



MANUALE STAZIONE DI SERVIZIO

1Q000869



Vespa GTS 125-150 i.e. 4V R.I.S.S. 3.0



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MANUALE STAZIONE DI SERVIZIO

Vespa GTS 125-150 i.e. 4V

R.I.S.S. 3.0

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

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

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



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



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



Vehicle intactness The incomplete or non-observance of these regulations leads to the risk of serious damage to the vehicle and sometimes even the invalidity of the guarantee.



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GENERAL MANDATORY REQUIREMENTS

NORM

General information

This section contains general information regarding the vehicle and the use of the manual, as well as important notes regarding safety.

IMPORTANT WARNINGS AND NOTES

Each symbol has a precise meaning, as illustrated below.

- **WARNING:** - This symbol indicates risks for the health of the operator and of the nearby persons if the described procedures are performed incorrectly.
- **CAUTION:-** This symbol indicates that the component on which works are being performed may be damaged if the described procedures are performed incorrectly.
- **NOTE:** - This paragraph provides additional instructions for the ongoing procedure, so that the operation may be performed in an efficient manner.

REACH REGULATION WARNINGS :

To protect the health and safety of the PROFESSIONAL CLIENT, as provided by the:

- (EC) Regulation No. 1907/2006 (REACH);
- 2000/53/EC (END of LIFE VEHICLES);
- SCIP Database Directive (art.9, par.1 lett.i) of the framework directive regarding waste, as modified by the Directive 2018/851

The technical personnel operating during the ordinary and special maintenance activities has the obligation to always wear the personal protection equipment:

1. chemical protection gloves if the specific type is not explicitly indicated, or, if required, special gloves according to the substance used;
2. mask, possibly a chemically active one, if specifically required;
3. protective goggles.

The above indications represent an alternative for the prescriptions of other regulations and of the legislation in force in the specific countries. Regarding the use of other PPE, governed by the laws regarding the safety at work, the relevant legislation in force apply.

**GENERAL SAFETY WARNINGS :**

1. Always wear protective goggles and proper clothing.
2. Always use a safety support to operate under the vehicle.
3. Check that the ignition switch is always OFF, unless the procedure indicates otherwise.
4. Pull the hand brake (if applicable) before starting working on the vehicle.
5. Start the engine only in well ventilated places, to avoid the risks related to the carbon oxide.
6. Keep a safe distance from the mobile parts during the operation of the engine, especially from the fans and belts.
7. To avoid burns, avoid contact with the hot metallic parts, such as the radiator, exhaust manifold, exhaust pipe, catalytic converter and silencer.
8. Do not smoke during maintenance operations.
9. To avoid any injuries, do not wear rings, watches, jewellery and loose clothing before starting to work on the vehicle.
10. Keep your hands and other objects away from the blades of the radiator's fan (if present)!
11. The cooling fan (if present) is fitted on the radiator and may start any time due to a temperature increase of the cooling fluid. It is important to check that the cooling fan's starter motor is disconnected from the wiring harness before starting the works.

The measurement units used in the manual are imperial UNITS of measurement. (International system for UNITS). Example: 24.5-34.3 Nm

INDEX OF TOPICS

PRE-DELIVERY

PRE DE

Aesthetic inspection

Appearance check:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

Safety locks check

Make sure that the marking is on the:

- Safety fasteners
- Fastening screws

Safety fasteners:

- Upper fastening of rear shock absorber
- Rear shock absorber lower fastener
- Front wheel axle nut
- Wheel hub nut
- Swingarm bolt - Frame
- Swinging arm pin - Engine
- Engine arm pin - Frame arm
- Handlebar lock-nut
- Lower steering ring nut
- Upper steering ring nut

Electrical system

- Main switch
- Lights: high beam lights, low beam lights, tail lights and their warning lights
 - Headlight adjustment according to the regulations currently in force
- Brake light operation by using the RH and LF brake lever
- Turn indicators and their warning lights
- Instrument lighting
- instruments: fuel and temperature indicator
- Instrument panel lights
- Horn
- Electric starter
- Engine stopping with emergency stop switch

- electric saddle opening button

TO ENSURE MAXIMUM PERFORMANCE, THE BATTERY MUST BE CHARGED BEFORE USE. INADEQUATELY CHARGING THE BATTERY WITH A LOW ELECTROLYTE LEVEL BEFORE IT IS USED FOR THE FIRST TIME WILL SHORTEN THE LIFE OF THE BATTERY.

CAUTION

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

WARNING

BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

IF IT ACCIDENTALLY COMES INTO CONTACT WITH YOUR EYES OR SKIN, WASH WITH ABUNDANT WATER FOR APPROX. 15 MIN. AND SEEK IMMEDIATE MEDICAL ATTENTION.

IF ACCIDENTALLY SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.

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 THE REACH OF CHILDREN.

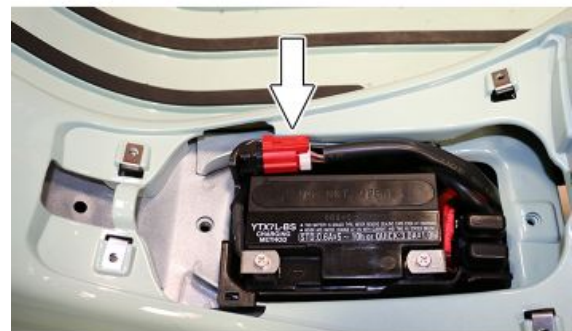
CAUTION

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

The vehicle is equipped with an OBD (On-Board Diagnostics) port, compliant with the Euro 5 directives and which allows the connection between the vehicle and the diagnostic tool.

N.B.

AT EACH SCHEDULED MAINTENANCE A VERIFICATION MUST BE PERFORMED WITH THE DIAGNOSTIC TOOL TO CHECK IF THERE ARE ERRORS AND THE IF THE PARAMETERS ARE CORRECT. ENSURE THAT THE VEHICLE CALIBRATION IS UP TO DATE AFTER UPDATING THE DIAGNOSTIC TOOL.



Levels check

Level check:

- Hydraulic brake system liquid level
- Rear hub oil level
- Engine coolant level
- Engine oil level

Road test

Test ride:

- Cold start
- Instrument operations
- Response to throttle control
- Stability on acceleration and braking

- Front and rear brake efficiency
- Front and rear suspension efficiency
- Abnormal noise

N.B.

PERFORM THE ASR SYSTEM'S CALIBRATION PROCEDURE DURING THE ROAD TEST.

Static test

Static control after the test drive:

- Warm start
- Minimum holding (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 SINCE THE TYRES MAY BURST.

Functional inspection

Functional Checks:

- Hydraulic braking system: lever travel
- Clutch: proper functioning check
- Engine: proper general functioning and no abnormal noise check
- Other: papers check, chassis and engine number check, tools and equipment, licence plate fitting, lock check, tyre pressure check, rear-view mirror and any accessory fitting

Instruments start-up

SELECTING KM OR MILES AS UNIT OF MEASUREMENT B

Press the **MODE** briefly to cycle through the modes and select **TOTAL** odometer mode, then turn the ignition switch to **OFF**.

Turn the ignition switch to **ON** while pressing and holding the **MODE** button.

Release the **MODE** button for 2 to 4 seconds.

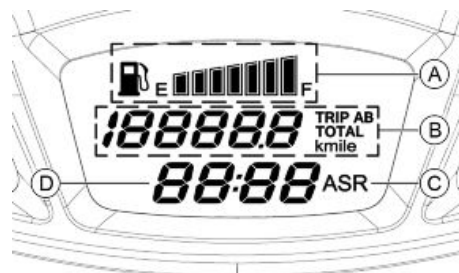
WARNING

TO CHANGE FROM "KM" A "MILE" IT IS NECESSARY TO SET THE MULTIFUNCTION INDICATOR TO TOTAL ODOMETER (TOTAL).

CAUTION



FOR SAFETY, THIS SELECTION PROCEDURE IS ONLY PERMITTED AT A VEHICLE SPEED OF 0 KM/H.



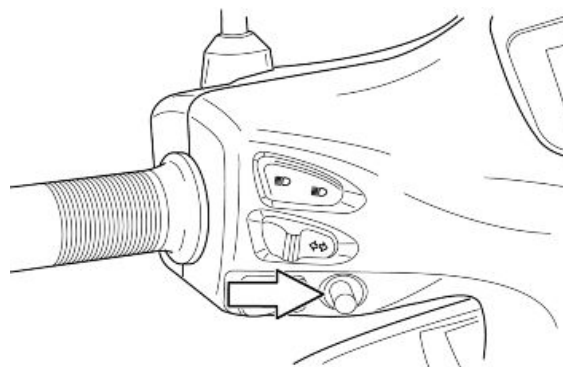
FOR SUPERTech VERSION

The **MODE** joystick allows the cyclic display of the information shown on the multifunction panel of the digital display. It also allows navigation in the «**settings**» menu and setting various parameters. This is possible by pressing or moving the joystick in the four directions with short or long presses.

N.B.



"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 0.5 SECONDS;
 "PRESS AND HOLD": PRESS THE BUTTON AND HOLD FOR AT LEAST 2 SECONDS.



SETTINGS MENU

When the vehicle is at a standstill, briefly press the joystick up or down several times to display the «**settings**» function at the centre of the multifunctional panel. The «**settings**» menu can be accessed with a prolonged press on the central button of the joystick.



Briefly press the joystick upward or downward to highlight the "**Configuration**" function.

Briefly press the central button of the joystick to enter the menu.



MEASUREMENT UNITS MENU (UNITS)

Highlight the "**Units**" function via a short press on the central button of the joystick and enter the menu where it is possible to configure:

- Speed
- Temperature

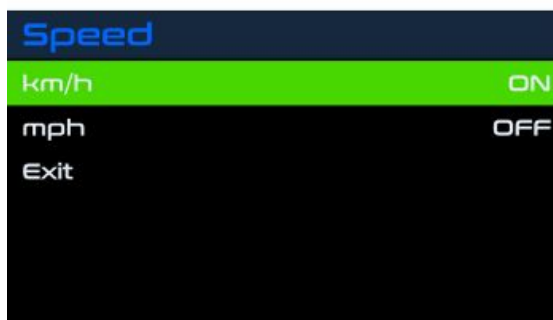


SETTING THE SPEED UNIT OF MEASUREMENT (SPEED)

Highlight the "**Speed**" function. Via a short press on the central button of the joystick, enter the menu.

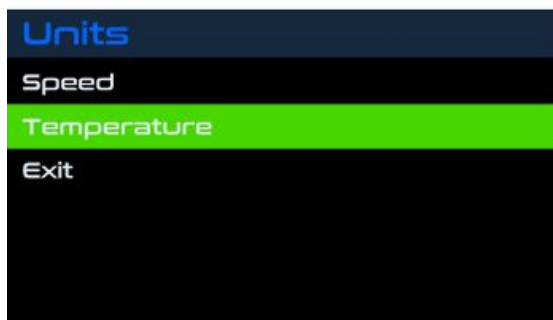


Select the desired format between Km/h or mph.
The selection excludes the others.



SETTING THE TEMPERATURE UNIT OF MEASUREMENT (TEMPERATURE)

Highlight the "**Temperature**" function. Via a short press on the central button of the joystick, enter the menu.



Select the desired format between °C or °F. The selection excludes the others.



ASR SYSTEM

FOR CLASSIC - TOURING - SUPER - RACING - SUPERSPORT VERSIONS

The ASR system is a driving aid that assists the driver in acceleration manoeuvres, particularly on low-grip surfaces or under conditions that can cause sudden back-wheel slippage. The ASR in these situations automatically intervenes by reducing engine output within the limit imposed by the grip conditions, contributing significantly to the maintenance of stability the vehicle.



WARNING



THE ASR SYSTEM IS BASED ON THE RECOGNITION OF SPEED DIFFERENCES BETWEEN FRONT AND REAR WHEEL. FOR THE SYSTEM TO PERFORM CORRECTLY IN ALL CONDITIONS, THE PROCEDURE MUST BE PERFORMED EACH TIME A TYRE IS REPLACED EVEN IF ONLY ONE OF THE TYRES IS REPLACED. FOR THE CALIBRATION OF THE ASR SYSTEM PERFORM THE PROCEDURE BELOW.

WARNING

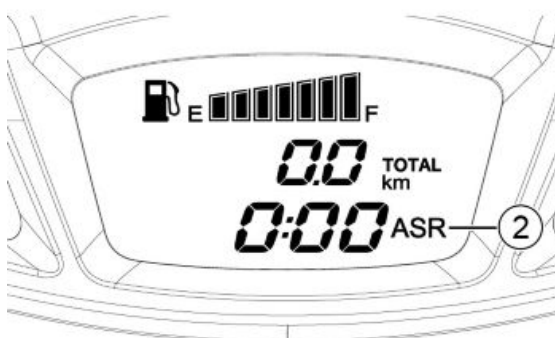


THE ASR SYSTEM PREVENTS THE APPLICATION OF HIGH SPEED ROTATION ON THE REAR WHEEL WITH THE VEHICLE ON THE CENTRE STAND. IT IS RECOMMENDED TO NOT INSIST WITH THE THROTTLE GRIP IN THIS SPECIFIC SITUATION, BECAUSE THIS MAY CAUSE ABNORMAL STOPS AND/OR DAMAGE TO THE CATALYSTS.

ASR BUTTON 1: to activate/deactivate the ASR system, with the engine running, press and hold the start button (for at least 4 seconds).



ASR ICON 2: ASR status indicator icon.



ASR ICON FLASHING MODE:

- Frequency of 5 flashes per second (5Hz), with vehicle running: The system is functioning correctly and is active (poor grip conditions, engine power limiting in effect); ride with extreme care, as the grip limit has been exceeded; restore the vehicle safety conditions by gently reducing the throttle opening.
- Frequency of 1 flash per second (1 Hz), with the key in "ON" position and the vehicle at a standstill: The system is active and the calibration is performed. The relative icon will stay on steady as soon as the engine is started.
- Frequency of 1 flash per second (1 Hz), with the key in "ON" position, the vehicle at a standstill and started programming procedure: the system calibration is in progress.
- Switched off can have three meanings:
 1. calibration procedure performed incorrectly. Perform a new calibration;
 2. the ASR system is not operating and will not intervene in case of loss of grip;
 3. the ASR system has been willingly disabled.
 - If the deactivation was voluntary (by pressing the start button "1" for at least 4 seconds with the engine running) it is recommended to reactivate the system as soon as possible.
 - If the system was NOT deactivated voluntarily, this indicates a failure of the ASR system: In this case, proceed with the system diagnosis and reactivation.
- Switched on steady can have three meanings:
 1. calibration procedure performed correctly;
 2. the ASR system is operating and will intervene in case of loss of grip;
 3. the ASR system has been willingly inserted.

To ensure maximum safety of the vehicle it is advisable to keep the system active. Deactivation may be necessary only in case of starting with very low grip surfaces (mud, snow) on which the operation of the ASR could actually prevent the movement of the vehicle.

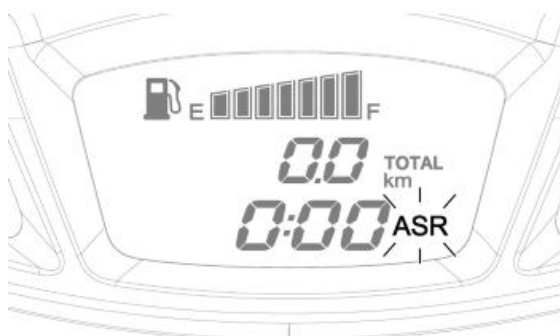
Manual calibration procedure of the ASR system during predelivery/ECU replacement.

In order to maintain the efficiency of the ASR system when one or both tires are replaced, a calibration procedure of the ASR system must be performed as follows on a straight flat stretch of road:

1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to «ON» and start the engine.
3. Wait with the engine running at idle speed for at least 3 seconds.

4. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The "ASR" icon lights up with 1 Hz **slow flashing** (1 flash per second).



5. Start driving and **accelerate to 30 km/h within 25 seconds and keep the speed constant for at least 10 seconds** .

The **"ASR" icon on steady**, indicates that the calibration was successful.



6. Stop the vehicle and **turn off the engine** by turning the key to OFF.



7. If the procedure has finished correctly, the next time the key is **turned to ON**, the **"ASR" icon will light up with slow flashing 1Hz** (1 flash per second), then when the engine starts, the **"ASR" icon will light up steady on** and the ASR system will be **ACTIVE**.

8. If the procedure is **NOT completed correctly**, the **"ASR" icon turns off**, indicating that the **ASR system is DEACTIVATED**. By pressing the appropriate button, the user can manually reactivate the ASR system by returning it to the previously stored calibration or proceed with a new manual calibration by repeating the procedure from the beginning.



Manual calibration procedure of the ASR system.

In order to maintain the efficiency of the ASR system when one or both tires are replaced, a calibration procedure of the ASR system must be performed as follows on a straight flat stretch of road:

1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to **«ON»** and start the engine.
3. **Disengage the ASR system** by pressing the start button for at least 4 seconds with the engine running; **the "ASR" icon will switch off**, initially it was on steady as the ASR system had already been calibrated in the past.
4. Wait with the engine running at idle speed for at least 3 seconds,

5. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The "ASR" icon lights up with 1Hz **slow flashing** (1 flash per second),

6. Start the gear and **reach the speed of 30 km/h within 25 seconds, keep the speed constant for at least 10 seconds,**

The "ASR" icon on steady, indicates that the calibration was successful.

7. Stop the vehicle **and turn off the engine** by turning the key to OFF.

8. **If the procedure has finished correctly**, the next time the key is **turned to ON**, the "ASR" icon **will light up with slow flashing** 1Hz (1 flash per second), then when the engine starts, the "ASR" icon will light up steady on and the ASR system will be ACTIVE.

9. If the procedure is **NOT completed correctly**, the "ASR" icon **turns off**, indicating that the **ASR system is DEACTIVATED**. By pressing the appropriate button, the user can manually reactivate the ASR system by returning it to the previously stored calibration or proceed with a new manual calibration by repeating the procedure from the beginning.

Automatic ASR calibration procedure.

The ASR system performs the automatic calibration, if the following conditions are met:

- If a manual ASR calibration has been performed at least once,
- If the conditions of constant speed, zero acceleration and constant throttle position (TPS) are respected, on a straight and flat stretch of road for at least 5 seconds,

If manual programming has been performed previously, automatic programming overwrites it.

If during the key ON - key OFF cycle the manual calibration has been successfully performed, then for that same cycle the ASR system will not perform any automatic programming.

If the ASR is active, **it comes into action when the system detects a slippage between the two wheels, greater than a nominal value previously stored in calibration.**

WARNING

N.B.



AT THE KEY "ON", THE FLASHING ASR ICON INDICATES THE SYSTEM DIAGNOSIS PHASE. IF THERE IS NO FLASHING WHEN THE ENGINE IS STARTED, THE ASR SYSTEM MAY NOT BE WORKING.

WARNING



THE ASR SYSTEM IS ACTIVATED AT EVERY "ON" POSITIONING OF THE IGNITION SWITCH. IF DISABLED BY THE USER, THE ASR SYSTEM KEEPS THE STATE OF INACTIVITY ONLY IF THE VEHICLE IS OFF, BY USING THE ENGINE STOP SWITCH (WHERE REQUIRED); AT THE NEXT KEY ON THE ASR SYSTEM IS ENABLED AUTOMATICALLY.

CAUTION



IT IS RECOMMENDED TO PAY PARTICULAR ATTENTION IN THE EVENT OF ACCELERATION FROM STANDSTILL IN CONDITIONS OF LOW GRIP, ESPECIALLY IN THE FIRST METRES. A POOR STATE OF MAINTENANCE OF THE TYRES CAN RESULT IN ABNORMAL OPERATION OF THE ASR SYSTEM.

IF THE ASR SYSTEM IS TRIGGERED REPEATEDLY EVEN IN ADEQUATE GRIP CONDITIONS AND AT SMALL THROTTLE APERTURES, CHECK THE STATE OF WEAR AND INFLATION PRESSURE OF THE TYRES.

CAUTION

IT IS EMPHASISED THAT THE RIDING AUXILIARY SYSTEM CANNOT CHANGE THE PHYSICAL LIMITS OF GRIP AND IS NOT A SUBSTITUTE FOR PROPER MANAGEMENT OF POWER, BOTH ON STRAIGHT STRETCHES AND IN TURNS. THEREFORE, IT IS RECOMMENDED TO ALWAYS USE THE VEHICLE WITH THE UTMOST CARE AND IN ACCORDANCE WITH THE REGULATIONS IN FORCE.

N.B.

THE DEVICE PREVENTS IMPRESSING ON THE REAR HIGH SPEED ROTATION WHEEL WITH THE VEHICLE ON THE CENTRE STAND. IT IS RECOMMENDED NOT TO INSIST WITH THE THROTTLE GRIP IN THIS PARTICULAR CONDITION.

N.B.

IN CASE OF ROAD DISCONNECTIONS THERE COULD BE SHORT ACTIVATIONS OF THE ASR SYSTEM. SUCH EVENT APPEARS UNDER NORMAL OPERATION CONDITIONS OF THE VEHICLE.

CAUTION

IN THE EVENT OF MALFUNCTION OF THE BATTERY, THE ABS - ASR SYSTEM TURNS OFF.

ASR SYSTEM**FOR SUPERTech VERSION**

The ASR system is a driving aid that assists the driver in acceleration manoeuvres, particularly on low-grip surfaces or under conditions that can cause sudden back-wheel slippage. The ASR in these situations automatically intervenes by reducing engine output within the limit imposed by the grip conditions, contributing significantly to the maintenance of stability the vehicle.

**WARNING**

THE ASR SYSTEM IS BASED ON THE RECOGNITION OF SPEED DIFFERENCES BETWEEN FRONT AND REAR WHEEL. FOR THE SYSTEM TO PERFORM CORRECTLY IN ALL CONDITIONS, THE PROCEDURE MUST BE PERFORMED EACH TIME A TYRE IS REPLACED EVEN IF ONLY ONE OF THE TYRES IS REPLACED.

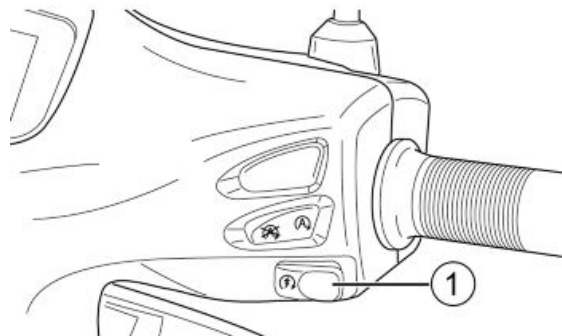
FOR THE CALIBRATION OF THE ASR SYSTEM PERFORM THE PROCEDURE BELOW.

WARNING



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- Frequency of 5 flashes per second (5Hz), with vehicle running: The system is functioning correctly and is active (poor grip conditions, engine power limiting in effect); ride with extreme care, as the grip limit has been exceeded; restore the vehicle safety conditions by gently reducing the throttle opening.
- Frequency of 1 flash per second (1 Hz), with the key in "ON" position and the vehicle at a standstill: The system is active and the calibration is performed. The corresponding icon will switch off as soon as the ABS system becomes operational.
- Frequency of 1 flash every 2 seconds (0.5 Hz), with the key in "ON" position and the vehicle at a standstill: the system calibration is in progress.
- Switched on steady can have three meanings:
 1. calibration procedure performed incorrectly. Perform a new calibration;
 2. the ASR system is not operating and will not intervene in case of loss of grip;
 3. the ASR system has been willingly disabled.

- If the deactivation was voluntary (by pressing the specific button "1" for 4 seconds with the engine running) it is recommended to reactivate the system as soon as possible.
- If the system was NOT deactivated voluntarily, this indicates a failure of the ASR system:
In this case, proceed with the system diagnosis and reactivation.

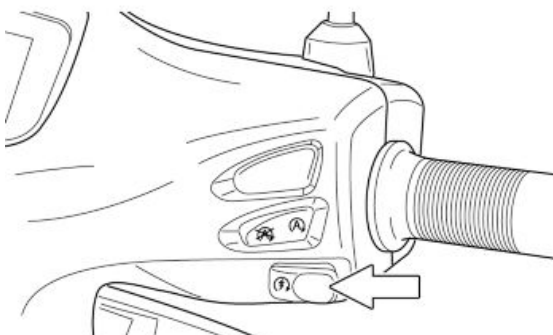
To ensure maximum safety of the vehicle it is advisable to keep the system active. Deactivation may be necessary only in case of starting with very low grip surfaces (mud, snow) on which the operation of the ASR could actually prevent the movement of the vehicle.

Manual calibration procedure of the ASR system during predelivery/ECU replacement.

In order to maintain the efficiency of the ASR system when one or both tires are replaced, a calibration procedure of the ASR system must be performed as follows on a straight flat stretch of road:

1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to «ON» and start the engine.
3. Wait with the engine running at idle speed for at least 3 seconds.
4. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The "ASR" icon lights up with **0.5 Hz slow flashing** (1 flash every 2 seconds).



5. Start driving and **accelerate to 30 km/h within 25 seconds and keep the speed constant for at least 10 seconds** .

The "ASR" icon **switched off**, indicates that the calibration was successful.



6. Stop the vehicle **and turn off the engine** by turning the key to OFF.



7. If the procedure has finished correctly, the next time the key is turned to ON, the "ASR" icon will light up with slow flashing 1Hz (1 flash per second), then when the engine starts, the "ASR" icon turns off and the ASR system will be ACTIVE.

8. If the procedure is **NOT completed correctly**, the "ASR" icon switches on steady, indicating that the **ASR system is DEACTIVATED**. By pressing the appropriate button, the user can manually reactivate the ASR system by returning it to the previously stored calibration or proceed with a new manual calibration by repeating the procedure from the beginning.



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1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to «ON» and start the engine.
3. **Disengage the ASR system** by pressing the start button for at least 4 seconds with the engine running; **the "ASR" icon will switch on steady**; initially it was switched off because the ASR system had already been calibrated in the past.
4. Wait with the engine running at idle speed for at least 3 seconds,

5. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The **"ASR"** icon lights up with **0.5 Hz slow flashing** (1 flash every 2 seconds),

6. Start the gear and **reach the speed of 30 km/h within 25 seconds, keep the speed constant for at least 10 seconds,**

The "ASR" icon switched off, indicates that the calibration was successful.

7. Stop the vehicle **and turn off the engine** by turning the key to OFF.

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Automatic ASR calibration procedure.

The ASR system performs the automatic calibration, if the following conditions are met:

- If a manual ASR calibration has been performed at least once,
- If the conditions of constant speed, zero acceleration and constant throttle position (TPS) are respected, on a straight and flat stretch of road for at least 5 seconds,

If manual programming has been performed previously, automatic programming overwrites it.

If during the key ON - key OFF cycle the manual calibration has been successfully performed, then for that same cycle the ASR system will not perform any automatic programming.

If the ASR is active, **it comes into action when the system detects a slippage between the two wheels, greater than a nominal value previously stored in calibration.**

WARNING

N.B.



AT THE KEY "ON", THE FLASHING ASR ICON INDICATES THE SYSTEM DIAGNOSIS PHASE. IF THERE IS NO FLASHING WHEN THE ENGINE IS STARTED, THE ASR SYSTEM MAY NOT BE WORKING.

WARNING



THE ASR SYSTEM IS ACTIVATED AT EVERY "ON" POSITIONING OF THE IGNITION SWITCH. IF DISABLED BY THE USER, THE ASR SYSTEM KEEPS THE STATE OF INACTIVITY ONLY IF THE VEHICLE IS OFF, BY USING THE ENGINE STOP SWITCH (WHERE REQUIRED); AT THE NEXT KEY ON THE ASR SYSTEM IS ENABLED AUTOMATICALLY.

CAUTION



IT IS RECOMMENDED TO PAY PARTICULAR ATTENTION IN THE EVENT OF ACCELERATION FROM STANDSTILL IN CONDITIONS OF LOW GRIP, ESPECIALLY IN THE FIRST METRES. A POOR STATE OF MAINTENANCE OF THE TYRES CAN RESULT IN ABNORMAL OPERATION OF THE ASR SYSTEM.

IF THE ASR SYSTEM IS TRIGGERED REPEATEDLY EVEN IN ADEQUATE GRIP CONDITIONS AND AT SMALL THROTTLE APERTURES, CHECK THE STATE OF WEAR AND INFLATION PRESSURE OF THE TYRES.

CAUTION

IT IS EMPHASISED THAT THE RIDING AUXILIARY SYSTEM CANNOT CHANGE THE PHYSICAL LIMITS OF GRIP AND IS NOT A SUBSTITUTE FOR PROPER MANAGEMENT OF POWER, BOTH ON STRAIGHT STRETCHES AND IN TURNS. THEREFORE, IT IS RECOMMENDED TO ALWAYS USE THE VEHICLE WITH THE UTMOST CARE AND IN ACCORDANCE WITH THE REGULATIONS IN FORCE.

N.B.

THE DEVICE PREVENTS IMPRESSING ON THE REAR HIGH SPEED ROTATION WHEEL WITH THE VEHICLE ON THE CENTRE STAND. IT IS RECOMMENDED NOT TO INSIST WITH THE THROTTLE GRIP IN THIS PARTICULAR CONDITION.

N.B.

IN CASE OF ROAD DISCONNECTIONS THERE COULD BE SHORT ACTIVATIONS OF THE ASR SYSTEM. SUCH EVENT APPEARS UNDER NORMAL OPERATION CONDITIONS OF THE VEHICLE.

CAUTION

IN THE EVENT OF MALFUNCTION OF THE BATTERY, THE ABS - ASR SYSTEM TURNS OFF.

Specific operations for the vehicle

N.B.

AT EACH SCHEDULED SERVICE, USE THE DIAGNOSTIC TOOL TO CHECK FOR ERRORS AND CHECK THAT ALL PARAMETERS ARE CORRECT. ENSURE THAT THE VEHICLE CALIBRATION IS UP TO DATE AFTER UPDATING THE DIAGNOSTIC TOOL.

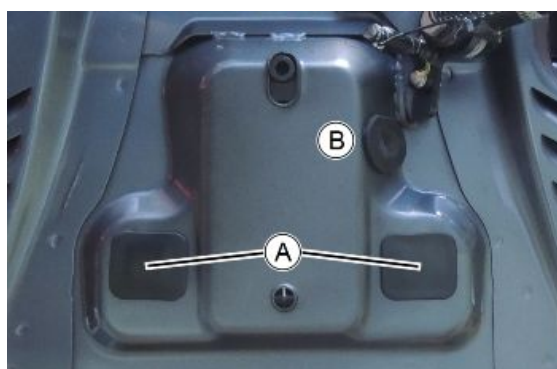
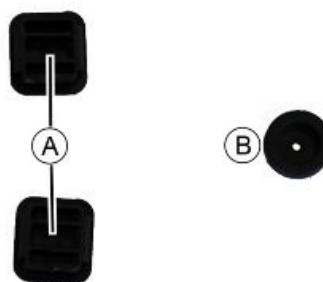
CAUTION

AFTER THE PROVIDED MAINTENANCE PROGRAM IS INDICATED TO PROCEED WITH THE MAINTENANCE OF THE VEHICLE STARTING FROM THE SERVICE OF 5,000 Km (3,106 mi) OR 5 MONTHS.

N.B.

BEFORE USING THE VEHICLE, ENSURE THAT IT IS EQUIPPED WITH THE LICENSE PLATE HOLDER WITH LATERAL REFLECTORS PROVIDED.

Install the underbody caps as shown in the figure.



INDEX OF TOPICS

TECHNICAL DATA

DT

Rules

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

Safety rules

- If work can only be done on the vehicle with the engine running, make sure that the premises are well ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.
 - The battery electrolyte contains sulphuric acid. Protect your eyes, clothes and skin. Sulphuric acid is highly corrosive; in the event of contact with your eyes or skin, rinse thoroughly with abundant water and seek immediate medical attention.
 - The battery produces hydrogen, a gas that can be highly explosive. Do not smoke and avoid sparks or flames near the battery, especially when charging it.
 - Fuel is highly flammable and it can be explosive given some conditions. Do not smoke in the working area, and avoid naked flames or sparks.
 - Clean the brake pads in a well-ventilated area, directing the jet of compressed air carefully to avoid the risk of inhaling dust produced by worn 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 spare parts may damage the vehicle.
 - Use only the appropriate tools designed for this vehicle.
 - Always use new gaskets, seal rings and cotter pins when reassembling.
 - After removal, clean the components using non-flammable or low flash-point solvents. Lubricate all the work surfaces, except tapered couplings, before refitting these parts.
 - After refitting, make sure that all the components have been installed correctly and work properly.
 - Use only equipment with metric sizes for removal, service and reassembly operations. Metric bolts, nuts and screws are not interchangeable with coupling members using English measurements. Using unsuitable coupling members and tools may damage the vehicle.
 - When carrying out maintenance operations on the vehicle that involve the electrical system, make sure the electrical connections have been made properly, particularly the ground and battery connections.
-

Vehicle identification

The identification registration number consists of a prefix followed by a number stamped on both the chassis and the engine. These numbers must always be quoted in the spare parts requests. We recommend checking that the frame registration number stamped on the vehicle corresponds with that on the vehicle documentation.

CAUTION



NOTE THAT ALTERING SERIAL NUMBERS MAY BE PUNISHABLE WITH SEVERE LEGAL PENALTIES (IMPOUNDING OF VEHICLE, ETC.).



Frame number

The chassis number «A» is stamped near the fuel tank.

To read it, proceed as follows:

- lift the saddle;

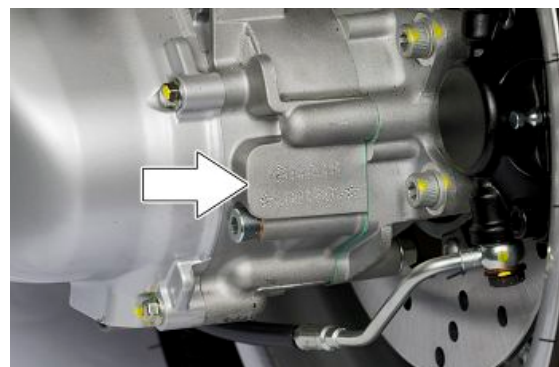


- lift the helmet compartment by removing it.



Engine number

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

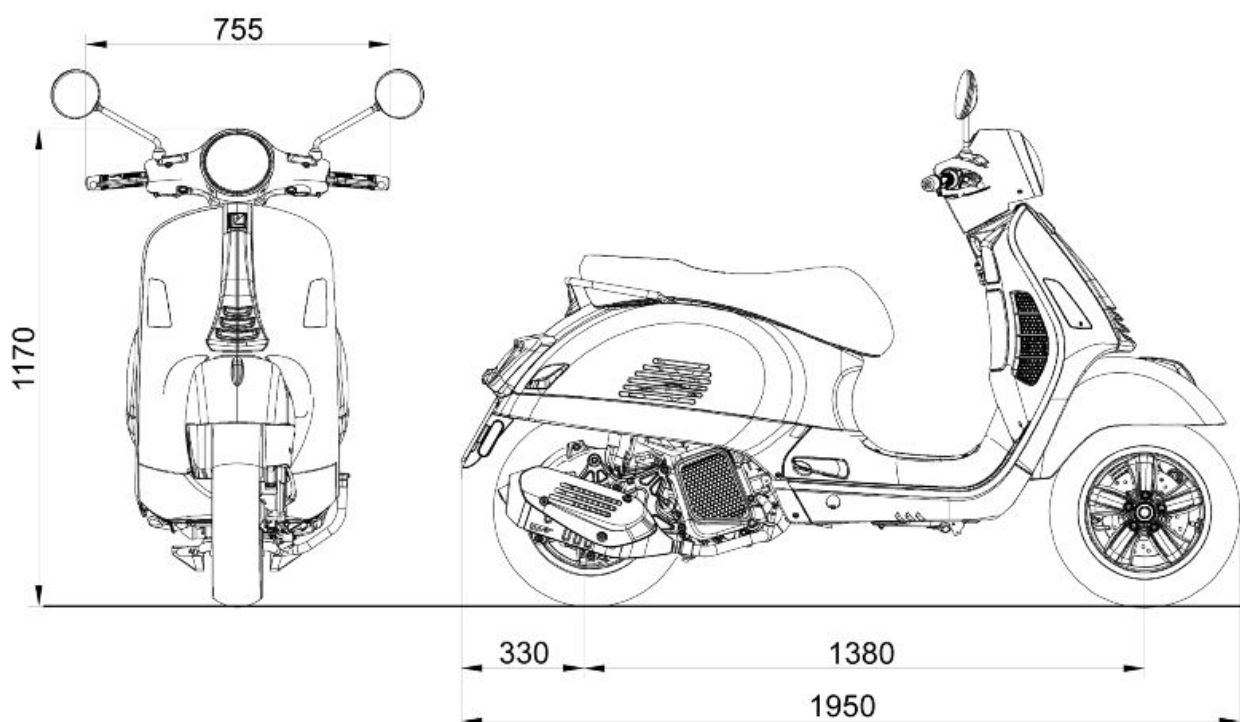


VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Frame prefix	ZAPMD3200
Engine prefix	MD32M

FOR SUPERTech VERSION**VEHICLE IDENTIFICATION**

Specification	Desc./Quantity
Frame prefix	ZAPMD3201
Engine prefix	MD32M

Vehicle data**VEHICLE DATA**

Specification	Desc./Quantity
Frame	Stamped plate supporting body.
Front suspension	Single arm suspension (cantilever wheel) fitted with a dual-chamber hydraulic shock absorber with coaxial spring.
Rear suspension	Two double-acting shock absorbers, adjustable to four positions at pre-loading.
Front brake	Ø 220 mm hydraulically operated disc brake controlled from RH handlebar lever; braking assisted by ABS system.
Rear brake	Ø 220 mm hydraulically operated disc brake controlled from LH handlebar lever; braking assisted by ABS system.
Wheel rims type	Light alloy.
Front rim	12" x 3.00
Rear rim	12" x 3.00
Front tire	120/70 - 12" 51P Tubeless
Rear tire	Tubeless 130/70 - 12" 62P
Front tire pressure (with passenger)	1.8 bar (1.8 bar)
Rear tire pressure (with passenger)	2.0 bar (2.2 bar)

Specification	Desc./Quantity
Kerb mass	147 kg
Maximum technically permissible weight at full load	340 kg
Battery	12V -6Ah

Engine Data

ENGINE SPECIFICATIONS

Specification	Desc./Quantity
Engine	Single-cylinder, 4-stroke Piaggio i-get with "Start&Stop" system.
Engine capacity	125 cm ³
Bore per stroke	52 x 58.7 mm
Maximum power	10.3 kW at 8.750 rpm
Maximum torque	12.0 Nm at 6.750 rpm
Compression ratio	12 ± 0.5: 1
Timing system	Single overhead camshaft with 4 valves.
Valve clearance (cold engine)	Intake: 0.10 ± 0.02 mm Exhaust: 0.15 ± 0.03 mm
Spark plug	NGK LMAR8EI-7
Power supply	Electronic injection
Lubrication	Wet sump
Starting	Electric
Cooling	Forced coolant circulation system.
Gearbox	Continuously variable transmission with torque server
Clutch	Automatic centrifugal dry clutch
Fuel	Unleaded gasoline E10 (95 R.O.N.)
Exhaust silencer	Absorption-type exhaust silencer with catalytic converter.
Emissions compliance	EURO 5

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil quantity	1300 cm ³
Hub oil quantity	325 cm ³
Fuel tank	7 ± 0.5 litres
Cooling system fluid	0.7 l

MEASUREMENT UNITS CONVERSION - FROM THE ANGLO-SAXON SYSTEM TO THE INTERNATIONAL SYSTEM (I.S.).

Specification	Desc./Quantity
1 Inch (in)	25.4 Millimetres (mm)
1 Foot (ft)	0.305 Metres (m)
1 Mile (mi)	1.609 Kilometres (km)
1 US gallon (gal US)	3.785 Litres (l)
1 Pound (lb)	0.454 Kilograms (Kg)
1 Cubic inch (in ³)	16.4 Cubic centimetres (cm ³)
1 Pound per foot (lb ft)	1.356 Newton metres (N m)
1 Mile per hour (mi/h)	1.602 Kilometres per hour (km/h)
1 Pound per square foot (PSI)	0.069 (bar)
1 Fahrenheit (°F)	32+(9/5) Celsius (°C)

Tightening Torques

LUBRICATION

Name	Torque in Nm
Crankcase timing cover screws	3.5 ÷ 4.5

Name	Torque in Nm
Screws fixing oil pump to the crankcase	4 - 6
Pump rod screw	11 to 13
Minimum oil pressure sensor locking	12 - 14 (LOCTITE 5091 Edge closure between metal body and plastic block)

TRANSMISSION AND FINAL REDUCTION

Name	Torque in Nm
Transmission cover screws	11 ÷ 13
Final reduction cover screws	24 ÷ 27
Driven pulley fixing nut	53 - 59
Oil drain screw	14.7 - 16.7
Freewheel fixing screws	10 - 11
driving pulley retainer nut	75 - 83

HEAD AND CYLINDER

Name	Torque in Nm
Head cover screws	10.8 - 12.7
Cylinder head nut (PRE-TIGHTENING)	6 ÷ 8
Cylinder head nut (TIGHTENING)	9 - 11 (Tighten to the prescribed torque and then proceed with 270.0°±5.0° rotation)
Cylinder stud bolt fitting	See section ENGINE/LUBRICATION/STUD BOLT
Throttle body clamp screws	1.3 ÷ 1.7
Tensioner spring retaining screw	5 to 6
Fastener chain tensioner	11 to 13
Thermostat cover screws	3 - 4
Pressure reducer counterweight retainer screw	7 ÷ 8.5 Nm
Injection manifold fixing screws	11 to 13
Valve clearance adjustment screw	6 - 9
Spark plug tightening	10 to 12
Timing system sprocket fixing screw	4 - 6
Screws fixing cylinder to crankcase	10.8 - 12.7
Head blow by	3 - 4

CRANKCASE

Name	Torque in Nm
Calibrated fixing dowel	5 to 7
Oil filter cover	24 to 30
Engine oil level shaft	1.3 to 1.7
Engine-crankcase coupling screws	11 ÷ 13
Rear brake screw	15 to 17
Oil sensor	12 - 14
Oil filter	5 to 6
Oil drain screw	14.7 - 16.7
Oil pump bulkhead screw	4 - 6
Freewheel fixing screws	10 - 11
Oil pump fastener screw	5 to 6
Oil pump command sprocket screw	10 - 14
Rotor cover	1 - 1.50
Rotor clamp	3 - 4

FLYWHEEL COVER

Name	Torque in Nm
Pick-up screws	3 - 4
Stator fixing screws	5 - 6 (Loctite 242)
Stator cable plates clamping screws	3 - 4
Fixing clamps of head pump cover by-pass pipe	1.3 to 1.7
Coil fixing screw	11 to 13

FLYWHEEL

Name	Torque in Nm
Flywheel cover screw	11 to 13
Starter sprocket check fixing screw	5 to 6
Flywheel fixing nut	100 - 110

SILENCER

Name	Torque in Nm
Silencer heat guard fixing screw	4 - 5
Screws fixing silencer to the crankcase	24 to 27
Lambda probe tightening on exhaust manifold	40 - 50

STEERING ASSEMBLY

Name	Torque in Nm
Rear-view mirror - Handlebars	15 - 20 Nm
Handlebars - Steering tube	50 - 55 Nm
Brake pump - Handlebars	7 - 10 Nm

FRONT SUSPENSION

Name	Torque in Nm
Rear wheel - Front wheel hub	19 - 24 Nm
Front shock absorber (upper fixing) - Steering tube	19 - 29 Nm
Front shock absorber (lower fixing) - Shock absorber support	19 - 26 Nm
Front wheel hub - Front wheel axle	74 - 88 Nm
Front brake calliper - Bracket	19 - 24 Nm
Front tone wheel sensor - Wheel bracket	5 - 6 Nm

REAR SUSPENSION

Name	Torque in Nm
Rear wheel - Rear wheel hub	20 - 25 Nm
Silencer support bracket - Rear wheel axle	104 - 126 Nm
Silencer support bracket - Engine	20 - 25 Nm
Rear shock absorber (lower fix) - Shock absorber support bracket	40 - 45 Nm
Rear shock absorber (lower fix) - Silencer support bracket	40 - 45 Nm
Rear brake calliper - Engine	20 - 25 Nm
Rear tone wheel sensor - Silencer support bracket	5 - 6 Nm

BRAKING SYSTEM

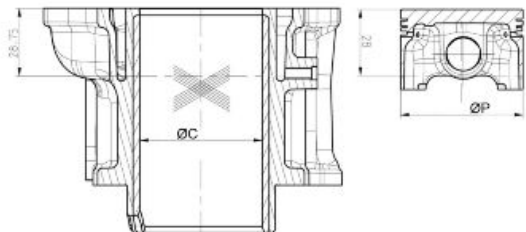
Name	Torque in Nm
Front brake calliper - Bracket	19 - 24 Nm
Rear brake calliper - Engine	20 - 25 Nm
Front brake pad - Front brake calliper	8 - 10 Nm
Rear tone wheel sensor - Silencer support bracket	5 - 6 Nm

BODYWORK

Name	Torque in Nm
Front central cover - Frame	4.5 - 7 Nm
Front handlebar cover - Rear handlebar cover	1 - 1.7 Nm
Front handlebar cover - Handlebar	1 - 1.7 Nm
Rear handlebar cover - handlebars	1 - 1.7 Nm
Rear-view mirror - Handlebars	15 - 20 Nm
Chassis middle cover - Footrest	1 - 1.7 Nm
Radiator cover - Radiator	4.5 - 7 Nm
Side fairing (internal fix) - Chassis	4.5 - 7 Nm
Side fairing (side fix) - Chassis	1 - 1.7 Nm
Battery bracket - Footrest	4.5 - 7 Nm
Expansion tank - Chassis	4.5 - 7 Nm

Overhaul data**Assembly clearances**

Cylinder - piston assy.



CYLINDER - PISTON (125)

Specification	Desc./Quantity
Plunger diameter	51.961 (±0.014) mm
Cylinder diameter	52 (+0.008 -0.020) mm

COUPLING CATEGORIES (125)

Name	Initials	Cylinder	Piston	Play on fitting
cylinder - piston	A	51.980 - 51.987	51.947 - 51.954	0.026 - 0.040
cylinder - piston	B	51.987 - 51.994	51.954 - 51.961	0.026 - 0.040
cylinder - piston	C	51.994 - 52.001	51.961 - 51.968	0.026 - 0.040
cylinder - piston	D	52.001 - 52.008	51.968 - 51.975	0.026 - 0.040

N.B.

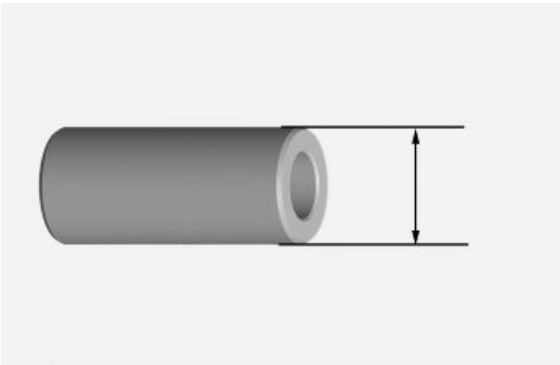
THE PISTON MUST BE INSTALLED WITH THE ARROW FACING TOWARDS THE EXHAUST SIDE, THE PISTON RINGS MUST BE INSTALLED WITH THE WORD «TOP» OR THE STAMPED MARK FACING UPWARDS.

- Check the pin external diameter.

Characteristic

Pin external diameter

14 (+0 -0.004) mm

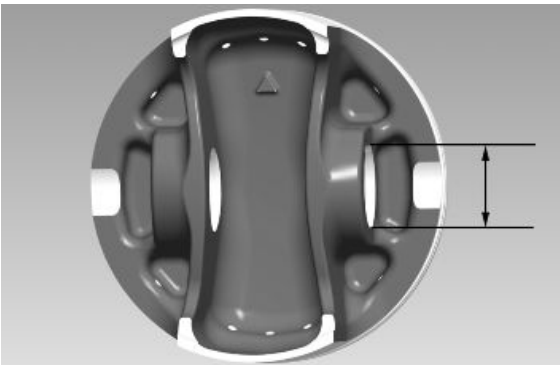


- Measure the diameter of the housings on the piston

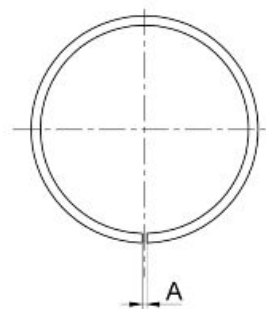
Characteristic

Standard diameter

14 (+0.006 +0.001) mm



- Carefully clean the seal housings.
- Measure the coupling clearance between the sealing rings and the piston grooves using suitable sensors, as shown in the diagram.
- If the clearance is greater than that indicated in the table, replace the piston.
- Check the clearance upon mounting (A) of the bands:

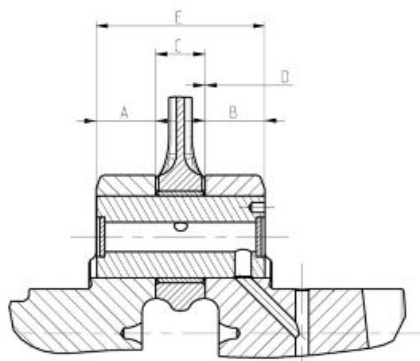
**N.B.**

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

ASSEMBLY CLEARANCE OF BANDS - SEAL RINGS (125)

DENOMINATION	DIMENSIONS	ASSEMBLY CLEARANCES (A)
1° compression ring (mm)	52x0.8	0.20 - 0.35
2° compression ring (mm)	52x0.8	0.20 - 0.40
Oil scraper rings (mm)	52x1.5	0.20 - 0.70

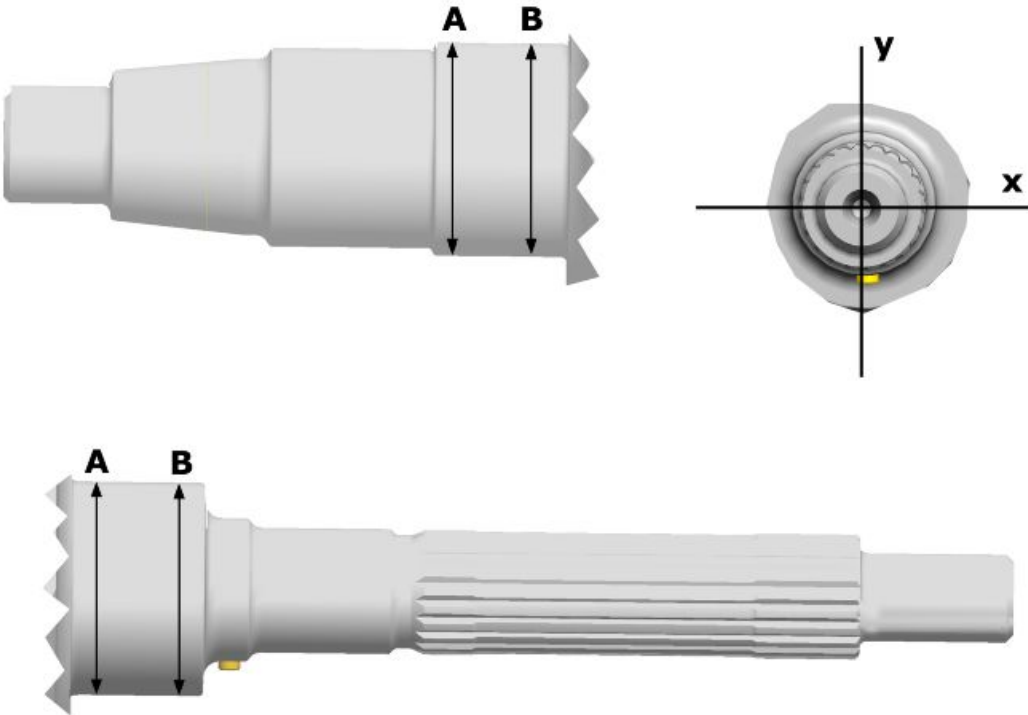
- Check that the head coupling surface is not worn or misshapen.
- Pistons and cylinders are classified according to diameter. The coupling is carried out in pairs (A-A, B-B, C-C, D-D).

Crankcase - crankshaft - connecting rod**AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD**

Name	Code	Dimensions	Assembly clearance
Transmissionside half-shaft	A	18.1 (+0; -0.05) mm	D = 0.20 - 0.50
Flywheel-side halfshaft	B	18.1 (+0; -0.05) mm	D = 0.20 - 0.50
Connecting rod	C	15 (-0.10; -0.15) mm	D = 0.20 - 0.50
Spacer tool	E	51.4 (+0.05; +0) mm	D = 0.20 - 0.50

Diameter of crankshaft bearings.

Measure the bearings on both axes x-y.



CRANKSHAFT

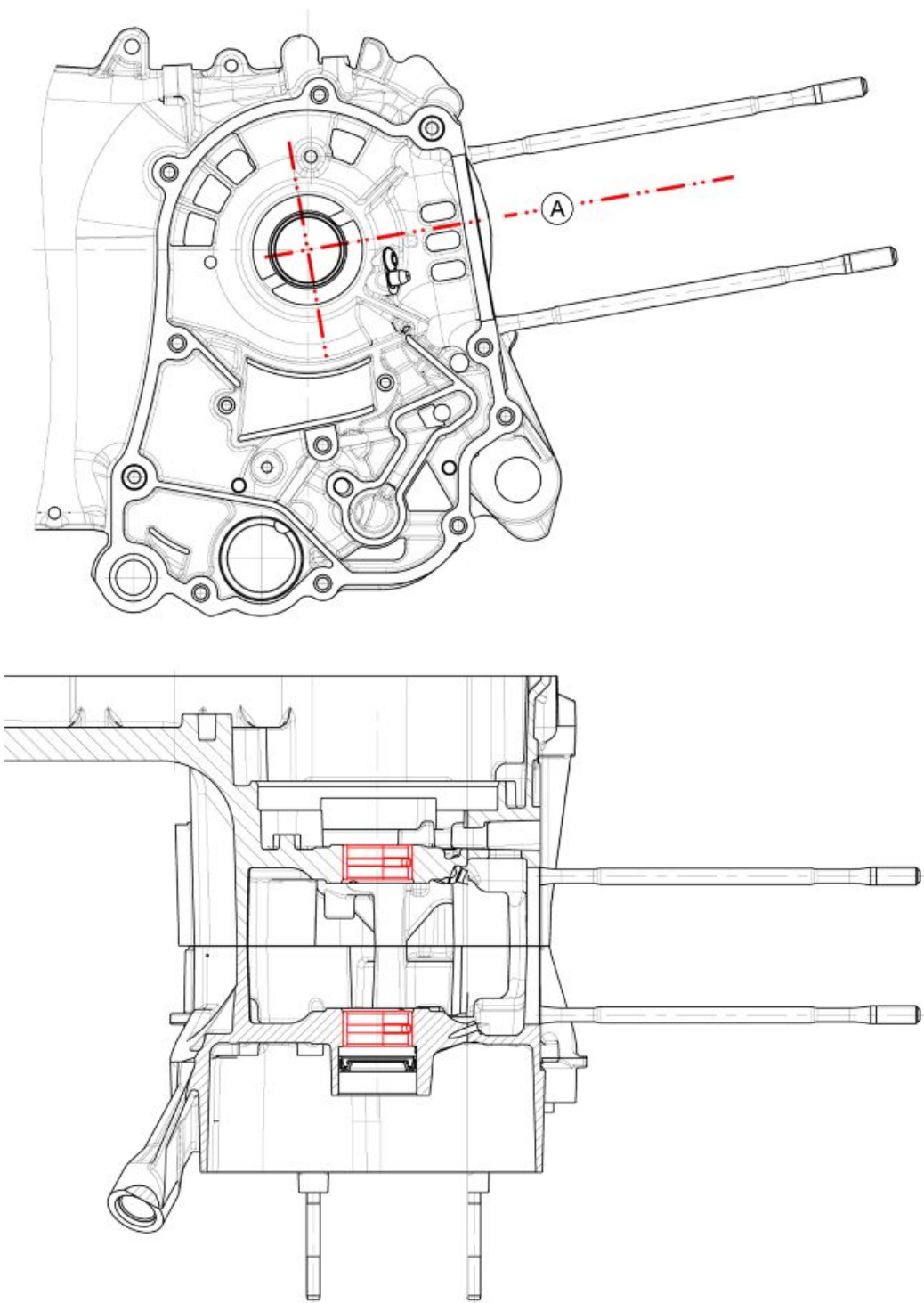
Specification	Desc./Quantity
Crankshaft bearings: Standard diameter: Cat. 1	26.998 - 27.004 mm
Crankshaft bearings: Standard diameter: Cat. 2	27.004 - 27.010 mm

- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.

Characteristic

«A»

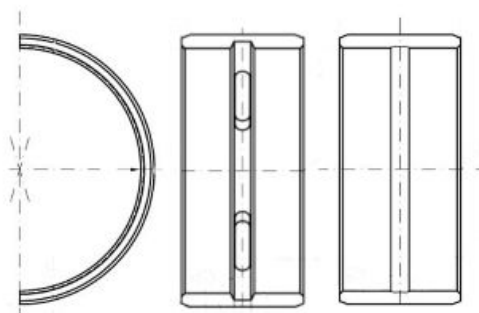
AXIS CYLINDER



BEARINGS

TYPE	IDENTIFICATION	CRANKSHAFT HALF-BEARING
B	BLUE	1.971 - 1.976
C	YELLOW	1.974 - 1.979
E	GREEN	1.977 - 1.982

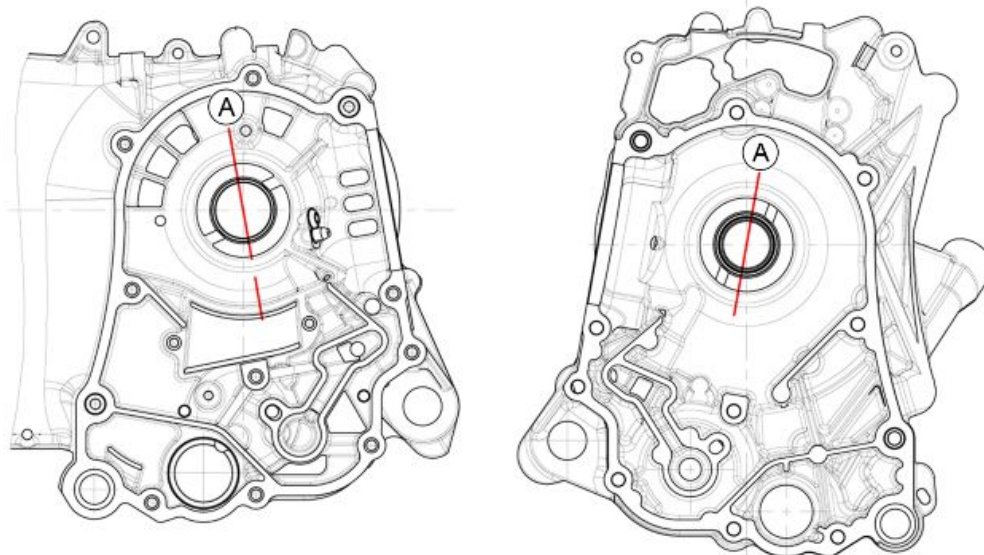
- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.
- The main bushings are made of 2 half bearings, one oil supply hole and lubrication channel and the other only with lubrication channel.



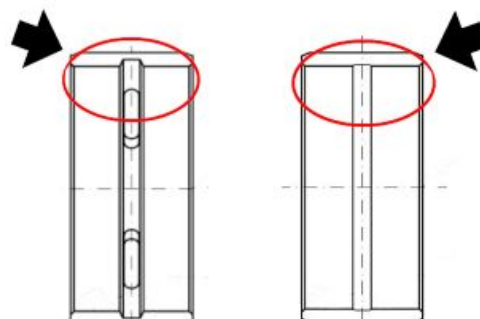
Characteristic

«A»

HAL BEARING CONNECTION LINE



- The section of the oil feeding channels is also influenced by the driving depth of the bushings.
- Visually check the wear of the bushings: in the coupling ends shown in the photo the bushing usually keeps the original look, check in the rest of the bushing if there is evident removal of material. **If this occurs as stated, proceed to replace the crankcase halves.**



N.B.

SMALL MARKS AND SCRATCHES OF THE SHAFT ROTATION ARE NORMAL SIGNS OF ENGINE USAGE, AND DO NOT AFFECT THE CORRECT FUNCTIONING.

Measurement of crankcase halves - crankshaft coupling clearance

- The nominal diameters of the bushings, even if of the same coupling category, may differ by hundredths due to the plastic slackening of the material of the crankcase due to the driving load.
- Measure along the axis of the «A» cylinder, using a bore meter at two depths indicated in the figure, the diameter of the bushings.
- After measuring the two diameters, take the average.

Characteristic**«A»****AXIS CYLINDER**

- The bushings housing hole in the crankcase half is divided into two categories depending on the size, Category 1 and Category 2.

DIAMETER OF CRANKCASE WITHOUT BUSHING

Specification	Desc./Quantity
CAT 1	30.959 - 30.965 mm
CAT 2	30.953 - 30.959 mm

- Combine the shaft with two category 1 crankwebs with the category 1 crankcase (or cat. 2 with cat. 2). Furthermore a spare crankcase cannot be matched with a crankshaft with mixed categories. The spare crankshaft has half-shafts of the same category.
- According to the classification of the shaft CAT.1 - CAT.2 combine a complete crankcase pre-fitted with suitable bushings according to the starting shaft.

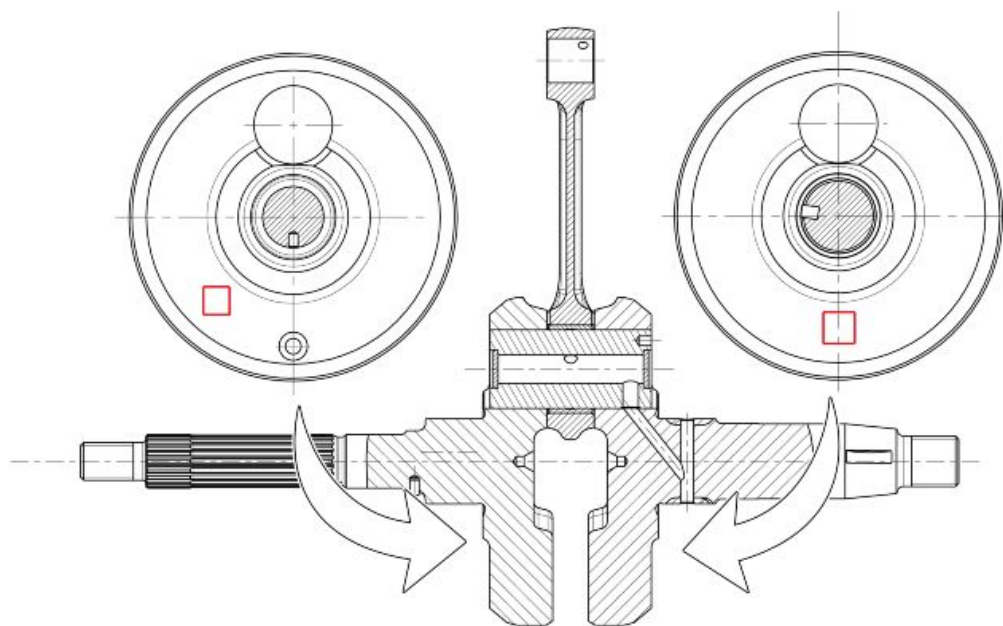
CATEGORIES

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

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

Characteristic**Crankshaft category:**

CAT. 1 - CAT. 2



Cylinder Head

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

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

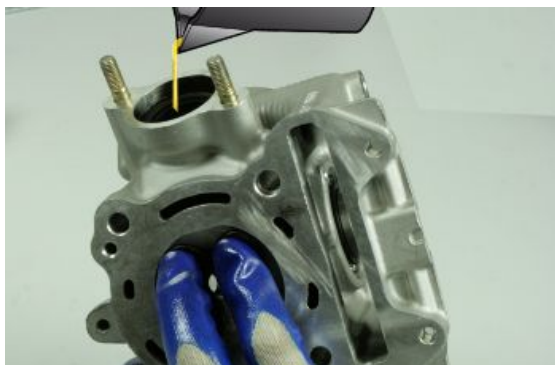
Characteristic

Maximum allowable run-out:

0.03 mm

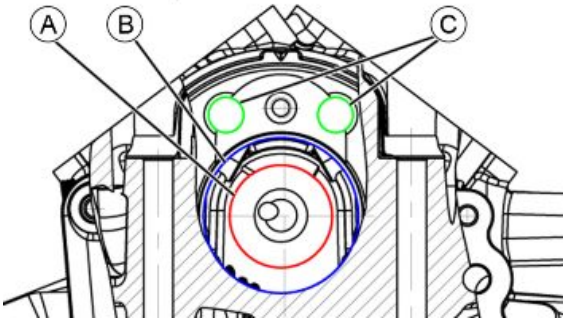
- In case of faults, replace the head.
- Check the sealing surfaces for the exhaust manifold.
- Check that the camshaft and the rocker pin capacities exhibit no wear.
- Check that the head cover shows no signs of wear.
- Check that there is no cooling liquid leakage from the seals.

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



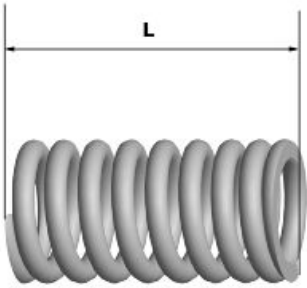
HEAD OUTPUTS

Specification	Desc./Quantity
bearing «A»	Ø 28.000 (+0.007 +0.028) mm
bearing «B»	Ø 47.000 (+0.041 +0.025) mm
bearing «C»	Ø 10.000 (+0.028 +0.013) mm



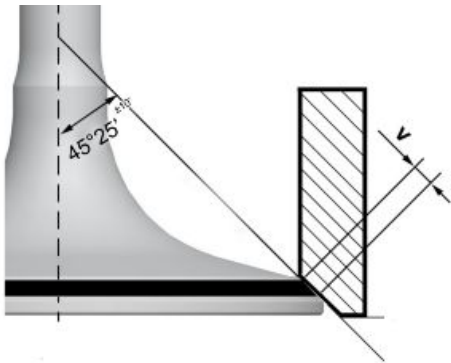
Measure the unloaded spring length

Characteristic
Standard length
36.2 mm



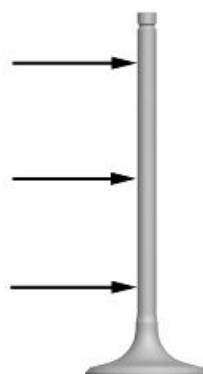
- Clean the valve seats of any carbon residues.
- Using the Prussian blue, check the width of the impression on the valve seat "V".

Characteristic
Standard value:
1 - 1.3 mm



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

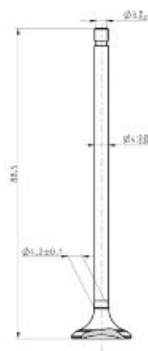
- Measure the diameter of the valve stems in the three positions indicated in the diagram.



INTAKE VALVE



EXHAUST VALVE



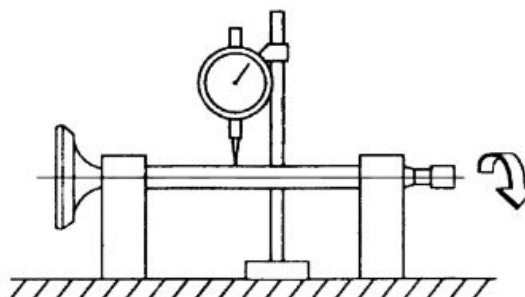
- Check the deviation of the valve stem by resting it on a «V» shaped abutment and measuring the extent of the deformation with a dial gauge.

Characteristic

Valve eccentricity

Nominal value 0.1 mm

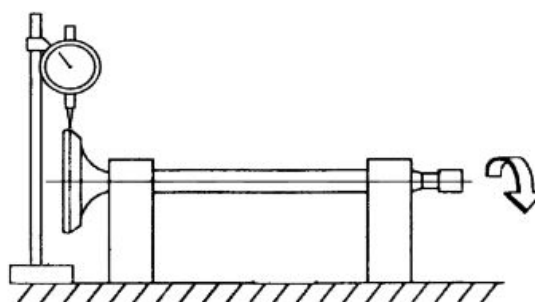
- Calculate the clearance between the valve and the valve guide.



- Check the oscillation of the valve head by arranging a dial gauge at right angle relative to the valve head and rotate it on a "V" shaped abutment.

Characteristic**Valve eccentricity**

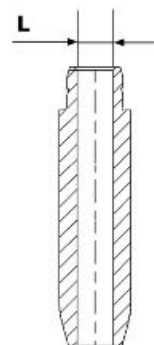
Nominal value 0.08 mm



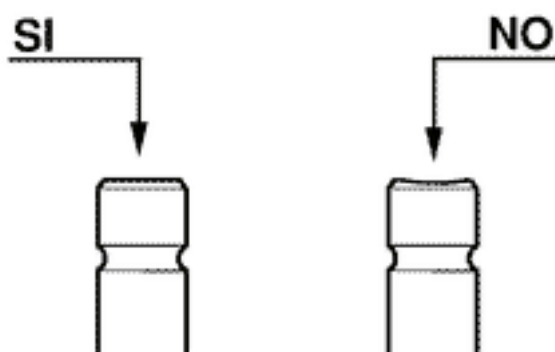
Measure the valve guide.

Characteristic**Valve guide:**

4.0 - 4.012 mm



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



- If no anomalies are found during the above checks, you can use the same valves. To obtain better sealing performance, grind the valve seats. Grind the valves gently with a fine-grained lapping compound. During the grinding, keep the cylinder head with the valve axes in a horizontal position. This will prevent the lapping compound residues from penetrating between the valve stem and the guide (see figure).

CAUTION

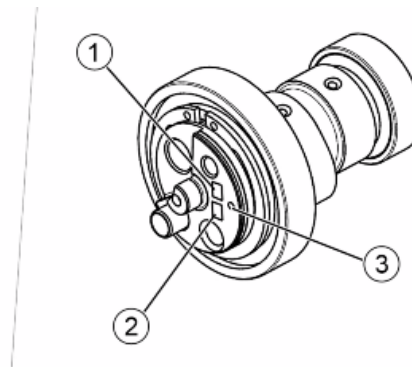
TO AVOID SCORING THE MATING SURFACE, DO NOT ROTATE THE VALVE WHEN NO LAPPING COMPOUND IS LEFT. CAREFULLY WASH THE CYLINDER HEAD AND THE VALVES WITH A SUITABLE PRODUCT FOR THE TYPE OF LAPPING COMPOUND BEING USED.

CAUTION

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

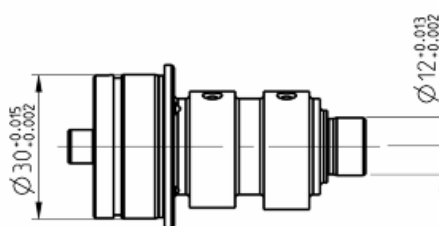
CAMSHAFT

The external side of the camshaft is provided with marks useful for its identification.

**Key:**

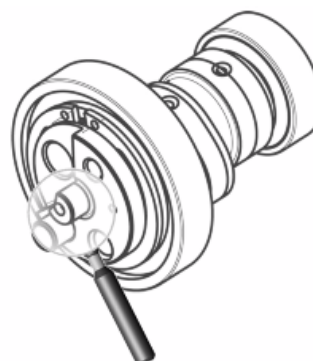
1. Area dedicated to laser engraving printing; if there is an "H" letter, the camshaft is designed to be used on an **HPE** version engine.
2. Area dedicated to laser engraving printing; letters "C" or "D" may exist, identifying the class of coupling with the decompressor mass.
3. Area reserved for punch engraving; if there are no punches, the camshaft is designed to be used on 125 cc versions and if there are, the camshaft is designed to be used on 150 cc versions.

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

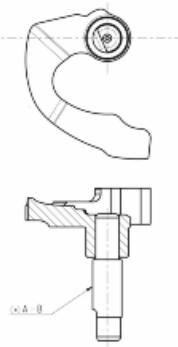


For the correct operation of the Start & Stop system, the cam axis and the decompressor mass must comply with the coupling class.

The colour of the cam axis is indicated in the figure.



The classification of the decompressor mass is indicated in the figure.

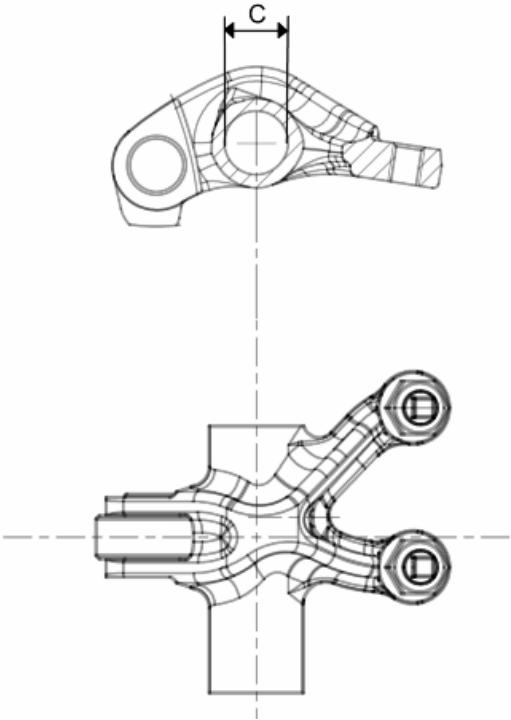


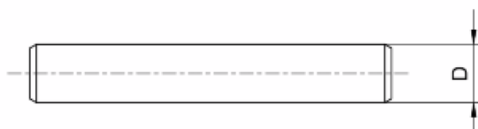
- Measure the external diameter of the rocking lever pins
- Check the rocker pins do not show signs of wear or scoring.
- Measure the internal diameter of each rocker

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

DIAMETER OF PINS AND ROCKING LEVERS

Specification	Desc./Quantity
Rocking lever inside diameter: Standard diameter (C)	Ø 10.013 - 10.031 mm
Rocking lever pin diameter: Standard diameter (D)	Ø 9.991 - 10.0 mm



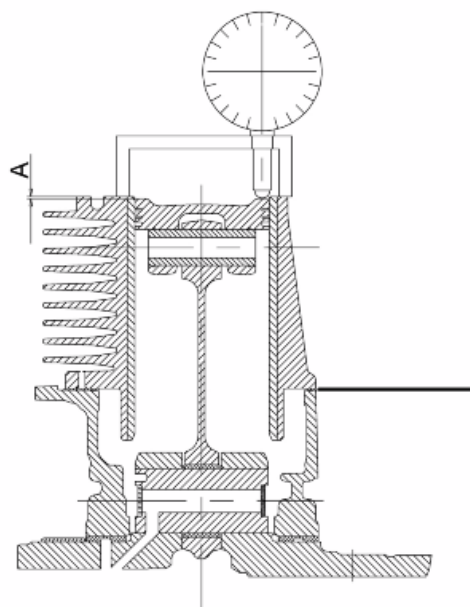


Slot packing system

Characteristic

Compression ratio

12 ± 0.5: 1



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

N.B.

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


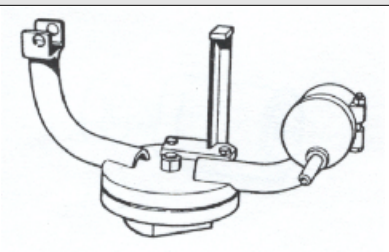

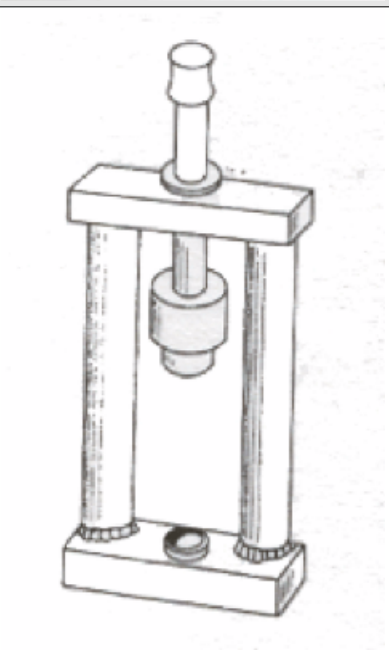

ENGINE 125/150 SHIMMING

Name	Measure A	Thickness
Shimming	0 - -0.1	0.8 ± 0.05
Shimming	-0.1 - -0.3	0.6 ± 0.05
Shimming	-0.3 - -0.4	0.4 ± 0.05




INDEX OF TOPICS






TOOLING	TOOL
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SPECIFIC TOOLS	
Stores code	Description
001330Y	Tool for fitting steering seats
	
001467Y	Extractor for bearings for holes
	
001467Y013	Calliper to extract ø 15-mm bearings
	
001467Y014	Calliper to extract ø 15-mm bearings
	
001467Y017	Bell for bearings, OD 39 mm
	
001467Y035	Bearing housing, external ø 47 mm
	







Stores code	Description	
002465Y	Calliper for circlips	
005095Y	Engine support	
020004Y	Punch for removing steering bearings from headstock	
020021Y	Front suspension service tool	
020036Y	Punch	







Stores code	Description	
020037Y	Punch	
020038Y	Punch	
020055Y	Wrench for steering tube ring nut	
020074Y	Support base for checking crankshaft alignment	
020115Y	punch ø 18	
020150Y	Air heater mounting	
020151Y	Air heater	



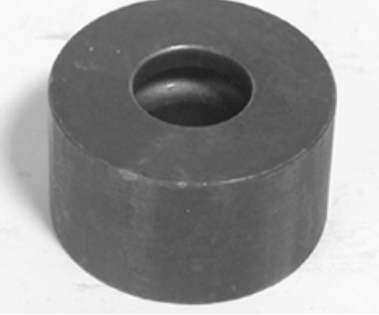



Stores code	Description	
020244Y	punch ø 15	
020262Y	Crankcase splitting plate	
020263Y	Driven pulley assembly sheath	
020287Y	Clamp for fitting piston on cylinder	
020306Y	Punch valve seal rings fitting	
020329Y	Mity-Vac vacuum pump	

Stores code	Description	
020331Y	Digital multimeter	
020332Y	Digital rpm indicator	
020334Y	Multiple battery charger	
020335Y	Magnetic mounting for dial gauge	
020345Y	Union for oil pressure measurement	


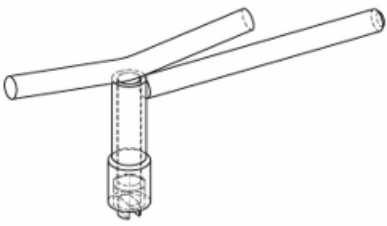
Stores code	Description	
020357Y	32 x 35-mm Adaptor	
020359S	42 x 47 mm Adaptor	
020360S	52 x 55 mm adaptor	
020363Y	20-mm guide	
020364Y	25-mm guide	
020365Y	22 mm guide	

Stores code	Description	
020375Y	28 x 30 mm adaptor	
020376Y	Adaptor handle	
020382Y	Valve cotters equipped with part 012 removal tool	
020382Y011	adapter for valve removal tool	
020412Y	15-mm guide	
020424Y	Driven pulley roller casing fitting punch	

Stores code	Description	
020426Y	Piston fitting fork	
020431Y	Valve oil seal extractor	
020441S	26 x 28 mm adaptor	
020442Y	Pulley lock wrench	
020444Y	Tool for installing/removing clutch on/ from driven pulley	
020454Y	Tool for fitting the pin snap rings (200 - 250)	

Stores code	Description	
020456Y	Ø 24 mm adaptor	
020459Y	Punch for fitting the bearing on the steering tube	
020477Y	Adapter 37 mm	
020480Y	Fuel pressure measurement kit	
020483Y	30-mm guide	
020621Y	A.T cable pick-up adapter	

Stores code	Description	
020648Y	Single battery charger	
020922Y	Diagnosis Tool	
020938Y	Drive pulley lock	
020942Y	Piston protrusion check tool	
020994Y	Driven pulley stop	
021006Y	Lock for engine timing R.I.S.S.	
021007Y	Flywheel extractor	

Stores code	Description	
021008Y	Punch	
AP8140261	Valve clearance adjuster wrench	

INDEX OF TOPICS

MAINTENANCE

MAIN

FOR SUPERTech VERSION

MAINTENANCE ICON

This function indicates the scheduled maintenance interventions. For each time the key is turned to "ON", once the instrument panel has performed the initial check, if the value of the remaining kilometres until the next intervention is less than 300 Km (186.41 mi), the indicated icon will flash for 5 seconds. When the service mileage is reached, with each key "ON", the icon remains switched on steady until it is reset after the service operations are carried out.



MAINTENANCE ICON RESET

To reset the maintenance icon, proceed as follows:

- Turn the ignition switch to "ON";
- Briefly press the MODE joystick upward or downward until the "Battery charge state" function is displayed at the centre of the digital display.



N.B.



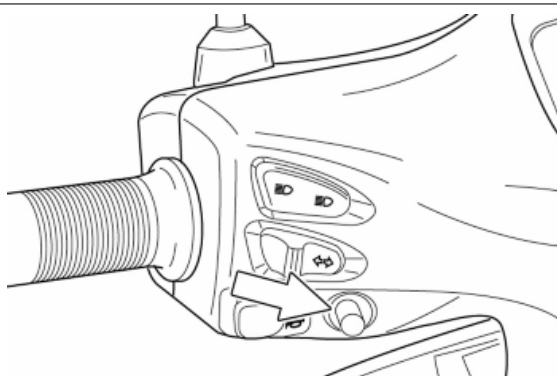
"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 0.5 SECONDS;
 "PRESS AND HOLD": PRESS THE BUTTON AND HOLD FOR AT LEAST 2 SECONDS.

- Press and hold the MODE button for at least 10 seconds but not more than 15 seconds. Upon releasing it, the maintenance icon switches off.
- If the MODE joystick is released without waiting 10 seconds, the maintenance icon will not switch off and the service interval counter will not be reset.

CAUTION



THE MAINTENANCE ICON RESET PROCEDURE MAY ONLY BE PERFORMED WHEN THE VEHICLE IS AT A STANDSTILL (SPEED = 0 Km/h).



Maintenance chart

N.B.

AT EACH SCHEDULED SERVICE, USE THE DIAGNOSTIC TOOL TO CHECK FOR ERRORS AND CHECK THAT ALL PARAMETERS ARE CORRECT. ENSURE THAT THE VEHICLE CALIBRATION IS UP TO DATE AFTER UPDATING THE DIAGNOSTIC TOOL.

CAUTION

ONCE THE REQUIRED MAINTENANCE PROGRAM HAS BEEN COMPLETED, THE VEHICLE'S MAINTENANCE MUST BE CONTINUED STARTING WITH THE 10,000 Km (6,214 mi).

SCHEDULED MAINTENANCE TABLE

I: CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY C: CLEAN; R: REPLACE; A: ADJUST; L: LUBRICATE.

** Check level every 5,000 km.*

km x 1,000 (mi x 1,000)	1 (0.6)	10 (6.2)	20 (12.4)	30 (18.6)	40 (24.8)	50 (31.0)	EVERY 12 MONTHS	EVERY 24 MONTHS
Safety blocks	I	I	I	I	I	I		
Spark plug			R		R			
Centre/side stand		L	L	L	L	L	L	L
Drive belt		I	R	I	R	I		
Throttle control	I	I	I	I	I	I	I	I
Rollers housing		I	I	I	I	I		
Diagnosis by tool	I	I	I	I	I	I	I	I
Air filter		R	R	R	R	R		
CVT Filter		C	C	C	C	C		
Engine oil filter	R	R	R	R	R	R	R	R
Valve clearance		A		A		A		
Clutch assembly			I		I			
Electrical system and battery	I	I	I	I	I	I		
Braking system	I	I	I	I	I	I	I	I
Coolant level	I	I	I	R	I	I	I	R
Brake Fluid	I	I	I	I	I	I	I	R
Engine oil *	R	R	R	R	R	R	R	R
Hub oil		I	I	R	I	I	I	I
Headlight direction adjustment		I	I	I	I	I		
Brake pads		I	I	I	I	I	I	I
Sliding shoes / CVT rollers		I	R	I	R	I		
Engine oil pre-filter	C	C	C	C	C	C		
Tire pressure and wear	I	I	I	I	I	I	I	I
Vehicle road test	I	I	I	I	I	I	I	I
Radiator - External cleaning			C		C			
Suspensions		I	I	I	I	I	I	I
Steering	A	A	A	A	A	A	I	I
Transmission		L	L	L	L	L	I	I
Labour time (minutes)	100	190	170	200	170	190	60	60

Recommended products

Piaggio Group recommends the use of products from its Castrol official partner for the scheduled maintenance of its vehicles.

Only use lubricants and fluids which meet or exceed the performance characteristics specified.

This also applies when topping up only.

**RECOMMENDED PRODUCT TABLE**

Product	Description	Specifications
Engine oil 0W -30	Synthetic lubricant for four stroke engines (-15°C < T < 40°C)	SAE 0W-30 ACEA A5/B5-04 - VW 503 00, 506 00, 506 01

Product	Description	Specifications
Transmission oil 80W-90	Lubricant for gearboxes and transmissions.	SAE 80W-90 API GL-4
Anti-freeze liquid, ready to use, colour red	Ethylene glycol antifreeze liquid with organic inhibition additives. Red, ready to use.	ASTM D 3306 - ASTM D 4656 - ASTM D 4985 - CUNA NC 956-16
DOT 4 brake fluid	Synthetic brake fluid.	SAE J 1703; FMVSS 116; ISO 4925; CUNA NC 956 DOT4
Lubricant grease	Lithium and medium fibre yellow brown coloured grease suitable for various uses.	ISO L-X-BCHA 3 - DIN 51 825 K3K -20
Water repellent spray grease	Water repellent pouring calcium spray grease.	White, soap base spray grease with NLGI 2 Calcium complex; ISO-L-XBCIB2

MEASUREMENT UNITS CONVERSION - FROM THE ANGLO-SAXON SYSTEM TO THE INTERNATIONAL SYSTEM (I.S.).

Specification	Desc./Quantity
1 Inch (in)	25.4 Millimetres (mm)
1 Foot (ft)	0.305 Metres (m)
1 Mile (mi)	1.609 Kilometres (km)
1 US gallon (gal US)	3.785 Litres (l)
1 Pound (lb)	0.454 Kilograms (Kg)
1 Cubic inch (in ³)	16.4 Cubic centimetres (cm ³)
1 Pound per foot (lb ft)	1.356 Newton metres (N m)
1 Mile per hour (mi/h)	1.602 Kilometres per hour (km/h)
1 Pound per square foot (PSI)	0.069 (bar)
1 Fahrenheit (°F)	32+(9/5) Celsius (°C)

Spark plug

SPARK PLUG REMOVAL

Lift the saddle and remove the helmet compartment.



Using a flathead screwdriver, release the clamp and release the fuel line.



Unscrew the fixing nuts of the support plate of the connectors of the flywheel magnet.
Lower the plate.



Remove the spark plug journal.



With the specific spark plug spanner, unscrew the plug and remove it.



SPARK PLUG REFITTING

When refitting the plug, tighten it manually, being sure to insert it at the right angle.

Use the spanner only for locking to the recommended torque.

Characteristic

Spark plug

NGK LMAR8EI-7

Locking torques (N*m)

Spark plug - Cylinder big end 10 - 12 Nm

CAUTION



THE SPARK PLUG MUST BE REMOVED WHEN THE ENGINE IS COLD. THE USE OF SPARK PLUGS OF DIFFERENT THERMAL GRADE FROM THAT REQUIRED OR WITH INAPPROPRIATE THREADS MAY SERIOUSLY DAMAGE THE ENGINE.

CAUTION

FOLLOW THESE PROCEDURES VERY CAREFULLY TO AVOID ANY SEVERE DAMAGE THAT MAY BE CAUSED BY THE VERY POWERFUL IGNITION SYSTEM.

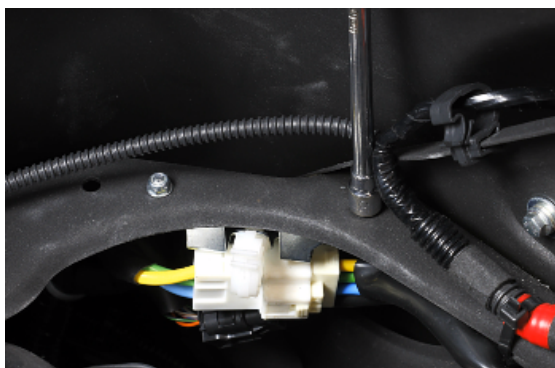
CAUTION

THE USE OF SPARK PLUGS OTHER THAN THOSE RECOMMENDED OR A SHIELDLESS SPARK PLUG CAP COULD CAUSE DISTURBANCES TO THE SYSTEM.

Put back the spark plug cap making sure it enters completely.



Reposition the support plate of the connectors of the flywheel magnet and screw the fixing nuts to the chassis.



Put back the fuel line into the fixing clamp.
Put back the helmet compartment.



Hub oil

Check

Park the vehicle on level ground and on its centre stand.

Undo the indicated screw and check for oil by inserting a shank/plug. The level should be just under the lower margin of the fill hole.

With a cloth carefully clean the transmission casing.

WARNING



THE FUNCTION OF THE HUB WITH INSUFFICIENT HUB LUBRICATION OR WITH CONTAMINATED OR IMPROPER LUBRICANTS ACCELERATES THE WEAR AND TEAR OF THE MOVING PARTS AND CAN CAUSE SERIOUS DAMAGE.

Characteristic

Hub oil quantity

325 cm³

Replace the copper seal each time to ensure the screw holds.



Tighten the screw to the specified torque.

Locking torques (N*m)

Oil charge screw hub - Crankcase 15 to 17 Nm



Replacement

Rest the vehicle on its centre stand.

Unscrew the charge screw of the hub oil.



Get a container for collecting the old oil.

Unscrew the drain screw of the hub oil.

Let all the oil flow out.



Replace the copper seal each time to ensure the screw holds.



Tighten the drain screw to the specified torque.

Locking torques (N*m)

Oil drain screw hub - Crankcase 15 to 17 Nm

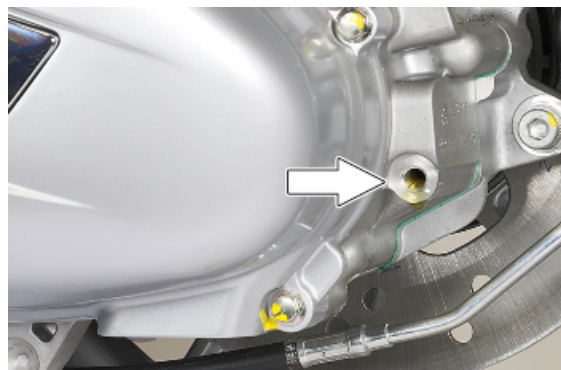


Fill with recommended product, using the filling hole, until reaching the lower edge of the hole itself.

Recommended products

Transmission oil 80W-90 Lubricant for gear-boxes and transmissions.

SAE 80W-90 API GL-4



Replace the copper seal each time to ensure the screw holds.



Tighten the screw to the specified torque.
With a cloth carefully clean the transmission casing.

Locking torques (N*m)

Oil charge screw hub - Crankcase 15 to 17 Nm

**Air filter****AIR FILTER DISASSEMBLY**

Rest the vehicle on its centre stand.

Remove the left side fairing.

Unscrew the fixing screws and the two top knobs of the air filter cover.



Remove the air filter cover



Unscrew the fixing screws of the filter element on the air box.



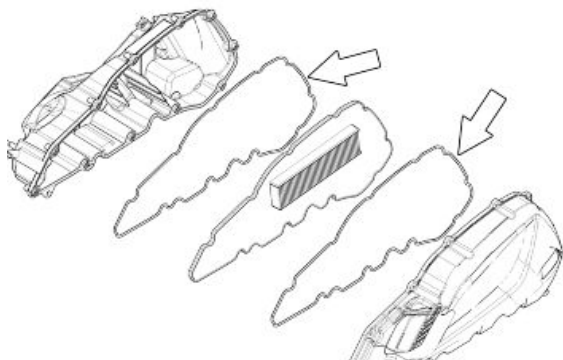
Remove the filter element and put in the new one.



WARNING



ALWAYS USE NEW GASKETS / O -RINGS; WHENEVER NEEDED, REMOVE THE AIR FILTER CASE OR REPLACE THE FILTER ELEMENT. FAILURE TO COMPLY WITH THIS NOTE MAY CAUSE SEALING PROBLEMS AT THE FILTER ELEMENT AND THEREFORE MAY DAMAGE AND WEAR THE ENGINE.



AIR FILTER FITTING

Put in the new filter element.



Screw in the filter's fixing screws.



Put on the air filter cover.



Tighten the screws and fixing knobs of the cover to the air box.

Refit the left side fairing.



Engine oil

In four-stroke engines, the engine oil is used to lubricate the timing elements, the bench bearings and the head-engine block-piston assembly. **An insufficient quantity of oil can cause serious damage to the engine.**

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

Replacement

Rest the vehicle on its centre stand.

Get a container for collecting the old oil.

Unscrew the engine oil drain plug.



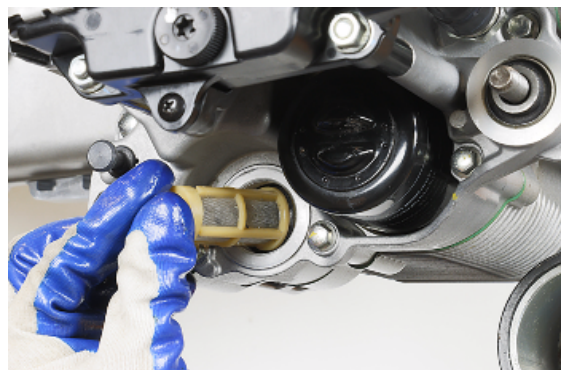
Remove the drain plug and let all the engine oil flow out.



To help the engine oil come out, unscrew the oil level dipstick.



Remove the engine oil pre-filter and clean it if necessary.



Unscrew and remove the engine oil filter.



Lubricate the o-ring of the new filter with engine oil.



Screw on the oil filter.

With the specific wrench, tighten the oil filter to the specified torque.

Locking torques (N*m)

Engine oil filter - Crankcase 8 - 10 Nm



Put back the oil pre-filter and tighten the drain plug to the specified torque.

Locking torques (N*m)

Engine oil drainage plug - Crankcase 24 - 30 Nm



Using the charge hole, fill with the recommended product respecting the recommended maximum quantity.

Check the engine oil level.

Recommended products

Engine oil 0W -30 Synthetic lubricant for four stroke engines (-15°C < T < 40°C)

SAE 0W-30 ACEA A5/B5-04 - VW 503 00, 506 00, 506 01

**Characteristic****Engine oil quantity**

1300 cm³

Check

The engine oil level should be checked when the engine is cold.

Otherwise, wait at least 10 minutes after the engine has been switched off.

Rest the vehicle on its centre stand on flat ground.

Unscrew the engine oil dipstick, dry it with a clean cloth and screw it back in.



Unscrew it and check that the engine oil level is between the minimum and maximum indicators on the dipstick itself.

If necessary top-up using the recommended product without exceeding the maximum level.

Recommended products

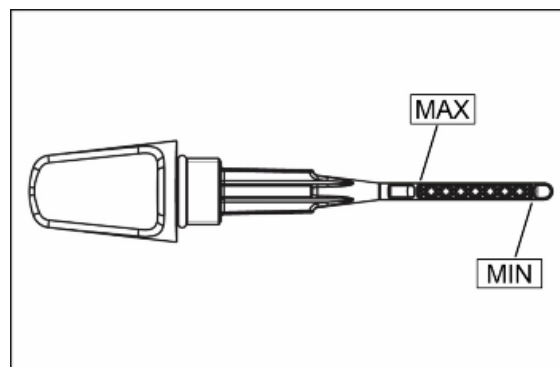
Engine oil 0W -30 Synthetic lubricant for four stroke engines (-15°C < T < 40°C)

SAE 0W-30 ACEA A5/B5-04 - VW 503 00, 506 00, 506 01

Characteristic

Engine oil quantity

1300 cm³



Engine oil filter

The engine oil filter should be changed according to the scheduled maintenance table.

Unscrew and remove the engine oil filter.



Lubricate the o-ring of the new filter with engine oil.



Screw on the oil filter.

With the specific wrench, tighten the oil filter to the specified torque.

Locking torques (N*m)

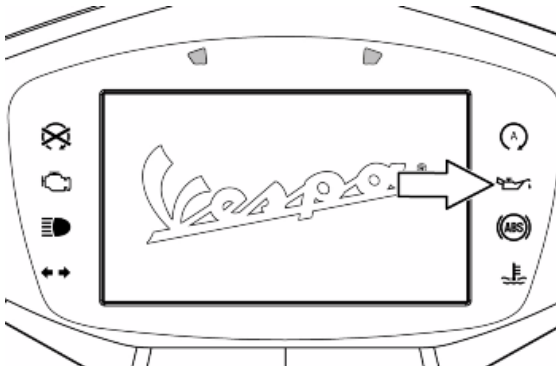
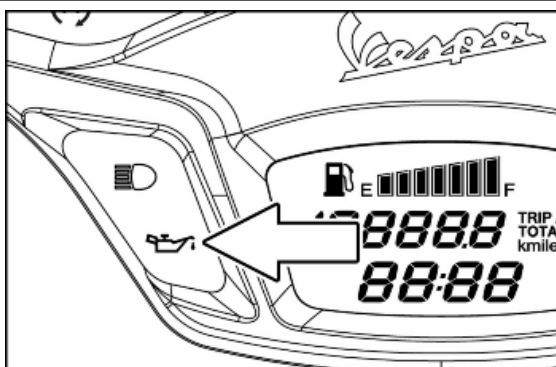
Engine oil filter - Crankcase 8 - 10 Nm



Oil pressure warning light

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

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



Checking the valve clearance

Checking the valve clearance should be carried out according to the scheduled maintenance table. Place the vehicle on the centre stand above a suitable bridge so that the front wheel can be locked.

Disconnect the battery cables. Remove the right hand side fairing.



Lift the saddle and remove the helmet compartment.

WARNING

CARRY OUT THESE OPERATIONS WHEN THE ENGINE IS COLD.

Unscrew the engine ground cable from its fastening on the left side of the chassis.



Unscrew the fixing screw of the fuel line support bracket and release the line.



Disconnect the fuel line from the injector connector.

Dry any fuel leaks.



Disengage the throttle control transmissions from the support bracket.



From the right side of the vehicle, disengage the clamp of the main wiring harness and release the wiring.



From the right side of the vehicle, cut the retaining clamp of the wiring harness.



Unscrew the screw fixing the expansion tank to the frame.



Remove the expansion tank cap.



From the right side of the vehicle, cut the retaining clamp of the line connecting the expansion tank to the radiator.



Unscrew the belt cooling cover fixing screws.



Remove the belt cooling cover without disconnecting it from the bellows.



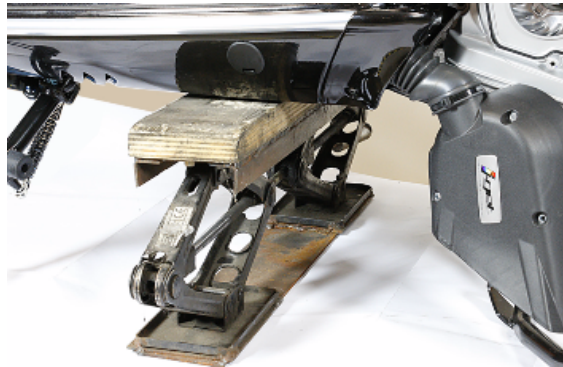
Unscrew the screws fixing the air filter box to the engine.



Secure the rear of the vehicle with a suitable hoist.



Place, in the part shown, a parallelogram to support the front of the vehicle.



Lift the filter box to access the lower fastening of the left rear shock absorber.

Unscrew and remove the fixing bolt.



Unscrew and remove the fixing nut of the right rear shock absorber.



Tension the hoist and lift the centre stand until the rear wheel rests on the bridge.



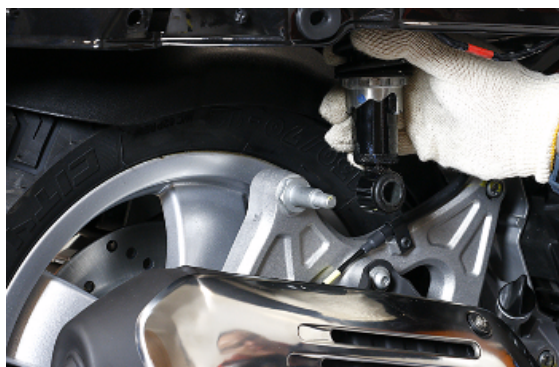
Disengage the right rear shock absorber from the silencer support bracket.

Using the rear hoist, the engine rotates slightly between the rear wheel and the swingarm.

The big end rises upwards, rendering the inspection glass of the valves available.

CAUTION

BE CAREFUL WHEN HANDLING THE HOIST SO THE ELECTRIC CABLES ARE NOT TENSIONED TOO MUCH.



Unscrew the fixing screws of the big end cover on the intake side and remove it.



Unscrew the screws fixing the big end cover on the exhaust side and remove it.



Rotating the crankshaft, make sure to position the piston on the TDC, namely check that there is some clearance between the rockers and the valves.



Using the specific tool, unscrew the fixing nut of the valve clearance adjustment nut.

Specific tooling

AP8140261 Valve clearance adjuster wrench



Using a feeler gauge, check the clearance between the adjustment nut and the valve and carry out any adjustment needed bringing it to the recommended value.

Do the same to adjust the clearance of the valves on the exhaust side.

Tighten the counter nut to the recommended torque, making sure to keep the adjustment nut still with the inside of the specific tool.



Characteristic

Valve clearance (cold engine)

Intake: 0.10 mm

Exhaust: 0.15 mm

Locking torques (N*m)

Valve adjustment counter nut - Rocker 6 - 8 Nm

Put back the big end covers and tighten the screws to the recommended torque.

Put a loop strip on the main electrical wiring harness.

Locking torques (N*m)

Head cover - Head 5 - 6 Nm



Put a clamp on the pipe supplying coolant from the expansion tank to the radiator.



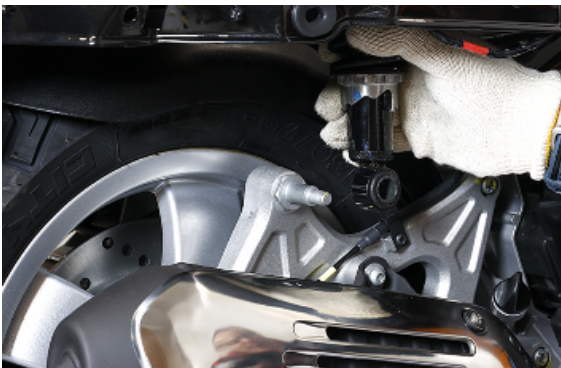
Lower the centre stand.



Slowly lower the rear hoist and the front parallelogram until the vehicle is resting on the centre stand.



Put back both rear shock absorbers, tighten the nut and the bolt to the recommended torque.



TIGHTENING REAR SHOCK ABSORBERS

Name	Torque in Nm
Rear shock absorber (lower fix) - Shock absorber support bracket	40 - 45 Nm
Rear shock absorber (lower fix) - Silencer support bracket	40 - 45 Nm

Put back the air filter box in its seat and tighten the fixing screws.



Put back the belt cooling cover and tighten the fixing screws on the crankcase cover.



Tighten the screw of the expansion tank to the recommended torque.

Locking torques (N*m)
Expansion tank - Chassis 4.5 - 7 Nm



Put back the electrical wiring harness inside the fixing clamp on the frame.



Put back the throttle control transmissions on the support bracket.



Connect the fuel line to the injector connection.



Fix the pipe on the support bracket.



Fix the engine ground to the chassis.

Tighten the loop strap on the pipe of the expansion tank and the electrical wiring harness previously prepared.

Refit the right side fairing.

Put back the under-seat compartment.

Connect the battery.



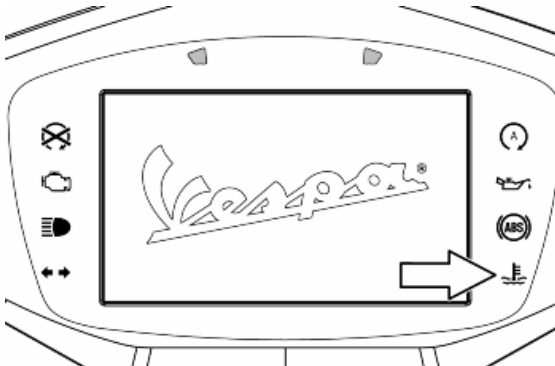
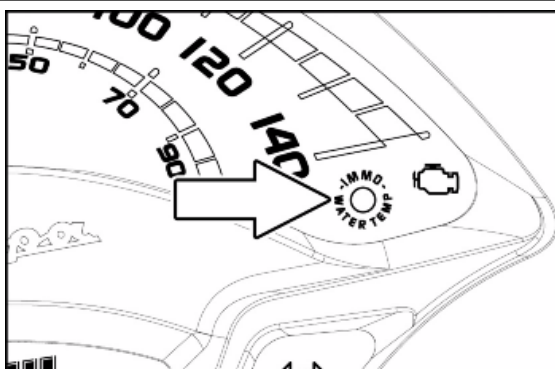
Cooling system

The coolant must be checked when the engine is cold, and in accordance with the indications provided in the scheduled maintenance table.

The engine cooling system is of the forced liquid circulation type.

With the engine running, if the engine temperature is too high, the relative indicator light on the instrument panel will turn on, indicating that the engine must be immediately shut off and allowed to cool.

Inspect the cooling system



Level check

Lift the saddle and remove the helmet compartment.



Check that the coolant level is between the "**MIN**" and "**MAX**" lines.

If necessary, top-up with fluid if the level is near the minimum mark.



Top-up

Lift the saddle and remove the helmet compartment.



Remove the expansion tank cap and top up using the recommended product and never exceed the «**MAX**» level shown on the tank itself.

If the coolant needs to be topped up frequently, you must check the cooling system.

WARNING



YOU MUST MAKE SURE THE FLUID NEVER EXCEEDS THE MAXIMUM LEVEL INDICATED SO AS TO AVOID IT OVERFLOWING AND CAUSING DAMAGE WHILE THE SCOOTER IS MOVING. TO ENSURE CORRECT ENGINE OPERATION, KEEP THE RADIATOR GRILLE CLEAN.

Recommended products

Anti-freeze liquid, ready to use, colour red Ethylene glycol antifreeze liquid with organic inhibition additives. Red, ready to use.

ASTM D 3306 - ASTM D 4656 - ASTM D 4985 -

CUNA NC 956-16



Braking system

Level check

Rest the vehicle on its centre stand and with the handlebars perfectly horizontal.

Check the liquid level through the relative inspection sight glass.

If the sight glass is full, the brake fluid level is correct. If the brake fluid is near the «**MIN**» reference, top-up



Top-up

Remove the central front cover.

Remove the front handlebar cover.

Remove the fixing screws of the cover of the brake pumps and top up with the recommended product.

WARNING



ONLY USE DOT 4-CLASSIFIED BRAKE FLUID. BRAKE CIRCUIT FLUID IS HIGHLY CORROSIVE: DO NOT LET IT COME INTO CONTACT WITH PAINTED PARTS.

CAUTION



AVOID CONTACT OF BRAKE FLUID WITH EYES, SKIN, AND CLOTHING. IN CASE OF ACCIDENTAL CONTACT, RINSE WITH WATER. THE BRAKING CIRCUIT FLUID IS HYGROSCOPIC, THAT IS, IT ABSORBS HUMIDITY FROM THE SURROUNDING AIR. IF MOISTURE CONTAINED IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, THIS WILL RESULT IN INEFFICIENT BRAKING. NEVER USE BRAKE LIQUID FROM OPEN OR PARTIALLY USED CONTAINERS.

WARNING

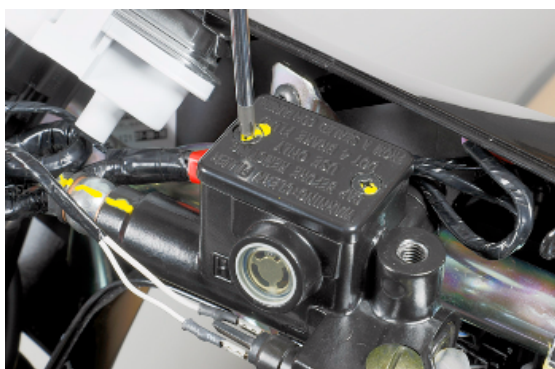
BRAKE CIRCUIT FLUID IS HIGHLY CORROSIVE: DO NOT LET IT COME INTO CONTACT WITH PAINTED PARTS.

CAUTION

BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF THE CONTENT OF MOISTURE IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, BRAKING WILL BE INEFFICIENT. NEVER USE BRAKE LIQUID FROM OPEN OR PARTIALLY USED CONTAINERS. UNDER NORMAL CLIMATIC CONDITIONS, REPLACE FLUID AS INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

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**DOT 4 brake fluid Synthetic brake fluid.**

SAE J 1703; FMVSS 116; ISO 4925; CUNA NC

956 DOT4

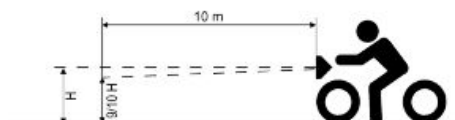
Headlight adjustment

Proceed as follows:

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

Turn on the headlight and check that the boundary of the light beam projected onto the screen is not higher than $\frac{9}{10}$ or lower than $\frac{7}{10}$ of the distance between the centre of the headlight and the ground;

If this is not the case, adjust the headlight by following the procedure below.



Turn the handlebar completely to the right.

Insert a screwdriver with a PH2 bit in the hole in the bottom part of the front handlebar cover.



Use the screwdriver to adjust:

Turn clockwise to raise the light beam and turn anticlockwise to lower the light beam.

Remove the screwdriver and move the handlebar to the centre.

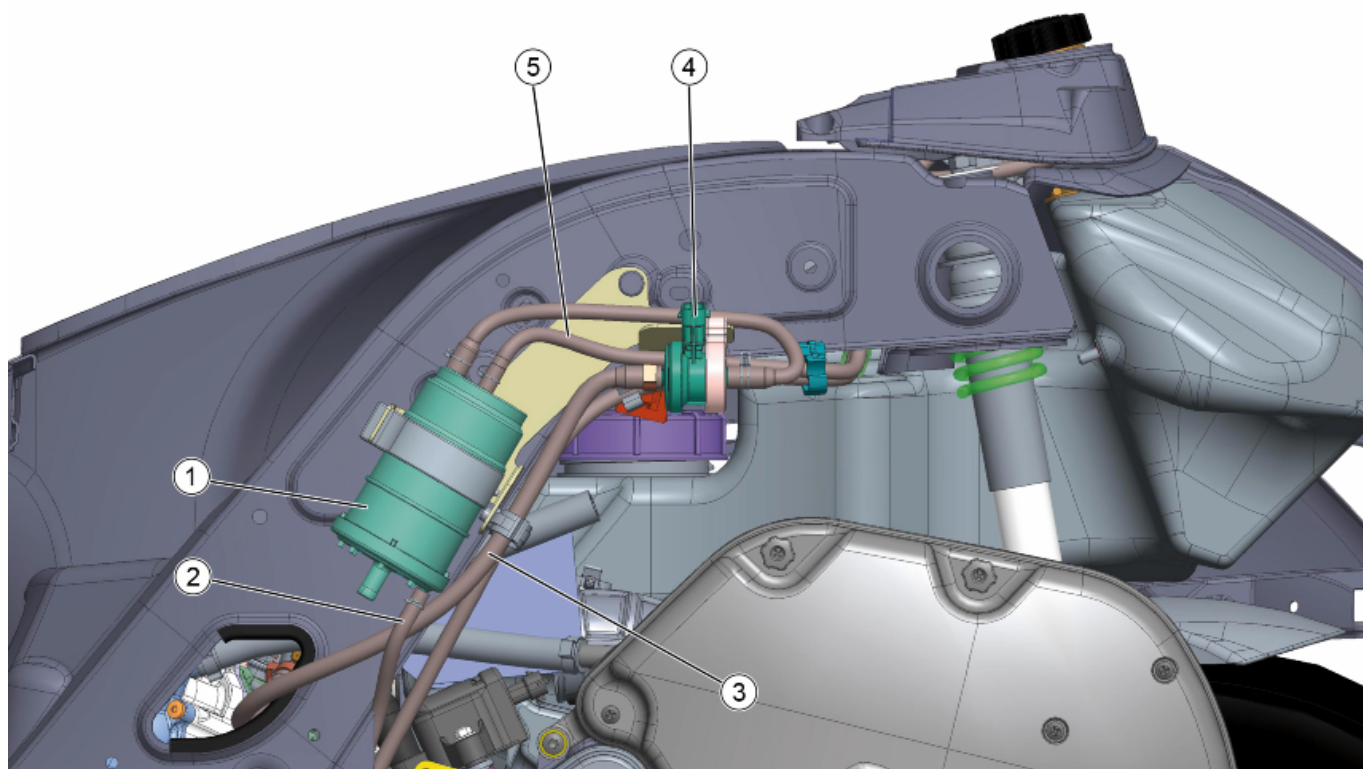
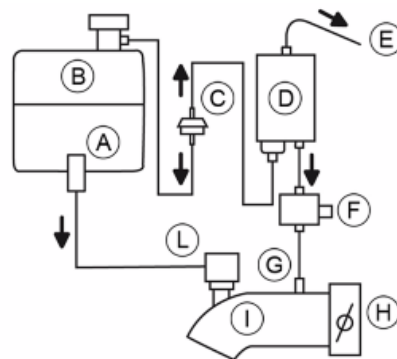
Check the height of the light beam and, if necessary, repeat the procedure until it is correctly adjusted.



Anti-evaporation system

The vehicle is equipped with the "Canister", main component of the system for the control of evaporative emissions, compliant with the current standards.

- A. Fuel pump
- B. Fuel tank
- C. Two-way fuel vapour ventilation valve
- D. Canister
- E. Air purge pipe into atmosphere
- F. One-way electronic fuel vapour purge control valve (controlled by ECU)
- G. Vacuum fitting
- H. Throttle body
- I. Air induction fitting
- L. Injector

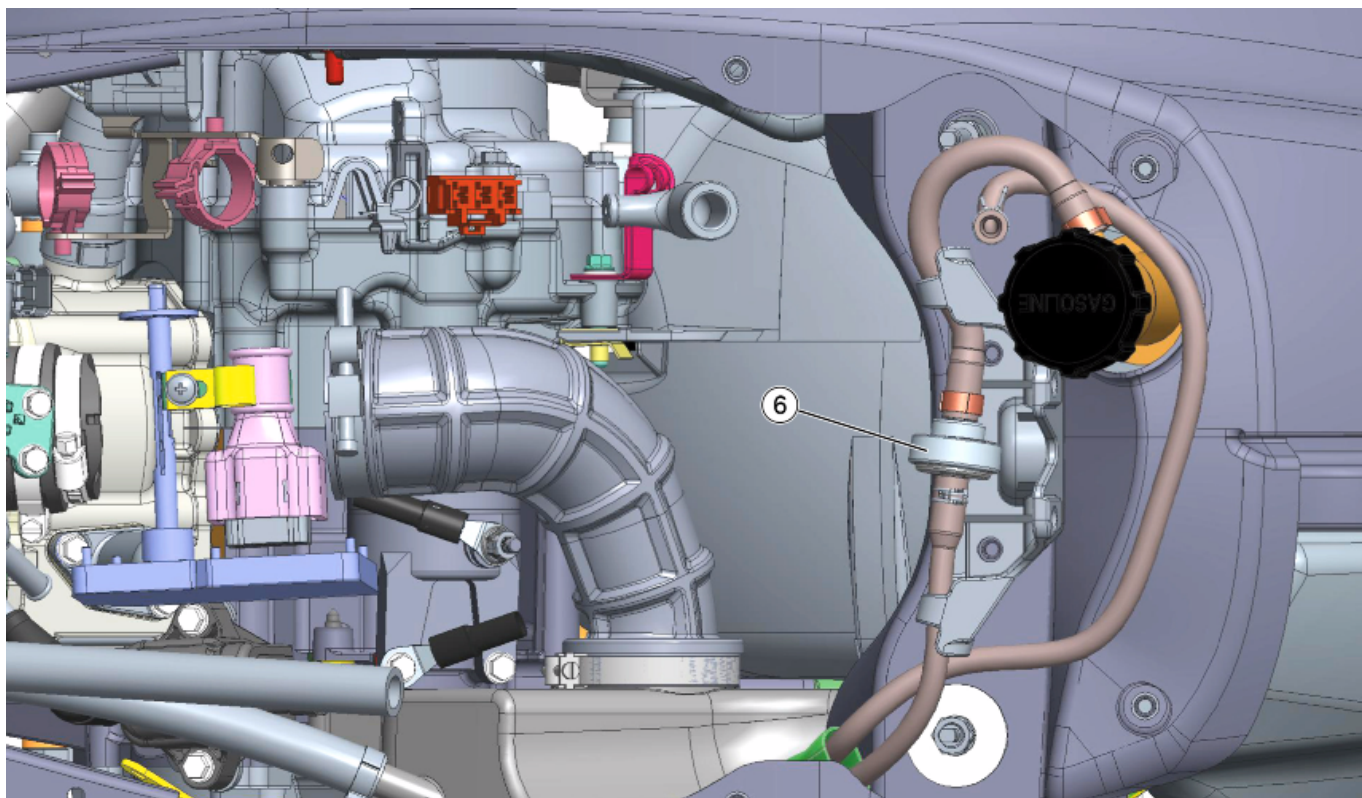


The evaporative emissions control system is located on the rear left hand side of the vehicle.

Key:

- 1 Canister
- 2 Bleeder pipe
- 3 Pipe for connecting the canister to the inlet fitting
- 4 Canister valve

5 Pipe for connecting the fuel tank to the canister

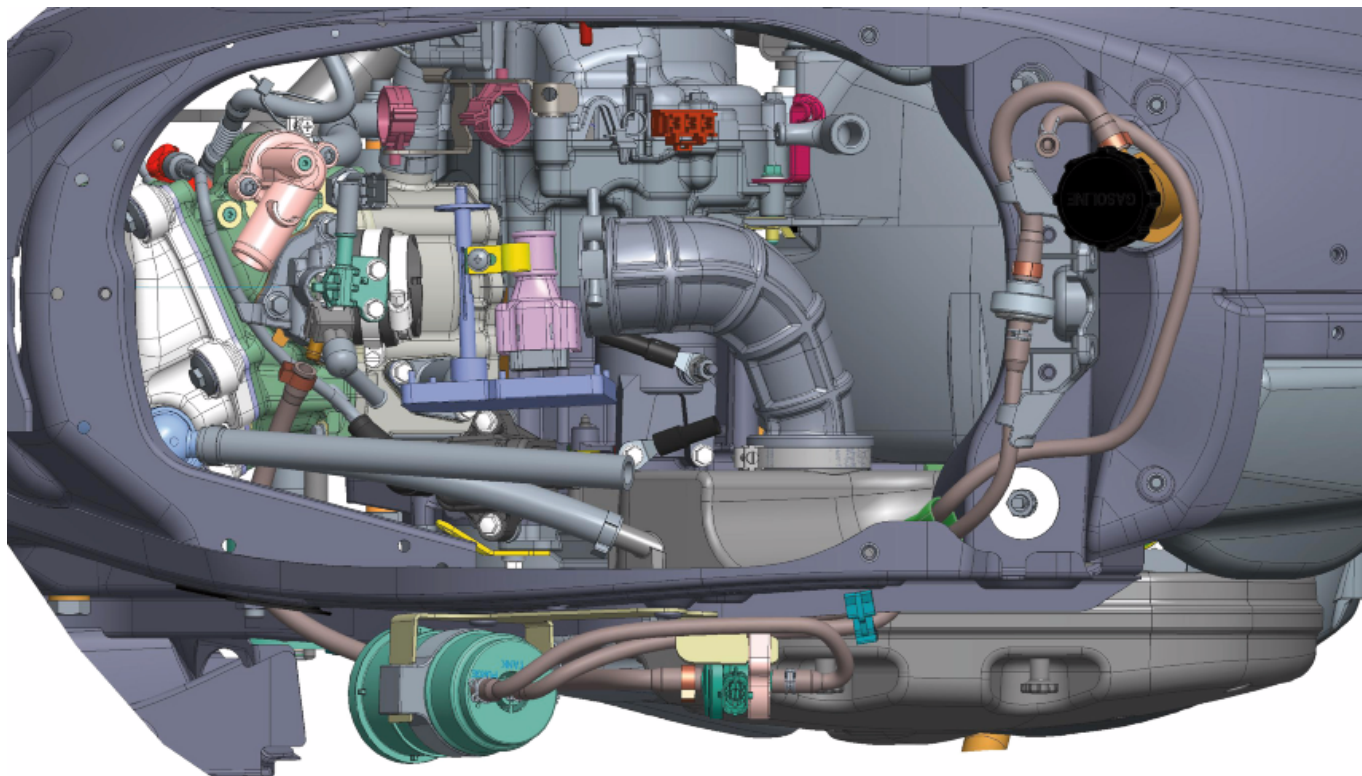


Key:

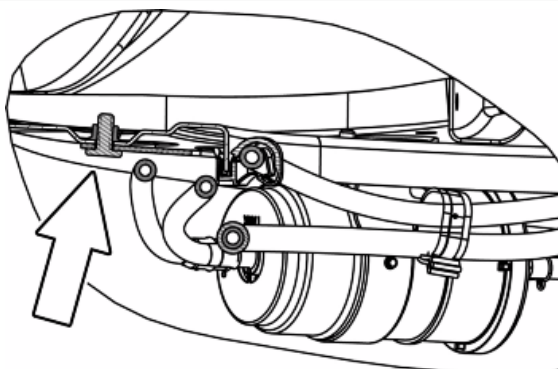
6 Breather valve

Removing system components

Remove the helmet compartment to gain access to the components of the evaporative emissions control system.

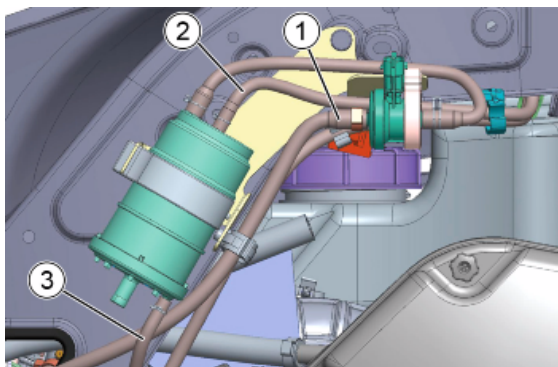


After having removed the clamps, unscrew the fastening screw to release the system and bring the components inside the engine compartment.



Refitting system components

Upon reassembling the components, use caution when connecting the pipes to the canister.



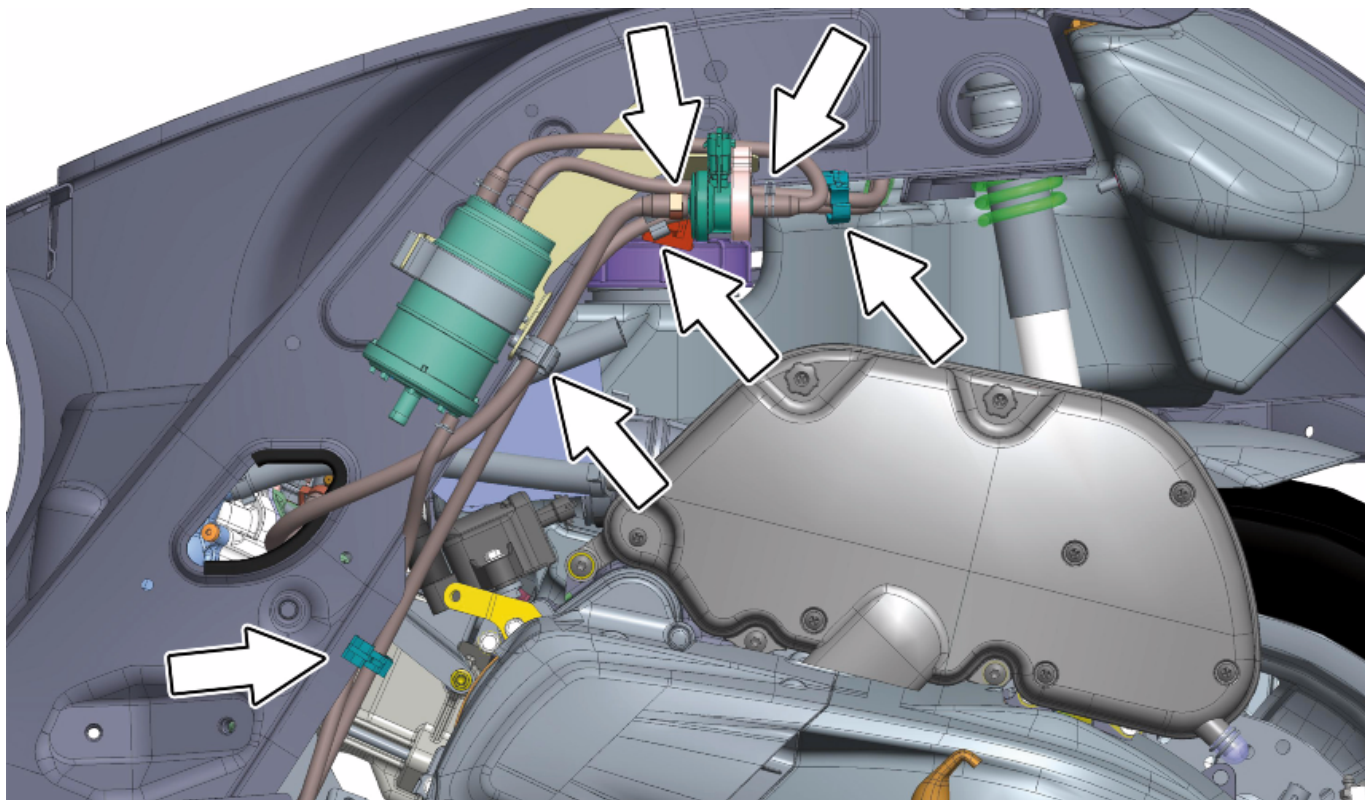
1. canister - insertion coupling connection pipe.
2. tank - canister connection pipe.
3. Bleeder pipe.

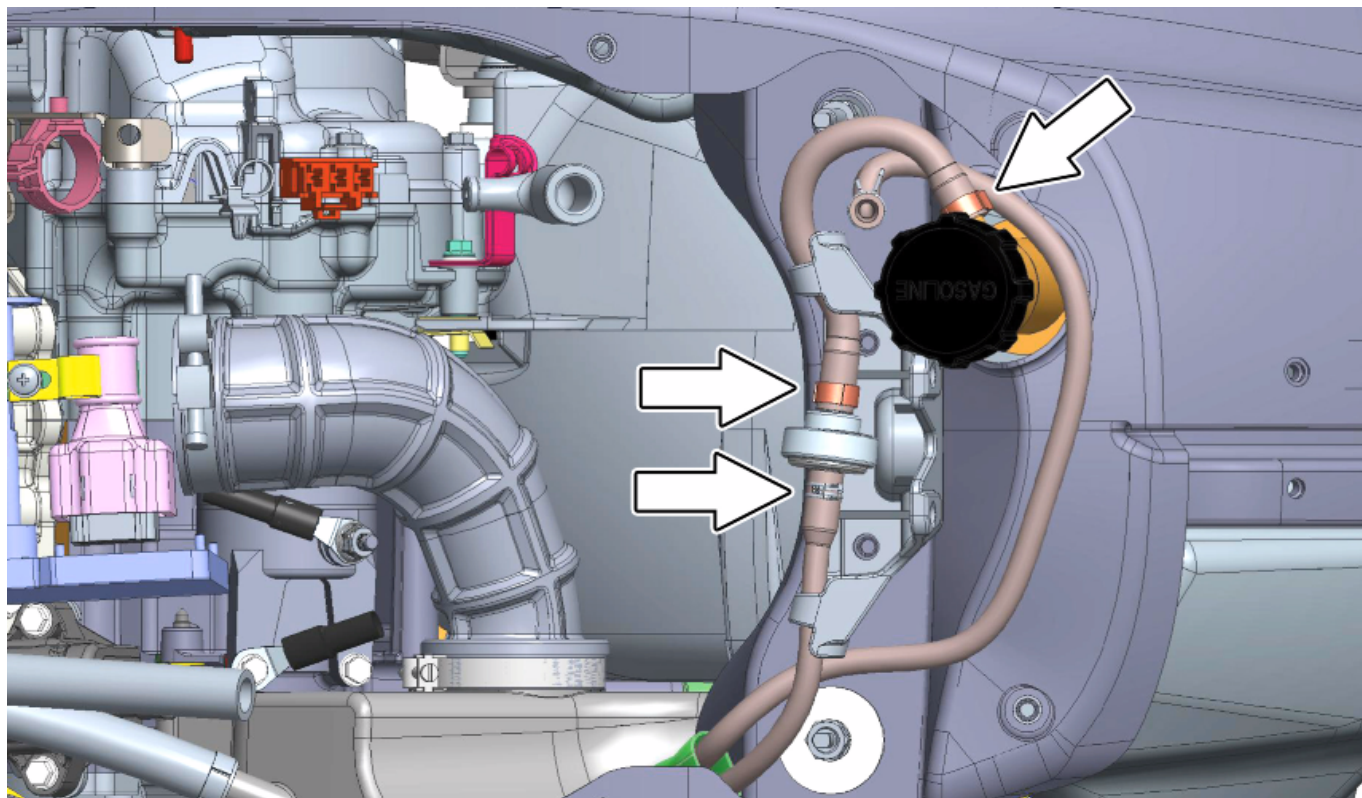
Refit the components by properly inserting the pipes and securing them with new metal clamps.

CAUTION

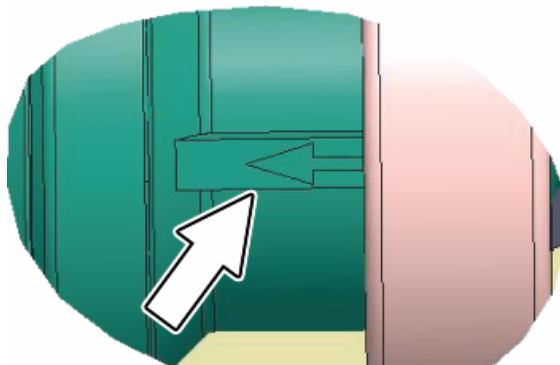
TAKE CARE TO ENSURE THE PROPER DIRECTION OF THE COMPONENTS' INSTALLATION: IF INSTALLED IN REVERSE, THEY COULD COMPROMISE THE FUNCTIONALITY OF THE ENTIRE EVAPORATING SYSTEM.

After having installed the components, secure the pipes with new ties.





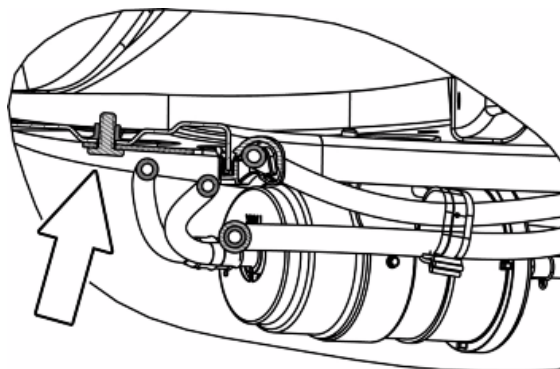
Upon refitting the canister valve, observe the direction of the arrow toward the engine.



Refit the canister support bracket on the chassis and tighten the fastening screws.

Locking torques (N*m)

Canister - Frame support bracket 12.0 ± 1.0 Nm



Make sure that the orientation of the breather valve is correct.

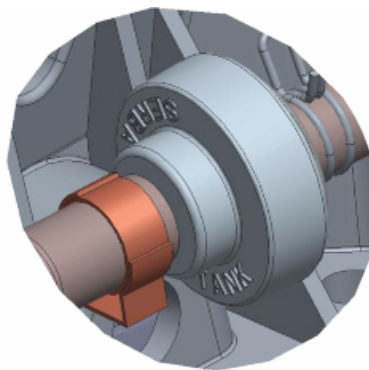
If you detect different pressures, replace the valve.

Characteristic**Discharge pressure**

80/100 mbar

Intake pressure

≤ 20 mbar

**Canister inspection**

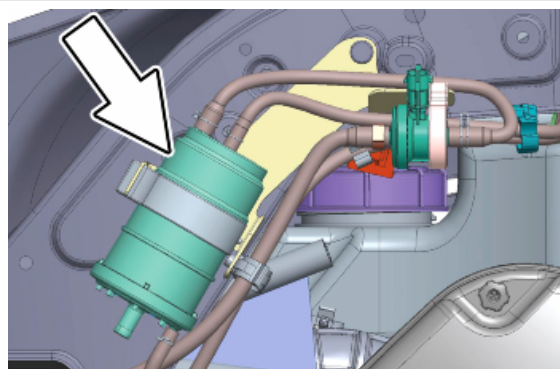
The canister is essential to treat the hydrocarbons present in the volume of gas that escapes from the tank when there is an increase in internal pressure (tank heating induced by the cooling radiator, by the motor or by the external environment).

Although the amount of hydrocarbons coming from the tank is small enough to avoid the saturation of the canister, it is necessary to regenerate the activated carbon by means of a reversed flow of ambient air sucked by the engine.

These vacuums of pollution and carbon regeneration take place at each cycle of use of the vehicle.

To control the canister, it is necessary to proceed with its removal while keeping the 2 pipes connected.

- Shake the Canister and make sure there is no noise.
- Using a compressed air gun, blow alternately in 3 ducts and make sure that pressure does not build inside the canister.
- Check that the air flow is kept free and that no carbon residues escape out of any pipe.



If you detect noise, clogging or loss of carbon, replace the canister.

INDEX OF TOPICS

TROUBLESHOOTING

TROUBL

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
Air filter blocked or dirty	Replace
Excessive drive belt wear	Check it and replace, if necessary
Lack of compression: parts, cylinder and valves worn	Replace the worn parts
Engine oil level exceeds maximum	Check for causes and fill to reach the correct level
Excess of scales in the combustion chamber	Descale the cylinder, the piston, the head and the valves
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Silencer obstructed	Replace
Inefficient automatic transmission	Check the rollers and the pulley movement, replace the damaged parts and lubricate the movable guide of the driven pulley with grease
Wrong valve adjustment	Adjust the valve clearance properly
Overheated valves	Remove the head and the valves, grind or replace the valves
Valve seat distorted	Replace the head unit
Worn cylinder, Worn or broken piston rings	Replace the piston cylinder assembly or just the piston rings

Starting difficulties

START-UP PROBLEMS

Possible Cause	Operation
Flat battery	Check the state of the battery. If it shows signs of sulphation, replace it and bring the new battery into service by charging it for not more than ten hours at a current of 1/10 of the capacity of the battery itself.
Faulty spark plug	Replace the spark plug
Incorrect valve sealing or valve adjustment	Inspect the head and/or restore the correct clearance
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Air filter blocked or dirty	Replace
Fuel pump fault	Check the pump.

Excessive oil consumption/Exhaust smoke

EXCESSIVE CONSUMPTION

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

Insufficient lubrication pressure

LOW LUBRICATION PRESSURE

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

Transmission and brakes

Clutch grabbing or performing inadequately

IRREGULAR CLUTCH PERFORMANCE OR SLIPPAGE

Possible Cause	Operation
Slippage or irregular functioning	<p>Check that there is no grease on the masses.</p> <p>Check that the faying surface between the clutch masses and the clutch housing is mainly in the middle and with equivalent specifications on the three masses.</p> <p>Check that the clutch housing is not scored or worn abnormally.</p>

Insufficient braking

INEFFICIENT OR NOISY BRAKING

Possible Cause	Operation
Worn brake pads or shoes	Replace the brake pads or shoes and check for brake disk or drum wear conditions.
Front brake disk loose or deformed	Check the brake disc screws are locked; use a dial gauge and a wheel mounted on the vehicle to measure the axial shift of the disc.
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	Failing elastic fittings, plunger or brake pump seals, replace

Brakes overheating

BRAKES OVERHEATING

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

Electrical system

Battery

BATTERY

Possible Cause	Operation
Battery	<p>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+.</p> <p>For the recharging of the batteries follow the instructions in chap. ELECTRICAL SYSTEM.</p>

Steering and suspensions

Heavy steering

STEERING HARDENING

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

Excessive steering play

EXCESSIVE STEERING CLEARANCE

Possible Cause	Operation
Excessive steering clearance	Check the tightening of the top ring nut. 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.

Noisy suspension

NOISY SUSPENSION

Possible Cause	Operation
Noisy suspension	Check the efficiency of the front shock absorber, the condition of the ball bearings and relative locking nuts, the limit stop rubber pads and sliding bushes. Finally check the locking torques of the wheel hub, the brake calliper, the disc and the fastenings of the shock absorber to the hub and to the steering tube.

Suspension oil leakage

OIL LEAKAGE FROM SUSPENSION

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

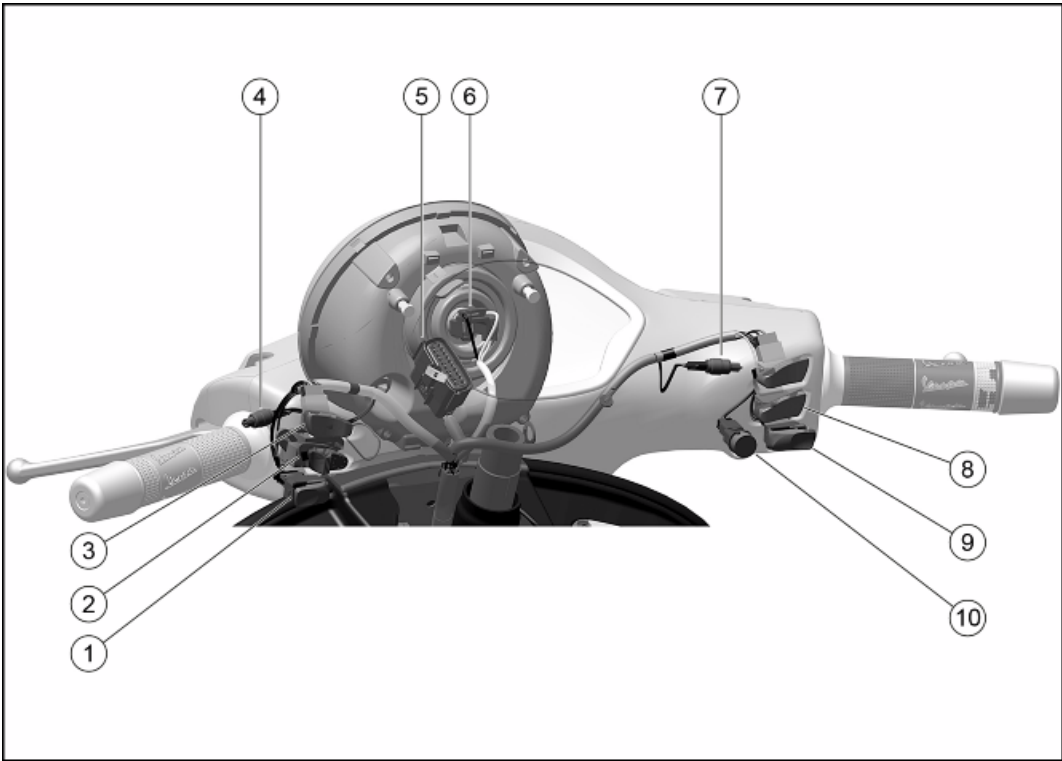
INDEX OF TOPICS

ELECTRICAL SYSTEM

ELE SYS

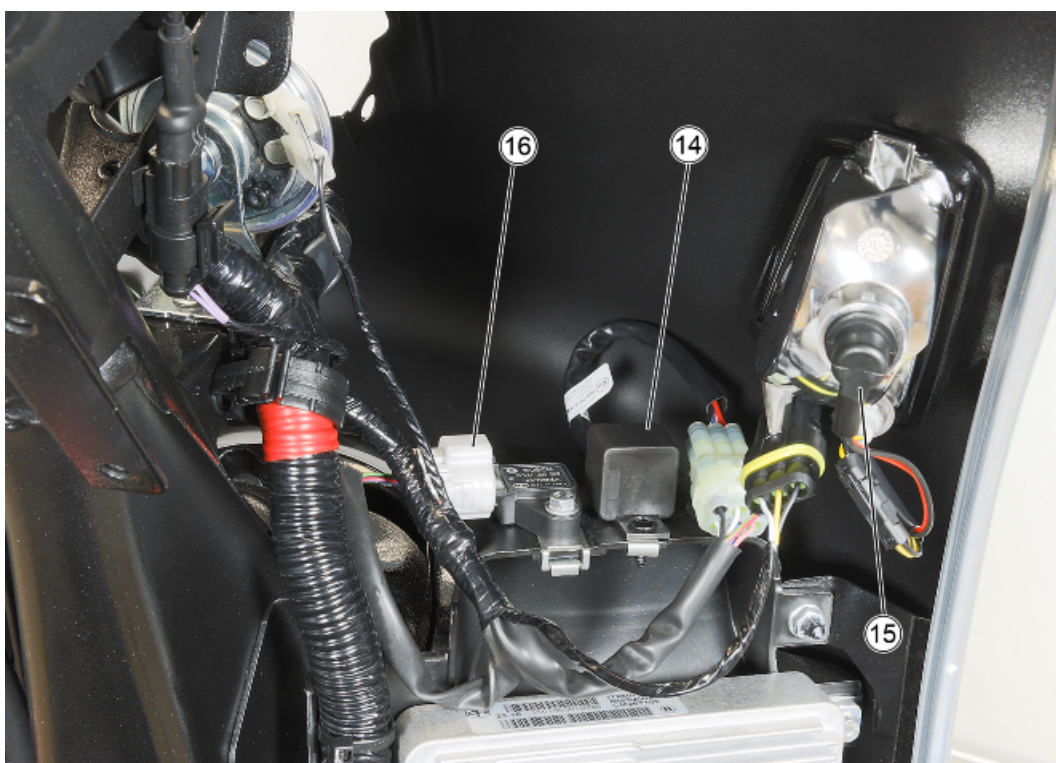
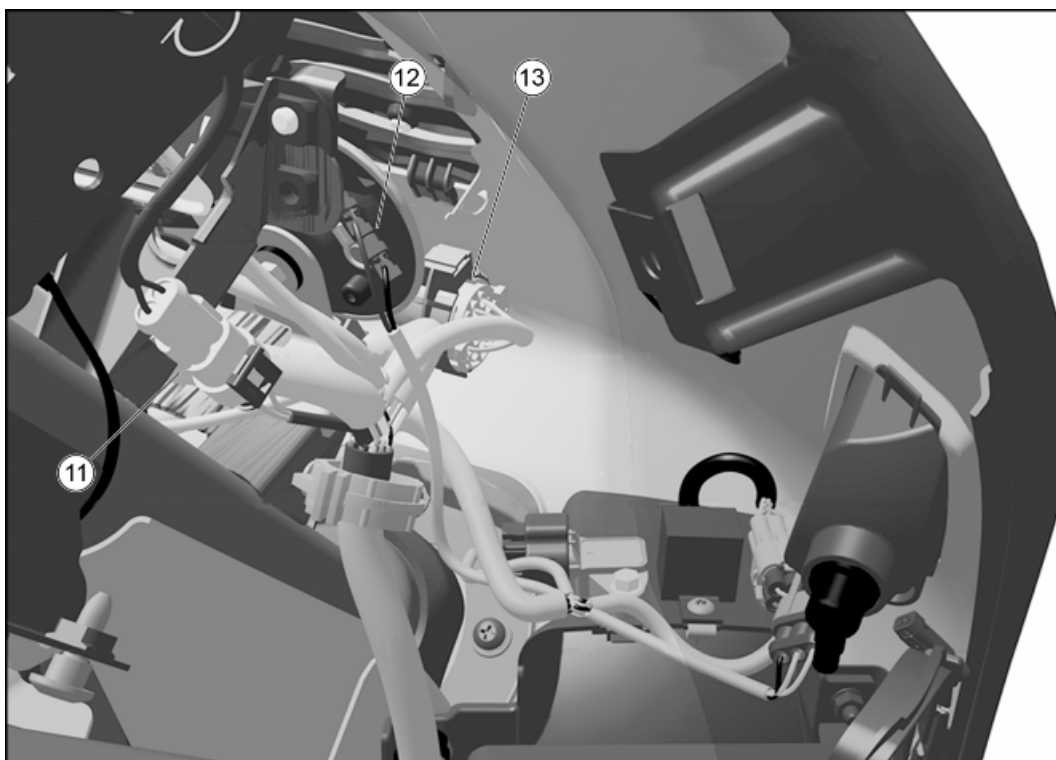
This section is dedicated to the description of the electrical system components.

Components arrangement

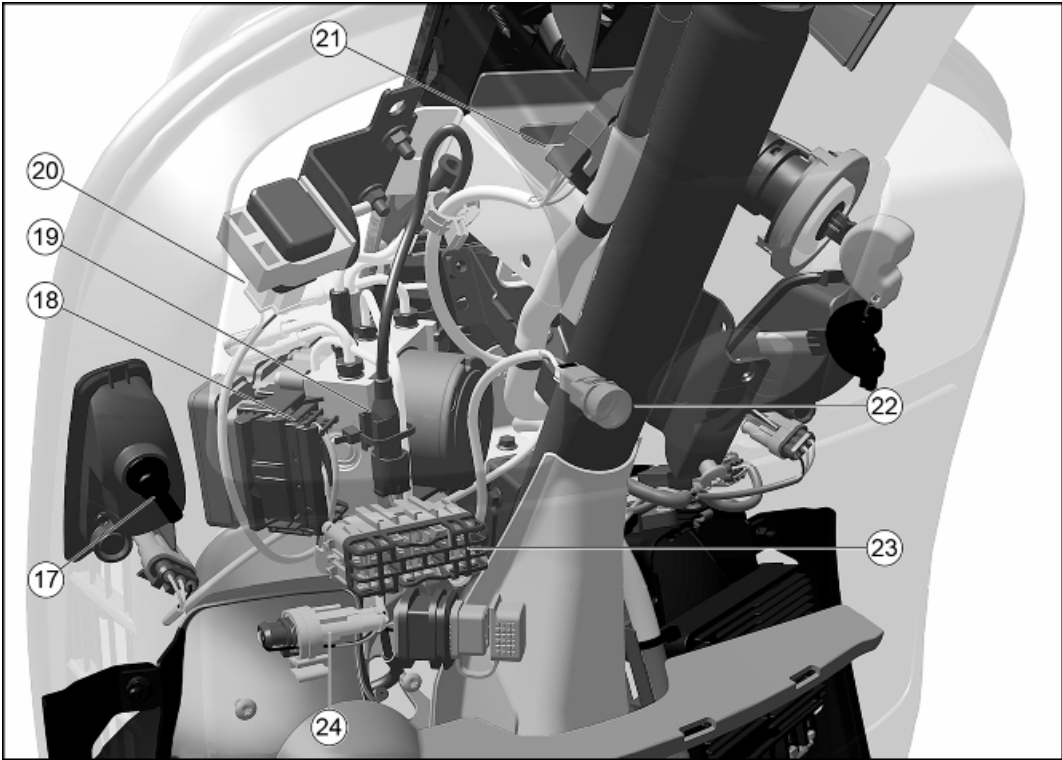


HANDLEBAR COMPONENTS LAYOUT

No.	Component
1	Audible warning device control button
2	Turn signal control switch
3	Light switch
4	Stop button on rear brake
5	Instrument panel
6	Headlight
7	Stop button on front brake
8	Start&Stop switch
9	Starter button
10	MODE button

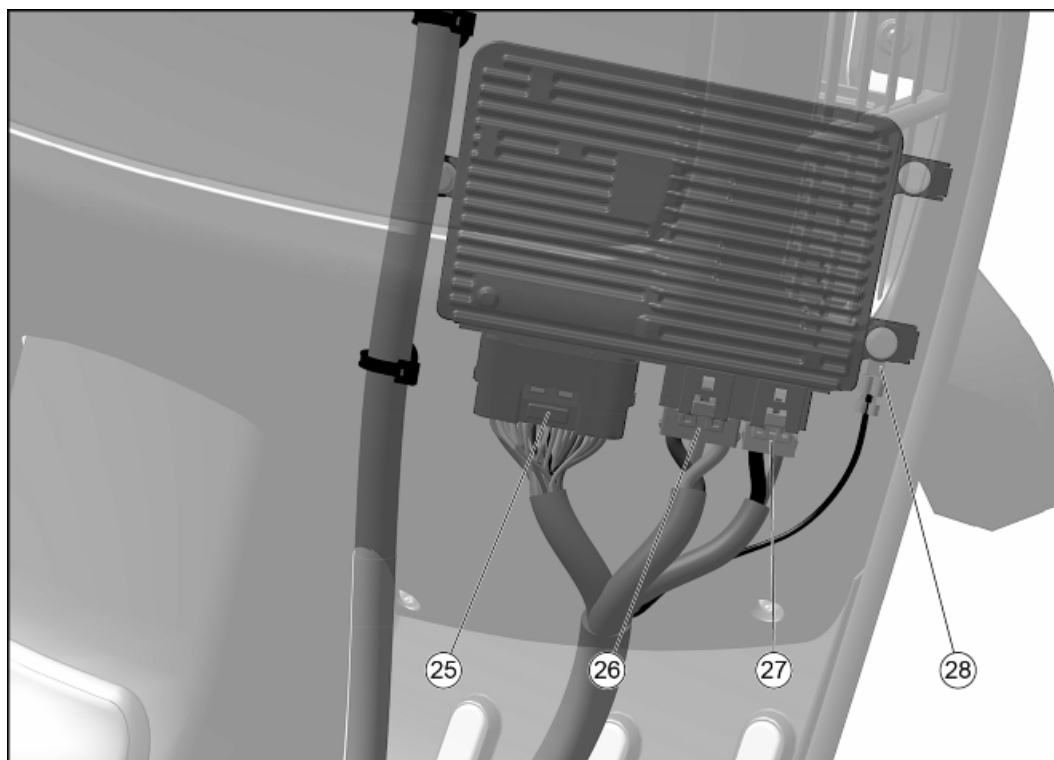
**RIGHT LEG SHIELD BACK PLATE COMPONENTS LAYOUT**

No.	Component
11	Antenna for Immobilizer
12	Horn
13	Accessories pre-installation junction
14	Bike-Finder Device
15	Right front light cluster
16	Intake air pressure sensor

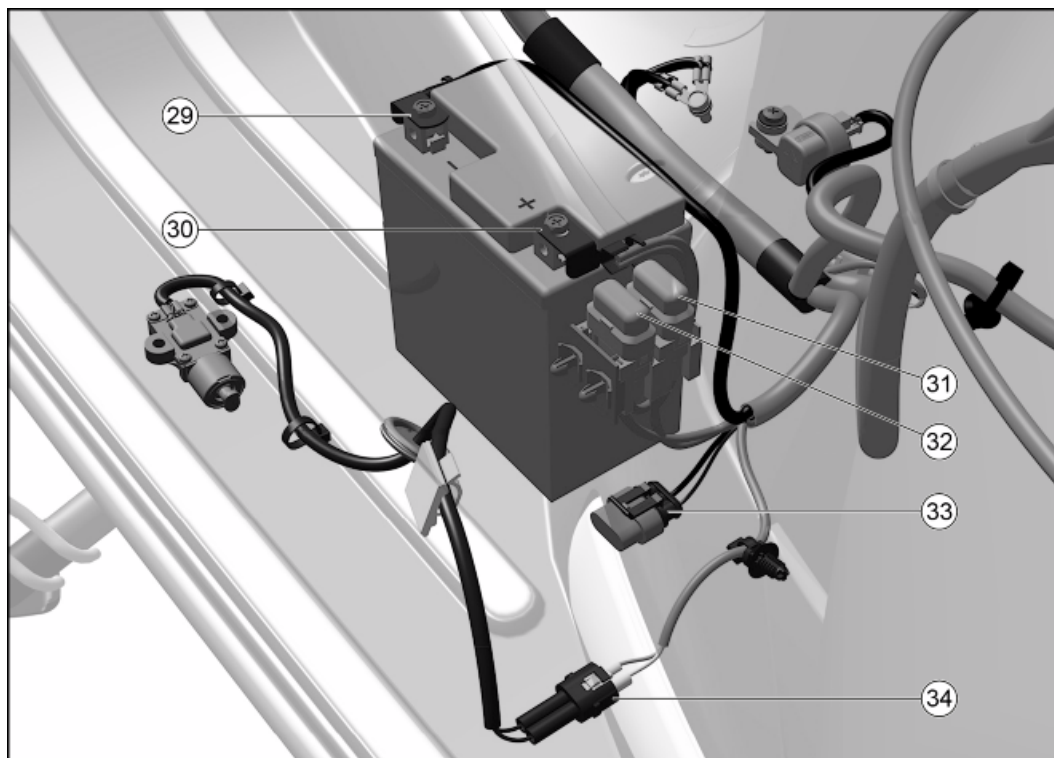


LEFT LEG SHIELD BACK PLATE COMPONENTS LAYOUT

No.	Component
17	Left front light cluster
18	ABS control unit
19	Front wheel ABS sensor
20	Flasher device
21	Ignition switch
22	Saddle opening switch
23	Fuse box
24	USB port

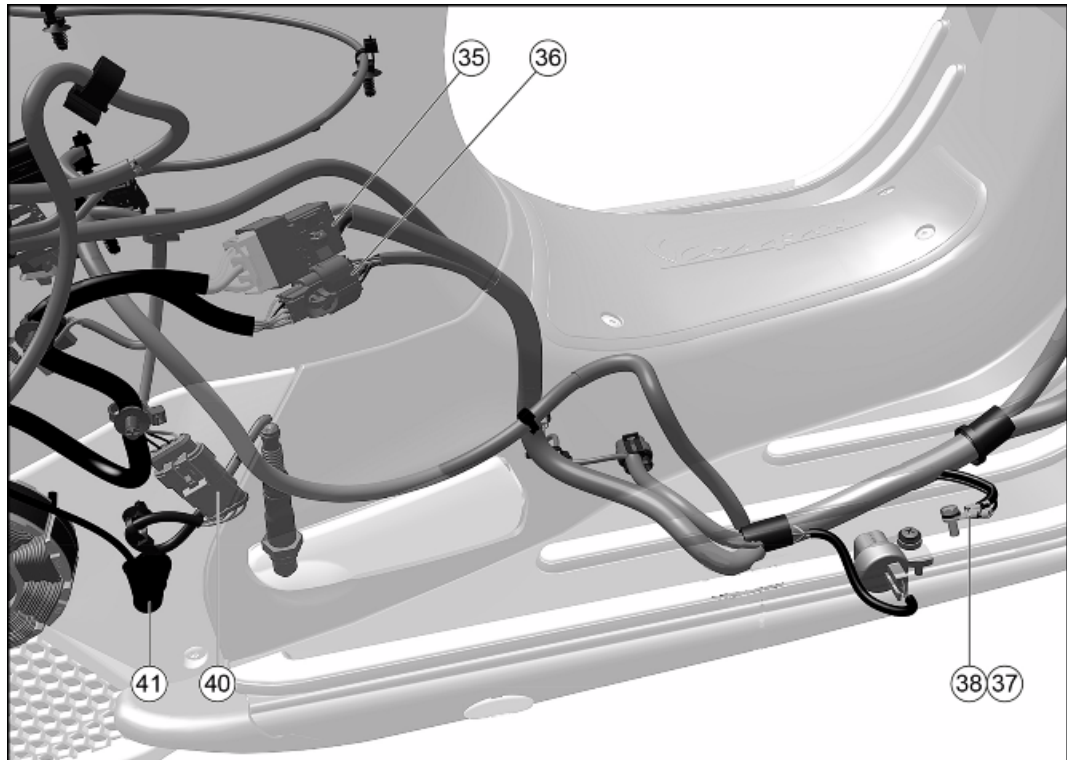
**R.I.S.S. CONTROL UNIT COMPONENTS LAYOUT**

No.	Component
25	RISS control unit - connector C
26	RISS control unit - connector B
27	RISS control unit - connector A
28	RISS control unit ground point



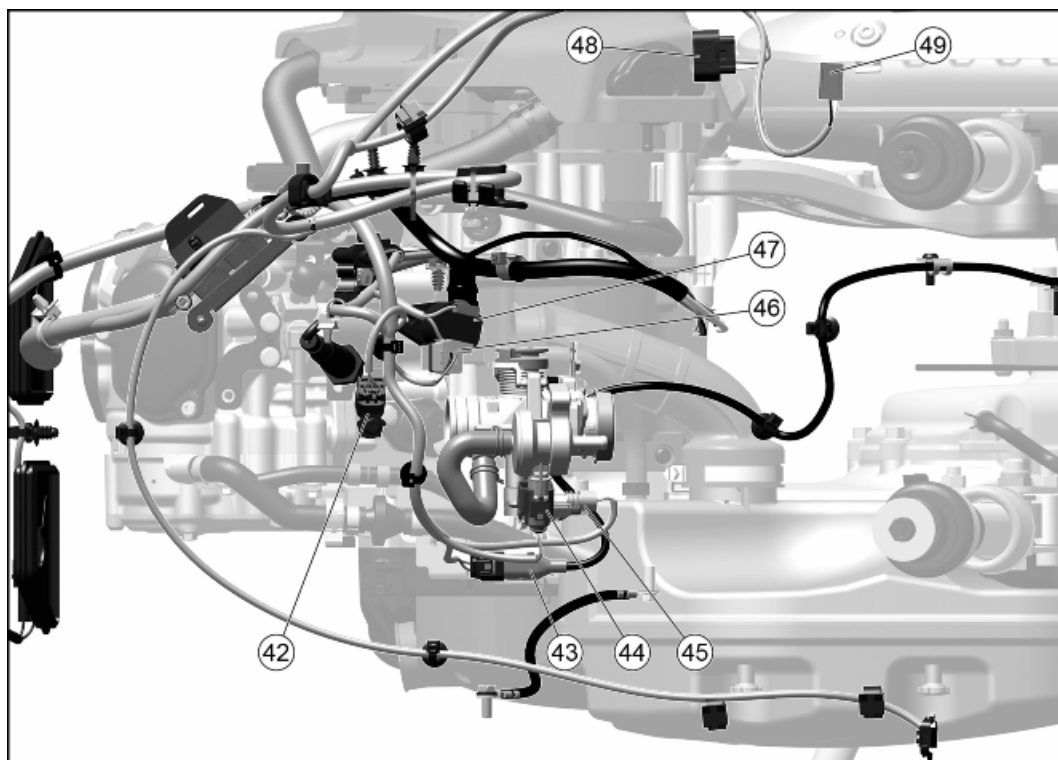
LEFT SIDE FOOTBOARD COMPONENTS LAYOUT

No.	Component
29	Negative battery pole
30	Positive battery pole
31	RISS control unit fuse
32	Main fuse
33	OBD diagnosis connector
34	Stand switch

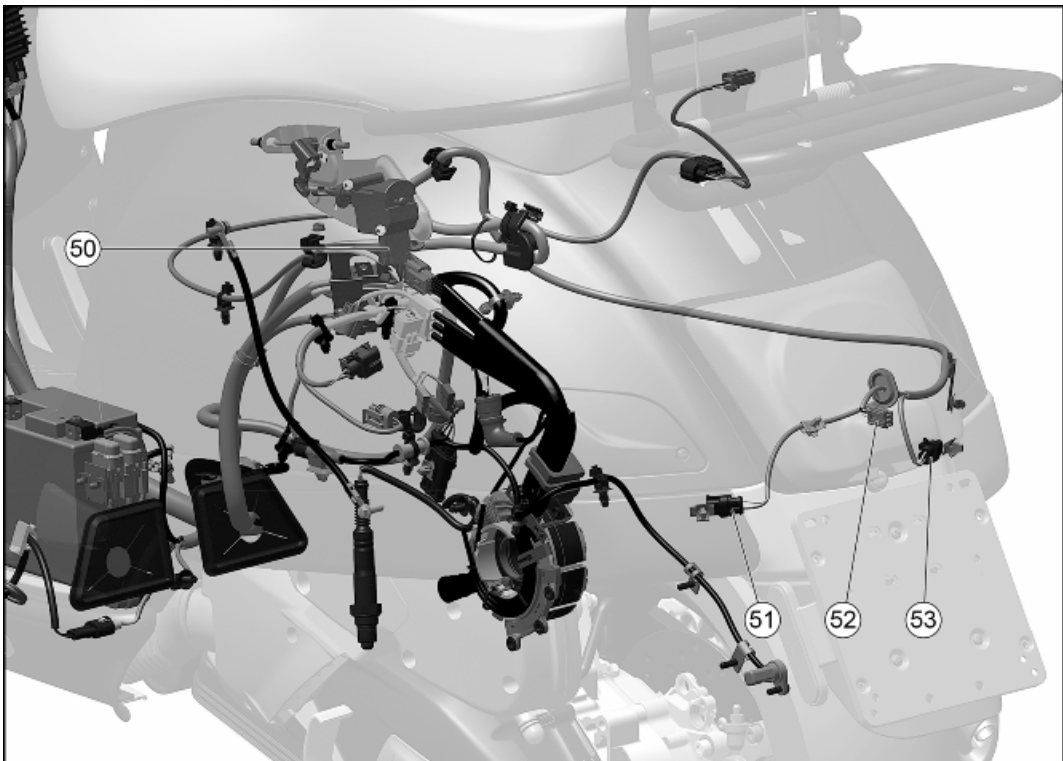


DISPOSIZIONE COMPONENTI PEDANA LATO DESTRO

Num.	Componente
35	Magneto flywheel - connector A
36	Magneto flywheel - connector B
37	battery ground point
38	Chassis/engine ground point
40	Lambda probe
41	Engine oil pressure sensor

**ENGINE COMPONENTS LAYOUT**

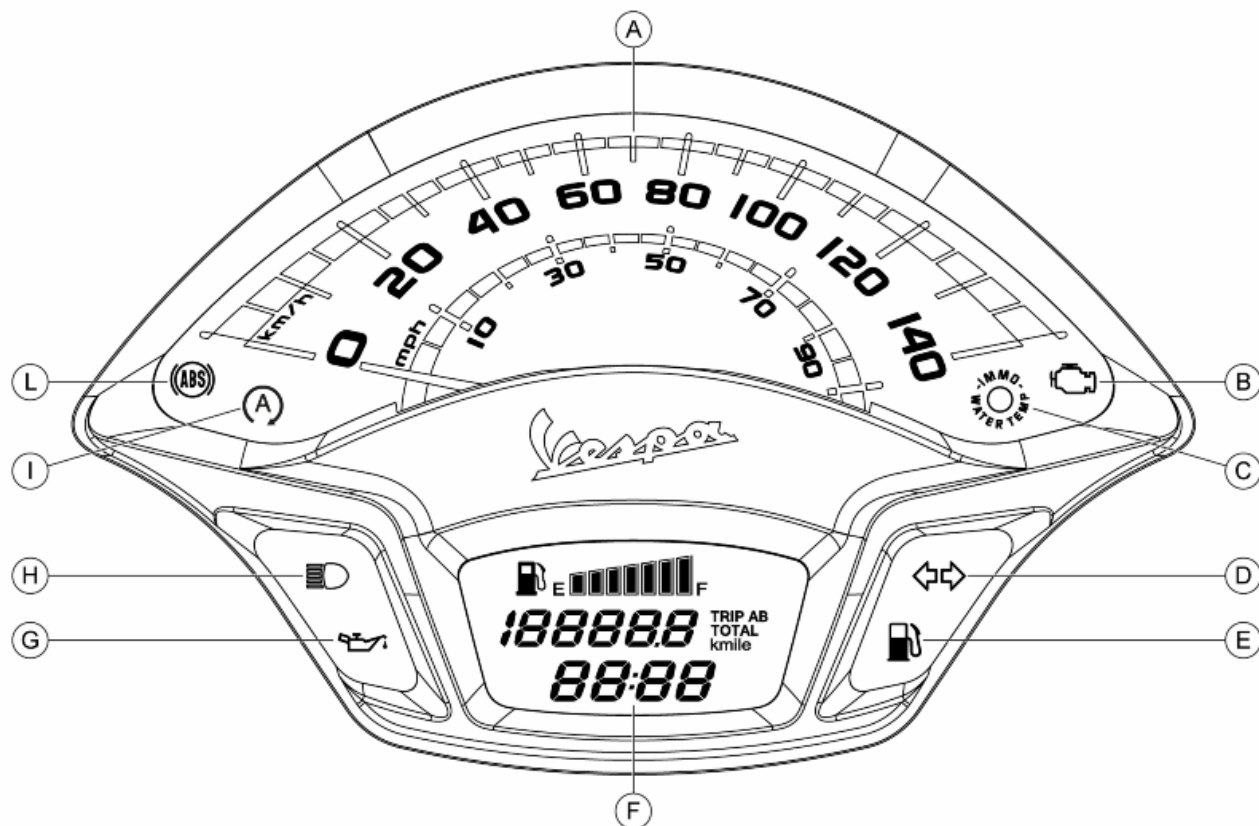
No.	Component
42	Injector
43	Rear wheel ABS sensor
44	Engine idle control solenoid valve
45	Throttle position sensor
46	Engine water temperature sensor
47	Ignition coil
48	Electric fuel pump
49	Fuel level sensor



REAR PART COMPONENTS LAYOUT

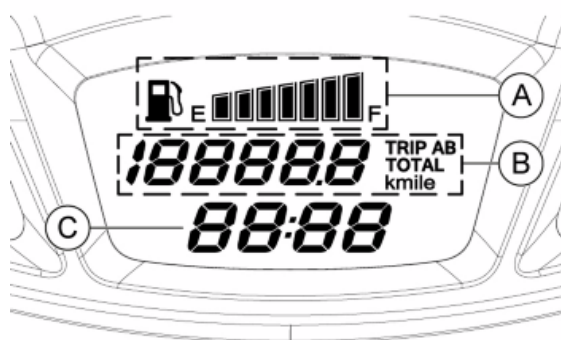
No.	Component
50	Saddle opening motor
51	Rear left turn indicator
52	Taillight
53	Rear right turn indicator

Instrument panel



- A = Speedometer
- B = Engine control warning light
- C = Immobilizer / Engine temperature warning lamp
- D = Turn indicator warning light
- E = Low fuel warning light
- F = Digital display
- G = Low engine oil pressure warning light
- H = High beam warning light
- I = Start&Stop indicator light
- L = ABS indicator light

- A = Fuel gauge with fuel pump symbol
- B = Total and trip odometer/Km-miles
- C = Clock



When the ignition switch is turned to **ON**, all the functions of the digital display illuminate for a few seconds.

MULTIFUNCTION INDICATOR B

Press the **MODE** button briefly to cycle through the following indicator modes:

- Total Odometer (TOTAL)
- Trip odometer A (TRIP A)
- Trip odometer B (TRIP B)



To reset the trip odometers, select **TRIP A** or **TRIP B** then press and hold the **MODE** button. Press and hold the **MODE** button while in **TOTAL** odometer mode to access clock setting mode.

N.B.

THE FOLLOWING ARE DEFINED WHEN NAVIGATING THE DISPLAY:

- «BRIEF PRESS»: A PRESS OF THE INDICATED BUTTON, FOR A PERIOD OF LESS THAN TWO SECONDS;
- «PROLONGED PRESS»: A PRESS OF THE INDICATED BUTTON, FOR A PERIOD OF MORE THAN TWO SECONDS.

SELECTING KM OR MILES AS UNIT OF MEASUREMENT B

Press the **MODE** briefly to cycle through the modes and select **TOTAL** odometer mode, then turn the ignition switch to **OFF**.

Turn the ignition switch to **ON** while pressing and holding the **MODE** button.

Release the **MODE** button for 2 to 4 seconds.

WARNING

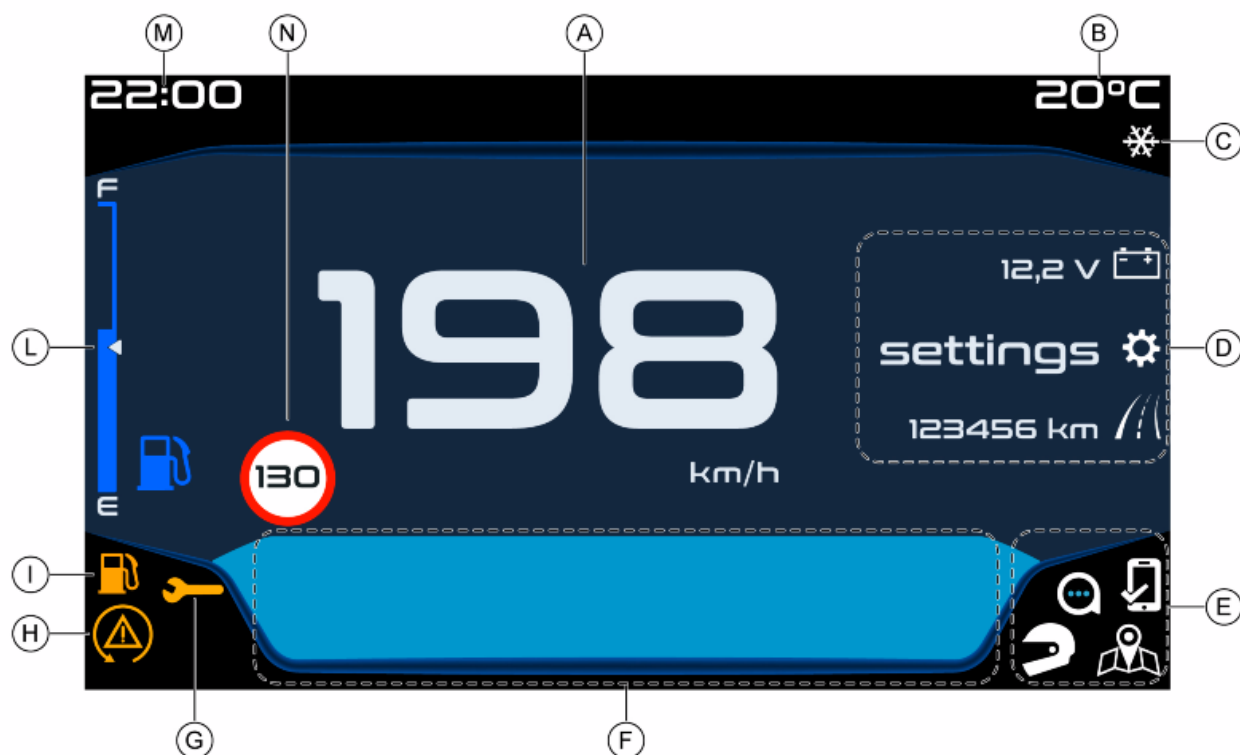
TO CHANGE FROM "KM" A "MILE" IT IS NECESSARY TO SET THE MULTIFUNCTION INDICATOR TO TOTAL ODOMETER (TOTAL).

CAUTION



FOR SAFETY, THIS SELECTION PROCEDURE IS ONLY PERMITTED AT A VEHICLE SPEED OF 0 KM/H.

FOR SUPERTech VERSION

**Key:**

A = Speedometer

B = Ambient temperature indicator

C = Ice hazard icon

D = Multifunctional panel

E = "Vespa MIA" icon panel

F = Graphics ad infotainment panel

G = Maintenance icon

H = ASR warning light

I = Reserve fuel tank warning light

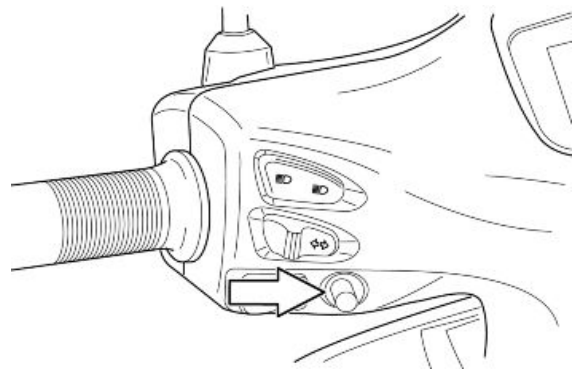
L = Fuel gauge

M = Clock (12h or 24h)

N = Speed limit indicator via navigation system

By turning the ignition switch to "ON" position and then to "OFF" position, the digital display will show a "Welcome" and "Good bye".

The **MODE** joystick allows the cyclic display of the information shown on the multifunction panel of the digital display. It also allows navigation in the «**settings**» menu and setting various parameters. This is possible by pressing or moving the joystick in the four directions with short or long presses.



N.B.



"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 0.5 SECONDS;
 "PRESS AND HOLD": PRESS THE BUTTON AND HOLD FOR AT LEAST 2 SECONDS.

MAINTENANCE ICON

This function indicates the scheduled maintenance interventions. For each time the key is turned to "**ON**", once the instrument panel has performed the initial check, if the value of the remaining kilometres until the next intervention is less than 300 Km (186.41 mi), the indicated icon will flash for 5 seconds. When the service mileage is reached, with each key "**ON**", the icon remains switched on steady until it is reset after the service operations are carried out.



MAINTENANCE ICON RESET

To reset the maintenance icon, proceed as follows:

- Turn the ignition switch to "**ON**";
- Briefly press the MODE joystick upward or downward until the "**Battery charge state**" function is displayed at the centre of the digital display.

N.B.



"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 0.5 SECONDS;
 "PRESS AND HOLD": PRESS THE BUTTON AND HOLD FOR AT LEAST 2 SECONDS.



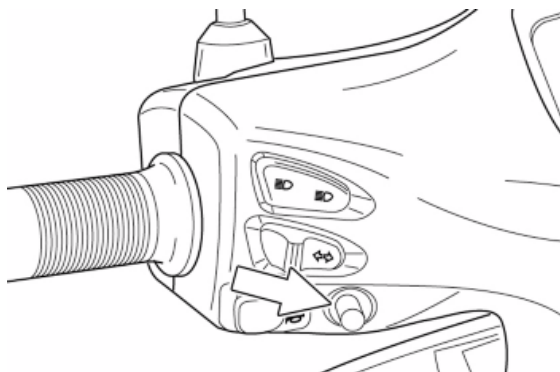
- Press and hold the MODE button for at least 10 seconds but not more than 15 seconds. Upon releasing it, the maintenance icon switches off.

If the MODE joystick is released without waiting 10 seconds, the maintenance icon will not switch off and the service interval counter will not be reset.

CAUTION



THE MAINTENANCE ICON RESET PROCEDURE MAY ONLY BE PERFORMED WHEN THE VEHICLE IS AT A STANDSTILL (SPEED = 0 Km/h).



AMBIENT TEMPERATURE INDICATION

Each time the key is turned to "ON", the digital display will show the ambient temperature in °C or in °F.

If the ambient temperature is less than 3°C (37.4°F), the digital display indicates with the specific symbol the potential presence of ice on the road.

In such conditions, it is recommended to drive carefully. To select the desired unit of measurement, enter the «**settings**» menu as described below.



MULTIFUNCTIONAL PANEL

The multifunctional panel displays the following information cyclically, by briefly pressing the MODE joystick upward or downward:

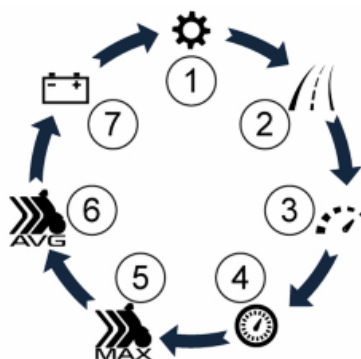
N.B.



"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 0.5 SECONDS;
"PRESS AND HOLD": PRESS THE BUTTON AND HOLD FOR AT LEAST 2 SECONDS.



1. Settings
2. Total odometer
3. Trip odometer
4. Trip time
5. Maximum speed
6. Average speed
7. Battery charge state

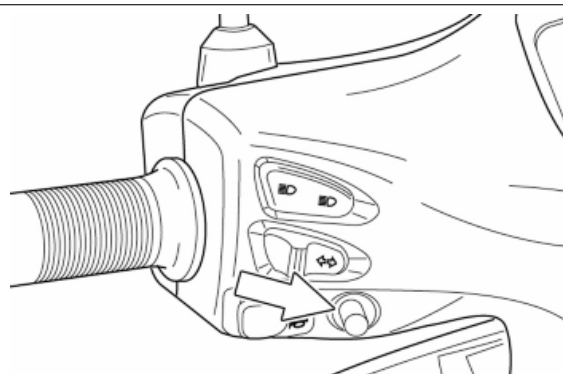
**WARNING**

THE "SETTINGS" FUNCTION CAN ONLY BE ACCESSED WITH THE VEHICLE AT A STANDSTILL.

While displaying one of the following functions:

- partial odometer
- trip time
- maximum speed
- average speed

by holding the MODE joystick pressed toward the **CENTRE**, all values are reset.

**SETTINGS MENU**

When the vehicle is at a standstill, briefly press the joystick up or down several times to display the «**settings**» function at the centre of the multifunctional panel. The «**settings**» menu can be accessed with a prolonged press on the central button of the joystick .



Briefly press the joystick up or down to highlight the desired function, with a short press on the central button of the joystick, you can select:

- Language
- Configuration
- Backlight
- Graphic



LANGUAGE SETTING

Briefly press the joystick up or down to highlight the desired function. Select the desired language via a short press on the central button of the joystick. The selection excludes the others.

Language	
Italian	ON
English	OFF
French	OFF
German	OFF
Spanish	OFF
Exit	

CONFIGURATION MENU

Highlight the «**Configuration**» function via a short press on the central button of the joystick; enter the menu where it is possible to configure:

- Clock
- Measurement Units (Units)
- Pairing configuration

SETTINGS	
Language	
Configuration	
Backlight	
Graphic	
Exit	

CLOCK SETTING (CLOCK)

Highlight the "Clock" function via a short press on the central button of the joystick and enter the menu.

CAUTION



FOR SAFETY, THE CLOCK SETTING FUNCTION IS ONLY AVAILABLE AT A VEHICLE SPEED OF 0 KM/H.

WARNING



DISCONNECTING THE BATTERY CABLES WILL RESULT IN A RESET OF THE CLOCK

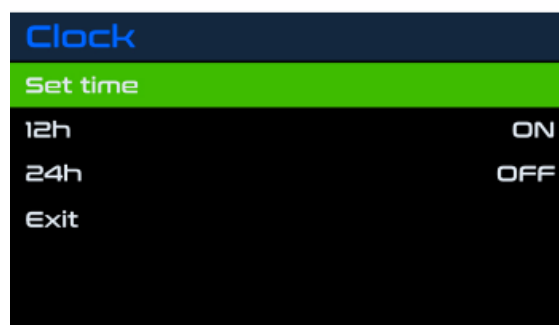
Configuration	
Clock	
Units	
Pairing configuration	
Exit	

Select the desired format between 12h or 24h.

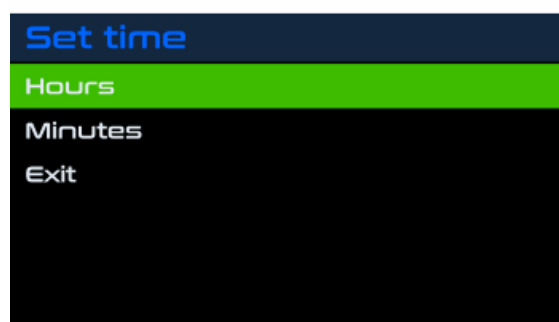
The selection excludes the others.

Clock	
Set time	
12h	ON
24h	OFF
Exit	

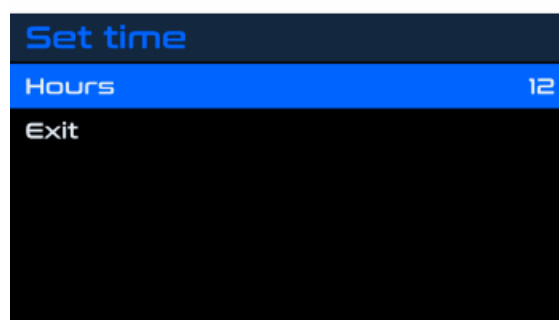
Highlight the "**Set time**" function via a short press on the central button of the joystick and enter the menu.



Highlight the "**Hour**" function. Via a short press on the central button of the joystick, enter the menu.



Briefly press the joystick up or down to set the correct hour. Briefly press the joystick central button to confirm. The green bar confirms the selection.



Highlight the "**Minutes**" function. Via a short press on the central button of the joystick, enter the menu.



Briefly press the joystick up or down to set the correct minutes. Briefly press the joystick central button to confirm. The green bar confirms the selection.



MEASUREMENT UNITS MENU (UNITS)

Highlight the "Units" function via a short press on the central button of the joystick and enter the menu where it is possible to configure:

- Speed
- Temperature



SETTING THE SPEED UNIT OF MEASUREMENT (SPEED)

Highlight the "Speed" function. Via a short press on the central button of the joystick, enter the menu.

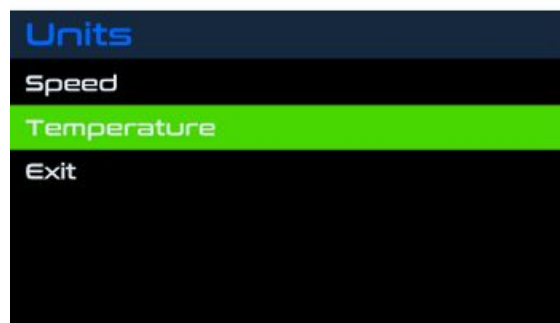


Select the desired format between Km/h or mph. The selection excludes the others.



SETTING THE TEMPERATURE UNIT OF MEASUREMENT (TEMPERATURE)

Highlight the "**Temperature**" function. Via a short press on the central button of the joystick, enter the menu.



Select the desired format between °C or °F. The selection excludes the others.



VMP MULTIMEDIA SYSTEM - VESPA MIA

Download and install on your smartphone the specific "**Vespa**" app from Play Store or Apple Store.



PAIRING CONFIG. MENU (PAIRING CONFIGURATION)

The vehicle is equipped with the "**Vespa MIA**" control unit that communicates with the smartphone via Bluetooth. Using the specific "**Vespa**" application installed on the smartphone, it is possible to exchange data with the vehicle and manage multimedia contents. Once a connection is established correctly between the control unit and the smartphone, the following functions can be directly managed by the digital display of the vehicle:

- manage phone calls;
- manage audio playback;



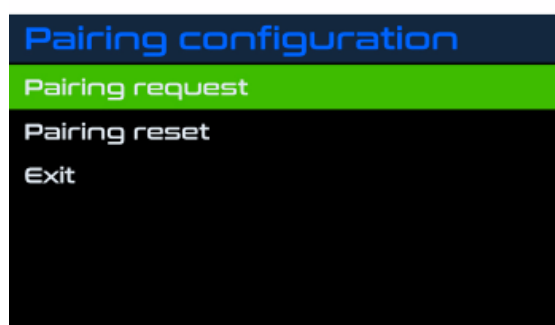
- SMS notifications management;
- GPS navigation.

Highlight the "**Pairing configuration**" function.

Via a short press on the central button of the joystick, enter the menu.



Highlight the "**Pairing request**" function and briefly press the central button of the joystick.



The digital display shows the message confirming that pairing with the smartphone is enabled. Enable the bluetooth search on your smartphone, select the "**BT-ROUTER**" device, and, if required, type the password "0000" and press on pair.



The smartphone will display the "**BT-ROUTER**" device in the associated devices list. Wait for the digital display to automatically connect the smartphone. **Do NOT force the connection from the telephone.** The smartphone icon on the display indicates active communication. **When requested, allow phone book and notifications sharing.** These authorizations are required to display the caller's name and the SMS reception notification on the display.



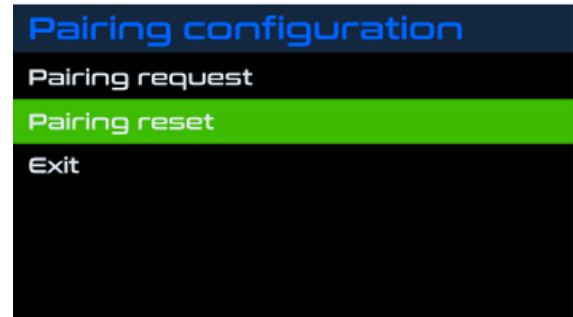
N.B.

UPON THE FIRST PAIRING BETWEEN THE DISPLAY AND SMARTPHONE, MORE TIME MAY BE REQUIRED FOR THE SYNCHRONIZATION OF THE PHONE BOOK. THE SUCCESSFUL CONNECTION BETWEEN THE SMARTPHONE AND VEHICLE WILL BE INDICATED BY THE SMARTPHONE ICON LIGHTING UP ON THE DISPLAY.

If the association between the smartphone and the vehicle is not successful, proceed as follows:

- restart the smartphone;
- turn the ignition key to "OFF" and then to "ON"; wait until the animation on the display ends.

If the smartphone icon on the display has not lit after about 1 minute, select the **"Pairing reset"** function and briefly press the central button of the joystick.



All stored Bluetooth devices are deleted from the **"Vespa MIA"** system.

The display shows the message confirming the deletion. The smartphone pairing procedure can be repeated.

N.B.

PLEASE NOTE THAT TO CONNECT THE APP TO THE VEHICLE AGAIN, THE FOLLOWING WILL BE NECESSARY:

- ON IOS, DELETE THE PREVIOUSLY INSTALLED APP AND REINSTALL IT.
- ON ANDROID IT WILL BE NECESSARY AND SUFFICIENT TO DELETE THE APPLICATION DATA FROM THE APP MANAGEMENT MENU (THIS WILL RESET THE APPLICATION TO DEFAULT SETTINGS AND IT WILL BE NECESSARY TO PERFORM THE LOGIN AND THE FIRST CONNECTION TO THE VEHICLE AGAIN).
- IN CASE OF CONNECTION TO A NEW VEHICLE, IT IS NECESSARY TO REMOVE THE PREVIOUS BT-ROUTER FROM THE ASSOCIATED DEVICES.

N.B.

IT IS RECOMMENDED TO ASSOCIATE MAXIMUM N. 2 SMARTPHONES AND 1 HEADSET TO THE SAME VEHICLE, TO OPTIMIZE THE SYSTEM OPERATION. IF TWO SMARTPHONES ARE PAIRED, THE CONNECTION OF THE FIRST SMARTPHONE PAIRED WITH THE "BT-ROUTER" COULD REQUIRE MORE THAN 30 SECONDS. ONCE THE SMARTPHONE IS CONNECTED TO THE "BT-ROUTER", THE OPERATING SYSTEM REQUIRES ACCESS TO THE PHONE BOOK AND NOTIFICATIONS; ACCEPT TO BE ABLE TO VIEW THE NAME OF THE CALLERS AND THE SMS RECEIPT NOTIFICATIONS ON THE DISPLAY.



CONNECTION BETWEEN THE APPLICATION AND THE DIGITAL DISPLAY

Open the "**Vespa**" app on the smartphone and register your account according to the instructions. Select "**allow**" for the location and notification requests.



On the application's main page select "**Connect**". Select your vehicle model; the digital display will show the icon of the "**Vespa**" app, confirming the successful activation of the communication between the app and Vespa.

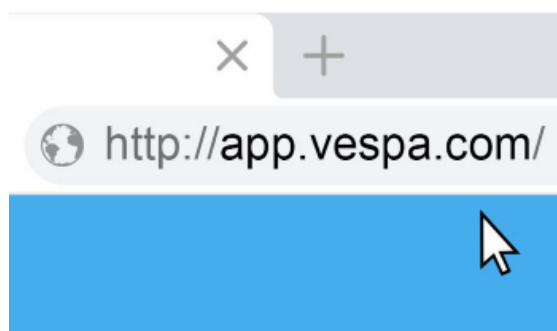


For specific information about the pairing of the "Vespa MIA" system and for any differences in the procedure depending on the type of smartphone used, please refer to the user manual included in the "Vespa" app.

Please note that the installation and connection of the app are **ESSENTIAL** for using the system.

The app manual with specific information for using the system is available by visiting the site

<http://app.vespa.com/>



BLUETOOTH HEADSET PAIRING

The multimedia functions can be used with the MODE joystick, by pairing a bluetooth headset with the digital display via the "**Vespa**" application. After pairing, it will be possible to answer or reject calls, activate voice commands and manage the music on the smartphone.

Activate the **"pairing"** mode of the bluetooth headset to be paired (refer to the instructions of the device). Press the Bluetooth icon on the main screen of the **"Vespa"** application and search for new devices until the headset is displayed. Select the bluetooth headset, check the **"Hands-free / Driver headset"** option and press **"Pair"**. The successful pairing is indicated by the headset icon displayed on the digital display.

If the pairing is not successful, perform a new search.



No multimedia function can be managed from the handlebar of the vehicle if there is no bluetooth headset, or if the headset is directly connected to the smartphone. **The bluetooth headset can be associated to the vehicle only via the "Vespa" application and it must be connected to the vehicle in order to correctly use the multimedia functions of the system. For this reason, the headsets that automatically connects to the smartphone are not compatible (Ex: Apple Air-pod).**



Required operation for iOS 10.0 versions or higher

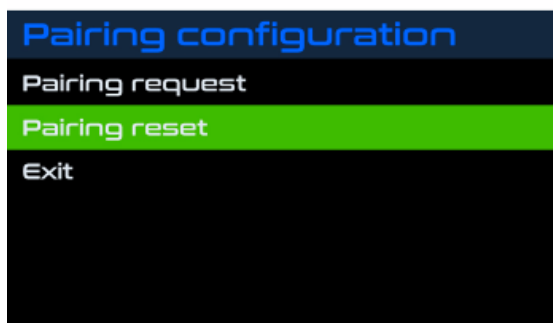
If the **"BT-ROUTER"** does not automatically require access to notifications, it will be necessary to proceed as follows:

- Enter the menu: "Settings" > "Bluetooth" > "Telephone devices";
- select "BT-ROUTER", select "Info", enable the options manually;
- for iOS systems, the SMS notifications will be enabled starting from the moment in which the ignition key is turned to "ON", AFTER the one in which the options have been manually enabled.

If it is necessary to disconnect the smartphone, proceed as follows. Highlight the '**Pairing reset**' function and briefly press the central button of the joystick.

N.B.

THIS OPERATION IS NECESSARY WHEN THE SMARTPHONE IS REPLACED.

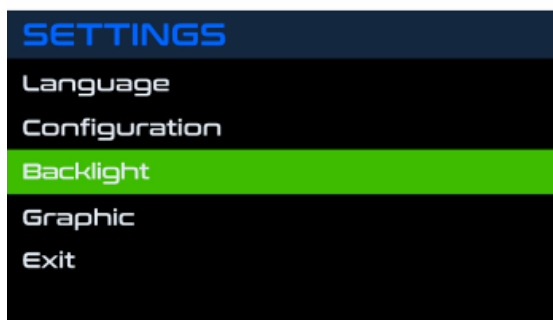


All stored Bluetooth devices are deleted from the "**Vespa MIA**" system. The display shows the message confirming the deletion. The pairing procedure can be repeated for a new smartphone.

**BACKLIGHT MENU (BACKLIGHT)**

Highlight the "**Backlight**" function via a short press on the central button of the joystick and enter the menu where it is possible to configure:

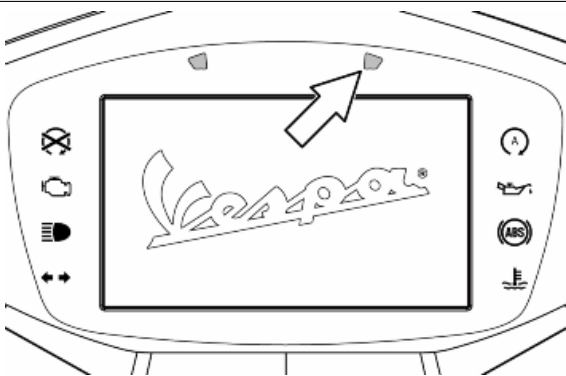
- Backlight mode: Automatic, Day, Night
- Brightness level (Settings)



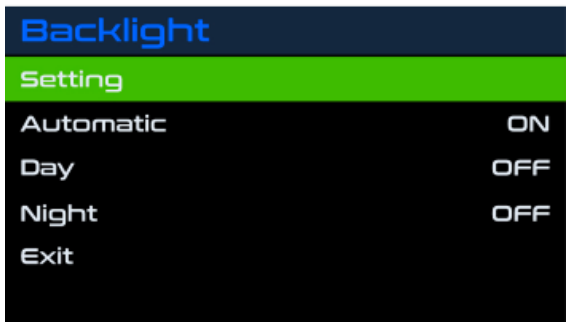
Briefly press the joystick up or down to highlight the desired function. Confirm the selected option with a short press of the central button of the joystick. The selection excludes the others.



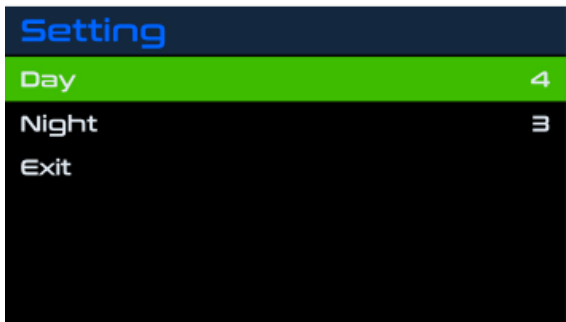
The **"Automatic"** option allows automatic switching between the day and night graphics depending on the light detected by the brightness sensor located on the instrument panel.



Highlight the **"Setting"** function. Via a short press on the central button of the joystick, enter the menu.



Highlight the **"Day"** function. Via a short press on the central button of the joystick, enter the menu. The default value is 4.



Briefly press the joystick up or down to set the desired brightness level. Briefly press the joystick central button to confirm. The green bar confirms the selection.



Highlight the "**Night**" function. Via a short press on the central button of the joystick, enter the menu. The default value is 3.



Briefly press the joystick up or down to set the desired brightness level. Briefly press the joystick central button to confirm. The green bar confirms the selection.

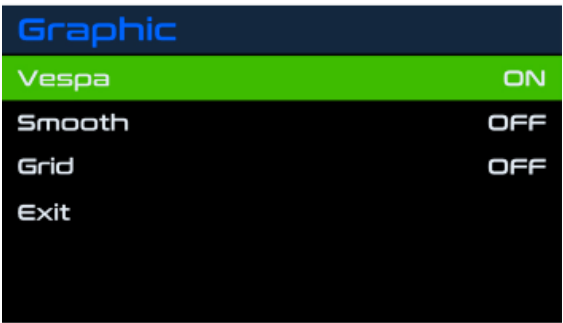


GRAPHIC MENU (GRAPHIC)

Highlight the "**Graphic**" function with a short press of the central button of the joystick. Via a short press on the central button of the joystick, enter the menu.



Various background graphics can be selected for the digital display. Briefly press the joystick up or down to highlight the desired function. Confirm the selected option with a short press of the central button of the joystick. The selection excludes the others.



"VESPA MIA" SYSTEM MESSAGES

The "**Vespa MIA**" system communicates with the user by means of messages displayed on the graphic panel of the digital display. Depending on the message type, the graphic panel shows the icon, colours and the specific message. The image on the side shows:

- Text alarms;
- Caution messages;
- Information messages.



N.B.



JOYSTICK COMMANDS ARE IGNORED WHEN A POPUP WINDOW IS ACTIVE ON THE DISPLAY. THE POPUP WINDOW MUST BE CLEARED FROM THE DISPLAY TO RESTORE NORMAL OPERATION WITH A PROLONGED PRESS ON THE CENTRAL BUTTON OF THE JOYSTICK.

PHONE CALLS AND SMS MESSAGES MANAGEMENT

To use phone features, view caller notifications and identifiers, it is necessary to:

- pair the smartphone with the "**Vespa MIA**" system via bluetooth, as previously described;
- install and access your "**Vespa**" application account on the smartphone;
- pair a bluetooth headset with the «**Vespa MIA**» system using the "**Vespa**" application;
- allow the address book and notifications sharing during the Bluetooth pairing of the smartphone with the "**Vespa MIA**" system.

The corresponding three icons are shown on the digital display. Please note that on iOS systems the message notifications will be displayed **ONLY** at the second connection of the smartphone to the vehicle.



N.B.

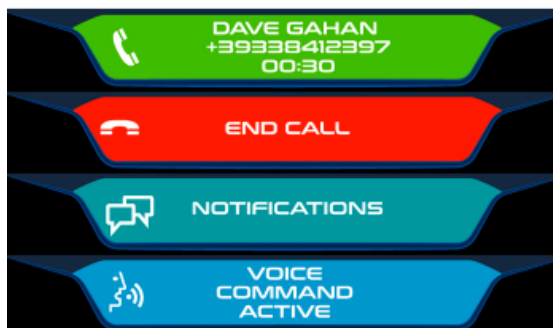


WHEN A SMARTPHONE CONNECTS WITH THE VESPA MIA SYSTEM (BT-ROUTER), AUDIO IS AUTOMATICALLY ROUTED TO THE VESPA MIA SYSTEM.

IF THERE IS NO HEADSET CONNECTED TO THE "VESPA MIA" SYSTEM, THE AUDIO FUNCTION OR MUSIC PLAYBACK CANNOT BE MANAGED, THEREFORE THE SMARTPHONE AUDIO MUST BE MANUALLY ROUTED TO THE DESIRED DEVICE (e.g. SPEAKERS/TELEPHONE MICROPHONE).

The following information appears on the digital display:

- call in progress;
- call ended;
- SMS, email, generic notification;
- active vocal management.



Use the MODE joystick for phone call management, as indicated in the table:

MODE JOYSTICK FUNCTIONS FOR PHONE CALL MANAGEMENT

Specification	Desc./Quantity
Accept incoming call	CENTRAL BUTTON BRIEF PRESS
End an active call	CENTRAL BUTTON LONG PRESS
Reject incoming call	CENTRAL BUTTON LONG PRESS
Cancel outgoing call	CENTRAL BUTTON LONG PRESS
Clear most recent missed call popup (with NO call in progress)	CENTRAL BUTTON BRIEF PRESS
Redial last missed call number (with NO call in progress)	CENTRAL BUTTON LONG PRESS
Increase volume (with call in progress)	BRIEF UPWARD PRESS
Lower volume (with call in progress)	BRIEF DOWNWARD PRESS
Enable/disable voice command	SHORT DOUBLE CENTRAL PRESS

MUSIC PLAYBACK MANAGEMENT

To use the functions of the music player, the following must be performed:

- pair the smartphone with the "Vespa MIA" system via bluetooth, as previously described;
- install and access your "Vespa" application account on the smartphone;
- pair a bluetooth headset with the «Vespa MIA» system using the "Vespa" application.

The corresponding three icons are shown on the digital display.

N.B.



WHEN A SMARTPHONE CONNECTS WITH THE VESPA MIA SYSTEM (BT-ROUTER), AUDIO IS AUTOMATICALLY ROUTED TO THE VESPA MIA SYSTEM. IF THERE IS NO HEADSET CONNECTED TO THE "VESPA MIA" SYSTEM, THE AUDIO FUNCTION OR MUSIC PLAYBACK CANNOT BE MANAGED, THEREFORE THE SMARTPHONE AUDIO MUST BE MANUALLY ROUTED TO THE DESIRED DEVICE (e.g. SPEAKERS/TELEPHONE MICROPHONE).



The following information appears on the digital display:

- track playback;
- playback paused;
- playback suspended;
- forward (or reverse) track scrolling.

WARNING



A PLAYLIST MUST B OPENED FROM THE SMARTPHONE BEFORE STARTING YOUR TRIP OR THROUGH VOCAL COMMANDS IF YOU ARE TRAVELLING.



Use the MODE joystick for music playback management, as indicated in the table:

MODE JOYSTICK FUNCTIONS FOR MUSIC MANAGEMENT

Specification	Desc./Quantity
Music playback/pause	CENTRAL BUTTON BRIEF PRESS
Increase audio volume (with audio playback in progress)	BRIEF PRESS UPWARD
Lower audio volume (with audio playback in progress)	BRIEF PRESS DOWNWARD
Next music track	PRESS SELECTOR BRIEFLY TO THE RIGHT
Previous audio track	PRESS SELECTOR BRIEFLY TO THE LEFT
Exit audio playback mode	CENTRAL BUTTON LONG PRESS

GPS NAVIGATION

Combined with the "Vespa" application, the "Vespa MIA" system allows the display of GPS indications on the digital display. By means of pictograms, distance and travel time data, the desired destination can be reached.

Refer to the navigation guide by accessing the "Vespa" application with your account. After setting the destination address and navigation is started, the navigation icon is shown on the digital display..

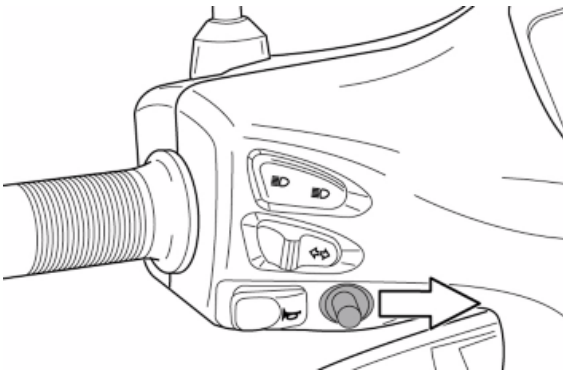


By holding the MODE joystick pressed to the RIGHT, the GPS indications screen in accessed. During navigation, you can return to the instrument panel home screen at any time (and vice versa) while keeping the navigation active.

N.B.

BY SETTING THE DESTINATION ADDRESS VIA THE "VESPA" APPLICATION, THE DIGITAL DISPLAY AUTOMATICALLY DISPLAYS THE INDICATION SCREEN.

N.B.



"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 0.5 SECONDS;
 "PRESS AND HOLD": PRESS THE BUTTON AND HOLD FOR AT LEAST 2 SECONDS.



NAVIGATION SCREEN KEY

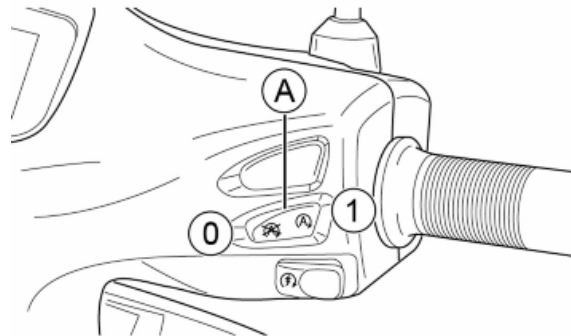
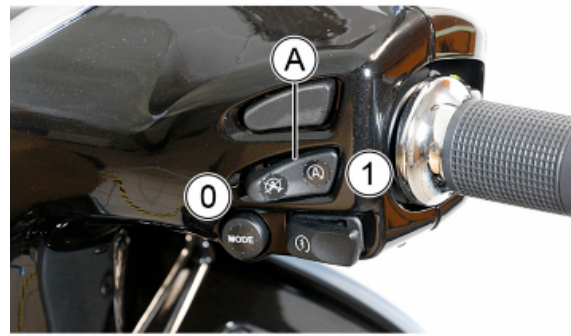
- A** = destination or next turn address;
- B** = indication following the next manoeuvre;
- C** = distance to the next manoeuvre;
- D** = remaining time until reaching the destination;
- E** = remaining distance until reaching the destination;
- F** = next manoeuvre indication;
- G** = distance related to indication "F";
- H** = exit number to follow at a roundabout;
- I** = indication regarding the speed limit on the road travelled;
- L** = indication regarding the current speed (tachometer).

Switches-Selectors-Buttons

START & STOP BUTTON

The vehicle is equipped with the "Start & Stop" function, which switches the engine off when the vehicle is stationary and restarts the engine automatically when needed to reduce fuel consumption and emissions.

Set button **A** of the "Start&Stop" function to **1** to activate the system; set to **0** to deactivate.



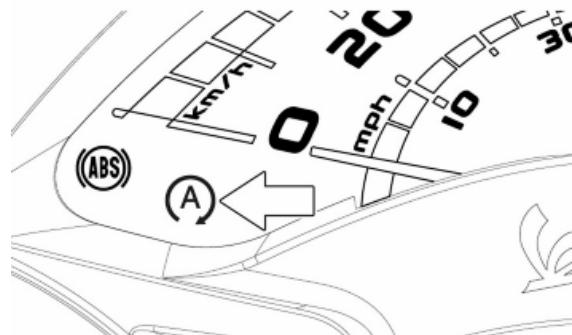
The following conditions must be met to enable activation of the "Start&Stop" on R.I.S.S. 3.0 engines:

1. If the side stand is lifted;
2. "Start&Stop" button «**A**» in position «**1**»;
3. engine running for approximately 15 minutes and coolant temperature approximately 40°C (104°F);
4. vehicle must have exceeded 10 km/h (6 mph) at least once since engine start; only once the engine has been automatically switched off by the Start & Stop function and subsequently restarted with the throttle grip, the speed threshold for the activation of the "Start&Stop" function changes to 5 km/h (3 mph);
5. state of charge of utilities battery at least 15% of nominal capacity.

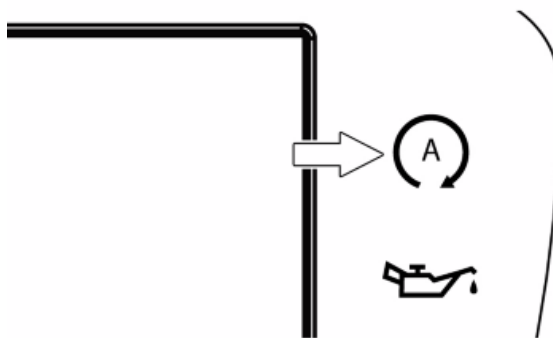
The relative indicator lamp on the instrument cluster illuminates when the "Start&Stop" function is active.

When the engine is running, the indicator lamp illuminates with the following modes:

- flashing rapidly, if the conditions for activation of the "Start&Stop" are not met or if the state of charge of the utilities battery is less than 15% of nominal capacity;



- lit steadily, when the "Start&Stop" function is active and operational;
- off, if the "Start&Stop" has been manually disabled by the user.
- flashing slowly, when the "Start&Stop" function is active and the engine has been switched off by the system in throttle closed state (e.g.: with vehicle stopped at a traffic light).



To restart the engine, simply turn the throttle grip; if the user turns the throttle grip sufficiently to start the engine but not to set off from a standstill, the "Start&Stop" function is temporarily disabled. The "Start&Stop" function will only be enabled again once the vehicle exceeds a speed of 5 km/h (3 mph).

N.B.

MULTIPLE, PROLONGED STOPS WITH THE HEADLIGHT ON MAY DRAIN THE BATTERY; IF THIS OCCURS, THE SYSTEM WARNS THE USER BY FLASHING THE START&STOP INDICATOR LAMP RAPIDLY. IN THIS SITUATION, THE TURNING OFF WITH "START&STOP" FUNCTION IS DISABLED, WHEN THE VEHICLE IS AT STANDSTILL UNTIL THE NECESSARY BATTERY STATE OF CHARGE IS REACHED.

N.B.

EXTENDING THE SIDE STAND AUTOMATICALLY DISABLES THE START&STOP FUNCTION; THE VEHICLE MAY STILL BE STARTED, HOWEVER, BY ACTING ON THE START BUTTON WHILE HOLDING ONE OF THE TWO BRAKE LEVERS.

N.B.

THE START&STOP FUNCTION IS AUTOMATICALLY DISABLED IF THE VEHICLE FALLS OVER; IN THIS CASE, STARTING THE ENGINE FROM THE START BUTTON IS ALSO DISABLED, AND THE IGNITION SWITCH MUST BE TURNED OFF AND ON AGAIN TO RE-ENABLE ENGINE START.

CAUTION



DO NOT LEAVE THE VEHICLE UNATTENDED WITH THE "START&STOP" FUNCTION ENABLED. IF ACTING ON THE THROTTLE GRIP, THE ENGINE COULD START SUDDENLY, EVEN WITH THE VEHICLE ON THE CENTRAL STAND.

WARNING



THE HEADLAMPS STAY ON AFTER THE ENGINE HAS BEEN TURNED OFF WITH THE "START&STOP" FUNC-

TION. THE BATTERY MAY DRAIN MAKING IT IMPOSSIBLE TO RESTART THE ENGINE. IN CASE OF LONG BREAK, TURN THE IGNITION KEY ALWAYS TO «OFF».

Checks and inspections

Immobiliser

The electronic ignition system is controlled by the injection electronic control unit with the integrated Immobilizer system. The immobilizer is an anti-theft system which allows the vehicle to work only if it is activated by means of the coded keys that the control unit recognises. The code is stored in a transponder installed in the body of the key. This allows the driver clear operation without having to do anything other than just turning the key.

The Immobilizer system consists of the following components: - injection electronic control unit. - immobilizer antenna - master key with built-in transponder - reserve key - diagnostic led on the instrument panel

The diagnosis LED also works as a theft-deterrent blinker. This function is activated every time the ignition switch is turned to the "OFF" position, or the emergency stop switch is turned to the "OFF" position. It remains activated for 48 hours in order not to affect the battery charge. When the ignition switch is turned to "ON", it interrupts the function of the Immobilizer lamp and a start enable lamp comes "ON". The length of time the lamp remains for depends on the control unit settings.

The diagnostic LED is normally mounted on the instrument panel and receives its power supply directly from the battery. It is controlled by the injection electronic control unit via a negative signal. If the LED is extinguished, irrespective of the position of the ignition switch and/or the instrument panel does not initialise, check: - that the emergency stop button functions correctly; - the connection line used to manage the diagnostic LED, between the injection electronic control unit and the instrument panel; - the connection line between the injection electronic control unit and the emergency stop switch.

NOTE: CONSULT THE SPECIFIC ELECTRICAL CIRCUIT DIAGRAM FOR THE VEHICLE WHEN CARRYING OUT THE FOLLOWING OPERATIONS

Emergency stop button check

1. Disconnect the emergency stop button electrical connector and carry out a continuity check on the connection lines to the injection electronic control unit; 2. Carry out a continuity check on the connection line between emergency stop button and ground. 3. Using a multimeter, check that the emergency stop button functions correctly; connect the terminals of the multimeter between the two pins on the switch that are connected to ground and the injection electronic control unit. Press the button and check that it functions correctly.

Electronic injection control unit check

1. Disconnect the connector from the injection electronic control unit. 2. Make sure that the connection line between the injection electronic control unit and the instrument panel (diagnostic LED management

line) is not shorted to the battery. 3. Carry out a continuity test on the connection line between the injection electronic control unit and the instrument pane (diagnostic LED management line).

If no faults are found, replace the injection electronic control unit.

Instrument panel check

1. Disconnect the instrument panel electrical connector. 2. Make sure that the connection line between the injection electronic control unit and the instrument panel (diagnostic LED management line) is not shorted to the battery. 3. Carry out a continuity test on the connection line between the engine electronic control unit and the instrument pane (diagnostic LED management line).

If no other faults are found, replace the instrument panel.

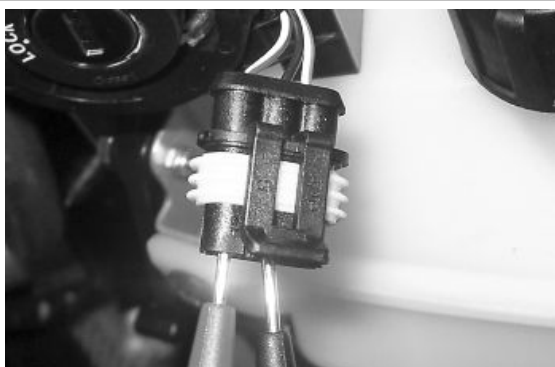
After removing the leg shield back plate, remove the electrical connection from the antenna as shown in the picture.



Remove the protective base from the connector.



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



Virgin circuit

When the ignition system is not encoded, any key can operate the engine limited to 2,000 rpm. The keys can only be recognised if the control unit has been programmed properly.

The memorisation procedure of a new control unit provides for the recognition of the MASTER as the first key to be saved: **this becomes particularly important because it is the only key that enables the control unit to be wiped clean and reprogrammed for the memorisation of the service keys.**

The Master and service keys must be used to code the system as follows:

- Insert the Master key «A», switch to «ON» and maintain this position for 2 seconds (limit values 1 - 3 seconds).
- Insert the service key «B» and switch to «ON» for 2 seconds.

If you have duplicate copies of the service key, repeat the operation for each key.

- Insert the Master key again and turn it to «ON » for 2 seconds.

The maximum time to change keys is 10 seconds.

A maximum of **3 service keys** can be programmed at one time.

The times and the procedure must be followed exactly, otherwise repeat from the beginning.

Once the system has been programmed, master key transponder, decoder and control unit are strictly matched.

With this link established, it is now possible to encode new service keys, in the event of losses, replacements, etc.

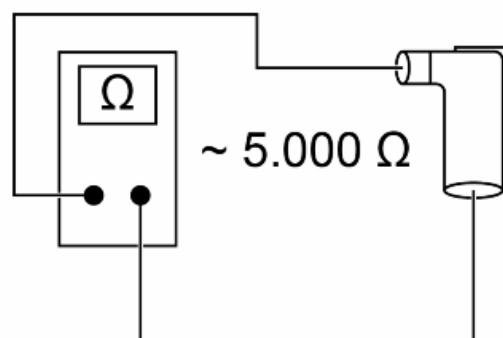
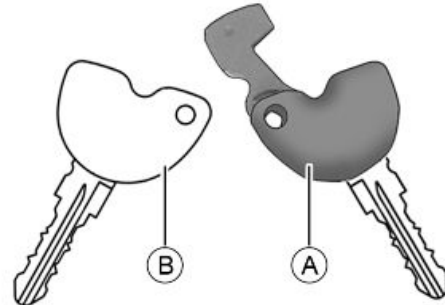
Each new programming deletes the previous one so, in order to add or eliminate keys, you must repeat the procedure using all the keys you intend to keep using.

If a service key becomes uncoded, the efficiency of the high voltage circuit shielding must be thoroughly inspected. In any case it is advisable to use resistive spark plugs.

Characteristic

Shielded cap resistance

~ 5,000 Ω



Diagnostic codes

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

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

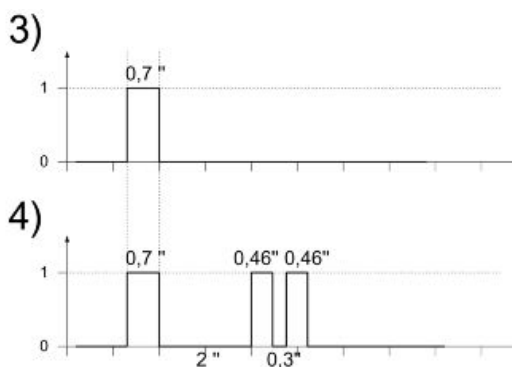
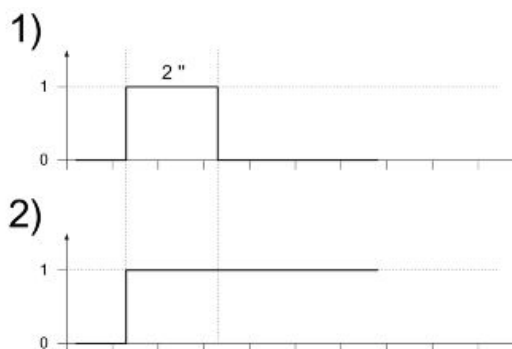
2. Previously unused control unit - transponder absent or cannot be used: the LED is on permanently. In this condition no operations are possible including the start up of the vehicle.

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

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

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

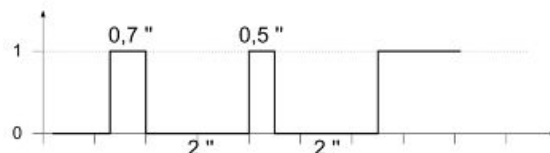
- 1-flash code
- 2-flash code



- 3-flash code

Diagnostic code - 1 flash

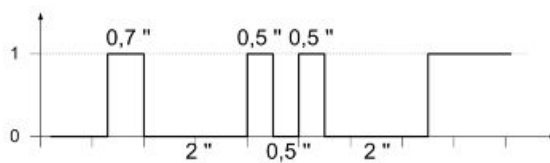
A one-flash code indicates a system where the serial line is not present or is not detected. Check the Immobilizer antenna wiring and change it if necessary.



Diagnostic code - 2 flashes

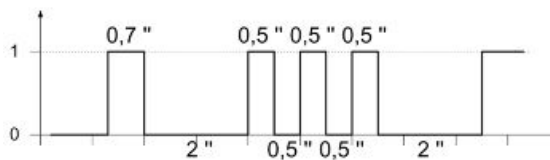
A two-flash code shows a system where the control unit does not show the transponder signal. This might depend on the inefficiency of the Immobilizer antenna or the transponder.

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



Diagnostic code - 3 flashes

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



Lights list

BULBS

	Specification	Desc./Quantity
1	High beam / low beam bulb	Type: LED Quantity: 2
2	Front daylight running lights	Type: LED Quantity: 2
3	Front and rear turn indicator bulbs	Type: All glass Power: 12V - 6W Quantity: 4
4	Rear tail light bulb	Type: LED Quantity: 2
5	Stop light bulb	Type: LED Quantity: 1
6	Licence plate light bulb	Type: LED Quantity: 2

Fuses

The electrical system has 2 main fuses located inside the battery compartment, and 6 secondary fuses located inside the front case.

CAUTION



**ELIMINATE THE CAUSE OF THE FAULT BEFORE REPLACING THE FUSE.
WE STRONGLY RECOMMEND THAT YOU CONTACT AN AUTHORISED SERVICE CENTRE.**

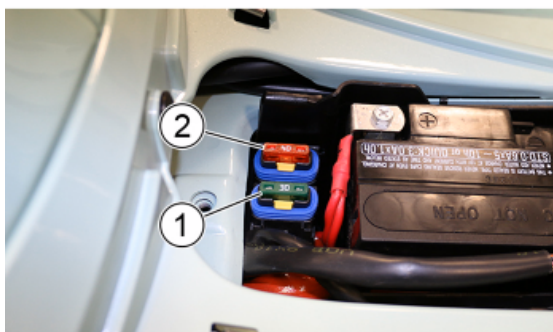
CAUTION



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

MAIN FUSES

The location and characteristics of the vehicle's 2 main fuses are indicated in the table.

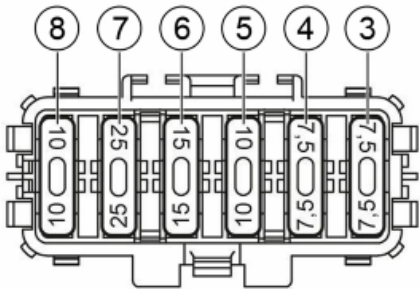


MAIN FUSES TABLE

	Specification	Desc./Quantity
1	Fuse no. 1	Capacity: 30 A Protected circuits: Fuses No. 5-6-7-8.
2	Fuse no. 2	Capacity: 40 A Protected circuits: Battery recharge.

SECONDARY FUSES

The location and characteristics of the vehicle's 6 secondary fuses are indicated in the table.



SECONDARY FUSES TABLE

	Specification	Desc./Quantity
1	Fuse no. 3	Capacity: 7.5 A Protected circuits (key-on power): daylight running lights, oil indicator lamp relay coil, instrument cluster, accessories provision, horn, , bike finder, turn indicators, USB port, OBD socket.
2	Fuse no. 4	Capacity: 7.5 A Protected circuits (key-on power): injection control unit, stop light and buttons, ABS control unit.
3	Fuse no. 5	Capacity: 10 A Protected circuits: injection loads relay coil, injection loads (via relay), injection control unit.
4	Fuse no. 6	Capacity: 15 A Protected circuits (key-on power): Fuses No. 3-4.
5	Fuse no. 7	Capacity: 25 A Protected circuits: ABS ECU.
6	Fuse no. 8	Capacity: 10 A Protected circuits: instrument cluster, accessories provision, bike finder, OBD socket. Protected circuits (key-on power): Saddle opening button.

FOR SUPERTECH VERSION

SECONDARY FUSES TABLE

	Specification	Desc./Quantity
1	Fuse no. 3	Capacity: 7.5 A Protected circuits (key-on power): daylight running lights, instrument cluster, accessory provisions, PMP2, horn, bike finder, turn signals, USB port, OBD socket.
2	Fuse no. 4	Capacity: 7.5 A Protected circuits (key-on power): injection control unit, stop light and buttons, ABS control unit.
3	Fuse no. 5	Capacity: 10 A Protected circuits: injection loads relay coil, injection loads (via relay), injection control unit.

	Specification	Desc./Quantity
4	Fuse no. 6	Capacity: 15 A Protected circuits (key-on power): Fuses No. 3-4.
5	Fuse no. 7	Capacity: 25 A Protected circuits: ABS ECU.
6	Fuse no. 8	Capacity: 10 A Protected circuits: instrument cluster, accessories provision, bike finder, OBD socket. Protected circuits (key-on power): Saddle opening button.

Sealed battery

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

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

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

INSTRUCTIONS FOR BATTERY REFRESH AFTER OPEN CIRCUIT STORAGE

1) Voltage check

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

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

2) Constant voltage battery charge mode

- Constant voltage charge equal to 14.40 - 14.70V
- Initial charge voltage equal to 0.3 - 0.5 for Nominal capacity
- Charge time:
10 - 12 h recommended
Minimum 6 h
Maximum 24 h

3) Constant current battery charge mode

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

Battery installation

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

WARNING

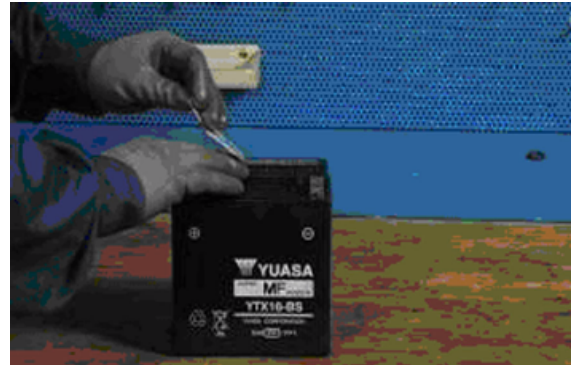
BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. IF IT ACCIDENTALLY COMES INTO CONTACT WITH YOUR EYES OR SKIN, WASH WITH ABUNDANT WATER FOR APPROX. 15 MIN. AND SEEK IMMEDIATE MEDICAL ATTENTION.

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.

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 THE REACH OF CHILDREN.

1) Battery preparation

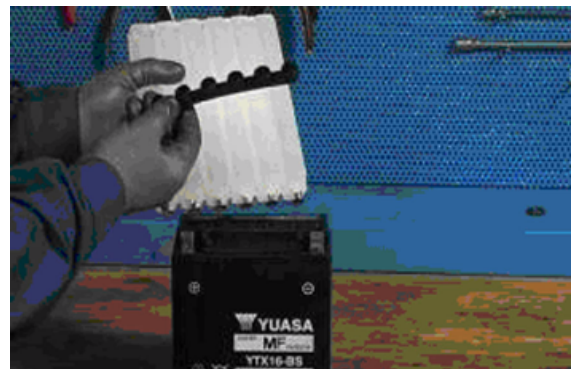
Position the battery on a flat surface. Remove the adhesive sheet closing cells and proceed as quickly as possible to run the subsequent activation phases.



2) Electrolyte preparation.

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

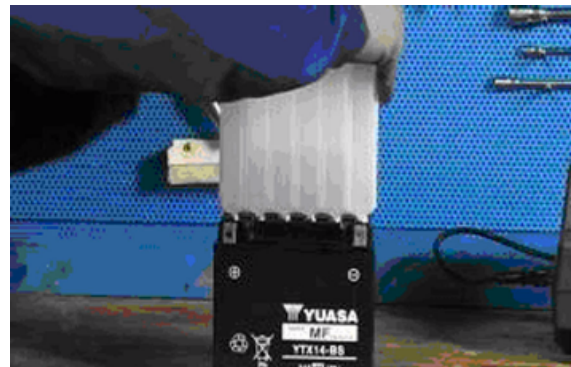
Note: Do not pierce the sealing of the container or the container itself because inside there is sulphuric acid.



3) Procedure for filling the battery with acid.

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

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



4) Control the flow of electrolyte

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

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

5) Take out the container.

Make sure all the electrolyte in the battery is drained. Gently tap the bottom of the container if electrolyte remains in the container. Only once the container is completely empty, gently remove the container itself from the battery. Leave the battery to rest, without sealing the six cells, for at least 1 hour before charging.

6) Recharging the new battery

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

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

The dry charge battery MF like the completely loaded YTX, must have a zero load voltage between 12.8 - 13.15 V Bring the battery to full charge, using the 020648Y battery charger:

- a - select the type of battery with the red switch on the left of the panel battery charger panel
- b - select NEW on the yellow timer
- c - connect the clamps of the battery charger to the battery poles (black clamp to negative pole (-) and red clamp to positive pole (+)).

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



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



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



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



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



i - The battery is now properly activated, disconnect the battery charger from the power supply and unplug the terminals from the battery.

7) Battery closing.

Insert the airtight cover strips into the filling holes.

Press horizontally with both hands and make sure that the strip is levelled with the top part of the battery.

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

The filling process is now complete.

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

Assembly procedure of the battery on the vehicle.

Connectors

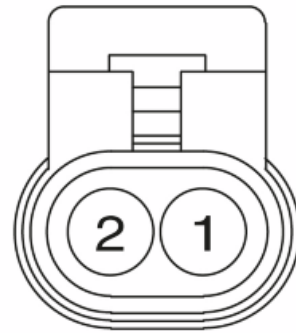
The electrical components of the vehicle are as follows:

- Passive antenna (immobilizer)
- Saddle opening actuator
- Battery
- Bike Finder
- Blinker
- H.V. coil
- ABS control unit
- RISS injection control unit
- Horn
- Ignition switch
- Flasher switch
- Throttle body
- Light switch
- Taillight
- Main fuse
- RISS control unit fuse
- Secondary fuses
- Instrument cluster
- Front RH turn indicator
- Front LH turn indicator
- Rear RH turn indicator
- Rear LH turn indicator
- Fuel level indicator
- Injector
- Start&Stop switch
- Joystick (ONLY SUPERTECH VERSION)
- Engine/frame ground
- Frame ground
- Fuel pump
- Accessories pre-installation
- Provision for PMP2 (ONLY SUPERTECH VERSION)
- OBD socket
- USB port
- Headlight
- Saddle release button
- Start button
- Stand button
- Horn button

- MODE button (ONLY CLASSIC - TOURING - SUPER - RACING - SUPERSPORT VERSIONS)
 - Right stop button
 - Left stop button
 - Air temperature sensor (ONLY SUPERTech VERSION)
 - Engine temperature sensor
 - Front wheel speed sensor
 - Rear wheel speed sensor
 - Lambda probe with heater
 - Injection load relay
 - Breather valve (canister)
 - Flywheel
-

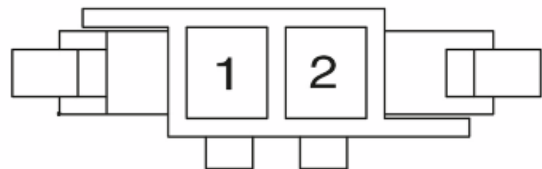
Passive antenna

1. (Purple/White) - Connection with RISS control unit (IMMO-1)
2. (Purple/Black) - Connection with RISS control unit (IMMO-2)



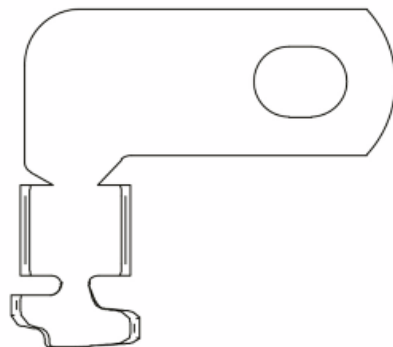
Saddle opening actuator

1. (Black) - Ground
2. (Blue) - (+) signal input from saddle release button



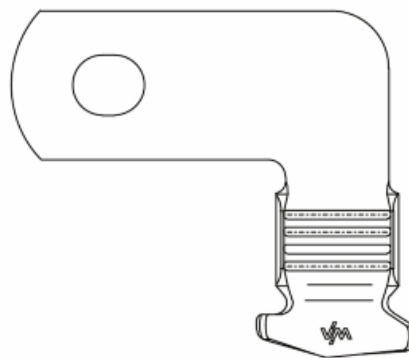
Battery positive

- (Red) - Positive battery terminal

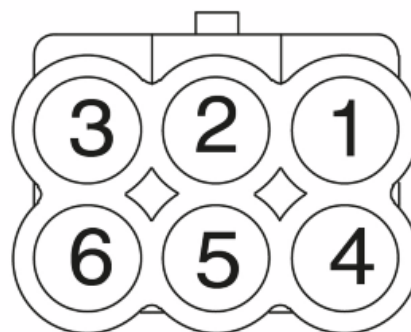


Battery negative

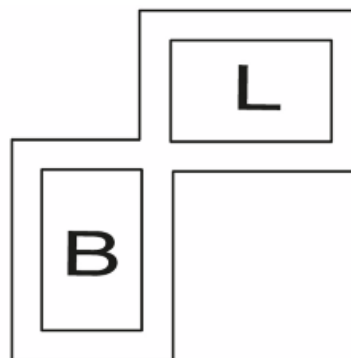
- (Black) - Negative battery terminal

**Bike Finder**

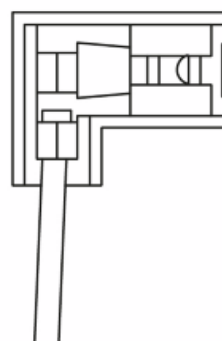
1. (Red/Brown) - Battery power input from fuse F08
2. (Yellow/Black) - Key-on power input from fuse F03
3. (Black) - Ground
4. (Pink) - LH side turn indicator command signal output
5. (Blue) - Saddle release signal input
6. (White/Blue) - Right hand turn indicator command signal output

**Blinker**

- L.** (Blue/Black) - Signal output for turn indicator switch
- B.** (Yellow/Pink) - Ignition switched live power input from fuse F03

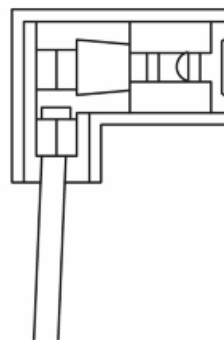
**HV coil_A**

- (Pink/Black) - Signal input (+) from the RISS control unit for coil activation



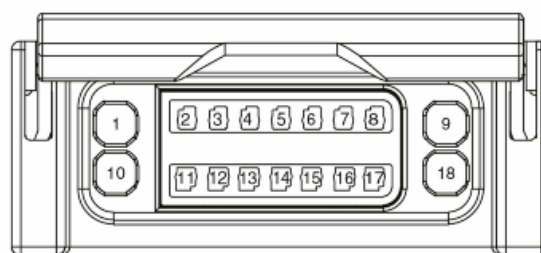
HV Coil_B

- (Black) - Ground



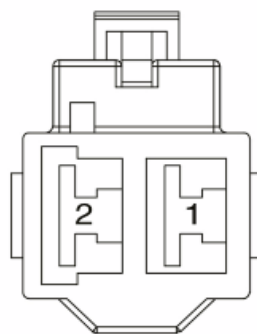
ABS control unit

1. Not connected
2. (Pink/Red) - CAN H line
3. (Blue) - ABS indicator lamp command signal (-) output
4. (White/Brown) - Ignition switched live power input from fuse F04
5. (Orange/Black) - Line K
6. (Brown/Red) - Signal input from rear wheel speed sensor
7. Not connected
8. (Light blue/Red) - Signal input from front wheel speed sensor
9. Not connected
10. (Black) - Ground
11. (Pink/White) - CAN L Line
12. Not connected
13. (Light blue) - Vehicle speed signal output
14. (Black) - PCC Ground_2
15. (Brown/Black) - Reference ground for rear wheel speed sensor
16. (Black) - PCC Ground_1
17. (Light blue/Black) - Reference ground for front wheel speed sensor
18. (Red/Blue) - Battery power input from fuse F07
19. Not connected
20. Not connected

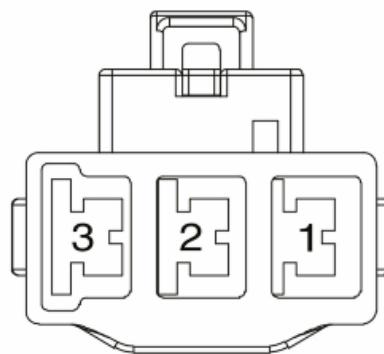


RISS_A control unit

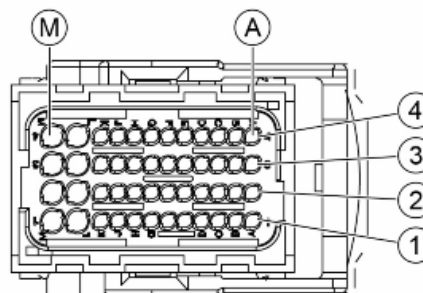
- 1. (Red) - Battery charging line (protected by fuse F02 - 40A)
- 2. (Black) - Ground

**RISS_B control unit**

- 1. (Yellow) - Phase C
- 2. (Green) - Phase A
- 3. (Light blue) - Phase B

**RISS control unit_C (CLASSIC - TOURING - SUPER - RACING - SUPERSPORT VERSIONS)**

- A1.** (Brown/Yellow) - MIL lamp activation command signal output
- A2.** (Pink/Green) - Start&Stop lamp activation command signal output
- A3.** (Purple/Black) - Connection with immobilizer antenna (signal IMMO_2)
- A4.** (Purple/White) - Connection with immobilizer antenna (signal IMMO_1)
- B1.** - Not connected
- B2.** (Grey/Green) - Connection line with engine flywheel
- B3.** (Orange/White) - Signal input from TPS
- B4.** (White/Pink) - Stand button signal input
- C1.** (Red/Blue) - Injection loads coil command signal output
- C2.** - Not connected
- C3.** (Black/Green) - Sensor ground reference
- C4.** (Orange) - Pickup



D1. (Purple/Yellow) - ASR lamp activation command signal output

D2. - Not connected

D3. (Yellow) - Immobilizer indicator lamp activation command signal output

D4. (Light blue) - Vehicle speed signal input

E1. - Not connected

E2. (Green/Grey) - Air temperature signal input

E3. (Light blue/Green) - Engine temperature sensor signal input

E4. - Not connected

F1. (Pink/White) - Signal output for the oil lamp activation command

F2. (Black/Green) - Sensor ground reference

F3. (Green/White) - Lambda probe

F4. (White/Black) - Signal input from the STOP switches

G1. (Light blue/Black) - Throttle body command signal output

G2. - Not connected

G3. - Not connected

G4. (Light blue/White) - Signal input from the Start&Stop button

H1. (Brown/Red) - Throttle body command signal output

H2. (Blue/Yellow) - Flywheel connection (HALL2)

H3. (White/Green) - Flywheel connection (HALL1)

H4. (Brown/Red) - Signal input from the start button

J1. (Brown/Black) - Throttle body command signal output

J2. (Red/Green) - Sensor power supply output

J3. (Brown/Green) - Signal input from the MAP sensor

J4. (White/Grey) - Flywheel connection (HALL3)

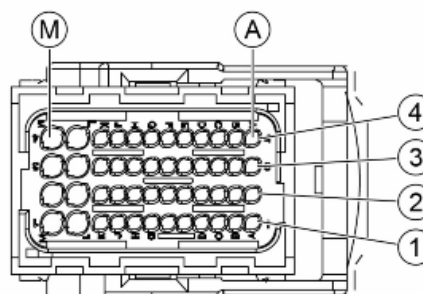
K1. (Light blue/Red) - Throttle body command signal output

K2. (Pink/White) - CAN L Line

- K3.** (Pink/Red) - CAN H line
- K4.** (White/Brown) - Ignition switched live power supply
- L1.** (Black/Purple) - Ground reference for lambda probe heater
- L2.** (White/Red) - Breather valve command signal output
- L3.** - Not connected
- L4.** (Red/Yellow) - Injector command signal output
- M1.** (Green) - Fuel pump command signal output
- M2.** (Pink/Black) - Ignition coil command signal output
- M3.** (Red/White) - Power supply from the battery
- M4.** (Brown/Purple) - Signal output for lights selector switch

RISS_C control unit (SUPERTECH VERSION)

- A1.** - Not connected
- A2.** (Pink/Green) - Start&Stop lamp activation command signal output
- A3.** (Purple/Black) - Connection with immobilizer antenna (signal IMMO_2)
- A4.** (Purple/White) - Connection with immobilizer antenna (signal IMMO_1)
- B1.** - Not connected
- B2.** (Grey/Green) - Connection line with engine flywheel
- B3.** (Orange/White) - Signal input from TPS
- B4.** (White/Pink) - Stand button signal input
- C1.** (Red/Blue) - Injection loads coil command signal output
- C2.** - Not connected
- C3.** (Black/Green) - Sensor ground reference
- C4.** (Orange) - Pickup
- D1.** (Purple/Yellow) - ASR lamp activation command signal output
- D2.** - Not connected



D3. (Yellow) - Immobilizer indicator lamp activation command signal output

D4. (Light blue) - Vehicle speed signal input

E1. - Not connected

E2. (Green/Grey) - Air temperature signal input

E3. (Light blue/Green) - Engine temperature sensor signal input

E4. - Not connected

F1. - Not connected

F2. (Black/Green) - Sensor ground reference

F3. (Green/White) - Lambda probe

F4. (White/Black) - Signal input from the STOP switches

G1. (Light blue/Black) - Throttle body command signal output

G2. - Not connected

G3. - Not connected

G4. (Light blue/White) - Signal input from the Start&Stop button

H1. (Brown/Red) - Throttle body command signal output

H2. (Blue/Yellow) - Flywheel connection (HALL2)

H3. (White/Green) - Flywheel connection (HALL1)

H4. (Brown/Red) - Signal input from the start button

J1. (Brown/Black) - Throttle body command signal output

J2. (Red/Green) - Sensor power supply output

J3. (Brown/Green) - Signal input from the MAP sensor

J4. (White/Grey) - Flywheel connection (HALL3)

K1. (Light blue/Red) - Throttle body command signal output

K2. (Pink/White) - CAN L Line

K3. (Pink/Red) - CAN H line

K4. (White/Brown) - Ignition switched live power supply

L1. (Black/Purple) - Ground reference for lambda probe heater

L2. (White/Red) - Breather valve command signal output

L3. - Not connected

L4. (Red/Yellow) - Injector command signal output

M1. (Green) - Fuel pump command signal output

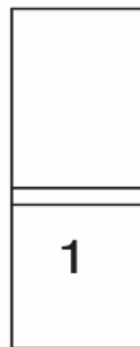
M2. (Pink/Black) - Ignition coil command signal output

M3. (Red/White) - Power supply from the battery

M4. (Brown/Purple) - Signal output for lights selector switch

Horn

- (Grey/Black) - (+) signal input from horn button



Horn

- (Black) - Ground



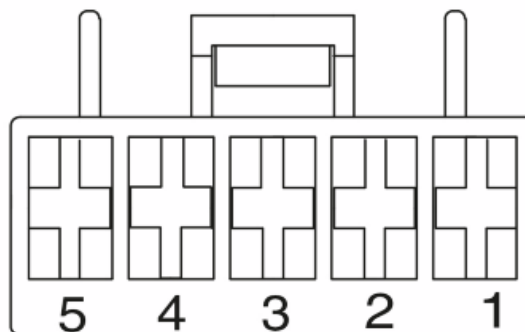
Ignition switch

1. (Red/Brown) - Battery power input from fuse F08

2. Not connected

3. (Green) - Key-on power feed output for saddle release button

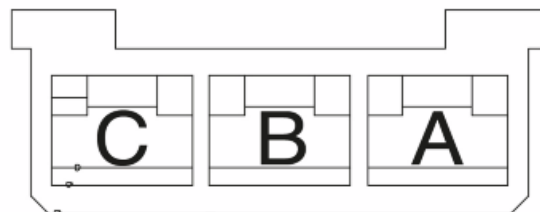
4. (Red/Yellow) - Battery power input from fuse F06



5. (Orange/Red) - Key-on power feed output for fuses F03, F04

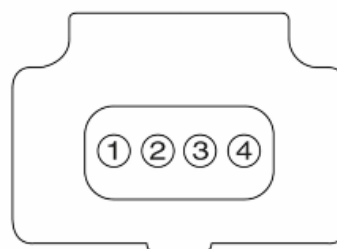
Flasher switch

- A. (Pink) - LH side turn indicator activation signal output
- B. (Blue/Black) - Signal input from Blinker
- C. (White/Blue) - Right hand turn indicator activation signal output



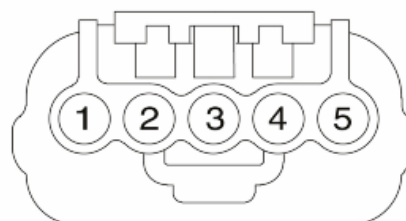
Throttle body_A

1. Signal input from the injection control unit (AzNe)
2. Signal input from the injection control unit (AzRs)
3. Signal input from the injection control unit (MaNe)
4. Signal input from the injection control unit (MaRs)



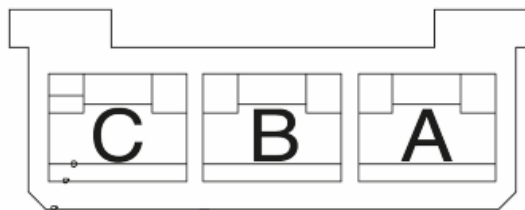
Throttle body_B

1. (Brown/Green) - MAP signal output for the injection control unit
2. (Red/Green) - Power supply from the injection control unit
3. (Orange/White) - TPS signal output for the injection control unit
4. (Black/Green) - Ground reference from the injection control unit
5. (Green/Grey) - Air temperature signal output for the injection control unit

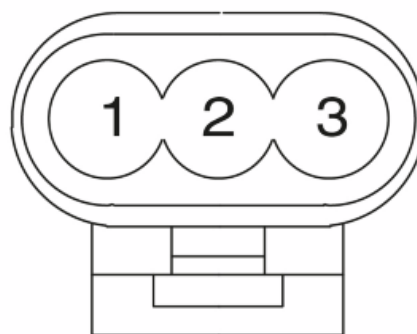


Light switch

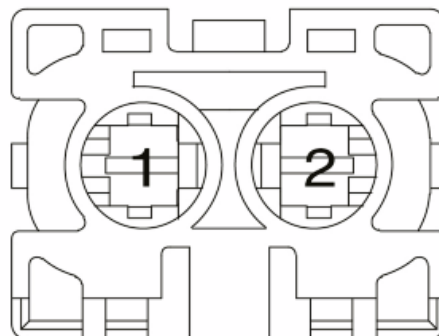
- A.** (Brown/Purple) - Signal input (+) from the RISS control unit
- B.** (Orange/White) - Low beam command (+) signal output
- C.** (Purple) - High beam command signal (+) output

**Taillight**

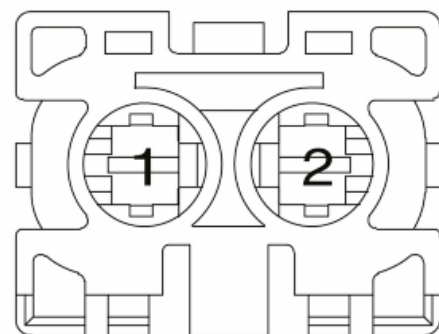
- 1.** (Yellow/Black) - CITY light command (+) signal input
- 2.** (Black) - Ground
- 3.** (White/Black) - Brake light command (+) signal input

**Main fuse**

- 1.** (Red) - Direct battery power input
- 2.** (Red/Black) - Battery power feed output for secondary fuses (F05, F06, F07, F08)

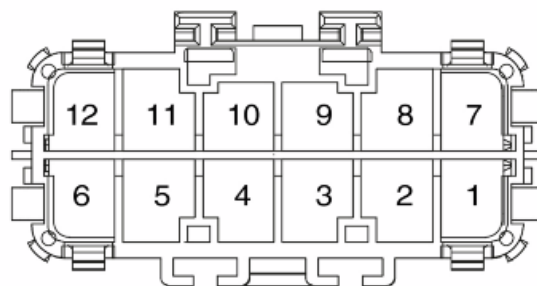
**RISS control unit fuse**

- 1.** (Red) - Connection to battery for charging
- 2.** (Red) - Connection to RISS control unit

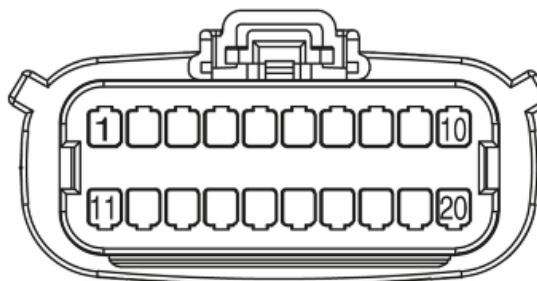


Secondary fuses

1. (Yellow/Black) - Ignition switched live power supply output
2. (White/Brown) - Ignition switched live power supply output
3. (Red/White) - Battery power supply
4. (Red/Yellow) - Battery power supply output
5. (Red/Blue) - Battery power supply output
6. (Red/Brown) - Battery power supply output
7. (Orange/Red) - Key-on power feed input
8. (Orange/Red) - Key-on power feed input
9. (Red/Black) - Battery power input from main fuse F01
10. (Red/Black) - Battery power input from main fuse F01
11. (Red/Black) - Battery power input from main fuse F01
12. (Red/Black) - Battery power input from main fuse F01

**Instrument cluster (CLASSIC - TOURING - SUPER - RACING - SUPERSPORT VERSIONS)**

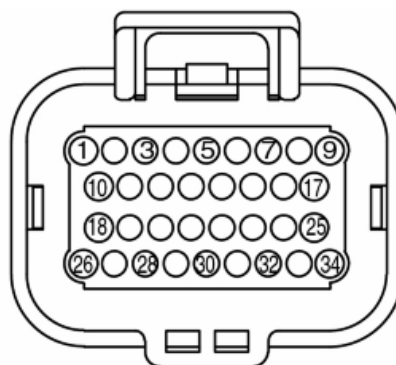
1. (Red/Green) - Engine oil lamp activation signal input (-)
2. (Green) - (-) signal input from MODE button
3. (Pink) - Left turn lamp activation signal input
4. (White/Blue) - Right turn lamp activation signal input
5. (Purple) - High beam indicator lamp command (+) signal input
6. (Blue) - ABS indicator lamp command (-) signal input
7. (Purple/Yellow) - ASR lamp activation signal input
8. - Not connected
9. - Not connected
10. - Not connected
11. - Not connected



- 12. (White/Green) - Fuel level signal input
- 13. (Pink/Green) - Start&Stop indicator lamp command (-) signal input
- 14. (Light blue) - Vehicle speed signal input
- 15. - Not connected
- 16. (Brown/Yellow) - MIL lamp command (-) signal input
- 17. (Black) - Ground
- 18. (Yellow) - Immobilizer indicator lamp command (-) signal input
- 19. (Yellow/Black) - Key-on power input from fuse F03
- 20. (Red/Brown) - Battery power input from fuse F08

Instrument cluster (SUPERTECH VERSION)

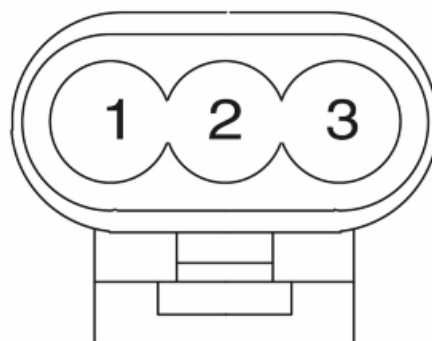
- 1. - Not connected
- 2. - Not connected
- 3. - Not connected
- 4. (White/Green) - Fuel level signal input
- 5. (Red/Yellow) - Air temperature signal input
- 6. (Blue/White) - UP signal input from Joystick
- 7. - Not connected
- 8. - Not connected
- 9. (Red/Brown) - Battery power supply input
- 10. (Pink/Green) - Start&Stop lamp command signal input
- 11. (Green) - DOWN signal input from Joystick
- 12. (Red) - PUSH signal input from Joystick
- 13. (White/Brown) - Engine oil pressure signal input (-) warning light control
- 14. (Purple) - High beam indicator light command signal input
- 15. (Blue) - ABS indicator light control signal input
- 16. (Yellow/Black) - Key on power supply input
- 17. (Red/Brown) - Battery power supply input
- 18. (Light blue) - Vehicle speed signal input



19. (White/Blue) - Right hand turn indicator signal input
20. (Pink) - Left hand turn indicator signal input
21. (Yellow) - Immobilizer lamp command signal input
22. (Yellow) - RIGHT signal input from Joystick
23. (White) - LEFT signal input from Joystick
24. (Black) - Ground
25. (Black/Purple) - Sensors ground reference
26. - Not connected
27. - Not connected
28. (Yellow/Black) - CITY LIGHT lamp command signal input
29. (Purple/Yellow) - ASR lamp command signal input
30. (Black/Purple) - CFG ground reference
31. (Grey / Red) - Motor temperature signal input
32. (Pink/White) - CAN L
33. (Pink/Red) - CAN H
34. - Not connected

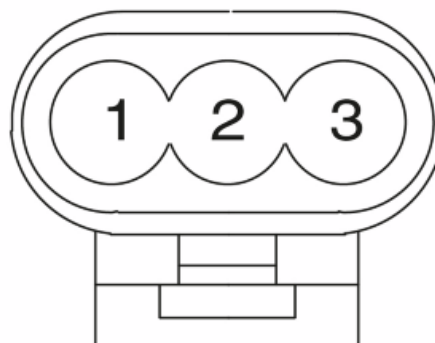
Front right turn indicator

1. (White/Blue) - Turn indicator command signal input
2. (Yellow/Black) - CITY light command signal input
3. (Black) - Ground



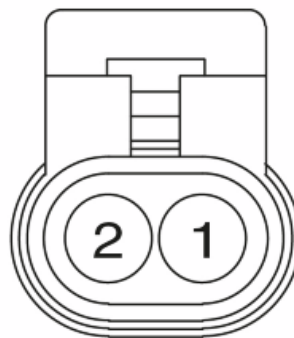
Front left turn indicator

1. (Pink) - Turn indicator command signal input
2. (Yellow/Black) - CITY light command signal input
3. (Black) - Ground

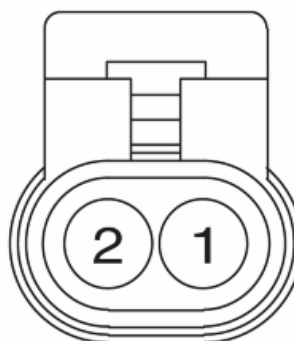


Rear right turn indicator

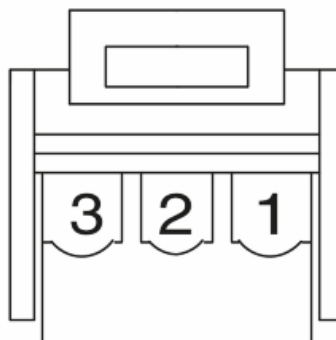
1. (Black) - Ground
2. (White/Blue) - Turn indicator command signal input

**Rear left turn indicator**

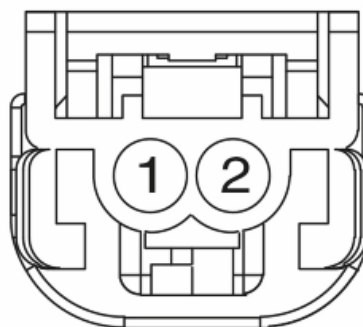
1. (Black) - Ground
2. (Pink) - Turn indicator command signal input

**Fuel level indicator**

1. (White/Green) - Fuel level signal output
2. (Black) - Ground
3. - Not connected

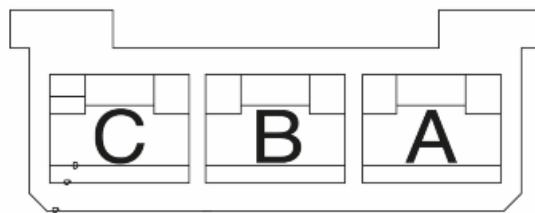
**Injector**

1. (Red/Yellow) - (-) signal input from RISS control unit
2. (Red/Green) - Battery power supply input from the injection load relay

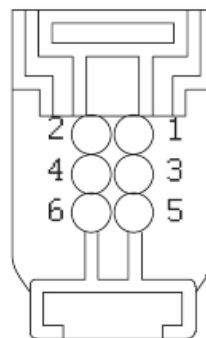


Start&Stop switch

- A.** - Not connected
- B.** (Light blue/White) - (-) signal output for RISS control unit
- C.** (Black/Green) - Ground

**Joystick (SUPERTECH VERSION)**

- 1.** (Black/Purple) - Ground
- 2.** (White) - LEFT signal output
- 3.** (Yellow) - RIGHT signal output
- 4.** (Green) - DOWN signal output
- 5.** (Light blue/White) - UP signal output
- 6.** (Red) - PUSH signal output

**Engine/frame ground**

- (Black) - Engine/frame ground point

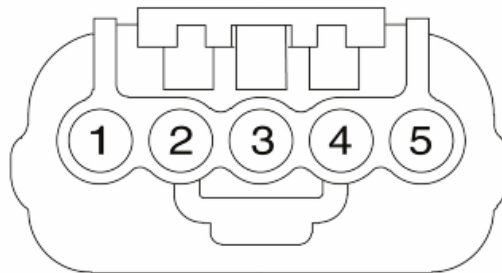
**Frame ground**

- (Black) - Frame ground point

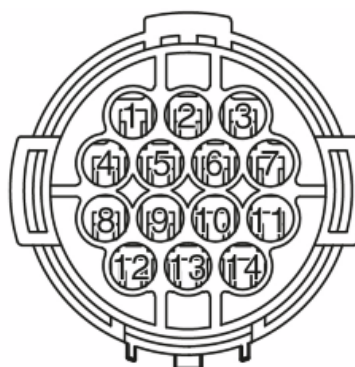


Fuel pump

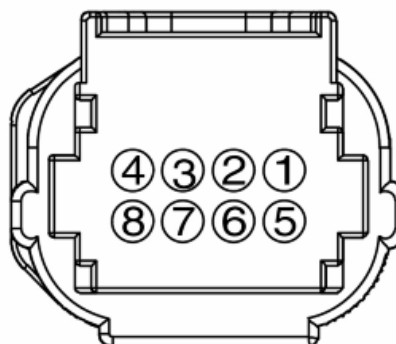
1. (Green) - (-) signal input from RISS control unit
2. (Red/Green) - Battery power supply input from the injection load relay
3. - Not connected
4. - Not connected
5. - Not connected

**Accessories pre-installation**

1. (Black) - Ground
2. (White/Green) - Fuel level signal
3. (Pink/Red) - CAN H
4. (Pink/White) - CAN L
5. (Orange/Black) - Line K
6. Not connected
7. (Red/Brown) - Battery power supply from fuse F08
8. (Yellow/Black) - Key-on power feed from fuse F03
9. - Not connected
10. (Blue) - Saddle release signal
11. (Pink) - Left hand turn indicator signal
12. (White/Blue) - Right hand turn indicator signal
13. (Purple) - High beam lights signal
14. (Light blue) - Vehicle speed signal

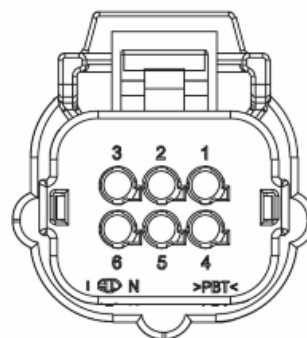
**Provision for PMP2 (SUPERTECH VERSION)**

1. (Yellow/Black) - Key on power supply input
2. (Black/Purple) - Ground
3. (Pink/Red) - CAN H
4. (Pink/White) - CAN L
5. Not connected
6. (White/Green) - Fuel level signal
7. (White/Blue) - Right hand turn indicator signal
8. (Pink) - Left turn indicator signal



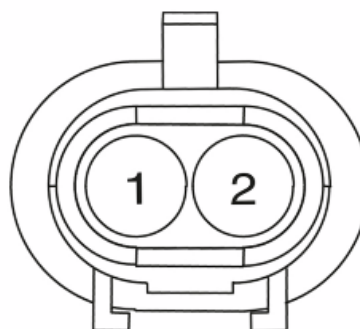
OBD socket

1. (Yellow/Black) - Key-on power input from fuse F03
2. (Pink/Red) - CAN H
3. (Black) - Ground
4. (Red/White) - Battery power input from fuse F08
5. (Pink/White) - CAN L
6. (Orange/Black) - Line K



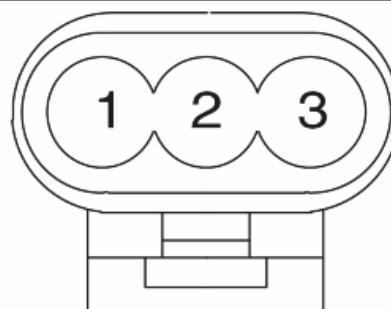
USB port

1. (Yellow/Black) - Key-on power input from fuse F03
2. (Black) - Ground



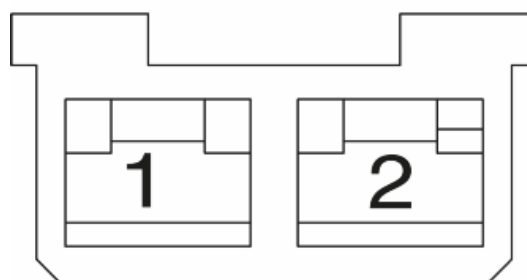
Headlight

1. (Orange/White) - Low beam headlight (+) signal input
2. (Purple) - High beam headlight (+) signal input
3. (Black) - Ground



Saddle release button

1. (Green) - Key-on power feed input
2. (Blue) - Saddle release (+) signal output



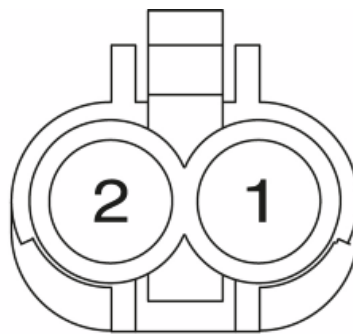
Start button

1. (Brown/Red) - (-) signal output for RISS control unit
2. (Black/Green) - Ground
3. - Not connected

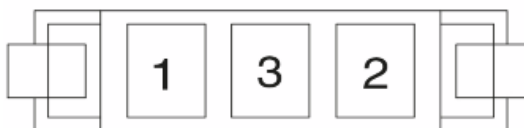


Stand button

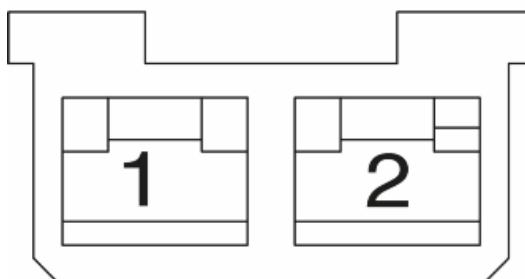
1. (White/Pink) - Signal output for the RISS control unit
2. (Black/Green) - Negative from the RISS control unit

**Horn button**

1. (Yellow/Black) - Key on power supply input
2. (Grey/Black) - Horn command signal (+) output
3. - Not connected

**MODE button (CLASSIC - TOURING - SUPER - RACING - SUPERSPORT VERSIONS)**

1. (Green) - (-) signal output for instrument cluster
2. (Black) - Ground

**RH brake light button**

- (White/Brown) - Ignition switched live power input from fuse F04

**RH brake light button**

- (White/Black) - Brake light command signal (+) output



LH brake light button

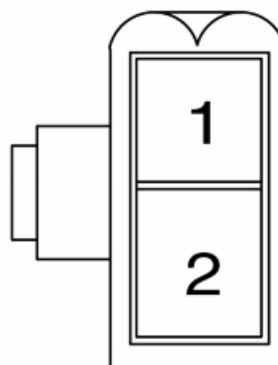
- (White/Brown) - Ignition switched live power input
from fuse F04

**LH brake light button**

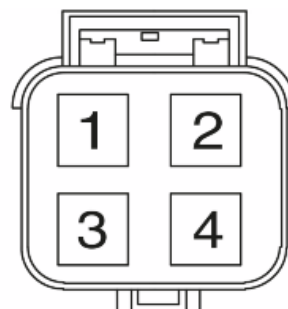
- (White/Black) - Brake light command signal (+)
output

**Air temperature sensor (SUPERTECH VERSION)**

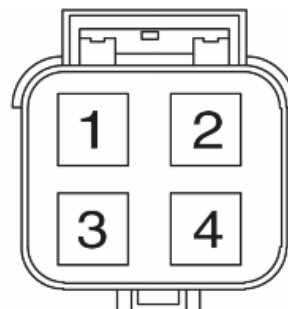
1. (Black/Purple) - Ground
2. (Red/Yellow) - Signal output for instrument cluster

**Engine temperature sensor (CLASSIC - TOURING - SUPER - RACING - SUPERSPORT VERSIONS)**

1. (Light blue/Green) - Signal output for RISS control unit
2. - Not connected
3. (Black/Green) - Ground
4. - Not connected

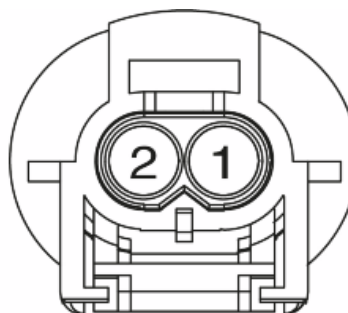
**Engine temperature sensor (SUPERTECH VERSION)**

1. (Light blue/Green) - Signal output for RISS control unit
2. (Black/Purple) - Ground
3. (Black/Green) - Ground
4. (Grey/Red) - Signal output for instrument cluster

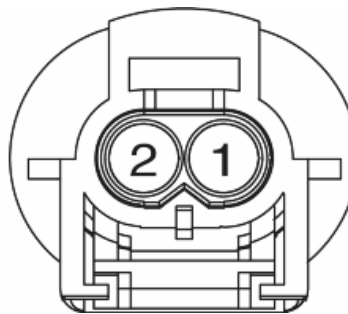


Front wheel speed sensor

1. (Light blue/Black) - Reference ground from ABS control unit
2. (Light blue/Red) - Signal output for ABS control unit

**Rear wheel speed sensor**

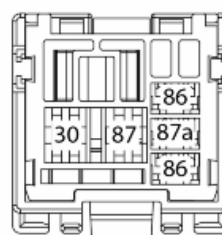
1. (Brown/Black) - Reference ground from ABS control unit
2. (Brown/Red) - Signal output for ABS control unit

**Lambda probe with heater**

1. (Green/White) - Probe signal (+) from the RISS control unit
2. (Black/Green) - Ground reference from the RISS control unit
3. (Red/Green) - Heater power supply from the injection load relays
4. (Black/Purple) - Heater signal (-) from the RISS control unit

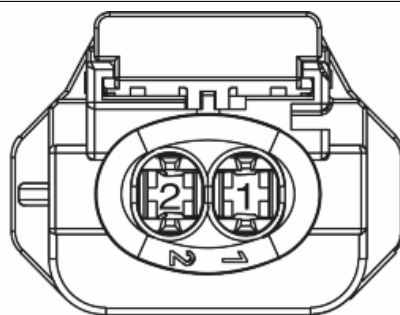
**Injection load relay**

30. (Red/White) - Power supply from the battery
85. (Red-Blue) - Signal input (-) from the injection control unit
86. (Red/White) - Power supply from the battery
87. (Red-Green) - Injection loads power supply output
- 87a. - Not connected

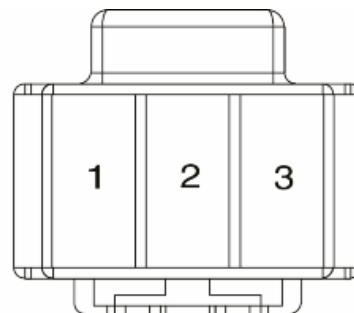


Breather valve

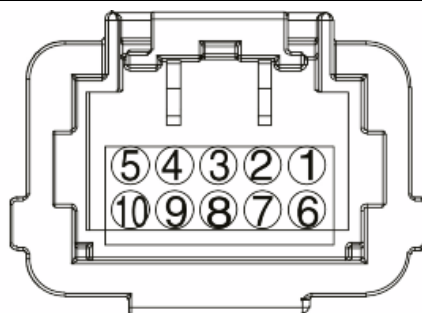
1. (White/Red) - Signal input (-) from the RISS control unit
2. (Red/Green) - Battery power supply input from the injection load relay

**Flywheel_A**

1. (Yellow) - Phase C
2. (Green) - Phase A
3. (Light blue) - Phase B

**Flywheel_B**

1. (White/Green) - Connection with RISS control unit (HALL 1)
2. (Blue/Yellow) - Connection with RISS control unit (HALL 2)
3. (White/Grey) - Connection with RISS control unit (HALL 3)
4. (Black/Green) - Reference ground for engine speed sensor
5. (Orange) - Power feed for engine speed sensor
6. (Black/Green) - Ground
7. (Grey/Green) - Connection with RISS control unit (DIRECTION)
8. (Red/Green) - Power supply from the RISS control unit (V_REF)
9. (White/Brown) - Engine oil pressure signal output
10. - Not connected

**Remote seat opening****Battery replacement**

The remote control is powered by internal batteries that get discharged after extended use; If the LED turns on when the button is pressed, the remote control is working properly.

You may need to replace the batteries if the remote control fails or if its range of operation is reduced. To separate the two halves of the remote control, insert the blade of a plain slot screwdriver at one point on the edge and slide it all around.

Once the remote control is open, remove the two batteries from the contact terminal. Install the two new CR2016 batteries with the positive pole facing the contact terminal. Reassemble the remote control by pressing the two clip-on halves gently with your fingers.

To open the saddle itself without using the remote control, it is possible to proceed as described in section «Saddle opening».

Programming

To program the new radio commands, do the following:

1. disconnect the battery of the vehicle;
2. reconnect the battery of the vehicle;
3. within 5 seconds of reconnecting the battery, simultaneously press buttons "1" and "3" on the remote control twice. the «Bike Finder» device will confirm the process with an optical signal by the quick flashing of the turn indicator;
4. the programming of the new radio command generates the end of the procedure and the system is ready for use.



If it is necessary to erase a radio command from the memory of the device, it will be necessary to repeat the programming 4 times even with the same remote control, in order to recover the 4 provided memories.

CAUTION



TO STORE THE OTHER REMOTE CONTROLS TO MEMORY (4 MAXIMUM) YOU NEED TO REPEAT THE WHOLE PROCEDURE AGAIN. FAILURE TO CARRY OUT THESE OPERATIONS WITHIN THE INDICATED TIMES WILL RESULT IN THE REMOTE-CONTROL UNIT KEY PROGRAMMING PROCEDURE BEING ABANDONED AUTOMATICALLY. STORING A FIFTH REMOTE CONTROL MAY LEAD TO CANCELLATION OF THE FIRST ONE.

WARNING



DO NOT KEEP THE REMOTE CONTROL IN PLACES WITH TEMPERATURES EXCEEDING 60° C: THE BATTERY WILL RUN DOWN TOO QUICKLY.

CAUTION



TO AVOID BATTERY DISCHARGE, THE SADDLE OPENING REMOTE CONTROL RADIO RECEIVER DEACTIVATES 3 MINUTES AFTER THE LAST RECEIPT. TO RESTORE FUNCTIONS SIMPLY PRESS THE ACTIVATION BUTTON ON THE REMOTE CONTROL FOR ABOUT 3 SECONDS, AS DESCRIBED ABOVE.

Diagnostic instrument

ERROR TABLE

CODE	DESCRIPTION
P0030	Heater lambda probe - Open circuit
P0031	Heater lambda sensor - Short-circuit to ground
P0032	Heater lambda sensor - Short-circuit to positive
P0107	Pressure sensor - Short-circuit to ground
P0108	Pressure sensor - Short-circuit to positive
P0111	Air temperature sensor - Implausible signal
P0112	Air temperature sensor - Short-circuit to ground
P0113	Air temperature sensor - Short-circuit to positive
P0114	Air temperature sensor - Open circuit
P0116	Engine temperature sensor - Implausible signal
P0117	Engine temperature sensor - Short-circuit to ground
P0118	Engine temperature sensor - Short-circuit to positive
P0119	Engine temperature sensor - Open circuit
P0120	Throttle valve position sensor - Short-circuit to ground
P0123	Throttle valve position sensor - Short-circuit to positive
P0130	Lambda sensor - Short-circuit to ground
P0132	Lambda sensor - Short-circuit to positive
P0133	Lambda sensor - Implausible signal
P0134	Lambda sensor - Open circuit
P0171	Thin fuel system - Implausible signal
P0172	Thick fuel system - Implausible signal
P0201	Injector - Open circuit
P0231	Fuel pump relay - Short-circuit to ground
P0232	Fuel pump relay - Short-circuit to positive
P0261	Injector - Short-circuit to ground
P0262	Injector - Short-circuit to positive
P0301	No ignition - Implausible signal
P0301	No ignition - Open circuit
P0336	Engine revolution sensor (operational) - Implausible signal
P0458	Canister purge valve - Open circuit or short-circuit to ground
P0459	Canister purge valve - Short-circuit to positive
P0505	Stepper motor control - Open circuit
P0506	Idle control system - Open circuit
P0507	Idle control system - Implausible signal
P0508	Stepper motor control - Short-circuit to ground
P0509	Stepper motor control - Short-circuit to positive
P0511	Stepper motor control - Implausible signal
P0512	Ignition button - Implausible signal
P0562	Battery voltage - Short-circuit to ground
P0563	Battery voltage - Short-circuit to positive
P0601	EEPROM ECU test - Implausible signal
P0604	RAM ECU test - Implausible signal
P0605	ROM ECU test - Implausible signal
P0650	MIL warning light - Open circuit
P1101	Throttle valve position sensor - Implausible signal
P1106	Pressure sensor - Implausible signal
P1108	Manifold pressure too low - Implausible signal

CODE	DESCRIPTION
P1206	Pressure sensor - Open circuit
P1607	Data buffer - Implausible signal
P1651	MIL warning light - Short-circuit to ground
P1652	MIL warning light - Short-circuit to positive
P1761	Electric roll-over sensor - Short-circuit to positive
P1762	Electric roll-over sensor - Short-circuit to ground
P2300	Coil - Short-circuit to ground
P2301	Coil - Short-circuit to positive
U0001	Bus off on CAN - Short-circuit to ground
U0185	Immobilizer error - Open circuit
U0486	Immobilizer error - Implausible signal
U1185	Immobilizer error - Short-circuit to ground

INDEX OF TOPICS

ENGINE FROM VEHICLE

ENG VE

Questa sezione descrive le operazioni da effettuare per lo smontaggio del motore dal veicolo.

Exhaust assy. Removal

REMOVAL

Place the vehicle on its centre stand;

Remove the right hand side fairing.

Remove the right footrest end.

Uncouple the lambda probe from its support and disconnect it.



Unscrew the nuts fastening the silencer manifold to the head.



Support the silencer.

Unscrew the screws fastening the silencer to the mounting bracket.



Remove the silencer.



FITTING

Put in place the silencer.



Insert and tighten the screws fastening the silencer to the mounting bracket.



Place the manifold flange on the stud bolts.
Insert and tighten the nuts fastening the silencer manifold to the head.



Connect the lambda probe connector and insert it in its support.

Fit the right footrest end.

Fit the right hand side fairing.

**CAUTION
WARNING**

SHOULD IT BE NECESSARY TO REMOVE ONLY THE SILENCER TIP, ALWAYS REPLACE THE GRAPHITE GASKET BETWEEN THE PRIMARY PIPE AND SILENCER.

Removal of the engine from the vehicle

REMOVAL

Remove the helmet compartment.

Remove the entire muffler assembly.

Remove the side fairings.

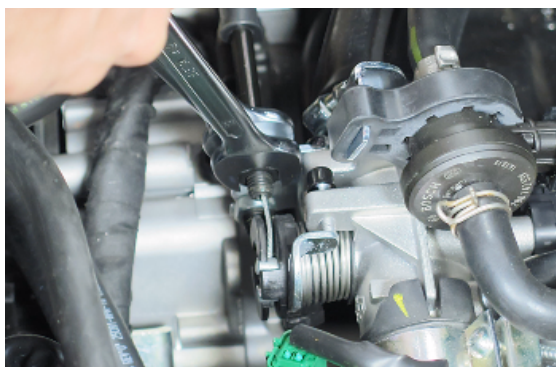
Remove the left and right footrest ends



Unscrew the engine ground cable from its fastening on the left side of the chassis.



Loosen the nuts fixing the throttle control to the throttle body.



Disconnect the cables from the throttle valve control cam.



Unscrew and remove the nuts fixing the electric connectors bracket.



Disconnect the connector of the electric start&stop motor and the connector of the three-phase generator.



Lock the pipe connecting the radiator-expansion tank.

Remove the clamp fixing the pipe to the radiator.



Remove the locking clamp of the cable assembly.

Disconnect the injector connector.

Disconnect the engine temperature sensor connector.

Disconnect the rear wheel ABS sensor connector.

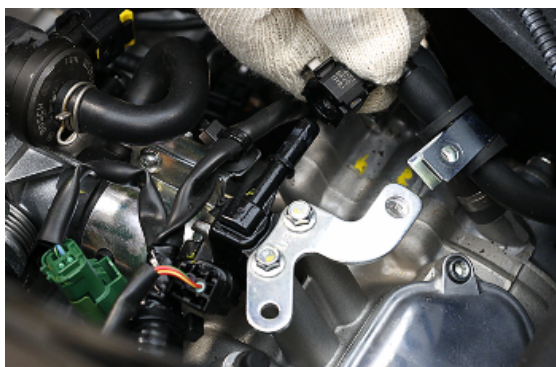
Disconnect the TPS sensor connector.



Unscrew the fixing screw of the fuel line support bracket and release the line.



Disconnect the fuel line from the injector connector.
Dry any fuel leaks.



Unscrew the belt cooling cover fixing screws.



Remove the belt cooling cover without disconnecting it from the bellows.



Unscrew the screws fixing the air filter box to the engine.



Place, in the part shown, a parallelogram to support the front of the vehicle.



Remove the clamp fixing the rear brake pipe.



Unscrew the screws fixing the rear brake calliper to the engine and remove it.



Lift the filter box to access the lower fastening of the left rear shock absorber.

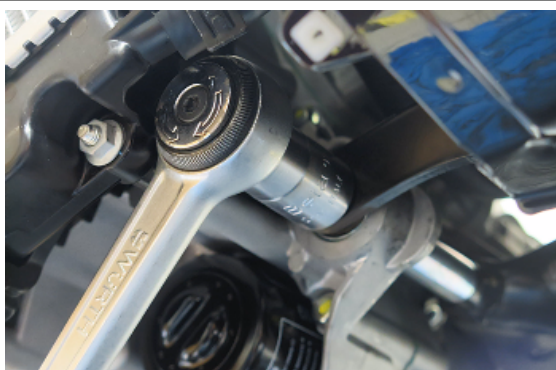
Unscrew and remove the fixing bolt.



Unscrew and remove the fixing nut of the right rear shock absorber.



Unscrew and remove the nut fixing the swinging arm - engine pin.



Support the engine.

Disconnect the rear right shock absorber.



Remove the swinging arm - engine pin.
The engine is now released from the vehicle.



Installing engine in vehicle

FITTING

Put the engine in place.
Insert the swinging arm - engine pin



Connect the rear right shock absorber.



Insert and tighten to the specified torque the nut
fixing the swinging arm - engine pin.

Locking torques (N*m)

Swinging arm on engine side - Engine 67 - 75 Nm



Insert the lower fixing nut of the rear right shock absorber and tighten to the specified torque.

Locking torques (N*m)

Rear shock absorber - Silencer support bracket 40 - 45 Nm



Insert the lower fixing nut of the rear left shock absorber and tighten to the specified torque.

Locking torques (N*m)

Rear shock absorber - Engine 40 - 45 Nm



Install the brake calliper on the disc and tighten the fastening screws on the engine to the specified torque.

Locking torques (N*m)

Rear brake calliper screws - Engine 20 - 25 Nm



Insert and fix the clamp fixing the rear brake pipe.



Put back the air filter box in its seat and tighten the fixing screws.



Put back the belt cooling cover and tighten the fixing screws on the crankcase cover.



Connect the fuel line to the injector connection.



Fix the pipe on the support bracket.



Connect the injector connector.

Connect the engine temperature sensor connector.

Connect the rear wheel ABS sensor connector.

Connect the TPS sensor connector.

Fix the cable assembly using a plastic clamp.



Connect the pipe connecting the radiator-expansion tank.

Fit a new pipe fixing clamp.



Connect the connector of the electric start&stop motor and the connector of the three-phase generator.



Put in place the electric connectors bracket in its seat on the bodywork and secure it using the fastening nuts.



Connect the cables from the throttle valve control cam.



Tighten the nuts fixing the throttle control to the throttle body.



Fix the engine ground to the chassis.

Fit the entire muffler.

Fit the left and right footrest ends

Fit the side fairings.

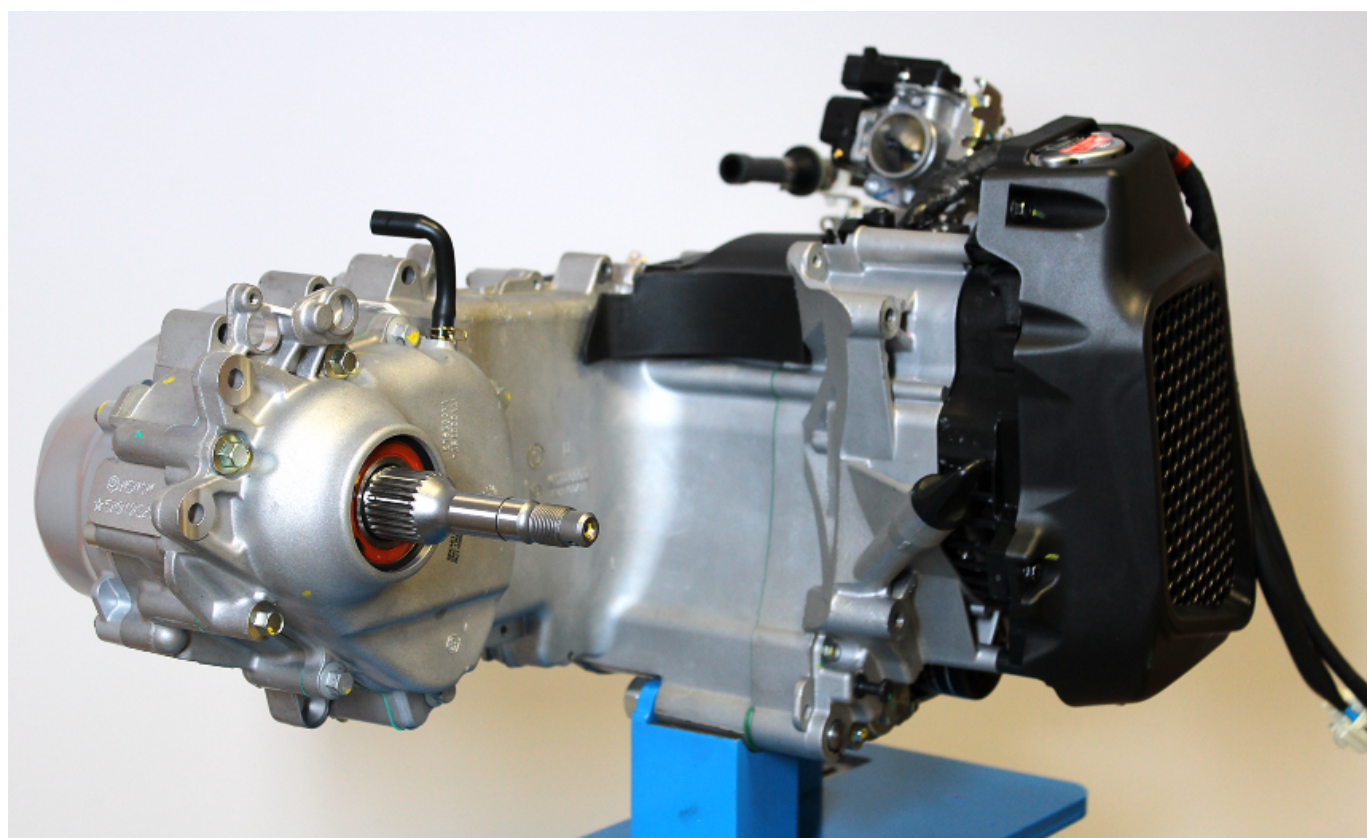
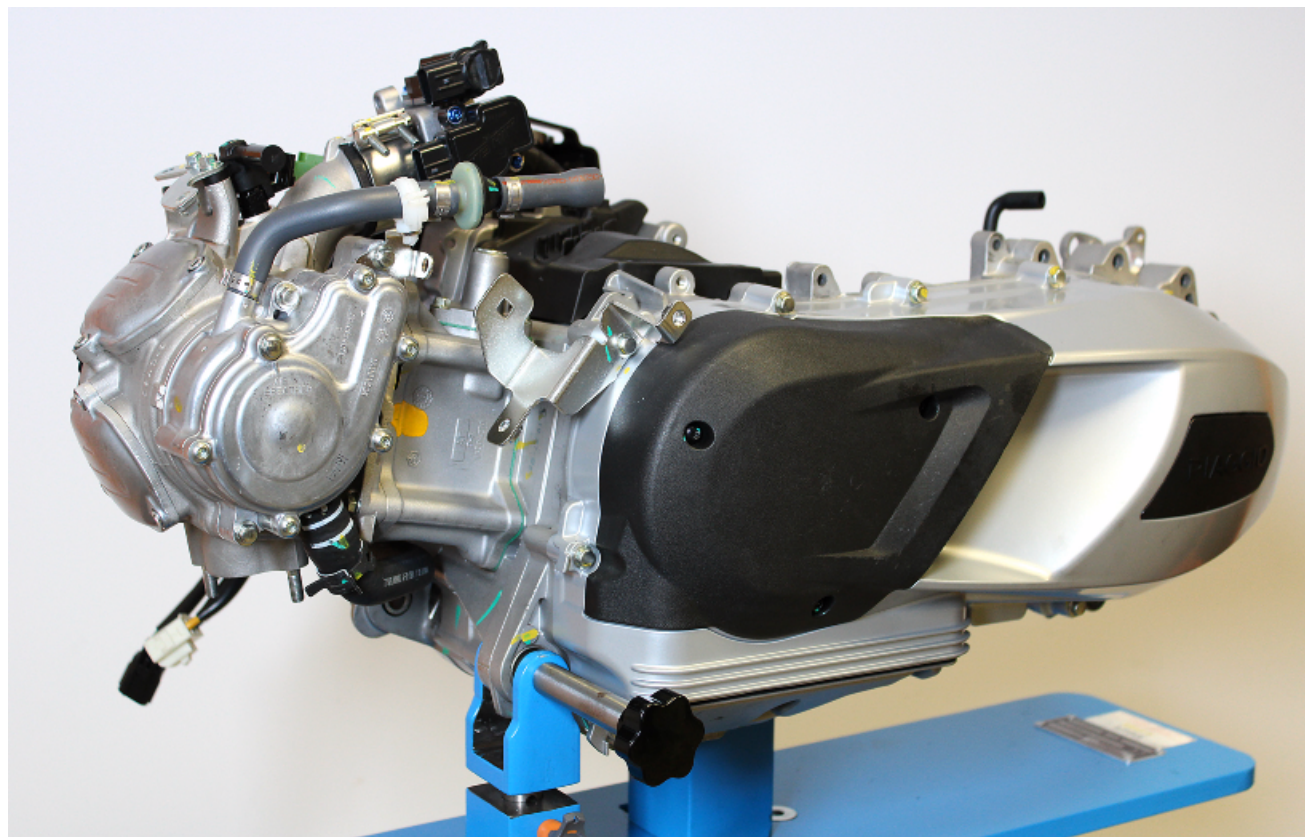
Fit the helmet compartment.

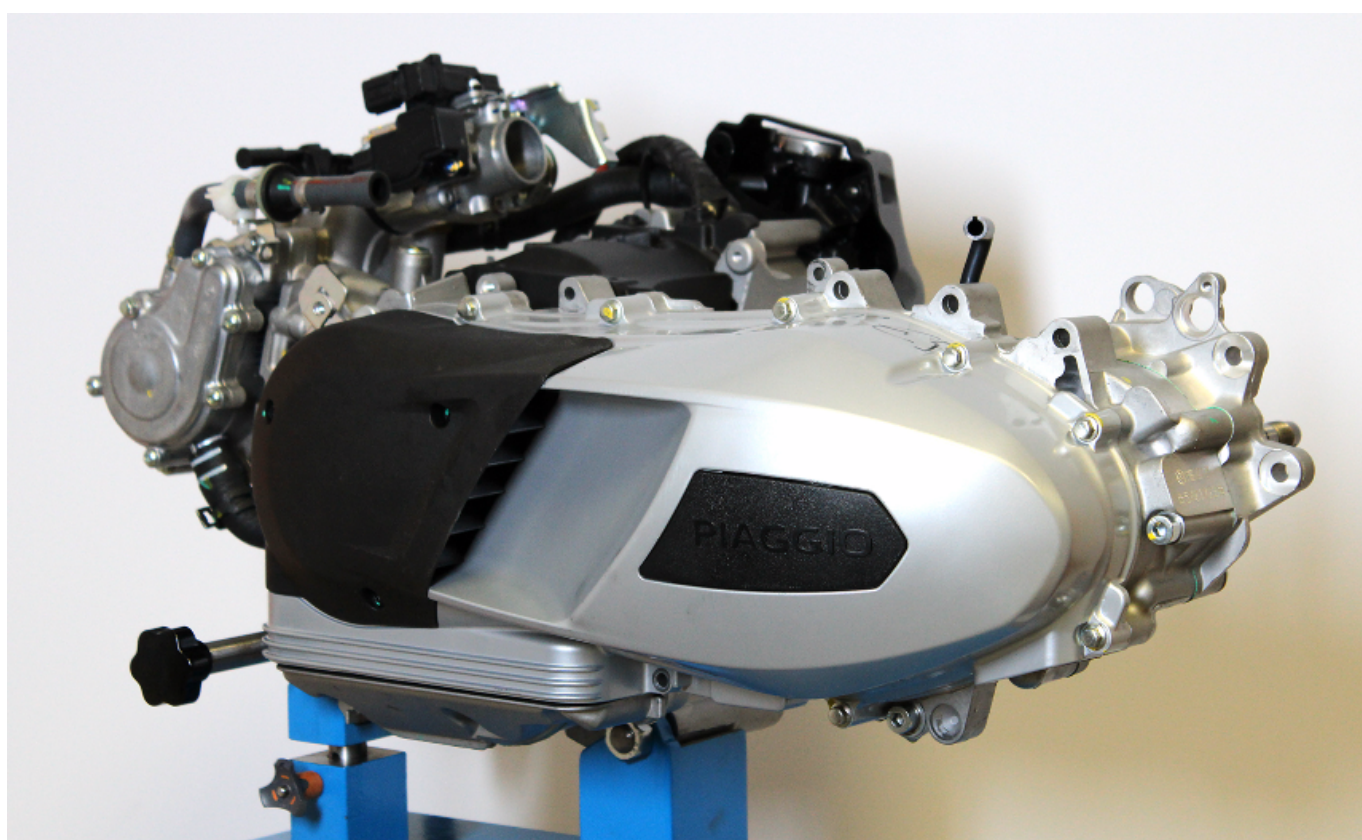
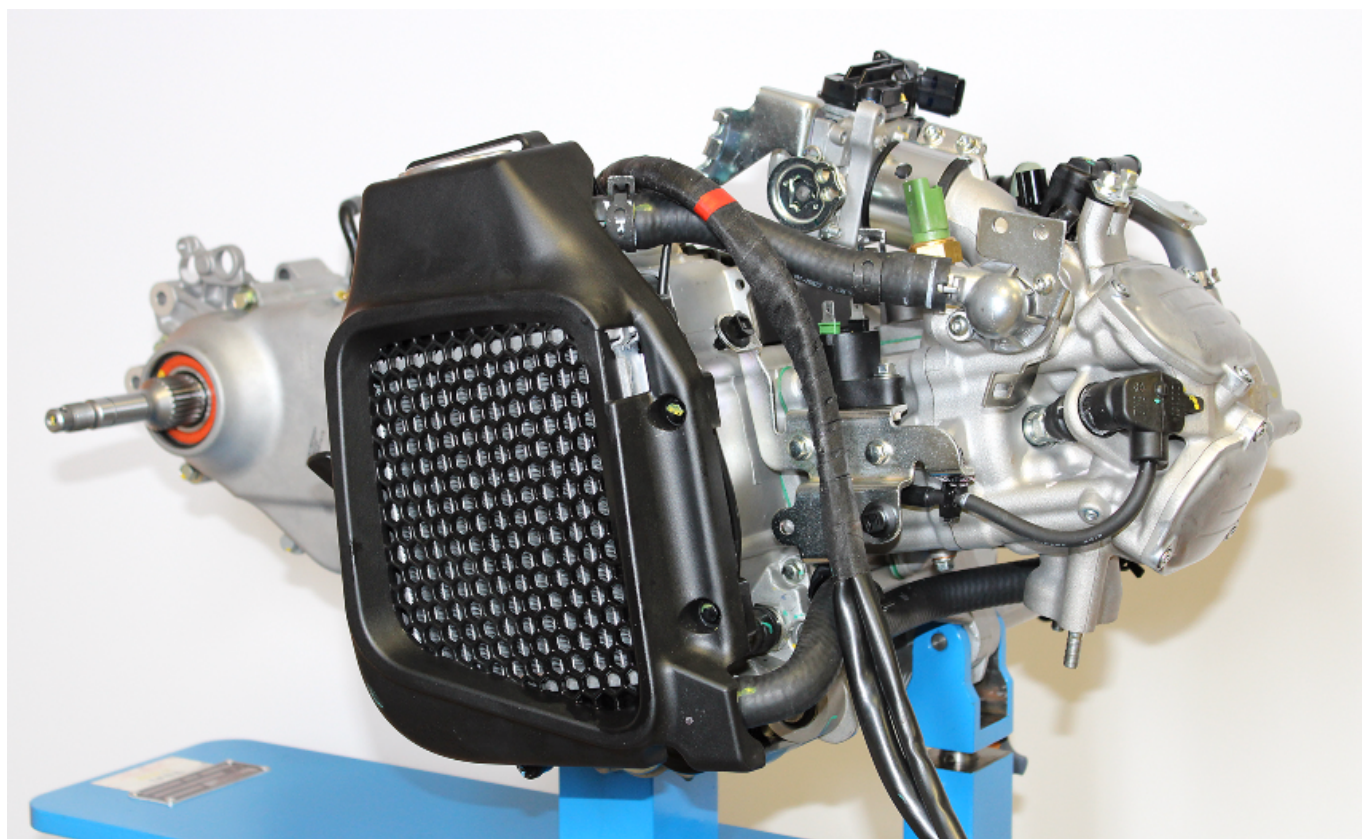


INDEX OF TOPICS

ENGINE

ENG





Automatic transmission

Transmission cover



To remove the transmission cover, proceed as follows:

- Remove the plastic plug.



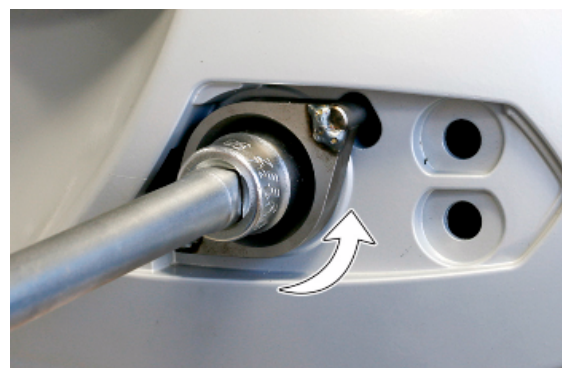
- Remove the air duct.
- Remove the plastic cover of the rear wheel axle.
- Insert the specific tools, rotate the engine until the driven pulley stops.

Specific tooling

020994Y Driven pulley stop



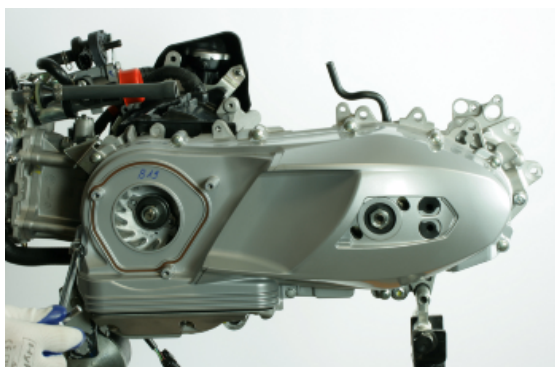
- Unscrew the wheel axle nut.



- Remove the specific tool, the wheel axle nut and collect the washer.



- Unscrew the ten screws fixing the engine and remove the transmission cover.



Air duct

- Remove the plastic cover.



- Unscrew the screws indicated and remove the duct.



Removing the driven pulley shaft bearing

- Remove the Seeger ring.

CAUTION

PLACE THE COVER ON A SURFACE, REMOVING OR EXCLUDING THE ALIGNMENT DOWELS.



- Support the transmission cover adequately.
- Using appropriate tools, remove the bearing.

Specific tooling

020376Y Adaptor handle

020357Y 32 x 35-mm Adaptor

020412Y 15-mm guide



Refitting the driven pulley shaft bearing

- Use the heat gun to heat the inner part of the lid.
- Using the equipment plant a new bearing, apply grease on the adaptor and guide in order to maintain the position of the bearing during operation on the vertical axis.

Specific tooling

020151Y Air heater

020376Y Adaptor handle

020358Y 37 x 40 mm Adaptor

020412Y 15-mm guide

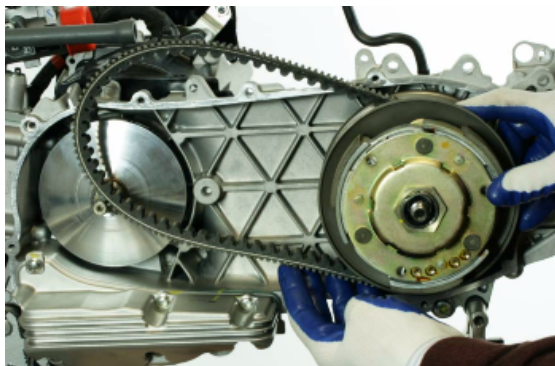
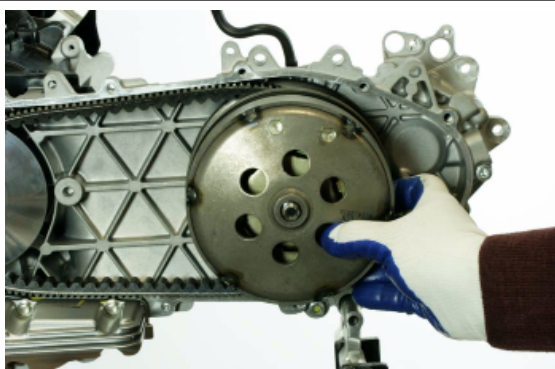


- Insert the Seeger ring.
- Insert the alignment dowels if removed during disassembly.



Removing the driven pulley

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



Inspecting the clutch drum

- Make sure that the clutch housing is not worn or damaged.
- Measure the clutch housing inside diameter.

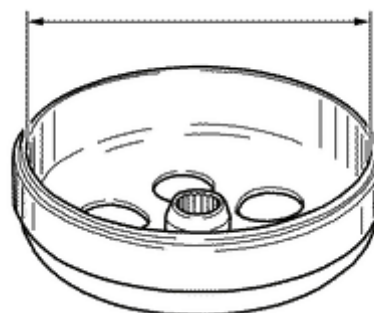
Characteristic

Clutch housing max. value

Max. value: Ø 134.5 mm

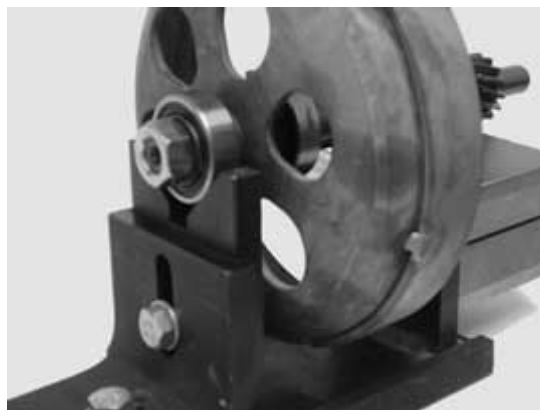
clutch housing standard value

Standard value: Ø 134 - 134.2 mm

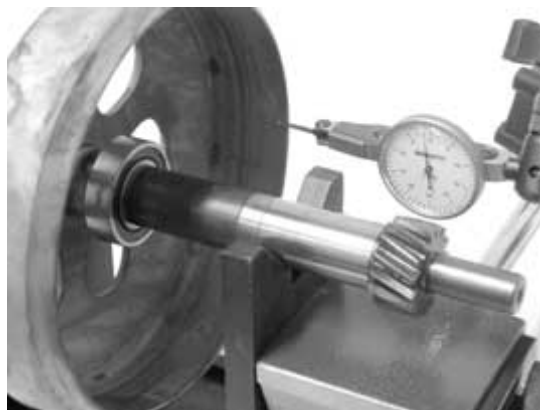


Checking the bell working surface eccentricity

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



- Using a dial gauge and the magnetic base, measure the bell eccentricity.
- Repeat the measurement at 3 positions (Central, internal, external).
- In case of faults, replace the bell.

**Specific tooling**

020074Y Support base for checking crankshaft alignment

020335Y Magnetic mounting for dial gauge

Characteristic

clutch housing check: Limit eccentricity.

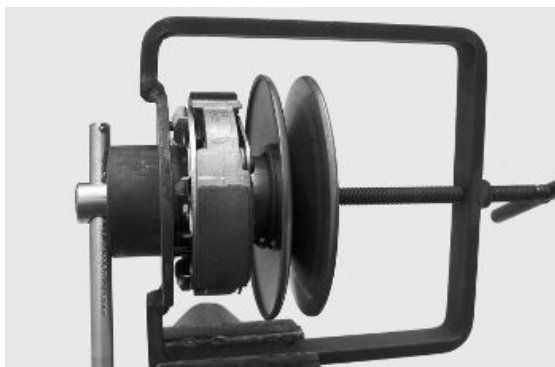
Admissible limit eccentricity: 0.15 mm

Removing the clutch

- Prepare the locking tool for the driven pulley with the pins half-screwed in the tool set to «C».
- Introduce the adapter ring 11 with the chamfering facing the inside of the tool.



- Fit the driven pulley unit in the tool so as the bolt get into the masses clutch support holes. Afterwards make the support screw make contact with a minimum force.
- Using the specific wrench, inserted 46 mm from the side, remove the clutch central locking nut.



- Separate the components of the driven pulley.

CAUTION

THE TOOL MUST BE FIRMLY FIXED IN THE VICE AND THE CENTRAL SCREW MUST NOT BE TIGHTENED WITH EXCESSIVE TORQUE AS THIS MAY DAMAGE THE PULLEY OR DEFORM THE SPECIFIC TOOL.

Specific tooling

020444Y Tool for installing/removing clutch on/from driven pulley

020444Y011 adapter ring

020444Y009 wrench 46 x 55



Inspecting the clutch

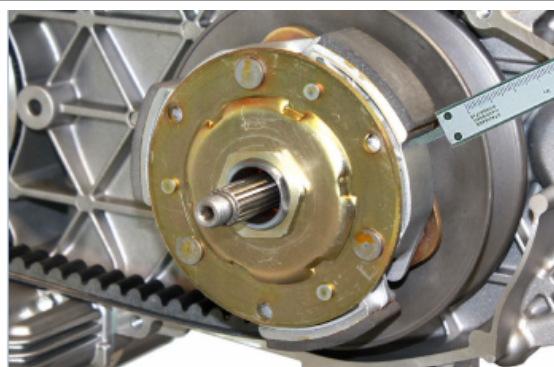
- Check the thickness of the clutch mass friction material.
- The masses must exhibit no traces of lubricants; in that case, check the driven pulley unit seals.

N.B.

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

CAUTION

DO NOT USE TOOLS TO OPEN THE MASSES TO AVOID VARIATION IN THE RETURN SPRING LOAD.



Characteristic**Check minimum thickness**

1 mm

Pin retaining collar

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

N.B.

USE TWO SCREWDRIVERS IF YOU HAVE ANY DIFFICULTY.

N.B.

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



Inspecting the driven fixed half-pulley

- Measure the outside diameter of the pulley bushing.

Characteristic**Standard diameter:**

Ø 40.1 ± 0.05 mm

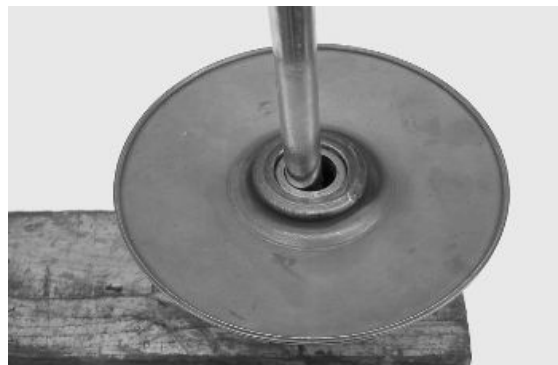


Removing the driven half-pulley bearing

- Remove the retainer ring using two flat blade screwdrivers.
- Using a hammer and pin, knock the ball bearing out as shown in the figure.
- Remove the bearing and the rollers with the specific extractor.

N.B.

REST THE DRIVEN PULLEY ON A WOODEN SURFACE TO AVOID DAMAGING ITS THREADED BUSHING. ALSO DO THIS UPON REMOVAL.

Specific tooling

001467Y008 Clamp to extract 17 mm ø bearings

001467Y009 Bell for OD 42-mm bearings



Refitting the driven half-pulley bearing

- Assemble a new roller bearing using the specific punch, fit the bearing with the label facing outward and insert it completely up to the punch on the half-pulley.

N.B.

REST THE DRIVEN PULLEY ON A WOODEN SURFACE TO AVOID DAMAGING ITS THREADED BUSHING. ALSO DO THIS UPON REMOVAL.

Specific tooling

020424Y Driven pulley roller casing fitting punch



- To assemble the new ball bearing, insert it fully down in its seat with the specific punch and finally fit the seeger ring.

Specific tooling

020375Y 28 x 30 mm adaptor

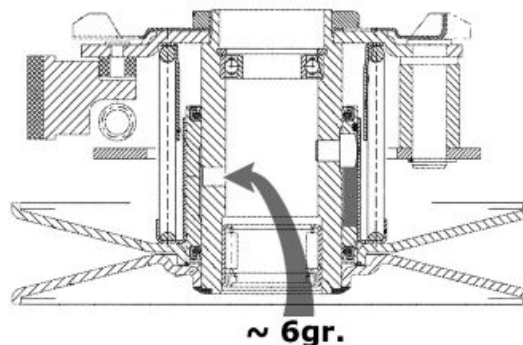
020376Y Adaptor handle

020439Y 17-mm guide



Refitting the driven pulley

- Check that the faying surfaces of the 2 half-pulleys and the belt do not show any signs of wear, scoring or grease.
- Insert the new oil seals and O-rings on the movable half-pulley.
- Fit the half-pulley on the bushing with the appropriate protection sheath.
- Make sure the pins and collar are not worn, refit the pins and the collar.
- Use a greaser with a curved spout to lubricate the driven pulley unit with around 6 g of grease. This operation must be done through one of the holes inside the bushing until grease comes out of the opposite hole. This operation is necessary to avoid the presence of grease beyond the O-rings.



Specific tooling

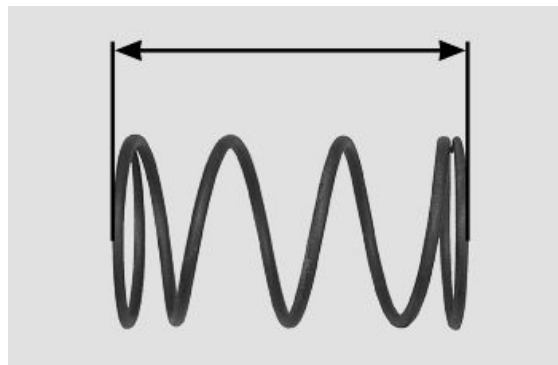
020263Y Driven pulley assembly sheath

Inspecting the clutch spring

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

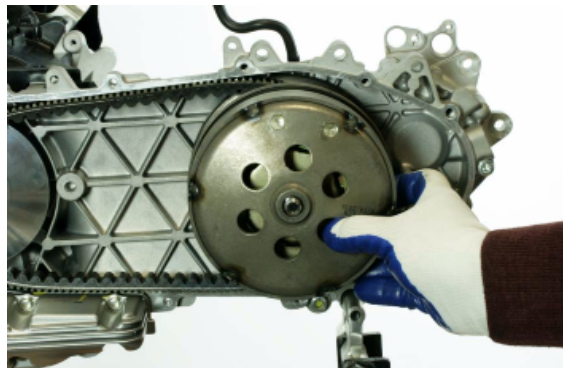
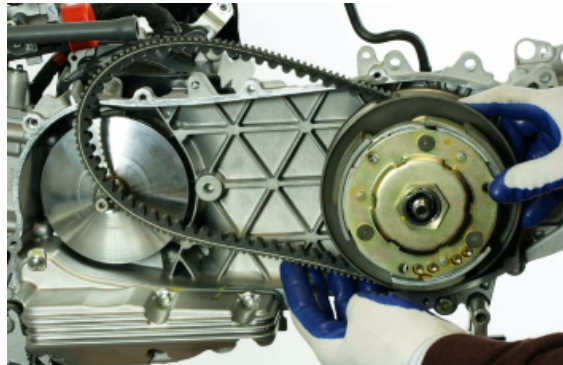
Characteristic
Standard length

88 mm



Refitting the driven pulley

- perform the operations in reverse order of disassembly.



Drive-belt

- Make sure the drive belt is not damaged and does not show abnormal wear.
- Replace according to the scheduled maintenance table.

Removing the driving pulley

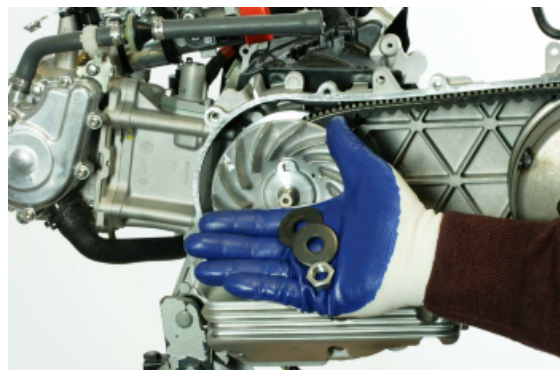
- using specific tools, lock the driving pulley and loosen the nut.

Specific tooling

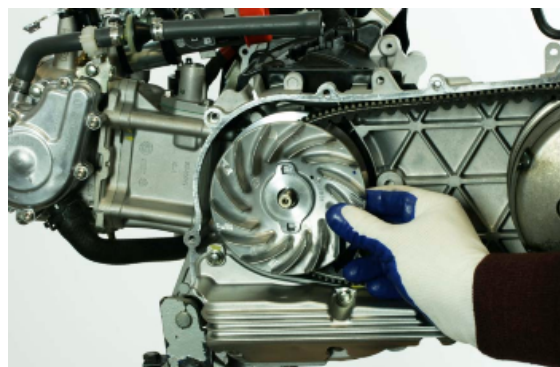
020938Y Drive pulley lock



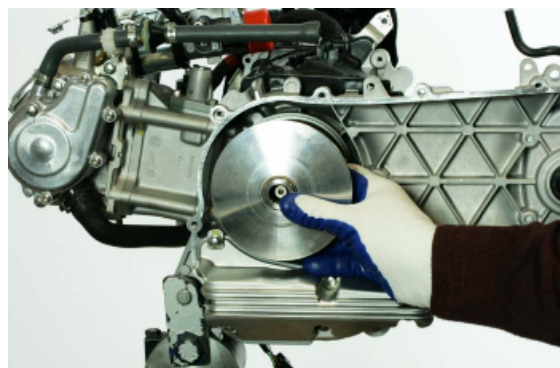
- remove the flat washer and the cup washer.



- remove the stationary half-pulley and the washer.



- disengage the belt.
- remove the complete roller housing.



Inspecting the rollers case

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



- Check that stationary driving pulley does not show signs of abnormal wear on the grooved edge and on the surface in contact with the belt.

CAUTION

DO NOT LUBRICATE OR CLEAN SINTERED BUSHINGS

Characteristic

movable driving half-pulley bushing: Standard Diameter

26.000 - 26.021 mm

Sliding bushing

Ø26 (-0.020 -0.041)mm

Characteristic

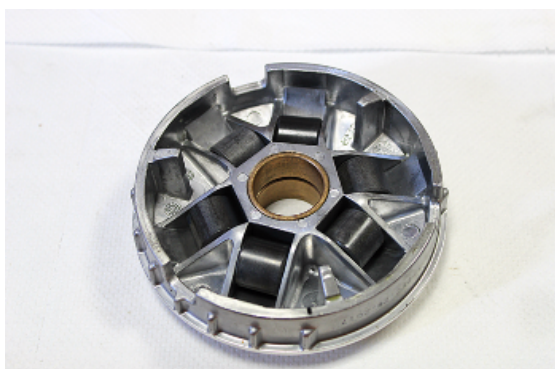
CVT rollers ø 19 mm

Wear limit ø 18.4 mm

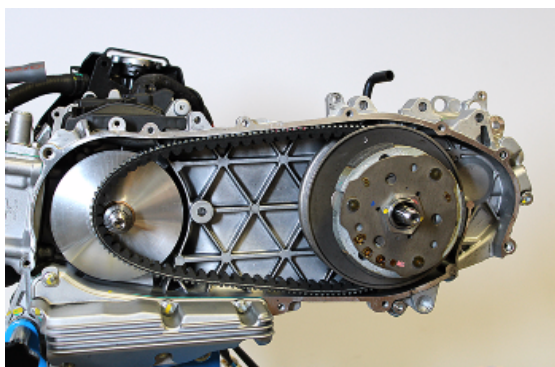


Refitting the driving pulley

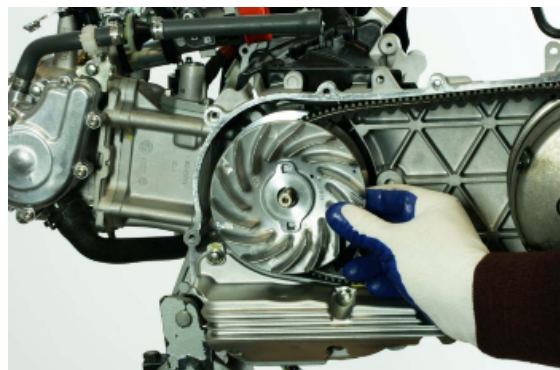
- Insert the rollers in the mobile pulley half.



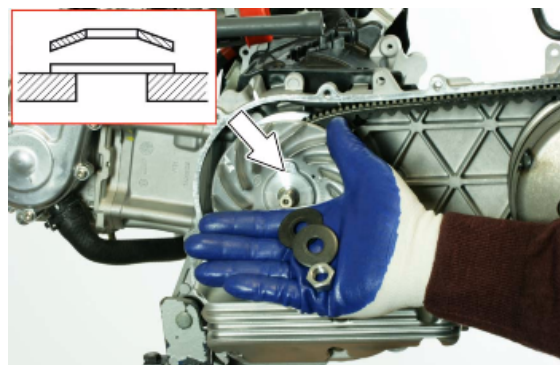
- Assemble the mobile drive pulley half.
- Place the driven pulley and the drive belt



- Insert the stationary drive pulley half.



- Insert in the following order: the washer, the spring washer and the nut.



- tighten the torque using the specific tool to lock the pulley.

CAUTION

DURING THE INSTALLATION PAY SPECIAL ATTENTION TO THE ASSEMBLY OF THE SPRING WASHER, AS SHOWN IN FIGURE.

Locking torques (N*m)

driving pulley retainer nut 75 - 83



Refitting the transmission cover

Follow the removal steps but in reverse order; be careful to tighten to the prescribed torques.

Locking torques (N*m)

Clutch cover retainer screws 10.8 - 12.8



End gear

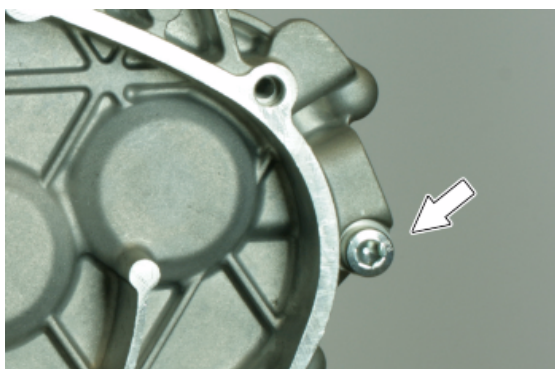
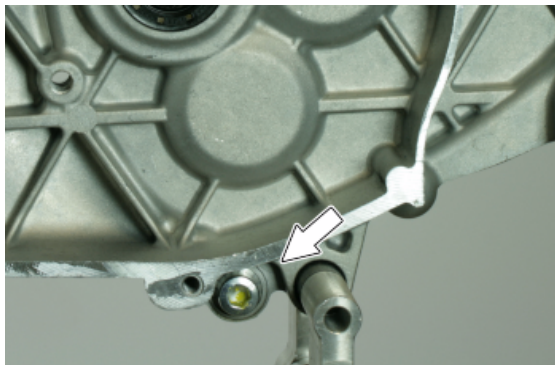
Removing the hub cover

- Use a container large enough to recover the final reduction oil. Unscrew the indicated screw and re-cover the aluminium seal.
- Unscrew the oil filler screw in order to facilitate bleeding.

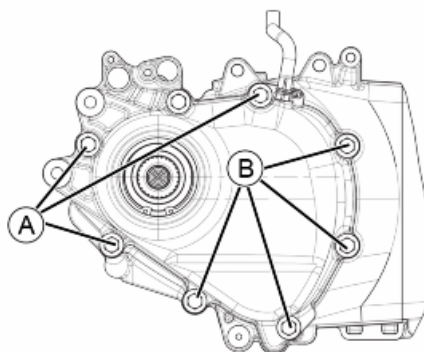
Characteristic

Hub oil quantity

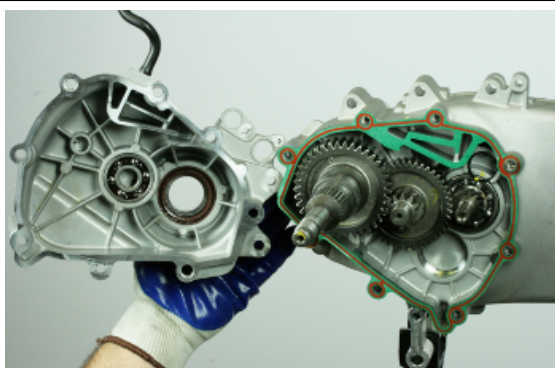
325 cm³



- Undo the three screws «A» and the four screws «B».



- Remove the final reduction cap paying attention to the gears.
- Remove the gasket paying attention to the positioning of the dowels.



Removing the hub bearings

Removing the clutch shaft bearing

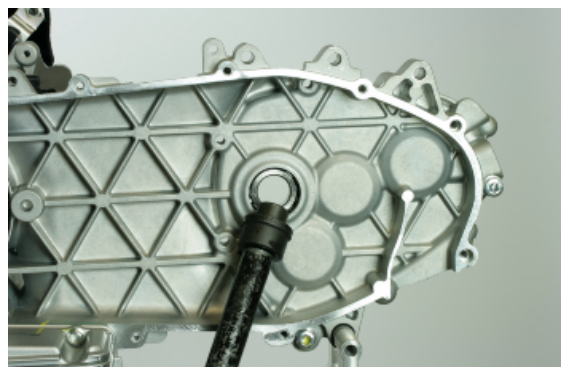
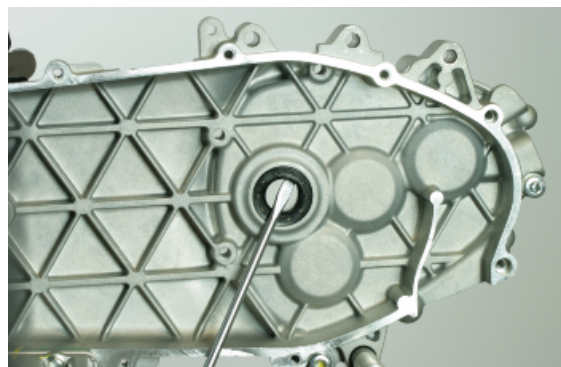
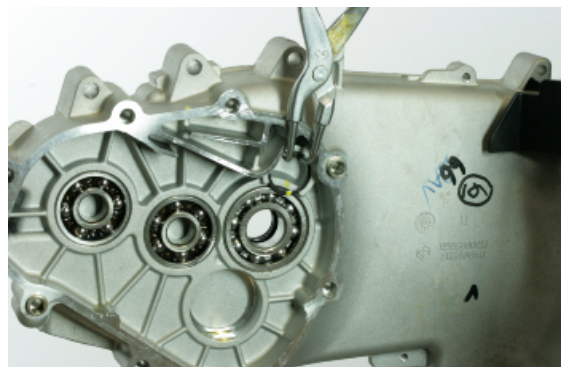
- Remove the Seeger ring.
- Remove the oil seal from the opposite side.
- Remove the bearing working from the external side and using the specific tools.

Specific tooling

020376Y Adaptor handle

020363Y 20-mm guide

020357Y 32 x 35-mm Adaptor



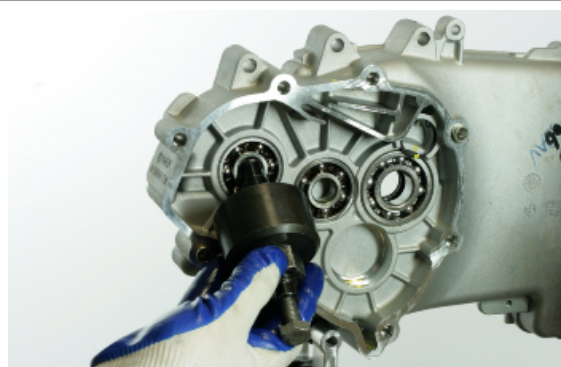
Removing the intermediate gear bearing

- Remove the bearing using the specific tools

Specific tooling

001467Y009 Bell for OD 42-mm bearings

001467Y013 Calliper to extract \varnothing 15-mm bearings



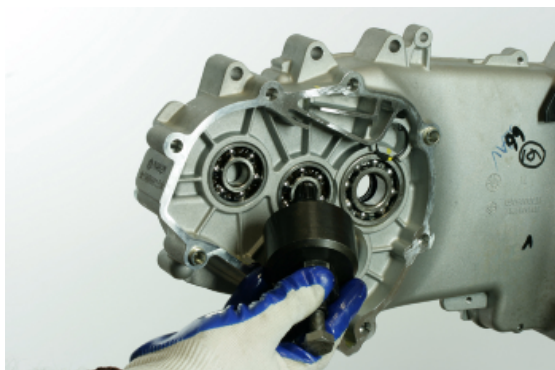
Wheel axle bearing removal

- Remove the bearing using the specific tools

Specific tooling

001467Y009 Bell for OD 42-mm bearings

001467Y013 Calliper to extract \varnothing 15-mm bearings

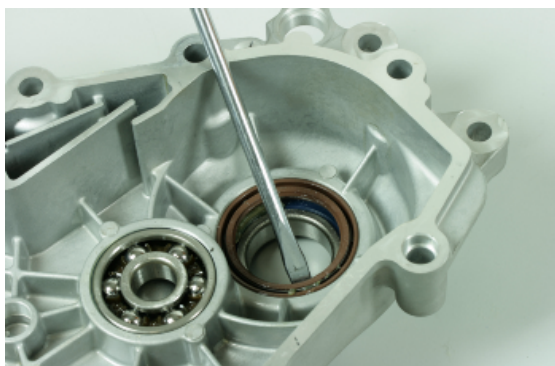


Removing the wheel axle bearings

- Support the hub cover properly to avoid damaging the sealing surface with the crankcase.
- Remove the Seeger ring from the outside.



- Operating on the inside, remove the oil seal.



- Remove the wheel axle bearing using the specific tool.

Specific tooling

020376Y Adaptor handle

020359S 42 x 47 mm Adaptor

020483Y 30-mm guide



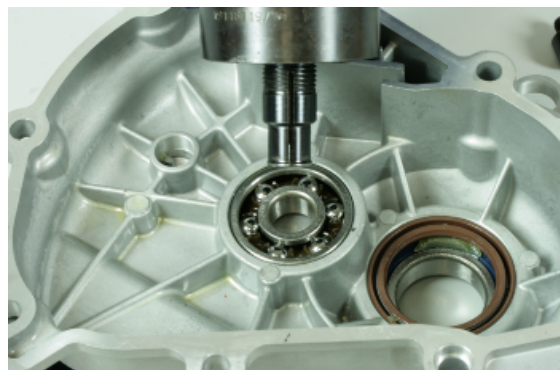
Removing the intermediate gear bearing

- Remove the bearing using the specific tools

Specific tooling

001467Y013 Calliper to extract \varnothing 15-mm bearings

001467Y009 Bell for OD 42-mm bearings

**Inspecting the hub shaft**

- Check the three shafts and the intermediate gear for wear or distortion of the toothed surfaces, the bearing housings, and the oil seal housings.
- In case of faults, replace the damaged parts.

Characteristic**Driven pulley shaft**

A: 22(-0.01 -0.02)mm

Wheel axle

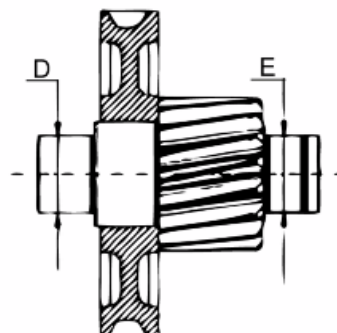
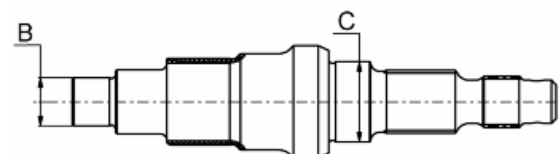
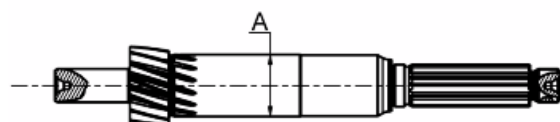
B: 15(-0.010 -0.020)mm

C: 25(-0.007 -0.020)mm

Intermediate gear

D: 15(-0.01 -0.02)mm

E: 15(-0.01 -0.02)mm

**Inspecting the hub cover**

- Check that the fitting surface is not dented or distorted.

- Check the bearing bearings.
- In case of faults, replace the damaged components.

Refitting the driven pulley shaft bearing

- Use the heat gun to heat the bearing seat.
- Set a new bearing using the specific equipment.
- Insert a locking seeger.

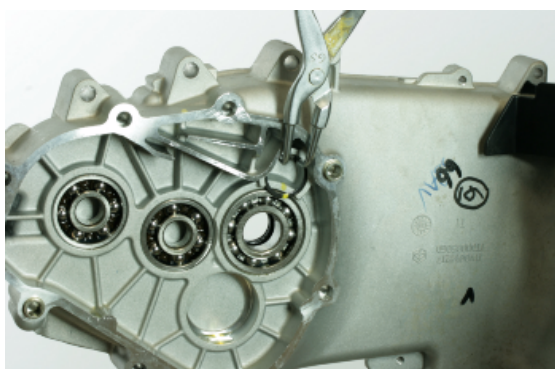
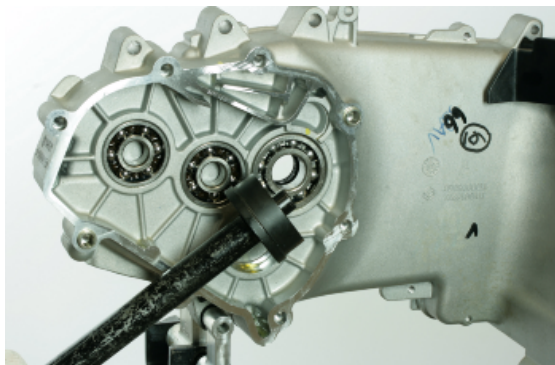
Specific tooling

020151Y Air heater

020376Y Adaptor handle

020360S 52 x 55 mm adaptor

020363Y 20-mm guide



- Insert a new oil seal using the specific tool.

Specific tooling

020376Y Adaptor handle

020363Y 20-mm guide

020357Y 32 x 35-mm Adaptor



Fitting the transmission shaft bearing

- Use the heat gun to heat the bearing seat.
- Set a new bearing using the specific equipment.

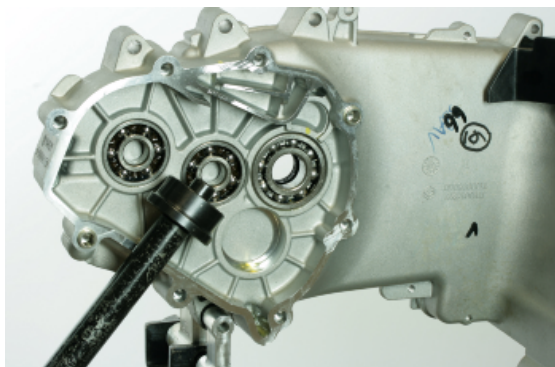
Specific tooling

020151Y Air heater

020376Y Adaptor handle

020359S 42 x 47 mm Adaptor - For main bearings and wheel axle

020412Y 15-mm guide



Fitting the Wheel axle bearing

- Use the heat gun to heat the bearing seat.
- Set a new bearing using the specific equipment.

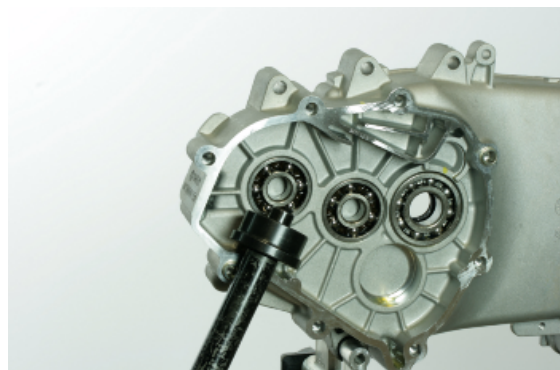
Specific tooling

020151Y Air heater

020376Y Adaptor handle

020359S 42 x 47 mm Adaptor - For main bearings and wheel axle

020412Y 15-mm guide



Refitting the hub cover bearings

Fitting the Wheel axle bearing

- Use the heat gun to heat the bearing seat.
- Plant a new bearing using the equipment, apply grease on the adaptor and guide in order to maintain the position of the bearing during operation on the vertical axis.
- Insert the Seeger ring.

Specific tooling

020151Y Air heater

020376Y Adaptor handle

020360S 52 x 55 mm adaptor

020364Y 25-mm guide

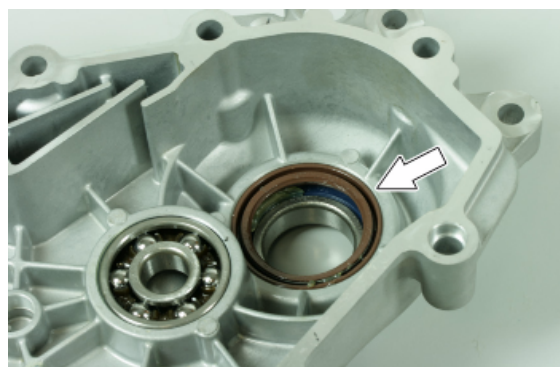
- Insert a new oil seal using the specific tool.

Specific tooling

020376Y Adaptor handle

020360S 52 x 55 mm adaptor

020483Y 30-mm guide

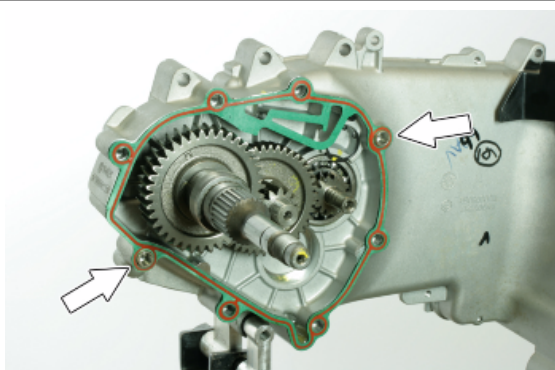
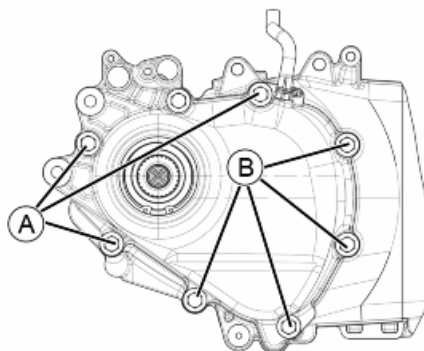


Fitting the transmission gear bearing

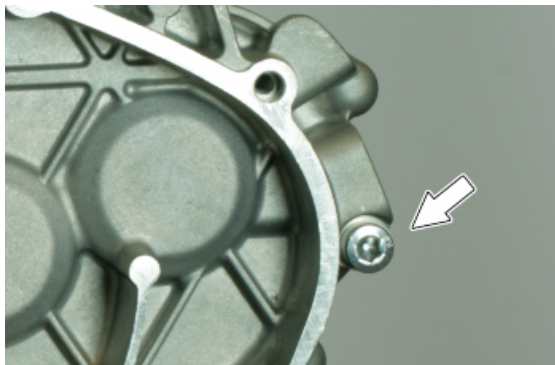
- Use the heat gun to heat the bearing seat.
- Using the equipment set a new bearing.

Specific tooling**020151Y Air heater****020376Y Adaptor handle****020359S 42 x 47 mm Adaptor****020412Y 15-mm guide****Refitting the ub cover**

- Check the proper position of the centring dowels.
- Install a new gasket.
- Fit the gearbox cover, making sure the breather pipe is in the correct position.

**Locking torques (N*m)****Final reduction cover screws 23 - 25**

- Restore the level of oil inside reduction unit with the recommended product, acting from the filler screw.
- Tighten to the specified torque.

Characteristic**Hub oil quantity**325 cm³**Locking torques (N*m)****Oil relief screw 15 ÷ 17 Hub oil drain screws 15 to 17**

Flywheel cover

Cooling hood

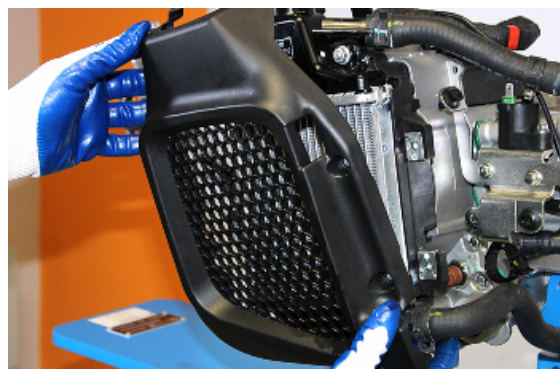
The radiator is protected by a plastic grille.

Removal

Unscrew and remove the fixing screws.

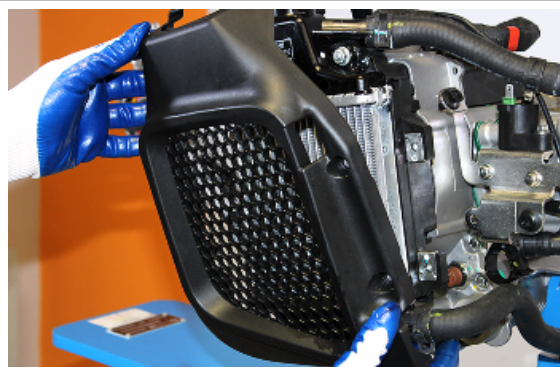


remove the protection grille



Fitting

place the protection grille.



Insert and tighten the fixing screws.



Cooling fan

CAUTION



ATTENTION THE FIXING IS GUARANTEED BY THE THREADLOCK.

- Undo the three fastening screws at the flywheel.



- For the fitting, tighten to the indicated torque applying the prescribed product.

Recommended products

Loctite 243 Medium strength thread-locking sealant.

Blue

Locking torques (N*m)

Pick-up screw and cables retainer plate - fly-wheel position sensor - flywheel - flywheel fan 5 - 6



Removing the stator

- Remove the flywheel.
- Cut the wiring harness sealing clamp.



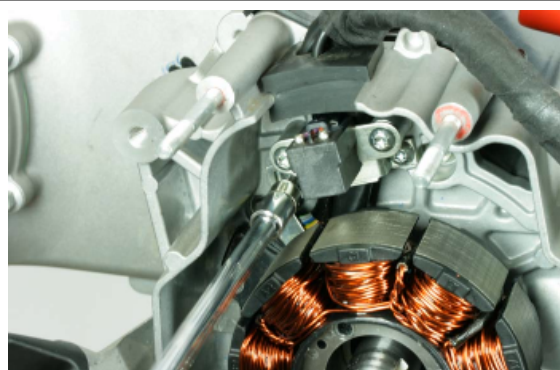
- Undo the three fastening screws.



- Undo the three fixing screws of the flywheel position sensor.



- Undo the two fixing screws of the cable retainer plate.

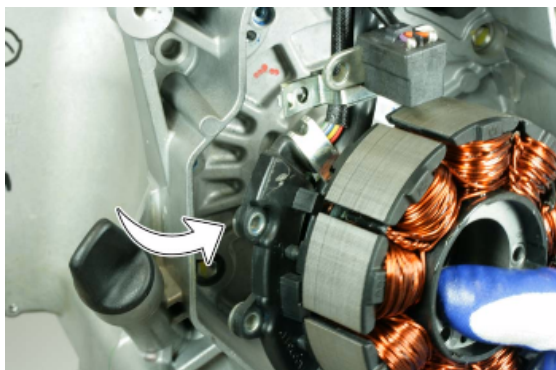


- Undo the two pick-up fixing screws.

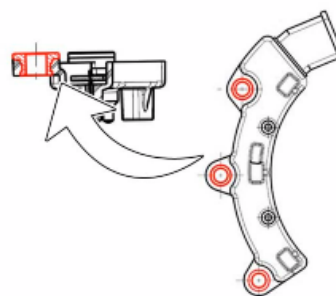
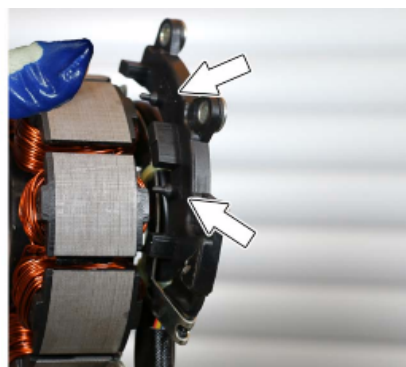


CAUTION

BEFORE REMOVING THE UNIT TOGETHER WITH THE STATOR, PICK-UP AND POSITION SENSOR, MAKE SURE THAT THERE IS ADHESION OF LATTER TO THE ENGINE CRANKCASE.

**CAUTION**

DO NOT PULL THE STATOR WHEN THE POSITION SENSOR PRESENTS ADHESION TO THE ENGINE CRANKCASE IN ORDER TO AVOID THE RISK OF BREAKAGE OF THE CENTRING PINS.
IF NECESSARY, HANDLE THE BUSHINGS HIGHLIGHTED IN THE FIGURE.

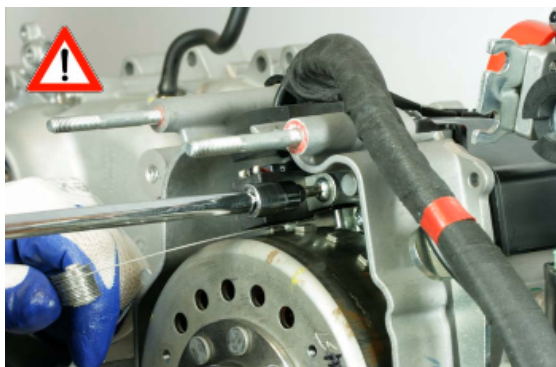


Refitting the stator

- perform the operations in reverse order of disassembly.

CAUTION

PAY ATTENTION TO THE FIXING OF THE PICK-UP, THE TORQUE TIGHTENING MUST OCCUR AFTER THE ADJUSTMENT OF THE AIR GAP DESCRIBED IN SECTION "FLYWHEEL AND MAGNET FLYWHEEL FITTING/START".



- For the fitting, tighten to the indicated torque applying the prescribed product.

Recommended products

Loctite 243 Medium strength thread-locking sealant.

Blue

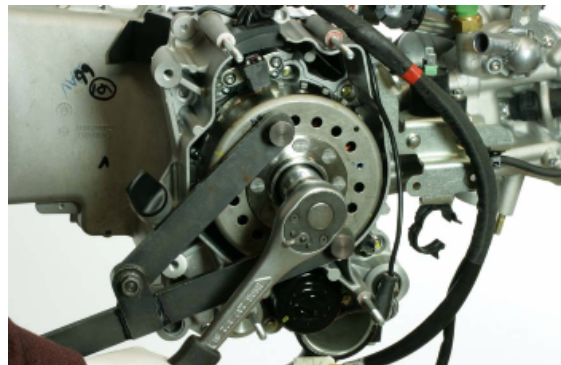
Locking torques (N*m)

Pick-up screw and cables retainer plate - flywheel position sensor - flywheel - flywheel fan 5 - 6

Flywheel and starting

Removing the flywheel magneto

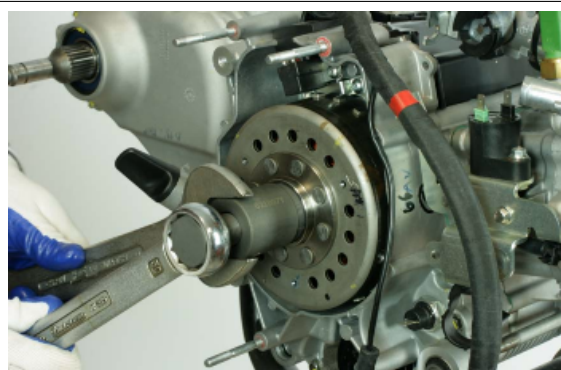
- Remove the cooling fan.
- Unscrew the nut and collect the washer.



- Using the special tool, remove the flywheel.

Specific tooling

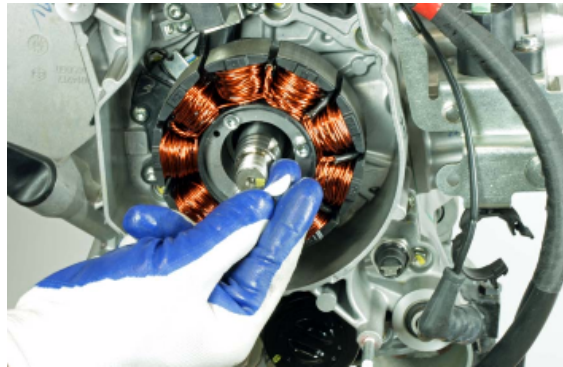
021007Y Flywheel extractor



- Manually grab the extractor, vigorously pull to win the magnetism resistance and remove the fly-wheel.



- Remove the cotter.



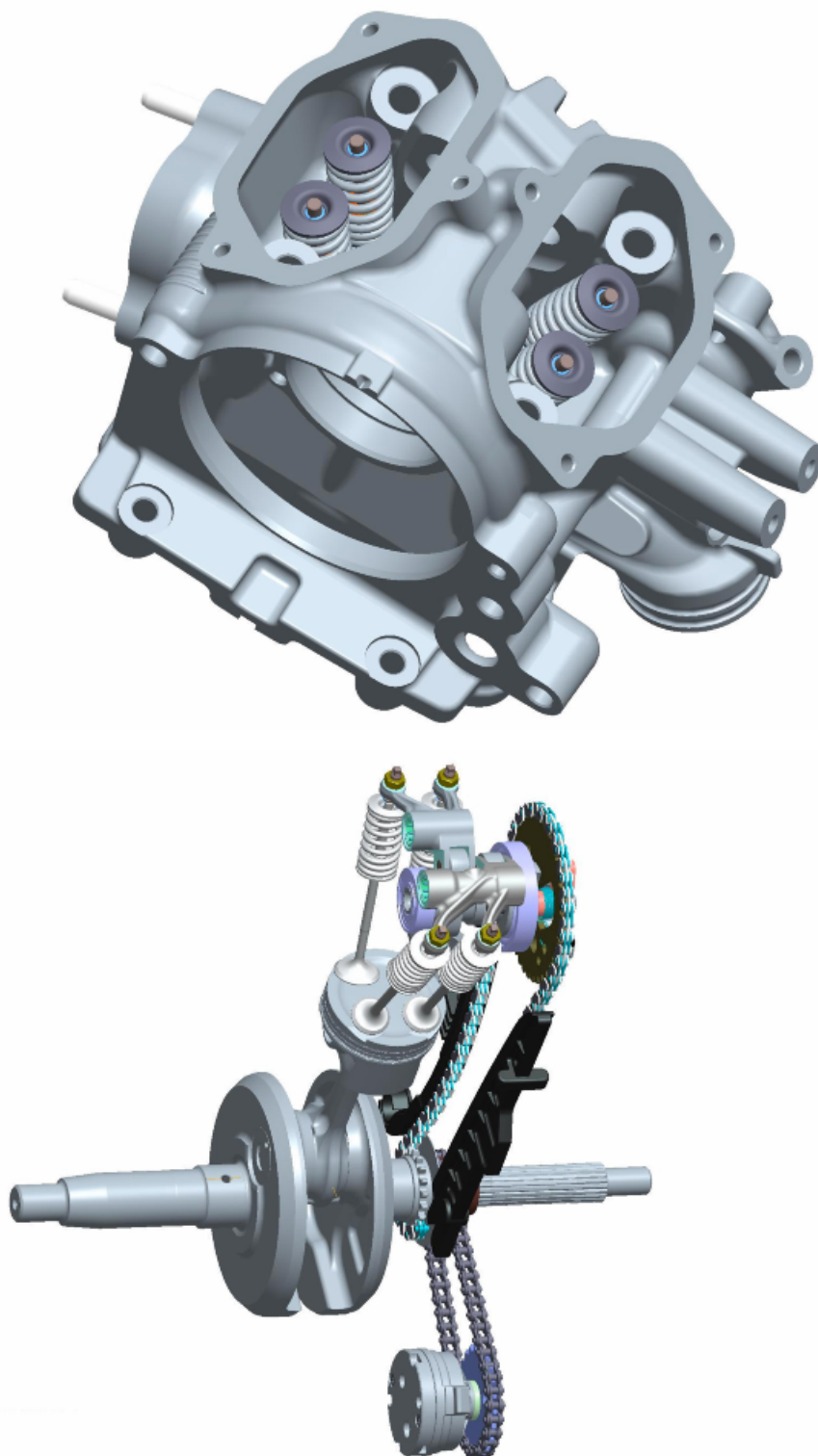
Refitting the flywheel magneto

- perform the operations in reverse order of disassembly.

Locking torques (N*m)

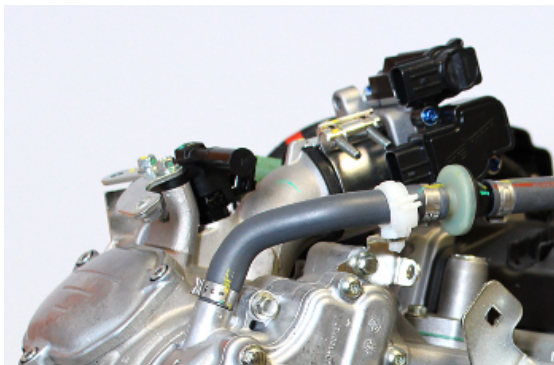
Flywheel fixing nut 75 - 83

Cylinder assy. and timing system



Removing the intake manifold

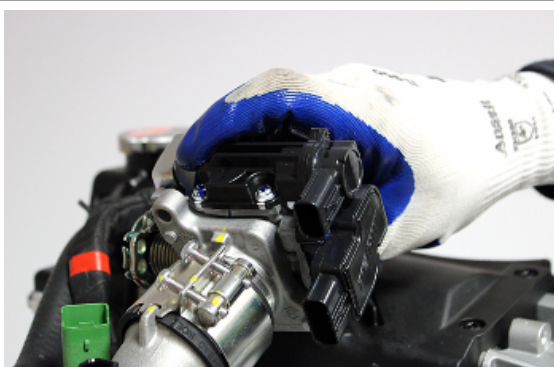
- The intake manifold is located on the big end.



- To remove the throttle body, loosen the metallic clamp screws located on the rubber coupling.

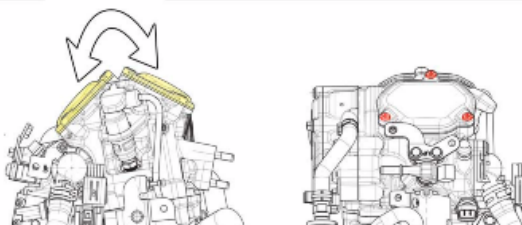


- Remove the throttle body by detaching it from the rubber coupling.



Removing the rocker-arms cover

- To remove the two valve covers, undo the three highlighted screws on both sides of the head.

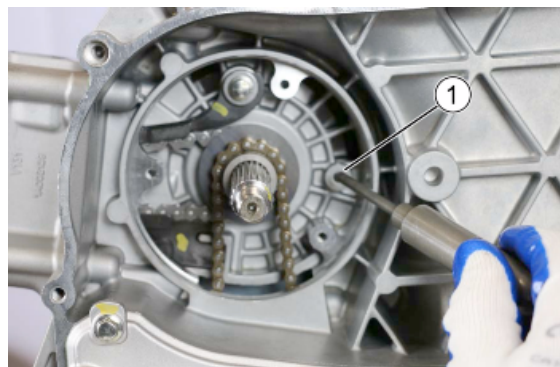


Removing the timing system drive

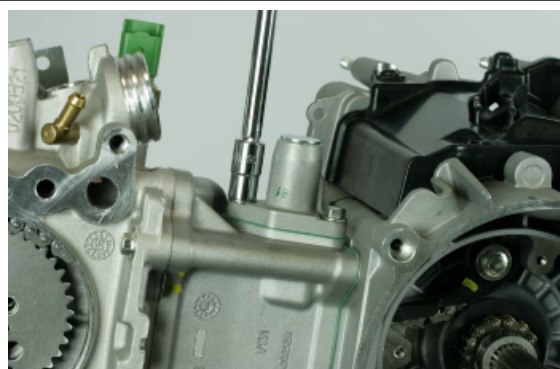
- Before performing interventions on the timing system, position the engine to the TDC in compression, then use the hole on the engine crankcase to insert the specific tool to lock the crankshaft.

Specific tooling

021006Y Lock for engine timing R.I.S.S.



- First loosen the tensioner and unscrew the fixing screws.
- Remove the tensioner complete with gasket.

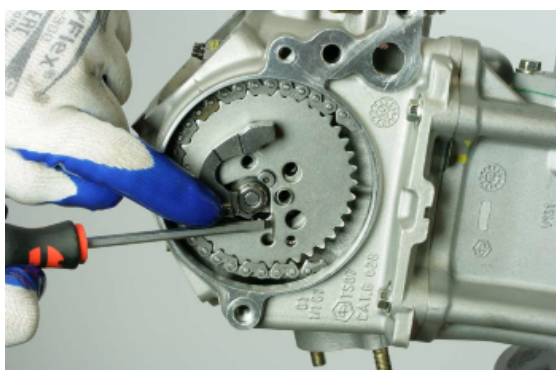
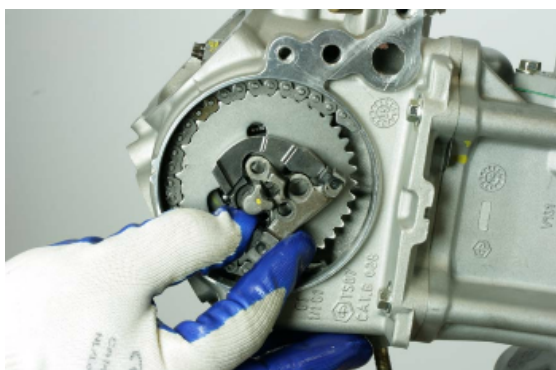
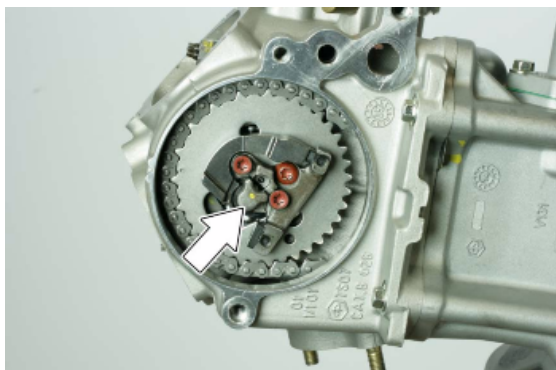


CAUTION



ATTENTION THE FIXING IS GUARANTEED BY THE THREADLOCK.

- Disassemble the coolant pump as described in section «**Water pump / removal**»
- Undo the three screws on the timing system gear.
- Remove the pressure reducer complete paying attention to disengage the spring from the sprocket.



- Disengage the timing system gear and remove the camshaft control sprocket.
- Remove the cylinder as described in section «**Engine/Piston cylinder disassembly**»



When the head is removed it is possible to remove the camshaft control components as described in the section «**Head-engine block-piston assembly / Head removal**».

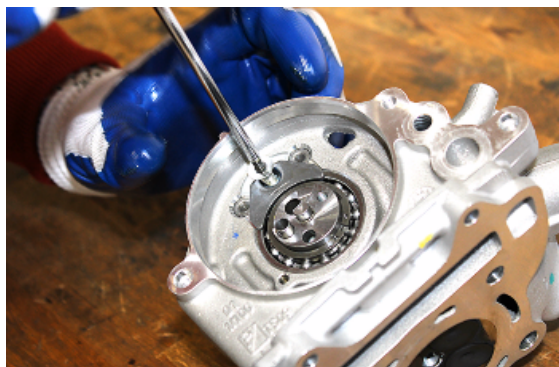
Removing the cam shaft

CAUTION



ATTENTION THE FIXING IS GUARANTEED BY THE THREADLOCK.

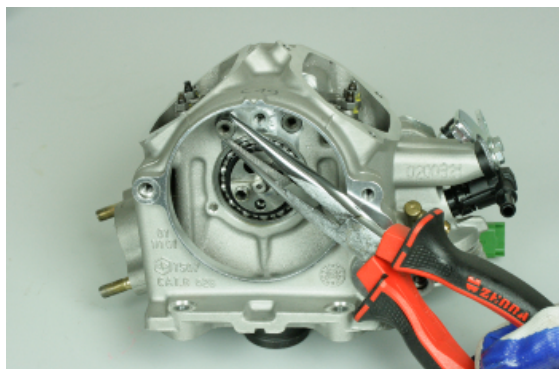
- Undo the camshaft lock screw.



- Remove the camshaft fixing plate.



- Remove the two pins.



- Remove the rockers.

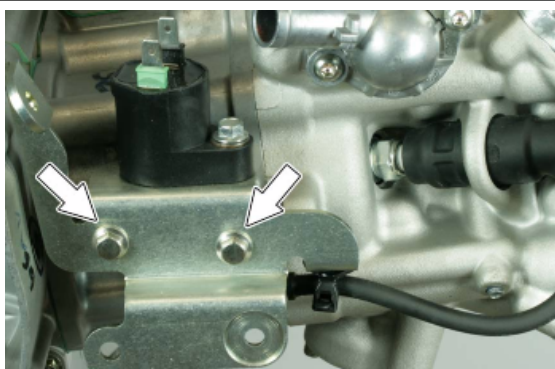


- Remove the camshaft.

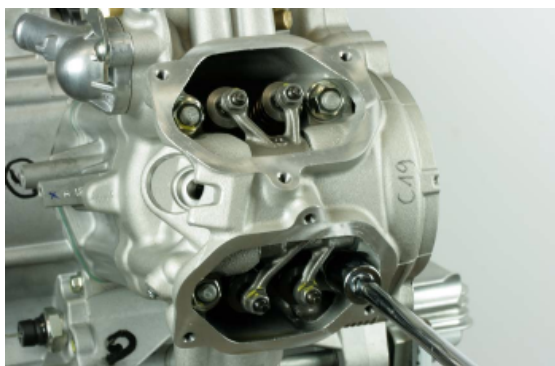


Removing the cylinder head

- Temporary remove the timing system sprocket, as described in section «**Head-engine block-piston assembly / Timing system control removal**»
- Remove the coil support fixing screws from the cylinder and remove the complete coil removing the tube from the spark plug.



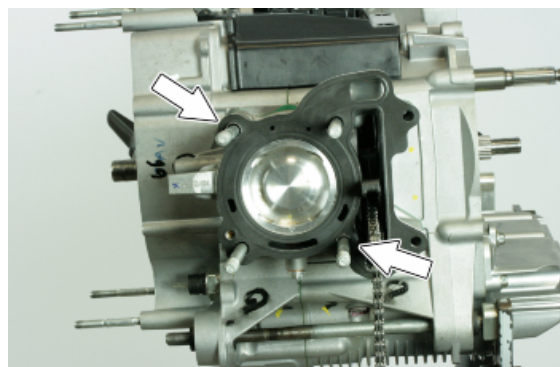
- First remove the valve covers as described in section "**Head-engine block-piston assembly and timing system / Tappet cover**".
- Undo the four fixing nuts inside the head and the two external screws timing system side.



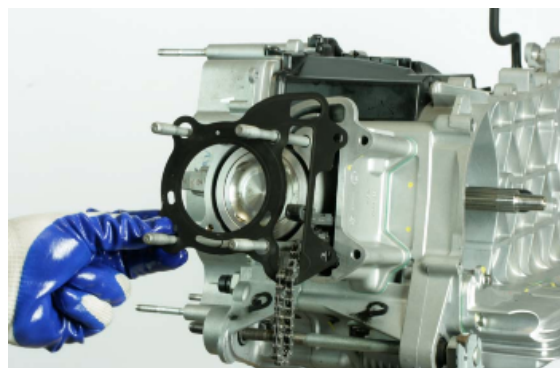
- Remove the head and the underlying gasket.



- Pay attention to the alignment dowels.



- Remove the gasket.



- Remove the inspection cover as described in sec. «Lubrication/Main bushing oil seals removal».
- Undo the chain tensioner pad fixing screw and remove it recovering the busher.
- Remove the tensioner slider.



- Remove the mobile chain guide slider.



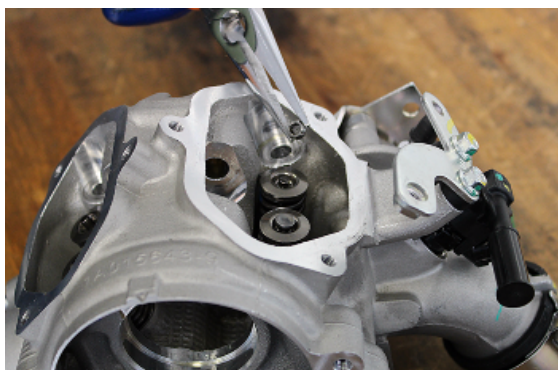
- Remove the fixed chain guide slider.



Removing the valves

Proceed as follows to remove the valves:

- Remove the valve terminals from the end of the intake valves.



- Place the valve removal specific tool in a vice.
- Insert the big end in the tool.

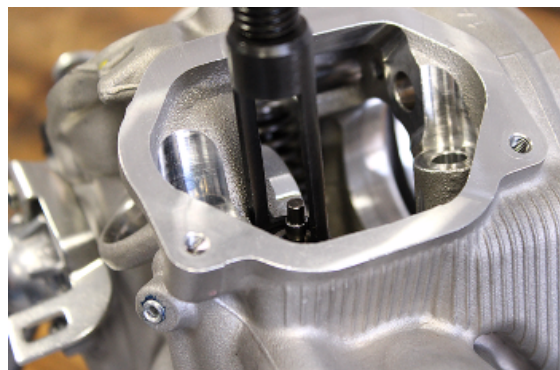
Specific tooling

020382Y Valve fitting/ removal tool

020382Y011 adapter for valve removal tool



- Operate the tool and compress the spring.



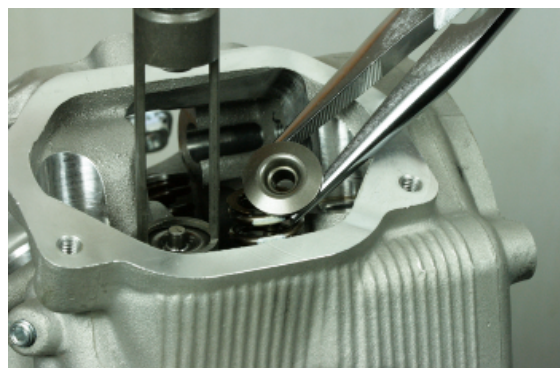
- Remove the cotter pins.

CAUTION

ARRANGE THE VALVES SO AS TO RECOGNISE THE ORIGINAL POSITION ON THE HEAD (FLYWHEEL SIDE AND TRANSMISSION SIDE).



- Operate the specific tool, releasing the pressure on the spring.
- Remove the big end from the tool.
- Remove the spring upper cap.



- Remove the spring.



- Remove the valve.



Removing the cylinder - piston assy.

- Remove the cylinder, paying attention to the cylinder-crankcase alignment dowels.

CAUTION

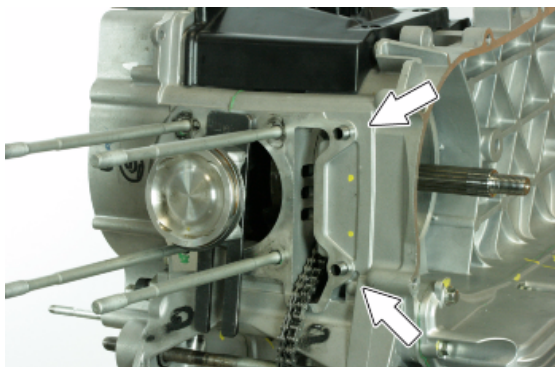
TO PREVENT DAMAGING THE PISTON, SUPPORT IT WHILE REMOVING THE CYLINDER.

N.B.

IN ORDER NOT TO DAMAGE THE BASE GASKET WITH THE PISTON LOCK FORK 020426Y DURING THE MOUNTING PHASE, IT IS RECOMMENDED TO INSERT THE ALIGNMENT DOWELS OF THE CYLINDER - CRANKCASE UNDER THE CYLINDER DURING THE ASSEMBLY.



- Remove the base gasket.



- Remove the retainer rings and remove the piston.

N.B.

BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL.



Inspecting the small end

N.B.

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

See also

[Crankcase - crankshaft - connecting rod](#)

Inspecting the wrist pin

N.B.

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

See also

[Cylinder - piston assy.](#)

Inspecting the piston

N.B.

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

See also

[Cylinder - piston assy.](#)

Inspecting the piston rings

N.B.

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

See also

[Piston rings](#)

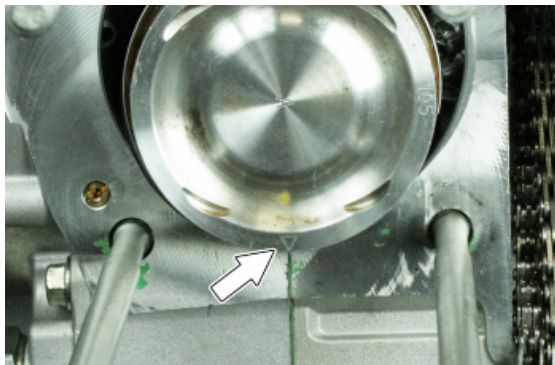
Removing the piston

- Fit the piston and pin onto the connecting rod, aligning the piston arrow towards the engine direction of rotation.

CAUTION



AT EVERY NEW MOUNTING USE RETAINER RING PINS.



Choosing the gasket

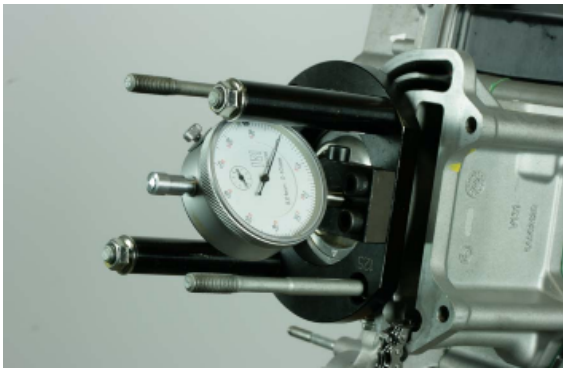
- Provisionally fit the piston into the cylinder, without any base gasket.
- Assemble a dial gauge on the specific tool.

Specific tooling

020942Y Piston protrusion check tool

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



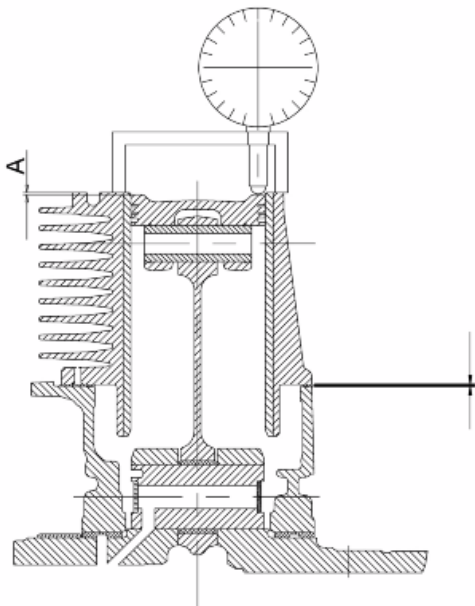


- By means of the table, see the Specifications chapter identify the cylinder base gasket thickness to be used for refitting. Correctly identify the cylinder base gasket thickness to keep the correct compression ratio.
- Remove the special tool and the cylinder.

Characteristic

Compression ratio

12 ± 0.5: 1



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

N.B.

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

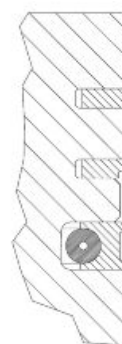
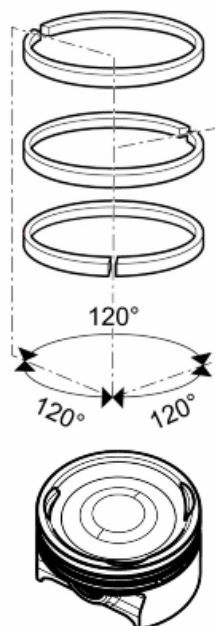
ENGINE 125/150 SHIMMING

Name	Measure A	Thickness
Shimming	0 - -0.1	0.8 ± 0.05

Name	Measure A	Thickness
Shimming	-0.1 - -0.3	0.6 ± 0.05
Shimming	-0.3 - -0.4	0.4 ± 0.05

See also[Slot packing system](#)**Refitting the piston rings**

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

CAUTION**AT EVERY NEW MOUNTING USE RETAINER RING PINS.**

Refitting the cylinder

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

N.B.

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

Specific tooling

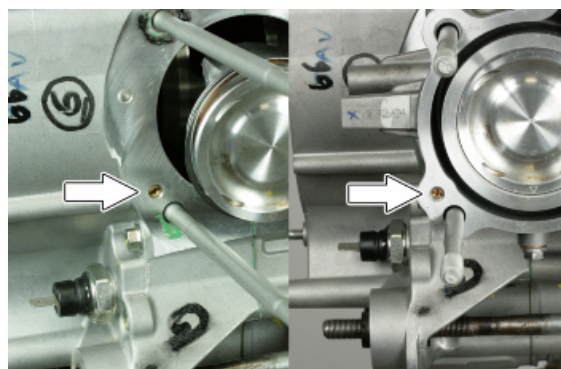
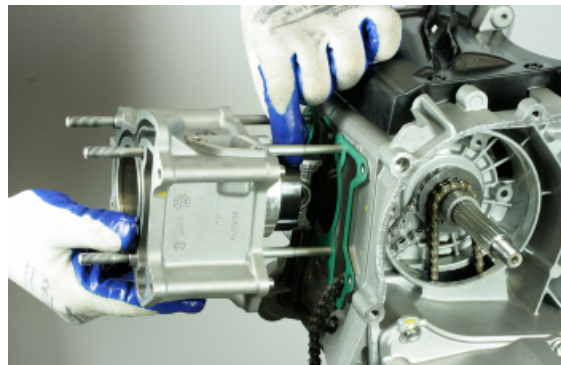
020426Y Piston fitting fork

020287Y Clamp for fitting piston on cylinder

Recommended products

Engine oil 0W -30 Synthetic lubricant for four stroke engines (-15°C < T < 40°C)

SAE 0W-30 ACEA A5/B5-04 - VW 503 00, 506 00, 506 01



Inspecting the cylinder head

N.B.

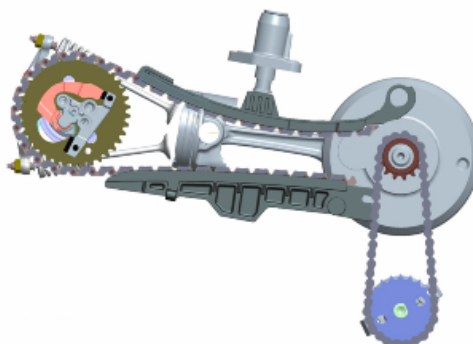
TO MEASURE WEAR LIMITS AND COUPLING CLEARANCES, SEE THE SPECIFICATIONS CHAPTER.

See also

[Cylinder Head](#)

Inspecting the timing system components

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



- If examples of wear are found, replace the whole unit.
 - When the components of the timing system are replaced, check the match of the correct pressure reducer ground.
 - To match the pressure reducer ground refer to chapter «Characteristics»
-

Inspecting the valve sealings

N.B.

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

See also

[Cylinder Head](#)

Inspecting the valves

N.B.

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

VALVE CLEARANCE CHECK

- Remove the valve covers.
- Position the engine to the TDC in compression.
- Using a feeler gauge check the valve clearance.
- To restore the values indicated, use the specific tool.

Specific tooling

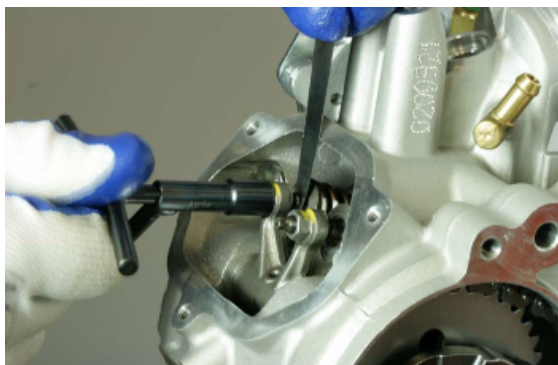
AP8140261 Valve clearance adjuster wrench

Characteristic

Valve clearance (cold engine)

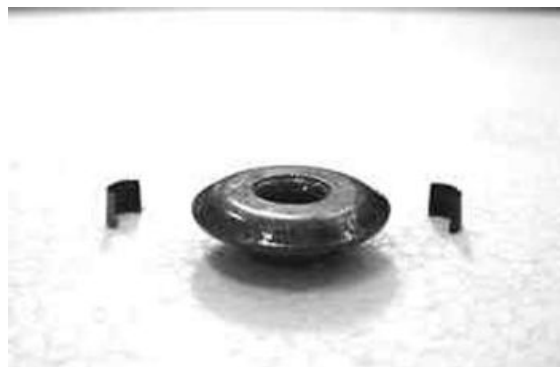
Intake: 0.10 mm

Exhaust: 0.15 mm



Inspecting the springs and half-cones

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



N.B.

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

See also

[Cylinder Head](#)

Refitting the valves

- Insert the valve.

N.B.

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



- Fit the spring.

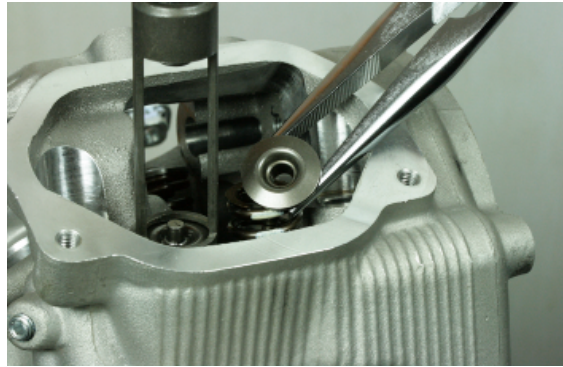
CAUTION



MOUNT THE VALVE SPRINGS WITH THE WHITE COLOURED COIL FACING UPWARD.



- Insert the spring upper cap.



- Place the big end in the tool.
- Operate the tool to compress the spring.

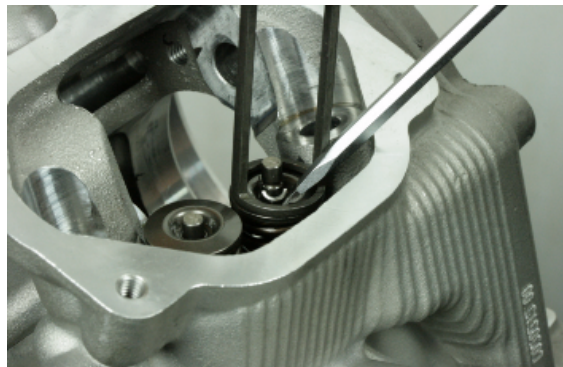
Specific tooling

020382Y Valve fitting/ removal tool

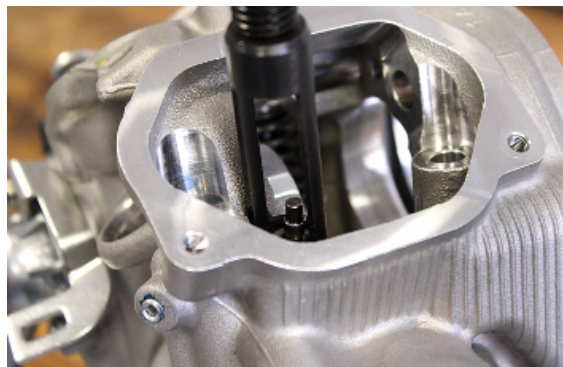
020382Y011 adapter for valve removal tool



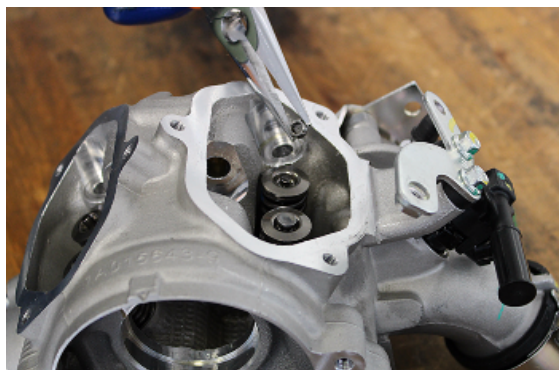
- Insert the cotter pins.



- Operate the specific tool, releasing the pressure on the spring.
- Remove the big end from the tool.



- Insert the valve terminals from the end of the intake valves.



Inspecting the cam shaft

N.B.

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

To remove the bearings of the camshaft, proceed as follows:

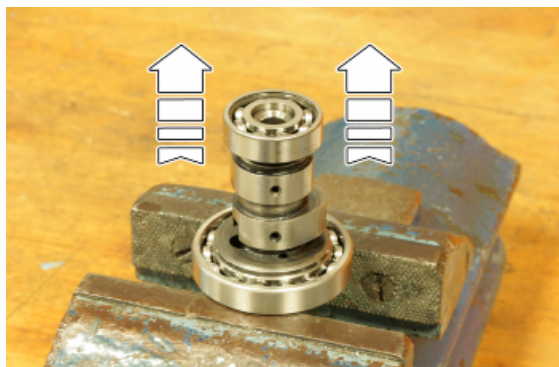
TIMING SYSTEM SIDE

- Hold the camshaft properly.
- Remove the Seeger ring.
- Remove the bearing using the press.



SPARK PLUG SIDE

- Hold the camshaft properly.
- Remove the bearing by levering.





To fit the bearings of the camshaft, proceed as follows:

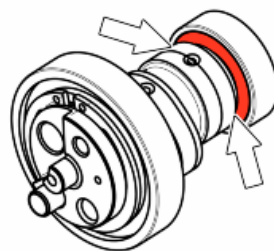
TIMING SYSTEM SIDE

- Hold the camshaft properly.
- Using the press, insert a new bearing and then the seeger ring.



SPARK PLUG SIDE

- Hold the camshaft properly.
- Using the press, insert a new bearing paying observing the introduction direction. The shielded side must be fitted inside the camshaft, as indicated in the figure.



Refitting the head and timing system components

- Tighten the nuts to an initial pre-torque of 9-11 Nm.
- Tighten up the nuts by rotating $270.0 \pm 5.0^\circ$ with crossed sequence.
- Fit the two screws on the outside of the timing chain side and tighten them to the specified torque.

CAUTION



DO NOT PERFORM 270° IN ONE ROTATION. PERFORM WITH THREE GRADUAL ROTATIONS, OBSERVING THE SEQUENCE INDICATED ON THE STUD BOLTS.

N.B.

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

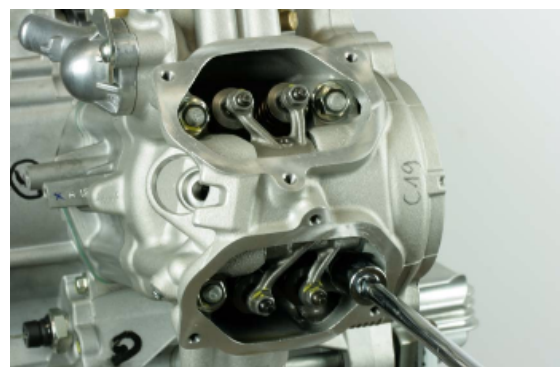
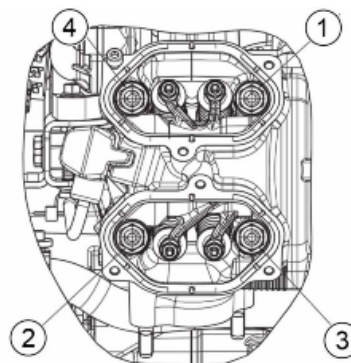
CAUTION



ALWAYS USE A NEW HEAD GASKET UPON REFITTING.

Locking torques (N*m)

Cylinder head nut (TIGHTENING) 9 - 11 (Tighten to the prescribed torque and then proceed with $270.0 \pm 5.0^\circ$ rotation) **Screws fixing cylinder to crankcase** 10.8 - 12.7

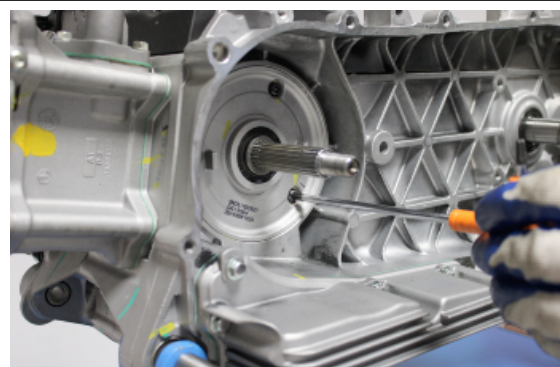


Refitting the timing chain

DISTRIBUTION TIMING

to obtain the correct timing of the distribution, proceed as follows:

- To fit the timing chain, follow the indications in section "**Crankshaft crankcase / Crankcase coupling**"
- also follow the instructions in section "**head-engine block-piston assembly and timing system /Cylinder fitting - Fitting the big end and**



the distribution components"; complete the fitting of components to be able to perform the timing correctly;

- remove the timing system aluminium cover;

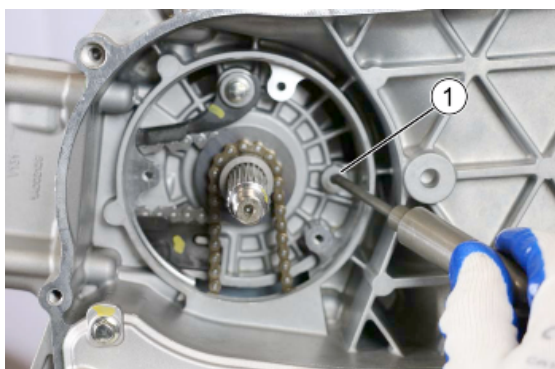
WARNING

THIS TIMING SYSTEM ALLOWS THE RECOVERY OF ALL MACHINING AND/OR INSTALLATION CLEARANCES IN ORDER TO GUARANTEE A PARTICULARLY ACCURATE TIMING.

CAREFULLY OBSERVE THE FOLLOWING:

Specific tooling**021006Y Lock for engine timing R.I.S.S.**

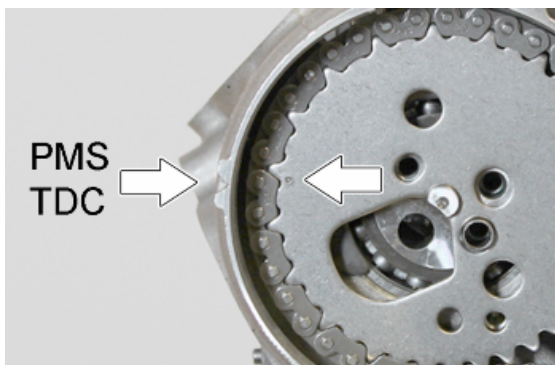
Lock the crankshaft at the Upper dead centre (PMS), inserting the punch of the specific tool in the hole (1);



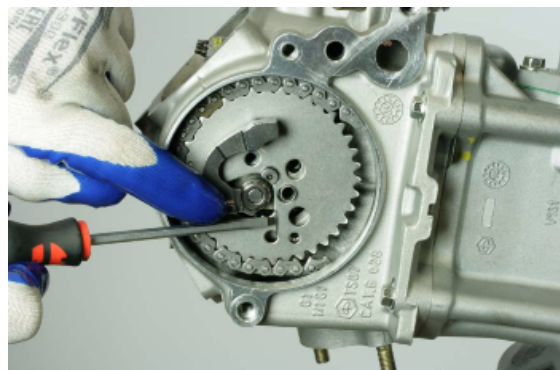
Assemble the sprocket with the prearranged timing chain and align the reference point on the sprocket with the one on the big end;



Make sure that the point on the sprocket and the reference on the cylinder head are aligned; this position indicates the Upper dead centre PMS;



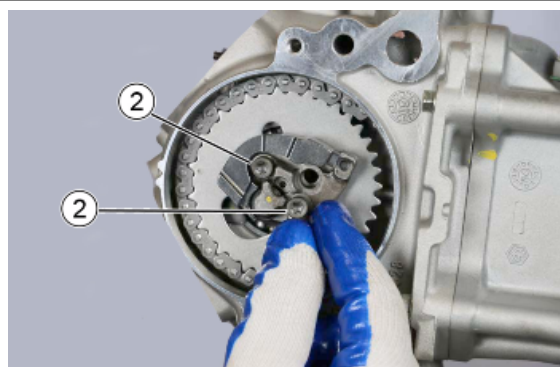
Assemble the decompressor mass and spring.



Insert the decompressor's drive support.



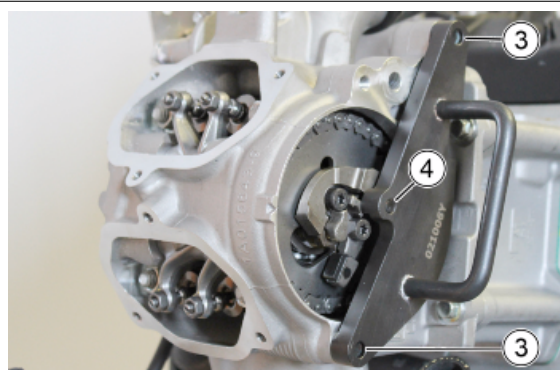
Manually screw the screws (2) with pre-applied thread lock, without fastening then.



Lock the camshaft in position, mounting the specific tool until the end and inserting the central pin in the hole (4) and the two reference pins in the holes (3).

Specific tooling

021006Y Lock for engine timing R.I.S.S.



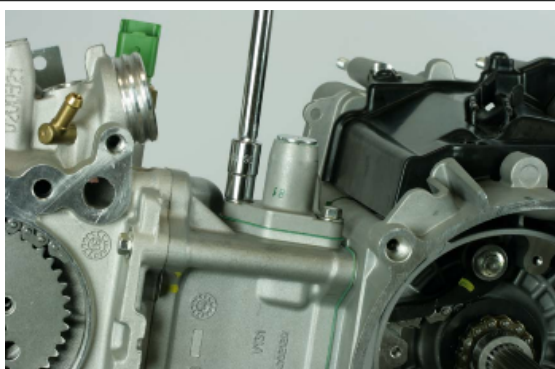
Preload the chain tensioner until it locks;



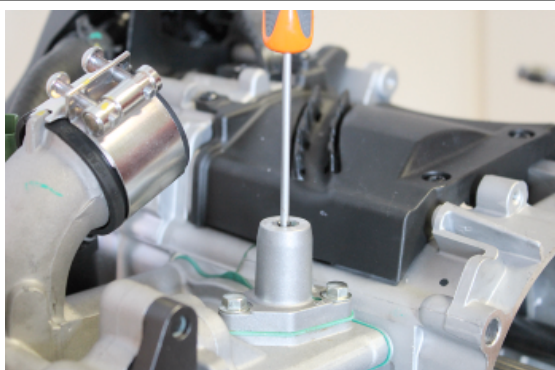
Place the gasket and mount the chain tensioner on the cylinder, locking it at the specified torque.

Locking torques (N*m)

Chain tensioner - Cylinder 8 - 10 Nm



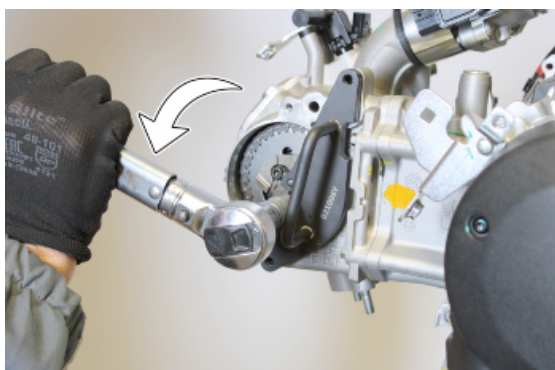
Release the chain tensioner piston, thus tensioning the timing chain and then screw and lock the cap.



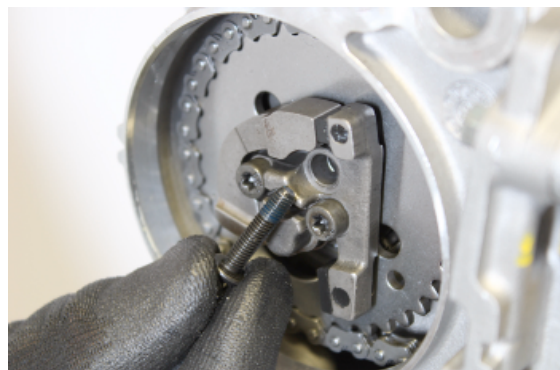
Fasten to the specified torque the fixing screws between the decompressor counterweight and the camshaft; this will allow the system to eliminate all clearances.

Locking torques (N*m)

Pressure reducer counterweight retainer screw 7 ÷ 8.5 Nm



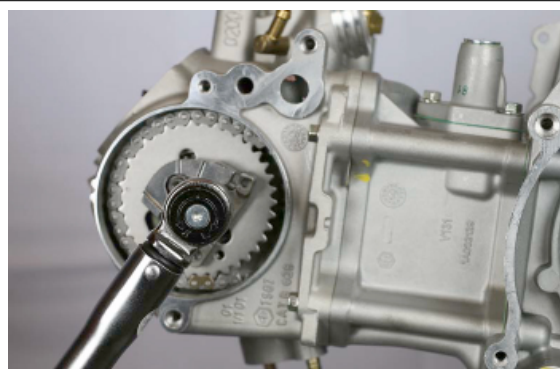
Remove the specific tool from the cylinder head and screw the unfastened fixing screw of the decompressor;



Tighten the fixing screws of the decompressor counterweight to the prescribed torque;

Locking torques (N*m)

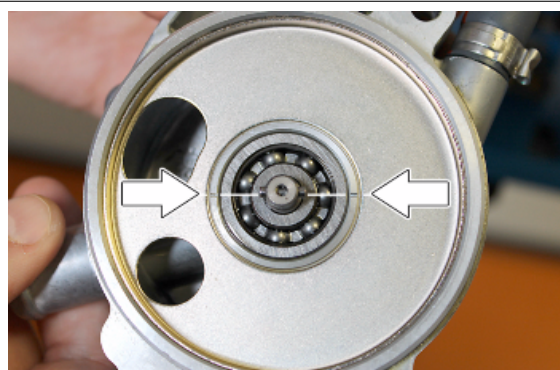
Pressure reducer counterweight retainer screw $7 \div 8.5$ Nm



Remove the punch of the specific tool mounted at the beginning of the procedure to fasten the crankshaft;



Align the references of the water pump before mounting it on the cylinder head;



Check the integrity of the sealing rings of the water pump's body and, if necessary, replace them with new O-rings; then tighten to the specified torque.

Locking torques (N*m)

Water pump's body screws - Cylinder head
10.8-12.7 Nm



Tighten the water pump cover to the specified torque.

Locking torques (N*m)

Water pump cover screws - Water pump body
4.9-5.9 Nm



Inspecting the radial air gap

- Following the fitting of the flywheel, complete the tightening of the pick-up after the adjustment of the air gap.
- Using the feeler gauge to reset the indicated value.
- Tighten to torque using the threadlocker.

Recommended products

Loctite 243 Medium strength thread-locking sealant.

Blue

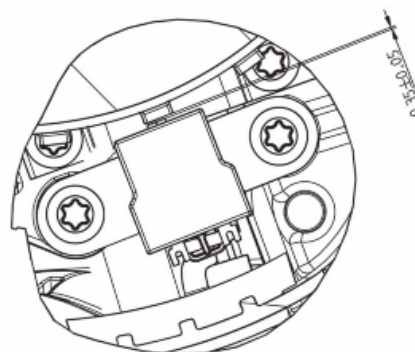
Characteristic

AIR GAP ENGINE R.I.S.S.

0.35 mm \pm 0.05

Locking torques (N*m)

Pick-up screw and cables retainer plate - flywheel position sensor - flywheel - flywheel fan 5 - 6



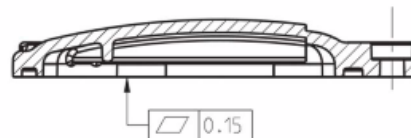
Refitting the rocker-arms cover

- Check the evenness of the covers, when they exceed the allowed limits, replace them.

Characteristic

Evenness limit

0.15 mm



- Check the wear condition of the gaskets, if they are damaged and/or if there is oil leakage, replace them applying the recommended product.

Recommended products

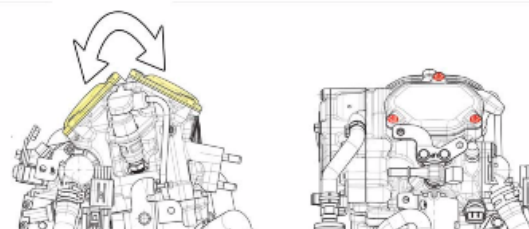
Calcium based grease Calcium grease

Smooth-textured appearance; Ivory coloured Specification TL 9150 066, symbol NATO G 460

- Place the valve covers and tighten the screws to the indicated torque.

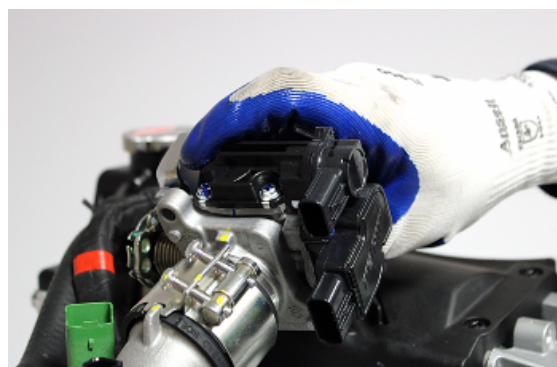
Locking torques (N*m)

Tappet cover screws 5 - 6 Nm



Refitting the intake manifold

- Insert the intake manifold in the rubber sleeve.



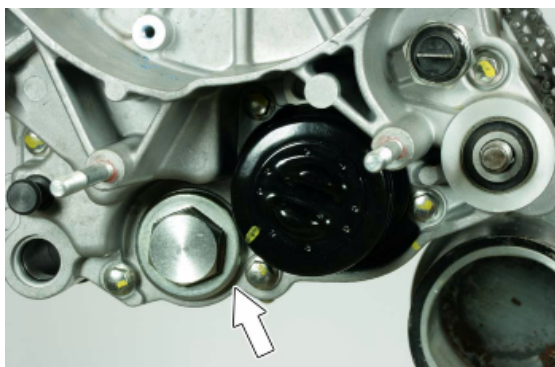
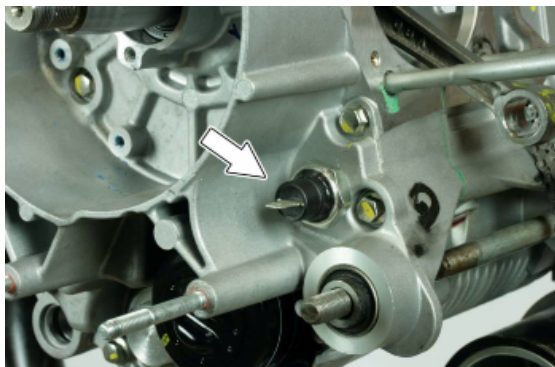
- Tighten the metallic clamp screws to the prescribed torque.

Locking torques (N*m)**Inlet manifold screws 5 - 6****Crankcase - crankshaft****Splitting the crankcase halves**

- Unscrew the four screws in the photo and remove the cable grommet plastic.



- Unscrew the oil minimum pressure sensor.
- Unscrew the screw cap of the mesh filter and remove it.
- Remove the cartridge oil filter.





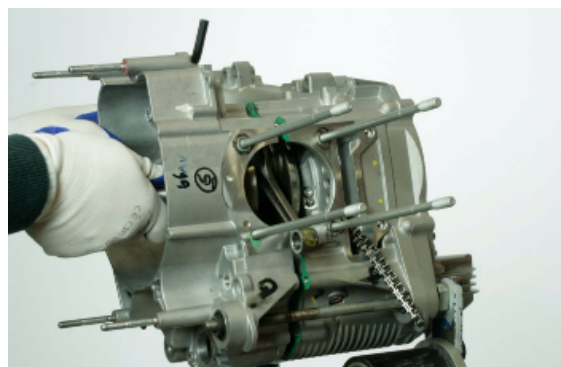
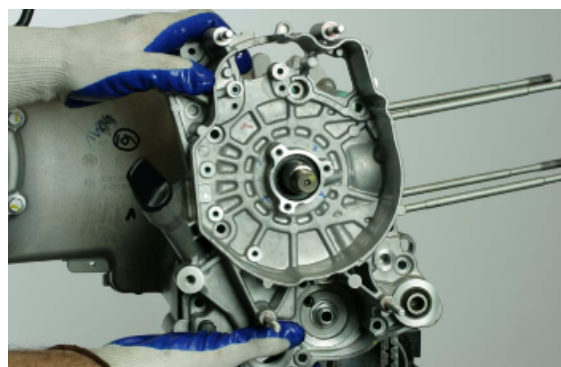
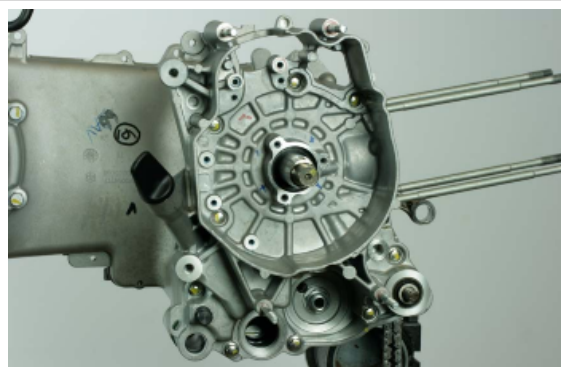
- Undo the nine crankcase coupling screws.
- Separate the crankcase halves while keeping the crankshaft in one of these two halves.
- Only after the halves have been separated, can the crankshaft be checked.

CAUTION

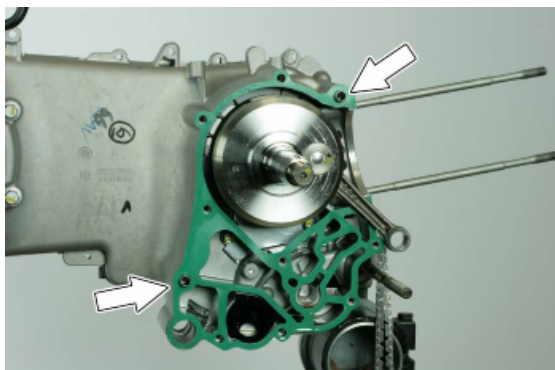
WHILE OPENING THE CRANKCASES AND REMOVING THE CRANKSHAFT, CHECK THAT THE THREADED SHAFT ENDS DO NOT INTERFERE WITH THE MAIN BUSHINGS. FAILURE TO OBSERVE THIS PRECAUTION CAN DAMAGE THE MAIN BUSHINGS.

CAUTION

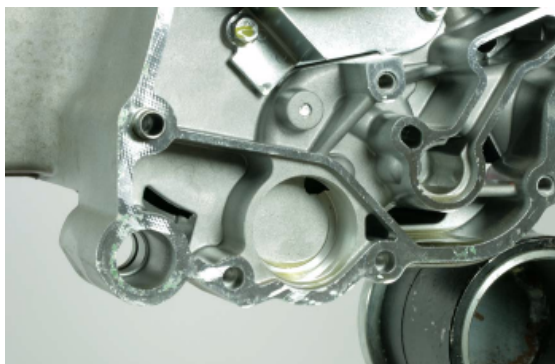
KEEP THE CRANKSHAFT IN ONE OF THE TWO HALVES OF THE CRANKCASE WHEN SEPARATING IT. IF YOU FAIL TO DO THIS, THE CRANKSHAFT MIGHT ACCIDENTALLY FALL.



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



- Remove the filter holder insert.



Inspecting the crankshaft components

N.B.

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

See also

[Crankcase - crankshaft - connecting rod](#)

Inspecting the crankshaft alignment

N.B.

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

See also

[Crankcase - crankshaft - connecting rod](#)

Inspecting the crankcase halves

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

N.B.

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

N.B.

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

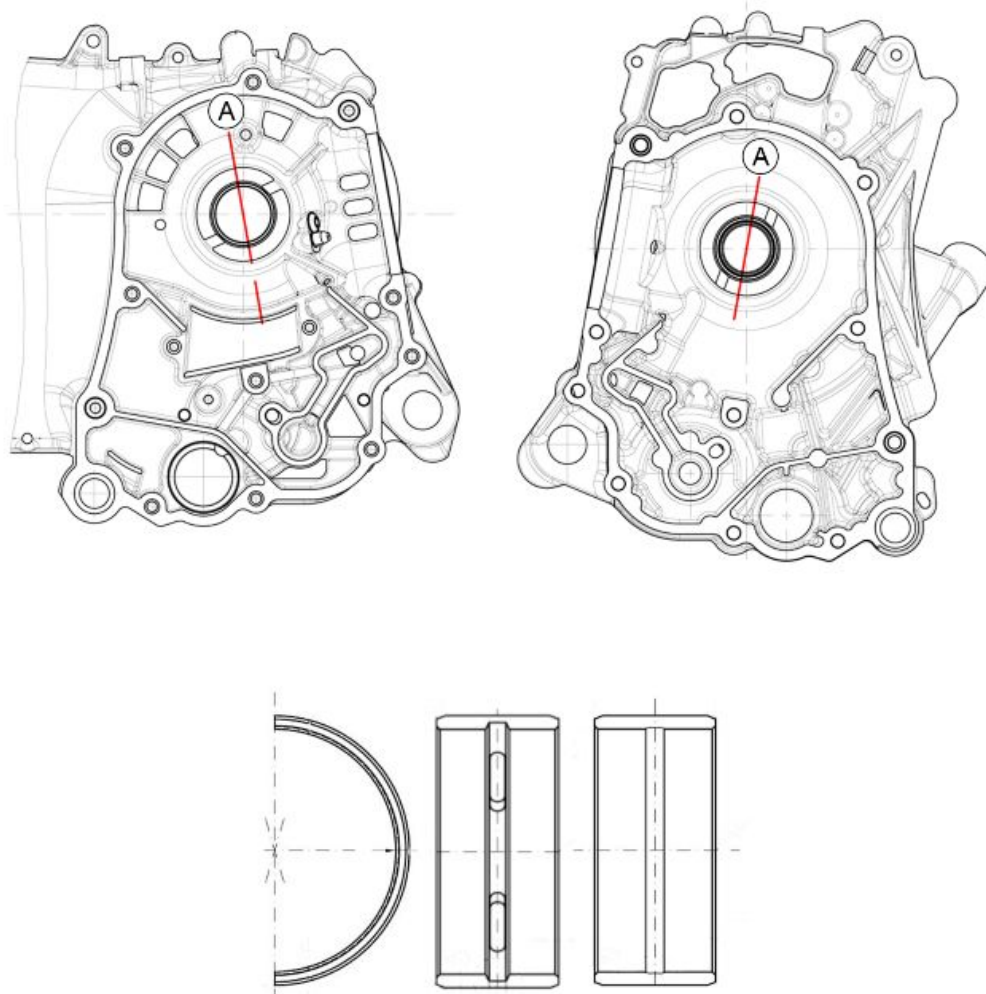
Inspecting the crankshaft plain bearings

- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.
- The main bushings are made of 2 half bearings, one oil supply hole and lubrication channel and the other only with lubrication channel.

Characteristic

«A»

HAL BEARING CONNECTION LINE



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

N.B.

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

Coupling chart

N.B.

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

See also

[Crankcase - crankshaft - connecting rod](#)

Refitting the crankcase halves

- Follow the removal steps but in reverse order; be careful to respect the prescribed tightening torques.
- Insert the by-pass.
- Insert a new gasket and be careful with the alignment dowels.
- Maintaining the crankshaft inserted in the flywheel side crankcase, couple the crankcase halves.
- Insert the screws and tighten to specified torque.

CAUTION



CAREFULLY CHECK THE CLEANING OF THE BY-PASS DUCT.
CHECK THAT THE PISTON SLIDES BY HAND, FREELY AND WITHOUT STICKING.

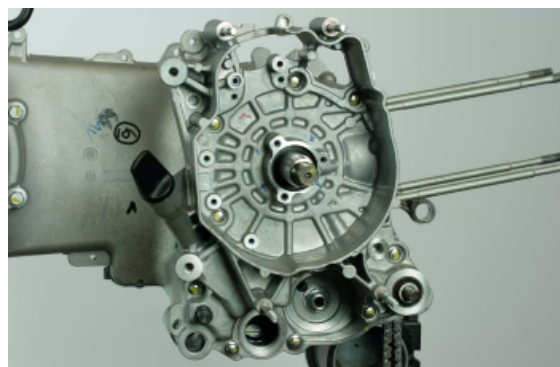
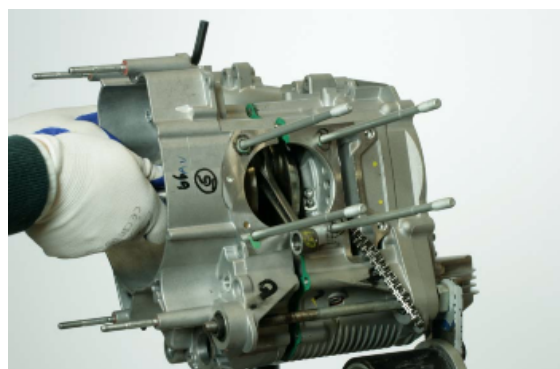
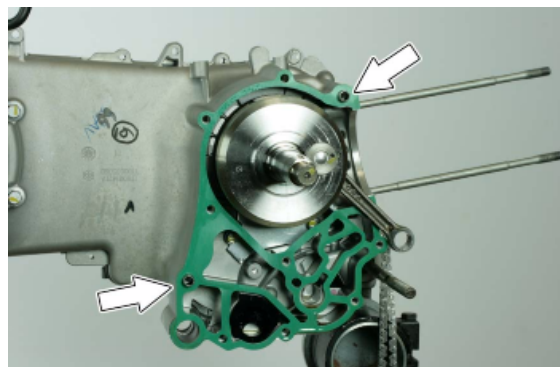
CAUTION



IT IS ADVISABLE TO INSERT THE CRANKSHAFT IN THE FLYWHEEL SIDE CRANKCASE HALF TO PREVENT, WITH ACCIDENTAL MOVEMENTS DURING INSERTION, THE OIL PUMP CONTROL TOOTHING FROM DAMAGING THE BUSHINGS.

Locking torques (N*m)

Engine-crankcase coupling screws $11 \div 13$



- Complete the coupling operations with the verification of the crankshaft axial clearance.
- Using specific tools to support the dial gauge, verify that the fitting clearance is within the limits.
- Higher clearances are signs of wear of the crankshaft - crankcase supporting surfaces.

Characteristic

Crankshaft-crankcase axial clearance

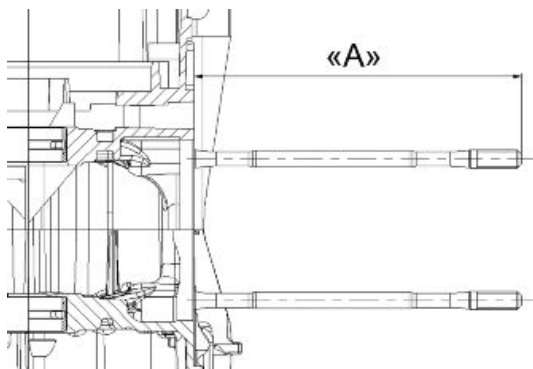
0.2 - 0.5 mm

Studs

- Using two nuts, fitted as nut and lock nut type, remove and then drive from the seat.
- Proceed with a thorough cleaning of the threaded seat on the crankcase.
- Screw the new stud bolts up to the driving depth indicated.

N.B.

NEW STUD BOLTS DO NOT NEED THREADLOCK, AS THEY COME EQUIPPED WITH SCOTCH-GRIP.



Characteristic

Driving depth of stud bolts «A»

170 mm+ 0.5

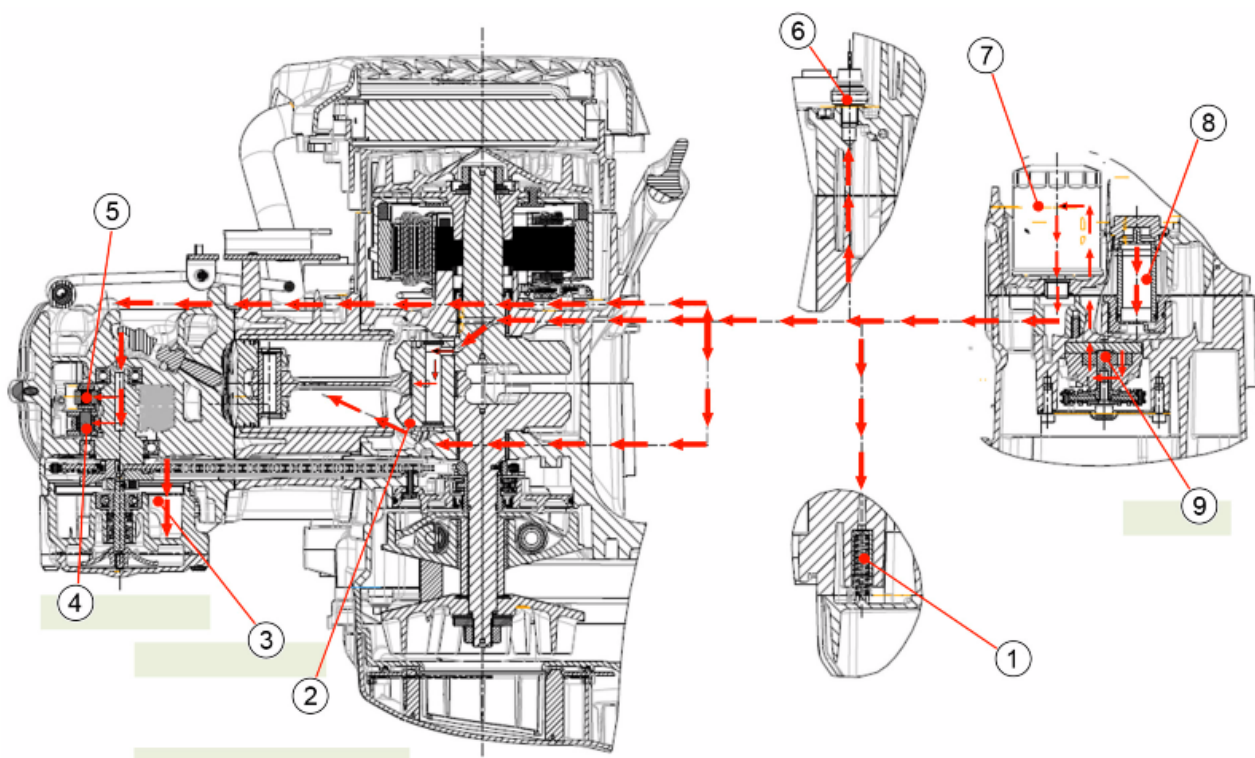
Lubrication

Conceptual diagrams

The lobe pump «9» sucks the oil from the sump, through the mesh pre-filter «8», it pushes it into the cartridge filter «7» where there is also a safety valve «1».

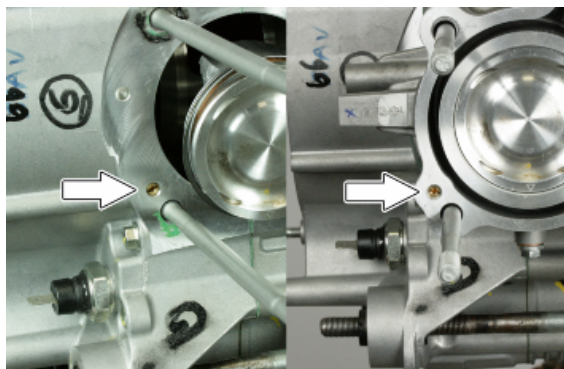
Through the suitable passages found in the crankcases, the oil enters the crank chamber, where the main bushings are lubricated. The big end, the piston pin and connecting rod small end via spray «2». From the engine crankcase, the pressurised oil reaches the distribution through a pipe, with calibrated nozzles, one in the crankcase and the other in the cylinder, as shown in the images. The pressurized oil lubricates the camshaft «5» and from it the valves and the rocker «4». Through the timing chain's pipe, the oil falls back in the sump, while the oil vapours leak out of the pipe's end «3» toward the air filter, through a non-return valve located on the pipe.

The plant is equipped with a minimum oil pressure sensor «6».

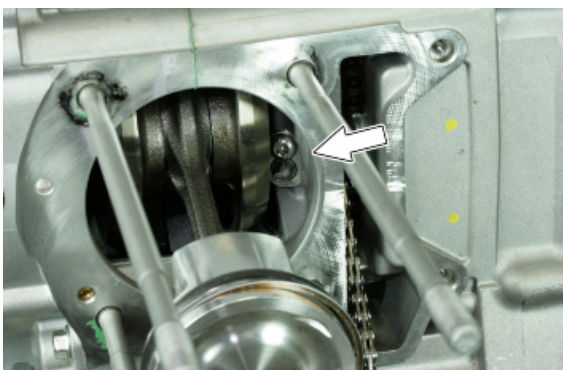


LUBRICATION CIRCUIT NOZZLES

Name	Torque in Nm
Piston cooling nozzle fixing screw	5 to 6
Carter calibrated nozzle	1 - 2
Cylinder calibrated nozzle	1 - 2



APPLY LOCTITE FORTE 263 ON THE SCREW FIXING THE PISTON COOLING NOZZLE.



Oil pressure check

- Remove the air duct at the radiator.
- Remove the electrical minimum oil pressure switch connection and remove the switch.
- Use the specific tool to install the oil gauge.
- With the engine idling at 1750 rpm and the oil temperature at $\sim 90^{\circ}\text{C}$, check that the oil pressure is between 0.5 to 1.2 atm.
- With the engine idling at 5000 rpm and the oil temperature at $\sim 90^{\circ}\text{C}$, check that the oil pressure is between 3.2 to 4.2 atm.
- Remove the appropriate tools once the measurement is complete, refit the oil pressure switch and washer, tightening it to the specified torque and fit the flywheel cover.
- If the oil pressure is not within the specified limits, in the following order, check: the oil filter, the oil by-pass valve, the oil pump and the crankshaft seals.

**N.B.**

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

Specific tooling

020345Y Union for oil pressure measurement

Characteristic

Oil pressure

Operating pressure

- At 1,750 rpm: (0.5 - 1.2)bar
- At 5,000 rpm: (3.2 - 4.2)bar

Locking torques (N*m)

Minimum oil pressure sensor 10

- Remove the air duct at the radiator.
- Remove the electrical minimum oil pressure switch connection and remove the switch.
- Use the specific tool to install the oil gauge.
- With the engine idling at 1,750 rpm and the oil temperature at ~90°C, check that the oil pressure is between 0.5 - 1.2 atm.
- With the engine idling at 5,000 rpm and the oil temperature at ~90°C, check that the oil pressure is between 3.2 - 4.2 atm.
- Remove the appropriate tools once the measurement is complete, refit the oil pressure switch and washer, tightening it to the specified torque and fit the flywheel cover.
- If the oil pressure is not within the specified limits, in the following order, check: the oil filter, the oil by-pass valve, the oil pump and the crankshaft seals.

**N.B.**

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

Specific tooling

020345Y Union for oil pressure measurement

Characteristic**Oil pressure MY 2019**

Operating pressure

- At 1800 rpm: (0.5 - 1.2)bar
- At 5,000 rpm: (3.2 - 4.2)bar

Locking torques (N*m)

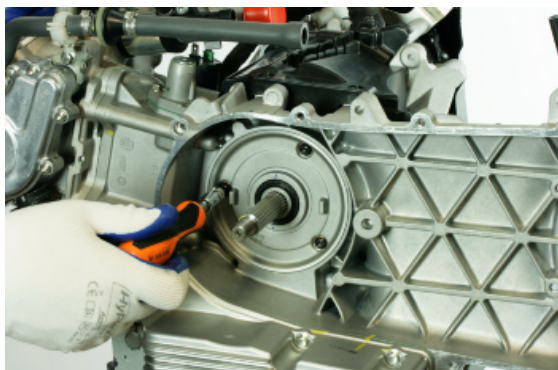
Minimum oil pressure sensor 10

Crankshaft oil seals

Removal

TRANSMISSION SIDE

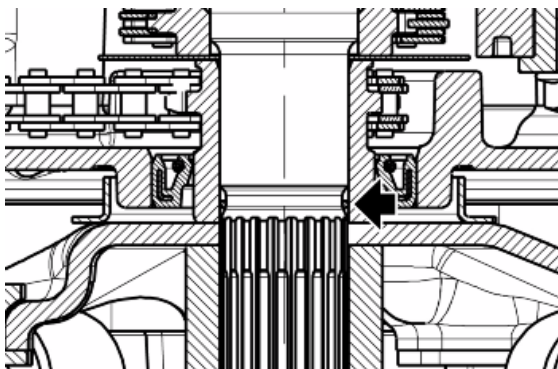
- Unscrew the three screws and remove them, complete with the copper gaskets.



- Using pliers remove the door by acting on the appendices.



- Remove the spacer and the O-ring.

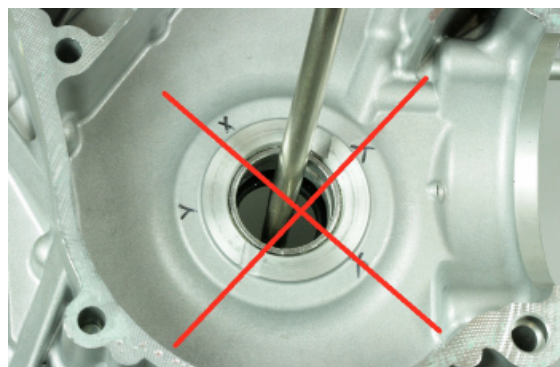


FLYWHEEL SIDE

- Remove the flywheel side crankcase half.
- Operating from the external side, remove the oil seal pulling it with a curved tool.



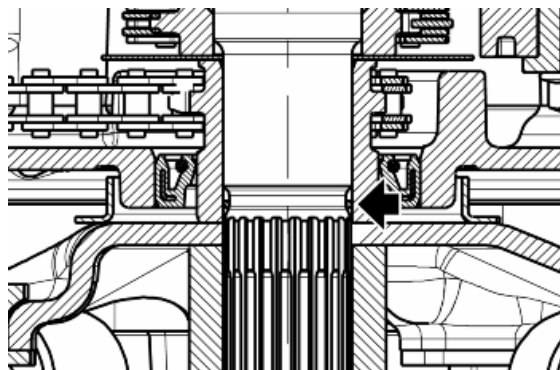
**DO NOT REMOVE THE OIL SEAL BY PUSHING IT FROM THE INSIDE.
THE NON-COMPLIANCE WITH THIS WARNING MAY CAUSE DAMAGE TO THE BUSHINGS.**

**Refitting****TRANSMISSION SIDE**

- Insert the components making sure to thoroughly grease the O-ring and the oil seal.
- Follow the steps in reverse order taking care to tighten to torque.

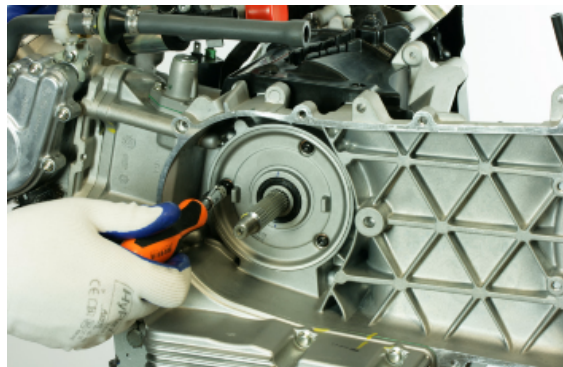
WARNING

IN ORDER TO PREVENT ABNORMAL FORMATIONS OF DIRT DUE TO THE RELEASE OF GREASE, WE RECOMMEND FIRST LUBRICATING THE SEAL RING STOPS WITH A BRUSH.

**Locking torques (N*m)**

Crankcase timing cover screws 3.5 ÷ 4.5





FLYWHEEL SIDE

- Insert a new oil seal in the half-crankcase.
- Using the specific tool to insert it all the way.



INSERT THE OIL SEAL ONLY WITH THE SPECIFIC TOOL TO RESPECT THE EXACT DEPTH OF THE PRESS-FITTING.
THE NON-COMPLIANCE WITH THIS WARNING MAY CAUSE THE OBSTRUCTION OF THE LUBRICATION CHANNEL WITH RESULTING SERIOUS DAMAGE TO THE ENGINE.



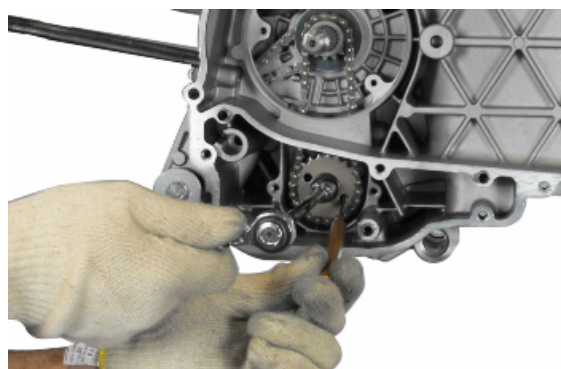
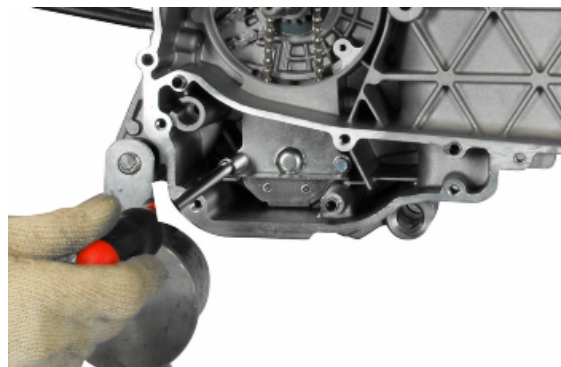
Specific tooling

021008Y Punch

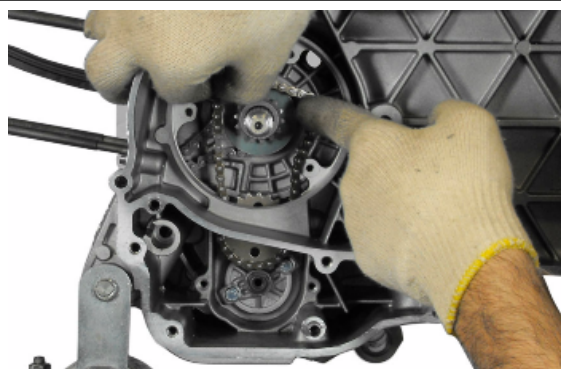
Oil pump

Removal

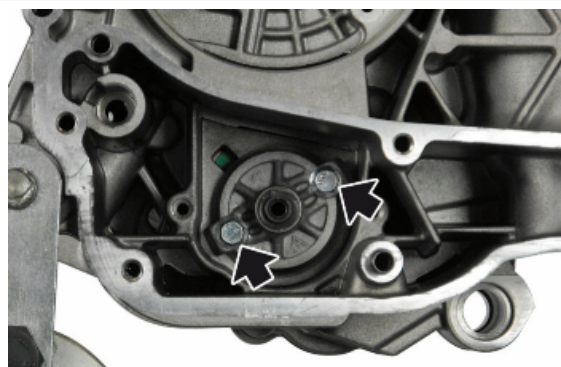
- Remove the oil sump and the by-pass.
- Remove the oil shield.
- Preventing rotation, unscrew the water pump command screw and collect the washer.



- Remove the oil pump command sprocket complete with chain.



- Unscrew the two screws and remove the oil pump.



Inspection

- Remove the two screws and remove the oil pump cover.
- Remove and wash the rotors thoroughly with petrol and compressed air.
- Reassemble the rotors in the pump body, keeping the two reference marks visible.
- Using a feeler gauge, check the distance between the rotors in the position shown in the figure.
- Check the distance between the outer rotor and pump body, see figure.

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

Characteristic

Axial rotor clearance

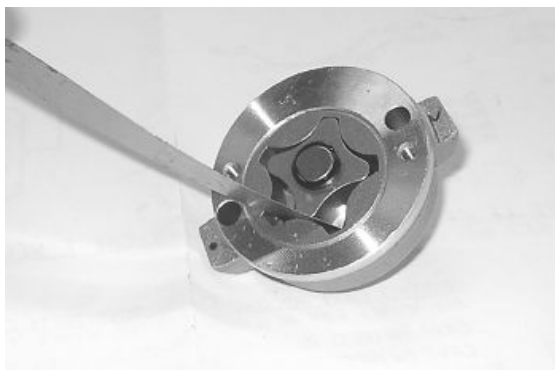
Limit value admitted: 0.09 mm

Distance between the outer rotor and the pump body

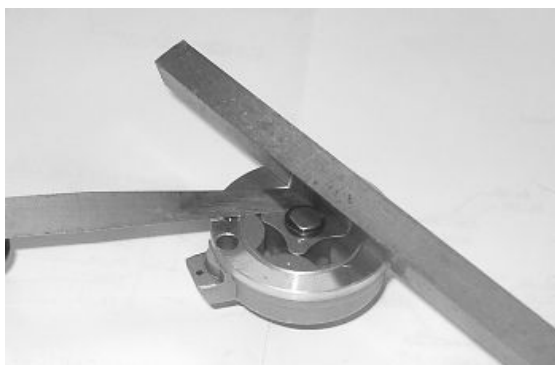
Admissible limit clearance: 0.20 mm

Distance between the rotors

Admissible limit clearance: 0.12 mm



Planarity check





Refitting

- Insert the oil pump.
- Insert and tighten the fixing screws, applying the recommended torque.

Recommended products

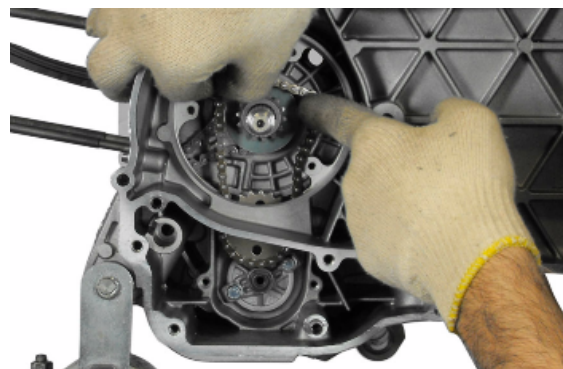
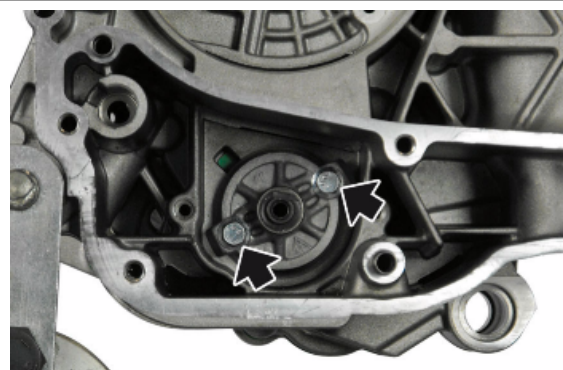
Loctite 243 Medium strength thread-locking sealant.

Blue

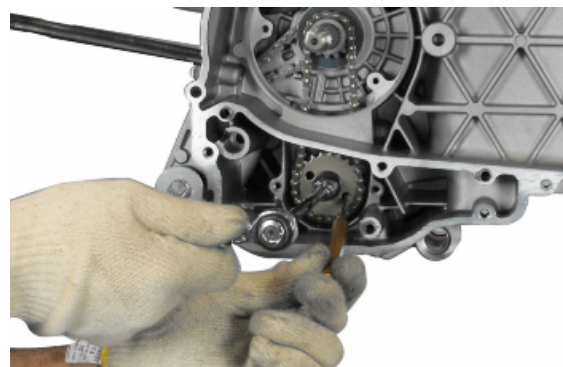
Locking torques (N*m)

Screws fixing oil pump to the crankcase 5 ÷ 6

- Insert the control sprocket and the chain.



Use a screwdriver to lock the sprocket rotation and screw the oil pump control screw.

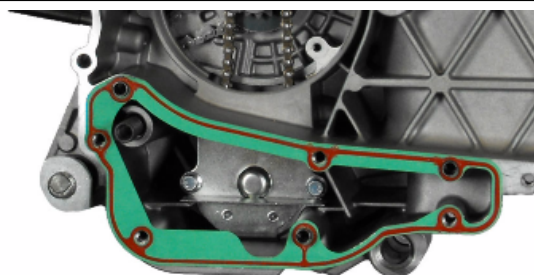


Removing the oil sump

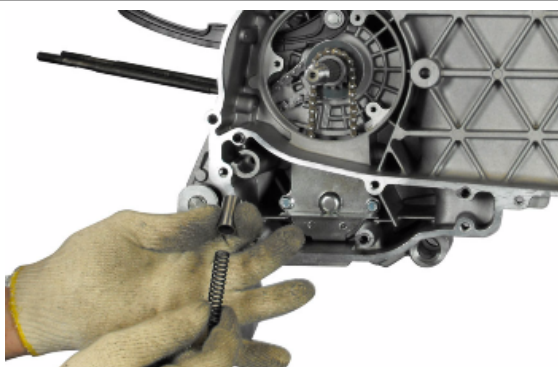
- Remove the oil filler plug, the transmission cover, the complete drive pulley assembly with belt and the sprocket wheel, as described in the Transmission chapter.
- Remove the seven screws indicated in the figure with the two rear brake transmission retainer brackets.



- Remove the gasket.



- Remove the spring and the by-pass piston.

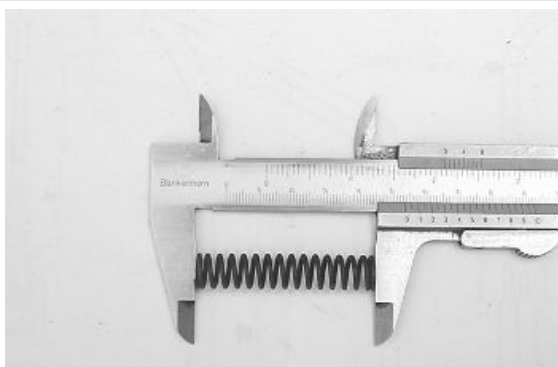


Inspecting the by-pass valve

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

Characteristic
Standard length

52.4 mm



Piston standard diameter

12.861 + 12.843 mm

Refitting the oil sump

- Refit the by-pass piston in its housing.
- Insert the pressure-regulating spring.
- Fit a new sump seal.
- Refit the sump, taking care to locate the spring in the appropriate recess machined into the inside of the sump.
- Refit the rear brake transmission mounting brackets and the screws in the reverse order from which they were removed.
- Tighten the screws to the prescribed torque.
- Refit the driving pulley assembly, the drive belt, the sprocket wheel and the transmission cover, as described in the "Transmission" chapter.
- **When testing the lubrication system, refer to the "Crankcase and Crankshaft" chapter, regarding lubrication of the connecting rod assembly**



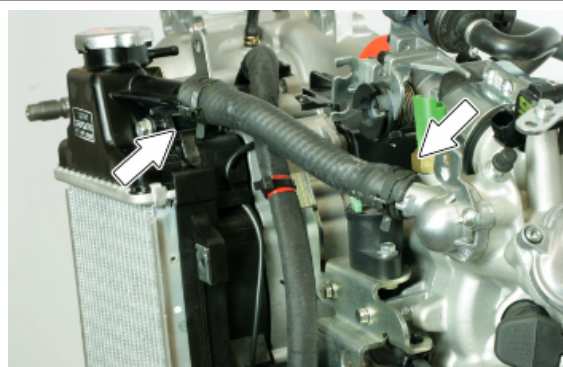
Locking torques (N*m)

Tightening torque 11 to 13

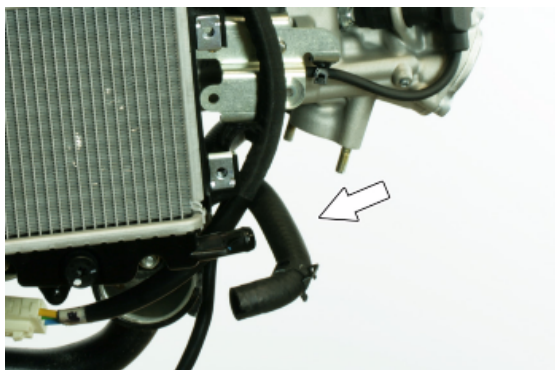
Water pump

Removal

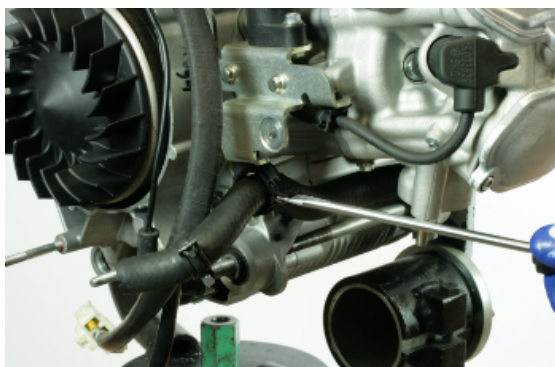
- Disconnect the two indicated clamps and remove the coolant inlet pipe to the radiator.



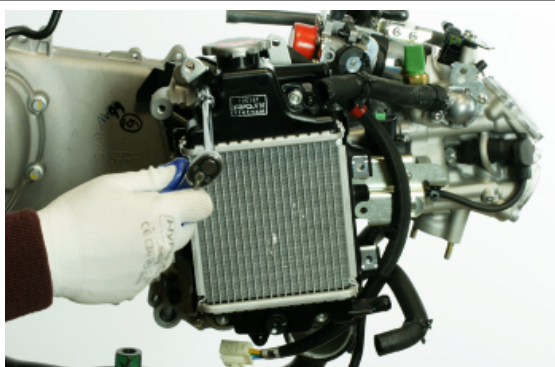
- Disconnect the coolant output clamp from the radiator.



- Disengage the pipe from the cable grommet clamp.



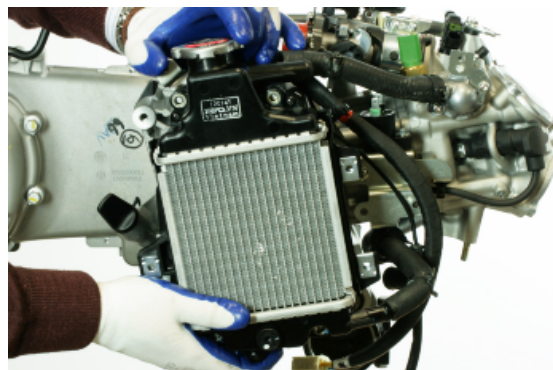
- Undo the four radiator fixing nuts and remove the complete radiator.



- Remove the four spacer bushings and the upper air duct fixing plate.



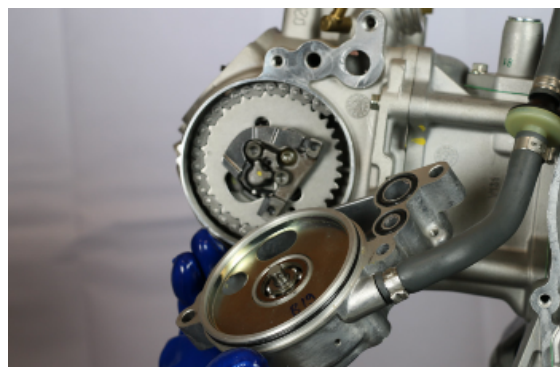
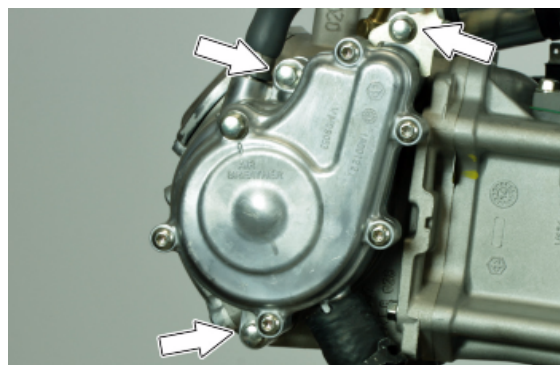
- Remove the radiator complete.



- Disconnect the clamp from the pump and remove the coolant output pipe from the radiator.



- Remove the three coolant pump fixing screws and remove the pump.



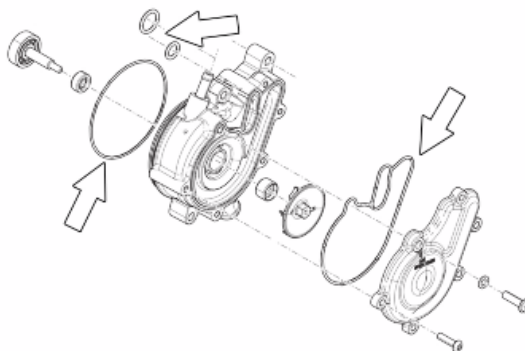
Fitting

- For the pump overhaul, see section «**Cooling system / water pump overhaul**».
- Before inserting the pump, lubricate the o-rings between the pump and head using the recommended product.

Recommended products

Paraffin Rubber/metal lubricant

Solvent and silicone free spring paraffin.

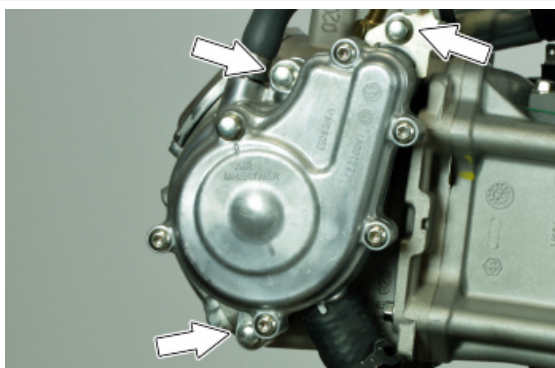


Align the references of the water pump before mounting it on the cylinder head;



Locking torques (N*m)

Head - pump fastening screws 11 - 13 Cooling system purge screw - liquid pump 11 to 13



INDEX OF TOPICS

INJECTION	INJEC
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Precautions

Troubleshooting tips

1 An injection system failure is more likely to be due to connections than to components. Before troubleshooting the injection system, carry out the following checks:

A: Electrical power supply

- a. Battery voltage
- b. Blown fuse
- c. Relays
- d. Connectors

B: Chassis ground

C: Fuel system

- a. Faulty fuel pump
- b. Dirty fuel filter

D: Ignition system

- a. Faulty spark plug
- b. Faulty coil
- c. Faulty shielded cap

E: Intake circuit

- a. Air filter dirty
- b. b. Dirty by-pass circuit
- c. Idle speed adjustment device

F: Other

- a. Wrong timing system
- b. Wrong reset of the throttle valve position sensor

2 Injection system failure may be caused by loose connectors. Make sure that all connections are properly implemented. Check the connectors taking into consideration the following point:

A: check that the terminals are not bent

B: check that the connectors have been properly connected

C: check if the malfunction can be fixed by shaking the connector slightly.

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

4 For troubleshooting, use a multimeter with an internal resistance of more than 10 KW/V. Improper instruments may damage the injection control unit. The instruments to be preferred have a definition over 0.1V and 0.5W and an accuracy over $\pm 2\%$.

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

2. The supply system is pressurised at 250 kPa (2.5 BAR). Before disconnecting the fast-release fitting of the fuel supply pipe, check that there are no naked flames. Do not smoke. Act with caution to avoid spraying fuel to your eyes.
3. When repairing electric components, the battery must always be disconnected unless it is strictly necessary for the battery to be connected.
4. When functional checks are performed, make sure that the battery voltage exceeds 12V.
5. Before attempting to start the vehicle, ensure that there are at least two litres of fuel in the tank. Failure to respect this norm will damage the fuel pump.
6. If a long period is envisaged with the vehicle not in use, fill the tank to at least the halfway mark. This will ensure the pump will be covered by fuel.
7. When washing the vehicle, do not spray excessive water on electric components and wiring harnesses.
8. In the event of ignition problems, begin troubleshooting from the battery and the injection system connections.
9. Before disconnecting the connector of the injection control unit, perform the following steps in the order shown:
 - Set the switch to «OFF»
 - Disconnect the battery
 Failure to respect this norm may damage the control unit.
10. Do not invert the poles when fitting the battery.
11. To avoid causing any damage, disconnect and reconnect the injection system connectors only if required. Before reconnecting, check that the connectors are dry.
12. When carrying out electric inspections, do not force the tester probes into the connectors. Do not take measurements not specifically foreseen by the manual.
13. At the end of every check performed with the diagnostic tester, remember to protect the system connector with its cap. Failure to observe this precaution may damage the injection control unit.
14. Before reconnecting the quick couplers of the power supply system, check that the terminals are perfectly clean.

Troubleshooting procedure

Engine does not start

ENGINE DOES NOT START EVEN IF PULLED

Possible Cause	Operation
Immobilizer enabling signal	System not encoded System not efficient, repair according to the indications of the self-diagnosis
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor

Possible Cause	Operation
	Air temperature Coolant temperature Atmospheric pressure
Fuel system	Fuel in the tank Fuel pump activation Fuel pressure (low) Injector flow (low)
Power to spark plug Parameter reliability	Shielded spark plug cap H.V. coil (secondary insulation) Engine temperature Distribution timing adjustment - injection start Intake air temperature
End of compression pressure	End of compression pressure

Starting difficulties

ENGINE STARTER PROBLEMS

Possible Cause	Operation
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor Air temperature Engine temperature
Starter speed	Battery Ground connections
End of compression pressure Power to spark plug	End of compression pressure Spark plug Shielded cap H.V. coil. Engine speed timing sensor Ignition advance
Fuel system	Fuel pressure (low) Injector flow (low) Injector sealing (poor)
Correctness of the parameters	Engine temperature Cleaning the throttle valve, air filter efficiency

Engine stops at idle

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

Possible Cause	Operation
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor Air temperature Engine temperature
Ignition efficiency	Spark plug Ignition timing
Correctness of the parameters	Throttle valve position sensor Engine temperature sensor Intake air temperature sensor
Intake system cleaning	Air filter Diffuser and throttle valve
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold Air cleaner joint Filter housing
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector flow

Engine does not rev down

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

Possible Cause	Operation
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor Air temperature Engine temperature
Ignition efficiency	Ignition timing
Correctness of the parameters	Throttle valve position sensor Engine temperature sensor Intake air temperature sensor
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold Air cleaner joint Filter housing
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector flow

Exhaust backfires in deceleration

EXHAUST BACKFIRING WHEN DECELERATING

Possible Cause	Operation
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor Air temperature Engine temperature Lambda probe
Correctness of the parameters	Throttle valve position sensor Engine temperature sensor Intake air temperature sensor
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold Air cleaner joint Filter housing
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector flow
Exhaust system sealing (infiltrations)	Manifold - head Manifold - silencer silencer welding

Engine revs irregularly

ENGINE IRREGULAR PERFORMANCE WITH VALVE SLIGHTLY OPEN

Possible Cause	Operation
Intake system cleaning	Air filter Diffuser and throttle valve
Intake system sealing	Air cleaner joint Filter housing
Ignition system	Spark plug wear check
Parameter reliability	Throttle valve position signal Engine temperature signal Intake air temperature signal Ignition advance
TPS reset successful	TPS reset successful

Possible Cause	Operation
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor Air temperature Engine temperature Lambda probe

Poor performance at full throttle

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

Possible Cause	Operation
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor Air temperature Engine temperature Lambda probe
Power to spark plug	Spark plug Shielded cap H.V. cable H.V. coil
Intake system	Air filter Filter box (sealing) Air cleaner joint (sealing)
Parameter reliability	Throttle valve position signal Engine temperature signal Intake air temperature signal Ignition advance
Fuel system	Fuel level in the tank Fuel pressure Fuel filter Injector flow

Engine knocking

PRESENCE OF KNOCKING (COMBUSTION SHOCKS)

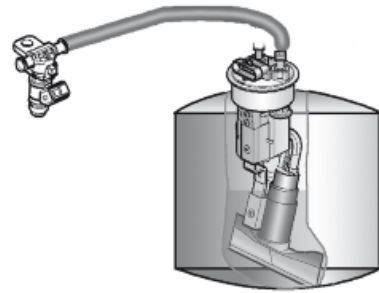
Possible Cause	Operation
Faults detected by self-diagnosis	H.V. coil Injector Engine speed timing sensor Air temperature Engine temperature Lambda probe
Ignition efficiency	Spark plug
Parameter reliability	Throttle valve position signal Engine temperature signal Intake air temperature signal Ignition advance
Intake system sealing	Air cleaner joint Filter housing
TPS reset successful	TPS reset successful
Fuel system	Fuel pressure Fuel filter Injector flow Fuel quality
Selection of the cylinder base gasket thickness	Selection of the cylinder base gasket thickness

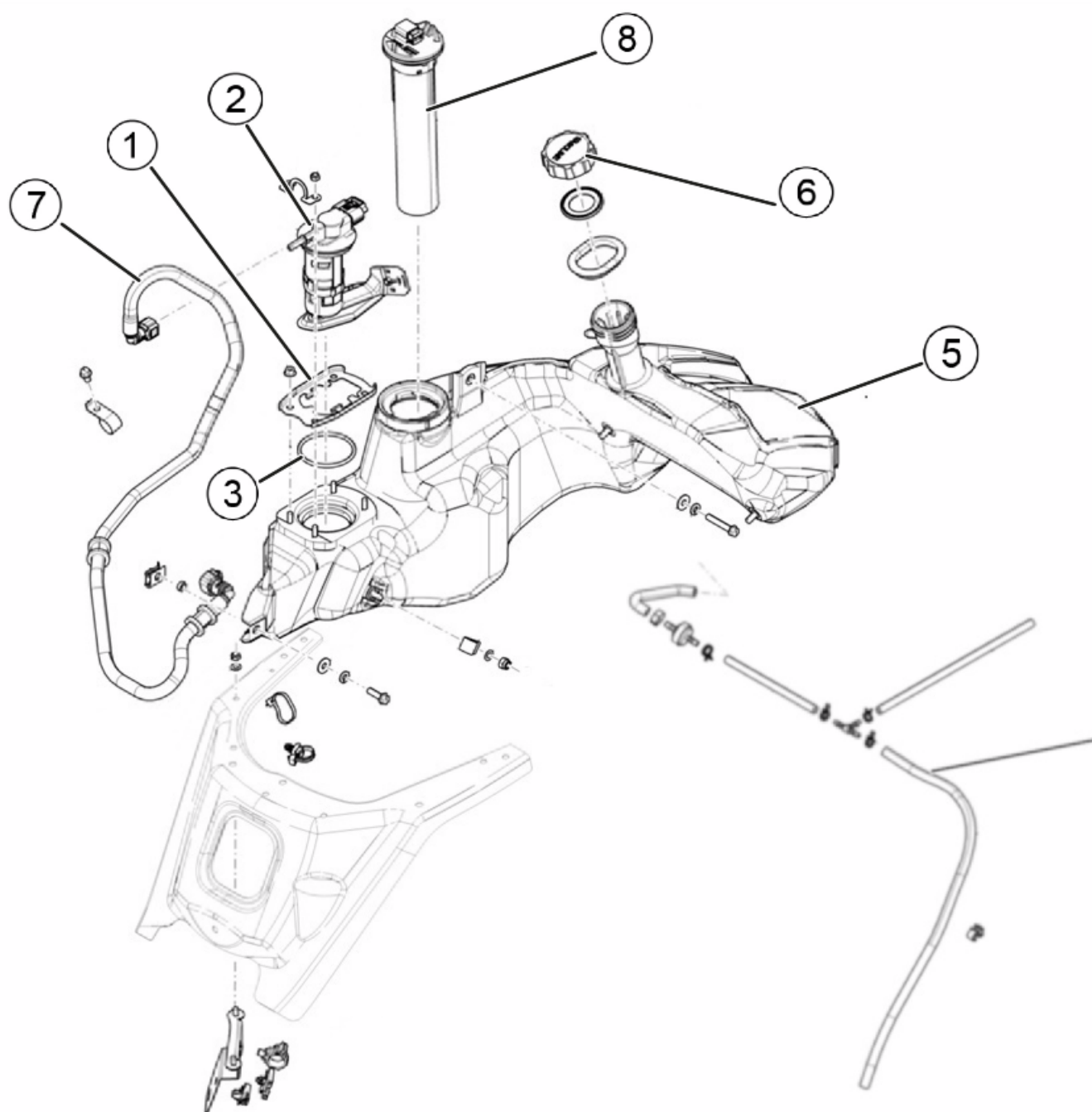
Fuel supply system

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

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

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



**Key:**

- 1. Fuel pump ring nut
- 2. Fuel pump
- 3. Fuel pump gasket
- 4. Complete vent pipe
- 5. Fuel tank
- 6. Fuel tank cap

7. Fuel delivery pipe

8. Fuel gauge

REMOVING THE COMPLETE FUEL LEVEL SENSOR

Unscrew the fuel level sensor, turning anticlockwise; use the specific tool included with the vehicle if necessary.

Specific tooling

020442Y Pulley lock wrench



Remove the fuel level sensor from the fuel tank.

CAUTION



FUEL IS HIGHLY FLAMMABLE. DO NOT SMOKE AND KEEP ALL NAKED FLAME AND SOURCES OF SPARKING OUT OF THE AREA: FIRE HAZARD. DO NOT INHALE THE FUEL SMOKE. DO NOT ALLOW FUEL TO COME INTO CONTACT WITH PLASTIC COMPONENTS OR THE BODYWORK OF THE VEHICLE.



FITTING THE COMPLETE FUEL LEVEL SENSOR

Fit the fuel level sensor, complete with sealing gasket inside the tank.



Tighten the fuel level sensor, turning clockwise; use the specific tool included with the vehicle if necessary.

Refit the fuel tank on the vehicle.

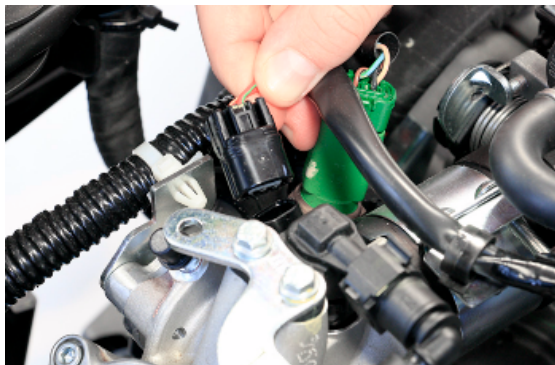
Specific tooling

020442Y Pulley lock wrench



Removing the injector

- Remove the helmet compartment.
- Disconnect the electrical connector from the injector.



- Unscrew the fuel hose support clamp's fastening screw from the injector support bracket.



- Disengage the fuel hose coupling's fastening spring and disconnect the hose from the injector.

CAUTION



AVOID PERFORMING THESE OPERATIONS WHILE THE ENGINE IS HOT.

CAUTION

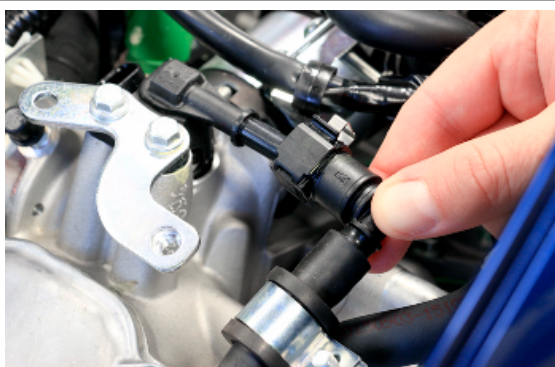


BEWARE OF ANY FUEL LEAKAGE WHILE DISASSEMBLING THE HOSE.

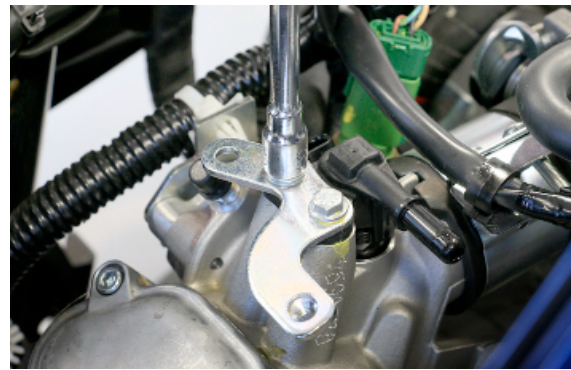
CAUTION



ELIMINATE THE LEAKED FUEL, AND CLEAN THE PARTS IN THE VICINITY OF THE HOSE WITH A CLEAN CLOTH. WAIT FOR ALL THE FUEL TO EVAPORATE BEFORE STARTING THE ENGINE.



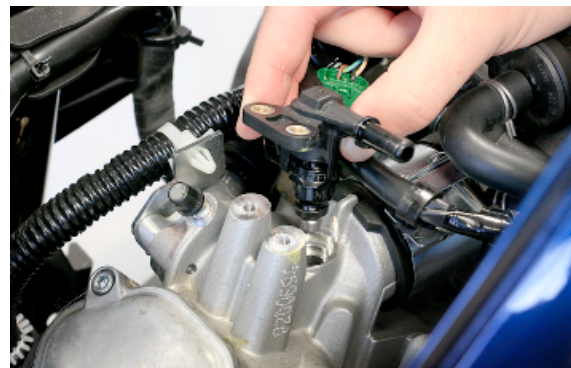
- Unscrew and remove the injector support bracket's fastening screw.



- Remove the injector from its lodging.

N.B.

THE INJECTOR MUST ONLY BE REMOVED FROM THE MANIFOLD AFTER ITS DEFECTIVENESS HAS BEEN VERIFIED. THE INJECTOR FUNCTIONALITY TESTS MUST BE PERFORMED WITH THE INJECTOR INSTALLED ON THE MANIFOLD (SEE "INJECTION").



Refitting the injector

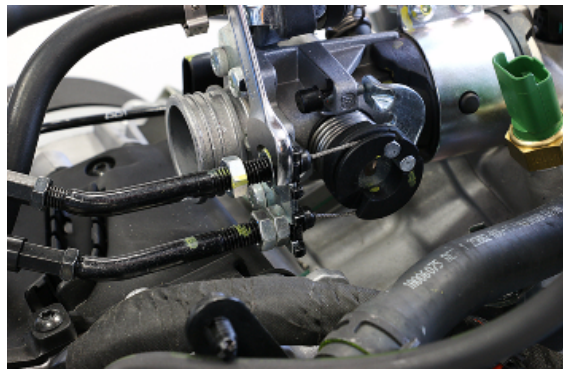
For refitting, perform the removal operations in reverse order and lubricate the sealing OR gasket with grease for internal application before fitting the injector on the manifold.

Removing the butterfly valve

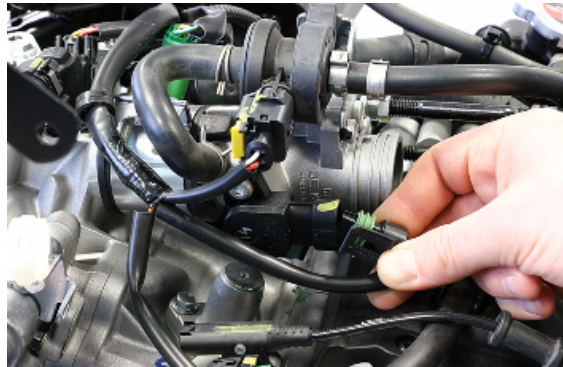
- Loosen the gas control closure transmission lock nut.



- Loosen the gas control closure transmission fastening nut.



- Disconnect the TPS sensor connector.



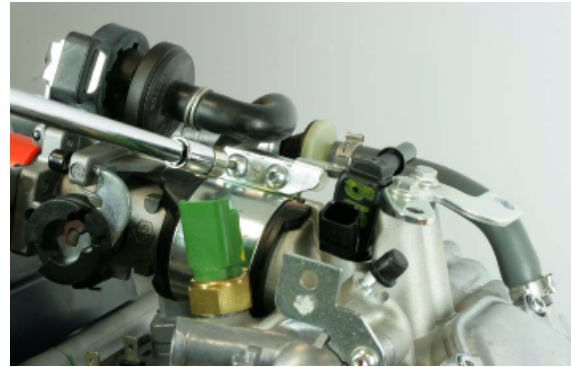
- Disconnect the idle speed adjustment sensor connector.



- Release the gas control closure transmission from the throttle valve control cam.
- Proceed in the same way for the gas control throttle valve opening transmission.



- loosen the clamp and remove the throttle body.



- Clean the throttle body.

WARNING

AFTER MAINTENANCE OPERATIONS, IT IS RECOMMENDED TO DELETE THE SELF-ADJUSTABLE PARAMETERS.

Recommended products

Detergent for throttle bodies Spray cleaner for throttle bodies

Detergent for throttle bodies



Refitting the butterfly valve

- After refitting, delete the error and reset the adaptive parameters.
- Keep the engine running at idle speed for 15 minutes.

Do not tamper with the stop screw under the throttle body.

CAUTION

DO NOT TAMPER WITH THE STOP SCREWS UNDER THE THROTTLE BODY, AS THE IDLE SPEED IS ADJUSTED IN THE FACTORY.



Circuit leak test

Install the specific tool for checking the fuel pressure, with the pipe fitted with the gauge.

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



With the battery voltage > 12 V, check the pump flow rate by disconnecting from the injector the pipe equipped with the pressure gauge of the appropriate tool. Make a graded burette available with a flow rate of approximately 1 L. Rotate the pump using the active diagnosis of the palm top computer. Using a pair of long flat needle-nose pliers, choke the fuel pipe making the pressure stabilise at approx. 2.5 bar. Check that within 15 seconds the pump has a flow rate of approx. 110 cm³.

Specific tooling

020480Y Fuel pressure measurement kit

Inspecting the injector hydraulics

- Remove the injector.

Install the specific tool to check the fuel pressure and position the injector on a graduated container of at least 100 cm³.

- Connect the clamps of the cable supplied to an auxiliary battery.
- Activate the fuel pump with diagnostics engaged and make sure that within fifteen seconds, approximately 40 cm³ of fuel is dispensed with a pressure of approximately 2.5 BAR.



Specific tooling

020480Y Fuel pressure measurement kit

Proceed with the injector seal test.

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

Value limit = 1 drop per minute



Zeroing the throttle

Resetting the throttle valve position signal (T.P.S reset)

The throttle body is supplied with throttle valve position sensor and is pre-calibrated.

Pre-calibration entails regulating the minimum opening of the throttle valve to obtain a certain flow of air under pre-set reference conditions.

Pre-calibration ensures optimal air flow to control idling.

This regulation must not be tampered with in any way whatsoever.

The injection system will complete the management of the idling through the related device and the variation of the ignition advance.

The throttle body after the pre-calibration has an opened valve with an angle that can vary depending on the tolerances of the machining of the pipe and the valve itself.

The valve position sensor can also assume various fitting positions. For these reasons the mV of the sensor with the valve at idle can vary from one throttle body to another.

To obtain the optimum fuel mixture, especially at small openings of the throttle valve, it is essential to match the throttle body with the control unit following the procedure known as TPS resetting.

With this operation we inform the control unit, as the starting point, of the mV value corresponding to the pre-calibrated position.

To reset, proceed as follows.

Connect the diagnostic tester.

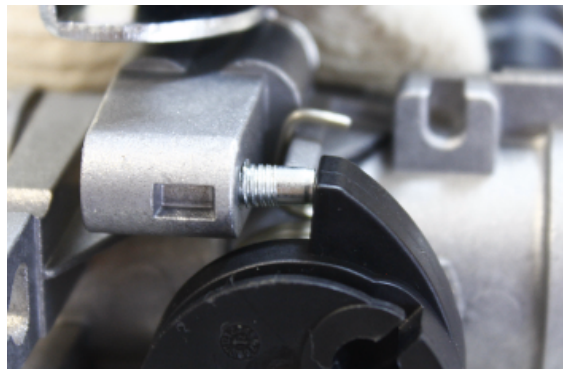
Switch to «ON».

Select the functions of the diagnostic tester on «TPS RESET».

Specific tooling

020922Y Diagnosis Tool

Make sure that the throttle valve with the control is supporting the stop screw.



With the throttle completely closed, check that the cables have clearance in all steering positions and confirm the position at the diagnostic tool.

Keep the throttle in a completely open position and confirm the position at the diagnostic tool.

CAUTION

DO NOT TAMPER WITH THE STOP SCREWS UNDER THE THROTTLE BODY, AS THE IDLE SPEED IS ADJUSTED IN THE FACTORY.

INDEX OF TOPICS

S**SUSPENSIONS**

SUSP

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

Front

Removing the front wheel

Rest the vehicle on its centre stand.

Suitably secure the rear part of the vehicle by raising the front slightly.

Loosen the screws fixing the wheel rim to the hub.



Remove the front wheel.



Front wheel hub overhaul

REMOVING THE FRONT WHEEL HUB

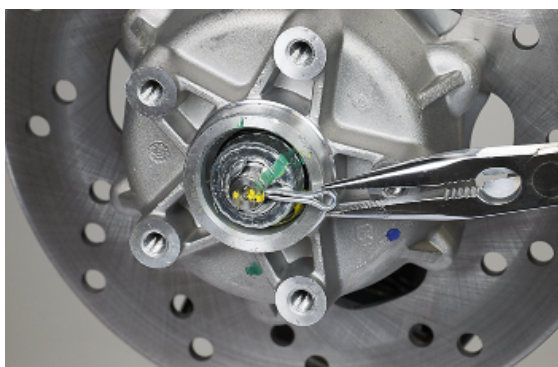
Rest the vehicle on its centre stand.

Suitably secure the rear part of the vehicle by raising the front slightly.

Remove the front wheel.

Remove the front brake calliper.

Remove the safety cotter pin bending the flaps.



Remove the safety cap.



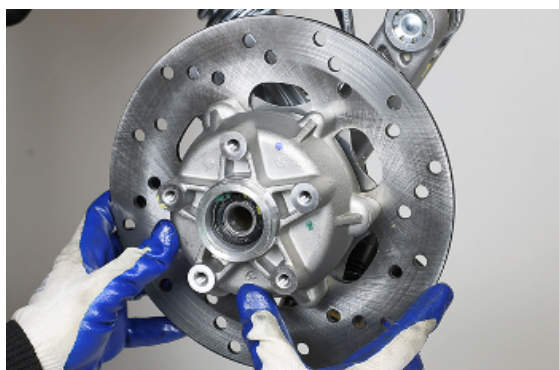
Unscrew the nut fixing the front wheel hub to the wheel axis.



Remove the nut.

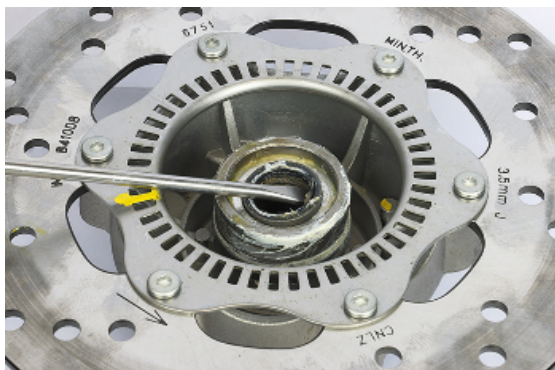


Remove the front wheel hub from its seat.



FRONT WHEEL HUB SERVICE

Remove the oil seal on the brake disc side using a flat-head screwdriver.



Turn the hub on the wheel side.

Using the relative clamps, remove the Seeger ring.



Engage the specific tool on the inner ring of the bearing on the wheel side.

Specific tooling

001467Y Extractor for bearings for holes



Remove the bearing using the specific tool.

Specific tooling

001467Y Extractor for bearings for holes

001467Y017 Bell Ø 35



Remove the bearing and the specific tool.



Remove the roller bearing using the specific tool.

Specific tooling

020376Y Adaptor handle

020456Y Ø 24 mm adaptor

020363Y 20-mm guide



Check the seat of the bearing.

Heat the bearing's seat on the hub using the specific tool.

Specific tooling

020151Y Air heater



Using the specific tool, place the new ball bearing in its seat with the shielding facing up.

Specific tooling

020376Y Adaptor handle

020357Y 32 x 35-mm Adaptor

020412Y 15-mm guide



Put the bearing all the way into its seat.



Put in the Seeger ring.



Turn the hub on the opposite side.

Using the specific tool, insert the roller bearing all the way in.

Apply the recommended product in the chamber between the ball bearing and the roller bearing.

Specific tooling

020038Y Punch

Recommended products

Lubricant grease Lithium and medium fibre yellow brown coloured grease suitable for various uses.

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



Using the specific tool, put a new oil seal in its seat.

Specific tooling

020376Y Adaptor handle

020357Y 32 x 35-mm Adaptor

020412Y 15-mm guide

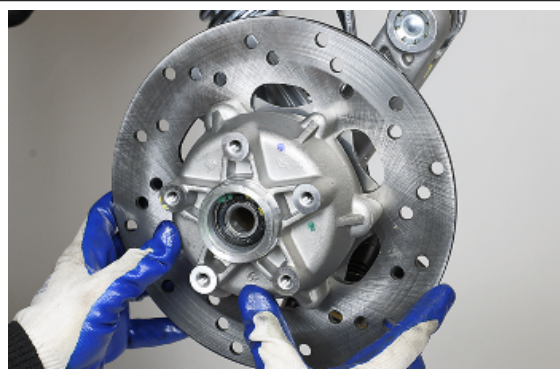


Put the oil seal all the way into its seat.



FITTING THE FRONT WHEEL HUB

Place the wheel hub on the front wheel axle.



Screw on the fixing nut on the wheel axle.



Tighten the fixing nut on the wheel axle to the prescribed torque.

Locking torques (N*m)

Front wheel hub - Wheel axle 74 - 88 Nm



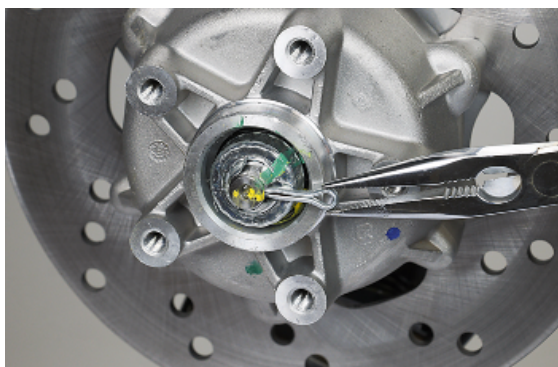
Put on the safety cap so that the hole for the cotter pin is visible.



Insert the safety cotter pin and fold the flaps outwards.

Refit the front brake calliper.

Fit the front wheel.



Refitting the front wheel

Put back the front wheel on the wheel hub.



Tighten to the recommended torque the screws fixing the front wheel to the hub.

Locking torques (N*m)

Rear wheel - Front wheel hub 19 - 24 Nm



Handlebar

Removal

Rest the vehicle on its centre stand.

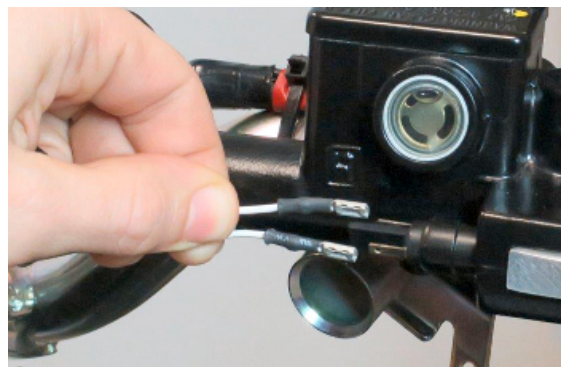
Remove the rear-view mirrors.

Remove the front centre cover.

Remove the front handlebar cover.

Remove the rear handlebar cover.

Disconnect the stop light switch cables on both sides of the vehicle.



Unscrew the screws fixing the U-bolt of the rear brake pump.



Remove the rear brake pump without detaching the brake piping.



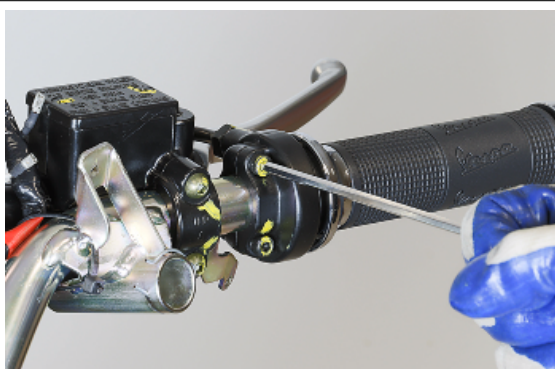
Unscrew the end fixing screw from both sides of the handlebar and remove it.



Using compressed air, remove the left knob from the handlebars.



Unscrew the screws fixing the U-bolt of the throttle and remove it.



Release the throttle control transmissions from the sleeve.



Take out the entire throttle sleeve.



Unscrew the screws fixing the U-bolt of the front brake pump.



Remove the front brake pump from the handlebars without detaching the brake piping.



Remove the Velcro ties fixing the wiring harness onto the handlebars.



Unscrew the bolt fixing the handlebars to the steering tube and remove it.



Take the handlebars out of the steering tube.

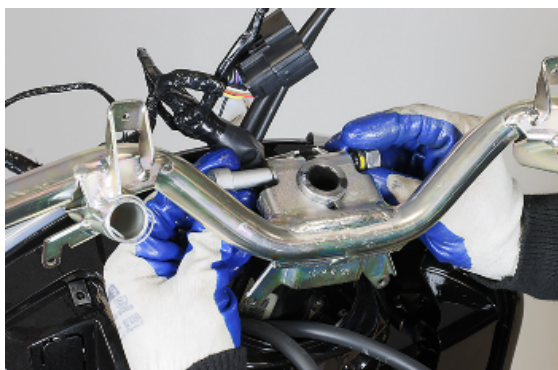


Refitting

Reposition the handlebars on the steering tube.



Insert the bolt at the relative seat on the steering tube.



Tighten the bolt fixing the handlebars to the steering tube to the prescribed torque.

Locking torques (N*m)

Handlebars - Steering tube 50 - 55 Nm



Fix the wiring harness, on both sides of the handlebars, with a Velcro tie at the red marking on the wiring harness.



Place the front brake pump in its seat.



Tighten the screws fixing the U-bolt to the brake pump to the prescribed torque.

Locking torques (N*m)

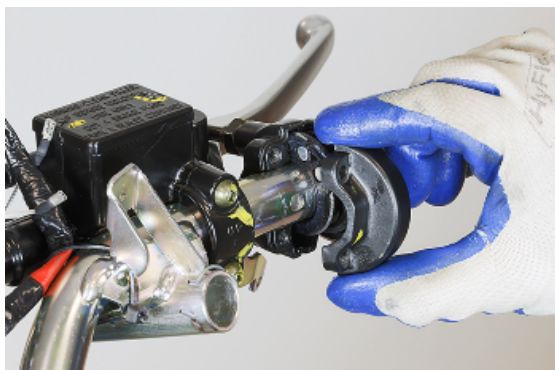
Brake pump - Handlebars 7 - 10 Nm



Place the throttle sleeve on the handlebars.



Insert the throttle transmissions on the sleeve and reposition the fixing U-bolt.



Tighten the screws fixing the U-bolt to the gas throttle to the prescribed torque.

Locking torques (N*m)

U-bolt - Throttle control sleeve 3 - 4 Nm



Using compressed air, reposition the left knob on the handlebars.



Working on both sides of the handlebars, tighten the screw fixing the handlebar end to the prescribed torque.

Locking torques (N*m)

Handlebar end - Handlebars 9 - 11 Nm



Put back the rear brake pump on its seat on the handlebars.



Tighten the screws fixing the U-bolt to the brake pump to the prescribed torque.

Locking torques (N*m)

Brake pump - Handlebars 7 - 10 Nm



Connect the stop light switch cables on both sides of the vehicle.

Refit the rear handlebar cover.

Refit the front handlebar cover.

Refit the front centre cover.

Refit the rear-view mirrors.



Steering column

Removal

Rest the vehicle on its centre stand.

Remove the rear-view mirrors.

Remove the front centre cover.

Remove the front handlebar cover.

Remove the rear handlebar cover.

Remove the handlebars

Remove the front wheel.



Remove the front brake calliper from the support without detaching the tubing.

Remove the front shock absorber.

Reposition the protective collar.

Release the retention clamp of the front brake piping and the wiring harness of the ABS sensor from the steering tube.



Working on the inside of the front mudguard, release the Velcro tie fixing the front brake piping and the ABS sensor wiring harness.



Using the specific tool, unscrew the upper ring nut fixing the steering tube to the headstock.

Specific tooling

020055Y Wrench for steering tube ring nut



Remove the upper ring nut.



Remove the safety plate



Using the specific tool, unscrew the lower ring nut fixing the steering tube to the headstock. Supporting the steering tube at the bottom.

Specific tooling

020055Y Wrench for steering tube ring nut



Remove the lower ring nut.



Remove the ball cage of the upper steering bearing.



Take out the steering tube from below so that you can access the screws fixing the front mudguard.



Unscrew the front mudguard fixing screws and definitively remove the steering tube from its seat.



Overhaul

Servicing the front suspension-steering assembly, described below, deals mainly with replacing parts (pin- NADELLA roller bushings - sealing rings unit and dust gaiter) which connect the steering tube to the front wheel holder swinging hub.

N.B.

BEFORE PROCEEDING WITH THE DESCRIBED SERVICE, CHECK THAT THE STEERING TUBE AND THE WHEEL HOLDER HUB ARE IN EXCELLENT CONDITIONS: ONLY THEN IS THE SERVICE JUSTIFIABLE.

MOREOVER, REMEMBER THE STEERING TUBE SHOULD BE REPLACED WITH A NEW ONE WHEN DEFORMED.

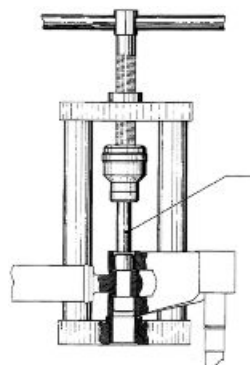
a = Ø 12 Punch

b = Sharp-edged end

Use a suitable punch with the dimensions indicated on the figure; hit with a mallet until the wedging washer is crushed and then extract it with the help of a pointed end.

Repeat the operation for the second washer using the punch on the side opposite to the one shown in the figure.

Use the tool fitted with part 1 as shown in the figure and move the tool hand-grip until the pin and the



NADELLA are simultaneously ejected in the direction opposite the tool thrusting force.

After removing the pin and the first NADELLA, the swinging hub gets detached from the steering tube.

To remove the second NADELLA, use the tool fitted with part 2 instead of part 1, on the side opposite the one shown in the figure.

N.B.

DURING THE REMOVAL OPERATIONS DESCRIBED ABOVE, THE ROLLER BUSHINGS ARE DESTROYED WHEN THE EXTRACTOR IS USED. UPON REFITTING, IT IS THEREFORE NECESSARY TO USE NEW BUSHINGS AS WELL AS A NEW PIN, NEW SEALING RINGS AND DUST GAITER.

Specific tooling

020021Y Front suspension service tool

Connect the swinging hub to the steering tube with the guiding pin.

- Use the tool fitted with part 3 on the stem and part 4.

Lubricate the pin with recommended grease and insert it temporarily on the swinging hub, move the tool hand-grip until part 3 is fully inserted on the steering tube.

After fitting the pin, insert the two spacers, slightly hitting them with the mallet.

N.B.

BEFORE PROCEEDING WITH THE DESCRIBED FITTING, PLACE THE TWO DUST GAITER RINGS ON THE SWINGING HUB AS SHOWN IN THE FIGURE.

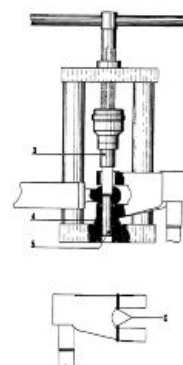
Specific tooling

020021Y Front suspension service tool

Recommended products

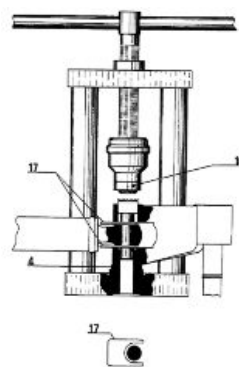
Molybdenum disulphide grease Lithium grease with molybdenum disulphide.

Grey black grease



Insert the sealing ring on the pin and the roller bushing with its wedging washer at the same time.

- Remove the tool and the part 5 (guide), which has been partially ejected during the previous pin fitting phase, and leave part 4 always fitted.
- Replace part 3 with part 16 (on the stem).
- By moving the tool hand-grip, push the wedging washer - roller bushing - seal ring unit, placing part 16 until it stops on the swinging hub.
- Repeat the above operation using the tool with part 16 and part 22, instead of part 4, always fitted to the stem, on the side opposite that indicated in the figure to fit the second wedging washer - roller bushing - sealing ring unit.



WARNING

BEFORE PROCEEDING WITH THE DESCRIBED PRE-FITTING, DIP THE SEALING RINGS IN MINERAL OIL AND THE "NADELLA" ROLLER BUSHINGS (PREVIOUSLY WASHED IN PURE PETROL OR NEUTRAL PETROLEUM TO ELIMINATE THE ANTI-RUST PROTECTION), HALF-FILLED WITH GREASE.

Specific tooling

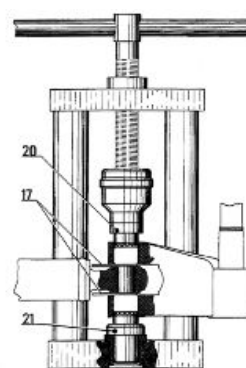
020021Y Front suspension service tool

Recommended products

Multi-purpose grease "Multi-purpose" lithium and medium fibre-based yellow brown grease suitable for various uses.

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

- Use the tool fitted with part 20 on its stem and part 21 on the tool base as shown in the figure.
- By moving the tool hand-grip, push the two NADELLA bushings until their internal bottoms make contact with the pin end.
- Use the tool fitted with parts 3 and 4 to fit the pin, and press moving the tool hand-grip, until wedging the washers on the swinging hub.
- Now, remove the two spacers (parts 17 and 16) and, once the space between the NADELLAs - steering tube and swinging hub - has been fully filled with grease, move the dust gaiter rings until they are placed in that space.



- By wedging the washers as described above, the front suspension unit refitting stage is finished.

Recommended products

Multi-purpose grease "Multi-purpose" lithium and medium fibre-based yellow brown grease suitable for various uses.

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

Refitting

FITTING

Partially insert the steering tube into the headstock, position the front mudguard on the steering tube and tighten the fixing screws to the prescribed torque, paying attention to the passage of the brake piping and the wiring of the ABS sensor.

Locking torques (N*m)

Front mudguard - Steering tube 5 - 6.5 Nm

Finish inserting the steering tube on the headstock.

Pay attention to the passage of the brake piping and the wiring of the ABS sensor.

Make sure that the lower steering bearing is correctly positioned in its seat of the ball cage.



Supporting the steering tube at the bottom, grease the lower track of the steering bearing with the recommended product and position the ball cage.

Recommended products

Calcium based grease Calcium grease

Smooth-textured appearance; Ivory coloured

Specification TL 9150 066, symbol NATO G 460



Screw on the lower ring nut.



Tighten the lower ring nut to the prescribed torque.

Locking torques (N*m)

Lower steering ring nut - Steering headstock
12 - 14 Nm



Insert the safety plate.



Screw on the upper ring nut.



Tighten the upper ring nut to the prescribed torque.

Locking torques (N*m)

Upper steering ring nut - Steering headstock
35 - 40 Nm



Reposition the protective collar.



Insert the retention clamp of the front brake piping and the wiring of the ABS sensor into its seat on the steering tube.



Fix the front brake piping and the wiring of the ABS sensor with a Velcro tie at the cable gland at the red marking on the relative clamp of the steering tube.

Refit the front shock absorber.

Refit the brake calliper.

Fit the front wheel.

Refit the handlebars.

Refit the rear handlebar cover.

Refit the front handlebar cover.

Refit the front centre cover.

Refit the rear-view mirrors.



Front shock absorber

Removal

Rest the vehicle on its centre stand.

Remove the front wheel.

Unscrew the inside screws fixing the cover of the steering tube to the front mudguard.



Unscrew the outside screw fixing the steering tube cover and remove it.



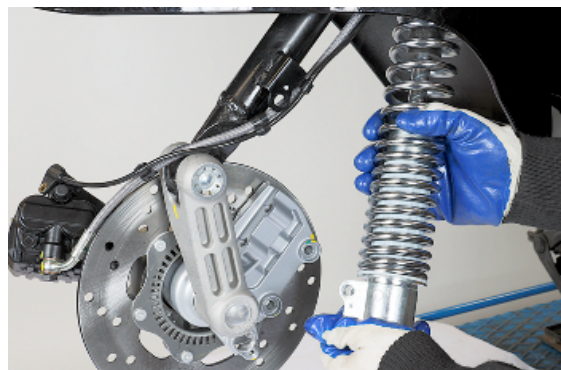
Unscrew the lower screws fixing the shock absorber to the support.



Unscrew the upper screws fixing the shock absorber to the steering tube.



Remove the shock absorber.



Refitting

Reposition the shock absorber in its seat.



Tighten the upper screws fixing the shock absorber to steering tube with the prescribed torque.

Locking torques (N*m)

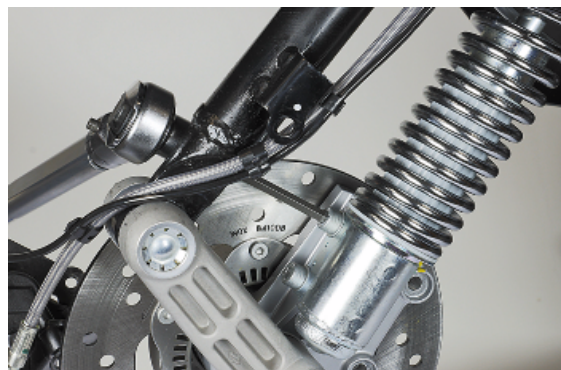
Front shock absorber (upper fixing) - Steering tube 19 - 29 Nm



Tighten the lower screws fixing the shock absorber to the support with the prescribed torque.

Locking torques (N*m)

Front shock absorber (lower fixing) - Shock absorber support 19 - 26 Nm



Reposition the cover of the steering tube and tighten the outside screw to the prescribed torque.

Locking torques (N*m)

Steering tube cover - Steering tube 4 - 7 Nm



Tighten the inside screws of the cover of the steering tube to the front mudguard with the prescribed torque.

Locking torques (N*m)

Steering tube cover - Front mudguard 2 - 4 Nm



Shock-absorber - calliper bracket

Removal

Rest the vehicle on its centre stand.

Remove the front wheel.

Remove the front brake calliper.

Remove the speed sensor.

Remove the front wheel hub.

Remove the front shock absorber.

Remove the Seeger ring



Remove the special washer.



Remove the brake calliper-shock absorber support.



Recuparate the adjustment washer and the O-ring.



Overhaul

Using a flat-head screwdriver, remove the hub side dust gaiter.



Using a flat-head screwdriver, remove the dust gaiter on the shock absorber side.



Using the specific tool, remove the roller cages.

Specific tooling

020365Y 22 mm guide

020376Y Adaptor handle

020441S 26 x 28 mm adaptor



After checking the roller cage seat on the support, use the specific tool to install a new roller cage on the wheel hub side.

Specific tooling

020037Y Punch



Using the specific tool, install a roller cage on the front shock absorber side.

Specific tooling

020036Y Punch



Using the specific tool, install a dust gaiter on the shock absorber side.

Specific tooling

020365Y 22 mm guide

020376Y Adaptor handle

020441S 26 x 28 mm adaptor



Using the specific tool, install a new dust gaiter on the wheel hub side.

Specific tooling

020360S 52 x 55 mm adaptor

020376Y Adaptor handle



Refitting

Insert a new adjustment washer and a new O-ring.



Insert the brake calliper-shock absorber on the wheel axle after greasing the seats of the roller cages with the recommended product.

Recommended products

Calcium based grease Calcium grease

Smooth-textured appearance; Ivory coloured

Specification TL 9150 066, symbol NATO G 460



Insert the special washer on the front wheel axle and make sure it is fully into its seat.



insert the locking Seeger ring of the support.

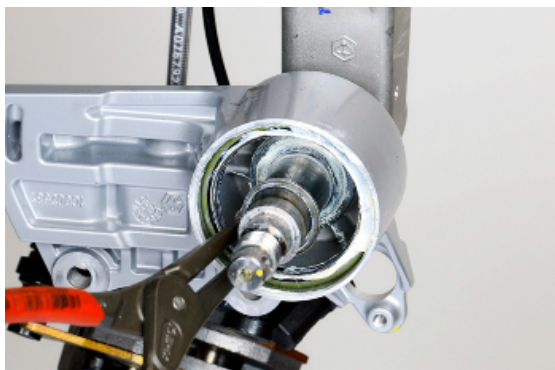
Refit the front shock absorber.

Refit the front wheel hub.

Refit the speed sensor.

Refit the front brake calliper.

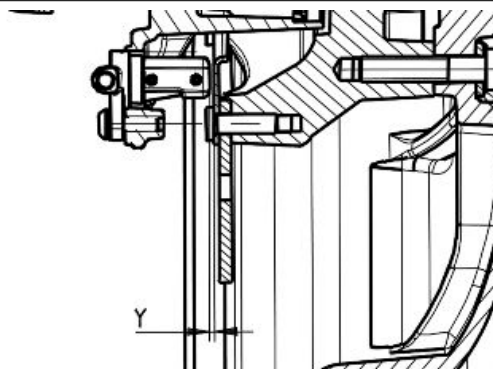
Fit the front wheel.



Check the "Y" distance between the speed sensor and the tone wheel:

If the "Y" distance is less than 0.7 mm, add an appropriate calibrated washer.

If the "Y" distance is greater than 1.9 mm, remove a calibrated washer.



Steering bearing

Removal

Remove the lower ball cage from the steering tube.



Remove the lower plate of the steering bearing from the steering tube.



Using the specific tool, remove the track of the lower steering bearing on the steering headstock.

Specific tooling

020004Y Punch for removing steering bearings from headstock



Using the specific tool, remove the track of the upper steering bearing on the steering headstock.

Specific tooling

020004Y Punch for removing steering bearings from headstock



Refitting

Insert the specific tool and the upper track of the lower steering bearing into the steering headstock.

Specific tooling

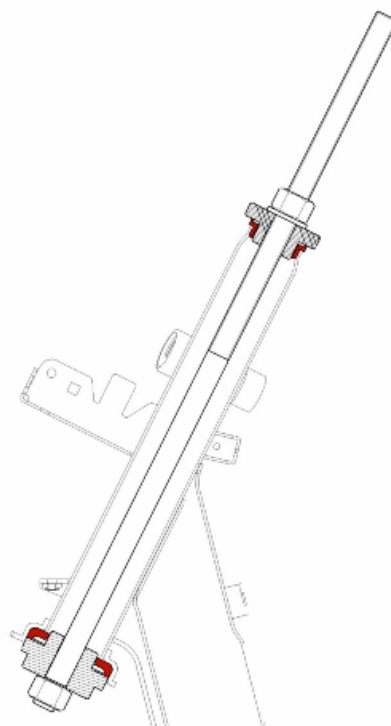
001330Y Tool for fitting steering seats



Insert the lower plate of the upper steering bearing into the specific tool and tighten the nut.



Make sure the tracks go all the way onto the steering headstock.



Using the specific tool, refit the lower plate of the steering tube bearing.

Specific tooling

020459Y Punch for fitting the bearing on the steering tube



Grease the track of the seat of the steering bearing with the recommended product.

Reposition the ball cage and refit the steering tube onto the headstock.

Recommended products

Calcium based grease Calcium grease

Smooth-textured appearance; Ivory coloured

Specification TL 9150 066, symbol NATO G 460



Rear

Removing the rear wheel

Remove the complete silencer.

Remove the silencer mounting bracket.

Remove the screws fixing the rear wheel to the wheel hub.



Remove the rear wheel.



Refitting the rear wheel

Refit the rear wheel on the wheel hub.



Tighten the screws fixing the rear wheel to the wheel hub to the specified torque.

Refit the silencer support bracket.

Refit the silencer.

Locking torques (N*m)

Rear wheel - Rear wheel hub 20 - 25 Nm



Swing-arm

Removal

Remove the silencer.

Remove the side fairings.

Remove the left and right footrest ends

Remove the radiator cover.

Remove the helmet compartment.

Support the vehicle adequately.

Place a lifting device below the vehicle frame and use it to support the weight of the frame, the stand must remain in contact with the ground to support the weight of the engine.



Unscrew the belt cooling cover fixing screws.



Remove the belt cooling cover without disconnecting it from the bellows.



Unscrew and remove the nut fixing the swinging arm - engine pin.



Remove the right and left caps under the footrest at the swinging arm pin frame side.



Unscrew the fastening screws of the swinging arm pad support bracket.



Remove the frame side swinging arm pin.



Support the assembly and remove the engine side swinging arm pin.



Remove the swinging arm



Overhaul

- Remove the Seeger ring fastening the rubber pads.



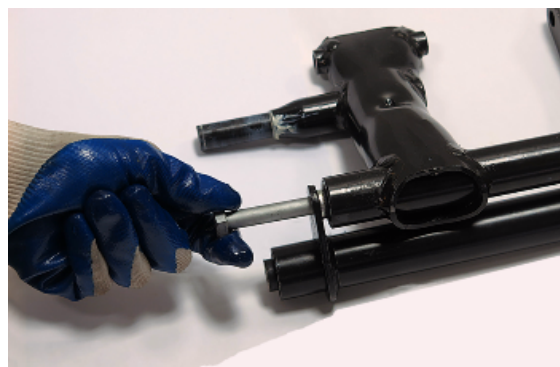
- Remove the rubber pads.



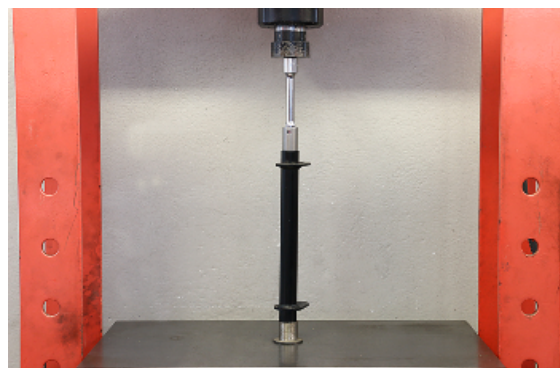
- Unscrew the nut fastening the engine side connecting rod.



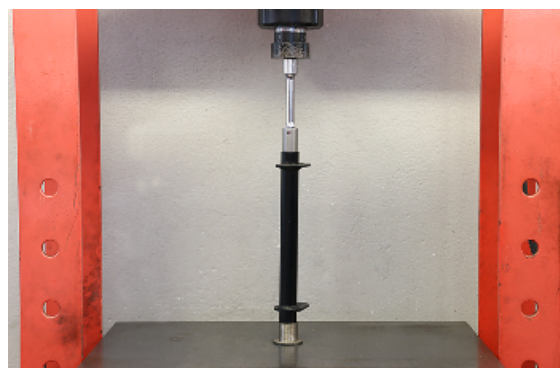
- Remove the pin.



- Suitably position the engine side or frame side swinging arm in the press, as needed, and remove the silent-blocks.



- Suitably position the engine side or frame side swinging arm in the press, as needed, and insert the new silent-blocks, placing a spacer between them.



- Assemble the swinging arm assembly without tightening to torque.



- Insert the new rubber pads.



- Insert the Seeger ring fastening the rubber pads

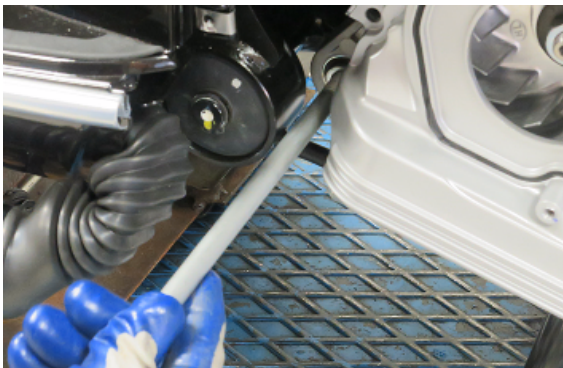


Refitting

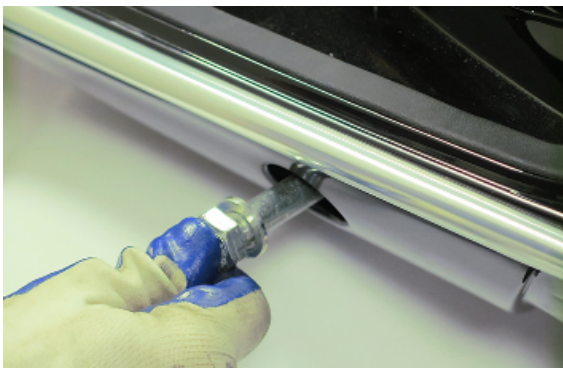
- Insert the assembled swinging arm between the bodywork and engine.



Insert the pin of the engine swinging arm.



Insert the frame side swinging arm pin.



Tighten the screws fastening the swinging arm pad support bracket to the specified torque.

Locking torques (N*m)

Silent-block support bracket - frame 42 - 52 Nm



Remove the lifting device from under the frame and take the vehicle off the centre stand.
Preload the vehicle with a pilot weight of 75 Kg.
Tighten the nuts of the swinging arm to the specified torque in the following order.



SWINGING ARM TIGHTENING TORQUES

Name	Torque in Nm
Frame side swinging arm - Engine side swinging arm	40 - 45 Nm
Swinging arm on frame side - Frame	76 - 83 Nm
Swinging arm on engine side - Engine	67 - 75 Nm

Put back the belt cooling cover and tighten the fixing screws on the crankcase cover.



Insert the right and left caps at the swinging arm pin frame side.



Insert the helmet compartment.

Fit the radiator cover.

Fit the left and right footrest ends

Fit the side fairings.

Fit the silencer.

Shock absorbers

Removal

To remove the rear shock absorbers proceed as follows:

Adequately support the vehicle by inserting a lifting device under the bodywork.



Remove the silencer.

Remove the plastic cover of the luggage rack.



Unscrew the lower fixing nut of the right shock absorber.



Unscrew the screws fixing the air filter box to the engine.



Lift the filter box to access the lower fastening of the left rear shock absorber.

Unscrew and remove the fixing bolt.



Unscrew and remove the upper fixing nuts of the shock absorbers.



Remove the shock absorbers pulling them upwards.



Refitting

Insert the top threaded stem of the shock absorbers in the relative holes in the bodywork.



Insert and screw in without tightening to torque the upper fixing nuts of the shock absorbers.



Lift the filter box to access the lower fastening of the left rear shock absorber.

Insert and tighten to torque the lower fixing bolt of the left shock absorber.

Locking torques (N*m)

Rear shock absorber - Engine 40 - 45 Nm



Put in place the lower fixing nut of the right shock absorber.

Insert the fixing nut and tighten to the specified torque.

Locking torques (N*m)

Rear shock absorber (lower fix) - Silencer support bracket 40 - 45 Nm



Tighten the upper fixing nuts of the shock absorbers to the recommended torque.

Locking torques (N*m)

Rear shock absorber - Chassis 20 - 25 Nm



Fit the silencer.

Fit the plastic cover of the luggage rack

Fit the air filter box.

Exhaust bracket

Removal

Rest the vehicle on its centre stand.

Remove the complete silencer.

Unscrew the screws fixing the clamps retaining the rear tone wheel sensor cable.



Unscrew the screws fixing the rear tone wheel sensor to the silencer support bracket and remove it.



Reclose the ends of the split pin and remove it from its seat.



Remove the safety cap.



Unscrew the locking nut of the silencer support bracket on the rear wheel axle keeping the rear wheel locked.



Remove the locking nut.



Unscrew the lower fixing nut of the right rear shock absorber.



Unscrew the front screws fixing the silencer support bracket to the engine.

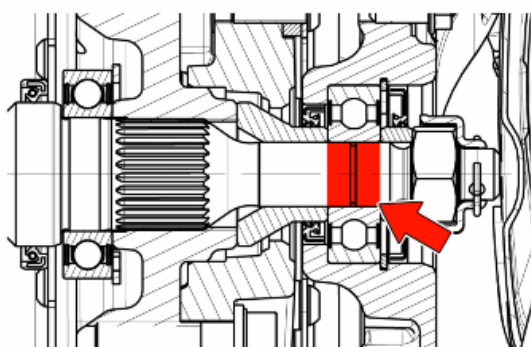


Remove the rear shock absorber from the pin on the bracket and remove the silencer support bracket from its seat.



Refitting

using the recommended product, lubricate the contact surfaces between the wheel axle and the bearing on the bracket, as indicated in figure. **Take care not to apply the grease to the threaded portion of the wheel axle.**



Reposition the rear shock absorber on the pin of the bracket .
Reposition the silencer support bracket in its seat.



Screw in, **without tightening to torque**, the front fixing screws of the silencer support bracket.



Reposition the right rear shock absorber in its seat and tighten the lower fixing nut to the recommended torque.

Locking torques (N*m)

Rear shock absorber (lower fix) - Shock absorber support bracket 40 - 45 Nm



Screw on the nut locking the silencer support bracket on the wheel axle.



Keeping the rear wheel locked, tighten the fixing nut to the recommended torque.

Locking torques (N*m)

Silencer support bracket - Rear wheel axle 104 - 126 Nm



Tighten the front fixing screws of the silencer support bracket to the recommended torque.

Locking torques (N*m)

Silencer support bracket - Engine 20 - 25 Nm



Reposition the protective cap on the nut of the wheel axle.



Insert a new split pin in its seat and fold the ends towards the cap.



Reposition the wiring harness and the rear tone wheel sensor in their seat and tighten the sensor to the bracket at the recommended torque. Measure the air gap between the sensor and the tone wheel, and if it is less than the nominal value fit the specific washer between the sensor and the bracket.

**Characteristic****Nominal air gap**

≥ 0.4 mm

Sensor shimming washer

drw. 669282

Locking torques (N*m)

Rear tone wheel sensor - Silencer support bracket 5 - 6 Nm

Tighten the screws fixing the wiring retention clamps of the tone wheel sensor to the bracket.
Refit the complete silencer.



Centre-stand

REMOVAL

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

FITTING

- On refitting tighten the nut to the specified torque.



Locking torques (N*m)

Central stand bolt 32 - 40

Side stand

REMOVAL

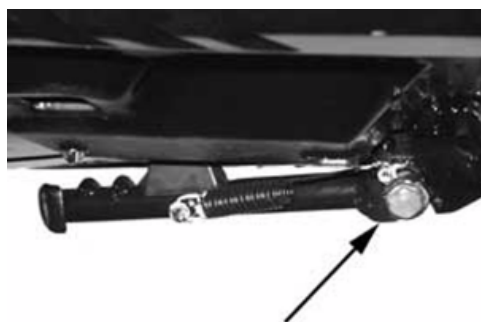
- Uncouple the centre stand return spring;
- Remove the screw shown in the photograph

FITTING

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

Locking torques (N*m)

Side stand fixing bolt 35 - 40



INDEX OF TOPICS

BRAKING SYSTEM

BRAK SYS

This section is dedicated to the description of the brake system components.

ABS

CAUTION

When removing the front wheel, for example to change the tyre, be careful not to damage the tone wheel.

Visually check the state of the tone wheel and carry out a road test, making a complete check of the ABS system before shipping the vehicle to the client.

Damage to the tone wheel causes the continual operation of the modulator pump even when the brake lever is not engaged.

CAUTION

WITH EACH REMOVAL AND FITTING OF THE FRONT WHEEL CHECK THE DISTANCE BETWEEN THE SPEED SENSOR AND THE TONE WHEEL, WHICH SHOULD BE BETWEEN 0.5 mm AND 1.5 mm. IF NECESSARY ADJUST IT BY ADDING OR REMOVING 0.5 MM CALIBRATED WASHERS CHECKING THE ABS SYSTEM TAKES PLACE WITH EACH KEY "ON" AND CAN BE REPEATED, ESPECIALLY IN HARSH CLIMATIC CONDITIONS AFTER THE ENGINE STARTS, THIS IS DUE TO THE NATURAL LOWERING OF THE BATTERY VOLTAGE CAUSED BY THE STARTING SYSTEM.

The vehicle is equipped with a locking ABS system on the wheels.

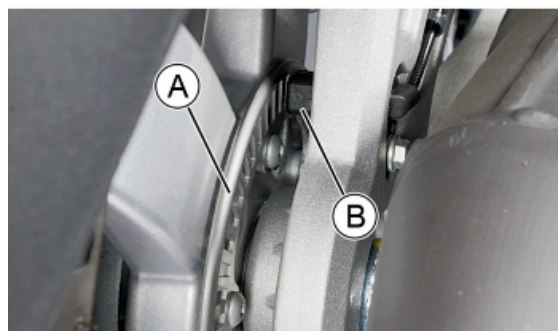
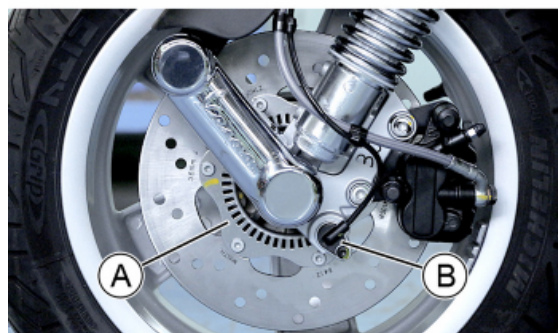
A: Tone wheel

B: Speed sensor

- **ABS:** It is a hydraulic - electronic device that limits the pressure within the braking circuit when a sensor, located on the wheel, detects its tendency to lock. This system prevents the wheels from locking to avoid the risk of falling.

In case of failure of the ABS system, immediately reported to the rider with ABS warning light on the instrument cluster, the vehicle retains the characteristics of a conventional braking system. If the ABS indicator light switches on, proceed with the system diagnosis and reactivation. The safety provided by the ABS does not, in any case, justify risky manoeuvres. The stopping distance may be greater, compared to a conventional vehicle equipped with traditional braking in the following conditions:

- Riding on rough roads, with gravel or snow
- Riding on roads with holes or bumps



It is therefore recommended to reduce speed in these conditions.



AT VERY LOW SPEEDS, LESS THAN 5 km/h (3 mph) THE ABS SYSTEM IS DISABLED.

IT IS RECOMMENDED TO PAY ATTENTION THEREFORE IN CASES OF BRAKING IN LOW GRIP CONDITIONS AT LOW SPEED (FOR EXAMPLE BRAKING ON GARAGE FLOOR TILES AFTER HAVING RIDDEN ON WET ROADS OR SIMILAR SITUATIONS)

CAUTION



IN THE EVENT OF MALFUNCTION OF THE BATTERY, THE ABS - ASR SYSTEM TURNS OFF.

When switching the key to «ON», the ABS control unit performs a control of the system, during which the ABS warning light flashes. This phase ends when exceeding 5 Km/h of speed with the switching off of the warning light.

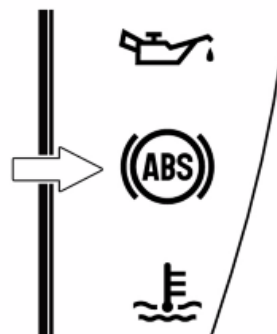
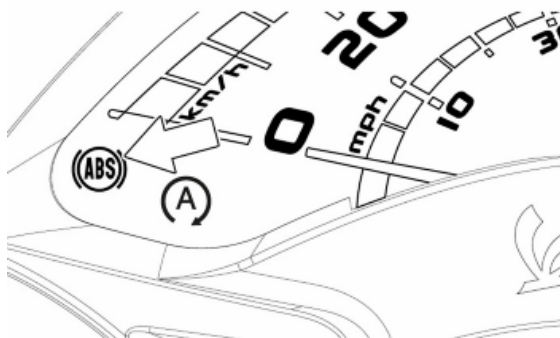
In case of error of the system, the ABS warning light remains fixed. The braking system keeps the characteristics of a traditional system.

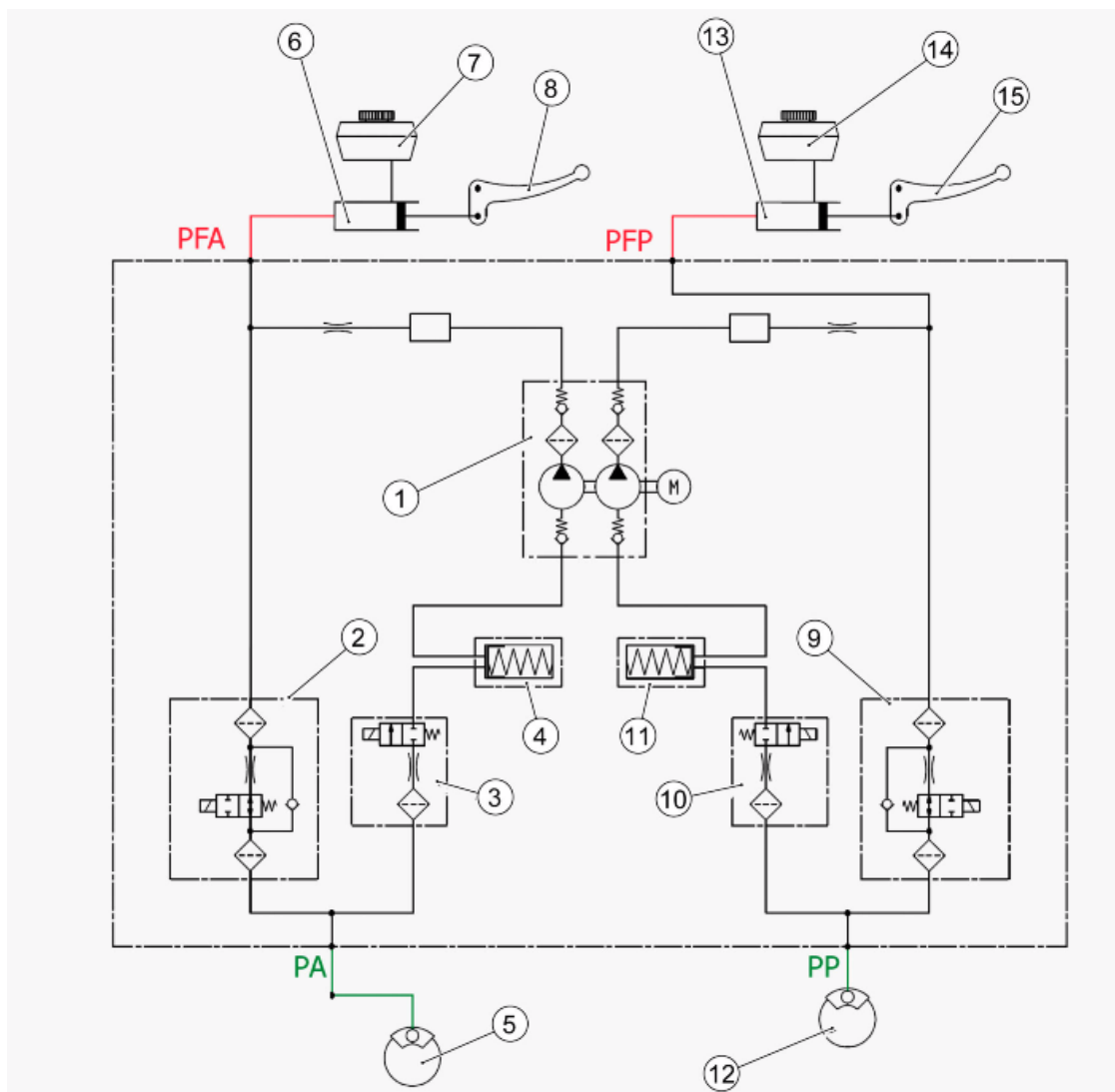
In this case, proceed with the system diagnosis and reactivation.

WARNING



IF THE WARNING LIGHT IS FLASHING, THE ABS SYSTEM IS NOT ACTIVE.



**Key:**

1. Recirculation pumps
2. Front brake circuit inlet solenoid valve
3. Front brake circuit outlet solenoid valve
4. Front brake circuit low pressure accumulator
5. Front Calliper (PA Pump)
6. Front Brake (PFA)
7. Front Brake Tank
8. Front brake control lever
9. Rear brake circuit inlet solenoid valve
10. Rear brake circuit outlet solenoid valve
11. Rear brake circuit low pressure accumulator
12. Rear Calliper (PP)
13. Rear Brake Pump (PFP)

14.Rear Brake Tank

15.Rear brake lever

OPERATION OF THE ABS

General considerations

- The front circuit is the same as the rear one.
- The ABS intake valve (2 - 9) is normally open and is closed only when the system intervenes to prevent locking.
- The exhaust valve (10 - 3) is normally closed and is only opened when the system intervenes to prevent locking.
- With the system in stand-by mode, the ABS processor controls the wheel speed instant by instant to assess any slippage of the wheels.
- While in stand-by, the system does not intervene in any way on the braking of the rider, the braking system is identical to the one without ABS.
- ABS Cycle phases (the following operations refer to the front circuit but they are also valid for the rear):

A - Start braking: the rider starts braking as he would usually do.

B - Pressure reduction: coincides with the recognition of the dangerous situation (wheel slippage exceeds the threshold): The system closes the intake valve (2 - 9) and temporarily opens the exhaust valve (10 - 3). In this phase, the rider cannot increase the pressure of the callipers (12 - 5) and the system reduces the pressure in the callipers. The excess fluid temporarily fills the front tank (14 - 7) until the ABS pump (1) self-operates by driving the fluid in the direction of brake pump (6 - 13).

C - Maintaining pressure: the pressure in the callipers (12 - 5) remains low until the full restoration of speed / grip of the wheel. The system returns the fluid removed from the calliper (12 - 5) to the system section between the brake pump (6 - 13) and the ABS intake valve (2 - 9).

D - Pressure restoration: through the temporary openings of the intake valve (2 - 9), pressure from the callipers (12 - 5) is increased until the maximum deceleration has been reached, the system then re-assigns braking control to the rider.

E - In the event that the wheel does not regain full grip, the system continues to operate as before until it is restored or until the vehicle stops. An error may be generated, however, if the pressure reduction stage persists for longer than a predetermined limit.

Modulator

REMOVAL

CAUTION



IT IS EXTREMELY IMPORTANT TO CAREFULLY FOLLOW THE REMOVAL AND REASSEMBLY PROCEDURES DESCRIBED BELOW. THESE PROCEDURES MAKE IT POSSIBLE TO AVOID AIR

FROM ENTERING THE BRAKING CIRCUIT AND ESPECIALLY IN THE ABS MODULATOR WHILE REPLACING THE COMPONENTS.

Support the vehicle adequately.

Remove the handlebar covers.

Remove the leg shield back plate.

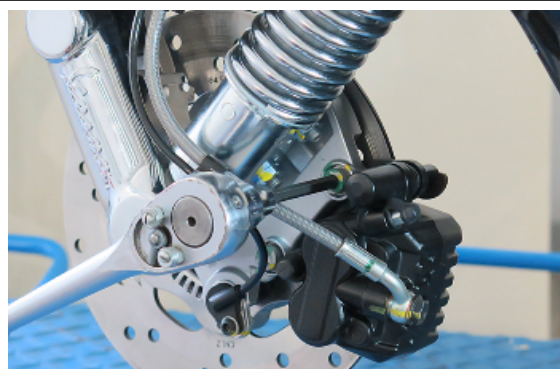
Remove the front centre cover.

Remove the wheels.

Unscrew the screws on the rear brake hose fastening clamps.



Unscrew and remove the front brake calliper fixing screws and remove it from the support.



With new pads or pads in a good condition, operate the brake pump repeatedly to bring the pads in contact with each other.



Refill the front brake pump tank and fit the cap.

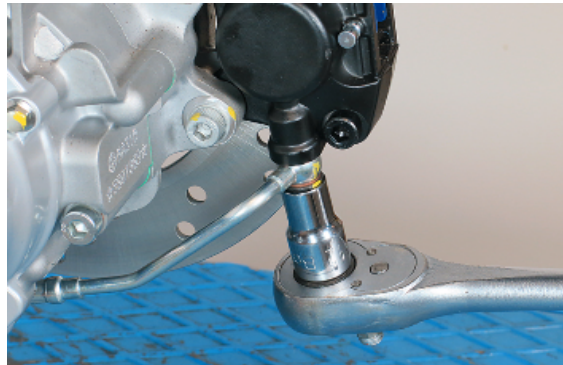


Operate the brake lever just beyond the point of closing communication with the tank.

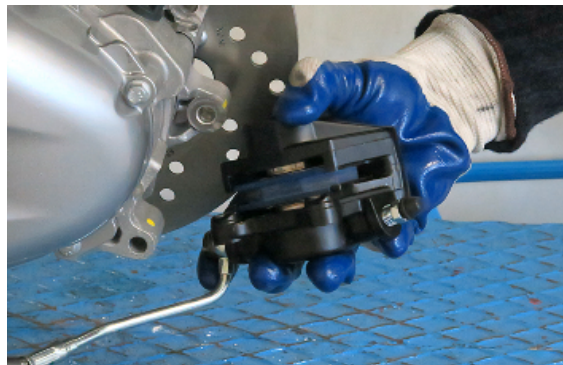
Block the position of the lever by fastening it.



Undo the fixing screws of the rear brake calliper to the engine.



With new pads or pads in a good condition, operate the brake pump repeatedly to bring the pads in contact with each other.



Refill the rear brake pump tank and fit the cap.



Operate the brake lever just beyond the point of closing communication with the tank.
Block the position of the lever by fastening it.



Unscrew the fixing nuts and remove the turn indicators device including bracket.



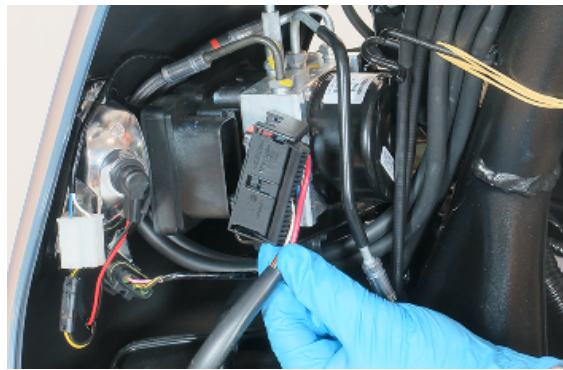
Disconnect the front tone wheel sensor connector.



Open the hydraulic hoses fastening clamp.



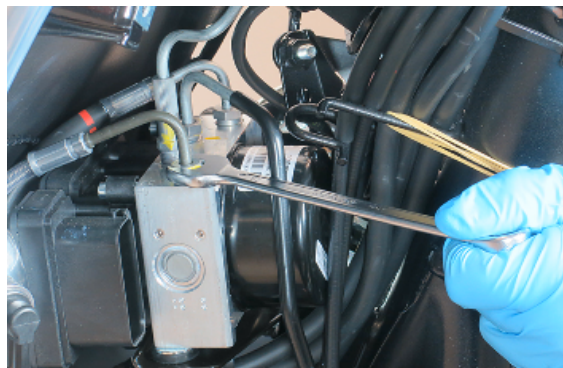
Disconnect the modulator connector.



Unscrew the connectors fastening the circuit pipes entering and exiting the modulator.

N.B.

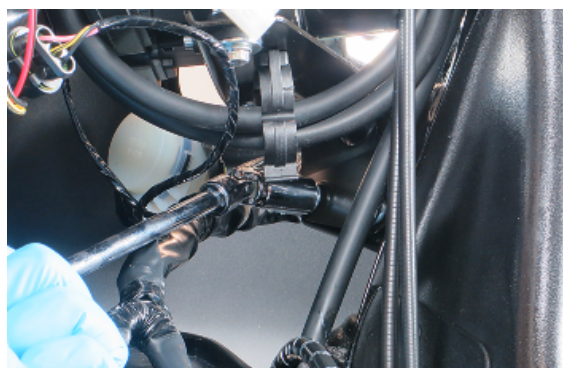
PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.



Through the front opening of the shield, unscrew and remove the modulator fixing screw to the side support bracket.



Undo and remove the fastening nuts of the modulator lower support bracket



Remove the modulator complete with lower support bracket.



Separate the ABS modulator from the lower support bracket by unscrewing the fastening screws.



FITTING

Install the new modulator on the support bracket, tightening the fastening screws to the specified torque.

Locking torques (N*m)

ABS Modulator - Bracket 8 - 10 Nm



Insert the ABS modulator complete with bracket in its seat.



Through the front opening of the shield, insert and tighten the modulator fixing screw at the prescribed torque to the side support bracket.

Locking torques (N*m)**ABS Modulator - Bracket 8 - 10 Nm**

Unscrew the seal plug on the RW outlet of the modulator.

N.B.

PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.



Connect the pipe supplying the rear calliper to the RW outlet on the modulator.

Screw in the connector all the way and then loosen it half a turn.



Slowly move away the rear calliper pads.



Until the brake fluid exits the slow connector.
Block the connector on the modulator while the fluid is exiting.

CAUTION

THE CONNECTOR MUST BE TIGHTENED BEFORE REMOVING THE THRUST FROM THE PADS. OTHERWISE, AIR ENTERS THE PIPE.



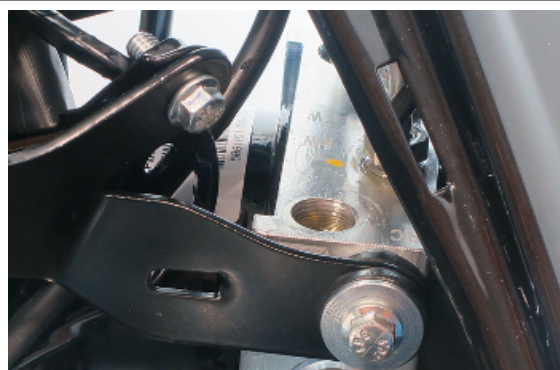
Unscrew the seal plug on the RC inlet of the modulator.

N.B.

PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.



Move the rear calliper pads further away until the brake fluid exits from the seat of the RC inlet.



Connect the rear brake master cylinder delivery pipe to the RC outlet on the modulator.
Screw in the connector all the way and then loosen it half a turn.



Pull the rear brake lever until brake fluid and air slowly exit the RC connector.
Block the connector while the brake fluid is exiting.

CAUTION

THE CONNECTOR MUST BE TIGHTENED BEFORE RELEASING THE BRAKE PUMP LEVER. OTHERWISE THE PUMP INTAKES AIR IN THE PIPE.



Free the rear brake pump lever.



Check and if necessary top up the level of the brake fluid in the brake pump tank.
Close the tank cap.



Refit the rear brake calliper on the disc, tightening the screws to the specified torque.
Actuate the brake pump lever, recovering the distance of the pads.
Check the system's efficiency.
If the work was performed properly, the brake must be efficient.

**Locking torques (N*m)**

Rear brake calliper screws - Engine 20 - 25 Nm

Proceed in the same manner to connect the front brake pipes.

Unscrew the seal plug on the FW outlet of the modulator.

N.B.

PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.



- Connect the pipe supplying the front calliper to the FW outlet on the modulator.

Screw in the connector all the way and then loosen it half a turn.



Slowly move away the front calliper pads.



Until the brake fluid exits the slow connector.

Block the connector on the modulator while the fluid is exiting.

CAUTION



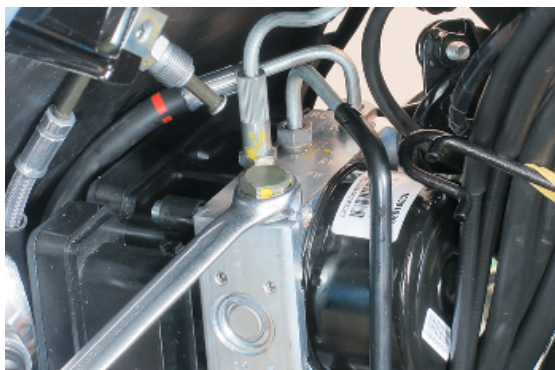
THE CONNECTOR MUST BE TIGHTENED BEFORE REMOVING THE THRUST FROM THE PADS. OTHERWISE, AIR ENTERS THE PIPE.



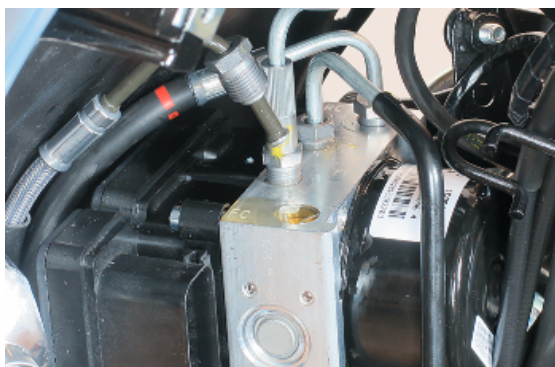
Unscrew the seal plug on the FC inlet of the modulator.

N.B.

PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.



Move the front calliper pads further away until the brake fluid exits from the seat of the FC inlet.



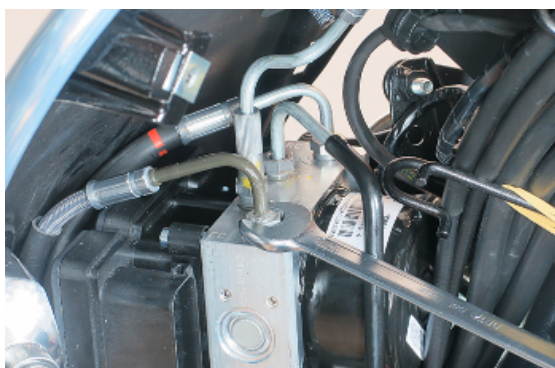
Connect the front brake master cylinder delivery pipe to the FC outlet on the modulator.
Screw in the connector all the way and then loosen it half a turn.



Pull the front brake lever until brake fluid and air slowly exit the FC connector.
Block the connector while the brake fluid is exiting.

CAUTION

THE CONNECTOR MUST BE TIGHTENED BEFORE RELEASING THE BRAKE PUMP LEVER. OTHERWISE THE PUMP INTAKES AIR IN THE PIPE.



Free the front brake pump lever.



Check and if necessary top up the level of the brake fluid in the brake pump tank.

Close the tank cap.



Refit the front brake calliper on the disc, tightening the screws to the specified torque.

Actuate the brake pump lever, recovering the distance of the pads.

Check the system's efficiency.

If the work was performed properly, the brake must be efficient.



Locking torques (N*m)

front brake calliper shock absorber and brake calliper support 19 - 24 Nm

Block the hydraulic hoses with the appropriate clamp



Connect the connector to the modulator until the click of the stop tooth is heard.



Connect the front tone wheel sensor connector.



Connect the direction indicator device connector



Position the direction indicator device complete with bracket in its seat

Insert and tighten the bracket fixing nuts.



Insert and tighten the screws of the rear brake pipe fastening clamps.

Assemble the wheels.

Assemble the front centre cover.

Assemble the leg shield back plate.

Fit the handlebar covers.



ASR

System ASR

FOR CLASSIC - TOURING - SUPER - RACING - SUPERSPORT VERSIONS

The ASR system is a driving aid that assists the driver in acceleration manoeuvres, particularly on low-grip surfaces or under conditions that can cause sudden back-wheel slippage. The ASR in these situations automatically intervenes by reducing engine output within the limit imposed by the grip conditions, contributing significantly to the maintenance of stability the vehicle.



WARNING



THE ASR SYSTEM IS BASED ON THE RECOGNITION OF SPEED DIFFERENCES BETWEEN FRONT AND REAR WHEEL. FOR THE SYSTEM TO PERFORM CORRECTLY IN ALL CONDITIONS, THE PROCEDURE MUST BE PERFORMED EACH TIME A TYRE IS REPLACED EVEN IF ONLY ONE OF THE TYRES IS REPLACED.

FOR THE CALIBRATION OF THE ASR SYSTEM PERFORM THE PROCEDURE BELOW.

WARNING



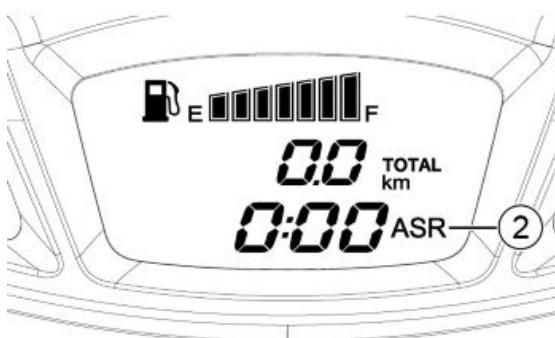
THE ASR SYSTEM PREVENTS THE APPLICATION OF HIGH SPEED ROTATION ON THE REAR WHEEL WITH THE VEHICLE ON THE CENTRE STAND.

IT IS RECOMMENDED TO NOT INSIST WITH THE THROTTLE GRIP IN THIS SPECIFIC SITUATION, BECAUSE THIS MAY CAUSE ABNORMAL STOPS AND/OR DAMAGE TO THE CATALYSTS.

ASR BUTTON 1: to activate/deactivate the ASR system, with the engine running, press and hold the start button (for at least 4 seconds).



ASR ICON 2: ASR status indicator icon.



ASR ICON FLASHING MODE:

- Frequency of 5 flashes per second (5Hz), with vehicle running: The system is functioning correctly and is active (poor grip conditions, engine power limiting in effect); ride with extreme care, as the grip limit has been exceeded; restore the vehicle safety conditions by gently reducing the throttle opening.
- Frequency of 1 flash per second (1 Hz), with the key in "ON" position and the vehicle at a standstill: The system is active and the calibration is performed. The relative icon will stay on steady as soon as the engine is started.
- Frequency of 1 flash per second (1 Hz), with the key in "ON" position, the vehicle at a standstill and started programming procedure: the system calibration is in progress.
- Switched off can have three meanings:
 1. calibration procedure performed incorrectly. Perform a new calibration;
 2. the ASR system is not operating and will not intervene in case of loss of grip;
 3. the ASR system has been willingly disabled.
 - If the deactivation was voluntary (by pressing the start button "1" for at least 4 seconds with the engine running) it is recommended to reactivate the system as soon as possible.
 - If the system was NOT deactivated voluntarily, this indicates a failure of the ASR system: In this case, proceed with the system diagnosis and reactivation.
- Switched on steady can have three meanings:
 1. calibration procedure performed correctly;
 2. the ASR system is operating and will intervene in case of loss of grip;
 3. the ASR system has been willingly inserted.

To ensure maximum safety of the vehicle it is advisable to keep the system active. Deactivation may be necessary only in case of starting with very low grip surfaces (mud, snow) on which the operation of the ASR could actually prevent the movement of the vehicle.

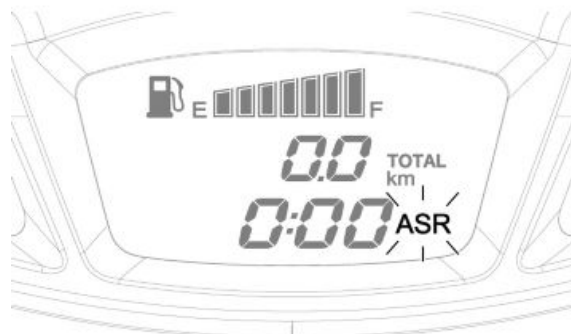
Manual calibration procedure of the ASR system during predelivery/ECU replacement.

In order to maintain the efficiency of the ASR system when one or both tires are replaced, a calibration procedure of the ASR system must be performed as follows on a straight flat stretch of road:

1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to «ON» and start the engine.
3. Wait with the engine running at idle speed for at least 3 seconds.

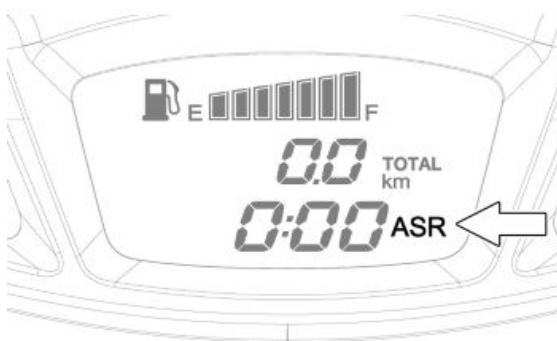
4. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The "ASR" icon lights up with 1 Hz **slow flashing** (1 flash per second).



5. Start driving and **accelerate to 30 km/h within 25 seconds and keep the speed constant for at least 10 seconds** .

The **"ASR" icon on steady**, indicates that the calibration was successful.



6. Stop the vehicle and **turn off the engine** by turning the key to OFF.



7. If the procedure has finished correctly, the next time the key is **turned to ON**, the **"ASR" icon will light up with slow flashing 1Hz** (1 flash per second), then when the engine starts, the **"ASR" icon will light up steady on** and the ASR system will be **ACTIVE**.

8. If the procedure is **NOT completed correctly**, the **"ASR" icon turns off**, indicating that the **ASR system is DEACTIVATED**. By pressing the appropriate button, the user can manually reactivate the ASR system by returning it to the previously stored calibration or proceed with a new manual calibration by repeating the procedure from the beginning.



Manual calibration procedure of the ASR system.

In order to maintain the efficiency of the ASR system when one or both tires are replaced, a calibration procedure of the ASR system must be performed as follows on a straight flat stretch of road:

1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to **«ON»** and start the engine.
3. **Disengage the ASR system** by pressing the start button for at least 4 seconds with the engine running; **the "ASR" icon will switch off**, initially it was on steady as the ASR system had already been calibrated in the past.
4. Wait with the engine running at idle speed for at least 3 seconds,

5. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The "ASR" icon lights up with 1Hz **slow flashing** (1 flash per second),

6. Start the gear and **reach the speed of 30 km/h within 25 seconds, keep the speed constant for at least 10 seconds,**

The "ASR" icon on steady, indicates that the calibration was successful.

7. Stop the vehicle **and turn off the engine** by turning the key to OFF.

8. **If the procedure has finished correctly**, the next time the key is **turned to ON**, the "ASR" icon **will light up with slow flashing** 1Hz (1 flash per second), then when the engine starts, the "ASR" icon will light up steady on and the ASR system will be ACTIVE.

9. If the procedure is **NOT completed correctly**, the "ASR" icon **turns off**, indicating that the **ASR system is DEACTIVATED**. By pressing the appropriate button, the user can manually reactivate the ASR system by returning it to the previously stored calibration or proceed with a new manual calibration by repeating the procedure from the beginning.

Automatic ASR calibration procedure.

The ASR system performs the automatic calibration, if the following conditions are met:

- If a manual ASR calibration has been performed at least once,
- If the conditions of constant speed, zero acceleration and constant throttle position (TPS) are respected, on a straight and flat stretch of road for at least 5 seconds,

If manual programming has been performed previously, automatic programming overwrites it.

If during the key ON - key OFF cycle the manual calibration has been successfully performed, then for that same cycle the ASR system will not perform any automatic programming.

If the ASR is active, **it comes into action when the system detects a slippage between the two wheels, greater than a nominal value previously stored in calibration.**

WARNING

N.B.



AT THE KEY "ON", THE FLASHING ASR ICON INDICATES THE SYSTEM DIAGNOSIS PHASE. IF THERE IS NO FLASHING WHEN THE ENGINE IS STARTED, THE ASR SYSTEM MAY NOT BE WORKING.

WARNING



THE ASR SYSTEM IS ACTIVATED AT EVERY "ON" POSITIONING OF THE IGNITION SWITCH. IF DISABLED BY THE USER, THE ASR SYSTEM KEEPS THE STATE OF INACTIVITY ONLY IF THE VEHICLE IS OFF, BY USING THE ENGINE STOP SWITCH (WHERE REQUIRED); AT THE NEXT KEY ON THE ASR SYSTEM IS ENABLED AUTOMATICALLY.

CAUTION



IT IS RECOMMENDED TO PAY PARTICULAR ATTENTION IN THE EVENT OF ACCELERATION FROM STANDSTILL IN CONDITIONS OF LOW GRIP, ESPECIALLY IN THE FIRST METRES. A POOR STATE OF MAINTENANCE OF THE TYRES CAN RESULT IN ABNORMAL OPERATION OF THE ASR SYSTEM.

IF THE ASR SYSTEM IS TRIGGERED REPEATEDLY EVEN IN ADEQUATE GRIP CONDITIONS AND AT SMALL THROTTLE APERTURES, CHECK THE STATE OF WEAR AND INFLATION PRESSURE OF THE TYRES.

CAUTION

IT IS EMPHASISED THAT THE RIDING AUXILIARY SYSTEM CANNOT CHANGE THE PHYSICAL LIMITS OF GRIP AND IS NOT A SUBSTITUTE FOR PROPER MANAGEMENT OF POWER, BOTH ON STRAIGHT STRETCHES AND IN TURNS. THEREFORE, IT IS RECOMMENDED TO ALWAYS USE THE VEHICLE WITH THE UTMOST CARE AND IN ACCORDANCE WITH THE REGULATIONS IN FORCE.

N.B.

THE DEVICE PREVENTS IMPRESSING ON THE REAR HIGH SPEED ROTATION WHEEL WITH THE VEHICLE ON THE CENTRE STAND. IT IS RECOMMENDED NOT TO INSIST WITH THE THROTTLE GRIP IN THIS PARTICULAR CONDITION.

N.B.

IN CASE OF ROAD DISCONNECTIONS THERE COULD BE SHORT ACTIVATIONS OF THE ASR SYSTEM. SUCH EVENT APPEARS UNDER NORMAL OPERATION CONDITIONS OF THE VEHICLE.

CAUTION

IN THE EVENT OF MALFUNCTION OF THE BATTERY, THE ABS - ASR SYSTEM TURNS OFF.

FOR SUPERTech VERSION

The ASR system is a driving aid that assists the driver in acceleration manoeuvres, particularly on low-grip surfaces or under conditions that can cause sudden back-wheel slippage. The ASR in these situations automatically intervenes by reducing engine output within the limit imposed by the grip conditions, contributing significantly to the maintenance of stability the vehicle.

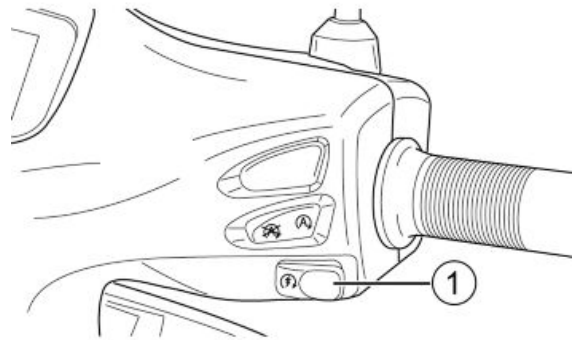
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THE ASR SYSTEM IS BASED ON THE RECOGNITION OF SPEED DIFFERENCES BETWEEN FRONT AND REAR WHEEL. FOR THE SYSTEM TO PERFORM CORRECTLY IN ALL CONDITIONS, THE PROCEDURE MUST BE PERFORMED EACH TIME A TYRE IS REPLACED EVEN IF ONLY ONE OF THE TYRES IS REPLACED. FOR THE CALIBRATION OF THE ASR SYSTEM PERFORM THE PROCEDURE BELOW.

WARNING

THE ASR SYSTEM PREVENTS THE APPLICATION OF HIGH SPEED ROTATION ON THE REAR WHEEL WITH THE VEHICLE ON THE CENTRE STAND. IT IS RECOMMENDED TO NOT INSIST WITH THE THROTTLE GRIP IN THIS SPECIFIC SITUATION, BECAUSE THIS MAY CAUSE ABNORMAL STOPS AND/OR DAMAGE TO THE CATALYSTS.

ASR BUTTON 1: to activate/deactivate the ASR system, with the engine running, press and hold the start button (for at least 4 seconds).



ASR ICON 2: ASR status indicator icon.

**ASR ICON FLASHING MODE:**

- Frequency of 5 flashes per second (5Hz), with vehicle running: The system is functioning correctly and is active (poor grip conditions, engine power limiting in effect); ride with extreme care, as the grip limit has been exceeded; restore the vehicle safety conditions by gently reducing the throttle opening.
- Frequency of 1 flash per second (1 Hz), with the key in "ON" position and the vehicle at a standstill: The system is active and the calibration is performed. The corresponding icon will switch off as soon as the ABS system becomes operational.
- Frequency of 1 flash every 2 seconds (0.5 Hz), with the key in "ON" position and the vehicle at a standstill: the system calibration is in progress.
- Switched on steady can have three meanings:
 1. calibration procedure performed incorrectly. Perform a new calibration;
 2. the ASR system is not operating and will not intervene in case of loss of grip;
 3. the ASR system has been willingly disabled.
 - If the deactivation was voluntary (by pressing the specific button "1" for 4 seconds with the engine running) it is recommended to reactivate the system as soon as possible.

- If the system was NOT deactivated voluntarily, this indicates a failure of the ASR system:
In this case, proceed with the system diagnosis and reactivation.

To ensure maximum safety of the vehicle it is advisable to keep the system active. Deactivation may be necessary only in case of starting with very low grip surfaces (mud, snow) on which the operation of the ASR could actually prevent the movement of the vehicle.

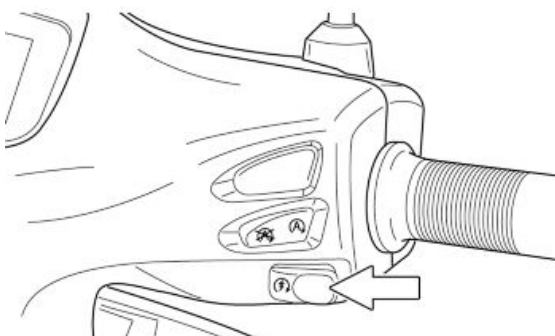
Manual calibration procedure of the ASR system during predelivery/ECU replacement.

In order to maintain the efficiency of the ASR system when one or both tires are replaced, a calibration procedure of the ASR system must be performed as follows on a straight flat stretch of road:

1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to «ON» and start the engine.
3. Wait with the engine running at idle speed for at least 3 seconds.

4. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The "ASR" icon lights up with **0.5 Hz slow flashing** (1 flash every 2 seconds).



5. Start driving and **accelerate to 30 km/h within 25 seconds and keep the speed constant for at least 10 seconds** .

The "ASR" icon **switched off**, indicates that the calibration was successful.



6. Stop the vehicle **and turn off the engine** by turning the key to OFF.



7. If the procedure has finished correctly, the next time the key is turned to ON, the "ASR" icon will light up with slow flashing 1Hz (1 flash per second), then when the engine starts, the "ASR" icon turns off and the ASR system will be ACTIVE.

8. If the procedure is **NOT completed correctly**, the "ASR" icon switches on steady, indicating that the **ASR system is DEACTIVATED**. By pressing the appropriate button, the user can manually reactivate the ASR system by returning it to the previously stored calibration or proceed with a new manual calibration by repeating the procedure from the beginning.



Manual calibration procedure of the ASR system.

In order to maintain the efficiency of the ASR system when one or both tires are replaced, a calibration procedure of the ASR system must be performed as follows on a straight flat stretch of road:

1. With vehicle at a standstill and engine off.
2. Pull the brake lever, turn the key to «ON» and start the engine.
3. **Disengage the ASR system** by pressing the start button for at least 4 seconds with the engine running; **the "ASR" icon will switch on steady**; initially it was switched off because the ASR system had already been calibrated in the past.
4. Wait with the engine running at idle speed for at least 3 seconds,

5. Keep the brake lever pulled and press the start button for at least 4 seconds then release to start the programming procedure.

The **"ASR"** icon lights up with **0.5 Hz slow flashing** (1 flash every 2 seconds),

6. Start the gear and **reach the speed of 30 km/h within 25 seconds, keep the speed constant for at least 10 seconds,**

The "ASR" icon switched off, indicates that the calibration was successful.

7. Stop the vehicle **and turn off the engine** by turning the key to OFF.

8. **If the procedure has finished correctly**, the next time the key is **turned to ON**, the **"ASR" icon will light up with slow flashing** 1Hz (1 flash per second), then when the engine starts, the "ASR" icon turns off and the ASR system will be ACTIVE.

9. If the procedure is **NOT completed correctly**, the **"ASR" icon switches on steady**, indicating that the **ASR system is DEACTIVATED**. By pressing the appropriate button, the user can manually reactivate the ASR system by returning it to the previously stored calibration or proceed with a new manual calibration by repeating the procedure from the beginning.

Automatic ASR calibration procedure.

The ASR system performs the automatic calibration, if the following conditions are met:

- If a manual ASR calibration has been performed at least once,
- If the conditions of constant speed, zero acceleration and constant throttle position (TPS) are respected, on a straight and flat stretch of road for at least 5 seconds,

If manual programming has been performed previously, automatic programming overwrites it.

If during the key ON - key OFF cycle the manual calibration has been successfully performed, then for that same cycle the ASR system will not perform any automatic programming.

If the ASR is active, **it comes into action when the system detects a slippage between the two wheels, greater than a nominal value previously stored in calibration.**

WARNING

N.B.



AT THE KEY "ON", THE FLASHING ASR ICON INDICATES THE SYSTEM DIAGNOSIS PHASE. IF THERE IS NO FLASHING WHEN THE ENGINE IS STARTED, THE ASR SYSTEM MAY NOT BE WORKING.

WARNING



THE ASR SYSTEM IS ACTIVATED AT EVERY "ON" POSITIONING OF THE IGNITION SWITCH. IF DISABLED BY THE USER, THE ASR SYSTEM KEEPS THE STATE OF INACTIVITY ONLY IF THE VEHICLE IS OFF, BY USING THE ENGINE STOP SWITCH (WHERE REQUIRED); AT THE NEXT KEY ON THE ASR SYSTEM IS ENABLED AUTOMATICALLY.

CAUTION



IT IS RECOMMENDED TO PAY PARTICULAR ATTENTION IN THE EVENT OF ACCELERATION FROM STANDSTILL IN CONDITIONS OF LOW GRIP, ESPECIALLY IN THE FIRST METRES. A POOR STATE OF MAINTENANCE OF THE TYRES CAN RESULT IN ABNORMAL OPERATION OF THE ASR SYSTEM.

IF THE ASR SYSTEM IS TRIGGERED REPEATEDLY EVEN IN ADEQUATE GRIP CONDITIONS AND AT SMALL THROTTLE APERTURES, CHECK THE STATE OF WEAR AND INFLATION PRESSURE OF THE TYRES.

CAUTION

IT IS EMPHASISED THAT THE RIDING AUXILIARY SYSTEM CANNOT CHANGE THE PHYSICAL LIMITS OF GRIP AND IS NOT A SUBSTITUTE FOR PROPER MANAGEMENT OF POWER, BOTH ON STRAIGHT STRETCHES AND IN TURNS. THEREFORE, IT IS RECOMMENDED TO ALWAYS USE THE VEHICLE WITH THE UTMOST CARE AND IN ACCORDANCE WITH THE REGULATIONS IN FORCE.

N.B.

THE DEVICE PREVENTS IMPRESSING ON THE REAR HIGH SPEED ROTATION WHEEL WITH THE VEHICLE ON THE CENTRE STAND. IT IS RECOMMENDED NOT TO INSIST WITH THE THROTTLE GRIP IN THIS PARTICULAR CONDITION.

N.B.

IN CASE OF ROAD DISCONNECTIONS THERE COULD BE SHORT ACTIVATIONS OF THE ASR SYSTEM. SUCH EVENT APPEARS UNDER NORMAL OPERATION CONDITIONS OF THE VEHICLE.

CAUTION

IN THE EVENT OF MALFUNCTION OF THE BATTERY, THE ABS - ASR SYSTEM TURNS OFF.

Rear brake calliper

Removal

- Remove the silencer.
- Remove the silencer supporting arm.
- Remove the rear wheel.
- Unscrew the screws on the rear brake hose fastening clamps.



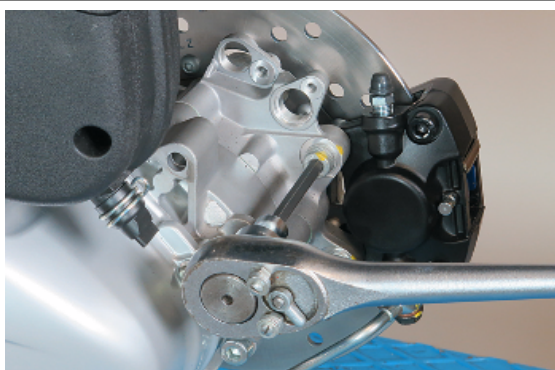
Operate the brake lever just beyond the point of closing communication with the tank.
Block the position of the lever by fastening it.



Previously loosen the screw fastening the pipe connector to the calliper.



Undo the fixing screws of the rear brake calliper to the engine.



Extract the calliper from the disc and turn it so that the end part of the pipe is tilted upwards.
Maintaining this position, remove the calliper by acting on the connector with the relative copper washers.

WARNING

KEEP THE END OF THE PIPE TILTED UPWARD.

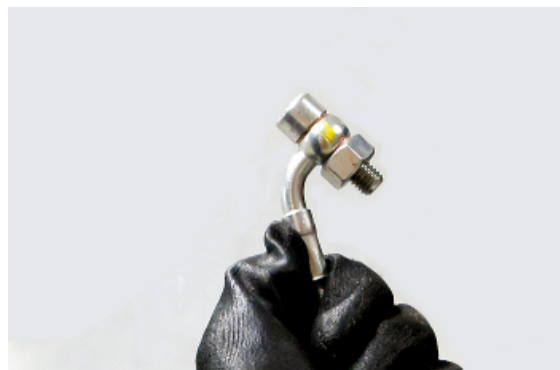


Suitably protect the connector and secure it so it is tilted upward to keep air from entering.

Immediately proceed with installing the new brake calliper.

CAUTION

BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE AIR. IT IS IMPORTANT TO COMPLETE THESE OPERATIONS AS QUICKLY AS POSSIBLE TO AVOID THE DEGRADATION OF THE CHARACTERISTICS OF THE FLUID.



Refitting

Keeping the end of the pipe upwards, connect the new calliper using the connector and the new copper washers.

Keeping the calliper aligned with the vehicle, temporarily block the connector to maintain a seal.



Fasten or maintain the calliper in the up position and free the pump lever.

WARNING

TO RELEASE THE BRAKE LEVER, CUT THE WIRE OF THE FASTENING IN ORDER TO OPEN THE COMMUNICATION WITH THE TANK. AVOID ANY ADDITIONAL OPERATION OF THE BRAKE LEVER.



Keeping the calliper up, connect the drain pipe and open the bleed valve connector.

Allow the air to flow out until only brake fluid exits.

CAUTION

THIS BLEEDING PHASE MUST TAKE PLACE BY MEANS OF GRAVITY. DO NOT ACTIVATE THE PUMP LEVER.



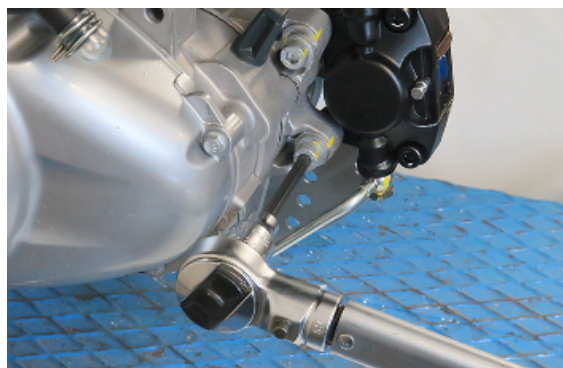
Check and if necessary top up the tank level.



Lower the calliper to the position shown in the photo and open the bleed valve connector again. Let the air flow out and close the bleed valve connector when the level of the brake fluid in the drain pipe has risen at least 10 cm without the outflow of air.



Install the brake calliper on the disc and tighten the fastening screws on the engine to the specified torque.



Locking torques (N*m)

Rear brake calliper screws - Engine 20 - 25 Nm

Loosen the connector fastening the pipe as little as possible to settle the pipe in the neutral position. Finally block the connector to the specified torque.

Locking torques (N*m)

Calliper - brake calliper connector 20 - 25 Nm

Refill the level of the brake fluid and close the tank cover.



Fix the rear brake pipe fastening clamps with the appropriate screws.

Fit the rear wheel.

Assemble the silencer supporting arm.

fit the silencer.



Check the system's efficiency.

If the work was performed properly, the brake must be efficient.

Front brake calliper

Removal

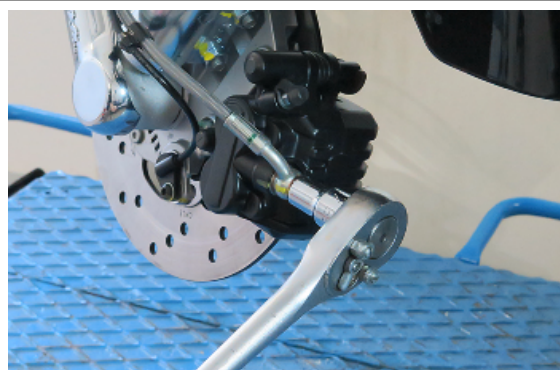
Remove the front wheel.

Operate the brake lever just beyond the point of closing communication with the tank.

Block the position of the lever by fastening it.



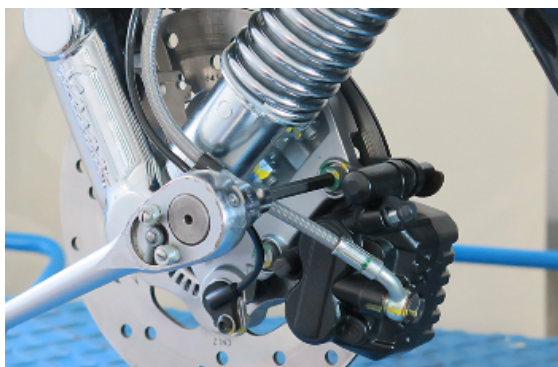
Previously loosen the screw fastening the pipe connector to the calliper.



Disconnect the front wheel sensor cable retaining clamps.



Unscrew and remove the front brake calliper fixing screws and remove it from the support.



Lift the calliper so that the end part of the pipe is tilted upwards.

Maintaining this position, remove the calliper by acting on the connector with the relative copper washers.



Refitting

Without lowering the pipe, connect the new calliper using the connector and the new copper washers. Keeping the calliper aligned with the vehicle, temporarily block the connector to maintain a seal.



Fasten or maintain the calliper in the up position and free the pump lever.

WARNING

TO RELEASE THE BRAKE LEVER, CUT THE WIRE OF THE FASTENING IN ORDER TO OPEN THE COMMUNICATION WITH THE TANK. AVOID ANY ADDITIONAL OPERATION OF THE BRAKE LEVER.

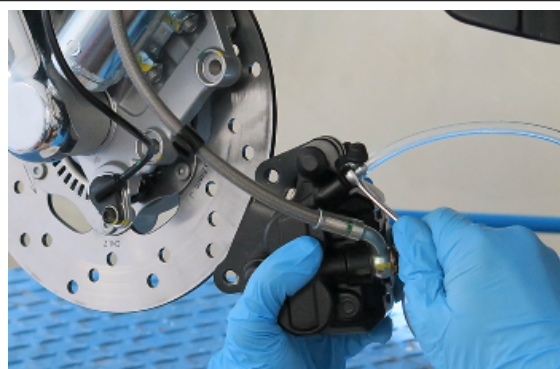


Keeping the calliper up, connect the drain pipe and open the bleed valve connector.

Allow the air to flow out until only brake fluid exits.

CAUTION

THIS BLEEDING PHASE MUST TAKE PLACE BY MEANS OF GRAVITY. DO NOT ACTIVATE THE PUMP LEVER.



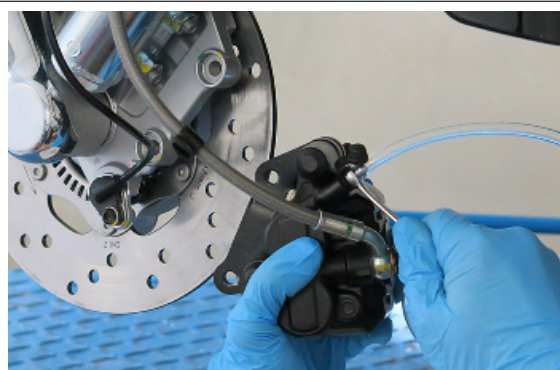
Check and if necessary top up the tank level.



Lower the calliper in the driving direction and slightly inclined to the right so the bleed screw is in the highest point of the calliper.

Reopen the bleed valve connector and let the air flow out.

- Close the bleed valve connector when the level of the brake fluid in the drain pipe has risen at least 10 cm without the outflow of air.



Separate the pads, if necessary, and install the brake calliper on the disc

Fasten the screws fastening the support to the specified torque.

Locking torques (N*m)

front brake calliper shock absorber and brake calliper support 19 - 24 Nm



Loosen the connector fastening the pipe as little as possible to settle the pipe in the neutral position.

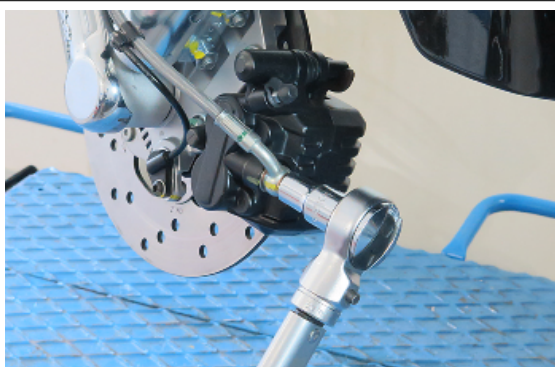
Finally block the connector to the specified torque.

WARNING

KEEP THE PIPE IN POSITION WHEN TIGHTENING THE CONNECTOR.

Locking torques (N*m)

Calliper - brake calliper connector 20 - 25 Nm



Refill the level of the brake fluid and close the tank cover.

Rear brake disc

Removal

Remove the rear brake calliper.

Remove the tapered spacer.



Remove the rear wheel hub with the brake disc.



Unscrew and remove the screws fastening the brake disc to the rear wheel hub.
Remove the disc.

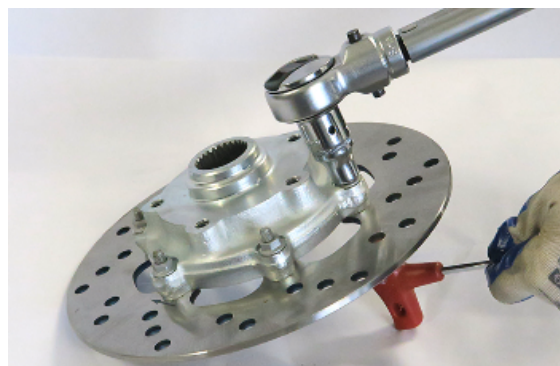


Refitting

Position the brake disc on the rear wheel hub.
Insert and tighten the fastening screws at the recommended torque.

Locking torques (N*m)

Brake disc - rear wheel hub 11 - 13 Nm



Insert the rear wheel hub with the brake disc on the wheel axle.



Insert the tapered spacer.
Assemble the brake calliper.
Fit the rear wheel.
Assemble the silencer supporting arm.
fit the silencer.



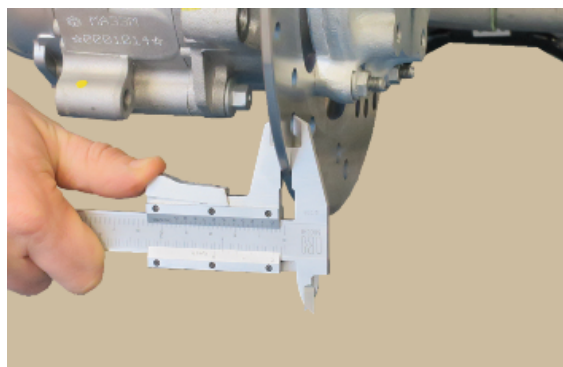
Disc Inspection

Remove the front wheel.
Check the thickness of the disc with an appropriate measuring instrument.

Characteristic

Standard thickness of rear disc

3.90 - 4.20 mm



- Repeat the measurement in at least 6 points on the disk.
- Check that the brake disc unit rotates smoothly using a special tool attached to the brake calliper support as shown in the photo.
- In order to secure the appropriate tool adequately use a metal plate with M8 threaded hole and fix it to one of the two rear brake calliper attachment points
- Fix the flange to the wheel axle using the original nut and spacer and an $\text{Æ } 17\text{mm}$ bearing

N.B.

FOR A CORRECT READING, MAKE THE DRIVEN PULLEY AXLE ROTATE IN ORDER TO ROTATE THE DISC.

Specific tooling

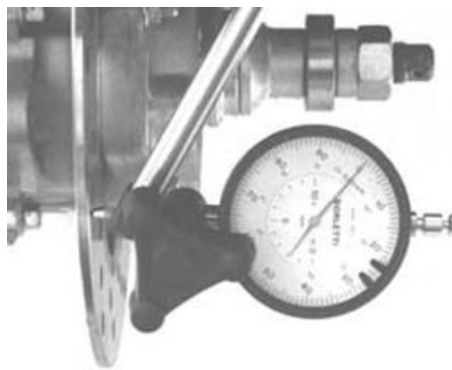
020335Y Magnetic mounting for dial gauge

Characteristic

Max. deviation allowed:

0.1 mm

- If incorrect values are measured, replace the disc. If the anomaly persists, replace the hub.



Front brake disc

Removal

Remove the front wheel.

Remove the front brake calliper.

Remove the front wheel hub with the disc.



Unscrew the screws fastening the brake disc and the phonic wheel to the hub and remove them.



Refitting

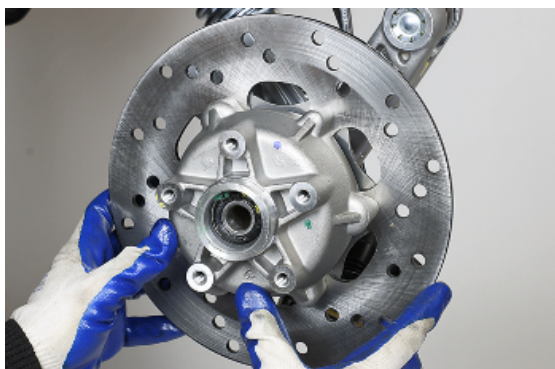
Fit the brake disc and tone wheel on the hub.
Insert and tighten the fastening screws at the recommended torque.

Locking torques (N*m)

Brake disc - front wheel hub 8 - 10 Nm



Insert the front wheel hub with the brake disc on the wheel axle.



Disc Inspection

Remove the front wheel.
Check the thickness of the disc with an appropriate measuring instrument.

Characteristic

Standard thickness of rear disc

3.90 - 4.20 mm



- Repeat the measurement in at least 6 points on the disk.
- Check that the brake disc unit rotates smoothly using a special tool attached to the brake calliper support as shown in the photo.
- In order to secure the appropriate tool adequately use a metal plate with M8 threaded hole and fix it to one of the two rear brake calliper attachment points
- Fix the flange to the wheel axle using the original nut and spacer and an \varnothing 17mm bearing

N.B.

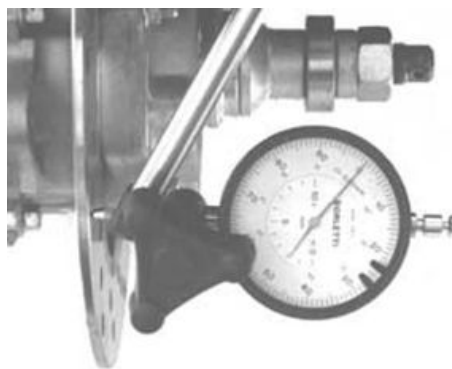
FOR A CORRECT READING, MAKE THE DRIVEN PULLEY AXLE ROTATE IN ORDER TO ROTATE THE DISC.

Specific tooling

020335Y Magnetic mounting for dial gauge**Characteristic****Max. deviation allowed:**

0.1 mm

- If incorrect values are measured, replace the disc. If the anomaly persists, replace the hub.



Front brake pads

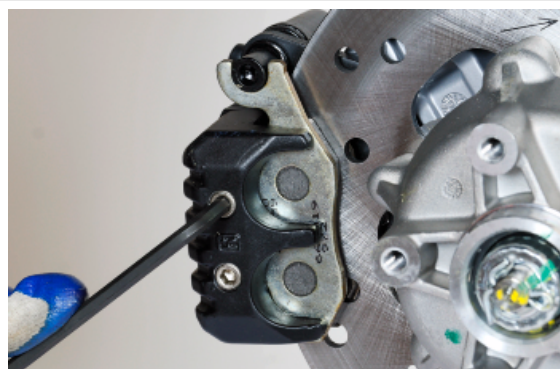
Removal

Rest the vehicle on its centre stand.

Suitably secure the rear part of the vehicle by raising the front slightly.

Remove the front wheel.

Loosen, without removing, the screws fixing the front brake pads.



Disconnect the wiring of the tone wheel sensor from the clamp, unscrew the screws fixing the front brake calliper to the support bracket and remove it.



Completely unscrew the screws and remove them, keeping the brake pads in position.



Remove the brake pads.

CAUTION



BE EXTREMELY CAREFUL NOT TO PULL THE BRAKE LEVER AFTER REMOVING THE PADS. THIS OPERATION COULD CAUSE THE CYLINDERS TO EXIT THE BRAKE CALLIPER AS WELL AS THE BRAKE FLUID TO ESCAPE.

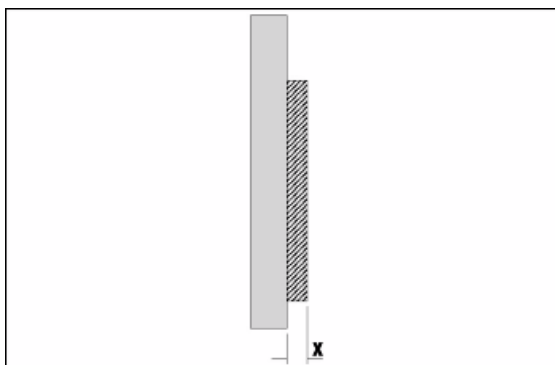


- Check the thickness of the wear material and, if below the minimum value, replace the pads.

Characteristic

Friction material minimum permissible thickness

1.5 mm

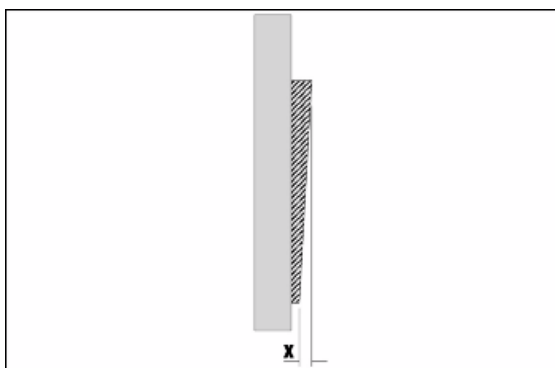


- Also check that the wear of the friction material is uniform and make sure it does not exceed the indicated tolerance. Otherwise, replace the pads.

Characteristic

Maximum permissible thickness tolerance for wear material

0.5 mm



Refitting

Put the new brake pads inside the clamp.



Screw in the fastening screws of the brake pads on the clamp.



Put the brake calliper on the support bracket and tighten the fixing screws to the specified torque.
Put the wiring harness of the tone wheel sensor in its clamp.



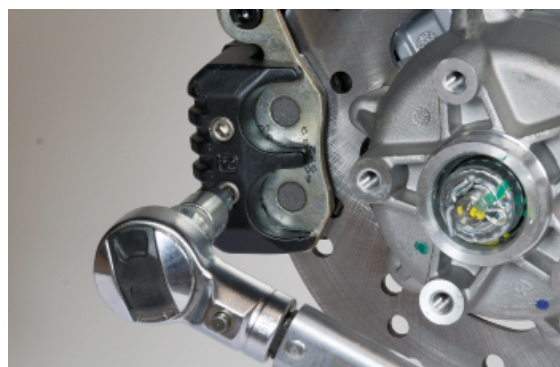
Locking torques (N*m)

Front brake calliper - Bracket 19 - 24 Nm

Tighten the fixing screws of the brake pads to the clamp at the specified torque.
Fit the front wheel.

Locking torques (N*m)

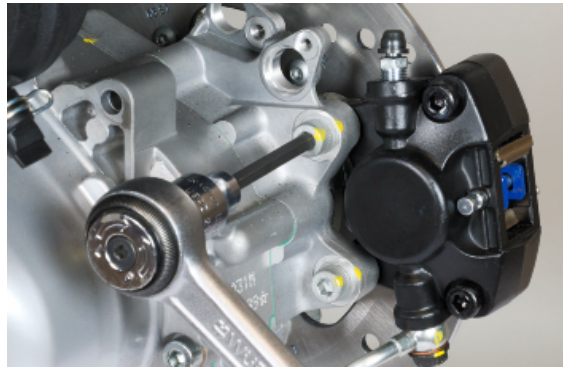
Front brake pad - Front brake calliper 8 - 10 Nm



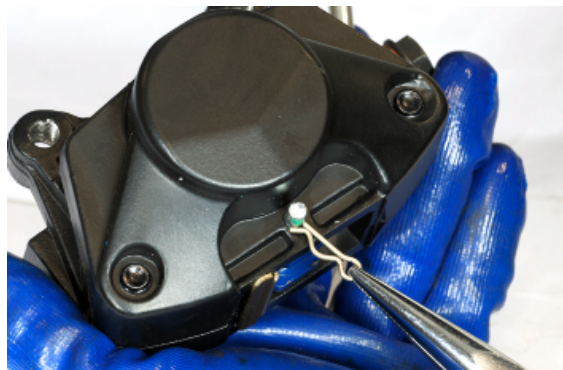
Rear brake pads

Removal

Rest the vehicle on its centre stand.
Remove the complete silencer.
Remove the silencer support bracket.
Remove the rear wheel.
Unscrew the screws fixing the rear brake calliper to the engine and remove it.



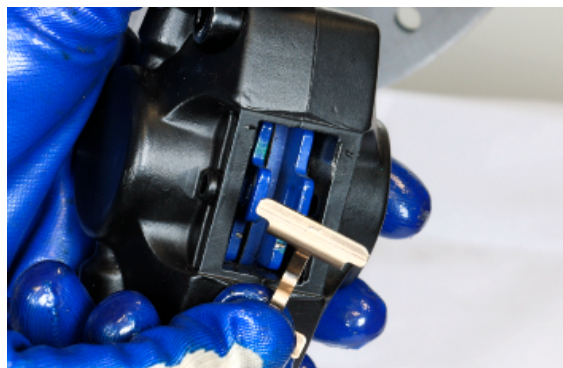
Remove the stop spring from the fastening pin of the brake pads.



Extract the fastening pin of the brake pads.



Remove the compression spring.



Take the brake pads out of the rear brake calliper.

CAUTION

BE EXTREMELY CAREFUL NOT TO PULL THE BRAKE LEVER AFTER REMOVING THE PADS. THIS OPERATION COULD CAUSE THE CYLINDERS TO EXIT THE BRAKE CALLIPER AS WELL AS THE BRAKE FLUID TO ESCAPE.

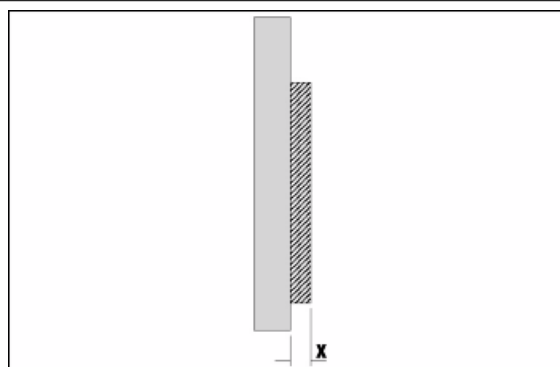


- Check the thickness of the wear material and, if below the minimum value, replace the pads.

Characteristic

Friction material minimum permissible thickness

1.5 mm

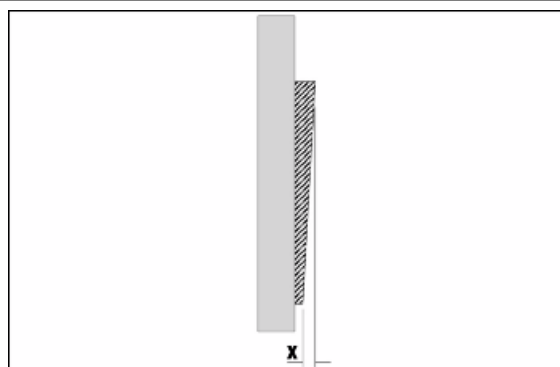


- Also check that the wear of the friction material is uniform and make sure it does not exceed the indicated tolerance. Otherwise, replace the pads.

Characteristic

Maximum permissible thickness tolerance for wear material

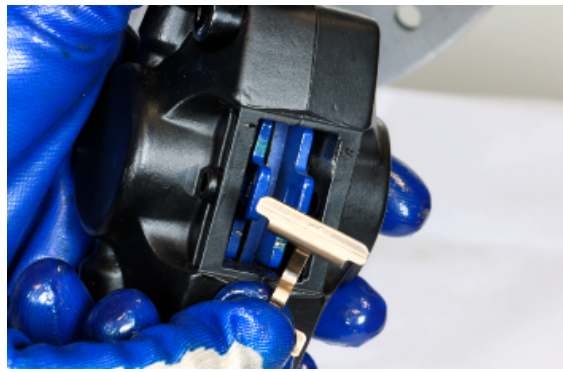
0.5 mm

**Refitting**

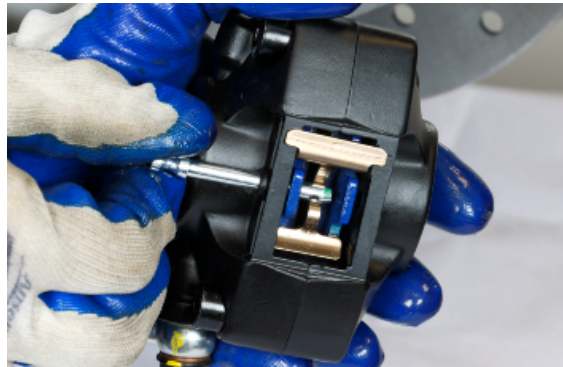
Put the new brake pads inside the clamp.



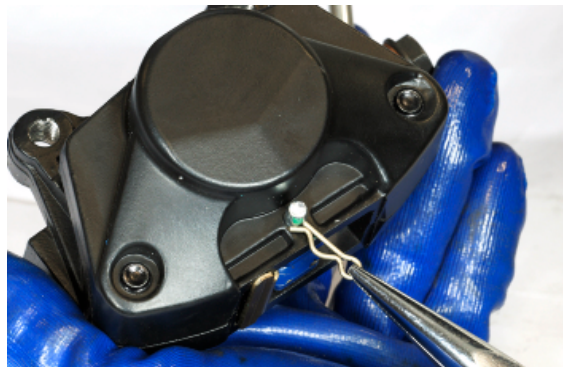
Put the compression spring back inside the brake calliper.



Insert the fastening pin of the brake pads.



Insert the stop spring on the fastening pin of the brake pads.



Put back the brake calliper in its seat and tighten the fixing screws to the specified torque.

Refit the rear wheel.

Refit the silencer support bracket.

Refit the complete silencer.

Locking torques (N*m)

Rear brake calliper - Engine 20 - 25 Nm



Fill

Rear - combined

For this procedure, see section «**Misc. documents**».

Front

For this procedure, see section «**Misc. documents**».

Brake fluid level check

Rest the vehicle on its centre stand and with the handlebars perfectly horizontal.

Check the liquid level through the relative inspection sight glass.

If the sight glass is full, the brake fluid level is correct. If the brake fluid is near the «**MIN**» reference, top-up



Front brake pump

Removal

Remove the handlebar covers.

Remove the front wheel.

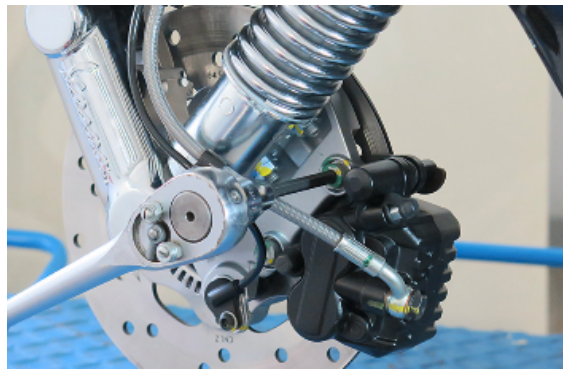
Disconnect the stop light switch connectors.



Disconnect the front wheel sensor cable retaining clamps.



Unscrew and remove the front brake calliper fixing screws and remove it from the support.



With new pads or pads in a good condition, operate the brake pump repeatedly to bring the pads in contact with each other.



Previously loosen the brake pump connector.



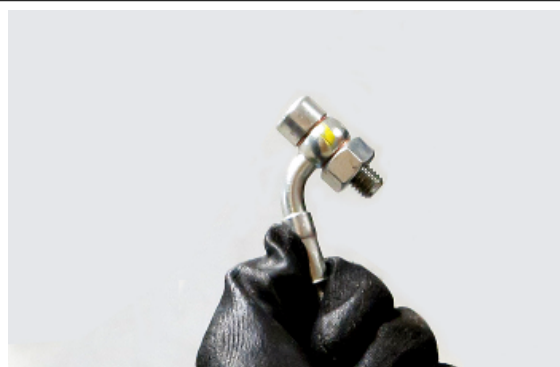
Unscrew the screws of the U-bolt fastening the pump.



Position the pump as shown in the photo and remove the connector with the copper washers.



Suitably protect the connector and secure it so it is tilted upward to keep air from entering.



Immediately proceed with installing the new brake pump.

CAUTION

BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE AIR. IT IS IMPORTANT TO COMPLETE THESE OPERATIONS AS QUICKLY AS POSSIBLE TO AVOID THE DEGRADATION OF THE CHARACTERISTICS OF THE FLUID.

Refitting

Install the new pump on the handlebars, paying attention to the correct position of the U-bolt.

Block the screws temporarily.



Remove the tank cover and tighten the pipe fastening connector to the specified torque using new copper washers.

Locking torques (N*m)

Pump connector - Brake pump 20 - 25 Nm



Position the handlebars so that the pump tank is levelled horizontally.

Top up with DOT4 brake fluid to the maximum level.

Recommended products

DOT 4 brake fluid Synthetic brake fluid.

SAE J 1703; FMVSS 116; ISO 4925; CUNA NC 956 DOT4



Operate the brake pump lever repeatedly, making the air bubble in the tank.

CAUTION

PERFORM THE OPERATION WITH THE HANDLEBARS TURNED IN THE MAXIMUM POSITION AWAY FROM THE BRAKE PUMP.



When the air finished bubbling in the tank, move the pads away in order to send the brake fluid to the pump.

During this operation, there will be a backflow of air in the tank.

Operate the pump lever until the pads are in contact with each other and repeat the procedure until the air stops exiting.



Refit the calliper on the support and tighten the screws to the specified torque.

Locking torques (N*m)

Front brake calliper - Bracket 19 - 24 Nm



Restore the working distance of the pads and top up the brake fluid level to the maximum.



Close the pump cover and remove the screws with the U-bolt fastened to the handlebars.



Lift the pump so it is upright and repeatedly operate the control lever.

This operation is required so the residual air contained in the pump cylinder will exit.

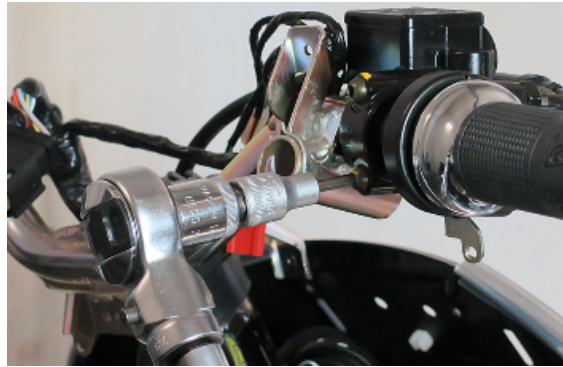
For an optimal result, slightly vary the position of the pump each time the lever is operated.



Install the pump on the handlebars, paying attention to the correct orientation of the U-bolt.
Gradually tighten the fastening screws to the specified torque.

Locking torques (N*m)

U-bolt - Brake pump 7 - 10 Nm.



Connect the stop light switch connector.



Rear brake pump - combined

Removal

Remove the handlebar covers.

Remove the rear wheel.

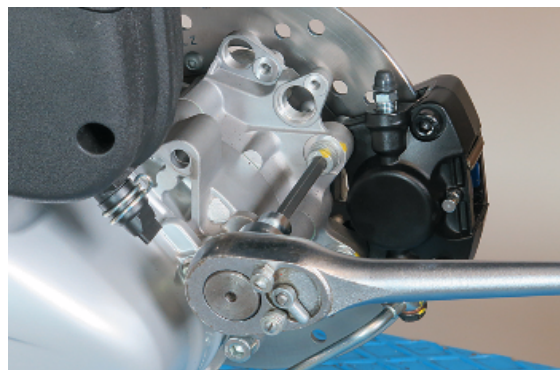
Disconnect the stop light switch cables.



Unscrew the screw on the clamp fastening the rear brake hose to the engine.



Undo the fixing screws of the rear brake calliper to the engine.



With new pads or pads in a good condition, operate the brake pump repeatedly to bring the pads in contact with each other.



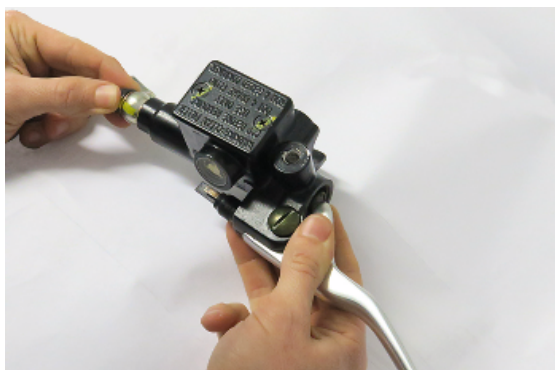
Previously loosen the brake pump connector.



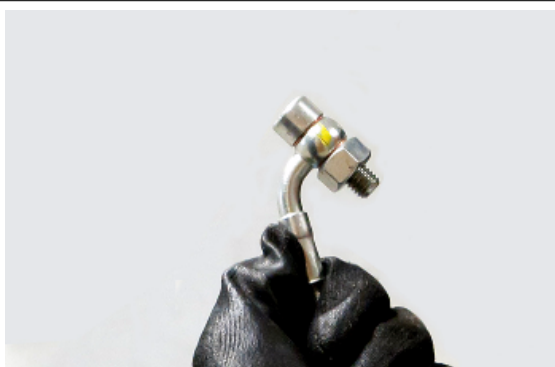
Unscrew the screws of the U-bolt fastening the pump.



Disconnect the pump from the handlebar, position it as shown in the photo and remove the connector with the copper washers.



Suitably protect the connector and secure it so it is tilted upward to keep air from entering.



Immediately proceed with installing the new brake pump.

CAUTION



BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE AIR. IT IS IMPORTANT TO COMPLETE THESE OPERATIONS AS QUICKLY AS POSSIBLE TO AVOID THE DEGRADATION OF THE CHARACTERISTICS OF THE FLUID.

Refitting

Install the new pump on the handlebars, paying attention to the correct position of the U-bolt. Block the screws temporarily.



Remove the tank cover and tighten the pipe fastening connector to the specified torque using new copper washers.

Locking torques (N*m)

Pump connector - Brake pump 20 - 25 Nm



Position the handlebars so that the pump tank is levelled horizontally.

Top up with DOT4 brake fluid to the maximum level.

Recommended products

DOT 4 brake fluid Synthetic brake fluid.

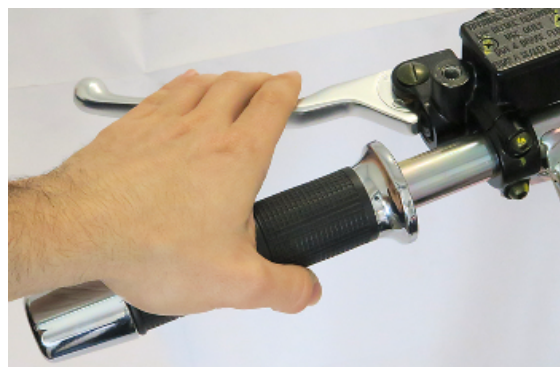
SAE J 1703; FMVSS 116; ISO 4925; CUNA NC 956 DOT4



Operate the brake pump lever repeatedly, making the air bubble in the tank.

CAUTION

PERFORM THE OPERATION WITH THE HANDLEBARS TURNED IN THE MAXIMUM POSITION AWAY FROM THE BRAKE PUMP.



When the air finished bubbling in the tank, move the pads away in order to send the brake fluid to the pump.

During this operation, there will be a backflow of air in the tank.

Operate the pump until the pads are in contact with each other and repeat the procedure until the air stops exiting.



Refit the calliper on the engine and tighten the screws to the specified torque.

Locking torques (N*m)

Rear brake calliper screws - Engine 20 - 25 Nm



Restore the working distance of the pads and top up the brake fluid level to the maximum.



Close the pump cover and remove the screws with the U-bolt fastened to the handlebars.



Lift the pump so it is upright and repeatedly operate the control lever.

This operation is required so the residual air contained in the pump cylinder will exit.

For an optimal result, slightly vary the position of the pump each time the lever is operated.



Install the pump on the handlebars, paying attention to the correct orientation of the U-bolt.
Tighten the fastening screws to the prescribed torque.

Locking torques (N*m)**U-bolt - Brake pump 7 - 10 Nm**

Connect the stop light switch connectors.



INDEX OF TOPICS

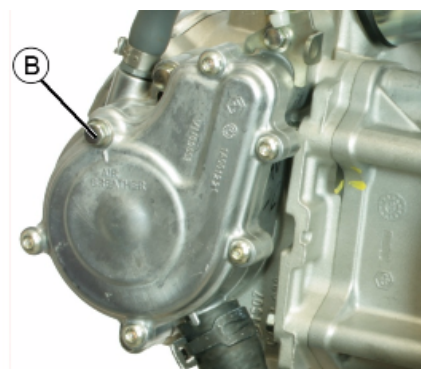
COOLING SYSTEM

COOL SYS

System bleed

SYSTEM BLEED WITH FILLED CIRCUIT

- Make sure to place the engine in the correct position so that the radiator cap is higher than the vent screw of the cylinder.
- Press the connecting pipe between the expansion tank close to the radiator.
- Open the radiator cap.
- Completely refill the circuit filling liquid from the radiator (in order to facilitate the air flow, manually crush the connecting pipes between radiator and engine various times).
- Open the vent screw "B" of the pump and let liquid escape.
- Continue to refill the radiator keeping the level.
- Close the pump breather and lock to the prescribed torque «B».
- Connect a transparent pipe to the head breather (to verify the disappearance of air bubbles)
- Let more liquid escape from the head breather until the air bubbles disappear.
- Close the head breather and lock to the prescribed torque «A».
- Close the radiator cap.
- Restore the connecting pipe between radiator and expansion tank.
- Fill the expansion tank up to the maximum level.
- Start the engine and after two minutes of heating check the level in the expansion tank.



NB: DO NOT BLEED THE AIR FROM THE HOT ENGINE OR WITH THE ENGINE RUNNING

Locking torques (N*m)

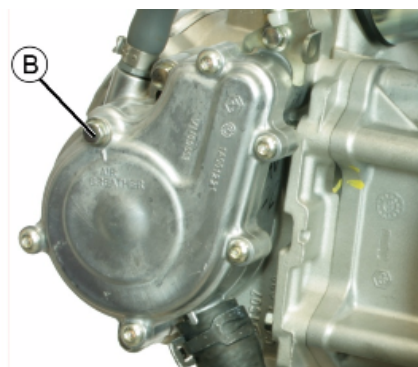
Cooling system purge screw - liquid pump 11 to 13
Cooling system purge screw - big end 3 - 4

SYSTEM FILLING AND BLEEDING

- Make sure to place the engine in the correct position so that the radiator cap is higher than the vent screw of the cylinder.
- Open the radiator cap.
- Open the vent screws on the engine «A» and «B».

**Locking torques (N*m)**

Cooling system purge screw - liquid pump 11 to 13
Cooling system purge screw - big end 3 - 4



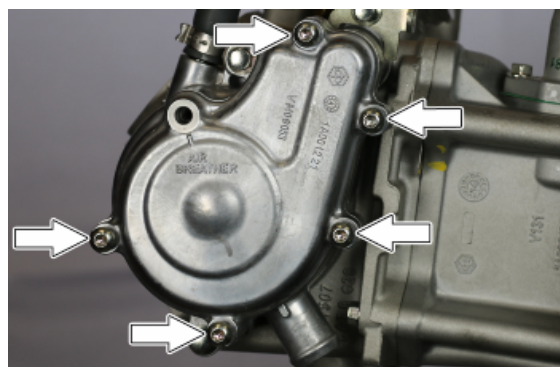
- Completely refill the circuit filling liquid from the radiator (in order to facilitate the air flow, manually crush the connecting pipes between radiator and engine various times).
- Let the liquid escape from the vent screws «A» and «B».
- Continue to refill the radiator keeping the level.
- Close the pump breather and lock to the prescribed torque «B».
- Connect a transparent pipe to the head breather (to verify the disappearance of air bubbles)
- Let more liquid escape from the head breather until the air bubbles disappear.
- Close the head breather and lock to the prescribed torque «A».
- Close the radiator cap
- Fill the expansion tank up to the maximum level.

Locking torques (N*m)

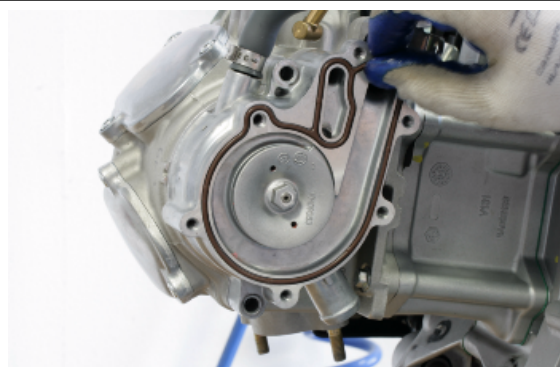
Cooling system purge screw - liquid pump 11 to 13 Cooling system purge screw - big end 3 - 4

Water pump - overhaul

- Unscrew the bleed screw and check the status of the copper gasket. If there is abnormal wear, replace it.
- Unscrew the fastening screws and remove the pump cover.



- Unscrew the three screws fastening the pump to the head
- Remove the seal OR.
- Unscrew the rotor.



- Position the complete coolant pump on the press.
- Screw in a new to protect the pump shaft thread.



- Heat the pump bearing seat using the specific tool for two minutes (2').
- Rotate the complete pump and using the previously screwed in nut, remove the pump shaft together with the bearing.

CAUTION

**DO NOT WORK ON THE COOLANT PUMP SHAFT BEFORE HEATING THE SEAT.
FAILURE TO OBSERVE THIS WARNING WILL RESULT IN REMOVING THE SHAFT WITHOUT THE BEARING DUE TO THE LACK OF THERMAL EXPANSION OF THE SEAT.**

Specific tooling

020151Y Air heater

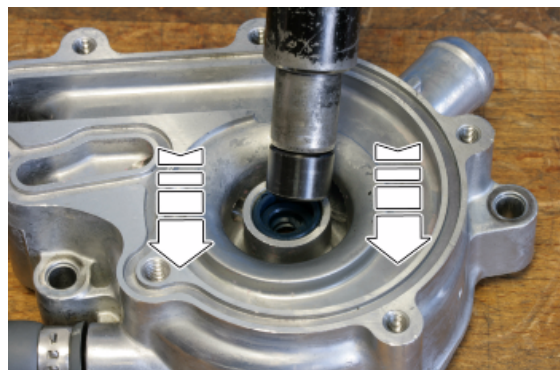


- Working on the work bench and using the specific tool, remove the two oil seals working from the usual side.

Specific tooling

020376Y Adaptor handle

020412Y 15-mm guide

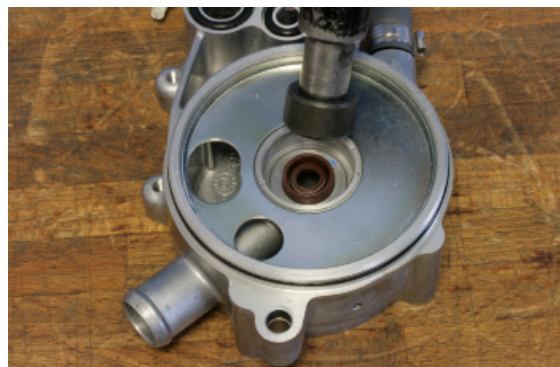


- Working from the inside, insert the new oil seal and drive it fully in using the specific tool.

Specific tooling

020376Y Adaptor handle

020364Y 25-mm guide



- Working from the outside, observing the requirements insert the new oil seal and drive it fully in using the specific tool.

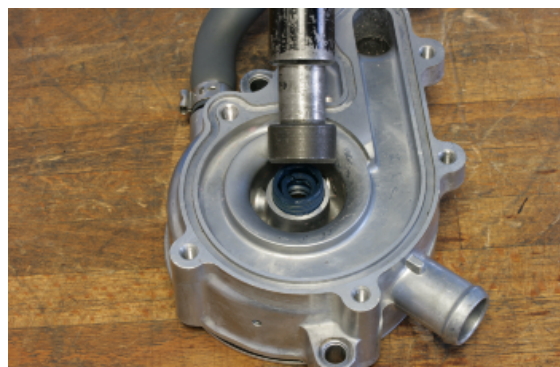
- Use the indicated product to fill the cavities inside the two oil seal lips.

THE PURPOSE OF THE PRODUCT IS TO LUBRICATE THE SHAFT. ONLY USE THE INDICATED PRODUCT. THE SPECIFIC GREASE MUST NOT EXIT FROM THE OUTER SEAL LIP.

THE USE OF OTHER PRODUCTS DOES NOT GUARANTEE CORRECT OPERATION, DO NOT USE OTHER PRODUCTS THAT COULD DRIP OUT OF THE BREATHER HOLES THAT, WHEN EXITING THE DRAIN HOLES COULD BE INTERPRETED AS LEAKS, CREATING "FALSE NEGATIVES".

THE INDICATED PRODUCT IS THE ONLY ONE THAT EVAPORATES AT THE ENGINE OPERATING TEMPERATURE WITHOUT LEAVING RINGS/DRIPS.

Specific tooling



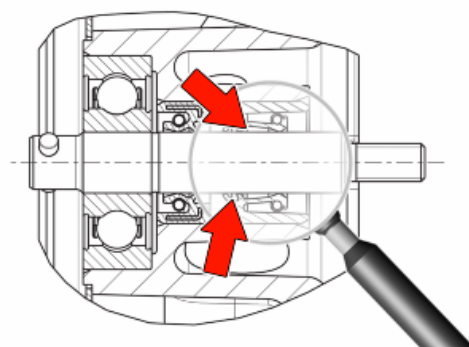
020376Y Adaptor handle

020364Y 25-mm guide

Recommended products

KLÜBERPLEX BEM 34-132 Special grease

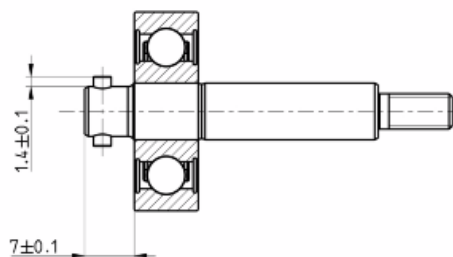
Combination of synthetic hydrocarbon oil, mineral oil and calcium complex soap.



- Insert the coolant pump shaft.
- Use the press on the OUTER race to drive it in fully.



- Check the correct size and position of the shaft, according to the dimensions indicated in the figure.

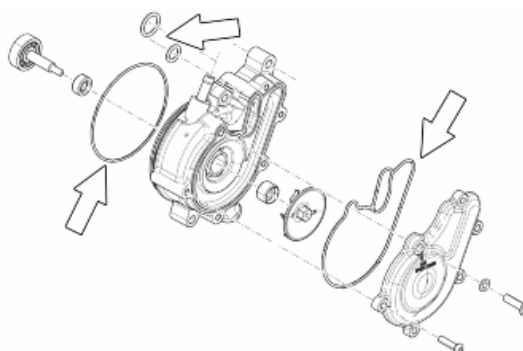


- Lubricate the parts upon assembly using the recommended product. Do not use other products as they do not guarantee correct operation.

Recommended products

Paraffin Rubber/metal lubricant

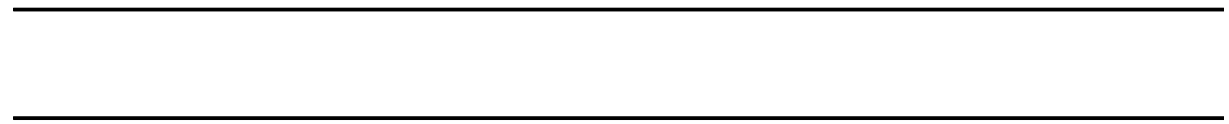
Solvent and silicone free spring paraffin.



- Complete the assembly by inserting the rotor, the seal gasket and the plug, tightening to the indicated torques.

Locking torques (N*m)

Head - pump fastening screws 11 - 13 Coolant rotor 5 - 8 Pump cover screws 5 - 6 Cooling system purge screw - liquid pump 11 to 13



INDEX OF TOPICS

CHASSIS

CHAS

This section è is dedicated to the operations that can be carried out on the vehicle's bodywork.

Seat

REMOVAL

Remove the helmet compartment.

Support the saddle, undo and remove the saddle fixing screws.

Remove the saddle.



FITTING

Position the saddle

Support the saddle, insert and tighten the saddle fixing screws.

Insert the helmet compartment.



SADDLE OPENING DEVICE REMOVAL

Remove the helmet compartment.



Remove the plastic cover above the luggage rack.



Free the electrical wiring from the retaining ties.



Disconnect the cable from the saddle's lock.



Unscrew and remove the fastening nuts from the saddle opening device's bracket.



Move the saddle opening device complete with the bracket downward and disconnect the electrical connector.



Unscrew and remove the bolts fastening the device to the bracket.



Disconnect the device from the spring.



SADDLE OPENING DEVICE ASSEMBLY

Connect the device to the spring.



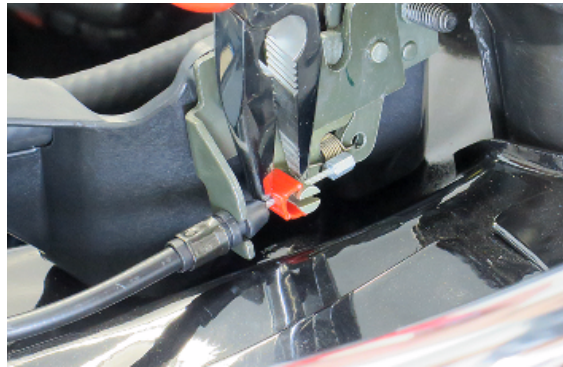
Insert and tighten the bolts for fastening the device to the bracket.



Connect the device's electrical connector and insert the saddle opening device complete with the bracket into its lodging.



Connect the cable to the saddle's lock.



apply and tighten the nuts for fastening the saddle opening device's bracket.



Insert the electrical wiring into the retaining ties.



Mount the plastic cover above the luggage rack.
Insert the helmet compartment.



Rear rack

REMOVAL

Remove the helmet compartment.
Undo and remove the fixing screws of the luggage rack and the plastic cover.



Remove the fuel tank cap.



Remove the plastic cover.



Unscrew and remove the fixing screw of the luggage rack screws cover.

Remove the cover of the rear screws of the luggage rack.



Unscrew and remove the rear fixing screws of the luggage rack.

Remove the luggage rack.



FITTING

Position the luggage rack.

Insert and tighten the rear fixing screws of the luggage rack.



Position the cover of the rear screws of the luggage rack.

Insert and tighten the fixing screw of the luggage rack screws cover.



Position the plastic cover.



Screw on the fuel tank cap.



Insert and tighten the fastening screws for the luggage rack and the plastic cover.
Insert the helmet compartment.



Driving mirrors

REMOVAL

Rest the vehicle on its centre stand.

Move the protection rubber.



Unscrew the fixing counter nut and unscrew the mirror using the rod.



FITTING

Screw the mirror into its seat using the rod.
Tighten the fixing counter nut to the specified torque.

Locking torques (N*m)

Rear-view mirror - Handlebars 15 - 20 Nm



Put back protection rubber.



Rear handlebar cover

REMOVAL

Rest the vehicle on its centre stand.
Remove the rear-view mirrors.
Remove the front centre cover.
Remove the front handlebar cover.
Unscrew from both sides the top fixing screw of the rear cover.



Unscrew from both sides the bottom fixing screw of the rear cover.



Remove the rear cover from the handlebars and disconnect the connector of the instrument unit.



Disconnect the connectors of the left control unit.



Disconnect the connectors of the right control unit and remove the rear cover.



FITTING

Connect the connectors of the right control unit.



Connect the connectors of the left control unit.



Connect the connector of the instrument unit.



Place the rear handlebar cover in its seat making sure the cables and tubes pass through correctly. Tighten the bottom screws fixing the cover to the handlebars to the specified torque.

Locking torques (N*m)

Rear handlebar cover - handlebars 1 - 1.7 Nm



Tighten the top screws fixing the cover to the handlebars to the specified torque.

Refit the front handlebar cover.

Refit the front centre cover.

Refit the rear-view mirrors.

Locking torques (N*m)

Rear handlebar cover - handlebars 1 - 1.7 Nm



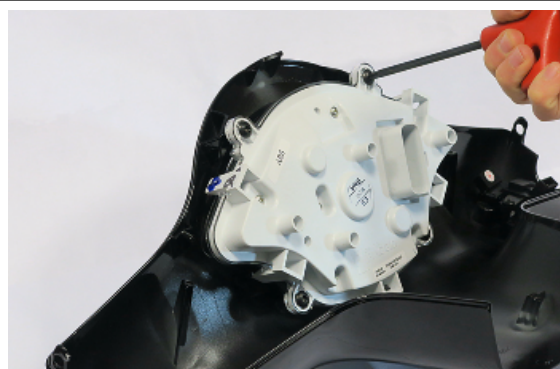
Instrument panel

REMOVAL

Remove the rear handlebar cover.

Remove the four fixing screws.

Remove the instrument panel.



FITTING

Position the instrument panel in its seat.

Insert and tighten the fixing screws.

Refit the rear handlebar cover.

Front handlebar cover

REMOVAL

Rest the vehicle on its centre stand.

Remove the rear-view mirrors.

Remove the front centre cover.

Unscrew the central screw fixing the cover to the handlebars.



Unscrew from both sides the bottom screw fixing the front cover to the rear cover.



Separate the front cover from the rear cover by releasing the side retainers.



Disconnect the connector of the front light assembly and remove the front handlebar cover.



FITTING

bring up the handlebar front cover and connect the connector of the front light assembly.



Join the front cover to the rear cover by engaging the side retainers.

Tighten the bottom screws fixing the front cover to the rear cover to the specified torque.

Locking torques (N*m)

Front handlebar cover - Rear handlebar cover
1 - 1.7 Nm



Tighten the middle screw fixing the front cover to the handlebars to the specified torque.

Refit the front centre cover.

Refit the rear-view mirrors.

Locking torques (N*m)

Front handlebar cover - Handlebar 1 - 1.7 Nm



Headlight assy.

Remove the front handlebar cover.

Unscrew the fixing screws of the front light assembly.



- Remove the light unit, detaching it from the front of the handlebar cover.



Unscrew the fixing screw and remove the turn indicator.



Frame central cover

Rest the vehicle on its centre stand.

Unscrew the screws fixing the middle cover to the footrest and remove it.

When refitting, tighten the fixing screws to the specified torque.

Locking torques (N*m)

Chassis middle cover - Footrest 1 - 1.7 Nm



Knee-guard

REMOVAL

Remove the handlebar covers.

Remove the front centre cover.

Remove the right side cover and the left side cover by unscrewing the fixing screws.



Unscrew and remove the screws under the right side cover and under the left side cover.



Unscrew and remove the screws on the shield.



Unscrew and remove the screws near the footrest.



Unscrew and remove the central screw inside the glove box.



Detach the leg shield back plate from the body.
Disconnect the connector for the USB port and the connector for the saddle opening button.
Disconnect the fuse terminal block from the leg shield back plate.
disconnect the emergency saddle opening transmission.
The leg shield back plate is now free and can be removed.



FITTING

Position the leg shield back plate on the body.
Connect the emergency saddle opening transmission.

Insert the fuse terminal block into its lodging inside the leg shield back plate.

Connect the connector for the USB port and the connector for the saddle opening button.



Insert and tighten the central screw inside the glove box.



Insert and tighten the screws under the right side cover and under the left side cover.



insert and tighten the screws near the footrest.



insert and tighten the screws on the shield.



Fit the right side cover and the left side cover.

Insert and tighten the fixing screws.

Fit the front centre cover.

Fit the handlebar covers.



Taillight assy.

REMOVAL

To remove the rear light assembly, unscrew and remove the fastening screw.



Disconnect the connector.



FITTING

Support the light assembly and connect the connector.



Insert the light assembly into its lodging.
Insert and tighten the fastening screw.



Footrest**REMOVAL**

Remove the leg shield back plate.
Remove the battery compartment cover and the battery.
Remove the side fairings
Remove the centre screw under the battery compartment cover.



Unscrew and remove the fixing screws of the passenger footrests.
Remove the footrests.



Remove the left and right footrest fixing screw.

Remove the left and right lower cover fixing screws.

Remove the lower covers.



Remove the non-slip rubber strips of the footrest.



Remove the screws positioned under the non-slip rubber strip.

Remove the footrest



FITTING

position the footrest on the frame.

Insert and tighten the screws positioned under the non-slip rubber strip.



Insert the central screw.



Insert and tighten the left and right footrest fixing screw.



assemble the lower covers.

Insert and tighten the left and right lower cover fixing screws.



Assemble the passenger footrests

Insert and tighten the footrest fixing screws.



Insert the non-slip rubber strips on the footrest.

Assemble the side fairings

Assemble the battery compartment cover and the battery.

Assemble the leg shield back plate.



Side fairings

REMOVAL

Proceed as follows to remove the side fairings:

- Undo and remove the front fastener screw.



- Undo and remove the rear fastener screw.



- Undo and remove the fastener nut under the bodywork.



- remove the side fairing, pulling outwards.



FITTING

- Fit the side fairing on the vehicle, fitting the pins into the rubber bushes.



- Fit and tighten the fastener nut under the body-work.



- Fit and tighten the rear fastener screw.



- Fit and tighten the front fastener screw.



Helmet bay

- Rest the vehicle on its centre stand.
- Lift the saddle and remove the helmet compartment by lifting it up.



Fuel tank

REMOVAL

- Support the vehicle adequately.
- insert a suitable lifting device beneath the body.
- Remove the helmet compartment.
- Remove the side fairings.
- remove the silencer.



- Secure the rear of the vehicle with a suitable hoist.



Unscrew the engine ground cable from its fastening on the left side of the chassis.



Remove the plastic cover above the luggage rack. Remove the rear light assembly and the right rear turn signal device.



Disconnect the rear shock absorbers' lower attachments.



Unscrew the fixing screw of the fuel line support bracket and release the line.



Disconnect the fuel line from the injector connector.

Dry any fuel leaks.



Unscrew the screw fixing the expansion tank to the frame.



Remove the clamp and disconnect the pipe at the mouth of the tank.



Using the hoist, lift the vehicle to increase the space between the body and the engine.

CAUTION

MAKE SURE THAT THE ELECTRIC CABLES AND PIPES ARE NOT SUBJECTED TO EXCESSIVE TENSION WHEN USING THE HOIST.

Unscrew and remove the tank's front fastening screw.



Unscrew and remove the rear fastening screw underneath the rear light assembly's chrome-plated frame.



Support the tank.

unscrew and remove the tank fastening screw near the right rear shock absorber's attachment.
remove the tank by disconnecting the connectors for the fuel pump and the fuel level indicator.



FITTING

Connect the connectors for the fuel pump and the fuel level indicator, and insert the tank into its lodging.

Insert and tighten the tank fastening screw near the right rear shock absorber's attachment.



Insert and tighten the tank's rear fastening screw near the rear light assembly's lodging.



Insert and tighten the tank's front fastening screw.



Using the hoist, lower the vehicle's body so that the rear shock absorbers' attachments are aligned.

Connect the rear shock absorbers.



Tighten the screw of the expansion tank to the recommended torque.

Locking torques (N*m)

Expansion tank - Chassis 4.5 - 7 Nm



Connect the fuel line to the injector connection.



Fix the pipe on the support bracket.



Fix the engine ground to the chassis.



Lower the vehicle using the hoist.

Remove the lifting device from underneath the body.

fit the silencer.

Mount the rear light assembly and the right rear turn signal device.

connect the pipe at the mouth of the fuel tank and secure it with a new metallic clamp.

Mount the plastic cover on the luggage rack

Mount the side fairings.

Insert the helmet compartment.

Front mudguard

REMOVAL

Suitably support the vehicle so the front wheel is lifted from the ground.

Remove the front wheel.

Remove the front brake calliper.



Remove the steering tube



Unscrew and remove the front mudguard fixing screws.

Slide off the mudguard from the steering tube.



FITTING

Insert the mudguard on the steering tube.

insert the front mudguard fastening screws and tighten to the specified torque.

Locking torques (N*m)

Front mudguard - Steering tube 5 - 6.5 Nm



Insert the steering tube.



Reassemble the front brake calliper and bleed the system.

Fit the front wheel.



Front central cover

REMOVAL

Rest the vehicle on its centre stand.

Using a flat-head screwdriver, remove the clip-on badge.



Unscrew the screw fixing the central cover to the frame.



Pull the cover to remove it.



FITTING

Place the central cover in its seat.

Push the cover towards the leg shield to ensure that all the spring clips engage correctly.



Tighten the screw fixing the central cover to the chassis at the specified torque.

Put back the clip-on badge.

Locking torques (N*m)

Front central cover - Frame 4.5 - 7 Nm

**Radiator cover**

Rest the vehicle on its centre stand.

Remove the right hand side fairing.

Unscrew the screws fixing the radiator cover to the radiator and remove it.

When refitting, tighten the fixing screws to the recommended torque.

Refit the right side fairing.

**Battery****REMOVAL**

Rest the vehicle on its centre stand.

Remove the chassis central cover.

Unscrew the fixing screws of the battery bracket.



Remove the battery bracket.



Unscrew the fixing screw of the negative pole «-» and disconnect it.



Unscrew the fixing screw of the positive pole «+» and disconnect it.

CAUTION



IT IS EXTREMELY IMPORTANT TO OBSERVE THE INDICATED DISCONNECTION SEQUENCE OF THE CABLES TO AVOID SHORT-CIRCUITS.



Remove the battery from its housing.



FITTING

Check the charge state of the battery.

Follow the instructions in this manual.

Insert the new battery as indicated in the figure.

Characteristic**Battery**

12V -6Ah



Screw in the fixing screw of the positive pole «+» to the battery.



Screw in the fixing screw of the negative pole «-» to the battery.

**CAUTION**

IT IS IMPORTANT TO OBSERVE THE INDICATED CONNECTION SEQUENCE OF THE CABLES TO THE BATTERY TO AVOID SHORT-CIRCUITS. FIRST CONNECT THE POSITIVE CABLE «+» AND THEN THE NEGATIVE CABLE«-».

CAUTION

DO NOT REVERSE THE POLARITY: RISK OF SHORT CIRCUIT AND DAMAGE TO THE ELECTRICAL SYSTEM.

WARNING

USED BATTERIES ARE HARMFUL TO THE ENVIRONMENT. COLLECTION AND DISPOSAL SHOULD BE CARRIED OUT IN COMPLIANCE WITH REGULATIONS IN FORCE.

Put back the battery bracket and tighten the fixing screws to the specified torque.

Put back the chassis central cover.

Locking torques (N*m)

Battery bracket - Footrest 4.5 - 7 Nm



A

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