PIAGGIO

SERVICE STATION MANUAL

677229 ÷ 677236

MP3 300 YOURBAN i.e. RL - NRL

SERVICE STATION MANUAL

MP3 300 YOURBAN i.e. RL - NRL

Piaggio & C. S.p.A. Viale Rinaldo Piaggio, 25 - 56025 PONTEDERA (PI), Italy
www.piaggio.com

SERVICE STATION MANUAL
MP3 300 YOURBAN i.e. RL - NRL

This workshop manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. This manual is addressed to Piaggio service mechanics who are supposed to have a basic knowledge of mechanics principles and of vehicle mounting techniques and procedures. Any important changes made to the vehicles or to specific mounting operations will be promptly reported 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 relating to 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

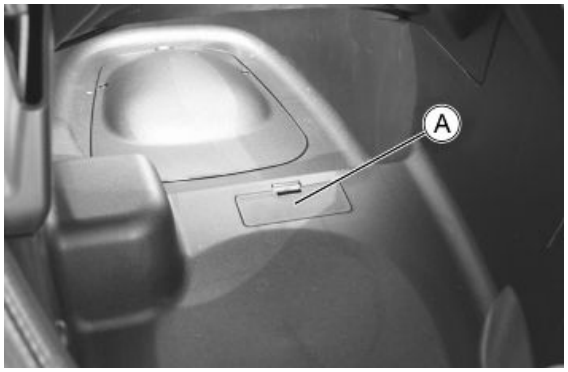
- If work can only be done on the vehicle with the engine running, make sure that the premises are well ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.
- The battery electrolyte contains sulphuric acid. Protect your eyes, clothes 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 naked flames or sparks.
- Clean the brake pads in a well-ventilated area, directing the jet of compressed air in such a way that you do not breathe in the dust produced by the wear of the friction material. Even though the latter contains no asbestos, inhaling dust is harmful.

Maintenance rules

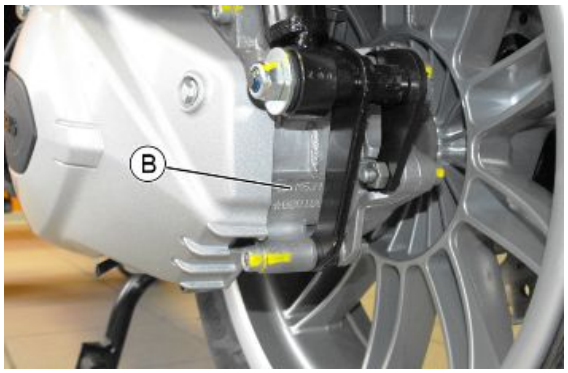
- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.
- Use only the appropriate tools designed for this vehicle.
- Always use new gaskets, sealing rings and split pins upon refitting.
- After removal, clean the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

Vehicle identification

The chassis prefix is stamped on the chassis under the cover «**A**» inside the helmet compartment.



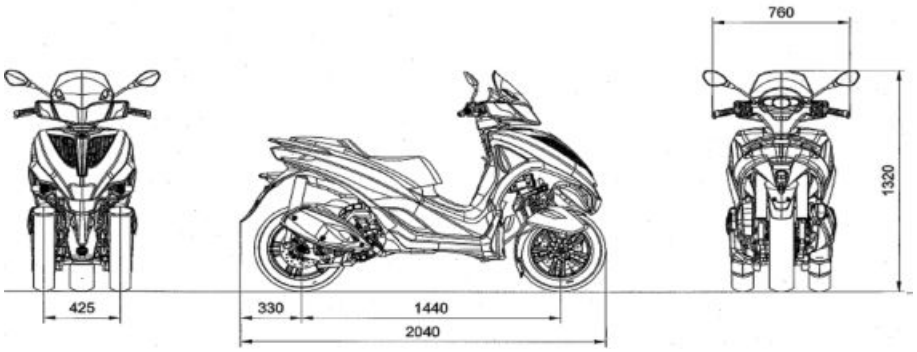
The engine prefix «**B**» is stamped near the rear left shock absorber lower support.



VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Chassis prefix	M64102
Engine prefix	M634M

Dimensions and mass



VEHICLE TECHNICAL DATA

Specification	Desc./Quantity
Chassis	Tubular and sheet steel
Front suspension	The roll system is composed of an articulated parallelogram suspension with die-cast aluminium control arms and two side headstocks plus shock absorbers with hydraulic locking system.
Rear suspension	Two double-acting shock absorbers, adjustable to four positions at preloading.

Specification	Desc./Quantity
Front brake	Ø 240-mm double disc brake with hydraulic control operated by the handlebar right-hand lever.
Rear brake	Ø 240-mm disc brake with hydraulic control operated by the handlebar left-hand lever.
Wheel rim type	Light alloy wheel rims.
Front wheel rim	13" x 3.00"
Rear wheel rim	14" x 3.75"
Front tyre	Without inner tube 110/70 13" 48P
Rear tyre	Without inner tube: 140/60-14" 64P
Front tyre pressure	1.7 bar
Rear tyre pressure	2.2 bar (2.6 bar with passenger)
Kerb weight	212 kg (200 kg for version NRL without front suspension block and parking brake locking)
Maximum weight allowed	405 kg
Battery	12 V-12Ah SEALED BATTERY

Engine

DATA

Specification	Desc./Quantity
Type	single-cylinder, four-stroke and four liquid-cooled valves
Engine capacity	278 cm³
Bore x stroke	75 X 63 mm
Compression ratio	11 ± 0.5 : 1
Engine idle speed	1,700 ± 100 rpm
MAX. torque	23.2 Nm at 6,500 rpm
Max. power	16.6 kW at 7,500 rpm
Timing system	single overhead camshaft, chain-driven, on the left-hand side, three-arm rocking levers set up with threaded set screw
valve clearance	intake: 0.10 mm - exhaust: 0.15 mm
Starting system	electric starter motor with freewheel
Lubrication	with lobe pump (inside the crankcase) chain-driven and double filter: mesh and paper
Fuel system	ELDOR KUBO03 electronic injection with 32 mm diam. throttle body and electric fuel pump.
Fuel	Unleaded petrol (95 RON)
Air filter	sponge, impregnated with mixture (50% petrol and 50% oil)
Silencer	Absorption-type exhaust muffler with catalytic converter and lambda probe.
Max. speed	125 km/h
Emissions compliance	EURO 3

Transmission

TRANSMISSION

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

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil	Capacity: 1.3 l (dry); 1.2 l (when changing oil and filter)
Transmission oil	250 cm³
Cooling system fluid	~ 2 l
Fuel tank	11 ± 0.5 l

Electrical system

ELECTRICAL COMPONENTS

Specification	Desc./Quantity
Ignition/advance	Electronic, with inductive discharge and variable advance with three-dimensional mapping
Spark plug	NGK CR8EKB
Battery	12V-12Ah
Alternator	alternating current

Frame and suspensions

CHASSIS AND SUSPENSION

Specification	Desc./Quantity
Chassis	Tubular and steel sheets.
Rear suspension	Single arm with two double-acting hydraulic shock absorbers and preloading adjustment in 4 positions.
Front suspension	The roll system is composed of an articulated parallelogram suspension with die-cast aluminium control arms and two side headstocks plus shock absorbers with hydraulic locking system.

Brakes

BRAKES

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

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Front wheel rim	13" x 3.00"
Rear wheel rim	14" x 3.75"
Front tyre	Without inner tube 110/70 13" 48P
Rear tyre	Without inner tube: 140/60-14" 64P

TYRE INFLATION PRESSURE

Specification	Desc./Quantity
Front tyre pressure	1.7 bar
Rear tyre pressure	2.2 bar (2.6 bar with passenger)

N.B.

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

Tightening Torques

STEERING

Name	Torque in Nm
Steering lower ring nut (central headstock)	10 to 12
Steering upper ring nut (central headstock)	22.5 to 25
Handlebar fixing screw	50 to 55
Fixing screws for the handlebar control unit U-bolts	7 - 10

CHASSIS

Name	Torque in Nm
Engine arm bolt - frame arm	33 to 41
Swinging arm buffer nut	64 - 72
Engine-swinging arm pin	55 - 61
Frame-swinging arm bolt	55 - 61
Centre stand bolt	31 - 39

FRONT SUSPENSION

Name	Torque in Nm
Shock absorber lower clamping	19 - 26
Shock absorber upper clamp	19 - 29
Front wheel fixing screws	19 ÷ 24
Steering arm bolt nut	20 to 25
Tilt gripper fixing screws	20 to 25
Front wheel axle	74 - 88
Arm coupling screws	45 to 50
Screws fixing arms to side headstocks	45 to 50
Screws fixing arms to central headstock	45 to 50
Screws fixing the half-arm coupling flange	20 to 25
Screws fixing roll lock disc section	20 to 25
Side headstock upper ring nut	20 - 24
Side headstock lower ring nut	12 ÷ 15
Screw fixing sliding stem to shock absorber	45 to 50
Clamp for sliding stem locking device	6.5 - 10.5
Fixing nuts for constant-velocity universal joints	18 - 20
Potentiometer to anti-tilting device clamp	8 to 10
Electric motor to anti-tilting device clamp	11 to 13
Clamp fixing pump bolt to anti-tilting device	11 to 13
Pump to anti-tilting device clamp	11 to 13
Pressure switch to distribution frame	18 - 20
Sensor to tilt gripper clamp	2.5 - 2.9
Pipe terminals to fifth wheel check spring	7 - 11
Joint to anti-tilting device pump	20 to 25
Lower fitting for shock absorber sliding locking clamp pipes	20 to 25
Upper fitting for shock absorber sliding locking clamp pipes	20 to 25

REAR SUSPENSION

Name	Torque in Nm
Shock absorber upper clamp	33 to 41
Shock absorber lower clamping	33 to 41
Shock absorber-crankcase attachment bracket	20 to 25
Rear wheel axle	104 ÷ 126
Silencer arm clamping screws	27 - 30

FRONT BRAKE

Name	Torque in Nm
Oil bleed screw	8 - 12
Disc tightening screw (°)	5 to 6
Brake fluid pump-hose fitting	16 - 20
Brake fluid pipe-calliper fitting	20 - 25
Screw tightening calliper to support	20 to 25
Calliper upper pipe fitting	20 to 25

REAR BRAKE

Name	Torque in Nm
Rear brake disc screws(°)	5 to 6.5
Rear brake calliper-pipe fitting	20 - 25
Rigid / flexible pipe fitting	13 - 18
Rear brake pump-pipe fitting	16 - 20
Rear brake calliper fixing screws	20 to 25

REAR BRAKE

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

SILENCER

Name	Torque in Nm
Silencer heat guard fixing screw	4 to 5
Screw for fixing silencer to supporting arm	20 ÷ 25
Lambda probe tightening on exhaust manifold	40 - 50
Exhaust manifold-silencer joint tightening	12 to 13
Manifold - silencer diaphragm tightening clamp	16 to 18

LUBRICATION

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

CYLINDER HEAD

Name	Torque in Nm
Spark plug	12 ÷ 14
Head cover screws	6 ÷ 7
Nuts fixing head to cylinder	7±1 + 10±1 + 270°
Head fixing side screws	11 - 12
Starter ground screw	7 ÷ 8.5
Tappet adjustment check nut	6 - 8
Intake manifold screws	11 ÷ 13
Timing chain tensioner slider screw	10 ÷ 14
Starter counterweight support screw	11 to 15
Timing chain tensioner support screw	11 ÷ 13
Timing chain tensioner central screw	5 ÷ 6
Camshaft retention plate screw	4 ÷ 6

TRANSMISSION

Name	Torque in Nm
Belt support roller screw	11 ÷ 13
Clutch unit nut on driven pulley	45 ÷ 50
Drive pulley nut	75 ÷ 83
Transmission cover screws	11 ÷ 13
Driven pulley shaft nut	54 ÷ 60
Rear hub cap screws	24 ÷ 27

FLYWHEEL

Name	Torque in Nm
Flywheel cover screw	11 ÷ 13

Name	Torque in Nm
Stator assembly screws	3 - 4 (Apply LOCTITE medium type 242 threadlock)
Flywheel nut	94 - 102
Pickup fixing screws	3 ÷ 4
Screw fixing freewheel to flywheel	13 - 15

CRANKCASE AND CRANKSHAFT

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

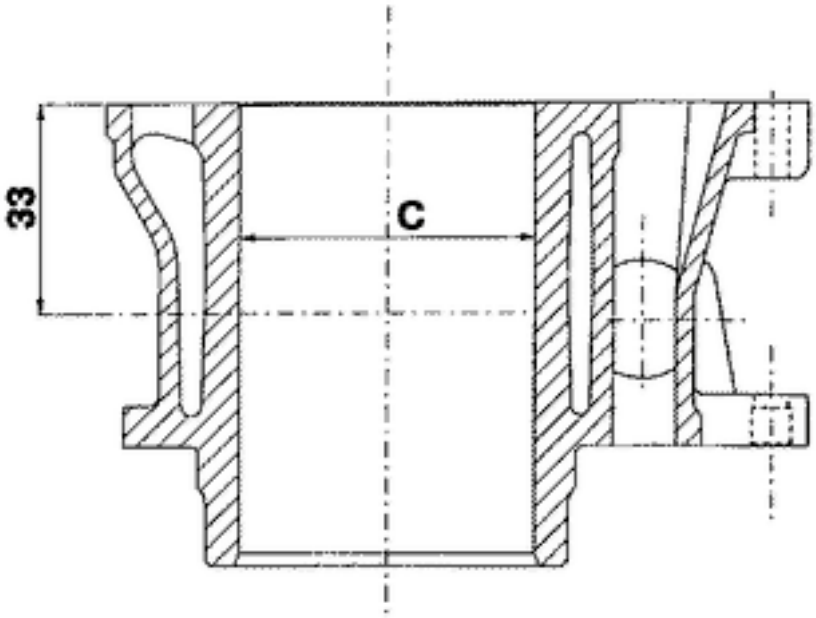
COOLING

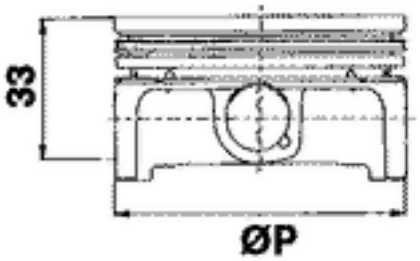
Name	Torque in Nm
Water pump rotor cover	3 ÷ 4
Thermostat cover screws	3 ÷ 4
Bleed screw	3

Overhaul data

Assembly clearances

Cylinder - piston assy.





CYLINDER - PISTON

Specification	Desc./Quantity
Plunger diameter	74.967 +0.014 -0.014 mm
Cylinder diameter	75 +0.038 +0.01 mm

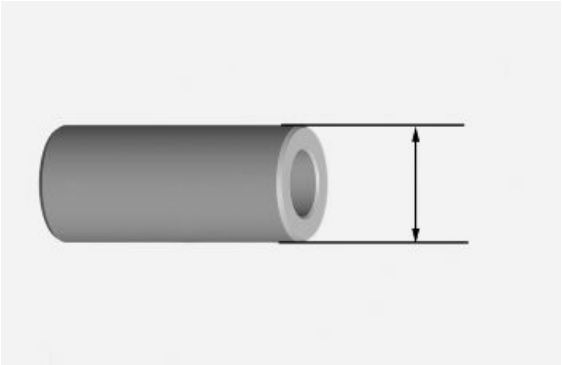
COUPLING CATEGORIES

Name	Initials	Cylinder	Piston	Play on fitting
cylinder-piston	M	75.01 ÷ 75.017	74.953 ÷ 74.960	0.050 ÷ 0.064
cylinder-piston	N	75.017 ÷ 75.024	74.960 ÷ 74.967	0.050 ÷ 0.064
cylinder-piston	O	75.024 ÷ 75.031	74.967 ÷ 74.974	0.050 ÷ 0.064
cylinder-piston	P	75.031 ÷ 75.038	74.974 ÷ 74.981	0.050 ÷ 0.064

N.B.

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

- Measure the outer diameter of the gudgeon pin.

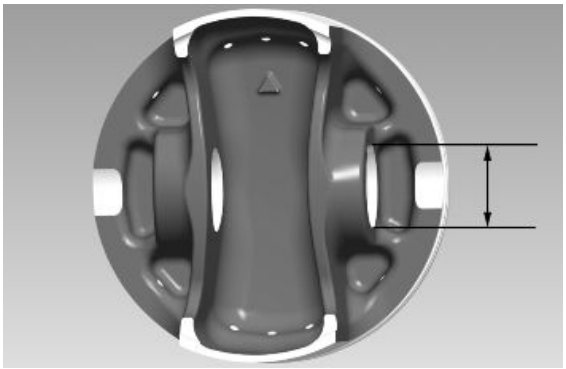


Characteristic

Pin outside diameter

16 +0 -0.004 mm

- Measure the diameter of the bearings on the piston.



Characteristic

Standard diameter

16 +0.006 +0.001 mm

- Calculate the piston pin coupling clearance.

N.B.

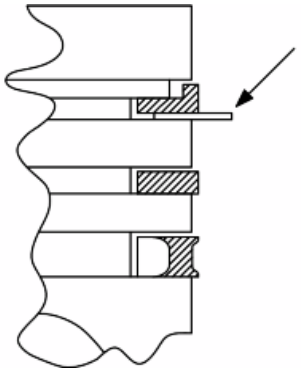
THE PIN HOUSINGS HAVE 2 LUBRICATION CHANNELS. FOR THIS REASON, MEASUREMENT MUST BE MADE ACCORDING TO THE PISTON AXIS

Characteristic

Standard clearance:

0.001 - 0.010 mm

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



N.B.

MEASURE THE CLEARANCE BY INSERTING THE BLADE OF THE FEELER GAUGE FROM THE SECOND SEAL RING SIDE.

Fitting clearance

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

- Check that the head coupling surface is not worn or misshapen.
- Pistons and cylinders are classified according to their diameter. The coupling must be made with those of the same type (M-M, N-N, O-O, P-P).

Characteristic

Maximum allowable run-out:

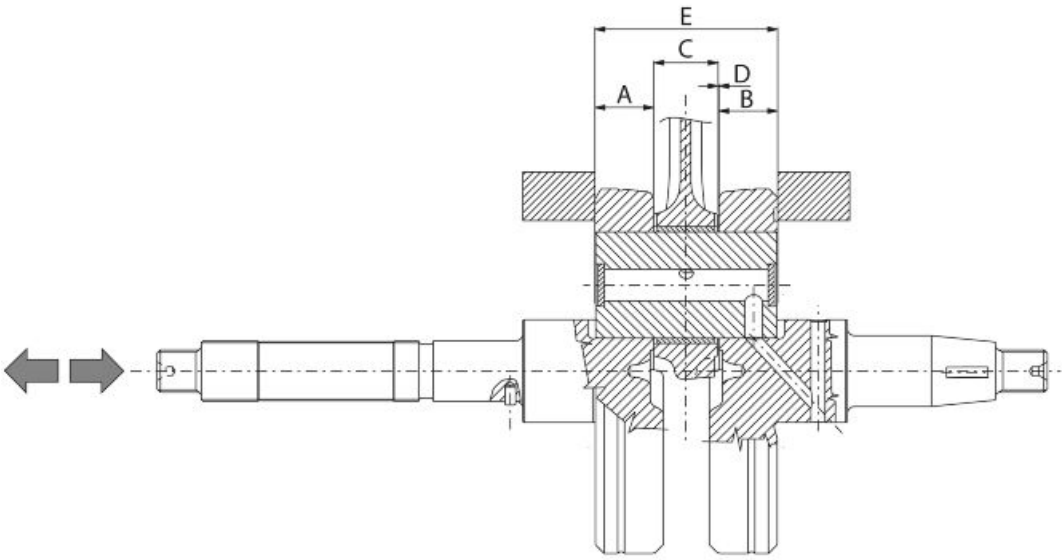
0.001 over 0.05 mm

Crankcase - crankshaft - connecting rod

CRANKSHAFT

Titolo	Durata/Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Crankshaft		Axial clearance between crankshaft and connecting rod	

Axial clearance between crankshaft and connecting rod

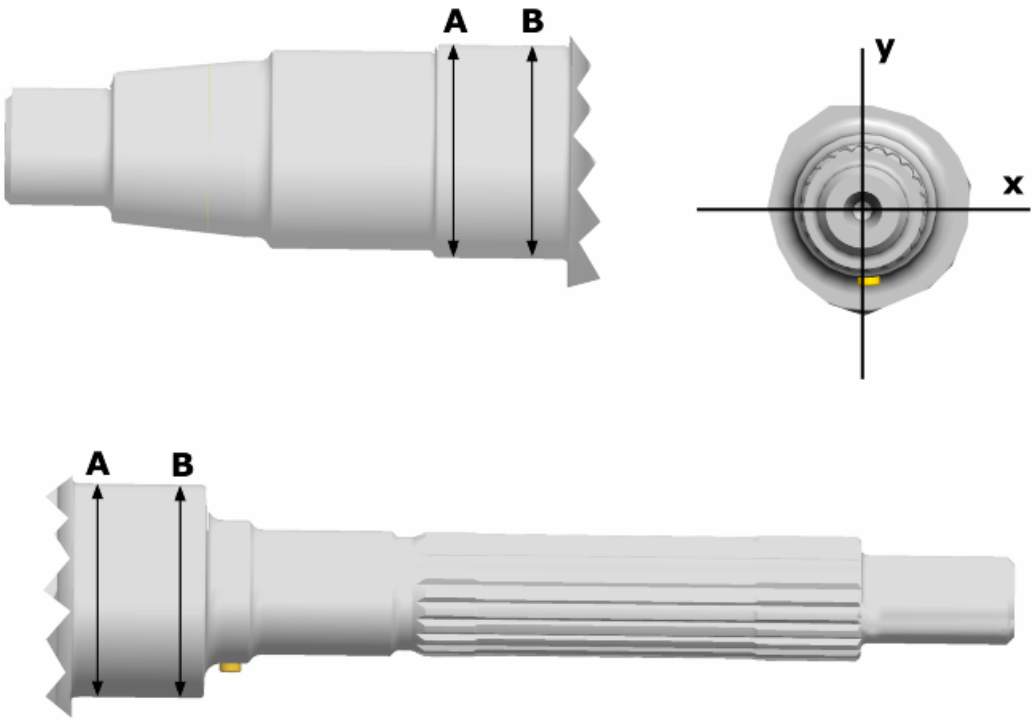


AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD

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

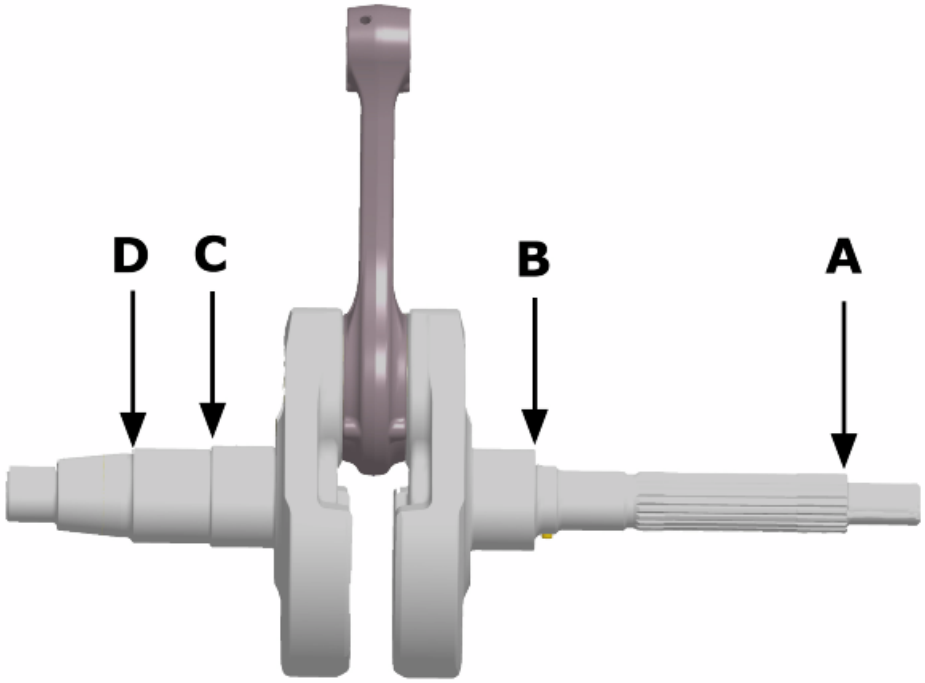
Diameter of crankshaft bearings.

Measure the bearings on both axes x-y.



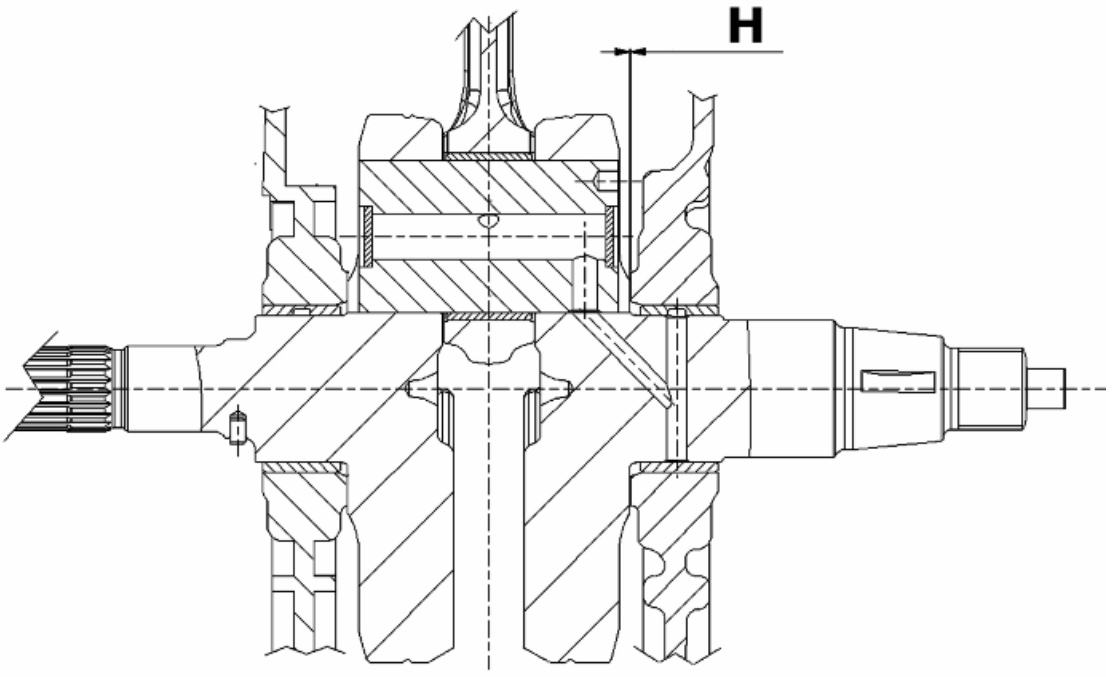
CRANKSHAFT

Specification	Desc./Quantity
Crankshaft bearings: Standard diameter: Cat. 1	28.998 ÷ 29.004 mm
Crankshaft bearings: Standard diameter: Cat. 2	29.004 ÷ 29.010 mm



MAX. ADMISSIBLE DISPLACEMENT

Specification	Desc./Quantity
A =	0.15 mm
B =	0.010 mm
C =	0.010 mm
D =	0.10 mm



Characteristic

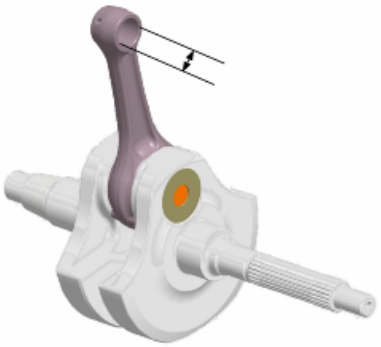
Crankshaft-crankcase axial clearance (H)

0.15 ÷ 0.43 mm

- Using a bore gauge, measure the connecting rod small end diameter.

N.B.

IF THE CONNECTING ROD SMALL END DIAMETER EXCEEDS THE STANDARD DIAMETER, EXHIBITS WEAR OR OVERHEATING, PROCEED TO REPLACE THE CRANKSHAFT AS DESCRIBED IN THE CRANKCASE AND CRANKSHAFT CHAPTER.



Characteristic

Standard diameter

16 +0.025 +0.015 mm

- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.
- The main bushings are comprised of two half-bearings, one with holes and channels for lubrication whereas the other is solid.
- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposite the cylinder.
- To prevent shutters in the oil feeding channels, the matching surface of the two half-bearings must be perfectly orthogonal to the cylinder axis, as shown in the figure.
- The oil feeding channel section is also affected by the bushings driving depth compared with the crankshaft axial clearance of the limiting surface.
- Check the inside diameter of the main bushings in the three directions indicated in the diagram.
- Repeat the measurements for the other bushing half. see diagram.
- There are three crankcase versions: with BLUE bushings, with YELLOW bushings and with GREEN bushings.
- There is only one type of main bushing housing hole in the crankcase. The standard bushing diameter after driving is variable on the basis of a coupling selection.
- The bushing housings in the crankcase are classified into 2 categories - Cat. 1 and Cat. 2 - just like those for the crankshaft.
- The main bushings are available in three thickness categories, identified by colour markings, as shown in the table below.

BUSHINGS

TYPE	IDENTIFICATION	CRANKSHAFT HALF-BEARING
B	BLUE	1.973 to 1.976
C	YELLOW	1.976 to 1.979
E	GREEN	1.979 to 1.982

COUPLINGS

BUSHING CATEGORY	CRANKCASE HALVES CATEGORY	BUSHING INSIDE DIAMETER AFTER FITTING
B	2	29.024 ÷ 29.054
C	1	29.024 ÷ 29.054
	2	29.018 ÷ 29.048
E	1	29.018 ÷ 29.048

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

CATEGORIES

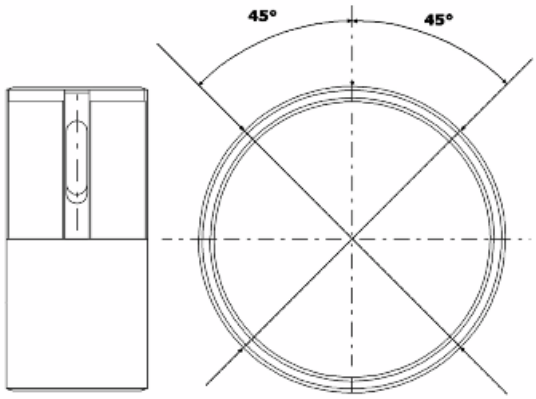
CRANKCASE HALVES	ENGINE HALF-SHAFT	BUSHING
Cat. 1	Cat. 1	E
Cat. 2	Cat. 2	B
Cat. 1	Cat. 2	C
Cat. 2	Cat. 1	C

N.B.

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

N.B.

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



Characteristic

Crankshaft-bushing maximum clearance admitted:

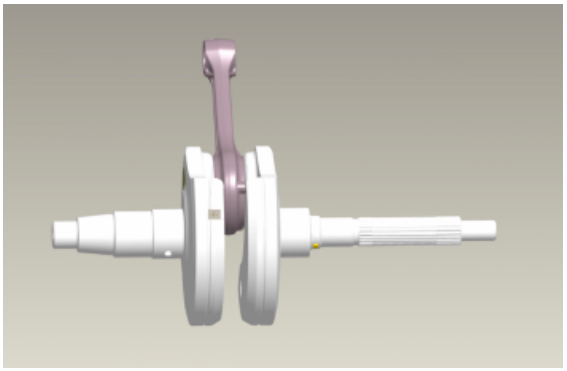
0.08 mm

Diameter of crankcase without bushing

CAT. 1: 32.959 ÷ 32.965 mm

CAT. 2: 32.953 ÷ 32.959 mm

THE CRANKSHAFT is available in two **CATEGORIES:**



Characteristic

Crankshaft category:

CAT. 1 - CAT. 2

CRANKSHAFT CATEGORY IDENTIFICATION:

The identification is indicated on the counterweight shoulder «***1 - *2**», if carried out with micropinholing. Otherwise, «**1 - 2**» if done manually with an electric pen. The spare part identification is located on the package with **a drawing number** plus **FC1/FC2** or (**001/002**).

If a crankshaft comprising two half-shafts of different categories needs to be replaced, also replace both crankcase halves, combining the two components (Shaft and Crankcase) featuring the same category.

Cylinder Head

Before performing head service operations, thoroughly clean all coupling surfaces. Note the position of the springs and the valves so as not to change the original position during refitting

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

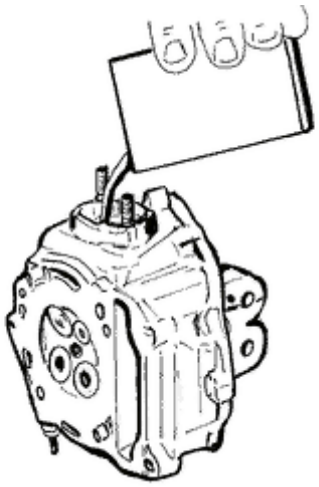
Characteristic

Maximum allowable run-out:

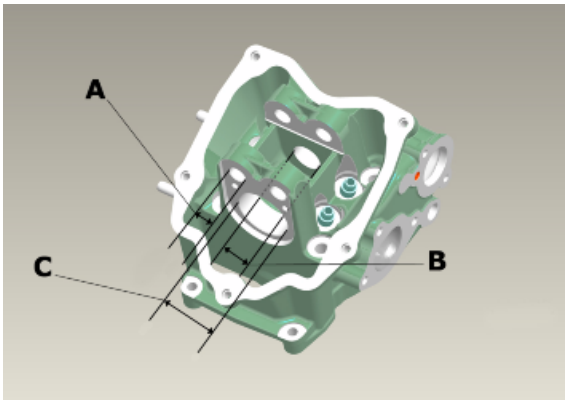
0.1 mm

- In case of faults, replace the head.
- Check the sealing surfaces for the intake and exhaust manifold.
- Check that the camshaft and the rocking lever pin capacities exhibit no wear.
- Check that the head cover surface is not worn.
- Check that the coolant seal plug exhibits no oxidation.

- 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.



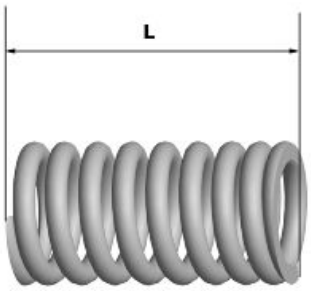
Measure the camshaft bearing seats and rocking lever support pins with a bore meter



HEAD BEARINGS

Specification	Desc./Quantity
bearing «A»	Ø 12.000 - 12.018 mm
bearing «B»	Ø 20.000 ÷ 20.021 mm
bearing «C»	Ø 37.000 - 37.025 mm

Measure the unloaded spring length



Characteristic

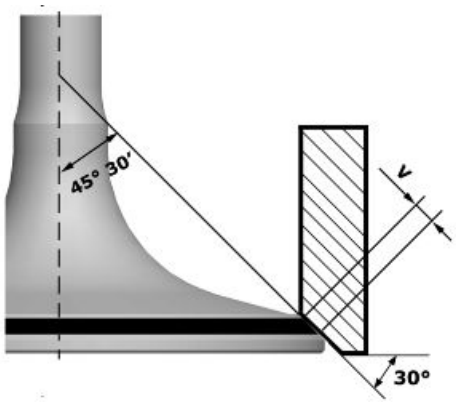
Standard length

40.2 mm

Allowable limit after use:

38.2 mm

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



Characteristic

Standard value:

1 - 1.3 mm

Admissible limit:

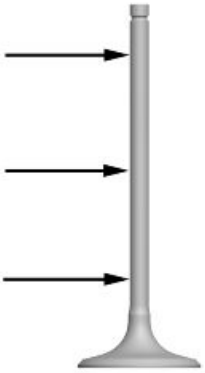
1.6 mm

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

STANDARD VALVE LENGTH

Specification	Desc./Quantity
Valve check Standard length	Intake: 94.6 mm
Valve check Standard length	Exhaust: 94.4 mm

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



STANDARD DIAMETER

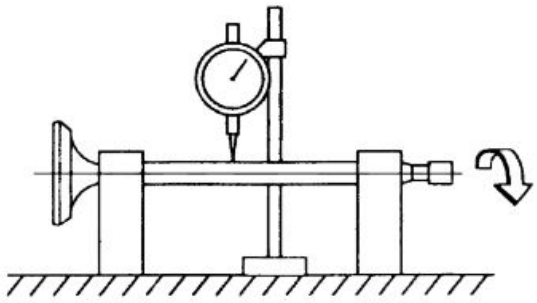
Specification	Desc./Quantity
Intake:	4.987 - 4.972 mm
Exhaust:	4.975 - 4.960 mm

MINIMUM ADMISSIBLE DIAMETER

Specification	Desc./Quantity
Intake:	4.96 mm
Exhaust:	4.945 mm

- Calculate the clearance between valve and valve guide.

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

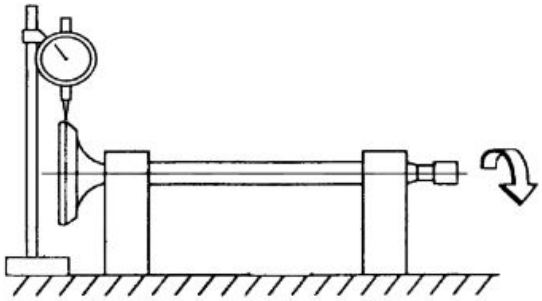


Characteristic

Limit values admitted:

0.1 mm

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

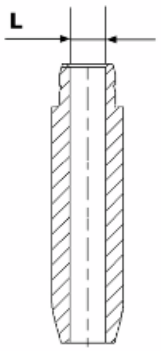


Characteristic

Admissible limit:

0.03 mm

Measure the valve guide.



Characteristic

Valve guide:

5 +0.012 mm

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

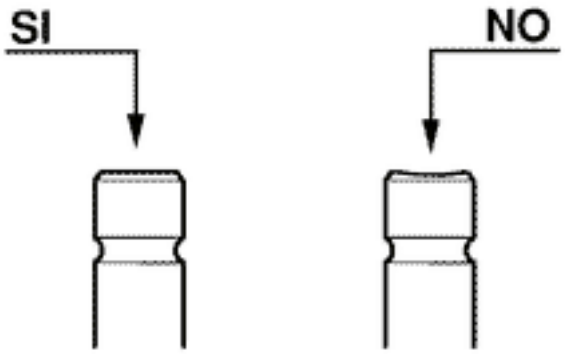
INTAKE

Specification	Desc./Quantity
Standard clearance:	0.013 - 0.04 mm
Admissible limit:	0.08 mm

EXHAUST

Specification	Desc./Quantity
Standard clearance:	0.025 to 0.052 mm
Admissible limit:	0.09 mm

- Check that there are no signs of wear on the mating surface with the set screw articulated terminal.



- If no faults are found during the above checks, you can use the same valves. To obtain better sealing performance, grind the valve seats. 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.

CAUTION

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

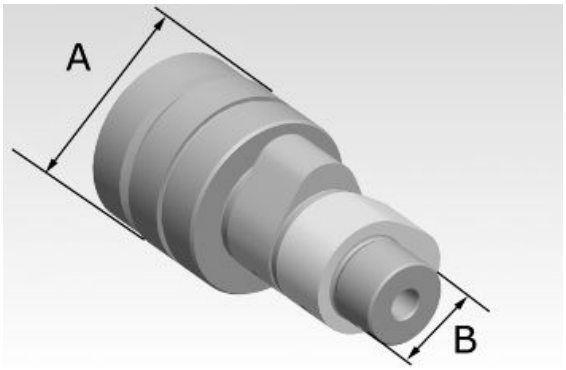
- Check that the camshaft bearings exhibit no scores or abnormal wear.
- Using a micrometer, measure the camshaft bearings.

STANDARD DIAMETER

Specification	Desc./Quantity
Camshaft check: Standard diameter	Bearing A Ø: 36.95 ÷ 36.975 mm
Camshaft check: Standard diameter	Bearing B diameter: 19.959 ÷ 19.98 mm

MINIMUM ADMISSIBLE DIAMETER

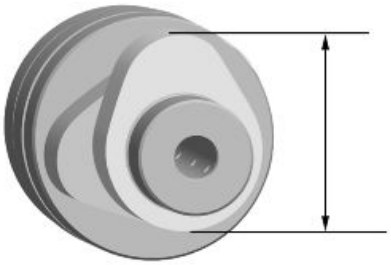
Specification	Desc./Quantity
Camshaft check: Minimum admissible diameter	Bearing A Ø: 36.94 mm
Camshaft check: Minimum admissible diameter	Bearing B diameter: 19.950 mm



- Using a gauge, measure the height of the cams.

STANDARD HEIGHT

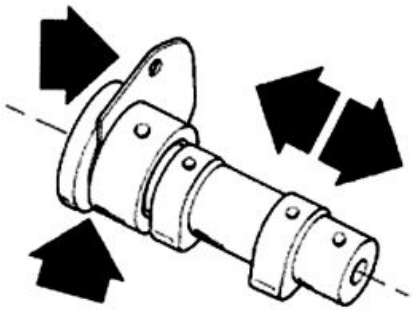
Specification	Desc./Quantity
Camshaft check: Standard height	Intake: 30.285 mm
Camshaft check: Standard height	Exhaust: 29.209 mm



Check the axial clearance of the camshaft

CAMSHAFT AXIAL CLEARANCE

Specification	Desc./Quantity
Camshaft check: Standard axial clearance:	0.11 - 0.41 mm
Camshaft check: Maximum admissible axial clearance	0.42 mm



- Measure the outside diameter of the rocking lever pins
- Check the rocking lever pins do not show signs of wear or scoring.
- Measure the internal diameter of each rocker.

Check there are no signs of wear on the slider from contact with the cam and on the jointed adjustment plate.

ROCKING LEVERS AND PIN DIAMETER:

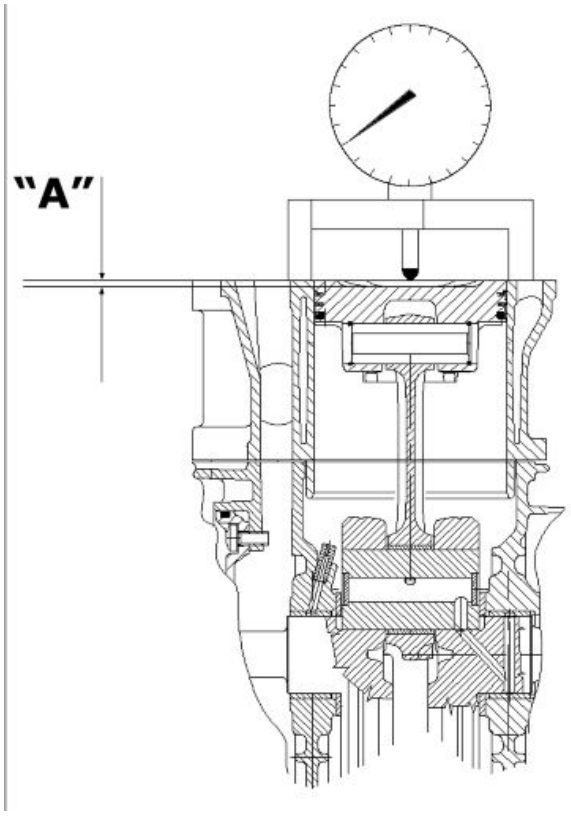
Specification	Desc./Quantity
Rocking lever inside diameter: Standard diameter	Diameter 12.000 - 12.011 mm
Rocking lever pin diameter: Standard diameter	Diameter 11.977 - 11.985 mm

Slot packing system

Characteristic

Compression ratio

10.5 ÷ 11.5 : 1



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

N.B.

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

ENGINE 300 SHIMMING

Name	Measure A	Thickness
SHIMMING	3.70 - 3.60	0.4 ± 0.05
SHIMMING	3.60 - 3.40	0.6 ± 0.05
SHIMMING	3.40 - 3.30	0.8 ± 0.05

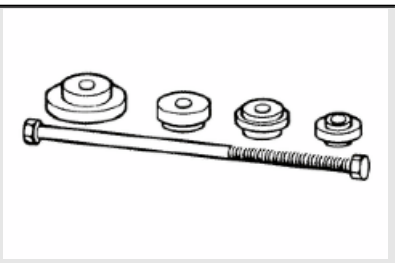
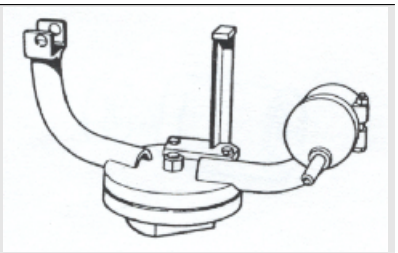
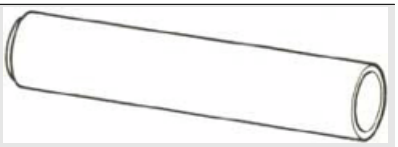
Products

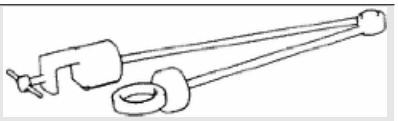
RECOMMENDED PRODUCTS TABLE

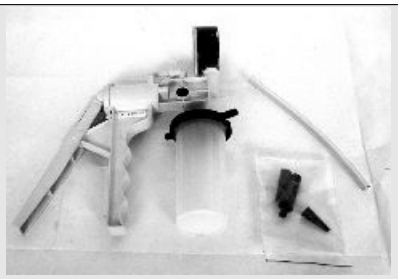
Product	Description	Specifications
AGIP GEAR SAE 80W-90	Lubricant for gearboxes and transmissions.	API GL-4
eni i-Ride PG 5W-40	Synthetic based lubricant for high-performance four-stroke engines.	JASO MA, MA2 - API SL - ACEA A3
AGIP FILTER OIL	Special product for the treatment of foam filters.	-
AGIP GP 330	Water repellent stringy calcium spray grease.	R.I.D./A.D.R. 2 10°b) 2 R.I.Na. 2.42 - I.A.T.A. 2 - I.M.D.G. class 2 UN 1950 Page 9022 EM 25-89
AGIP BRAKE 4	Brake fluid.	Synthetic fluid SAE J 1703 -FMVSS 116 - DOT 3/4 - ISO 4925 - CUNA NC 956 DOT 4
AGIP PERMANENT SPEZIAL	Ethylene glycol-based antifreeze fluid with organic inhibition additives. Red, ready to use.	ASTM D 3306 - ASTM D 4656 - ASTM D 4985 - CUNA NC 956-16

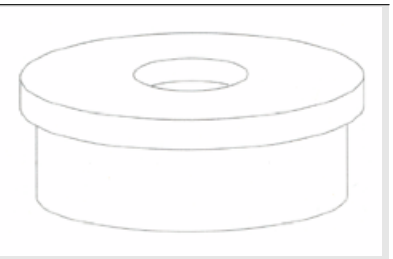
INDEX OF TOPICS

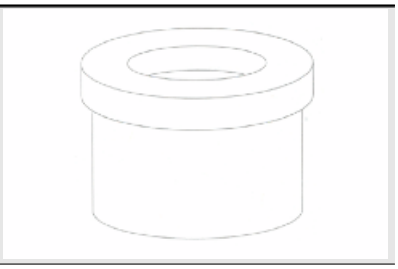
ATTREZZATURA SPECIFICA

Stores code	Description	
001330Y	Tool for fitting steering seats	
001467Y014	Calliper to extract ø 15-mm bearings	
005095Y	Engine support	
002465Y	Calliper for circlips	
006029Y	Punch for fitting steering bearing seat on steering tube	
020004Y	Punch for removing steering bearings from headstock	
020055Y	Wrench for steering tube ring nut	

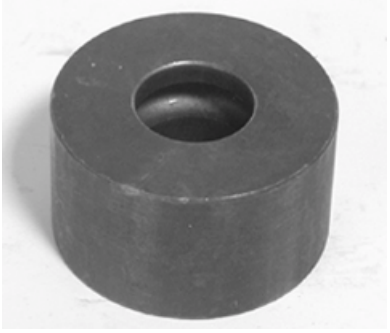
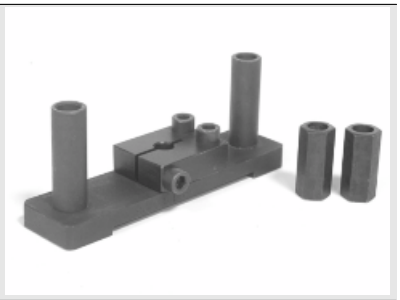
Stores code	Description	
020074Y	Support base for checking crankshaft alignment	
020150Y	Air heater mounting	
020151Y	Air heater	
020193Y	Oil pressure check gauge	
020262Y	Crankcase splitting plate	
020263Y	Driven pulley assembly sheath	

Stores code	Description	
020306Y	Punch for assembling valve seal rings	
020329Y	Mity-Vac vacuum-operated pump	
020330Y	Stroboscopic light to check timing	
020331Y	Digital multimeter	
020332Y	Digital rpm indicator	

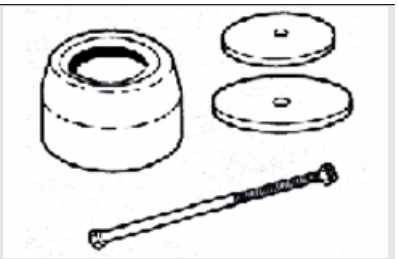
Stores code	Description	
020334Y	Multiple battery charger	
020335Y	Magnetic mounting for dial gauge	
020357Y	32 x 35-mm Adaptor	
020359Y	42 x 47-mm Adaptor	
020360Y	52 x 55-mm Adaptor	
020363Y	20-mm guide	

Stores code	Description	
020375Y	28 x 30 mm adaptor	
020376Y	Adaptor handle	
020382Y	Valve cotters equipped with part 012 removal tool	
020382Y011	adapter for valve removal tool	
020393Y	Piston assembly band	
020412Y	15-mm guide	

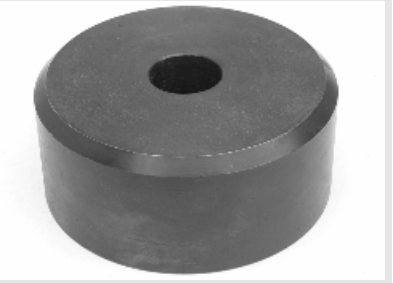
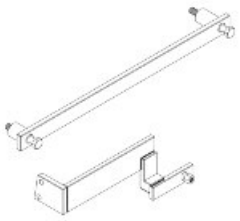
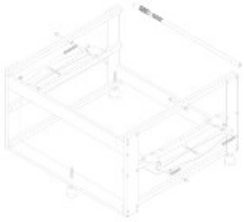
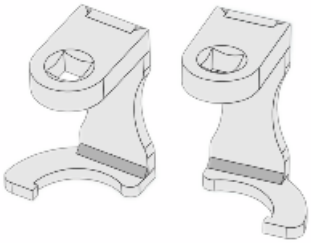
Stores code	Description	
020423Y	Driven pulley lock wrench	
020424Y	Driven pulley roller casing fitting punch	
020426Y	Piston fitting fork	
020431Y	Valve oil seal extractor	
020434Y	Oil pressure check fitting	
020444Y	Tool for fitting/ removing the driven pulley clutch	

Stores code	Description	
020456Y	Ø 24 mm adaptor	
020477Y	37 mm adaptor	
020483Y	30-mm guide	
020489Y	Hub cover support stud bolt kit	
020428Y	Piston position check mounting	
020621Y	HV cable extraction adaptor	

Stores code	Description	
001467Y035	Bearing housing, outside ø 47 mm	
020626Y	Driving pulley lock wrench	
001467Y013	Calliper to extract ø 15-mm bearings	
020627Y	Flywheel lock wrench	
020467Y	Flywheel extractor	
020454Y	Tool for fitting piston pin stops (200 - 250)	

Stores code	Description	
020622Y	Transmission-side oil seal punch	
020480Y	Petrol pressure check kit	
020244Y	15-mm diameter punch	
020115Y	Ø 18 punch	
020271Y	Tool for removing-fitting silent bloc	
020922Y	Diagnosis Tool	
020648Y	Single battery charger	

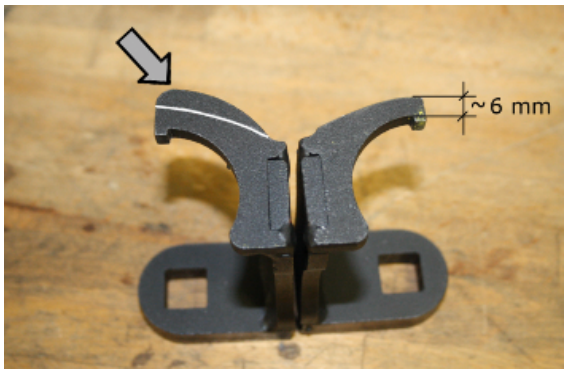
Stores code	Description	
020639Y	Roll lock control unit software	
020481Y004	Parking control unit interface wiring	
001467Y017	Driver for OD 36 mm bearings	
020234y	extractor	
020441Y	26 x 28 mm adaptor	
020362Y	12 mm guide	
020358Y	37x40-mm Adaptor	

Stores code	Description	
001467Y002	Driver for OD 73 mm bearing	
020646Y	Parallelogram and steering positioning tool	
020647Y	Toe-in checking tool	
020647Y028	MP3 LT Toe-in tool (tricycle)	
020892y	Steering side headstock ring nut key	

INDEX OF TOPICS

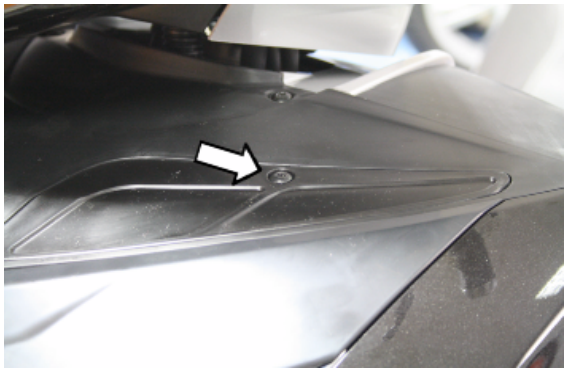
MEASURE FOR TOOL CHANGE 020892Y

To carry out the operation on MP3 YOURBAN described below, it is necessary to modify the existing tool 020892Y, removing the material as described in the photo. This operation will make the tool usable, even on this vehicle

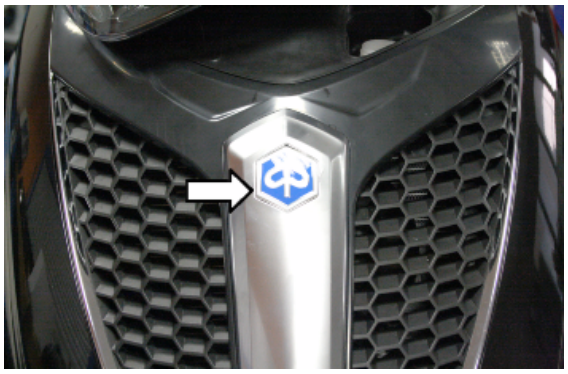


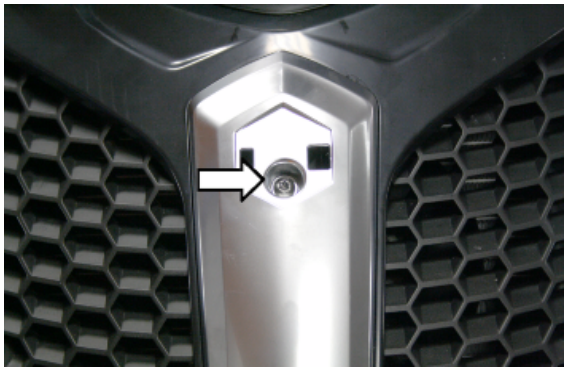
ADJUSTMENT PROCEDURE OF THE RING NUTS OF THE SIDE HEADSTOCKS

Remove the cooling liquid expansion tank cover and corresponding tap.

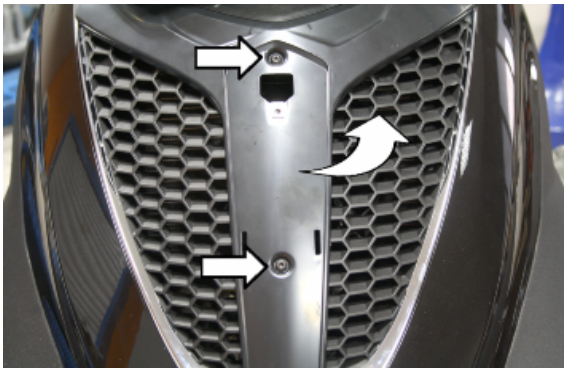


Remove the screw under the clip-on badge and remove the cover.

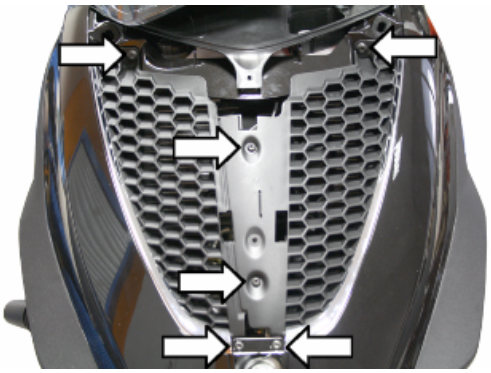




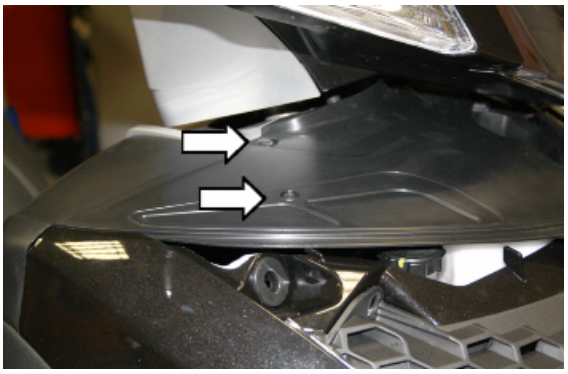
Remove the 2 screws indicated in the figure and remove the cover.

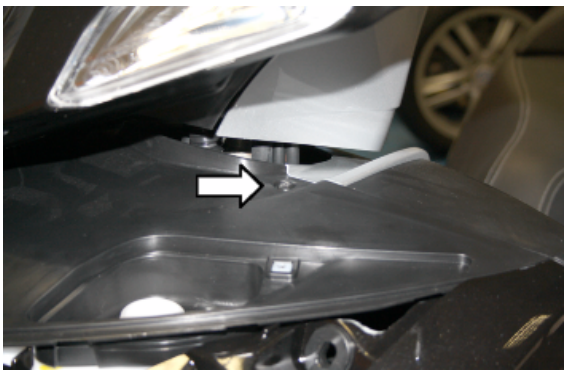


- Remove the 6 screws shown in the figure

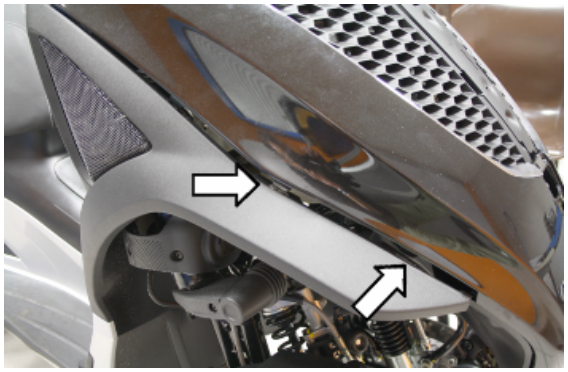


Remove the 3 screws indicated in the photo and remove the upper cover.

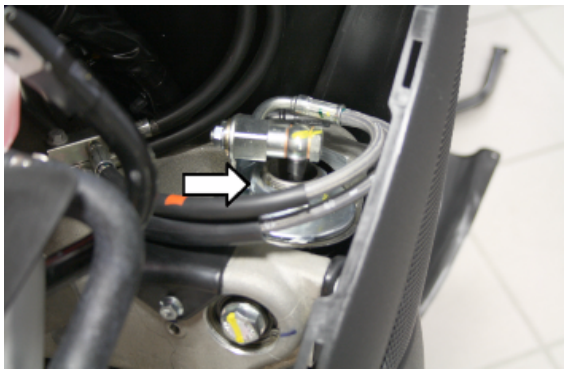




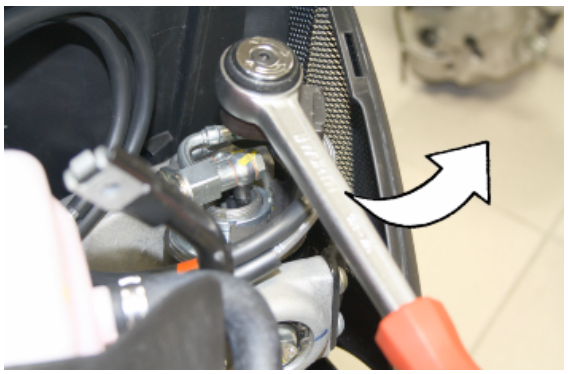
Remove the 2 screws on the leg shield back plate and remove the front shield, taking care to detach the anchoring tongues on the side spoilers



Once the plastics have been remove the ring nuts of the side headstock of the front suspension can be reached



Unscrew the upper ring nut

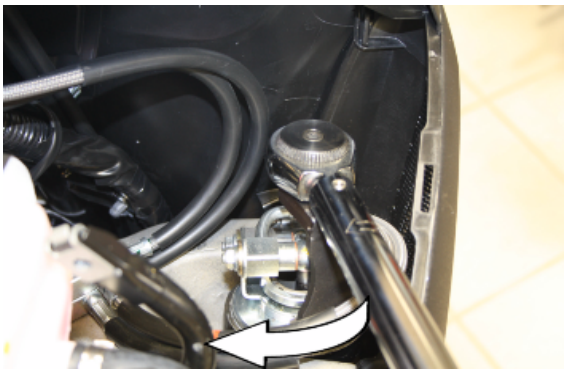


Bring the upper ring nut to the end of the headstock thread of the side suspension

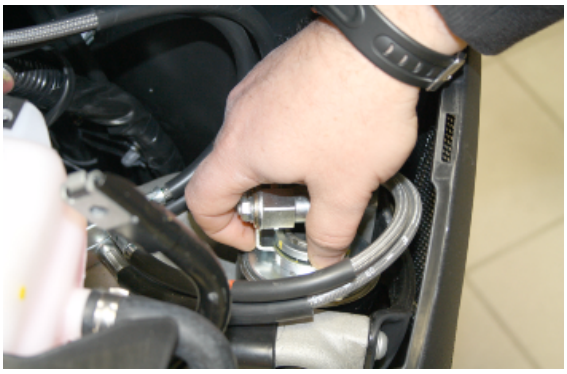
Tighten the lower ring nut to the specified torque with the appropriate key.

Locking torques (N*m)

Side headstock lower ring nut **12 ÷ 15**



Screw the upper ring nut until it stops



Tighten upper ring nut to the specified torque with the appropriate key.

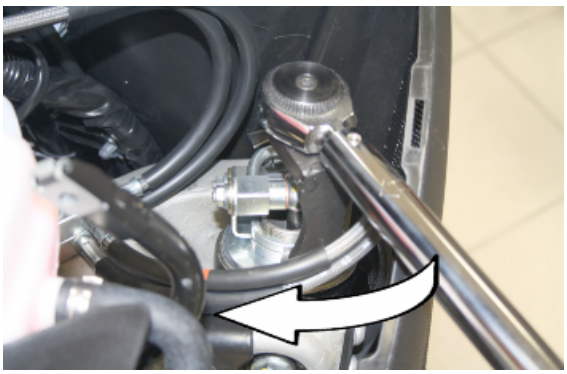
Carry out the assembly of the plastic covers in reverse order to the disassembly.

Specific tooling

020892y Steering side headstock ring nut key

Locking torques (N*m)

Side headstock upper ring nut **20 - 24**



Use the switch "MODE" to "ODO" mode

Hold the switch "MODE" for more than 3 seconds, the hours will be displayed. Hours will increase each time the "MODE" button is pressed.

Once the hour is adjusted, hold the switch "MODE" more than 3 seconds to display the minutes. Minutes will increase each time the "MODE" button is pressed.

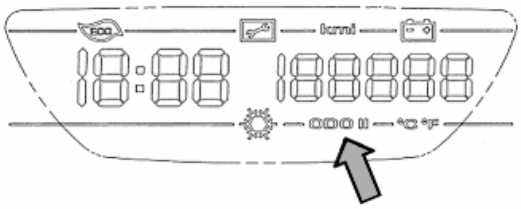
If no key is pressed for 3 seconds, the system will leave the clock adjustment mode.

WARNING

FOR SAFETY REASONS, CLOCK ADJUSTMENT IS POSSIBLE EXCLUSIVELY WITH VEHICLE SPEED EQUAL TO 0 Km/h.

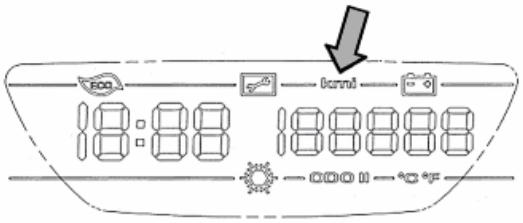
TRIP COUNTER PARTIAL RESET

In the partial trip counter function, press and hold the MODE button for longer than 3 seconds and it will reset.



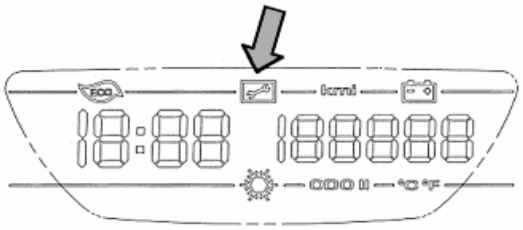
SELECT MILES - KM

When using the function measuring the voltage of the battery, holding down the MODE button for longer than 10 seconds will switch between reading in kilometres or miles for the odometer.
For the first 5 seconds the bearing will not give any signal, for the next 5 seconds the message of the unit of measurement (Km or miles) currently in use will blink at a frequency of 1Hz. If the button is released before 10 seconds the measurement unit is not changed.



RESET SERVICE WARNING LIGHT

At vehicle ignition, immediately after the ignition check, if there are less than 300 km (187.5 miles) to the next scheduled service, the corresponding icon flashes for 5 seconds. Once the service mileage has been reached, the icon remains steadily on until it is reset.
The resetting of the service is done by holding down the MODE key to the key connection for more than 10 seconds. For the first 5 seconds, the instrument panel will not give any signal, for the next 5 seconds the key icon will blink at a frequency of 1Hz. If the button is released before the 10 seconds, the service is not reset.



Maintenance chart

SCHEDULED MAINTENANCE TABLE

***I**: CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY.*
***C**: CLEAN, **R**: REPLACE, **A**: ADJUST, **L**: LUBRICATE*
** Replace every 2 years*

Km x 1,000	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Safety fasteners	I		I				I				I				I		
Spark plug		I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R
Centre stand bracket			L				L				L				L		
Drive belt				R			R			R			R			R	
Throttle control	A		A		A		A		A		A		A		A		A
Air filter			C		C		C		C		C		C		C		C
Engine oil filter	R		R		R		R		R		R		R		R		R
Valve clearance					A				A				A				A
Electrical system and battery	I		I		I		I		I		I		I		I		I
Coolant *	I		I		I		I		I		I		I		I		I
Brake fluid *	I		I		I		I		I		I		I		I		I

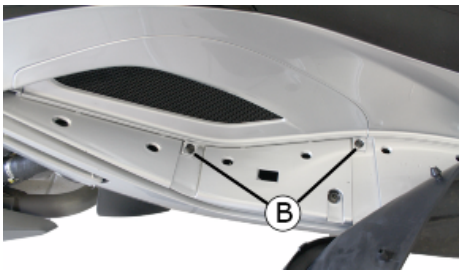
Km x 1,000	1	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Engine oil	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R
Hub oil	R	I	I	I	R	I	I	I	R	I	I	I	R	I	I	I	R
Brake pads	I		I		I		I		I		I		I		I		I
Sliding shoes / CVT rollers			R		R		R		R		R		R		R		R
Tyre pressure and wear			I		I		I		I		I		I		I		I
Vehicle and brake test	I		I		I		I		I		I		I		I		I
Suspension			I		I		I		I		I		I		I		I
Steering	I		I		I		I		I		I		I		I		I
Roll lock gripper control cable	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Time	120	15	165	75	135	15	185	15	135	75	165	15	165	15	185	15	165

Spark plug

- Remove the screw "A"

- Remove the platform mat by removing the pressure pads.

- Remove the 2 screws "B"



- Remove the flap "C"

- Remove the spark plug cover and insert the box-spanner with the appropriate leverage for the removal.

- Remove the spark plug.
- When refitting, place the spark plug into the hole at the required angle and finger tighten it as far as it will go. Use the wrench only to tighten it.
- Cover the spark plug completely with its cap, making sure it is back in the retainer.

N.B.

USE OF SPARK PLUGS OTHER THAN THE INDICATED TYPE OR UNSHIELDED SPARK PLUG CAPS CAN LEAD TO FAULTS IN THE VEHICLE 'S ELECTRICAL SYSTEM.

WARNING

SPARK PLUG MUST BE REMOVED WHEN THE ENGINE IS COLD. REPLACE THE SPARK PLUG AS INDICATED IN THE SCHEDULED MAINTENANCE TABLE. THE USE OF ELECTRONIC CENTRAL UNITS AND OF NON-COMPLIANT ELECTRONIC IGNITIONS OR SPARK PLUGS OTHER THAN THOSE PRESCRIBED MAY SERIOUSLY DAMAGE THE ENGINE.

RECOMMENDED SPARK PLUG

Specification	Desc./Quantity
Spark plug	NGK CR8EKB
Electrode gap	0.7 to 0.8 mm

Hub oil

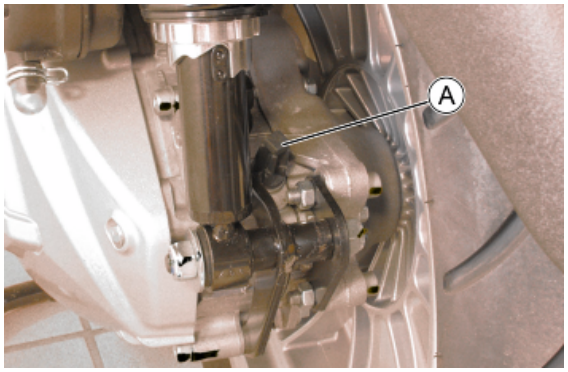
Check

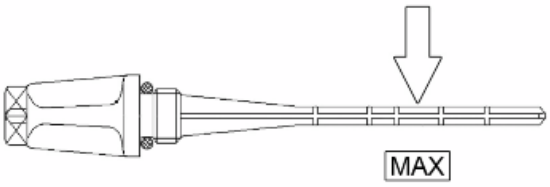
-Place the vehicle on the centre stand on flat ground;

- Remove the oil dipstick «**A**», dry it with a clean cloth and put it back into its hole **tightening it completely**;

Remove the dipstick and check that the oil level is slightly over the second notch starting from the lower end; if the level is under the MAX. mark, it needs to be filled with the right amount of hub oil.

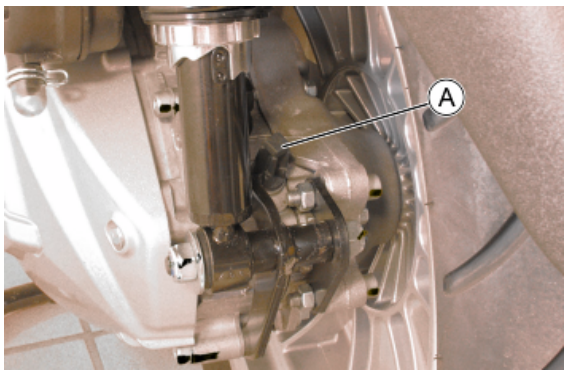
-Screw up the oil dipstick again and make sure it is locked properly into place.





Replacement

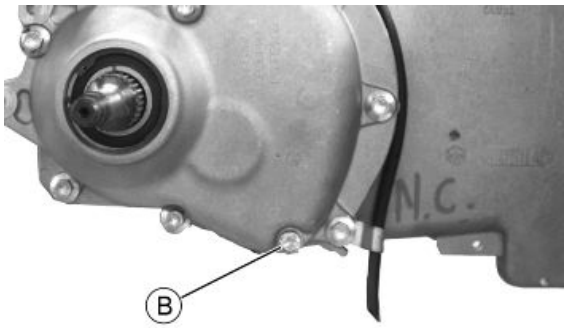
- Rimuovere il tappo di carico olio «A».
- Predisporre un adeguato contenitore.
- Svitare il tappo di scarico olio «B» e lasciar defluire completamente l'olio.
- Riavvitare il tappo di scarico con la relativa guarnizione e rifornire.
- Riavvitare il tappo di carico olio.



Recommended products

AGIP GEAR SAE 80W-90 Lubricant for gear-boxes and transmissions.

API GL-4



Characteristic

Rear hub oil

Capacity approximately 250 cc

Locking torques (N*m)

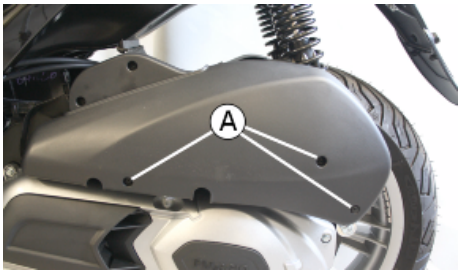
Hub oil drainage screw **15 to 17 Nm**

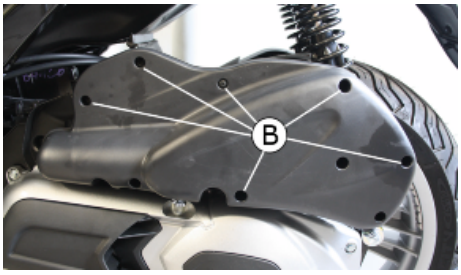
Air filter

Proceed as follows:

Loosen the 3 screws "**A**" and remove the filter housing cover.

Loosen the 6 remaining screws "**B**" and remove the air filter cover.





1. Wash the sponge with water and mild soap.

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

3. Impregnate the sponge with a mixture of 50% petrol and 50% specified oil.

4. Gently squeeze the filtering element, let it drip dry and then refit it.

CAUTION

IF THE VEHICLE IS USED ON DUSTY ROADS IT IS NECESSARY TO CARRY OUT MAINTENANCE CHECKS OF THE AIR FILTER MORE OFTEN TO AVOID DAMAGING THE ENGINE.

Recommended products

AGIP FILTER OIL Special product for the treatment of foam filters.

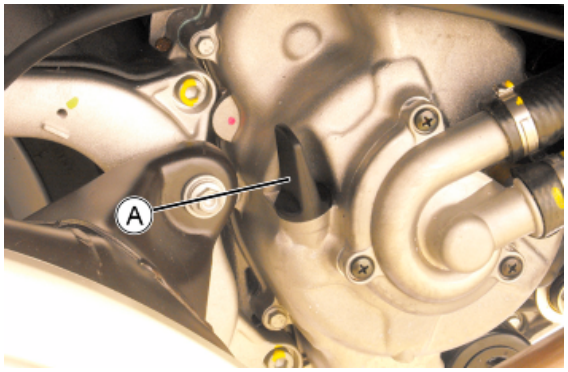
-

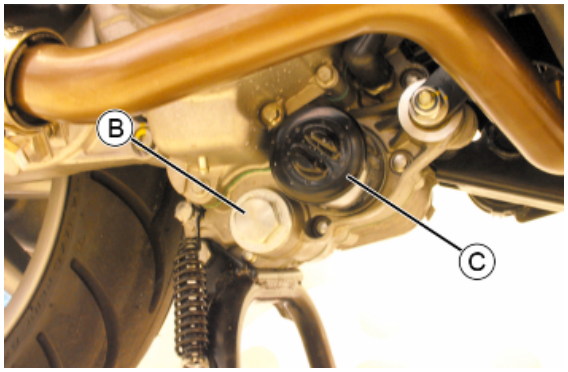
Engine oil

In four stroke engines, the engine oil is used to lubricate the timing elements, the bench bearings and the thermal group. **An insufficient quantity of oil can cause serious damage to the engine.**
In all four stroke engines, the deterioration of the oil characteristics, or a certain consumption should be considered normal, especially if during the run-in period. Consumption levels in particular can be influenced by the conditions of use (e.g.: oil consumption increases when driving at "full throttle".

Replacement

Have oil changed and cartridge filter «**C**» replaced as indicated in the scheduled maintenance table at an **Authorised Service Centre**. The engine should be emptied by draining the oil through drainage plug «**B** » of the mesh filter on the fly-wheel side. In order to facilitate oil drainage, loosen the cap/dipstick. Since a certain quantity of oil still remains in the circuit, add approx. 950 to 1000 cm^3 of oil through the cap «**A**. Then start the engine, leave it running for a few minutes and shut it off: after 5 minutes, check the level and if necessary, top-up **without exceeding the MAX level**. The cartridge filter must be replaced at every oil change. For top-ups and changes, use new oil of the recommended type.





WARNING

RUNNING THE ENGINE WITH INSUFFICIENT LUBRICATION OR WITH INADEQUATE LUBRICANTS ACCELERATES THE WEAR AND TEAR OF THE MOVING PARTS AND CAN CAUSE IRRETRIEVABLE DAMAGE.

WARNING

EXCESSIVE OIL LEVEL AT TOP-UPS CAN LEAD TO SCALE FORMATION AND VEHICLE MALFUNCTION.

CAUTION

USED OILS CONTAIN SUBSTANCES HARMFUL TO THE ENVIRONMENT. FOR OIL CHANGE, CONTACT AN AUTHORISED SERVICE CENTRE WHICH IS EQUIPPED TO DISPOSE OF USED OILS IN AN ENVIRONMENTALLY FRIENDLY AND LEGAL WAY.

CAUTION

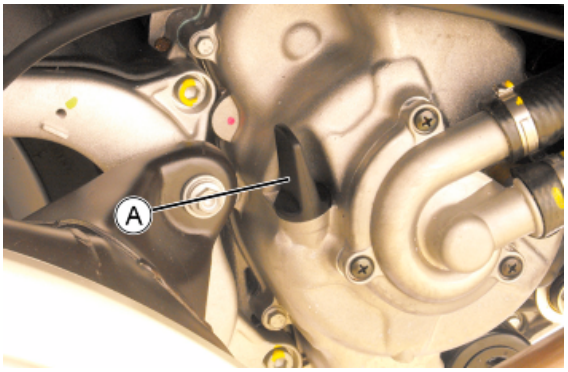
USING OILS OTHER THAN THOSE RECOMMENDED CAN SHORTEN THE LIFE OF THE ENGINE.

Recommended products

eni i-Ride PG 5W-40 Synthetic based lubricant for high-performance four-stroke engines.

JASO MA, MA2 - API SL - ACEA A3

Check



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

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

The MAX level mark indicates a quantity of around 1300 cc of engine oil. If the check is carried out after the vehicle has been used, and therefore with a hot engine, the level 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.

Engine oil top-up

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

Restoration of the level from **MIN** to **MAX** requires approximately **200 cc**.

Engine oil filter

Change oil and replace filter as indicated in the scheduled maintenance table. Use new oil of the recommended type for topping up and changing purposes.

Make sure the pre-filter and drainage plug O-rings are in good conditions. Lubricate them and refit the mesh filter and the oil drainage plug, screwing them up to the specified torque. Refit the new cartridge filter being careful to lubricate the O-ring before fitting it. Change the engine oil.

Recommended products

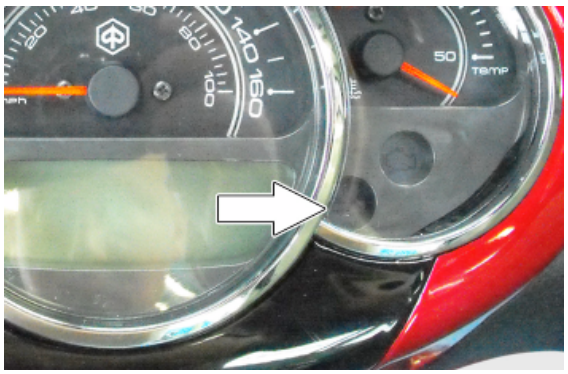
eni i-Ride PG 5W-40 Synthetic based lubricant for high-performance four-stroke engines.

JASO MA, MA2 - API SL - ACEA A3

Oil pressure warning light

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

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



Cooling system

Engine cooling is carried out by a forced-circulation coolant system. The coolant consists of a mixture 50% de-ionised water and 50% glycol ethylene-based antifreeze solution with corrosion inhibitors. The coolant supplied with the scooter is already mixed and ready for use.

For proper engine functioning, make sure that the temperature of the coolant remains in the middle zone of the corresponding gauge. If the needle of the gauge enters the red zone, stop the engine, let it cool down and check the coolant level; if the level is OK, contact an **Authorised Service Centre.**

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

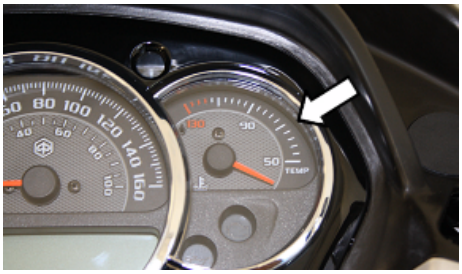
1. Set the vehicle upright on the stand and remove the cover by undoing screw «**A**».

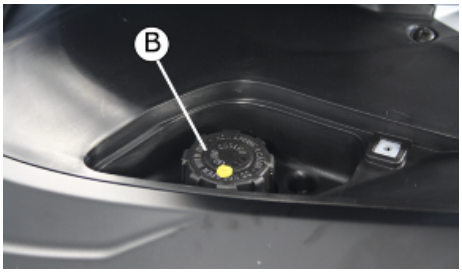
2. Remove the expansion tank cap«**B**» by turning it anticlockwise.

3. Look inside the expansion tank and check that fluid level is always between the «**MIN**» and «**MAX**» levels.

4. Top-up the fluid when it is close to the minimum mark.

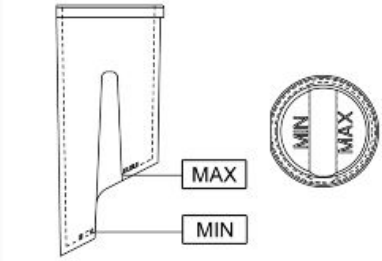
If the level is not correct, proceed to top-up when the engine is cold. If the coolant needs to be top-





ped up frequently or the expansion tank is completely dry, check the cooling system to find the cause of the problem. It is therefore essential to have the cooling system checked at an **Authorised Service Centre**.

Replace coolant as indicated in the scheduled maintenance table. Take your vehicle to an **Authorised Service Centre** for this operation.



WARNING

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

WARNING

IN ORDER TO AVOID HARMFUL FLUID LEAKS WHILE RIDING, IT IS IMPORTANT TO MAKE SURE THAT THE LEVEL DOES NOT EXCEED THE REFERENCE TONGUE TOO MUCH.
TO ENSURE CORRECT ENGINE OPERATION, KEEP THE RADIATOR GRILLE CLEAN.

Recommended products

AGIP PERMANENT SPEZIAL Ethylene glycol-based antifreeze fluid with organic inhibition additives. Red, ready to use.

ASTM D 3306 - ASTM D 4656 - ASTM D 4985 - CUNA NC 956-16

Braking system

Level check

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

1. Place the vehicle on its centre stand and make sure the handlebar is centred;

2. Check the fluid through the specific sight glass «**C**».

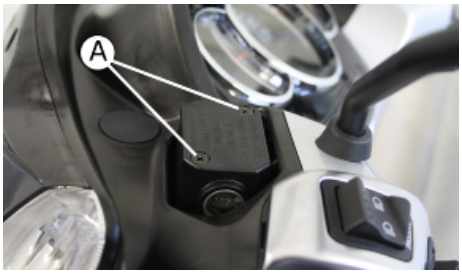
A drop in the brake fuel level may be caused by pad wear. Should the level appear to be below the minimum mark, please contact an **Authorised**

Service Centre or Dealer in order to have the braking system thoroughly checked.

Top-up

Proceed as follows:

Loosen the two fixing screws «**A**» and remove the cap to perform the top-up to the recommended level exclusively with recommended fluids without exceeding the maximum level.



This procedure applies to the rear brake pump top-up operation; follow the same procedure for the front brake pump.

Under standard climatic conditions, replace fluid as indicated in the scheduled maintenance table.

This operation must be carried out by trained personnel; take your vehicle to an **authorised Service centre or Dealer.**

WARNING

ONLY USE DOT 4-CLASSIFIED BRAKE FLUID. BRAKE CIRCUIT FLUID IS VERY 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.

Synthetic fluid SAE J 1703 -FMVSS 116 - DOT 3/4 - ISO 4925 - CUNA NC 956 DOT 4

Headlight adjustment

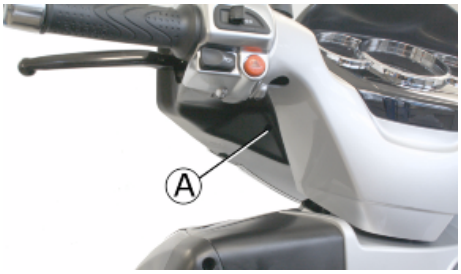
Proceed as follows:

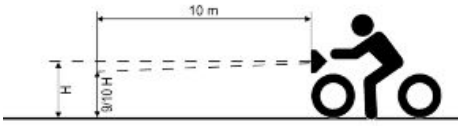
1. Position the unloaded vehicle, in running order and with the tyres inflated to the prescribed pressure, on a flat surface 10 m away from a half-lit white screen; ensure that the longitudinal axis of the vehicle is perpendicular to the screen;

2. Turn on the headlight and check that the borderline of the projected light beam is lower than 9/10 and higher than 7/10 of the distance from the ground to the centre of the vehicle headlight;

3. Otherwise, adjust the headlight with the screw **«A»** indicated in the figure

To carry out this operation, it is not necessary to remove any cover.





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.

INDEX OF TOPICS

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

For each failure, a list of the possible causes and pertaining operations is given.

Engine

Excessive oil consumption/Exhaust smoke

EXCESSIVE CONSUMPTION

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

Insufficient lubrication pressure

POOR LUBRICATION PRESSURE

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

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 faying surface with the bell is mainly in the centre with equivalent characteristics on the three masses. Check that the clutch housing is not scored or worn in an anomalous way

Insufficient braking

INEFFICIENT BRAKING SYSTEM

Possible Cause	Operation
Inefficient braking system	Check the pad wear (1.5 min). Check that the brake discs are not worn, scored or warped. Check the correct level of fluid in the pumps and change brake fluid if necessary. Check there is no air in the circuits; if necessary, bleed the air. Check that the front brake calliper moves in axis with the disc.
Fluid leakage in hydraulic braking system	Failing elastic fittings, plunger or brake pump seals, replace

Possible Cause	Operation
Brake disc slack or distorted	Check the brake disc screws are locked; measure the axial shift of the disc with a dial gauge and with wheel mounted on the vehicle.

Brakes overheating

BRAKE OVERHEAT

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

Steering and suspensions

Heavy steering

STEERING HARDENING

Possible Cause	Operation
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 seats in which the ball bearings rotate: if they are recessed or if the balls are squashed, replace them.

Excessive steering play

EXCESSIVE STEERING CLEARANCE

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 seats in which the ball bearings rotate: replace them if they are recessed or if the balls are flattened.

Noisy suspension

NOISY SUSPENSION

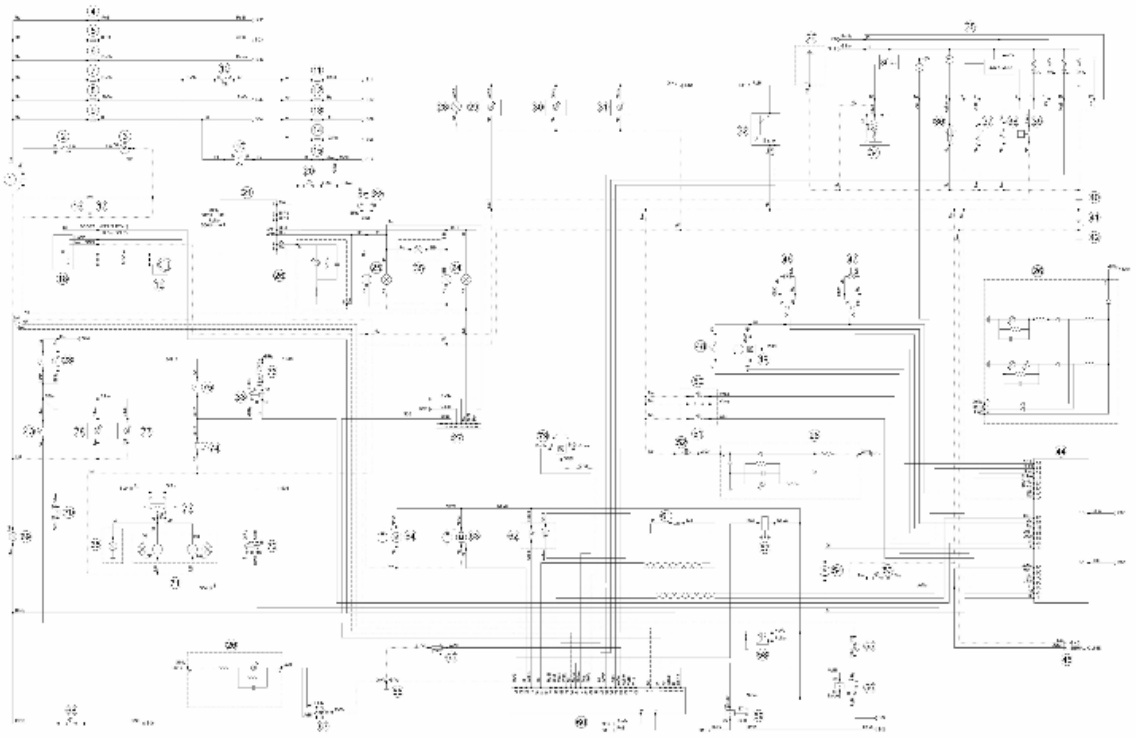
Possible Cause	Operation
Faults in the suspension system	If the front suspension is noisy, check: the efficiency of the front shock absorber; the condition of the ball bearings and relevant lock-nuts, the limit switch rubber buffers; and the movement bushings. In conclusion, check the tightening torque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

Suspension oil leakage

OIL LEAKAGE FROM SUSPENSION

Possible Cause	Operation
Faulty or broken seals	Replace the shock absorber Check the condition of wear of the steering covers and the adjustments.

INDEX OF TOPICS



KEY

1. BATTERY

2. STARTER SOLENOID CONTACTS

3. STARTER MOTOR

4. FUSE 02 7.5A

5. FUSE 03 20A

6. FUSE 06 7.5A

7. FUSE 01 30A

8. FUSE 05 10A

9. FUSE 04 10A

10.KEY SWITCH OFF/LOCK

11. FUSE 11 7.5A

12. FUSE 10 7.5A

13. FUSE 09 7.5A

14. FUSE 08 7.5A

15. FUSE 12 5A

16.CHASSIS GROUND

17. ENGINE GROUND

18.REGULATOR

19. FLYWHEEL

20. HAZARD BUTTON
21. TURN INDICATOR CONTROL DEVICE AND HAZARD
22. TURN INDICATOR SWITCH
23. STOP BUTTONS
24.RIGHT BULBS 12V-10W
25. LEFT BULBS 12V-10W
26. WARNING LIGHT UNIT
27. PRE-INSTALLATION FOR ANTI-THEFT DEVICE
28. FRONT LICENSE PLATE LAMP
29. FRONT DAYLIGHT RUNNING LIGHT
30.LEFT REAR TAIL LIGHT BULB
31.RIGHT REAR TAIL LIGHT BULB
32. AERIAL WITH IMMOBILIZER
33. HORN RELAY
34.FUEL GAUGE
35.INSTRUMENT PANEL
36. ENGINE TEMPERATURE SENSOR (INSTRUM.)
37. AMBIENT TEMPERATURE SENSOR
38.MODE BUTTON
39.OIL PRESSURE SENSOR
40. INSTRUMENT PANEL GROUND NODE
41. FRONT GROUND NODE
42.REAR GROUND NODE
43.STARTER BUTTON
44. PARKING CONTROL ECU
45. DIAGNOSTICS SOCKET
46.LEFT SPEED SENSOR
47.RIGHT SPEED SENSOR
48.RIDER DETECTION SENSOR
49.ROTATION SENSOR
50. LOCK SWITCH
51.UNLOCK SWITCH
52.HAND BRAKE SWITCH
53.BRAKE CALLIPER SENSOR
54.GEAR MOTOR
55. ELECTRIC FAN
56.ELECTRIC FAN RELAY
57.FUEL INJECTOR

58.HV COIL

59. INJECTION LOAD RELAY

60. C.D.I.

61. ENGINE SPEED SENSOR

62.LAMBDA PROBE

63.WATER PUMP (ONLY 125cc)

64.FUEL PUMP

65.ENGINE TEMPERATURE SENSOR (C.D.I.)

66.C.D.I. GROUND NODE

67.ENGINE STOP

68.SADDLE COMPARTMENT LIGHT SWITCH

69. SADDLE COMPARTMENT LIGHT

70. STARTER SOLENOID COIL

71.HEADLIGHT

72.HEADLIGHT RELAY

73. Light switch

74. HORN

75. HORN BUTTON

76.LOCK/UNLOCK PRESSURE SENSOR

77. RIGHT STOP LIGHT

78.LEFT STOP LIGHT

79. FALL SENSOR

Key

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

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

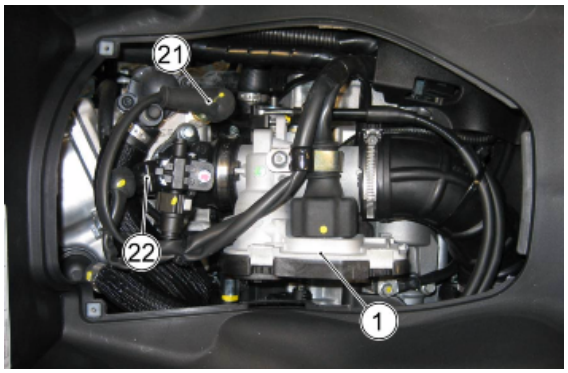
Components arrangement

1. Injection ECU

21. Coolant temperature sensor

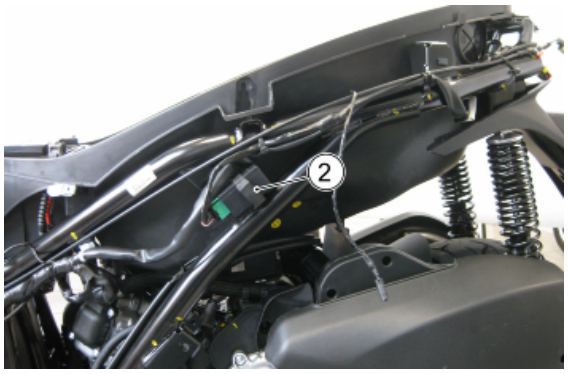
22. Injector

Remove the inspection cover placed in the helmet compartment to reach it.



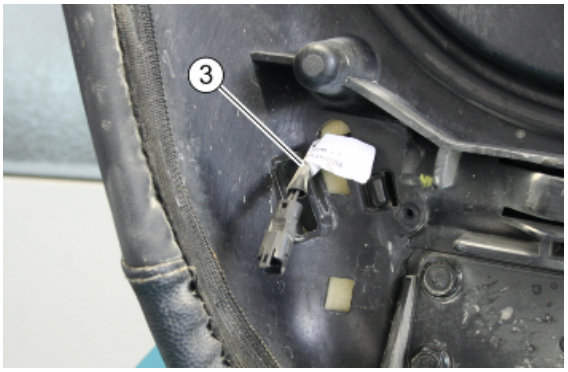
2. Turn indicator control device

Remove the left side fairing to reach it.



3. Rider detection sensor

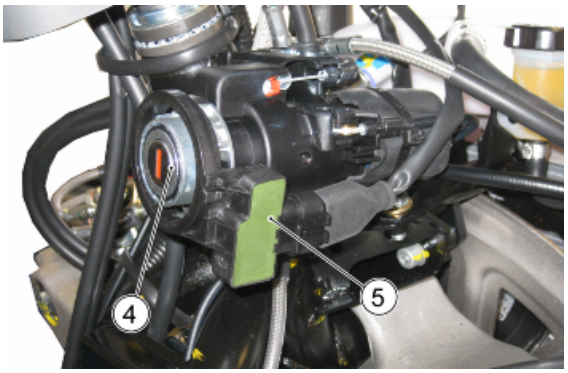
The sensor is placed under the saddle.



4. Ignition switch

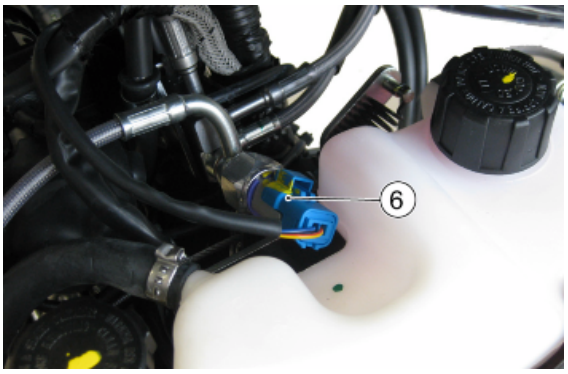
5. Immobilizer antenna

Remove the leg shield back plate to reach it.



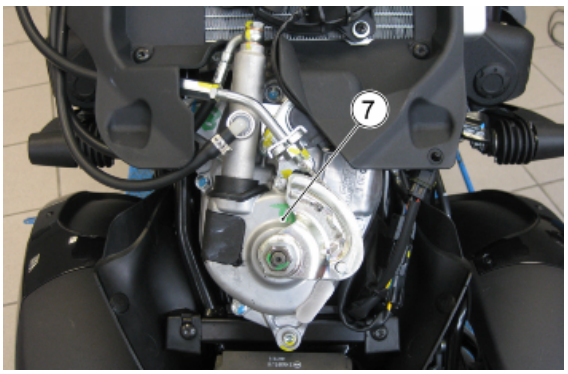
6. Pressure sensor

Remove the shield to reach it.



7. Gear motor

Remove the shield to reach it.



8. Solenoids

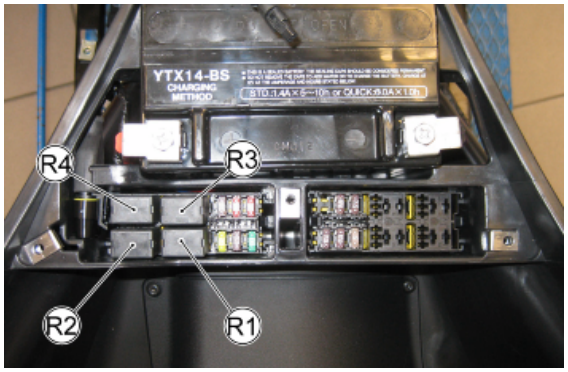
Remove the battery cover placed in the helmet compartment to reach them.

R1. Horn solenoid

R2. Electric fan solenoid

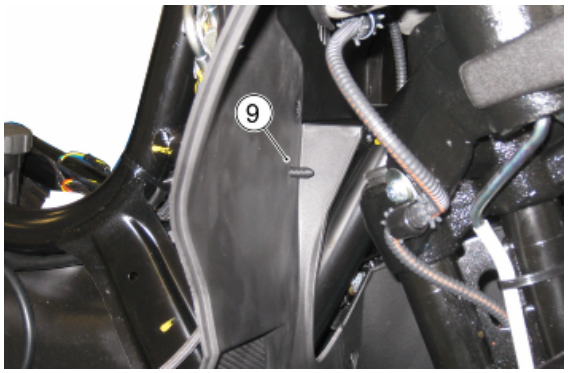
R3. Injection load solenoid

R4. Headlight solenoid



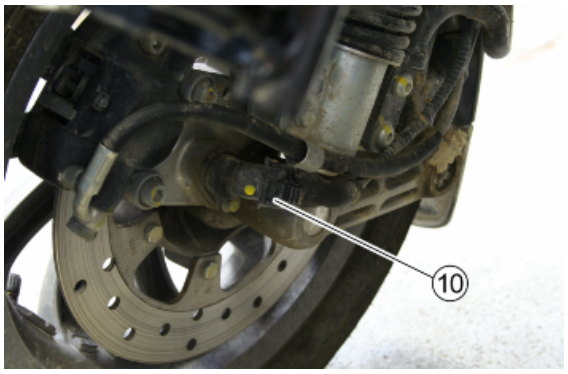
9. External temperature sensor

The sensor is fixed to the front wheel compartment.



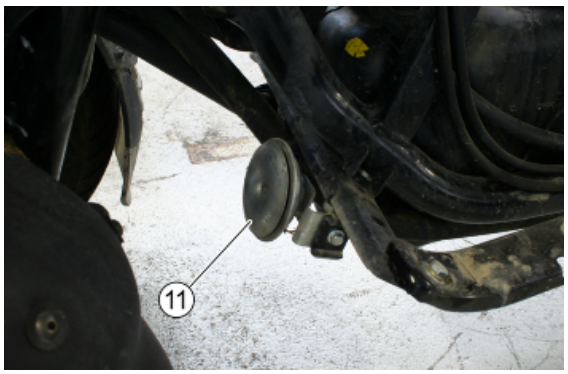
10. Right and left speed sensors

The sensors are located the internal section of the front wheel.



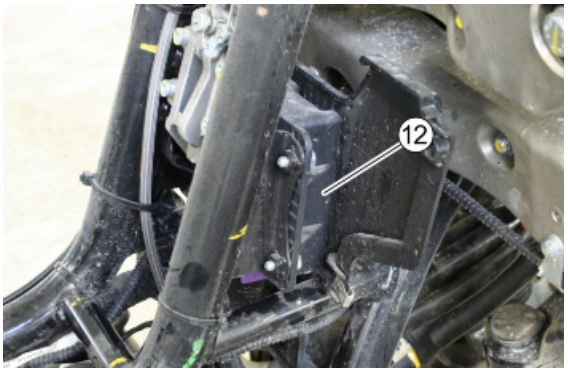
11. Horn

Remove the front wheel housing to reach it.



12. Parking control ECU

Remove the leg shield back plate to reach it.



13. FUSES

20. Battery

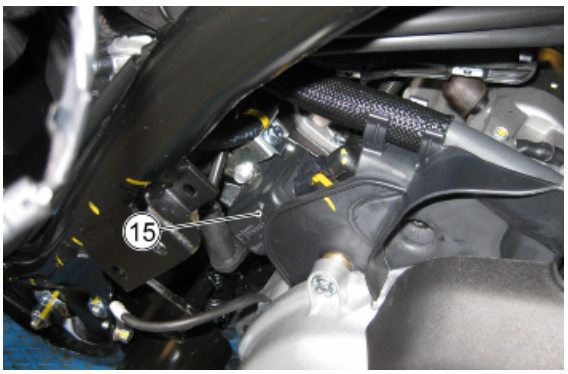
Remove the battery cover placed in the helmet compartment to reach them.

14. Fuel level transmitter

Remove the central cover to reach it.

15. HV coil

To access the protective cover.



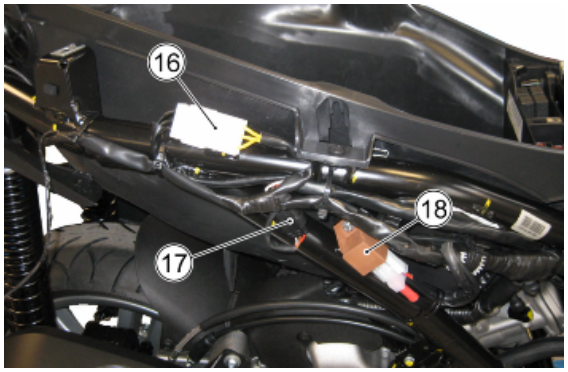
16. Magneto flywheel

17. Engine speed sensor

The cable harness of these components exit from the flywheel, the connectors are fixed to the chassis on the vehicle right hand side.

18. Starter relay

Remove the right side fairing to reach it.



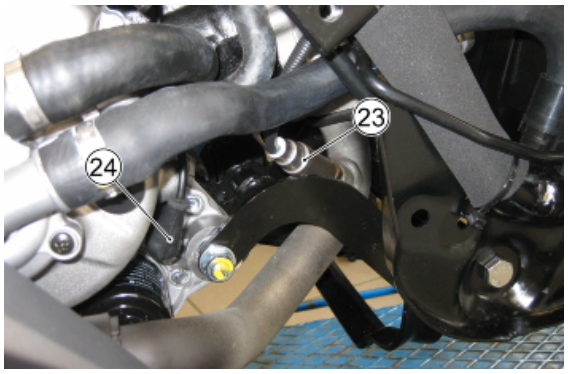
19. Voltage regulator

Remove the front shield to reach it.

23. Lambda probe

24. Engine oil pressure sensor

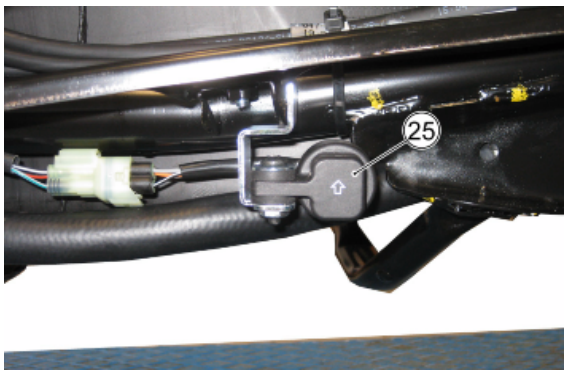
Remove the right fairing to reach it.



25. Roll over sensor.

26 Antitheft pre-installation connector.

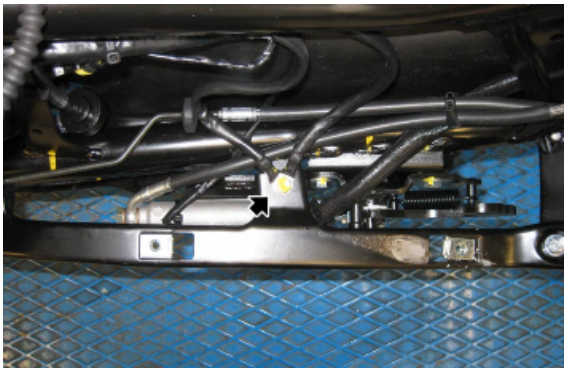
Remove the left footrest to reach them.



Ground points

1. Ground point on engine

Remove the plastic cover placed on the engine left side to reach it.

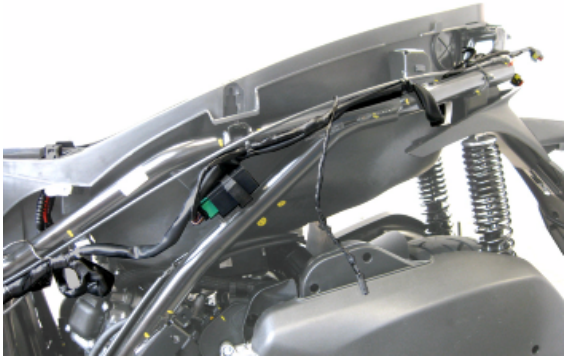


2. Ground point on chassis

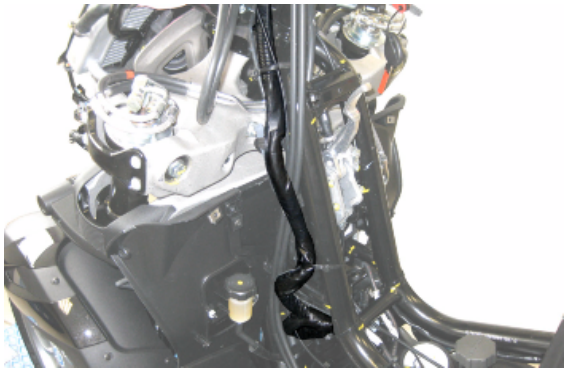
To reach them, remove the right footrest.

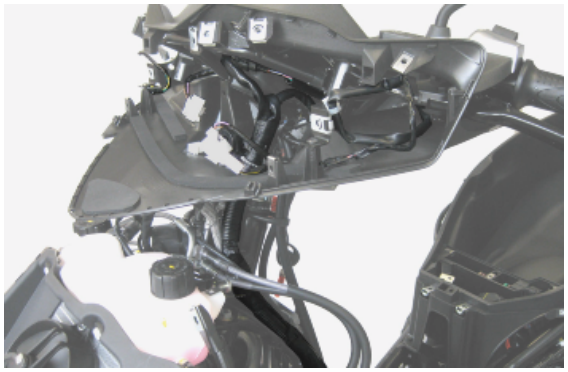
Electrical system installation

Left side



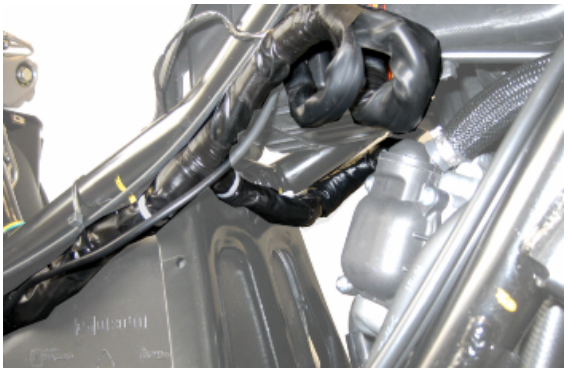
Top part front left side



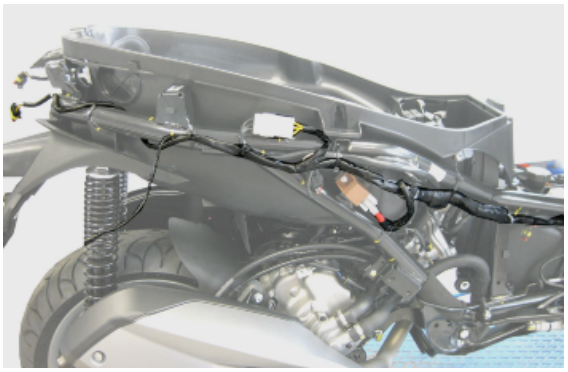


Lower part front left side

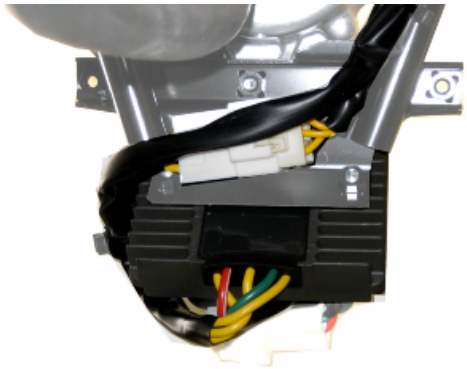
Central passage



Right side

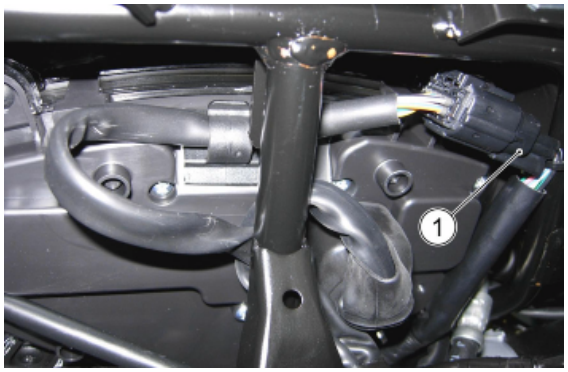


Lower part front right side

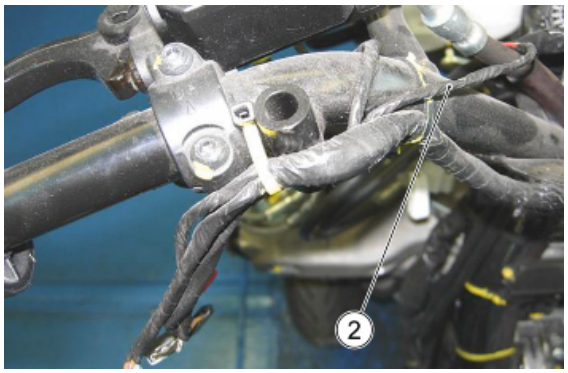


Front side

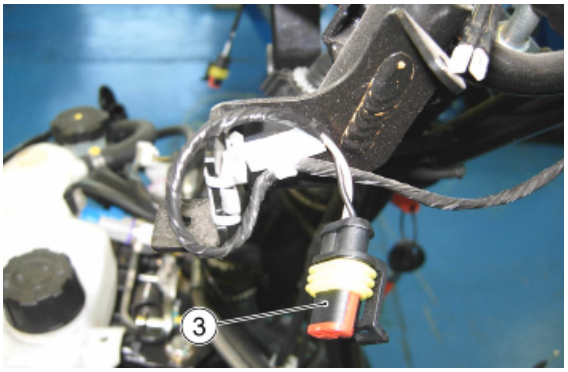
1. Instrument panel



2. To the left STOP button

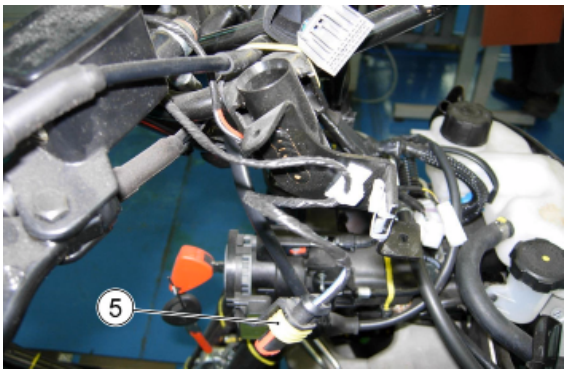


3. To the front left turn indicator.

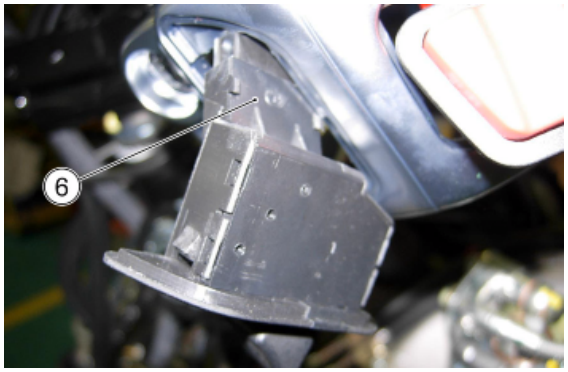


4. To the right stop button

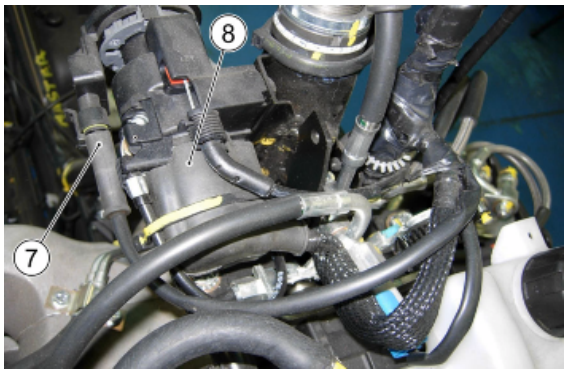
5. To the front right turn indicator.



6. Roll unlocking/locking switch



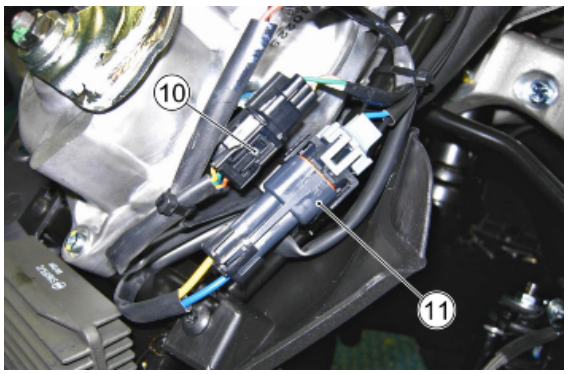
7. Immobilizer aerial **8.** Ignition switch hood



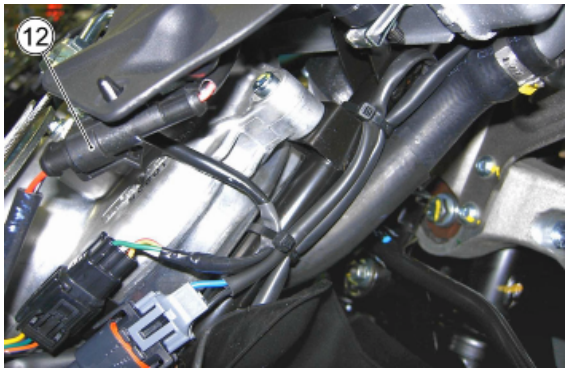
9. Suspension locking pressure sensor

10. Rotation sensor connection

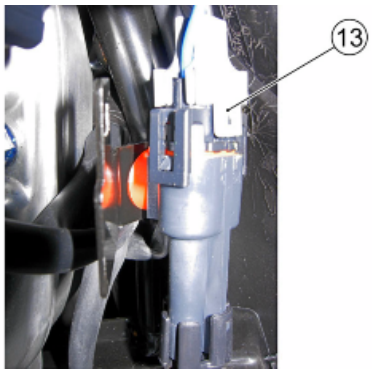
11. Gear motor connection



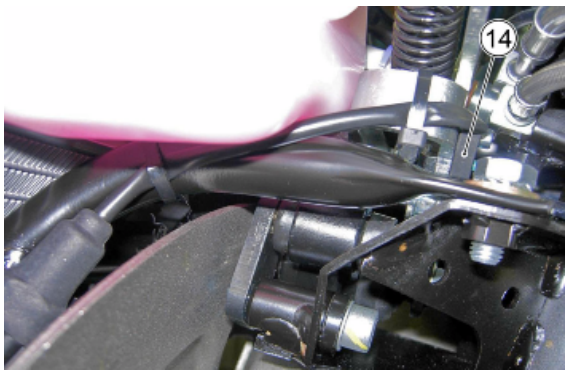
12. Electric fan connection



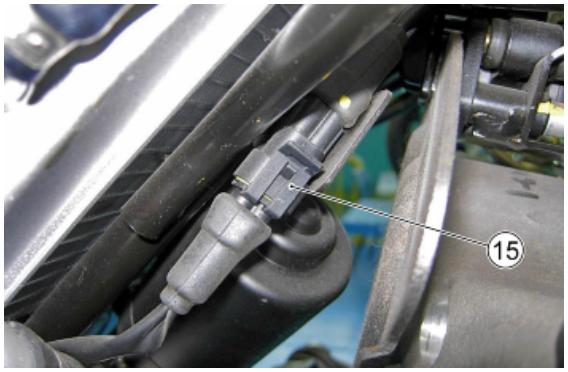
13. Gear motor connection

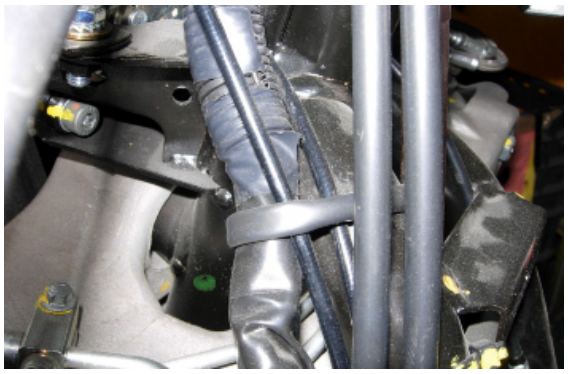


14. Brake calliper sensor

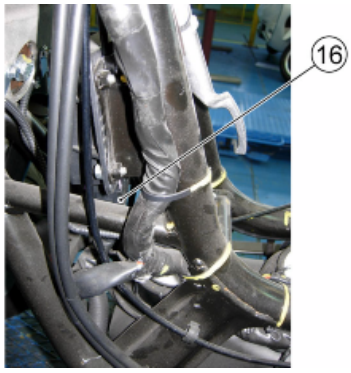


15. Calliper connection





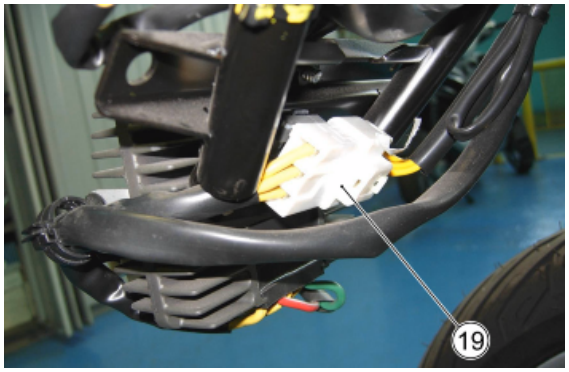
16. Parking electronic control unit



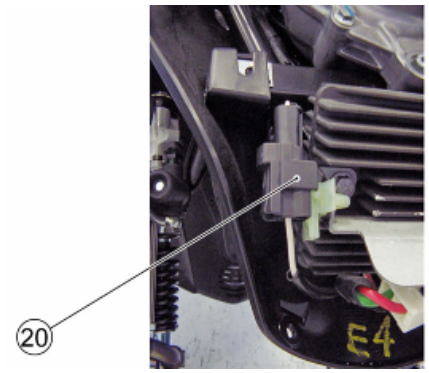
17. DC connection

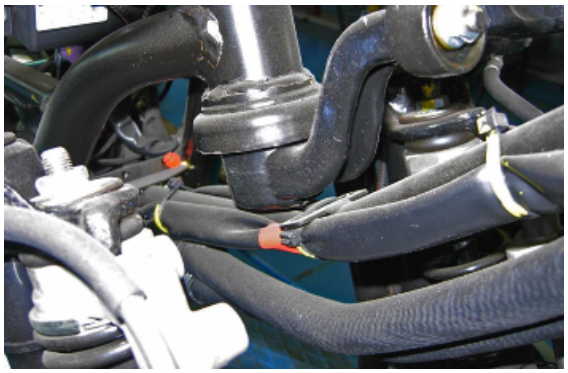
18. Voltage regulator

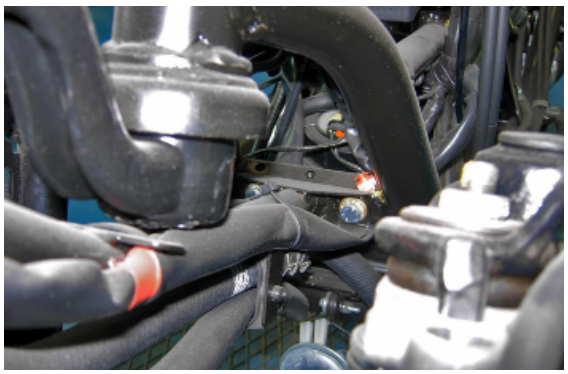
19. Regulator-flywheel connection (AC)

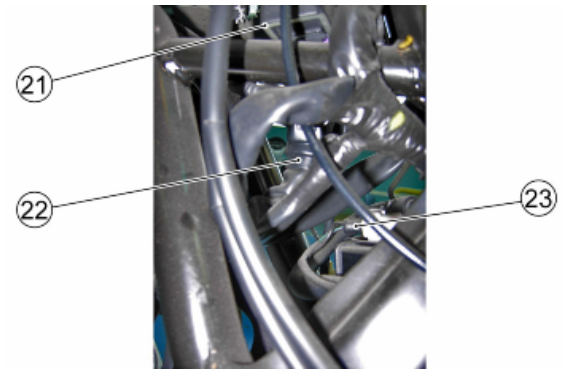


20. Boost-Regulator connection (connected for the 125 cc version only)


20
E4



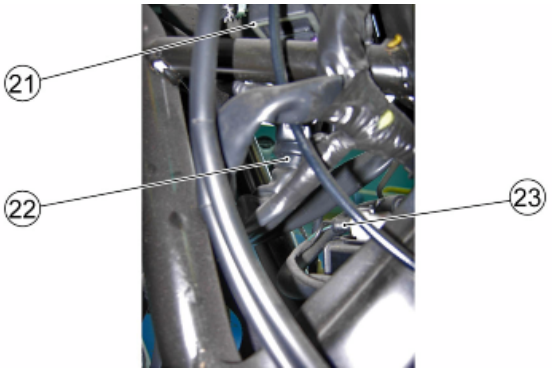



21
22
23

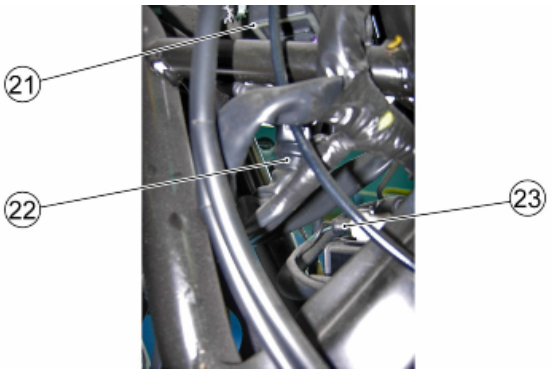
21. Parking locking electronic control unit

22. Parking locking electronic control unit connection

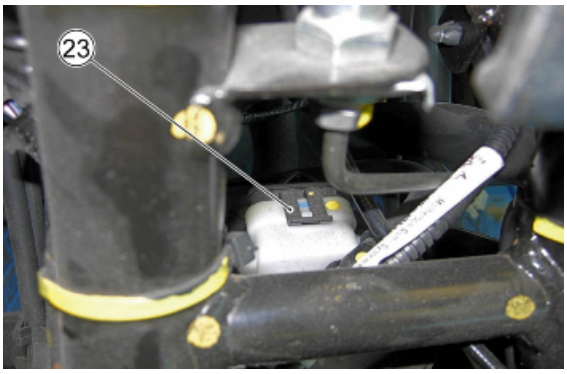
23. Fuel pump connection



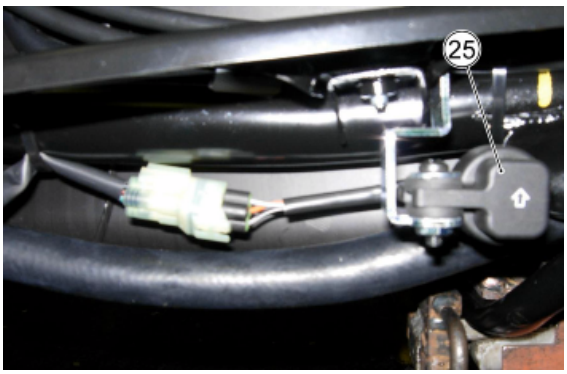
24. Roll-over sensor connection



23. Fuel pump connection



25. Roll-over sensor

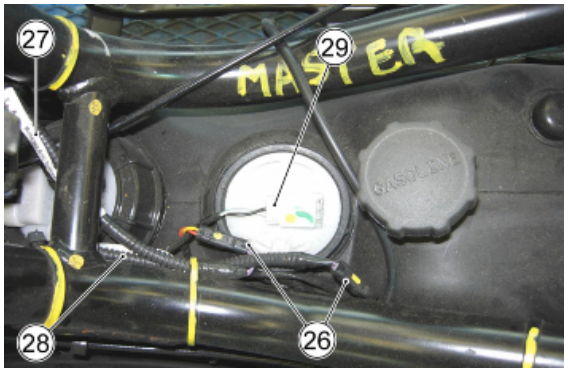


26. Speed sensors connection

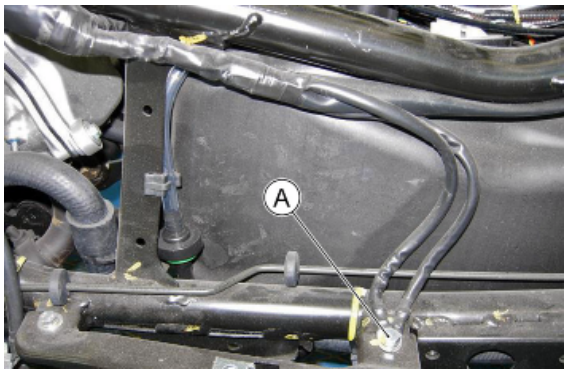
27. Right wheel speed sensor cable.

28. Left wheel speed sensor cable.

29. Fuel gauge connection



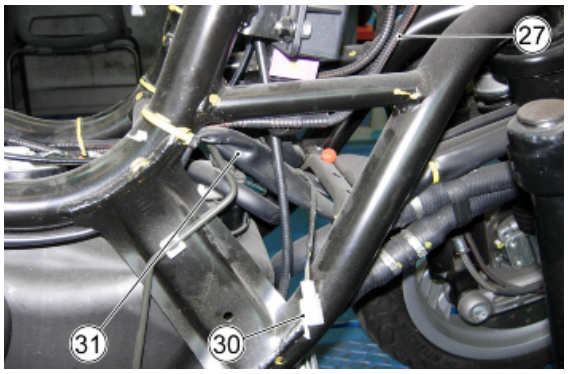
A. Ground point chassis "A"



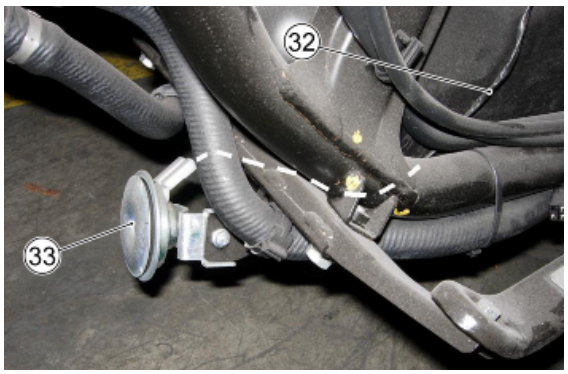
27. Right wheel speed sensor cable.

30. To the ambient temperature sensor

31. To the voltage regulator

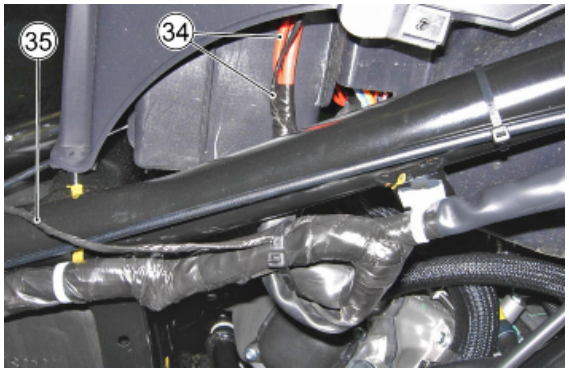


32. Horn cables **32.** Horn

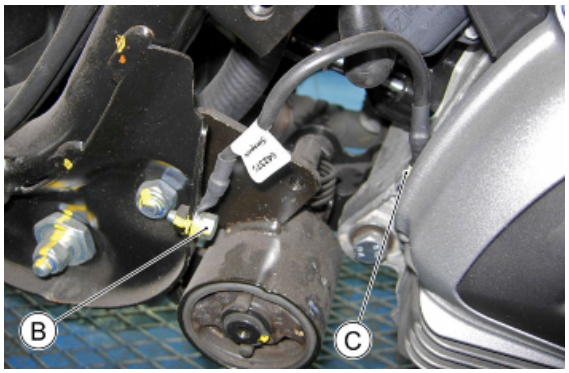


Back side

34. To the Battery positive and diagnostics **35.** To helmet compartment light switch



B. Ground point chassis "B" **C.** Ground point engine "C"



36. Turn indicator control device

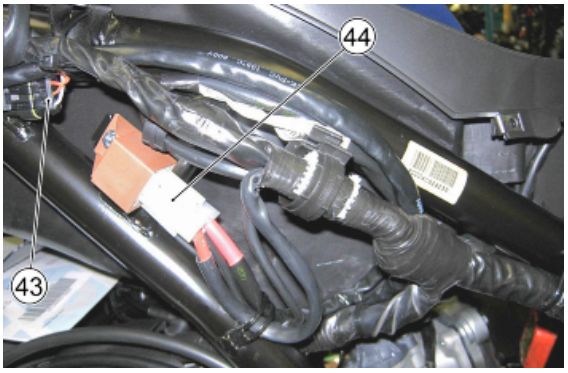
37. Left rear turn indicator. **38.** To the license plate light **39.** To the helmet compartment lighting

37. Rear left turn indicator

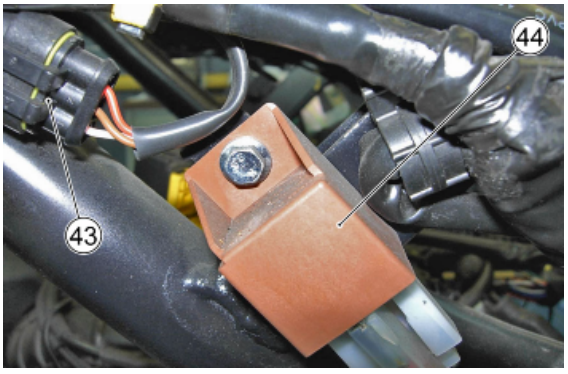
40. Rear right turn indicator

41. To the battery negative **41.** Helmet compartment

43. Pick-up connection **44.** Start-up relay

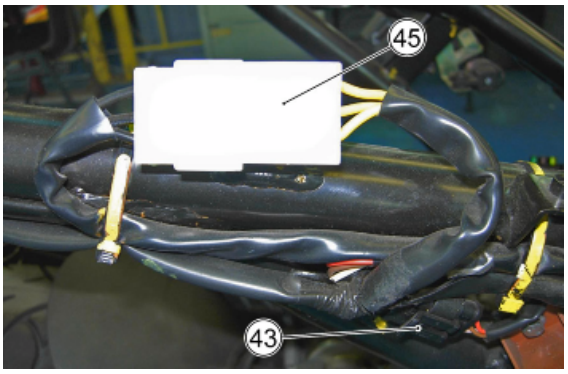


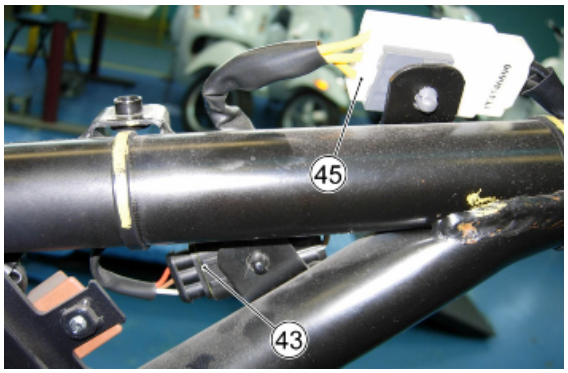
45. Flywheel AC connection



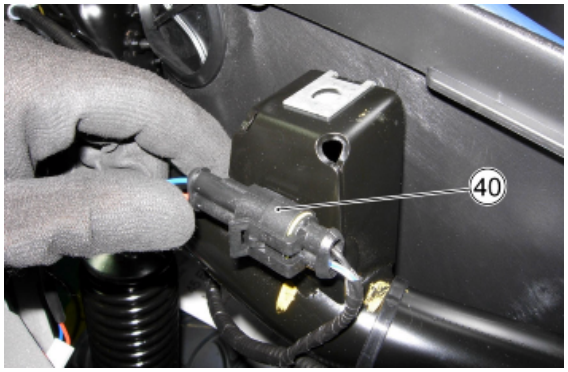
43. Pick-up connection

45. Flywheel AC connection





40. Rear right turn indicator

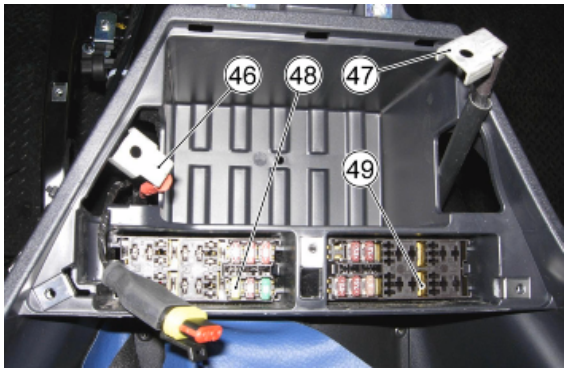


46 Battery positive

47. Battery negative

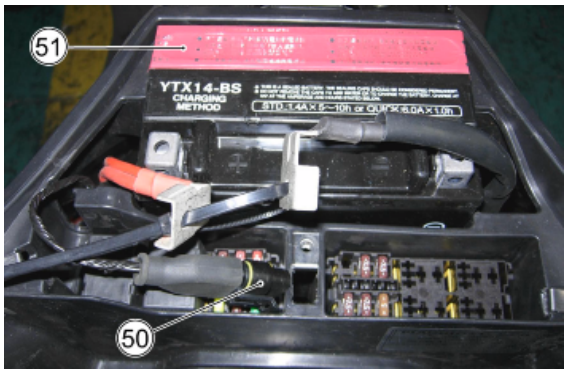
48. Left fuses and relay terminal block.

49. Right fuses and relay terminal block.



50. Diagnostics socket

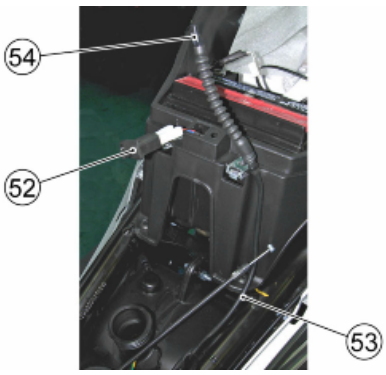
51. Battery



52. Helmet compartment light switch

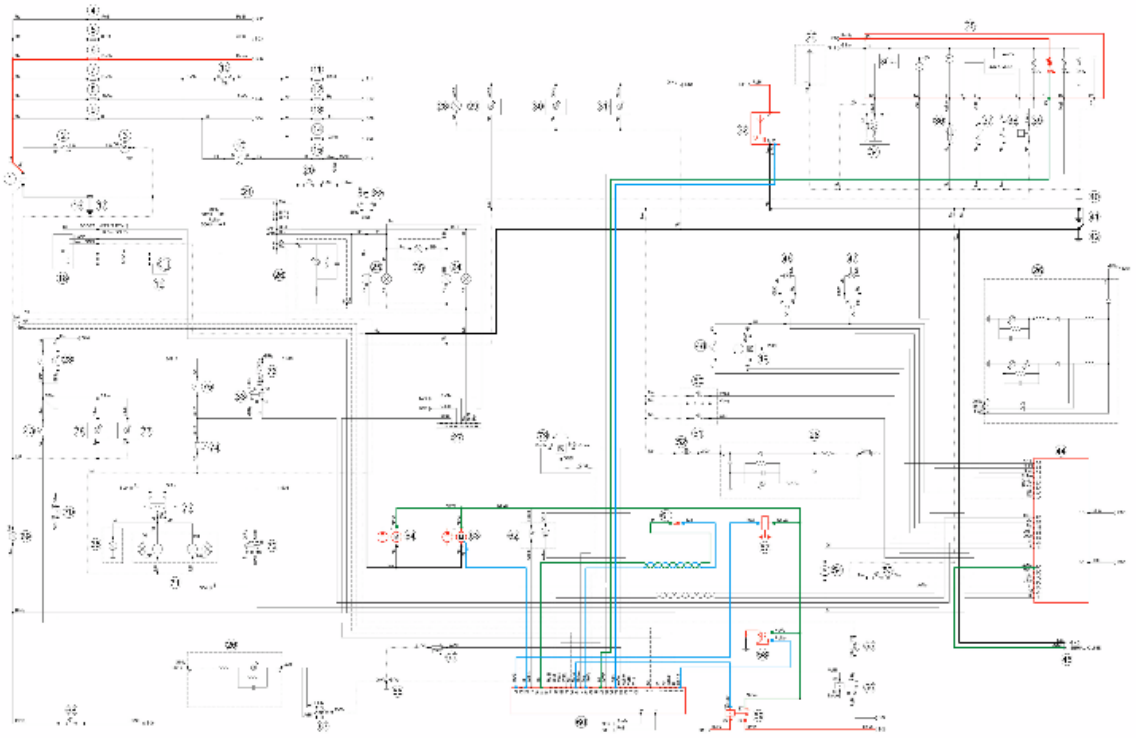
53. Rider presence sensor cable

54. Rider presence sensor connection



Conceptual diagrams

Ignition



KEY

1. BATTERY

6. FUSE 06 7.5A

16.CHASSIS GROUND

32. AERIAL WITH IMMOBILIZER

35.INSTRUMENT PANEL

41. FRONT GROUND NODE

42.REAR GROUND NODE

44. PARKING CONTROL ECU

45. DIAGNOSTICS SOCKET

57.FUEL INJECTOR

58.HV COIL

59. INJECTION LOAD RELAY

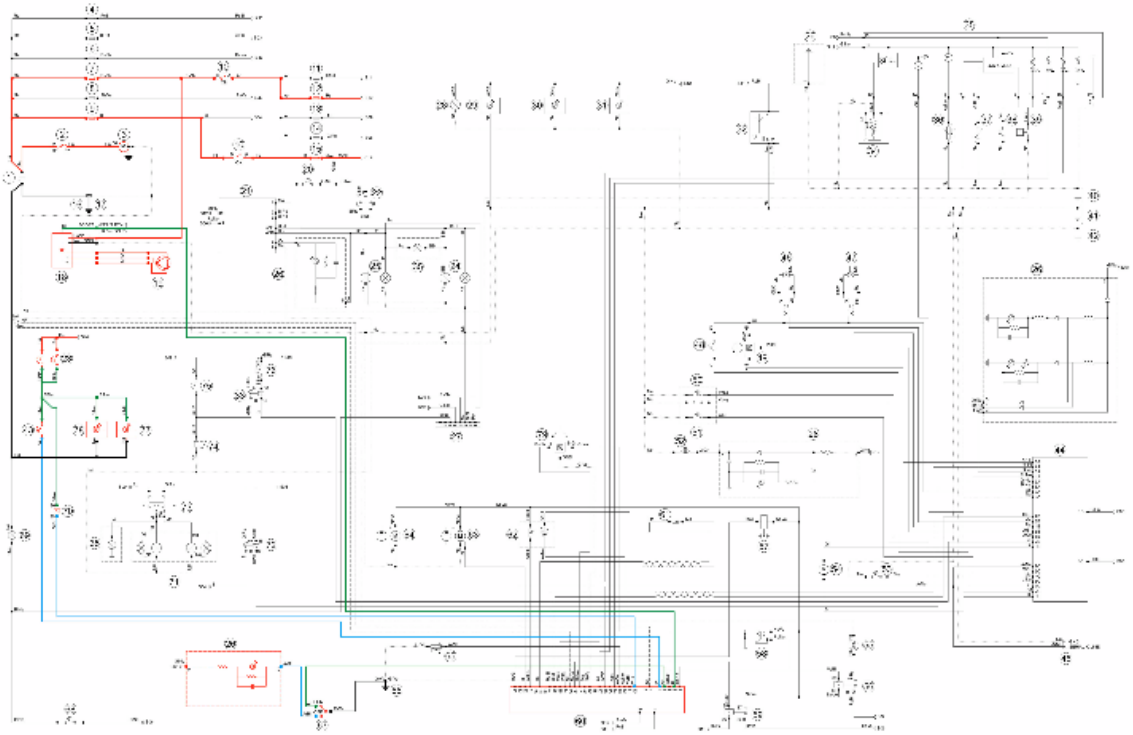
60. C.D.I.

61. ENGINE SPEED SENSOR

63.WATER PUMP (ONLY 125cc)

64.FUEL PUMP

Battery recharge and starting



KEY

1. BATTERY

2. STARTER SOLENOID CONTACTS

3. STARTER MOTOR

7. FUSE 01 30A

9. FUSE 04 10A

10.KEY SWITCH OFF/LOCK

12. FUSE 10 7.5A

15. FUSE 12 5A

16.CHASSIS GROUND

18.REGULATOR

19. FLYWHEEL

23. STOP BUTTONS

26. WARNING LIGHT UNIT

43.STARTER BUTTON

60. C.D.I.

66.C.D.I. GROUND NODE

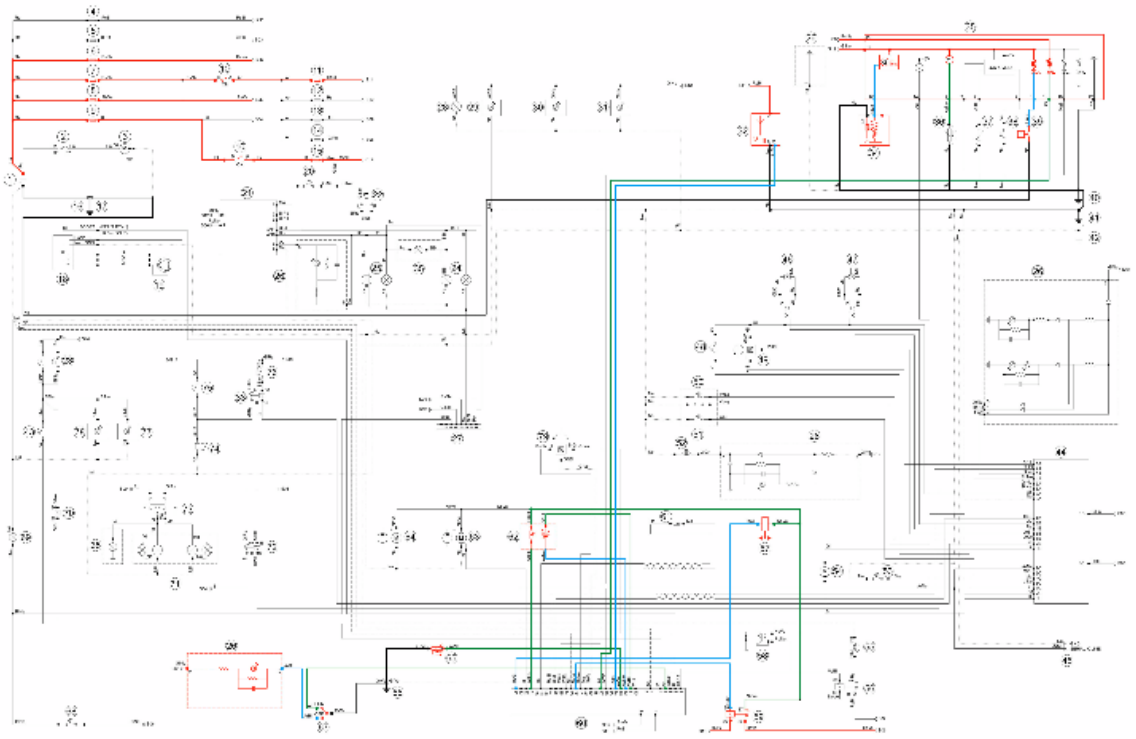
67.ENGINE STOP

70. STARTER SOLENOID COIL

77. RIGHT STOP LIGHT

78.LEFT STOP LIGHT

Level indicators and enable signals section



KEY

1. BATTERY

6. FUSE 06 7.5A

7. FUSE 01 30A

8. FUSE 05 10A

9. FUSE 04 10A

10.KEY SWITCH OFF/LOCK

11. FUSE 11 7.5A

15. FUSE 12 5A

16.CHASSIS GROUND

17. ENGINE GROUND

26. WARNING LIGHT UNIT

32. AERIAL WITH IMMOBILIZER

34.FUEL GAUGE

35.INSTRUMENT PANEL

36. ENGINE TEMPERATURE SENSOR (INSTRUM.)

39.OIL PRESSURE SENSOR

40. INSTRUMENT PANEL GROUND NODE

41. FRONT GROUND NODE

57.FUEL INJECTOR

59. INJECTION LOAD RELAY

60. C.D.I.

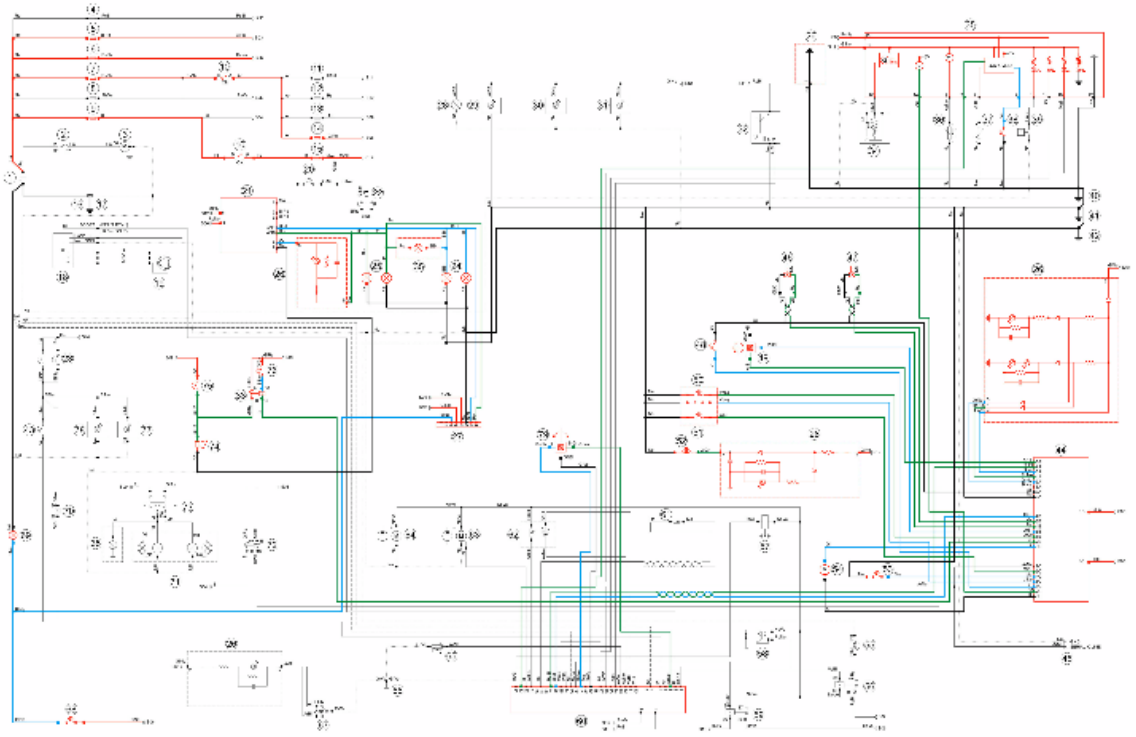
62.LAMBDA PROBE

65.ENGINE TEMPERATURE SENSOR (C.D.I.)

66.C.D.I. GROUND NODE

67.ENGINE STOP

Devices and accessories



KEY

1. BATTERY

5. FUSE 03 20A

6. FUSE 06 7.5A

7. FUSE 01 30A

9. FUSE 04 10A

10.KEY SWITCH OFF/LOCK

14. FUSE 08 7.5A

15. FUSE 12 5A

16.CHASSIS GROUND

21. TURN INDICATOR CONTROL DEVICE AND HAZARD

24.RIGHT BULBS 12V-10W

25. LEFT BULBS 12V-10W

26. WARNING LIGHT UNIT

27. PRE-INSTALLATION FOR ANTI-THEFT DEVICE

33. HORN RELAY

35.INSTRUMENT PANEL

38.MODE BUTTON

40. INSTRUMENT PANEL GROUND NODE

41. FRONT GROUND NODE

42.REAR GROUND NODE

44. PARKING CONTROL ECU

46.LEFT SPEED SENSOR

47.RIGHT SPEED SENSOR

48.RIDER DETECTION SENSOR

49.ROTATION SENSOR

50. LOCK SWITCH

51.UNLOCK SWITCH

52.HAND BRAKE SWITCH

53.BRAKE CALLIPER SENSOR

54.GEAR MOTOR

60. C.D.I.

68.SADDLE COMPARTMENT LIGHT SWITCH

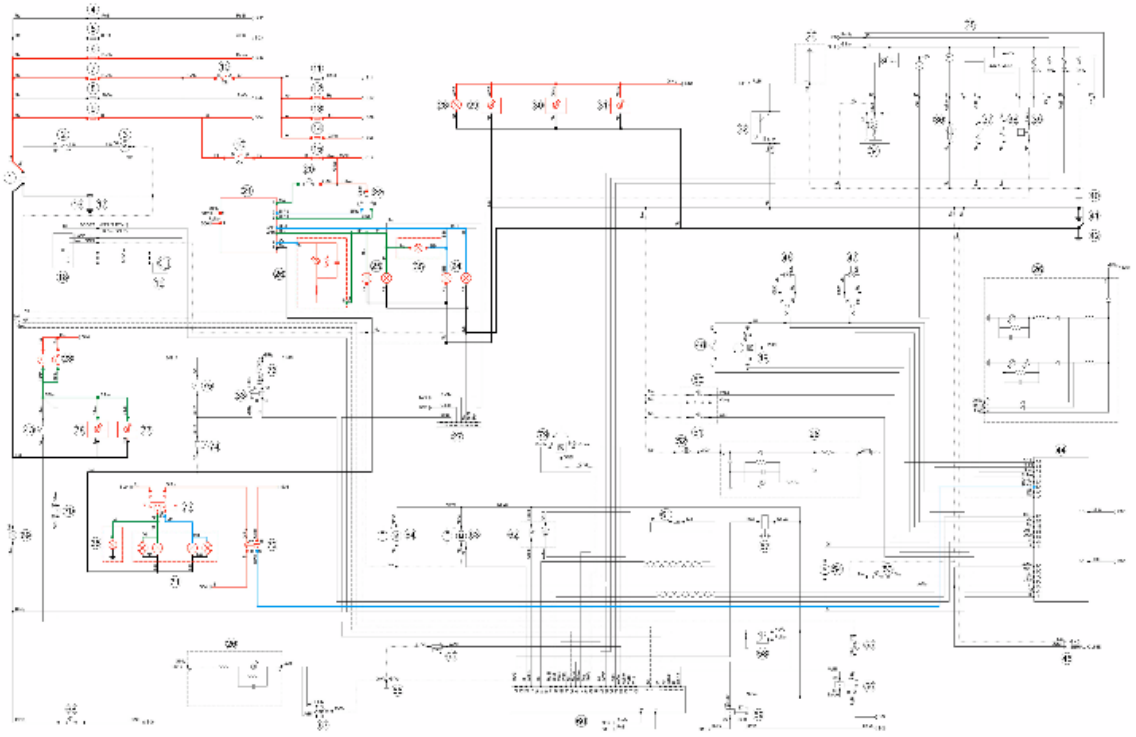
69. SADDLE COMPARTMENT LIGHT

74. HORN

75. Horn button

76.LOCK/UNLOCK PRESSURE SENSOR

Lights and turn indicators



KEY

1. BATTERY

6. FUSE 06 7.5A

7. FUSE 01 30A

9. FUSE 04 10A

10.KEY SWITCH OFF/LOCK

12. FUSE 10 7.5A

13. FUSE 09 7.5A

14. FUSE 08 7.5A

16.CHASSIS GROUND

20. HAZARD BUTTON

21. TURN INDICATOR CONTROL DEVICE AND HAZARD

22. TURN INDICATOR SWITCH

23. STOP BUTTONS

24.RIGHT BULBS 12V-10W

25. LEFT BULBS 12V-10W

26. WARNING LIGHT UNIT

28. FRONT LICENSE PLATE LAMP

29. FRONT DAYLIGHT RUNNING LIGHT
30.LEFT REAR TAIL LIGHT BULB
31.RIGHT REAR TAIL LIGHT BULB
35.INSTRUMENT PANEL
41. FRONT GROUND NODE
42.REAR GROUND NODE
44. PARKING CONTROL ECU
71.HEADLIGHT
72.HEADLIGHT RELAY
73. Light switch
77. RIGHT STOP LIGHT
78.LEFT STOP LIGHT

Checks and inspections

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

Immobiliser

The electronic ignition system is controlled by the control unit with the integrated Immobilizer system. The immobiliser is an antitheft system which allows the vehicle to function only if it is activated by means of the coded keys that the control unit recognises. The code is integrated in a transponder in the key block. This allows the driver clear operation without having to do anything other than just turning the key. The Immobilizer system consists of the following components:
- an electronic control unit
- immobilizer aerial
- master key with incorporated transponder (red key)
- service key with incorporated transponder (black key)
- HV coil
- diagnosis LED

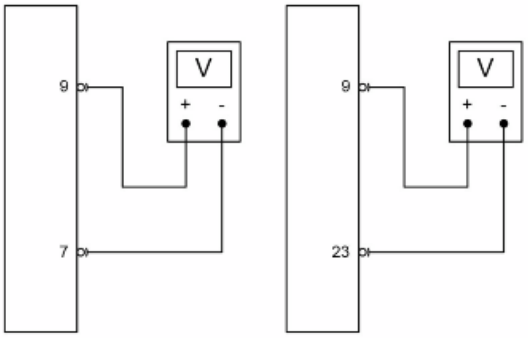
The diagnosis LED also works as a theft-deterrent blinker. This function is activated every time the ignition switch is set to «**OFF**» or the emergency stop switch is set to «**OFF**». It remains activated for 48 hours in order not to affect the battery charge. When the ignition switch is turned to «**ON**», the deterring blinker function is deactivated. Subsequently, a flash confirms the switching to « **ON**». The duration of the flash depends on the programming of the electronic control unit If the LED is off regardless of the position of the ignition key and/or the instrument panel is not initiated, check if:

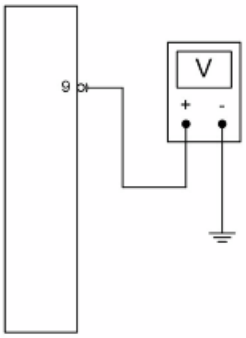
- there is battery voltage
- fuses efficiency No. 1, 6, 11

- there is power to the control unit as specified below:

With the ignition key set to « OFF»:

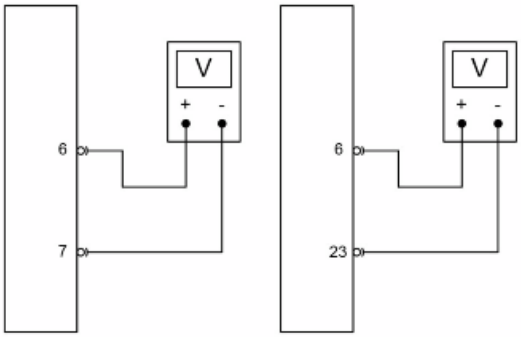
- if there is battery voltage between terminals 9-7, 9-23 and terminal 9-chassis ground (fixed power supply). If there is no voltage, check that fuse 5 and its cable harness are in working order.

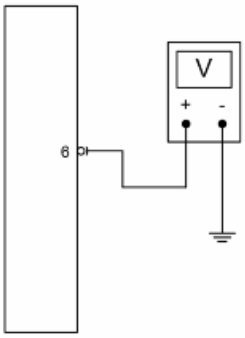




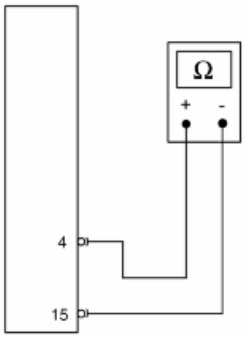
With the ignition key set to «ON»:

- if there is battery voltage between terminals 6-7, 6-23 and terminal 6-chassis ground (fixed power supply). If there is no voltage, check the ignition switch contacts and that fuses No. 1, 11 and their cables are in working order.

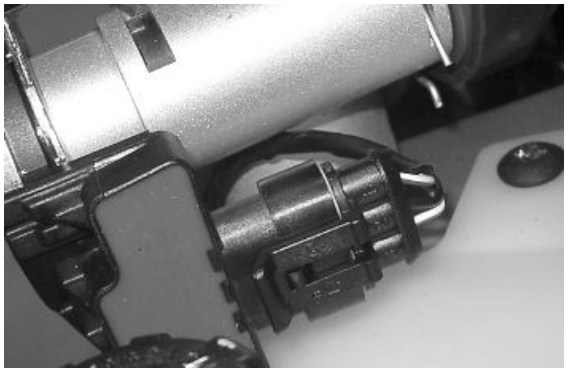




- Continuity tests between terminals 4 and 15 with the emergency switch set to «RUN». If there is no continuity check the contacts of the switch.

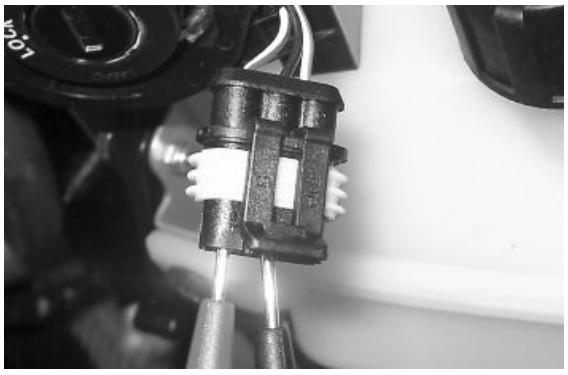


After removing the leg shield back plate, remove the electrical connection from the aerial as shown in the picture.

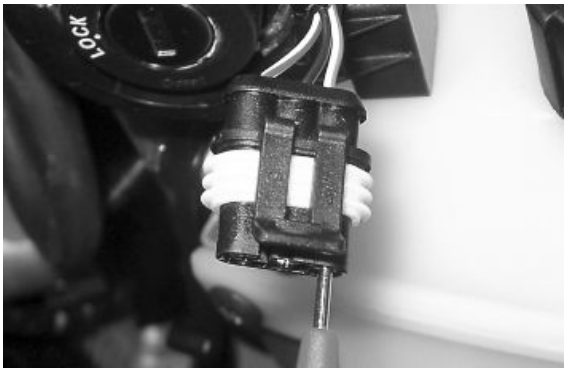


Remove the protective base from the connector.

With the ignition switch at ON check there is battery voltage between the Red-White and Black cables



With ECU connector disconnected, check if there is continuity between the aerial Orange-White cable and pin 14 of the control unit.



Specific tooling

020331Y Digital multimeter

Virgin circuit

When the ignition system is not encrypted, any key will start the engine but limited to 2000 rpm. The keys can only be recognised if the control unit has been programmed properly. The data storage procedure for a previously not programmed control unit provides for the recognition of the Master as the first key to be stored to memory: this becomes particularly important because it is the only key that enables the control unit to be wiped clean and reprogrammed for the memorisation of the service keys. The Master and service keys must be used to code the system as follows:

- Insert the Master key, turn it to «ON» and keep this position for two seconds (lower and upper limits 1 to 3 seconds).
- Insert the service key and turn it to «ON» for 2 seconds.
- If you have copies of the key, repeat the operation with each key.
- Insert the MASTER key again and turn it to «ON» for 2 seconds.

The maximum time to change keys is 10 seconds.

A maximum of 7 service keys can be programmed at one time.

It is essential to adhere to the times and the procedure. If you do not, start again from the beginning. Once the system has been programmed, master key transponder, decoder and control unit are strictly matched. With this link established, it is now possible to encode new service keys, in the event of losses, replacements, etc. Each new programming deletes the previous one; to add or delete a key it is therefore necessary to repeat the procedure using all the keys that you intend to keep in use. If a service key becomes uncoded, the efficiency of the high voltage circuit shielding must be thoroughly inspected: In any case it is advisable to use resistor spark plugs.

Characteristic

MASTER key:

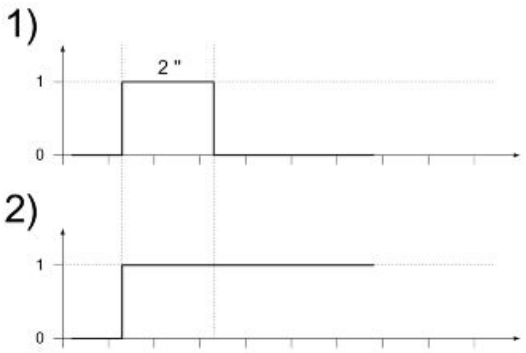
RED KEY

SERVICE key.

BLACK KEY

Diagnostic codes

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

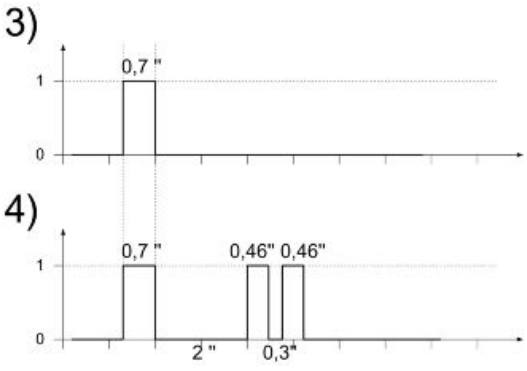


1. Previously unused control unit - key inserted: a single 2 second flash is displayed, after which the LED remains off permanently. The keys can be stored to memory, the vehicle can be started but with a limitation imposed on the number of revs.

2. Previously unused control unit - transponder absent or cannot be used: the LED is on permanently. In this condition no operations are possible including the start up of the vehicle.

3. **Programmed control unit - the service key in (normal condition of use)**: a single 0.7-second flash is displayed, after which the LED remains off steadily. The engine can be started.

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



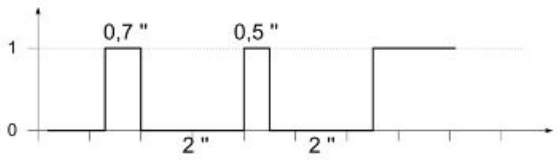
5. Programmed control unit - fault detected: a light code is displayed according to the fault detected, after which the LED remains on steadily. The engine cannot be started. The codes that can be transmitted are:

- 1-flash code
- 2-flash code

- 3-flash code

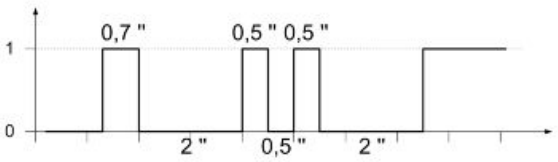
Diagnostic code - 1 flash

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



Diagnostic code - 2 flashes

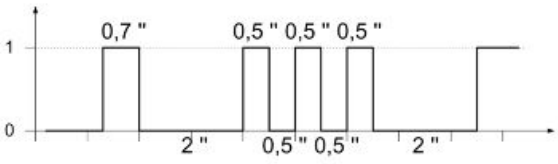
A two-flash code shows a system where the control unit does not show the transponder signal. This might depend on the inefficiency of the immobilizer antenna or the transponder.
Turn the switch to ON using several keys: if the code is repeated even with the Master key, check the aerial wiring and change it if necessary. If this is not the case, replace the defective key and/or reprogram the control unit. Replace the control unit if the problem continues.



Diagnostic code - 3 flashes

8

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



Ignition circuit

No spark plug

WARNING

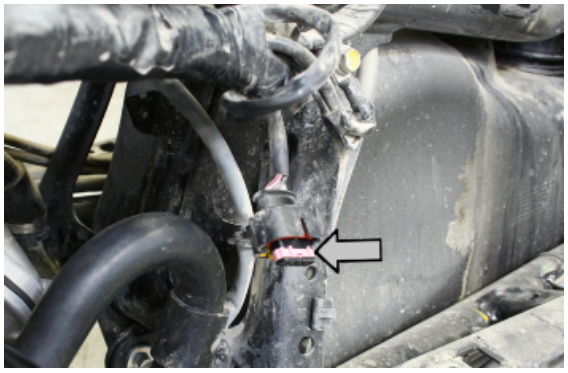
ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

HV coil primary resistance value:

Disconnect the connector of the HV coil and remove the protective base shown in the figure.

Measure the resistance present between the Red-Black and Black-Green terminals.

Repeat checks between pin 1 of the control unit connector and the Black-Green cable of the injection load solenoid. If the value measured is incorrect, check cable harness for integrity.



Electric characteristic

HV coil resistance primary value:

670 ± 67 mΩ

Remote controls check

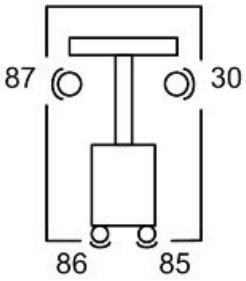
To check the operation of a solenoid:

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 solenoid.

3) With the solenoid fed, check that there is continuity between terminals 87 and 30.

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



Battery recharge circuit

The charging circuit consists of three-phase alternator and a permanent magneto flywheel.

The generator is directly connected to the voltage regulator.

This, in its turn, is connected directly to the ground and the battery positive terminal passing through the 30A protective fuse.

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

Switches check

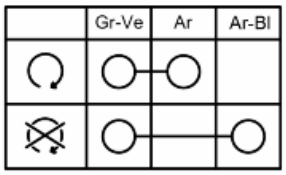
26

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

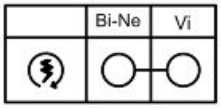
KEY

Ar: Orange **Az:** Light blue **Bi:** White **Bl:** Blue **Gi:** Yellow **Gr:** Grey **Ma:** Brown **Ne:** Black **Ro:** Pink **Rs:** Red **Ve:** Green **Vi:** Purple

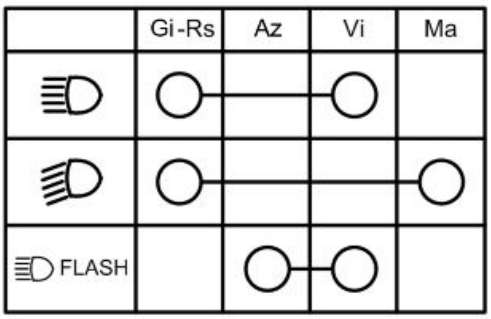
ENGINE STOP SWITCH



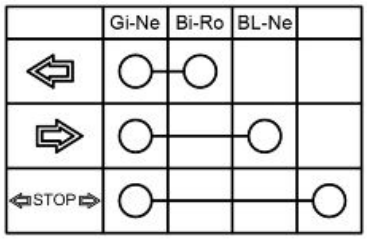
STARTER BUTTON



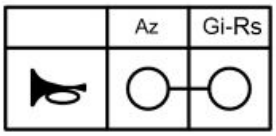
LIGHT SWITCH



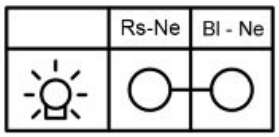
TURN INDICATOR SWITCH



HORN BUTTON

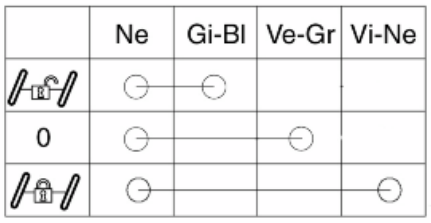


HELMET COMPARTMENT LIGHT SWITCH

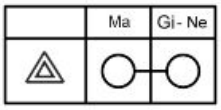


PARKING BRAKE BUTTON

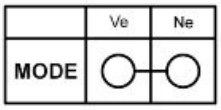
LOCKING/UNLOCKING SWITCH



HAZARD BUTTON



MODE BUTTON



Stator check

Checking the stator windings

WARNING

THIS CHECK-UP CAN BE MADE WITH THE STATOR PROPERLY INSTALLED.

1) Remove the right side panel.

2) Disconnect the connector between stator and regulator with the three yellow cables as shown in the picture.

3) Measure the resistance between each of the yellow terminals and the other two.

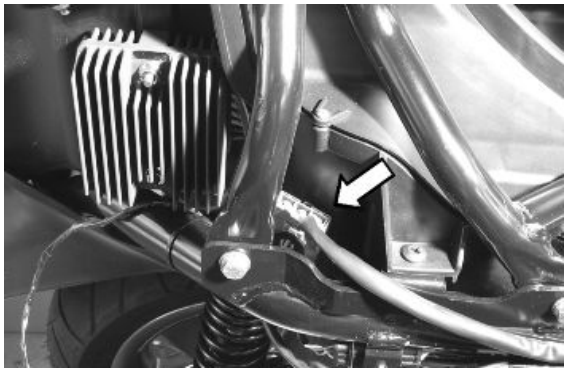
Electric characteristic

Resistance:

0.2 - 1 Ω

4) Check that there is insulation between the each yellow cable and the ground.

5) If values are incorrect, replace the stator.



Recharge system voltage check

Look for any leakage

1) Access the battery by removing its cover under the saddle.

2) Check that the battery does not show signs of losing fluid before checking the output voltage.

3) Turn the ignition key to position OFF, connect the terminals of the tester between the negative pole (-) of the battery and the black cable and only then disconnect the black cable from the negative pole (-) of the battery.

4) With the ignition key always at OFF, the reading indicated by the ammeter must be ≤ 0.5 mA.

Charging current check

WARNING

BEFORE CARRYING OUT THE CHECK, MAKE SURE THAT THE BATTERY IS IN GOOD WORKING ORDER.

1) Place the vehicle on its centre stand

2) With the battery correctly connected to the circuit, place the multimeter leads between the battery terminals..

3) Turn on the engine, increase the engine rpm and, at the same time, measure the voltage.

Electric characteristic

Voltage ranging between 14.0 and 15.0V at 5000 rpm.

Maximum current output check.

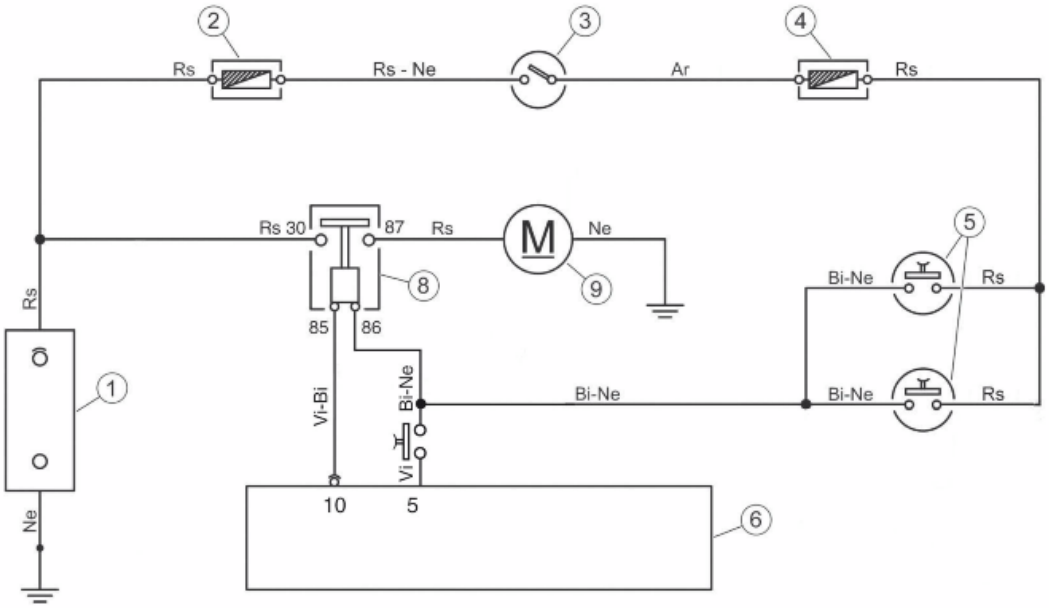
- With the engine off and the panel at «ON» with the lights on, allow the battery voltage to stop at 12V.
- Connect ammeter pliers to the 2 recharge positive poles in output from the regulator.
- Start the engine and rev it up to a high engine speed while reading the value on the pincer.

With an efficient battery a value must be detected: > 20A

VOLTAGE REGULATOR/RECTIFIER

Specification	Desc./Quantity
Type	Non-adjustable three-phase transistor
Voltage	14 to 15V at 5000 rpm with lights off

Starter motor



KEY

1. Battery

2. Fuse No. 1 - 30A

3. Ignition switch contacts

4. Fuse No. 10 - 7.5A

5. Stop buttons

6. C.D.I.

7. Starter button

8. Starter relay

9. Starter motor

WARNING

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

1) Check fuses No. 1 and No. 10.

2) Check ignition switch contacts.

3) Check the contacts of the stop buttons and the starter button.

4) With the ignition switch set to «**ON**», the brake engaged and the starter button pressed, check if there is voltage between the White-Black cable of the starter relay base (86) and ground connection.

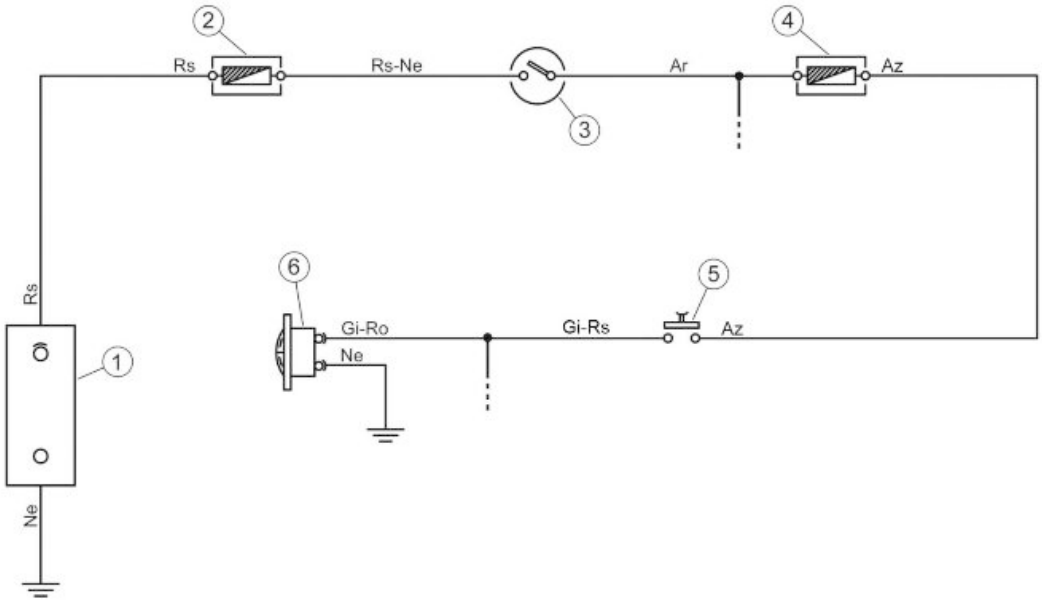
5)If no voltage is detected, check cable harnesses for continuity.

6) Check if there is continuity of the Purple-White cable between the starter relay base (85) and pin 10 of the C.D.I control unit.

7) Check the starter relay.

8) Check if there is continuity of the Red cable between the battery and the solenoid base (30). Also check if there is continuity between the latter (87) and the starter motor.

Horn control



KEY

1. Battery

2. Fuse No. 1 - 30A

3. Ignition switch contacts

4. Fuses No. 9 - 7.5A

5. Horn button

6. Horn

WARNING

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

1) Check fuses No. 1 and No. 9.

2) Check ignition switch contacts.

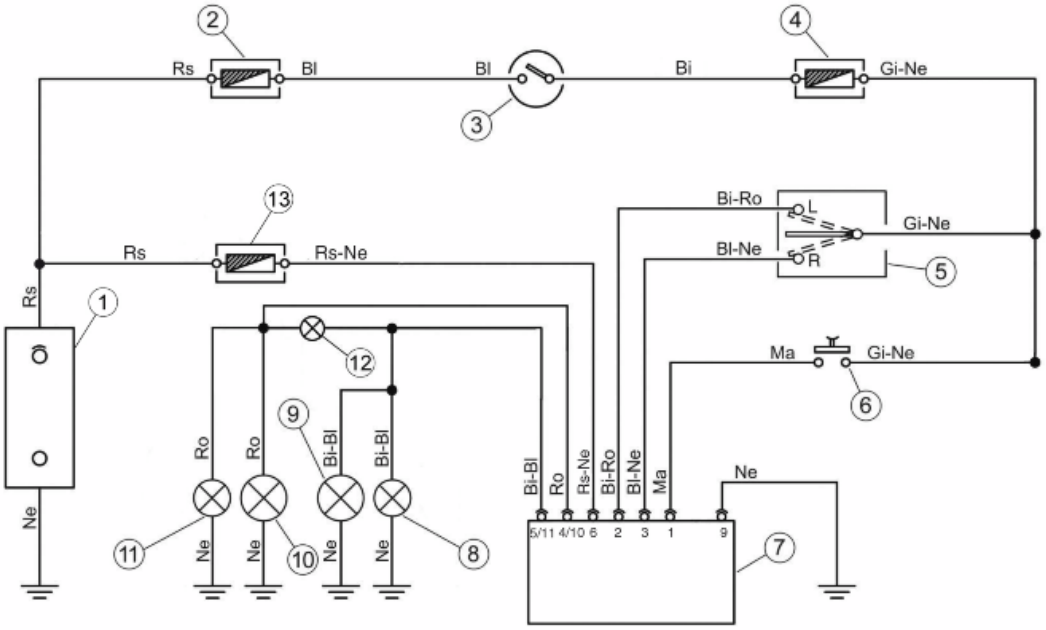
3)Check the horn button contacts.

4) With the ignition switch set to «**ON**» and the horn button pressed, check whether there is voltage between the Yellow-Pink cable of the horn connector and the ground connection.

5)If no voltage is detected, check cable harnesses for continuity.

6) Check that the Black cable of the horn connector is grounded.

Turn signals system check



KEY

1. Battery

2. Fuse No. 4 - 10A

3. Ignition switch contacts

4. Fuse No. 12 - 5A

5. Turn indicator switch

6. Hazard button

7. Hazard and turn indicator control device

8. Rear right turn indicator bulbs

9. Front right turn indicator bulb

10. Front left turn indicator bulb

11. Rear left turn indicator bulbs

12. Indicator warning lights

13. Fuses No. 6 - 7.5A

WARNING

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

1) Check that bulbs operate properly.

2) Check fuses No. 4, No. 6 and No. 12.

3) Check the contacts of the ignition switch, the turn indicator switch and the Hazard button.

4)With the ignition switch set to «**ON**», check whether there is voltage:

- between White-Pink cable of the turn indicator control device and the ground lead, with the turn indicator switch to the left (L).
- between Blue-Black cable of the turn indicator control device and the ground lead, with the turn indicator switch to the right (R).
- between Brown cable of the turn indicator control device and the ground lead, with the Hazard button pressed.

5) If there is no voltage, check that there is continuity in the relevant cable harness.

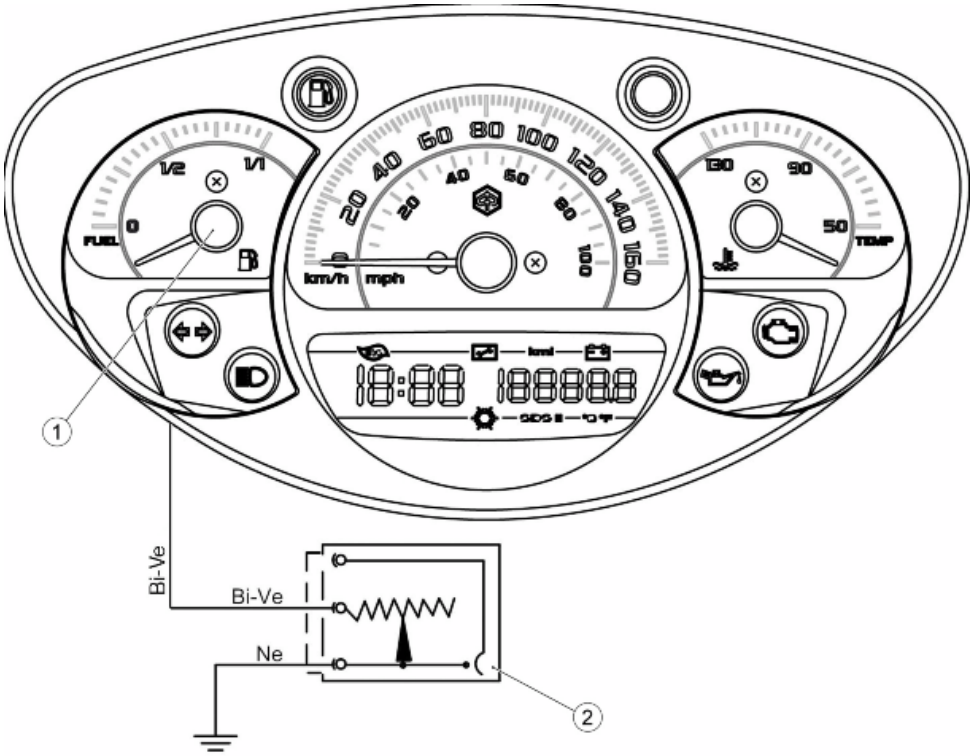
6) Check power supply of the turn indicator control device checking if there is voltage between the Blue and the Black cable.

7) Check that the cable harnesses are not interrupted wherever no voltage is detected.

8) Check if there is continuity of the cable harnesses that connect the bulbs to the turn indicator control device.

9) Check the bulbs ground connection.

level indicators



KEY

1. Fuel gauge

2. Fuel level transmitter

WARNING

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

1) With a multimeter, check resistance values between the White-Green cable and the Black cable of the fuel level transmitter under different conditions.

2) If the values measured are correct but the indication on the instrument panel is not exact, check if there is continuity of the White-Green cable.

Electric characteristic

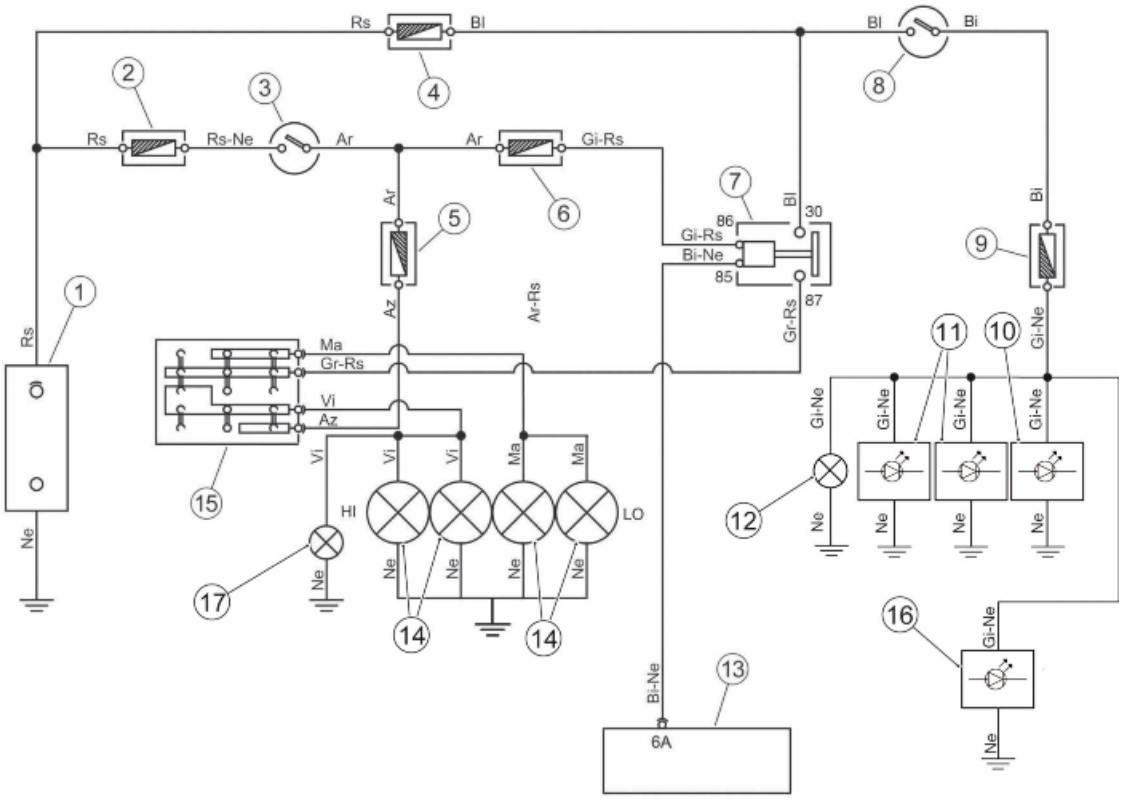
Resistance value when the tank is full

<= 5 Ω

Resistance value when the tank is empty

98 ± 5 Ω

Lights list



KEY

1. Battery

2. Fuse No. 1 - 30A

3. Ignition switch contacts

4. Fuse No. 4 - 10A

5. Fuses N. 9 - 7.5A

6. Fuses N. 8 - 7.5A

7. Headlight solenoid

8. Ignition switch contacts

9.Fuses No. 12 - 5A

10. Front daylight running light bulbs

11. Rear daylight running light bulbs

12. License plate bulbs

13. Roll lock device

14. Headlight with twin-filament bulb

15. Light switch

16. Instrument panel light bulbs

17. High beam headlight on indicator light

WARNING

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

DAYLIGHT RUNNING LIGHT LINE CHECK

1) Check that bulbs operate properly.

2) Check fuses No. 4 and No. 12.

3) Check ignition switch contacts.

4) With the ignition switch ON, check if there is voltage between the Yellow-Black cable of fuse No. 12 and the ground lead. Otherwise, check the continuity of cable harnesses.

5) Check the continuity of the bulb cable harness connected to fuse No. 12 (Yellow-Black cables).

6) Check the bulbs ground connection.

HIGH/LOW BEAM LIGHTS LINE - CHECK

1) Check that bulbs operate properly.

2) Check fuses No. 1, No. 4, No. 8 and No. 9.

3) Check ignition switch contacts.

4) Check there is voltage:

- between the Blue cable of the headlight solenoid and the ground lead.

- between the Yellow-Red cable of the headlight solenoid base (86) and the ground lead, with the ignition switch set to «**ON** ».

- in the Sky Blue cable between the light switch and the ground lead, with the ignition switch set to «**ON**».

5) Check that the relevant cable harnesses are not interrupted wherever no voltage is detected.

6) Check the headlight solenoid and the light switch contacts.

7) check if there is continuity in:

- the White-Black cable between the parking control ECU (pin 6A) and the headlight solenoid base (85).

- the Grey-Red cable between the headlight solenoid base (87) and the light switch.
- the cable harnesses between the headlight and the light switch (Brown and Purple cables).

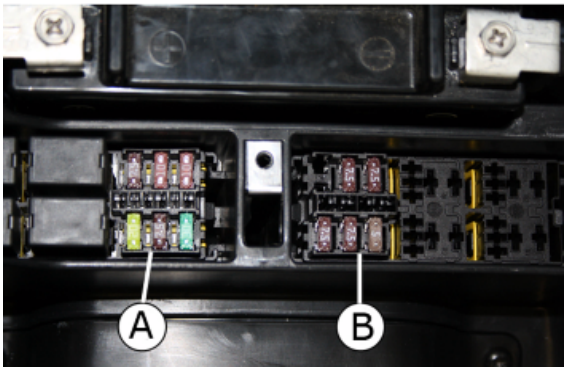
8) Check the bulbs ground connection.

BULBS

	Specification	Desc./Quantity
1	Front side light bulb	**Type**: LED **Power**: - **Quantity**: -
2	Front turn indicator light bulb	**Type**: Incandescent (BAU 15s) **Power**: 12V - 10W **Quantity**: 1 RHS + 1 LHS
3	Helmet compartment light bulb	**Type:** Incandescent (SV 8.5) **Power:** 12V - 5W **Quantity:** 1
4	Stop light/rear daylight running light bulb	**Type**: LED **Power**: - **Quantity**: -
5	Rear turn indicator light bulb	**Type**: Incandescent (BAU 15s) **Power**: 12V - 10W **Quantity**: 1 RHS + 1 LHS
6	License plate bulb	**Type:** Incandescent (W2.1x9.5d) **Power:** 12V - 5W **Quantity:** 1
7	Instrument panel bulb	**Type**: LED **Power**: - **Quantity**: -

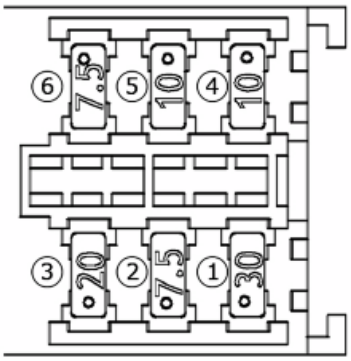
Fuses

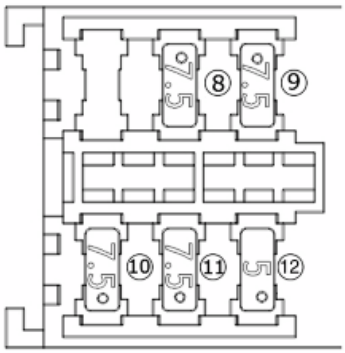
The electrical system is equipped with eleven fuses to protect the different installation circuits divided in two fuse boxes, located inside the battery compartment «**A**», and inside the footrest «**B**» on the left side of the vehicle and can be reached by undoing the screw «**C**». The chart shows the position and characteristics of the fuses in the vehicle.



CAUTION

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

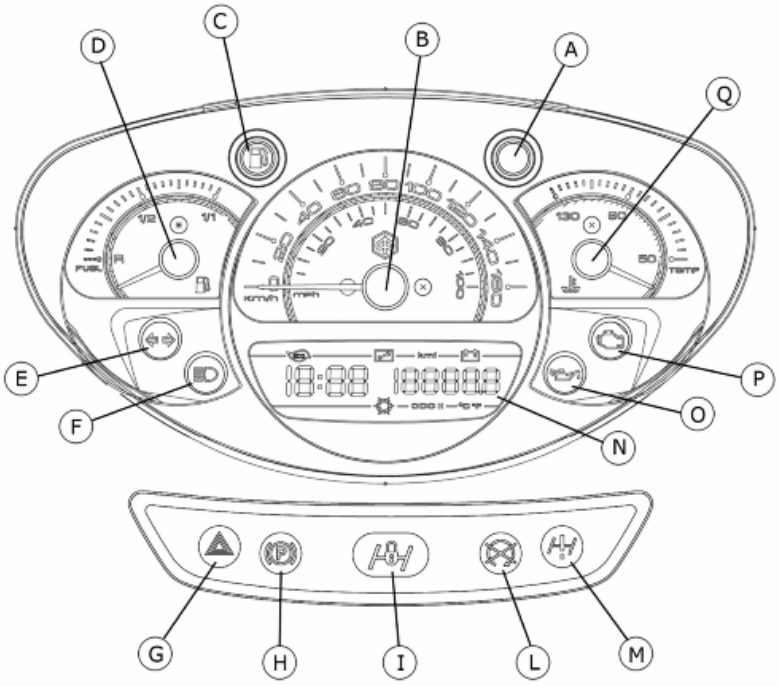




FUSES

	Specification	Desc./Quantity
1	Fuse No. 1	**Capacity**: 30A **Location**: battery compartment **Protected circuits:** battery recharge and fuses 8, 9, 10, 11
2	Fuse No. 2	**Capacity**: 7.5A **Location**: battery compartment **Protected circuits:** direct battery-powered fuel system for electric fan
3	Fuse No. 3	**Capacity**: 20A **Location**: battery compartment **Protected circuits:** direct battery-powered fuel system for parking control ECU
4	Fuse No. 4	**Capacity**: 10 A **Location**: battery compartment **Protected circuits:** direct battery-powered fuel system for headlight and 12 fuses
5	Fuse No. 5	**Capacity**: 10 A **Location**: battery compartment **Protected circuits:** direct battery-powered fuel system for injection control unit and injection loads
6	Fuse No. 6	**Capacity**: 7.5 A **Location**: battery compartment **Protected circuits:** direct battery-powered fuel system for instrument panel
7	Fuse No. 8	**Capacity**: 7.5 A **Location**: battery compartment **Protected circuits:** live power supply for parking control ECU, headlight solenoid, parking system pressure sensor, horn solenoid.
8	Fuse No. 9	**Capacity**: 7.5 A **Location**: battery compartment **Protected circuits:** live power supply for horn and high-beam flash.
9	Fuse No. 10	**Capacity**: 7.5 A **Location**: battery compartment **Protected circuits:** live power supply for stop lights and starter relay.
10	Fuse No. 11	**Capacity**: 7.5 A **Location**: battery compartment **Protected circuits:** live power supply to injection control unit, immobilizer antenna injection load solenoid.
11	Fuse No. 12	**Capacity**: 5A **Location**: battery compartment **Protected circuits:** live power supply for turn indicator control device, daylight running light, instrument panel, antitheft pre-installation, warning light unit.

Dashboard



A = Immobilizer / anti-theft LED

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

C = Fuel reserve warning light

D = Fuel gauge

E = Turn indicator warning light

F = High-beam warning light

G = Emergency turn indicator warning light

H = Warning light for parking brake engaged (where available)

I = Front suspension locking system warning light (where available)

L = Engine stop warning light

M = Front suspension locking system failure warning light (where available)

N = Digital display

O = Low oil pressure warning light

P = Engine control telltale light and injection system failure warning light

Q = Coolant temperature gauge

Battery installation

VRLA battery (valve-regulated lead-acid battery) Maintenance Free (MF)

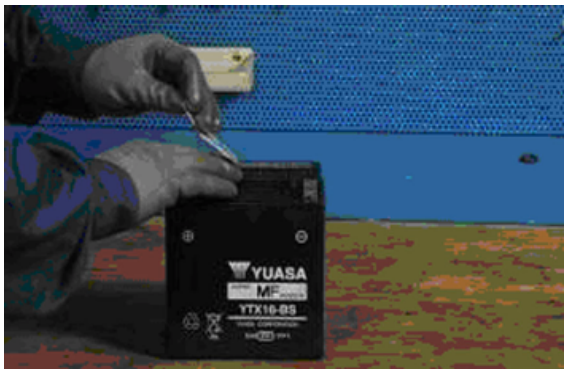
WARNING

BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH YOUR EYES, SKIN AND CLOTHING. IN CASE OF CONTACT WITH YOUR EYES OR SKIN, RINSE WITH ABUNDANT WATER FOR ABOUT 15 MINUTES AND SEEK IMMEDIATE MEDICAL ATTENTION.

IN THE EVENT OF ACCIDENTAL INGESTION OF THE LIQUID, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR MILK. MAGNESIUM MILK, BATTERED EGG OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.
BATTERIES PRODUCE EXPLOSIVE GASES; KEEP CLEAR OF NAKED FLAMES, SPARKS OR CIGARETTES; VENTILATE THE AREA WHEN RECHARGING INDOORS.
ALWAYS PROTECT YOUR EYES WHEN WORKING CLOSE TO BATTERIES.
KEEP OUT OF THE REACH OF CHILDREN

1) Battery preparation

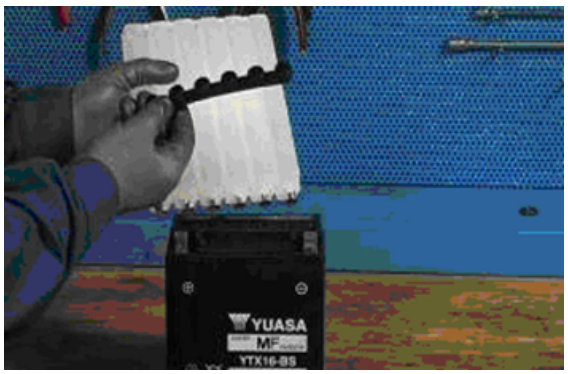
Position the battery on a flat surface. Remove the adhesive sheet closing cells and proceed as quickly as possible to run the subsequent activation phases.



2) Electrolyte preparation.

Remove the container of the electrolyte from the pack. Remove and preserve cover strips from the container, in fact, the strip will later be used as a closing cover.

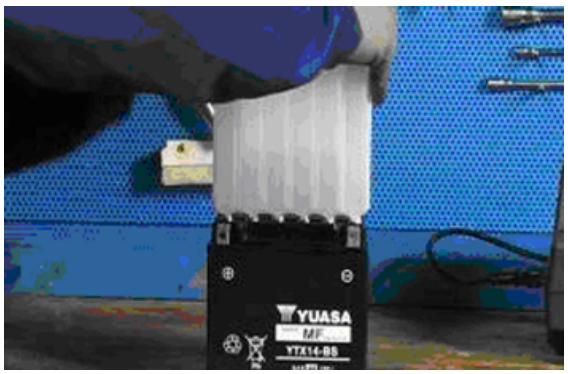
Note: Do not pierce the sealing of the container or the container itself because inside there is sulphuric acid.



3) Procedure for filling the battery with acid.

Position the electrolyte container upside down with the six areas sealed in line with the six battery filler holes. Push the container down with enough force to break the seals. The electrolyte should start to flow inside the battery.

Note: Do not tilt the container to prevent the flow of electrolyte from pausing or stopping.



4) Control the flow of electrolyte

Make sure air bubbles are rising from all six filling holes. Leave the container in this position for 20 minutes or more.

Note: If there are no air bubbles coming out of the filling holes, lightly tap the bottom of the container two or three times. Do not remove the container from the battery.

5) Take out the container.

Make sure all the electrolyte in the battery is drained. Gently tap the bottom of the container if electrolyte remains in the container. Now, gently pull the container out from the battery, only do this when the container is completely empty, and proceed immediately to the next point.

6) Battery closing.

Insert the airtight cover strips into the filling holes. Press horizontally with both hands and make sure that the strip is levelled with the top part of the battery.

Note: To do this, do not use sharp objects that could damage the closing strip, use gloves to protect your hands and do not bring your face close to the battery.

The filling process is now complete.

Do not remove the strip of caps under any circumstances, do not add water or electrolyte.

Place the battery down for 1 to 2 hours prior to the charging from the battery.

7) Recharging the new battery

With the above-mentioned procedure, the battery will have gained around 70% - 75% of its total electrical capacity. Before installing the battery on the vehicle, it must be fully charged and then must be recharged.

If the battery is to be installed on the vehicle prior to this pre-charged one, the battery will not be able to exceed 75% charge without jeopardising its useful life on vehicle.

The dry charge battery MF like the completely loaded YTX, must have a no-load voltage between 12.8 - 13.15 V Bring the battery to full charge, using the 020648Y battery charger:

a - select the type of battery with the red switch on the left of the panel battery charger panel

b - select NEW on the yellow timer

c - connect the clamps of the battery charger to the battery poles (black clamp to negative pole (-) and red clamp to positive pole (+)).

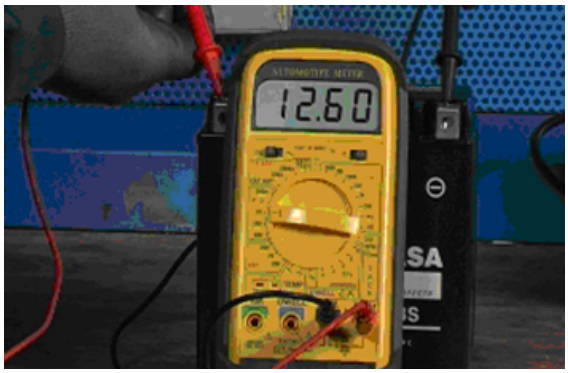
d - Press the red button, as shown in figure.

e - Press the "MF" black button to activate the battery recharge **Maintenance Free** as shown in figure.

f - Check the ignition of the green LED indicated with a red arrow in figure.

g - The activation cycle of the new battery lasts for 30 minutes after the ignition of the recharge LED has taken place

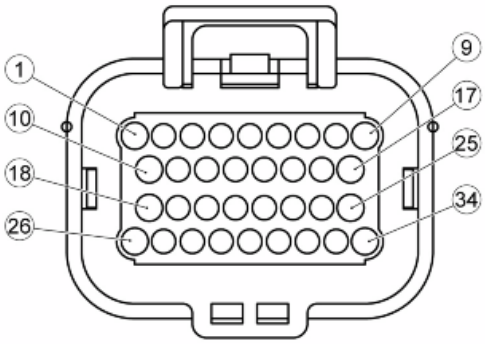
h - Disconnect the clamps from the battery and check the voltage, if voltages are detected of less than 12.8 V, proceed with a new recharge of the battery starting from point c of the recharge procedure of **the new battery**, otherwise go to point i



i - The battery is now completely activated, disconnect the battery charger from the fuel supply grid, disconnect the clamps from the battery and proceed to fitting the battery on the vehicle.

Connectors

C.D.I. CONNECTOR



1. HV coil (Red-Black)
2. Regulator Boost Outlet (only 125) (White)
3. Fall sensor (Grey-Black)
4. RUN STOP (Orange)
5. Starter button (Purple)
6. Key-on power (Red-White)
7. Ground 1 (Black)
8. Not connected
9. Battery powered (Red-Green)
10. Start-up enabling switch (Purple-White)
11. Lambda probe positive (Green-Blue)
12. Lambda probe negative (Sky blue-Black)
13. Engine temperature indicator (Sky blue-Green)
14. Immobilizer bus (Orange-White)
15. Ground sensors (Grey-Green)
16. Diagnosis (Orange-Black)
17. Immobilizer warning light (Yellow)
18. Not connected
19. Fall sensor ground (Grey-Green)
20. Speed sensor negative (Brown)
21. Positive fall sensor (Red-Black)
22. Pump relay (Black-Purple)
23. Ground 2 (Black)

24. Electric fan solenoid (Green-White)

25. Engine check warning light (Brown-White)

26. CAN "H" Line Vehicle (White-Blue)

27. CAN "L" Line Vehicle (Pink-White)

28. Not connected

29. Speed sensor positive (Red)

30. Not connected

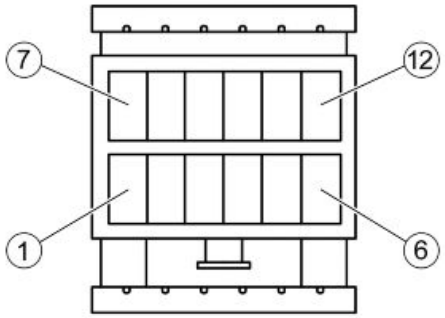
31. Not connected

32. Water pump (only 125 cc.) (Blue)

33. Lamp./eco relay

34. Injector (Red-Yellow)

TURN INDICATOR CONTROL DEVICE CONNECTOR



1. Hazard button (Brown)

2. Left Switch (White-Pink)

3. RHS Switch (Blue-Black)

4/10. Left turn indicators (Pink)

5/11. Right turn indicators (White-Blue)

6. Battery-powered (Red-Black)

7. Hazard warning light (Green)

8. Live supply (Yellow-Black)

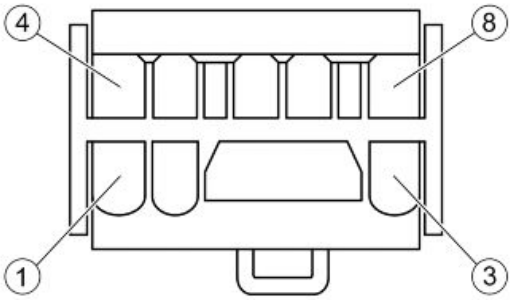
9. Ground lead (Black)

10. Not connected

11. Not connected

12. Not connected

ANTI-THEFT DEVICE PRE-INSTALLATION CONNECTOR



1. LHS Turn indicators (Pink)

2. RHS Turn indicators (White-Blue)

3. Ground (Black)

4. Battery powered (Red-Black)

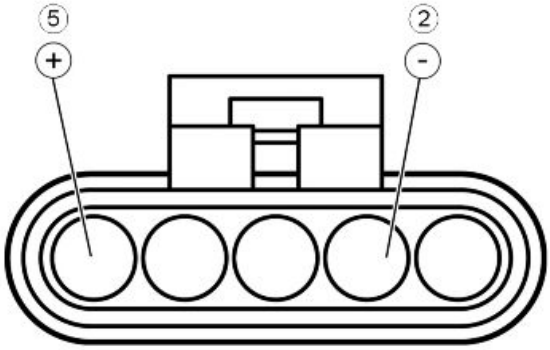
5. Key-on power (Yellow-Black)

6. Saddle compartment lighting bulb (Blue-Black)

7. Not connected

8. Not connected

FUEL PUMP CONNECTOR



1. Not connected

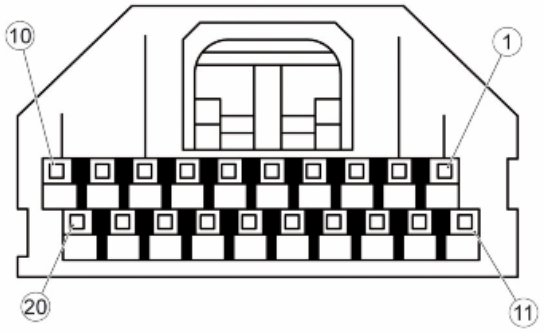
2. Pump negative (Black)

3. Not connected

4. Not connected

5. Pump positive (Black-Green)

INSTRUMENT PANEL CONNECTOR



1. Oil pressure warning light negative (Pink-White)

2. «MODE» remote button (Green)

3. LHS Turn indicator warning light (Pink)

4. RHS Turn indicator warning light (White-Blue)

5. High beam warning light (Purple)

6. Not connected

7. ECO

8. Not connected

9. Not connected

10. Not connected

11. Air temperature sensor (Yellow-Blue)

12. Fuel level indicator (White-Green)

13. Engine temperature sensor (Sky blue-Black)

14. Vehicle speed signal (Sky blue)

15. Not connected

16. Engine check warning light (Brown-White)

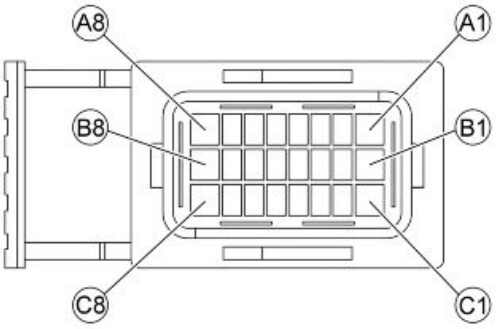
17. Ground lead (Black)

18. Immobilizer warning light (Yellow)

19. Live positive (Yellow-Black)

20. Battery positive (Red-Black)

PARKING CONTROL ECU CONNECTOR



1A. Potentiometer power supply (Orange-Blue)

2A. CAN "L" Line (Pink-White)

3A. Warning light power supply (Yellow-Green)

4A. Roll lock activated warning light (Pink-Black)

5A. Roll lock system failure warning light (Grey-Black)

6A. Headlight solenoid (White-Black)

7A. Potentiometer ground lead, rpm sensor, rider detection sensor (Yellow)

8A. Ground lead (Black)

1B. Live supply (Yellow-Red)

2B. CAN "H" Line (White-Blue)

3B. Left wheel speed sensor (Green)

4B. Right wheel speed sensor (Red)

5B. Potentiometer signal (Green-Blue)

6B. Locking/unlocking switch (Green-Grey)

7B. Horn solenoid for alarms (White)

8B. Gear motor positive (Yellow)

1C. Battery powered (Blue-Red)

2C. Diagnosis (Orange-Black)

3C. Locking/unlocking switch (Yellow-Blue)

4C. Calliper sensor (Brown)

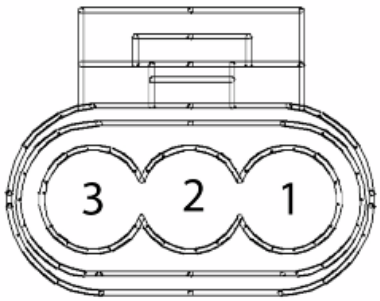
5C. Locking/unlocking switch (Purple-Black)

6C. Rider detection sensor (Purple)

7C. Vehicle speed signal (Sky blue)

8C. Gear motor negative (Blue)

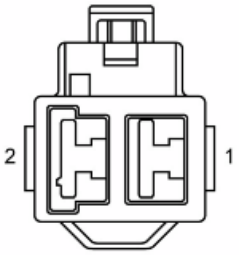
PICKUP CONNECTOR



1. Pickup + (Red)
2. Pickup - (Brown)
3. Oil pressure sensor (Pink-White)

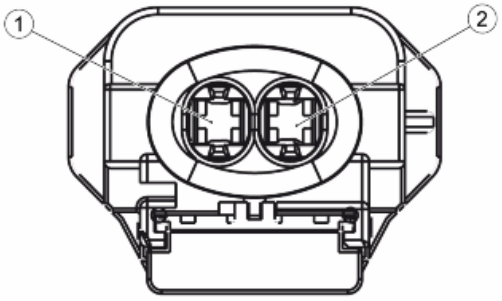
VOLTAGE REGULATOR CONNECTOR

1. Red-Black (+)
2. Black (-)



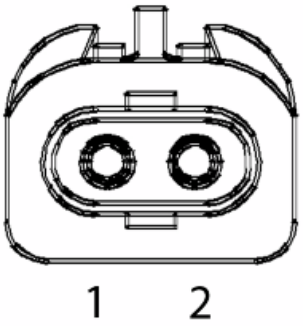
COIL CONNECTOR

1. Ground - (Red-Black)
2. To injection load solenoid + (Black-Green)



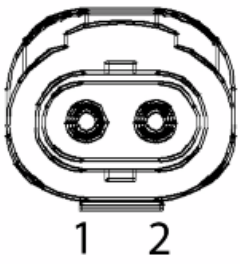
RIDER DETECTOR SENSOR CONNECTOR

1. Purple (+)
2. Yellow (-)



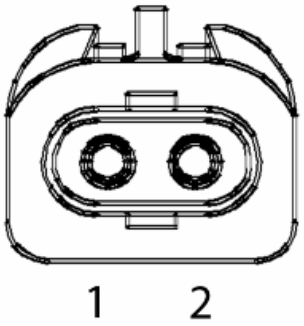
LH SPEED SENSOR CONNECTOR

1. Pickup - (Yellow)
2. Pickup + (Green)



RH SPEED SENSOR CONNECTOR

1. Pickup - (Yellow)
2. Pickup + (Red)



Diagnostic instrument

On this screen page, the general data relating to the control unit is read, for example the type of software, mapping, control unit programming data.

ECU INFO SCREEN PAGE

Characteristic	Value/example	Units of measurement	Notes
Hardware number			
Hardware version			
Software number			
Software version			
Configuration	MIU_EFI		Information on the type of vehicle on which the ECU has been initialised.

On this screen page, the parameters detected by various sensors (engine rpm, engine temperature, ...) or values set from the control unit (injection time, ignition advance, ..) are read.

PARAMETERS

Characteristic	Value/example	Units of measurement	Notes
Battery voltage	00.00	V	Voltage perceived by the ECU.

Characteristic	Value/example	Units of measurement	Notes
Sensors voltage	00.00	V	Voltage generated by the ECU to supply the sensors.
Parking status	BLOCC_RIPOS_ABILI_TRANS_INDET_ERROR_POW.L		
RH speed	DIFET_000	Km/h	
LH speed	DIFET_000	Km/h	
Calliper sensor	ON_OFF_DIFET		ON: free calliper; OFF: locked calliper.
Potentiometer angle	DIFET_000.0	°	Possible values: 70-80° free system, 280-290° parked system.
Potentiometer voltage	0.0	V	Possible values: ~ 1 V free system, ~ 4 V parked system.
Parking command	BLOCC_LIBER_RIPOS_DIFET		
Rider present	SI_NO_DIFET		
Engine rpm	DIFET_00000	rpm	
Throttle	DIFET_00.0	%	
Relative potentiometer angle	000.0	°	Active only during SYSTEM ZEROING procedure.

On this screen page, you can delete the errors from the memory of the controller and you can enable some systems controlled by the control unit.

ACTIVATION

Characteristic	Value/example	Units of measurement	Notes
Parking warning lamp			
Parking warning light			
Buzzer			
Speedometer			Take the speedometer indicator to 59 km/h and back to 0.
Headlamp relay			Turns on the headlamps.
Self configuration request			Operation to initial a new control unit.

This screen page displays any errors detected in the vehicle (ATT) or stored in the control unit (MEM) and you can check that the cancellation of error (STO) has taken place.

WARNING

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

ERRORS

Code	Description	Possible cause
9001 - Speed sensors difference	The speed measured by the LH sensor is higher than that of the RH sensor.	Temporary removal of the right wheel engine speed sensor.
9001 - Speed sensors difference	The speed measured by the RH sensor is higher than that of the LH sensor.	Temporary removal of the left wheel engine speed sensor.
9002 - RH speed sensor	The RH sensor circuit is open or the signal is not compliant.	Lack of continuity in the cable harness PIN 1 sensor - PIN 7A parking control unit or PIN 2 sensor - PIN 4B control unit; detachment of the sensor.
9003 - LH speed sensor	The LH sensor circuit is open or the signal is not compliant.	Lack of continuity in the cable harness PIN 1 sensor - PIN 7A parking control unit or PIN 2 sensor - PIN 3B control unit; detachment of the sensor.
9004 - Potentiometer	The voltage of the potentiometer is higher than the values of the specification.	Wrong potentiometer zeroing; potentiometer breakage.
9004 - Potentiometer	The voltage of the potentiometer is lower than the values of the specification.	Wrong potentiometer zeroing; potentiometer breakage.
9004 - Potentiometer	Lack of the potentiometer signal. Open circuit or short circuit to ground.	Lack of continuity in the cable harness PIN 1 sensor - PIN 1A parking control unit or PIN 2 sensor - PIN 5B control unit or PIN 3 sensor - PIN 7A control unit; presence of a short to ground on PIN 1A, or on PIN 5B, or on PIN 7A parking control unit; breakage of the potentiometer.
9005 - Control switch (unlocking/locking)	The lock command remains inserted.	Switch locked in the locked position; presence of a short to ground on PIN 5C parking control unit.
9005 - Control switch (unlocking/locking)	The unlock command remains inserted.	Switch locked in the unlocked position; presence of a short to ground on PIN 3C parking control unit.
9005 - Control switch (unlocking/locking)	Lack of consent of the command at rest or the signals are over placed.	Presence of short circuit to positive on PIN 6C parking control unit switch breakage.
9006 - Rider presence	Open circuit.	Lack of continuity in the cable harness PIN 1 sensor - PIN 6A parking control unit or PIN 2 sensor - PIN 7A control unit; sensor detachment.
9006 - Rider presence	Short circuit to ground.	Presence of a short to ground on PIN 6C or on PIN 7A parking control unit short circuit of the sensor.
9006 - Rider presence	Signal not compliant or short circuit to positive.	Presence of a short to positive on PIN 6C or on PIN 7A parking control unit sensor breakage.
9007 - Warning lamp	Short circuit to positive. Voltage greater than 3.5 V. Warning light off.	Presence of short circuit to positive on PIN 5A parking control unit detachment or breakage of warning light.
9007 - Warning lamp	Open circuit or short circuit to ground.	Presence of a short to ground on PIN 5A or on PIN 3A parking control unit interrupted cable harness.
9007 - Warning lamp	Short circuit to positive. Voltage greater than 2 V with warning light off.	Short circuit to positive on PIN 3A parking control unit.
9008 - Parking warning light	Short circuit to positive. Voltage greater than 5.5 V. Warning light off.	Presence of short circuit to positive on PIN 4A parking control unit detachment or breakage of warning light.
9008 - Parking warning light	Open circuit or short circuit to ground.	Presence of a short to ground on PIN 4A or on PIN 3A parking control unit interrupted cable harness.
9008 - Parking warning light	Short circuit to positive. Voltage greater than 2 V with warning light off.	Short circuit to positive on PIN 3A parking control unit switch breakage.
9009 - Gear motor	Short circuit to ground or locked rotor. Current beyond specification.	Presence of a short to ground on PIN 8B or on PIN 8C parking control unit short circuit to the engine (contact between the two cables); detachment or breakage of the engine.
9009 - Gear motor	Open circuit. The current is null or lower than specification.	Lack of continuity in the cable harness PIN A gear motor - PIN 8B parking control unit or PIN B gear motor - PIN 8C control unit; detachment or breakage of the engine.
9009 - Gear motor	Internal failure to the gear motor control circuit.	Detachment or breakage of the engine; faulty control unit.
900A - CAN RH line	Interrupted or short circuit. Check supply of the engine ECU.	Presence of a short to ground or to the positive on the PIN 2A (PIN 27 ECU) or the PIN 2B (PIN 26 ECU) control command station; interrupted cable harness; disconnected or faulty control unit.
900A - CAN RH line	Signal not compliant.	Disconnected or faulty control unit; non valid data contained in the package received.
900B - CAN TX line	Interrupted or short circuit. Check supply of the engine ECU.	Presence of a short to ground or to the positive on the PIN 2A (PIN 27 ECU) or the PIN 2B (PIN 26

Code	Description	Possible cause
		ECU) control command station; interrupted cable harness; disconnected or faulty control unit.
900C - Calliper sensor	Signal not compliant.	Presence of a short to ground or to positive on the PIN 4C parking control unit; interrupted cable harness; switch breakage.
900D - EEPROM	Internal failure to the control unit or zero setting of the wrong potentiometer.	Wrong potentiometer zeroing; breakage of the potentiometer; faulty control unit.
900E - Sensor voltage	Short circuit to ground or internal failure to the control unit.	Presence of a short to ground on PIN 1A, 3B, 4B or 6C parking control unit faulty control unit.
900F - Warning light voltage	The voltage is too low or too high or the circuit is short to ground.	Presence of a short to ground on PIN 3A parking control unit; faulty control unit.
9010 - Speedometer output	Short circuit to positive.	Presence of short circuit to positive on PIN 7C parking control unit.
9010 - Speedometer output	Short circuit to ground.	Presence of a short to ground on PIN 7C parking control unit.
9011 - Headlamp relay	Short circuit to positive.	Presence of short circuit to positive on PIN 6A parking control unit.
9012 - Alarm relay	Short circuit to positive.	Presence of short circuit to positive on PIN 7B parking control unit.
9013 - Buzzer	Internal failure to the control unit.	Faulty control unit.

STARTER COMMAND

Function

Commands engine starting through the injection control unit.

Operation / Operating principle

The starter button, the brake switches, the starter solenoid and the injection control unit through PIN 5 and 10 are involved.

ELECTRICAL ERRORS

Starter command P0170 - shorted to positive.

Error cause

Shorted to positive: excessive voltage at PIN 10 of the control unit connector.

Troubleshooting

Short circuit to positive:

- This malfunction is detected with a brake activated and the starter button pressed (voltage of 12V read at PIN 5)
- If the battery voltage does not drop (thanks to the absorption of the starter command relay excitation coil) the control unit understands that PIN 10 is shorted to battery.
- Restore the cabling (if the short is in the cabling) or the relay (if the short is in the relay).

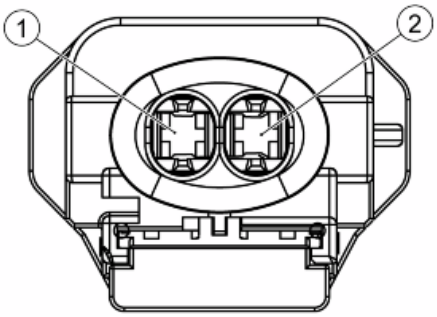
COIL

Function

Allows generation of the electrical discharge on the spark plug, with an increase of voltage.

Pinout:

1. Activation by control unit (control unit side PIN 1)
2. Relay powered (PIN 87 relay side)



ELECTRICAL ERRORS

H.V. Coil P0351 - shorted to positive / open circuit or shorted to negative.

Error cause

Shorted to positive: excessive voltage at PIN 1 of the control unit connector.

Circuit open or shorted to negative: interruption of the circuit or null voltage at PIN 1 of the control unit connector.

Troubleshooting

Short circuit to positive:

- Disconnect the coil connector, turn the key to ON and activate the component through the diagnostics instrument.
- Verify the presence of voltage on the coil connector PIN 1: if present, restore the cabling, otherwise replace the coil.

Open circuit:

- Carry out the check procedure of the coil and control unit connectors.
- Verify continuity of the cabling between the coil and control unit: Coil PIN 1 - control unit PIN 1. In the absence of continuity restore the cabling.
- Verify, with the key turned ON, the presence of voltage on the coil connector PIN 2: If no voltage is detected, check that the cable harness between the coil and injection relay is not interrupted: Coil PIN 2 - relay PIN 87.
- If the above tests provided a positive result, the coil should be replaced.

Short circuit to negative:

- Disconnect the control unit connector and the coil connector.
- Verify the coil connector PIN 1 ground insulation (or control unit connector PIN 1). Restore the cabling if necessary.

INJECTOR

Function

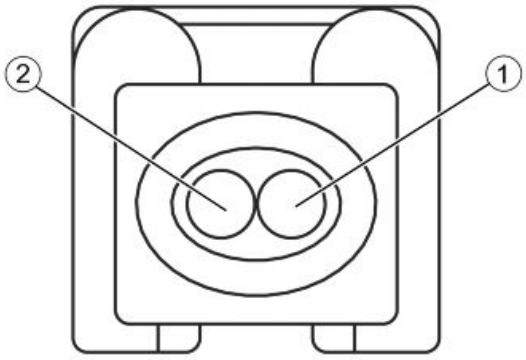
Provide the correct amount of fuel at the correct time.

Operation / Operating principle

Injector coil is excited for the petrol passage to open.

Pinout:

1. Power from relay
2. Ground from control unit



ELECTRICAL ERRORS

Injector P0201 - short circuit to positive / short circuit to negative / open circuit.

Error cause

Short circuit to positive: excessive voltage to PIN 34 of the control unit connector.

Short circuit to negative: zero voltage to the PIN 1 of the injector connector.

Open circuit: circuit interruption.

Troubleshooting

Short circuit to positive:

- Disconnect the injector connector, turn ignition switch to ON and activate the component using the diagnostic tool.
- Verify the absence of voltage at the injector connector PIN 2; if present restore the cable harness, otherwise proceed with the following checks.

Short circuit to negative:

- Disconnect the injector connector, turn ignition switch to ON and activate the component using the diagnostic tool.
- Verify the presence of voltage at the ends of the injector connector; if there is no voltage, restore the cable harness, otherwise proceed with the following checks.

Open circuit:

- Perform the check of the injector and control unit connectors.
- Verify continuity of the cable harness between the control unit connector and the injector connector (control unit PIN 34 - injector PIN 2). If there is no continuity, restore the cable harness.

FUEL PUMP

ELECTRICAL ERRORS

Fuel pump relay P0230 - shorted to positive / shorted to negative / open circuit.

Error cause

Shorted to positive: excessive voltage at PIN 22 of the control unit connector.

Short circuit to negative: null voltage at PIN 86 of the injection relay.

Open circuit: circuit interruption.

Troubleshooting

Short circuit to positive:

- Disconnect the injection relay, turn the key to ON and activate the relay through the diagnostics instrument.
- Verify the presence of voltage between relay connector PIN 86 and 85 toward the cabling.
- If no voltage is read, disconnect the control unit and verify insulation from battery positive of the relay PIN 85 (or control unit PIN 22). If necessary, restore the cable harness.

Short circuit to negative:

- Disconnect the injection relay and the control unit.
- Verify ground insulation of the relay connector PIN 86 and 85 toward the cabling: if there is no insulation, restore the cabling.

Open circuit:

- Disconnect the injection relay and the control unit.
- Verify continuity of the cabling between the relay and control unit: Relay PIN 85 - control unit PIN 22. If necessary, restore the cable harness.

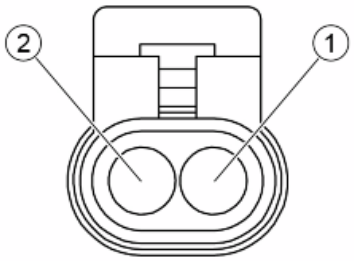
ELECTRIC FAN CIRCUIT

Function

Radiator fan and coolant - Operation.

Operation / Operating principle

The control unit closes the fan control relay excitation circuit to ground until the temperature drops.



Pinout:

1. Ground lead
2. Power from relay

ELECTRICAL ERRORS

Fan relay P0480 - shorted to positive / shorted to negative / open circuit.

Error cause

Shorted to positive: excessive voltage at PIN 24 of the control unit connector.

Short circuit to negative: null voltage at PIN 24 of the control unit connector.

Open circuit: circuit interruption.

Troubleshooting

Short circuit to positive:

- Disconnect the fan control relay and, turning the key to ON position, measure the voltage read at PIN 85 of the relay connector to the cable harness: if the voltage is 12V restore the cabling. If the voltage is zero replace the relay.

Short circuit to negative:

- Disconnect the fan control relay and the control unit.
- Verify ground insulation of the cable between the fan control relay (PIN 85) and the control unit (PIN 24). If necessary, restore the cable harness.

Open circuit:

- Carry out the check procedure of the control unit and relay connectors.
- Verify electrical continuity of the cable between the relay connector (PIN 85) and the control unit connector (PIN 24).
- Verify electrical continuity of the cable between the relay connector (PIN 30) and the fuse holders.
- Verify continuity between relay PIN 85 and PIN 86. If there is no continuity replace the relay.

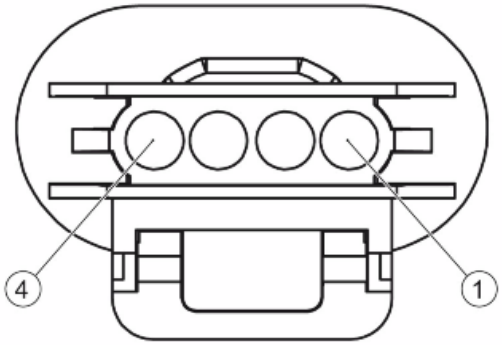
LAMBDA PROBE

Function

In charge of telling the control unit whether the mixture is lean or rich.

Operation / Operating principle

Based on the difference of oxygen in the exhaust fumes and the environment, this generates voltage which is read and interpreted by the injection control unit. It does not require an external supply source but, in order to work properly, it should reach a high operating temperature: that is why there is a heating circuit inside.



Pinout:

1. Heater power
2. Heater ground
3. Sensor signal +
4. Sensor signal -

ELECTRICAL ERRORS

Check the air-fuel ratio / Lambda probe P0130 - short circuit to positive / open circuit, short circuit to negative or carburetion excessively lean / signal not plausible for abnormal title correction or probe signal fault.

Error cause

Shorted to positive: excessive voltage at PIN 11 or PIN 12 of the control unit connector.

Circuit open or short circuit to negative:interruption of the circuit or null voltage between control unit connector PIN 11 and 12.

Troubleshooting

Short circuit to positive:

- Disconnect the control unit connector and the sensor connector.

- Verify that there is no short to battery positive on sensor connector PIN 3 (corresponding to control unit connector PIN 11); in the presence of short circuit, restore the cable harness.
- Verify that there is no short to battery positive on sensor connector PIN 4 (corresponding to control unit connector PIN 12); in the presence of short circuit, restore the cable harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Check the continuity of the cable harness between the sensor connector and control unit connector: Control unit PIN 11 - sensor PIN 3 and control unit PIN 12 - sensor PIN 4. If necessary, restore the cable harness.
- If the cable harness is intact and the error persists, proceed with the following checks.

Short circuit to negative:

- Disconnect the sensor connector and the control unit connector.
- Check the sensor connector PIN 3 from ground insulation. If there is no insulation, restore the cable harness.
- Check the sensor connector PIN 4 from ground insulation. If there is no insulation, restore the cable harness.
- If PIN 3 and PIN 4 are insulated from the ground and the error persists, this means that there is a probable fault in the control unit.

P0135 Lambda probe heating - shorted to positive / shorted to negative / open circuit.

Error cause

Shorted to positive: excessive voltage at PIN 31 of the control unit connector.

Short circuit to negative: lack of insulation from ground on the sensor connector PIN 1.

Open circuit: circuit interruption.

Troubleshooting

Short circuit to positive:

- Disconnect the control unit connector and the sensor connector.
- Verify that there is no short to battery positive on sensor connector PIN 2 (corresponding to control unit connector PIN 31); in the presence of short circuit, restore the cable harness.

Open circuit:

- Disconnect the control unit connector and the sensor connector.
- Check the continuity of the cable harness between the sensor connector and control unit connector: control unit PIN 31 - sensor PIN 2. If necessary, restore the cable harness.
- Verify continuity of the cabling between the sensor connector and the injection relay: sensor PIN 1 - injection relay PIN 87. If necessary, restore the cable harness.
- If the cable harness is intact and the error persists, proceed with the following checks.

Short circuit to negative:

- Disconnect the sensor connector.

- Check the insulation from the ground of PIN 2 of the sensor connector. If there is no insulation, restore the cable harness.
- If PIN 2 is insulated from ground and in the absence of other errors (fuel pump, injector, coil), this means that the control unit is most likely faulty.

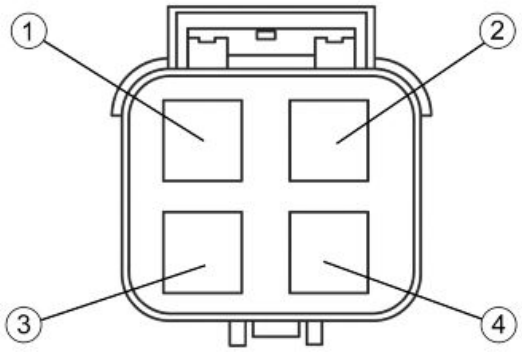
ENGINE TEMPERATURE SENSOR

Function

Serves the purpose of communicating the engine temperature to the control unit in order to optimise performance.

Operation / Operating principle

NTC type sensor (resistance sensor, inversely variable with temperature).



Pinout:

1. Injection ECU
2. Instrument panel
3. Control unit ground
4. Ground lead

Engine temperature sensor P0115 - open circuit or shorted to positive / shorted to negative.

Error cause

Open circuit or shorted to positive: interruption of the circuit or excessive voltage at PIN 13 of the control unit connector. Shorted to negative: null voltage between PIN 13 and 15 of the control unit connector.

Troubleshooting

Open circuit:

- Disconnect the connector of the control unit.
- Measure the resistance value of the sensor at different temperatures between PIN 13 and 15.
- Disconnect the sensor connector.
- Verify continuity of the cabling between the sensor connector and the control unit connector: Control unit PIN 13 - sensor PIN 1 and control unit PIN 15 - sensor PIN 3. Restore the cabling if necessary.
- If the cabling is intact but the sensor resistance value is incorrect, this means that the sensor is faulty and must be replaced, otherwise proceed with the checks.

Short circuit to positive:

- With the sensor connector and the control unit disconnected, verify that the fault is shorted with the battery positive of sensor connector PIN 1 (or control unit PIN 13) and restore the cabling.

Short circuit to negative:

- Disconnect the sensor connector.
- Check the sensor connector PIN 1 ground insulation.
- If there is no ground insulation restore the cabling.

- If PIN 1 is insulated from the ground and the error persists, this means that there is a probable fault in the control unit.

INDEX OF TOPICS

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

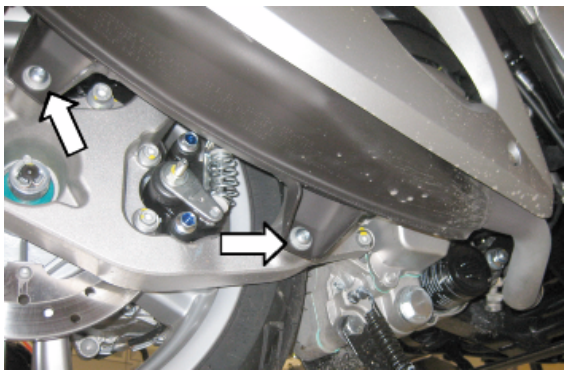
Exhaust assy. Removal

- Working from both sides, release the two clamps securing the exhaust manifold to the head.
- Detach the exhaust manifold making it pass through the swinging arm.

CAUTION

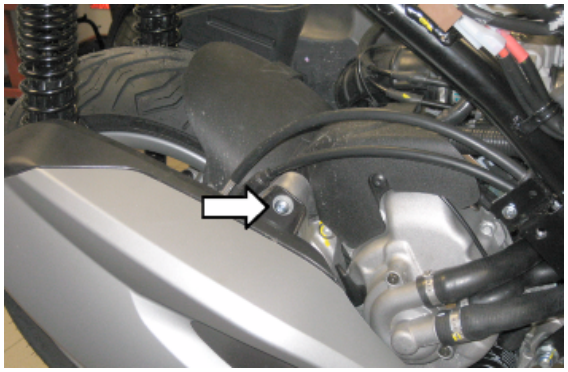
SHOULD IT BE NECESSARY TO REMOVE ONLY THE MUFFLER TIP, ALWAYS REPLACE THE GRAPHITE GASKET BETWEEN STUB AND TIP.

- Svitare le tre viti di fissaggio alla staffa di supporto.



WARNING

PAY CAREFUL ATTENTION TO THE DISASSEMBLY OF THE LAMBDA PROBE. AVOID REMOVING THE PROBE FROM THE EXHAUST PIPE.
REMOVE THE SILENCER NOT FROM THE EXPANSION JOINT, BUT DIRECTLY FROM THE ENGINE. DISCONNECT THE ELECTRICAL CONNECTION OF THE LAMBDA PROBE, LEAVING IT FITTED ON THE EXHAUST PIPE.



To fit, follow the removal steps but in reverse order; be careful to tighten to the correct locking torques once the muffler silencer has been refitted.

Removal of the engine from the vehicle

CAUTION

SUPPORT THE VEHICLE ADEQUATELY.

Disconnect the battery.

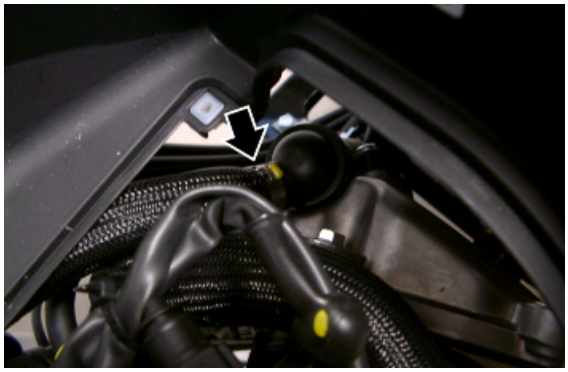
- Remove the side fairings.

- Remove the inspection cover in helmet compartment.

- Remove the full silencer unit.

- Remove the air filter.

- Release the blow-by return pipe from the clamp and disconnect it from the head.



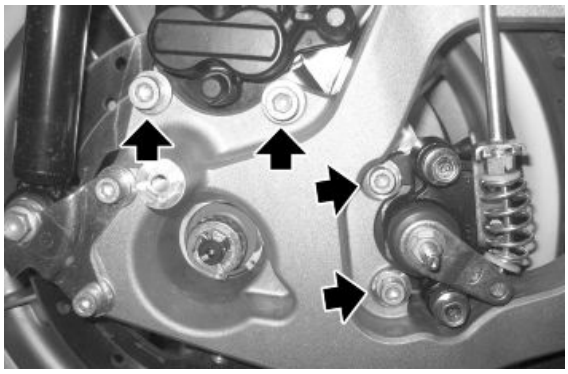
CAUTION

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

Remove the full silencer assembly.

- Remove the screw fixing the right-hand shock absorber to the bracket

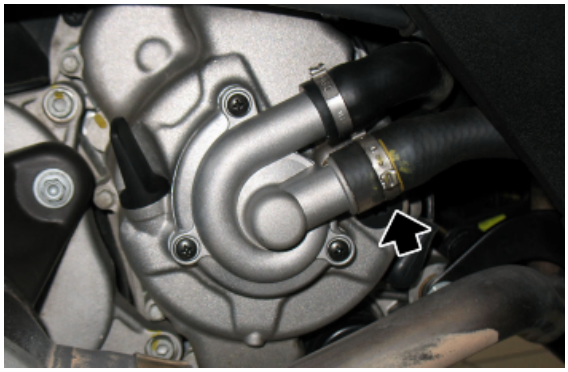
- Remove the two screws fixing the brake calliper to the mounting bracket and the parking brake caliper fixing screws.



WARNING

PAY CAREFUL ATTENTION TO THE DISASSEMBLY OF THE LAMBDA PROBE. AVOID REMOVING THE PROBE FROM THE EXHAUST PIPE.
REMOVE THE SILENCER NOT FROM THE EXPANSION JOINT, BUT DIRECTLY FROM THE ENGINE. DISCONNECT THE ELECTRICAL CONNECTION OF THE LAMBDA PROBE, LEAVING IT FITTED ON THE EXHAUST PIPE.

- Working on the vehicle right side, remove the coolant intake pipes and empty the system.



N.B.

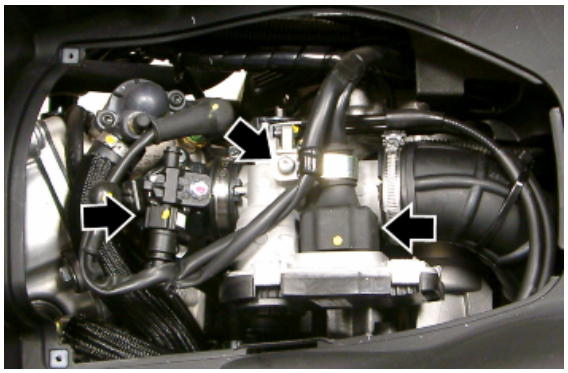
LET THE COOLANT DRAIN INTO A CONTAINER OF ADEQUATE CAPACITY.

Characteristic

Cooling system fluid

~ 2 l

- Disconnect:
- fuel piping and retainer clamp.
- injector connector.
- control unit connector.

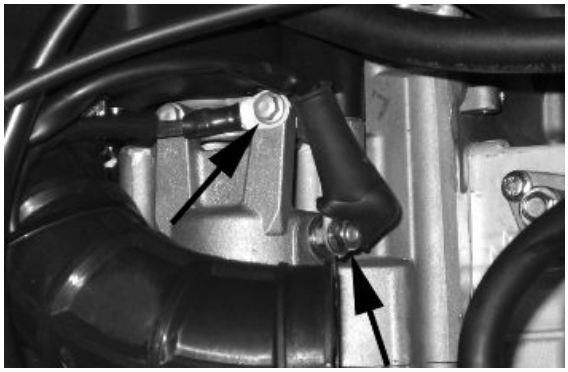


- Remove the coolant outlet pipe from the engine as indicated.

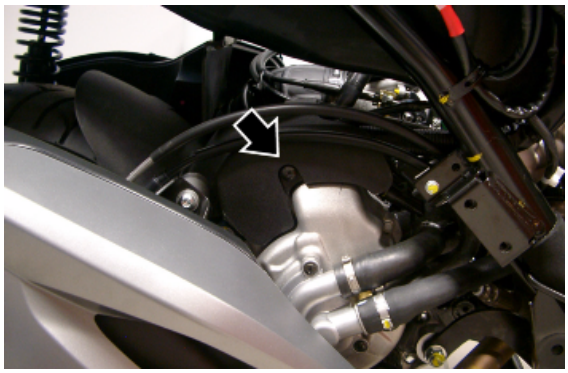
- Remove the spark plug cap.
- Remove the coolant temperature sensor connector indicated in the picture.

- Remove the throttle cables from the throttle body by undoing the nuts indicated in the picture.

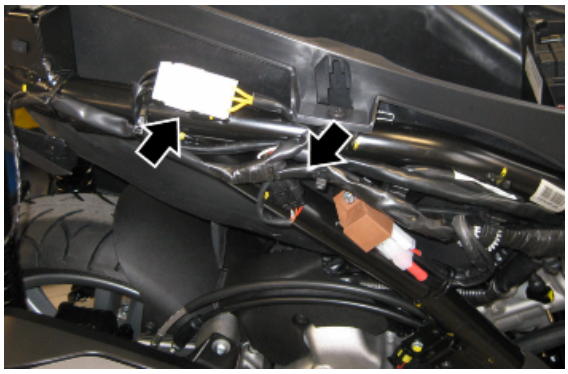
- Remove the positive and negative wiring from the starter motor as shown in the picture.



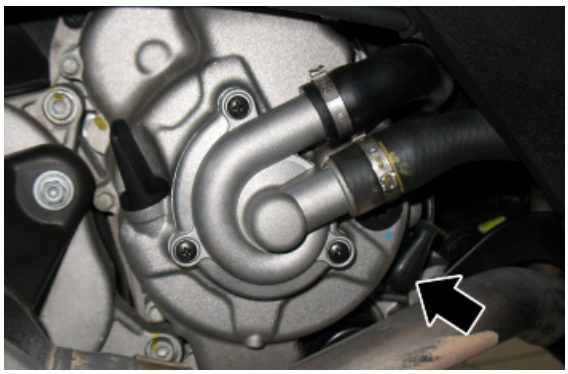
- Rimuovere la copertura in plastica svitando al vite indicata.



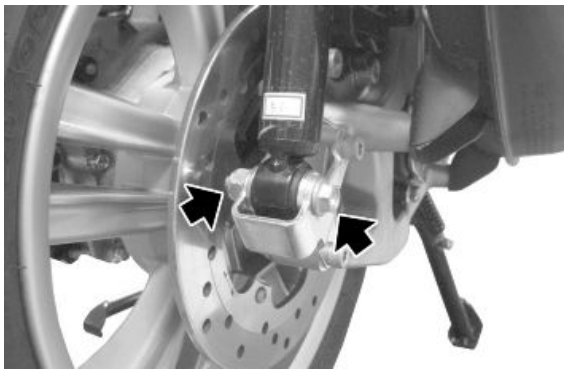
- Scollegare i connettori del pick-up e del regolatore di tensione.

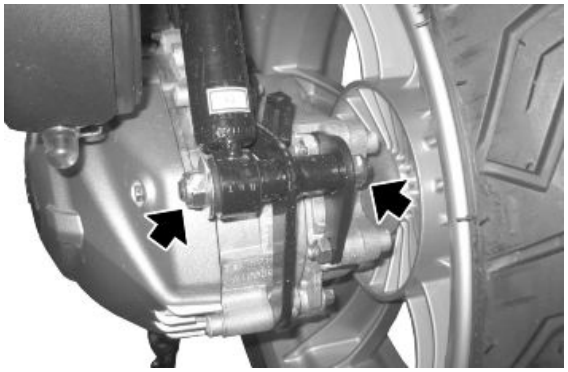


- Release the cable harness from the cable grommet clamp and remove the clamp indicated.
- Disconnect the oil minimum pressure sensor.

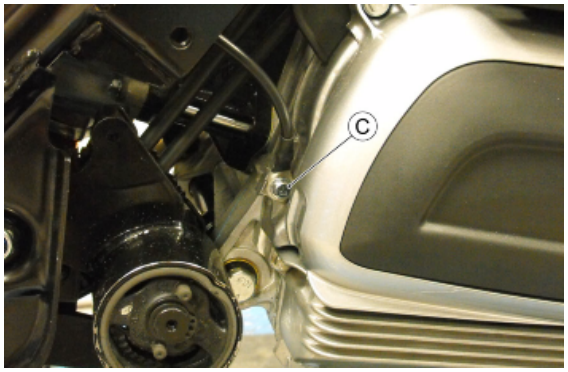


- Remove the lower screws of the right and left shock absorber.

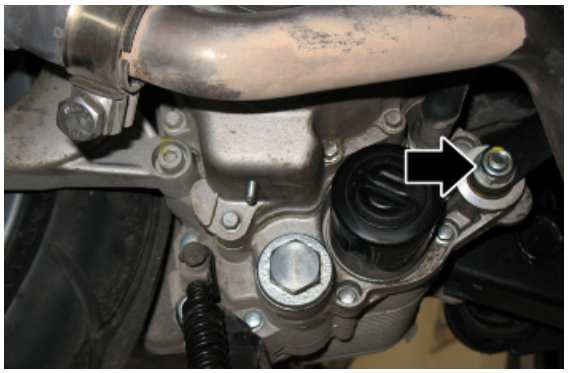


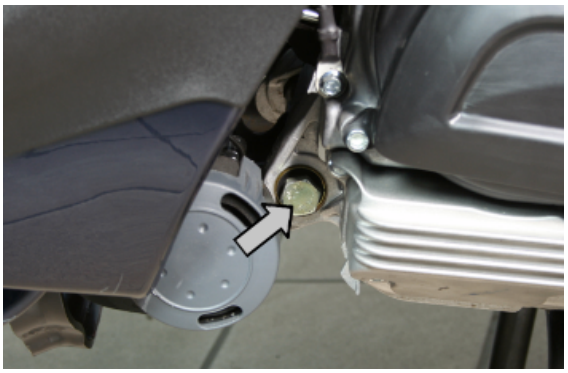


- Take out the ground retainer on the engine.



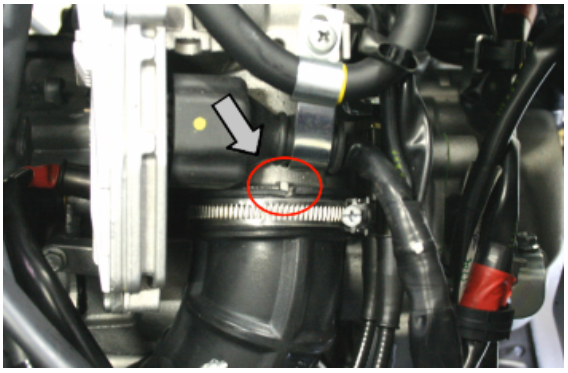
- Remove the pin fixing the engine to the swinging arm.
- The engine is now free.

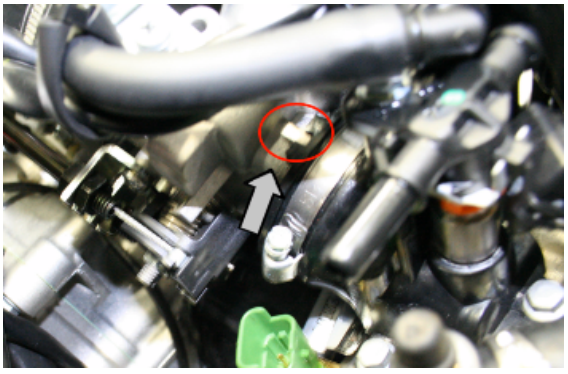




Upon refitting the engine to the vehicle, carry out the removal operations but in reverse order, and respect the tightening torque shown in the «Specifications» Chapter.

- Check that there is a small clearance when the valve is in abutment against the set screw.
- Check the engine oil level and if necessary, top it up with the recommended type.
- Fill and bleed the cooling circuit.
- Check accelerator and electric devices for correct functioning.
- Pay particular attention to the sleeve, be careful to position the throttle body reference marks as indicated in the picture.





CAUTION

PAY PARTICULAR ATTENTION TO POSITIONING THE THROTTLE CONTROL TRANSMISSION PROPERLY.

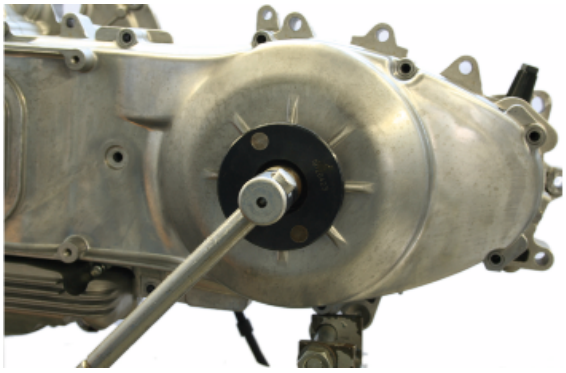
INDEX OF TOPICS

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

Automatic transmission

Transmission cover

- Remove the air duct.
- With the specific tool lock the driven pulley, undo the indicated nut and collect the washer.



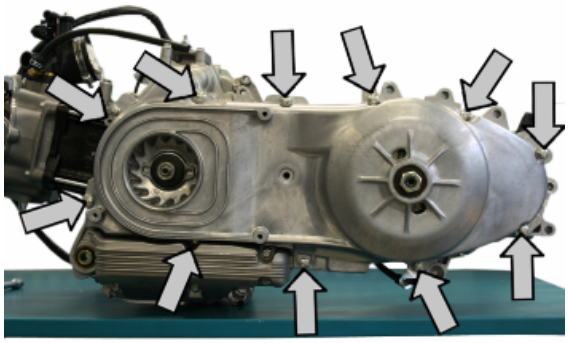
Specific tooling

020423Y Driven pulley lock wrench

- Undo the eleven fixings screws to the engine and remove the transmission cover

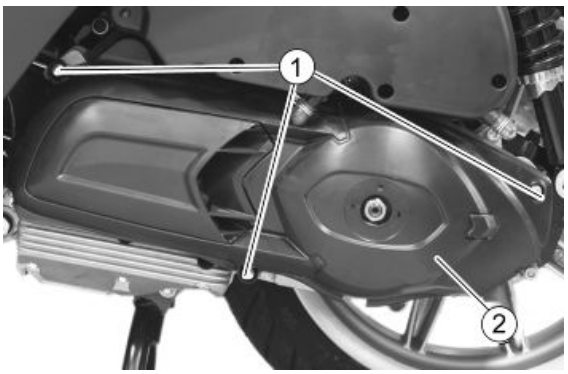
N.B.

WHEN YOU ARE REMOVING THE TRANSMISSION COVER YOU MUST BE CAREFUL NOT TO DROP THE CLUTCH HOUSING.

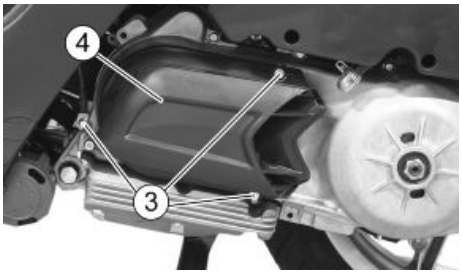


Air duct

- Undo the three screws «**1**» and remove the crankcase cover «**2**».



- Undo the three screws «**3**» and remove the filter cover in the transmission housing «**4**».



- Take out the filtering element «**5**» from the cover.

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 28 x 30 mm adaptor

020412Y 15-mm guide

Refitting the driven pulley shaft bearing

- Heat the crankcase from the inside.
- Insert the bearing in its seat.
- Refit the Seeger ring.

CAUTION

USE AN APPROPRIATE SUPPORT TO AVOID DAMAGING THE COVER SURFACE.

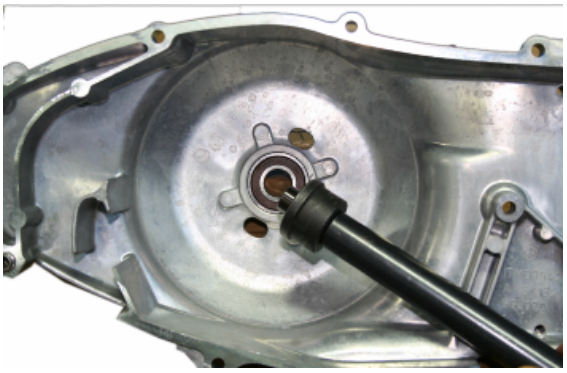
N.B.

ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REFITTING.

Specific tooling

020376Y Adaptor handle

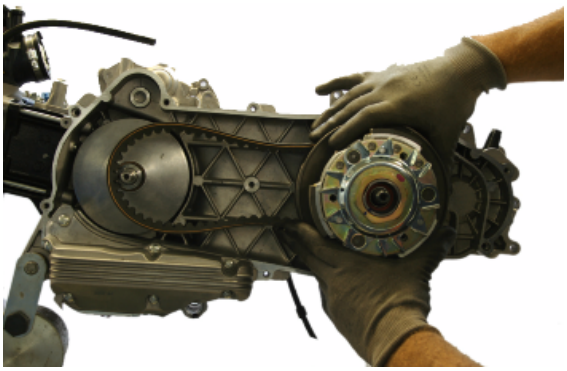
020357Y 32 x 35-mm Adaptor



020412Y 15-mm guide

Removing the driven pulley

- Remove the stationary driving half-pulley and the clutch housing.
- Remove the driven pulley together with the belt.



Inspecting the clutch drum

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

Characteristic

Max. value clutch housing

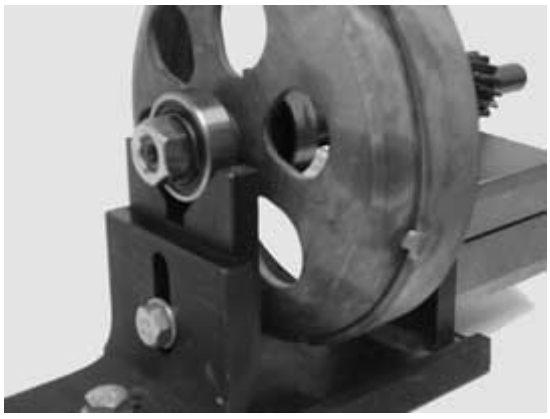
Max. value: Ø 134.5 mm

clutch housing standard value

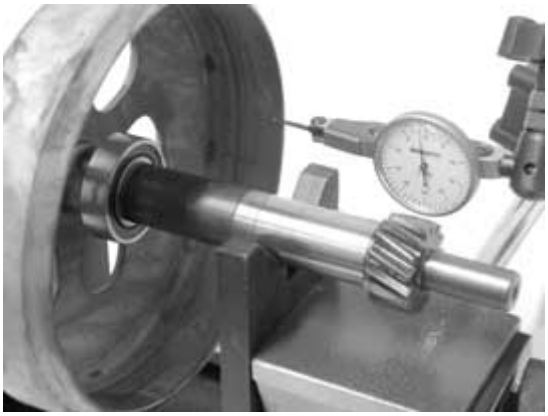
Standard value: Ø 134 - 134.2 mm

Checking the bell working surface eccentricity

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



- Using a feeler dial 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 mounting for dial gauge

Characteristic

clutch housing 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 **«C»** on the tool internal side.

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

CAUTION

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

Specific tooling

020444Y011 adapter ring

020444Y009 wrench 46 x 55

020444Y Tool for fitting/ removing the driven pulley clutch

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 FAYING SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER.
VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.

CAUTION

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

Characteristic

Check minimum thickness

1 mm

Pin retaining collar

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

N.B.

USE TWO SCREWDRIVERS IF YOU HAVE ANY DIFFICULTY.

N.B.

BE CAREFUL NOT TO PUSH THE SCREWDRIVERS IN TOO FAR TO AVOID DAMAGE THAT COULD COMPROMISE THE O-RING SEAL.

- Remove the 4 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 retainer 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 Bearing housing, outside ø 47 mm

- Remove the roller bearing using the modular punch.

Specific tooling

020376Y Adaptor handle

020456Y Ø 24-mm adaptor

020363Y 20-mm guide

Inspecting the driven fixed half-pulley

Version 250

- Measure the outside 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 contact surface.

Characteristic

Half-pulley minimum diameter

Minimum admissible diameter: Ø 40.96 mm

Half-pulley standard diameter

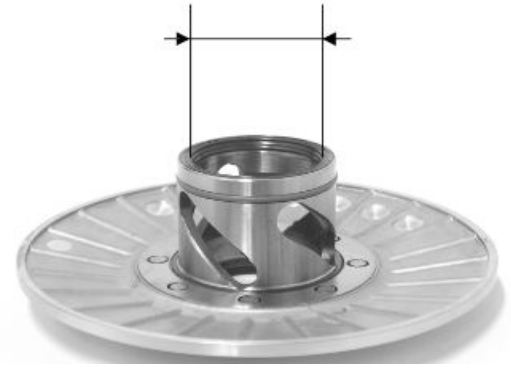
Standard diameter: Ø 40.985 mm

Wear limit

0.3 mm

Inspecting the driven sliding half-pulley

- Remove the two seal rings and the two O-rings.
- Measure the movable half-pulley bushing inside diameter.
- 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 contact surface.



MOVABLE DRIVEN HALF-PULLEY DIMENSIONS

Specification	Desc./Quantity
Wear limit	0.3 mm
standard diameter	Ø 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 bearing as shown in the figure.
- For the fitting of the new ball bearing, follow the example in the figure using a modular punch.

Fit the retainer ring

WARNING

N.B.

FIT THE BALL BEARING WITH THE VISIBLE SHIELDING

Specific tooling

020376Y Adaptor handle

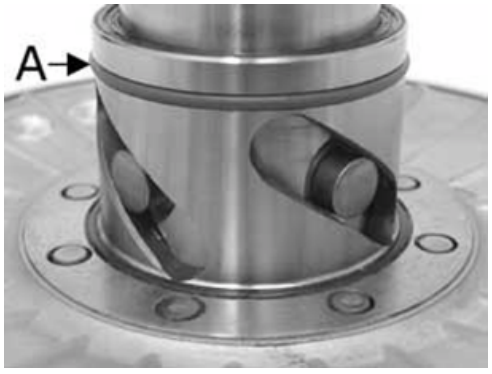
020375Y 28 x 30 mm adaptor

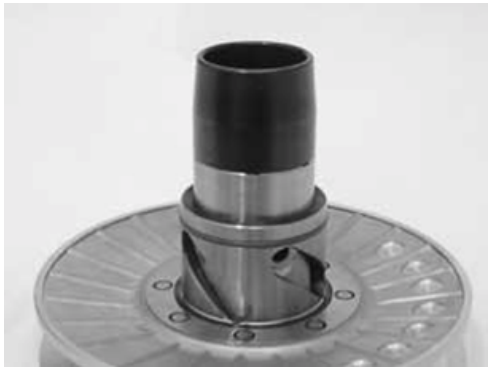
020424Y Driven pulley roller casing fitting punch

Refitting the driven pulley

- Insert the new oil seals 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 specific 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 unit with approximately 6 grams of grease. Apply 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 Driven pulley assembly sheath

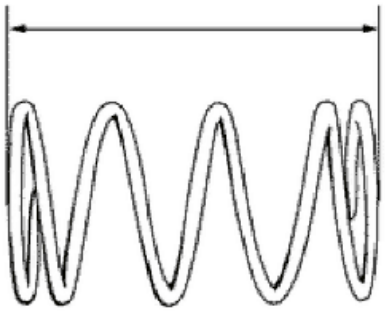
Recommended products

AGIP GREASE SM 2 Gray black smooth-textured lithium grease, containing molybdenum disulphide.

-

Inspecting the clutch spring

- Measure the length of the spring when it is relaxed.



Characteristic

Standard length

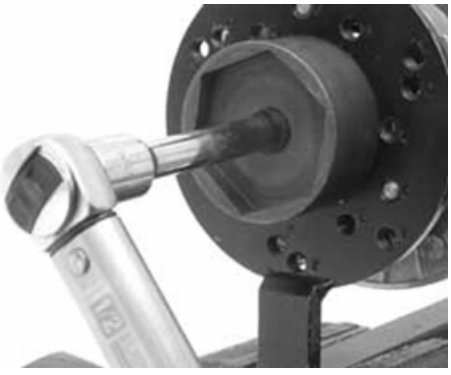
145 mm

Acceptable limit after use

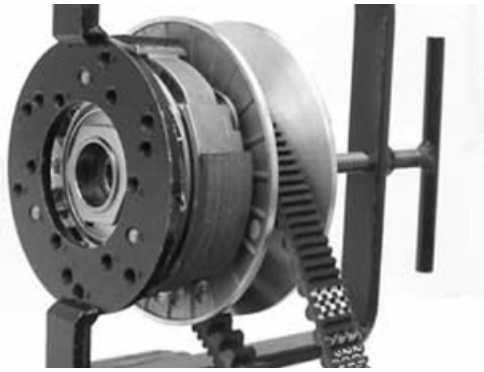
140 mm

Refitting the clutch

- Support the driven pulley spring compressor specific tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position "**C**" on the inside.
- Introduce the adapter ring No. 11 with the chamfering facing upwards.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the torque server closing collar.
- Insert the spring with its plastic holder in contact with the clutch.
- Insert the drive belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly preload the spring.



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



N.B.

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

N.B.

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

Specific tooling

020444Y Tool for fitting/ removing the driven pulley clutch

020444Y011 adapter ring

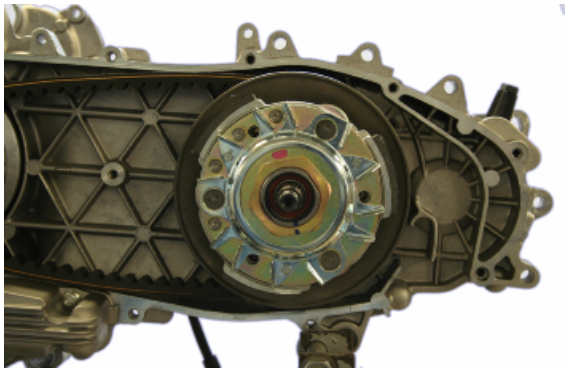
020444Y009 wrench 46 x 55

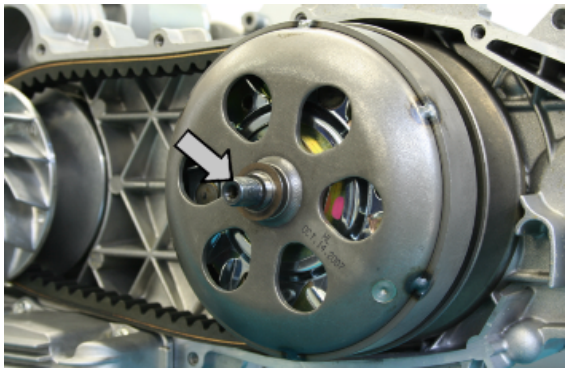
Locking torques (N*m)

Clutch unit nut on driven pulley **45 ÷ 50**

Refitting the driven pulley

- Fit the clutch housing on the driven pulley paying attention to the position of the washer indicated.



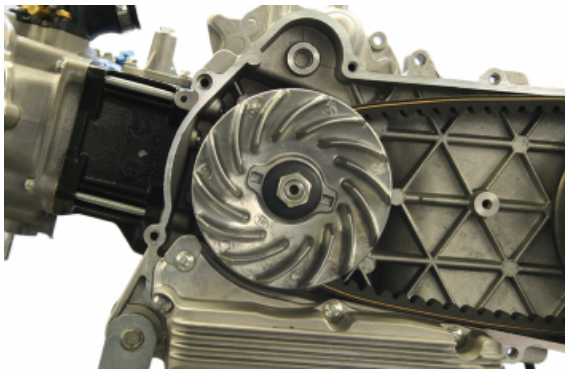


Drive-belt

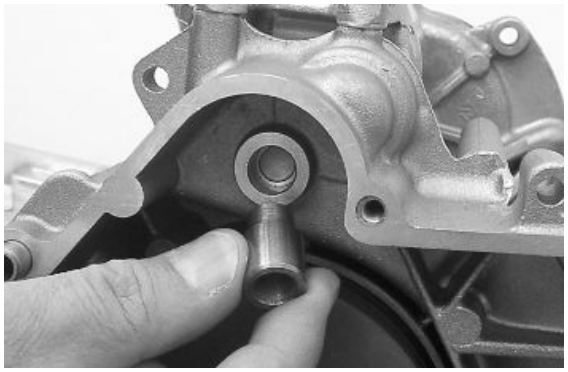
- Make sure the drive belt is not damaged and does not show abnormal wear.
- Replace as indicated in the scheduled maintenance table.

Removing the driving pulley

- Turn the crankshaft until the ropes of the pulley are on a horizontal axis



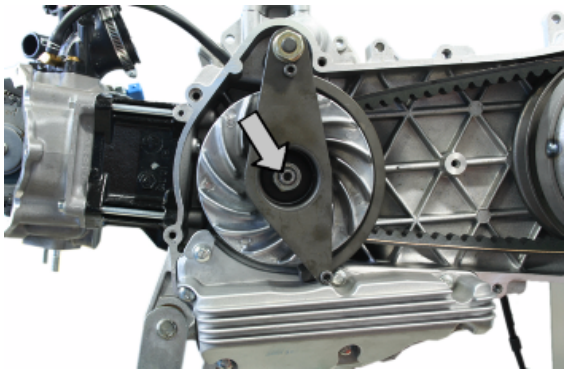
- Insert the adaptor sleeve of the appropriate tool in the hole shown in the picture



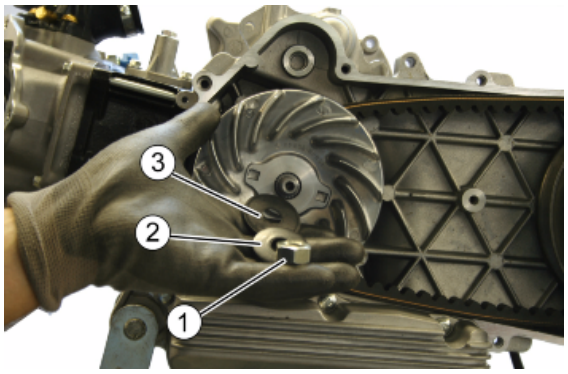
- Insert the tool in the hollows and apply the retention ring
- Bring in the ring's clamping screws while keeping the tool to support the pulley
- Remove the fixing nut and the washer
- Remove the stationary drive pulley half.

Specific tooling

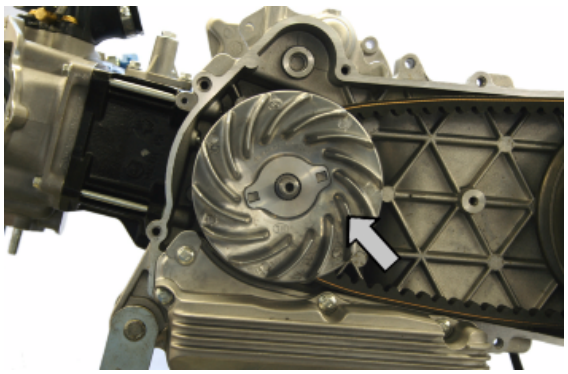
020626Y008 Driving pulley lock wrench



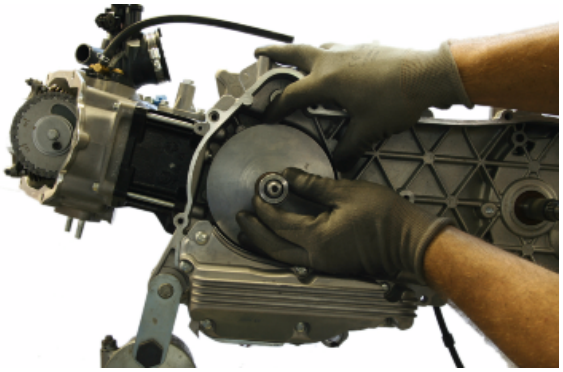
- Remove nut «**1**», Belleville spring «**2**», and washer «**3**».



- Remove the stationary driving half-pulley.



- Detach the drive belt from the crankshaft, remove the sliding bushing and the entire roller housing.



Inspecting the rollers case

- Check that the internal bushing shown in the figure is not abnormally worn and measure inner diameter A.
- Measure outer diameter B of the pulley sliding bushing shown in the figure.
- Check that the rollers are not damaged or worn.
- Check the guide shoes for the variator back-plate are not worn.
- Check the wear of the roller housings and of the belt 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

movable driving half-pulley bushing: Standard Diameter

26.000 - 26.021 mm

movable driving half-pulley bushing: Maximum allowable diameter

Ø 26.12 mm

Sliding bushing: Standard Diameter

Ø 25.959 ÷ 25.98 mm

Sliding bushing: Minimum admissible diameter

Ø 25.95 mm

Roller: Standard diameter

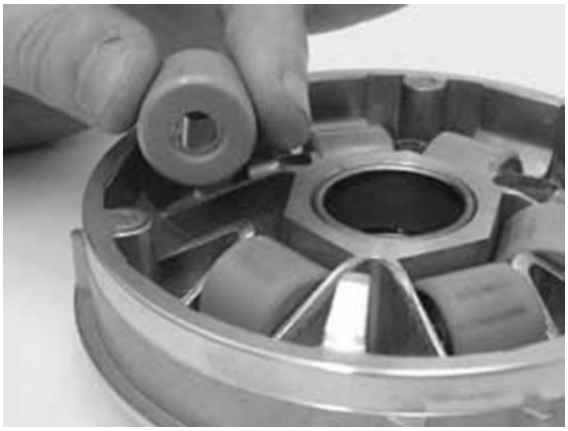
Ø 19.5 - 20.1 mm

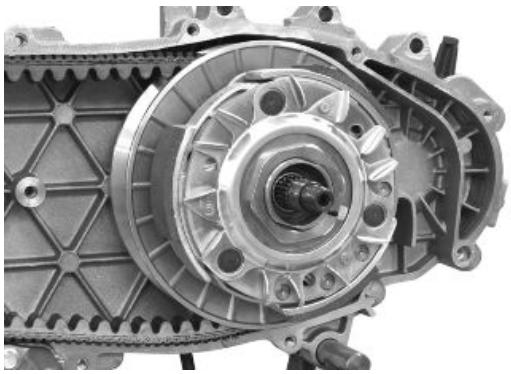
Roller: Minimum admissible weight

5.4 ± 0.15 g

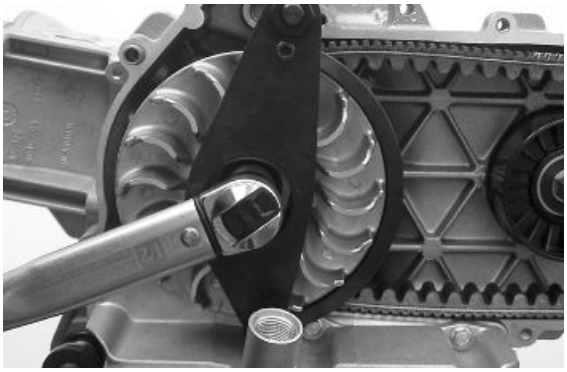
Refitting the driving pulley

- 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 crankshaft.
- Fit the driven pulley/Clutch/belt unit on the engine.





- Fit the steel shim in contact with the bushing and the stationary drive pulley.
- Install the appropriate tool as described in the removal phase.
-Tighten the nut with washer to the prescribed torque.



Specific tooling

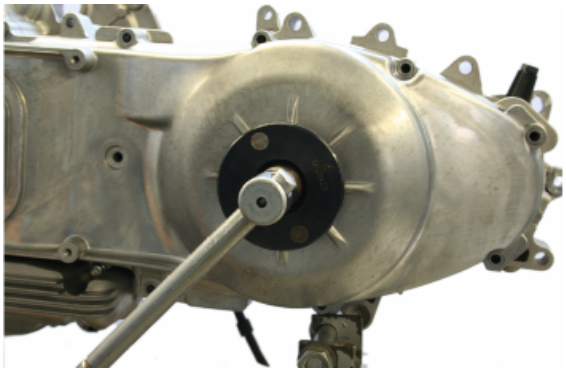
020626Y008 Driving pulley lock wrench

Locking torques (N*m)

Drive pulley nut 75 - 83

Refitting the transmission cover

- Check that there are two alignment dowels and that the sealing gasket for the oil sump on the transmission cover is adequately fitted.
- Refit the cover and tighten the «**12**» screws to the specified torque.
- 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.
- Refit the plastic cover.



Specific tooling

020423Y Driven pulley lock wrench

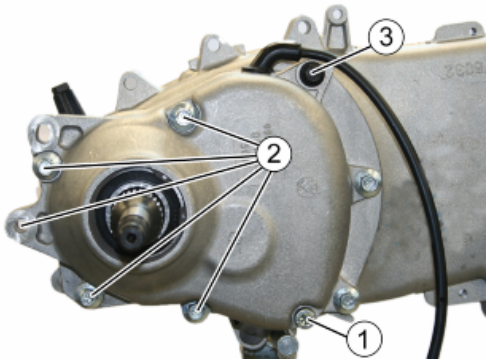
Locking torques (N*m)

Transmission cover screws 11 - 13 **Driven pulley shaft nut** 54 - 60

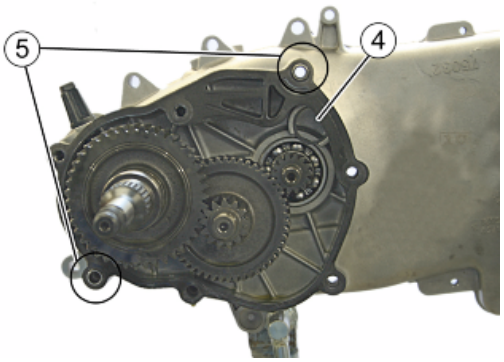
End gear

Removing the hub cover

- Empty the reduction oil through the drain screw «**1**».
- Undo the six screws «**2**», and the screw «**3**».

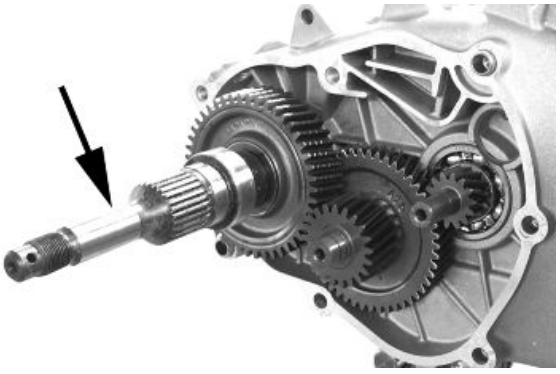


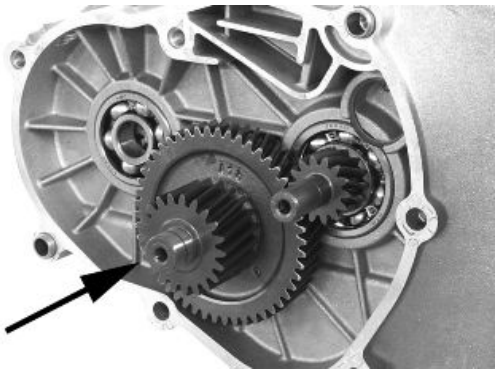
- Remove gasket «**4**» and make sure that alignment dowels «**5**» are adequately positioned.



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).

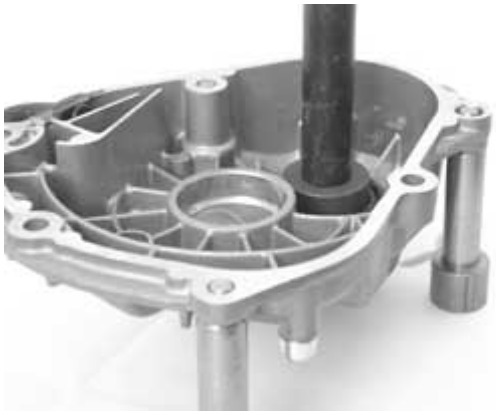
Specific tooling

001467Y013 Calliper to extract ø 15-mm bearings

Removing the wheel axle bearings

- Take out the clip on the outside of the hub cover.
- Support the hub cover and expel the bearing.

By means of the appropriate tools, remove the oil guard as in the figure.



Specific tooling

020376Y Adaptor handle

020477Y 37 mm adaptor

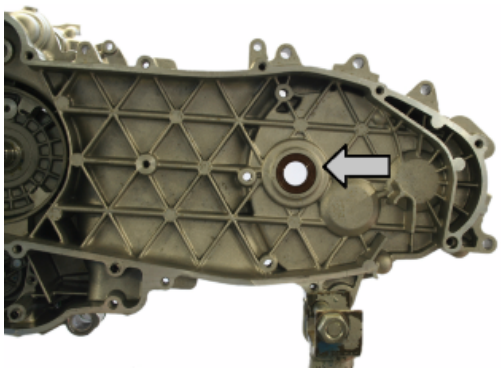
020483Y 30-mm guide

020359Y 42 x 47-mm Adaptor

020489Y Hub cover support stud bolt kit

Removing the driven pulley shaft bearing

- Extract the driven pulley shaft from its bearing.
- Remove the oil seal using a screwdriver and be careful not to damage the seat.



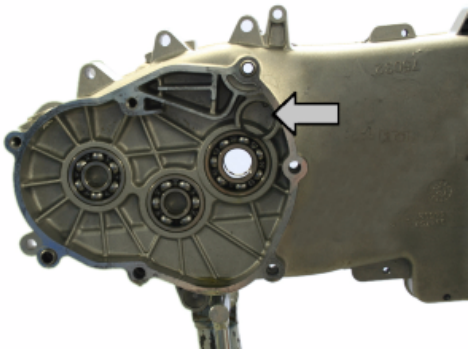
- Remove the Seeger ring indicated.

Specific tooling

020376Y Adaptor handle

020375Y 28 x 30 mm adaptor

020363Y 20-mm guide



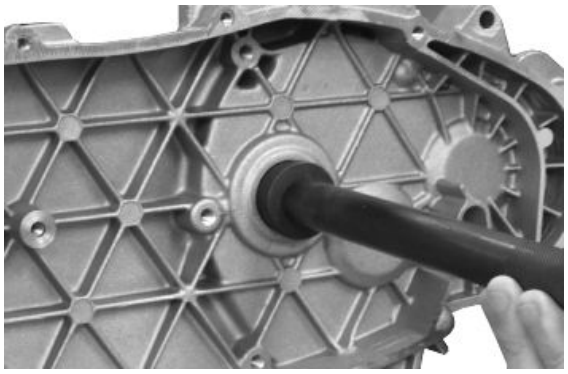
- Remove the driven pulley shaft bearing using the modular punch.

Specific tooling

020376Y Adaptor handle

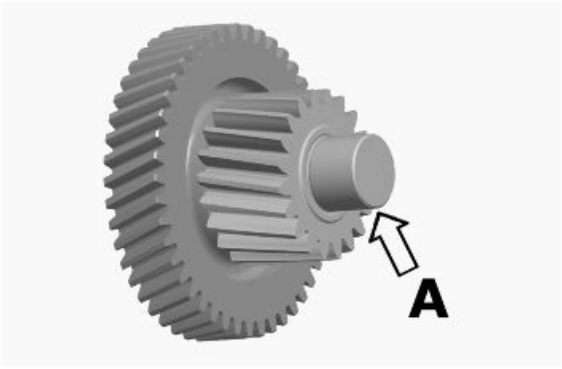
020375Y 28 x 30 mm adaptor

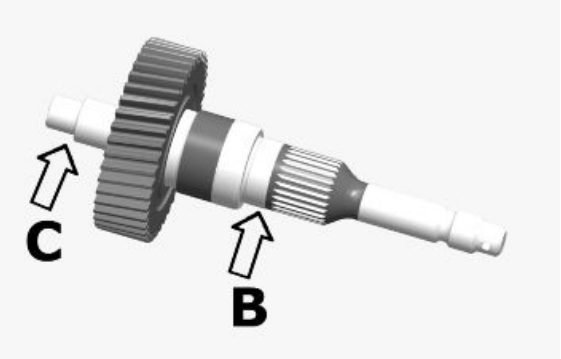
020363Y 20-mm guide

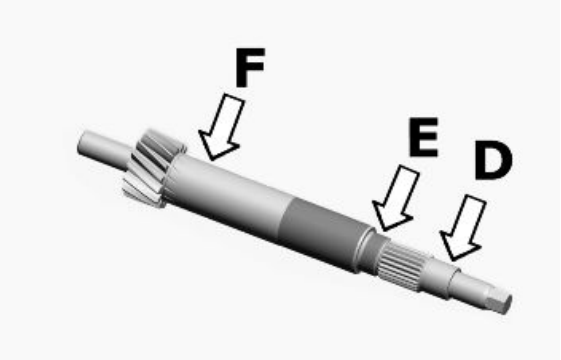


Inspecting the hub shaft

- Check that the 3 shafts exhibit no wear or deformation on the grooved surfaces, at the bearings and at the oil seals.
- In case of faults, replace the damaged parts.







Characteristic

Connection diameter for countershaft:

A = Ø 15 - 0.01 -0.02 mm

Connection diameter for wheel shaft:

B = Ø 25 - 0.020 -0.035 mm

C = diameter 15 - 0.01 -0.02 mm

Bearing diameter for driven pulley shaft:

D = Ø 15 - 0.01 -0.02 mm

E = 19.8 ± 0.1

F = Ø 20 - 0.01 -0.02 mm

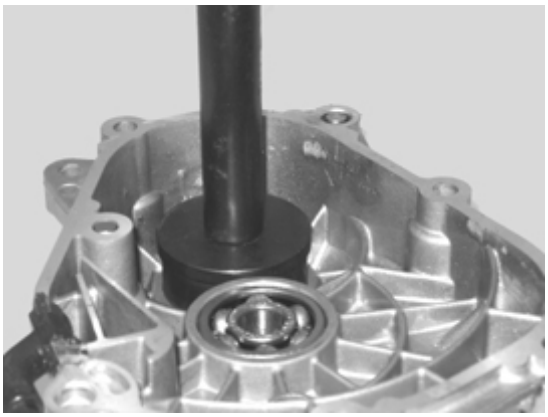
Inspecting the hub cover

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

Refitting the wheel axle bearing

- Support the hub cover on a wooden surface.
- Heat the crankcase cover with the specific heat gun.
- Fit the wheel shaft bearing with a modular punch as shown in the figure.
- Fit the Seeger ring.
- Fit the oil guard with seal lip towards the inside of the hub and place it flush with the internal surface by means of the appropriate tool used from the 52-mm side**.**

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



Specific tooling

020376Y Adaptor handle

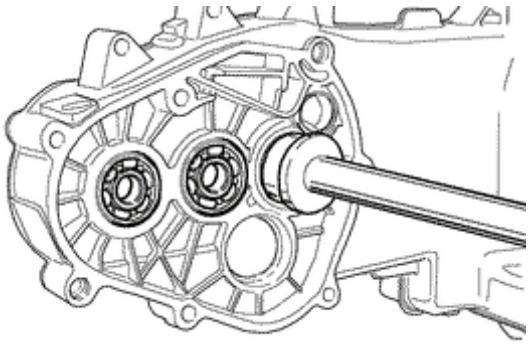
020360Y 52 x 55-mm Adaptor

020483Y 30-mm guide

Refitting the hub cover bearings

In order to fit the hub box bearings, the engine crankcase and the cover must be heated with the special heat gun.

- The three 15-mm bearings must be fitted using the appropriate tools:
- The 42-mm side of the adapter must be turned towards the bearing.



Specific tooling

020150Y Air heater mounting

020151Y Air heater

020376Y Adaptor handle

020359Y 42 x 47-mm Adaptor

020412Y 15-mm guide

N.B.

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

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

N.B.

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

Specific tooling

020376Y Adaptor handle

020359Y 42 x 47-mm Adaptor

020363Y 20-mm guide

N.B.

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

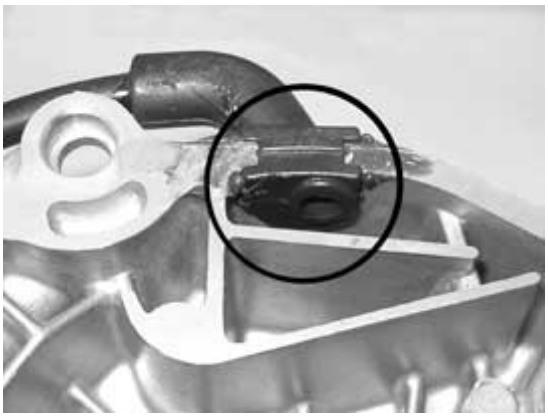
- Refit the Seeger ring with the opening facing the bearing and fit a new oil seal flush with the crankcase from the pulley side.

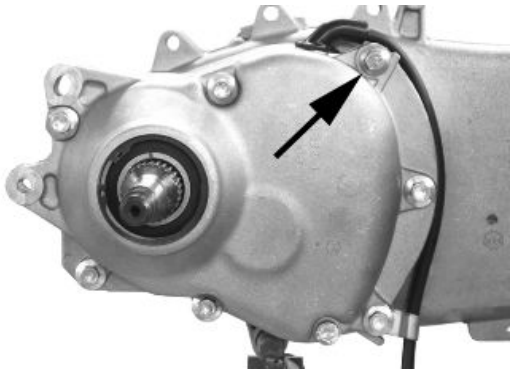
Refitting the hub bearings

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

Refitting the ub cover

- Fit a new gasket together with the alignment 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.
- Position the shorter screw that can also be recognised from the different colour as shown in the figure.
- Fix the breather tube support by means of the lower screw.
- Fit the remaining screws and tighten the seven screws to the prescribed torque.





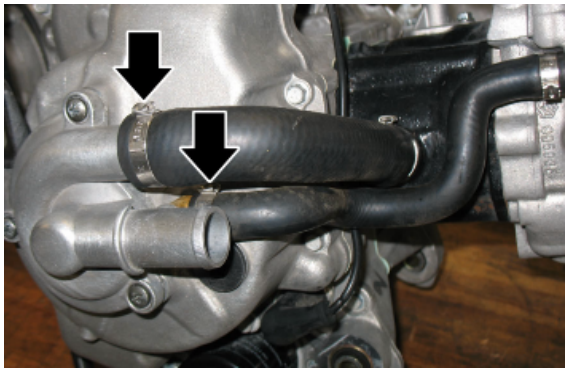
Locking torques (N*m)

Hub cover fixing screws **24 to 27** **Hub oil drain screws** **15 to 17**

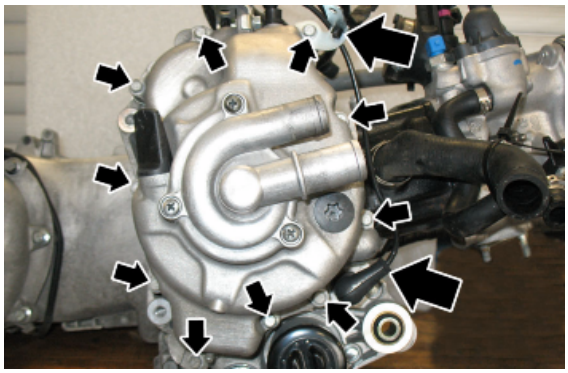
Flywheel cover

Removing the hub cover

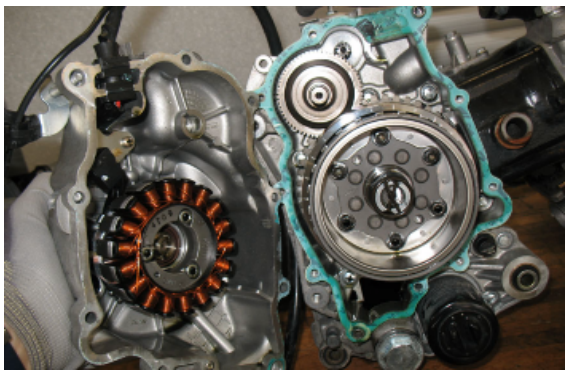
- Remove the clamps fastening the water pipes on the pump cover.
- Detach the pipes from the pump cover.



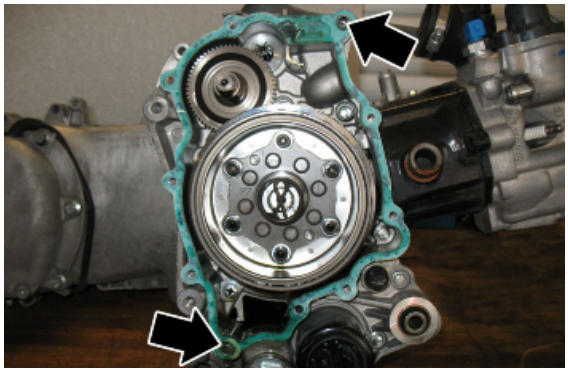
- Unscrew the ten screws fastening the flywheel, retrieving the indicated plate.
- Disconnect the electric connector from the minimum oil pressure switch.



- Remove the flywheel cover.

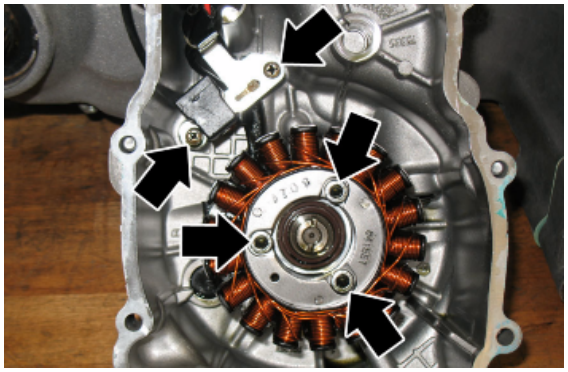


- Remove the gasket and be careful with the two alignment dowels.



Removing the stator

- Remove the two pickup screws and the screw holding the wiring support and the three stator clamping screws shown in the figure.
- Remove the stator and its wiring.

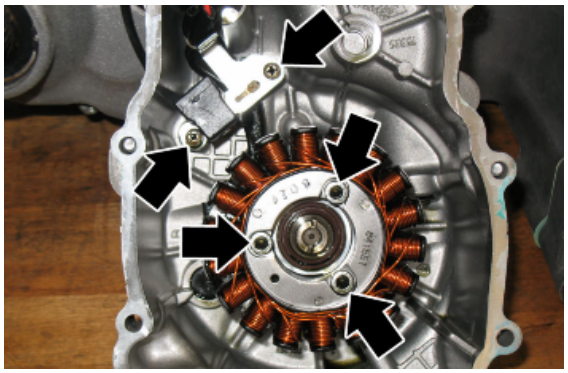


Refitting the stator

- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the specified torque.

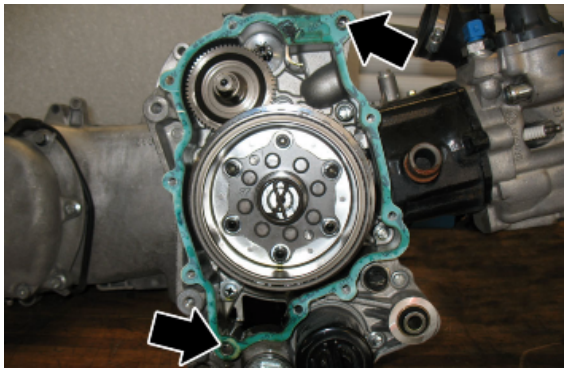
Locking torques (N*m)

Stator fixing screws 8 to 10 **Pickup fixing screws** 3 to 4

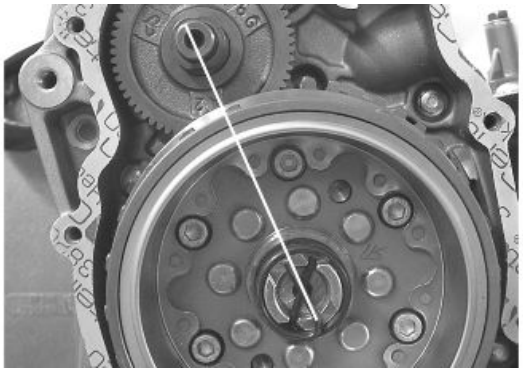


Refitting the flywheel cover

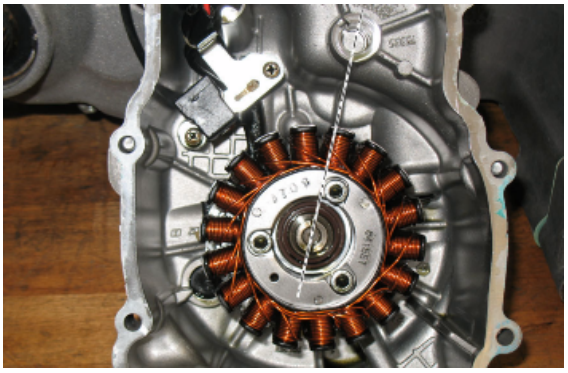
- Fit the gasket and be careful with the two alignment dowels.



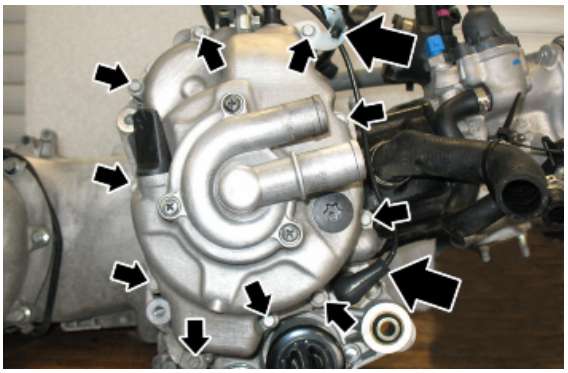
- Position the spline clip on the crankshaft and orient the end as shown in the figure.



- Orient the water pump shaft with reference to the transmission gear seat as shown in the picture.



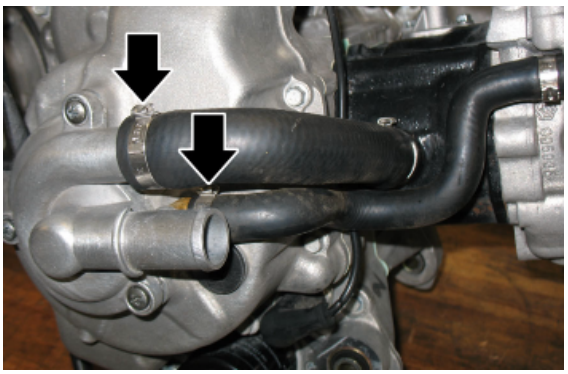
- Fit the flywheel cover complete with pump, ensuring that the alternator cable grommet is fitted correctly.
- Tighten the ten screws fastening the flywheel cover, ensuring that the indicated plate is positioned correctly.
- Reconnect the electric connector on the minimum oil pressure switch.



- Fit the water pipes onto the unions on the pump cover and tighten the clamps.

Locking torques (N*m)

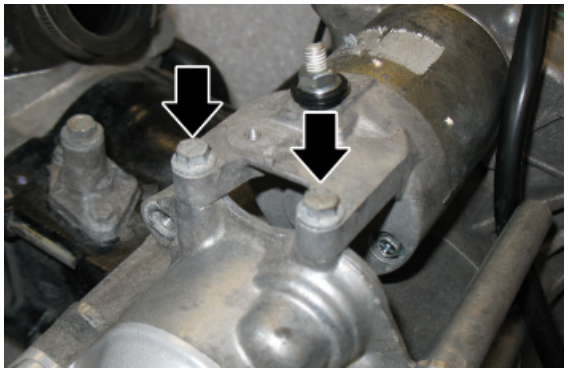
Flywheel cover screw **11 ÷ 13**



Flywheel and starting

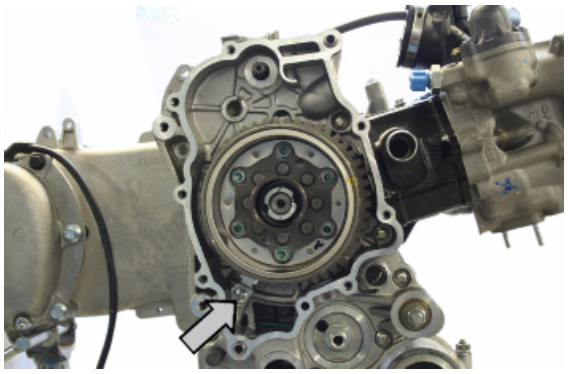
Removing the starter motor

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



Removing the flywheel magneto

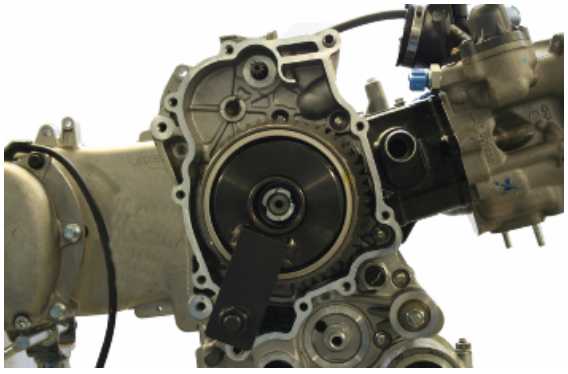
- Remove the screw and the plate of the starting sprocket.



- Fit the specific tool, screw the guide bushing to the flywheel, insert the flywheel stop tool as shown in the picture.

Specific tooling

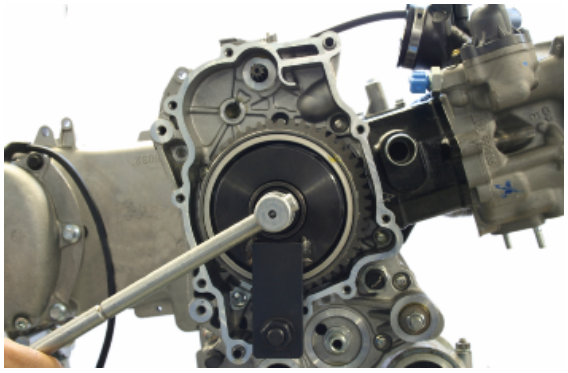
020627Y Flywheel lock wrench

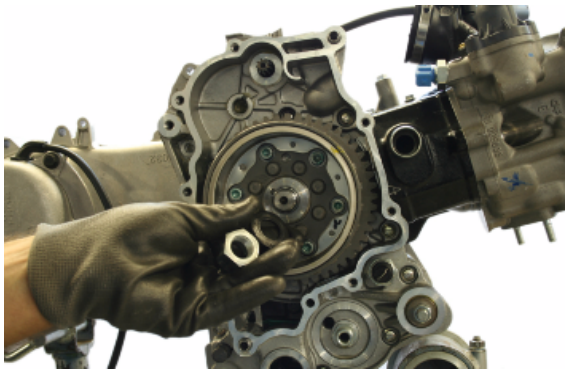


- Undo the flywheel screw and remove the washer.
- Manually screw the nut without washer, being careful not to leave the first threads uncovered.

CAUTION

SCREWING UP THE NUT WITHOUT WASHER HELPS PROTECT THE THREAD AGAINST THE STRAIN EXERTED BY THE EXTRACTOR AND ALSO PREVENTS DROPPING THE FLYWHEEL ACCIDENTALLY UPON EXTRACTING IT. POTENTIAL DROPS MAY DAMAGE THE CERAMIC INSERTS.

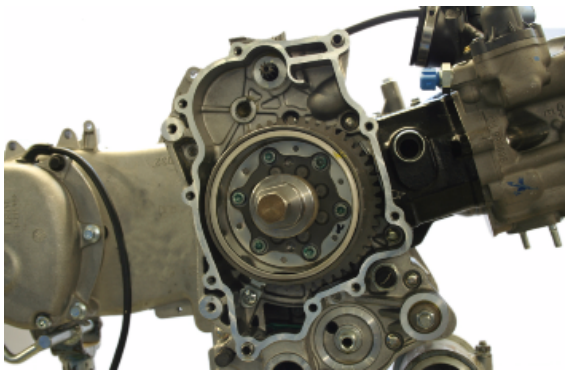




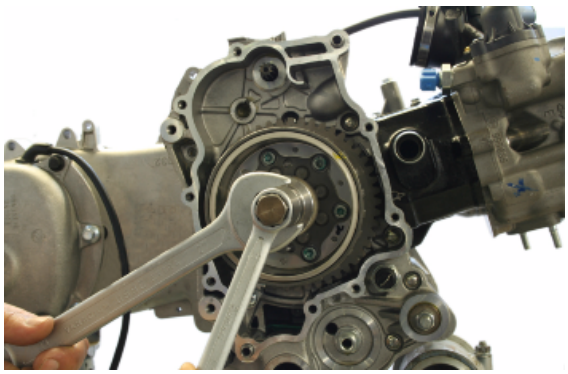
- Insert the extractor.

Specific tooling

020467Y Flywheel extractor



- Act on the extractor to remove the flywheel together with the starting sprocket.



Inspecting the flywheel components

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

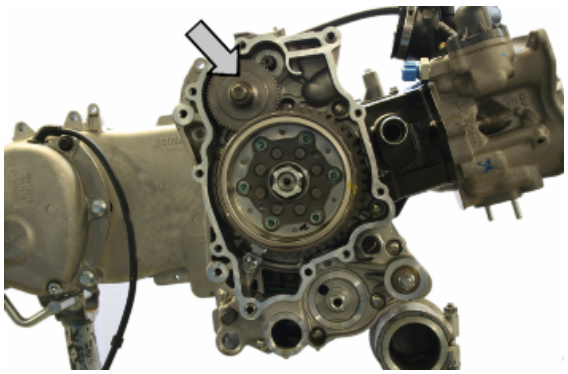
Starter gear rim

See also

Removing the flywheel magneto

Intermediate gear

- Remove the flywheel cover.
- Remove the intermediate gear and take it out of its housing.



Refitting the free wheel

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

Recommended products

Loctite 243 Medium-strength threadlock

Medium Loctite 243 threadlock

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

Locking torques (N*m)

Screw fixing freewheel to flywheel **13 - 15**

- Oil the free wheel "rollers".

Refitting the flywheel magneto

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

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

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

Specific tooling

020627Y Flywheel lock wrench

Locking torques (N*m)

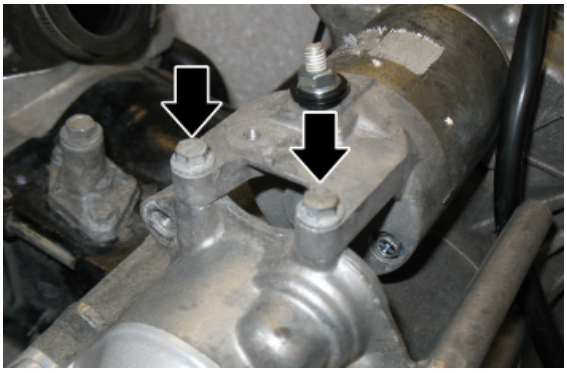
Flywheel nut **94 - 102**

Refitting the starter motor

- Fit a new O-ring on the starter motor and lubricate it.
- Fit the starter motor on the crankcase and lock the 2 screws to the prescribed torque.

Locking torques (N*m)

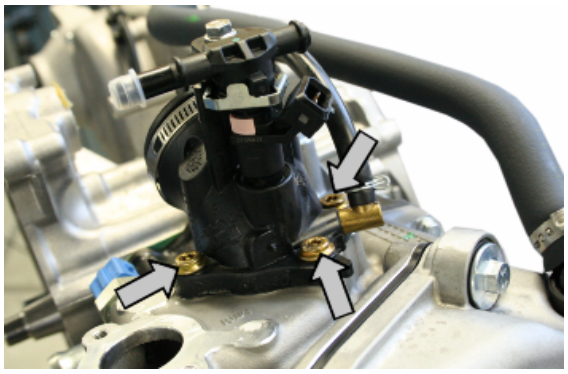
Starter motor screws **11 - 13**



Cylinder assy. and timing system

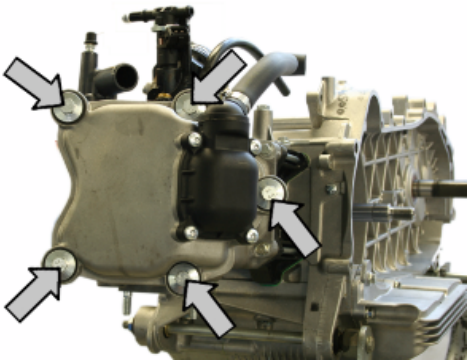
Removing the intake manifold

- Undo the three screws with an anti-tampering device.



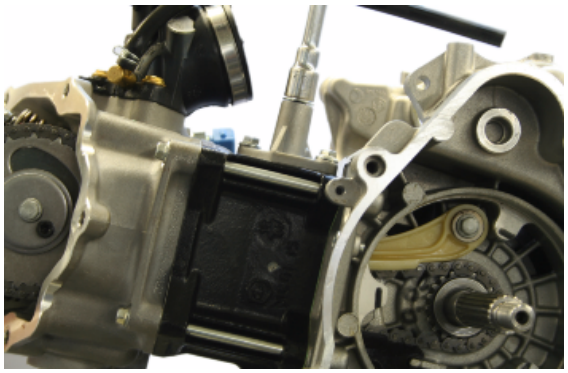
Removing the rocker-arms cover

- Remove the five screws shown in the figure.
- Remove the entire head cover.

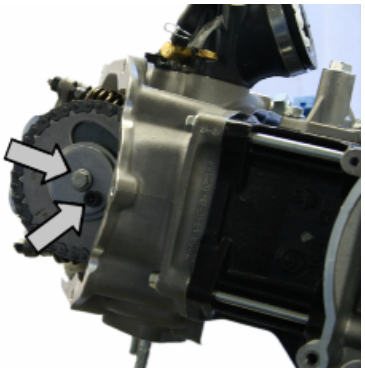


Removing the timing system drive

- Remove the oil pump control gear and the pinion separation washer as described in the «Engine/ Lubrication/Oil pump» section.
- Undo the central screw and collect the washer. Undo the two fixing screws to the cylinder and remove the tensioner together with the gasket.



- Undo the two screws indicated.

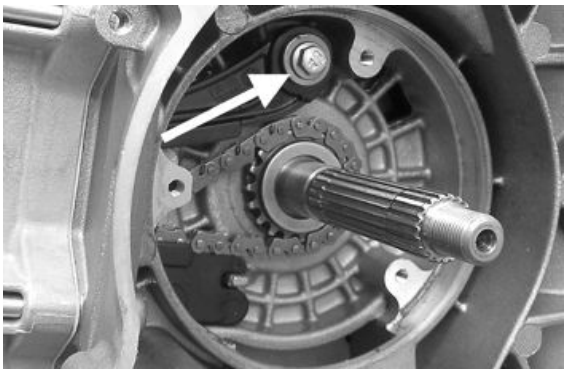


- Detach the timing chain and remove the camshaft control pulley and the corresponding washer.

- Remove the screws indicated in the figure, the spacer bar and the tensioner slider.
- Remove the control sprocket wheel and the timing chain.
- As regards the chain guide slider, it may only be removed after the head has been removed.

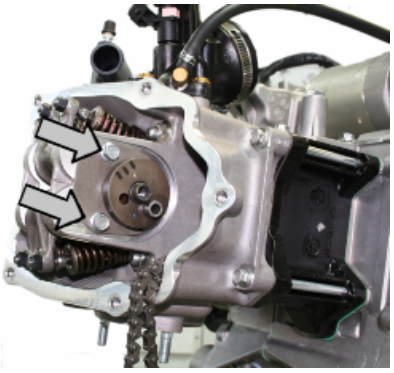
N.B.

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



Removing the cam shaft

- Undo the two indicated fixing screws to the cylinder and remove the fixing plate.



- Remove the camshaft.

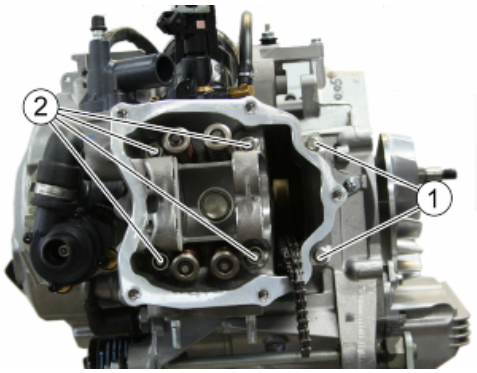
- Acting on flywheel-side holes, push and slide off the rocking lever pins.

N.B.

IF NEEDED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, ROCKER PINS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE CRANKSHAFT CHAIN TENSIONER.

Removing the cylinder head

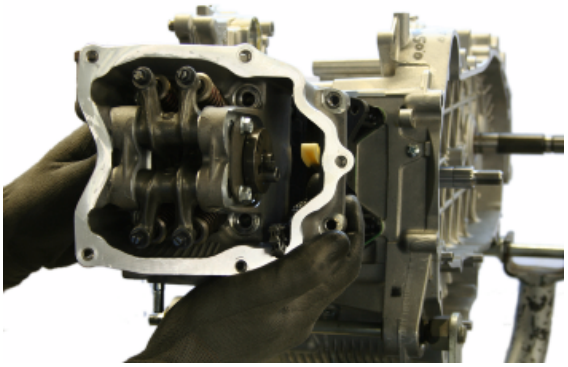
- Undo the two screws «**1**» fixing the head to the transmission-side crankcase half.
- Unscrew the four nuts «**2**» by loosening them in two or three stages and in a crossed sequence.



- Remove the head.

N.B.

IF NEEDED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, ROCKER PINS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE CRANKSHAFT CHAIN TENSIONER.



- Remove the gasket.

Removing the valves

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

CAUTION

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

Specific tooling

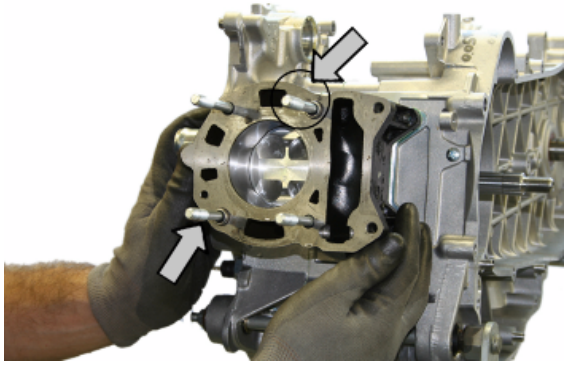
020382Y011 adapter for valve removal tool

020382Y Valve cotters equipped with part 012 removal tool

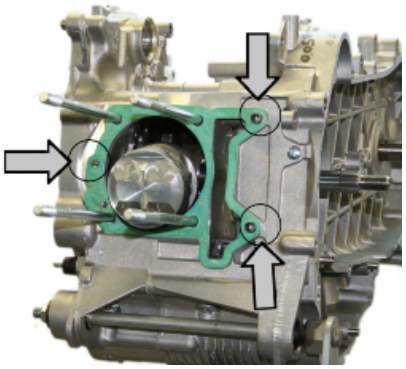
020431Y Valve oil seal extractor

Removing the cylinder - piston assy.

- Remove the chain guide slider; be careful with the two alignment dowels and remove the cylinder.



- Remove the base gasket; be careful with the two centring dowels and the dowel pin.



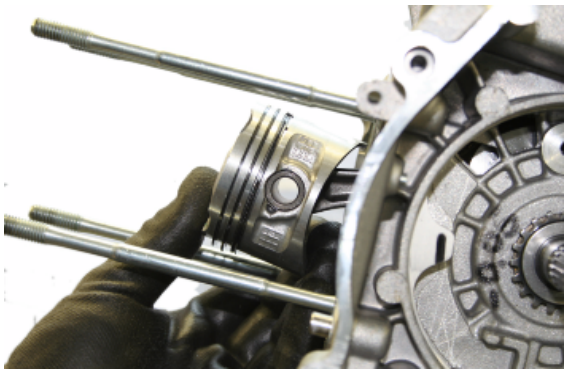
- Remove the sealing rings, the pin and remove the piston.

CAUTION

TO PREVENT 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

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Crankcase - crankshaft - connecting rod

Inspecting the wrist pin

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Cylinder - piston assy.

Inspecting the piston

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Cylinder - piston assy.

Inspecting the piston rings

N.B.

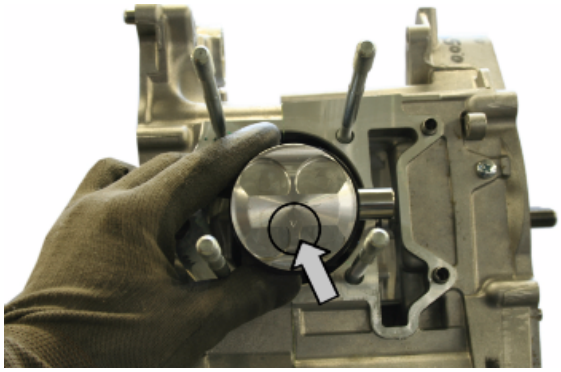
TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Piston rings

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 retainer ring onto the appropriate tool
- With opening in the position indicated on the tool

S = left

D= right

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

N.B.

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

CAUTION

USING A HAMMER MIGHT DAMAGE THE STOPS' HOUSING.

Specific tooling

020430Y Pin lock fitting tool

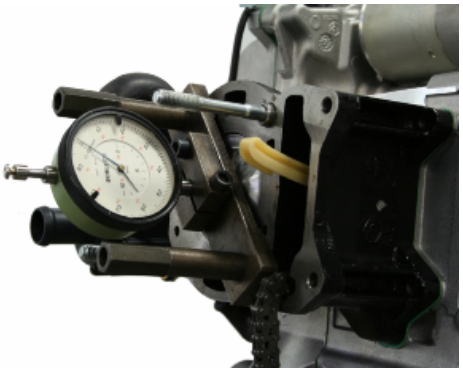
Choosing the gasket

- Provisionally fit the piston into the cylinder, without any base gasket.
- Install a dial gauge on the special tool using the short union, as shown in the figure.

Specific tooling

020475Y Piston position checking tool

- Using an abutment plane, reset the dial gauge with a preload of a few millimetres.
- Finally fix the dial gauge.
- Check the perfect sliding of the feeler pin.
- Install the tool on the cylinder without changing the dial gauge position.
- Lock the tool using the original head fixing nuts.
- Rotate the crankshaft up to the TDC (the inversion point of the dial gauge rotation)
- Measure the deviation from the reset value.



- By means of the table, see 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 special tool and the cylinder.

N.B.

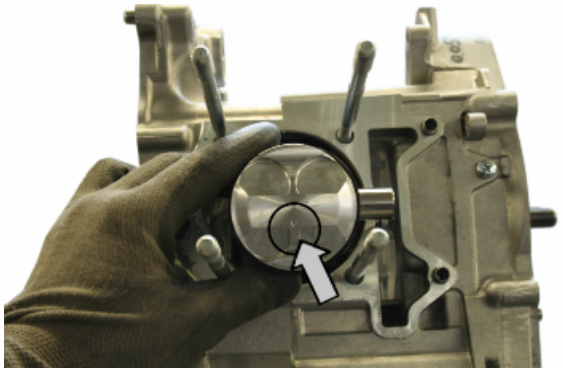
IF DEVIATIONS (OR RECESSES OR PROJECTIONS) CLOSE TO THE CHANGE OF CATEGORY ARE MEASURED, REPEAT THE MEASUREMENT AT THE OPPOSED SIDE. TO DO SO, REPEAT THE TOOL INSTALLATION BY INVERTING ITS POSITION.

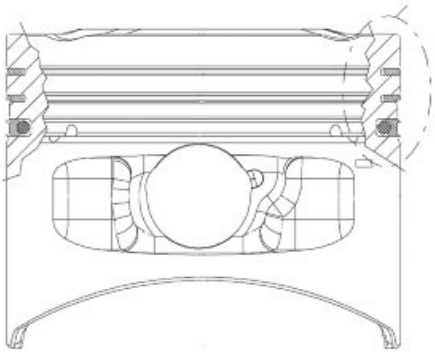
See also

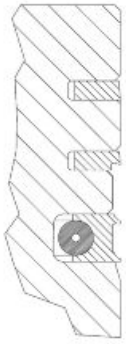
Slot packing system

Refitting the piston rings

- Pistons (like cylinders) are supplied in 4 categories: A, B, C and D, and must be fitted so that the reference arrow faces the exhaust duct. The letter is found at the centre of the piston.
- Fit the sealing rings with the word TOP or the identification letter facing upwards. In any case, the step must be facing opposite the piston crown.
- Sealing rings are manufactured with a cylinder contact conical cross-section and piston gaps must be offset by 120° in order to obtain a better bedding.
- Lubricate rings with engine oil when fitting them.





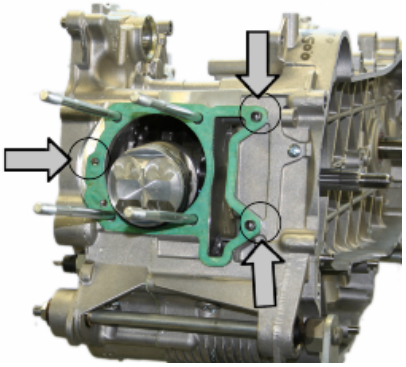


Refitting the cylinder

N.B.

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

- Check the position of the alignment dowels and dowel pin and fit a gasket with a thickness previously determined.

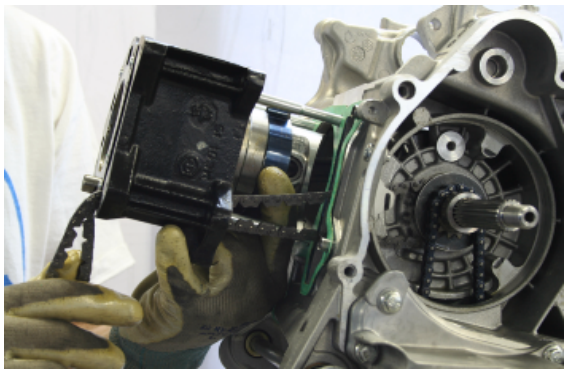


- Using the specific tool fit the cylinder paying attention that the chain does not remain in the timing system compartment.

Specific tooling

020426Y Piston fitting fork

020393Y Piston assembly band



Inspecting the cylinder head

N.B.

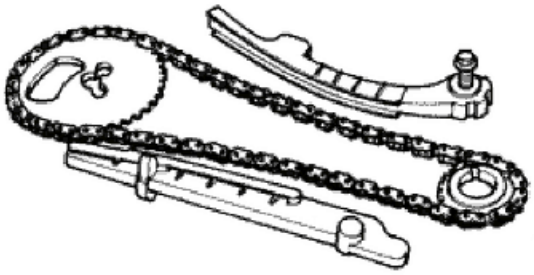
TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

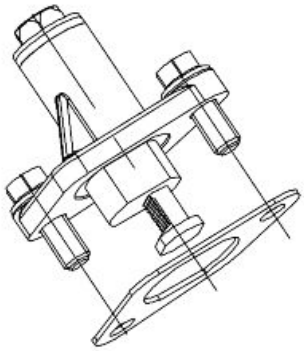
See also

Cylinder Head

Inspecting the timing system components

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





Inspecting the valve sealings

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Cylinder Head

Inspecting the valves

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Cylinder Head

Inspecting the springs and half-cones

- Check that the upper and lower supporting spring washers, the cotters and the oil seal show exhibit no signs of abnormal wear. Replace a component when worn.

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Cylinder Head

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 seal rings.
- 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 POSITIONS THE VALVES ARE FITTED IN FIT THE VALVE SPONGES WITH THE REFERENCE COLOUR ON COTTER SIDE (TURNS WITH GREATER PITCH).

Specific tooling

020306Y Punch for assembling valve seal rings

020382Y011 adapter for valve removal tool

020382Y Tool to extract valve cotters

Inspecting the cam shaft

N.B.

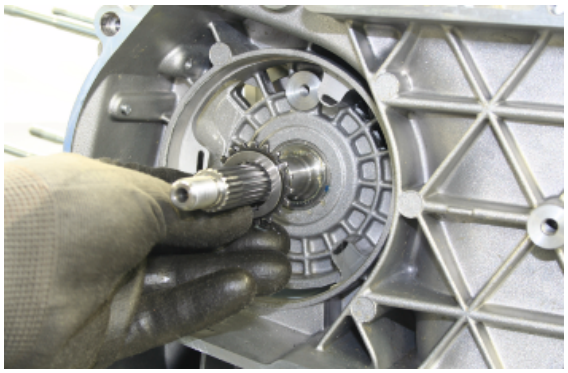
TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

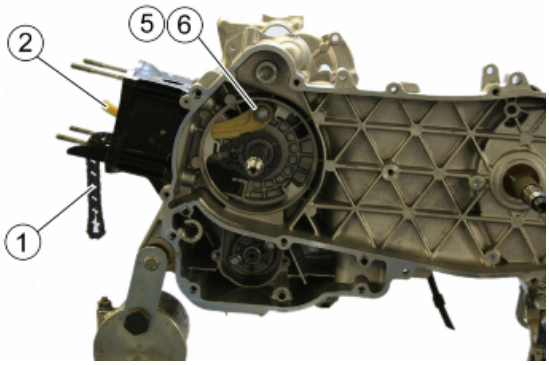
Cylinder Head

Refitting the head and timing system components

Assemble the timing chain sprocket wheel on the crankshaft with the chamfering facing the insertion side and observing the position of the reference dowel.



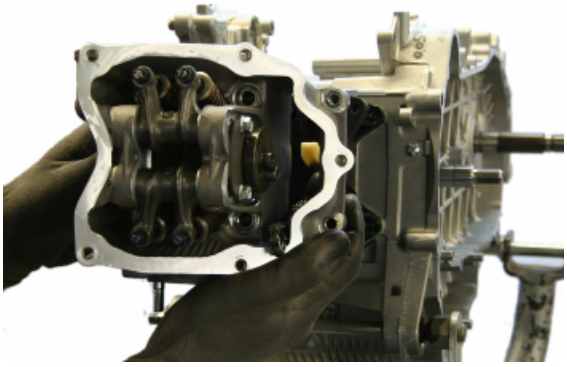
- Loop the timing control chain «**1**» around the crankshaft.
- Fit the guide slider and the tensioner pad «**2**» on the head side.
- Fit spacer «**5**» with fixing screw «**6**».
- Tighten the screws to the prescribed torque.



Locking torques (N*m)

Slider screw **10 - 14 Nm**

- Fit the head gasket and check that the alignment dowels work properly.
- Insert the head.
- Lubricate the stud bolt threads with engine oil.
- Tighten up the nuts to an initial pre-torque of 7±1 Nm.
- Tighten up the nuts to a second pre-torque of 10 ±1 Nm
- To carry out the operations described above, follow the tightening sequence in the figure.
- Fit the two screws on the outside of the timing chain side and tighten them to the specified torque.



N.B.

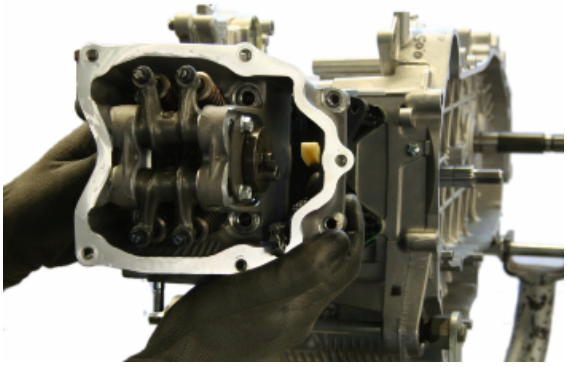
BEFORE INSTALLING THE HEAD, MAKE SURE THAT THE LUBRICATION CHANNEL IS CLEAN USING A COMPRESSED AIR JET.

Locking torques (N*m)

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

Fit the pins and rocking levers.

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

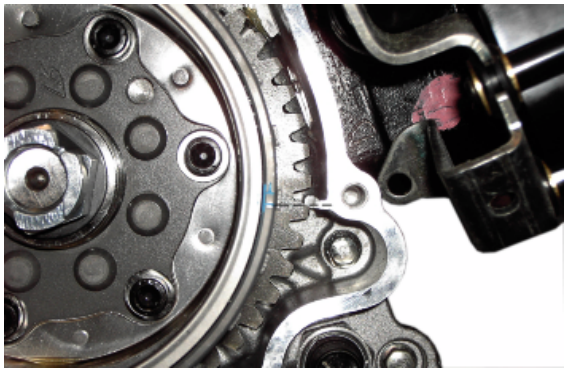


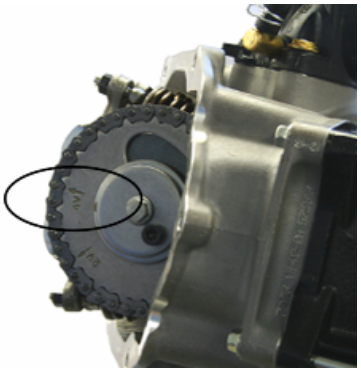
Locking torques (N*m)

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.
- Insert the pulley on the camshaft while keeping the reference 4V in correspondence with the reference mark on the head.
- Holding this position insert the chain on the camshaft control pulley.
- Lock the fixing screws.





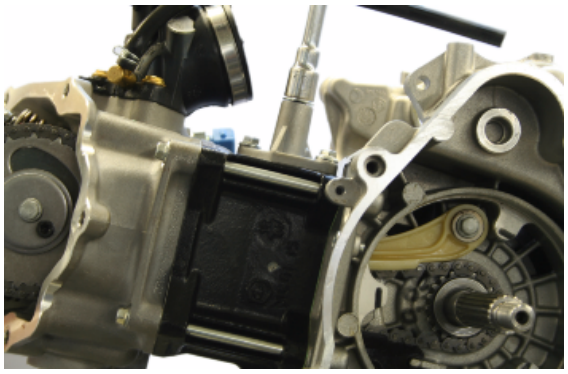
Locking torques (N*m)

Counterweight screw **7 to 8.5**

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 to 13** **Tensioner cover** **5 - 6 Nm**

- Check valve clearance.

Characteristic

Valve clearance (when cold)

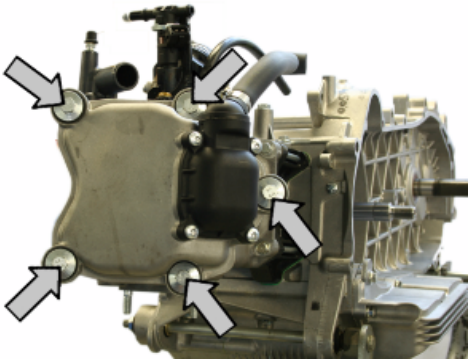
Intake: 0.10 mm Exhaust: 0.15 mm

Refitting the rocker-arms cover

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

Locking torques (N*m)

Tappet cover screws 5 - 6 Nm

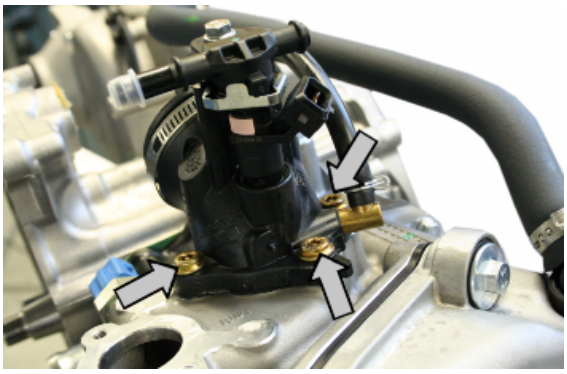


Refitting the intake manifold

- Fit the intake manifold and do up the three screws.

Locking torques (N*m)

Intake manifold screws 11 ÷ 13

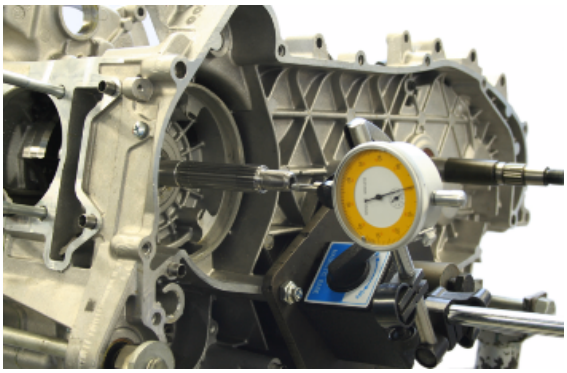


Crankcase - crankshaft

Splitting the crankcase halves

AXIAL CLEARANCE CHECK

- Before opening the engine crankcase, it is advisable to check the axial clearance of the crankshaft. Use a specific tool to check axial clearance.
- Higher clearances are signs of wear on the crankshaft - crankcase supporting surfaces.



Specific tooling

020262Y Crankcase splitting plate

020335Y Magnetic mounting for dial gauge

Characteristic

Axial crankshaft/crankcase clearance: Standard clearance

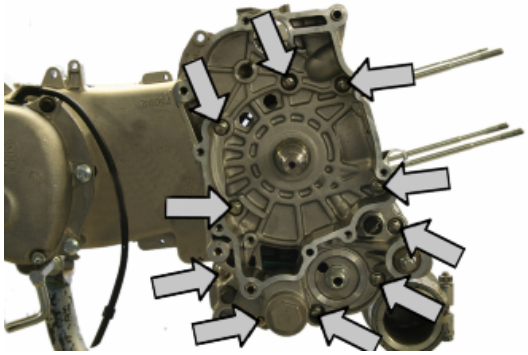
0.15 - 0.40 mm (when cold)

Axial connecting rod - crankshaft clearance
Standard clearance

0.20 to 0.50 mm

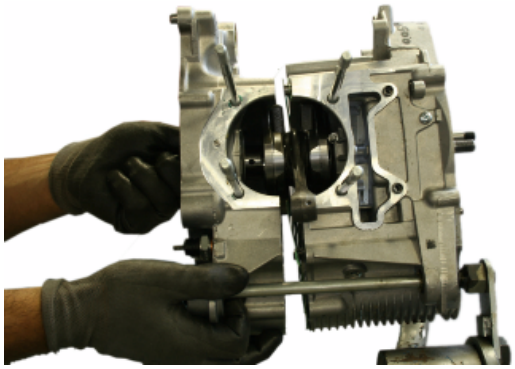
CRANKCASE OPENING

- Undo the ten crankshaft coupling screws.
- Separate the crankcase halves while keeping the crankshaft in one of these two halves.
- Only after the halves have been separated, can the crankshaft be checked.



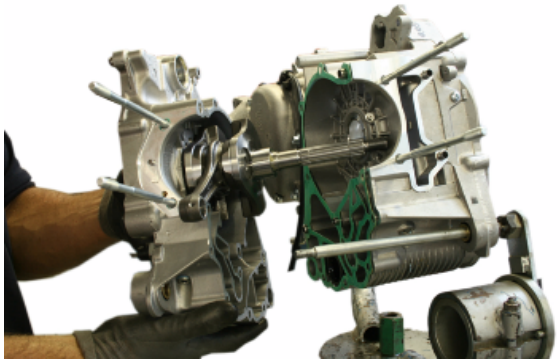
CAUTION

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

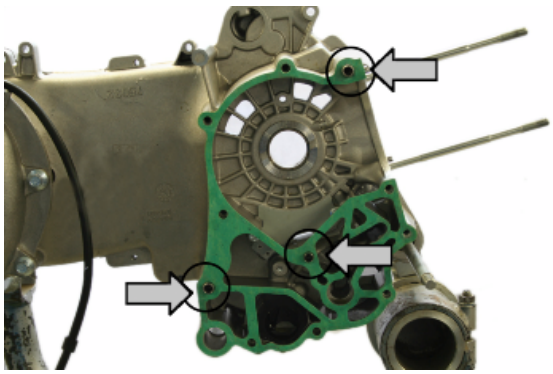


CAUTION

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.

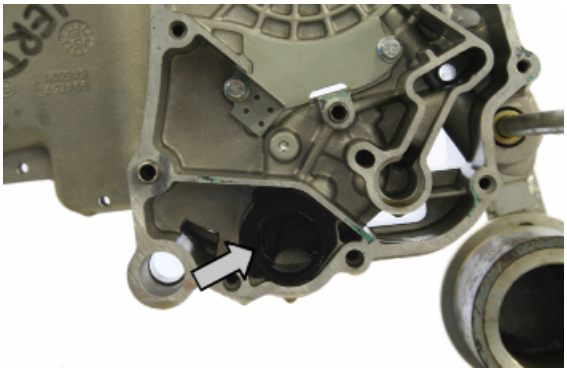


- Remove the crankcase halves gasket and be careful with the two alignment dowels.



- Unscrew the oil filter fitting if required.

- Once the crankcase halves have been separated, reach and remove the internal bulkhead and the protection bulkhead for the mesh pre-filter.



Inspecting the crankshaft components

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Crankcase - crankshaft - connecting rod

Inspecting the crankshaft alignment

N.B.

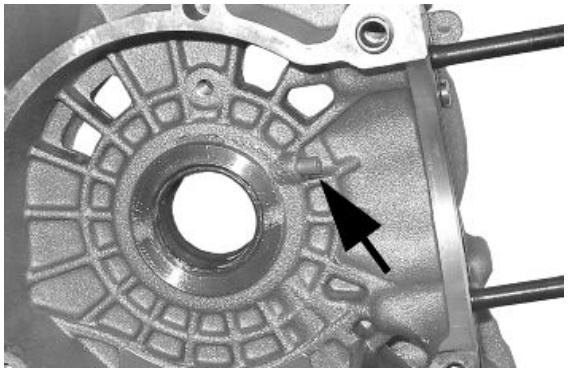
TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

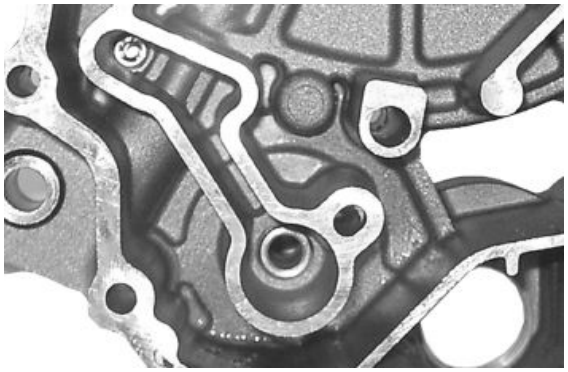
See also

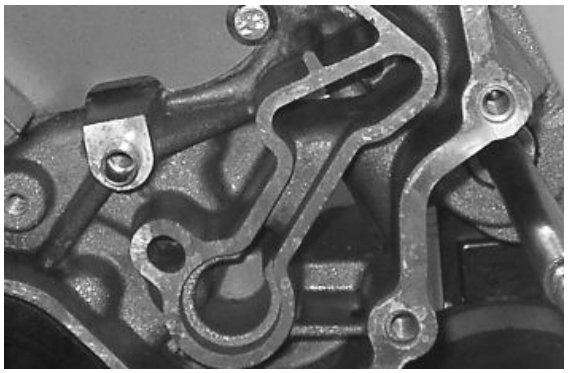
Crankcase - crankshaft - connecting rod

Inspecting the crankcase halves

- Before proceeding to check the crankcase halves, thoroughly clean all surfaces and oil ducts.
- On the transmission-side crankcase half, take particular care when handling the oil pump compartment and the oil ducts, the by-pass duct, the main bushings and the cooling jet on the transmission side (see diagram).
- Take particular care, also, that there are no signs wear in the oil by-pass valve housing (see Chapter Lubrication), as this could prevent a good seal in the piston, 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 bushings and connecting 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.

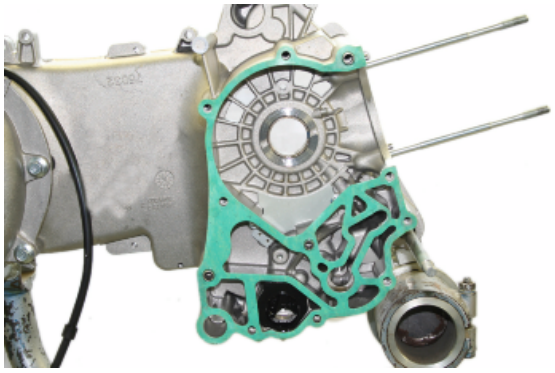
THE JET IS FED THROUGH THE MAIN BUSHINGS. PROPER OPERATION OF THIS COMPONENT IMPROVES PISTON CROWN COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAKS CAN CAUSE A CONSIDERABLE DROP IN THE LUBRICATION PRESSURE FOR MAIN BUSHINGS AND CONNECTING ROD.

N.B.

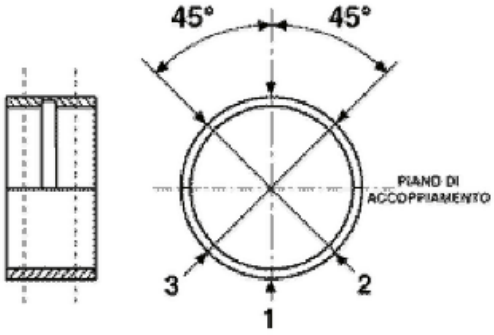
THE HEAD LUBRICATION CHANNEL IS PROVIDED WITH A SHUTTER JET; THIS GIVES A "LOW PRESSURE" HEAD LUBRICATION; THIS CHOICE WAS MADE TO REDUCE THE OIL TEMPERATURE IN THE SUMP. THE JET CLOGGING IMPAIRS THE HEAD LUBRICATION AND THE TIMING MECHANISMS. A JET FAILURE CAUSES A DECREASE OF THE MAIN BUSHING AND CONNECTING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

Inspecting the crankshaft plain bearings

- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure (3.2 bar) and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.
- The main bushings are comprised of two half-bearings, one with holes and channels for lubrication whereas the other is solid.



- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposite the cylinder.
- To prevent shutters in the oil feeding channels, the matching surface of the two half-bearings must be perfectly orthogonal to the cylinder axis, as shown in the figure.



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

N.B.

TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

Crankcase - crankshaft - connecting rod

Coupling chart

N.B.

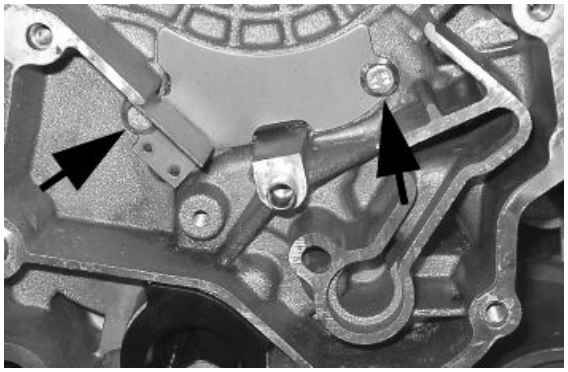
TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

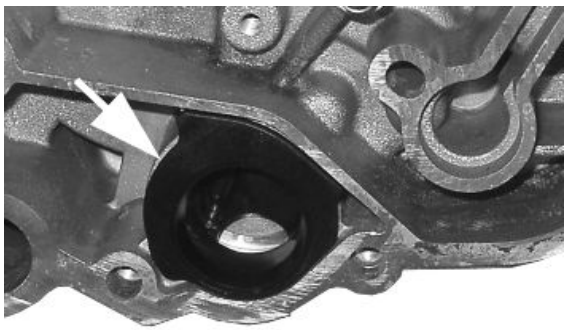
See also

Crankcase - crankshaft - connecting rod

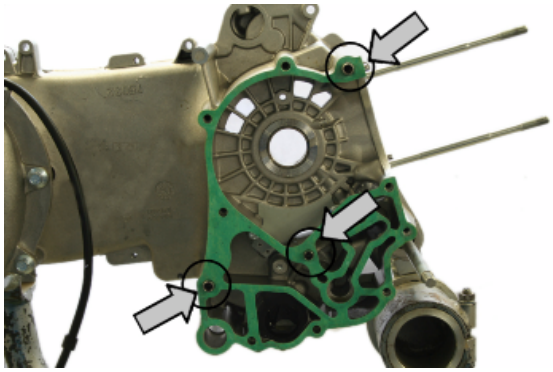
Refitting the crankcase halves

- Fit the internal bulkhead and lock the two screws to the prescribed torque.
- Fit the oil filter fitting and tighten it to the prescribed torque.
- Position the oil pre-filter element as shown in the picture.

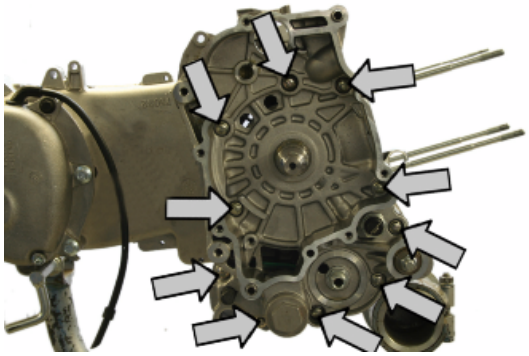




- Place a new gasket on one of the crankcase halves, preferably on the transmission side, together with the alignment dowels.



- Lubricate the main bushings with engine oil and insert the crankshaft in the transmission-side crankcase half.
- Reassemble both crankcase halves.
- Fit the ten screws and tighten them to the prescribed torque.
- Assemble a new O-Ring on the pre-filter and lubricate it with engine oil.
- Insert the filter on the engine with the relative cap.
- Tighten to the specified torque.

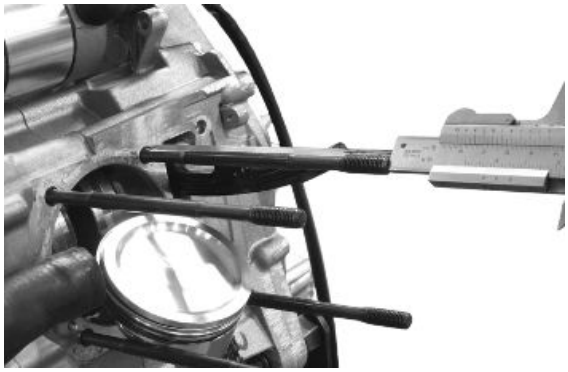


Locking torques (N*m)

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

Studs

Check that the stud bolts have not worked loose from their seat in the crankcase.
Check the depth of stud bolt driving with a gauge, as indicated in the picture. If it varies significantly from the driving depth indicated, it means that the stud bolt has yielded.
In this case, replace it.

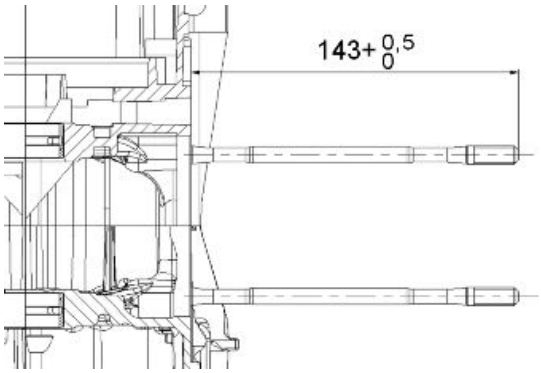


By working on two fitted cylinder head fixing nuts, nut and lock nut, as shown in the picture, remove the stud bolt from its seat.
Clean the threaded seat on the carter thoroughly.
Refit a new stud bolt and apply the special product on the threading crankcase side.
Tighten up to the depth of the driving indicated.

Recommended products

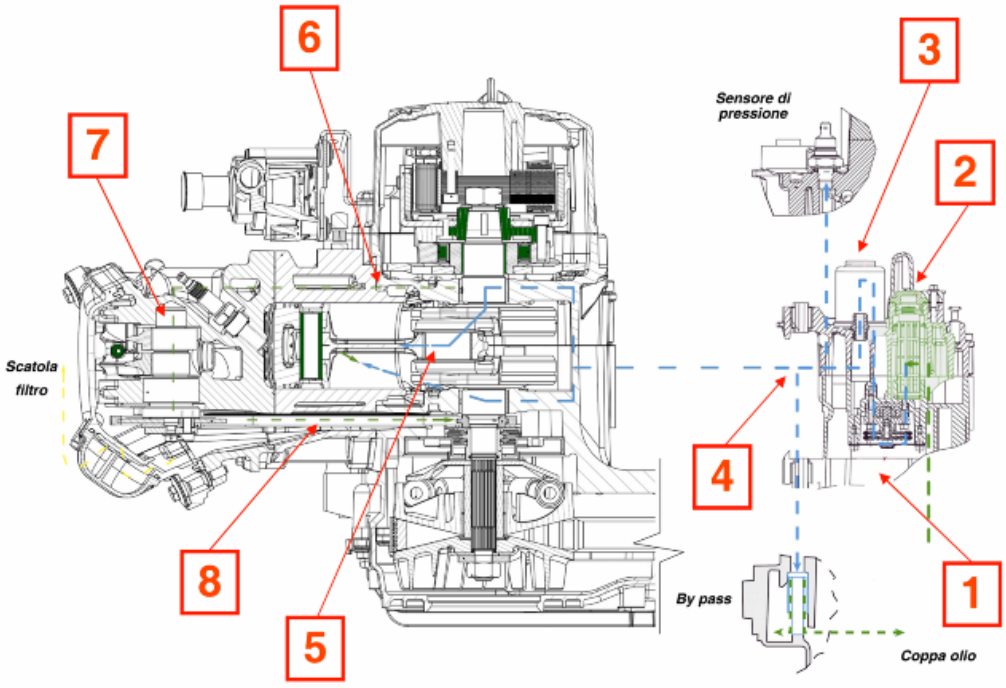
Loctite Quick Set Loctite 270 high strength threadlock

Loctite 270 high strength threadlock



Lubrication

Conceptual diagrams

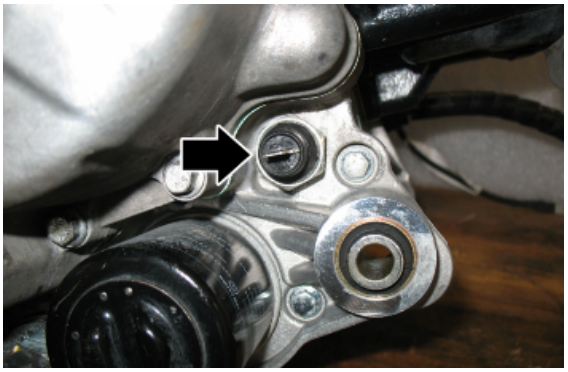


The high pressure circuit is highlighted in blue. The low pressure circuit is highlighted in green

The lobe pump «**1**» sucks in oil from the sump through the mesh pre-filter «**2**», pushes it into the cartridge filter «**3**»; the main bushings and the big end are lubricated (with high pressure) through the suitable passages found in the crankcase halves «**4**» whereas the piston pin and connecting rod small end are lubricated via jet «**5**».

Afterwards, the oil, through a nozzle «**6**» whose function is to reduce the flow rate, reaches the timing system where it lubricates the camshaft and from there, the valves and rockers «**7**». The oil passes through the timing chain conduit and returns to the sump «**8**» by gravity

Oil pressure check



- Remove the electrical minimum oil pressure switch connection and remove the switch.
- Check that the oil pressure reading is between 0.5 and 1.2 atm with the engine idling at 1650 rpm and the oil at the required temperature (wait for at least one electric ventilation).
- Check that the oil pressure is between 3.2 and 4.2 atm with the engine running at 6000 rpm and the oil at the required temperature.
- Remove the appropriate tools once the measurement is complete, refit the oil pressure switch and washer, tightening it to the specified torque and fit the 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 PROPER CONDITION.

Characteristic

Oil pressure

Minimum pressure admitted at 6000 rpm: 3.2 atm.

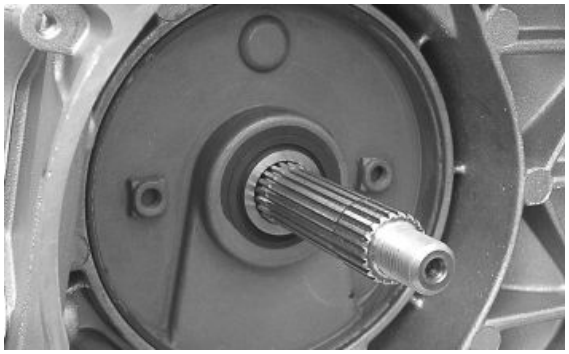
Locking torques (N*m)

Minimum oil pressure sensor **12 to 14**

Crankshaft oil seals

Removal

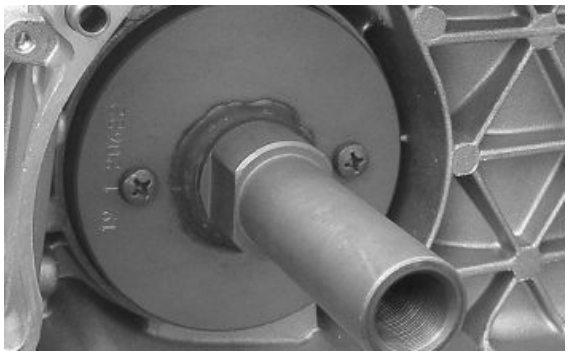
- Remove the transmission cover and the complete drive pulley beforehand



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

Specific tooling

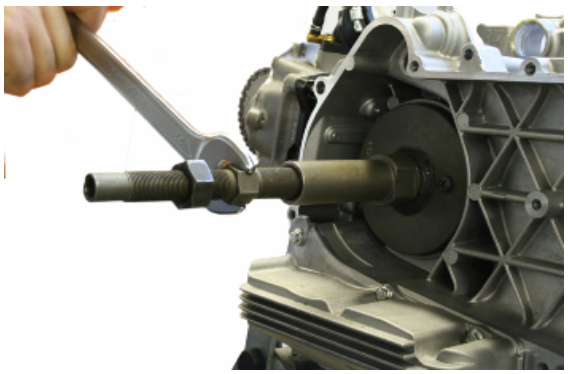
020622Y Transmission-side oil seal punch



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

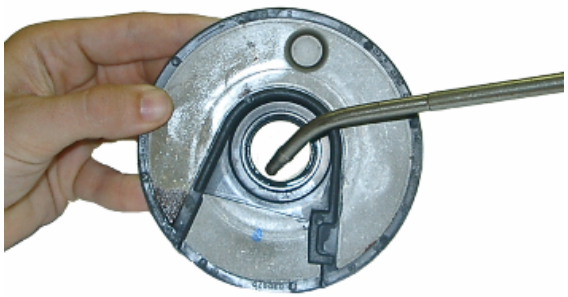
Specific tooling

020622Y Transmission-side oil seal punch



Refitting

- Always use a new oil seal upon refitting
- Prepare the new oil guard by lubricating the sealing lip.
- Preassemble the oil seal with the appropriate tool by positioning the screws.
- Insert the sheath over the crankshaft.
- Insert the tool with the oil seal on the crankshaft until it comes into contact with the crankcase.
- Insert the adaptor bushing of the tool in the hole on the crankcase.



- Orientate the oil seal by inserting the bracket which is part of the appropriate 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 see the end of the oil seal driving stroke
- Remove all the tool components following the procedure but in reverse order

CAUTION

DO NOT LUBRICATE THE KEYING SURFACE ONTO THE ENGINE CRANKCASE.

CAUTION

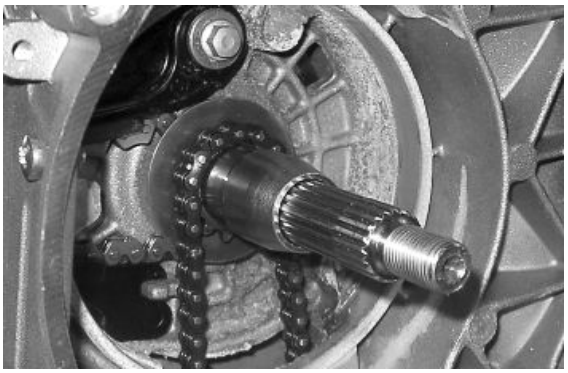
ORIENT THE OIL SEAL BY POSITIONING THE CHAIN HOUSING CHANNEL FACING DOWNWARDS. WHEN THE POSITION IS REACHED, DO NOT RETRACT THE OIL SEAL. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE A WRONG POSITIONING OF THE OIL SEAL SHEATH.

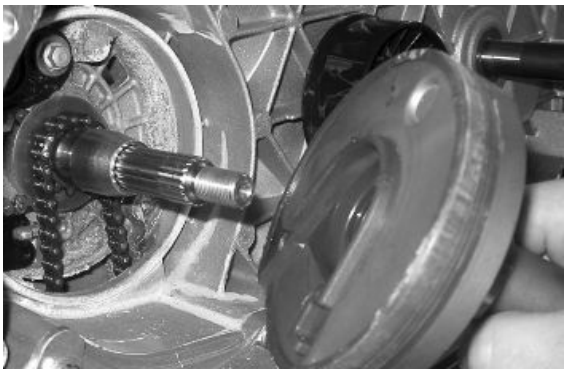
CAUTION

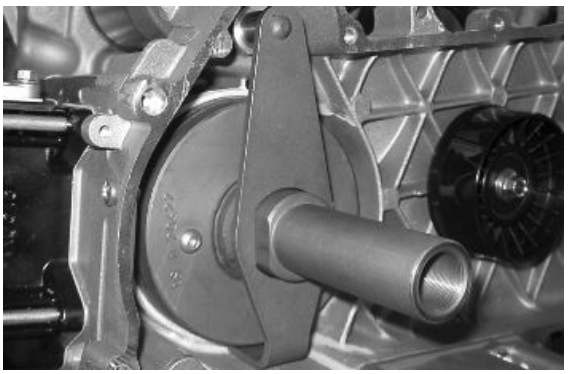
FAILURE TO COMPLY WITH THIS ASSEMBLY PROCEDURE CAN SERIOUSLY DAMAGE THE ENGINE DUE TO THE WRONG TENSIONING OF THE OIL PUMP CONTROL CHAIN.

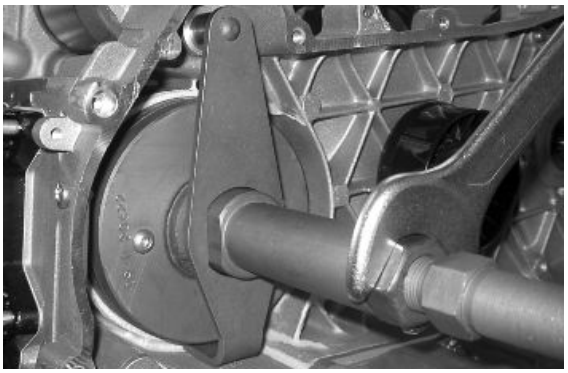
Specific tooling

020622Y Transmission-side oil seal punch





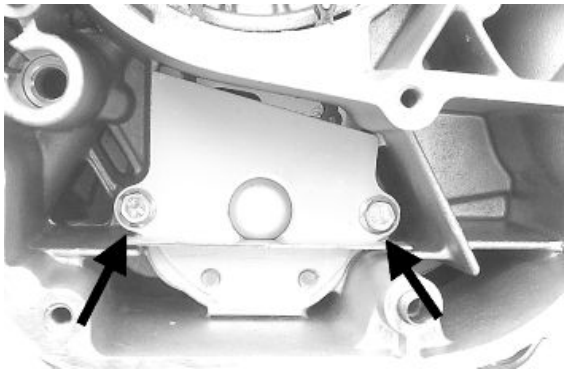




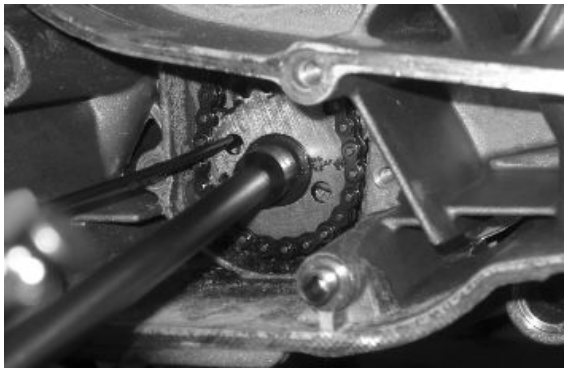
Oil pump

Removal

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



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



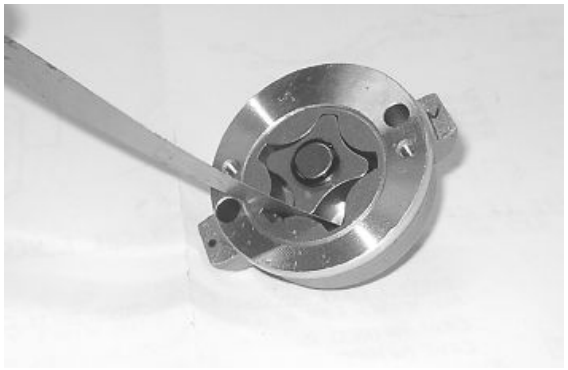
- Remove the oil pump by undoing the two screws in the figure.
- Remove the oil pump seal.

N.B.

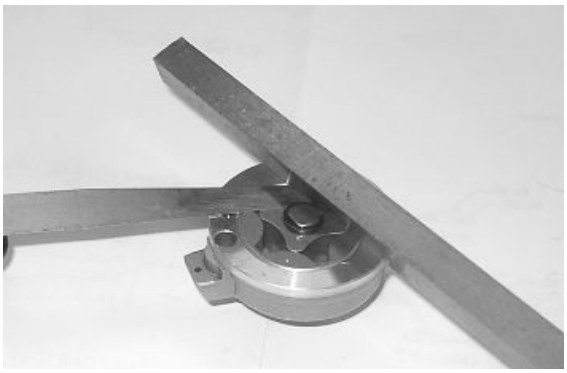
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

Inspection

- Remove the two screws and the oil pump cover.
- Remove the circlip 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 retainer ring.



- Check the clearance between the rotors in the position shown in the diagram using a feeler gauge.
Measure the distance between the outer rotor and the pump body (see figure).
- Check the axial clearance of the rotors using a trued bar as shown in the figure.



Characteristic

Axial rotor clearance

Limit values admitted: 0.09 mm

Distance between the outer rotor and the pump body

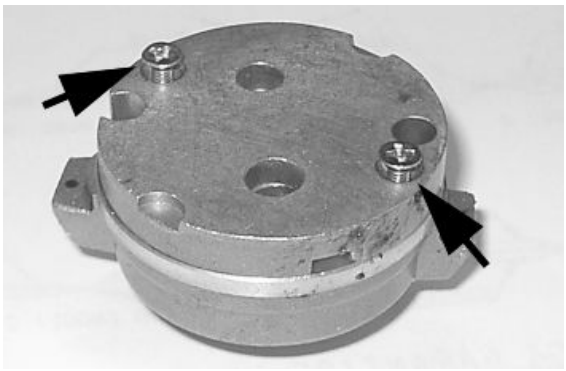
Admissible limit clearance: 0.20 mm

Distance between the rotors

Admissible limit clearance: 0.12 mm

Refitting

- Check there are no signs of wear on the oil pump shaft or body.
- Check there are no signs of scoring or wear on the oil pump cover.
- If you detect non-conforming measurements or scoring, replace the faulty parts or the unit.
- Fit the pump cover in the position that permits the crankcase clamping 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 cup washer. Tighten to the prescribed torque.
-Fit the oil pump cover, by tightening the two screws to the prescribed torque.

N.B.

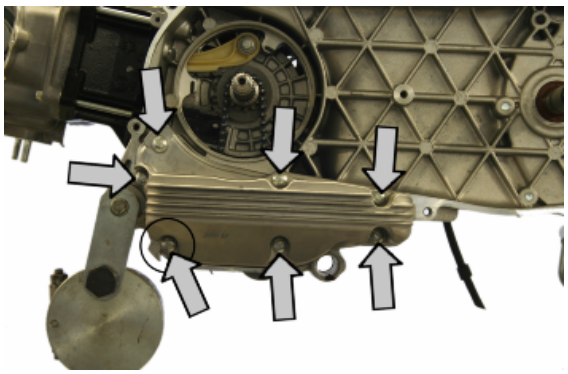
FIT THE CUP WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.

Locking torques (N*m)

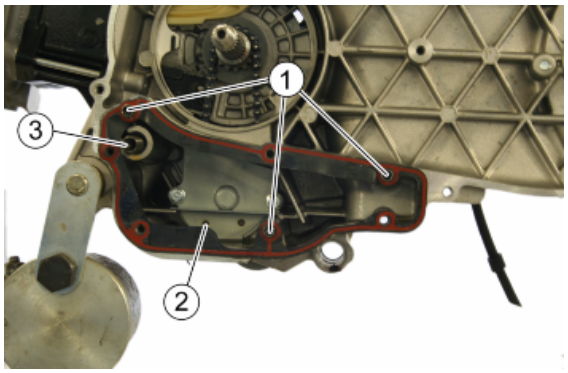
Screws fixing oil pump to the crankcase 5 ÷ 6
Oil pump command sprocket screw 10 to 14 **Oil pump cover screws** 0.7 - 0.9

Removing the oil sump

- Drain the oil from the sump.
- Remove the seven screws indicated in the figure and the bracket of the rear brake pipes.

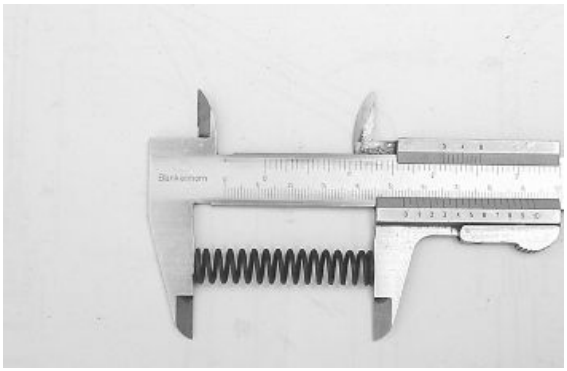


- Check the correct position of the three alignment dowels «**1**» and remove gasket «**2**», spring and by-pass piston «**3**».



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.



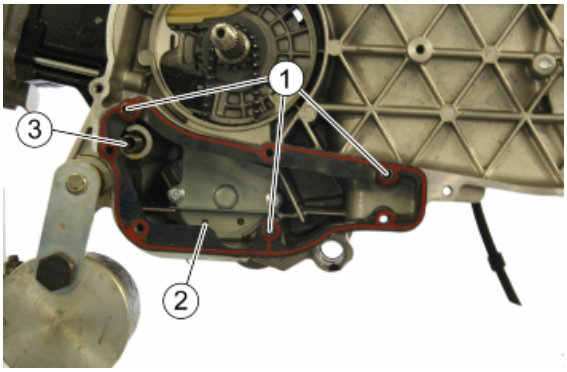
Characteristic

By-pass check up: Standard length

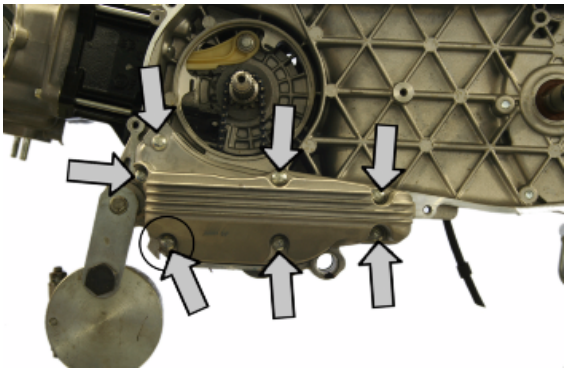
54.2 mm

Refitting the oil sump

- Check the correct position of alignment dowels «**1**».
- Fit a new gasket «**2**».
- Fit the by-pass piston and spring «**3**».



- Assemble the oil sump by tightening the seven fixing screws and be careful with the plate indicated.
- Tighten to the specified torque.



Locking torques (N*m)

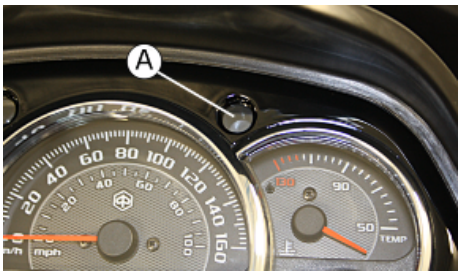
Oil sump screws **10 to 14**

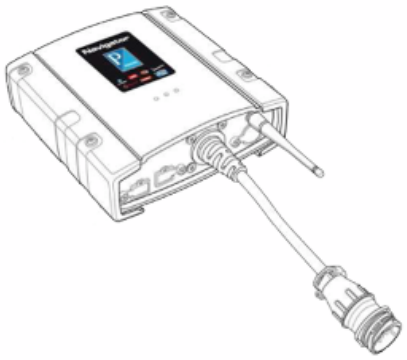
INDEX OF TOPICS

COMPONENT LAYOUT

	Specification	Desc./Quantity
1	Battery	12V - 12 Ah
2	Diagnostics socket connector	
3	Electric fan remote control	
4	Injection load relay	
5	Water temperature sensor	
6	Throttle body and electronic injection control unit (MIU)	
7	Fuel injector	
8	H.V. coil	
9	Lambda probe	
10	Fuel pump	
11	Engine Speed sensor	

The control unit is provided with a self-diagnosis system connected to an indicator light in the instrument panel.





Precautions

Troubleshooting hints

1. An injection system fault is more likely to be caused by a connection than a component.

Before troubleshooting the system, carry out the following checks:

A: Electrical power supply

a. Battery voltage

b. Blown fuse

c. Solenoids

d. Connectors

B: Chassis ground

C. Fuel system

a. Broken fuel pump

b. Dirty fuel filter

D: Ignition system

a. Faulty spark plug

b. Broken coil

c. Broken shielded cap

E: Intake circuit

a. Dirty air filter

b. Dirty by-pass circuit

c. Faulty Stepper motor

F: Other

a. Incorrect distribution timing

b. Wrong idle mixture

c.Incorrect reset of the throttle valve position sensor

2. EMS faults may be caused by loose connectors. Make sure that all connections are properly implemented.

Check the connectors taking into consideration the following point:

A: check that the terminals are not bent.

B: check that the connectors have been properly connected.

C. check whether the failure changes if the connector is slightly vibrating.

3. Before replacing the EMS ECU, check the whole system thoroughly. If the fault is fixed even by replacing the control unit, install the original control unit again and check if the fault occurs again.

4. Use a multimeter with an internal resistance over 10 KW/V for troubleshooting. Using unsuitable instruments may damage the ECU. The instruments to be preferred have a definition over 0.1V and 0.5W and an accuracy over ± 2%.

---

1. Before repairing any part of the injection system, check if any faults have been stored. Do not disconnect the battery before checking for faults.

2. The fuel supply system is pressurised at 250 kPa (2.5 BAR). Before disconnecting the fast-release fitting of the fuel supply pipe, check that there are no naked flames. Do not smoke. Act with caution to avoid spraying fuel to your eyes.

3. When repairing electric components, the battery must always be disconnected unless it is strictly necessary for the battery to be connected.

4. When carrying out functional tests, ensure that battery voltage is above 12V.

5. Before attempting to start the vehicle, ensure that there are at least two litres of fuel in the tank. Failure to respect this norm will damage the fuel pump.

6. If a long period is envisaged with the vehicle not in use, fill the tank to at least the halfway mark. This will ensure the pump will be covered by fuel.

7. When washing the vehicle, do not spray excessive water on electric components and wiring.

8. In the event of ignition problems, begin troubleshooting from the battery and the injection system connections.

9. Before disconnecting the ECU connector, perform the following steps in the order shown:

- Set the switch to «**OFF**»
- Disconnect the battery

Failure to respect this norm may damage the control unit.

10. Do not invert the poles when fitting the battery.

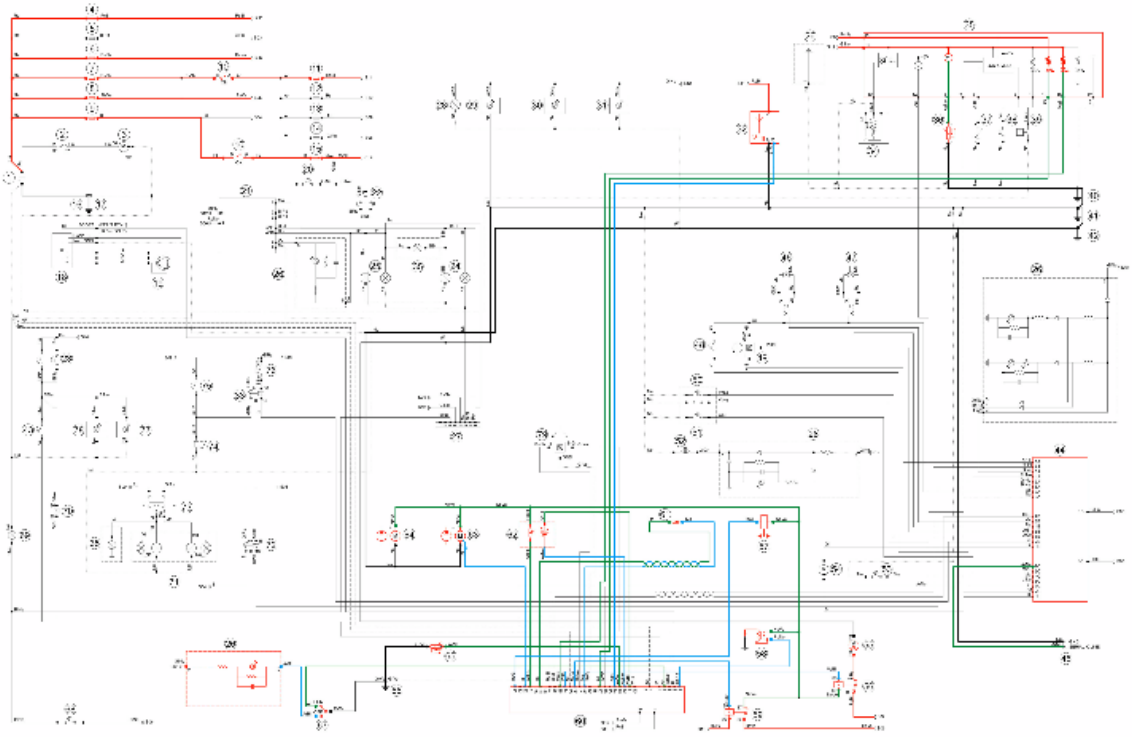
11. To avoid causing any damage, disconnect and reconnect the system connectors only if required. Before reconnecting, check that the connectors are dry.

12. When carrying out electric inspections, do not force the tester probes into the connectors. Do not take measurements not specifically foreseen by the manual.

13. At the end of every check performed with the diagnostic tester, remember to protect the system connector with its cap. Failure to observe this precaution may damage the control unit.

14. Before reconnecting the quick couplers of the power supply system, check that the terminals are perfectly clean.

EMS circuit diagram



KEY

1. BATTERY

4. FUSE 02 7.5A

6. FUSE 06 7.5A

7. FUSE 01 30A

8. FUSE 05 10A

9. FUSE 04 10A

10.KEY SWITCH OFF/LOCK

11. FUSE 11 7.5A

15. FUSE 12 5A

16.CHASSIS GROUND

26. WARNING LIGHT UNIT

32. AERIAL WITH IMMOBILIZER

35.INSTRUMENT PANEL

36. ENGINE TEMPERATURE SENSOR (INSTRUM.)

40. INSTRUMENT PANEL GROUND NODE

41. FRONT GROUND NODE

42.REAR GROUND NODE

44. PARKING CONTROL ECU

45. DIAGNOSTICS SOCKET

55. ELECTRIC FAN

56.ELECTRIC FAN RELAY

57.FUEL INJECTOR

58.HV COIL

59. INJECTION LOAD RELAY

60. C.D.I.

61. ENGINE SPEED SENSOR

62.LAMBDA PROBE

63.WATER PUMP (ONLY 125cc)

64.FUEL PUMP

65.ENGINE TEMPERATURE SENSOR (C.D.I.)

66.C.D.I. GROUND NODE

67.ENGINE STOP

Troubleshooting procedure

Engine does not start

ENGINE DOES NOT START IF ONLY PULLED

Possible Cause	Operation
Immobiliser enabling signal	System not encoded System not efficient, repair according to the indications of the self-diagnosis
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor
Fuel system	Fuel in the tank Fuel pump activation Fuel pressure (low) Injector capacity (low)
Power to the spark plug	Shielded spark plug cap HV coil (secondary insulation)
Parameter reliability	Coolant temperature Distribution timing - injection ignition Air temperature
End of compression pressure	End of compression pressure

Starting difficulties

ENGINE STARTER PROBLEMS

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Coolant temperature

Possible Cause	Operation
Start-up speed	Starter motor and solenoid Battery Ground connections
End of compression pressure	End of compression pressure
Power to the spark plug	Spark plug Shielded cap HV coil Speed-timing sensor Ignition advance
Fuel system	Fuel pressure (low) Injector capacity (low) Injector sealing (poor)
Correctness of the parameters	Coolant temperature Stepper throttle valve position intake air temperature (steps and actual opening) Cleaning of the auxiliary air pipe and throttle valve Air filter efficiency

Engine stops at idle

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

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Coolant temperature
Ignition efficiency	Spark plug Ignition timing
Correctness of the parameters	Throttle valve position sensor Stepper Coolant temperature sensor Intake air temperature sensor
Intake system cleaning	Air filter Diffuser and throttle valve Additional air pipe and Stepper
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold Intake sleeve Filter box
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector capacity

Engine does not rev down

ENGINE DOES NOT RETURN TO IDLING SPEED/IDLING SPEED TOO HIGH

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Coolant temperature
Ignition efficiency	Ignition timing
Correctness of the parameters	Throttle valve position sensor Stepper Coolant temperature sensor Intake air temperature sensor
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold

Possible Cause	Operation
	Intake sleeve
	Filter box
Fuel system (low pressure)	Fuel pump
	Pressure regulator
	Fuel filter
	Injector capacity

Exhaust backfires in deceleration

EXHAUST BACKFIRES WHEN DECELERATING

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay
	HV coil
	Injector
	Revolution timing sensor
	Air temperature
	Coolant temperature
	Lambda probe
Correctness of the parameters	Throttle valve position sensor
	Stepper
	Coolant temperature sensor
	Intake air temperature sensor
Intake system sealing (infiltrations)	Intake manifold - head
	Throttle body - manifold
	Intake sleeve
	Filter box
Fuel system (low pressure)	Fuel pump
	Pressure regulator
	Fuel filter
	Injector capacity
Exhaust system sealing (infiltrations)	Manifold - head
	Manifold - silencer
	silencer welding

Engine revs irregularly

ENGINE IRREGULAR PERFORMANCE WITH VALVE SLIGHTLY OPEN

Possible Cause	Operation
Intake system cleaning	Air filter
	Diffuser and throttle valve
	Additional air pipe and Stepper
Intake system sealing	Intake sleeve
	Filter box
Ignition system	Spark plug wear check
Parameter reliability	Throttle valve position signal
	Coolant temperature indicator
	Intake air temperature indicator
	Ignition advance
TPS reset successful	TPS reset successful
Presence of faults detected by the self diagnosis	Pump relay
	HV coil
	Injector
	Revolution timing sensor
	Air temperature
	Coolant temperature
	Lambda probe

Poor performance at full throttle

POOR ENGINE PERFORMANCE AT FULL POWER/ ENGINE IRREGULAR PERFORMANCE ON PICKUP

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Coolant temperature Lambda probe
Spark plug power supply	Spark plug Shielded cap HV cable HV coil
Intake system	Air filter Filter box (sealing) Intake sleeve (sealing)
Parameter reliability	Throttle valve position signal Coolant temperature indicator Intake air temperature indicator Ignition advance
Fuel system	Fuel level in the tank Fuel pressure Fuel filter Injector capacity

Engine knocking

PRESENCE OF KNOCKING (COMBUSTION SHOCKS)

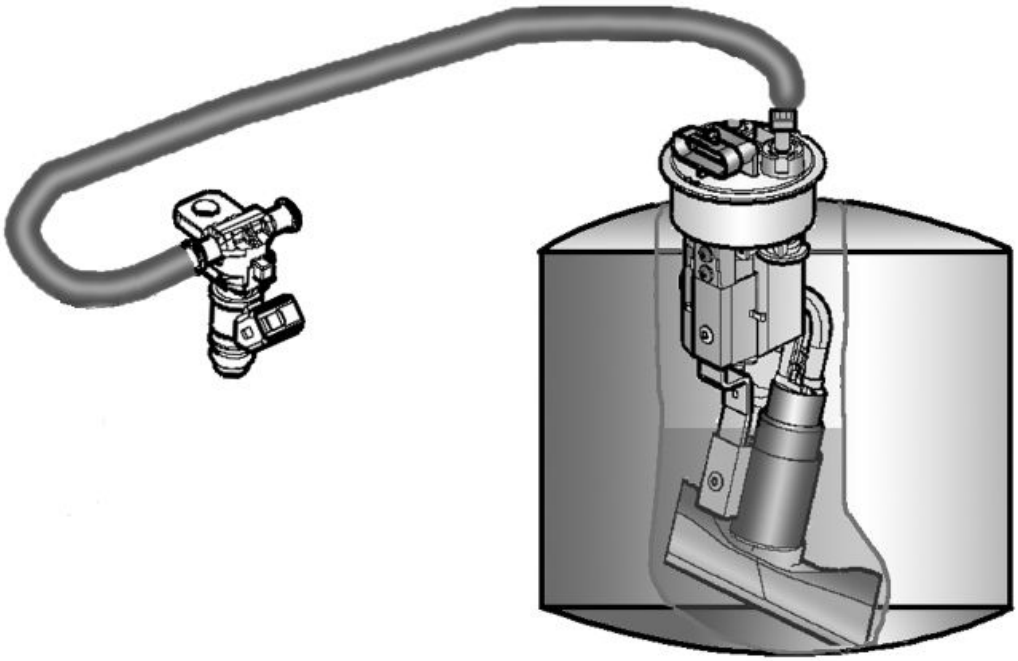
Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Coolant temperature Lambda probe
Ignition efficiency	Spark plug
Parameter reliability	Throttle valve position signal Coolant temperature indicator Intake air temperature indicator Ignition advance
Intake system sealing	Intake sleeve Filter box
TPS reset successful	TPS reset successful
Fuel system	Fuel pressure Fuel filter Injector capacity Fuel quality
Selection of the cylinder base gasket thickness	Selection of the cylinder base gasket thickness

Fuel supply system

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

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

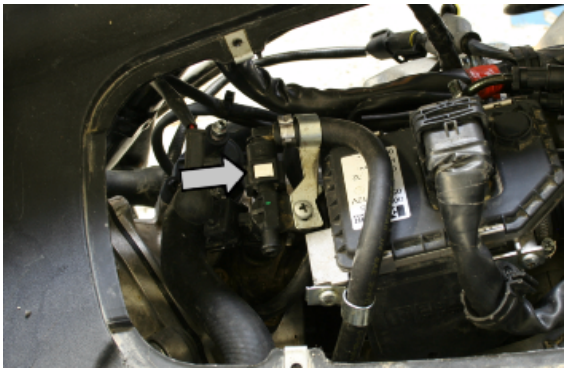
The pressure is controlled by the pressure regulator situated in the pump assembly in the tank.



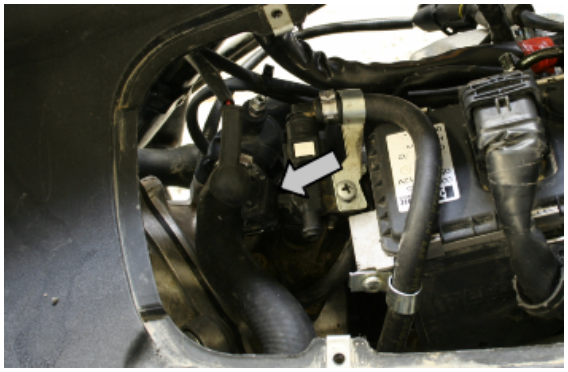
Removing the butterfly valve

Remove the screws fixing the fuel pipes indicated in the figure.

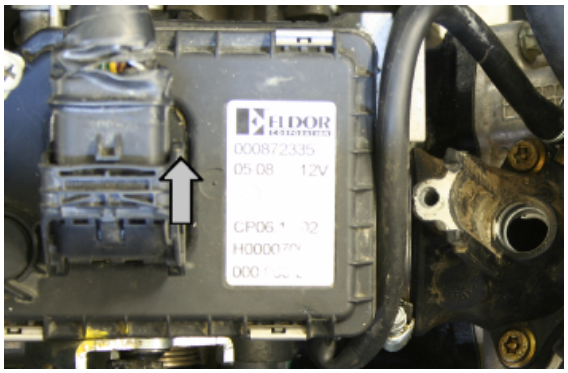
Remove the fast-release fitting from the injector support.



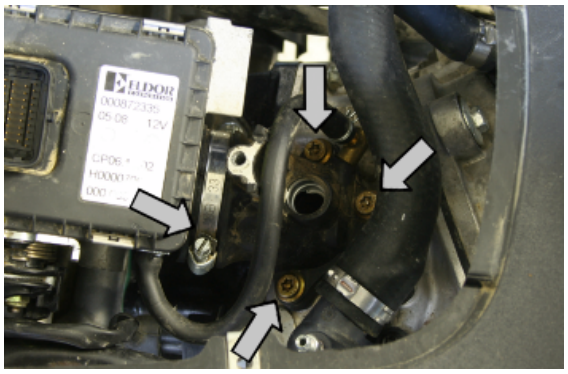
Remove the injector connector and the injector it-self.



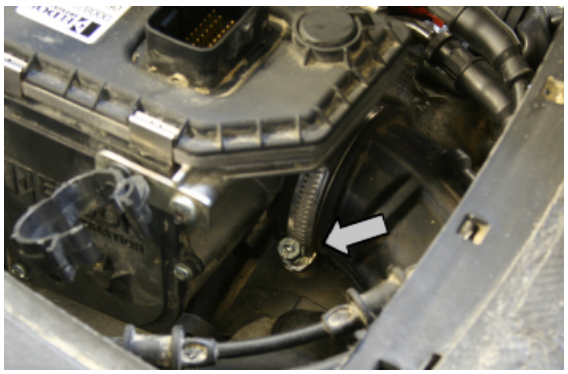
Remove the ECU connector.



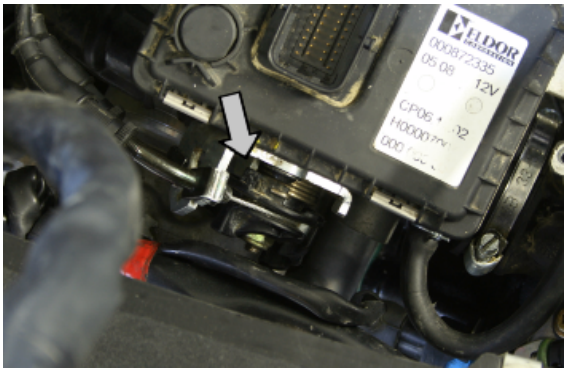
Remove the three screws fixing the manifold to the cylinder head and the clip fixing the throttle body to the manifold.



Remove the clip fixing the throttle body to the air cleaner bellows.

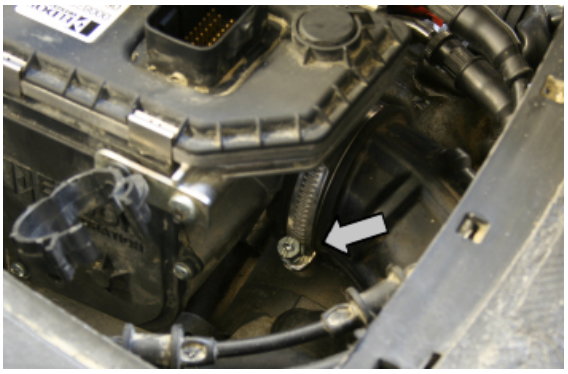


Remove the throttle control retainer.

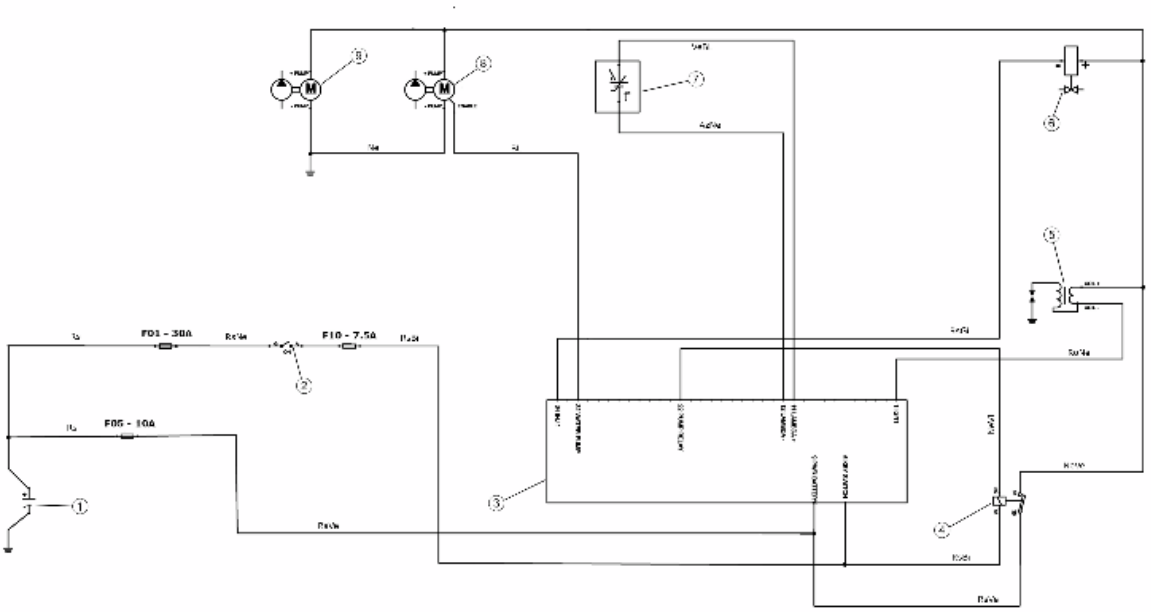


Refitting the butterfly valve

To refit, perform the operations in the reverse order from the removal operations being careful to position the clip fixing the throttle body to the air filter bellows at 45° as shown in the photograph.



Pump supply circuit



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

1. Battery 12V 12Ah
2. Ignition switch contacts
3. Electronic control unit
4. Injection load solenoid
5. HV coil
6. Fuel injector
7. Lambda probe
8. Water pump (only 125 cc. version)
9. Fuel pump

When switched to «**ON** », the fuel pump starts to rotate for 2 seconds and then stops. When the engine starts, in the presence of rpm timing signal the pump is continuously supplied.

Electric characteristic

Pump winding resistance value

~ 1.5 Ω

Input current during regular functioning

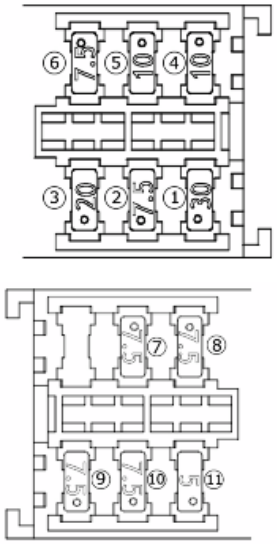
1.4 - 1.8 A

Input current with hydraulic circuit closed

~ 2 A

Check the efficiency of 10 A fuse N° 5 injection load.

Check that the live control unit power supply 7.5A fuse No. 10 works properly.



Check the efficiency of the injection load solenoid as described in the Electrical system chapter.

Circuit leak test

Install the appropriate tool for fuel pressure control with the pipe fitted with the pressure gauge on the delivery pipe..

Check during regular operation by placing the appropriate tool between the pump and the injector. With the battery voltage> 12 V check that the fuel pressure is 2.5 BAR and that the input current is 1.4 to 1.8 A

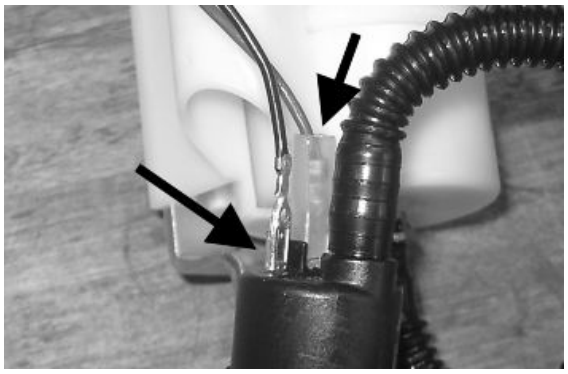
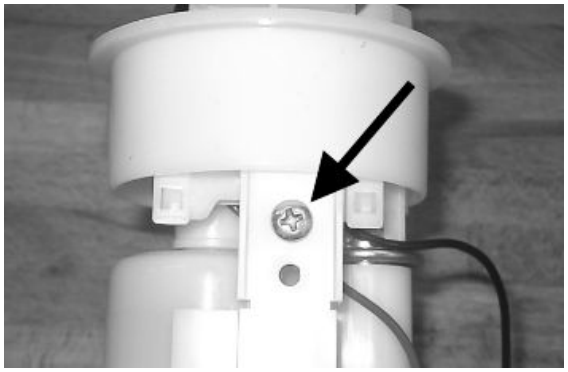
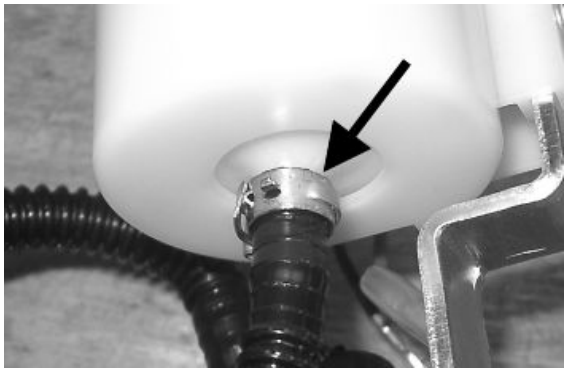
With the battery voltage > 12 V, check the capacity of the pump flow rate by disconnecting from the injector the pipe equipped with the pressure gauge of the appropriate tool. Make a graded burette

available with a flowrate of approximately 1 L. Rotate the pump using the active diagnosis of the palm top computer. Using a pair of long flat needle-nose pliers, choke the fuel pipe making the pressure stabilise at approx. 2.5 BAR. Check that, in fifteen seconds, the pump has a flowrate of around 110cc.

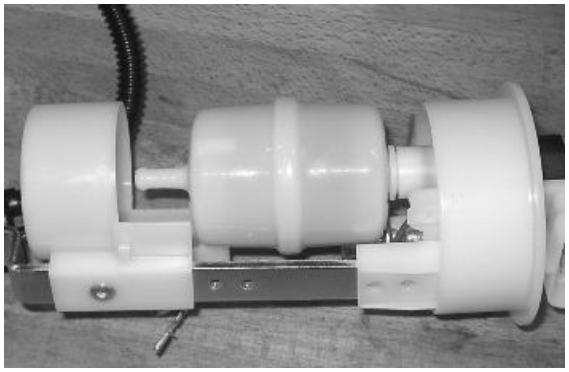
Specific tooling

020480Y Petrol pressure check kit

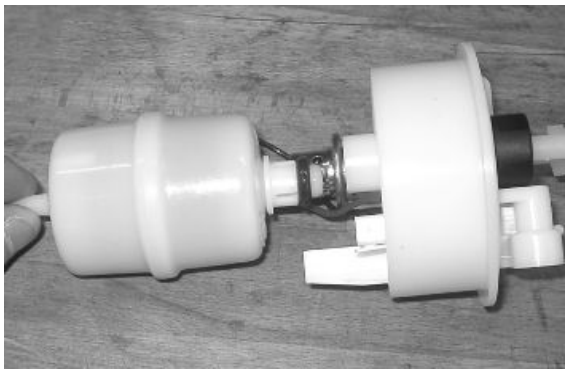
Fuel filter check

Disconnect the terminals from the electric pump	
Remove the screw shown in the picture	
Remove the clip fixing the piping to the filter shown in the picture	

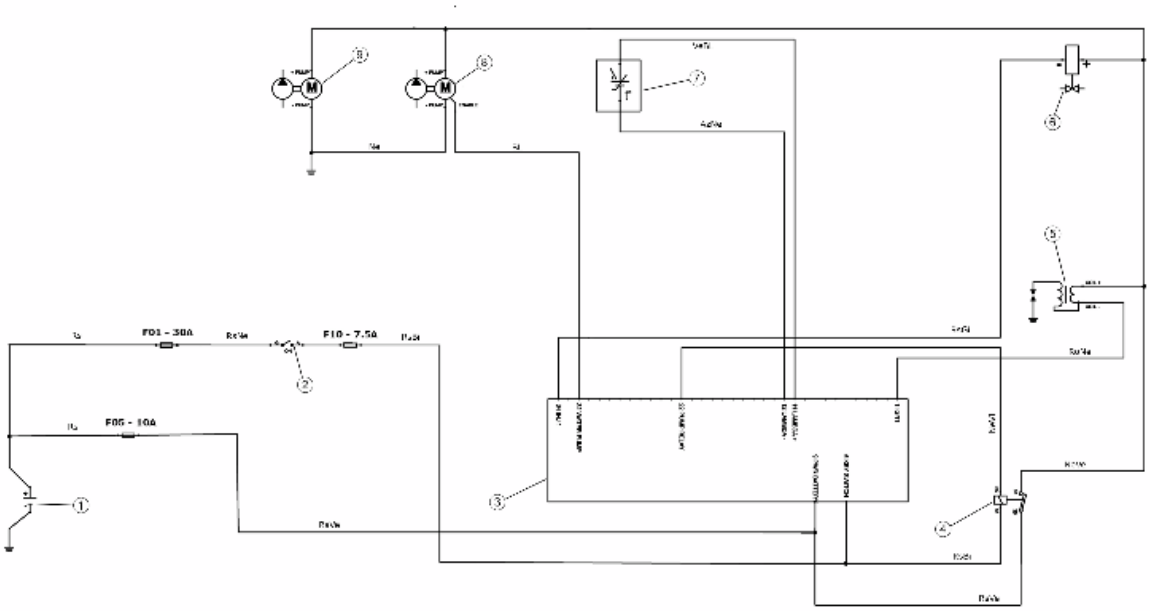
Separate the lower part of the pump mounting as shown in the picture.



Remove the filter from the pump mounting



Inspecting the injector circuit

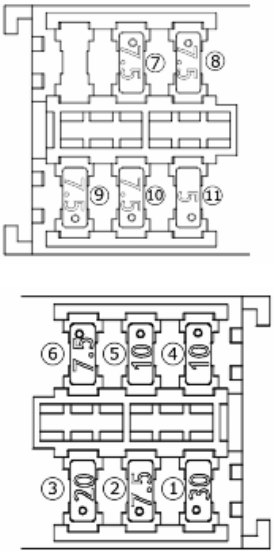


KEY

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

Check the efficiency of 10 A fuse N° 5 injection load.

Check that the live control unit power supply 7.5A fuse No. 10 works properly.



Check the efficiency of the injection load solenoid as described in the Electrical system chapter.

Check the power supply line of the injection load solenoid energising coil: after switching to "ON", make sure there is battery voltage, for two seconds, between the Red-White cable and Black-Purple cable of the solenoid control base. If there is not, check the continuity of the Red-White cable between the fuse box and the solenoid base and of the Black-Purple cable between the pin 22 of the control unit and the solenoid base.

N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (RELAYS, CONTROL UNIT, FUSES ETC.).

Check the presence of fixed voltage between the Red-Green cable of the solenoid base and ground. If no steady voltage is measured, check the continuity of the Red-Green cable between the fuse box (No. 5, 10 A) and the solenoid base.

N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (RELAYS, CONTROL UNIT, FUSES ETC.).

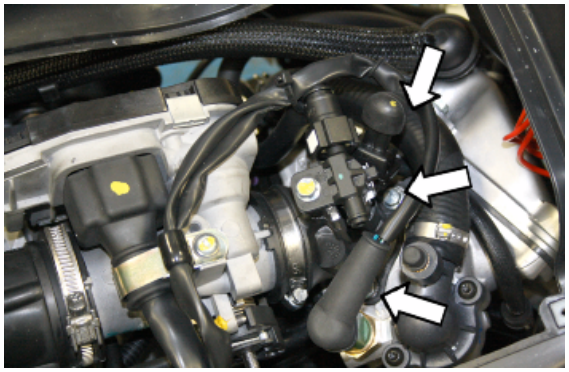
With the control unit and the injector disconnected, check if there is continuity in the Red-Yellow cable between pin 34 of the control unit connector and the injector connector

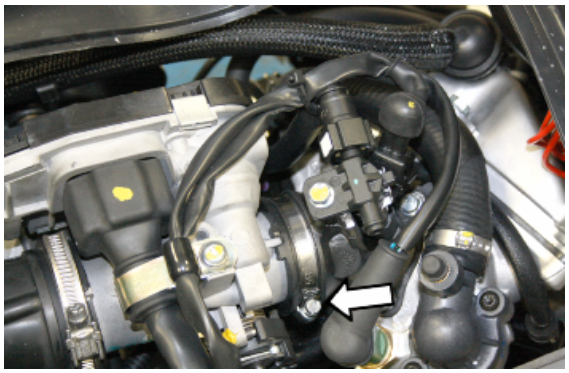
Switch to «ON» and check if there is voltage, with injector disconnected and control unit connected, between the Black-Green cable of the injector connector and the ground lead

With injector disconnected and the injector load relay disconnected, check the continuity of the Black-Green cable between the injector connector and solenoid base.

Inspecting the injector hydraulics

To carry out the injector check, remove the intake manifold by removing the three clamping screws at the head and the clip connecting the control unit to the manifold.





Install the appropriate tool for checking fuel pressure and position the manifold over a container graduated by at least 100 cm³. Connect the injector with the cable making up part of the supply for the injection tester. Connect the clamps of the cable to an auxiliary battery. Activate the fuel pump with the active diagnosis. Check that, within fifteen seconds, approximately 40 cm³ of fuel is dispensed with an adjustment pressure of approximately 2.5 BAR.

Specific tooling

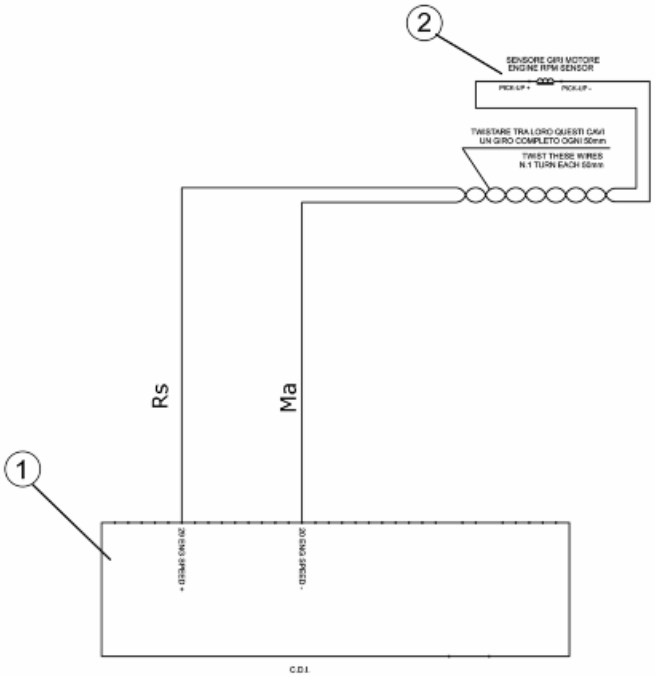
020480Y Petrol pressure check kit

Proceed with the injector seal test.

Dry the injector outlet with a blast of compressed air. Activate the fuel pump. Wait for one minute, making sure there are no leaks coming from the injector. Slight oozing is normal.

Value limit = 1 drop per minute

Tachometer



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

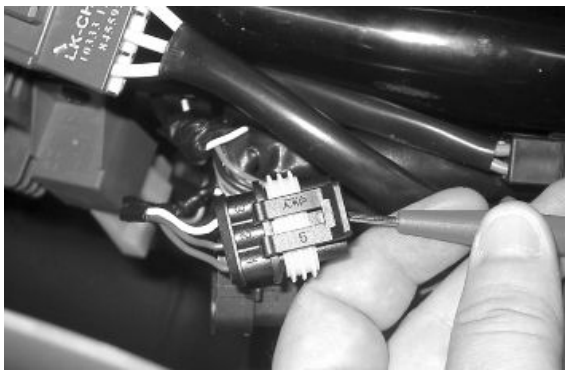
PIN RELATIONSHIP

PIN	PIN	Component	Reference value
20	29	Speed sensor	100 - 150 Ω a ~ 20°C

With the control unit disconnected, check that the sensor resistance between pins 20 and 29 is between 100 and 150 Ω at an engine temperature of approximately 20°.

Disconnect the fuel pipe connector. Start up the engine and wait for it to stop. Try to start the engine and check that the voltage between pins 20 and 29 is ~ 2.8 V.

With the control unit disconnected, check if there is continuity between pin 29 and the red cable of the speed sensor connector and between pin 20 and the brown cable of the speed sensor connector.

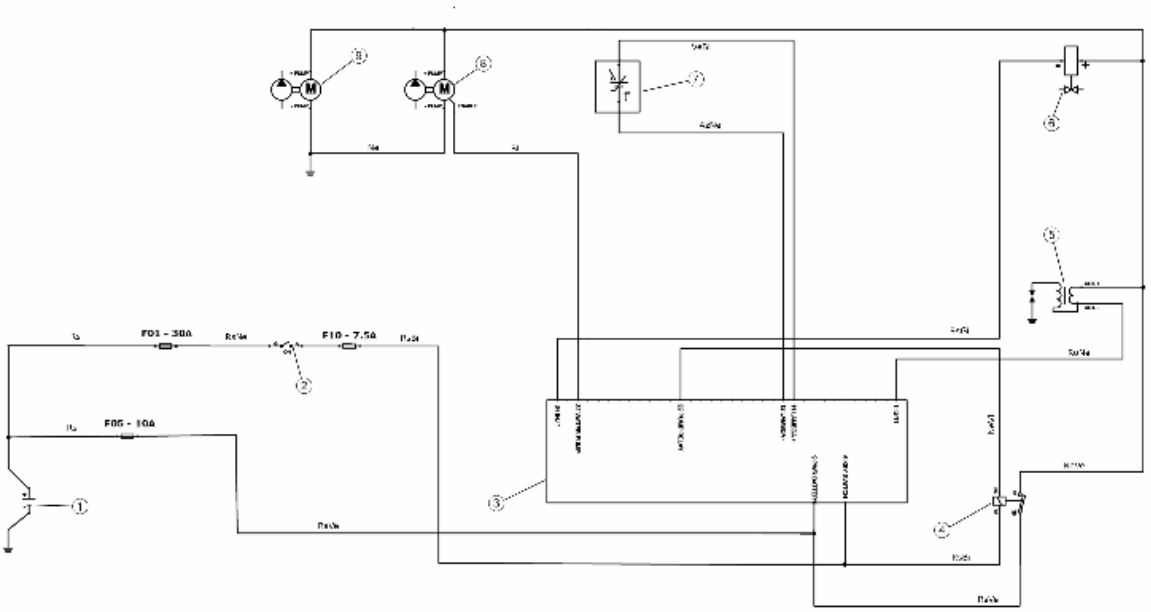


With the control unit and the speed sensor disconnected, check that the red and brown cables (pins 29 and 20) are isolated from each other and insulated from the ground lead.

Specific tooling

020331Y Digital multimeter

HT coil



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

1. Battery 12V 12Ah
2. Ignition switch contacts
3. Electronic control unit
4. Injection load solenoid
5. HV coil
6. Fuel injector
7. Lambda probe
8. Water pump (only 125 cc. version)
9. Fuel pump

The ignition system is integrated with the injection and it is a high-efficiency inductive type ignition.

The control unit manages two significant parameters:

- Ignition advance

This is optimised at once according to the engine revs, engine load, temperature and ambient pressure.

With idle engine, it is optimised to obtain the stabilisation of the speed at 1450 ± 50 R/1'.

- Magnetisation time

The coil magnetisation time is controlled by the control unit. The ignition power is increased during the engine start-up phase.

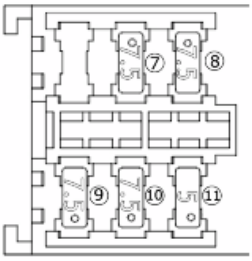
The injection system recognises the four-stroke cycle so the ignition is only commanded in the compression phase.

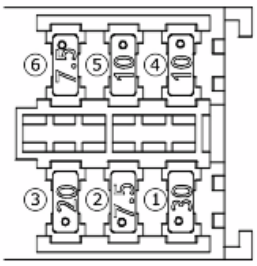
Specific tooling

020331Y Digital multimeter

Check the efficiency of 10 A fuse N° 5 injection load.

Check that the live control unit power supply 7.5A fuse No. 10 works properly.





After switching to «**ON**», check that there is voltage, for about 2 seconds, between the Black-Green cable of the coil connector and the ground lead with the coil connector disconnected.

Check the resistance of the coil primary between pin 1 of the control unit connector and the Black-Green cable of the injection load solenoid base, with the control unit disconnected and the solenoid disconnected.

Electric characteristic

Primary resistance

0.5 ± 0.8% ohm

Check the efficiency of the injection load solenoid as described in the Electrical system chapter.

Check the power supply line of the injection load solenoid energising coil: after switching to "ON", make sure there is battery voltage, for two seconds, between the Red-White cable and Black-Purple cable of

the solenoid control base. If there is not, check the continuity of the Red-White cable between the fuse box and the solenoid base and of the Black-Purple cable between the pin 22 of the control unit and the solenoid base.

N.B.

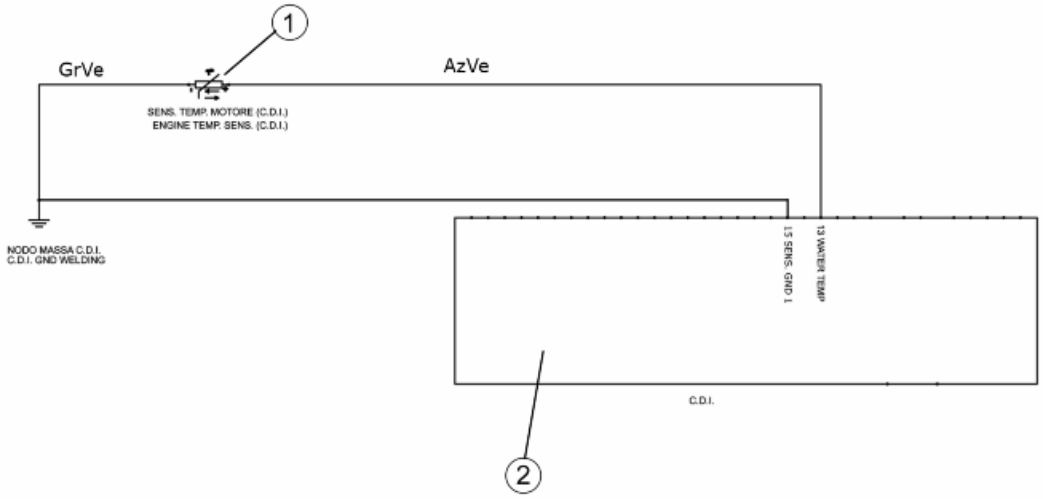
CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (RELAYS, CONTROL UNIT, FUSES ETC.).

Check the presence of fixed voltage between the Red-Green cable of the solenoid base and ground. If no steady voltage is measured, check the continuity of the Red-Green cable between the fuse box (No. 5, 10 A) and the solenoid base.

N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (RELAYS, CONTROL UNIT, FUSES ETC.).

Coolant temperature sensor



TEMPERATURE SENSOR

	Specification	Desc./Quantity
1	Water temperature sensor	
2	Electronic control unit	

With the connector on the control unit side disconnected and the coolant temperature sensor connector connected, check that the resistance values between pin 13 and the control unit ground (pin 15), correspond with the engine temperature.

With the control unit side connector disconnected, and the coolant temperature connector disconnected, check the insulation between the two Grey-Green and Sky blue-Green cables.

Electric characteristic

Resistance value at 20° C

2500 ± 100 Ω

Resistance value at 80° C

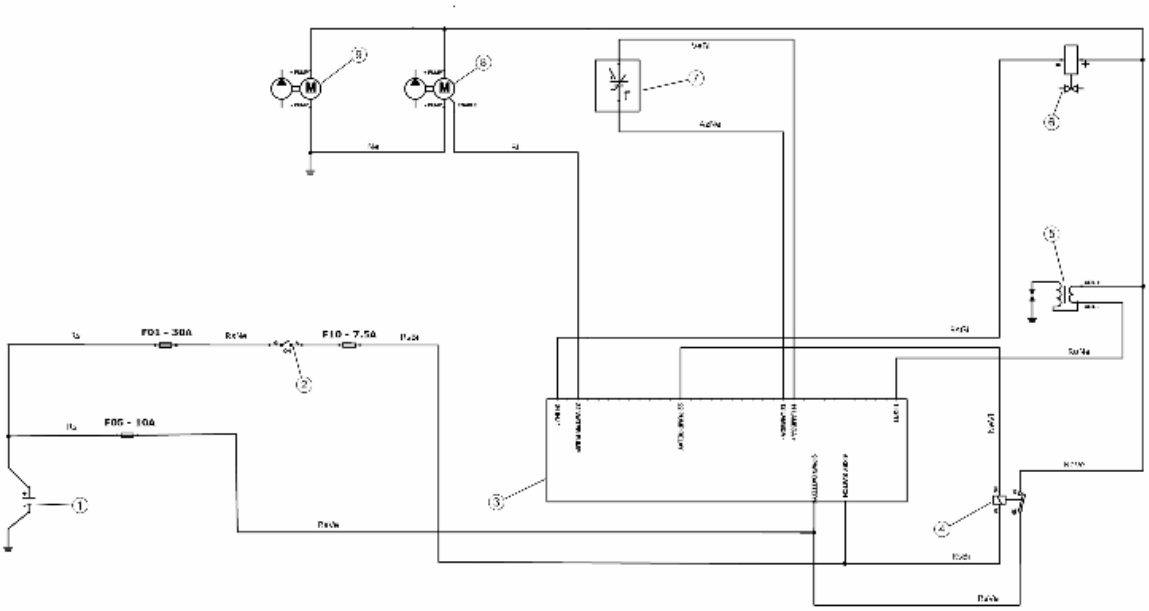
308 ± 6 Ω

With the connector on the control unit side disconnected and the coolant temperature sensor connector disconnected, check if there is continuity between pin 13 of the control unit connector and the Sky blue-Green cable and between ground (control unit pin 15) and the Grey-Green cable of the sensor.

Specific tooling

020331Y Digital multimeter

Lambda probe

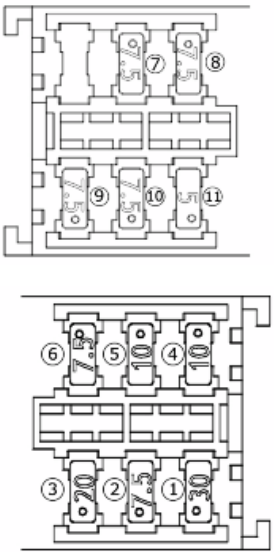


KEY

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

Check the efficiency of 10 A fuse N° 5 injection load.

Check that the live control unit power supply 7.5A fuse No. 10 works properly.



Check the efficiency of the injection load solenoid as described in the Electrical system chapter.

Check the power supply line of the injection load solenoid energising coil: after switching to "ON", make sure there is battery voltage, for two seconds, between the Red-White cable and Black-Purple cable of the solenoid control base. If there is not, check the continuity of the Red-White cable between the fuse box and the solenoid base and of the Black-Purple cable between the pin 22 of the control unit and the solenoid base.

N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (RELAYS, CONTROL UNIT, FUSES ETC.).

Check the presence of fixed voltage between the Red-Green cable of the solenoid base and ground. If no steady voltage is measured, check the continuity of the Red-Green cable between the fuse box (No. 5, 10 A) and the solenoid base.

N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (RELAYS, CONTROL UNIT, FUSES ETC.).

Check, with the control unit disconnected and the lambda probe disconnected, if there is continuity of the Sky blue-Red cable between pin 31 of the control unit and the lambda probe connector

After switching to «ON», check that there is voltage, for 2 seconds, with lambda probe disconnected and control unit connected, between Black-Green cable of the lambda probe connector and ground

With lambda probe disconnected and the injector load solenoid disconnected, check the continuity of the Black-Green cable between the lambda probe and solenoid base.

INDEX OF TOPICS

This section is dedicated to operations that can be carried out on the suspensions.

Wheel alignment

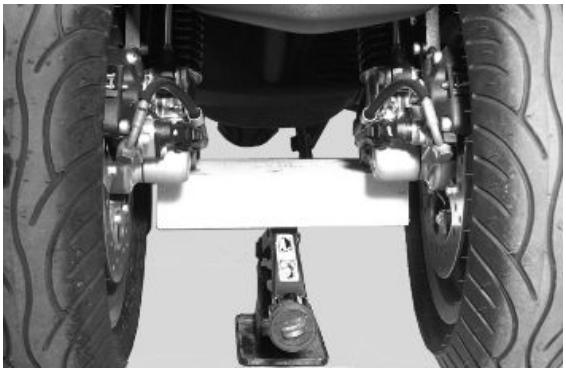
Tool fitting

How to use the tools

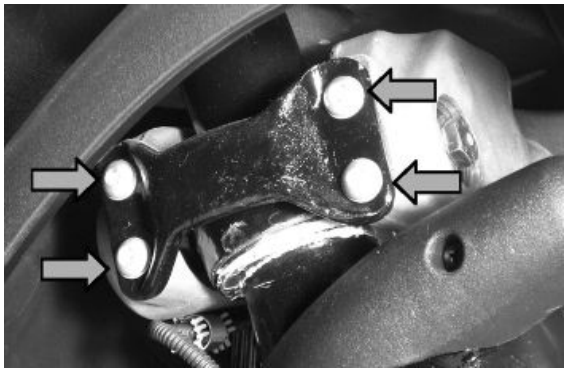
- Check that tyre pressure is correct.
- Park the vehicle on level, smooth and even ground.
- Park the vehicle on its centre stand.
- Make sure that the parking system is disengaged.
- Lift the front wheels as shown in the picture
- Check that the wheel rims rotate evenly and whether there is abnormal clearance in bearings and suspension.
- Make sure that the steering control shows no signs of abnormal clearance in joints and bearings. Otherwise, correct this and then adjust them.

TYRE INFLATION PRESSURE

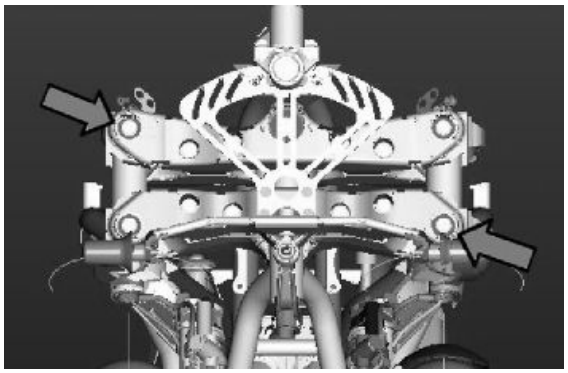
Specification	Desc./Quantity
Front tyre pressure	1.7 bar
Rear tyre pressure	2.2 bar (2.6 bar with passenger)



- Get the vehicle off the stand, back on the ground.
- Remove the right lower coupling plate of the half-arm by undoing the screws indicated in the picture.



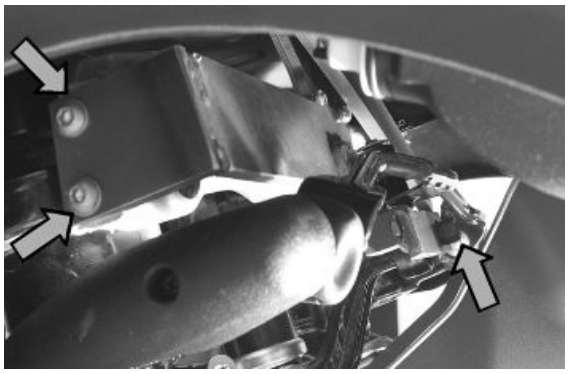
- Remove the right upper screw and the left bottom screw of the parallelogram unit.



- Fit the bracket locking the parallelogram in the holes of the previously removed screws; use the screws supplied with the tool and be careful to correctly centre the spacer in the bearing.

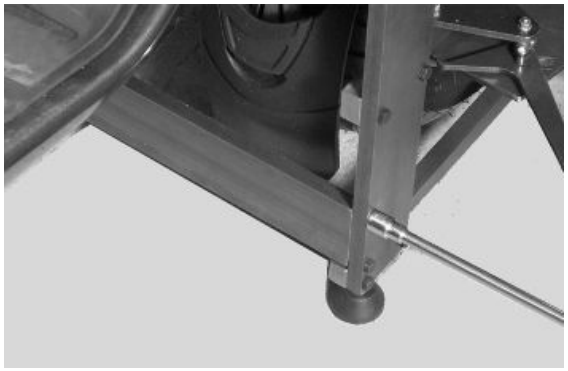
- Remove the nut fixing the steering control arm and keep the original washer in position.

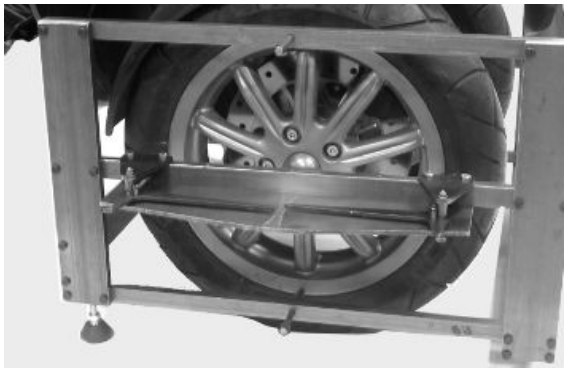
- Fit the steering guiding bracket in a straight riding position, fix one end to the attachment of the half-arm coupling flange and the other end to the screw fixing the steering control arm.



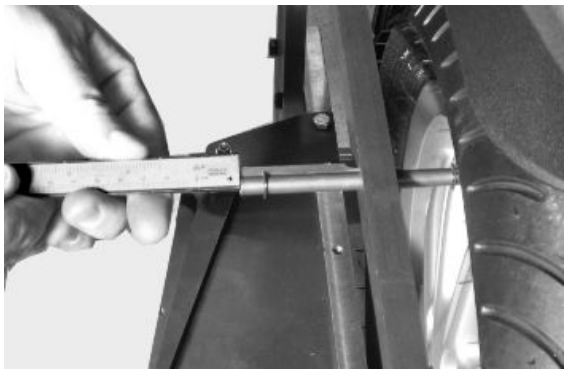
- Place the frame so that the sliders come into contact with the rim maximum diameter but without interfering with the tyre. If required, reposition the frame by operating the 3 adjustable support feet.

- Fit the frame locking bracket

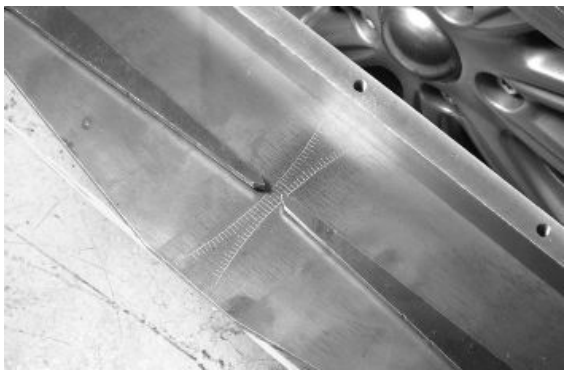




- Make sure the frame is adequately centred by checking with a gauge that the lugs along the vertical axis show the standard protrusion.



- Check that the pointers of both tyres are correctly aligned, as shown in the picture. Maximum misalignment allowed: 4 notches.
- Use tool 020647Y028 for LT version with extended track.

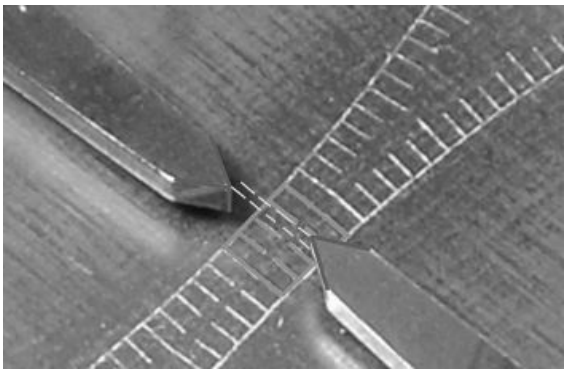


Specific tooling

020646Y Parallelogram and steering positioning tool

020647Y Toe-in checking tool

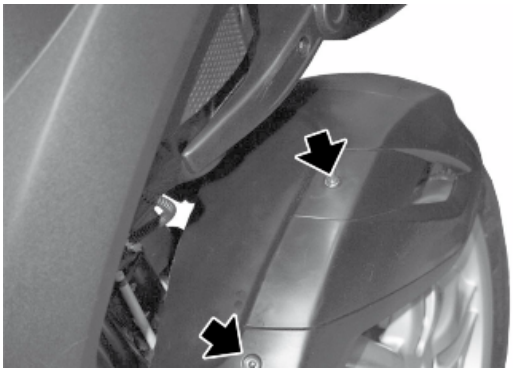
020647Y028 MP3 LT Toe-in tool (tricycle)



Front

Removing the front wheel

- Remove the mudguard, by removing the two screws indicated in figure.
- Remove the 5 fixing screws indicated in the picture.



Front wheel hub overhaul

- Remove the ball bearing check Seeger ring indicated in the picture

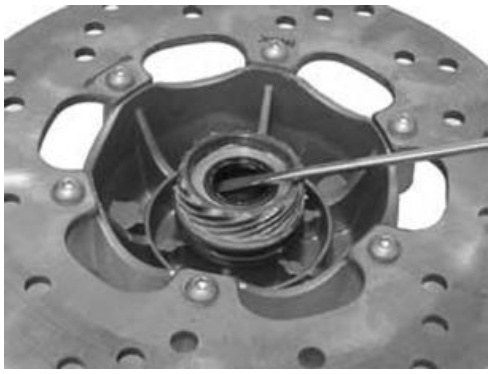
Extract the ball bearing using the specific tool

Specific tooling

001467Y014 Calliper to extract ø 15-mm bearings

001467Y017 Bell for bearings, OD 39 mm

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



- Remove the roller bearing using the specific tool

Specific tooling

020376Y Adaptor handle

020456Y Ø 24 mm adaptor

020363Y 20-mm guide

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

Specific tooling

020151Y Air heater

020376Y Adaptor handle

020359Y 42 x 47-mm Adaptor

020412Y 15-mm guide

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

Specific tooling

020038Y Punch

Recommended products

AGIP GREASE MU3 Yellow-brown, lithium-base, medium-fibre multipurpose grease.

ISO L-X-BCHA 3 - DIN 51 825 K3K -20

Refitting the front wheel

Eseguire le operazioni in senso inverso allo smontaggio rispettando la coppia prescritta

Locking torques (N*m)

Wheel fixing screw 20 to 25

Handlebar

Removal

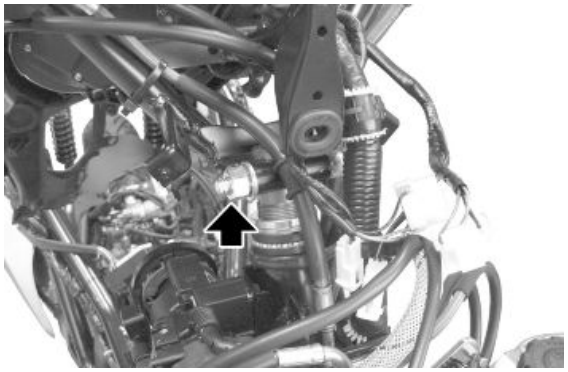
Remove the handlebar covers working as explained in the Bodywork Chapter.

Remove the handlebar wiring fixing clips and disconnect the electric connectors from the brake levers.

Unscrew the fittings, then remove the front and rear brake pump piping.

Remove the flexible transmissions of the throttle grip and remove the throttle control.

Loosen and remove the fixing screw of the handlebar to the steering tube and remove the handlebar 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 working in the reverse order from that used for removal.

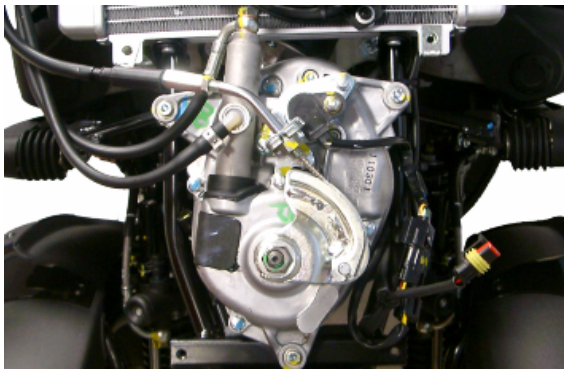
Locking torques (N*m)

Handlebar fixing screw 50 to 55

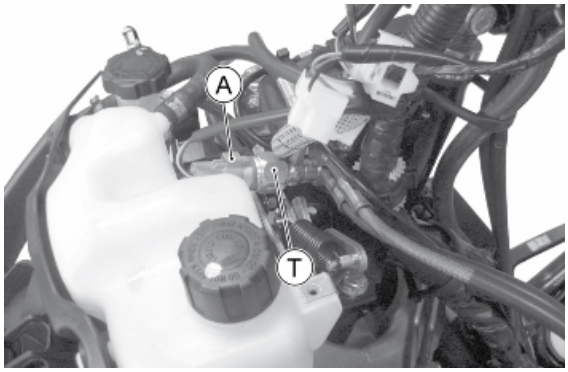
The tilt mechanism

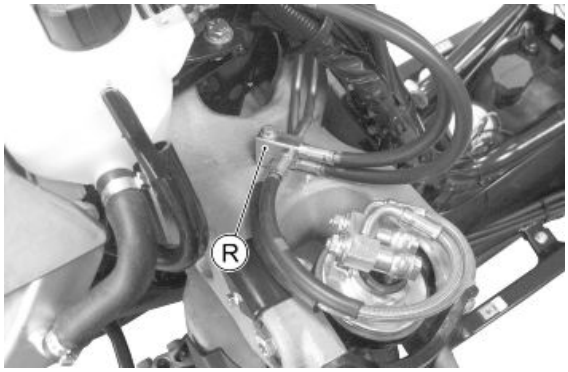
Hydraulic system layout

When roll is locked, the gear motor activates the hydraulic pump indicated in the picture and pressurises the circuit.



The pressurised oil reaches the **"T"** joint, where the pressure sensor **"A".** is placed. After the sensor, the pipe continues up to the distribution frame**"R"** from which the system branches are divided and reach the upper joint on the side steering tube.



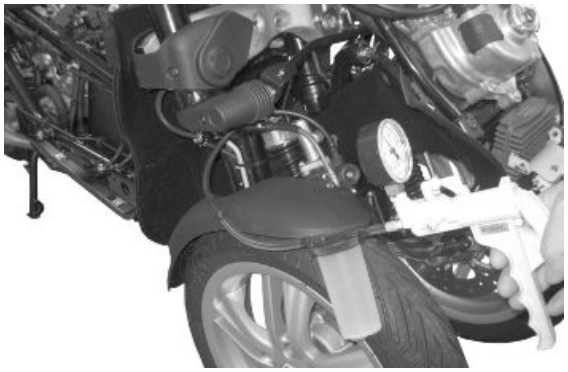


Through the rigid-flexible pipes inside the side steering tubes, the oil reaches the stem sliding locking device placed parallel to the shock absorber.

Roll lock system purge

- Remove the central cover and the front shield upper cover.
- Unscrew the cap and check that there is always braking liquid inside the reservoir along the whole process.

- Using a specific tool purge the calliper.
- Connect the pipe to the fitting and keep purging the system until air bubble free brake fluid flows out.



CAUTION

CARRY OUT THE FOLLOWING OPERATIONS ON BOTH CALLIPERS

Specific tooling

020329Y Mity-Vac vacuum-operated pump

- Restore the correct level inside the chamber adding oil of the recommended type.

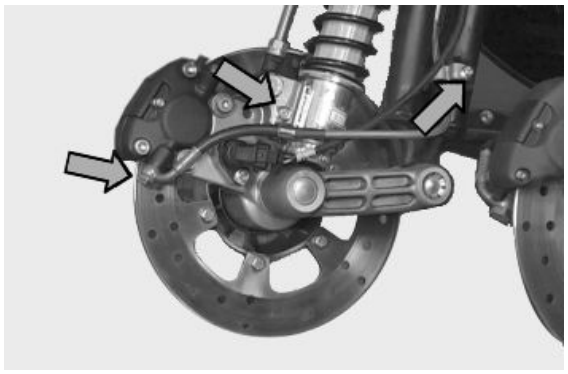
Recommended products

AGIP BRAKE 4 Brake fluid.

Synthetic fluid SAE J 1703 -FMVSS 116 - DOT 3/4 - ISO 4925 - CUNA NC 956 DOT 4

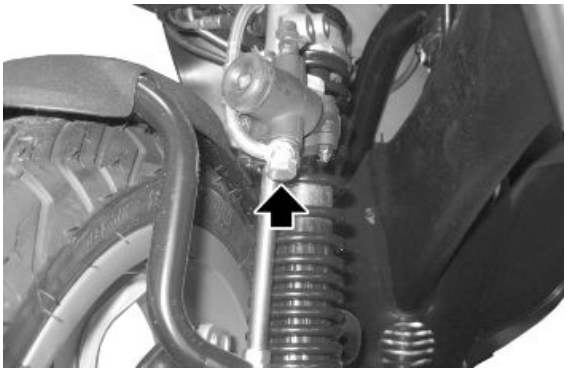
Steering tubes

Remove the brake calliper pipe retainers and the hydraulic pipe fitting from the brake calliper making sure there is a container to collect the brake fluid. If you decide to remove the mudguards, pay attention to the fact that the sliding dipstick for locking the roll remains positioned in its own place. Reinsert the locking screw, rescrewing it manually.

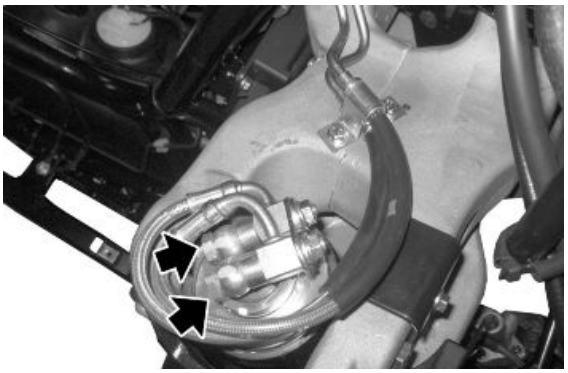


Disconnect the tone wheel connector indicated in the picture.

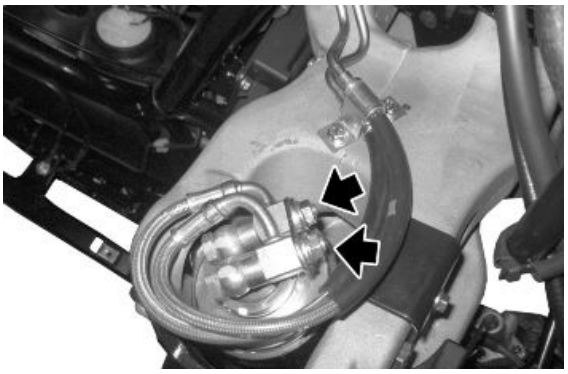
Remove the hydraulic pipe fitting from the sliding locking device, making sure again that the liquid drained is collected.



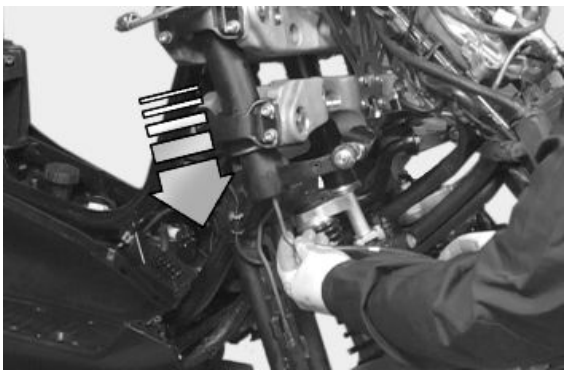
Remove the upper fittings, on the parallelogram, of the brake hydraulic pipes and the suspension lock indicated in the picture.



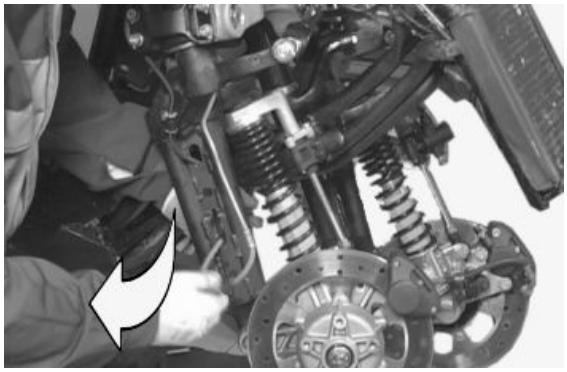
Remove the hydraulic pipe fitting fixing nuts indicated in the figure from the support bracket.

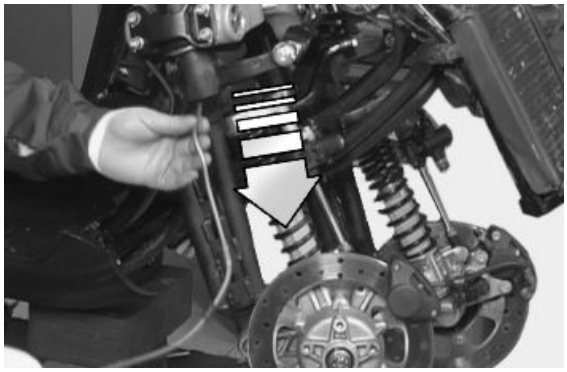


Remove the suspension roll lock device pipes from the headstock.

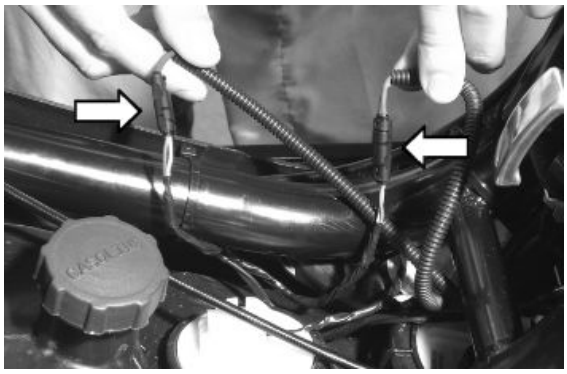


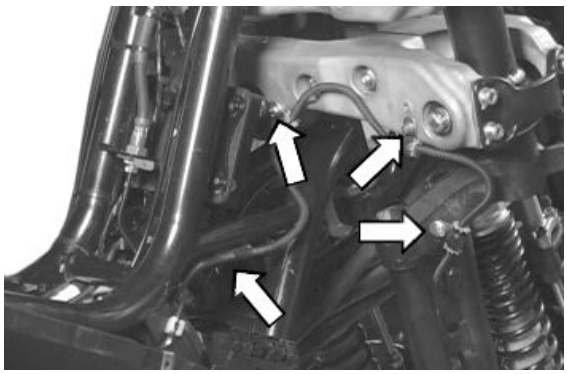
Remove first the flexible part of the calliper from the steering tube as shown in the picture, and then remove the rigid part.





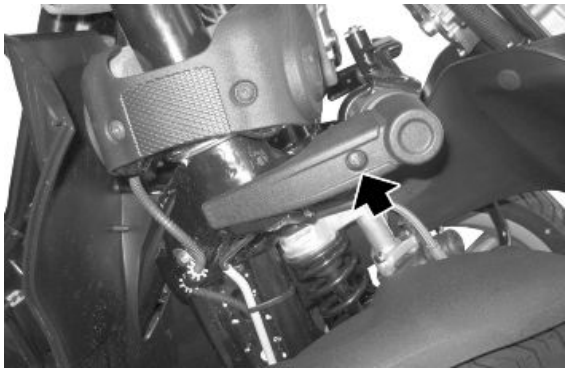
Remove the tone wheel wiring by disconnecting the connector on the fuel tank after removing the chassis central cover.
After that, remove the retainers indicated in the figure.

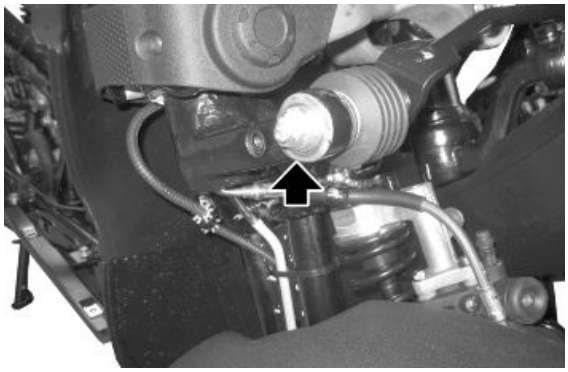




Remove the plastic protection.

Remove the constant-velocity universal joint from the steering bar by undoing the nut indicated in the picture.

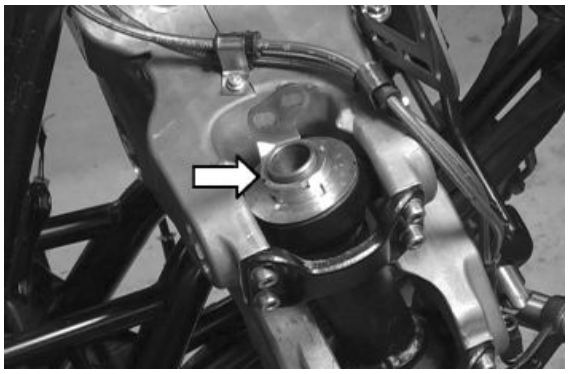




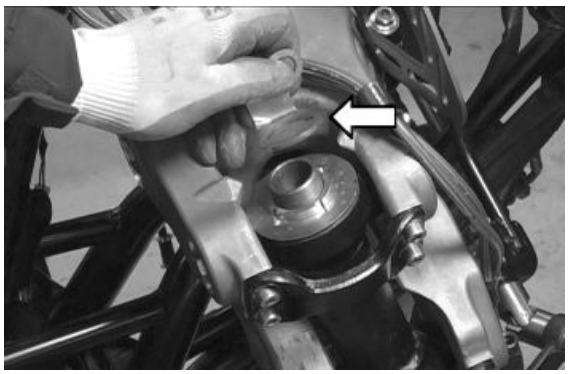
Use a specific tool to remove the upper tightening ring nut of the steering tube.

Specific tooling

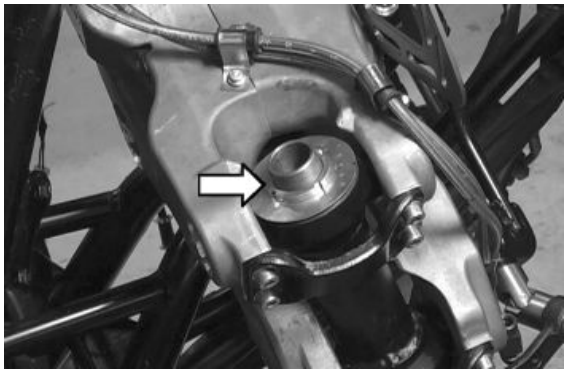
020055Y Wrench for steering tube ring nut

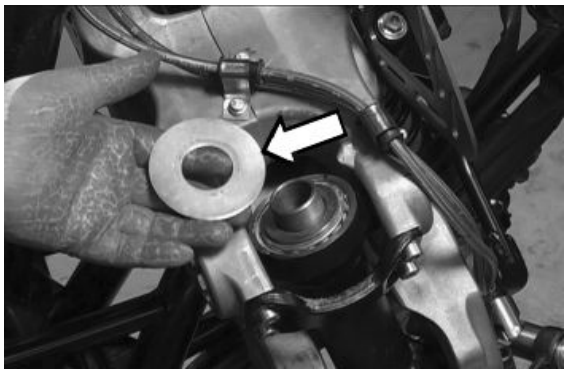


Remove the hydraulic pipe support bracket.



Remove the steering tube lower ring nut and the protection cap indicated in the picture.



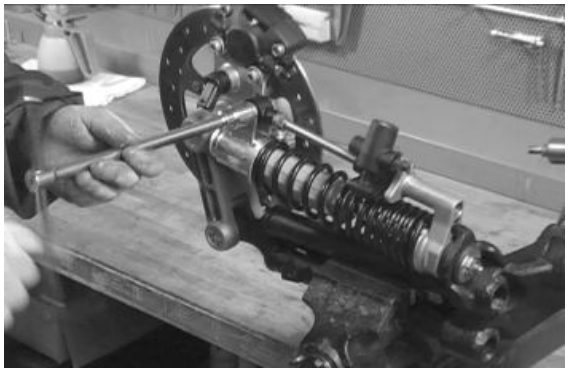


Now the steering tube can be removed.

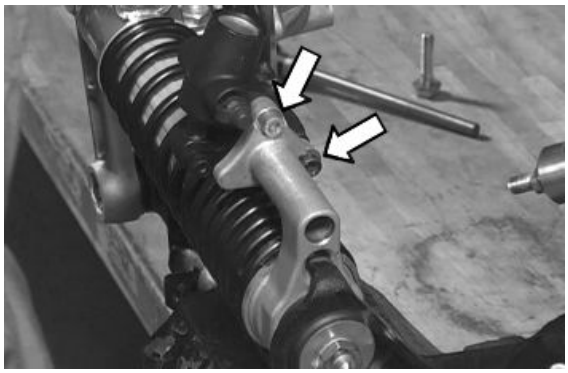
Check that the roller tapered bearing does not show signs of abnormal wear. If it does, replace it.

THE OPERATIONS DESCRIBED BELOW CAN ALSO BE CARRIED OUT EVEN WHEN THE SUSPENSION IS FITTED

Remove the lower retainer of the sliding stem shown in the picture.

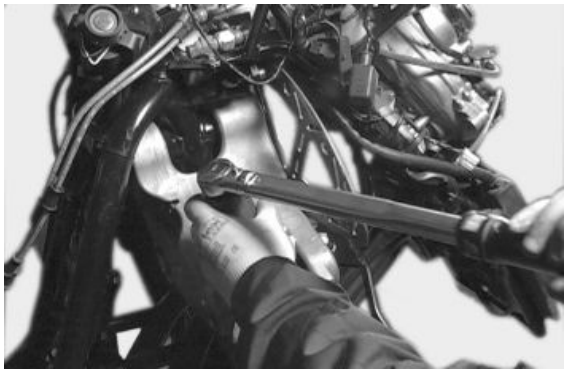


Remove the sliding stem locking device retainers indicated in the picture.



Check that the sliding stem locking device does not show signs of abnormal wear.

For refitting, follow the operations for removal but in reverse order, observing the prescribed torque and greasing the bearings and their seats.



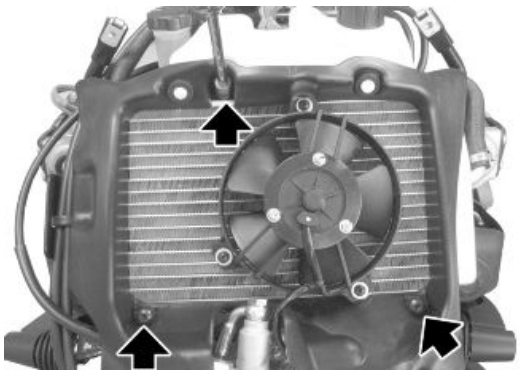
STEERING TUBES

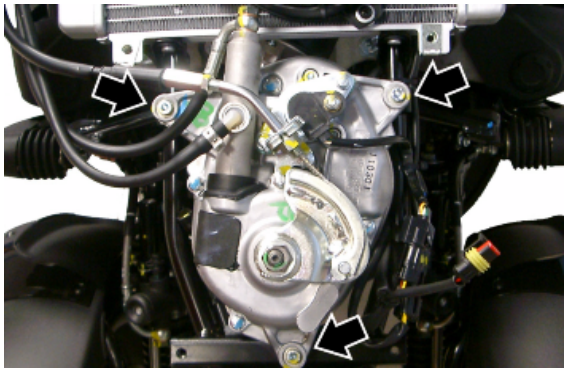
Name	Torque in Nm
Side headstock upper ring nut	20 - 24
Side headstock lower ring nut	12 ÷ 15
Screw fixing sliding stem to shock absorber	45 to 50
Clamp for sliding stem locking device	6.5 - 10.5
Fixing nuts for constant-velocity universal joints	18 - 20

Parallelogram device

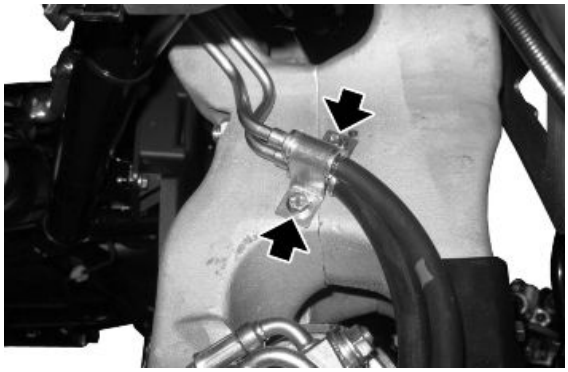
Remove the steering tubes.

To facilitate the disassembly operations of the brake disc sector, remove the radiator air duct, by taking out the 3 screws indicated and loosening the 3 fixing screws in the hydraulic electro-actuator indicated in the picture.

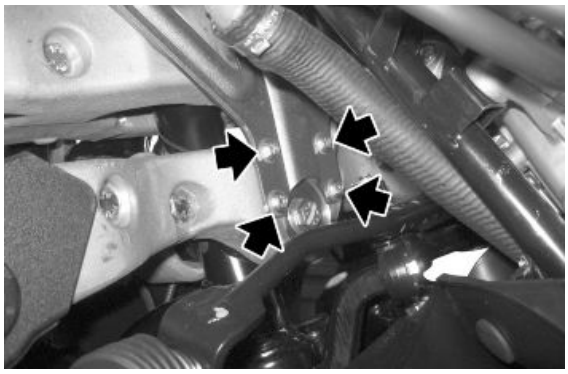




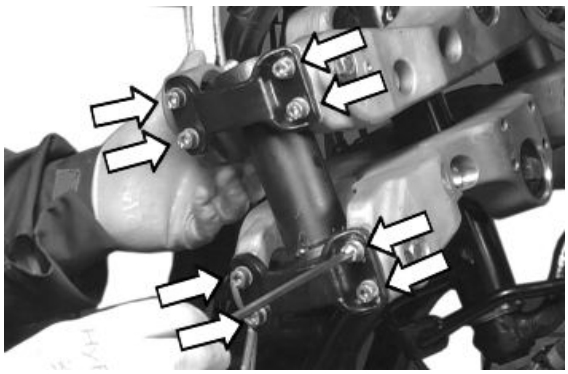
Remove the hydraulic pipe retainers from the parallelogram.



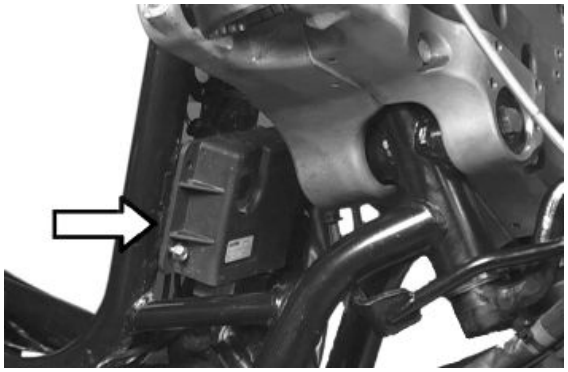
Remove the 4 screws fixing the tilt brake disc sector indicated in the picture.



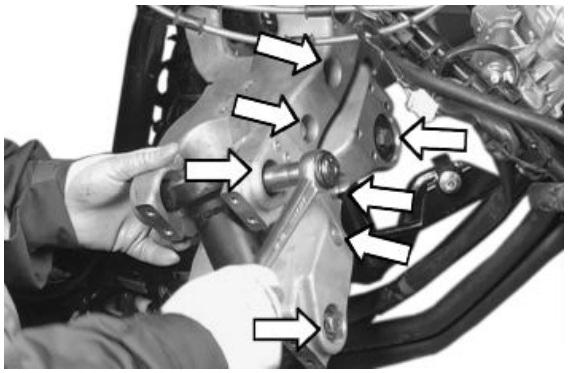
Remove the retainers indicated in picture of the half-arms joint flange.



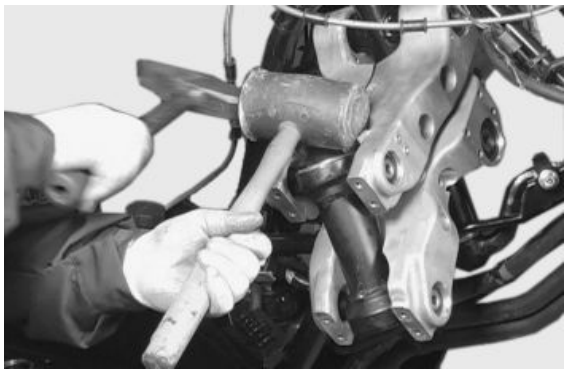
To facilitate the operations indicated below, remove the suspension locking electronic control unit indicated in the picture.

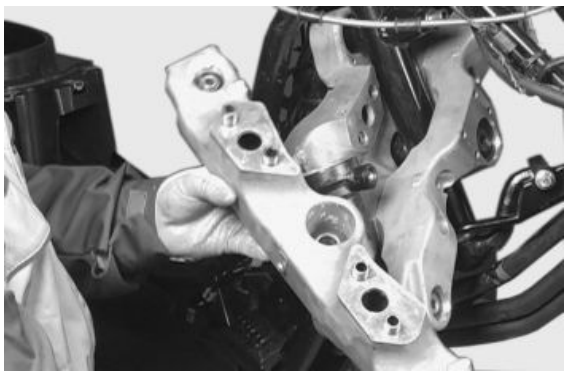


Remove the arm coupling retainers from the parallelogram by loosening the retainers indicated. For easy refitting operations, remember to take note of the positions of the components.



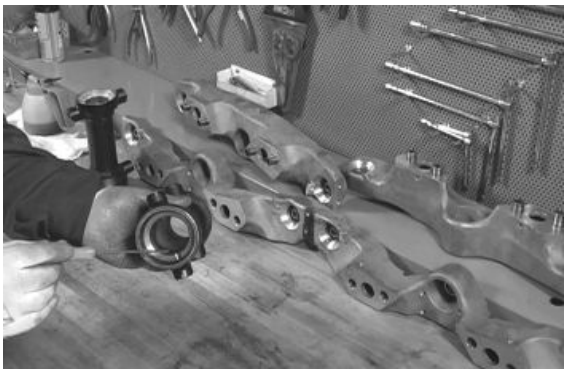
Separate the half-arms by hitting slightly with a wooden mallet where possible alternately to the left and right side of the parallelogram.





Remove the headstocks.

Carry out a visual check of the upper and lower bearings on the headstocks and their seats. Replace them in case of signs of abnormal wear.



Check the ball bearings on the parallelogram arms. Replace them in case of signs of abnormal wear.

Check the inside tracks of the parallelogram bearings on the chassis.

For refitting, follow the operations for removal but in reverse order, lubricating the reference dowels on the parallelogram half-arms and observing the prescribed torque.

PARALLELOGRAM DEVICE

Name	Torque in Nm
Arm coupling screws	45 to 50
Screws fixing arms to side headstocks	45 to 50
Screws fixing arms to central headstock	45 to 50
Screws fixing the half-arm coupling flange	20 to 25
Screws fixing roll lock disc section	20 to 25

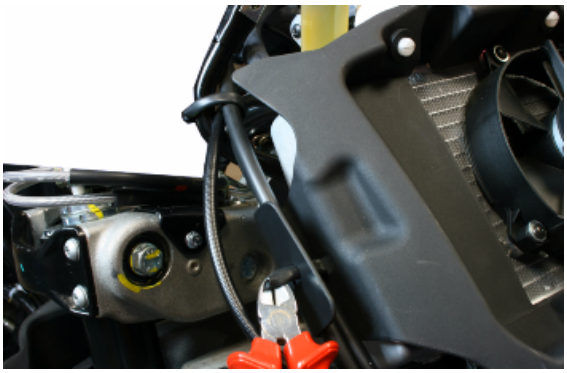
Geared motor and Suspension locking system

PARKING SYSTEM BOX REMOVAL

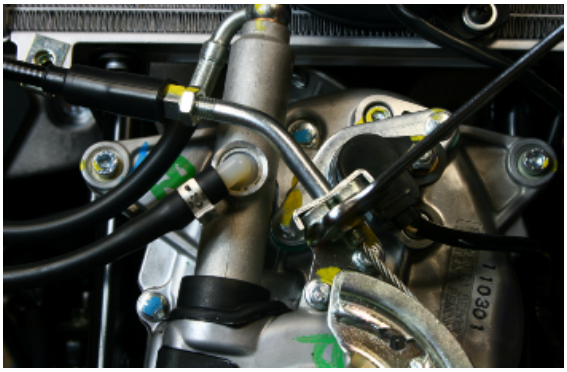
Remove the clamps.

N.B.

THE PROTECTIVE PIPES AROUND THE CLAMPS HAVE A GUIDING FUNCTION, FOR KEEPING AND USING DURING ASSEMBLY.



After verifying that the parking system is unlocked, loosen the adjuster screw of the mechanical caliper and remove the transmission from the device.



Make sure that the parking brake liquid tank tube is properly closed, then unscrew the fixing screw to the chassis.

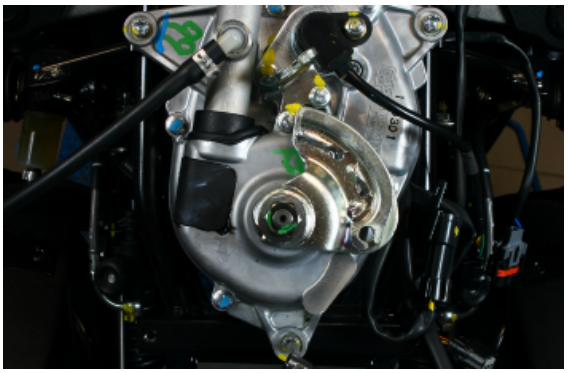
Detach from the fixing clamps.
Disconnect the potentiometer.
Disconnect the connector of the gear motor and detach from the support plate.

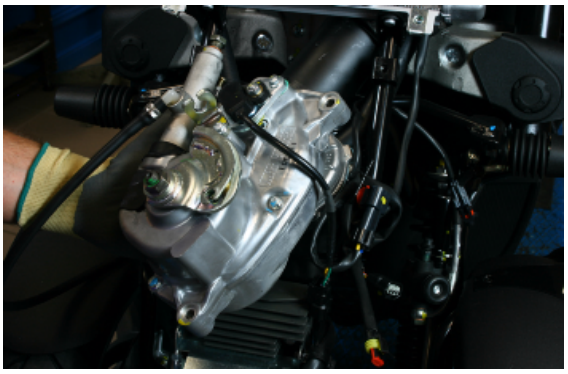
Unscrew the fixing screw of the piping, taking care that the brake fluid does not leak.

CAUTION

ELIMINATE ANY REMAINING BRAKE FLUID SPILLS.

Unscrew the three fixing screws of the parking box from the chassis and remove the box complete with the brake liquid tank piping.

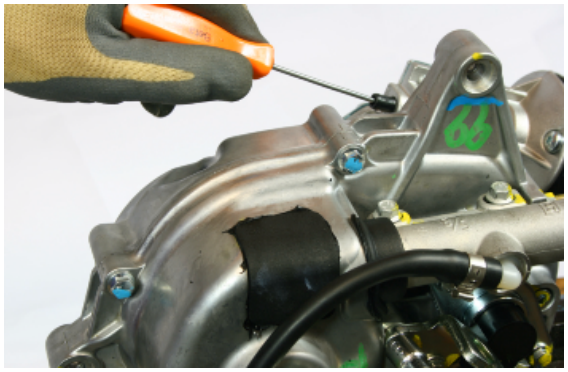




PARKING SYSTEM BOX DISASSEMBLY

With the bench box, remove the protection cover of the gear motor.

Turn the gear motor counterclockwise to allow the insertion of the wrench onto the screw as shown in figure.



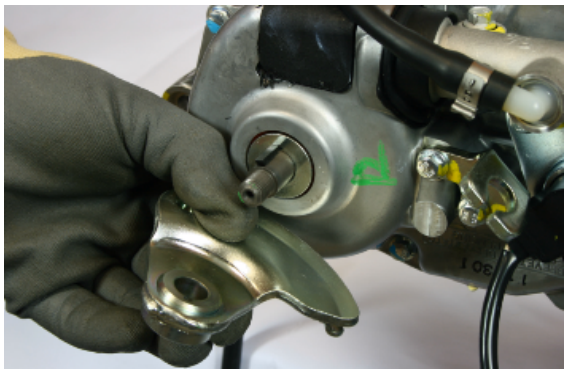
Holding the stop function wrench of the anchor bracket of the brake hose transmission, unscrew the fixing nut.

N.B.

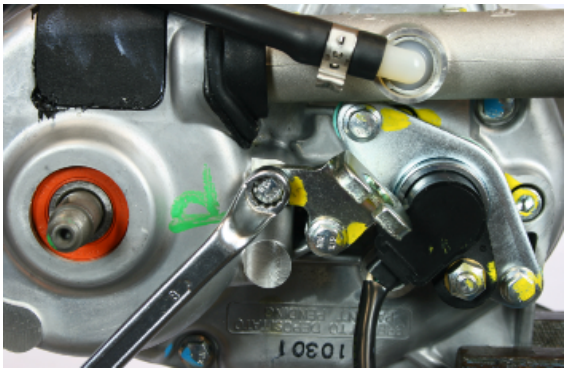
THE FAILURE TO RESPECT THE PROCEDURE MAY LEAD TO POSSIBLE SEVERE BREAKAGES WITHIN THE PARKING BOX.

Remove the anchor bracket of the brake hose transmission and recover the tongues.

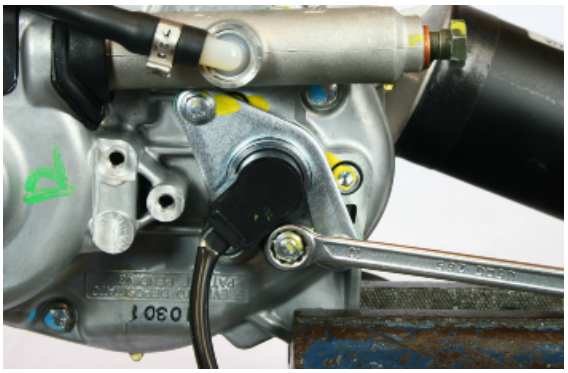
Recover the washer with an edge on the side of the bearing.

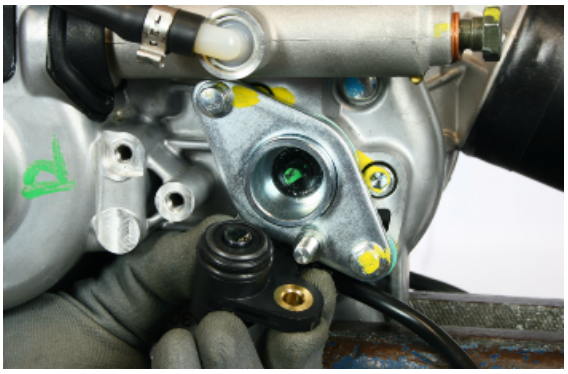


Unscrew the two screws of the control cable support bracket.

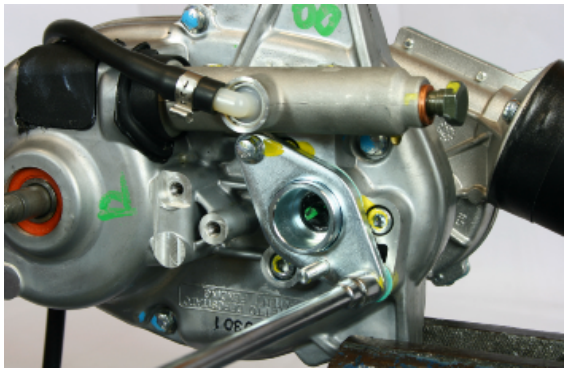


Unscrew the fixing nut of the potentiometer and recover the potentiometer complete with O-ring. Pay attention to the spacer.

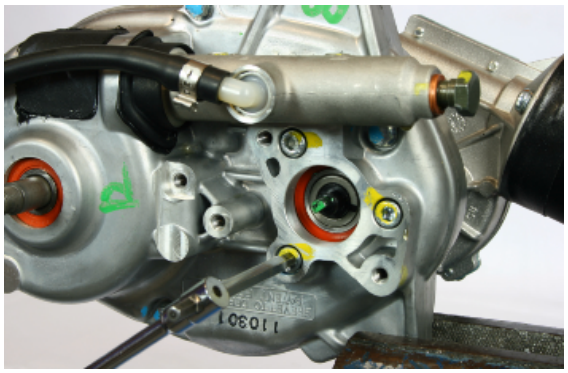


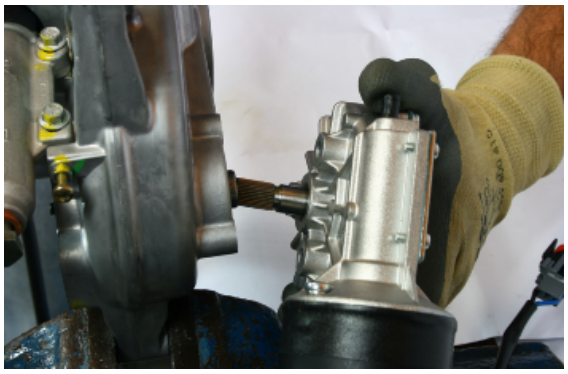


Unscrew the screws and remove the bracket with gasket paper and internal sealing ring, paying attention to the assembly.



Unscrew the three fixing screws of the gear motor, recovering the washers and remove the gear motor from the box.



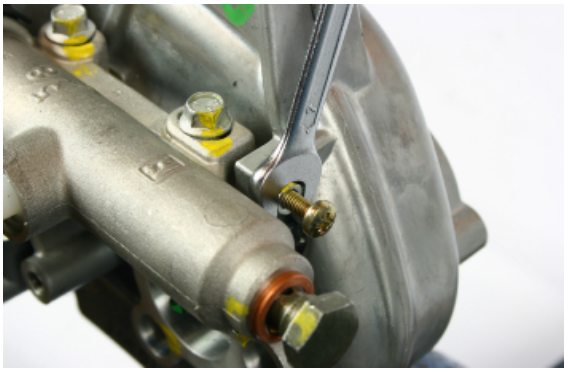


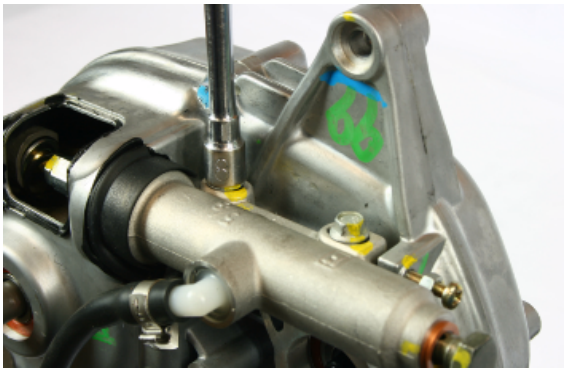
Remove the inspection cover of the control pump and remove the seeger ring of the control pump strut.

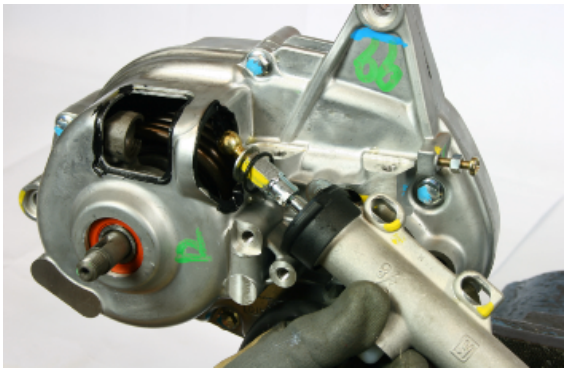
Loosen the lock nut and the control pump stop screw.

Unscrew the fixing screws of the control pump.

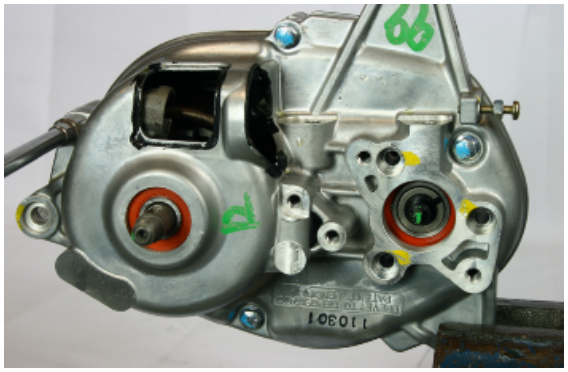
Turn and remove the control pump with gasket.





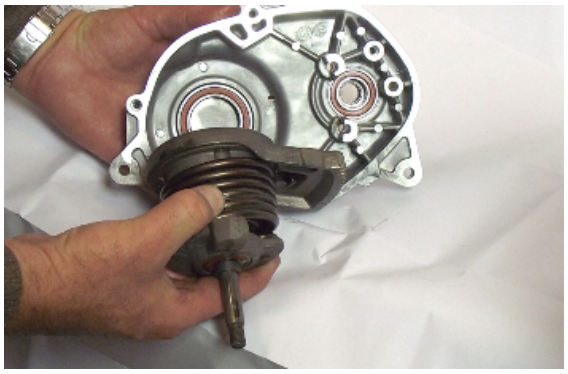


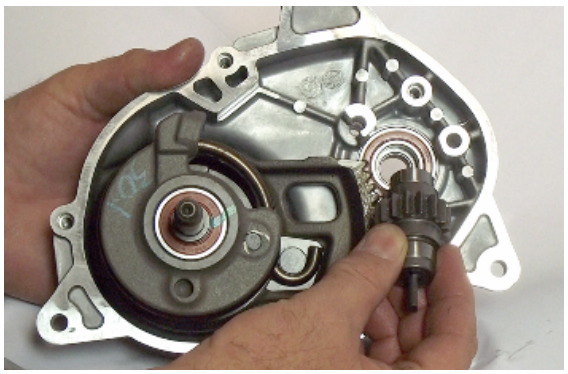
Unscrew the three fixing crews of the upper cover of the parking box.



Using a rubber mallet, disassemble two crankcase halves.

Remove the pinion and selector from their seat.





Remove the retaining Seeger ring of the bearing of the flexible transmission lever control shaft bearing.

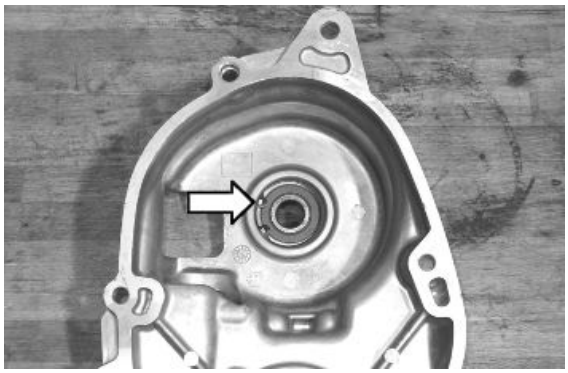
Remove the bearing with the specific tool.

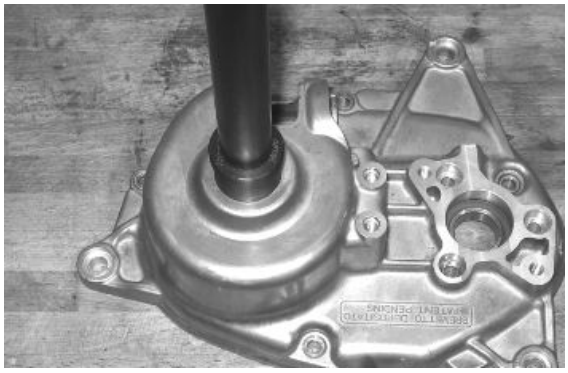
Specific tooling

020376Y Adaptor handle

020441Y 26 x 28 mm adaptor

020362Y 12 mm guide





Extract the electric motor bearing with the specific tool.

Specific tooling

020376Y Adaptor handle

020375Y 28 x 30 mm adaptor

020363Y 20-mm guide

Hold the crankcase in a perfectly horizontal position, heat it with a heat gun at about 120 °C, use the specific tool to fit the bearing of the flexible transmission lever control shaft. Hit slightly with a mallet if necessary.

Refit the bearing check Seeger ring.

Specific tooling

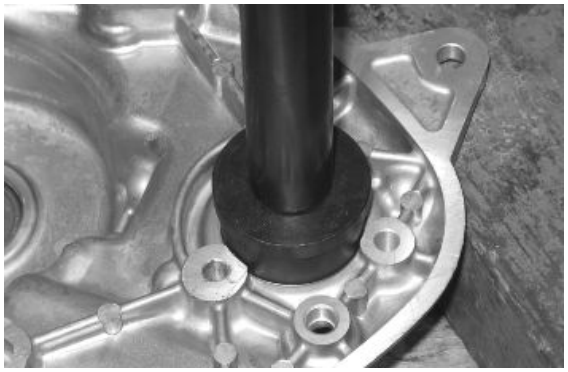
020151Y Air heater

020376Y Adaptor handle

020362Y 12 mm guide

020357Y 32 x 35-mm Adaptor

Hold the crankcase in a perfectly horizontal position, heat it with a heat gun at about 120 °C, use the specific tool to fit the bearing of the electric motor. Hit slightly with a mallet if necessary.



Specific tooling

020363Y 20-mm guide

020358Y 37x40-mm Adaptor

020151Y Air heater

020376Y Adaptor handle

Remove the spring/toothed sector unit from its fitting, slightly hit with a mallet if necessary to release the unit.

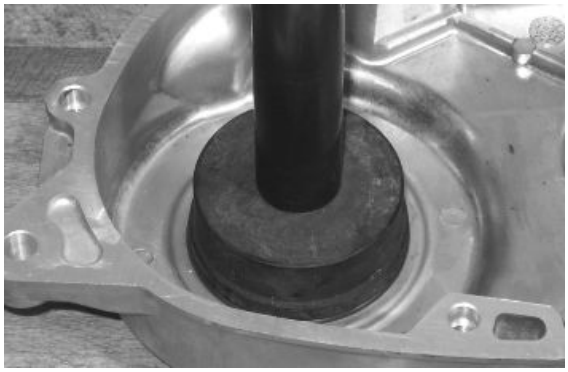
Extract the bearing of the spring/toothed sector unit with the specific tool.

Specific tooling

001467Y002 Driver for OD 73 mm bearing

Extract the bearing of the electric motor with the specific tool.

Hold the crankcase in a perfectly horizontal position, heat it with a heat gun at about 120 °C, use the specific tool to fit the bearing of the spring/ toothed sector unit. Hit slightly with a mallet if necessary.



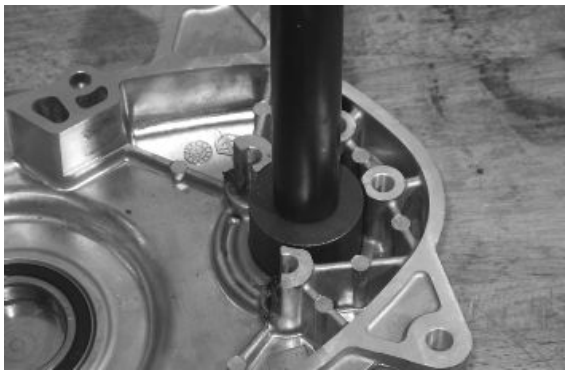
Specific tooling

020360Y 52 x 55-mm Adaptor

020151Y Air heater

020376Y Adaptor handle

Hold the crankcase in a perfectly horizontal position, heat it with a heat gun at about 120 °C, use the specific tool to fit the bearing of the electric motor. Hit slightly with a mallet if necessary.



Specific tooling

020363Y 20-mm guide

020151Y Air heater

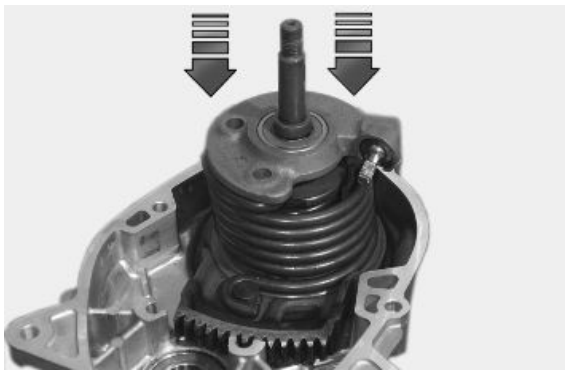
020376Y Adaptor handle

020477Y 37 mm adaptor

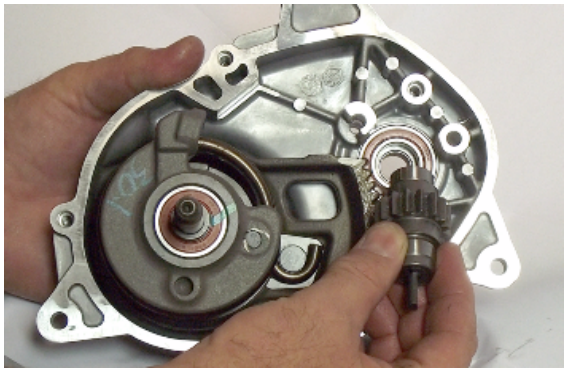
Check the correct positioning of the centring dowels on the crankcase halves

PUMP SEALING AND BOX ASSEMBLY

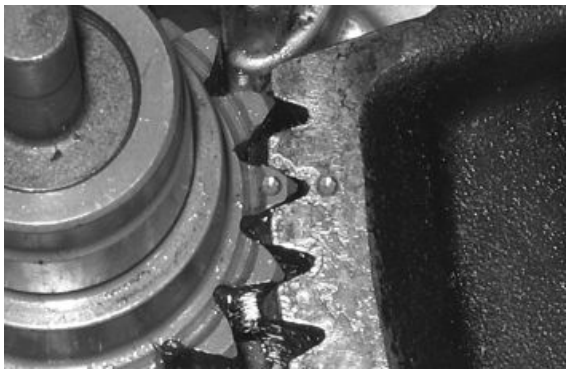
Insert the selector in its seat.



Insert the pinion in its seat.



Check that the timing is respected by check the alignment of the references made on the components as shown in figure.

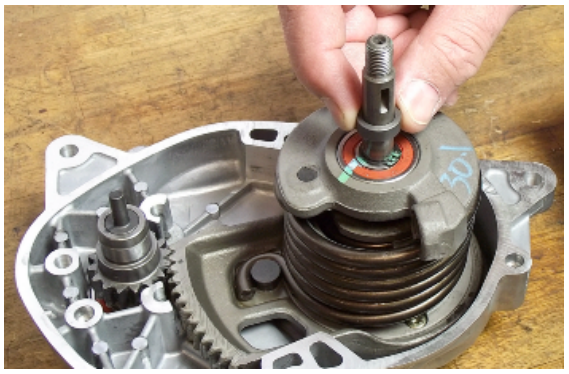


Check that the spacer ring on the selector shaft is positioned correctly. Clean the parts and grease the couplings with the recommended product.

Recommended products

MONTBLANC MOLYBDENUM GREASE MONTBLANC MOLYBDENUM GREASE

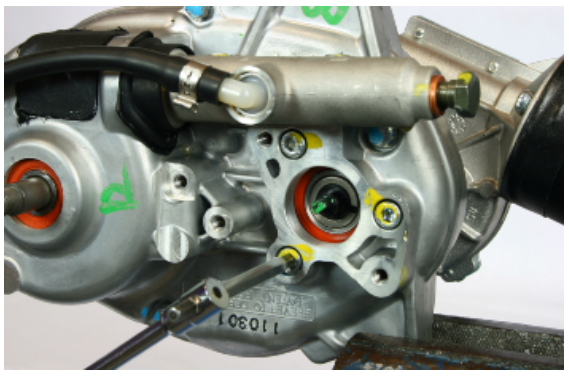
Grease with molybdenum disulphide

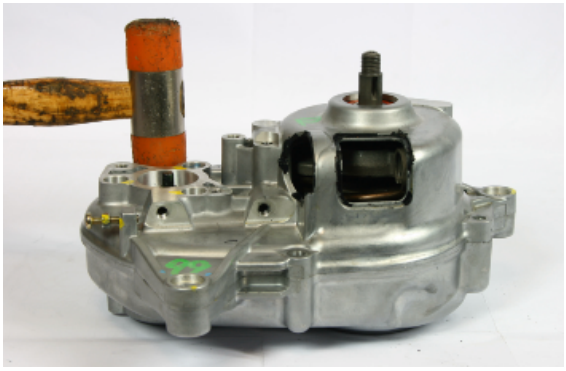


Match the crankcase halves using a rubber hammer. Tighten the crankcase coupling screws to the prescribed torque.

Locking torques (N*m)

Gear motor crankcase halves coupling screws **11 to 13**



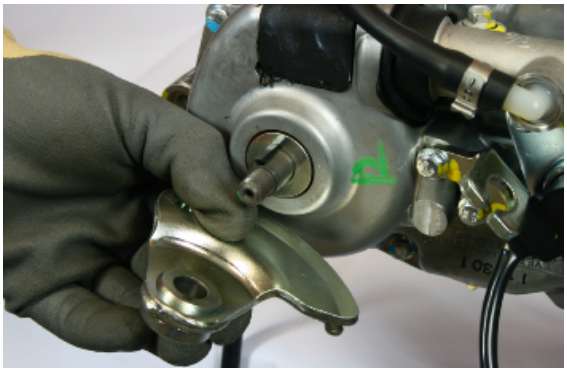


Insert the washer with the edge facing towards the bearing.

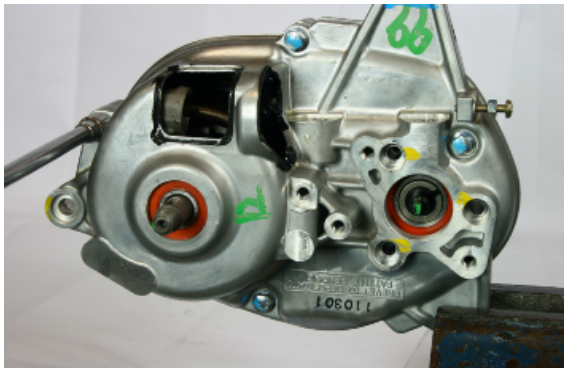
Insert the key and the brake caliper command sector and tighten with the fixing nut to the prescribed torque.

Locking torques (N*m)

Dado **40÷44**



Lightly turning the support bracket, position the brake caliper command sector near the lower stop and insert it from the part opposite the gear motor, aligning the fixing holes.
Insert the screws complete with washers and tighten to the prescribed torque.



Recommended products

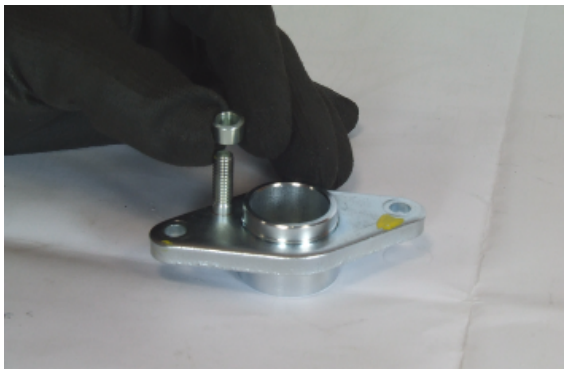
Loctite 243 Medium-strength threadlock

Medium Loctite 243 threadlock

Locking torques (N*m)

Electric motor coupling screws 6 - 7

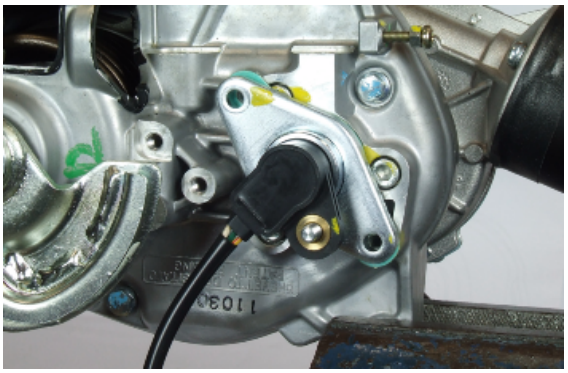
Insert the spacer onto the stud bolt and then insert the potentiometer complete with O-ring on the support bracket.



Insert a new gasket onto the support and taking care not to damage the movement sensor, insert the support complete with potentiometer.

N.B.

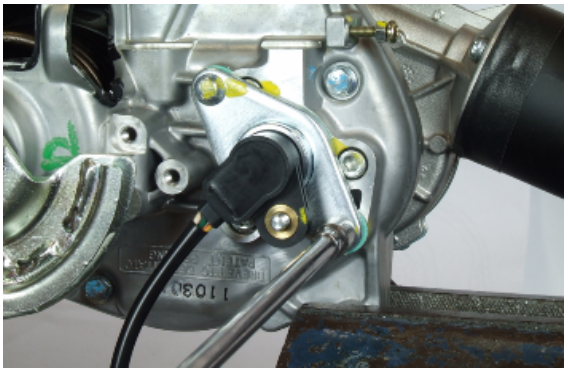
EXCESSIVE THRUST MAY CAUSE BREAKAGE OF THE MOVEMENT SENSOR AXLE RETAINER.
WITHIN THE SUPPORT THERE IS A SEALING RING, MAKE SURE THAT THE SEAL LIP IS FACING THE POTENTIOMETER.

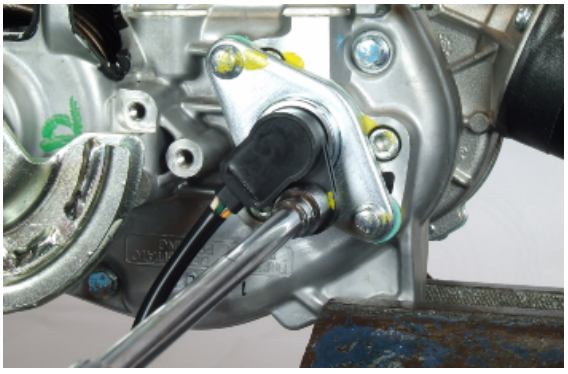


Tighten the fixing screws gear motor support and then the fixing nut of the potentiometer to the mounting, respecting the prescribed torque.

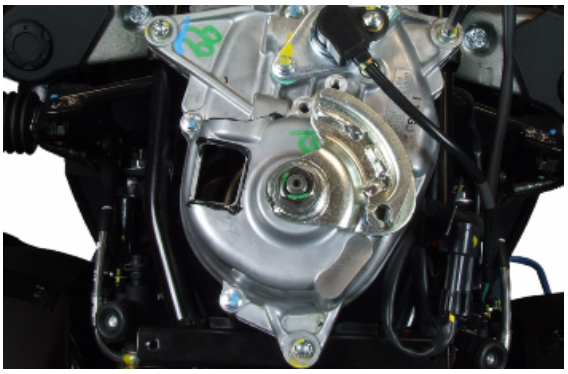
Locking torques (N*m)

Sensor fixing nut **5 - 7** **Support plate coupling screws** **8 ÷ 10**





Position the gear motor on the chassis and tighten the three screws and washers.



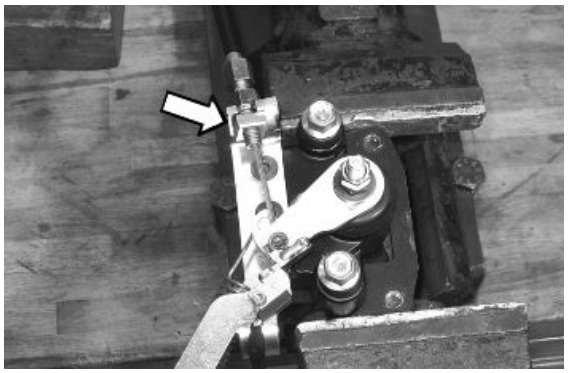
Posizionare i connettori potenziometro e mororiduttore sui supporti come indicato in figurqa e fissare i cablaggi con delle fascette.

Successivamente procedere all'azzeramento del sistema di stazionamento. Collegare il Navigator alla presa di diagnosi del veicolo e predisporre il pc.

Remove the two bracket screws after releasing the spring and freeing the flexible transmission adjustment.

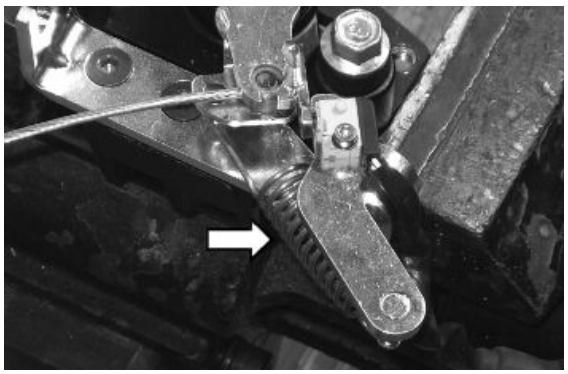
It is very important to remove the flexible transmission from its fitting only for replacement.

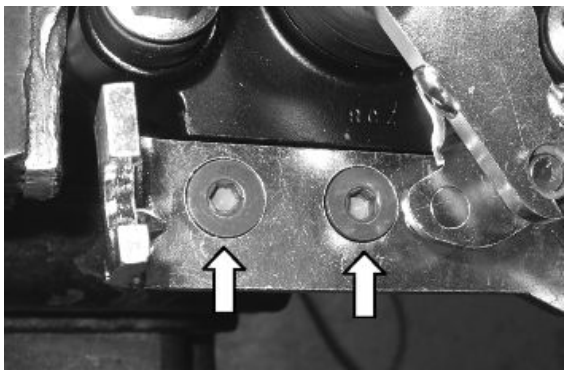
When refitting, tighten the two bracket screws and the flexible transmission lever nut to the prescribed torque.



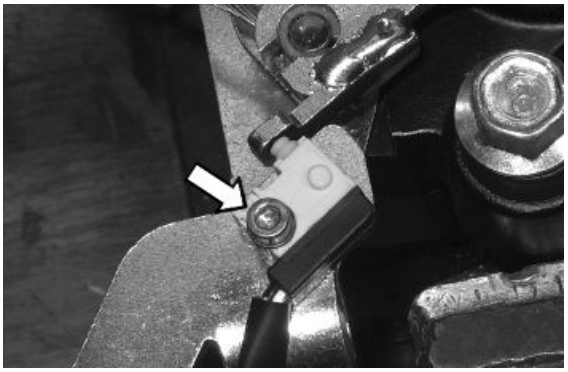
Locking torques (N*m)

Bracket tightening screws **8 to 12**

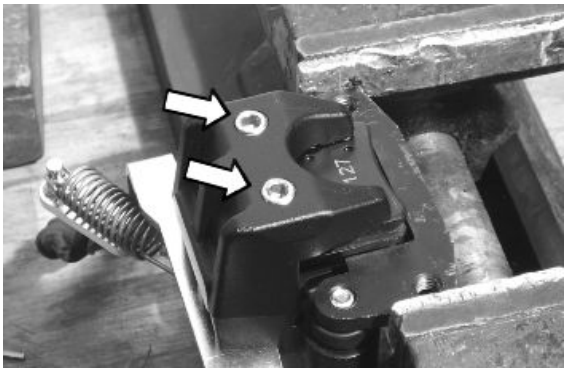


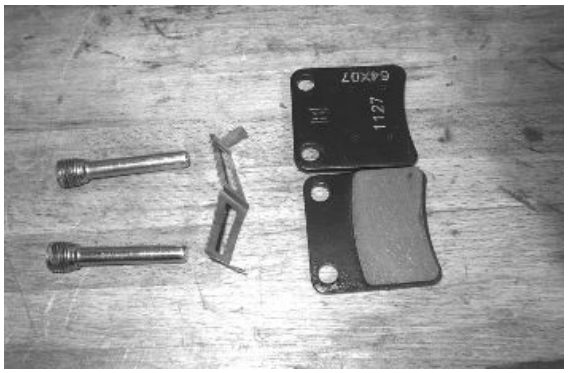


Undo the Allen screw and remove the switch.
Upon refitting, place the switch with the button oriented to the stop indicated on the calliper lever, observing the reference indicated on the switch supporting bracket.
After refitting, check in detail that the switch is regularly activated by the stop on the lever.



Undo the two pad pin screws; remove the pads with the spring.
Upon refitting, tighten the two screws to the prescribed torque and use threadlock.
Upon refitting, adjust the cable properly so that the switch is pushed when the system is unlocked.





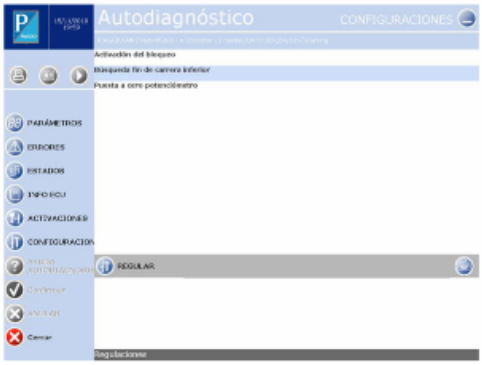
SYSTEM RESET

Set to «**ON**»,

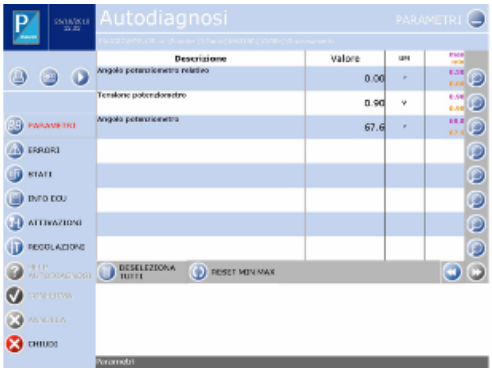
Select the «**PARKING** diagnosis»:

Enter into «**ADJUSTMENTS - LOWER STOP SEARCH** » click on «**ADJUST**» and «**CONFIRM**».

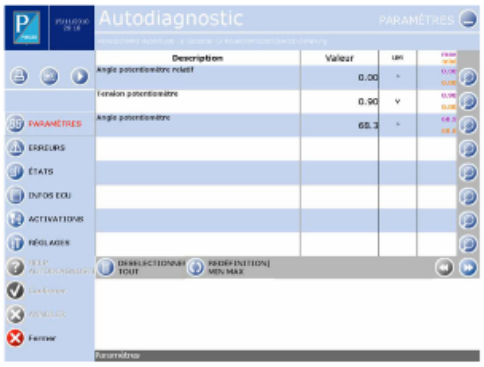
Seguono le schermate in lingua Francese, Tedesco, Spagnolo e Inglese.



- Exit from and then re-enter the diagnosis.
- Enter into «**PARAMETERS**» and set-up a screen page with:
    - Relative potentiometer angle
    - Potentiometer angle
    - Potentiometer tensioning

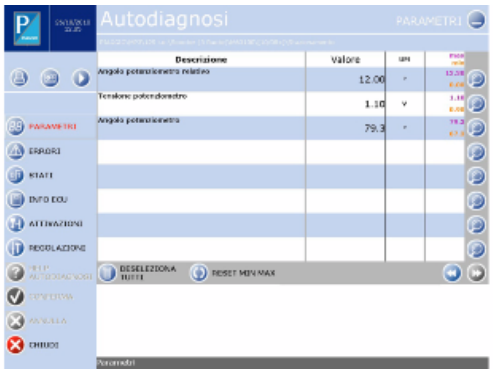


Seguono le schermate in lingua Francese, Tedesco, Spagnolo e Inglese.



With a screwdriver, turn counterclockwise to re-create the relative 12° adjustment position of the potentiometer.

When the adjustment is complete, insert the cover.



Seguono le schermate in lingua Francese, Tedesco, Spagnolo e Inglese.

When the silicone gasket residues are removed, apply sealant to the pump body and gasket, grease the ball before inserting the pump.

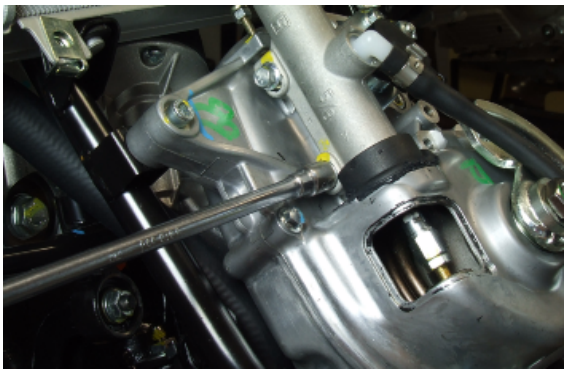
Recommended products

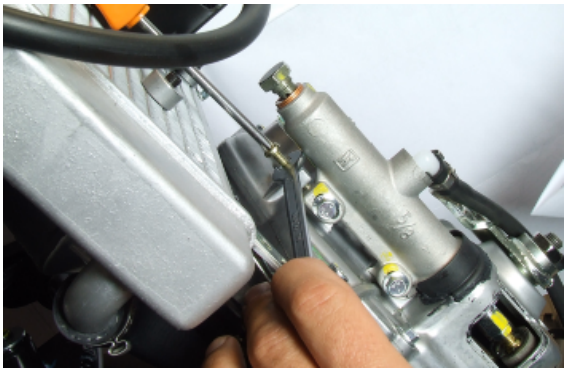
MONTBLANC MOLYBDENUM GREASE MONTBLANC MOLYBDENUM GREASE

Grease with molybdenum disulphide

Position the pump on the gear motor, bringing the ball into contact with the stop, pushing the pump body to the end of stroke. Tighten the screws into the described position

Disengage the fan rotating it to allow the screwdriver access, tighten the stop screw until it is in contact with the pump and lock the lock nut.





Locking torques (N*m)

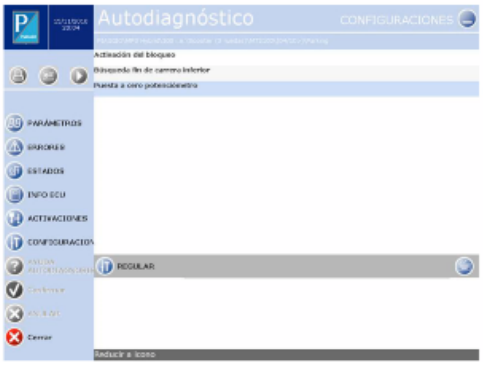
Gear motor hydraulic pump tightening screws **11 to 13**

Fit the seeger ring in its seat.

Select the «**PARKING**diagnosis».

Reset the potentiometer using the «**ADJUSTMENT - POTENTIOMETER RESET**» function and follow the procedure with the two confirmation requests.

Seguono le schermate in lingua Francese, Tedesco, Spagnolo e Inglese.

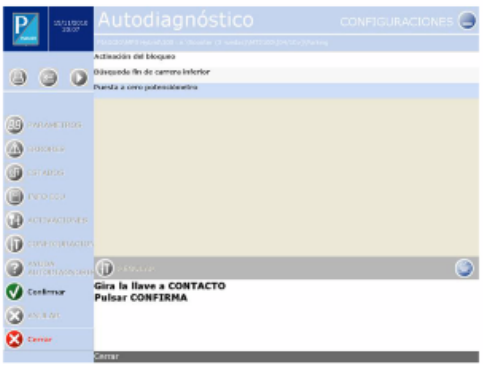


Commutare su «**OFF**» e cliccare su «**CONFERMA**»

Seguono le schermate in lingua Francese, Tedesco, Spagnolo e Inglese.

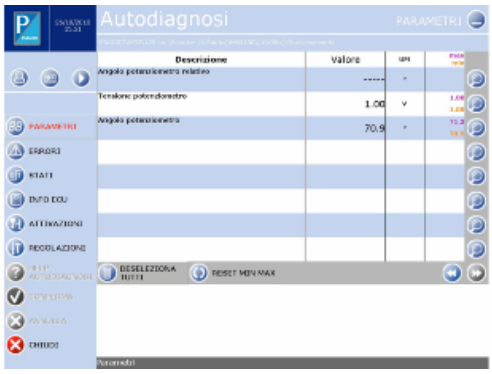
Communtare su «**ON**» cliccare su «**CONFERMA**».

Seguono le schermate in lingua Francese, Tedesco, Spagnolo e Inglese.

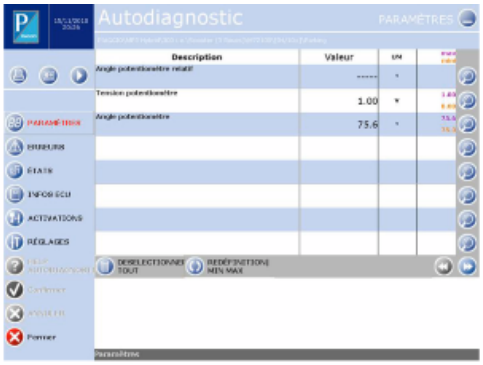


Verificare la situazione a fine procedura di regolazione:

- Angolo potenziometro relativo
- Angolo potenziometro
- Tensione potenziometro

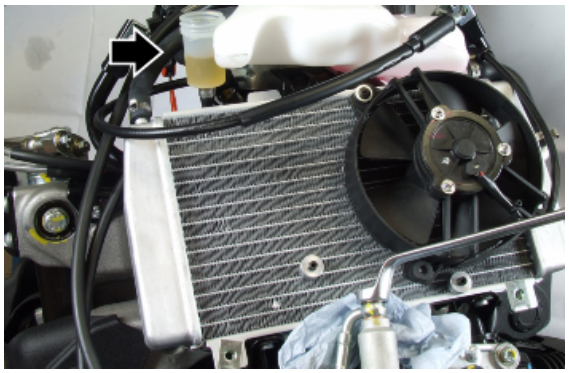


Seguono le schermate in lingua Francese, Tedesco, Spagnolo e Inglese.

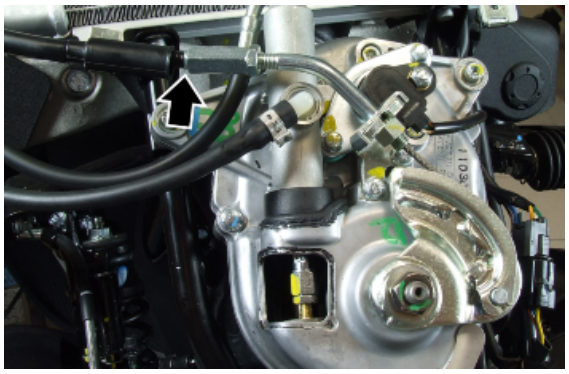


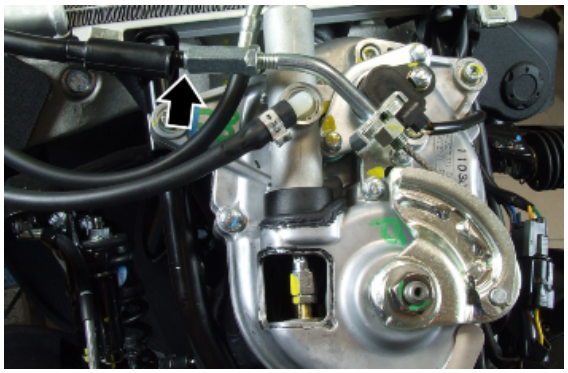
CONNECTION AND BLEEDING OF THE HYDRAULIC CIRCUIT

- Protect the pump retainer with the crankcase to avoid mating with the brake fluid and assembly the joint without tightening it.
- Position the brake fluid tank, letting the air bubbles escape from the tube.
- Unscrew the tank cover, allowing the brake fluid tank to fill the pump by gravity.
- Tighten as it exits the brake fluid.



- Screw the support bracket of the brake control hose transmission.
- Connect the command cable, by screwing the nut and adjusting the 1 - 2 mm clearance to the non-parked system.

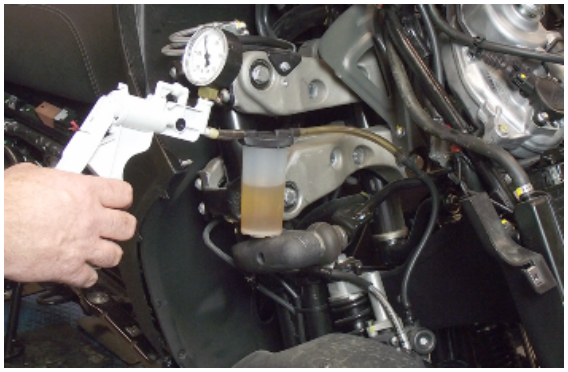




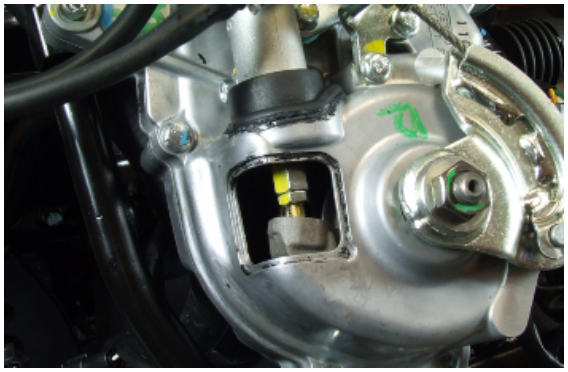
Fill the mity-vac pump tank with brake fluid, connect it to the shock absorber calliper.

Lock the suspension and open the bleed screw, repeat until the air in the tube is absent.

UPON ACTIVATION OF THE LOCK, PRESSURE LOWER THAN 25 BAR WILL LEAD TO 5 BEEPS OF THE HORN, TO SWITCH IN OFF.



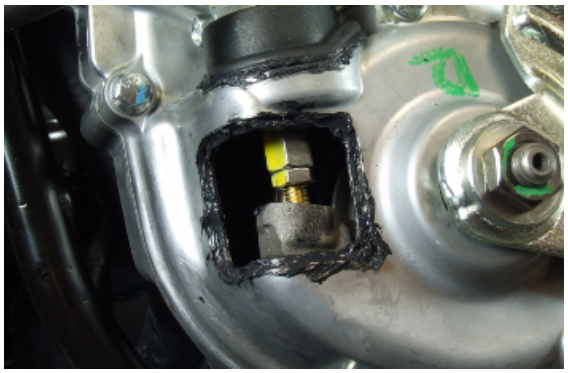
Activate the lock and check that the horn does not beep to show that the pressure within the circuit has been restored. Verify that the control pump has a short stroke as shown in photo.



Once the operations are complete, position the electric fan.

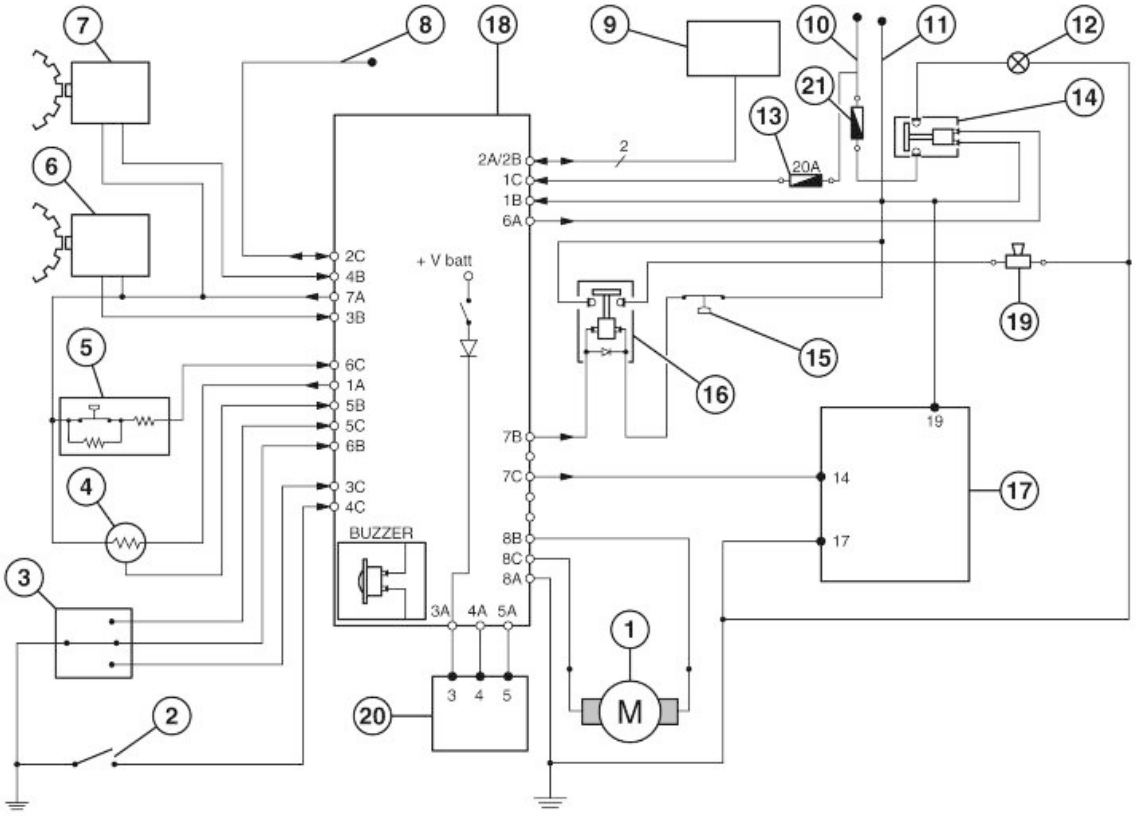
SIGILLATURA TAPPO VANO ISPEZIONE

Stendere il sigillante sulla sede del tappo del vano di ispezione e posizionare il tappo.



Electrical devices test

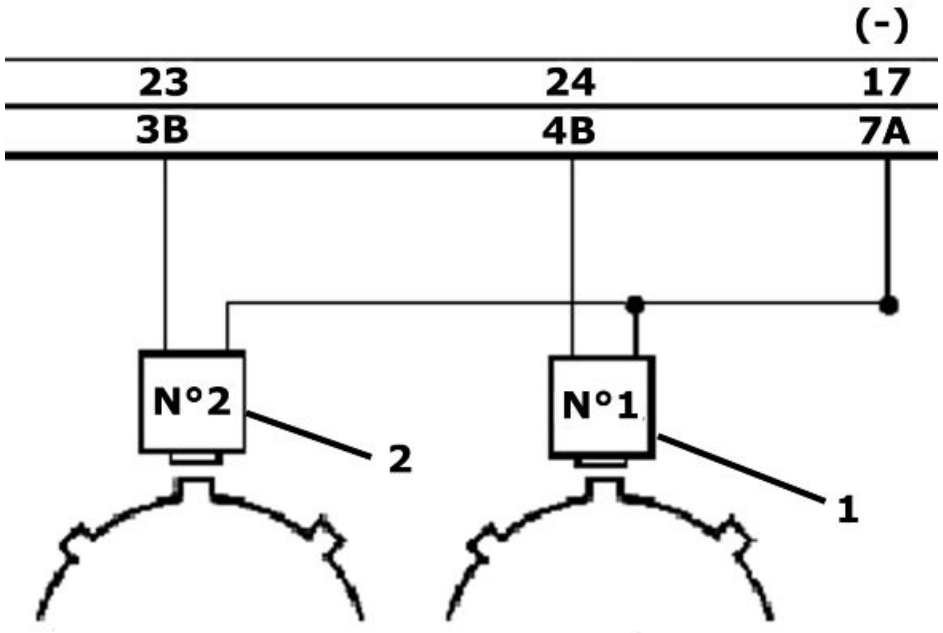
BASIC CIRCUIT DIAGRAM FOR ROLL LOCK ELECTRICAL SYSTEM



1. GEAR MOTOR
2. ROLL LOCK CALLIPER SWITCH
3. ROLL UNLOCK-LOCK CONTROL SWITCH
4. POTENTIOMETER
5. RIDER DETECTION SENSOR
6. LEFT SPEED SENSOR
7. RIGHT SPEED SENSOR
8. DIAGNOSTIC TESTER SERIAL LINE

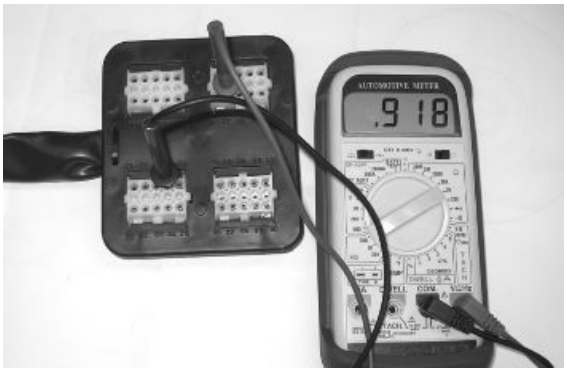
9. ENGINE CONTROL UNIT
10.+ DIRECT BATTERY
11.+ LIVE BATTERY
12.LOW BEAM LIGHT
13.FUSE No. 3, 20A
14.LOW BEAM LIGHT REMOTE CONTROL
15.PRESSURE SWITCH
16.HORN SOLENOID
17.INSTRUMENT PANEL
18.ROLL LOCK SYSTEM CONTROL UNIT
19.HORN
20.WARNING LIGHT UNIT
21.FUSE No. 4, 10A

TONE WHEEL SENSOR

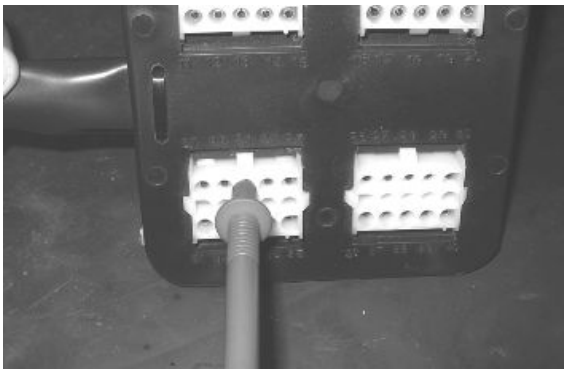


1: Right tone wheel
2: Left tone wheel

With the interface wiring disconnected from the parking electrical control unit and connected to the system, check that the sensor resistance between pins 23 - 17 and 24 - 17 is between 774 and 946 Ohm at approximately 20°

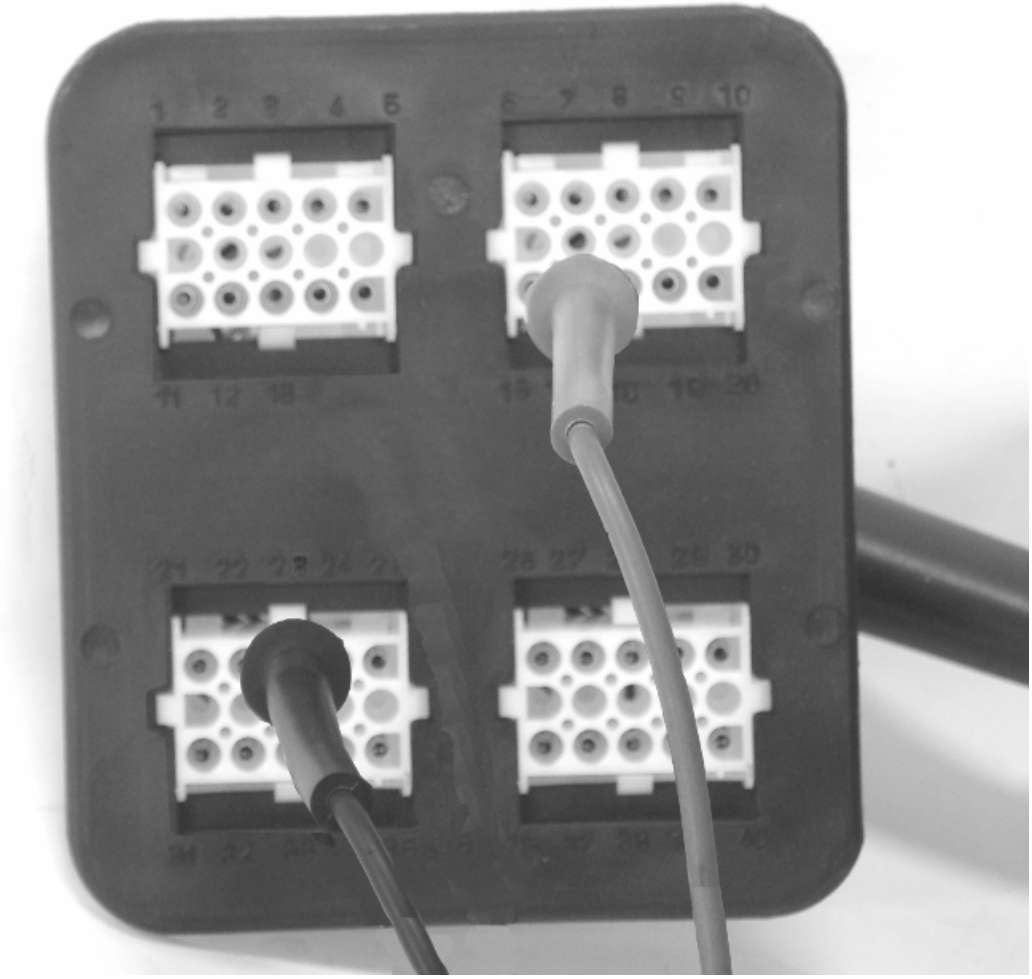


With the interface wiring disconnected from the control unit, check the continuity between pin 23 and the red cable of the LEFT wheel turning sensor connector; between pin 17 and the brown cables of the LEFT wheel speed sensor and brown cable of the RIGHT sensor; between pin 24 and the red cable of the RIGHT wheel speed sensor

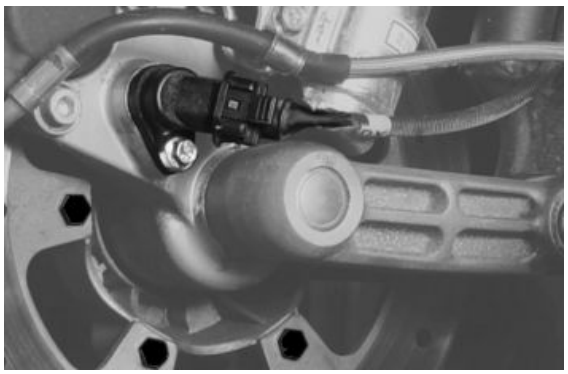


In case of failures, check the continuity between pin 23 and the connector green cable on the fuel tank after removing the chassis central cover; between pin 17 and the yellow cables on both connectors; between pin 24 and the red cable on the connector.

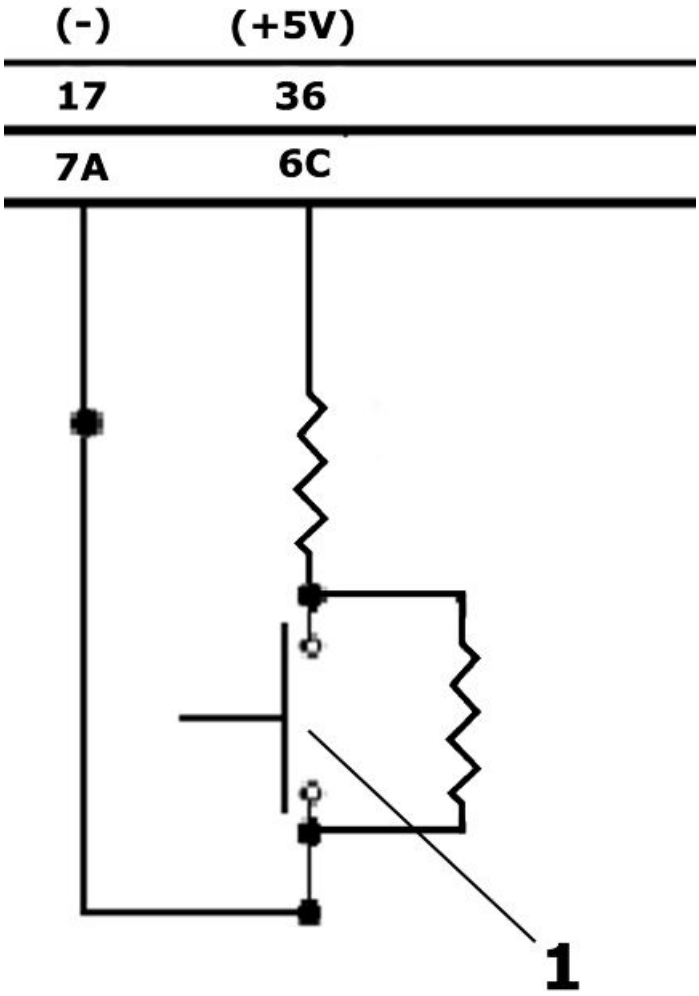
With the interface wiring disconnected from the control unit and the connectors disconnected from wheel turning sensors, check that pin 23 - 17 and 24 - 17 are insulated from each other and from ground.



With a feeler gauge, check that the air gap between the screw head and the sensor is between 0.35 and 1 mm



RIDER DETECTION SENSOR

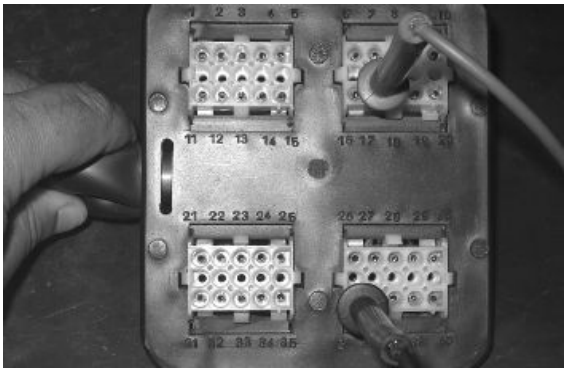


1: RIDER DETECTION SENSOR

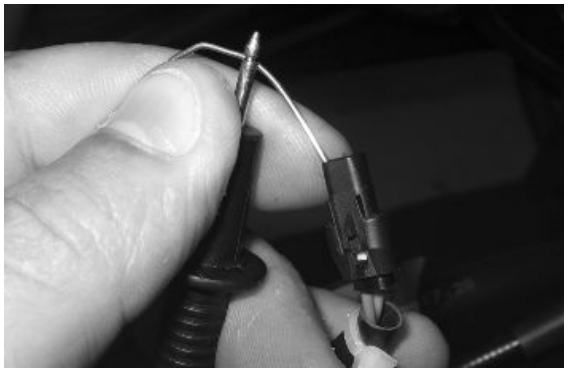
With the interface wiring disconnected from the control unit and connected to the system, check the following conditions:

pin 17 - 36: resistance 15 - 18 kOhm when the rider is not seated on the saddle.

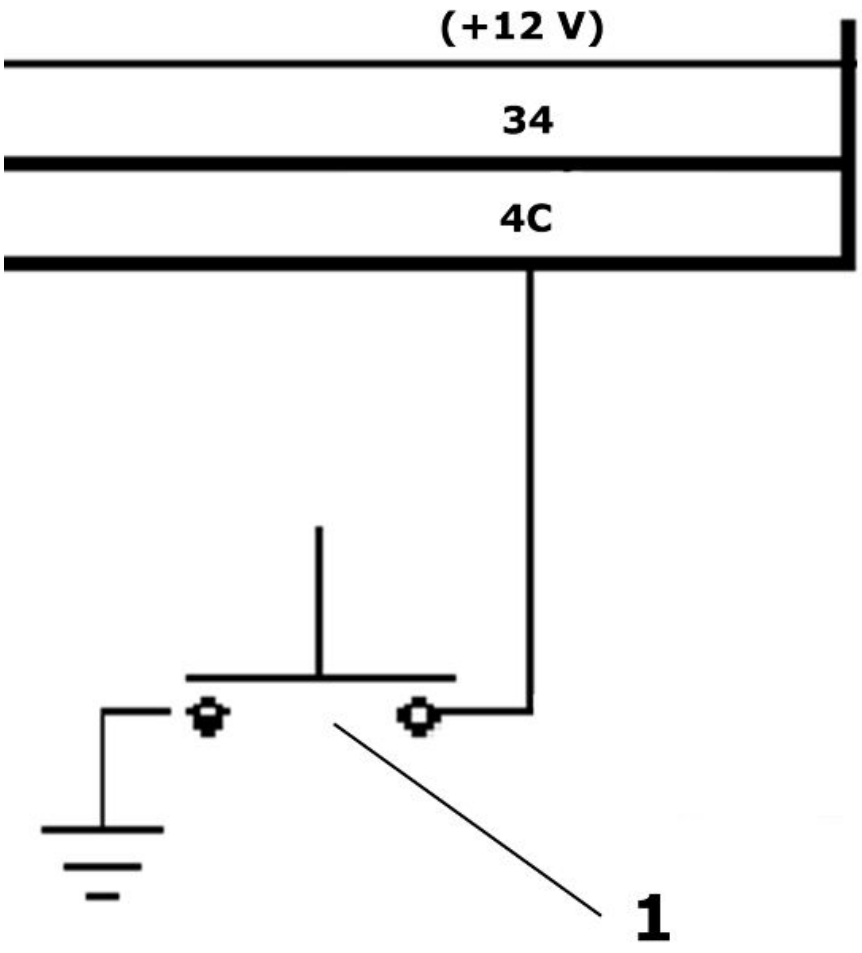
pin 17 - 36: resistance of about 3 kOhm when the rider is seated on the saddle



Check the continuity between the interface wiring pin 17 and the yellow cable of the rider presence connector.
Check the continuity between the interface wiring pin 36 and violet cable of the rider presence connector.



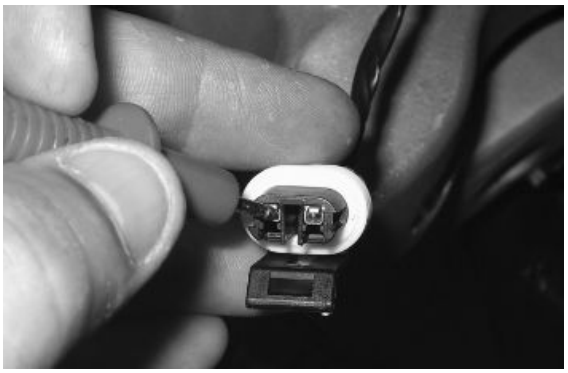
ROLL LOCK CALLIPER SENSOR



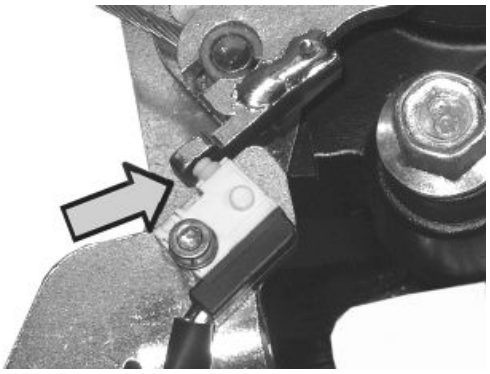
1: ROLL LOCK CALLIPER SENSOR

The roll lock calliper sensor is a normally opened switch. Check its correct operation with a multi-meter.

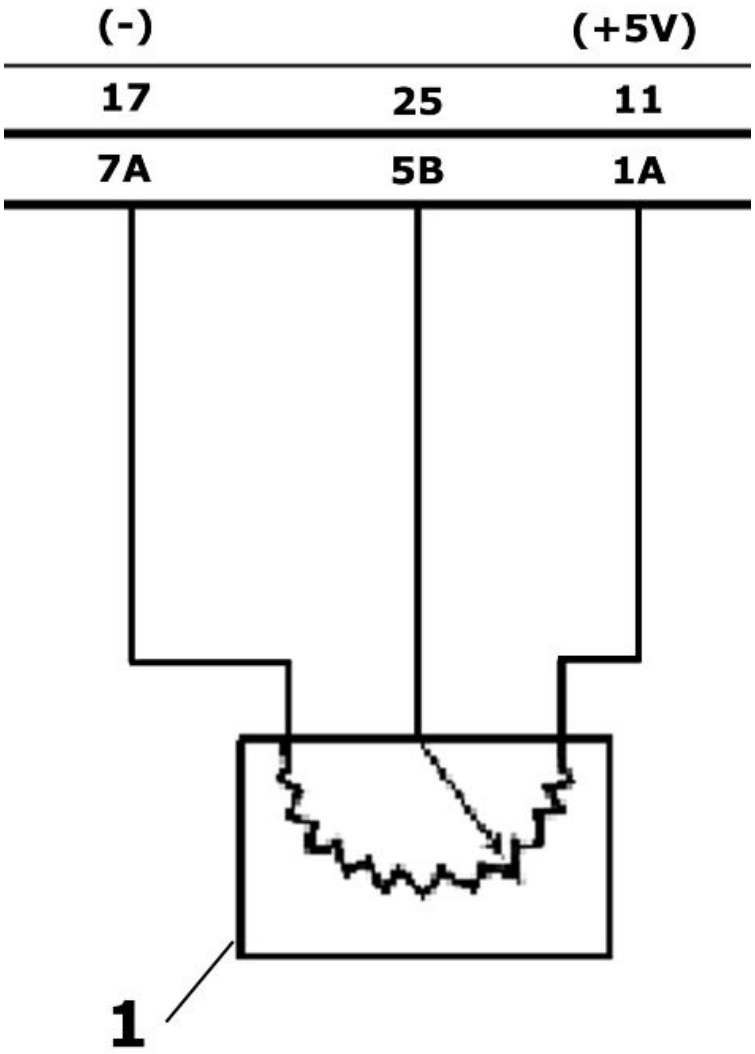
With the interface wiring disconnected from the control unit, check the continuity between pin 34 and the brown cable of the roll lock gripper sensor connector on the system side.
Check the continuity of the connector black cable and a ground point on the chassis



Also check that the flexible transmission control lever activates the limit stop switch properly.

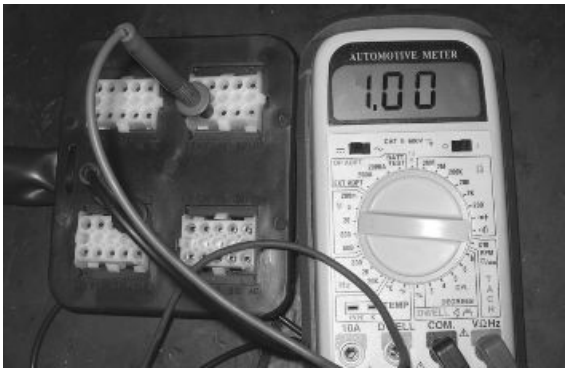


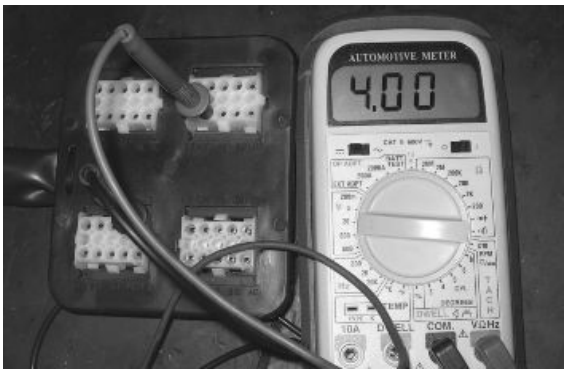
POTENTIOMETER



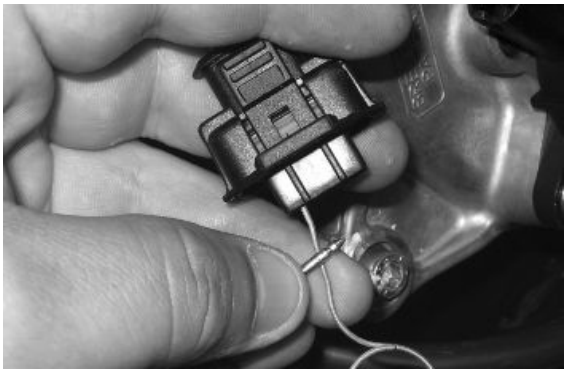
1: POTENTIOMETER

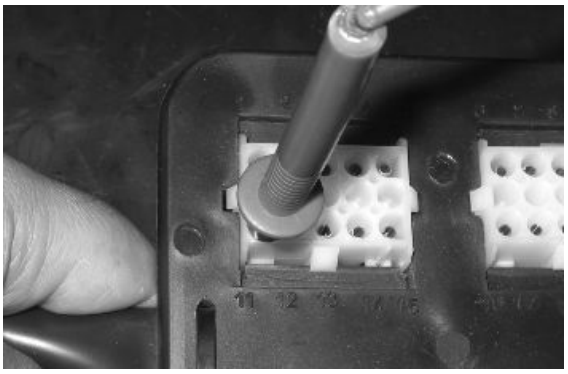
With the interface wiring connected to the control unit, secure the vehicle on its centre stand and switch to "ON". Select the reading scale on 20 V. Insert the multimeter probes on pins 17 (black) and 25 (red). Check that the voltage in the activated locking condition is 4V and 1V in the locking rest condition.



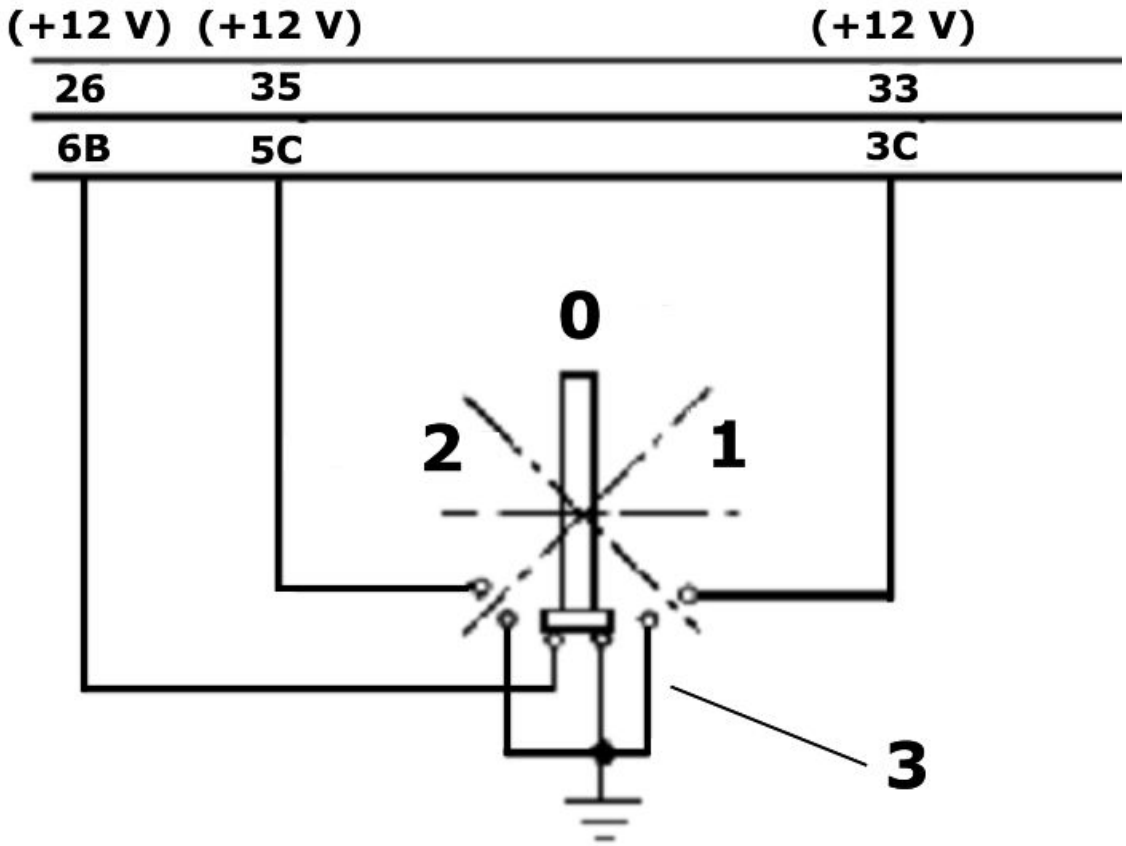


With the interface wiring disconnected from the control unit, check the continuity between pin 17 and the yellow cable of the potentiometer connector, between pin 25 and the green-blue cable, between pin 11 and the orange-blue cable. Also check that these lines are insulated from each other and ground.





ROLL LOCK-UNLOCK SWITCH



0: REST POSITION

1: LOCKING POSITION

2: UNLOCKING POSITION

3: ROLL LOCK-UNLOCK SWITCH

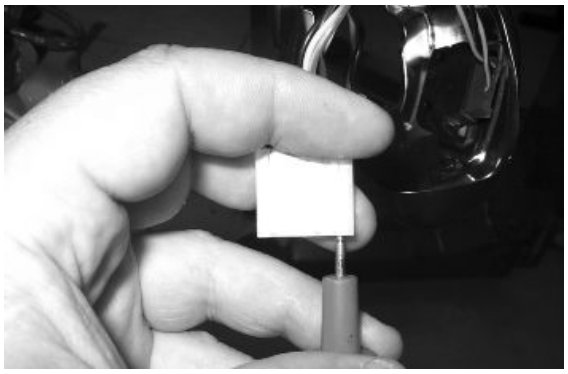
With the interface wiring disconnected from the control unit, check the continuity of the electrical lines between the interface wiring and the roll lock-unlock switch:

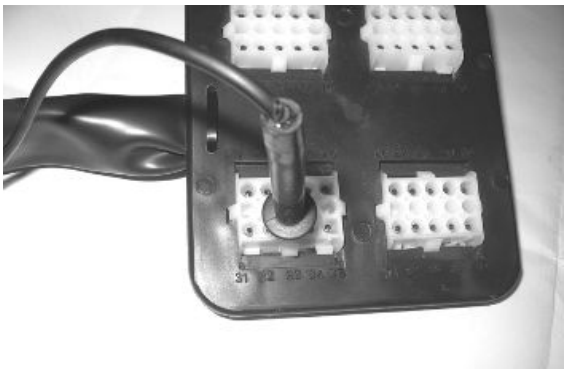
Pin 26 and green - grey cable

Pin 35 and violet - black cable

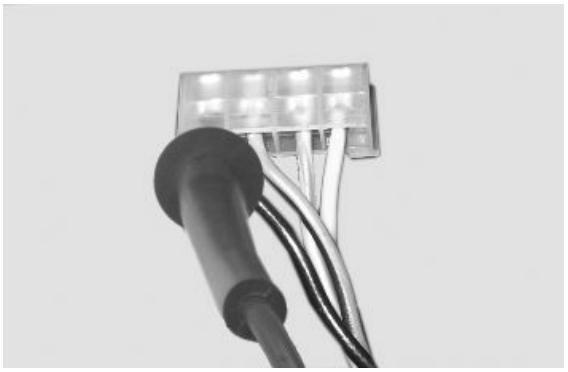
Pin 33 and yellow - blue cable

Also check that the above indicated electrical lines are insulated from the ground.



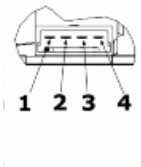


Check the continuity between the black cable on the connector and a ground point on the chassis.



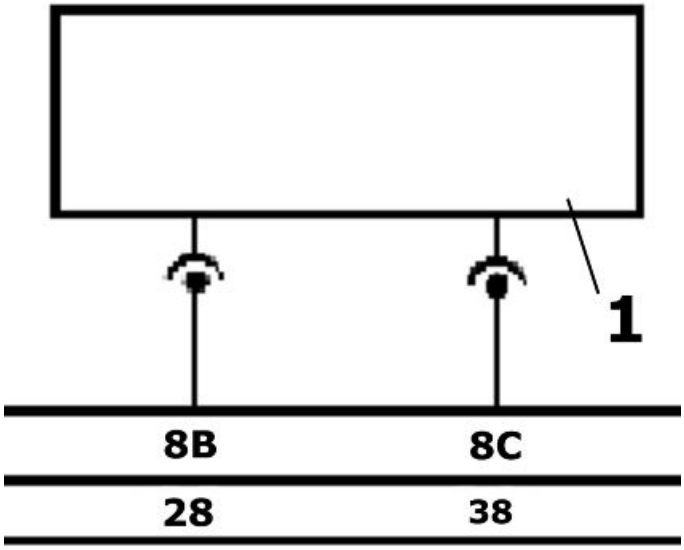
With a multimeter, check the operation of the roll lock-unlock switch referring to the diagram indicated in the figure.

1. GROUND
2. LOCK
3. REST
4. UNLOCK



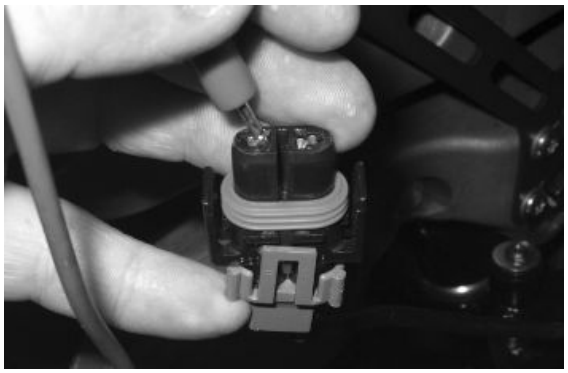
	2	3	4	1
			○	○
0		○		○
	○			○

GEAR MOTOR

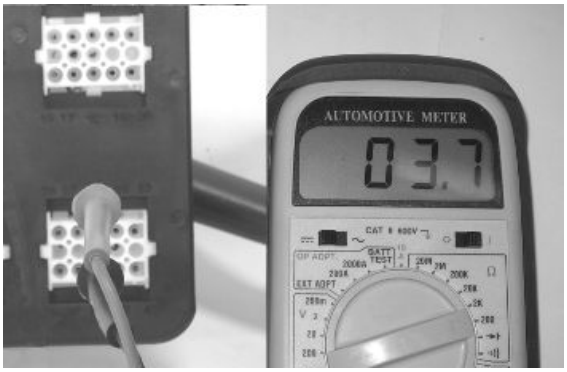


1: GEAR MOTOR

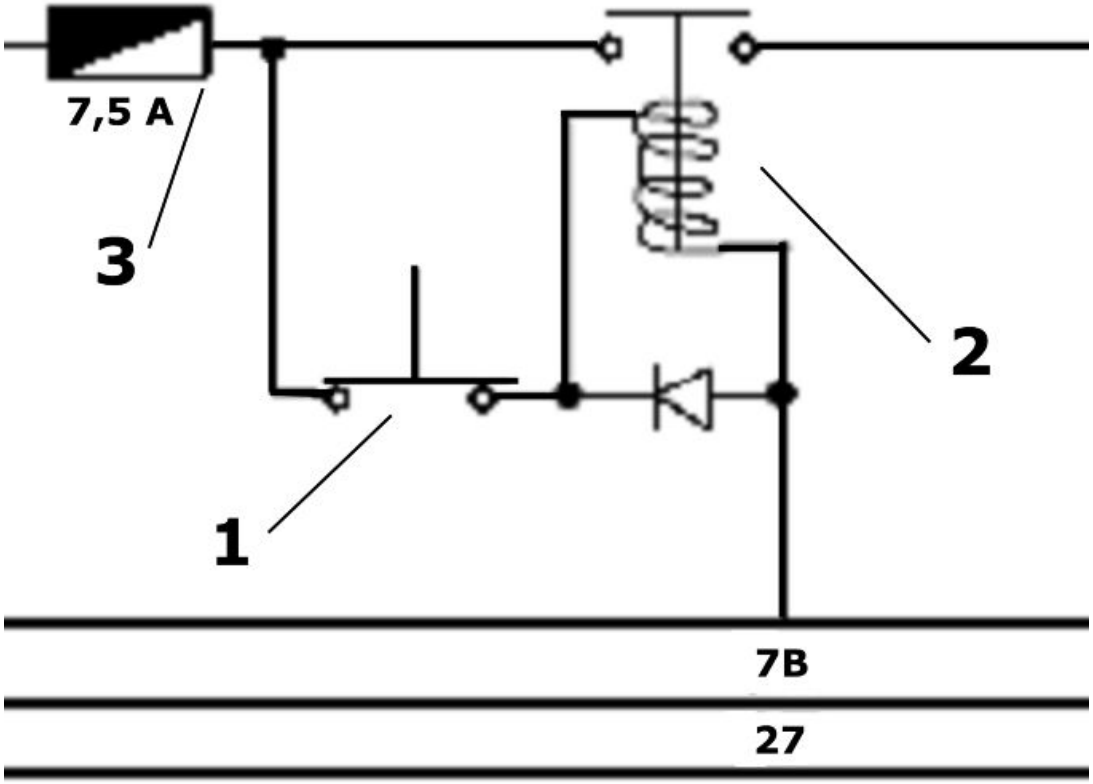
With the interface wiring disconnected from the control unit, check the continuity between pin 28 and the yellow cable, between pin 38 and the blue cable on the gear motor connector



With the interface wiring disconnected from the control unit, check the continuity of the gear motor winding placing the multimeter probes on pins 28 and 38 as indicated in the figure



PRESSURE SWITCH



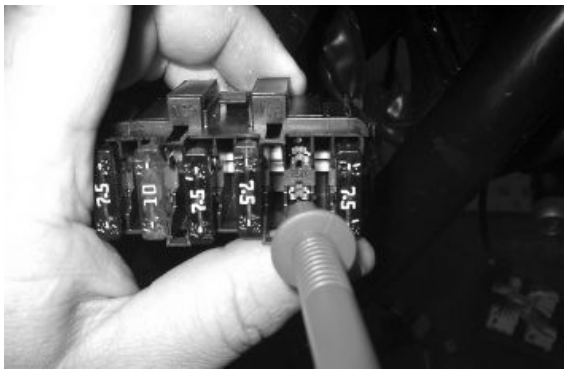
1: PRESSURE SWITCH

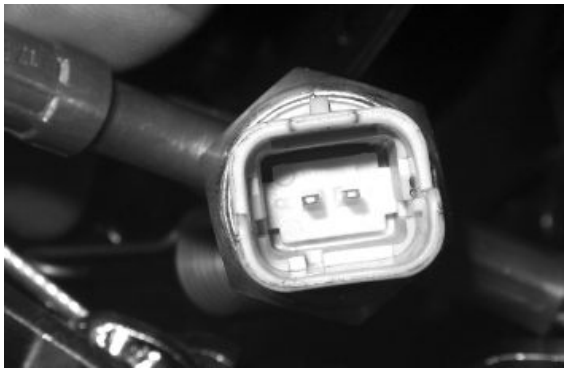
2: HORN SOLENOID

3: FUSE No. 8, 7.5A

Check 7.5 A fuse No. 8 for efficiency. With interface wiring disconnected from the control unit, check the continuity of the blue - black cable between pressure sensor connector and the horn solenoid base as indicated in the picture. Check the continuity between pin 27 and the solenoid base white cable.

Check the continuity of the yellow - red cable between the pressure switch connector and the fusebox and between the solenoid base and the fusebox.
With a multimeter, also check the pressure switch operation as well as the continuity at rest as this is normally closed switch.



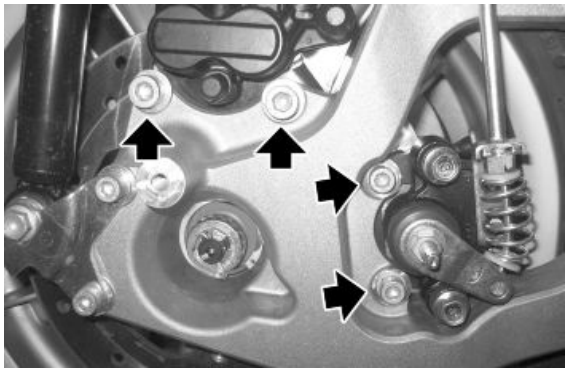


Rear

Removing the rear wheel

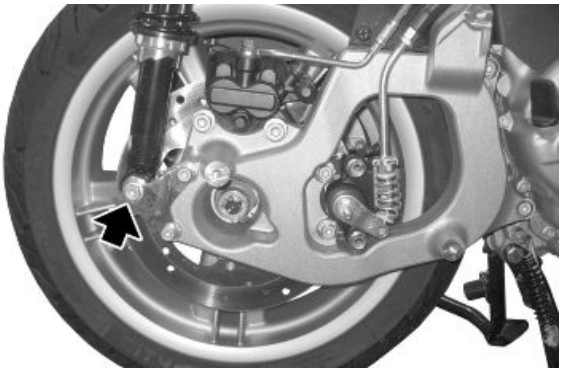
Remove the full silencer assembly.

- Remove the screw fixing the right-hand shock absorber to the bracket
- Remove the two screws fixing the brake calliper to the mounting bracket and the parking brake calliper fixing screws.

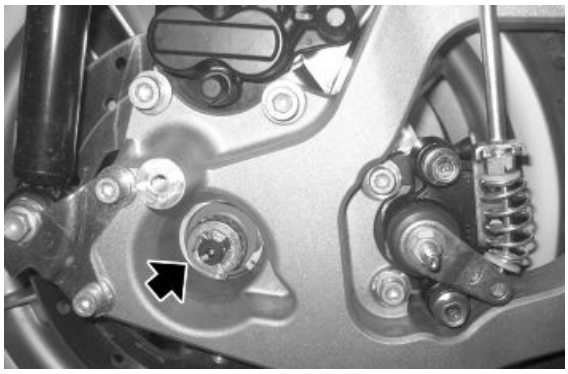


WARNING

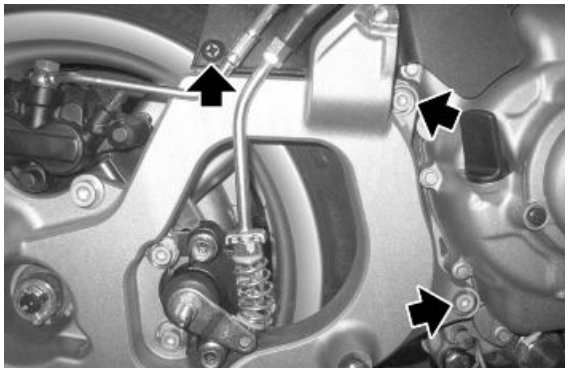
PAY CAREFUL ATTENTION TO THE DISASSEMBLY OF THE LAMBDA PROBE. AVOID REMOVING THE PROBE FROM THE EXHAUST PIPE.
REMOVE THE SILENCER NOT FROM THE EXPANSION JOINT, BUT DIRECTLY FROM THE ENGINE. DISCONNECT THE ELECTRICAL CONNECTION OF THE LAMBDA PROBE, LEAVING IT FITTED ON THE EXHAUST PIPE.



- Remove the cotter pin, the cap, the wheel axle fixing nut and the outer one of the two spacers.



- Remove the mud guard clamping screw
- Remove the two screws fixing the bracket to the engine



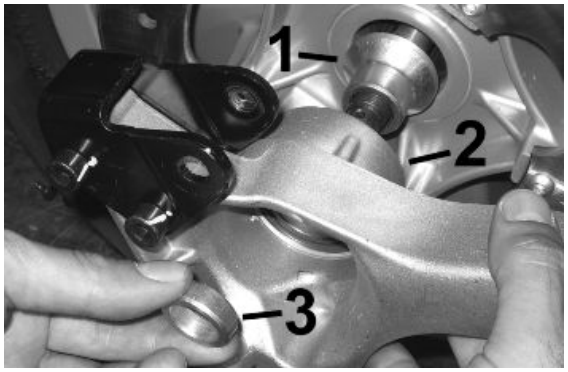
- Slide off the wheel axle bracket, using the heat gun if necessary.

See also

Engine from vehicle

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 picture.



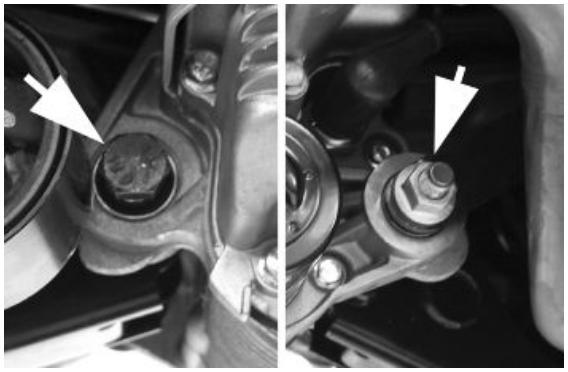
Locking torques (N*m)

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

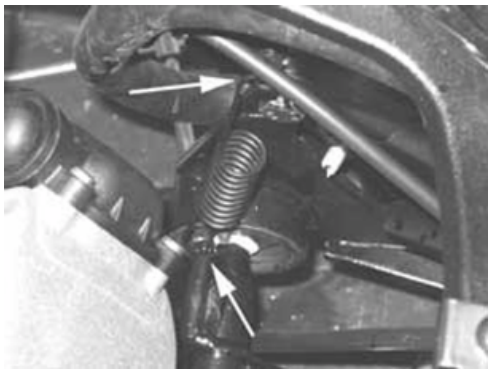
Swing-arm

Removal

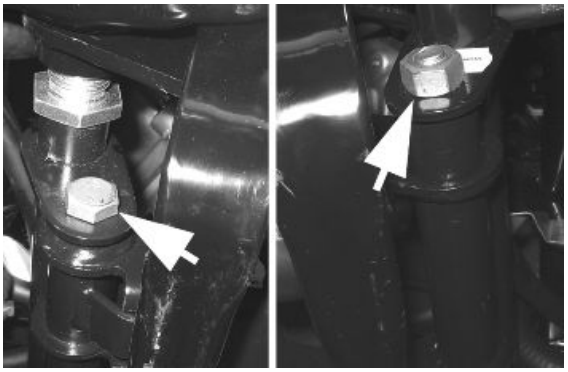
- Place the vehicle on its centre stand;
- Remove the swinging arm/engine fitting shown in the picture
- Move the engine back



- Remove the spring anchoring the swinging arm to the chassis as shown in the picture



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



- 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
sticking in the m
ment of the con
of the swinging
the engine side
swinging arm or
chassis side.
- Check the axia
ance between the two
swinging arms using a
feeler gauge

Characteristic

Standard clearance

0.40 - 0.60 mm

Allowable limit after use:

1.5 mm

- In order to che
clearance of the
ing arm on the f
side, prepare a
using the fixing
the swinging arn
frame and two r
from the special
020229Y. Alternatively,
use two washers with
12-mm inside diameter
for pins, minimum 30-
mm outside diameter
and 4-mm thick at least.

- Check there is
sticking in the rc
- Check the axia
ance of the swir
arm on the chas

Characteristic

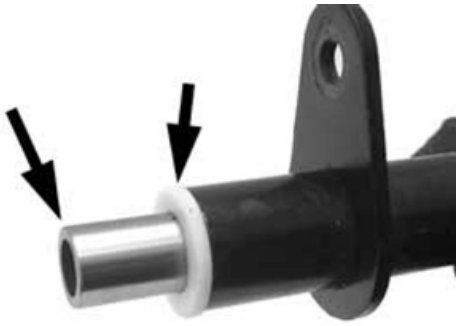
Standard clear

0.40 - 0.60 mm

Allowable limit after use:

1.5 mm

- Separate the s
arm on the engi
from the vehicle
arm.
- Remove the pl
bushings and th
nal spacer show
picture.



- Using a suitabl
move the roller
as shown in the

Mediante attrezzo specifico piantare nuovi astucci a rulli prestando attenzione a premere sull'estremità tampigliata con le marcature di identificazione. Lubrificare con il prodotto specifico.

Specific tooling

020244Y 15-mm diameter punch

Recommended products

AGIP GREASE PV2 Ivory smooth-textured, slightly-stringy anhydrous calcium-base grease.

TL 9150 066, NATO G 460 symbol

DATI REVISIONE COMPONENTI

Specification	Desc./Quantity
Lunghezza tubo braccio oscillante lato motore con bussole montate:	182,3
Lunghezza distanziale interno braccio oscillante lato motore:	183 - 0,2 0
Lunghezza tubo braccio oscillante lato telaio con bussole montate:	227 + 0,1 -0,3
Lunghezza distanziale interno braccio oscillante lato telaio:	228 - 0,2 -0,4
Engine side swinging arm plastic bushing shim:	3.5 ± 0.05 mm
Chassis side swinging arm plastic bushing shim:	3.5 ± 0.05 mm

- Lubricate rolle
ings and the pla
bushings with g
- Insert the spac
- Assemble the
arms with the re
bolt in the positi
shown in the pic

- Adjust the bolt as shown in the picture
- Position the chassis side swinging arm with the most protruding part pointing towards the silent block side as shown in the picture

Recommended products

AGIP GREASE PV2
Ivory smooth-textured, slightly-stringy anhydrous calcium-base grease.

TL 9150 066, NATO G 460 symbol

Refitting

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

1. Position the silent block supporting clamp with part **3** inserted, and slightly tighten part **1**

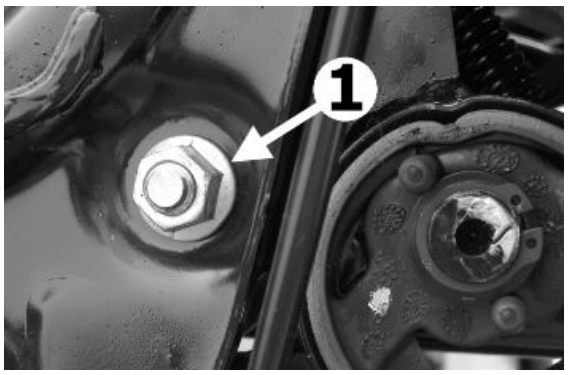
2. Position the swinging arm, inserting part **2**

3. Tighten part **3** to the prescribed torque

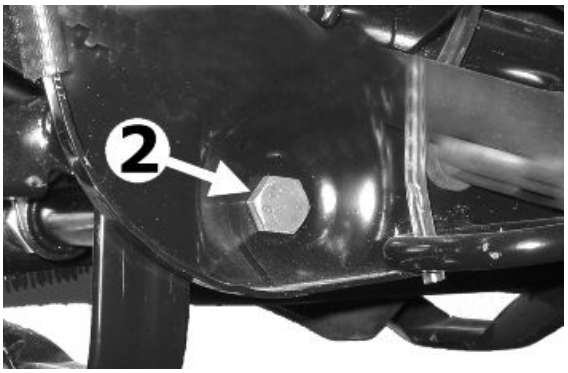
4. Screw on and tighten part **4** to the prescribed torque

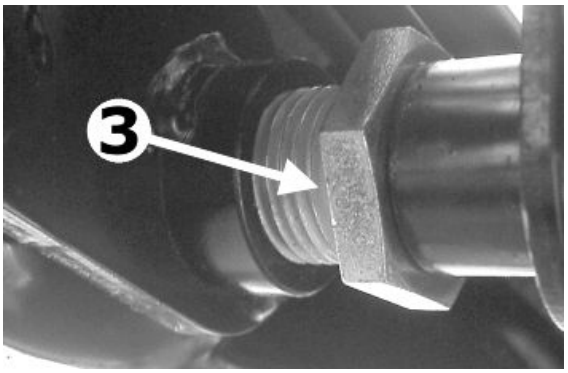
5. Screw on and tighten part **5** to the prescribed torque

6. Tighten part **1** to the prescribed torque



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





SWINGING ARM FITTING

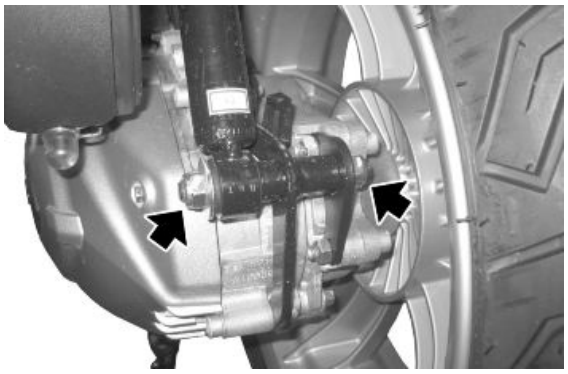
Name	Torque in Nm
Part 1	64 - 72
Part 3	5 - 7
Part 4	90 - 110
Part 5	64 - 72 Nm
Engine-swinging arm bolt	64 - 72

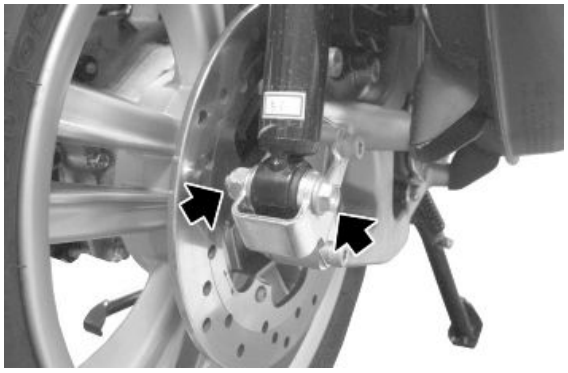
Shock absorbers

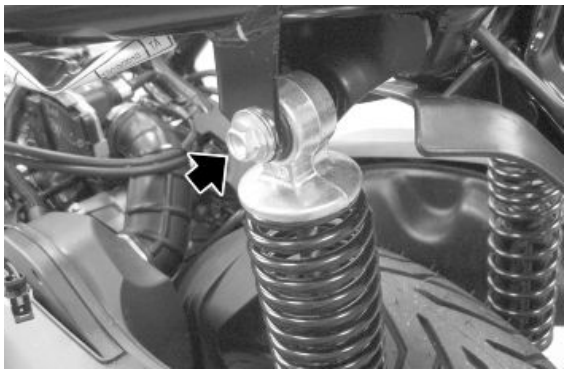
Removal

Proceed as follows:

- place the vehicle on its centre stand;
- lift the engine a little with a jack so as to free the two shock absorbers;
- remove the silencer
- remove the license plate holder;
- undo the shock absorber spring assembly clamping screw from the support fixed to the engine on the one side and from that fixed to the silencer on the other;
- unscrew the two upper nuts (one on each side) fixing the shock absorber spring assembly to the frame and remove the shock absorbers.







See also

Chassis

Refitting

Carry out the previous operations but in reverse order.

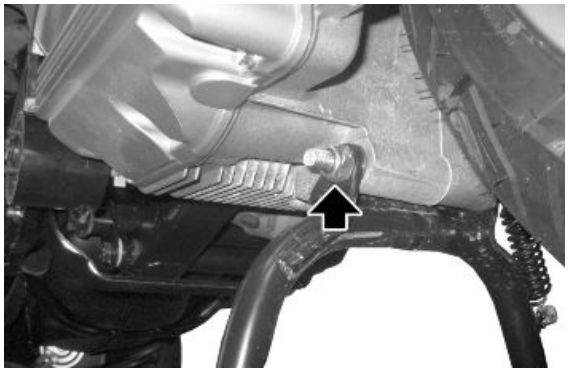
Locking torques (N*m)

Shock absorber lower clamping 33 to 41 Shock absorber upper clamp 33 to 41

Centre-stand

REMOVAL

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



FITTING

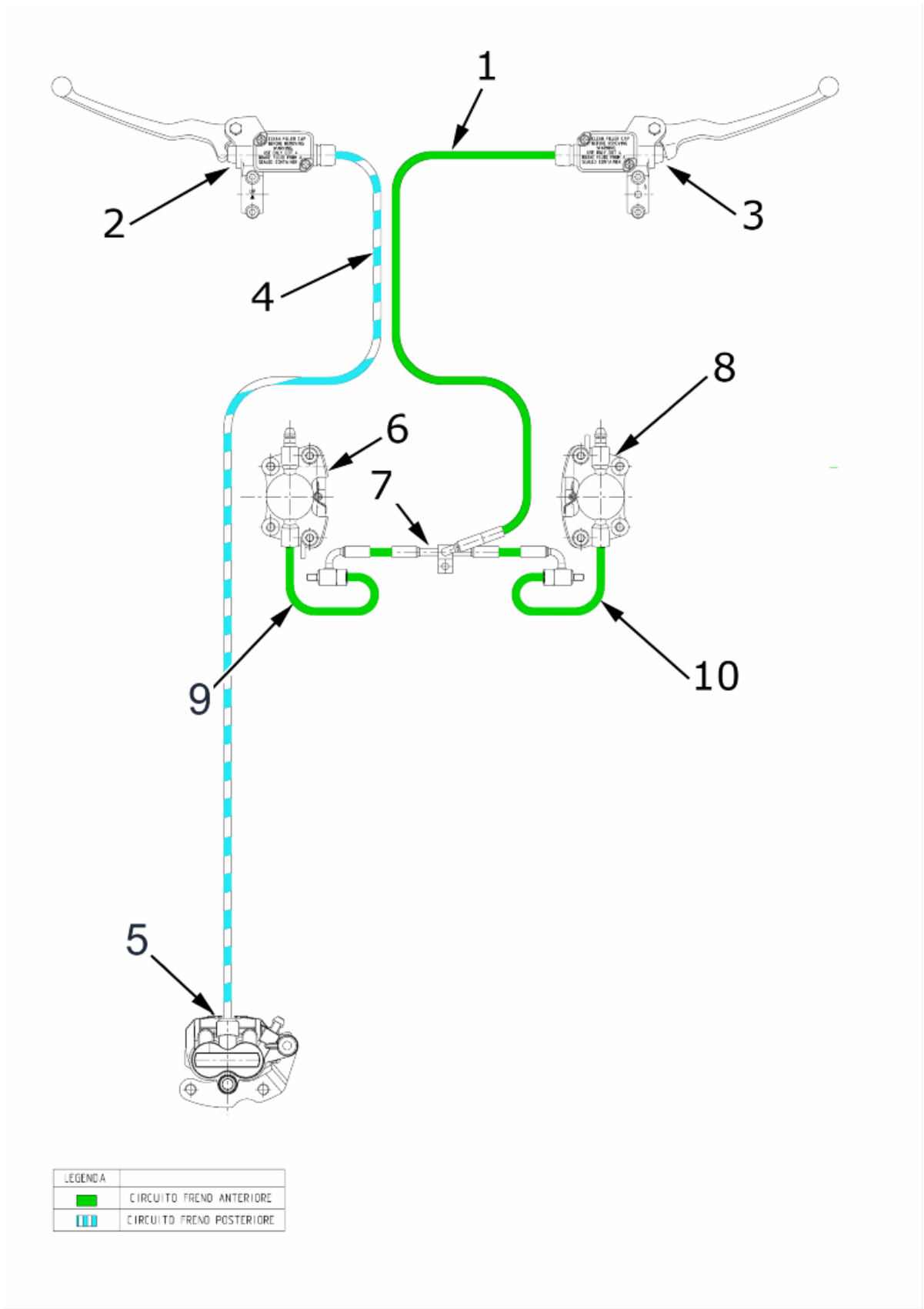
- On refitting tighten the nut to the specified torque.

Locking torques (N*m)

Centre stand bolt **31 - 39**

INDEX OF TOPICS

This section è is dedicated to the description of the brake system components.



1. Front brake pipes (front brake pump - rigid pipes)
2. Rear brake pump ø 11 mm
3. Front brake pump ø 12 mm
4. Rear brake pipes (rear brake pump - rear brake calliper)
5. Rear brake calliper ø 22 mm
6. Front brake left calliper ø 30 mm
7. Front brake rigid piping
8. Front right brake calliper ø 30 mm
9. Front brake left calliper pipes (fitting - wheel brake calliper)
10. Front brake right calliper pipes (fitting - wheel brake calliper)

Interventions rules

WARNING

BRAKING SYSTEM FLUID IS CORROSIVE: ALWAYS WEAR PROTECTIVE GLOVES. IN THE EVENT OF ACCIDENTAL CONTACT WITH YOUR EYES, RINSE THE CONTACT AREA WELL WITH ABUNDANT WATER.
THE BRAKE FLUID DRAINED FROM THE SYSTEM IS HARMFUL TO THE ENVIRONMENT. COLLECTION AND DISPOSAL MUST BE CARRIED OUT IN COMPLIANCE WITH THE REGULATIONS IN FORCE. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THE FLUID EVERY TWO YEARS. IF BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.
DURING INSTALLATION, THE PARTS TO BE REUSED MUST BE ABSOLUTELY CLEAN AND FREE FROM ANY TRACES OF OIL, FUEL AND GREASE: IT IS THEREFORE NECESSARY TO CLEAN THEM THOROUGH WITH DENATURED ALCOHOL.

N.B.

FOR TOPPING UP AND CHANGE, USE ONLY BRAKE FLUID DOT4 - NHTSA 116.
OBSERVE THE MAXIMUM DEGREE OF CLEANLINESS. HYDRAULIC FLUID IS EXTREMELY CORROSIVE FOR PAINTED SURFACES.
BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR.
IF THE MOISTURE CONTENT IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, IT WILL RESULT IN POOR BRAKING EFFICIENCY DUE TO A LOW BOILING POINT OF THE FLUID.

N.B.

ALWAYS USE FLUID FROM SEALED CONTAINERS.

N.B.

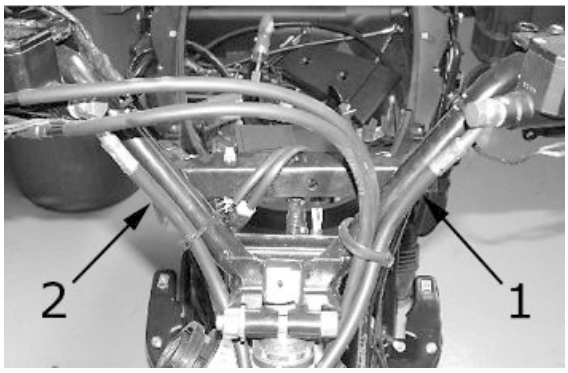
RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL LONGER THAN 20 SECONDS. AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH.
THE SEAL RINGS MUST BE IMMERSED IN THE OPERATING FLUID; THE USE OF PRF1 PROTECTIVE DEVICE IS ALLOWED.

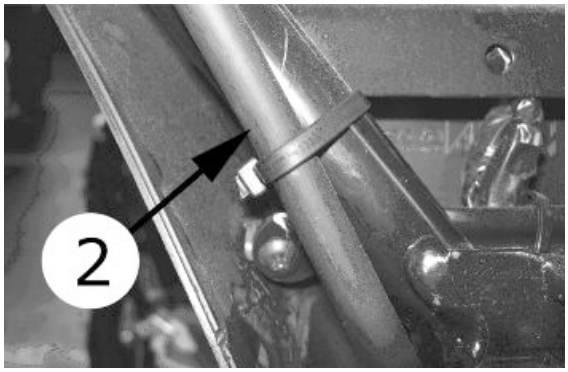
WARNING

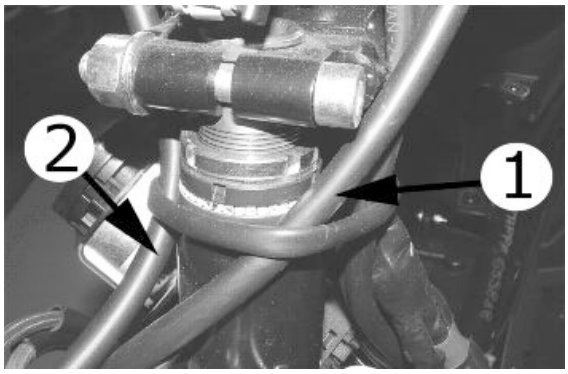
THE PRESENCE OF BRAKE FLUID ON THE DISC OR BRAKE PADS REDUCES BRAKING EFFICIENCY. IN THIS CASE, REPLACE THE PADS AND CLEAN THE DISC WITH A HIGH-QUALITY SOLVENT.

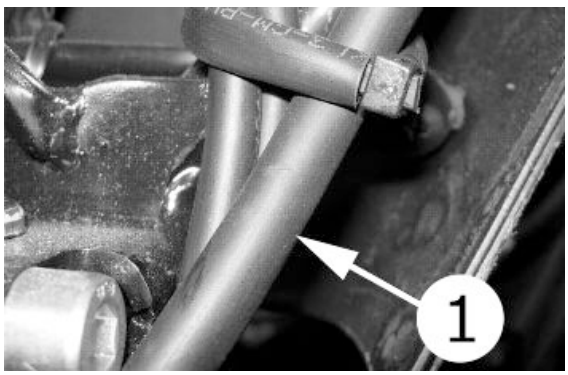
Brake system fitting

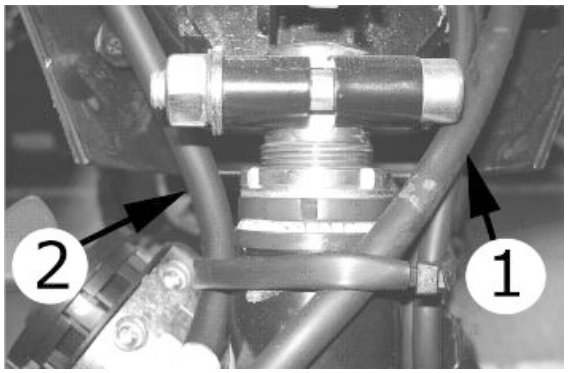
1. **PUMP PIPING - REAR BRAKE CALLIPER**
2. **FRONT BRAKE PUMP PIPING - RIGID PIPING**

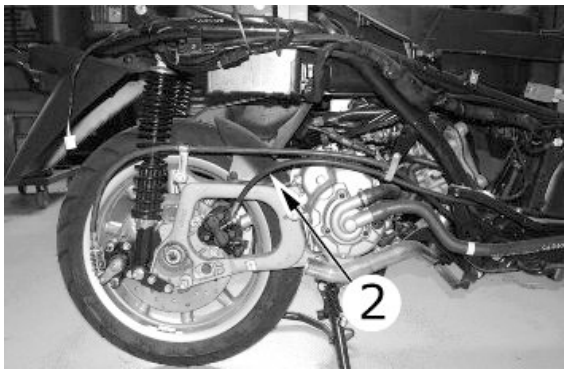


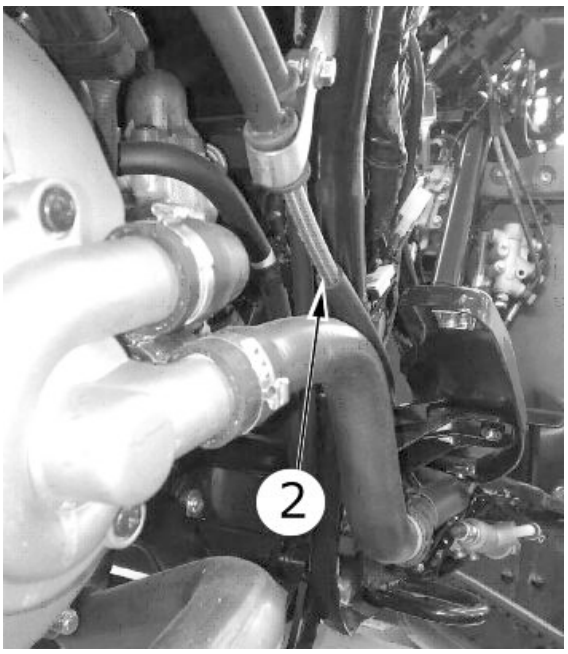


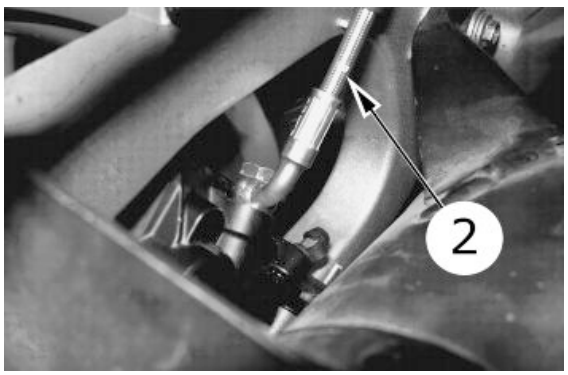





2
1


2


2


2

Rear brake calliper

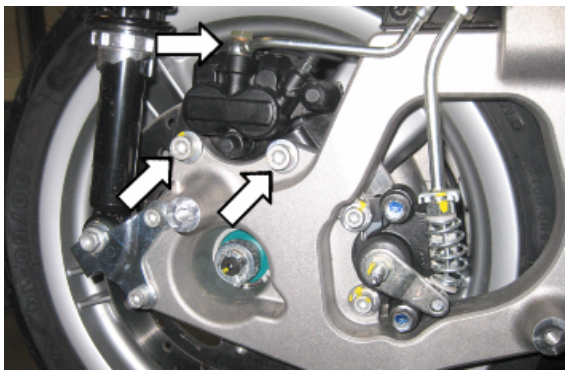
Removal

- Remove the silencer.

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

N.B.

IF IT IS NECESSARY TO REPLACE OR SERVICE THE BRAKE CALLIPER, BEFORE REMOVING THE FITTINGS FIXING THE CALLIPER TO THE SUPPORT BRACKET, FIRST LOOSEN THE OIL HOSE FITTING AFTER HAVING EMPTIED THE SYSTEM OF THE CIRCUIT BEING EXAMINED.



Refitting

Per il rimontaggio eseguire le operazioni di smontaggio in senso inverso. Al termine delle operazioni eseguire lo spurgo dell'impianto frenante.

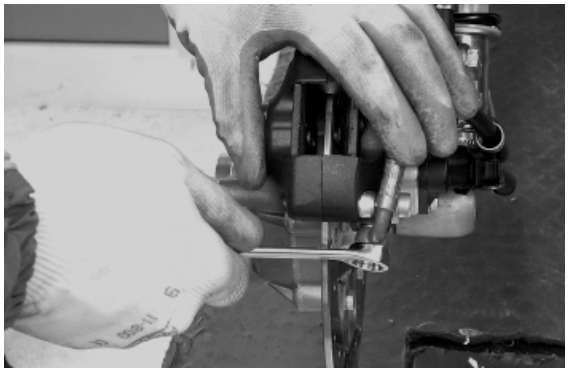
REAR BRAKE

Name	Torque in Nm
Rear brake disc screws(°)	5 to 6.5
Rear brake calliper-pipe fitting	20 - 25
Rigid / flexible pipe fitting	13 - 18
Rear brake pump-pipe fitting	16 - 20
Rear brake calliper fixing screws	20 to 25

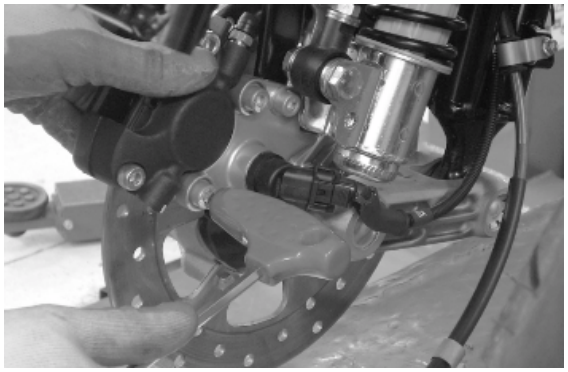
Front brake calliper

Removal

Place a container under the calliper, unscrew the tube-calliper joint and empty the braking system. For easy draining of the braking system fluid, open the pump reservoir cap.



Svitare le due viti mostrate in figura e rimuovere la pinza dal supporto.



Refitting

Per il rimontaggio eseguire le operazioni di smontaggio in senso inverso. Al termine delle operazioni eseguire lo spurgo dell'impianto frenante.

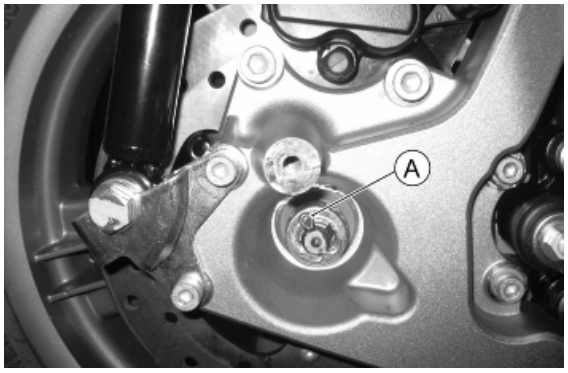
FRONT BRAKE

Name	Torque in Nm
Oil bleed screw	8 - 12
Disc tightening screw (°)	5 to 6
Brake fluid pump-hose fitting	16 - 20
Brake fluid pipe-calliper fitting	20 - 25
Screw tightening calliper to support	20 to 25
Calliper upper pipe fitting	20 to 25

Removal

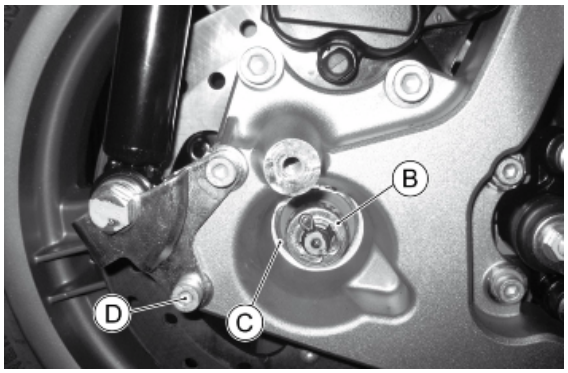
Remove the cotter pin «**A**»

Use new split pins when refitting.

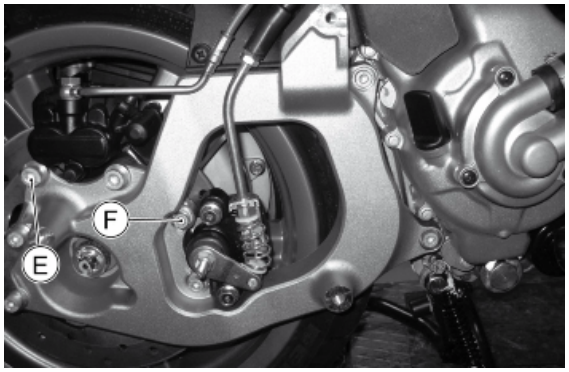


Rimuovere le due viti «**D**» di fissaggio ammortizzatore posteriore.

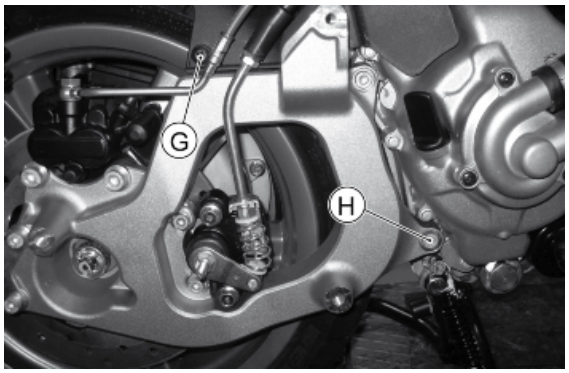
Svitare il dado mozzo ruota «**B**» e rimuovere l'anello seeger sottostante «**C**».

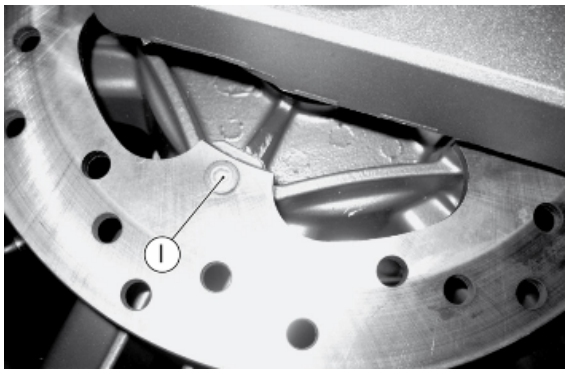


Remove the corresponding retainers «**E**» and «**F**», respectively, of the rear brake calliper and the parking brake calliper.
Be careful not to damage the brake calliper piping and the protective sheath of the parking brake calliper operation cable.



Remove the retainer «**G**» of the rear mudguard.
Remove the retainers«**H**» and remove the rear plate.

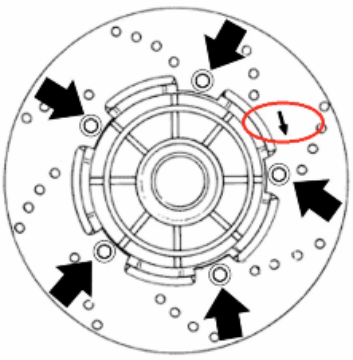




Rimuovere i fissaggi «**I**» del disco freno al cerchio ruota.

Refitting

- To fit the rear brake disc, follow the removal steps but in reverse order; be careful to tighten the screws to the prescribed torque using threadlock.



Recommended products

Loctite 243 Medium-strength threadlock

Medium Loctite 243 threadlock

Locking torques (N*m)

Rear disc screws **5 - 6.5 Nm**

Disc Inspection

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

Characteristic

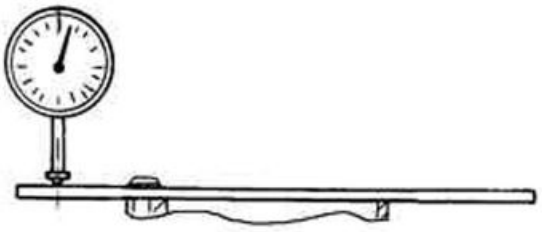
New rear disc thickness

5 mm

Disc thickness at wear limit (rear)

3.5 mm

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



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

Characteristic

Max. axial run-out

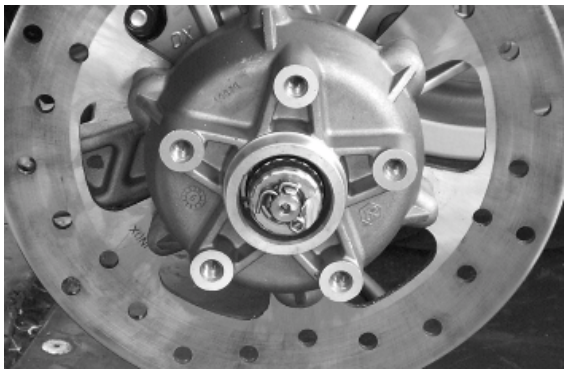
0.1 mm

Front brake disc

Removal

Remove the cotter pin.

Use new split pins when refitting.

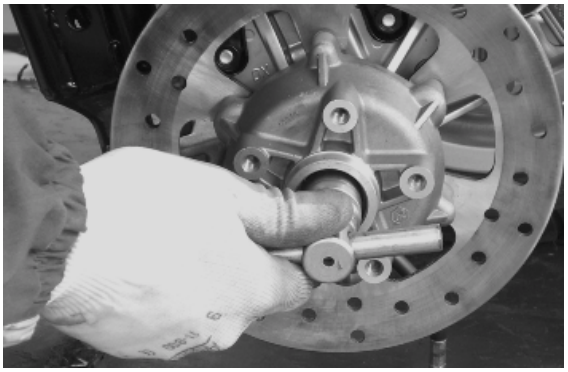


Undo the wheel hub nut.

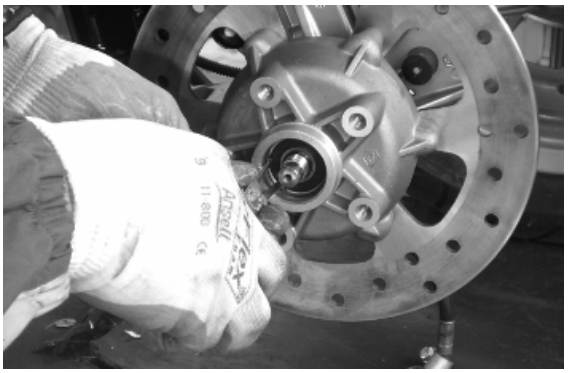
- Upon refitting, secure to the specified torque.

Locking torques (N*m)

Wheel axle nut 74 - 88



Remove the Seeger ring, after that, remove the hub with the help of a rubber mallet slightly hitting on the brake disc side, turning the wheel hub at the same time.



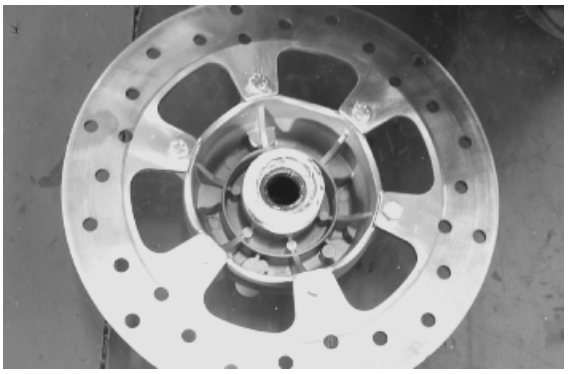
Loosen the 6 screws indicated in the figure and remove the brake disc from the wheel hub.

- Upon refitting, secure to the specified torque.

Recommended products

Loctite 242 product description

Apply LOCTITE medium type 242 threadlock



Refitting

- To fit the front brake disc, follow the removal steps but in reverse order; be careful to tighten the screws to the prescribed torque using threadlock.

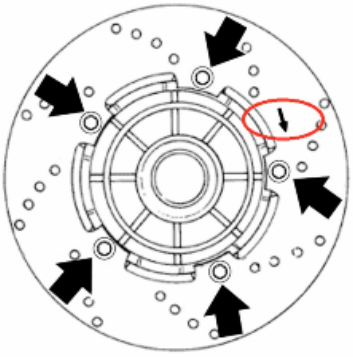
Recommended products

Loctite 243 Medium-strength threadlock

Medium Loctite 243 threadlock

Locking torques (N*m)

Brake disc screws 8 ÷ 10



Disc Inspection

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

Characteristic

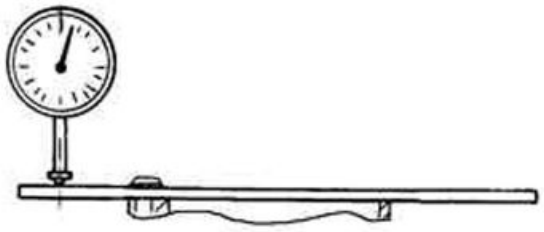
Thickness of a new front disc

4.0 mm

Disc thickness at wear limit (front)

3.5 mm

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



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

Characteristic

Max. axial run-out

0.1 mm

Front brake pads

Refitting

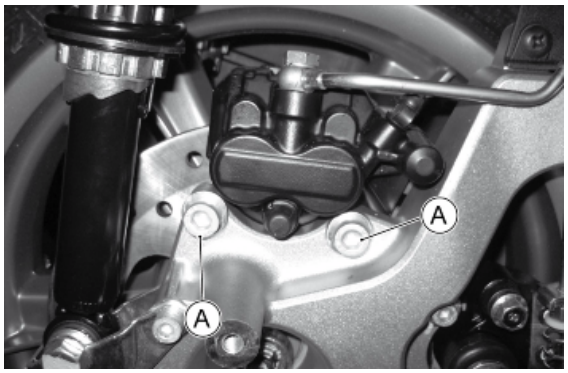
- Follow the removal steps but in reverse order; check that the Benzing snap ring of the pads is in good conditions.

Removal

Park the vehicle on its centre stand.

Remove the retainers «**A**» of the brake calliper and slide it out, being careful not to damage the piping.

- Upon refitting, secure to the specified torque.

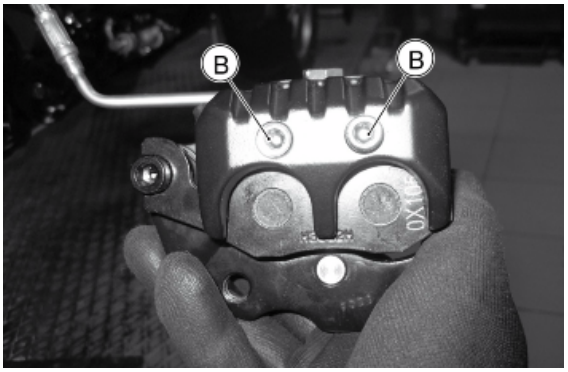


Locking torques (N*m)

Calliper tightening screw **20 - 25**

Remove the two threaded blocking pins «**B**» of the pads.

- Upon refitting, secure to the specified torque.



Recommended products

Loctite 243 Medium-strength threadlock

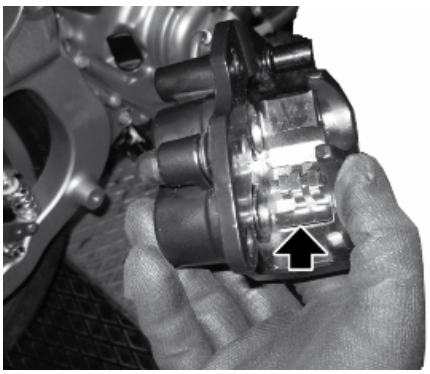
Medium Loctite 243 threadlock

Locking torques (N*m)

Pad fastening pin 20 to 25

Remove the worn pad paying attention to the spring below.

Fit a new pad kit following the procedure described but in reverse order.



Fill

Rear - combined

For the procedure in question see «**Highlighted operations**» section.

Front

For the procedure in question see «**Highlighted operations**» section.

Brake pipes

Front brake pipes removal

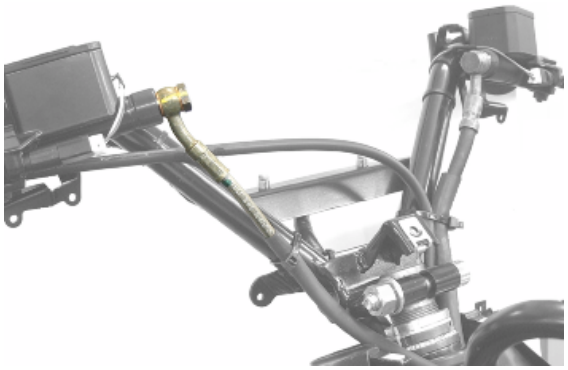
Remove legshield.

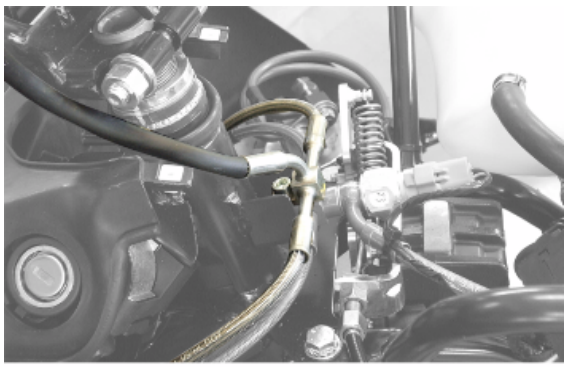
Remove front wheel and mudguard.

Disconnect the brake pipes from the calliper and drain the brake fluid.

Then, remove the plastic and metallic straps.

Unscrew the brake pump pipes as indicated in the figure.



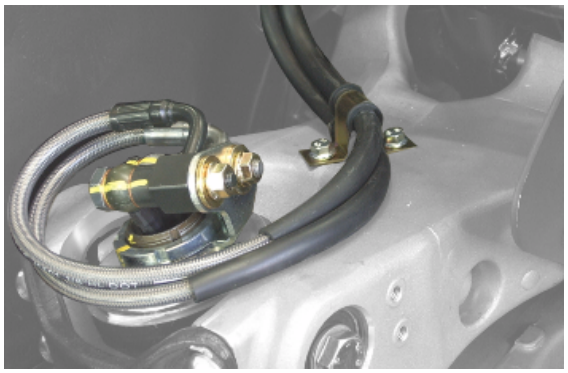


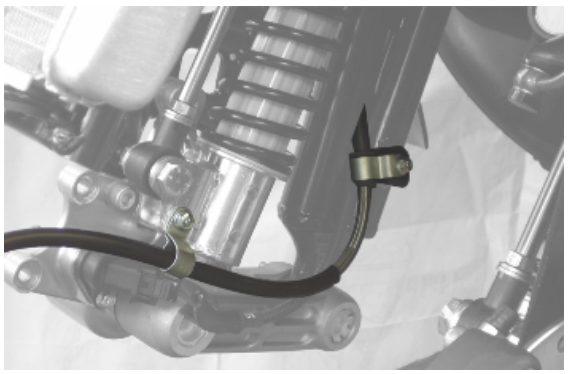
Front brake pipes removal

Unscrew the braking splitter screw.

Disconnect the brake pipes removing the two metallic straps indicated in the figure.

Remove the brake oil tube fitting from the rigid pipe inside the front suspension arm and loosen the hydraulic joint fixing nut of the suspension locking to release the brake pipes.

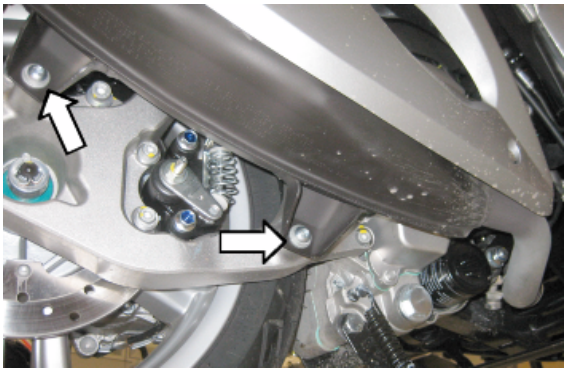


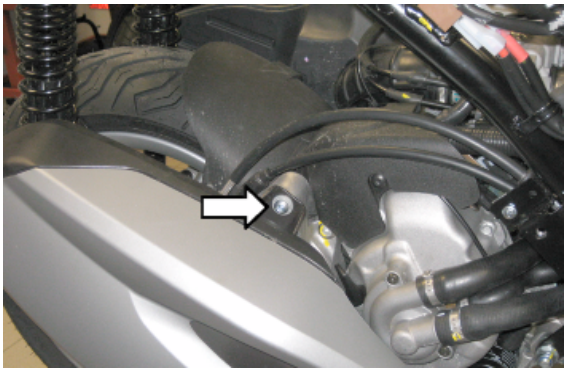


Parking brake

Remove the silencer loosening the 3 screws and the strap on the exhaust tube indicated in the picture.

When refitting, place the parking brake flexible transmission retaining strap correctly.





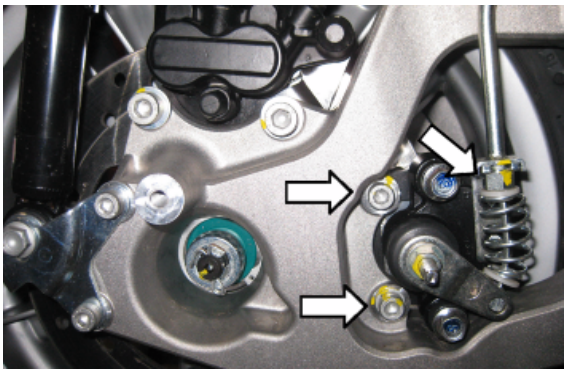
Loosen the transmission set screw and release the cable from the calliper.

Remove the two fixing screws of the mechanic calliper and remove the calliper. To check calliper components, refer to the chapter on the roll lock calliper.

When refitting, tighten to the specified torque.

Locking torques (N*m)

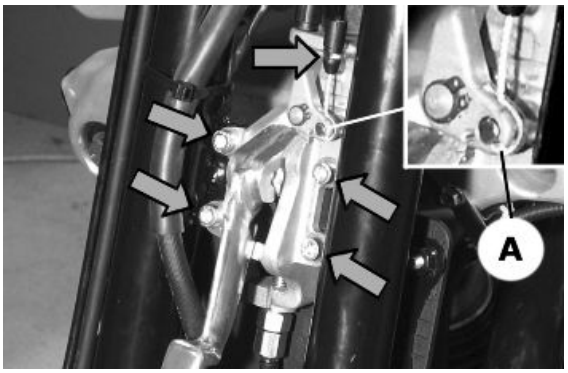
Screw tightening calliper to support 20 to 25



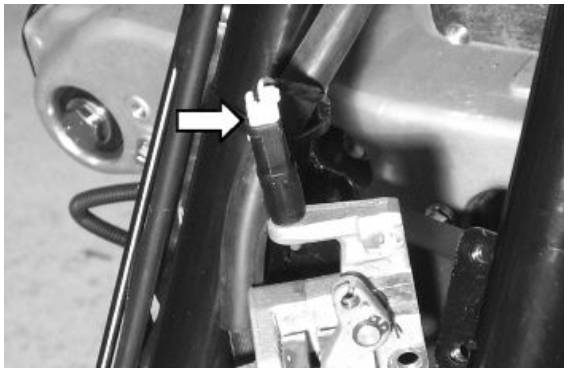
After removing the leg shield back plate, remove the engaging cable for the safety mechanism removing it from its fitting.

Remove the 4 screws shown in the figure.

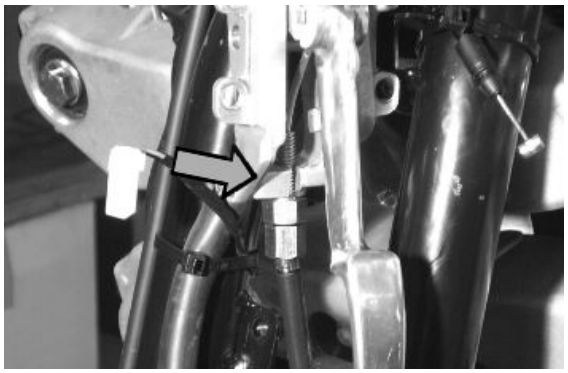
When refitting, pay attention to insert the metallic cable peg in the fitting marked «**A**» as indicated in the enlarged picture.



Remove the electric connection from the engaged parking brake warning light switch.

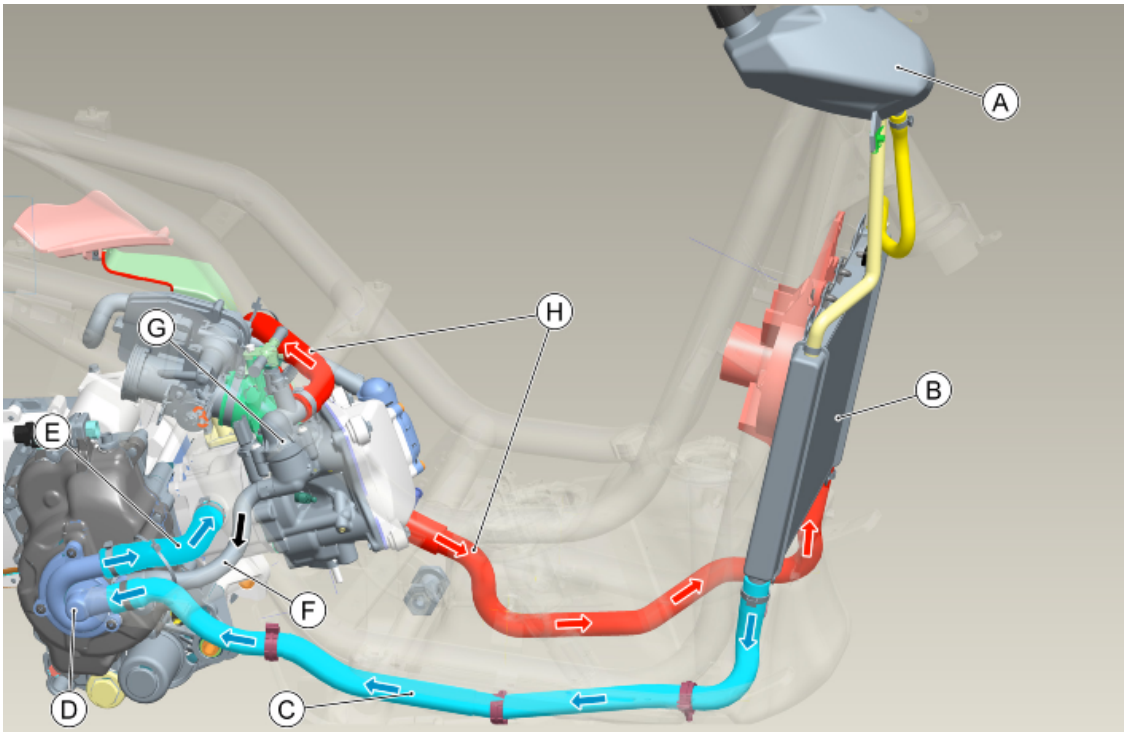


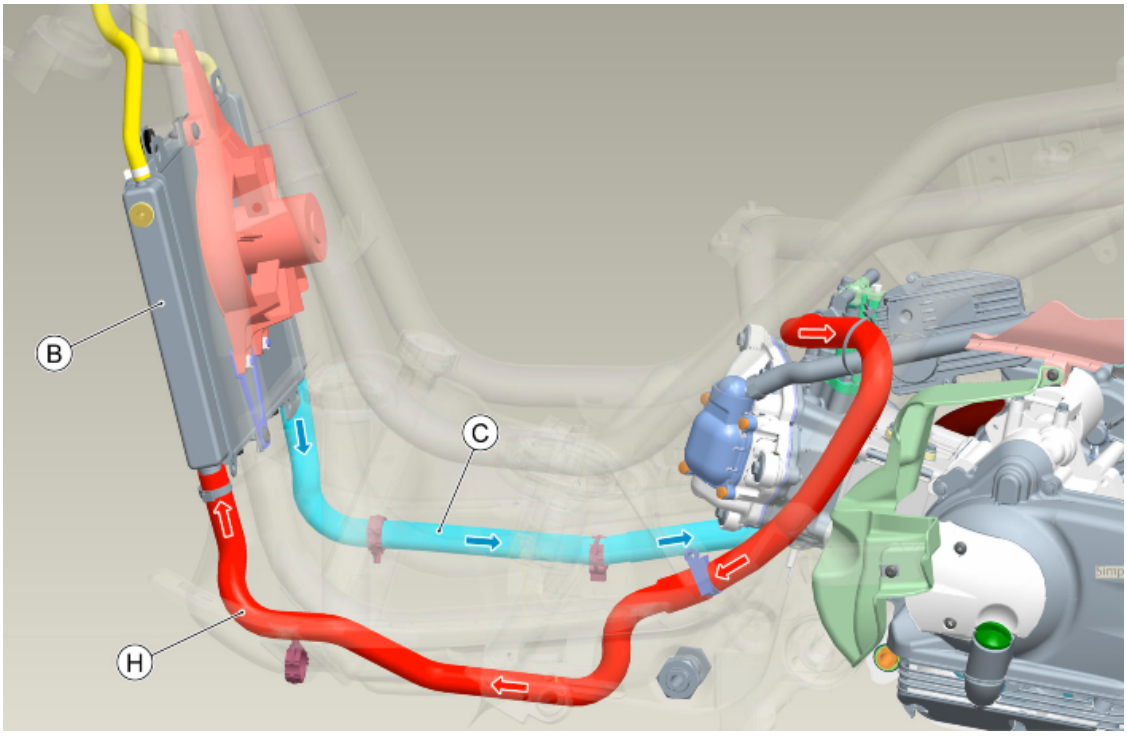
Remove the parking brake cable from the lever by operating the set screw indicated in the picture.



INDEX OF TOPICS

Circuit diagram





KEY

A = Expansion tank

B = Radiator

C = Radiator intake pipe

D = Water pump

E = Delivery pipe to cylinder

F = By-Pass pipe

G = Thermostat

H = Radiator delivery pipe

TECHNICAL SPECIFICATIONS

Specification	Desc./Quantity
Cooling system capacity:	~ 2 l
Recommended fluid	AGIP PERMANENT SPEZIAL (ready for use)
Sealing pressure	Cap calibrated at 0.9 bar

THERMOSTAT

Specification	Desc./Quantity
Type	Wax-type, with deviator
Starts opening at	85 ± 2°C

ELECTRIC VENTILATION

Specification	Desc./Quantity
Electric ventilation starts at	100° C
Electric ventilation stops at	90° C

WATER PUMP

Specification	Desc./Quantity
Type	Centrifugal
Control	Coaxial to crankshaft

RADIATOR

Specification	Desc./Quantity
Type	Aluminium, with horizontal circulation

EXPANSION TANK

Specification	Desc./Quantity
Calibration	Automatic bleeding, in parallel with the radiator

Electric fan check

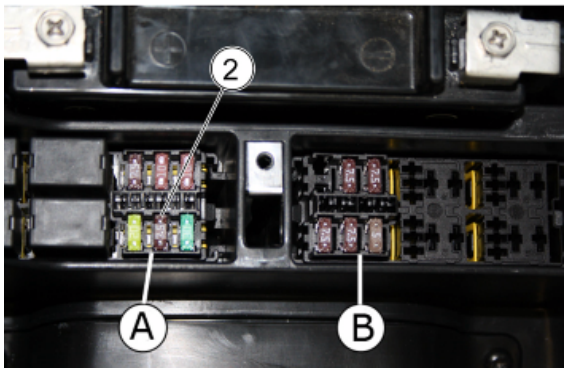
- Check and, if necessary, restore the correct battery voltage.

Characteristic

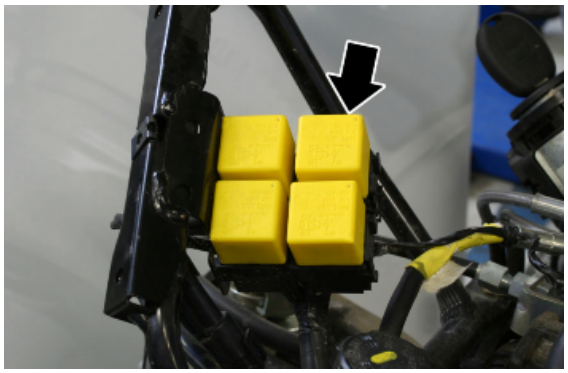
Battery voltage

12V

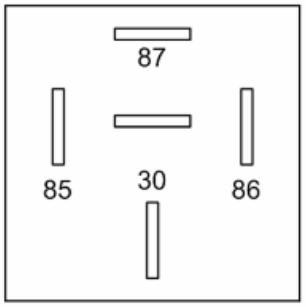
- Check the state of the 7.5A fuse No. 2.



- Check that the electric ventilation relay is working properly. Remove the shield to reach it.



- If the relay is not working, replace it.
- If the relay is working correctly, remove it and jump the Blue - Yellow and Red - White (85 - 86) wires. If all components are working correctly, the fan starts when the ignition switch is turned **ON**.



- In order to check the coolant temperature sensor, see the «Injection» chapter.

See also

Remote controls check

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 picture
- 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

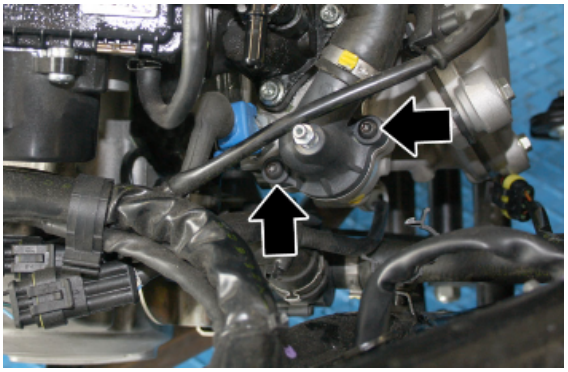
Locking torques (N*m)

Bleed screw 3

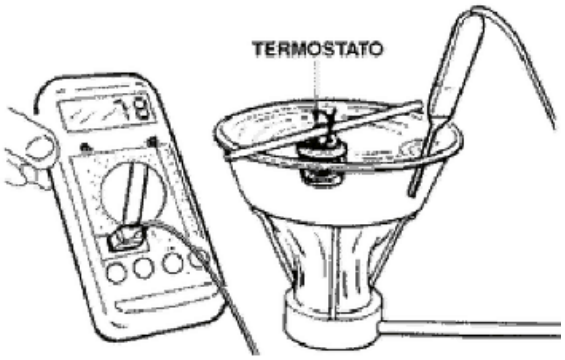
Thermostat

Removal

- Detach the battery - inverter compartment as described in the chapter **bodywork.**
- Place a + 2.0 l container under the vehicle to collect the coolant.
- Undo the two screws indicated, lift the cover and remove the thermostat.



Check



1) Visually inspect that the thermostat is not damaged.

2) Fill a metal container with approx. 1 litre of water.

Immerse the thermostat, and keep it in the centre of the container.

Immerse the multimeter temperature probe, and keep it close to the thermostat.

Heat up the container using the thermal gun.

Check the temperature at which the thermostat starts to open:

Heat up until the thermostat is completely open.

3) Replace the thermostat if it is not working properly.

CAUTION

TO EXECUTE THE TEST CORRECTLY, MAKE SURE NEITHER THE THERMOSTAT NOR THE THERMOMETER TOUCHES THE CONTAINER.

Specific tooling

020331Y Digital multimeter

020151Y Air heater

THERMOSTAT

Specification	Desc./Quantity
Type	Wax-type, with deviator
Starts opening at	85±2°C

Refitting

- Follow the removal steps but in reverse order; be careful to tighten screws to the prescribed torque.

Locking torques (N*m)

Thermostat cover screws 3 ÷ 4

- Once the cooling circuit is restored, refill using the recommended product and purge the circuit as expressly indicated in the «Cooling System» chapter.

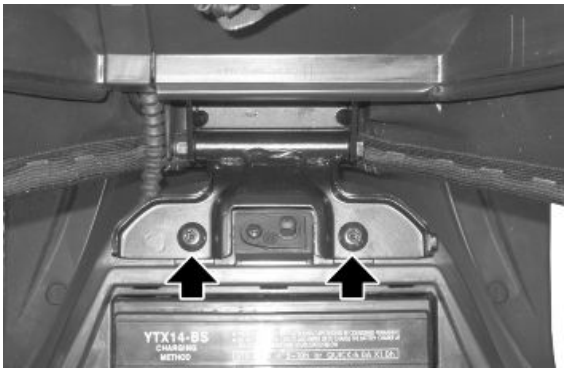
INDEX OF TOPICS

This section è is dedicated to the operations that can be carried out on the vehicle's bodywork.

Seat

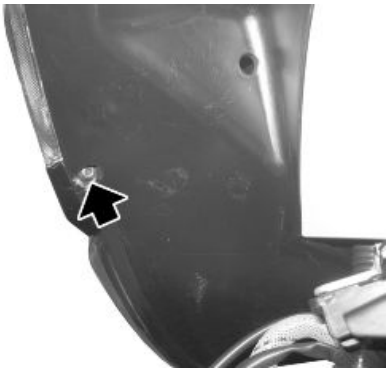
Lift the saddle and disconnect the rider detector sensor by removing the plastic cover that protects the electrical connection.

Remove the 2 fixing screws.

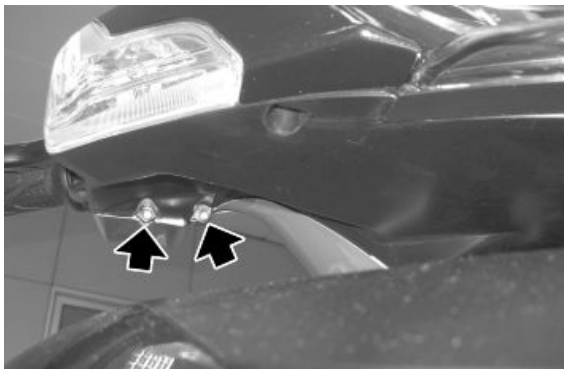


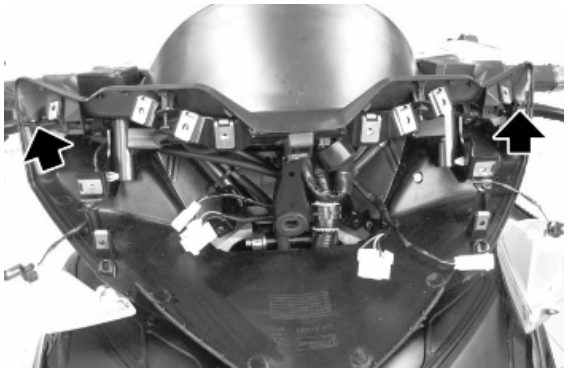
Front handlebar cover

Remove the 2 screws indicated (one on the left and one on the right).
Pull carefully the cover down so as to release the three unions at the top.

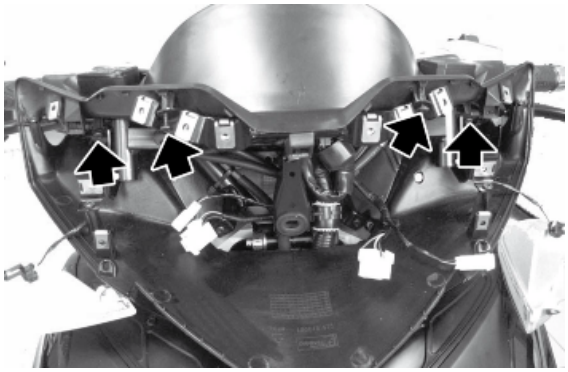


After removing the front headlight assembly and the turn indicator, remove the lower part of the handlebar cover, unscrewing the 6 screws indicated.

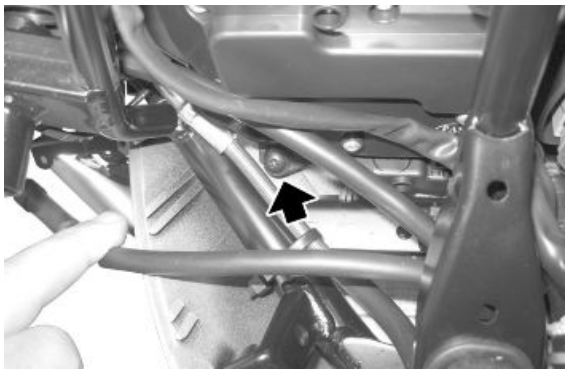


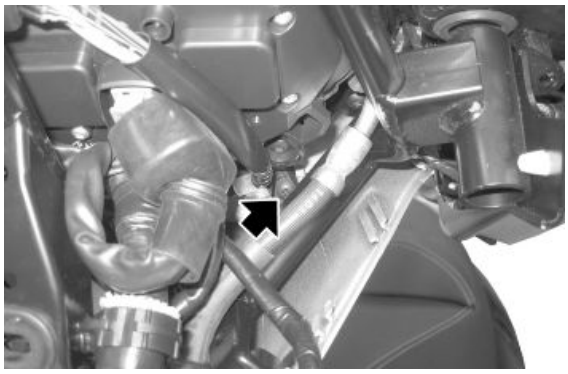


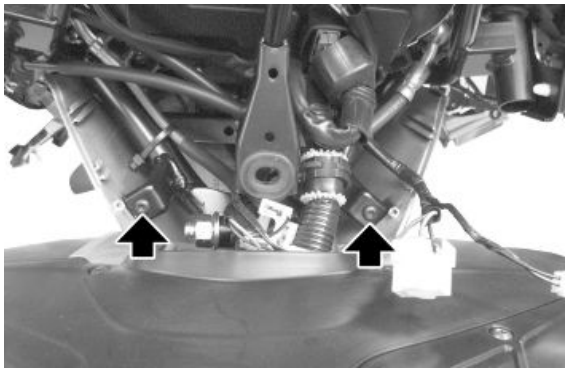
Remove the upper part of the handlebar cover, by removing the 4 screws.
Carry out the electrical disconnection of the instrument panel.



Now, by removing the 4 screws indicated, it is possible to remove the rear part of the handlebar cover.

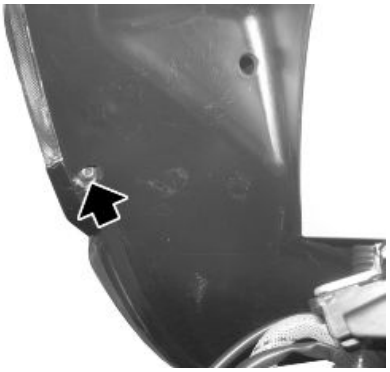






Headlight assy.

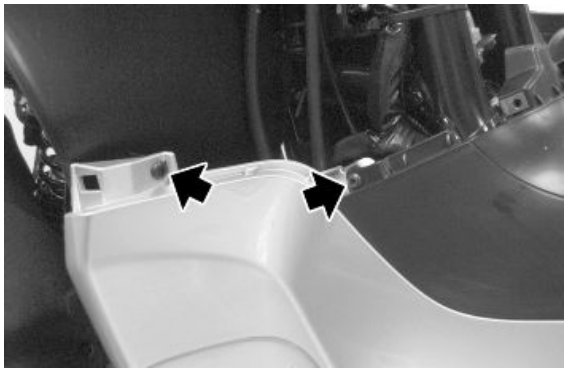
Remove the front cover of the handlebar by unscrewing the indicated screw and gently sliding off the cover itself from its unions.
Both the front headlamp and the turn indicators are reached.

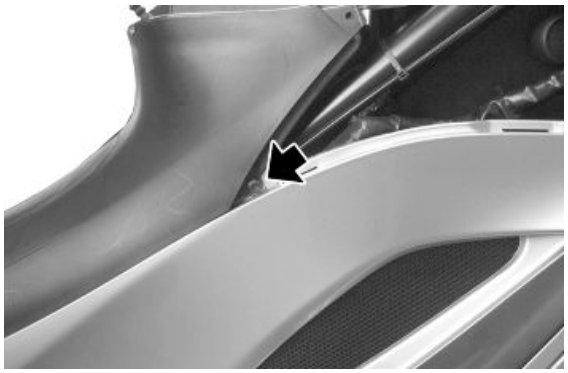


Unscrew the two central screws and the two side screws.
Carry out the electrical disconnection.

Frame central cover

Remove the shield back plate.
Remove the saddle.
Remove the side panels
Remove the screws indicated.
Remove the reservoir cap and once the central cover is raised, release the refilling compartment opening cable.



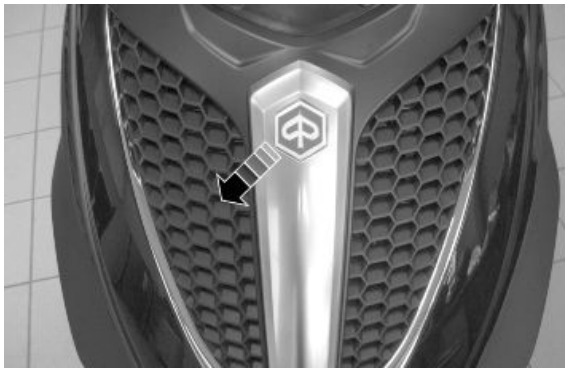


See also

Seat
Knee-guard
Handles and top side fairings

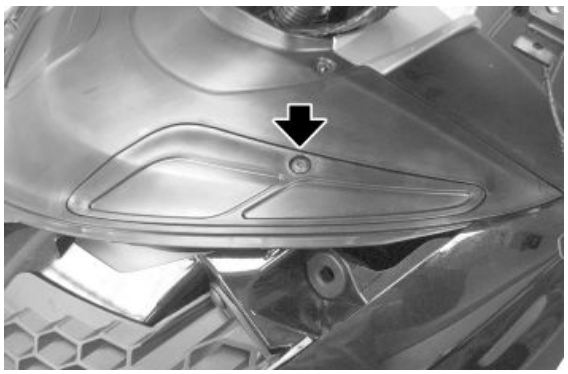
Legshield

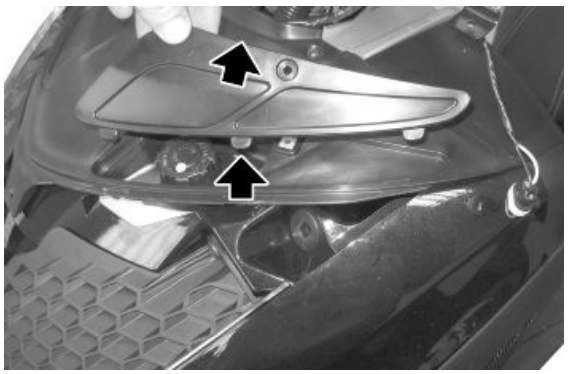
Remove the central part of the legshield. Use the tip of a small screwdriver to unlock the PIAGGIO clip-on badge.
Remove the screw below from downwards to upwards, remove the central part of the legshield.

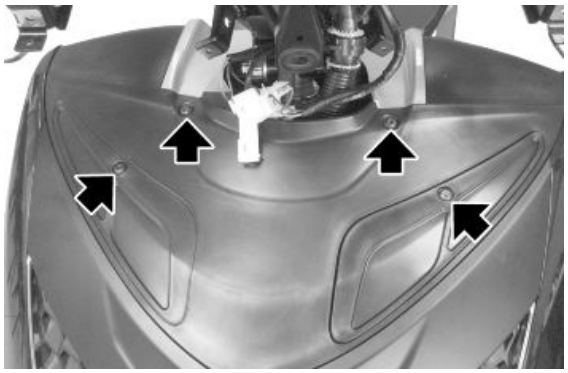


Remove the screws indicated and slide them downwards, so as to unlock the upper joints, the central part of the legshield.

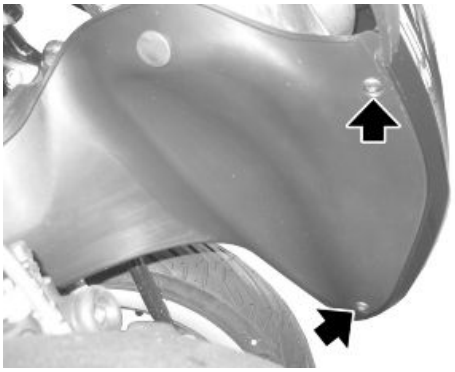
Remove the screw and the corresponding cover of the cooler expansion tank cover.
Remove the screw below and the other fixing screws of the shield-leg shield back plate upper cover.





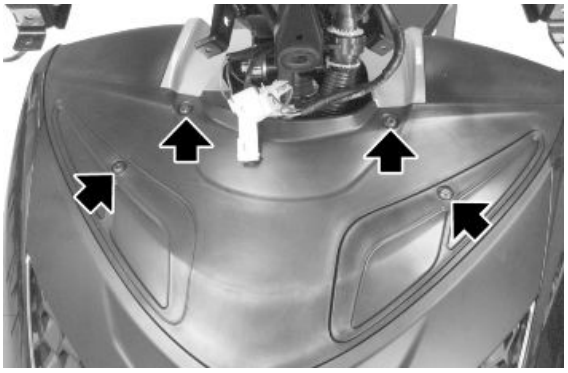


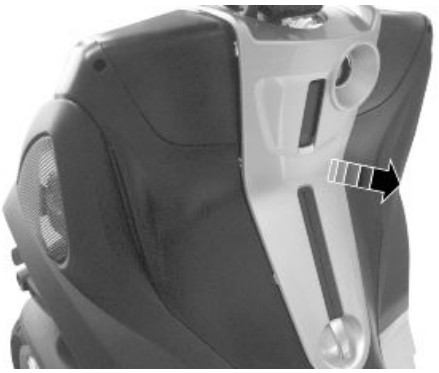
Remove the 2 screws on the leg shield back plate.
Remove the 4 screws (2 on each side) located below the mudguards.
Carefully slide the legshield downwards, unlocking it from the lateral covers.



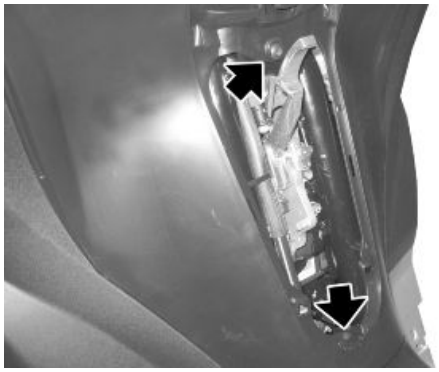
Knee-guard

- Remove the upper cover between shield-leg shield back plate.
- Rotate anticlockwise and remove the ignition block cover.
- Carefully unlock the central part of the leg shield back plate letting out the parking brake lever from the appropriate opening.

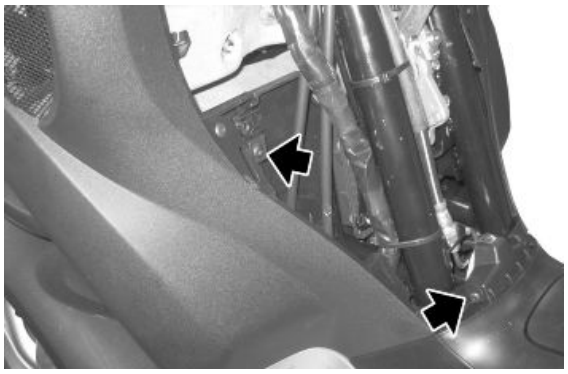


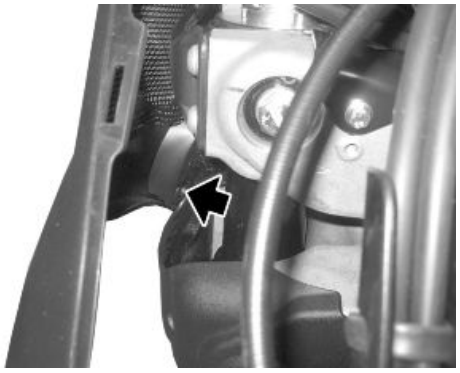


- Remove the screws indicated and unlock the shield back plate central part.



- After taking out the central part, removing the screws indicated, it is possible to disassemble the side part (one for each side) of the leg shield back plate.



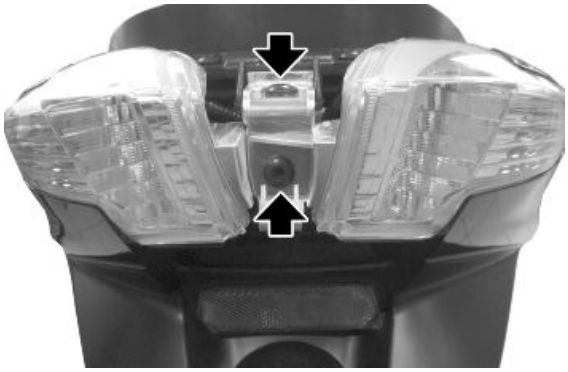


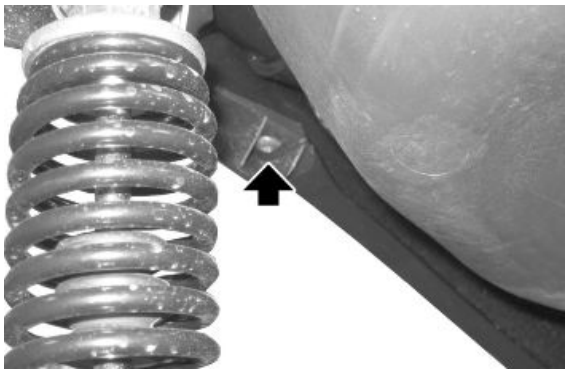
See also

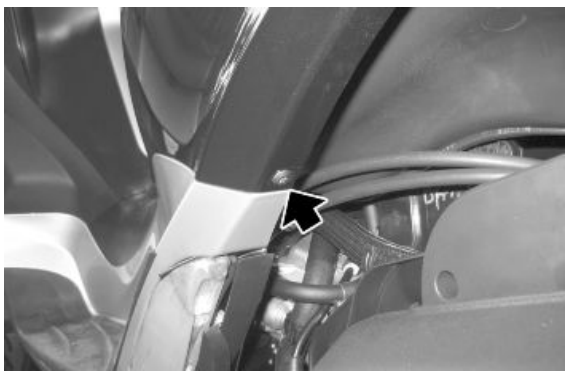
Legshield

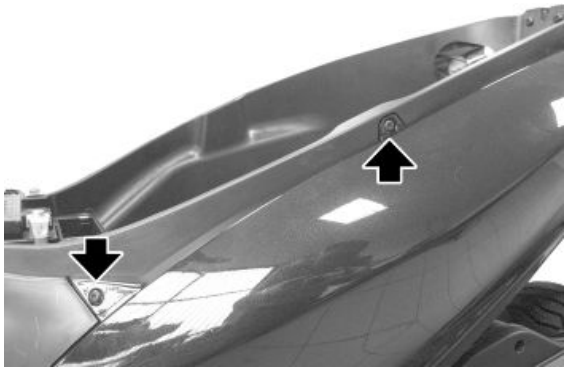
Taillight assy.

- Remove the rear grab handle.
- Remove the licence plate holder.
- Remove the two headlight assembly rear fixing screws.
- Remove the 2 side fixing screws and the union screw between the side fairing and the footrest.
- Carry out the electrical disconnection.

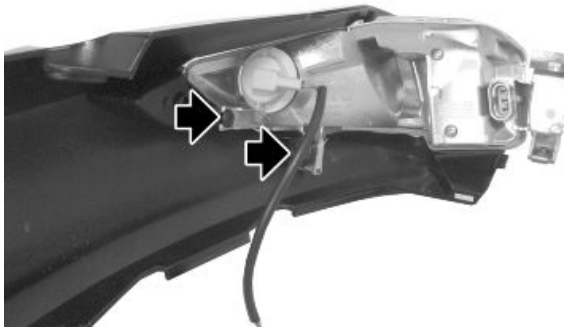






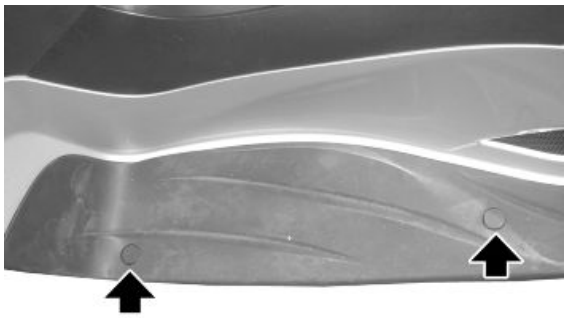


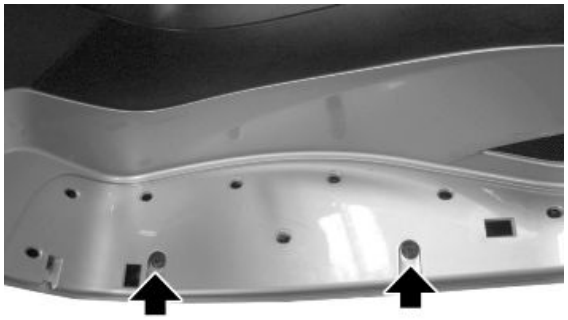
- If it is necessary to replace the rear turn indicator, remove the two indicated screws.

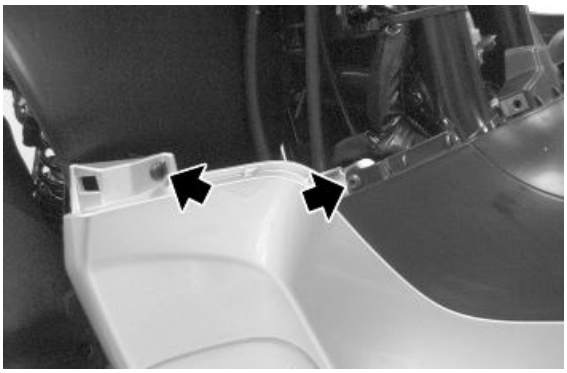


Footrest

Remove the leg shield back plate, the central cover and the rear side fairings.
Being careful not to spoil them, remove the two plastic joint stops and remove the rubber cover.
Remove the three screws placed below the rubber protection and the two screws under the vehicle.





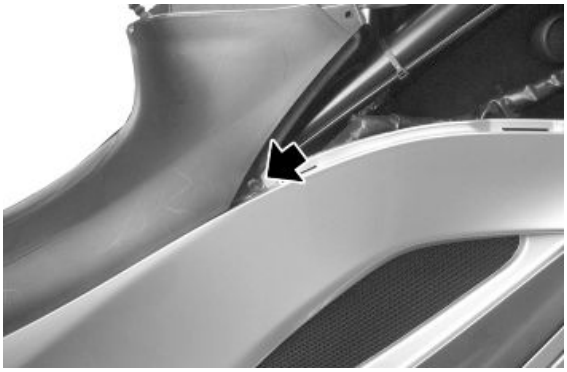


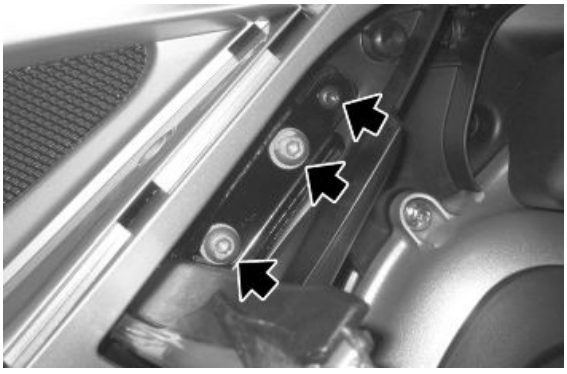
Remove the two screws located under the leg shield back plate.

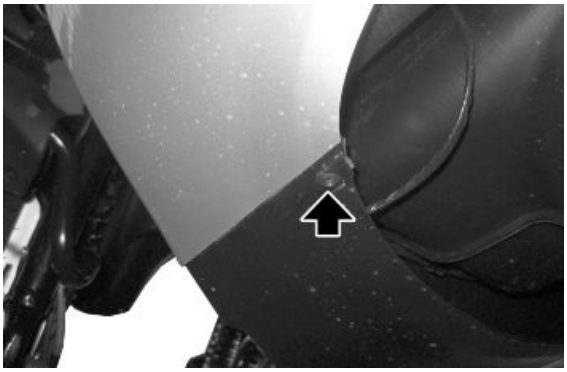
Remove the two fixing screws of the passenger footrest.

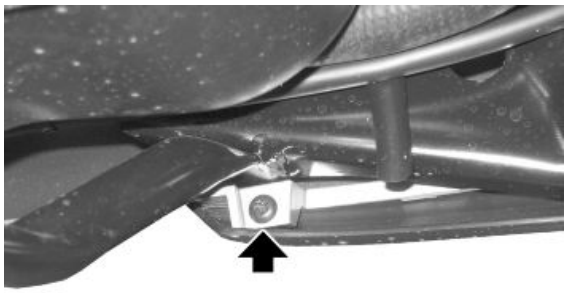
Remove the fixing screws between the footrest and the passenger footrest.

Remove the passenger footrest.









See also

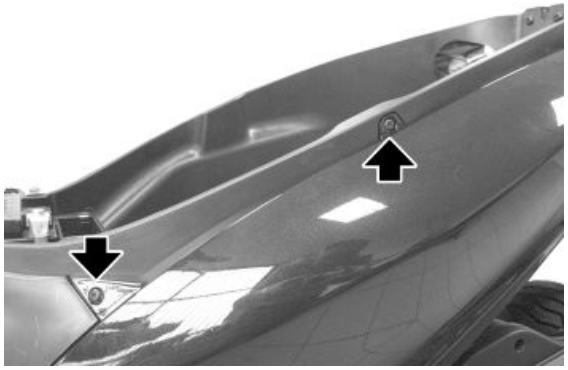
Frame central cover
Taillight assy.
Knee-guard
Side fairings

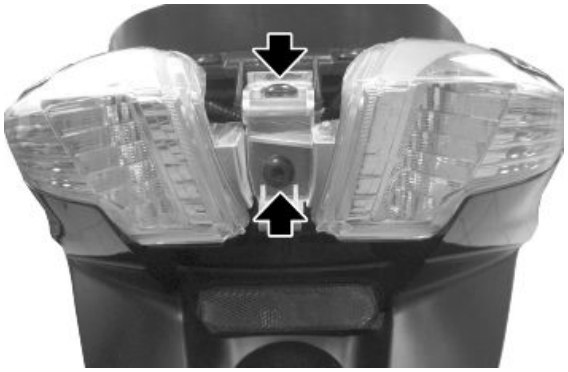
Side fairings

Remove the rear grab handle.

Open the saddle and remove the two indicated screws.

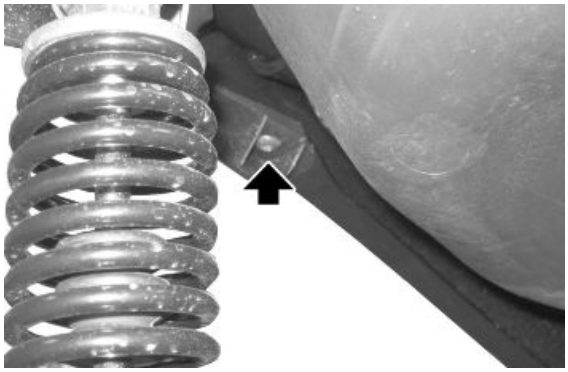
Remove the two fixing screws of the rear light unit.

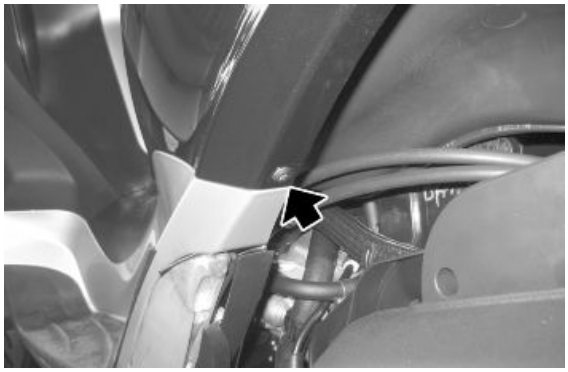




Remove the union screw with the rear license plate holder and the union screw with the footrest.

Carry out the electrical disconnection of the rear light unit.





See also

Handles and top side fairings

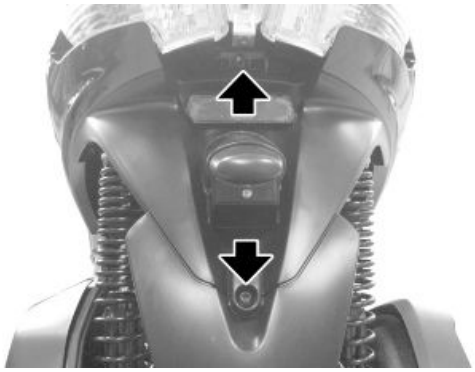
License plate holder

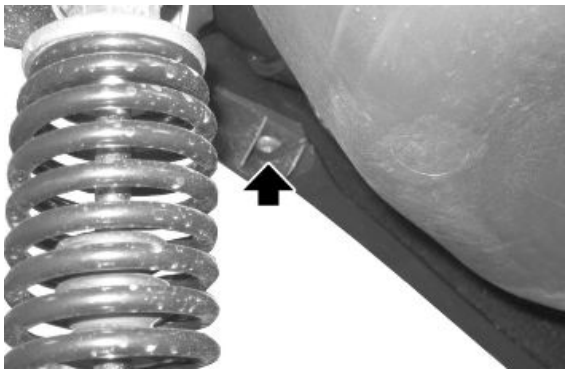
Remove the rear grab handle.

Remove the rear light unit cover.

Remove the fixing screws with the side fairings and the two central screws.

Carry out the electrical disconnection of the license plate lamp.





Helmet bay

Remove the saddle.

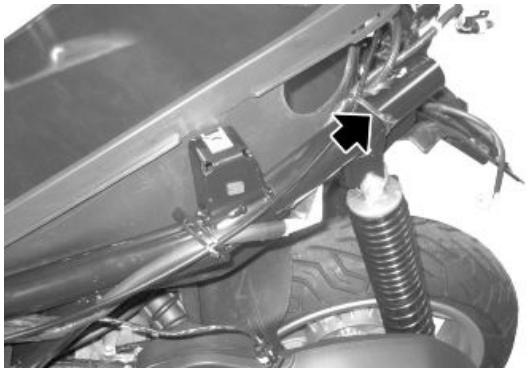
Remove the frame central cover.

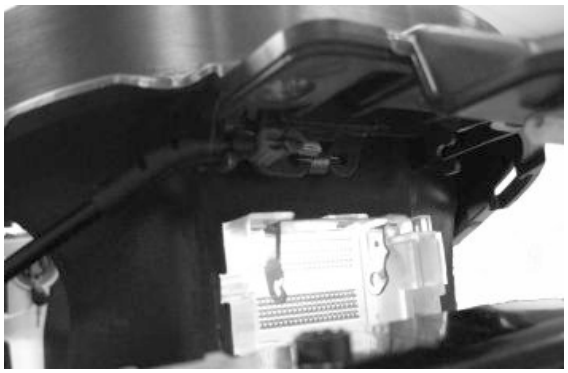
Remove the rear grab handle and the lateral fairings including the rear light unit.

Remove the battery and release the fuse-box from the unions.

Remove the saddle opening lock control cable retainer clamp.

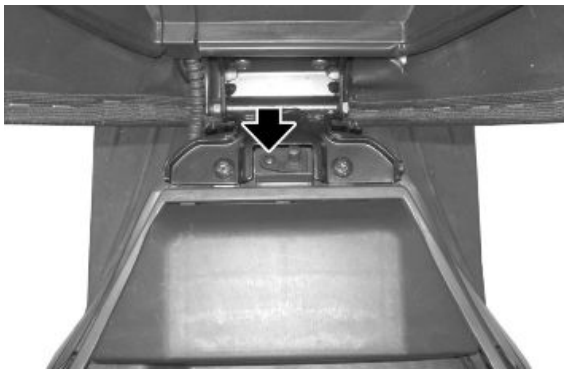
Release the saddle opening lock control cable.

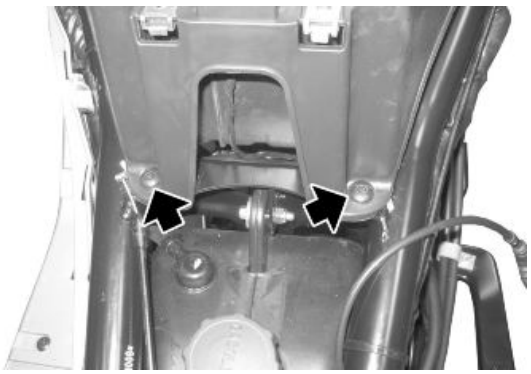


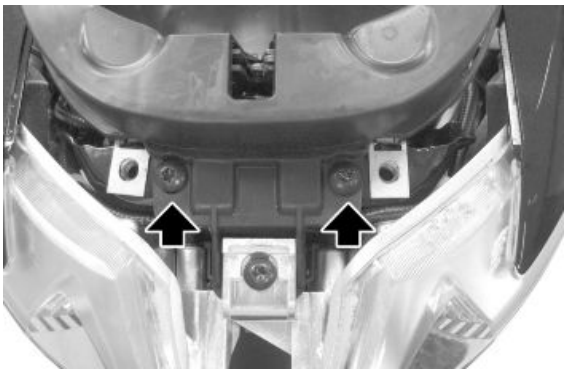


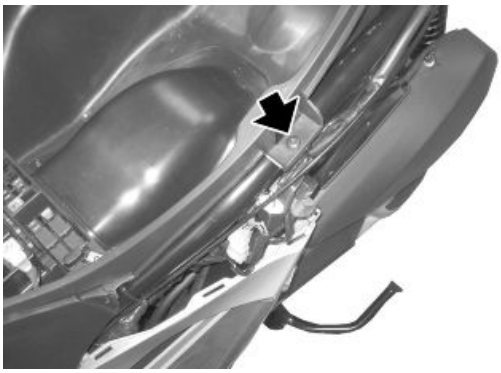
Remove the compartment light blocking switch screw helmet and carry out the electrical disconnection.

Remove the screws indicated.







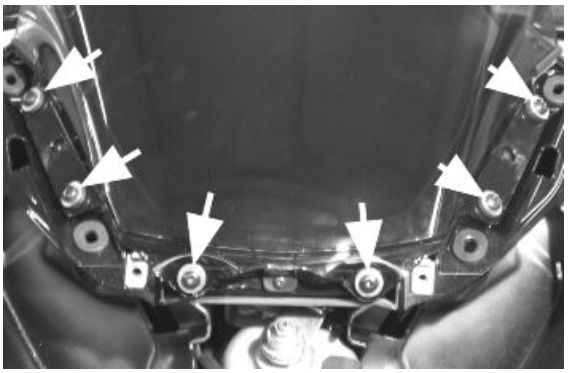


See also

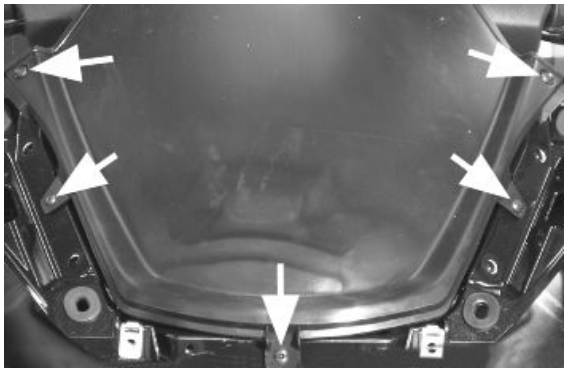
Frame central cover
Taillight assy.
Knee-guard
Side fairings
License plate holder

spoiler

Remove the shield central finish; then, screw the six screws indicated in the figure.



Remove the five screws indicated in the figure.



See also

Headlight assy.

Fuel tank

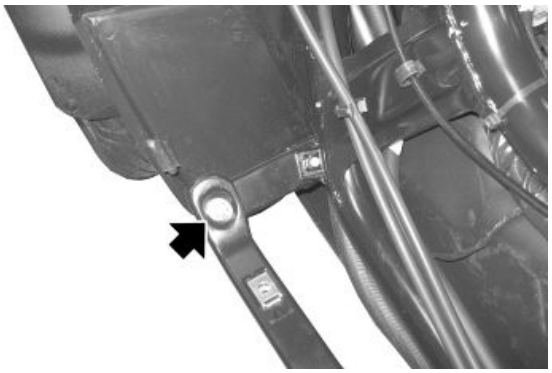
Remove the chassis central cover.

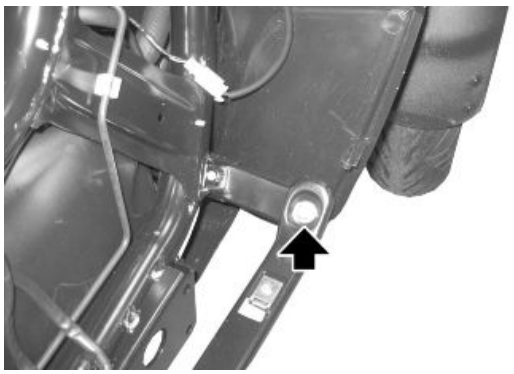
Remove the footrest.

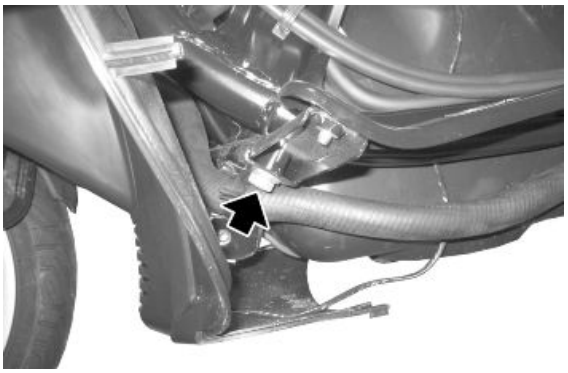
Empty the tank.

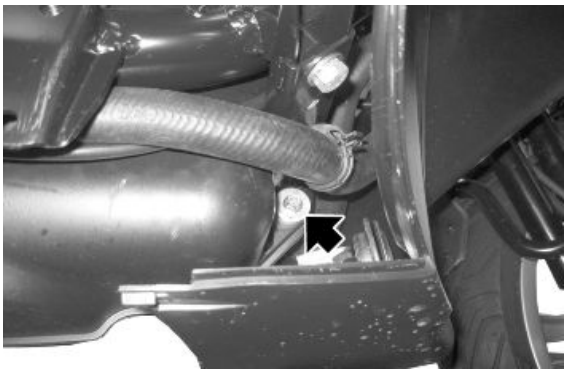
Disconnect the wiring and the fuel manifold, paying attention to its leaking.

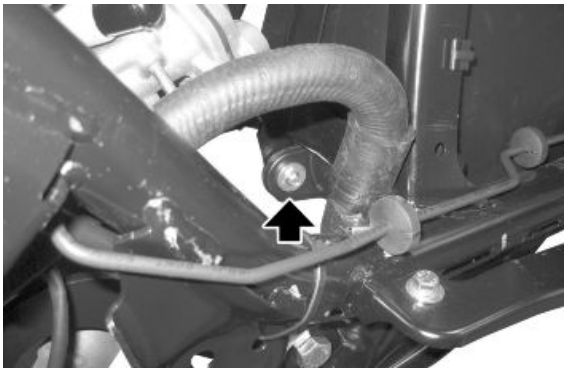
Remove the connection beam of the footrest supports by unscrewing the screws indicated and carrying out the electrical disconnection of the horn. Remove the three retainers of the tank and slide it downwards, looking out for any fuel leakage.

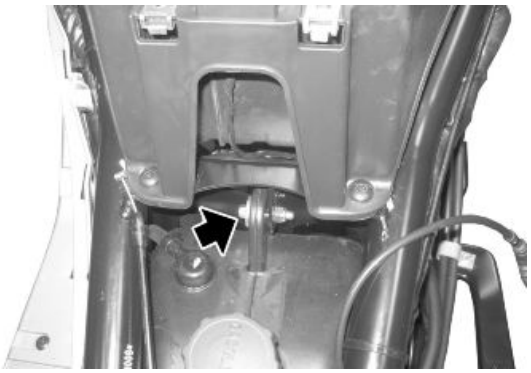












See also

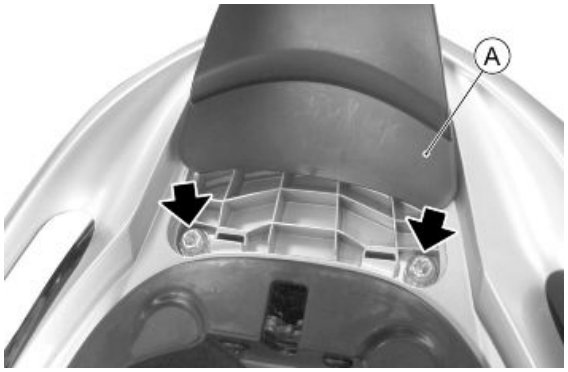
Chassis

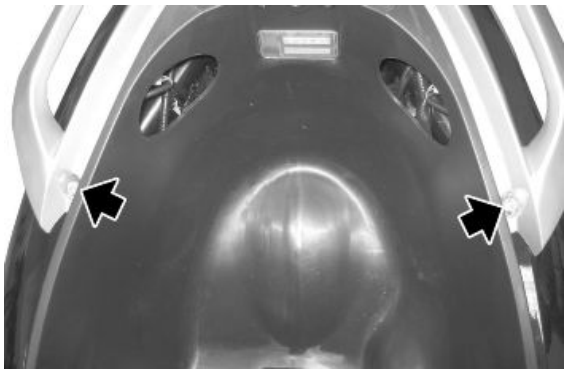
Handles and top side fairings

Remove the screw indicated and take out the rear light unit central cover.

Remove the protective cover **«A»** and the two screws below.

Open the saddle and remove the two side screws.

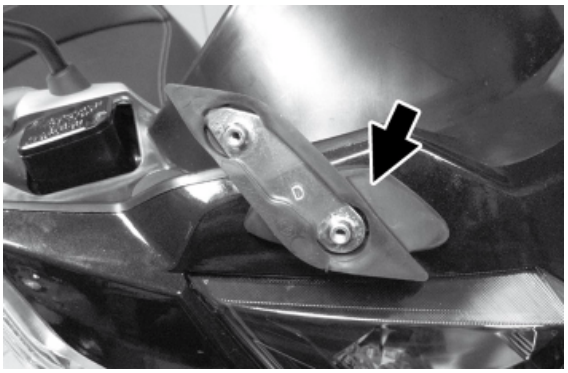


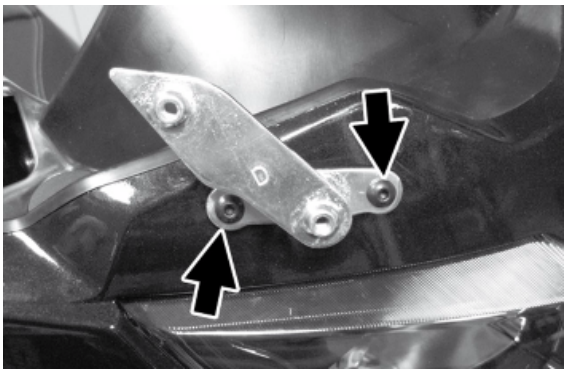


Flyscreen

Remove the windshield top fairing retaining the 4 indicated screws (2 each side).

- Remove the rubber cover.
- Remove the top fairing supports retaining the indicated screws and paying attention to the requested spacers.





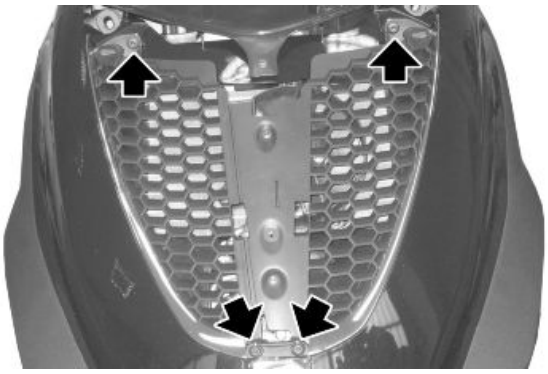
Radiator cover

Remove the PIAGGIO clip-on badge and the corresponding screw below.

Slide the central moulding downwards.

Remove the three screws indicated and pulling downwards, detach the central part of the front shield.

Remove the fours indicated screws to access the radiator.



INDEX OF TOPICS

Aesthetic inspection

Appearance check:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

Lock check

- Safety fasteners
- Fixing screws

Safety fasteners:

- Rear shock absorber upper fixing
- Rear shock absorber lower fixing
- Front shock absorber upper fixing
- Front shock absorber lower fixing
- Sliding stems fixing
- Break callipers fixing
- Front wheels fixing screws
- Front wheels axle nut
- Rear wheel axle nut
- Chassis - engine swinging arm fixing
- Handlebar lock nut
- Lower ring nut for side steering tubes
- Upper ring nut for side steering tubes
- Lower ring nut for central steering tube
- Upper ring nut for central steering tubes
- Constant-velocity universal joints

Electrical system

• Battery

• Main switch

• Lights: high beam lights, low beam lights, taillights (front and rear) and relevant warning lights

- Headlight adjustment 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 starter

• Engine stopping with emergency stop switch

• Electric opening of saddle with solenoid

• Tilting system locking - unlocking button

CAUTION

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

CAUTION

WHEN INSTALLING THE BATTERY, ATTACH THE POSITIVE LEAD FIRST AND THEN THE NEGATIVE ONE.

WARNING

BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH YOUR EYES, SKIN AND CLOTHING.
IN CASE OF CONTACT WITH YOUR EYES OR SKIN, RINSE WITH ABUNDANT WATER FOR ABOUT 15 MINUTES AND SEEK IMMEDIATE MEDICAL ATTENTION.
IF IT ACCIDENTALLY SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.
BATTERIES PRODUCE EXPLOSIVE GASES; KEEP THEM AWAY FROM NAKED FLAMES, SPARKS AND CIGARETTES. IF THE BATTERY IS CHARGED IN A CLOSED PLACE, TAKE CARE TO ENSURE ADEQUATE VENTILATION. ALWAYS PROTECT YOUR EYES WHEN WORKING CLOSE TO BATTERIES.
KEEP OUT OF THE REACH OF CHILDREN

CAUTION

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

Levels check

Level check:

- Hydraulic brake system liquid level.
- Roll lock system fluid level
- Rear hub oil level
- Engine coolant level
- Engine oil level

Road test

Test ride

- Cold start
- Instrument operations
- Response to the gas command

- Stability on acceleration and braking
- Rear and front brake efficiency
- Parking brake efficiency
- Rear and front suspension efficiency
- Abnormal noise
- Tilting system locking - unlocking efficiency

Static test

Static control after the test ride:

• Hot engine restart
• Minimum seal (turning the handlebar)
• Uniform steering rotation
• Possible losses
• electric radiator fan operation

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

CAUTION

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

Functional inspection

Functional Checks:

• Hydraulic braking system: lever travel
• Clutch: proper functioning check
• Engine: proper general functioning and no abnormal noise check
• Other: papers check, chassis and engine number check, tools and equipment, licence plate fitting, lock check, tyre pressure check, rear-view mirror and any accessory fitting

V