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

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

N.B. Provides key information to make the procedure easier to understand and carry out.

CAUTION Refers to specific procedures to carry out for preventing damages to the vehicle.

WARNING Refers to specific procedures to carry out to prevent injuries to the repairer.

Personal safety Failure to completely observe these instructions will result in serious risk of personal injury.

Safeguarding the environment Sections marked with this symbol indicate the correct use of the vehicle to prevent damaging the environment.

Vehicle intactness The incomplete or non-observance of these regulations leads to the risk of serious damage to the vehicle and sometimes even the invalidity of the guarantee.
<table>
<thead>
<tr>
<th>INDEX OF TOPICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHARACTERISTICS</td>
</tr>
<tr>
<td>TOOLING</td>
</tr>
<tr>
<td>MAINTENANCE</td>
</tr>
<tr>
<td>TROUBLESHOOTING</td>
</tr>
<tr>
<td>ELECTRICAL SYSTEM</td>
</tr>
<tr>
<td>ENGINE FROM VEHICLE</td>
</tr>
<tr>
<td>ENGINE</td>
</tr>
<tr>
<td>SUSPENSIONS</td>
</tr>
<tr>
<td>PURE JET INJECTION</td>
</tr>
<tr>
<td>BRAKING SYSTEM</td>
</tr>
<tr>
<td>COOLING SYSTEM</td>
</tr>
<tr>
<td>CHASSIS</td>
</tr>
<tr>
<td>PRE-DELIVERY</td>
</tr>
<tr>
<td>TIME</td>
</tr>
</tbody>
</table>
Rules

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

Safety rules

- If work can only be done on the vehicle with the engine running, make sure that the premises are well-ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.

- The battery electrolyte contains sulphuric acid. Protect your eyes, clothes and skin. Sulphuric acid is highly corrosive; in the event of contact with your eyes or skin, rinse thoroughly with abundant water and seek immediate medical attention.

- The battery produces hydrogen, a gas that can be highly explosive. Do not smoke and avoid sparks or flames near the battery, especially when charging it.

- Fuel is highly flammable and it can be explosive given some conditions. Do not smoke in the working area, and avoid open flames or sparks.

- Clean the brake pads in a well-ventilated area, directing the jet of compressed air in such a way that you do not breathe in the dust produced by the wear of the friction material. Even though the latter contains no asbestos, inhaling dust is harmful.

Maintenance rules

- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.

- Use only the appropriate tools designed for this vehicle.

- Always use new gaskets, sealing rings and split pins upon refitting.

- After removal, clean the components using non-flammable or low flash-point solvent. Lubricate all the work surfaces except the tapered couplings before refitting.

- After refitting, make sure that all the components have been installed correctly and work properly.

- For removal, overhaul and refit operations use only tools with metric measures. Metric bolts, nuts and screws are not interchangeable with coupling members with English measurement. Using unsuitable coupling members and tools may damage the scooter.

- When carrying out maintenance operations on the vehicle that involve the electrical system, make sure the electric connections have been made properly, particularly the ground and battery connections.
Vehicle identification

Frame prefix: ZAPC45200 × 1001
Engine prefix: C452M

Dimensions and mass

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max length</td>
<td>1790 mm.</td>
</tr>
<tr>
<td>Max width</td>
<td>850 mm.</td>
</tr>
<tr>
<td>Seat height</td>
<td>795 mm.</td>
</tr>
<tr>
<td>Wheelbase</td>
<td>1280 mm</td>
</tr>
<tr>
<td>Dry weight</td>
<td>99 kg.</td>
</tr>
</tbody>
</table>
## Engine

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGINE</strong></td>
<td></td>
</tr>
<tr>
<td>Engine type</td>
<td>2 stroke single cylinder Piaggio HI-PER2 PRO PUREJET</td>
</tr>
<tr>
<td>Bore x stroke</td>
<td>40 X 39.3 mm</td>
</tr>
<tr>
<td>Cubic capacity</td>
<td>49.40 cc</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>9.4 to 10.4 :1</td>
</tr>
<tr>
<td>Throttle body</td>
<td>BING Ø18mm</td>
</tr>
<tr>
<td>Engine idle speed</td>
<td>1800 to 2000 r.p.m.</td>
</tr>
<tr>
<td>Air filter</td>
<td>Sponge impregnated with fuel mixture (50% SELENIA air filter oil and 50% unleaded petrol)</td>
</tr>
<tr>
<td>Starting system</td>
<td>electric starter/kickstarter</td>
</tr>
<tr>
<td>Cooling system</td>
<td>forced coolant circulation system</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Engine lubrication (piston, cylinder, crankshaft, main bearings) with mixer oil</td>
</tr>
<tr>
<td>Fuel supply</td>
<td>With electric fuel pump, controlled by the ECU and unleaded petrol (with 95 octane minimum) via throttle body</td>
</tr>
<tr>
<td>Cooling system</td>
<td>Through circulation of cooling liquid</td>
</tr>
</tbody>
</table>
### Transmission

<table>
<thead>
<tr>
<th>Specification</th>
<th>TRANSMISSION</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission</td>
<td>With automatic expandable pulley variator, torque server, V belt, automatic clutch, gear reduction unit.</td>
<td></td>
</tr>
</tbody>
</table>

### Capacities

<table>
<thead>
<tr>
<th>Specification</th>
<th>CAPACITIES</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear hub oil</td>
<td>Quantity: approx. 75 cm³</td>
<td></td>
</tr>
<tr>
<td>Mixer oil</td>
<td>1.2 litres</td>
<td></td>
</tr>
<tr>
<td>Fuel tank capacity</td>
<td>6.5 litres (1.5 litres of reserve)</td>
<td></td>
</tr>
</tbody>
</table>

### Electrical system

<table>
<thead>
<tr>
<th>Specification</th>
<th>ELECTRICAL SYSTEM</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition type</td>
<td>Electronic ignition system with integrated H.T. coil managed by ECU</td>
<td></td>
</tr>
<tr>
<td>Ignition advance (before TDC)</td>
<td>variable (integrated into the ignition system)</td>
<td></td>
</tr>
<tr>
<td>Recommended spark plug type</td>
<td>CHAMPION RG6YCA</td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>12V-9Ah</td>
<td></td>
</tr>
<tr>
<td>Main fuse</td>
<td>20A</td>
<td></td>
</tr>
<tr>
<td>Generator</td>
<td>Three-phase alternating current</td>
<td></td>
</tr>
</tbody>
</table>

### Frame and suspensions

<table>
<thead>
<tr>
<th>Specification</th>
<th>FRAME AND SUSPENSIONS</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis type</td>
<td>Welded tubular steel chassis with stamped sheet reinforcements</td>
<td></td>
</tr>
<tr>
<td>Front suspension</td>
<td>upside-down hydraulic telescopic fork.</td>
<td></td>
</tr>
<tr>
<td>Front suspension travel</td>
<td>75 mm</td>
<td></td>
</tr>
<tr>
<td>Rear suspension</td>
<td>With coaxial spring and hydraulic shock absorber. Chassis to engine support with swinging arm.</td>
<td></td>
</tr>
</tbody>
</table>

### Brakes

<table>
<thead>
<tr>
<th>Specification</th>
<th>BRAKES</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front brake</td>
<td>Ø 220 mm disc brake with hydraulic linkage (r.h. brake lever).</td>
<td></td>
</tr>
<tr>
<td>Rear brake</td>
<td>Ø 175 mm disc (hydraulically controlled via lever on left hand-side of handlebar)</td>
<td></td>
</tr>
</tbody>
</table>
### Wheels and Tyres

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front tyre</td>
<td>Tubeless 120/70-13&quot;</td>
</tr>
<tr>
<td>Rear tyre</td>
<td>Tubeless 140/60 x 13&quot;</td>
</tr>
<tr>
<td>Wheels</td>
<td>With circles of 3.50 x 13&quot; in light alloy.</td>
</tr>
</tbody>
</table>

### Tightening Torques

#### Steering Assembly

<table>
<thead>
<tr>
<th>Name</th>
<th>Torque in Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper steering ring nut (safety locks)</td>
<td>35 to 40 Nm</td>
</tr>
<tr>
<td>Lower steering ring nut (safety locks)</td>
<td>8 to 10 Nm</td>
</tr>
<tr>
<td>Handlebar fixing pin (safety locks)</td>
<td>45 to 50 Nm</td>
</tr>
</tbody>
</table>

#### Frame Assembly

<table>
<thead>
<tr>
<th>Name</th>
<th>Torque in Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swinging arm-engine pin (safety locks)</td>
<td>33 to 41 Nm</td>
</tr>
<tr>
<td>Swinging arm-frame pin (safety locks)</td>
<td>64 to 72 Nm</td>
</tr>
<tr>
<td>Shock absorber - frame nut (safety locks)</td>
<td>20 to 25 Nm</td>
</tr>
<tr>
<td>Shock absorber-engine pin (safety locks)</td>
<td>33 to 41 Nm</td>
</tr>
<tr>
<td>Rear wheel axis (safety locks)</td>
<td>104 to 126 Nm</td>
</tr>
<tr>
<td>Bolt holding stand to the engine</td>
<td>18 to 19 Nm</td>
</tr>
<tr>
<td>Side stand fixing screw</td>
<td>12 ÷ 20</td>
</tr>
<tr>
<td>Side stand bracket fixing screw</td>
<td>15 ÷ 20</td>
</tr>
<tr>
<td>Rear rim fixing screw</td>
<td>20 ÷ 25</td>
</tr>
</tbody>
</table>

#### Front Suspension

<table>
<thead>
<tr>
<th>Name</th>
<th>Torque in Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front wheel axle nut (safety locks)</td>
<td>45 to 50 Nm</td>
</tr>
<tr>
<td>Wheel axle clamp screw</td>
<td>6 ÷ 7 Nm</td>
</tr>
<tr>
<td>Lower leg screw</td>
<td>15 to 20 Nm</td>
</tr>
<tr>
<td>Hydraulic cartridge stem nut</td>
<td>15 to 18 Nm</td>
</tr>
</tbody>
</table>

#### Front Brake

<table>
<thead>
<tr>
<th>Name</th>
<th>Torque in Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viti fissaggio coperchio pompa freno</td>
<td>1,5 ÷ 2 Nm</td>
</tr>
<tr>
<td>Brake pump support fixing screw</td>
<td>7 to 10 Nm</td>
</tr>
<tr>
<td>Brake fluid pump - hose fitting</td>
<td>13 to 18 Nm</td>
</tr>
<tr>
<td>Brake fluid tube - calliper fitting</td>
<td>20 to 25 Nm</td>
</tr>
<tr>
<td>Calliper tightening screw</td>
<td>20 to 25 Nm</td>
</tr>
<tr>
<td>Disc tightening screw (safety locks - lock with LOCTITE THREADLOCK MEDIUM TYPE 243)</td>
<td>6 ÷ 7 Nm</td>
</tr>
<tr>
<td>Oil bleed screw</td>
<td>7 to 10 Nm</td>
</tr>
<tr>
<td>Calliper coupling screw</td>
<td>20 to 25 Nm</td>
</tr>
</tbody>
</table>

#### Rear Brake

<table>
<thead>
<tr>
<th>Name</th>
<th>Torque in Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastening screws calliper to the crankcase</td>
<td>20 - 25</td>
</tr>
</tbody>
</table>
### Torque in Nm

<table>
<thead>
<tr>
<th>Name</th>
<th>Torque in Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake reservoir cover fixing screw</td>
<td>2÷4 N·m (Grimeca) - 0,8÷1,5 N·m (Brembo) - 1,5÷2 N·m (Hengtong)</td>
</tr>
<tr>
<td>Brake pump support fixing screw</td>
<td>7 to 10 Nm</td>
</tr>
<tr>
<td>Brake fluid pump - hose fitting</td>
<td>13 to 18 Nm</td>
</tr>
<tr>
<td>Brake fluid tube - calliper fitting</td>
<td>20 to 25 Nm</td>
</tr>
<tr>
<td>Oil bleed screw</td>
<td>7 to 10 Nm</td>
</tr>
</tbody>
</table>

### ENGINE UNIT

<table>
<thead>
<tr>
<th>Name</th>
<th>Torque in Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch bell nut</td>
<td>40 to 44 Nm</td>
</tr>
<tr>
<td>Clutch lock ring nut</td>
<td>55 ÷ 60</td>
</tr>
<tr>
<td>nut locking driving pulley on the crankshaft</td>
<td>40 to 44 Nm</td>
</tr>
<tr>
<td>Start-up lever screw</td>
<td>12 ÷ 13</td>
</tr>
<tr>
<td>Flywheel nut</td>
<td>40 to 44 Nm</td>
</tr>
<tr>
<td>Flywheel fan screws</td>
<td>3 ÷ 4</td>
</tr>
<tr>
<td>Half-crank case joint bolts</td>
<td>12 ÷ 13</td>
</tr>
<tr>
<td>Bolts holding exhaust pipe to the crankcase</td>
<td>22 ÷ 24</td>
</tr>
<tr>
<td>Screws holding the filter box to the crank case</td>
<td>4 ÷ 5</td>
</tr>
<tr>
<td>Head nuts</td>
<td>10 ÷ 11</td>
</tr>
<tr>
<td>Temperature ECU sensor</td>
<td>18÷22 N·m</td>
</tr>
<tr>
<td>Termistor</td>
<td>6÷8 N·m</td>
</tr>
<tr>
<td>Starter screws</td>
<td>12 ÷ 13</td>
</tr>
<tr>
<td>Ignition spark plug</td>
<td>25 ÷ 30</td>
</tr>
<tr>
<td>Hub oil drainage cap</td>
<td>3 ÷ 5</td>
</tr>
<tr>
<td>Oil hub level dipstick</td>
<td>Manual</td>
</tr>
<tr>
<td>Rear hub cap screws</td>
<td>12 ÷ 13</td>
</tr>
<tr>
<td>Transmission cover screws</td>
<td>12 ÷ 13</td>
</tr>
<tr>
<td>Inlet manifold screws</td>
<td>8 ÷ 9</td>
</tr>
<tr>
<td>Flywheel hood fixing screws</td>
<td>1 ÷ 2</td>
</tr>
<tr>
<td>Cylinder hood fixing screws</td>
<td>3.5 ÷ 5</td>
</tr>
<tr>
<td>Stator clamping screws</td>
<td>3 ÷ 4</td>
</tr>
<tr>
<td>Pick-Up clamping screw</td>
<td>4 ÷ 5</td>
</tr>
<tr>
<td>Mixer clamping screws</td>
<td>3 ÷ 4</td>
</tr>
<tr>
<td>Screw fixing brake lever to the journal on the engine</td>
<td>12 ÷ 13</td>
</tr>
</tbody>
</table>

### Overhaul data

### Assembly clearances

### Cylinder - piston assy.

#### CYLINDER-PISTON FITTING

<table>
<thead>
<tr>
<th>Name</th>
<th>Initials</th>
<th>Cylinder</th>
<th>Piston</th>
<th>Play on fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard fitting M</td>
<td>M</td>
<td>39.997-40.004</td>
<td>39.943-39.95</td>
<td>0.047-0.061</td>
</tr>
<tr>
<td>Standard fitting N</td>
<td>N</td>
<td>40.004-40.011</td>
<td>39.95-39.957</td>
<td>0.047-0.061</td>
</tr>
<tr>
<td>Standard fitting O</td>
<td>O</td>
<td>40.011-40.018</td>
<td>39.957-39.964</td>
<td>0.047-0.061</td>
</tr>
<tr>
<td>Standard fitting P</td>
<td>P</td>
<td>40.018-40.025</td>
<td>39.964-39.971</td>
<td>0.047-0.061</td>
</tr>
<tr>
<td>1st oversize fitting M1</td>
<td>M1</td>
<td>40.197-40.204</td>
<td>40.143-40.15</td>
<td>0.047-0.061</td>
</tr>
<tr>
<td>1st oversize fitting N1</td>
<td>N1</td>
<td>40.204-40.211</td>
<td>40.15-40.157</td>
<td>0.047-0.061</td>
</tr>
</tbody>
</table>
### Piston rings

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Dimensions</th>
<th>Initials</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression ring</td>
<td>40</td>
<td>A</td>
<td></td>
<td>0.10 to 0.25</td>
</tr>
<tr>
<td>Compression ring 1st oversize</td>
<td>40.2</td>
<td>A</td>
<td></td>
<td>0.10 to 0.25</td>
</tr>
<tr>
<td>Compression ring 2nd Oversize</td>
<td>40.4</td>
<td>A</td>
<td></td>
<td>0.10 to 0.25</td>
</tr>
</tbody>
</table>

### Crankcase - crankshaft - connecting rod

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Dimensions</th>
<th>Initials</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting rod</td>
<td>11.750-0.05</td>
<td>A</td>
<td></td>
<td>clearance ( E = 0.25 ) to 0.50</td>
</tr>
<tr>
<td>shoulder washer</td>
<td>0.5 ± 0.03</td>
<td>G</td>
<td></td>
<td>clearance ( E = 0.25 ) to 0.50 - clearance ( F = 0.20 ) to 0.75</td>
</tr>
</tbody>
</table>
Slot packing system

- Fit the cylinder without installing the basic gasket.
- Apply a centimetre dial gauge on the special tool and zero it on the ground plane
- Fit the tool to the top of the cylinder fixing it with two nuts to the studbolts and take the piston to the T.D.C.
- The thickness of the gasket to fit will change depending on the value detected. For this purpose, there are three with different thicknesses

Specific tooling

020272Y Piston position check tool

<table>
<thead>
<tr>
<th>Name</th>
<th>Measure A</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shimming</td>
<td>2.80 ÷ 3.04</td>
<td>0.4</td>
</tr>
<tr>
<td>Shimming</td>
<td>3.04 ÷ 3.24</td>
<td>0.6</td>
</tr>
<tr>
<td>Shimming</td>
<td>3.25 ÷ 3.48</td>
<td>0.8</td>
</tr>
</tbody>
</table>
## Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGIP ROTRA 80W-90</td>
<td>Rear hub oil</td>
<td>SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications</td>
</tr>
<tr>
<td>AGIP CITY HI TEC 4T</td>
<td>Oil for flexible transmission lubrication (brake, throttle control and mixer, odometer)</td>
<td>Oil for 2-stroke engines: SAE 5W-40, API SL, ACEA A3, JASO MA</td>
</tr>
<tr>
<td>AGIP FILTER OIL</td>
<td>Oil for air filter sponge</td>
<td>Mineral oil with specific additives for increased adhesiveness</td>
</tr>
<tr>
<td>AGIP CITY TEC 2T</td>
<td>Mixer oil</td>
<td>Synthetic oil for 2-stroke engines: JASO FC, ISO-L-EGD</td>
</tr>
<tr>
<td>AGIP GP 330</td>
<td>Grease for brake levers, throttle</td>
<td>White calcium complex soap-based spray grease with NLGI 2; ISO-L-XBCIB2</td>
</tr>
<tr>
<td>AGIP GREASE SM 2</td>
<td>Grease for the tone wheel revolving ring</td>
<td>Soap-based lithium grease containing NLGI 2 Molybdenum disulphide; ISO-L-XBCBH2, DIN KF2K-20</td>
</tr>
<tr>
<td>AGIP BRAKE 4</td>
<td>Brake fluid</td>
<td>FMVSS DOT4 Synthetic fluid</td>
</tr>
<tr>
<td>MONTBLANC MOLYBDENUM GREASE</td>
<td>Grease for driven pulley shaft adjusting ring and movable driven pulley housing</td>
<td>Molybdenum disulphide grease</td>
</tr>
<tr>
<td>AGIP GREASE PV2</td>
<td>Grease for the steering bearings, pin seats and swinging arm</td>
<td>White anhydrous-calcium based protective grease for roller bearings; temperature range between -20 C and +120 C; NLGI 2; ISO-L-XBCIB2.</td>
</tr>
<tr>
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</tr>
<tr>
<td>--------------</td>
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<td></td>
</tr>
<tr>
<td>001330Y</td>
<td>Tool for fitting steering seats</td>
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</tr>
<tr>
<td>001467Y006</td>
<td>Pliers to extract 20 mm bearings</td>
<td></td>
</tr>
<tr>
<td>001467Y007</td>
<td>Driver for OD 54 mm bearing</td>
<td></td>
</tr>
<tr>
<td>001467Y008</td>
<td>Pliers to extract 17 mm ø bearings</td>
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<tr>
<td>001467Y009</td>
<td>Driver for OD 42 mm bearings</td>
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</tr>
<tr>
<td>001467Y013</td>
<td>Pliers to extract ø 15-mm bearings</td>
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</tr>
<tr>
<td>001467Y014</td>
<td>Pliers to extract ø 15-mm bearings</td>
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<tr>
<td>001467Y017</td>
<td>Bell for bearings, outside Ø 39 mm</td>
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</tr>
<tr>
<td>001467Y021</td>
<td>Extraction pliers for ø 11 mm bearings</td>
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<td>001467Y029</td>
<td>Bell for bearings, O.D. 38 mm</td>
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<tr>
<td>002465Y</td>
<td>Pliers for circlips</td>
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</tr>
<tr>
<td>004499Y</td>
<td>Camshaft bearing extractor</td>
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</tr>
<tr>
<td>Stores code</td>
<td>Description</td>
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</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------</td>
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</tr>
<tr>
<td>004999Y007</td>
<td>Half rings</td>
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</tr>
<tr>
<td>006029Y</td>
<td>Punch for fitting fifth wheel seat on steering tube</td>
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<tr>
<td>020004Y</td>
<td>Punch for removing fifth wheels from headstock</td>
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<tr>
<td>020055Y</td>
<td>Wrench for steering tube ring nut</td>
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<tr>
<td>020074Y</td>
<td>Support base for checking crankshaft alignment</td>
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<tr>
<td>020080Y</td>
<td>Punch for removing 12-mm bearings</td>
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<tr>
<td>020150Y</td>
<td>Air heater support</td>
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<tr>
<td>020151Y</td>
<td>Air heater</td>
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<tr>
<td>020162Y</td>
<td>Flywheel extractor</td>
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<tr>
<td>020163Y</td>
<td>Crankcase splitting plate</td>
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<tr>
<td>020164Y</td>
<td>Driven pulley assembly sheath</td>
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<tr>
<td>020166Y</td>
<td>Pin lock fitting tool</td>
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</tr>
<tr>
<td>020168Y</td>
<td>Water seal punch mount on half-</td>
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<tr>
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<td>crankcase</td>
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<td>Stores code</td>
<td>Description</td>
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</tr>
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<td>------------</td>
<td>-----------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>020169Y</td>
<td>Water pump crankshaft fitting and removal spanner</td>
<td></td>
</tr>
<tr>
<td>020170Y</td>
<td>Water pump/mixer command gear extractor</td>
<td></td>
</tr>
<tr>
<td>020171Y</td>
<td>Punch for driven pulley roller bearing</td>
<td></td>
</tr>
<tr>
<td>020209Y</td>
<td>Spring hook</td>
<td></td>
</tr>
<tr>
<td>020265Y</td>
<td>Bearing fitting base</td>
<td></td>
</tr>
<tr>
<td>Stores code</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>020272Y</td>
<td>Piston position check tool</td>
<td></td>
</tr>
<tr>
<td>020325Y</td>
<td>Brake-shoe spring calliper</td>
<td></td>
</tr>
<tr>
<td>020329Y</td>
<td>MityVac vacuum-operated pump</td>
<td></td>
</tr>
<tr>
<td>020330Y</td>
<td>Stroboscopic light for timing control</td>
<td></td>
</tr>
<tr>
<td>020331Y</td>
<td>Digital multimeter</td>
<td></td>
</tr>
</tbody>
</table>

NRG Power Purejet

Tooling
<table>
<thead>
<tr>
<th>Stores code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>020332Y</td>
<td>Digital rev counter</td>
</tr>
<tr>
<td>020334Y</td>
<td>Multiple battery charger</td>
</tr>
<tr>
<td>020335Y</td>
<td>Magnetic support for dial gauge</td>
</tr>
<tr>
<td>020340Y</td>
<td>Flywheel and transmission oil seals fitting punch</td>
</tr>
<tr>
<td>020357Y</td>
<td>32 x 35 mm adaptor</td>
</tr>
<tr>
<td>020358Y</td>
<td>37x40-mm adaptor</td>
</tr>
<tr>
<td>020359Y</td>
<td>42x47-mm adaptor</td>
</tr>
<tr>
<td>020362Y</td>
<td>12-mm guide</td>
</tr>
<tr>
<td>Stores code</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>020363Y</td>
<td>20 mm guide</td>
</tr>
<tr>
<td>020409Y</td>
<td>Multimeter adaptor - Peak voltage detection</td>
</tr>
<tr>
<td>020376Y</td>
<td>Adaptor handle</td>
</tr>
<tr>
<td>020412Y</td>
<td>15 mm guide</td>
</tr>
<tr>
<td>020439Y</td>
<td>17 mm guide</td>
</tr>
<tr>
<td>020444Y</td>
<td>Test probe removal / fitting tool</td>
</tr>
<tr>
<td>Stores code</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>020456Y</td>
<td>Ø 24 mm adaptor</td>
</tr>
<tr>
<td>020451Y</td>
<td>Start-up crown lock</td>
</tr>
<tr>
<td>020452Y</td>
<td>Tube for removing and refitting the driven pulley shaft</td>
</tr>
<tr>
<td>020460Y</td>
<td>Scooter diagnosis and tester</td>
</tr>
<tr>
<td>020481Y</td>
<td>Control unit interface wiring</td>
</tr>
<tr>
<td>Stores code</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>020565Y</td>
<td>Flywheel lock calliper spanner</td>
</tr>
<tr>
<td>020469Y</td>
<td>Reprogramming kit for scooter diagnosis tester</td>
</tr>
<tr>
<td>020614Y</td>
<td>Diagnostic tester programming software</td>
</tr>
<tr>
<td>020615Y</td>
<td>Carbon dam ring fitting kit</td>
</tr>
<tr>
<td>020616Y</td>
<td>Fuel pressure control kit</td>
</tr>
<tr>
<td>020617Y</td>
<td>Air pressure check kit</td>
</tr>
<tr>
<td>Stores code</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>020620Y</td>
<td>Water pump impeller stop</td>
</tr>
<tr>
<td>020621Y</td>
<td>HV cable extraction adaptor</td>
</tr>
</tbody>
</table>
## Maintenance chart

### EVERY 2 YEARS

**Action**

- Brake fluid - change
- Coolant - change

### AFTER 1000 KM

**50’**

**Action**

- Hub oil - change
- Oil mixer/throttle linkage - adjustment
- Odometer cable - greasing
- Steering - adjustment
- Brake control levers - greasing
- Brake fluid level - check
- Safety locks - check
- Electrical system and battery - check
- Tyre pressure and wear - check
- Vehicle and brake test - road test

### AT 5000 KM OR 12 MONTHS, 25000 KM, 35000 KM AND 55000 KM

**40’**

**Action**

- Hub oil level - check
- Spark plug/electrode gap - replacement
- Air filter - clean
- Oil mixer/throttle linkage - adjustment
- Coolant level - check
- Brake control levers - greasing
- Brake pads - check condition and wear
- Brake fluid level - check
- Electrical system and battery - check
- Tyre pressure and wear - check
- Vehicle and brake test - road test

### AT 10000 KM OR 24 MONTHS AND 50000 KM

**95’**

**Action**

- Hub oil - change
- Spark plug/electrode gap - replacement
- Air filter - clean
- Idling speed (*) - adjustment
- Oil mixer/throttle linkage - adjustment
- Variable speed rollers - replacement
- Odometer cable - greasing
- Driving belt - check
- Coolant level - check
- Steering - adjustment
- Brake control levers - greasing
- Brake pads - check condition and wear
<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake fluid level - check</td>
</tr>
<tr>
<td>Transmission elements - lubrication</td>
</tr>
<tr>
<td>Safety locks - check</td>
</tr>
<tr>
<td>Suspensions - check</td>
</tr>
<tr>
<td>Electrical system and battery - check</td>
</tr>
<tr>
<td>Headlight - adjustment</td>
</tr>
<tr>
<td>Tyre pressure and wear - check</td>
</tr>
<tr>
<td>Vehicle and brake test - road test</td>
</tr>
</tbody>
</table>

(*) See CO regulation in the «Adjusting the engine idle» section

**AT 15000 KM AND 45000 KM**

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hub oil level - check</td>
</tr>
<tr>
<td>Spark plug/electrode gap - replacement</td>
</tr>
<tr>
<td>Air filter - clean</td>
</tr>
<tr>
<td>Oil mixer/throttle linkage - adjustment</td>
</tr>
<tr>
<td>Driving belt - replacement</td>
</tr>
<tr>
<td>Coolant level - check</td>
</tr>
<tr>
<td>Brake control levers - greasing</td>
</tr>
<tr>
<td>Brake pads - check condition and wear</td>
</tr>
<tr>
<td>Brake fluid level - check</td>
</tr>
<tr>
<td>Electrical system and battery - check</td>
</tr>
<tr>
<td>Tyre pressure and wear - check</td>
</tr>
<tr>
<td>SAS box (sponge) (**) - cleaning</td>
</tr>
<tr>
<td>Vehicle and brake test - road test</td>
</tr>
</tbody>
</table>

(**) See the regulations of the "Secondary air system" section

**AT 20000 KMS AND 40000 KMS**

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hub oil - change</td>
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<tr>
<td>Spark plug/electrode gap - replacement</td>
</tr>
<tr>
<td>Air filter - clean</td>
</tr>
<tr>
<td>Idling speed (*) - adjustment</td>
</tr>
<tr>
<td>Cylinder cooling system - check/cleaning</td>
</tr>
<tr>
<td>Oil mixer/throttle linkage - adjustment</td>
</tr>
<tr>
<td>Driving belt - check</td>
</tr>
<tr>
<td>Variable speed rollers - replacement</td>
</tr>
<tr>
<td>Mixer belt - replacement</td>
</tr>
<tr>
<td>Coolant level - check</td>
</tr>
<tr>
<td>Radiator - external cleaning/ check</td>
</tr>
<tr>
<td>Odometer cable - greasing</td>
</tr>
<tr>
<td>Steering - adjustment</td>
</tr>
<tr>
<td>Brake control levers - greasing</td>
</tr>
<tr>
<td>Brake pads - check condition and wear</td>
</tr>
<tr>
<td>Brake fluid level - check</td>
</tr>
<tr>
<td>Transmission elements - lubrication</td>
</tr>
<tr>
<td>Safety locks - check</td>
</tr>
<tr>
<td>Suspensions - check</td>
</tr>
<tr>
<td>Electrical system and battery - check</td>
</tr>
<tr>
<td>Headlight - adjustment</td>
</tr>
<tr>
<td>Tyre pressure and wear - check</td>
</tr>
</tbody>
</table>
### AT 30000 KM

**Action**

<table>
<thead>
<tr>
<th>Vehicle and brake test - road test</th>
</tr>
</thead>
</table>

(*) See CO regulation in the «Adjusting the engine idle» section

<table>
<thead>
<tr>
<th>130'</th>
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**Action**

<table>
<thead>
<tr>
<th>Hub oil - change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark plug/electrode gap - replacement</td>
</tr>
<tr>
<td>Air filter - clean</td>
</tr>
<tr>
<td>Idling speed (*) - adjustment</td>
</tr>
<tr>
<td>Oil mixer/throttle linkage - adjustment</td>
</tr>
<tr>
<td>Driving belt - replacement</td>
</tr>
<tr>
<td>Variable speed rollers - replacement</td>
</tr>
<tr>
<td>Coolant level - check</td>
</tr>
<tr>
<td>Odometer cable - greasing</td>
</tr>
<tr>
<td>Steering - adjustment</td>
</tr>
<tr>
<td>Brake control levers - greasing</td>
</tr>
<tr>
<td>Brake pads - check condition and wear</td>
</tr>
<tr>
<td>Flexible brake tubes - replacement</td>
</tr>
<tr>
<td>Brake fluid level - check</td>
</tr>
<tr>
<td>Transmission elements - lubrication</td>
</tr>
<tr>
<td>Safety locks - check</td>
</tr>
<tr>
<td>Suspensions - check</td>
</tr>
<tr>
<td>Electrical system and battery - check</td>
</tr>
<tr>
<td>Headlight - adjustment</td>
</tr>
<tr>
<td>Tyre pressure and wear - check</td>
</tr>
<tr>
<td>SAS box (sponge) (**) - cleaning</td>
</tr>
<tr>
<td>Vehicle and brake test - road test</td>
</tr>
</tbody>
</table>

(*) See CO regulation in the «Adjusting the engine idle» section

(**) See rules in the «Secondary Air System» section

### AT 60000 KM

**Action**

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</table>

**Action**

<table>
<thead>
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<th>Hub oil - change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spark plug/electrode gap - replacement</td>
</tr>
<tr>
<td>Air filter - clean</td>
</tr>
<tr>
<td>Idling speed (*) - adjustment</td>
</tr>
<tr>
<td>Oil mixer/throttle linkage - adjustment</td>
</tr>
<tr>
<td>Driving belt - replacement</td>
</tr>
<tr>
<td>Variable speed rollers - replacement</td>
</tr>
<tr>
<td>Mixer belt - replacement</td>
</tr>
<tr>
<td>Coolant level - check</td>
</tr>
<tr>
<td>Radiator - external cleaning/ check</td>
</tr>
<tr>
<td>Odometer cable - greasing</td>
</tr>
<tr>
<td>Steering - adjustment</td>
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<tr>
<td>Brake control levers - greasing</td>
</tr>
<tr>
<td>Brake pads - check condition and wear</td>
</tr>
<tr>
<td>Flexible brake tubes - replacement</td>
</tr>
<tr>
<td>Brake fluid level - check</td>
</tr>
<tr>
<td>Transmission elements - lubrication</td>
</tr>
<tr>
<td>Safety locks - check</td>
</tr>
<tr>
<td>Suspensions - check</td>
</tr>
</tbody>
</table>
**Spark plug**

- Position the vehicle on its centre stand;
- Remove the centre cover by unscrewing the 2 set screws;
- Disconnect the cover from the plug lead;
- Unscrew the spark plug using a spark plug spanner;
- Check the conditions of the spark plug, make sure the insulation is intact and measure the gap between the electrodes with a feeler.
- Adjust the gap if necessary, carefully bending the side electrode.

In the event of defects replace the spark plug with the prescribed type;
- Position the spark plug at the correct angle and manually tighten it all the way down, then use the specific spanner to tighten it to the prescribed torque;
- Put the cover back over the spark plug;
- Reassemble the central cover.

**CAUTION**

THE SPARK PLUG MUST BE REMOVED WHEN THE MOTOR IS COLD. THE SPARK PLUG MUST BE REPLACED EVERY 5000 KM. USE OF STARTERS NOT CONFORMING OR SPARK PLUGS NOT THOSE DESCRIBED CAN SERIOUSLY DAMAGE THE ENGINE.

**Characteristic**

**Recommended spark plug type**

CHAMPION RG6YCA

**Electric characteristic**

**Electrode gap**
0.55±0.65 mm

**Locking torques (N*m)**
Spark plug 25 - 30 Nm

### Hub oil

#### Check

Do the following to check the correct level:
1) Stand the vehicle on the centre-stand on flat ground;
2) Remove the dipstick «A», and dry it with a clean cloth. Reinsert it, screwing it in all the way;
3) Remove the stick and check that the oil level is slightly over the second notch starting from the lower end;
4) Screw the dipstick back in, checking that it is locked in place.

**Recommended products**
- AGIP ROTRA 80W-90 Rear hub oil
- SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications

#### Replacement

- Remove oil filler cap «A».
- Loosen oil draining cap «B» and allow for the system to drain completely.
- Refit the draining cap and refill the hub with the prescribed oil.

**Characteristic**
- Rear hub oil
  - ~ 85 cc
Air filter

- Remove the cap of the purifier, unscrewing the six clamping screws and removing the filter.

Cleaning:
- Wash with water and neutral soap.
- Dry with a clean cloth and short blasts of compressed air.
- Saturate with a 50% mixture of gasoline and oil.
- Drip dry the filter and then squeeze it between the hands without wringing.
- Let it dry and refit it again.

**CAUTION**
NEVER RUN THE ENGINE WITHOUT THE AIR FILTER, THIS WOULD RESULT IN AN EXCESSIVE WEAR OF THE PISTON AND CYLINDER.

Recommended products
AGIP FILTER OIL Oil for air filter sponge
Mineral oil with specific additives for increased adhesiveness

Checking the ignition timing

- Adjust the control cables:
Mix cable: see procedure indicated in "Mixer timing".
Throttle cable: adjust the set screw on the carburettor in such a way that the sheath has no backlash.
Splitter control cable: adjust set screw on the throttle control to the handlebar in such a way that there is no backlash on the throttle control.
Adjust all transmissions in such a way that their sheathings show no sign of backlash.

**Mixer Timing**
- Using the transmission set screw on the crankcase, with throttle control untwisted, adjust the reference mark on the rotating plate so that it is
lined up with the reference mark on the mixer body, as shown in the figure.

While doing this, the engine must be fuelled with a 2 % oil mixture (0.5 litre minimum if the reservoir is empty).

**CAUTION**


**Recommended products**

AGIP CITY TEC 2T Mixer oil

synthetic oil for 2-stroke engines: JASO FC, ISO-L-EGD

**Braking system**

**Level check**

Proceed as follows:

- Rest the vehicle on its centre stand with the handlebars perfectly horizontal;
- Check the level of liquid with the related warning light «A».

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

Proceed as follows:
- Remove the tank cap by loosening the two screws, remove the gasket and top up using only the liquid specified without exceeding the maximum level.

**CAUTION**

ONLY USE DOT 4-CLASSIFIED BRAKE FLUID.

**CAUTION**

MAKE SURE THE BRAKE FLUID DOES NOT GET INTO YOUR EYES OR ON YOUR SKIN OR CLOTHES. IF THIS HAPPENS ACCIDENTALLY, WASH WITH WATER.

**CAUTION**

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

**CAUTION**

THE BRAKE FLUID IS HYGROSCOPIC, IN OTHER WORDS, IT ABSorbs MOISTURE FROM THE SURROUNDING AIR. IF THE CONTENT OF MOISTURE IN THE BRAKING FLUID EXCEEDS A CERTAIN VALUE, BRAKING WILL BE INEFFICIENT.

NEVER USE BRAKE LIQUID IN OPEN OR PARTIALLY USED CONTAINERS.

UNDER NORMAL CLIMATIC CONDITIONS, THE FLUID MUST BE CHANGED EVERY 20,000 KM OR ANYWAY EVERY TWO YEARS.

N.B.

SEE THE BRAKING SYSTEM CHAPTER WITH REGARD TO THE CHANGING OF BRAKE FLUID AND THE BLEEDING OF AIR FROM THE CIRCUITS.

**Recommended products**

AGIP BRAKE 4 Brake fluid

FMVSS DOT4 Synthetic fluid

Headlight adjustment

Proceed as follows:
1. Place the vehicle in running order and with the tyres inflated to the prescribed pressure, on a flat surface 10 m away from a white screen situated in a shaded area, making sure 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 on the screen is not lower than 9/10 of the distance from the ground to the centre of vehicle headlamp and higher than 7/10;

3. Otherwise, regulate the headlight by adjusting the screw «A», after removing the front grille.

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.
<table>
<thead>
<tr>
<th>INDEX OF TOPICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TROUBLESHOOTING</td>
</tr>
</tbody>
</table>
This section makes it possible to find the solutions to use in troubleshooting. For each breakdown, a list of the possible causes and respective interventions is given.

Engine

### Poor performance

<table>
<thead>
<tr>
<th>POOR PERFORMANCE</th>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor performance</td>
<td>Defective fuel pump or damaged depression line</td>
<td>Replace the pump or control lines</td>
</tr>
<tr>
<td></td>
<td>Fuel filter dirty or clogged</td>
<td>Clean the coupling filter</td>
</tr>
<tr>
<td></td>
<td>Excess of encrustations in the combustion chamber</td>
<td>Remove the encrustations</td>
</tr>
<tr>
<td></td>
<td>Lack of compression wear of the piston rings or</td>
<td>Check the worn parts and replace them</td>
</tr>
<tr>
<td></td>
<td>cylinder</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhaust pipe clogged due to excessive encrusta-</td>
<td>Replace the exhaust pipe and check the carbur-</td>
</tr>
<tr>
<td></td>
<td>tions</td>
<td>ation and mixer timer</td>
</tr>
<tr>
<td></td>
<td>Air filter blocked or dirty</td>
<td>Clean according to the procedure</td>
</tr>
<tr>
<td></td>
<td>Clutch slipping</td>
<td>Check the centrifugal brake shoe assembly and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or clutch bell replace if necessary</td>
</tr>
<tr>
<td></td>
<td>Defective mobile pulley sliding</td>
<td>Check the parts, change the faulty parts and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lubricate the driven pulley using only Montblanc-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Mo-</td>
</tr>
<tr>
<td></td>
<td>Transmission belt worn</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Roller wear; Presence of oil; Dirt</td>
<td>Clean the speed variator, replace the rollers if</td>
</tr>
<tr>
<td></td>
<td></td>
<td>worn out</td>
</tr>
</tbody>
</table>

### Rear wheel spins at idle

<table>
<thead>
<tr>
<th>REAR WHEEL</th>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intake manifold cracked or incorrectly tightened</td>
<td>Make sure the manifold is not damaged and that it</td>
</tr>
<tr>
<td></td>
<td></td>
<td>is correctly tightened on the throttle body and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>crankcase</td>
</tr>
<tr>
<td></td>
<td>Clutch fault</td>
<td>Check the spring/friction mass and the clutch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bell</td>
</tr>
</tbody>
</table>

### Starting difficulties

<table>
<thead>
<tr>
<th>DIFFICULTY IN STARTING</th>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Defective fuel pump or damaged depression line</td>
<td>Replace the pump or control lines</td>
</tr>
<tr>
<td></td>
<td>Battery flat</td>
<td>Check the state of the battery. If it shows signs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of sulphation replace it and bring the new battery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>into service charging it for eight hours at a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>current of 1/10 of the capacity of the battery</td>
</tr>
<tr>
<td></td>
<td>Altered fuel characteristics</td>
<td>Drain off the fuel no longer up to standard;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>then, refill</td>
</tr>
<tr>
<td></td>
<td>Defective spark plug or with incorrect electrode</td>
<td>Remove the encrustation, restore the plug gap</td>
</tr>
<tr>
<td></td>
<td>gap</td>
<td>or replace being sure to use the types of spark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>plug</td>
</tr>
</tbody>
</table>
Possible Cause | Operation
--- | ---
Recommended at all times. Bear in mind that many problems engines have, derive from the use of the wrong spark plug | 
Intake joint cracked or with a bad seal | Replace the intake joint and check its tightness on the crankcase and on the carburettor
Purifier-carburettor fitting damaged | Replace

### Excessive oil consumption/Exhaust smoke

**EXCESSIVE OIL CONSUMPTION/SMOKEY EXHAUST**

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
</table>
| Excess of encrustations in the combustion chamber | Remove the encrustations

### Engine tends to cut-off at idle

**ENGINE IDLE**

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
</table>
| Reed valve does not close | Check / replace the reed pack
| Spark plug defective or faulty | Replace the spark plug with one with the specified degree and check the plug gap

### Transmission and brakes

### Clutch grabbing or performing inadequately

**CLUTCH**

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
</table>
| Tear or irregular functioning | Check that the masses open and return normally
Check that there is no grease on the masses
Check that the clutch masses' contact surface with the clutch bell is mainly in the middle with characteristics equivalent on the three masses
Check that the clutch bell is not scored or worn abnormally
Never operate the engine without the clutch bell

### Insufficient braking

**BRAKE SYSTEM FAULT**

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
</table>
| Poor braking | The rear (drum type) brake is adjusted by regulating the special adjustment (on the wheel) bearing in mind that, with the control levers in the rest position, the wheels must turn freely.
The braking action should begin when the brake levers are pressed by about a third.
Check the brake pad wear. |
Possible Cause | Operation
---|---
If it is not possible to remove any problems by simply adjusting the transmissions, check the brake pads and front brake disc, the brake shoes and the rear drum. If you encounter excessive wear or scoring, make the necessary replacements.

Air bubbles inside the hydraulic braking system | Carefully bleed the hydraulic braking system, (there must be no flexible movement of the brake lever).

Fluid leakage in hydraulic braking system | Elastic fittings, piston seals or brake pump breakdown, replace

The brake fluid has lost its properties | Replace the front brake fluid and top up to the correct level in the pump

Brake noise | Check the wear of the brake pads and/or shoes

---

**Brakes overheating**

<table>
<thead>
<tr>
<th>BRAKE OVERHEATING</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Cause</td>
<td>Operation</td>
</tr>
<tr>
<td>Defective piston sliding</td>
<td>Check calliper and replace any damaged part.</td>
</tr>
<tr>
<td>Deformed brake disc</td>
<td>Use a comparator to check the disc planarity with the wheel correctly mounted</td>
</tr>
</tbody>
</table>

---

**Battery**

<table>
<thead>
<tr>
<th>BATTERY</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Cause</td>
<td>Operation</td>
</tr>
<tr>
<td>Battery</td>
<td>The battery is the electrical device in the system that requires the most frequent inspections and thorough maintenance. If the vehicle is not used for some time (1 month or more) the battery needs to be recharged periodically. The battery runs down completely in the course of 5 ÷ 6 months. If the battery is fitted on a motorcycle, be careful not to invert the connections, keeping in mind that the black ground wire is connected to the negative terminal while the red wire is connected to the terminal marked+. Follow the instructions in the ELECTRICAL SYSTEM chapter for the recharging of the batteries.</td>
</tr>
</tbody>
</table>

---

**Steering and suspensions**
Rear wheel

POOR ROAD HOLDING

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faulty suspension</td>
<td>Check that the rear shock absorber and/or the front fork is/are in good working order. Replace or overhaul the front fork and/or replace the rear shock absorbers in case of malfunction.</td>
</tr>
<tr>
<td>Tyres deflated or damaged</td>
<td>Check the correct pressure of the tyres and the condition of the tread. Inflate to the correct pressure or replace.</td>
</tr>
<tr>
<td>Loosen the anchorage points of the front and/or rear suspension unit.</td>
<td>Check the tightness between the frame, swinging arm and engine and the fixing of the wheels to the hub and/or the axle. Check the correct tightening of the steering ring nut.</td>
</tr>
</tbody>
</table>

Heavy steering

STEERING HARDENING

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque not conforming</td>
<td>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 if they are recessed.</td>
</tr>
</tbody>
</table>

Excessive steering play

EXCESSIVE STEERING CLEARANCE

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCESSIVE STEERING CLEARANCE</td>
<td>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 if they are recessed.</td>
</tr>
</tbody>
</table>

Noisy suspension

NOISY SUSPENSION

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components of the front suspension damaged.</td>
<td>Check the quiet operation in the compression or release phases of the fork and if necessary overhaul it. Check that there is no noise or seizing during the wheel rotation; if there is, change the wheel bearing.</td>
</tr>
<tr>
<td>Components of the rear suspension damaged.</td>
<td>Check the absence of noise in the compression or release of the suspension, if necessary check the proper tightness to the swinging arm unit and the</td>
</tr>
</tbody>
</table>
### Possible Cause

**Absence of rust or replace the entire shock absorber**. Check that there is no noise or seizing during the wheel rotation; if there is noise or seizing overhaul the final reduction assembly.

### Suspension Oil Leakage

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock absorbers malfunctioning</td>
<td>Replace the complete shock absorption unit</td>
</tr>
<tr>
<td>Hydraulic cartridge in the fork damaged.</td>
<td>Replace the hydraulic cartridge</td>
</tr>
</tbody>
</table>
1. Blinker switch device
2. Front left indicator with lamp
3. Horn button
4. Turn indicator selector.
5. High/low beam selector.
6. Rear brake stop button
7. Complete headlight
8. 2 lamps for parking light 12V-3W
9. Lamp for dipped beam light 12V - 35W
10. Lamp for high beam light 12V - 35W
11. Instrument unit
12. Rpm-timing sensor
13. Front brake stop button
14. Start button
15. Front right indicator with lamp
16. Key switch
17. Fuel warning light transmitter
18. Oil mix lamp control
19. Voltage regulator
20. H.T. coil
21. Pick-up
22. Magneto
23. Starter motor
24. Front right indicator with lamp
25. Complete resistance
26. Battery 12V-9A
27. Fuse 20A
28. Fuse 5A
29. Petrol injector
30. Air injector
31. Water temperature sensor
32. Throttle body sensor
33. Output for diagnostics
34. Complete taillight
35. Rear left indicator with lamp
36. Starter relay
37. Electronic cpu
38. Fuel pump
39. Horn

Conceptual diagrams
### Ignition

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Battery</td>
<td>12V - 9Ah</td>
</tr>
<tr>
<td>2 Fuse</td>
<td>20A</td>
</tr>
<tr>
<td>3 Key switch contacts</td>
<td></td>
</tr>
<tr>
<td>4 Voltage regulator</td>
<td></td>
</tr>
<tr>
<td>5 Ignition spark plug</td>
<td></td>
</tr>
<tr>
<td>6 HV coil</td>
<td></td>
</tr>
<tr>
<td>7 Flywheel magneto</td>
<td></td>
</tr>
<tr>
<td>8 Pick - up</td>
<td></td>
</tr>
<tr>
<td>9 CPU</td>
<td></td>
</tr>
</tbody>
</table>
# Headlights and automatic starter section

**LIGHTS AND TURN INDICATORS**

<table>
<thead>
<tr>
<th>Spec.</th>
<th>Description/Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flywheel magneto</td>
</tr>
<tr>
<td>2</td>
<td>High beam bulb</td>
</tr>
<tr>
<td>3</td>
<td>Digital instrument unit</td>
</tr>
<tr>
<td>4</td>
<td>Voltage regulator</td>
</tr>
<tr>
<td>5</td>
<td>Low beam bulb</td>
</tr>
<tr>
<td>6</td>
<td>Fuse</td>
</tr>
</tbody>
</table>

Type: H8
Power: 12V - 35W
Quantity: 1
20A
### Electrical System

#### Specification

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Key switch contacts</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Battery</td>
<td>12V - 9Ah</td>
</tr>
<tr>
<td>9</td>
<td>Front parking light</td>
<td>Type: All glass&lt;br&gt;Power: 12V - 3W&lt;br&gt;Quantity: 2</td>
</tr>
<tr>
<td>10</td>
<td>Turn indicator control device</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Fuse 5A</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Turn signal switch</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>4 turn indicator lamps</td>
<td>12V-10w</td>
</tr>
</tbody>
</table>

### Battery Recharge and Starting

![Diagram of Electrical System]

---

NRG Power Purejet

ELE SYS - 6
## BATTERY CHARGER AND STARTING

<table>
<thead>
<tr>
<th>Spec.</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flywheel magneto</td>
</tr>
<tr>
<td>2</td>
<td>Rear light with LED</td>
</tr>
<tr>
<td>3</td>
<td>CPU</td>
</tr>
<tr>
<td>4</td>
<td>Voltage regulator</td>
</tr>
<tr>
<td>5</td>
<td>Starter motor</td>
</tr>
<tr>
<td>6</td>
<td>Fuse 20A</td>
</tr>
<tr>
<td>7</td>
<td>Key switch contacts</td>
</tr>
<tr>
<td>8</td>
<td>Battery 12V - 9Ah</td>
</tr>
<tr>
<td>9</td>
<td>Starter remote control</td>
</tr>
<tr>
<td>10</td>
<td>Starter button</td>
</tr>
<tr>
<td>11</td>
<td>Fuse 5A</td>
</tr>
<tr>
<td>12</td>
<td>Fuse 5A</td>
</tr>
<tr>
<td>13</td>
<td>Diode</td>
</tr>
<tr>
<td>14</td>
<td>Two brake light buttons</td>
</tr>
<tr>
<td>15</td>
<td>Mixture oil level sender</td>
</tr>
<tr>
<td>16</td>
<td>Resistor 47 Ohm 25W</td>
</tr>
</tbody>
</table>

### Level indicators and enable signals section
### CONSENSUSES AND LEVEL INDICATORS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Battery 12V - 9Ah</td>
</tr>
<tr>
<td>2</td>
<td>CPU</td>
</tr>
<tr>
<td>3</td>
<td>Fuse 20A</td>
</tr>
<tr>
<td>4</td>
<td>Key switch contacts</td>
</tr>
<tr>
<td>5</td>
<td>Water temperature sensor</td>
</tr>
<tr>
<td>6</td>
<td>Fuel level sending unit</td>
</tr>
<tr>
<td>7</td>
<td>Fuse 5A</td>
</tr>
<tr>
<td>8</td>
<td>Mixture oil level sender</td>
</tr>
<tr>
<td>9</td>
<td>Digital instrument unit</td>
</tr>
<tr>
<td>10</td>
<td>Wheel rpm sensor</td>
</tr>
</tbody>
</table>

### Digital instrument panel

![Digital instrument panel](image)

### INSTRUMENT UNIT CONNECTOR

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+ Battery</td>
</tr>
<tr>
<td>2</td>
<td>+ permanent power supply</td>
</tr>
<tr>
<td>3</td>
<td>Earth</td>
</tr>
<tr>
<td>4</td>
<td>Grounding for phonic wheel</td>
</tr>
<tr>
<td>5</td>
<td>Power supply to phonic wheel</td>
</tr>
<tr>
<td>6</td>
<td>Phonic wheel signal</td>
</tr>
<tr>
<td>7</td>
<td>Instrument light and parking light indicator</td>
</tr>
<tr>
<td>8</td>
<td>Instrument temperature mass</td>
</tr>
<tr>
<td>9</td>
<td>Not connected</td>
</tr>
<tr>
<td>10</td>
<td>Rpm indicator signal</td>
</tr>
<tr>
<td>11</td>
<td>Instrument temperature signal</td>
</tr>
<tr>
<td>12</td>
<td>Fuel level sensor</td>
</tr>
<tr>
<td>13</td>
<td>High-beam warning light</td>
</tr>
<tr>
<td>14</td>
<td>+ Right direction indicator</td>
</tr>
<tr>
<td>15</td>
<td>+ Left direction indicator</td>
</tr>
<tr>
<td>16</td>
<td>Low-oil warning light</td>
</tr>
<tr>
<td>17</td>
<td>Low-fuel warning light</td>
</tr>
<tr>
<td>18</td>
<td>Oil light check outlet</td>
</tr>
<tr>
<td>19</td>
<td>Injection warning light</td>
</tr>
<tr>
<td>20</td>
<td>Not connected</td>
</tr>
</tbody>
</table>

### Checks and inspections

ELE SYS - 8
Battery recharge circuit

The recharge circuit has a three phase generator with permanent magneto. The generator is directly connected to the voltage regulator. The voltage regulator is connected directly to the earth and battery positive passing through the 15A protection fuse. Therefore this system does not have a connection to the key switch. The three phase generator provides a significant recharge power and at low rpm, a good compromise is obtained between distributed power and idle stability.

Stator check

Disconnect the connector from the voltage regulator and check for continuity between each yellow wire with the other two. Ohm value: 0.7 - 0.9 Ohm. Also check that each yellow wire is isolated from the ground. If non-conforming values are found, repeat the checks on the stator; if incorrect values continue to occur, replace the stator or repair the wiring.

Voltage regulator check

With the battery perfectly charged and the lights off, measure the voltage at the battery leads with the engine running at high rpm. The voltage must not exceed 15.2 volts. If higher voltages are found, replace the regulator. If voltages under 14 volts are found, carry out the checks for the stator and related wiring.
Recharge system voltage check

Connect an ammeter induction clamp to the voltage regulator positive cable. Measure the battery voltage and turn on the lights with the engine off and wait until the voltage settles at around 12 volts. Start the engine and measure the current distributed by the circuit with the lights on and engine at high rpm.

If the current value is less than 10A, repeat the test using a new regulator and/or stator instead.

Starter motor

Specifications
- Rated voltage 12V.
- Rated power 0.25 kW.
- Left rotation viewed from pinion side.
- Connection to engine with pinion and crown wheel on transmission side crankshaft.
- Control with button

Tests to perform to check the electrical starter

Static test
Remove the left side panel.
Check the resistance of the induced brush unit.
Reference value: $< \text{ or equal to } 1 \text{ Ohm}$
- Use a lift to adequately support the vehicle.
- Remove the stand and support.
- Use a multimeter to check the continuity of the positive and negative power supply cable.
- Make sure the connections are good.
If no faults are found, replace the starter.

Specific tooling
020331Y Digital multimeter
**Dynamic tests**

Check the battery voltage after it has not been used for a few hours.

*Voltage < or equal to 12.5 V.*

Check the density of the electrolyte of each element.

*Bé = 30 ÷ 32*

*Specific weight: 1.25 ÷ 1.26*

Make sure the negative terminals (battery negative and starter negative) are correctly connected to each other and to the frame.

- Connect the diagnostic tester.
- Connect an ammeter induction clamp to the negative power supply cable of the starter.
- Disconnect the fuel injection connector.
- Turn to «ON».
- Select the «PARAMETERS» function.
- Start the engine (making sure the vehicle cannot move) long enough to measure the rpm and starter absorption.

- Absorption at drag rpm: from 15 to 25 A.
- Drag rpm: from 500 to 550 rpm

---

**N.B.**

*THE VALUE OF DECLARED RPM IS THAT INDICATED BY THE DIAGNOSTIC TESTER*

---

**Specific tooling**

020460Y Scooter diagnosis and tester

---

Carry out a no-load absorption test.

Remove the transmission cover.

Remove the starter pinion.
With the starter motor in no-load, maximum absorption must be 10 A with power supply voltage $\geq 12$V.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starter motor</td>
<td></td>
</tr>
<tr>
<td>Voltmeter</td>
<td></td>
</tr>
<tr>
<td>Starter motor contactor</td>
<td></td>
</tr>
<tr>
<td>Start button</td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>12V-9Ah</td>
</tr>
<tr>
<td>Ammeter</td>
<td></td>
</tr>
</tbody>
</table>

See also
- Centre-stand
- Side fairings

**Turn signals system check**

The turn signal circuit is managed by an intermittent device.
If there is a fault in the turn signal circuit check:
- The 5A fuse indicated in the photo by removing the air duct.
- Use a multimeter to check if there is $+$ 12V voltage on the BLUE-BLACK wire to the turn signal connector.
- To make sure the lamps work, apply a +12V voltage to the WHITE-BLUE wire of the turn indicator switch for the right lamps and to the PINK wire for the left lamps.

See also
Air duct

level indicators

Composed of the petrol level transmitter, analogue reading instrument and reserve warning lamp.

In the event of a fault check:
- Fuel reserve warning lamp
- The 5A fuse indicated in the photo by removing the air duct.

- Make sure the voltage at the WHITE wire of the instrument unit is +12V
- Using a multimeter check the ohm values of the fuel level by moving the arm with float.

Limit values:
empty tank position = 87 - 103 Ohm
½ tank position = 34 - 42 Ohm
full tank position < or equal to 7 Ohm

See also
Air duct

The oil mix lamp carries out a timed check for 3 seconds every time the key is switched to ON. The check is controlled by the turn indicator device which applies a 12V voltage to the oil warning lamp.

If the check is not carried out when the key is switched to ON, check:
- If the lamp is working
- The 5A fuse indicated in the photo by removing the air duct.

- Use a multimeter to check if there is 12V voltage at the 2 YELLOW oil mix lamp control wires when the key is turned to ON
- The oil mix lamp is working
To access the oil mix lamp control remove the right panel. Remember that the +12V voltage to the 2 YELLOW oil mix lamp control lasts 3 minutes from when the key is switched to ON.

**See also**
- Air duct
- Side fairings

### Lights list

The lighting system goes on when the key is switched to ON.

The high beams can be selected using the high beam/dipped beam selector.

If faults occur in the lighting system check:
- If the lamps are working
- The 5A fuse indicated in the figure by removing the air duct.
- Use a multimeter the make sure there is + 12V voltage at the GREY - RED wire of the cover with contacts
- That at the YELLOW - BLACK wires of the light there is a + 12V voltage
- Make sure the lamp holder earth is present.

**See also**
- Air duct

### Sealed battery

#### Airtight battery start-up operations

**INSTRUCTIONS FOR REFRESHING THE STOCK CHARGE OF AN OPEN CIRCUIT**

**1) Voltage check**

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

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

**2) Constant voltage battery charge mode**

- Constant voltage equal to 14.40÷14.70V
- Initial charge voltage equal to 0.3÷0.5 for nominal capacity
- Duration of the charge: 10 to 12 h recommended

Minimum 6 h
Maximum 24 h

**3) Constant current battery charge mode**

- Charge current equal to 1/10 of the nominal capacity of the battery
- Duration of the charge: 5 h
WARNING
-WHEN THE BATTERY IS REALLY FLAT (WELL BELOW 12.6V) IT MIGHT BE THAT 5 HOURS OF RECHARGING ARE NOT ENOUGH TO ACHIEVE OPTIMAL PERFORMANCE. IN THESE CONDITIONS IT IS HOWEVER ESSENTIAL NOT TO EXCEED EIGHT HOURS OF CONTINUOUS RECHARGING SO AS NOT TO DAMAGE THE BATTERY ITSELF.

Dry-charge battery

WARNING
THE BATTERY ELECTROLYTE IS POISONOUS AS IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH THE EYES, THE SKIN AND CLOTHING. IF COMING INTO CONTACT WITH EYES OR SKIN, WASH ABUNDANTLY WITH WATER FOR APPROX. 15 MIN. AND SEEK IMMEDIATE MEDICAL ATTENTION.
IN THE EVENT OF ACCIDENTAL INGESTION OF THE LIQUID, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR MILK, MAGNESIUM MILK, BATTERED EGG OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.
THE BATTERIES PRODUCE EXPLOSIVE GAS; KEEP CLEAR OF NAKED FLAMES, SPARKS OR CIGARETTES; VENTILATE THE AREA WHEN RECHARGING INDOORS.
ALWAYS WEAR EYE PROTECTION WHEN WORKING IN THE PROXIMITY OF BATTERIES.
KEEP OUT OF REACH OF CHILDREN

Characteristic
Battery
12V-9Ah

Commissioning dry-charge batteries:
1) Once the short closed tube and caps are removed, add sulphuric acid to the elements, of a type for batteries with a specific gravity of 1.26, corresponding to 30° Bé at a temperature of at least 15°C until reaching the upper level.
2) Let it sit for two hours.
3) Use the specific battery charger (single or multiple) to charge to an intensity equal to around 1/10 of the capacity until the voltage has reached a value of around 2.7 V per element. The density of the acid should be about 1.27, corresponding to 31° Bé, and the values have stabilised. The duration of the charging operations must be 15 - 20 hours.
4) Once the charging is complete, level out the acid (add distilled water or remove excess acid), put on the caps and clean carefully.
5) Once these operations have been completed, install the battery on the vehicle, correctly following the connections described in point 3) «Battery charging».

WARNING
- ONCE THE BATTERY HAS BEEN INSTALLED IN THE VEHICLE IT IS NECESSARY TO REPLACE THE SHORT TUBE (WITH CLOSED END) NEAR THE + POSITIVE TERMINAL WITH THE CORRESPONDING LONG TUBE (WITH OPEN END), THAT YOU FIND FITTED TO THE VEHICLE, TO ENSURE THAT THE GASES THAT FORM CAN ESCAPE PROPERLY.

Specific tooling
020333Y Single battery charger
020334Y Multiple battery charger
Battery maintenance
The battery is the electric device that requires the most careful monitoring and diligent maintenance.

The maintenance rules are:

1) Check the level of the electrolyte
Check regularly that the electrolyte level is at upper level. Use only distilled water to top up the level.
If the battery needs topping up very frequently, check the vehicle electrics: the battery is probably working in overload conditions which will lead to rapid deterioration.

2) Check the charge
After topping up the electrolyte, check the density using a densimeter (see figure).

CHECKING ELECTROLYTE DENSITY

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keep the tube vertical</td>
<td></td>
</tr>
<tr>
<td>Check with bare eye</td>
<td></td>
</tr>
<tr>
<td>The float must be released</td>
<td></td>
</tr>
</tbody>
</table>

When the battery is charged, the density should be $30 \div 32$ Bé corresponding to a specific weight of $1.26 \div 1.28$ at a temperature not under $15^\circ$ C.
If the density falls below $20^\circ$ Bé, the battery is completely run down and needs to be recharged. When a battery is being charged the voltage of each element must be $2.6 \div 2.8$V.
The discharge limit of each element is $1.8$V.
When charging is completed, check the level and density of the electrolyte as well as the voltage of each element. If the vehicle is not used for long periods of time (1 month or longer) the battery must be periodically recharged.
The battery will completely discharge over three months. When the battery is refitted onto the vehicle, be careful not to invert the connections: remember that the ground wire (black) needs to be connected to the negative (-) terminal, while the red wire is connected to the terminal marked with the positive (+) sign.

3) Recharging the battery

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

Normal charging on the bench is done with the specific battery charger (single or multiple), positioning the battery charger selector on the type of battery to recharge at a current of $0.9$A for around $6 \div 8$
hours. The connections with the power supply source must be made by connecting the corresponding poles (+ with + and - with -). The battery caps must be removed during charging.

**Specific tooling**

020333Y Single battery charger

020334Y Multiple battery charger

4) Cleaning the battery
The battery should always be kept clean, especially the upper part, and the terminals protected with vaseline.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN EMERGENCIES, THE CHARGING TIME CAN BE DECREASED TO 5-6 HOURS.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORDINARY AND DRINKING WATER CONTAINS MINERAL SALTS THAT ARE HARMFUL FOR THE BATTERY. FOR THIS REASON, YOU MUST ONLY USE DISTILLED WATER.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHARGE THE BATTERY BEFORE USE TO ENSURE OPTIMUM PERFORMANCE. INADEQUATE CHARGING OF THE BATTERY WITH A LOW LEVEL OF ELECTROLYTE BEFORE IT IS FIRST USED SHORTENS THE LIFE OF THE BATTERY.</td>
</tr>
</tbody>
</table>
Removal of the engine from the vehicle

1. Detach the battery.
2. Remove the exhaust assy.
3. Remove the rear wheel.
4. Remove the rear brake cable.
5. Detach the electrical connection to the flywheel.
6. Detach the throttle and mixer cables.
7. Detach the mixture oil, fuel, and vacuum pump outlet tubing.
8. Detach the H.T. cable from the spark plug.
9. Remove the rear shock-absorber fixing bolt from the engine.
10. Remove the nut on the l.h.s., and hence remove the engine - swing-arm fixing bolt.

Locking torques (N\(\cdot\)m)

- Engine-swinging arm bolt 33 \(\div\) 41
- Shock absorber-engine pin 33 to 41 Nm
- Rear wheel axle nut 104 \(\div\) 126
| ENGINE | ENG |
Automatic transmission

Transmission cover

- Loosen the 15 screws and remove the transmission cover with the aid of a mallet.

N.B.
THE CRANKCASE IS SLIGHTLY BLOCKED BY THE TIGHT FIT BETWEEN THE SHAFT OF THE DRIVEN HALF-PULLEY AND THE BEARING HOUSED ON THE CRANKCASE.

Air duct

- Remove the Radiator grill
- Remove the air conveyor by disengaging the special joints

See also
Front central cover

Removing the driven pulley shaft bearing

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

N.B.
IN CASE OF DIFFICULTY A STANDARD 8MM-INSIDE DIAMETER EXTRACTOR CAN BE USED.
Refitting the driven pulley shaft bearing

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

**N.B.**
WHEN REFITTING, ALWAYS REPLACE THE BEARING WITH A NEW ONE.

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

Removing the driven pulley

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

**N.B.**
The unit can also be removed with the drive pulley mounted.

Specific tooling

020565Y Flywheel lock calliper spanner

Inspecting the clutch drum

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

**Characteristic**

Clutch bell diameter/standard value

Ø 107+0.2 +0 mm

Clutch bell diameter/max. value allowed after use

Ø 107.5 mm

Eccentricity measured /max.

0.20 mm
Removing the clutch

- Equip the tool with long pins screwed into position «A» from the outside, insert the entire driven pulley in the tool and put the central screw under stress.

**CAUTION**
THE TOOL WILL BE DEFORMED IF THE CENTRAL SCREW IS TIGHTENED UP TOO FAR.

- Using a 34 mm socket wrench remove the clutch locking nut.
- Loosen the central screw thereby undoing the driven pulley unit
- Separate the components.

**Specific tooling**
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 CONTACT SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER. VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.

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

**Characteristic**
Check minimum thickness
1 mm
Pin retaining collar

- Remove the collar with the aid of 2 screwdrivers.

- Remove the three guide pins and the mobile half pulley.

Removing the driven half-pulley bearing

- Remove the roller bearing with the special extractor inserted from the bottom of the fixed half-pulley.

CAUTION

Specific tooling
001467Y029 Bell for bearings, O.D. 38 mm

- Remove the ball bearing retention snap ring.
- Expel the ball bearing from the side of the clutch housing by means of the special tool.

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

Specific tooling
020376Y Adaptor handle
020363Y 20 mm guide
Inspecting the driven fixed half-pulley

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

**Characteristic**

Stationary driven half-pulley/Standard diameter
Ø 33.965 to 33.985 mm

Stationary driven half-pulley / Minimum diameter admitted after use
Ø 33.96 mm

Inspecting the driven sliding half-pulley

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

**Characteristic**

Mobile driven half-pulley/ Maximum diameter allowed
Ø 34.08 mm

- Check the belt contact surfaces.
- Insert the new oil seal and O-rings on the mobile half-pulley.
- Fitting the half-pulley on the bushing.

**Recommended products**

AGIP GREASE SM 2 Grease for the tone wheel revolving ring
Soap-based lithium grease containing NLGI 2 Molybdenum disulphide; ISO-L-XBCHB2, DIN KF2K-20

- Make sure the pins and collar are not worn, reassemble the pins and collar.
- Use a greaser with a curved spout to lubricate the driven pulley unit with around 6 gr. of grease. This operation must be done through one of the holes inside the bushing until grease comes out of the opposite hole. This procedure is necessary to prevent the presence of grease beyond the O-ring.

**Recommended products**

**AGIP GREASE SM 2** Grease for the tone wheel revolving ring
Soap-based lithium grease containing NLGI 2 Molybdenum disulphide; ISO-L-XBCHB2, DIN KF2K-20

---

**Refitting the driven half-pulley bearing**

- Fit a new ball bearing with the specific tool.
- Fit the ball bearing retention snap ring.
- Fit the new roller bearing with the wording visible from the outside.

**CAUTION**

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

**Specific tooling**

020376Y Adaptor handle
020456Y Ø 24 mm adaptor
020362Y 12 mm guide
020171Y Punch for Ø 17 mm roller case

---

**Refitting the driven pulley**

- Check the surfaces contacting with the belt.
- Insert the new oil seals and the O-rings on the mobile half-pulley.
- Fit the half-pulley on the bushing.

**CAUTION**

WHILE FITTING THE MOBILE DRIVEN HALF-PULLEY, TAKE CARE NOT TO DAMAGE THE OIL SEALS.

- Check that pins and collar are not worn, refit pins and collar.
- Use a bent tip oiler to lubricate the pulley unit with approx. 6 gr grease. This operation must be performed through one of the holes into the bushing until the grease starts leaking from the opposite hole. This procedure is necessary to prevent the presence of grease beyond the O-ring.

**Recommended products**

**AGIP GREASE SM 2** Grease for odometer transmission gear case
Lithium grease with NLGI 2 Molybdenum disulphide; ISO-L-XBCHB2, DIN KF2K-20

---

ENG - 7
• Measure the free length of the mobile driving half-pulley.

**Characteristic**

**Standard length:**

110 mm

---

**Inspecting the clutch spring**

- Check that the contrast spring of the driven pulley does not show signs of deformation
- Measure the free length of the spring

**Characteristic**

**Standard length**

118 mm

**Minimum length allowed after use**

XXXX

---

**Refitting the clutch**

- Preassemble the driven pulley group with spring, sheath and clutch.
- Position the spring with the sheath
- Insert the components in the tool and preload the spring being careful not to damage the plastic sheath and the end of the threaded bar.

- Reassemble the nut securing the clutch and tighten to the prescribed torque.

**CAUTION**

SO AS NOT TO DAMAGE THE CLUTCH NUT USE A SOCKET WRENCH WITH SMALL CHAMFER.

**CAUTION**

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

**Locking torques (N*m)**
Nut locking clutch unit on pulley 55 ÷ 60 Nm

**Refitting the driven pulley**

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

**Specific tooling**

020565Y Flywheel lock calliper spanner

**Locking torques (N·m)**

- Locking torque: 40 ÷ 44 N·m

---

**Drive-belt**

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

**Characteristic**

**Transmission belt/Minimum width**

- 17.5 mm

---

**Removing the driving pulley**

- Lock the driving pulley using the appropriate tool.
- Remove the central nut with the related washer, then remove the drive and the plastic fan.
- Remove the stationary half-pulley.

- Remove the belt, washer and remove the mobile half-pulley with its bushing, being careful that the rollers and contrast plate fitted loosely on it do not come off.

**Specific tooling**

020451Y Start-up crown lock
Inspecting the rollers case

1) Check that the bushing and the sliding rings of the mobile pulley do not show signs of scoring or deformation.

2) Check the roller running tracks on the contact pulley; there must not be signs of wear and check the condition of the contact surface of the belt on the half-pulleys (mobile and stationary).

3) Check that the rollers do not show signs of marked facetting on the sliding surface and that the metallic insert does not come out of the plastic shell borders.

4) Check the integrity of the sliding blocks of the contact plate.

- Check that the internal bushing shown in the figure is not abnormally worn and measure inside diameter «A».
- Measure outside diameter «B» of the pulley sliding bushing shown in the figure.

CAUTION
DO NOT LUBRICATE OR CLEAN THE BUSHING.

Characteristic
Driving pulley / Maximum diameter:
20.12 mm

Driving pulley/ Standard diameter:
20.021 mm

Driving pulley bushing/ Diameter maximum:
XXX mm

Driving pulley bushing/ Standard diameter:
20 -0.020/-0.041mm
Refitting the driving pulley

- Manually move the mobile driven half-pulley away pulling it towards the clutch unit and insert the belt repeating the direction of rotation of the first fitting.

N.B.
IT IS GOOD PRACTICE ALWAYS TO FIT THE BELT SO THE WORDING CAN BE READ, IN THE CASE THAT THIS DOES NOT SHOW A FITTING SIDE.

- Refit the particular components of the assembly (roller container assembly with bushing, limiting washer, stationery half-pulley, cooling fan belt with drive, washer and nut).

- Tighten the lock nut to torque 20 Nm and then perform a final 90° lock preventing the rotation of the drive pulley with the specific tooling.

N.B.
REPLACE THE NUT WITH A NEW ONE AT EVERY REFIT

CAUTION
IT IS MOST IMPORTANT WHEN FITTING THE DRIVING PULLEY UNIT THAT THE BELT IS FREE INSIDE IN ORDER TO AVOID MAKING A WRONG TIGHTENING WITH THE POSSIBLE LATER DAMAGE OF THE CRANKSHAFT KNURLING.

Specific tooling
020451Y Start-up crown lock

Locking torques (N*m)
Crankshaft pulley nut 18 to 20 + 90° N.m

End gear
Removing the hub cover

- Remove the transmission cover
- Remove the clutch assembly
- Discharge the rear hub oil.
- Remove the 5 screws indicated in the figure.
- Remove the hub cover with driven pulley shaft.

See also
Refitting the clutch

Removing the wheel axle

- Remove the intermediate gear and the complete gear wheel axle.
- When removing the intermediate gear pay attention to the various shim adjustments.

Removing the wheel axle bearings

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

Specific tooling
020363Y 20 mm guide
020376Y Adaptor handle
020358Y 37x40-mm adaptor
Removing the driven pulley shaft bearing

- Remove the seeger ring inside the cover.
- Remove the oil seal from the outside.
- Remove the centring dowels and position the cover on a plane.
- Position the special tool on the internal track of the bearing and remove said bearing with the aid of a press.

Specific tooling

**020452Y Tube for removing and refitting the driven pulley shaft**

- Position the special tube on the internal raceway of the bearing and from the shaft toothed side as indicated in the figure. Expel the driven pulley shaft with the aid of a press.

Specific tooling

**020452Y Tube for removing and refitting the driven pulley shaft**

Inspecting the hub shaft

- Check that the three shafts exhibit no wear or deformation on the toothed surfaces, at the bearing housings and at the oil guards.
- In case of anomalies, replace the damaged components.
- Check that the fitting surface is not dented or distorted.
- If faults are found, replace the hub cover.
Refitting the driven pulley shaft bearing

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

Specific tooling

020452Y Tube for removing and refitting the driven pulley shaft

- Heat the hub cover and insert the bearing with the specific punch.
- Fit the snap ring with the concave or radial part on the bearing side.

N.B.
FIT THE BALL BEARING WITH THE SHIELD FACING THE OIL SEAL.

Specific tooling

020151Y Air heater
020376Y Adaptor handle
020439Y 17 mm guide
020358Y 37x40-mm adaptor

Refitting the wheel axle bearing

- Heat the half crankcase on the transmission side using a thermal gun.
- After lubricating its outer strip, insert the bearing with the special adapter with the aid of a hammer.
- Refit the seeger ring and the oil seal using the 42 x 47 mm adapter and the handle.

Specific tooling

020151Y Air heater
020376Y Adaptor handle
020363Y 20 mm guide
020359Y 42x47-mm adaptor
Refitting the ub cover

- Refit the complete wheel axis.
- Refit the intermediate gear being careful of the two shim adjustments.
- Apply LOCTITE 510 for surfaces on the hub cover and refit it with the complete pulley shaft.
- Insert the 5 screws and tighten them to the prescribed torque.

N.B.
CLEAN THE CONTACT SURFACES OF THE HUB COVER AND THE HALF CRANKCASE OF RESIDUE FROM PREVIOUS GASKETS BEFORE APPLYING A NEW ONE.

Locking torques (N*m)
Locking torque: 11 to 13 Nm

Flywheel cover

Removing the stator

- Remove the flywheel cover.

- Use a specific compass wrench and a 15 mm Allen wrench to remove the flywheel lock-nut.

Specific tooling
020565Y Flywheel lock calliper spanner
• Use a specific extractor to remove the flywheel

**Specific tooling**
020162Y Flywheel extractor

• Remove the two studs of the revolutions sensor to the coolant inlet pipe.

• Remove the coolant inlet duct

• Remove the two stator fixing screws
• Remove the stator with wiring and revolution sensor

**Locking torques (N*m)**
Flywheel nut 40 to 44 N.m

---

**Refitting the stator**

- To refit, perform the removal procedures in the reverse direction.
Refitting the flywheel cover

- Fit the rubber seal on the flywheel connector and around the inlet coolant hose.

- Keeping the flywheel connector rubber clamp on the coolant inlet hose, refit the flywheel cover paying attention in inserting the strap in the groove.

- Tighten the 4 studs, noting that the two longer golden screws are inserted in the 2 top holes and are also responsible for restraining the secondary air-box.

Cylinder assy. and timing system

- Remove the flywheel cover using the 4 screws shown in the figure.
### Removing the cylinder head

- Use a TORX 20 wrench to remove the air feeding line from the injection head as shown in the figure.

- Remove the injection head, including the fuel injector and the pressure regulator, using the 2 screws shown in the figure.

- Remove the spark plug
- Remove the temperature sensor shown in the figure

To remove the air injector, extract the dust cover and use a screwdriver to remove the injector as shown in the figure.

**N.B.**

BE CAREFUL NOT TO DAMAGE THE INJECTOR PLASTIC SUPPORT
• Remove the coolant outlet union from the head with the relevant O-ring, using the two screws, as shown in the figure.

• Remove the head inside recirculation duct as shown in the figure.

• Remove the head using the 4 screws as shown in the figure.
Removing the cylinder - piston assy.

- Remove the cylinder holding the piston in order to prevent damage

- Remove the 2 plug stops by a screwdriver inserted into the special slits on the piston
- Remove piston pin and remove the piston

**N.B.**
USE PAPER OR A CLOTH TO CLOSE THE CYLINDER HOUSING MOUTH ON THE CRANK-CASE TO PREVENT SLIPPAGE OF ONE OF THE PIN LOCKING RINGS INTO THE CASE.

- Remove the roller from the connecting rod as shown in the figure

- Remove the piston sealing rings

**CAUTION**
NOTE THE ASSEMBLY POSITIONS OF THE LININGS TO PREVENT INVERTING THE POSITION IN CASE OF REUSE.

**N.B.**
BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL.
Inspecting the small end

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

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

**Characteristic**

Rod small end: standard diameter
17 +0.011–0.001

Rod small end: maximum allowable diameter
17,060 mm

Inspecting the wrist pin

- Check the wrist pin external diameter using a micrometer

**Characteristic**

Wrist pin: standard diameter
12 +0.005 +0.001 mm

Inspecting the piston

- Measure the bearings on the piston using a bore meter
- Calculate the piston-pin coupling clearance.

**Characteristic**

Wrist pin housing: standard diameter
12 +0.007 +0.012

Wrist pin housing: standard clearance
0.002 ÷ 0.011 mm
- Measure the outer diameter of the piston, perpendicular to the pin axis.
- Take the measurement in the position shown in the figure.
To classify the cylinder-piston fitting, check the appropriate table.

See also
Cylinder - piston assy.

Inspecting the cylinder

- Check that the cylinder exhibits no seizure. If it does, replace or adjust it, while respecting the allowable oversizes.
- Use a bore meter to measure the cylinder inside diameter according to the directions shown in the figure.

- Check that the fitting surface with the head is not worn or deformed.
To classify the fitting, refer to the tables.

See also
Cylinder - piston assy.

Inspecting the piston rings

- Alternatively, insert the 2 sealing rings into the cylinder.
- Insert the rings in an orthogonal position relative to the cylinder axis, using the piston.
- Measure the sealing ring opening by a feeler gauge, as shown in the figure.

- If the values are higher than those prescribed on the chart, replace the rings.
Removing the piston

• Insert the roller in the connecting rod

• Fit piston and wrist pin on the connecting rod, with piston facing the outlet

• Insert the wrist pin stop ring in the specific tool with the aperture in the position shown on the tool, as in the figure

• Place the wrist pin stop ring into position using a punch

**Specific tooling**

020166Y Pin lock fitting tool
• Fit the wrist pin stop using the plug as shown in the figure

Specific tooling
020166Y Pin lock fitting tool

Choosing the gasket

• Temporarily fit the cylinder on the piston, without the basic gasket.
• Fit a dial gauge on the specific tool, using the short union as shown in the figure.

Use a reference plane to reset the dial gauge with a pre-load of a few millimetres.
Set the dial gauge.
Check that tracer slides smoothly.
Fit the tool on the cylinder without changing the dial gauge position.
Lock the tool by the nuts used to secure the head.

Turn the engine shaft to the dead centre position (dial gauge rotation inversion point).
Measure the difference with the reset value.
Refer to the table to identify the thickness of the cylinder base gasket to use for refitting. The correct identification of the thickness of the cylinder base gasket allows maintaining the correct compression ratio.
Remove the specific tool and the cylinder.

Specific tooling
020272Y Piston position check tool

See also
Cylinder - piston assy.
Refitting the head and timing system components

• Carefully clean the head, removing any carbon residues
• Check the perfect condition of the fitting surfaces
• Check that the O-rings are not broken, otherwise replace them
• Screw the 4 head fixing nuts and tighten them in crossed sequence to the prescribed torque

**Locking torques (N*m)**
**Head fixing nuts:** 10 ÷ 11 Nm

• Refit the head inside recirculation duct as shown in the figure.

• Check that the O-Ring is in good working condition.
• Fit the coolant outlet union on the head with relevant O-ring by tightening 2 screws to the prescribed torque.

**Locking torques (N*m)**
**Coolant outlet union fixing screws:** 3 ÷ 4 Nm

• Introduce the air injector into the head.
• Refit the dust cover onto the air injector.

**N.B.**


• Fit the spark plug

• Refit the temperature sensor shown in the figure and tighten to the prescribed torque.

**Locking torques (N*m)**

Temperature sensor: 18 ÷ 22 Nm
Spark plug: 11 ÷ 14 Nm

• Refit the injection head including the fuel injector and pressure regulator and tighten to the prescribed torque.

**Locking torques (N*m)**

Injection head fixing screw: 3 ÷ 4 Nm

• Use a TORX 20 wrench to refit the air feeding pipe from the injection head.

**See also**

[air injector circuit](#)

**Air Injection**

Carbon - dam replacement
- Remove the air injector
- The carbon dam ring must be broken to be removed.
- Carefully clean the air injector and the seat removing any carbon residues.
- Check that the sealing rings exhibit no wear, or replace them.
- To refit, use a new carbon dam ring.
- Use the specific tool to fit the carbon dam ring.

We recommend doing this in several steps to ensure a correct widening of the ring as shown in the photo.

**Specific tooling**

020615Y Carbon dam ring fitting kit

- Position the specific tool with the rung facing the injector as shown in the figure.

- Use the specific tool to tighten the carbon dam ring seat as shown in the figure.
- Take several steps to ensure a correct insertion into the seat.
- Refit the air injector in its seat on the head quickly to prevent the carbon dam ring from expanding again.

**Specific tooling**

020615Y Carbon dam ring fitting kit

**Crankcase - crankshaft**

- Remove flywheel and stator
- Remove the driving pulley
- Remove the driven pulley
- Remove the mixer
- Remove the throttle body with manifold, diaphragm, gasket and blade support
- Remove the volumetric compressor
- Remove the thermal unit
- Remove the starter

See also
- Removing the driven pulley
- Removing the driving pulley
- Cylinder assy. and timing system
- Removal

Splitting the crankcase halves
- Remove the 8 crankcase half clamping screws shown in the figure

- Insert the guard on the crankshaft as shown in the figure.

- Use the specific tool to remove the crankcase half on the flywheel side. Place the tool being careful to correctly centre it
- Use a 17 mm Allen wrench to remove the crankcase half on the flywheel side.

N.B.
IF SEPARATION REQUIRES FORCING, USE A THERMAL GUN TO HEAT THE CRANKCASE IN THE BENCH BEARING ZONE

Specific tooling
- 020151Y Air heater
- 020163Y Crankcase splitting plate
- Install the specific tool with relevant guard on the transmission side crankcase half. Use four M6 screws of a suitable length.
- Use a 17 mm Allen wrench to remove the crankshaft from the transmission side crankcase half.

Removing the crankshaft

- Install the specific tool on the half crankcase on the transmission side using four M6 screws of an adequate length.
- Remove the crankshaft from the transmission side half crankcase

Specific tooling

020163Y Crankcase splitting plate

Removing the crankshaft bearings

- Bearings may be left on the crankcase halves or on the crankshaft.
- Use the specific tool to remove any bearings left on the crankshaft.

N.B.
HALF-RINGS MUST BE INSERTED ON THE BEARINGS BY STRIKING THEM WITH A MALLET.

Specific tooling

004499Y Camshaft bearing extractor
004499Y007 Half rings
- Use the specific tool to remove any bearings left on both crankcase halves.

**Specific tooling**

001467Y006 Pliers to extract 20 mm bearings  
001467Y007 Driver for OD 54 mm bearing

---

**Refitting the crankshaft bearings**

- This operation requires assembly by temperature  
- Dip the bearings in oil bath when this is still cold.  
  Avoid contact between bearings and container.  
- Use an appropriate amount of oil (approx. 1 l)

- Gradually heat the container with a thermal gun until the oil temperature reaches approx. 150°.  
- Check the temperature using a multimeter provided with thermal probe

**N.B.**

**IF THE BEARINGS WERE IMMERSED INTO HOT OIL, THEY WOULD BE IMMEDIATELY DAMAGED.**

- Place the crankshaft on the special support  
- Alternately introduce the 2 bearings to insert them home.  
- If required, use a specific pipe to ensure their insertion.

**N.B.**

**THIS OPERATION SHOULD BE PERFORMED QUICKLY AND WITH PRECISE MOVES. OTHERWISE, START OVER.**

**Specific tooling**

020265Y Bearing fitting base
**008119Y009 Tube to assemble shafts and axles**

**Inspecting the crankshaft components**

- Check for any abnormal wear on the eccentric track.
- To check using the dial gauge, see the section «Checking crankshaft alignment»

**Inspecting the crankshaft alignment**

With the specific tool shown check that the eccentricity of the surfaces of diam. «A»–«B»–«C» are within 0.03 mm (reading limit on the dial gauge); in addition, check the eccentricity of diam. «D», for which a maximum reading of 0.02 mm is permitted. In the case where eccentricity is not much above prescribed levels, **straighten** the shaft by acting on the counterweights with a shim or tighten them in a clamp (with an aluminium bushing) as required.

**Specific tooling**

- 020335Y Magnetic support for dial gauge
- 020074Y Support base for checking crankshaft alignment
Inspecting the crankcase halves

- Remove the oil seals from both crankcase halves using a screwdriver.

- Clean the fitting surfaces removing Loctite residues and residues of the paper seal on the cylinder.
- For this operation, use specific products available on the market. Avoid any method that may impair the crankcase fitting surfaces.
- To facilitate this operation, remove the rotor. Please note that the threading is anticlockwise.
- Check the fitting surfaces and the bearing and oil seal capacities.

- Check the cleaning and efficiency of the unidirectional valve of the oil supply to the pump case.
- Check the correct installation of the reference dowels.
Refitting the crankshaft

- Place the transmission side crankcase half on two wooden supports.
- Refit the water pump rotor (note that the threading is anticlockwise)
- Use the thermal gun to heat the bearing seat to approx. 120°.

**N.B.**
MAKE SURE THAT THERE IS THE NECESSARY SPACE IN THE LOWER SIDE TO INSERT THE CRANKSHAFT.

- Insert the crankshaft using a firm movement until the bearing reaches home.

**N.B.**
CHECK THAT THE CONNECTING ROD IS PLACED ACCORDING TO THE CYLINDER AXIS. IF ASSEMBLY IS UNSUCCESSFUL, START OVER FOLLOWING THE HEATING RULES AND BEING CAREFUL TO THE SHAFT INSERTION MOVEMENT. DO NOT LUBRICATE THE SHAFT SINCE THE CRANKCASE HALF FITTING SURFACES MAY BE SOILED.

- Let the crankcase half temperature settle with the crankshaft temperature.
- Install the specific crankcase separation plate again without installing the crankshaft guard.
- Keep the central thrust screw loosened during assembly.
- Move the 4 fixing screws to the end of stroke and loosen them again by the same angle (e.g. 90°)
- When temperature has settled, pre-load the thrust screw of the tool manually until the bearing ball backlash is zeroed.

**N.B.**
AN EXCESSIVE PRE-LOAD MAY CHANGE THE CRANKCASE BEARING POSITION.
- Prepare the fitting surface using the recommended product applying a thin layer after degreasing the surface with a suitable solvent (e.g. trichloroethylene)

**Recommended products**

*Loctite 510 Liquid sealant*

*Gasket*

- Assemble the equipment need to close the crankcase half (screws, wrench).
- Heat the crankcase half on the flywheel side using the thermal gun, with the same procedure on the transmission side crankcase half.

- Keep the transmission side crankcase half in horizontal position to introduce the flywheel side crankcase half with a firm and precise move.

**N.B.**

*WEAR GLOVES WHEN HANDLING THE CRANKCASE HALF. DO NOT USE RAGS FOR THIS OPERATION.*

- Insert at least 3 fixing screws and tighten quickly.
- Insert 5 more screws and tighten at the prescribed torque.

**Locking torques (N*m)**

*Crankcase closing screws: 12 -13 Nm*
Refitting the crankcase halves

- Prepare the coupling surface with LOCTITE 510 applying a thin layer of it after degreasing the surface using a suitable solvent (e.g. trichloroethylene)
- Heat the flywheel-side half crankcase with a thermal gun.

Recommended products
Loctite 510 Liquid sealant
Gasket

- Keeping the half crankcase on the transmission side, insert the flywheel side half crankcase with a clean precise movement
- Insert at least three clamping screws and tighten up rapidly
- Insert the other 5 screws and tighten them to the specified torque.

Locking torques (N\text{*}m)
crankcase coupling screws 11 - 13

- Move the crankcase separation plate in a position back from the one indicated in the figure
- Install the special magnetic support with dial gauge at the end of the crankshaft
- Check the axial clearance of the crankcase
If this is not within the maximum limit allowed, repeat the crankcase coupling procedure

Specific tooling
020335Y Magnetic support for dial gauge

Characteristic
Axial clearance with warm crankcase
0.10 \(\pm\) 0.12 mm
Axial clearance with cold crankcase
0.06 to 0.08 mm
Limit value with cold crankcase
0.02 \(\pm\) 0.03 mm
Air compressor

Removal

Air compressor removal

- Remove the throttle body manifold
- Remove the air piping union from the injection head using a Torx 25mm wrench

- Remove the air piping support bracket fixing screw from the transmission covers.

- Remove the 4 screws fixing the air compressor to the crankcase, as shown in the figure.
- Remove the air compressor
Overhaul

Air compressor check

- Check the presence of any unusual wear, traces of overheating on the roller contacting with the eccentric, as shown in the figure.

- Use a feeler gauge to measure the axial play of the control roller by placing the blade between roller and one of the two shim adjustments.

Characteristic

Standard axial play:

XXX

Allowable limit after use:

XXX

- Check that the O-ring exhibits no breakage or squashing.

- Remove the flywheel cover.
- Turn the crankshaft to check that the eccentric track exhibits no unusual wear or signs of overheating.

Refitting

Air compressor refitting
- Place the shaft with the eccentric at its lower dead point.
- Insert the compressor into the crankcase, correctly placing the reference dowels.

- Refit the sealing ring.
- Refit the 4 fixing screws tightening to the prescribed torque.

**Locking torques (N*m)**

**Air compressor fixing screws: 3 - 4 Nm**

- Refit the air pipe support bracket fixing screw on the transmission cover.
- Refit the air piping union on the injection head.

- Refit the throttle body manifold.
- Refit the flywheel cover.

**Lubrication**
Crankshaft oil seals

Refitting

- Install a new oil seal on the flywheel side using the specific tool punch. The flywheel side oil seal can be recognised by the smaller diameter.

N.B.
USE OF THE TOOL IS NOT COMPATIBLE WITH THE MOUNTED KEY

Specific tooling
020340Y Flywheel and transmission oil seals fitting punch

- Install a new oil seal on the transmission side using the specific tool provided with adapter ring. The transmission side oil seal can be recognised by the larger diameter.

Specific tooling
020340Y Flywheel and transmission oil seals fitting punch

- Lubricate bearings and connecting rod head using 2T oil.

- Refit the thermal unit
- Refit the compressor
- Refit the throttle body
- Refit the flywheel - stator
- Refit the mixer
- Refit the driven pulley
- Refit the driving pulley

Oil pump
Removal

- Remove the transmission cover
- Remove driving pulley
- Remove the 2 screws shown in the figure

- Remove the pipe gasket from the case as shown in the figure

- Remove the pipe from the oil inlet union in the pump case

See also
Removing the driving pulley
Refitting

- To refit, perform the removal procedures in the reverse direction.
- Perform purging after refitting, using the screw shown in the figure.
| SUSPENSIONS | SUSP |
Sospensioni anteriore

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

Front

Removing the front wheel

- Support the vehicle in such a way that the front wheel is raised.
- Using two 18 mm hexagonal wrenches remove the front wheel axle.

Refitting the front wheel

- When refitting, pay attention in repositioning the odometer drive correctly.

Locking torques (N*m)
Wheel fixing nut 40 to 50 N.m

Handlebar

Removal

- Remove the front handlebar cover.
- Remove the rear handlebar cover.
- After removing the transmissions and disconnecting the electrical terminals, remove the bolt «A» and the handlebar
- Check all components and replace faulty parts.

N.B.
IF THE HANDLEBAR IS BEING REMOVED TO REMOVE THE STEERING, TILT THE HANDLEBAR FORWARD TO AVOIDING DAMAGING THE TRANSMISSIONS.
Refitting

When refitting, tighten to the prescribed torque and apply the recommended grease to the threaded cone.

Recommended products
AGIP GREASE PV2 Grease for control levers on the engine
White anhydrous-calcium based grease to protect roller bearings; temperature range between -20 °C and +120 °C; NLGI 2; ISO-L-XBCIB2

Locking torques (N*m)
Locking torque: 65 to 70 N-m

Front fork

Removal
- Remove the front brake calliper.
- Remove the odometer cable from the reduction gear box.
- Remove the front mudguard.
- Remove the handlebar.
After removing the steering ring-nut using the special tool, lean the vehicle on one side and extract the steering tube.

Specific tooling
020055Y Wrench for steering tube ring nut

See also
Front brake calliper
Handlebar

Overhaul
Disassemble damper
- Remove screw 1 fixing the screw to the stem and remove the stanchion heating it if necessary with the specified heater, then remove sealing ring 2 and seeger 3.
- Using nut 4, remove the spring stem and bushing. The damper is an integral part of the stem and cannot therefore be overhauled, so if you need to work on the damper (loss of fork oil), carry out the operations mentioned above and replace the shock absorber-stem unit.
When refitting, tighten to the prescribed torque and apply the recommended grease to the threadlock nut.

**Specific tooling**
020150Y Air heater support
020151Y Air heater

**Recommended products**
Loctite 243 Medium strength threadlock
Loctite 243 medium-strength threadlock

**Locking torques (N•m)**
Stud-stanchion fixing screw 20 to 25 N•m
Nut tightening torque 20 to 25 N•m

**Replace seal ring**
- Remove the wheel axle.
- Remove the screw (4).
- Remove the stanchion (3).
- Remove the dust guard (1).
- Insert the new sealing ring after lubricating the inside parts of the ring and paying attention not to damage it.
- Insert the stanchion applying the recommended product to the clean surface.
- Lock the screw (4).

**Recommended products**
Loctite 243 Medium strength threadlock
Loctite 243 medium-strength threadlock
Rod disassembly

- Remove the dust guard (1) using a screwdriver to prise it out.
- Remove the seeger (2) and remove the power pipe.

**N.B.**

**GREASE THE SPRINGS AND THE BUSHINGS BEFORE REFITTING, WITH A SMALL QUANTITY OF GREASE (AROUND 3 GR.)**

**Recommended products**

AGIP GREASE MU3 Grease for odometer transmission gear case

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

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**Refitting**

Lubricate the seats and the balls with the grease recommended.

- Lock at the prescribed torque and turn the key anticlockwise by 90° to 100°.

**Specific tooling**

020055Y Wrench for steering tube ring nut

**Recommended products**

AGIP GREASE PV2 Grease for control levers on the engine

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

**Locking torques (N*m)**

Locking torque: 50 to 60 Nm

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**Steering column**

**Removal**

Lower and upper races from frame removal
- Only remove the seats if it is strictly necessary.
- Using the special tool remove the upper fifth wheel seat by putting the special tool into the lower part of the headstock as indicated in the figure.
- By inserting the punch into the top of the tube, remove the lower fifth wheel seat from the headstock.

**Specific tooling**

020004Y Punch for removing fifth wheels from headstock

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**Refitting**

**Lower and upper races from frame refitting**

- Using the special tool, refit the upper and lower bearing seats on the headstock.

**Specific tooling**

001330Y Tool for fitting steering seats

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**Steering bearing**

**Removal**

**Disassemble steering locking ring nut**

- Remove the handlebar.
- Remove the bearing of steering ring nut using the specific tool.

**Specific tooling**

020055Y Wrench for steering tube ring nut

---

See also

Handlebar
Overhaul slew ring seat on fork

Check the condition of the fifth wheel and the fifth wheel seat on the fork (steering tube). Replace if there are faults.

- Support the fork properly.
- Using the special tool, remove the fifth wheel seat on the steering tube as shown in the photograph by applying small mallet blows.

Specific tooling

020004Y Punch for removing fifth wheels from headstock

Always use a new fifth wheel seat on refitting.

- Using the special tool, refit the fifth wheel seat with the aid of a few mallet blows and bring it as far as the stop shown in the photo.

Specific tooling

006029Y Punch for fitting fifth wheel seat on steering tube

Refitting

Rimontaggio ghiera di bloccaggio sterzo

- After locking the first ring nut in place, lock the second ring nut using a specific tool.

Specific tooling

020055Y Wrench for steering tube ring nut

Locking torques (N*m)

Locking torque: 30 to 40 Nm

Rear
Removing the rear wheel

- Use a screwdriver as a lever between the drum and the cover.
- Straighten the split pin and remove the cap.
- Remove the wheel acting on the central fixing point.

**WARNING**

- ALWAYS USE NEW SPLIT PINS FOR REFITTING.

Shock absorbers

**Removal**

To replace the shock absorber you just need to remove the battery access flap to get and remove the shock absorber/frame anchorage nut. Then remove the shock absorber/engine anchorage nut.

**Refitting**

When refitting, tighten the shock absorber/frame anchorage nut and the shock absorber/engine pin at the prescribed torque.

**Locking torques (N*m)**

- Shock absorber/frame nut torque 20 to 25 Nm
- Shock absorber/engine pin torque 33 to 41 N·m
Centre-stand

Assembly and staking of stand pivot pin to bracket

- Caulk the end of the pin «P» between the two punches shown in the figure.
- After caulking it must be possible for the stand to turn freely.

N.B.
UPON REFITTING USE NEW O-RING AND PIN, GREASE THE SPRING ATTACHMENTS AND THE PIN.

Expelling stand pivot pin from bracket

- Remove the stand support bracket from the engine.
- Drill a 5 mm hole in the bracket so that the pin «P» can come out.

Changing the complete stand

- Work on the screws shown in the figure.
- When refitting, secure to the prescribed torque.

Locking torques (N*m)
Stand screw torque 18.5 to 19 Nm
Introduction

EMS injection system
The injection system has an incorporated injection and ignition. Injection is direct and pneumatic, by air electro-injector and fuel electro-injector. Injection and ignition are phased on the 2T cycle by a phonic wheel on the flywheel and phase rpm sensor with reluctance variation.
Fuel preparation and ignition are controlled on the basis of the engine rpm and of the gas valve opening. Further correction is made according to the following parameter: coolant temperature.
The ECU stabilises the idle at 2000 RPM for any temperature of use, by suitably managing the air injector controls, fuel injector and HV coil. Fuel preparation therefore changes according to the use temperature.
During running, fuel preparation is controlled on the basis of the engine rpm signals, coolant temperature, and gas valve position in relation to preset mapping.

The fuel injection circuit consists of:
- Fuel filter
- Pump feeding duct with auto-bleeding
- Fuel pump
- Fuel injector
- Pressure regulator
The injector mounting is connected by two snap on pipes. The continuous circulation prevents the fuel from boiling. The pressure regulator is placed in output of the injector mounting. The fuel pump is controlled by the ECU; this ensures safety of the vehicle.

The power supply circuit consists of:
- Volumetric compressor with unidirectional valve controlled by the eccentric on the crankshaft
- Flexible lines connecting to the injector mounting
- Pressure regulator
- Air injector

The ignition circuit consists of:
- ECU
- H.V. coil
- H.V. cable
- Shielded cap
- Spark plug
The ECU manages ignition with an optimum control of the advance and of the coil magnetisation time. The ECU injection-ignition system manages the engine functions by a default program. This injection system allows reaching great results as regards:
- Fuel consumption reduction
- Lubricant consumption reduction
- Discharge emission reduction. Emissions are further limited by the catalyser.

The injection system allows these results by:
- Air washing of cycle 2T
- Stratified load
- Fine nebulisation by pneumatic injection

These results are obtaining without impairing the delivery features of torque and power. Should any input signals be missing, acceptable engine performance is ensured to allow the user to reach the workshop.

Of course this cannot happen when the phase rpm signal is missing, or when the fault concerns control circuits:
- Fuel pump
- HV coil
- Injectors
- TPS (Throttle Position Sensor)

The ECU is provided with a self-diagnosis system and informs the user by the lamp into the instrument panel. The signals are given in two ways:
- Flashing light
- Solid light

The flashing light denotes a medium fault that requires a check at the workshop. The engine may work normally or in limited conditions.

The solid light denotes serious faults that impair the engine functions.

**precautionary measures**

1. Before fixing any part of the injection system, check any registered faults. Never disconnect the battery before checking for faults.
2. The power supply system is pressurised at 250 ÷ 800 KPa (2.5 ÷ 8 BAR). Before disconnecting the snap on attachment of a fuel line, check that there are no free flames and do not smoke. Act with caution to prevent spraying in the eyes.
3. When fixing electric components, operate with battery connected only when actually required.
4. When functional checks are performed, check that the battery voltage is more than 12V.
5. When washing the vehicle, be careful of the electric components and wiring.
6. When an ignition fault is detected, start the checks from the battery and the injection system connections.
7. Before disconnecting the ECU connector, perform the following steps in the order shown: Set the switch to "OFF" then disconnect the battery. Failure to comply with this rule may damage the ECU.
8. Do not invert the polarity when fitting the battery.
9. To prevent damage, disconnect and reconnect the ECU system connectors only if required. Before reconnecting, check that the connectors are dry.

10. During electrical checks, do not force the tester tips into the connectors. Do not perform tests not specifically required by the manual. Perform electrical checks using the interface wiring specific tool.

11. At the end of every check performed with the diagnostic tester, protect the system connector with the cap. Failure to comply with this rule may damage the ECU.

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

13. During repairs, do not remove the compressed air line clamps. If required, replace the rubber hose.

14. If you have to remove the air injector, replace the carbon dam sealing ring.

15. Do not perform voltage checks on the spark plug when it is not fitted on the head. Power supply voltages are very high. Hazard of dangerous electric shock. In addition, the air - fuel mixture leaking from the spark plug may cause fire.

16. Do not switch to «ON» during repair procedures when the tank is empty. While on the road, do not use the reserve if it could deplete the fuel.

17. Do not disconnect the battery leads when the engine is running.

18. If the fuel is completely depleted, refuel with at least 4 litres. This will enable safe triggering of the fuel pump

Specific tooling
020481Y Control unit interface wiring

Troubleshooting

Suggestions for diagnosis

1 A failure of the injection system may most probably depend on the connections rather than the components.

Before troubleshooting the injection system, perform the following checks:

1. Power supply
   Battery voltage
   Burnt fuse
   Connectors
2. Ground to frame
3. Air supply
   Volumetric compressor
   Supply line
4. Fuel supply
   Faulty fuel pump
   Dirty fuel filter
Fuel supply vent clogged
5. Ignition system
Faulty spark plug
Faulty coil
Faulty screened cap
6. Suction circuit
Air filter dirty
7. Others
Incorrect reset of the gas valve position sensor

2 Injection system faults may be caused by loosened connectors. Make sure that all connections are efficient.

Check the connections as follows:
1. check that the terminals are not bent.
2. check that the connectors are properly engaged.
3. check if the fault can be fixed by slightly vibrating the connector.

3 Check the entire system before replacing the ECU
If the fault is fixed by replacing the ECU, install the original ECU again and check if the fault occurs again.

4 For troubleshooting, use a multimeter with internal resistance of more than 10 Ohm / V.
Inappropriate instruments may damage the ECU.
The preferred instruments have a definition of more than 0.1V and 0.5 Ohm, precision must be more than ±2%.

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**menù diagnosis tester**

**Menu of the diagnostic tester**
The specific scooter diagnostic tester is provided with a specific software for the diagnostic of the PUREJET injection system.

**Specific tooling**

**020460Y Scooter diagnosis and tester**
The diagnostic tester is provided with a base setting menu.
To select the various functions, proceed as follows:
1. Press «ESC» and «OK» and keep them pressed while enabling the battery power.
2. The display shows the following menu: ECU DIAGNOSTIC, LINK TO PC, CONTRAST SET, LANGUAGE SET, BUZZER SET, VERSION
3. Select ECU diagnostic
4. Select the software for the PUREJET system
5. Wait until the modules are loaded
6. The diagnostic tester is ready for use. The selected software will stay in memory also for the next uses.

**N.B.**

**IF THE SCOOTER DIAGNOSTIC TESTER IS NOT LOADED WITH THE SYSTEM SOFTWARE, UPGRADE WITH A PC, THE PROGRAMMING KIT AND THE SOFTWARE TO LOAD. SET THE DIAGNOSTIC TESTER TO FUNCTION «LINK TO PC» IN THE MENU.**

The main menu of the diagnostic tester has the following functions:

- PARAMETERS
- ERRORS
- PARAMETERS STORED
- ERROR CLEARING
- ACTIVE DIAGNOSTIC
- TPS RESET
- CALIBRATION
- ECU INFORMATION

To access the individual functions, the tester must be connected to the vehicle diagnostic outlet and the ECU must be on.

- To connect the scooter diagnostic tester, raise the seat
- Remove the left detail shown in the figure

- Extract the grip from the support clip
• Remove the cover from the diagnostic grip

• Connect the diagnostic tester wiring

• Connect the power supply cable with battery terminals to the diagnostic tester
• Connect the terminals to the battery respecting the polarity: RED (+) - BLACK (-)

N.B.
FAILURE TO DO SO MAY PERMANENTLY IMPAIR THE DIAGNOSTIC TESTER

• To disconnect the tester, remove the terminals from the battery
• Remove the connector from the outlet
• Reapply the protection cap to the outlet to prevent dirt from laying onto the contacts
• Refit the battery cover

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGINE RPM</td>
<td>Displays the regime of the engine in all conditions, including the start-up</td>
</tr>
<tr>
<td>ENGINE TEMP. °C</td>
<td>Indicates the coolant temperature</td>
</tr>
<tr>
<td>THROTTLE OPEN. %</td>
<td>Indicates the % of opening of the throttle valve</td>
</tr>
<tr>
<td>T. FUEL INJECT. MS</td>
<td>Time of opening the fuel injector</td>
</tr>
<tr>
<td>AIR INJECTION T. MS</td>
<td>Time of opening the air injector (air-fuel spray)</td>
</tr>
<tr>
<td>ADVANCE IGN. °</td>
<td>Advance ignition in degrees before the TDC</td>
</tr>
</tbody>
</table>
**Specification** | **Desc./Quantity**
---|---
VOLTAGE SENSOR V | Denotes the voltage of the TPS sensor
TEMP. ENGINE V | Denotes the voltage of the coolant temperature indicator
TPS1 OUTPUT V | Indicates the TPS1 voltage indicator
TPS2 OUTPUT V | Indicates the TPS2 voltage indicator
TPS1 RESET V | Indicates the reset voltage of the TPS1 indicator (voltage referring to the ground)
TPS2 RESET V | Indicates the reset voltage of the TPS2 indicator (voltage referring to the positive 5V)
VOLT. BATT. V | Indicates the power supply voltage of the ECU (normally identical to the power of the vehicle battery)
T. OF DWELL MS | Indicates the core dwell time of the H.V. coil
MIN RPM | Indicates the number of engine revolutions set in the ECU for checking the minimum
INST. CONS.L/H | Indicates instantaneous fuel consumption
D. CYCLE CONS. % | Indicates the ratio in % between the time in "ON" and the time in "OFF" of the consumption meter control indicator (this vehicle is not fitted with this instrument)
ENGINE STATUS | Displays the engine status:
| STALL (stationary)  
| CRANK (starting)  
| IDLE (idle)  
| RUN (running)  
RUNNING HOURS | Displays the engine running time (in hours)
S.T. FUEL PUMP. | Denotes the status of the fuel pump (OFF - ON)
TPS TO RESET | Indicates the need to repeat the reset of the TPS indicators (YES- NO)

All the parameters can be displayed by selecting the 4 pages. In case of need, all the parameters can be stored in the tester by pressing the «TAB» key at the selected time. The parameters are stored as long as the power of the diagnostic tester is inserted.

**ERRORS**

| Specification | Desc./Quantity |
---|---|
G11 P0115 | **Engine temperature indicator:** the voltage of the coolant temperature indicator is near 0V (short circuit) or 5V (open circuit).  
| Temperature indicator off  
| Light off  

G11 P0217 | **Engine temperature high:** the coolant temperature signal voltage has reached too low voltages. They denote a very high temperature, higher than what can be indicated by the instrument panel.  
| Flashing light  

G20 P1120 TPS OFFSET | The voltage of TPS signals is not as expected.  
| Engine is in idle.  
| Light on  

G20 P1123 TPS | TPS signals missing  
| Voltage close to 0V (short circuit)  
| Voltage close to 5V (open circuit)  
| Engine to forced idle
<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>G21 P1124 TPS1 OFFSET</td>
<td>TPS1 signal is not as expected. Light off</td>
</tr>
<tr>
<td>G21 P1125 TPS1</td>
<td>TPS1 signal missing. Voltaages close to 0V (short circuit)</td>
</tr>
<tr>
<td></td>
<td>Voltaages close to 5V (open circuit)</td>
</tr>
<tr>
<td></td>
<td>Light on</td>
</tr>
<tr>
<td>G22 P1127 TPS2 OFFSET</td>
<td>TPS2 signal is not as expected. Light off</td>
</tr>
<tr>
<td>G22 P1128 TPS2</td>
<td>TPS2 signal missing. Voltage close to 0V (short circuit)</td>
</tr>
<tr>
<td></td>
<td>Voltage close to 5V (open circuit)</td>
</tr>
<tr>
<td></td>
<td>Light on</td>
</tr>
<tr>
<td>G30 P0560 Battery voltage</td>
<td>ECU power supply voltage is below 8.5V or is too high</td>
</tr>
<tr>
<td>G30 P1560 voltage sensor</td>
<td>The TPS sensor and coolant temperature sensor supply voltage are not as expected. Light off</td>
</tr>
<tr>
<td>G30 P1561 Sensor 2</td>
<td>TPS voltage sensor and coolant temperature sensor are not as expected (high temperature). Engine remains at forced idle Light on</td>
</tr>
<tr>
<td>G40 P0219 Runaway rpm</td>
<td>The engine has reached excessive rpm. Light on</td>
</tr>
<tr>
<td>G40 P0335 Rpm pickup</td>
<td>The ECU cannot properly recognise the rotation speed or the engine phase point. Engine with stall Light on</td>
</tr>
<tr>
<td>G40 P0700 Belt CVT</td>
<td>With engine idle or during start up, the automatic transmission or the clutch has required an excess driving force. The fault is registered when the engine management is not as expected for 3 consecutive times. Light on</td>
</tr>
<tr>
<td>G50 P0251 Fuel injector</td>
<td>The ECU has detected an interruption in the injector circuit. The fault can only be recognised in the presence of phase - rpm Light on</td>
</tr>
<tr>
<td>G50 P0350 H.V. coil</td>
<td>The ECU has detected an interruption in the HV coil primary supply circuit. The fault can only be recognised in the presence of phase - rpm. Engine without injection Light on</td>
</tr>
<tr>
<td>G60 P0230 Fuel pump</td>
<td>The ECU has detected an interruption or short circuit on the power supply line of the pump. Light on</td>
</tr>
<tr>
<td>G60 P0650 Check lamp.</td>
<td>The ECU has detected an interruption or short circuit on the injection indicator supply. Open circuit: indicator always off Circuit to ground: light always on</td>
</tr>
<tr>
<td>G60 P1561 Temp. indicator</td>
<td>The ECU has detected an interruption or a short circuit on the temperature indicator circuit. Light off</td>
</tr>
</tbody>
</table>
Specifications

**G60 P1160 Air injector**

The ECU has detected an interruption in the injector circuit. The fault can only be recognised in the presence of phase - rpm Light on.

Faults are reported by a dark dot on one of the reference columns. The recognition occurs in 3 modes:

- Dot on the column marked «A». The fault is «CURRENT» and present during the check.

- Dot on the column marked with «O». The letter denotes «OCCURRED». The fault has occurred and has been fixed during the same period of use. The fault may be intermittent and not present during the check.

- Dot on the column marked with «M». The letter denotes «STORED», the faults displayed in «CURRENT» or «OCCURRED» automatically shifts to «STORED» after switching to «OFF». The passage to «STORED» always occurs at the end of the period of use.

N.B.

**THE FAULT CAN BE SIGNALLED IN A SINGLE MODE. THAT IS, THE «CURRENT» AND «STORED» CONDITIONS CANNOT COEXIST.**

Parameters stored

This function displays the parameters stored previously. As already specified in the description of the parameter function, parameters are stored by pressing the «TAB» key at the selected time.

The diagnostic tester can contain a single memorisation.

It is cancelled out automatically as soon as power is disconnected from the tester.

Error clearing

This function clears any faults and settings recorded by the ECU auto-diagnostic function.

Active diagnosis
This function is very useful for making an efficiency check of the main components of the system and related circuits.

The components involved are:

### ACTIVE DIAGNOSTICS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR INJECTOR</td>
<td>Wait for the sound confirming 5 openings</td>
</tr>
<tr>
<td>FUEL INJECTOR</td>
<td>Wait for the sound confirming 5 openings</td>
</tr>
<tr>
<td>HV COIL</td>
<td>Wait for the sound confirming 5 coil magnetic activity (weak signal)</td>
</tr>
<tr>
<td>FUEL PUMP</td>
<td>Wait for the sound confirming the pump rotation for approx. 30 seconds.</td>
</tr>
<tr>
<td>TEMPERATURE INDICATOR</td>
<td>The indicator increases to display an average temperature, then returns to the rest position (to perform with cold engine)</td>
</tr>
<tr>
<td>CHECK LAMP</td>
<td>The light is normally on. The diagnostic is confirmed when the light turns off briefly.</td>
</tr>
<tr>
<td>ODOMETER</td>
<td>Instrument not present on the vehicle</td>
</tr>
<tr>
<td>CONSUMPTION GAUGE</td>
<td>Instrument not present on the vehicle</td>
</tr>
</tbody>
</table>

When the various diagnostics are enabled, the tester displays its results «ENDED SUCCESSFULLY» or «FAILED».

The tester results must always be combined with sound or visual checks.

The tester can confirm transmission of the command but cannot check the actual power supply or efficiency of the circuit under testing.

### Resetting the TPS

This function allows combining the throttle body with the ECU.

### Calibration

This function makes it possible to insert new calibrations to the ECU with the product developments.

### ECU information

The tester displays the following information:

- N. SER. = ECU serial number
- HW REV = Hardware revision Nr
- ECU SW = ECU software reference
- CALIBR = Calibration reference
terminal layout on cpu

1 - Ground
2
3 - Fuel injector (negative)
4 - To diagnosis indicator (negative)
5 - Coolant temperature indicator (button negative)
6 - Analogue rev. counter signal
7 - Signal TPS 1
8
9 - Coolant temperature sensor (positive)
10 - Signal TPS 2
11
12 - HV coil (negative)
13 - Air injector (negative)
14 - Fuel pump (negative)
15 - ECU power supply (+12V)
16 - Coolant sensor and TPS sensor ground
17 - Power supply (+12V)
18 - TPS sensor positive (+5V)
19 - Phase rpm sensor positive
20 - Phase rpm sensor negative

INJ PJ - 12
21 - Serial line for diagnostic tester
22

EMS system diagram
<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital instrument unit</td>
</tr>
<tr>
<td>2</td>
<td>Fuse 5A</td>
</tr>
<tr>
<td>3</td>
<td>Key switch contacts</td>
</tr>
<tr>
<td>4</td>
<td>EMS diagnostic socket</td>
</tr>
<tr>
<td>5</td>
<td>Fuel pump</td>
</tr>
<tr>
<td>6</td>
<td>Battery 12V - 9Ah</td>
</tr>
<tr>
<td>7</td>
<td>Fuse 20A</td>
</tr>
<tr>
<td>8</td>
<td>Air injector</td>
</tr>
<tr>
<td>9</td>
<td>Throttle position sensor</td>
</tr>
<tr>
<td>10</td>
<td>HV coil</td>
</tr>
<tr>
<td>11</td>
<td>Flywheel magneto</td>
</tr>
<tr>
<td>12</td>
<td>Voltage regulator</td>
</tr>
<tr>
<td>13</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>14</td>
<td>Water temperature sensor</td>
</tr>
<tr>
<td>15</td>
<td>Injection ECU</td>
</tr>
</tbody>
</table>
NRG Power Purejet

CPU POWER CIRCUIT

**ECU POWER SUPPLY CIRCUIT**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital instrument unit</td>
</tr>
<tr>
<td>Specification</td>
<td>Desc./Quantity</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>2</td>
<td>Fuse 5A</td>
</tr>
<tr>
<td>3</td>
<td>Fuel pump</td>
</tr>
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<td>5</td>
<td>Fuse 20A</td>
</tr>
<tr>
<td>6</td>
<td>Battery 12V - 9Ah</td>
</tr>
<tr>
<td>7</td>
<td>Air injector</td>
</tr>
<tr>
<td>8</td>
<td>HV coil</td>
</tr>
<tr>
<td>9</td>
<td>Voltage regulator</td>
</tr>
<tr>
<td>10</td>
<td>Fuel injector</td>
</tr>
<tr>
<td>11</td>
<td>Injection ECU</td>
</tr>
</tbody>
</table>

1- Turn the key switch to the «ON» position

Check the following conditions:
- Ignition light on steady
- Fuel pump activated for approx. 4-5 seconds

YES point 2 NO point 3 NO point 4 NO point 6 NO point 14

2- The ECU supplies are currently present.

GO TO point 9

N.B.

WHEN THE SWITCH IS ON «ON», ALL SERVICES ARE ACTIVATED. IF THERE ARE ANY FAULTS, REFER TO SECTION «VEHICLE ELECTRICS».

3- The ignition light is flashing.

GO TO point 5

4- The ignition light does not switch on and the pump is correctly activated. Perform all the checks required in the injection light section.

5- Connect the diagnostic tester of scooter. Select the «errors» function and check the faults that are signalled in current status.

GO TO point 7 GO TO point 8

Specific tooling

020460Y Scooter diagnosis and tester

6- The fuel pump did not start, but the ignition light is normally switched on. Perform all the checks required in the «pump supply» section.

GO TO point 13

7- In current mode, the tester signals faults relating to:
- engine temperature
- TPS

Make all checks reported in the relating sections The ECU supply meets specs.

8- In current mode, the tester signals faults relating to the "battery voltage"

GO TO point 10

9- Connect the diagnostic tester of the scooter. Select the errors function. Check faults relating to «battery voltage » in stored status

YES point 15 NO point 16

INJ PJ - 16
Specific tooling
020460Y Scooter diagnosis and tester

10- Measure the battery voltage.
    GO TO point 11
    GO TO point 12
11- Voltage is lower than 8.5 V. Recharge the battery.
    GO TO point 15
12- The battery voltage is between 8.5 and 14.5 V
    GO TO point 18
13- The ECU supplies are currently present. For a complete check, perform the check as described at point «A»
14- The ignition light did not switch on. The fuel pump is not activated. When connecting the diagnostic testers, the following message appears: «the ECU does not respond, check all connections».
    GO TO point 19

Specific tooling
020460Y Scooter diagnosis and tester

15- Check the charger.
    GO TO point 17
16- The ECU supplies are conform.
17- Check all electrical installation connections for any possible problems that are related to loosening or oxidation.
    GO TO point 20
18- Check the main supply.
    GO TO point 20
19- Check the power supply to panel.
    GO TO point 20
20- Prepare the interface wiring with adapter 3. Install the specific tool as described here:
    - Remove the 20A fuses
    - Disconnect the connector from the ECU
    - Connect the specific tool to the vehicle installation, not connecting the ECU
    - Re-connect the 20A fuse
    This toll, mounted this way, allows all checks on the installation sections
    GO TO point 21

Specific tooling
020481Y Control unit interface wiring
21- Check on the ground connection.
Check the ground connection on pin n°1 by using
the multimeter.
1 - battery positive = battery voltage
YES point 22 NO point 23

22- The ground line is efficient.
GO TO point 24

23- Check and restore where necessary the direct
ground line to the battery.
GO TO point 21

24- Check the main supply.
Check the presence of battery positive voltage on
pin 15.
1 - 15 = battery voltage
YES point 25 NO point 26

25- The supply is conform.

26- Check the efficiency of the 15A fuse and of the
connections to the fuse-holder (red - blue)
YES point 27 NO point 28

27- Restore the continuity of the line connecting
fuse with pin 15 (blue cable)
GO TO point 24

28- If connections are conform and the fuse is
burnt, proceed as follows: Disconnect the follow-
ing connectors:
- Air injection
- Fuel injection
- H.V. core.
- Voltage adjuster
GO TO point 29

29- Remove the burnt fuse. Check the mass insu-
lration of the pin 15 supply line
1 - 15 = Ohm infinite
YES point 31 NO point 30
30- Restore the wiring insulation.
**GO TO** point 29
31- Connect the specific tool to the ECU. Mount a new 20A fuse. Check the presence of battery voltage between pin 15 and pin 1 (the fuse does not burn)
1 - 15 = V battery
**YES** point 33 **NO** point 32

32- The fuse is again burnt. Check the wiring more accurately and, if necessary, replace the ECU.
**GO TO** point 31
33- Make a good visual check of the wiring to avoid possible causes for short circuits. If there are no faults, check any possible short circuits in the lines connecting the following components:
- air injector
- fuel injector
- H.V. coil
- Voltage adjuster
**GO TO** point 24
34- After confirmation of the correct main supply (point B) check the power supply to panel. Check the following conditions:
1 - 17 = battery voltage (switch on «ON»)
1 - 17 = 0V (switch on «OFF»)
**YES** point 35 **NO** point 36
35- The ECU power supply to panel is conform.
36- Check the efficiency of the 20A fuse and of the connections to the fuse-holder red - blue.
**YES** point 37 **NO** point 40
37- Check the efficiency of the key switch.
**YES** point 39 **NO** point 38
38- Replace the key switch.
**GO TO** point 34
39- Restore the continuity of the wiring from fuse holder to pin 17
**GO TO** point 34
40- If connections are conform and the fuse is burnt, proceed as follows: Disconnect the following connectors:
- Disconnect the specific tool 020481Y from the ECU
- Remove the 25 A fuses
- Remove the connector of the fuel pump

**GO TO point 41**

**Specific tooling**

**020481Y Control unit interface wiring**

41- Remove the burnt 20A fuse. Check the mass insulation of the supply line of pin 17 with the switch on «ON»

\[1 - 17 = \text{Ohm infinite}\]

**YES point 43 NO point 42**

42- Restore the mass insulation of the wiring or of the key switch.

**GO TO point 34**

43- Re-connect the specific tool with the ECU Mount a new 20A. fuse Check the following conditions:

\[1 - 17 = \text{battery voltage (switch on «ON»)}\]

\[1 - 17 = 0 \text{Volt (switch on «OFF»)}\]

**YES point 45 NO point 44**

44- If the fuse is again burnt. Check the wiring more accurately and, if necessary, replace the ECU

**GO TO point 34**

45- Make a good visual check of the wiring to avoid possible causes for short circuits. Reconnect the 5 A fuses. If there are no anomalies, check any possible short circuits or absorbance on the supply circuit of the fuel pump.

**GO TO point 34**
diagnosis tester connection circuit

COMPONENTS LAYOUT:
1 ECU
2 Diagnostic outlet
A + Under-panel
B + Fixed

Connect the scooter diagnostic tester.
Enter the main menu and select a function.
If the diagnostic tester returns «ECU not responding, check connections», proceed as follows.

Specific tooling
020460Y Scooter diagnosis and tester

1. Check that the insertion of the connection to the vehicle is correct.
   YES point 3 NO point 2
2. Restore the connection.
3. Turn to «OFF», wait a few seconds and turn again to «ON». If the fault persists, make the following checks:
   GO TO point 4
4. Check the ECU supplies.
GO TO point 5
5. Disconnect tester from diagnostic connector.
Check the continuity of the ground line between diagnostic connector and vehicle mass.
Diagnostic connector Pin «2» - Battery negative =
continuity
YES point 7 NO point 6

6. Restore the continuity of the ground line.
7. Connect the interface wiring.
Do not connect the wiring with the ECU. Check the continuity of the line between the diagnostic connector and ECU.
Pin 3 = diagnostic connector
Pin 21 = continuity
YES point 9 NO point 8

Specific tooling
020481Y Control unit interface wiring

8. Restore the wiring continuity.
9. Check the insulation of the line connecting the diagnostic connector with the ECU.
(Keep the ECU disconnected)
21 - 15 > 1MOhm
21 - 1 > 1MOhm
YES point 11 NO point 10

10. Restore the wiring connection.
11. The diagnostic tester connection meets specs. If the problem persists, check the diagnostic tester and the ECU, if necessary.
**Injection lamp circuit**

THERMIC: 1 - 4
CONDITIONS: Key selector set to «ON», engine off
STANDARD: Less than 0.1 V

THERMIC: 1 - 4
CONDITIONS: Key selector set to "ON", engine on, no fault detected
STANDARD: Battery voltage
**INJECTION LAMP CIRCUIT**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital instrument unit</td>
</tr>
<tr>
<td>2</td>
<td>Fuse 5A</td>
</tr>
<tr>
<td>3</td>
<td>Key switch contacts</td>
</tr>
<tr>
<td>4</td>
<td>Fuel pump</td>
</tr>
<tr>
<td>5</td>
<td>Injection ECU</td>
</tr>
<tr>
<td>Specification</td>
<td>Desc./Quantity</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>6</td>
<td>Fuse 20A</td>
</tr>
<tr>
<td>7</td>
<td>Battery 12V - 9Ah</td>
</tr>
</tbody>
</table>

The injection lamp must go on every time «ON» is switched on and remain on until the engine is started. When the autodiagnosis detects a fault, it turns on the lamp based on the level of priority:

• PRIORITY 1 = FLASHING
• PRIORITY 2 = ON

See autodiagnosis

Turning on of the lamp is controlled by the ECU by managing the negative. If necessary check the operation of the ECU.

Using the scooter tester select the «enable diagnosis» function.

Activate the «check - lamp» diagnosis with the switch in the «ON» position and engine off. The light which is normally on, which go off for an instant confirming that the ECU is operational.

The operation of the autodiagnosis lamp is also enabled on the injection lamp circuit.

### Specific tooling

020460Y Scooter diagnosis and tester

1. Connect the scooter diagnostic tester. Select the errors function. Check the presence of error **P0650**

**CHECK LAMP**

**YES** point 3 **NO** point 2

### Specific tooling

020460Y Scooter diagnosis and tester

2. Control circuit and lamp are efficient

3. Any faults in current status would be perceived before connecting the diagnostic circuit. To check the circuit, proceed as follows.

**GO TO** point 4

4. Connect the interface wiring to the system, omitting the connection to the ECU. Switch to «ON» and check the following condition:

1 - 4 = battery voltage
lamp off

### Specific tooling

020481Y Control unit interface wiring
5. Remove the 5A fuse (white lead) and check the presence of voltage.
   \[1 - 4 = 0V\]
   **YES** point 6 **NO** point 7

6. The lamp control circuit is efficient.
7. Access the instrument unit and disconnect the 8-pin connector. Check the positive insulation of the connection line to the ECU.
   \[1 - 4 = 0V\]
   Restore the wiring in case of faults

8. Battery voltage is lacking and the lamp is off. Access the instrument unit and disconnect the 2 electrical connectors. Check the presence of voltage between white lead (+) and black lead (-)
   \[\text{Black(2/4)} - \text{White(5/8)} = \text{battery voltage with switch to «ON»}\]
   **YES** point 10 **NO** point 9

9. Positive power to panel missing. This comes from the switch and the 5A fuse. Power supply is shared by the fuel level indicator and other uses. Restore the wiring continuity.
   **GO TO** point 8
10. Check the instrument panel injection lamp.
    **YES** point 12 **NO** point 11
11. Replace the lamp.
12. Check the continuity of the negative line from the instrument unit to the ECU
    \[\text{GREY(1/4)} - \text{pin 4} = 0\Omega \text{ (continuity)}\]
    If there is no continuity, restore the wiring.
13. Battery voltage is missing and the lamp is on. Access the instrument unit and disconnect the 8-pin connector. Check the ground insulation of the connection line

1 - 4 > 1MOhm

In case of faults, restore the wiring.

**throttle position sensor circuit (T.P.S.)**

TERMINALS: 16 (-) - 18 (+)

CONDITIONS: Key switch set to «ON»

STANDARD VALUES: 5V

TERMINALS: 16 - 7

CONDITIONS: Key switch set to «ON» , opening the gas gradually

STANDARD VALUES: V= progressive increase

TERMINALS: 16 - 10

CONDITIONS: Key switch set to «ON» , opening the gas gradually

STANDARD VALUES: V= progressive decrease
The throttle position sensor (TPS) is a built-in part of the throttle body and cannot be removed. The sensor receives 5V power (electronically determined) from the ECU. The 5V power is used for the TPS sensor circuit and coolant temperature circuit. The TPS sensor is a double reading sensor, which means two resistive tracks which generate two opposite signals defined as TPS1 and TPS2. The TPS1 signal increases with increased throttle opening. The TPS2 signal decreases with increased throttle opening. The two signals are equivalent at a single point corresponding to average opening (50%). The two signals are converted to a percentage value of throttle opening. The dual reading system allows for greater control, since the TPS1 and TPS2 signals are compared to each other and a reference map. If missing or out of line TPS signals are detected autodiagnosis is activated and the related fault code is generated. Faults are generated according to three priority levels. The TPS signals in combination with the rpm-timing signal are the basic reference for the operation of the built-in injection - ignition system.
The throttle position sensor and related circuit can be checked by using the scooter tester.

**Specific tooling**

**020460Y Scooter diagnosis and tester**

For the check, proceed as follows.

Connect the diagnostic tester to the vehicle. Select the «parameters» function. The following values are reported:

**THROTTLE OPEN. %**

The displayed value refers to the valve opening percentage. Check that a progressive actuation of the valve corresponds to an equal increase of the opening percentage value. A 0% percentage denotes the minimum position (approx. 20% opening)

**TPS1 OUTPUT = V**

**TPS2 OUTPUT = V**

The displayed tensions refers to the TPS1 and TPS2 signals. Progressively open the valve and check the following conditions:

TPS1 - Increases progressively

TPS2 - Decreases progressively

Set the valve opening to 50% and check that at this value the signals TPS1 and TPS2 are equal or very close (a few hundreds volts difference).

**N.B.**

FOR A MORE PRECISE CHECK, PROGRESSIVELY OPEN THE VALVE DIRECTLY BY THE THROTTLE BODY. USING A FLEXIBLE TRANSMISSION CAUSES AN IRREGULAR OPENING

**TPS1 ZERO = V**

**TPS2 ZERO = V**

**TPS TO REST = (NO - YES)**

The TPS signal reset function is used when signals TPS are efficient.

Select the errors function.

Check the following errors and relevant ISO codes:

<table>
<thead>
<tr>
<th>ERROR AND ISO CODE</th>
<th>WARNING ORIGIN</th>
<th>ENGINE BEHAVIOUR</th>
<th>INJECTION LIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1123 TPS</td>
<td>Both TPS signals missing. Acknowledgement occurs when voltages are close to: 0V = short circuit 5V = open circuit</td>
<td>Forced idle</td>
<td>Flashing</td>
</tr>
<tr>
<td></td>
<td>In the event of intermittent fault, the system switches to the &quot;occurred&quot; status. To reset the function, switch ON - OFF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- ON to allow switching to the stored status.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Status</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1125</td>
<td>TPS1 signal missing. Acknowledgement occurs when the signal voltage is close to:</td>
<td>Free</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>0V = short circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5V = open circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1128</td>
<td>TPS2 signal missing. Acknowledgement occurs when the signal voltage is close to:</td>
<td>Free</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>0V = short circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5V = open circuit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1120</td>
<td>The voltage of both TPS signals in not as expected. The fault is recognised by comparing the signals with the power supply polarity</td>
<td>Stays idle</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>TPS OFFSET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1124</td>
<td>The voltage of TPS1 signal in not as expected. The fault is recognised by comparing the signals with the TPS1 power supply polarity</td>
<td>Free</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>TPS1OFFSET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1127</td>
<td>The voltage of TPS2 signal in not as expected. The fault is recognised by comparing the signals with the TPS2 power supply polarity</td>
<td>Free</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>TPS2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1560</td>
<td>The TPS sensor and coolant temperature sensor power supply voltage do not meet specs.</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SENSOR VOLTAGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1561 (*)</td>
<td>The TPS sensor and temperature sensor power supply voltage does not meet specs. Too high voltages may be recognised.</td>
<td>Forced idle</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>VOLTAGES SENSOR 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If one or more errors are detected, or differences are detected between the values shown in the parameters, check the circuit and sensor using the troubleshooting procedure.

1. Install the interface wiring ECU.

**Specific tooling**

**020481Y Control unit interface wiring**

Omit the connection to the ECU. Disconnect the connector of sensor TPS and of the coolant temperature sensor.
GO TO point 2
2. Use a multimeter to check the wiring continuity.

N° 1 (TPS) - 16 (ECU) = Ohm Continuity
N° 2 (TPS) - 7 (ECU) = Ohm Continuity
N° 3 (TPS) - 10 (ECU) = Ohm Continuity
N° 4 (TPS) - 18 (ECU) = Ohm Continuity
YES point 4 NO point 3
3. Restore or replace the wiring.

GO TO point 2

4. Check the earth insulation of the wiring with disconnected battery power supply

1 - 16 > 1 MOhm
1 - 7 > 1 MOhm
1 - 10 > 1 MOhm
1 - 18 > 1 MOhm
YES point 6 NO point 5
5. Replace or restore the wiring.

GO TO point 4

6. Check the wiring positive insulation.

N.B.
THE CHECK SHOULD BE PERFORMED WITH THE BATTERY CONNECTED, KEY SWITCH SET TO «ON» AND EFFICIENT FUSES.

1 - 16 = 0 Volt
1 - 7 = 0 Volt
1 - 10 = 0 Volt
1 - 18 = 0 Volt
YES point 8 NO point 7
7. Restore or replace the wiring.

GO TO point 6

8. Check the reciprocal insulation of the TPS sensor connection lines.

16 - 7 - 10 - 18
Reciprocal insulation > 1 MW
Check the connector efficiency.
YES point 10 NO point 9
9. Replace or restore the wiring.

GO TO point 8

10. Connect the ECU connector, switch to «ON».

Check the TPS sensor power supply.
16(-) - 18(+) = 5 V

YES point 12 NO point 11

11. Carefully check the ECU power supply. Replace the ECU if required.

GO TO point 10

12. Connect the TPS sensor connector and measure the voltage.

16(-) - 18 (+) = 5 V

YES point 14 NO point 13

13. Voltage measured: 0 V or much lower than 5V. Check the connector and replace the throttle body, if required.

Replacement

Resetting

GO TO point 12

14. Measure the voltage of the TPS1 and TPS2

16 - 7 = V TPS1 (increasing with the opening from 0.5 to 4.5V)

16 - 10 = V TPS1 (decreasing with the opening from 4.5 to 0.5V)

Voltage variations must be progressive with gas opening, without stall or direction reversal. The sum of voltages TPS1 and TPS2 must be constant and with values slightly lower than the TPS sensor power supply voltage.

YES point 16 NO point 15

15. Check the TPS and ECU connectors and replace the throttle body, if required.

Replacement

Resetting

GO TO point 14

16. Check that the voltage values of signals TPS1 and TPS2 measured match those shown by the diagnostic tester in the «parameters» function.

YES point 18 NO point 17

Specific tooling

020481Y Control unit interface wiring

020460Y Scooter diagnosis and tester
17. When slightly different voltage values are found, check the ECU connector more thoroughly and replace the ECU if required.

18. TPS sensor and circuit meet specs.

See also
menù diagnosis tester

T.P.S. signal reset

The throttle body is supplied with gas valve and is precalibrated. Precalibration entails regulating the minimum opening of the gas valve to obtain a certain flow of air under preset reference conditions. Pre-calibration results in an optimum air capacity for the engine management during start up or during idle running, and at any possible temperature during the use of the vehicle. This is allowed by the electronic management of the engine and by its capacity to work with very lean air - fuel mixtures. In fact, pre-calibration results in an air capacity which, with idle and hot engine, is much higher than the actual requirements.

To achieve higher engine performance, increased rpm are not due to the gas valve opening increase, but are enabled by the ECU.

When the ECU perceives a slight increase in the gas valve opening, it enables the engine to fast rotation and excludes the idle and the CUT OFF management.

This result can be obtained by recovering the pre-calibration and keying tolerances of the TPS sensor on the throttle body.

This occurs by resetting the signals TPS1 and TPS2, i.e., by reporting the voltage values TPS1 and TPS2 corresponding to the pre-calibration position to the ECU.

These voltage values will be recognised as suitable by the ECU only if falling within the design default ranges.

The throttle body pre-calibration register is sealed with paint and must not be tampered with.

The signals TPS1 and TPS2 may be reset as follows:
- Automatic reset
- Manual reset

Specific tooling
020460Y Scooter diagnosis and tester

automatic T.P.S. reset

AUTOMATIC RESET

Automatic reset already occurs at the end of the assembly line when the battery power is connected and switched to «ON». In order to prevent resetting the signals TPS1 and TPS2 not corresponding to the actual pre-calibration position of the throttle body, the ECU should only be powered after checking that the valve command sector is correctly abutted against the register. A slight tensioning of the flexible transmission commanding the throttle body may impair the reset precision and the injection control.
A greater tensioning causes signals TPS1 and TPS2 whose voltage is not as expected by the ECU, which cancels the reset procedure.

To check that TPS signals are properly reset, use the following procedure:

1- Connect the scooter diagnostic tester

Select the «parameters» function and visualise the indicator showing the «TPS to reset»

GO TO point 2

2. The diagnostic tester responds YES. Continue to make the following checks:
   - The throttle body is not tampered with
   - The control transmission is correctly registered
   - The connector of the throttle body is correctly connected
   - The electric circuit control meets specs.

GO TO point 3

3. Carry out the manual reset procedure.

4. The diagnostic tester responds NO. The reset procedure was successful.

GO TO point 5

5. For a further confirmation, check the following indications of the "parameters" function.

   TPS1 OUTPUT V 0.64
   TPS2 OUTPUT V 4.27
   TPS1 ZERO V 0.64
   TPS2 ZERO V 0.72

The voltage reported here corresponds to a possible condition.

GO TO point 6

6. Check the following conditions:
   TPS1 OUTPUT = TPS1 ZERO
   TPS2 OUTPUT + TPS2 ZERO = 5V

YES point 7 NO point 8

7. The TPS reset meets specs.

8. Repeat the reset procedure using the manual mode.

Specific tooling
020460Y Scooter diagnosis and tester

Manual T.P.S. reset

MANUAL RESET

This procedure is required when the ECU or the throttle body is replaced. Before resetting, check the following conditions:

- The throttle body has not been tampered in pre-calibration
- The throttle body connector is properly inserted
- The control transmission is properly installed and adjusted

Proceed to manually reset the signals TPS1 and TPS2 as follows:

1. Connect the scooter diagnostic tester

Select "RESET TPS" from the menu. By using this procedure, the following indications are visualised.

GO TO point 2

2. Check for possible errors

Wait

GO TO point 3

GO TO point 4

3. Errors present

Cancel all errors

Press a key

GO TO point 5

4. No errors

Press a key

GO TO point 6

5. Check the auto-diagnostic content and make the necessary repairs

GO TO point 1

6. TPS reset in process

Wait

GO TO point 7

7. Key «OFF»

Press a key

GO TO point 8

8. Check the abut of the throttle body

Press OK to proceed

GO TO point 9

9. Wait

GO TO point 10

10. Key on «ON»

Press a key

GO TO point 11

11. Wait

GO TO point 12

12. Check for possible errors

Wait

GO TO point 13

13. No errors
Press a key
GO TO point 14
14. Wait
GO TO point 15
15. TPS resetting successful
Press a key
GO TO point 16
16. The manual procedure is completed. For a further confirmation, check that the indications reported in the parameters function comply with the instructions given for automatic reset.

**rpm-timing sensor circuit**

TERMINALS: 19 - 20
CONDITIONS: Engine driven by the starter (500-600 RPM)
STANDARD VALUES: $V = 3.5 - 4$
TERMINALS: 19 - 20
CONDITIONS: Idle engine
STANDARD VALUES: $V = 11 - 12$
RPM-TIMING SENSOR

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuse 20A</td>
</tr>
<tr>
<td>2</td>
<td>Battery 12V - 9Ah</td>
</tr>
<tr>
<td>3</td>
<td>Key switch contacts</td>
</tr>
<tr>
<td>4</td>
<td>Pick - up</td>
</tr>
<tr>
<td>5</td>
<td>Injection ECU</td>
</tr>
</tbody>
</table>

This built-in injection and ignition system, requires a prompt perception of the rotation speed and angular position of the crankshaft. With each engine cycle the ECU, must manage the following, in order:

- Petrol injector
- Air injector
- H.T. coil

Each actuator is managed with a specific timing. This is made possible by the rpm timing sensor from a phonic wheel on the external diameter of the magneto rotor. The magneto is subdivided into 24 sectors and has 23 control teeth of the air gap variations at the nucleus of the pick-up. This is a reluctance variation type, it has its own magnetism and produces alternating voltage. When the magneto rotates, each of the teeth changes the magnetic activity of the nucleus, generating a complete alternation. These continue every 15° making a precise measurement of the rotation speed possible, even at a periodic level. The perception of the angular position occurs via alternations separated by 30° of rotation due to the missing teeth. The electrical lines connected with the ECU are polarised to guarantee correct timing.

The positive peak of the alternated signal is separated from the negative by around 2° of rotation.

The ECU autodiagnosis checks the rpm - timing signal, even if this activity is limited to recognition of signal irregularities within an engine cycle. These cases occur with missing combined with a signal to the driver via the injection lamp going on. This is different than a clean interruption of the signal, which leads to the engine going off without any recognition of the fault by the autodiagnosis. When the rpm - timing signal is missing, management of the following actuators also fails:

- Petrol injector
- Air injector
- H.T. coil
- Petrol pump

1. Connect the scooter diagnostic tester. Select the «errors» function on the menu. Check the presence of the error:

**P0335 PICK UP RPM**

YES point 2

GO TO point 3

**Specific tooling**

**020460Y Scooter diagnosis and tester**

2. The ECU has detected instability of the phase rpm signal. Proceed as follows, regardless of the storage status (current - occurred - stored).
3. The ECU has detected no fault relating to the phase - rpm signal. The signal may be totally missing. To check, proceed as follows.

4. Connect the interface wiring. Omit the connection to the ECU. Disconnect the connector from the flywheel magneto.

**Specific tooling**

020481Y Control unit interface wiring

5. Check the continuity of the connection lines of the sensor from the ECU to the flywheel connector

19 - red lead = Ohm continuity
20 - brown lead = Ohm continuity

**YES** point 7 **NO** point 6

6. If continuity is not detected, restore or replace the wiring.

7. Check the ground insulation of the lines

1 - 19 > 1M\(\Omega\)m
1 - 20 > 1M\(\Omega\)m

**YES** point 9 **NO** point 8
8. Restore the insulation or replace the wiring.

GO TO point 7

9. Check the reciprocal insulation of the lines

19 - 20 > 1MOhm

YES point 11 NO point 10

10. Restore the insulation or replace the wiring.

GO TO point 9

11. Check the line positive insulation.

1 - 19 = 0V

1 - 20 = 0V

YES point 13 NO point 12

N.B.

THE CHECK SHOULD BE PERFORMED WITH THE BATTERY CONNECTED, KEY SWITCH SET TO «ON» AND EFFICIENT FUSES.
12. Restore the insulation or replace the wiring.
   GO TO point 11
13. Connect the flywheel connector and repeat the insulation checks from earth and from positive.
   1 - 19 > 1 MOhm
   1 - 20 > 1 MOhm
   YES point 15 NO point 14

14. Restore or replace the stator with phase - rpm sensor.
   GO TO point 17
15. Check the phase - rpm sensor resistance
   19 - 20 = Ohm...... at 20°
   (detected 106.7W)
   YES point 17 NO point 16
   N.B.
   IF THE CHECK IS DONE WHEN THE ENGINE IS HOT, RESISTIVE VALUES WILL BE HIGHER
16. When out of tolerance resistive values are detected, replace the stator with phase - rpm sensor.
17. Measure the alternated voltage produced by the phase - rpm sensor with engine driven by the starter.
   19 - 20 = 3.5 , 4 V ~
   (at 500 - 600 RPM)
   YES point 19 NO point 18
18. Check the magnetic activity and gap of the phase - rpm sensor. Replace the stator if required.

GO TO point 17

19. Connect the interface wiring to the ECU. Check the alternated voltage upon start up and at idle.

19 - 20 = 3.5 - 4 V~

(start up)

19 - 20 = 11 - 12 V~ (idle)

YES point 21 NO point 20

20. If voltages are very different, replace the ECU

GO TO point 19

21. The phase - rpm sensor and relevant circuit are efficient.

**H.T. coil circuit**

TERMINALS: 1 - 12

CONDITIONS: Engine stopped, switch in any position

STANDARD VALUES: Battery voltage
The ignition system with built-in injection is an induction type. Ignition is managed based on two parameters:

- Ignition lead
- Dwell time

The ignition lead curve is optimised based on the rpm and engine load perceived by the TPS1 and TPS2 sensors. The dwell time is optimised based on the power required by the H.T. coil. The dwell time is optimised based on the power required by the H.T. coil. Naturally longer dwell times are used during starting phases.

**PETROL INJECTION CIRCUIT**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Desc./Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key switch contacts</td>
<td>1</td>
</tr>
<tr>
<td>Fuse</td>
<td>20A</td>
</tr>
<tr>
<td>Injection ECU</td>
<td>3</td>
</tr>
<tr>
<td>Air injector</td>
<td>4</td>
</tr>
<tr>
<td>Battery</td>
<td>12V - 9Ah</td>
</tr>
<tr>
<td>HV coil</td>
<td>6</td>
</tr>
<tr>
<td>Fuel injector</td>
<td>7</td>
</tr>
</tbody>
</table>

**NRG Power Purejet**

pure jet injection

INJ PJ - 42
The ECU autodiagnosis also checks the coil power circuit and detects interruptions and shorts. Checking is normally only done in the presence of the rpm - timing signal (engine running). Any faults are signalled to the driver via the injection lamp. In addition to protect the vehicle, the injector power is interrupted, its operation is not automatically reset, thus preventing use with backfiring. To reset operation, it is necessary to switch «ON» to «OFF» and then «ON». The fault is recorded without the possibility of moving to «PAST EVENTS».

CIRCUIT DIAGNOSIS
1- Connect the scooter diagnostic tester. Select the active diagnostic function.

GO TO point 2

Specific tooling
020460Y Scooter diagnosis and tester

2. Start the diagnostic of H.V. coil. Check if 5 ignitions are controlled. These can be detected by the noise produced by the magnetic activity and from the spark on the plug. If this check is not possible, use an external spark plug and check the 5 sparks directly.

YES point 3 NO point 4 NO point 5

3. There are 5 sparks. The ignition system is working. For greater certainty, continue with the autodiagnostic check in order to highlight stored errors.

4. No sparks present, even if the result is: "test successful". Continue with circuit checks. If there are no faults, replace the ECU

GO TO point 2

5. No sparks present. The result is: «test failed» Repeat the diagnostic and, if necessary, replace the ECU.

GO TO point 2

CHECKING THE auto-diagnostic MESSAGE
1- Connect the scooter diagnostic tester. Select the «errors» function on the menu. Check if there are any errors on the H.V. coil.

P0350 H.V. COIL

YES point 3 YES point 4 NO point 2

Specific tooling
020460Y Scooter diagnosis and tester

2. No errors. To be more sure, check:
   · Spark plug
   · H.V. coil secondary
   · Shielded cap
   · Ignition timing


4. Error on the H. V. coil in «occurred» or stored status. Continue with circuit checks. Possible problems:
- Uncertain contacts
- Lacking insulation

**CHECKING THE ELECTRIC CIRCUIT**

1. Connect the interface wiring. Do not connect the ECU. Disconnect the connector of the H.V. coil primary.

**GO TO** point 2

**Specific tooling**

*020481Y Control unit interface wiring*

2. Check that there is a positive battery voltage to the connector supplying the primary with the switch in any position.

1 - blue cable (positive) = battery voltage

**YES** point 4  **NO** point 3

**N.B.**

TO MAKE THIS CHECK, USE A SMALL SOCKET. PAY ATTENTION NOT TO DAMAGE THE CONNECTOR

3. Check the efficiency of the 20A fuse. If necessary, restore the wiring. See ECU supply.

**GO TO** point 2

4. Check the continuity of the control line of the coil.

12 - violet - black = continuity

**YES** point 6  **NO** point 5

**N.B.**

TO MAKE THIS CHECK, USE A SMALL SOCKET. PAY ATTENTION NOT TO DAMAGE THE CONNECTOR

5. Restore the wiring.

**GO TO** point 4

6. Check the insulation - from positive - of the control line of the coil.

1 - 12 = 0V

**YES** point 8  **NO** point 7
7. Restore the wiring
GO TO point 6

8. Check the insulation - from negative - of the control line of the coil.
1 - 12 > 1MOhm
NO point 9
GO TO point 10

9. Restore the wiring.
GO TO point 8

10. Check the resistance of the primary wiring of the H.V. coil.
**Standard value**: 0.63 ± 0.03 Ohm at 23°C
YES point 12 NO point 11

11. If notably different resistances are detected, replace the H.V. coil.
GO TO point 10

12. Check the ground insulation of the primary wiring. To make this check, measure the resistance between one of the primary poles and the bar supporting the coil to the frame.
**Standard value**: > 1MOhm
YES point 14 NO point 13

13. If lower values are detected, replace the H.V. coil.
GO TO point 12

14. Check the resistance of the screened cap as shown in the figure
**Standard value**: 5 KOhm ±
YES point 16 NO point 15
15. Replace the screened cap.
GO TO point 14

16. Reconnect the following components:
- Shielded cap
- H.V. coil supply connector
- ECU interface wiring:
GO TO point 17

17. With the engine idle, measure the induced voltage produced by the H.V. coil primary. In this case, use the digital multimeter and the peak voltages adaptor.

\[ 1 - 12 = 300 \text{V (peak)} \]

**Minimum allowable voltage \( \geq 200 \text{V (peak)} \)**

**Standard voltage at start-up= about 350V (peak)**

YES point 18 NO point 19

**N.B.**

USE THE ADAPTER WITH THE POSITIVE PROD ON PIN 12. IF THE ENGINE DOES NOT START, CHECK THE INDUCED VOLTAGE AT THE START-UP

**Specific tooling**

020331Y Digital multimeter

020409Y Multimeter adaptor - Peak voltage detection

18. The system is efficient, check timing.

19. If the detected voltage is much lower than the minimum allowable, check the core dwelling time reported in the «parameters» function of the diagnostic tester

**T. OF DWELL =**

6 ms (start-up)

2 \( \div 3 \) ms (idle)

YES point 20 NO point 21

20. Replace the H.V. coil

21. Replace the ECU
ignition timing check

The ignition advance is electronically determined on the basis of the ECU parameters. For this reason, it is not possible to state reference values based on the engine rpm. The ignition advance value can be detected by the parameters function of the diagnostic tester. The degrees displayed in the parameters function may be checked for matching with the actual ignition command degrees.

The following is required for this check:
- Diagnostic tester
- Stroboscopic lamp
- Adapter for the H.V. cable signal

Remove the flywheel cover. Adjust the adapter for detecting the H.V. cable signal to a position between the 4th and the 5th reference and install it between the spark plug and the original cap. Connect the induction clips of the stroboscopic lamp to the screened cable of the adapter according to their polarity. Select the lamp control to the conventional engine 2T position (1 spark = 1 rev). With engine idle, set a degree phasing on the lamp equal to the indication of the advance shown in the tester parameters.

Check that the fifth to last tooth in the direction of rotation is aligned with the rpm - phase sensor core, as shown in the figure. The position denotes the top dead centre.

Checking a clear lack of correspondence of the advance values, continue with checks on the phase - rpm sensor and the ECU.

N.B.
THE STROBOSCOPIC LAMP CANNOT DISPLAY A FLYWHEEL KEYING ERROR. TO THIS PURPOSE, IF YOU HAVE ANY DOUBTS, CHECK THAT THE FLYWHEEL POSITION INDICATED IN THE FIGURE ACTUALLY MATCHES THE TOP DEAD CENTRE.
Specific tooling

020460Y Scooter diagnosis and tester
020330Y Stroboscopic light for timing control
020621Y HV cable extraction adaptor

**Compressed air system**

Direct injection in the cylinder takes place by pressure of the compressed air. The injection pressure is vital to ensuring the correct fuel preparation and pulverisation of the mix.

The system consists of the following components:

- Volumetric compressor
- Injectors support
- Connecting union
- Fuel pressure regulator control chamber
- Air injector

The mechanical installation of these components is described in the chapter relating to engine. This section of the manual deals with the pneumatic inspections on the system.

To perform pneumatic inspections on the compressed air system, proceed as follows.

1. Remove the air supply duct of the injectors and install the air pressure control kit
   
   **GO TO point 2**

   **N.B.**
   
   **BE VERY CAREFUL WHEN CLEANING THE PARTS AND MAKING THE PROPER CONNECTION OF UNIONS. ANY IMPURITY MAY DAMAGE THE AIR INJECTOR. AVOID REMOVING THE RUBBER HOSE FROM THE BRASS HOSE HOLDERS. IF REQUIRED, REPLACE THE HOSE.**

Specific tooling

020617Y Air pressure check kit

2. Remove the following electrical connectors:

   - Air injector
   - Fuel injector
   - H.V. coil

   Remove the ignition spark plug.

   **GO TO point 3**

3. Connect the scooter diagnostic tester. Select the parameters function. Start the starter for 15 seconds and check the following:

   **Engine rpm > or = 500 RPM**

   **Air pressure at the end of test > or = 4 BAR**

   **YES point 5 NO point 4 NO point 6**
4- The engine rpm and pressures are lower than specifications. Check the battery and starter system.
   GO TO point 3
5- Engine rpm and pressure are as expected. Check that the pressure remains stable over time.
   YES point 16 NO point 8
6- Engine rpm are as expected and pressure is lower than specifications. Check that the pressure remains stable over time.
   YES point 7 NO point 8
7- Replace the volumetric compressor.
   GO TO point 3
8- Pressure decreases very quickly. Check if there are any fuel leaks from the injector mounting.
   YES point 9 YES point 10 NO point 11
9- There are leaks at the coupling to the head. Replace the O-Ring between air injector and support.
   GO TO point 3
10- There are leaks at the pressure regulator cover. Replace the full injector mounting.
    GO TO point 3
11- Use water with soap or foam to check the seal of the volumetric compressor connection hose to the injector mounting
    YES point 13 NO point 12
12- Restore the seals or replace the hose.
    GO TO point 3
13- Bring the system to pressure again and as soon as the starter stops rotating, close the compressor connection pipe at the shunting with the manometer by a flat and long pincer. Check the pressure progress.

GO TO point 14
GO TO point 15

14- Pressure decreases with the same trend. Check the seals on the injector mounting, replace the air injector if required.

GO TO point 3

15- Pressure remains unchanged. The compressor unidirectional valve is not efficient. Replace the volumetric compressor.

GO TO point 3

16- Refit the ignition spark plug and connect the cap. Connect the following connectors:
- H.V. coil
- Fuel injector
- Air injector

Use the diagnostic tester to remove the faults registered during pressure check.

GO TO point 17

Specific tooling

020460Y Scooter diagnosis and tester

17- Start the engine and check the air pressure with engine idle and free from loads at medium rpm.

Standard air pressure = 5 ÷ 5.5 bar (500 ÷ 550 Kpa)

N.B.

AIR PRESSURE DURING THE ENGINE OPERATION IS FAIRLY CONSTANT SINCE THE INCREASE OF CAPACITY OF THE PUMP IN RELATION TO THE INCREASE OF RPM IS PARTLY COMPENSATED BY THE LONGER OPENING TIME OF THE AIR INJECTOR. TO CONFIRM THIS, CHECK THAT THE PRESSURE INCREASES UP TO ABOUT 8 BAR (800 KPA) AFTER SWITCHING TO THE “OFF” POSITION WHEN THE ENGINE RUNS AT HIGH RPMs.

Air injector circuit

TERMINALS: 1 - 13

CONDITIONS: Engine stopped, switch in any position

STANDARD VALUES: Battery voltage
The air injector is the main component of the electrical-pneumatic injection. To make things easier, the injector is called an air injector, even if a mixture of air and petrol is actually injected. Direct injection of petrol transported by the compressed air makes it possible to obtain a fine mist of the mixture within the cylinder. The ECU runs the air injector by checking the time and opening time. This makes it possible to achieve better results in terms of pollution and consumption. The ECU autodiagnosis also checks
the air injector circuit. A fault is detected if the circuit is interrupted or if there is a short towards the earth or positive. Any faults are signalled to the driver via the injection lamp. If a fault is present the engine will not run. The fault is only recognised when the rpm - timing sensor is present. For this reason when there is a fault memorisation changes from the "current event" state to "past event" state when the engine stops. To check the air injector electrical circuit, proceed as follows.

1 - Connect the scooter tester. Select the "enable diagnosis" function.

GO TO point 2

Specific tooling

020460Y Scooter diagnosis and tester

2 - Enable the air injector diagnostic. Check the 5 sounds that denote the air injector activation. Check the tester response.

YES point 3 NO point 4 NO point 5

3 - The air injector has enabled 5 times and the tester has returned "test finished successfully". The air injector and relevant circuit are currently efficient. For greater certainty, continue with the auto-diagnostic check in order to highlight stored errors.

4 - The injector has not been enabled and the tester has returned "test failed". Repeat the diagnostic and, if necessary, replace the ECU.

GO TO point 2

5 - The air injector has not been enabled and the tester has returned «test finished successfully». Check the air injector circuit.

6 - Connect the scooter diagnostic tester Select the «errors» function. Check the presence of error

P1160 AIR INJECTOR.

GO TO point 7

YES point 8 YES point 9

Specific tooling

020460Y Scooter diagnosis and tester

7 - No error present. The injector electrics are efficient. Check the compressed air circuit to inspect the injector seal.

8 - Air injector error in current status. Check the air injector circuit.

9 - Air injector error in stored status. Check the circuit for false contacts or uncertain insulation.

10 - Connect the interface wiring. Omit the connection to the ECU. Disconnect the air injector connector.

GO TO point 11

Specific tooling

020481Y Control unit interface wiring
11 - Check the battery positive voltage to the blue lead of the power supply connector of the air injector.

1 - blue lead (positive) = V battery

**YES** point 13 **NO** point 12

**N.B.**
THIS CONNECTOR ALLOWS AN EASY CHECK USING THE MULTIMETER PRODS. DO NOT INSERT THE PRODS INTO THE PINS.

12 - Check the efficiency of fuse 20A and restore the wiring if required.

**GO TO** point 11

13 - Check the continuity of the air injector control line.

13 - pink (injector connector) = continuity

**YES** point 15 **NO** point 14

**N.B.**
THIS CONNECTOR ALLOWS AN EASY CHECK USING THE MULTIMETER PRODS. DO NOT INSERT THE PRODS INTO THE PINS.

14 - Restore the wiring.

**GO TO** point 13

15 - Check the air injector control line positive insulation.

1 - 13 = 0V

**YES** point 17 **NO** point 16

16 - Restore the wiring.

**GO TO** point 15

17 - Check the air injector control line negative insulation.

1 - 13 > or = 1MOhm

**YES** point 19 **NO** point 18
18- Restore the wiring.
   TO GO point 17

19- Check the air injector winding resistance
   **standard value**= ... Ohm
   **YES** point 21 **NO** point 20

20- If very different resistive values are detected,
   replace the air injector.
   GO TO point 19

21- Check the air injector winding negative insulation.
   **1 - any pin of the injector ≥ 1MOhm**
   **YES** point 23 **NO** point 22

22- Replace the air injector.
   GO TO point 21

23- Connect the specific tool to the ECU. Connect
   the air injector connector. Check the presence of
   voltage to the ECU.
   **1 - 13 = V battery (engine off and any position
   of the switch)**
   **YES** point 25 **NO** point 24

**Specific tooling**

**020481Y Control unit interface wiring**

24 - Voltage is close to 0V and the injector is open. Carefully check the control line insulation. Replace
   the ECU if required.
25 - The air injector control circuit is efficient. The air injector opening time can be checked when the engine is running by the «parameters» menu

**AIR INJECTION T. mS =**

6 ÷ 7 mS (start up at 20° C)

~ 1.6 mS (idle at 20° C)

~ 1.4 mS (idle at 60° C)

The values are indicative but useful for diagnostics. Command failures or unusual opening times are always caused by the ECU.

---

**fuel pump circuit**

**TERMINALS:** 1 - 14

**CONDITIONS:** Switch in «ON» position after the engine timing

**STANDARD VALUES:** less than 0.1 V

**TERMINALS:** 1 - 14

**CONDITIONS:** Switch in «ON» position after timing with engine still

**STANDARD VALUES:** Battery voltage
The fuel pump is a piston type supplied with a direct current motor. It is designed to distribute high pressure with small deliveries and little absorption, thus suited for use on reduced horse power engines. Given the reduced absorption, the pumped is powered directly by the ECU without using relay switches. The pump is powered for 4 - 5 seconds after switching to «ON» this lets the system bleed.
and get rid of the fuel aged by boiling within the injector support. Subsequent management of the pump is combined with the presence of the rpm timing signal. This guarantees the safety of the vehicle in the event of an accident. The ECU auto-diagnosis also checks the pump electrical circuit. A fault is recognised in the event of an interrupted circuit or short. The fault is recognised with a priority level of 3, this means registered by the auto-diagnosis but not signalled by turning on the injection lamp. Naturally, this fault causes the engine to fail and is easily recognisable on an acoustic level due to the failure of the pump to rotate.

- The footrest needs to be removed to access the fuel pump.

- In order to gain access to the fuel pump it is necessary to remove the foot rest board.

- A connection is present at the pump entrance with the derivation of two tubes, respectively:
  A: fuel arrival tube
  B: fuel drainage tube

In the case of replacement, do not invert the order of the two tubes during reassembly.

1- Switch to the «ON» position. Listen for activation of the pump for 4-5 seconds

YES point 3 NO point 2

2 - Proceed with the auto-diagnostic and control circuit checks.

3 - Check whether the pump activation starts up again when trying to start the engine.

YES point 4 NO point 5

4- The pump control circuit is efficient.

5- Check the auto-diagnostic and the phase - rpm signal.

6- Connect the scooter diagnostic tester Select the «active diagnostic» function

GO TO point 7

**Specific tooling**

020460Y Scooter diagnosis and tester

7- Check that the tank is adequately topped up and proceed with the activation of the «fuel pump» diagnostic. Listen for 10 consecutive activations of around 4 seconds of the fuel pump. Check the outcome on the diagnostic tester.

YES point 8 NO point 9 NO point 10
8- The fuel pump was activated 10 times and the tester returned the «test successfully completed» outcome. The pump and the relative circuit are currently efficient. For greater certainty, proceed with the auto-diagnostic check in order to highlight any errors in stored status.

9- The pump remained inactive and the tester returned the «test failed» outcome. Repeat the diagnostic and, if necessary, replace the ECU.

GO TO point 7

10- The fuel pump was not activated and the tester returned the «test successfully completed» outcome. Proceed with checking the pump and the relative electric circuit.

11- Connect the scooter diagnostic tester, select the «errors» function. Check for the presence of error PO230 FUEL PUMP.

YES point 13 YES point 14 NO point 12

Specific tooling
020460Y Scooter diagnosis and tester

12- No error present. The pump's electric command circuit is efficient. For a more complete check, proceed with the check on the fuel supply circuit.

13- Fuel pump error in occurred or stored status. Proceed with the check on the pump and the control circuit, paying particular attention to false contacts or uncertain insulation.

14- Fuel pump error in actual state. Proceed with the check on the fuel pump supply circuit.

15- Connect the interface wiring. Omit the connection with the ECU. Disconnect the fuel pump supply connector.

GO TO point 16

Specific tooling
020481Y Control unit interface wiring

16- Turn the switch to the «ON» position. Check for the presence of positive battery voltage at the orange pump supply connector wire.

1 - ORANGE = battery voltage

NO point 17

GO TO point 18

N.B.

AVOID DAMAGING THE CONNECTOR PIN. USE A PIN ADAPTOR IF NECESSARY.
17 - Check the efficiency of the 20 A fuse, the key switch and restore the wiring if necessary.

18 - Check the continuity of the petrol pump control line.

14 - green/blue (pump con.) = continuity

N.B.
AVOID DAMAGING THE CONNECTOR PIN.
USE A PIN ADAPTOR IF NECESSARY.

19 - Restore the wiring.
GO TO point 18

20 - Check the fuel pump control line positive insulation.

1 - 14 = 0V
YES point 22 NO point 21

21 - Restore the wiring.
GO TO point 20

22 - Check the fuel pump control line negative insulation.

1 - 14 = 1 MOhm
YES point 24 NO point 23

23 - Restore the wiring.
GO TO point 22

24 - Check the fuel pump winding continuity.

Standard resistance = .......Ohm (5Ohm measured)

N.B.
IF THE CHECK IS DONE ON A NEW PUMP, HIGHER RESISTANCE VALUES MIGHT RESULT DUE TO THE FACT THAT THE MANIFOLD HAS NOT BEEN BROKEN IN.
If there are difficulties in doing the check directly on the pump, proceed with the check through the wiring. Reconnect the fuel pump connector and measure the resistance between the specific tool's pins, keeping the switch in the «OFF» position.

14 - 17 = \ldots \ldots \text{Ohm} (5 \text{Ohm measured})

YES point 26 NO point 25

25- A resistance of around 0 Ohm indicates the presence of a short circuit. A resistance significantly greater than the standard values indicates low conductivity. In these cases, replace the pump.

GO TO point 24

26- Keeping the ECU conditions disconnected and pump connector connected, check that with the key switch in the «ON» position, the pump starts to rotate each time that pin 14 is grounded.

1 - 14 (bridged) = pump activated

YES point 28 NO point 27

27- There is electric absorption but the pump does not rotate. Replace the pump due to mechanical damage.

GO TO point 24

28- Especially in case an error is verified in the «occurred» or «stored» state, repeat activation of the pump several times in order to distinguish any faults deriving from a manifold that is not perfectly efficient.

GO TO point 29

GO TO point 30

29- Some pauses are present. Check the connectors more carefully and replace the pump, if necessary.

30- The pump rotates normally. The pump connection electric system is efficient. Connect the ECU and check that the pump activates for around 4 seconds each time the switch is turned «ON» and constantly when the rpm- phase (engine in rotation) signal is present). Replace the ECU if there are any faults.

GO TO point 31

31- For a more complete fuel pump check, it is best to proceed with the checks on the current absorbed and the hydraulic characteristics of the pump.

See also

Footrest
petrol injector circuit

TERMINALS: 1 - 3
CONDITIONS: Engine stopped, switch in any position
STANDARD VALUES: Battery voltage

The petrol injector receives pressurised fuel through the supply system. The ECU runs the injector by checking the time and opening time. The fuel is injected into the compressed air chamber this forming the rich titre air petrol mixture to be injected into the cylinder via the air injector. The petrol injector prepares the mixture when the air injector is still closed and the air injector injects the mixture when the
petrol injection has finished. The operation of the petrol injector is always very important in all engine operating phases, but particularly during idling and starting. The ECU autodiagnosis also checks the petrol injector control circuit. A fault is detected if the circuit is interrupted or if there is a short towards the earth or positive. Any faults are signalled to the driver via the injection lamp. If a fault is present the engine will not run. The fault is only recognised when the rpm - timing sensor is present, i.e. when the ECU controls opening of the injector. For this reason when there is a fault, recognition changes from the «current event» state to «past event» state when the engine stops.

1 - Connect the scooter tester. Select the enable diagnosis function.

GO TO point 2

Specific tooling

020460Y Scooter diagnosis and tester

2- Activate the fuel injector diagnostic. Listen for 5 fuel injector activations. Check the diagnostic tester response.

YES point 3 NO point 4 NO point 5

3- The fuel injector was activated 5 times and the tester returned the «test completed successfully» outcome. The fuel injector and the relative circuit are efficient. For further certainty, proceed with the auto-diagnostic test in order to avoid any errors in the stored status.

4- The injector remained inactive and the tester returned the outcome «test failed». Repeat the diagnostic and replace the ECU if necessary.

5- The fuel injector remained inactive and the tester returned the «test completed successfully» outcome. Check the fuel injector circuit.

6- Connect the scooter diagnostic tester. Select the «errors» function on the menu. Check the presence of any errors PO251 FUEL INJECTOR.

YES point 8 YES point 9 NO point 7

Specific tooling

020460Y Scooter diagnosis and tester

7- No error present. The injector electric part is sufficient. Proceed with the injector hydraulic inspections.

8- Fuel injector error in current status. Check the fuel injector circuit.

9- Fuel injector error in occurred or stored status. Check the injector circuit with special attention to false contacts of uncertain insulation.
coolant temperature sensor circuit

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital instrument unit</td>
<td>1</td>
</tr>
<tr>
<td>Key switch contacts</td>
<td>2</td>
</tr>
<tr>
<td>Fuse 5A</td>
<td>3</td>
</tr>
<tr>
<td>Fuse 20A</td>
<td>4</td>
</tr>
<tr>
<td>Battery 12V - 9Ah</td>
<td>5</td>
</tr>
<tr>
<td>Injection ECU</td>
<td>6</td>
</tr>
<tr>
<td>Coolant temperature sensor</td>
<td>7</td>
</tr>
</tbody>
</table>
Front brake calliper

Removal

- Check that the brake piping, gasket and fitting are in good condition. If you see any oil on the brake calliper and/on the components of the system, it is necessary to replace them.
- Disconnect the oil line from the calliper, collecting the oil in a container.
- Remove the two clamps highlighted in the diagram.

Overhaul

- Remove the calliper assembling bolts and take out the internal bodies and components. If necessary, in order to make it easier to take out the plungers, inject (shorts blasts of) compressed air through the brake fluid pipe.
- Check that the cylinders of the internal and external body of the calliper do not show scratches or signs of erosion; otherwise, replace the entire calliper.

CAUTION
ALL THE INTERNAL COMPONENTS MUST BE REPLACED EVERY TIME THE CALLIPER IS SERVICED.

Insert the following:
- sealing rings (1-2);
- pistons (3);
- locate the OR seal inside a calliper body (4).
- Join the inner and outer bodies via fixing bolts. Refit the pads and breathe any air inside the circuit (see previous paragraphs).
- Locate the calliper on the disc and secure to the supporting bracket tightening the fixing bolt.
- Tighten the tube joint on the calliper at the prescribed torque.
- When refitting the components, they must be perfectly clean and free from any trace of oil, fuel, grease, etc... It is therefore necessary to carefully clean them with denatured alcohol.

The seal rings must be immersed in the operating liquid; Protective solution PRF1 may be used.

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

Locking torques (N*m)

Calliper coupling screw 20 to 25 Nm Oil bleed screw 7 to 10 Nm
1 DUST GUARDS
2 SEALING RINGS
3 PLUNGERS
4 O-RING GASKET

Refitting

- Refit the pincer on the support and tighten the screws at the prescribed torque.
- Refit the tube complete with fitting with new copper gaskets.
- Bleed the air from the system.

Locking torques (N*m)

Brake fluid tube calliper 20 ÷ 25 Nm
Fastening screws calliper to the crankcase 20 - 25 Nm
Oil bleed screw 7 to 10 Nm

Front brake disc

Removal

- Remove the front wheel loosening the axle clamp.
- Remove the six fastenings of the disc.

Refitting

- When refitting, position the disc correctly making sure that it rotates in the right direction.

Locking torques (N*m)

Disc tightening screw 8 - 12
Disc Inspection

Checking the disc is important; it must be perfectly clean, with no sign of rust, oil or grease or other dirt and must not show signs of deep scoring.

Characteristic

**New rear disc thickness**
4.0 mm

**Disc thickness at wear limit (front)**
3.5 mm

- Using the appropriate tool, measure how much the disc protrudes when the wheel is fitted properly. The protrusion, measured near the external edge of the disc, must be less than 0.1 mm.
- If a value is measured other than the specified value, remove the front wheel (Front/Rear Suspension chapter) and check the protrusion of the disc. Maximum permissible out of true is 0.1 mm. If the value measured is greater, replace the disc and repeat the check.
- If the problem persists, check and replace the wheel hub if necessary.

Specific tooling

020335Y Magnetic support for dial gauge

Front brake pads
Removal

- Remove the pin split ring located at the back of the calliper body.
- Remove the pin, paying attention in recovering the spring, hence remove the pads.
- The pads must be replaced if the working thickness is less than 1.5 mm

Refitting

- To reassemble perform the above steps in reverse order. Position the leaf spring with the arrow facing up.

Fill
- Once the bleed valve is closed, fill the system with brake liquid to the maximum level.
- Undo the bleed screw.
- Apply the tube of the special tool to the bleed screws.

When bleeding it is necessary to fill the oil tank in continuation while working with a MITYVAC pump on the bleed screws until no more air comes out of the system.

The operation is finished when just oil comes out of the bleed screws.
- Do up the bleed screw.
- When the operation is over, tighten up the oil bleed screw to the prescribed torque.

**N.B.**

**IF AIR CONTINUES TO COME OUT DURING PURGING, EXAMINE ALL THE FITTINGS:**
**IF SAID FITTINGS DO NOT SHOW SIGNS OF BEING FAULTY, LOOK FOR THE AIR INPUT AMONG THE VARIOUS SEALS ON THE PUMP AND CALLIPER PISTONS.**

**CAUTION**

- **DURING THE OPERATIONS, THE VEHICLE MUST BE ON THE STAND AND LEVEL.**

**N.B.**

**DURING PURGING FREQUENTLY CHECK THE LEVEL TO PREVENT AIR GETTING INTO THE SYSTEM THROUGH THE PUMP.**

**WARNING**

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

**CAUTION**

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

Specific tooling
020329Y MityVac vacuum-operated pump

Recommended products
AGIP BRAKE 4 Brake fluid
FMVSS DOT4 Synthetic fluid

Locking torques (N*m)
Oil bleed screw 8÷12

Front brake pump

- After removing the front and rear handlebar covers, act on the two stand fixing points (see the figure).
- Disconnect the tube, collecting the brake oil in a container.
- On refitting, perform the operation in reverse.
- Tighten the hydraulic line to the prescribed torque and bleed the system.

Locking torques (N*m)
Brake fluid pump - hose fitting 20 ÷ 25 Nm

Removal

- Bleed the circuit and drain the brake fluid through the bleeding screw located on the calliper and actuate the brake lever until no more fluid flows out.
- Remove the oil pump from the handlebar; remove the brake lever and then remove the wheel cylinder.
1. Tank cap screw.
2. Tank cover.
3. Diaphragm.
4. Bellows.
5. Sealing ring.
6. Piston.
7. Gasket.
8 - Spring

**CAUTION**
- THE PRESENCE OF BRAKE FLUID ON THE DISC OR BRAKE PADS REDUCES THE BRAKING EFFICIENCY.
IN THIS CASE, REPLACE THE PADS AND CLEAN THE DISC WITH A HIGH-QUALITY SOLVENT.
CONTACT WITH BRAKE FLUID WILL DAMAGE PAINTED SURFACES.
RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL FOR LONGER THAN 20 SECONDS.
AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH.
THE SEALING RINGS MUST BE IMMERSED IN THE OPERATING LIQUID.

**Refitting**

Before fitting, the parts must be perfectly clean and free of traces of oil, diesel fuel, grease, etc.. They should be washed thoroughly in denatured alcohol before proceeding.
- Reinstall the individual parts in the reverse order to the removal, paying attention to the correct positioning of the rubber parts in order to ensure leak tightness.
1. Tank cap screw.
2. Tank cover.
3. Diaphragm.
4. Bellows.
5. Sealing ring.
6. Piston.
7. Gasket.
8. Spring.
| COOLING SYSTEM | COOL SYS |
System bleed

1. Fill the circuit through the expansion tank to the maximum level.
2. Fasten the rubber line to the drain fitting on the head and thread it into the expansion tank mouth.
3. Loosen the fitting and restore the tank level.
4. Start up the engine and wait until only coolant exits from the line, then tighten the fitting on the head.
5. Turn off the engine, restore the level of liquid to the maximum level, then close the expansion tank.
6. Heat up the engine to normal operating temperature in order to eliminate any air formation in the main lines.
7. Stop the engine and let it cool, then check that the level of coolant in the expansion tank to the maximum; refill it.

Water pump - overhaul

- Remove the pick-up/coolant inlet hose clamp
- Remove the transmission cover
- Remove the mixer
- Setup the special as shown in the picture

N.B.
WHEN SECURING THE TOOL, PAY ATTENTION NOT TO OVERLOAD THE PLASTIC IMPELLER.

Specific tooling
020167Y Arrest key for impeller pump
- Remove the mixer/water pump drive-belt with the two sprockets

- Remove the split ring from the shaft together with the bearings
  - Remove the steel washer

- Using the air heater, warm up the crankcase in the area around the water pump bearings as shown in the picture.

- With the aid of the special tool, loosen the impeller shaft turning the spanner clockwise (left-handed thread)
  - As the thread is fully disengaged, extract the shaft with the aid of pliers.

**Specific tooling**

- 020169Y Water pump crankshaft fitting and removal spanner

- Using the special hook, remove the sealing ring from its housing as shown in the picture.

**Specific tooling**

- 020209Y Spring hook
- Ensure the shaft is not abnormally worn and the bearings not noisy. Otherwise, replace shaft and bearings
- Carefully clean oil seal and bearing housings

- Use a new oil seal to refit
- Position the new oil seal on the special tool with the main lip facing the bearings as shown in the picture

- Lubricate the oil seal and push it home using the special tool as shown in the picture

**Specific tooling**

020168Y Water seal punch mount on half-crankcase

- Insert the shaft, with bearings, into its housing by pushing and turning it at the same (turn anticlockwise for tightening)
- Turn it rapidly to the end of the threading.
- Should this operation prove difficult, do not carry on; instead, start over by reheating the crankcase

**N.B.**

FAILURE TO OBSERVE THIS RULE MAY RESULT IN DAMAGE TO THE THREAD OF THE COPPER INSERT ON THE IMPELLER, OR SEPARATION OF THIS FROM THE IMPELLER ITSELF.

**Specific tooling**

020169Y Water pump crankshaft fitting and removal spanner
Using the air heater, warm up the water pump bearing housing, without directing the air flow directly against the oil seal.
- Lubricate the end of the water pump shaft on the oil seal side, using the recommended product.

**Recommended products**
AGIP GREASE MU3 Grease for odometer transmission gear case
Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20

**Thermostat**

**Removal**
- Detach the coolant hose from the head, partially draining the system.
- Remove the cylinder head.
- Remove the two fixing screws and hence the thermostat.

**Check**
1) Visually check that the thermostat is not damaged.
2) Fill a metallic container with approx. 1 litre of water.
   Immerse the thermostat, and keep it in the centre of the bowl.
   Immerse the multimeter temperature probe, and keep it close to the thermostat.
   Heat up the bowl using the thermal gun.
   Check the thermostat opening start temperature: Heat up until the thermostat is completely open.
3) Replace the thermostat if not working properly.

**CAUTION**

NRG Power Purejet

**COOL SYS - 5**
TO EXECUTE THE TEST CORRECTLY, MAKE SURE NEITHER THE THERMOSTAT NOR THE THERMOMETER TOUCHES THE CONTAINER.

Specific tooling
020331Y Digital multimeter
020151Y Air heater

Characteristic
Thermostat check: Opening start temperature
60±2°C

Refitting

- Refit the thermostat onto the head, following the removal operations in the reverse order, and paying attention in inserting the groove on the thermostat on the reference on the head.
| Chassis | Chas |
Frame central cover

- Remove the top and bottom fairings.
- Remove the 2 Philips screws fixing the footrest.
- Remove the 3 Allen screws located around the fuel filler cap.
- Remove the fuel filler cap.

See also
Side fairings

Knee-guard

- Remove the footrest and its side fairings.
- Remove the expansion tank and the fuel filler cap.
- Remove the 11 fixing screws, and hence release the knee-guard.

See also
Footrest

Taillight assy.

- Remove the top joining element of the fairings located behind the taillight.
- Remove the two top fairings.
- Remove the 2 fixing screws; hence remove the taillight after disconnecting the connector to the vehicle system.

See also
Side fairings
Footrest

- Remove the centre frame cover.
- Remove the 10 screws (5 for each side), hence remove the footrest.

- Remove the side fairing from the footrest, by removing the two screws joining this to the spoiler and the knee-guard.

See also
- Frame central cover
- Frame central cover

Side fairings

- Remove the top l.h.s. and r.h.s. fairings, by removing the 3 side screws and the screw located underneath the taillight
• Remove the lower fairings, removing the 2 side screws and the central joining screw located underneath the spark plug cover.

License plate holder

• Remove the top fairing joining element located behind the taillight.
• Remove the 2 screws joining the top side fairings.
• Remove the 4 lower screws joining the front wheel housing cover with the lower side fairings.

See also
Side fairings

Fuel tank

• Remove the footrest and its side fairings.
• Remove the 2 Allen screws fixing the fuel support cross member, and remove the bracket.
- Remove the metallic clip joining the rubber bellow to the tank and loosen the 3 screws fixing to the knee-guard

- Remove the 2 top screws fixing the tank to the frame and lower the tank so to disconnect the inlet and outlet fuel hoses from the pump.
- Remove the tank completely paying attention to avoid fuel spillage.

See also
Footrest

**Front central cover**

- Mediante cacciavite a croce rimuovere la vite come indicato in figura.
- Rimuovere la mascherina.
Aesthetic inspection

Appearance checks:
- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

Lock check
- Safety locks
- clamping screws

Safety locks
- Rear shock absorber upper fixing
- Rear shock absorber lower fixing
- Front wheel axle nut
- Wheel hub nut
- Frame - swinging arm bolt *
- Swinging arm bolt - Engine
- Engine arm pin - Frame arm
- Handlebar lock nut
- Steering lower ring nut
- Upper steering ring nut

Electrical system

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

PRE DE - 2
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.

WARNING
BEFORE RECHARGING THE BATTERY, REMOVE THE CAPS OF EACH CELL. KEEP OPEN FLAMES OR SPARKS AWAY FROM THE BATTERY DURING CHARGING. REMOVE THE BATTERY FROM THE SCOOTER, DISCONNECTING THE NEGATIVE TERMINAL FIRST.

CAUTION
WHEN INSTALLING THE BATTERY, ATTACH THE POSITIVE LEAD FIRST AND THEN THE NEGATIVE LEAD.

WARNING
BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. IN CASE OF CONTACT WITH EYES OR SKIN, RINSE WITH ABUNDANT WATER FOR ABOUT 15 MINUTES AND SEEK MEDICAL ATTENTION AT ONCE. IF IT IS SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION. THE BATTERIES PRODUCE EXPLOSIVE GAS; KEEP THEM AWAY FROM NAKED FLAMES, SPARKS AND CIGARETTES. IF THE BATTERY IS CHARGED IN A CLOSED PLACE, TAKE CARE TO ENSURE ADEQUATE VENTILATION. ALWAYS PROTECT YOUR EYES WHEN WORKING CLOSE TO BATTERIES. KEEP OUT OF THE REACH OF CHILDREN

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

Levels check
Level check:
- Hydraulic braking system fluid level.
- Rear hub oil level
- Engine coolant level.

Road test
Test ride
- Cold start
- Instrument operations
- Response to the throttle control
- Stability on acceleration and braking
- Rear and front brake efficiency
- Rear and front suspension efficiency
- Abnormal noise
Static test

Static control after the test ride:
- Starting when warm
- Starter operation
- Minimum hold (turning the handlebar)
- Uniform turning of the steering
- Possible leaks

CAUTION
CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.
CAUTION
NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

Functional inspection

Functional check:
Braking system (hydraulic)
- Lever travel
Braking system (mechanical)
- Lever travel
Clutch
- Proper functioning check
Engine
- Throttle travel check
Others
- Check documentation
- Check the frame and engine numbers
- Tool kit
- License plate fitting
- Check locks
- Check tyre pressures
- Installation of mirrors and any accessories
This section is devoted to the time necessary to carry out repairs. The description and code for each operation is indicated.

**Engine**

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>001001</td>
<td>Engine to chassis - Replacement</td>
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## Crankcase

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<tbody>
<tr>
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<td>Engine crankcase - Replacement</td>
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Crankshaft

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<tr>
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<tr>
<td>2</td>
<td>Main bearings - Replacement</td>
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<tr>
<td>3</td>
<td>Oil seal, flywheel side - Replacement</td>
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<tr>
<td>4</td>
<td>Oil seal, clutch side - Replacement</td>
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</tbody>
</table>
Cylinder assy.

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
</tr>
</thead>
</table>
| 1     | 001002                  | Cylinder piston - Replace-
|       |                         |   ment                    |
| 2     | 001107                  | Cylinder / piston - Inspe-
|       |                         |   ction / cleaning        |

Cylinder / piston

NRG Power Purejet

Time

TIME - 5
### Cylinder head assy.

#### HEAD UNIT

<table>
<thead>
<tr>
<th>Code</th>
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<tr>
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<td>001056 Head gasket - change</td>
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<td>3</td>
<td>001057 Thermostat - Replacement</td>
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<td>4</td>
<td>001093 Spark plug - Replacement</td>
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<td>5</td>
<td>001126 Head - Replacement</td>
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<td>6</td>
<td>007010 Bleed valve - Replacement</td>
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<td>7</td>
<td>001178 Disc pack - Replacement</td>
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<td>8</td>
<td>001083 Thermistor - Replacement</td>
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<td>9</td>
<td>005111 Air injector - Replacement</td>
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<td>10</td>
<td>005112 Air injector - Service</td>
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<td>11</td>
<td>005110 Fuel injector mounting - Replacment</td>
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TIME - 6
## Driven pulley

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<tr>
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<td>2</td>
<td>Clutch - Replacement</td>
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<td>3</td>
<td>Clutch bell housing - Replacement</td>
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<td>4</td>
<td>Driven pulley - overhaul</td>
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![Driven pulley diagram](image-url)
Oil pump

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<tr>
<td>1</td>
<td>001018 Mixer - Replacement</td>
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<tr>
<td>2</td>
<td>001019 Mixer belt - replacement</td>
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<tr>
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<td>001028 Mix movement gear socket - Replacement</td>
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Final gear assy.

<table>
<thead>
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<th>Code</th>
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<tbody>
<tr>
<td>001010</td>
<td>Geared reduction unit - Service</td>
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<tr>
<td>001156</td>
<td>Gear reduction unit cover - Replacement</td>
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<tr>
<td>003065</td>
<td>Gear box oil - Replacement</td>
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<tr>
<td>004125</td>
<td>Rear wheel axle - Replacement</td>
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## Driving pulley

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<td>2</td>
<td>driving pulley - Replacement</td>
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<td>3</td>
<td>Starter sprocket wheel - Replacement</td>
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<td>4</td>
<td>Driving half-pulley - replace</td>
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<td>5</td>
<td>Variator rollers / shoes - Replacement</td>
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## Transmission cover

<table>
<thead>
<tr>
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<th>Code Reference</th>
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<tr>
<td>1</td>
<td>001096</td>
<td>Transmission crankcase cover - Replacement</td>
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<td>2</td>
<td>001131</td>
<td>Transmission air intake - Replacement</td>
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<td>3</td>
<td>001132</td>
<td>Transmission air inlet pipe - Replacement</td>
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<td>4</td>
<td>001135</td>
<td>Transmission cover bearing - Replacement</td>
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<td>5</td>
<td>004179</td>
<td>Stand buffer - Replacement</td>
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Water pump

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<tr>
<td>1</td>
<td>Water pump - Replacement</td>
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</tr>
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<td>2</td>
<td>Water pump command shaft - Replacement</td>
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<td>3</td>
<td>Connection water pump pipe / return pipe - Replace</td>
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</table>
### STARTER MOTOR

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<tr>
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<tbody>
<tr>
<td>1</td>
<td>Starter motor - Replacement</td>
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<td>Starter motor cable harness - Replacement</td>
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</tr>
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<td>3</td>
<td>Start-up pinion - Replacement</td>
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</table>

NRG Power Purejet
**Flywheel magneto**

<table>
<thead>
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<tr>
<td>1</td>
<td>001058 Flywheel - Replacement</td>
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<td>2</td>
<td>001067 Stator - Replacement</td>
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<td>3</td>
<td>001173 Rotor - Replacement</td>
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<td>001087 Flywheel cover - Replacement</td>
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Butterfly valve

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<tbody>
<tr>
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<td>Throttle body</td>
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<td>2</td>
<td>Throttle body - Overhaul</td>
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</tr>
<tr>
<td>3</td>
<td>Air cleaner carburettor fitting -</td>
<td>Replacement</td>
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</table>

**THROTTLE BODY**
<table>
<thead>
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<tbody>
<tr>
<td>1</td>
<td>001009 Muffler - Replacement</td>
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<tr>
<td>2</td>
<td>001095 Muffler guard - Replacement</td>
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<td>3</td>
<td>001136 Exhaust emissions - Adjustment</td>
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Air cleaner

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<tr>
<td>1</td>
<td>001027 Body / air cleaner union - Replacement</td>
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<td>2</td>
<td>001015 Air filter box - Replacement</td>
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<td>001014 Air filter - Replacement / cleaning</td>
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</table>
Frame

<table>
<thead>
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<th>Code</th>
<th>Action</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>001053</td>
<td>Stand bolt - Replacement</td>
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<td>2</td>
<td>004004</td>
<td>Stand - Replacement</td>
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<td>3</td>
<td>004001</td>
<td>Frame - replace</td>
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<td>004015</td>
<td>Footrest - Replacement</td>
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<td>5</td>
<td>004171</td>
<td>Stand support plate - Re-</td>
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<td></td>
<td></td>
<td>placement</td>
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<tr>
<td>6</td>
<td>004143</td>
<td>Footrest support - replace</td>
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**Legshield spoiler**

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<td>004065  Front shield rear section - Replacement</td>
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<td>2</td>
<td>004064  Front shield - Replacement</td>
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<tr>
<td>3</td>
<td>003087  Wheel housing - Replacement</td>
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<td>4</td>
<td>004167  Grill / radiator cover - Replacement</td>
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<td>5</td>
<td>004176  Air vent - Replacement</td>
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Side fairings

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<tr>
<td>1</td>
<td>004053 Spoiler - Replacement</td>
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<tr>
<td>2</td>
<td>004178 Footrest - Replacement</td>
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<tr>
<td>3</td>
<td>004011 Central chassis cover - Replacement</td>
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Underseat compartment

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<td>1</td>
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<td>Spark plug inspection flap - Replacement</td>
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<td>2</td>
<td>004016</td>
<td>Helmet compartment - Replacement</td>
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<td>3</td>
<td>005046</td>
<td>Battery cover - change</td>
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Plate holder

<table>
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<th>Code</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear turn indicators - Replacement</td>
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<tr>
<td>2</td>
<td>Rear turn indicator bulb - Replacement</td>
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<tr>
<td>3</td>
<td>Taillight - Replacement</td>
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<td>4</td>
<td>Rear tail light support - Replacement</td>
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<tr>
<td>5</td>
<td>Turn indicator glass - Replacement</td>
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</table>

NRG Power Purejet

TIME - 22
# Mudguard

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<tr>
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<td>Rear mudguard - Replacement</td>
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<td>2</td>
<td>Bumper - Replacement</td>
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<td>Front mudguard - Replacement</td>
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**Fuel tank**

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<tr>
<td>1</td>
<td>004005 Fuel tank - Replacement</td>
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<td>005010 Tank float - Replacement</td>
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<td>3</td>
<td>004011 Central chassis cover - Replacement</td>
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<td>4</td>
<td>004072 Fuel filter - Replacement</td>
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<td>5</td>
<td>004110 Fuel tank hose - Replacement</td>
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<td>004168 Fuel tank cap - Replacement</td>
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<td>004170 Tank filler neck - Replacement</td>
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### Tank oil

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<tr>
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<td>Oil reservoir - Replacement</td>
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<td>Oil reservoir float - Replacement</td>
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<td>Oil reservoir cock - Replacement</td>
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<td>4</td>
<td>Oil reservoir hose - Replacement</td>
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</table>
Rear shock-absorber

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<tbody>
<tr>
<td>1</td>
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<td>Rear shock absorbers - Replacement</td>
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## Steering column bearings

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<tr>
<td>1</td>
<td>003002 Steering fifth wheel - Replacement</td>
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<td>2</td>
<td>003073 Steering clearance - Adjustment</td>
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<td>3</td>
<td>004119 Bearing / upper steering fifth wheel - Replacement</td>
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</table>
## Handlebar components

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<tr>
<td>1</td>
<td>003001 Handlebar - Replacement</td>
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<td>2</td>
<td>002060 Complete throttle control - Replacement</td>
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<td>3</td>
<td>002059 Right hand grip - Replacement</td>
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<td>4</td>
<td>005017 Stop switch - Replacement</td>
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<td>5</td>
<td>003059 Counterweight - Replacement</td>
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<tr>
<td>6</td>
<td>002024 Front brake pump - replace</td>
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<tr>
<td>7</td>
<td>002037 Brake or clutch lever - Replacement</td>
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<tr>
<td>8</td>
<td>002047 Front brake fluid and air bleeding system - Replacement</td>
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<tr>
<td>9</td>
<td>003061 Accelerator transmission - Adjustment</td>
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<tr>
<td>10</td>
<td>004066 Driving mirror - Replacement</td>
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</tr>
<tr>
<td>11</td>
<td>002071 Left hand grip - Replacement</td>
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<td>12</td>
<td>002067 Rear brake pump - Replacement</td>
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</tr>
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<td>13</td>
<td>002080 Rear brake oil bleeding system - Replacement</td>
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Swing-arm

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<tbody>
<tr>
<td>1</td>
<td>Engine / frame swinging arm fitting - Replacement</td>
<td>001072</td>
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</table>
Seat

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<tr>
<td>004003</td>
<td>Saddle - Replacement</td>
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<tr>
<td>004054</td>
<td>Seat lock hook - Replacement</td>
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</tr>
<tr>
<td>002083</td>
<td>Saddle opening transmission - Replacement</td>
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</table>
**Instrument panel**

---

**INSTRUMENT UNIT AND HANDLEBAR COVER**

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<th>Duration</th>
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<tbody>
<tr>
<td>1</td>
<td>005014 Odometer - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>004018 Handlebar front section - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>004019 Handlebar rear section - Replacement</td>
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</tr>
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<td>4</td>
<td>005078 Odometer glass - Replacement</td>
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</table>

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NRG Power Purejet

| Time | 31  |

---
## Turn signal lights

### FRONT LIGHT

<table>
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<th>Code</th>
<th>Action</th>
<th>Duration</th>
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<tr>
<td>1</td>
<td>Front turn indicator bulb - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Front headlamp bulbs - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Front headlamp - change</td>
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</tr>
<tr>
<td>4</td>
<td>Front turn indicator - Replacement</td>
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</tbody>
</table>
Front wheel

<table>
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<th>Action</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Front brake disc - Replacement</td>
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</tr>
<tr>
<td>2</td>
<td>Front wheel bearings - Replacement</td>
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</tr>
<tr>
<td>3</td>
<td>Front wheel rim - Replacement</td>
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</tr>
<tr>
<td>4</td>
<td>Front tyre - Replacement</td>
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</tr>
<tr>
<td>5</td>
<td>Front wheel - Replacement</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front wheel axle - Replacement</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tone wheel - Replacement</td>
<td></td>
</tr>
</tbody>
</table>

**Grease tone wheel or drive**

Please take note that the code has been introduced:

900001 - Tone wheel / drive greasing - 15'.

Never mistake the codes 002011 (movement sensor replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTE-LA MRM 2 (soap-based lithium grease with Molybdenum disulphide).
In the following points we indicate with an arrow the area to be greased (1 - Drive, 2 - Tone wheel)

### Rear wheel

<table>
<thead>
<tr>
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<th>Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rear wheel rim - replace</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rear wheel - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rear brake disc - Replacement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rear wheel tyre - Replacement</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear wheel hub - Replacement</td>
<td></td>
</tr>
</tbody>
</table>
compressore aria

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Air compressor - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Compressed air hose - Replacement</td>
<td></td>
</tr>
</tbody>
</table>

NRG Power Purejet

Time
**FUEL PUMP**

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuel pump - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Injector pump pipe - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Petrol pump depression tube - Replacement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fuel filter - Replacement</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fuel reverse pipe - Replacement</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Injection pump - Replace</td>
<td></td>
</tr>
</tbody>
</table>
# Electric devices

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control unit - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spark plug cap - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Electrical system - Replacement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Voltage regulator - replace</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Resistance - Replacement</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Front lights cable unit - Replace</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Action</td>
<td>Duration</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Battery - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Battery fuse - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuse holder - Replacement</td>
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</tr>
<tr>
<td>4</td>
<td>Start-up remote control switch - Replacement</td>
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</tbody>
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Electronic controls

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Starter button - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Horn button - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Key switch - Replacement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lock series - Replacement</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Antitheft lock - replace</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Horn - Replacement</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Light switch or turn indicators - Replacement</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Headlight switch - replace</td>
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</tbody>
</table>
### Transmissions

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>002012 Splitter - Replacement</td>
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</tr>
<tr>
<td>2</td>
<td>002058 Mix / splitter transmission complete - Replacement</td>
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</tr>
<tr>
<td>3</td>
<td>002057 Carburettor / splitter transmission complete - Replacement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>002054 Throttle or splitter transmission complete - Replacement</td>
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</tr>
</tbody>
</table>
## Brake callipers

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>002007</td>
<td>Front brake pads - Replacement</td>
<td></td>
</tr>
<tr>
<td>002021</td>
<td>Front brake piping - Replacement</td>
<td></td>
</tr>
<tr>
<td>002039</td>
<td>Front brake calliper - Replacement</td>
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</tr>
<tr>
<td>002002</td>
<td>Rear brake pads - Replacement</td>
<td></td>
</tr>
<tr>
<td>002020</td>
<td>Rear brake disc piping - Replacement</td>
<td></td>
</tr>
<tr>
<td>002048</td>
<td>Rear brake calliper - Replacement</td>
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</tbody>
</table>

**NRG Power Purejet**

**Time**

TIME - 41
### Rear side fairings

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plates / Stickers - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Upper rear light cover - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lower chassis cover - Replacement</td>
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</tr>
<tr>
<td>4</td>
<td>Fairing (1) - Replacement</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rear fairing - Replacement</td>
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</tr>
</tbody>
</table>
Front suspension

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Front suspension - Service</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Complete fork - replace</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fork oil seal - Replacement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fork stanchion - Replacement</td>
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# Cooling system

<table>
<thead>
<tr>
<th>Code</th>
<th>Action</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Expansion tank - Replacement</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Water cooler - Replacement</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Coolant and air bleed - Replacement</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Expansion tank cap - Replacement</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Expansion tank / radiator connecting hose - Replacement</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Delivery line and coolant return - Replacement</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Air duct - Replacement</td>
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</tr>
</tbody>
</table>