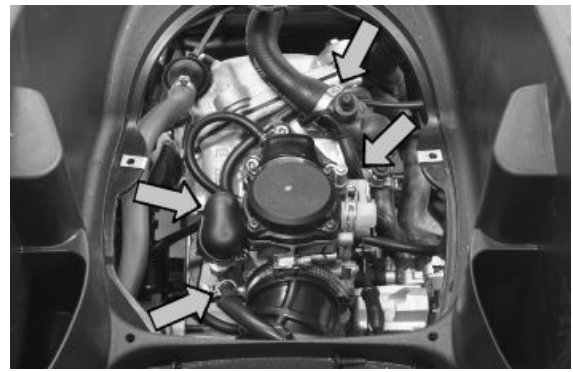
- Remove the throttle control transmission from the carburettor.



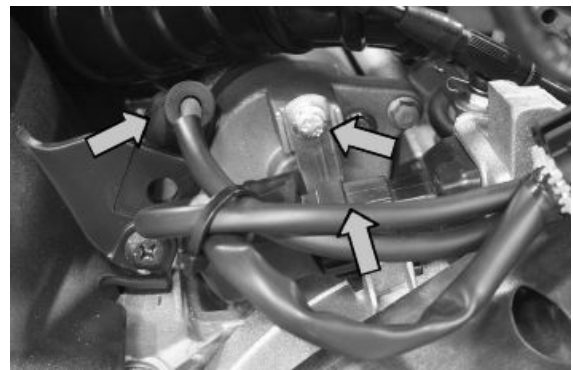
- Remove the indicated retainer clamp.
- Release the throttle control transmission and the start-up pick-up connection from the cable guide clamps.



- Disconnect the coolant outlet pipes, remove the start-up pick-up, the fuel pipes, the retainer clamp and the thermistor connector.



- Disconnect the starter motor and the generator connector connections.



- Disconnect the spark plug HV wire.
- Remove the engine earthing.



- Unscrew the nut fixing the engine-side swinging arm bolt.



-
- Remove the engine-side swinging arm bolt.
 - The engine is now free.



- When refitting the engine on the scooter, carry out the removal operations but in reverse order and respect the locking torques indicated in the Characteristics Chapter.
- 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. CHECK THAT THERE IS A SMALL CLEARANCE WHEN THE VALVE IS IN ABUTMENT AGAINST THE SET SCREW.

INDEX OF TOPICS

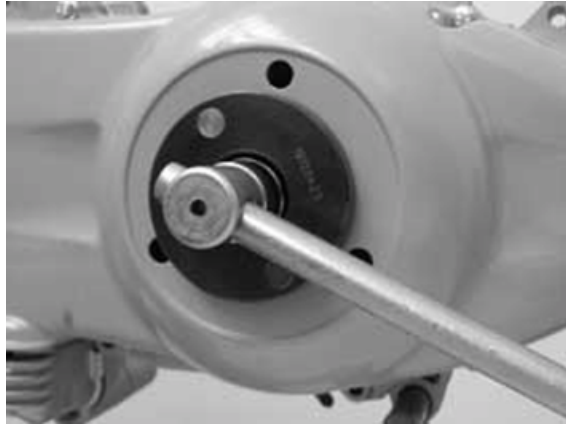
ENGINE

ENG

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

- Remove the 4 screws and the housing.



Removing the driven pulley shaft bearing

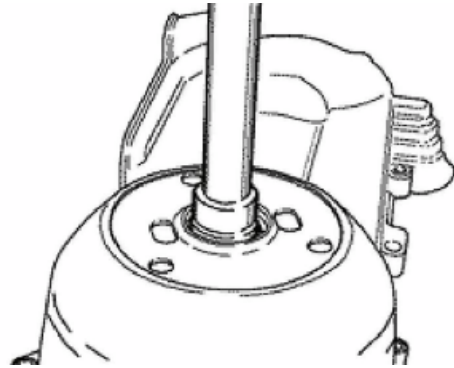
- Remove the clip from the inside of the cover.
- Remove the bearing from the crankcase by means of:

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020412Y 15 mm guide



Refitting the driven pulley shaft bearing

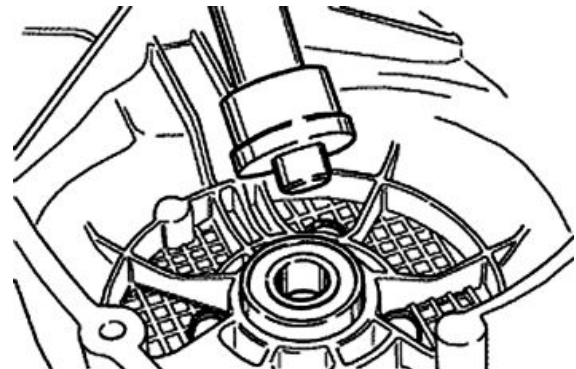
- Slightly heat the crankcase from the inside so as not to damage the painted surface.
- Insert the bearing in its seat.
- Refit the seeger ring.

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

Removal

Belt support roller (200 cm³ 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 a the fan housing.

Locking torques (N*m)

Anti-flapping roller 12 - 16



Plastic roller

- Check that the roller does not show signs of wear and that it turns freely.
- Remove the special clamping screws as indicated in the photograph



- Check the outside diameter of the roller does not have defects that could jeopardise belt functioning
- For refitting, place the roller with the belt containment edge on the engine crankcase side
- Tighten the wrench to the prescribed torque.

Locking torques (N*m)

Anti-flapping roller 12 - 16

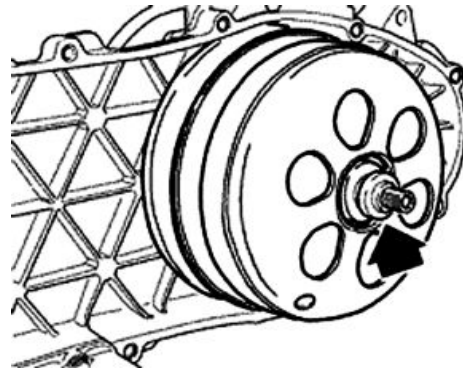


Removing the driven pulley

- 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.

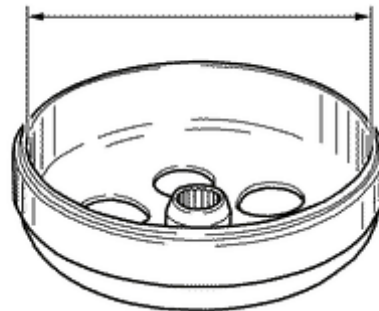
Characteristic

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

Removing the clutch

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



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.

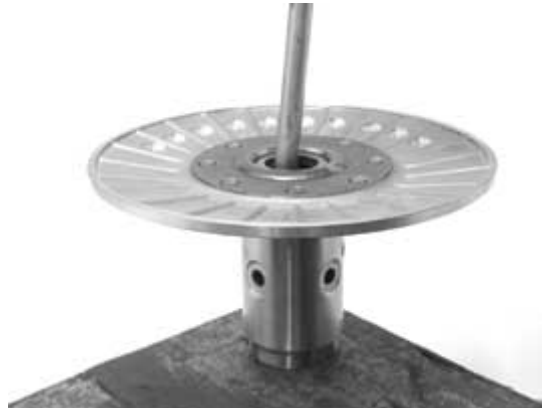


- Remove the four torque server pins and pull the pulley halves apart.



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

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

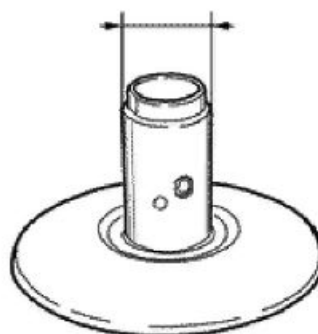
Characteristic

Half-pulley standard diameter

Standard diameter: Ø 40.985 mm

Half-pulley minimum diameter

Minimum admissible diameter Ø 40.96 mm



Inspecting the driven sliding half-pulley

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

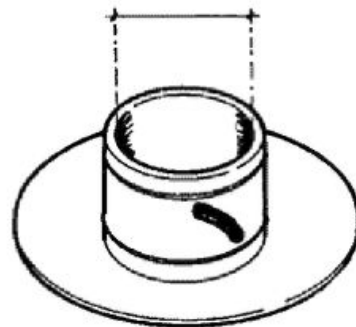
Characteristic

Movable driven half-pulley max. diameter

Max. diameter admitted: Ø 41.08 mm

Movable driven half-pulley standard diameter

Standard diameter: Ø 41.000 ÷ 41.035 mm



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.



- 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 length of the spring, while it is relaxed.

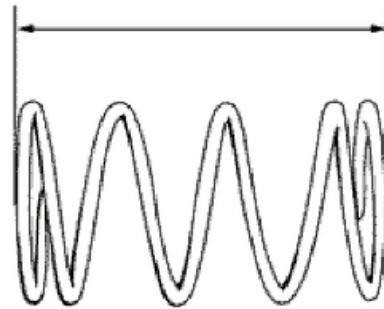
Characteristic

Standard length

106 mm

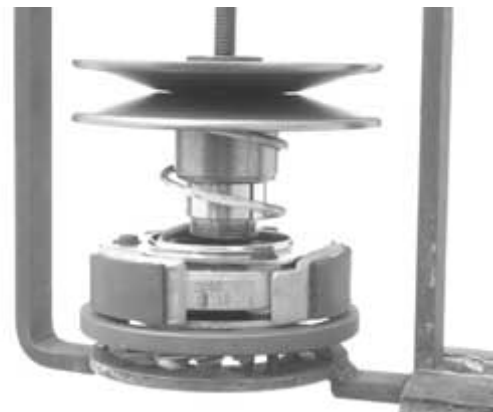
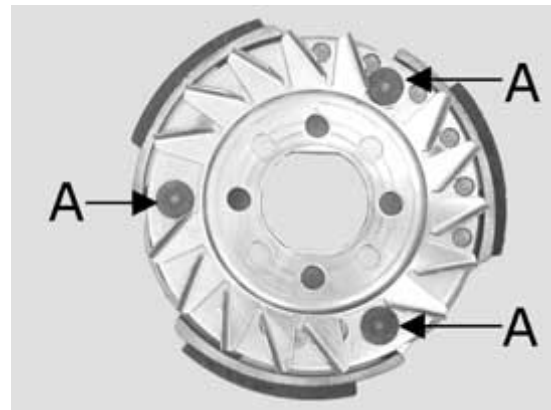
acceptable limit after use:

101 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 «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

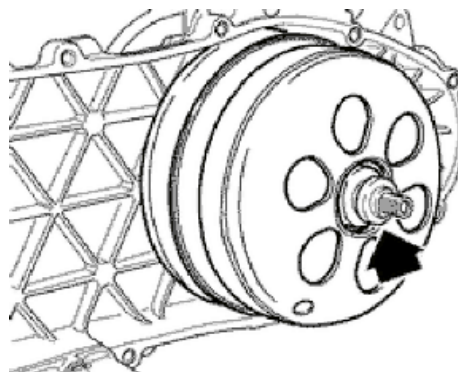
020444Y009 46x55 Wrench

Locking torques (N*m)

Clutch unit nut on driven pulley 55 ÷ 60

Refitting the driven pulley

- Reassemble the clutch bell and spacer.



Drive-belt

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

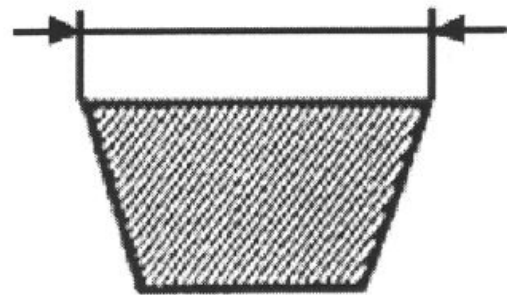
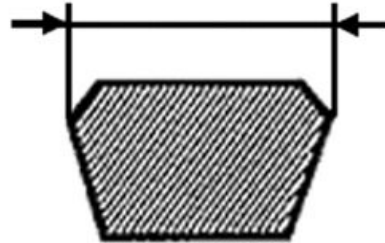
Characteristic

Driving belt - minimum width:

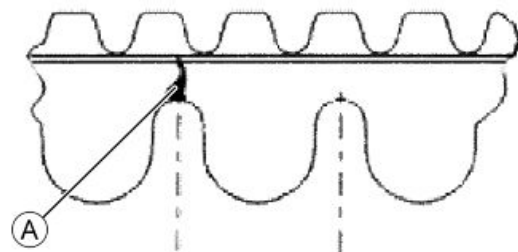
21.5 mm

Driving belt - standard width:

22.5 ± 0.2 mm



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.



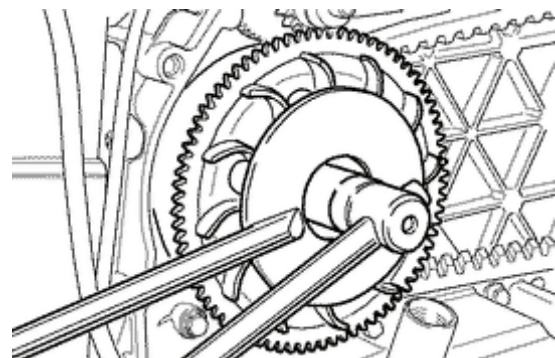
Removing the driving pulley

- 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.

Specific tools:

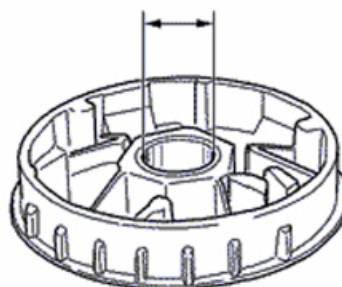
Specific tooling

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 outer diameter B of the pulley sliding bushing 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

Movable driving half-pulley bushing: Standard Diameter

26.000 - 26.021 mm

Movable driving half-pulley bushing: Maximum allowable diameter

Ø 26.12 mm

Sliding bushing: Standard Diameter

Ø 25.959 ÷ 25.98 mm

Sliding bushing: Minimum admissible diameter

Ø 25.95 mm

Roller: Standard Diameter

Ø 18.9 ÷ 19.1 mm

Roller: Minimum diameter permitted

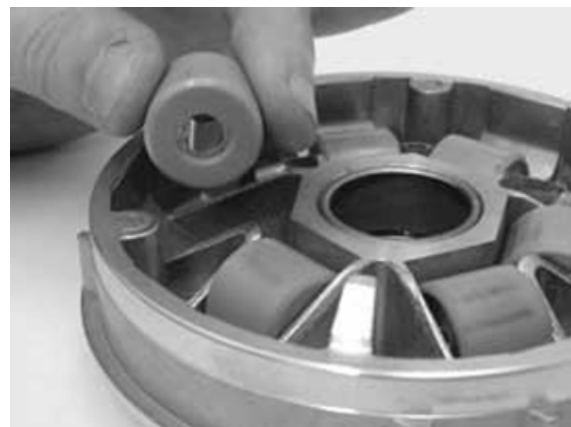
Ø 18.5 mm



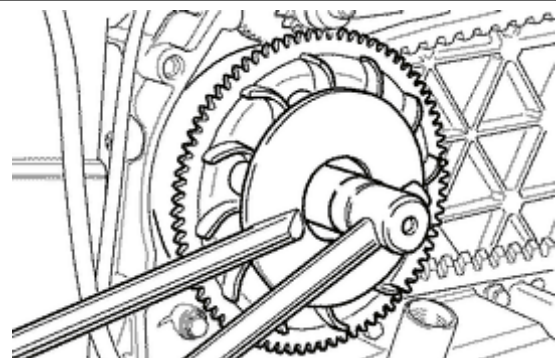


Refitting the driving pulley

- 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.



- 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

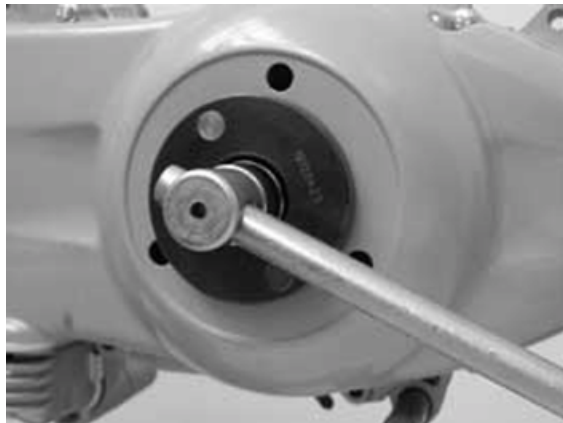
020368Y driving pulley lock wrench

Locking torques (N*m)

Drive pulley nut 75 ÷ 83

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

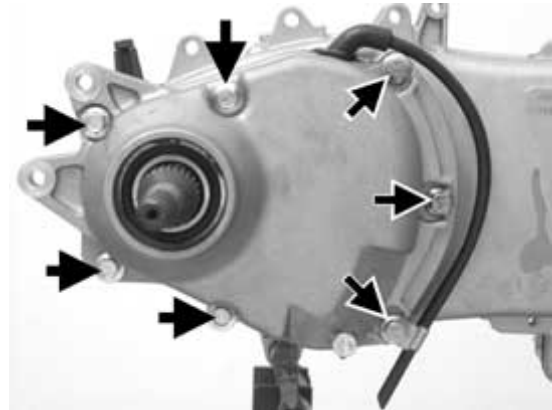
Locking torques (N*m)

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

End gear

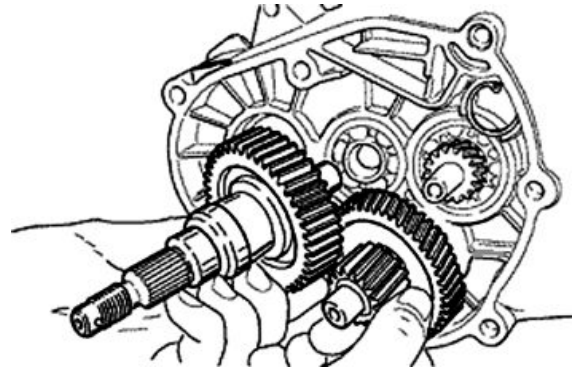
Removing the hub cover

- 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.

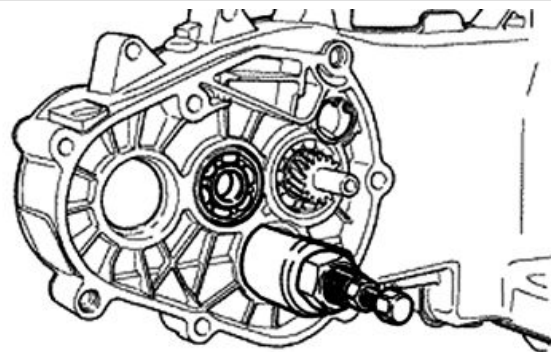


Removing the hub bearings

- 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

- Take out the clip on the outside of the gearbox cover.
 - Support the hub cover and expel the bearing.
- By means of the appropriate tools, remove the oil guard as in the figure.

Specific tooling

020376Y Adaptor handle

020477Y Adaptor 37 mm

020483Y 30 mm guide

020359Y 42x47-mm adaptor

020489Y Hub cover support stud bolt set



Removing the driven pulley shaft bearing

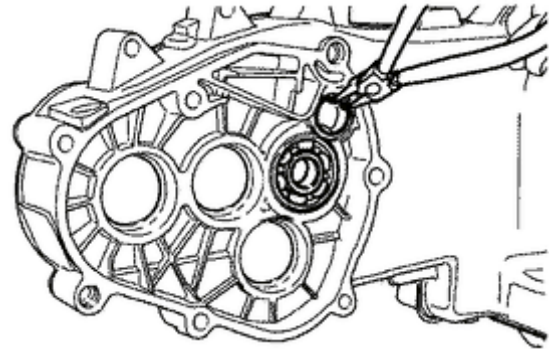
- As you need to remove the driven pulley shaft, its bearing and oil guard, remove the transmission cover as described above.
- Extract the driven pulley shaft from its bearing.
- Remove the oil guard using a screwdriver, working from inside the bearing and being careful not to damage the housing, make it come out of the belt transmission side.
- Remove the seeger ring shown in the figure
- Remove the driven pulley shaft bearing using the modular punch.

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020363Y 20 mm guide



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 crankcase cover with the specific heat gun.
- Fit the wheel shaft bearing with a modular punch as shown in the figure.
- Fit 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.

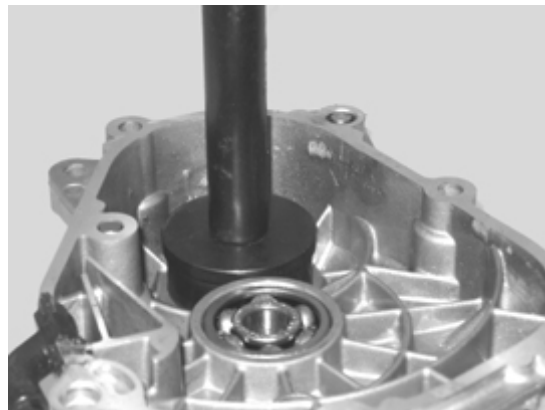
The 52 mm side of the adapter must be turned towards the bearing.

Specific tooling

020376Y Adaptor handle

020360Y Adaptor 52 x 55 mm

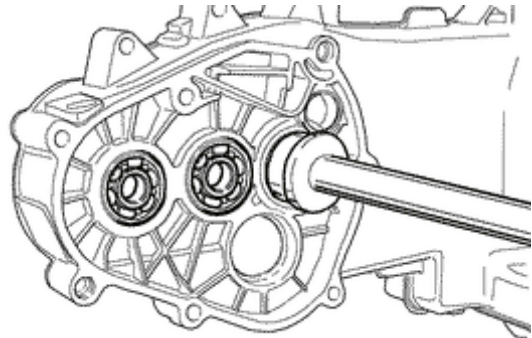
020483Y 30 mm guide



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 adaptor 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



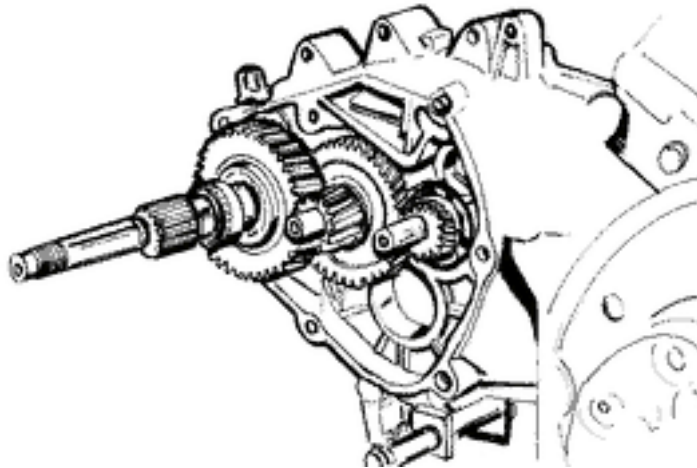
N.B.

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.

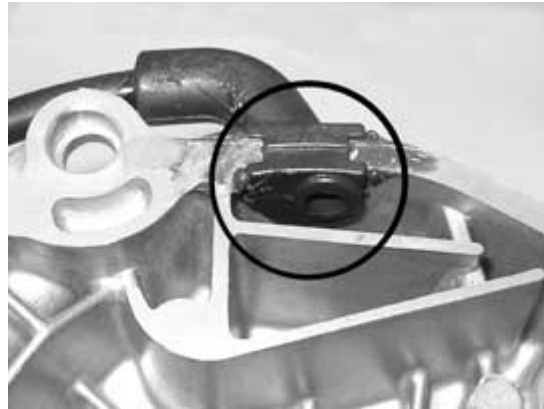
Refitting the hub bearings

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



Refitting the ub 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)

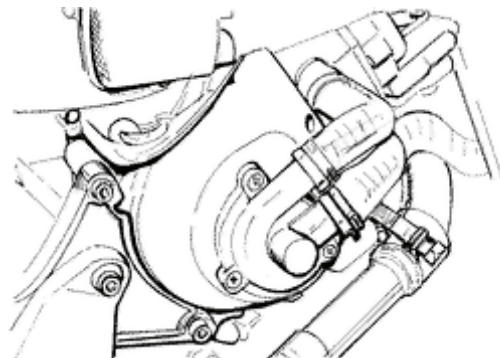
Rear hub cover screws 24 ÷ 27



Flywheel cover

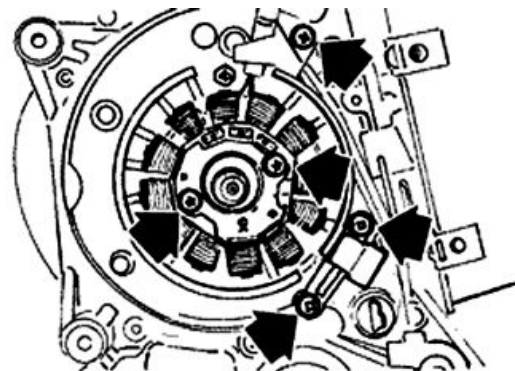
Removing the hub cover

- 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

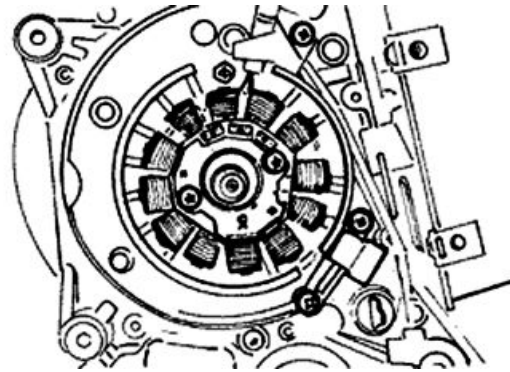
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the specified torque.
- Place the cable harness as shown in the figure.
- Stator screws and Pick-Up

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



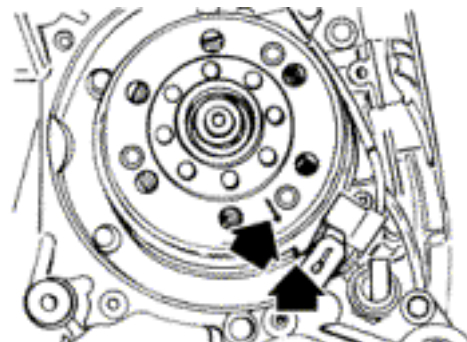
Refitting the flywheel cover

- 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

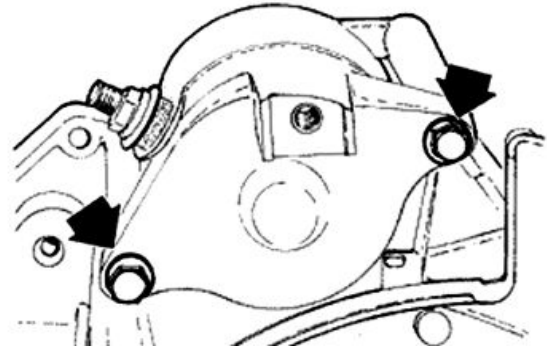
TAKE CARE TO CORRECTLY POSITION THE FLYWHEEL CONNECTOR. MAKE SURE THE CENTRING DOWELS ARE PRESENT.



Flywheel and starting

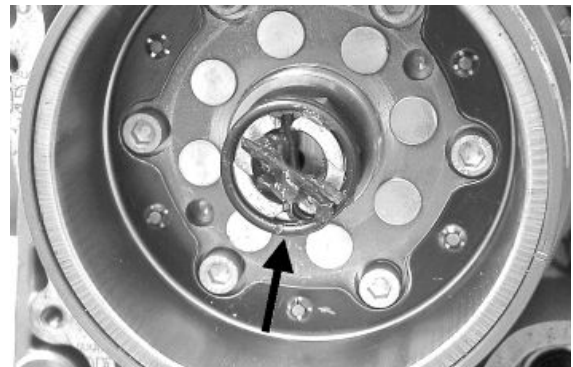
Removing the starter motor

- Remove the two screws indicated in the figure.
- Take the starter motor out of its seat



Removing the flywheel magneto

- Remove the water pump shaft and crankshaft spline clip



- Line up the two holes in the flywheel as shown in the photo



- Screw in the guide bushing that is part of the special flywheel stop tool on the flywheel as shown in the photo.



- Insert the special flywheel stop tool on the flywheel as shown in the photo

Specific tooling

020627Y Flywheel lock wrench



- Remove the flywheel nut with its washer
- Do up the flywheel nut by three or four threads so that the flywheel does not fall accidentally on extraction
- Screw the extractor onto the flywheel and extract it as shown in the photograph

Specific tooling

020467Y Flywheel extractor



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

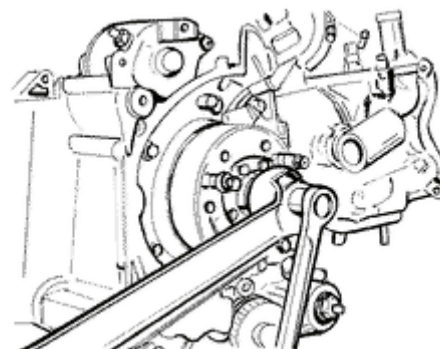
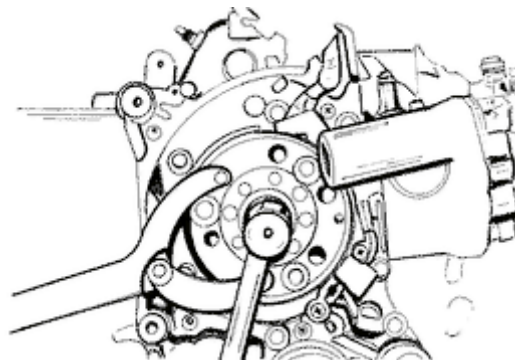
CAUTION

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

Specific tooling

020565Y Flywheel lock calliper spanner

008564Y Flywheel extractor



Inspecting the flywheel components

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

Refitting the free wheel

- Make sure the freewheel faying surfaces are in good condition.
- Thoroughly clean the free wheel to remove LOCTITE residue.
- Degrease the threading of the holes in the free wheel and the clamping screws.
- Apply the recommended product to the end of the screws.

Recommended products

Loctite 243 Medium strength threadlock

Loctite 243 medium-strength threadlock

- Fit the freewheel on the magneto flywheel making sure that the ground side is in contact with the flywheel itself, i.e. with wheel seeger ring visible.
- Lock the six clamping screws in criss-cross fashion to the prescribed torque.



Locking torques (N*m)

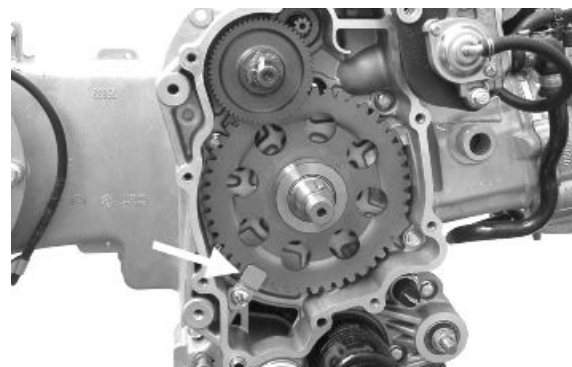
Screw fixing freewheel to flywheel 13 ÷ 15

- Oil the free wheel "rollers".



Refitting the flywheel magneto

- Remove the freewheel retaining plate indicated in the photograph
- Remove the transmission gear and the freewheel



- Insert the free wheel on the flywheel as shown in the photo
- Then refit the flywheel with free wheel and transmission gear



- Using the special flywheel stop tool, tighten up the flywheel fixing nut to the prescribed torque
- Refit the retention plate



Specific tooling

020627Y Flywheel lock wrench

Locking torques (N*m)

Flywheel nut 94 ÷ 102

- 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 ÷ 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.

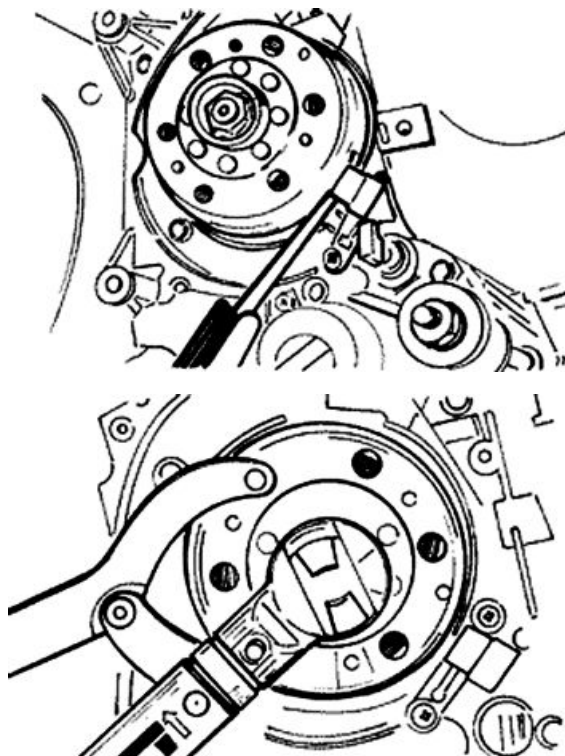
A VARIATION IN THE AIR GAP DISTANCE MODIFIES THE IGNITION SYSTEM IDLE SPEED

Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Flywheel nut 54 ÷ 60

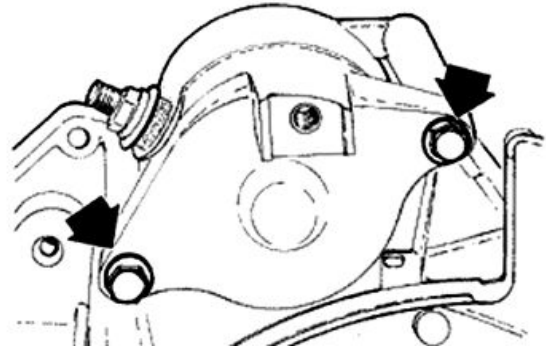


Refitting the starter motor

- 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 $11 \div 13$



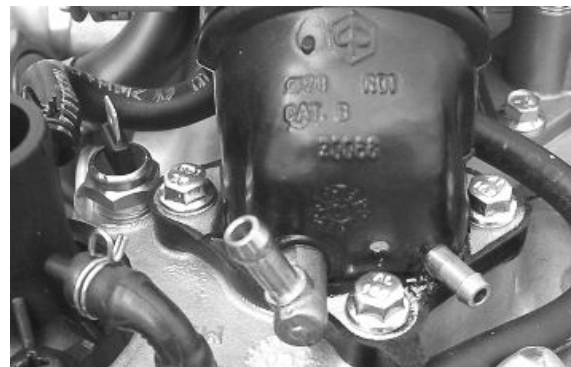
Cylinder assy. and timing system

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.

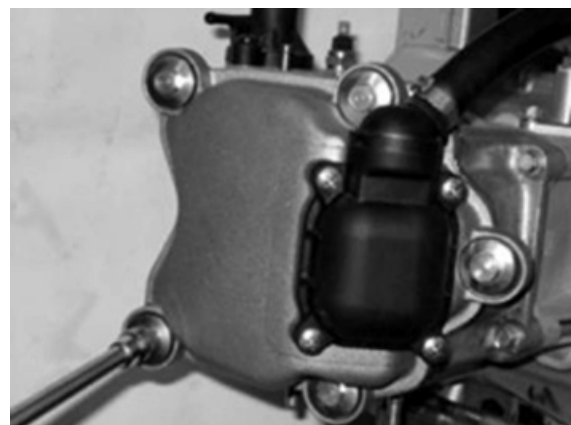
N.B.

TAMPERPROOF SCREWS ARE SUPPLIED WITH 125 CC MODELS.



Removing the rocker-arms cover

- Remove the 5 screws indicated in the figure



Removing the timing system drive

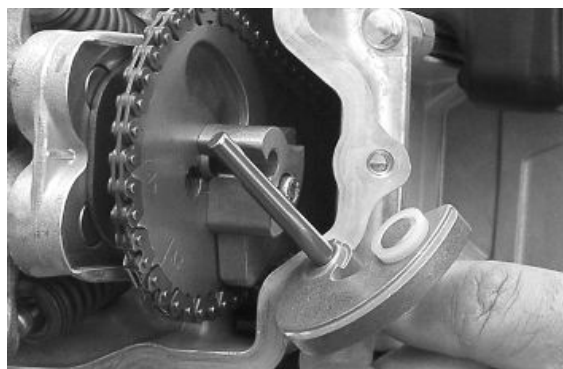
- Remove the parts listed below first: transmission cover, drive pulley with belt, oil sump with spring and by-pass piston, oil pump pulley cover, O-ring on the crankshaft and the sprocket wheel separation washer.

- Remove the tappet cover.

- Remove the central screw fastener and the automatic valve-lifter retaining cover, as shown in the figure.



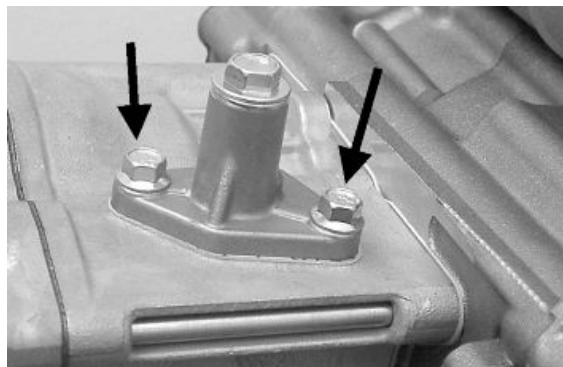
- Remove the return spring of the automatic valve lifter unit and the automatic valve lifter unit and its end of stroke washer.



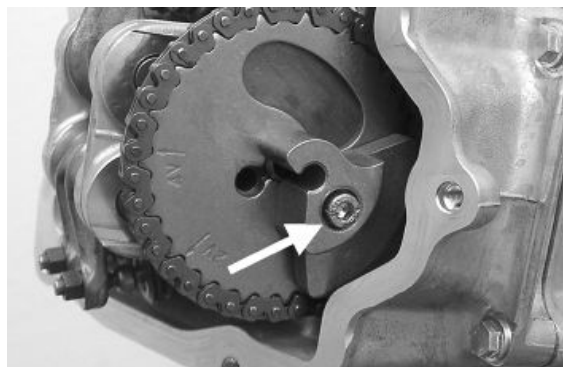
- Loosen the central screw on the tensioner first.

- 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.

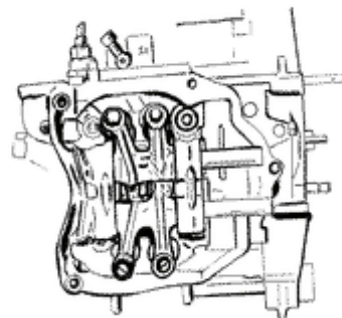
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

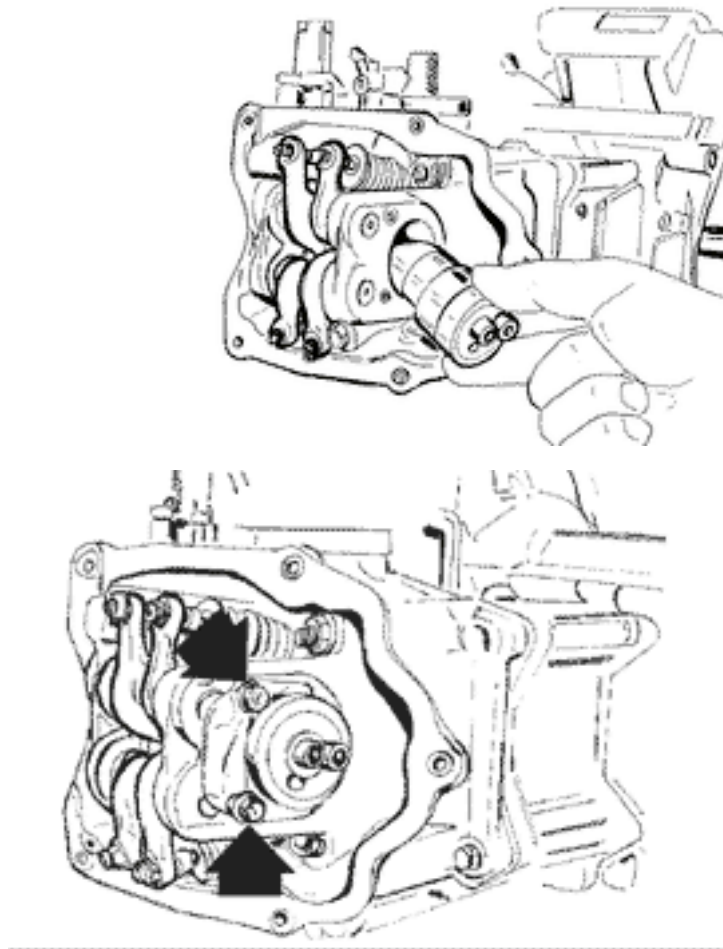
Removing the cam shaft

- 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.



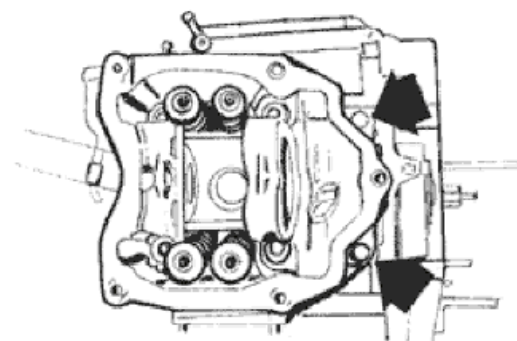


Removing the cylinder head

- 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



Removing the cylinder - piston assy.

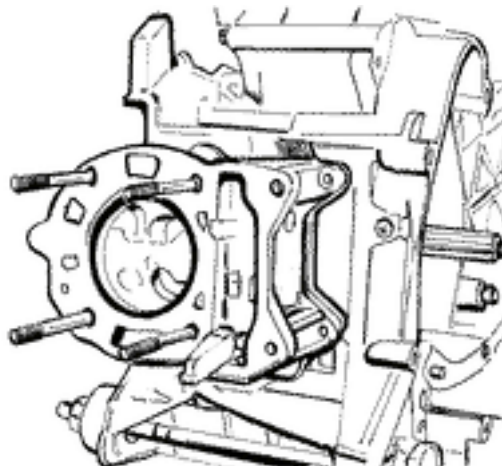
- Remove the chain guide pad.
- Pull out the cylinder.
- Remove the cylinder base gasket.
- Remove the two stop rings, the wrist pin and the piston.
- Remove the piston seals.

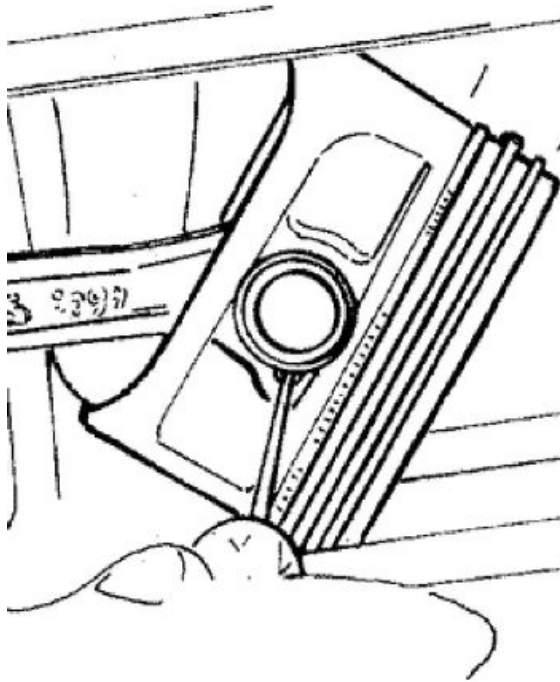
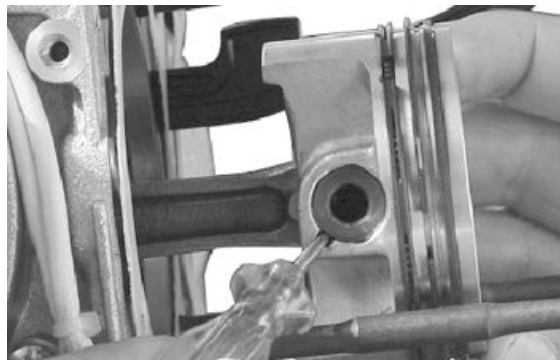
CAUTION

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.

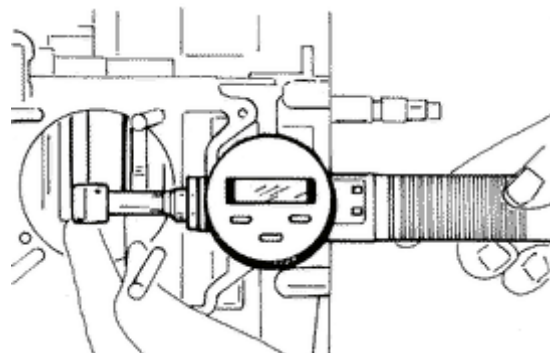
Characteristic

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

- Measure the outside diameter of the gudgeon pin.
- Calculate the coupling clearance between pin and connecting rod end.

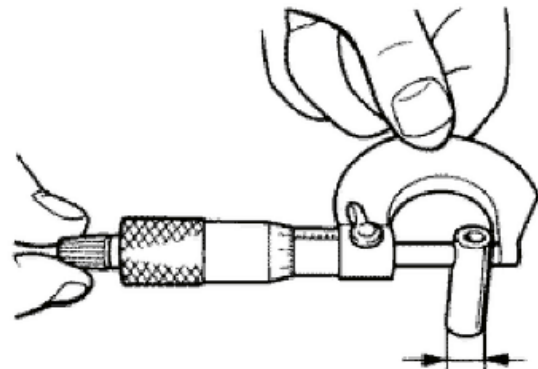
Characteristic

Pin diameter: Standard clearance

0.015 ÷ 0.029 mm

Pin diameter Standard diameter

14.996 - 15.000 mm



Inspecting the piston

- Measure the diameter of the wrist pin seat on the piston.
- Calculate the piston pin coupling clearance.
- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.
- Measure at 41.1 mm from the piston crown in the position shown in the figure.
- 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.



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

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

piston diameter

56.945 ÷ 56.973 mm

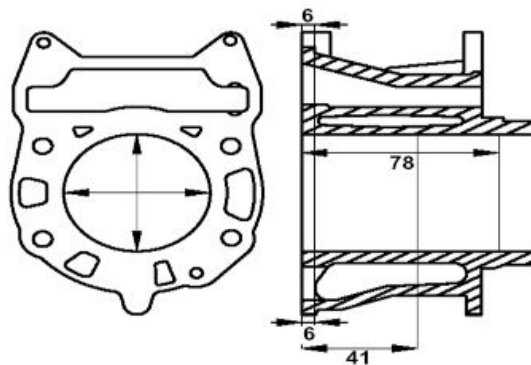
Fitting clearance

Top piston ring - standard coupling clearance 0.025 ÷ 0.07 mm
Top piston ring - maximum clearance allowed after use 0.08 mm
Middle piston ring - standard coupling clearance 0.015 - 0.06 mm
Middle piston ring - maximum clearance allowed after use 0.07 mm
oil scraper ring - standard coupling clearance 0.015 - 0.06 mm
oil scraper ring - maximum clearance allowed after use 0.07 mm



Inspecting the cylinder

- Using a bore meter, measure the inner cylinder diameter at three different points according to the directions shown in the figure.
- Check that the head coupling surface is not worn or misshapen.
- Pistons and cylinders are classified according to diameter. The coupling is carried out in pairs (A-A, B-B, C-C, D-D).
- The cylinder rectifying operation should be carried out with a surfacing that respects the original angle.
- The cylinder surface roughness should be 0.9 micron.
- This is indispensable for a good seating of the sealing rings, which in turn minimises oil consumption and guarantees optimum performance.
- The pistons are oversized due to cylinder grinding and are subdivided into three categories- 1st, 2nd, 3rd corresponding to 0.2-0.4-0.6 mm oversi-



zes. They are also classified into 4 categories A-A, B-B, C-C, D-D.

Characteristic

cylinder: standard diameter

56.997 - 57.025 mm (at 41 mm)

Maximum allowable run-out:

0.05 mm

Inspecting the piston rings

Sealing 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.

Characteristic

Top piston ring

Standard opening: 0.15 ÷ 0.30 mm

Middle piston ring

Standard opening: 0.10 ÷ 0.30 mm

scraper ring

Standard opening: 0.15 ÷ 0.35 mm



Removing the piston

- Install piston and wrist pin onto the connecting rod, aligning the piston arrow the arrow facing towards the exhaust.
 - Fit the wrist 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



N.B.

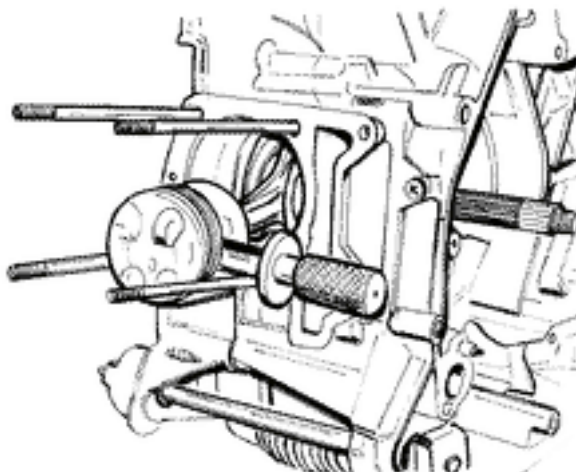
THE TOOL FOR INSTALLING THE STOP RINGS MUST BE USED MANUALLY.

CAUTION

USING A HAMMER MIGHT DAMAGE THE STOPS' HOUSING.

Specific tooling

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

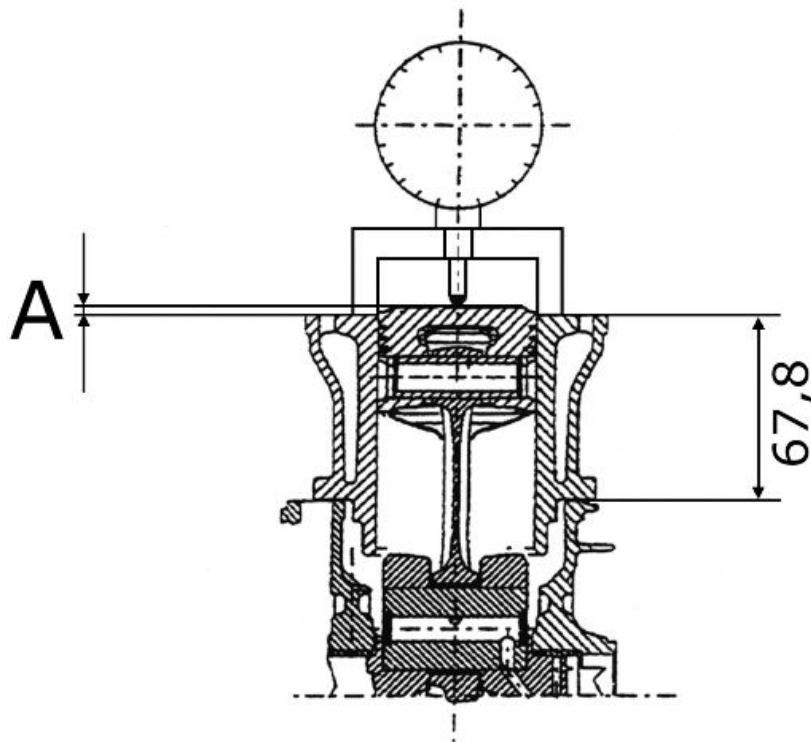


Choosing the gasket

Characteristic

Compression ratio

12 ± 0.5: 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 thicker the base gasket to be used (to restore the compression ratio) and vice versa.

N.B.

NO GASKETS AND SEALS SHOULD BE ASSEMBLED BETWEEN THE CRANKCASE AND CYLINDER AND THE DIAL GAUGE EQUIPPED WITH SUPPORT SHOULD BE SET TO ZERO FOR MEASUREMENT «A» TO BE TAKEN WITH THE PISTON AT TOP DEAD CENTRE POSITION AND ON A RECTIFIED PLANE.

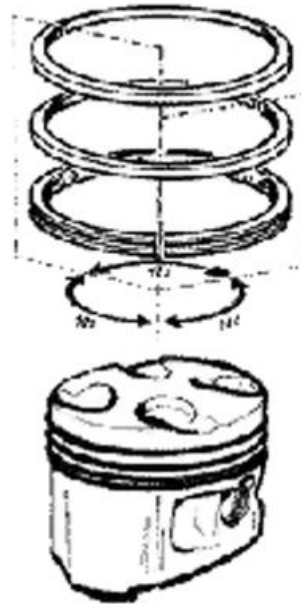
MODELS WITH METAL HEAD GASKET (0.3)

Name	Measure A	Thickness
Shimming - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.4	1.40 ÷ 1.65	0.4 ± 0.05
Shimming - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.6	1.65 ÷ 1.90	0.6 ± 0.05

Refitting the piston rings

Fitting the sealing 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.



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

020426Y Piston fitting fork

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»

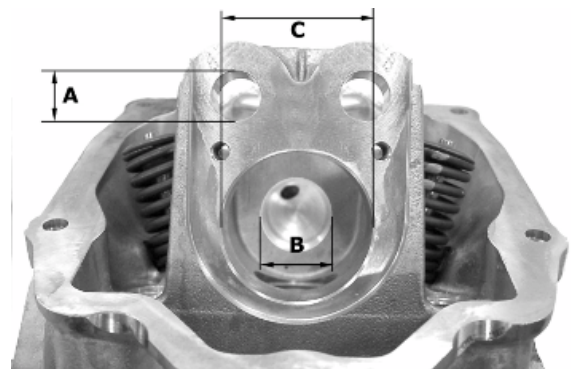
Ø 12.000 - 12.018 mm

bearing «B»

Ø 20.000 ÷ 20.021 mm

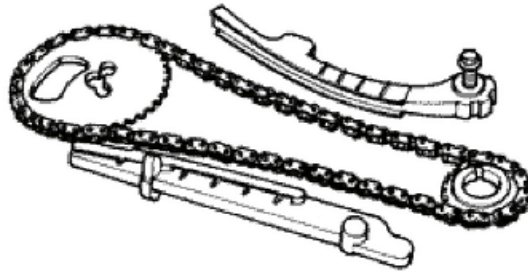
bearing «C»

Ø 37.000 - 37.025 mm



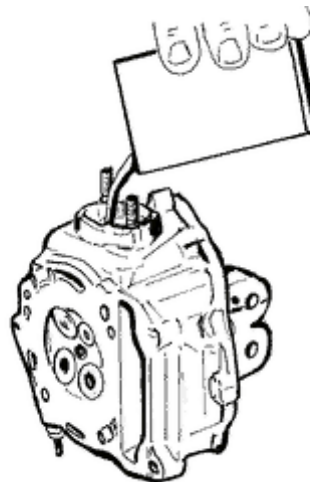
Inspecting the timing system components

- 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.



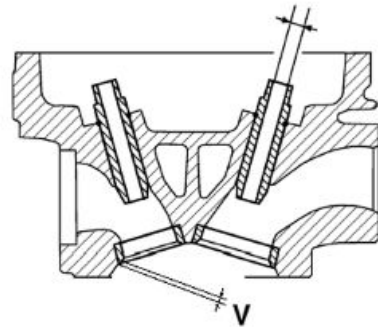
Inspecting the valve sealings

- 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 width of the sealing surface on the valve seats and on the valves.

Sealing surface width: After use: Intake and exhaust: 1.6 mm

- If any of the sealing surfaces on the valves is wider than the specified limit or is damaged in one or more points, or curved, replace the valve with a new one.



CAUTION

DO NOT REVERSE THE FITTING POSITIONS OF THE VALVES (RIGHT - LEFT).

Characteristic

Valve wear check Standard: Intake and exhaust:

0.99 - 1.27 mm

- 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

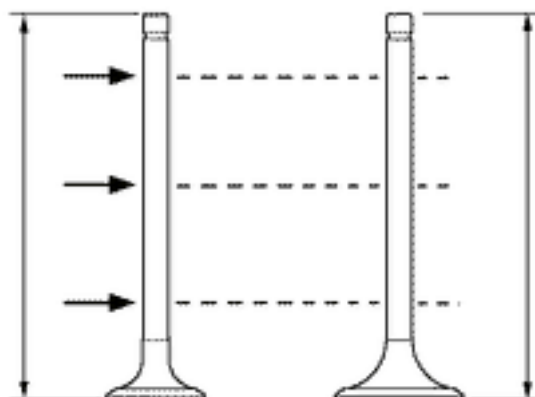
Inlet: 4.96 mm

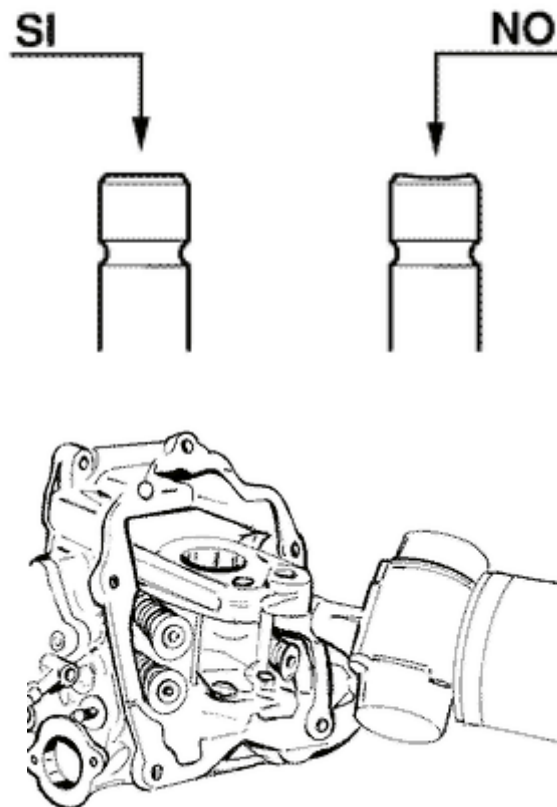
Valve check Standard diameter:

Inlet: 4.972 ÷ 4.987 mm

Valve check Standard diameter:

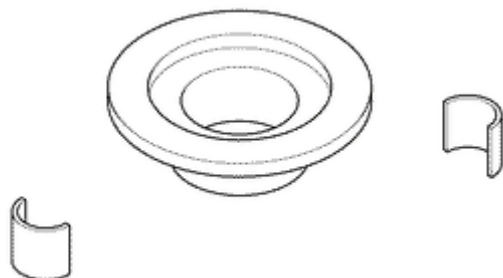
Outlet: 4.96 ÷ 4.975 mm





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

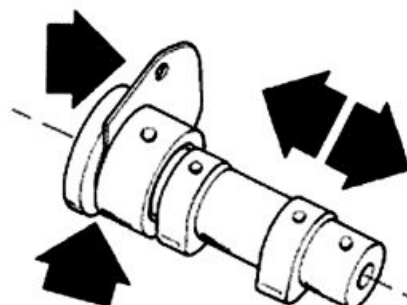
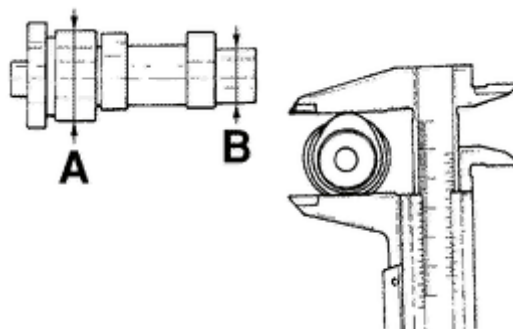
020382Y Valve cotters equipped with part **012** removal tool

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

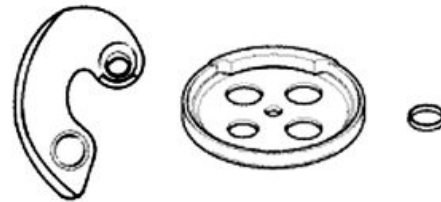
Bearing A Ø: 36.94 mm

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



Refitting the head and timing system components

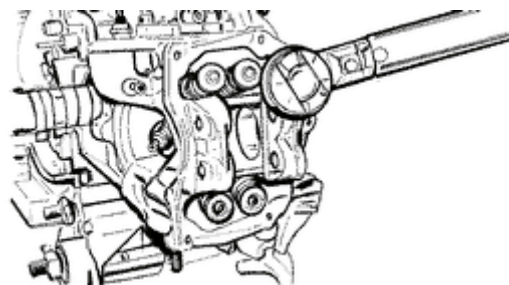
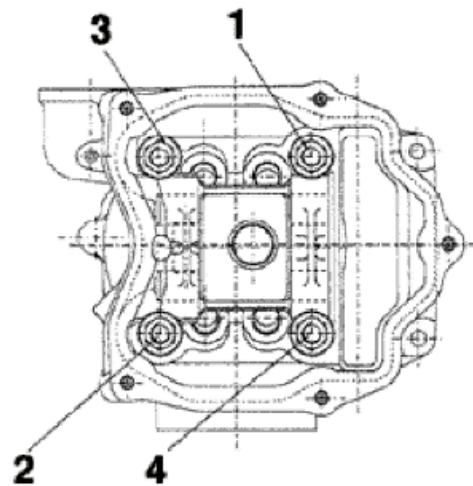
- Fit the timing chain guide pad.
- Insert the centring dowel between the cylinder head to the cylinder, fit the cylinder head gasket and the cylinder head.
- Lubricate the stud bolt threading.
- Tighten up the nuts to a pre-torque of 7 ± 1 N·m
- Rotate by a 180° angle (2 rotations of 90° each)
- To 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)

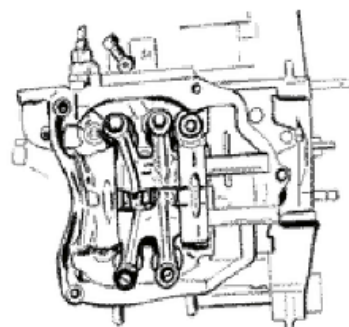
Timing chain tensioner support screw $11 \div 13$



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.

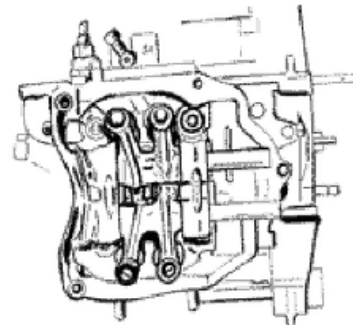
Locking torques (N*m)



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 camshaft 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°.

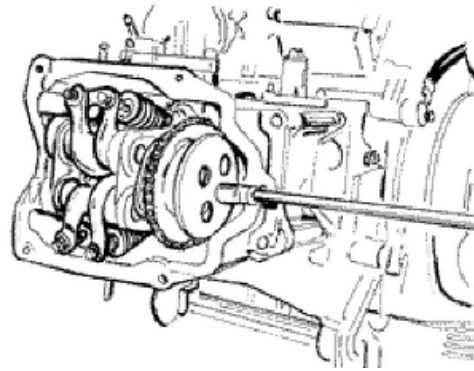


Assemble the limiting bell using the counterweight fixing screw as a reference.

- Tighten the clamping screw to the prescribed torque.

Locking torques (N*m)

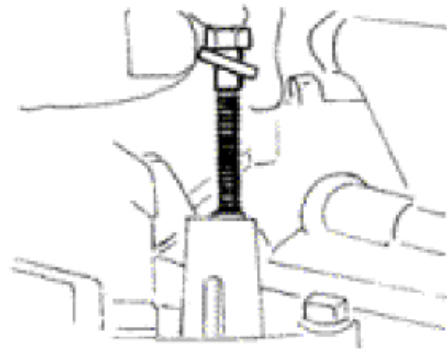
Limiting bell screw 11 ÷ 15 Nm



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

Name	Torque in Nm
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

Name	Torque in 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

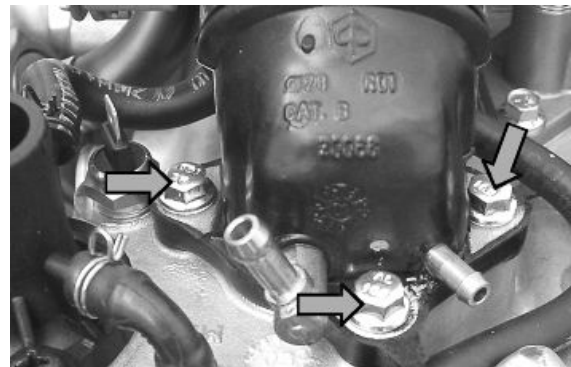


Refitting the intake manifold

Fit the intake manifold and do up the three screws.

N.B.

FOR SPECIAL SCREWS USE COMMERCIALY AVAILABLE INSERTS AND INSERT HOLDERS.



Crankcase - crankshaft

Splitting the crankcase halves

First remove the following units:

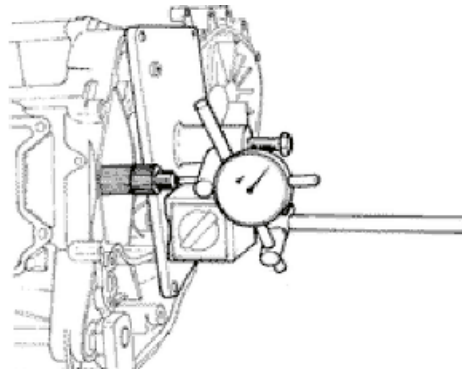
transmission cover, driving pulley, driven pulley and belt, rear hub cover, gears, bearings and oil seals as described in the **transmission** chapter.

- 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 ÷ 0.40 mm



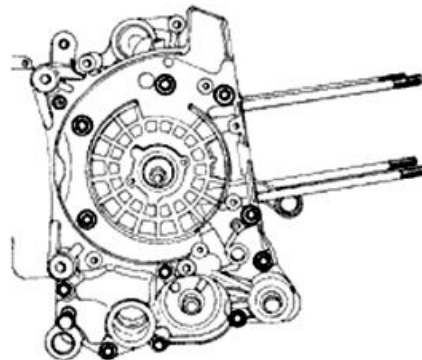
Remove the 11 coupling screws to the crankcase.

- Separate the crankcase while keeping the crankshaft in one of the two halves of the crankcase.

Remove the crankshaft.

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.

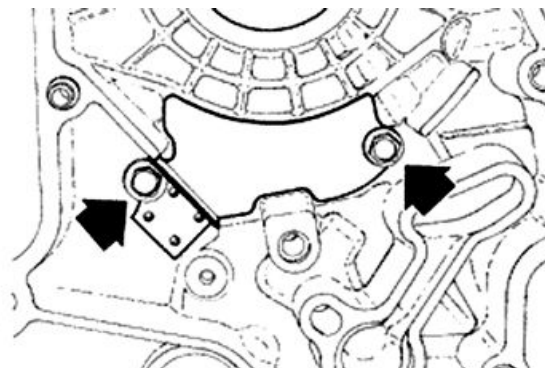


- Remove the coupling gasket of the crankcase halves.

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

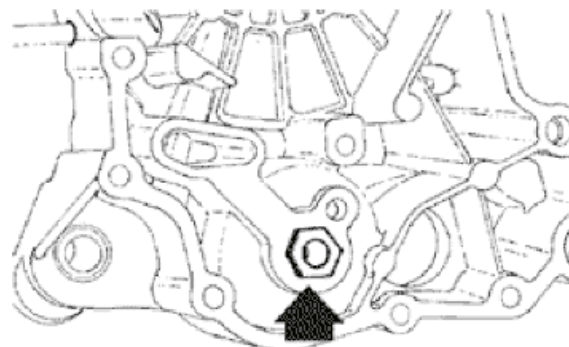
CAUTION

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.



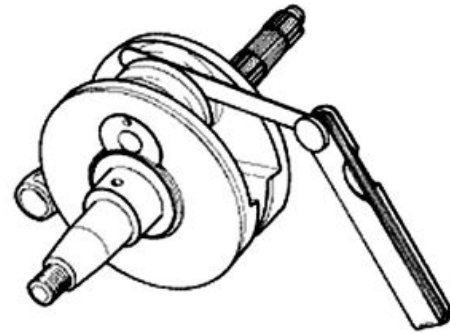
- Remove the oil guard on the flywheel side.

- 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

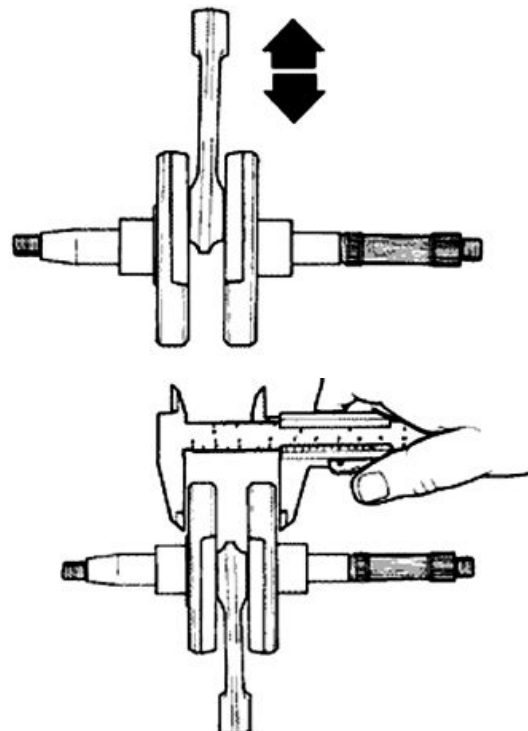
-Check the surfaces that limit the axial free-play are not scored and measure the width of the crankshaft between these surfaces, as shown in the diagram.

Standard dimensions:

55.75 ÷ 55.90 mm

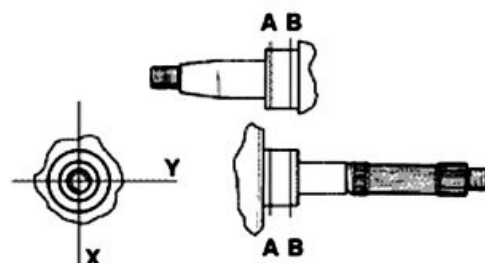
N.B.

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



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 bearings of the crankshaft according to the axes and surfaces shown in the figure. The half-shafts are classified in two categories Cat. 1 and Cat. 2 as shown the chart below.



Characteristic

Standard diameter - Category 2

29.004 ÷ 29.010

Standard diameter - Category 1

28.994 ÷ 29.000

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

Inspecting the 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

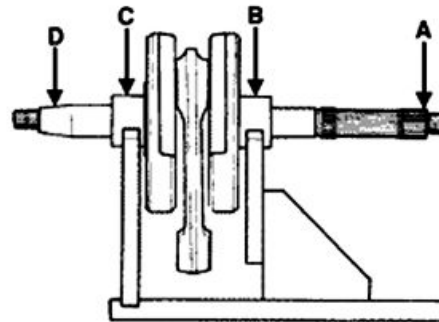
Off-line maximum admitted

A = 0.15 mm

B = 0.01 mm

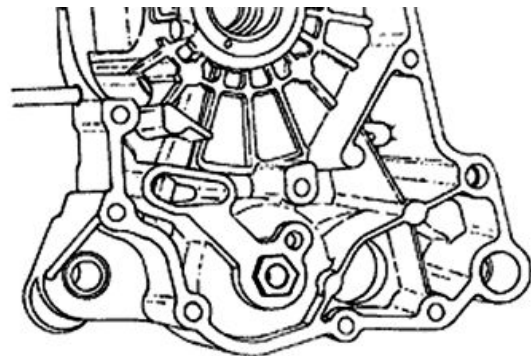
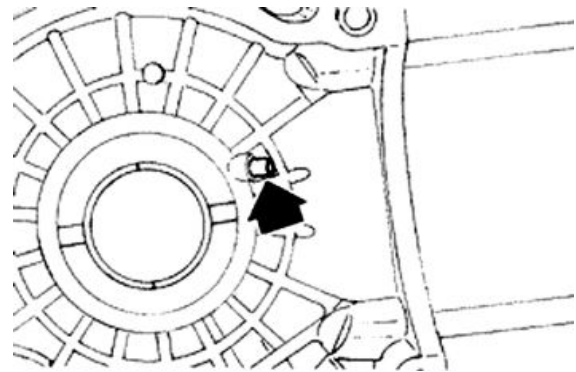
C = 0.01 mm

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 of 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.

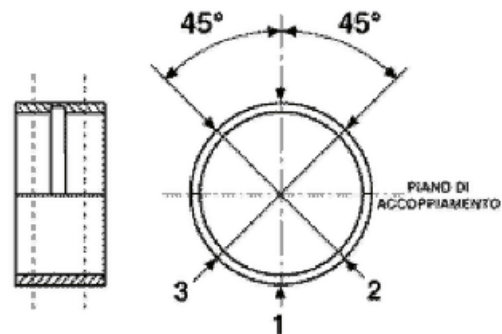
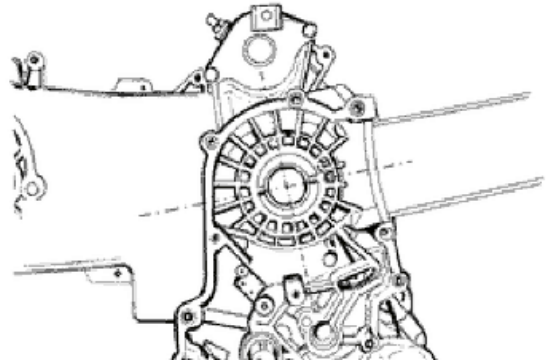
- Check the inside diameter of the main bushings in the three directions indicated in the diagram.

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

Crankcase halves	Engine half shaft	Bushing
Cat. 1	Cat. 1	B
Cat. 2	Cat. 2	B
Cat. 1	Cat. 2	A
Cat. 2	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

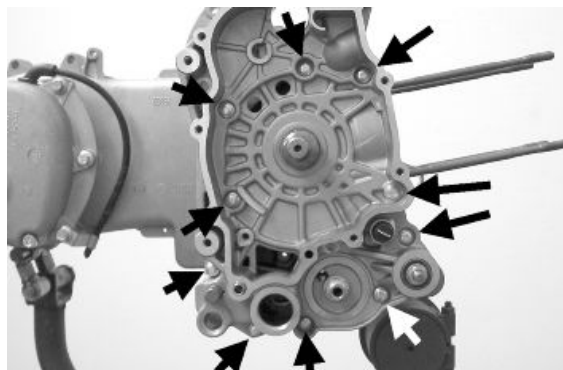
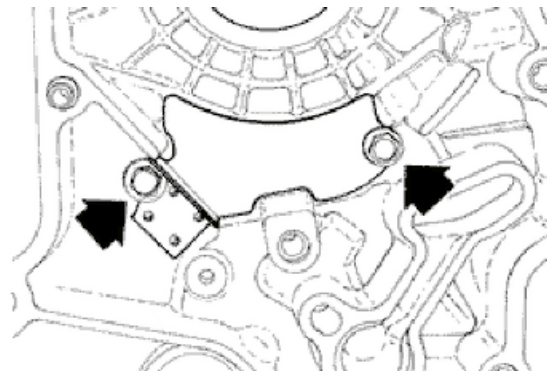
32.953 ÷ 32.963

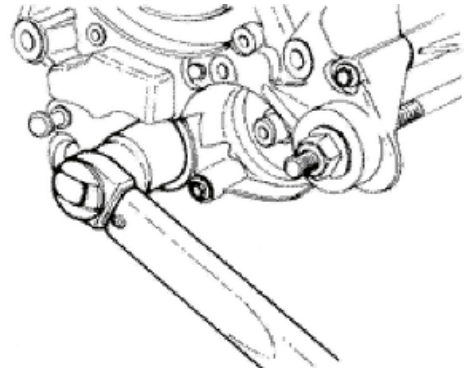
Refitting the crankcase halves

- 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.
- Fit the 10 screws and tighten them to the prescribed torque.
- 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 prescribed torque.

Locking torques (N*m)

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

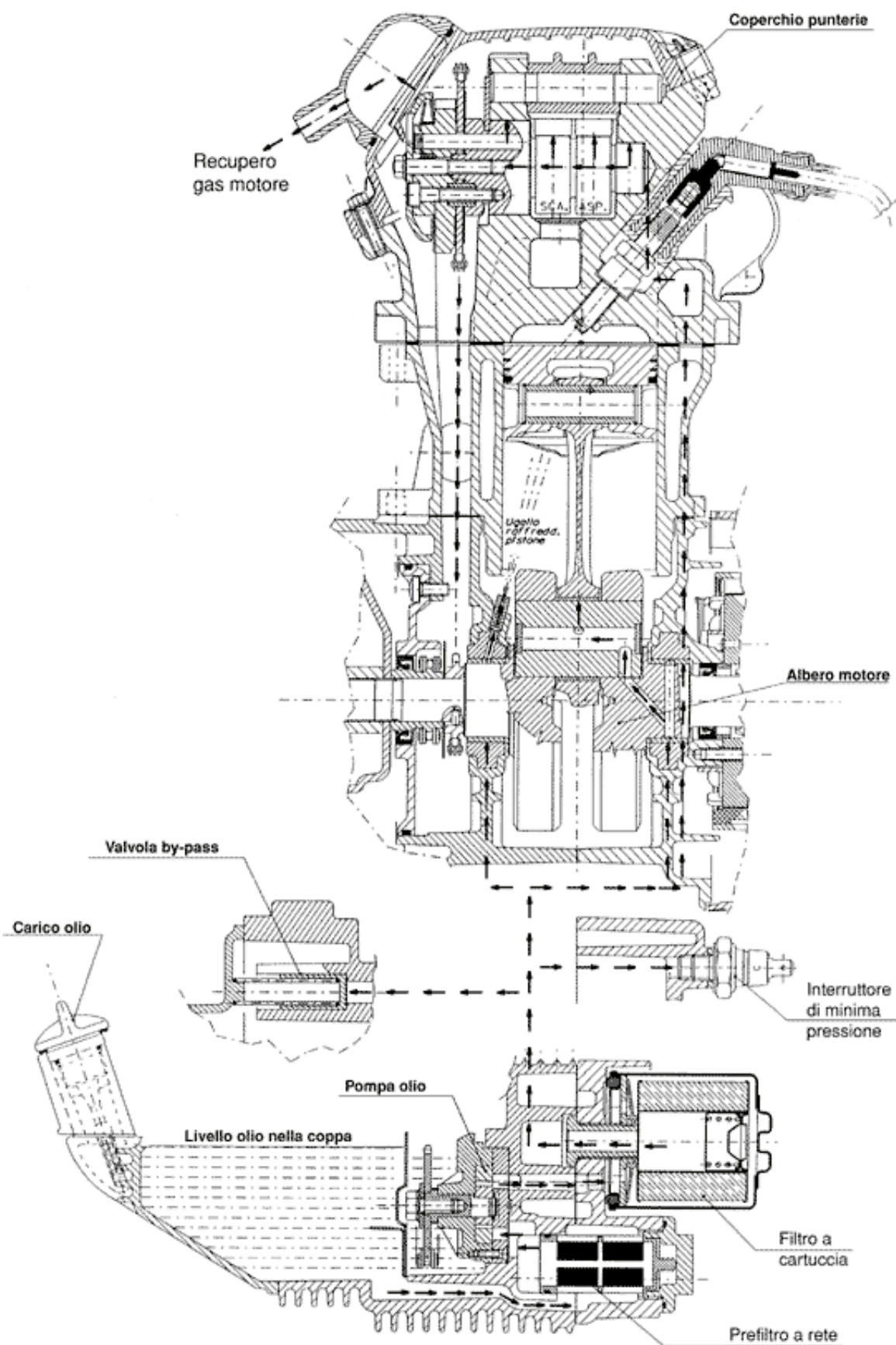




Lubrication

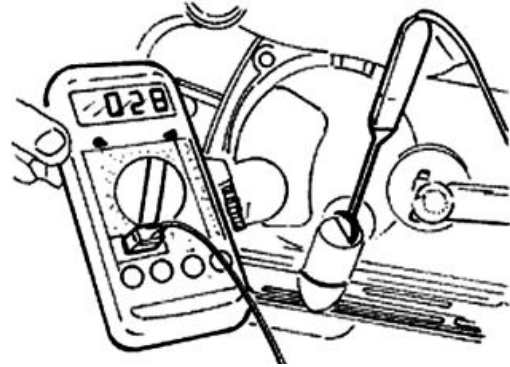
Conceptual diagrams

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)

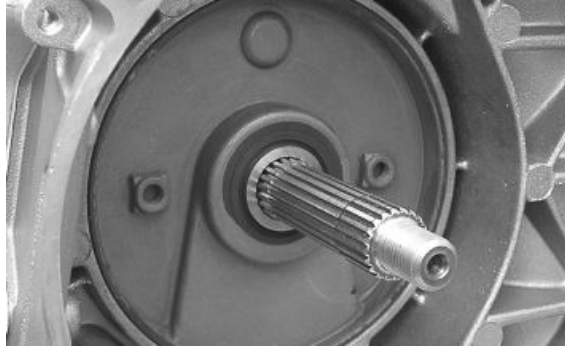
Minimum oil pressure sensor $12 \div 14$



Crankshaft oil seals

Removal

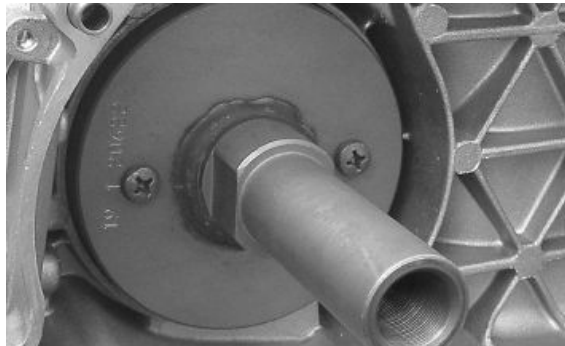
- First remove the transmission cover and the complete driving pulley



- Install the base of the appropriate tool on the oil guard using the screws provided.

Specific tooling

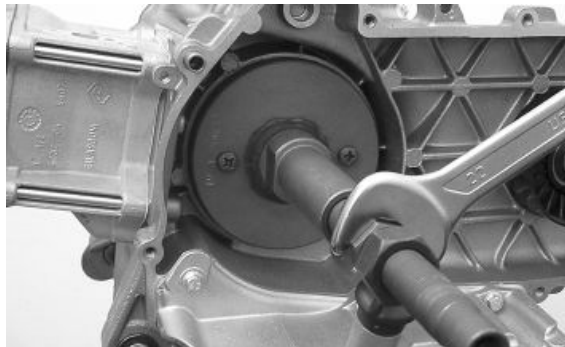
020622Y Transmission-side oil guard punch



- Screw the threaded bar onto the base of the tool and extract the oil guard.

Specific tooling

020622Y Transmission-side oil guard punch



Refitting

- Use a new oil seal upon refitting.
- Prepare the new oil seal, lubricating the sealing lip.
- Preassemble the oil seal with the specific tool, positioning the screws.
- Place the sheath over the crankshaft.
- Insert the tool with the oil seal on the crankshaft until it comes into contact with the crankcase.



- Orientate the oil seal by inserting the bracket which is part of the specific tool.
- Tighten the threaded bar onto the crankshaft as far as it will go.
- Use the nut to move the base of the tool until you can feel the end of the oil seal driving stroke.
- Remove all of the tool components following the inverse procedure

CAUTION

DO NOT LUBRICATE THE SURFACE FOR KEYING ONTO THE ENGINE CRANKCASE.

CAUTION

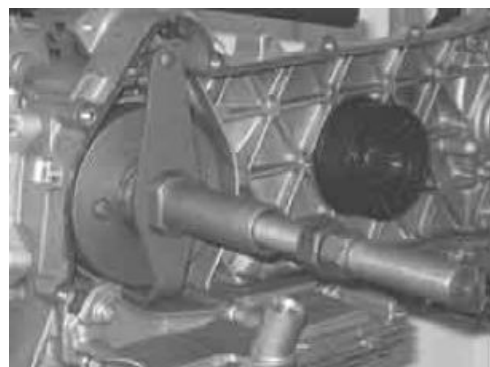
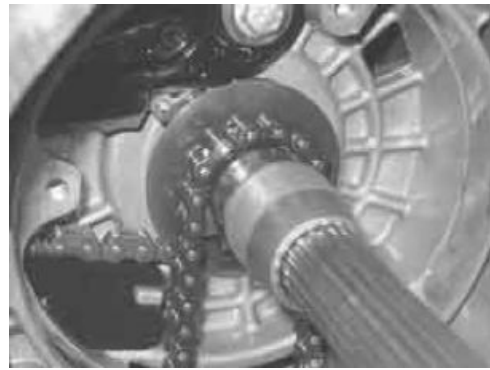
ORIENT THE OIL GUARD BY POSITIONING THE CHAIN HOUSING CHANNEL FACING DOWNWARDS. WHEN THE POSITION IS REACHED, DO NOT RETRACT THE OIL GUARD. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE A WRONG POSITIONING OF THE OIL GUARD SHEATH.

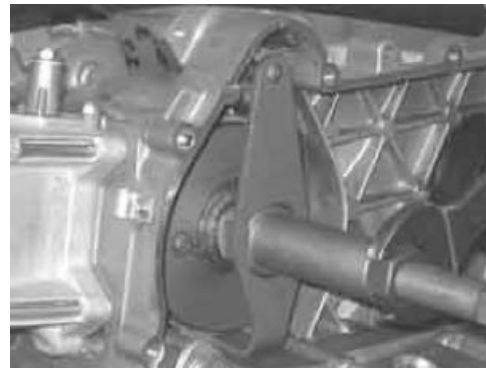
CAUTION

FAILURE TO COMPLY WITH THIS ASSEMBLY PROCEDURE CAN SERIOUSLY DAMAGE THE ENGINE DUE TO THE WRONG TENSIONING OF THE OIL PUMP CONTROL CHAIN.

Specific tooling

020622Y Transmission-side oil guard punch





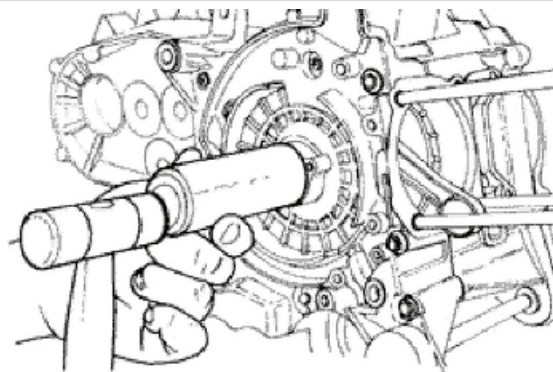
For 125 models, fit a new oil seal on the flywheel side using the specific tool as shown in the photograph

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

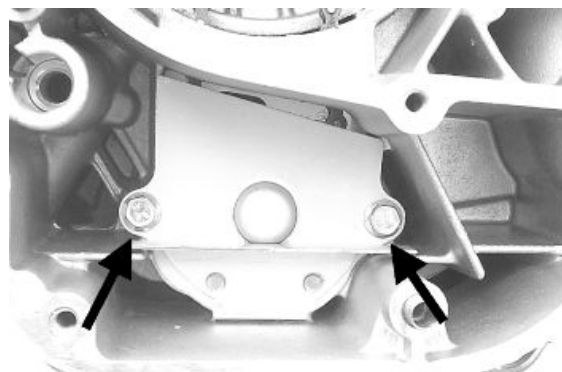
020425Y Punch for flywheel-side oil seal



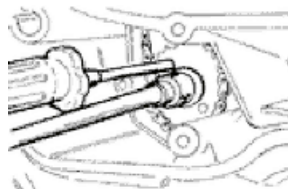
Oil pump

Removal

- Undo the two clamping screws in the figure and remove the cover over the pump control crown.



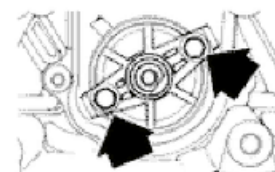
- Block the rotation of the oil pump control pulley with a screwdriver inserted through one of its two holes.



- Remove the central screw with Belleville washer, as shown in the diagram.

- Remove the chain with the crown.

- Remove the control sprocket with relative O-ring.



- Remove the oil pump by undoing the two screws in the figure.
- Remove the oil pump seal.

N.B.

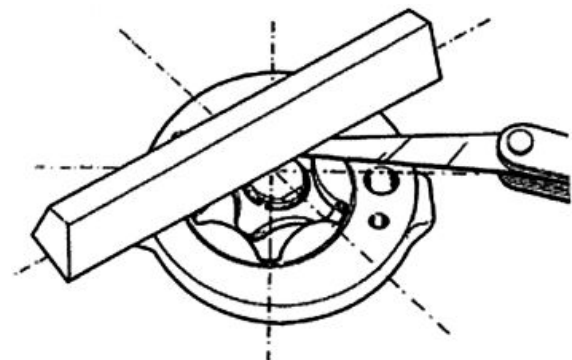
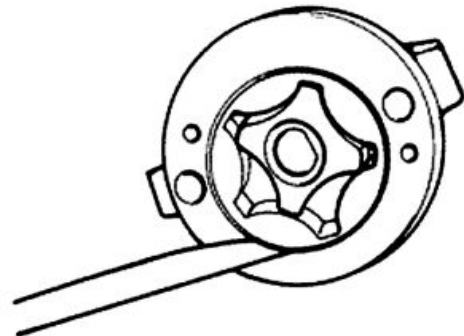
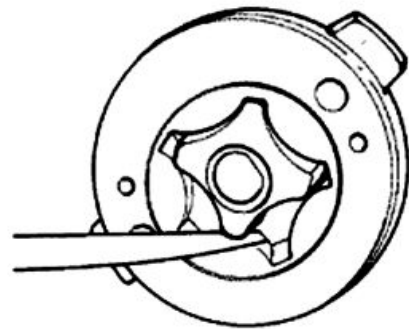
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

Inspection

- Remove the two screws and the oil pump cover.
- Remove the clip retaining the innermost rotor.
- Remove and wash the rotors thoroughly with petrol and compressed air.
- Reassemble the rotors in the pump body, keeping the two reference marks visible. Replace the snap ring.
- Check the clearance between the rotors in the position shown in the diagram using a thickness gauge.

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

- Check the axial clearance of the rotors using a trued bar as shown in the figure.



Characteristic

Axial rotor clearance

Limit values admitted: 0.09 mm

Distance between the outer rotor and the pump body

Admissible limit clearance: 0.20 mm

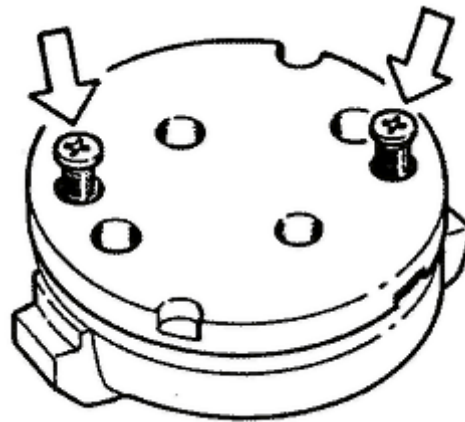
Distance between the rotors

Admissible limit clearance: 0.12 mm



Refitting

- 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.

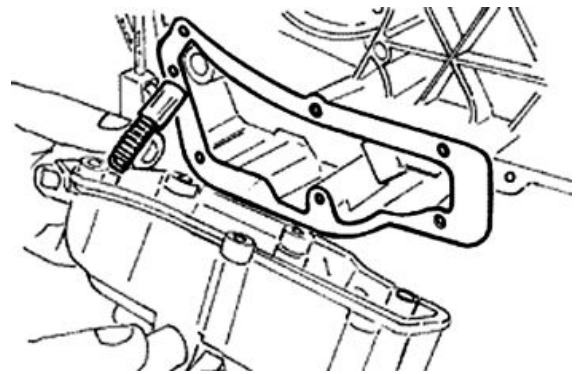
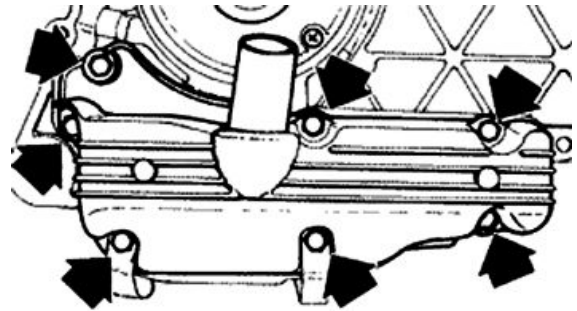
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.

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.



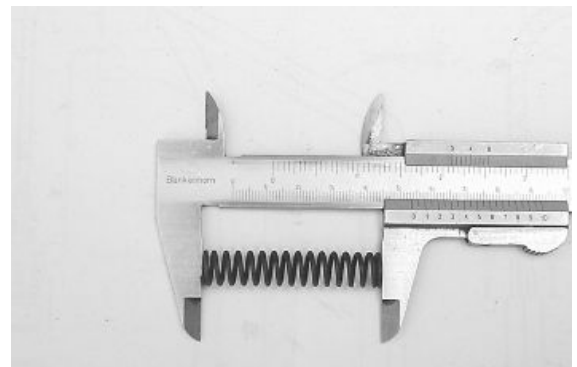
Inspecting the by-pass valve

- 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

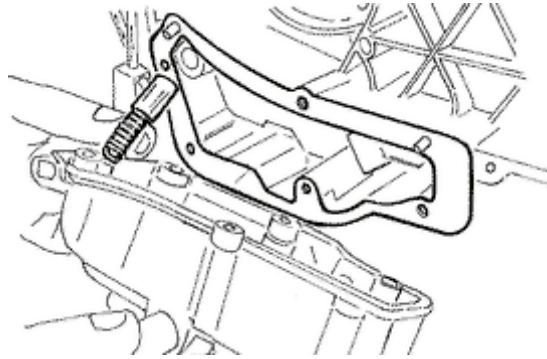
By-pass check up: Standard length

54.2 mm



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

SAS valve

Inspecting the one-way valve

- 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 (VAC-UUM).
- 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

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



Fuel supply

Removing the carburettor

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.

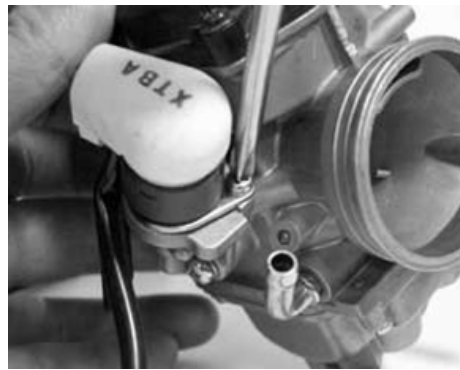
- Take out the carburettor and rotate it so as to remove the screw with the water joint and the pipes.

N.B.

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



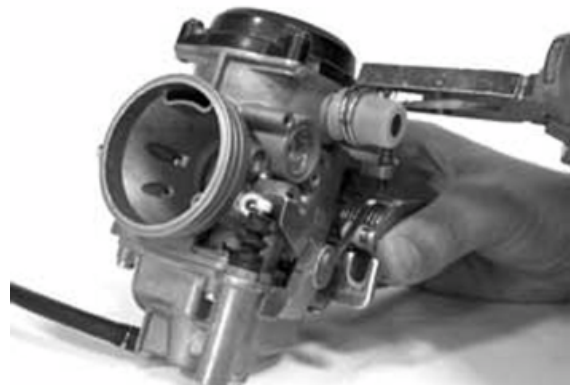
- Remove the protection, the bracket and the starter acting on the screw shown in the figure.



- 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.

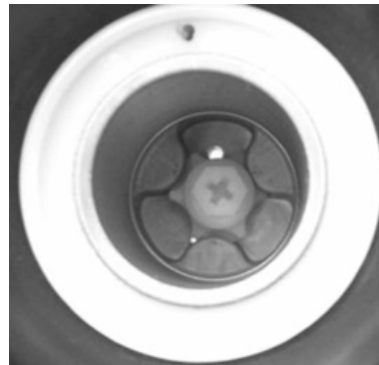




- Remove the vacuum valve together with the diaphragm.



- 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.

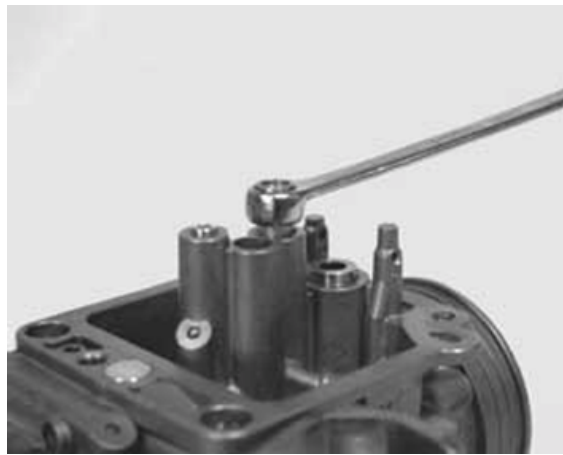


Adequately support the carburettor and using a rod and hammer remove the float pin acting from the throttle control side.

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



-Remove the maximum nozzle.



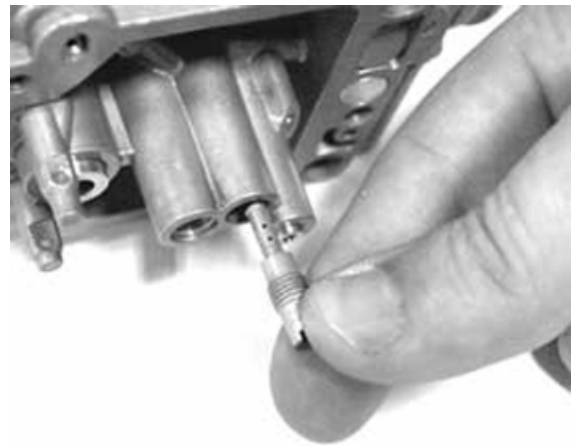
-Remove diffuser.



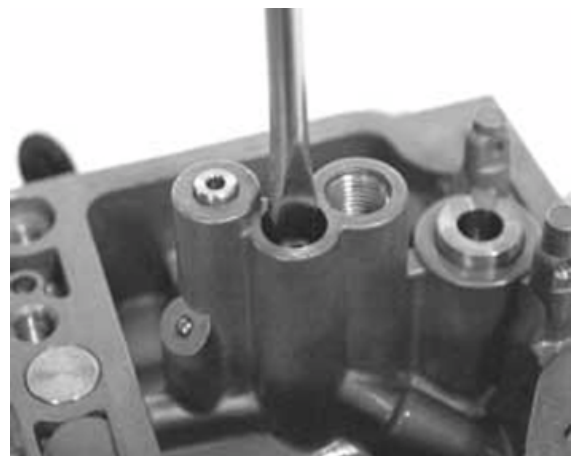
- Remove the sprayer.

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.



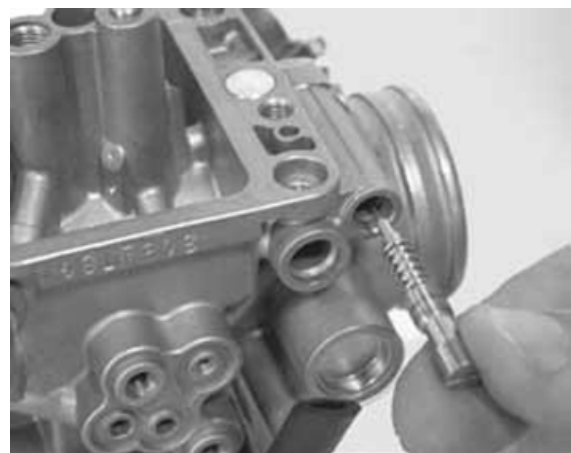
- Remove the minimum nozzle.



- 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.



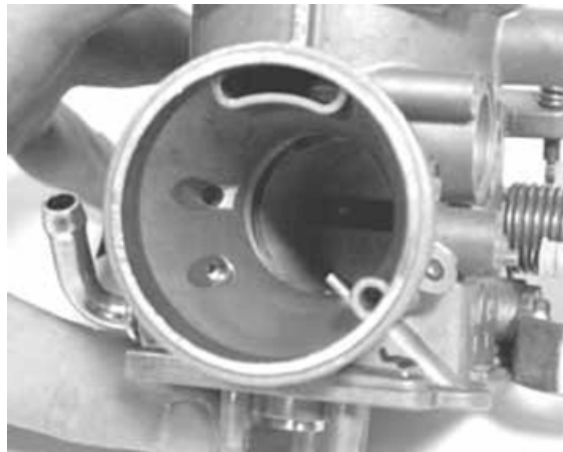
Refitting the carburettor

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.

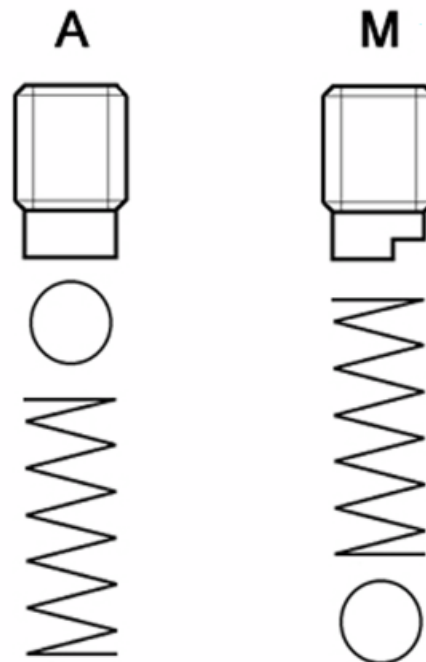
- Reassemble the acceleration pump valves following this order:

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.

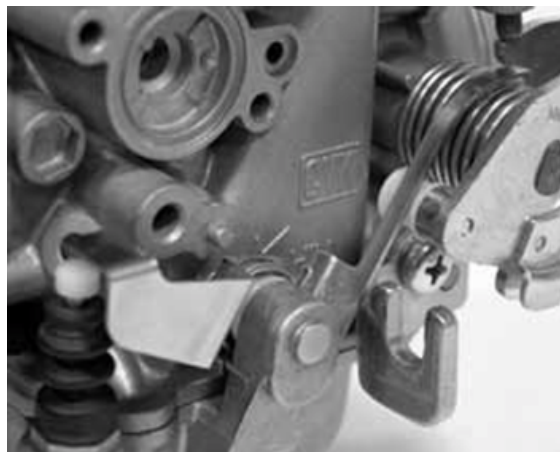
- Check that the control roller is free to rotate in its own seat.

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.

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.

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.



Inspecting the automatic choke device

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 electric 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

Protrusion value

10 mm at about 24°

Starter resistance

20 Ω

Check the automatic starter: Keihin maximum time

5 min



INDEX OF TOPICS

SSUSPENSIONS

SUSP

Front

Removing the front wheel

- Remove the front calliper.
- Loosen the wheel axle lock-nut.



- Loosen the two wheel axle safety screws on the fork leg, on the brake calliper side.
- Pull out the wheel axle.



See also

[Removal](#)

Front wheel hub overhaul

Check that the wheel bearings do not show signs of wear.

If you have to replace the wheel bearings, proceed as follows:

- Remove the plastic cover on the tone wheel side to avoid damage by loosening the 5 fixing screws.
- Remove the two bearings on the odometer drive side using the pliers 14 or 34 and the bell detail 9.
- Remove the internal spacer.



* Either tool can be used.



- Support the front wheel with two wooden shims that make it possible to avoid scratching in the case of contact with the rim.

- Insert the punch (consisting of adaptor handle, 15 mm adaptor and guide) from the odometer drive side to permit the removal of the brake disc side bearing and the spacer bushing.



Specific tooling

020376Y Adaptor handle

020456Y Ø 24 mm adaptor

020412Y 15 mm guide

- Heat the bearing seat on the side the brake disc with the heat gun.



- Insert the bearing using the punch consisting of adaptor handle, 42x47 mm adaptor and 15 mm guide, and drive it up to the stop.



- Reinsert the spacer bushing on the brake disc side using the appropriate tool and take it to the stop.

Specific tooling**020376Y Adaptor handle****020359Y 42x47-mm adaptor****020412Y 15 mm guide****020201Y Spacer bushing driving tube**

- Turn over the wheel and insert the internal spacer with the part fitted with the Seeger ring facing the bearing on the brake disc side installed previously.



- Heat the bearing seat on the odometer drive side with the heat gun.



- Insert the two bearings using the punch consisting of adaptor handle, 32x35 mm adaptor and 15 mm guide, and drive it up to the stop.

Specific tooling**020376Y Adaptor handle****020357Y 32 x 35 mm adaptor****020412Y 15 mm guide**

- Refit the cap and tighten the five fixing screws.



Refitting the front wheel

- Grease the wheel axle, then install it from the tone wheel side and install the tone wheel properly.
- Tighten the wheel axle nut to the prescribed torque.

N.B.

TAKE CARE NOT TO DAMAGE THE ODOMETER DRIVE. FOR THE SAKE OF SAFETY, OFFSET THE INTERNAL STOP FROM THE STOP OF THE TONE WHEEL BY 90°.



- Tighten the two safety screw on the leg to the prescribed torque.

Locking torques (N*m)

Front wheel axle nut 45 - 50 Safety screw on fork leg 6 ÷ 7



Handlebar

Removal

- Remove the rear handlebar cover.
- Remove the pin mounting the handlebar to the steering tube.
- Remove the handlebar and place it on the rear cover of the front shield.



See also

[Rear handlebar cover](#)

Refitting

- Install the handlebars on the steering tube, paying attention to the centring, aligning the recess on the handlebar with that on the steering tube as shown in the figure.
- Tighten the handlebar fixing screw on the steering tube to the prescribed torque.



Locking torques (N*m)

Handlebar fixing screw 45 ÷ 50

Front fork

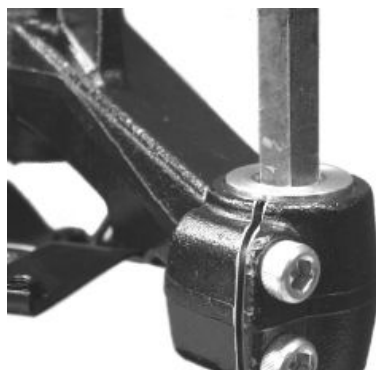
Removal

Overhaul

- Support the fork in a vice.
- Loosen the two tightening screws of the stem supporting clamp.
- Unscrew the stem closing cap and slide off the complete fork leg from the corresponding support.

CAUTION

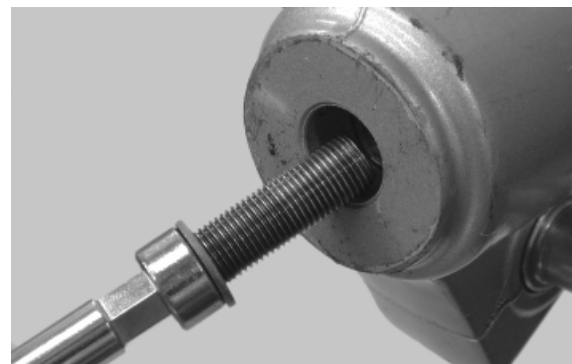
THE STEM CLOSING CAP KEEPS THE MAIN SPRING PRE-LOADED. KEEP THE CAP PROPERLY FITTED DURING THE REMOVAL FINAL STAGE TO AVOID ACCIDENTS.



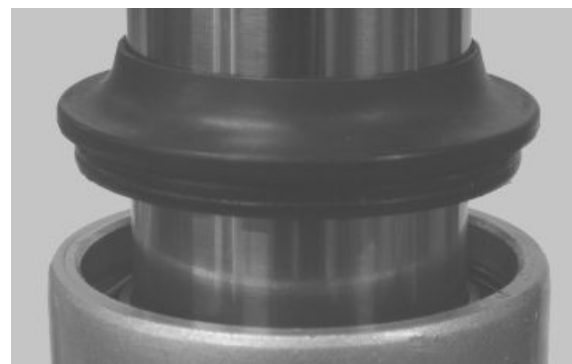
- Support the fork leg properly, remove the main spring and drain off the fork leg oil.



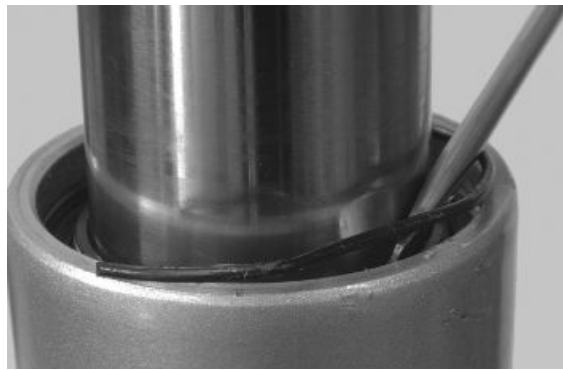
- Remove the hydraulic rod fixing screw with the corresponding sealing gasket:
- With a 19-mm hexagonal spanner, lock hydraulic rod rotation.
- Undo the fixing screw and collect the copper washer.



- Remove the stem dust guard with a screwdriver.



-
- Remove the circlip retaining the oil seal.



-
- Take out the stem.



- Check there are no signs of wear or seizing between the stem and the fork leg. Otherwise, replace the damaged parts.

Characteristic**Maximum leg diameter**

35.10 mm

Minimum stem diameter

34.90 mm

-
- Take out the oil seal using the appropriate tools.
 - Fit the tie rod into the oil seal.
 - Insert in sequence the two half-rings per Ø 35-mm stems.

Specific tooling**020487Y Fork oil seal extractor**

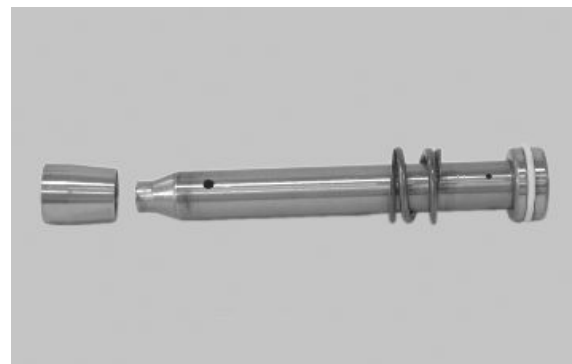
- Hold the tie rod manually so that it does not fall into the fork leg and/or that both half-rings are not in their position.
- Fit the bell.
- Tighten the nut until it stops.
- Act on the tool until the oil seal is completely removed.

Specific tooling

020487Y Fork oil seal extractor



- Remove the hydraulic rod with the corresponding sealing gasket, the spring and the stop bushing.



COMPONENT CHECK

CAUTION

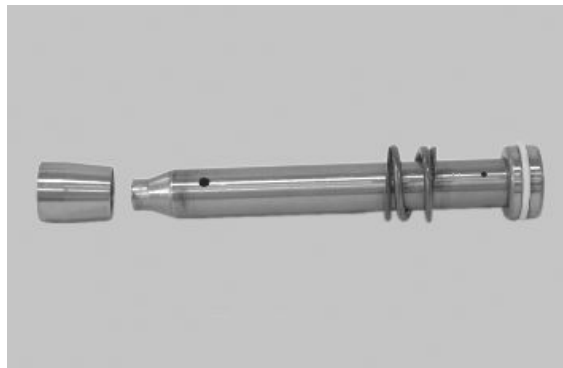
CLEAN ALL THE COMPONENTS THOROUGHLY.

- Check that the fork leg is not cracked or broken in the attachments.
- Check that the stem is not scored, dented or distorted.
- Check that the stop bushing for the hydraulic rod is correctly fixed through caulking.





-
- Check that hydraulic rod caulking, the return spring to the unloaded the end of stroke and the hydraulic rod sealing ring are in good conditions.



-
- Check that the main spring exhibits no signs of yielding or abnormal wear.



-
- Check that the closing cap O-ring of the stem is in good conditions.



Refitting

- First grease the splitting chamber of the two sealing lips of a new oil seal.
- Fit the sealing ring on the stem and keep the identification words facing upwards.
- Drive the oil seal as far as it will go using the appropriate tool.



Specific tooling

020376Y Adaptor handle

020359Y 42x47-mm adaptor

- Pre-fit the stem with the hydraulic rod, the spring and the stop bushing.
- Fit the pre-assembled components inside the fork leg.



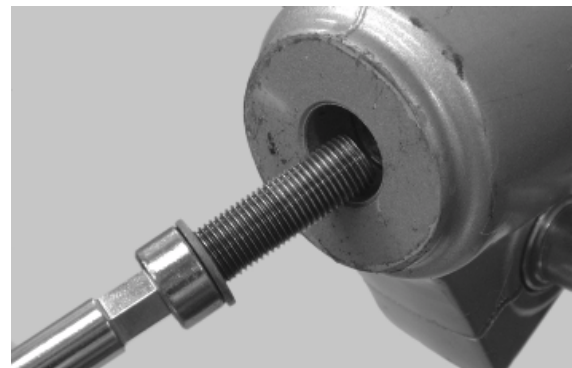
- Fit the hydraulic rod fixing screw with the copper sealing washer and tighten to the prescribed torque using the recommended product.

CAUTION

ALWAYS USE NEW COPPER WASHER.

Locking torques (N*m)

Hydraulic rod fixing screw 25 ÷ 35*



(°) Apply LOCTITE 243 threadlock

- Lock hydraulic rod rotation using a 19-mm hexagonal spanner.



- Fit the oil seal retaining circlip.



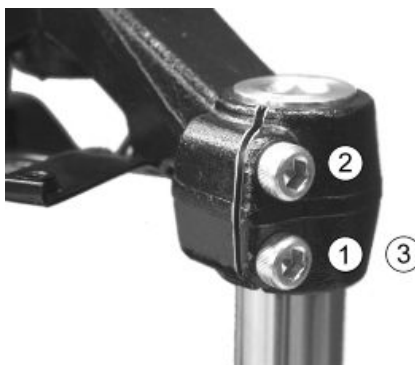
- Grease and fit a new dust guard.



- Fit the fork leg together with the stem on the fork supporting clamp until it stops.
- Tighten the two screws to the prescribed torque in the sequence indicated in the photograph.

Locking torques (N*m)

Stem support clamp tightening screws 20 ± 25



- Refill the fork leg with the recommended product to the prescribed amount.

Recommended products

AGIP FORK 7.5 W Oil for front fork

Hydraulic fluid SAE 7.5 W

Characteristic

Oil quantity per stem

133 ± 3 cm³



- Bleed the hydraulic rod by actuating the stem repeatedly.
- Fit the spring into the stem.



- Lubricate the closing cap O-ring of the stem.
- Preload the spring, fit the closing cap and tighten to the prescribed torque.

Locking torques (N*m)

Fork locking screws cap $15 \div 30$



- Repeat the procedure for the other fork leg.

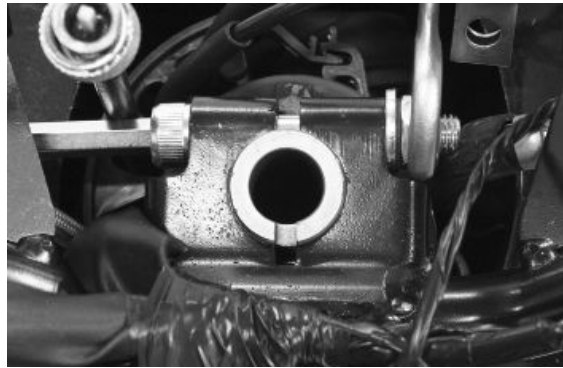
N.B.

IF BOTH FORK LEGS ARE SERVICED AT THE SAME TIME, BE CAREFUL NOT TO INVERT THE RIGHT FORK LEG WITH THE LEFT ONE.

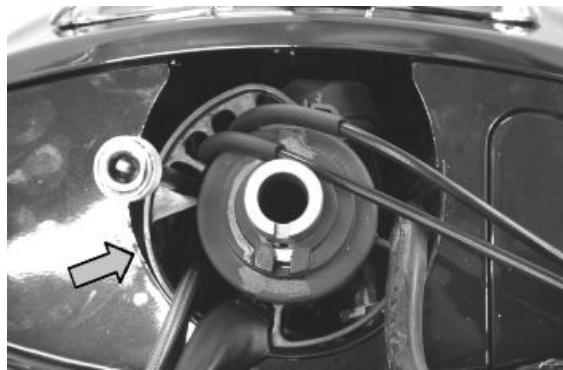
Steering column

Removal

- Remove the front wheel.
- Remove the front mudguard
- Remove the front brake calliper
- Remove the front and rear handlebar covers.
- Remove the pin mounting the handlebar to the steering tube.
- Remove the handlebar and rest it on the shield back plate.



- Remove by releasing the cable passages and sliding the protection collar upwards.



Using the special tool, loosen and remove the upper ring nut, the spacer washer and the counter-ring nut.

- Extract the fork.

N.B.

TAKE CARE TO SUPPORT THE FORK SO AS TO PREVENT IT FROM COMING OFF ABRUPTLY

Specific tooling

020055Y Wrench for steering tube ring nut



Refitting

- Fit the lower steering fifth wheel on the steering tube.
- Fit the fork together with the lower steering fifth wheel on the headstock and hold it so that it does not fall.

N.B.

LUBRICATE THE STEERING FIFTH WHEEL TRACKS WITH RECOMMENDED GREASE BEFORE USE.

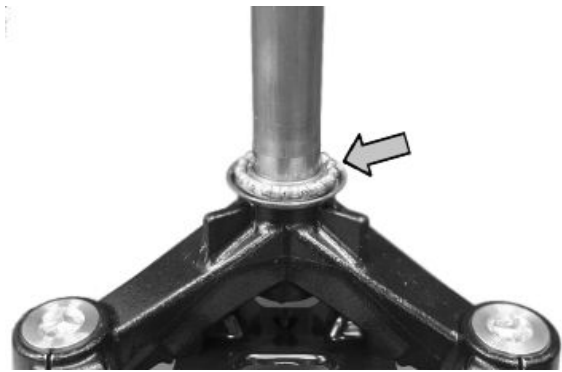
Recommended products

AGIP GREASE PV2 Grease for steering bearings, bolt seatings for swinging arms and fay-



ing surface of driven pulley spring (only pulley side)

Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2



- Fit the upper steering fifth wheel.

CAUTION

INSERT THE UPPER FIFTH WHEEL WITH THE CAGE FACING UPWARDS.



- Fit the steering fifth wheel upper seat.



- Fit the cover plate.



- Insert the lower tightening ring nut, screw until it stops and, with the specific tool, tighten to the prescribed torque.

Specific tooling

020055Y Wrench for steering tube ring nut

Locking torques (N*m)

Steering tube lower ring nut 14 ÷ 17



- Fit the spacer between the two ring nuts on the steering tube in the position indicated.



- Insert the upper tightening ring nut, screw until it stops and, with the specific tool, tighten to the indicated torque.

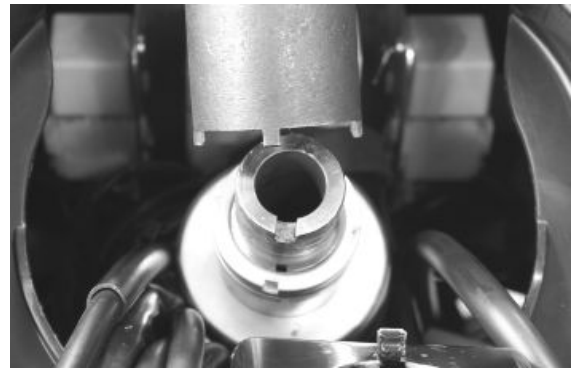
Specific tooling

020055Y Wrench for steering tube ring nut

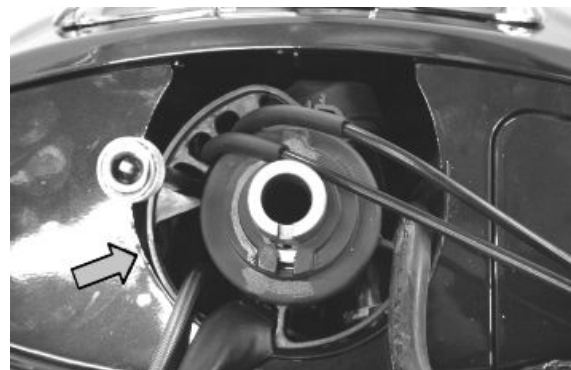
Locking torques (N*m)

Steering tube upper ring nut 40 ÷ 45





Insert the collar shown in the figure and restore the cable passage as shown in the figure.



- Fit the front wheel.

Steering bearing

Removal

- Clean thoroughly and visually inspect if the components are in good conditions.
- Check the upper steering fifth wheel for wear.



- Check the lower steering fifth wheel for wear.



- Visually inspect that the steering fifth wheel tracks, the headstock and the steering tube exhibit no scores or abnormal wear. Otherwise, replace them.

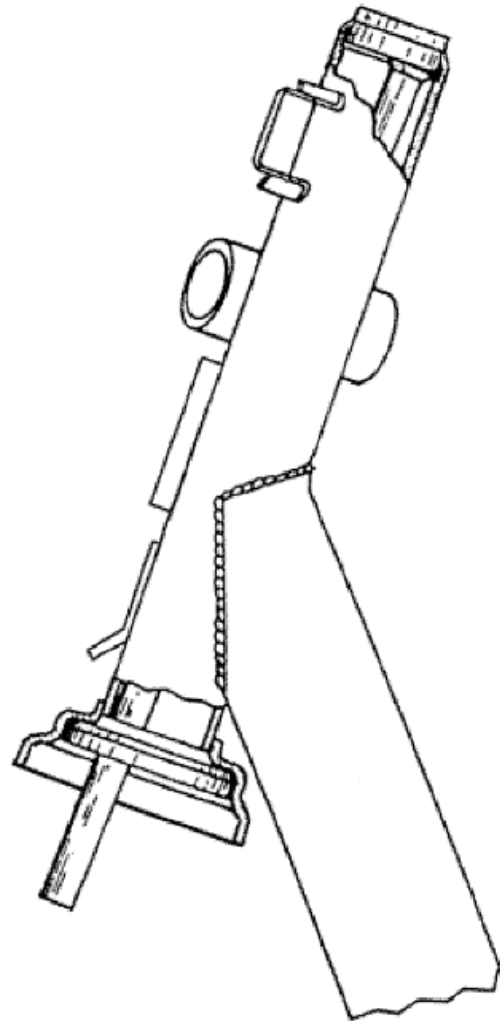
STEERING FIFTH WHEEL TRACK REMOVAL

- Remove the steering fifth wheel tracks on the chassis with the specific tool, following the indicated procedure.
- Fit the specific tool from the lower part of the headstock until it makes contact with the upper track.
- Hit with force the specific tool, placing it at different points diametrically opposed so as to remove the upper track.



Specific tooling

020004Y Punch for removing fifth wheels from headstock



- Repeat the procedure for the lower steering fifth wheel track.

- Remove the lower fifth wheel seat on the steering tube using the specific tool.

Specific tooling

020004Y Punch for removing fifth wheels from headstock



Refitting

STEERING FIFTH WHEEL TRACK FITTING

- Thoroughly clean the track seats on the headstock and the steering tube.
- Fit the new tracks of the headstock with the specific tool.
- Screw the nut until the tracks are fully inserted.

N.B.

LUBRICATE THE STEERING FIFTH WHEEL TRACKS WITH RECOMMENDED GREASE BEFORE USE.

Specific tooling

001330Y Tool for fitting steering seats

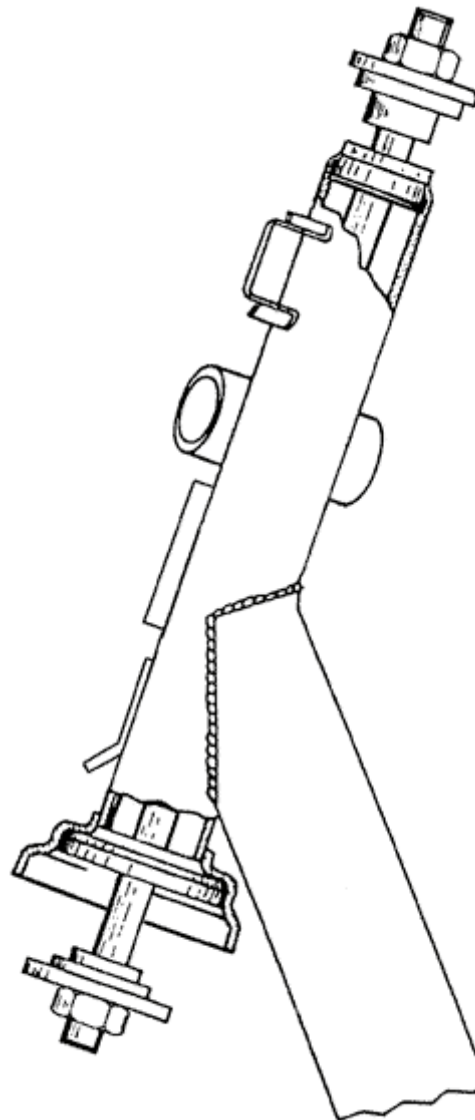
001330Y014 Tool for fitting steering seats

001330Y015 Tool for fitting steering seats

Recommended products

AGIP GREASE PV2 Grease for steering bearings, bolt seatings for swinging arms and faying surface of driven pulley spring (only pulley side)

Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2



- Fit the lower fifth wheel seat on the steering tube.
- With a tube of the indicated sizes, fit the lower seat until it stops. Inside Ø: 35.5 mm; Outside Ø: 38 mm; Length: 350 mm.

N.B.

LUBRICATE THE STEERING FIFTH WHEEL TRACKS WITH RECOMMENDED GREASE BEFORE USE.

Recommended products

AGIP GREASE PV2 Grease for steering bearings, bolt seatings for swinging arms and faying surface of driven pulley spring (only pulley side)



Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2

Rear

Removing the rear wheel

- Remove the muffler support bracket
- Remove the 5 screws shown in the photograph



Refitting the rear wheel

- Carry out the removal operations but in reverse order, observing the prescribed tightening torques.

Locking torques (N*m)

Fixing screw for wheel rim to hub 34 ÷ 38

Swing-arm

Removal

- Place the scooter on its centre stand;
- Support the engine adequately;
- Loosen the nut shown in the figure and pull out the spindle from the left-hand side.



- Loosen the nut and lock nut on the left-hand side of the scooter (see figure) and unscrew the spindle from the opposite side.
- Remove the retaining screw of the rear brake pipe shown in the figure.

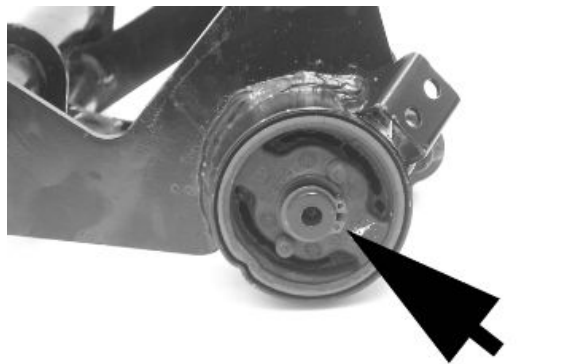


- Loosen the nut on the inside of the frame from the left-hand side (see figure) and remove the relevant spindle;
- Remove the swinging arm.



Overhaul

- Check that the silent bloc is not damaged. If there is, replace it.
- Remove the Seeger ring shown in the photograph



- Remove the full silent bloc bracket
- 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

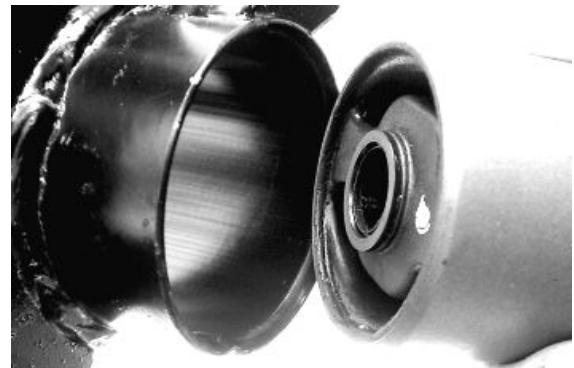


Specific tooling

020271Y Tool for removing-fitting silent bloc



- 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

Specific tooling

020271Y Tool for removing-fitting silent bloc



- 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 gauge

Characteristic

Allowable limit after use:

1 mm

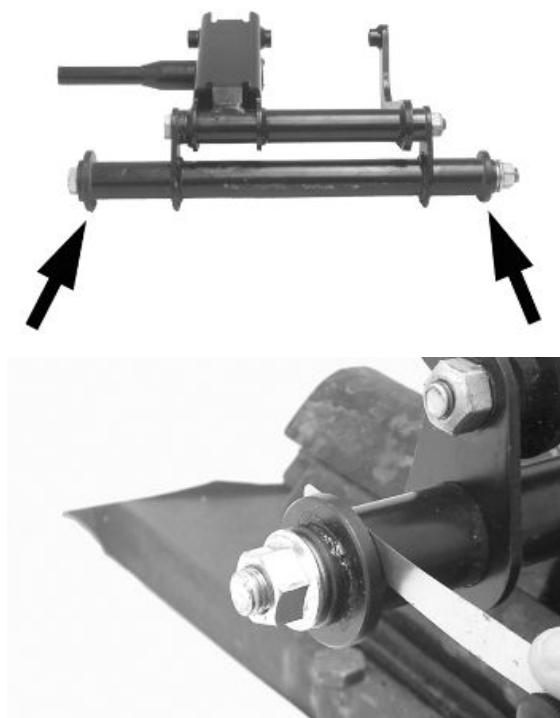
standard clearance

0.40 ÷ 0.70 mm

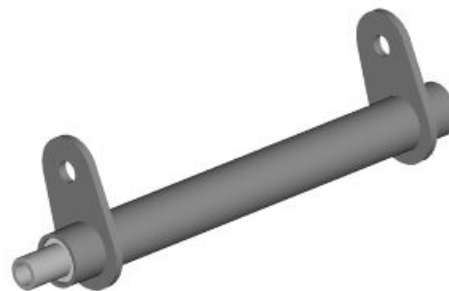


- In order to check the clearance of the swinging arm on the frame side, prepare a retainer using the fixing pin of the swinging arm on the frame and two rings from the special tool 020229Y.

Alternatively, use two washers with inside diameter of 12 mm for pins, outside diameter min. 30 mm and thickness min. 4 mm.



- Separate the swinging arm on the engine side from the vehicle side arm.
- Remove the internal spacer shown in the photograph



- 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

020115Y Ø 18 punch

020244Y 15 mm diameter punch



SWINGING ARM SERVICE

Specification	Desc./Quantity
Length of the internal swinging arm spacer on the frame side	228 -0.2/-0.4 mm
Length of the internal swinging arm spacer on the engine side	183 0/-0.2 mm
Length of the swinging arm tube on the engine side	182.5 -0.1/-0.3 mm
Length of the swinging arm tube on the frame side	227.1 +0.2/0 mm

- Lubricate the roller bearing housings 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

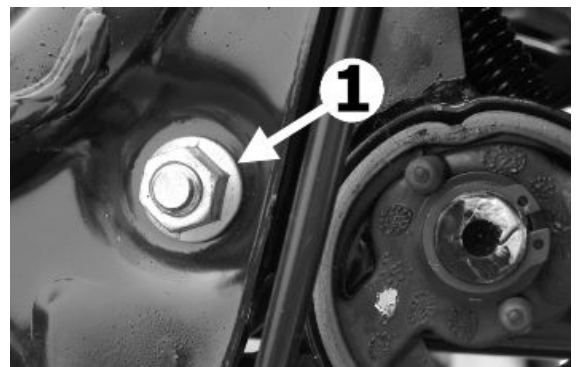
AGIP GREASE PV2 Grease for control levers on the engine

White anhydrous-calcium based grease to protect roller bearings; temperature range between -20 ° C and +120 °C; NLGI 2; ISO-L-XBCIB2

Refitting

For correct installation of the swinging arm on the scooter, proceed as follows:

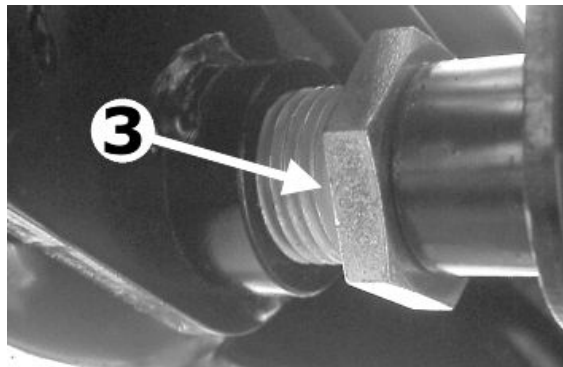
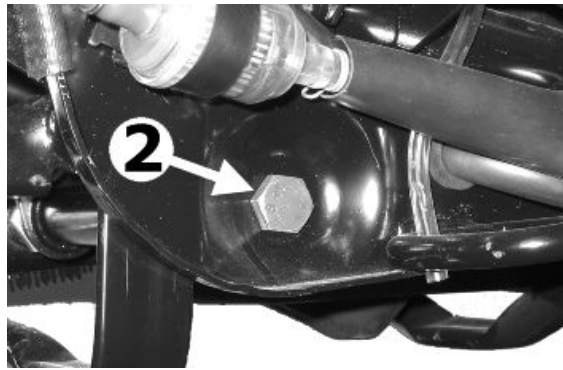
1. Position the silent block supporting clamp with part 3 inserted, and slightly tighten part 1
2. Position the swinging arm, inserting part 2
3. Tighten part 3 to the prescribed torque
4. Screw on and tighten part 4 to the prescribed torque



5. Screw on and tighten part 5 to the prescribed torque

6. Tighten part 1 to the prescribed torque

Insert the swinging arm - engine bolt and tighten to the prescribed torque



SWINGING ARM FITTING

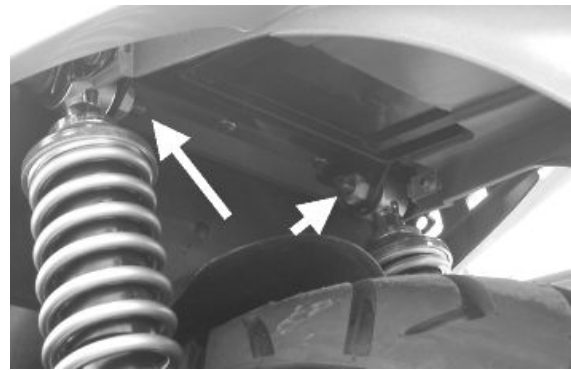
Name	Torque in Nm
Part 1	64 ÷ 72 Nm
Part 3	5 - 7 Nm
Part 4	90 ÷ 110 Nm
Part 5	64 ÷ 72 Nm
Engine-swinging arm bolt	64 - 72

Shock absorbers

Removal

Proceed as follows:

- place the scooter on its centre stand;
- lift the engine a little with a jack so as to free the two shock absorbers;
- remove the muffler
- 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.



See also

[Exhaust assy. Removal](#)

Refitting

Carry out the previous operations but in reverse order.

Locking torques (N*m)

Lower shock absorber clamp 33 ÷ 41 Upper shock absorber clamp 33 ÷ 41

Exhaust bracket

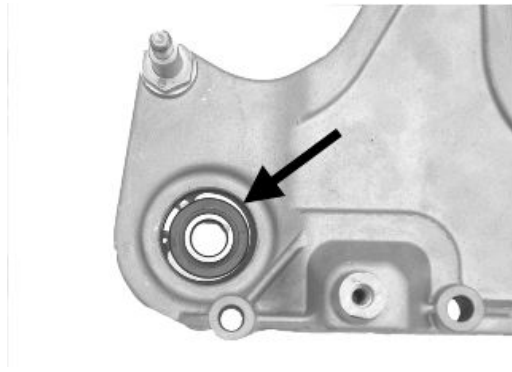
Removal

- Remove the exhaust silencer.
- Loosen and remove the lower retaining bolt of the right-hand shock absorber at the support arm.
- Undo the two screws fixing the arm to the engine.
- Remove the split pin and safety cover; unscrew the wheel axle nut; use the rear brake to prevent the wheel from turning.
- Remove the support arm.



Overhaul

- Remove the circlip shown in the photograph

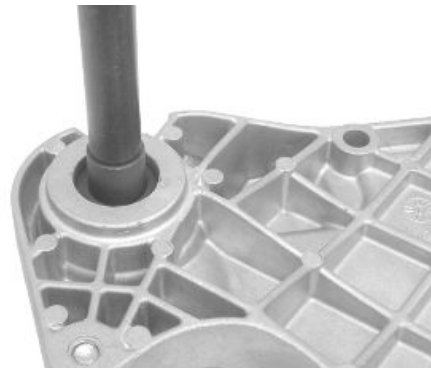


- Support the muffler support bracket sufficiently
- Using the special punch, remove the bearing from its seat as shown in the photograph

Specific tooling

020376Y Adaptor handle

020456Y Ø 24 mm adaptor



- Heat the bearing seat using the heat gun
- Using the special punch, install a new bearing in the seat as shown in the photograph

Specific tooling

020376Y Adaptor handle

020151Y Air heater



Refitting

To refit, carry out the removal operations in reverse order, observing the prescribed tightening torques.

Locking torques (N*m)

Rear wheel axle nut 104 ÷ 126 Muffler support arm to engine screws (*) 20 ÷ 25 Lower shock absorber clamp 33 ÷ 41

Centre-stand

- 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.
- On refitting tighten the nut to the specified torque.



Locking torques (N*m)

Centre stand bolt 32 ÷ 40

Side stand

Removal of the side stand

- Unhook the springs;
- Loosen the nut;
- Pull out the screw;

Fitting

Carry out the previous operations but in reverse order.

Locking torques (N*m)

Side stand fixing bolt 40 ÷ 45



INDEX OF TOPICS

BRAKING SYSTEM

BRAK SYS

Interventions rules

WARNING

BRAKING SYSTEM FLUID IS CORROSIVE: ALWAYS WEAR PROTECTIVE GLOVES. IN THE EVENT OF ACCIDENTAL CONTACT WITH YOUR EYES, RINSE THE CONTACT AREA WELL WITH ABUNDANT WATER.

THE BRAKE FLUID DRAINED FROM THE SYSTEM IS HARMFUL TO THE ENVIRONMENT. COLLECTION AND DISPOSAL MUST BE CARRIED OUT IN COMPLIANCE WITH THE REGULATIONS IN FORCE. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THE FLUID EVERY TWO YEARS. IF BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.

DURING INSTALLATION, THE PARTS TO BE REUSED MUST BE ABSOLUTELY CLEAN AND FREE FROM ANY TRACES OF OIL, FUEL AND GREASE: IT IS THEREFORE NECESSARY TO CLEAN THEM THOROUGH WITH DENATURED ALCOHOL.

N.B.

FOR TOPPING UP AND CHANGE, USE ONLY BRAKE FLUID DOT4 - NHTSA 116.

OBSERVE THE MAXIMUM DEGREE OF CLEANLINESS. HYDRAULIC FLUID IS EXTREMELY CORROSIVE FOR PAINTED SURFACES.

BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR.

IF THE MOISTURE CONTENT IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, IT WILL RESULT IN POOR BRAKING EFFICIENCY DUE TO A LOW BOILING POINT OF THE FLUID.

N.B.

ALWAYS USE FLUID FROM SEALED CONTAINERS.

N.B.

RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL LONGER THAN 20 SECONDS. AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH.

THE SEAL RINGS MUST BE IMMERSSED IN THE OPERATING FLUID; THE USE OF PRF1 PROTECTIVE DEVICE IS ALLOWED.

WARNING

THE PRESENCE OF BRAKE FLUID ON THE DISC OR BRAKE PADS REDUCES BRAKING EFFICIENCY. IN THIS CASE, REPLACE THE PADS AND CLEAN THE DISC WITH A HIGH-QUALITY SOLVENT.

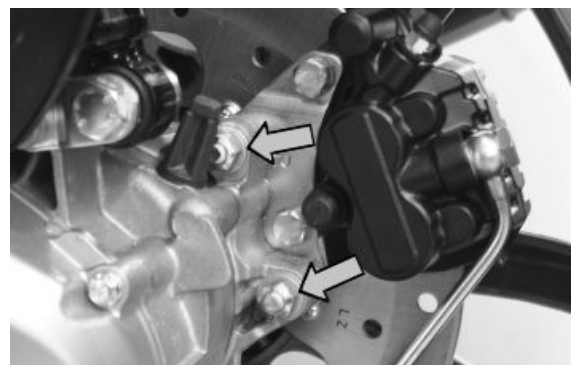
Rear brake calliper

Removal

- Remove the rear wheel.
- Remove the two rear brake calliper devices fastening them to the support as shown in the photograph.

N.B.

SHOULD THE BRAKE CALLIPER BE REPLACED, BEFORE REMOVING THE FITTINGS FIXING THE CALLIPER TO THE SUPPORTING BRACKET, FIRST LOOSEN THE OIL HOSE FITTING AFTER HAVING EMPTIED THE SYSTEM OF THE CIRCUIT BEING INSPECTED.



Refitting

- Follow the removal procedures but in reverse order and tighten to the prescribed torques with the recommended product.

Recommended products

Loctite 243 Medium strength threadlock

Loctite 243 medium-strength threadlock

Locking torques (N*m)

Screw tightening calliper to the support 42 ÷ 52

If the calliper is replaced:

CAUTION

ONCE REFITTING IS FINISHED, BLEED THE SYSTEM.

CAUTION

ALWAYS USE NEW COPPER WASHERS.

Locking torques (N*m)

Pipe - brake calliper union 20 ÷ 25

See also

[Rear - combined](#)

Front brake calliper

Removal

- Remove the two retainers fastening the front brake calliper to the support as shown in the photograph.

N.B.

SHOULD IT BE NECESSARY TO REPLACE THE CALLIPER, FIRST LOOSEN THE FITTING CONNECTING THE PIPE TO THE BRAKE CALLIPER.



Refitting

- To fit the calliper, follow the above operations but in reverse order.

Locking torques (N*m)

Screw tightening calliper to the support 20 ÷ 25

If the calliper is replaced:

CAUTION

ONCE REFITTING IS FINISHED, BLEED THE SYSTEM.

CAUTION

ALWAYS USE NEW COPPER WASHERS.

Locking torques (N*m)

Pipe - brake calliper union 20 ÷ 25

See also

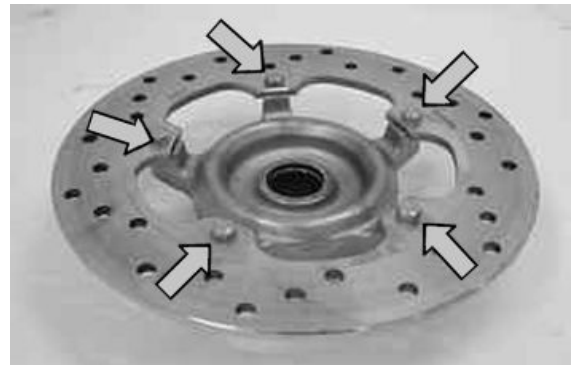
[Front](#)

Rear brake disc

Sui veicoli può essere presente la ruota posteriore con mozzo integrato oppure quella con mozzo separato dalla ruota.

Removal**RUOTA POSTERIORE CON MOZZO SEPARATO**

- Remove the rear wheel.
- Act on the disc five fixing screws shown in the photograph.

**See also**

[Removing the rear wheel](#)

Refitting**RUOTA POSTERIORE CON MOZZO SEPARATO**

- For the installation, position the disc correctly using the arrow stamped on it as reference.
- Tighten the screws to the prescribed torque and apply the recommended product.

N.B.

THE SURFACE OF THE DISC WITH THE STAMPED ARROW FOR THE DIRECTION OF ROTATION MUST FACE TOWARDS THE OUTSIDE OF THE SCOOTER.

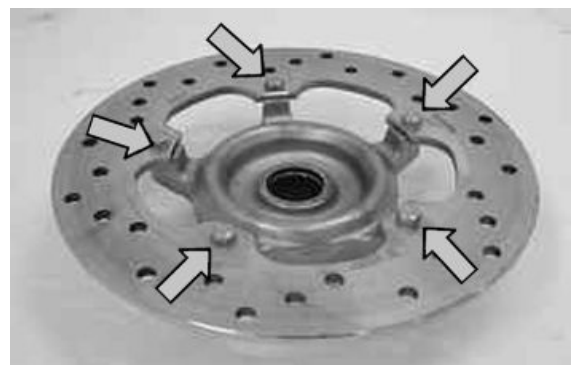
Recommended products

Loctite 243 Medium strength threadlock

Loctite 243 medium-strength threadlock

Locking torques (N*m)

Brake disc fixing screws 11 ÷ 13



Disc Inspection

Checking the disc is important; it must be perfectly clean, with no sign of rust, oil or grease or any other dirt, and must show no signs of deep scoring.

Characteristic

New rear disc thickness

4.0 mm

Disc thickness at wear limit (rear)

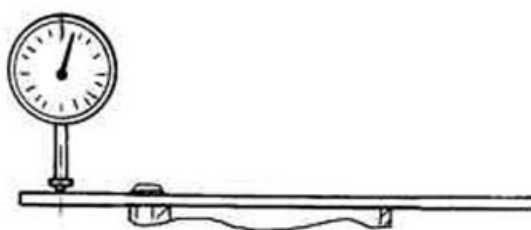
3.5 mm



- Controllare mediante attrezzatura apposita, che lo scostamento assiale della superficie frenante rientri nei parametri prescritti.

- In caso contrario sostituire il disco e rifare la prova.

WHEN INSTALLING, THOROUGHLY CLEAN THE DISC AND ITS SEAT ON THE HUB.



Characteristic

Max. axial run-out

0.1 mm

Front brake disc

Removal

Proceed as follows:

- Remove the front wheel.
- Loosen the five disc fixing screws.
- Thoroughly clean the seats on the front wheel hub and on the disc.



See also

[Removing the front wheel](#)

Refitting

For fitting, position the disc correctly using the arrow stamped on it as reference.

- Do up the screws to the prescribed torque and apply the recommended product

N.B.

THE ARROW STAMPED ON THE DISC INDICATING THE RUNNING DIRECTION MUST BE FITTED TOWARDS THE OUTSIDE OF THE VEHICLE.

Recommended products

Loctite 243 Medium strength threadlock

Loctite 243 medium-strength threadlock

Locking torques (N*m)

Brake disc screws 8 ÷ 10

Disc Inspection

Checking the disc is important; it must be perfectly clean, with no sign of rust, oil or grease or any other dirt, and must show no signs of deep scoring.



Characteristic

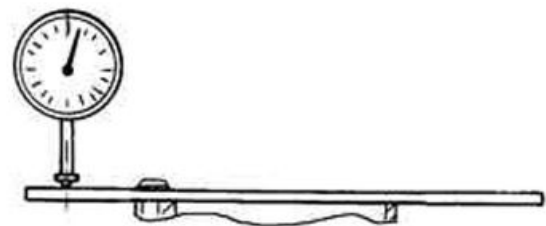
Thickness of a new front disc

4.0 mm

Disc thickness at wear limit (front)

3.5 mm

- Remove the wheel and check using the appropriate tools that the axial run-out of the brake surface is within the prescribed limits.
- If this is not the case, replace the disc and repeat the test.



WHEN INSTALLING, THOROUGHLY CLEAN THE DISC AND ITS SEAT ON THE HUB.

Characteristic

Max. axial run-out

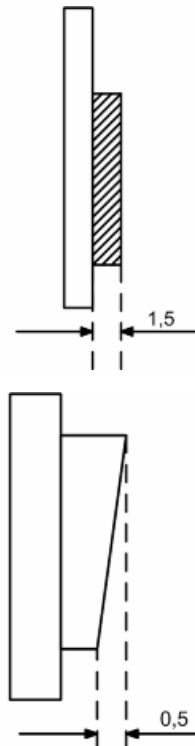
0.1 mm

Front brake pads

Removal

Proceed as follows:

- Remove the front calliper.
- Loosen the two pins shown in the figure that lock the two pads.
- Remove the pads, being careful with the pad spring clamp.
- Check the thickness of the friction material of the pads.
- Replace the pads if the thickness is below the minimum value.
- 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.



Characteristic Minimum value

1.5 mm

See also

[Front](#)
brake calliper

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

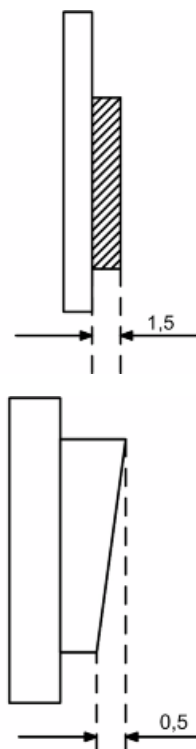
Loctite 243 medium-strength threadlock

Locking torques (N*m)

Pad fastening pin 19.6 ÷ 24.5

Rear brake pads**Removal**

- Remove the rear brake calliper
- Loosen the two pins shown in the figure that lock the two pads; be careful with the pad spring clamp.
- Remove the brake pad and check there are no faults or warping. Replace it if such anomalies are present.
- 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

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)

Pad fastening pin 19.6 ÷ 24.5

Fill

Rear - combined

- 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 brake lever, load the system and bring it up to the required pressure.
- Keeping the brake lever pulled, loosen the bleed screw to purge the air in the system. 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 cap over the bleed screw.
- Top up the brake fluid to the right level in the reservoir.

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)**

Oil bleed screw 12 - 16

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 brake lever, load the system and bring it up to the required pressure.
- Keeping the brake lever pulled, loosen the bleed screw to purge the air in the system. 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 cap over the bleed screw.
- Top up the brake fluid to the right level in the reservoir.

If necessary, bleeding can be done using a special vacuum pump

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Specific tooling**020329Y MityVac vacuum-operated pump****Locking torques (N*m)**

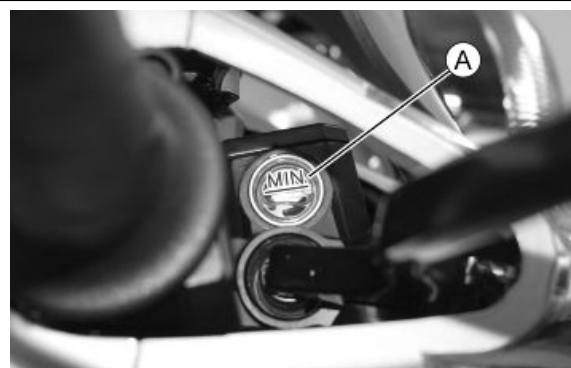
Oil bleed screw 12 - 16

Brake fluid level check

The front and rear brake fluid reservoirs are both positioned on the handlebars. Proceed as follows:

- Rest the vehicle onto the centre stand, with the handlebar centred.
- Check the fluid level through the sight glass «A».

A certain lowering of the level is caused by wear on the pads.



Front brake pump

Removal

- Remove the rear handlebar cover.
- Drain the brake system.
- Disconnect the brake fluid line from the pump, paying attention to a possible escape of remaining brake fluid.
- Remove the brake stop button from the lever.
- Undo the two U-bolt fixing screws.
- Remove the brake pump with the lever.



Refitting

- Upon refitting, perform the operation but in reverse order.
- Tighten the hydraulic line to the prescribed torque and purge the system.
- When the operation is over, tighten the brake fluid bleed screw to the prescribed torque.

N.B.

WHILE REFITTING, REPLACE THE COPPER GASKETS ON THEIR FITTINGS.

WARNING

BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF THE LEVEL OF MOISTURE IN THE FLUID EXCEEDS A GIVEN VALUE, BRAKING WILL BE INEFFICIENT. THEREFORE, ALWAYS USE FLUID FROM SEALED CONTAINERS. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THIS FLUID EVERY TWO YEARS. IF BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.

CAUTION

WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM BETWEEN THE BLEED SCREW AND ITS SEAT ON THE CALLIPER. CAREFULLY DRY THE CALLIPER AND DE-GREASE THE DISC SHOULD THERE BE BRAKE FLUID ON IT.

Locking torques (N*m)

Oil bleed screw 12 - 16 Hydraulic line fixing screw: 16 ÷ 20 Fixing screws for handlebar control assembly U-bolts 7 ÷ 10

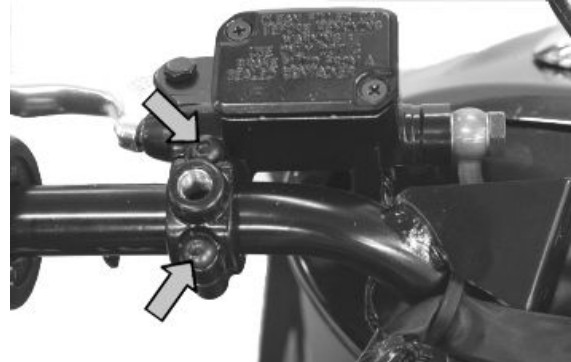
See also

[Front](#)

Rear brake pump - combined

Removal

- Remove the rear handlebar cover.
- Drain the brake system.
- Disconnect the brake fluid line from the pump, paying attention to a possible escape of remaining brake fluid.
- Remove the brake stop button from the lever.
- Undo the two U-bolt fixing screws.
- Remove the brake pump with the lever.



Refitting

- Upon refitting, perform the operation but in reverse order.
- Tighten the hydraulic line to the prescribed torque and purge the system.
- When the operation is over, tighten the brake fluid bleed screw to the prescribed torque.

N.B.

WHILE REFITTING, REPLACE THE COPPER GASKETS ON THEIR FITTINGS.

WARNING

BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF THE LEVEL OF MOISTURE IN THE FLUID EXCEEDS A GIVEN VALUE, BRAKING WILL BE INEFFICIENT. THEREFORE, ALWAYS USE FLUID FROM SEALED CONTAINERS. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THIS FLUID EVERY TWO YEARS. IF BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.

CAUTION

WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM BETWEEN THE BLEED SCREW AND ITS SEAT ON THE CALLIPER. CAREFULLY DRY THE CALLIPER AND DE-GREASE THE DISC SHOULD THERE BE BRAKE FLUID ON IT.

Locking torques (N*m)

Oil bleed screw 12 - 16 Hydraulic line fixing screw: 16 ÷ 20 Fixing screws for handlebar control assembly U-bolts 7 ÷ 10

See also

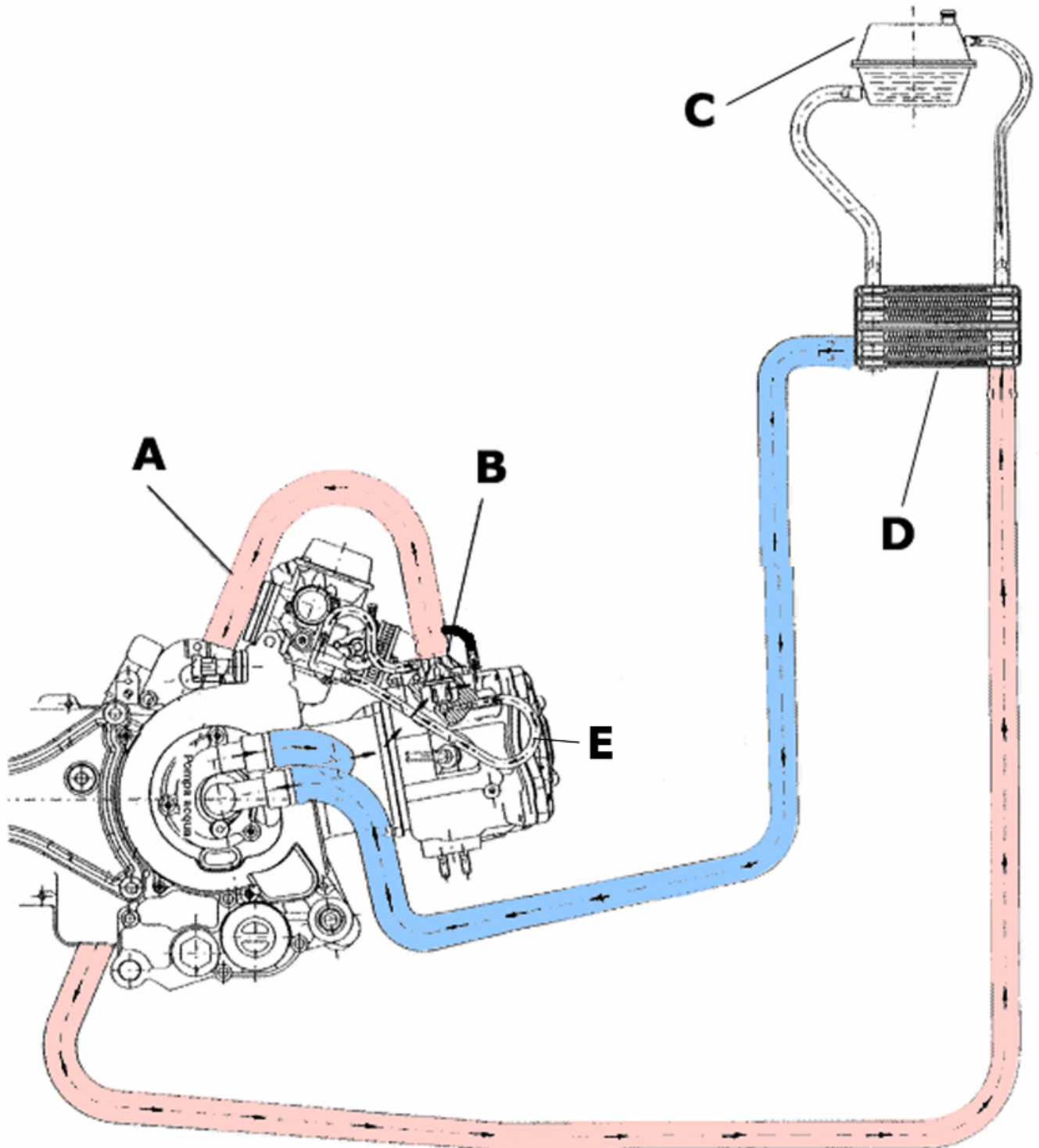
[Rear - combined](#)

INDEX OF TOPICS

COOLING SYSTEM

COOL SYS

Circuit diagram



COOLING CIRCUIT

Specification	Desc./Quantity
A	Fluid cooling circuit
B	Thermostat with By-Pass

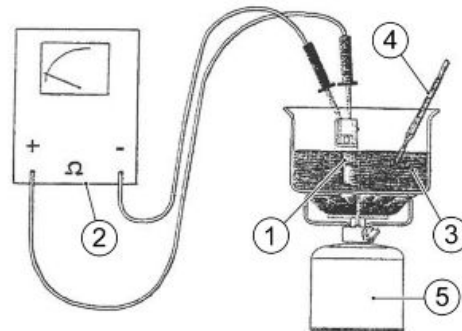
Specification	Desc./Quantity
C	Expansion tank
D	Radiator
E	Carburettor heating circuit

Electric fan check

- To check electric fan activation, with the key switch set to «ON», jump the Green-Black electrical terminals of the thermostwitch.

Thermostwitch operation check:

- Remove the front shield.
- Remove the thermostwitch «1».
- Connect a tester «2» (set as ohmmeter) to the thermostwitch «1» as shown in the figure.
- Immerse the thermostwitch in a container «3» with coolant.



- In the same container, immerse a thermometer «4» with a temperature range of 0°÷150° (32°÷302°F).
- Place the container on a stove «5» and warm up the coolant slowly.
 - Check that the temperature indicated on the thermometer and the thermostwitch value indicated on the tester correspond to the data on the table.

COOLANT TEMPERATURE °C (°F) / RESISTANCE VALUES (OHM)

Specification	Desc./Quantity
Less than 90° (194°)	Unlimited
More than 90° (194°)	0

System bleed

- Start up the engine until the operating temperature is reached.
- Remove the rubber hood over the bleed valve
- Obtain a rubber tube that is of the right length to connect the valve to the expansion tank
- Place one end of the pipe on the bleed valve and the other in the expansion tank
- Loosen the screw by **two** turns until the communication hole is revealed with the head as shown in the photo



- Wait until only coolant comes out of the rubber pipe so as to eliminate any air bubbles inside the circuit.
- Tighten the bleed valve respecting the maximum torque.
- Bring the coolant up to the correct level inside the expansion tank



Locking torques (N*m)

Bleed screw 3

INDEX OF TOPICS

CHASSIS

CHAS

Seat

- Remove the saddle by loosening the three retaining screws indicated in the figure;



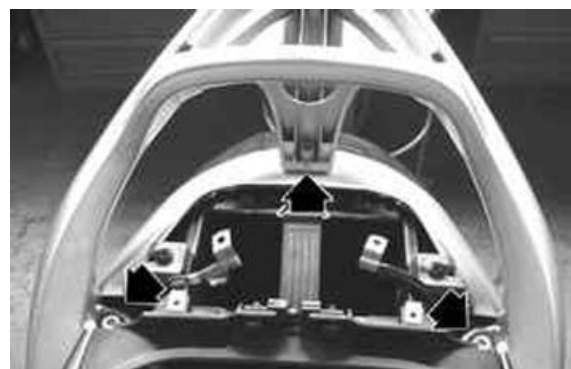
Side fairings

- Remove side bumpers by removing the mounting screws shown in the figure (one on each side).



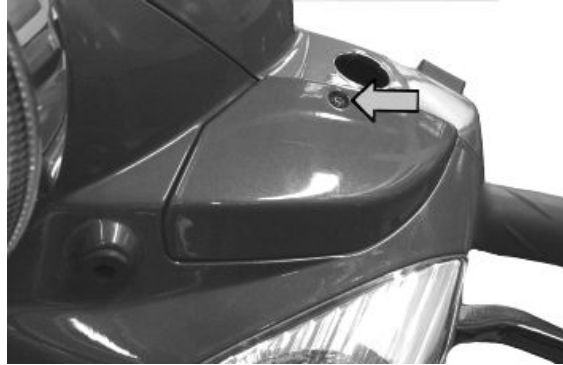
Rear rack

- Loosen the two mounting screws and remove the battery cover.
- Remove the plastic cover of the rear luggage rack by removing the two side screws from the lower side of the rack.
- Loosen the 3 hexagonal retaining screws indicated in the figure and remove luggage rack.



Rear handlebar cover

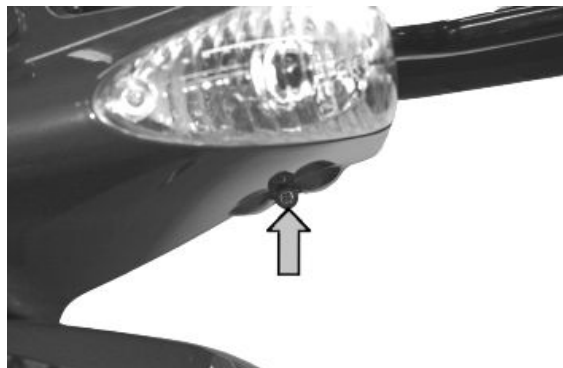
- Remove the windshield.
- Remove the rear-view mirrors.
- On both sides of the handlebar undo the screw indicated and remove the brake pump compartment inspection cover.



-
- Undo the screw indicated.



-
- From below undo the screw fixing it to the front handlebar cover.

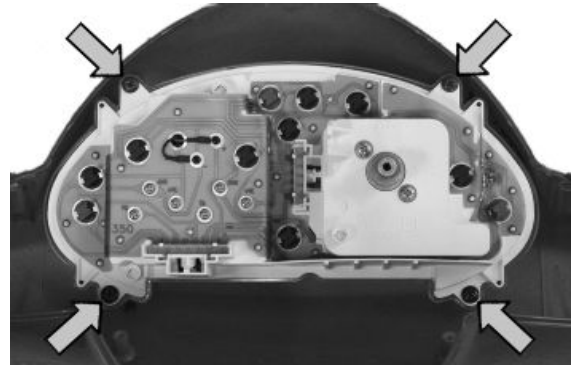


-
- Undo the two screws fixing it to the frame.
 - Remove the rear handlebar cover after disconnecting the electrical connectors and the odometer cable.



Instrument panel

- Remove the rear handlebar cover.
- Undo the four screws shown in the photograph.
- Remove the instrument panel.

**See also**

[Rear handlebar cover](#)

Front handlebar cover

- Remove the rear handlebar cover.
- Disconnect the electrical connectors of the headlamp and turn indicators.
- Undo the five screws indicated and remove the headlight assembly and the front handlebar cover.



- During the fitting stage, make sure that the retainer clamp indicated is placed correctly.



Headlight assy.

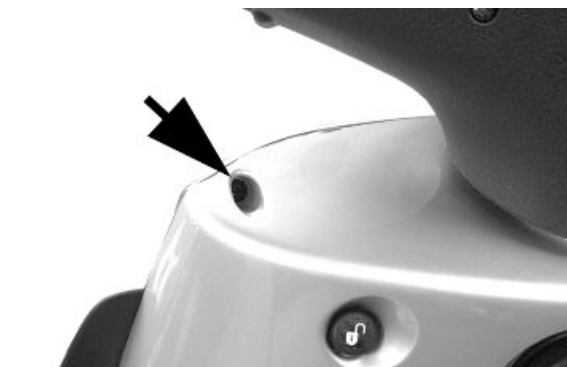
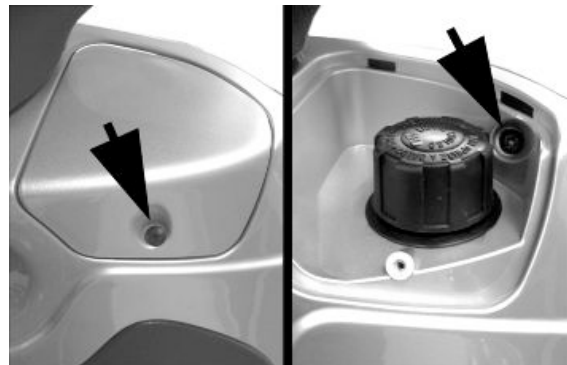
Frame central cover

- Open the fuel tank access port.
 - Loosen the 4 screws shown in the figure.
 - At the same time, remove the fuel tank cap.
- Remove the frame central cover by sliding it from the rear side of the scooter and disconnecting it from the cover opening transmission.



Legshield

- Remove the fixing screw of the expansion tank access cover.
- Unscrew the 2 fixing screws on the upper part of the shield back plate indicated in the figure.
- Undo the 2 fixing screws to the wheel housing.



- Remove the central frame cover, then unscrew the 2 screws indicated in the figure.
- Remove the Piaggio symbol from the shield, then remove the screw.
- Remove the legshield to the front.



- To reassemble, follows the steps in reverse order, paying attention to the correct seating of the shield on the shield back plate.



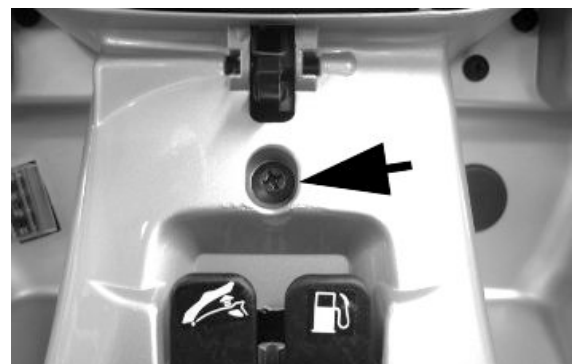
See also

Headlight assy.

[Frame central cover](#)

Knee-guard

- Remove the legshield.
- Undo the two screws fixing the fuse box to the front glove-box.
- Remove the electrical connections.
- Remove the expansion tank.
- Undo the fixing screw inside the glove-box.



- Disconnect the saddle closing mechanism.
- Remove the rear shield with the glove box.

**See also**

[Legshield](#)

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.
- To refit, proceed in the reverse order.

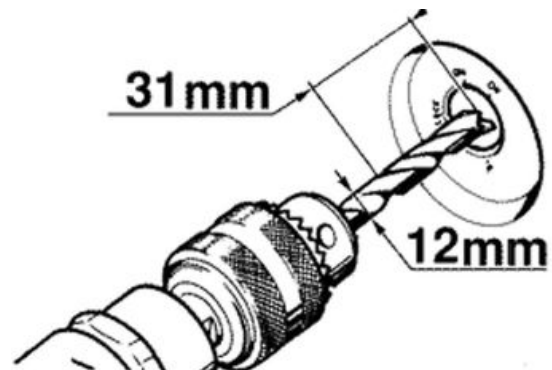
**See also**

[Knee-guard](#)**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.

TO REFIT THIS ITEM, THE SCOOTER STEERING LOCK MUST BE RELEASED WITH THE LOCK BODY (INTERNAL AND EXTERNAL PART) IN POSITION "OFF". PROCEED AS DESCRIBED IN THE PREVIOUS PARAGRAPH.

**See also**

[Removing the ignition key-switch when on *off*](#)

Front wheel housing

- Remove the shield back plate.
- Remove the footrests.
- Remove the front suspension.
- Loosen the remaining retaining screws holding the central chassis cover.
- Remove the radiator cover.

**See also**

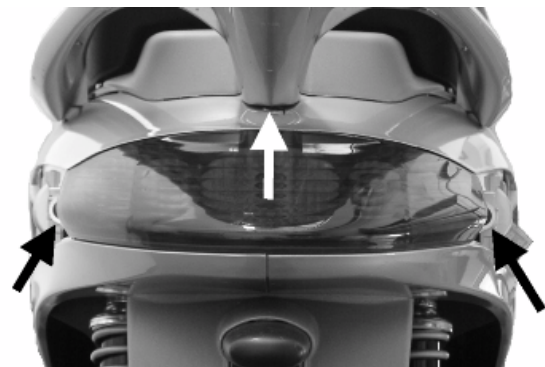
[Knee-guard](#)

[Removing the front wheel](#)

[Footrest](#)

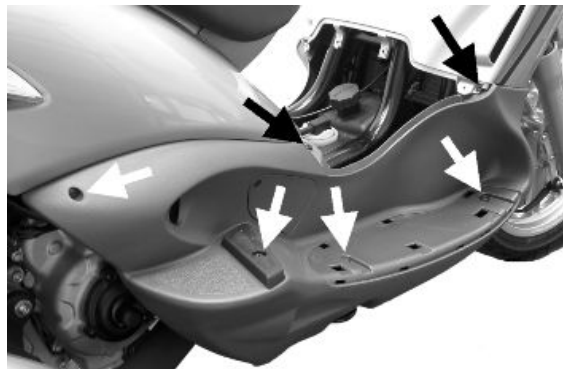
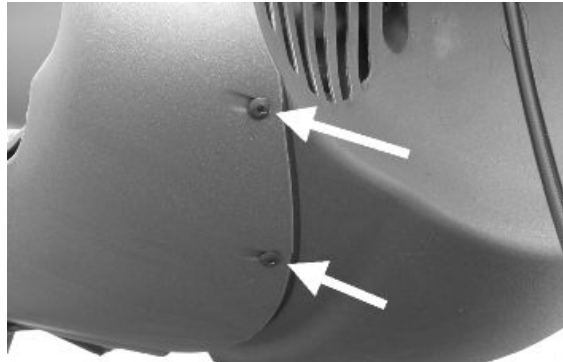
Taillight assy.

- Remove the cover of the luggage rack (snapped-in).
- Remove the side bumpers.
- Unscrew the 3 screws holding the rear light.
- Remove the rear light assembly after disconnecting the electrical cable harness.

**See also**

[Side fairings](#)**Footrest**

- Remove the central cover.
- Remove the RHS footrest mat.
- Loosen the eight footrest mounting screws.
- Remove the RHS footrest.
- Repeat the same operations for the LHS footrest.

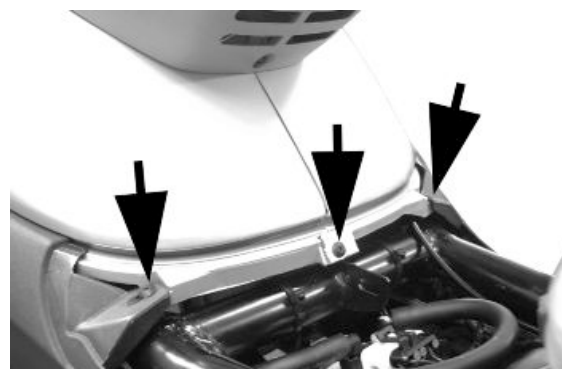
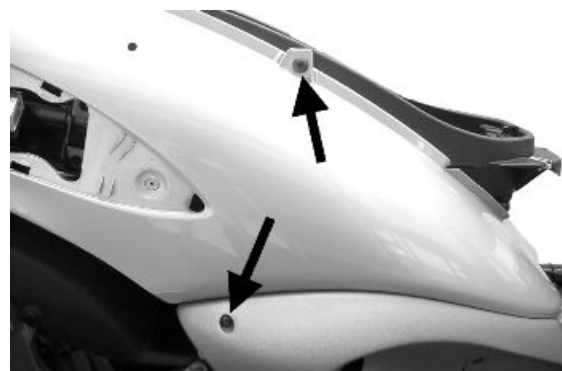
**See also**

[Frame central cover](#)
[Frame central cover](#)

Side fairings

- Remove the saddle.
- Remove the luggage rack.
- Remove the central cover.
- Remove the rear light assembly.
- Remove the cover under the saddle by loosening the retaining screw located under the saddle mounting plate.
- Loosen the 6 side-fairing fixing screws indicated in the 3 photographs.
- Remove the fairings.



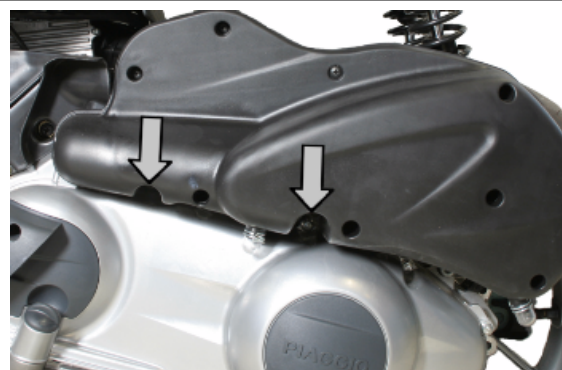


See also

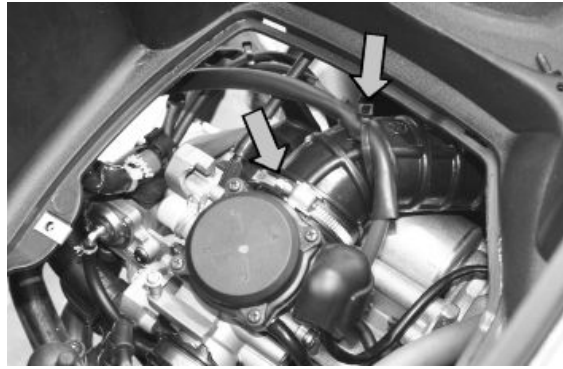
- [Seat](#)
- [Rear rack](#)
- [Frame central cover](#)
- [Taillight assy.](#)
- [Rear rack](#)
- [Seat](#)
- [Taillight assy.](#)
- [Frame central cover](#)

Air filter

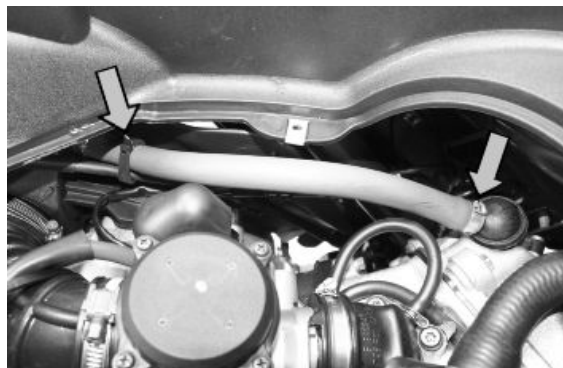
- Undo the two screws indicated.



- Reach the inspection compartment inside the helmet compartment.
- Disconnect the two manifold clamps.



- Disconnect the two clamps connecting the blow-by tube.



Rear mudguard

- Loosen the 4 fixing screws, 2 of which are indicated in the figure and the other 2 located on the opposite side under the air filter;
- Remove the rear mudguard.



Helmet bay

- Remove the side fairings;
- Disconnect the electrical connections;
- Undo the 8 fixing screws, 4 of which are inside the compartment;
- Remove the license plate holder support by undoing the 4 fixing screws shown in the figure and disconnecting the electrical cable harness;
- Remove the helmet compartment.



Fuel tank

- Remove the shield back plate.
- Remove the front wheel housing.
- Remove the footrest.

N.B.

THIS OPERATION SHOULD PREFERABLY BE PERFORMED WITH THE TANK EMPTY.



- Separate the electrical connections of the fuel gauge and disconnect the fuel supply line and tank breather;
- Undo and remove the screw fixing the horn shown in the upper figure after disconnecting the electrical connection;
- Remove the toggle handles by loosening the 4 retaining screws;
- Remove the support bracket by loosening the 2 retaining screws of the bracket at the frame;
- Undo the two screws fixing the tank to the chassis;
- Remove the tank by tilting it downwards and pulling out from below.



See also

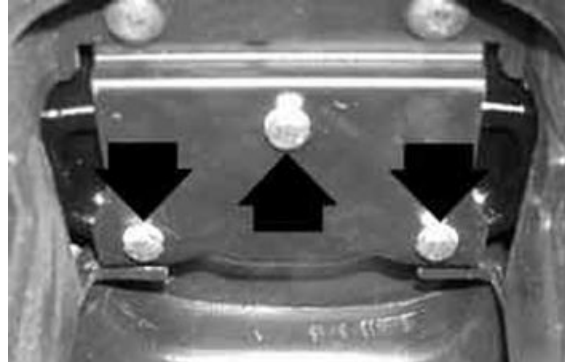
[Front wheel housing](#)

[Knee-guard](#)

[Footrest](#)

Front mudguard

- Remove the retaining screw of the cable lead through support on the right-hand side of the mudguard.
- Loosen the 3 fixing retaining screws indicated in the figure and remove the mudguard.



Radiator fan

- Remove the front wheel housing.
- Prepare a container for the coolant.
- Remove the expansion tank outlet and return pipes.
- Remove the coolant supply and return pipes from the radiator.
- Loosen the screw mounting the radiator to the frame.
- Disengage the radiator and the electric fan.



See also

[Front wheel housing](#)

Flyscreen

- Undo the screw indicated.



- Undo the four screws indicated and remove the windshield.



INDEX OF TOPICS

PRE-DELIVERY

PRE 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

- Visually check that there is a yellow mark on the following clamps:

FRONT SUSPENSION

- Front wheel pin nut
- Screw fixing wheel pin on right fork leg

FRONT BRAKE

- Screws fixing front brake callipers to fork
- Brake pipes to front brake callipers couplings

REAR SUSPENSION

- Rear wheel tightening screws
- Shock absorber lower clamp
- Upper shock absorber clamp
- Swinging arm - engine retainer
- Swinging arm - chassis retainer
- Nuts fixing muffler supporting arm - engine
- Screws fixing muffler to supporting arm

REAR BRAKE

- Screws fixing rear brake calliper to supporting plate
- Brake pipe / rear brake calliper coupling
- Screws fixing the support plate to engine

STAND

- Central stand bolt nuts
-

Electrical system

Electrical system:

- Main switch
-

- Headlamps: high beam, low beam, position and parking lights and the respective warning lights
- Adjusting the headlights according to the regulations currently in force
- Rear light, parking light, stop light
- Front and rear stop light switches
- Turn indicators and their warning lights
- Instrument panel lights
- Instrument panel: fuel and temperature indicator
- Instrument panel warning lights
- Horn
- Starter

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.

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE CAPS OF EACH CELL. KEEP THE BATTERY AWAY FROM NAKED FLAMES OR SPARKS WHILE IT IS CHARGED. REMOVE THE BATTERY FROM THE SCOOTER, DISCONNECTING THE NEGATIVE TERMINAL FIRST.

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 braking system fluid level.
 - Rear hub oil level
 - Engine coolant 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:

- Starting when warm
- Starter operation
- Minimum hold (turning the handlebar)
- Uniform turning of the steering
- Possible leaks

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:

Braking system (hydraulic)

- Lever travel

Braking system (mechanical)

- Lever travel

Clutch

- Proper functioning check

Engine

- Throttle travel check

Others

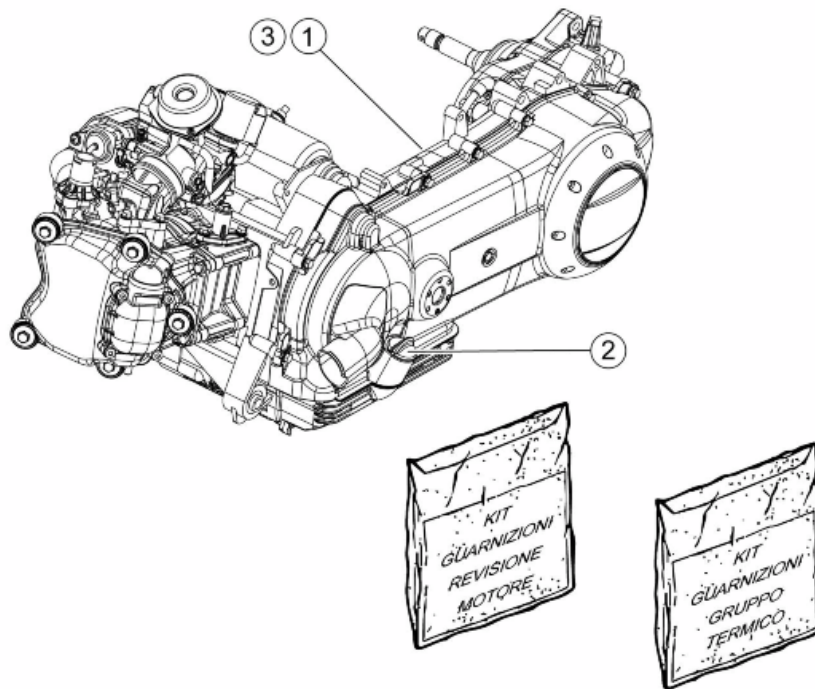
- Check documentation
 - Check the frame and engine numbers
 - Tool kit
 - License plate fitting
 - Check locks
-

- Check tyre pressures
 - Installation of mirrors and any accessories
-

INDEX OF TOPICS

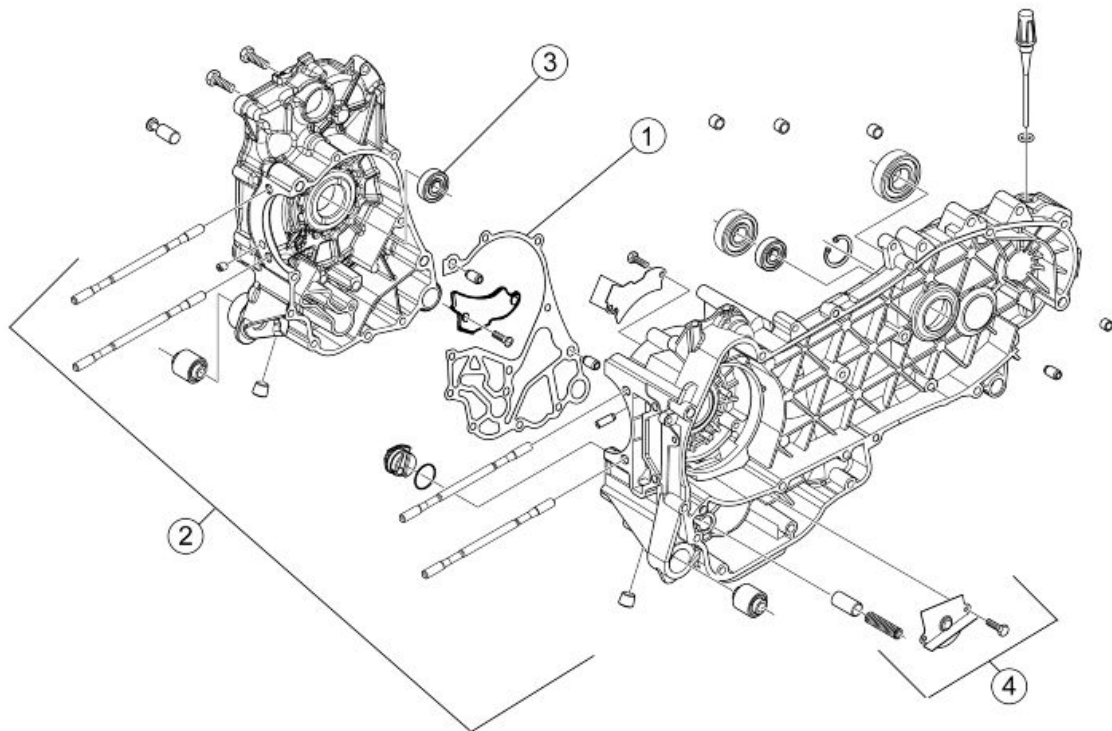
TIME

TIME

Engine
**ENGINE**

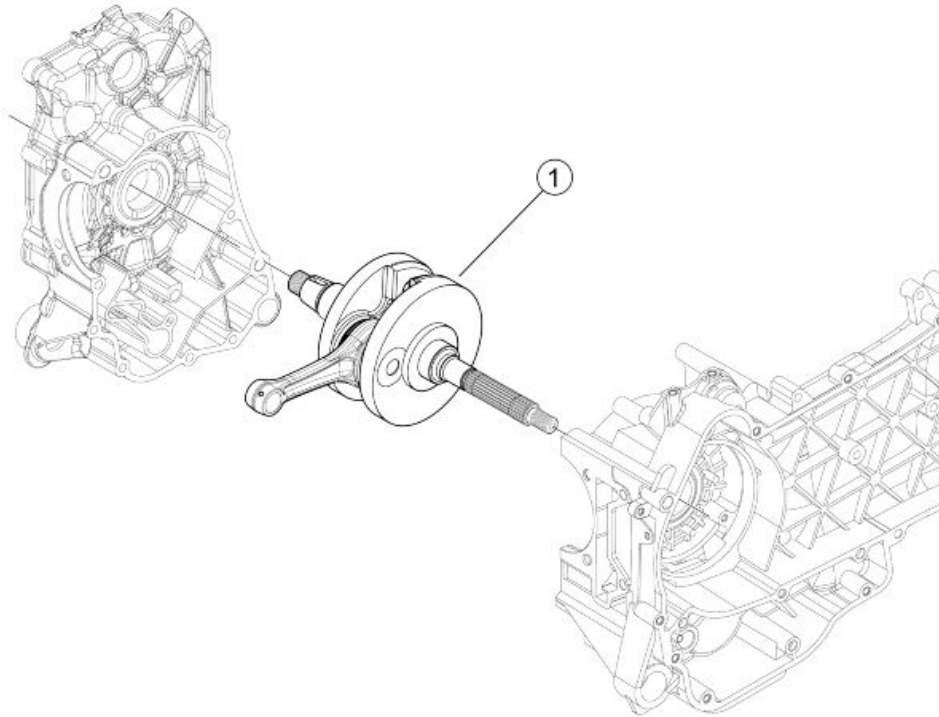
	Code	Action	Duration
1	001001	Engine from frame - Removal and re-fit.	
2	003064	Engine oil - Change	
3	003057	Engine retainer - Tighten nuts	

Crankcase



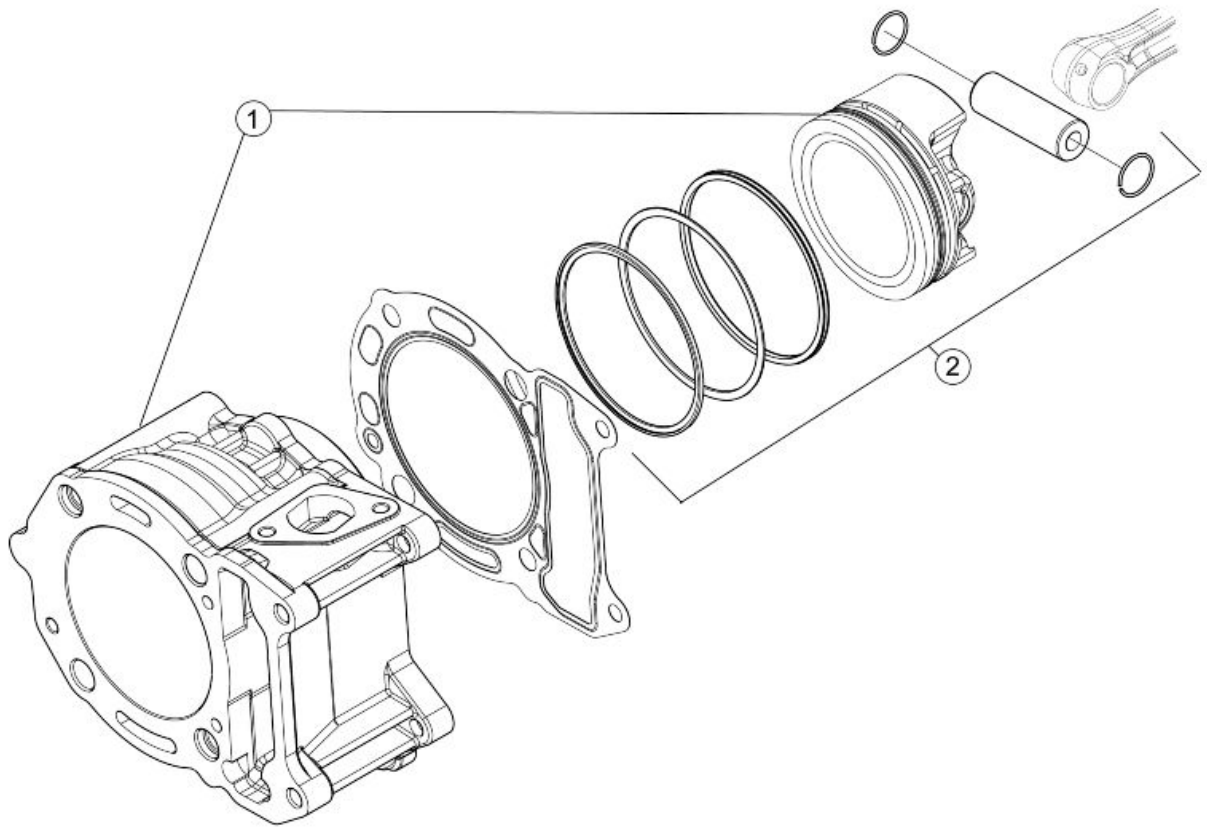
CRANKCASE

	Code	Action	Duration
1	001153	Crankcase halves gasket - Replacement	
2	001133	Engine crankcase - Replacement	
3	001099	Oil seal, flywheel side - Replacement	
4	001124	Lubrication by-pass - Replacement	

Crankshaft**CRANKSHAFT**

	Code	Action	Duration
1	001117	Crankshaft - Replacement	

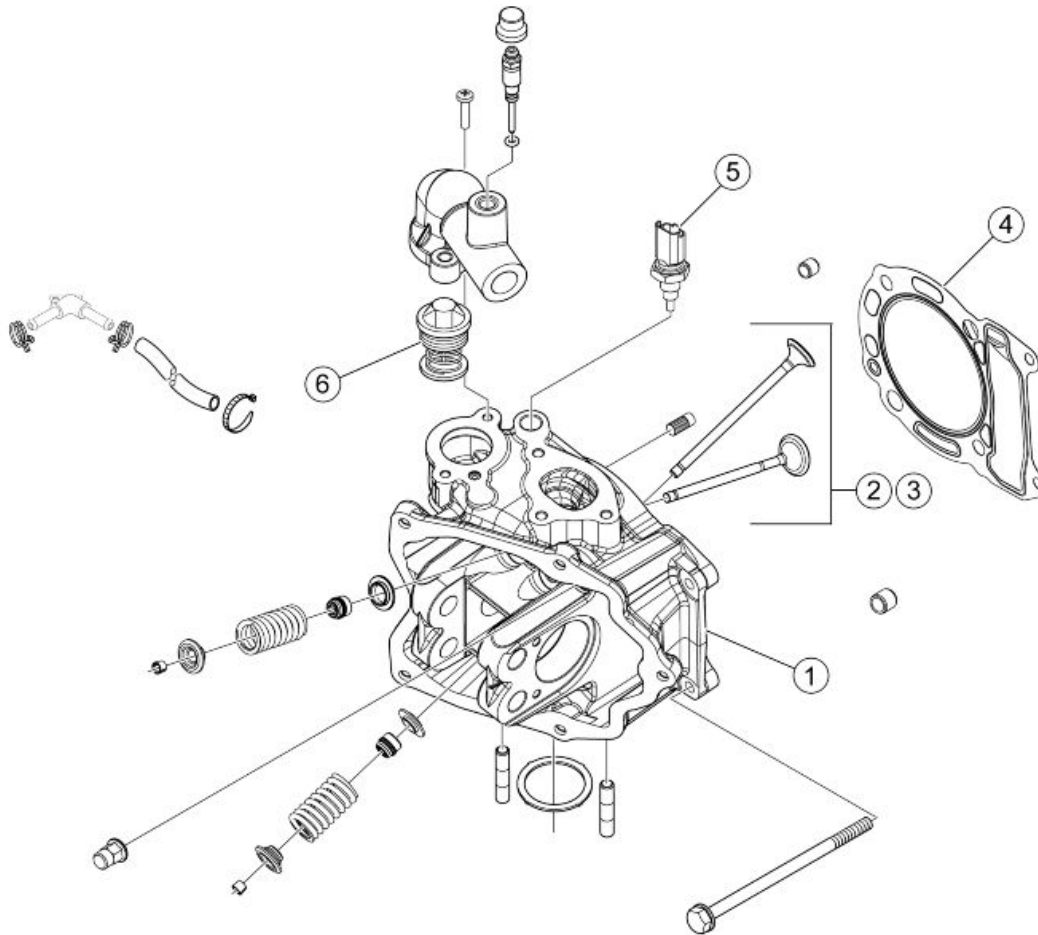
Cylinder assy.



CYLINDER- PISTON

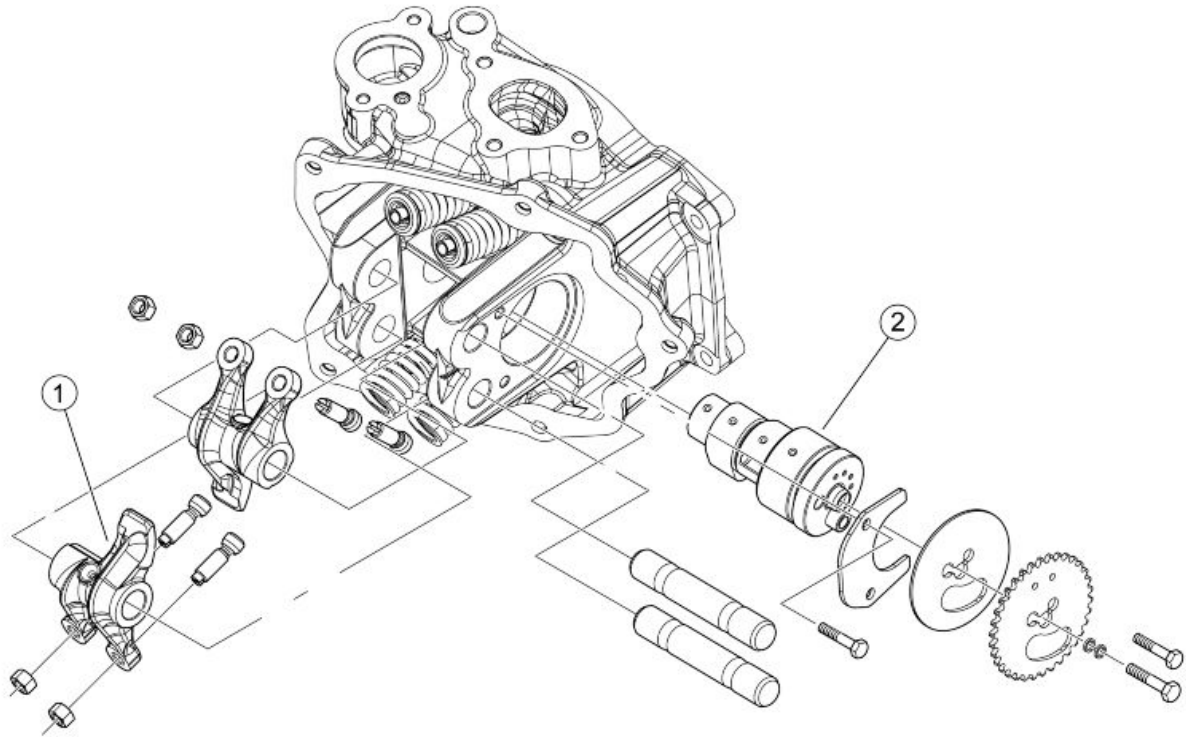
	Code	Action	Duration
1	001002	Cylinder-Piston - Replacement	
2	001154	Pin ring piston unit - Service	

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	

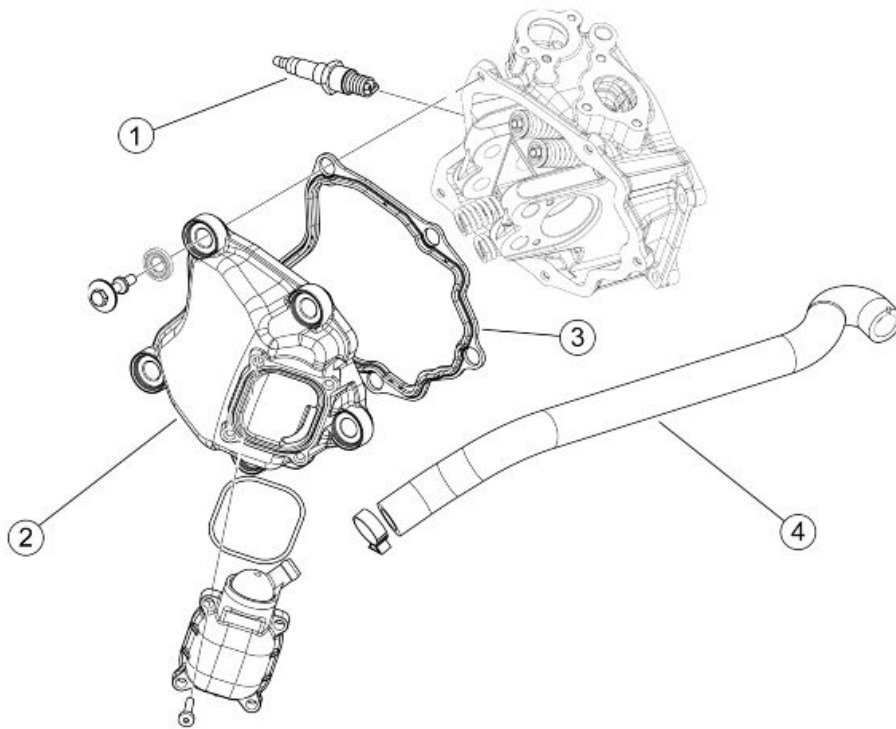
Rocker arms support assy.



CAMSHAFT - ROCKING LEVERS

	Code	Action	Duration
1	001148	Valve rocking levers - Replacement	
2	001044	Camshaft - Replacement	

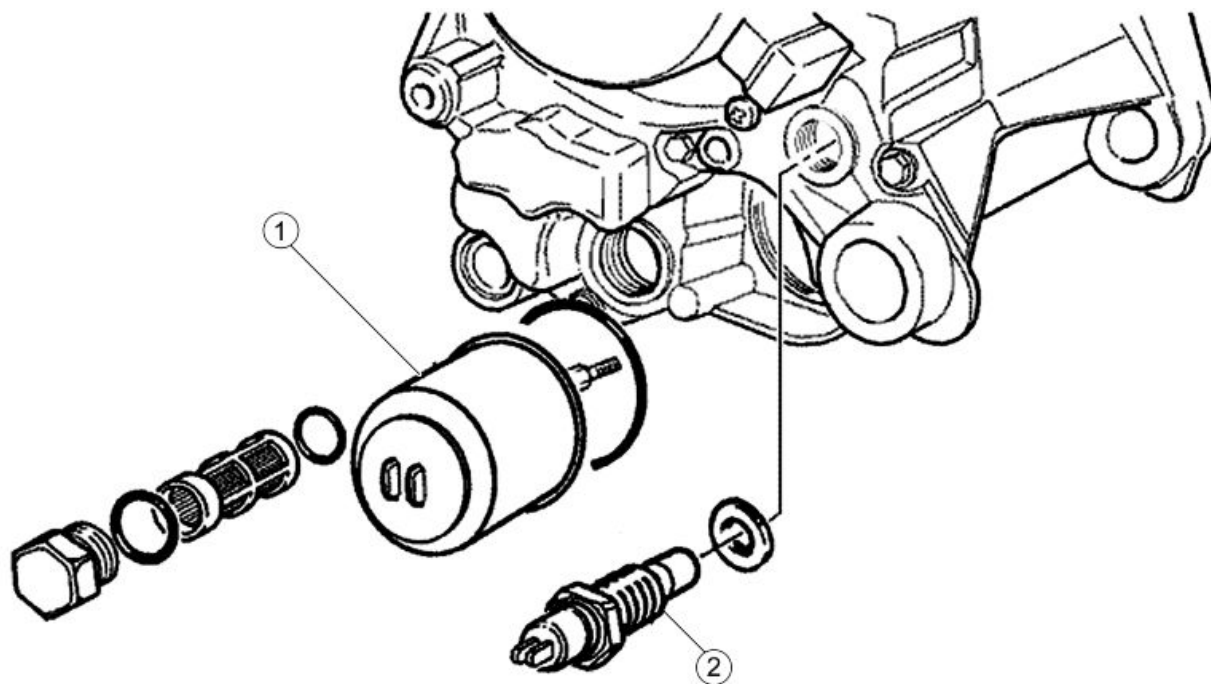
Cylinder head cover



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	

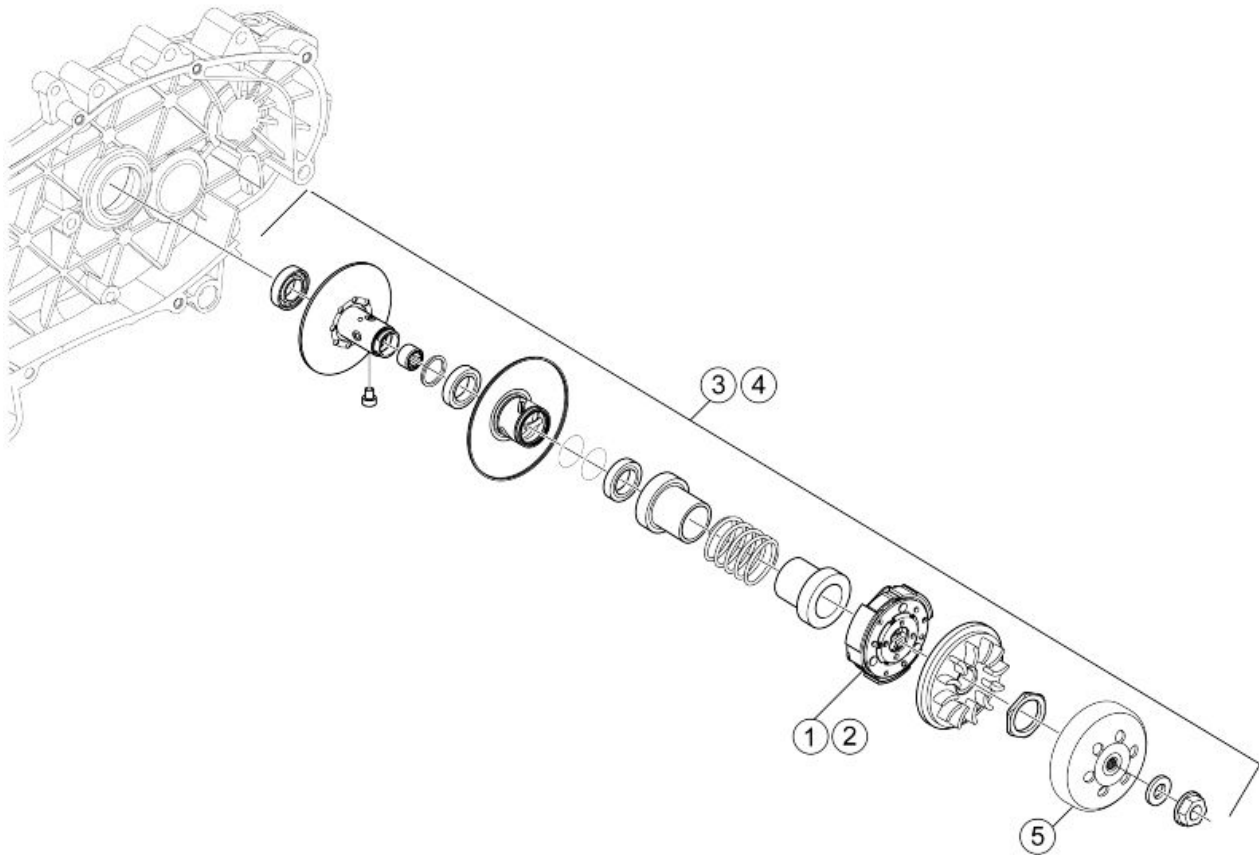
Oil filter



OIL FILTER

	Code	Action	Duration
1	001123	Oil filter - Replacement	
2	001160	Oil pressure sensor - Replacement	

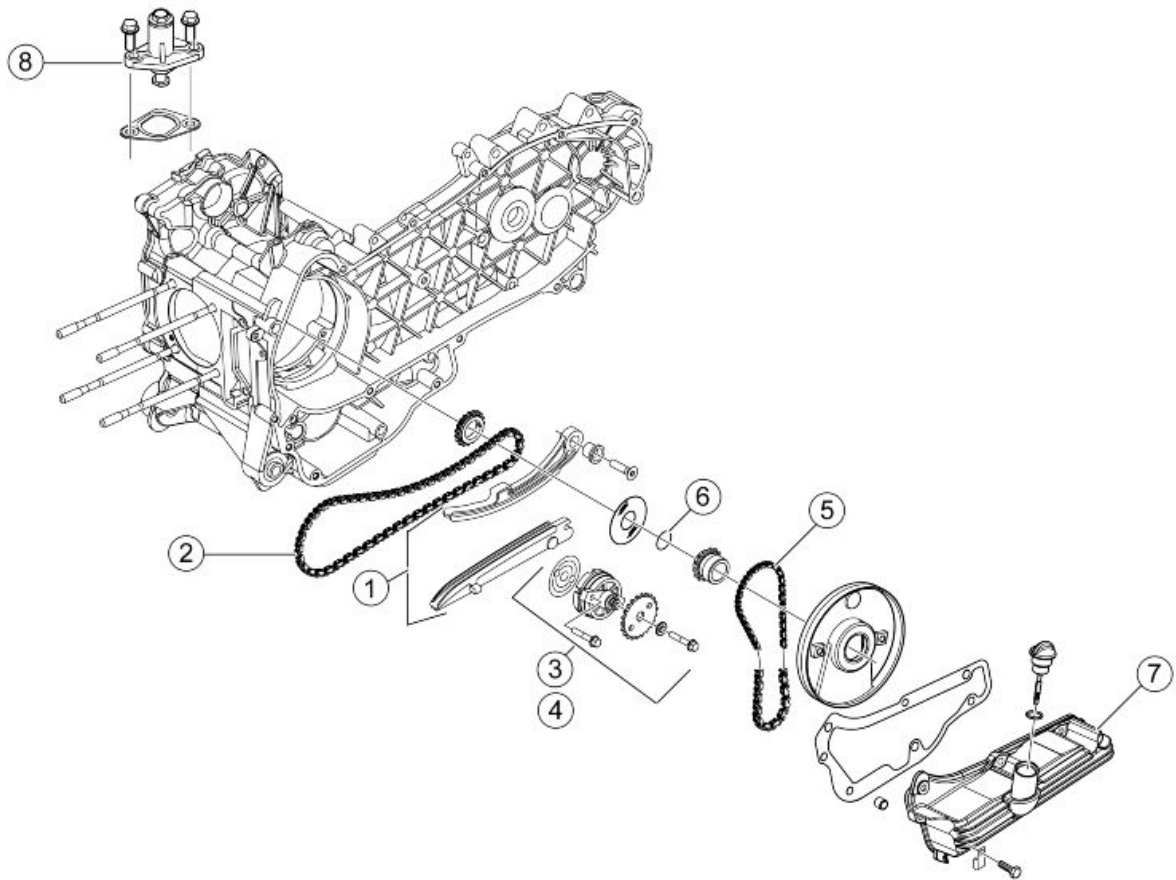
Driven pulley



DRIVEN PULLEY

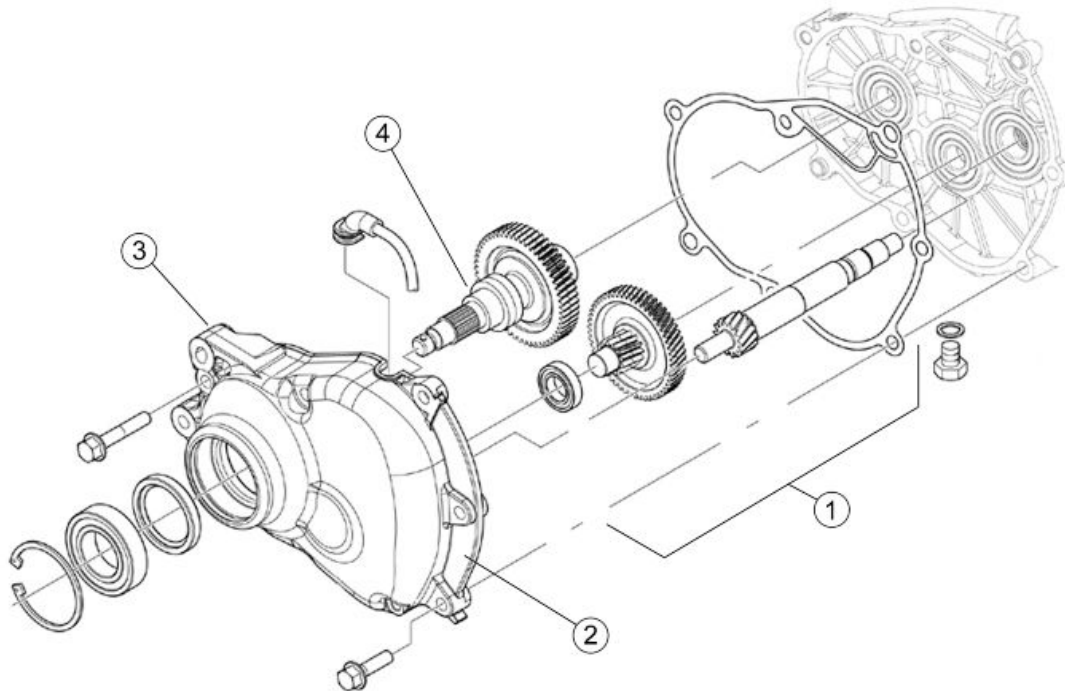
	Code	Action	Duration
1	001022	Clutch - Replacement	
2	003072	Clutch unit - Wear check	
3	001012	Driven pulley - Service	
4	001110	Driven pulley - Replacement	
5	001155	Clutch bell housing - Replacement	

Oil pump



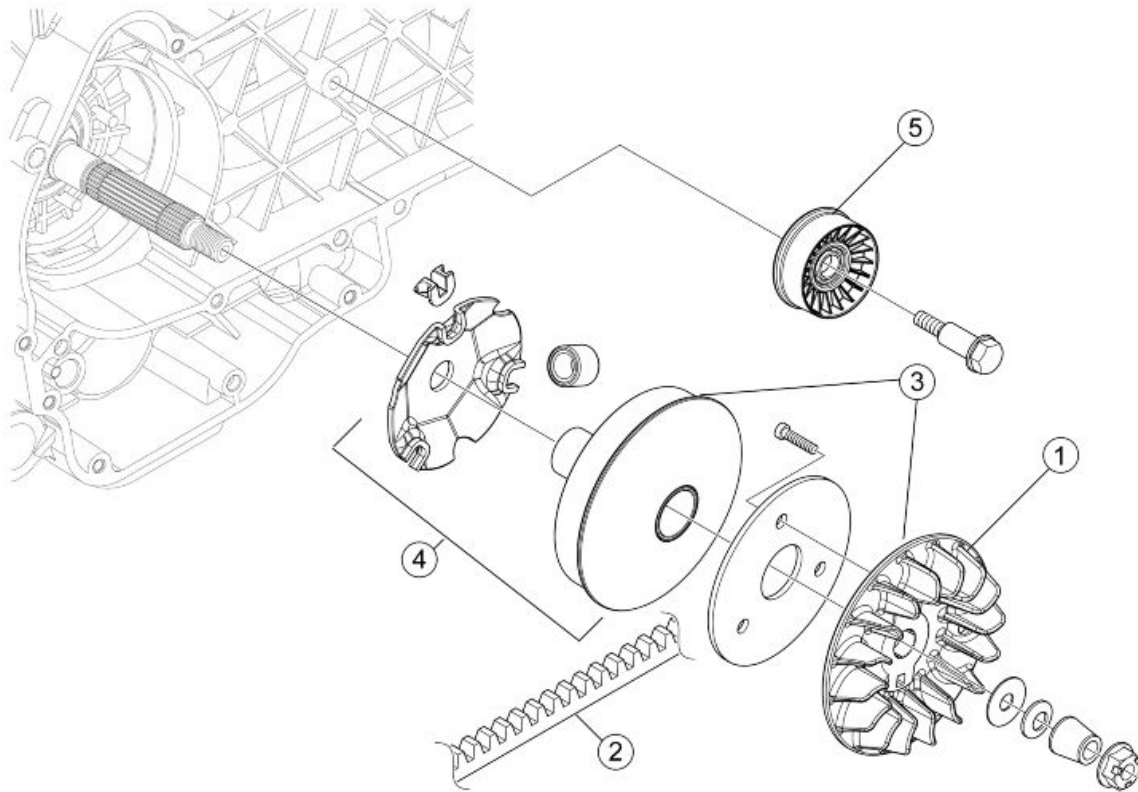
PUMP - OIL SUMP UNIT

	Code	Action	Duration
1	001125	Chain guide pads - Replacement	
2	001051	Belt/ Timing chain - Replacement	
3	001042	Oil pump - Service	
4	001112	Oil pump - Replacement	
5	001122	Oil pump chain - Replacement	
6	001121	Chain cover oil seal - Replacement	
7	001130	Oil sump - Replacement	
8	001129	Chain tightener - Overhaul and replacement	

Final gear assy.**FINAL REDUCTION**

	Code	Action	Duration
1	001010	Geared reduction unit - Service	
2	003065	Gear box oil - Replacement	
3	001156	Geared reduction unit cover - Replacement	
4	004125	Rear wheel axle - Replacement	

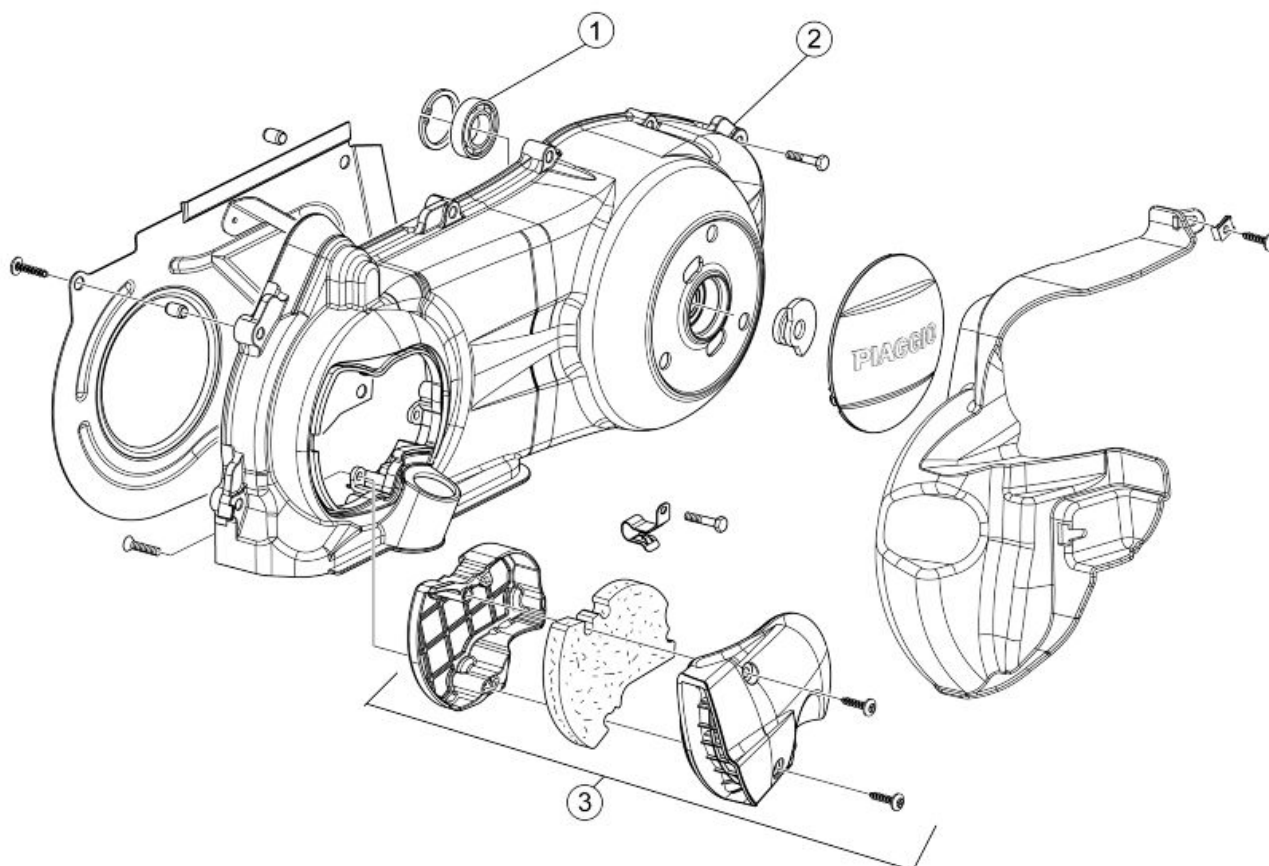
Driving pulley



DRIVING PULLEY

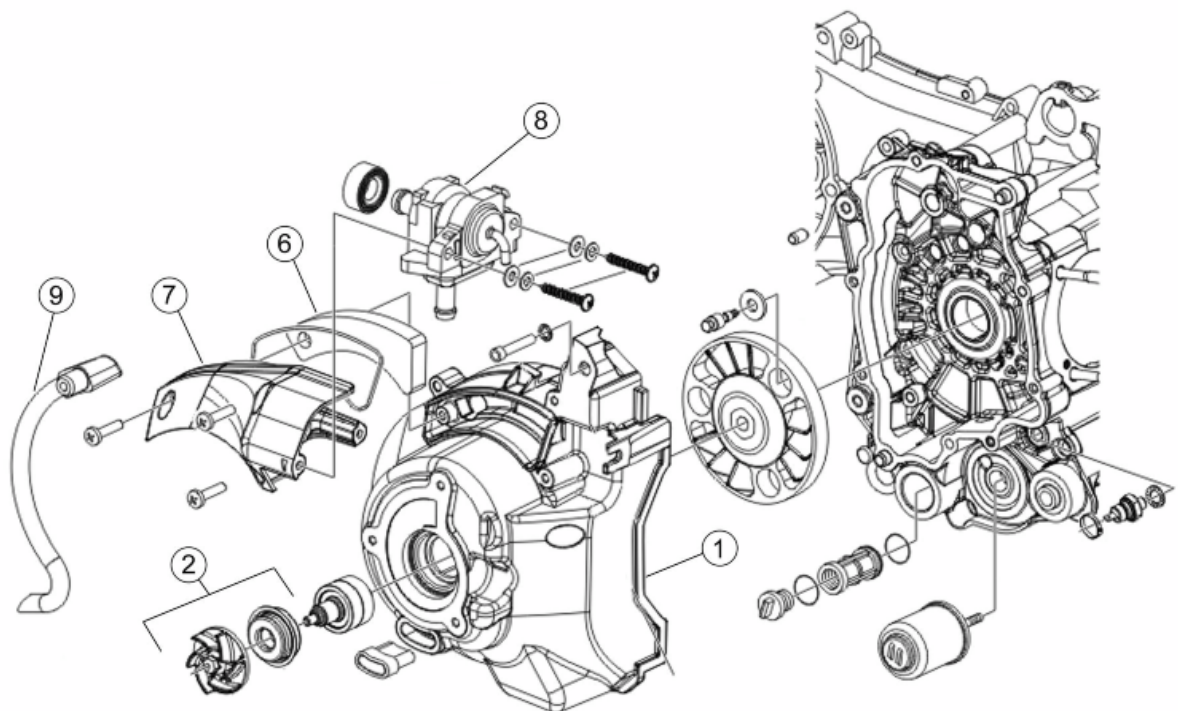
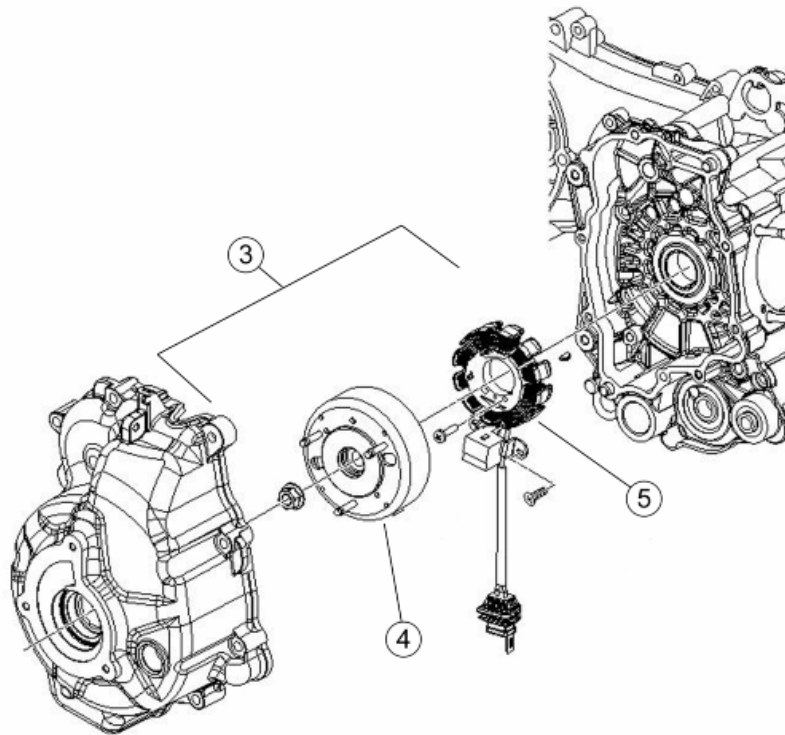
	Code	Action	Duration
1	001086	rear-view half-pulley - Replacement	
2	001011	Driving belt - Replacement	
3	001066	Driving pulley - Removal and Refitting	
4	001006	driving pulley - Service	
5	001141	Belt anti-flapping roller - Replacement	

Transmission cover

**TRANSMISSION COVER**

	Code	Action	Duration
1	001135	Transmission cover bearing - Replacement	
2	001096	Transmission crankcase cover - replace	
3	001131	Transmission air intake - Replacement	

Flywheel magneto

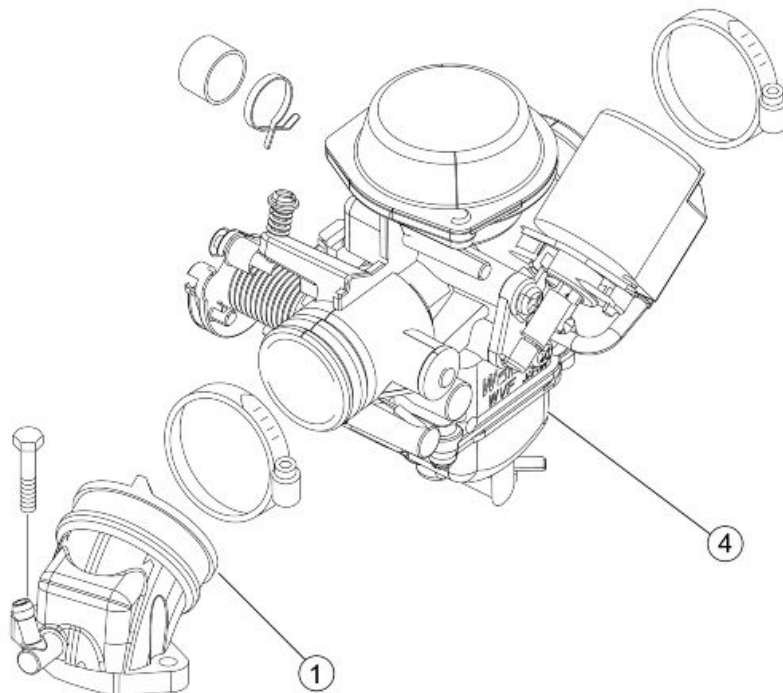


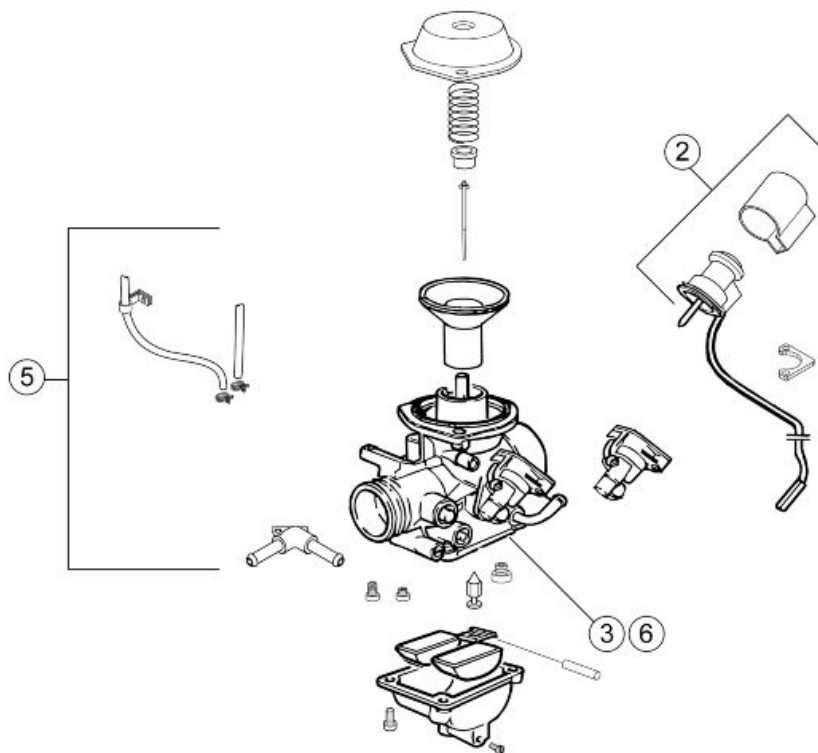
MAGNETO FLYWHEEL AND SECONDARY AIR

	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001113	Water pump / Pump rotor - Replacement	

	Code	Action	Duration
3	001058	Flywheel - Replacement	
4	001173	Rotor - Replacement	
5	001067	Stator - Replacement	
6	001161	Secondary air filter - Replacement / Cleaning	
7	001162	Secondary air housing - Replace- ment	
8	001174	SAS valve - Replacement	
9	001163	SAS valve / Head connection - Re- placement	

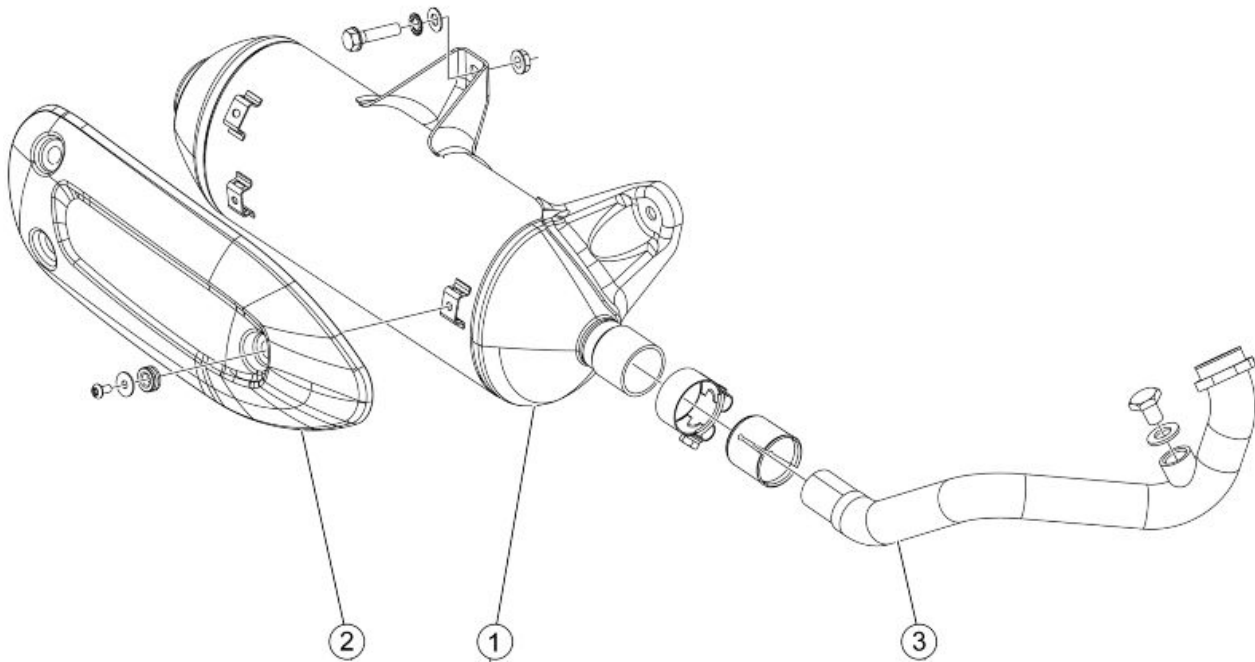
Carburettor





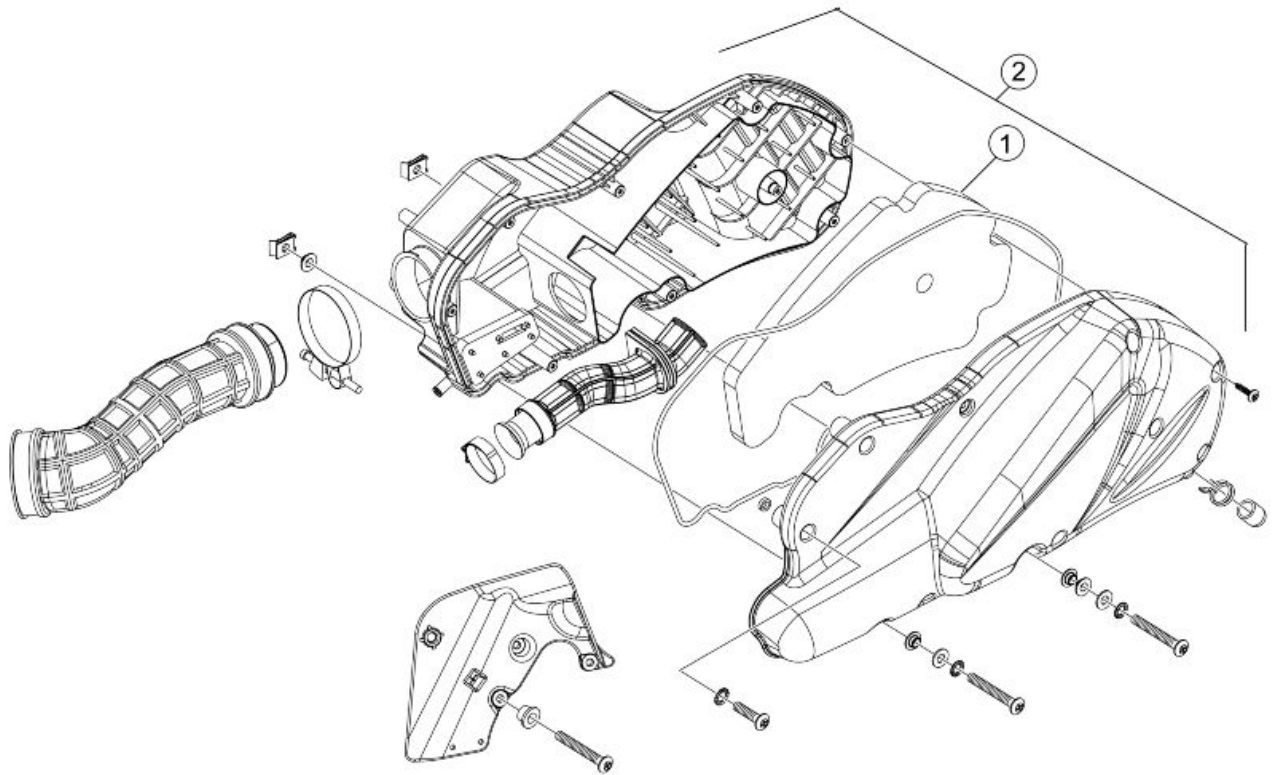
CARBURETTOR

	Code	Action	Duration
1	001013	Intake manifold - Replacement	
2	001081	Automatic choke - Replacement	
3	001008	Carburettor - Inspection	
4	001063	Carburettor - Replacement	
5	007020	Carburettor heating tubing - replacement	
6	003058	Carburettor - Adjustment	

Exhaust pipe**MUFFLER**

	Code	Action	Duration
1	001009	Muffler - Replacement	
2	001095	Muffler guard - Replacement	
3	001092	Exhaust manifold - Replacement	

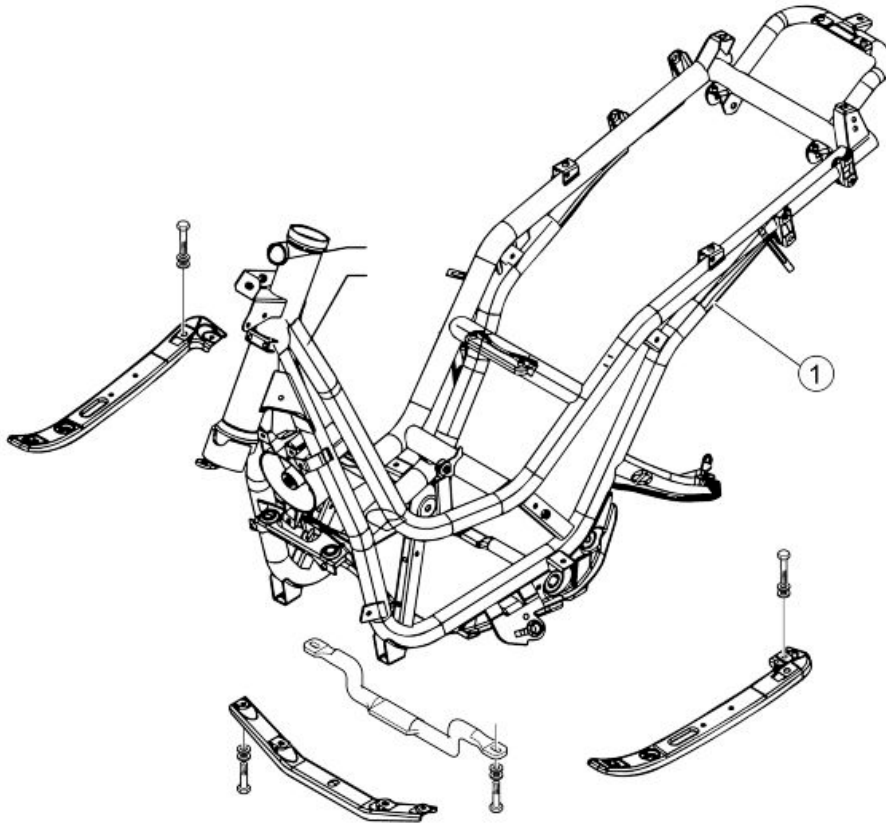
Air cleaner



AIR CLEANER

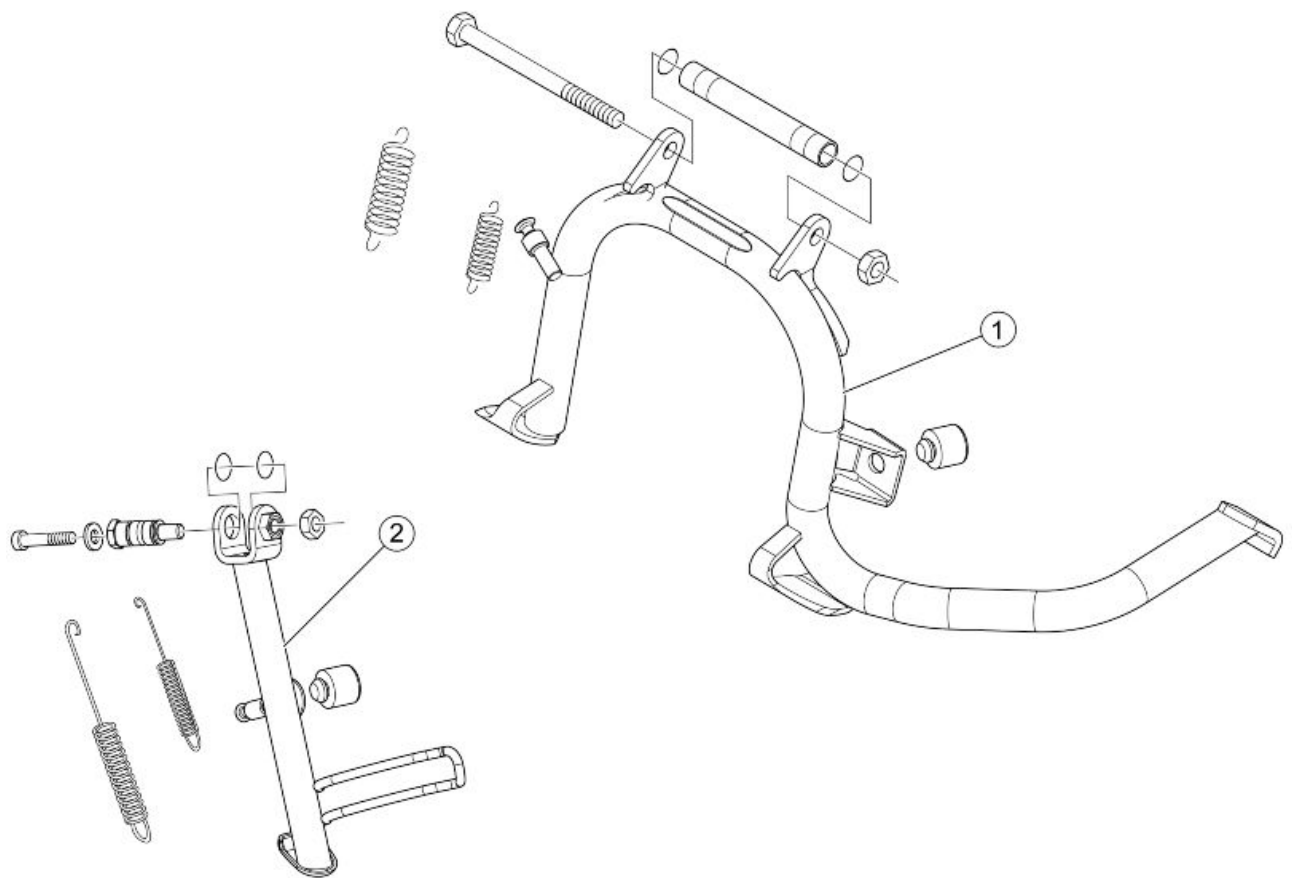
	Code	Action	Duration
1	001014	Air filter - Replacement/Cleaning	
2	001015	Air filter box - Replacement	
3	004122	Carburettor air cleaner attachment - Replacement	

Frame

**CHASSIS**

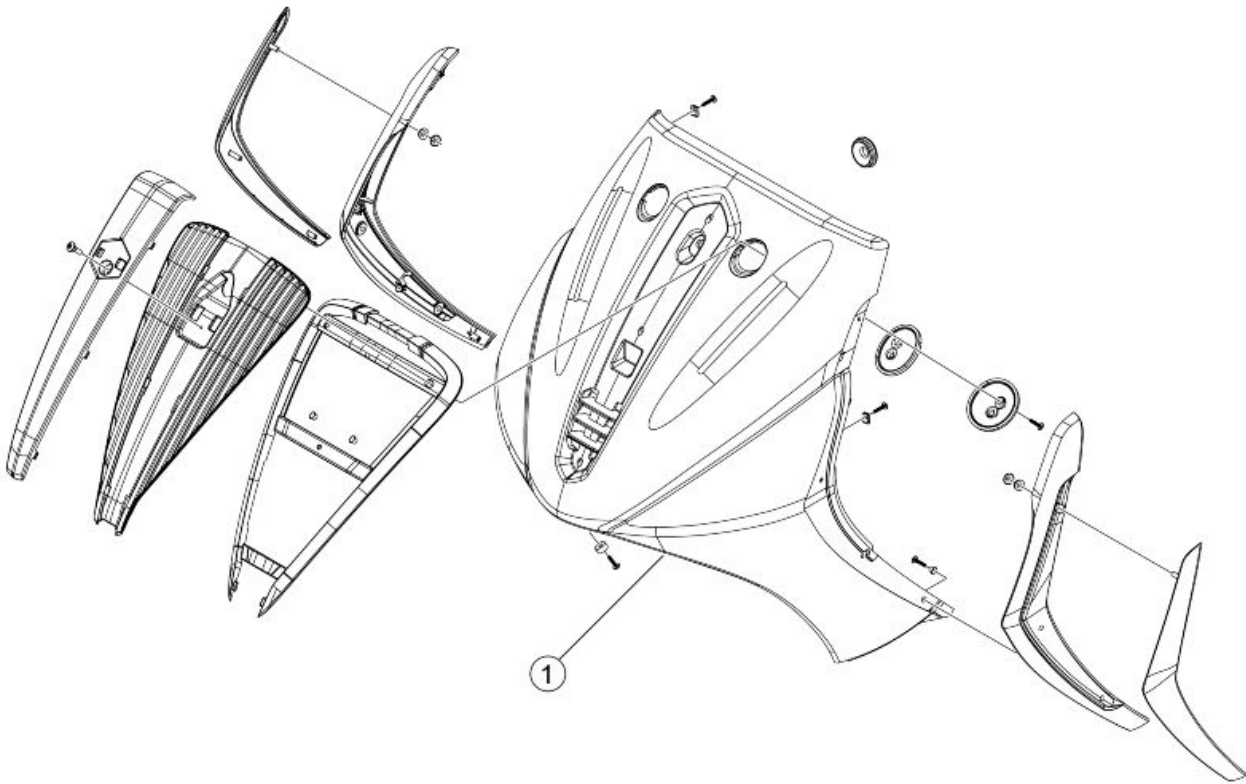
	Code	Action	Duration
1	004001	Chassis - Replacement	

Centre-stand



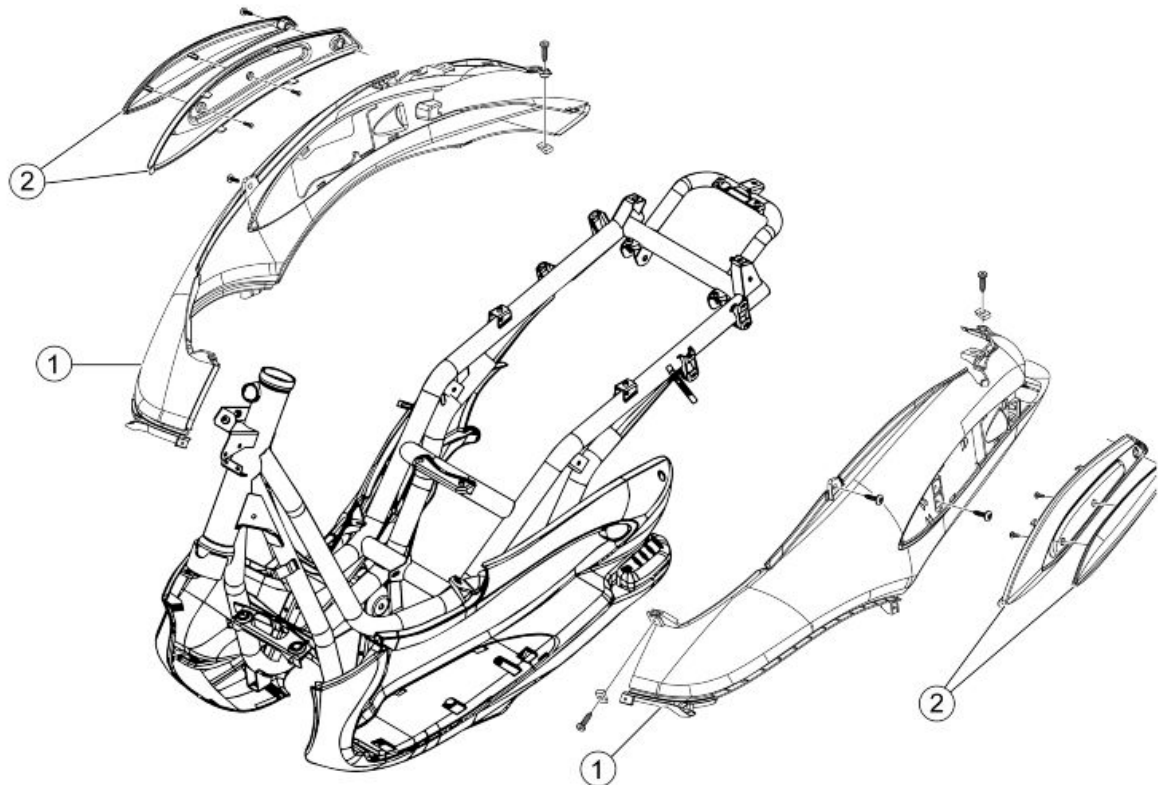
CENTRE AND SIDE STANDS

	Code	Action	Duration
1	004004	Stand - Replacement	
2	004102	Side stand - Replacement	

Legshield spoiler**LEGSIELD - SPOILER**

	Code	Action	Duration
1	004064	Legshield - Replacement	

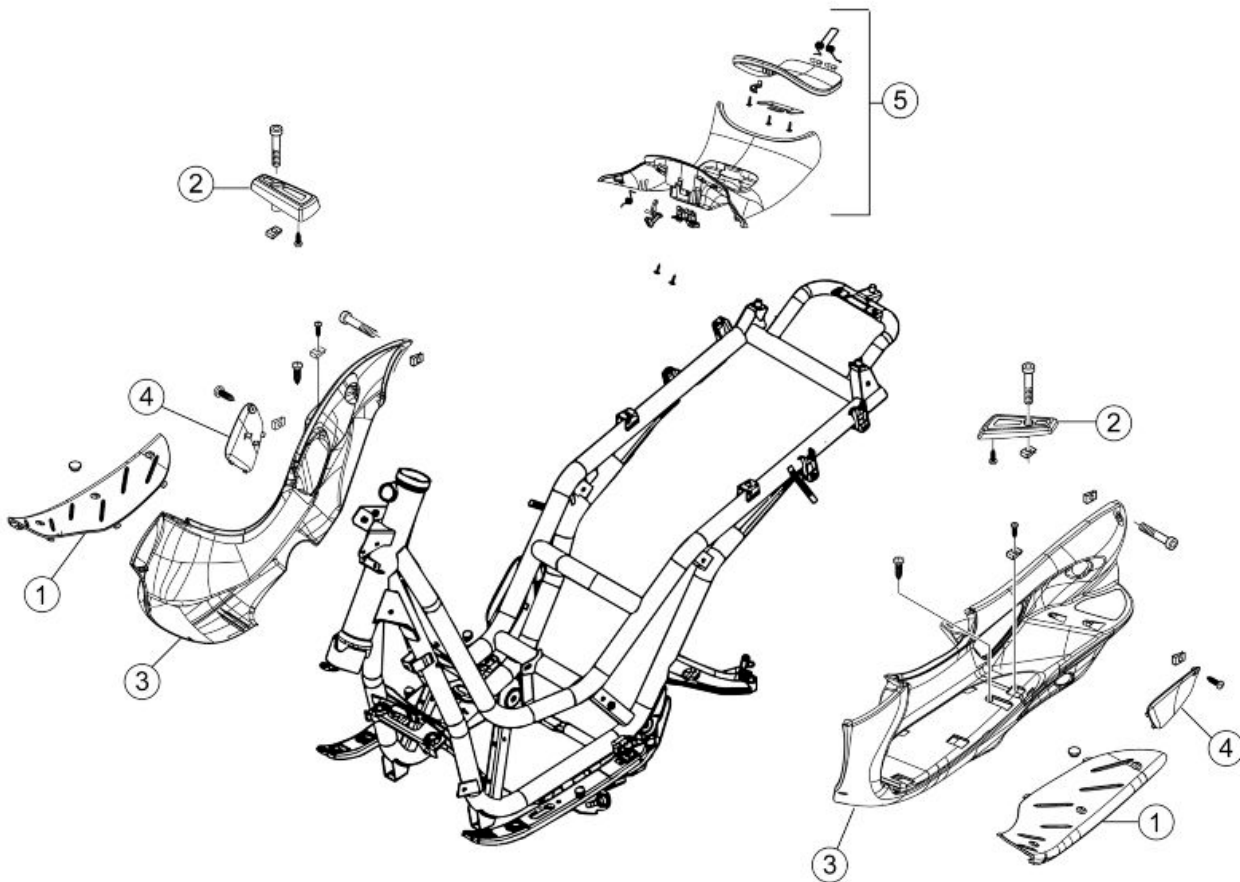
Side fairings



SIDE COVERS

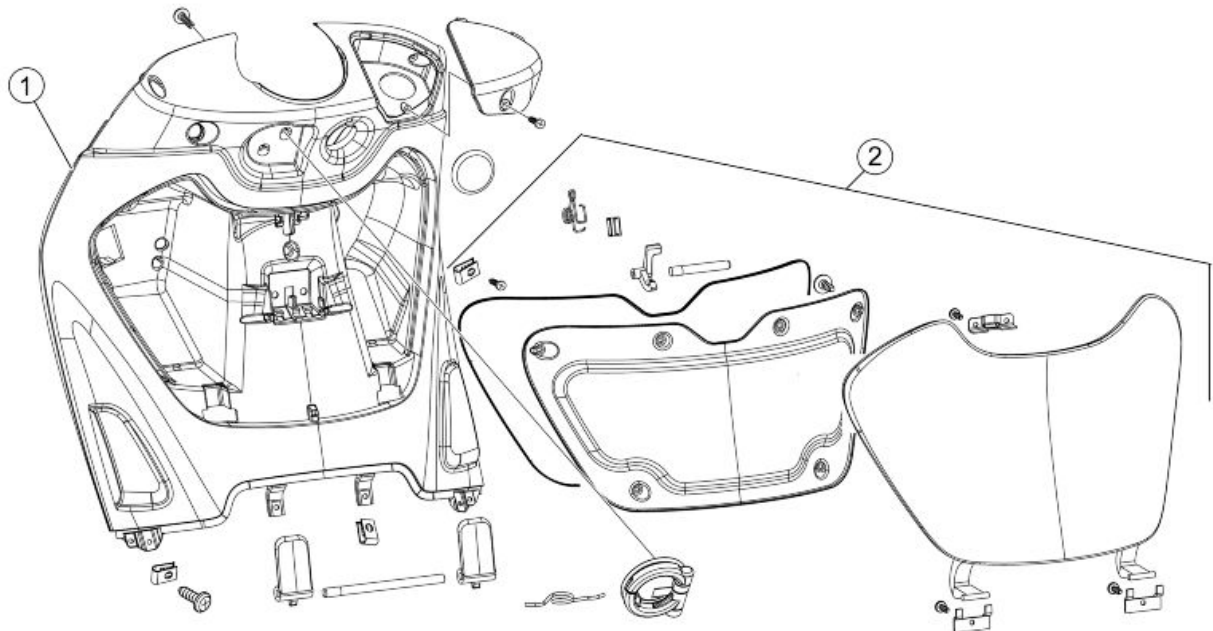
	Code	Action	Duration
1	004012	Rear side panels - Replacement	
2	004052	Bumper - Replacement	

Footrests

**MATS AND COVERS**

	Code	Action	Duration
1	004075	Front mat - Replacement	
2	004079	Passenger footrest (1) - Replacement	
3	004015	Footrests - Remov. and Refit.	
4	004085	Fairing (1) - Replacement	
5	004011	Central chassis cover - Replacement	

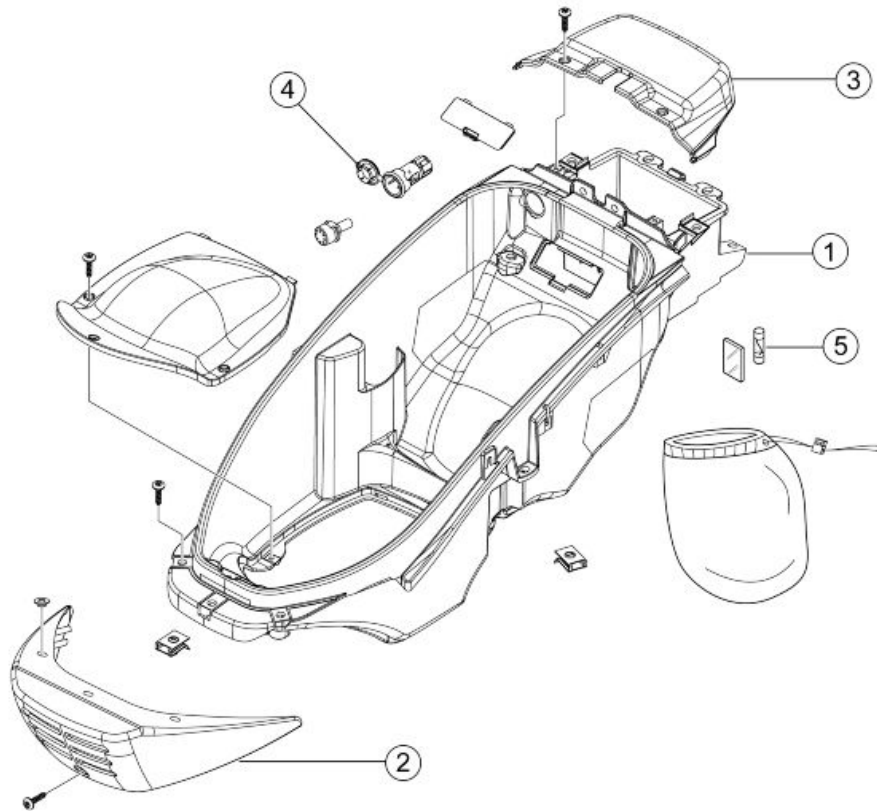
Rear cover



REAR SHIELD

	Code	Action	Duration
1	004065	Legshield rear section - Remov. and Refit.	
2	004081	Glove box door - Replacement	

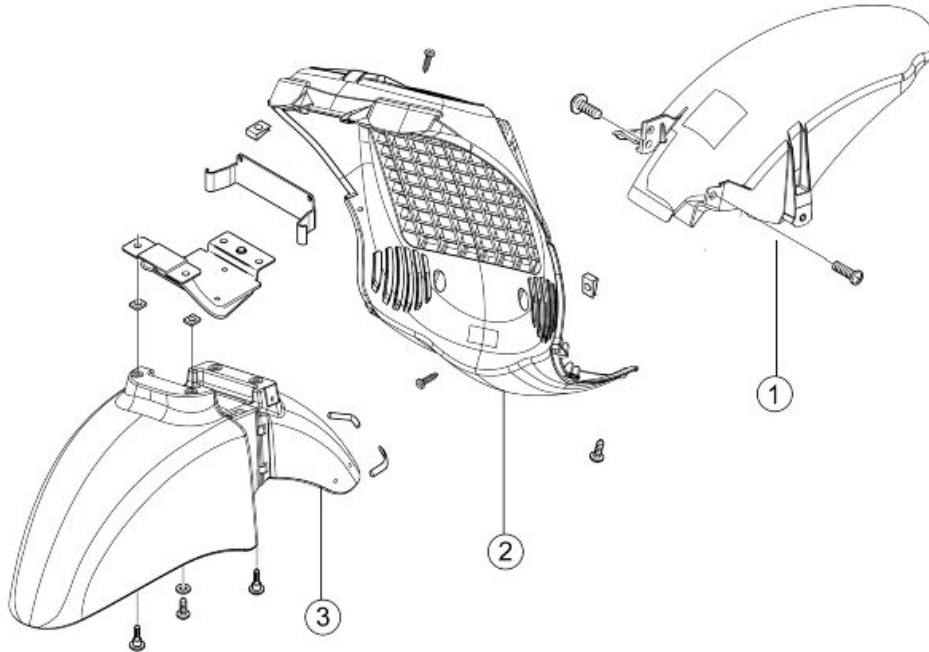
Underseat compartment



HELMET COMPARTMENT- SEAT ELECTRIC OPENING-LICENCE PLATE HOLDER

	Code	Action	Duration
1	004016	Helmet compartment - Remov. and Refit.	
2	004106	Underseat band - Replacement	
3	005046	Battery cover - Replacement	
4	004142	Plug socket - Replacement	
5	005026	Helmet compartment light - Replacement	

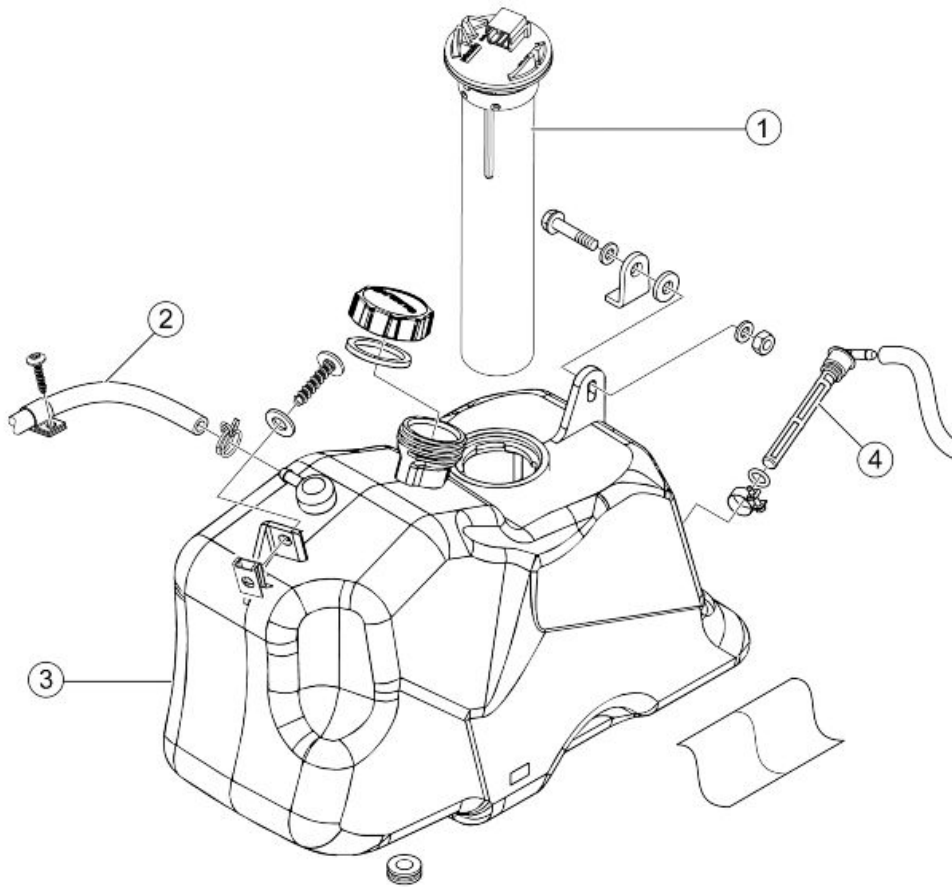
Mudguard



FRONT AND REAR MUDGUARDS

	Code	Action	Duration
1	004009	Rear mudguard - Replacement	
2	004002	Front mudguard - Replacement	
3	004053	Spoiler - Replacement	

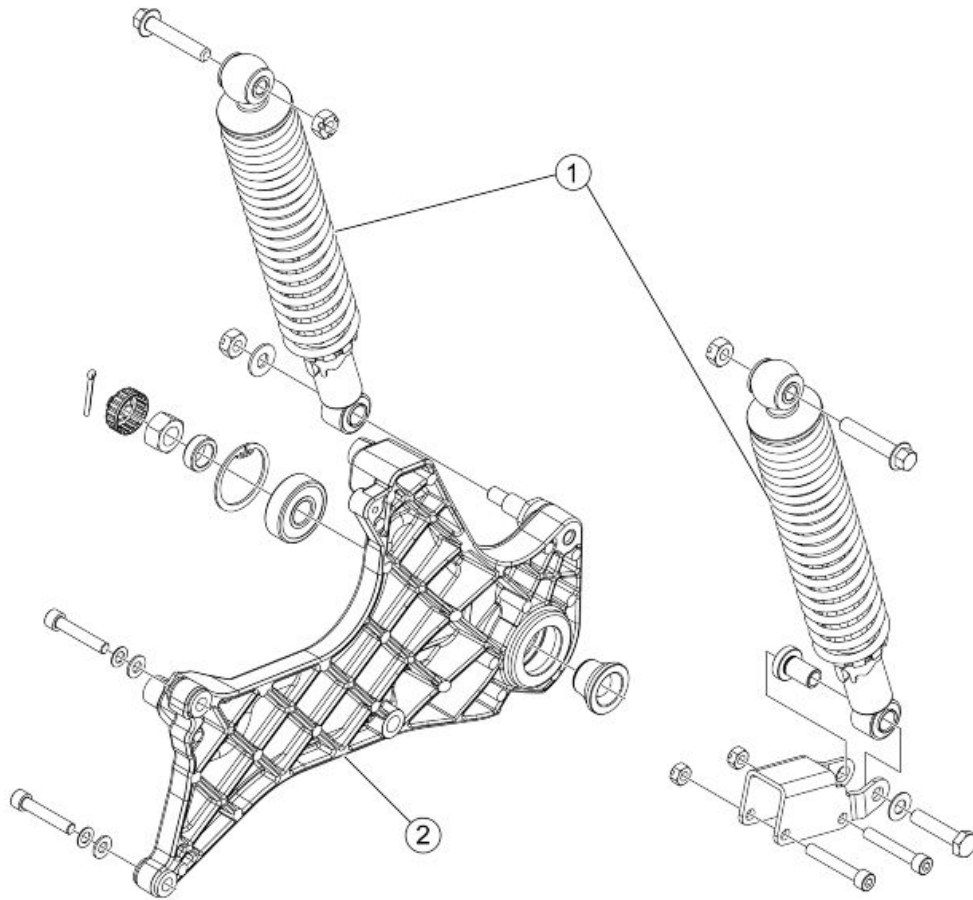
Fuel tank



FUEL TANK

	Code	Action	Duration
1	005010	Tank float - Replacement	
2	004109	Fuel tank breather - Replacement	
3	004005	Fuel tank - Replacement	
4	004007	Fuel valve - Replacement	

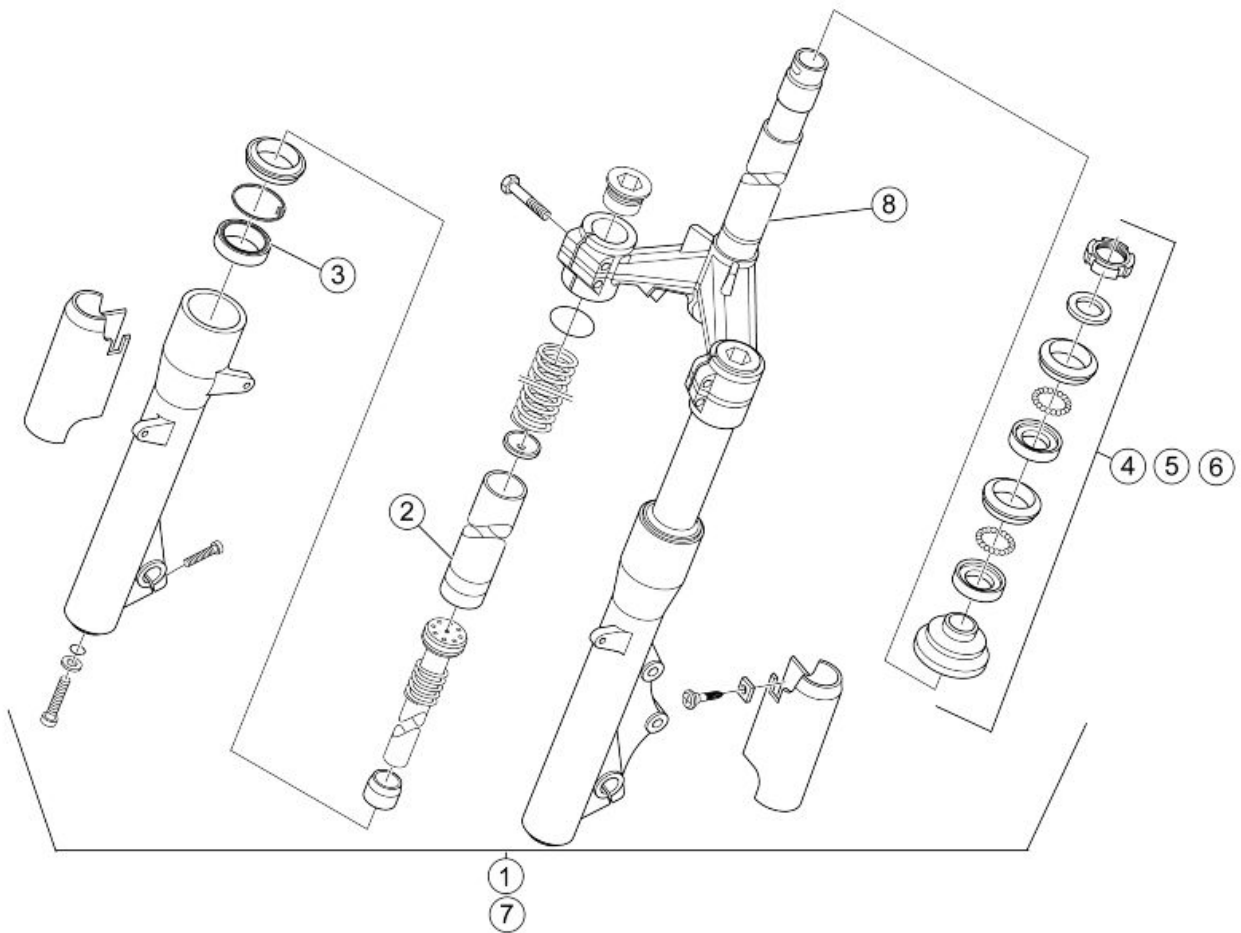
Rear shock-absorber



REAR SHOCK ABSORBER

	Code	Action	Duration
1	003007	Rear shock absorber - Remov. and Refit.	
2	003077	Muffler supporting arm/ rear shock absorber - Replacement	

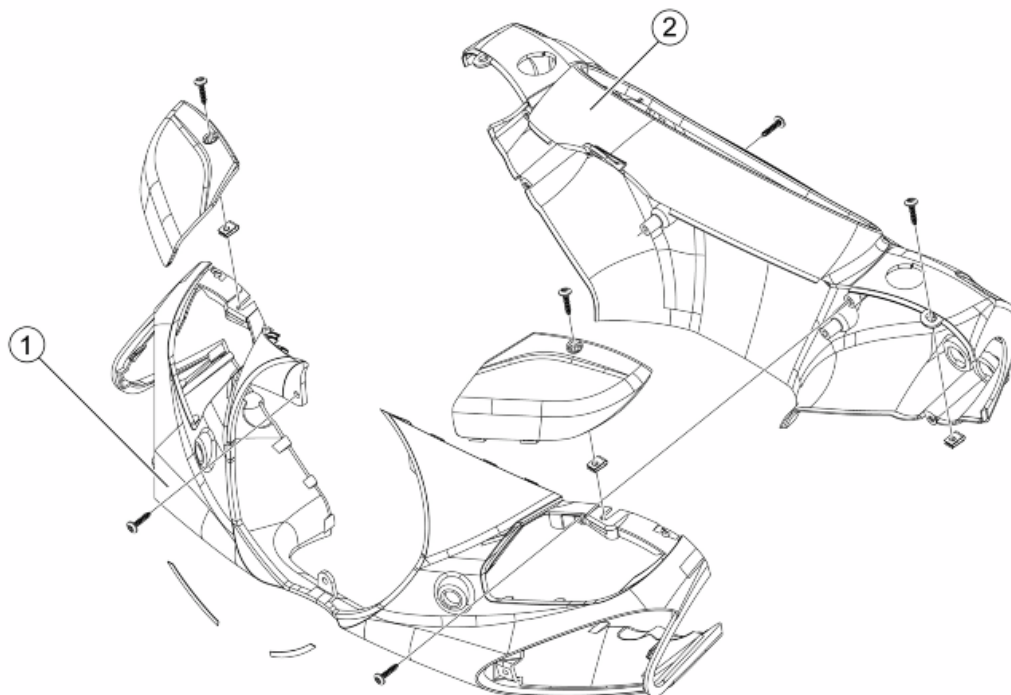
Steering column bearings



STEERING FIFTH WHEELS

	Code	Action	Duration
1	003051	Fork unit - Replacement	
2	003079	Fork stem - Replacement	
3	003048	Fork oil seal - Replacement	
4	004119	Bearing/upper steering fifth wheel - Replacement	
5	003002	Steering fifth wheel - Replacement	
6	003073	Steering clearance - Adjustment	
7	003010	Front suspension - Service	
8	003050	Fork lower plate - Replacement	

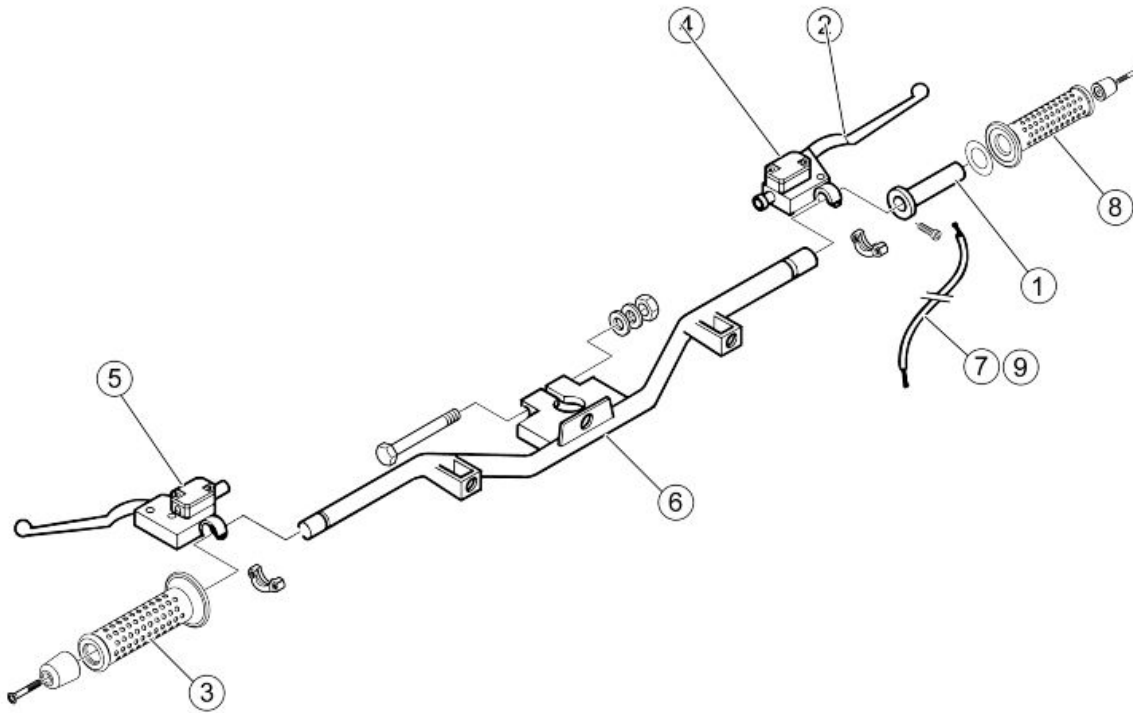
Handlebar covers



HANDLEBAR COVERS

	Code	Action	Duration
1	004018	Front handlebar covers - Replacement	
2	004019	Rear handlebar cover - Replacement	

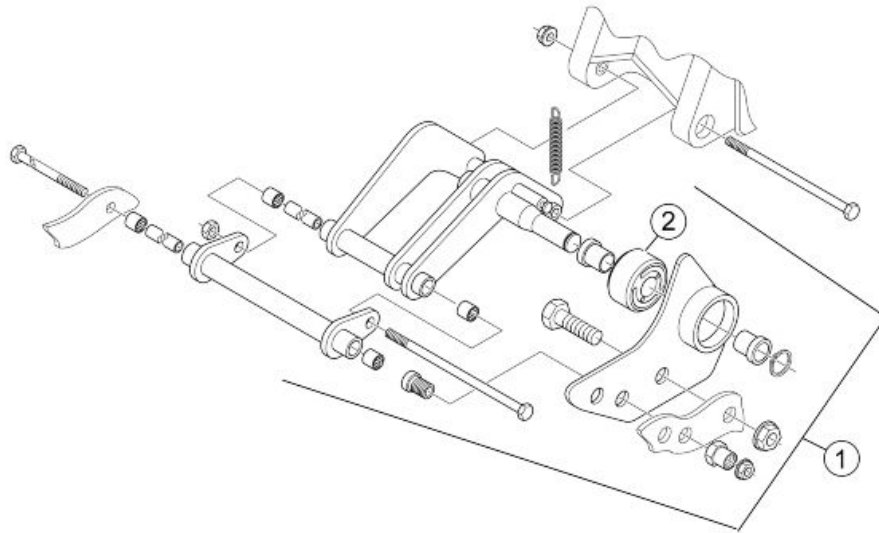
Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	002060	Throttle grip - Replacement	
2	002037	Brake or clutch lever - Replacement	
3	002071	Left knob - Replacement	
4	002024	Front brake pump - Removal and Re-fitting	
5	002067	Rear brake pump - Replacement	
6	003001	Handlebar - Replacement	
7	002063	Complete throttle grip transmission - Replacement	
8	002059	Right-hand knob - Replacement	
9	003061	Accelerator transmission - Adjustment	

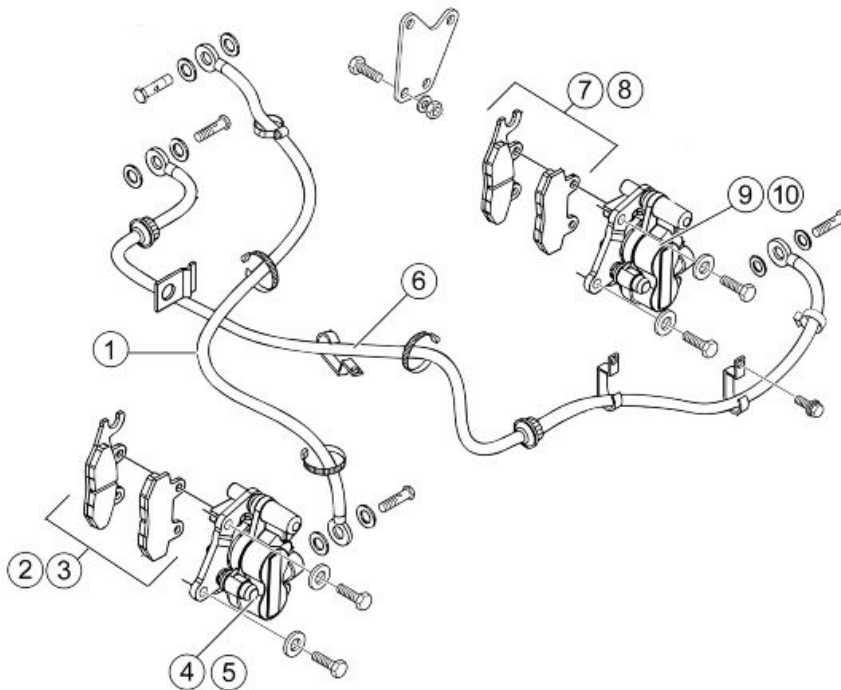
Swing-arm



SWINGING ARM

	Code	Action	Duration
1	001072	Swinging arm - Engine-chassis connection - Replacement	
2	004058	Silent block - Replacement	

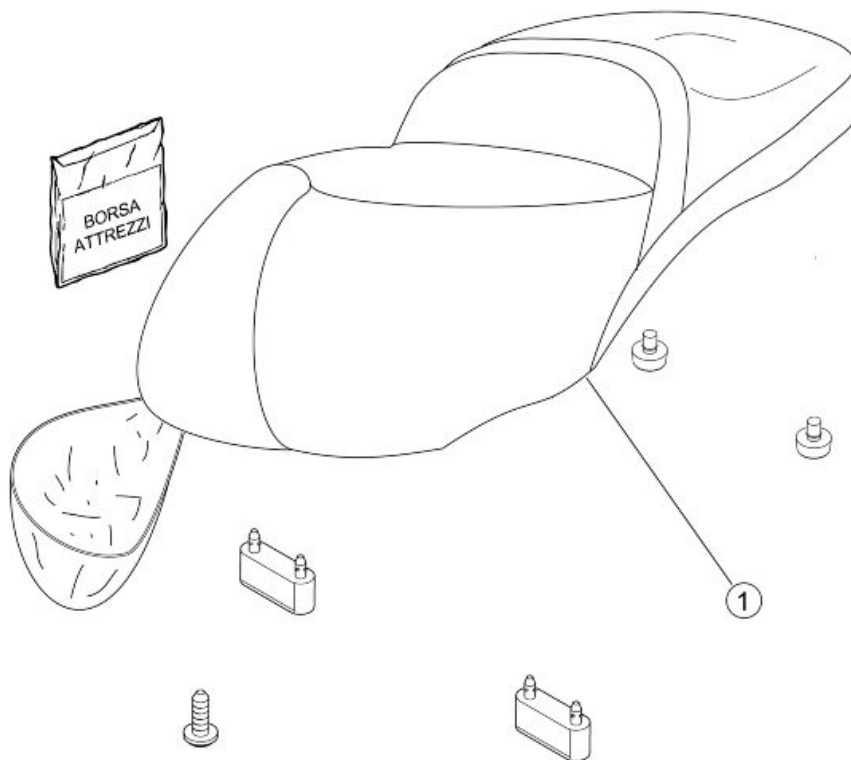
Brake hoses



BRAKE PIPING

	Code	Action	Duration
1	002021	Front brake piping - Replacement	
2	003070	Front brake pads/shoes - Check for wear	
3	002007	Front brake pads - Replacement	
4	002039	Front brake calliper - Replacement	
5	002047	Front brake fluid and air bleeding system - Replacement	
6	002020	Rear brake disc piping - Replacement	
7	003071	Rear brake pads/shoes - Check for wear	
8	002002	Rear brake pads - Replacement	
9	002080	Rear brake oil bleeding system - Replacement	
10	002048	Rear brake calliper - Replacement	

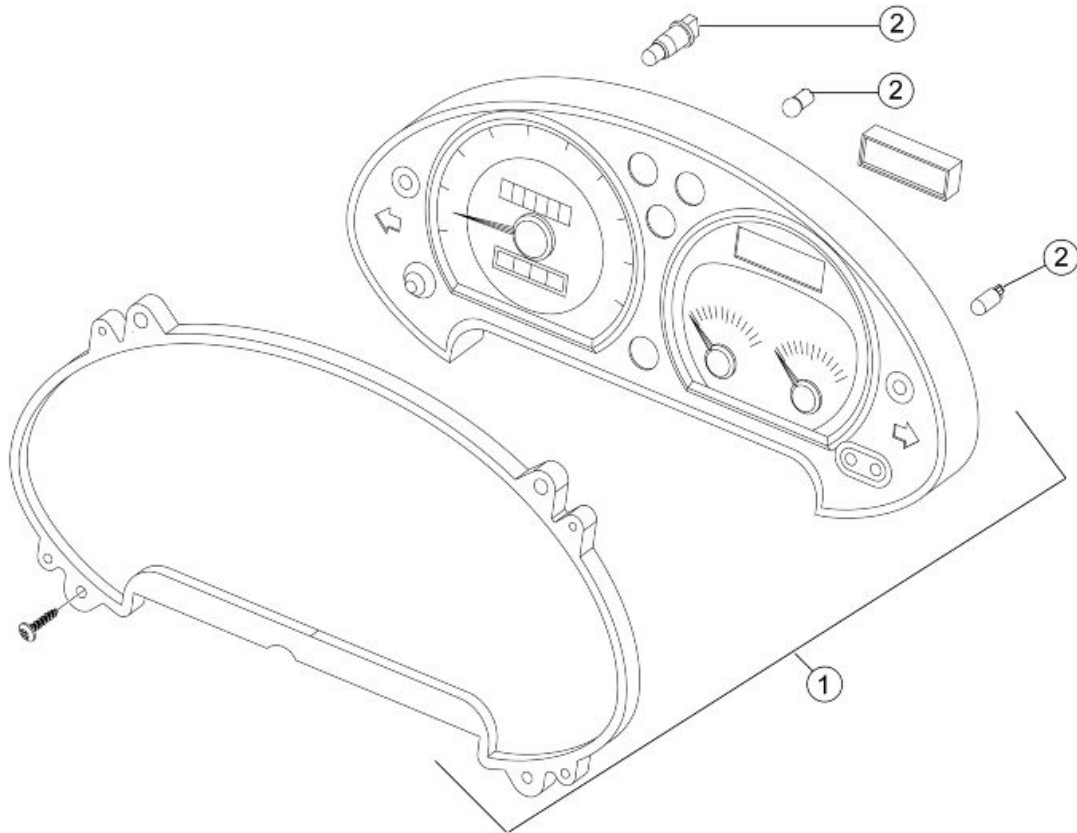
Seat



SADDLE

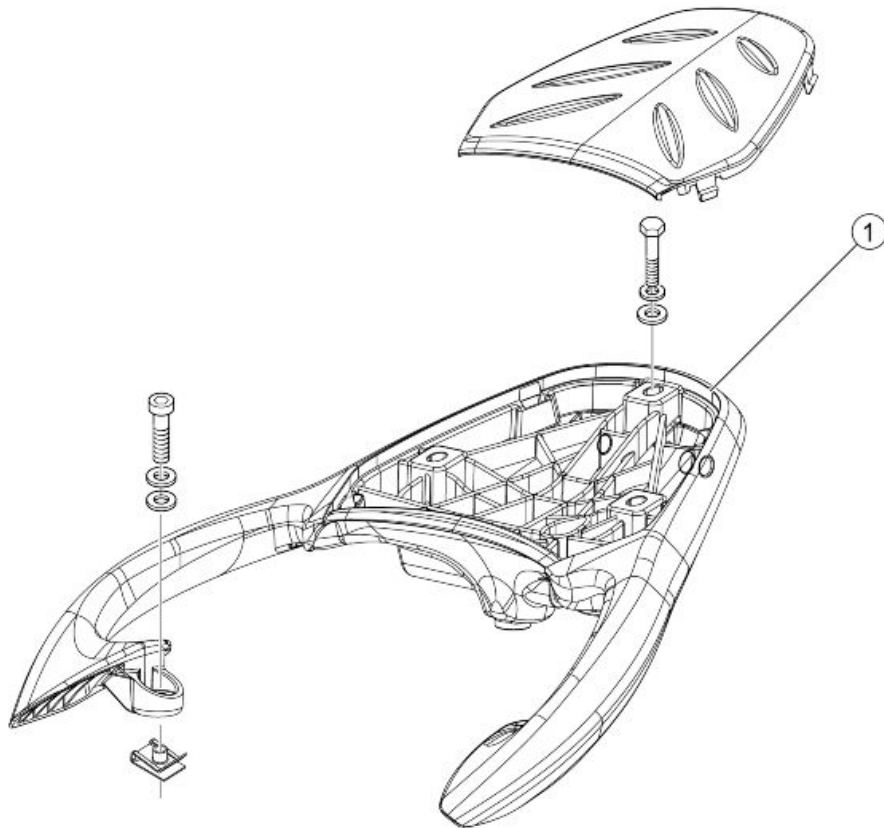
	Code	Action	Duration
1	004003	Saddle - Replacement	

Instrument panel

**INSTRUMENT PANEL**

	Code	Action	Duration
1	005014	Odometer - Replacement	
2	005038	Instrument panel warning light bulbs - Replacement	

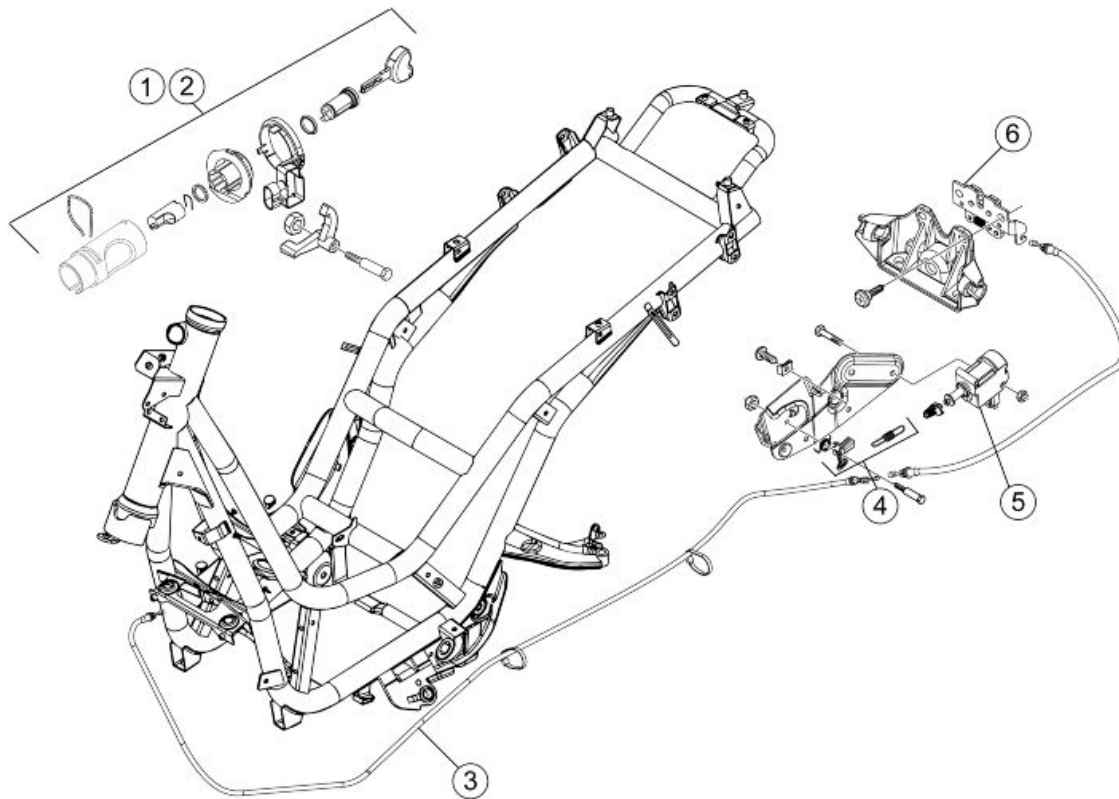
Rear rack



LUGGAGE RACK

	Code	Action	Duration
1	004008	Luggage rack - Replacement	

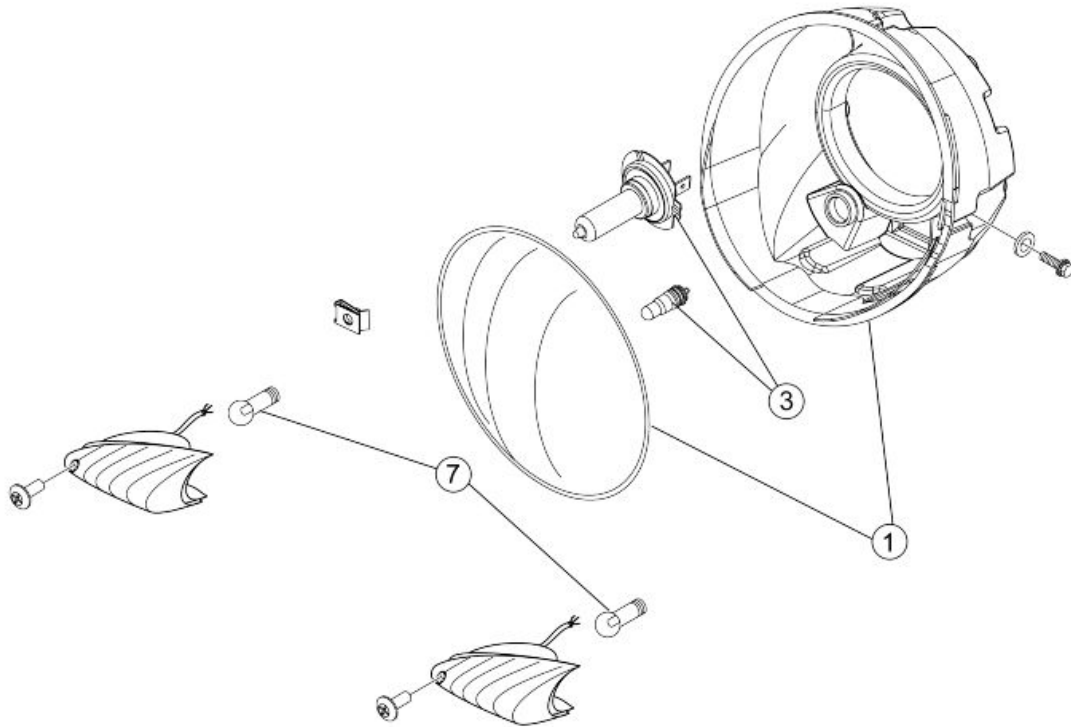
Locks

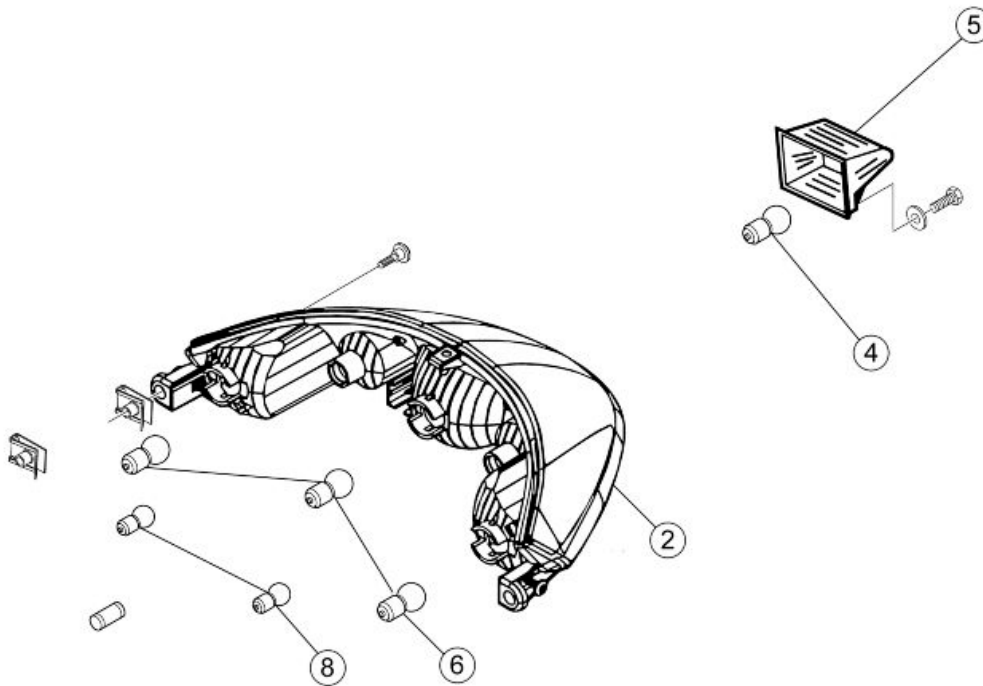


LOCKS

	Code	Action	Duration
1	005016	Key switch - Replacement	
2	004010	Anti-theft lock - Replacement	
3	002083	Saddle opening transmission - Replacement	
4	004158	Saddle opening splitter - Replacement	
5	005099	Electric saddle opening device - Replacement	
6	004054	Saddle lock catch - Replacement	

Turn signal lights

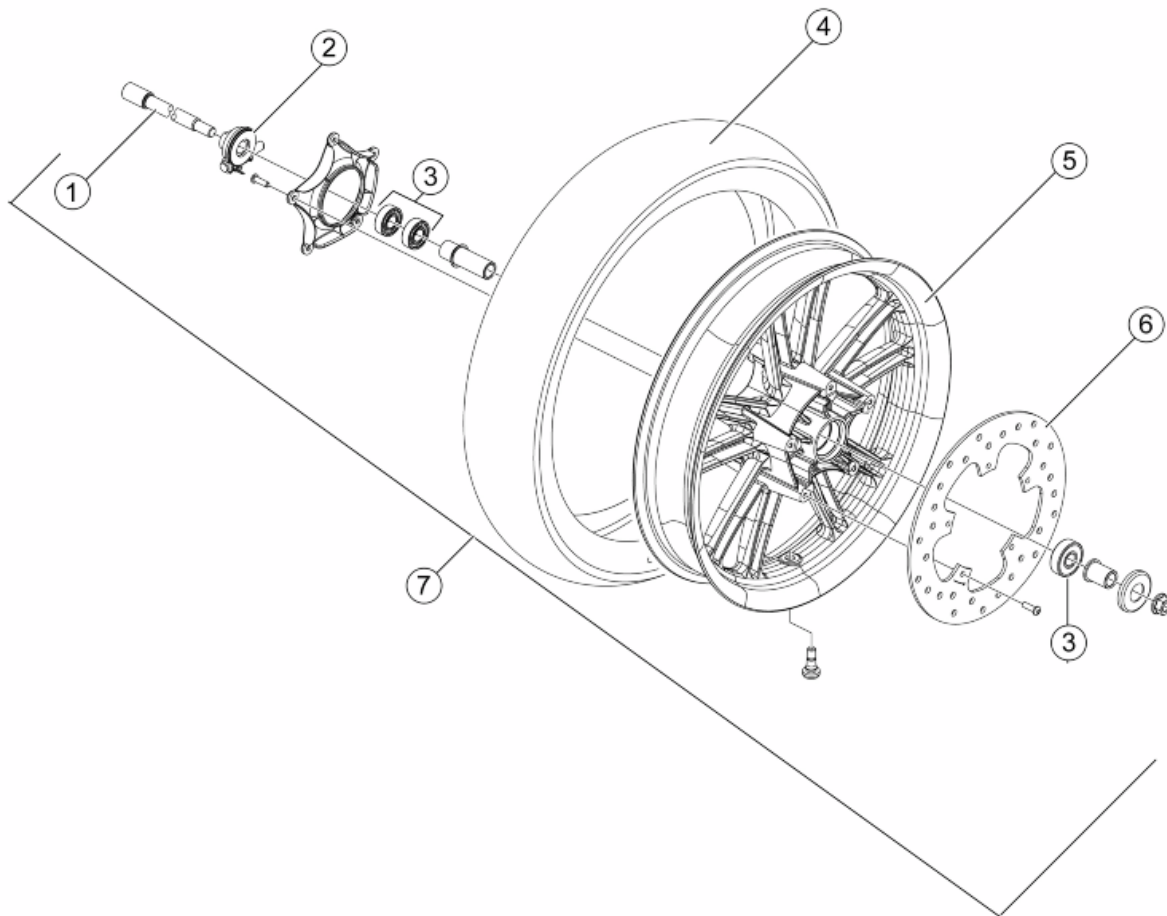




TURN INDICATOR LIGHTS

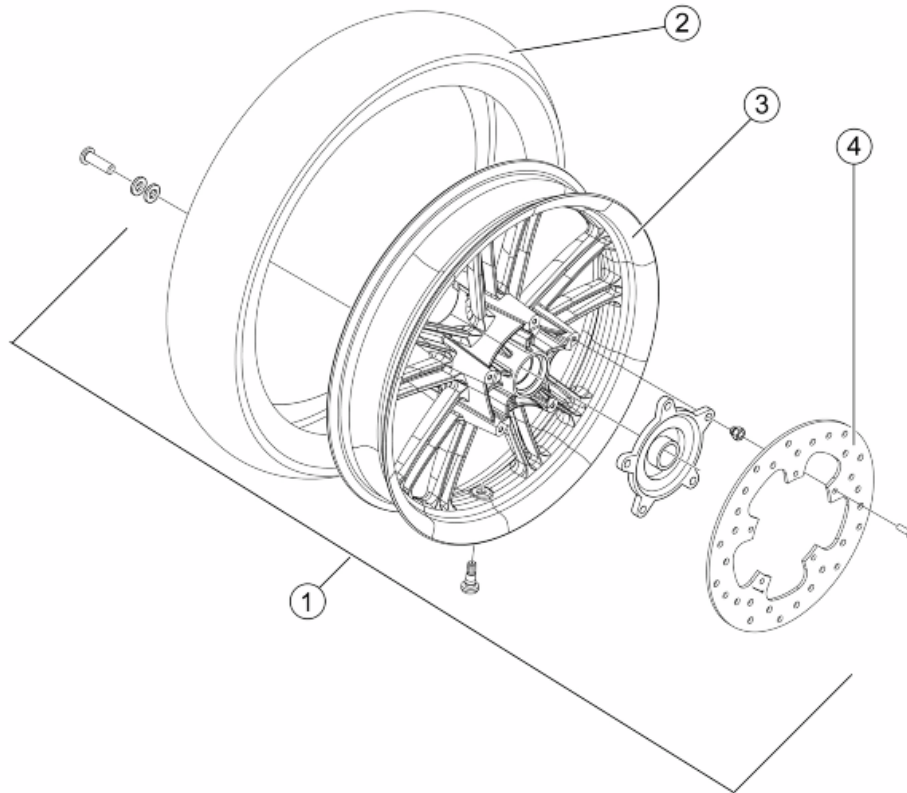
	Code	Action	Duration
1	005002	Front headlamp - Replacement	
2	005005	Taillight - Replacement	
3	005008	Headlight bulbs - Replacement	
4	005031	Licence plate light bulb - Replacement	
5	005032	Licence plate light glass - Replacement	
6	005066	Rear light bulbs - Replacement	
7	005067	Front turn indicator light - Replacement	
8	005068	Rear turn indicator bulb - Replacement	

Front wheel



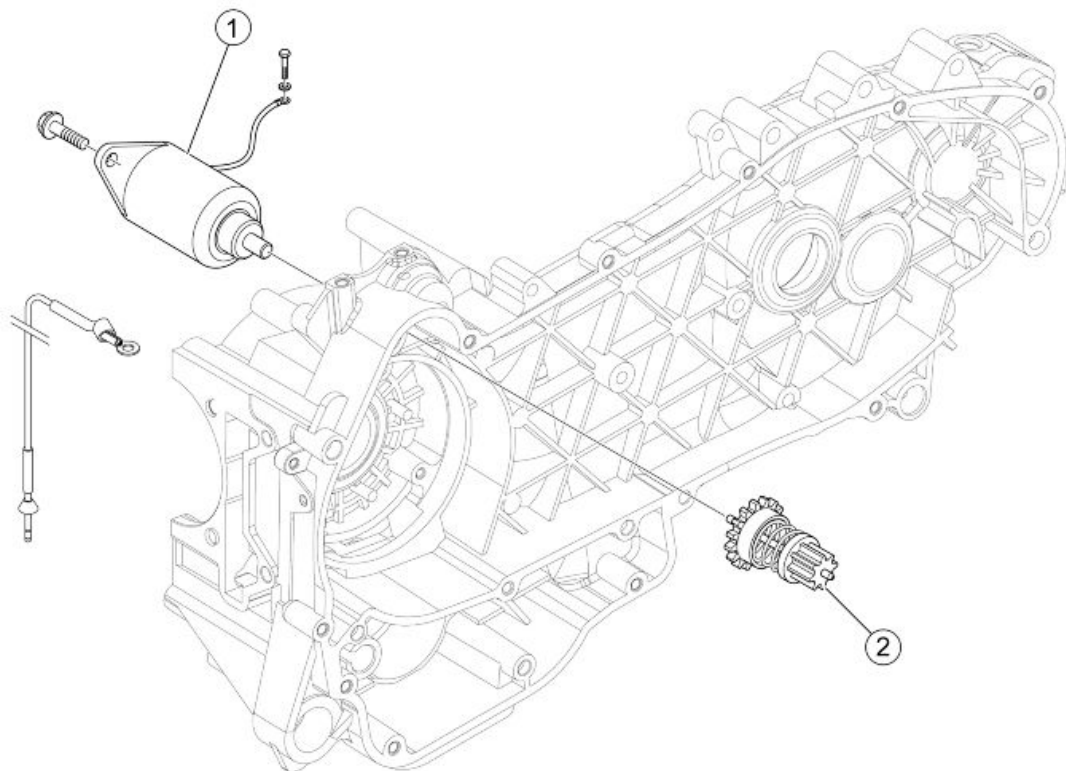
FRONT WHEEL

	Code	Action	Duration
1	003038	Front wheel axle - Replacement	
2	002011	Odometer drive - Replacement	
3	003040	Front wheel bearings - Replacement	
4	003047	Front tyre - replace	
5	003037	Front wheel rim- Replacement	
6	002041	Front brake disc - Replacement	
7	004123	Front wheel - Replacement	

Rear wheel**REAR WHEEL**

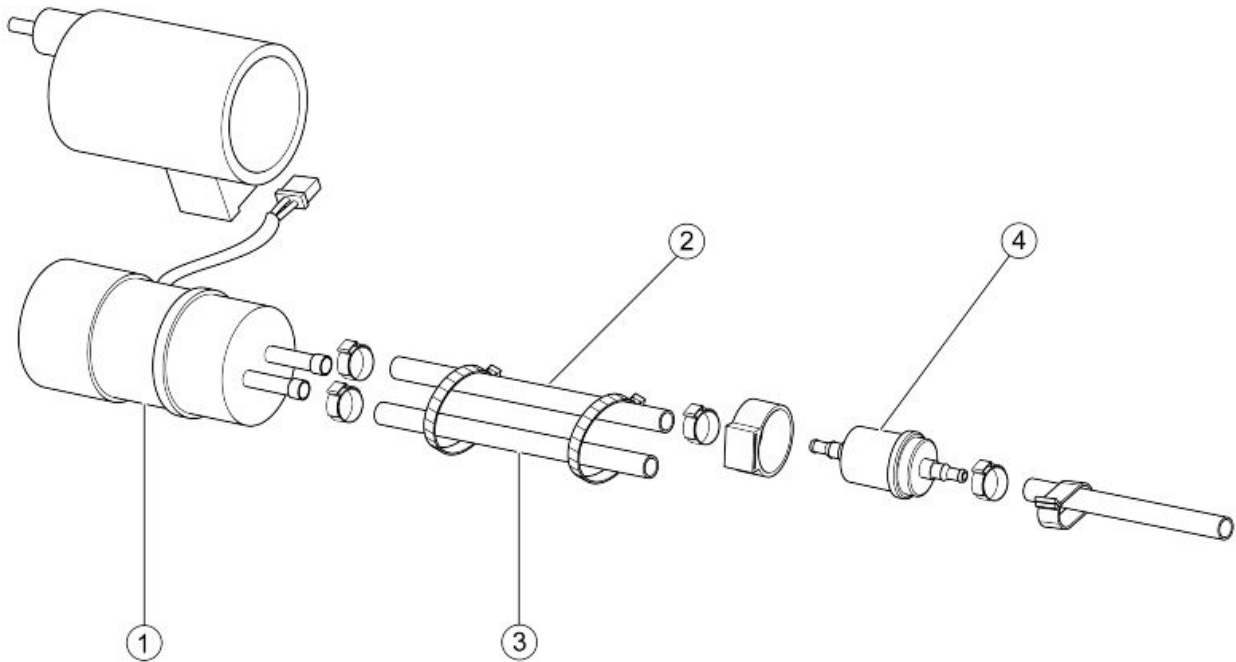
	Code	Action	Duration
1	001016	Rear wheel - Replacement	
2	004126	Rear wheel tyre - Replacement	
3	001071	Rear wheel rim - Replacement	
4	002070	Rear brake disc - Replacement	

Electric start



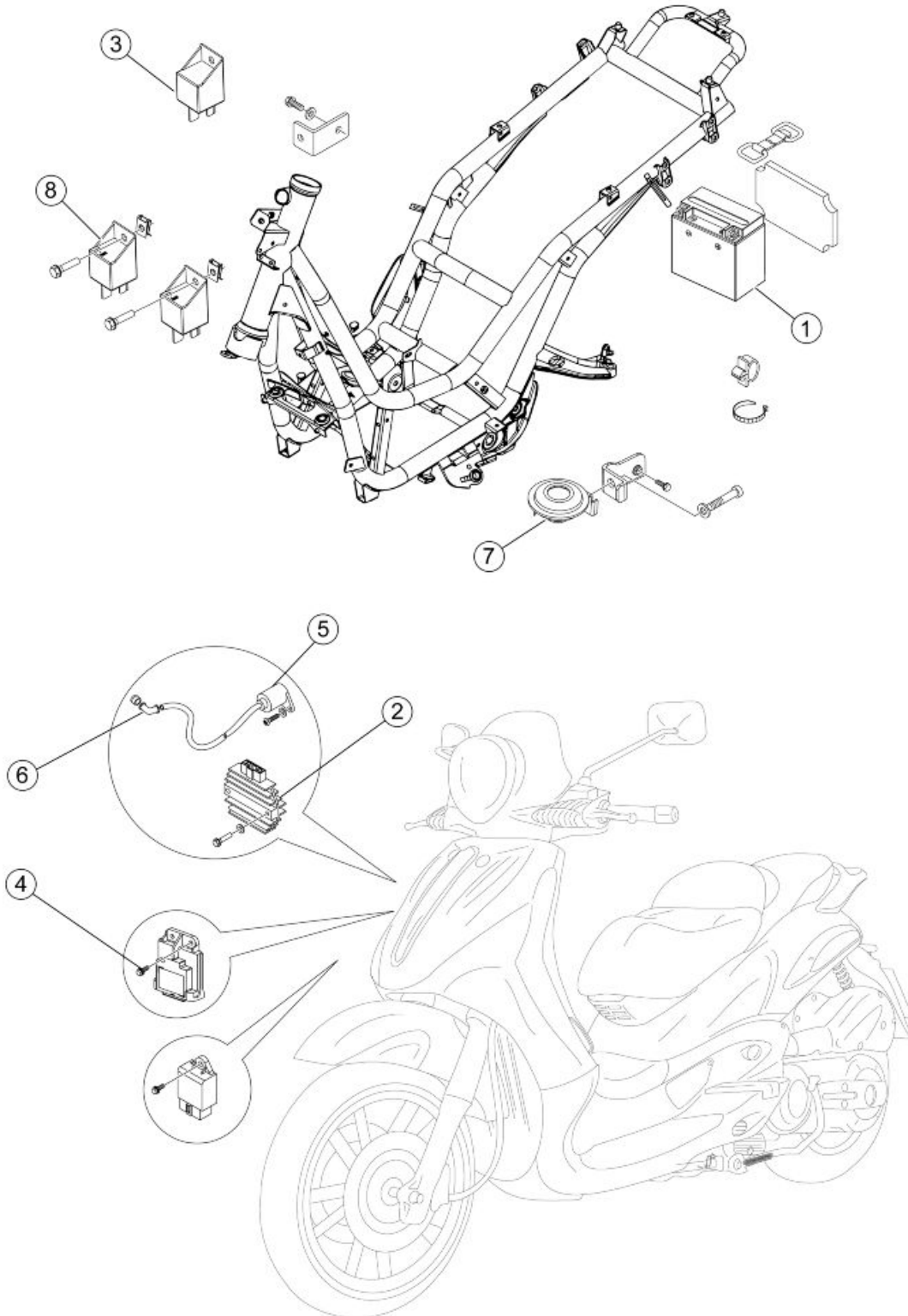
ELECTRICAL START-UP

	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	001017	Start-up pinion - Replacement	

Fuel pump**FUEL PUMP**

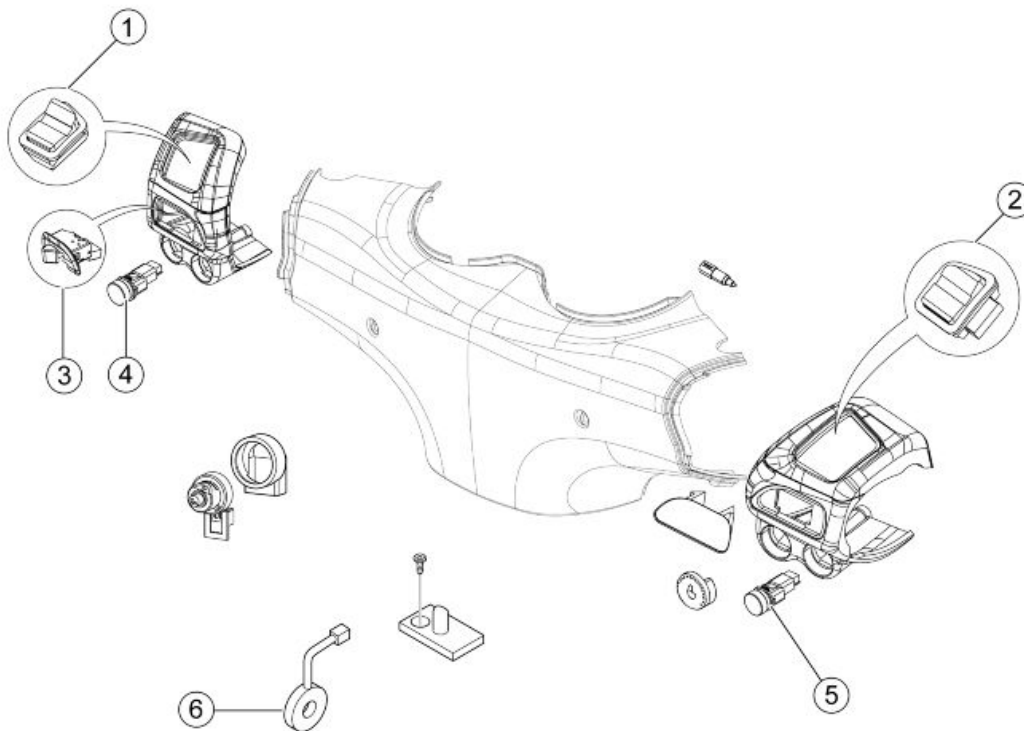
	Code	Action	Duration
1	004073	Fuel pump - Replacement	
2	004137	Carburettor pump hose - Replacement	
3	004089	Tank-pump hose - Replacement	
4	004072	Fuel filter - Replacement	

Electric devices

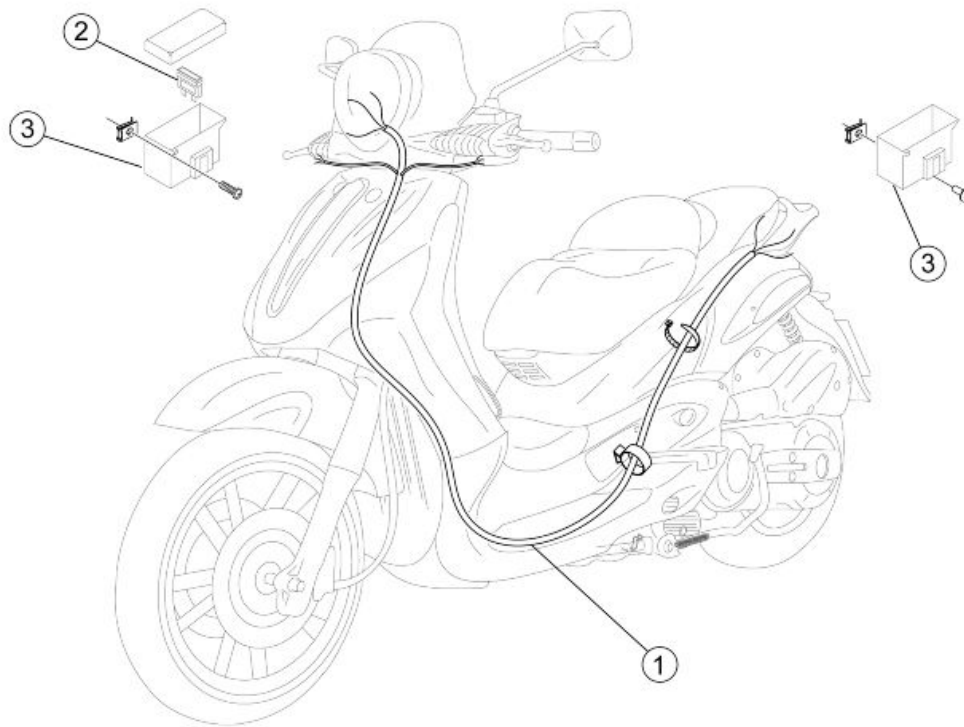


ELECTRIC DEVICES

	Code	Action	Duration
1	005007	Battery - Replacement	
2	005009	Voltage regulator - Replacement	
3	005011	Start-up remote control switch - Replacement	
4	001023	Control unit - Replacement	
5	001069	HV coil - Replacement	
6	001094	Spark plug cap - Replacement	
7	005003	Horn - Replacement	
8	005035	Headlight remote control - Replacement	

**ELECTRIC DEVICES**

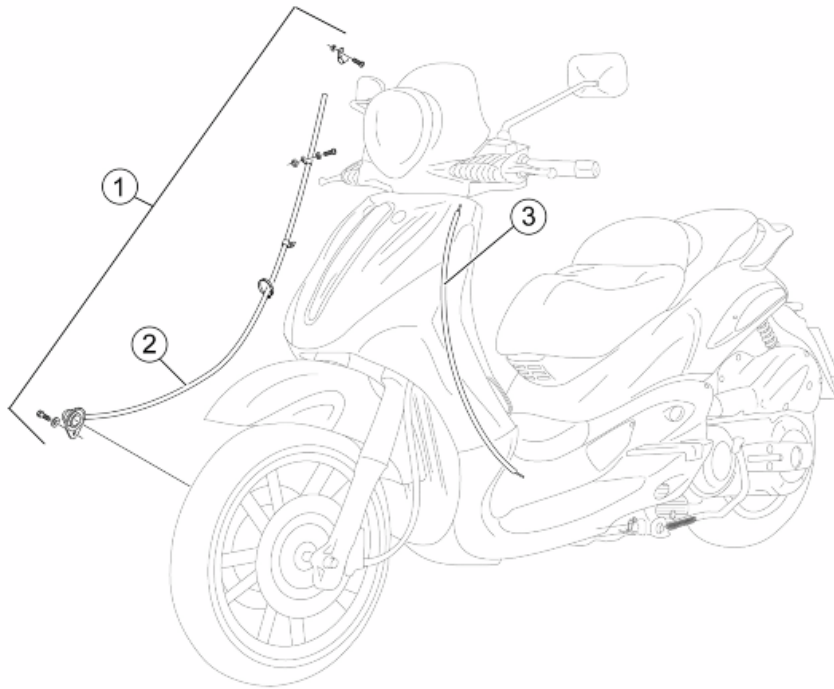
	Code	Action	Duration
1	005039	Headlight switch - Replacement	
2	005077	Emergency stop switch - Replacement	
3	005006	Light switch or turn indicators - Replacement	
4	005040	Horn button - Replacement	
5	005041	Starter button - Replacement	
6	005079	Stand switch - Replacement	



ELECTRIC DEVICES

	Code	Action	Duration
1	005001	Electrical system - Replacement	
2	005052	Fuse (1) - Replacement	
3	005054	Fuse block (1) - Replacement	

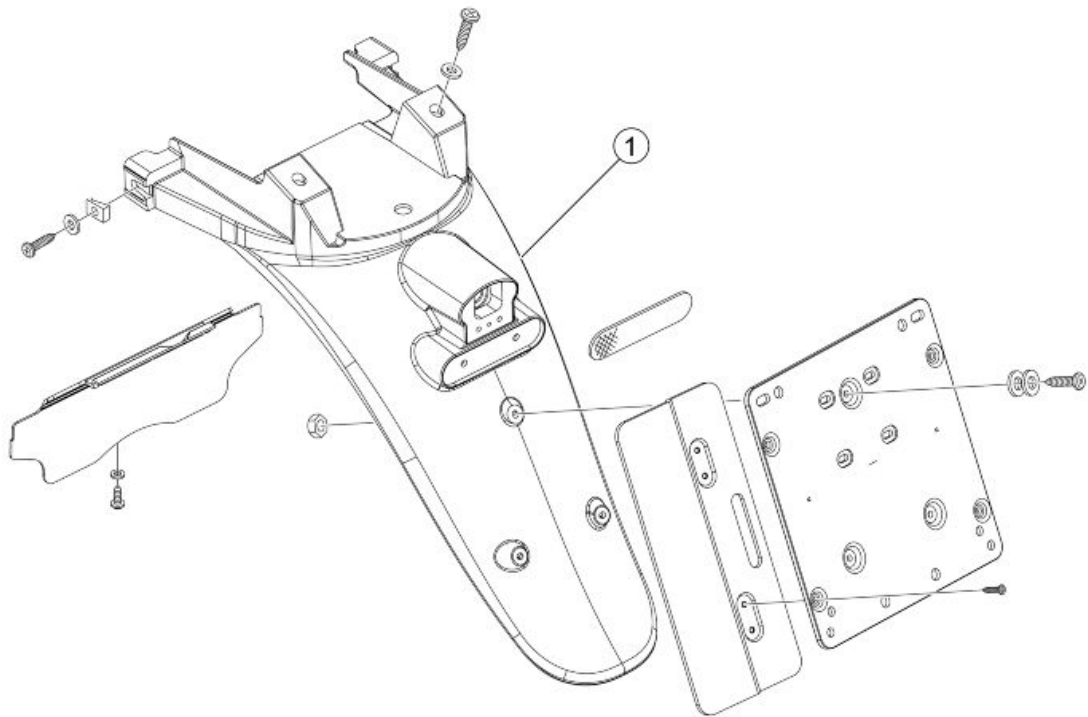
Transmissions



TRANSMISSIONS

	Code	Action	Duration
1	002051	Odometer transmission assembly - Replacement	
2	002049	Odometer cable - Replacement	
3	002082	Fuel tank cap opening drive - Replacement	

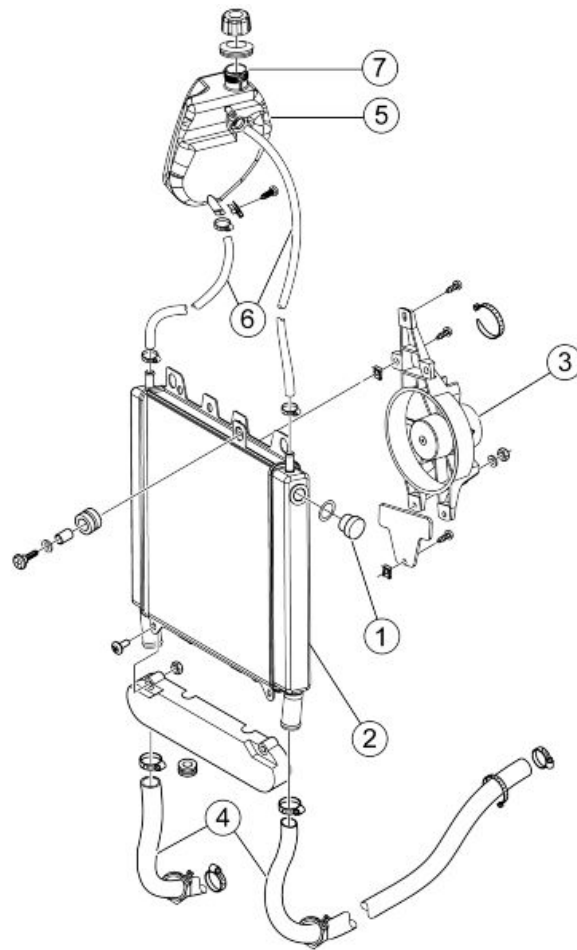
Rear side fairings



REAR COVERS

	Code	Action	Duration
1	004136	License plate holder support - Replacement	

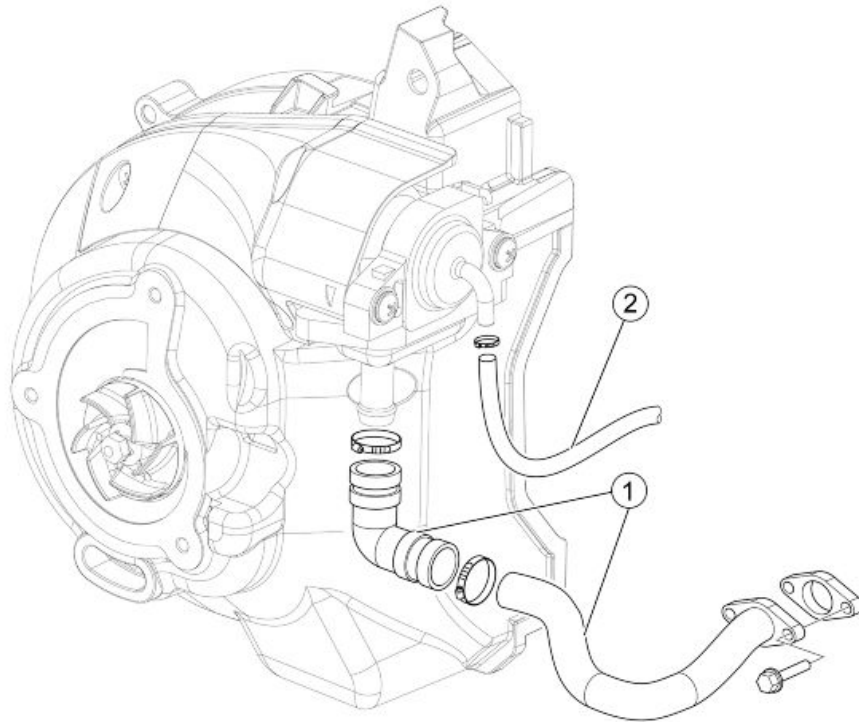
Cooling system



COOLING SYSTEM

	Code	Action	Duration
1	007014	Radiator thermal switch - Replacement	
2	007002	Radiator water - Replacement	
3	007016	Complete fan with support - Replacement	
4	007003	Coolant delivery and return pipe - Replacement	
5	007001	Expansion tank - Replacement	
6	007013	Expansion tank - radiator connection pipe - Replacement	
7	001052	Coolant and air bleed - Replacement	

Secondary air box



SECONDARY AIR HOUSING

	Code	Action	Duration
1	001163	Muffler secondary air connection - Replacement	
2	001164	Crankcase secondary air connection - Replacement	

A

Air filter: 41, 231

B

Battery: 55, 73, 81, 82

Brake: 207–213, 215, 216, 274

Brake fluid: 215

C

Carburettor: 13, 36, 164, 169, 256

Coolant:

E

Engine oil: 41

Engine stop:

F

Fuel: 54, 164, 233, 268, 284

Fuses: 80

H

Headlight: 48, 225, 227

Horn: 76

Hub oil: 39

I

Identification: 8

Instrument panel: 65, 225, 276

L

Luggage rack:

M

Maintenance: 7, 36

O

Oil filter: 43, 249

S

Saddle:

Shock absorbers: 203

Spark plug: 38, 71

Stand: 205

Start-up:

T

Tank: 233, 268

Transmission: 10, 54, 96, 110, 254

Tyres: 11