WORKSHOP MANUAL

1Q000999



VESPA GTV 300 HPE

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WORKSHOP MANUAL

VESPA GTV 300 HPE

This workshop manual has been produced for consultation by the technical staff of Dealerships, Service Centres, Authorised Service Network Workshops.
This manual is addressed to service mechanics who are supposed to have a basic knowledge of mechanics principles and of vehicle mounting techniques and procedures.
Any technical changes made to the vehicles or to specific mounting operations will be promptly reported by updates to this manual.
In order to achieve satisfactory operations, it is necessary to have adequate work areas and the necessary specific equipment or hierarchies.

N.B.
Indicates a note that provides information to make the process easier and clearer.

IMPORTANT
Indicates the specific processes that must be followed in order to prevent possible injury to the person repairing the vehicle.

WARNING
Indicates the specific processes that must be followed in order to prevent damage to the vehicle.



Personal Safety
The total or partial failure to follow these instructions may lead to serious personal injury.



Environmental Protection
Indicates the correct behaviour to adopt for an environmentally-friendly use of the vehicle.



Vehicle Integrity
The total or partial failure to follow these instructions may lead to serious damage to the vehicle and may even invalidate the warranty.

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LIST OF TOPICS

General mandatory requirements

General Information

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

WARNINGS AND IMPORTANT NOTES

Each symbol has a precise meaning, as illustrated below.

- **IMPORTANT:** - This symbol indicates risks for the health of the operator and of the nearby persons if the described procedures are performed incorrectly.
- **WARNING:** - 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 units of measurement used in this manual are indicated as SI UNITS (International System of Units). Example: 24.5 - 34.3 Nm

LIST OF TOPICS

Pre-delivery

Carry out the listed tests before delivering the vehicle.

WARNING



PROCEED WITH THE UTMOST CAUTION WHEN HANDLING PETROL.

2.1 Appearance check

Appearance check:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

2.2 Locking check

Locking check

Check to make sure that the marking in coloured mark is present on the:

- Safety fasteners
- Fastening screws

Safety fasteners:

- Front shock absorber lower fastener
- Rear shock absorber lower fastener
- Engine - Swinging arm pin
- Front wheel brake calliper
- Rear wheel brake calliper
- Coolant delivery and return pipe ties on the coolant pump cover

2.3 Electrical system

- Main switch
- Headlamps: high beam lights, low beam lights, tail lights and their warning lights
- Headlight adjustment according to prevailing regulations
- Brake light operation by using the RH and LF brake lever
- Turn indicators and their warning lights
- Instrument cluster lights
- Instrument cluster: fuel and temperature indicator
- Instrument panel warning lights
- Horn
- Electric Starter

- Engine stop with emergency stop switch
- Button for saddle electric opening

WARNING



TO ENSURE MAXIMUM PERFORMANCE, THE BATTERY MUST BE CHARGED BEFORE USE. THE LACK OF AN ADEQUATE BATTERY CHARGE BEFORE THE FIRST USE WILL CAUSE A PREMATURE FAILURE OF THE BATTERY.

ATTENTION



WHEN INSTALLING THE BATTERY, ATTACH THE POSITIVE LEAD FIRST AND THEN THE NEGATIVE ONE, AND PERFORM THE REVERSE OPERATION DURING REMOVAL.

ATTENTION



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 IT 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.

ALWAYS WEAR EYE PROTECTION WHEN WORKING IN THE PROXIMITY OF BATTERIES.

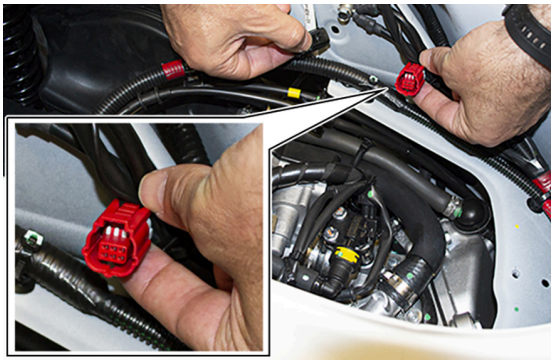
KEEP OUT OF THE REACH OF CHILDREN.

ATTENTION



NEVER USE FUSES WITH A CAPACITY HIGHER THAN THAT RECOMMENDED. THE USE OF A FUSE OF UNSUITABLE CAPACITY MAY RESULT IN SERIOUS DAMAGES TO THE WHOLE VEHICLE OR EVEN CAUSE A FIRE.

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



NOTE

☞

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.

2.4 Checking levels

Level check:

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

2.5 test drive

Test drive:

- 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

NOTE

☞

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

2.6 Static check

Static control after the test drive:

- Restarting when warmed up
- Minimum holding (turning the handlebar)
- Uniform turning of the steering
- Any leaks
- Operation of the radiator electric fan

ATTENTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

ATTENTION

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

2.7 Functional checks

Functional Checks:

• Hydraulic braking system: lever travel

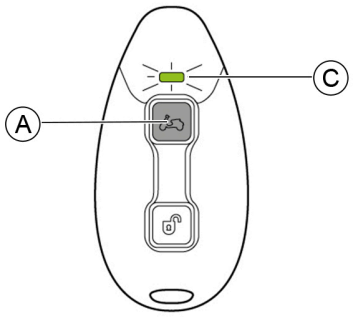
• Clutch: proper functioning check

• Engine: proper general functioning and no abnormal noise check

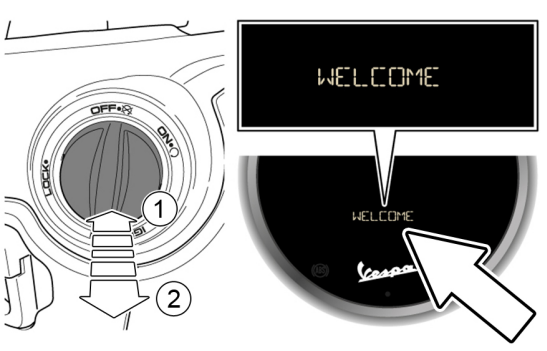
• Other: papers check, chassis and engine number check, tools and equipment, licence plate fitting, lock check, tyre pressure check, rear-view mirror and any accessory fitting

2.8 Instrument activation

To switch on and view the digital display, enable the remote control (see section "Remote Control"); When starting up for the first time, press button "**A**", wait for the green LED "**C**" to flash and the turn indicators to light up.

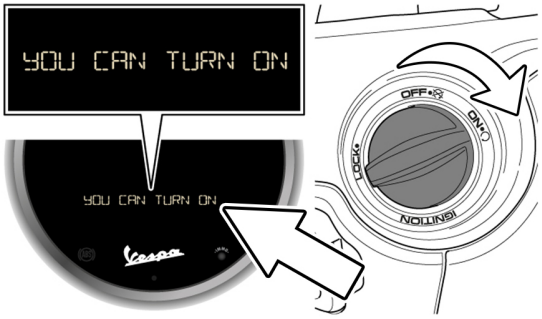


Press and release the starter switch; the message “**WELCOME**” is displayed in the information panel.



Five seconds after the welcome message, the message "**YOU CAN TURN ON**" is displayed.

Turn the switch to the «**ON**» position.



The **MODE** button allows the cyclic display of the information shown on the multifunction panel and on the total/partial odometer panel of the digital display.

It also allows navigation in the "**SETTINGS**" menu and setting various parameters.



NOTE

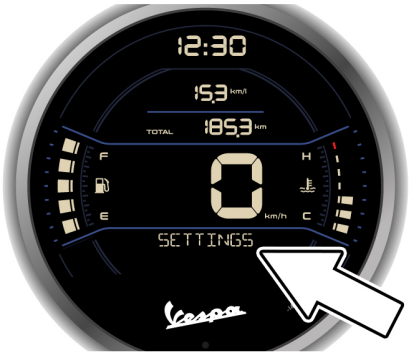
"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 2 SECONDS;

"PRESS AND HOLD": PRESS AND HOLD THE BUTTON FOR AT LEAST 2 SECONDS

SETTINGS MENU

With the vehicle at standstill and the VMP system deactivated, **briefly press** the **MODE** button to display the "**SETTINGS**" function in the information panel.

By **long-pressing** the **MODE button on the front handlebar cover**, the menu can be entered.



By **briefly pressing** the **MODE** button, the following information is shown cyclically in the settings menu:

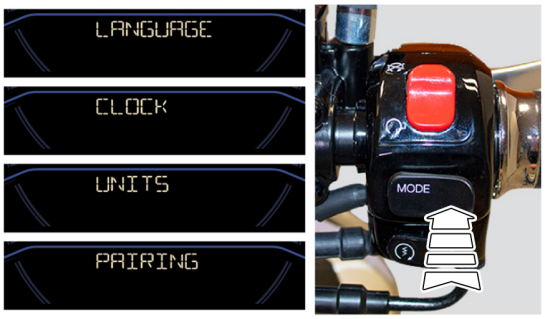
- LANGUAGE

- CLOCK

- UNITS

- PAIRING (*)

(*): NOTE: The function with asterisk is only available with the presence of the PMP3 device (Piaggio Multimedia Platform).



UNITS SETTING

Select the "**UNITS**" item and enter the submenu by **long-pressing** the **MODE** button.

Select the desired measuring unit by **short-pressing** the **MODE** button and confirm by **long-pressing** the **MODE** button.

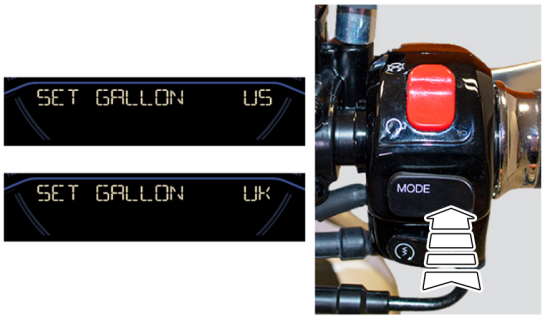
It is possible to select:

- **KM**
- **MI**



if the "**MI**" format is selected, a sub-menu will open to choose the "**USA**" or "**UK**" standard for **GALLONS.**

Once the choice has been confirmed, the display will show the next PAIRING submenu.



ASR SYSTEM

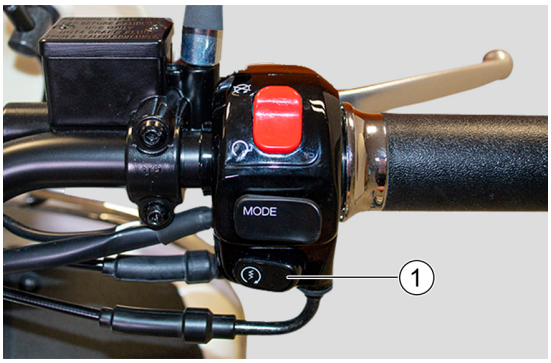
The ASR system is a driving aid that assists the driver in acceleration manoeuvres, particularly on low-grip surfaces or under conditions that can cause sudden back-wheel slippage. The ASR in these situations automatically intervenes by reducing engine output within the limit imposed by the grip conditions,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

WARNING

THE ASR SYSTEM IS BASED ON THE RECOGNITION OF SPEED DIFFERENCES BETWEEN FRONT AND REAR WHEEL. IN ORDER FOR THE SYSTEM TO MAINTAIN MAXIMUM EFFICIENCY IN ALL CONDITIONS, THE CALIBRATION PROCEDURE MUST BE PERFORMED EVERY TIME, EVEN IN CASE OF REPLACEMENT OF JUST ONE TYRE.

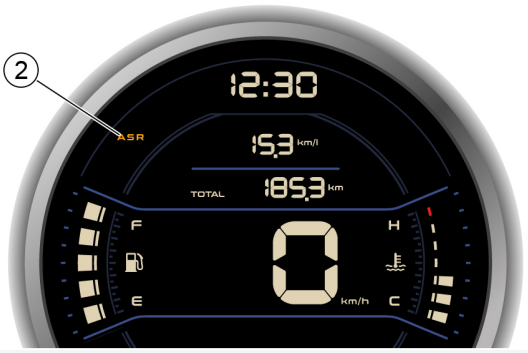
FOR THE CALIBRATION OF THE ASR SYSTEM PERFORM THE PROCEDURE BELOW.

To activate/deactivate the ASR system, **press and hold** the start button (**1**).



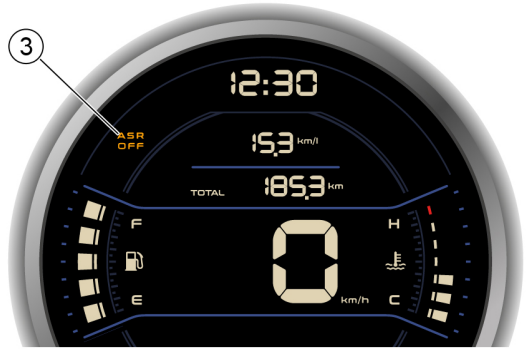
ASR (2) system activation icon

System active and calibrated: icon flashes with each rotation of the ignition switch to the «**ON**» position, then goes off with the engine running.



ASR (3) system deactivation icon

Icon "**ASR OFF**": **on steady** with engine started, ASR system not working or not calibrated or voluntarily deactivated.



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 ignition switch in the "**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 ignition switch in the "**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.

NOTE

☞

WITH THE ROTATION OF THE IGNITION SWITCH TO POSITION "ON", THE ASR ICON FLASHES AT THE SAME FREQUENCY AS THE ABS INDICATOR LIGHT TO INDICATE THAT SYSTEM DIAGNOSIS IS IN PROGRESS. IF NO ERRORS ARE FOUND, THE ASR ICON AND THE ABS INDICATOR LAMP EXTINGUISH SIMULTANEOUSLY ONCE VEHICLE SPEED EXCEEDS 5 km/h.

IF THERE IS NO FLASHING UPON START-UP, THE SYSTEM MAY NOT BE OPERATIONAL. PLEASE CONTACT A DEALER OR AN AUTHORISED SERVICE CENTRE.

WARNING

THE ASR SYSTEM IS ACTIVATED EVERY TIME, THE STARTER SWITCH IS TURNED TO THE "ON" POSITION.

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; THE ASR SYSTEM IS AUTOMATICALLY ENABLED THE NEXT TIME THE IGNITION SWITCH IS TURNED TO THE "ON" POSITION.

ATTENTION



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.

NOTE



IN CASE OF ROADS FULL OF HOLES BRIEF ACTIVATION OF THE ASR SYSTEM MAY OCCUR. SUCH EVENT APPEARS UNDER NORMAL OPERATION CONDITIONS OF THE VEHICLE.

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.

WARNING



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. IF THE PROBLEM PERSISTS, CONTACT A DEALERSHIP OR AN AUTHORISED SERVICE CENTRE.

ATTENTION



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

predelivery ASR SYSTEM calibration/ ECU replacement

In the case of a vehicle in predelivery, or following the replacement of the engine management ECU, **on which the Initialization procedure of the ASR system has never been performed**, proceed as follows.

After turning the ignition key to "**ON**", the ABS warning light flashes and the ASR icon "**2**" is **switched on steady**.

1. Start the vehicle and ride a short distance of more than 5 km/h and wait for the flashing of the ASR warning light to stop. The ASR icon stays switched on steady.
2. Stop the vehicle and leave the engine running at idle speed for at least 3 seconds.
3. Press the engine start button « **1** » for at least 4 seconds (has no effect pull the brake lever left).
4. The activation of the procedure will be confirmed by the slow flashing switched on ASR icon "**2** " (1 flash every 2 seconds).
5. Accelerate to a constant speed of 30 km/h and maintain it for at least to 10 seconds.
6. The end of the procedure will be indicated by the turning off of the ASR icon "**2**".
7. Once the procedure is complete, turn the ignition key to "**OFF** " and wait at least 30 seconds until switching back to "**ON** " again.
8. If the procedure is not completed within 2 minutes, the ASR icon "**2**" will remain on continuously and the ASR will remain off until the next time the ignition switch is turned to the "**OFF**" position.
9. To reactivate the ASR, it is necessary to turn it to "**ON**" position and repeat the procedure until successful.

ASR SYSTEM CALIBRATION following the replacement of one or both tires

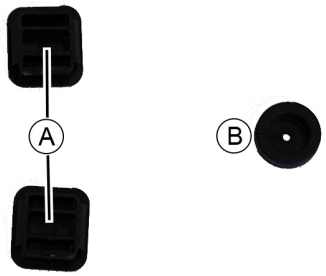
If one or both tires are replaced, proceed in the following manner.

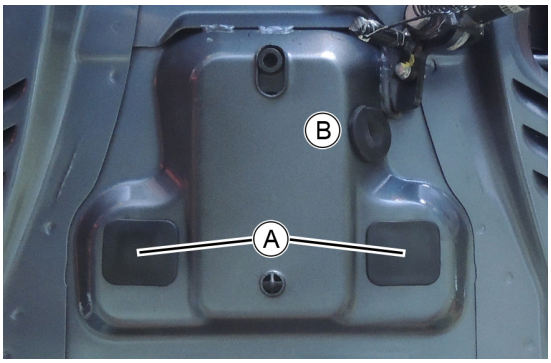
After turning the ignition switch to the '**ON**" position, the ABS indicator light and the ASR icon '**2**" flash at the same frequency (fast flashing).

1. Start the vehicle and ride a short distance of more than 5 km/h and wait for the flashing of the ASR warning light and of the ABS icon to stop.
2. Stop the vehicle and leave the engine running at idle speed for at least 3 seconds.
3. Turn the ASR system off by pressing the specific button "**1**" on the handlebar and check that the ASR disabling icon "**3**" is switched on steady.
4. Keep the brake lever pulled and press the start button "**1**" for at least 4 seconds then release to start the programming procedure.
5. The activation of the procedure will be confirmed by the slow flashing switched on ASR icon "**2** " (1 flash every 2 seconds).
6. Accelerate to a constant speed of 30 km/h and maintain it for at least to 10 seconds.
7. The end of the procedure will be indicated by the turning off of the ASR icon "**2**".
8. Once the procedure is complete, turn the ignition key to "**OFF**" and wait at least 30 seconds until switching back to "**ON** " again.
9. If the procedure is not completed within 2 minutes, the ASR icon "**2**" will remain on continuously and the ASR will remain off until the next time the ignition switch is turned to the "**OFF**" position.
10. To reactivate the ASR it will be necessary to rotate the ignition switch to "**ON**" position and repeat the procedure until successful.

2.9 Specific operations for vehicle

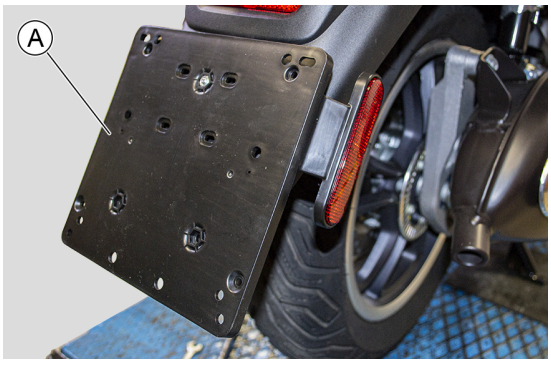
Install the underbody caps as shown in the figure.





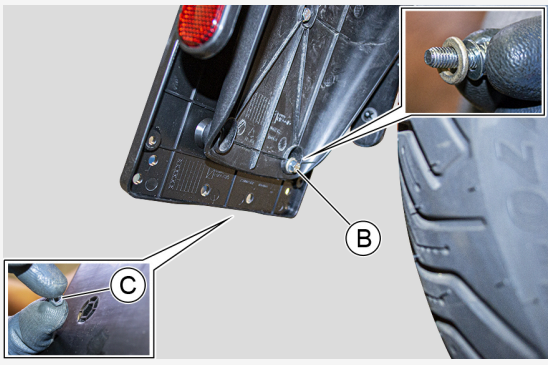
FITTING THE LICENCE PLATE HOLDER

Place the licence plate holder plate **(A)** on the rear splash guard.



Insert the three nuts **(C)** in the proper seats of the license plate holder plate.

From the inside, insert and tighten the three screws **(B)** with the corresponding washers.



LIST OF TOPICS

Dati Tecnici

Questa sezione descrive le caratteristiche generali del veicolo.

3.1 Regulations

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

3.1.1 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 gasses 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.

3.1.2 maintenance instructions

- 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.

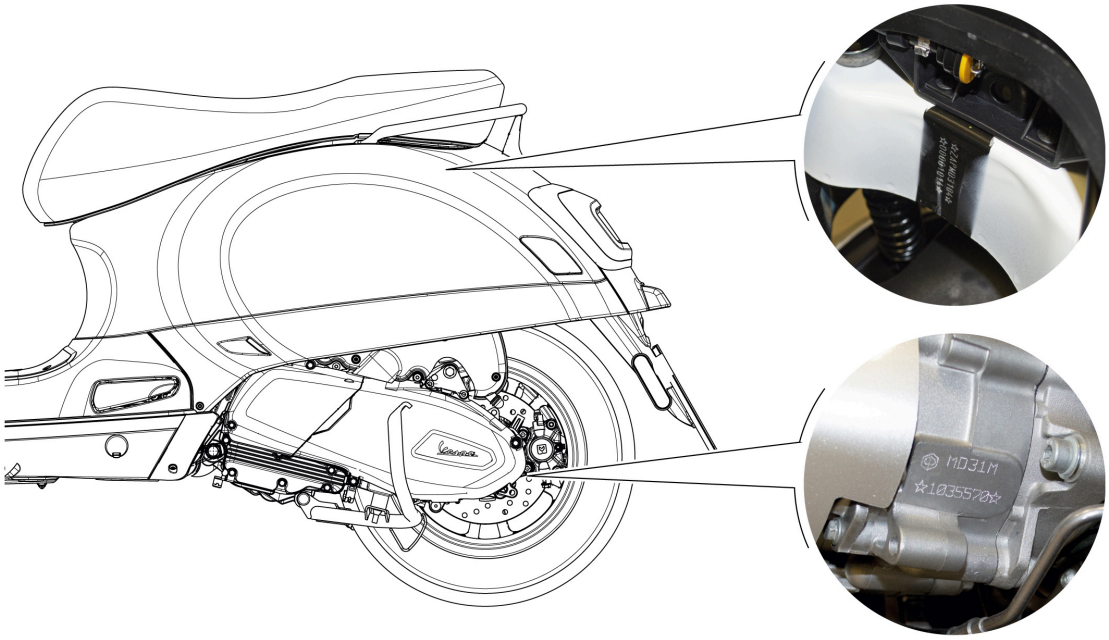
- After removal, clean the components using non-flammable or low flash-point solvents. Lubricate all the work surfaces, except tapered couplings, before refitting these parts.

- 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 with English measurement. 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.

3.2 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.

ATTENTION

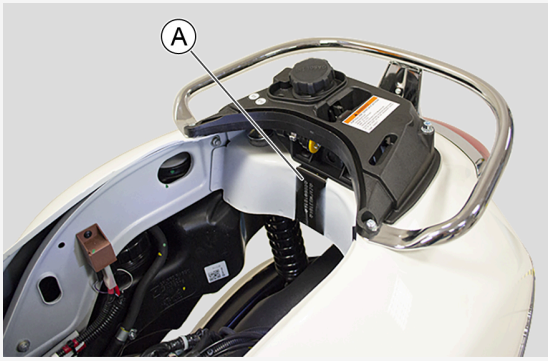
NOTE THAT ALTERING SERIAL NUMBERS MAY BE PUNISHABLE WITH SEVERE LEGAL PENALTIES (IMPOUNDING OF VEHICLE, ETC.).

Frame number

Lift the saddle and remove the helmet compartment.

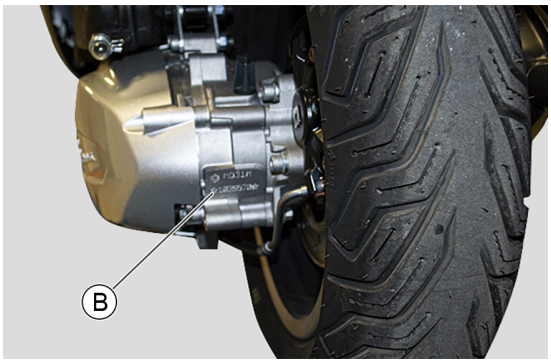


The chassis number (**A**) is stamped near the fuel tank.



Engine number

The engine number (**B**) is stamped near the rear left shock absorber lower support.



VEHICLE IDENTIFICATION	
Chassis prefix	ZAPMD3108
Engine prefix	MD31M

3.3 Vehicle Information

FOR EUROPE VERSION

VEHICLE INFORMATION	
Chassis	Stamped plate supporting body.
Front suspension	Single arm suspension, steering column tube with cantilever wheel, dual-chamber hydraulic shock absorber and coaxial coil 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.

VEHICLE INFORMATION	
Rear brake	Ø 220 mm hydraulically operated disc brake controlled from LH handlebar lever; braking assisted by ABS system.
Wheel type	Light alloy.
Front rim	12" x 3.00
Rear rim	12" x 3.00
Front tire	Tubeless 120/70 - 12" 51P
Rear tyre	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)
Kerb mass	163 kg
Maximum technically permissible weight at full load	340 kg
Battery	12V-10Ah

FOR USA-LATAM VERSION

VEHICLE INFORMATION	
Chassis	Stamped plate supporting body.
Front suspension	Single arm suspension, steering column tube with cantilever wheel, dual-chamber hydraulic shock absorber and coaxial coil spring.
Rear suspension	Two double-acting shock absorbers, adjustable to four positions at pre-loading.
Front brake	Ø 8.7 (220 mm) hydraulically operated disc brake controlled from RH handlebar lever; braking assisted by ABS system.
Rear brake	Ø 8.7 in (220 mm) hydraulically operated disc brake controlled from LH handlebar lever; braking assisted by ABS system.
Wheel type	Light alloy.
Front rim	12" x 3.00

VEHICLE INFORMATION	
Rear rim	12" x 3.00
Front tire	Tubeless 120/70 - 12" 51P
Rear tyre	Tubeless 130/70 - 12" 62P
Front tire pressure (with passenger)	26 psi / 1.8 bar (-)
Rear tire pressure (with passenger)	29 psi / 2.0 bar (37.7 psi (2.6 bar)
Kerb mass	359.3 lb (163 Kg)
Maximum technically permissible weight at full load	774.4 lb (352 Kg)
Battery	12V-10Ah

3.4 Dati Motore

PER VERSIONE EUROPA

DATI MOTORE	
Tipo	Monocilindrico a 4 tempi
Cilindrata	278 cm³
Alesaggio x Corsa	75x63 mm
Rapporto di compressione	11 ± 0,5 : 1
Minimo motore	1.700 ± 100 giri/min
Distribuzione	4 valvole, monoalbero a camme in testa comandato da catena.
Gioco valvole (a freddo)	Aspirazione: 0,10 ± 0,02 mm Scarico: 0,10 ± 0,02 mm
Potenza massima	17,5 kW a 8250 giri/min
Coppia massima	26,0 Nm a 5250 giri/min
Trasmissione	Variatore automatico a pulegge espansibili con asservitore di coppia, cinghia trapezoidale, frizione automatica centrifuga a secco autoventilante, vano trasmissione a circolazione d'aria forzata.
Riduzione finale	A ingranaggi in bagno d'olio.

DATI MOTORE	
Lubrificazione	Lubrificazione del motore con pompa a lobi (interna al carter) comandata da catena e doppio filtro a rete e in carta.
Raffreddamento	A circolazione forzata di liquido.
Avviamento	Elettrico
Accensione	Elettronica a scarica induttiva ad alta efficienza e con bobina AT separata.
Anticipo accensione	Mappa tridimensionale di tipo α/N gestita da centralina
Candela	NGK MR7BI-8
Alimentazione	Iniezione elettronica con corpo farfallato Ø 32 mm e pompa carburante elettrica.
Carburante	Benzina senza piombo max E10 (95 R.O.N.)
Marmitta di scarico	Di tipo ad assorbimento con convertitore catalitico a 3 vie e sonda lambda.
Sistema Emissioni Antievaporativo	Composto da Canister ed Elettrovalvola gestita dalla centralina iniezione.
Normativa emissioni	EURO 5

PER VERSIONE USA-LATAM

DATI MOTORE	
Tipo	Monocilindrico a 4 tempi
Cilindrata	16.96 in³ (278 cm³)
Alesaggio x Corsa	2.95x2.48 in (75x63 mm)
Rapporto di compressione	11 ± 0,5 : 1
Minimo motore	1.700 ± 100 giri/min
Distribuzione	4 valvole, monoalbero a camme in testa comandato da catena.
Gioco valvole (a freddo)	Aspirazione: 0.004 in (0,10 mm) Scarico: 0.006 in (0,15 mm)
Potenza massima	17,5 kW a 8250 giri/min

DATI MOTORE	
Coppia massima	19.17 lbf ft (26,0 Nm) a 5.250 giri/min
Trasmissione	Variatore automatico a pulegge espansibili con asservitore di coppia, cinghia trapezoidale, frizione automatica centrifuga a secco autoventilante, vano trasmissione a circolazione d'aria forzata.
Riduzione finale	A ingranaggi in bagno d'olio.
Lubrificazione	Lubrificazione del motore con pompa a lobi (interna al carter) comandata da catena e doppio filtro a rete e in carta.
Raffreddamento	A circolazione forzata di liquido.
Avviamento	Elettrico
Accensione	Elettronica a scarica induttiva ad alta efficienza e con bobina AT separata.
Anticipo accensione	Mappa tridimensionale di tipo α/N gestita da centralina
Candela	NGK MR7BI-8
Alimentazione	Iniezione elettronica con corpo farfallato Ø 32 mm e pompa carburante elettrica.
Carburante	Benzina senza piombo max E10 (95 R.O.N.)
Marmitta di scarico	Di tipo ad assorbimento con convertitore catalitico a 3 vie e sonda lambda.
Sistema Emissioni Antievaporativo	Composto da Canister ed Elettrovalvola gestita dalla centralina iniezione.
Normativa emissioni	40 CFR Part 86 Subpart E

PER VERSIONE ASIA-PACIFIC

DATI MOTORE	
Tipo	Monocilindrico a 4 tempi
Cilindrata	278 cm³
Alesaggio x Corsa	75x63 mm
Rapporto di compressione	11 ± 0,5 : 1

DATI MOTORE	
Minimo motore	1.700 ± 100 giri/min
Distribuzione	4 valvole, monoalbero a camme in testa comandato da catena.
Gioco valvole (a freddo)	Aspirazione: 0,10 ± 0,02 mm Scarico: 0,10 ± 0,02 mm
Potenza massima	17,5 kW a 8250 giri/min
Coppia massima	26,0 Nm a 5250 giri/min
Trasmissione	Variatore automatico a pulegge espansibili con asservitore di coppia, cinghia trapezoidale, frizione automatica centrifuga a secco autoventilante, vano trasmissione a circolazione d'aria forzata.
Riduzione finale	A ingranaggi in bagno d'olio.
Lubrificazione	Lubrificazione del motore con pompa a lobi (interna al carter) comandata da catena e doppio filtro a rete e in carta.
Raffreddamento	A circolazione forzata di liquido.
Avviamento	Elettrico
Accensione	Elettronica a scarica induttiva ad alta efficienza e con bobina AT separata.
Anticipo accensione	Mappa tridimensionale di tipo α/N gestita da centralina
Candela	NGK MR7BI-8
Alimentazione	Iniezione elettronica con corpo farfallato Ø 32 mm e pompa carburante elettrica.
Carburante	Benzina senza piombo max E10 (95 R.O.N.)
Marmitta di scarico	Di tipo ad assorbimento con convertitore catalitico a 3 vie e sonda lambda.
Sistema Emissioni Antievaporativo	Composto da Canister ed Elettrovalvola gestita dalla centralina iniezione.
Normativa emissioni (mercato Vietnam e Indonesia)	EURO 3

DATI MOTORE	
Normativa emissioni (mercato Thailandia)	EURO 4
Normativa emissioni (mercato Giappone, Hong Kong / Singapore e Korea)	EURO 5

3.5 Capacity

FOR EUROPE VERSION

CAPACITY	
Engine oil	1.3 l
Transmission oil	250 cm³
Cooling system fluid	~ 2 l
Fuel tank	8.5 ± 0.5 litres

FOR USA-LATAM VERSION

CAPACITY	
Engine oil	0.34 gal (1.3 l)
Rear hub oil	15 cu.in (250 cc)
Cooling system fluid	~ 0.37 gal (1.42 l)
Fuel tank	2.24 gal ± 0.13 (8.5 ± 0.5 l)

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

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 (in³)	16.4 Cubic centimetres (cm³)
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)

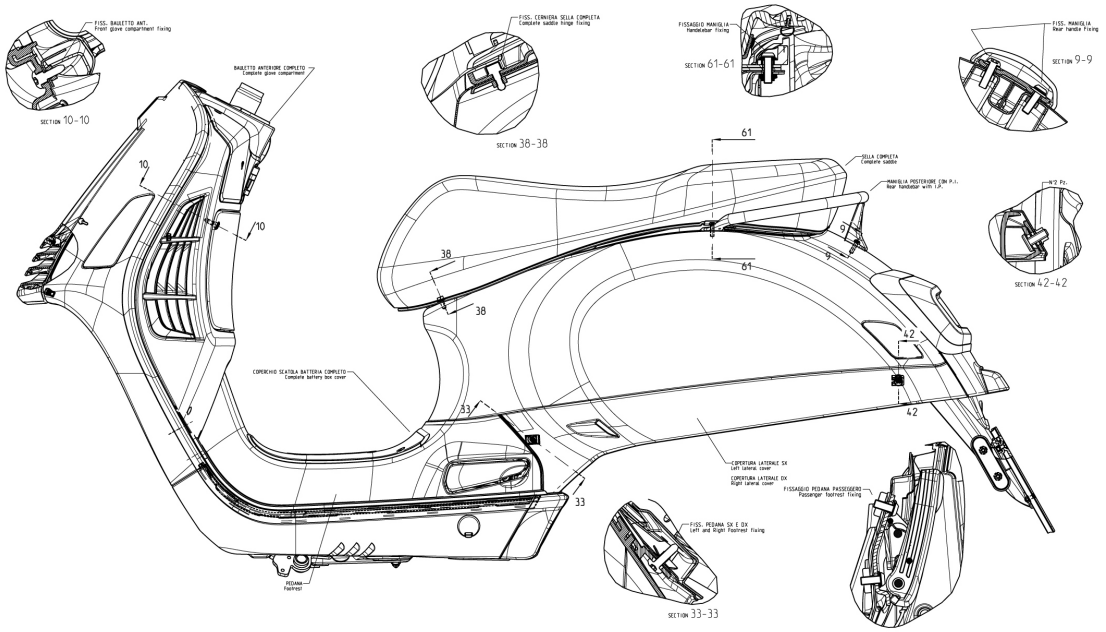
3.6 Impianto elettrico

Mercato di destinazione	Frequenza	Disegno
EMEA	434 MHz	1D004008
USA/CANADA	315 MHz	1D004096
ASIA	434 MHz	1D004008

3.7 Tightening torques

VEHICLE TIGHTENING TORQUES

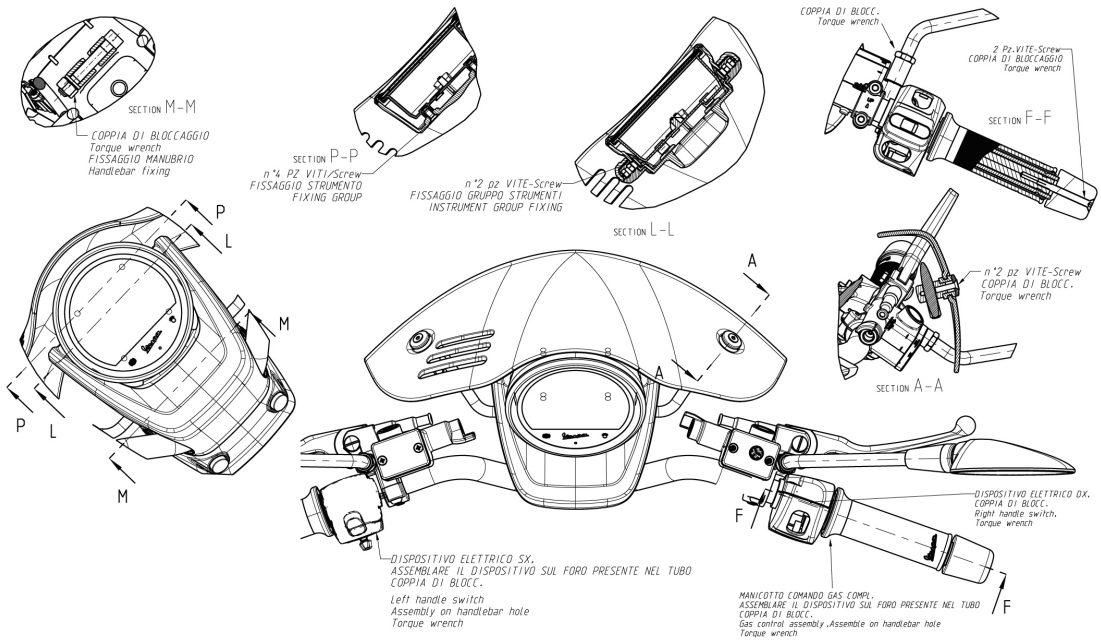
BODYWORK



DESCRIPTION	TORQUE
Saddle hinge - Body shell	9 ± 1 Nm
Cover_Luggage carrier	9 ± 1 Nm
Leg shield back plate - Body shell	5.75 ± 1.25 Nm
Footboard - Body	5.75 ± 1.25 Nm
Passenger footrests - Body shell	19.5 ± 2.5 Nm
Side fairing - Body	5.75 ± 1.25 Nm
License plate mount - Body	5.75 ± 1.25 Nm
Side stand - Body	37.5 ± 2.5 Nm
Chassis middle cover – Footrest	1.35 ± 0.35 Nm
Taillight - Body	5.75 ± 1.25 Nm

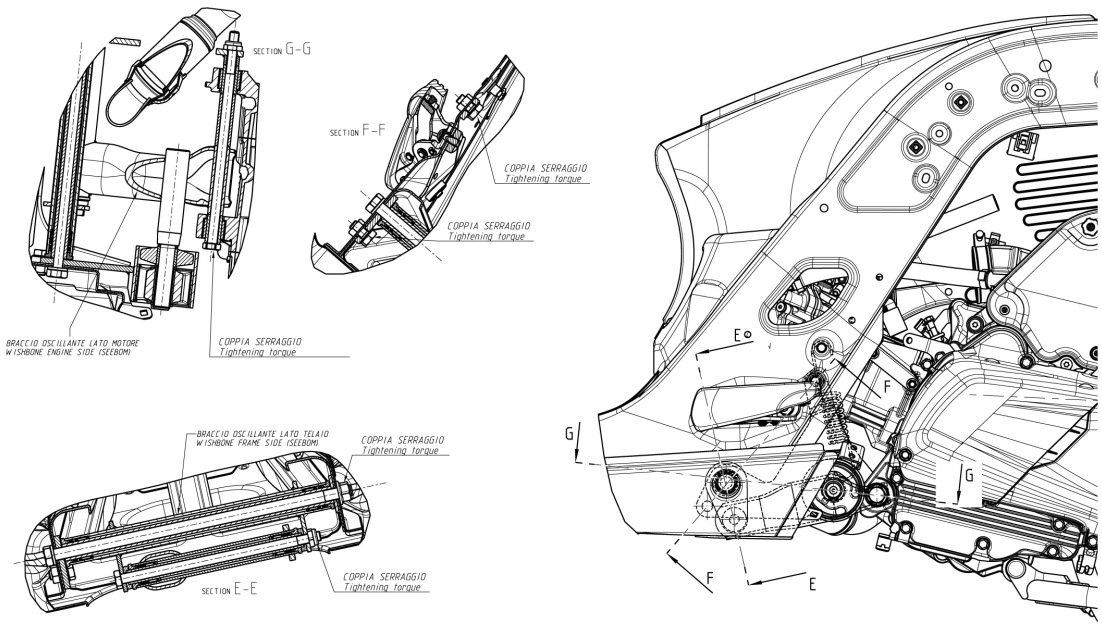
DESCRIPTION	TORQUE
Electric fan - Radiator	5.75 ± 1.25 Nm
Radiator - Body shell	5.75 ± 1.25 Nm
Pipe clamp	2.75 ± 0.25 Nm
Battery bracket – Footrest	5.75 ± 1.25 Nm

HANDLEBAR AND STEERING



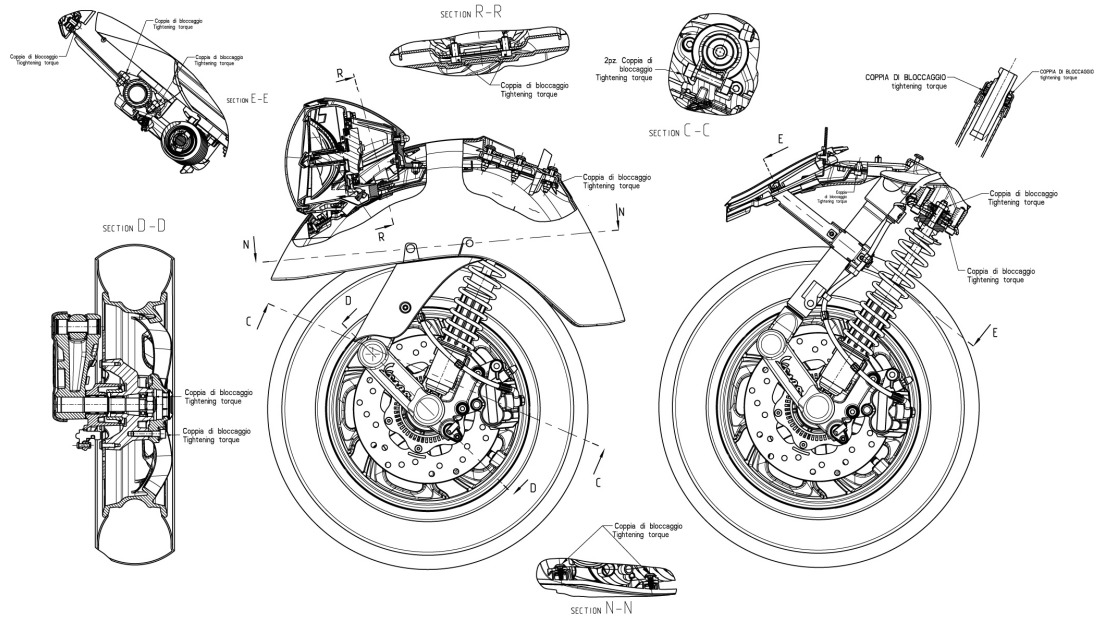
DESCRIPTION	TORQUE
Throttle control sleeve - Handlebar tube	5 ± 1 Nm
Handlebars - Steering tube	52.5 ± 2.5 Nm
Rear-view mirror - Brake pump	30 ± 1 Nm
Top fairing - Top fairing support	5.75 ± 1.25 Nm
instrument cluster - Instrument cluster support	5 ± 0.5 Nm
Throttle control cable - RH switchgear set	2.5 ± 0.5 Nm
U-bolt - RH switchgear set	3.5 ± 0.5 Nm
RH switchgear set - Handlebar	2.5 ± 0.5 Nm
LH switchgear set - Handlebar	2.5 ± 0.5 Nm
Handlebar end – Handlebars	8.5 ± 1.5 Nm

SWINGARM



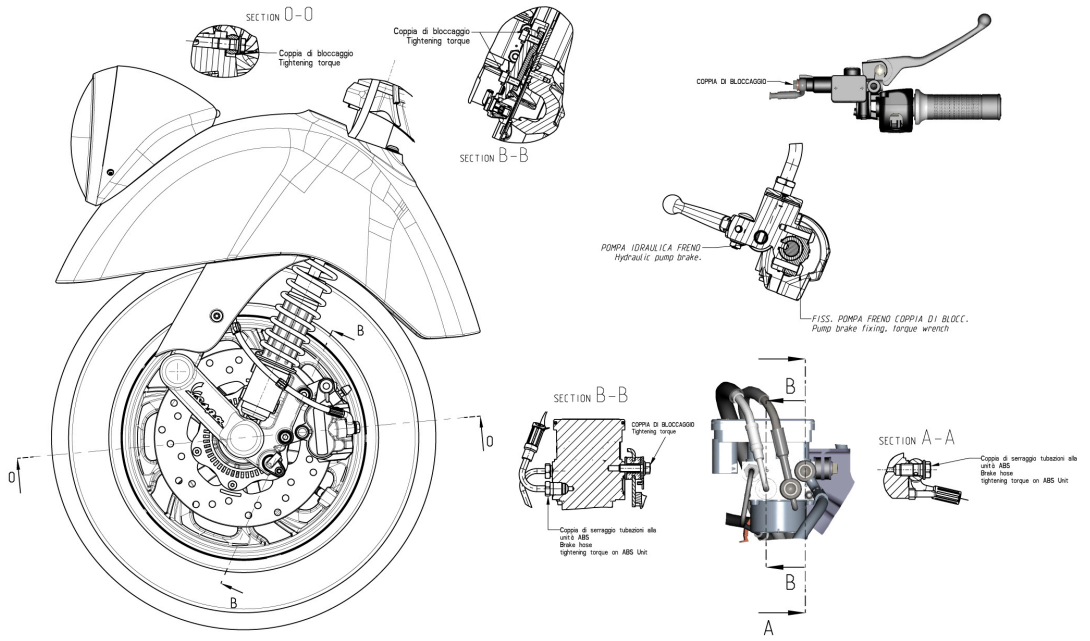
DESCRIPTION	TORQUE
Engine - swinging arm pin	71 ± 4 Nm
Swinging arm bolt - body shell	79.5 ± 3.5 Nm
Engine and vehicle side swinging arm junction bolt	42.5 ± 2.5 Nm
Silent block support plate - Body	47 ± 5 Nm

FRONT SUSPENSION



DESCRIPTION	TORQUE
Wheel axle nut - wheel axle	85 ± 8 Nm
Front wheel - Front hub	21.5 ± 2.5 Nm
Shock absorber - Shock absorber plate	22.5 ± 3.5 Nm
Shock absorber - Shock absorber attachment bracket	24 ± 5 Nm
Shock absorber attachment bracket - Steering tube	21.5 ± 2.5 Nm
Front mudguard – Steering tube	6.2 ± 0.3 Nm
Upper lock-nut - Steering tube	36.75 ± 2.45 Nm
Lower lock-nut - Steering tube	12.7 ± 1 Nm
Mudguard support bracket - Steering tube	9 ± 1 Nm
Headlamp cover - Mudguard	9 ± 1 Nm
Shock absorber cover - Mudguard	3 ± 1 Nm
Steering tube cover – Steering tube	5.5 ± 1.5 Nm

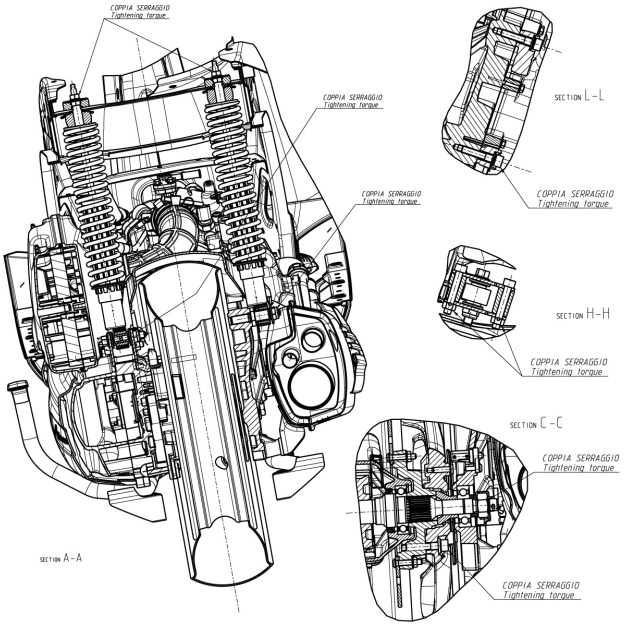
FRONT BRAKE

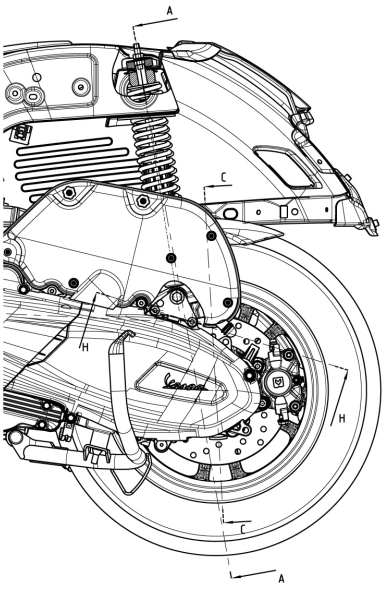


DESCRIPTION	TORQUE
Front brake calliper - Bracket	21.5 ± 2.5 Nm
ABS sensor - Shock absorber support	7 ± 1 Nm
Front brake pipe - Front brake calliper	23.5 ± 1.5 Nm

DESCRIPTION	TORQUE
Front brake pipe - Front branke master cylinder	24.5 ± 1.5 Nm
Front brake pipe - ABS control unit	23.5 ± 1.5 Nm
ABS control unit - Support	9 ± 1 Nm
U-bolt - Front brake master cylinder	8.5 ± 1.5 Nm
ABS control unit support - Body	8 ± 2 Nm
Brake disc – front wheel hub	9 ± 1 Nm
Stud bolt - ABS control unit	5.5 ± 0.5 Nm

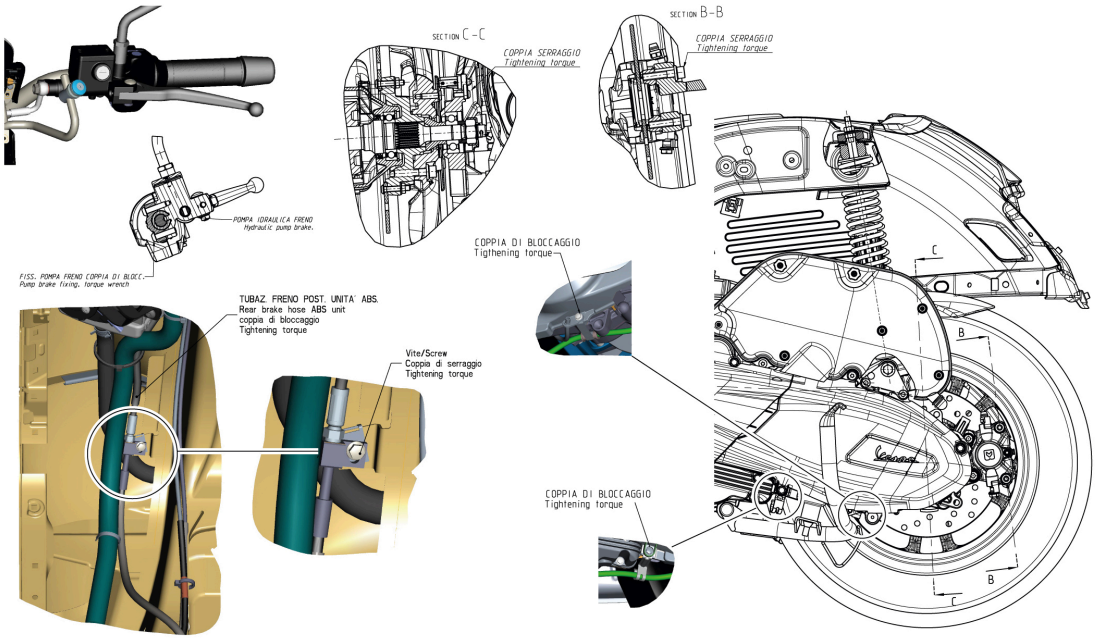
REAR SUSPENSION





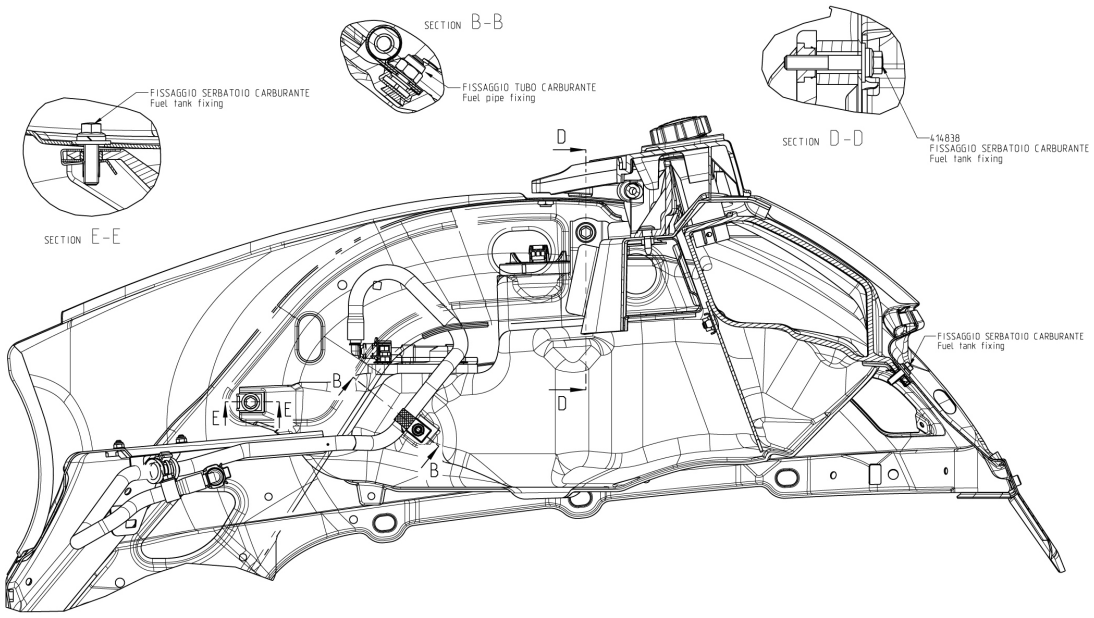
DESCRIPTION	TORQUE
Left shock absorber support plate - Crankcase	22.5 ± 2.5 Nm
Rear shock absorber - Engine	42.5 ± 2.5 Nm
Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm
Rear shock absorber - Chassis	22.5 ± 2.5 Nm
Rear wheel axle nut - Rear wheel axle	115 ± 11 Nm
Rear wheel – Rear wheel hub	22.5 ± 2.5 Nm
Silencer support bracket - Engine	22.5 ± 2.5 Nm
Rear tone wheel - Rear wheel	9 ± 1 Nm

REAR BRAKE



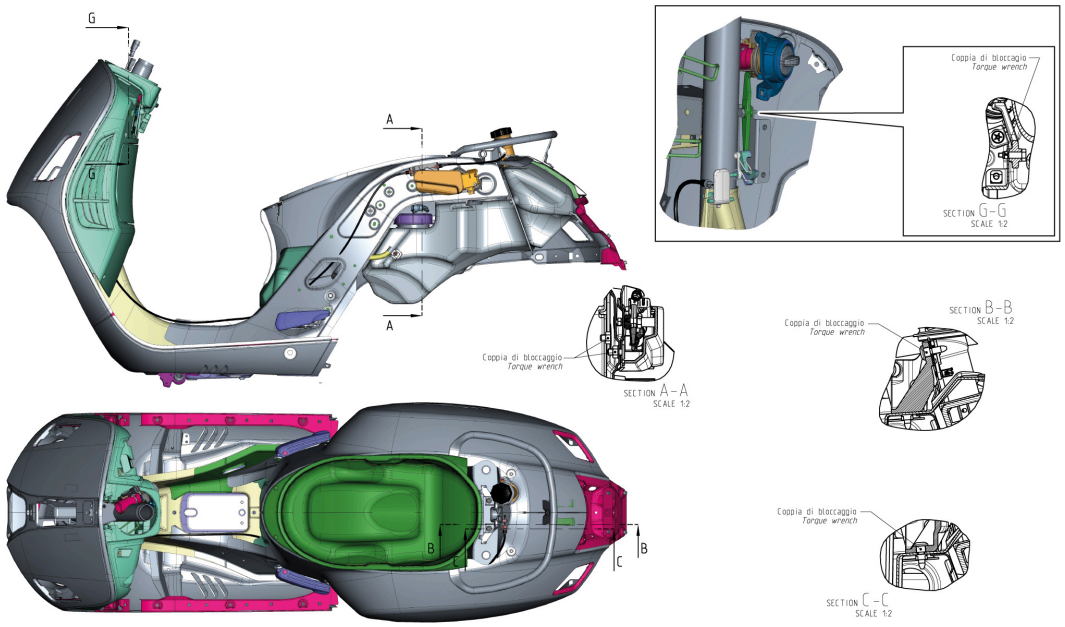
DESCRIPTION	TORQUE
Rear brake calliper - Engine	22.5 ± 2.5 Nm
ABS sensor - Shock absorber support	7 ± 1 Nm
Rear brake pipe - Rear brake calliper	23.5 ± 1.5 Nm
Rear brake pipe - Rear brake pump	24.5 ± 1.5 Nm
Rear brake pipe - ABS control unit	23.5 ± 1.5 Nm
U-bolt - Rear brake pump	8.5 ± 1.5 Nm
ABS ECU pipe joint - Rear brake calliper pipe	15 ± 2 Nm
Rear brake pipe - Body	8 ± 2 Nm
Rear brake pipe clamp - Engine	12 ± 1 Nm
Brake disc – rear wheel hub	12 ± 1 Nm
Oil bleed screw - Rear brake calliper	5.4 ± 1.5 Nm
Brake pump cover - Brake pump	1.1 ± 0.2 Nm
Pad fastening pin - Rear brake calliper	17.15 ± 2.45 Nm
Air filter box - Engine	4.5 ± 0.5 Nm

FUEL TANK



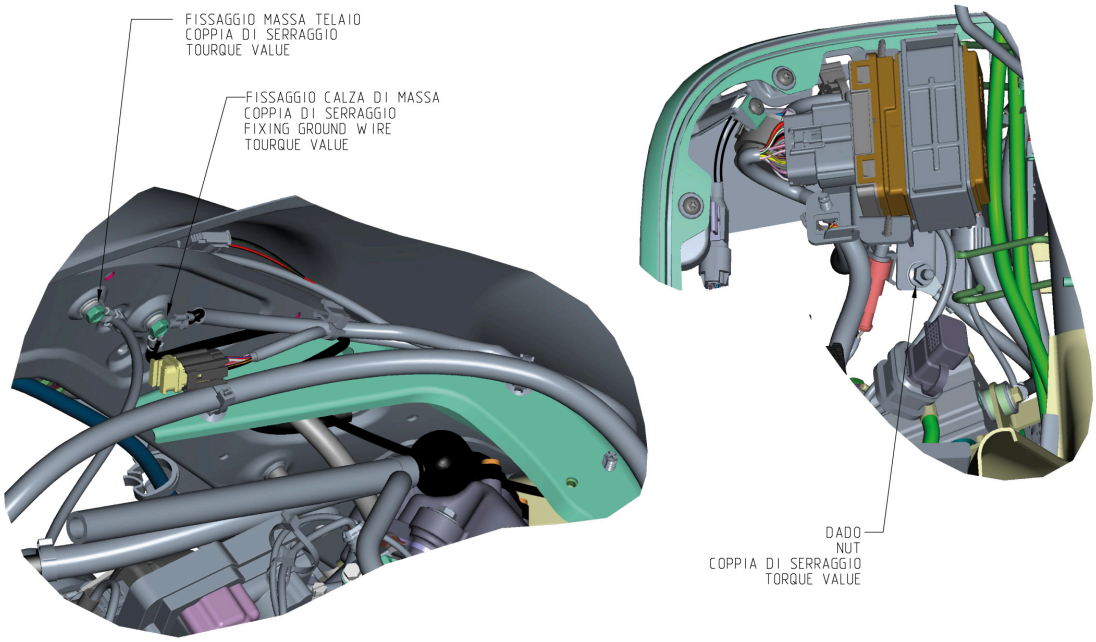
DESCRIPTION	TORQUE
Fuel tank - Body shell	9 ± 1 Nm
Canister unit - Body	5.75 ± 1.25 Nm
Canister valve - Canister support	5.75 ± 1.25 Nm
Fuel pipe - Fuel tank	5.75 ± 1.25 Nm
Injector - Head	3.5 ± 0.5 Nm

LOCKS



DESCRIPTION	TORQUE
Lever for the lock - Body	5.75 ± 0.75 Nm
Saddle lock bracket - Body shell	5.75 ± 1.25 Nm
Saddle actuator support plate - Body	5.75 ± 1.25 Nm

ELECTRICAL SYSTEM

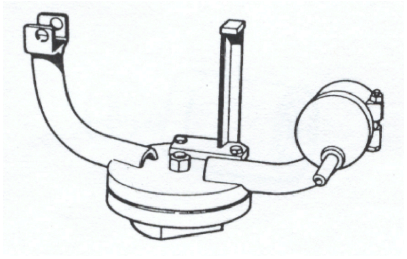
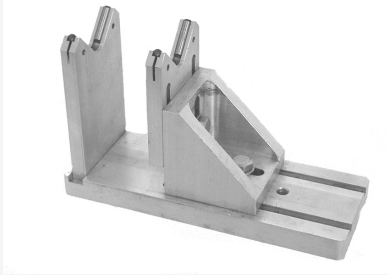
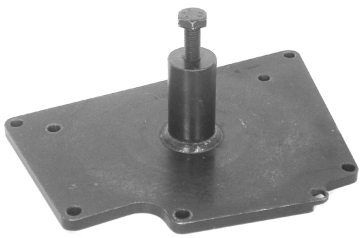


DESCRIPTION	TORQUE
Main wiring harness ground lead	8.5 ± 1 Nm
Earth cable - Body	8.5 ± 1 Nm
ABS earth cable - Body	8.5 ± 1 Nm

LIST OF TOPICS

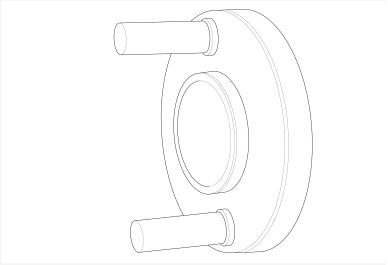
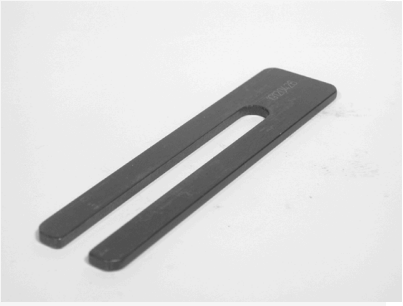
Specific tools

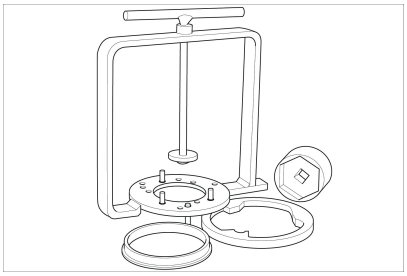
ENGINE

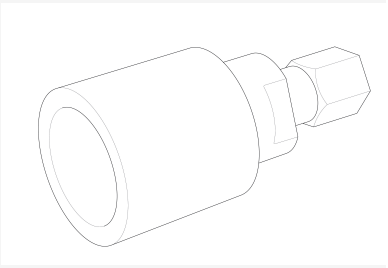
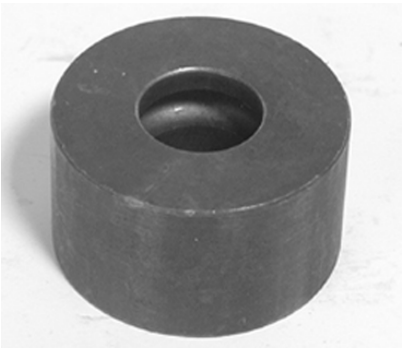
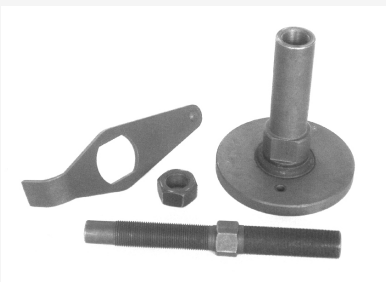
CODE	DESCRIPTION	IMAGE
001467Y013	Calliper to extract ø 15-mm bearings	
001467Y035	Bearing housing, external ø 47 mm	
005095Y	Engine support	
020074Y	Support base for checking crankshaft alignment	
020262Y	Crankcase splitting plate	

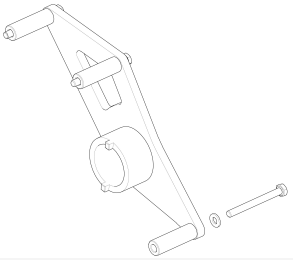
CODE	DESCRIPTION	IMAGE
020263Y	Driven pulley assembly sheath	
020306Y	Punch valve seal rings fitting	
020359Y	42 x 47 mm Adaptor	
020360Y	52 x 55 mm adaptor	
020363Y	20-mm guide	

CODE	DESCRIPTION	IMAGE
020364Y	25-mm guide	
020375Y	28 x 30 mm adaptor	
020376Y	Adaptor handle	
020382Y	Valve cotters equipped with part 012 removal tool	
020382Y011	adapter for valve removal too	

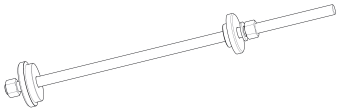
CODE	DESCRIPTION	IMAGE
020393Y	Piston ring compressor	
020412Y	15-mm guide	
020423Y	Driven pulley lock wrench	
020424Y	Driven pulley roller casing fitting punch	
020426Y	Piston fitting fork	

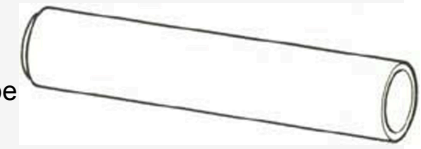
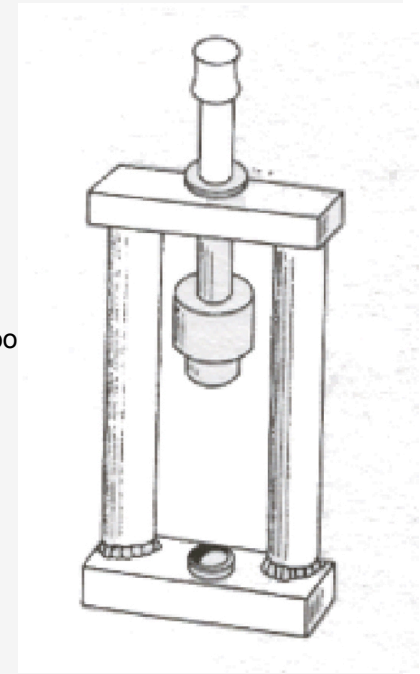
CODE	DESCRIPTION	IMAGE
020431Y	Valve oil seal extractor	
020434Y	Union for oil pressure measurement	
020444Y	Tool for FITTING/removing clutch on/from driven pulley	
020454Y	Tool for fitting the pin snap rings (200 - 250)	
020456Y	Adapter 24 mm	

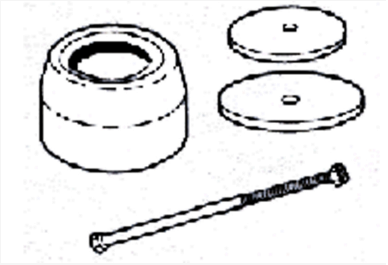
CODE	DESCRIPTION	IMAGE
020467Y	Flywheel puller tool	
020477Y	Adapter 37 mm	
020483Y	30-mm guide	
020489Y	Hub cover support stud bolt kit	
020622Y	Transmission-side oil seal punch	

CODE	DESCRIPTION	IMAGE
020627Y	Flywheel lock tool	
021021Y	Driving pulley lock wrench	

VEHICLE

CODE	DESCRIPTION	IMAGE
001330Y	Tool for fitting steering seats	
001467Y014	Calliper to extract ø 15-mm bearings	
001467Y017	Bearing housing, external ø 39 mm	

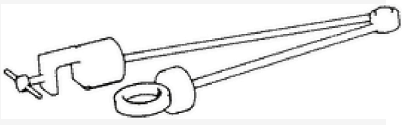
CODE	DESCRIPTION	IMAGE
006029Y	Punch for fitting steering bearing on the steering tube	
020004Y	Punch for removing steering bearings from headstock	
020021Y	Front suspension service too	
020036Y	Punch	

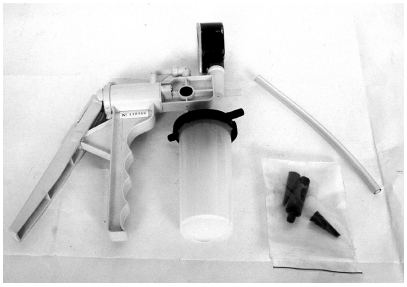
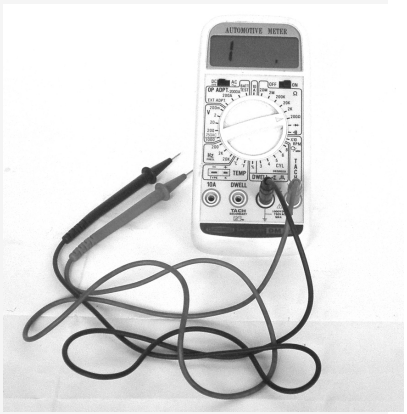
CODE	DESCRIPTION	IMAGE
020038Y	Punch	
020055Y	Wrench for steering tube ring nut	
020115Y	18 mm Ø punch	
020244Y	15 mm Ø punch	
020271Y	Tool for removing-fitting silent blocks	

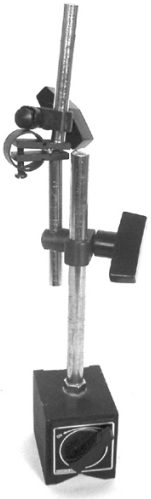
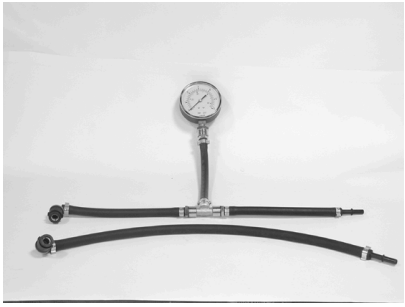
CODE	DESCRIPTION	IMAGE
020357Y	32 x 35-mm Adaptor	
020360Y	52 x 55 mm adaptor	
020363Y	20-mm guide	
020365Y	22 mm guide	
020376Y	Adaptor handle	

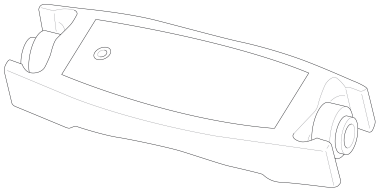
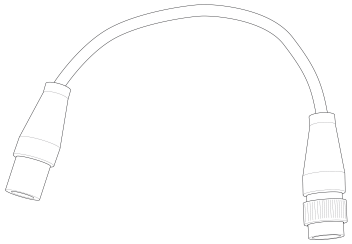
CODE	DESCRIPTION	IMAGE
020412Y	15-mm guide	
020441Y	26 x 28 mm adaptor	
020456Y	Adapter 24 mm	

COMMON

CODE	DESCRIPTION	IMAGE
002465Y	Calliper for circlips	
020150Y	Air heater mounting	

CODE	DESCRIPTION	IMAGE
020151Y	Air heater	
020193Y	Oil pressure gauge	
020329Y	Mity-Vac vacuum pump	
020331Y	Digital multimeter	

CODE	DESCRIPTION	IMAGE
020332Y	Digital rpm indicator	
020335Y	Magnetic mounting for dial gauge	
020480Y	Fuel pressure measurement kit	
020621Y	HV cable pick-up adapter.	

CODE	DESCRIPTION	IMAGE
020648Y	Single battery charger	
020922Y	PADS	
021017Y	PADS EOBD E5 diagnostics cable	

LIST OF TOPICS

Maintenance

MAINTENANCE ICON (SERVICE WARNING LIGHT)

This function indicates the scheduled maintenance interventions. For each time the ignition key is turned to "**ON**", once the digital display has performed the initial check, if the value of the remaining kilometres until the next intervention is less than 300 Km, the indicated icon will flash for 5 seconds.

Once the scheduled service mileage is reached, each time the key is turned to "**ON**", the icon remains solidly lit until the scheduled service is carried out.

MAINTENANCE ICON RESET

ATTENTION



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

To reset the maintenance icon, proceed as follows:

- Press and release the starter switch;- Turn the starter switch to the "**ON**" position;

- On vehicles not equipped with a PMP3 device or a non-communicating PMP3, briefly press the MODE button until the '**Battery charge status**' function is displayed on the multifunction panel.

NOTE



"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 2 SECONDS;

"PRESS AND HOLD": PRESS AND HOLD THE BUTTON FOR AT LEAST 2 SECONDS

- On a vehicle equipped with a communicating PMP3 device, briefly press the MODE button on the front handlebar cover until the '**Battery charge status**' function is displayed on the multifunction panel.

NOTE



"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 2 SECONDS;

"PRESS AND HOLD": PRESS AND HOLD THE BUTTON FOR AT LEAST 2 SECONDS

- Press and hold the MODE button for more than 10 seconds.

After approximately 5 seconds, the icon will flash and the **message** "**COUPON RESETTING**" will be displayed on the information panel.

- Once the procedure is successfully completed, the message "**COUPON RESETTED**" will be displayed on the information panel and the indicator light will switch off.

5.1 Maintenance Table

FOR THE EUROPE-USA/LATAM VERSION

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)**	**60 (37.2)**	**12 MONTHS**	**24 MONTHS**	**36 MONTHS**	**48 MONTHS**
Safety fasteners	I	I		I		I	I				
Spark plug			R		R		R				
Centre stand		L	L	L	L	L	L	L	L	L	L
Drive belt		R	R	R	R	R	R				
Throttle control	I	I	I	I	I	I	I	I	I	I	I
Complete roller housing		I	I	I	I	I	I				

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)	60 (37.2)	12 MONTHS	24 MONTHS	36 MONTHS	48 MONTHS
Diagnosis by tool	I	I	I	I	I	I	I	I	I	I	I
Air filter		R	R	R	R	R	R				
CVT Filter		I	I	I	I	I	I				
Engine oil filter	R	R	R	R	R	R	R	R	R	R	R
Valve clearance		A	A	A	A	A	A				
Electrical system and battery	I	I	I	I	I	I	I				
Brake system	I	I	I	I	I	I	I	I	I	I	I
Coolant	I	I	I	I	I	I	I	I	R	I	R
Brake fluid (1)	I	I	I	I	I	I	I	R	I	R	I
Engine oil	R	R	R	R	R	R	R	R	R	R	R
Hub oil	R	I	R	I	R	I	R	I	I	I	I
Headlight direction adjustment		I	I	I	I	I	I				
Brake pads		I	I	I	I	I	I	I	I	I	I
Sliding shoes / CVT rollers		R	R	R	R	R	R				
Tire pressure and wear	I	I	I	I	I	I	I	I	I	I	I
Test drive of vehicle on road	I	I	I	I	I	I	I	I	I	I	I
Suspension		I	I	I	I	I	I	I	I	I	I
Steering	A	A	A	A	A	A	A	I	I	I	I
Time required (minutes)	70	155	170	155	170	155	175	90	60	90	60

- (**I**): CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY
- (**C**): CLEAN
- (**R**): REPLACE

- (**A**): ADJUST
- (**L**): LUBRICATE
- (**1**) CAUTION: failure to do so may result in a complete loss of the brake system functionality

NOTE

☞

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.

ATTENTION

AFTER THE PROVIDED MAINTENANCE PROGRAM IS INDICATED TO PROCEED WITH THE MAINTENANCE OF THE VEHICLE STARTING FROM THE SERVICE OF 10,000 km.

5.2 Prodotti Raccomandati

PER VERSIONE EUROPA - USA/LATAM

Piaggio Group raccomanda i prodotti del «Partner Ufficiale Castrol» per la manutenzione programmata dei propri veicoli.

Utilizzare prodotti lubrificanti e liquidi che rispondano alle specifiche equivalenti, o superiori a quelle prescritte. Queste stesse indicazioni sono valide anche per eventuali rabbocchi.

PRODUCT	DESCRIPTION	SPECIFICATIONS
Engine oil 5W -40	Synthetic-based lubricant for four-stroke engines.	SAE 5W-40; JASO MA, MA2; API SL; ACEA A3
Transmission oil 80W-90	Lubricant for gearboxes and transmissions.	SAE 80W-90; API GL-4
Anti-freeze liquid, ready to use, colour red	Glycol ethylene based antifreeze liquid with organic additive technology corrosion inhibitor. Colour red, ready to use.	ASTM D 3306 - ASTM D 4656 - ASTM D 4985 - CUNA NC 956-16

PRODUCT	DESCRIPTION	SPECIFICATIONS
DOT 4 brake fluid	Synthetic brake fluid.	SAE J 1703; FMVSS 116; ISO 4925; CUNA NC 956 DOT4
Water repellent spray grease	Water repellent pouring calcium spray grease.	White, soap base spray grease with NLGI 2 Calcium complex; ISO-L-XBCIB2

PER VERSIONE ASIA-PACIFIC

Piaggio Group raccomanda i prodotti del «Partner Ufficiale Castrol» per la manutenzione programmata dei propri veicoli.

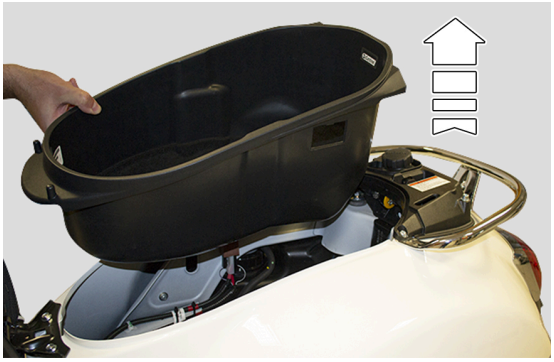
Utilizzare prodotti lubrificanti e liquidi che rispondano alle specifiche equivalenti, o superiori a quelle prescritte. Queste stesse indicazioni sono valide anche per eventuali rabbocchi.

PRODUCT	DESCRIPTION	SPECIFICATIONS
Engine oil 5W -40	Synthetic-based lubricant for four-stroke engines.	SAE 5W-40; JASO MA, MA2; API SL; ACEA A3
Engine oil 10W-40	Synthetic lubricant for four stroke engines (0°C< T <45°C).	SAE 10W-40; JASO MB, MA, MA2; API SL
Transmission oil 80W-90	Lubricant for gearboxes and transmissions.	SAE 80W-90; API GL-4
Anti-freeze liquid, ready to use, colour red	Glycol ethylene based antifreeze liquid with organic additive technology corrosion inhibitor. Colour 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
Water repellent spray grease	Water repellent pouring calcium spray grease.	White, soap base spray grease with NLGI 2 Calcium complex; ISO-L-XBCIB2

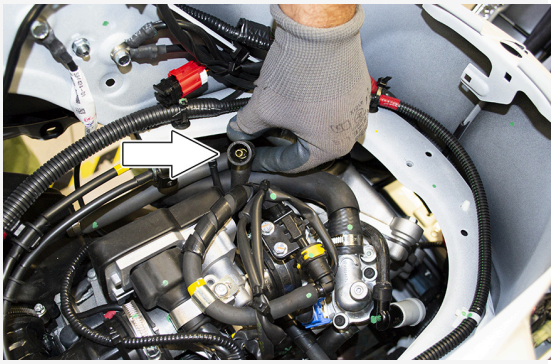
5.3 Spark plug

Proceed as follows:

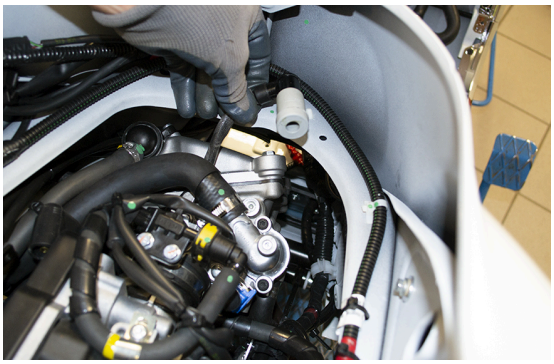
Lift the saddle and remove the helmet compartment.



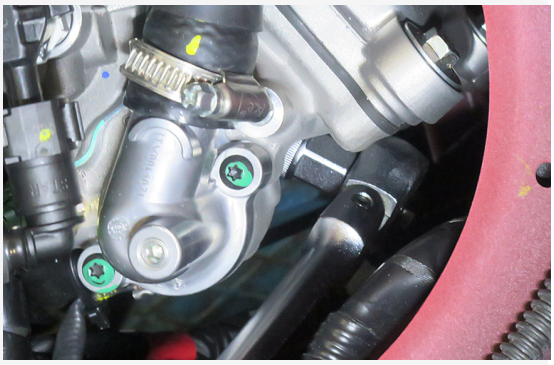
Disconnect the cap from the H. V. coil.



Disconnect the spark plug cap, detaching the H. V. cable from the safety bracket.

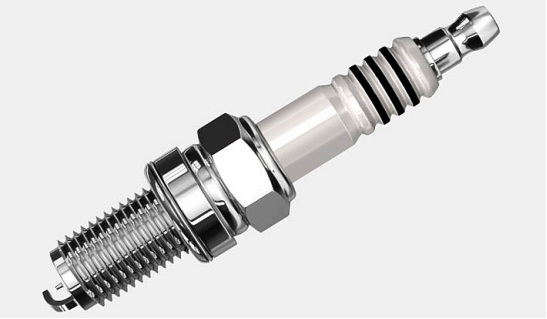


Undo the spark plug using the specific spark plug spanner.



Remove the spark plug.

When refitting, place the spark plug into the hole at the required angle and finger tighten it as far as it will go. Use the wrench only to tighten it.



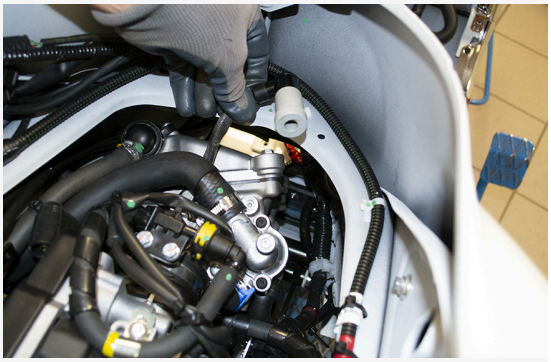
ATTENTION

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.

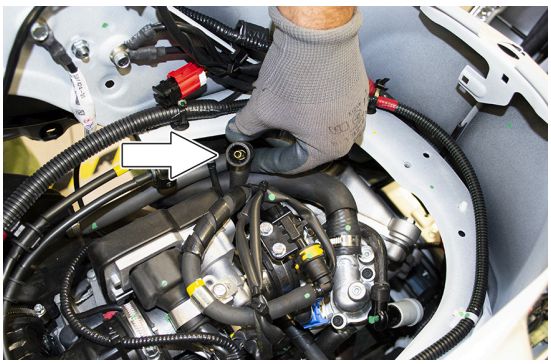
NOTE

USING SPARK PLUGS OTHER THAN THE INDICATED TYPE OR SHIELD-LESS SPARK PLUG CAPS CAN CAUSE ELECTRICAL SYSTEM FAILURES.

Insert the cap on the spark-plug, securing it to the safety bracket.



Reconnect the cap on the H. V. coil.



Refit the helmet compartment and lower the saddle.

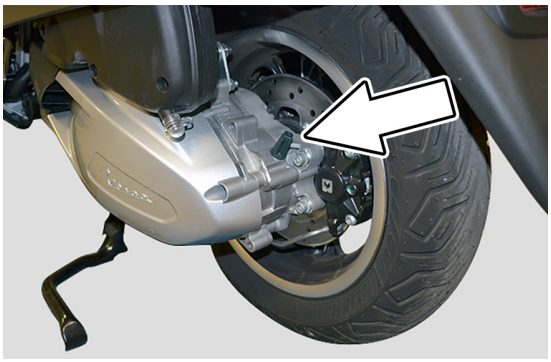


5.4 Hub oil

5.4.1 Check

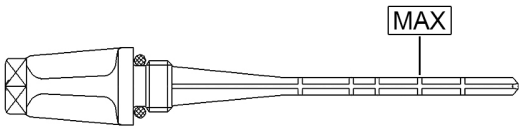
- Rest the vehicle on its centre stand on level ground.

- Unscrew the oil dipstick, wipe it with a clean cloth and fit it back into place, **tightening completely.**



- Unscrew the dipstick and check that the oil level corresponds to the «**MAX**» mark as indicated in figure; if the level is below this mark, top-up the hub oil.

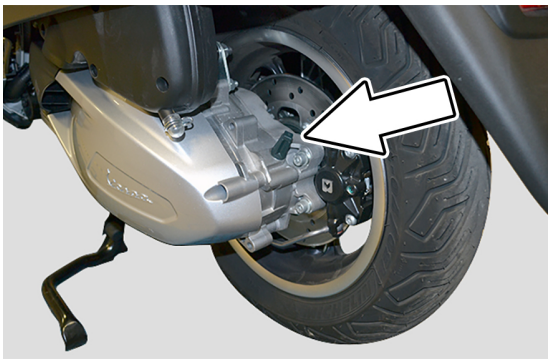
-Screw up the oil dipstick again and make sure it is locked properly into place.



5.4.2 Replacement

Rest the vehicle on its centre stand on level ground.

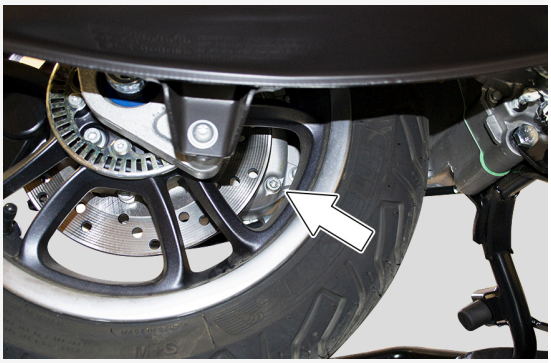
- Unscrew the hub oil dipstick.



- Unscrew the drainage screw and drain all the oil into a suitable container.

- Tighten the drainage screw, applying the pre-defined torque, and refill the hub using the recommended product.

Transmission oil 80W-90	Lubricant for gearboxes and transmissions.	SAE 80W-90; API GL-4



ATTENTION

OPERATING THE HUB WITH INSUFFICIENT LUBRICATION OR CONTAMINATED OR IMPROPER LUBRICANTS WILL ACCELERATE WEAR OF MOVING PARTS AND CAN LEAD TO SERIOUS FAILURES.

ATTENTION

USED OIL CAN HARM THE ENVIRONMENT. COLLECTION AND DISPOSAL SHOULD BE CARRIED OUT IN COMPLIANCE WITH REGULATIONS IN FORCE.

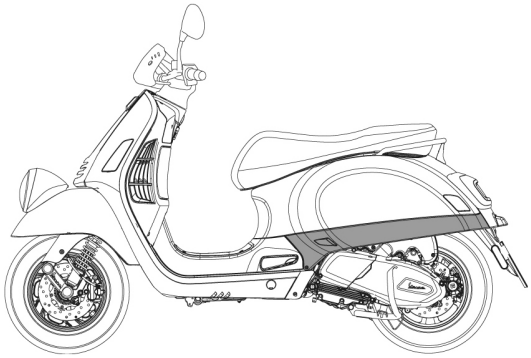
ATTENTION

WHEN CHANGING THE HUB OIL, MAKE SURE IT DOES NOT TOUCH THE REAR WHEEL AND TIRE.

5.5 Air filter

Proceed as follows:

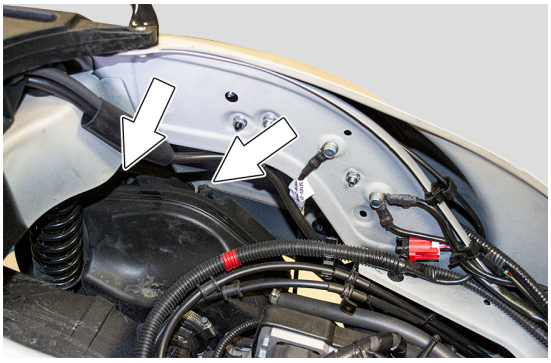
- Remove the left side fairing.



- Lift the saddle and remove the helmet compartment.



- Unscrew the knobs, which are accessible after removing the helmet compartment.



- Unscrew the air filter cover fastening screws.



- Remove the cover from the air filter.



- Replace the filter element.

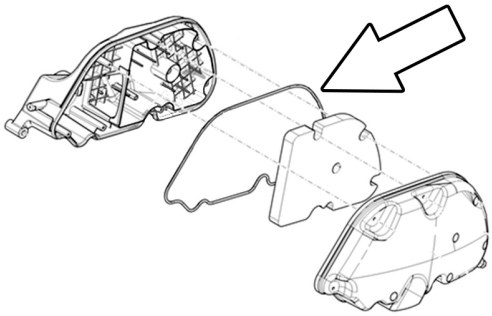


ATTENTION

REPLACE THE AIR FILTER IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED IN THE SCHEDULED MAINTENANCE TABLE. IN THE EVENT OF HEAVY DUTY USAGE, THE MAINTENANCE OPERATIONS MUST BE CARRIED OUT MORE FREQUENTLY ON THE VEHICLE, IN ORDER TO AVOID DAMAGING THE ENGINE.

WARNING

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



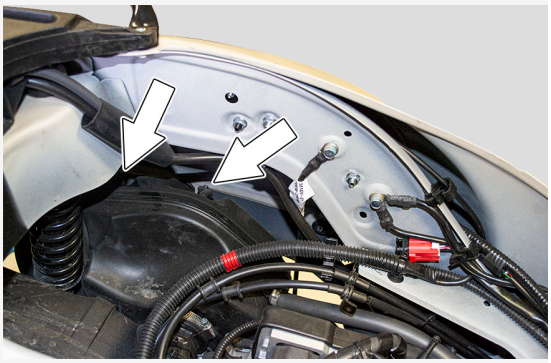
- Place the air filter box cover.



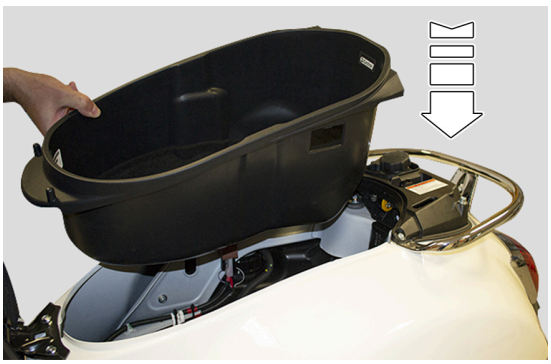
- Insert and tighten the air filter cover fixing screws.



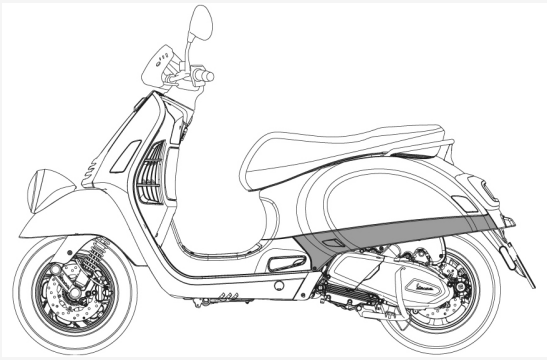
- Tighten the knobs in the two upper fastenings of the air filter cover.



- Refit the helmet compartment and lower the saddle.



- Fit the left side fairing.



5.6 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 seriously damage 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".

5.6.1 Replacement

Change the engine oil and replace the filter in accordance with the instructions provided in the scheduled maintenance table.

- Unscrew the dipstick so that the oil drains from the engine more efficiently.



- Unscrew the engine oil drainage cap «**A**» and remove the mesh filter, allow the oil to drain into a suitable container.

- Unscrew the engine oil filter «**B**».



- Check the condition of the o-rings on the drainage cap and the mesh filter.

- Lubricate the o-rings, insert the mesh filter in its housing and tighten the drainage cap, applying the pre-defined torque.

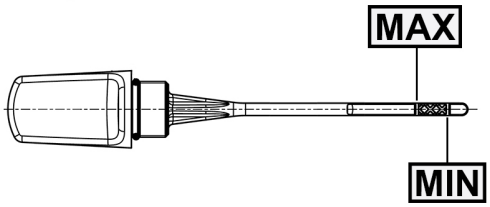


- Lubricate the engine oil filter o-ring and secure it in its housing, applying the pre-defined tightening torque.



- Restore the engine oil level using the recommended product.

Engine oil 5W -40	Synthetic-based lubricant for four-stroke engines.	SAE 5W-40; JASO MA, MA2; API SL; ACEA A3



Start the engine, leave it running for a few minutes and switch it off again. Check the level again after approximately five minutes and top up if necessary. Do not exceed the **MAX** level mark.

NOTE

☞

THE ENGINE MUST BE HOT WHEN THE OIL IS CHANGED.

ATTENTION

USED OIL CAN HARM THE ENVIRONMENT. COLLECTION AND DISPOSAL SHOULD BE CARRIED OUT IN COMPLIANCE WITH REGULATIONS IN FORCE.

5.6.2 Check

This check must be carried out when the engine is cold, if necessary, wait for 10 minutes after switching the engine off.

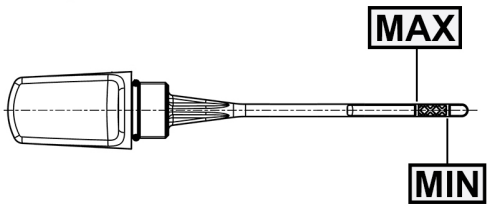
- Rest the vehicle on its centre stand on level ground.

- Unscrew the oil dipstick, wipe it with a clean cloth and fit it back into place, **tightening completely.**



- Unscrew the dipstick and check that the oil level is between the «**MIN**» and «**MAX**» marks indicated in figure; if the level is below the «**MIN**» mark, top-up the engine oil, **taking care never to exceed the** «**MAX**» level mark.

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



5.7 Engine oil filter

The engine oil filter must be changed in accordance with the instructions provided in the scheduled maintenance table. Lubricate the o-ring before replacing the oil filter.



5.8 Oil pressure warning light

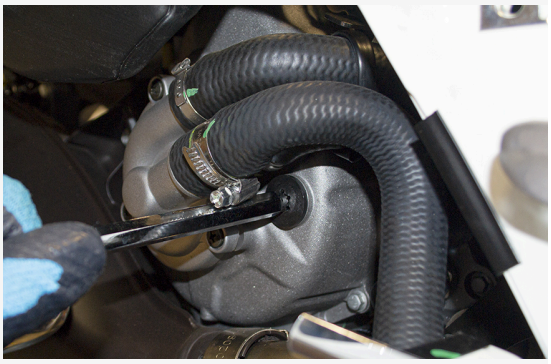
5.9 Distribution timing check

Proceed as follows:

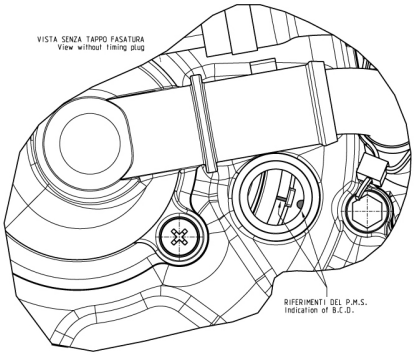
- Lift the saddle and remove the helmet compartment.



- Unscrew the inspection cap on the flywheel side cover.

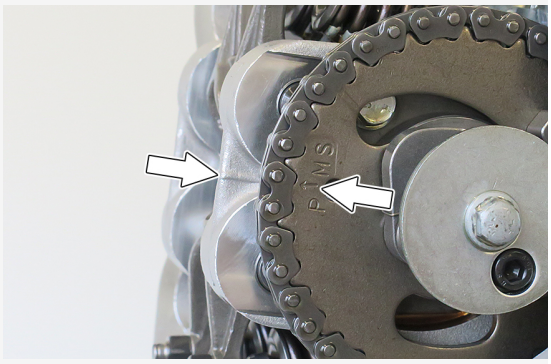


- Loosen the ignition spark plug and align the reference marks on the flywheel and the crankcase by rotating the crankshaft.



- Remove the big end cover.

Make sure that the 4V reference point on the camshaft control crown gear is aligned with the reference mark on the big end. If the reference is positioned diametrically opposite the reference mark on the big end, perform a complete rotation of the crankshaft.



5.10 Valve clearance check

Checking the valve clearance should be carried out according to the scheduled maintenance table.

Place the vehicle on the centre stand above a suitable lift so that the front wheel can be locked.

Disconnect the battery cables.

Remove the helmet compartment.

Remove the side fairings and the footrest terminals.

Remove the silencer.

Lift the rear of the body using a suitable device.



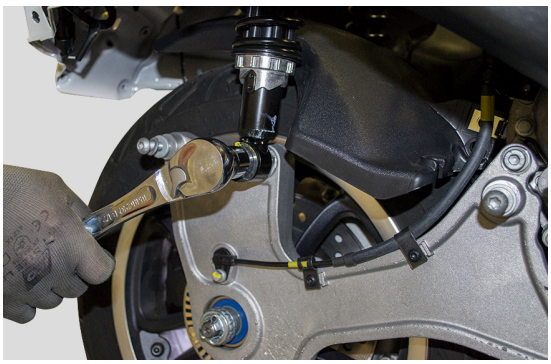
Remove the screws fixing the filter box to the engine.



Acting on the device, lift the body shell of the vehicle.

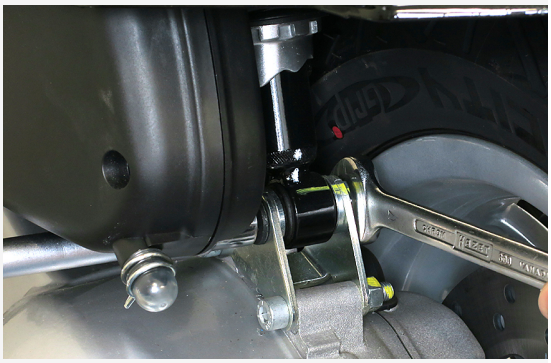
Raise the stand from the floor and then lower the vehicle until the rear wheel touches the supporting surface.

Unscrew and remove the right shock absorber lower fixing nut.

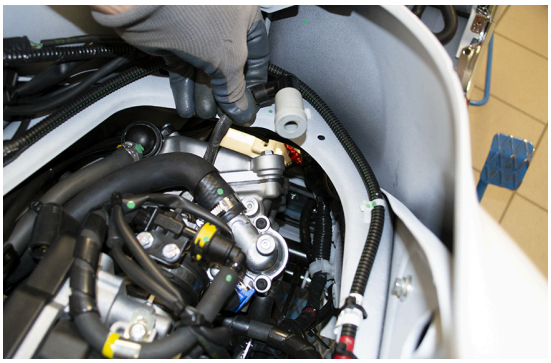


Lift the filter box.

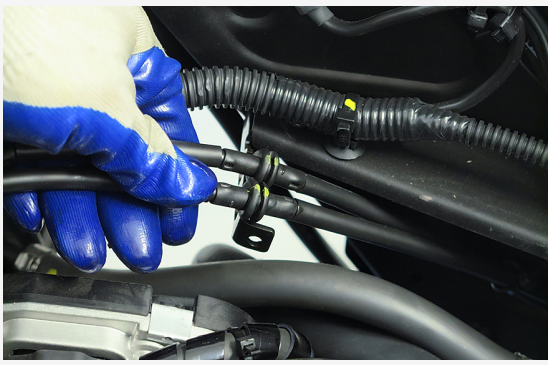
Unscrew and remove the lower fixing bolt of the left shock absorber.



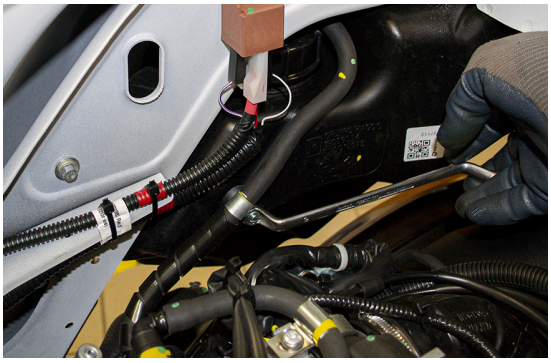
Disconnect the spark plug tube.



Disconnect the throttle control transmissions.



Unscrew the fuel pipe clamp fixing nut.



Unscrew and remove the transmission cover's fixing screws.



Remove the transmission cover.

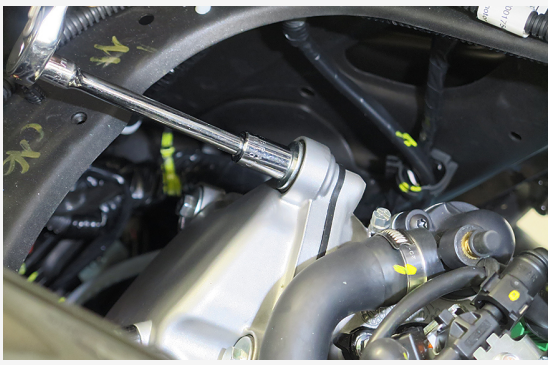


Using the lifting device, lift the body of the vehicle, the engine rotates slightly between the rear wheel and the swingarm.

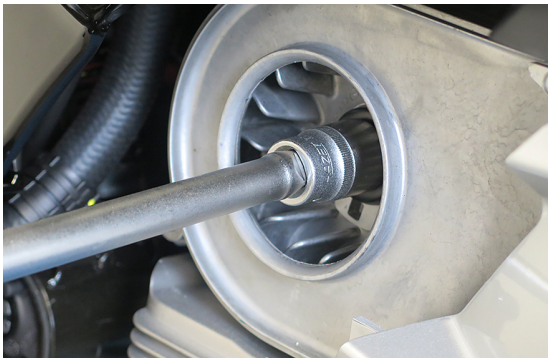
The big end raises making the tapper cover accessible.

Undo and remove the screws that secure the tappet cover.

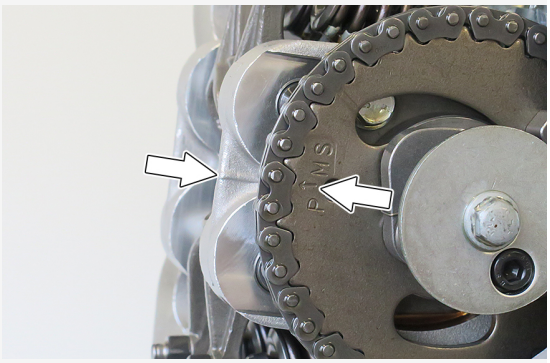
Remove the tappet cover.



Act on the crankshaft to move the piston to the upper dead centre.

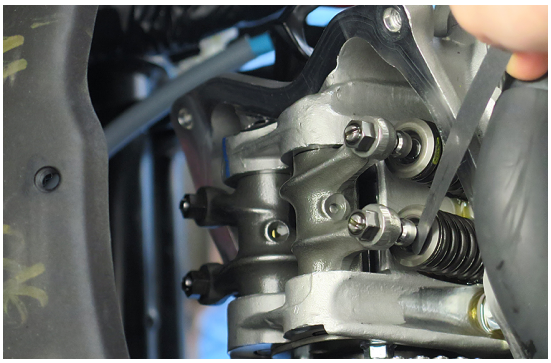


Verify the alignment of the reference on the big end with the one on the camshaft sprocket.



Using a feeler gauge, check the clearance between the adjuster and the valve.

Valve clearance (cold) Intake: 0.10 ± 0.02 mm
Exhaust: 0.10 ± 0.02 mm



If an incorrect value is found, adjust it back to the prescribed value.



Fit the tappet cover.

Insert and tighten the fastening screws at the recommended torque.



Put the transmission cover.



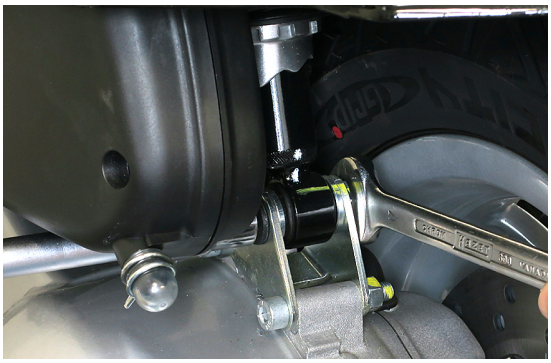
Insert and tighten the fixing screws of the transmission cover to the prescribed torque.



Acting on the lifting device, lower the vehicle body to align the lower coupling of the shock absorber with the corresponding coupling on the engine.

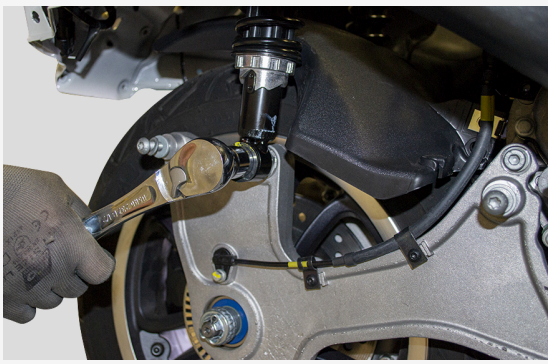
Insert and fasten the fixing bolt at the prescribed torque .

Rear shock absorber - Engine	42.5 ± 2.5 Nm



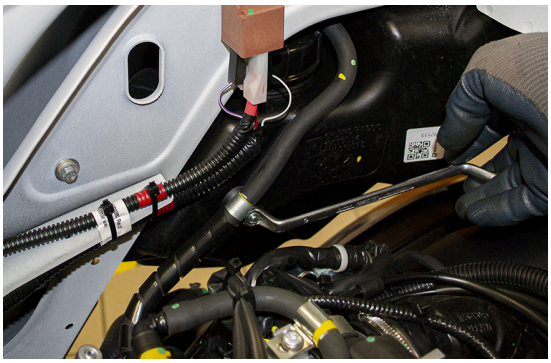
Insert the lower fixing bolt of the right shock absorber and tighten to the specified torque.

Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm



Insert and tighten the fuel pipe clamp fixing nut.

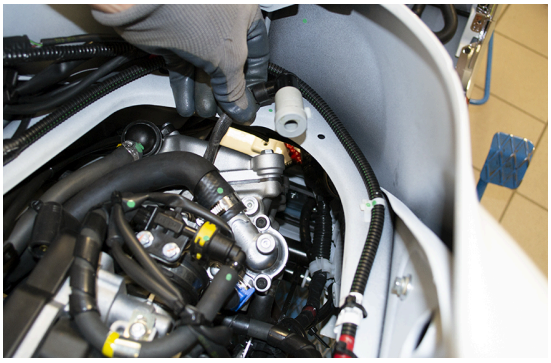
Fuel pipe - Fuel tank	5.75 ± 1.25 Nm



Insert the throttle control cable in the support bracket.



Insert the spark plug tube.



Position the air filter box.

Insert and tighten the screws fixing the filter box to the engine.

Air filter box - Engine	4.5 ± 0.5 Nm



Using the lifting device, place the vehicle back on the centre stand.

Disconnect the lifting equipment .

Insert the helmet compartment.

fit the silencer.

Assemble the side fairings and the footrest terminals.

Connect the battery cables.



5.11 Cooling system

With the engine running, in the event of excessive engine temperature, all bars and the icon in the coolant level gauge will flash; stop the engine immediately and allow it to cool down.

Inspect the cooling system.

5.11.1 Level check

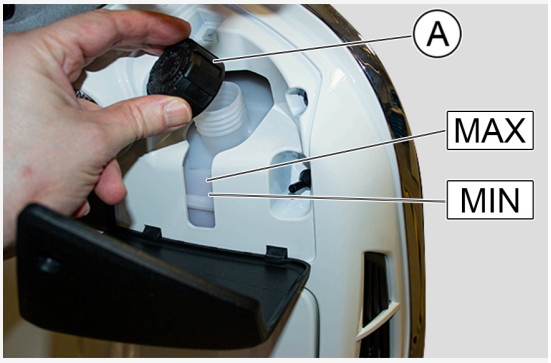
check the fluid when the engine is cold, according to the scheduled maintenance table, in the way shown below:

- Rest the vehicle on its centre stand.

- Unscrew the expansion chamber cover fastening screw.



- Top up with the recommended product when the fluid level is close to or under the "**MIN**" level. The fluid level should always be comprised between the "**MIN**" and "**MAX**." level.



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.

WARNING



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

RECOMMENDED PRODUCTS

Anti-freeze liquid, ready to use, colour red	Glycol ethylene based antifreeze liquid with organic additive technology corrosion inhibitor. Colour red, ready to use.	ASTM D 3306 - ASTM D 4656 - ASTM D 4985 - CUNA NC 956-16

5.11.2 Top-up

If necessary, top the cooling system up, with the engine cold, if you find the liquid is too close to the minimum level. If it becomes necessary to top-up the coolant level at frequent intervals, or you find that the expansion chamber is completely dry, check the cooling system to find the cause of the problem.

Replace the coolant, using the recommended product, in accordance with the instructions provided in the scheduled maintenance table. For instructions on how to drain the system, refer to the dedicated section of the chapter covering the «**Cooling System**».

WARNING



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

WARNING



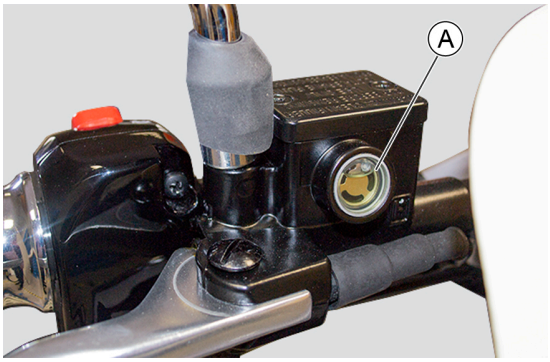
YOU MUST MAKE SURE THE FLUID NEVER EXCEEDS THE MAXIMUM LEVEL INDICATED SO AS TO AVOID IT OVERFLOWING AND CAUSING DAMAGE WHILE THE SCOOTER IS MOVING.

TO ENSURE CORRECT ENGINE OPERATION, KEEP THE RADIATOR GRILLE CLEAN.

5.12 Braking system

5.12.1 Level check

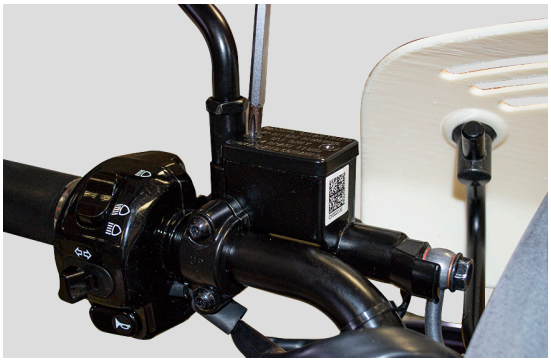
Rest the vehicle on its centre stand and with the handlebars perfectly horizontal. Check the liquid level through the relative inspection sight glass. If the sight glass is full, the brake fluid level is correct. If the brake fluid is near the «**MIN**» reference, top-up.



5.12.2 Top-up

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

After topping up, refit the cover and tighten the screws to the prescribed torque.



WARNING

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

ATTENTION

AVOID CONTACT OF BRAKE FLUID WITH EYES, SKIN, AND CLOTHING. IN CASE OF ACCIDENTAL CONTACT, RINSE WITH WATER.

ATTENTION

BRAKE FLUID IS HIGHLY CORROSIVE. AVOID CONTACT WITH THE SKIN, EYES AND PARTS OF THE MOTORCYCLE.

WHEN TOPPING UP, PROTECT PARTS OF THE MOTORCYCLE IN THE VICINITY OF THE RESERVOIR WITH ABSORBENT MATERIAL.

WARNING

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.

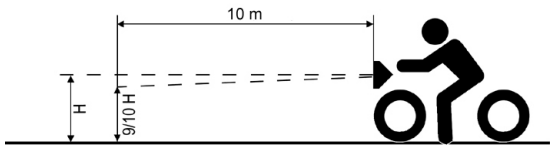
NOTE

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

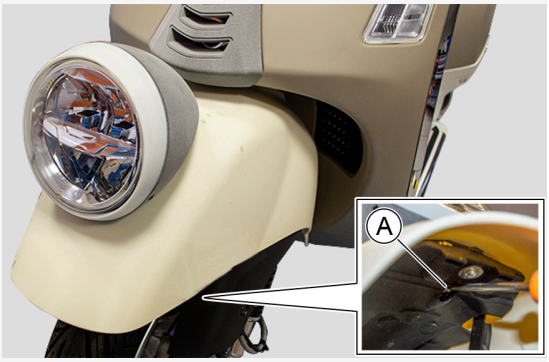
5.13 Headlight adjustment



Operate on the adjustment screw (**A**) located inside the front mudguard.

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

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



5.14 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 breather valve

D. Canister

E. Air purge pipe into atmosphere

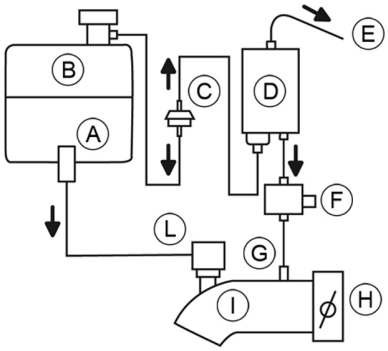
F. One-way electronic fuel vapour purge control valve (controlled by ECU)

G. Vacuum connection

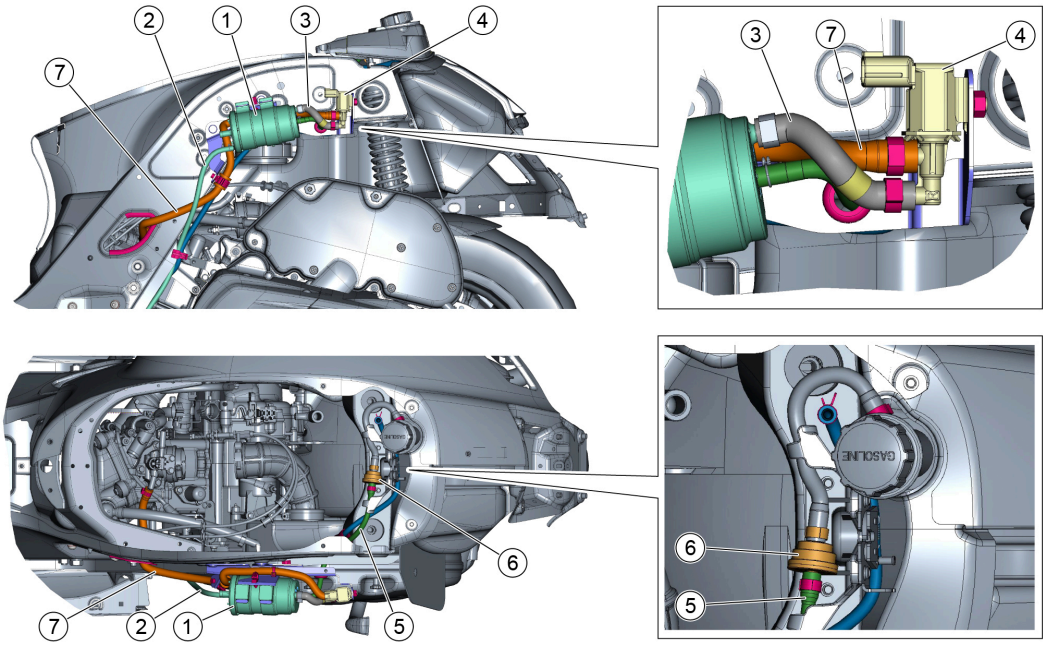
H. Throttle body

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 canister valve
4 . Canister valve
5 . Pipe for connecting the breather valve to the canister
6 . Breather valve
7 . Pipe for connecting the canister to the inlet fitting

5.14.1 System components removal

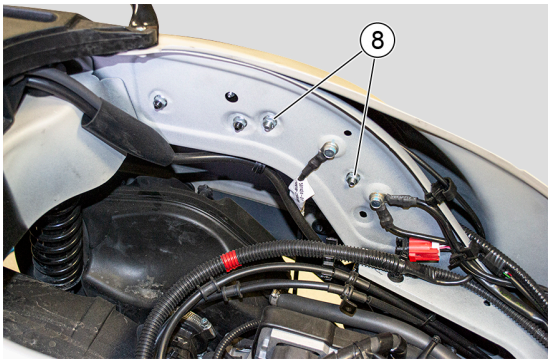
To access the components of the evaporative system, proceed as follows:

- Raise the saddle.

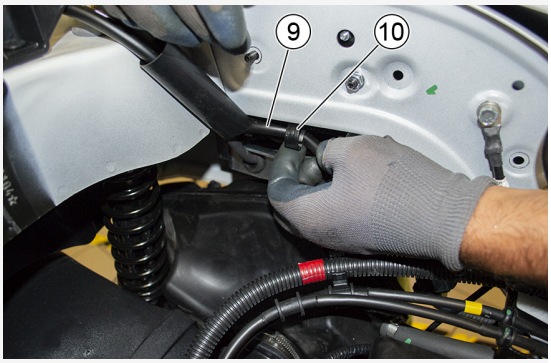
- Remove the helmet compartment.

- Remove the under-saddle compartment.

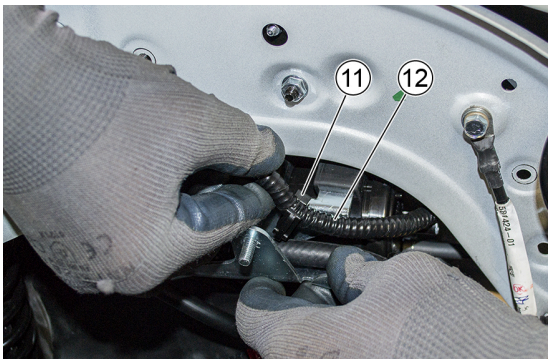
- Unscrew the two nuts **(8)** fastening the canister support plate.



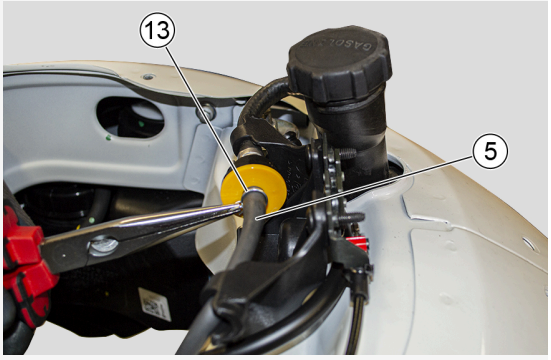
- Remove the breather pipe of the plastic cover **(9)** from the retainer clamp **(10)**.



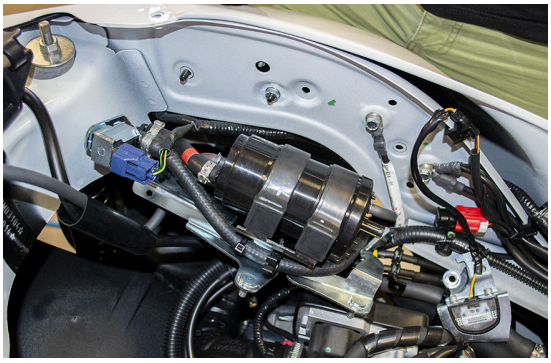
- Remove the wiring **(12)** from the retainer clamp **(11)**.

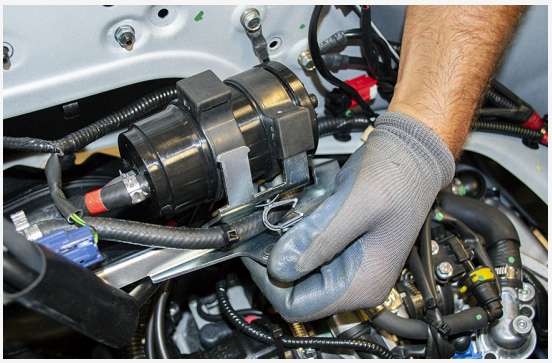


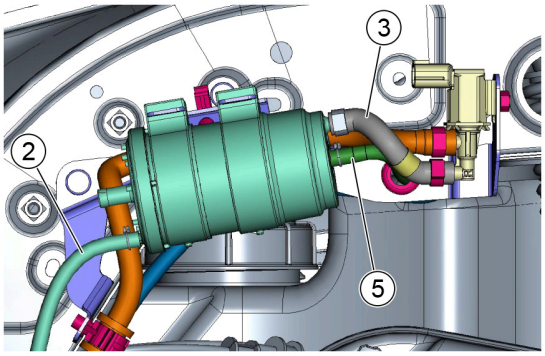
- Loosen the clamp **(13)** and remove the breather pipe - canister connecting pipe **(5)**.



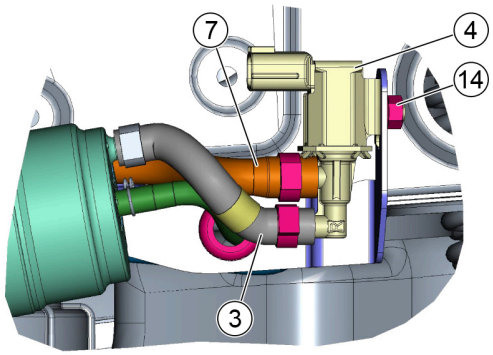
- Slide the canister unit downwards.

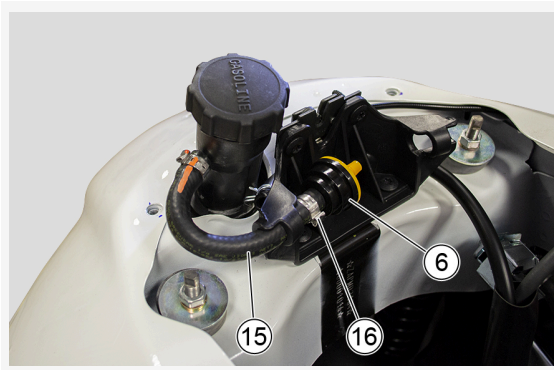





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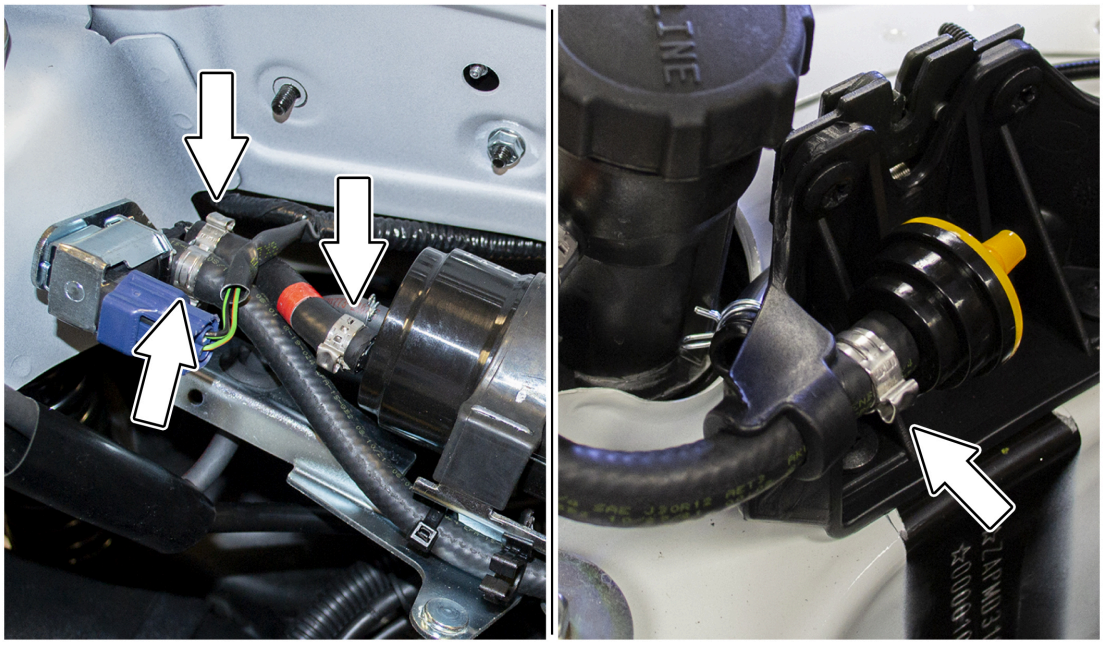

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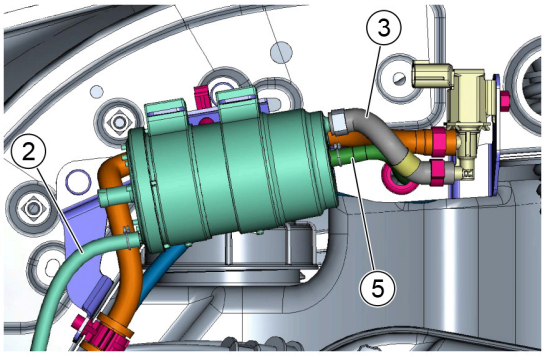


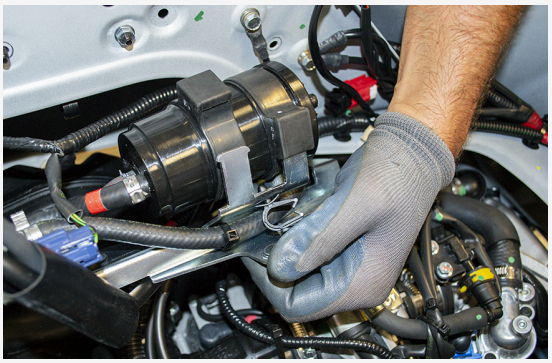
5.14.2 System components installation

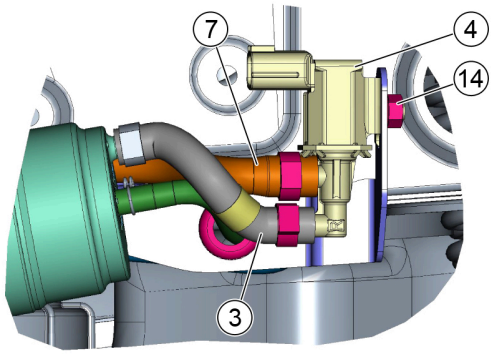
WARNING

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.



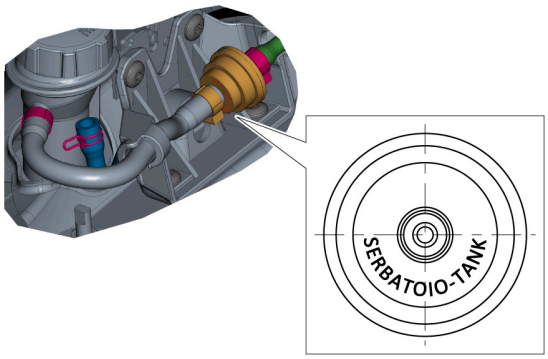




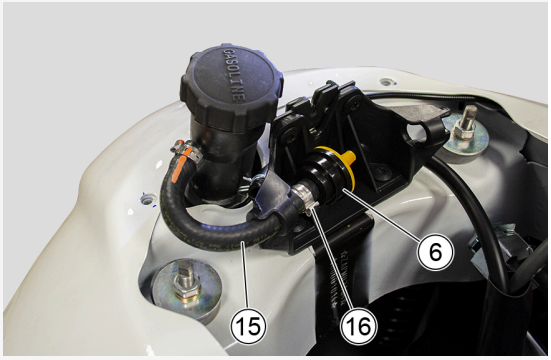


Canister valve - Canister support	5.75 ± 1.25 Nm



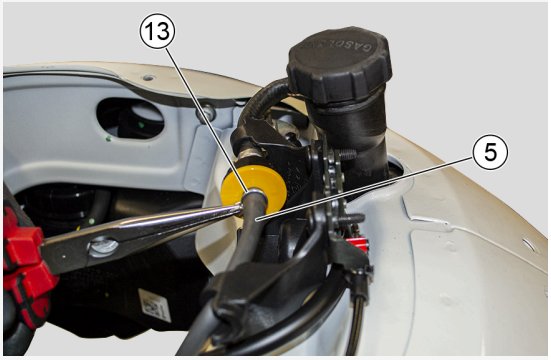


- Insert the pipe that connects the breather valve to the tank **(15)** inside the saddle lock bracket and connect it to the breather valve **(6)**; use a new metal clamp.

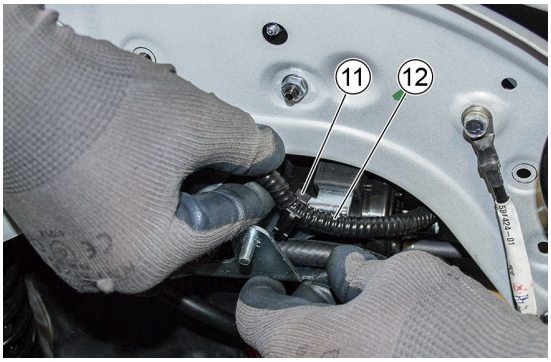


- Place the canister unit inside the body and insert the two nuts **(8)**.

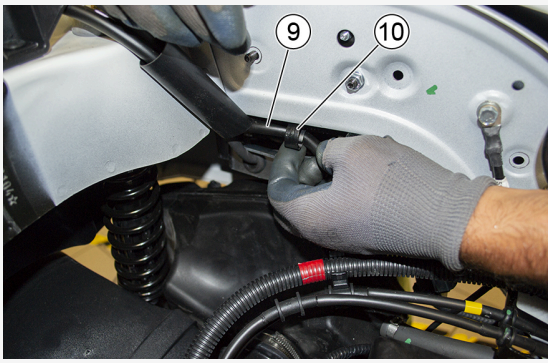
- Insert the pipe that connects the breather valve to the canister **(5)** inside the saddle lock bracket, connect it to the breather valve **(6)** and tighten with the clamp **(13)**.



- Insert the wiring harness **(12)** in the retaining clamp **(11)**.

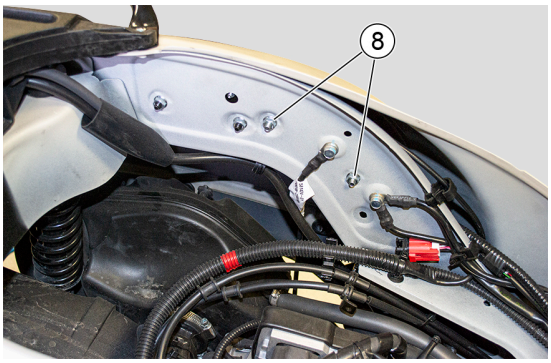


- Insert the breather pipe of the plastic cover **(9)** in the retainer clamp **(10)**.



- Tighten to the prescribed torque the two nuts **(8)** fastening the canister support plate.

Canister unit - Body	5.75 ± 1.25 Nm



- Fit the under-saddle compartment cover.
- Insert the helmet compartment.

5.14.3 canister check

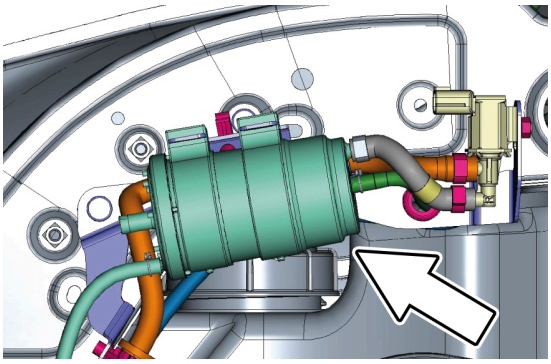
The canister is essential to treat the hydrocarbons present in the volume of gas that escapes from the tank when there is an increase in internal pressure (tank heating induced by the cooling radiator, by the motor or by the external environment).

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.

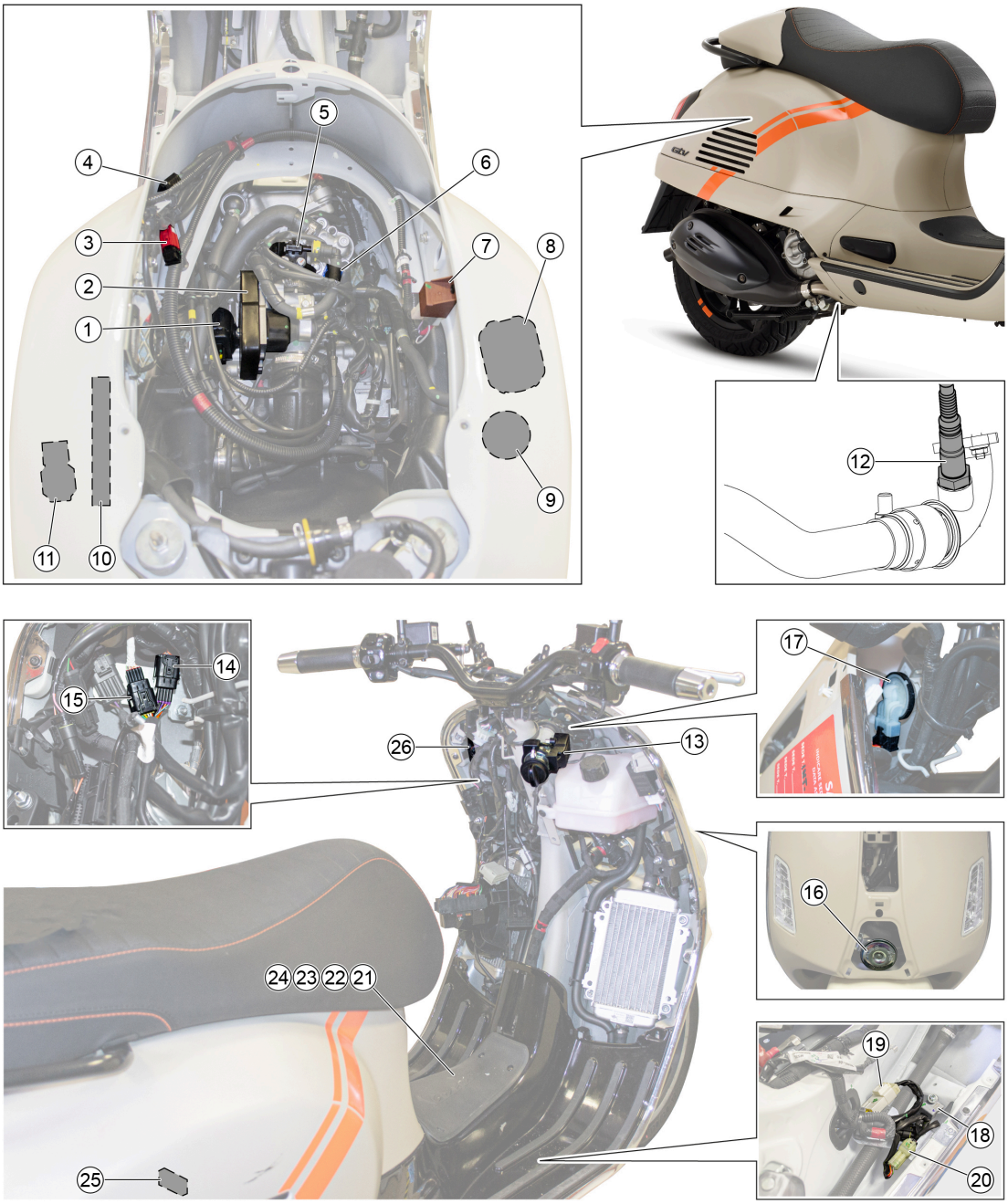


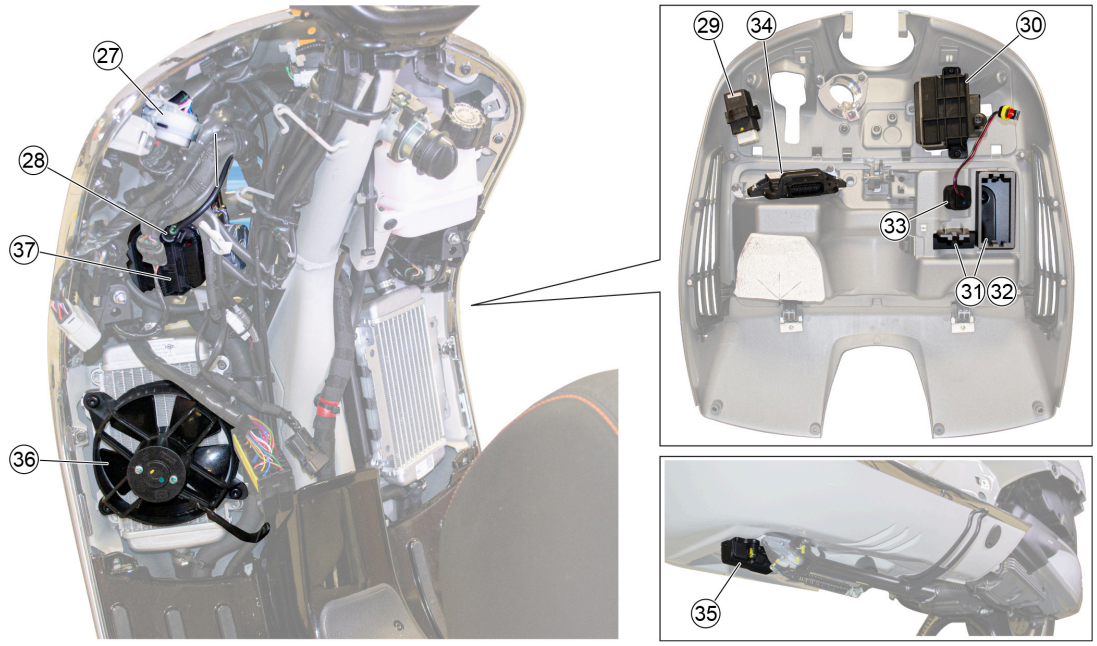
If you detect noise, clogging or loss of carbon, replace the canister.

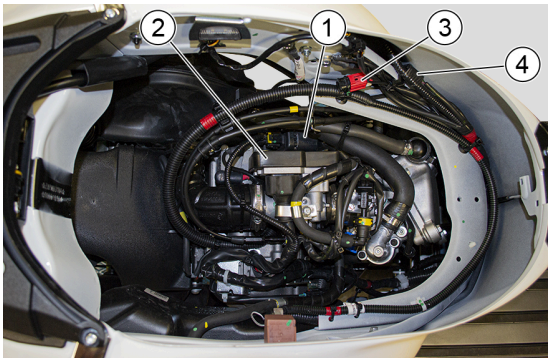
LIST OF TOPICS

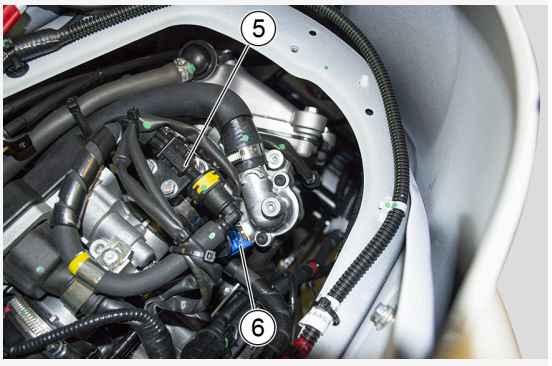
Electrical system

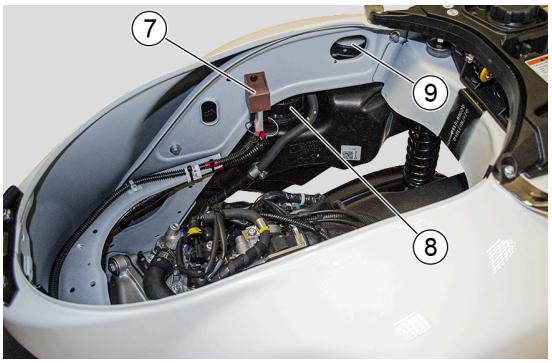
6.1 Component layout

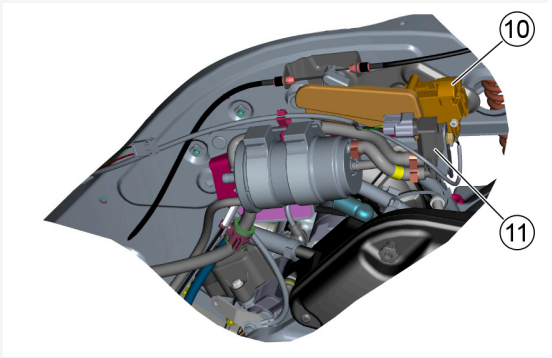


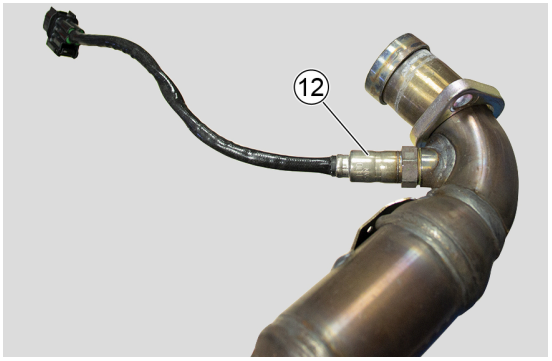

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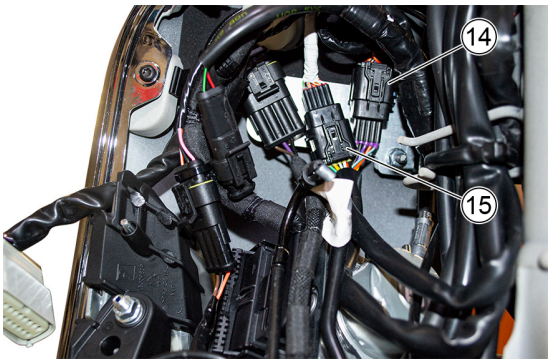

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14. Left hand handlebar electric device connector

15. Right hand handlebar electrical device connector

Remove the front leg shield back plate to reach it.

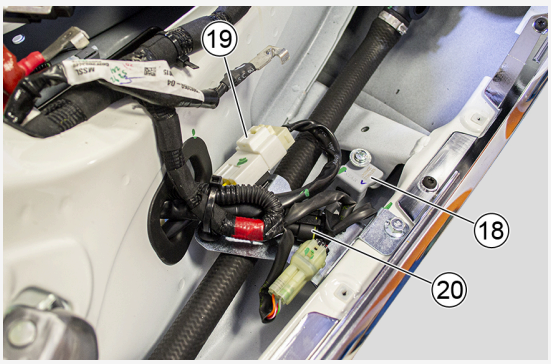


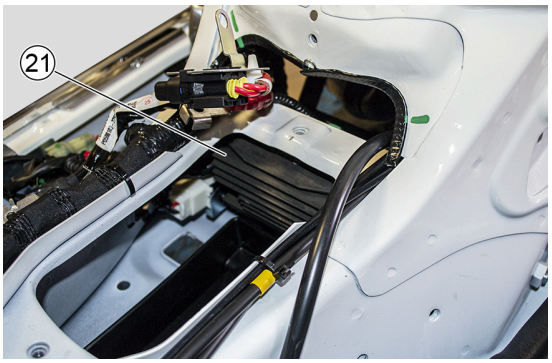


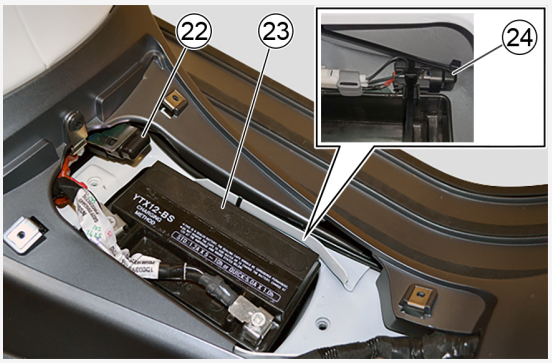
17. Key switch

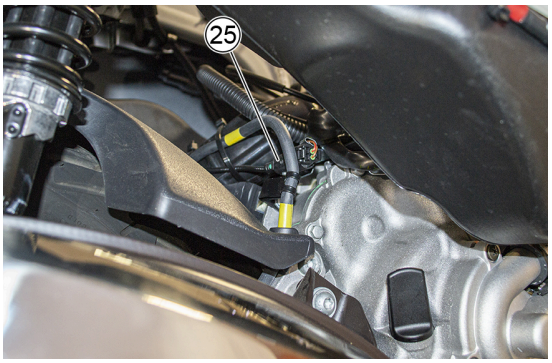
Remove the front leg shield back plate to reach it.











26. Front phonic wheel sensor connector

27. Accessories pre-installation

28. Provision for heated saddle

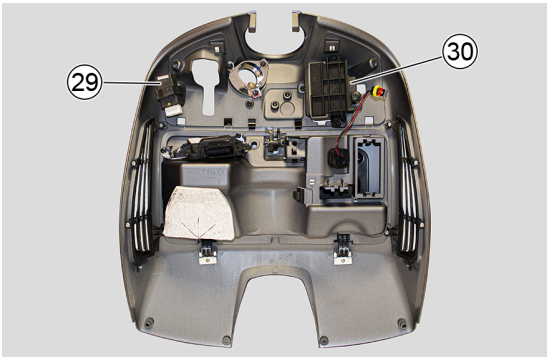
Remove the front leg shield back plate to reach it.



29. Turn indicator device

30. "Keyless" ECU

Remove the leg shield back plate to reach it.



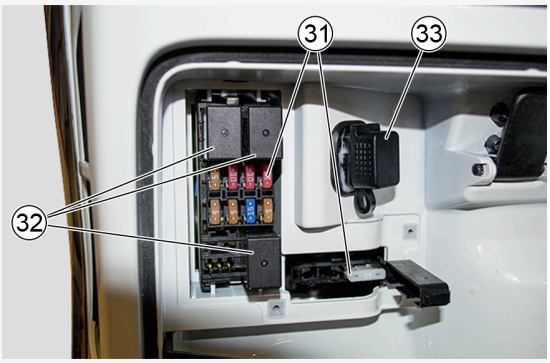
31. Fuses

32. Relay

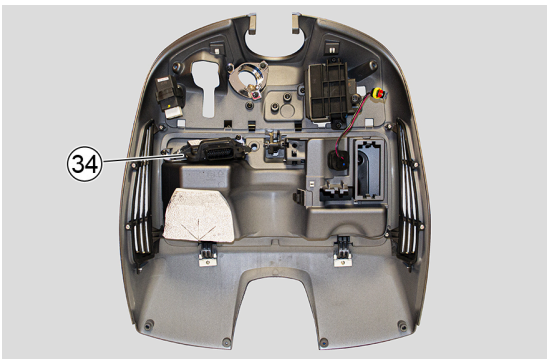
Open the front top-box and remove the fuse box cover to reach it.

33. USB port

Open the front top case to reach it.

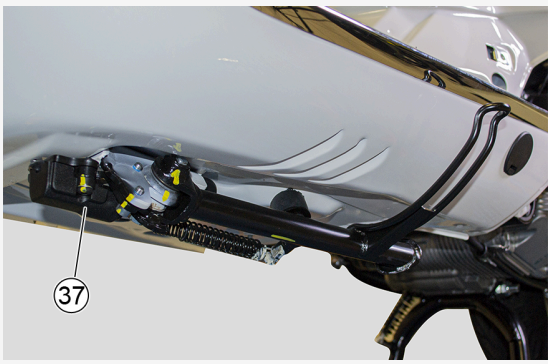


34. PMP3 (optional)



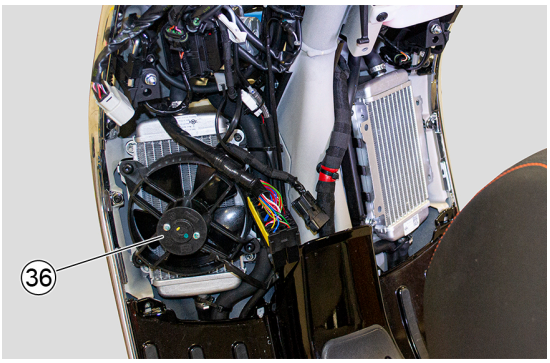
35. Side stand safety switch

Located in the lower part of the body shell, on the left hand side.



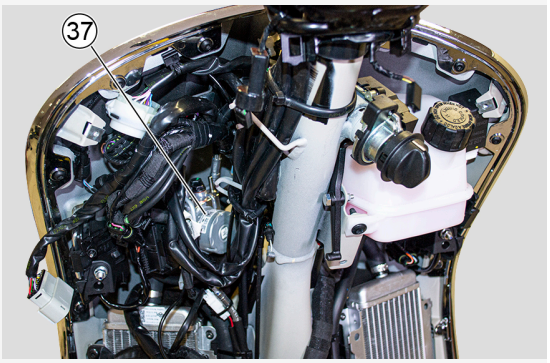
36. Electric fan

Remove the front leg shield back plate to reach it.



37. ABS control unit

Remove the front leg shield back plate to reach it.



6.2 Instrument cluster





Key

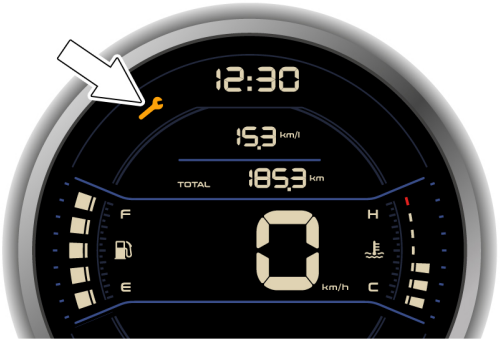
1 . Low fuel warning light (amber)
2 . ASR warning light (amber)
3 . Icon for scheduled maintenance service to be carried out (Service warning light)
4 . Left turn indicator warning light (green)
5 . Clock (24h format) / Trip time
6 . IRight turn indicator warning light (green)
7 . Insufficient engine oil pressure warning light (red)
8 . Engine start inhibited icon (red)
9 . MIL warning light (amber)
10 . Coolant temperature indicator
11 . High beam warning light (blue)
12 . Immobilizer indicator lamp (red)
13 . Brightness sensor
14 . ABS warning light (amber)
15 . Side stand icon (amber)
16 . Fuel gauge
17 . Multifunctional panel
18 . Total/partial odometer
19 . Incoming call icon - Optional (*)
20 . Icon for missed call on smartphone – Optional (*)
21 . Information panel
22 . Listening to music icon – Optional (*)
23 . Smartphone battery level icon – Optional (*)
24 . Icon for the connection between the PIAGGIO app on the smartphone and the VMP control unit on the vehicle - Optional (*)
25 . Bluetooth connection with smartphone active icon - Optional (*)

26 . Icon for SMS message on the smartphone – Optional (*)

27 . Speedometer

(*): NOTE: The function with asterisk is only available with the presence of the PMP3 device (Piaggio Multimedia Platform) and may vary according to the version purchased.

MAINTENANCE ICON (SERVICE WARNING LIGHT)

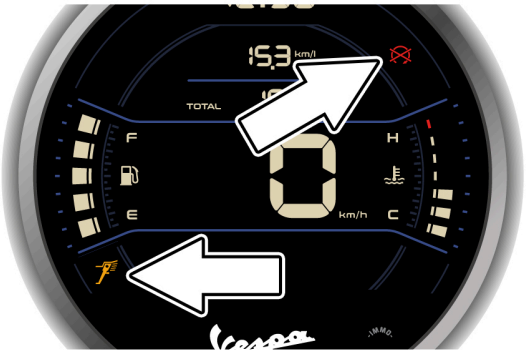


This function indicates the scheduled maintenance interventions. For each time the ignition key is turned to "**ON**", once the instrument panel has performed the initial check, if the value of the remaining kilometres until the next intervention is less than 300 Km, the indicated icon will flash for 5 seconds.

Once the scheduled service mileage is reached, each time the key is turned to "**ON**", the icon remains solidly lit until the scheduled service is carried out.

For the maintenance operations contact a **Dealership** or an **Authorised service centre**.

SIDE STAND ICON AND ENGINE START INHIBITED ICON



The side stand and engine start inhibited icons light when the side stand is down.

In this condition, engine start is disabled. Extending the side stand while the engine is running causes engine shut-down.

ATTENTION

OPENING THE SIDE STAND INHIBITS THE ENGINE START OR, WITH THE ENGINE STARTED, CAUSES THE ENGINE TO STOP. TAMPERING WITH THIS SAFETY FUNCTION MAY CAUSE PERSONAL INJURY AND DAMAGE TO THE VEHICLE.

MULTIFUNCTIONAL PANEL



Vehicle not equipped with a PMP3 (Piaggio Multimedia Platform) device or non-communicating PMP3.

By **briefly pressing** the **MODE button on the right handlebar device** or the **MODE button on the front handlebar cover,** the following information is shown cyclically on the multifunction panel.

With total odometer selected are displayed:

1. Current consumption
2. Battery charge state
3. Settings menu (only with the vehicle at standstill)

With partial odometer or range selected are displayed:

1. Current consumption
2. average consumption
3. Average speed
4. Maximum speed
5. Battery charge state
6. Settings menu (only with the vehicle at standstill)

NOTE

☞

"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 2 SECONDS;

"PRESS AND HOLD": PRESS AND HOLD THE BUTTON FOR AT LEAST 2 SECONDS

ATTENTION

FOR THE RIDER AND PASSENGER SAFETY, THE "SETTINGS" FUNCTION IS ONLY ACCESSIBLE WHEN THE VEHICLE IS STATIONARY.

Vehicle equipped with communicating PMP3 (Piaggio Multimedia Platform) device.

By **briefly pressing** the **MODE button on the handlebar front cover**, the following information is shown cyclically on the multifunction panel.





With total odometer selected are displayed:

1. Current consumption
2. Battery charge state

With partial odometer or range selected are displayed:

1. Current consumption
2. average consumption
3. Average speed
4. Maximum speed
5. Battery charge state

NOTE

"PRESS BRIEFLY AND RELEASE": PRESS THE BUTTON AND RELEASE WITHIN 2 SECONDS;

"PRESS AND HOLD": PRESS AND HOLD THE BUTTON FOR AT LEAST 2 SECONDS

TOTAL/PARTIAL ODOMETER AND RANGE

Vehicle not equipped with a PMP3 (Piaggio Multimedia Platform) device or non-communicating PMP3

By **briefly double pressing** the **MODE button on the right handlebar device** or the **MODE button on the front handlebar cover,** the following information is shown cyclically on the total/partial odometer.







1. TRIP (partial odometer)
2. RANGE (range)
3. TOTAL (total odometer)

The **"TRIP"** function is reset by pressing the **MODE** button for 10 seconds.

When the function is reset, the respective values are reset:

- Trip time
- average consumption
- Average speed
- Maximum speed

Vehicle equipped with communicating PMP3 (Piaggio Multimedia Platform) device.

By **double pressing** the **MODE button on the handlebar front cover**, the following information is shown cyclically on the Total/ partial odometer.



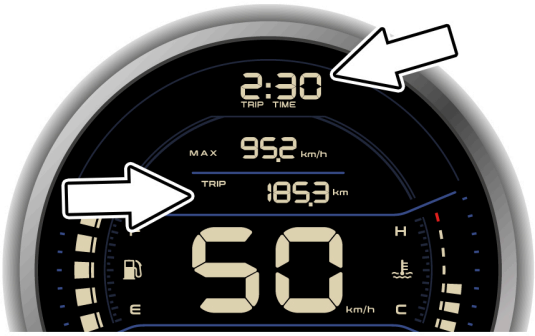
1. TRIP (partial odometer)
2. RANGE (range)
3. TOTAL (total odometer)

The "**TRIP**" function is reset by pressing the **MODE** button for 10 seconds.

When the function is reset, the respective values are reset:

- Trip time
- average consumption
- Average speed
- Maximum speed

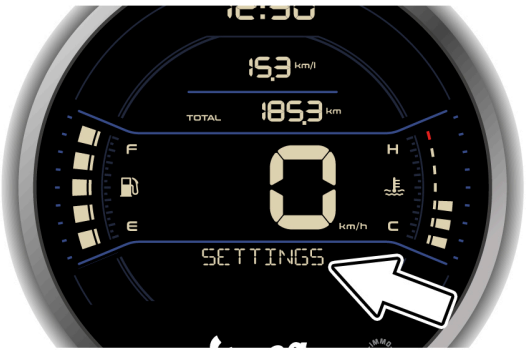
While the "**TRIP**" function is displayed, the trip time is displayed in the "**TRIP TIME**" box.



SETTINGS MENU

With the vehicle at standstill, **briefly press** the **MODE** button to display the "**SETTINGS**" function in the information panel.

By **long-pressing** the **MODE** button on the front handlebar cover, the menu can be entered.



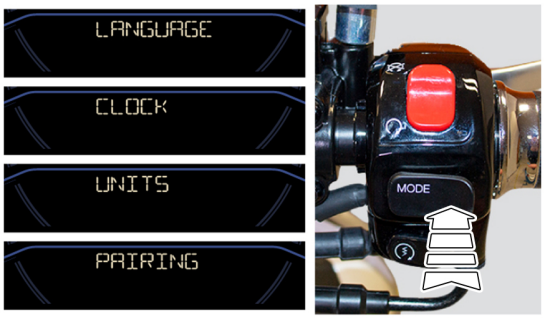
WARNING

THE SETTINGS MENU CAN ONLY BE ACTIVATED WHEN THE VEHICLE IS AT STANDSTILL AND THE VMP SYSTEM IS DEACTIVATED.

By **briefly pressing** the **MODE** button, the following information is shown cyclically in the settings menu:

- LANGUAGE
- CLOCK
- UNITS
- PAIRING (*)

(*): NOTE: The function with asterisk is only available with the presence of the PMP3 device (Piaggio Multimedia Platform).



LANGUAGE SETTING

Select the "**LANGUAGE**" item and enter the submenu by **long-pressing** the **MODE** button.

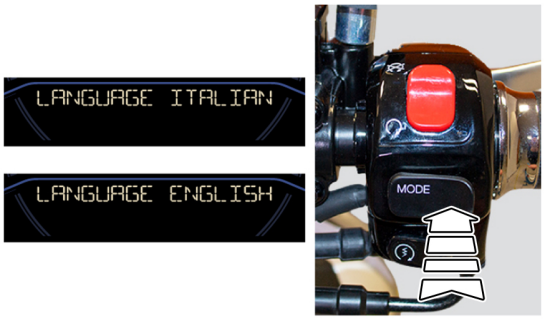
Select the desired language by **short-pressing** the **MODE** button and confirm by **long-pressing** the **MODE** button.

It is possible to select:

- **LANGUAGE ITALIAN**
- **LANGUAGE ENGLISH**

Once the choice has been confirmed, the display will show the next CLOCK submenu.

If a selection is not made within 10 seconds, the display will switch to the selection of the LANGUAGE submenu.



CLOCK SETTING (CLOCK)

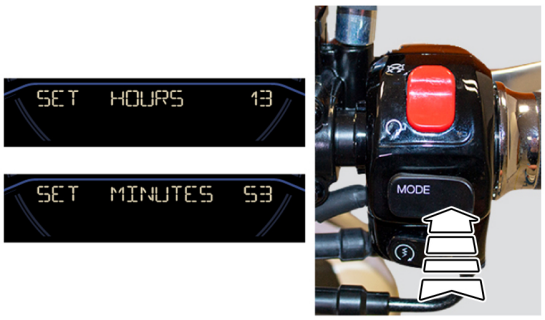
The clock is automatically adjusted when you connect the «**Vespa MIA**» device.

To adjust the clock manually proceed as follows:

Select the "**CLOCK**" item and enter the submenu by **long-pressing** the **MODE** button.

Briefly press the **MODE** button to adjust the hours and confirm with **long pressing** the **MODE** button.

Briefly press the **MODE** button to adjust the minutes and confirm with **long pressing** the **MODE** button.



Once the choice has been confirmed, the display will show the next UNITS submenu.

If a selection is not made within 10 seconds, the display will switch to the selection of the CLOCK submenu.

NOTE

DISCONNECTING THE BATTERY CABLES WILL RESET THE CLOCK; AT THE FIRST KEY-ON THE CLOCK WILL SHOW "00:00" UNTIL FURTHER ADJUSTMENT.

UNITS SETTING

Select the "**UNITS**" item and enter the submenu by **long-pressing** the **MODE** button.







Select the desired measuring unit by **short-pressing** the **MODE** button and confirm by **long-pressing** the **MODE** button.

It is possible to select:

- **KM**
- **MI**

if the "**MI**" format is selected, a sub-menu will open to choose the "**USA**" or "**UK**" standard for **GALLONS.**







Once the choice has been confirmed, the display will show the next PAIRING submenu.

If a selection is not made within 5 seconds, the display will switch to the selection of the UNITS submenu.

VMP MULTIMEDIA SYSTEM - VESPA MIA

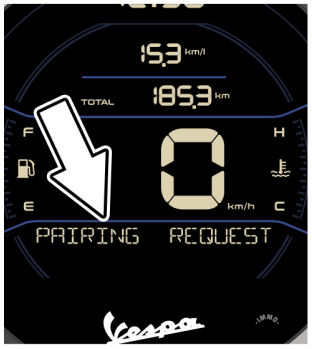
The 'Vespa Mia' system is optional and can be purchased separately.

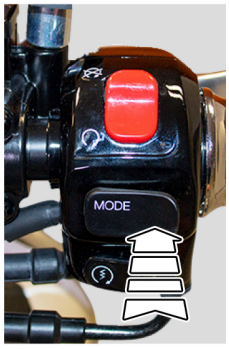
Download and install on your smartphone the specific "**Vespa**" app from Play Store or Apple Store.

Once the connection between the control unit and the smartphone is correctly established,

calls, music playback and SMS notifications can be managed.

PAIRING SETTING





Select the "**PAIRING**" item and enter the submenu by **long-pressing** the **MODE** button.

Select the "**PAIRING REQUEST**" item with a **short press** of the **MODE** button and confirm with a **long press** of the **MODE** button.

The message confirming that pairing with the smartphone is enabled appears on the digital display.

Enable the bluetooth search on your smartphone, select the «**PMP3: XXXX**» device and click on pair.

NOTE

☞

THE DEVICE WILL BE DETECTED TWICE ON THE ANDROID SMARTPHONE: SELECT ONLY THE ONE WITH THE HEADSET SYMBOL.

IF THE SECOND DEVICE IS SELECTED, IT WILL NOT BE POSSIBLE TO CONNECT THE APP TO THE VEHICLE CORRECTLY.



The "**PMP3-xxxx**" device will be visible in the list of associated devices on the smartphone. 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 incoming call notification and the SMS reception notification on the display.

NOTE

☞

UPON THE FIRST PAIRING BETWEEN THE DISPLAY AND SMARTPHONE, MORE

TIME MAY BE REQUIRED FOR THE SYNCHRONIZATION OF THE PHONE BOOK.

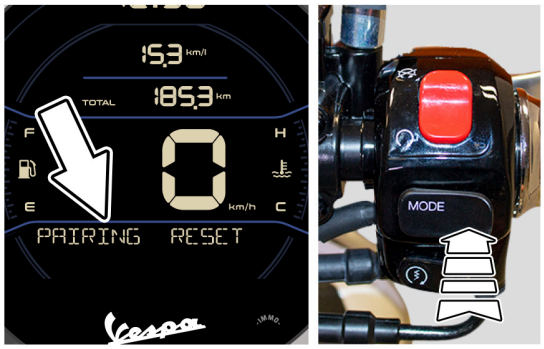
THE CONNECTION BETWEEN THE SMARTPHONE AND VEHICLE WILL BE SIGNALLED BY THE LIGHTING OF THE SMARTPHONE ICON ON THE DISPLAY.

FOLLOWING THE PAIRING OF THE PHONE ONLY, THE SYSTEM WILL STILL NOT BE ABLE TO MANAGE THE MULTIMEDIA FUNCTIONS SINCE IT IS ESSENTIAL TO CONNECT THE APPLICATION IN ADVANCE AS INDICATED IN THE DEDICATED PARAGRAPH.

If pairing between Smartphone and Vehicle is not successful, proceed as follows: restart the smartphone; turn the ignition switch to "**OFF**" and then to "**ON**".

If the smartphone icon on the display has not lit after about 1 minute, select the "**PAIRING RESET**" function and confirm by **long pressing** the **MODE** button.

Repeat the smartphone pairing procedure.



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

NOTE

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 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 PMP3-XXXX FROM THE ASSOCIATED DEVICES.

NOTE

IT IS RECOMMENDED TO ASSOCIATE A MAXIMUM OF 2 SMARTPHONES TO THE SAME VEHICLE, TO OPTIMIZE THE SYSTEM OPERATION.

IF TWO SMARTPHONES ARE PAIRED, THE CONNECTION OF THE FIRST SMARTPHONE PAIRED WITH THE "PMP3" COULD REQUIRE MORE THAN 30 SECONDS.

ONCE THE SMARTPHONE IS CONNECTED TO THE "PMP3", 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

Search for the "**Vespa**" application in Play Store or App Store and install it. Register your account by following the instructions. Select "**allow**" for the position and notifications management requests.



Open the "**Vespa**" application on the smartphone and access your account. On the application's main page select "**Connect**". Select your vehicle model, press the connect button and wait for the device to be detected by the system.



If the device cannot be found, check that the location services are active and, on the Android devices, check in the Bluetooth settings that no "**PMP3: XXXX**" device is associated with a symbol other than that of the headset.

If there are several **PMP3** devices near the phone, a list will be presented; select the one

with the same name previously connected to the phone.

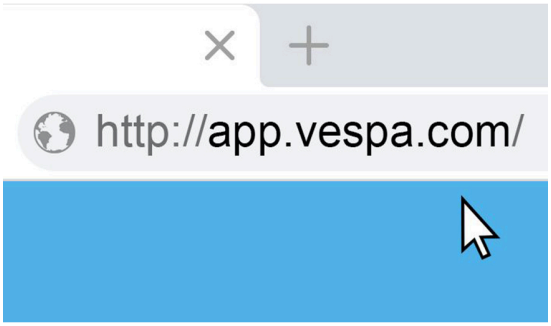
The digital display will show the icon of the "**Vespa**" App, confirming the successful activation of the communication between the App and Vespa.

Required operation for iOS 10.0 versions or higher

On iOS devices, in order to ensure the transmission of the audio on any Bluetooth headset connected to the phone, it is necessary to:

- Enter the menu: "Settings" > "Accessibility" > "Touch" > "Call routing";
- select "Bluetooth headset".

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.

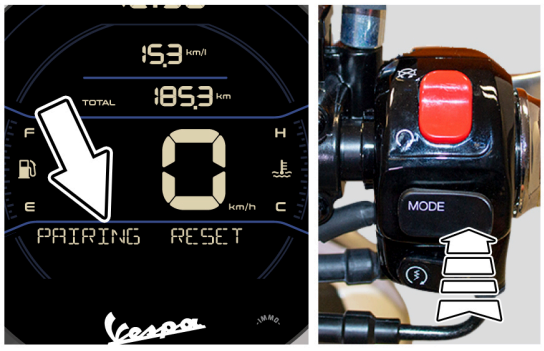
The app manual with specific information for using the system is available by visiting the site

http://app.vespa.com/

However, please note that the connection of the application is strictly necessary for the use of the system and that the management of multimedia functions will be enabled only through the App itself.

Following a successful connection, the App will try to connect to the vehicle again even when in background. In the event that this does not happen (always possible due to restrictions of the operating system after a period of inactivity or following the deactivation of its Bluetooth module), or in any case following each complete closure of the App, it is possible to force the connection process via pressing the dedicated button on the main page of the application.

If it is necessary to disconnect the smartphone, select the "**PAIRING RESET**"function and confirm by **long-pressing** the **MODE** button.



CALLS AND MUSIC MANAGEMENT

Pair the smartphone with the "**Vespa MIA**" system via bluetooth, as previously described.

Install the «**Vespa**» App on your smartphone and access your account.

Allow sharing of contacts and notifications during bluetooth pairing of the smartphone to the system.

The corresponding two icons will appear on the digital display (**VESPA MIA - Smartphone**).

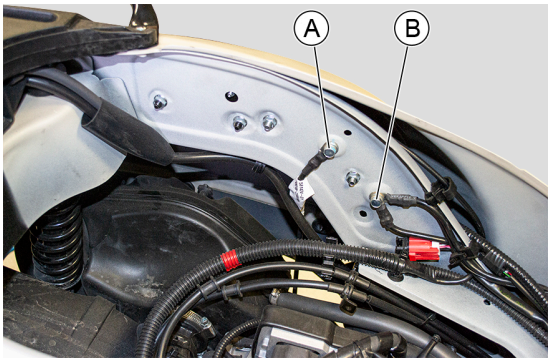


The following icons appear on the digital display:

1. Icon for incomming call on smartphone
2. Icon for missed call on smartphone
3. Icon listening to music
4. Smartphone battery level indicator
5. Icon for SMS message on smartphone



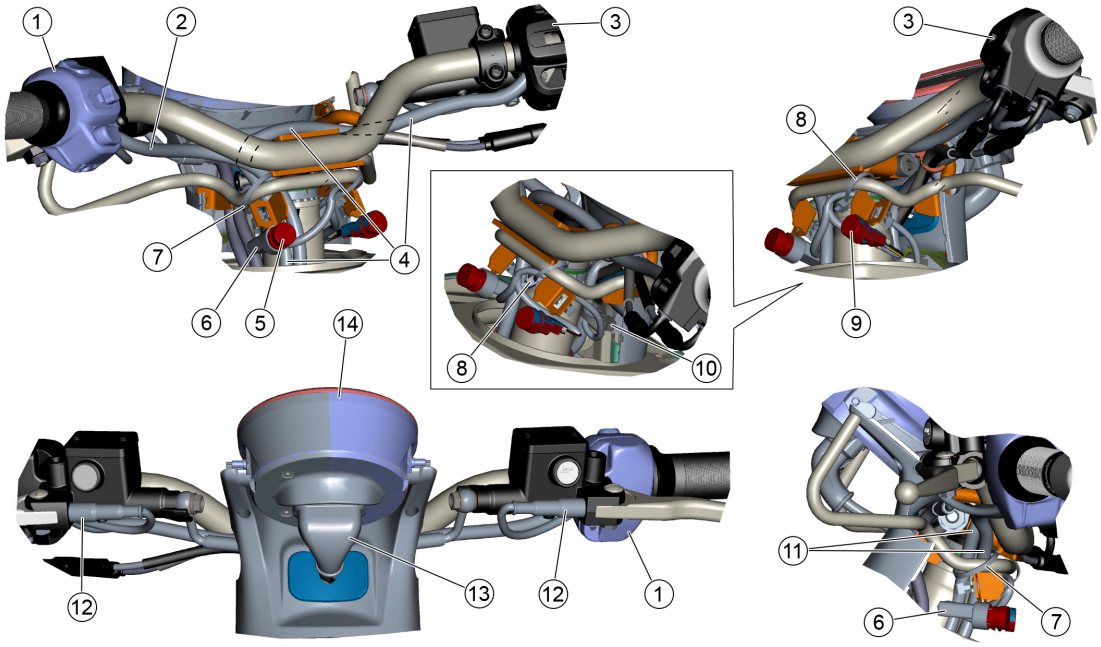
6.3 Ground connections



6.4 Electrical system installation

6.4.1 Front of vehicle

HANDLEBAR UNIT



1. LH handlebar switchgear set

2. LH handlebar switchgear set wiring harness

3. RH handlebar switchgear set

4. RH handlebar switchgear set wiring harness

5. MODE button

6. Fit the cap on the button

7. Cable tie

8. Cable tie

9. Saddle release switch

10. Insert the wiring harness clamp in the cover hole

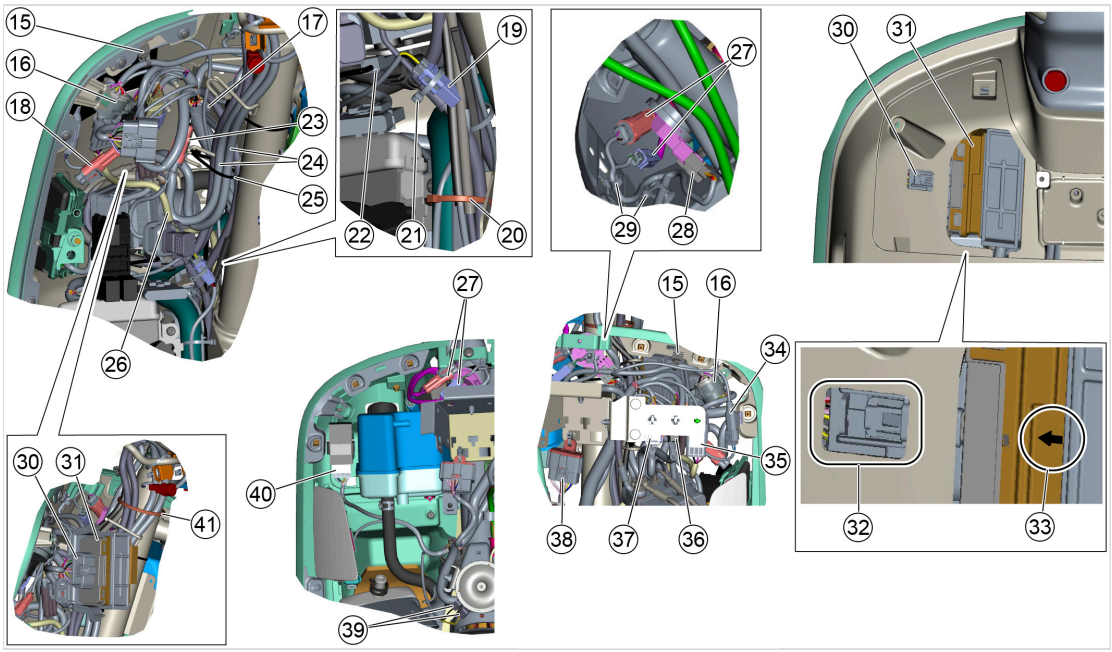
11. The handlebar switchgear set wiring harnesses must be inserted inside the iron support

12. Fit the cap over the stop button

13. Instrument panel connector

14. Instrument panel

LEG SHIELD



15. Mount the clamp on the wiring harness in the frame

16. Wiring for accessories - connector

17. Mount the wiring harness clamp in the body hole

18. Connector for provision for heated saddle (taped to the ABS sensor branch)

19. Electric fan connector

20. Cable tie

21. Cable tie (engage the connection to the ABS piping)

22. Earth braid fastening to the ABS control unit; Insert the capsula in the special terminal

23. USB port connector (taped to the branch of the Keyless control unit)

24. Handlebar switchgear set wiring harnesses (pass inside the upper retainer and outside the lower retainer)

25. Cable tie

26. Front headlamp wiring harness

27. Keyless connectors

28. Ignition switch connector

29. Clamps (insert in the holes of the body)

30. Keyless control unit connector

31. Keyless ECU

32. The closing click of the connector must be to view

33. Check the presence of the arrow on the body of the Keyless control unit

34. Front phonic wheel sensor connector

35. Front headlamp wiring harness connector

36. Right hand handlebar electrical device connector

37. Left hand handlebar electric device connector

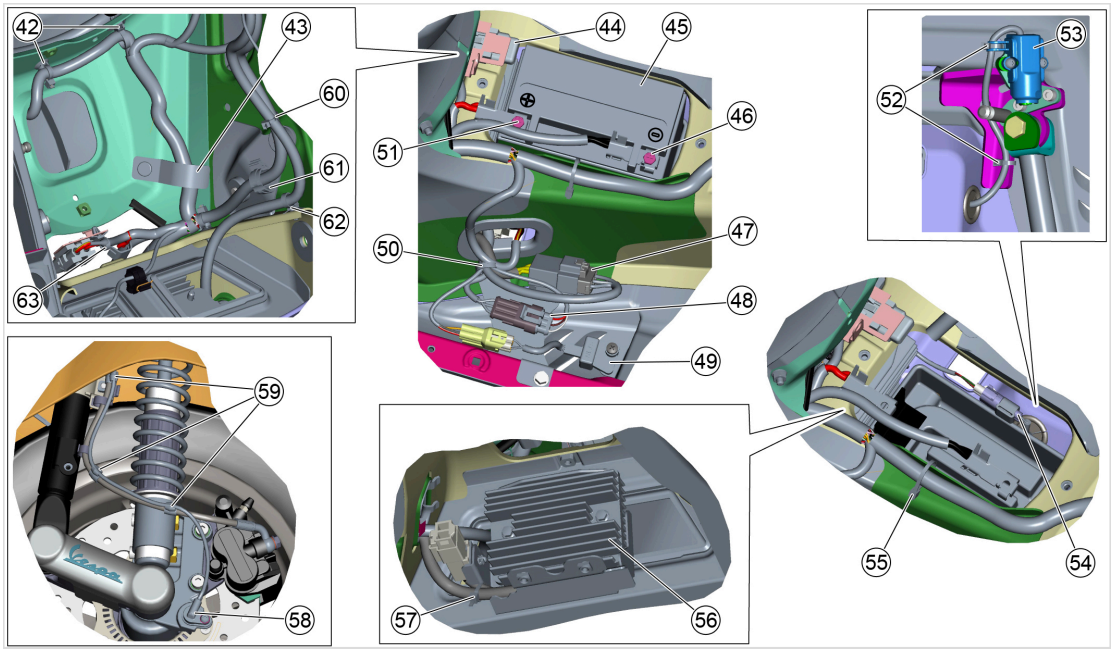
38. Connector for PMP3 option

39. Horn connectors

40. Turn indicator control device connector

41. Cable tie (take all transmissions and wiring harness except the wiring harness branch to the instrument cluster)

BATTERY COMPARTMENT_FOOTRESTS_ABS



42. Clamp (to be inserted in the hole of the frame)

43. Wiring harness retaining bracket

44. Main fuse

45. Battery

46. Battery negative

47. Magneto flywheel connector

48. Pick-up connector

49. Tilting sensor

50. Clamp

51. Battery positive

52. Cable tie

53. Side stand safety switch

54. Side stand safety switch connector

55. Clamp

56. Voltage regulator

57. Cable tie

58. Front tone wheel sensor

59. Cable grommet

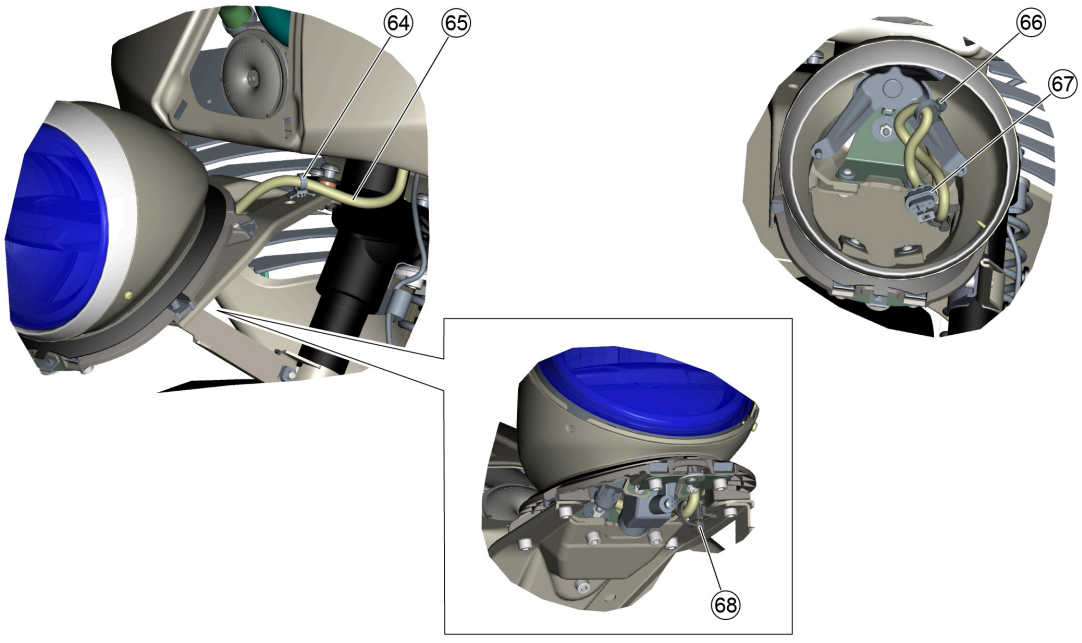
60. Cable tie

61. Clip

62. Clamp (to be inserted in the hole of the frame)

63. Clamp (to be inserted in the hole of the bracket)

FRONT HEADLIGHT



64. Insert the wiring harness clamp in the bracket hole

65. Front headlamp wiring harness

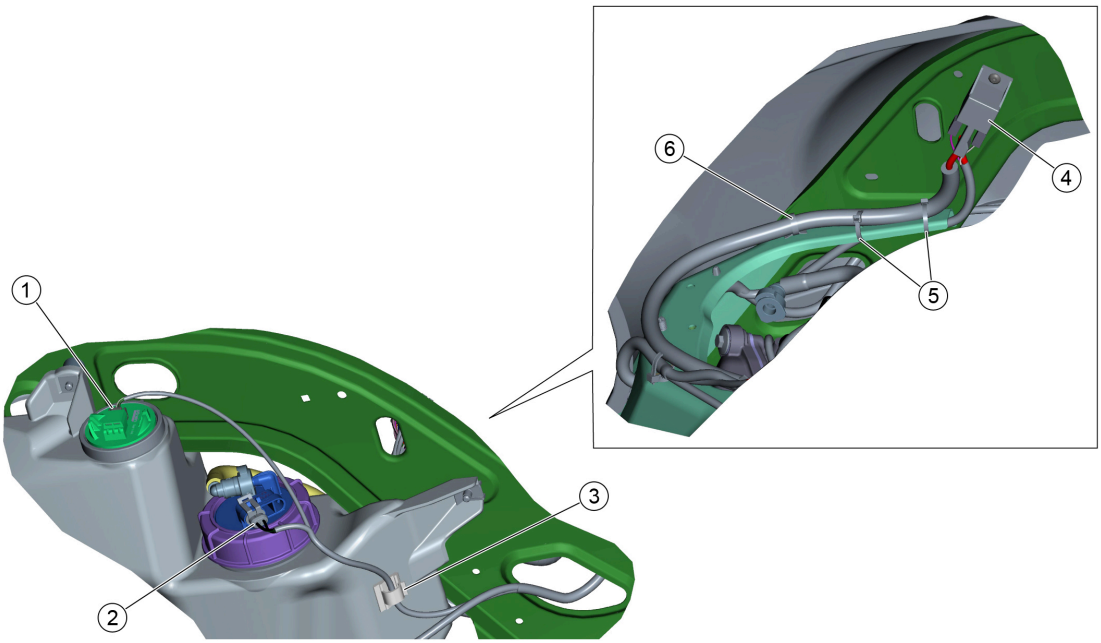
66. Hook the headlight wiring harness clamp in the special seat on the headlight support bracket

67. Front headlamp connector

68. Hook the headlight wiring harness clamp to the bracket

6.4.2 Rear section

RIGHT SIDE FRAME



1. Fuel gauge connector

2. Fuel pump connector

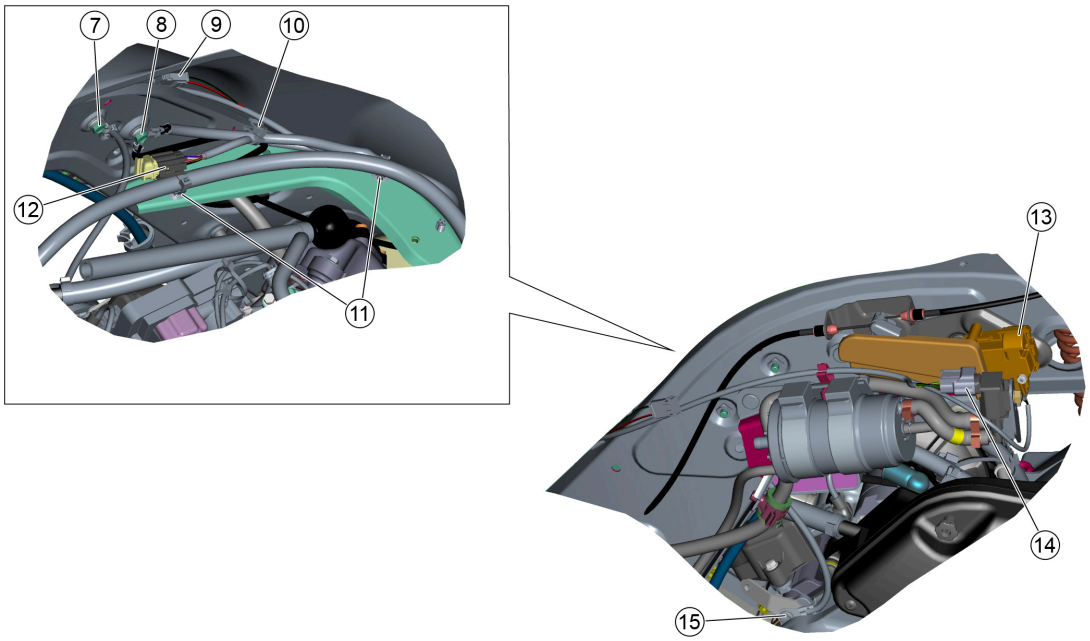
3. Adhesive clip

4. Starter relay

5. Cable tie

6. Clamp (to be inserted in the hole of the body shell)

LEFT SIDE FRAME



7. Engine ground cable

8. Frame ground cable

9. Heated saddle pre-installation connector

10. Metal sheet edge clamp

11. Clamp (to be inserted in the hole of the body shell)

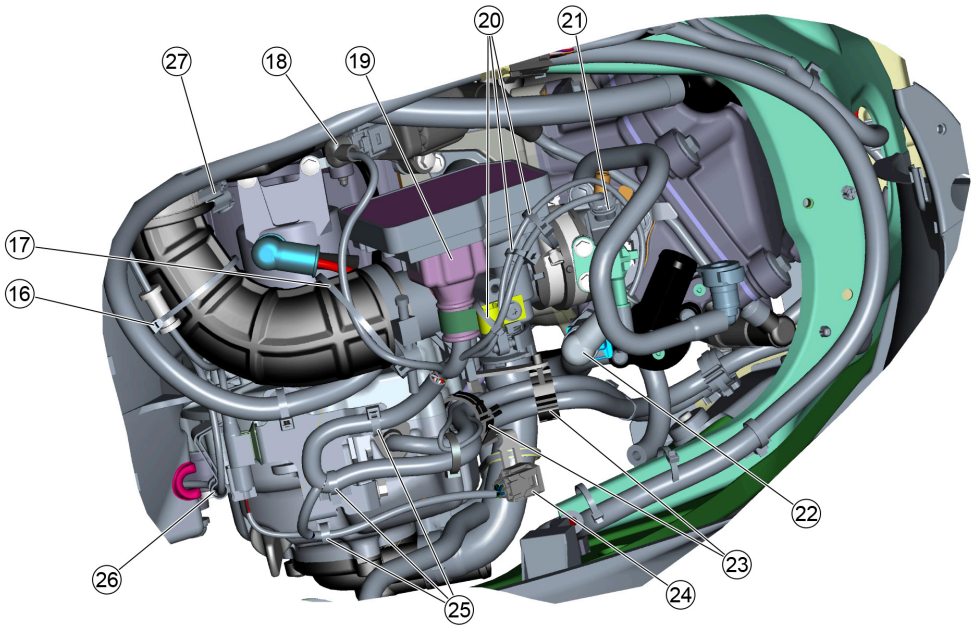
12. Diagnostic socket connector

13. Saddle actuator

14. Canister valve connector

15. Engine ground cable

UPPER VIEW OF THE ENGINE



16. Cable tie (ABS sensor cable to the intake duct)

17. Cable tie (H. V. coil cable to the intake duct)

18. HV coil connector.

19. Injection ECU connector

20. Cable tie

21. Injector connector

22. Coolant temperature sensor connector

23. Clip

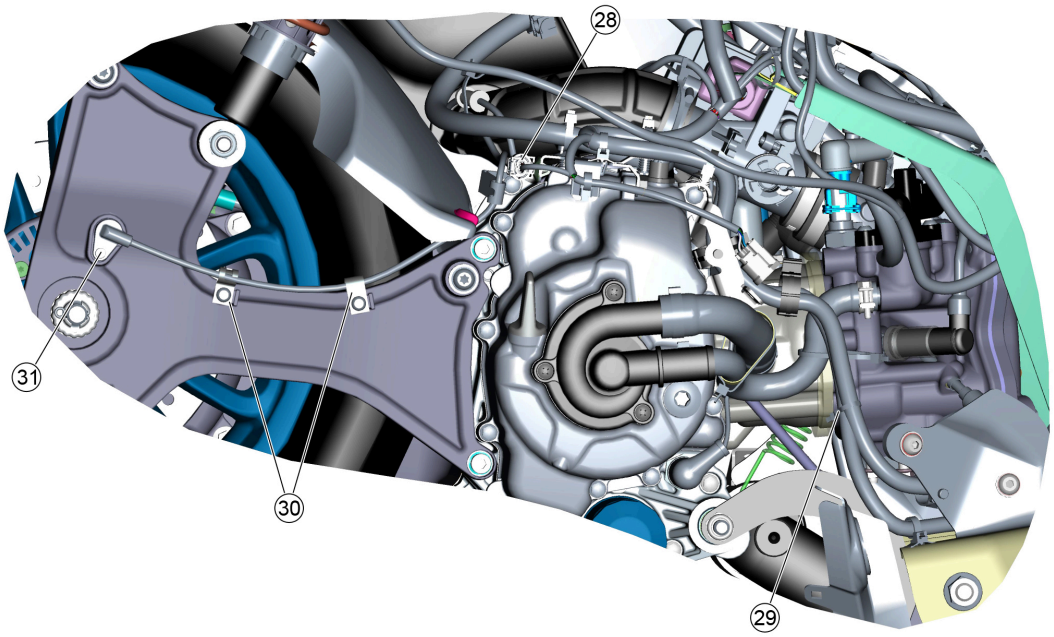
24. Lambda probe connector

25. Clamp (insert in the holes on the connector support bracket)

26. Metal clamp

27. Clip (secure the starter motor cable with the gas transmission)

ENGINE SIDE VIEW



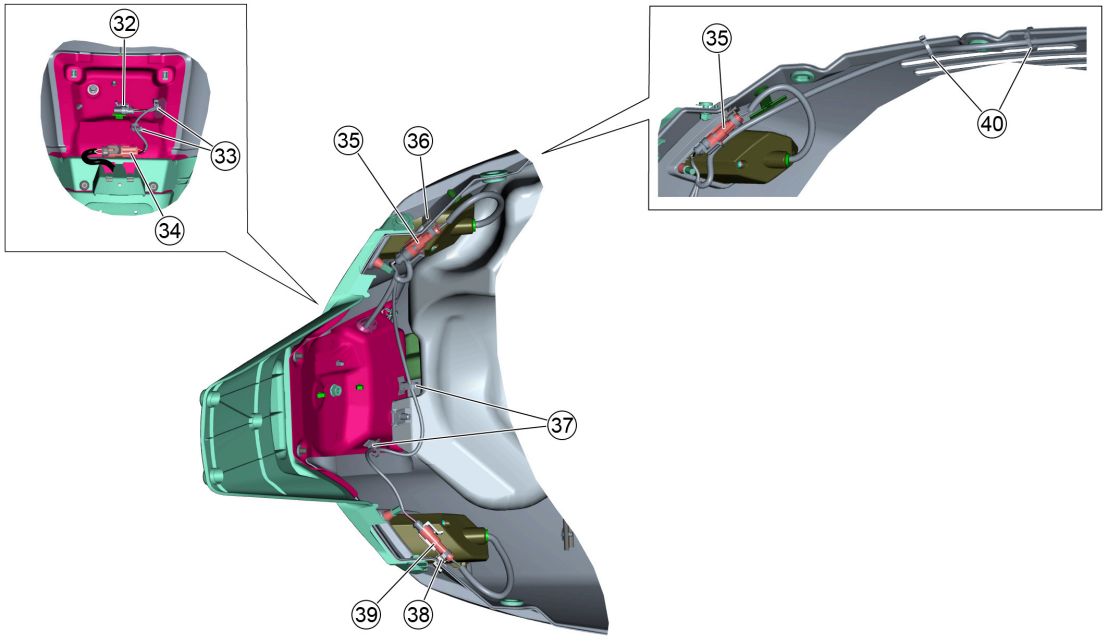
28. Rear tone wheel sensor connector

29. Cable tie (flywheel cables to the main wiring harness)

30. Clamp

31. Rear tone wheel sensor

LIGHTS UNIT



32. Taillight connector

33. Clamp (to be inserted in the hole of the body shell)

34. Licence plate lighting lamp connector

35. Right turn indicator connector

36. Clamp (to be hooked to the slot of the body shell)

37. Clamp (to be inserted in the hole of the body shell)

38. Clamp (to be hooked to the slot of the body shell)

39. Left turn indicator connector

40. Cable tie (to be inserted in the hole of the body shell)

6.5 Checks and controls

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

6.5.1 Immobilizer

The Immobilizer is an anti-theft system that allows vehicle operation only if the vehicle is started after the keyless remote has been recognized by the keyless control unit.

The code is integrated in a transponder in the remote control. This allows transparent operation for the driver, who does not have to perform any operations in addition to the normal rotation of the ignition switch.

The Immobilizer system consists of the following components:

- Keyless ECU.

- immobilizer antenna

- TAG with built-in transponder

- Remote control

- Diagnostic LED on the instrument cluster

The diagnosis LED also works as a theft-deterrent blinker. This function is activated whenever the ignition switch is turned "OFF" and is active for 9 days 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 confirming the switching to "ON".

The duration of the flash depends on the programming of the electronic control unit.

The diagnostic LED is normally mounted on the instrument panel and receives its power supply directly from the battery. Its operation is controlled by the keyless control unit via a negative signal.

In the event that the led is off regardless of the switch position and/or the instrument cluster is not initialized, check the following:

- the connection line of the keyless ECU to the instrument panel for managing the diagnostic led.

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

Keyless control unit check

1. Disconnect the electrical connector of the Keyless control unit.

2. Make sure that the connection line between the keyless 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 keyless control unit and the instrument panel (diagnostic LED management line).

If no faults are found, replace the keyless control unit.

Instrument panel check

1. Disconnect the instrument panel electrical connector.

2. Make sure that the connection line between the keyless 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 keyless control unit and the instrument panel (diagnostic LED management line).

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

6.5.2 Battery recharge circuit

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

The alternator is directly connected to the voltage regulator.

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

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

6.5.3 Switch check

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

KEY

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

ENGINE STOP SWITCH

ENGINE STOP/RUN		
Colour wire	Gr-Ve	Vi-Ne
OFF		
ON	o—— ——o	

STARTER BUTTON

START SWITCH		
Colour wire	Vi	Ar-Bi
OFF		
ON	o——	——o

MODE BUTTON

MODE SWITCH		
Colour wire	Ma-Ne	Gr-Ve
OFF		
ON	o——	——o

LIGHT SWITCH

HI - LOW - PASSING SWITCH			
Colour wire	Vi	Gi-Ro	Ma
HI	o——	——o	
LOW		o——	——o
PASS		o——	——o
	o——	——o	

TURN SIGNAL SELECTOR

FLASHER SWITCH			
Colour wire	Rs-Ve	Ar-Bi	Bl-Ve
LEFT	o——	——o	
N PREMUTO (OFF)			
RIGHT		o——	——o

HORN BUTTON

HORN SWITCH		
Colour wire	Ar-Bi	Gi-Rs
OFF		
ON	o——o	

6.5.4 Stator check

Checking the stator windings

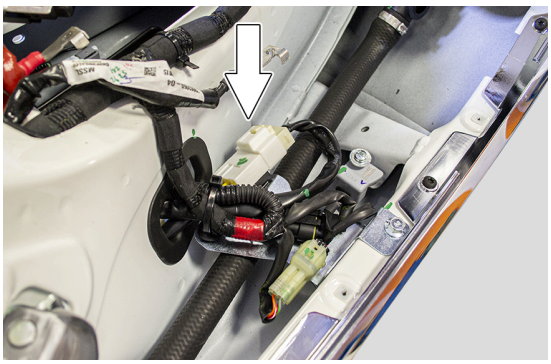
NOTE

☞

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

1) To access the connector remove the footrest.

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



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

Resistance: 0.2 ÷ 1 Ω

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

5) If the values are incorrect, replace the stator.

6.5.5 Recharge system output check

Look for any leakage

1) Access the battery by removing the cover in the footrest.

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

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

4) With the ignition switch to OFF, the reading indicated by the ammeter must be ≤ 0.5 mA.

Charging current check

WARNING

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

1) Place the vehicle on its centre stand.

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

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

Voltage 14 to 15V at 5,000 rpm (rev/min) with lights off

Maximum current output check

- With the engine off and the panel at «ON» with the lights on, allow the battery voltage to stop at 12V.

- Connect ammeter clamp to the 2 recharge positive poles in output from the regulator.

- Start the engine and rev it up to a high engine speed while reading the value on the pincer.

VOLTAGE REGULATOR/RECTIFIER	
Type	Non-adjustable three-phase transistor
Voltage	14 to 15V at 5,000 rpm with lights off

6.5.6 level indicators

WARNING

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

If faults are detected:

1) Using a multimeter, measure the resistance values between pins 1 and 2 on the fuel level sender in various conditions.

2) If the transmitter operates correctly but the indication on the instrument panel is not exact, check that the wiring harnesses between them are not interrupted.

Resistance value with full tank<= 5 Ω

Resistance value with empty tank 98 ± 5 Ω



6.5.7 Lighting system



FOR EUROPE VERSION

FUNCTION	DESCRIPTION / VALUE
High beam / low beam bulb	**Type:** LED **Quantity:** 2
Front daylight running lights	**Type:** LED **Quantity:** 2
Front indicator light bulb	**Type:** LED **Quantity:** 2
Rear indicator light bulb	**Type:** LED **Quantity:** 2
Rear tail light bulb	**Type:** LED **Quantity:** 1
Stop light bulb	**Type:** LED **Quantity:** 1
Licence plate light bulb	**Type:** All glass lamp W5W **Power:** 12V - 5W **Quantity:** 1

FOR USA-LATAM VERSION

FUNCTION	DESCRIPTION / VALUE
High beam / low beam bulb	**Type:** LED **Quantity:** 2
Front indicator light bulb	**Type:** LED **Quantity:** 2
Rear indicator light bulb	**Type:** LED **Quantity:** 2
Rear tail light bulb	**Type:** LED **Quantity:** 1
Stop light bulb	**Type:** LED **Quantity:** 1
Licence plate light bulb	**Type:** All glass lamp W5W **Power:** 12V - 5W **Quantity:** 1

6.5.8 Fuses

ATTENTION



BEFORE REPLACING THE BLOWN FUSE, SEARCH AND SOLVE THE PROBLEM THAT CAUSED IT TO BLOW.

NEVER TRY TO REPLACE A BLOWN FUSE WITH A FUSE OF A DIFFERENT RATING THAN THAT SPECIFIED OR USING OTHER MATERIAL (FOR EXAMPLE, A PIECE OF ELECTRICAL WIRE).

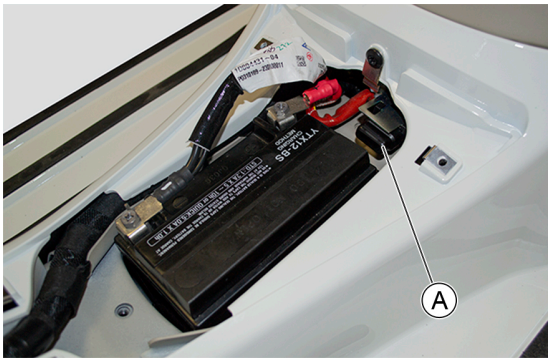
ATTENTION



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.

The electrical system is equipped with:

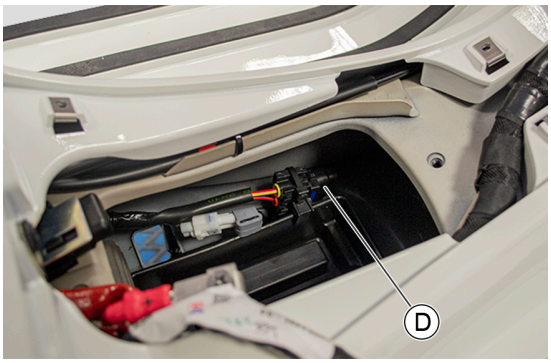
1. one fuse «**A**», located in the battery compartment;



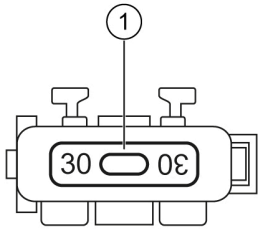
2. eight safety fuses «**B**» and one safety fuse «**C**» located inside the case on the left;



3. one fuse «**D**», located in the battery compartment. The tables show the position and characteristics of the fuses on the vehicle.

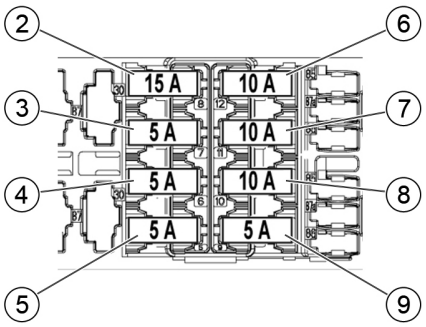


Fuse box «**A**».



FUNCTION	DESCRIPTION / VALUE
Fuse no. 1	**Capacity:** 30 A **Fuel system:** from battery **Protected circuits:** System general.

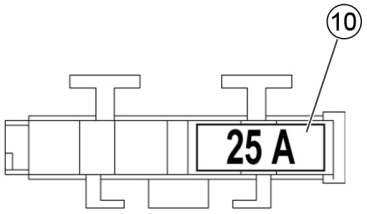
Fuse box «**B**».



FUNCTION	DESCRIPTION / VALUE
Fuse no. 2	**Capacity:** 15 A **Fuel system:** from battery **Protected circuits (under starter switch):** fuses No. 5, 6 and 7.
Fuse no. 3	**Capacity:** 5 A **Fuel system:** from ignition switch **Protected circuits:** USB socket, accessories provision, diagnostics socket, «Vespa MIA» device.
Fuse no. 4	**Capacity:** 5 A **Fuel system:** from ignition switch **Protected circuits:** instrument cluster, horn button, starter switch, daytime running lights, blinker control device, left and right STOP buttons, rear stop light, license plate light.
Fuse no. 5	**Capacity:** 5 A **Fuel system:** from ignition switch **Protected circuits:** "Keyless" ECU, lights relay (coil), ABS ECU, injection load relay (coil), lean angle sensor, engine management ECU.

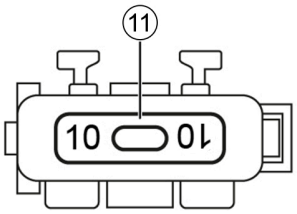
FUNCTION	DESCRIPTION / VALUE
Fuse no. 6	**Capacity:** 10 A **Fuel system:** from battery **Protected circuits:** accessories provision.
Fuse no. 7	**Capacity:** 10 A **Fuel system:** from battery **Protected circuits:** injection load relay, engine control unit.
Fuse no. 8	**Capacity:** 10 A **Fuel system:** from battery **Protected circuits:** diagnostics socket, electric fan relay.
Fuse no. 9	**Capacity:** 5 A **Fuel system:** from battery **Protected circuits:** Headlamp, instrument cluster, «Vespa MIA» device.

Fuse box «**C**».



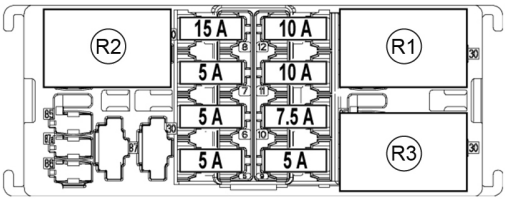
FUNCTION	DESCRIPTION / VALUE
Fuse no. 10	**Capacity:** 25 A **Fuel system:** from battery **Protected circuits:** ABS control unit.

Fuse box «**D**».



FUNCTION	DESCRIPTION / VALUE
Fuse no. 11	**Capacity:** 10 A **Fuel system:** from battery **Protected circuits:** "Keyless" ECU.

The relays are located inside the case on the left.



FUNCTION	DESCRIPTION / VALUE
Relay no. 1	**Circuits:** Injection loads.
Relay no. 2	**Circuits:** electric fan.
Relay no. 3	**Circuits:** Lights.

6.5.9 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 FITTING the battery on the vehicle, perform an open-circuit voltage check using a conventional 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 to 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

6.5.10 Battery installation

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

WARNING



THE BATTERY ELECTROLYTE IS TOXIC, CORROSIVE AND, AS IT CONTAINS SULPHURIC ACID, MAY CAUSE BURNING IF IT COMES INTO CONTACT WITH THE SKIN. WHEN HANDLING BATTERY ELECTROLYTE, WEAR TIGHT-FITTING GLOVES AND PROTECTIVE APPAREL. IN THE EVENT OF SKIN CONTACT WITH THE ELECTROLYTIC FLUID, RINSE WELL WITH PLENTY OF CLEAN WATER. IT IS PARTICULARLY IMPORTANT TO PROTECT YOUR EYES BECAUSE EVEN TINY AMOUNTS OF BATTERY ACID MAY CAUSE BLINDNESS. IF THE FLUID GETS INTO CONTACT WITH THE EYES, WASH WITH ABUNDANT WATER FOR FIFTEEN MINUTES AND CONSULT AN EYE SPECIALIST IMMEDIATELY. THE BATTERY RELEASES EXPLOSIVE GASES; KEEP IT AWAY FROM FLAMES, SPARKS, CIGARETTES OR ANY OTHER HEAT SOURCES. ENSURE ADEQUATE VENTILATION WHEN SERVICING OR RECHARGING THE BATTERY.

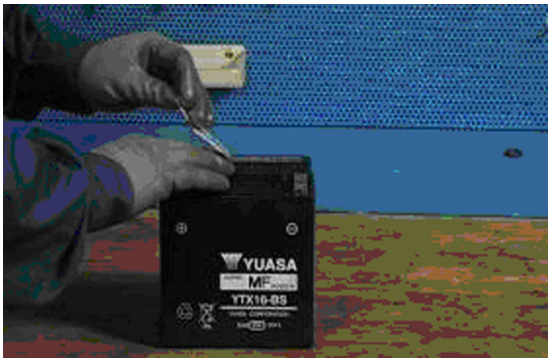
KEEP OUT OF THE REACH OF CHILDREN.

BATTERY LIQUID IS CORROSIVE. DO NOT POUR OR SPREAD IT ESPECIALLY ON PLASTIC PARTS.

ENSURE THAT THE ELECTROLYTIC ACID IS COMPATIBLE WITH THE BATTERY BEING ACTIVATED.

1) Battery preparation

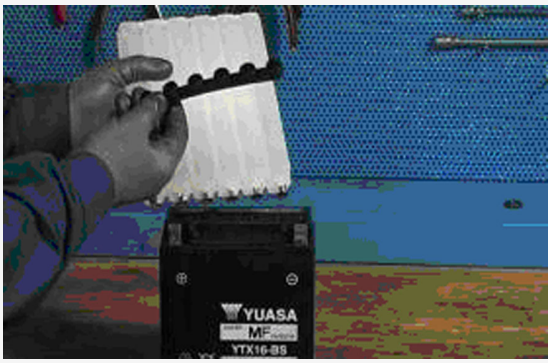
Position the battery on a flat surface. Remove the adhesive sheet closing cells and proceed as quickly as possible to run the subsequent activation phases.



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.

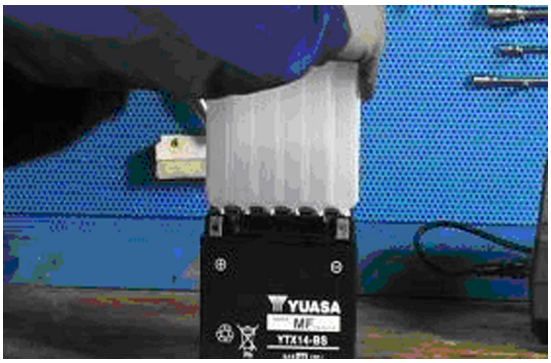
Note: Do not pierce the sealing of the container or the container itself because inside there is sulphuric acid.



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 FITTING 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 to 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.



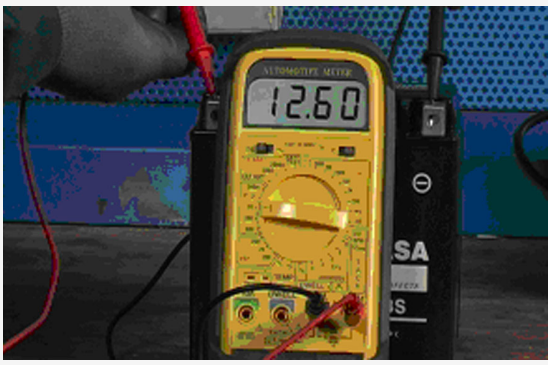
f - Check the ignition of the green LED indicated with a red arrow in figure.



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.

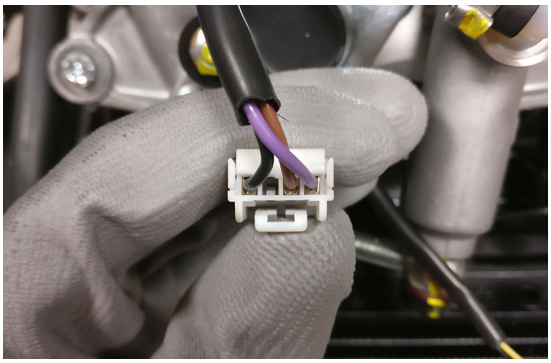
Assembly procedure of the battery on the vehicle.

6.6 Connectors

NOTE

☞

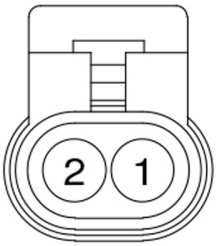
THE DIAGRAM SHOWS THE LAYOUT OF THE CONNECTORS VIEWED FROM THE CABLE INLET SIDE, AS INDICATED IN THE EXAMPLE.

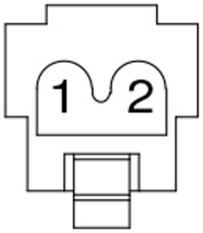


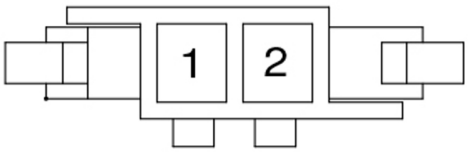
The electrical components of the vehicle are as follows:

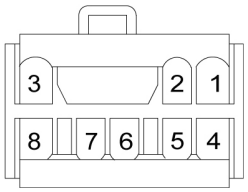
- Ignition actuator (contact)
- Ignition actuator (solenoid)
- Saddle opening actuator
- Blinker
- H.V. coil.
- ABS control unit
- Keyless ECU
- MIUG4 control unit
- Horn
- Key switch
- Starter relay contact
- RH switchgear set
- Left hand electrical device "A"
- Left hand electrical device "B"
- Electric fan
- Rear light
- ABS fuses
- Keyless fuse
- Main fuse
- Instrument panel
- Right turn indicator and parking light
- Left turn indicator and parking light
- Rear right turn indicator
- Rear left turn indicator
- Fuel gauge
- Injector
- Number plate light
- Frame ground
- Battery negative
- Pickup / Oil pressure sensor
- PMP3
- Fuel pump

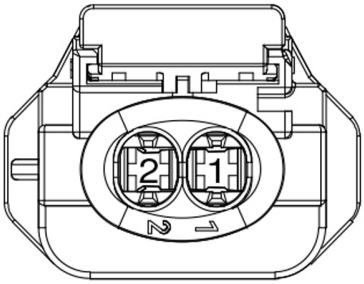
- Fuse box
- Battery positive
- Accessories pre-installation
- Provision for heated saddle
- OBD socket
- USB port
- Headlight
- Saddle release switch
- Stand button
- MODE button
- Voltage regulator
- Front ABS sensor
- Rear ABS sensor
- Roll-over sensor
- Engine temperature sensor
- Lambda probe with heater
- Starter relay
- Canister valve











ABS control unit

1. Not connected

2. (Pink-Red) CAN H

3. (Green-Blue) ABS warning light activation control

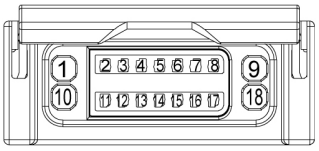
4. (Red-White) Ignition switched live power supply (F05) for the ABS ECU

5. (Orange-Black) Line K

6. (Brown-Red) Signal from rear ABS sensor

7. Not connected

8. (Light blue-Red) Signal from the front ABS sensor



9. Not connected

10. (Black) Ground

11. (Pink - White) CAN L

12. Not connected

13. (Light blue) Tachometer signal for provision

14. (Black) Ground

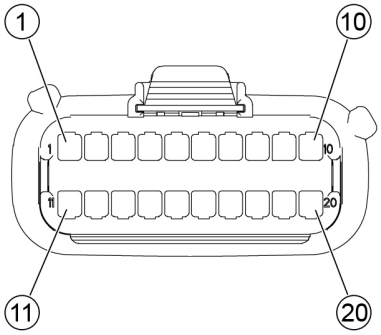
15. (Brown-Black) Rear ABS sensor ground

16. (Black) Ground

17. (Light blue-Black) Ground for front ABS sensor

18. (Red-Grey) Battery direct power supply (F10) for ABS ECU

Keyless ECU



1. (Red-Grey) - Battery direct power supply (F11) for Keyless ECU

2. (Green-White) Signal + for ignition actuator solenoid

3. (Black) Ground

4. (Green-Black) Signal - for ignition actuator solenoid

5. (Pink-Red) CAN H

6. (Pink - White) CAN L

7. Not connected

8. (Yellow-Grey) Saddle release command signal

9. Not connected

10. (Pink) Signal input for the left turn indicator light activation command

11. (Purple-White) Signal input from ignition actuator contact

12. (Red-White) Ignition switched live power supply (F05) for the Keyless ECU

13. Not connected

14. (Brown-Yellow) Saddle release command input

15. Not connected

16. (Brown-Black) Ground

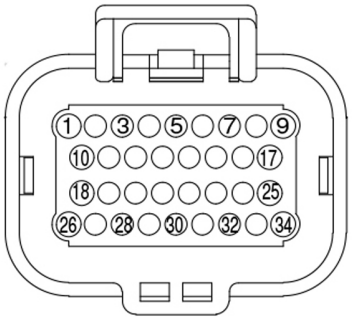
17. (Yellow) Immobilizer indicator light activation command

18. (Grey) Ground for courtesy LED

19. Not connected

20. (White-Blue) Signal input for the right turn indicator light activation command

MIUG4 control unit



1. (Pink-Black) H.V. coil signal output (-).

2. Not connected

3. Not connected

4. (Purple-Black) Signal input (-) from engine stop button

5. (Purple) Signal input (+) from the start button

6. (Red-White) Key-on power input (from fuse F05)

7. (Black) Power ground

8. Not connected

9. (Red-Green) Battery power supply input (from fuse F03)

10. (Purple-White) Signal output (-) for starter relay coil command

11. (Green-Blue) Lambda probe (+)

12. (Light Blue-Black) Lambda probe (-)

13. (Light blue-Green) Signal input from the engine temperature sensor

14. Not connected

15. (Grey-Green) Sensor ground reference

16. Not connected

17. Not connected

18. (Orange) Signal input from the tilt sensor

19. (Brown-Red) Signal input (-) from the stand button

20. (Brown) Pickup (-)

21. Not connected

22. (Black-Purple) Injection loads coil command signal output (-)

23. (Black) Power ground

24. (Green-White) Electric fan relay coil command signal output (-)

25. Not connected

26. (Pink-Red) CAN H line

27. (Pink-White) CAN L Line

28. Not connected

29. (Red) Pickup (+)

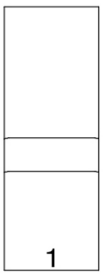
30. Not connected

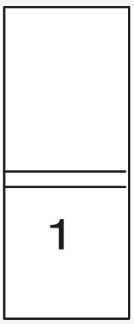
31. (White-Blue) Ground reference for lambda probe heater

32. (Green-Orange) Canister valve

33. (White-Black) Lights relay coil command signal output (-)

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





Ignition switch

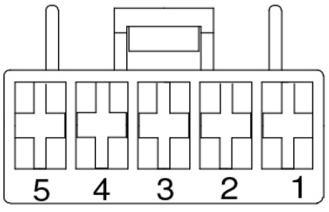
1. Not connected

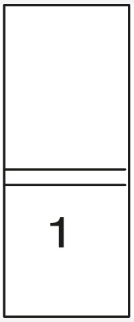
2. Not connected

3. Not connected

4. (Orange) Key-on power supply output

5. (Red) Battery power supply input (F08) for ignition switch





RH switchgear set

1. (Orange-White) Key-on power supply input for right stop button

2. (White-Black) Key-on power feed output for right stop button

3. (Purple) Engine start command signal for injection ECU

4. (Orange-White) Key-on power supply for engine starter button

5. (Grey-Green) Engine stop button ground

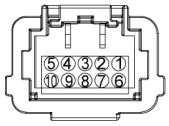
6. (Purple-Black) Engine stop command signal for injection ECU

7. (Brown-Black) MODE button signal for instrument panel

8. (Grey-Green) Ground for MODE button

9. Not connected

10. Not connected



LH switchgear set

1. (White-Black) Key-on power supply output for left stop button

2. (Orange-White) Key-on power supply input for left stop button

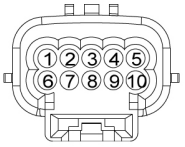
3. (Orange-White) Key-on power supply input for horn button

4. (Yellow-Pink) Horn activation signal output

5. (Pink-Green) Left turn indicator activation signal output

6. (Orange-White) Key-on power supply input for turn indicator switch

7. (Blue-Green) Right turn indicator activation signal output



8. (Purple) High beam lights activation signal output

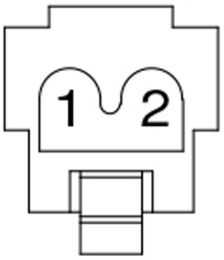
9. (Yellow-Red) Power supply input from the lights relay contact

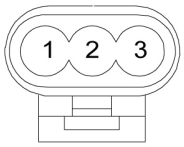
10. (Brown) Low beam lights activation signal output

Electric fan

1. (Black) Ground

2. (Yellow-Blue) Power supply input from electric fan relay contact





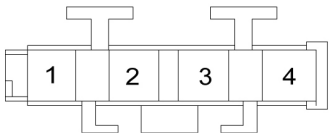
ABS fuses

1. Not connected

2. Not connected

3. (Red-Yellow) Battery direct power supply (F09)

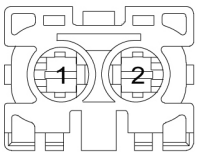
4. (Red-Grey) Battery direct power supply output for ABS ECU

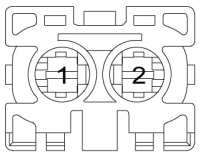


Keyless fuse

1. (Red-Grey) Battery power supply input

2. (Red-Yellow) Battery power supply output





Instrument panel

1. (White) Engine oil warning light control signal input

2. (Brown-Black) Signal input MODE button

3. (Pink) - Left hand turn signal indicator command signal input

4. (White-Blue) Right hand turn signal indicator command signal input

5. (Purple) High beam indicator light command signal input

6. (Black-Purple) Signal input MODE button

7. (Blue-Green) ABS indicator light command signal input

8. Not connected

9. Not connected

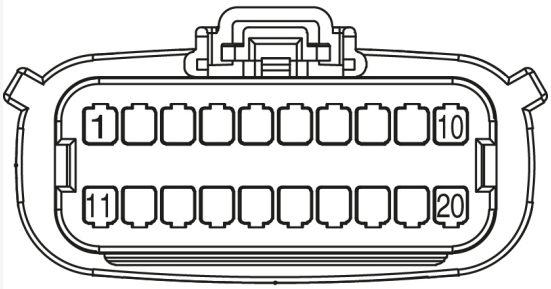
10. (White-Green) Fuel level signal input

11. (Pink-Red) CAN H line

12. (Pink-White) CAN L Line

13. Not connected

14. (Yellow) Immobilizer lamp command signal input



15. Not connected

16. (Grey-Green) Ground for sensors

17. (Black) Ground

18. (Grey) Signal input for courtesy LED

19. (Orange-White) Ignition switched live

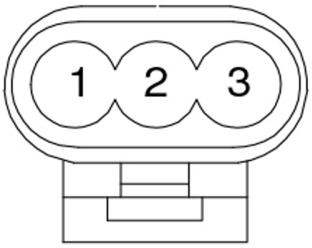
20. (Blue) Battery power supply

Right turn indicator and parking light

1. (Orange-White) Daylight running lights ignition switched live power supply (F06)

2. (Black) Ground

3. (White-Blue) Turn indicator activation signal input (+)

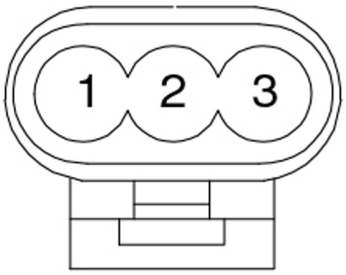


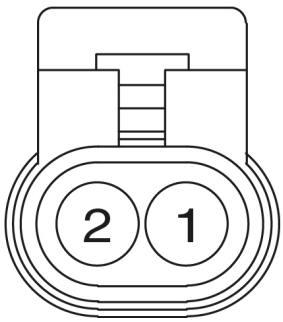
Left turn indicator and parking light

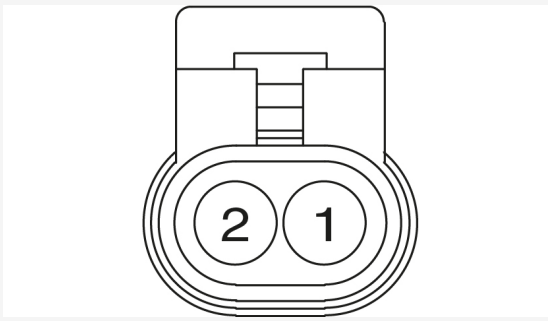
1. (Orange-White) Daylight running lights ignition switched live power supply (F06)

2. (Black) Ground

3. (Pink) Turn indicator light activation signal input (+)





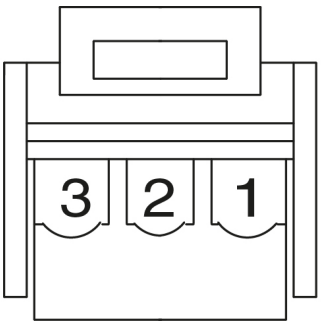


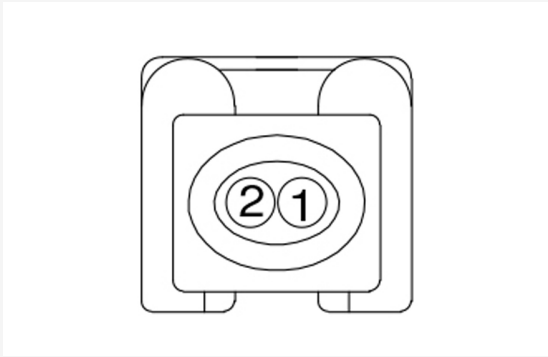
Fuel gauge

1. (White-Green) Fuel level signal output

2. (Grey-Green) Ground lead

3. Not connected

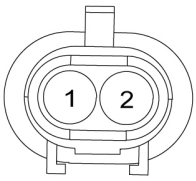




Number plate light

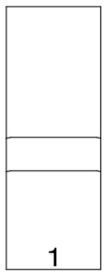
1. (Black) Ground

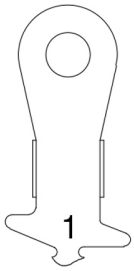
2. (Orange-White) Ignition switched live power supply (F06) for licence plate light

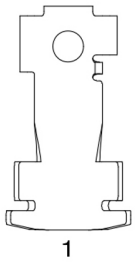


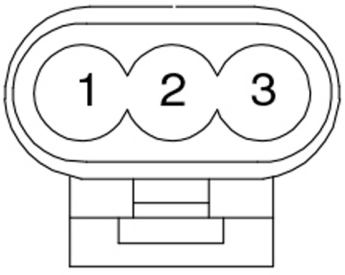
ABS ground

1. (Black) Ground

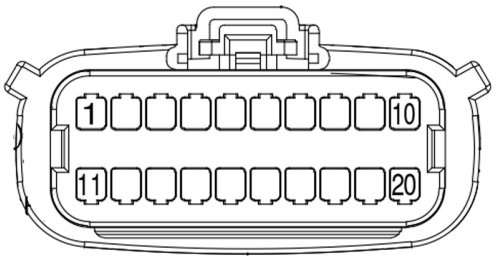








PMP3



1. (Pink-Red) CAN H line

2. (White) Key-on power supply (F07) for PMP3

3. Not connected

4. Not connected

5. (Brown) Follow Me signal function

6. (White-Blue) Right turn indicator signal

7. (Pink) Left turn indicator signal

8. (Yellow-Pink) Horn signal

9. (Blue) Battery power supply (F01) for PMP3

10. Not connected

11. (Pink-White) CAN L Line

12. Not connected

13. Not connected

14. (Pink) Spare signal for left turn indicator

15. (White-Blue) Spare signal for right turn indicator

16. Not connected

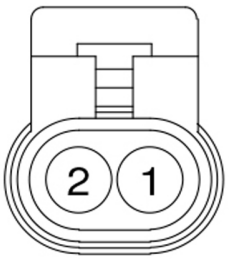
17. Not connected

18. Not connected

19. (Grey-Green) Ground for sensors

20. Not connected

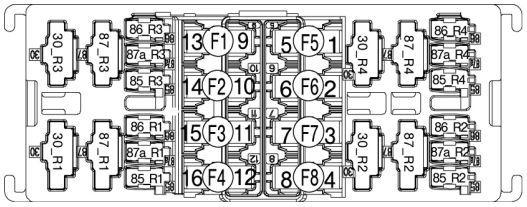
Fuel pump



1. (Black) Ground

2. (Black/Green) Power supply input from injection load relay

Fuse box



1 . (Orange) Key-on power supply input for fuse F05 line

1 . (Orange) Key-on power supply output for fuse F07 line

2 . (Orange) Key-on power supply input for fuse F07 line

3 . (Red) Battery power supply output from fuse F08 line

4 . (Orange) Key-on power supply input for fuse F05 line

4 . (Orange) Key-on power supply output for fuse F06 line

5 . (Orange-White) Key-on power supply output from fuse F06

6 . (White) Key-on power supply output from fuse F07

7 . (Red-Yellow) Battery power supply input

8 . (Red-White) Key-on power supply output from fuse F05

9 . Not connected

10 . Not connected

11 . Not connected

12 . (Red-Yellow) Battery power supply input for F04 line

13 . (Blue) Battery power supply output from fuse F01

14 . (Red-Blue) Battery power supply output from fuse F02

15 . (Red-Green) Battery power supply output from fuse F03

16 . (Red-Black) Battery power supply output from fuse F04

30R1 (Red-Green) Battery power supply input for injection loads relay

87R1 (Black-Green) Battery power supply output from injection loads relay

85R1 (Black-Purple) Signal input from injection ECU for injection loads relay coil

87aR1 Relay contact

86R1 (Red-White) Key-on power supply input for injection loads relay coil

30R2 (Red-Blue) Battery power supply input for electric fan control relay

87R2 (Yellow-Blue) Battery power supply output from electric fan relay

85R2 (Green-White) Signal input from injection ECU for electric fan relay coil

87Ar2 Relay contact

86R2 (Black-Green) Power supply input from relay loads

30R3 (Blue) Battery power supply input for lights relay

87R3 (Yellow-Red) Battery power supply output from lights relay

85R3 (White-Black) Signal input from injection ECU for lights relay coil

87Ar3 Relay contact

86R3 (Red-White) Key-on power supply input for lights relay coil

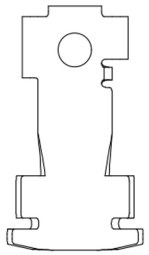
30R4 Not connected

87R4 Not connected

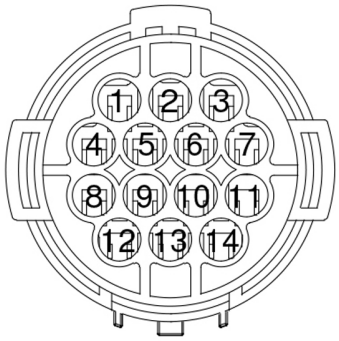
85R4 Not connected

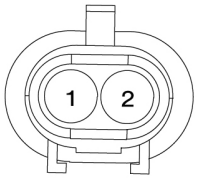
87Ar4 Not connected

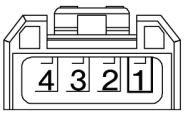
86R4 Not connected

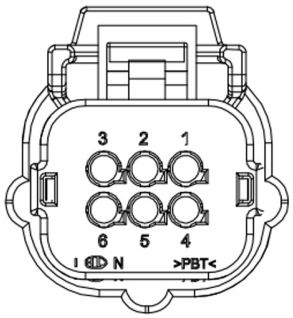


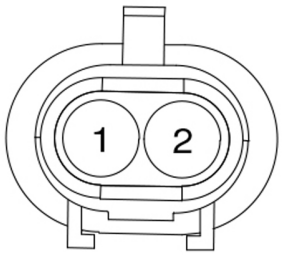
1


1 2 3
4 5 6 7
8 9 10 11
12 13 14


1 2


4 3 2 1


3 2 1
6 5 4
N
>PBT<



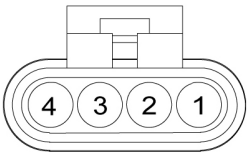
Headlight

1. (Brown) Low beam lights activation command

2. (Purple) High beam lights activation command

3. (Black) Ground

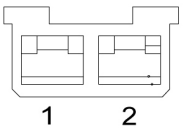
4. Not connected

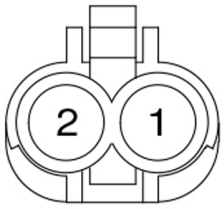


Saddle release switch

1. (Brown-Yellow) Saddle release command signal

2. (Brown-Black) Ground

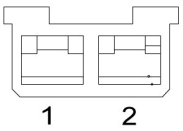


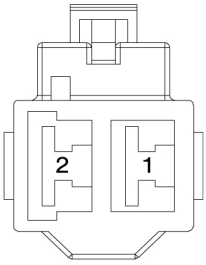


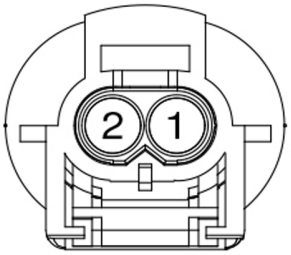
MODE button

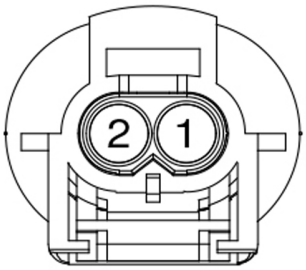
1. (Black-Purple) MODE button signal for instrument panel

2. (Grey-Green) Ground lead









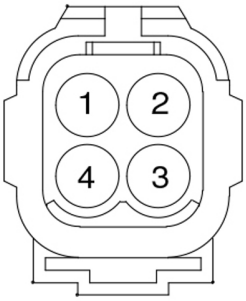
Roll-over sensor

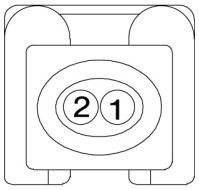
1. Not connected

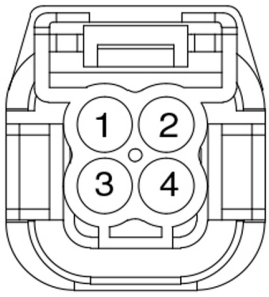
2. (Grey-Green) Ground lead

3. (Red-White) Key-on supply (F05) for tilt sensor

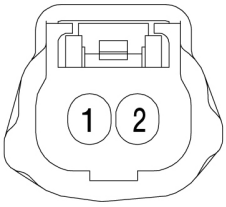
4. (Orange) Signal for injection control unit





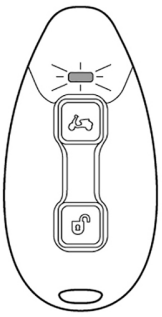






6.7 How to replace inner batteries

When the remote control LED flashes in green or red, the remote control battery level is low. The battery must be replaced as soon as possible.



The battery is a 3 Volt **CR2032** button type battery.

Proceed as follows:

- Open the top of the remote control taking care not to damage the locking tabs.



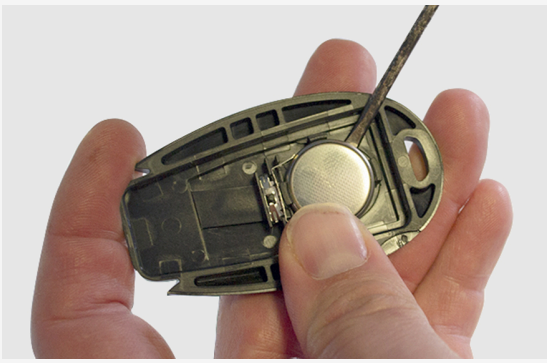
- Insert a lever in the appropriate slot and uncouple the two half-shells of the remote control; be careful not to scratch the surface.



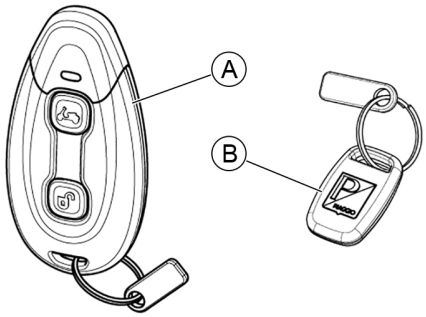
Remove the battery from the lower half-shell and replace it with a new one.

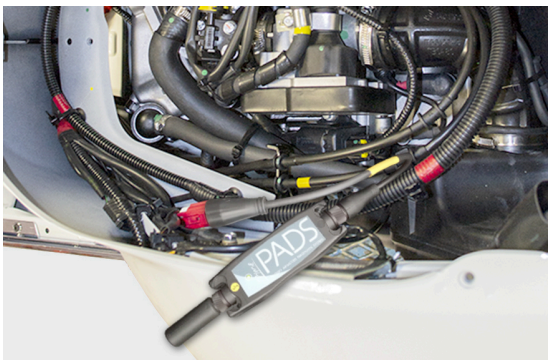
- Re-couple the two snap-on half-shells, exerting light pressure with your fingers.

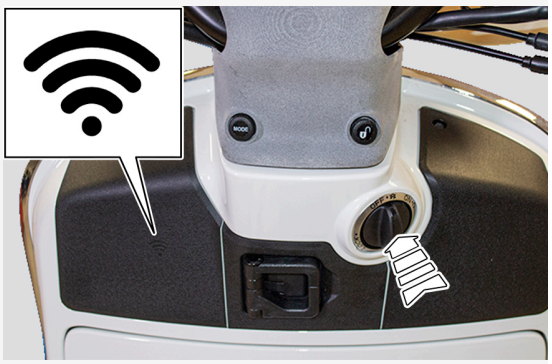
- Refit the upper part of the remote control.

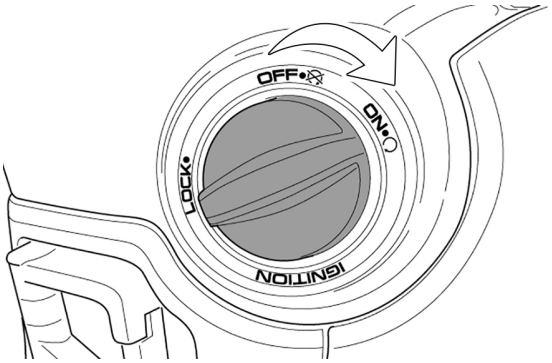


6.8 Copying the remote controls



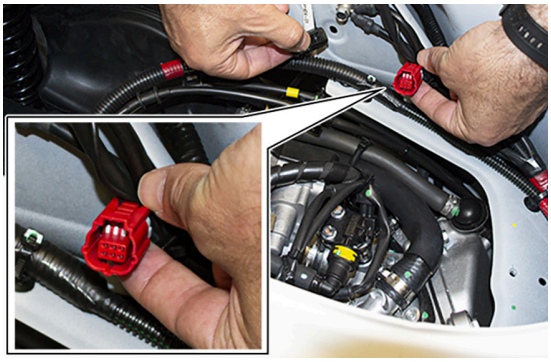






6.9 Diagnostic tool

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

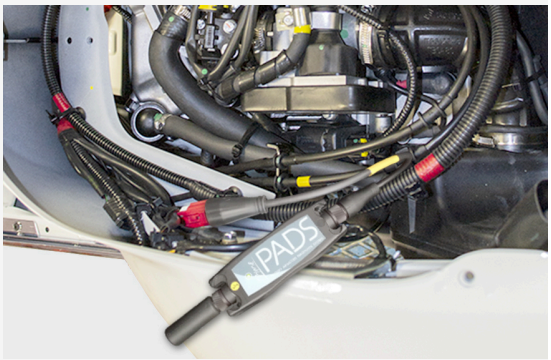


To access the OBD port, proceed as follows:

- Raise the saddle.
- Remove the helmet compartment.
- Connect the diagnostic tool

020922Y Diagnostic instrument

021017Y EOBD E5 diagnostic cable



LIST OF TOPICS

Engine from the vehicle

DESCRIPTION	TORQUE
Engine - swinging arm pin	71 ± 4 Nm
Swinging arm bolt - body shell	79.5 ± 3.5 Nm
Engine and vehicle side swinging arm junction bolt	42.5 ± 2.5 Nm
Silent block support plate - Body	47 ± 5 Nm

DESCRIPTION	TORQUE
Left shock absorber support plate - Crankcase	22.5 ± 2.5 Nm
Rear shock absorber - Engine	42.5 ± 2.5 Nm
Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm
Rear shock absorber - Chassis	22.5 ± 2.5 Nm
Rear wheel axle nut - Rear wheel axle	115 ± 11 Nm
Rear wheel – Rear wheel hub	22.5 ± 2.5 Nm
Silencer support bracket - Engine	22.5 ± 2.5 Nm
Rear tone wheel - Rear wheel	9 ± 1 Nm

7.1 Complete exhaust silencer

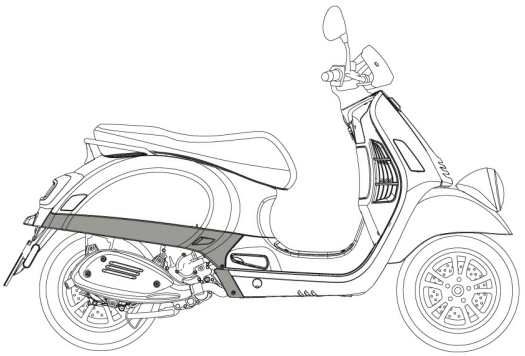
REMOVAL

To remove the complete silencer, proceed as follows:

- Rest the vehicle on its centre stand.

- Lift the saddle and remove the helmet compartment.

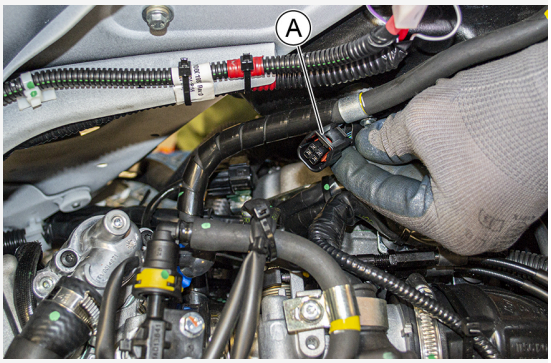
- Remove the right side fairing and the spoiler terminal.



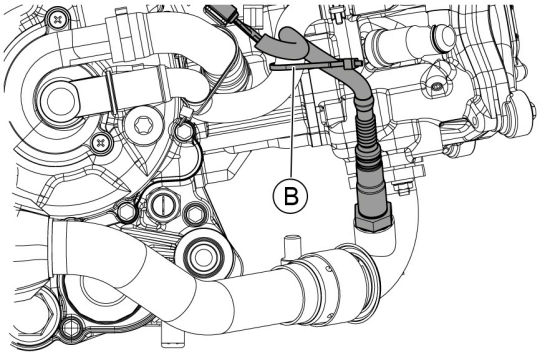
ATTENTION

BEFORE CARRYING OUT THE FOLLOWING OPERATIONS, LET THE ENGINE AND THE SILENCER TO COOL OFF AT AMBIENT TEMPERATURE TO AVOID POTENTIAL BURNS.

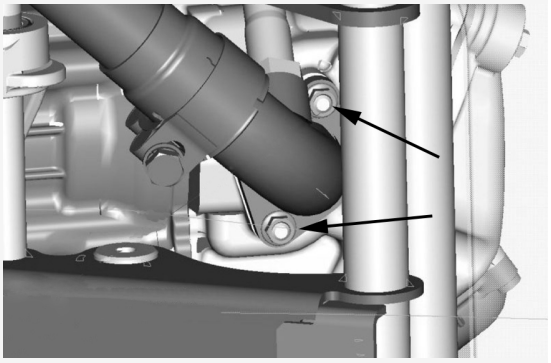
- Disconnect the lambda probe connector (**A**).



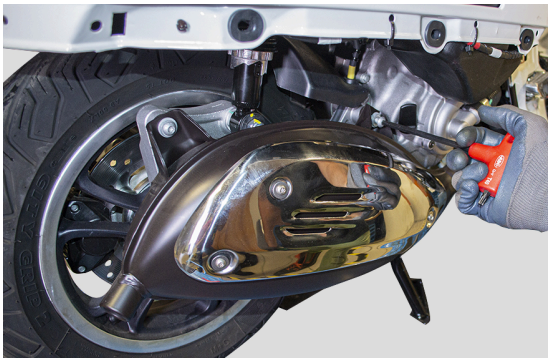
- Remove the clamp (**B**) holding the lambda probe cable to the coolant pipe.



- Undo the two exhaust manifold fixings on the head. To unscrew the nuts that fix the silencer flange to the head properly, use a jointed wrench that allows, according to the travel direction, to get also at the right nut. That is difficult to do with a traditional straight wrench.



- Undo the three screws that fix the muffler to the support arm.



- Remove the complete silencer.



- Unscrew the three screws fastening the heat shield, along with the respective washers.

- Remove the heat shield from the silencer.

- Remove the three rubber pieces from the heat shield.



- Remove the lambda probe from the manifold.

WARNING

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



FITTING

- Insert and tighten to the specified torque the lambda probe on the manifold.



- Pre-assemble the three rubber pads on the heat shield.

- Position the heat shield on the silencer and insert the three screws and washers.

- Tighten the three screws to the prescribed torque.

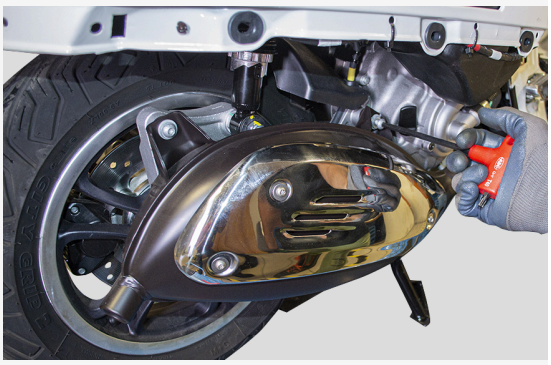


- Position the exhaust silencer in its seat, taking care to insert the manifold in the head correctly.



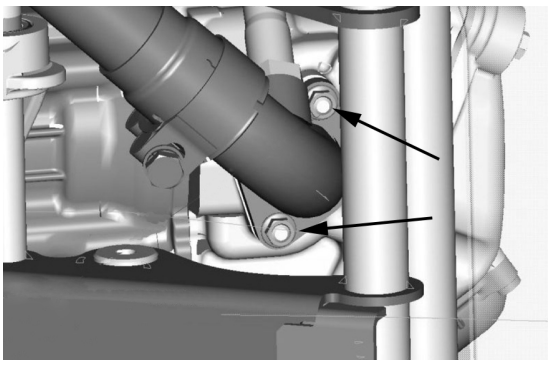
- While supporting the muffler, insert the three lateral fixing screws with their washers.

- Tighten the three screws to the prescribed torque.



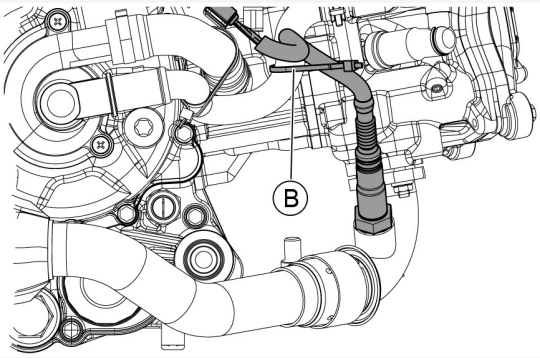
- Position the fixing flange of the silencer on the head.

- Gradually screw in and tighten the nuts securing the silencer to the big end, ensuring that the flange is always parallel to the mating face on the big end.

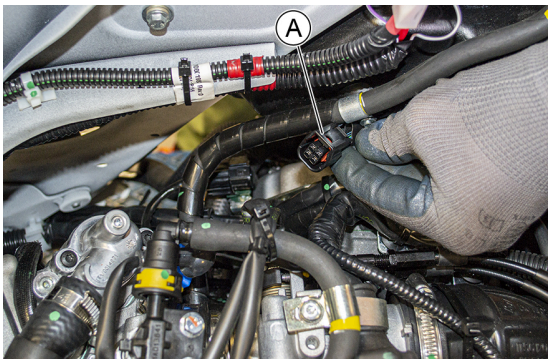


- Assemble the wiring harness of the lambda probe as indicated in figure.

- Use a cable tie (**B**) to secure the lambda probe wiring harness to the water pipe, as shown in the figure.

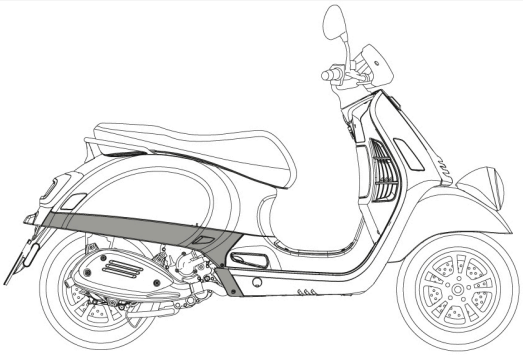


- Connect the lambda probe connector (**A**).



- Fit the spoiler terminal and the right side fairing.

- Fit the helmet compartment and lower the saddle.



7.2 Removing the engine from the vehicle

ATTENTION

SUPPORT THE VEHICLE ADEQUATELY.

To remove the engine from the vehicle, proceed as follows:

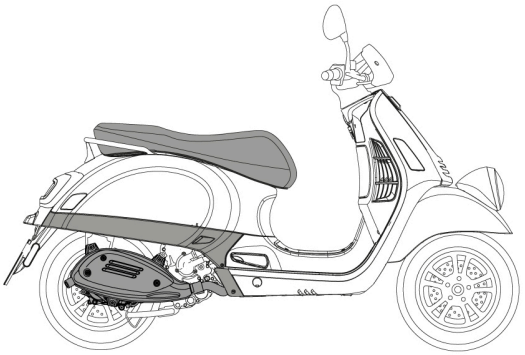
- Disconnect the battery.

- Remove the seat.

- Remove the helmet compartment.

- Remove the side fairings and the spoiler terminals.

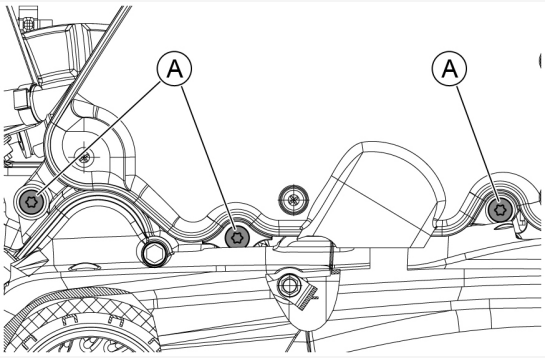
- Remove the complete silencer.



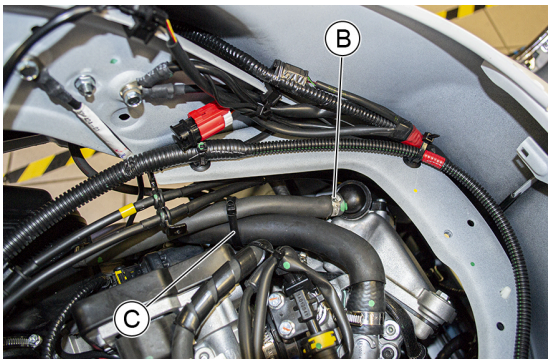
ATTENTION

BEFORE CARRYING OUT THE FOLLOWING OPERATIONS, LET THE ENGINE AND THE SILENCER TO COOL OFF AT AMBIENT TEMPERATURE TO AVOID POTENTIAL BURNS.

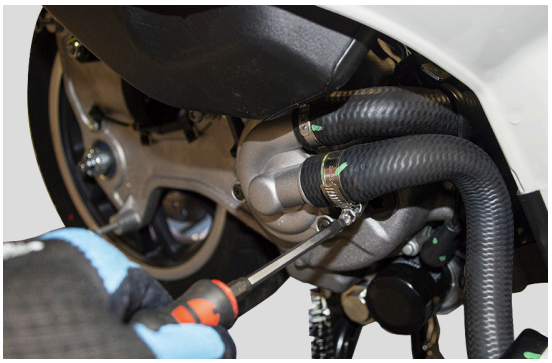
- Unscrew the three screws **(A)** used to fasten the air filter box to the crankcase.

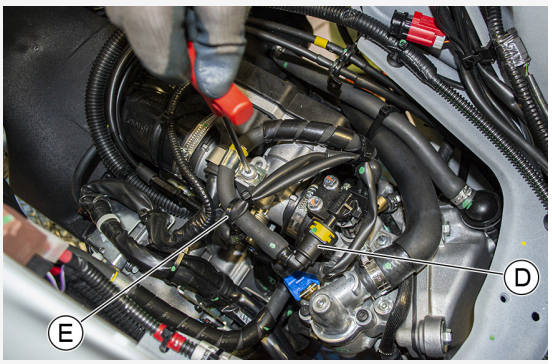


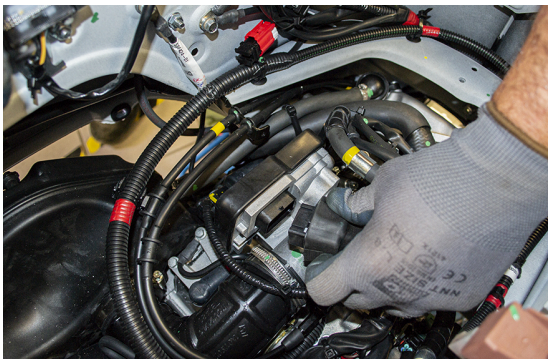


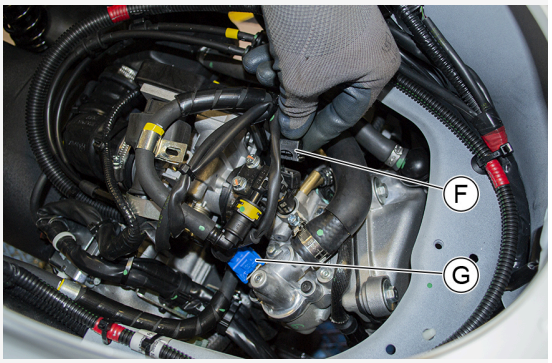

B
C

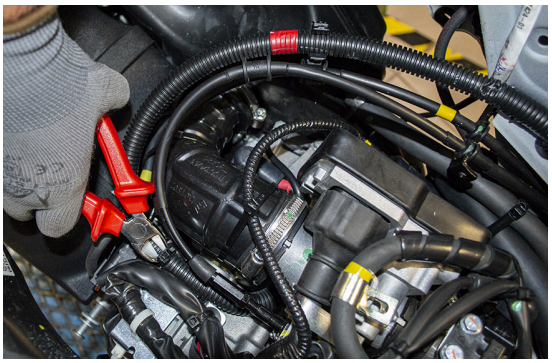


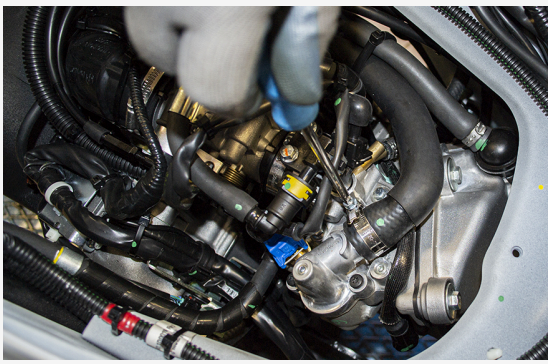


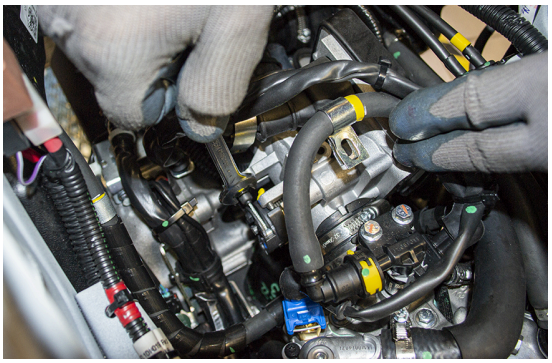

D
E

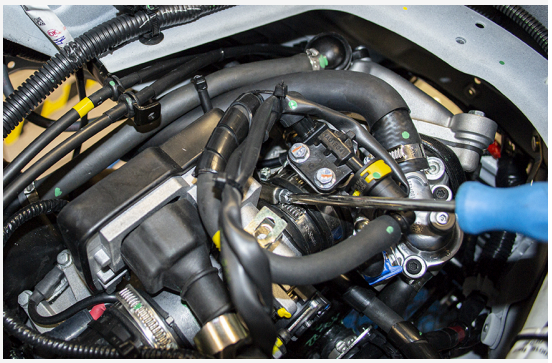


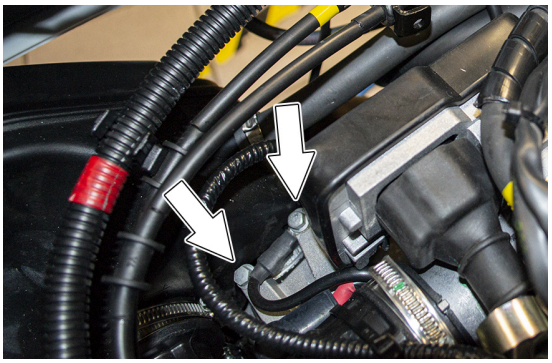

F
G



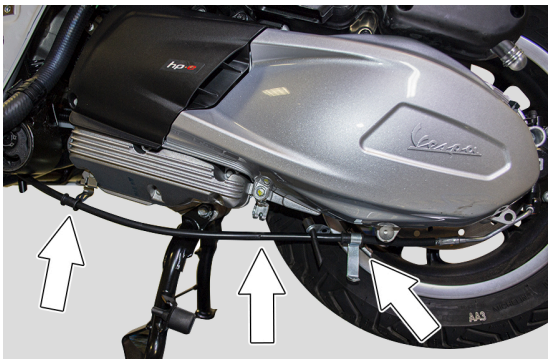


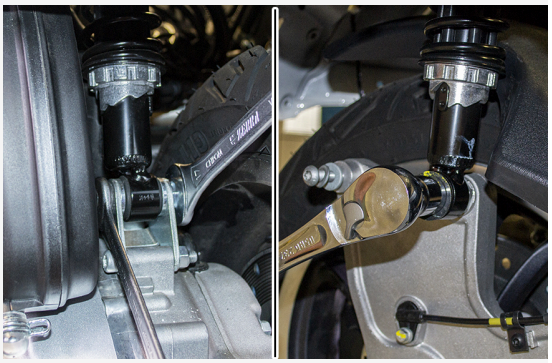


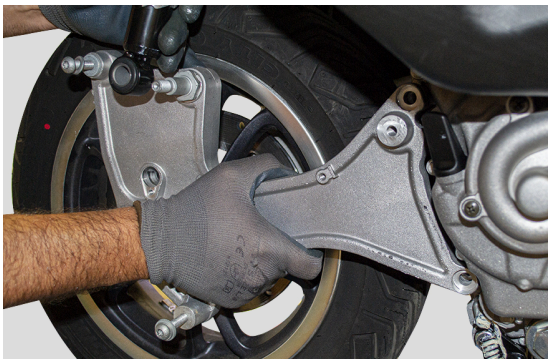


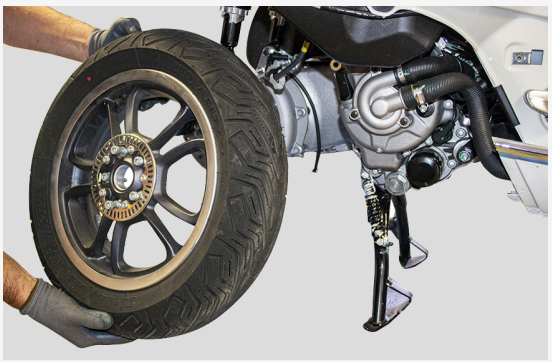


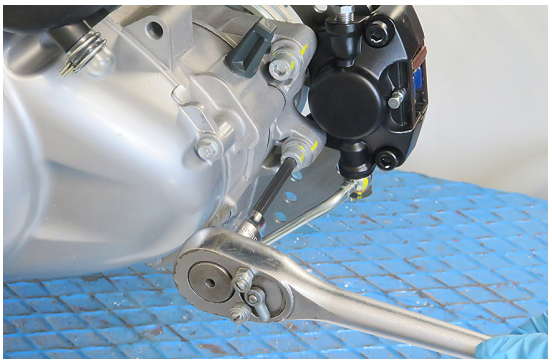




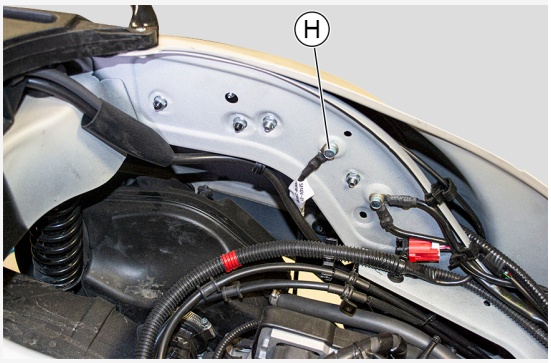


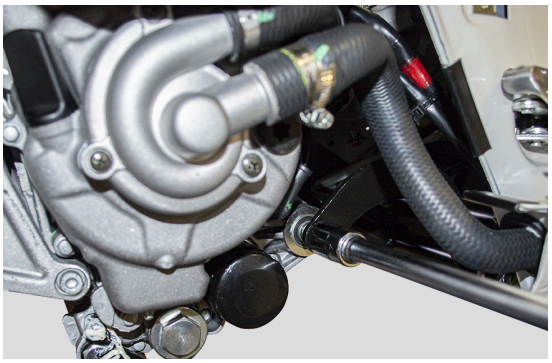


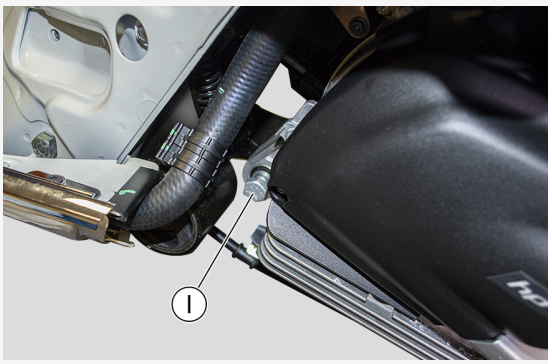




- Operating on the left-hand side, unscrew and remove the screw **(H)** with the relevant washers to disconnect the engine ground cable.







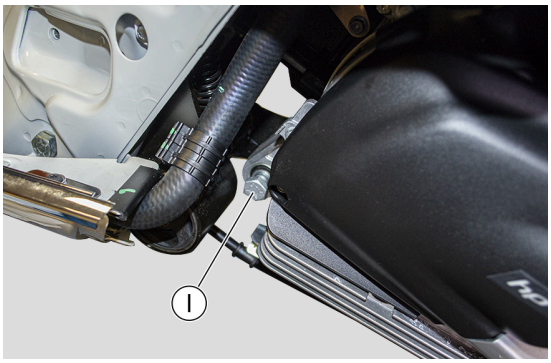
7.3 Fitting the engine on the vehicle

ATTENTION

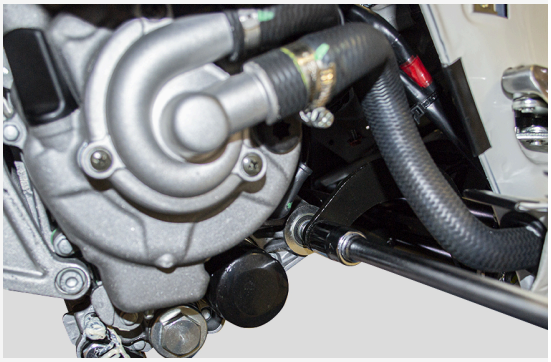
SUPPORT THE VEHICLE ADEQUATELY.

- Ensure that the engine is adequately supported, then position it on the vehicle.

- Working on the left side, insert the pin **(I)**.

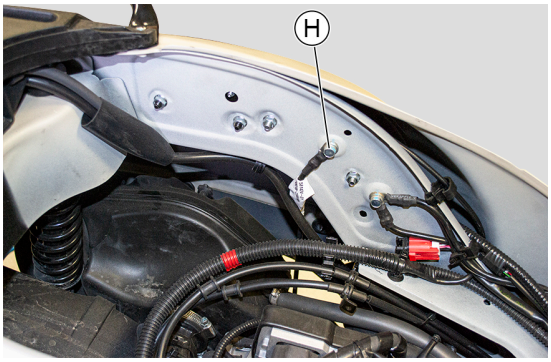


Engine - swinging arm pin	71 ± 4 Nm

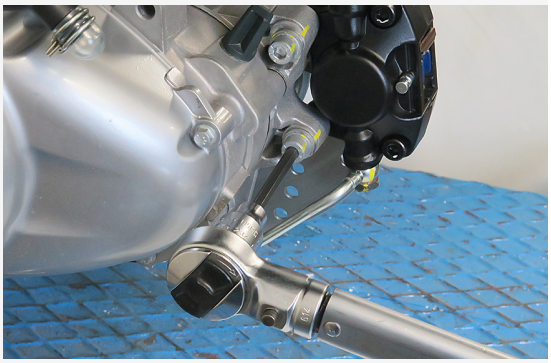


- Operating on the left-hand side, tighten the screw **(H)**, with the relevant washers, to the specified torque for connecting the engine earth cable.

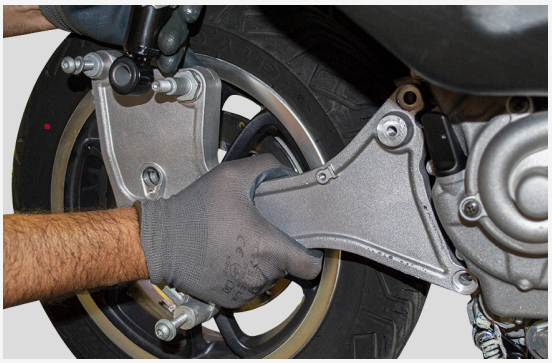
Earth cable - Body	8.5 ± 1 Nm



Rear brake calliper - Engine	22.5 ± 2.5 Nm



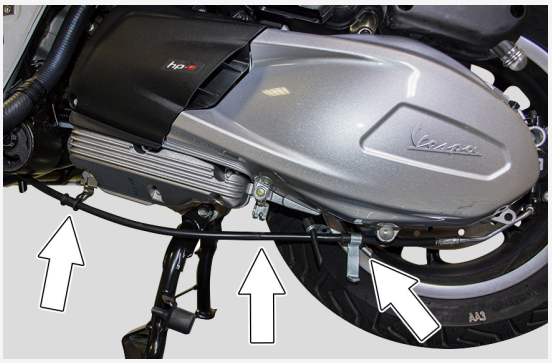




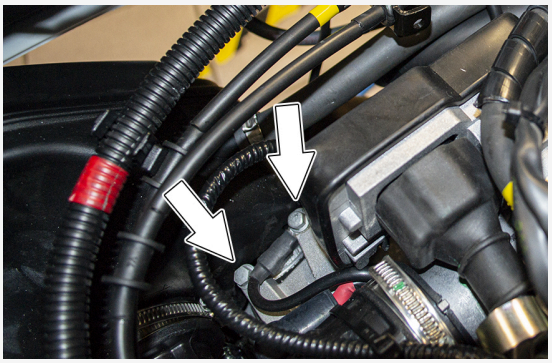
Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm
Rear shock absorber - Engine	42.5 ± 2.5 Nm







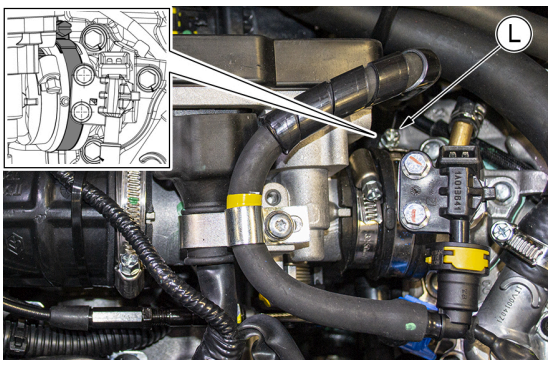




- Mount the throttle body.

- Insert the inlet coupling sleeve and tighten the clamp **(L)** to the specified torque.

Rubber sleeve hose clamp - air inlet fitting	1 ± 0.15 Nm

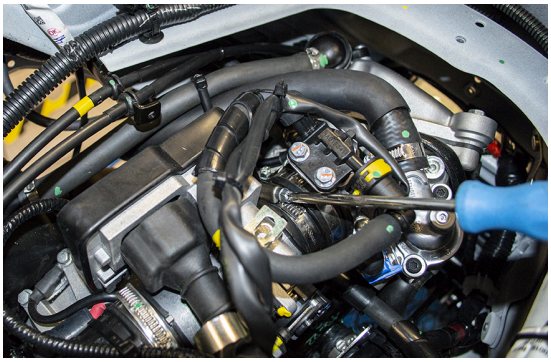


ATTENTION

DO NOT OVER-TIGHTEN THE HOSE CLAMP TO THE RUBBER SLEEVE AS

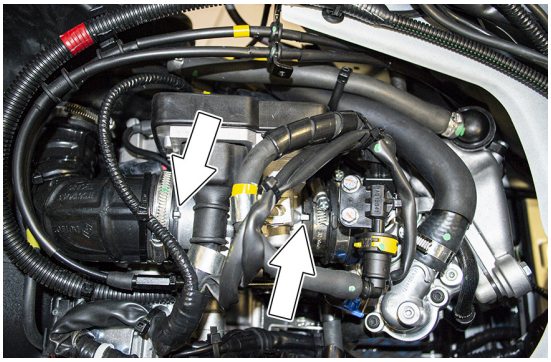
THIS MAY CAUSE DEFORMATION AND/OR BREAKAGE.

OBSERVE THE TIGHTENING TORQUE VALUE.

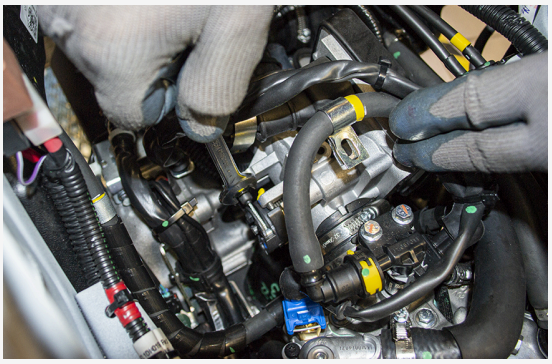


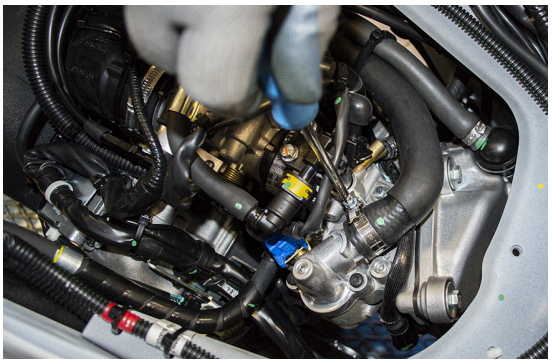
- Insert the air filter sleeve and tighten the clamp.

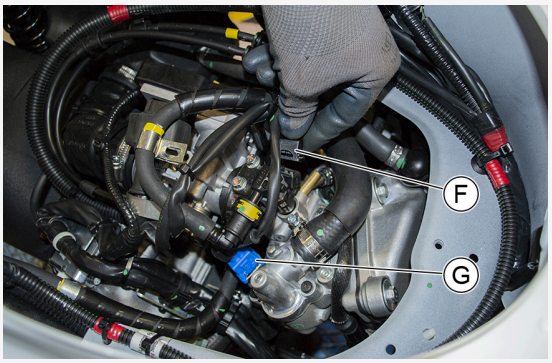
- Pay particular attention to the sleeves, taking care to position the marks of the throttle body as shown in the picture.

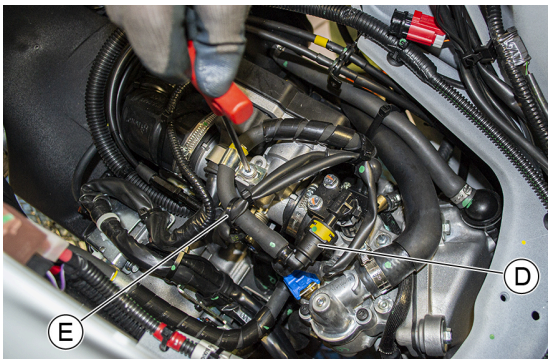


- Connect the connector of the injection control unit.

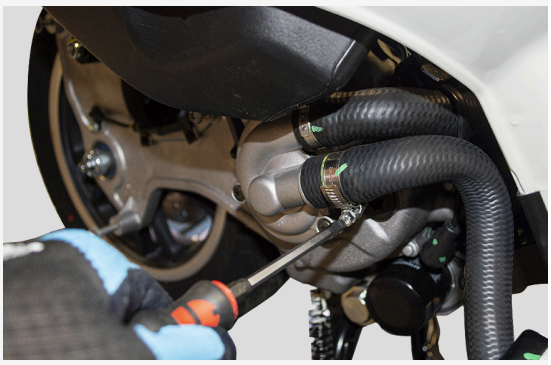


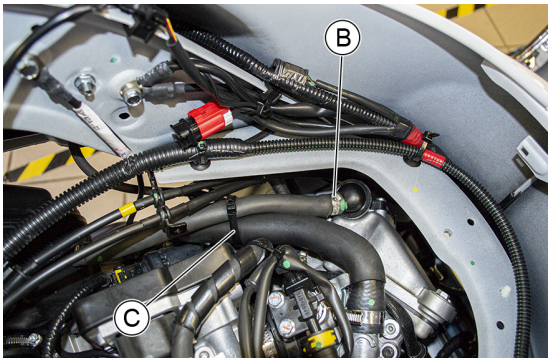




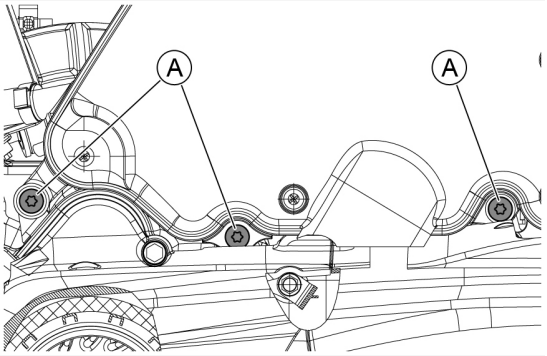


Pipe clamp	2.75 ± 0.25 Nm	



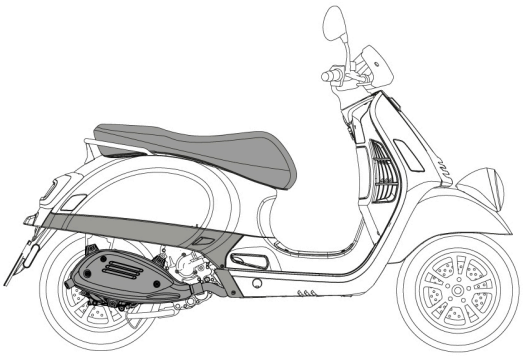


- Insert and tighten the three screws **(A)** used to fasten the filter housing to the crankcase.





- Fit the complete silencer.
- Mount the side fairings and the spoiler terminals.
- Fit the helmet compartment.
- Fit the saddle.
- Connect the battery.



-Check the engine oil level and if necessary top it up with the recommended type.

- Fill and bleed the cooling circuit.

- Check accelerator and electric devices for correct functioning.

LIST OF TOPICS

Injection

MIU injection system

This vehicle is fitted with an integrated injection and ignition system.

Injection is indirect in the manifold through an electro-injector.

The injection and ignition are timed on the four-stroke cycle by means of a tone wheel keyed on to the crankshaft (24-2 teeth) and pick-up sensor.

Mixture and ignition are managed on the basis of engine revs and throttle valve opening. Further corrections are made according to the following parameters:

- Coolant temperature

- Intake air temperature

- Lambda probe

The system implements cold engine idle fuel/air mixture correction with a stepper motor on a by-pass circuit of the throttle valve. The control unit manages the Stepper motor and the injector opening time, thereby ensuring the idle steadiness and the proper mixture.

In all conditions of use, mixture preparation is managed by modifying the injector opening time.

The fuel system pressure is kept constant in relation to ambient pressure.

The **Fuel system circuit** consists of:

- Fuel pump

- Fuel filter

- Injector

- Pressure regulator

The pump, the filter and the regulator are placed inside the fuel tank on a single support.

The injector is connected by a pipe with fast-release fittings. The pressure regulator is located at the beginning of the circuit.

The fuel pump is controlled by the MIU control unit; this ensures safety of the vehicle.

The **ignition circuit** consists of:

- H.V. coil.

- H.V. cable.

- Shielded cap

- MIU control unit

- Spark plug

The MIU control unit manages ignition with the best advance ensuring four-stroke timing (ignition only in the compression phase) at the same time.

The MIU injection-ignition system controls engine functions by means of a pre-set program.

Should any input signals fail, an acceptable working order of the engine is ensured to allow the user to reach a service station.

Of course, this cannot happen when the rpm-timing signal is missing, or when the failure involves the control circuits:

- Fuel pump

- H.V. coil.

- Injector

The control unit is fitted with a self-diagnosis system connected to a warning light on the instrument panel.

Failures are detected and restored by the diagnostic tester.

In any case, when the fault is no longer present, data storage is automatically wiped clean after 16 cycles of use (cold starting, running at regular engine temperature, stop).

The diagnostic tester is also required to adjust the idle mixture.

020922Y Diagnosis Tool

The MIU injection-ignition system carries out checks on the rpm indicator and the electric fan for radiator cooling.

The MIU control unit has a decoder for the anti-theft immobilizer system.

The MIU control unit is connected to a diagnostic LED on the instrument panel, that also carries out the deterrent flashing functions.

The MIU control unit power supply is furthermore controlled by the emergency switch; this to ensure vehicle security still further.

8.1 Precautions

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

2. The fuel supply system is pressurised at 300 kPa (3 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 MIU control unit connector, perform the following steps in the order shown:

- Set the switch to «OFF»

- Disconnect the battery

Failure to respect this norm may damage the control unit.

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

11. In order to not cause damage, disconnect and reconnect the connectors of the MIU system only after proven necessary. 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 MIU control unit.

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

Troubleshooting tips

1) A failure of the EMS system is more likely to be due to the connections than to the components.

Before troubleshooting the MIU system, carry out the following checks:

A: Electrical power supply

a. Battery voltage

b. Blown fuse

c. Relays

d. Connectors

B: Frame 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. Faulty Stepper motor

F: Other

a. Wrong timing system

b. Wrong idle mixture

c.Incorrect reset of the throttle valve position sensor

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

Check the connectors taking into consideration the following point:

A: check that the terminals are not bent.

B: check that the connectors have been properly connected.

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

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

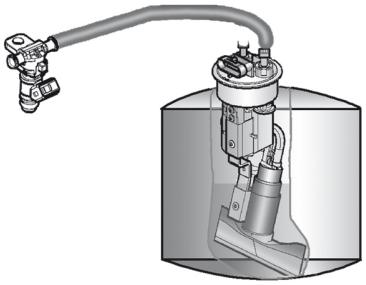
4) Use a multimeter with an internal resistance over 10 KW/V for troubleshooting. Using unsuitable instruments may damage the MIU ECU. The instruments to be preferred have a definition over 0.1V and 0.5W and an accuracy over 2%.

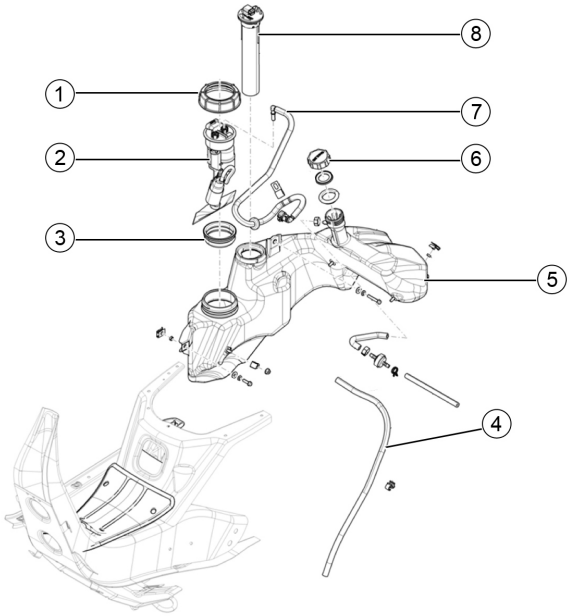
8.2 Fuel system

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 PUMP

Remove the fuel tank.



ATTENTION

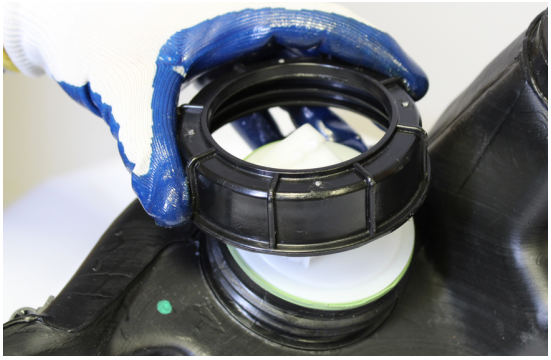


FUEL IS HIGHLY FLAMMABLE. DO NOT SMOKE AND KEEP ALL NAKED FLAME AND SOURCES OF SPARKING OUT OF THE AREA: FIRE HAZARD. DO NOT INHALE THE FUEL SMOKE. DO NOT ALLOW FUEL TO COME INTO CONTACT WITH PLASTIC COMPONENTS OR THE BODYWORK OF THE VEHICLE.

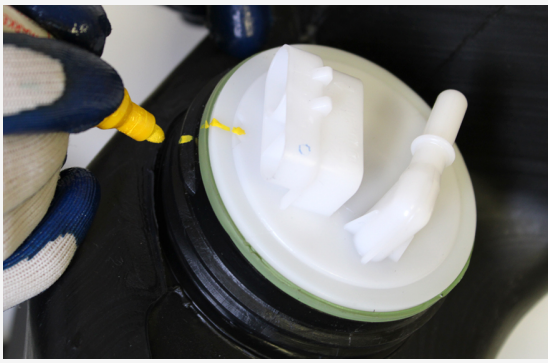
Unscrew the fastener ring of the fuel pump, turning anticlockwise.



Remove the fastener ring of the fuel pump.

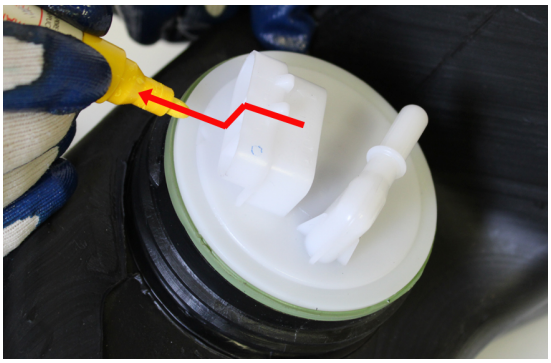


Mark the correct orientation of the fuel pump relative to its seat on the tank with a marker pen.

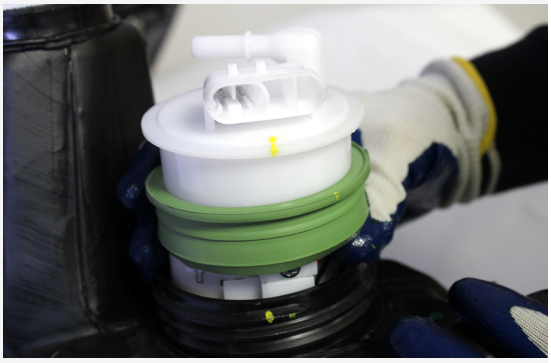


NOTE:

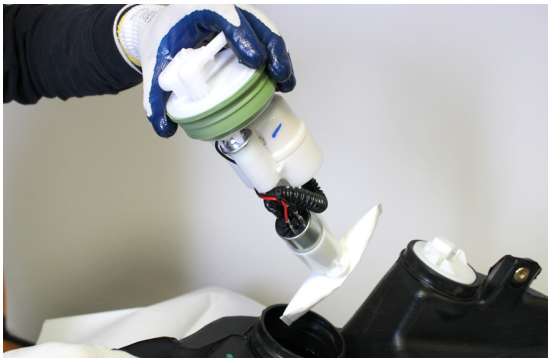
Apply the marking on the fuel pump and the relative seat as shown in the figure.



Lift the fuel pump and rock it back and forth and side to side to disengage it from the gasket.



Disengage the gasket from the tank and extract the complete fuel pump.

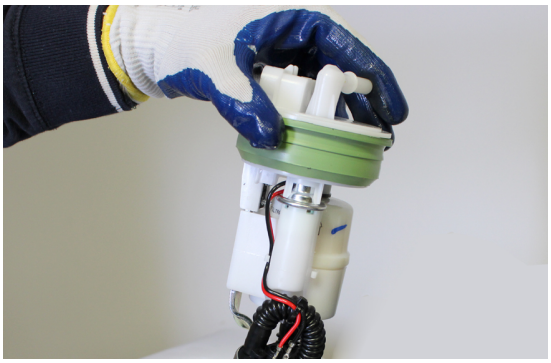


FITTING THE COMPLETE FUEL PUMP

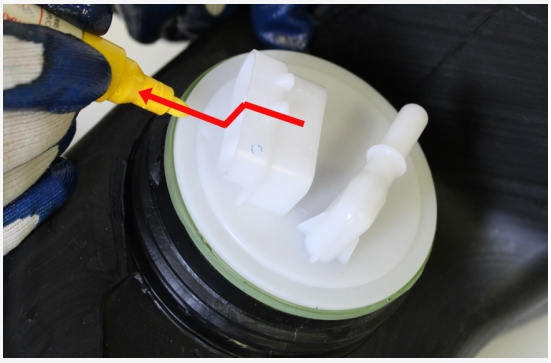
Slide the new gasket onto the fuel pump casing.



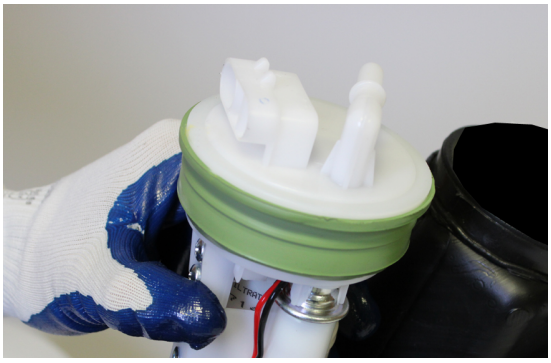
Slide the gasket over the pump and fit it provisionally into the upper seat on the fuel pump.



Apply the assembly marking to new fuel pump as shown in the figure.

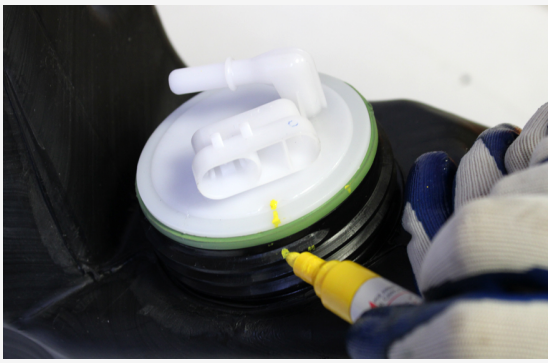


Place the complete fuel pump inside the tank.



NOTE:

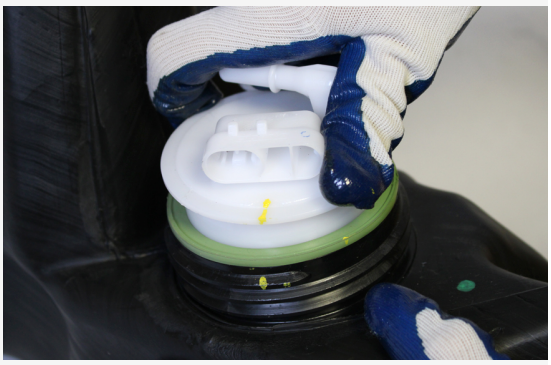
Ensure that the fuel pump is oriented correctly by aligning the markings made previously on the pump and on the relative seat.



Fit the gasket, pushing downwards to ensure that it is flush with the surface of the tank.



Push the fuel pump downwards to bring it against the gasket.



Fit the fastener ring of the fuel pump.



Tighten the fastener ring of the fuel pump firmly, turning clockwise.

Refit the fuel tank on the vehicle.

WARNING

MAKE SURE THAT THE FASTENER RING IS TIGHTENED COMPLETELY.



REMOVING THE COMPLETE FUEL SENSOR

Unscrew the fuel level sensor, turning anticlockwise; use the specific tool included with the vehicle if necessary.

020442 Y Pulley lock wrench



Remove the fuel level sensor from the fuel tank.

ATTENTION

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

Insert the fuel gauge with 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.

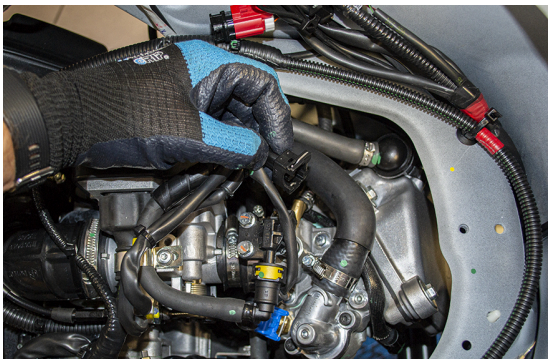
020442 Y Pulley lock wrench



8.2.1 Removing injector

To remove the injector, proceed as follows:

- Raise the saddle.
- Remove the helmet compartment.
- Disconnect the connector of the injector.



- Disconnect the fuel pipe connector.

ATTENTION

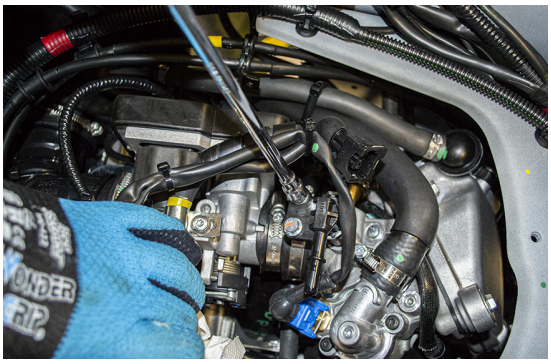
AVOID PERFORMING THESE OPERATIONS WHILE THE ENGINE IS HOT.

WARNING



BEWARE OF ANY FUEL LEAKAGE WHILE DISASSEMBLING THE HOSE. ELIMINATE ANY LEAKED FUEL AND CLEAN THE PARTS IN THE VICINITY OF THE PIPE WITH A CLEAN CLOTH.

- Unscrew and remove the two fixing screws of the injector.

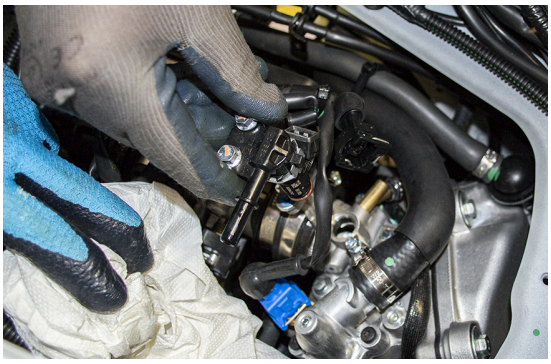


- Remove the injector.



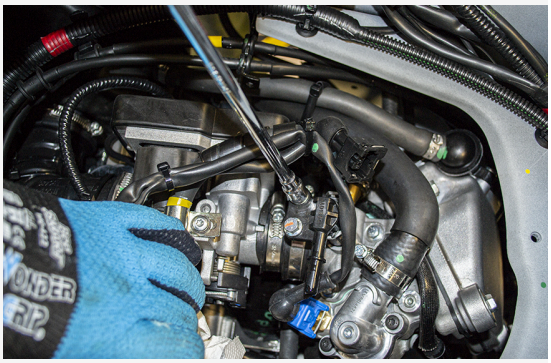
8.2.2 FITTING injector

- Lubricate the sealing OR gasket with engine oil before fitting the injector on the manifold.
- Refit the injector in its seat.



- Insert and tighten the two fixing screws of the injector applying the prescribed torque.

Injector - Head	3.5 ± 0.5 Nm



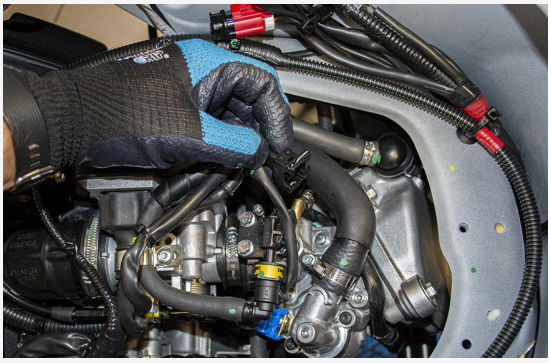
- Connect the fuel pipe to the injector.

ATTENTION

AVOID PERFORMING THESE OPERATIONS WHILE THE ENGINE IS HOT.



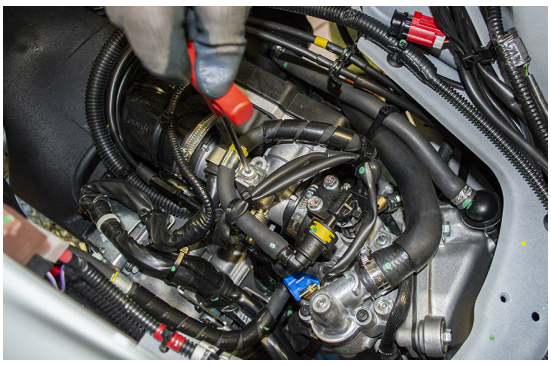
- Connect the electric injector connector.
- Refit the helmet compartment.
- Lower the saddle.



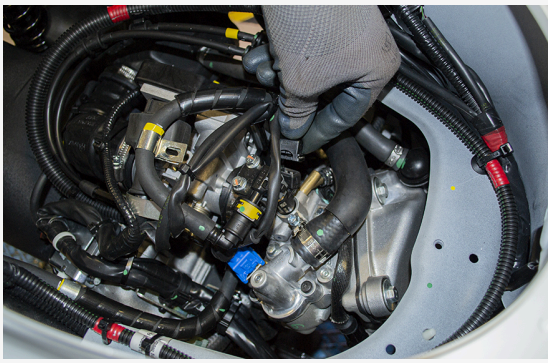
8.2.3 Throttle body removal

To remove the throttle body, proceed as follows:

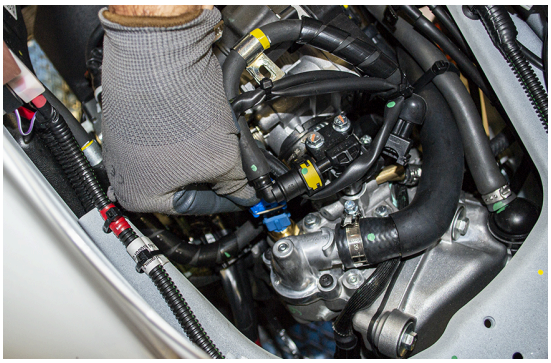
- Unscrew and remove the fuel pipe clamp fastening screw.



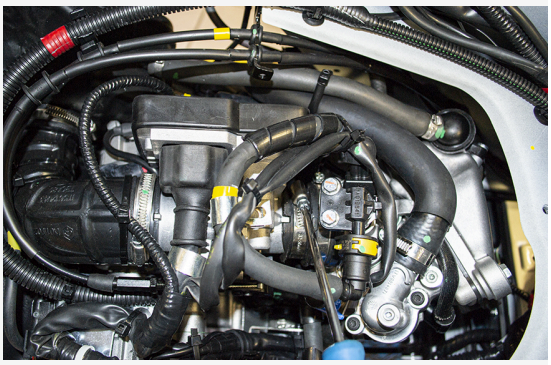
- Disconnect the injector connector.



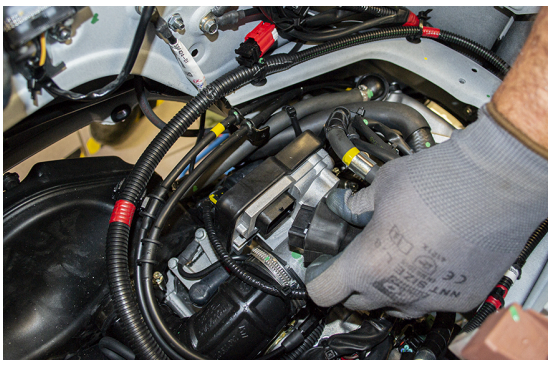
- Disconnect the engine temperature sensor connector.



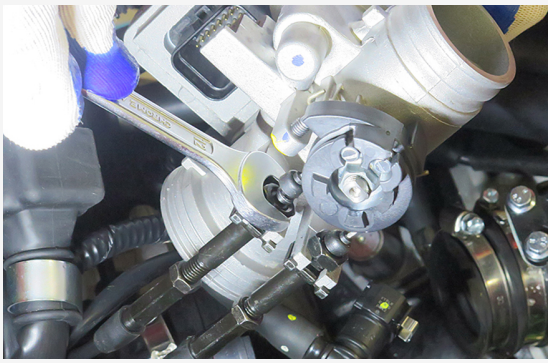
- Loosen the clamps of the intake manifold and of the filter box connection sleeve.



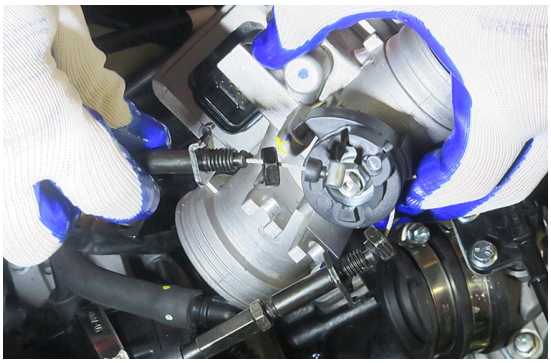
- Disconnect the connector of the control unit.



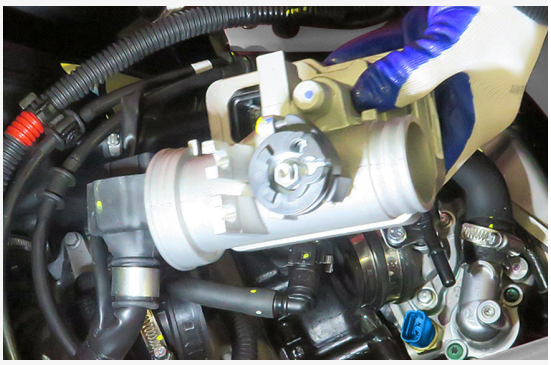
-Loosen the fixing nuts of the throttle control transmissions.



- Disconnect the throttle control cables.

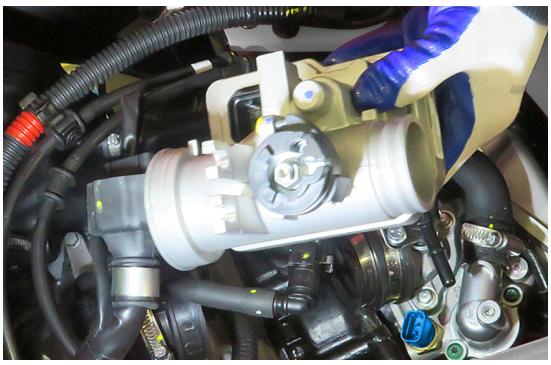


- Remove the throttle body.

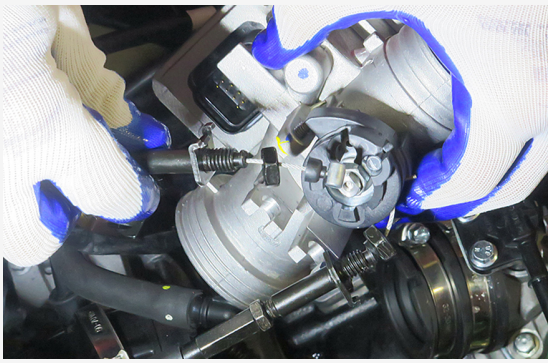


8.2.4 Throttle body fitting

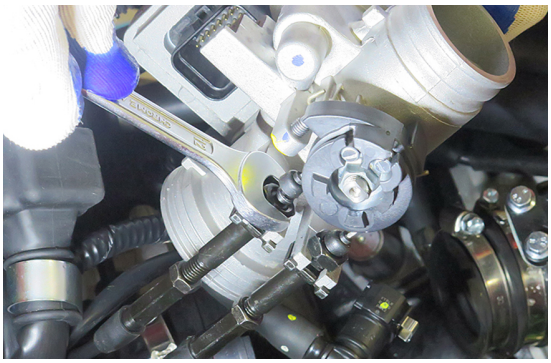
- put the throttle body.



- Connect the throttle control cables.



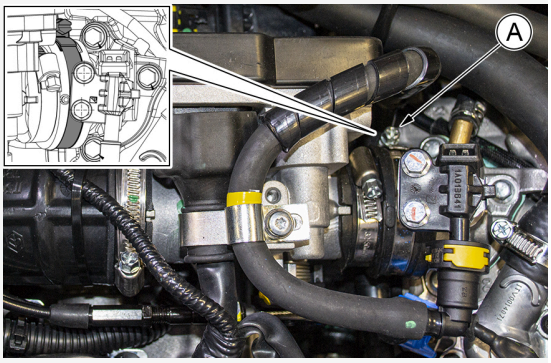
-Tighten the fixing nuts of the throttle control transmissions.



- Put the throttle body in the intake manifold and in the connection pipe to the filter box.

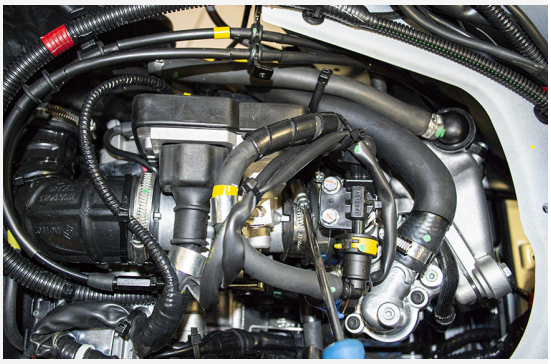
- Insert the inlet coupling sleeve and tighten the clamp **(A)** to the specified torque.

Rubber sleeve hose clamp - air inlet fitting	1 ± 0.15 Nm



- Insert the air filter sleeve and tighten the clamp.

- Pay particular attention to the sleeves, taking care to position the marks of the throttle body as shown in the picture.

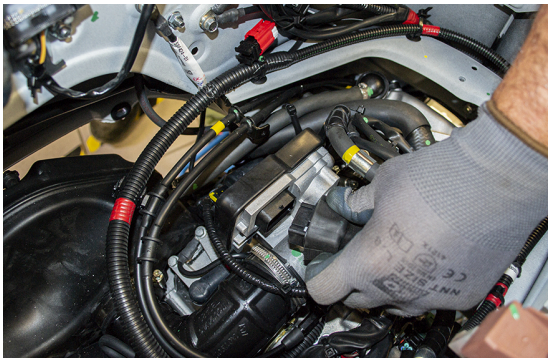


ATTENTION

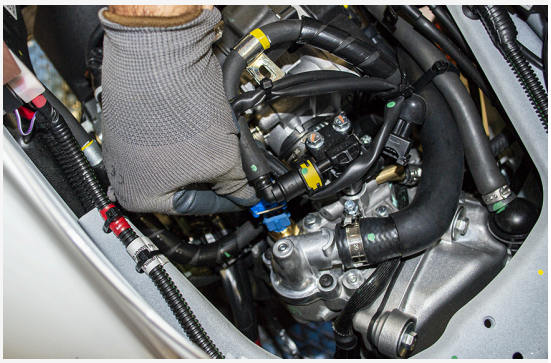
DO NOT OVER-TIGHTEN THE HOSE CLAMP TO THE RUBBER SLEEVE AS THIS MAY CAUSE DEFORMATION AND/OR BREAKAGE.

OBSERVE THE TIGHTENING TORQUE VALUE.

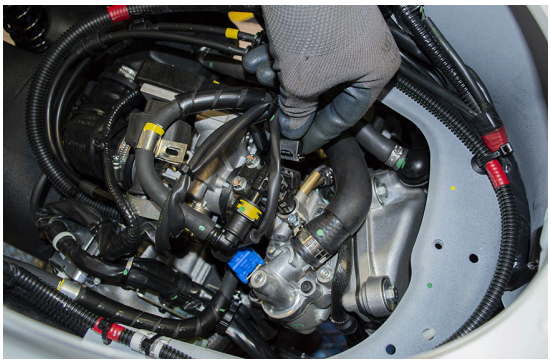
- Connect the control unit connector.



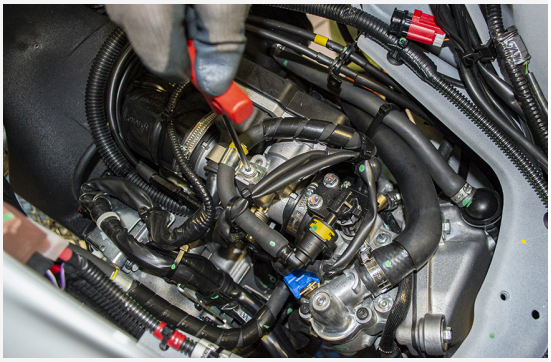
- Connect the engine temperature sensor connector.



- Connect the injector connector.



- Insert and tighten the screw that fastens the fuel pipe clamp.



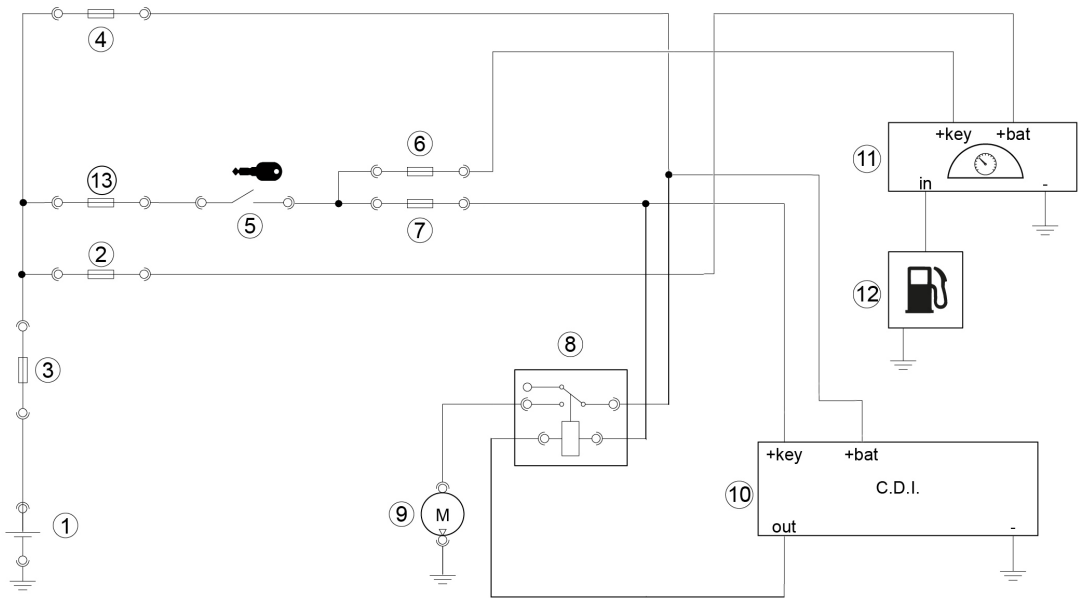
predelivery ASR SYSTEM calibration/ ECU replacement

In case of predelivery vehicle, or following the replacement of the engine management control unit, on which the ASR system initialisation procedure has never been performed, proceed as follows.

After turning the ignition key to "**ON**", the ABS warning light flashes and the ASR icon is switched on steady.

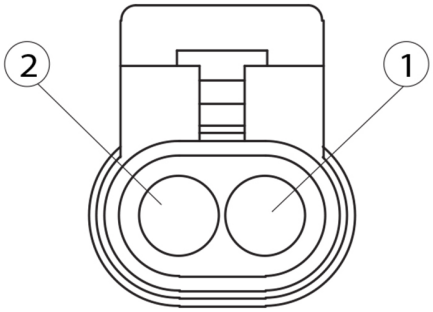
1. Start the vehicle and ride a short distance of more than 5 km/h and wait for the flashing of the ASR warning light to stop. The ASR icon stays switched on steady.
2. Stop the vehicle and leave the engine running at idle speed for at least 3 seconds.
3. Press the engine start button for at least 4 seconds (it is indifferent to pull the left brake lever).
4. The activation process will be confirmed by the ASR icon switching on with slow flashing (1 flash every 2 seconds).
5. Accelerate to a constant speed of 30 km/h and maintain it for at least to 10 seconds.
6. The end of the procedure will be indicated by the turning off of the ASR icon.
7. Once the procedure is complete, turn the ignition key to "**OFF** " and wait at least 30 seconds until switching back to "**ON** " again.
8. If the procedure is not completed within 2 minutes, the ASR icon will remain on continuously and the ASR will remain off until the next time the ignition switch is turned to the "**OFF**" position.
9. To reactivate the ASR, it is necessary to turn it to "**ON**" position and repeat the procedure until successful.

8.2.5 Pump supply circuit



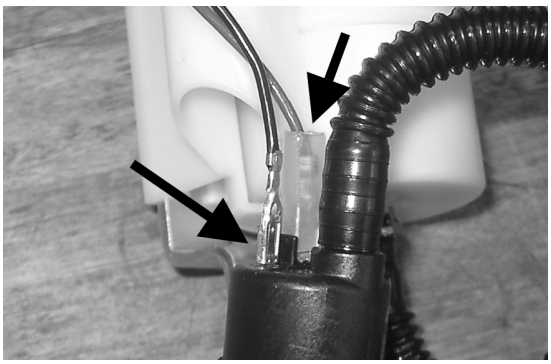
1. Battery 12V
2. Fuse no.1 of 5A
3. Fuse no. 9 of 30A
4. Fuse no.3 of 10A
5. Key switch
6. Fuse no. 6 of 5A
7. Fuse no. 5 of 5A
8. Injection load relay

9 . Fuel pump
10 . Electronic injection control unit
11 . Instrument panel
12 . Fuel level indicator
13 . Fuse no. 8 of 15A

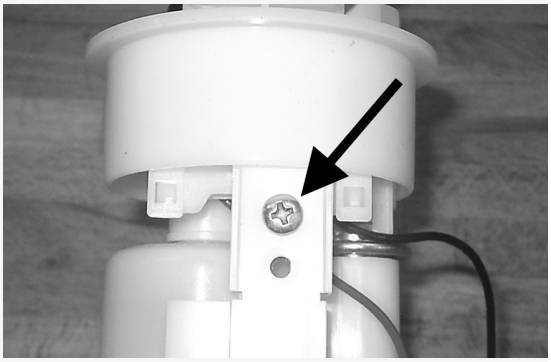


8.2.7 Fuel filter check

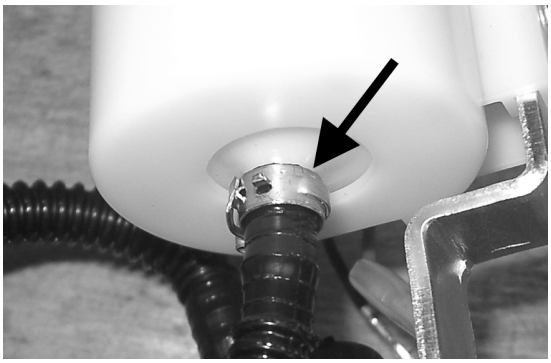
Disconnect the terminals of the electrical pump



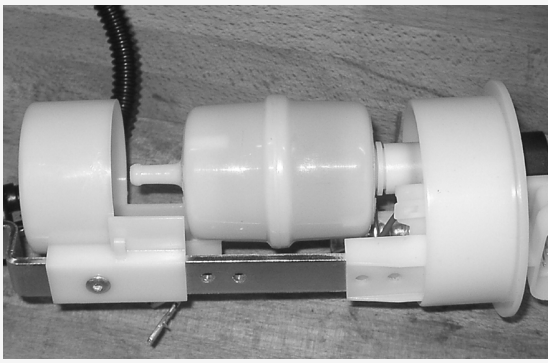
Remove the screw shown in the picture



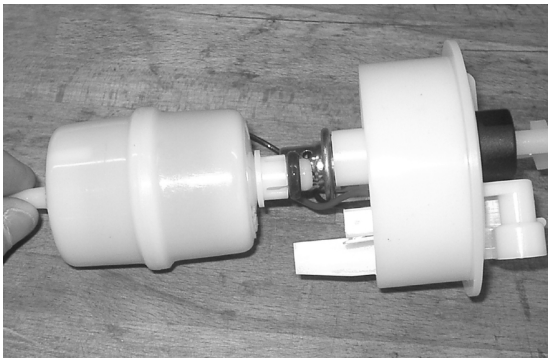
Remove the clamp fixing the piping to the filter shown in the photograph



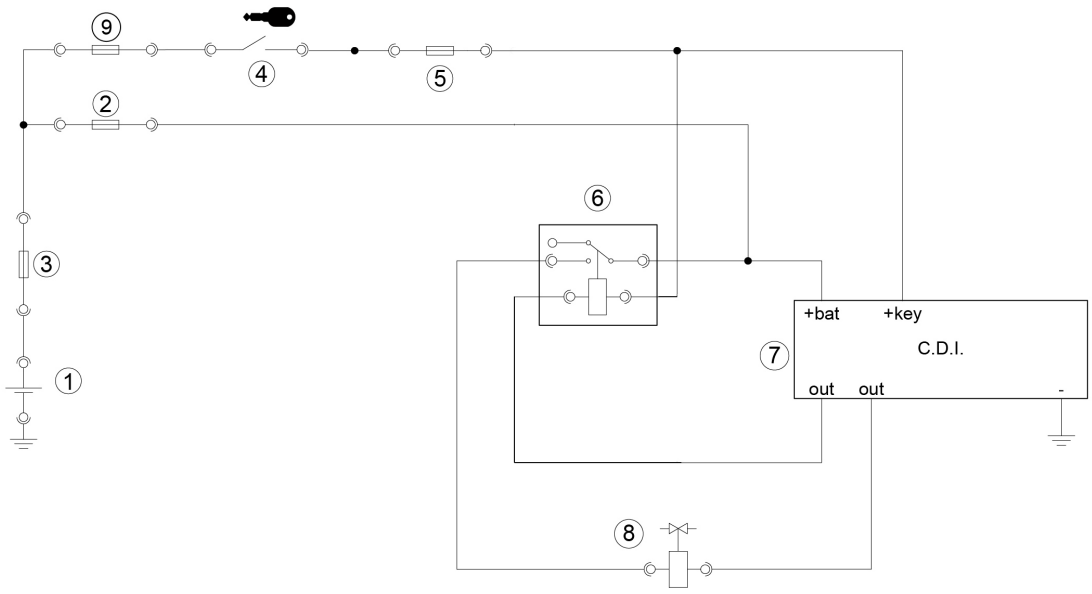
Separate the lower part of the pump mounting as shown in the picture.



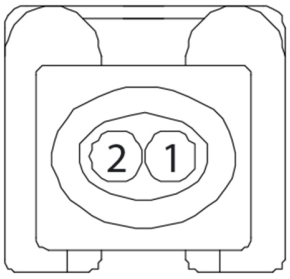
Remove the filter from the pump mounting



8.2.8 Injector circuit check



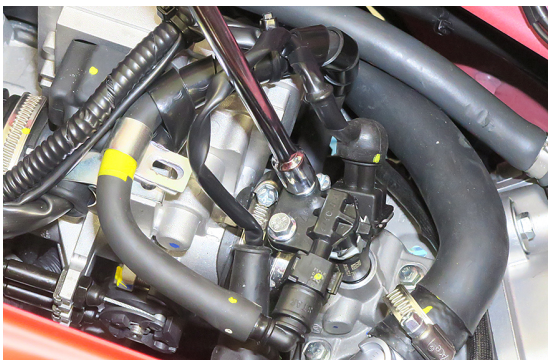
Switch to «**ON**» and check that, with the injector disconnected and the control unit connected, there is a voltage present between pin 1 on the injector connector and ground.



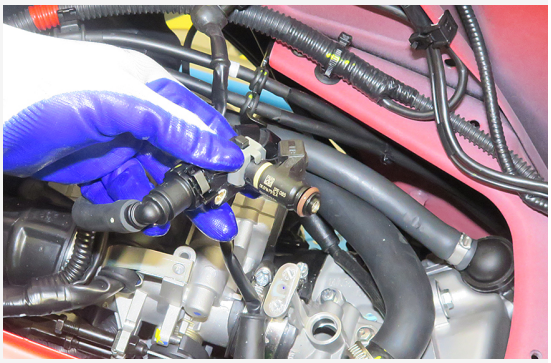
8.2.9 Hydraulic check of the injector

To check the injector, proceed as follows:

- Unscrew and remove the screws that fasten the injector to the intake manifold.



- Remove the injector from the intake manifold.



- Install the specific tool to check the fuel pressure and put the manifold on a graduated container of at least 100 cm³.

- Connect the injector with the supplied cable for the injection tester.

- Connect the cable terminals to an auxiliary battery and activate the fuel pump with the diagnostics active.

020480Y Fuel pressure measurement kit



- Check that within 15 approx. 44 cm³ of fuel is delivered with an adjustment pressure of approx. 3 BAR.



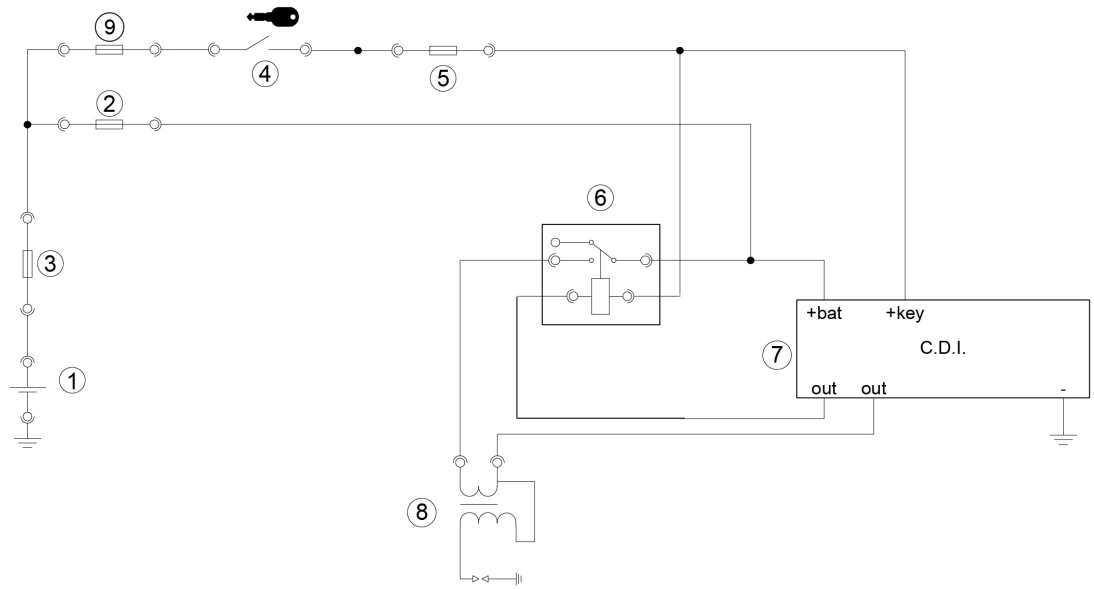
Proceed with the injector seal test.

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.

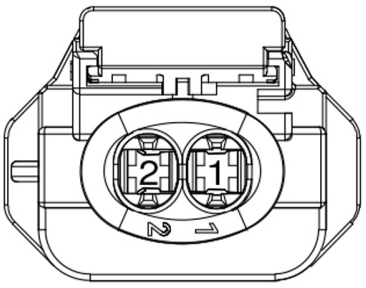
Value limit = 1 drop per minute



8.3 H.V. coil



Switch to «**ON**» and check that, with the coil disconnected and the control unit connected, there is a voltage present between pin 1 on the coil connector and ground.



8.4 Throttle valve position reset

Resetting the throttle valve position signal (TPS reset)

The MIU control unit is supplied with a throttle valve position sensor that 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 Stepper motor 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 have 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.

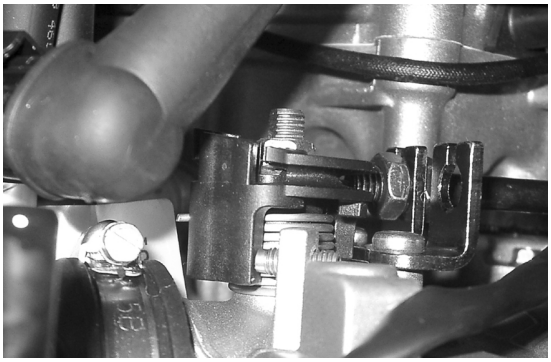
Connect the diagnostic tester.

Turn to «**ON**».

Select the functions of the diagnostic tester on «**TPS RESET**».

020922Y Diagnostic instrument

Make sure that the throttle valve with the control is supporting the stop screw.



Guaranteeing that this position will be kept, send a confirmation for the TPS reset procedure.

Reset should be performed in the following cases:

- on first fitting.

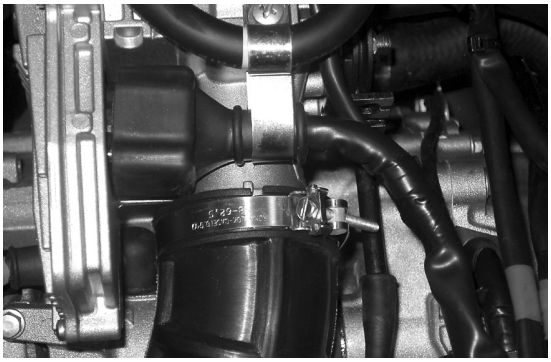
- if the injection control unit is replaced.

NOTE

☞

THE TPS RESET PROCEDURE MUST NOT BE CARRIED OUT WITH A USED THROTTLE BODY BECAUSE POSSIBLE VALVE WEAR AND STOP WEAR FOR THE MINIMUM OPENING MAKE THE AIR FLOW DIFFERENTLY FROM THAT OF PRE-CALIBRATION.

Given that the TPS resetting is also done when the control unit is replaced, place the control unit - filter box bellows at 45° during the refitting operation as shown in the picture.



LIST OF TOPICS

Suspension

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

9.1 Front

HANDLEBAR AND STEERING

DESCRIPTION	TORQUE
Throttle control sleeve - Handlebar tube	5 ± 1 Nm
Handlebars - Steering tube	52.5 ± 2.5 Nm
Rear-view mirror - Brake pump	30 ± 1 Nm
Top fairing - Top fairing support	5.75 ± 1.25 Nm
instrument cluster - Instrument cluster support	5 ± 0.5 Nm
Throttle control cable - RH switchgear set	2.5 ± 0.5 Nm
U-bolt - RH switchgear set	3.5 ± 0.5 Nm
RH switchgear set - Handlebar	2.5 ± 0.5 Nm
LH switchgear set - Handlebar	2.5 ± 0.5 Nm
Handlebar end – Handlebars	8.5 ± 1.5 Nm

FRONT SUSPENSION

DESCRIPTION	TORQUE
Wheel axle nut - wheel axle	85 ± 8 Nm
Front wheel - Front hub	21.5 ± 2.5 Nm
Shock absorber - Shock absorber plate	22.5 ± 3.5 Nm
Shock absorber - Shock absorber attachment bracket	24 ± 5 Nm
Shock absorber attachment bracket - Steering tube	21.5 ± 2.5 Nm
Front mudguard – Steering tube	6.2 ± 0.3 Nm
Upper lock-nut - Steering tube	36.75 ± 2.45 Nm
Lower lock-nut - Steering tube	12.7 ± 1 Nm
Mudguard support bracket - Steering tube	9 ± 1 Nm
Headlamp cover - Mudguard	9 ± 1 Nm
Shock absorber cover - Mudguard	3 ± 1 Nm
Steering tube cover – Steering tube	5.5 ± 1.5 Nm

9.1.1 front wheel removal

Rest the vehicle on its centre stand.

Suitably secure the rear part of the vehicle by raising the front slightly.

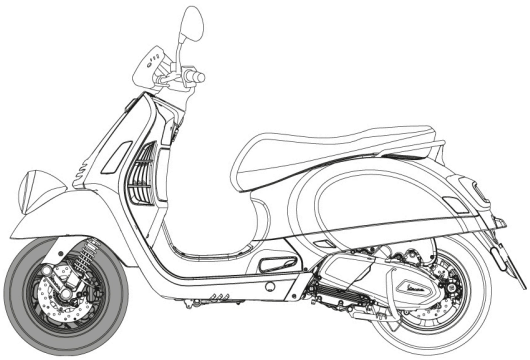
Loosen the screws fixing the wheel rim to the hub.

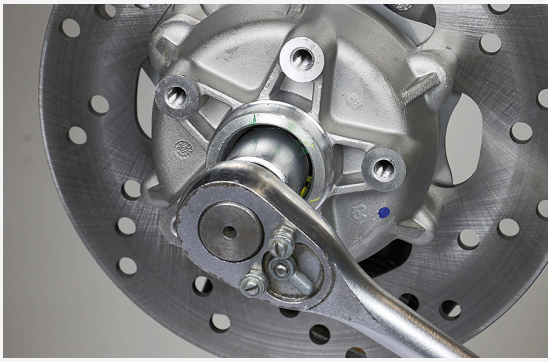


Remove the front wheel.

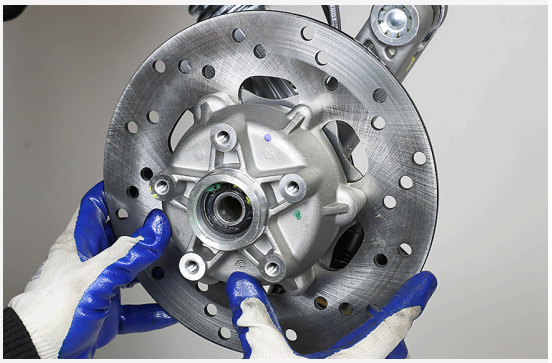


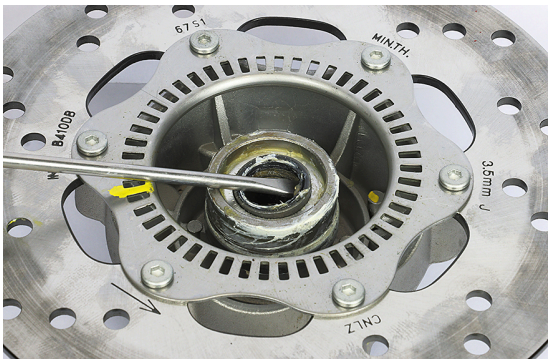
9.1.2 Front wheel hub service

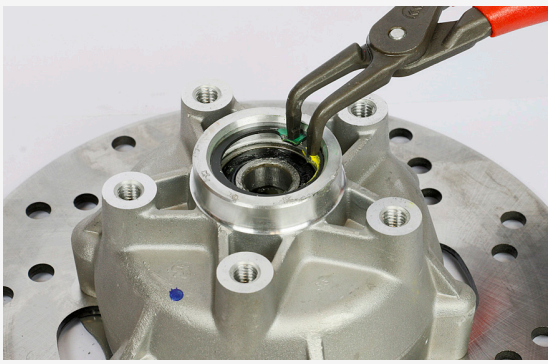


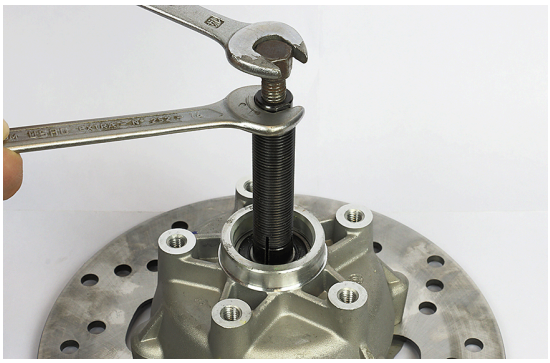


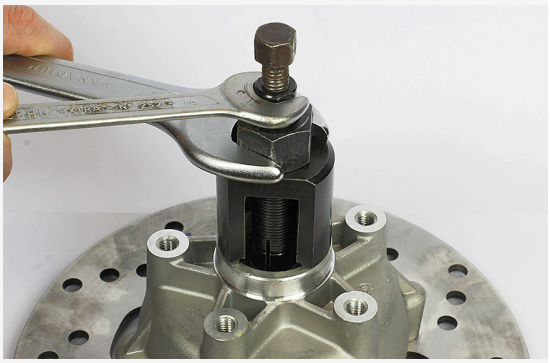


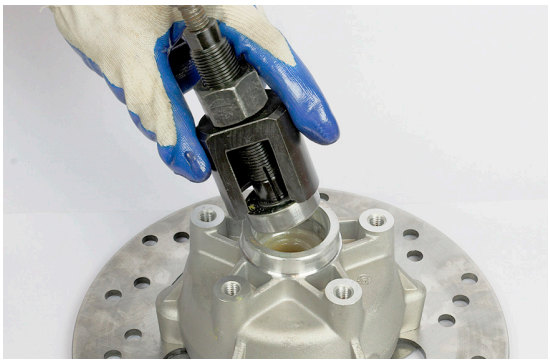


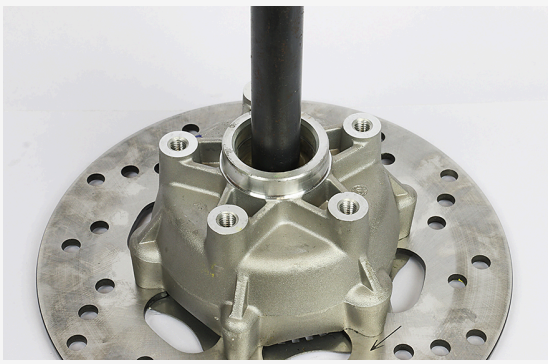

B41008
MIN.TH.
3,5mm





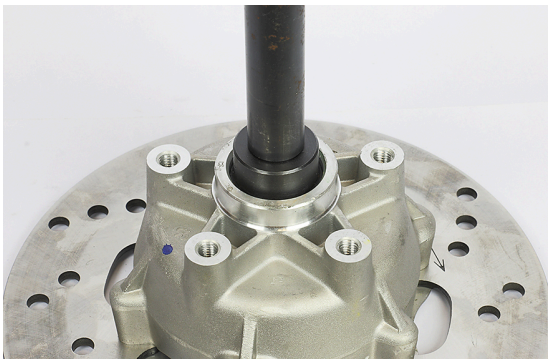


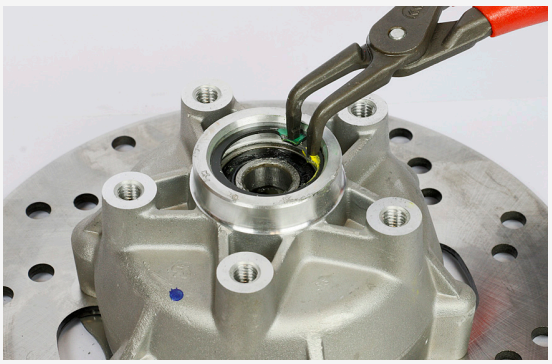










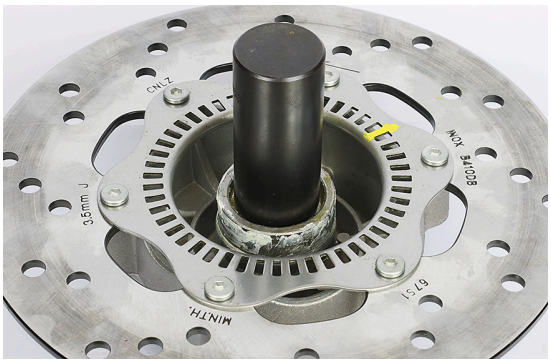


Turn the hub on the opposite side.

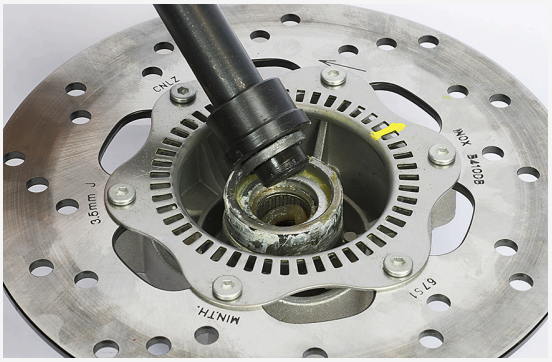
Using the specific tool, insert the roller bearing all the way in.

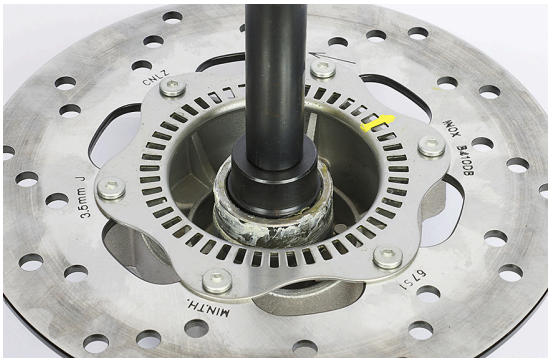
Apply the recommended product in the chamber between the ball bearing and the roller bearing.

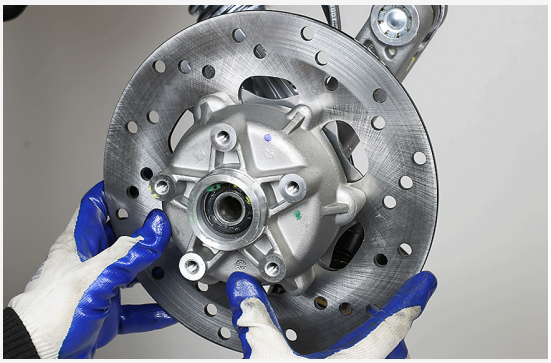
020038Y Punch



Lithium-based grease	Lithium and medium fibre yellow brown coloured grease and suitable for various uses.	ISO L-X-BCHA 3 - DIN 51 825 K3K -20



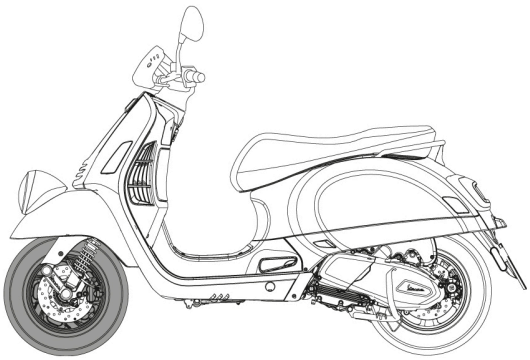






Wheel axle nut - wheel axle	85 ± 8 Nm





9.1.3 Fitting 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.

Front wheel - Front hub	21.5 ± 2.5 Nm



9.1.4 Handlebar

REMOVAL

Rest the vehicle on its centre stand.

Remove the top fairing.

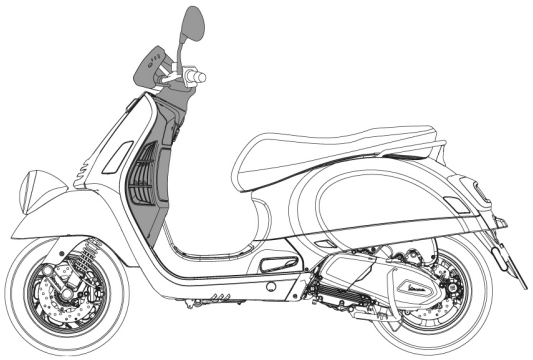
Remove the rear-view mirrors.

Remove the front leg shield back plate.

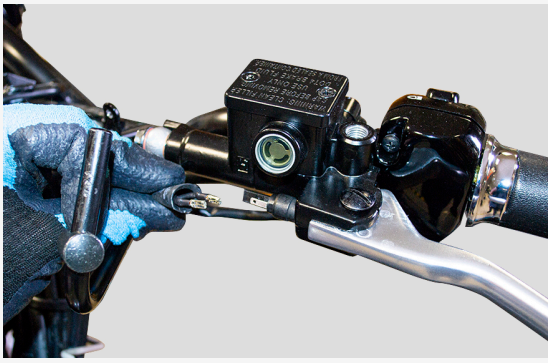
Remove the instrument cluster.

Remove the front handlebar cover.

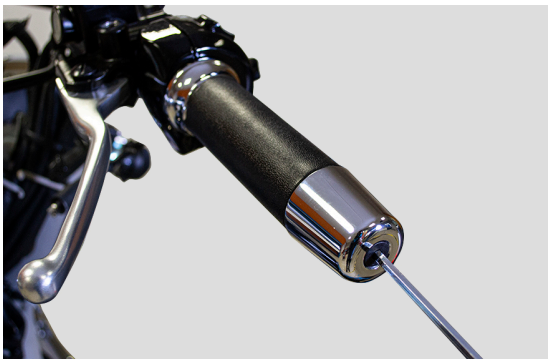
Remove the rear handlebar cover.



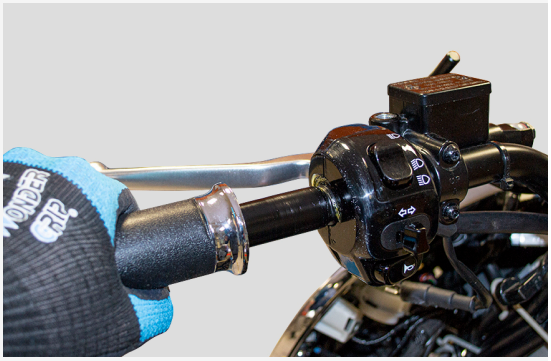
Disconnect the stop light switch cables on both sides of the vehicle.



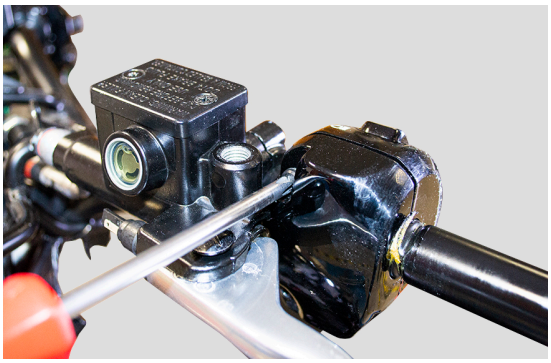
Unscrew the end fixing screw from both sides of the handlebar and remove it.



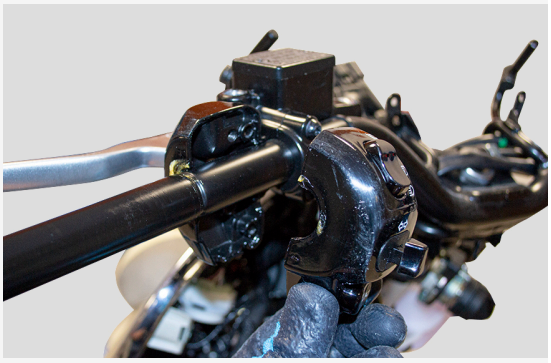
Using compressed air, remove the left knob from the handlebars.



Unscrew the two screws used to fasten the left hand electrical device.

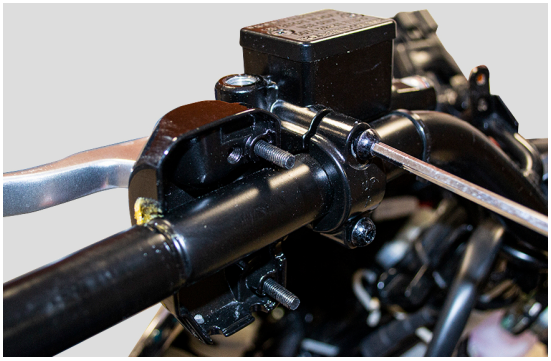


Remove the front part of the left-hand electrical device, taking care not to damage the wiring harness.



Unscrew the screws fixing the U-bolt of the rear brake pump.

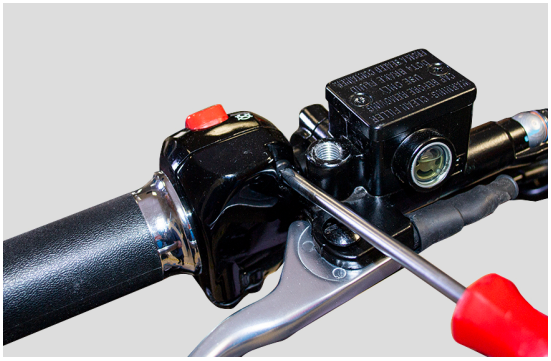
Remove the rear brake pump.



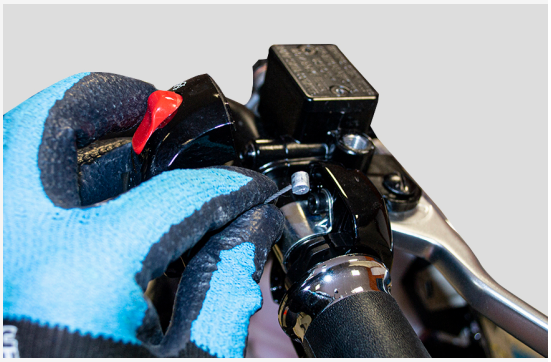
Remove the rear part of the left hand electrical device from the handlebar.



Unscrew the two screws used to fasten the right hand electrical device.

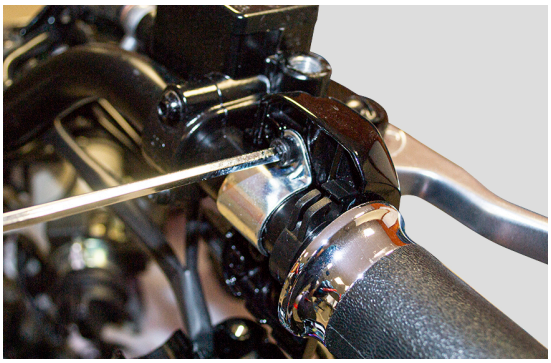


Detach the throttle gas control closure transmission from the sleeve cam.



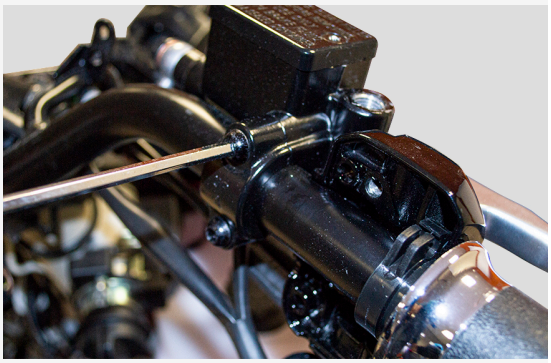
Unscrew the fixing screws of the retaining U-bolt of the rear part of the right electric device.

Remove the U-bolt.



Unscrew the screws fixing the U-bolt of the front brake pump.

Remove the front brake pump.

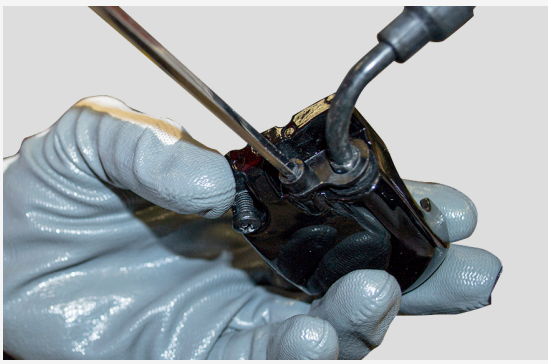


Detach the throttle gas control aperture cable from the sleeve cam.

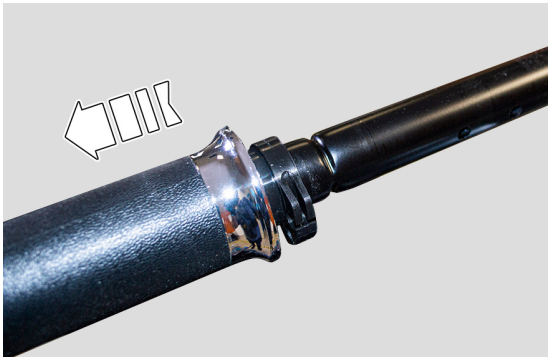


Unscrew the screw used to fasten the gas command cable retaining plate.

Slide the gas command cable from the device.



Slide the gas command sleeve out.



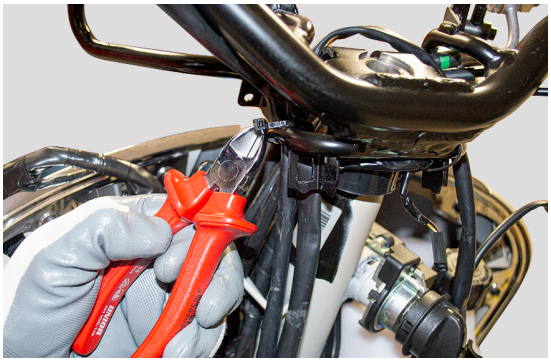
Properly cover the parts underneath the handlebars to avoid damaging the bodywork from any brake fluid leakage.

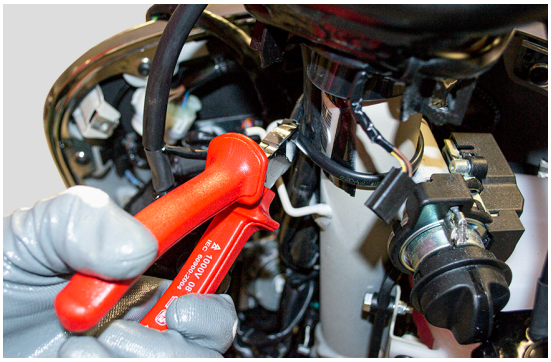
Unscrew the fittings and remove both brake pumps.

Suitably protect the couplings and secure them so they are tilted upward to keep air from entering.



Cut the retaining clamps of the wiring harnesses of electrical devices, taking care not to damage the harnesses themselves.

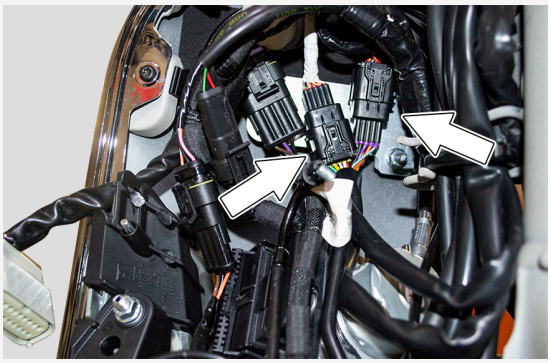




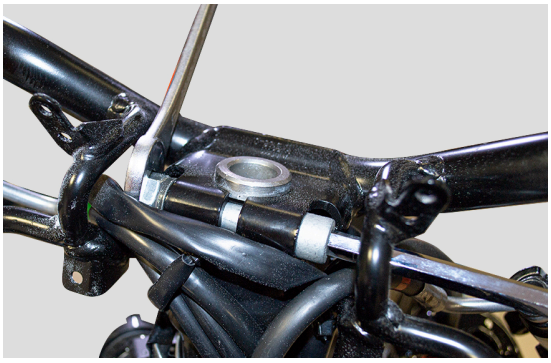


Disconnect the indicated connectors from the left and right hand handlebar electrical devices.

Extract the wiring harnesses and remove the right and left electrical device.



Unscrew the bolt fixing the handlebars to the steering tube and remove it.



Make a note of the layout of the brake pipes, the gas command transmission cables and the various wiring harnesses, in order to ensure they are positioned correctly during reassembly.

Remove the handlebars.



FITTING

Reposition the brake pipes, the gas command transmission cables and the various wiring harnesses correctly inside the handlebar.

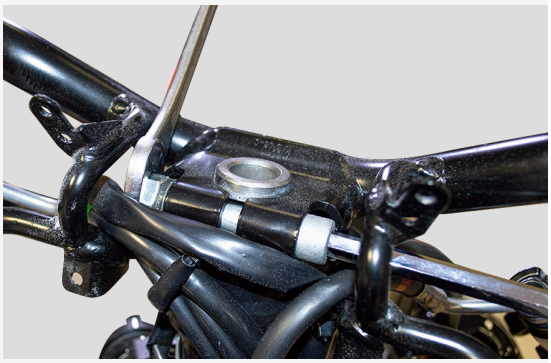
Reposition the handlebars on the steering tube.



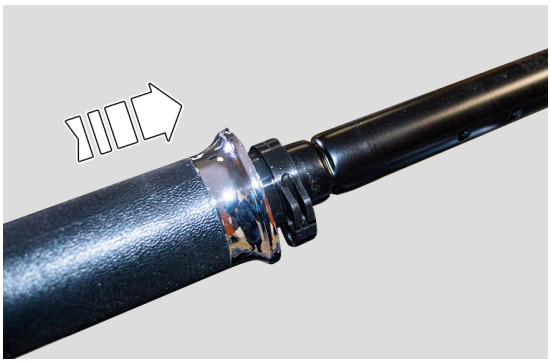
Insert the bolt at the relative seat on the steering tube.

Tighten the screw to the prescribed torque while holding the nut on the opposite side.

Handlebars - Steering tube	52.5 ± 2.5 Nm

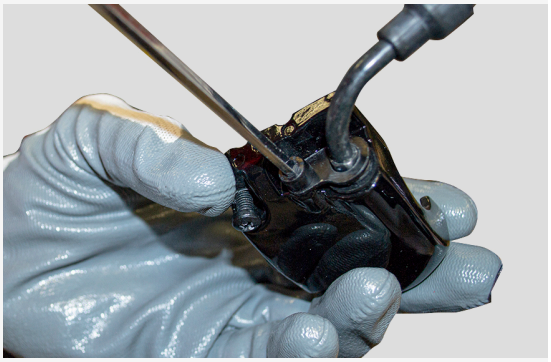


Insert the throttle sleeve on the handlebar.



Reposition the gas command throttle aperture transmission on the right hand handlebar support and tighten the fastening screw to the prescribed torque.

Throttle control cable - RH switchgear set	2.5 ± 0.5 Nm

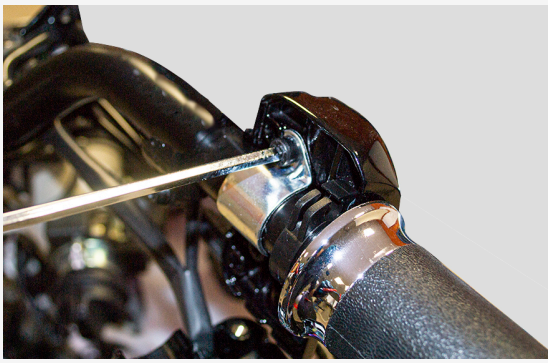


Reposition the transmission on the gas command sleeve cam.

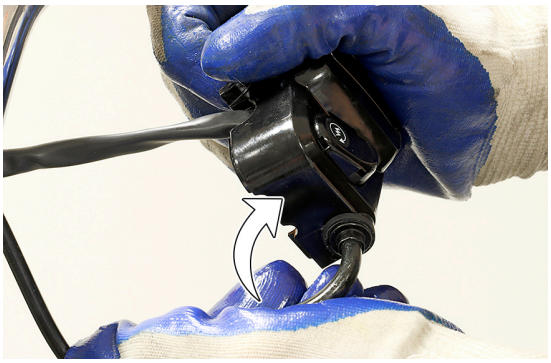


Insert and tighten the screws used to fasten the U-bolt to the right hand support, applying the recommended torque.

U-bolt - RH switchgear set	3.5 ± 0.5 Nm



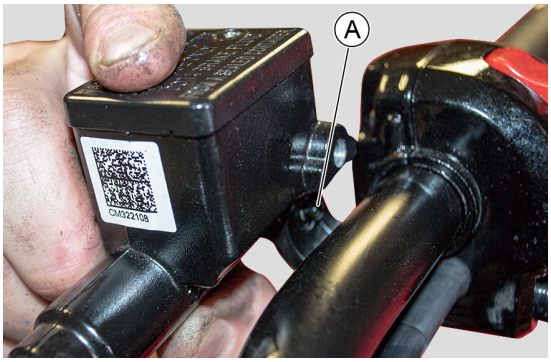
Insert the gas command closure transmission on the right hand electrical device and rotate it by 90°.



Reposition the transmission on the throttle sleeve cam and engage the right-hand electrical device fixing screws on the handlebar.



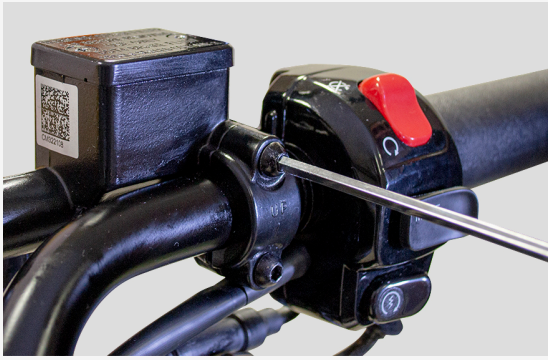
Place the front brake pump in its seat aligning the pin **(A)** with the hole on the handlebar.



Tighten the screws fixing the U-bolt to the brake pump to the prescribed torque.

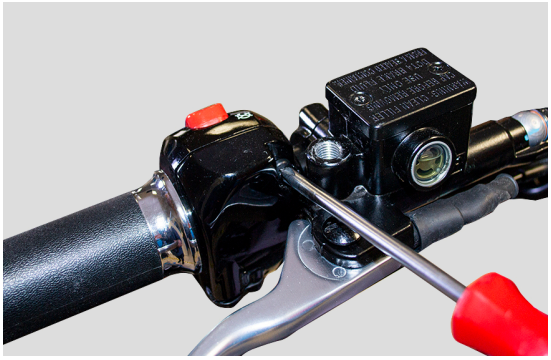
U-bolt - Front brake master cylinder	8.5 ± 1.5 Nm

Refit the front brake hose as described in this manual under **"Braking system > front brake master cylinder"**

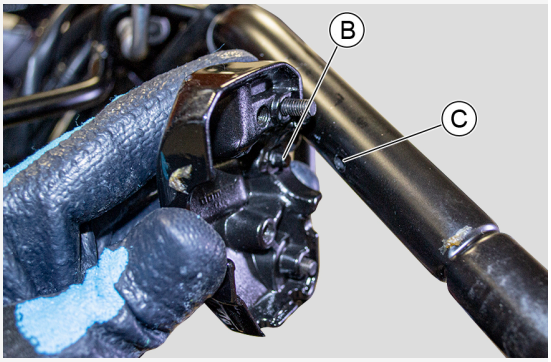


Tighten the screws used to fasten the right hand electrical device to the handlebar, applying the recommended torque.

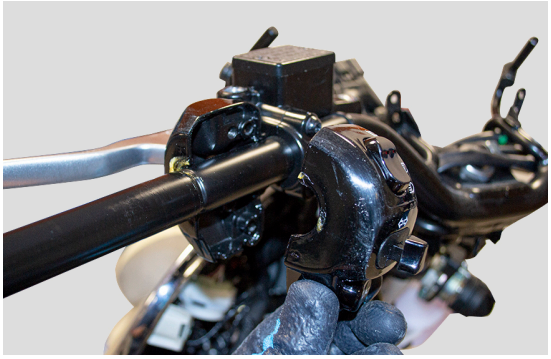
RH switchgear set - Handlebar	2.5 ± 0.5 Nm



Place the rear of the left-hand electrical device in its place by bundling the plug **(B)** with the hole **(C)** on the handlebar.



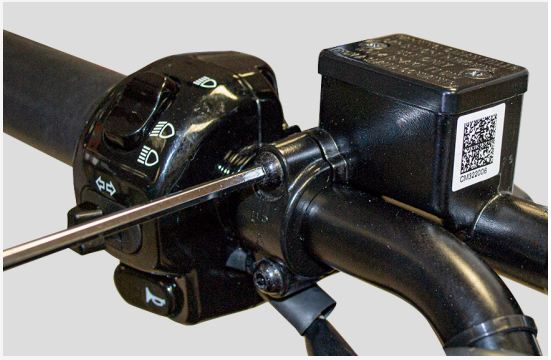
Reposition the back of the left-hand electrical device and tighten the fixing screws.



Place the rear brake pump in its seat aligning the pin with the hole on the handlebar.

Tighten the screws fixing the U-bolt to the brake pump to the prescribed torque.

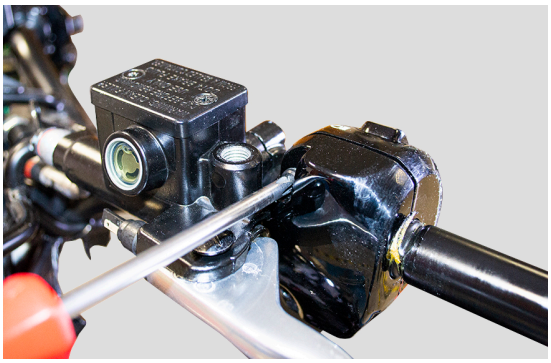
U-bolt - Rear brake pump	8.5 ± 1.5 Nm



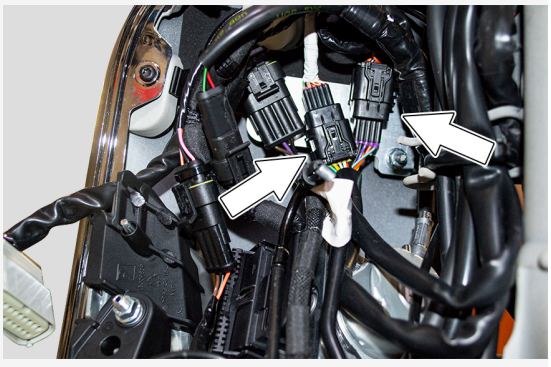
Tighten the screws used to fasten the left hand electrical device to the handlebar, applying the recommended torque.

LH switchgear set - Handlebar	2.5 ± 0.5 Nm

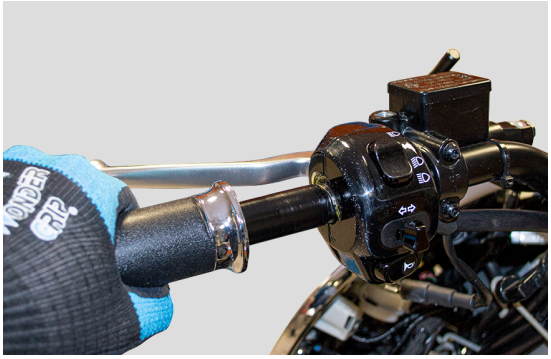
Refit the rear brake hose as described in this manual under **"Braking system > rear brake master cylinder"**



Reposition the wiring harness of the devices according to **"Electrical system > Electrical system installation > Front part"** and connect the connectors.

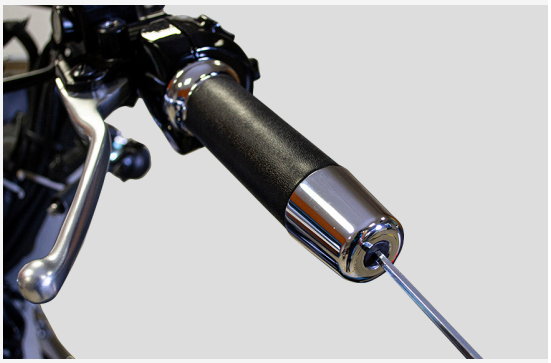


Using compressed air, reposition the left knob on the handlebars.

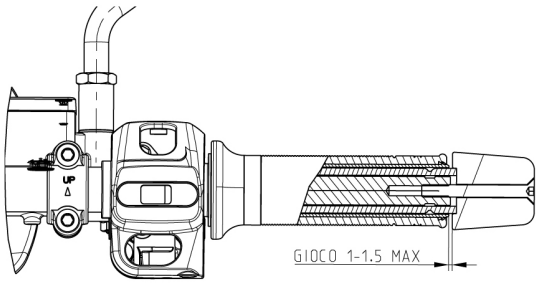


Working on both sides of the handlebars, tighten the screw fixing the handlebar end to the prescribed torque.

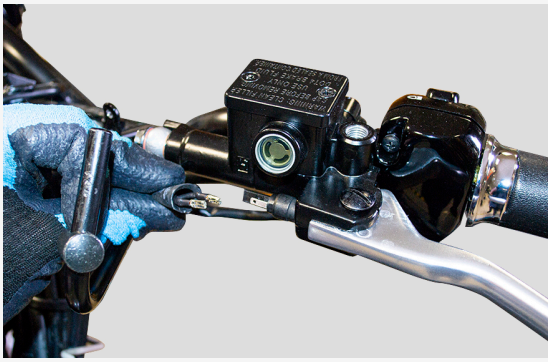
Handlebar end – Handlebars	8.5 ± 1.5 Nm



The clearance between the throttle control and the handlebar terminal should be between 1 - 1.5 mm.



Connect the stop light switch cables on both sides of the vehicle.



Refit the rear handlebar cover.

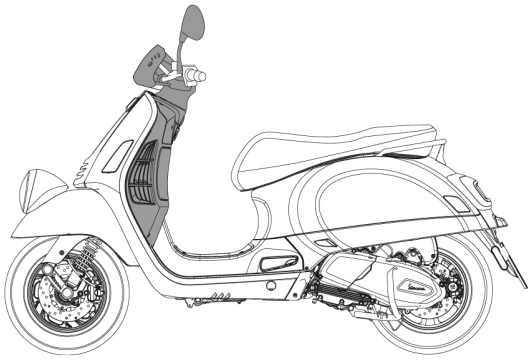
Refit the front handlebar cover.

Refit the instrument cluster.

Refit the front leg shield back plate.

Refit the rear-view mirrors.

Refit the top fairing.



9.1.5 Steering tube

9.1.5.1 Removal

Remove the top fairing.

Remove the rear-view mirrors.

Remove the front leg shield back plate.

Remove the instrument cluster.

Remove the front handlebar cover.

Remove the rear handlebar cover.

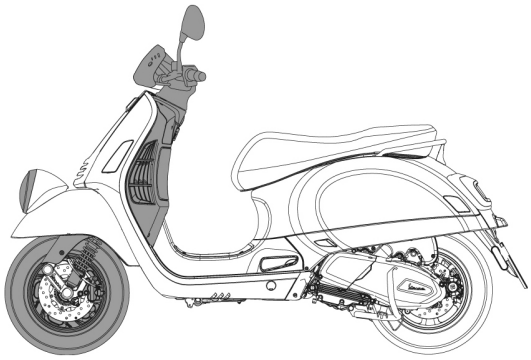
Remove the front wheel.

Remove the front brake calliper and protect the coupling.

Remove the front tone wheel sensor.

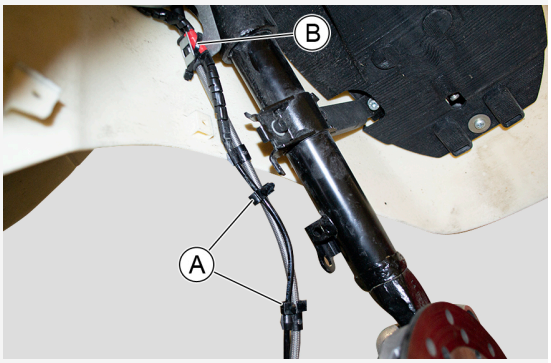
Remove the front shock absorber.

Remove the front headlight.

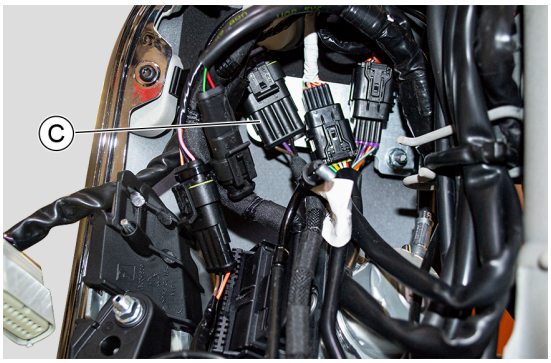


Release the hose guides **(A)** from the steering tube.

Remove the cable tie **(B)**.

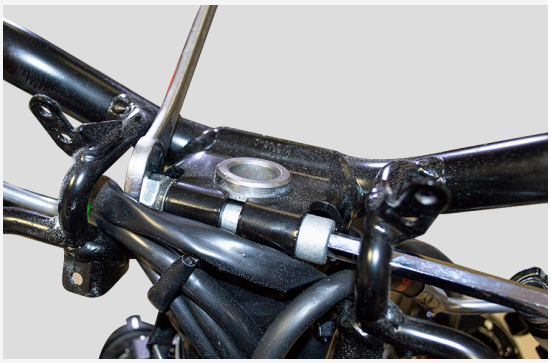


Disconnect the connector **(C)** of the front headlamp



Unscrew the screw used to fasten the handlebar from the steering tube.

Tilt the handlebar forwards.



Remove the protective collar.



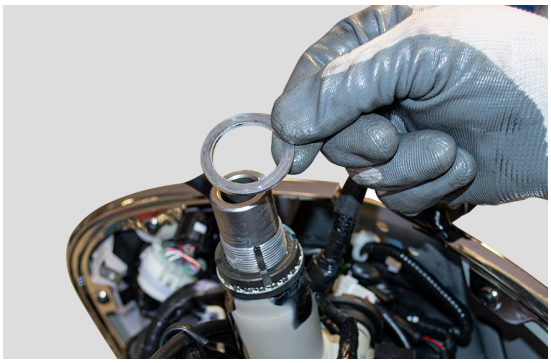
Using the specific tool, unscrew the upper ring nut fixing the steering tube to the headstock.

Remove the upper ring nut.

020055Y Steering stem ring nut wrench



Remove the safety plate.



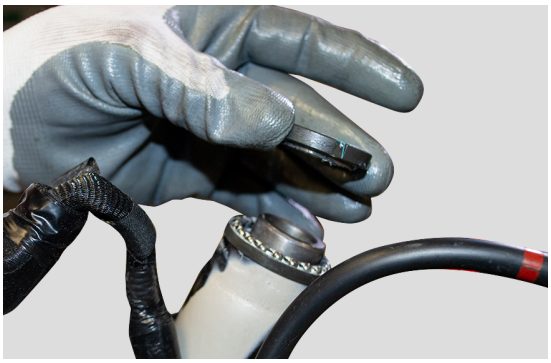
Using the specific tool, unscrew the lower ring nut fixing the steering tube to the headstock. Supporting the steering tube at the bottom.

020055Y Steering stem ring nut wrench



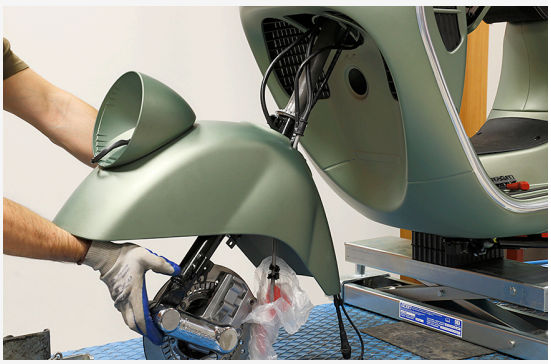
Remove the lower ring nut.

Remove the ball cage of the upper steering bearing.



Remove the steering tube from below.

Carefully slide out the brake pipes and the phonic wheel and front headlamp wiring harnesses.



9.1.5.2 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.

NOTE

☞

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

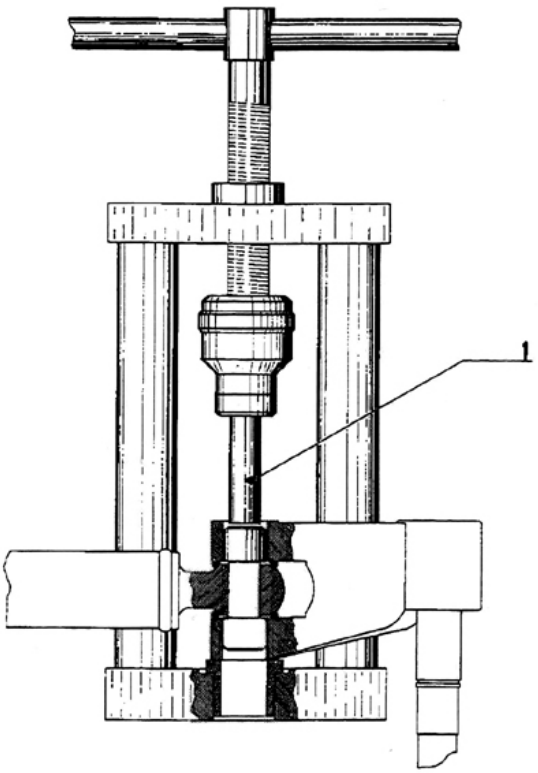
Use a suitable punch with the dimensions indicated on the figure; hit with a mallet until the wedging washer is crushed and then extract it with the help of a pointed end.

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.



NOTE

☞

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.

020021Y Front suspension service tool

Connect the swinging hub to the steering tube with the guiding pin.

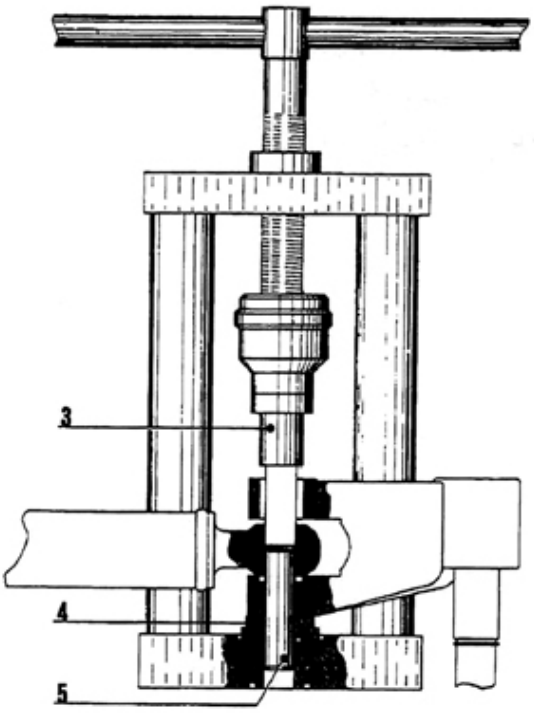
- Use the tool fitted with part 3 on the stem and part 4.

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.

NOTE

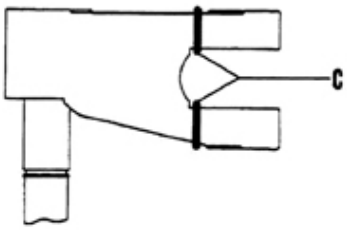
BEFORE PROCEEDING WITH THE DESCRIBED FITTING, PLACE THE TWO DUST GAITER RINGS ON THE SWINGING HUB AS SHOWN IN THE FIGURE.



020021Y Front suspension service tool

RECOMMENDED PRODUCTS

Molybdenum disulphide grease	Lithium grease with molybdenum disulphide.	Grey black grease



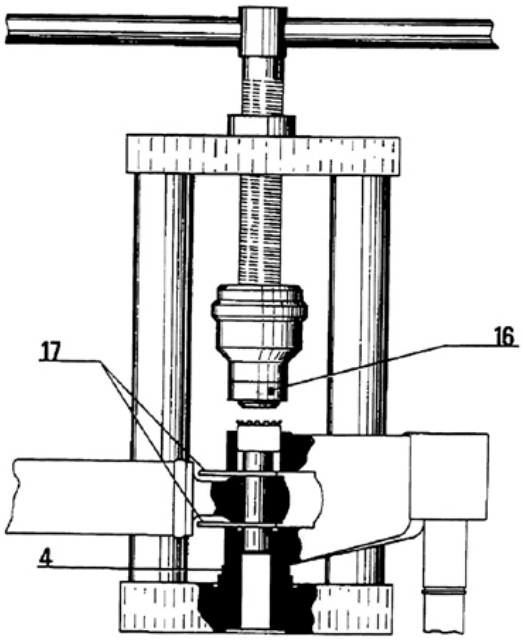
Insert the sealing ring on the pin and the roller bushing with its wedging washer at the same time.

- 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.





NOTE

☞

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.

020021Y Front suspension service tool

RECOMMENDED PRODUCTS

Lithium-based grease	Lithium and medium fibre yellow brown coloured grease and suitable for various uses.	ISO L-X-BCHA 3 - DIN 51 825 K3K -20

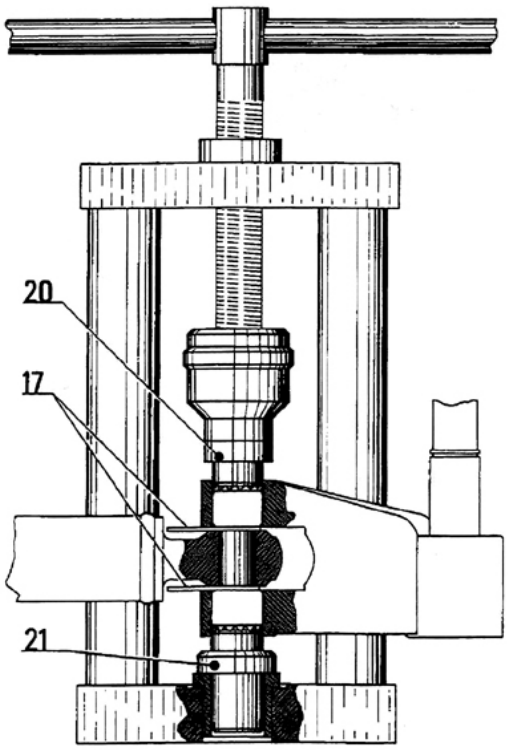
- Use the tool fitted with part 20 on its stem and part 21 on the tool base as shown in the figure.

- 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.

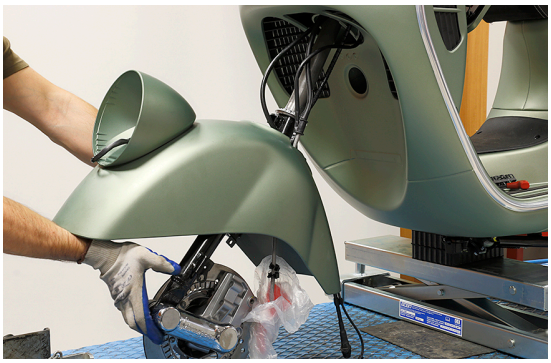
- By wedging the washers as described above, the front suspension unit refitting stage is finished.



Lithium-based grease	Lithium and medium fibre yellow brown coloured grease and suitable for various uses.	ISO L-X-BCHA 3 - DIN 51 825 K3K -20

9.1.5.3 Fitting

Correctly reposition the brake hose, phonic wheel sensor wiring and front headlight wiring. Insert the steering tube, complete with the lower steering bearing 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.

Screw on the lower ring nut.

Calcium based grease	Calcium grease.	Ivory coloured calcium grease; TL 9150 066; NATO G 460

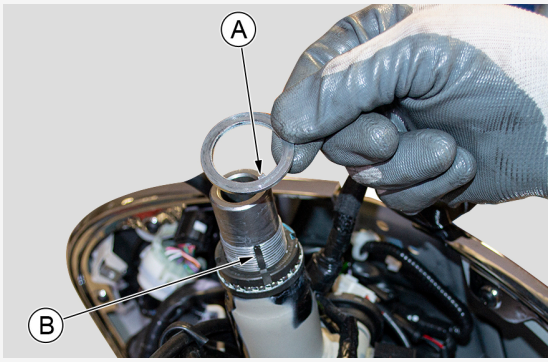


Tighten the lower ring nut to the prescribed torque.

Lower lock-nut - Steering tube	12.7 ± 1 Nm



Insert the safety plate by aligning the tooth **(A)** with the groove **(B)** on the steering tube.



Screw and tighten the upper ring nut to the prescribed torque.

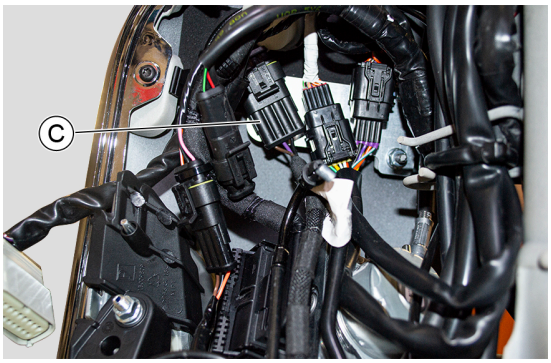
Upper lock-nut - Steering tube	36.75 ± 2.45 Nm



Reposition the protective collar.



Reconnect the connector **(C)** of the front headlamp



Refit the cable grommets **(D)** on the steering tube.

Clamp the brake pipe and the phonic wheel sensor wiring to the bracket **(F)** using a self-locking clamp **(E)**.

Refit the front shock absorber.

Refit the front tone wheel sensor.

Refit the front brake hose to the caliper.

Refit the front brake calliper.

Refit the front wheel.

Refit the rear handlebar cover.

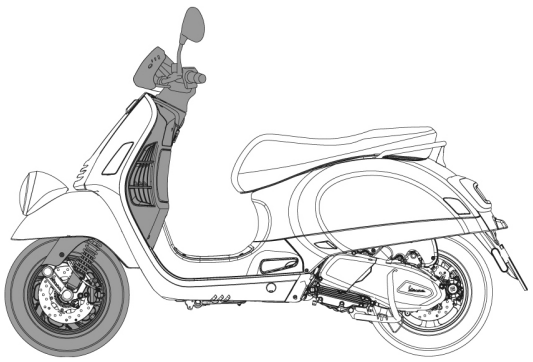
Refit the front handlebar cover.

Refit the instrument cluster.

Refit the front leg shield back plate.

Refit the rear-view mirrors.

Refit the top fairing.

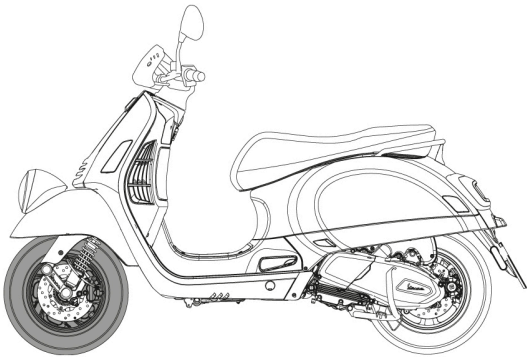


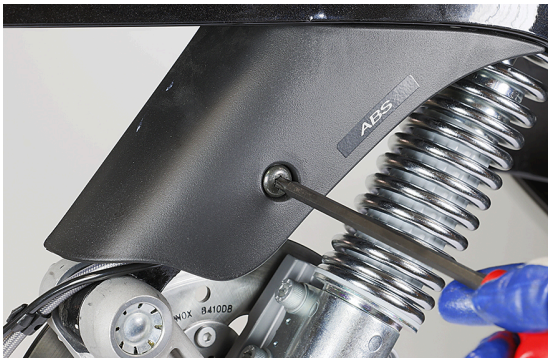
9.1.6 Front shock absorber

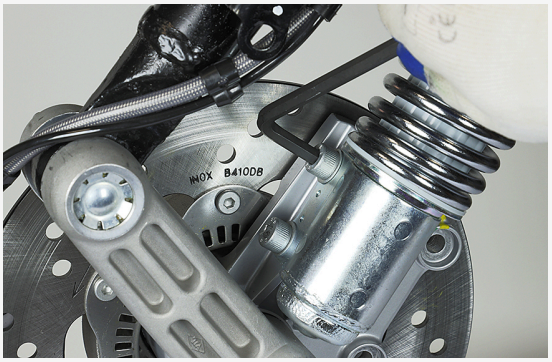
REMOVAL

Rest the vehicle on its centre stand.

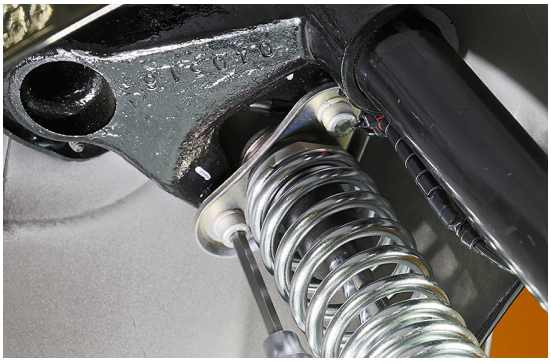
Remove the front wheel and brake calliper.



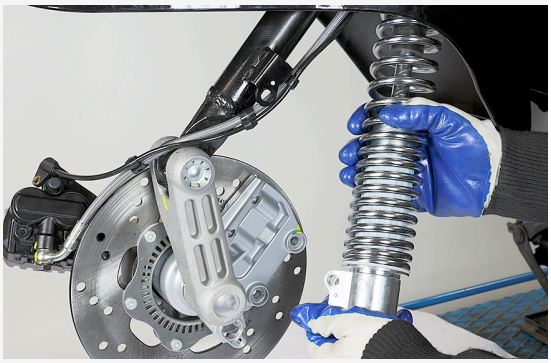




Unscrew the upper screws fixing the shock absorber to the steering tube.

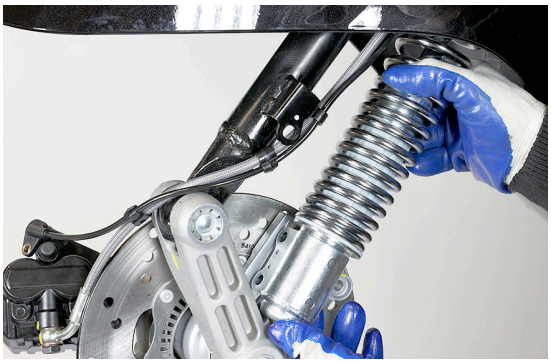


Remove the shock absorber.



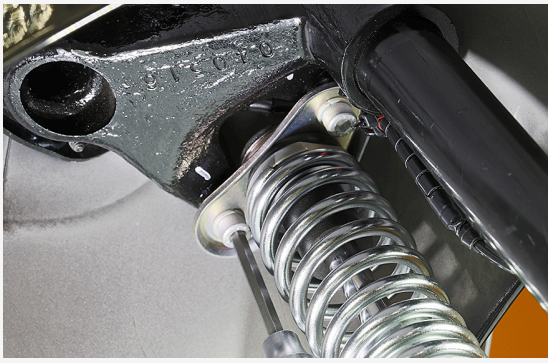
FITTING

Reposition the shock absorber in its seat.



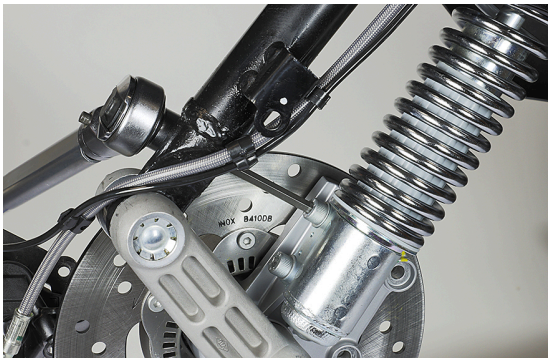
Tighten the upper screws fixing the shock absorber to steering tube with the prescribed torque.

Shock absorber attachment bracket - Steering tube	21.5 ± 2.5 Nm



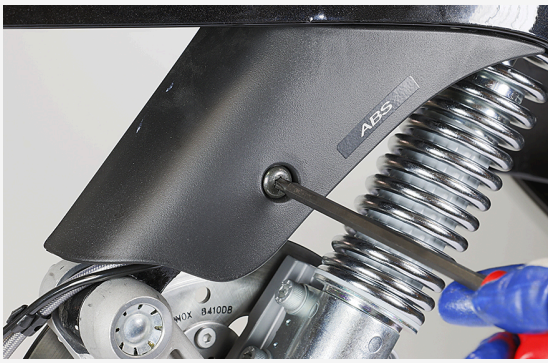
Tighten the lower screws fixing the shock absorber to the support with the prescribed torque.

Shock absorber - Shock absorber plate	22.5 ± 3.5 Nm



Reposition the cover of the steering tube and tighten the outside screw to the prescribed torque.

Steering tube cover – Steering tube	5.5 ± 1.5 Nm

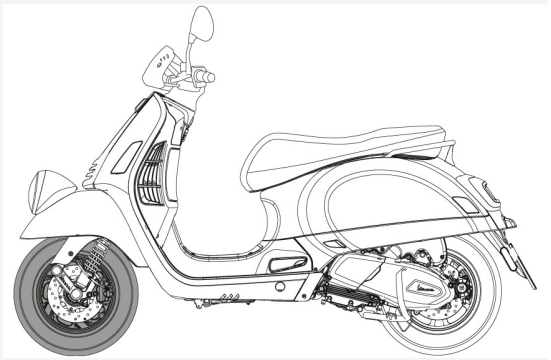


Tighten the inside screws of the cover of the steering tube to the front mudguard with the prescribed torque.

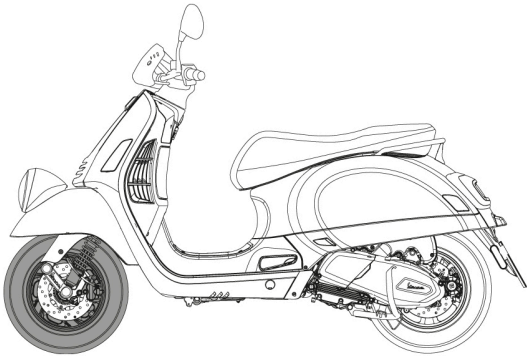
Shock absorber cover - Mudguard	3 ± 1 Nm



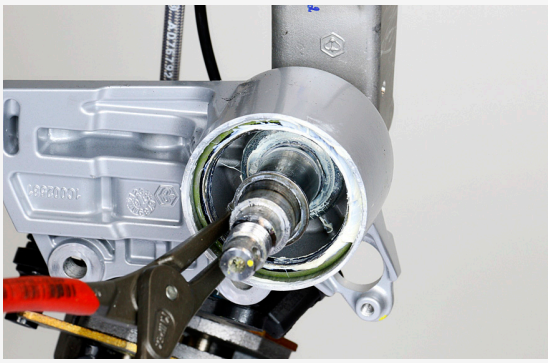
Refit the front wheel and brake calliper.



9.1.7 shock absorber-brake calliper mount



Remove the Seeger ring.



Remove the special washer.



Remove the brake calliper-shock absorber support.



Recuperate 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.

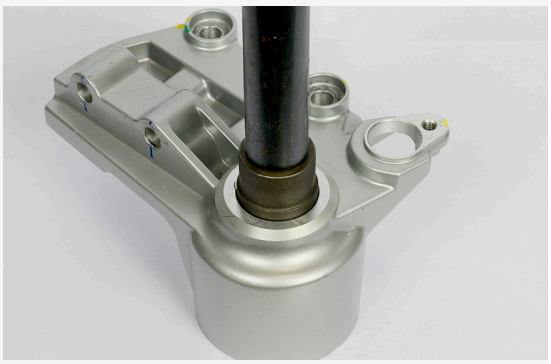


Using the specific tool, remove the roller cages.

020365Y 22-mm guide

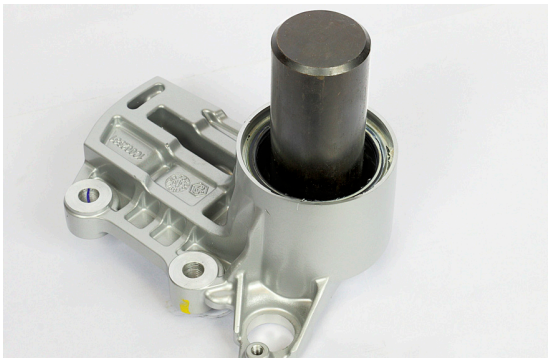
020376Y Handle for adaptors

020441Y Adaptor 26 x 28 mm



After checking the roller cage seat on the support, use the specific tool to install a new roller cage on the wheel hub side.

020037Y Punch



Using the specific tool, install a roller cage on the front shock absorber side.

020036Y Punch

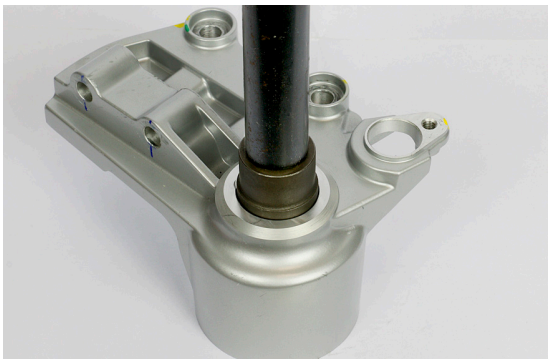


Using the specific tool, install a dust gaiter on the shock absorber side.

020365Y 22-mm guide

020376Y Handle for adaptors

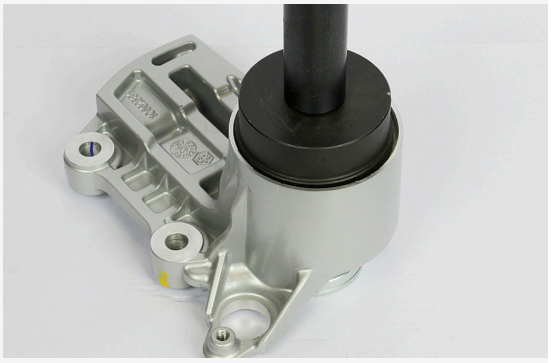
020441Y Adaptor 26 x 28 mm



Using the specific tool, install a new dust gaiter on the wheel hub side.

020360Y Adaptor 52 x 55 mm

020376Y Handle for adaptors



FITTING

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.

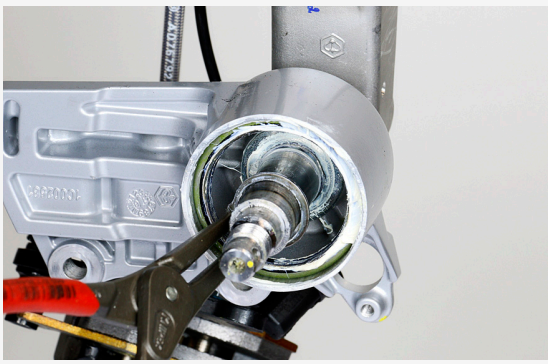
Calcium based grease	Calcium grease.	Ivory coloured calcium grease; TL 9150 066; NATO G 460

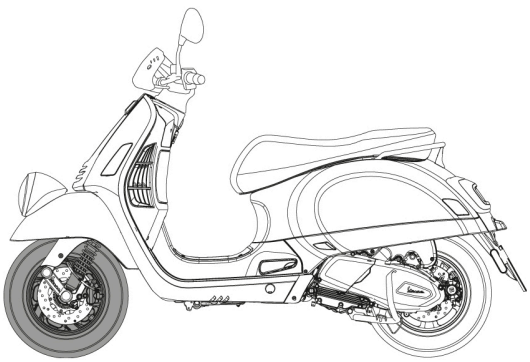


Insert the special washer on the front wheel axle and make sure it is fully into its seat.



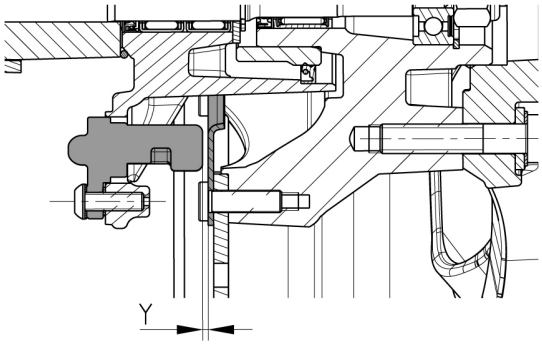
insert the locking Seeger ring of the support.





If distance "**Y**" is less than or igual to 0.4 mm add a special calibrated washer (code 669282).

The maximum distance between the speed sensor and the tone wheel is 1.7 mm.



9.1.8 Steering bearings

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.

020004Y Punch for removing steering bearings from headstock



Using the specific tool, remove the track of the upper steering bearing on the steering headstock.

020004Y Punch for removing steering bearings from headstock



FITTING

Insert the specific tool and the upper track of the lower steering bearing into the steering headstock.

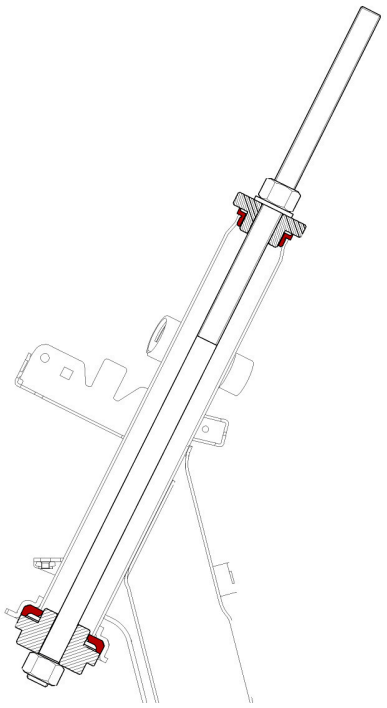
001330Y Tool for fitting steering seats



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.

020459Y Punch for fitting the bearing on the steering tube



Grease the track of the seat of the steering bearing with the recommended product.

Calcium based grease	Calcium grease.	Ivory coloured calcium grease; TL 9150 066; NATO G 460



Reposition the ball cage and refit the steering tube onto the headstock.

9.2 Rear

REAR SUSPENSION

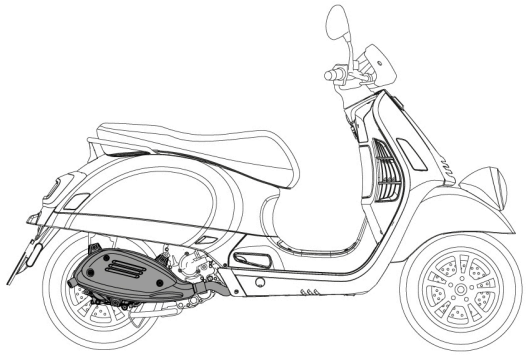
DESCRIPTION	TORQUE
Left shock absorber support plate - Crankcase	22.5 ± 2.5 Nm
Rear shock absorber - Engine	42.5 ± 2.5 Nm
Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm
Rear shock absorber - Chassis	22.5 ± 2.5 Nm
Rear wheel axle nut - Rear wheel axle	115 ± 11 Nm
Rear wheel – Rear wheel hub	22.5 ± 2.5 Nm
Silencer support bracket - Engine	22.5 ± 2.5 Nm
Rear tone wheel - Rear wheel	9 ± 1 Nm

SWINGARM

DESCRIPTION	TORQUE
Engine - swinging arm pin	71 ± 4 Nm
Swinging arm bolt - body shell	79.5 ± 3.5 Nm
Engine and vehicle side swinging arm junction bolt	42.5 ± 2.5 Nm
Silent block support plate - Body	47 ± 5 Nm

9.2.1 Rear wheel

REMOVAL





Remove the rear wheel.



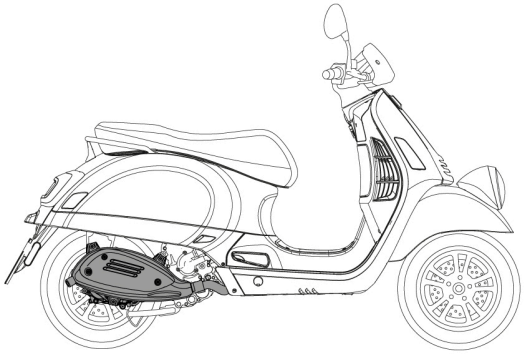
FITTING



Tighten the screws fixing the rear wheel to the wheel hub to the specified torque.

Rear wheel – Rear wheel hub	22.5 ± 2.5 Nm

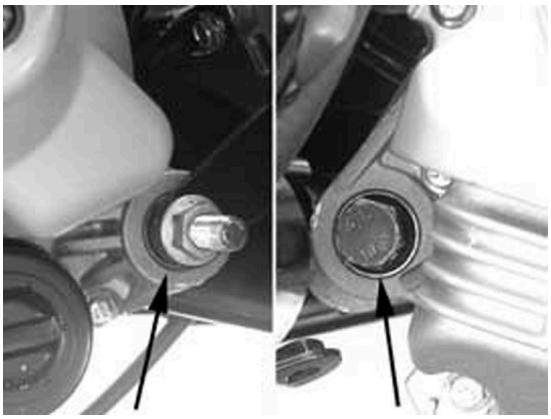




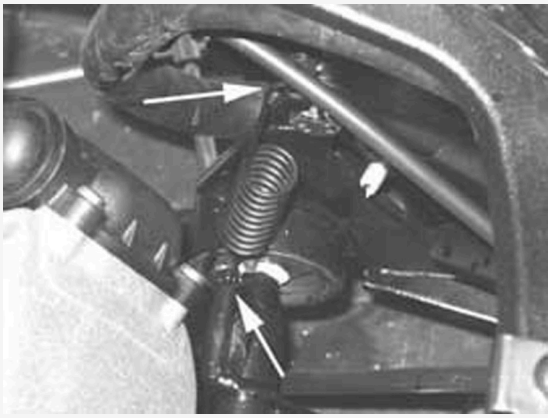
9.2.2 Swingarm

9.2.2.1 Removal

- Place the vehicle on its centre stand;
- Remove the engine housing
- Remove the swinging arm/engine fitting shown in the picture
- Move the engine back

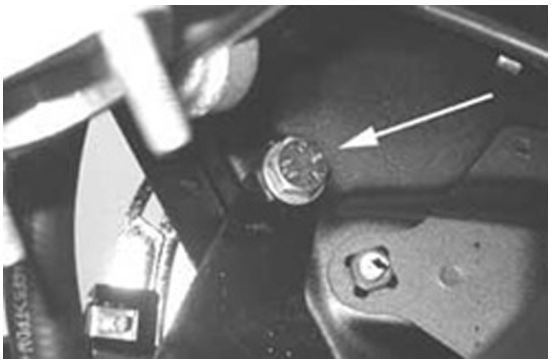


- Remove the spring anchoring the swinging arm to the chassis as shown in the picture



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





- Remove the left and right caps located under the footrest to reach the pin fixing the swinging arm to the body.

- Remove the pin. Then remove the swinging arm



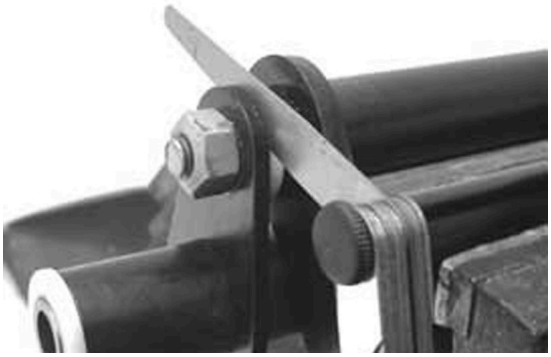
9.2.2.2 Overhaul

- Check there is no sticking in the movement of the connection of the swinging arm on the engine side to the swinging arm on the chassis side

- Check the axial clearance between the two swinging arms using a feeler gauge

Standard clearance 0.40 to 0.60 mm

Acceptable limit after use 1.5 mm



- In order to check the clearance of the swinging arm on the frame side, prepare a retainer using the fixing pin of the swinging arm on the frame and two rings from the special tool 020229Y. Alternatively, use two washers with 12-mm inside diameter for pins, minimum 30-mm outside diameter and 4-mm thick at least.



- Check there is no sticking in the rotation.

- Check the axial clearance of the swinging arm on the chassis side

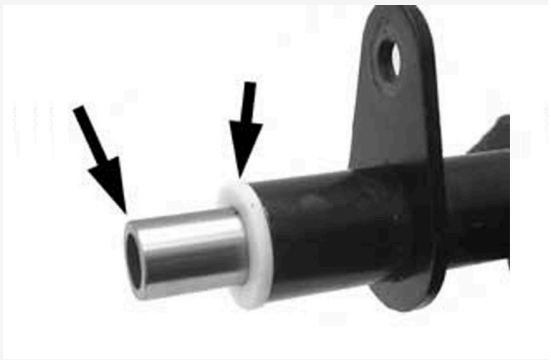
Standard clearance 0.40 to 0.60 mm

Acceptable limit after use 1.5 mm



- Separate the swinging arm on the engine side from the vehicle side arm

- Remove the plastic bushings and the internal spacer shown in the picture



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



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

020244Y Punch ø 15

020115Y Punch ø 18

Length of the swinging arm tube on the engine side: L 175.3 +0.3 -0 mm

Length of the internal swinging arm spacer on the engine side: L 183 +0.3 -0 mm

Engine side swinging arm plastic bushing shim: 3.5 ± 0.05 mm

Chassis side swinging arm plastic bushing shim: 3.5 ± 0.05 mm

Length of the internal swinging arm spacer on the chassis side: L290 ± 0.1 mm

Length of the swinging arm tube on the chassis side: 283 ± 0.1 mm



- Lubricate roller casings and the plastic bushings with grease

Calcium based grease	Calcium grease.	Ivory coloured calcium grease; TL 9150 066; NATO G 460



- Insert the spacers

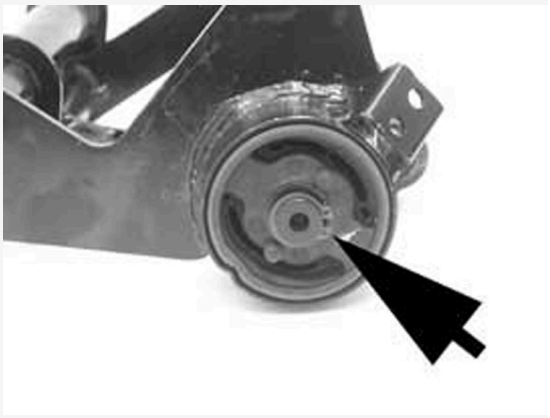
- Assemble the two arms with the relative bolt in the position shown in the picture

- Adjust the bolt as shown in the picture

- Position the chassis side swinging arm with the most protruding part pointing towards the silent block side as shown in the picture

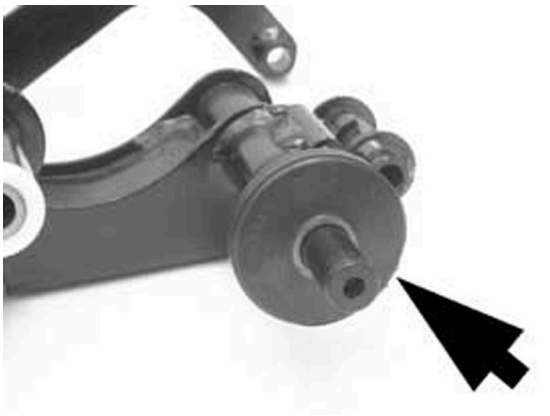
- Make sure the silent block is not broken. If it is, replace the coupling

- Remove the Seeger ring shown in the picture



- Remove the full silent block bracket

- Undo the silent block ring shown in the picture



- Hold the full silent bloc bracket in the clamp

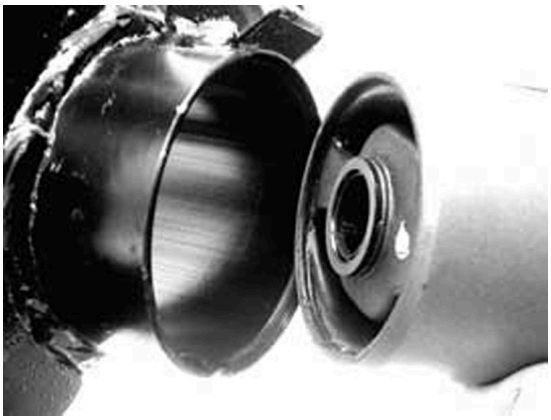
- Using the appropriate tool, remove the silent bloc from the bracket from the side corresponding to the inside of the vehicle. This is to guarantee the tool is centred properly on the support





- Install a new silent block, making sure it aligns properly with the reference tooth.

- Fit the silent blocks, making sure the chamfered part of the silent block matches the chamfered part of the bracket



- Using the appropriate tool, fit the silent block as shown in the picture



9.2.2.3 Fitting

- To refit, perform the removal operations in reverse.

- Grease the bearings and the rolling parts with the recommended grease.

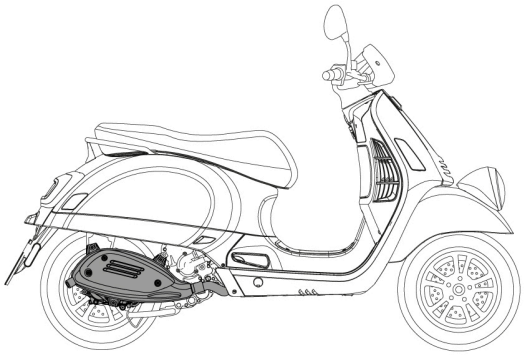
-Complete the fitting by tightening the nuts on the relative bolts to the proper tightening torque.

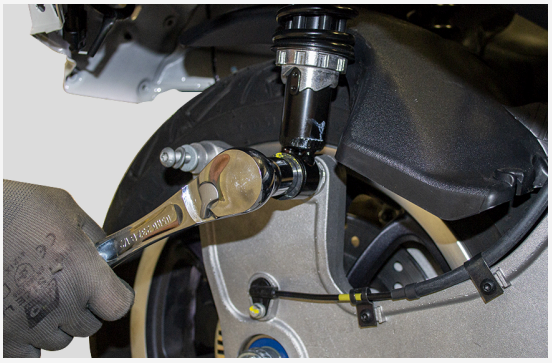
Engine and vehicle side swinging arm junction bolt	42.5 ± 2.5 Nm
Engine - swinging arm pin	71 ± 4 Nm

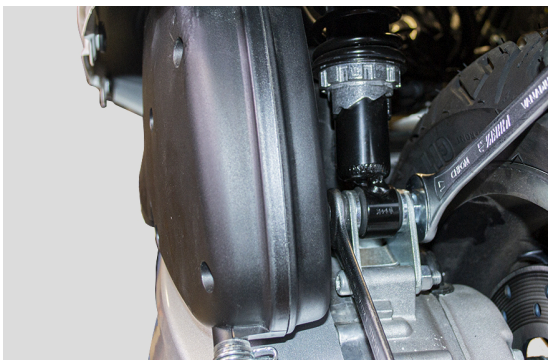
Swinging arm bolt - body shell	79.5 ± 3.5 Nm
Silent block support plate - Body	47 ± 5 Nm

9.2.3 Shock absorbers

REMOVAL









FITTING

For fitting, proceed as follows:

- Insert the top attachment of the rear shock absorbers into the seat in the chassis.

- Tighten the nuts to the specified torque.

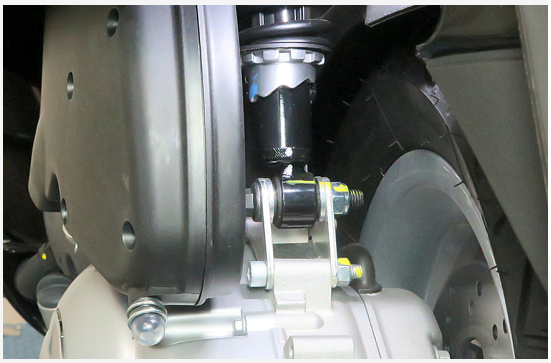
Rear shock absorber - Chassis	22.5 ± 2.5 Nm



- Insert the lower fixing bolt of the left shock absorber.

- Tighten the bolt to the specified torque.

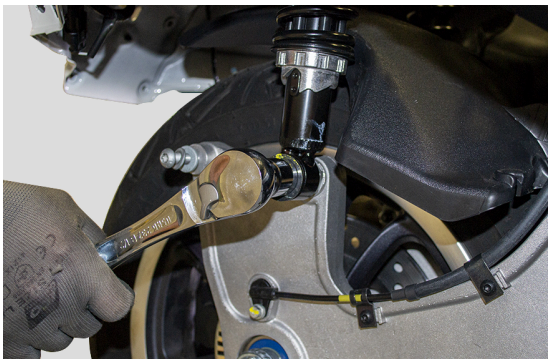
Rear shock absorber - Engine	42.5 ± 2.5 Nm

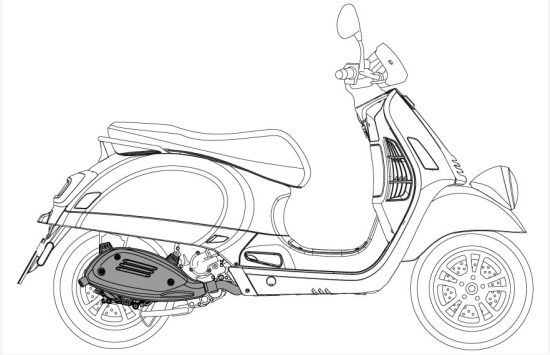


- Place the right shock absorber's lower fastening element.

- Insert and tighten the fixing nut to the specified torque.

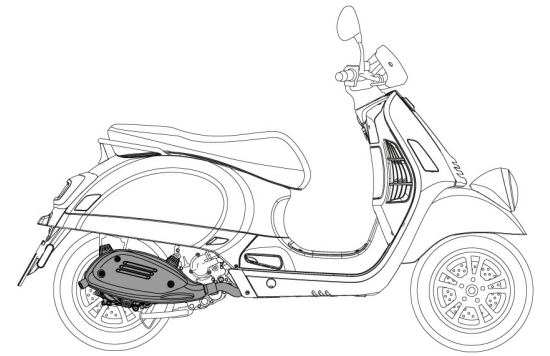
Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm



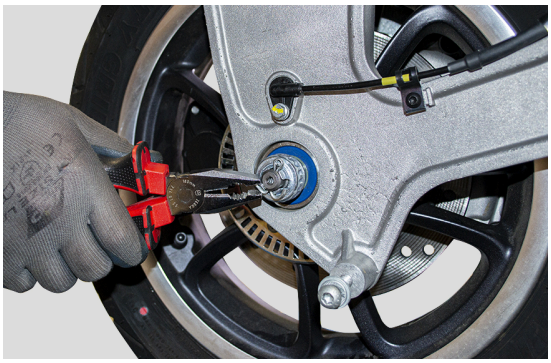


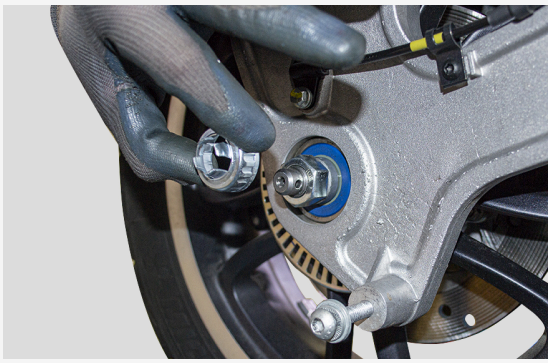
9.2.4 Silencer support bracket

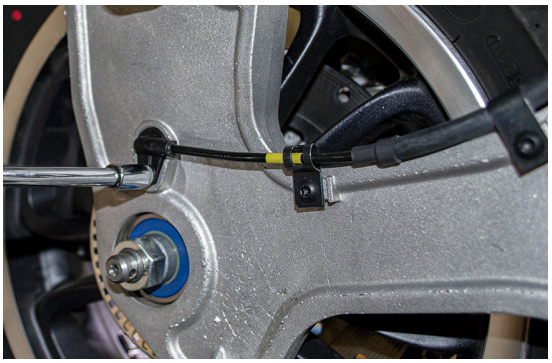
REMOVAL



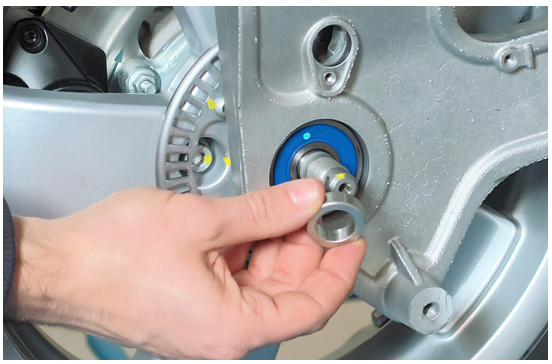


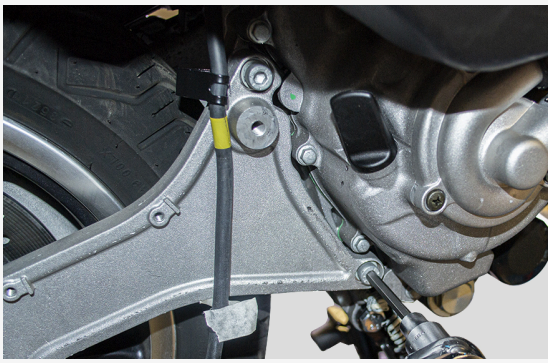


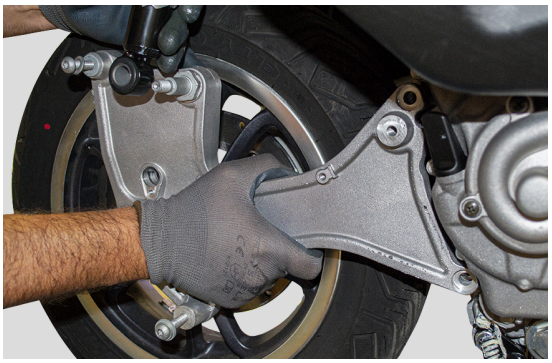






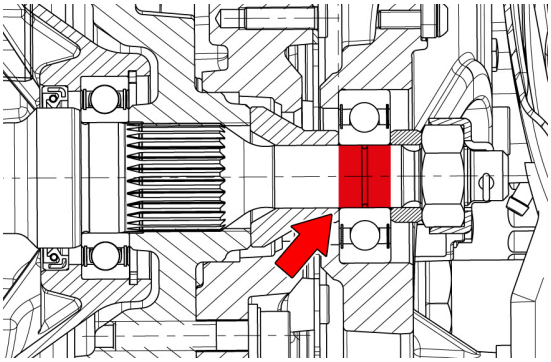


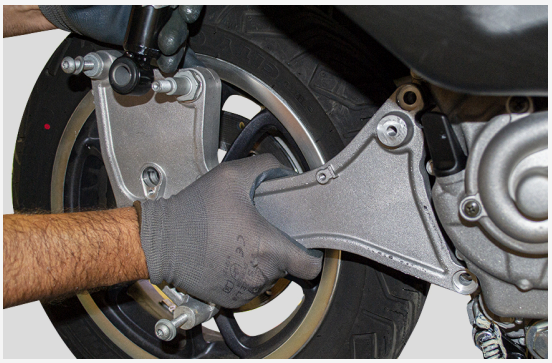


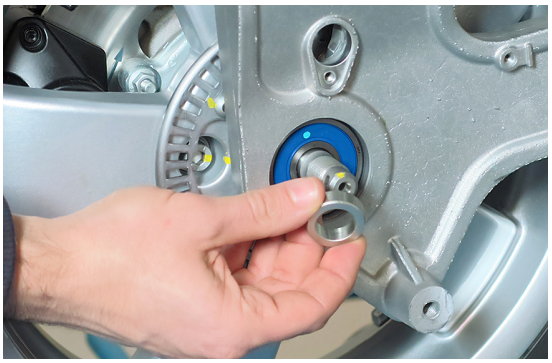


FITTING

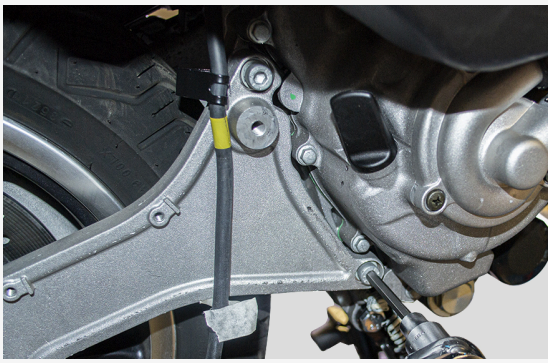
using the recommended product, lubricate the contact surfaces between the wheel axle and the bearing on the bracket, as indicated in figure. **Take care not to apply the grease to the threaded portion of the wheel axle.**







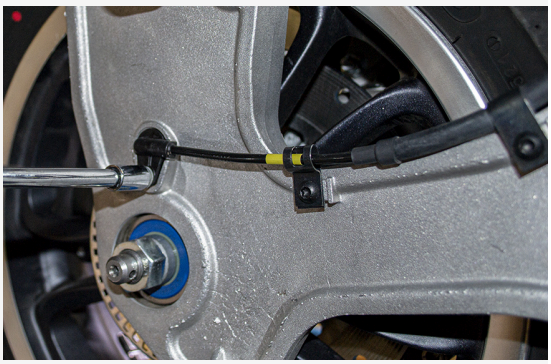
Silencer support bracket - Engine	22.5 ± 2.5 Nm

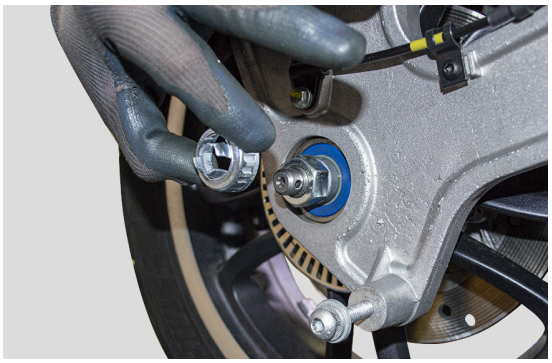


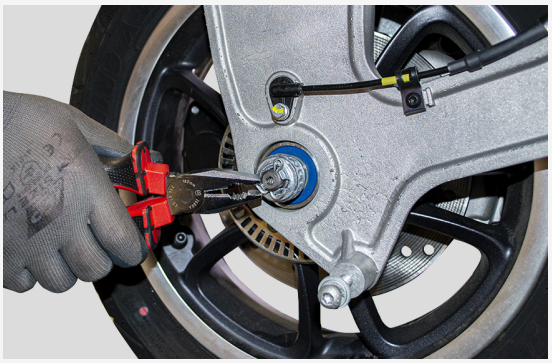
Rear wheel axle nut - Rear wheel axle	115 ± 11 Nm



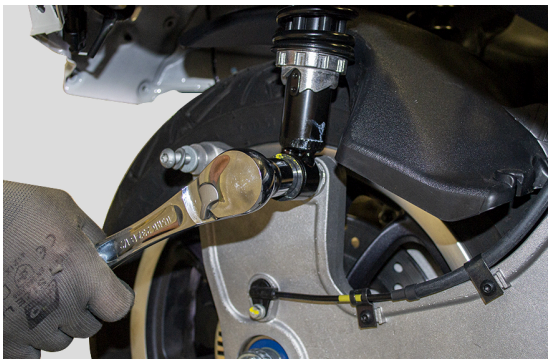
ABS sensor - Shock absorber support	7 ± 1 Nm

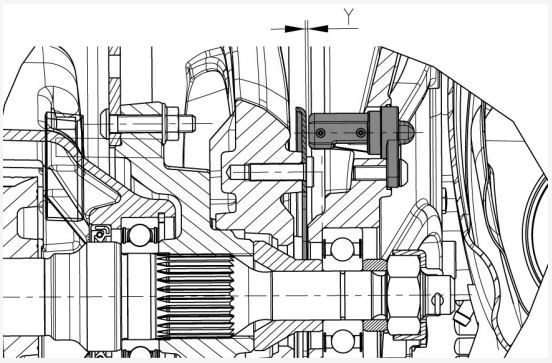


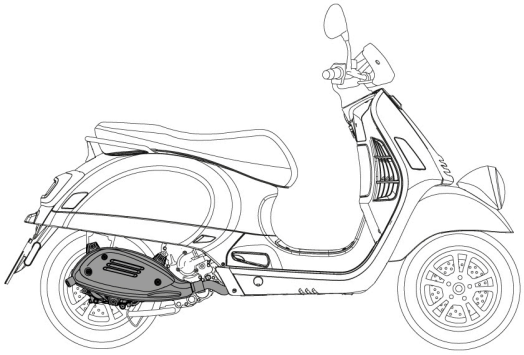




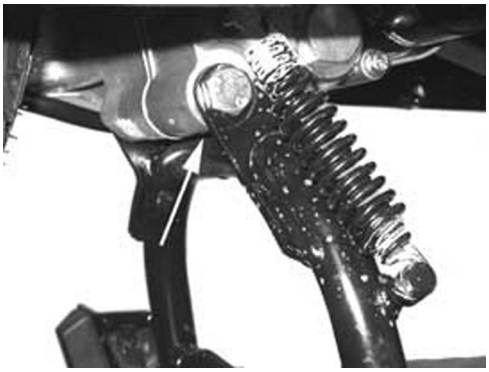
Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm







9.3 Centre stand



REMOVAL

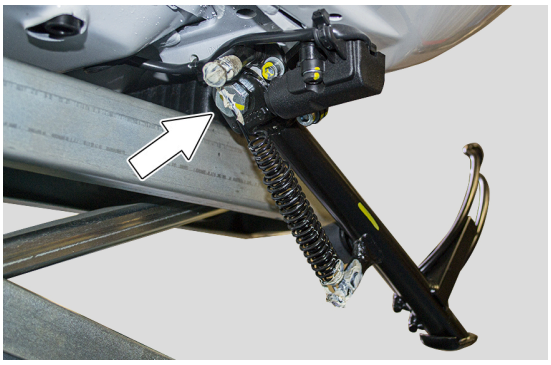
- Use a jack to support the vehicle properly.
- Remove the two return springs from the centre stand.
- Undo the nut shown in the figure.
- Remove the pin from the right side.
- Remove the centre stand.

FITTING

- On refitting tighten the nut to the specified torque.
- Grease the springs on the sliding surfaces.

Central stand bolt 32 - 40

9.4 Side stand



REMOVAL

- Release the 2 return springs of the stand.
- Unscrew the nut.
- Undo and remove the screw indicated.

FITTING

- First lubricate the pin and bushing with silicone grease.
- Refit the stand, locking the bolt to the prescribed torque.

Side stand - Body	37.5 ± 2.5 Nm

- Then refit the return springs and lubricate with silicone grease.

LIST OF TOPICS

Braking system

FRONT BRAKE

DESCRIPTION	TORQUE
Front brake calliper - Bracket	21.5 ± 2.5 Nm
ABS sensor - Shock absorber support	7 ± 1 Nm
Front brake pipe - Front brake calliper	23.5 ± 1.5 Nm
Front brake pipe - Front branke master cylinder	24.5 ± 1.5 Nm
Front brake pipe - ABS control unit	23.5 ± 1.5 Nm
ABS control unit - Support	9 ± 1 Nm
U-bolt - Front brake master cylinder	8.5 ± 1.5 Nm
ABS control unit support - Body	8 ± 2 Nm
Brake disc – front wheel hub	9 ± 1 Nm
Stud bolt - ABS control unit	5.5 ± 0.5 Nm

REAR BRAKE

DESCRIPTION	TORQUE
Rear brake calliper - Engine	22.5 ± 2.5 Nm
ABS sensor - Shock absorber support	7 ± 1 Nm
Rear brake pipe - Rear brake calliper	23.5 ± 1.5 Nm
Rear brake pipe - Rear brake pump	24.5 ± 1.5 Nm
Rear brake pipe - ABS control unit	23.5 ± 1.5 Nm
U-bolt - Rear brake pump	8.5 ± 1.5 Nm
ABS ECU pipe joint - Rear brake calliper pipe	15 ± 2 Nm
Rear brake pipe - Body	8 ± 2 Nm
Rear brake pipe clamp - Engine	12 ± 1 Nm
Brake disc – rear wheel hub	12 ± 1 Nm
Oil bleed screw - Rear brake calliper	5.4 ± 1.5 Nm
Brake pump cover - Brake pump	1.1 ± 0.2 Nm
Pad fastening pin - Rear brake calliper	17.15 ± 2.45 Nm
Air filter box - Engine	4.5 ± 0.5 Nm

10.1 ABS

ATTENTION



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.

ATTENTION



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 2.1 mm. IF NECESSARY, ADJUST IT BY ADDING OR REMOVING CALIBRATED WASHERS

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. In case of ABS warning light, reduce speed and go to a **Dealership** or an **Authorised Service Centre** for the appropriate checks. 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.

ATTENTION



AT VERY LOW SPEEDS (LESS THAN 5 km/h) THE ABS SYSTEM IS DISABLED.

IT IS THEREFORE RECOMMENDED TO PAY ATTENTION 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).

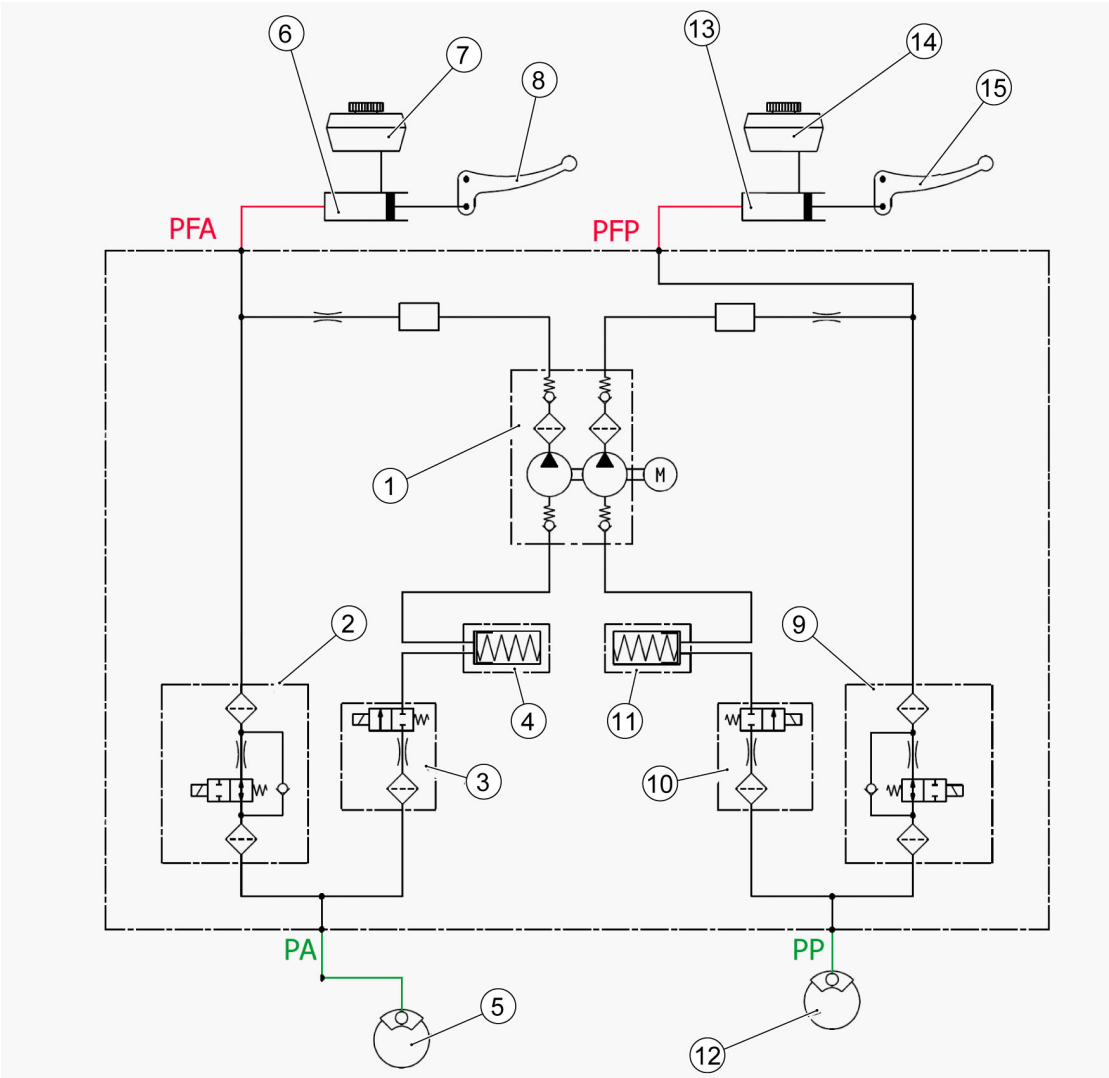
NOTE

☞

THE ABS WARNING LIGHT TURNS ON AND STAYS ON UNTIL REACHING 5 km/h.

ATTENTION

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



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.

10.1.1 Diagnosis guide

When exceeding 5 km/h:

The ABS system is deactivated!

The system is still fully functional like any other brake system without ABS.

The detection of malfunctions may require more or less time depending on the type of fault.

Following the detection logic one or more conditions must persist within a certain time to detect errors.

If during this time one of the conditions is lost and then reappears, the timer is reset and the system is not able to detect the fault.

The ABS system continues to be inactive.

Example:

the error code 5D93 takes a few minutes before being diagnosed, so in this period, the ABS warning light continues to flash.

GUIDE TO ABS FAULT DIAGNOSTIC

1. ABS LAMP ON

2. CONNECT THE DIAGNOSTIC TOOL

DOES THE DIAGNOSTIC TOOL COMMUNICATE? (NO, go to point 3; YES, go to point 4)

3. CHECK THE ABS CONTROL UNIT POWER SUPPLY.

4. ARE THERE ANY ERRORS? YES, go to point 5; NO, go to point 6)

5. CONSULT THE ERRORS DISPLAY TABLE

6. ABS WARNING LIGHT ACTIVATION

IS IT ACTIVATED?(YES, go to point 7; NO, go to point 8)

7. CONTACT TECHNICAL SERVICE

8. PERFORM THESE CHECKS:

- A. Continuity in cable between PIN 3 of ABS unit connector and PIN 7 of instrument cluster.
- B. Check connectors - see operations described in the chapter.

If the above checks are OK, the causes can be:

- C. ABS control unit malfunction
- D. Instrument panel malfunction

10.1.2 Modulator

REMOVAL

ATTENTION

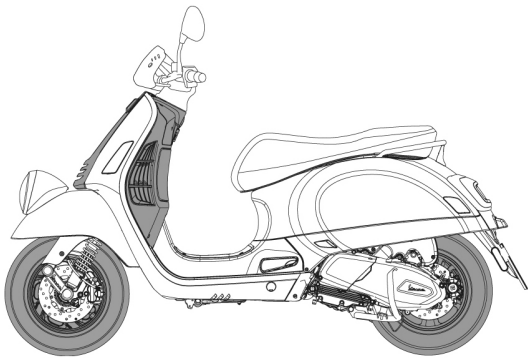
IT IS EXTREMELY IMPORTANT TO CAREFULLY FOLLOW THE REMOVAL AND REASSEMBLY PROCEDURES DESCRIBED BELOW. THESE PROCEDURES MAKE IT POSSIBLE TO AVOID AIR FROM ENTERING THE BRAKING CIRCUIT AND ESPECIALLY IN THE ABS MODULATOR WHILE REPLACING THE COMPONENTS.

Support the vehicle adequately.

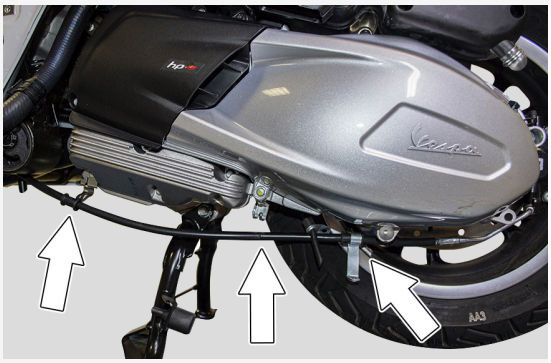
Remove the front centre cover.

Remove the leg shield back plate.

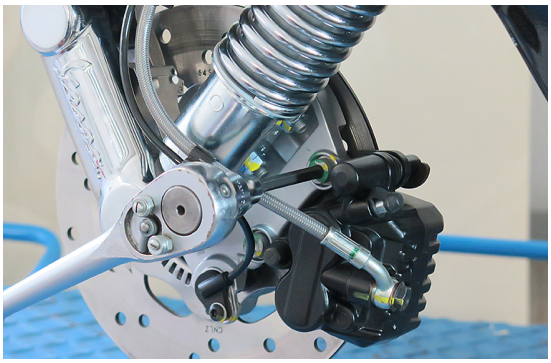
Remove the wheels.



- Release the rear brake pipe from the three fasteners of the crankcase, as indicated in the picture.



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.

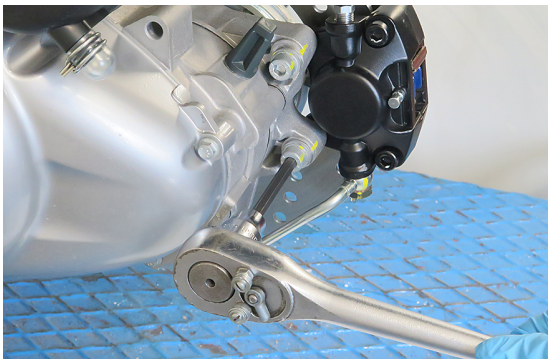


Operate the brake lever just beyond the point of closing communication with the tank.

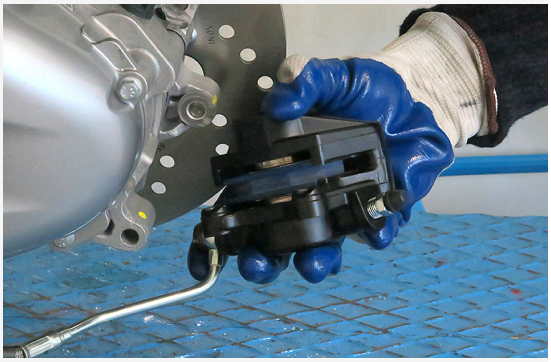
Block the position of the lever by fastening it.



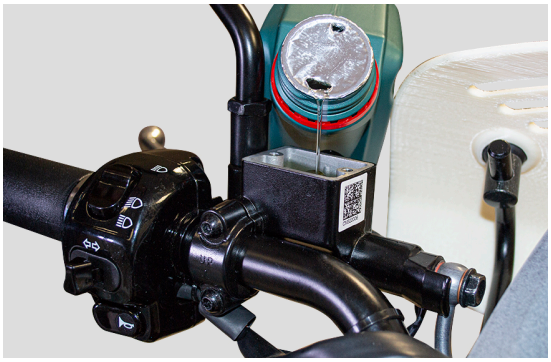
Undo the fixing screws of the rear brake calliper to the engine.



With new pads or pads in a good condition, operate the brake pump repeatedly to bring the pads in contact with each other.

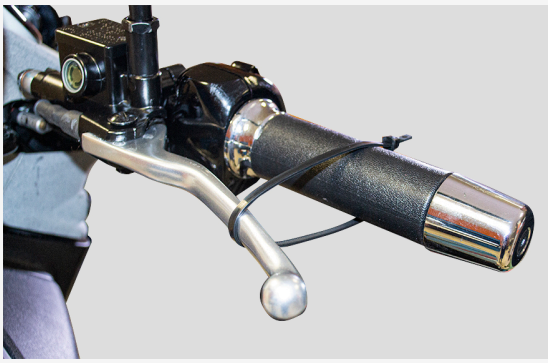


Refill the rear brake pump tank and fit the cap.

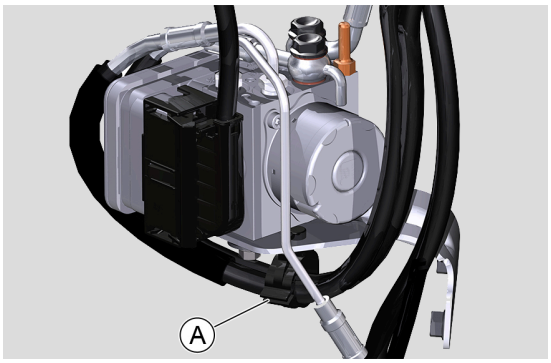


Operate the brake lever just beyond the point of closing communication with the tank.

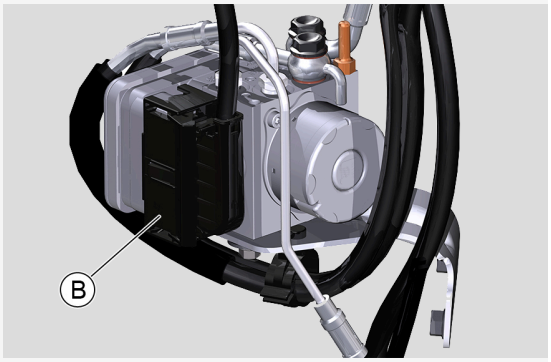
Block the position of the lever by fastening it.



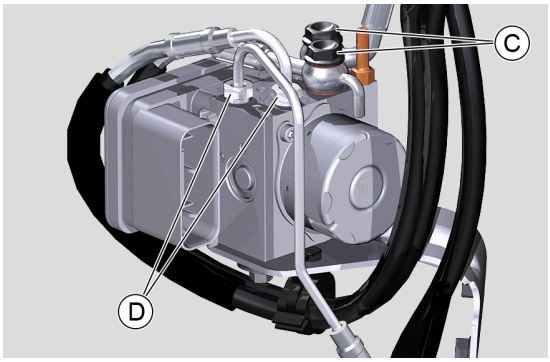
Open the hydraulic hoses fastening clamp **(A)**.



Disconnect the connector **(B)** from the modulator.



Unscrew the couplings **(C)** fastening the front braking system pipes and the couplings **(D)** fastening the rear braking system pipes on the modulator.



ATTENTION

PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.

Protect the fittings properly and secure them at an upward angle to prevent air ingress.

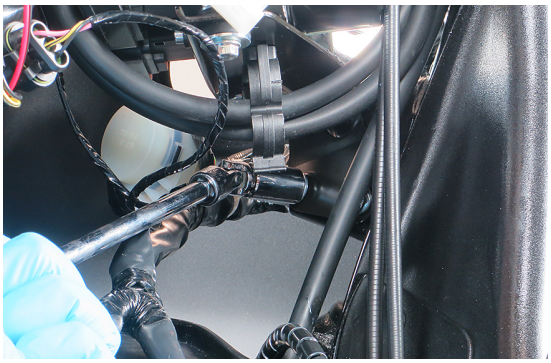


ATTENTION

THE 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.

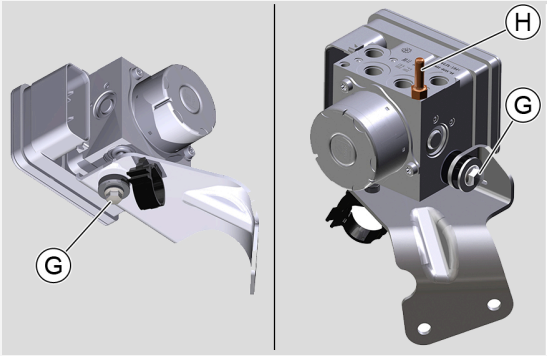
Undo and remove the fastening nuts of the modulator lower support bracket.

Remove the modulator complete with lower support bracket.



Unscrew the stud bolt **(H)**.

Separate the ABS modulator from the lower support bracket by unscrewing the fastening screws **(G)**.



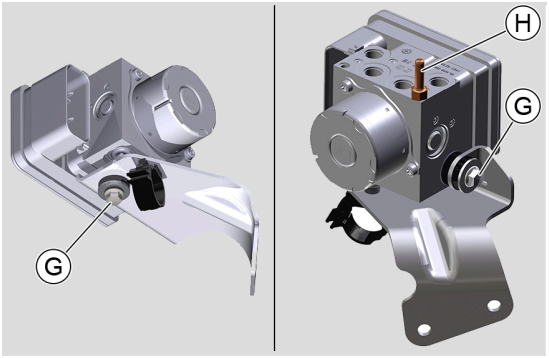
FITTING

Install the new modulator on the support bracket, tightening the fastening screws **(G)** to the specified torque.

ABS control unit - Support	9 ± 1 Nm

Insert and tighten to the specified torque the stud bolt **(H)**.

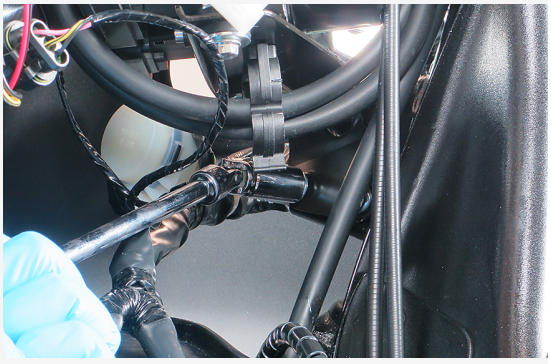
Stud bolt - ABS control unit	5.5 ± 0.5 Nm



Insert the ABS modulator complete with bracket in its seat.

Screw and tighten to the specified torque the fastening nuts of the plate to the body.

ABS control unit support - Body	8 ± 2 Nm



Unscrew the seal plug on the RW outlet of the modulator.

ATTENTION

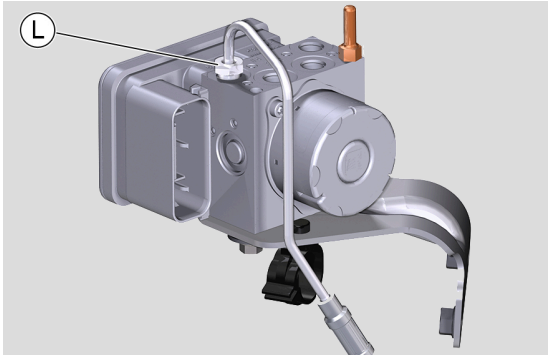
PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.

Connect the pipe supplying the rear calliper to the RW outlet on the modulator. Screw in the connector **(L)** all the way and then loosen it half a turn.

Slowly move the rear calliper pads away until brake fluid can escape from the loose fitting.



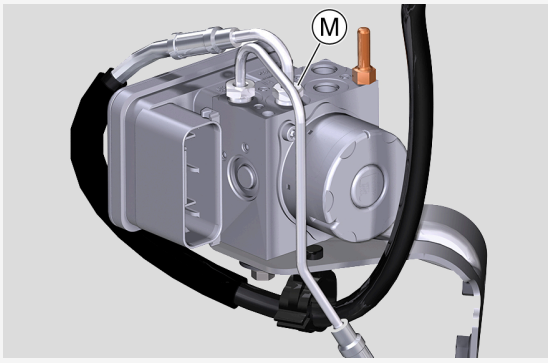
Block the connector **(L)** on the modulator while the fluid is exiting.



WARNING

THE CONNECTOR MUST BE TIGHTENED BEFORE REMOVING THE THRUST FROM THE PADS. OTHERWISE, AIR ENTERS THE PIPE.

Unscrew the seal plug on the RM inlet of the modulator.



ATTENTION

PAY ATTENTION TO THE LOSS OF BRAKE FLUID DURING THE REMOVAL OF THE PIPING FROM THE MODULATOR. USE A SMALL CONTAINER AND A CLOTH.

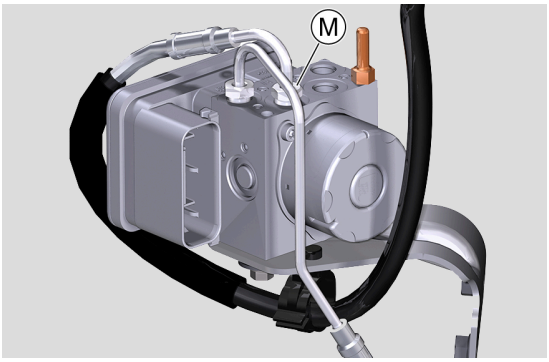
Move the rear calliper pads further away until the brake fluid exits from the seat of the RM inlet.

Connect the rear brake master cylinder delivery pipe to the RM outlet on the modulator.

Screw in the connector **(M)** all the way and then loosen it half a turn.

Pull the rear brake lever until brake fluid and air slowly exit the RM connector.

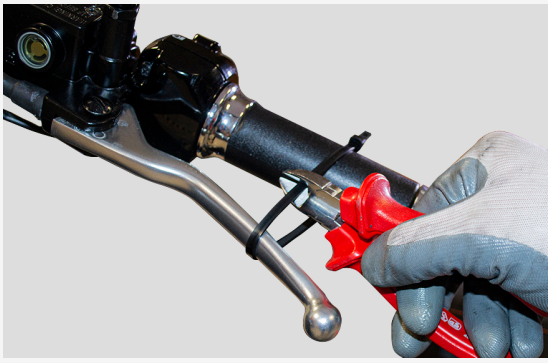
Block the connector **(M)** while the brake fluid is exiting.



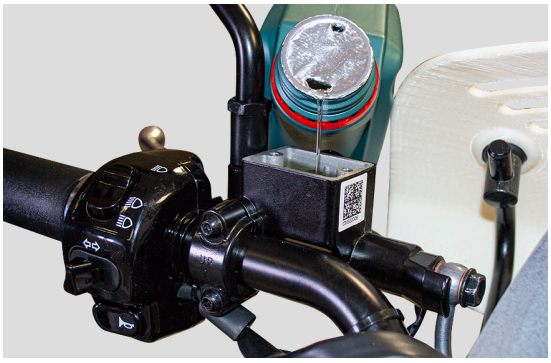
WARNING

THE CONNECTOR MUST BE TIGHTENED BEFORE REMOVING THE THRUST FROM THE PADS. OTHERWISE, AIR ENTERS 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.



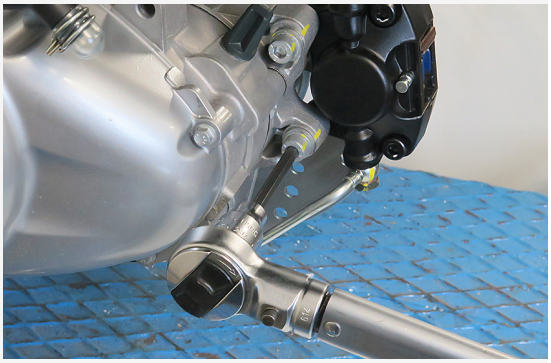
Refit the rear brake calliper on the disc, tightening the screws to the specified torque.

Rear brake calliper - Engine	22.5 ± 2.5 Nm

Actuate the brake pump lever, recovering the distance of the pads.

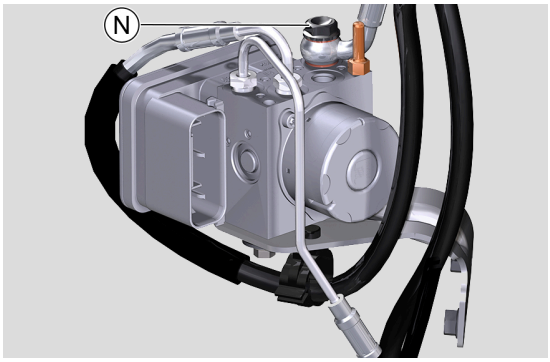
Check the system's efficiency.

If the work was performed properly, the brake must be efficient.



Proceed in the same manner to connect the front brake pipes.

Unscrew the seal plug on the FW outlet of the modulator.



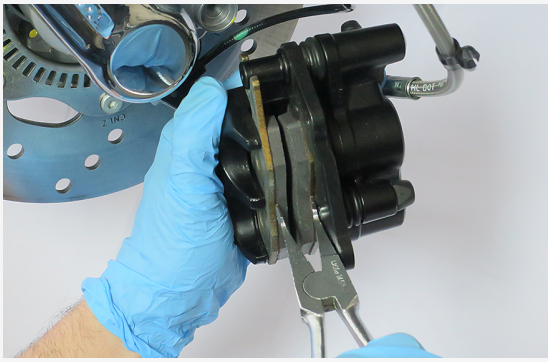
ATTENTION

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.

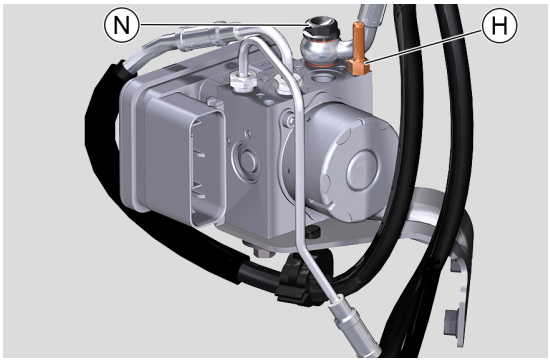
Tighten the screw **(N)** all the way and then loosen it half a turn.

Slowly move the front calliper pads away until brake fluid can escape from the loose fitting.



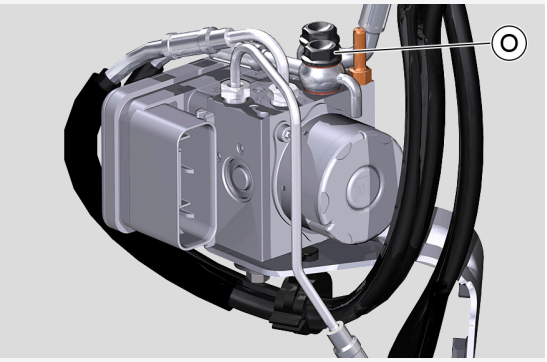
Tighten the screw **(N)** to the prescribed torque while the fluid is exiting.

Front brake pipe - ABS control unit	23.5 ± 1.5 Nm



Check that the terminal of the front brake calliper pipe is positioned in contact with the stud bolt **(H)**.

Unscrew the seal plug on the FM inlet of the modulator.



ATTENTION

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 FM inlet.

Connect the front brake master cylinder delivery pipe to the FM outlet on the modulator.

Tighten the screw **(O)** all the way and then loosen it half a turn.

Pull the front brake lever until brake fluid and air slowly exit the FM connector.

Tighten the screw **(O)** to the prescribed torque while the fluid is exiting.

Front brake pipe - ABS control unit	23.5 ± 1.5 Nm

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.



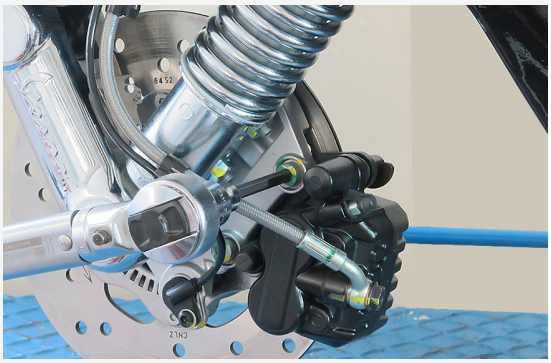
Refit the front brake calliper on the disc, tightening the screws to the specified torque.

Front brake calliper - Bracket	21.5 ± 2.5 Nm

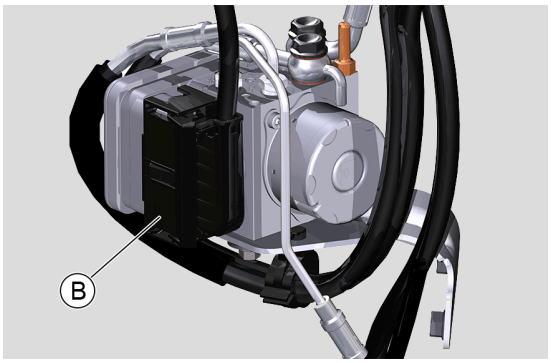
Actuate the brake pump lever, recovering the distance of the pads.

Check the system's efficiency.

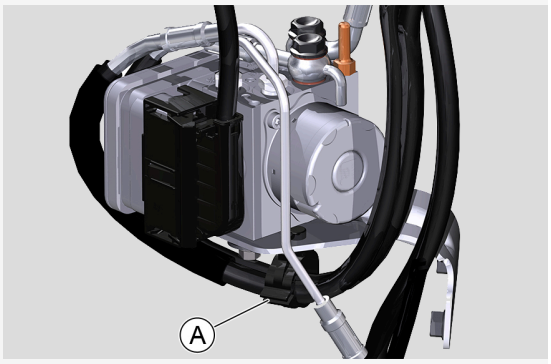
If the work was performed properly, the brake must be efficient.



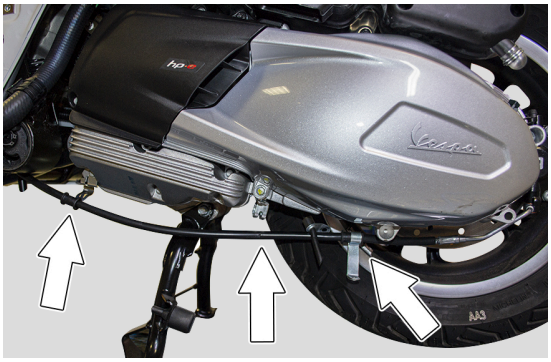
Connect the connector **(B)** to the modulator until the click of the stop tooth is heard.



Block the hydraulic hoses with the appropriate clamp **(A)**.



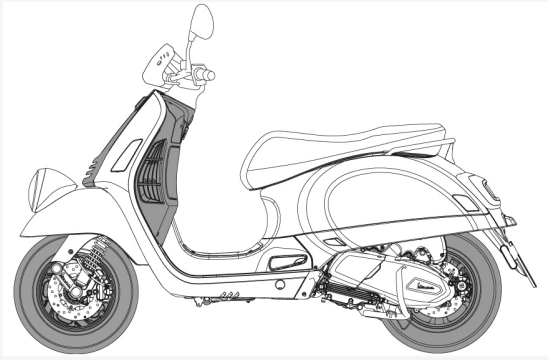
Fasten the rear brake pipe to the three anchoring points on the engine crankcase, as shown in the figure.



Assemble the wheels.

Assemble the leg shield back plate

Assemble the front centre cover.



10.2 ASR

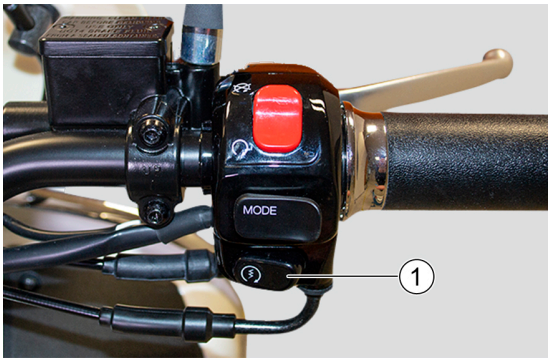
10.2.1 ASR System

WARNING

THE ASR SYSTEM IS BASED ON THE RECOGNITION OF SPEED DIFFERENCES BETWEEN FRONT AND REAR WHEEL. IN ORDER FOR THE SYSTEM TO MAINTAIN MAXIMUM EFFICIENCY IN ALL CONDITIONS, THE CALIBRATION PROCEDURE MUST BE PERFORMED EVERY TIME, EVEN IN CASE OF REPLACEMENT OF JUST ONE TYRE.

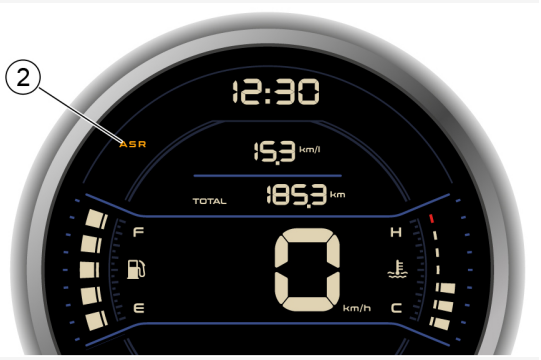
FOR THE CALIBRATION OF THE ASR SYSTEM PERFORM THE PROCEDURE BELOW.

To activate/deactivate the ASR system, **press and hold** the start button (**1**).



ASR (2) system activation icon

System active and calibrated:icon flashes with each rotation of the ignition switch to the **«ON»** position, then goes off with the engine running.



ASR (3) system deactivation icon

Icon "ASR OFF": on steady with engine started, ASR system not working or not calibrated or voluntarily deactivated.



NOTE

☞

WITH THE ROTATION OF THE IGNITION SWITCH TO POSITION "ON", THE ASR ICON FLASHES AT THE SAME FREQUENCY AS THE ABS INDICATOR LIGHT TO INDICATE THAT SYSTEM DIAGNOSIS IS IN PROGRESS. IF NO ERRORS ARE FOUND, THE ASR ICON AND THE ABS INDICATOR LAMP EXTINGUISH SIMULTANEOUSLY ONCE VEHICLE SPEED EXCEEDS 5 km/h.

IF THERE IS NO FLASHING UPON START-UP, THE SYSTEM MAY NOT BE OPERATIONAL. PLEASE CONTACT A DEALER OR AN AUTHORISED SERVICE CENTRE.

WARNING

THE ASR SYSTEM IS ACTIVATED EVERY TIME, THE STARTER SWITCH IS TURNED TO THE "ON" POSITION.

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; THE ASR SYSTEM IS AUTOMATICALLY ENABLED THE NEXT TIME THE IGNITION SWITCH IS TURNED TO THE "ON" POSITION.

ATTENTION



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.

NOTE



IN CASE OF ROADS FULL OF HOLES BRIEF ACTIVATION OF THE ASR SYSTEM MAY OCCUR. SUCH EVENT APPEARS UNDER NORMAL OPERATION CONDITIONS OF THE VEHICLE.

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.

WARNING



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. IF THE PROBLEM PERSISTS, CONTACT A DEALERSHIP OR AN AUTHORISED SERVICE CENTRE.

ATTENTION



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

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predelivery ASR SYSTEM calibration/ ECU replacement

In the case of a vehicle in predelivery, or following the replacement of the engine management ECU, **on which the Initialization procedure of the ASR system has never been performed**, proceed as follows.

After turning the ignition key to **"ON"**, the ABS warning light flashes and the ASR icon **(2) is switched on** steady.

1. Start the vehicle and ride a short distance of more than 5 km/h and wait for the flashing of the ASR warning light to stop. The ASR icon stays switched on steady.
2. Stop the vehicle and leave the engine running at idle speed for at least 3 seconds.
3. Keep the brake lever pulled and press the start button **(1)** for at least 12 seconds then release to start the programming procedure.
4. The activation process will be confirmed by the ASR icon **(2)** switching on with slow flashing (1 flash every 2 seconds).
5. Accelerate to a constant speed of 30 km/h and maintain it for at least to 10 seconds.
6. The end of the procedure will be indicated by the turning off of the ASR icon **(2)**.
7. Once the procedure is complete, turn the ignition key to **"OFF "** and wait at least 30 seconds until switching back to **"ON "** again.
8. If the procedure is not completed within 2 minutes, the ASR icon **(2)** will remain on continuously and the ASR will remain off until the next time the ignition switch is turned to the **"OFF"** position.
9. To reactivate the ASR, it is necessary to turn it to **"ON"** position and repeat the procedure until successful.

ASR SYSTEM CALIBRATION following the replacement of one or both tires

If one or both tires are replaced, proceed in the following manner.

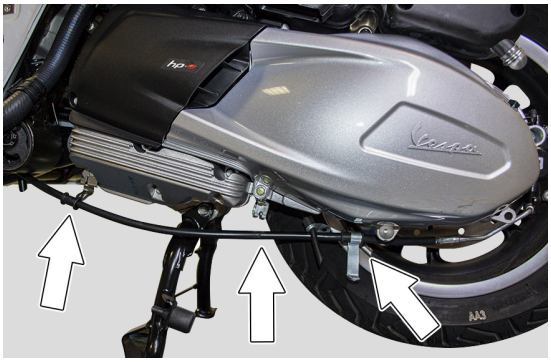
After turning the ignition switch to the "**ON**" position, the ABS indicator light and the ASR icon **(2) flash at the same frequency (fast flashing)**.

1. Start the vehicle and ride a short distance of more than 5 km/h and wait for the flashing of the ASR warning light and of the ABS icon to stop.
2. Stop the vehicle and leave the engine running at idle speed for at least 3 seconds.
3. Turn the ASR system off by pressing the specific button **(1)** on the handlebar and check that the ASR disabling icon **(3)** is switched on steady.
4. Keep the brake lever pulled and press the start button **(1)** for at least 12 seconds then release to start the programming procedure.
5. The activation process will be confirmed by the ASR icon **(2)** switching on with slow flashing (1 flash every 2 seconds).
6. Accelerate to a constant speed of 30 km/h and maintain it for at least to 10 seconds.
7. The end of the procedure will be indicated by the turning off of the ASR icon **(2)**.
8. Once the procedure is complete, turn the ignition key to **"OFF "** and wait at least 30 seconds until switching back to **"ON "** again.
9. If the procedure is not completed within 2 minutes, the ASR icon **(2)** will remain on continuously and the ASR will remain off until the next time the ignition switch is turned to the **"OFF"** position.
10. To reactivate the ASR, it is necessary to turn it to **"ON"** position and repeat the procedure until successful.

10.3 Rear brake calliper

REMOVAL

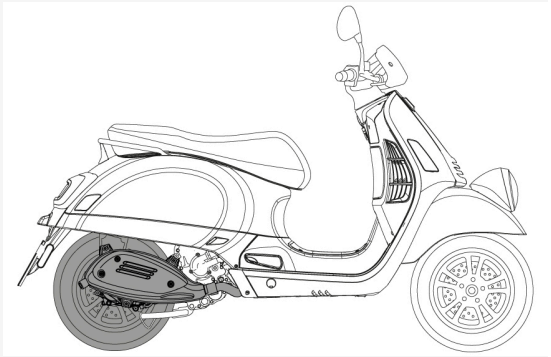
Release the rear brake pipe from the three fasteners of the crankcase, as indicated in the picture.



Remove the silencer.

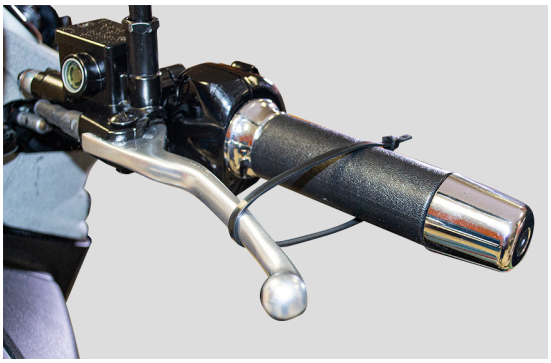
Remove the silencer supporting arm.

Remove the rear wheel.

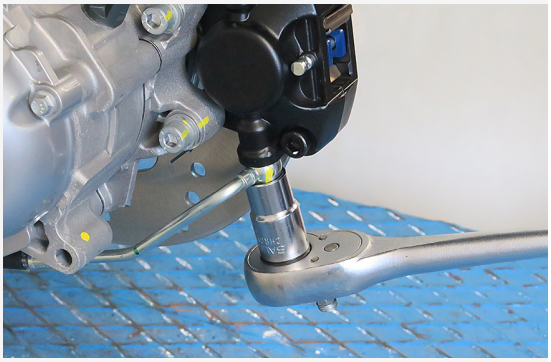


Operate the brake lever just beyond the point of closing communication with the tank.

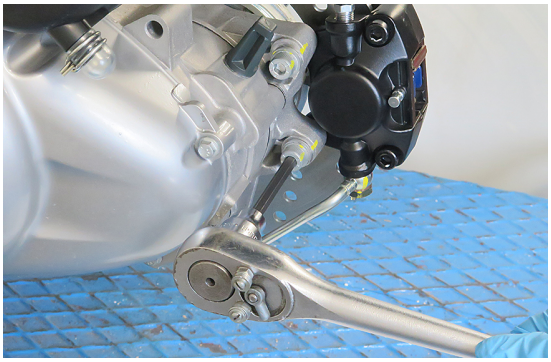
Block the position of the lever by fastening it.



Previously loosen the screw fastening the pipe connector to the calliper.



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.

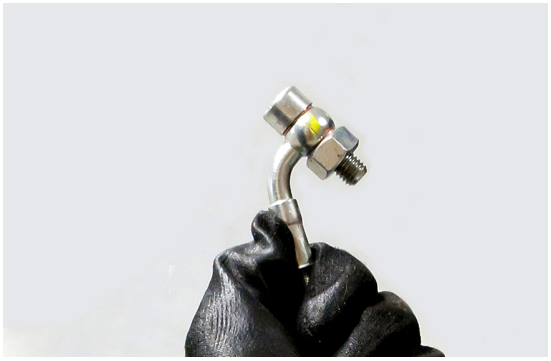


Suitably protect the connector and secure it so it is tilted upward to keep air from entering.

Immediately proceed with FITTING the new brake calliper.

ATTENTION

THE 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.



FITTING

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.

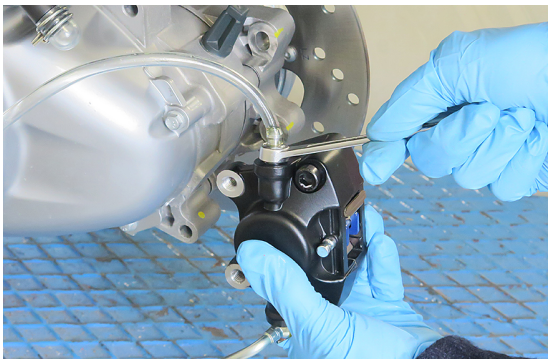


Keeping the calliper up, connect the drain pipe and open the bleed valve connector.

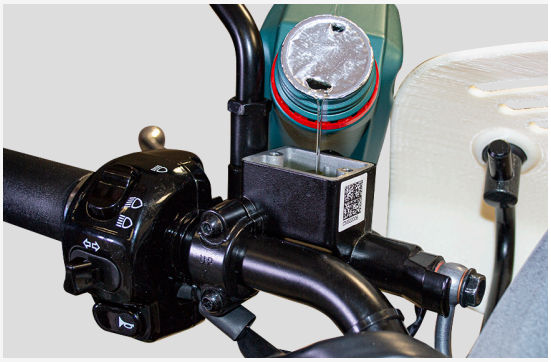
Allow the air to flow out until only brake fluid exits.

WARNING

THIS BLEEDING PHASE MUST TAKE PLACE BY MEANS OF GRAVITY. DO NOT ACTIVATE THE PUMP LEVER.

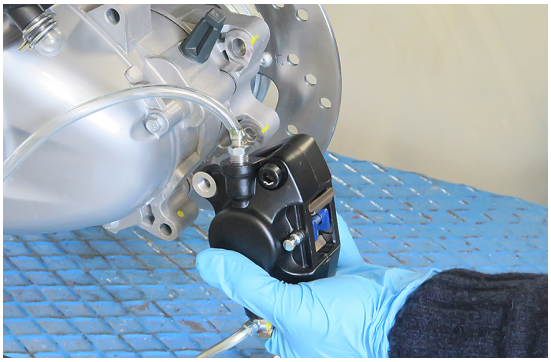


Check and if necessary top up the tank level.



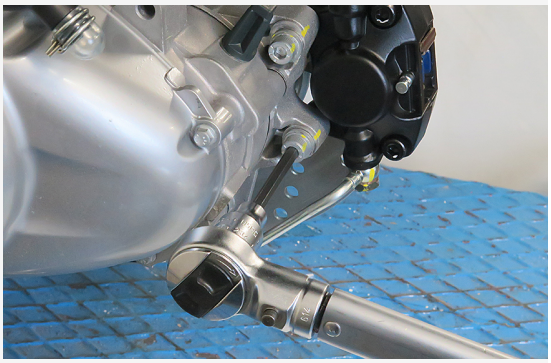
Lower the calliper to the position shown in the photo and open the bleed valve connector again.

Let the air flow out and close the bleed connector when the level of the brake fluid in the drain pipe has risen at least 10 cm without any air outflow.



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

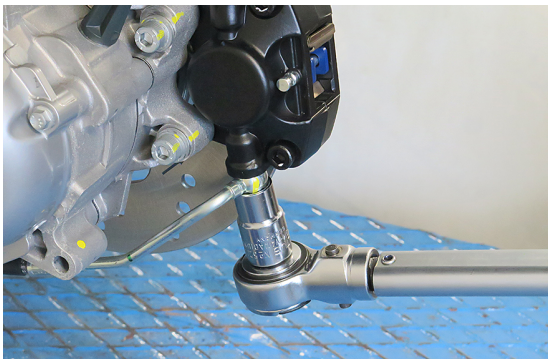
Rear brake calliper - Engine	22.5 ± 2.5 Nm



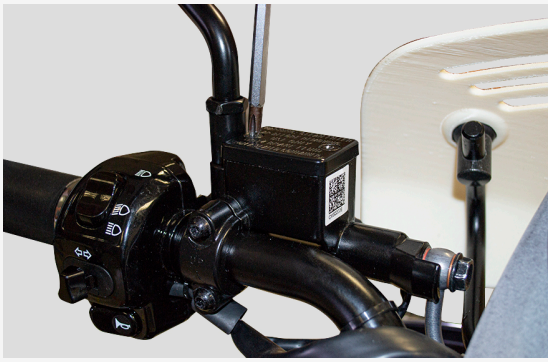
Loosen the connector fastening the pipe as little as possible to settle the pipe in the neutral position.

Finally block the connector to the specified torque.

Rear brake pipe - Rear brake calliper	23.5 ± 1.5 Nm



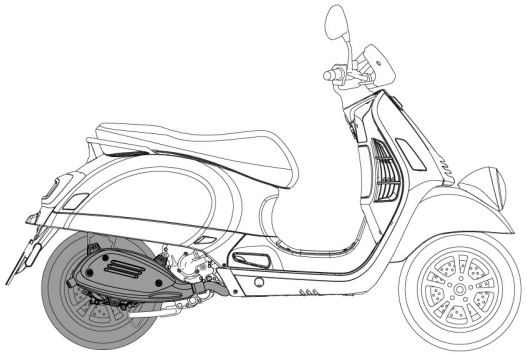
Refill the level of the brake fluid and close the tank cover.



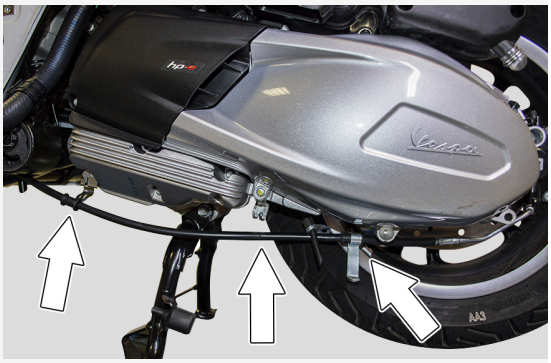
Fit the rear wheel.

Assemble the silencer supporting arm.

fit the silencer.



Fasten the rear brake pipe to the three anchoring points on the engine crankcase, as shown in the figure.



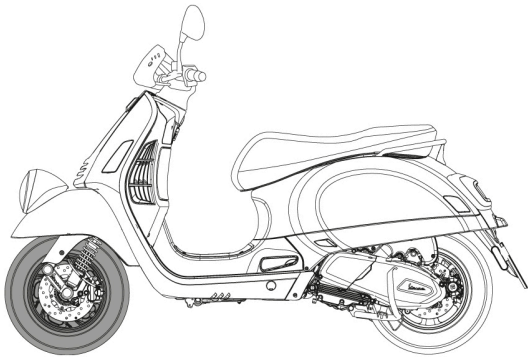
Check the system's efficiency.

If the work was performed properly, the brake must be efficient.

10.4 Front brake calliper

REMOVAL

Remove the front wheel.

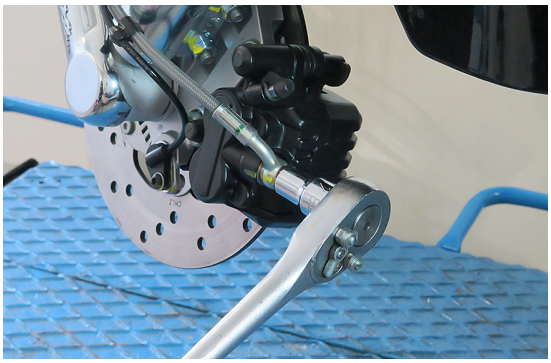


Operate the brake lever just beyond the point of closing communication with the tank.

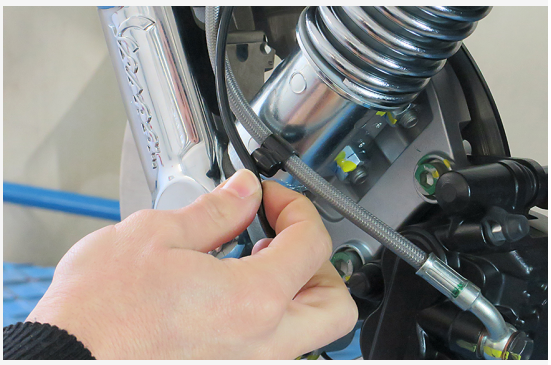
Block the position of the lever by fastening it.



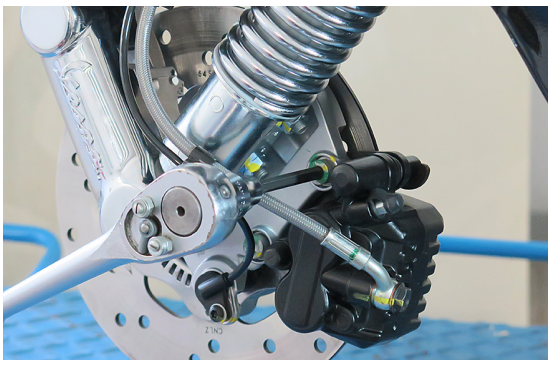
Previously loosen the screw fastening the pipe connector to the calliper.



Disconnect the front wheel sensor cable retaining clamps.

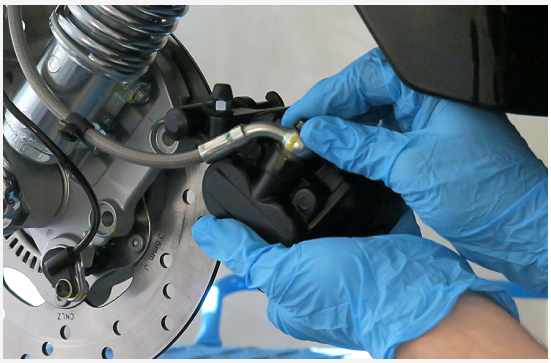


Unscrew and remove the front brake calliper fixing screws and remove it from the support.



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.



FITTING

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

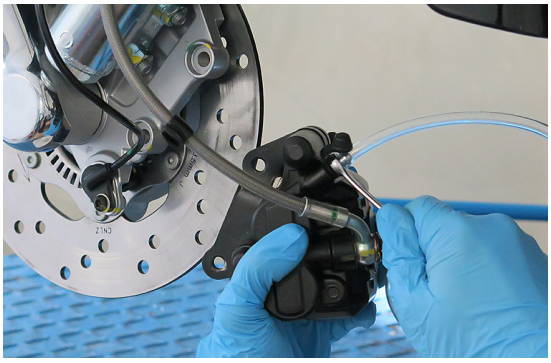
TO RELEASE THE BRAKE LEVER, CUT THE WIRE OF THE FASTENING IN ORDER TO OPEN THE COMMUNICATION WITH THE TANK. AVOID ANY ADDITIONAL OPERATION OF THE BRAKE LEVER.



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.

WARNING



THIS BLEEDING PHASE MUST TAKE PLACE BY MEANS OF GRAVITY. DO NOT ACTIVATE THE PUMP LEVER.

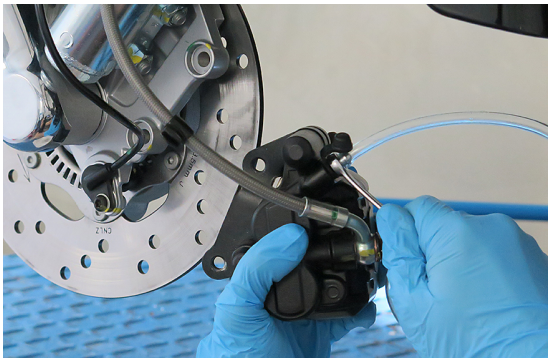
Check and if necessary top up the tank level.



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 fitting and let the air flow out.

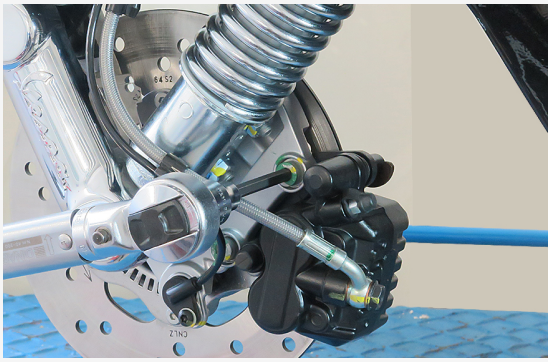
Close the bleed fitting when the level of the brake fluid in the drain pipe has risen at least 10 cm without the outflow of air.



Separate the pads, if necessary, and install the brake calliper on the disc.

Fasten the screws fastening the support to the specified torque.

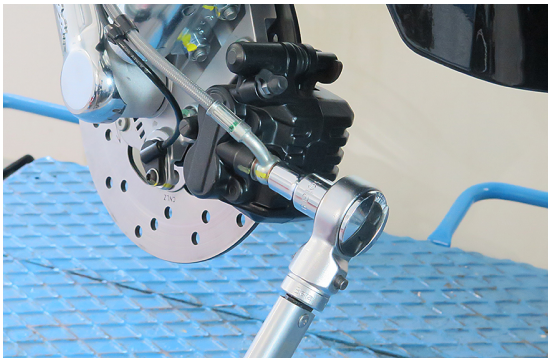
Front brake calliper - Bracket	21.5 ± 2.5 Nm



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.

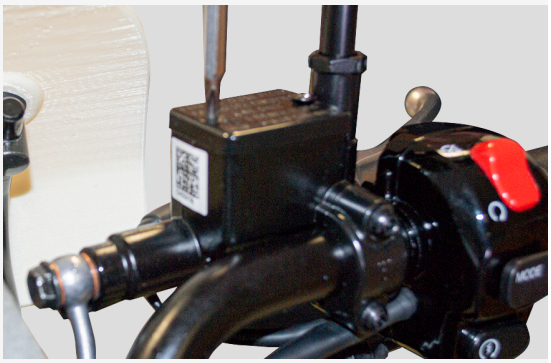
WARNING



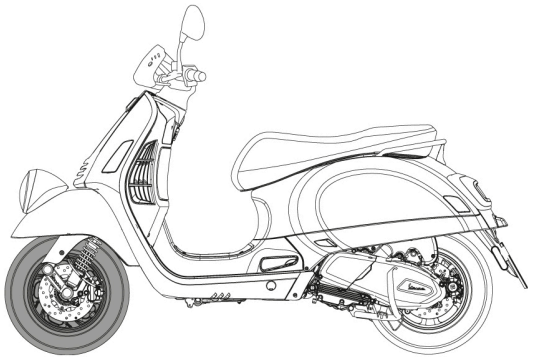
KEEP THE PIPE IN POSITION WHEN TIGHTENING THE CONNECTOR.

Front brake pipe - Front brake calliper	23.5 ± 1.5 Nm

Refill the level of the brake fluid and close the tank cover.



Fit the front wheel.

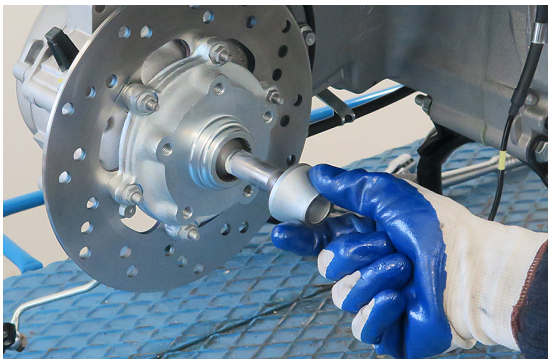


10.5 Rear brake disc

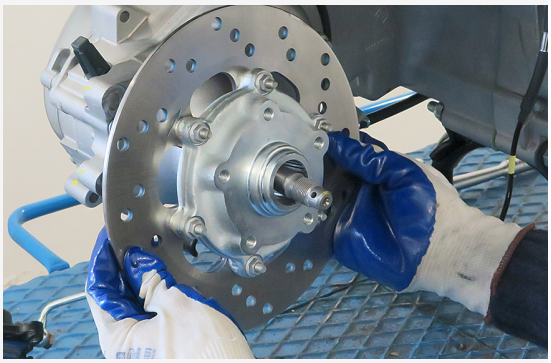
10.5.1 Removal

Remove the rear brake calliper.

Remove the tapered spacer.

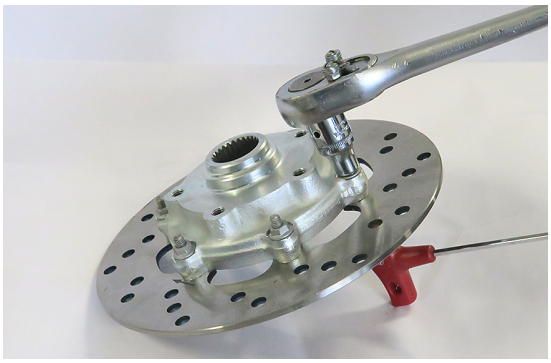


Remove the rear wheel hub with the brake disc.



Unscrew and remove the screws fastening the brake disc to the rear wheel hub.

Remove the disc.

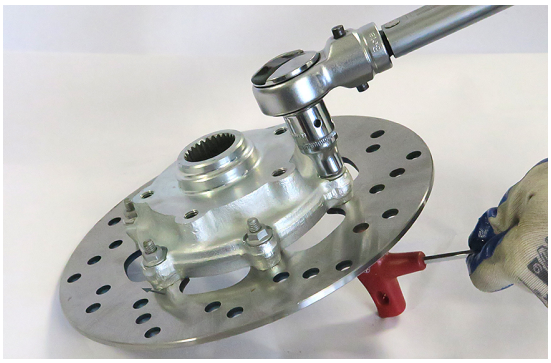


10.5.2 Fitting

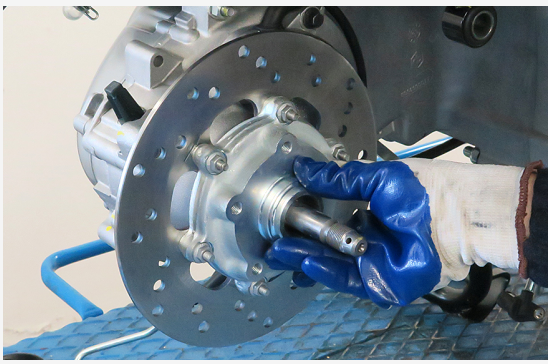
Position the brake disc on the rear wheel hub.

Insert and tighten the fastening screws at the recommended torque.

Brake disc – rear wheel hub	12 ± 1 Nm



Insert the rear wheel hub with the brake disc on the wheel axle.



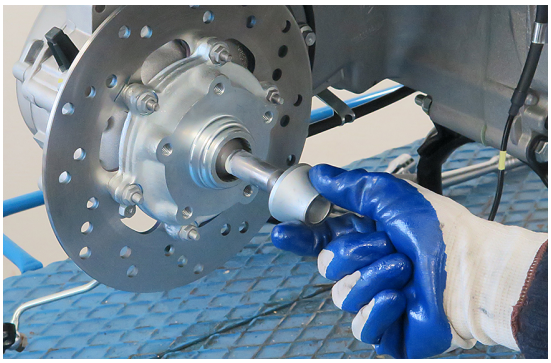
Insert the tapered spacer.

Assemble the brake calliper.

Fit the rear wheel.

Assemble the silencer supporting arm.

fit the silencer.



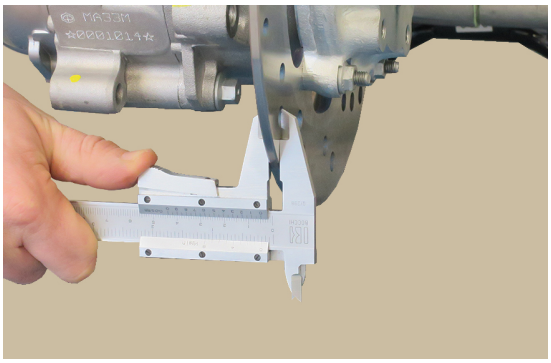
10.5.3 Disc check

Remove the rear wheel.

Check the thickness of the disc with an appropriate measuring instrument.

Standard thickness of the rear disc 3.90 to 4.20 mm

Disc thickness at wear limit (front) 3.5 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.

- Fasten the flange properly to the wheel axle using the original nut and spacer and a ø 17 mm bearing.

NOTE

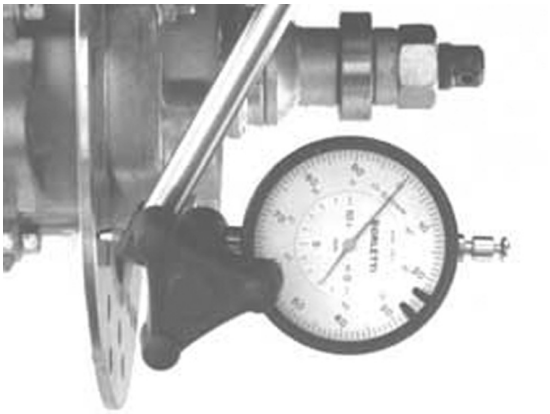
☞

FOR A CORRECT READING, MAKE THE DRIVEN PULLEY AXLE ROTATE IN ORDER TO ROTATE THE DISC.

020335Y Magnetic mounting for dial gauge

Max. deviation allowed: 0.1 mm

- If incorrect values are measured, replace the disc. If the anomaly persists, replace the hub.



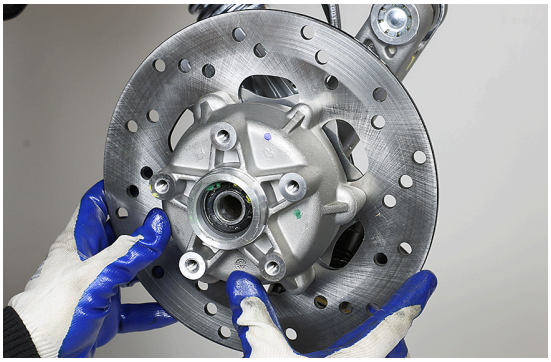
10.6 Front brake disc

10.6.1 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.



10.6.2 Fitting

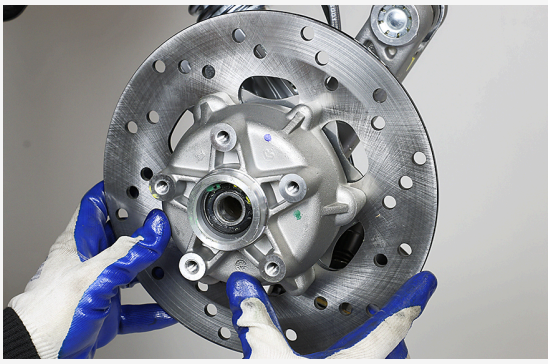
Fit the brake disc and tone wheel on the hub.

Insert and tighten the fastening screws at the recommended torque.

Brake disc – front wheel hub	9 ± 1 Nm



Insert the front wheel hub with the brake disc on the wheel axle.



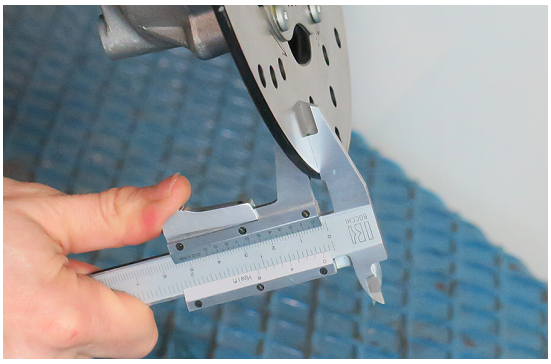
10.6.3 Disc check

Remove the front wheel.

Check the thickness of the disc with an appropriate measuring instrument.

Standard thickness of the front disc 3.90 to 4.20 mm

Disc thickness at wear limit (front) 3.5 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.

- Fasten the flange properly to the wheel axle using the original nut and spacer and a ø 17 mm bearing.

NOTE

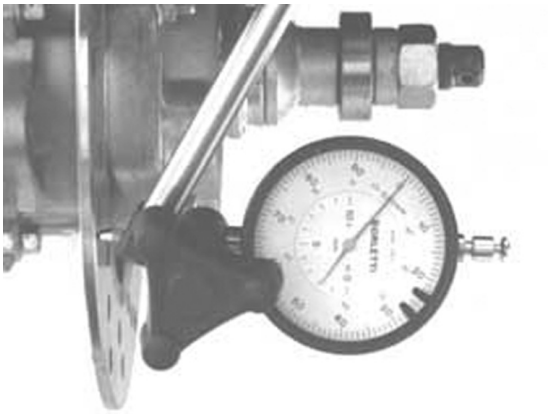
☞

FOR A CORRECT READING, MAKE THE DRIVEN PULLEY AXLE ROTATE IN ORDER TO ROTATE THE DISC.

020335Y Magnetic mounting for dial gauge

Max. deviation allowed: 0.1 mm

- If incorrect values are measured, replace the disc. If the anomaly persists, replace the hub.



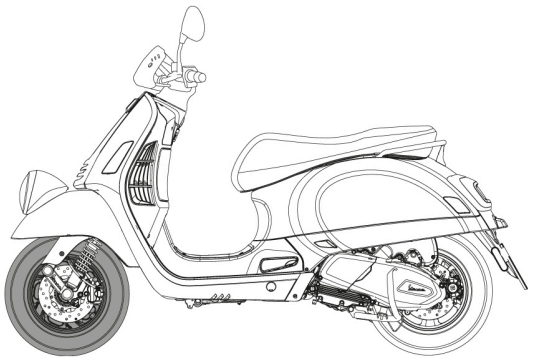
10.7 Front brake pads

REMOVAL

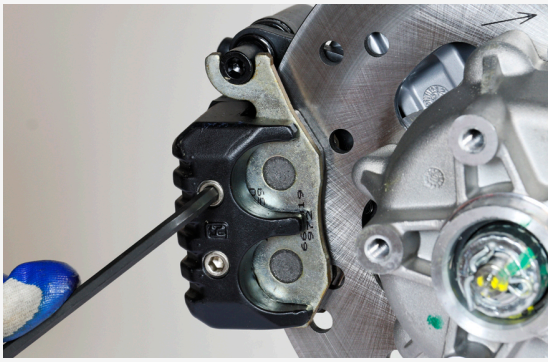
Rest the vehicle on its centre stand.

Suitably secure the rear part of the vehicle by raising the front slightly.

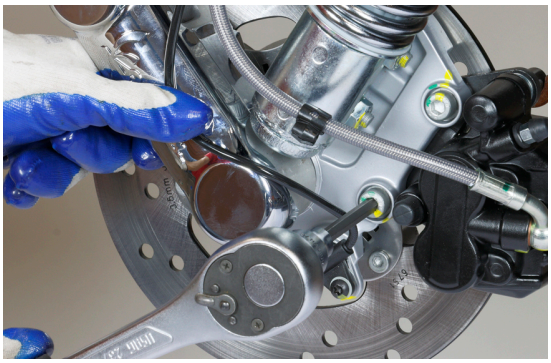
Remove the front wheel.



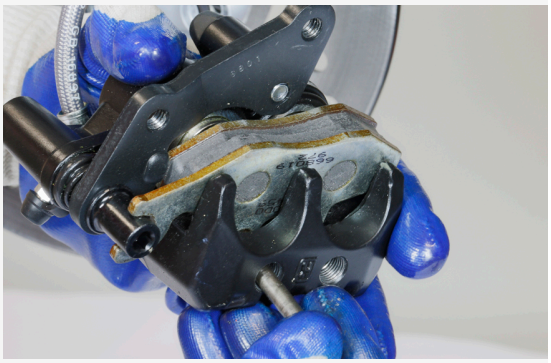
Loosen, without removing, the screws fixing the front brake pads.



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.

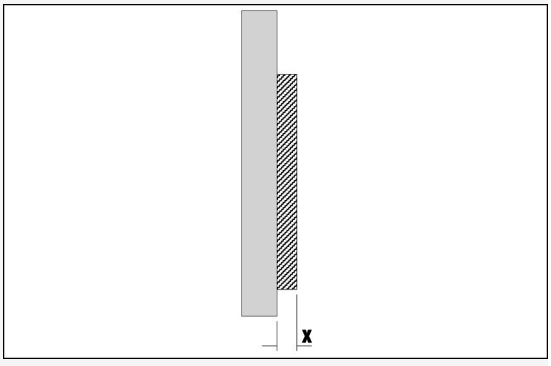
ATTENTION

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.



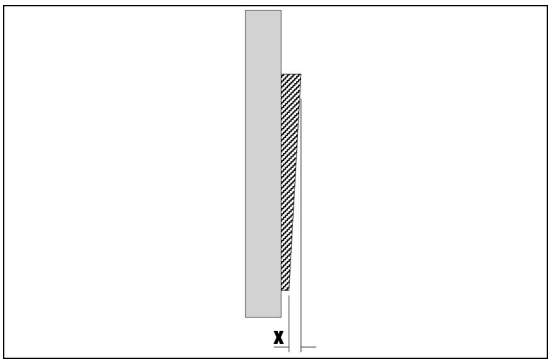
Check the thickness of the wear material and, if below the minimum value, replace the pads.

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.

Maximum permissible thickness tolerance for friction material 0.5 mm

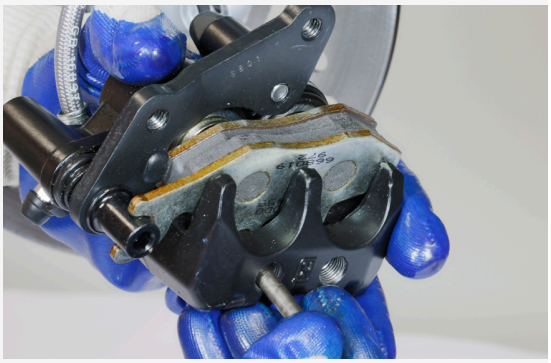


FITTING

Put the new brake pads inside the clamp.



Screw in the fastening screws of the brake pads on the clamp.



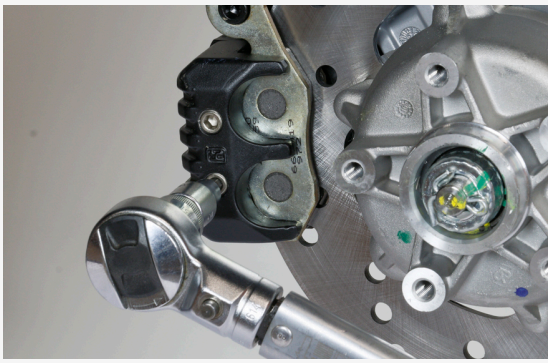
Put the brake calliper on the support bracket and tighten the fixing screws to the specified torque.

Front brake calliper - Bracket	21.5 ± 2.5 Nm

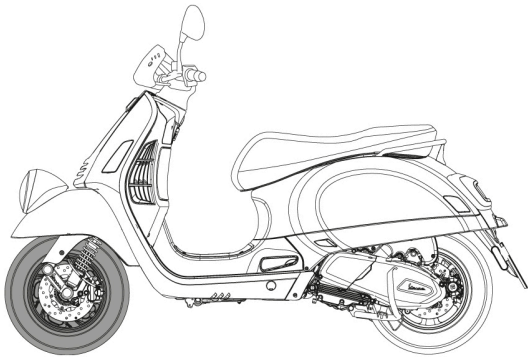
Put the wiring harness of the tone wheel sensor in its clamp.



Tighten the fixing screws of the brake pads to the clamp at the specified torque.



Refit the front wheel.



10.8 Rear pads

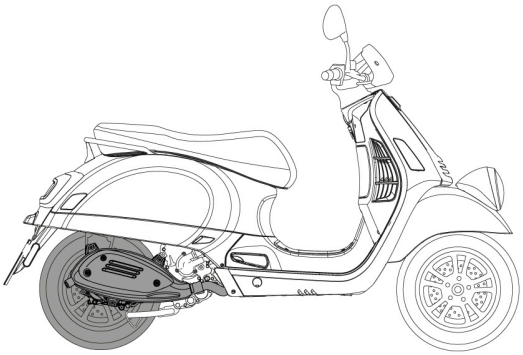
REMOVAL

Rest the vehicle on its centre stand.

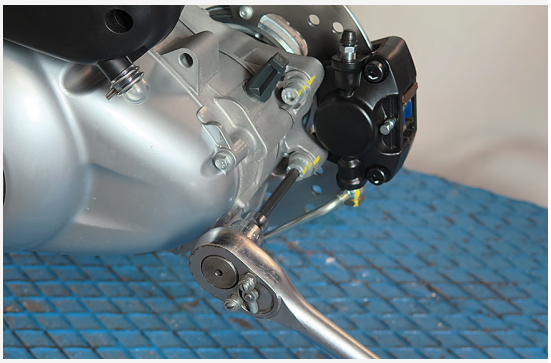
Remove the complete silencer.

Remove the silencer support bracket.

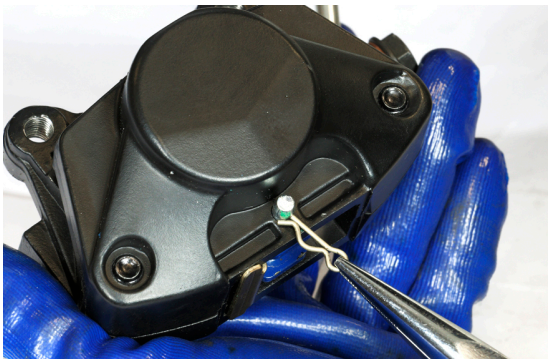
Remove the rear wheel.



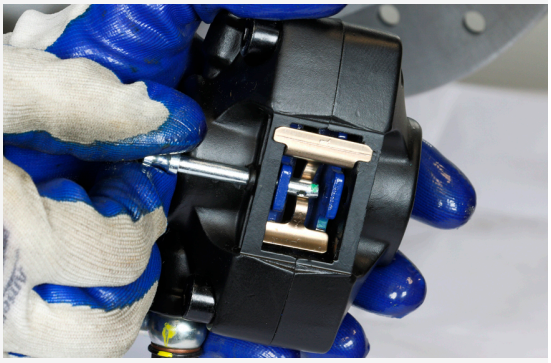
Unscrew the screws fixing the rear brake calliper to the engine and remove it.



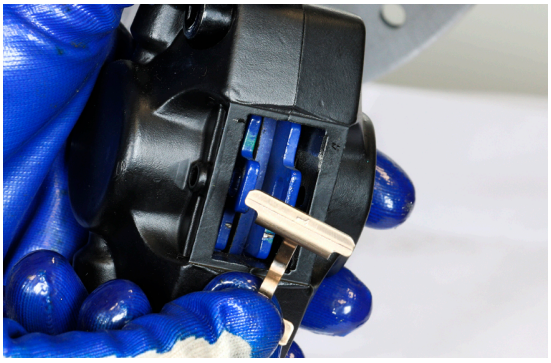
Remove the stop spring from the fastening pin of the brake pads.



Extract the fastening pin of the brake pads.



Remove the compression spring.



Take the brake pads out of the rear brake calliper.

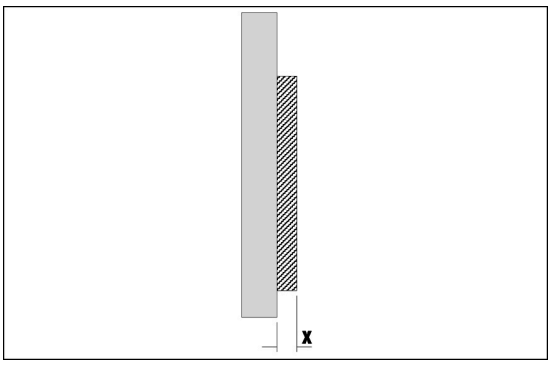


ATTENTION

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.

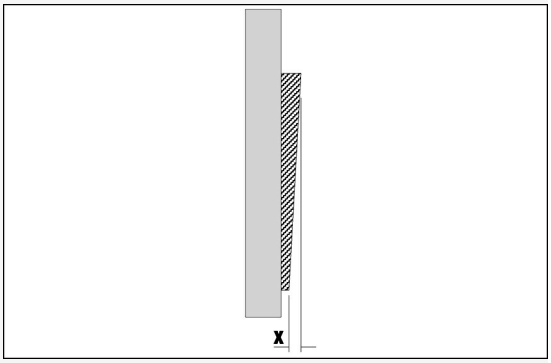
Check the thickness of the wear material and, if below the minimum value, replace the pads.

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.

Maximum permissible thickness tolerance for friction material 0.5 mm

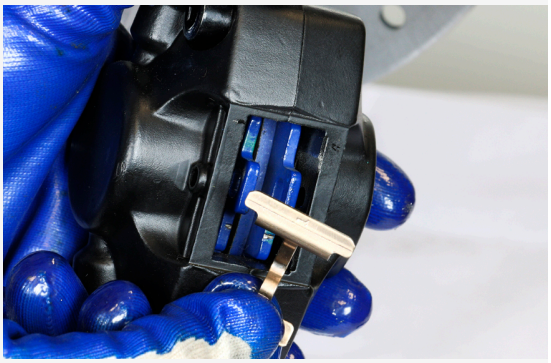


FITTING

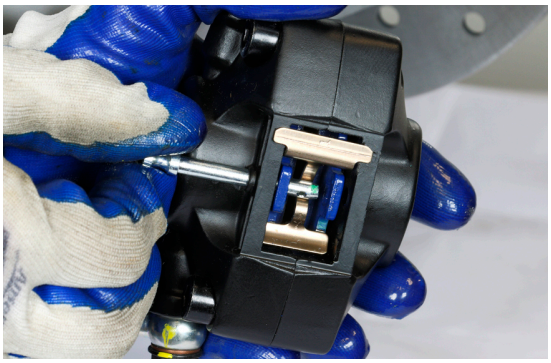
Put the new brake pads inside the clamp.



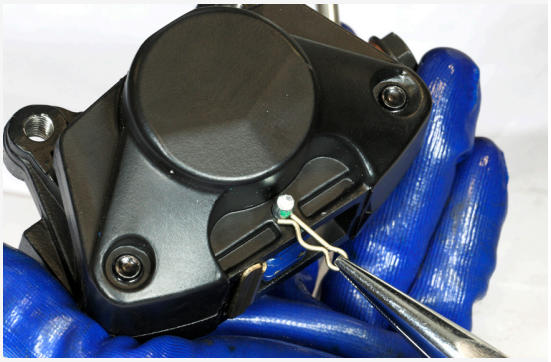
Put the compression spring back inside the brake calliper.



Insert the fastening pin of the brake pads.

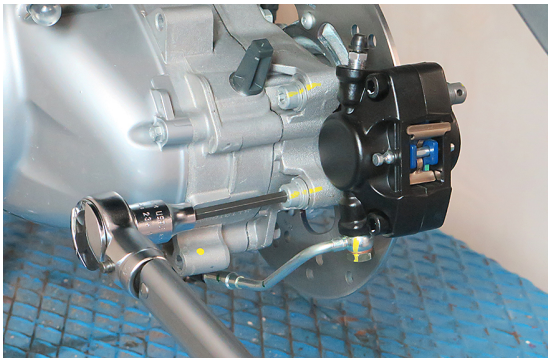


Insert the stop spring on the fastening pin of the brake pads.



Put back the brake calliper in it seat and tighten the fixing screws to the specified torque.

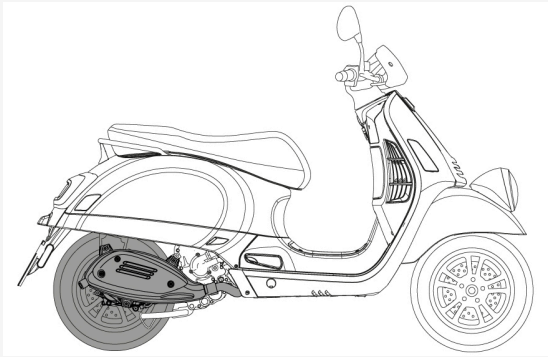
Rear brake calliper - Engine	22.5 ± 2.5 Nm



Refit the rear wheel.

Refit the silencer support bracket.

Refit the complete silencer.



10.9 Braking system - filling and bleeding

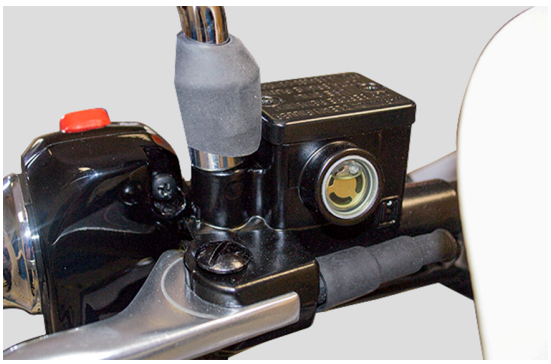
10.9.1 Rear - integral

For this procedure, see **“Brake fluid replacement“** available in the area **"Misc documents"** in the Service Portal.

10.9.2 Front

For this procedure, see **“Brake fluid replacement“** available in the area **"Misc documents"** in the Service Portal.

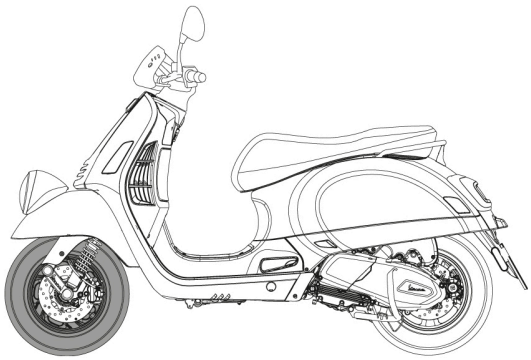
10.10 Brake fluid level check



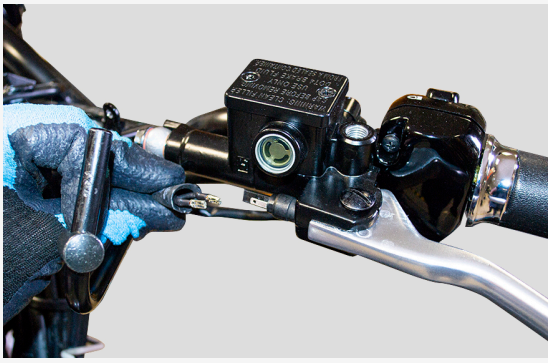
10.11 Front brake master cylinder

REMOVAL

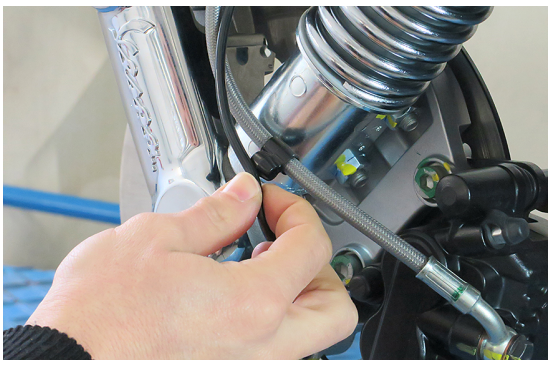
Remove the front wheel.



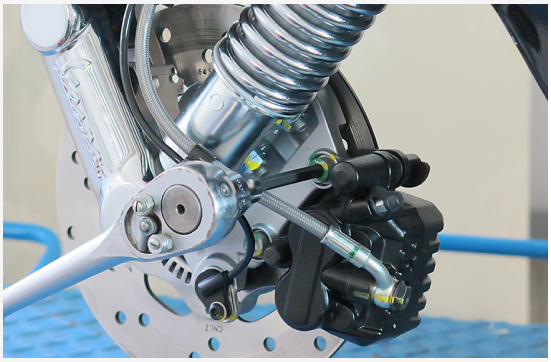
Disconnect the stop light switch connectors.



Disconnect the front wheel sensor cable retaining clamps.



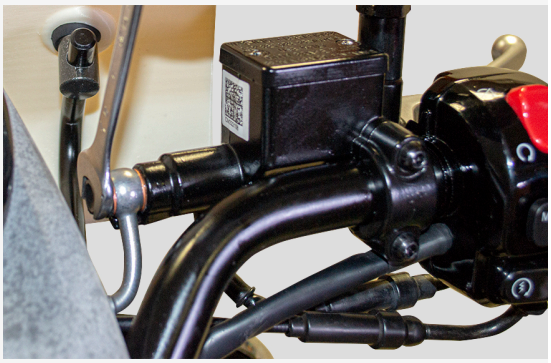
Unscrew and remove the front brake calliper fixing screws and remove it from the support.



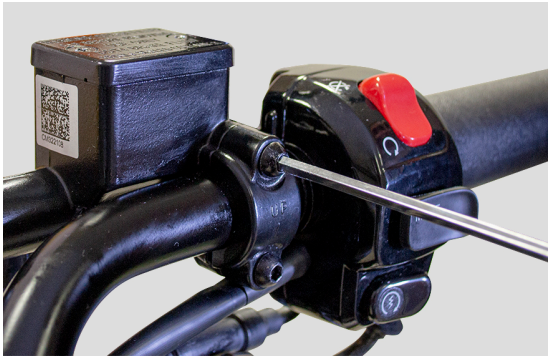
With new pads or pads in a good condition, operate the brake pump repeatedly to bring the pads in contact with each other.



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 FITTING the new brake pump.

ATTENTION

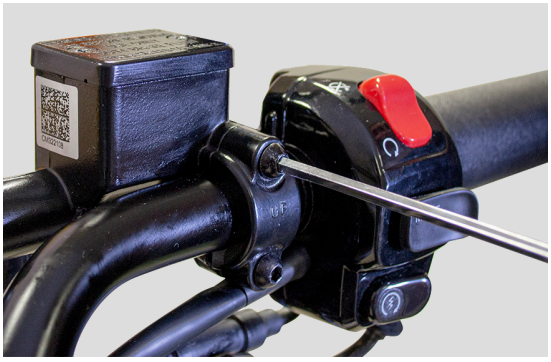
THE BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE AIR. IT IS IMPORTANT TO COMPLETE THESE OPERATIONS AS QUICKLY AS POSSIBLE TO AVOID THE DEGRADATION OF THE CHARACTERISTICS OF THE FLUID.

FITTING

First assemble the fitting with the new copper washers on the brake pump.

Install the new pump on the handlebars, paying attention to the correct position of the U-bolt.

Block the screws temporarily.



Remove the reservoir lid and tighten the connector fastening the pipe to the prescribed torque.

Front brake pipe - Front branke master cylinder	24.5 ± 1.5 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.

WARNING

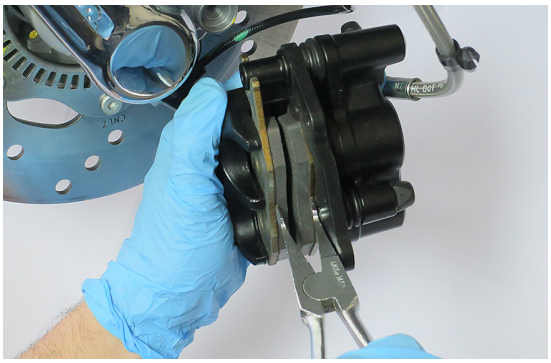
PERFORM THE OPERATION WITH THE HANDLEBARS TURNED IN THE MAXIMUM POSITION AWAY FROM THE BRAKE PUMP.



When the air finished bubbling in the tank, move the pads away in order to send the brake fluid to the pump.

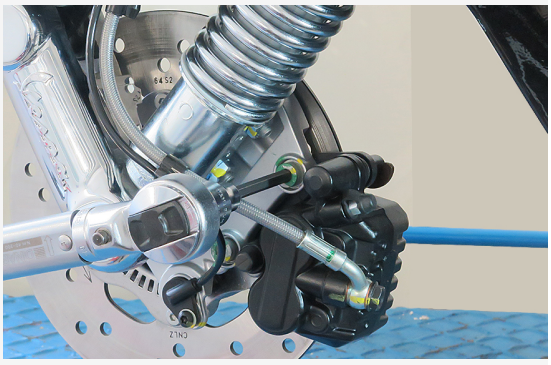
During this operation, there will be a back-flow of air in the tank.

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.

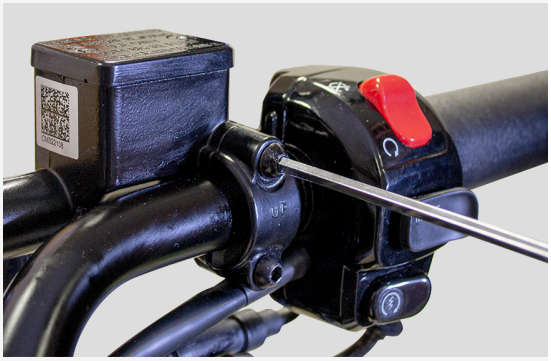
Front brake calliper - Bracket	21.5 ± 2.5 Nm



Restore the working distance of the pads and top up the brake fluid level to the maximum.



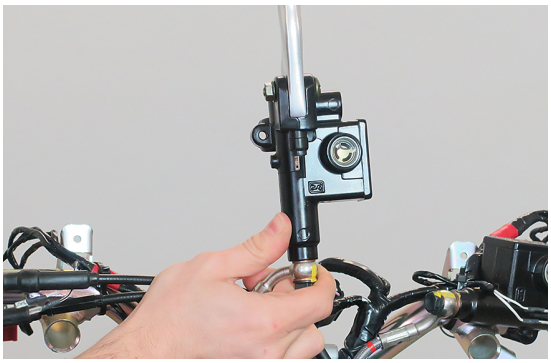
Close the pump cover and remove the screws with the U-bolt fastened to the handlebars.



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.

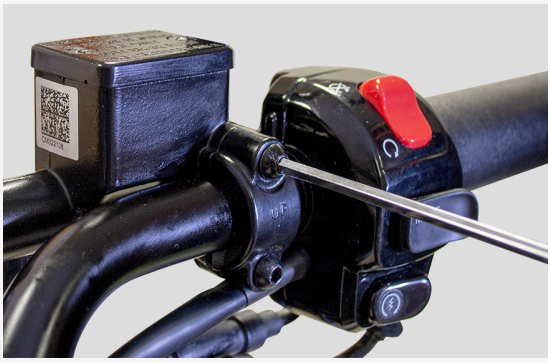
For an optimal result, slightly vary the position of the pump each time the lever is operated.



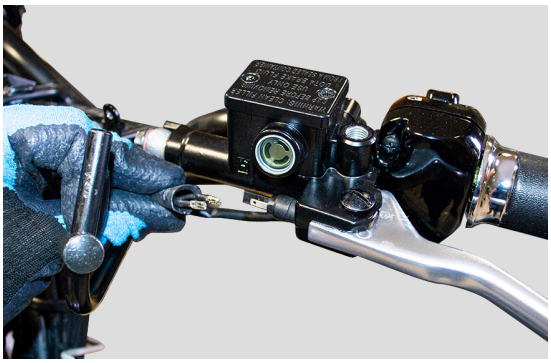
Install the pump on the handlebars, paying attention to the correct orientation of the U-bolt.

Gradually tighten the fastening screws to the specified torque.

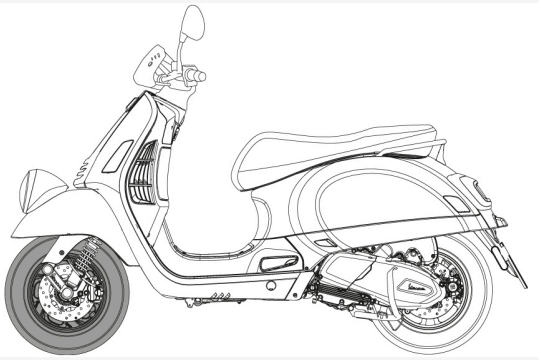
U-bolt - Front brake master cylinder	8.5 ± 1.5 Nm



Connect the stop light switch connector.



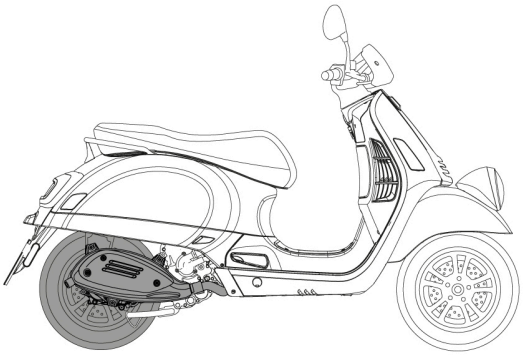
Refit the front wheel.



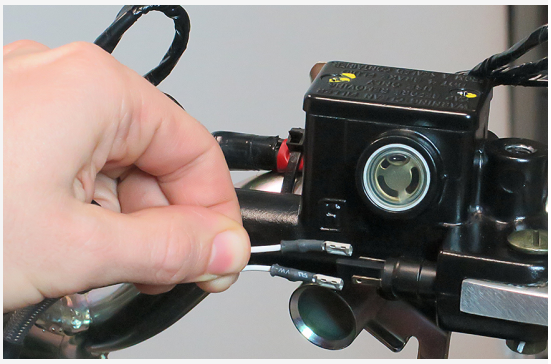
10.12 Rear brake master cylinder

REMOVAL

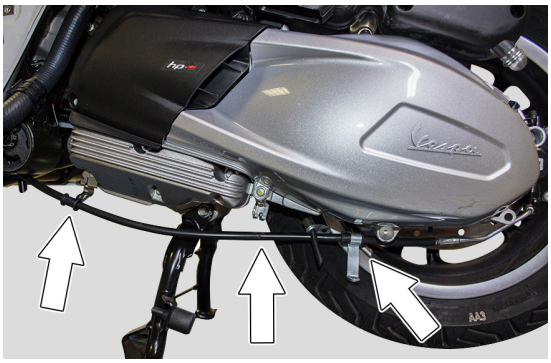
Remove the rear wheel.



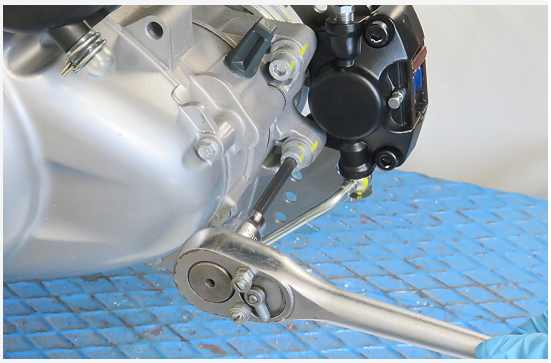
Disconnect the stop light switch cables.



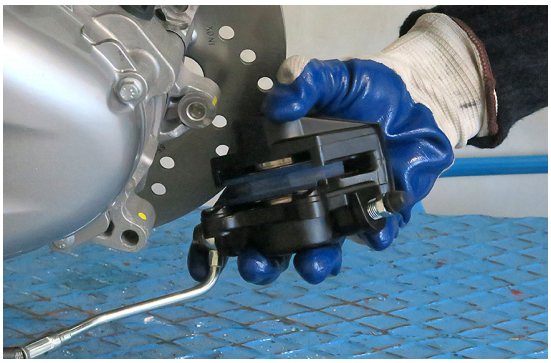
Release the rear brake pipe from the three fasteners of the crankcase, as indicated in the picture.



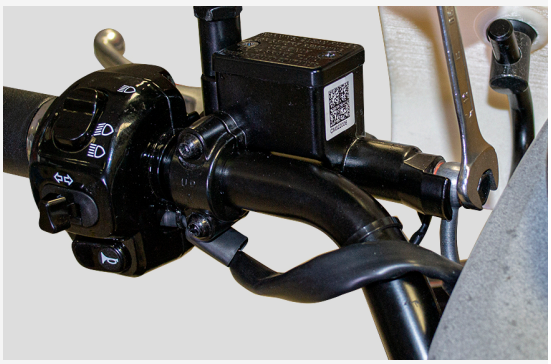
Undo the fixing screws of the rear brake calliper to the engine.



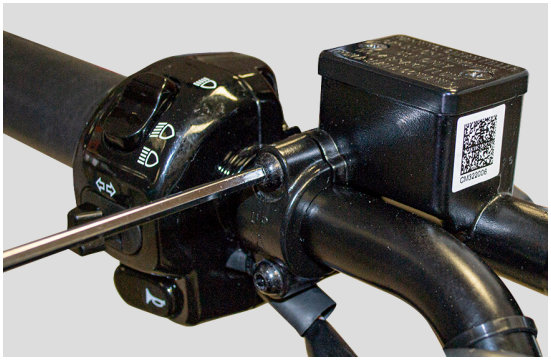
With new pads or pads in a good condition, operate the brake pump repeatedly to bring the pads in contact with each other.



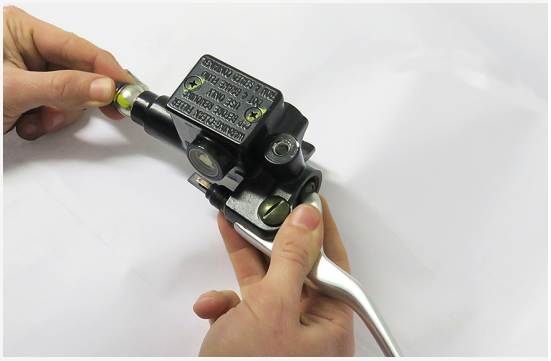
Previously loosen the brake pump connector.



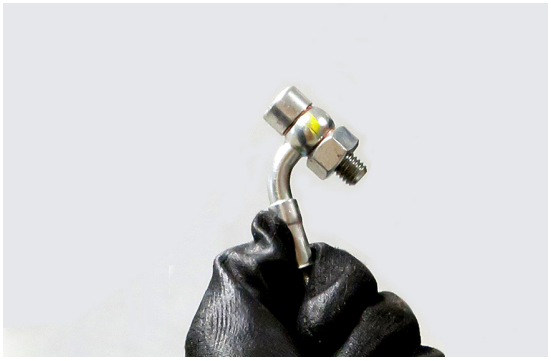
Unscrew the screws of the U-bolt fastening the pump.



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 FITTING the new brake pump.

ATTENTION

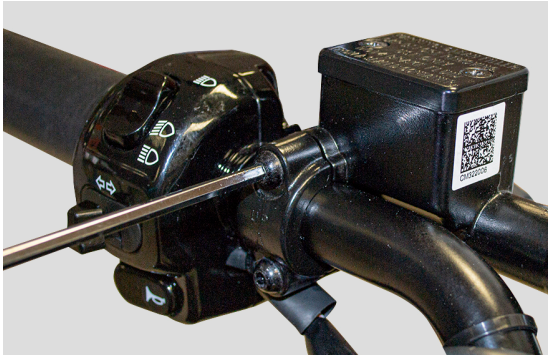
THE BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE AIR. IT IS IMPORTANT TO COMPLETE THESE OPERATIONS AS QUICKLY AS POSSIBLE TO AVOID THE DEGRADATION OF THE CHARACTERISTICS OF THE FLUID.

FITTING

First assemble the fitting with the new copper washers on the brake pump.

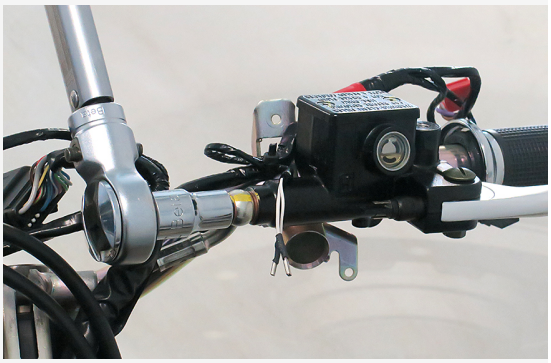
Install the new pump on the handlebars, paying attention to the correct position of the U-bolt.

Block the screws temporarily.



Remove the tank cover and tighten the pipe fastening connector to the specified torque using new copper washers.

Rear brake pipe - Rear brake pump	24.5 ± 1.5 Nm

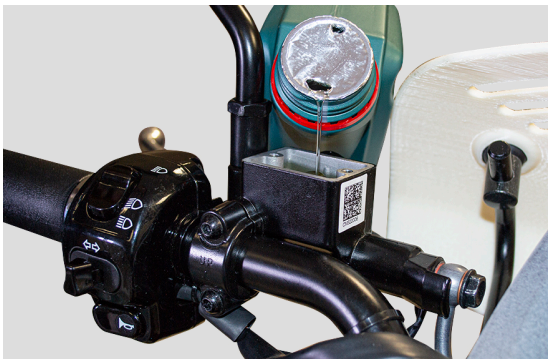


Position the handlebars so that the pump tank is levelled horizontally.

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.

WARNING

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.

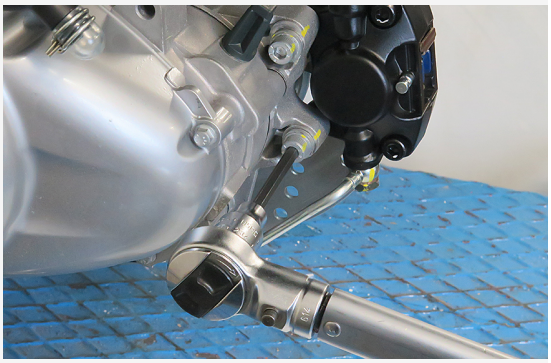
During this operation, there will be a back-flow of air in the tank.

Operate the pump until the pads are in contact with each other and repeat the procedure until the air stops exiting.

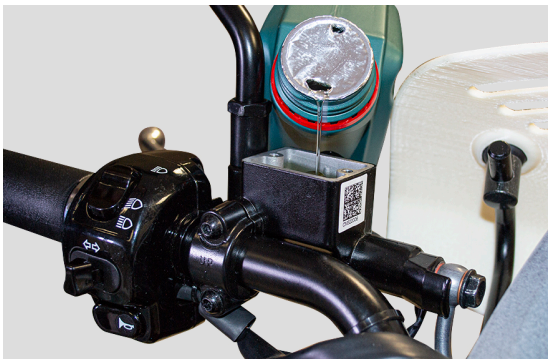


Refit the calliper on the engine and tighten the screws to the specified torque.

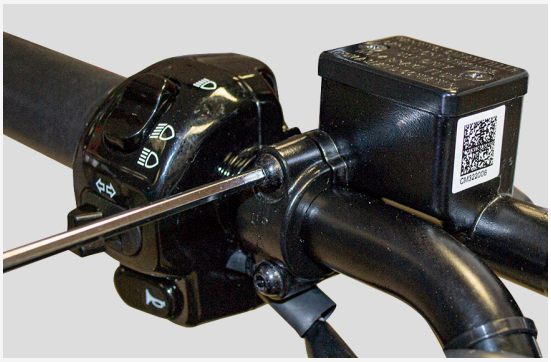
Rear brake calliper - Engine	22.5 ± 2.5 Nm



Restore the working distance of the pads and top up the brake fluid level to the maximum.

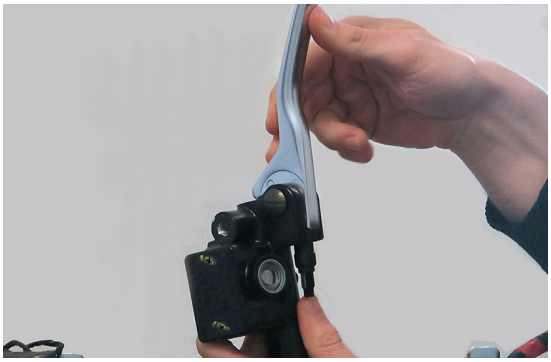


Close the pump cover and remove the screws with the U-bolt fastened to the handlebars.



Lift the pump so it is upright and repeatedly operate the control lever.

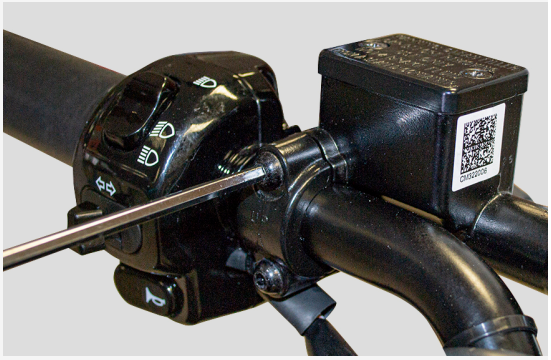
This operation is required so the residual air contained in the pump cylinder will exit. For an optimal result, slightly vary the position of the pump each time the lever is operated.



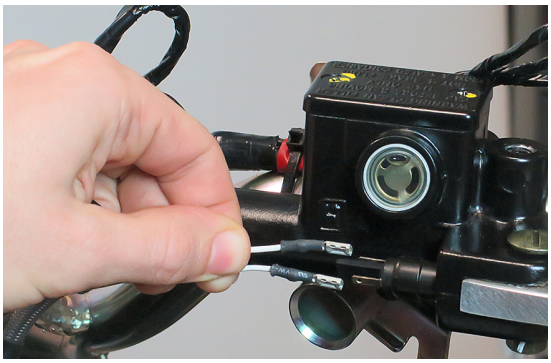
Install the pump on the handlebars, paying attention to the correct orientation of the U-bolt.

Tighten the fastening screws to the prescribed torque.

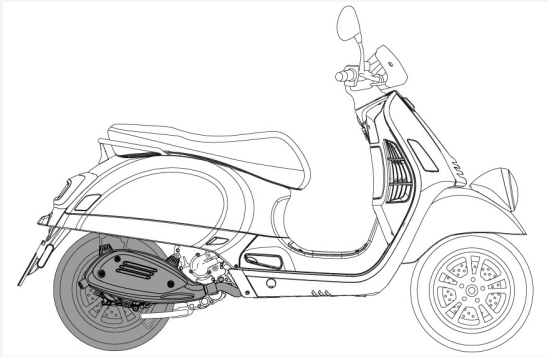
U-bolt - Rear brake pump	8.5 ± 1.5 Nm



Connect the stop light switch connectors.



Refit the rear wheel.

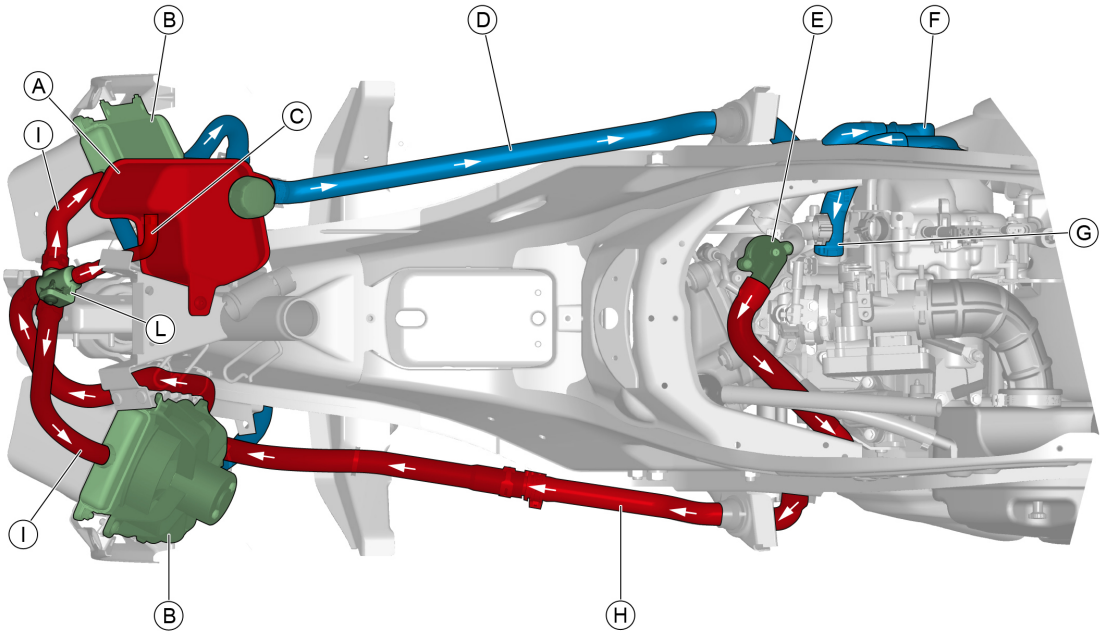


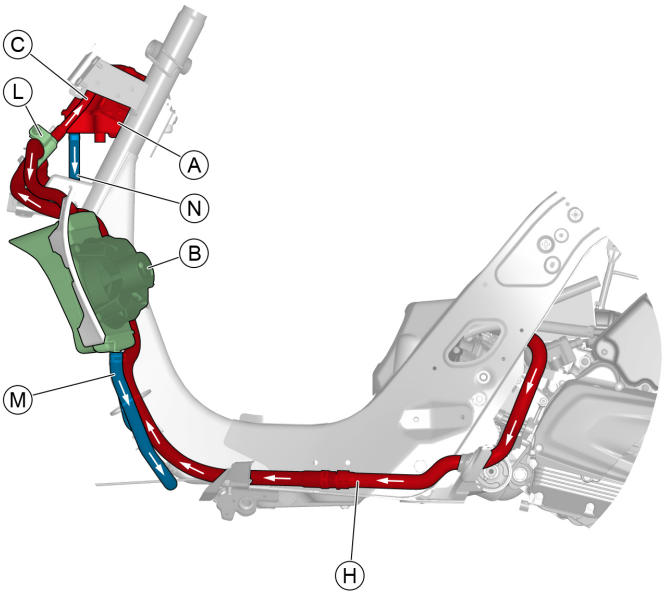
LIST OF TOPICS

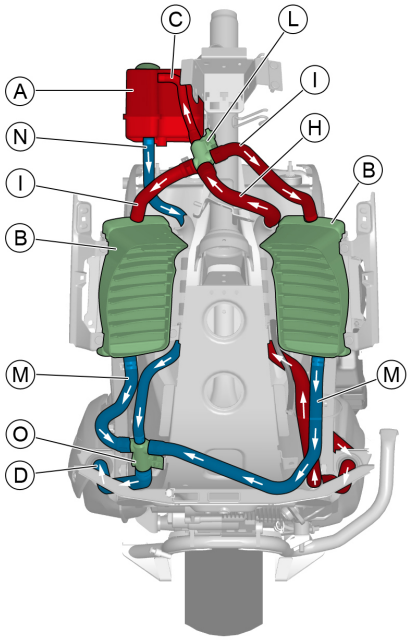
Cooling system

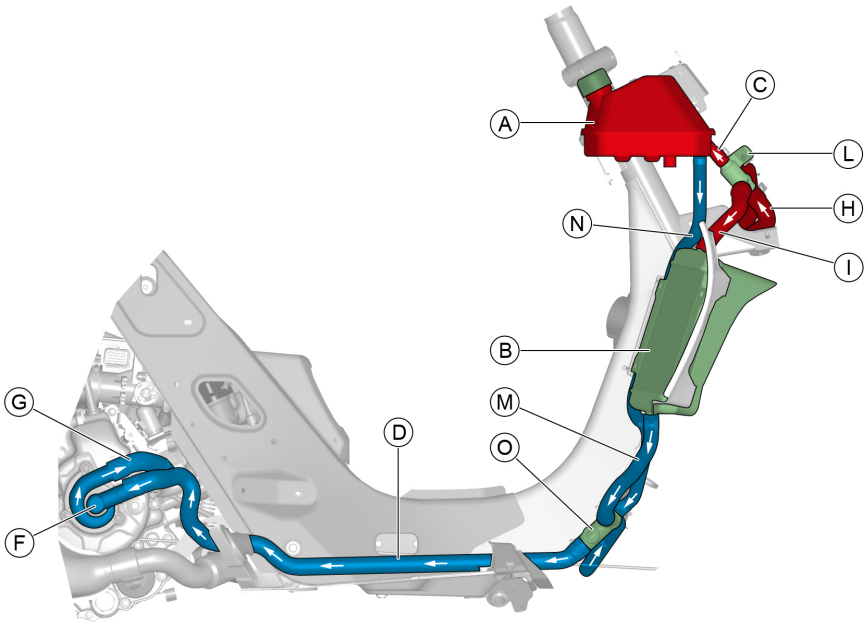
COOLING

11.1 Circuit diagram









KEY

A = Expansion tank

B = Water radiator

C = Central coupling - expansion tank connection pipe

D = Lower connection - water pump connection pipe

E = Water outlet connection

F = Water pump

G = Delivery pipe to cylinder

H = Central coupling - head connection pipe

I = Central coupling - radiators connection pipes

L = Central coupling

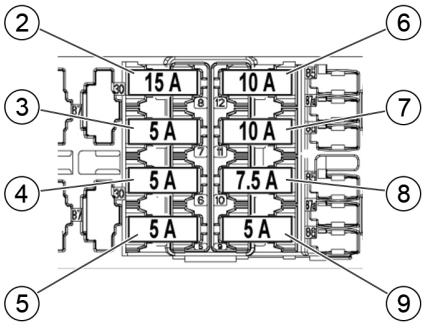
M = Lower coupling - radiators connection pipes

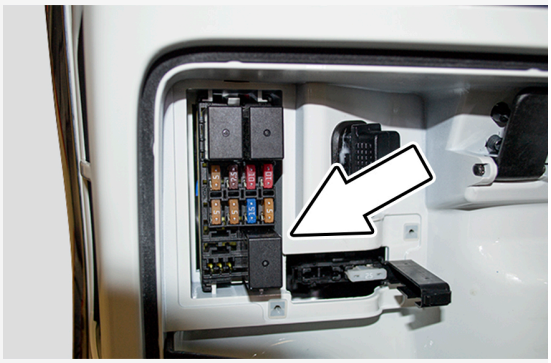
N = Lower coupling - expansion tank connection pipe

O = Lower coupling

11.2 electric fan check

- Check the state of fuse No. 8 of 7.5 A.



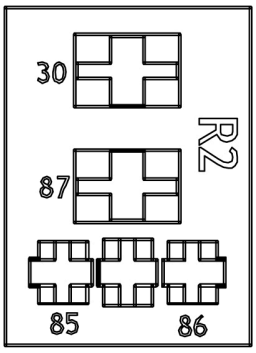


- Check that the electric fan relay functions correctly.

- If the relay is not working, replace it.

- If the relay is working, remove it and jump the Green-White and Black-Green wires (terminals 85 and 86): With the starter switch turned to "**ON**" and all components operational, the electric fan will start.

- In order to check the coolant temperature sensor, see the «Injection» chapter.



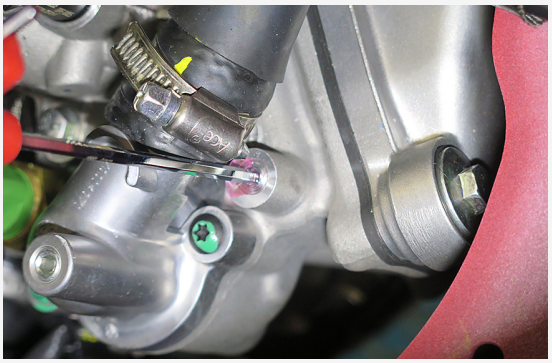
11.3 System bleed

WARNING

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

Anti-freeze liquid, ready to use, colour red	Glycol ethylene based antifreeze liquid with organic additive technology corrosion inhibitor. Colour red, ready to use.	ASTM D 3306 - ASTM D 4656 - ASTM D 4985 - CUNA NC 956-16



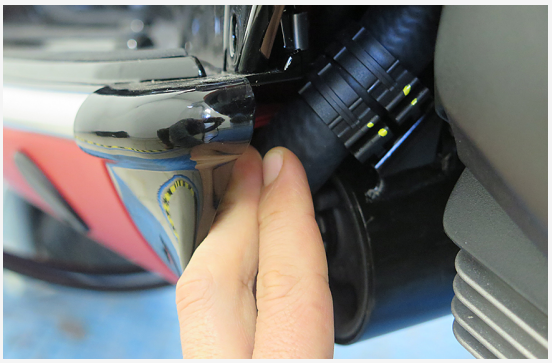




Restore the "MAX" level of the expansion tank.







The opening of the thermostat is confirmed as soon as a sudden rise in the temperature of the circulating liquid in the hose is detected.

With the thermostat open, slowly rotate the accelerator handle.

Take the engine to medium revs and maintain it for about 10 seconds.

Return the engine to idle and wait for the electric fan to start.

Wait for the electric fan to stop and turn off the engine.

ATTENTION

NEVER UNSCREW THE COOLING SYSTEM BLEED SCREW WITH THE ENGINE RUNNING OR HOT.

WARNING

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

Wait for the complete cooling of the system and restore the "MAX" level of the coolant.



11.4 Thermostat

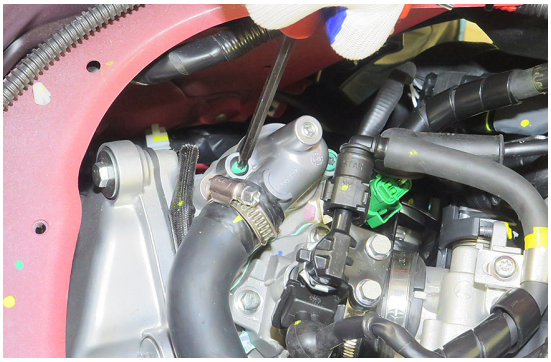
11.4.1 Removal

To remove the thermostat, proceed as follows:

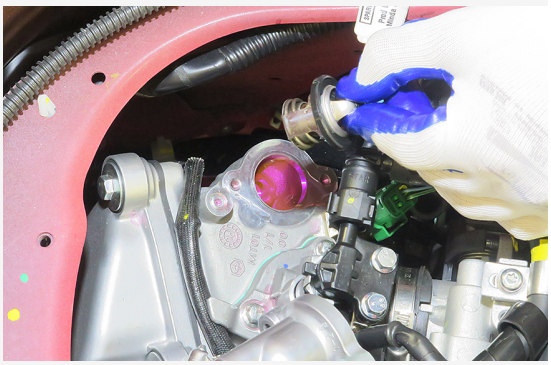
- Remove the helmet compartment.

- Place a + 2.0 l container under the vehicle to collect the coolant.

- Unscrew and remove the cover fastening screws



- Lift and remove the thermostat cover.



11.4.2 Check

1) Visually inspect that the thermostat is not damaged.

2) Fill a metal container with approx. 1 litre of water.

Immerse the thermostat, and keep it in the centre of the container.

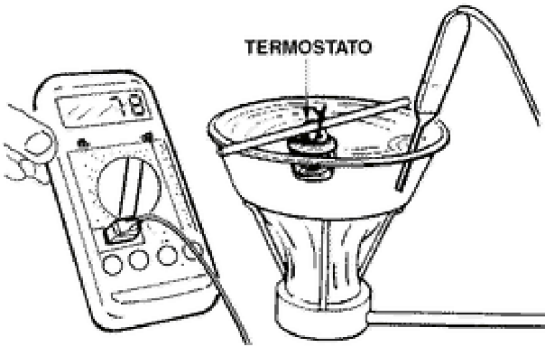
Immerse the multimeter temperature probe, and keep it close to the thermostat.

Heat up the container using the thermal gun.

Check the temperature at which the thermostat starts to open:

Heat up until the thermostat is completely open

3) Replace the thermostat if it is not working properly.



ATTENTION

TO EXECUTE THE TEST CORRECTLY, MAKE SURE NEITHER THE THERMOSTAT NOR THE THERMOMETER TOUCHES THE CONTAINER.

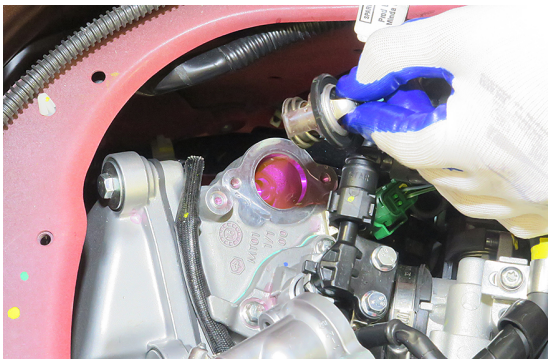
020331Y Digital multimeter

020151Y Air heater

FUNCTION	DESCRIPTION / VALUE
Type	Wax-type, with deviator
Starts opening at	85±2°C

11.4.3 Fitting

- Insert the thermostat in the head.
- Position the cover.



- Insert the cover fixing screws and tighten them to the specified torque.

- Fill the system and bleed it.



LIST OF TOPICS

Bodywork

BODYWORK

DESCRIPTION	TORQUE
Saddle hinge - Body shell	9 ± 1 Nm
Cover_Luggage carrier	9 ± 1 Nm
Leg shield back plate - Body shell	5.75 ± 1.25 Nm
Footboard - Body	5.75 ± 1.25 Nm
Passenger footrests - Body shell	19.5 ± 2.5 Nm
Side fairing - Body	5.75 ± 1.25 Nm
License plate mount - Body	5.75 ± 1.25 Nm
Side stand - Body	37.5 ± 2.5 Nm
Chassis middle cover – Footrest	1.35 ± 0.35 Nm
Taillight - Body	5.75 ± 1.25 Nm
Electric fan - Radiator	5.75 ± 1.25 Nm
Radiator - Body shell	5.75 ± 1.25 Nm
Pipe clamp	2.75 ± 0.25 Nm
Battery bracket – Footrest	5.75 ± 1.25 Nm

FUEL TANK

DESCRIPTION	TORQUE
Fuel tank - Body shell	9 ± 1 Nm
Canister unit - Body	5.75 ± 1.25 Nm
Canister valve - Canister support	5.75 ± 1.25 Nm
Fuel pipe - Fuel tank	5.75 ± 1.25 Nm
Injector - Head	3.5 ± 0.5 Nm

12.1 Saddle



Saddle hinge - Body shell	9 ± 1 Nm



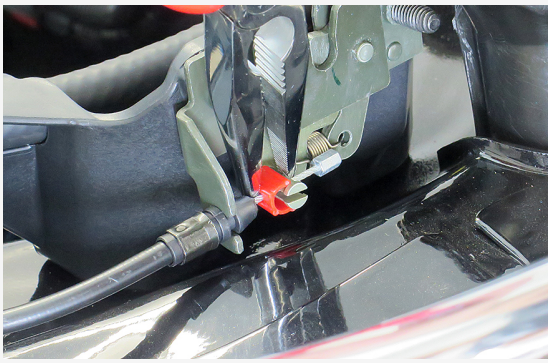
SADDLE OPENING DEVICE

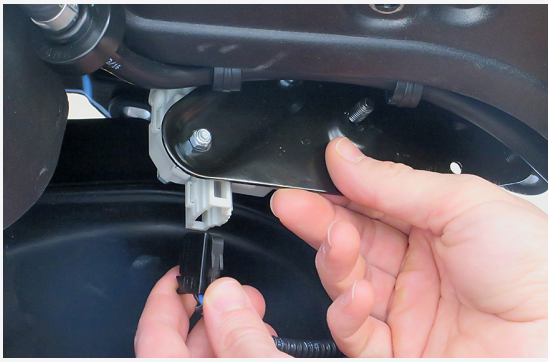
REMOVAL



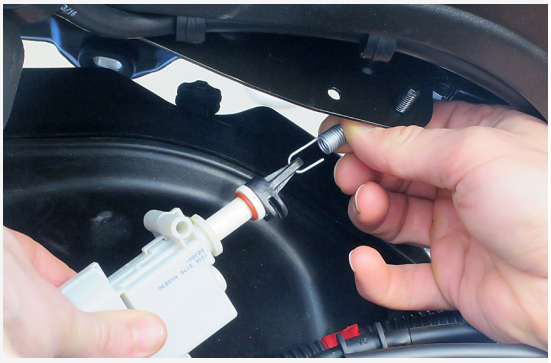






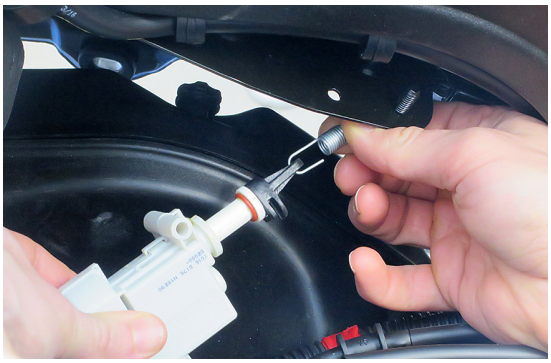




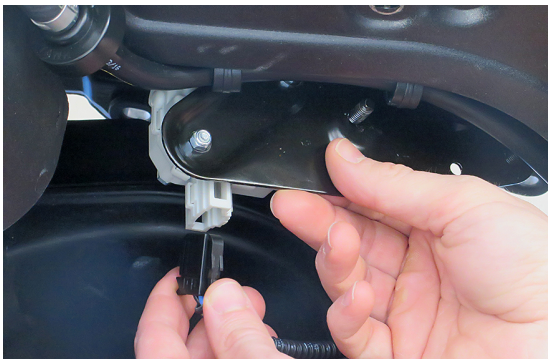


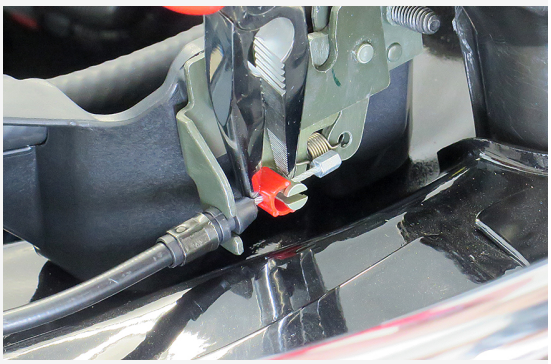
SADDLE OPENING DEVICE

FITTING









Saddle actuator support plate - Body	5.75 ± 1.25 Nm



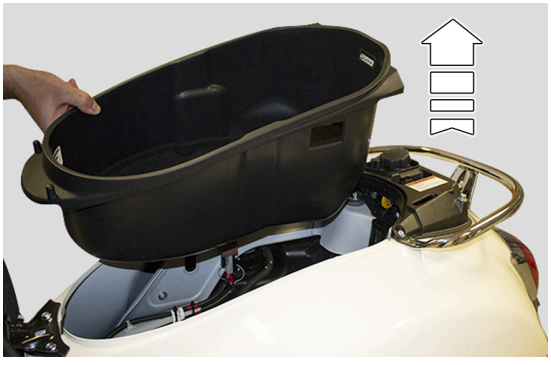




12.2 Luggage rack

REMOVAL

Lift the saddle and remove the helmet compartment.



Unscrew the two front fastening screws of the luggage rack and plastic cover, together with the washers.



Unscrew the two rear that fasten the plastic cover to the body, together with the washers.



Remove the fuel tank cap.



Remove the gasket from the plastic cover.



Lift the plastic cover and disconnect the breather pipe **(A)**.

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.



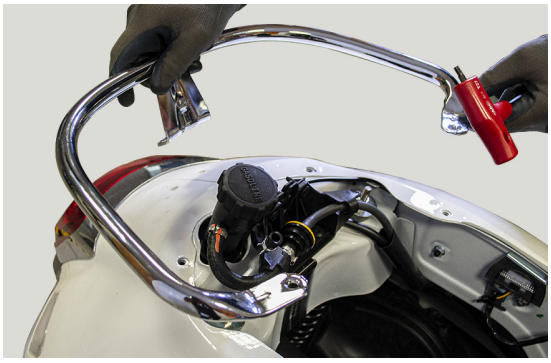
Unscrew and remove the rear fixing screws of the luggage rack.

Remove the luggage rack.



FITTING

Position the luggage rack taking care not to damage the body.



Insert the two rear fixing screws of the luggage rack and tighten them to the prescribed torque.

Cover_Luggage carrier	9 ± 1 Nm



Position the cover of the rear screws of the luggage rack.

Insert and tighten the fixing screw of the luggage rack screws cover.



Insert a wire clamp and connect the breather pipe **(A)** to the plastic cover.

Position the plastic cover.



Fit the gasket on the plastic cover.



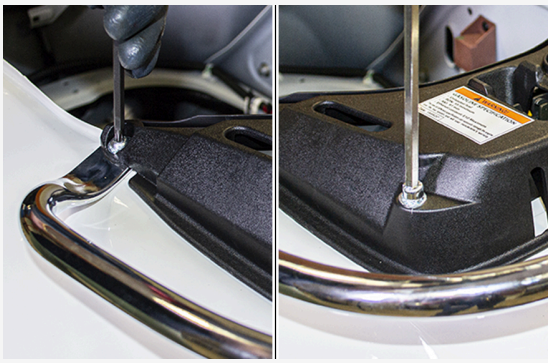
Screw on the fuel tank cap.



Insert the four fixing screws and the respective spring and flat washers.

Insert the four fixing screws of the luggage rack and plastic cover and tighten them to the prescribed torque.

Cover_Luggage carrier	9 ± 1 Nm



Insert the helmet compartment and close the saddle.



12.3 Rear-view mirrors

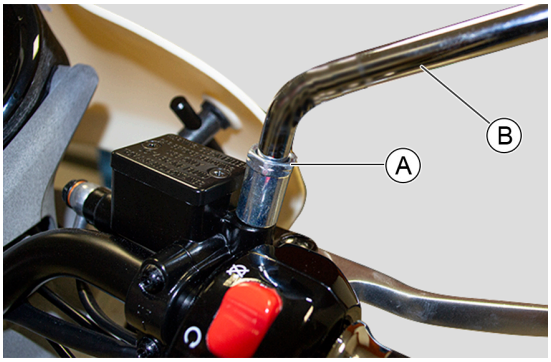
REMOVAL

Rest the vehicle on its centre stand.

Loosen the lock nut **(A)** and undo the mirror acting on the stanchion **(B)**

ATTENTION

PAY ATTENTION TO THE THREAD TYPE OF THE MIRRORS: THE RIGHT MIRROR



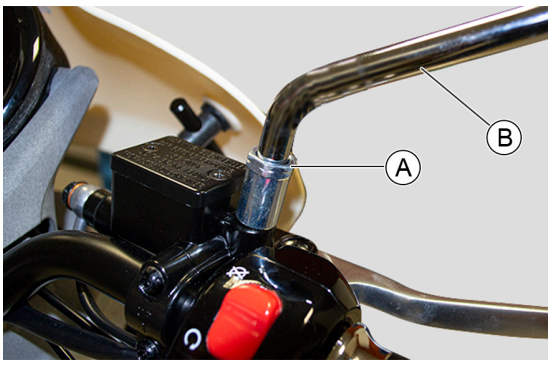
HAS A CLOCKWISE THREAD, WHILE THE LEFT MIRROR HAS AN ANTI-CLOCKWISE THREAD.

FITTING

Screw the mirror into its seat using the rod **(B)**.

Tighten the fixing lock **(B)** to the prescribed torque.

Rear-view mirror - Brake pump	30 ± 1 Nm

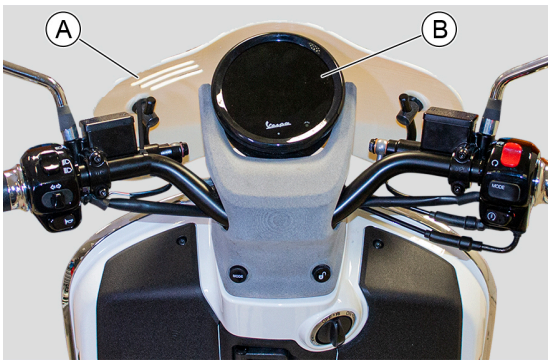


12.4 Rear handlebar cover

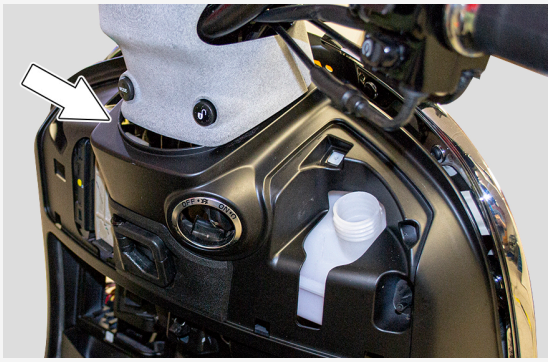
REMOVAL

Remove the windshield **(A)**.

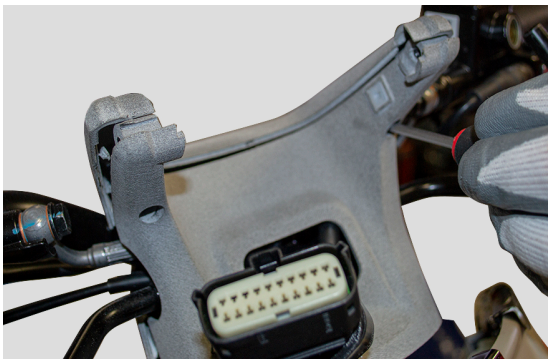
Remove the instrument cluster **(B)**.



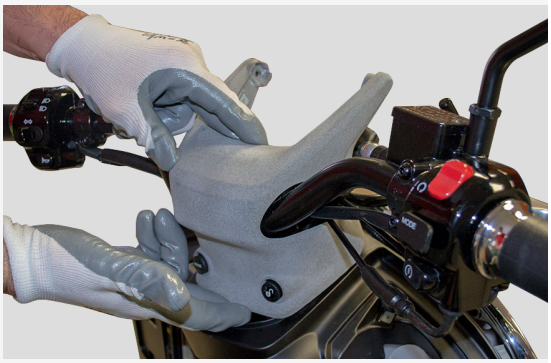
To facilitate the removal of the rear handlebar cover, move the front leg shield back plate upper part, as shown in the figure.



Unscrew the two screws fixing the rear handlebar cover to the front one.



Move the rear handlebar cover by lifting it from the bottom upwards.



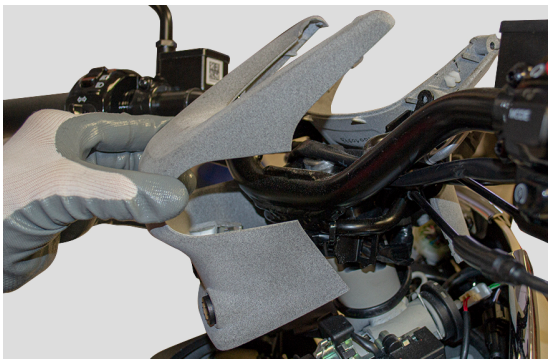
Disconnect the connector of the saddle release button.



Disconnect the connector of the MODE button.



Remove the rear handlebar cover.



FITTING

Place the rear handlebar and connect the connector of the MODE button.



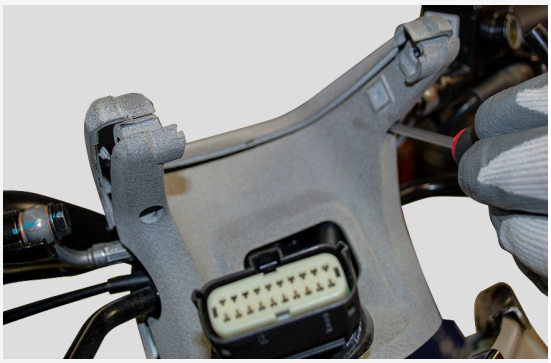
Connect the connector of the saddle release button.



Be careful to position the hooks at the attachments and press firmly to engage the handlebar cover.



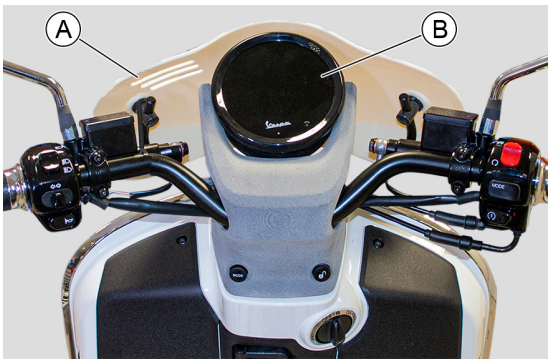
Insert and tighten the two screws fixing the rear handlebar cover to the front one.



Reposition the front leg shield back plate in its housing.

Refit the instrument cluster **(B)**.

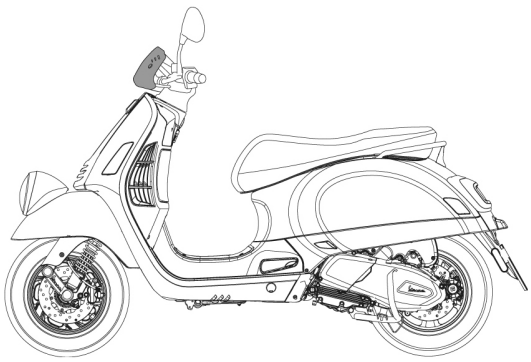
Refit the windshield **(A)**.



12.5 Instrument panel

REMOVAL

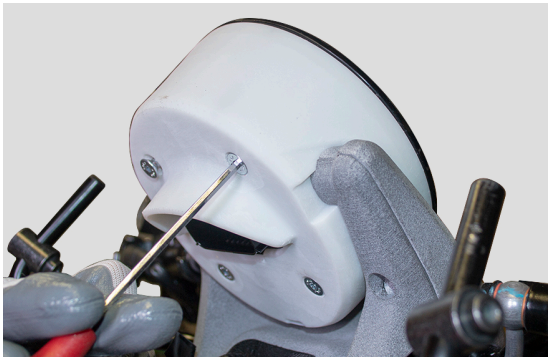
Remove the windscreen.



Disconnect the instrument assembly connector.



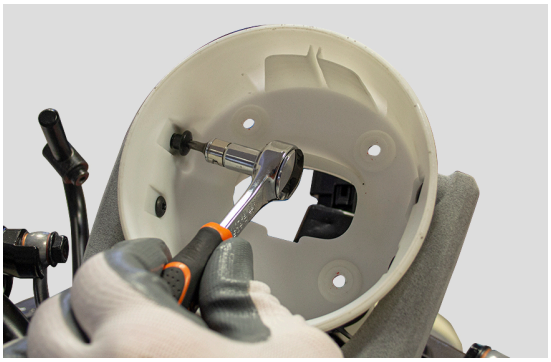
Unscrew and remove the four screws fixing the instrument cluster to the support.



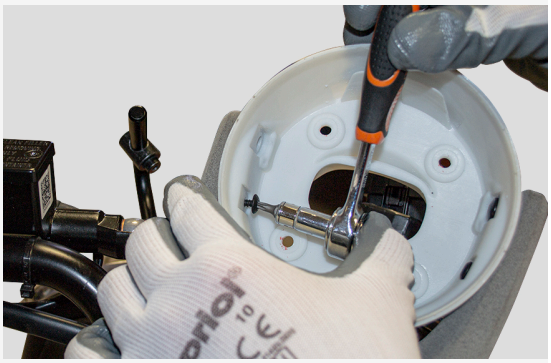
Remove the instrument cluster.



Undo and remove the two upper screws fixing the bracket to the rear handlebar cover.



Undo and remove the two lower screws fixing the bracket to the rear handlebar cover.



Remove the instrument panel support.

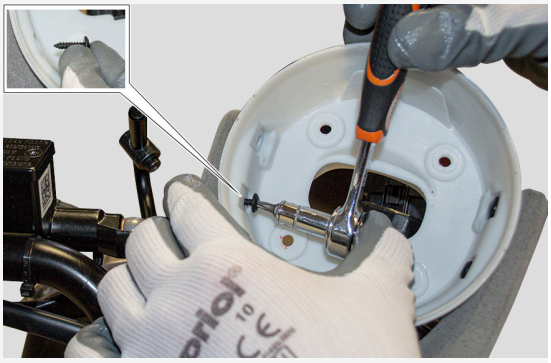


FITTING

Place the instrument cluster support on the front handlebar cover.

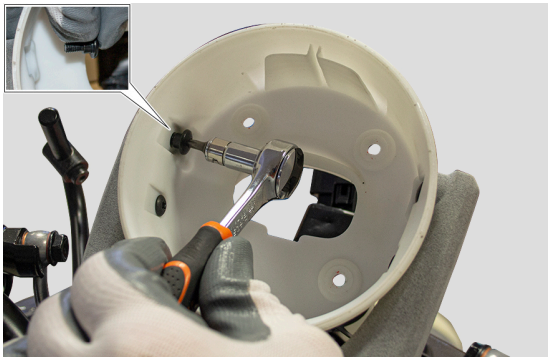


Insert and tighten two lower screws fixing the bracket to the rear handlebar cover.



Insert and tighten the two upper fixing screws of the rear handlebar cover support to the prescribed torque.

instrument cluster - Instrument cluster support	5 ± 0.5 Nm

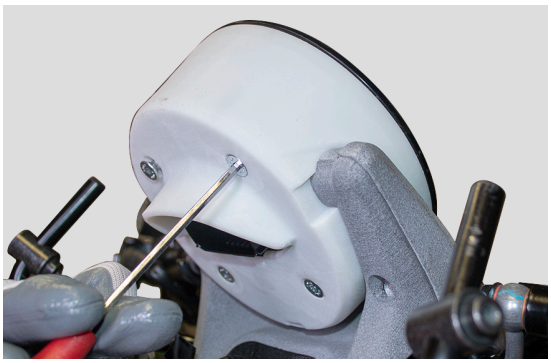


Place the instrument cluster inside the support.



Insert and tighten the four screws fixing the instrument cluster support to the prescribed torque.

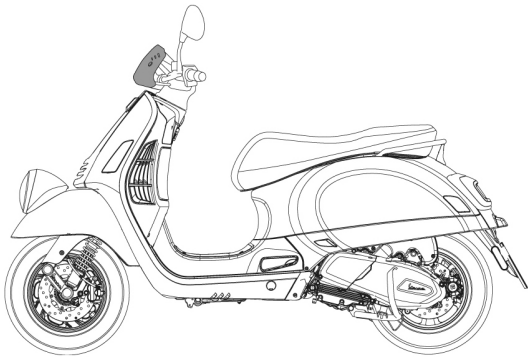
instrument cluster - Instrument cluster support	5 ± 0.5 Nm



Connect the connector of the instrument unit.



Fit the windscreen.



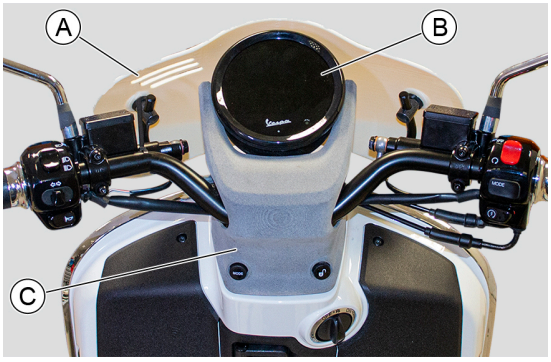
12.6 Front handlebar cover

REMOVAL

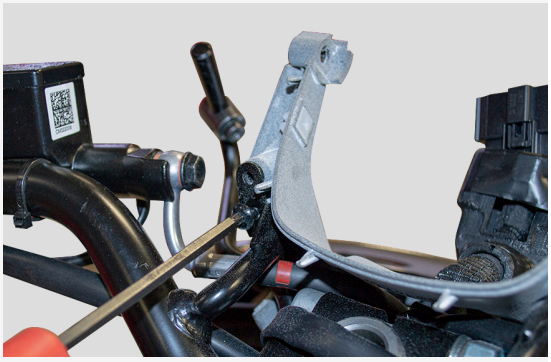
Remove the windshield **(A)**.

Remove the instrument cluster **(B)**.

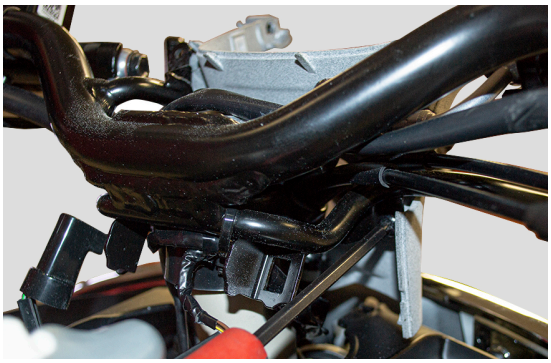
Remove the rear handlebar cover **(C)**.



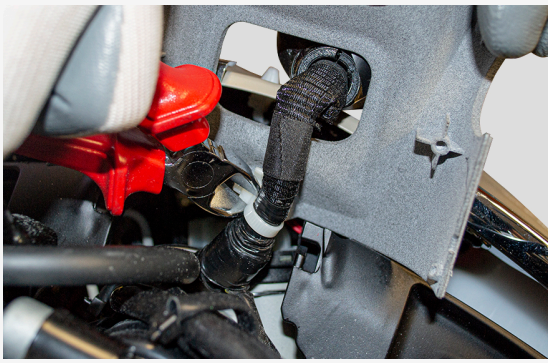
Unscrew and remove the two upper screws fixing the front handlebar cover to the handlebar.



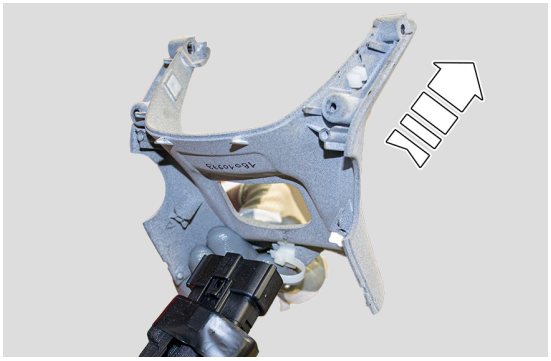
Unscrew and remove the two lower screws fixing the front handlebar cover to the handlebar.



Cut the retaining clamp of the instrument cluster wiring harness.

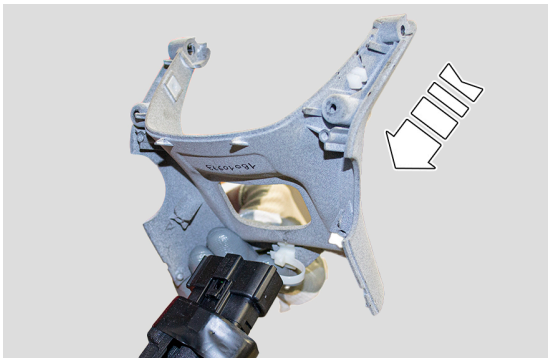


Remove the front handlebar cover making sure not to damage the cable harness.

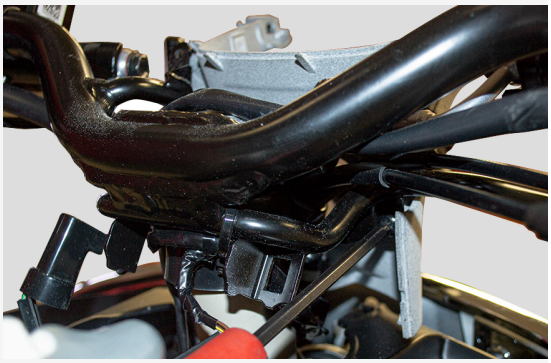


FITTING

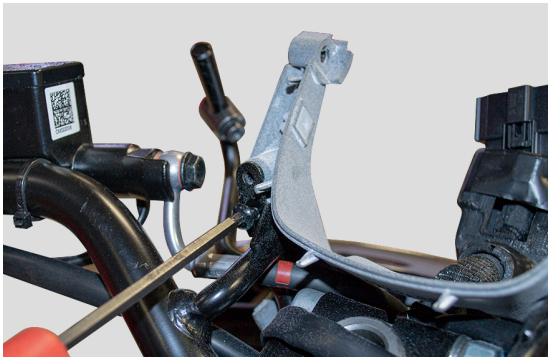
Pass the wiring harness of the instrument cluster inside the front handlebar cover and fasten it with a new nylon clamp.



Insert and tighten the two lower screws fixing the front handlebar cover to the handlebar.



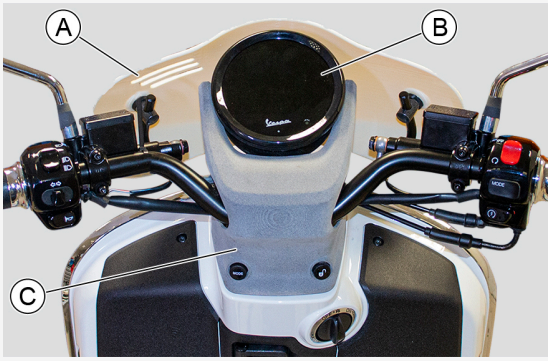
Insert and tighten the two upper screws fixing the front handlebar cover to the handlebar.



Fit the rear handlebar cover **(C)**.

Fit the instrument cluster **(B)**.

Fit the windshield **(A)**.



12.7 Front light cluster

REMOVING THE FRONT LIGHT ASSEMBLY

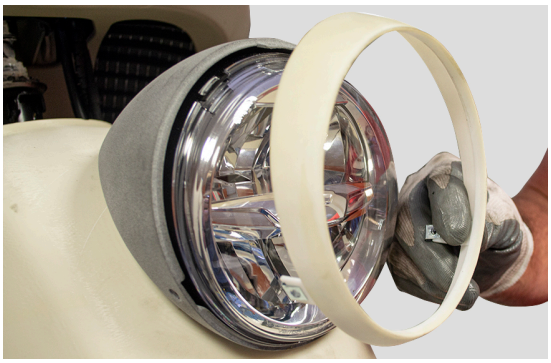
Unscrew the rear fixing nut of the front headlamp and remove it.



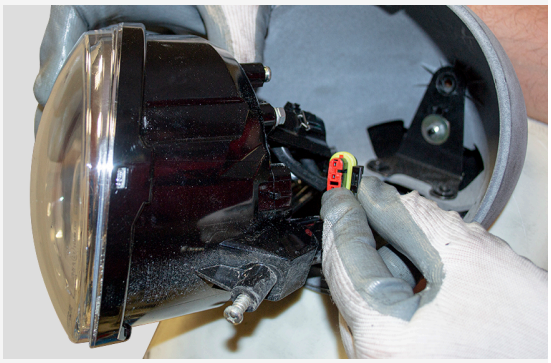
Unscrew and remove the two fixing screws of the front headlamp frame.



Remove the frame.



Disconnect the headlamp connector.

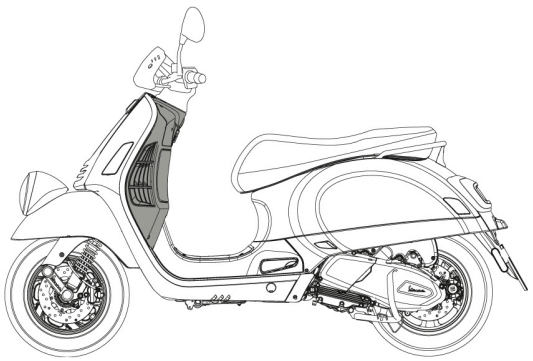


Cut the clamp that fastens the wiring harness and remove the front headlamp.



TURN INDICATORS REMOVAL

Remove the front leg shield back plate.

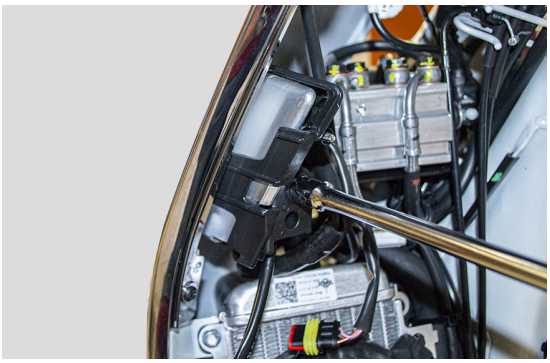


The following operations are valid for both turn indicators.

Extract the turn indicator connector from its seat and disconnect it.



Unscrew and remove the nut that secures the turn indicator to its support.



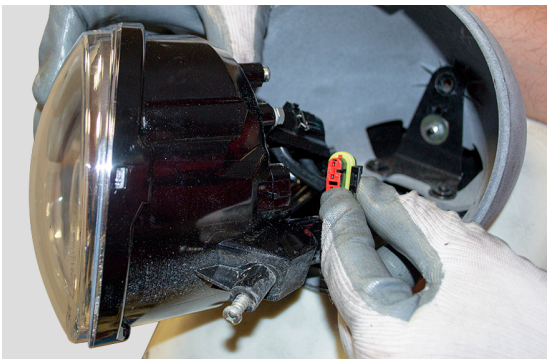
Remove the front turn indicator sliding it off towards the rear of the vehicle.



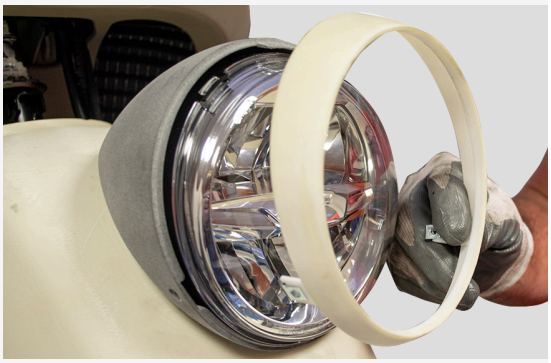
ASSEMBLING THE FRONT LIGHT ASSEMBLY

Place the headlamp and connect the connector.

Clamp the cable harness with a nylon clamp.



Insert the frame on the cover.



Insert and tighten the two fixing screws of the front headlamp frame.



Screw and tighten the rear fastener nut of the front headlamp to the cover.



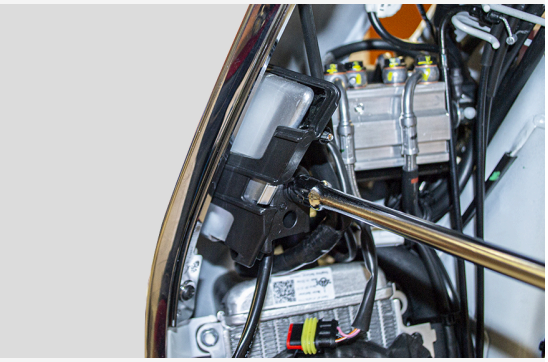
TURN INDICATOR FITTING

The following operations are valid for both turn indicators.

Insert the front turn indicator inside the body, as shown in the figure.



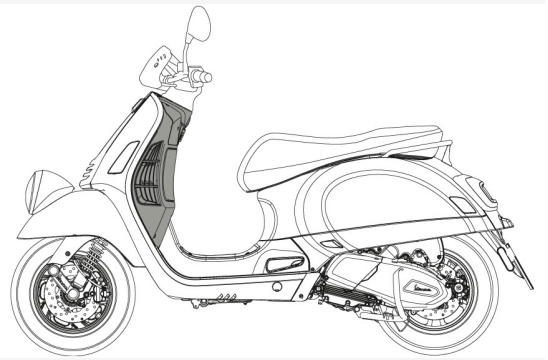
Screw in and tighten the nut securing the turn indicator to the turn indicator support.



Connect the connector of the front turn indicator and insert it in its seat.



Assemble the front leg shield back plate.



12.8 Central frame 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.

Chassis middle cover – Footrest	1.35 ± 0.35 Nm

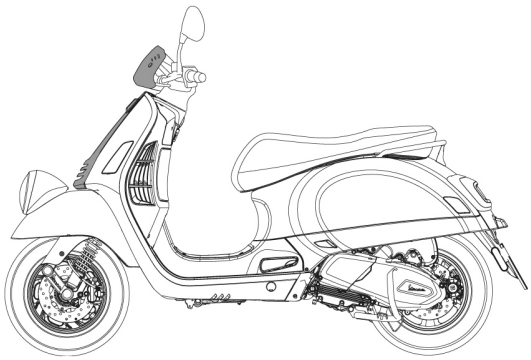


12.9 Leg shield back plate

REMOVAL

Remove the windscreen.

Remove the central cover.













Working on the front of the vehicle, unscrew and remove the central screw of the shield.

Remove the plate inside the shield.



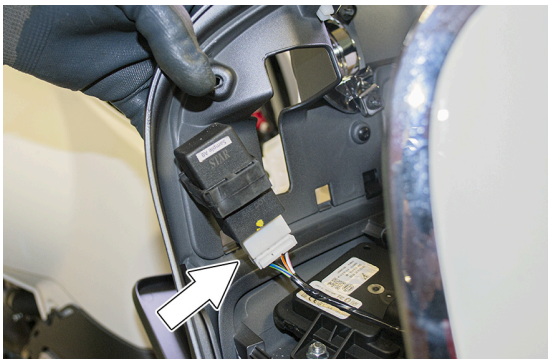






Detach the leg shield back plate from the body.

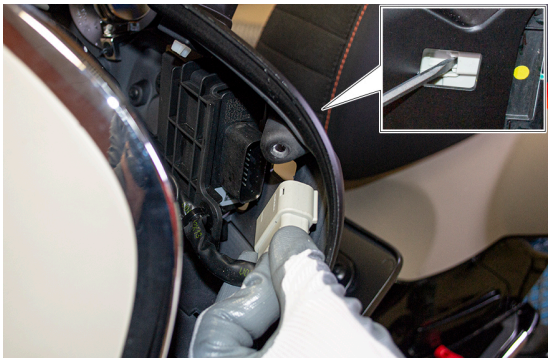
Operating on the right side of the vehicle, disconnect the turn indicator device connector.

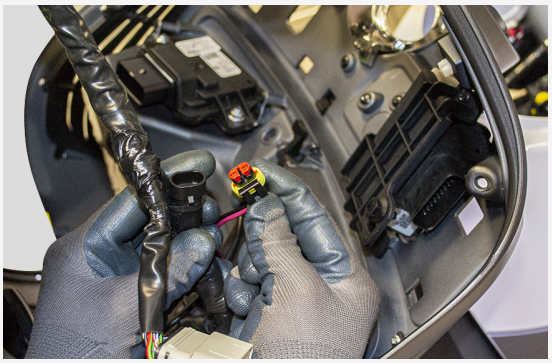




Operating on the vehicle LHS, use a screwdriver to release the connector.

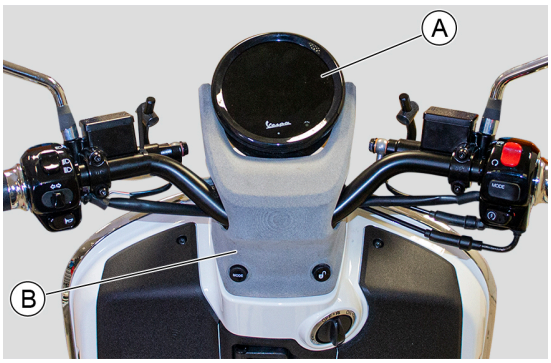
Disconnect the connector of the Keyless control unit.



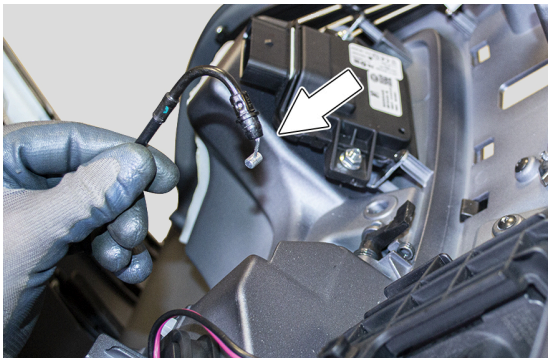


Remove the instrument cluster **(A)**.

Remove the rear and front leg shield back plate **(B)**.

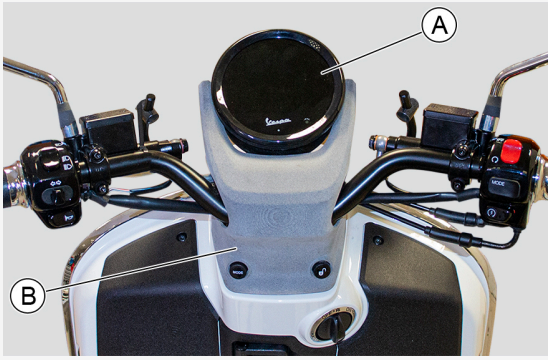


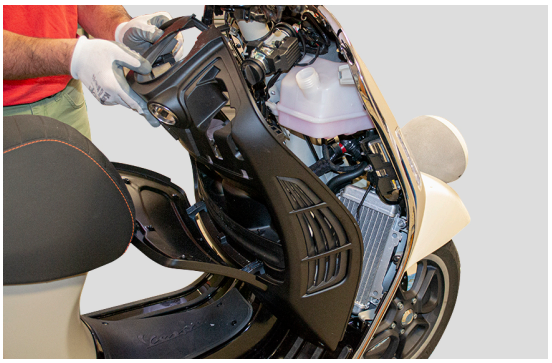




Remove the instrument cluster **(A)**.

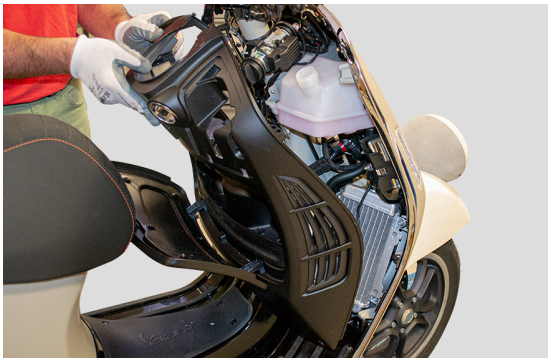
Remove the front and rear handlebar covers **(B)**.

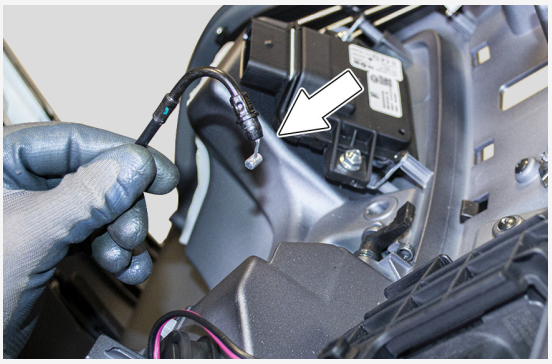


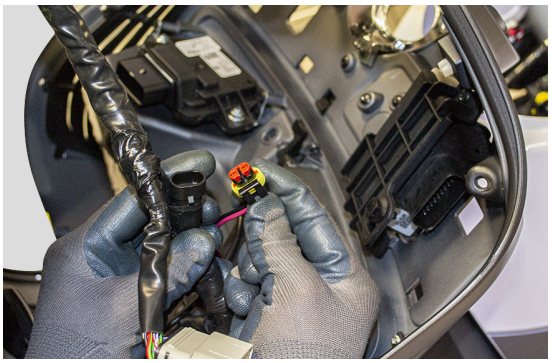


FITTING

Position the leg shield back plate on the body.

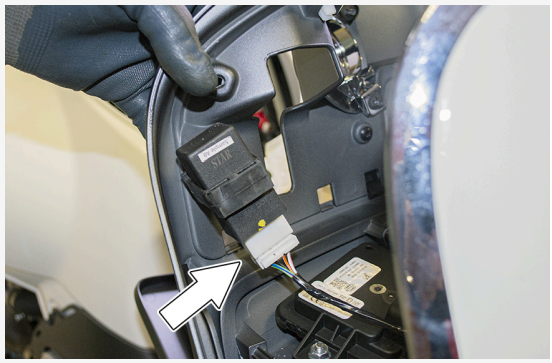


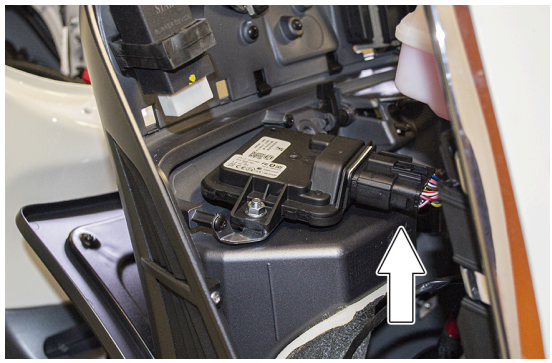














Insert and tighten the central screw inside the top case.

Leg shield back plate - Body shell	5.75 ± 1.25 Nm



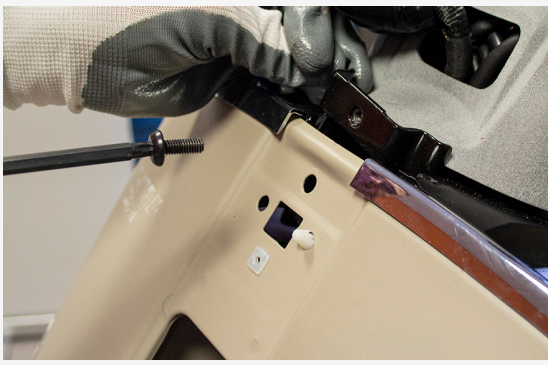




Working on the front side of the vehicle, insert the plate inside the shield.

Insert the central screw of the shield and tighten it to the prescribed torque.

Leg shield back plate - Body shell	5.75 ± 1.25 Nm





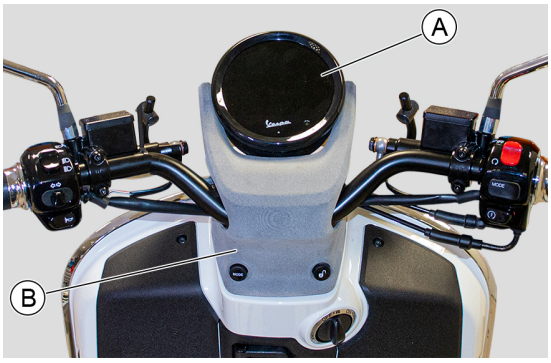






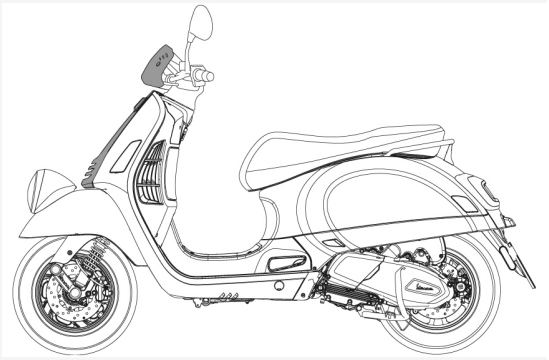
Fit the front handlebar cover and the rear one **(B)**.

Fit the instrument cluster **(A)**.



Fit the central cover.

Fit the windscreen.

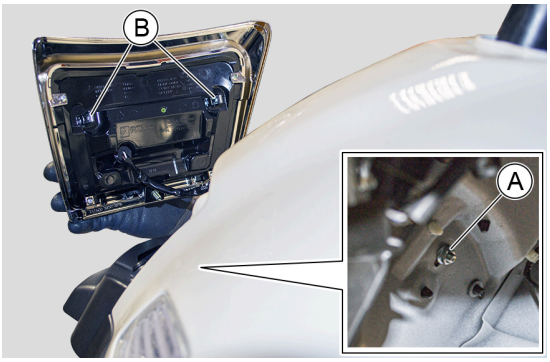


12.10 Rear light assembly

TAILLIGHT REMOVAL

Operating from the internal side of the rear body, unscrew and remove the nut **(A)** used to fasten the taillight to the body itself.

Pull slightly the headlamp towards the rear of the vehicle to remove it from their clamps **(B)**.



Disconnect the connector.

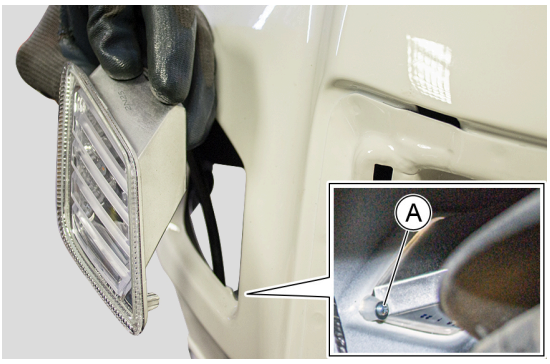


REAR TURN INDICATOR REMOVAL

The following operations are valid for both turn indicators.

Operating from the internal side of the rear body, unscrew and remove the screw **(A)** fixing the indicator to the body itself.

Remove the indicator and disconnect it from the connector.



FITTING

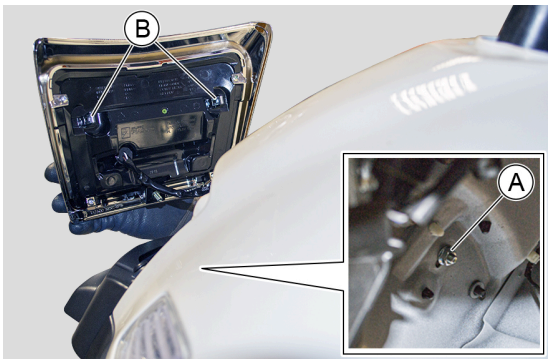
Support the light assembly and connect the connector.



Place the taillight on the body inserting the relative clamps **(B)** in the respective housings.

From the inside of the body, screw and tighten the nut **(A)** to the prescribed torque.

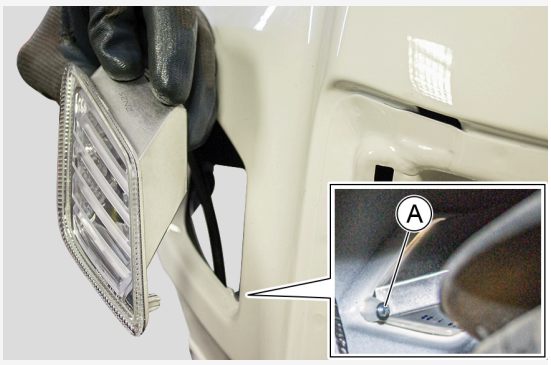
Taillight - Body	5.75 ± 1.25 Nm



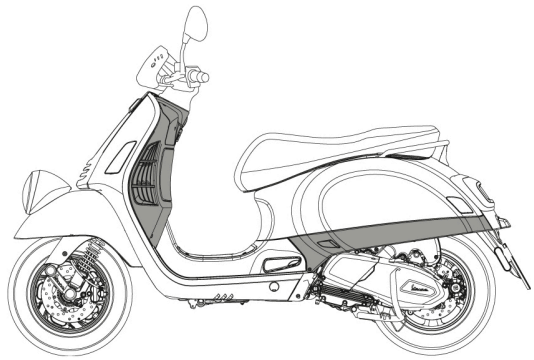
REAR TURN INDICATOR FITTING

The following operations are valid for both turn indicators.

Operating from the internal side of the rear body, insert and tighten the screw **(A)** fixing the indicator to the body itself.



12.11 footrests





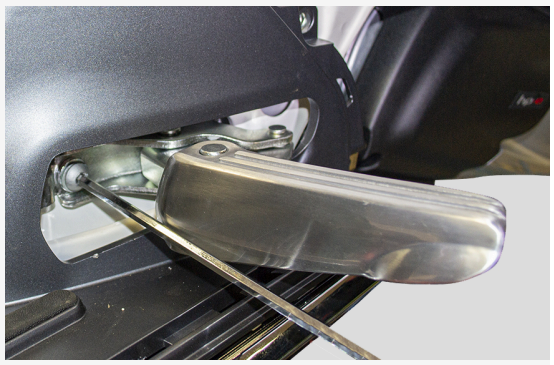














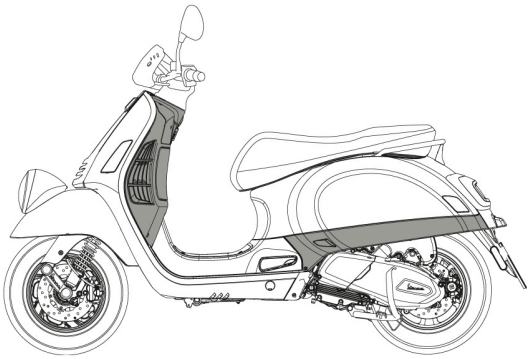






Footboard - Body	5.75 ± 1.25 Nm	

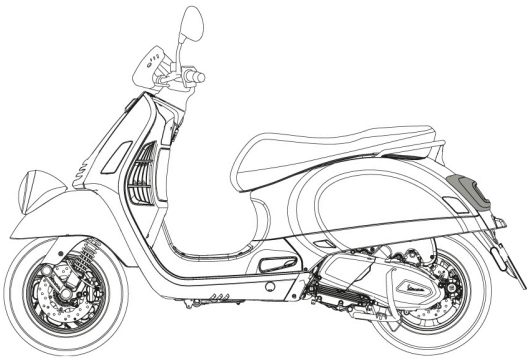


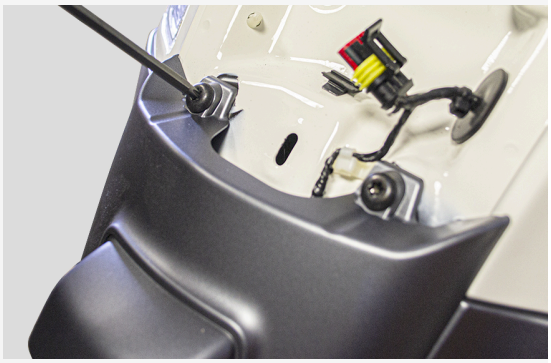


Passenger footrests - Body shell	19.5 ± 2.5 Nm

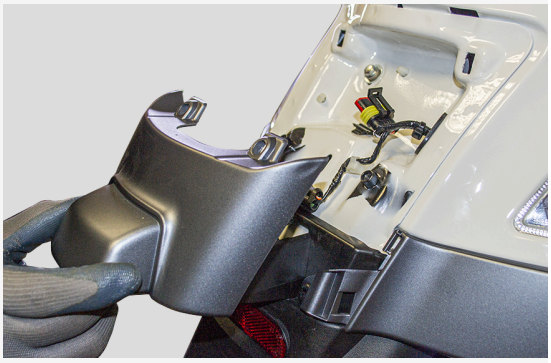


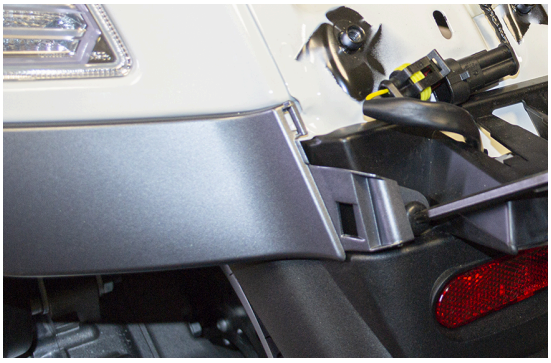
12.12 Side fairing

















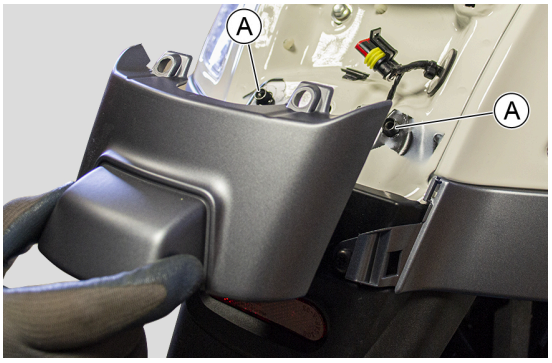


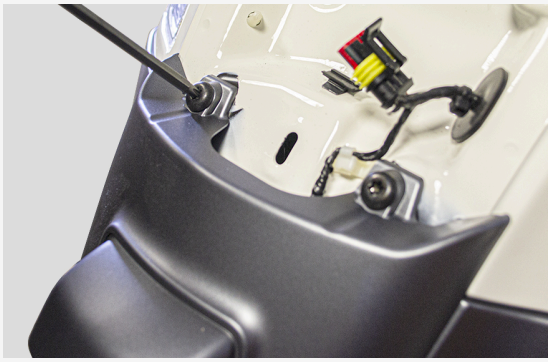
Side fairing - Body	5.75 ± 1.25 Nm

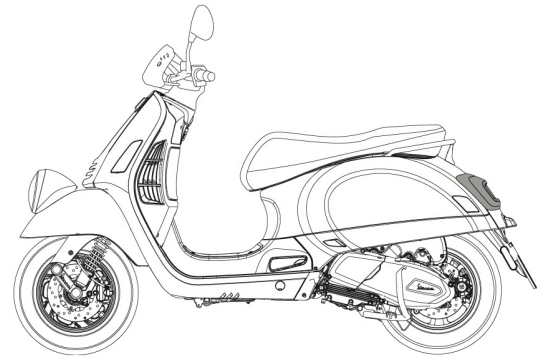




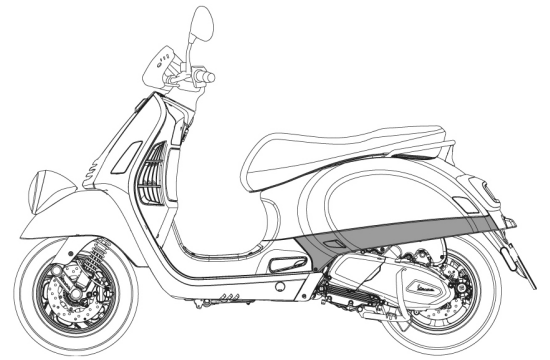


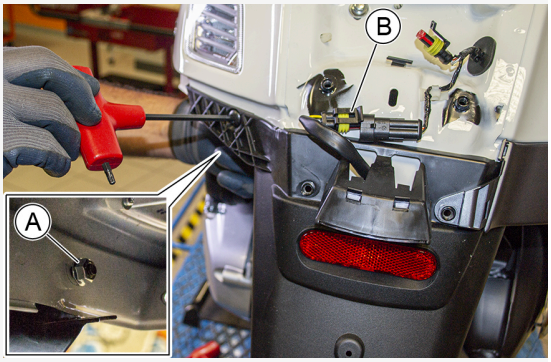


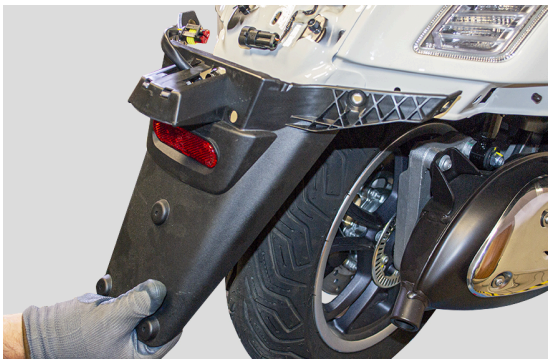


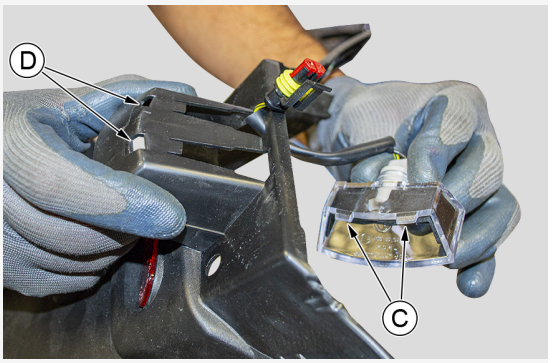


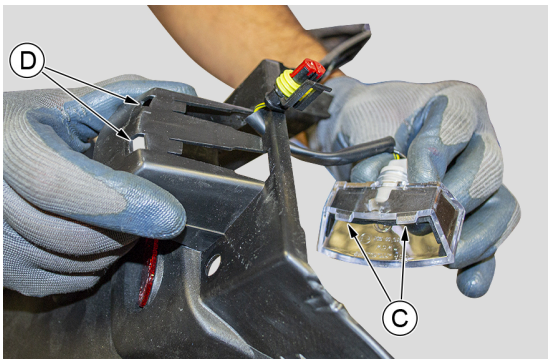
12.13 Licence plate mount



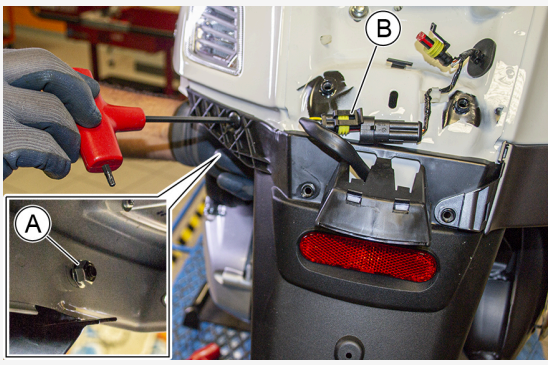


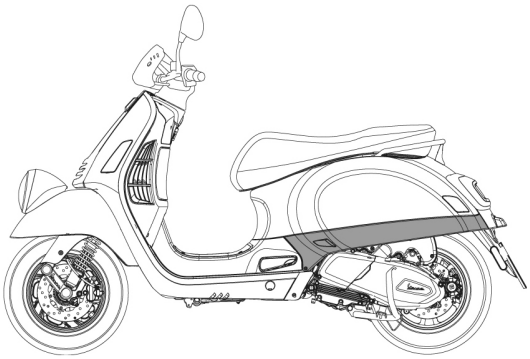




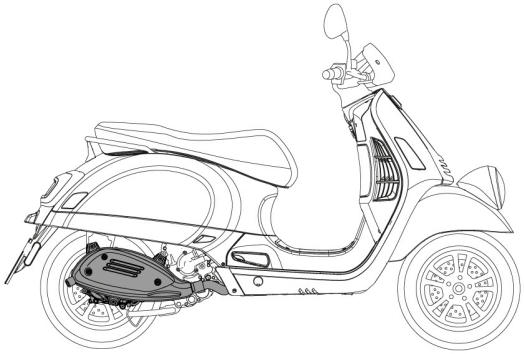


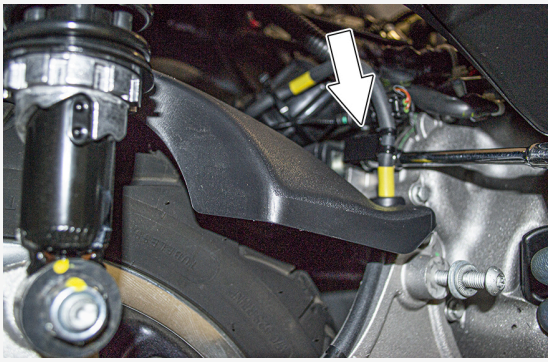
License plate mount - Body	5.75 ± 1.25 Nm

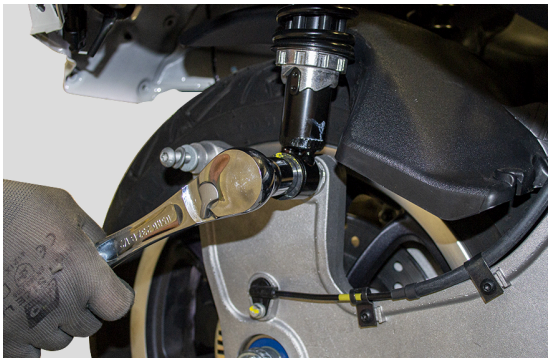




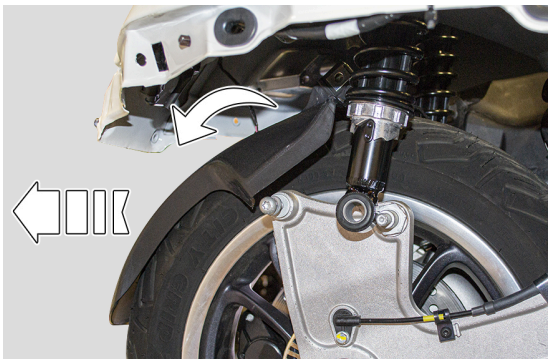
12.14 Rear mudguard

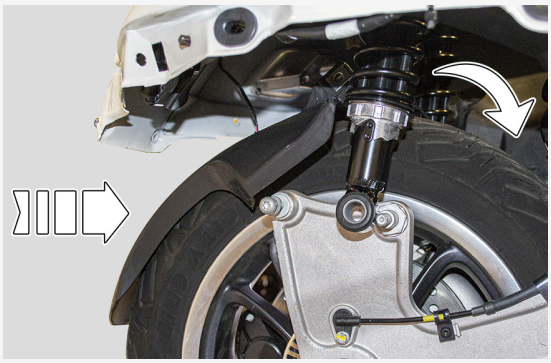










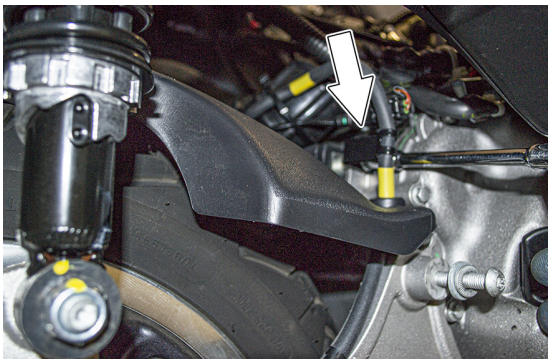


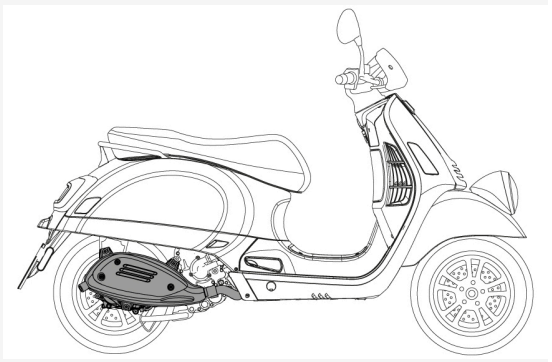
Air filter box - Engine	4.5 ± 0.5 Nm



Rear shock absorber - Silencer support bracket	42.5 ± 2.5 Nm



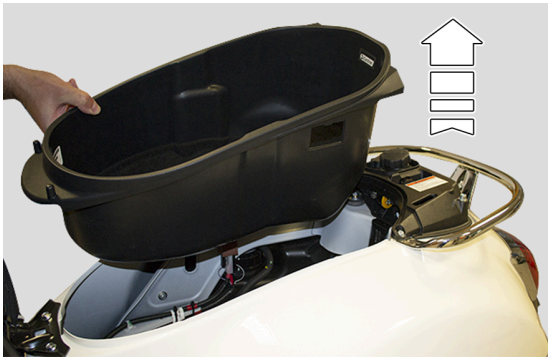




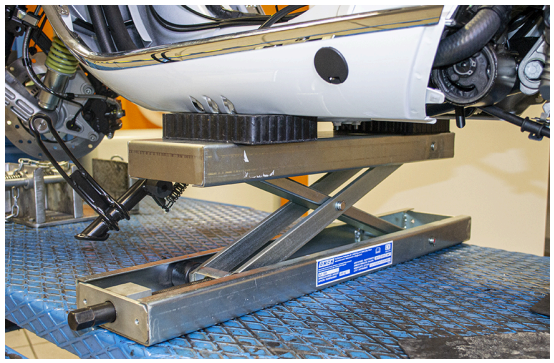
12.15 Helmet compartment

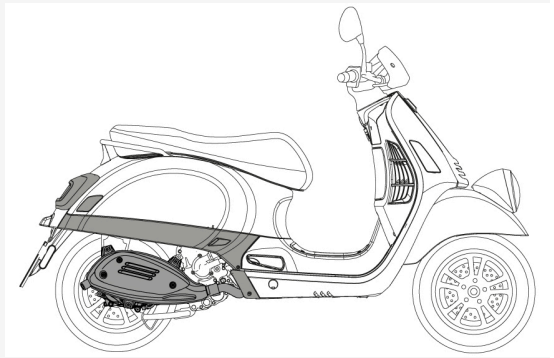
Rest the vehicle on its centre stand.

Lift the saddle and remove the helmet compartment by lifting it up.



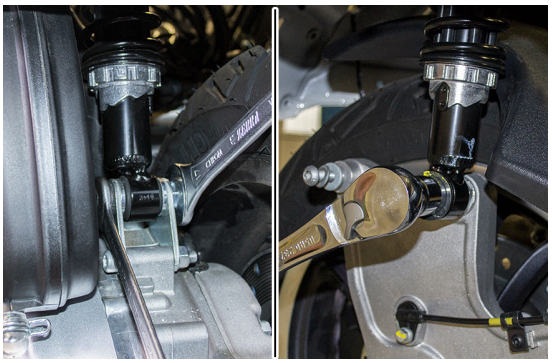
12.16 Fuel tank





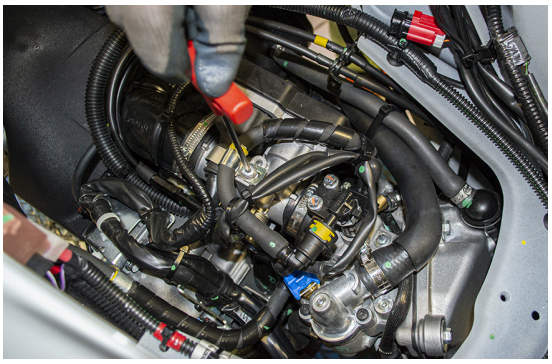




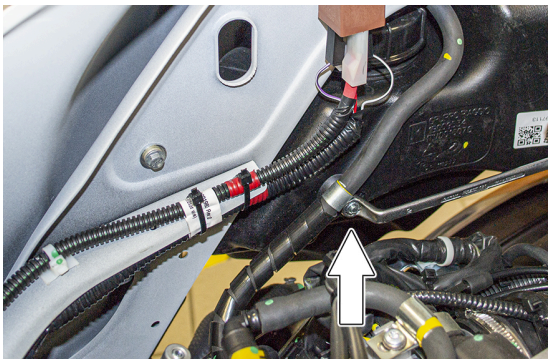


ATTENTION

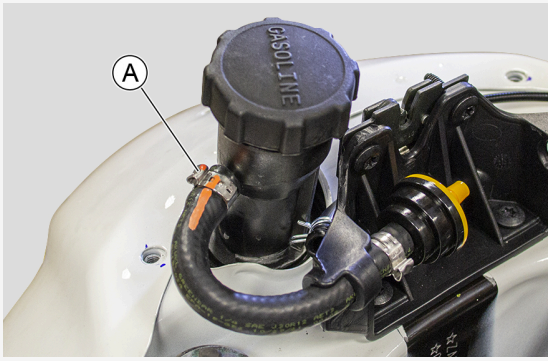
MAKE SURE THAT THE ELECTRIC CABLES AND PIPES ARE NOT SUBJECTED TO EXCESSIVE TENSION WHEN USING THE HOIST.



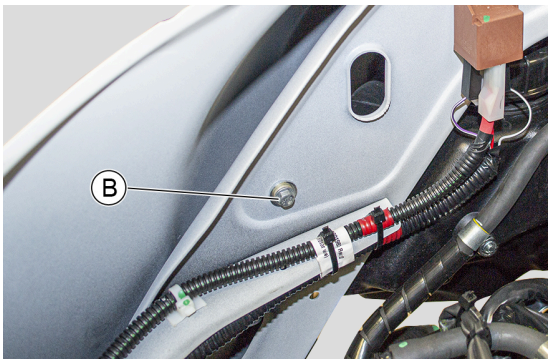




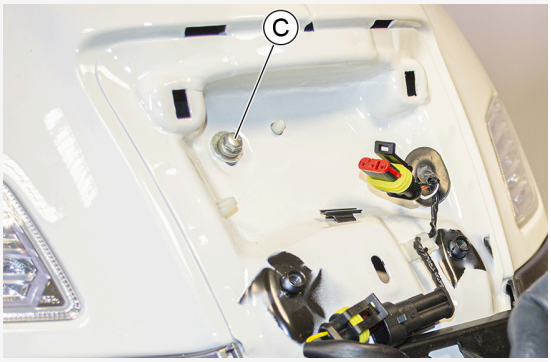
Remove the clamp **(A)** and disconnect the pipe at the tank neck.



Unscrew and remove the screw **(B)** fastening tank at the tank.



Unscrew and remove the rear fastening screw **(C)** under the rear light cluster's chrome-plated frame.



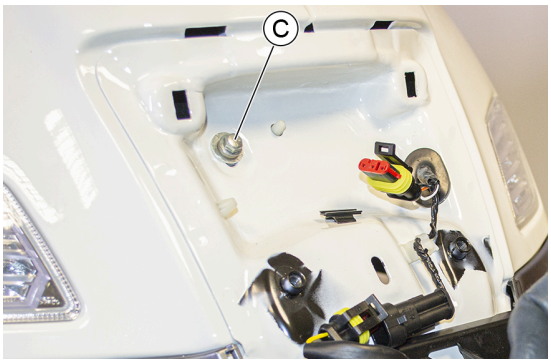


Fuel tank - Body shell	9 ± 1 Nm



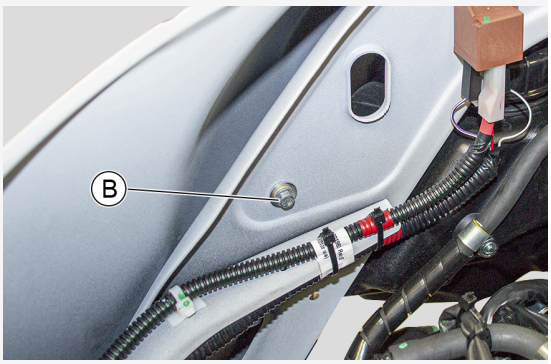
Insert the rear fixing **(C)** rear fastening in the rear light cluster housing and tighten to the specified torque.

Fuel tank - Body shell	9 ± 1 Nm

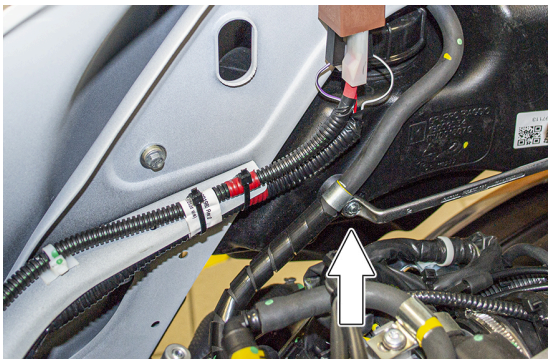


Insert and tighten to the specified torque the screw **(B)** fastening the tank at the front.

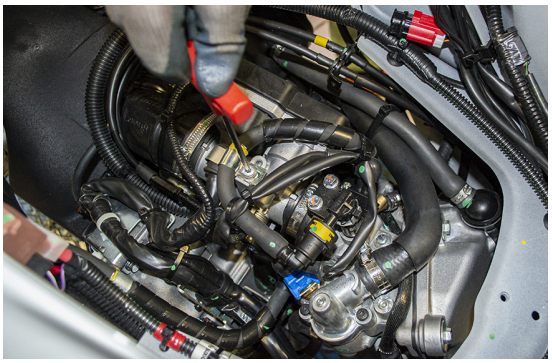
Fuel tank - Body shell	9 ± 1 Nm

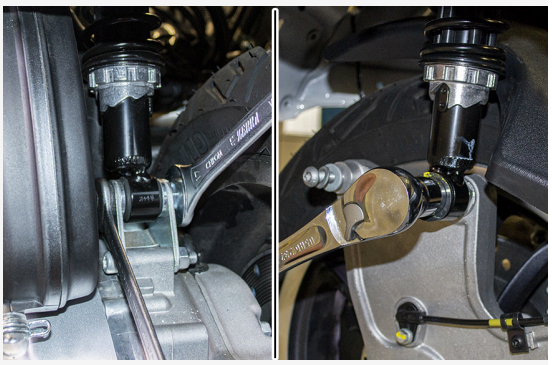


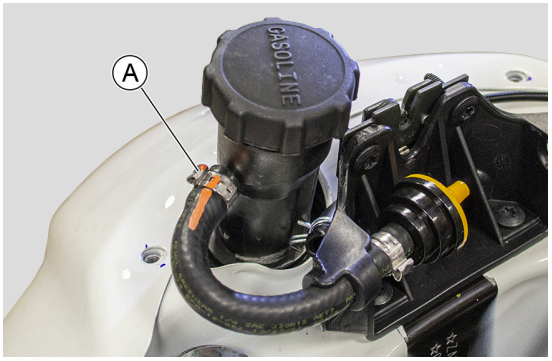
Fuel pipe - Fuel tank	5.75 ± 1.25 Nm



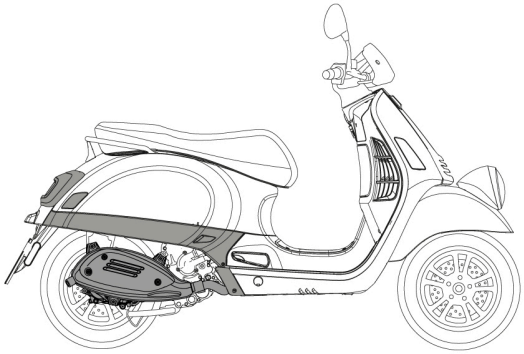












12.17 Front mudguard

REMOVAL

Remove the windscreen.

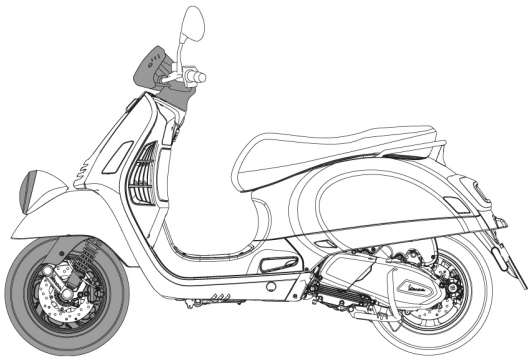
Remove the instrument cluster.

Remove the front and rear handlebar covers.

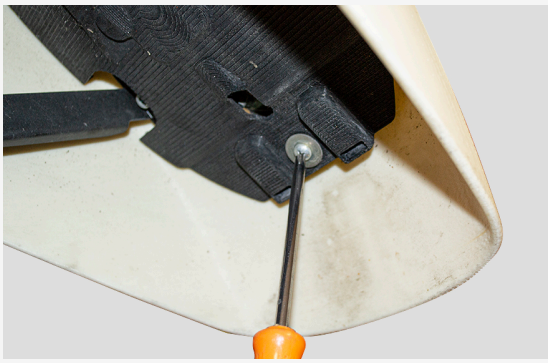
Remove the light assembly.

Remove the front wheel.

Remove the front shock absorber.



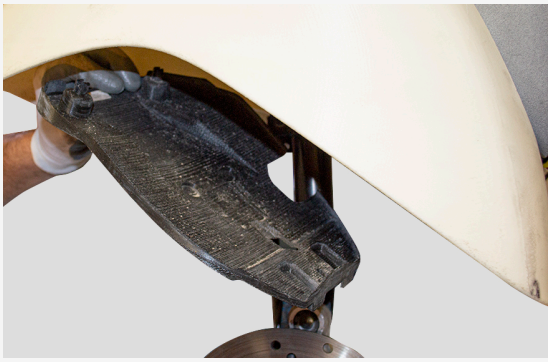
Unscrew the front splash guard fastening screw.



Unscrew the front splash guard fastening screws.



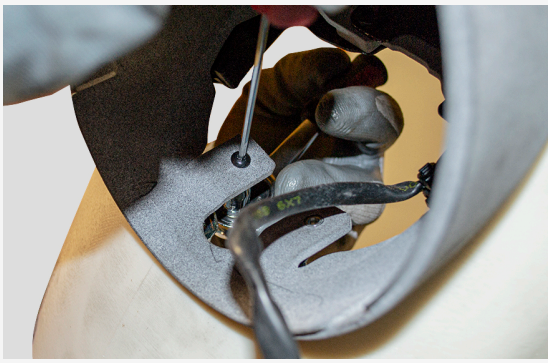
Remove the front splash guard.



Unscrew the three central headlamp cover fastening screws.



Undo the screws fastening the taillight to the front mudguard keeping from the opposite side, the two nuts.



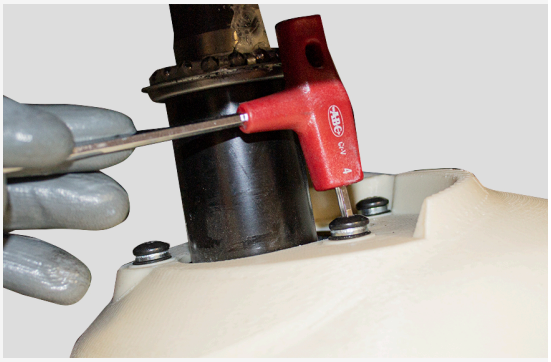
Remove the headlamp cover.



Remove the steering tube.

Unscrew and remove the front mudguard fixing screws.

Slide off the mudguard from the steering tube.



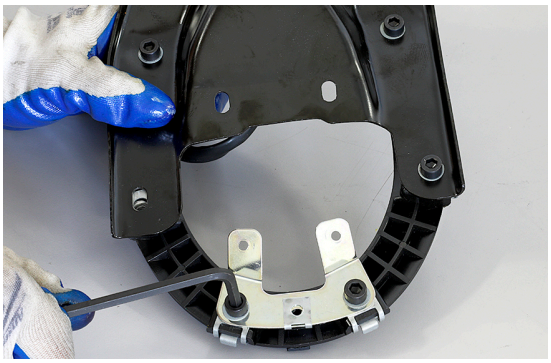
Unscrew the screw used to fasten the support bracket to the suspension flange.



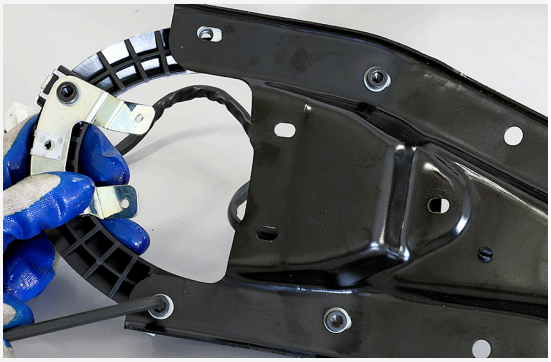
Remove the complete headlight support bracket.



Unscrew the retaining bracket fastening screws and remove it.



Unscrew the screws used to fasten the flange suspension to the support bracket.



Undo the screws used to fasten the support bracket to the steering tube.

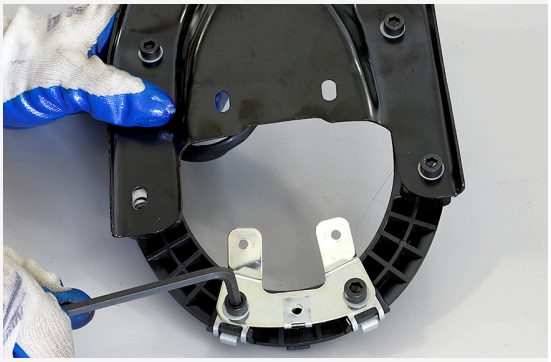


FITTING

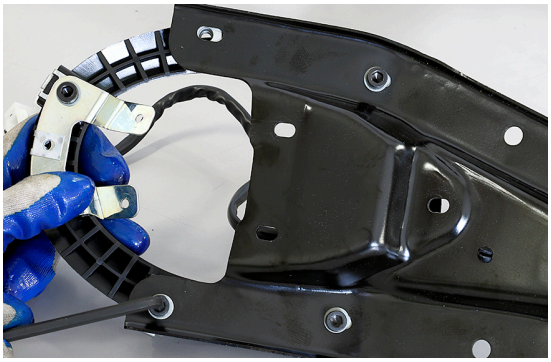
Insert the screws used to fasten the support bracket to the steering tube, without tightening them.



Tighten the screws used to fasten the retaining bracket to the flange.



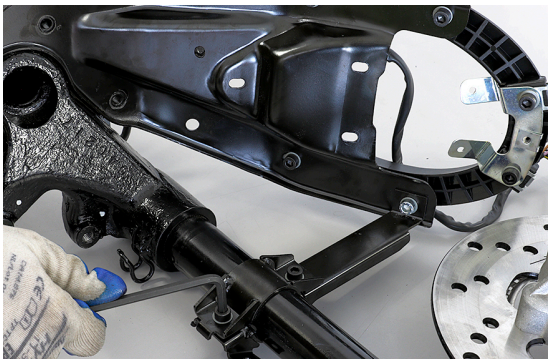
Fasten the complete flange to the headlight support bracket.



Tighten the screw used to fasten the bracket to the headlight support.



Apply the final tightening torque to the screws used to fasten the support bracket to the steering tube.



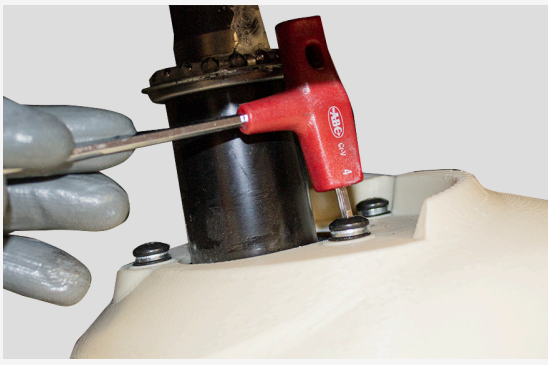
Insert the front mudguard in its housing.

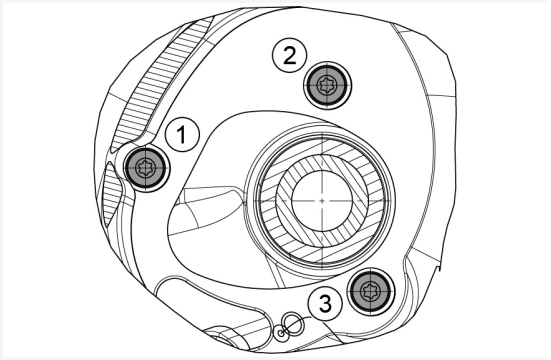
Insert and tighten to the prescribed torque, the front mudguard fixing screws in the sequence shown in the figure.

Front mudguard – Steering tube	6.2 ± 0.3 Nm

Tighten again to the prescribed torque and same sequence.

Insert the steering tube.



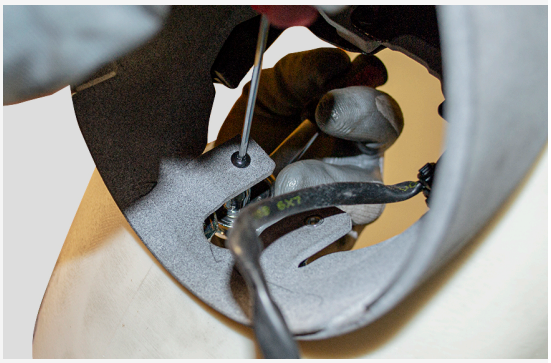


Position the headlamp cover on the front mudguard.

Tighten the rear fixing screw.



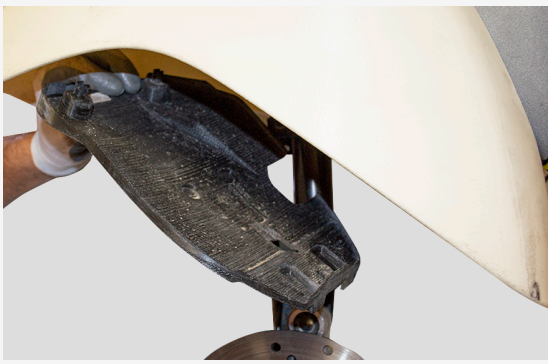
Insert and tighten the screws fastening the taillight to the front mudguard keeping from the opposite side, the two nuts.



Insert and tighten the central headlamp cover fastening screws.



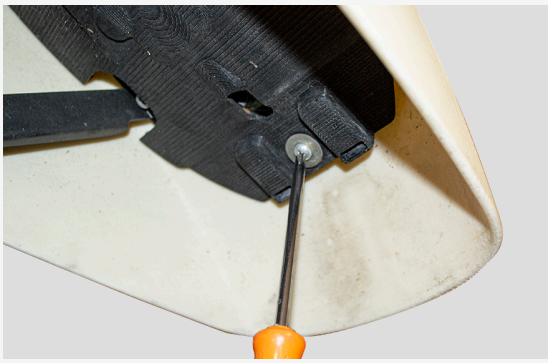
Insert the front splash guard in its housing.



Insert and tighten the screws used to fasten the front splash guard to the headlight support bracket.



Insert and tighten the front splash guard central fastening screw.



Fit the front shock absorber.

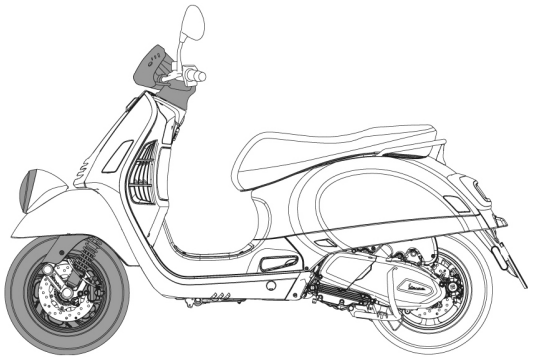
Fit the front wheel.

Fit the front headlight assembly.

Fit the front and rear handlebar covers.

Fit the instrument cluster.

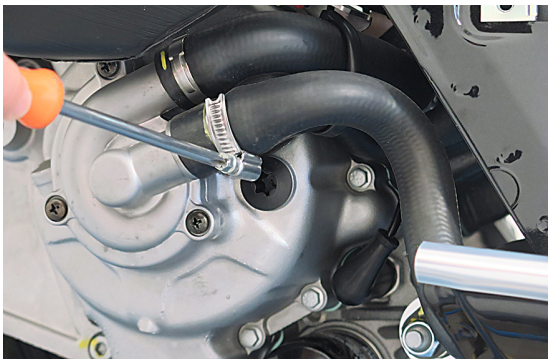
Fit the windscreen.



12.18 Electric fan radiator

REMOVAL

- In order to carry out any operation on the radiator unit, flow out the coolant in the coolant delivery pipe in the pump.

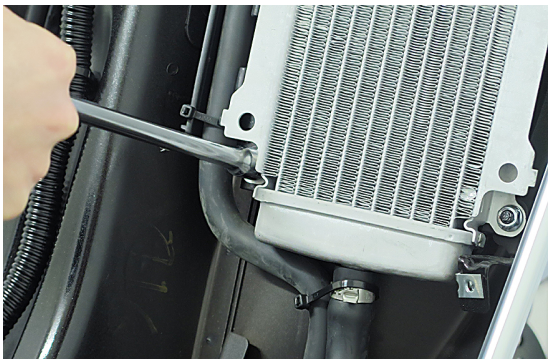


Remove the leg shield back plate.

Remove the cooling hoses plastic retaining clamps.



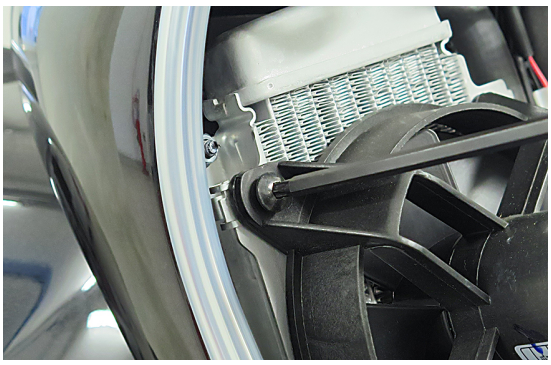
Unscrew and remove the nuts and screw fastening the right radiator.



Disconnect the electric fan connector.



Unscrew and remove the electric fan fixing screws to the left radiator.



Remove the electric fan.

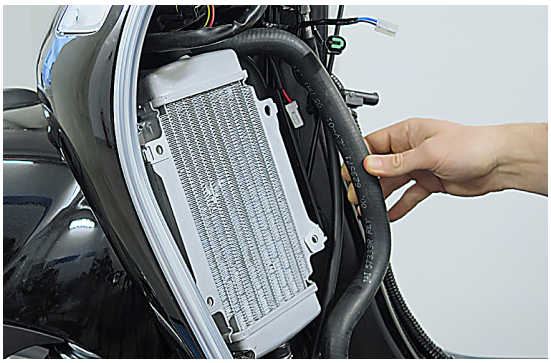


Remove the hose from its seat.

Unscrew and remove the nuts and screw fastening the left radiator.

Remove the clamps of the connection hoses to the right and left radiators.

Remove the radiators.



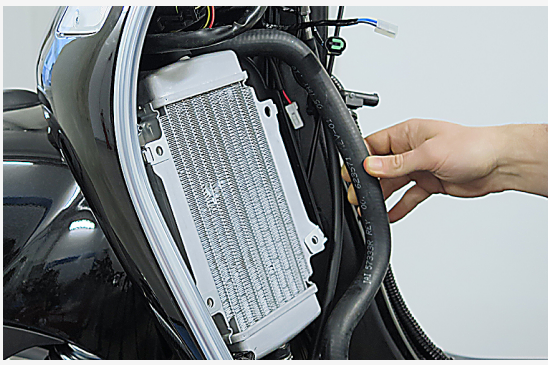
FITTING

Position the radiators in their seats.

Insert the fluid inlet and outlet hoses to the radiators.

Fasten the connection hoses to the right and left radiators with new clamps.

Insert the hose in its seat.



Position the electric fan in its housing on the left radiator.

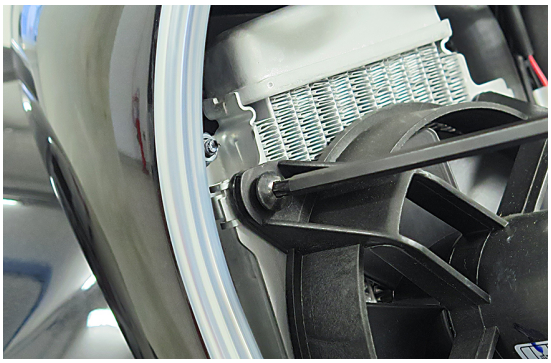


Connect the electric fan connector.



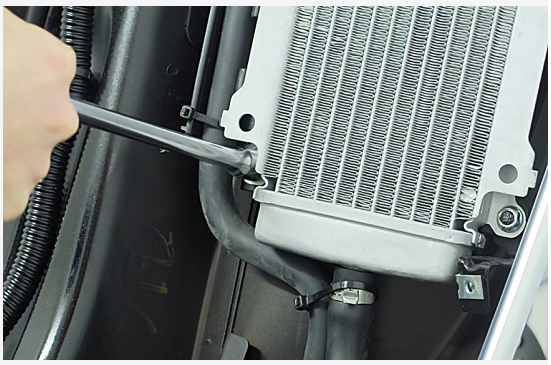
Install the screws that fasten the electric fan to the left-hand radiator and tighten them to the specified torque.

Electric fan - Radiator	5.75 ± 1.25 Nm



Fit and tighten the attachment screw and fixing nuts of the right-hand radiator to the specified torque.

Radiator - Body shell	5.75 ± 1.25 Nm



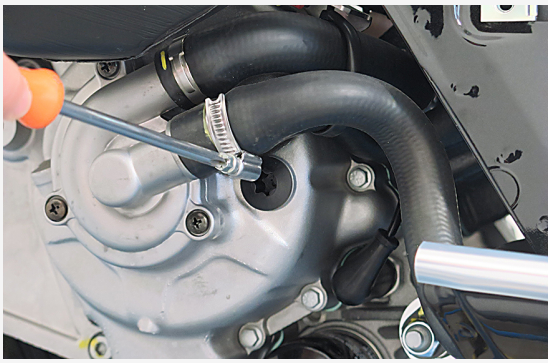
Insert the new cooling hoses plastic retaining clamps.

Reassemble the leg shield back plate.



Fasten the fluid inlet hose to the pump.

Pipe clamp	2.75 ± 0.25 Nm



Fill the system.

12.19 Front centre 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.



Insert and tighten the screw fixing the central cover to the frame.



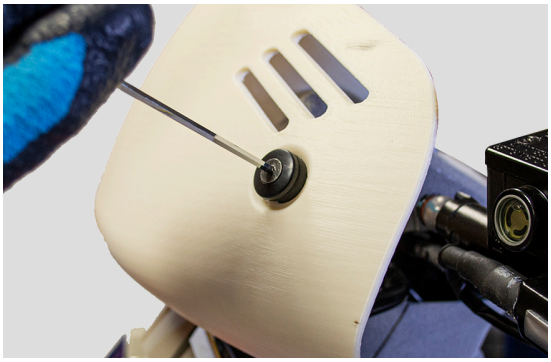
Put back the clip-on badge.



12.20 Lower windshield - windshield

REMOVAL

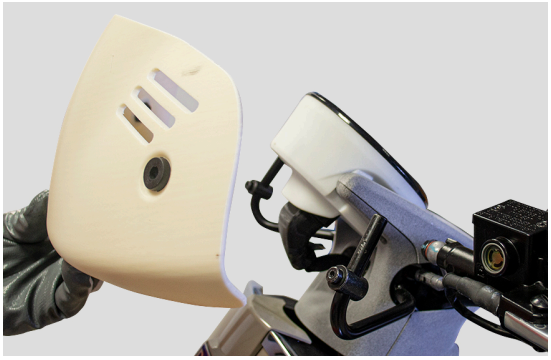
Unscrew the screws used to fasten the windshield to its support on both sides.



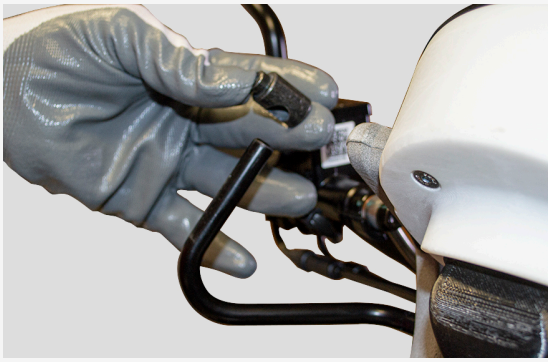
Remove the special washers.



Remove the windscreen.

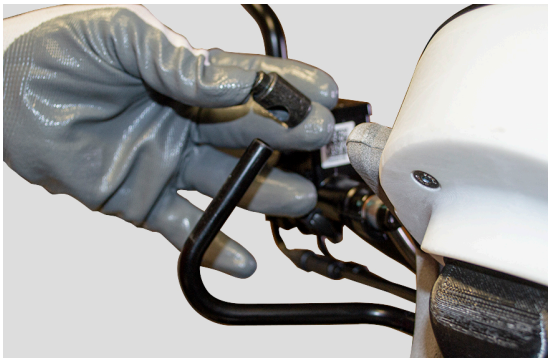


Remove from both sides the fixing bushings.

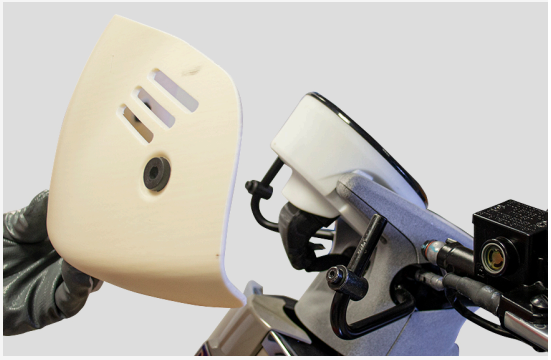


FITTING

Insert the bushings fixing the windshield on the support.



Place the windshield on the bushings fitted previously.



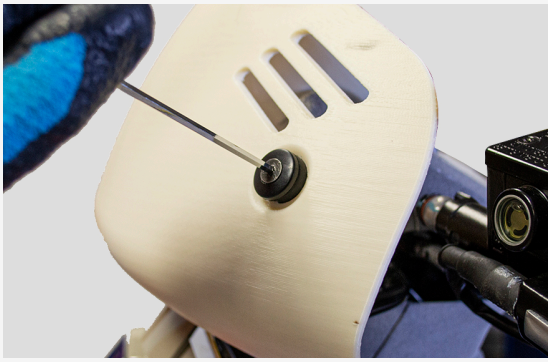
Insert the special washers on the fastening screws.

Insert the screws from both sides.



Tighten the screws to the prescribed torque.

Top fairing - Top fairing support	5.75 ± 1.25 Nm



12.21 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.

ATTENTION

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 state of the battery charge.

Follow the instructions in this manual.

Insert the new battery in its seat as shown in the figure.

Battery 12V-10Ah



Screw in the fixing screw of the positive pole «**+**» to the battery.



Screw in the fixing screw of the negative pole «**-**» to the battery.



ATTENTION

IT IS IMPORTANT TO OBSERVE THE INDICATED CONNECTION SEQUENCE OF THE CABLES AT THE BATTERY TO AVOID SHORT-CIRCUITS. WHEN FITTING THE NEW BATTERY, FIRST CONNECT THE POSITIVE CABLE «+» AND THEN THE NEGATIVE CABLE «-».

ATTENTION



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.

Battery bracket – Footrest	5.75 ± 1.25	Nm

Put back the chassis central cover.

