PIAGGIO

SERVICE STATION MANUAL

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X7 125

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PIAGGIO & C. S.p.A. - After-Sales
V.le Rinaldo Piaggio, 23 - 56025 PONTEDERA (Pi)

SERVICE STATION MANUAL
X7 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, no mounting work can be satisfactory if the necessary equipment and tools are unavailable. It is therefore advisable to read the sections of this manual concerning special tools, along with the special 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.

INDEX OF TOPICS

INDEX OF TOPICS

This section describes the general specifications of the vehicle.

Rules

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

Safety rules

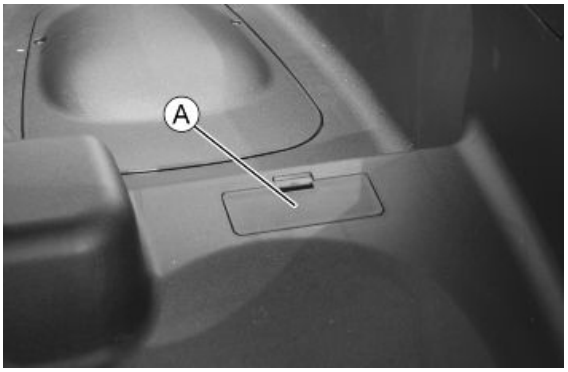
- If work can only be done on the vehicle with the engine running, make sure that the premises are well-ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.
- The battery electrolyte contains sulphuric acid. Protect your eyes, clothes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

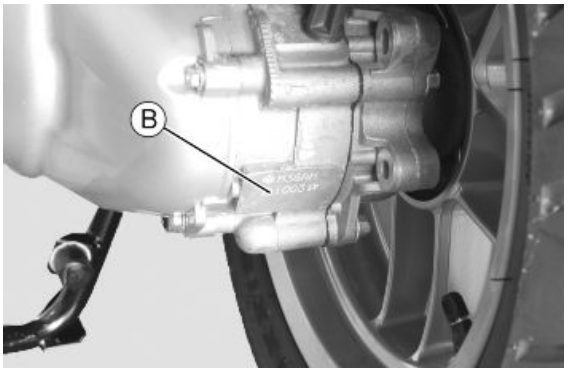
- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.
- Use only the appropriate tools designed for this vehicle.
- Always use new gaskets, sealing rings and split pins upon refitting.
- After removal, clean the components using non-flammable or low flash-point solvent. Lubricate all the work surfaces except the tapered couplings before refitting.
- 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 measurement. 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**».



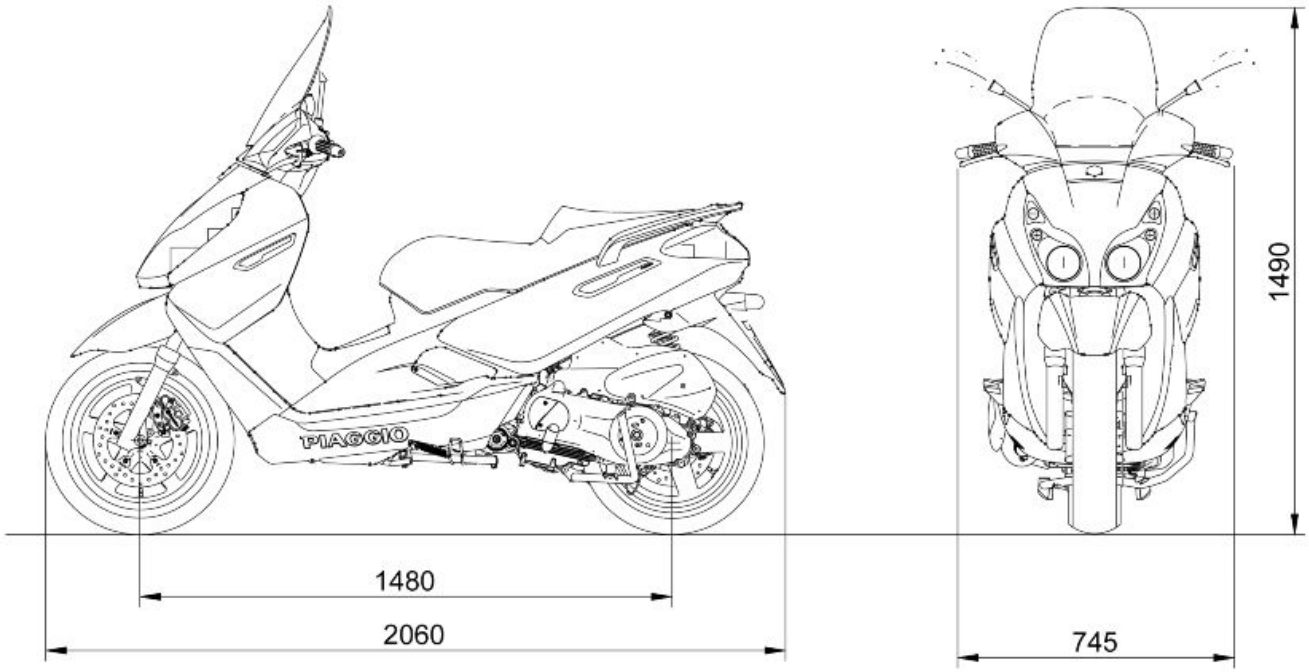
The engine prefix «**B**» is stamped near the lower support of the rear left shock absorber.



VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Chassis prefix	M62100
Engine prefix	M621M

Dimensions and mass



VEHICLE EARTHING

Specification	Desc./Quantity
Kerb weight	157 kg ± 7 kg
Maximum weight allowed	360 kg

Engine

ENGINE

Specification	Desc./Quantity
Type	Single-cylinder, 4-stroke
Cubic capacity	124 cm³
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	10.3 kW at 9,750 rpm
Max. torque	11.2 Nm at 8,500 rpm
Lubrication	Engine lubrication with lobe pump (inside crank-case) controlled by a chain with double filter: mesh and paper.
Lubrication pressure	4 bar

Specification	Desc./Quantity
Minimum lubrication pressure (100° C)	0.8 bar
Fuel supply	KEIHIN CVEK 30 carburettor and electrical fuel pump.
Cooling	Forced coolant circulation system.
Fuel	Unleaded petrol (95 RON)
Exhaust muffler	absorption-type exhaust muffler with catalytic converter.
Emission regulations	EURO 3

Transmission

TRANSMISSION

Specification	Desc./Quantity
Main drive	Automatic expandable pulley variator with torque server, V-belt, automatic self-ventilating centrifugal dry clutch
Final reduction	Gear reduction unit in oil bath.

Capacities

CAPACITY

Specification	Desc./Quantity
Fork oil (quantity per stem)	133 cm^3 ± 3 cm^3
Engine oil	1.1 l
Transmission oil	150 cm^3
Cooling system fluid	~ 2 l
Fuel tank (reserve)	~ 12 l (~2 l)

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	In 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	94 mm

Specification	Desc./Quantity
Rear suspension	Two double-acting shock absorbers, adjustable to four positions at preloading.
Rear suspension travel	89 mm

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 260-mm disc brake with hydraulic control activated by the handlebar right-side lever.
Rear brake	Ø 240 mm disc brake with hydraulic control activated by the handlebar left-side lever.

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Wheel rim type	Light alloy rims.
Front rim	14'' x 3.50
Rear rim	13'' x 3.50
Front tyre	Tubeless, 120/70-14'' 55P
Rear tyre	Tubeless, 140/60 - 13'' 63P
Front tyre pressure (with passenger)	2 bar (2 bar)
Rear tyre pressure (with passenger)	2.2 bar (2.5 bar)

Carburettor

125cc Version

Kehin

KEIHIN CARBURETTOR

Specification	Desc./Quantity
Type	Depression carburettor
Model	CVK 30
Body stamping	CVK
Tapered pin stamping	306F
CUT-OFF device	Not present
Diffuser	Ø 29
Max. jet	98
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

Specification	Desc./Quantity
Starter air jet	Ø 1.5
Starter jet	40
Starter device resistance	~ 20 Ω
Starter pin travel	10

Tightening Torques

REAR BRAKE

Name	Torque in Nm
Oil bleed screw	12 - 16
Brake disc screws	8 ÷ 10
Rear brake calliper-pipe fitting	20 ÷ 25
Rear brake pump-pipe fitting	16 ÷ 20
Screw tightening calliper to the support	42 ÷ 52

REAR BRAKE

Product	Description	Specifications
(°) Loctite 243	Medium strength threadlock	Apply LOCTITE 243 medium-strength threadlock

FRONT BRAKE

Name	Torque in Nm
Oil bleed screw	12 - 16
Brake disc screws	8 ÷ 10
Brake fluid pipe-calliper fitting	20 ÷ 25
Brake fluid pump - hose fitting	16 ÷ 20
Screw tightening calliper to the support	20 ÷ 25
Tightening screw for calliper support to the fork	41 ÷ 51

REAR SUSPENSION

Name	Torque in Nm
Upper shock absorber clamp	33 ÷ 41
Shock absorber lower clamp	33 ÷ 41
Shock absorber-crankcase attachment bracket	20 ÷ 25
Rear wheel axle	104 ÷ 126
Muffler arm clamping screws	27 ÷ 30
Silencer - muffler supporting arm fixing screws	24 ÷ 27
Lambda probe clamp on exhaust manifold	40 ÷ 50
Manifold - muffler diaphragm tightening clamp	16 ÷ 18

FRONT SUSPENSION

Name	Torque in Nm
Fork leg screw	6 ÷ 7
Front wheel shaft	45 ÷ 50
Fork plate screw	25 ÷ 34
Hydraulic rod fixing screw	25 ÷ 35*
Stem support clamp tightening screws	20 ÷ 25
Fork locking screws cap	15 ÷ 30

FRONT SUSPENSION

Product	Description	Specifications
(*) Loctite 243	Medium strength threadlock	Apply LOCTITE 243 medium-strength threadlock

CHASSIS

Name	Torque in Nm
Stand fixing bolt	40 ÷ 45
Engine and vehicle side swinging arm junction bolt	33 ÷ 41
Engine-swinging arm bolt	64 - 72
Body shell - Swinging arm pin	76 ÷ 83
Screw fixing the silent-block support plate to the body	42 ÷ 52

STEERING

Name	Torque in Nm
Fixing screws for handlebar control assembly U-bolts	7 ÷ 10
Steering tube upper ring nut	40 ÷ 45
Steering tube lower ring nut	14 ÷ 17
Handlebar fixing screw	43 ÷ 47

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

CRANKCASE AND CRANKSHAFT

Product	Description	Specifications
(°) Loctite 243	Medium strength threadlock	Apply LOCTITE 243 medium-strength threadlock

ENGINE - FLYWHEEL

Name	Torque in Nm
Pick-Up clamping screws	3 ÷ 4
Stator assembly screws (°)	3 ÷ 4
Flywheel cover fixing screws	5 - 6
Flywheel nut	54 ÷ 60
Screw fixing freewheel to flywheel	13 ÷ 15

ENGINE - TRANSMISSION

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

ENGINE - CYLINDER HEAD

Name	Torque in Nm
Manifold-silencer retaining bolt	15 ÷ 20
Nut fixing muffler to cylinder head	16 ÷ 18
Camshaft retention plate screw	4 ÷ 6
Timing chain tensioner central screw	5 - 6
Timing chain tensioner support screw	11 ÷ 13
Starter ground support screw	11 ÷ 15
Timing chain tensioner slider screw	10 ÷ 14
Inlet manifold screws	11 ÷ 13
Tappet set screw lock nut	6 ÷ 8
Starter ground screw	7 ÷ 8.5
Head fixing side screws	11 ÷ 12
Nuts fixing head to cylinder (*)	27 ÷ 29
Tappet cover screws	6 ÷ 7
Spark plug	12 ÷ 14

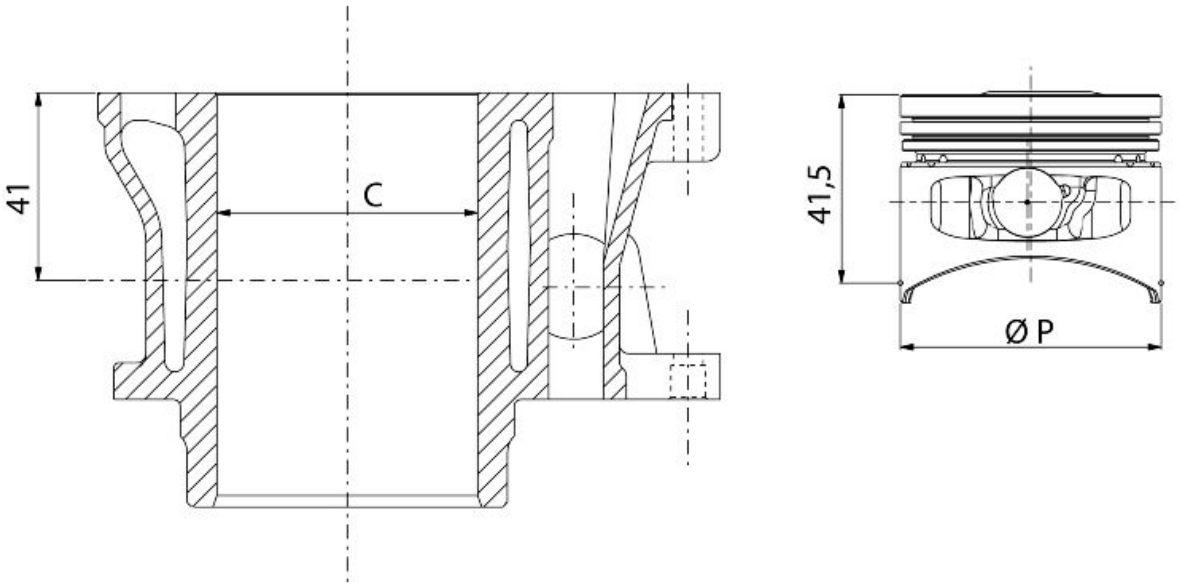
LUBRICATION

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 the 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

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 Over-size	A1	57.197 ÷ 57.204	57.145 ÷ 57.152	0.045 - 0.059
Cylinder 1st Over-size	B 1	57.204 ÷ 57.211	57.152 ÷ 57.159	0.045 - 0.059
Piston 1st Over-size	C 1	57.211 ÷ 57.218	57.159 ÷ 57.166	0.045 - 0.059
Piston 1st Over-size	D 1	57.218 ÷ 57.225	57.166 ÷ 57.173	0.045 - 0.059
Cylinder 2nd Over-size	A2	57.397 ÷ 57.404	57.345 ÷ 57.352	0.045 - 0.059
Cylinder 2nd Over-size	B 2	57.404 ÷ 57.411	57.352 ÷ 57.359	0.045 - 0.059
Piston 2nd Over-size	C 2	57.411 ÷ 57.418	57.359 ÷ 57.366	0.045 - 0.059
Piston 2nd Over-size	D 2	57.418 ÷ 57.425	57.366 ÷ 57.373	0.045 - 0.059
Cylinder 3rd Over-size	A 3	57.597 ÷ 57.604	57.545 ÷ 57.552	0.045 - 0.059
Cylinder 3rd Over-size	B 3	57.604 ÷ 57.611	57.552 ÷ 57.559	0.045 - 0.059
Piston 3rd Over-size	C 3	57.611 ÷ 57.618	57.559 ÷ 57.566	0.045 - 0.059
Piston 3rd Over-size	D 3	57.618 ÷ 57.625	57.566 ÷ 57.573	0.045 - 0.059

Crankcase - crankshaft - connecting rod

CRANKSHAFT HALF-BEARINGS

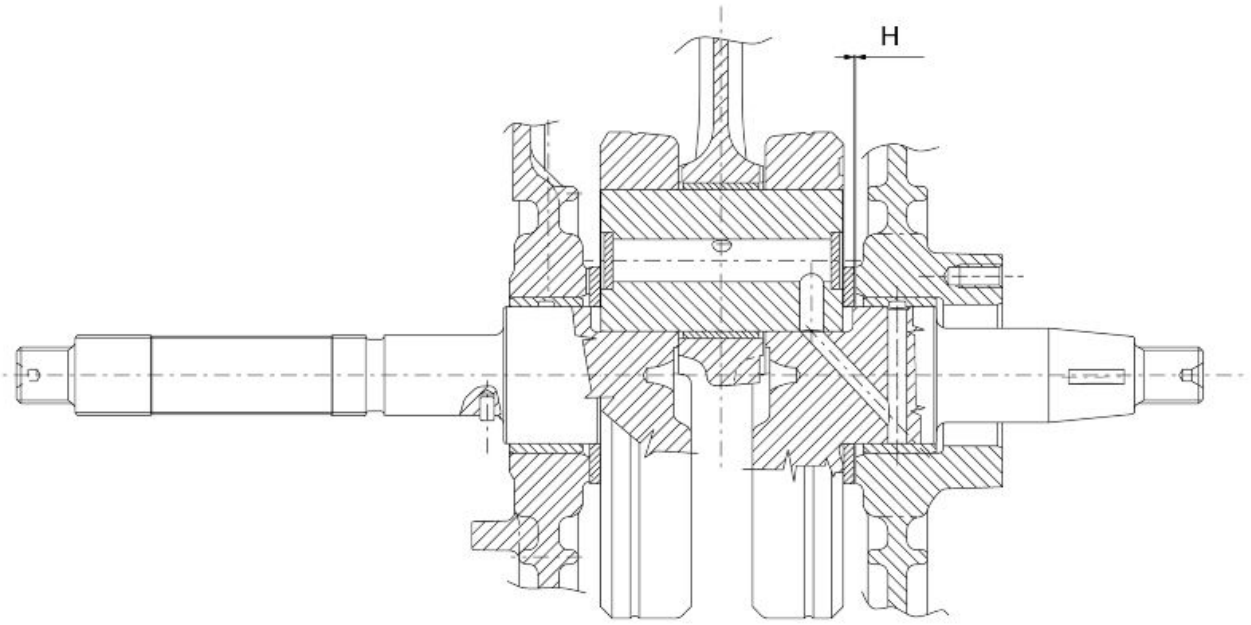
Name	Description	Dimensions	Initials	Quantity
Crankshaft half-bearing			Category B - blue	1.973 ÷ 1.976
Crankshaft half-bearing			Category C - yellow	1.976 ÷ 1.979
Crankshaft half-bearing			Category E - green	1.979 ÷ 1.982

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 category 2 - Crankcase category 1			C - C	
Crankshaft category 2 - Crankcase category 2			B - B	

CRANKSHAFT - CRANKCASE

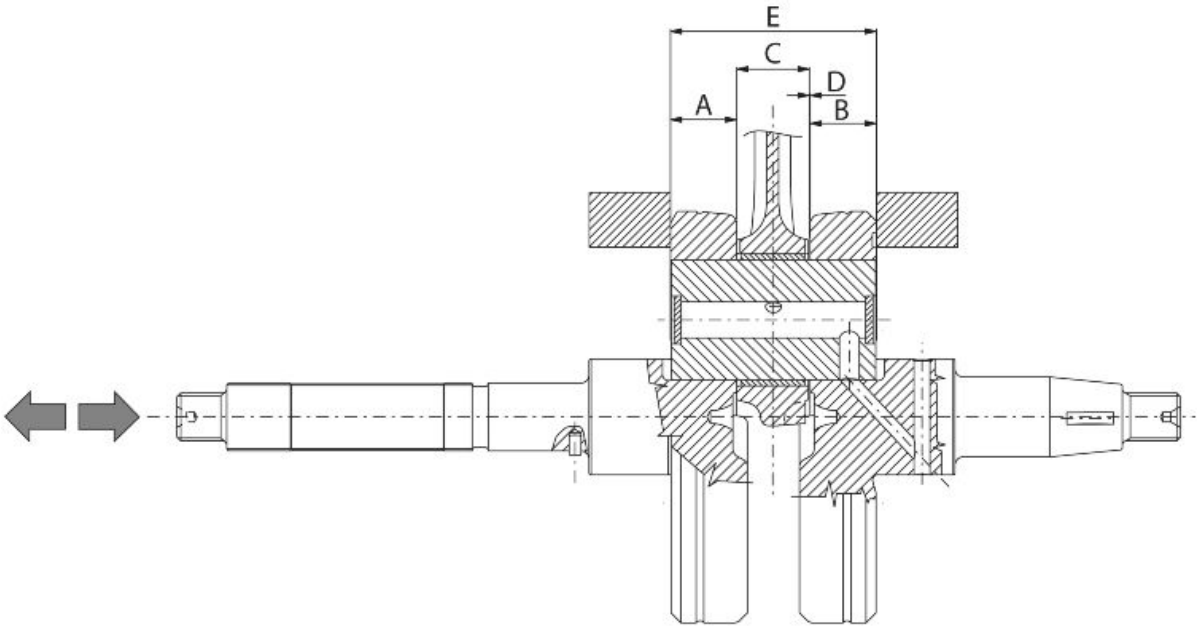
Name	Description	Dimensions	Initials	Quantity
Crankshaft			Category 1	28.998 ÷ 29.004
Crankshaft			Category 2	29.004 ÷ 29.010
Crankcase			Category 1	32.959 ÷ 32.965
Crankcase			Category 2	32.953 ÷ 32.959



Fitting clearances

Crankshaft/crankcase axial clearance (H):

0.15 ÷ 0.40 mm (when cold)



AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD

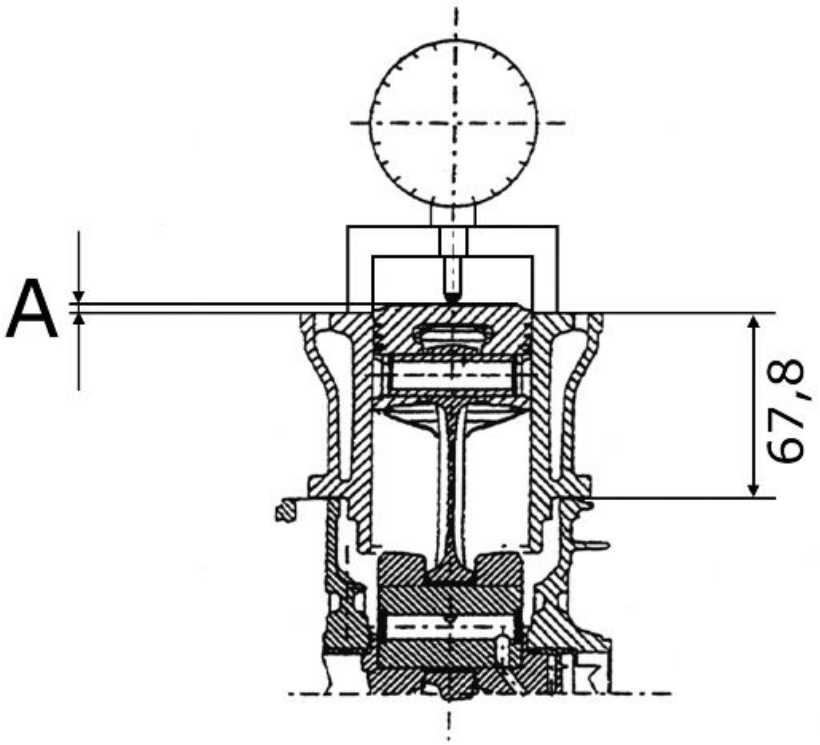
Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		16.6 +0-0.05	A	D = 0.20 - 0.50
Flywheel-side half-shaft		16.6 +0-0.05	B	D = 0.20 - 0.50
Connecting rod		18 -0.10 -0.15	C	D = 0.20 - 0.50
Spacer tool		51.4 +0.05	E	D = 0.20 - 0.50

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.

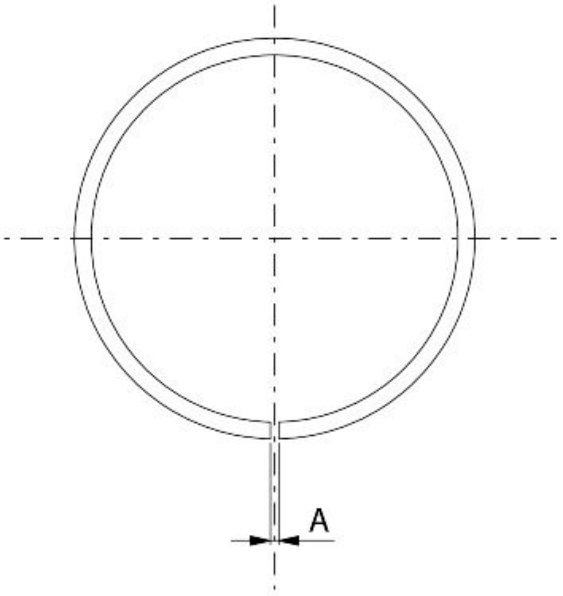
N.B.

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

Name	Description	Dimensions	Initials	Quantity
Oil scraper ring 3rd Oversize		57.6 x 2.5	A	0.15 ÷ 0.35

Products

RECOMMENDED PRODUCTS TABLE

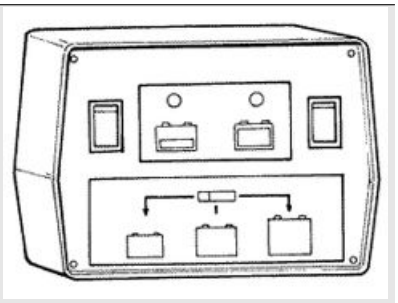
Product	Description	Specifications
AGIP ROTRA 80W-90	Rear hub oil	SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications
AGIP CITY HI TEC 4T	Oil to lubricate flexible transmissions (throttle control)	Oil for 4-stroke engines
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific 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
AGIP CITY HI TEC 4T	Engine oil	SAE 5W-40, API SL, ACEA A3, JASO MA Synthetic oil
AGIP BRAKE 4	Brake fluid	FMVSS DOT4 Synthetic fluid
SPECIAL AGIP PERMANENT fluid	coolant	Monoethylene glycol-based anti-freeze fluid, CUNA NC 956-16

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

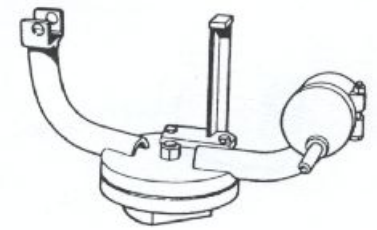
Specification	Desc./Quantity
1 Inch (in)	25.4 Millimetres (mm)
1 Foot (ft)	0.305 Meter (m)
1 Mile (mi)	1.609 Kilometre (km)
1 US Gallon (USgal)	3.785 Litre (l)
1 Pound (lb)	0.454 Kilogram (kg)
1 Cubic inch (in^3)	16.4 Cubic centimetres (cm^3)
1 Foot pound (ft lb)	1.356 Newton meter (Nm)
1 Miles per hour (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)

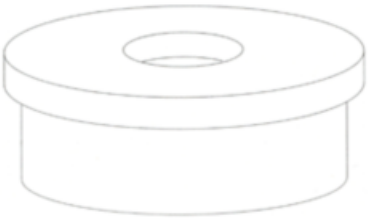
INDEX OF TOPICS

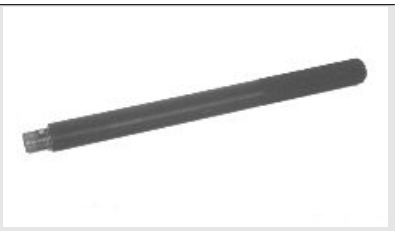
APPROPRIATE TOOLS

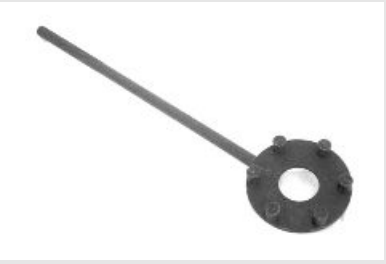
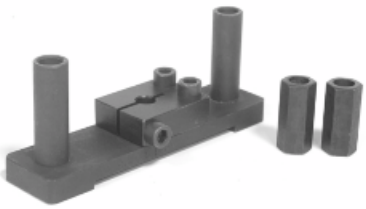
Stores code	Description	
020151Y	Air heater	
020331Y	Digital multimeter	
020333Y	Single battery charger	
020334Y	Multiple battery charger	
001467Y014	Pliers to extract ø 15-mm bearings	

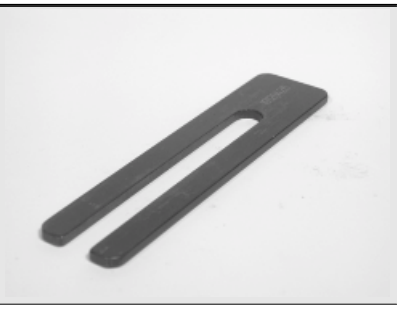
Stores code	Description	
020412Y	15 mm guide	
020335Y	Magnetic support for dial gauge	
020565Y	Flywheel lock calliper spanner	
020439Y	17 mm guide	
020359Y	42x47-mm adaptor	

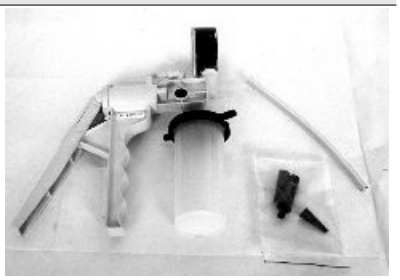
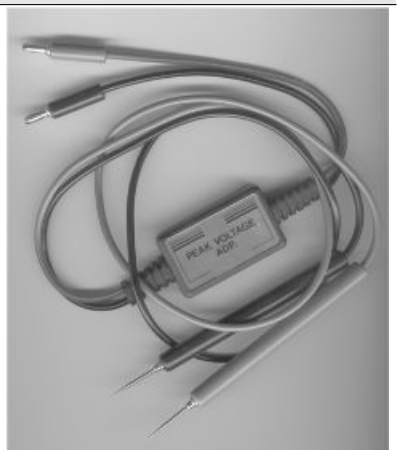
Stores code	Description	
020363Y	20 mm guide	
020459Y	Punch for fitting bearing on steering tube	
020458Y	Puller for lower bearing on steering tube	
005095Y	Engine support	
008564Y	Flywheel extractor	
020434Y	Oil pressure control fitting	

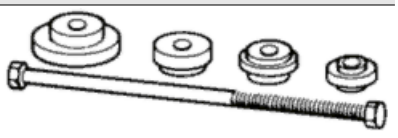
Stores code	Description	
020382Y011	adapter for valve removal tool	
020424Y	Driven pulley roller casing fitting punch	
020431Y	Valve oil seal extractor	
020193Y	Oil pressure gauge	
020306Y	Punch for assembling valve seal rings	
020360Y	Adaptor 52 x 55 mm	

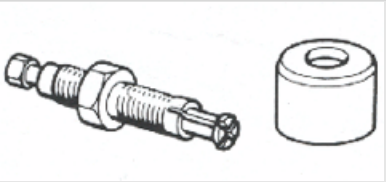
Stores code	Description	
020364Y	25-mm guide	
020375Y	Adaptor 28 x 30 mm	
020376Y	Adaptor handle	
020444Y	Tool for fitting/ removing the driven pulley clutch	
020330Y	Stroboscopic light for timing control	
001467Y035	Belle for OD 47-mm bearings	

Stores code	Description	
020368Y	driving pulley lock wrench	
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 removal 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 crank-shaft 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	

INDEX OF TOPICS

Maintenance chart

EVERY 2 YEARS

Action
Coolant - change
Brake fluid - change
secondary air filter (outside) - cleaning

EVERY 3,000 KM

10'

Action
Engine oil - level check/ top-up

AFTER 1,000 KM

65'

Action
Engine oil - replacement
Hub oil - change
Idle speed (*) - adjustment
Throttle lever - adjustment
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Safety locks - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in the «Idle speed adjustment» section

AFTER 6,000 KM

120'

Action
Engine oil - replacement
Hub oil level - check
Spark plug/ electrode gap - check
Valve clearance - check
Air filter - clean
Engine oil - change
Driving belt - check
Sliding blocks / variable speed rollers - check
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AFTER 12,000 KM; 60,000 KM

130'

Action
Engine oil - replacement
Hub oil level - check
Air filter - clean
Engine oil - change
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Driven pulley roller casing - Greasing
Driving belt - replacement
Sliding blocks / variable speed rollers - check
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in the «Idle speed adjustment» section

AFTER 18,000 KM; 54,000 KM

Action
Engine oil - change
Engine oil - change
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Sliding blocks / variable speed rollers - check
Driving belt - Check
Coolant level - check
Radiator - external cleaning/ check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AFTER 24,000 KM; 48,000 KM

Action
Engine oil - replacement
Engine oil - change
Hub oil - change
Air filter - clean
Spark plug - replacement
Valve clearance - Check
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Driving Belt - replacement
Driven pulley roller casing - Greasing

Action
Throttle lever - adjustment
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in the «Idle speed adjustment» section

AFTER 30,000 KM; 42,000 KM; 66,000 KM

90'

Action
Engine oil - change
Engine oil - change
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Driving belt - check
Sliding blocks / variable speed rollers - check
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AFTER 36,000 KM

Action
Engine oil - replacement
Hub oil level - check
Air filter - clean
Engine oil - change
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Driving belt - replacement
Sliding blocks / variable speed rollers - check
Driven pulley roller casing - Greasing
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check

Action
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in the «Idle speed adjustment» section

AFTER 72,000 KM

270'

Action
Engine oil - replacement
Engine oil - change
Hub oil - change
Spark plug / electrode gap - check / replacement
Valve clearance - check
Air filter - clean
Idle speed (*) - adjustment
Throttle lever - adjustment
Driving belt - replacement
Sliding block / variable speed rollers - change
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Driven pulley roller casing - Greasing
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in the «Idle speed adjustment» section

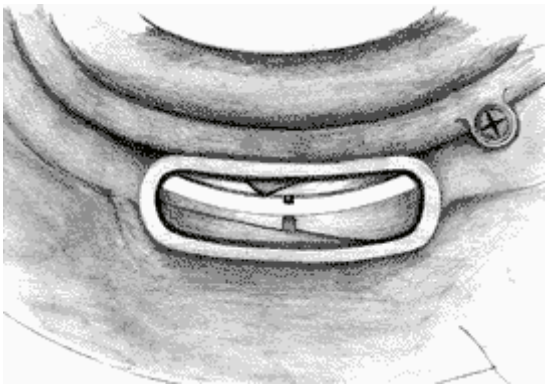
Carburettor

- 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.
- Check that the advance degrees corresponds with the rotation speed as indicated in the table.
- If failures are found, check the Pick-Up and the control unit power supply (positive-negative), replace the control unit if necessary.
- The unprogrammed control unit prevents that the engine rotation exceeds 2000 rpm.
- The programmed control unit allows the engine to rotate within the prescribed limits.

Characteristic

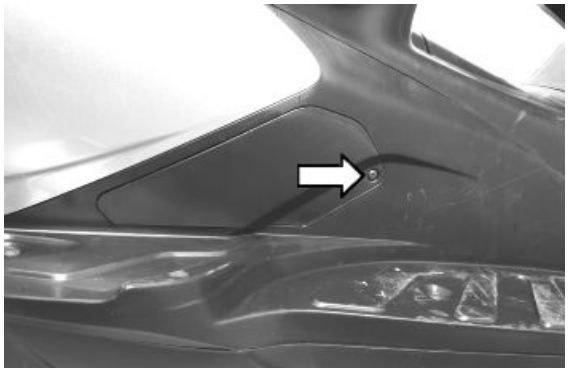
Variable ignition advance (before TDC)

10°±1° at 2000 rpm

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

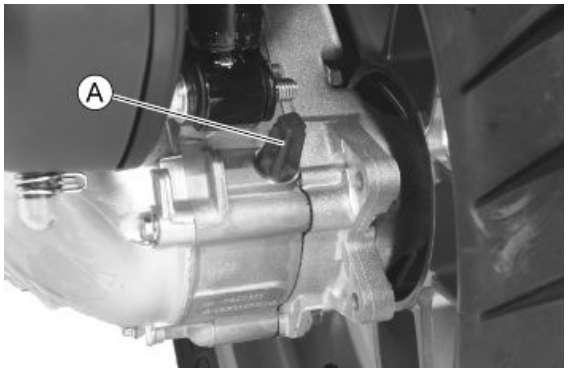
To check the rear hub oil level, proceed as follows:

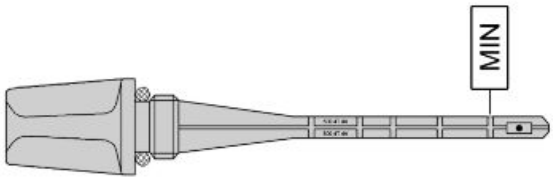
-Park the vehicle on level ground and rest it on its centre stand.

- 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 first notch from the bottom. If the oil level is below the **MAX** notch, refill the hub with the adequate amount of oil.

- Screw the dipstick back.





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

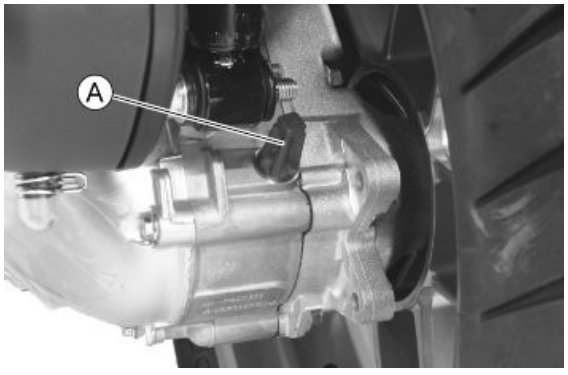
Characteristic

Transmission oil

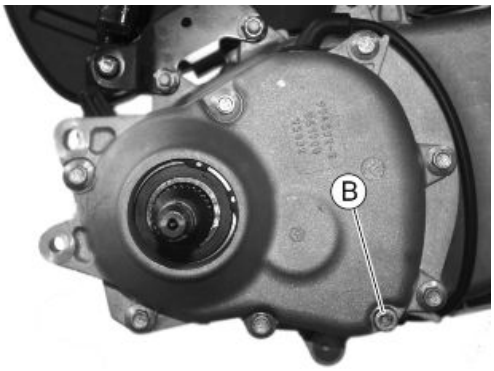
150 cm³

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)

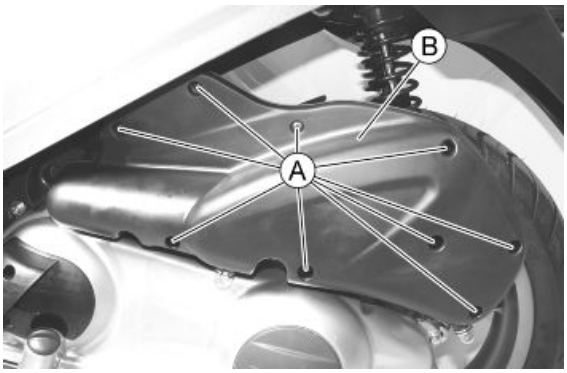
Hub oil drainage plug 15 ÷ 17

Air filter

To reach 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 CARRY OUT MAINTENANCE CONTROLS OF THE AIR FILTER TO AVOID DAMAGING THE ENGINE.

Recommended products

AGIP FILTER OIL Oil for air filter sponge

Mineral oil with specific additives for increased adhesiveness

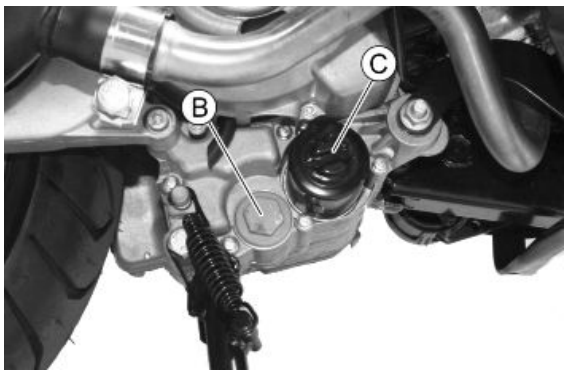
Engine oil

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** ».

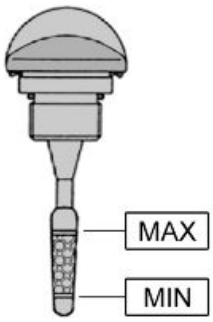


Make sure the pre-filter and drainage plug O-rings are in good conditions. Lubricate them and refit the mesh filter and the oil drainage plug, screwing them up to the prescribed torque.

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

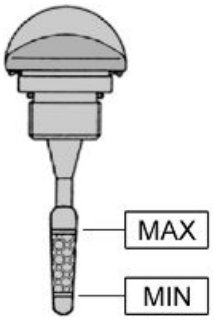
1.1 l

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 cm^3 of oil.

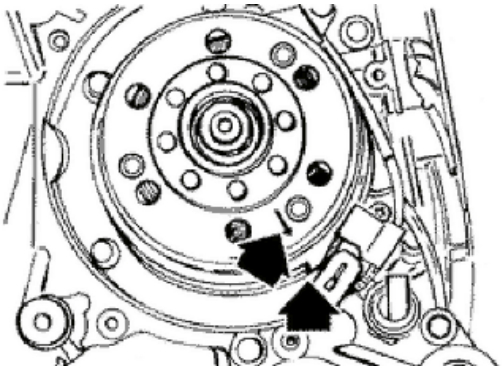
Checking the ignition timing

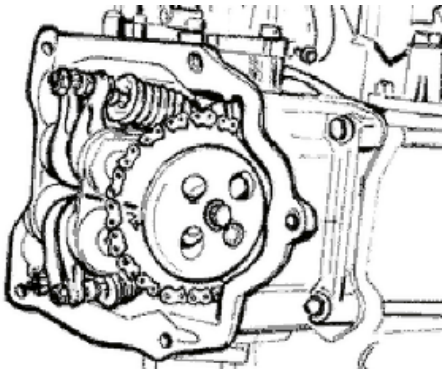
-Remove the 4 fixing screws and move away from the engine the flywheel cover fitted with the water pump and cooling sleeves.

- 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 is opposite the indicator on the head, turn the crankshaft once more.

N.B.

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

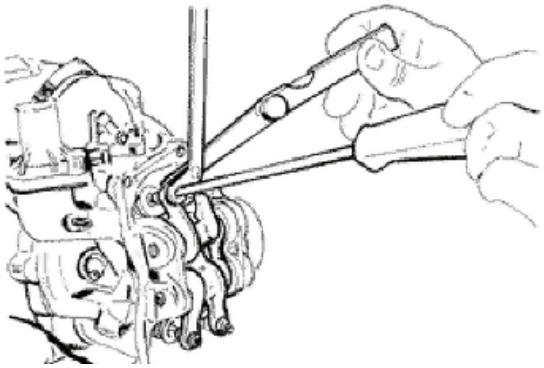




Checking the valve clearance

-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 register 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

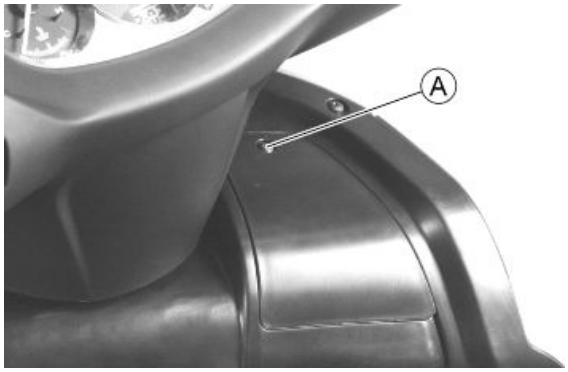
Inlet: 0.10 mm Outlet: 0.15 mm

Cooling system

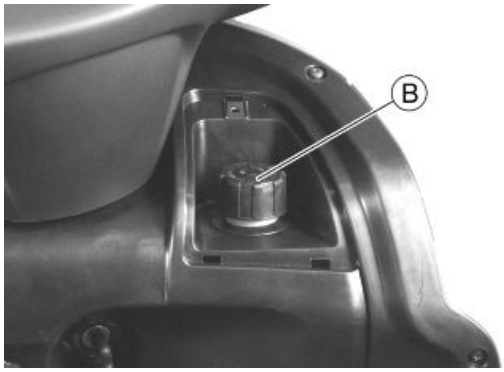
Level check

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**».

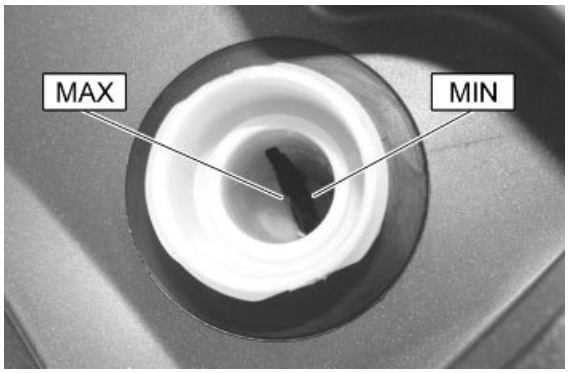


- Remove the expansion tank cover «**B**» by turning it anticlockwise.



- 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

IN ORDER TO AVOID BURNS, DO NOT UNSCREW THE EXPANSION TANK CAP 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

SPECIAL AGIP PERMANENT fluid coolant

Monoethylene glycol-based antifreeze fluid, CUNA NC 956-16

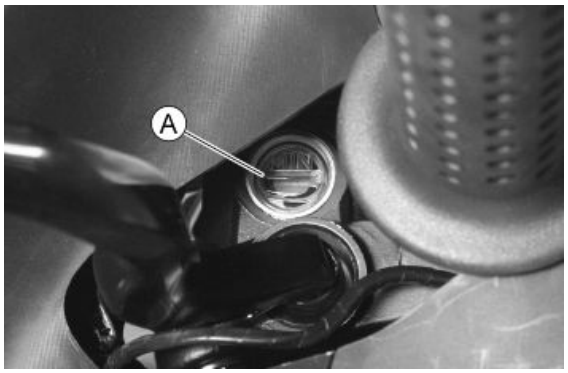
Braking system

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

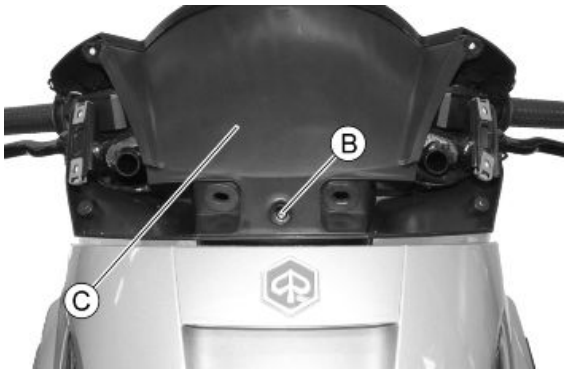
Proceed as follows:

- Remove the rear-view mirrors.

- Working from both sides of the vehicle, undo the three screws «**A**» and remove the front frame.

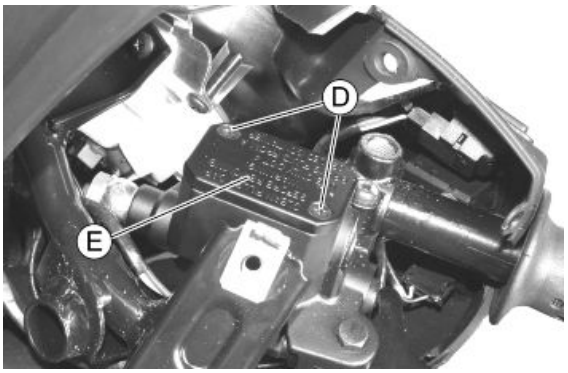
- Remove the windshield.

- Undo the screw «**B**» and remove the front handlebar cover «**C**» partially.



- Remove the cap «**E**» by loosening the two screws «**D**» and restore the fluid level by adding prescribed fluid type only, without exceeding the maximum level.

This operation applies to top up the rear brake pump. Follow the same procedure for the front one.



WARNING

ONLY USE DOT 4 CLASS BRAKE FLUIDS. COOLING SYSTEM FLUIDS ARE HIGHLY CORROSIVE. MAKE SURE THAT IT DOES NOT COME INTO CONTACT WITH THE PAINTWORK.

CAUTION

AVOID CONTACT OF BRAKE FLUID WITH EYES, SKIN, AND CLOTHING. IN CASE OF CONTACT, RINSE WITH WATER. THE BRAKING CIRCUIT FLUID IS HYGROSCOPIC, THAT IS, IT ABSORBS HUMIDITY FROM THE 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

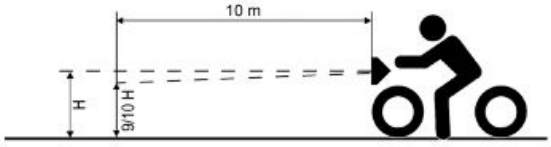
AGIP BRAKE 4 Brake fluid

FMVSS DOT4 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 borderline of the projected light beam should be lower than 9/10 of the distance from the ground to the

centre of the vehicle's headlight, and higher than 7/10.

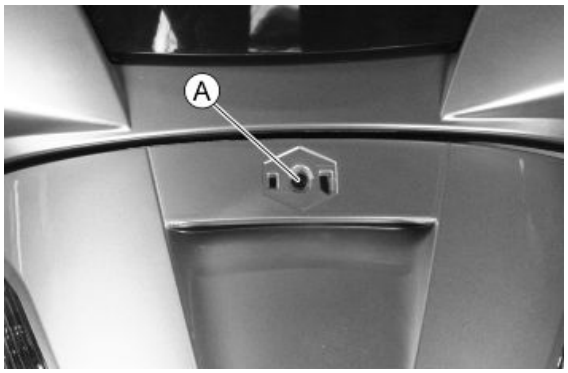
- Otherwise, adjust the headlight.

N.B.

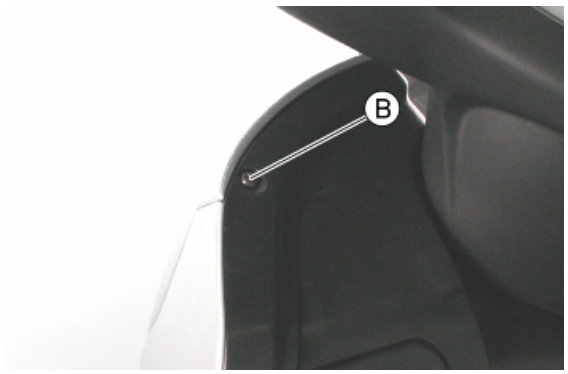
THE ABOVE PROCEDURE COMPLIES WITH THE EUROPEAN STANDARDS REGARDING MAXIMUM AND MINIMUM HEIGHT OF LIGHT BEAMS. REFER TO THE STATUTORY REGULATIONS IN FORCE IN EVERY COUNTRY WHERE THE vehicle IS USED.

In order to adjust the light beams:

- Remove the PIAGGIO clip-on badge and undo the screw «**A**».



- Working on both sides of the vehicle, undo the screw «**B**» and remove the front headlight cover.



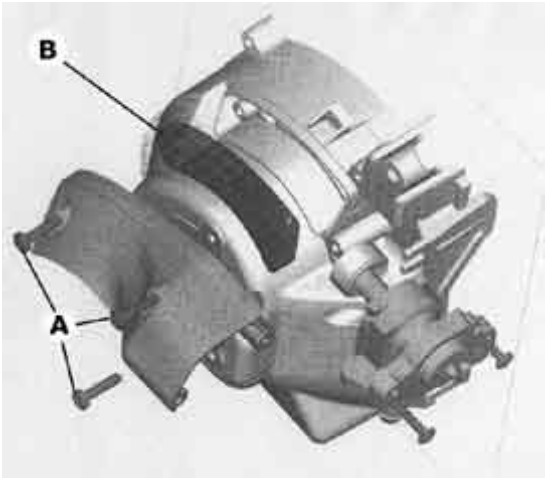
- Act on the screws «**C**» in order to aim the light properly.

SAS filters inspection and cleaning

Remove the secondary air filter cover after undoing the 3 fixing screws «**A**», then remove the filtering element «**B**».

- Wash with water and mild soap.

-Dry with a clean cloth and short blasts of compressed air.



CAUTION

NEVER RUN THE ENGINE WITHOUT THE SECONDARY AIR FILTER

CAUTION

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

INDEX OF TOPICS

This section makes it possible to find what solutions to apply when troubleshooting.

For each breakdown, a list of the possible causes and respective interventions is given.

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 power 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 wear	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

Possible Cause	Operation
Incorrect valve sealing or valve adjustment	Inspect the head and/or restore the correct clearance
- Engine flooded.	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
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

POOR LUBRICATION PRESSURE

Possible Cause	Operation
By-Pass remains open	Check the By-Pass and replace if required. Carefully clean the By-Pass area.
Oil pump with excessive clearance	Perform the dimensional checks on the oil pump components
Oil filter too dirty	Replace the cartridge filter
Oil level too low	Restore the level 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
Inefficient Starter	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 replace brake fluid if necessary. Check there is no air in

Possible Cause	Operation
	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 re-charged 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, headstock components, inspect forks.
Seal fault or breakage	Replace the shock absorber

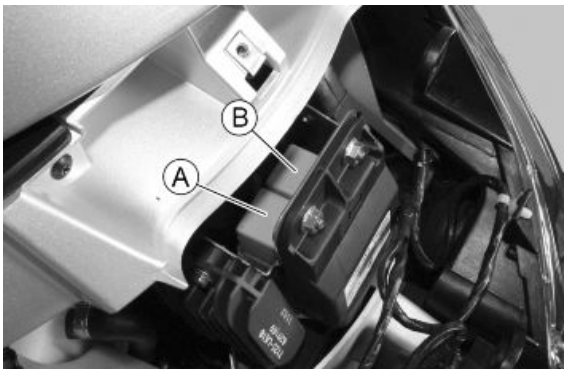
INDEX OF TOPICS

Components arrangement

1. Remote control switches: remove the front headlight cover to reach them.

A. Stop light remote control

B. Light remote control



2. Voltage regulator: remove the front headlight cover to reach them.

Electric characteristic

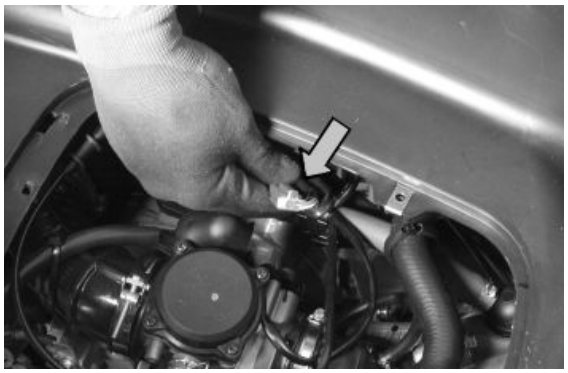
Control voltage

14÷15 V to 1500÷12000 rpm

3. Electronic ignition device: remove the front headlight cover to reach them.

4. Fuel electric pump control device: remove the front headlight cover to reach them.

5. Automatic starter: to reach the connector, remove the inspection compartment placed under the helmet compartment.



6. HV coil: to reach it, remove the cover on the vehicle left fairing.

Electric characteristic

HV coil resistance primary value:

210±25 mΩ

HV coil resistance secondary value:

3.1±0.31 kΩ

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

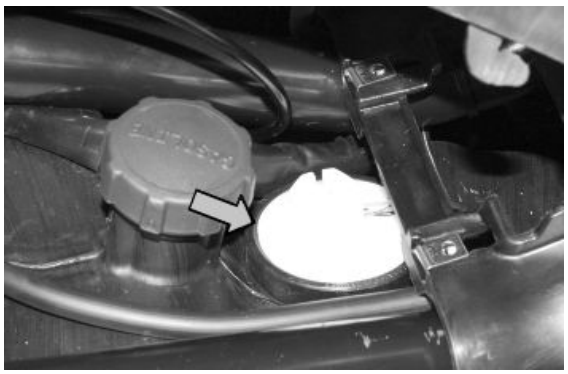
Electric characteristic

Resistance value when the tank is full

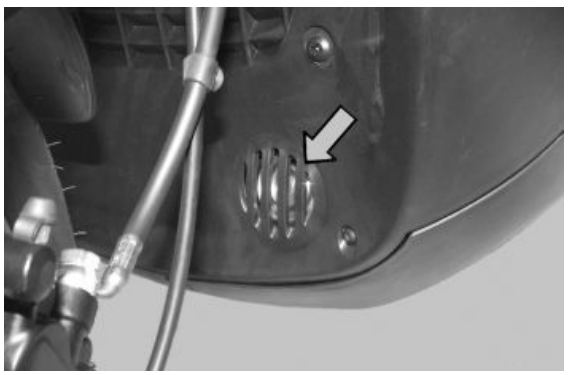
<= 7 Ω

Resistance value when the tank is empty

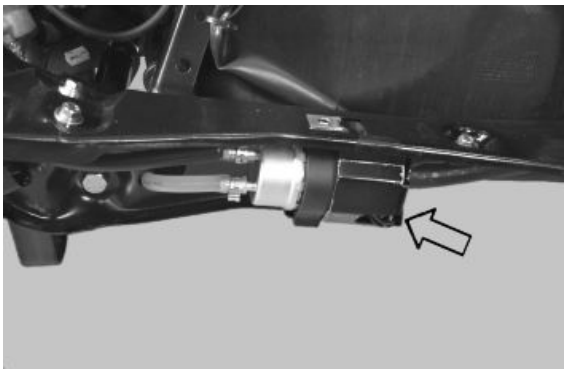
90 +13/-3 Ω



8. Horn: remove the front wheel housing to reach it.



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

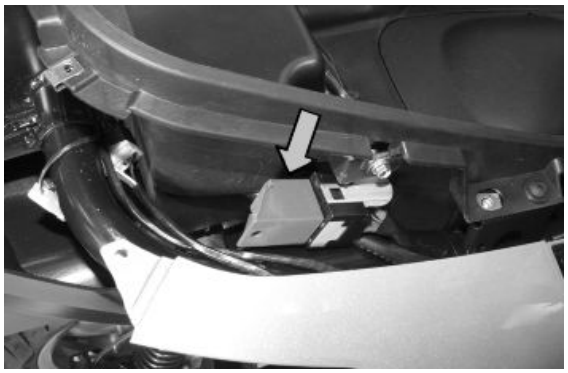


10. Magneto flywheel - Pick-up: the connector is placed on the rear part of the vehicle right fairing.

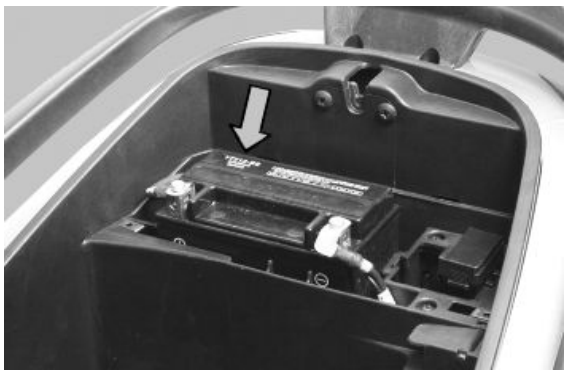
11. Oil pressure sensor: the connector is placed on the rear part of the vehicle right fairing.

12. Starter motor: the connector is placed on the rear part of the vehicle right fairing.

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



14. Battery: remove the battery cover placed in the helmet compartment to reach it.



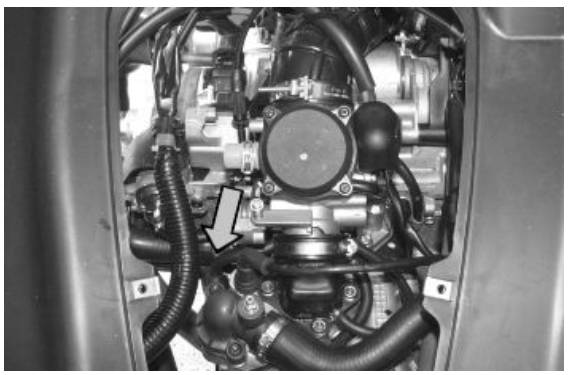
Electric characteristic

Battery

Sealed, 12 V/10 Ah

15. Fuses: remove the battery cover placed in the helmet compartment to reach it.

16. Thermistor: remove the inspection compartment placed in the helmet compartment to reach it.



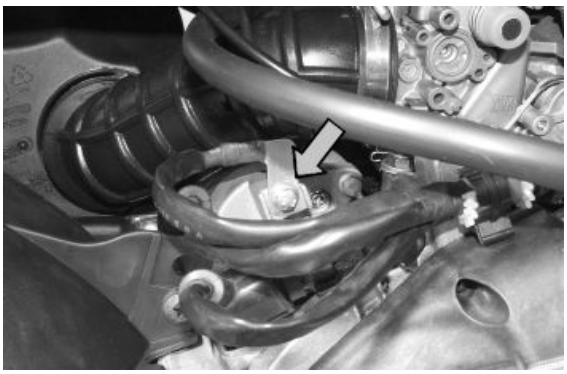
17. Electric fan: remove the shield back plate.

Punti di massa

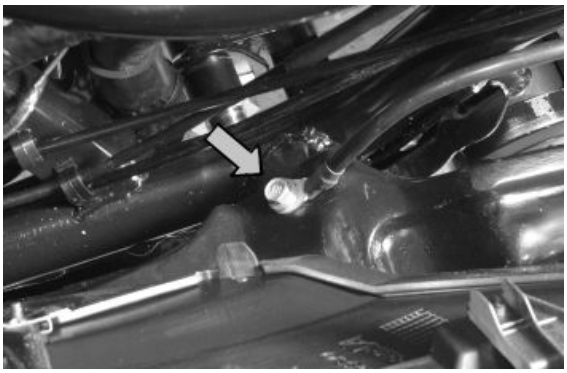
There are four ground points in the electrical system :

A. It is placed on the engine on the vehicle left fairing.

B. It is placed on the engine on the vehicle right fairing.

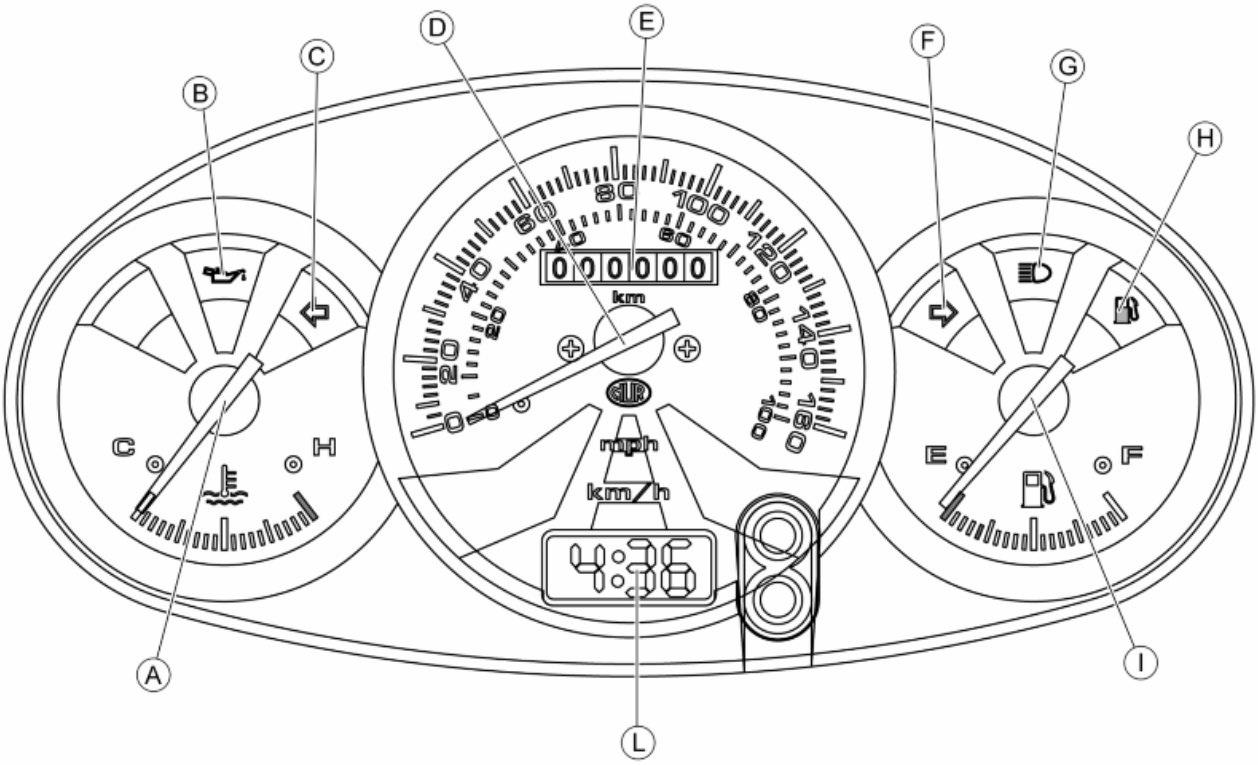


C. It is placed on the chassis on the vehicle left fairing. Remove the left side fairing to reach it.



D. It is placed on the chassis on the vehicle left fairing. Remove the left footrest to reach it.

Cruscotto



A = Coolant temperature gauge

B = Low oil pressure warning light

C = Left turn indicator warning light

D= Speedometer with twin scale (km/h and mph)

E = Odometer

F = Right turn indicator warning light

G = High-beam warning light

H = Low fuel warning light

I = Fuel gauge

L = Digital clock

Checks and inspections

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

Ignition circuit

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

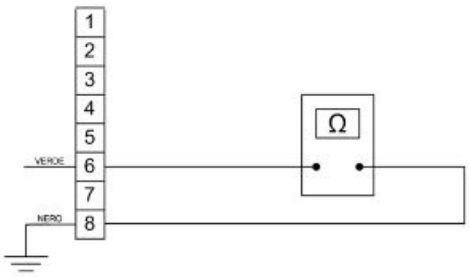
WARNING

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

Once the lack of power to the spark plug has been detected, proceed as follows:

-**Check the Pick-Up**.

Disconnect the control unit connector and check that the cable between terminal No. 6 (Green) and terminal No. 8 (Black) is not interrupted. Check the Pick-Up and its power line:



Electric characteristic

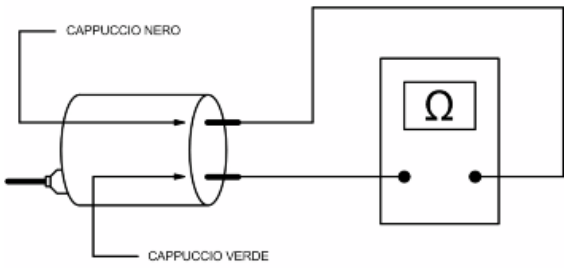
Pick-up resistance value

Pick-up resistance value: 105 ÷ 124 Ohm

If a break in the circuit is found, check again the flywheel and the engine earth connectors. If non-conforming values are detected, replace the Pick-Up. Otherwise, check that the cable harness and the connections are not interrupted.

- HV primary coil check

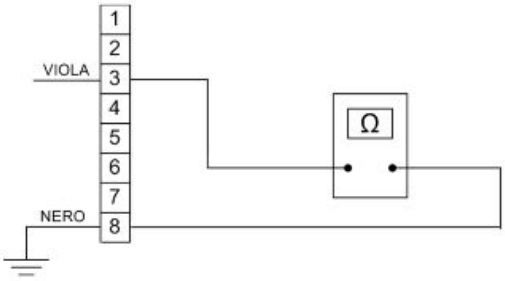
Disconnect the two connectors on the HV coil and check continuity (see figure). If non-conforming values are detected, replace the HV coil. If conforming values are detected, check that the cable harness to the control unit connector is not interrupted (see figure). If failures are detected, check the HV coil secondary.



Electric characteristic

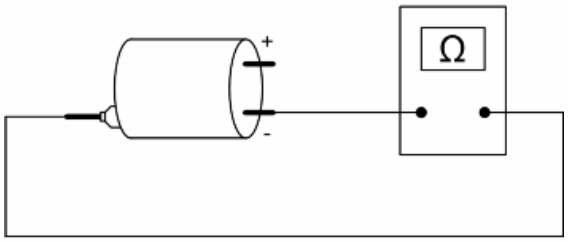
HV coil resistance primary value:

210±25 mΩ



- 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 detected, replace the HV coil. To carry out a more complete diagnosis, check peak voltage with the multimeter adaptor.



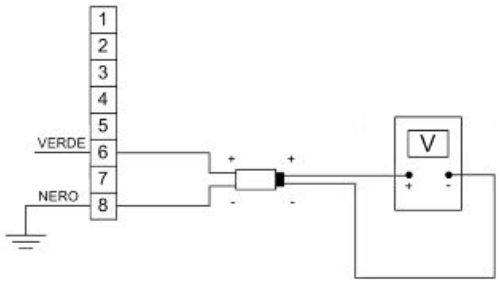
Electric characteristic

HV coil resistance secondary value:

3.1±0.31 kΩ

- Pick-Up.

- Disconnect the control unit connector and connect the Pick-Up positive terminal to pin No. 6 and the negative terminal to pin No. 8 (see figure). Use the start-up system to run the engine and measure the voltage produced by the Pick-Up. Replace Pick-Up if non-conforming values are measured.



Electric characteristic

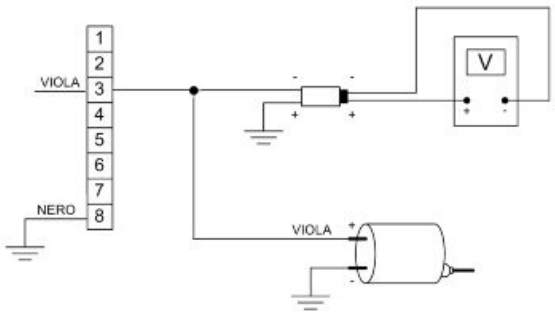
Pick-Up voltage value

Pick-Up voltage value: > 2 Volt

- **HV coil**

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

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



N.B.

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

Electric characteristic

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-magnet flywheel.

The alternator is directly connected to the voltage regulator.

This, in its turn, is connected directly to the ground and the battery's positive terminal passing through the 20A protective fuse.

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

Stator check

WARNING

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

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

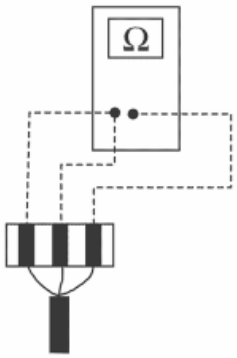
Electric characteristic

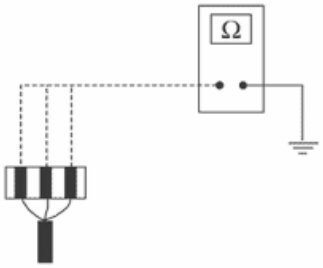
Resistance value

approx. 0.4 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.





- With a tester, check the circuit between connections 5-3 and 5-1 is not interrupted.
- Check the earth isolation on the three phases of stators 5-earth, 3-earth, 1-earth.

Minimum oil pressure switch check

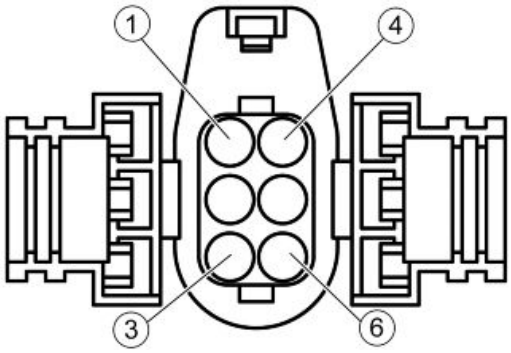
- With a tester, check the circuit between connections 4 and ground (with engine off) is not interrupted.

Pick-Up check

- Check that there is a resistance of approx. 105 ÷ 124 Ω at 20° C between connection 6 and the ground lead.
- In case values different from the ones stated are detected, replace the defective parts.

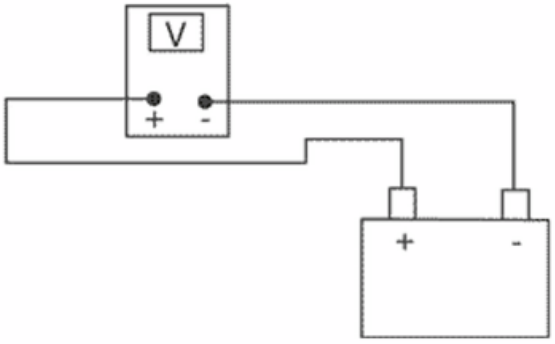
N.B.

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



Voltage regulator check

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



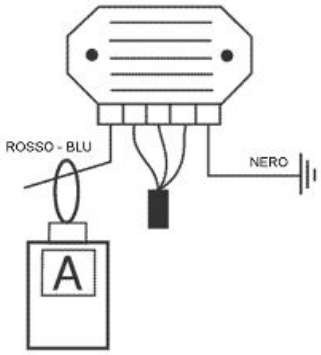
Electric characteristic

Control voltage

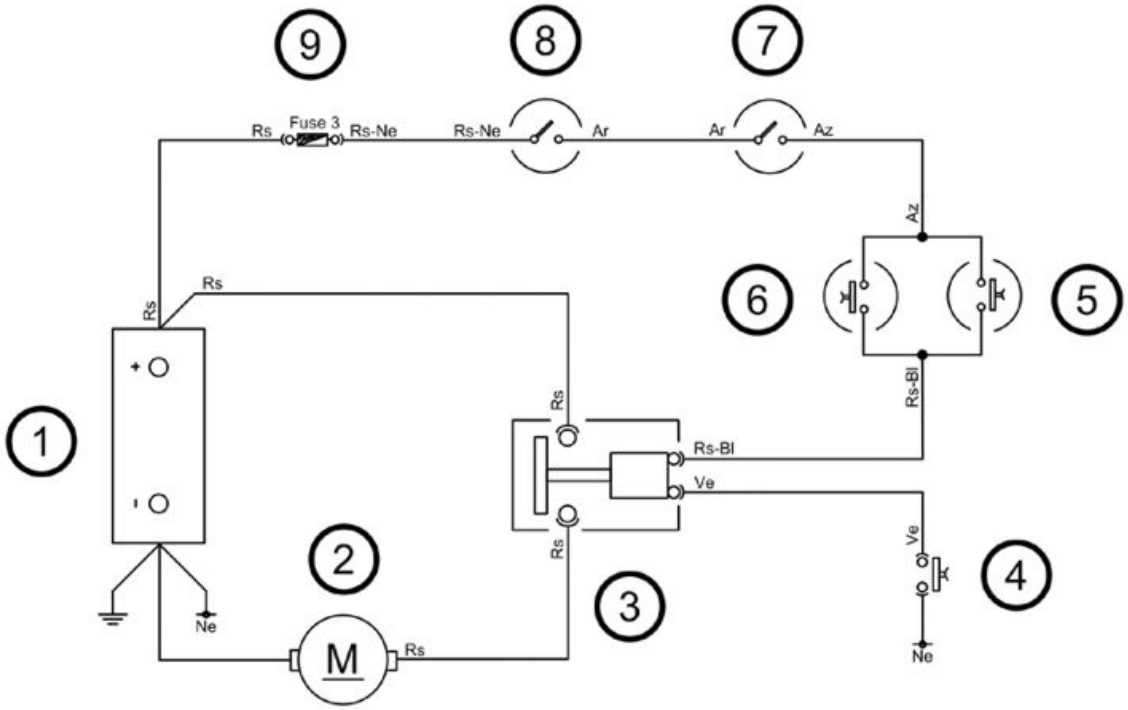
14÷15 V to 1500÷12000 rpm

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. Starter motor

3. Start-up remote control switch

4. Starter button

5. Stop button on front brake

6. Stop button on rear brake

7. Engine stop switch

8. Key switch contacts

9. Fuse No. 3

WARNING

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

If the starter motor does not operate correctly, proceed as follows:

1) Check the starter motor ground connection.

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

3) Check the start-up remote control switch.

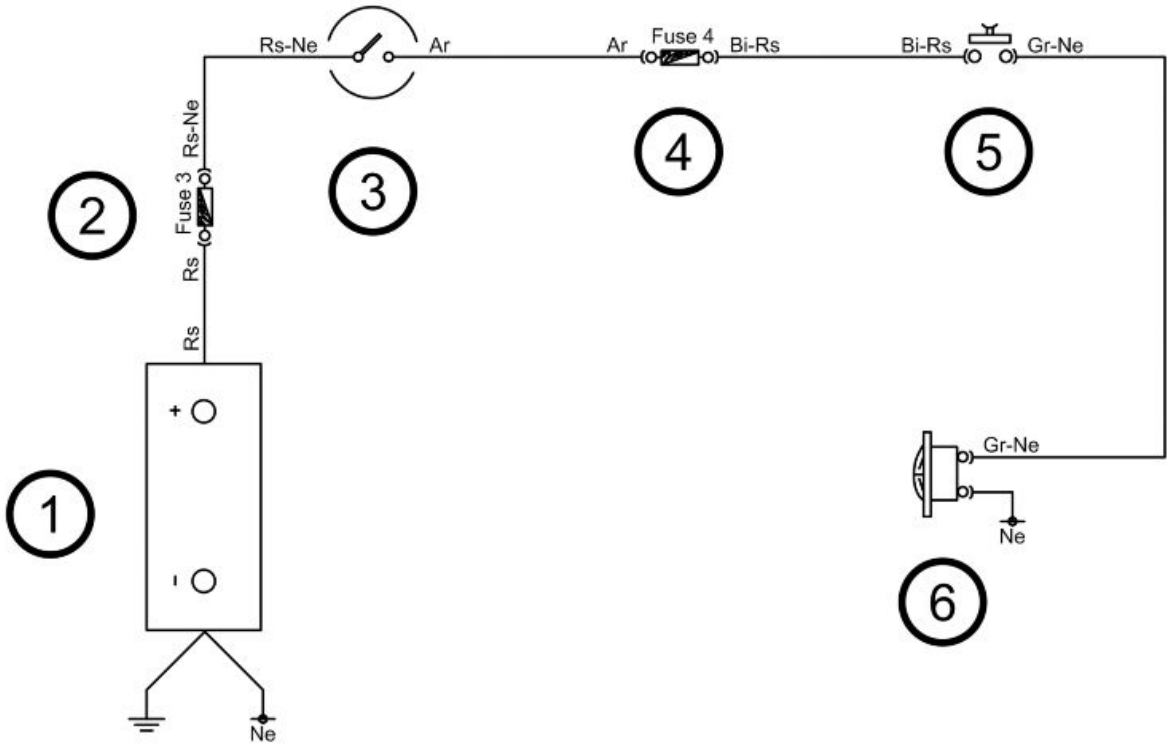
4) Check the starter button.

5) Check the starter button ground connection and continuity between the Green cable and the start-up remote control switch.

6) Check the stop buttons, the engine stop switch, the key switch contacts and the fuse No 3.

7) If all components are in good conditions, check that the cable harness connecting them is not interrupted (see diagram).

Horn control



KEY

1. Battery

2. Fuse No. 3

3. Key switch contacts

4. Fuse No. 4

5. Horn button

6. Horn

WARNING

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

In case the horn does not operate correctly, proceed as follows:

1) Check fuses No. 3 and 4, key switch contacts and the horn button.

2) If components are in good conditions, check that the cable harness connecting them is not interrupted (see diagram).

3) Check the horn ground connection.

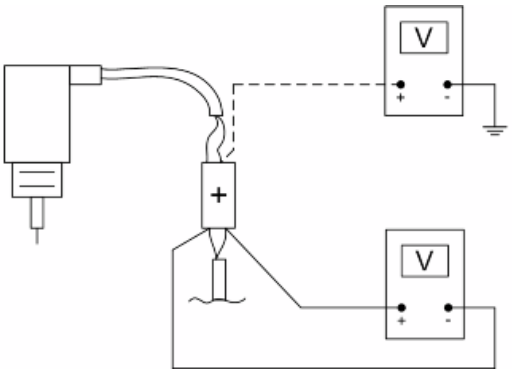
Choke Inspection

WARNING

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

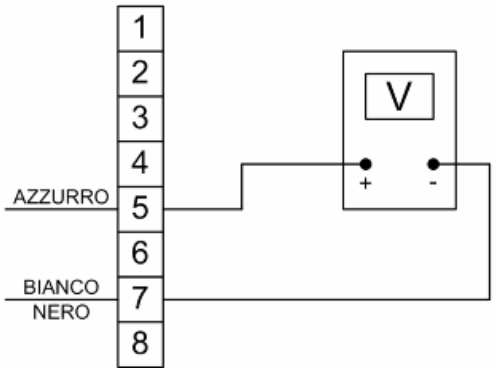
1) Keep the connector connected to the system and check if there is battery voltage between the two terminals with engine on (see figure). If voltage is detected, replace the automatic starter as it is surely failing.

2) If no voltage is detected, connect the multimeter negative probe to ground and the positive probe to the automatic starter Orange cable. With the key switch set to «**ON**», check if there is battery voltage: if there is no voltage, check that the cable harness connections to the key switch are not interrupted.

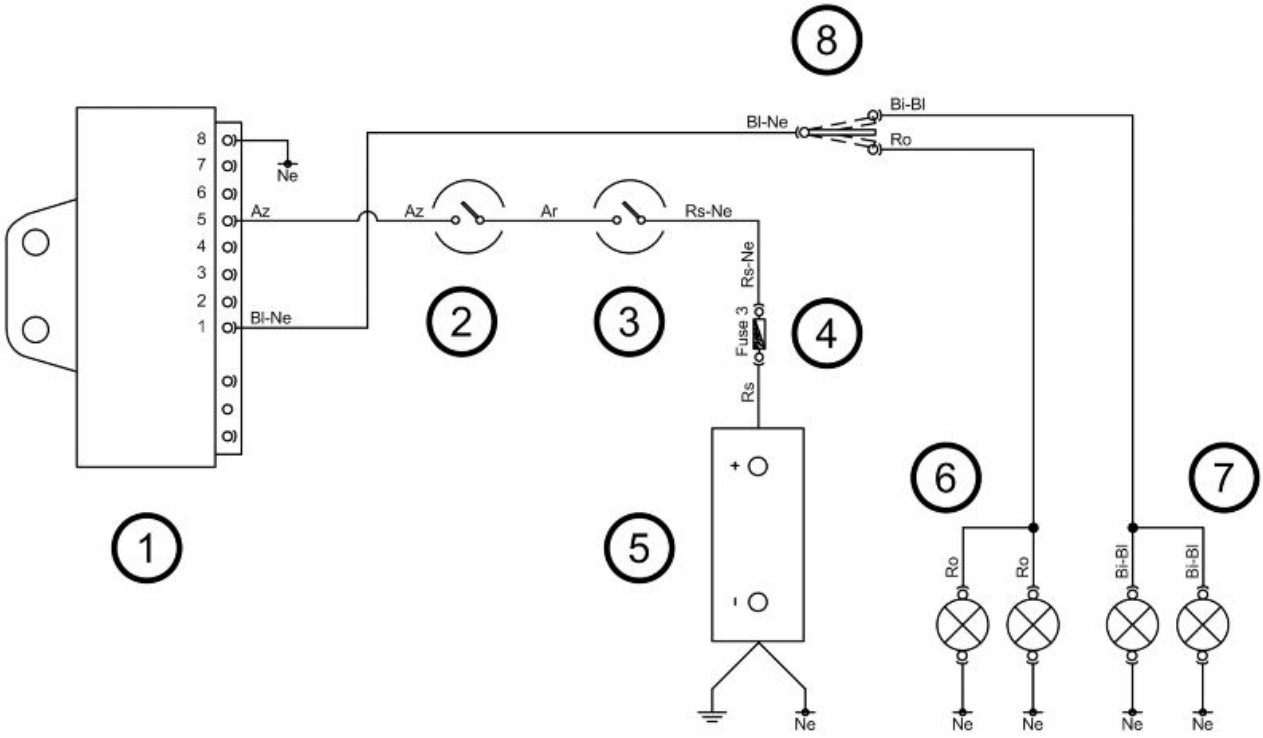


3)If voltage is detected, check again the control unit connector: after disconnecting the starter, start up the engine and keep it at idle speed and check there is voltage by connecting the positive probe to pin No. 5 (Light blue) and the negative one to pin No. 7 (Black-White).

4) If no voltage is detected, replace the control unit; otherwise, check that the cable harness between the control unit and the automatic starter is not interrupted.



Turn signals system check



KEY

1. Electronic ignition device

2. Engine stop switch

3. Key switch contacts

4. Fuse No. 3

5. Battery

6. Left turn indicator bulbs

7. Right turn indicator bulbs

8. Turn indicator switch

WARNING

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

If the turn indicators do not operate correctly:

1) Check that bulbs operate properly.

2) With the key switch set to «**ON**» and the engine stop switch set to «**RUN**», check if there is voltage between pin 5 (Light blue) and pin 8 (Black) of the control unit connector.

3) If there is no voltage, check fuse No 3, the key switch contacts and the engine stop switch. If components are in good conditions, check that the cable harness connecting them is not interrupted.

4) Check that the Blue-Black cable between the control unit and the turn indicator switch is not interrupted.

5) Check the turn indicator switch.

6) Check that the Pink and White-Blue cables connecting the turn indicator switch to the bulbs are not interrupted.

level indicators

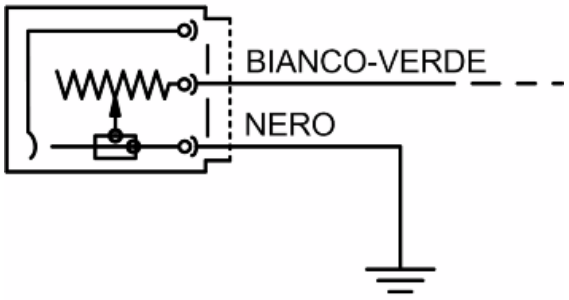
WARNING

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

<= 7 Ω

Resistance value when the tank is empty

90 +13/-3 Ω

Lights list

LIGHT BULB TABLE

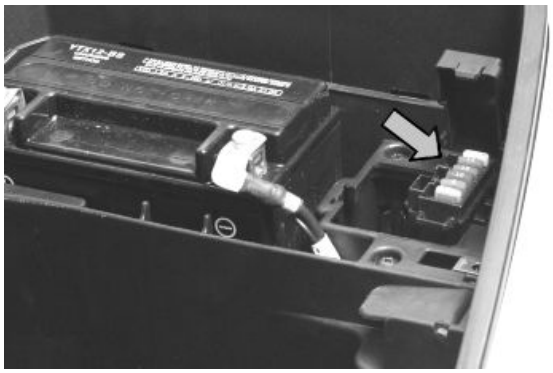
	Specification	Desc./Quantity
1	High-beam light bulb	**Type:** HALOGEN (H7) **Power:** 12V - 55W **Quantity:** 1
2	Low-beam bulb	**Type:** HALOGEN (H7) **Power:** 12V - 55W **Quantity:** 1
3	Front tail light bulb	**Type:** ALL GLASS **Power:** 12V - 5W **Quantity:** 2
4	Instrument panel bulb	**Type:** ALL GLASS **Power:** 12V - 1.2W **Quantity:** 3
5	Front turn indicator bulb	**Type:** ALL GLASS **Power:** 12V - 10W **Quantity:** 1 RHS + 1 LHS
6	Rear turn indicator light bulb	**Type:** SPHERICAL **Power:** 12V - 10W **Quantity:** 1 RHS + 1 LHS
7	Tail light and stop light bulb	**Type:** SPHERICAL, TWIN-FILAMENT

	Specification	Desc./Quantity
		Power: 12V - 5/21W **Quantity:** 2
8	License plate light bulb	**Type:** ALL GLASS **Power:** 12V - 5W **Quantity:** 1

Fuses

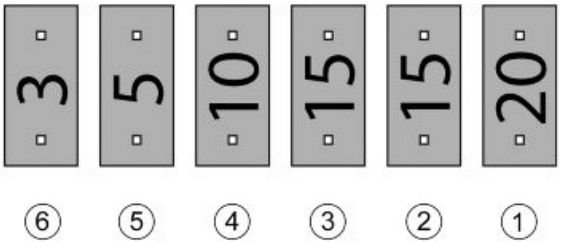
The electrical system has 6 fuses located alongside the battery to protect the different circuits of the vehicle.

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



CAUTION

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



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.

FUSE TABLE

	Specification	Desc./Quantity
1	Fuse No. 1	**Capacity**: 20A **Protected circuits:** Battery recharge circuit.
2	Fuse No. 2	**Capacity**: 15A **Protected circuits:** Optional pre-installation, high-beam light and low-beam light (via remote control).
3	Fuse No. 3	**Capacity**: 15A **Protected circuits:** Electric fan, pre-installation for antitheft device. **Protected circuits (live)**: Fuses No. 4-5-6, light remote control, automatic starter, start-up circuit, power supply for the electronic starter.
4	Fuse No. 4	**Capacity**: 10 A

	Specification	Desc./Quantity
		Protected circuits (live): High-beam light in flashing mode, pre-installation for antitheft device, horn, stop lights (via remote control), level gauge and warning light, pre-installation for satellite navigation system.
5	Fuse No. 5	**Capacity**: 5A **Protected circuits (live)**: Instrument panel lighting, license plate light, tail lights.
6	Fuse No. 6	**Capacity**: 3A **Protected circuits (live)**: Fuel electric pump control device.

Sealed battery

If the vehicle is provided with a sealed battery, the only maintenance required is checking its charge and recharging, when 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 standard 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, WHEREAS 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.

Dry-charge battery

COMMISSIONING A NEW DRY-CHARGED BATTERY

- Remove the battery air pipe stop cap and each single element caps.
- Fill the battery with electrolyte of 1.270+/-0.01 kg/l density (corresponding to 31+/-1 Bé) with an ambient temperature not below 15°C, until it reaches the upper level indicated on the block.
- Tilt the battery slightly to remove any air bubbles formed during filling.
- Place the caps on each single element filling holes without screwing them and leave the battery to rest. During this stage, the battery is subjected to a gasification phenomenon and temperature increases.
- Let it rest until it reaches ambient temperature (this stage can take up to 60 minutes).
- Tilt the battery slightly to facilitate the elimination of any gas bubbles present inside; restore the level using the same filling electrolyte

Note: This is the last time that electrolyte can be added. Future top-ups should be done only with distilled water;

- Before 24 hours elapse, recharge the battery following these steps:
- Connect the battery charger terminals observing the correct polarity;
- Wit the battery charger drw. 020333Y and/or drw. 020334Y operate the battery charger control by selecting the position corresponding to that capacity;
- Otherwise, charge the battery with direct current equal to 1/10 of rated capacity (e.g. for a battery with a 9Ah rated capacity, the charging current should be 0.9-1.0A) for approximately a 4-6 hour charge.

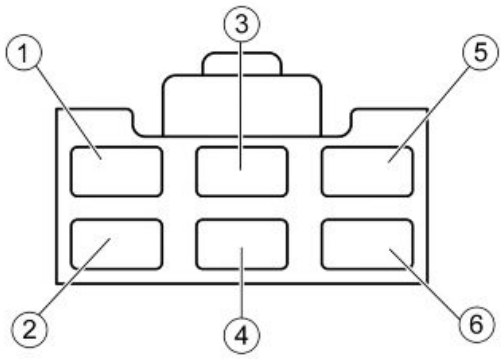
Note: Batteries that have been stored for a long time may take a longer charging time. The battery chargers drw. 020333Y and drw. 020334Y have an automatic protection which interrupts the recharge after 12 hours to avoid battery harmful heating. In this case, a green LED turns on to indicate the activation of the safety system and not the end of the charge.

- Let the open circuit battery rest for approximately 4-6 hours; then check the off-load voltage using a standard tester.
- If the open-circuit voltage is higher or equal to **12.6V**, the battery is charged adequately. Slightly shake or tilt the battery to eliminate any air bubbles formed during recharging.
- Check the electrolyte levels again, fill them with distilled water up to the upper level line if necessary, clean battery properly, close each single cell cap tightly and install it on the vehicle.
- If the voltage indicated is low, charge the battery another 4-6 hours in the way described above.

Note: With the battery charger drw. 020334Y, it is possible to check the battery charge level with the **Check** function. The value indicated on the display must be higher than the value indicated on the chart; otherwise, recharge the battery again in the same way indicated above.

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»

Controllo teleruttori

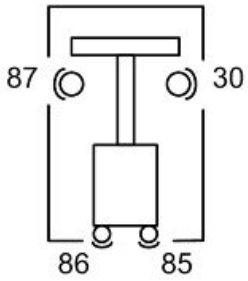
To check the operation of a remote control:

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.



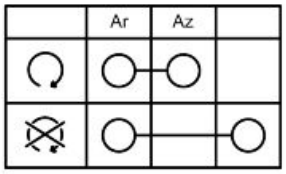
Controllo interruttori

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

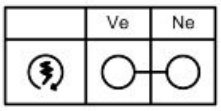
KEY

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

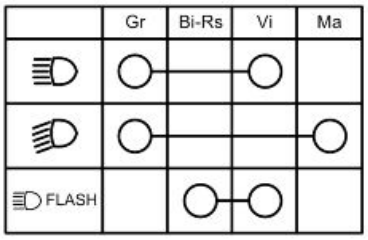
ENGINE STOP SWITCH



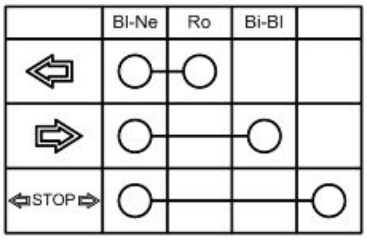
STARTER BUTTON



LIGHT SWITCH



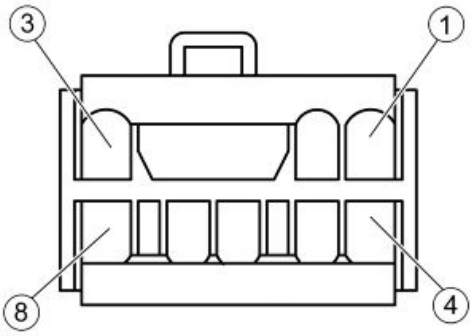
TURN INDICATOR SWITCH



HORN BUTTON

Connectors

ELECTRONIC IGNITION DEVICE CONNECTOR



1.Turn indicator switch (White-Blue)

2. Not connected

3. HV coil (Purple)

4. Not connected

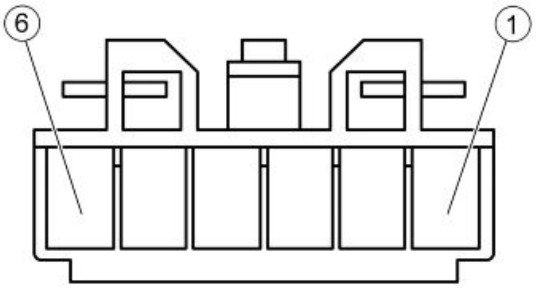
5.Live power supply (Light Blue)

6. Pick-up (Green)

7.Automatic starter (White-Black)

8. Ground (Black)

INSTRUMENT PANEL CONNECTOR «A»



1. Low fuel warning light (Yellow-Green)

2. Live supply (White-Red)

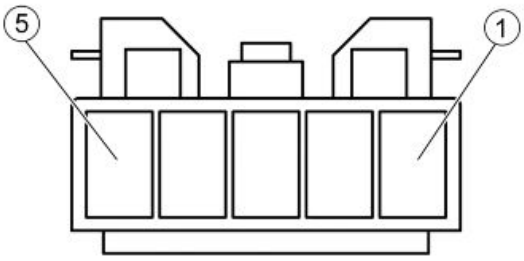
3. High-beam warning light (Purple)

4. Right turn indicator warning light (White-Blue)

5. Fuel level indicator (White-Green)

6. Instrument panel lighting (Yellow-Black)

INSTRUMENT PANEL CONNECTOR «B»



1. Ground (Black)

2. Left turn indicator warning light (Pink)

3. Coolant temperature signal (Yellow-Pink)

4. Not connected

5. Not connected

VOLTAGE REGULATOR CONNECTOR

1. Battery positive (Red-Blue)

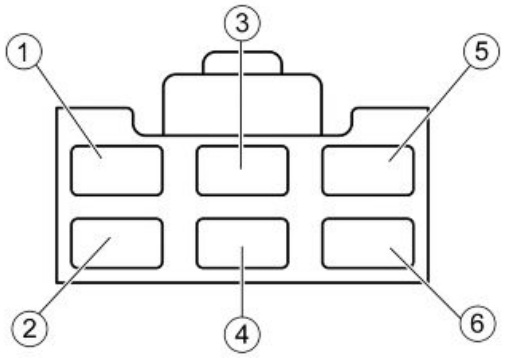
2. Magneto flywheel (Yellow)

3. Not connected

4. Magneto flywheel (Yellow)

5. Ground (Black)

6. Magneto flywheel (Yellow)



MAGNETO FLYWHEEL - PICK-UP CONNECTOR

1. Voltage regulator (Yellow)

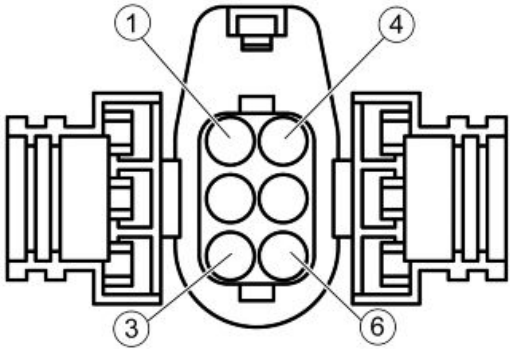
2. Not connected

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 supply (Orange-Blue)

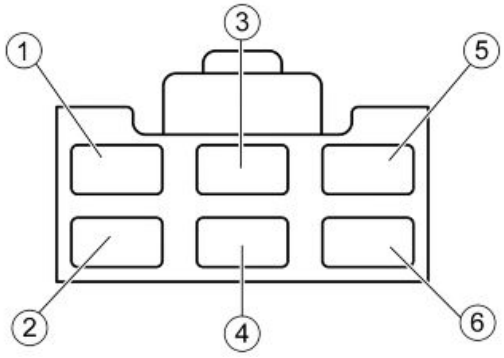
2. Not connected

3. Electric fuel pump negative (White-Black)

4. Electric fuel pump positive (Blue-Black)

5. Ground (Black)

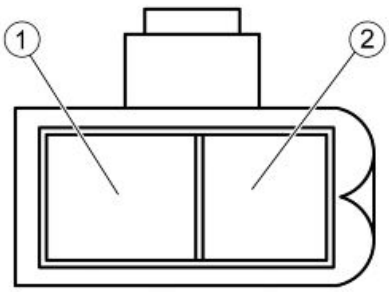
6. Electronic ignition device (Purple)



FUEL ELECTRIC PUMP CONNECTOR

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

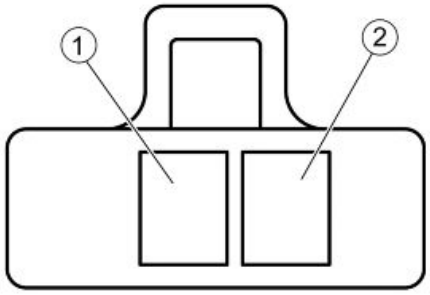
2. Fuel electric pump control device positive (Blue-Black)



AUTOMATIC STARTER CONNECTOR

1. Live power supply (Orange)

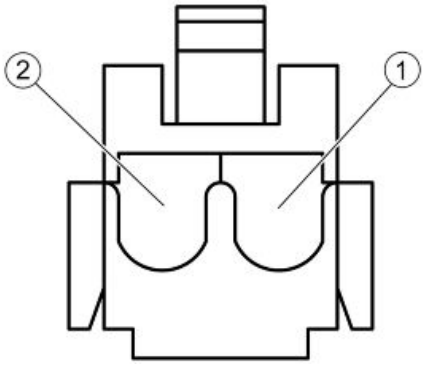
2. Electronic ignition device negative (White-Black)



ELECTRIC FAN CONNECTOR

1. Thermal switch (Green)

2. Battery powered (Red-Black)

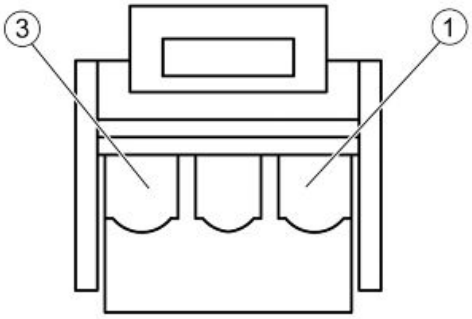


FUEL LEVEL TRANSMITTER CONNECTOR

1. Low fuel warning light (Yellow-Green)

2. Ground (Black)

3. Fuel level indicator (White-Green)



ANTITHEFT DEVICE PRE-INSTALLATION CONNECTOR

1. LHS Turn indicator bulbs (Pink)

2. RHS Turn indicator bulbs (White-Blue)

3. Ground (Black)

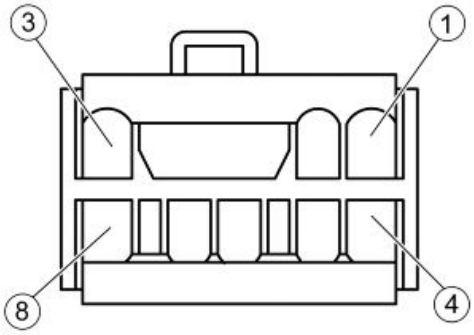
4. Battery powered (Red-Black)

5. Live supply (White-Red)

6. Not connected

7. Not connected

8. Not connected

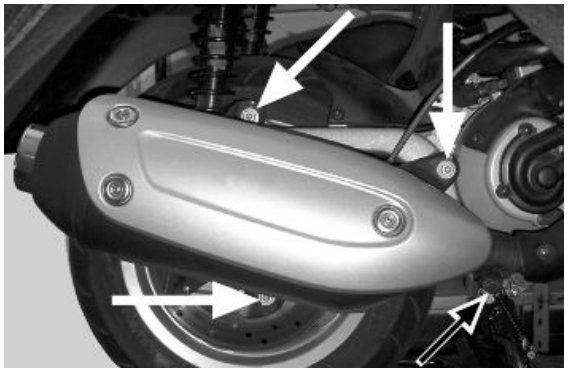


INDEX OF TOPICS

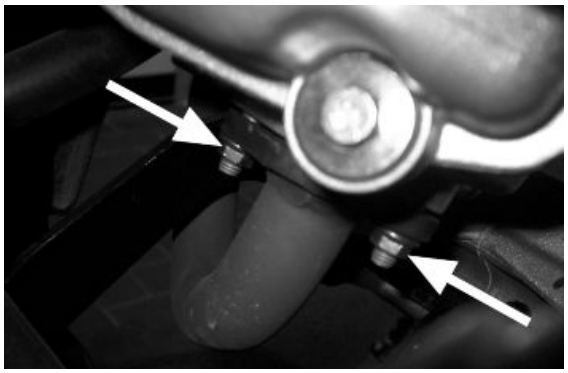
This section describes the operations to carry out when removing the engine from the vehicle.

Exhaust assy. Removal

- Unscrew the 3 screws fixing the muffler to the engine crankcase and the supporting arm;
- Loosen the bolt holding the muffler to the exhaust manifold; after that, remove the muffler backwards.

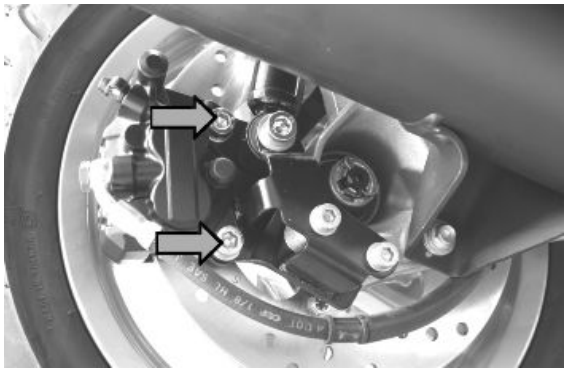


- Unscrew the 2 nuts that fix the exhaust manifold to the head and remove it.

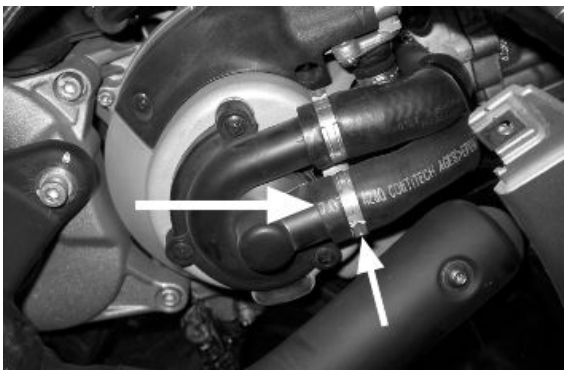


Removal of the engine from the vehicle

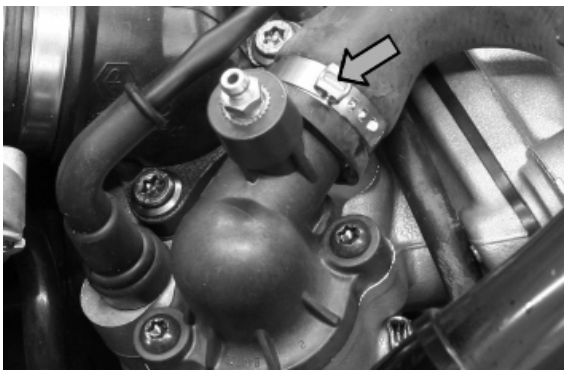
- Remove the side panels
- Undo the 2 screws fixing the rear brake calliper to the supporting arm and remove it.
- Keep the pipes connected to the calliper and move it aside towards the vehicle front part so as not to hinder the next removal operations.



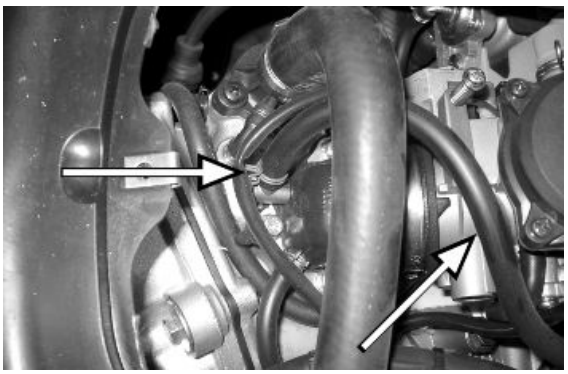
- Empty the cooling system.
- Remove the clamps and disconnect the coolant feeding (engine compartment) and return (water pump) pipes.



- Remove the holding spring and remove the coolant out pipes;

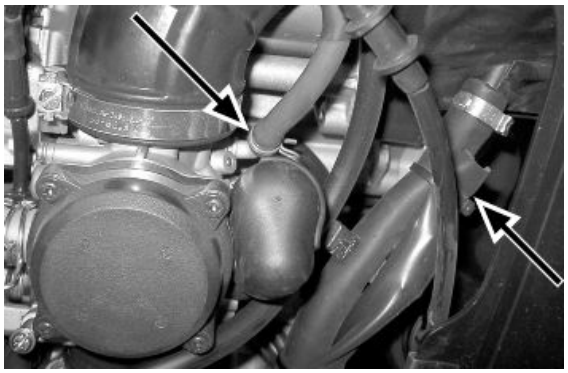


- Remove the holding spring and remove the petrol pump low-pressure pipe from the inlet manifold;
- Move the accelerator wire from the throttle control rocking lever; unscrew the set screw and disconnect the transmission from the carburettor.

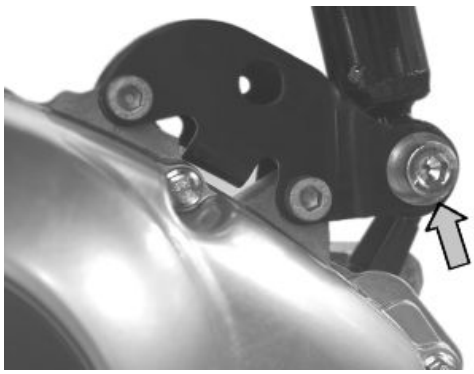


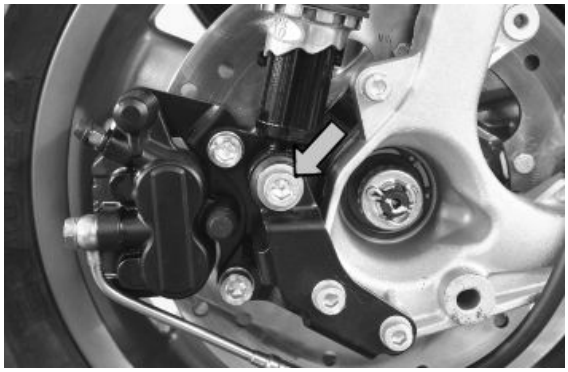
- Disconnect the HV wire from the spark plug;
- Disconnect the thermistor electrical connection after removing the rubber cap.

- Remove the holding spring and move the petrol feed pipe to carburettor;
- Cut the plastic clamp and disconnect the starter supply connection.

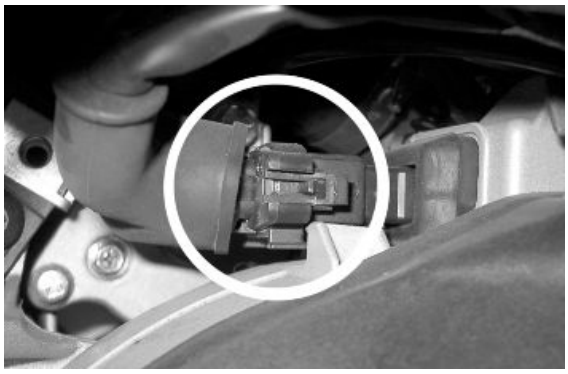


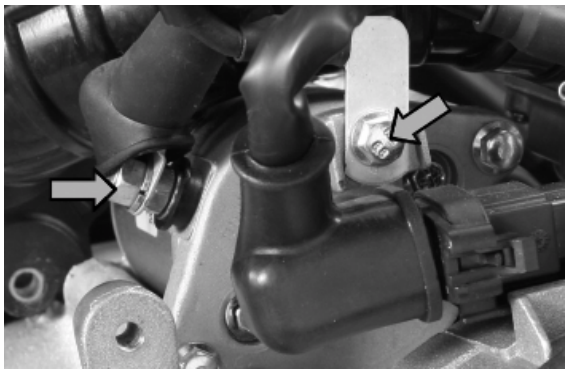
- Remove the lower screws fastening the rear shock absorbers to the engine crankcase and the supporting arm;



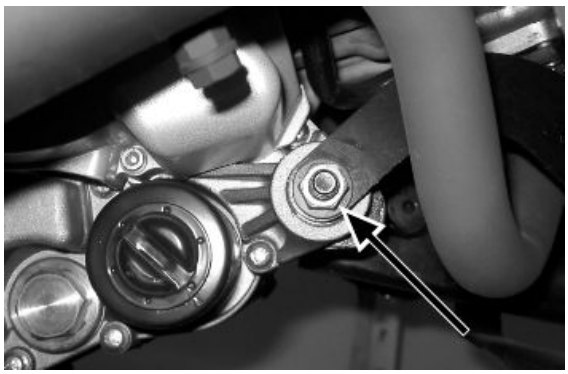


- Disconnect the electric connector linking the magneto flywheel to the vehicle cable harness.
- Remove the starter motor electrical connections acting on the two screws.





- Remove the footrest and the left side fairing; move the lower central cover slightly to the outside and remove the three screws fixing the supporting plate of the swinging arm buffer.
- Remove the buffer sealing seeger ring and remove the supporting plate of the swinging arm buffer.
- Support the vehicle adequately with the jack. Remove the engine-swinging arm fixing pin by acting on the nut and the pin head as shown in the figure.
- The engine is now free.



Locking torques (N*m)

Engine swinging arm pin nut 33 ÷ 41 Shock absorber lower clamp 33 ÷ 41 Rear brake calliper tightening screws 20 ÷ 25

INDEX OF TOPICS

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

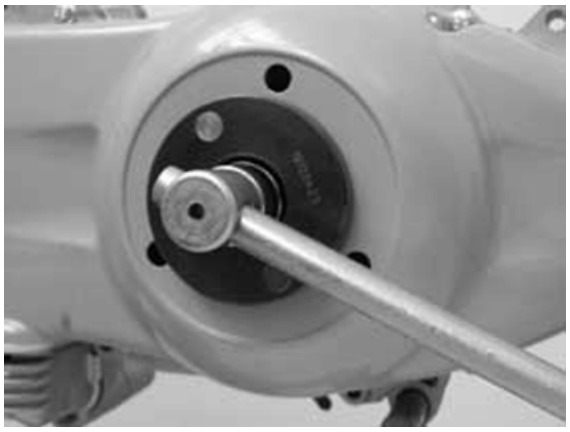
Automatic transmission

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

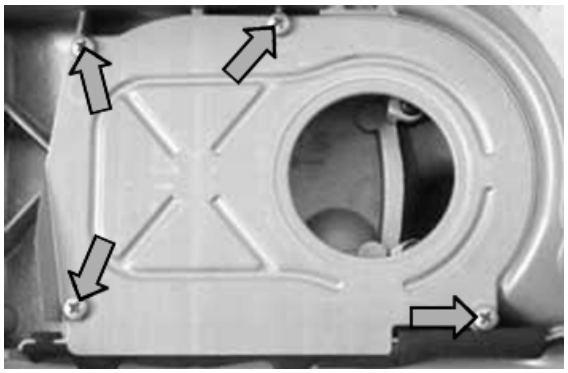
020423Y driven pulley lock wrench



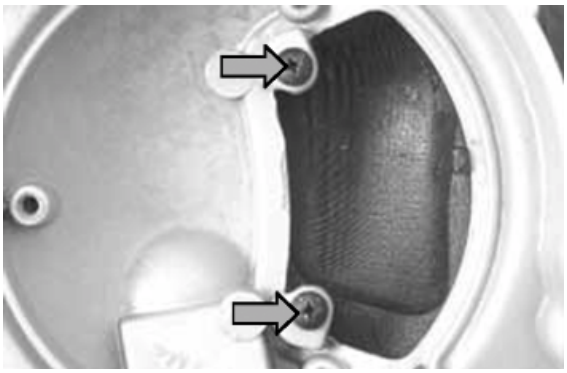
- Remove the cap/dipstick from the engine oil filling hole «**A**».
- Remove the ten screws.
- Remove the transmission cover.

Air duct

- Remove the 4 screws and the housing.

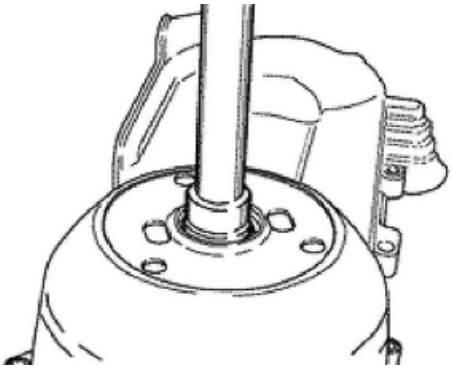


- To remove the intake throat on the transmission cover, just remove the 2 fixing screws indicated in the figure.



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

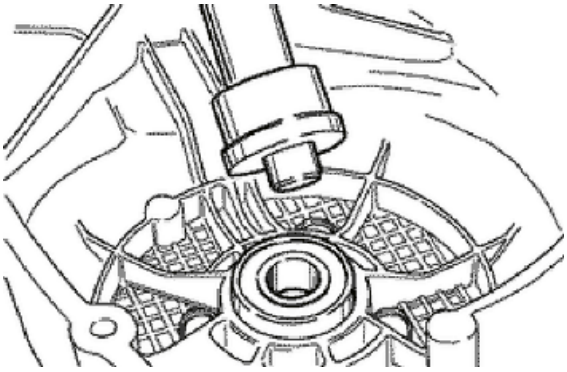
- Slightly heat the crankcase from the inside so as not to damage the painted surface.
- Insert the bearing in its seat.
- Refit the seeger ring.

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

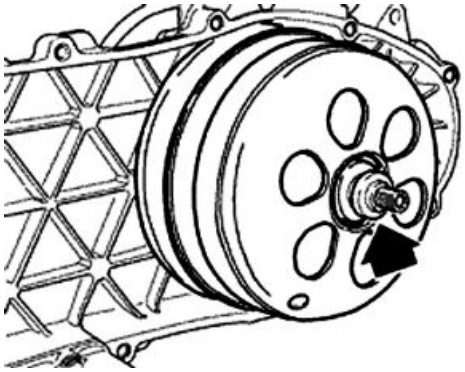
020412Y 15 mm guide

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.

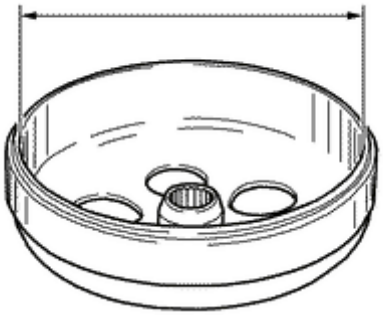
Characteristic

Max. value clutch bell

Max. value: Ø 134.5 mm

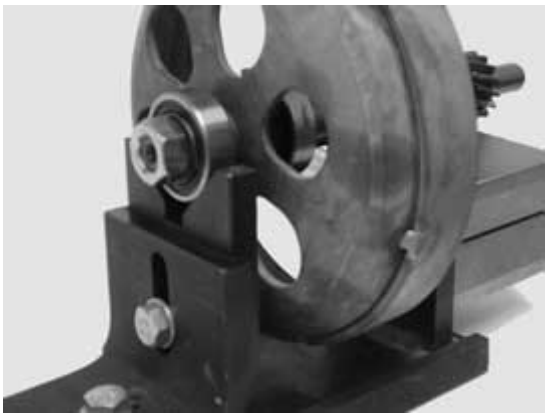
Clutch bell standard value

Standard value: Ø 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.

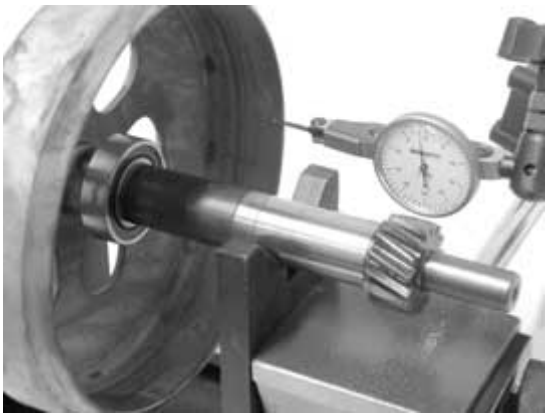


- Using a feeler pin gauge and the magnetic base, measure the bell eccentricity.
- Repeat the measurement in 3 positions (Central, internal, external).
- If faults are found, replace the bell.

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

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 No. 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 No. 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

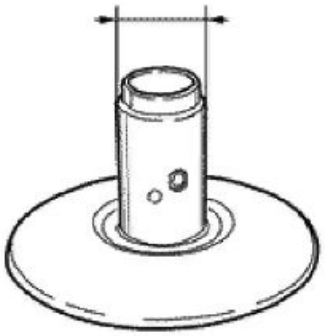
020376Y Adaptor handle

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 faying surface with the belt to make sure there are no flaws.
- Check the riveted joints are functional.
- Check the evenness of the belt faying surface.



Characteristic

Half-pulley standard diameter

Standard diameter: Ø 40.985 mm

Half-pulley minimum diameter

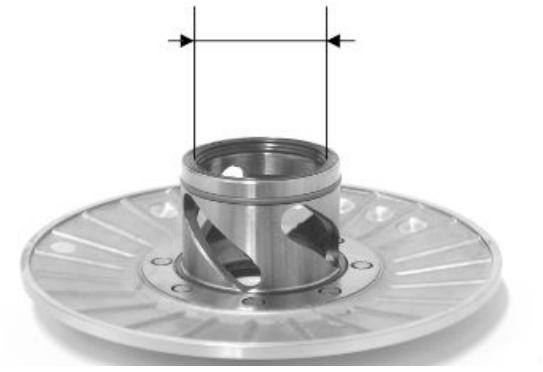
Minimum admissible diameter Ø 40.96 mm

Wear limit

0.3 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.
- Check that the faying surface with the belt is not abnormally worn.
- Check the riveted joints are functional.
- Check the evenness of the belt faying surface.



MOVABLE DRIVEN HALF-PULLEY DIMENSIONS

Specification	Desc./Quantity
Wear limit	0.3 mm
standard diameter	Diameter 41.000 - 41.035 mm
maximum allowable diameter	Ø 41.08 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 retention ring

WARNING

N.B.

FIT THE BALL BEARING WITH THE VISIBLE SHIELD

Specific tooling

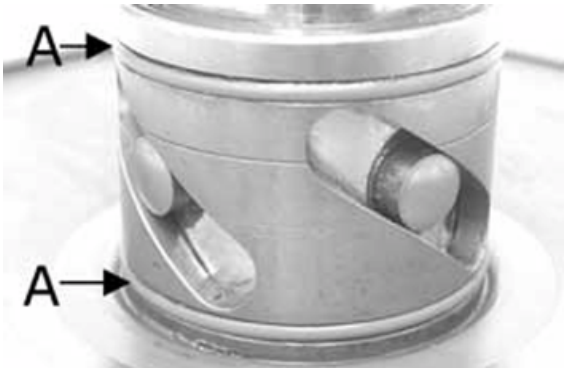
020376Y Adaptor handle

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

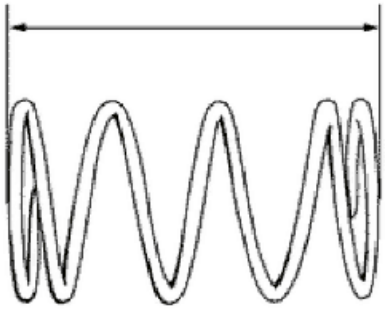
Recommended products

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 movable driven half-pulley spring while it is unloaded.



Characteristic

Standard length

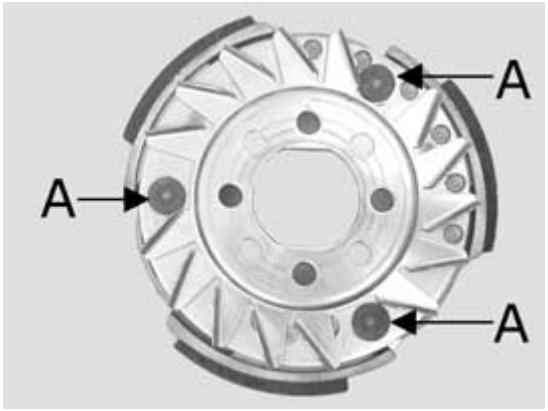
106 mm

acceptable limit after use:

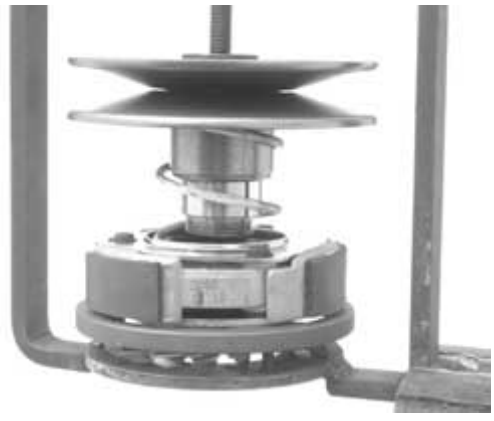
101 mm

Refitting the clutch

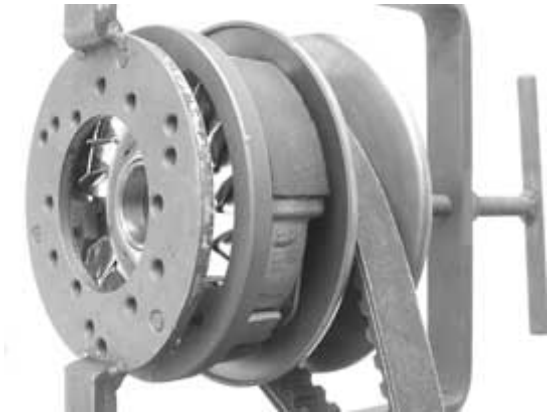
- Support the driven pulley spring compressor appropriate tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed on the inside.
- Insert the adapter ring No. 8 in the pins.
- Preassemble the cooling fan to the clutch in such a way that the keying facets are aligned and the 3 pin heads «**A**» of the fulcrum 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 pulley unit with the belt into the tool.
- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch fixing nut and tighten it to the prescribed torque using the special 46x55 wrench.



- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Preload the clutch return spring with a traction/ rotation combined action 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

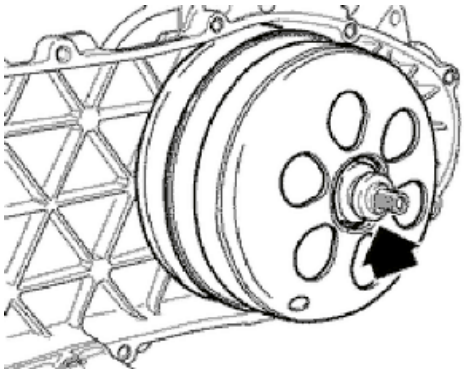
020444Y009 46x55 Wrench

Locking torques (N*m)

Clutch unit nut on driven pulley 55 ÷ 60

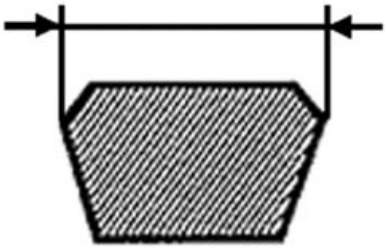
Refitting the driven pulley

- Reassemble the clutch bell and spacer.



Drive-belt

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



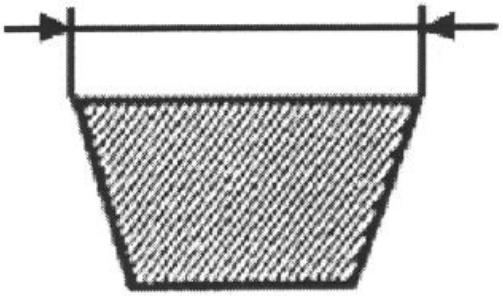
Characteristic

Driving belt - minimum width:

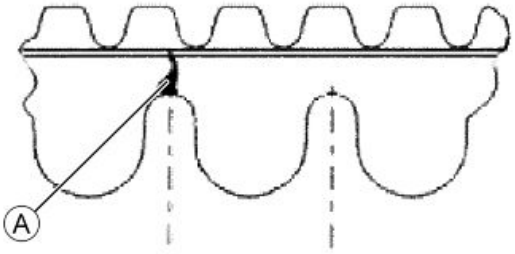
21.5 mm

Driving belt - standard width:

22.5 ± 0.2 mm

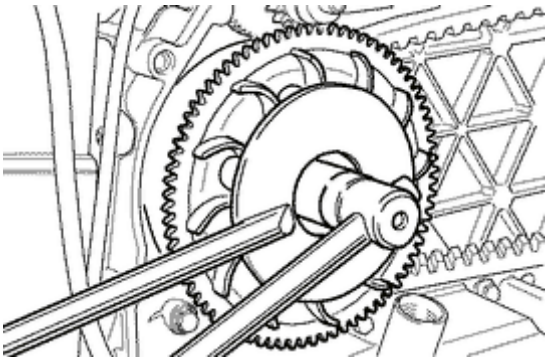


During the wear check foreseen in the scheduled maintenance, check that the rim bottom of the toothing does not show signs of scores or cracking (see figure); otherwise, replace the belt.



Removing the driving pulley

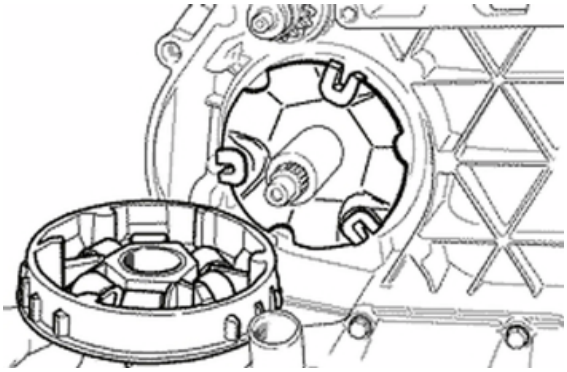
- With the appropriate tool, remove the nut with the built-in belleville washer, the drive and the steel washer.
- Remove the fixed driving half-pulley.
- Remove the steel washer separating from the bushing.
- Remove the belt and slide the movable half-pulley with the relevant bush, taking care of the falling free assembled rollers.



- Remove the return rollers plate with the relative guide pads.

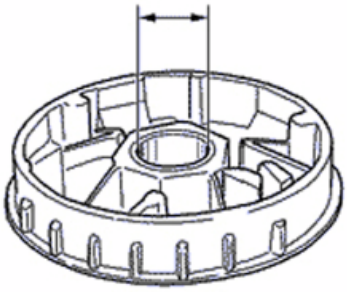
Specific tooling

020368Y driving pulley lock wrench



Inspecting the rollers case

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



CAUTION

DO NOT LUBRICATE OR CLEAN SINTERED BUSHINGS

Characteristic

Roller: Standard Diameter

Ø 18.9 ÷ 19.1 mm

Sliding bushing: Minimum admissible diameter

Ø 25.95 mm

Movable driving half-pulley bushing: Maximum allowable diameter

Ø 26.12 mm

roller: Standard Diameter

Ø 18.9 ÷ 19.1 mm

Sliding bushing: Standard Diameter

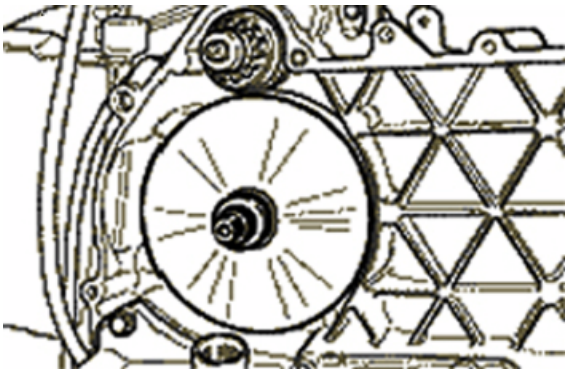
Ø 25.959 ÷ 25.98 mm

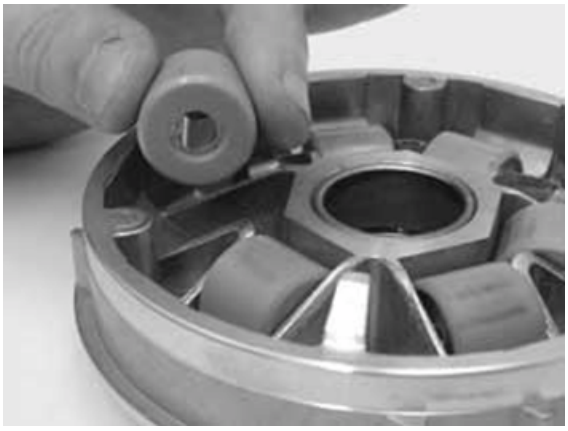
Movable driving half-pulley bushing: Standard Diameter

26.000 - 26.021 mm

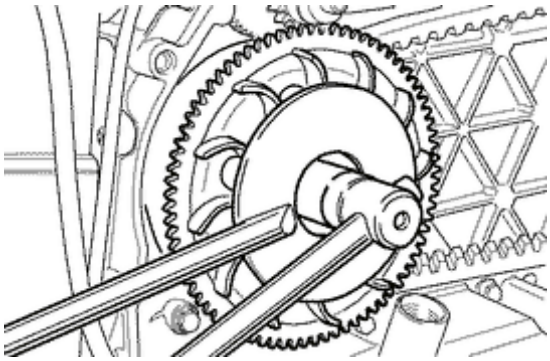
Refitting the driving pulley

- 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

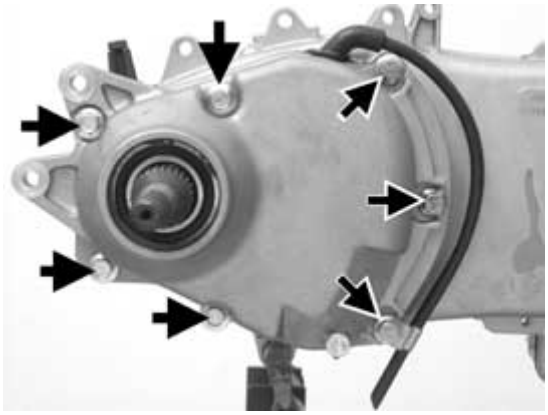
Locking torques (N*m)

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

End gear

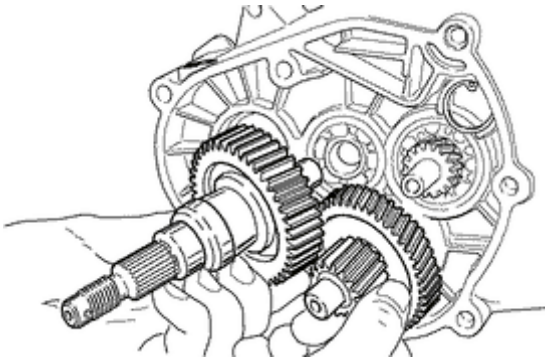
Removing the hub cover

- 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.

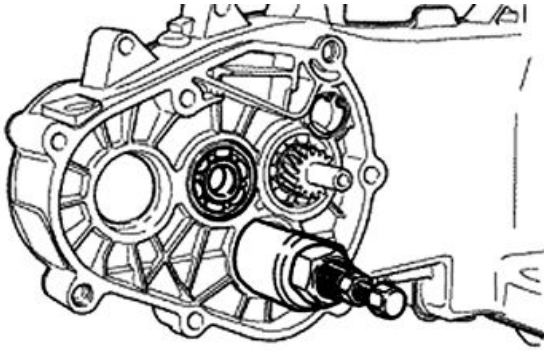


Removing the hub bearings

- 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 ø 15-mm bearings



Removing the wheel axle bearings

Hold up the hub cover and take out the bearing.

Specific tooling

020376Y Adaptor handle

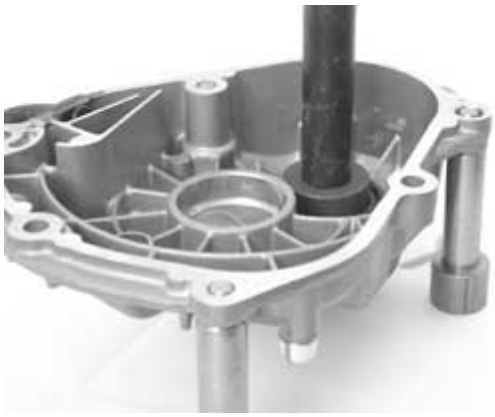
020477Y Adaptor 37 mm

020483Y 30 mm guide

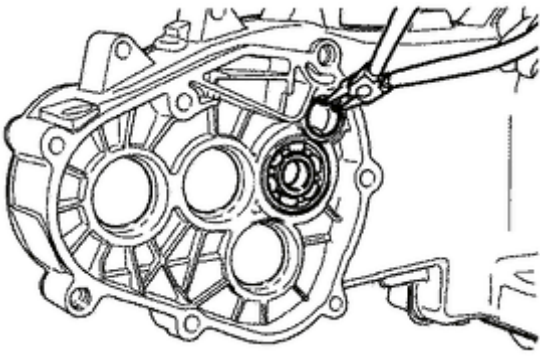
With the appropriate tools, remove the oil seal as shown in the figure.

Specific tooling

020359Y 42x47-mm adaptor



Removing the driven pulley shaft bearing



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

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

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

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020363Y 20 mm guide

Inspecting the hub shaft

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

Inspecting the hub cover

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

Refitting the wheel axle bearing

Support the hub cover on a wooden surface.

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

Specific tooling

020150Y Air heater support

020151Y Air heater

020376Y Adaptor handle

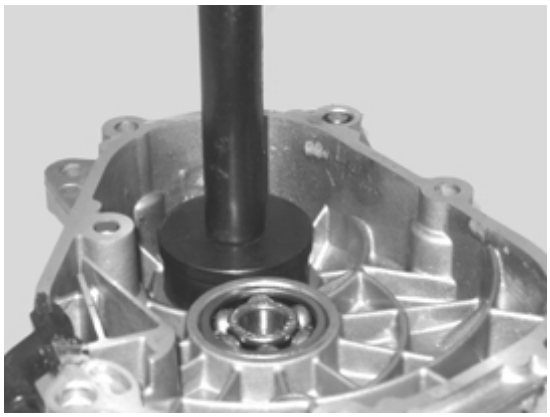
020360Y Adaptor 52 x 55 mm

020483Y 30 mm guide

Assemble the seeger ring.

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

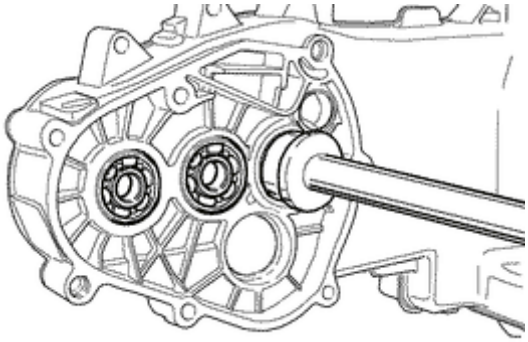
The 52 mm side of the adapter must be turned towards the bearing.



Refitting the hub cover bearings

To fit the hub housing bearings, the engine crankcase and the cover must be heated with the special heat gun.

- The three 15 mm bearings must be fitted using the appropriate tools.
- The 42-mm side of the adapter must be turned towards the bearing.
- Refit the seeger ring with the opening facing the bearing and the new oil seal flush with the crankcase on the pulley side.
- Refit the driven pulley shaft bearing with a modular punch as shown in the figure.



Specific tooling

020150Y Air heater support

020151Y Air heater

020376Y Adaptor handle

020359Y 42x47-mm adaptor

020412Y 15 mm guide

020363Y 20 mm guide

N.B.

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

N.B.

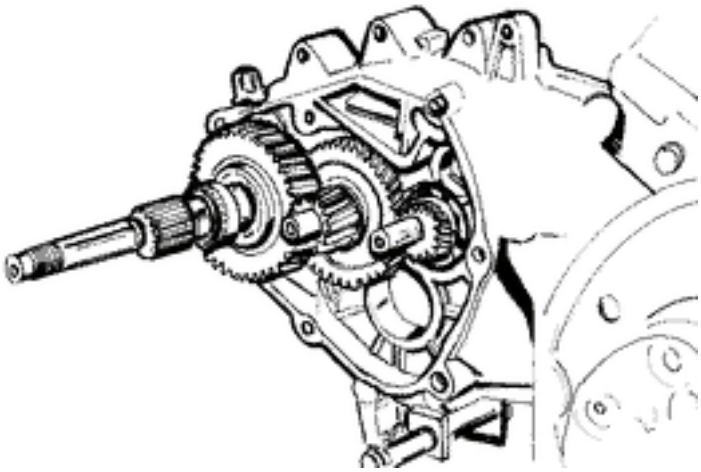
IF THE BEARING HAS AN ASYMMETRICAL BALL RETAINER, PLACE IT SO THAT THE BALLS ARE VISIBLE FROM THE HUB INNER SIDE.

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.

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.

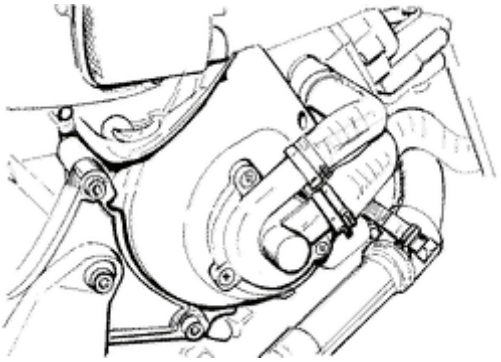
Locking torques (N*m)

Rear hub cover screws 24 ÷ 27

Flywheel cover

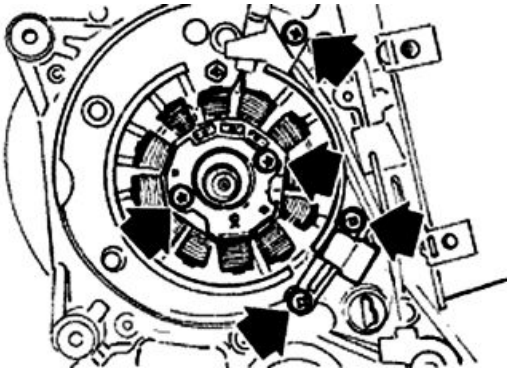
Removing the hub cover

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



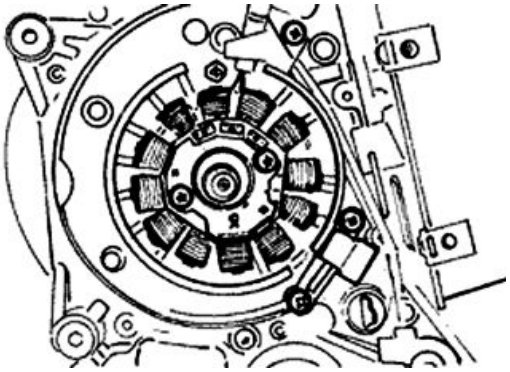
Removing the stator

- 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 prescribed torque.
- Place the cable harness as shown in the figure.
- Stator screws and Pick-Up



N.B.

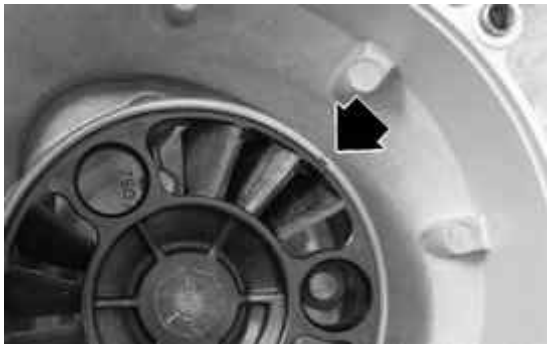
THE PICK-UP WIRE SHOULD BE POSITIONED BETWEEN THE UPPER SCREW AND THE REFERENCE PIN AS SHOWN IN THE DETAIL DRAWING.

Locking torques (N*m)

Stator assembly screws (°) 3 ÷ 4

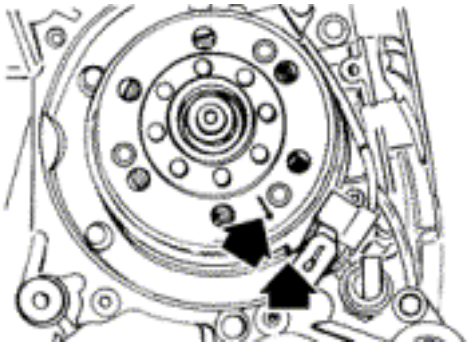
Refitting the flywheel cover

- 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.



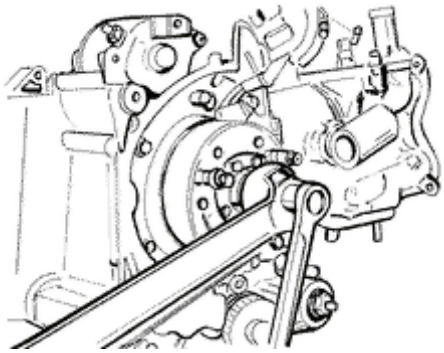
Flywheel and starting

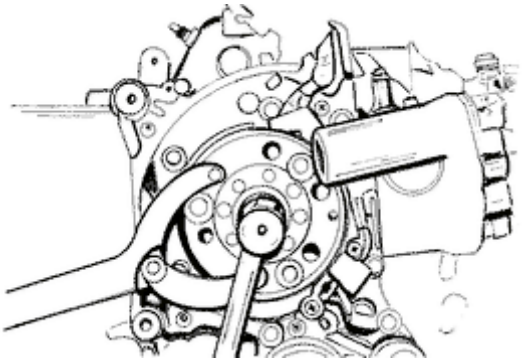
Removing the flywheel magneto

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

CAUTION

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





Inspecting the flywheel components

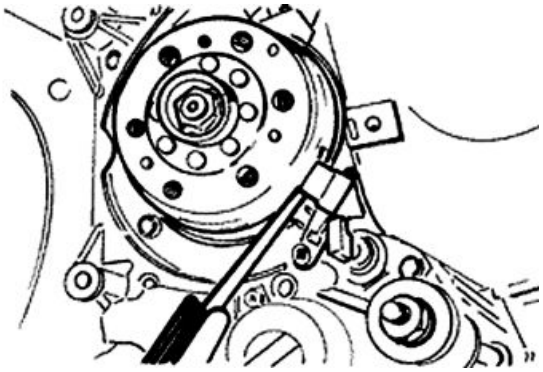
- Check the integrity of the internal plastic parts of the flywheel and the Pick-Up control plate.

Refitting the flywheel magneto

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

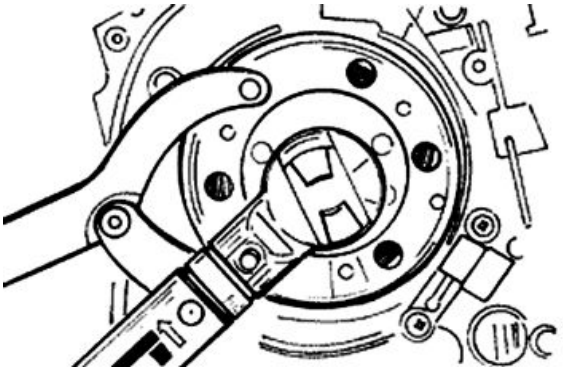
A VARIATION IN THE AIR GAP DISTANCE MODIFIES THE IGNITION SYSTEM IDLE SPEED

Specific tooling

020565Y Flywheel lock calliper spanner

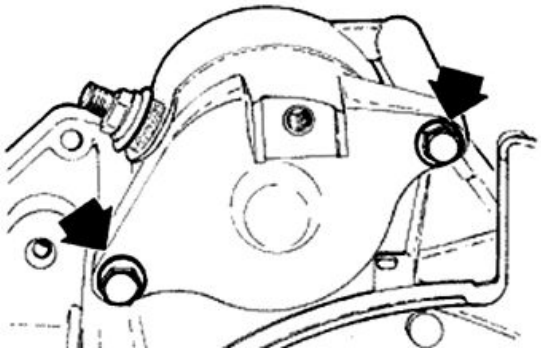
Locking torques (N*m)

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 ÷ 13

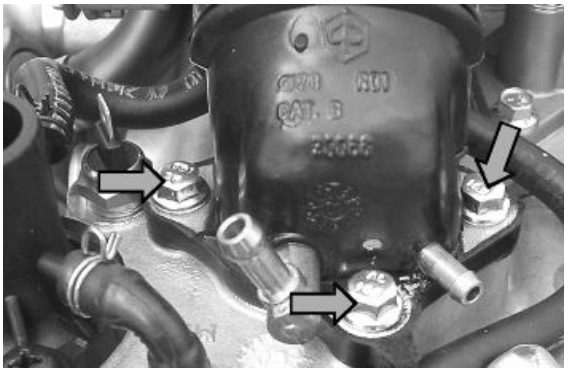
Cylinder assy. and timing system

Removing the intake manifold

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

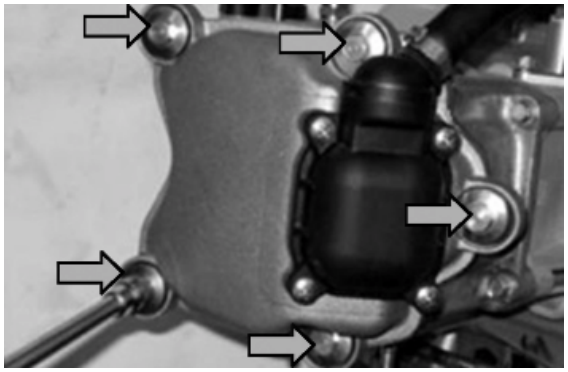
N.B.

SCREWS AGAINST ACCIDENTAL OPERATION ARE PROVIDED.



Removing the rocker-arms cover

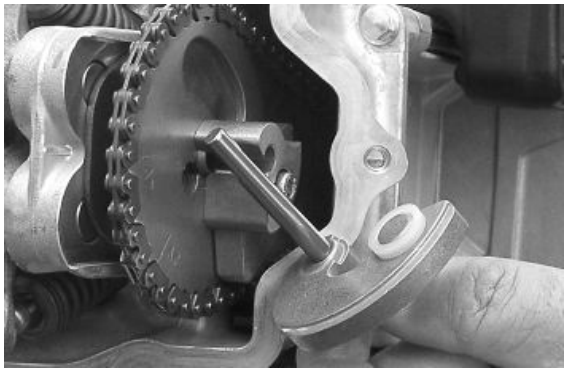
- Remove the 5 screws indicated in the figure



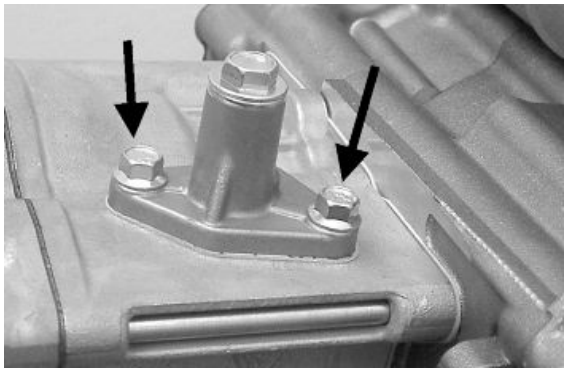
Removing the timing system drive

- First remove the following units:
transmission cover, driving 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.

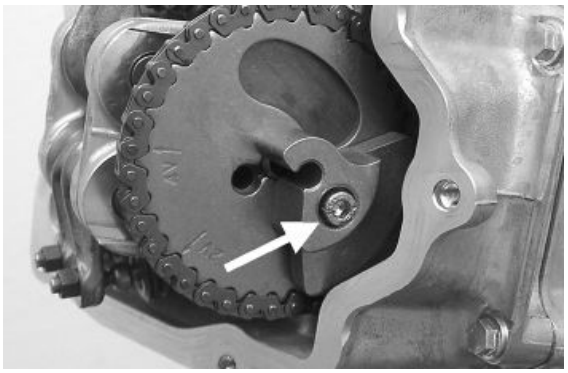
- Remove the return spring of the automatic valve lifter unit and the automatic valve lifter unit and its end of stroke washer.



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



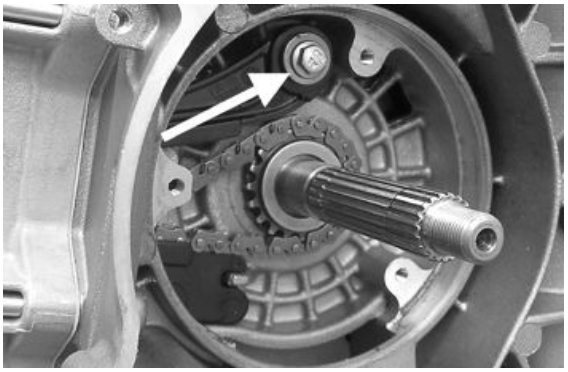
- Remove the internal hex screw and the counter-weight shown in the figure.



- 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.

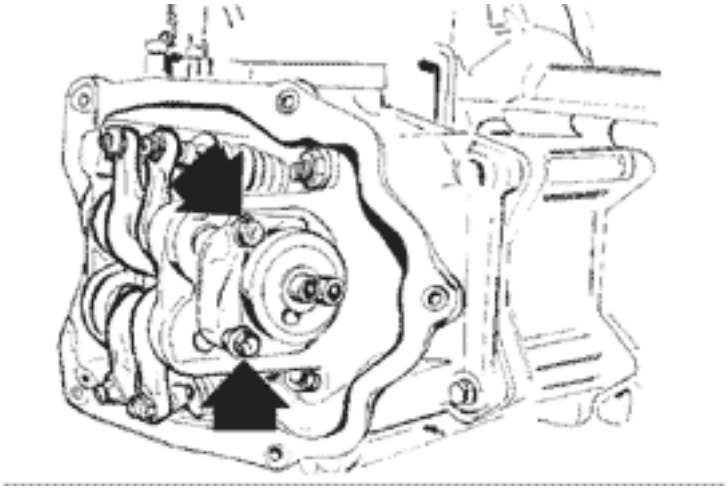


N.B.

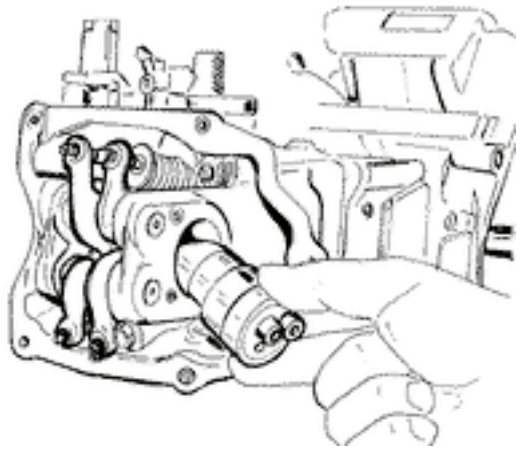
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

Removing the cam shaft

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



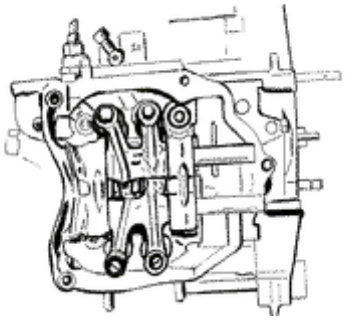
- Remove the cam shaft.



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

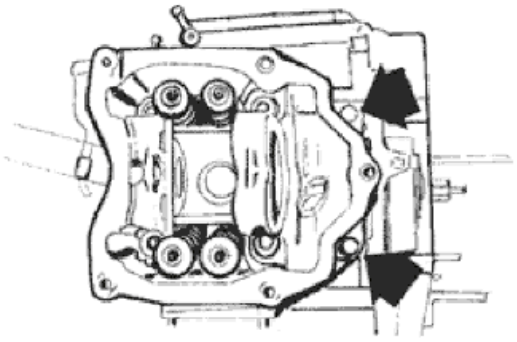
N.B.

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 adapter, 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.

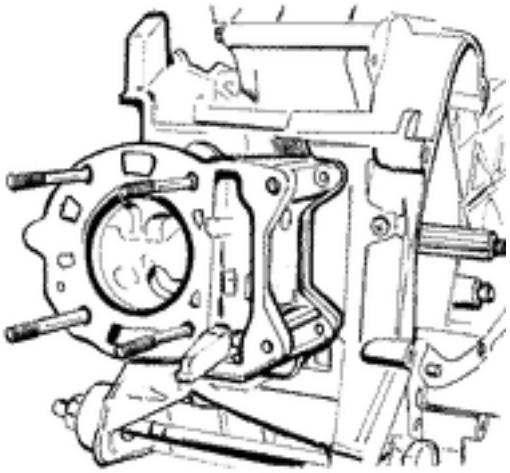
- Remove the chain guide pad.
- Pull out the cylinder.
- Remove the cylinder base gasket.
- Remove the two stop rings, the wrist pin and the piston.
- Remove the piston seals.

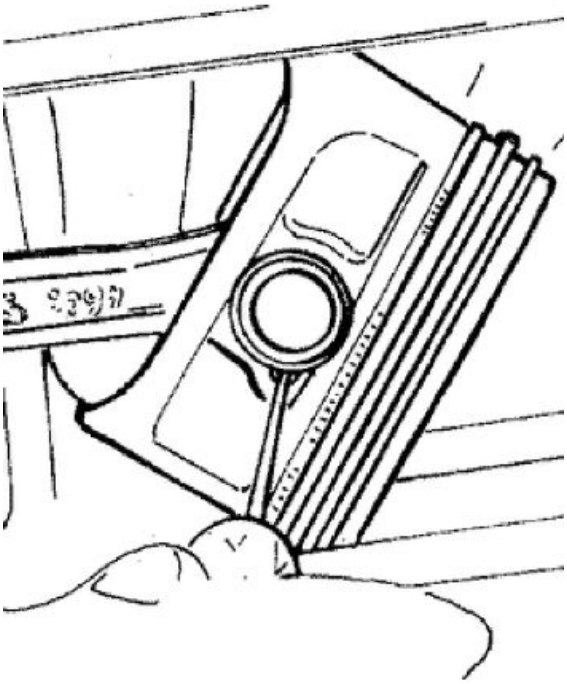
CAUTION

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

N.B.

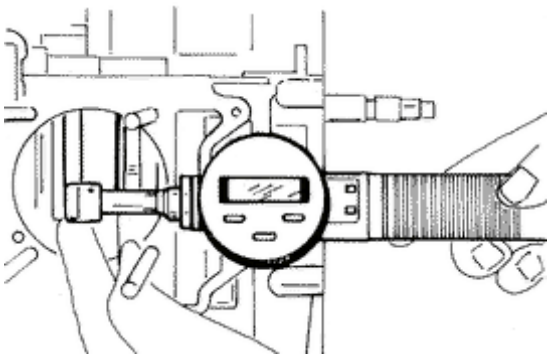
BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL.





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

Checking the connecting rod small end: Maximum diameter

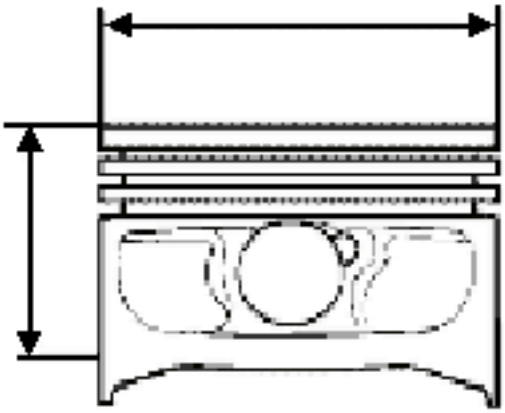
15.030 mm

Checking the connecting rod small end: Standard diameter

15 +0.015+0.025 mm

Inspecting the wrist pin

- Measure the outer diameter of the gudgeon pin.
- Calculate the coupling clearance between pin and connecting rod end.
- Measure the capacity diameter on the piston.
- Calculate the piston pin coupling clearance.
- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.
- Carry out the measurement as shown in the figure.



41.1 mm (from the crown)

- 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 matching surface exhibits no deformations or wear.

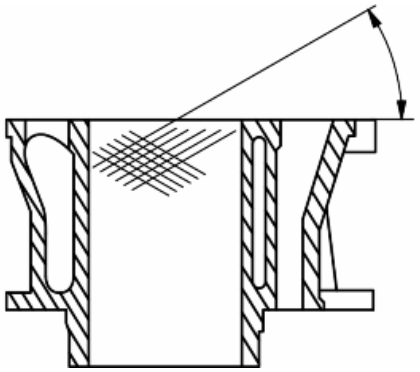
Maximum admissible displacement: 0.05 mm

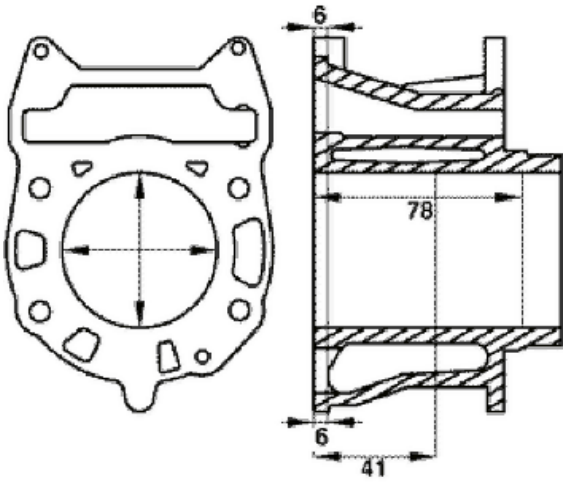
- Pistons and cylinders are classified according to diameter (0.2 - 0.4 - 0.6 m). The coupling is carried out in pairs (A-A, B-B, C-C, D-D).
- The cylinder rectifying operation should be carried out with a surfacing that respects the original angle.

- 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.

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

Pin diameter Standard diameter:

56.997 ÷ 57.025

piston diameter

56.945 ÷ 56.973 mm

Pin diameter: Standard clearance

0.015 ÷ 0.029 mm

Pin diameter Standard diameter

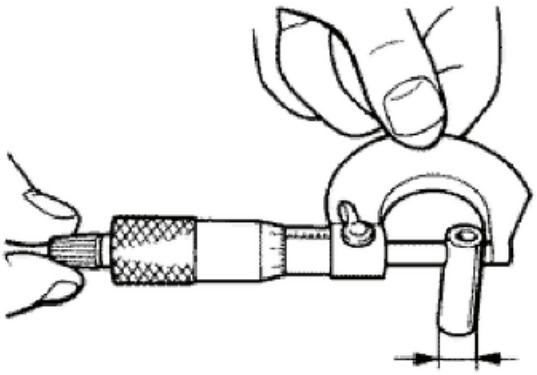
14.996 - 15.000 mm

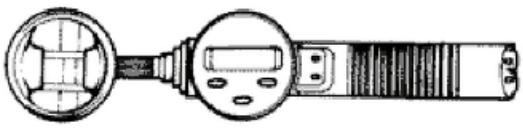
Wrist pin seat on the piston: Standard diameter

15.001 ÷ 15.006 mm

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

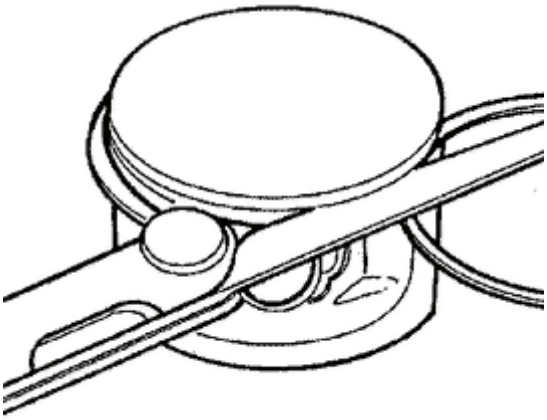
0.001 ÷ 0.010 mm





Inspecting the piston

- 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.



Inspecting the piston rings

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

N.B.

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

Removing the piston

- Install piston and wrist pin onto the connecting rod, aligning the piston arrow the arrow facing towards the exhaust.
- Fit the pin stop ring onto the appropriate tool.
- With opening in the position indicated on the tool

S = left

D = right

- Place the wrist pin stop ring into position using a punch
- Fit the wrist pin stop using the plug as shown in the figure

CAUTION

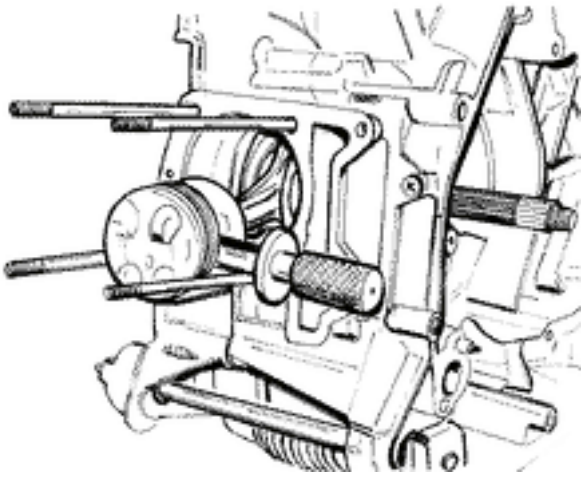
USING A HAMMER MIGHT DAMAGE THE STOPS' HOUSING.

N.B.

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

Specific tooling

020430Y Pin lock fitting tool

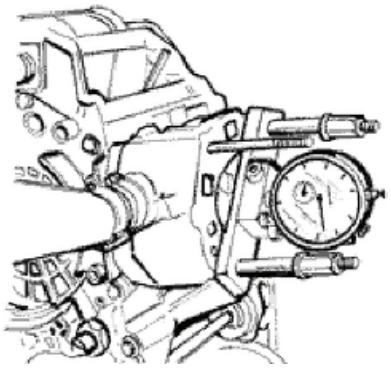


Choosing the gasket

- Provisionally fit the piston into the cylinder, without any base gasket.
- Assemble a dial gauge on the specific tool.

Specific tooling

020428Y Piston position check support



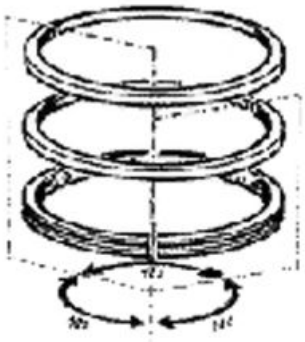
- Set the dial gauge to zero placing the tool on a contrasting surface. Keeping the zero position, assemble the tool on the cylinder and lock it with 2 supplied nuts as shown in the figure.
- Rotate the crankshaft until TDC (the inverted point of the dial gauge rotation)
- Position the dial gauge on the piston as shown in the figure and measure how much the piston protrudes.
- By means of the table shown in the specifications chapter identify the cylinder base gasket thickness to be used for refitting. Correctly identify the cylinder base gasket thickness to keep the correct compression ratio.
- Remove the specific tool and the cylinder.

N.B.

MEASURE PISTON PROTRUSION.

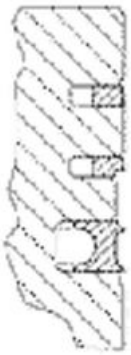
Refitting the piston rings

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



N.B.

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



Refitting the cylinder

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

N.B.

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

Specific tooling

020393Y Piston fitting band

020287Y Clamp to assemble piston on cylinder

Inspecting the cylinder head

- Using a trued bar and feeler gauge check that the cylinder head surface is not worn or distorted.
Maximum allowable run-out: 0.05 mm
- Check that the camshaft and the rocker pin capacities exhibit no wear.
- Check that the cylinder head cover surface, the intake manifold and the exhaust manifold are not worn.

Characteristic

bearing «A»

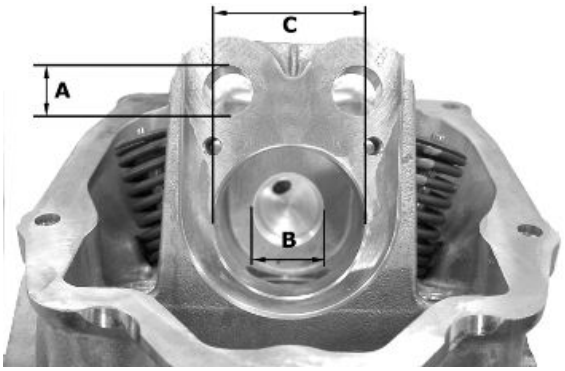
Ø 12.000 - 12.018 mm

bearing «B»

Ø 20.000 ÷ 20.021 mm

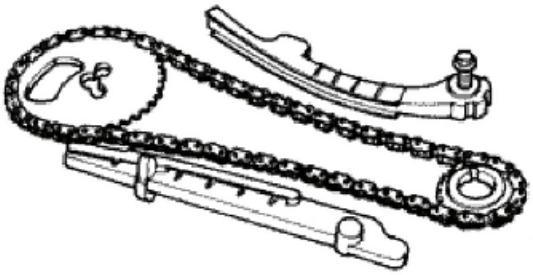
bearing «C»

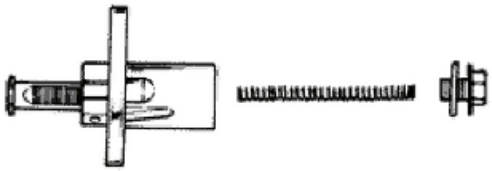
Ø 37.000 - 37.025 mm



Inspecting the timing system components

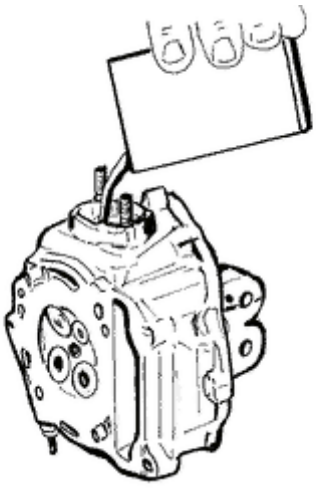
- Check that the guide shoe and the tensioner shoe are not worn out.
- Ensure that the camshaft control pulley chain assembly and the sprocket wheel are not worn.
- If you encounter wear, replace the parts or, if the chain, sprocket wheel and pulley are worn replace the whole assembly.
- Remove the centre 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.



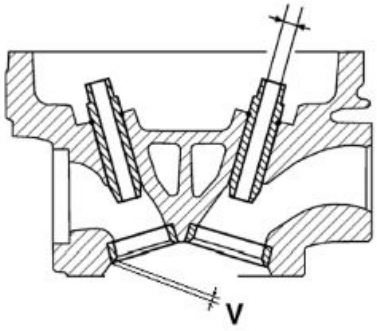


Inspecting the valve sealings

- 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 mark on the seat of valve «**V**».
- 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

Max. wear limit

1.6 mm

Valve seat wear Intake guide

limit accepted: 5.022

Valve seat wear Intake guide

Standard diameter: 5.000 ÷ 5.012 mm

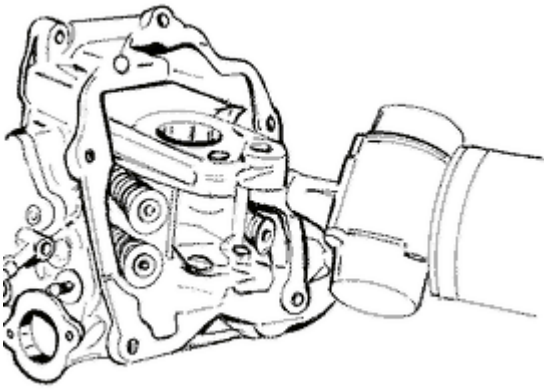
Valve seat wear Exhaust guide

Accepted limit 5.022

Valve seat wear Exhaust guide

Standard diameter: 5.000 ÷ 5.012 mm

Inspecting the valves



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

lapping compound residues from penetrating between the valve stem and the guide (see figure).

CAUTION

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

N.B.

DO NOT CHANGE THE POSITIONS THE VALVES ARE FITTED IN

Characteristic

Valve check standard length

Outlet: 94.4 mm

Valve check standard length

Inlet: 94.6 mm

Valve check Maximum admissible clearance

Outlet: 0.072 mm

Valve check Maximum admissible clearance

Inlet: 0.062 mm

Valve check standard clearance

Outlet: 0.025 ÷ 0.052 mm

Valve check standard clearance

Inlet: 0.013 ÷ 0.040 mm

Valve check Minimum admissible diameter

Outlet: 4.95 mm

Valve check Minimum admissible diameter

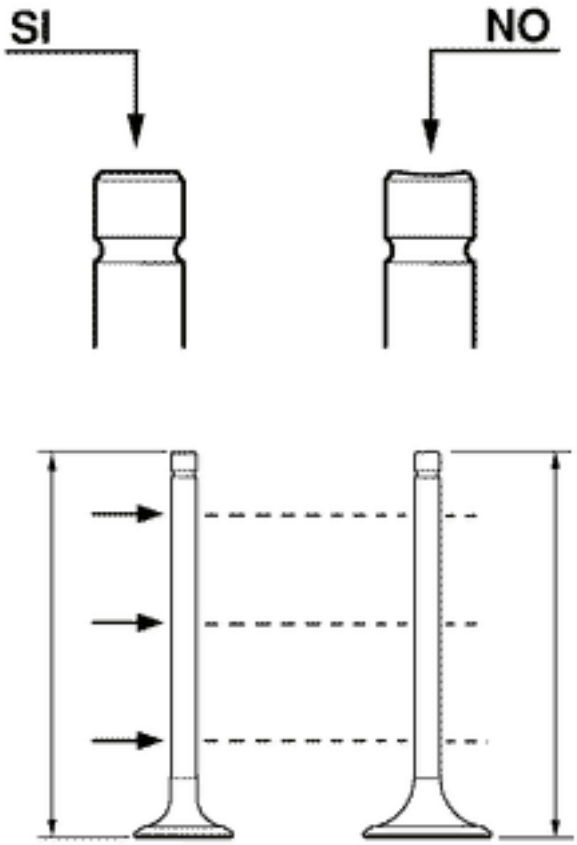
Inlet: 4.96 mm

Valve check Standard diameter:

Inlet: 4.972 ÷ 4.987 mm

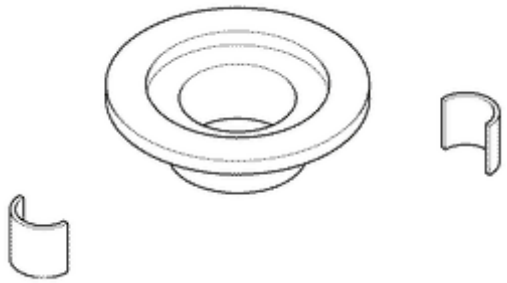
Valve check Standard diameter:

Outlet: 4.96 ÷ 4.975 mm



Inspecting the springs and half-cones

- Check that the upper and lower supporting washers of the springs, the cotters and the oil seal do not show signs of abnormal wear.
- Replace the components when worn.



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

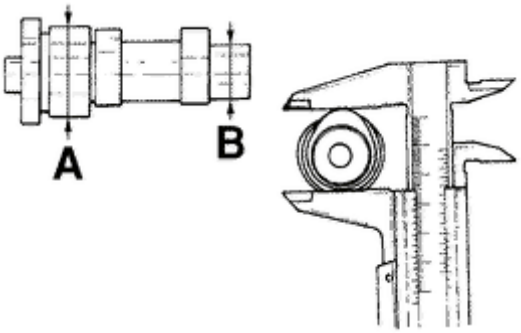
020306Y Punch for assembling valve seal rings

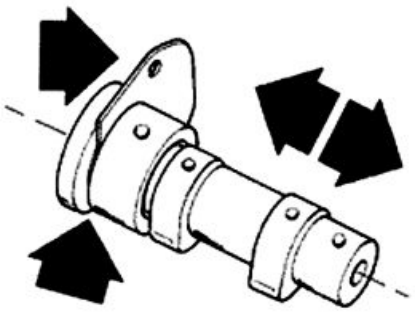
020382Y Valve cotters equipped with part 012 removal tool

020382Y011 adapter for valve removal tool

Inspecting the cam shaft

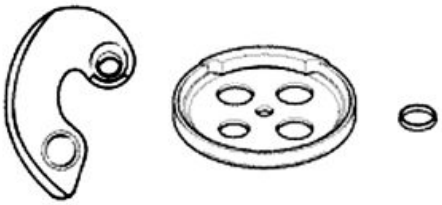
- Inspect the cam shaft for signs of abnormal wear on the cams.
- Check the cam height.
- Check there is no wear on the cam shaft retaining plate and its associated groove on the cam shaft.
- If any of the above dimensions are outside the specified limits, or there are signs of excessive wear, replace 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

Rocker arm 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

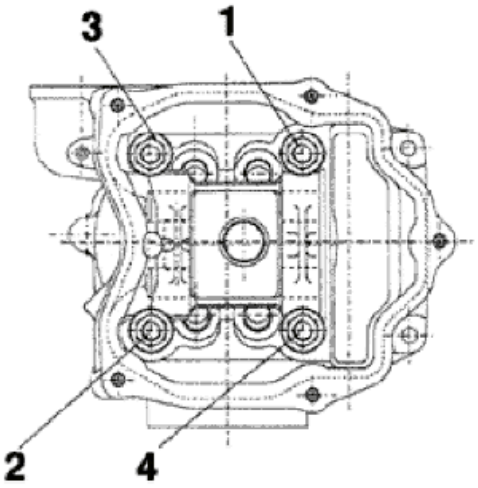
Bearing B diameter: 19.959 ÷ 19.98 mm

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 prescribed torque.

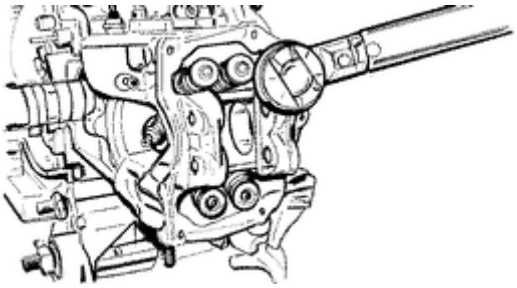


N.B.

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

Locking torques (N*m)

Timing chain tensioner support screw 11 ÷ 13



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

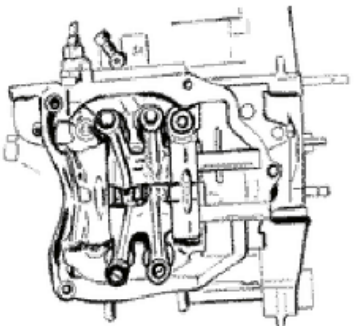
- Loop the timing chain around the sprocket on the crankshaft.
- Fit the chain tensioner slider from the cylinder head side.
- Fit the spacer and the screw fastener.
- Tighten the screws to the prescribed torque.

Locking torques (N*m)

Slider screw 10 ÷ 14 Nm

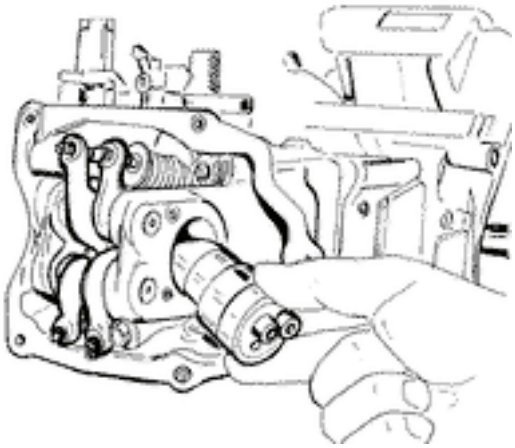
Fit the pins and rocking levers.

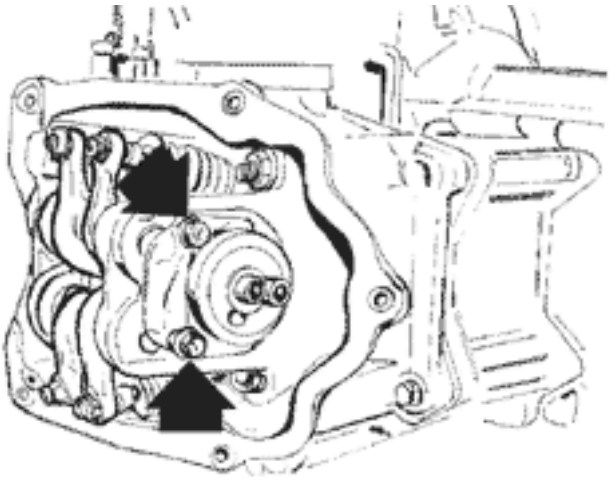
- Lubricate the two rocking levers through the holes at the top.
- Lubricate the 2 bearings and insert the cam shaft in the cylinder head with the cams corresponding to the rockers.
- Insert the retention plate and tighten the two screws shown in the figure to the prescribed torque.



Locking torques (N*m)

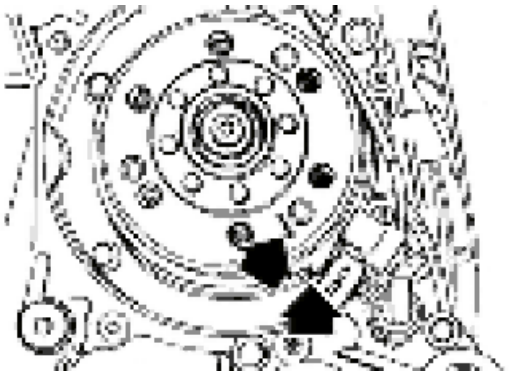
Plate screws 4 ÷ 6 Nm





Insert the spacer on the cam shaft.

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



Locking torques (N*m)

Counterweight screw 7 ÷ 8.5

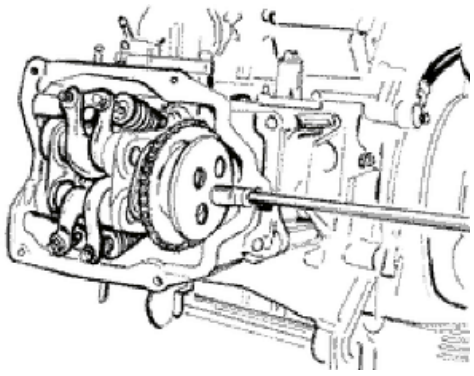
Fit the end-of stroke ring on the valve-lifting mass and fit the automatic valve-lifting cam to the cam-shaft.

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.



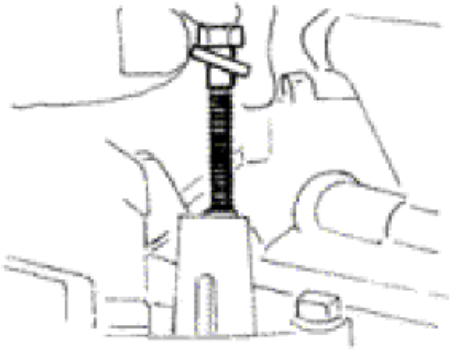
Locking torques (N*m)

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.

Locking torques (N*m)

Spark plug 12 ÷ 14

Characteristic

Electrode distance

0.8 mm

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

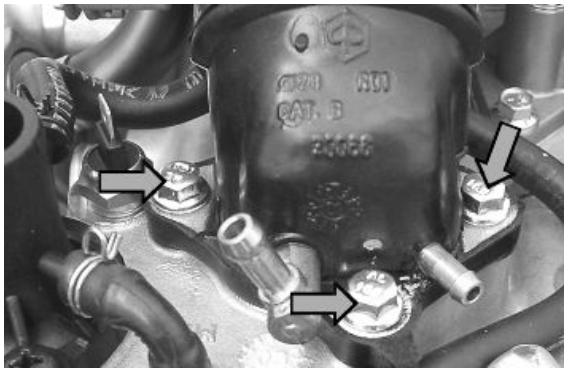
Name	Torque in Nm
Tappet cover screws	6 - 7 Nm
Spark plug	12 ÷ 14
Tensioner cover	5 ÷ 6 Nm
Tensioner screws	11 ÷ 13
Limiting bell screw	11 ÷ 15 Nm
Counterweight screw	7 ÷ 8.5
Plate screws	4 ÷ 6 Nm
Slider screw	10 ÷ 14 Nm

Refitting the intake manifold

- Fit the intake manifold and tighten the three screws.

N.B.

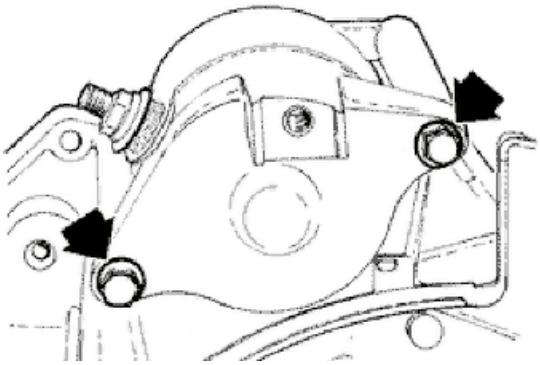
FOR SPECIAL SCREWS USE COMMERCIALLY AVAILABLE INSERTS AND INSERT HOLDERS.



Crankcase - crankshaft

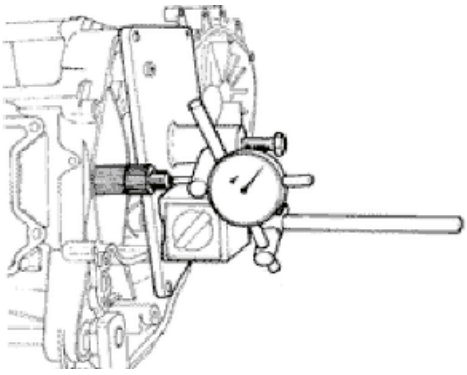
Splitting the crankcase halves

Precautionary 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.

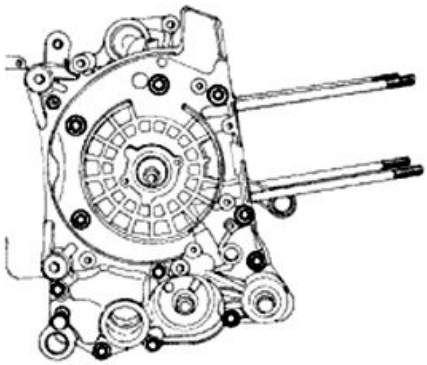


Characteristic

Standard clearance:

0.15 ÷ 0.40 mm

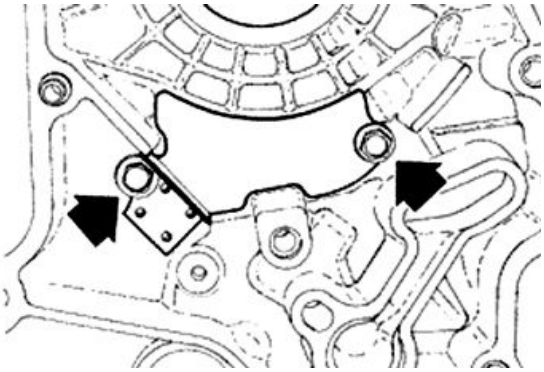
- Remove the eleven crankshaft coupling screws.
- Separate the crankcase while keeping the crankshaft in one of the two halves of the crankcase.
- Remove the crankshaft.



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.

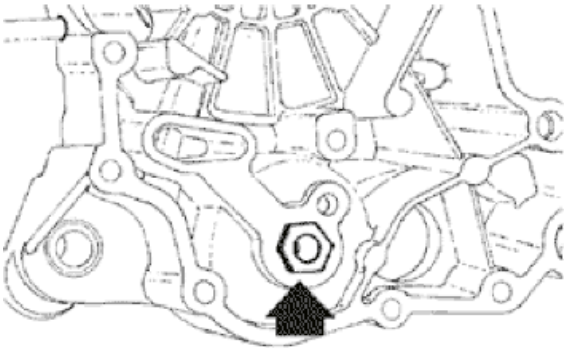
- Remove the coupling gasket of the crankcase halves.
- Remove the two screws and the internal cover shown in the diagram.



CAUTION

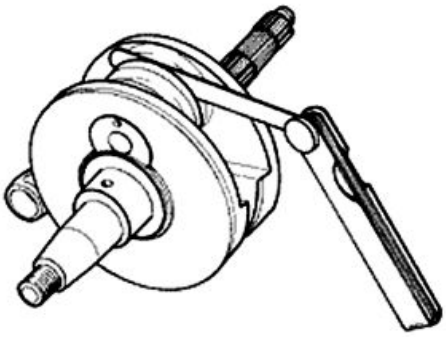
WHILE OPENING THE CRANKCASES AND REMOVING THE DRIVING SHAFT, CHECK THAT THE THREADED SHAFT ENDS DO NOT INTERFERE WITH THE MAIN BUSHINGS. FAILURE TO OBSERVE THIS PRECAUTION CAN DAMAGE THE MAIN BUSHINGS.

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

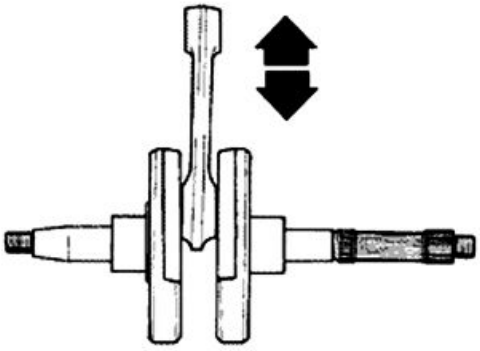


Fitting clearance

Connecting rod axial clearance 0.20 - 0.50



- Check the radial clearance on the connecting rod.
-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.



N.B.

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

Characteristic

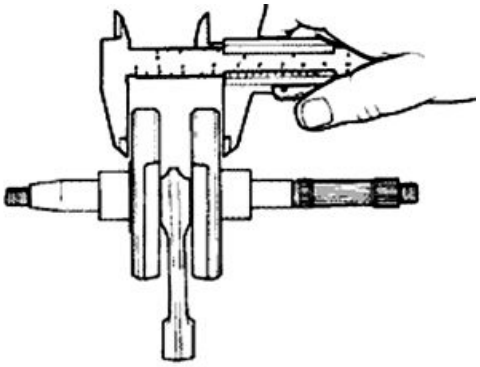
Standard clearance:

0.036 ÷ 0.054 mm

Standard dimensions:

55.75 ÷ 55.90 mm

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

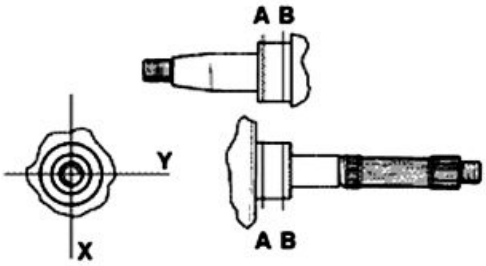


N.B.

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

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

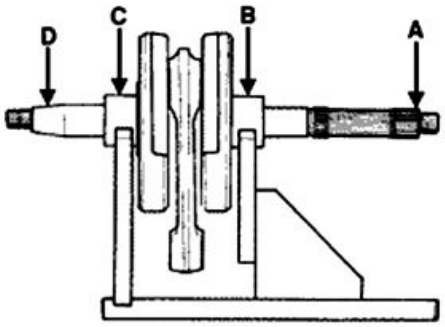
Check the diameters of both bearings of the crankshaft according to the axes and surfaces shown in the figure. The half-shafts are classified in two categories Cat. 1 and Cat. 2 as shown the chart below.



STANDARD DIAMETER

Specification	Desc./Quantity
Standard diameter - Category 1	28.994 ÷ 29.000
Standard diameter - Category 2	29.004 ÷ 29.010

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

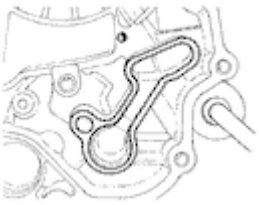
Off-line maximum admitted

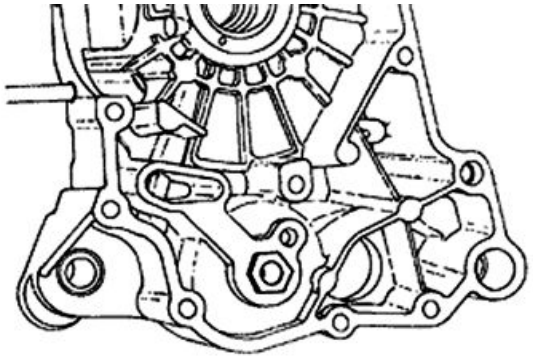
A = 0.15 mm

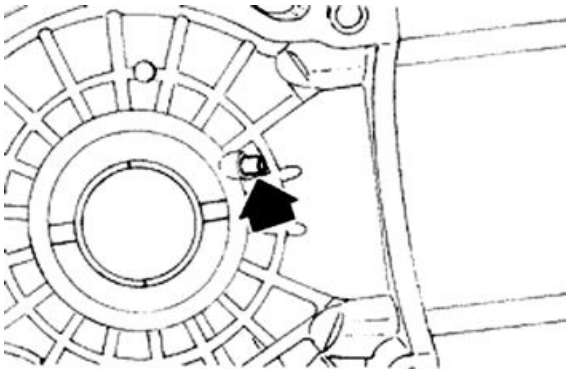
B = 0.01 mm
C = 0.01 mm
D = 0.10 mm

Inspecting the crankcase halves

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







N.B.

THE JET IS FED THROUGH THE MAIN BUSHINGS. PROPER OPERATION OF THIS COMPONENT IMPROVES THE PISTON TOP COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAK CAN CONSID-

ERABLY DECREASE THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRESSURE.

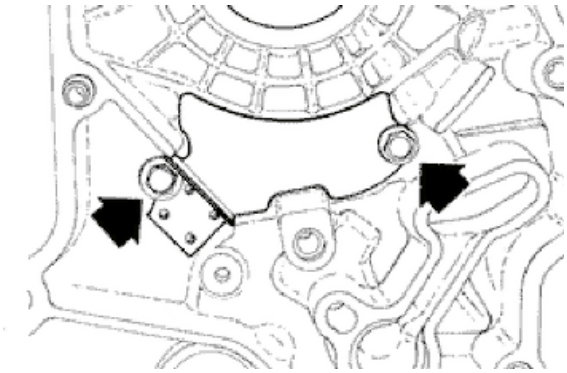
N.B.

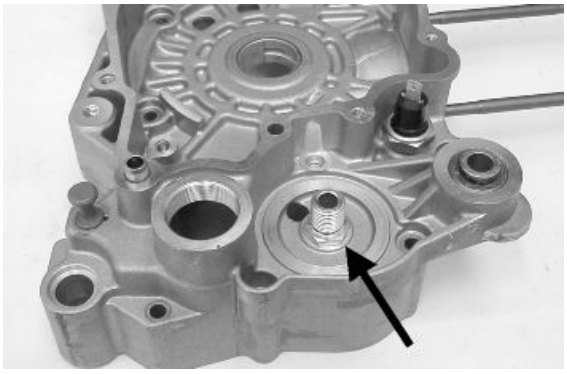
THE HEAD LUBRICATION CHANNEL IS PROVIDED WITH A SHUTTER JET; THIS GIVES A "LOW PRESSURE" HEAD LUBRICATION; THIS CHOICE WAS MADE TO REDUCE THE OIL TEMPERATURE IN THE SUMP. THE JET CLOGGING IMPAIRS THE HEAD LUBRICATION AND THE TIMING MECHANISMS. A JET FAILURE CAUSES A DECREASE OF THE MAIN BUSHING AND CONNECTING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

Inspecting the crankshaft plain bearings

Refitting the crankcase halves

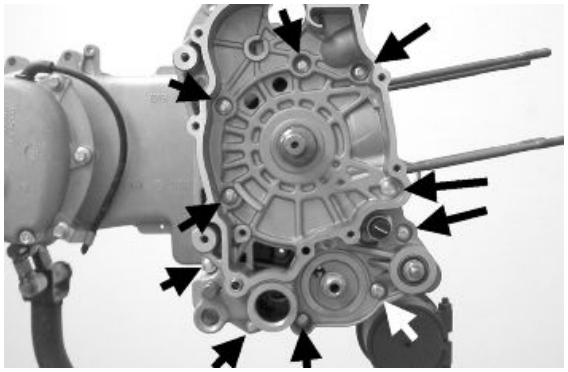
- Fit the internal bulkhead by locking the two screws to the prescribed torque.
- Fit the oil filter fitting and tighten it to the prescribed torque.
- Place a new gasket on one of the crankcase halves, preferably on the transmission side, together with the locating dowels.
- Lubricate the main bushings 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.

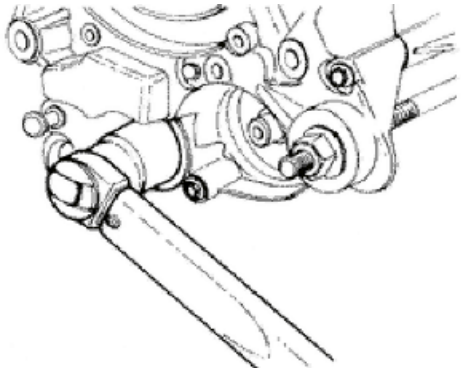




Locking torques (N*m)

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

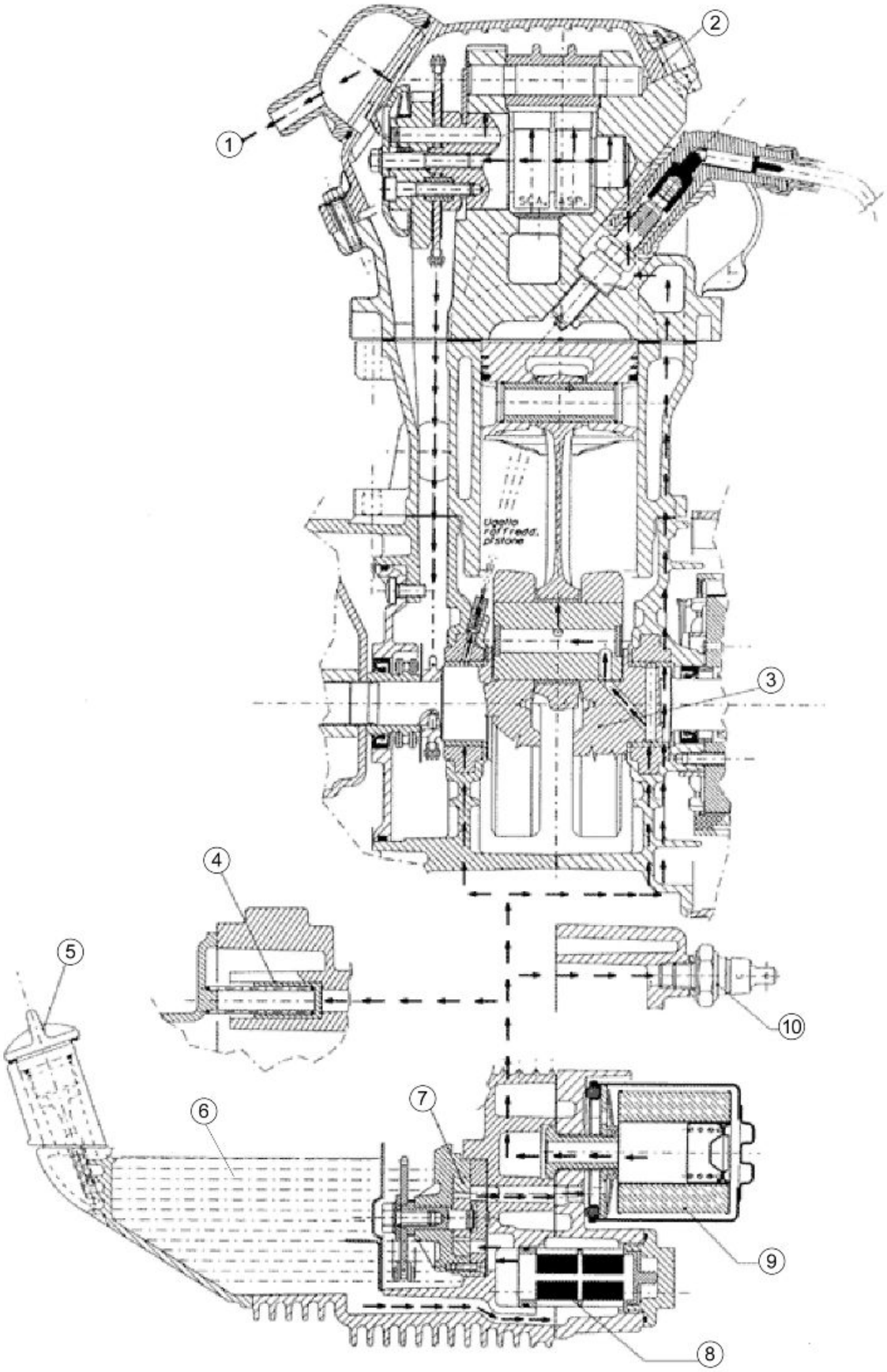




Lubrication

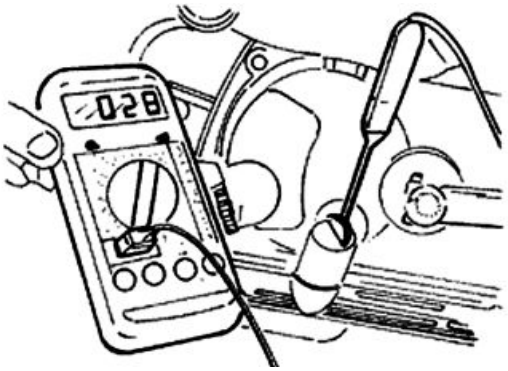
Conceptual diagrams

LUBRICATION CIRCUIT


1
2
3
4
5
6
7
8
9
10

1. Engine throttle recovery
2. Tappet cover
3. Crankshaft
4. By-pass valve
5. Oil filler
6. Oil level in the sump
7. Oil pump
8. Mesh pre-filter
9. Cartridge filter
10. Minimum pressure switch

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.
- Install the special tool.
- With the engine idling at 1650 rpm and the oil temperature at ~90°C, check that the oil pressure is between 0.5 ÷ 1.2 atm.
- With the engine idling at 6000 rpm and the oil temperature at ~90°C, check that the oil pressure is between 3.2 ÷ 4.2 atm.
- Remove the specific tool once the check is complete, refit the oil pressure switch and its washer, tighten the washer to the prescribed torque and fit the flywheel 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.

Specific tooling

020193Y Oil pressure gauge

Characteristic

Oil pressure

Minimum pressure admitted at 6000 rpm: 3.2 atm.

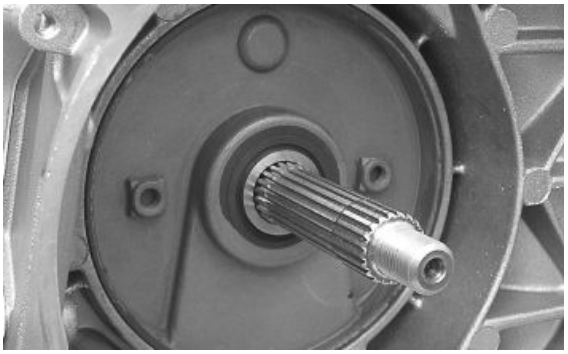
Locking torques (N*m)

Minimum oil pressure sensor 12 ÷ 14

Crankshaft oil seals

Removal

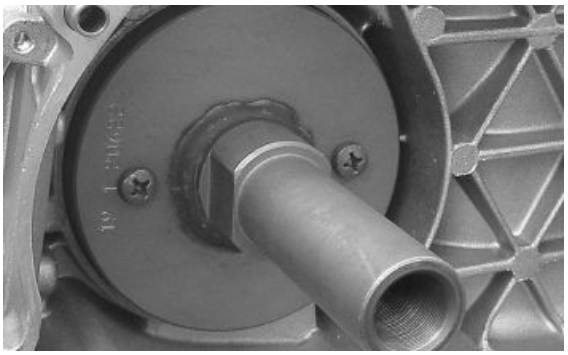
- Remove the transmission cover and the complete driving pulley beforehand



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

Specific tooling

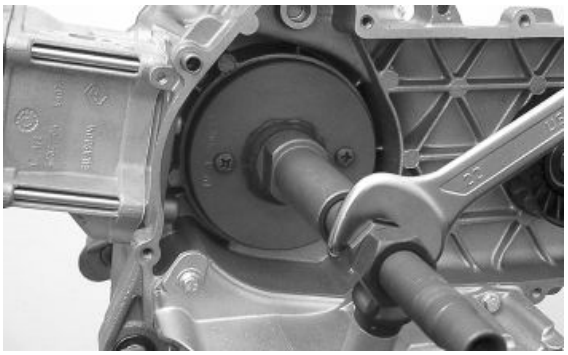
020622Y Transmission-side oil guard punch



- 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

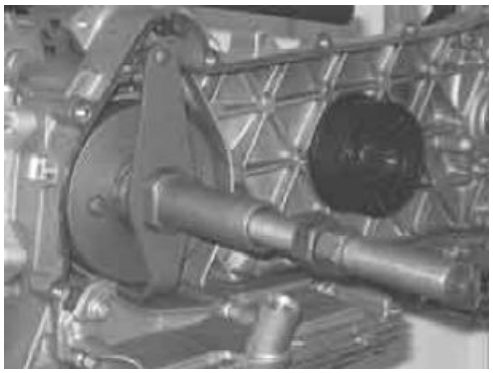
ORIENT THE OIL GUARD BY POSITIONING THE CHAIN HOUSING CHANNEL FACING DOWNWARDS. WHEN THE POSITION IS REACHED, DO NOT RETRACT THE OIL GUARD. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE A WRONG POSITIONING OF THE OIL GUARD SHEATH.

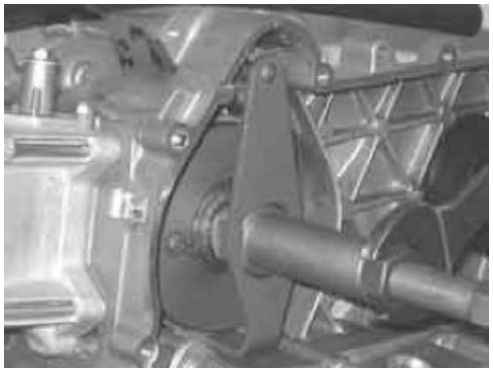
CAUTION

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

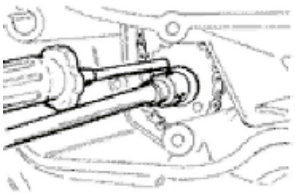


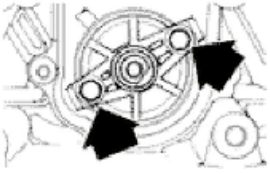


Oil pump

Removal

- Remove the cover of the pump control pulley using the two retainers, as shown in the figure.
- Block the rotation of the oil pump control pulley inserting a screwdriver through one of its two holes.
- Remove the central screw with Belleville washer, as shown in the diagram.
- Remove the chain.
- Remove the control sprocket with relative O-ring.





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

N.B.

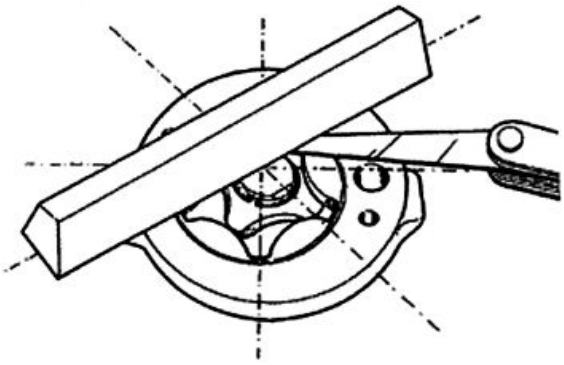
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

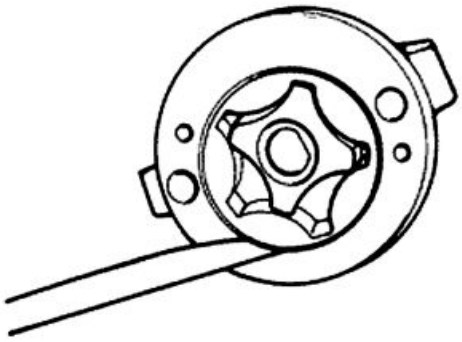
Inspection

- 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 clip.
- Check the clearance between the rotors in the position shown in the diagram.

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

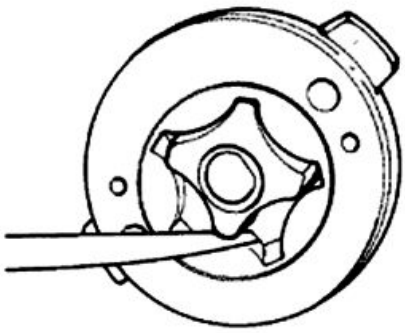
Limit values admitted: 0.09 mm

Distance between the outer rotor and the pump body

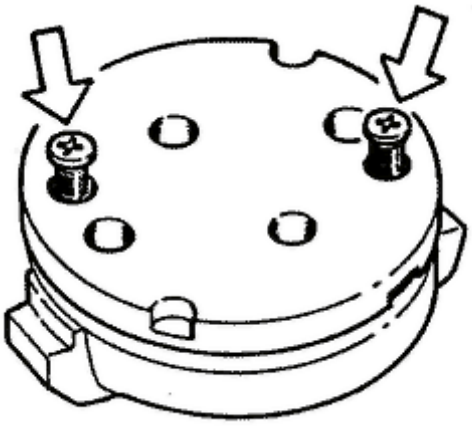
Admissible limit clearance: 0.20 mm

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.

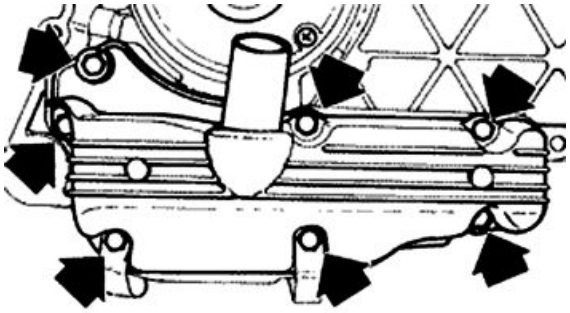
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.

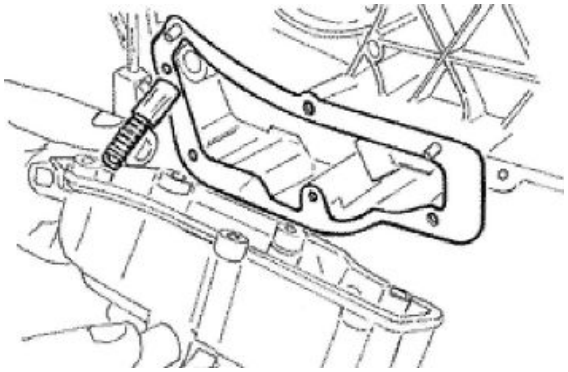
Locking torques (N*m)

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

Removing the oil sump

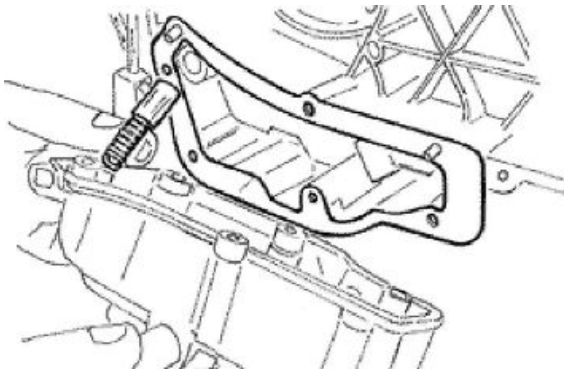
- Remove the oil filler plug, the transmission cover, the complete driving pulley assembly with belt and the sprocket wheel, as described in the "Transmission" chapter.
- Drain the oil as described previously.
- Remove the seven screws, shown in the diagram, and the two rear brake fluid pipe fixing brackets.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

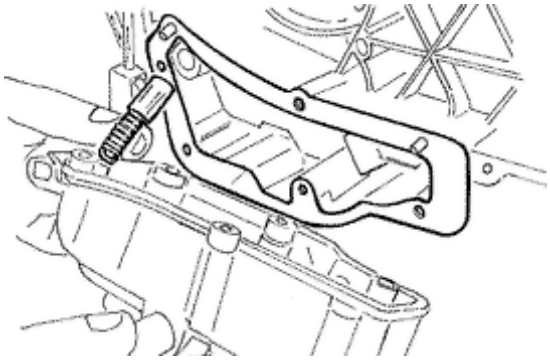


Characteristic

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 driving 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 (VACUUM).
- Operate the pump slowly.
- Check that the one way valve allows the air to pass through causing a slight vibration.
- Switch the pump to pressure mode (PRESSURE).

- Operate the pump slowly and check if there is an increase of pressure. A small leakage is considered to be normal.

If anomalies are detected, replace the pump.

N.B.

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

N.B.

ABSENCE OF VIBRATION INDICATES INEFFICIENT SEALING

Specific tooling

020329Y MityVac vacuum-operated pump

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.

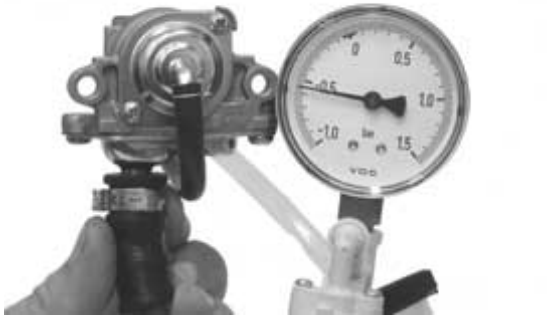
LACK OF TIGHTNESS IN THE CUT-OFF VALVE RESULTS IN EXHAUST NOISE (EXPLOSIONS IN THE MUFFLER). INCORRECT CUT-OFF VALVE CALIBRATION CAN RESULT IN CATALYTIC CONVERTER MALFUNCTIONING

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



Removing the carburettor

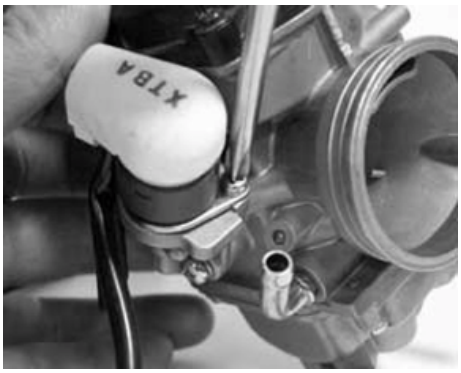
Kehin

- 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.

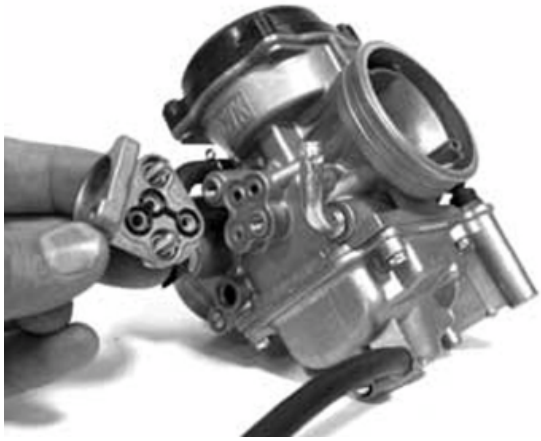
N.B.

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

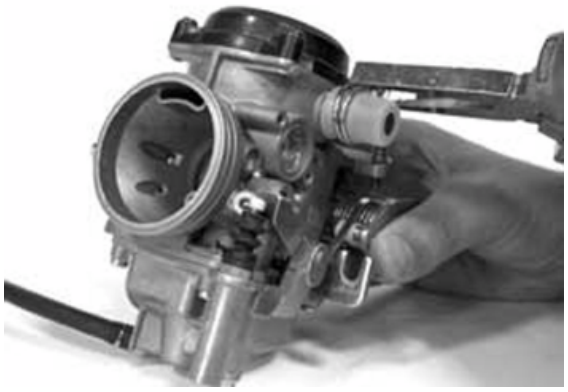
- Remove the protection, the bracket and the starter acting on the screw shown in the figure.



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



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



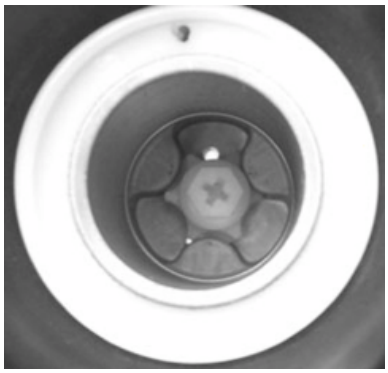
- Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.

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.

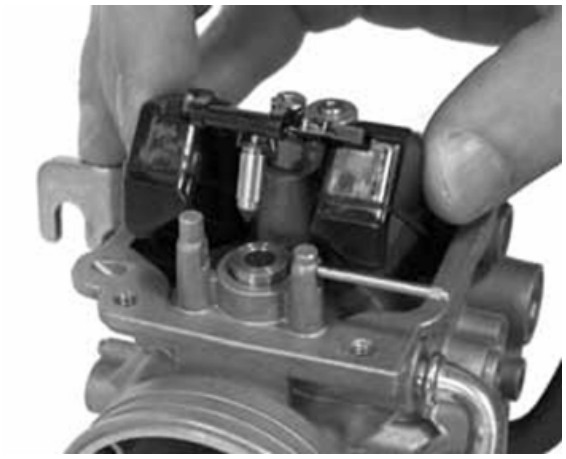
CAUTION, THE ACCELERATION PUMP VALVES ARE MADE UP OF NOZZLES, SPRING AND BALL.

N.B.

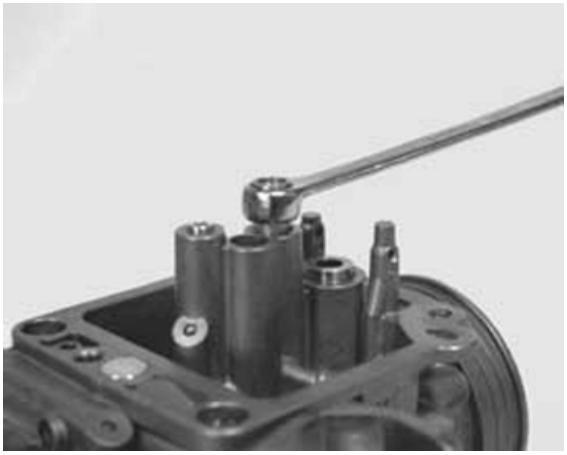
AVOID REMOVING THE PISTON OF THE PUMP AND ITS CONTROL.

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

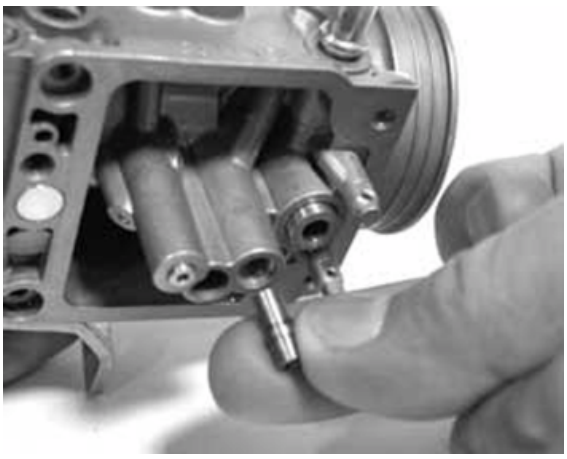
- Remove the float and the plunger.



-Remove the maximum nozzle.



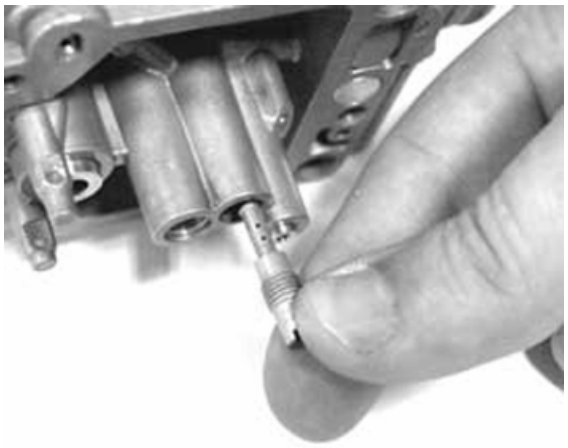
-Remove diffuser.



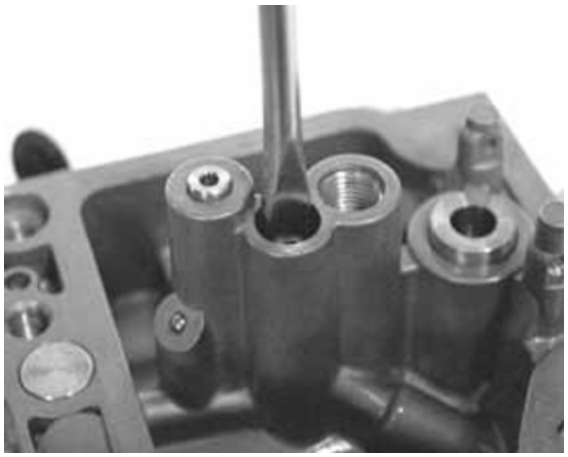
- Remove the sprayer.

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.



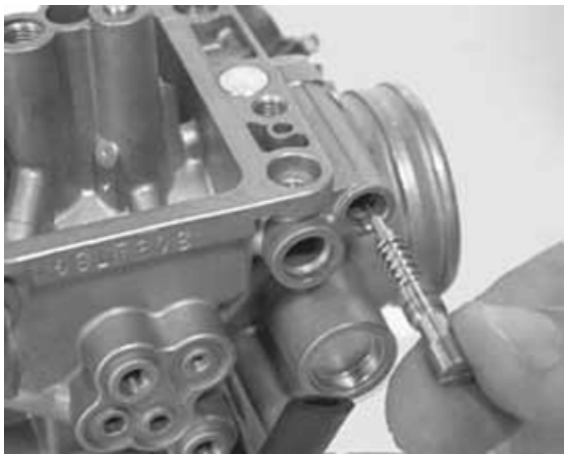
-Remove the minimum nozzle.



- 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.

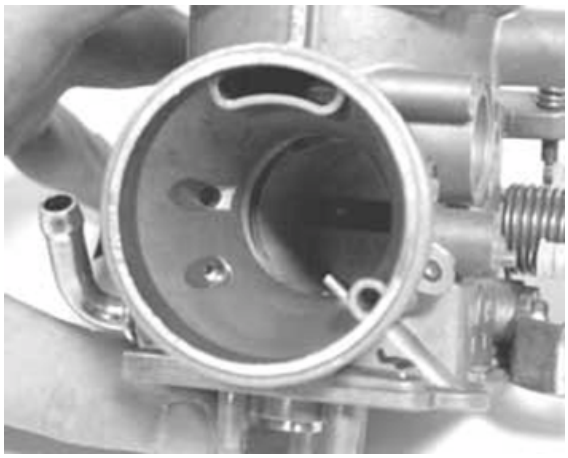


Refitting the carburettor

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.

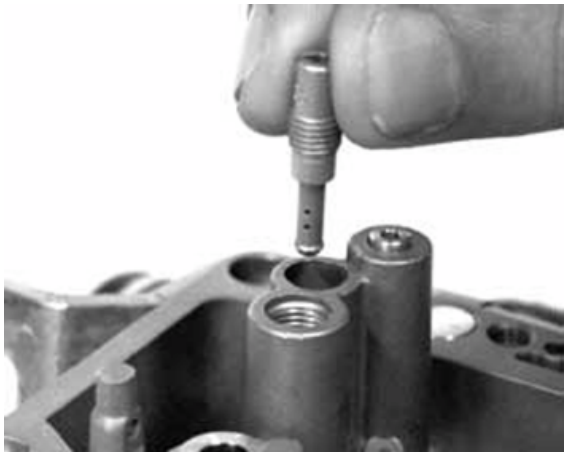
- Check that there are 5 closing ball joints for the operating pipes on the carburettor body.

- 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.

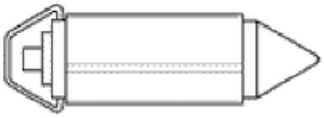
TO AVOID DAMAGES, DO NOT INTRODUCE METAL OBJECTS IN THE ADJUSTED SECTIONS.

- 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.



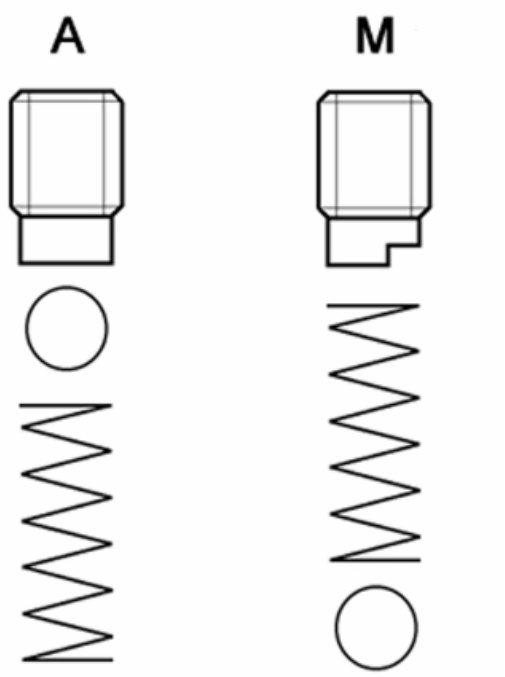
- Check that the float is not worn on the pin housing or on the contact plate with the plunger and that there are no fuel infiltration.
- Replace it in case of anomalies.

- 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)

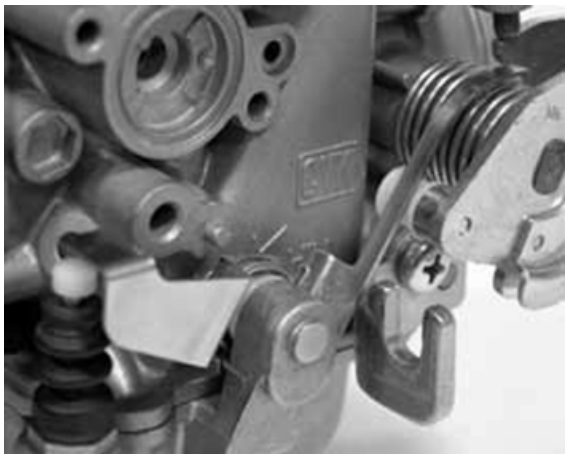
- Ball
- Spring
- Nozzle

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.

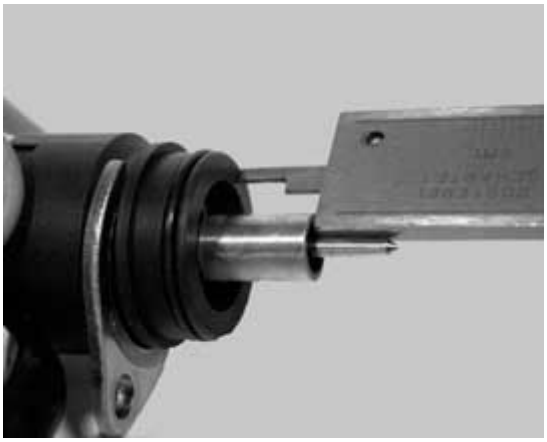
Inspecting the automatic choke device

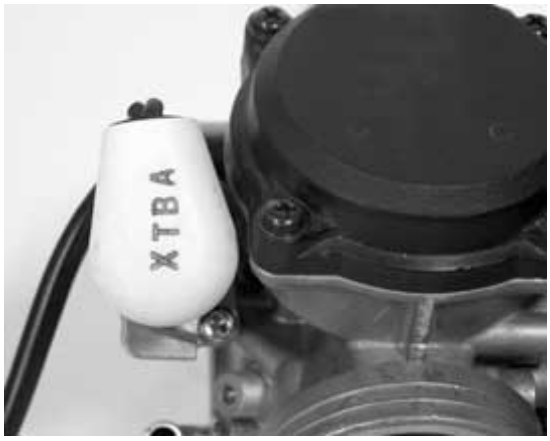
Kehin

- 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

Starter pin travel

10

Starter device resistance

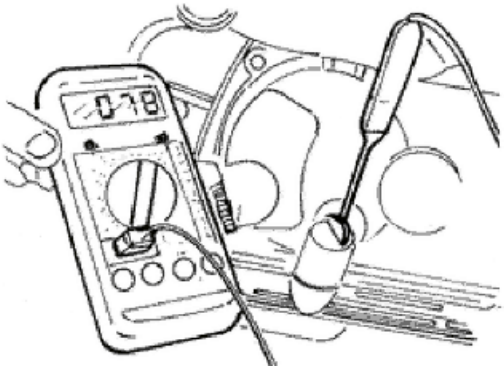
~ 20 Ω

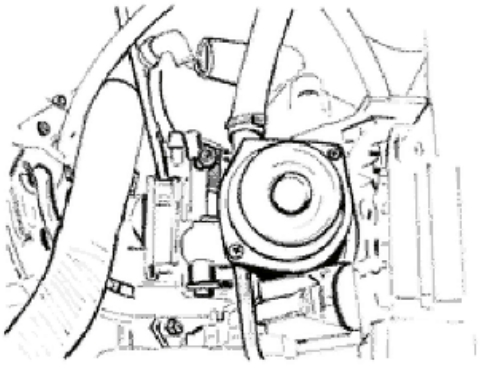
Check the automatic starter: Keihin maximum time

5 min

Adjusting the idle

- The engine does not require frequent idle speed adjustments, but it is essential to strictly follow certain rules when adjusting the idle speed.
- Before adjusting the carburettor make sure to respect the lubrication requirements, valve clearance, and complying timing, spark plug should be in optimum conditions, air filter clean and sealed, and the exhaust system tight.
- Warm up the engine by running it at least 5 minutes at approximately 50 kph.
- Connect a millimetre thermometer (020331y) on the sump, using a cover with oil expressly prepared for probes.
- Start the engine and before adjusting the idle speed, make sure that the oil temperature is between 70÷80 °C.
- Using the rpm indicator of the analyser or an independent one (020332y), adjust the idle set screw until 1600 ÷ 1700 rpm is obtained.





N.B.

THE WASTED SPARK IGNITION SYSTEM OFFERS REMARKABLE POWER. READINGS MAY NOT BE ACCURATE IF INADEQUATE RPM INDICATORS ARE USED. CORRECT COUPLING OF THE RPM INDICATOR WILL BE INDICATED WHEN IT CAN READ RPM OVER 6000 ÷ 8000

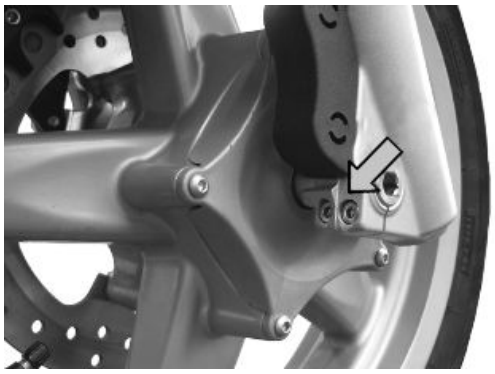
INDEX OF TOPICS

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

Front

Removing the front wheel

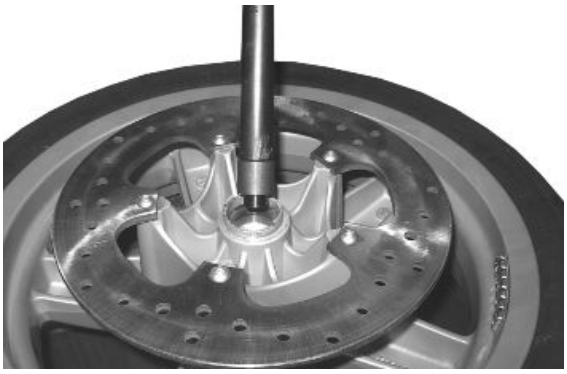
- Remove the fixing nut from the wheel axle on the left side of the vehicle.
- Loosen the two screws fixing the wheel axle clamp and remove the clamp.



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 two bearings on the brake disc side using pliers 14 and the special bell 9.
- Remove the internal spacer.

- 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, 24 mm adaptor and 15 mm guide) from the brake disc side to permit the removal of the opposite 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 opposite the brake disc with the heat gun.

- Insert the bearing using the punch consisting of adaptor handle, 40x37 mm adaptor and 15 mm guide, and take it 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

- Refit the cap and tighten the five fixing screws.

- 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.

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

2 - Insert the two bearings one at a time using the punch consisting of adaptor handle, 32x35 mm adaptor and 15 mm guide, and take it to the stop.

Specific tooling

020376Y Adaptor handle

020357Y 32 x 35 mm adaptor

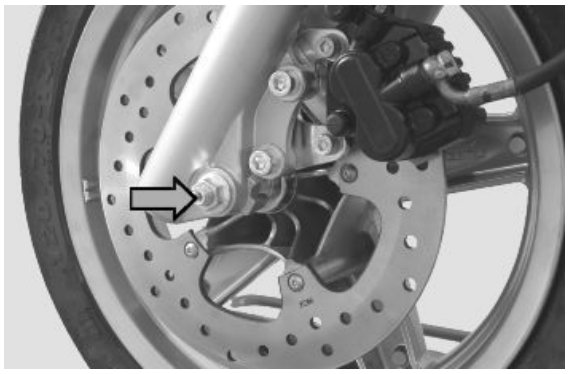
020412Y 15 mm guide

Refitting the front wheel

- Carry out the operations described in the «removal» section but in reverse order.

Locking torques (N*m)

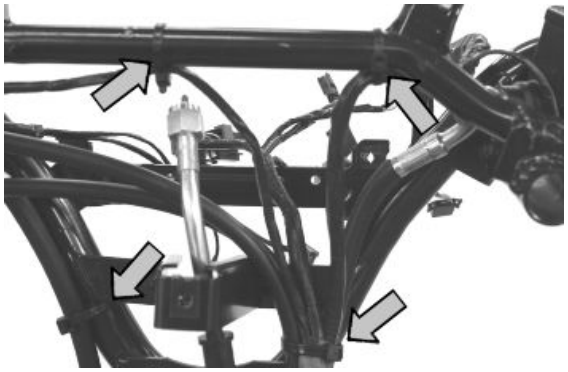
Wheel axle nut 45 ÷ 50 Wheel axle clamp screws 6 - 7 Nm



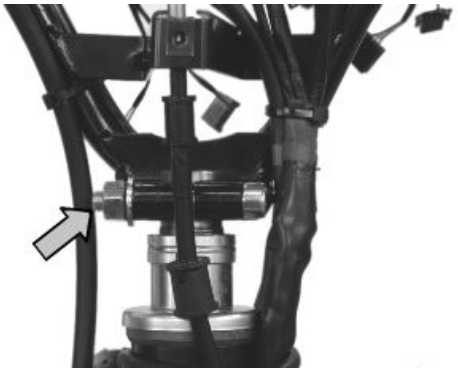
Handlebar

Removal

- Remove the handlebar covers as explained in the «Bodywork» Chapter.
- Remove the handlebar wiring retaining straps and disconnect the electric connectors from the brake levers.



- Unscrew the clamps of the U-bolts and release the brake pumps.
- Remove the flexible transmission of the throttle grip and remove the throttle control.
- Loosen the clamp fixing the handlebar to the steering tube and remove the handlebar by pulling it upwards.

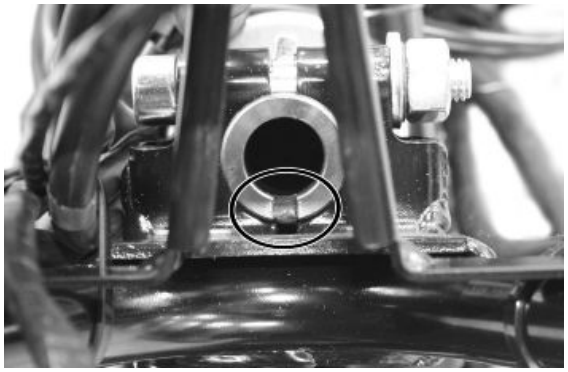


N.B.

IF THE HANDLEBAR IS BEING REMOVED TO REMOVE THE STEERING, IT IS ONLY NECESSARY TO TILT THE HANDLEBAR FORWARD ONTO THE FRONT PART OF THE VEHICLE WITHOUT REMOVING THE PARTS FITTED SO AS TO AVOID DAMAGING THE SHAFTS.

Refitting

Carry out the above operations by following the removal steps but in reverse order, respecting the handlebar-steering tube alignment as shown in the figure.



Locking torques (N*m)

Handlebar fixing screw (*) 43 ÷ 47

Front fork

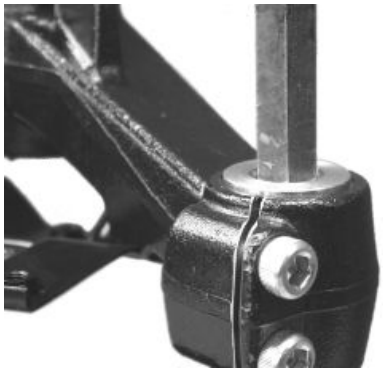
Removal

See also

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.

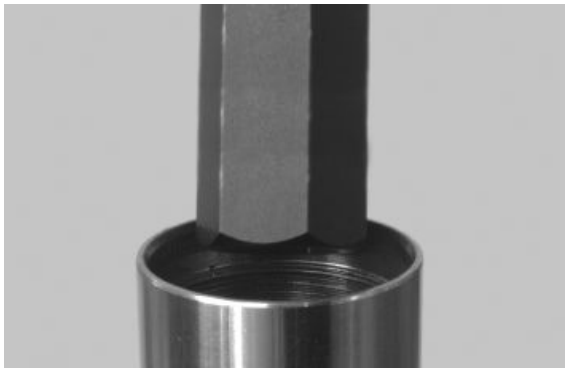


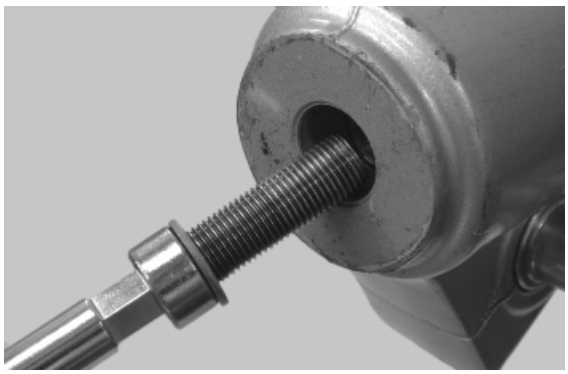
CAUTION

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

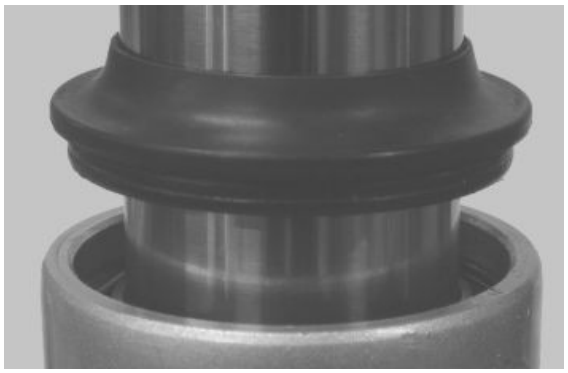
- Support the fork leg properly, remove the main spring and drain off the fork leg oil.

- 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.

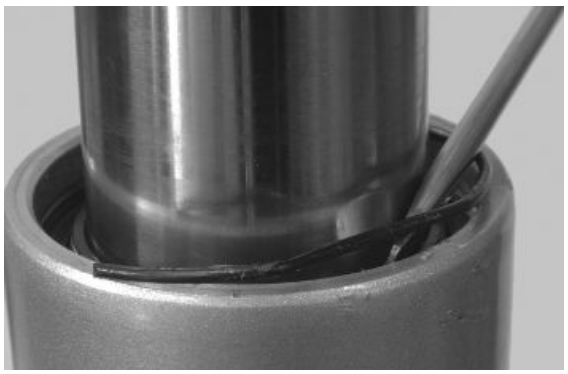




- Remove the stem dust guard with a screwdriver.



- 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

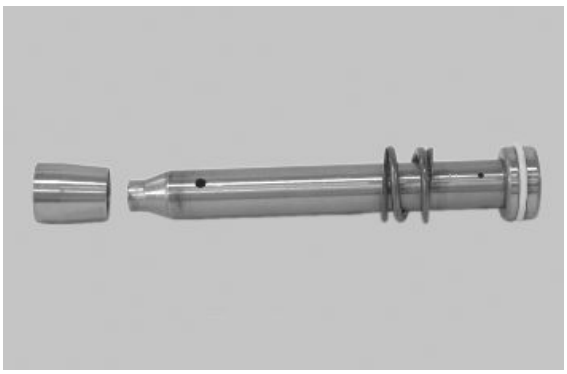
020487Y Fork oil seal extractor

- Hold the tie rod manually so that it does not fall into the fork led and/or that both half-rings lose 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.

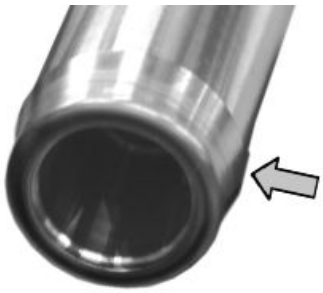


COMPONENT CHECK

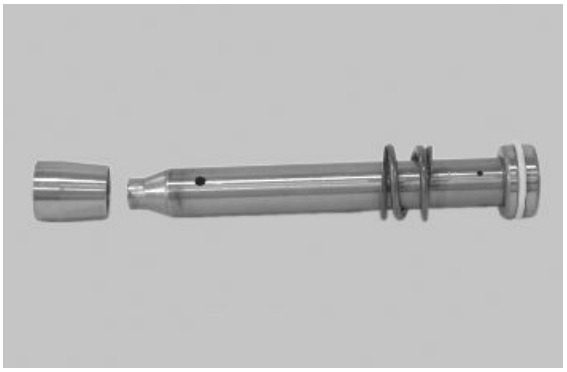
CAUTION

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 caulkings, the contrast 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

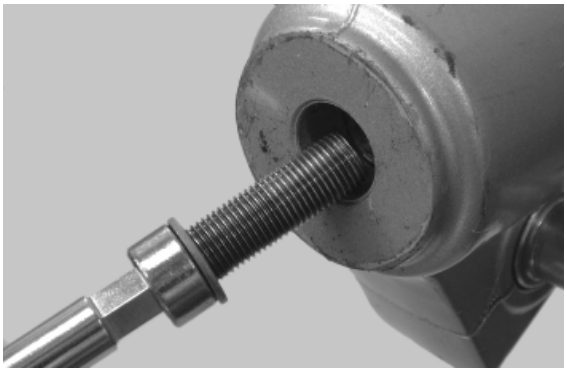
020359Y 42x47-mm adaptor

- 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.

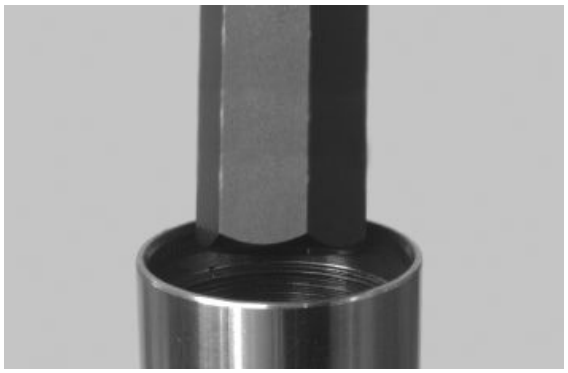


Locking torques (N*m)

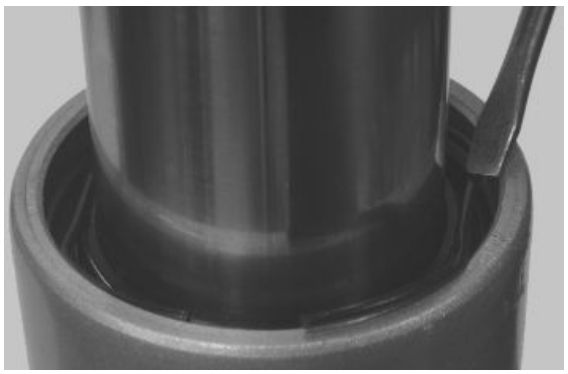
Hydraulic rod fixing screw 25 ÷ 35*

(°) Apply LOCTITE 243 threadlock

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



- Fit the oil seal retaining circlip.



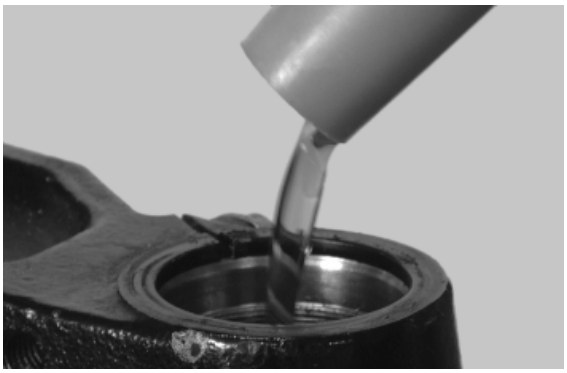
- Grease and fit a new dust guard.

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

Locking torques (N*m)

Fork locking screws cap 15 ÷ 30

- Repeat the procedure for the other fork leg.

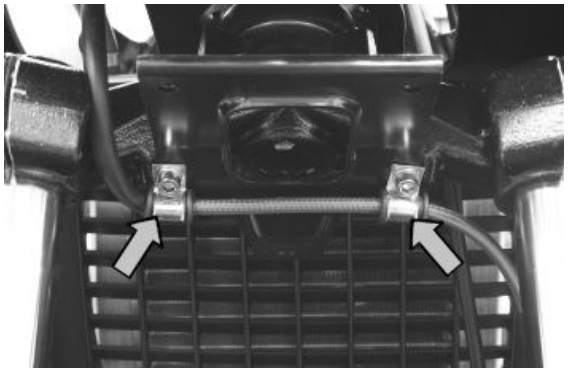
N.B.

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 handlebar and tip it onto the shield back plate being careful not to damage the plate.
- Release the front brake pipe from the fork by undoing the screws indicated.



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

See also

Removing the front wheel
Removal

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.

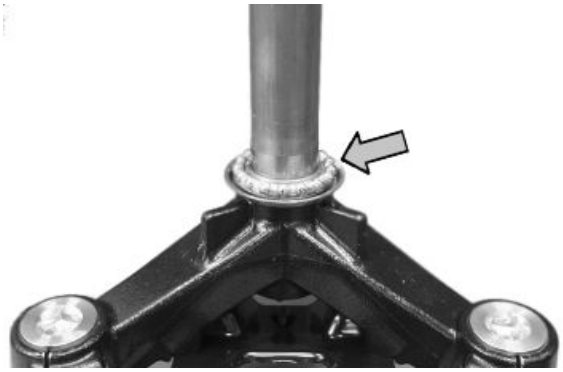
N.B.

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 faying 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 spacer.

- 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.

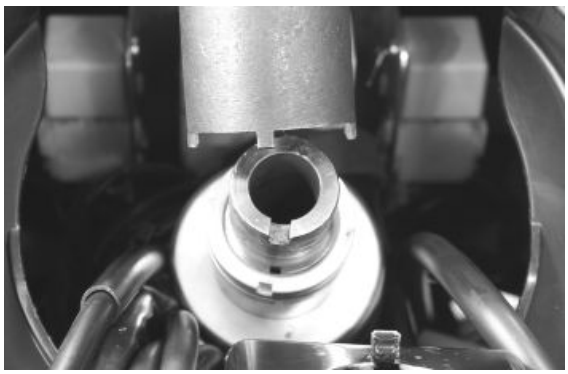
- Insert the upper tightening ring nut, screw until it stops and, with the specific tool, tighten to the indicated torque.

Specific tooling

020055Y Wrench for steering tube ring nut

Locking torques (N*m)

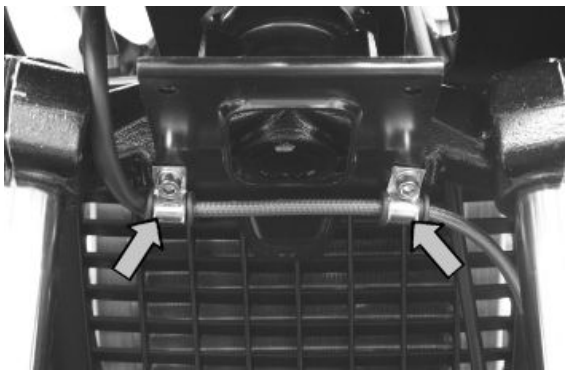
Steering tube upper ring nut 40 ÷ 45



- Fasten the two retainer clamps of the front brake pipe to the fork plate.

Locking torques (N*m)

Screw fixing the front brake pipe to the fork plate 5 ÷ 7



- Fit the front wheel.

Steering bearing

Removal

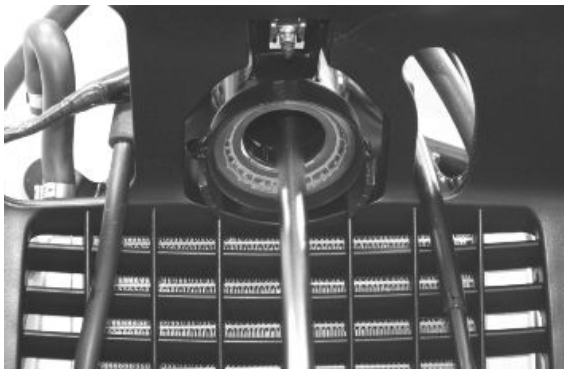
- Clean thoroughly and visually inspect if the components are in good conditions.
- Check the upper steering fifth wheel for wear.

- 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.

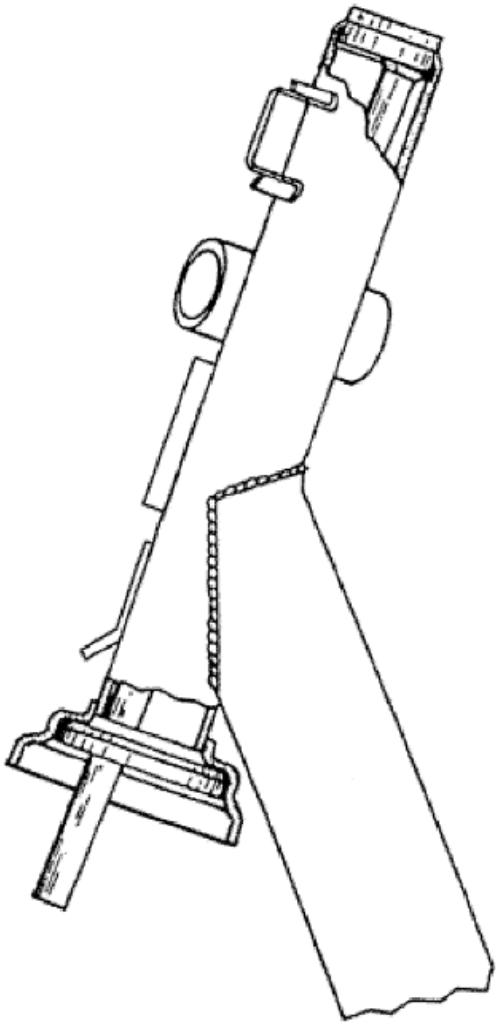
STEERING FIFTH WHEEL TRACK REMOVAL

- 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

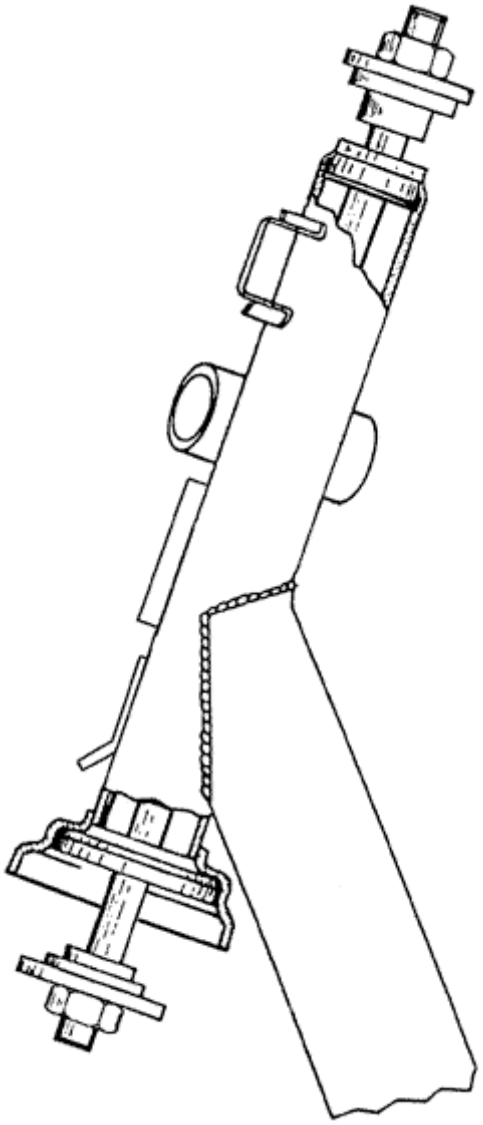
001330Y014 Tool for fitting steering seats

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 supporting bracket.
- Remove the rear mudguard.
- Remove the tapered spacer.

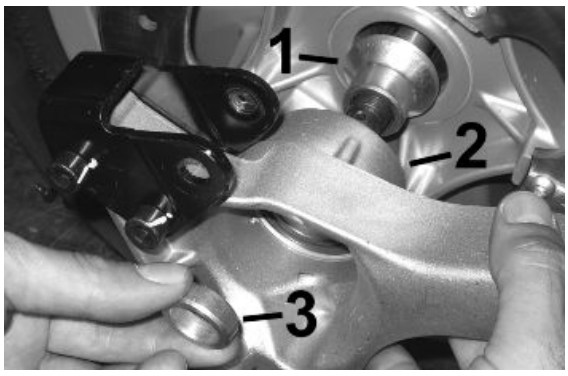
- Remove the rear wheel.

Refitting the rear wheel

To fit, follow the removal steps but in the reverse sequence, being careful to fit the spacers on the wheel axle as shown in the photograph.

Locking torques (N*m)

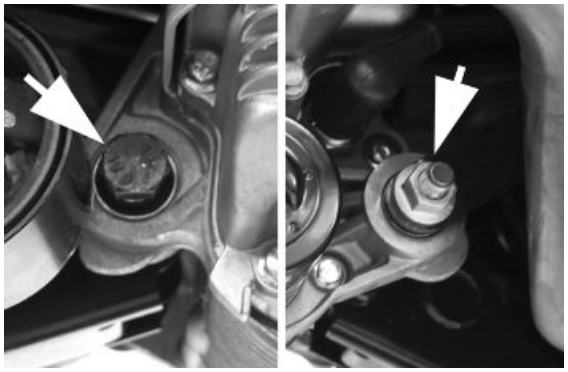
Muffler arm clamping screws 27 ÷ 30 Rear wheel axle nut 104 ÷ 126 Shock absorber-crankcase attachment bracket 20 ÷ 25 Lower shock absorber clamping screw 33 ÷ 41 Nm Rear brake calliper fixing screws 25 ÷ 30 Nm



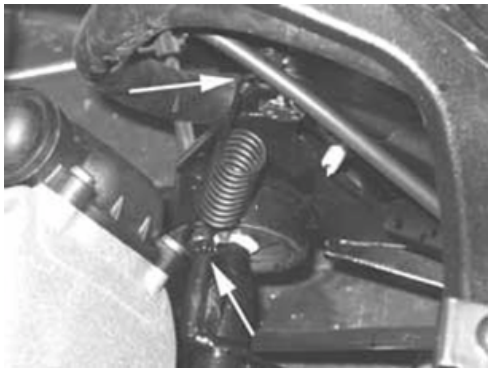
Swing-arm

Removal

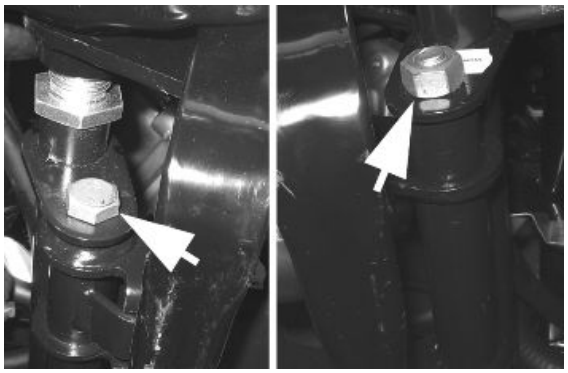
- Place the scooter on its centre stand;
- Remove the swinging arm/engine fitting shown in the photo
- Move the engine back



- remove the spring anchoring the swinging arm to the frame as shown in the photo



- Remove the two screws fixing the buffer support bracket to the frame



- Undo the nut on the LHS shown in the figure and remove the corresponding bolt from the opposite side.
- Remove the swinging arm.

- Check the entire swinging arm assembly.
- Check all the centring bushing components and silent block rubber buffers.
- Replace the work components that cause excessive clearance on the rear suspension.

Overhaul

- Check there is no sticking in the movement of the connection of the swinging arm on the engine side to the swinging arm on the frame side.
- Check the axial clearance between the two swinging arms using a feeler gauge

Characteristic

Standard clearance

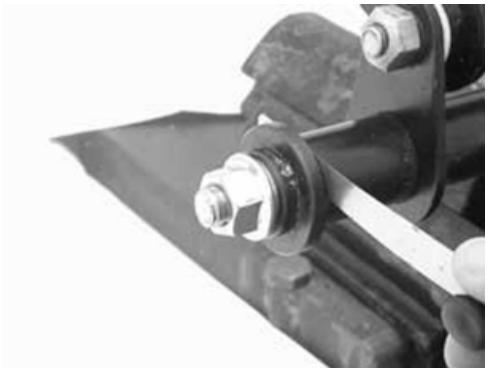
0.40 ÷ 0.60 mm

Allowable limit after use:

1.5 mm

- To check the clearance on the frame-side arm, mount the retainer using the pin fixing the swinging arm to the frame and two adaptor rings of the appropriate tool 020229Y. Alternatively use two washers with inner diameter for 12-mm pins, min. outer diameter: 30 mm: min. thickness: 4 mm.

- Check there is no sticking in the rotation.
- Check the axial clearance of the swinging arm on the frame side



Characteristic

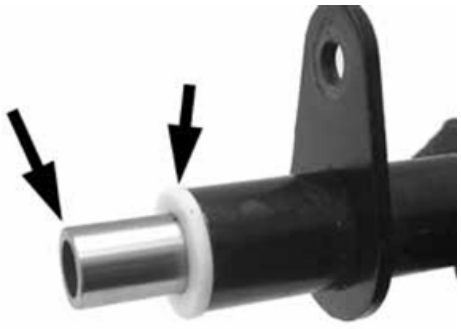
Standard clearance

0.40 ÷ 0.60 mm

Allowable limit after use:

1.5 mm

- Separate the swinging arm on the engine side from the vehicle side arm.
- Remove the plastic bushings and the internal spacer shown in the photo.



- Using a suitable pin remove the roller casings as shown in the photographs

- Using an appropriate tool plant new roller casings, being careful to position the bearings with the O-rings facing outwards

Specific tooling

020244Y 15-mm diameter punch

020115Y Ø 18 punch

Characteristic

Length of the swinging arm tube on the engine side:

175.3 ± 0.3 mm

Length of the internal swinging arm spacer on the engine side:

183 ± 0.3 mm

Engine side swinging arm plastic bushing shim:

3.5 ± 0.05 mm

Frame-side swinging arm plastic bushing shim:

3.5 ± 0.05 mm

Length of the internal swinging arm spacer on the frame side:

290 ± 0.1 mm

Length of the swinging arm tube on the frame side:

283 ± 0.1 mm

- Lubricate roller casings and the plastic bushings with grease
- Insert the spacers
- Assemble the two arms with the relative bolt in the position shown in the photograph
- Adjust the bolt as shown in the photograph
- Position the frame side swinging arm with the most protruding part pointing towards the silent block side as shown in the photograph

Recommended products

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

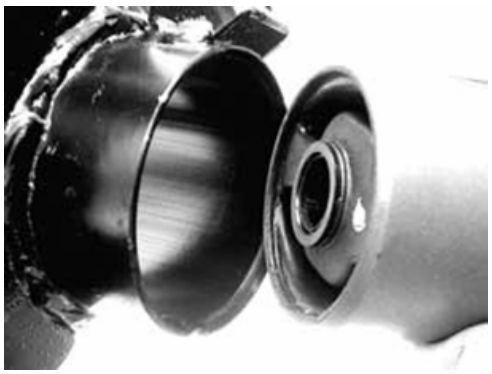
Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2 of the swinging arm

- Make sure the silent bloc is not broken. If there is, replace it.
- Remove the seeger ring shown in the photograph

- Remove the full silent bloc bracket
- Undo the silent bloc ring shown in the photograph

- Hold the full silent bloc bracket in the clamp
- Using the appropriate tool, remove the silent bloc from the bracket from the side corresponding to the inside of the vehicle. This is to guarantee the tool is centred properly on the support

- Install a new silent bloc, making sure it aligns properly with the reference tooth.
- Fit the silent blocs, making sure the chamfered part of the silent bloc matches the chamfered part of the bracket



- Using the appropriate tool, fit the silent bloc as shown in the photo

Refitting

- To refit, perform the removal operations in reverse.
- Grease the bearings and the rolling parts with the recommended grease.

-Complete the fitting by tightening the nuts on the relative bolts to the proper tightening torque.

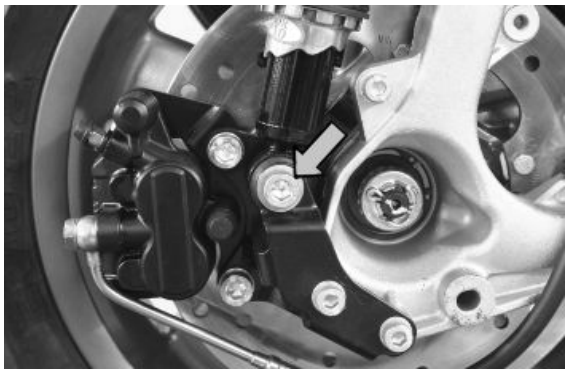
Locking torques (N*m)

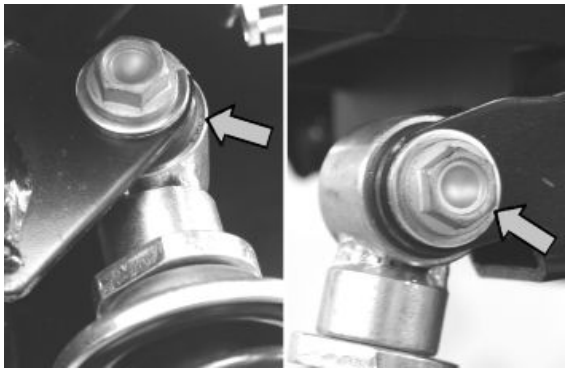
Engine and vehicle side swinging arm junction bolt 33 ÷ 41 Nm Swinging arm pin - Engine 64 - 72 Body shell - Swinging arm pin 76 ÷ 83 Screw fixing the silent-block support plate to the body 42 ÷ 52

Shock absorbers

Removal

- Rest the scooter on its centre stand.
- Slightly lift the engine using a jack to free both shock absorbers.
- Remove the silencer.
- Unscrew the shock absorber spring unit fixing screw from the support fixed to the engine on one side, and from that fixed to the muffler support on the other.
- Undo the two upper nuts (one on each side) fixing the shock absorber spring unit to the frame and remove the shock absorbers themselves.





Refitting

Carry out the previous operations but in reverse order.

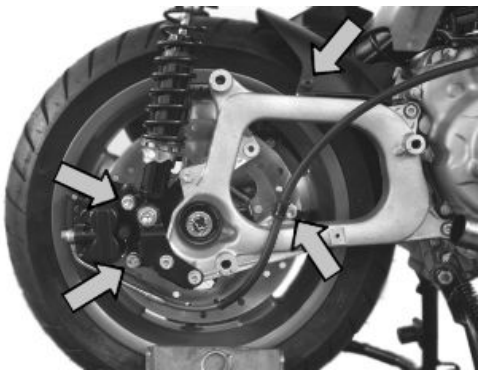
Locking torques (N*m)

Shock absorber lower clamp 33 ÷ 41 Upper shock absorber clamp 33 ÷ 41

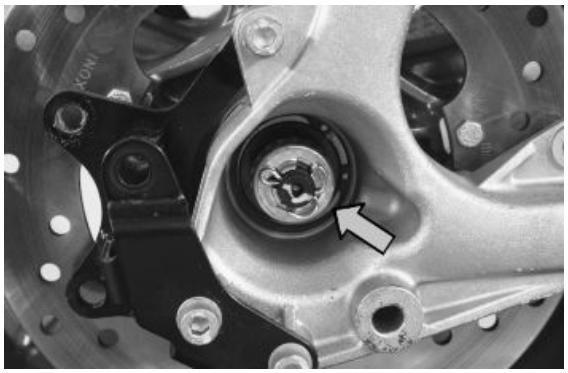
Exhaust bracket

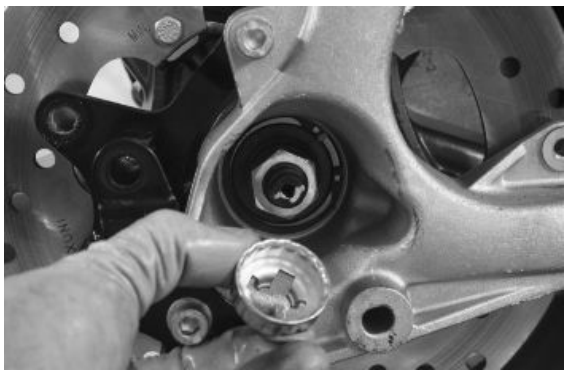
Removal

- Remove the exhaust silencer.
- Remove the rear brake calliper, release the rear brake pipes from the retainer clamp and undo the screw fixing the rear mudguard.



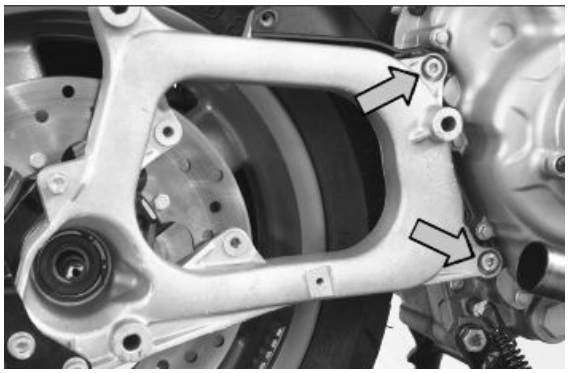
- Release the cotter pin and remove the cap.



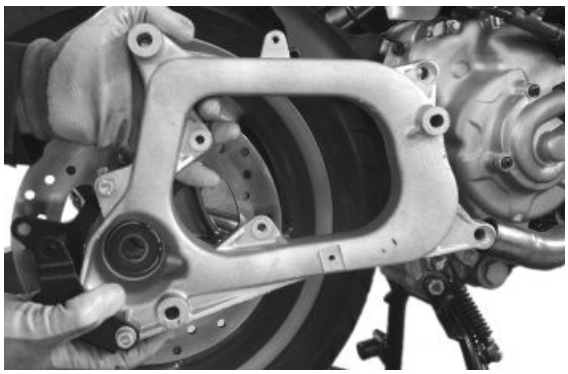


- Unscrew the rear wheel fixing nut and remove the spacer.

- Undo the two fixing screws to the engine crank-case.



- Remove the muffler supporting bracket.



Overhaul

- Remove the seeger ring.

- With the appropriate tools, remove the bearing from the inside.

Specific tooling

020376Y Adaptor handle

020439Y 17 mm guide

020358Y 37x40-mm adaptor

- Check that the bearing seat is not abnormally worn.
- Heat the bearing seat with the appropriate tool.

Specific tooling

020151Y Air heater

- Drive a new bearing as far as it will go using the appropriate tool.

Specific tooling

020376Y Adaptor handle

020439Y 17 mm guide

020359Y 42x47-mm adaptor

- Fit the seeger ring.

Refitting

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

Recommended products

AGIP GREASE PV2 Grease for steering bearings and spindle seats

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

Locking torques (N*m)

Muffler arm clamping screws 27 ÷ 30 Rear wheel axle 104 ÷ 126

See also

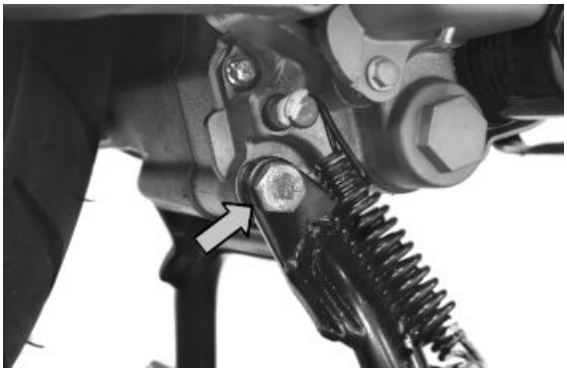
Refitting
Refitting the rear wheel
Refitting

Centre-stand

REMOVAL

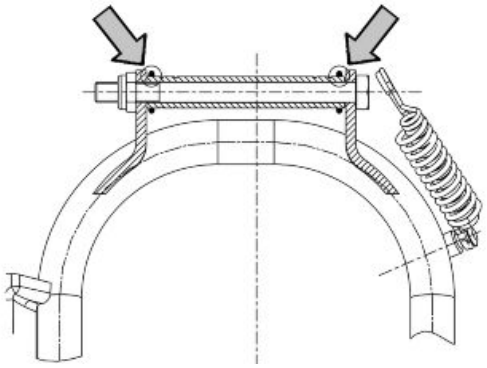
- Use a jack to support the vehicle properly.
- Remove the two stand return springs.
- Undo the nut shown in the figure.

- Remove the bolt from the right side.
- Remove the centre stand.



FITTING

- Install the sealing rings on the support tube of the stand;
- Carry out the operations described above in reverse order, then insert the sealing rings into their seats.



CAUTION

LUBRICATE THE FOLLOWING PARTS WITH GREASE: SPRING COUPLING PINS, BUSHINGS ON STAND FIXING BRACKETS.

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

Locking torques (N*m)

Stand fixing bolt 40 ÷ 45

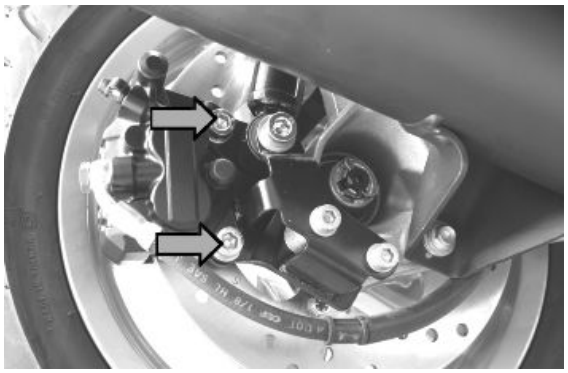
INDEX OF TOPICS

This section è is devoted to the description of the braking system components.

Rear brake calliper

Removal

- Remove the muffler.
- 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)

Rear brake calliper-pipe fitting 20 ÷ 25

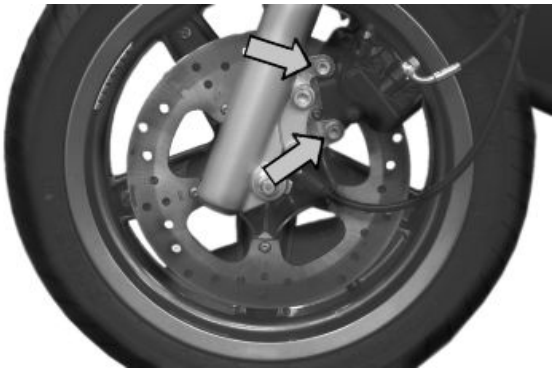
See also

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 24 ÷ 27

If the calliper is replaced:

CAUTION

ALWAYS USE NEW COPPER WASHERS.

CAUTION

ONCE REFITTING IS FINISHED, BLEED THE SYSTEM.

Locking torques (N*m)

Brake fluid pipe-calliper fitting 20 ÷ 25

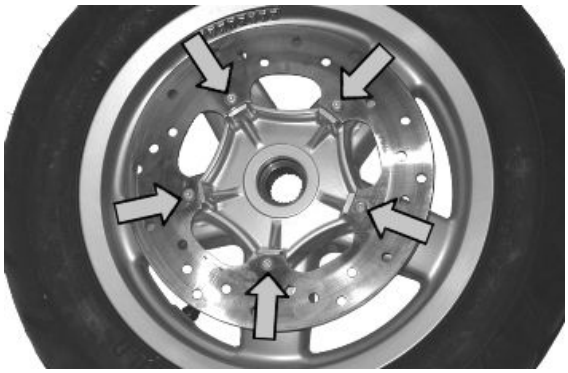
See also

Front

Rear brake disc

Removal

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



Refitting

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

N.B.

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

- Tighten the screws to the prescribed torque and apply the recommended product.

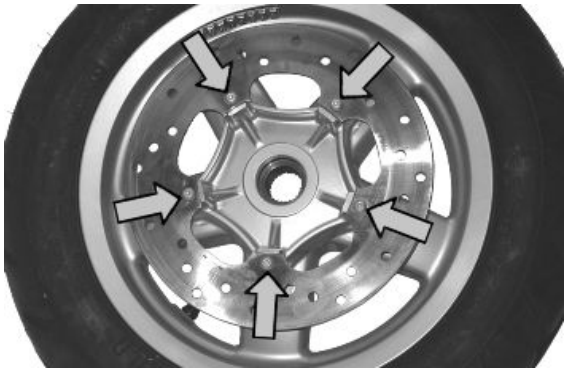
Recommended products

Loctite 243 Medium strength threadlock

Loctite 243 medium-strength threadlock

Locking torques (N*m)

Brake disc screws 8 ÷ 10



Disc Inspection

- Remove the rear brake calliper
- Check disc thickness with a micrometer, repeat the measurement at no fewer than six points on the disc.

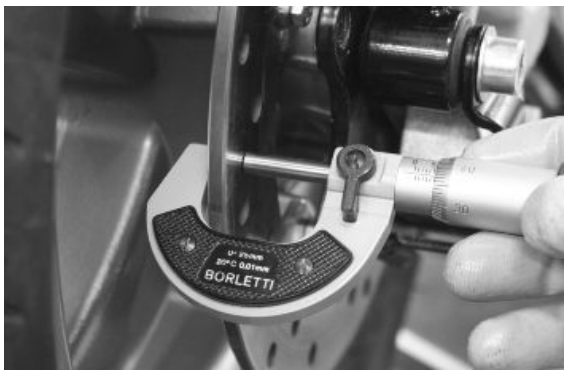
Characteristic

Standard thickness:

5 ± 0.2 mm

Disc thickness at wear limit

4.5 mm



- Check the brake disc rotates regularly using the appropriate tool fixed onto the brake calliper support.

- In order to be able to anchor the specific tool properly use a metal plate with an M8 threaded hole and fix it to one of the two rear brake calliper attachment points.

N.B.

SO AS NOT TO GET A DISTORTED READING, CAUSE THE DRIVEN PULLEY SHAFT TO TURN IN ORDER TO ROTATE THE DISC.

Specific tooling

020335Y Magnetic support for dial gauge

Characteristic

Max. deviation allowed:

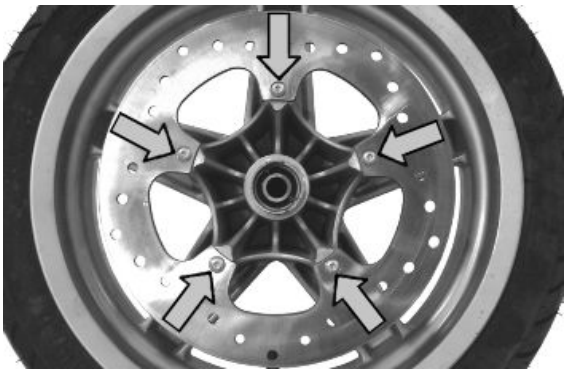
0.1 mm

- If you detect incorrect values, replace the disc.
- If the fault continues, repeat the test.
- If the problem persists, replace the wheel.

Front brake disc

Removal

- Remove the front wheel.
- Undo the five clamping screws shown in the photograph

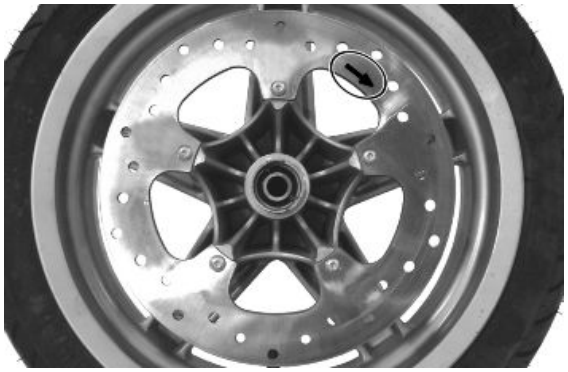


Refitting

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

N.B.

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



- Tighten the screws to the prescribed torque and apply the recommended product.

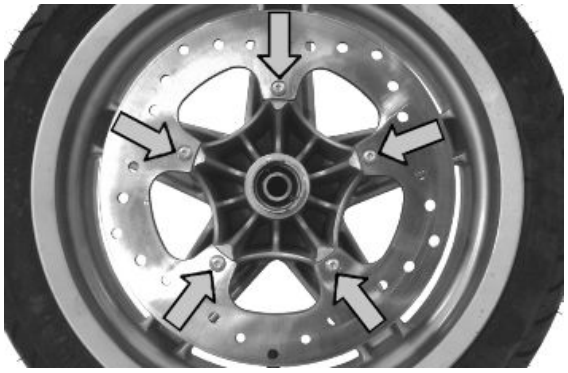
Recommended products

Loctite 243 Medium strength threadlock

Loctite 243 medium-strength threadlock

Locking torques (N*m)

Brake disc screws 8 ÷ 10



Disc Inspection

- Remove the front calliper.
- Check disc thickness with a micrometer, repeat the measurement at no fewer than six points on the disc.

Characteristic

Standard thickness:

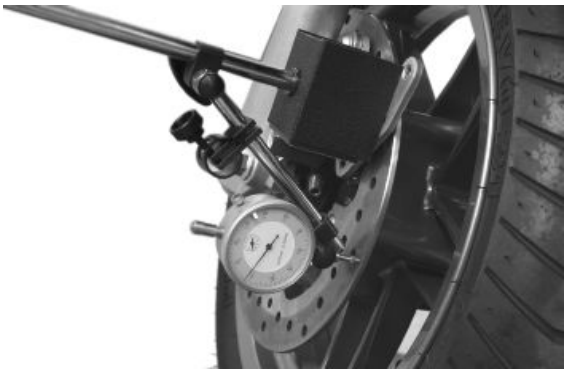
5 ± 0.2 mm

Disc thickness at wear limit

4.5 mm

- Check the brake disc rotates regularly using the appropriate tool fixed onto the brake calliper support.

- In order to secure the specific tool adequately use a metal plate with an M8 threaded hole and fix it to one of the two front brake calliper attachment points.



Specific tooling

020335Y Magnetic support for dial gauge

Characteristic

Max. deviation allowed:

0.1 mm

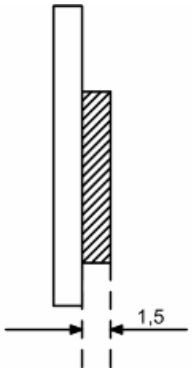
- If you detect incorrect values, replace the disc.
- If the fault continues, repeat the test.
- If the problem persists, replace the wheel.

Front brake pads

Removal

Proceed as follows:

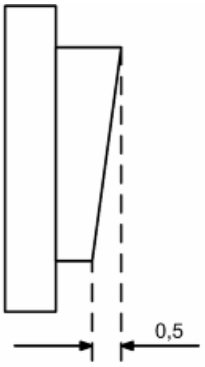
- Remove the front calliper.
- Loosen the two pins shown in the figure that lock the two pads.
- Remove the pads, being careful with the pad spring clamp.
- Check the thickness of the friction material of the pads.
- Replace the pads if the thickness is below the minimum value.
- The replacement must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

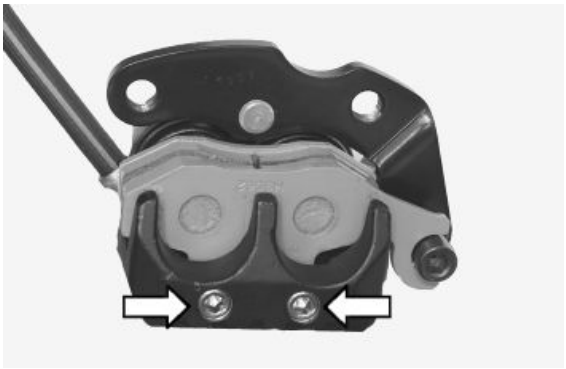
Locking torques (N*m)

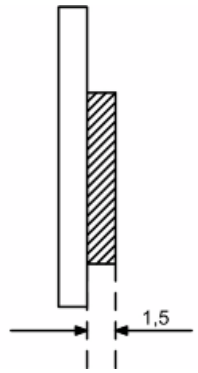
Screw tightening calliper to the support 24 ÷ 27 Pad fastening pin 19.6 ÷ 24.5

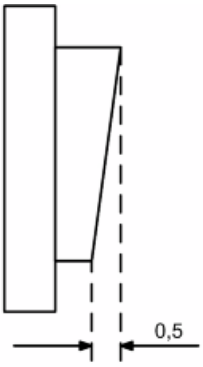
Rear brake pads

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

Rear 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

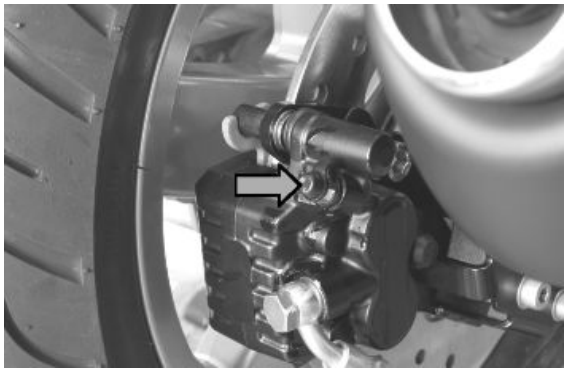
Locking torques (N*m)

Screw tightening calliper to the support 24 ÷ 27 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)

System bleed calliper fitting: 12 ÷ 16 Nm

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

N.B.

DURING THE BLEEDING OPERATIONS, MAKE SURE THE BRAKE FLUID DOES NOT COME INTO CONTACT WITH THE BODYWORK SO AS NOT TO DAMAGE IT. FURTHERMORE, DURING THE BLEEDING OPERATIONS REGARDING THE BRAKE CALLIPERS, MAKE SURE THE BRAKE FLUID DOES NOT COME INTO CONTACT WITH THE DISC BRAKES AND WITH THE BRAKE PADS. FAILURE TO COMPLY WITH THIS NORM WILL ENDANGER THE PROPER WORKING AND EFFICIENCY OF THE BRAKING SYSTEM

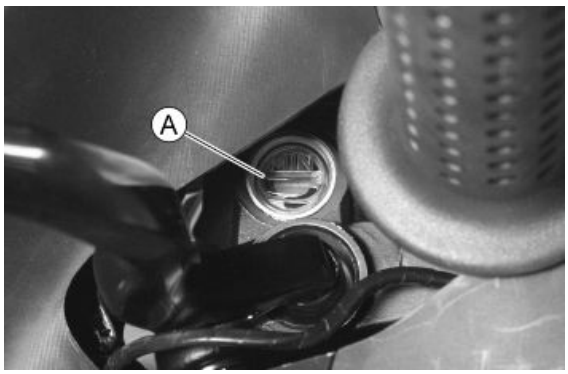
Specific tooling

020329Y MityVac vacuum-operated pump

Locking torques (N*m)

System bleed calliper fitting: 12 ÷ 16 Nm

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**».

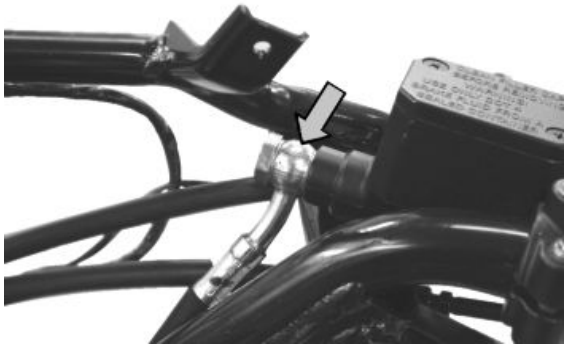
A certain lowering of the level is caused by wear on the pads.

Front brake pump

Removal

- Remove the front and rear handlebar cover.
- Place a suitable container to collect the oil, disconnect the oil pipe from the calliper and operate the brake lever until no more oil comes out.

- Disconnect the oil pipe from the pump.



- Unscrew the two clamps of the U-bolt and remove the pump.

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.

WARNING

THE 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 EFFICIENCY WILL BE REDUCED. THEREFORE, ALWAYS USE FLUID FROM SEALED CONTAINERS. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THIS LIQUID EVERY TWO YEARS. IF THE 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.

CAUTION

ALWAYS USE NEW COPPER WASHERS.

Locking torques (N*m)

Oil bleed screw 12 - 16 Rear brake calliper-pipe fitting 20 ÷ 25 Rear brake pump-pipe fitting 16 ÷ 20 Fixing screws for handlebar control assembly U-bolts 7 ÷ 10

See also

Front

Rear brake pump - combined

Removal

- Remove the front and rear handlebar cover.
- Place a suitable container to collect the oil, disconnect the oil pipe from the calliper and operate the brake lever until no more oil comes out.

- Disconnect the oil pipe from the pump.

- Unscrew the two clamps of the U-bolt and remove the pump.

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.

WARNING

THE 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 EFFICIENCY WILL BE REDUCED. THEREFORE, ALWAYS USE FLUID FROM SEALED CONTAINERS. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THIS LIQUID EVERY TWO YEARS. IF THE 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 DEGREASE THE DISC SHOULD THERE BE BRAKE FLUID ON IT.

CAUTION

ALWAYS USE NEW COPPER WASHERS.

Locking torques (N*m)

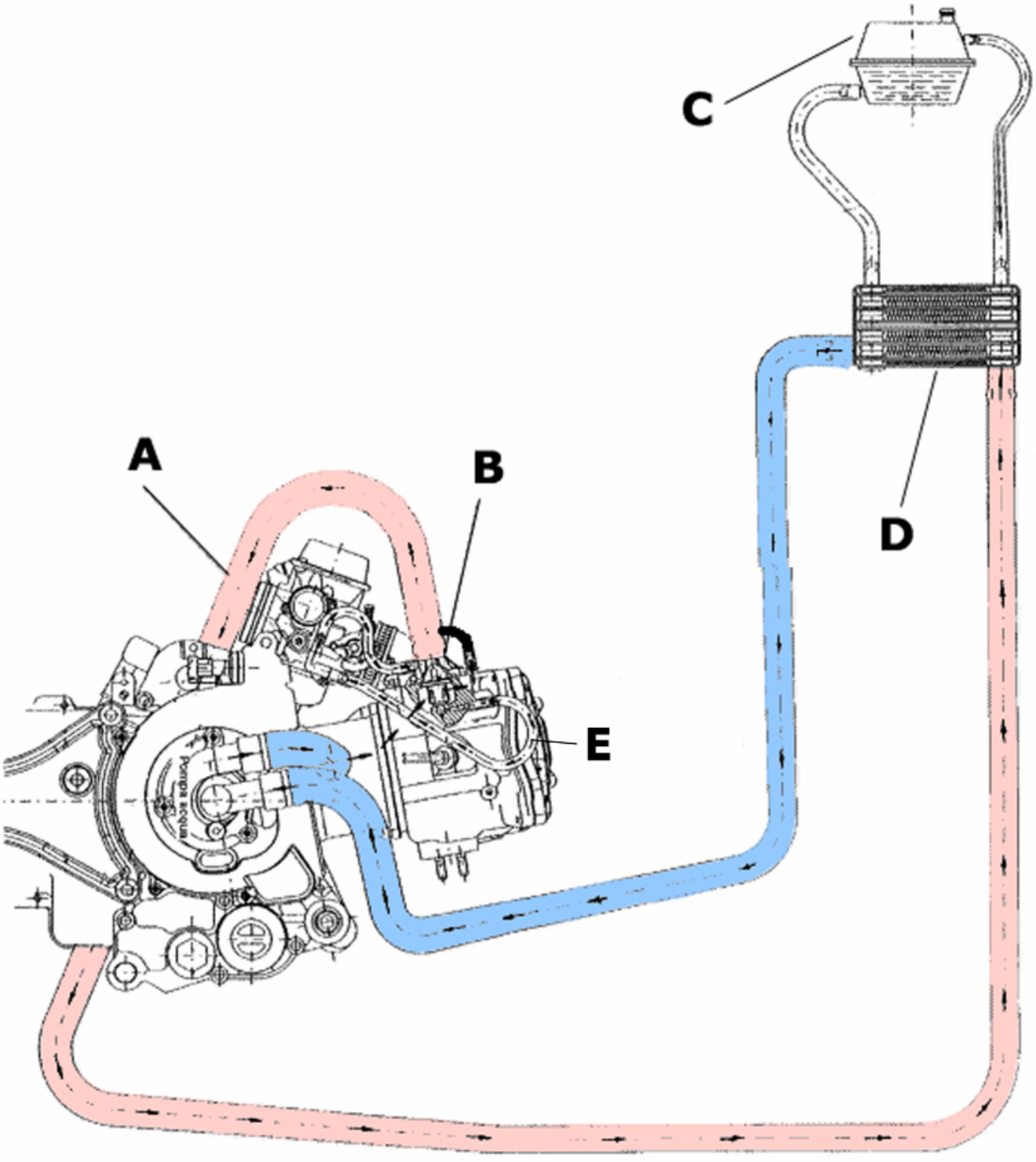
Oil bleed screw 12 - 16 Rear brake calliper-pipe fitting 20 ÷ 25 Rear brake pump-pipe fitting 16 ÷ 20 Fixing screws for handlebar control assembly U-bolts 7 ÷ 10

See also

Rear - combined

INDEX OF TOPICS

Circuit diagram



COOLING CIRCUIT

Specification	Desc./Quantity
A	Fluid cooling circuit

Specification	Desc./Quantity
B	Thermostat with By-Pass
C	Expansion tank
D	Radiator
E	Carburettor heating circuit

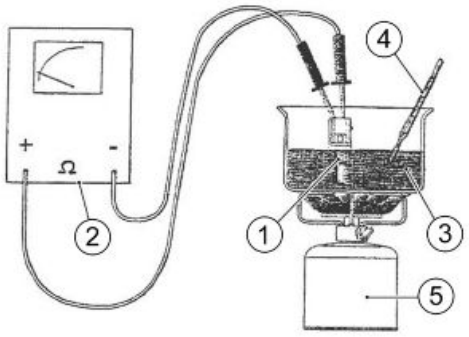
Electric fan check

Thermoswitch operation check:

- Remove the front shield.
- Remove the thermoswitch «**1**».
- Connect a tester «**2**» (set as ohmmeter) to the thermoswitch «**1**» as shown in the figure.
- Immerse the thermoswitch 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 thermistor 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

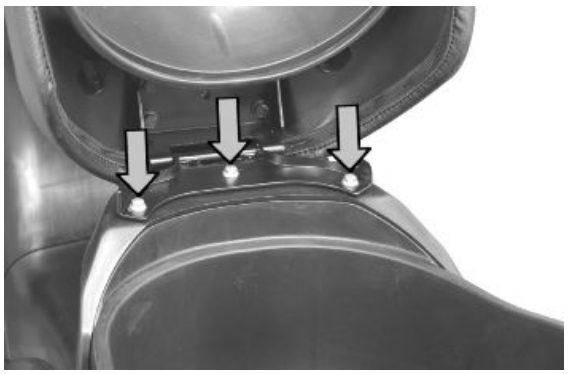
Locking torques (N*m)

Bleed screw: 3

INDEX OF TOPICS

Seat

- Lift the saddle and undo the three screws indicated.

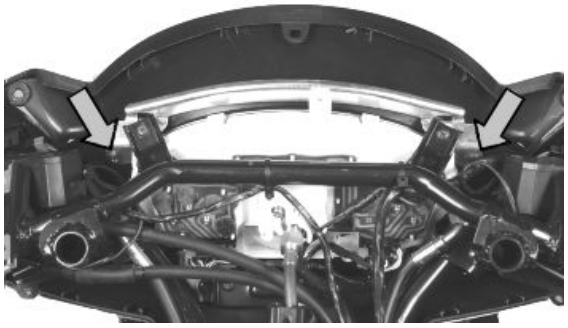


Driving mirrors

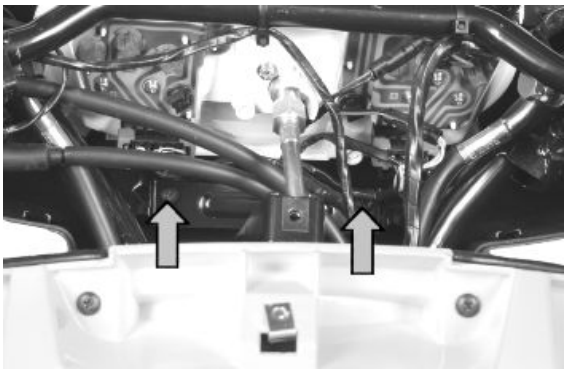
- Unscrew the lock-nut and slide off the rear-view mirror stem.

Rear handlebar cover

- Remove the front handlebar cover.
- Undo the two screws indicated.



- Undo the two screws and disconnect the connections of the electrical controls .

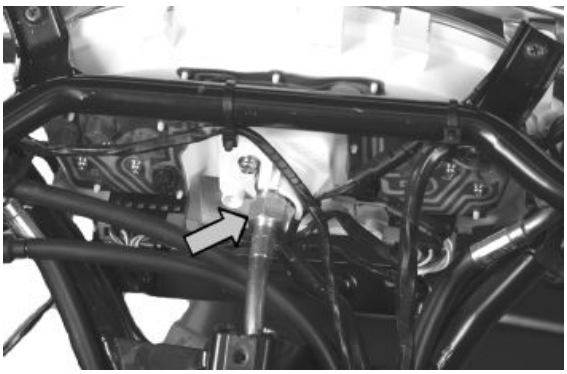


See also

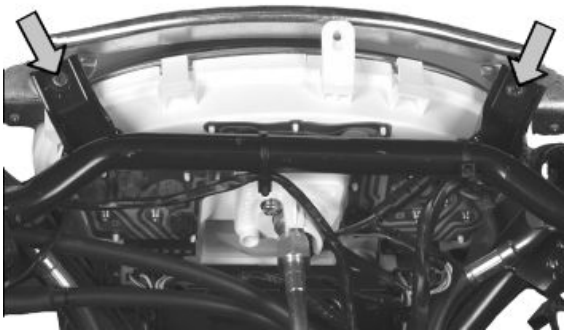
Front handlebar cover

Instrument panel

- Remove the rear handlebar cover.
- Disconnect the odometer transmission cable.



- Undo the two screws indicated.



- Undo the two screws indicated and disconnect the connectors.

See also

Rear handlebar cover

Front handlebar cover

- Remove the windshield and the front central cover.
- Undo the screw indicated from both sides of the vehicle.

- Undo the screw indicated and remove the front handlebar cover.

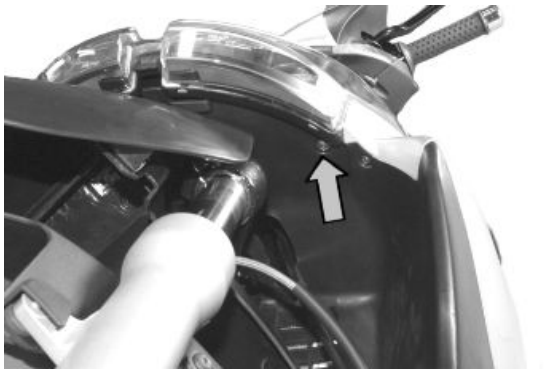
See also

Front central cover
Flyscreen

Headlight assy.

- Remove the front central cover.
- Undo the three screws indicated.

- Undo the screw indicated in the front wheel housing on both sides.
- Disconnect the connectors from the low-beam, high-beam and turn indicators bulbs.
- Slide off the tail light rubber bulb holders.

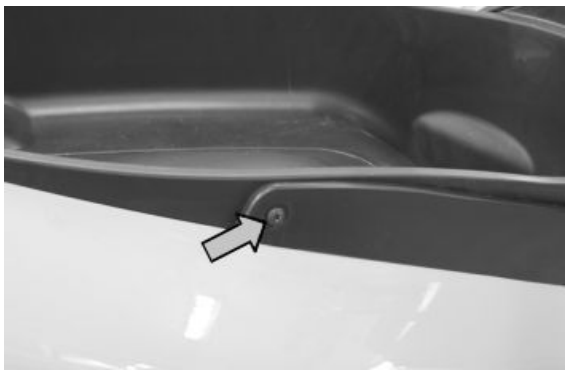


See also

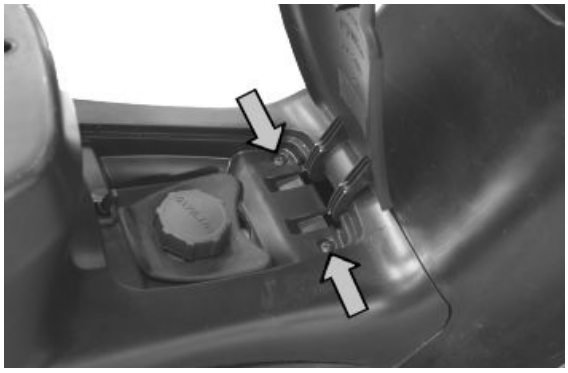
Front central cover

Frame central cover

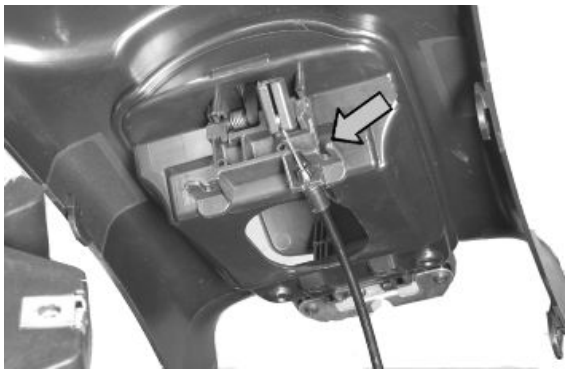
- Remove the saddle.
- Undo and remove the screw indicated from both sides of the vehicle and free the retainers.



- Unscrew the fuel tank cap.
- Undo the two screws indicated.



- Free the central cover from its retainers.
- Disconnect the fuel tank cap opening transmission.

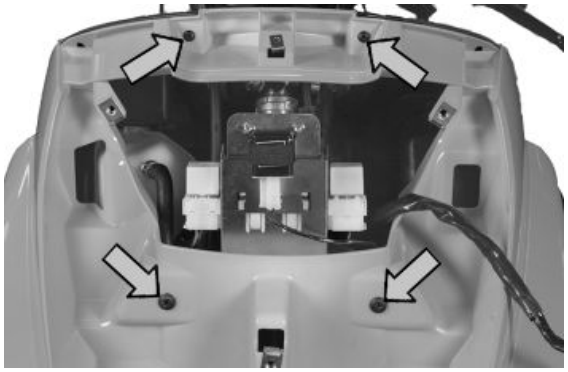


See also

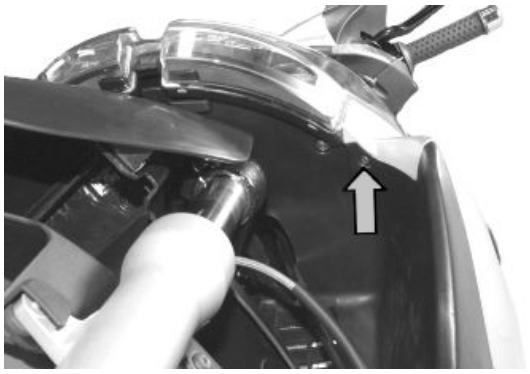
Seat

Legshield

- Remove the shield back plate.
- Remove the headlight assembly.
- Undo the four screws indicated.



- Undo the screw indicated in the front wheel housing on both sides.



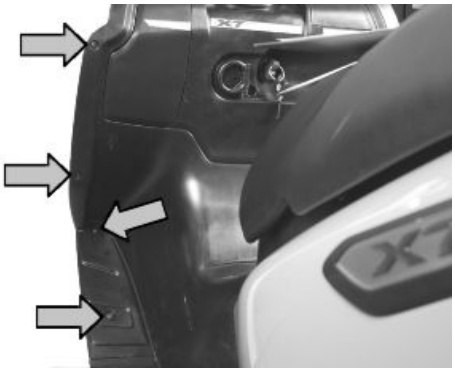
- Undo the two screws indicated on both sides of the vehicle.

See also

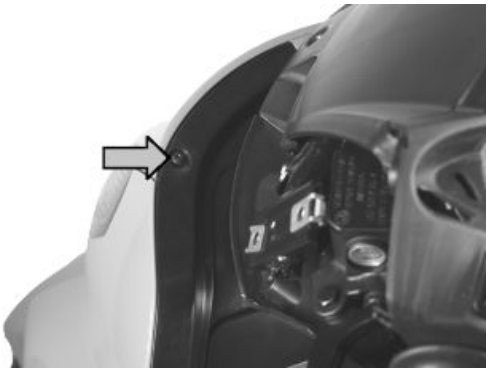
Knee-guard
Headlight assy.

Knee-guard

- Remove the footrest.
- Undo the four screws on both sides.

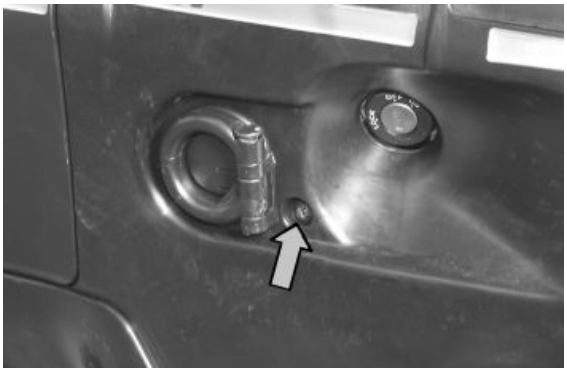


- Undo the screw indicated on both sides of the vehicle.



- Undo the screw indicated.
- Remove the lid and unscrew the expansion tank cap.

- Undo the screw indicated.



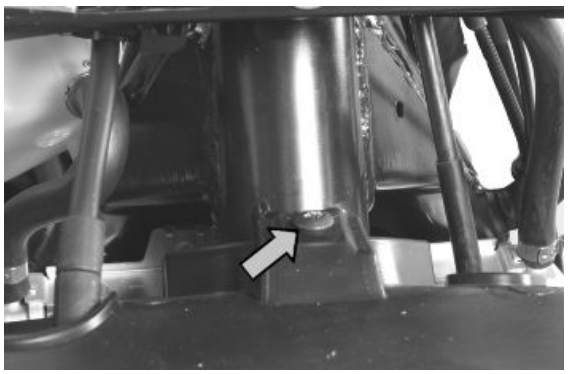
- Undo the screw indicated on both sides of the vehicle.

See also

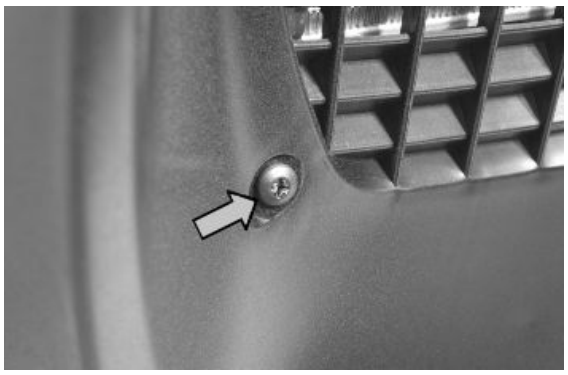
Footrest

Front wheel housing

- Remove the front shield.
- Remove the fork
- Undo the screw indicated.



- Undo the screw indicated from both sides of the vehicle.

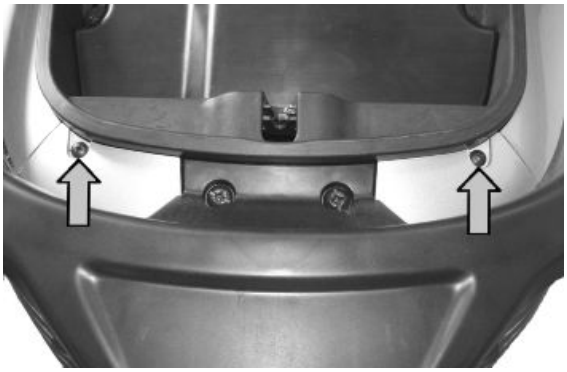


See also

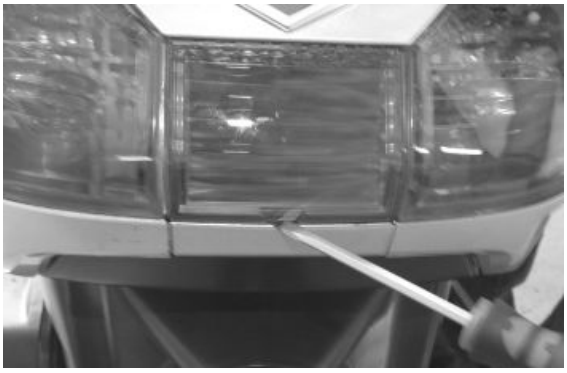
Legshield

Taillight assy.

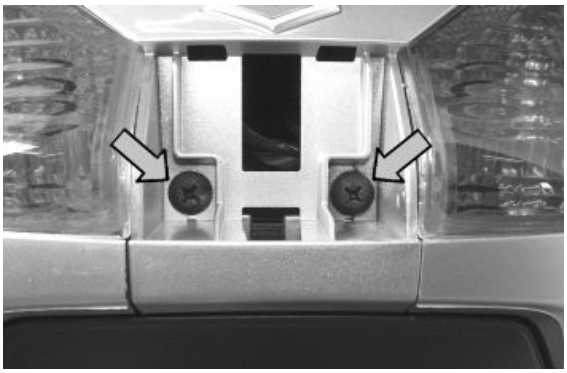
- Undo the two screws indicated.



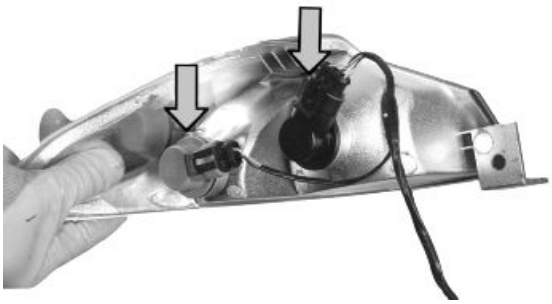
- With the aid of a flat screwdriver, remove the cover indicated.



- Undo the two screws indicated.

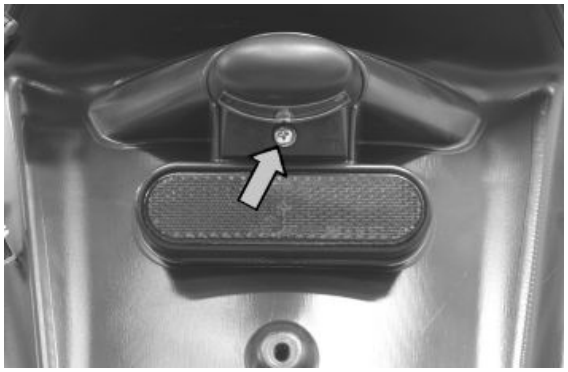


- Extract the light units and disconnect the bulb connectors.



License plate light

- Undo the screw indicated and slide off the rubber bulb holder.



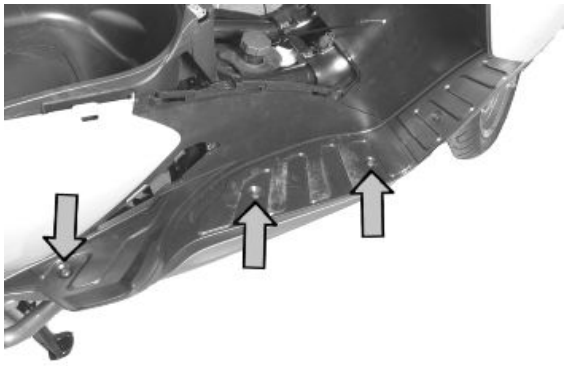
- Remove the rear light unit and disconnect the electrical connection indicated.

See also

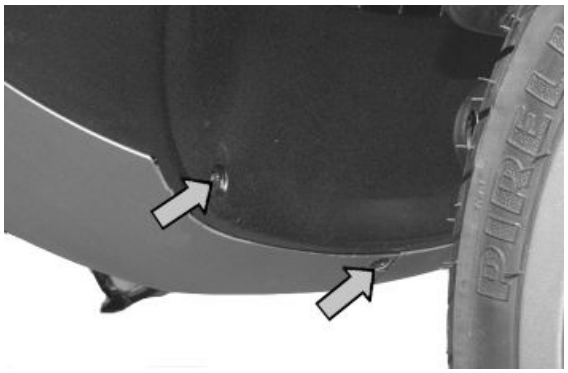
Taillight assy.

Footrest

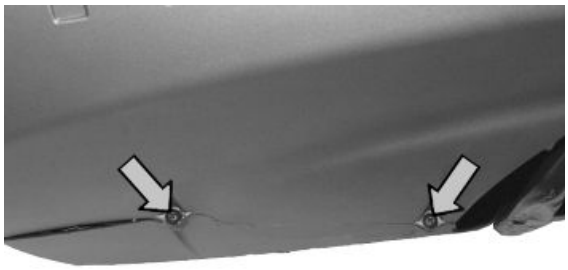
- Remove the side fairing.
- Undo the three screws indicated.



- Remove the two screws indicated in the front wheel housing.



- Undo the two screws indicated.



See also

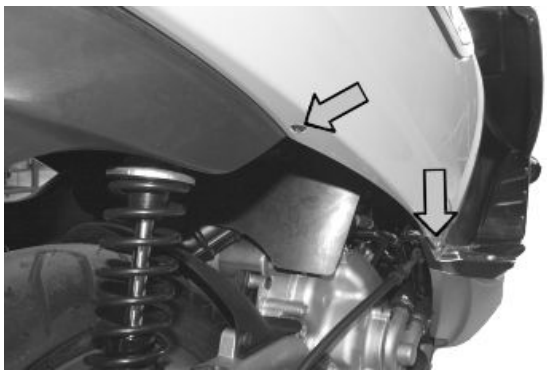
Side fairings

Side fairings

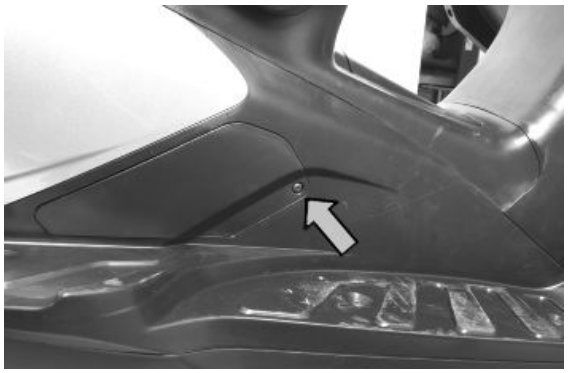
- Remove the central frame cover.
- Remove the rear light assembly.
- Undo the screw indicated.

- Undo the four screws indicated and remove the passenger grab handles.

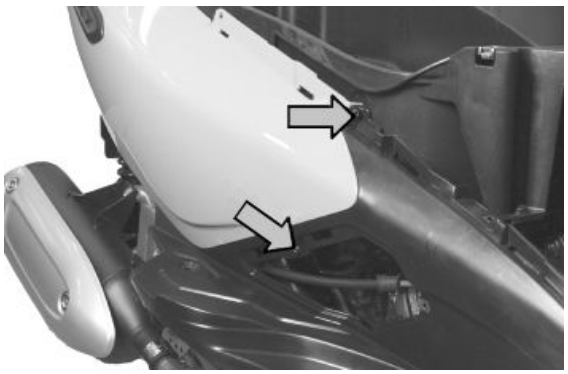
- Undo the two screws indicated.



- Undo the screw indicated and remove the inspection door.



- Undo the two screws indicated.

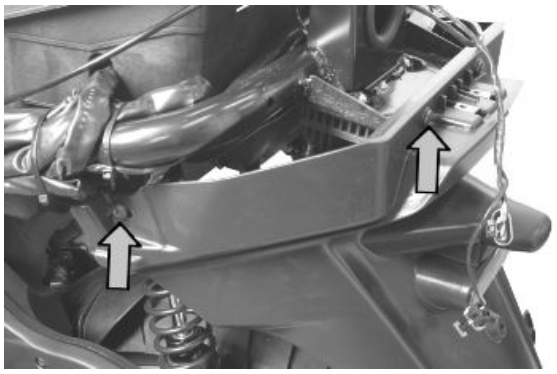


See also

Frame central cover
Taillight assy.

License plate holder

- Remove the side fairings.
- Undo the two screws indicated on both sides of the vehicle.
- Disconnect the license plate light connection.

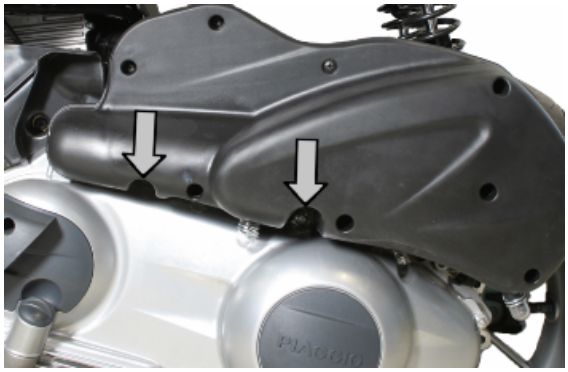


See also

Side fairings

Air filter

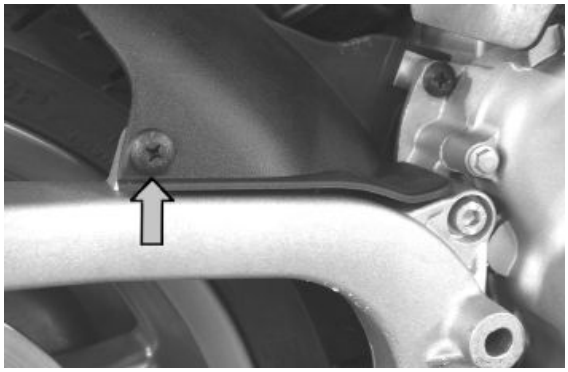
- Undo the two screws indicated.



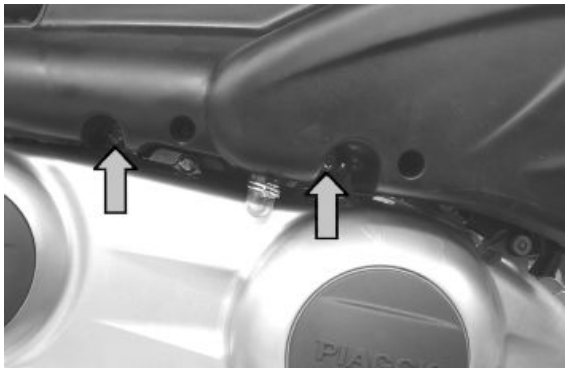
- Loosen the tightening screw of the carburettor sleeve to the filter.

Rear mudguard

- From the right side of the vehicle, undo the screw indicated.



- Undo the two screws indicated from the right side and collect the washers.
- Remove the rear mudguard.



Helmet bay

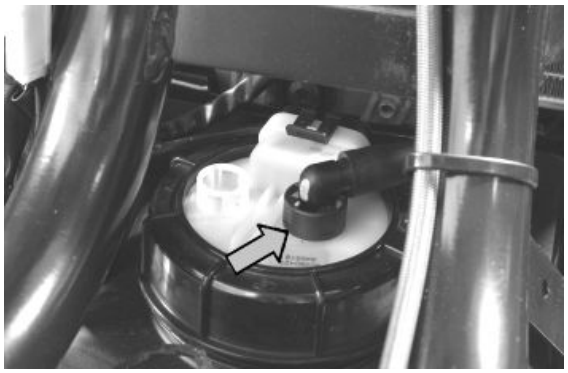
- Remove the central frame cover.
- Remove the side fairings.
- Undo the three screws indicated on both sides of the vehicle.
- Release the wiring from the helmet compartment.

See also

Side fairings
Frame central cover

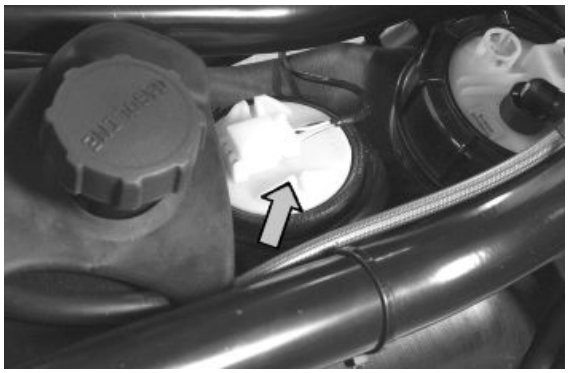
Fuel tank

- Remove the footrests.
- Disconnect the fuel delivery pipe.



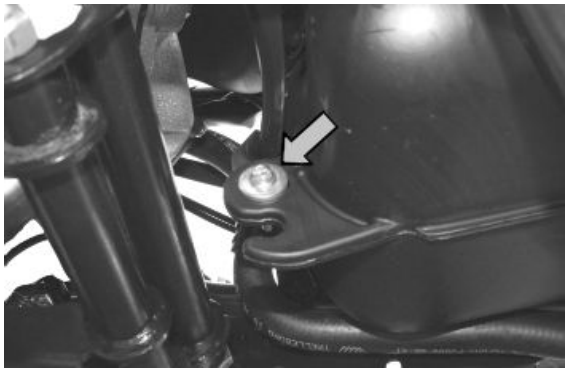
- Disconnect the power connector from the fuel pump.

- Disconnect the connector of the probe checking fuel level.

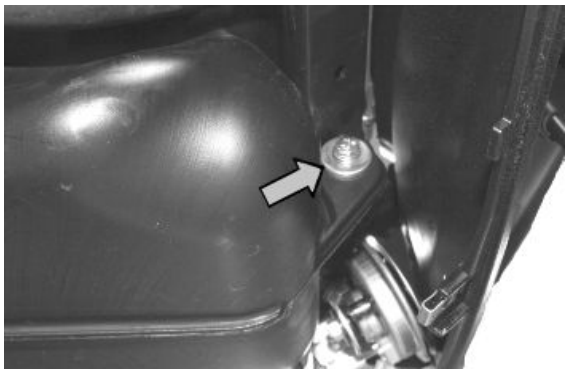


- Undo the screw indicated.

- Undo the screw indicated, placed under the vehicle at the back of the tank.



- Undo the screw indicated, placed under the vehicle at the front of the tank.



See also

Footrest

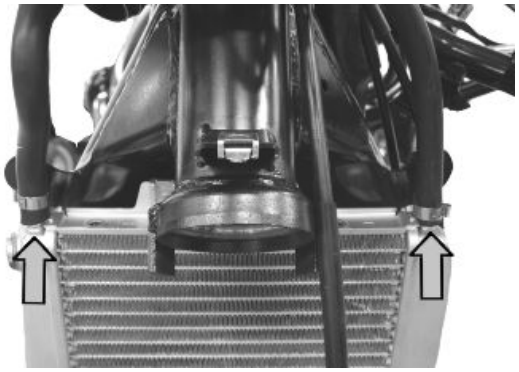
Front mudguard

- Undo the three screws indicated inside the mudguard.

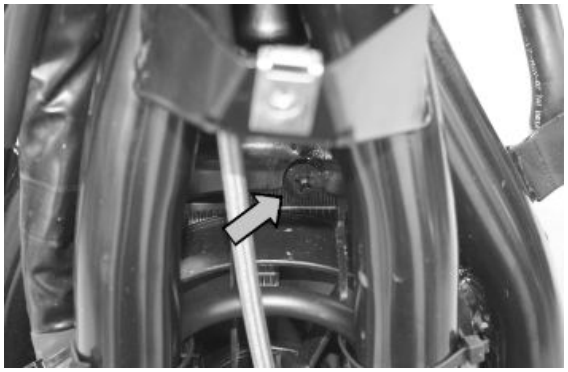
Radiator fan

- Remove the wheel housing.
- Disconnect the connector of the electric fan.
- Get a container of suitable capacity and disconnect the feeding and return cooling circuit pipes.

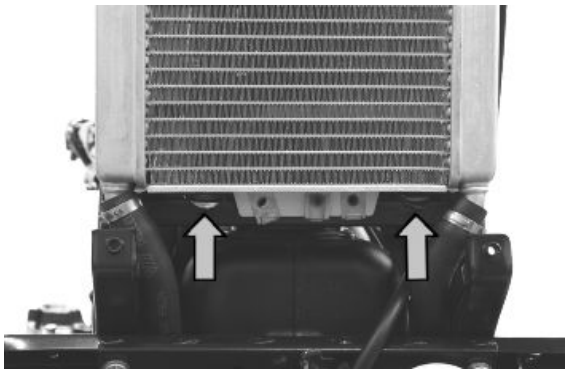
- Disconnect the feeding and return pipes from the expansion tank.



- Undo the fixing screw to the frame.



- Disconnect the radiator together with the electric fan from the chassis retainers.
- Once the radiator is removed, undo the three fixing screws to remove the electric fan.



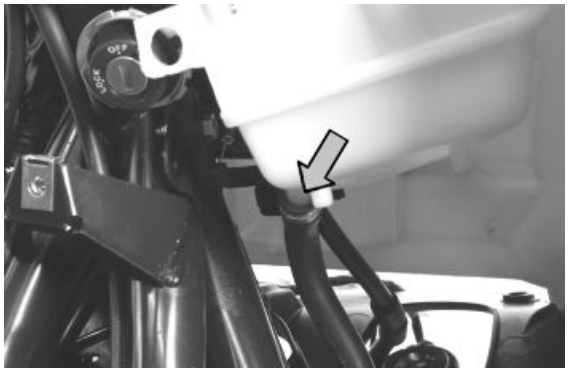
See also

Front wheel housing

Expansion tank

- Remove the shield back plate.
- Disconnect the circuit de-aeration pipe.

- Disconnect the circuit refill pipe.

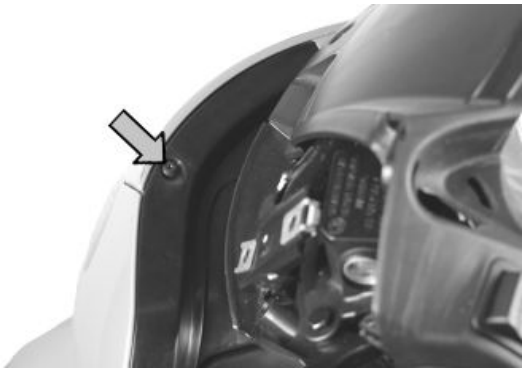


See also

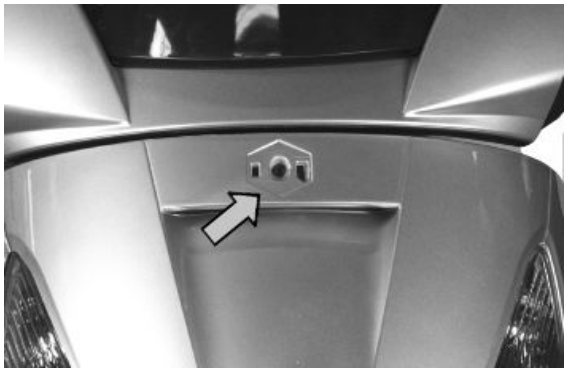
Knee-guard

Front central cover

- Undo the screw indicated from both sides of the vehicle.



- Remove the PIAGGIO clip-on badge and undo the screw indicated.



Flyscreen

- Remove both rear-view mirrors.
- Undo both rear-view mirrors supports.

- Undo the screws indicated on both sides of the handlebar and remove the front frame.

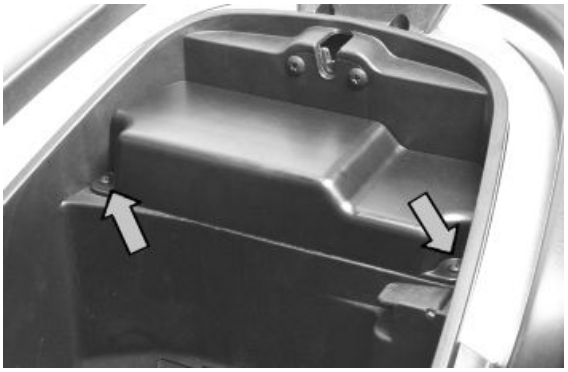
- Undo the four screws indicated and remove the windshield.

See also

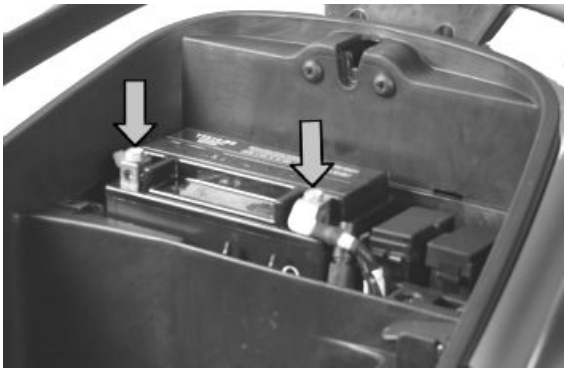
Driving mirrors

Battery

- Lift the saddle
- Undo the two screws and remove the battery cover.



- Unscrew the two terminals and remove the battery.



INDEX OF TOPICS

Carry out the listed tests before delivering the vehicle.

Warning- be very careful when handling fuel.

Aesthetic inspection

Appearance checks:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

- Check visually that the following clamps are marked in yellow:

FRONT SUSPENSION

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

FRONT BRAKE

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

REAR SUSPENSION

- Shock absorbers lower fixing screw
- Shock absorbers upper fixing screw

REAR BRAKE

- Screws fixing rear brake calliper to supporting plate
- Brake pipe to rear brake calliper coupling

SWINGING ARM

- Swinging arm to engine pin locknut

STAND

- Central stand bolt nuts
- Screw fixing muffler to muffler supporting arm

Electrical system

• Battery

• Main switch

• Lights: high beams, low beams, side/taillights (front and rear) and relevant warning lights

- Regulating the headlights according to the regulations currently in force

• Front and rear stop light buttons and bulb

• Turn indicators and their warning lights

• Instrument lighting

• instruments: fuel and temperature indicator

•Instrument panel lights

• Horn

• electric start up

• Engine stopping with emergency stop switch

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 THE LIFE OF THE BATTERY.

CAUTION

WHEN INSTALLING THE BATTERY, ATTACH THE POSITIVE LEAD FIRST AND THEN THE NEGATIVE LEAD.
- 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.
THE BATTERIES PRODUCE EXPLOSIVE GAS; KEEP THEM AWAY FROM NAKED FLAMES, SPARKS AND CIGARETTES. VENTILATE THE AREA WHEN RECHARGING INDOORS.
ALWAYS WEAR EYE PROTECTION WHEN WORKING IN THE PROXIMITY OF BATTERIES.
KEEP OUT OF THE REACH OF CHILDREN

CAUTION

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

Levels check

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:

Braking system (hydraulic)

- Lever travel

Braking system (mechanical)

- Lever travel

Clutch

- Proper functioning check

Engine

- Throttle travel check

Others

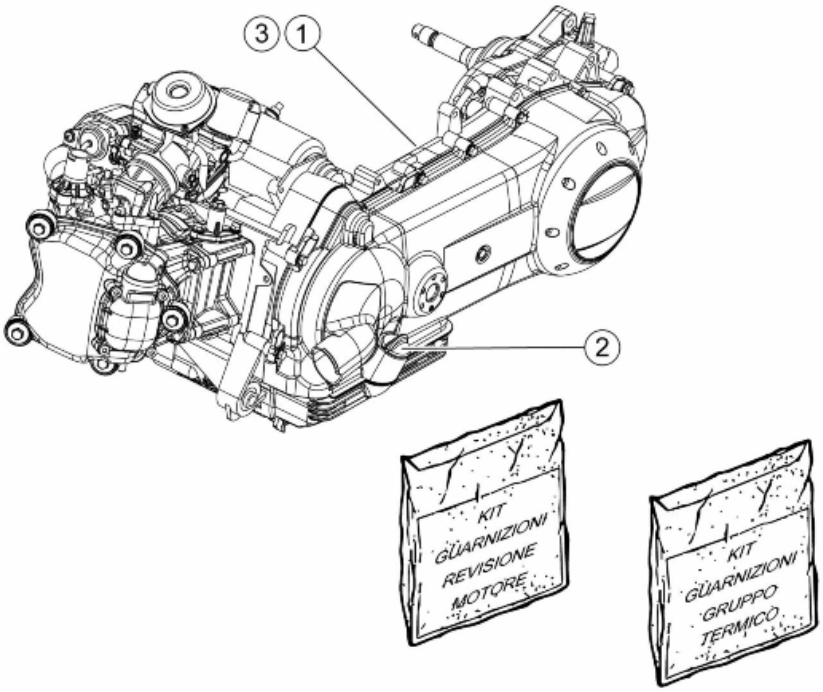
- Check documentation
- Check the frame and engine numbers
- Tool kit
- License plate fitting
- Check locks
- Check tyre pressures
- Installation of mirrors and any accessories

INDEX OF TOPICS

This section is devoted to the time necessary to carry out repairs.

For each operation, the description, code and time envisages are specified.

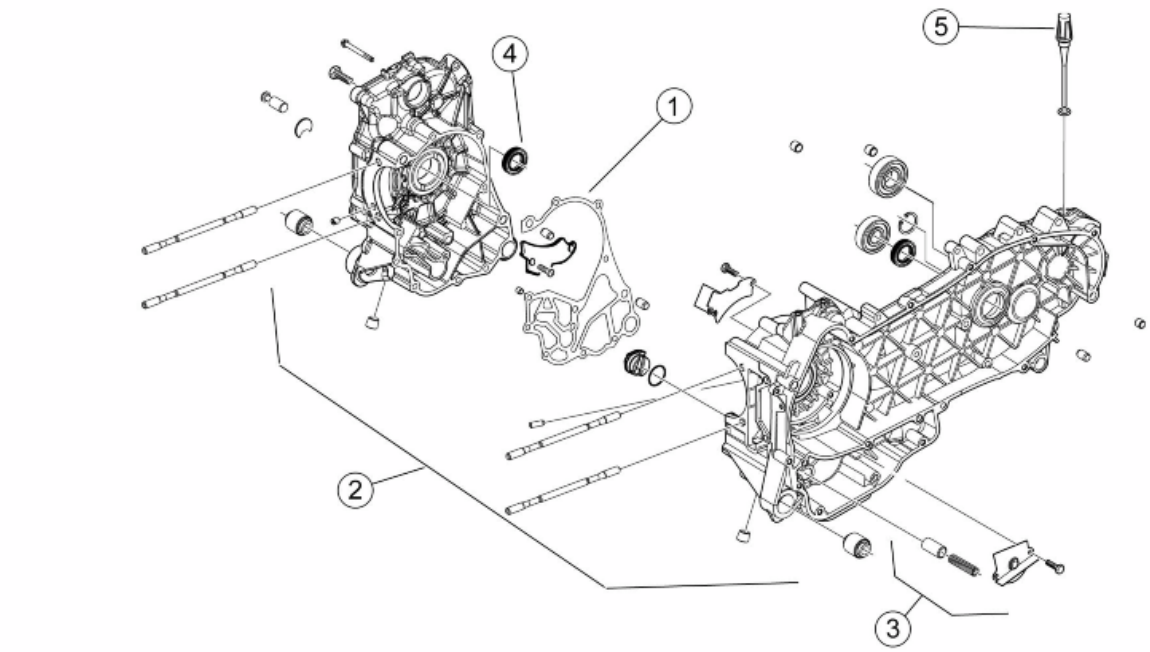
Engine



ENGINE

	Code	Action	Duration
1	001001	Engine - Replacement	
2	003064	Engine oil - Change	
3	001127	Engine - Complete service	

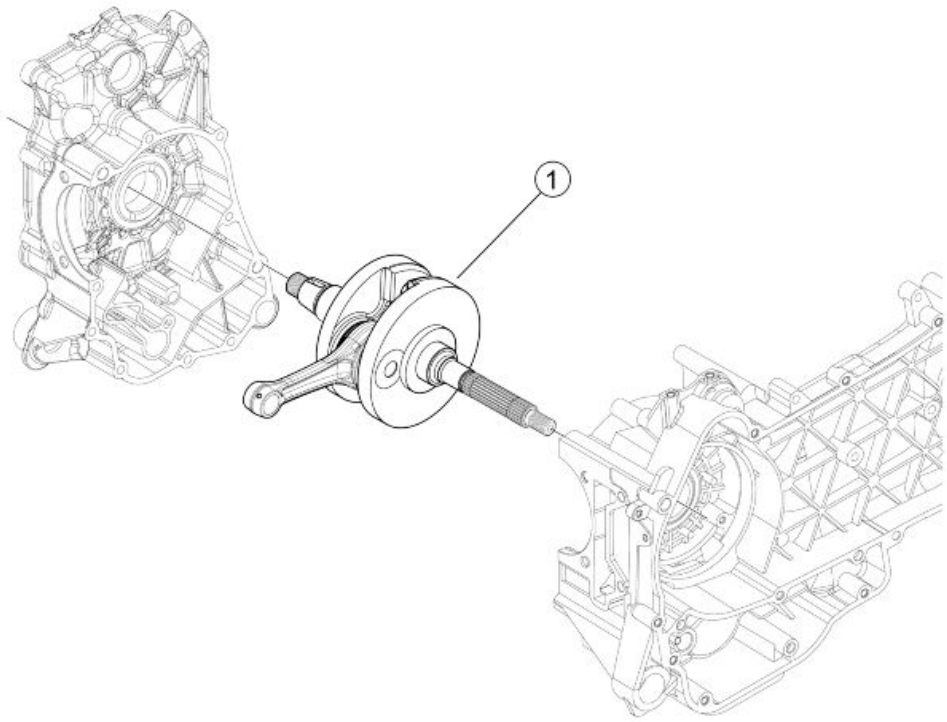
Crankcase



CRANKCASE

	Code	Action	Duration
1	001153	Crankcase halves gasket - Replacement	
2	001133	Engine crankcase- Replacement	
3	001124	Lubrication by-pass - Replacement	
4	001099	Oil seal, flywheel side - Replacement	
5	002028	Rear wheel hub - Replacement	

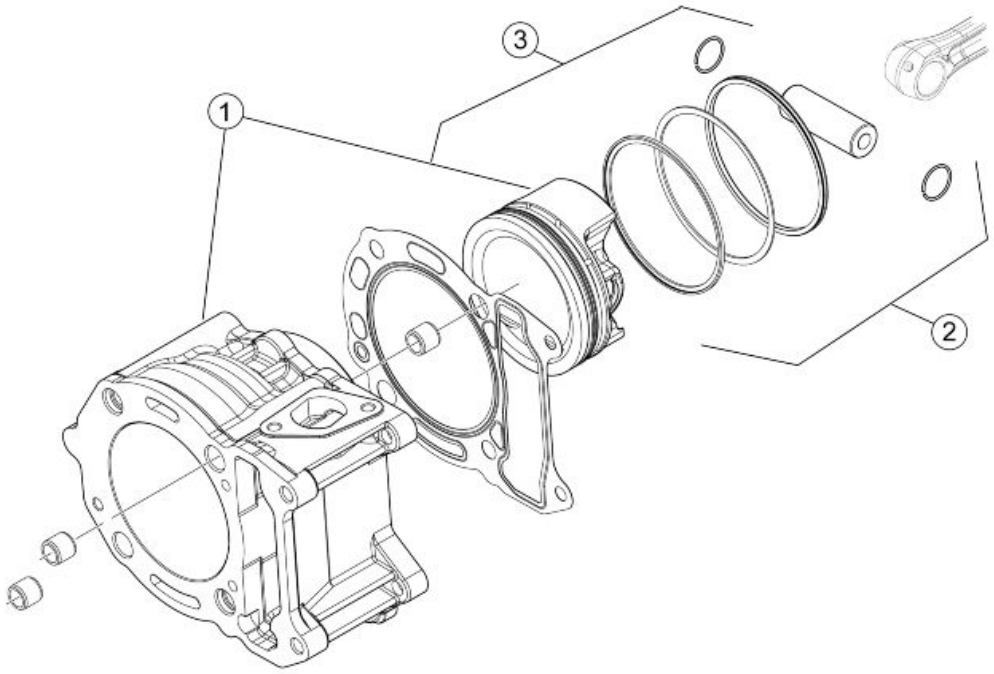
Crankshaft



CRANKSHAFT

	Code	Action	Duration
1	001117	Crankshaft - Replacement	

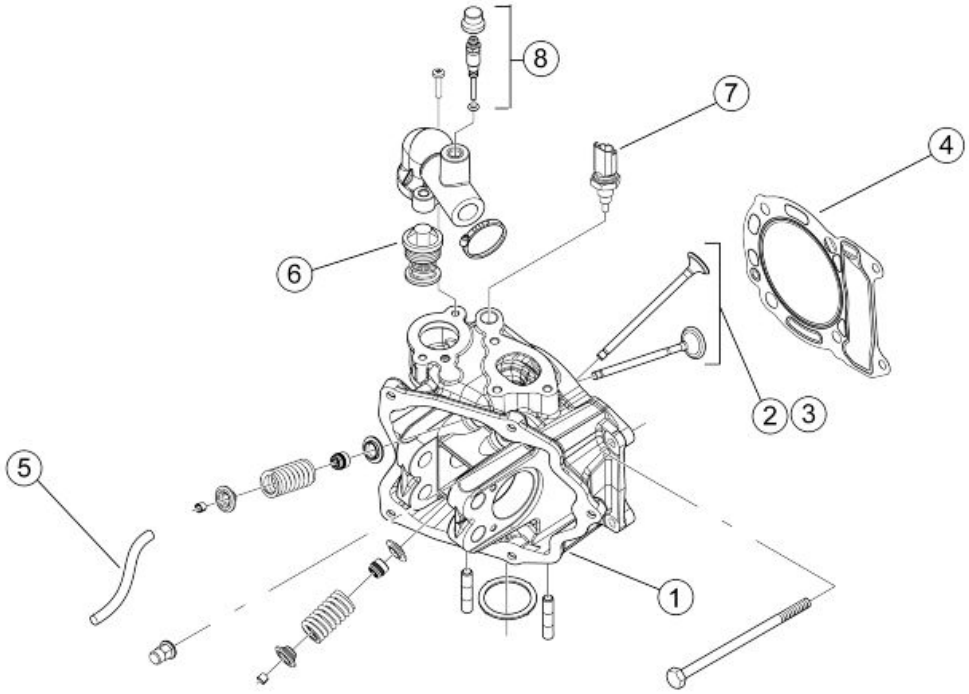
Cylinder assy.



CYLINDER UNIT - PISTON

	Code	Action	Duration
1	001002	Cylinder-Piston - Replacement	
2	001176	Rings / Pin - Replacement	
3	001154	Pin ring piston unit - Service	

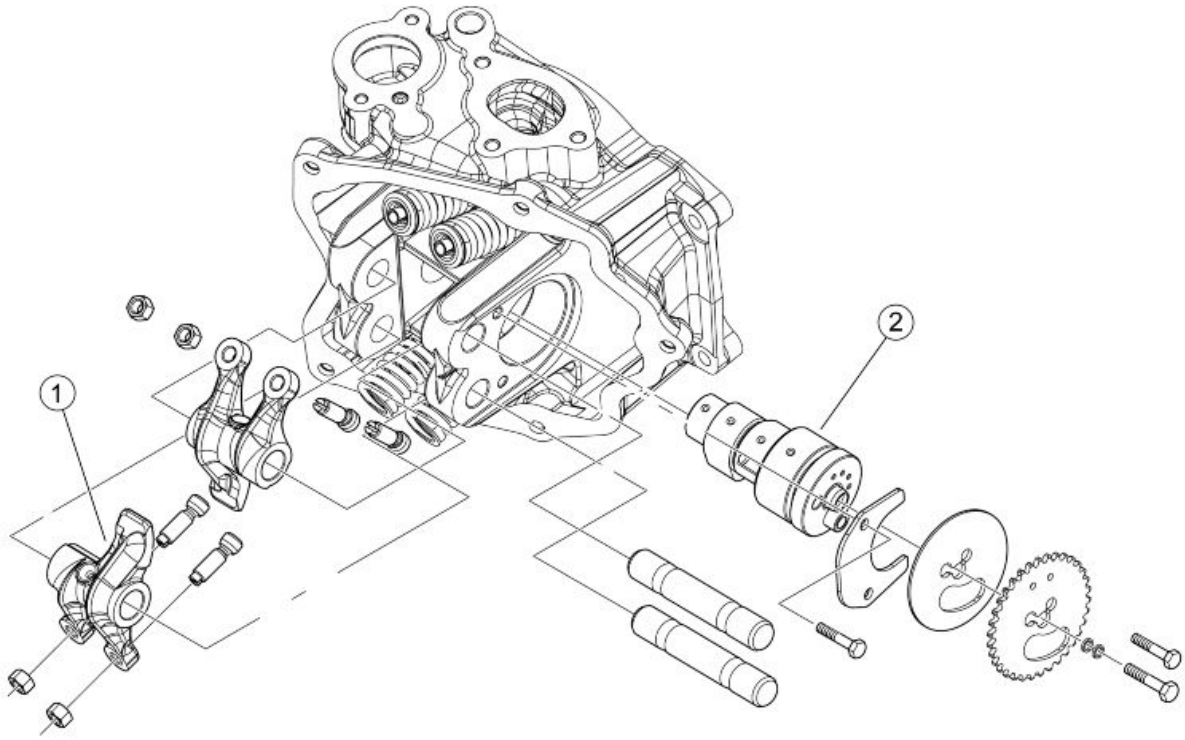
Cylinder head assy.



HEAD UNIT

	Code	Action	Duration
1	001126	Head - Replacement	
2	001045	Valves - Replacement	
3	001049	Valves - Adjustment	
4	001056	Head gasket - Replacement	
5	007009	Cylinder / pump rubber coupling - Replacement	
6	001057	Thermostat - Replacement	
7	001083	Thermistor - Replacement	
8	007012	Coolant bleed valve - Replacement	

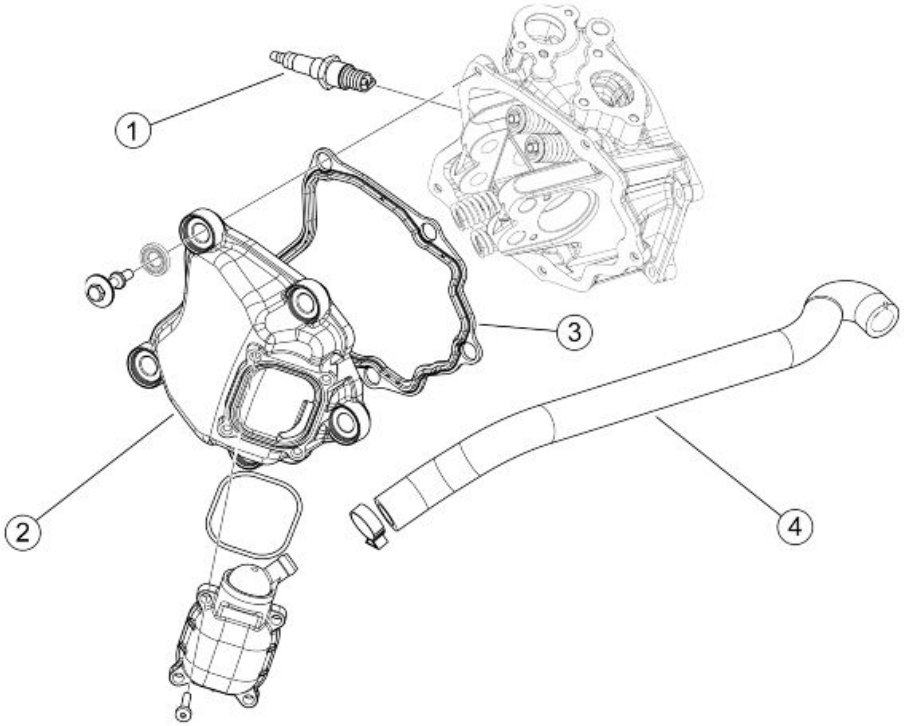
Rocker arms support assy.



GRUPPO SUPPORTO BILANCIERI

	Code	Action	Duration
1	001148	Rocking lever valve - Replacement	
2	001044	Camshaft - Replacement	

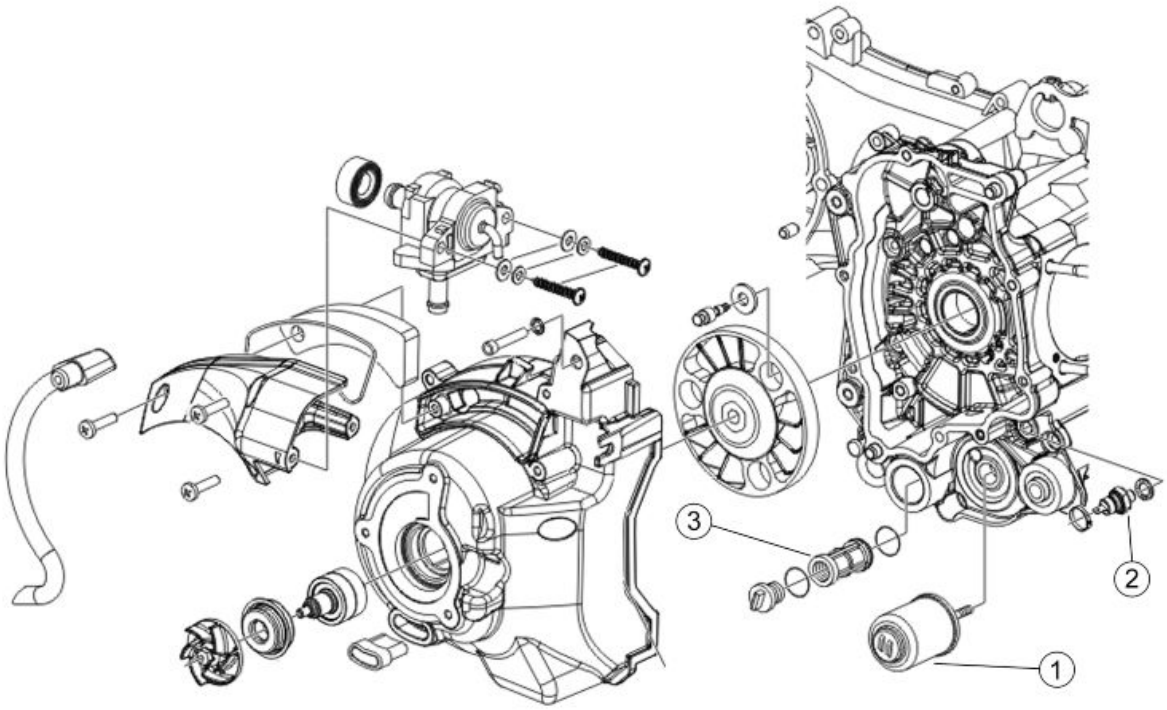
Cylinder head cover



HEAD COVER

	Code	Action	Duration
1	001093	Spark plug - Replacement	
2	001089	Head cover - Replacement	
3	001088	Head cover gasket - Replacement	
4	001074	Oil vapour recovery pipe - Replacement	

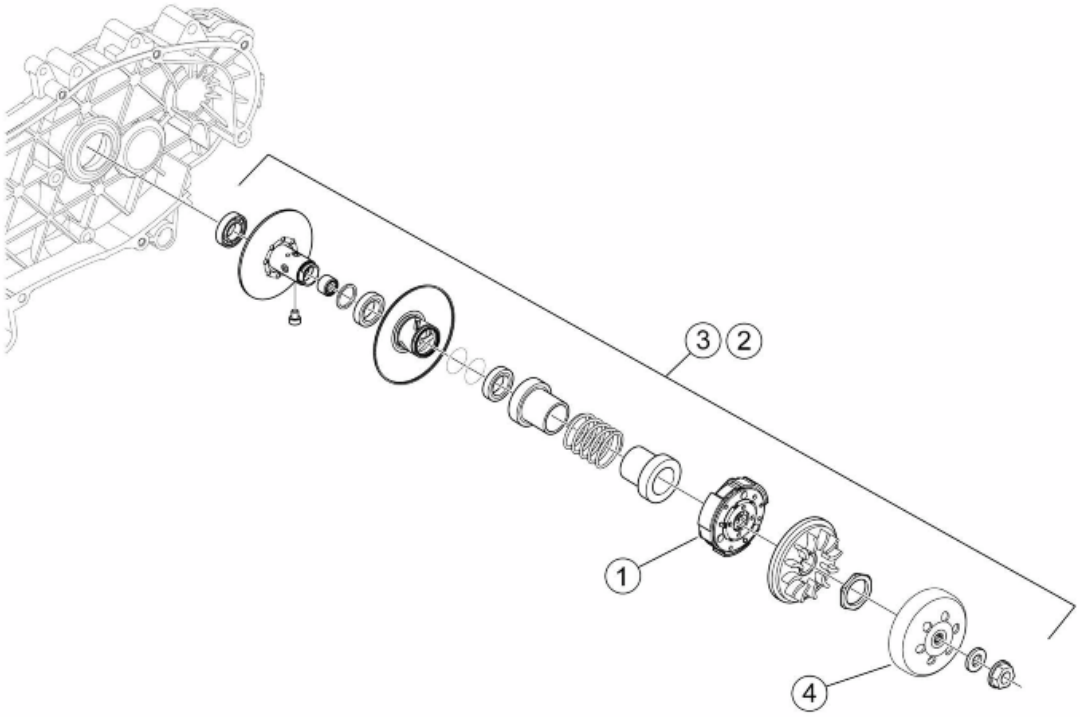
Oil filter



OIL FILTER

	Code	Action	Duration
1	001123	Oil filter -Replacement	
2	001160	Oil pressure sensor - Replacement	
3	001102	Oil mesh filter - Change / Cleaning	

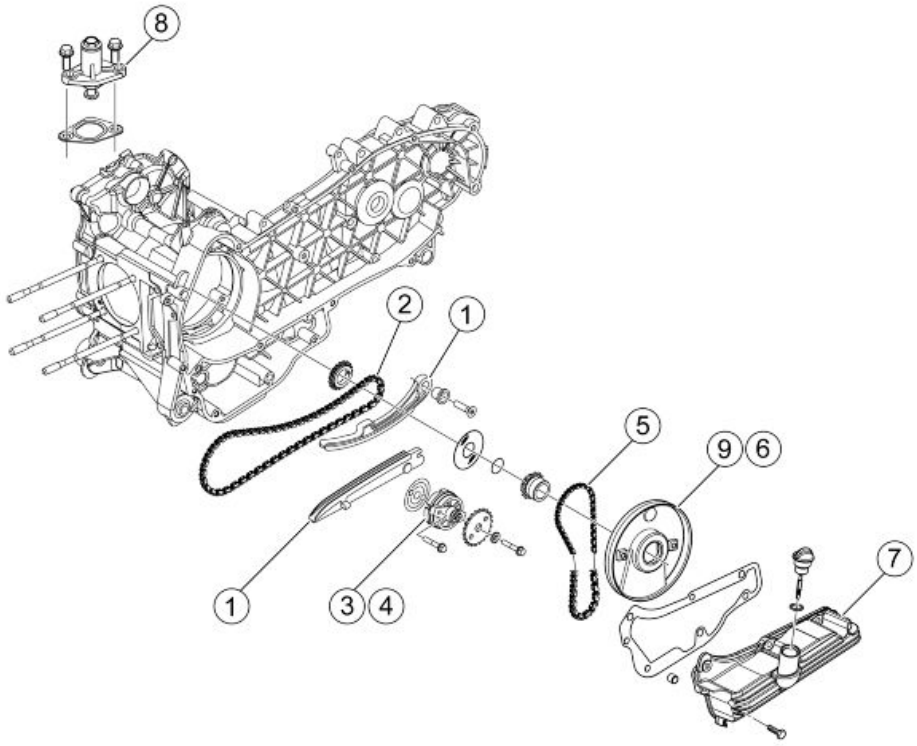
Driven pulley



DRIVEN PULLEY

	Code	Action	Duration
1	001022	Clutch - Replacement	
2	001012	Driven pulley - Service	
3	001110	Driven pulley - Replacement	
4	001155	Clutch bell - Replacement	

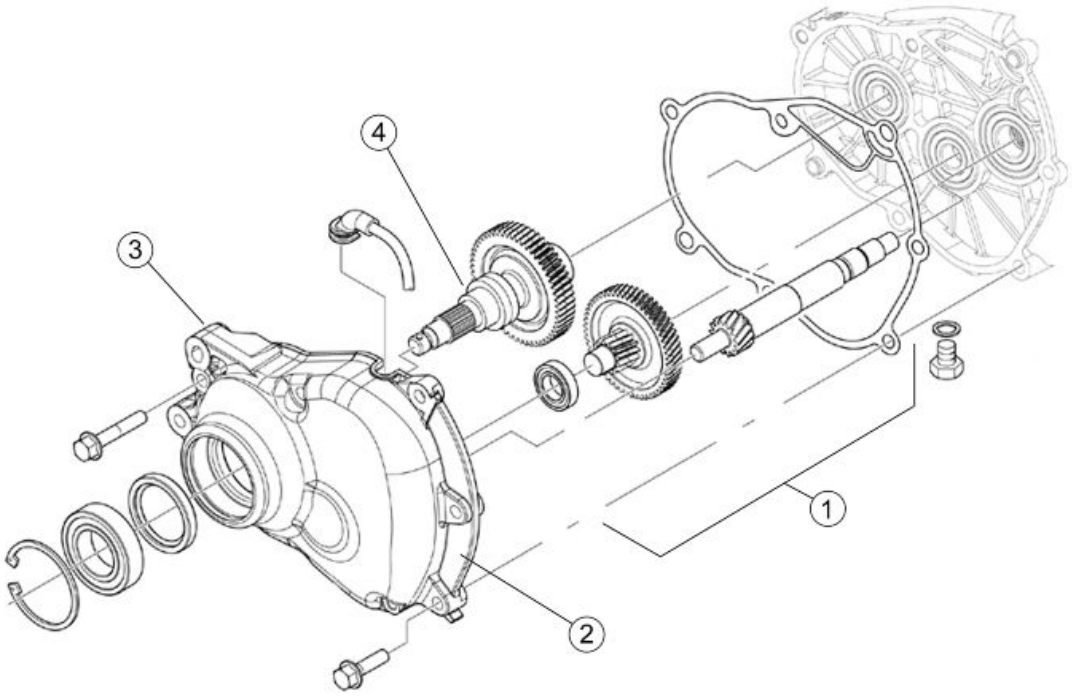
Oil pump



OIL PUMP

	Code	Action	Duration
1	001125	Chain guide pads - change	
2	001051	Belt - Distribution chain - Replacement	
3	001042	Oil pump - overhaul	
4	001112	Oil pump - change	
5	001122	Oil pump chain - Replacement	
6	001172	Chain cover flap - change	
7	001130	Oil sump - change	
8	001129	Chain tightener - Overhaul and replacement	
9	888133	Chain cover flap - Check / replacement	

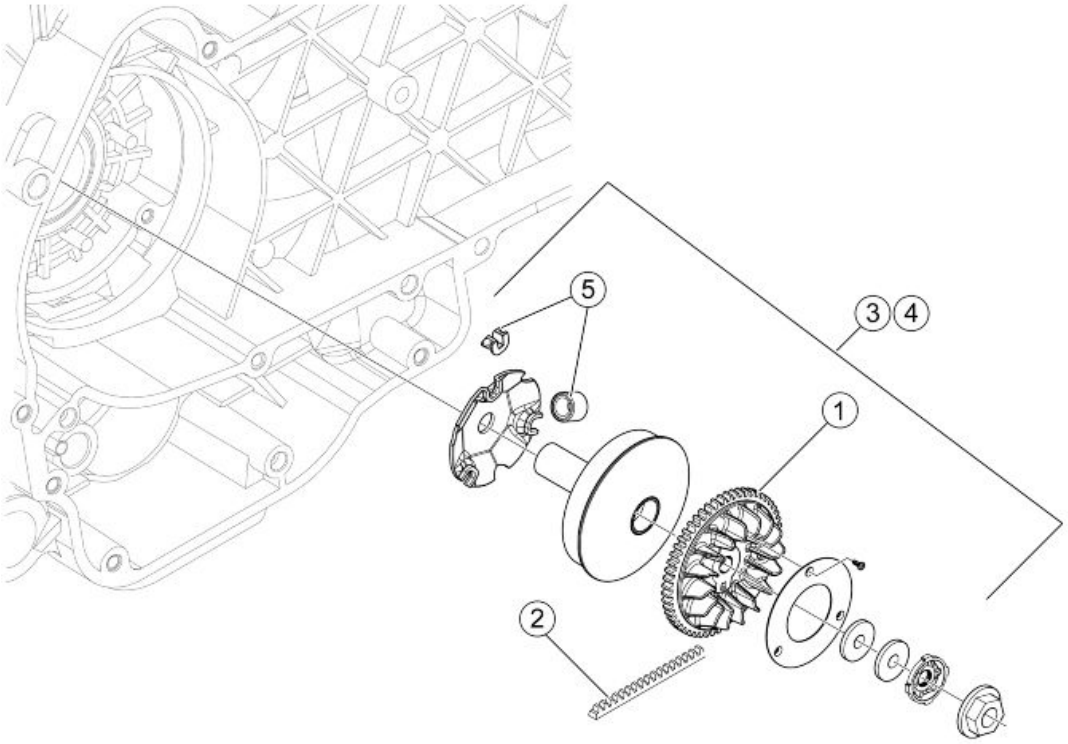
Final gear assy.



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	

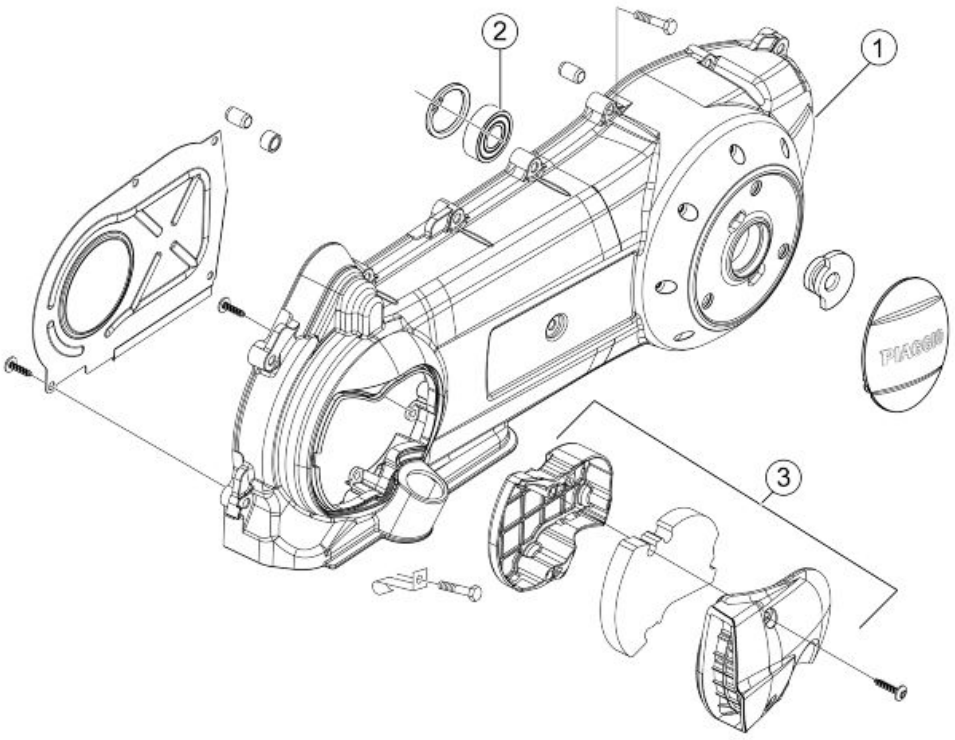
Driving pulley



DRIVING PULLEY REPAIR TIME

	Code	Action	Duration
1	001086	Driving half-pulley - Replacement	
2	001011	Driving belt - Replacement	
3	001006	driving pulley - Service	
4	001066	driving pulley - Replacement	
5	001177	Variator rollers / shoes - Replacement	

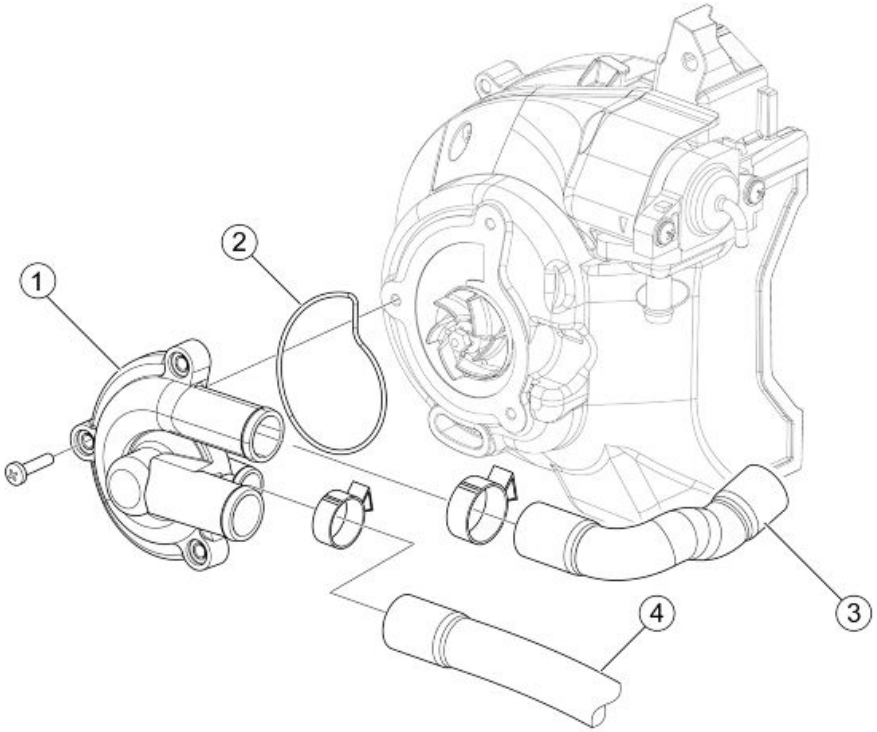
Transmission cover



TRANSMISSION COVER

	Code	Action	Duration
1	001096	Transmission crankcase cover - Replacement	
2	001135	Transmission cover bearing - Replacement	
3	001170	Air duct - Replacement	

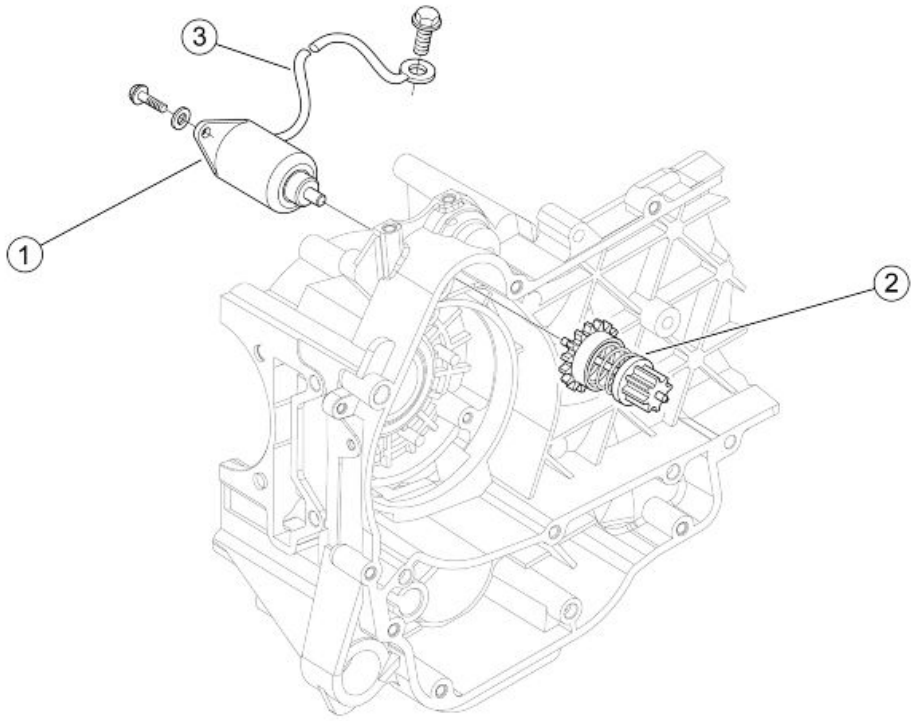
Water pump



WATER PUMP

	Code	Action	Duration
1	007017	Water pump cover - Replacement	
2	161011	Water pump and/or gasket - Replacement	
3	007008	Cylinder head outlet rubber coupling - Replacement	
4	007009	Head-pump by-pass rubber coupling - Replacement	

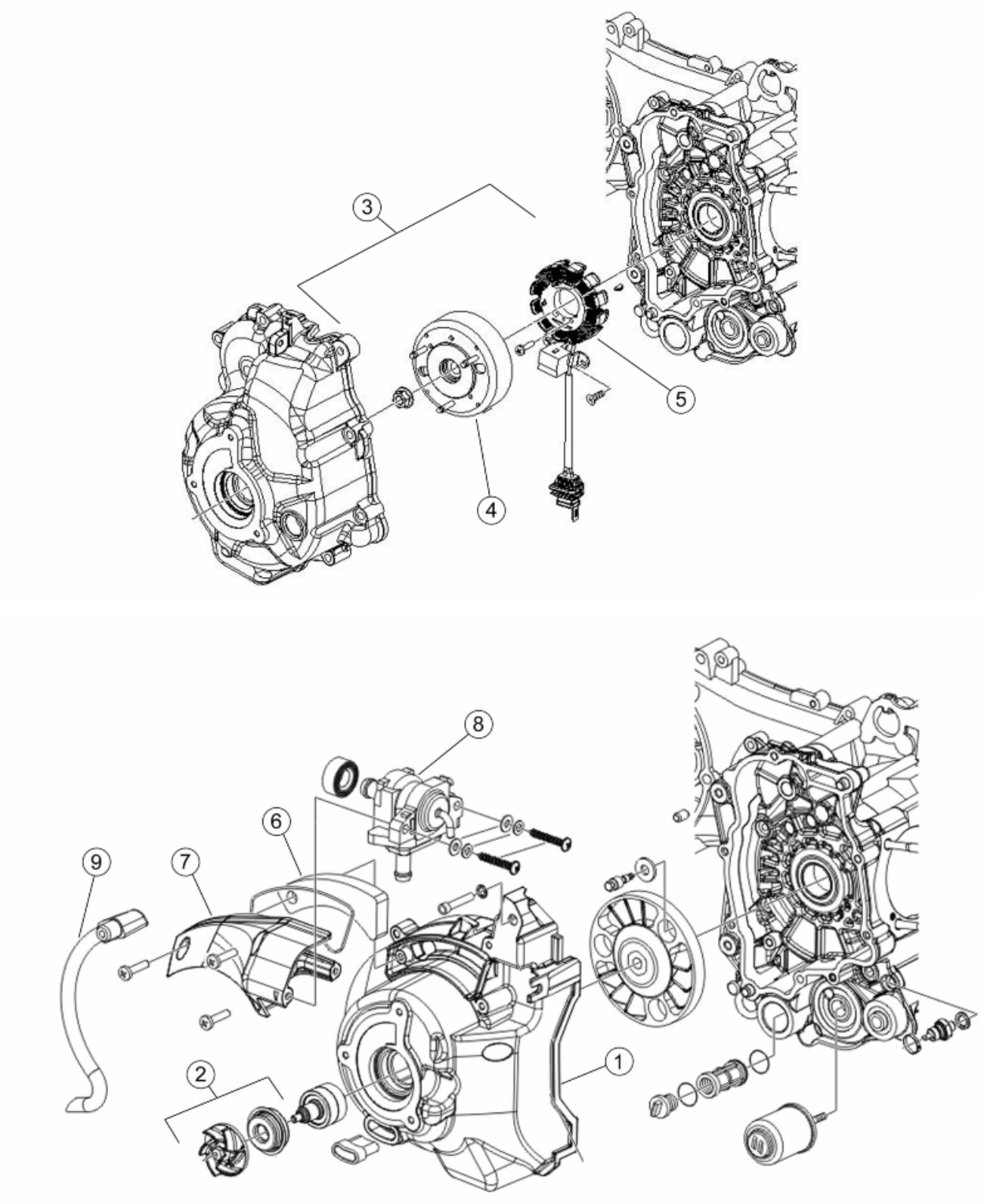
Starter motor



STARTER MOTOR

	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	001017	Start-up pinion - Replacement	
3	005045	Starter motor cable assembly - Replacement	

Flywheel magneto

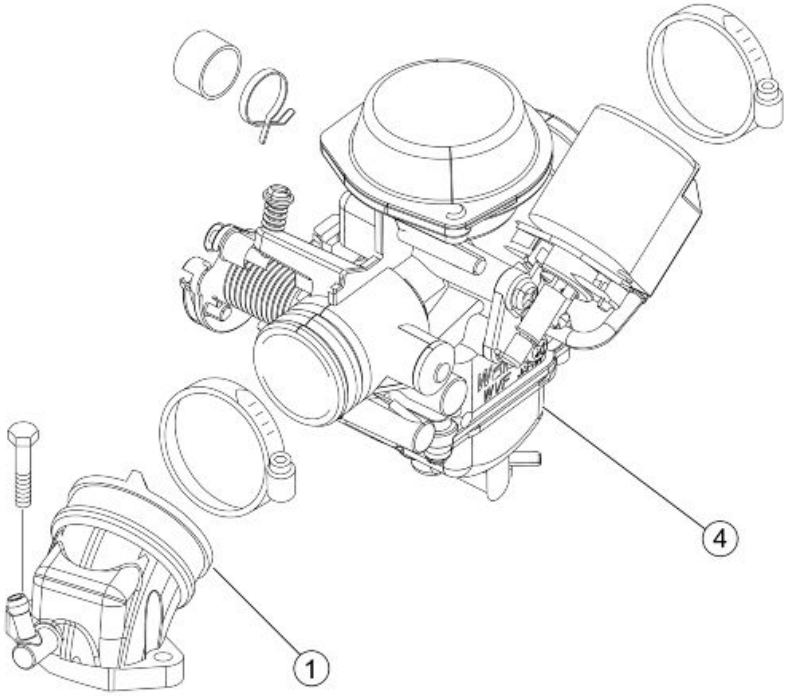


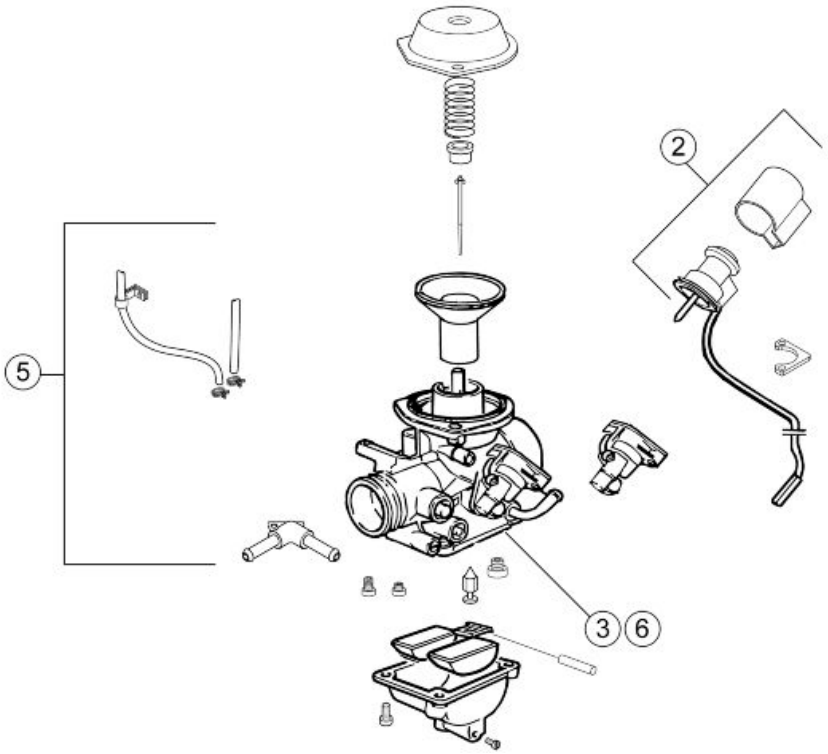
MAGNETO FLYWHEEL AND SECONDARY AIR

	Code	Action	Duration
1	001087	Flywheel cover - replace	

	Code	Action	Duration
2	001113	Water pump / Pump rotor - Replacement	
3	001058	Flywheel - Replacement	
4	001173	Rotor - Replacement	
5	001067	Stator - Replacement	
6	001161	Secondary air filter - Replacement / Cleaning	
7	001162	Secondary air housing - Replacement	
8	001174	SAS valve - Replacement	
9	001163	SAS valve / Head connection - Replacement	

Carburettor

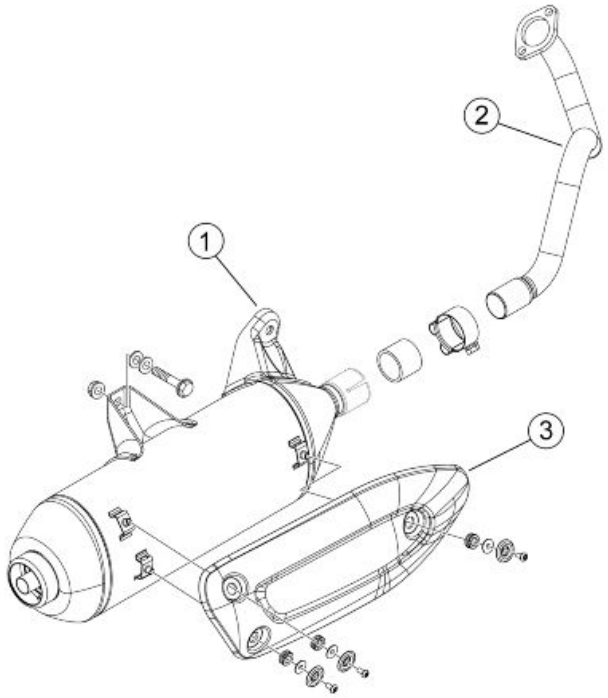




CARBURETTOR

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

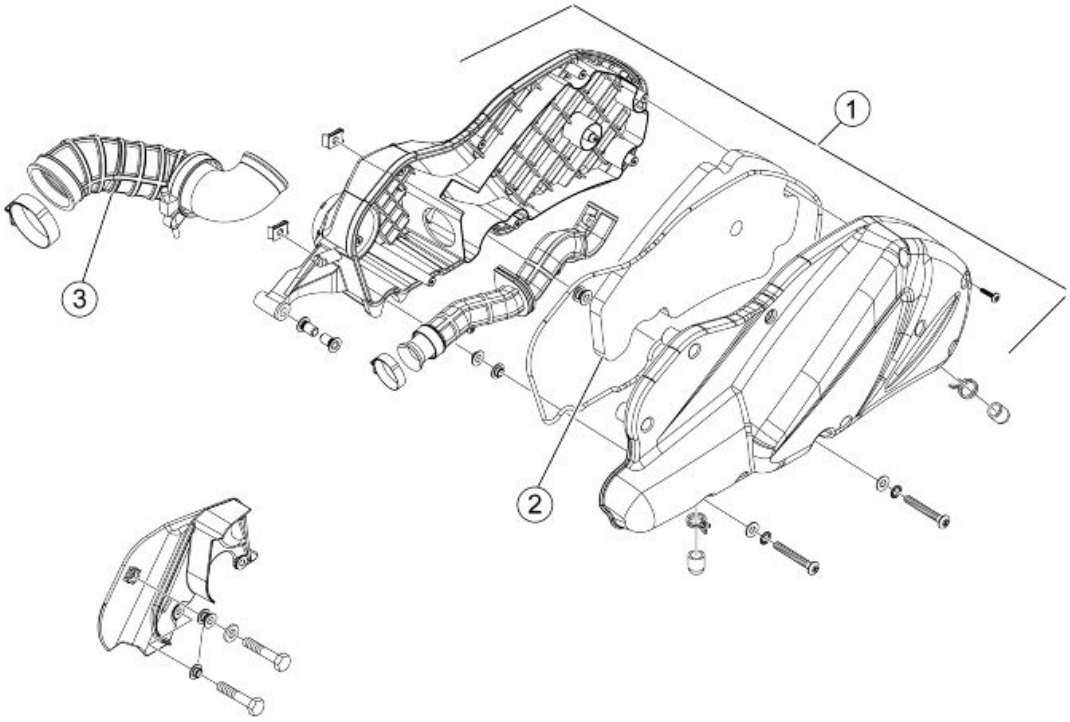
Exhaust pipe



MUFFLER

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

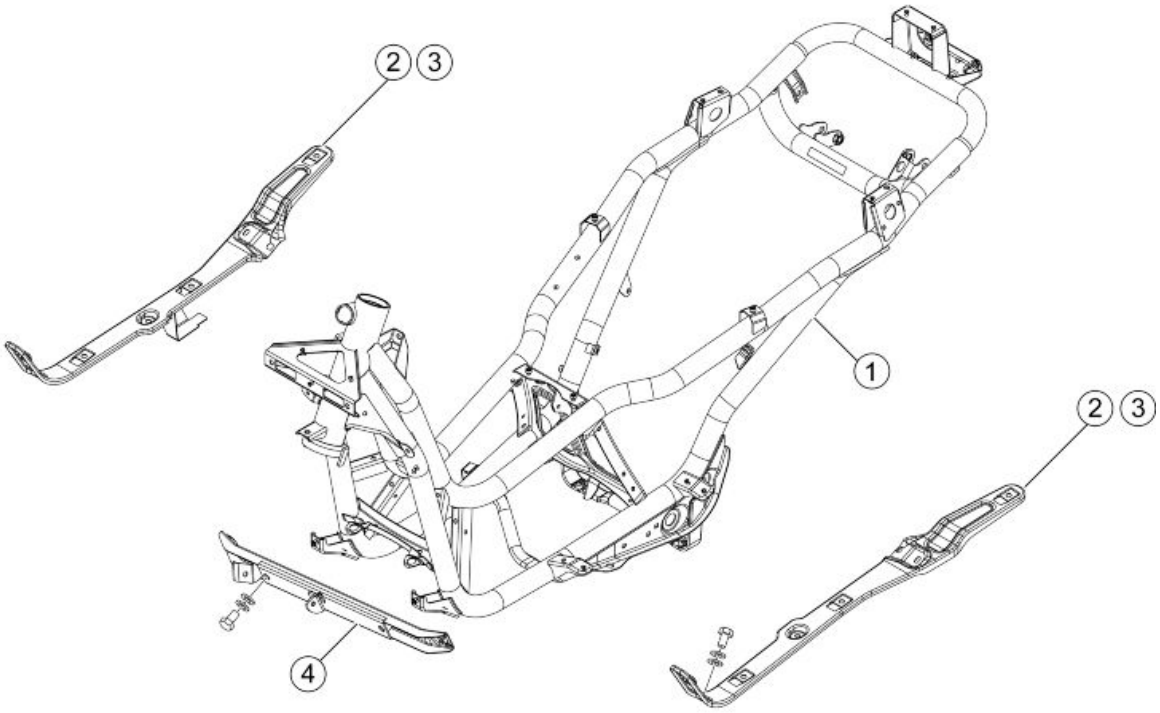
Air cleaner



AIR CLEANER

	Code	Action	Duration
1	001015	Air filter box - Replacement	
2	001014	Air filter - Replacement / cleaning	
3	004122	Air cleaner/ carburettor fitting - Replacement	

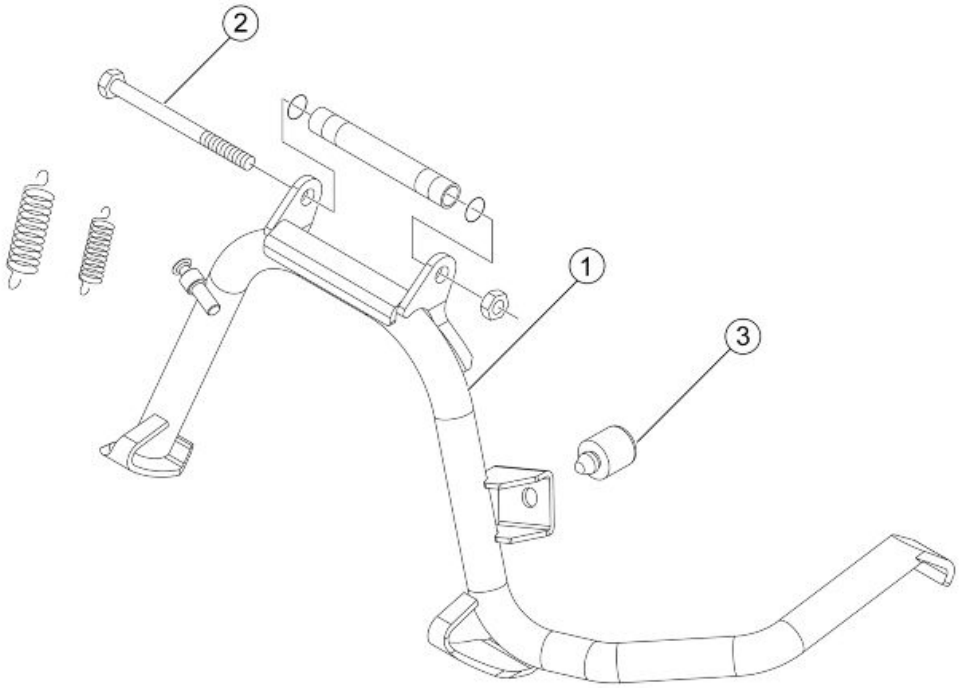
Frame



CHASSIS

	Code	Action	Duration
1	004001	Chassis - Replacement	
2	004147	Footrest support bracket, one side - Replacement	
3	004148	footrest support bracket, both sides - Replacement	
4	004146	Front frame - Replacement	

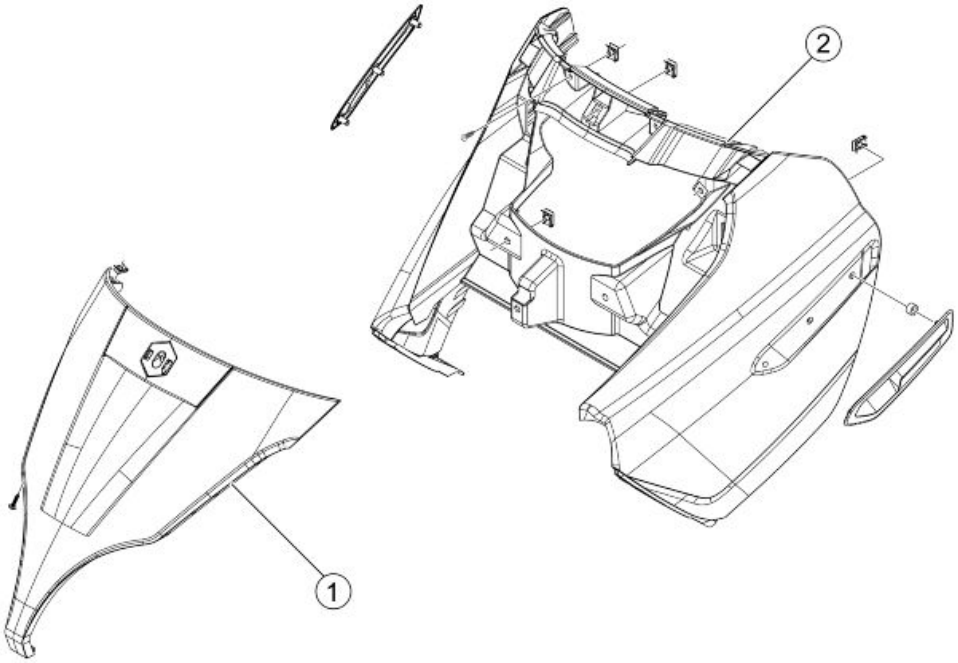
Centre-stand

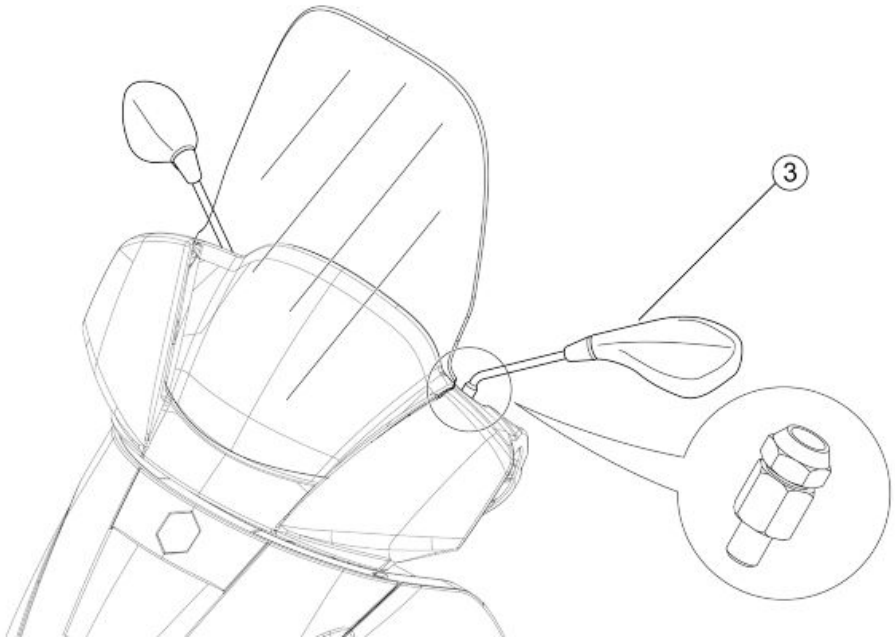


STAND

	Code	Action	Duration
1	004004	Stand - Replacement	
2	001053	Stand bolt - Replacement	
3	004179	Stand buffer - Replacement	

Legshield spoiler



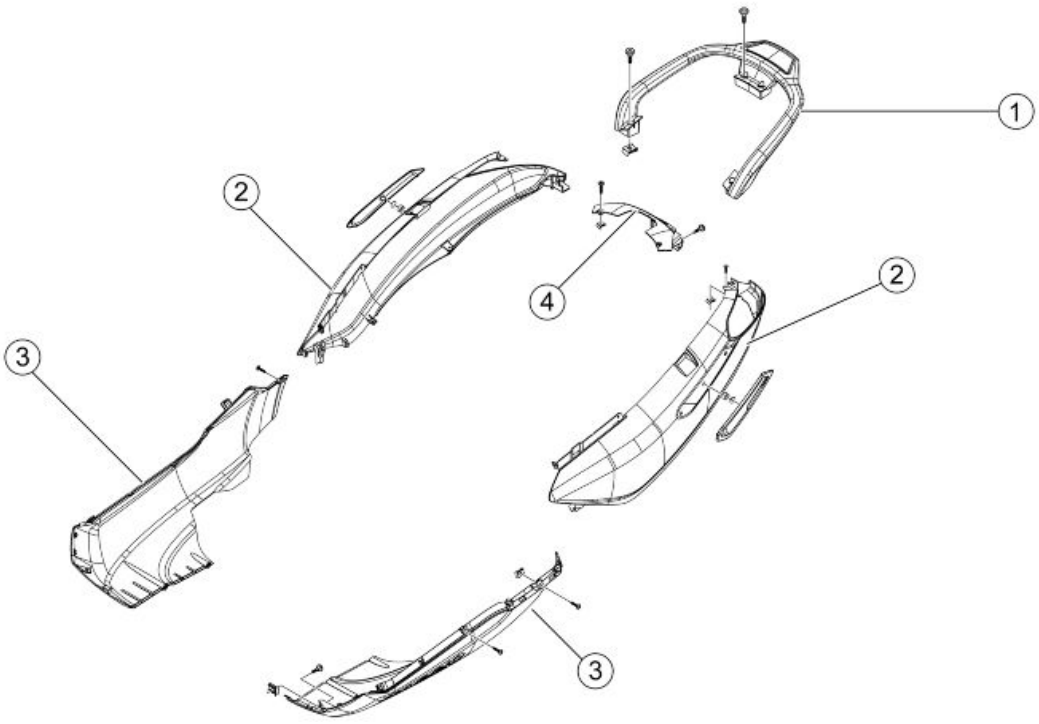


FRONT SHIELD

	Code	Action	Duration
1	004020	Headlight frame - Replacement	

	Code	Action	Duration
2	004064	Front shield, front section - Replacement	
3	004066	Driving mirror - Replacement	

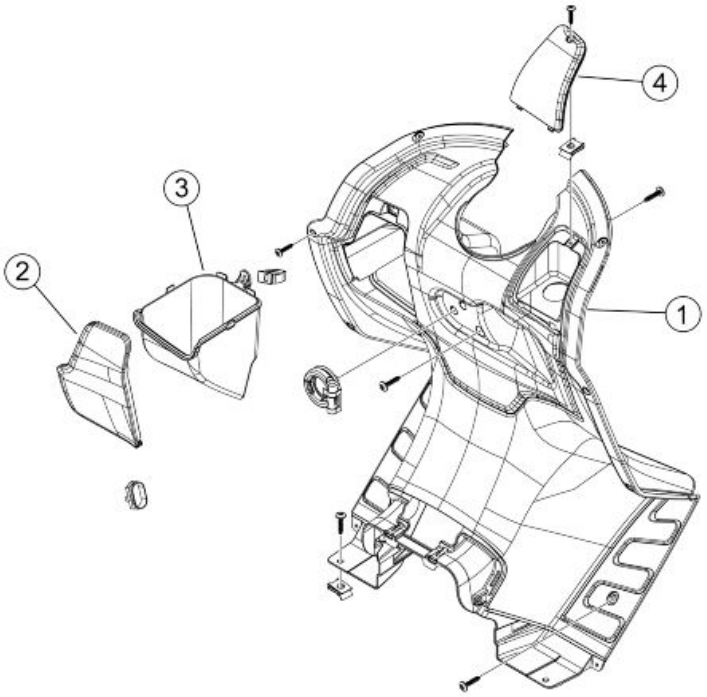
Side fairings



SIDE COVERS

	Code	Action	Duration
1	004068	Passenger handgrip - Replacement	
2	004085	Fairing (1) - Replacement	
3	004053	Spoiler - Replacement	
4	004036	Frame cover - Replacement	

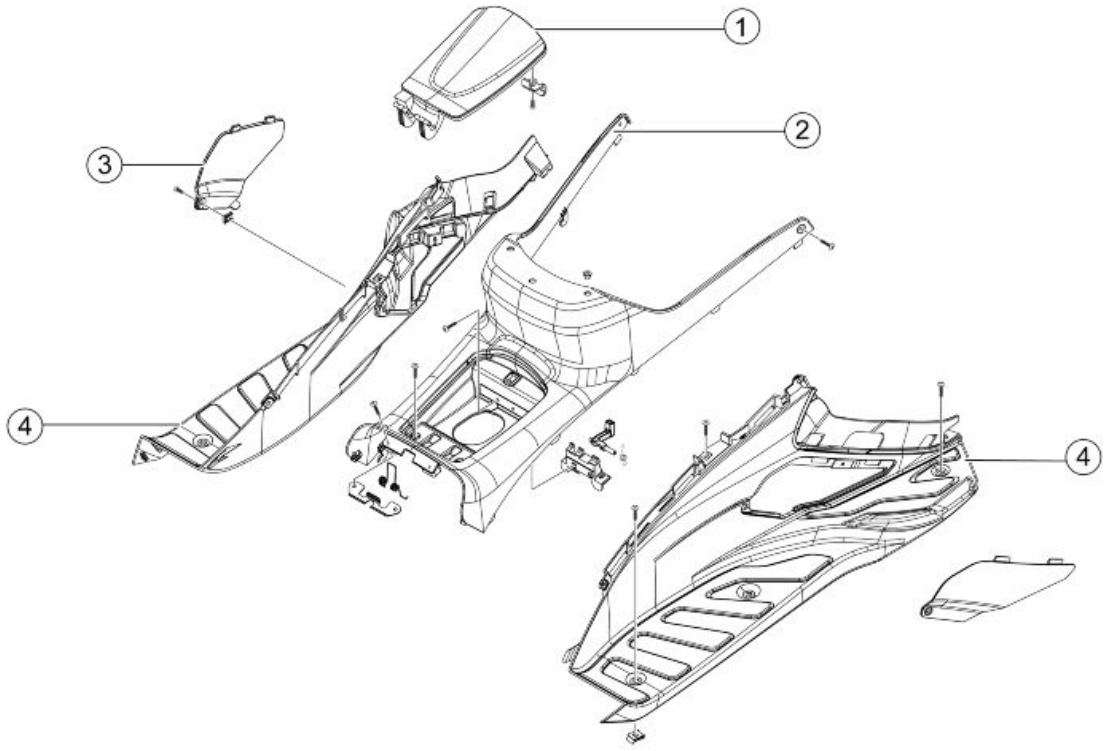
Rear cover



SHIELD BACK PLATE

	Code	Action	Duration
1	004065	Shield back plate - Replacement	
2	004156	Glove box flap and/or support - Replacement	
3	004145	Glove box - Replacement	
4	007024	Expansion tank cap - Replacement	

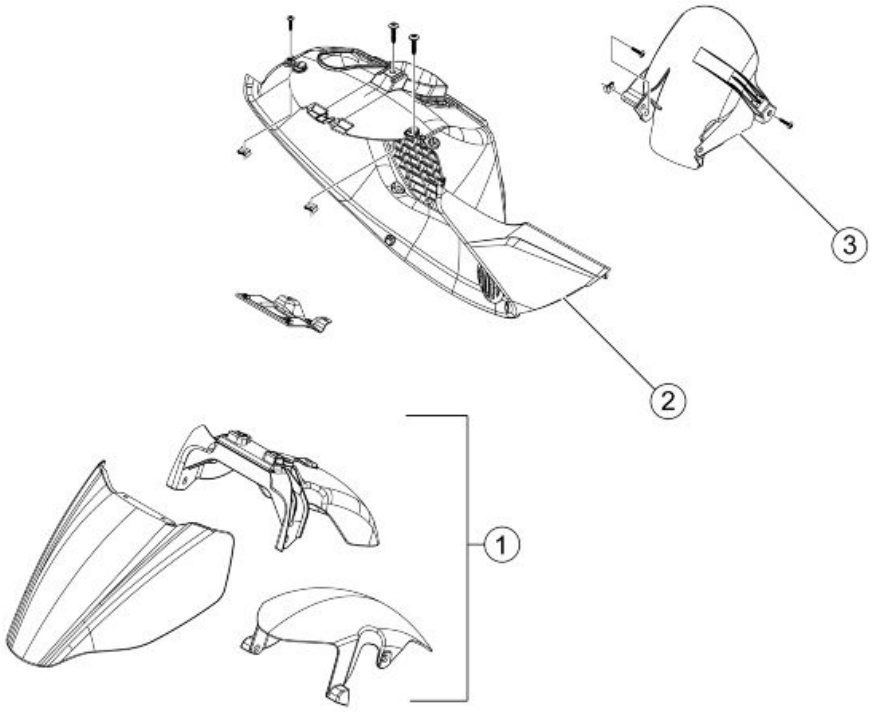
Central cover



CENTRAL COVER

	Code	Action	Duration
1	004135	Fuel tank port - Replacement	
2	004011	Central chassis cover - Replacement	
3	004059	Spark plug inspection flap - Replacement	
4	004015	Footrest - Replacement	

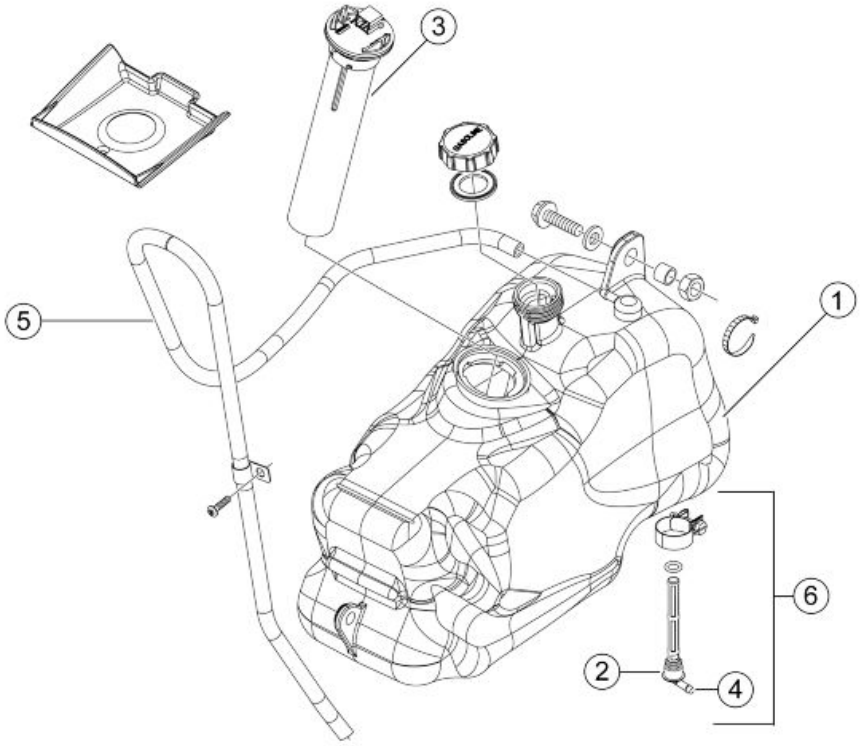
Mudguard



MUDGUARDS

	Code	Action	Duration
1	004002	Front mudguard - Replacement	
2	004167	Grill / radiator cover - Replacement	
3	004009	Rear mudguard - Replacement	

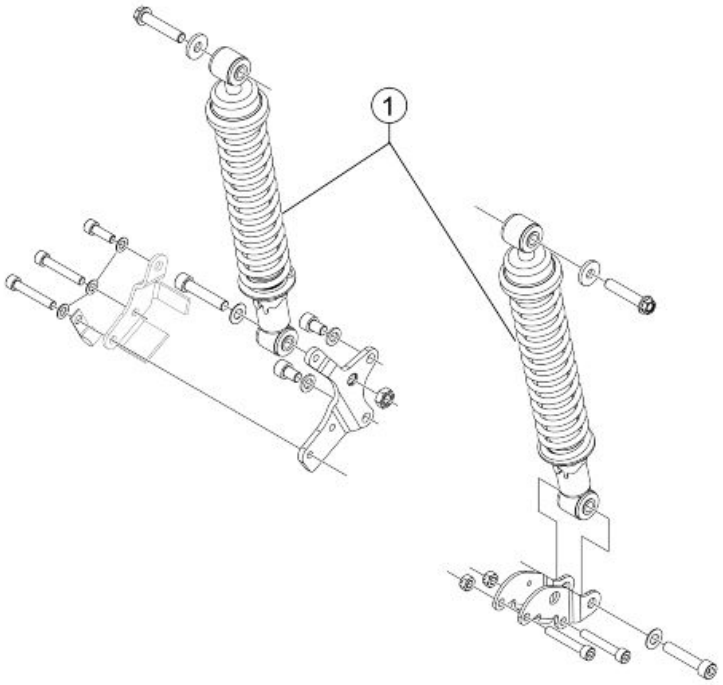
Fuel tank



FUEL TANK

	Code	Action	Duration
1	004005	Fuel tank - Replacement	
2	004007	Fuel valve - Replacement	
3	005010	Tank float - Replacement	
4	004089	Tank / petrol pump pipe - Replacement	
5	004109	Fuel tank breather - Replacement	
6	888141	Fuel tank coupling check	

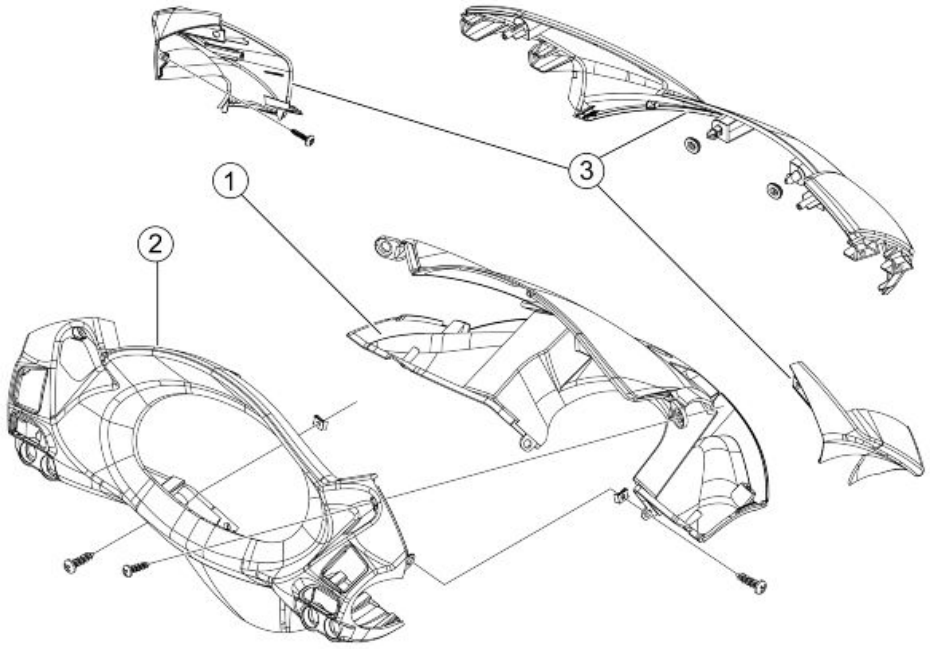
Rear shock-absorber



REAR SHOCK ABSORBER

	Code	Action	Duration
1	003007	Rear shock absorber - Replacement	

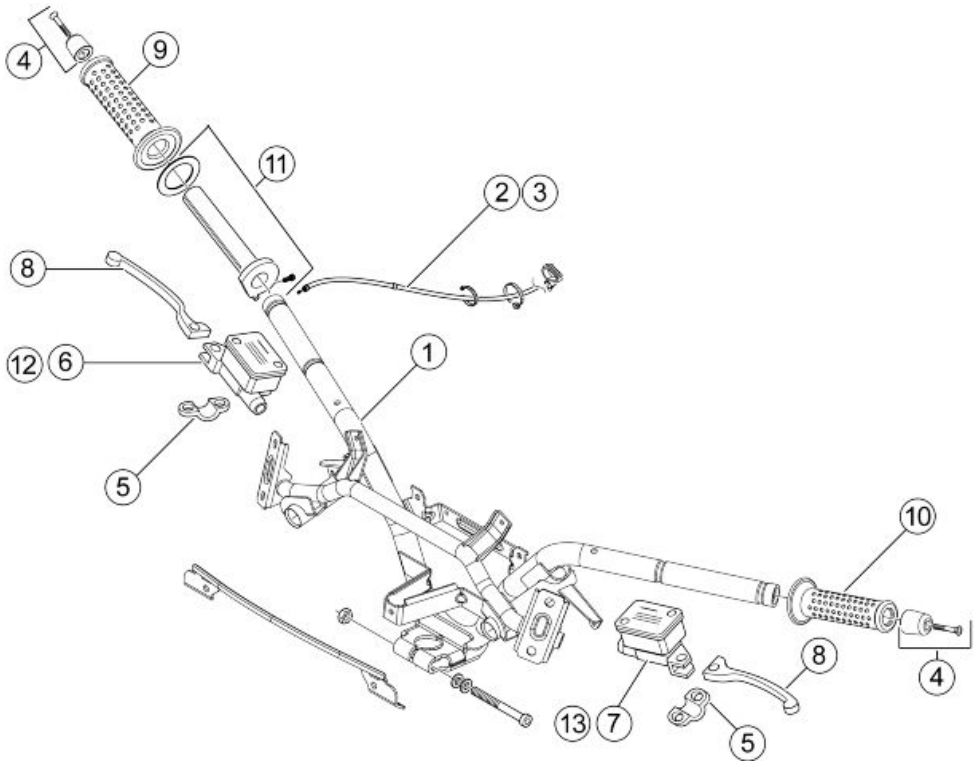
Handlebar covers



HANDLEBAR COVERS

	Code	Action	Duration
1	004018	Front handlebar covers - Replacement	
2	004019	Rear handlebar covers - Replacement	
3	004101	Windshield - Replacement	

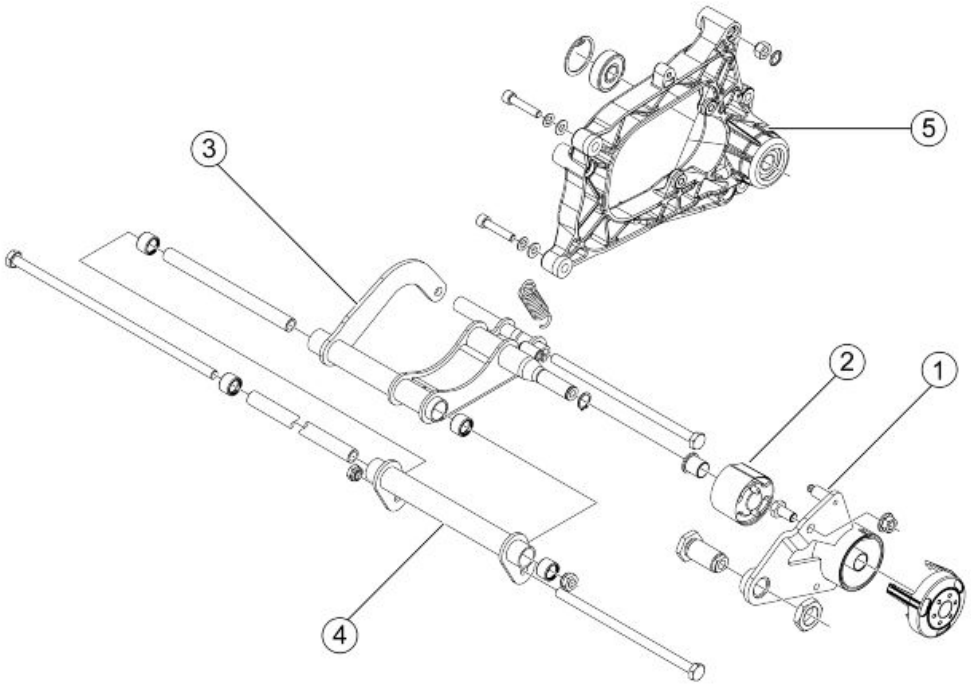
Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	003001	Handlebar - Replacement	
2	002063	Complete throttle control - Replacement	
3	003061	Accelerator transmission - Adjustment	
4	003059	Counterweight - Replacement	
5	004162	Mirror support and/or brake pump fitting U-bolt - Replacement	
6	002024	Front brake pump - Replacement	
7	002067	Rear brake pump - Replacement	
8	002037	Brake lever - Replacement	
9	002071	Left knob - Replacement	
10	002059	Right-hand knob - change	
11	002060	Complete throttle control - Replacement	
12	002047	Front brake fluid and air bleeding system - Replacement	
13	002080	Rear brake oil bleeding system - Replacement	

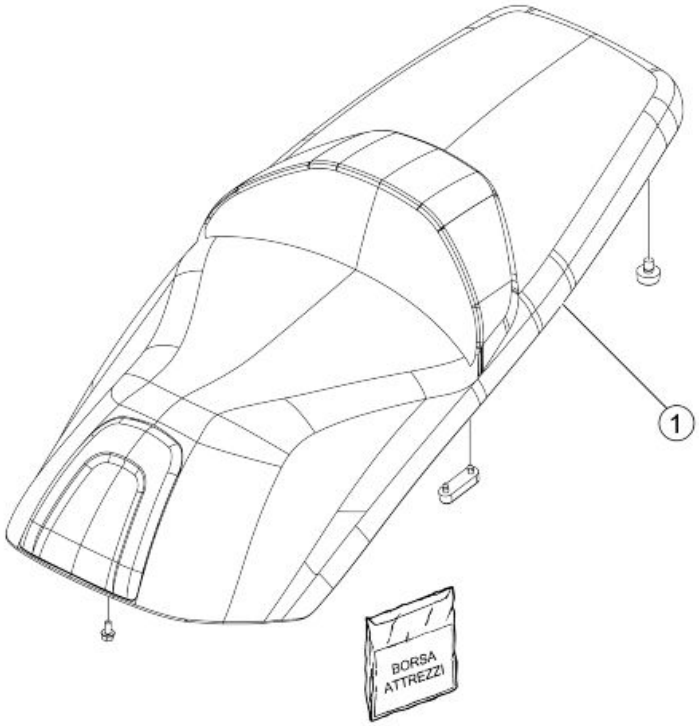
Swing-arm



SWINGING ARM

	Code	Action	Duration
1	003081	Swinging arm support flange - replace	
2	004058	Silent-block - replace	
3	001072	Engine /frame swinging arm attachment - replace	
4	003080	Swinging arm on frame - Replacement	
5	003077	Muffler supporting arm/ rear shock absorber - Replacement	

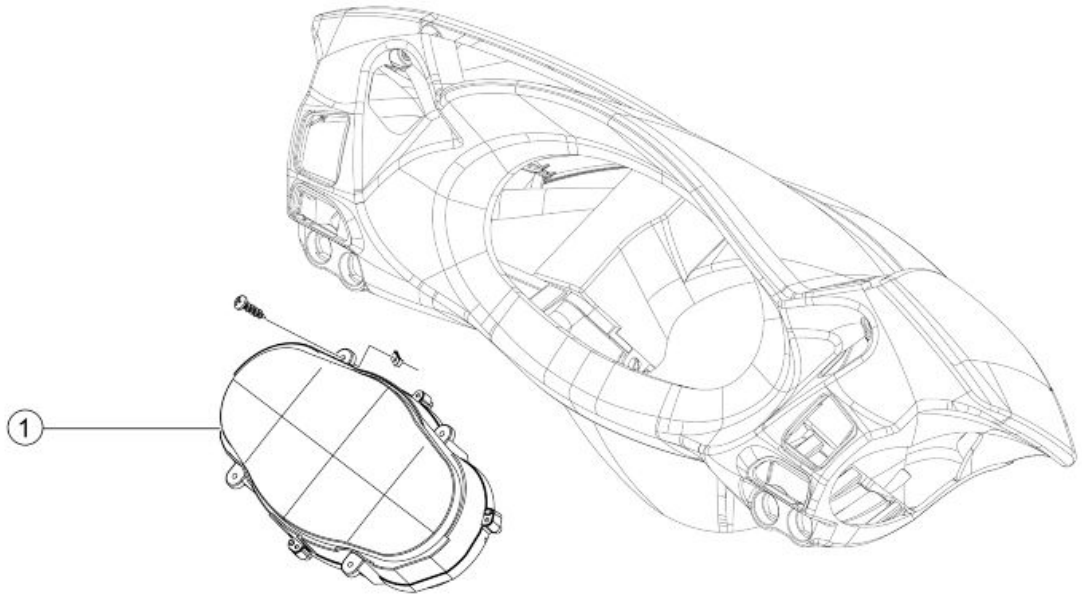
Seat



SADDLE

	Code	Action	Duration
1	004003	Saddle - Replacement	

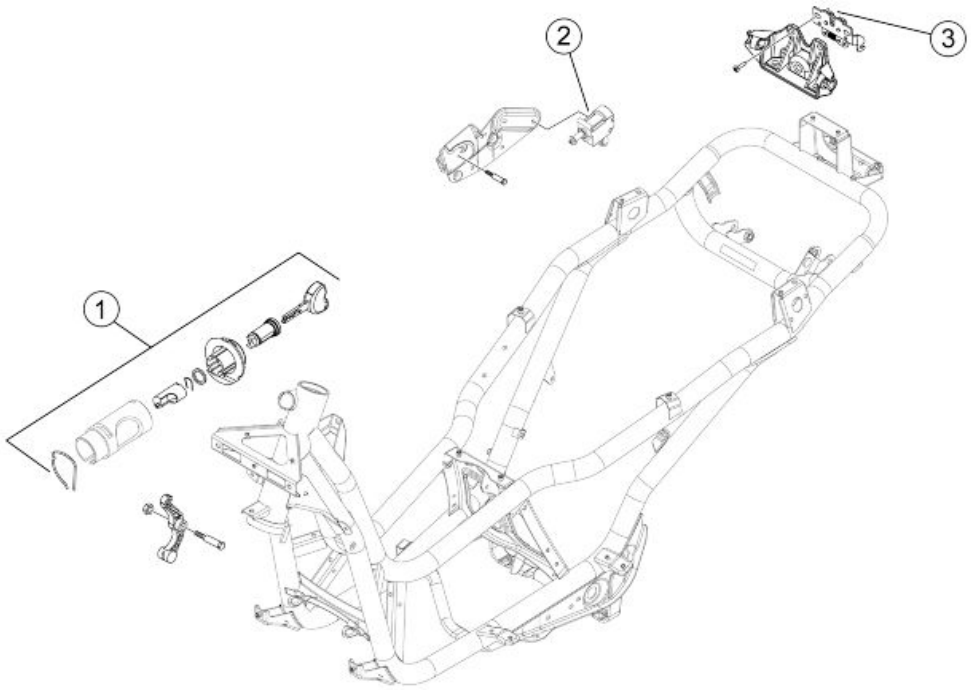
Instrument panel



INSTRUMENT PANEL

	Code	Action	Duration
1	005014	Odometer - Replacement	

Locks

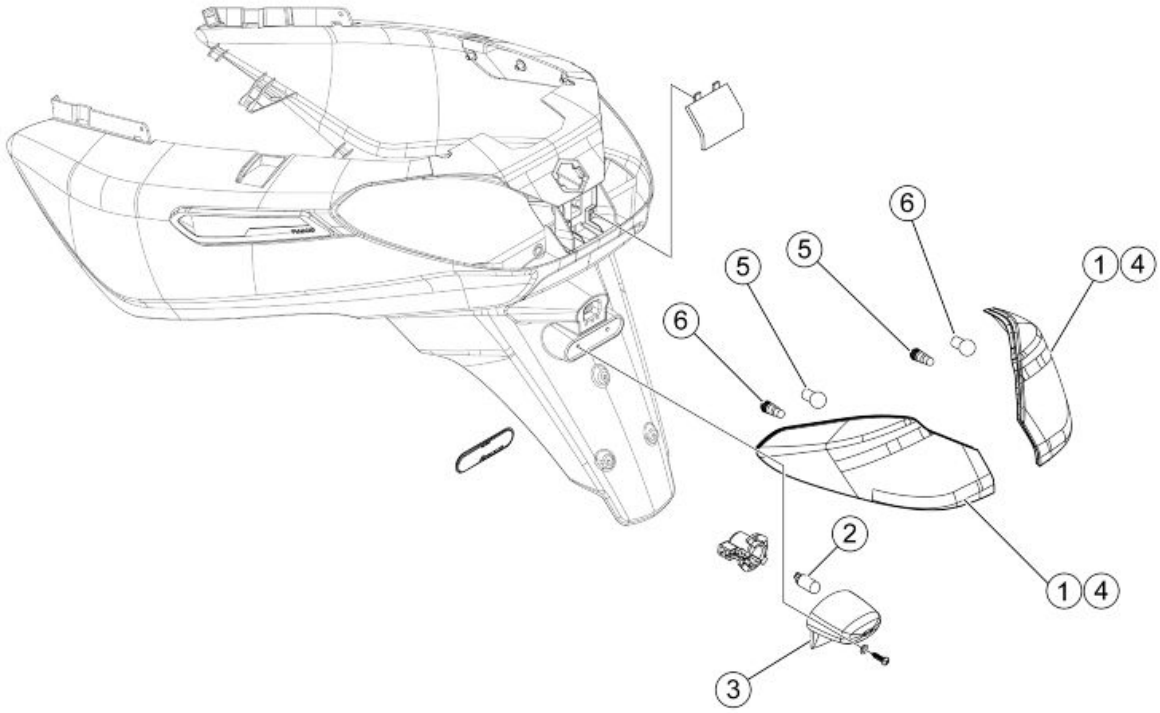


LOCKS

	Code	Action	Duration
1	004010	Anti-theft lock - Replacement	
2	005099	Electric saddle opening device - Replacement	
3	004054	Saddle lock catch - Replacement	

Turn signal lights

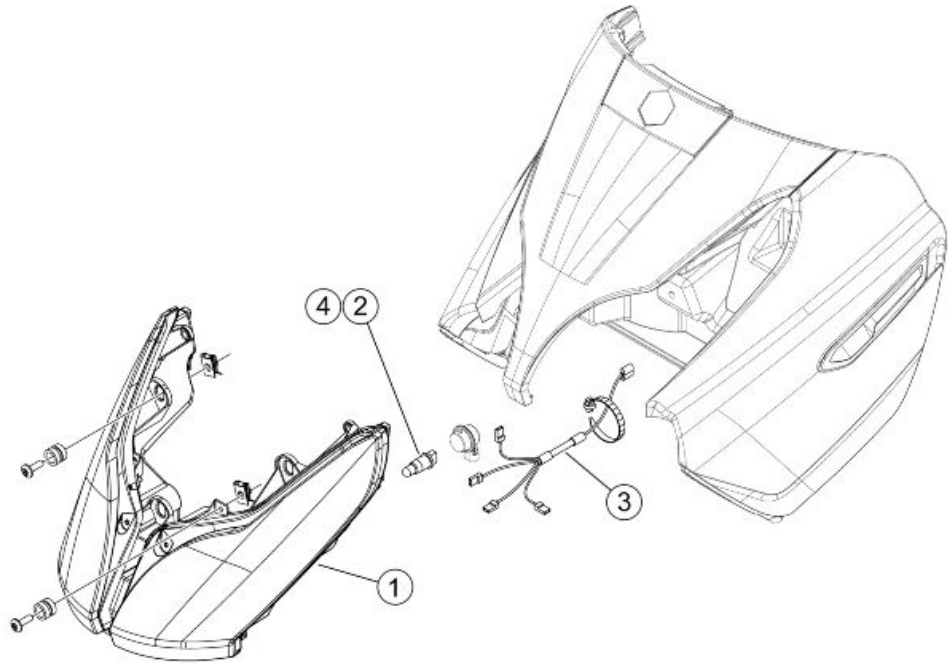
Rear lights



REAR LIGHTS

	Code	Action	Duration
1	005005	Taillight - Replacement	
2	005031	Licence plate light bulb - Replacement	
3	005032	Transparent licence plate cover - replace	
4	005022	Rear turn indicators - Replacement	
5	005066	Rear light bulbs - Replacement	
6	005068	Rear turn indicator bulb - Replacement	

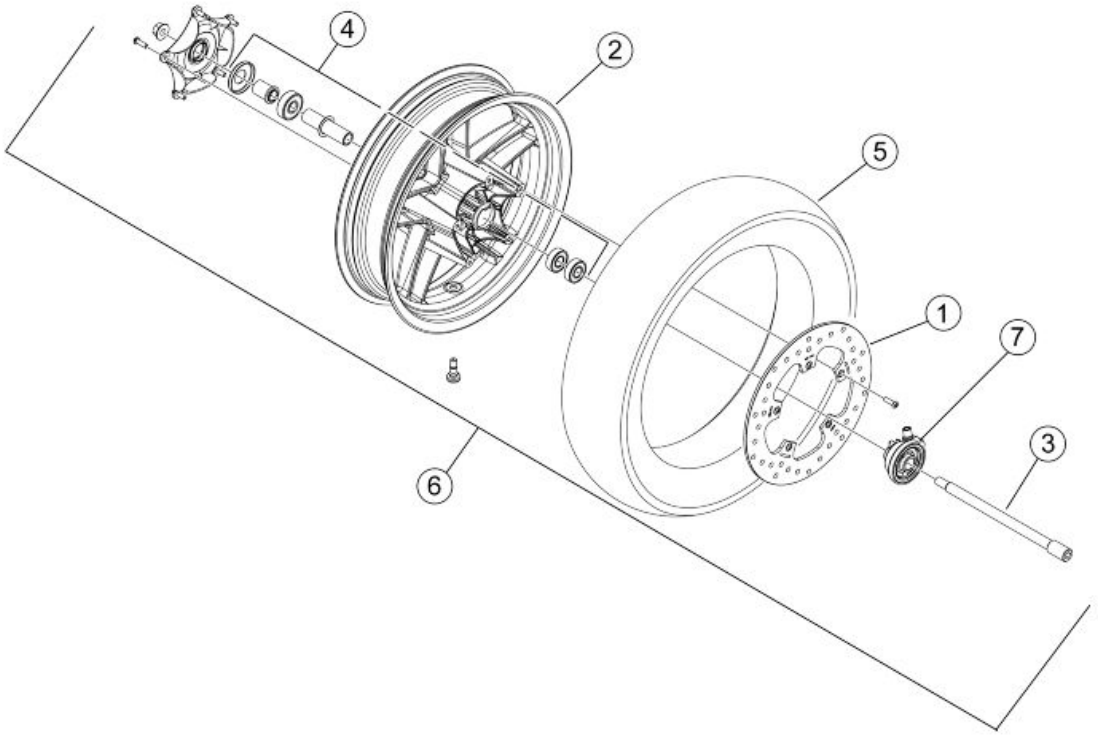
Front lights



TURN INDICATOR LIGHTS

	Code	Action	Duration
1	005002	Front light - Replacement	
2	005008	Light bulbs - Replacement	
3	005044	Front lights cable unit- Replacement	
4	005067	Front direction indicator bulb - Replacement	

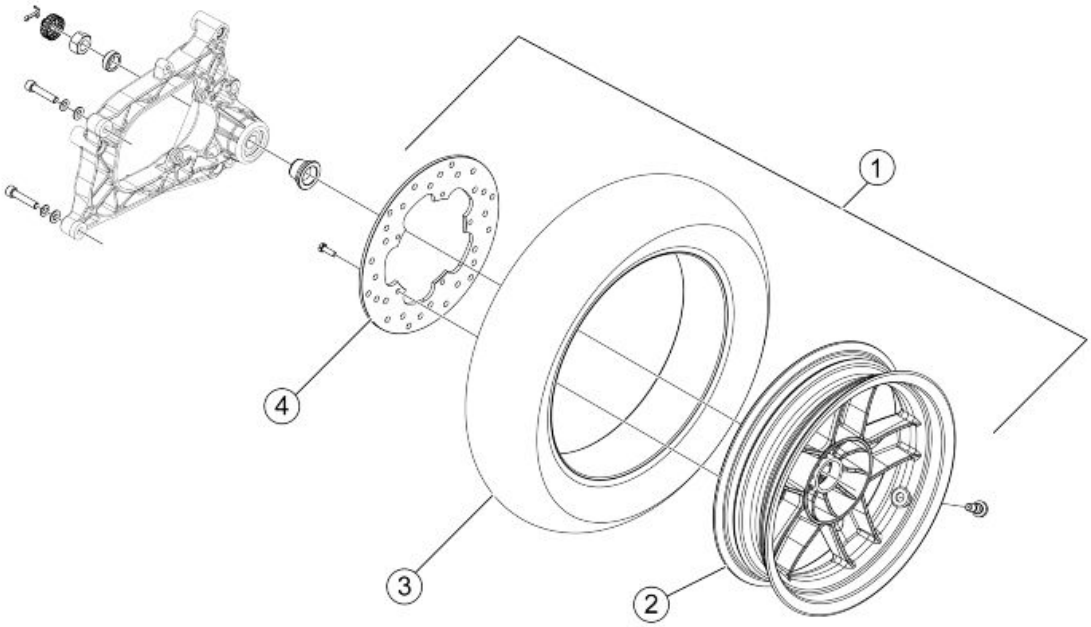
Front wheel



FRONT WHEEL

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

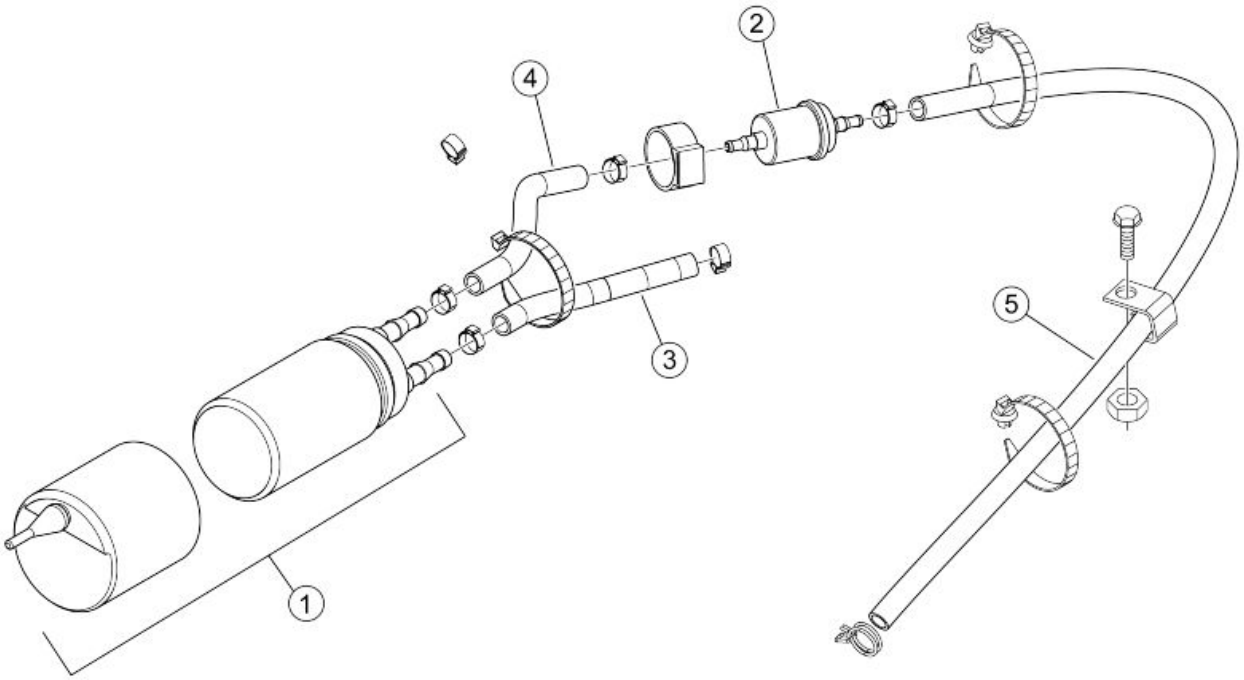
Rear wheel



REAR WHEEL

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

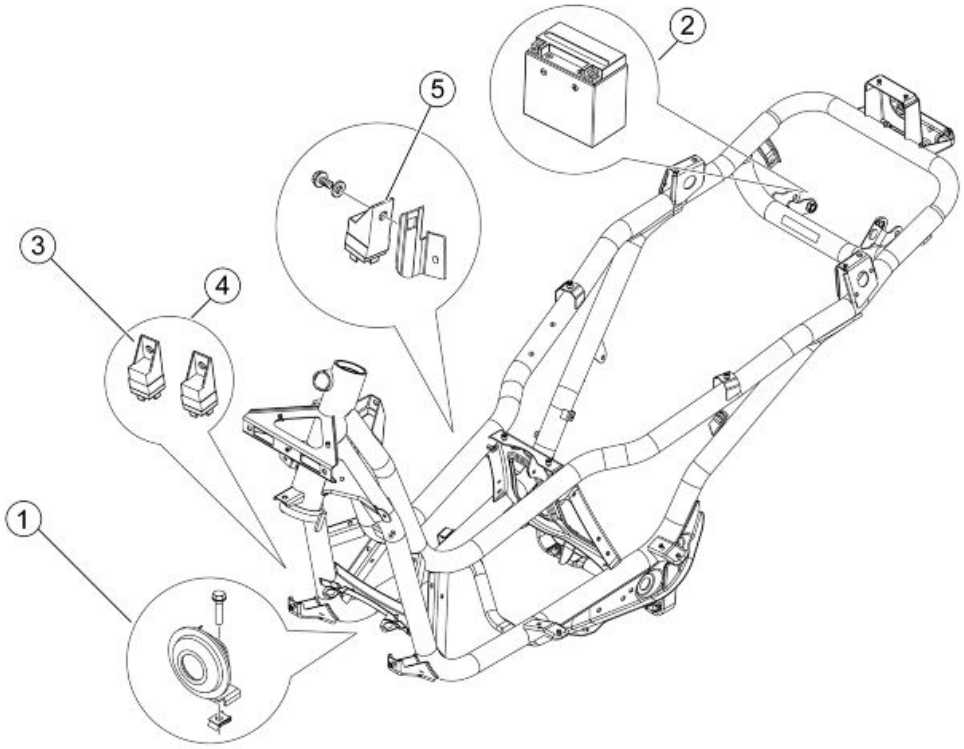
Fuel pump



FUEL PUMP

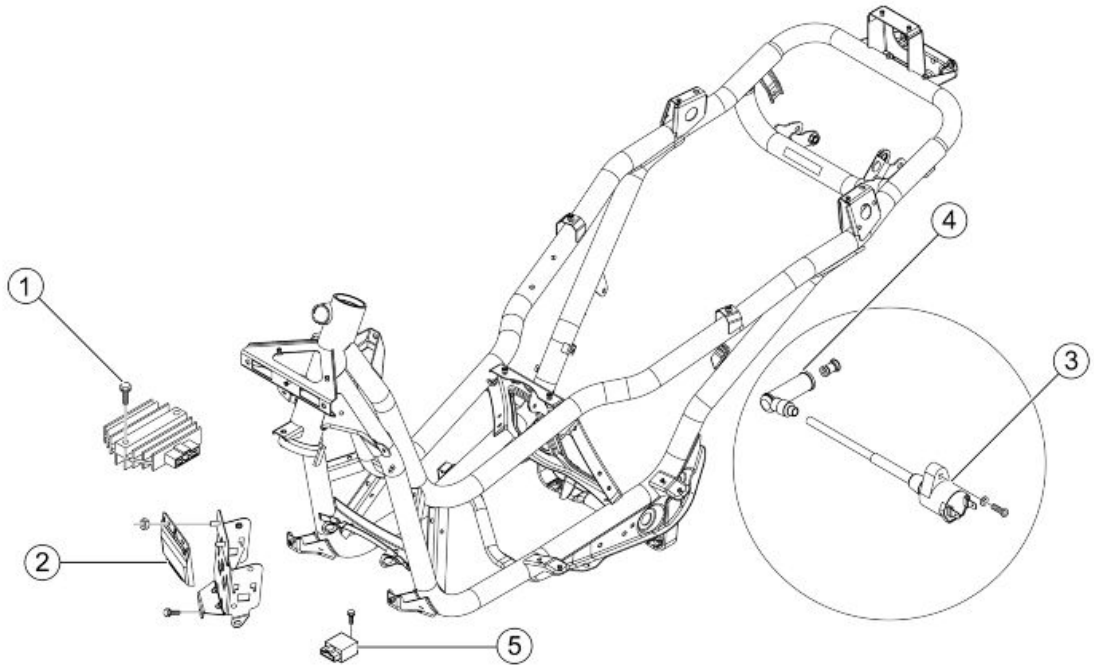
	Code	Action	Duration
1	004073	Fuel pump - Replacement	
2	004072	Fuel filter - Replacement	
3	004086	Petrol pump depression tube - Replacement	
4	004087	Filter / petrol pump pipe - Replacement	
5	004137	Pump / carburettor hose - Replacement	

Electric devices



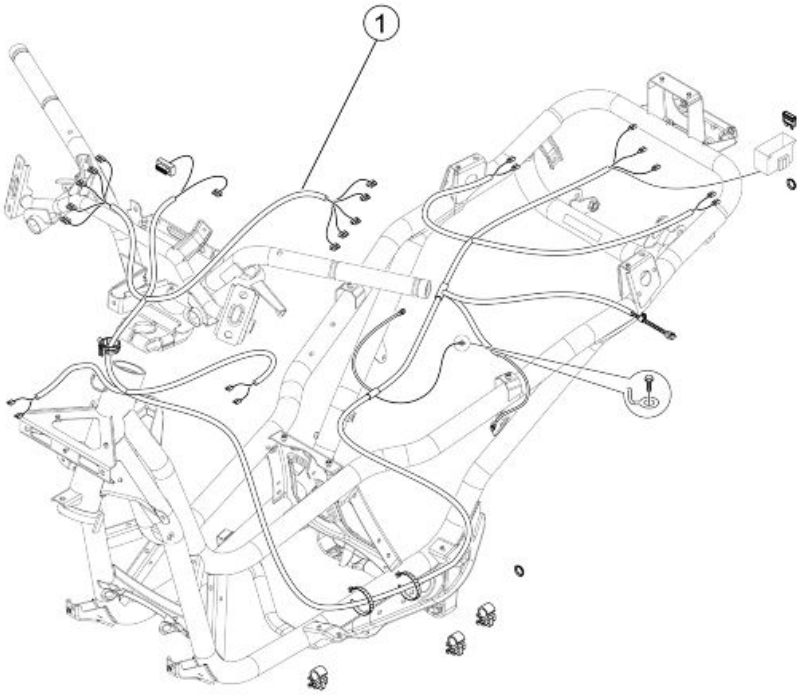
REMOTE CONTROLS

	Code	Action	Duration
1	005003	Horn - Replacement	
2	005007	Battery - Replacement	
3	005075	Stop remote control - Replacement	
4	005035	Headlight remote control - Replacement	
5	005011	Start-up remote control switch - Replacement	



VOLTAGE REGULATOR

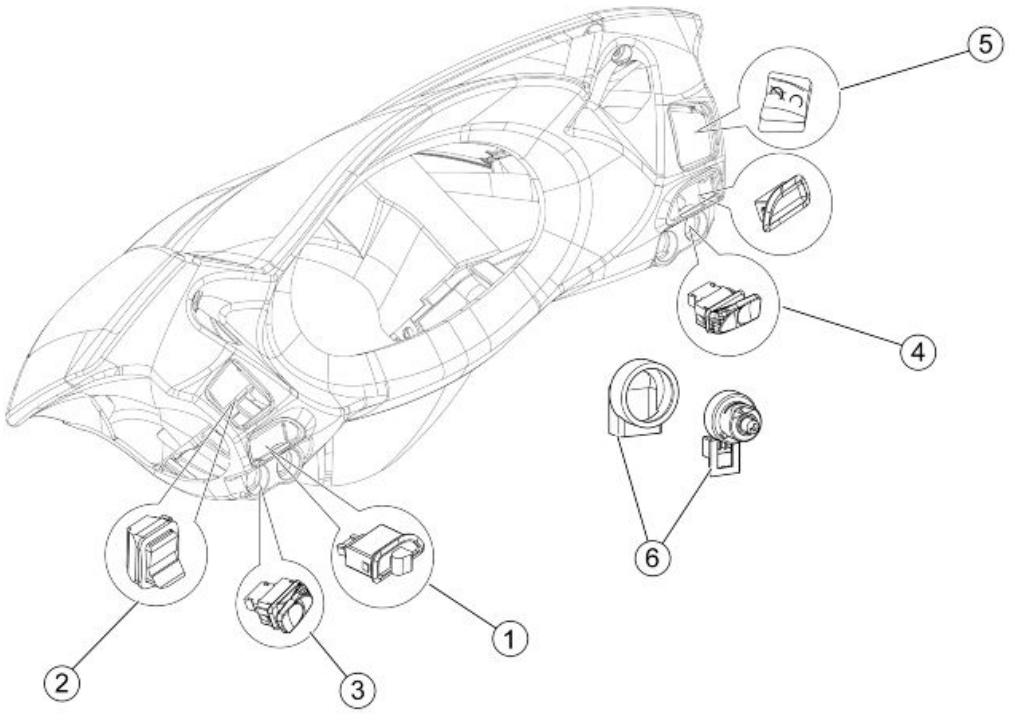
	Code	Action	Duration
1	005009	Voltage regulator - Replacement	
2	001023	Control unit - Replacement	
3	001069	HV coil - Replacement	
4	001094	Spark plug cap - Replacement	
5	005119	Fuel pump remote control - Replacement	



WIRE UNIT

	Code	Action	Duration
1	005001	Electrical system - Replacement	

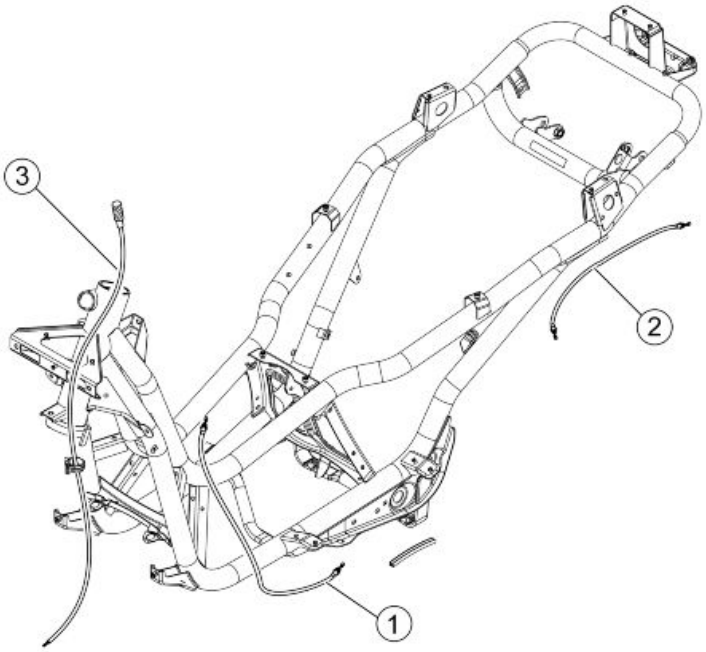
Electronic controls



ELECTRIC CONTROLS

	Code	Action	Duration
1	005006	Light switch or turn indicators - Replacement	
2	005039	Headlight switch - replace	
3	005040	Horn button - Replacement	
4	005041	Starter button - Replacement	
5	005077	Emergency stop switch - Replacement	
6	005016	Key switch - Replacement	

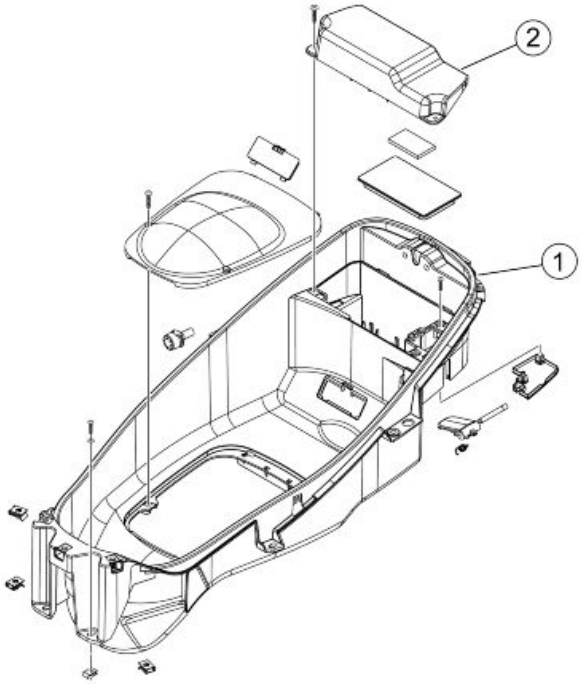
Transmissions



TRANSMISSIONS

	Code	Action	Duration
1	002082	Fuel tank cap opening drive - Replacement	
2	002083	Saddle opening transmission - Replacement	
3	002049	Odometer cable - Replacement	

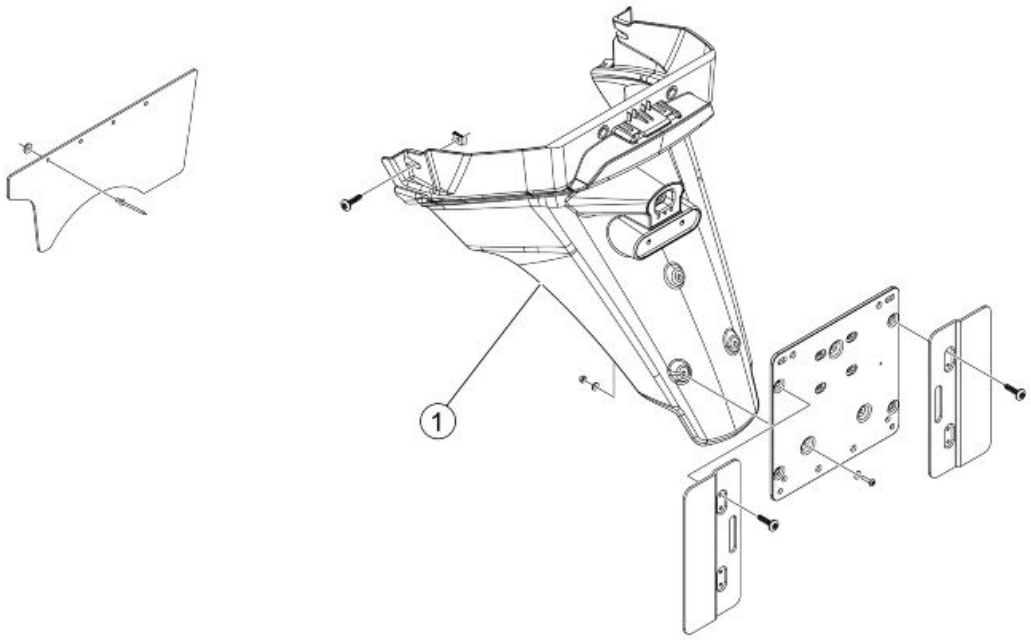
Helmet bay



HELMET COMPARTMENT

	Code	Action	Duration
1	004016	Helmet compartment - Re-placement	
2	005046	Battery cover - change	

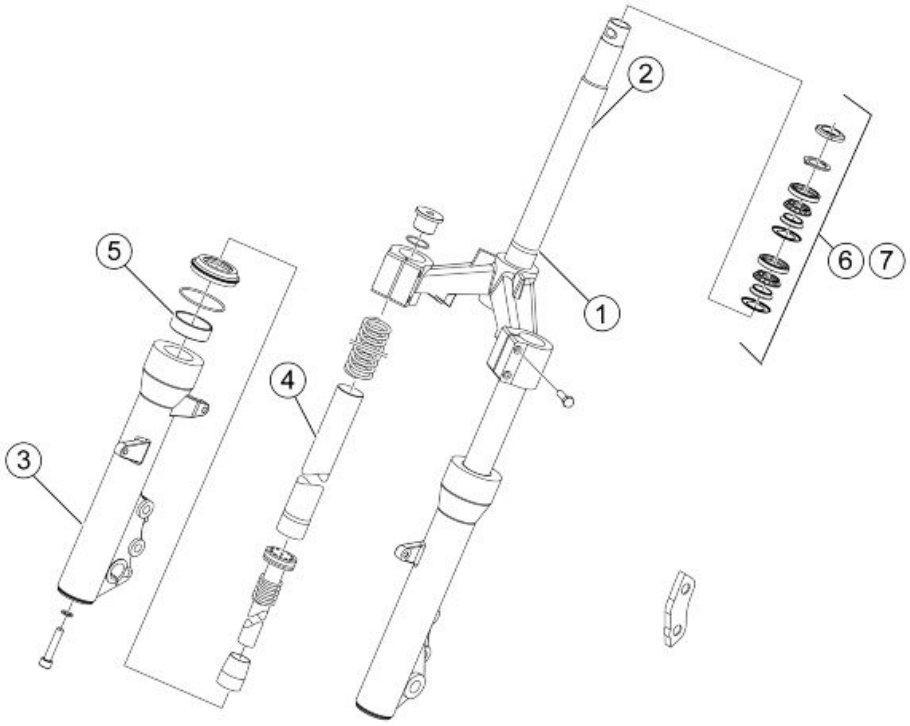
Rear side fairings



REAR COVERS

	Code	Action	Duration
1	005048	Licence plate holder - Replacement	

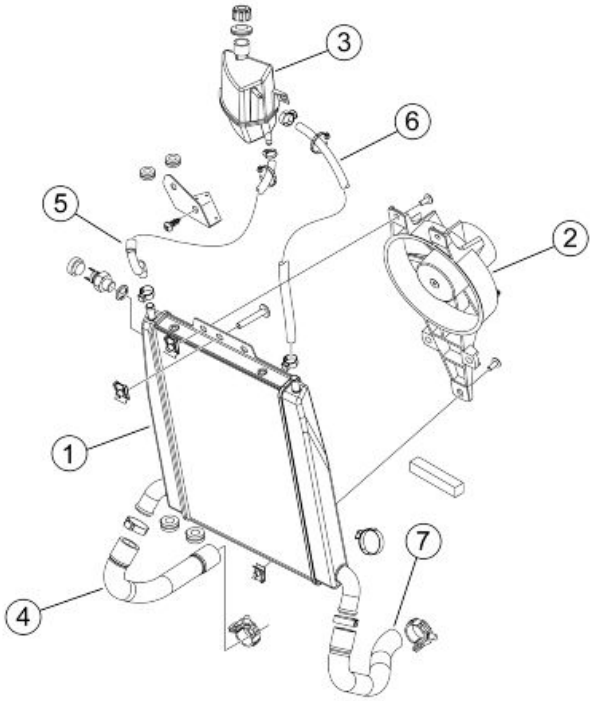
Front suspension



FRONT SUSPENSION

	Code	Action	Duration
1	003051	Complete fork - replace	
2	003010	Front suspension - Service	
3	003076	Fork sheath - Replacement	
4	003079	Fork stem - Replacement	
5	003048	Fork oil seal - Replacement	
6	003002	Steering thrust washer - Replacement	
7	003073	Steering clearance - Adjustment	

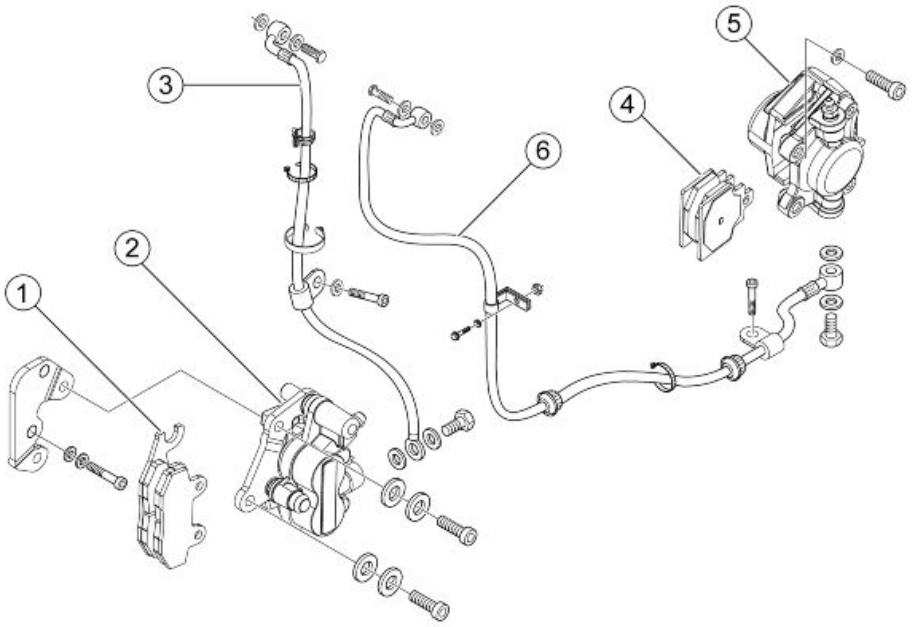
Cooling system



COOLING SYSTEM

	Code	Action	Duration
1	007002	Water radiator - replacement	
2	007016	Fan with support - Replacement	
3	007001	Expansion tank - Replacement	
4	007022	Coolant delivery pipe - Replacement	
5	007013	Radiator expansion tank connection pipe - Replacement	
6	001052	Coolant and air bleed - Replacement	
7	007019	Connection water pump pipe / return pipe - Replacement	

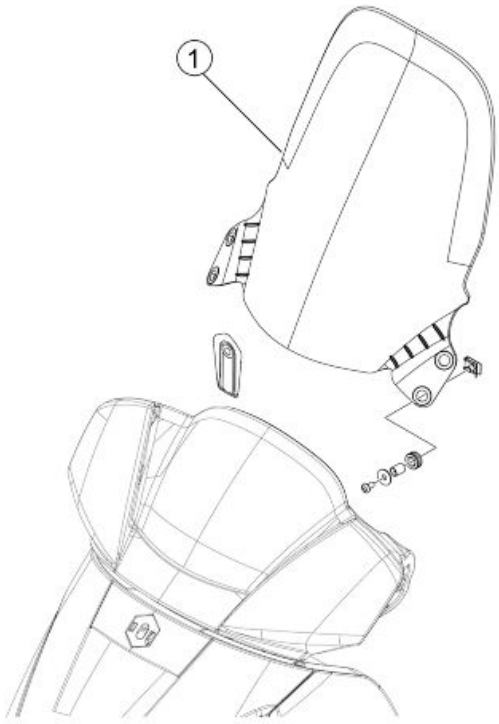
Braking system



BRAKE SYSTEM

	Code	Action	Duration
1	002007	Front brake pads - Replacement	
2	002039	Front brake calliper - Replacement	
3	002021	Front brake piping - Replacement	
4	002002	Rear brake pads - Replacement	
5	002048	Rear brake calliper - Replacement	
6	002020	Rear brake disc piping - Replacement	

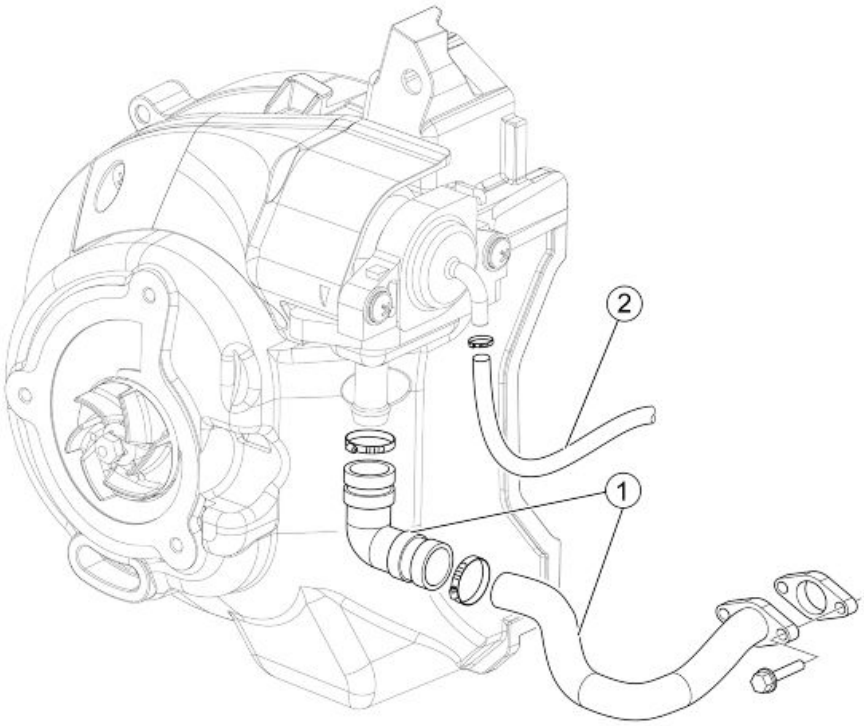
Windscreen



WINDSHIELD

	Code	Action	Duration
1	004101	Windshield - Replacement	

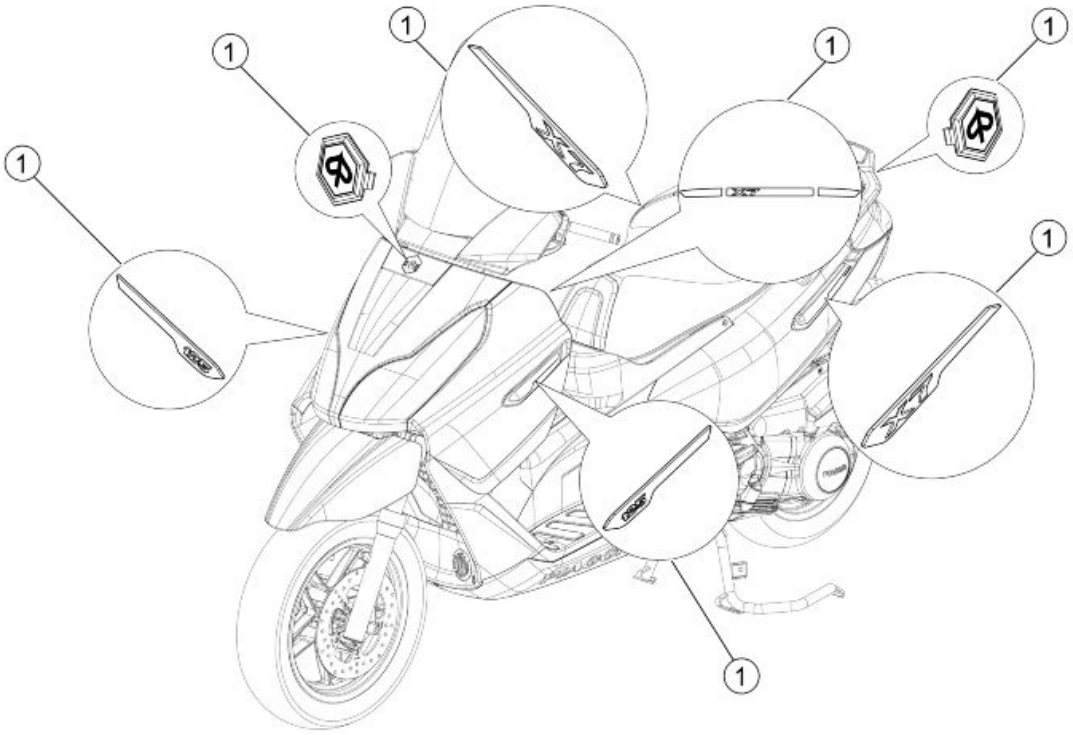
Secondary air box



SECONDARY AIR HOUSING

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

Stickers



TRANSFERS

	Code	Action	Duration
1	004159	Plates / Stickers - Replacement	